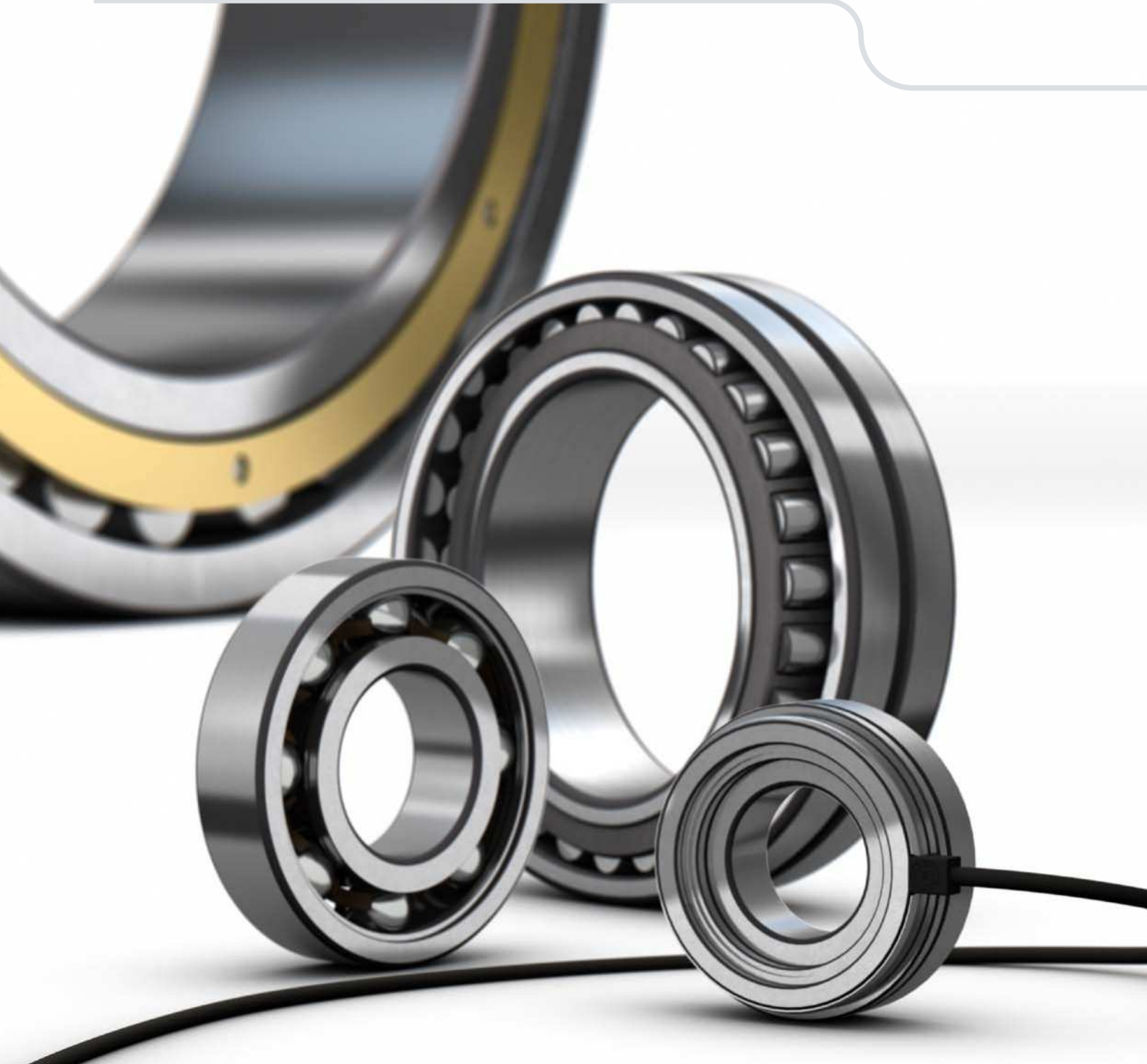
# Rolling bearings



# SKF mobile apps

SKF mobile apps are available from both Apple App Store and Google Play. These apps provide useful information and allow you to make critical calculations, providing SKF Knowledge Engineering at your fingertips.

*Apple App Store*

To download a PDF document of this catalogue and for information about important updates, go to skf.com/go/17000. Please note product data in this printed catalogue was accurate on the day of printing. The latest and most accurate product data is always available for you on skf.com.

*Google Play*

**skf.com**

® SKF, Duoflex, CARB, ICOS, INSOCOAT, KMT, KMTA, Monoflex, Multiflex, NoWear, SensorMount, SKF Explorer, SYSTEM 24 and Wave are registered trademarks of the SKF Group.

AMP Superseal 1.6 Series is a trademark of the TE connectivity family of companies .

Apple is a trademark of Apple Inc., registered in the US and other countries.

Google Play is a trademark of Google Inc.

© SKF Group 2018
The contents of this publication are the copyright of the publisher and may not be reproduced (even extracts) unless prior written permission is granted. Every care has been taken to ensure the accuracy of the information contained in this publication but no liability can be accepted for any loss or damage whether direct, indirect or consequential arising out of the use of the information contained herein.

**PUB BU/P1 17000/1 EN** · October 2018

This publication supersedes publication 10000 EN.

# Rolling bearings

# Contents


Unit conversions . . . . . 6
Foreword . . . . . 7
What is new in this edition . . . . . 8
Catalogue information and how to use it . . . . . 10
Units of measurement . . . . . 11
Rotating equipment performance . . . . . 12
SKF Care . . . . . 13

## Principles of rolling bearing selection 15

## General bearing knowledge . . . . . 17

**A.1 Bearing basics** . . . . . **19**
Why rolling bearings? . . . . . 20
Terminology . . . . . 22
Components and materials . . . . . 24
Internal clearance . . . . . 26
Heat and surface treatment . . . . . 27
Standardized boundary dimensions . . . . . 28
Basic bearing designation system . . . . . 29

**A.2 Tolerances** . . . . . **35**
Tolerance values . . . . . 36
Tolerance symbols . . . . . 36
Diameter series identification . . . . . 37
Chamfer dimensions . . . . . 37
Rounding values . . . . . 55

**A.3 Storage** . . . . . **57**

## Bearing selection process . . . . . 59

**Bearing selection process, introduction** . . . . . **60**

**B.1 Performance and operating conditions** . . . . . **65**

**B.2 Bearing type and arrangement** . . . . . **69**
Arrangements and their bearing types . . . . . 70
Selection criteria . . . . . 77

**B.3 Bearing size** . . . . . **85**
Size selection based on rating life . . . . . 88
Size selection based on static load . . . . . 104
Requisite minimum load . . . . . 106
Checklist after the bearing size is determined . . . . . 106
SKF life testing . . . . . 107

**B.4 Lubrication** . . . . . **109**
Selecting grease or oil . . . . . 110
Selecting a suitable grease . . . . . 116
Selecting a suitable oil . . . . . 120
SKF bearing grease selection chart . . . . . 124
Technical specifications for SKF greases . . . . . 126

**B.5 Operating temperature and speed** . . . . . **129**
Thermal equilibrium . . . . . 131
Bearing friction, power loss and starting torque . . . . 132
Estimating bearing operating temperature . . . . . 133
Speed limitations . . . . . 135

**B.6 Bearing interfaces** . . . . . **139**
The ISO tolerance system . . . . . 140
Selecting fits . . . . . 140
Tolerances for bearing seats and abutments . . . . . 144
Surface texture of bearing seats . . . . . 147
Seat tolerances for standard conditions . . . . . 148
Tolerances and resultant fits . . . . . 153
Provisions for mounting and dismounting . . . . . 176
Axial location of bearing rings . . . . . 178
Radially free mounted bearings for axial load . . . . . 179
Raceways on shafts and in housings . . . . . 179

**B.7 Bearing execution** . . . . . **181**
Selecting internal clearance or preload . . . . . 182
Bearing tolerance class . . . . . 187
Cages . . . . . 187
Integral sealing . . . . . 189
Additional options . . . . . 189

**B.8 Sealing, mounting and dismounting** . . . . . **193**
External sealing . . . . . 194
Mounting and dismounting . . . . . 199
Inspection and monitoring . . . . . 211

## Bearing selection examples ..... 215

**C.1 Vibrating screen** ..... **216**

**C.2 Rope sheave** ..... **222**

**C.3 Centrifugal pump** ..... **228**

# Product data 237

## Ball bearings

**1 Deep groove ball bearings** ..... **239**
Designs and variants ..... 241
Bearing data ..... 250
Loads ..... 254
Temperature limits ..... 256
Permissible speed ..... 256
Designation system ..... 258
Product tables ..... 260

**2 Insert bearings (Y-bearings)** ..... **339**
Designs and variants ..... 341
Lubrication ..... 348
Bearing data ..... 350
Loads ..... 353
Temperature limits ..... 355
Permissible speed ..... 355
Design considerations ..... 356
Mounting and dismounting ..... 359
Designation system ..... 364
Product tables ..... 366

**3 Angular contact ball bearings** ..... **383**
Designs and variants ..... 385
Bearing data ..... 392
Loads ..... 398
Temperature limits ..... 402
Permissible speed ..... 402
Design considerations ..... 403
Designation system ..... 404
Product tables ..... 406

**4 Self-aligning ball bearings** ..... **437**
Designs and variants ..... 439
Bearing data ..... 443
Loads ..... 445
Temperature limits ..... 445
Permissible speed ..... 446
Design considerations ..... 446
Mounting ..... 447
Designation system ..... 449
Product tables ..... 450

**5 Thrust ball bearings** ..... **465**
Designs and variants ..... 467
Bearing data ..... 469
Loads ..... 469
Temperature limits ..... 470
Permissible speed ..... 470
Mounting ..... 470
Designation system ..... 471
Product tables ..... 472

## Roller bearings

**6 Cylindrical roller bearings** ..... **493**
Designs and variants ..... 496
Bearing data ..... 504
Loads ..... 509
Temperature limits ..... 511
Permissible speed ..... 511
Design considerations ..... 512
Mounting ..... 512
Designation system ..... 514
Product tables ..... 516

**7 Needle roller bearings** ..... **581**
Designs and variants ..... 583
Bearing data ..... 598
Loads ..... 606
Temperature limits ..... 608
Permissible speed ..... 608
Design considerations ..... 609
Mounting ..... 611
Designation system ..... 612
Product tables ..... 614

**8 Tapered roller bearings** ..... **665**
Designs and variants ..... 669
Bearing data ..... 676
Loads ..... 680
Temperature limits ..... 685
Permissible speed ..... 686
Design considerations ..... 687
Mounting ..... 690
Bearing designations ..... 691
Designation system ..... 692
Product tables ..... 694

**9 Spherical roller bearings** ..... **773**
Designs and variants ..... 775
Bearing data ..... 781
Loads ..... 784
Temperature limits ..... 785
Permissible speed ..... 785
Design considerations ..... 786
Mounting ..... 788
Designation system ..... 790
Product tables ..... 792

**10 CARB toroidal roller bearings** . . . . . **841**
Designs and variants . . . . . 844
Bearing data . . . . . 846
Loads . . . . . 849
Temperature limits . . . . . 850
Permissible speed . . . . . 850
Design considerations . . . . . 850
Mounting . . . . . 853
Designation system . . . . . 855
Product tables . . . . . 856

**11 Cylindrical roller thrust bearings** . . . . . **877**
Designs and variants . . . . . 879
Bearing data . . . . . 881
Loads . . . . . 884
Temperature limits . . . . . 884
Permissible speed . . . . . 884
Design considerations . . . . . 885
Designation system . . . . . 886
Product table . . . . . 888

**12 Needle roller thrust bearings** . . . . . **895**
Designs and variants . . . . . 896
Bearing data . . . . . 899
Loads . . . . . 902
Temperature limits . . . . . 902
Permissible speed . . . . . 902
Design considerations . . . . . 903
Designation system . . . . . 904
Product tables . . . . . 906

**13 Spherical roller thrust bearings** . . . . . **913**
Designs and variants . . . . . 915
Bearing data . . . . . 916
Loads . . . . . 917
Temperature limits . . . . . 918
Permissible speed . . . . . 918
Design considerations . . . . . 918
Lubrication . . . . . 919
Mounting . . . . . 920
Designation system . . . . . 921
Product table . . . . . 922

## Track rollers

**14 Cam rollers** . . . . . **931**
Designs and variants . . . . . 933
Bearing data . . . . . 934
Loads . . . . . 935
Temperature limits . . . . . 936
Speed limits . . . . . 936
Design considerations . . . . . 936
Designation system . . . . . 937
Product tables . . . . . 938

**15 Support rollers** . . . . . **943**
Designs and variants . . . . . 945
Lubrication . . . . . 947
Bearing data . . . . . 948
Loads . . . . . 949
Temperature limits . . . . . 950
Speed limits . . . . . 950
Design considerations . . . . . 950
Mounting . . . . . 951
Designation system . . . . . 952
Product tables . . . . . 954

**16 Cam followers** . . . . . **963**
Designs and variants . . . . . 965
Accessories . . . . . 968
Lubrication . . . . . 971
Bearing data . . . . . 972
Loads . . . . . 973
Temperature limits . . . . . 974
Speed limits . . . . . 974
Design considerations . . . . . 974
Mounting . . . . . 975
Designation system . . . . . 976
Product table . . . . . 978

## Engineered products

**17 Sensor bearing units** . . . . . **987**
Motor encoder units . . . . . 988
Roller encoder units . . . . . 996
Rotor positioning sensor bearing units . . . . . 998
Rotor positioning bearings . . . . . 1000
Product table . . . . . 1002

**18 High temperature bearings** . . . . . **1005**
Deep groove ball bearings for high temperature applications . . . . . 1008
Insert bearings for high temperature applications . . . 1010
Bearing data . . . . . 1011
Loads and selecting bearing size . . . . . 1012
Design considerations . . . . . 1013
Relubrication and running in . . . . . 1014
Mounting . . . . . 1014
Designation system . . . . . 1014
Product tables . . . . . 1016

**19 Bearings with Solid Oil** . . . . . **1023**
Designs and variants . . . . . 1025
Bearing data . . . . . 1025
Loads . . . . . 1026
Temperature limits . . . . . 1026
Speed limits . . . . . 1026
Friction characteristics . . . . . 1027
Mounting . . . . . 1027
Designation system . . . . . 1027

**20 INSOCOAT bearings** . . . . . **1029**
Designs and variants . . . . . 1031
Bearing data . . . . . 1033
Loads . . . . . 1034
Temperature limits . . . . . 1034
Permissible speed . . . . . 1034
Design considerations . . . . . 1035
Mounting . . . . . 1035
Designation system . . . . . 1035
Product tables . . . . . 1036

**21 Hybrid bearings** . . . . . **1043**
Designs and variants . . . . . 1045
Bearing data . . . . . 1047
Loads . . . . . 1048
Temperature limits . . . . . 1048
Permissible speed . . . . . 1048
Designation system . . . . . 1049
Product tables . . . . . 1050

**22 NoWear coated bearings** . . . . . **1059**
Designs and variants . . . . . 1061
Bearing data . . . . . 1062
Bearing service life . . . . . 1062
Loads . . . . . 1062
Temperature limits . . . . . 1062
Permissible speed . . . . . 1062
Lubrication . . . . . 1062
Designation system . . . . . 1062

## Bearing accessories

**23 Adapter sleeves** . . . . . **1065**
Designs and variants . . . . . 1067
Product data . . . . . 1070
Designation system . . . . . 1071
Product tables . . . . . 1072

**24 Withdrawal sleeves** . . . . . **1087**

**25 Lock nuts** . . . . . **1089**
Designs and variants . . . . . 1090
Product data . . . . . 1098
Installation and removal . . . . . 1100
Designation system . . . . . 1103
Product tables . . . . . 1104

# Indexes

**Text index** . . . . . **1120**

**Product index** . . . . . **1136**

# Unit conversions

| Quantity | Unit | Conversion | | | |
|---|---|---|---|---|---|
| **Length** | inch | 1 mm | 0.03937 in | 1 in | 25,4 mm |
| | foot | 1 m | 3.281 ft | 1 ft | 0,3048 m |
| | yard | 1 m | 1.094 yd | 1 yd | 0,9144 m |
| | mile | 1 km | 0.6214 mi | 1 mi | 1,609 km |
| **Area** | square inch | 1 $mm^2$ | 0.00155 $in^2$ | 1 $in^2$ | 645,16 $mm^2$ |
| | square foot | 1 $m^2$ | 10.76 $ft^2$ | 1 $ft^2$ | 0,0929 $m^2$ |
| **Volume** | cubic inch | 1 $cm^3$ | 0.061 $in^3$ | 1 $in^3$ | 16,387 $cm^3$ |
| | cubic foot | 1 $m^3$ | 35 $ft^3$ | 1 $ft^3$ | 0,02832 $m^3$ |
| | imperial gallon | 1 l | 0.22 gallon | 1 gallon | 4,5461 l |
| | US gallon | 1 l | 0.2642 US gallon | 1 US gallon | 3,7854 l |
| **Speed, velocity** | foot per second | 1 m/s | 3.28 ft/s | 1 ft/s | 0,3048 m/s |
| | mile per hour | 1 km/h | 0.6214 mph | 1 mph | 1,609 km/h |
| **Mass** | ounce | 1 g | 0.03527 oz | 1 oz | 28,35 g |
| | pound | 1 kg | 2.205 lb | 1 lb | 0,45359 kg |
| | short ton | 1 tonne | 1.1023 short ton | 1 short ton | 0,90719 tonne |
| | long ton | 1 tonne | 0.9842 long ton | 1 long ton | 1,0161 tonne |
| **Density** | pound per cubic inch | 1 $g/cm^3$ | 0.0361 $lb/in^3$ | 1 $lb/in^3$ | 27,68 $g/cm^3$ |
| **Force** | pound-force | 1 N | 0.225 lbf | 1 lbf | 4,4482 N |
| **Pressure, stress** | pounds per square inch | 1 MPa | 145 psi | 1 psi | 6,8948 × $10^3$ Pa |
| | | 1 $N/mm^2$ | 145 psi | | |
| | | 1 bar | 14.5 psi | 1 psi | 0,068948 bar |
| **Moment** | pound-force inch | 1 Nm | 8.85 lbf-in | 1 lbf-in | 0,113 Nm |
| **Power** | foot-pound per second | 1 W | 0.7376 ft-lb/s | 1 ft-lb/s | 1,3558 W |
| | horsepower | 1 kW | 1.36 hp | 1 hp | 0,736 kW |
| **Temperature** | degree | Celsius | $t_C = 0.555\ (t_F - 32)$ | Fahrenheit | $t_F = 1{,}8\ t_C + 32$ |

# Foreword

This catalogue contains detailed information on SKF rolling bearings that are typically used in industrial applications. It also includes information on engineered products such as:

- motor encoder units, which measure rotation speed and direction
- rolling bearings designed to withstand extreme temperatures
- bearings with electrical insulation
- bearings with balls or rollers made from ceramic materials

Products presented in this catalogue are available worldwide through SKF sales channels. For information about lead times and deliveries, contact your local SKF representative or SKF Authorized Distributor.

The complete assortment of SKF rolling bearings is much larger than what is presented in this catalogue. Visit skf.com or contact SKF to learn more about rolling bearings, including:

- super-precision bearings
- ball and roller bearing units
- fixed section ball bearings
- large deep groove ball bearings with filling slots
- large angular contact thrust ball bearings
- tapered roller thrust bearings
- multi-row ball or roller bearings
- split roller bearings
- crossed tapered roller bearings
- slewing bearings
- linear ball bearings
- bearings for inline skates and skateboards
- backing bearings for cluster mills
- indexing roller units for continuous furnaces of sintering plants
- application specific bearings for railway rolling stock
- application specific bearings for cars and trucks
- triple ring bearings for the pulp and paper industry
- bearings for printing press rollers
- bearings for critical aerospace applications

The information in this catalogue reflects SKF's state-of-the-art technology and production capabilities as of 2018. The information herein may differ from that shown in earlier catalogues because of redesign, technological developments, or revised calculation methods. SKF reserves the right to continually improve its products with respect to materials, design and manufacturing methods, some of which are driven by technological developments.

## SKF Explorer bearings

SKF Explorer rolling bearings accommodate higher load levels and provide extended service life. Optimized internal geometry reduces friction, wear and heat generation, allowing heavier loads to be accommodated. Their advanced surface finish reduces friction and enhances lubricating conditions.

Benefits of using SKF Explorer bearings include:

- significantly extended service life
- increased uptime and productivity
- extended lubricant life
- reduced sensitivity to misalignment
- reduced noise and vibration
- the prospect of downsizing applications

SKF Explorer bearings are shown coloured blue in the product tables.

# What is new in this edition

The four main differences in this edition of the SKF catalogue *Rolling bearings*, compared to the previous, are described below.

## 1. The bearing selection process

When selecting bearings for any purpose, ultimately you want to be certain of achieving the required level of equipment performance – and at the lowest possible cost. In addition to the bearing rating life, there are other key factors you must consider when putting together the bearing specifications for an application. The bearing selection process helps to evaluate these key factors.

Go to section B, page 60, to learn more about bearing selection.

- Performance and operating conditions
- Bearing type and arrangement
- Bearing size
- Lubrication
- Operating temperature and speed
- Bearing interfaces
- Bearing execution
- Sealing, mounting and dismounting

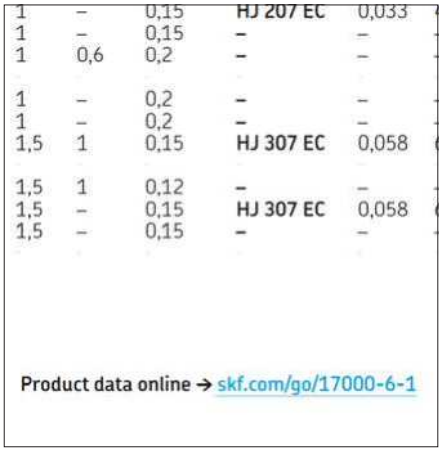
## 2. Popular items

Popular items are marked in the product tables with the symbol ▶. Bearings marked as popular items are of sizes that SKF produces for many customers and are usually in stock. They have a high level of availability and generally provide a cost-effective solution.

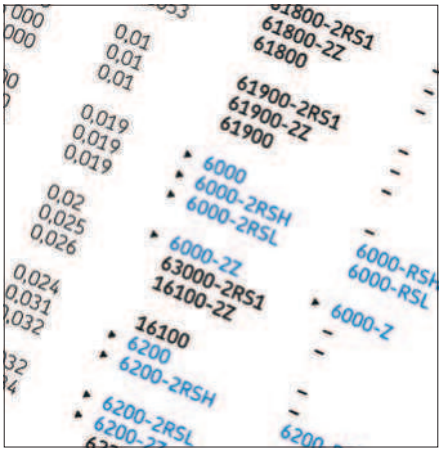
## 3. Streamlined content and easy online access

This catalogue contains information on rolling bearings commonly used in industrial applications. To reduce the volume of the book and make it more manageable, we have excluded less common bearing types and sizes, though you can readily find these in our online product information.

Short URLs in the product sections provide direct access to related online information.




*Short URLs in the product sections provide direct access to related online information.*




*A triangle indicates popular items. They have a high level of availability and generally provide a costeffective solution.*

## 4. Important product updates

### Tapered roller bearings

Tapered roller bearings with an outside diameter up to 600 mm have been redesigned. These new bearings have an increased dynamic load rating, and most of the range is available as SKF Explorer bearings. A consolidated catalogue assortment and a simplified designation system provide a clear view of what is available.

### Angular contact ball bearings with 25° contact angle

These new bearings have a raceway geometry optimized for high speeds and reduced sensitivity to axial loading and misalignment. They can increase robustness when used as the backup bearing in sets that are predominantly loaded in one direction.

### Upgraded INSOCOAT bearings

INSOCOAT bearings feature electrical insulation on either the inner or outer ring. The upgraded coating provides higher Ohmic resistance, including high Ohmic resistance even in a humid environment, and higher breakdown voltage.

### Spherical roller bearings for wind energy applications

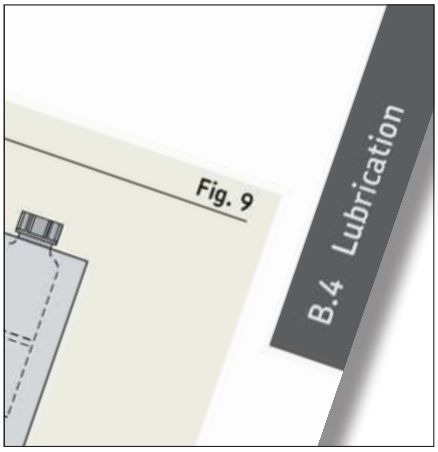
Spherical roller bearings for wind energy applications are designed explicitly for wind turbine main shafts. They have an optimized internal geometry with large diameter rollers and increased contact angle for increased axial load carrying capacity.

# Catalogue information and how to use it

This catalogue is divided into three parts:

## Principles of rolling bearing selection

This part is marked by grey bars at the page edge. It provides general information about rolling bearings (section A), explains the bearing selection process (section B), and presents three examples on how to apply the bearing selection process for various applications (section C).




*Grey bars mark the three sections under* Principles of rolling bearing selection.

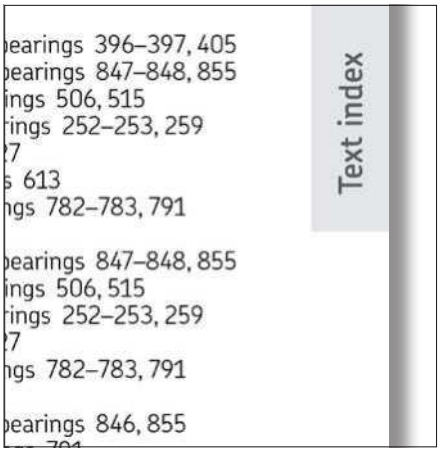
## Product data

The part is divided into sections per bearing type. Each product section is marked by blue tabs containing the section number and a descriptive icon.

*Sections by bearing type are marked with blue tabs including section number and an icon.*

## Indexes

The product index and text index are marked with grey bars. The product index lists series designations, relates them to the bearing type, and guides you to the relevant product section and product table. The text index lists entries in alphabetical order, including designation suffixes, and helps you locate specific information quickly.




*Indexes are marked with grey bars.*

## Use case: Select a bearing for an application

If you are unsure whether you have adequate knowledge or experience to select a bearing that best suits your application requirements, you will probably find the *Bearing selection process*, **page 60**, helpful.

If you are an experienced bearing expert, go directly to the section for the relevant bearing type, browse the product tables for the required size, and then look at additional details and information on more specific variants in the text part preceding the product tables.

## Use case: Find details of a known bearing

The easiest way to find detailed information about a bearing for which you have the designation is to use the product index, **page 1136**. Compare the initial characters in a bearing designation with the entries in the product index; each entry specifies the related bearing type, and the relevant product section and product table.

To understand the suffixes used in a bearing designation, go to the text index, **page 1120**, locate the entry for the suffix and follow the reference to the relevant product sectioin, where you can find detailed information.

# Units of measurement

This catalogue is for global use. Therefore, the predominant units of measurement are in accordance with ISO 80000-1. Imperial units are used wherever necessary. Unit conversions can be made using the conversion table, **page 6**.

For easier use, temperature values are provided in both °C and °F. Specified temperature values are typically rounded. Therefore, values obtained using conversion formulae may not exactly match those specified.

# Rotating equipment performance

Every customer is different, with their own drivers and needs, and we have engineered a broad range of products and services to better serve all our customers. So whether you have a problem that needs solving, you want to digitalize your operations, or you want access to design advice, SKF has the right solution to help you get the most out of your rotating equipment.

## What does it mean to you?

Performance looks different for every business. We are here to help our customers make choices that deliver against what performance means to them:

- **Improve output**
  By working with SKF to optimise the performance of your rotating equipment you can increase availability, application speed and quality – all driving greater overall equipment effectiveness, and boosting output for your business.

- **Trim your total cost of ownership**
  Poor performance doesn't just affect your output, it can cost you in energy, maintenance, spare parts, labour and more – all adding up to a greater TCO. SKF can help you achieve more reliable rotation, so you can reduce your total cost of ownership.

- **Realise your digital ambitions**
  Make immediate and tangible progress towards your digitalization ambitions. SKF has the digital products, software, services and analytics capabilities to help you gain visibility of the health of your equipment and to turn data into performance-driving insight. Allowing your business to be more agile, deliver greater output, or optimise safety and sustainability.

- **Reduce reliance on scarce talent**
  Work with us to bring rotating equipment expertise into your business, and you can reduce the time and cost burden of recruiting and retaining increasingly scarce and expensive maintenance and diagnostic skillsets.

- **Operate more safely**
  Whether you want to ensure maximum operational safety, reduce hygiene incidents or navigate the minefield of EHSS regulations, SKF can help you drive operational safety, and a reduced incident rate will feed into your productivity too.

- **Be more sustainable**
  SKF can work with you to reduce energy usage, waste output, spare parts consumption and more, helping you to deliver against your sustainability agenda, as well as saving on costs.

## The way that works for you

It is not all about the technologies, services and solutions to meet your business needs. Every customer can have different commercial needs. As a result we have created innovative business models for delivering our rotating equipment performance solutions, which in themselves can contribute towards the performance that matters to your business.

## Delivered through our distribution partners

Many of our distribution partners are now delivering greater value to their customers through maintenance, reliability and operations services powered by SKF digitalization capabilities.

Find out how SKF Authorized Distributors and SKF Certified Maintenance Partners could support you on this journey via our support network and services tailored for distributor enablement.

# SKF Care

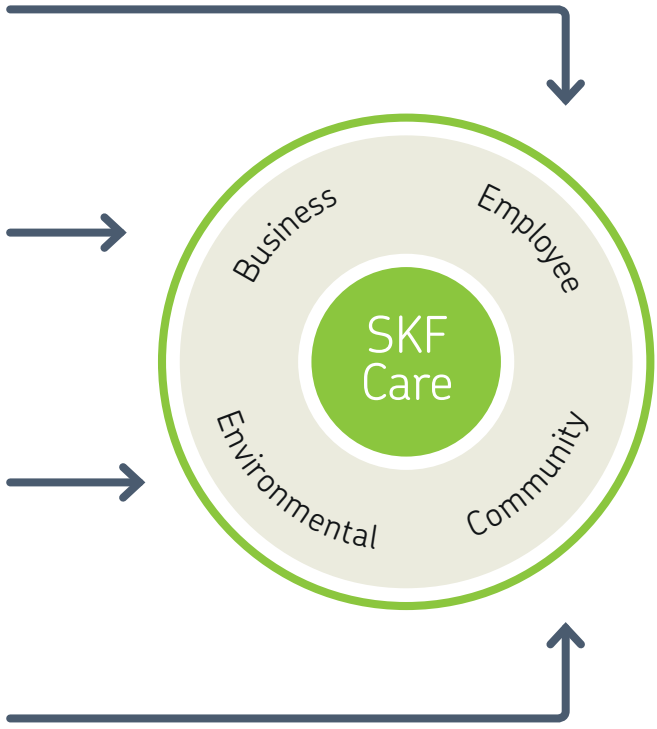
SKF Care is our definition of sustainability. The framework comprises four main perspectives that help us to create value for business partners, the environment, our employees, and the communities around us.

The employee perspective is about ensuring a safe working environment and promote health, education and well-being of employees at SKF and in the supply chain.

The business perspective is about customer focus, financial performance and returns for shareholders – with the highest standards of ethical behaviour.

The environmental perspective is about continually reducing the environmental impact from the Group's operations, as well as actions to significantly improve customers' environmental performance through the products, solutions and services that SKF supplies.

The community perspective is about making positive contributions to the communities in which we operate and guides us to run our business in a way that supports positive development.




## SKF BeyondZero

SKF BeyondZero is our mindset to integrate environmental concern into the way we do business. It includes actions to reduce the environmental impact resulting from SKF's operations and those of our suppliers, while at the same time providing customers with solutions to reduce the impact of their products or operations.

# Principles of rolling bearing selection

A. General bearing knowledge . . . . . 17

B. Bearing selection process . . . . . 59

C. Bearing selection examples . . . . . 215

# A

# General bearing knowledge

# General bearing knowledge

**A.1 Bearing basics** . . . . . **19**

**A.2 Tolerances** . . . . . **35**

**A.3 Storage** . . . . . **57**

This section provides general information that is valid for rolling bearings.

*Bearing basics* contains information that all readers should know. When you have read that section you will:

- know what rolling bearings are
- know about their components
- have a basic understanding about materials used for rolling bearings
- be familiar with the terminology
- understand the system of standardized boundary dimension
- be able to determine information about a bearing from its designation (part number)

*Tolerances* provides information that enables you to identify and determine the tolerances of practically every bearing presented here. This is possible because bearing tolerances are standardized internationally, predominantly by ISO. The individual product sections refer to the information in this section, where needed.

*Storage* provides advice on how to deal with SKF bearings and how to administer them while in storage.

# Bearing basics

# A.1 Bearing basics



**Why rolling bearings?** . . . . . **20**
Ball and roller bearings. . . . . 20
Radial and thrust bearings . . . . . 21

**Terminology** . . . . . **22**
Shaft-bearing-housing system . . . . . 22
Radial bearings . . . . . 23
Thrust bearings. . . . . 23

**Components and materials** . . . . . **24**
Bearing rings . . . . . 24
Rolling elements . . . . . 24
Cages. . . . . 25
Integral sealing . . . . . 26

**Internal clearance** . . . . . **26**

**Heat and surface treatment** . . . . . **27**
Hardening . . . . . 27
Dimensional stability . . . . . 27
Surface treatment and coatings . . . . . 27

**Standardized boundary dimensions** . . . . . **28**
Bearings with inch dimensions. . . . . 28

**Basic bearing designation system** . . . . . **29**
Basic designations . . . . . 31
Bearing series . . . . . 31
Prefixes and suffixes . . . . . 32
Bearing designations not covered by the basic system . . . 32
Insert bearings . . . . . 32
Needle roller bearings . . . . . 32
Tapered roller bearings . . . . . 32
Customized bearings . . . . . 32
Other rolling bearings . . . . . 32
Designation system . . . . . 33

# A.1 Bearing basics

## Why rolling bearings?

Rolling bearings support and guide, with minimal friction (fig. 1), rotating or oscillating machine elements – such as shafts, axles or wheels – and transfer loads between machine components. Rolling bearings provide high precision and low friction and therefore enable high rotational speeds while reducing noise, heat, energy consumption and wear. They are cost-effective and exchangeable machine elements that typically follow national or international dimension standards.

## Ball and roller bearings

The two basic types of rolling element distinguish the two basic types of rolling bearing:

- ball → ball bearing
- roller → roller bearing

Balls and rollers are different in how they make contact with the raceways.

Balls make point contact with the ring raceways (fig. 2). With increasing load acting on the bearing, the contact point becomes an elliptical area. The small contact area provides low rolling friction, which enables ball bearings to accommodate high speeds but also limits their load-carrying capacity.

Rollers make line contact with the ring raceways (fig. 3). With increasing load acting on the bearing, the contact line becomes somewhat rectangular in shape. Because of the larger contact area and the consequently higher friction, a roller bearing can accommodate heavier loads, but lower speeds, than a same-sized ball bearing.

**Fig. 1**

**Why rolling bearings?**

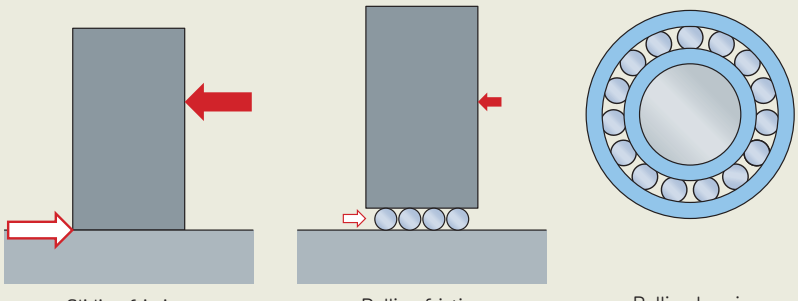



**Fig. 2**

**Point contact**

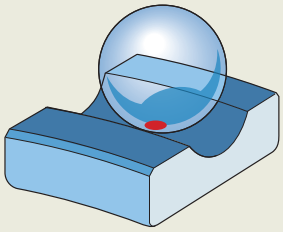
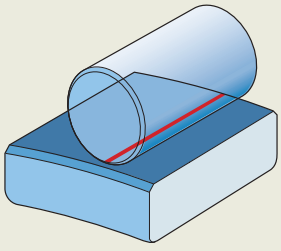


**Fig. 3**

**Line contact**



# Radial and thrust bearings

Rolling bearings are classified into two groups based on the direction of the load they predominantly accommodate:

- **Radial bearings**
  Radial bearings accommodate loads that are predominantly perpendicular to the shaft. Some radial bearings can support only pure radial loads, while most can additionally accommodate some axial loads in one direction and, in some cases, both directions (fig. 4).

- **Thrust bearings**
  Thrust bearings accommodate loads that act predominantly along the axis of the shaft. Depending on their design, thrust bearings may support pure axial loads in one or both directions (fig. 5), and some can additionally accommodate radial loads (combined loads, fig. 6). Thrust bearings cannot accommodate speeds as high as same-sized radial bearings.

The contact angle (fig. 7) determines which group the bearing belongs to. Bearings with a contact angle ≤ 45° are radial bearings, the others are thrust bearings.

Fig. 4

**Radial bearings**

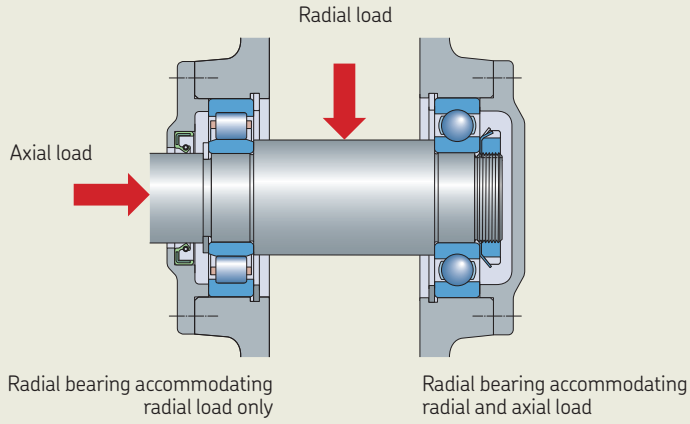



Fig. 5

**Thrust bearing for pure axial load**

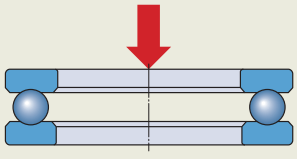


Fig. 6

**Thrust bearing for combined load**

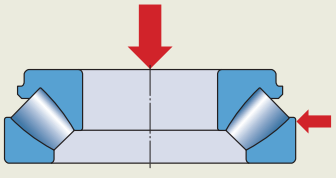
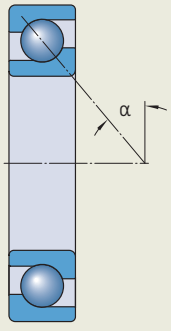


Fig. 7

**Contact angle**



# Terminology

Some frequently used bearing terms are explained here. For a detailed collection of bearing-specific terms and definitions, refer to ISO 5593 *Rolling bearings – Vocabulary*. Symbols used in this catalogue are mainly in accordance with ISO standards. The most common symbols are (fig. 8 and fig. 9):

**d** Bore diameter
**D** Outside diameter
**B** Bearing width
**H** Bearing height
**r** Chamfer dimension
**α** Contact angle

Fig. 8

**Symbols for boundary dimensions – radial bearings**

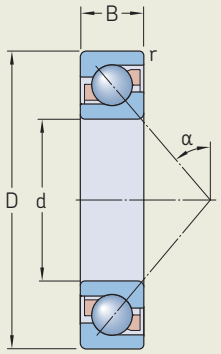
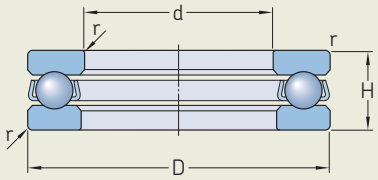



Fig. 9

**Symbols for boundary dimensions – thrust bearings**



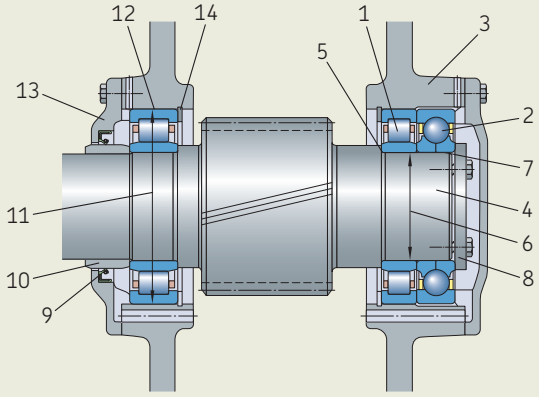

# Shaft-bearing-housing system

(fig. 10)

**1** Cylindrical roller bearing
**2** Four-point contact ball bearing
**3** Housing
**4** Shaft
**5** Shaft abutment shoulder
**6** Shaft diameter
**7** Shaft seat
**8** End plate
**9** Radial shaft seal
**10** Seal wear ring
**11** Housing bore diameter
**12** Housing seat
**13** Housing cover
**14** Snap ring

Fig. 10

**Terminology – Shaft-bearing-housing system**



# Radial bearings

(fig. 11 and fig. 12)

**1** Inner ring
**2** Outer ring
**3** Rolling element: ball, cylindrical roller, needle roller, tapered roller, spherical roller, or toroidal roller
**4** Cage
**5** Capping device
Seal – made of elastomer
Shield – made of sheet steel
**6** Outer ring outside surface
**7** Inner ring bore
**8** Inner ring shoulder surface
**9** Outer ring shoulder surface
**10** Snap ring groove
**11** Snap ring
**12** Outer ring side face
**13** Recess for capping device
**14** Outer ring raceway
**15** Inner ring raceway
**16** Recess for capping device
**17** Inner ring side face
**18** Chamfer
**19** Bearing pitch circle diameter
**20** Total bearing width
**21** Guide flange
**22** Retaining flange
**23** Contact angle

# Thrust bearings

(fig. 13)

**24** Shaft washer
**25** Rolling element and cage assembly
**26** Housing washer
**27** Housing washer with a sphered seat surface
**28** Seat washer

**Fig. 11**

**Terminology – Radial bearing**

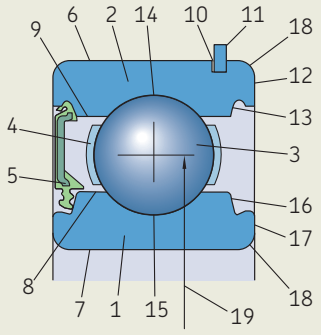



**Fig. 12**

**Terminology – Radial bearing**

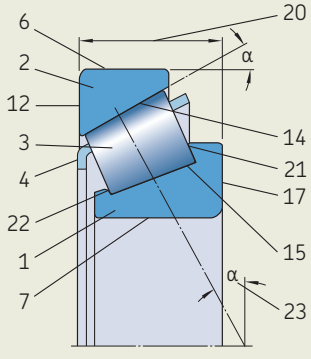
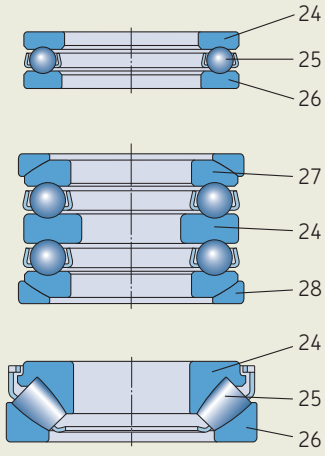



**Fig. 13**

**Terminology – Thrust bearing**



# Components and materials

A typical rolling bearing consists of the following components (fig. 14):

- an inner ring
- an outer ring
- balls or rollers, as rolling elements
- a cage

SKF supplies several bearing types capped with a seal or shield on one or both sides. Bearings capped on both sides are factory-filled with grease. They provide an economic and space-saving solution compared to external sealing.

## Bearing rings

The pressure at the rolling contact area and the cyclic overrolling creates fatigue in the bearing rings when the bearing is in operation. To cope with such fatigue, rings that are made of steel must be hardened.

The standard steel for bearing rings and washers is 100Cr6, a steel containing approximately 1% carbon and 1,5% chromium.

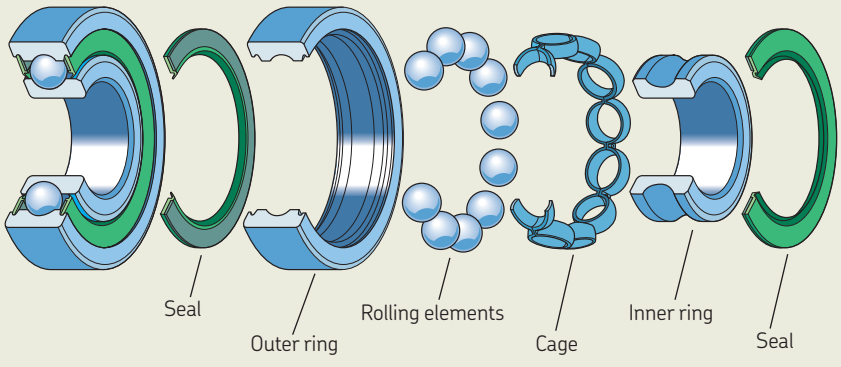
SKF bearing rings and washers are made of steel in accordance with SKF specifications. They cover all aspects that are relevant to providing a long service life for the bearing. Depending on specific requirements, SKF uses stainless steels or high-temperature steels.

## Rolling elements

The rolling elements (balls or rollers) transfer the load between inner and outer rings. Typically, the same steel is used for rolling elements as for bearing rings and washers. When required, rolling elements can be made of ceramic material. Bearings containing ceramic rolling elements are considered hybrid bearings and are becoming more and more common.

**Fig. 14**

**Bearing components**



# Cages

The primary purposes of a cage are:

- separating the rolling elements to reduce the frictional heat generated in the bearing
- keeping the rolling elements evenly spaced to optimize load distribution
- guiding the rolling elements in the unloaded zone of the bearing
- retaining the rolling elements of separable bearings when one bearing ring is removed during mounting or dismounting

Cages are radially centred (fig. 15) either on:

- the rolling elements
- the inner ring
- the outer ring

Cages centred on the rolling elements permit the lubricant to enter the bearing easily. Ring centred cages, which provide more precise guidance, are typically used when bearings must accommodate high speeds, high vibration levels or inertia forces stemming from movements of the whole bearing.

The main cage types are:

- **Stamped metal cages (fig. 16)**
  Stamped metal cages (sheet steel or sometimes sheet brass) are lightweight and withstand high temperatures.

- **Machined metal cages (fig. 17)**
  Machined metal cages are made of brass or sometimes steel or light alloy. They permit high speeds, temperatures, accelerations and vibrations.

- **Polymer cages (fig. 18)**
  Polymer cages are made of polyamide 66 (PA66), polyamide 46 (PA46) or sometimes polyetheretherketone (PEEK) or other polymer materials. The good sliding properties of polymer cages produce little friction and, therefore, permit high speeds. Under poor lubrication conditions, these cages reduce the risk of seizure and secondary damage because they can operate for some time with limited lubrication.

- **Pin-type cages (fig. 19)**
  Steel pin-type cages need pierced rollers and are only used together with large-sized roller bearings. These cages have relatively low weight and enable a large number of rollers to be incorporated.

**Fig. 15**

**Options for cage centring**

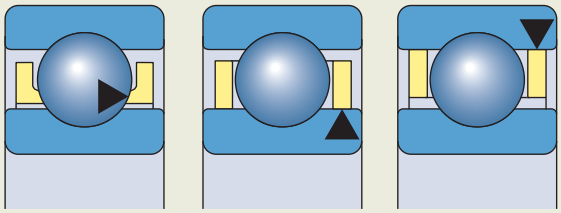


**Fig. 16**

**Stamped metal cage**

**Fig. 17**

**Machined metal cage**

**Fig. 18**

**Polymer cage**

**Fig. 19**

**Pin-type cage**

# Integral sealing

Integral sealing can significantly prolong bearing service life because it keeps lubricant in the bearing and contaminants out of it. SKF bearings are available with various capping devices:

- **Shields**
  There is a small gap between the shield and inner ring. Bearings fitted with shields (fig. 20) are used where the operating conditions are relatively clean, or where low friction is important because of speed or operating temperature considerations.

- **Seals**
  Bearings with seals are preferred for arrangements where contamination is moderate. Where the presence of water or moisture cannot be ruled out, contact seals (fig. 21) are typically used. These seals make positive contact with the sliding surface on one of the bearing rings. Low-friction seals (fig. 22) and non-contact seals (fig. 23) can accommodate the same speeds as bearings with shields, but with improved sealing effectiveness.

Fig. 20

**Shield**

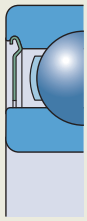


Fig. 21

**Contact seal**

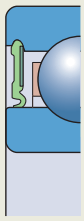


Fig. 22

**Low-friction seal**

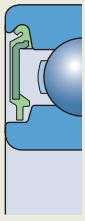
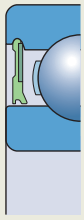


Fig. 23

**Non-contact seal**



# Internal clearance

Bearing internal clearance (fig. 24) is defined as the total distance through which one bearing ring can be moved relative to the other in the radial direction (radial internal clearance) or in the axial direction (axial internal clearance).

In almost all applications, the initial clearance in a bearing is greater than its operating clearance. The difference is mainly caused by two effects:

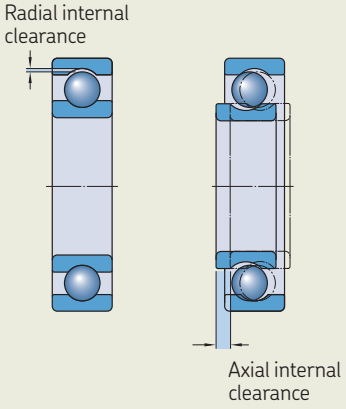
- Bearings are typically mounted with an interference fit on the shaft or in the housing. The expansion of the inner ring or the compression of the outer ring reduces the internal clearance.
- Bearings generate heat in operation. Differential thermal expansion of the bearing and mating components influences the internal clearance.

Sufficient internal clearance in a bearing during operation is important. Preload (clearance below zero) is possible for certain bearing types.

To enable selection of the appropriate initial internal clearance to achieve the desired operational internal clearance, bearings are available in different clearance classes. ISO has established five clearance classes for many bearing types. SKF uses designation suffixes to indicate when the bearing internal clearance differs from Normal (table 1).

Fig. 24

**Bearing internal clearance**



# Heat and surface treatment

Rolling bearing rings and rolling elements must:

- be hard enough to cope with fatigue and plastic deformations
- be tough enough to cope with applied loads
- be sufficiently stable to experience only limited changes of dimensions over time

The required properties are achieved by heat and surface treatments.

## Hardening

There are three typical hardening methods that may be applied to bearing components:

- **Through-hardening**
  This is the standard method for most bearings and provides good fatigue and wear-resistance, as hardening is applied over the full cross section.

- **Induction-hardening**
  Surface induction-hardening is used to selectively harden a component's raceway to limit rolling contact fatigue, leaving the remainder of the component unaffected to maintain structural strength.

- **Case-hardening**
  Case-hardening provides hardness to the surface. It is used, for example, where bearing rings are subjected to high shock loads causing structural deformations.

## Dimensional stability

Heat treatment is used to limit dimensional changes caused by metallurgical effects at extreme temperatures. There is a standardized classification system for dimensional stability (table 2). The various SKF bearing types are stabilized to different classes as standard.

## Surface treatment and coatings

Coating is a well-established method for providing bearings with additional functional benefits to accommodate specific application conditions. Widely used coatings are zinc chromate and black oxide.

Two other methods developed by SKF have proven successful in many applications:

- INSOCOAT bearings are standard bearings that have the external surfaces of their inner or outer ring coated with an aluminium oxide layer. This coating increases resistance to electric current through the bearing.
- NoWear enhances wear-resistance of the raceway or rolling element surfaces. It can help the bearing withstand long periods of operation under poor lubrication conditions and to reduce the risk for low load damage.

**Table 1**

**Internal clearance classes**

| ISO clearance class | SKF designation suffix | Internal clearance |
|---|---|---|
| – | C1 | Smaller than C2 |
| Group 2 | C2 | Smaller than Normal |
| Group N | – | Normal |
| Group 3 | C3 | Greater than Normal |
| Group 4 | C4 | Greater than C3 |
| Group 5 | C5 | Greater than C4 |

**Table 2**

**Dimensional stability**

| Stabilization class | Stabilized up to | |
|---|---|---|
| – | °C | *°F* |
| SN | 120 | *250* |
| S0 | 150 | *300* |
| S1 | 200 | *390* |
| S2 | 250 | *480* |
| S3 | 300 | *570* |
| S4 | 350 | *660* |

# Standardized boundary dimensions

Boundary dimensions are the main dimensions of a bearing (fig. 25 and fig. 26). They comprise:

- the bore diameter (d)
- the outside diameter (D)
- the width or height (B, C, T or H)
- the chamfer dimensions (r)

The boundary dimensions for metric bearings are standardized in the ISO (International Organization for Standardization) general plans:

- ISO 15 for radial rolling bearings, except insert bearings, some types of needle roller bearings and tapered roller bearings
- ISO 104 for thrust bearings
- ISO 355 for tapered roller bearings

Most rolling bearings follow ISO standard dimensions, which is a prerequisite to enable interchangeability.

The ISO general plan for radial bearings provides several series of standardized outside diameters for every standard bore diameter. They are called diameter series and are numbered 7, 8, 9, 0, 1, 2, 3 and 4 (in order of increasing outside diameter). Within each diameter series, different width series exist (width series 8, 0, 1, 2, 3, 4, 5 and 6 in order of increasing width). The diameter series 0, 2 and 3, combined with width series 0, 1, 2 and 3, are shown in fig. 27.

For thrust bearings, height series are used instead of width series. Height series are numbered 7, 9, 1 and 2.

Bearings to ISO general plans have the same boundary dimensions when they share the same bore diameter and dimension series (table 3). If not, they have different boundary dimensions.

# Bearings with inch dimensions

In addition to the bearings in accordance with ISO dimensions, SKF has a comprehensive assortment of bearings with inch dimensions following American and British standards.

**Fig. 25**

**Boundary dimensions, radial bearing**

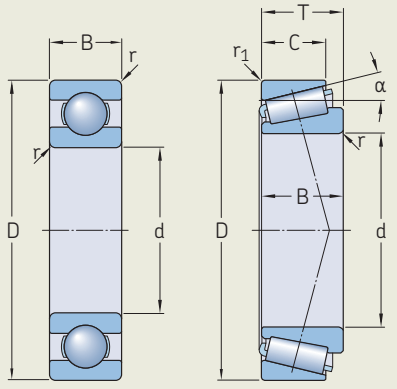
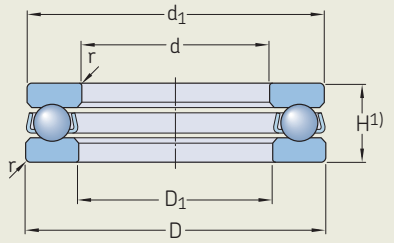



**Fig. 26**

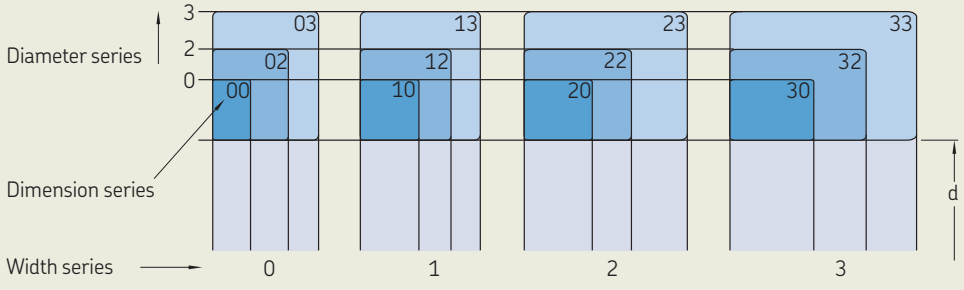
**Boundary dimensions, thrust bearing**




1) ISO uses T.

**Fig. 27**

**System of ISO dimension series**



# Basic bearing designation system

The designations of most SKF rolling bearings follow a designation system. The complete bearing designation may consist of a basic designation with or without one or more supplementary prefixes and suffixes (**diagram 1**). The basic designation identifies:

- the bearing type
- the basic design
- the boundary dimensions

Prefixes and suffixes identify design features or bearing components.

**Diagram 1**

**Designations for SKF rolling bearings**

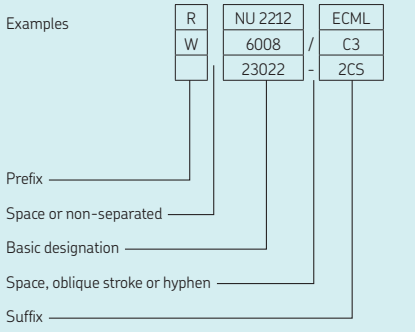



**Table 3**

**Examples of boundary dimensions**

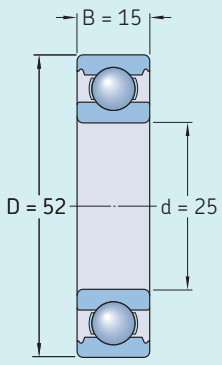
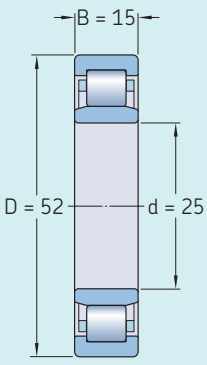
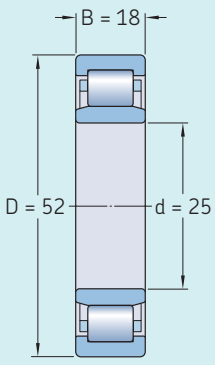
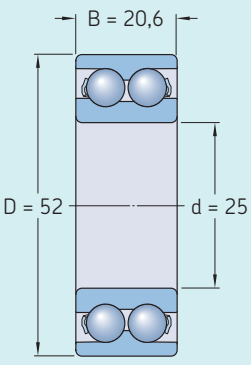
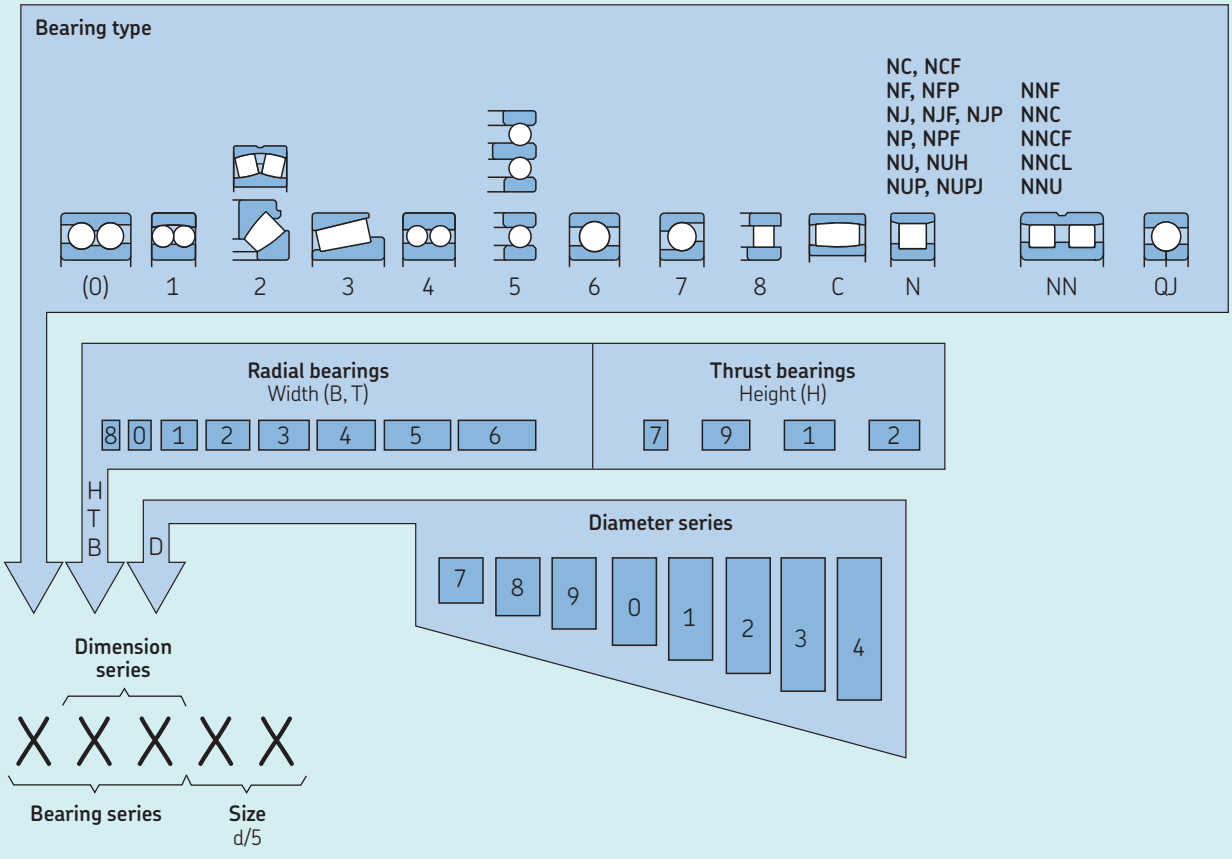
| **Same bore diameter and dimension series** | | **Same bore diameter, but different dimension series** | |
|---|---|---|---|
| Deep groove ball bearing<br>6205 | Cylindrical roller bearing<br>NU 205 | Cylindrical roller bearing<br>NU 2205 ECP | Angular contact ball bearing<br>3205 A |
| **Dimension series 02** | **Dimension series 02** | **Dimension series 22** | **Dimension series 32** |
|  |  |  |  |

Table 4

**Basic designation system for SKF standard metric ball and roller bearings**

**Bearing series**

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 6(0)4 | | | | | | | |
| | | | | | 544 | 623 | | | | (0)4 | | | |
| | | 223 | | | 524 | 6(0)3 | | | | 33 | | | |
| | | 213 | | | 543 | 622 | | | | 23 | | | |
| | | 232 | | | 523 | 6(0)2 | | | | (0)3 | | | |
| | | 222 | | | 542 | 630 | | | 23 | 22 | | | |
| | | 241 | | | 522 | 6(1)0 | | | 32 | 12 | | | |
| | | 231 | | | | 16(0)0 | | | 22 | (0)2 | | | |
| | | 240 | 323 | | 534 | 639 | | | 41 | 31 | | 41 | |
| | | 230 | 313 | | 514 | 619 | | | 31 | 30 | | 31 | |
| | | 249 | 303 | | 533 | 609 | | | 60 | 20 | | 60 | |
| | 139 | 239 | 332 | | 513 | 638 | 7(0)4 | 814 | 50 | 10 | | 50 | |
| | 130 | 248 | 322 | | 532 | 628 | 7(0)3 | 894 | 40 | 39 | | 40 | 23 |
| | (1)23 | 238 | 302 | | 512 | 618 | 7(0)2 | 874 | 30 | 29 | | 30 | (0)3 |
| | 1(0)3 | | 331 | | 511 | 608 | 7(1)0 | 813 | 69 | 19 | | 69 | 12 |
| | (1)22 | 294 | 330 | | 510 | 637 | 719 | 893 | 59 | 38 | | 49 | (0)2 |
| (0)33 | 1(0)2 | 293 | 320 | 4(2)3 | 591 | 627 | 718 | 812 | 49 | 28 | | 39 | 10 |
| (0)32 | 1(1)0 | 292 | 329 | 4(2)2 | 590 | 617 | 708 | 811 | 39 | 18 | | 48 | 19 |




| Code | Bearing type |
|---|---|
| 0 | Double row angular contact ball bearing |
| 1 | Self-aligning ball bearing |
| 2 | Spherical roller bearing, spherical roller thrust bearing |
| 3 | Tapered roller bearing |
| 4 | Double row deep groove ball bearing |
| 5 | Thrust ball bearing |
| 6 | Single row deep groove ball bearing |

| Code | Bearing type |
|---|---|
| 7 | Single row angular contact ball bearing |
| 8 | Cylindrical roller thrust bearing |
| C | CARB toroidal roller bearing |
| N | Cylindrical roller bearing. Two or more letters are used to identify the number of the rows or the configuration of the flanges, e.g. NJ, NU, NUP, NN, NNU, NNCF |

| Code | Bearing type |
|---|---|
| QJ | Four-point contact ball bearing |
| T | Tapered roller bearing in accordance with ISO 355 |

# Basic designations

A basic designation typically contains three to five digits. The basic designation system is shown in **table 4**. The number and letter combinations have the following meaning:

- The first digit or letter or combination of letters identifies the bearing type and eventually a basic variant.
- The following two digits identify the ISO dimension series. The first digit indicates the width or height series (dimensions B, T or H). The second digit identifies the diameter series (dimension D).
- The last two digits of the basic designation identify the size code of the bearing bore. The size code multiplied by 5 gives the bore diameter (d) in mm.

The most important exceptions in the basic bearing designation system are:

**1** In a few cases the digit for the bearing type or the first digit of the dimension series identification is omitted. These digits are shown in brackets in **table 4**.

**2** Bearings with a bore diameter of 10, 12, 15 or 17 mm have the following size code identifications:
00 = 10 mm
01 = 12 mm
02 = 15 mm
03 = 17 mm

**3** For bearings with a bore diameter < 10 mm, or ≥ 500 mm, the bore diameter is generally given in millimetres (uncoded). The size identification is separated from the rest of the bearing designation by an oblique stroke, e.g. 618/8 (d = 8 mm) or 511/530 (d = 530 mm). This is also true for standard bearings in accordance with ISO 15 that have a bore diameter of 22, 28 or 32 mm, e.g. 62/22 (d = 22 mm).

**4** For some bearings with a bore diameter < 10 mm, such as deep groove, self-aligning and angular contact ball bearings, the bore diameter is also given in millimetres (uncoded) but is not separated from the series designation by an oblique stroke, e.g. 629 or 129 (d = 9 mm).

**5** Bore diameters that deviate from the standard bore diameter of a bearing are uncoded and given in millimetres up to three decimal places. This bore diameter identification is part of the basic designation and is separated by an oblique stroke, e.g. 6202/15.875 (d = 15,875 mm = 5/8 in).

## Bearing series

Bearing series designations consist of an identification for the bearing type and the dimension series. The most common series designations are shown in **table 4**. The digits in brackets belong to the system, but are not used in the series designation in practice.

# Prefixes and suffixes

The designations of most SKF rolling bearings follow a system that consists of a basic designation with or without one or more prefixes and/or suffixes, as shown in **diagram 2**.

Prefixes and suffixes provide additional information about the bearing.

Prefixes are mainly used to identify components of a bearing. They can also identify bearing variants.

Suffixes identify designs or variants, which differ in some way from the original design or from the current basic design. The suffixes are divided into groups. When more than one special feature is to be identified, suffixes are provided in the order shown in **diagram 2**.

Details of the significance of specific prefixes and suffixes are given in the relevant product sections.

# Bearing designations not covered by the basic system

## Insert bearings

The designations for insert bearings differ somewhat from those described in the basic designation system and are described under *Insert bearings*, **page 339**.

## Needle roller bearings

The designations for needle roller bearings do not fully follow the basic designation system and are described under *Needle roller bearings*, **page 581**.

## Tapered roller bearings

The designations for metric tapered roller bearings follow either the basic designation system or a designation system, established by ISO in 1977, covered in ISO 355. Inch tapered roller bearings are designated in accordance with the relevant ANSI/ABMA standard. The designation system is explained under *Tapered roller bearings*, **page 665**.

## Customized bearings

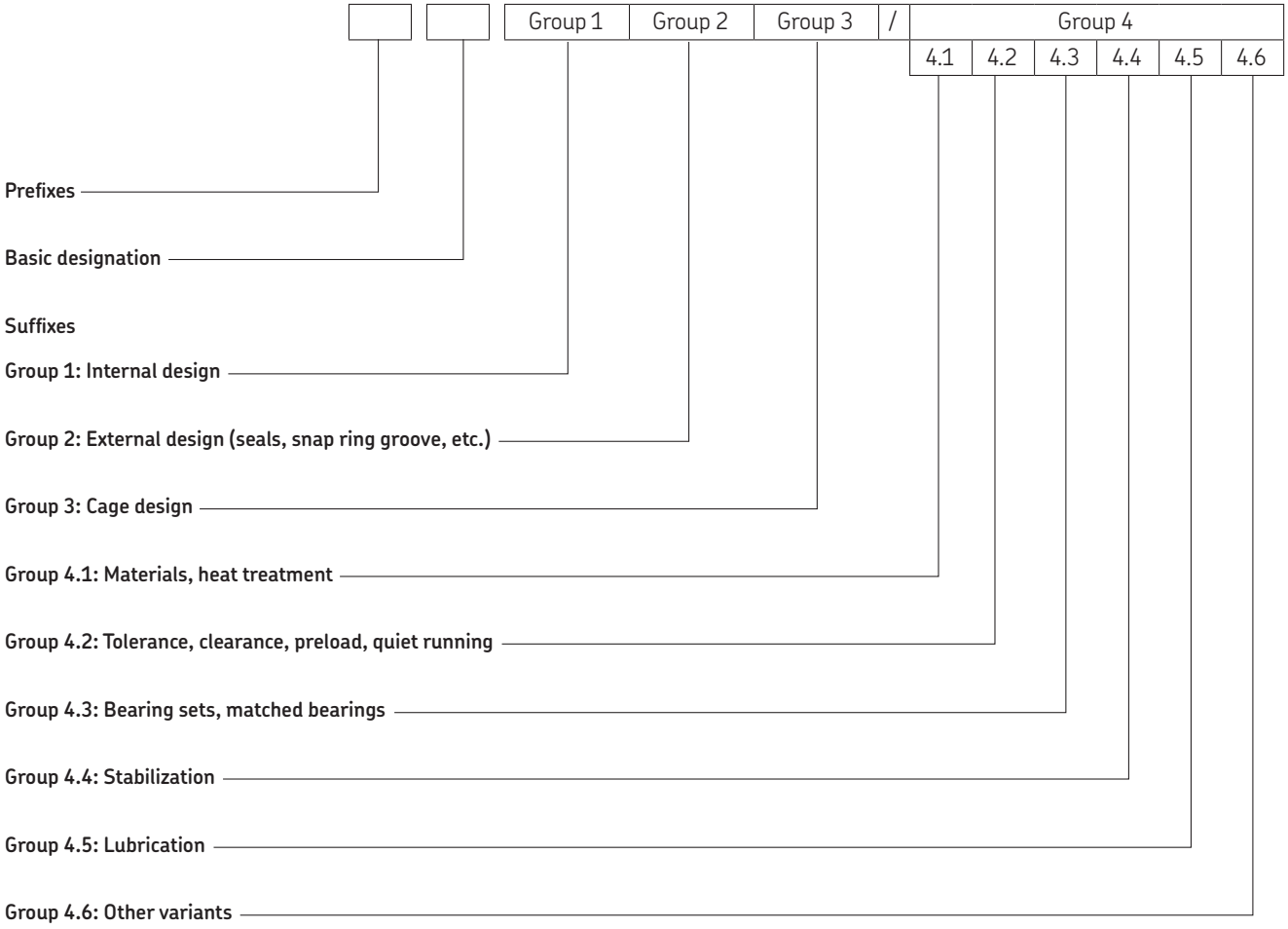
Bearings designed to meet a specific customer requirement are typically designated by a drawing number. The drawing number does not provide any information about the bearing.

## Other rolling bearings

Rolling bearings not covered in the ball bearings and roller bearings sections, such as super-precision bearings, thin section bearings, slewing bearings or linear bearings, follow designation systems that can differ significantly from the basic designation system.

Diagram 2

# Designation system



# Tolerances

# A.2 Tolerances



**Tolerance values** . . . . . **36**

**Tolerance symbols** . . . . . **36**

**Diameter series identification** . . . . . **37**

**Chamfer dimensions** . . . . . **37**
Minimum chamfer dimensions . . . . . 37
Maximum chamfer dimensions . . . . . 37

**Rounding values** . . . . . **55**
Shoulder diameters . . . . . 55
Load and speed ratings and fatigue load limits . . . . . 55
Masses . . . . . 55
Temperatures . . . . . 55

# A.2 Tolerances

Tolerance classes and the corresponding values for certain tolerance characteristics are specified in ISO 492 (for radial bearings) and ISO 199 (for thrust bearings). In 2014 these standards were aligned with general ISO GPS (Geometrical Product Specification) standards such as ISO 1101 and ISO 5459. For additional information on ISO 492 and ISO 199, and the changes that have been made to their previous editions, refer to the SKF e-learning platform (skf.com/go/17000-learnGPS).

There are three common tolerance classes for SKF ball and roller bearings (**table 1**).

The product sections for the various bearing types provide information on compliance with applicable tolerance classes. The tolerance class of a bearing cannot always be determined from its designation suffixes. Where the tolerance class is standard for the bearing, it is not specified in the designation suffixes.

For information about SKF bearings that have a tolerance class better than class 5, refer to the SKF catalogue *Super-precision bearings* or skf.com/super-precision.

## Tolerance values

Actual tolerance values are listed in the following tables.

**Metric radial bearings, except tapered roller bearings:**

- Normal tolerances (**table 2**, **page 38**)
- P6 class tolerances (**table 3**, **page 39**)
- P5 class tolerances (**table 4**, **page 40**)

**Metric tapered roller bearings:**

- Normal and CL7C class tolerances (**table 5**, **page 41**)
- CLN class tolerances (**table 6**, **page 42**)
- P5 class tolerances (**table 7**, **page 43**)

**Inch radial bearings, except tapered roller bearings:**

- Normal tolerances (**table 8**, **page 44**)

**Inch tapered roller bearings:**

- Normal, CL2, CL3 and CL0 class tolerances (**table 9**, **page 45**)

**Thrust bearings:**

- Normal, P6 and P5 class tolerances (**table 10**, **page 46**)

**Tapered bore, taper 1:12:**

- Normal, P6 and P5 class tolerances (**table 11**, **page 47**)

**Tapered bore, taper 1:30:**

- Normal tolerances (**table 12**, **page 48**)

Where standardized, the values are in accordance with ISO 492, ISO 199 and ANSI/ABMA Std. 19.2.

## Tolerance symbols

The tolerance symbols that we use are in line with ISO 492 and ISO 199 and are explained in **table 13**, **page 49**. The symbols normally refer to dimensional tolerances, only Kia, Kea, Sd, SD, Sia and Sea refer to geometrical tolerances.

**Table 1**

**Common tolerance classes for SKF ball and roller bearings**

| ISO tolerance class | SKF designation suffix | Description |
|---|---|---|
| **Normal** | – | Minimum standard for all SKF ball and roller bearings. |
| **Class 6** | P6 | Tighter tolerances than Normal. |
| **Class 5** | P5 | Tighter tolerances than class 6. |

# Diameter series identification

The bore and outside diameter variation tolerances $t_{Vdsp}$ and $t_{VDsp}$ for metric radial bearings (**table 2**, **page 38**, to **table 4**, **page 40**) vary depending on the diameter series to which the bearing belongs. To determine the diameter series, refer to **table 14**, **page 52**.

# Chamfer dimensions

## Minimum chamfer dimensions

Minimum chamfer dimensions (**fig. 1**) are listed in the product tables, for the radial ($r_1$, $r_3$) and axial ($r_2$, $r_4$) directions. For metric SKF bearings, these values are in accordance with the general plans listed in the following standards:

- ISO 15, ISO 12043 and ISO 12044 for radial bearings
- ISO 355 for radial tapered roller bearings
- ISO 104 for thrust bearings

## Maximum chamfer dimensions

The maximum chamfer dimensions (**fig. 1**) for the radial ($r_1$, $r_3$) and axial ($r_2$, $r_4$) directions, appropriate to the respective minimum values and the bore or outside diameter, are listed in the following tables:

- Metric radial and thrust bearings, except radial tapered roller bearings (**table 15**, **page 53**)
- Metric radial tapered roller bearings (**table 16**, **page 53**)
- Inch tapered roller bearings (**table 17**, **page 54**)

The maximum chamfer dimensions for metric SKF bearings are in accordance with ISO 582.

### Example

What is the largest radial and axial value ($r_{1\,max}$ and $r_{2\,max}$) for the chamfer of a 6211 deep groove ball bearing?

From the relevant product table, $r_{1,2\,min}$ = 1,5 mm and d = 55 mm.

From **table 15**, with $r_{s\,min}$ = 1,5 mm and d < 120 mm, the largest radial value $r_{1\,max}$ = 2,3 mm and the largest axial value $r_{2\,max}$ = 4 mm.

**Fig. 1**

**Minimum and maximum chamfer dimensions**

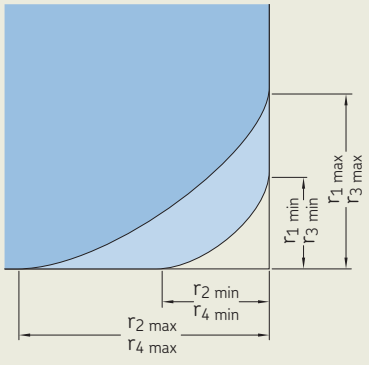


Table 2

## Normal tolerances for radial bearings, except tapered roller bearings

### Inner ring

| d | | $t_{\Delta dmp}$[1] | | $t_{Vdsp}$[1] Diameter series | | | $t_{Vdmp}$ | $t_{\Delta Bs}$ All | Normal | Modified[3] | $t_{VBs}$ | $t_{Kia}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| > | ≤ | U | L | 7, 8, 9[2] | 0, 1 | 2, 3, 4 | | U | L | L | | |
| mm | | µm | | µm | | | µm | µm | | | µm | µm |
| – | 2,5 | 0 | –8 | 10 | 8 | 6 | 6 | 0 | –40 | – | 12 | 10 |
| 2,5 | 10 | 0 | –8 | 10 | 8 | 6 | 6 | 0 | –120 | –250 | 15 | 10 |
| 10 | 18 | 0 | –8 | 10 | 8 | 6 | 6 | 0 | –120 | –250 | 20 | 10 |
| 18 | 30 | 0 | –10 | 13 | 10 | 8 | 8 | 0 | –120 | –250 | 20 | 13 |
| 30 | 50 | 0 | –12 | 15 | 12 | 9 | 9 | 0 | –120 | –250 | 20 | 15 |
| 50 | 80 | 0 | –15 | 19 | 19 | 11 | 11 | 0 | –150 | –380 | 25 | 20 |
| 80 | 120 | 0 | –20 | 25 | 25 | 15 | 15 | 0 | –200 | –380 | 25 | 25 |
| 120 | 180 | 0 | –25 | 31 | 31 | 19 | 19 | 0 | –250 | –500 | 30 | 30 |
| 180 | 250 | 0 | –30 | 38 | 38 | 23 | 23 | 0 | –300 | –500 | 30 | 40 |
| 250 | 315 | 0 | –35 | 44 | 44 | 26 | 26 | 0 | –350 | –500 | 35 | 50 |
| 315 | 400 | 0 | –40 | 50 | 50 | 30 | 30 | 0 | –400 | –630 | 40 | 60 |
| 400 | 500 | 0 | –45 | 56 | 56 | 34 | 34 | 0 | –450 | – | 50 | 65 |
| 500 | 630 | 0 | –50 | 63 | 63 | 38 | 38 | 0 | –500 | – | 60 | 70 |
| 630 | 800 | 0 | –75 | – | – | – | – | 0 | –750 | – | 70 | 80 |
| 800 | 1 000 | 0 | –100 | – | – | – | – | 0 | –1 000 | – | 80 | 90 |
| 1 000 | 1 250 | 0 | –125 | – | – | – | – | 0 | –1 250 | – | 100 | 100 |
| 1 250 | 1 600 | 0 | –160 | – | – | – | – | 0 | –1 600 | – | 120 | 120 |
| 1 600 | 2 000 | 0 | –200 | – | – | – | – | 0 | –2 000 | – | 140 | 140 |

### Outer ring

| D | | $t_{\Delta Dmp}$ | | $t_{VDsp}$[4] Open bearings Diameter series | | | Capped bearings[5] | $t_{VDmp}$[4] | $t_{\Delta Cs}$, $t_{VCs}$ | $t_{Kea}$ |
|---|---|---|---|---|---|---|---|---|---|---|
| > | ≤ | U | L | 7, 8, 9[2] | 0, 1 | 2, 3, 4 | 2, 3, 4 | | | |
| mm | | µm | | µm | | | | µm | µm | µm |
| 2,5 | 18 | 0 | –8 | 10 | 8 | 6 | 10 | 6 | Identical to $t_{\Delta Bs}$ and $t_{VBs}$ of an inner ring of the same bearing as the outer ring | 15 |
| 18 | 30 | 0 | –9 | 12 | 9 | 7 | 12 | 7 | | 15 |
| 30 | 50 | 0 | –11 | 14 | 11 | 8 | 16 | 8 | | 20 |
| 50 | 80 | 0 | –13 | 16 | 13 | 10 | 20 | 10 | | 25 |
| 80 | 120 | 0 | –15 | 19 | 19 | 11 | 26 | 11 | | 35 |
| 120 | 150 | 0 | –18 | 23 | 23 | 14 | 30 | 14 | | 40 |
| 150 | 180 | 0 | –25 | 31 | 31 | 19 | 38 | 19 | | 45 |
| 180 | 250 | 0 | –30 | 38 | 38 | 23 | – | 23 | | 50 |
| 250 | 315 | 0 | –35 | 44 | 44 | 26 | – | 26 | | 60 |
| 315 | 400 | 0 | –40 | 50 | 50 | 30 | – | 30 | | 70 |
| 400 | 500 | 0 | –45 | 56 | 56 | 34 | – | 34 | | 80 |
| 500 | 630 | 0 | –50 | 63 | 63 | 38 | – | 38 | | 100 |
| 630 | 800 | 0 | –75 | 94 | 94 | 55 | – | 55 | | 120 |
| 800 | 1 000 | 0 | –100 | 125 | 125 | 75 | – | 75 | | 140 |
| 1 000 | 1 250 | 0 | –125 | – | – | – | – | – | | 160 |
| 1 250 | 1 600 | 0 | –160 | – | – | – | – | – | | 190 |
| 1 600 | 2 000 | 0 | –200 | – | – | – | – | – | | 220 |
| 2 000 | 2 500 | 0 | –250 | – | – | – | – | – | | 250 |

[1] Tolerances for tapered bores (table 11, page 47 and table 12, page 48).
[2] Diameter series 7 and 8 not covered by ISO 492.
[3] Applies to inner rings and outer rings of bearings of matched bearing sets consisting of two or more bearings. Does not apply to universally matchable angular contact ball bearings.
[4] Applies to bearings prior to mounting and after removal of internal or external snap ring.
[5] Capped bearings are sealed or shielded bearings.

Table 3

## P6 class tolerances for radial bearings, except tapered roller bearings

### Inner ring

| d | | $t_{\Delta dmp}$[1] | | $t_{Vdsp}$[1] Diameter series | | | $t_{Vdmp}$ | $t_{\Delta Bs}$ | | | $t_{VBs}$ | $t_{Kia}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| > | ≤ | U | L | 7, 8, 9[2] | 0, 1 | 2, 3, 4 | | All | Normal | Modified[3] | | |
| mm | | µm | | µm | | | µm | µm | | | µm | µm |
| – | 2,5 | 0 | –7 | 9 | 7 | 5 | 5 | 0 | –40 | – | 12 | 5 |
| 2,5 | 10 | 0 | –7 | 9 | 7 | 5 | 5 | 0 | –120 | –250 | 15 | 6 |
| 10 | 18 | 0 | –7 | 9 | 7 | 5 | 5 | 0 | –120 | –250 | 20 | 7 |
| 18 | 30 | 0 | –8 | 10 | 8 | 6 | 6 | 0 | –120 | –250 | 20 | 8 |
| 30 | 50 | 0 | –10 | 13 | 10 | 8 | 8 | 0 | –120 | –250 | 20 | 10 |
| 50 | 80 | 0 | –12 | 15 | 15 | 9 | 9 | 0 | –150 | –380 | 25 | 10 |
| 80 | 120 | 0 | –15 | 19 | 19 | 11 | 11 | 0 | –200 | –380 | 25 | 13 |
| 120 | 180 | 0 | –18 | 23 | 23 | 14 | 14 | 0 | –250 | –500 | 30 | 18 |
| 180 | 250 | 0 | –22 | 28 | 28 | 17 | 17 | 0 | –300 | –500 | 30 | 20 |
| 250 | 315 | 0 | –25 | 31 | 31 | 19 | 19 | 0 | –350 | –500 | 35 | 25 |
| 315 | 400 | 0 | –30 | 38 | 38 | 23 | 23 | 0 | –400 | –630 | 40 | 30 |
| 400 | 500 | 0 | –35 | 44 | 44 | 26 | 26 | 0 | –450 | – | 45 | 35 |
| 500 | 630 | 0 | –40 | 50 | 50 | 30 | 30 | 0 | –500 | – | 50 | 40 |
| 630 | 800 | 0 | –50 | – | – | – | – | 0 | –750 | – | 60 | 45 |
| 800 | 1 000 | 0 | –60 | – | – | – | – | 0 | –1 000 | – | 60 | 50 |
| 1 000 | 1 250 | 0 | –75 | – | – | – | – | 0 | –1 250 | – | 70 | 60 |
| 1 250 | 1 600 | 0 | –90 | – | – | – | – | 0 | –1 600 | – | 70 | 70 |
| 1 600 | 2 000 | 0 | –115 | – | – | – | – | 0 | –2 000 | – | 80 | 80 |

### Outer ring

| D | | $t_{\Delta Dmp}$ | | $t_{VDsp}$[4] Open bearings Diameter series | | | Capped bearings[5] | $t_{VDmp}$[4] | $t_{\Delta Cs}$, $t_{VCs}$ | $t_{Kea}$ |
|---|---|---|---|---|---|---|---|---|---|---|
| > | ≤ | U | L | 7, 8, 9[2] | 0, 1 | 2, 3, 4 | 0, 1, 2, 3, 4 | | | |
| mm | | µm | | µm | | | | µm | | µm |
| 2,5 | 18 | 0 | –7 | 9 | 7 | 5 | 9 | 5 | Identical to $t_{\Delta Bs}$ and $t_{VBs}$ of an inner ring of the same bearing as the outer ring | 8 |
| 18 | 30 | 0 | –8 | 10 | 8 | 6 | 10 | 6 | | 9 |
| 30 | 50 | 0 | –9 | 11 | 9 | 7 | 13 | 7 | | 10 |
| 50 | 80 | 0 | –11 | 14 | 11 | 8 | 16 | 8 | | 13 |
| 80 | 120 | 0 | –13 | 16 | 16 | 10 | 20 | 10 | | 18 |
| 120 | 150 | 0 | –15 | 19 | 19 | 11 | 25 | 11 | | 20 |
| 150 | 180 | 0 | –18 | 23 | 23 | 14 | 30 | 14 | | 23 |
| 180 | 250 | 0 | –20 | 25 | 25 | 15 | – | 15 | | 25 |
| 250 | 315 | 0 | –25 | 31 | 31 | 19 | – | 19 | | 30 |
| 315 | 400 | 0 | –28 | 35 | 35 | 21 | – | 21 | | 35 |
| 400 | 500 | 0 | –33 | 41 | 41 | 25 | – | 25 | | 40 |
| 500 | 630 | 0 | –38 | 48 | 48 | 29 | – | 29 | | 50 |
| 630 | 800 | 0 | –45 | 56 | 56 | 34 | – | 34 | | 60 |
| 800 | 1 000 | 0 | –60 | 75 | 75 | 45 | – | 45 | | 75 |
| 1 000 | 1 250 | 0 | –75 | – | – | – | – | – | | 85 |
| 1 250 | 1 600 | 0 | –90 | – | – | – | – | – | | 100 |
| 1 600 | 2 000 | 0 | –115 | – | – | – | – | – | | 100 |
| 2 000 | 2 500 | 0 | –135 | – | – | – | – | – | | 120 |

1) Tolerances for tapered bores (table 11, page 47).
2) Diameter series 7 and 8 not covered by ISO 492.
3) Applies to inner rings and outer rings of bearings of matched bearing sets consisting of two or more bearings. Does not apply to universally matchable angular contact ball bearings.
4) Applies to bearings prior to mounting and after removal of internal or external snap ring.
5) Capped bearings are sealed or shielded bearings.

Table 4

**P5 class tolerances for radial bearings, except tapered roller bearings**

**Inner ring**

| d | | $t_{\Delta dmp}$[1] | | $t_{Vdsp}$[1] Diameter series | | $t_{Vdmp}$ | $t_{\Delta Bs}$ All | Normal | Modified[4] | $t_{VBs}$ | $t_{Kia}$ | $t_{Sd}$ | $t_{Sia}$[3] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| > | ≤ | U | L | 7, 8, 9[2] | 0, 1, 2, 3, 4 | | U | L | L | | | | |
| mm | | µm | | µm | | µm | µm | | | µm | µm | µm | µm |
| – | 2,5 | 0 | –5 | 5 | 4 | 3 | 0 | –40 | –250 | 5 | 4 | 7 | 7 |
| 2,5 | 10 | 0 | –5 | 5 | 4 | 3 | 0 | –40 | –250 | 5 | 4 | 7 | 7 |
| 10 | 18 | 0 | –5 | 5 | 4 | 3 | 0 | –80 | –250 | 5 | 4 | 7 | 7 |
| 18 | 30 | 0 | –6 | 6 | 5 | 3 | 0 | –120 | –250 | 5 | 4 | 8 | 8 |
| 30 | 50 | 0 | –8 | 8 | 6 | 4 | 0 | –120 | –250 | 5 | 5 | 8 | 8 |
| 50 | 80 | 0 | –9 | 9 | 7 | 5 | 0 | –150 | –250 | 6 | 5 | 8 | 8 |
| 80 | 120 | 0 | –10 | 10 | 8 | 5 | 0 | –200 | –380 | 7 | 6 | 9 | 9 |
| 120 | 180 | 0 | –13 | 13 | 10 | 7 | 0 | –250 | –380 | 8 | 8 | 10 | 10 |
| 180 | 250 | 0 | –15 | 15 | 12 | 8 | 0 | –300 | –500 | 10 | 10 | 11 | 13 |
| 250 | 315 | 0 | –18 | 18 | 14 | 9 | 0 | –350 | –500 | 13 | 13 | 13 | 15 |
| 315 | 400 | 0 | –23 | 23 | 18 | 12 | 0 | –400 | –630 | 15 | 15 | 15 | 20 |
| 400 | 500 | 0 | –28 | 28 | 21 | 14 | 0 | –450 | – | 18 | 17 | 18 | 23 |
| 500 | 630 | 0 | –35 | 35 | 26 | 18 | 0 | –500 | – | 20 | 19 | 20 | 25 |
| 630 | 800 | 0 | –45 | – | – | – | 0 | –750 | – | 26 | 22 | 26 | 30 |
| 800 | 1 000 | 0 | –60 | – | – | – | 0 | –1 000 | – | 32 | 26 | 32 | 30 |
| 1 000 | 1 250 | 0 | –75 | – | – | – | 0 | –1 250 | – | 38 | 30 | 38 | 30 |
| 1 250 | 1 600 | 0 | –90 | – | – | – | 0 | –1 600 | – | 45 | 35 | 45 | 30 |
| 1 600 | 2 000 | 0 | –115 | – | – | – | 0 | –2 000 | – | 55 | 40 | 55 | 30 |

**Outer ring**

| D | | $t_{\Delta Dmp}$ | | $t_{VDsp}$[5] Diameter series | | $t_{VDmp}$ | $t_{\Delta Cs}$ | $t_{VCs}$ | $t_{Kea}$ | $t_{SD}$[6] | $t_{Sea}$[3] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| > | ≤ | U | L | 7, 8, 9[2] | 0, 1, 2, 3, 4 | | | | | | |
| mm | | µm | | µm | | µm | | µm | µm | µm | µm |
| 2,5 | 18 | 0 | –5 | 5 | 4 | 3 | Identical to $t_{\Delta Bs}$ of an inner ring of the same bearing as the outer ring | 5 | 5 | 4 | 8 |
| 18 | 30 | 0 | –6 | 6 | 5 | 3 | | 5 | 6 | 4 | 8 |
| 30 | 50 | 0 | –7 | 7 | 5 | 4 | | 5 | 7 | 4 | 8 |
| 50 | 80 | 0 | –9 | 9 | 7 | 5 | | 6 | 8 | 4 | 10 |
| 80 | 120 | 0 | –10 | 10 | 8 | 5 | | 8 | 10 | 4,5 | 11 |
| 120 | 150 | 0 | –11 | 11 | 8 | 6 | | 8 | 11 | 5 | 13 |
| 150 | 180 | 0 | –13 | 13 | 10 | 7 | | 8 | 13 | 5 | 14 |
| 180 | 250 | 0 | –15 | 15 | 11 | 8 | | 10 | 15 | 5,5 | 15 |
| 250 | 315 | 0 | –18 | 18 | 14 | 9 | | 11 | 18 | 6,5 | 18 |
| 315 | 400 | 0 | –20 | 20 | 15 | 10 | | 13 | 20 | 6,5 | 20 |
| 400 | 500 | 0 | –23 | 23 | 17 | 12 | | 15 | 23 | 7,5 | 23 |
| 500 | 630 | 0 | –28 | 28 | 21 | 14 | | 18 | 25 | 9 | 25 |
| 630 | 800 | 0 | –35 | 35 | 26 | 18 | | 20 | 30 | 10 | 30 |
| 800 | 1 000 | 0 | –50 | 50 | 29 | 25 | | 25 | 35 | 12,5 | – |
| 1 000 | 1 250 | 0 | –63 | – | – | – | | 30 | 40 | 15 | – |
| 1 250 | 1 600 | 0 | –80 | – | – | – | | 35 | 45 | 17,5 | – |
| 1 600 | 2 000 | 0 | –100 | – | – | – | | 38 | 55 | 20 | – |
| 2 000 | 2 500 | 0 | –125 | – | – | – | | 45 | 65 | 25 | – |

1) Tolerances for tapered bores (table 11, page 47).
2) Diameter series 7 and 8 not covered by ISO 492.
3) Applies to groove ball bearings only, except for self-aligning ball bearings.
4) Applies to inner rings and outer rings of bearings of matched bearing sets consisting of two or more bearings. Does not apply to universally matchable angular contact ball bearings.
5) No values have been established for capped (sealed or shielded) bearings.
6) Tolerance values have become half the values in accordance with the revised ISO standard because SD is defined as perpendicularity of outer ring outside surface axis with respect to datum established from the outer ring face.

**Table 5**

## Normal and CL7C class tolerances for metric tapered roller bearings

### Inner ring, bearing width and ring widths

| d | | $t_{\Delta dmp}$ | | $t_{Vdsp}$ | $t_{Vdmp}$ | $t_{\Delta Bs}$ | | $t_{Kia}$ Tolerance classes Normal | CL7C[1] | $t_{\Delta Ts}$ | | $t_{\Delta T1s}$ | | $t_{\Delta T2s}$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| > | ≤ | U | L | | | U | L | | | U | L | U | L | U | L |
| mm | | µm | | µm | µm | µm | | µm | | µm | | µm | | µm | |
| **10** | **18** | 0 | –12 | 12 | 9 | 0 | –120 | 15 | 7 | 200 | 0 | 100 | 0 | 100 | 0 |
| **18** | **30** | 0 | –12 | 12 | 9 | 0 | –120 | 18 | 8 | 200 | 0 | 100 | 0 | 100 | 0 |
| **30** | **50** | 0 | –12 | 12 | 9 | 0 | –120 | 20 | 10 | 200 | 0 | 100 | 0 | 100 | 0 |
| **50** | **80** | 0 | –15 | 15 | 11 | 0 | –150 | 25 | 10 | 200 | 0 | 100 | 0 | 100 | 0 |
| **80** | **120** | 0 | –20 | 20 | 15 | 0 | –200 | 30 | 13 | 200 | –200 | 100 | –100 | 100 | –100 |
| **120** | **180** | 0 | –25 | 25 | 19 | 0 | –250 | 35 | – | 350 | –250 | 150 | –150 | 200 | –100 |
| **180** | **250** | 0 | –30 | 30 | 23 | 0 | –300 | 50 | – | 350 | –250 | 150 | –150 | 200 | –100 |
| **250** | **315** | 0 | –35 | 35 | 26 | 0 | –350 | 60 | – | 350 | –250 | 150 | –150 | 200 | –100 |
| **315** | **400** | 0 | –40 | 40 | 30 | 0 | –400 | 70 | – | 400 | –400 | 200 | –200 | 200 | –200 |

### Outer ring

| D | | $t_{\Delta Dmp}$ | | $t_{VDsp}$ | $t_{VDmp}$ | $t_{\Delta Cs}$ | | $t_{Kea}$ Tolerance classes Normal | CL7C[1] |
|---|---|---|---|---|---|---|---|---|---|
| > | ≤ | U | L | | | U | L | | |
| mm | | µm | | µm | µm | µm | | µm | |
| **18** | **30** | 0 | –12 | 12 | 9 | 0 | –120 | 18 | 9 |
| **30** | **50** | 0 | –14 | 14 | 11 | 0 | –120 | 20 | 10 |
| **50** | **80** | 0 | –16 | 16 | 12 | 0 | –150 | 25 | 13 |
| **80** | **120** | 0 | –18 | 18 | 14 | 0 | –200 | 35 | 18 |
| **120** | **150** | 0 | –20 | 20 | 15 | 0 | –250 | 40 | 20 |
| **150** | **180** | 0 | –25 | 25 | 19 | 0 | –250 | 45 | 23 |
| **180** | **250** | 0 | –30 | 30 | 23 | 0 | –300 | 50 | – |
| **250** | **315** | 0 | –35 | 35 | 26 | 0 | –350 | 60 | – |
| **315** | **400** | 0 | –40 | 40 | 30 | 0 | –400 | 70 | – |
| **400** | **500** | 0 | –45 | 45 | 34 | 0 | –450 | 80 | – |
| **500** | **630** | 0 | –50 | 60 | 38 | 0 | –500 | 100 | – |
| **630** | **800** | 0 | –75 | 80 | 55 | 0 | –750 | 120 | – |

[1] Tolerances are not in accordance with any ISO tolerance class and are for high-performance design tapered roller bearings.

Table 6

**CLN class tolerances[1] for metric tapered roller bearings**

**Inner ring, bearing width and ring widths**

| d | | $t_{\Delta dmp}$ | | $t_{Vdsp}$ | $t_{Vdmp}$ | $t_{\Delta Bs}$ | | $t_{Kia}$ | $t_{\Delta Ts}$ | | $t_{\Delta T1s}$ | | $t_{\Delta T2s}$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| > | ≤ | U | L | | | U | L | | U | L | U | L | U | L |
| mm | | µm | | µm | µm | µm | | µm | µm | | µm | | µm | |
| **10** | **18** | 0 | –12 | 12 | 9 | 0 | –50 | 15 | 100 | 0 | 50 | 0 | 50 | 0 |
| **18** | **30** | 0 | –12 | 12 | 9 | 0 | –50 | 18 | 100 | 0 | 50 | 0 | 50 | 0 |
| **30** | **50** | 0 | –12 | 12 | 9 | 0 | –50 | 20 | 100 | 0 | 50 | 0 | 50 | 0 |
| **50** | **80** | 0 | –15 | 15 | 11 | 0 | –50 | 25 | 100 | 0 | 50 | 0 | 50 | 0 |
| **80** | **120** | 0 | –20 | 20 | 15 | 0 | –50 | 30 | 100 | 0 | 50 | 0 | 50 | 0 |
| **120** | **180** | 0 | –25 | 25 | 19 | 0 | –50 | 35 | 150 | 0 | 50 | 0 | 100 | 0 |
| **180** | **250** | 0 | –30 | 30 | 23 | 0 | –50 | 50 | 150 | 0 | 50 | 0 | 100 | 0 |
| **250** | **315** | 0 | –35 | 35 | 26 | 0 | –50 | 60 | 200 | 0 | 100 | 0 | 100 | 0 |
| **315** | **400** | 0 | –40 | 40 | 30 | 0 | –50 | 70 | 200 | 0 | 100 | 0 | 100 | 0 |

**Outer ring**

| D | | $t_{\Delta Dmp}$ | | $t_{VDsp}$ | $t_{VDmp}$ | $t_{\Delta Cs}$ | | $t_{Kea}$ |
|---|---|---|---|---|---|---|---|---|
| > | ≤ | U | L | | | U | L | |
| mm | | µm | | µm | µm | µm | | µm |
| **18** | **30** | 0 | –12 | 12 | 9 | 0 | –100 | 18 |
| **30** | **50** | 0 | –14 | 14 | 11 | 0 | –100 | 20 |
| **50** | **80** | 0 | –16 | 16 | 12 | 0 | –100 | 25 |
| **80** | **120** | 0 | –18 | 18 | 14 | 0 | –100 | 35 |
| **120** | **150** | 0 | –20 | 20 | 15 | 0 | –100 | 40 |
| **150** | **180** | 0 | –25 | 25 | 19 | 0 | –100 | 45 |
| **180** | **250** | 0 | –30 | 30 | 23 | 0 | –100 | 50 |
| **250** | **315** | 0 | –35 | 35 | 26 | 0 | –100 | 60 |
| **315** | **400** | 0 | –40 | 40 | 30 | 0 | –100 | 70 |
| **400** | **500** | 0 | –45 | 45 | 34 | 0 | –100 | 80 |
| **500** | **630** | 0 | –50 | 60 | 38 | 0 | –100 | 100 |

[1] Tolerance class CLN is in accordance with ISO tolerance class 6X.

**Table 7**

## P5 class tolerances for metric tapered roller bearings

### Inner ring and bearing width

| d | | $t_{\Delta dmp}$ | | $t_{Vdsp}$ | $t_{Vdmp}$ | $t_{\Delta Bs}$ | | $t_{Kia}$ | $t_{Sd}$ | $t_{\Delta Ts}$ | | $t_{\Delta T1s}$ | | $t_{\Delta T2s}$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| > | ≤ | U | L | | | U | L | | | U | L | U | L | U | L |
| mm | | µm | | µm | µm | µm | | µm | µm | µm | | µm | | µm | |
| **10** | **18** | 0 | –7 | 5 | 5 | 0 | –200 | 5 | 7 | +200 | –200 | +100 | –100 | +100 | –100 |
| **18** | **30** | 0 | –8 | 6 | 5 | 0 | –200 | 5 | 8 | +200 | –200 | +100 | –100 | +100 | –100 |
| **30** | **50** | 0 | –10 | 8 | 5 | 0 | –240 | 6 | 8 | +200 | –200 | +100 | –100 | +100 | –100 |
| **50** | **80** | 0 | –12 | 9 | 6 | 0 | –300 | 7 | 8 | +200 | –200 | +100 | –100 | +100 | –100 |
| **80** | **120** | 0 | –15 | 11 | 8 | 0 | –400 | 8 | 9 | +200 | –200 | +100 | –100 | +100 | –100 |
| **120** | **180** | 0 | –18 | 14 | 9 | 0 | –500 | 11 | 10 | +350 | –250 | +150 | –150 | +200 | –100 |
| **180** | **250** | 0 | –22 | 17 | 11 | 0 | –600 | 13 | 11 | +350 | –250 | +150 | –150 | +200 | –100 |
| **250** | **315** | 0 | –25 | 19 | 13 | 0 | –700 | 13 | 13 | +350 | –250 | +150 | –150 | +200 | –100 |
| **315** | **400** | 0 | –30 | 23 | 15 | 0 | –800 | 15 | 15 | +400 | –400 | +200 | –200 | +200 | –200 |
| **400** | **500** | 0 | –35 | 28 | 17 | 0 | –900 | 20 | 17 | +450 | –450 | +225 | –225 | +225 | –225 |
| **500** | **630** | 0 | –40 | 35 | 20 | 0 | –1 100 | 25 | 20 | +500 | –500 | – | – | – | – |
| **630** | **800** | 0 | –50 | 45 | 25 | 0 | –1 600 | 30 | 25 | +600 | –600 | – | – | – | – |
| **800** | **1 000** | 0 | –60 | 60 | 30 | 0 | –2 000 | 37 | 30 | +750 | –750 | – | – | – | – |
| **1 000** | **1 250** | 0 | –75 | 75 | 37 | 0 | –2 000 | 45 | 40 | +750 | –750 | – | – | – | – |
| **1 250** | **1 600** | 0 | –90 | 90 | 45 | 0 | –2 000 | 55 | 50 | +900 | –900 | – | – | – | – |

### Outer ring

| D | | $t_{\Delta Dmp}$ | | $t_{VDsp}$ | $t_{VDmp}$ | $t_{\Delta Cs}$ | $t_{Kea}$ | $t_{SD}$[1)] |
|---|---|---|---|---|---|---|---|---|
| > | ≤ | U | L | | | | | |
| mm | | µm | | µm | µm | | µm | µm |
| **18** | **30** | 0 | –8 | 6 | 5 | Identical to $t_{\Delta Bs}$ of an inner ring of the same bearing as the outer ring | 6 | 4 |
| **30** | **50** | 0 | –9 | 7 | 5 | | 7 | 4 |
| **50** | **80** | 0 | –11 | 8 | 6 | | 8 | 4 |
| **80** | **120** | 0 | –13 | 10 | 7 | | 10 | 4,5 |
| **120** | **150** | 0 | –15 | 11 | 8 | | 11 | 5 |
| **150** | **180** | 0 | –18 | 14 | 9 | | 13 | 5 |
| **180** | **250** | 0 | –20 | 15 | 10 | | 15 | 5,5 |
| **250** | **315** | 0 | –25 | 19 | 13 | | 18 | 6,5 |
| **315** | **400** | 0 | –28 | 22 | 14 | | 20 | 6,5 |
| **400** | **500** | 0 | –33 | 26 | 17 | | 24 | 8,5 |
| **500** | **630** | 0 | –38 | 30 | 20 | | 30 | 10 |
| **630** | **800** | 0 | –45 | 38 | 25 | | 36 | 12,5 |
| **800** | **1 000** | 0 | –60 | 50 | 30 | | 43 | 15 |
| **1 000** | **1 250** | 0 | –80 | 65 | 38 | | 52 | 19 |
| **1250** | **1 600** | 0 | –100 | 90 | 50 | | 62 | 25 |
| **1 600** | **2 000** | 0 | –125 | 120 | 65 | | 73 | 32,5 |

1) Tolerance values have become half the values in accordance with the revised ISO standard (2014) because SD is defined as perpendicularity of the outer ring outside surface axis with respect to datum established from the outer ring face.

Table 8

**Normal tolerances for inch radial bearings, except tapered roller bearings**

**Inner ring**

| d | | $t_{\Delta dmp}$ | | $t_{Vdsp}$ | $t_{\Delta Bs}$ | | $t_{VBs}$ | $t_{Kia}$ | $t_{Sia}$ |
|---|---|---|---|---|---|---|---|---|---|
| > | ≤ | U | L | | U | L | | | |
| mm | | µm | | µm | µm | | µm | µm | µm |
| **–** | **25,4** | +5 | –5 | 10 | 0 | –127 | 13 | 10 | 15 |
| **25,4** | **50,8** | +5 | –8 | 10 | 0 | –127 | 13 | 10 | 20 |
| **50,8** | **76,2** | +5 | –8 | 13 | 0 | –127 | 13 | 15 | 30 |
| **76,2** | **152,4** | +5 | –8 | 18 | 0 | –127 | 15 | 20 | 38 |
| **152,4** | **203,2** | +5 | –13 | 33 | 0 | –127 | 15 | 25 | 51 |
| **203,2** | **304,8** | +5 | –13 | 33 | 0 | –254 | 20 | 30 | 51 |
| **304,8** | **381** | +5 | –20 | 51 | 0 | –406 | 25 | 38 | 64 |

**Outer ring**

| D | | $t_{\Delta Dmp}$ | | $t_{VDsp}$ | $t_{\Delta Cs}$ | $t_{VCs}$ | $t_{Kea}$ | $t_{Sea}$ |
|---|---|---|---|---|---|---|---|---|
| > | ≤ | U | L | | | | | |
| mm | | µm | | µm | | µm | µm | µm |
| **–** | **25,4** | –8 | –18 | 10 | Identical to $t_{\Delta Bs}$ of an inner ring of the same bearing as the outer ring | 13 | 10 | 15 |
| **25,4** | **50,8** | –8 | –20 | 10 | | 13 | 13 | 15 |
| **50,8** | **76,2** | –13 | –25 | 13 | | 13 | 15 | 20 |
| **76,2** | **127** | –20 | –33 | 18 | | 15 | 18 | 30 |
| **127** | **203,2** | –33 | –46 | 33 | | 15 | 20 | 38 |
| **203,2** | **304,8** | –33 | –46 | 33 | | 20 | 25 | 51 |
| **304,8** | **381** | –33 | –58 | 51 | | 25 | 30 | 51 |
| **381** | **508** | –33 | –58 | 51 | | 30 | 38 | 64 |

**Table 9**

## Tolerances for inch tapered roller bearings

### Inner ring

| d | | $t_{\Delta dmp}$ Tolerance classes Normal, CL2 | | CL3, CL0 | | $t_{Kia}$, $t_{Sia}$ |
|---|---|---|---|---|---|---|
| > | ≤ | U | L | U | L | |
| mm | | µm | | µm | | |
| – | 76,2 | +13 | 0 | +13 | 0 | Values are given in outer ring table |
| 76,2 | 101,6 | +25 | 0 | +13 | 0 | |
| 101,6 | 266,7 | +25 | 0 | +13 | 0 | |
| 266,7 | 304,8 | +25 | 0 | +13 | 0 | |
| 304,8 | 609,6 | +51 | 0 | +25 | 0 | |
| 609,6 | 914,4 | +76 | 0 | +38 | 0 | |

### Outer ring

| D | | $t_{\Delta Dmp}$ Tolerance classes Normal, CL2 | | CL3, CL0 | | $t_{Kia}$, $t_{Kea}$, $t_{Sia}$, $t_{Sea}$ Tolerance classes Normal | CL2 | CL3 | CL0 | $t_{Kea}$ Tolerance class CL7C |
|---|---|---|---|---|---|---|---|---|---|---|
| > | ≤ | H | L | H | L | | | | | |
| mm | | µm | | | | µm | | | | µm |
| – | 304,8 | +25 | 0 | +13 | 0 | 51 | 38 | 8 | 4 | → table 5, page 41 |
| 304,8 | 609,6 | +51 | 0 | +25 | 0 | 51 | 38 | 18 | 9 | |
| 609,6 | 914,4 | +76 | 0 | +38 | 0 | 76 | 51 | 51 | 26 | |

### Abutment width of single row bearings

| d | | D | | $t_{\Delta Ts}$ Tolerance classes Normal | | CL2 | | CL3, CL0 | |
|---|---|---|---|---|---|---|---|---|---|
| > | ≤ | > | ≤ | U | L | U | L | U | L |
| mm | | mm | | µm | | | | | |
| – | 101,6 | – | – | +203 | 0 | +203 | 0 | +203 | –203 |
| 101,6 | 266,7 | – | – | +356 | –254 | +203 | 0 | +203 | –203 |
| 266,7 | 304,8 | – | – | +356 | –254 | +203 | 0 | +203 | –203 |
| 304,8 | 609,6 | – | 508 | +381 | –381 | +381 | –381 | +203 | –203 |
| 304,8 | 609,6 | 508 | – | +381 | –381 | +381 | –381 | +381 | –381 |
| 609,6 | – | – | – | +381 | –381 | – | – | +381 | –381 |

Table 10

**Tolerances for thrust bearings**

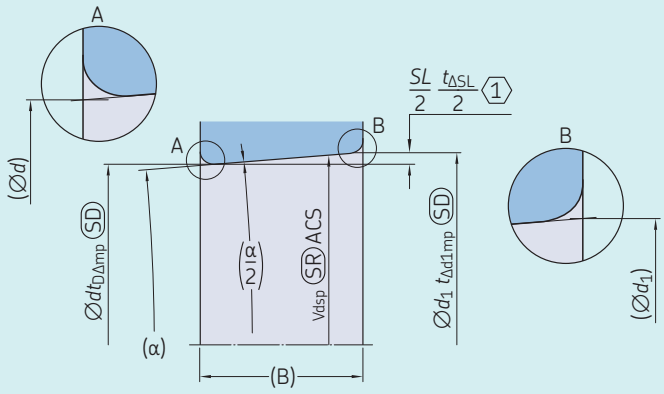
| Nominal diameter | | Shaft washer | | | | | | Housing washer | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $d$, $d_2$, $D$[1] | | $t_{\Delta dmp}$, $t_{\Delta d2mp}$ Tolerance classes Normal, P6, P5 | | $t_{Vdsp}$, $t_{Vd2sp}$ | $t_{Si}$[2][3] Tolerance classes Normal | $t_{Si}$[2][3] P6 | $t_{Si}$[2][3] P5 | $t_{\Delta Dmp}$ Tolerance classes Normal, P6, P5 | | $t_{VDsp}$ | $t_{Se}$[2] |
| > | ≤ | U | L | | | | | U | L | | |
| mm | | µm | | | | | | µm | | | |
| – | 18 | 0 | –8 | 6 | 10 | 5 | 3 | 0 | –11 | 8 | Identical to $t_{Si}$ of shaft washer of same bearing |
| 18 | 30 | 0 | –10 | 8 | 10 | 5 | 3 | 0 | –13 | 10 | |
| 30 | 50 | 0 | –12 | 9 | 10 | 6 | 3 | 0 | –16 | 12 | |
| 50 | 80 | 0 | –15 | 11 | 10 | 7 | 4 | 0 | –19 | 14 | |
| 80 | 120 | 0 | –20 | 15 | 15 | 8 | 4 | 0 | –22 | 17 | |
| 120 | 180 | 0 | –25 | 19 | 15 | 9 | 5 | 0 | –25 | 19 | |
| 180 | 250 | 0 | –30 | 23 | 20 | 10 | 5 | 0 | –30 | 23 | |
| 250 | 315 | 0 | –35 | 26 | 25 | 13 | 7 | 0 | –35 | 26 | |
| 315 | 400 | 0 | –40 | 30 | 30 | 15 | 7 | 0 | –40 | 30 | |
| 400 | 500 | 0 | –45 | 34 | 30 | 18 | 9 | 0 | –45 | 34 | |
| 500 | 630 | 0 | –50 | 38 | 35 | 21 | 11 | 0 | –50 | 38 | |
| 630 | 800 | 0 | –75 | 55 | 40 | 25 | 13 | 0 | –75 | 55 | |
| 800 | 1 000 | 0 | –100 | 75 | 45 | 30 | 15 | 0 | –100 | 75 | |
| 1 000 | 1 250 | 0 | –125 | 95 | 50 | 35 | 18 | 0 | –125 | 95 | |
| 1 250 | 1 600 | 0 | –160 | 120 | 60 | 40 | 25 | 0 | –160 | 120 | |
| 1 600 | 2 000 | 0 | –200 | 150 | 75 | 45 | 30 | 0 | –200 | 150 | |
| 2 000 | 2 500 | 0 | –250 | 190 | 90 | 50 | 40 | 0 | –250 | 190 | |

| Bearing height $d$, $d_2$[1] | | $t_{\Delta Ts}$ Single direction bearings without seat washer | | $t_{\Delta T1s}$[4] Single direction bearings with seat washer | | $t_{\Delta T1s}$ Double direction bearings without seat washers | | $t_{\Delta T3s}$[4] Double direction bearings with seat washers | | $t_{\Delta T4s}$[4][5] Spherical roller thrust bearings | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | SKF | | SKF Explorer | |
| > | ≤ | U | L | U | L | U | L | U | L | U | L | U | L |
| mm | | µm | | µm | | µm | | µm | | µm | | | |
| – | 30 | 20 | –250 | 100 | –250 | 150 | –400 | 300 | –400 | – | – | – | – |
| 30 | 50 | 20 | –250 | 100 | –250 | 150 | –400 | 300 | –400 | – | – | – | – |
| 50 | 80 | 20 | –300 | 100 | –300 | 150 | –500 | 300 | –500 | 0 | –125 | 0 | –100 |
| 80 | 120 | 25 | –300 | 150 | –300 | 200 | –500 | 400 | –500 | 0 | –150 | 0 | –100 |
| 120 | 180 | 25 | –400 | 150 | –400 | 200 | –600 | 400 | –600 | 0 | –175 | 0 | –125 |
| 180 | 250 | 30 | –400 | 150 | –400 | 250 | –600 | 500 | –600 | 0 | –200 | 0 | –125 |
| 250 | 315 | 40 | –400 | – | – | – | – | – | – | 0 | –225 | 0 | –150 |
| 315 | 400 | 40 | –500 | – | – | – | – | – | – | 0 | –300 | 0 | –200 |
| 400 | 500 | 50 | –500 | – | – | – | – | – | – | 0 | –400 | – | – |
| 500 | 630 | 60 | –600 | – | – | – | – | – | – | 0 | –500 | – | – |
| 630 | 800 | 70 | –750 | – | – | – | – | – | – | 0 | –630 | – | – |
| 800 | 1 000 | 80 | –1 000 | – | – | – | – | – | – | 0 | –800 | – | – |
| 1 000 | 1 250 | 100 | –1 400 | – | – | – | – | – | – | 0 | –1 000 | – | – |
| 1 250 | 1 600 | 120 | –1 600 | – | – | – | – | – | – | 0 | –1 200 | – | – |
| 1 600 | 2 000 | 140 | –1 900 | – | – | – | – | – | – | – | – | – | – |
| 2 000 | 2 500 | 160 | –2 300 | – | – | – | – | – | – | – | – | – | – |

1) For double direction bearings, the values apply only for $d_2 \leq 190$ mm and $D \leq 360$ mm.
2) Applies only to thrust ball bearings and thrust cylindrical roller bearings, each with 90° contact angle.
3) Not applicable for central shaft washers.
4) Not included in ISO 199.
5) ISO 199 uses symbol T.

**Table 11**

**Normal, P6 and P5 class tolerances for tapered bores, taper 1:12**



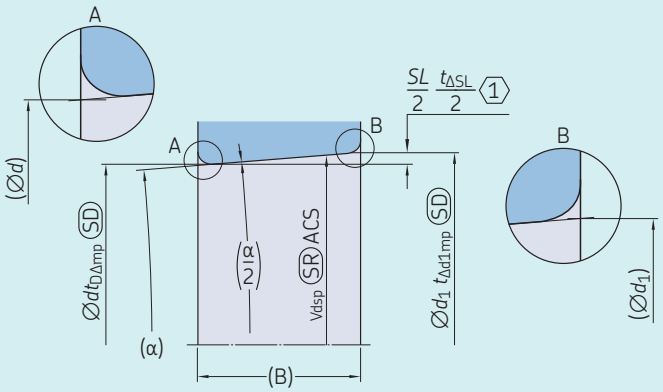

⟨1⟩ = $SL$ is a calculated nominal size from $d$ and $d_1$, i.e. $SL = (d_1 - d) = 2B \tan(\alpha/2)$;
$\Delta SL$ is a calculated characteristic, i.e. $\Delta SL = \Delta d1mp - \Delta dmp$

| **Bore diameter** | | **Tolerance classes** Normal[1], P6 | | | | | P5 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **d** | | $t_{\Delta dmp}$ | | $t_{Vdsp}$[2] | $t_{\Delta SL}$ | | $t_{\Delta dmp}$ | | $t_{Vdsp}$[2] | $t_{\Delta SL}$ | |
| > | ≤ | U | L | | U | L | U | L | | U | L |
| mm | | µm | | µm | µm | | µm | | µm | µm | |
| **18** | **30** | +21 | 0 | 13 | +21 | 0 | +13 | 0 | 13 | +13 | 0 |
| **30** | **50** | +25 | 0 | 15 | +25 | 0 | +16 | 0 | 15 | +16 | 0 |
| **50** | **80** | +30 | 0 | 19 | +30 | 0 | +19 | 0 | 19 | +19 | 0 |
| **80** | **120** | +35 | 0 | 22 | +35 | 0 | +22 | 0 | 22 | +22 | 0 |
| **120** | **180** | +40 | 0 | 31 | +40 | 0 | +25 | 0 | 25 | +25 | 0 |
| **180** | **250** | +46 | 0 | 38 | +46 | 0 | +29 | 0 | 29 | +29 | 0 |
| **250** | **315** | +52 | 0 | 44 | +52 | 0 | +32 | 0 | 32 | +32 | 0 |
| **315** | **400** | +57 | 0 | 50 | +57 | 0 | +36 | 0 | 36 | +36 | 0 |
| **400** | **500** | +63 | 0 | 56 | +63 | 0 | +40 | 0 | – | +40 | 0 |
| **500** | **630** | +70 | 0 | 70 | +70 | 0 | +44 | 0 | – | +44 | 0 |
| **630** | **800** | +80 | 0 | – | +80 | 0 | +50 | 0 | – | +50 | 0 |
| **800** | **1 000** | +90 | 0 | – | +90 | 0 | +56 | 0 | – | +56 | 0 |
| **1 000** | **1 250** | +105 | 0 | – | +105 | 0 | +66 | 0 | – | +66 | 0 |
| **1 250** | **1 600** | +125 | 0 | – | +125 | 0 | +78 | 0 | – | +78 | 0 |
| **1 600** | **2 000** | +150 | 0 | – | +150 | 0 | +92 | 0 | – | +92 | 0 |

[1] Smaller tolerance zones than ISO 492.
[2] Applies in any cross section of the bore.

Table 12

**Normal tolerances for tapered bores, taper 1:30**




⟨1⟩ = $SL$ is a calculated nominal size from $d$ and $d_1$, i.e. $SL = (d_1 - d) = 2B \tan(\alpha/2)$;
ΔSL is a calculated characteristic, i.e. ΔSL = Δd1mp – Δdmp

| **Bore diameter** | | **Tolerance class** Normal | | | | |
|---|---|---|---|---|---|---|
| **d** | | $t_{\Delta dmp}$ | | $t_{Vdsp}$ [1] | $t_{\Delta SL}$ | |
| > | ≤ | U | L | | U | L |
| mm | | µm | | µm | µm | |
| **–** | **80** | +15 | 0 | 19 | +30 | 0 |
| **80** | **120** | +20 | 0 | 22 | +35 | 0 |
| **120** | **180** | +25 | 0 | 40 | +40 | 0 |
| **180** | **250** | +30 | 0 | 46 | +46 | 0 |
| **250** | **315** | +35 | 0 | 52 | +52 | 0 |
| **315** | **400** | +40 | 0 | 57 | +57 | 0 |
| **400** | **500** | +45 | 0 | 63 | +63 | 0 |
| **500** | **630** | +50 | 0 | 70 | +70 | 0 |
| **630** | **800** | +75 | 0 | – | +100 | 0 |
| **800** | **1 000** | +100 | 0 | – | +100 | 0 |
| **1 000** | **1 250** | +125 | 0 | – | +115 | 0 |
| **1 250** | **1 600** | +160 | 0 | – | +125 | 0 |
| **1 600** | **2 000** | +200 | 0 | – | +150 | 0 |

[1] Applies in any cross section of the bore.

**Table 13**

**Tolerance symbols**

| Tolerance symbol | Definition |
|---|---|
| | **Radial bearings inner ring – cylindrical and tapered bore** |
| **d** | **1** Cylindrical bore: Nominal bore diameter<br>**2** Tapered bore: Nominal bore diameter at the theoretical small end |
| **Δdmp** | **1** Cylindrical bore: Deviation of a mid-range size (out of two-point sizes) of bore diameter in any cross section from its nominal size<br>**2** Tapered bore: Deviation of a mid-range size (out of two-point sizes) of bore diameter at the theoretical small end from its nominal size |
| **Δds** | Deviation of a two-point size of bore diameter of a cylindrical bore from its nominal size |
| **Vdsp** | Range of two-point sizes of bore diameter in any cross section of a cylindrical or tapered bore |
| **Vdmp** | Range of mid-range sizes (out of two-point sizes) of bore diameter obtained from any cross section of a cylindrical bore |
| **B** | Nominal inner ring width |
| **ΔBs**<br>Nomal, Modified[1)] | **1** Symmetrical rings: Deviation of a two-point size of inner ring width from its nominal size<br>**2** Asymmetrical rings, upper limit: Deviation of a minimum circumscribed size of inner ring width, between two opposite lines, in any longitudinal section which includes the inner ring bore axis, from its nominal size<br>**3** Asymmetrical rings, lower limit: Deviation of a two-point size of inner ring width from its nominal size |
| **VBs** | **1** Symmetrical rings: Range of two-point sizes of inner ring width<br>**2** Asymmetrical rings: Range of minimum circumscribed sizes of inner ring width, between two opposite lines, obtained from any longitudinal section which includes the inner ring bore axis |
| **Kia**[2)] | Circular radial run-out of inner ring bore surface of assembled bearing with respect to datum, i.e. axis, established from the outer ring outside surface |
| **Sd**[2)] | Circular axial run-out of inner ring face with respect to datum, i.e. axis, established from the inner ring bore surface |
| **Sia**[2)] | Circular axial run-out of inner ring face of assembled bearing with respect to datum, i.e. axis, established from the outer ring outside surface |
| | **Radial bearings inner ring – tapered bore only** |
| **$d_1$** | Nominal bore diameter at the theoretical large end of a tapered bore |
| **Δd1mp** | Deviation of a mid-range size (out of two-point sizes) of bore diameter at the theoretical large end from its nominal size |
| **SL** | Taper slope, the difference between nominal diameters at the theoretical large end and small end of a tapered bore ($d_1 - d$) |
| **ΔSL** | Deviation of taper slope of a tapered inner ring bore from its nominal size |

1) Modified applies to inner rings and outer rings of bearings of matched bearing sets consisting of two or more bearings. Does not apply to universally matchable angular contact ball bearings.
2) Geometrical tolerances

cont. table 13

**Tolerance symbols**

| Tolerance symbol | Definition |
|---|---|
| | **Radial bearings outer ring** |
| **D** | Nominal outside diameter |
| **ΔDmp** | Deviation of a mid-range size (out of two-point sizes) of outside diameter in any cross section from its nominal size |
| **ΔDs** | Deviation of a two-point size of outside diameter from its nominal size |
| **VDsp** | Range of two-point sizes of outside diameter in any cross section |
| **VDmp** | Range of mid-range sizes (out of two-point sizes) of outside diameter obtained from any cross section |
| **C** | Nominal outer ring width |
| **ΔCs** Nomal, Modified[1)] | **1** Symmetrical rings: Deviation of a two-point size of outer ring width from its nominal size<br>**2** Asymmetrical rings, upper limit: Deviation of a minimum circumscribed size of outer ring width, between two opposite lines, in any longitudinal section which includes the outer ring outside surface axis, from its nominal size<br>**3** Asymmetrical rings, lower limit: Deviation of a two-point size of outer ring width from its nominal size |
| **VCs** | **1** Symmetrical rings: Range of two-point sizes of outer ring width<br>**2** Asymmetrical rings: Range of minimum circumscribed sizes of outer ring width, between two opposite lines, obtained from any longitudinal section which includes the outer ring outside surface axis |
| **Kea**[2)] | Circular radial run-out of outer ring outside surface of assembled bearing with respect to datum, i.e. axis, established from the inner ring bore surface |
| **SD**[2)] | Perpendicularity of outer ring outside surface axis with respect to datum established from the outer ring face |
| **Sea**[2)] | Circular axial run-out of outer ring face of assembled bearing with respect to datum, i.e. axis, established from the inner ring bore surface |
| | **Chamfer limits** |
| $r_s$ | Single chamfer dimension |
| $r_{s\,min}$ | Smallest single chamfer dimension of $r_s$, $r_1$, $r_2$, $r_3$, $r_4$... |
| $r_1$, $r_3$ | Radial direction chamfer dimensions |
| $r_2$, $r_4$ | Axial direction chamfer dimensions |
| | **Tapered roller bearings** |
| **T** | Nominal assembled bearing width |
| **ΔTs** | Deviation of minimum circumscribed size of assembled bearing width from its nominal size |
| $T_1$ | Nominal effective width of cone (inner ring, with roller and cage assembly) assembled with a master cup (outer ring) |
| $T_2$ | Nominal effective width of cup assembled with a master cone |
| **ΔT1s** | Deviation of minimum circumscribed size of effective width (cone assembled with a master cup) from its nominal size |
| **ΔT2s** | Deviation of minimum circumscribed size of effective width (cup assembled with a master cone) from its nominal size |

1) Modified applies to inner rings and outer rings of bearings of matched bearing sets consisting of two or more bearings. Does not apply to universally matchable angular contact ball bearings.
2) Geometrical tolerances

**cont. table 13**

**Tolerance symbols**

| Tolerance symbol | Definition |
|---|---|
| | **Thrust bearings shaft washer** |
| **d** | Nominal bore diameter of shaft washer, single direction bearing |
| **Δds** | Deviation of a two-point size of shaft washer bore diameter from its nominal size |
| **Δdmp** | Deviation of a mid-range size (out of two-point sizes) of shaft washer bore diameter in any cross section from its nominal size |
| **Vdsp** | Range of two-point sizes of shaft washer bore diameter in any cross section |
| **$d_2$** | Nominal bore diameter of central shaft washer, double direction bearing |
| **Δd2mp** | Deviation of a mid-range size (out of two-point sizes) of central shaft washer bore diameter in any cross section from its nominal size |
| **Vd2sp** | Range of two-point sizes of central shaft washer bore diameter in any cross section |
| **Si** | **1** Range of two-point sizes of thickness between shaft washer raceway and the back face, cylindrical roller thrust bearing<br>**2** Range of minimum spherical sizes between the raceway and the opposite back face of the shaft washer, obtained from any longitudinal section which includes the shaft washer bore axis, thrust ball bearing |
| | **Thrust bearings housing washer** |
| **D** | Nominal outside diameter of housing washer |
| **ΔDs** | Deviation of a two-point size of housing washer outside diameter from its nominal size |
| **ΔDmp** | Deviation of a mid-range size (out of two-point sizes) of housing washer outside diameter in any cross section from its nominal size |
| **VDsp** | Range of two-point sizes of housing washer outside diameter in any cross section |
| **Se** | **1** Range of two-point sizes of thickness between housing washer raceway and the back face, cylindrical roller thrust bearing<br>**2** Range of minimum spherical sizes between the raceway and the opposite back face of the housing washer, obtained from any longitudinal section which includes the housing washer outside surface axis, thrust ball bearing |
| | **Thrust bearings assembled bearing height** |
| **T** | Nominal assembled bearing height, single direction thrust bearing (except spherical roller thrust bearing → $T_4$) |
| **ΔTs** | Deviation of minimum circumscribed size of assembled bearing height from its nominal size, single direction thrust bearing (except spherical roller thrust bearing → ΔT4s) |
| **$T_1$** | **1** Nominal assembled bearing height, double direction thrust bearing<br>**2** Nominal assembled bearing height, single direction thrust bearing with a seat washer |
| **ΔT1s** | **1** Deviation of minimum circumscribed size of assembled bearing height from its nominal size, double direction thrust bearing<br>**2** Deviation of minimum circumscribed size of assembled bearing height from its nominal size, single direction thrust bearing with a seat washer |
| **$T_3$**[3)] | Nominal assembled bearing height, double direction thrust bearing with seat washers |
| **ΔT3s**[3)] | Deviation of minimum circumscribed size of assembled bearing height from its nominal size, double direction thrust bearing with seat washers |
| **$T_4$**[4)] | Nominal assembled bearing height, spherical roller thrust bearing |
| **ΔT4s**[4)] | Deviation of minimum circumscribed size of assembled bearing height from its nominal size, spherical roller thrust bearing |

[3)] Not included in ISO 199.
[4)] In ISO 199, the symbol T is used.

Table 14

**Diameter series (radial bearings)**

| Bearing type | Diameter series<br>7, 8, 9 | 0, 1 | 2, 3, 4 |
|---|---|---|---|
| **Deep groove ball bearings**[1] | 617, 618, 619<br>627, 628<br>637, 638, 639 | 60<br>160, 161<br>630 | 2, 3<br>42, 43<br>62, 63, 64, 622, 623 |
| **Angular contact ball bearings** | | 70 | 32, 33<br>72, 73<br>QJ 2, QJ 3 |
| **Self-aligning ball bearings**[2] | 139 | 10, 130 | 12, 13, 112<br>22, 23 |
| **Cylindrical roller bearings** | | NU 10, 20<br>NJ 10 | NU 2, 3, 4, 12, 22, 23<br>NJ 2, 3, 4, 22, 23<br>NUP 2, 3, 22, 23<br>N 2, 3 |
| **Full complement cylindrical roller bearings** | NCF 18, 19, 28, 29<br>NNC 48, 49<br>NNCF 48, 49<br>NNCL 48, 49 | NCF 30<br>NNF 50<br>NNCF 50 | NCF 22<br>NJG 23 |
| **Needle roller bearings** | NA 48, 49, 69 | | |
| **Spherical roller bearings** | 238, 239<br>248, 249 | 230, 231<br>240, 241 | 222, 232<br>213, 223 |
| **CARB toroidal roller bearings** | C 39, 49, 59, 69 | C 30, 31<br>C 40, 41 | C 22, 23<br>C 32 |

[1] Bearings 604, 607, 608, 609 belong to diameter series 0, bearings 623, 624, 625, 626, 627, 628 and 629 to diameter series 2, bearings 634, 635 and 638 to diameter series 3, bearing 607/8 to diameter series 9.
[2] Bearing 108 belongs to diameter series 0, bearings 126, 127 and 129 to diameter series 2, bearing 135 to diameter series 3.

**Table 15**

**Chamfer dimension limits for metric radial and thrust bearings, except tapered roller bearings**

| Minimum single chamfer dimension | Nominal bearing bore diameter | | Maximum chamfer dimensions | | |
|---|---|---|---|---|---|
| | | | Radial bearings | | Thrust bearings |
| $r_{s\ min}$ | d<br>> | ≤ | $r_{1,3}$ | $r_{2,4}$ | $r_{1,2,3,4}$ |
| mm | mm | | mm | | |
| **0,05** | – | – | 0,1 | 0,2 | 0,1 |
| **0,08** | – | – | 0,16 | 0,3 | 0,16 |
| **0,1** | – | – | 0,2 | 0,4 | 0,2 |
| **0,15** | – | – | 0,3 | 0,6 | 0,3 |
| **0,2** | – | – | 0,5 | 0,8 | 0,5 |
| **0,3** | – | 40 | 0,6 | 1 | 0,8 |
| | 40 | – | 0,8 | 1 | 0,8 |
| **0,6** | – | 40 | 1 | 2 | 1,5 |
| | 40 | – | 1,3 | 2 | 1,5 |
| **1** | – | 50 | 1,5 | 3 | 2,2 |
| | 50 | – | 1,9 | 3 | 2,2 |
| **1,1** | – | 120 | 2 | 3,5 | 2,7 |
| | 120 | – | 2,5 | 4 | 2,7 |
| **1,5** | – | 120 | 2,3 | 4 | 3,5 |
| | 120 | – | 3 | 5 | 3,5 |
| **2** | – | 80 | 3 | 4,5 | 4 |
| | 80 | 220 | 3,5 | 5 | 4 |
| | 220 | – | 3,8 | 6 | 4 |
| **2,1** | – | 280 | 4 | 6,5 | 4,5 |
| | 280 | – | 4,5 | 7 | 4,5 |
| **2,5** | – | 100 | 3,8 | 6 | – |
| | 100 | 280 | 4,5 | 6 | – |
| | 280 | – | 5 | 7 | – |
| **3** | – | 280 | 5 | 8 | 5,5 |
| | 280 | – | 5,5 | 8 | 5,5 |
| **4** | – | – | 6,5 | 9 | 6,5 |
| **5** | – | – | 8 | 10 | 8 |
| **6** | – | – | 10 | 13 | 10 |
| **7,5** | – | – | 12,5 | 17 | 12,5 |
| **9,5** | – | – | 15 | 19 | 15 |
| **12** | – | – | 18 | 24 | 18 |

**Table 16**

**Chamfer dimension limits for metric radial tapered roller bearings**

| Minimum single chamfer dimension | Nominal bearing bore/ outside diameter | | Maximum chamfer dimensions | |
|---|---|---|---|---|
| $r_{s\ min}$ | d, D<br>> | ≤ | $r_{1,3}$ | $r_{2,4}$ |
| mm | mm | | mm | |
| **0,3** | – | 40 | 0,7 | 1,4 |
| | 40 | – | 0,9 | 1,6 |
| **0,5** | – | 40 | 1,1 | 1,7 |
| | 40 | – | 1,2 | 1,9 |
| **0,6** | – | 40 | 1,1 | 1,7 |
| | 40 | – | 1,3 | 2 |
| **1** | – | 50 | 1,6 | 2,5 |
| | 50 | – | 1,9 | 3 |
| **1,5** | – | 120 | 2,3 | 3 |
| | 120 | 250 | 2,8 | 3,5 |
| | 250 | – | 3,5 | 4 |
| **2** | – | 120 | 2,8 | 4 |
| | 120 | 250 | 3,5 | 4,5 |
| | 250 | – | 4 | 5 |
| **2,5** | – | 120 | 3,5 | 5 |
| | 120 | 250 | 4 | 5,5 |
| | 250 | – | 4,5 | 6 |
| **3** | – | 120 | 4 | 5,5 |
| | 120 | 250 | 4,5 | 6,5 |
| | 250 | 400 | 5 | 7 |
| | 400 | – | 5,5 | 7,5 |
| **4** | – | 120 | 5 | 7 |
| | 120 | 250 | 5,5 | 7,5 |
| | 250 | 400 | 6 | 8 |
| | 400 | – | 6,5 | 8,5 |
| **5** | – | 180 | 6,5 | 8 |
| | 180 | – | 7,5 | 9 |
| **6** | – | 180 | 7,5 | 10 |
| | 180 | – | 9 | 11 |

Table 17

**Chamfer dimension limits for inch tapered roller bearings**

| Inner ring | | | | | | Outer ring | | | |
|---|---|---|---|---|---|---|---|---|---|
| Minimum single chamfer dimension | | Nominal bearing bore diameter | | Maximum chamfer dimensions | | Nominal bearing outside diameter | | Maximum chamfer dimensions | |
| $r_{s\,min}$ | | d | | $r_1$ | $r_2$ | D | | $r_3$ | $r_4$ |
| > | ≤ | > | ≤ | | | > | ≤ | | |
| mm | | mm | | mm | | mm | | mm | |
| **0,6** | **1,4** | – | 101,6 | $r_{1\,min}$ + 0,5 | $r_{2\,min}$ + 1,3 | – | 168,3 | $r_{3\,min}$ + 0,6 | $r_{4\,min}$ + 1,2 |
| | | 101,6 | 254 | $r_{1\,min}$ + 0,6 | $r_{2\,min}$ + 1,8 | 168,3 | 266,7 | $r_{3\,min}$ + 0,8 | $r_{4\,min}$ + 1,4 |
| | | 254 | – | $r_{1\,min}$ + 0,9 | $r_{2\,min}$ + 2 | 266,7 | 355,6 | $r_{3\,min}$ + 1,7 | $r_{4\,min}$ + 1,7 |
| | | | | | | 355,6 | – | $r_{3\,min}$ + 0,9 | $r_{4\,min}$ + 2 |
| **1,4** | **2,5** | – | 101,6 | $r_{1\,min}$ + 0,5 | $r_{2\,min}$ + 1,3 | – | 168,3 | $r_{3\,min}$ + 0,6 | $r_{4\,min}$ + 1,2 |
| | | 101,6 | 254 | $r_{1\,min}$ + 0,6 | $r_{2\,min}$ + 1,8 | 168,3 | 266,7 | $r_{3\,min}$ + 0,8 | $r_{4\,min}$ + 1,4 |
| | | 254 | – | $r_{1\,min}$ + 2 | $r_{2\,min}$ + 3 | 266,7 | 355,6 | $r_{3\,min}$ + 1,7 | $r_{4\,min}$ + 1,7 |
| | | | | | | 355,6 | – | $r_{3\,min}$ + 2 | $r_{4\,min}$ + 3 |
| **2,5** | **4,0** | – | 101,6 | $r_{1\,min}$ + 0,5 | $r_{2\,min}$ + 1,3 | – | 168,3 | $r_{3\,min}$ + 0,6 | $r_{4\,min}$ + 1,2 |
| | | 101,6 | 254 | $r_{1\,min}$ + 0,6 | $r_{2\,min}$ + 1,8 | 168,3 | 266,7 | $r_{3\,min}$ + 0,8 | $r_{4\,min}$ + 1,4 |
| | | 254 | 400 | $r_{1\,min}$ + 2 | $r_{2\,min}$ + 4 | 266,7 | 355,6 | $r_{3\,min}$ + 1,7 | $r_{4\,min}$ + 1,7 |
| | | 400 | – | $r_{1\,min}$ + 2,5 | $r_{2\,min}$ + 4,5 | 355,6 | 400 | $r_{3\,min}$ + 2 | $r_{4\,min}$ + 4 |
| | | | | | | 400 | – | $r_{3\,min}$ + 2,5 | $r_{4\,min}$ + 4,5 |
| **4,0** | **5,0** | – | 101,6 | $r_{1\,min}$ + 0,5 | $r_{2\,min}$ + 1,3 | – | 168,3 | $r_{3\,min}$ + 0,6 | $r_{4\,min}$ + 1,2 |
| | | 101,6 | 254 | $r_{1\,min}$ + 0,6 | $r_{2\,min}$ + 1,8 | 168,3 | 266,7 | $r_{3\,min}$ + 0,8 | $r_{4\,min}$ + 1,4 |
| | | 254 | – | $r_{1\,min}$ + 2,5 | $r_{2\,min}$ + 4 | 266,7 | 355,6 | $r_{3\,min}$ + 1,7 | $r_{4\,min}$ + 1,7 |
| | | | | | | 355,6 | – | $r_{3\,min}$ + 2,5 | $r_{4\,min}$ + 4 |
| **5,0** | **6,0** | – | 101,6 | $r_{1\,min}$ + 0,5 | $r_{2\,min}$ + 1,3 | – | 168,3 | $r_{3\,min}$ + 0,6 | $r_{4\,min}$ + 1,2 |
| | | 101,6 | 254 | $r_{1\,min}$ + 0,6 | $r_{2\,min}$ + 1,8 | 168,3 | 266,7 | $r_{3\,min}$ + 0,8 | $r_{4\,min}$ + 1,4 |
| | | 254 | – | $r_{1\,min}$ + 3 | $r_{2\,min}$ + 5 | 266,7 | 355,6 | $r_{3\,min}$ + 1,7 | $r_{4\,min}$ + 1,7 |
| | | | | | | 355,6 | – | $r_{3\,min}$ + 3 | $r_{4\,min}$ + 5 |
| **6,0** | **7,5** | – | 101,6 | $r_{1\,min}$ + 0,5 | $r_{2\,min}$ + 1,3 | – | 168,3 | $r_{3\,min}$ + 0,6 | $r_{4\,min}$ + 1,2 |
| | | 101,6 | 254 | $r_{1\,min}$ + 0,6 | $r_{2\,min}$ + 1,8 | 168,3 | 266,7 | $r_{3\,min}$ + 0,8 | $r_{4\,min}$ + 1,4 |
| | | 254 | – | $r_{1\,min}$ + 4,5 | $r_{2\,min}$ + 6,5 | 266,7 | 355,6 | $r_{3\,min}$ + 1,7 | $r_{4\,min}$ + 1,7 |
| | | | | | | 355,6 | – | $r_{3\,min}$ + 4,5 | $r_{4\,min}$ + 6,5 |
| **7,5** | **9,5** | – | 101,6 | $r_{1\,min}$ + 0,5 | $r_{2\,min}$ + 1,3 | – | 168,3 | $r_{3\,min}$ + 0,6 | $r_{4\,min}$ + 1,2 |
| | | 101,6 | 254 | $r_{1\,min}$ + 0,6 | $r_{2\,min}$ + 1,8 | 168,3 | 266,7 | $r_{3\,min}$ + 0,8 | $r_{4\,min}$ + 1,4 |
| | | 254 | – | $r_{1\,min}$ + 6,5 | $r_{2\,min}$ + 9,5 | 266,7 | 355,6 | $r_{3\,min}$ + 1,7 | $r_{4\,min}$ + 1,7 |
| | | | | | | 355,6 | – | $r_{3\,min}$ + 6,5 | $r_{4\,min}$ + 9,5 |
| **9,5** | **12** | – | 101,6 | $r_{1\,min}$ + 0,5 | $r_{2\,min}$ + 1,3 | – | 168,3 | $r_{3\,min}$ + 0,6 | $r_{4\,min}$ + 1,2 |
| | | 101,6 | 254 | $r_{1\,min}$ + 0,6 | $r_{2\,min}$ + 1,8 | 168,3 | 266,7 | $r_{3\,min}$ + 0,8 | $r_{4\,min}$ + 1,4 |
| | | 254 | – | $r_{1\,min}$ + 8 | $r_{2\,min}$ + 11 | 266,7 | 355,6 | $r_{3\,min}$ + 1,7 | $r_{4\,min}$ + 1,7 |
| | | | | | | 355,6 | – | $r_{3\,min}$ + 8 | $r_{4\,min}$ + 11 |

# Rounding values



## Shoulder diameters

The dimensions for the shoulder diameters of radial bearings are rounded up or down to a level that is suitable for general machinery applications. Diameter dimensions of the inner ring are rounded down, whereas those of the outer ring are rounded up.

## Load and speed ratings and fatigue load limits

The values of these parameters are rounded to a level that fits the accuracy of the calculations they are intended to be used in.

## Masses

Masses are rounded to approximately ±5% of the actual value. They do not include the weight of any packaging.

## Temperatures

Temperatures are typically rounded to 5 °C and are presented in both units (°C and °F). Because of the rounding, temperature values may not match when using unit conversion formulae.

# Storage

# A.3 Storage



Storage time is the period that a bearing can remain in storage in order to avoid adverse effects on operational performance of the bearing. SKF bearings are coated with a high-quality preservative oil to protect them from corrosion. Long storage times can be attained by storing bearings in their original, unopened and undamaged, packaging. The storage time of bearings also depends on their storage environment conditions. To maintain the potential operating performance of a bearing, SKF recommends a "first in, first out" inventory policy.

## Storage time for open bearings

Typical storage times for open (unsealed) bearings are listed in **table 1**.

## Storage time for capped bearings

Capped bearings (bearings with seals or shields) should be stored for a maximum of three years to avoid deterioration of their grease fill.

## Additional storage-related factors

To avoid deterioration of your bearings while in storage, consider these factors:

- Store indoors, in a frost- and condensation-free environment, at a maximum ambient temperature of 40 °C *(105 °F)*, avoiding air flow.
- Store in vibration-free conditions. Vibration can cause damage to raceways.
- Store horizontally, preferably, to avoid damage that could be caused by the bearing falling over.
- Do not open or damage the original packaging.

**Table 1**

**Storage time for open (unsealed) bearings**

| **Storage environment conditions** Relative air humidity | Ambient temperature | | **Storage time** |
|---|---|---|---|
| % | °C | *°F* | years |
| **65** | 20 to 25 | *70 to 75* | 10 |
| **75** | 20 to 25 | *70 to 75* | 5 |
| **75** | 35 to 40 | *95 to 105* | 3 |
| Uncontrolled tropical conditions[1)] | | | 1 |

[1)] Contact SKF for advice on coping with extreme conditions or attaining a longer storage time.

# B

# Bearing selection process

# Bearing selection process


B.1 Performance and operating conditions . . . . . 65

B.2 Bearing type and arrangement . . . . . 69

B.3 Bearing size . . . . . 85

B.4 Lubrication . . . . . 109

B.5 Operating temperature and speed . . . . . 129

B.6 Bearing interfaces . . . . . 139

B.7 Bearing execution . . . . . 181

B.8 Sealing, mounting and dismounting . . . . . 193

# Bearing selection process



When selecting bearings for any purpose, ultimately you want to be certain of achieving the required level of equipment performance – and at the lowest possible cost. Robustness also is very important because the conditions in which your equipment is assembled, operated and maintained may not be precisely known and may, in fact, vary over time.

In addition to the bearing rating life, there are key factors you must consider when putting together the bearing specifications for an application, including:

- lubricant and supply method
- shaft and housing fits
- bearing clearance class
- cage material and guidance
- dimensional stability
- precision requirements
- bearing sealing
- mounting method and maintenance

To help evaluate these key factors, we recommend following the selection process shown on the right.

The process provides a straightforward step-by-step approach that shows the general relationship between each step. By clearly defining and naming the steps in this way, it should be easier to find information on a specific topic. In reality, however, you will find interdependencies that require you to loop back and forth between the steps.

**Bearing selection process**

Performance and operating conditions

Bearing type and arrangement

Bearing size

Lubrication

Operating temperature and speed

Bearing interfaces

Bearing execution

Sealing, mounting and dismounting

# SKF support

## SKF application engineering service

The SKF application engineering service provides expertise to help and support you with your technical needs.

Drawing on a wealth of experience, and supported by a global network of experts in a wide range of industries, local SKF application engineers work with original equipment manufacturers and end users to help and support them with their challenges.

Following a step-by-step application analysis process, and using SKF online and proprietary calculation tools, SKF application engineers can evaluate correct bearing type and size, and other requirements such as lubrication, fits and sealing, in order to obtain the right application solution and achieve reliable rotating equipment performance.

Contact the SKF application engineering service through your local SKF representative if you have any questions, or require any assistance, when using the bearing selection process guidelines or information in the product sections.

## Supporting calculation tools

In the early stages of the application analysis and design process, bearing selection is initially made using various assumptions and, as the process progresses, additional input is included to fine tune results.

SKF can support you throughout this process with our engineering software tools (*Engineering software tools*, **page 63**), ranging from easy-to-use online tools, based on formulae provided in this catalogue, to our most sophisticated simulation systems incorporating the latest theories.

SKF is constantly developing its engineering software tools for SKF engineers and customers to support them in obtaining solutions that are technically, commercially and environmentally optimal.

### Online tools

The SKF online engineering tools (*Engineering software tools*, **page 63**) provide functionality to:

- search for bearing data based on designation or dimensions
- calculate many useful bearing and application related parameters, including bearing basic rating life, SKF rating life, minimum load limit, shaft/housing tolerances and fits, relubrication intervals
- evaluate simple bearing arrangements
- generate drawings of bearings and housings that can be used in most commercially available CAD programs

## SKF SimPro Quick

SKF SimPro Quick (*Engineering software tools*) is bearing simulation software that provides functionality to rapidly evaluate the design of bearing arrangements, and their field performance, based on relevant application requirements and conditions. In addition to the basic analysis provided by the online tools, it enables you to determine bearing load distribution and the effects of bearing stiffness and bearing clearance.

SKF SimPro Quick is intuitive, quick to learn, follows the SKF process for application analysis and bearing selection, and enables you to take greater advantage of SKF engineering know-how. It is fully compatible with the SKF SimPro platform, thus allowing you to easily exchange and discuss results with your SKF representative.

## SKF SimPro Expert

SKF SimPro Expert (*Engineering software tools*) is the mainstream bearing application program used within the SKF application engineering community. It is a sophisticated bearing simulation system that enables analysis of muti-shaft systems at a deeper level than SKF SimPro Quick. It provides a wealth of functionality including:

- most of the needed modelling functionality for rotational analysis in general industry applications
- extensive analysis options for system behaviour, such as clearance effects, detailed rolling contact stress distribution
- design of experiments (DOE)

SKF SimPro Expert has also the option to add advanced modules for further analysis, as for example impact of bearing performance with a flexible support.

For additional information regarding SKF SimPro Expert and how it could help you, contact your local SKF representative.

## SKF BEAST

SKF BEAST (Bearing Simulation Tool) (*Engineering software tools*) is a software simulation tool that enables SKF engineers to study the detailed dynamic behaviour within a mechanical sub-system, such as a bearing, under virtually any load condition.

It is a multibody system with special focus on transient conditions and detailed geometry and contacts, thus enabling detailed analysis, for example, of bearing cage behaviour and its wear mechanisms.

This enables the “testing” of new concepts and designs in a shorter time and with more information gained compared with traditional physical testing.

# Engineering software tools

| User needs | SKF tool | Software capabilities | |
|---|---|---|---|
| • Bearing design verification<br>• Detailed, dynamic bearing and system evaluation<br>• Evaluation of surface and contact behaviours | SKF BEAST | **Advanced analysis, bearing dynamics**<br>Examples:<br>• advanced contact models<br>• dynamic behaviour of bearing components<br>• structural fatigue | SKF internal use |
| • Bearing performance verification<br>• Detailed bearing and system evaluation on complex models or multi-shafts | SKF SimPro Expert | **Advanced analysis, complex systems**<br>Examples:<br>• clearance optimization<br>• flexible systems<br>• detailed contact pressure distribution<br>• influence on gear meshing | Customer accessible |
| • Bearing performance verification<br>• Detailed bearing and system evaluation on single shaft | SKF SimPro Quick | **Advanced analysis, single shaft**<br>Examples:<br>• modified rating life according to ISO/TS16281<br>• bearing load distribution<br>• bearing stiffness impact<br>• clearance effect | |
| • Initial selection<br>• Basic performance evaluation | Online tools<br>• SKF Bearing Calculator<br>• SKF Bearing Select<br>• SKF LubeSelect | **Standard analysis, single bearing, single shaft**<br>Examples:<br>• SKF rating life<br>• basic rating life<br>• grease life<br>• minimum load limit | |

Level of complexity

# B.1

# Performance and operating conditions

# B.1 Performance and operating conditions

The first step in the bearing selection process is to understand and document:

- the required performance
- the operating conditions and assumptions of them
- any other application prerequisites

An application can set various requirements on the bearing solution. Common factors include:

- bearing life
- speed capability and ability to withstand applied acceleration levels
- precision of the radial and axial position of the shaft
- ability to cope with low or high temperatures or temperature gradients
- generated noise and vibration levels

The relative importance of these performance factors can influence the nature of the path you take through the steps of the bearing selection and application analysis process.

You should evaluate the operating conditions in as much detail as possible. The most important operating parameters are:

- load
- speed
- temperature
- lubricant and lubricant cleanliness

Usually these can be determined from physical and mechanical analysis of the application, or from experience with similar applications. Make sure that any assumptions made are clearly documented.

Operating conditions typically vary over time, e.g. in variable speed applications or because of seasonal temperature changes or increased output power. The range of the variation is important. In some cases, both limits of the range may be important, whereas in others, only the lower or the upper limit may be.

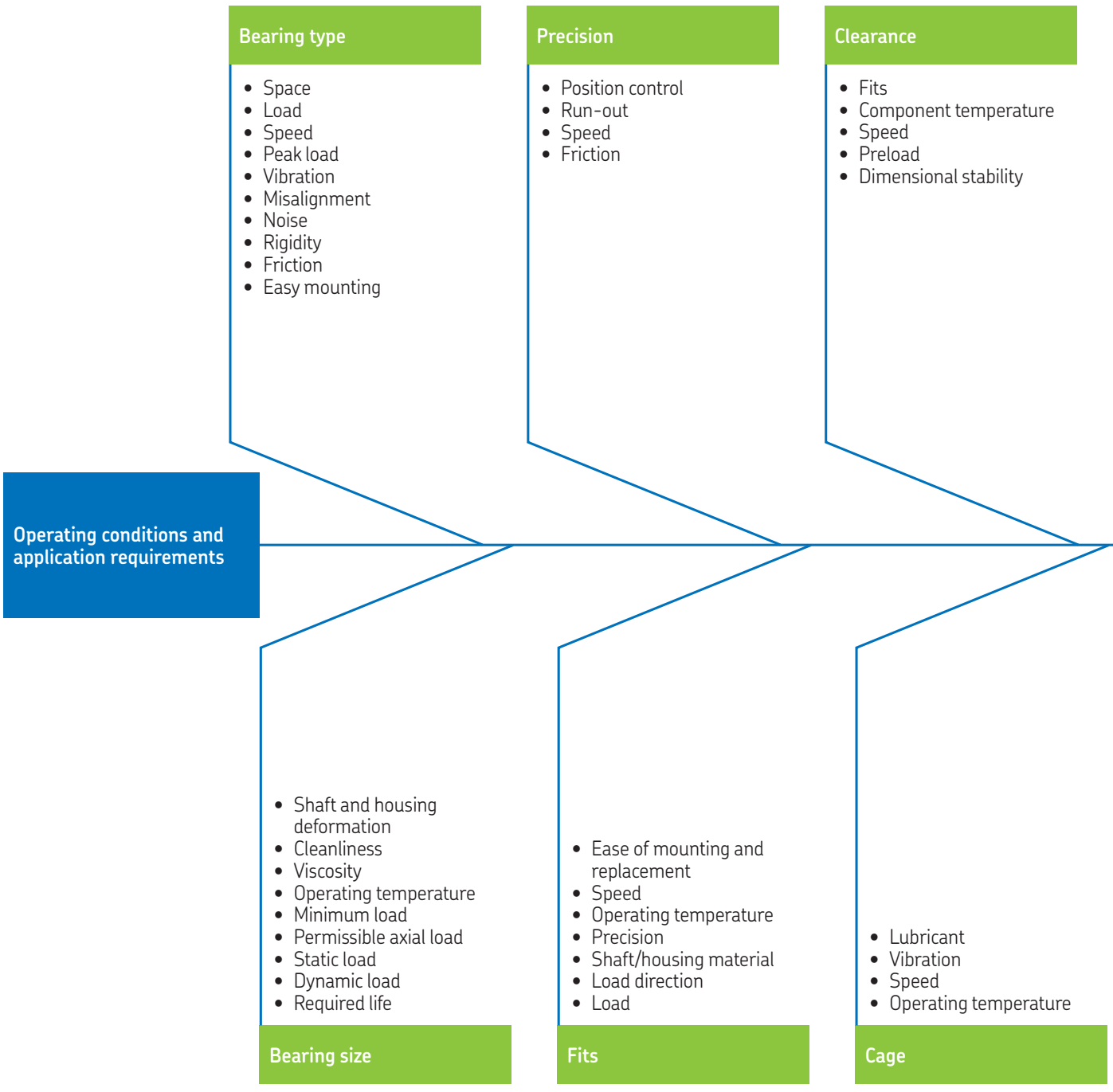
In order to optimize a design, you may need to loop through various steps of the bearing selection process. To minimize these, review and prioritize any application prerequisites, such as:

- available radial or axial space
- shaft diameters defined by shaft strength requirements
- lubricant choice determined by other components in the application

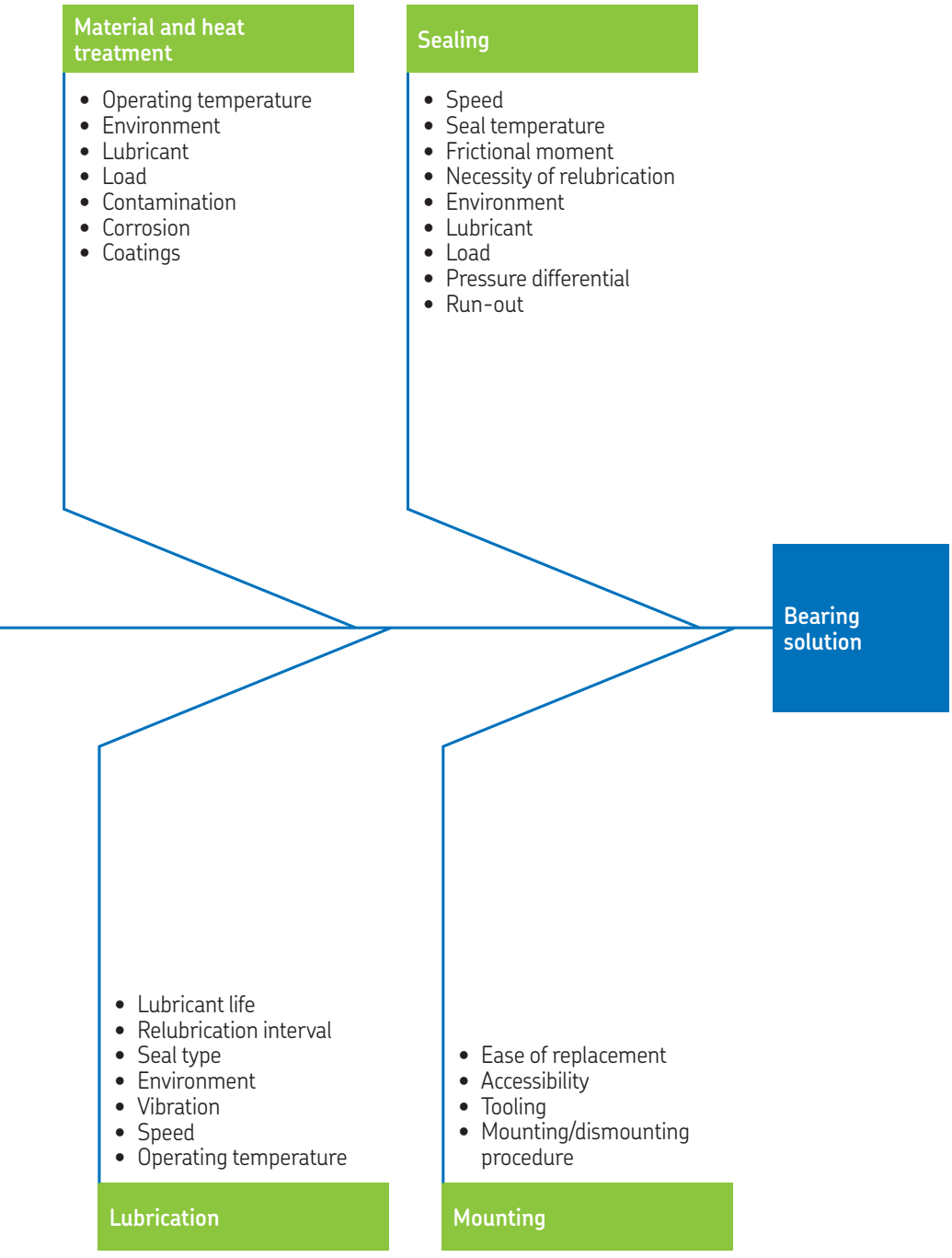
The relationship between principal operating conditions, application requirements and various aspects of a bearing arrangement's design are shown in *Factors to consider when translating operating conditions and application requirements into a bearing solution*, **page 66**. The lists are not comprehensive and you may have to consider other factors and interrelationships, like cost and availability, when striving to obtain a robust and cost-effective solution.

Use the *Application data sheet*, at the end of this catalogue, to help when contacting the SKF application engineering service.

# Factors to consider when translating operating conditions and application



# requirements into a bearing solution



# B.2 Bearing type and arrangement

# B.2 Bearing type and arrangement


**Arrangements and their bearing types** . . . . . **70**
Locating/non-locating bearing arrangements. . . . . 70
Bearings for the locating support. . . . . 70
Bearing combinations for the locating support . . . . . 71
Bearings for the non-locating support. . . . . 71
Suitability of rolling bearing for industrial apllications. . 72
Typical combinations of bearing supports . . . . . 74
Adjusted bearing arrangements. . . . . 76
Floating bearing arrangements . . . . . 76

**Selection criteria**. . . . . **77**
Available space . . . . . 77
Loads. . . . . 78
Combined radial and axial loads . . . . . 78
Speed and friction. . . . . 79
Misalignment . . . . . 80
Temperature . . . . . 80
Precision . . . . . 81
Stiffness . . . . . 81
Mounting and dismounting . . . . . 82
Separable bearings. . . . . 82
Tapered bore. . . . . 82
Integral sealing . . . . . 82
Cost and availability . . . . . 82
Popular items . . . . . 82
Large bearings . . . . . 82
Capped bearings. . . . . 82
Availability of standard housings and sleeves . . . . . 82

# B.2 Bearing type and arrangement



Each bearing type has characteristic properties that make it more or less suitable for use in a given application. An overview is provided in *Suitability of rolling bearings for industrial applications*, page 72, of the main bearing types (including their major features and design variants) and their degree of suitability for certain aspects of use.

This section provides information on what to consider when selecting a bearing arrangement and the types of bearing to use with it. It also provides guidelines on choosing bearing types to satisfy specific demands of an application, such as accommodating available space, loads, misalignment, and more.

## Arrangements and their bearing types

A bearing arrangement supports and locates a shaft, radially and axially, relative to other components such as housings. Typically, two bearing supports are required to position a shaft. Depending on certain requirements, such as stiffness or load directions, a bearing support may consist of one or more bearings.

Bearing arrangements comprising two bearing supports are:

- locating/non-locating bearing arrangements
- adjusted bearing arrangements
- floating bearing arrangements

An overview is provided in *Suitability of rolling bearings for industrial applications*, page 72, of the suitability of various bearing types for different bearing arrangements.

A single bearing arrangement consists of just one bearing that supports radial, axial and moment loads.

## Locating/non-locating bearing arrangements

In locating/non-locating bearing arrangements (fig. 1):

- The locating support provides axial location of the shaft relative to the housing.
- The non-locating support accommodates axial displacements that occur when thermal expansion of the shaft relative to the housing changes the distance between the two bearings. Additionally, it compensates for the accumulation of tolerances of the components, which affects the distance between the two bearings.

### Bearings for the locating support

Radial bearings that can accommodate combined (radial and axial) loads are used for the locating bearing support. These include:

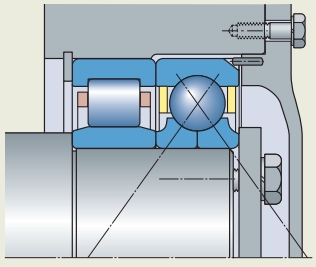
- deep groove ball bearings (page 239)
- two universally matchable single row angular contact ball bearings, arranged back-to-back or face-to-face (page 386)
- double row angular contact ball bearings (page 386)
- self-aligning ball bearings (page 438)
- spherical roller bearings (page 774)
- matched tapered roller bearings, arranged back-to-back or face-to-face (page 670)
- cylindrical roller bearings with flanges on both rings or cylindrical roller bearings mounted with an angle ring (thrust collar) (page 494)

**Fig. 1**

**Locating/non-locating bearing arrangement**

**Fig. 2**

**Combination of cylindrical roller bearing and four-point contact ball bearing**



## Bearing combinations for the locating support

The locating bearing support can consist of a combination of bearings. For example (fig. 2):

- To accommodate the radial load, a cylindrical roller bearing that has one ring without flanges may be used.
- To provide the axial location, a deep groove ball bearing, a four-point contact ball bearing, or a pair of angular contact ball bearings may be used.

The outer ring of the axial locating bearing must be mounted radially free and should not be clamped. Otherwise, this bearing can be subjected to unintended radial loads.

## Bearings for the non-locating support

There are two ways to accommodate axial displacements at the non-locating bearing support:

1 Use a bearing type that enables axial displacement within the bearing (fig. 3):
   – cylindrical roller bearings with flanges on one ring only (page 494)
   – needle roller bearings (page 582)
   – CARB toroidal roller bearings (page 842)

   When these bearings are rotating, they accommodate axial displacement and induce almost no axial load on the bearing arrangement. You should use this solution where an interference fit is required for both rings.

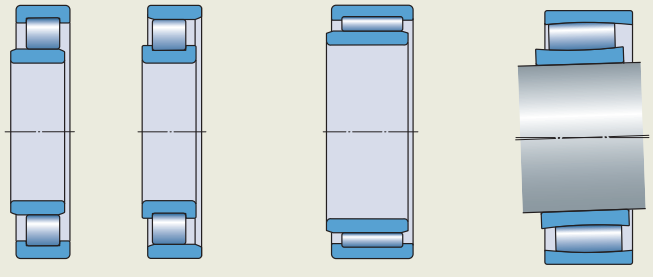
2 Use a loose fit between one bearing ring and its seat. Suitable bearing types include:
   – deep groove ball bearings (page 240)
   – self-aligning ball bearings (page 438)
   – spherical roller bearings (page 774)
   – pairs of angular contact ball bearings (page 385) or tapered roller bearings (page 670)

   Axial movements of a bearing on its seat cause axial loads, which might have an impact on the bearing service life.

When using other bearing types, you may need to take additional design considerations into account.

Fig. 3

**Bearings that accommodate axial displacement**



Cylindrical roller bearings (NU and N design) | Needle roller bearing | CARB toroidal roller bearing

# Suitability of rolling bearings for industrial applications

**Symbols**

+++ excellent
++ good
+ fair
- poor
– – unsuitable

⇔ double direction
← single direction
□ non-locating displacement on the seat
■ non-locating displacement within the bearing
✓ yes
✗ no

| Bearing type | Load carrying capability | | | Misalignment | |
|---|---|---|---|---|---|
| | Radial load | Axial load | Moment load | Static misalignment | Dynamic misalignment (few tenths of a degree) |
| Deep groove ball bearings | + | + ⇔ | A –, B + | – | – – |
| Insert bearings | + | + ⇔ | – – | ++ | – – |
| Angular contact ball bearings, single row | +[1] | ++ ← | – – | – | – – |
| matched single row | A, B ++<br>C ++[1] | A, B ++ ⇔<br>C ++ ← | A ++, B +<br>C – – | A, C – –,<br>B – | – – |
| double row | ++ | ++ ⇔ | ++ | – – | – – |
| four-point contact | +[1] | ++ ⇔ | – – | – – | – – |
| Self-aligning ball bearings | + | – | – – | +++ | +[2] |
| Cylindrical roller bearings, with cage | ++ | – – | – – | – | – – |
| | ++ | A, B + ←<br>C, D + ⇔ | – – | – | – – |
| full complement, single row | +++ | + ← | – – | – | – – |
| full complement, double row | +++ | A – –, B + ←<br>C + ⇔ | – – | – | – – |
| Needle roller bearings, with steel rings | ++ | – – | – – | A, B –<br>C ++ | – – |
| assemblies / drawn cups | ++ | A, B – –<br>C – | – – | – | – – |
| combined bearings | ++ | A –, B +<br>C ++ | – – | – – | – – |
| Tapered roller bearings, single row | +++[1] | ++ ← | – – | – | – – |
| matched single row | A, B +++<br>C +++[1] | A, B ++ ⇔<br>C ++ ← | A +, B ++<br>C – – | A –<br>B, C – – | – – |
| double row | +++ | ++ ⇔ | A +<br>B ++ | A –, B – – | – – |
| Spherical roller bearings | +++ | + ⇔ | – – | +++ | +[2] |
| CARB toroidal roller bearings, with cage | +++ | – – | – | ++ | – |
| full complement | +++ | – – | – | ++ | – |
| Thrust ball bearings | – – | A + ←<br>B + ⇔ | – – | – – | – – |
| with sphered housing washer | – – | A + ←<br>B + ⇔ | – – | ++ | – – |
| Cylindrical roller thrust bearings | – – | ++ ← | – – | – – | – – |
| Needle roller thrust beairngs | – – | ++ ← | – – | – – | – – |
| Spherical roller thrust bearings | +[1] | +++ ← | – – | +++ | +[2] |

[1] Provided the $F_a/F_r$ ratio requirement is met
[2] Reduced misalignment angle – contact SKF
[3] Depending on cage and axial load level

| Arrangement | | | | Suitable for | | | | | Design features | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Locating | Non-locating | Adjusted | Floating | Long grease life | High speed | Low run-out | High stiffness | Low friction | Integral sealing | Separable ring mounting | Tapered bore | Standard housings and accessories available |
| ⇔ | □ | ✗ | ✓ | A +++<br>B ++ | A +++<br>B + | A +++<br>B ++ | + | +++ | A ✓ | ✗ | ✗ | ✗ |
| ⇔ | ⇔ | ✗ | ✗ | +++ | ++ | A, B +<br>C ++ | + | ++ | ✓ | ✗ | ✗ | ✓ |
| ✗ | ✗ | ✓ | ✗ | ++ | ++ | +++ | ++ | ++ | ✓ | ✗ | ✗ | ✗ |
| A, B ⇔<br>C ← | A, B □<br>C ✗ | ✗ | ✗ | ++ | ++ | +++ | ++ | ++ | ✗ | ✗ | ✗ | ✗ |
| ↔ | □ | ✗ | ✗ | ++ | ++ | ++ | ++ | ++ | A ✓ | B ✓ | ✗ | ✗ |
| ⇔[1] | – – | – – | – – | + | +++ | ++ | ++ | ++ | ✗ | ✓ | ✗ | ✗ |
| ⇔ | □ | ✗ | ✓ | +++ | ++ | ++ | + | +++ | ✓ | ✗ | ✓ | ✓ |
| ✗ | ■ | ✗ | ✗ | ++ | +++ | +++ | ++ | +++ | ✗ | ✓ | ✗ | ✗ |
| A, B ←<br>C, D ⇔ | A, B ■ ←<br>C, D ✗ | ✗ | A ✓<br>B, C, D ✗ | ++[3] | +++ | ++ | ++ | +++ | ✗ | ✓ | ✗ | ✗ |
| ← | A, B ← | ✗ | ✓ | – | + | + | +++ | – | ✗ | A ✗<br>B ✓ | ✗ | ✗ |
| B ←<br>C, D ⇔ | A ■ ⇔<br>B ■ ← | ✗ | ✗ | – | + | + | +++ | – | D ✓ | ✗ | ✗ | ✗ |
| ✗ | ■ ⇔ | ✗ | ✗ | ++ | ++ | + | ++ | + | A ✓ | ✓ | ✗ | ✗ |
| A, B ✗<br>C ← | A, B ■<br>C ■ ← | ✗ | ✗ | ++ | ++ | + | ++ | + | B, C ✓ | ✓ | ✗ | ✗ |
| ← | ✗ | ✓ | ✗ | + | + | + | ++ | + | ✗ | ✓ | ✗ | ✗ |
| ← | ✗ | ✓ | ✗ | + | ++ | +++ | ++ | + | ✗ | ✓ | ✗ | ✗ |
| A, B ⇔<br>C ← | A, B □<br>C ✗ | A, B ✗<br>C ✓ | ✗ | + | + | ++ | +++ | + | ✗ | ✓ | ✗ | ✗ |
| ⇔ | □ | ✗ | ✗ | + | + | ++ | +++ | + | ✓ | ✓ | B ✓ | ✗ |
| ⇔ | □ | ✗ | ✓ | + | ++ | +++ | ++ | + | ✓ | ✗ | ✓ | ✓ |
| ✗ | ■ | ✗ | ✗ | + | ++ | +++ | ++ | + | ✗ | ✗ | ✓ | ✓ |
| ✗ | ■ | ✗ | ✗ | – | + | +++ | ++ | – | ✓ | ✗ | ✓ | ✓ |
| A ←<br>B ⇔ | ✗ | ✗ | ✗ | + | – | ++ | + | + | ✗ | ✓ | ✗ | ✗ |
| A ←<br>B ⇔ | ✗ | ✗ | ✗ | + | – | + | + | + | ✗ | ✓ | ✗ | ✗ |
| ← | ✗ | ✗ | ✗ | – | – | + | +++ | + | ✗ | ✓ | ✗ | ✗ |
| ← | ✗ | ✗ | ✗ | – | – | + | +++ | + | ✗ | ✓ | ✗ | ✗ |
| ← | ✗ | ✓ | ✗ | – | + | + | +++ | + | ✗ | ✓ | ✗ | ✗ |

## Typical combinations of bearing supports

From the large number of possible locating/non-locating bearing combinations, the following are the most popular.

### For bearing arrangements where the axial displacement is accommodated within the bearing

Conventional bearing arrangements in which limited angular misalignment occurs include:

- deep groove ball bearing / cylindrical roller bearing (fig. 4)
- double row angular contact ball bearing / NU or N design cylindrical roller bearing (fig. 5)
- matched single row tapered roller bearings / NU or N design cylindrical roller bearing (fig. 6)
- NUP design cylindrical roller bearing / NU design cylindrical roller bearing (fig. 7)
- NU design cylindrical roller bearing and a four-point contact ball bearing / NU design cylindrical roller bearing (fig. 8)

SKF self-aligning bearing systems, which can compensate for more misalignment, are:

- spherical roller bearing / CARB toroidal roller bearing (fig. 9)
- self-aligning ball bearing / CARB toroidal roller bearing

### For bearing arrangements where the axial displacement is accommodated between a bearing ring and its seat

- deep groove ball bearing / deep groove ball bearing (fig. 10)
- self-aligning ball bearings or spherical roller bearings (fig. 11) for both bearing positions
- matched single row angular contact ball bearings / deep groove ball bearing (fig. 12)

Fig. 4

**Deep groove ball bearing / cylindrical roller bearing**

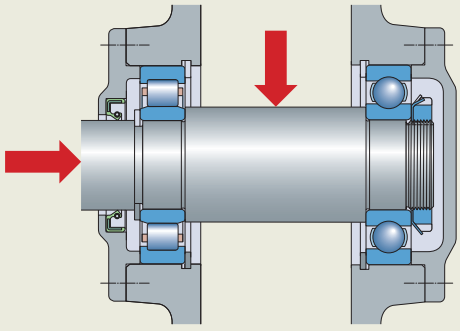


Fig. 5

**Double row angular contact ball bearing / NU design cylindrical roller bearing**

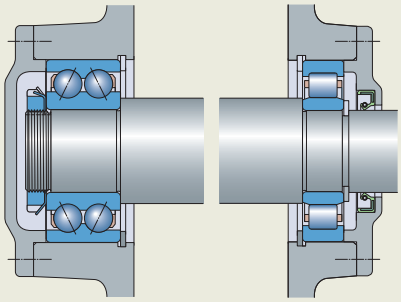


Fig. 6

**Matched single row tapered roller bearings / NU design cylindrical roller bearing**

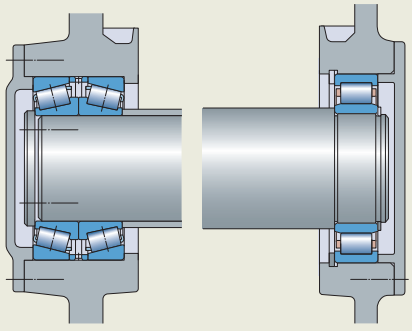


Fig. 7

**NUP design cylindrical roller bearing / NU design cylindrical roller bearing**

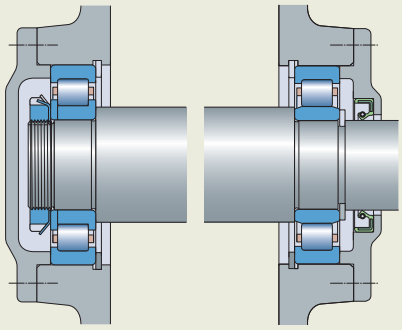


Fig. 8

**NU design cylindrical roller bearing and a four-point contact ball bearing / NU design cylindrical roller bearing**

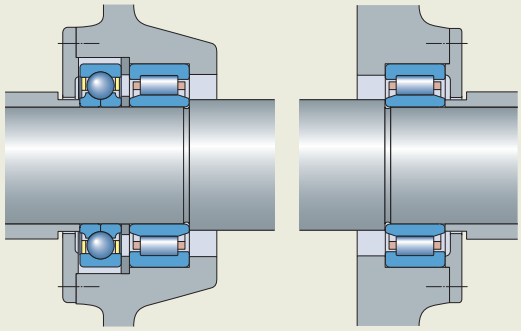


Fig. 9

**Spherical roller bearing / CARB toroidal roller bearing**

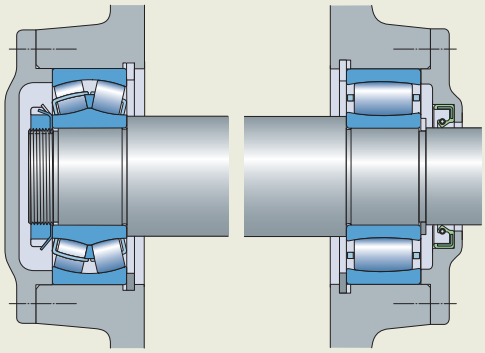


Fig. 10

**Deep groove ball bearing / deep groove ball bearing**

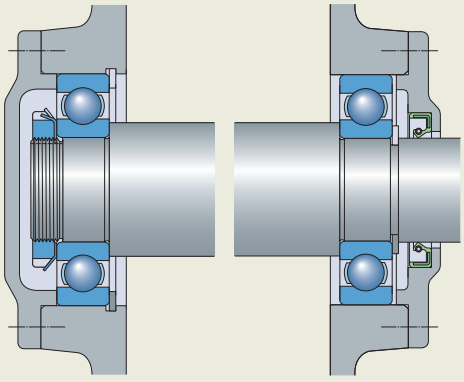


Fig. 11

**Spherical roller bearing / spherical roller bearing**

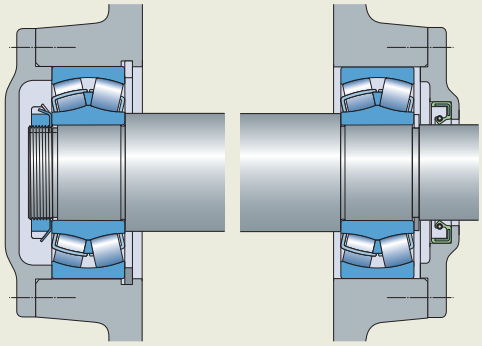
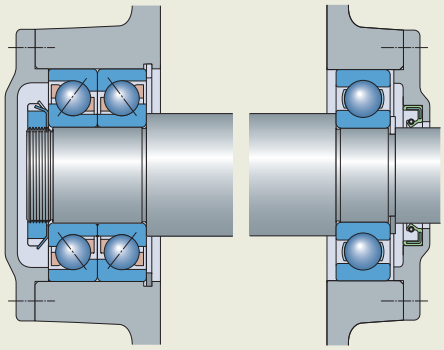


Fig. 12

**Matched single row angular contact ball bearings / deep groove ball bearing**



# Adjusted bearing arrangements

In adjusted bearing arrangements, the shaft is located axially in one direction by one bearing support and in the opposite direction by the other (cross-located). Adjusted bearing arrangements require proper adjustment of clearance or preload during mounting.

These bearing arrangements are generally used for short shafts, where thermal expansion has only a little effect. The most suitable bearings are:

- angular contact ball bearings (**fig. 13**)
- tapered roller bearings (**fig. 14**)

# Floating bearing arrangements

In floating bearing arrangements the shaft is cross-located, but is able to move axially a certain distance between the two end positions, i.e. "float".

When determining the required "float" distance, consider thermal expansion of the shaft relative to the housing and tolerances of the components, which affect the distance between the two bearings.

With this arrangement, the shaft can also be axially located by other components on the shaft, e.g. a double helical gear. Most common bearings are:

- deep groove ball bearings (**fig. 15**)
- self-aligning ball bearings
- spherical roller bearings (**fig. 16**)
- NJ design cylindrical roller bearings, mirrored, with offset rings (**fig. 17**)



**Fig. 13**

**Adjusted bearing arrangement, angular contact ball bearings arranged face-to-face**

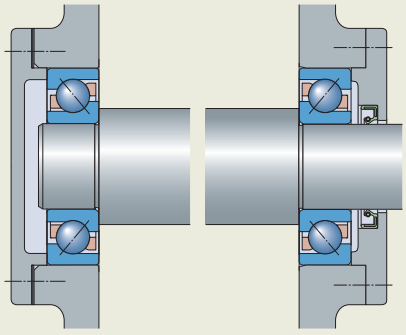


**Fig. 14**

**Adjusted bearing arrangement, tapered roller bearings arranged back-to-back**

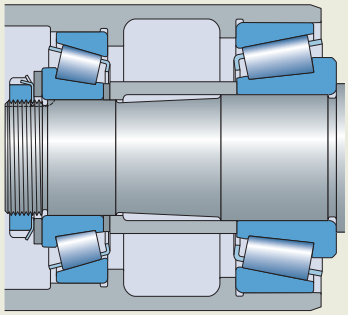


**Fig. 15**

**Floating bearing arrangement, deep groove ball bearings**

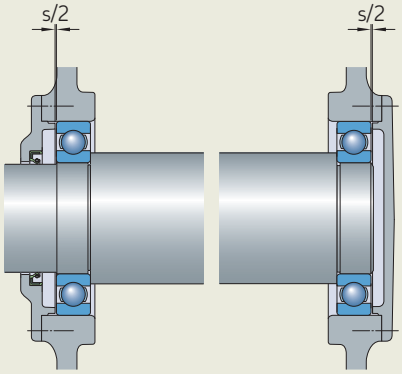
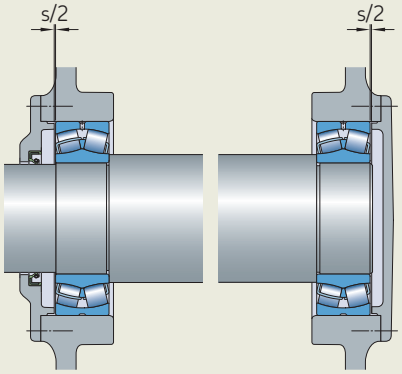



**Fig. 16**

**Floating bearing arrangement, spherical roller bearings**



# Selection criteria

## Available space

Often the boundary dimensions of a bearing are predetermined by the machine's design. Typically, the shaft diameter determines the bearing bore diameter. For the same bore diameter, different outside diameters and widths may be available (fig. 18). The availability of bearings in a certain ISO dimension series depends on bearing type and bore diameter.

Other space-related criteria that influence the selection of bearing type include:

- shafts with small diameter (approx. d < 10 mm)
  - deep groove ball bearings
  - needle roller bearings
  - self-aligning ball bearings
  - thrust ball bearings

- shafts with normal diameter
  - all bearing types

- very limited radial space
  - needle roller bearings
  - deep groove ball bearings in the 618 or 619 series
  - CARB toroidal roller bearings in the C49, C59 or C69 series
  - bearings without inner or outer ring and raceways machined directly on the shaft or in the housing

**Fig. 17**

**Floating bearing arrangement, NJ design cylindrical roller bearings, mirrored, with offset rings**

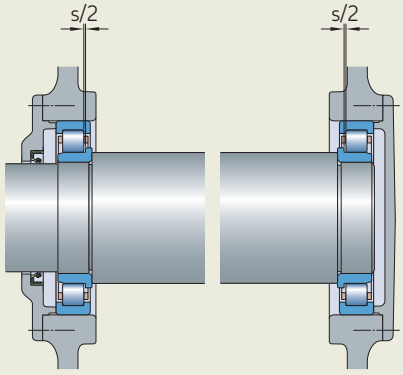
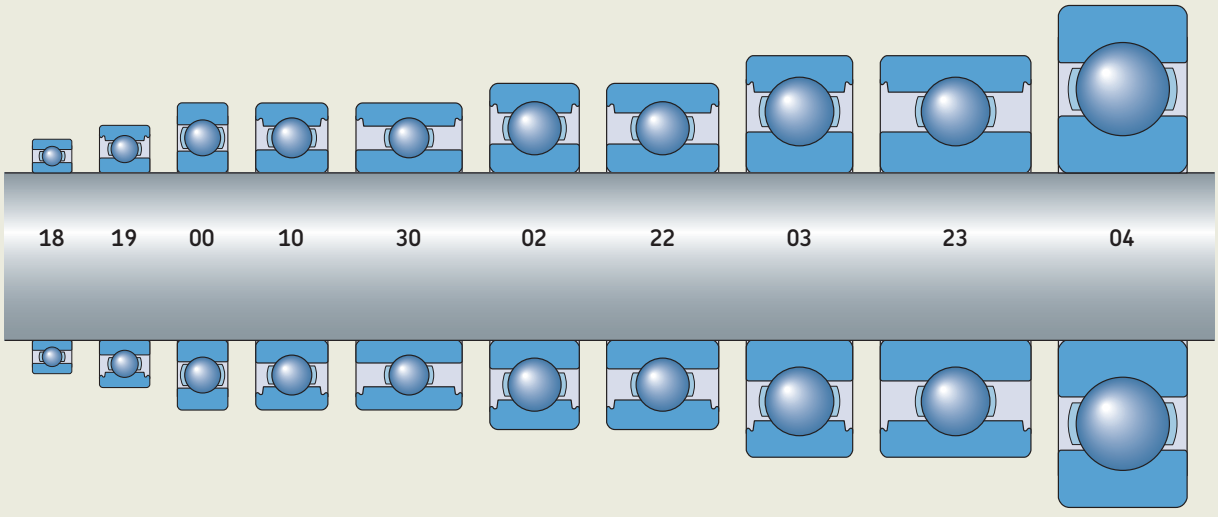



**Fig. 18**

**ISO dimension series for the same bore diameter**



# Loads

When selecting bearing type based on load criteria, you should bear in mind that:

- Roller bearings accommodate heavier loads than same-sized ball bearings.
- Full complement bearings accommodate heavier loads than the corresponding bearing with a cage.

An overview is provided in *Suitability of rolling bearings for industrial applications*, page 72, the radial, axial and moment load capability of various bearing types.

## Combined radial and axial loads

The direction of load is a primary factor in bearing type selection. Where the load on a bearing is a combination of radial and axial load, the ratio of the components determines the direction of the combined load (fig. 19).

The suitability of a bearing for a certain direction of load corresponds to its contact angle α (diagram 1) – the greater the contact angle, the higher the axial load carrying capacity of the bearing. You can see this indicated in the value of the calculation factor Y (refer to individual product sections), which decreases as the contact angle increases.

ISO defines bearings with contact angles ≤ 45° as radial bearings, and the others as thrust bearings, independent of their actual use.

To accommodate combined loads with a light axial component, bearings with a small contact angle can be used. Deep groove ball bearings are a common choice for light to moderate axial loads. With increasing axial load, a larger deep groove ball bearing (with higher axial load carrying capacity) can be used. For even higher axial load, bearings with a larger contact angle may be required, such as angular contact ball bearings or tapered roller bearings. These bearing types can be arranged in tandem to accommodate high axial loads.

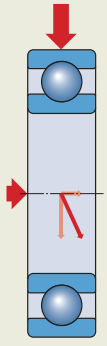
When combined loads have a large alternating axial load component, suitable solutions include:

- a pair of universally matchable angular contact ball bearings
- matched sets of tapered roller bearings
- double-row tapered roller bearings

Where a four-point contact ball bearing is used to accommodate the axial component of a combined load (fig. 2, page 70), the bearing outer ring must be mounted radially free and should not be clamped axially. Otherwise, the bearing may be subjected to unintended radial load.

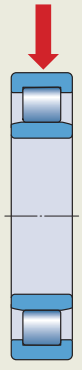
Fig. 19

**Direction of load**



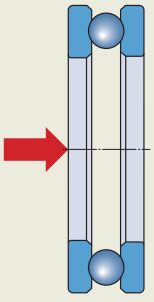
**Combined load**
The resulting load direction is determined by the ratio of radial to axial load.

Example: Deep groove ball bearing



**Pure radial load**
Load direction 0°

Example: NU design cylindrical roller bearing (accommodates radial load only)



**Pure axial load**
Load direction 90°

Example: Thrust ball bearing (accommodates axial load only)

# Speed and friction

The permissible operating temperature of rolling bearings imposes limits on the speed at which they can be operated. The operating temperature is determined, to a great extent, on the frictional heat generated in the bearing, except in machines where process heat is dominant.

An overview is provided in *Suitability of rolling bearings for industrial applications*, page 72, of the speed capability of various bearing types.

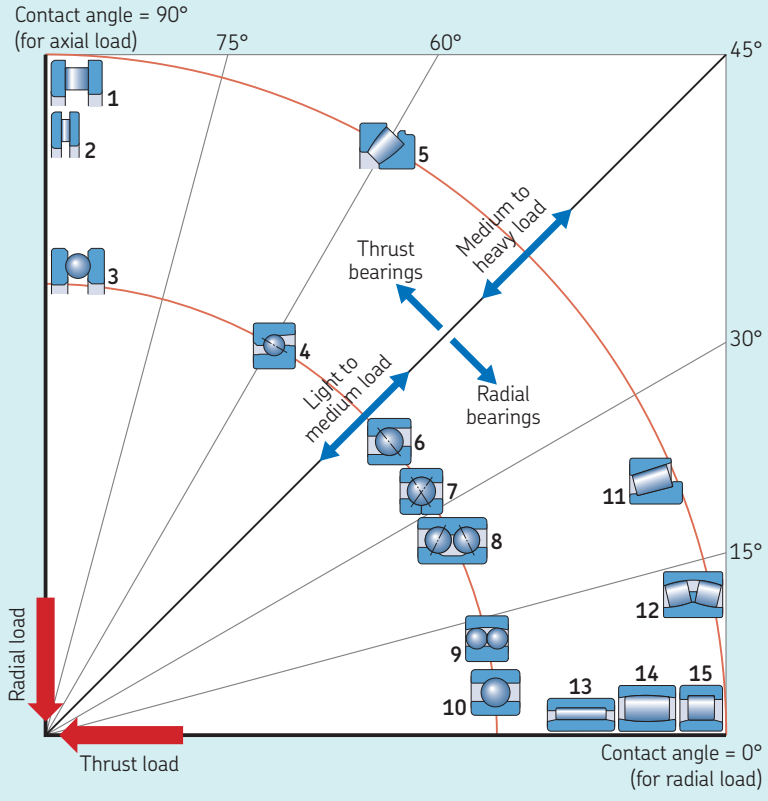
When selecting bearing type on the basis of operating speed, you should consider the following:

- Ball bearings have a lower frictional moment than same-sized roller bearings.
- Thrust bearings cannot accommodate speeds as high as same-sized radial bearings.
- Single row bearing types typically generate low frictional heat and are therefore more suitable for high-speed operation than double or multi-row bearings.
- Bearings with rolling elements made of ceramics (hybrid bearings) accommodate higher speeds than their all-steel equivalents.

**Diagram 1**

**Contact angles of various bearing types**

**1** Cylindrical roller thrust bearing
**2** Needle roller thrust bearing
**3** Thrust ball bearing
**4** Angular contact thrust ball bearing
**5** Spherical roller thrust bearing
**6** Single row angular contact ball bearing
**7** Four-point contact ball bearing
**8** Double row angular contact ball bearing
**9** Self-aligning ball bearing
**10** Deep groove ball bearing
The contact angle depends on load and clearance.
**11** Tapered roller bearing
**12** Spherical roller bearing
**13** Needle roller bearing
**14** CARB toroidal roller bearing
**15** Cylindrical roller bearings



# Misalignment

An overview is provided in *Suitability of rolling bearings for industrial applications*, page 72, of the capability of various bearing types to accommodate misalignment. The different types of misalignment are explained in table 1.

Bearing types vary in their ability to compensate for misalignment between the shaft and housing:

- **Self-aligning bearings (fig. 20)**
  Self-aligning bearings can compensate for misalignment within the bearing. Values for the permissible misalignment are listed in the relevant product section.
- **Alignment bearings (fig. 21)**
  Alignment bearings can accommodate initial static misalignment because of their sphered outside surface. Values for the permissible misalignment are listed in the relevant product section.
- **Rigid bearings**
  Rigid bearings (deep groove ball bearings, angular contact ball bearings, cylindrical, needle and tapered roller bearings) accommodate misalignment within the limits of their internal clearance. Values for the permissible misalignment are listed in the relevant product section. For rigid bearings, any misalignment may reduce service life.

Table 1

**Types of misalignment**

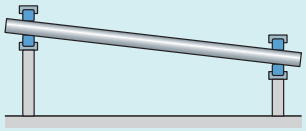
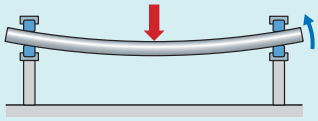
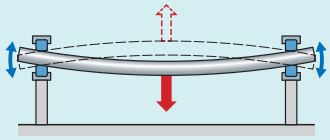
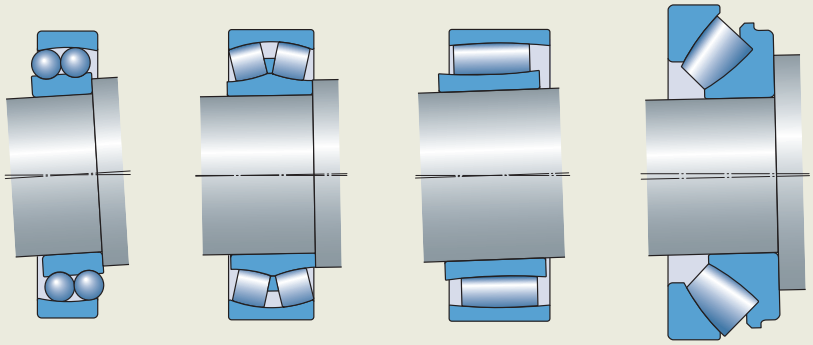
| | | |
|---|---|---|
| **Static misalignment** | There is an initial alignment error between the two supports of a shaft. |  |
| | Shaft deflection creates misalignment between bearing inner and outer rings that is constant in magnitude and direction. |  |
| **Dynamic misalignment** | Varying shaft deflection creates misalignment between bearing inner and outer rings that is continuously changing in magnitude or direction. |  |

Fig. 20

**Self-aligning bearings**



Self-aligning ball bearing | Spherical roller bearing | CARB toroidal roller bearing | Spherical roller thrust bearing

# Temperature

The permissible operating temperature of rolling bearings can be limited by:

- the dimensional stability of the bearing rings and rolling elements (table 2, for details refer to the relevant product section)
- the cage (*Cages*, page 187)
- the seals (relevant product section)
- the lubricant (*Lubrication*, page 110)

# Precision

Precision requirements typically do not influence bearing type selection. Most SKF bearings are available in various tolerance classes. Details are provided in the product sections.

For very high precision requirements, e.g. machine tool applications, use SKF super-precision bearings (SKF catalogue *Super-precision bearings* or available at skf.com/super-precision).

# Stiffness

The stiffness of a rolling bearing is characterized by the magnitude of the elastic deformation in the bearing under load and depends not only on bearing type, but also on bearing size and operating clearance.

When selecting bearing type on the basis of stiffness requirements, you should consider, for bearings with the same size, that:

- stiffness is higher for roller than for ball bearings
- stiffness is higher for full complement bearings than for the corresponding bearing with a cage
- stiffness is higher for hybrid bearings than for the corresponding all-steel bearing
- stiffness can be enhanced by applying a preload (*Selecting preload*, **page 186**)

**Table 2**

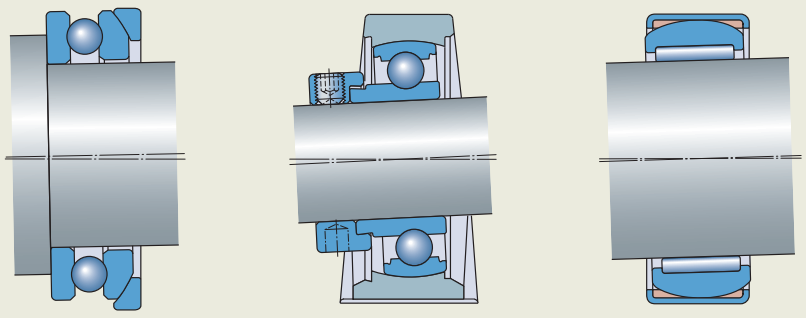
**Stabilization of SKF rolling bearings**

| | | | Stabilized for temperatures ≤ 120 °C (250 °F) | ≤ 150 °C (300 °F) | ≤ 200 °C (390 °F) |
|---|---|---|---|---|---|
| **Ball bearings** | **Radial** | Deep groove ball bearings | • | – | – |
| | | Angular contact ball bearings | • | • | – |
| | | Four-point contact ball bearings | • | • | – |
| | | Self-aligning ball bearings | • | ○ | – |
| | **Thrust** | Thrust ball bearings | • | • [1] | – |
| **Roller bearings** | **Radial** | Cylindrical roller bearings | • | • | – |
| | | Needle roller bearings | • | – | – |
| | | Tapered roller bearings | • | • | – |
| | | Spherical roller bearings | • | • | • |
| | | CARB toroidal roller bearings | • | • | • |
| | **Thrust** | Cylindrical roller thrust bearings | • | – | – |
| | | Needle roller thrust bearings | • | – | – |
| | | Spherical roller thrust bearings | • | • | • |

• Available as standard
○ Check availability with SKF, check cage material
– Check with SKF
1) Not for all sizes.

**Fig. 21**

**Alignment bearings**



Thrust ball bearing with sphered housing washer

Ball bearing unit

Alignment needle roller bearing

# Mounting and dismounting

When selecting bearing type, you should consider the mounting and dismounting requirements:

- Is it required or beneficial to mount the inner and outer ring independently?
  - Select a separable bearing.
- Is it required or beneficial to mount the bearing on a tapered seat or with a tapered sleeve?
  - Select a bearing with a tapered bore.
  - Consider using SKF ConCentra ball or roller bearing units (skf.com/ball-bearing-units and skf.com/roller-bearing-units).

## Separable bearings

Separable bearings are easier to mount and dismount, particularly if interference fits are required for both rings.

For separable bearing types, refer to *Suitability of rolling bearings for industrial applications*, **page 72**.

## Tapered bore

Bearings with a tapered bore can be mounted on a tapered shaft seat or mounted on a cylindrical shaft seat using an adapter or withdrawal sleeve (**fig. 22**). For bearing types available with tapered bore, refer to *Suitability of rolling bearings for industrial applications*, **page 72**.

# Integral sealing

There are two reasons for sealing bearings or bearing arrangements:

- keeping the lubricant in the bearing, and avoiding pollution of adjacent components
- protecting the bearing from contamination, and prolonging bearing service life

Capped bearings (sealed bearings or bearings with shields) can provide cost-effective and space-saving solutions for many applications. Bearing types, for which integral sealing is available, are indicated in *Suitability of rolling bearings for industrial applications*, **page 72**.

# Cost and availability

## Popular items

After determining your required bearing type, you may find it beneficial to select an appropriate bearing from our assortment of popular items, because they have a high level of availability and generally provide a cost-effective solution. Popular items are marked in the product tables with the symbol ▶.

## Large bearings

If a required bearing has an outside diameter D ≥ 420 mm, and is not marked as popular, then check its availability with SKF.

## Capped bearings

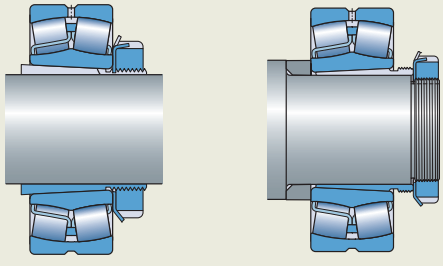
Capped (sealed bearings or bearings with shields) typically provide more cost-effective solutions than using external sealing. In addition to providing good sealing performance, these ready-greased bearings do not require initial grease fill.

## Availability of standard housings and sleeves

Using standard housings and sleeves generally leads to more cost-effective bearing arrangements. Bearing types for which these standard components are available are indicated in *Suitability of rolling bearings for industrial applications*, **page 72**.

**Fig. 22**

**Bearings with tapered bore on sleeves**



On an adapter sleeve

On a withdrawal sleeve

# B.3 Bearing size

# B.3 Bearing size


**Size selection based on rating life** . . . . . **88**
Bearing rating life . . . . . 88
Bearing life definition . . . . . 88
Basic rating life . . . . . 89
SKF rating life . . . . . 89
Calculating bearing life with variable operating conditions, fluctuating load. . . . . 90
Basic dynamic load rating, C . . . . . 91
Dynamic load rating for SKF Explorer bearings . . . . . 91
Equivalent dynamic bearing load, P . . . . . 91
Calculating equivalent dynamic bearing load. . . . . 92
Equivalent mean load . . . . . 92
Considerations when calculating equivalent dynamic bearing load . . . . . 93
Life modification factor, $a_{SKF}$ . . . . . 94
Lubrication condition – the viscosity ratio, κ . . . . . 102
κ value below 1 . . . . . 102
EP (extreme pressure) and AW (anti-wear) additives . . 102
Fatigue load limit, $P_u$ . . . . . 104
Contamination factor, $\eta_c$ . . . . . 104

**Size selection based on static load** . . . . . **104**
Static load rating. . . . . 104
Equivalent static bearing load. . . . . 105
Guideline values for static safety factor, $s_0$ . . . . . 106

**Requisite minimum load** . . . . . **106**

**Checklist after the bearing size is determined** . . . . . **106**

**SKF life testing** . . . . . **107**

# B.3 Bearing size



The size of a bearing must be sufficient to ensure that it is strong enough to deliver the required/expected life under defined operating conditions.

A bearing can be viewed as a system of components: raceways, rolling elements, cage, seals (if present) and lubricant (**fig. 1**). The performance of each component contributes to or determines the performance and life of the bearing (**diagram 1**). Consider these aspects:

- rolling contact fatigue (RCF) on the rolling elements and raceways – this is the primary aspect that dictates bearing life in most applications
- permanent deformation of rolling elements and raceways because of heavy loads acting on the bearing, while it is stationary or oscillating slowly, or high peak loads acting on the bearing while it is rotating
- cage type or cage material – these may limit the operating speed or the permissible acceleration or temperature[1)]
- speed limit of contacting seal lips – this can determine the maximum allowable speed, which affects operating temperature, thereby affecting life
- lubricant life – when the lubricant deteriorates, the resulting poor relubrication condition quickly reduces bearing life

The operating conditions of the application determine which of these factors most influence the performance and life of the bearing.

This section provides guidance on determining the required bearing size.

The effect of RCF or permanent deformation on rolling elements and raceways is directly related to bearing size. Effects of cage type and material are not related to bearing size. In capped bearings, the effects of the lubricant and integral seal are only indirectly related to bearing size.

Therefore, the two main criteria that can be used for determining appropriate bearing size are:

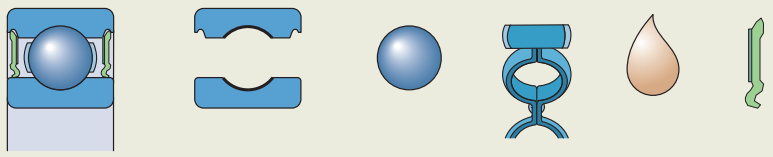
- **Size selection based on rating life,** **page 88**
  This is based on the required bearing life, taking into account the possible effects of rolling contact fatigue, and requires calculation of the basic rating life, $L_{10}$, or SKF rating life, $L_{10m}$, for the bearing.

- **Size selection based on static load,** **page 104**
  This is based on the static load that the bearing can accommodate, taking into account the possible effects of permanent deformation, and requires calculation of the static safety factor, $s_0$, for the bearing.

**Fig. 1**

**Bearing system life**

$L_{bearing} = f(L_{raceways}, L_{rolling\ elements}, L_{cage}, L_{lubricant}, L_{seals})$



1) Special cage executions are often available for bearing types that are commonly used in applications where such challenging conditions are present.

These selection criteria and the related bearing ratings and static safety factor are shown in **diagram 2** and are described in detail in the relevant subsections.

Which selection criteria you should use depends on the operating conditions of the bearing:

- For applications where bearings are running in typical operating conditions – i.e. normal speeds, good lubrication conditions and not highly or peak loaded – use *Size selection based on rating life*, **page 88**.
- For applications where bearings are running under very low speeds or which are used under stationary conditions, very bad lubrication conditions or where occasional peak loads occur, use *Size selection based on static load*, **page 104**.

Note that there are applications where both selection criteria must be considered, for example where a duty cycle has occasional peak loads. Also, in applications where the bearing is lightly loaded, the minimum load requirement (*Requisite minimum load*, **page 106**) must also be considered.

After determining bearing size, and before going to the next step, check the items listed in *Checklist after the bearing size is determined*, **page 106**.

Other attributes of the bearing components, such as strength and suitability, are addressed elsewhere in the *Bearing selection process*, including *Lubrication*, **page 110**, and *Bearing execution*, **page 182**, as well as in the product sections. Consider these attributes, in addition to bearing size, to ensure you obtain best bearing performance.

**Diagram 1**

**Performance and related bearing system components**

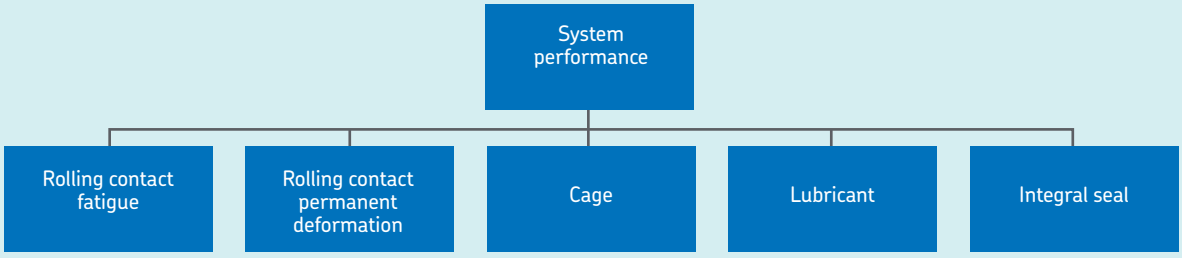
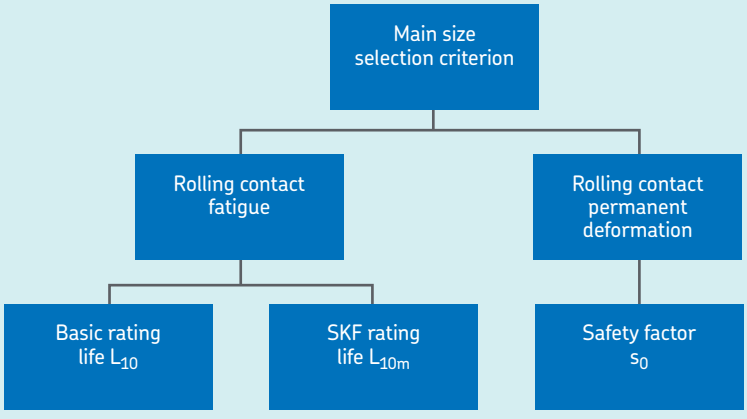



**Diagram 2**

**Main selection criteria for bearing size and related bearing ratings and safety factor**



# Size selection based on rating life

For applications where bearings are running in typical operating conditions – i.e. normal speeds, good lubrication conditions and not highly or peak loaded – determine the appropriate bearing size based on the required bearing life, taking into account the possible effects of rolling contact fatigue (RCF).

This subsection describes the bearing rating life equations and the factors that must be determined to make the evaluation:

- *Bearing rating life* – the basis for bearing rating life, showing how to calculate basic rating life, $L_{10}$, and SKF rating life, $L_{10m}$
- *Basic dynamic load rating*, *C*, **page 91**
- *Equivalent dynamic bearing load*, *P*, **page 91**
- *Life modification factor*, $a_{SKF}$, **page 94**
- *Lubrication condition – the viscosity ratio*, $\kappa$, **page 102**
- *Fatigue load limit*, $P_u$, **page 104**
- *Contamination factor*, $\eta_c$, **page 104**

# Bearing rating life

For estimating the expected bearing life, you can either use basic rating life, $L_{10}$, or SKF rating life, $L_{10m}$.

If you have experience with the operating conditions related to lubrication and contamination, and know that the conditions you are working with do not have a dramatic effect on the life of your bearings, use the basic rating life calculation, otherwise SKF recommends using the SKF rating life.

## Bearing life definition

Bearing life is defined as the number of revolutions (or the number of operating hours) at a given speed that the bearing is capable of enduring before the first sign of metal fatigue (spalling) occurs on a rolling element or the raceway of the inner or outer ring.

Tests on seemingly identical bearings, under identical operating conditions, result in a large variation in the number of cycles, or time, needed to cause metal fatigue. Therefore, bearing life estimates based on rolling contact fatigue (RCF) are insufficiently accurate and so a statistical approach is needed to determine bearing size.

The basic rating life, $L_{10}$, is the fatigue life that 90% of a sufficiently large group of apparently identical bearings, operating under identical operating conditions, can be expected to attain or exceed.

To determine a relevant bearing size using the definition given here, compare the calculated rating life against the service life expectations of the bearing application, using experience from previous dimensioning where available. Otherwise, use the guidelines regarding specification life of various bearing applications provided in **table 1** and **table 2**.

Because of the statistical spread of bearing fatigue life, an observed time to failure for an individual bearing can be evaluated in relation to its rated life, only if the failure probability of that particular bearing is determined in relation to the general population of bearings running under similar conditions.

Numerous investigations on bearing failure, in a variety of applications, have confirmed that design guidelines based on 90% reliability, and use of dynamic safety factors, lead to robust bearing solutions in which typical fatigue failures are avoided.

**Table 1**

**Guideline values of specification life for different machine types**

| Machine type | Specification life<br>Operating hours |
|---|---|
| Household machines, agricultural machines, instruments, technical equipment for medical use | 300 ... 3 000 |
| Machines used for short periods or intermittently: electric hand tools, lifting tackle in workshops, construction equipment and machines | 3000 ... 8 000 |
| Machines used for short periods or intermittently where high operational reliability is required: lifts (elevators), cranes for packaged goods or slings of drums, etc. | 8 000 ... 12 000 |
| Machines for use 8 hours a day, but not always fully utilized: gear drives for general purposes, electric motors for industrial use, rotary crushers | 10 000 ... 25 000 |
| Machines for use 8 hours a day and fully utilized: machine tools, woodworking machines, machines for the engineering industry, cranes for bulk materials, ventilator fans, conveyor belts, printing equipment, separators and centrifuges | 20 000 ... 30 000 |
| Machines for continuous 24-hour use: rolling mill gear units, medium-sized electrical machinery, compressors, mine hoists, pumps, textile machinery | 40 000 ... 50 000 |
| Wind energy machinery, this includes main shaft, yaw, pitching gearbox, generator bearings | 30 000 ... 100 000 |
| Water works machinery, rotary furnaces, cable stranding machines, propulsion machinery for ocean-going vessels | 60 000 ... 100 000 |
| Large electric machines, power generation plant, mine pumps, mine ventilator fans, tunnel shaft bearings for ocean-going vessels | 100 000 ... 200 000 |

## Basic rating life

If you consider only the load and speed, you can use the basic rating life, $L_{10}$.

The basic rating life of a bearing in accordance with ISO 281 is

$$L_{10} = \left(\frac{C}{P}\right)^p$$

If the speed is constant, it is often preferable to calculate the life expressed in operating hours using

$$L_{10h} = \frac{10^6}{60\ n} L_{10}$$

where

$L_{10}$ = basic rating life (at 90% reliability) [millions of revolutions]
$L_{10h}$ = basic rating life (at 90% reliability) [operating hours]
$C$ = basic dynamic load rating [kN]
$P$ = equivalent dynamic bearing load [kN]
$n$ = rotational speed [r/min]
$p$ = exponent of the life equation
= 3 for ball bearings
= 10/3 for roller bearings

## SKF rating life

For modern high-quality bearings, the calculated basic rating life can deviate significantly from the actual service life in a given application. Service life in a particular application depends not only on load and bearing size, but also on a variety of influencing factors including lubrication, degree of contamination, proper mounting and other environmental conditions.

ISO 281 uses a modified life factor to supplement the basic rating life. The life modification factor $a_{SKF}$ applies the same concept of a fatigue load limit $P_u$ (*Fatigue load limit, $P_u$*, **page 104**) as used in ISO 281. Values of $P_u$ are listed in the product tables. Just as in ISO 281, to reflect three of the important operating conditions, the life modification factor $a_{SKF}$ takes the lubrication conditions (*Lubrication condition – the viscosity ratio, $\kappa$*, **page 102**), the load level in relation to the bearing fatigue load limit, and a factor $\eta_c$ for the contamination level (*Contamination factor, $\eta_c$*, **page 104**) into consideration using

$$L_{nm} = a_1\ a_{SKF}\ L_{10} = a_1\ a_{SKF} \left(\frac{C}{P}\right)^p$$

If the speed is constant, the life can be expressed in operating hours, using

$$L_{nmh} = \left(\frac{10^6}{60\ n}\right) L_{nm}$$

where

$L_{nm}$ = SKF rating life (at 100 – n[1])% reliability) [millions of revolutions]
$L_{nmh}$ = SKF rating life (at 100 – n[1])% reliability) [operating hours]
$L_{10}$ = basic rating life (at 90% reliability) [millions of revolutions]
$a_1$ = life adjustment factor for reliability (**table 3**, **page 90**, values in accordance with ISO 281)
$a_{SKF}$ = life modification factor
$C$ = basic dynamic load rating [kN]
$P$ = equivalent dynamic bearing load [kN]
$n$ = rotational speed [r/min]
$p$ = exponent of the life equation
= 3 for ball bearings
= 10/3 for roller bearings

For 90% reliability:
$L_{nm}$ = SKF rating life (at 100 – n[1])% reliability) [million revolutions]

Becomes:
$L_{10m}$ = SKF rating life [million revolutions]

Since the life adjustment factor $a_1$ is related to fatigue, it is less relevant for load levels P below the fatigue load limit $P_u$. Dimensioning with life adjustment factors reflecting very high reliability (such as 99%) will result in large bearings for given loads. In these cases, the bearing load must be checked against the minimum load requirement for the bearing. Calculating minimum load is described in *Requisite minimum load*, **page 106**.

Commonly used conversion factors for bearing life in units other than million revolutions are provided in **table 4**, **page 91**.

**Table 2**

**Guideline values of specification life for axlebox bearings and units for railway vehicles**

| Type of vehicle | Specification life<br>Million kilometres |
|---|---|
| Freight wagons to UIC specification based on continuously acting maximum axle load | 0,8 |
| Mass transit vehicles: suburban trains, underground carriages, light rail and tramway vehicles | 1,5 |
| Main line passenger coaches | 3 |
| Main line diesel and electric multiple units | 3 ... 4 |
| Main line diesel and electric locomotives | 3 ... 5 |

1) The factor n represents the failure probability, which is the difference between the requisite reliability and 100%.

## Calculating bearing life with variable operating conditions, fluctuating load

In some applications – for example, industrial gearboxes, vehicle transmissions or windmills – the operating conditions, such as the magnitude and direction of loads, speeds, temperatures and lubrication conditions, are continually changing. In these types of applications, bearing life cannot be calculated without first reducing the load spectrum or duty cycle of the application to a limited number of simplified load cases (**diagram 3**).

For continuously changing loads, each different load level can be accumulated and the load spectrum reduced to a histogram plotting constant-load blocks. Each block should characterize a given percentage or time-fraction during operation. Heavy and normal loads consume bearing life at a faster rate than light loads. Therefore, it is important to have peak loads well represented in the load diagram, even if the occurrence of these loads is relatively rare and of relatively short duration.

Within each duty interval, the bearing load and operating conditions can be averaged to a representative, constant value. The number of operating hours or revolutions expected from each duty interval, showing the life fraction required by that particular load condition, should also be included. Therefore, if $N_1$ equals the number of revolutions required under the load condition $P_1$, and N is the expected number of revolutions for the completion of all variable loading cycles, then the cycle fraction $U_1 = N_1/N$ is used by the load condition $P_1$, which has a calculated life of $L_{10m1}$. Under variable operating conditions, bearing life can be rated using

$$L_{10m} = \frac{1}{\frac{U_1}{L_{10m1}} + \frac{U_2}{L_{10m2}} + \frac{U_3}{L_{10m3}} + \ldots}$$

where

$L_{10m}$ = SKF rating life (at 90% reliability) [million revolutions]

$L_{10m1}$, $L_{10m2}$, ... = SKF rating lives (at 90% reliability) under constant conditions 1, 2, ... [million revolutions]

$U_1$, $U_2$, ... = life cycle fraction under the conditions 1, 2, ... $U_1 + U_2 + \ldots U_n = 1$

The use of this calculation method is well suited for application conditions of varying load level and varying speed with known time fractions.

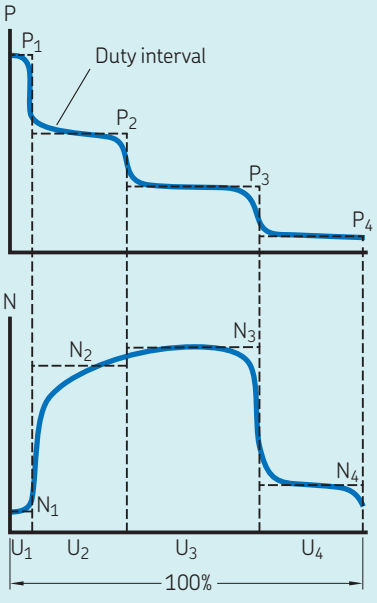
**Table 3**

**Values for life adjustment factor $a_1$**

| Reliability | Failure probability | SKF rating life | Factor |
|---|---|---|---|
| | n | $L_{nm}$ | $a_1$ |
| % | % | million revolutions | – |
| **90** | 10 | $L_{10m}$ | 1 |
| **95** | 5 | $L_{5m}$ | 0,64 |
| **96** | 4 | $L_{4m}$ | 0,55 |
| **97** | 3 | $L_{3m}$ | 0,47 |
| **98** | 2 | $L_{2m}$ | 0,37 |
| **99** | 1 | $L_{1m}$ | 0,25 |

**Diagram 3**

**Duty intervals with constant bearing load P and number of revolutions N**



# Basic dynamic load rating, C

The basic dynamic load rating C is used for calculating basic rating life and SKF rating life for bearings that rotate under load. The C value is defined as: the bearing load that will result in an ISO 281 basic rating life of 1 000 000 revolutions. It is assumed that the load is constant in magnitude and direction and is radial for radial bearings and axial, centrically acting, for thrust bearings.

The basic dynamic load ratings for SKF bearings are determined in accordance with the procedures outlined in ISO 281, and apply to bearings made of chromium bearing steel, heat treated to a minimum hardness of 58 HRC, operating under normal conditions.

## Dynamic load rating for SKF Explorer bearings

SKF Explorer bearings have undergone design, material and manufacturing improvements that require adjusted factors to calculate the dynamic load ratings in accordance with ISO 281. The SKF Explorer adjusted dynamic load ratings, which are higher than the ratings for SKF basic design bearings, are verified by extensive endurance testing.

To fully utilize the improved performance of SKF Explorer bearings, the SKF rating life calculation including the life modification factor $a_{SKF}$ is recommended. In fact, it is the modified rating life of the bearing, $L_{10m}$, rather than the dynamic load rating, C, that provides the most valuable information regarding the endurance performance of a bearing. For detailed information, refer to *Life modification factor, $a_{SKF}$*, **page 94**.

# Equivalent dynamic bearing load, P

When calculating the bearing rating life, a value for equivalent dynamic bearing load is required for both basic bearing life and SKF bearing life equations.

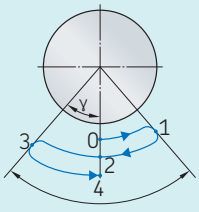
The loads acting on a bearing are calculated according to the laws of mechanics using the external forces – such as forces from power transmission, work forces, gravitational or inertial forces – that are known or can be calculated.

In real-world circumstances, the loads acting on a bearing may not be constant, can act both radially and axially, and are subject to other factors that require the load calculations to be modified or, in some cases, simplified.



**Table 4**

**Unit conversion factors for bearing life**




The complete oscillation = 4 γ
(= from point 0 to point 4)

| Basic units | Conversion factor<br>Million revolutions | Operating hours | Million kilometres | Million oscillation cycles[1)] |
|---|---|---|---|---|
| **1 million revolutions** | 1 | $\frac{10^6}{60\ n}$ | $\frac{\pi\ D}{10^3}$ | $\frac{180}{2\ \gamma}$ |
| **1 operating hour** | $\frac{60\ n}{10^6}$ | 1 | $\frac{60\ n\ \pi\ D}{10^9}$ | $\frac{180 \times 60\ n}{2\ \gamma\ 10^6}$ |
| **1 million kilometres** | $\frac{10^3}{\pi\ D}$ | $\frac{10^9}{60\ n\ \pi\ D}$ | 1 | $\frac{180 \times 10^3}{2\ \gamma\ \pi\ D}$ |
| **1 million oscillation cycles[1)]** | $\frac{2\ \gamma}{180}$ | $\frac{2\ \gamma\ 10^6}{180 \times 60\ n}$ | $\frac{2\ \gamma\ \pi\ D}{180 \times 10^3}$ | 1 |

D = vehicle wheel diameter [m]
n = rotational speed [r/min]
γ = oscillation amplitude (angle of max. deviation from centre position) [°]

1) Not valid for small amplitudes (γ < 10°).

## Calculating equivalent dynamic bearing load

The load value, P, used in the bearing rating life equations is the equivalent dynamic bearing load. The equivalent dynamic bearing load is defined as: a hypothetical load, constant in magnitude and direction, that acts radially on radial bearings and axially and centrically on thrust bearings.

This hypothetical load, when applied, would have the same influence on bearing life as the actual loads to which the bearing is subjected (**fig. 2**).

If a bearing is loaded with simultaneously acting radial load $F_r$ and axial load $F_a$ that are constant in magnitude and direction, the equivalent dynamic bearing load P can be obtained from the general equation.

$$P = X F_r + Y F_a$$

where
P = equivalent dynamic bearing load [kN]
$F_r$ = actual radial bearing load [kN]
$F_a$ = actual axial bearing load [kN]
X = radial load factor for the bearing
Y = axial load factor for the bearing

An axial load only influences the equivalent dynamic load P for a single row radial bearing if the ratio $F_a/F_r$ exceeds a certain limiting factor e. With double row bearings, even light axial loads influence the equivalent load and have to be considered.

The same general equation also applies to spherical roller thrust bearings, which can accommodate both axial and radial loads.

Certain thrust bearings, such as thrust ball bearings and cylindrical and needle roller thrust bearings, can only accommodate pure axial loads. For these bearings, provided the load acts centrically, the equation is simplified to

$$P = F_a$$

Information and data required for calculating the equivalent dynamic bearing load for the different bearing types is provided in the relevant product sections.

## Equivalent mean load

Other loads may vary with time. For these situations, an equivalent mean load must be calculated.

### Mean load within a duty interval

Within each loading interval, the operating conditions can vary slightly from the nominal value. Assuming that the operating conditions, such as speed and load direction, are fairly constant and the magnitude of the load constantly varies between a minimum value $F_{min}$ and a maximum value $F_{max}$ (**diagram 4**), the mean load can be calculated using

$$F_m = \frac{F_{min} + 2F_{max}}{3}$$

### Rotating load

If, as illustrated in **diagram 5**, the load on the bearing consists of a load $F_1$ which is constant in magnitude and direction, such as the weight of a rotor, and a rotating constant load $F_2$ such as an unbalanced load, the mean load can be calculated using

$$F_m = f_m (F_1 + F_2)$$

Values for the factor $f_m$ are provided in **diagram 6**.

### Peak load

High loads acting for short times (**diagram 7**) may not influence the mean load used in a fatigue life calculation. Evaluate such peak loads against the bearing static load rating $C_0$, using a suitable static safety factor $s_0$ (*Size selection based on static load*, **page 104**).

**Fig. 2**
**Equivalent dynamic bearing load**

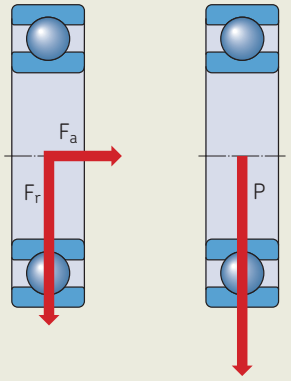



**Diagram 4**
**Load averaging**

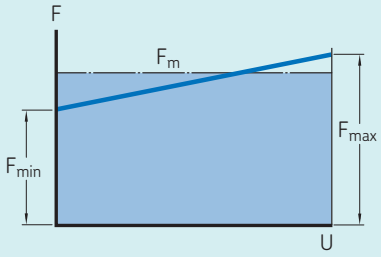
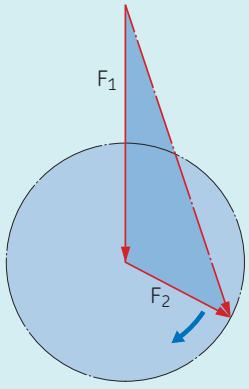



**Diagram 5**
**Rotating load**



## Considerations when calculating equivalent dynamic bearing load

For the sake of simplification, when calculating the load components for bearings supporting a shaft, the shaft is considered as a statically determined beam resting on rigid, moment-free supports. Elastic deformations in the bearing, the housing or the machine frame are not considered, nor are the moments produced in the bearing as a result of shaft deflection. These simplifications are necessary if you are making bearing arrangement calculations without the aid of relevant computer software. The standardized methods for calculating basic load ratings and equivalent bearing loads are based on similar assumptions.

It is possible to calculate bearing loads based on the theory of elasticity, without making the above assumptions, but this requires the use of complex computer programs (SKF SimPro Quick and SKF SimPro Expert). In these programs, the bearings, shaft and housing are considered as resilient components of a system.

If external forces and loads – such as inertial forces or loads resulting from the weight of a shaft and its components – are not known, they can be calculated. However, when determining work forces and loads – such as rolling forces, moment loads, unbalanced loads and impact loads – it may be necessary to rely on estimates based on experience with similar machines or bearing arrangements.

### Geared transmissions

With geared transmissions, the theoretical tooth forces can be calculated from the power transmitted and the design characteristics of the gear teeth. However, there are additional dynamic forces, produced either by the gear, or by the input or output shaft. Additional dynamic forces from gears can be the result of pitch or form errors of the teeth and from unbalanced rotating components. Gears produced to a high level of accuracy have negligible additional forces. For lower precision gears, use the following gear load factors:

- pitch and form errors < 0,02 mm: 1,05 to 1,1
- pitch and form errors 0,02 to 0,1 mm: 1,1 to 1,3

Additional forces arising from the type and mode of operation of the machines that are coupled to the transmission can only be determined when the operating conditions, the inertia of the drive line and the behaviour of couplings or other connectors are known. Their influence on the rating lives of the bearings is included by using an "operation" factor that takes into account the dynamic effects of the system.

### Belt drives

When calculating bearing loads for belt driven applications, "belt pull" must be taken into consideration. Belt pull, which is a circumferential load, depends on the amount of torque being transmitted. The belt pull must be multiplied by a factor whose value depends on the type of belt, belt tension and any additional dynamic forces. Belt manufacturers usually publish the values. However, should information not be available, the following can be used:

- toothed belts = 1,1 to 1,3
- V-belts = 1,2 to 2,5
- plain belts = 1,5 to 4,5

The larger values apply:

- where the distance between shafts is short
- for heavy or peak load type duty
- where belt tension is high

**Diagram 6**

**Rotating load**

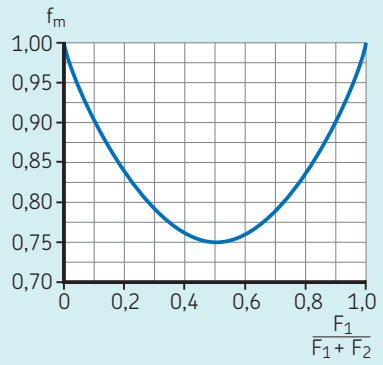
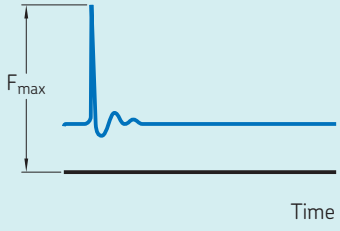



**Diagram 7**

**Short time peak load**



# Life modification factor, $a_{SKF}$

The life modification factor $a_{SKF}$ expands the scope of the basic rating life model, $L_{10}$, which depends purely on load and size, by taking the following important operational factors into account:

- the fatigue load limit in relation to the acting bearing equivalent load ($P_u/P$)
- the effect of the contamination level in the bearing ($\eta_c$)
- the lubrication condition (viscosity ratio $\kappa$)

This makes the resulting SKF rating life, $L_{10m}$, more encompassing than $L_{10}$ when verifying bearing size selection:

$$L_{nm} = a_1\, a_{SKF}\, L_{10} = a_1\, a_{SKF} \left(\frac{C}{P}\right)^p$$

A graph for estimating $a_{SKF}$ is shown in **diagram 8**. The horizontal axis represents the combined influence of load and contamination on fatigue. The viscosity ratio, $\kappa$, represents the lubrication conditions and their influence on fatigue.

Use **diagram 8** to see how operating conditions affect the basic rating life:

- **Area A** is dominated by very high load and/or severe indentations.

  The lubricating conditions in this domain can only marginally improve the expected fatigue life, so a potential life improvement depends on what dominates the relationship between the contamination level and the load level $P_u/P$. To achieve a greater SKF rating life, either the load must be reduced, or the cleanliness must be improved, or both.
- **Area B** offers high life modification factors, which is beneficial because a large life modification value will convert a low basic rating life sufficiently to produce a large SKF rating life.

  In this part of the graph, small deviations from estimated load level, cleanliness factor and lubrication conditions will greatly affect the life modification factor. Small changes to lubricating conditions, slightly higher loading and larger indentation severity (for example, from mounting or transport damage) may result in a change in $a_{SKF}$ from 50 to 5. This would result in a 90% loss of SKF rating life. In cases where the SKF rating life consists of a large life modification factor $a_{SKF}$ and a limited basic rating life $L_{10}$, the impact of variations in operating conditions should be evaluated in a sensitivity analysis.
- **Area C** is where the life modification factor is less sensitive to changes.

  Deviations from estimated load level, cleanliness factor and lubrication conditions (for example, from uncertainties in temperature) will not substantially affect the value of $a_{SKF}$, which means the resulting SKF rating life is more robust.

  In the load level domain, area C has the ranges:
  - $P_u \leq P \leq 0{,}5\ C$ for ball bearings
  - $P_u \leq P \leq 0{,}33\ C$ for roller bearings

Use the schematic $a_{SKF}$ graph to evaluate how changes to operational conditions would affect the life modification factor. This can help you check whether a potential benefit is worth the effort. For example, you can see how:

- improved cleanliness (better sealing, filtration and assembly conditions) increases the contamination factor $\eta_c$
- cooling or using a lubricant with higher viscosity increases the viscosity ratio $\kappa$
- choosing a larger bearing size increases the ratio $P_u/P$ (and the basic rating life $L_{10}$)
- using SKF Explorer bearings allows a more favourable scale on the horizontal axis for the combined effect of the $\eta_c$ times $P_u/P$

The following graphs show plots of the life modification factor $a_{SKF}$ for the four bearing types, as a function of $\eta_c(P_u/P)$, for SKF Explorer and SKF basic design bearings, and for different values of the viscosity ratio $\kappa$:

- **diagram 9**, **page 96**: radial ball bearings
- **diagram 10**, **page 97**: radial roller bearings
- **diagram 11**, **page 98**: thrust ball bearings
- **diagram 12**, **page 99**: thrust roller bearings

**NOTE**

The graphs in **diagram 9**, **10**, **11** and **12** are plotted for values and safety factors typically associated with fatigue load limits for other mechanical components. Considering the simplifications inherent in the SKF rating life equation, even if the operating conditions are accurately identified, it is not meaningful to use values of $a_{SKF}$ in excess of 50.

**Diagram 8**

**Factors influencing the life modification factor, $a_{SKF}$**

$$L_{nm} = a_1\, a_{SKF}\, L_{10} = a_1\, a_{SKF} \left(\frac{C}{P}\right)^p$$

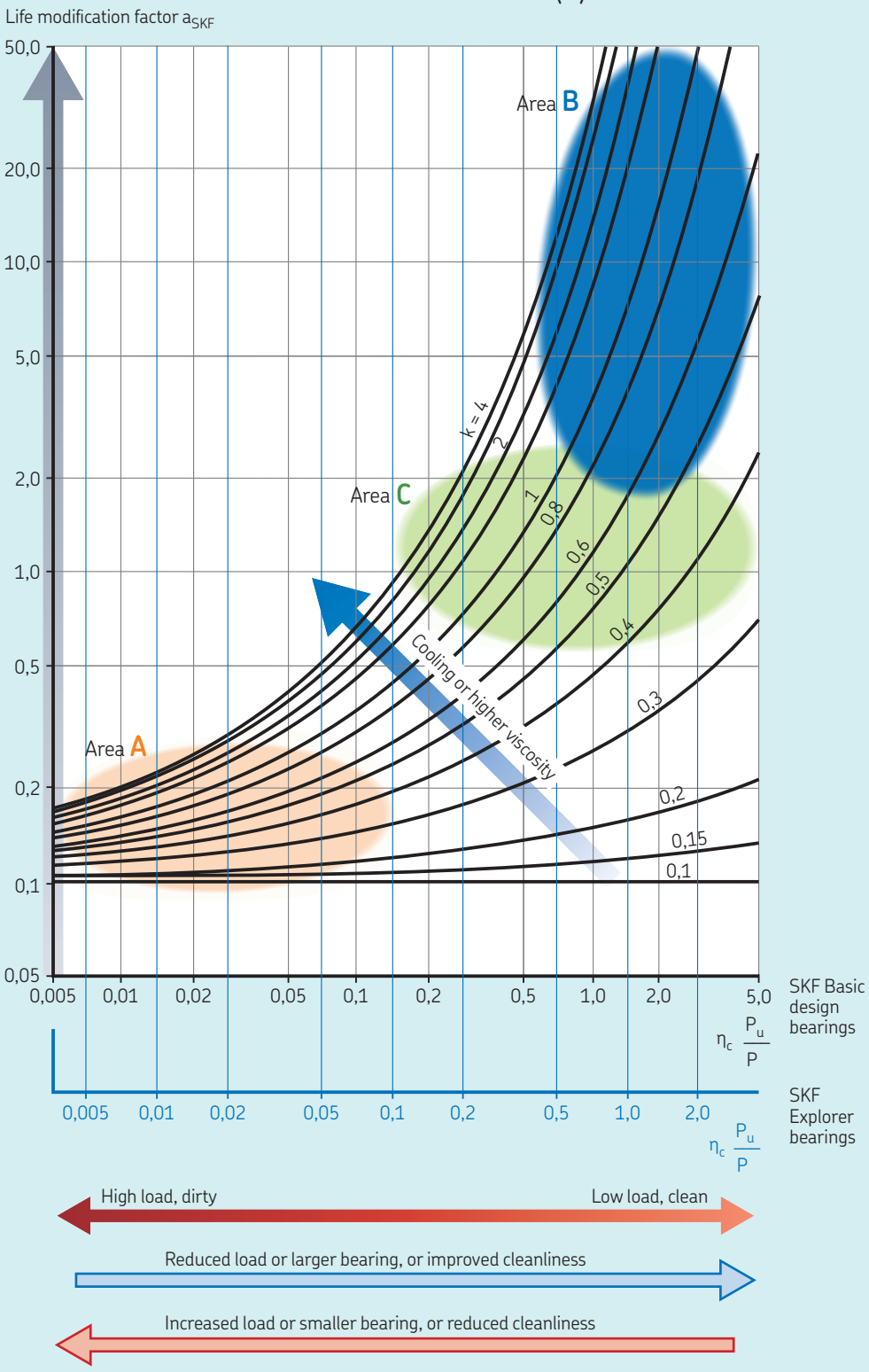


Diagram 9

**Factor $a_{SKF}$ for radial ball bearings**

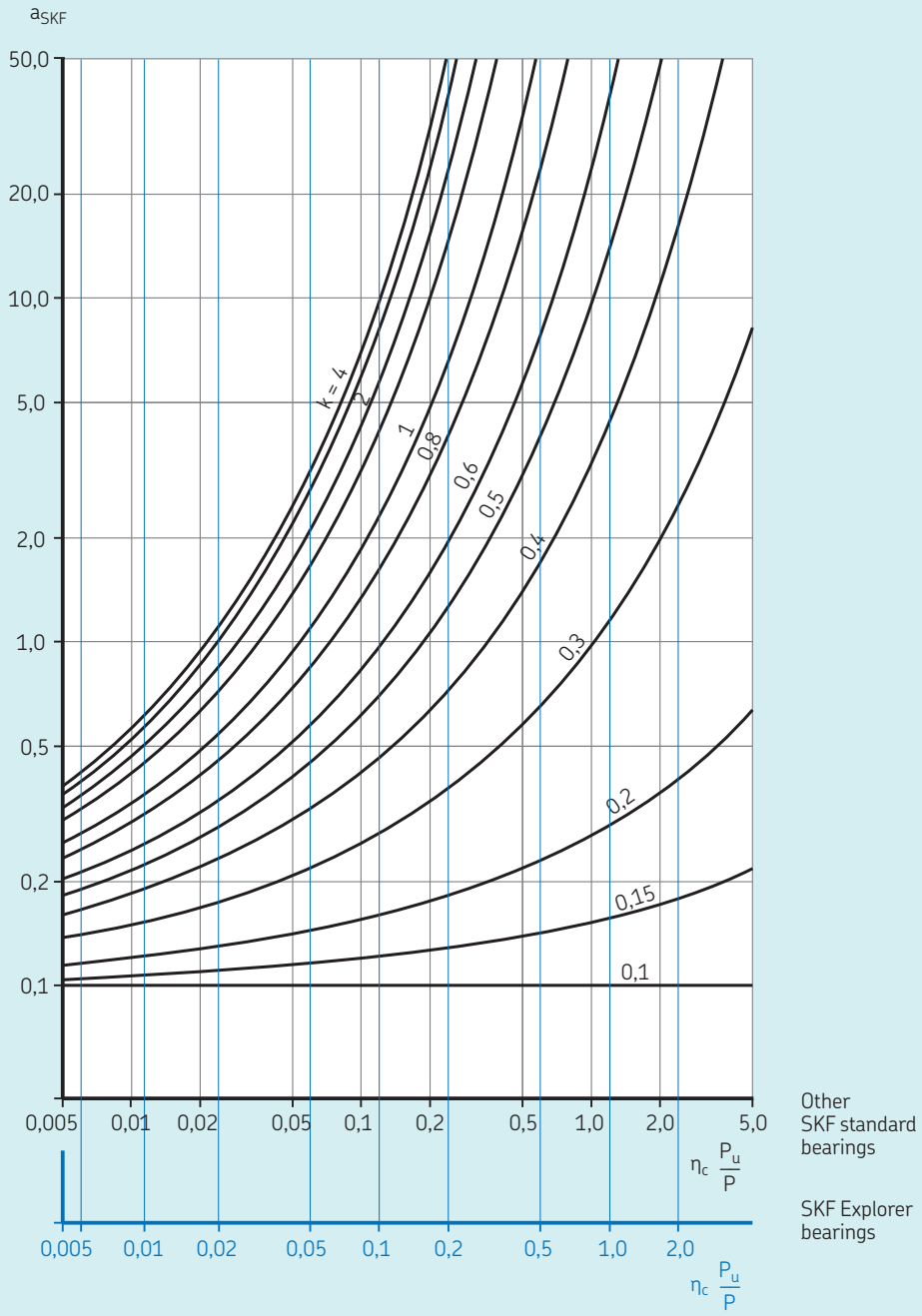


**Diagram 10**

**Factor $a_{SKF}$ for radial roller bearings**

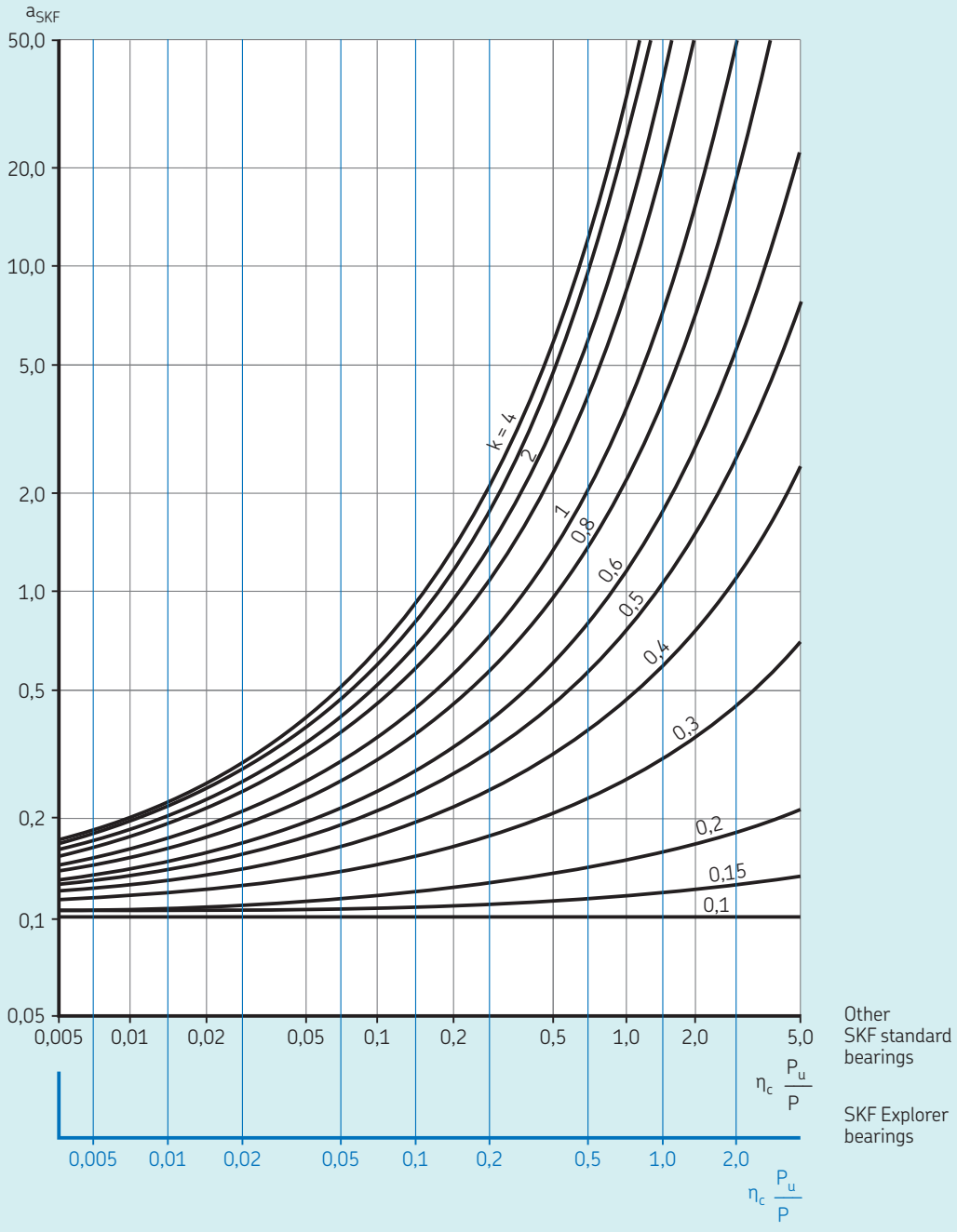


**Diagram 11**

**Factor $a_{SKF}$ for thrust ball bearings**

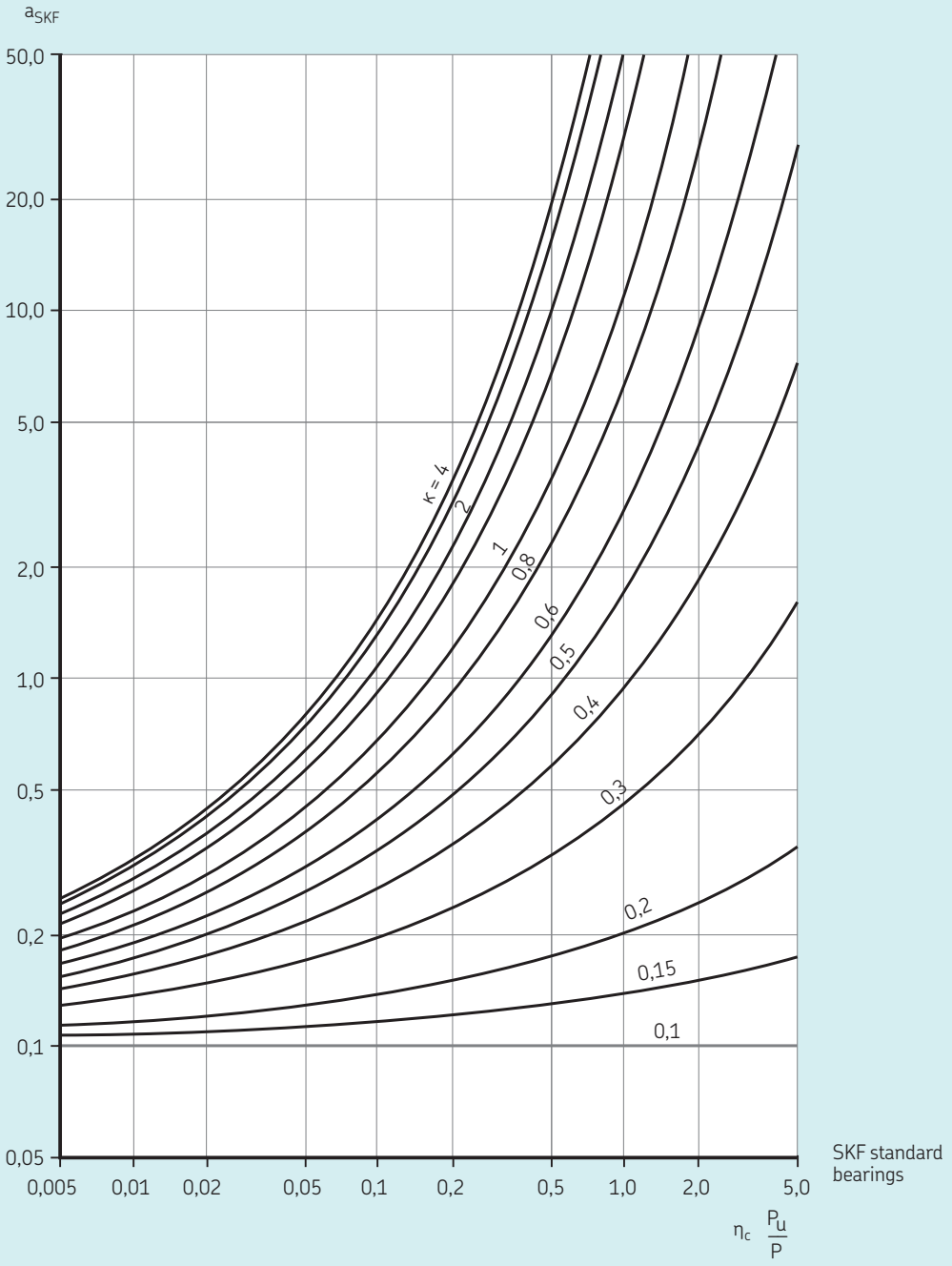


**Diagram 12**

**Factor $a_{SKF}$ for thrust roller bearings**

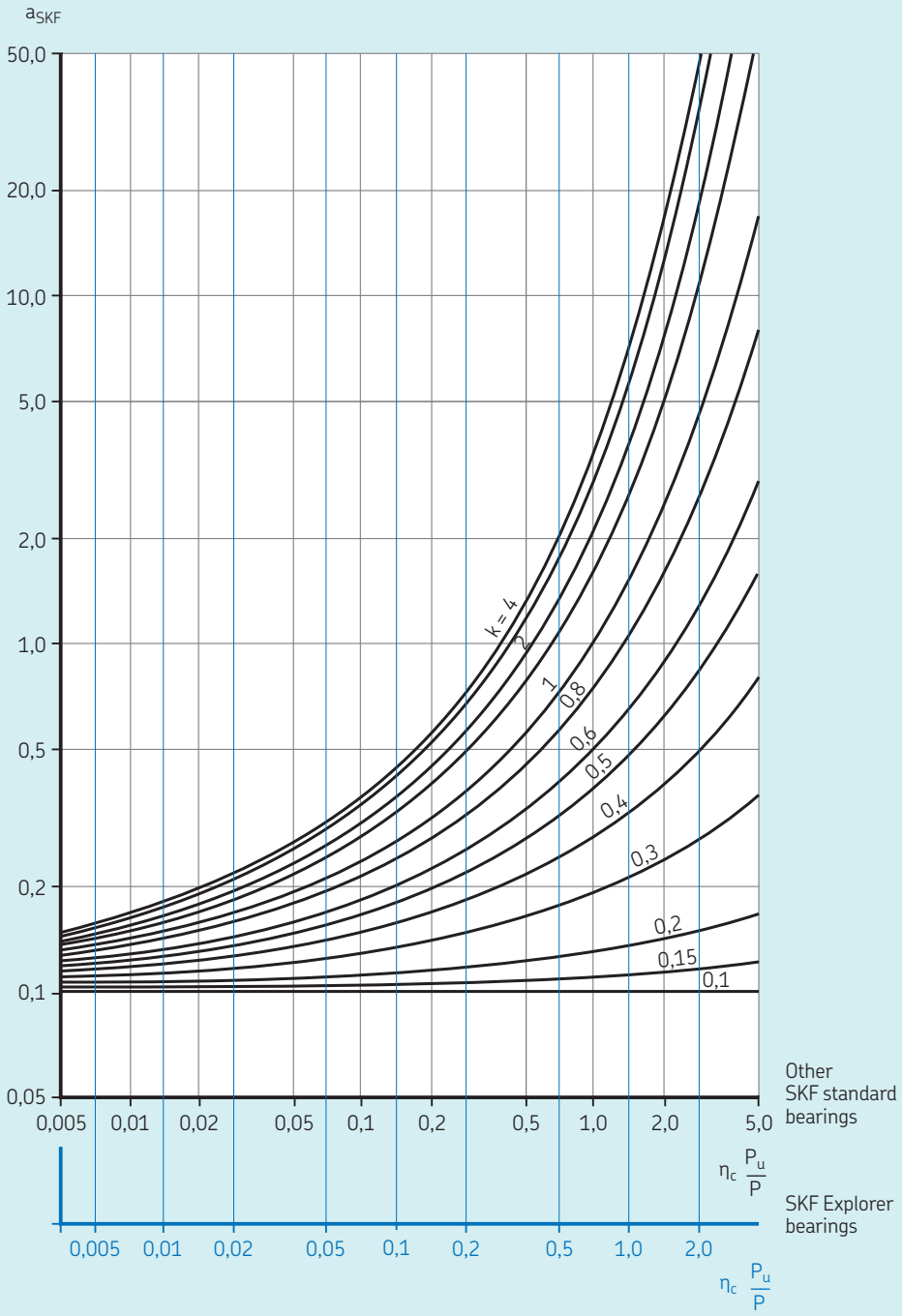


Diagram 13

**Viscosity-temperature diagram for ISO viscosity grades**
(Mineral oils, viscosity index 95)

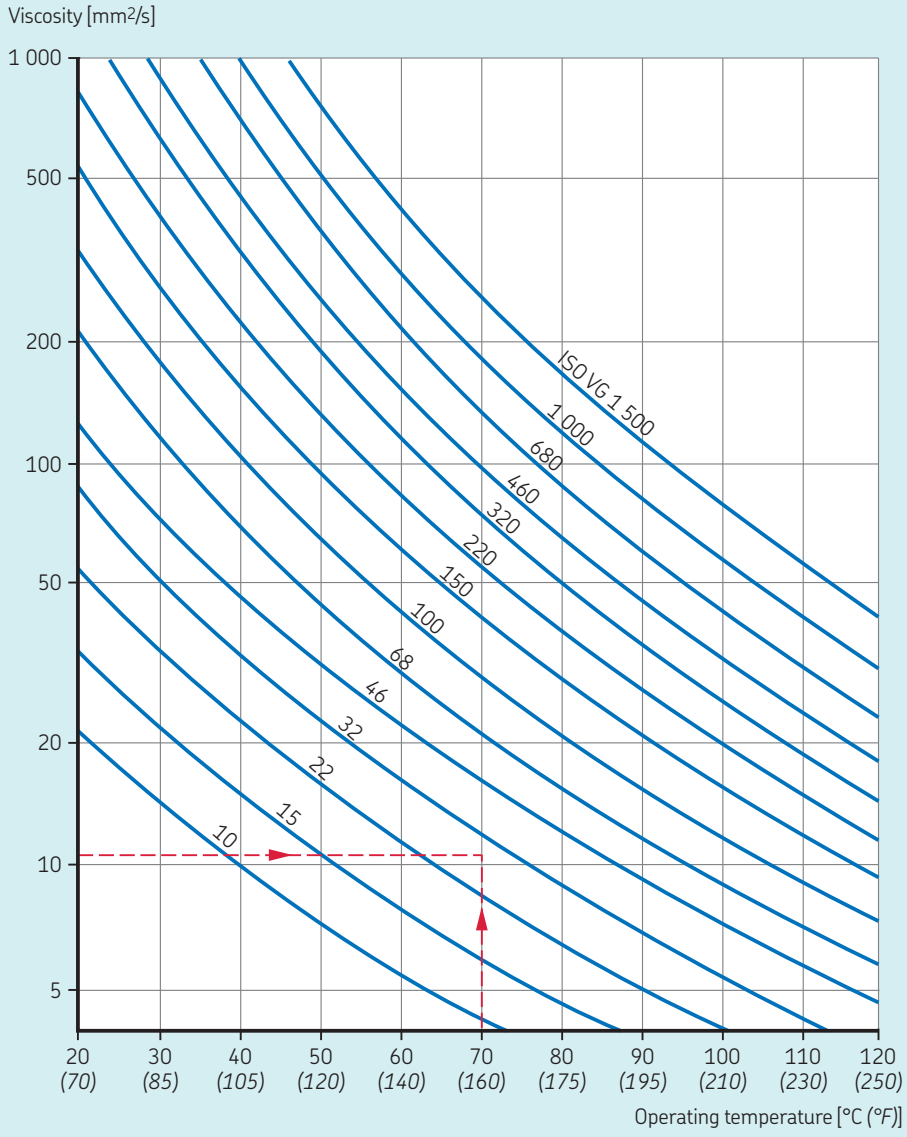
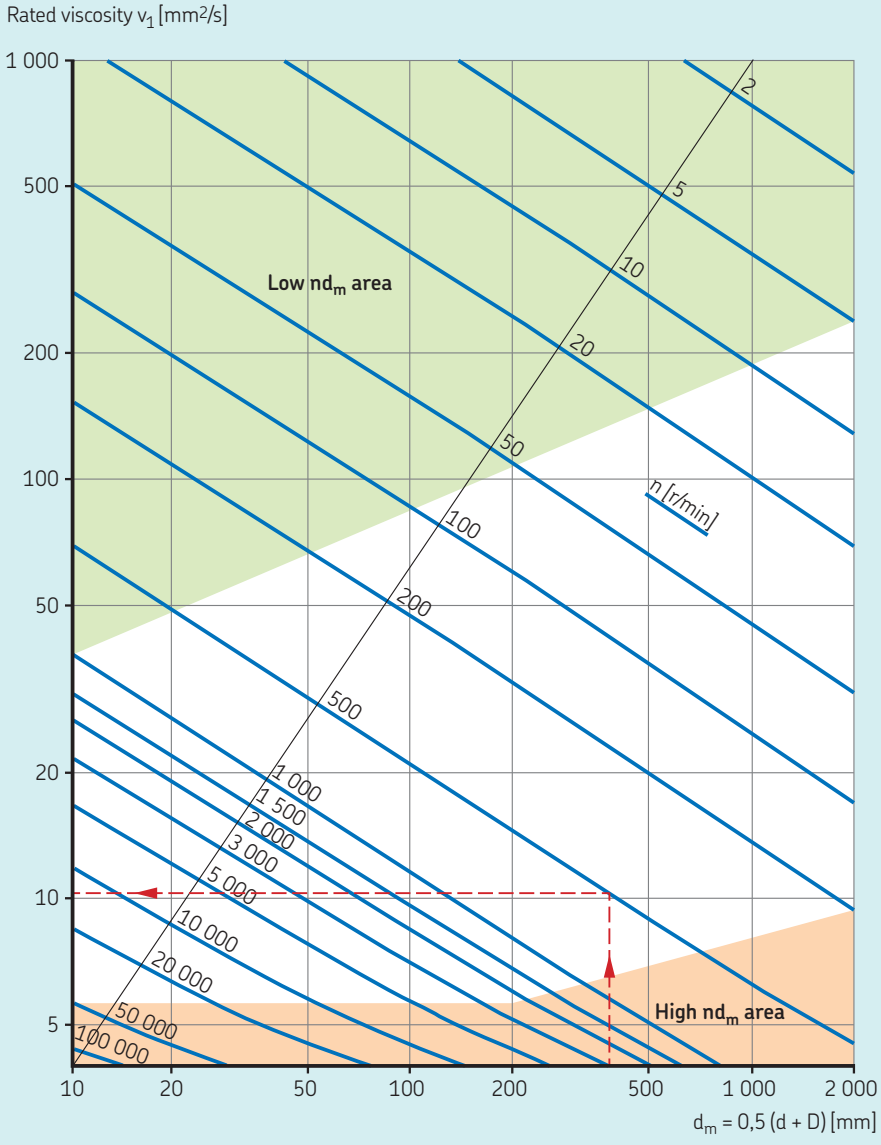


**Diagram 14**

**Estimation of the rated viscosity $\nu_1$**




Low $nd_m$ area, where $nd_m \leq 10\,000$ mm/min.
At these lower $nd_m$ values, AW or EP additives are needed to reduce wear.

High $nd_m$ area, where $nd_m \geq 500\,000$ mm/min for $d_m \leq 200$ mm, and $nd_m \geq 400\,000$ mm/min for $d_m > 200$ mm.
At these higher $nd_m$ values, operating temperature must be given more attention. Certain bearing types, such as spherical roller bearings, tapered roller bearings and spherical roller thrust bearings, normally have a higher operating temperature than others, such as deep groove ball bearings and cylindrical roller bearings, under comparable operating conditions.

# Lubrication condition – the viscosity ratio, κ

When a bearing has reached its normal speed and operating temperature, the lubrication condition of the bearing is:

$$\kappa = \frac{\nu}{\nu_1}$$

where

$\kappa$ = lubrication condition of the bearing, i.e. viscosity ratio

$\nu$ = actual operating viscosity of the oil or the grease base oil [mm²/s]

$\nu_1$ = rated viscosity, function of the mean bearing diameter and rotational speed [mm²/s]

The actual operating viscosity, $\nu$, of the lubricant can be determined from the ISO viscosity grade of the oil, or the grease base oil, and the operating temperature of the bearing (**diagram 13**, **page 100**) .

You can determine the rated viscosity, $\nu_1$, from **diagram 14**, **page 101**, using the bearing mean diameter $d_m = 0,5\ (d + D)$ [mm] and the rotational speed of the bearing, n [r/min]. Alternatively, you can use the *SKF Bearing Calculator* (skf.com/bearingcalculator).

Viscosity grades, in accordance with ISO 3448, are listed in **table 5**, along with the viscosity range for each grade at 40 °C *(105 °F)*.

The higher the κ value, the better the lubrication condition of the bearing and its expected rated life. This must be judged against the possible friction increase because of the higher oil viscosity. Therefore, most bearing applications are designed for a lubrication condition ranging from κ 1 to 4 (**diagram 15**). Alternatively, you can use the *SKF Bearing Calculator* (skf.com/bearingcalculator) to calculate the lubrication condition.

- $\kappa = 4$ indicates a regimen for which the rolling contact load is carried by the lubricant film – i.e. full film lubrication.
- $\kappa > 4$ (i.e. better than full film lubrication) will not further increase the rating of the bearing. However, $\kappa > 4$ may be useful in applications where the bearing temperature rise is small and additional lubrication condition reliability is desirable. This would apply, for example, to bearing applications with frequent start-stop running conditions or occasional temperature variations.
- $\kappa < 0,1$ indicates a regimen for which the rolling element load is carried by the contact of the asperities between rolling element and raceway – i.e. boundary lubrication. The use of fatigue life rating for lubrication conditions below 0,1 is not appropriate as it is beyond the applicability limits of the life rating model. Where $\kappa < 0,1$, select the bearing size on the basis of static loading criteria by means of the static safety factor, $s_0$ (*Size selection based on static load*, **page 104**).

## κ value below 1

For lubrication conditions with $0,1 < \kappa < 1$, take into account the following:

- If the κ value is low because of very low speed, base the bearing size selection on the static safety factor $s_0$ (*Size selection based on static load*, **page 104**).
- If the κ value is low because of low viscosity, counteract this by selecting a higher viscosity oil or by improving the cooling. Under these lubrication conditions, it is not appropriate to calculate the basic rating life $L_{10}$ only, because it does not take into account the detrimental effects of inadequate lubrication of the bearing. Instead, to estimate the rolling contact fatigue life of the bearing, use the SKF rating life method.

Where $\kappa < 1$, EP/AW additives are recommended.

The speed factor $nd_m$ is used to characterize the speed condition of the bearing.

- If the $nd_m$ of the bearing is lower than 10 000, the application is operating under low-speed conditions (**diagram 14**, **page 101**). This regimen requires high oil viscosity to ensure that the rolling element load is carried by the lubricant film.
- High-speed conditions are characterized by $nd_m > 500\ 000$ for $d_m$ values up to 200 mm, and > 400 000 for larger $d_m$ values (**diagram 14**). At very high speeds, the rated viscosity drops to very low values. Lubrication conditions and κ values are generally high.

## EP (extreme pressure) and AW (anti-wear) additives

EP/AW additives in the lubricant are used to improve the lubrication condition of the bearing in situations where small κ values are in use. Furthermore, EP/AW additives are also used to prevent smearing between lightly loaded rollers and raceway, for example, when especially heavy rollers enter a loaded zone at a reduced speed.

For operating temperatures lower than 80 °C *(175 °F)*, EP/AW additives in the lubricant may extend bearing service life when κ is lower than 1 and the factor for the contamination level, $\eta_c$, is higher than 0,2 and the resulting $a_{SKF}$ factor is lower than 3. Under those conditions, a value of $\kappa_{EP} = 1$ can be applied, in place of the actual κ value, in the calculation of $a_{SKF}$ for a maximum advantage of up to $a_{SKF} = 3$.

EP/AW additives containing sulphur-phosphorus can reduce bearing life. Generally, SKF recommends testing chemical reactivity of EP/AW for operating temperatures above 80 °C *(175 °F)*.

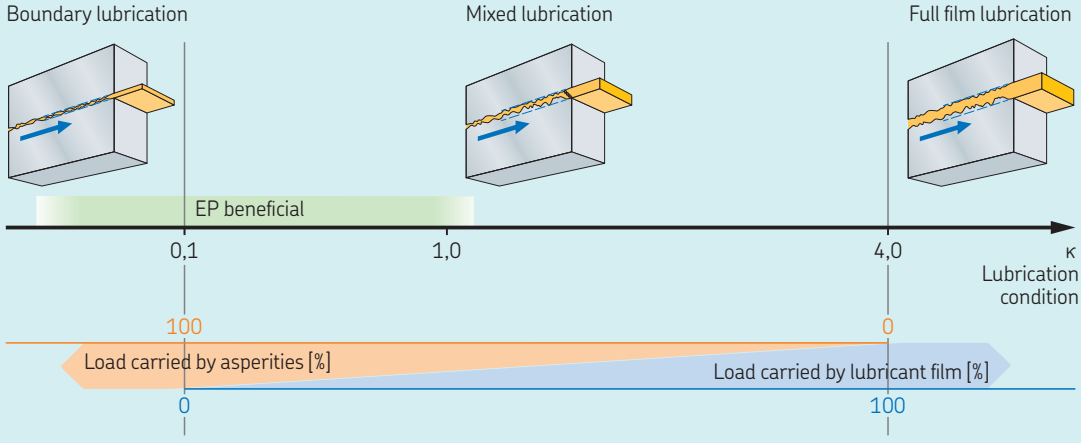
**Table 5**

**Viscosity classification to ISO 3448**

| Viscosity grade | Kinematic viscosity limits at 40 °C *(105°F)* | | |
|---|---|---|---|
| | mean | min. | max. |
| – | $mm^2/s$ | | |
| **ISO VG 2** | 2,2 | 1,98 | 2,42 |
| **ISO VG 3** | 3,2 | 2,88 | 3,52 |
| **ISO VG 5** | 4,6 | 4,14 | 5,06 |
| **ISO VG 7** | 6,8 | 6,12 | 7,48 |
| **ISO VG 10** | 10 | 9,00 | 11,0 |
| **ISO VG 15** | 15 | 13,5 | 16,5 |
| **ISO VG 22** | 22 | 19,8 | 24,2 |
| **ISO VG 32** | 32 | 28,8 | 35,2 |
| **ISO VG 46** | 46 | 41,4 | 50,6 |
| **ISO VG 68** | 68 | 61,2 | 74,8 |
| **ISO VG 100** | 100 | 90,0 | 110 |
| **ISO VG 150** | 150 | 135 | 165 |
| **ISO VG 220** | 220 | 198 | 242 |
| **ISO VG 320** | 320 | 288 | 352 |
| **ISO VG 460** | 460 | 414 | 506 |
| **ISO VG 680** | 680 | 612 | 748 |
| **ISO VG 1 000** | 1 000 | 900 | 1 100 |
| **ISO VG 1 500** | 1 500 | 1 350 | 1 650 |

**Diagram 15**

**Lubrication condition**




| Lubrication condition | κ | Size selection |
|---|---|---|
| **Boundary lubrication**<br>Full asperity contact, wear without EP/AW additives, high friction | $\kappa \leq 0,1$ | static safety factor |
| **Mixed lubrication**<br>Reducing asperity contact, wear and surface fatigue without EP/AW additives, friction reduced | $0,1 < \kappa \leq 4$ | SKF rating life and static safety factor[1)] |
| **Full film lubrication**<br>No asperity contact, increasing viscous frictional moment | $\kappa > 4$ | SKF rating life (no life gain, possible higher temperatures) and static safety factor[1)] |

[1)] This applies to peak load.

# Fatigue load limit, $P_u$

The fatigue load limit $P_u$ for a bearing is defined as the load level below which metal fatigue will not occur. For this to be valid, the lubricant film must fully separate the rolling elements from the raceways and no indentations, from contaminants or from damage related to handling, may exist on the rolling surfaces.

# Contamination factor, $\eta_c$

The contamination factor, $\eta_c$, takes into account how the level of solid particle contamination of the lubricant influences the calculated bearing fatigue life. The particles cause indentations in the rolling surfaces of the bearing, and these indentations increase the local contact stress, which reduces the expected fatigue life (**fig. 3**).

- $\eta_c = 1$ means perfectly clean conditions without any indentations.
- $\eta_c \rightarrow 0$ means severely contaminated conditions resulting in pronounced indentations.

In the SKF rating life model, the contamination factor for a certain bearing acts as a stress raiser, by reducing the bearing fatigue load limit $P_u$ (i.e. multiplying it by the contamination factor $\eta_c$).

Comparing the reduced fatigue load limit to the actual bearing load, the fatigue resistance value ($\eta_c P_u/P$) takes both the relative bearing load and the local stress field into account (**diagram 8, page 95**).

- Clean conditions (large contamination factor $\eta_c$) and a bearing load lower than the fatigue load limit results in a high resistance to fatigue.
- Contaminated conditions and a bearing load larger than the fatigue load limit results in a lower resistance to fatigue.

The stress-raising influence of contamination on bearing fatigue depends on a number of parameters, including: bearing size, relative lubricant condition, size and distribution of solid contaminant particles and types of contaminants (soft, hard, etc.). Therefore, it is not meaningful to specify precise values for the contamination factor $\eta_c$ that would have general validity. However, guideline values in accordance with ISO 281 are listed in **table 6**.

To simplify calculation of the contamination factor $\eta_c$, use the *SKF Bearing Calculator* (skf.com/bearingcalculator).

A more detailed method for estimating the contamination factor $\eta_c$ is described in a separate paper (*Method for estimating contamination factor, $\eta_c$, based on lubricant cleanliness*, skf.com/go/17000-B3).

# Size selection based on static load

When any of the following conditions exist, bearing size should be selected or verified based on the static load that the bearing can accommodate, taking into account the possible effects of permanent deformation:

- The bearing is not rotating and is subjected to continuous high load or intermittent peak loads.
- The bearing makes slow oscillating movements under load.
- The bearing rotates and, in addition to the normal fatigue life dimensioning operating loads, has to sustain temporary high peak loads.
- The bearing rotates under load at low speed ($n < 10$ r/min) and is required to have only a limited life. In such a case, the rating life equations, for a given equivalent load P, would give such a low requisite basic dynamic load rating C, that a bearing selected on a fatigue life basis would be seriously overloaded in service.

In such conditions, the resulting deformation can include flattened areas on the rolling elements or indentations in the raceways. The indentations may be irregularly spaced around the raceway, or evenly spaced at positions corresponding to the spacing of the rolling elements. A stationary or slowly oscillating bearing supporting a load great enough to cause permanent deformation will generate high levels of vibration and friction when subjected to continuous rotation. It is also possible that the internal clearance will increase or the character of the housing and shaft fits may be affected.

# Static load rating

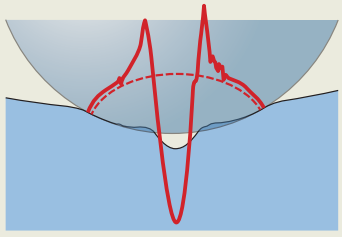
The basic static load rating $C_0$ is defined in ISO 76 as the load that results in a certain value of contact stress at the centre of contact of the most heavily loaded rolling element/raceway. The contact stress values are:

- 4 600 MPa for self-aligning ball bearings
- 4 200 MPa for all other ball bearings
- 4 000 MPa for all roller bearings

These stress values produce a total permanent deformation of the rolling element and raceway that is approximately 0,0001 of the rolling element diameter. The loads are purely radial for radial bearings and axial, centrically acting, for thrust bearings.

Fig. 3

**Example of stress fields**



# Equivalent static bearing load

Loads comprising radial and axial components that are to be evaluated in relation to the static load rating $C_0$, must be converted into an equivalent static bearing load. This is defined as that hypothetical load (radial for a radial bearing and axial for a thrust bearing) which, when applied, would cause the same maximum rolling element load in the bearing as the actual loads to which the bearing is subjected. It is obtained from the general equation

$$P = X_0 F_r + Y_0 F_a$$

where
$P_0$ = equivalent static bearing load [kN]
$F_r$ = actual radial bearing load [kN]
$F_a$ = actual axial bearing load [kN]
$X_0$ = radial load factor for the bearing
$Y_0$ = axial load factor for the bearing

Information and data required for calculating the equivalent static bearing load $P_0$ is provided in the relevant product sections.

In the equation, use radial and axial component values (**fig. 4**) for the maximum load that can occur. If the load varies then consider the combination that induces the highest value of $P_0$.

**Fig. 4**

**Equivalent static bearing load**

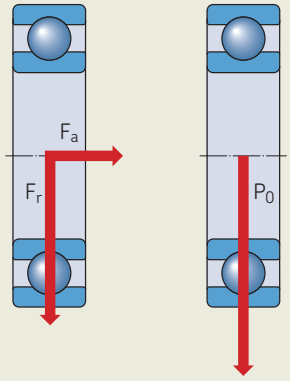



**Table 6**

**Guideline values for factor $\eta_c$ for different level of contamination**

| Conditions | Factor $\eta_c$[1] for bearings with diameter $d_m$ < 100 | $d_m$ ≥ 100 mm |
|---|---|---|
| **Extreme cleanliness**<br>• Particle size of the order of the lubricant film thickness<br>• Laboratory conditions | 1 | 1 |
| **High cleanliness**<br>• Oil filtered through an extremely fine filter<br>• Typical conditions: sealed bearings that are greased for life | 0,8 ... 0,6 | 0,9 ... 0,8 |
| **Normal cleanliness**<br>• Oil filtered through a fine filter<br>• Typical conditions: shielded bearings that are greased for life | 0,6 ... 0,5 | 0,8 ... 0,6 |
| **Slight contamination**<br>• Typical conditions: bearings without integral seals, coarse filtering, wear particles and slight ingress of contaminants | 0,5 ... 0,3 | 0,6 ... 0,4 |
| **Typical contamination**<br>• Typical conditions: bearings without integral seals, coarse filtering, wear particles, and ingress from surroundings | 0,3 ... 0,1 | 0,4 ... 0,2 |
| **Severe contamination**<br>• Typical conditions: high levels of contamination due to excessive wear and/or ineffective seals<br>• Bearing arrangement with ineffective or damaged seals | 0,1 ... 0 | 0,1 ... 0 |
| **Very severe contamination**<br>• Typical conditions: contamination levels so severe that values of ηc are outside the scale, which significantly reduces the bearing life | 0 | 0 |

[1] The scale for $\eta_c$ refers only to typical solid contaminants. Contamination by water or other fluids detrimental to bearing life is not included. Because of strong abrasive wear in highly contaminated environments ($\eta_c$ = 0), the useful life of the bearing can be significantly shorter than the rating life.

# Guideline values for static safety factor, $s_0$

The static safety factor $s_0$ is given by

$s_0 = C_0/P_0$

where
$s_0$ = static safety factor
$C_0$ = required basic static load rating [kN]
$P_0$ = equivalent static bearing load [kN]

Alternatively, you can calculate the required basic static load rating $C_0$.

Guideline values for the static safety factor $s_0$, based on experience, are listed for ball bearings in **table 7**, and roller bearings in **table 8**. The $s_0$ values given for continuous motion relate to the influence of permanent deformation on bearing performance – ranging from noticeable friction peaks, vibrations and reduced fatigue resistance (for the lowest $s_0$ values), to no influence on friction, vibration or fatigue life (for the highest $s_0$ values). The certainty of load level reflects how well the actual bearing load is known and/or can be predicted.

# Requisite minimum load

In applications where the bearing size is determined by factors other than load – for example, shaft diameter constrained by critical speed – the bearing may be lightly loaded in relation to its size and carrying capacity. Where there are very light loads, failure mechanisms other than fatigue, such as skidding and smearing of raceways or cage damage, often prevail. To provide satisfactory operation, rolling bearings must always be subjected to a given minimum load. As a general rule, minimum loads of 0,01 C should be imposed on ball bearings and 0,02 C on roller bearings. More accurate minimum load requirements are given in the product sections.

The importance of applying a minimum load is greater in applications where there are rapid accelerations or rapid starts and stops, and where speeds exceed 50% of the limiting speeds listed in the product tables (*Speed limitations*, **page 135**). If minimum load requirements cannot be met, potential improvements are:

- Use a bearing with a smaller dimension series.
- Consider special lubrication or running-in procedures.
- Consider *NoWear coated bearings*, **page 1060**.
- Consider applying a preload (*Selecting preload*, **page 186**).

# Checklist after the bearing size is determined

When you have worked through this section and determined bearing size, before continuing to the section on *Lubrication*, **page 110**, check the following by referring to the product sections:

- grease life for capped bearings
- allowed axial/radial loads and $F_a/F_r$ ratios
- minimum load
- adjusted reference speed and limiting speed
- misalignment
- stabilization class

**Table 7**

**Guideline values for the static safety factor $s_0$ – for continuous and/or occasional loads – ball bearings**

| Certainty of load level | Continuous motion<br>Permanent deformation acceptance<br>Yes | Some | No | Infrequent motion<br>Permanent deformation acceptance<br>Yes |
|---|---|---|---|---|
| **High certainty**<br>For example, gravity loading and no vibration | 0,5 | 1 | 2 | 0,4 |
| **Low certainty**<br>For example, peak loading | ≥ 1,5 | ≥ 1,5 | ≥ 2 | ≥ 1 |

# SKF life testing

SKF carries out life testing in the ISO 17025 accredited SKF Engineering and Research Centre in the Netherlands, together with the other SKF group research and testing facilities.

The purpose of this life testing is to improve the design, the materials and the manufacturing processes of bearing products, and the engineering analysis tools required for the design of bearing applications.

Typical life testing activities include tests on bearing population samples under different conditions, such as:

- full film lubrication conditions
- boundary and mixed lubrication conditions
- predefined contamination conditions of the lubricant

Apart from testing in different conditions, SKF life tests are performed to:

- verify the data published in product catalogues
- audit the quality of the manufacturing of SKF bearings
- research how lubricants and lubrication conditions influence bearing life
- support the development of rolling contact fatigue and friction models
- compare SKF products with competitors' products

Life tests are sophisticated and wide-ranging and are run under strictly controlled conditions. Post-test investigations with state-of-the-art equipment make it possible to investigate the factors that affect the life of the bearings in a systematic way.

As an example, the SKF Explorer bearing design is the result of optimizing influencing factors determined by analytical simulations and experimental verification.



**Table 8**

**Guideline values for the static safety factor $s_0$ – for continuous and/or occasional loads – roller bearings**[1)]

| Certainty of load level | Continuous motion<br>Permanent deformation acceptance<br>Yes | <br><br>Some | <br><br>No | Infrequent motion<br>Permanent deformation acceptance<br>Yes |
|---|---|---|---|---|
| **High certainty**<br>For example, gravity loading and no vibration | 1 | 1,5 | 3 | 0,8 |
| **Low certainty**<br>For example, peak loading | ≥ 2,5 | ≥ 3 | ≥ 4 | ≥ 2 |

1) For spherical roller thrust bearings, use $s_0 \geq 4$.

# B.4 Lubrication

# B.4 Lubrication


**Selecting grease or oil** . . . . . **110**
Lubrication selection flow chart and criteria . . . . . 110
Estimating the relubrication interval for grease . . . . . 111
Relubrication intervals . . . . . 112
Adjustments for relubrication intervals . . . . . 112
Determining grease quantity for initial fill and relubrication . . . . . 112
Relubrication procedures . . . . . 114

**Selecting a suitable grease** . . . . . **116**
Selecting a suitable SKF grease . . . . . 116
Using LubeSelect and selection rules. . . . . 116
The SKF traffic light concept for grease temperature performance . . . . . 117
Additional factors and considerations when selecting a grease . . . . . 118
Assessing the suitability of non-SKF greases . . . . . 118
Lubrication systems . . . . . 120

**Selecting a suitable oil** . . . . . **120**
Oil selection criteria . . . . . 120
Viscosity and viscosity index . . . . . 120
Oil type . . . . . 120
Additives . . . . . 121
Oil change interval . . . . . 121
Overview of main oil lubrication methods . . . . . 122

**SKF bearing grease selection chart** . . . . . **124**

**Technical specifications for SKF greases** . . . . . **126**

# B.4 Lubrication



Rolling bearings must be adequately lubricated to operate reliably. The lubricant is required to reduce friction, inhibit wear, protect the bearing surfaces against corrosion and may also be needed to provide cooling. This section describes:

- how to select between grease or oil
- how to select a suitable grease
- how to select a suitable oil

For information on lubrication of sealed bearings, refer to the relevant product sections.

### How lubrication relates to other selection criteria

Lubrication selection and lubricant properties greatly influence the operating temperature, which in turn influences:

- whether you should use grease or oil
- the relubrication interval required for grease
- whether oil lubrication is necessary, because circulating oil can be used to remove heat
- the lubrication condition – the viscosity ratio, $\kappa$, which influences the bearing size selection based on SKF rating life

## Selecting grease or oil

The first step in the lubrication selection process is to decide whether to use grease or oil. In most cases, grease is the appropriate choice for open bearings.

## Lubrication selection flow chart and criteria

A flow chart to help select the correct lubrication method is shown in **diagram 1**.

The main reasons to choose grease are:

- cost-effectiveness
- simplicity – grease is easily retained in the bearing and housing, thus requiring less complicated sealing arrangements compared with those for oil lubrication

The main exceptions to choosing grease are in applications where:

- operating conditions require a grease relubrication interval that is unacceptably short
- lubricating oil must be used for other purposes (such as in gearboxes)
- heat removal via circulating oil is required
- purging or removing used grease becomes cumbersome or expensive to handle

# Estimating the relubrication interval for grease

Lubricating grease slowly degrades and therefore has a limited life. Grease life depends on the operating conditions of the bearing and the grease type. Rolling bearings therefore have to be relubricated if:

- the grease life is shorter than the specified bearing life
- the grease becomes contaminated

It is important to calculate the grease relubrication interval and if it is unacceptably short then, unless you use automatic (centralized) greasing (*Lubrication systems*, page 120), you should choose oil instead.

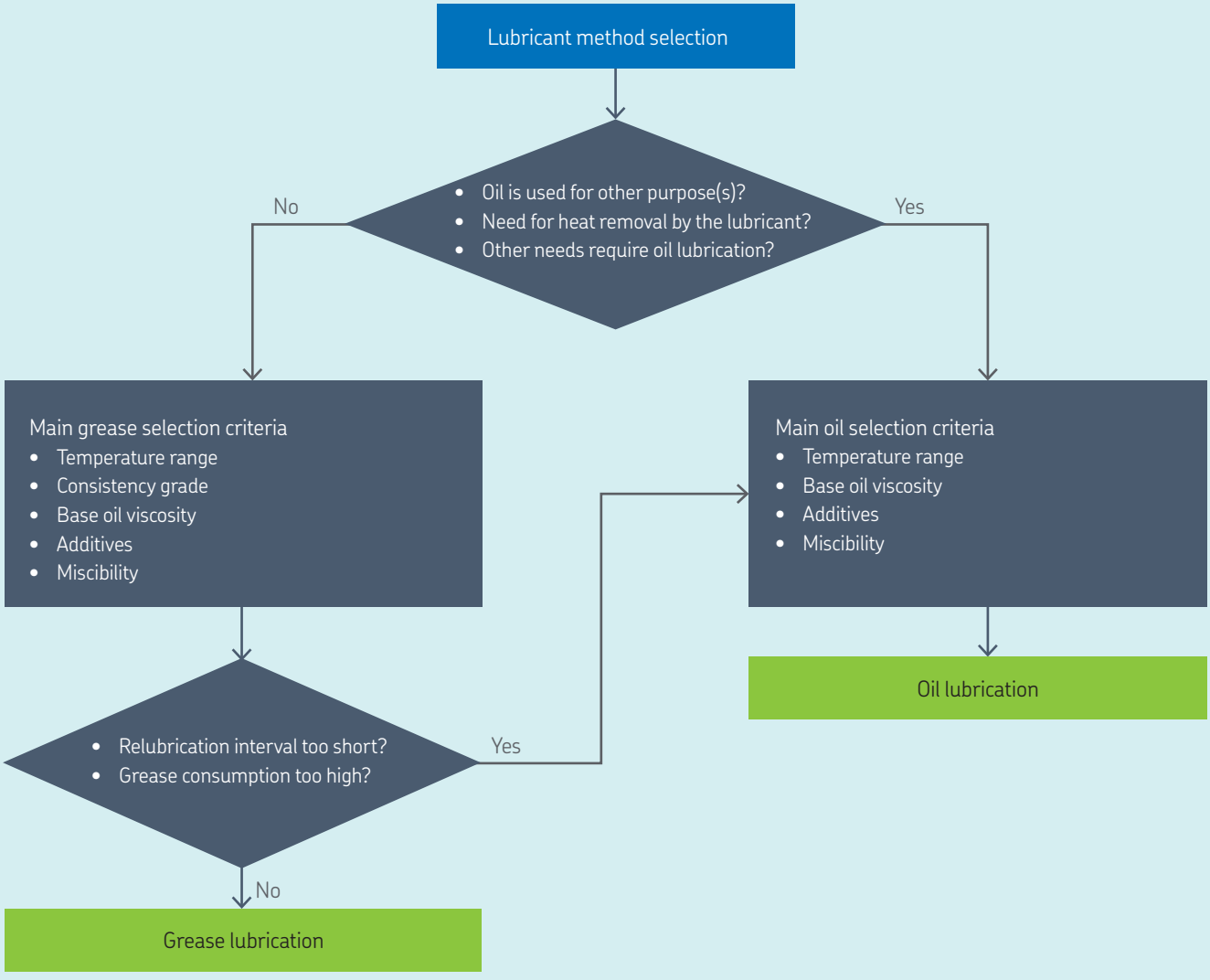
Relubrication should occur frequently enough to avoid grease deterioration having an adverse effect on the bearing life. Therefore, the SKF relubrication interval, $t_f$, is defined as the time period at the end of which there is only a 1% probability that the bearing will fail because of grease degradation. This represents the $L_1$ grease life. $L_{10}$ grease life represents a 10% probability failure because of grease degradation. Grease life depends mainly on:

- bearing type and size
- speed
- load ratio C/P
- operating temperature
- grease type

As a rule, standard greases have a practical upper temperature limit of 100 °C *(210 °F)* on the ring with the highest temperature. Above this temperature, special greases or automatic (centralized) greasing systems should be used – otherwise, commonly the grease life would be too short.

**Diagram 1**

**Process for selecting a suitable lubrication method for open bearings**



## Relubrication intervals

Use **diagram 2** to estimate the relubrication intervals $t_f$. The diagram is valid for bearings with a rotating inner ring on horizontal shafts under normal and clean operating conditions, using:

- the $nd_m$ factor multiplied by the relevant bearing factor $b_f$ where
  - n = rotational speed [r/min]
  - $d_m$ = bearing mean diameter [mm] = 0,5 (d + D)
  - $b_f$ = bearing factor dependent on bearing type and load conditions (**table 1**)
- the load ratio C/P

The relubrication interval $t_f$ is the estimated number of operating hours that a good quality lithium soap grease with a mineral base oil can perform adequately when the operating temperature is 70 °C *(160 °F)*. High performance greases can extend relubrication intervals and grease life.

The relubrication intervals given in **diagram 2** must be adjusted according to **table 2**, **page 115**.

When the speed factor $nd_m$ exceeds 70% of the recommended limits (**table 1**), check the influence of the selected lubricant on the operating temperature and speed.

In practice, relubrication intervals above 30 000 h are not reliable, because intervals of that length exceed the predictable performance life (because of lubricant ageing) of most greases.

## Adjustments for relubrication intervals

Various adjustments for relubrication intervals are described in **table 2** under various operating conditions. You may also calculate lubrication intervals using the *SKF Bearing Calculator* (skf.com/bearingcalculator).

# Determining grease quantity for initial fill and relubrication

Commonly, the free volume in bearings is completely filled during installation and the free volume in SKF plummer block housings is partly filled. SKF recommends that the free volume on each side of the bearing in a customer-designed housing is equal to the free volume of the bearing. For bearings with a metallic cage, the free volume in the bearing is approximately

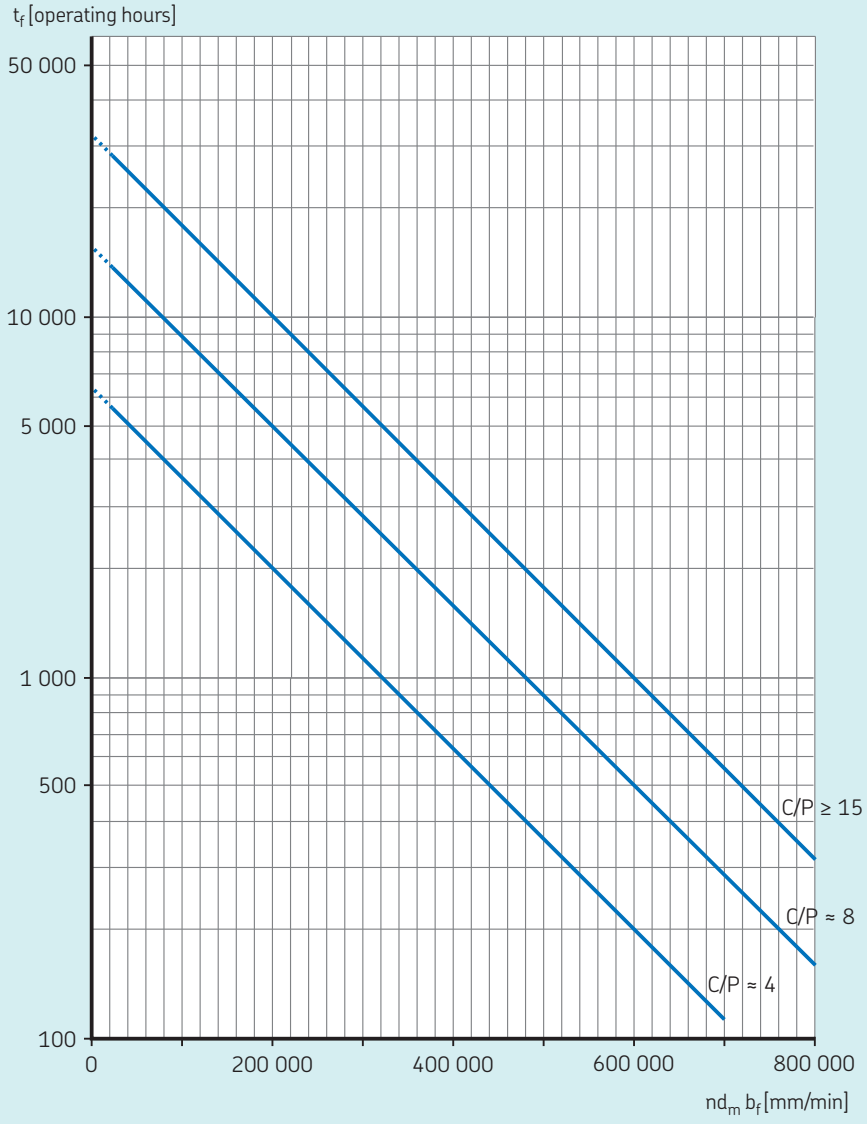
$$V = \frac{\pi}{4} B (D^2 - d^2) \times 10^{-3} - \frac{M}{7{,}8 \times 10^{-3}}$$

where

V = free volume in the bearing [$cm^3$] (for standard grease, mass in grams multiplied by 0,9; for fluorinated grease, mass in grams multiplied by approximately 2)
B = bearing width [mm]
D = outside diameter [mm]
d = bore diameter [mm]
M = bearing mass [kg]

**Diagram 2**

**Relubrication intervals at operating temperatures of 70 °C *(160 °F)***



For bearings with non-metallic cages, the formula gives a slight overestimation.

Depending on the intended method of relubrication, SKF recommends:

- relubrication from the side of the bearing (**fig. 1**, **page 114**)
  - initial fill: 40% of the free volume in the housing
  - replenishment quantity: $G_p$ = 0,005 D B
- relubrication through holes in the centre of the inner or outer ring (**fig. 2**, **page 114**)
  - initial fill: 20% of the free volume in the housing
  - replenishment quantity: $G_p$ = 0,002 D B

where

$G_p$ = grease quantity to be added when replenishing [g]
D = bearing outside diameter [mm]
B = total bearing width [mm] (for tapered roller bearings use T, for thrust bearings use height H)

During a running-in period, excess grease in the bearing distributes or escapes. At the end of the running-in period, the operating temperature drops, indicating that the grease has been distributed.

In applications where bearings operate at very low speeds and good protection against contaminants and corrosion is required, SKF recommends filling 70% to 100% of the housing with grease.

**Table 1**

**Bearing factors and recommended $nd_m$ limits**

| Bearing type[1] | Bearing factor $b_f$ | Recommended $nd_m$ limits for load ratio C/P ≥ 15 | C/P ≈ 8 | C/P ≈ 4 |
|---|---|---|---|---|
| – | – | mm/min | | |
| **Deep groove ball bearings** | 1 | 500 000 | 400 000 | 300 000 |
| **Angular contact ball bearings** | 1 | 500 000 | 400 000 | 300 000 |
| **Self-aligning ball bearings** | 1 | 500 000 | 400 000 | 300 000 |
| **Cylindrical roller bearings** | | | | |
| – non-locating bearing | 1,5 | 450 000 | 300 000 | 150 000 |
| – locating bearing, without external axial loads or with light but alternating axial loads | 2 | 300 000 | 200 000 | 100 000 |
| – locating bearing, with constantly acting light axial load | 4 | 200 000 | 120 000 | 60 000 |
| – without a cage, full complement[2] | 4 | NA[3] | NA[3] | 20 000 |
| **Needle roller bearings** | | | | |
| – with a cage | 3 | 350 000 | 200 000 | 100 000 |
| **Tapered roller bearings** | 2 | 350 000 | 300 000 | 200 000 |
| **Spherical roller bearings** | | | | |
| – when the load ratio $F_a/F_r \leq e$ and $d_m \leq 800$ mm | | | | |
| series 213, 222, 238, 239 | 2 | 350 000 | 200 000 | 100 000 |
| series 223, 230, 231, 232, 240, 248, 249 | 2 | 250 000 | 150 000 | 80 000 |
| series 241 | 2 | 150 000 | 80 000 | 50 000 |
| – when the load ratio $F_a/F_r \leq e$ and $d_m > 800$ mm | | | | |
| series 238, 239 | 2 | 230 000 | 130 000 | 65 000 |
| series 230, 231, 232, 240, 248, 249 | 2 | 170 000 | 100 000 | 50 000 |
| series 241 | 2 | 100 000 | 50 000 | 30 000 |
| – when the load ratio $F_a/F_r > e$ all series | 6 | 150 000 | 50 000 | 30 000 |
| **CARB toroidal roller bearings** | | | | |
| – with a cage | 2 | 350 000 | 200 000 | 100 000 |
| – without a cage, full complement[2] | 4 | NA[3] | NA[3] | 20 000 |
| **Thrust ball bearings** | 2 | 200 000 | 150 000 | 100 000 |
| **Cylindrical roller thrust bearings** | 10 | 100 000 | 60 000 | 30 000 |
| **Needle roller thrust bearings** | 10 | 100 000 | 60 000 | 30 000 |
| **Spherical roller thrust bearings** | | | | |
| – rotating shaft washer | 4 | 200 000 | 120 000 | 60 000 |

[1] The bearing factors and recommended $nd_m$ limits apply to bearings with standard internal geometry and standard cage execution. For alternative internal bearing design and special cage execution, contact the SKF application engineering service.
[2] The $t_f$ value obtained from **diagram 2** needs to be divided by a factor of 10.
[3] Not applicable, as a bearing with a cage is recommended for these C/P values.

# Relubrication procedures

Select a relubrication procedure that suits the application and the relubrication interval $t_f$. SKF recommends one of the following procedures:

- **Manual relubrication by replenishment** is a convenient procedure. It enables uninterrupted operation and provides, when compared with continuous relubrication, a lower steady-state temperature.

- **Automatic (centralized) relubrication** avoids performance issues related to over- or under-greasing. This is also commonly used where there are multiple points to lubricate, or where access to positions is difficult, or where equipment is operated remotely with no local maintenance staff (diagram 3).

- **Continuous lubrication** is used when the estimated relubrication intervals are short because of the adverse effects of very severe contamination. Continuous lubrication of applications is recommended typically with $nd_m$ values < 150 000 for ball bearings and < 75 000 for roller bearings. In these cases, the initial grease fill for the housing can be from 70% to 100 % (depending on the operation condition and housing seal), and the quantity for relubrication per unit of time is derived from the equations for $G_p$ (*Determining grease quantity for initial fill and relubrication*, page 112) by spreading the required quantity over the relubrication interval.

There must be provision for the used grease to be purged from the housing. If an excess of used grease needs to be purged from the housing, contacting seals must allow for this (consider seal type and seal orientation). Otherwise, an escape hole should be provided in the housing – tubing is not allowed, because it can restrict grease escape. The escape hole should be plugged during high-pressure cleaning.

Where a variety of bearing types is used in a bearing arrangement, it is common practice to apply the shortest estimated relubrication interval from the bearings in the arrangement.

Fig. 1

**Relubrication from the side**

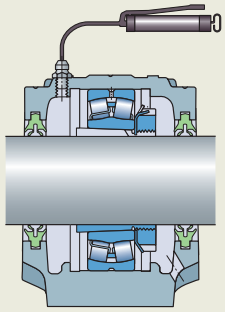


Fig. 2

**Relubrication in the centre**

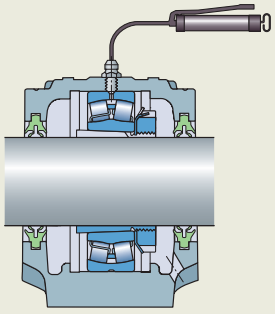


Diagram 3

**Relubrication method and impact on performance**

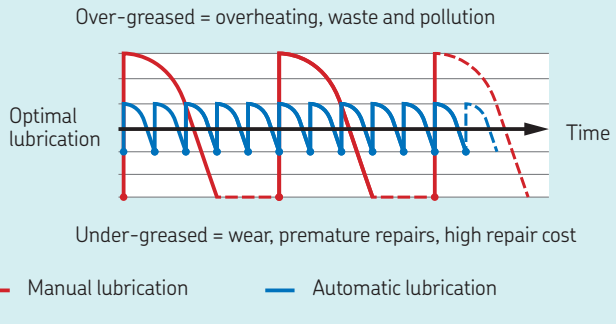


Table 2

**Relubrication interval adjustments**

| Operating condition / bearing type | Description | Recommended adjustment of $t_f$ | Reason for adjustment |
|---|---|---|---|
| **Operating temperature** | For every 15 °C *(27 °F)* above 70 °C *(160 °F)* up to the high temperature limit (HTL) | Halve the interval | To account for the accelerated ageing of grease at higher temperatures |
| | For 15 °C *(27 °F)* under 70 °C *(160 °F)* | Double the interval (maximum once)[1] | To account for the reduced risk of ageing of grease at lower temperatures |
| **Shaft orientation** | Bearings mounted on a vertical shaft | Halve the interval | The grease tends to leak out due to gravity |
| **Vibration** | High vibration or acceleration levels | Reduce the interval | Interval reduced depending on machine specific instructions (e.g. vibrating screen) |
| **Outer ring rotation** | Outer ring rotation or eccentric shaft weight | Calculate the speed as nD rather than $nd_m$ | The grease has a shorter grease life under these conditions |
| **Contamination** | Contamination or presence of fluid contaminants | Adjust depending on the contamination level:<br>**Low**<br>Relubrication intervals are given by grease life. It is assumed that there will be no or slight ingress of contamination entering the bearing.<br>**Medium**<br>Some contaminants may enter the bearing. Some additional relubrication is required to remove contaminants.<br>**High**<br>There is a clear risk that contaminants will enter the bearing. Relubrication is required to remove aged grease and to remove contaminants.<br>**Severe**<br>Relubrication is primarily needed to flush the bearing and remove contaminants. | To reduce the damaging effects caused by contaminants |
| **Bearing size** | Bearings with a bore diameter d > 300 mm | Reduce the interval by a factor 0,5 initially. If grease samples taken before relubrication are found to be satisfactory, the relubrication interval can be increased gradually. | These are typically critical arrangements, which require strict, frequent relubrication programmes |
| **Cylindrical roller bearings** | Bearings fitted with J, JA, JB, MA, MB, ML, MP and PHA cages[2] | Halve the interval | These cage designs require higher oil bleeding from the grease |

1) For full complement and thrust bearings, do not extend the interval.
2) For P, PH, M and MR cages, there is no need for adjustment.

# Selecting a suitable grease

## Selecting a suitable SKF grease

The assortment of SKF greases for rolling bearings provides adequate choice for most application requirements. These greases have been developed based on the latest knowledge of rolling bearing lubrication and their quality is continuously monitored.

### Using LubeSelect and selection rules

SKF LubeSelect is an online tool that lists SKF greases that fulfil the demands of your specified operating conditions. The analysis performed by the tool is based on generalized selection rules that have been carefully developed by SKF lubrication experts.

The same selection rules are used in the *SKF bearing grease selection chart*, page 124, where the speed, temperature and load range are used as the primary operating parameters for selecting a suitable grease.

The most important technical specifications for SKF greases are provided in *Technical specifications for SKF greases*, page 126.

### Temperature, speed, and load ranges for grease selection

The terms used to specify the ranges of temperature, speed and load, for grease lubricated bearings, are defined in table 3 to table 5.

### Consistency, NLGI

Consistency is a measure of the stiffness of the grease. Classification of greases by consistency is in accordance with the National Lubricating Grease Institute (NLGI), ISO 2137. Greases with a metallic soap thickener and a consistency grade of 1, 2 or 3 (soft to stiff) on the NLGI scale are typically used for rolling bearings. The most commonly used greases have a consistency of grade 2.

**Table 3**

**Temperature ranges for greases**

| Range | | Temperature | |
|---|---|---|---|
| – | | °C | °F |
| **L** | Low | < 50 | *< 120* |
| **M** | Medium | 50 to 100 | *120 to 210* |
| **H** | High | > 100 | *> 210* |
| **EH** | Extremely high | > 150 | *> 300* |

**Table 5**

**Load ranges for greases**

| Load range | | Load ratio C/P |
|---|---|---|
| **L** | Low | ≥ 15 |
| **M** | Medium | ≈ 8 |
| **H** | High | ≈ 4 |
| **VH** | Very high | < 2 |

**Table 4**

**Speed ranges for grease lubricated radial bearings**

| Speed range | | Speed factor Ball bearings | Spherical roller, tapered roller, CARB toroidal roller bearings | Cylindrical roller bearings |
|---|---|---|---|---|
| | | $nd_m$ | | |
| – | | mm/min | | |
| **VL** | Very low | – | < 30 000 | < 30 000 |
| **L** | Low | < 100 000 | < 75 000 | < 75 000 |
| **M** | Medium | < 300 000 | ≤ 210 000 | ≤ 270 000 |
| **H** | High | < 500 000 | > 210 000 | > 270 000 |
| **VH** | Very high | ≤ 700 000 | – | – |
| **EH** | Extremely high | > 700 000 | – | – |

n = rotational speed [r/min]
$d_m$ = bearing mean diameter [mm] = 0,5 (d + D)

## Mechanical stability

During rotation of a bearing, the grease is mechanically worked and a change in consistency may result. This property is known as the mechanical stability of the grease and is measured in standardized tests, ASTM D217 and/or ASTM D1831. Greases that soften may leak from the bearing cavity. Those that stiffen may restrict bearing rotation or limit oil bleeding. The mechanical stability should not change drastically if operation is within the specified temperature range of the grease.

## Corrosion protection

In applications where water or condensation is present, the corrosion inhibiting properties of the grease are very important. The corrosion inhibiting ability is determined by the properties of the rust inhibitor additive and/or the thickener type. The performance is measured using the EMCOR test, ISO 11007. For applications where water or condensation is present, the rating should be 0-0.

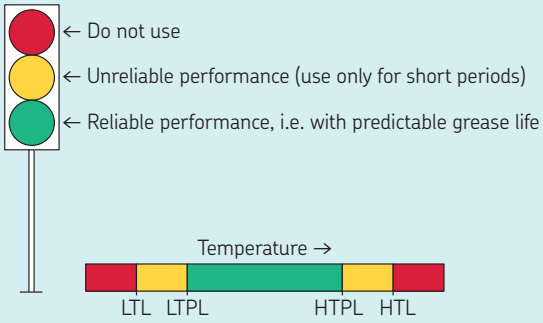
# The SKF traffic light concept for grease temperature performance

The temperature range over which a grease can be used depends mainly on the type of base oil, thickener and additives. The relevant temperature limits are schematically illustrated in **diagram 4** in the form of a double traffic light, with additional details provided in **diagram 5**.

- The low temperature limit (LTL) is determined by the low temperature frictional torque test according to ASTM D1478 or IP 186. The LTL is determined by the temperature at which the starting torque is equal to 1 000 Nmm and the running torque is 100 Nmm.
- The high temperature limit (HTL) is the temperature at which a grease loses its consistency and becomes a fluid. It is determined using the dropping point (ISO 2176).

**Diagram 4**

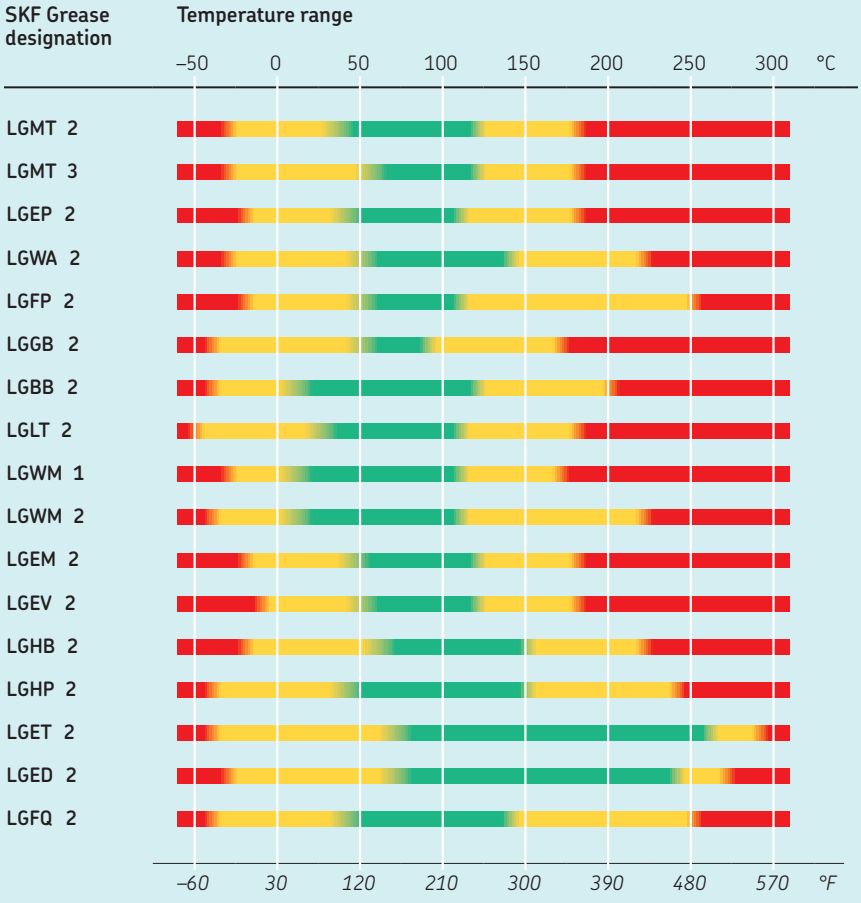
**The SKF traffic light concept**




LTL Low temperature limit
LTPL Low temperature performance limit
HTPL High temperature performance limit
HTL High temperature limit

**Diagram 5**

**SKF traffic light concept – SKF greases**[1)]




1) The low temperature performance limits (LTPL) are valid for roller bearings. LTPL values for ball bearings are approx. 20 °C (35 °F) lower.

The low and high temperature limits for reliable operation, indicated by the green zone in **diagram 4**, **page 117**, are:

- low temperature performance limit (LTPL), defined as the temperature at which grease no longer shows sufficient oil bleed as measured in DIN 51817. The LTPL values for roller bearings are provided in **diagram 5**, **page 117**. The LTPL values for ball bearings are approximately 20 °C *(35 °F)* lower.
- high temperature performance limit (HTPL), determined by the SKF R0F grease life test

Within these two limits, the grease fulfils its function reliably and the relubrication interval or grease life is predictable. Because the definition of the temperature performance limits is not standardized internationally, care must be taken when interpreting data from grease suppliers other than SKF.

At temperatures above the high temperature performance limit (HTPL), grease degrades with increasing rapidity. Therefore, temperatures in the amber zone, between the high temperature performance limit (HTPL) and the high temperature limit (HTL), should only be allowed to occur for very short periods.

An amber zone also exists for low temperatures, between the low temperature limit (LTL) and the low temperature performance limit (LTPL). In this zone, the temperatures are too low to provide sufficient oil bleeding. The width of the amber zone depends on the grease type and bearing type. Serious damage can result when the bearings are operated continuously below the LTPL. Short periods in this zone, such as during a cold start, are generally not harmful because the heat caused by friction brings the bearing temperature into the green zone.

## Additional factors and considerations when selecting a grease

### Verify the lubrication condition, consider EP/AW additives

The lubrication condition, κ, is evaluated by using the base oil viscosity as described in *Lubrication condition – the viscosity ratio, κ*, **page 102**. In the lubrication condition domain defined by κ below 1, EP/AW additives are recommended.

EP/AW additives of the sulphur-phosphorus type, which are the most commonly used today, may also have a negative influence on the fatigue life of the bearings. This is because in the presence of humidity, which can never be completely avoided, sulphur and phosphorus acids are produced which induce a more aggressive chemical process at the rolling contact. This effect increases with temperature and, for temperatures above 80 °C *(175 °F)*, a lubricant with EP/AW additives should only be used after careful testing. SKF greases have been tested and can be used above 80 °C *(175 °F)* until the HTPL is reached.

### Low speeds

Bearings that operate at very low to low speeds (**table 4**, **page 116**) under heavy loads should be lubricated with a grease that has a high viscosity base oil containing EP additives. The thickener should contribute to the surface separation. Sufficient oil bleeding should assure oil replenishment during operation.

Solid additives, such as graphite or molybdenum disulfide ($MoS_2$), should be considered for a speed factor $nd_m$ < 20 000 mm/min. SKF LGEV2 is successfully used up to $nd_m$ = 80 000.

### Heavy and very heavy bearing loads

For bearings subjected to a load ratio C/P < 4, the calculated relubrication interval may be so short that it dictates the use of continuous relubrication or oil lubrication.

### Miscibility with other greases

If it becomes necessary to change from one grease type to another, consider the miscibility of the greases and their ability to be mixed without adverse effects (**table 6** and **table 7**). If incompatible greases are mixed, the consistency of the grease mix can change dramatically such that bearing damage because of severe leakage could result. Note that PTFE-thickened greases are not compatible with other grease types.

### Miscibility with preservation oils

The preservative oils with which SKF bearings are treated are compatible with the majority of lubricating greases, with the exception of synthetic fluorinated oil based greases using a PTFE thickener, for example, SKF LGET 2 grease. For PTFE-thickened greases, the bearing preservatives must be removed before applying the grease. White spirit is recommended as a solvent. Make sure all remnants of solvent have evaporated and then immediately apply the grease.

# Assessing the suitability of non-SKF greases

Greases from suppliers other than SKF must be approved by the supplier. Use **diagram 6**, **page 120**, to evaluate the temperature performance and grease life prediction. Where relevant, take into account the considerations specified for SKF greases.

Table 6

**Compatibility of base oil types**

| | Mineral oil | Ester oil | Polyglycol | Silicone-methyl | Silicone-phenyl | Polyphenyl-ether | PFPE |
|---|---|---|---|---|---|---|---|
| **Mineral oil** | + | + | – | – | + | o | – |
| **Ester oil** | + | + | + | – | + | o | – |
| **Polyglycol** | – | + | + | – | – | – | – |
| **Silicone-methyl** | – | – | – | + | + | – | – |
| **Silicone-phenyl** | + | + | – | + | + | + | – |
| **Polyphenylether** | o | o | – | – | + | + | – |
| **PFPE** | – | – | – | – | – | – | + |

+ compatible
- incompatible
o individual testing required

Table 7

**Compatibility of thickener types**

| | Lithium soap | Calcium soap | Sodium soap | Lithium complex soap | Calcium complex soap | Sodium complex soap | Barium complex soap | Aluminium complex soap | Clay | Polyurea |
|---|---|---|---|---|---|---|---|---|---|---|
| **Lithium soap** | + | o | – | + | – | o | o | – | o | o |
| **Calcium soap** | o | + | o | + | – | o | o | – | o | o |
| **Sodium soap** | – | o | + | o | o | + | + | – | o | o |
| **Lithium complex soap** | + | + | o | + | + | o | o | + | – | – |
| **Calcium complex soap** | – | – | o | + | + | o | – | o | o | + |
| **Sodium complex soap** | o | o | + | o | o | + | + | – | – | o |
| **Barium complex soap** | o | o | + | o | – | + | + | + | o | o |
| **Aluminium complex soap** | – | – | – | + | o | – | + | + | – | o |
| **Clay** | o | o | o | – | o | – | o | – | + | o |
| **Polyurea** | o | o | o | – | + | o | o | o | o | + |

+ compatible
- incompatible
o individual testing required

# Lubrication systems

Continuous lubrication can be achieved via singlepoint or multipoint automatic lubricators, e.g. SKF's SYSTEM 24 or SYSTEM MultiPoint.

Centralized lubrication systems, such as SKF MonoFlex, SKF ProFlex, SKF DuoFlex, SKF MultiFlex (**table 8**) and Lincoln Centro Matic, Quicklub and Dual Line can reliably deliver grease in a wide range of quantities.

For additional information about SKF lubrication systems, refer to skf.com/lubrication.

# Selecting a suitable oil

## Oil selection criteria

When you select a lubricating oil, the most important parameters are the viscosity and viscosity index, the temperature stability (which influences the choice of oil type) and the additive package (EP/AW and corrosion protection) that fits the operating conditions for the application.

### Viscosity and viscosity index

The required viscosity is primarily given by the lubrication condition $\kappa$, at the expected operating temperature, evaluated as described in *Lubrication condition – the viscosity ratio, $\kappa$*, **page 102**. The viscosity index, VI, is the measure of how the oil viscosity changes with temperature. VI is a part of the selection process, in particular for applications that operate in a large temperature range. Oils with a VI of at least 95 are recommended.

### Oil type

There are two broad categories of oil types – mineral and synthetic – with the following types of synthetic oils available:

- polyalphaolefins (PAO)
- esters
- polyglycols (PAG)

Choice of oil type is mainly determined by the temperature range in which the application is expected to operate.

- Mineral oils are generally favoured as the lubricant for rolling bearings.
- Synthetic oils should be considered for operational temperatures above 90 °C *(195 °F)* because of their improved thermal and oxidation resistance, or below –40 °C *(–40 °F)* because of their better properties at low temperatures.

The pour point of an oil is defined as the lowest temperature at which a lubricant will flow, but it must not be used as a functional limit when selecting oil type. If the temperature is above but near the pour point, the viscosity is still very high, which may impair pumping, filtering, and other characteristics.

The thickness of the hydrodynamic film is determined, in part, by the viscosity index (VI) and the pressure-viscosity coefficient. For most mineral oil based lubricants, the pressure-viscosity coefficient is similar, and you can use the generic values obtained from literature. However, for synthetic oils, the effect on viscosity to increasing pressure is determined by the chemical structure of its base stock. As a result, there is considerable variation in pressure-viscosity coefficients for different types of synthetic base stocks.

Because of the differences in the viscosity index and pressure-viscosity coefficient, the formation of a hydrodynamic lubricant film, when using a synthetic oil, may differ from that of a mineral oil with the same viscosity.

Regarding the lubrication condition for mineral and synthetic oils, the combined effect of the viscosity index and the pressure-viscosity coefficient normally cancel each other out.

The properties of the different oil types are summarized in **table 9**. For additional information about synthetic oils, contact the lubricant supplier.

Oils, and in particular synthetic oils, may interact with such things as seals, paint or water in a different way than mineral oils, so such effects, as well as miscibility, must be investigated.

**Diagram 6**

**The SKF traffic light concept – standard greases**

## Additives

Lubricating oils usually contain additives of various kinds. The most important ones are antioxidants, corrosion protection agents, anti-foaming additives, and EP/AW additives. In the lubrication condition domain defined by $\kappa < 1$, EP/AW additives are recommended, but for temperatures above 80 °C *(175 °F)*, a lubricant with EP/AW additives should only be used after careful testing.

# Oil change interval

The oil change interval depends on the operating conditions and the oil type. With oil-bath lubrication, it is generally sufficient to change the oil once a year, provided the operating temperature does not exceed 50 °C *(120 °F)*. Typically, at higher temperatures or with heavy contamination, the oil must be changed more often.

With oil circulation, the interval after which the oil needs to be changed is determined by an inspection of the oil quality, taking into account oxidation and the presence of water and abrasive particles. Oil life in circulation systems can be extended by removing particles and water from the oil.

Oil change intervals for mineral oils are shown in **table 10**, **page 122**.



**Table 8**

**SKF Centralized Lubrication Systems**

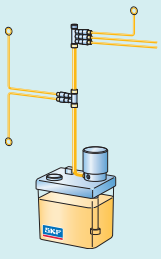
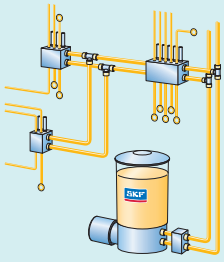
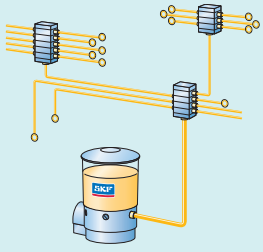
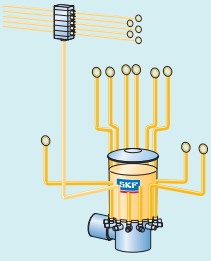
| | SKF MonoFlex | SKF DuoFlex | SKF ProFlex | SKF MultiFlex |
|---|---|---|---|---|
| |  |  |  |  |
| **Type** | Single-line | Dual-line | Progressive | Multi-line |
| **Suitable lubricants** | Oil<br>Grease with NLGI grades from 000 to 2 | Oil<br>Grease with NLGI grades from 000 to 3 | Oil<br>Grease with NLGI grades from 000 to 2 | Oil<br>Grease with NLGI grades from 000 to 3 |
| **Application examples** | Machine tools, printing, textile and off-highway applications | Metal working machines, pulp and paper industry, mining and cement plants, deck cranes, power plants | Printing and industrial presses machines, off-highway applications, wind turbines | Oil and gas industry, heavy industrial applications |

**Table 9**

**Properties of lubricating oil types**

| Properties | | Base oil type<br>Mineral | PAO | Ester | PAG |
|---|---|---|---|---|---|
| **Pour point** | [°C]<br>*[°F]* | –30 .. 0<br>*–20 .. 30* | –50 .. –40<br>*–60 .. –40* | –60 .. –40<br>*–75 .. –40* | approx. –30<br>*approx. –20* |
| **Viscosity index** | | low | moderate | high | high |
| **Pressure-viscosity coefficient** | | high | moderate | low to moderate | moderate |

# Overview of main oil lubrication methods

The oil lubrication methods are:

- oil bath without circulating oil
- oil bath with self-circulating oil through bearing pumping action
- circulating oil with external pump
- oil jet method
- oil air method

The choice of the oil lubrication method depends mainly on:

- the bearing speed
- the need to remove heat
- the need to remove contaminants (solid particles or liquid)

SKF offers a wide range of products for oil lubrication that are not covered here. For additional information about SKF lubrication systems and related products, refer to skf.com/lubrication.

## Oil bath without circulating oil

The simplest method of oil lubrication is the oil bath. The oil, which is picked up by the rotating components of the bearing, is distributed within the bearing and then flows back to the oil bath in the housing. Ideally, the oil level should reach the centre of the lowest rolling element (**fig. 3**) when the bearing is stationary. Oil levels higher than recommended will increase bearing temperature because of churning (*Bearing friction, power loss and starting torque*, **page 132**).

## Oil bath with self-circulating oil

Oil from a bath is forced to circulate by different methods. Here are some examples:

- Oil is salvaged and directed to the bearings by means of drain and ducts (**fig. 4**).
- A dedicated component (ring, disc, etc.) picks up oil from an oil bath and transports it (**fig. 5**).
- The pumping effect of some bearing types can be used to circulate the oil. In **fig. 6**, the spherical thrust roller bearing pumps oil which returns to the thrust bearing by connecting ducts located under it.

All designs of such lubricating methods should be validated individually by tests.

## Circulating oil without a bath

Circulating oil by means of an external oil pump, instead of an oil bath, is mainly used when it is needed to remove heat generated by the bearing and/or other sources. Oil circulation is also a good lubricating method for evacuating solid or liquid contaminants from the bearing to filters and/or oil/liquid separators. The design and layout of the oil drainage must ensure that there is no build-up of oil level (*Heat flow from adjacent parts or process*, **page 131**).

A basic circulating oil system (**fig. 7**) includes:

- oil pump
- filter
- oil reservoir
- oil cooling and/or heating system

## Oil jet

The oil jet lubricating method (**fig. 8**) is an extension of circulating oil systems, and is used for bearings operating at very high speeds. The dimensioning of oil flow and corresponding jet size is selected so that the oil jet speed reaches at least 15 m/s.

Oil injectors must be positioned so that the oil jet penetrates the bearing between one of the rings and the cage. To prevent churning that can cause increased friction and temperature, the design and layout of the oil drainage must ensure that there is no oil level build-up.

## Oil-air

The oil-air lubrication method (**fig. 9**), also called the oil-spot lubrication method, uses compressed air to transport small, accurately-metered quantities of oil as small droplets along the inside of the feed lines to an injector nozzle, where it is delivered to a bearing. This minimum-quantity lubrication method enables the bearings to operate at very high speeds at a relatively low operating temperature. The compressed air also cools the bearing and prevents dust or aggressive gases from entering. For additional information, refer to skf.com/super-precision.

**Table 10**

**Oil change intervals for mineral oils**

| Oil lubrication system | Typical operating conditions | Approximate oil change interval[1)] |
|---|---|---|
| **Oil bath or oil pick-up ring** | Operating temperature < 50 °C *(120 °F)* Little risk of contamination | 12 months |
| | Operating temperature 50 to 100 °C *(120 to 210 °F)* Some contamination | 3 to 12 months |
| | Operating temperature > 100 °C *(210 °F)* Contaminated environment | 3 months |
| **Circulating oil or oil jet** | All | Determined by test runs and regular inspection of the oil condition. Dependent on how frequently the total oil quantity is circulated and whether or not the oil is cooled. |

1) More frequent oil changes are needed if the operating conditions are more demanding.

Fig. 3

Oil bath

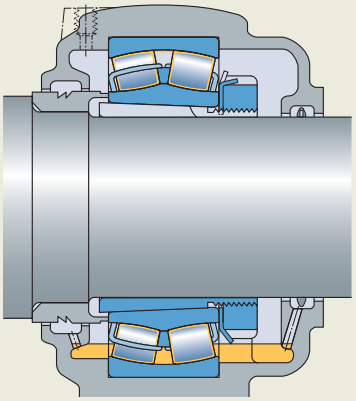


Fig. 4

Self-circulating oil by drain and ducts

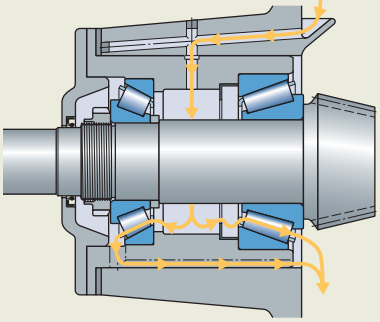


Fig. 5

Oil pick-up rings on SONL housing

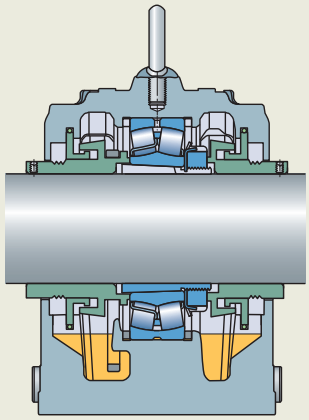


Fig. 6

Pumping effect in vertical shaft application

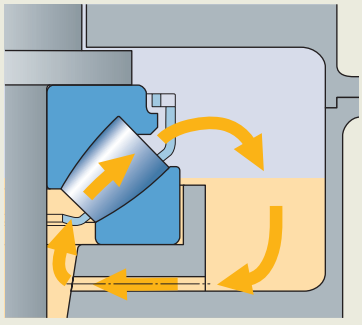


Fig. 8

Oil jet

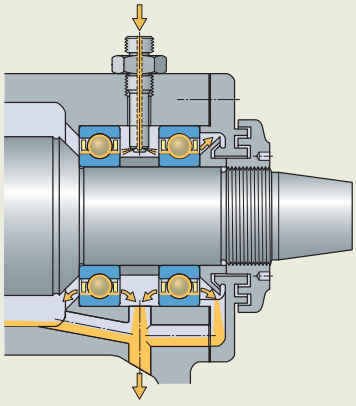


Fig. 7

Circulating oil

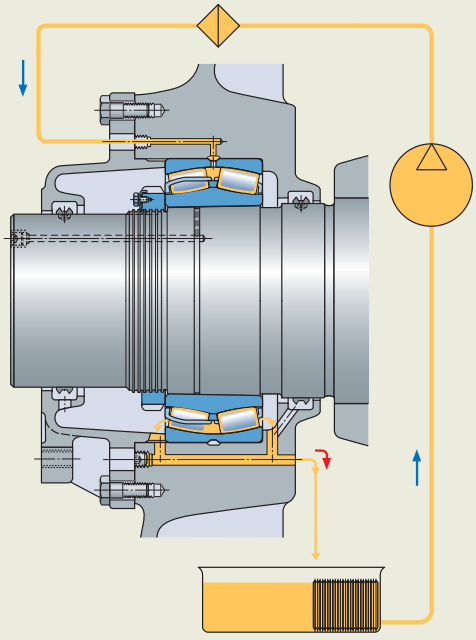
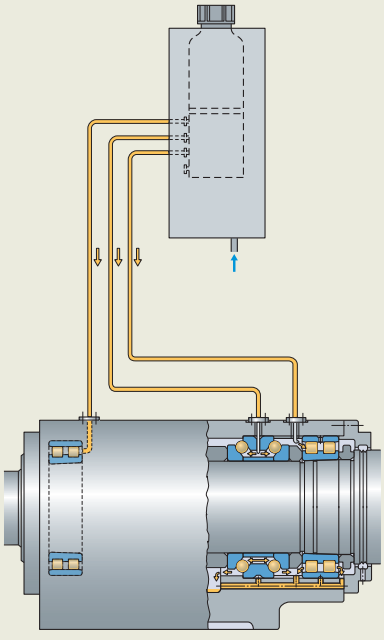


Fig. 9

Oil-air



## SKF bearing grease selection chart

| Grease | Description | Application example | Temperature range[1] | | Temp. | Speed |
|---|---|---|---|---|---|---|
| | | | LTL | HTPL | | |
| LGMT 2 | General purpose industrial and automotive | Automotive wheel bearings<br>Conveyors and fans<br>Small electric motors | –30 °C (–20 °F) | 120 °C (250 °F) | M | M |
| LGMT 3 | General purpose industrial and automotive | Bearings with d > 100 mm<br>Vertical shaft or outer bearing ring rotation<br>Car, truck and trailer wheel bearings | –30 °C (–20 °F) | 120 °C (250 °F) | M | M |
| LGEP 2 | Extreme pressure | Forming and press section of paper mills<br>Work roll bearings in steel industry<br>Heavy machinery, vibrating screens | –20 °C (–5 °F) | 110 °C (230 °F) | M | L to M |
| LGWA 2 | Wide temperature[3], extreme pressure | Wheel bearings in cars, trailers and trucks<br>Washing machines<br>Electric motors | –30 °C (–20 °F) | 140 °C (285 °F) | M to H | L to M |
| LGGB 2 | Biodegradable, low toxicity[4] | Agricultural and forestry equipment<br>Construction and earthmoving equipment<br>Water treatment and irrigation | –40 °C (–40 °F) | 90 °C (195 °F) | L to M | L to M |
| LGFP 2 | Food compatible | Food processing equipment<br>Wrapping machines<br>Bottling machines | –20 °C (–5 °F) | 110 °C (230 °F) | M | M |
| LGFQ 2 | Food compatible<br>High load | Pellet presses<br>Mills<br>Mixers | –40 °C (–40 °F) | 140 °C (285 °F) | L to H | VL to M |
| LGBB 2 | Wind turbine blade and yaw bearing grease | Wind turbine blade and yaw slewing bearings | –40 °C (–40 °F) | 120 °C (250 °F) | L to M | VL |
| LGLT 2 | Low temperature, extremely high speed | Textile and machine tool spindles<br>Small electric motors and robots<br>Printing cylinders | –50 °C (–60 °F) | 110 °C (230 °F) | L to M | M to EH |
| LGWM 1 | Extreme pressure, low temperature | Main shaft of wind turbines<br>Centralised lubrication systems<br>Spherical roller thrust bearing applications | –30 °C (–20 °F) | 110 °C (230 °F) | L to M | L to M |
| LGWM 2 | High load, wide temperature | Main shaft of wind turbines<br>Heavy duty off road or marine applications<br>Snow exposed applications | –40 °C (–40 °F) | 110 °C (230 °F) | L to M | L to M |
| LGEM 2 | High viscosity plus solid lubricants | Jaw crushers<br>Construction machinery<br>Vibrating machinery | –20 °C (–5 °F) | 120 °C (250 °F) | M | VL |
| LGEV 2 | Extremely high viscosity with solid lubricants | Trunnion bearings<br>Support and thrust rollers on rotary kilns and dryers<br>Slewing ring bearings | –10 °C (–15 °F) | 120 °C (250 °F) | M | VL |
| LGHB 2 | EP high viscosity, high temperature[5] | Steel on steel plain bearings<br>Dryer section of paper mills<br>Work roll bearings and continuous casting in steel industry<br>Sealed spherical roller bearings up to 150 °C (300 °F) | –20 °C (–5 °F) | 150 °C (300 °F) | M to H | VL to M |
| LGHP 2 | High performance polyurea grease | Electric motors<br>Fans, even at high speed<br>High speed ball bearings at medium and high temperatures | –40 °C (–40 °F) | 150 °C (300 °F) | M to H | M to H |
| LGED 2 | High temperature<br>Harsh environment | Bakery/brick oven equipment<br>Glass industry<br>Vacuum pumps | –30 °C (–20 °F) | 240 °C (465 °F) | VH | L to M |
| LGET 2 | Extreme temperature | Bakery equipment (ovens)<br>Wafer baking machines<br>Textile dryers | –40 °C (–40 °F) | 260 °C (500 °F) | VH | L to M |

1) LTL = Low Temperature Limit. Defined by means of the IP 186 Low temperature torque test. HTPL = High Temperature Performance Limit
2) $mm^2/s$ at 40 °C (105 °F) = cSt.
3) LGWA 2 can withstand peak temperatures of 220 °C (430 °F)
4) LGGB 2 can withstand peak temperatures of 120 °C (250 °F)
5) LGHB 2 can withstand peak temperatures of 200 °C (390 °F)

| Load | Thickener / base oil | NLGI | Base oil viscosity[2)] | Vertical shaft | Fast outer ring rotation | Oscillating movements | Severe vibrations | Peak loads or frequent startup | Rust inhibiting properties | |
|---|---|---|---|---|---|---|---|---|---|---|
| L to M | Lithium soap / mineral oil | 2 | 110 | ● | | | + | | + | Wide application greases |
| L to M | Lithium soap / mineral oil | 3 | 125 | + | ● | | + | | ● | Wide application greases |
| H | Lithium soap / mineral oil | 2 | 200 | ● | | ● | + | + | + | Wide application greases |
| L to H | Lithium complex soap / mineral oil | 2 | 185 | ● | ● | ● | ● | + | + | Wide application greases |
| M to H | Lithium-calcium soap / synthetic ester oil | 2 | 110 | ● | | + | + | + | ● | Special requirements |
| L to M | Aluminium complex / medical white oil | 2 | 150 | ● | | | | | + | Special requirements |
| L to VH | Complex calcium sulphonate/PAO | 1–2 | 320 | ● | ● | + | + | + | + | Special requirements |
| M to H | Lithium complex soap / synthetic PAO oil | 2 | 68 | | | + | + | + | + | Special requirements |
| L | Lithium soap / synthetic PAO oil | 2 | 18 | ● | | | | ● | ● | Low temperature |
| H | Lithium soap / mineral oil | 1 | 200 | | | + | | + | + | Low temperature |
| L to h | Complex calcium sulphonate / synthetic PAO oil / mineral oil | 1–2 | 80 | ● | ● | + | + | + | + | High loads |
| H to VH | Lithium soap / mineral oil | 2 | 500 | ● | | + | + | + | + | High loads |
| H to VH | Lithium-calcium soap / mineral oil | 2 | 1 020 | ● | | + | + | + | + | High loads |
| L to VH | Complex calcium sulphonate / mineral oil | 2 | 425 | ● | + | + | + | + | + | High loads |
| L to M | Di-urea / mineral oil | 2–3 | 96 | + | | | ● | ● | + | High temperature |
| H to VH | PTFE / synthetic fluorinated polyether oil | 2 | 460 | ● | ● | + | ● | ● | ● | High temperature |
| H to VH | PTFE / synthetic fluorinated polyether oil | 2 | 400 | ● | + | + | ● | ● | ● | High temperature |

● = Suitable + = Recommended

# Technical specifications for SKF greases

| | | LGMT 2 | LGMT 3 | LGEP 2 | LGWA 2 | LGGB 2 | LGFP 2 | LGFQ 2 |
|---|---|---|---|---|---|---|---|---|
| **DIN 51825 code** | | K2K-30 | K3K-30 | KP2G-20 | KP2N-30 | KPE 2K-40 | K2G-20 | KP1/2N-40 |
| **NLGI consistency grade** | | 2 | 3 | 2 | 2 | 2 | 2 | 1–2 |
| **Colour** | | Red brown | Amber | Light brown | Amber | Off white | Transparent | Brown |
| **Thickener** | | Lithium | Lithium | Lithium | Lithium complex | Lithium/calcium | Aluminium complex | Complex calcium sulphonate |
| **Base oil type** | | Mineral | Mineral | Mineral | Mineral | Synthetic (Ester) | Medical white oil | Synthetic (PAO) |
| **Operating temperature range** | °C<br>*°F* | –30 to +120<br>*(–20 to +250)* | –30 to +120<br>*(–20 to +250)* | –20 to +110<br>*(–5 to +230)* | –30 to +140<br>*(–20 to +285)* | –40 to +90<br>*(–40 to +195)* | –20 to +110<br>*(–5 to +230)* | –40 to +140<br>*(–40 to +285)* |
| **Dropping point DIN ISO 2176** | °C<br>*°F* | >180<br>*(>355)* | >180<br>*(>355)* | >180<br>*(>355)* | >250<br>*(>480)* | >170<br>*(>340)* | >250<br>*(>480)* | >300<br>*(>570)* |
| **Base oil viscosity**<br>40 °C *(105 °F)*<br>100 °C *(210 °F)* | <br>$mm^2/s$<br>$mm^2/s$ | <br>110<br>11 | <br>125<br>12 | <br>200<br>16 | <br>185<br>15 | <br>110<br>13 | <br>150<br>15,3 | <br>320<br>30 |
| **Penetration DIN ISO 2137**<br>60 strokes<br>100 000 strokes | <br>$10^{-1}$ mm<br>$10^{-1}$ mm | <br>265–295<br>+50 max.<br>(325 max.) | <br>220–250<br>280 max. | <br>265–295<br>+50 max.<br>(325 max.) | <br>265–295<br>+50 max.<br>(325 max.) | <br>265–295<br>+50 max.<br>(325 max.) | <br>265–295<br>+30 max. | <br>280–310<br>+30 max. |
| **Mechanical stability**<br>Roll stability, 50 h at 80 °C *(175 °F)*<br>V2F test | <br>$10^{-1}$ mm | <br>+50 max.<br>"M" | <br>295 max.<br>"M" | <br>+50 max.<br>"M" | <br>+50 max. change<br>"M" | <br>+70 max.<br>(350 max.) | | <br>–20 to +30 max. |
| **Corrosion protection**<br>Emcor:<br>– standard ISO 11007<br>– water washout test<br>– salt water test (100% seawater) | | <br><br>0–0<br>0–0<br>0–1 [1] | <br><br>0–0<br>0–0 | <br><br>0–0<br>0–0<br>1–1 [1] | <br><br>0–0<br>0–0 [1] | <br><br>0–0 | <br><br>0–0 [1] | <br><br>0–0<br>0–0 |
| **Water resistance**<br>DIN 51 807/1, 3 h at 90 °C *(195 °F)* | | 1 max. | 2 max. | 1 max. | 1 max. | 0 max. | 1 max. | 1 max. |
| **Oil separation**<br>DIN 51 817, 7 days at 40 °C *(105 °F)*, static | %<br> | 1–6 | 1–3 | 2–5 | 1–5 | 0,8–3 | 1–5 | 3 max. |
| **Lubrication ability**<br>R2F, running test B at 120 °C *(250 °F)*<br>R2F, cold chamber test, –30 °C *(–20 °F)*, +20 °C *(+70 °F)* | | Pass | Pass | Pass | Pass<br>100 °C *(210 °F)* | Pass<br>100 °C *(210 °F)* [1] | | Pass |
| **Copper corrosion**<br>DIN 51 811 | | 2 max.<br>110 °C *(230 °F)* | 2 max.<br>130 °C *(265 °F)* | 2 max.<br>110 °C *(230°F)* | 2 max.<br>100 °C *(210°F)* | | 1 max.<br>120 °C *(250 °F)* | 1b max.<br>100 °C *(210°F)* |
| **Rolling bearing grease life**<br>R0F test<br>$L_{50}$ life at 10 000 r/min | h | | 1 000 min.,<br>130 °C *(265 °F)* | | | >300,<br>120 °C *(250 °F)* | 1 000,<br>110 °C *(230 °F)* [1] | |
| **EP performance**<br>Wear scar DIN 51350/5, 1 400 N<br>4–ball test, welding load DIN 51350/4 | mm<br>N | | | 1,4 max.<br>2 800 min. | 1,6 max.<br>2 600 min. | 1,8 max.<br>2 600 min. | <br>1 100 min. | 1 max.<br>>4 000 |
| **Fretting corrosion**<br>ASTM D4170 FAFNIR test at +25 °C *(75 °F)* | mg | | | 5,7 [1] | | | | 0,8 [1] |
| **Low temperature torque**<br>IP186, starting torque<br>IP186, running torque | Nmm [1]<br>Nmm [1] | 98,<br>–30 °C *(–20 °F)*<br>58,<br>–30 °C *(–20 °F)* | 145,<br>–30 °C *(–20 °F)*<br>95,<br>–30 °C *(–20 °F)* | 70,<br>–20 °C *(–5 °F)*<br>45,<br>–20 °C *(–5 °F)* | 40,<br>–30 °C *(–20 °F)*<br>30,<br>–30 °C *(–20 °F)* | | 137,<br>–30 °C *(–20 °F)*<br>51,<br>–30 °C *(–20 °F)* | 369,<br>–40° C (–40°F)<br>223,<br>–40 °C (–40°F) |

Special requirements

Wide applications greases

[1] Typical value

| LGBB 2 | LGLT 2 | LGWM 1 | LGWM 2 | LGEM 2 | LGEV 2 | LGHB 2 | LGHP 2 | LGED 2 | LGET 2 |
|---|---|---|---|---|---|---|---|---|---|
| KP2G-40 | K2G-50 | KP1G-30 | KP2G-40 | KPF2K-20 | KPF2K-10 | KP2N-20 | K2N-40 | KFK2U-30 | KFK2U-40 |
| 2 | 2 | 1 | 1–2 | 2 | 2 | 2 | 2–3 | 2 | 2 |
| Yellow | Beige | Brown | Yellow | Black | Black | Brown | Blue | Off white | Off white |
| Lithium complex | Lithium | Lithium | Complex calcium sulphonate | Lithium | Lithium/calcium | Complex calcium sulphonate | Di–urea | PTFE | PTFE |
| Synthetic (PAO) | Synthetic (PAO) | Mineral | Synthetic (PAO)/ Mineral | Mineral | Mineral | Mineral | Mineral | Synthetic (fluori-nated polyether) | Synthetic (fluori-nated polyether) |
| –40 to +120 *(–40 to +250)* | –50 to +110 *(–60 to +230)* | –30 to +110 *(–20 to +230)* | –40 to +110 *(–40 to +230)* | –20 to +120 *(–5 to +250)* | –10 to +120 *(15 to 250)* | –20 to +150 *(–5 to +300)* | –40 to +150 *(–40 to +300)* | –30 to +240 *(–20 to +464)* | –40 to +260 *(–40 to +500)* |
| >200 *(390)* | >180 *(>355)* | >170 *(>340)* | >300 *(>570)* | >180 *(>355)* | >180 *(>355)* | >220 *(>430)* | >240 *(>465)* | >300 *(>570)* | >300 *(>570)* |
| 68 | 18<br>4,5 | 200<br>16 | 80<br>8,6 | 500<br>32 | 1 020<br>58 | 425<br>26,5 | 96<br>10,5 | 460<br>42 | 400<br>38 |
| 265–295<br>+50 max. | 265–295<br>+50 max. | 310–340<br>+50 max. | 280–310<br>+30 max | 265–295<br>325 max. | 265–295<br>325 max. | 265–295<br>–20 to +50<br>(325 max.) | 245–275<br>365 max. | 265–295<br>271 [1] | 265–295<br>– |
| +50 max. | | | +50 max. | 345 max.<br>"M" | +50 max.<br>"M" | –20 to +50<br>"M" | 365 max. | | ±30 max. 130 °C *(265 °F)* |
| 0–0<br>0–1 [1] | 0–1 | 0–0<br>0–0 | 0–0<br>0–0<br>0–0 [1] | 0–0<br>0–0 | 0–0<br>0–0 [1]<br>0–0 [1] | 0–0<br>0–0<br>0–0 [1] | 0–0<br>0–0<br>0–0 | 0–0 [1] | 1–1 max. |
| 1 max. | 1 max. | 1 max. | 1 max. | 1 max. | 1 max. | 1 max. | 1 max. | 1 max. | 0 max. |
| 4 max, 2,5 [1] | <4 | 8–13 | 3 max. | 1–5 | 1–5 | 1–3,<br>60 °C *(140 °F)* | 1–5 [1] | | 13 max. 30 h<br>200 °C *(390 °F)* |
| | | | Pass,<br>140 °C *(285 °F)*<br>Pass, Pass | Pass,<br>100 °C *(210 °F)* | | Pass,<br>140 °C *(285 °F)* | Pass | | |
| 1 max.<br>120 °C *(250 °F)* | 1 max.<br>100 °C *(210 °F)* | 2 max.<br>90 °C *(>195 °F)* | 2 max.<br>100 °C *(210 °F)* | 2 max.<br>100 °C *(210 °F)* | 1 max.<br>100 °C *(210 °F)* | 2 max.<br>150 °C *(300 °F)* | 1 max.<br>150 °C *(300 °F)* | 1 max.<br>100 °C *(210 °F)* [1] | 1 max.<br>150 °C *(300 °F)* |
| | >1 000,<br>20 000 r/min<br>100 °C *(210 °F)* | | 1 824 [1],<br>110 °C *(230 °F)* | | | >1 000,<br>130 °C *(265 °F)* | 1 000 min.<br>150 °C *(300 °F)* | >700 at 220 °C *(430 °F)* | >1 000 [1] at<br>220 °C *(428 °F)* |
| 0,4 [1]<br>5 500 [1] | 2 000 min. | 1,8 max.<br>3 200 min. [1] | 1,5 max. [1]<br>4 000 min. [1] | 1,4 max.<br>3 000 min. | 1,2 max.<br>3 000 min. | 0,86 [1]<br>4 000 min. | | 8 000 min. | 8 000 min. |
| 0–1 [1] | | 5,5 [1] | 5,2 / 1,1 at<br>–20 °C *(–5 °F)* [1] | | | 0 [1] | 7 [1] | | |
| 313,<br>–40 °C *(–40 °F)*<br>75,<br>–40 °C *(–40 °F)* | 32,<br>–50 °C *(–60 °F)*<br>21,<br>–50 °C *(–60 °F)* | 178,<br>0 °C *(32 °F)*<br>103,<br>0 °C *(32 °F)* | 249,<br>–40 °C *(–40 °F)*<br>184,<br>–40 °C *(–40 °F)* | 160,<br>–20 °C *(–5 °F)*<br>98,<br>–20 °C *(–5 °F)* | 96,<br>–10 °C *(14 °F)*<br>66,<br>–10 °C *(14 °F)* | 250,<br>–20 °C *(–5 °F)*<br>133,<br>–20 °C *(–5 °F)* | 1 000,<br>–40 °C *(–40 °F)*<br>280,<br>–40 °C *(–40 °F)* | | |

High loads

Low temperatures

High temperatures

# B.5 Operating temperature and speed

# B.5 Operating temperature and speed


Bearing operating temperature and heat flow . . . . . 130
Bearing size, operating temperature and lubrication conditions . . . . . 131

**Thermal equilibrium** . . . . . **131**
Generated heat . . . . . 131
Dissipated heat . . . . . 132

**Bearing friction, power loss and starting torque** . . . . . **132**
SKF model of bearing friction . . . . . 132
Starting torque . . . . . 133

**Estimating bearing operating temperature** . . . . . **133**
Estimating heat dissipation from SKF plummer (pillow) blocks . . . . . 133
Cooling via circulating oil . . . . . 134
Further temperature-related checks . . . . . 135

**Speed limitations** . . . . . **135**
Approximate thermal speed limit based on ISO standard conditions . . . . . 135
Adjusted reference speed . . . . . 135
Mechanical speed limit . . . . . 135
Speeds above the reference or limiting speed . . . . . 136

# B.5 Operating temperature and speed



The relationships between the temperature and power loss of components within an application is complex and these factors, in turn, have interdependencies with many others such as bearing sizes, loads and lubrication conditions.

They influence many performance characteristics of an application and its parts, and do so in various ways depending on the operational state, such as at start-up or in normal operation, when steady-state conditions have been reached.

Estimating the operating temperature and verifying speed limitations is a critical aspect of the analysis of an application.

This section provides details of these primary relationships, and guidance on what to consider.

## Bearing operating temperature and heat flow

Temperature has a major influence on many performance characteristics of an application. The heat flow to, from and within an application determines the temperature of its parts.

The operating temperature of a bearing is the steady-state temperature it attains when running and in thermal equilibrium with its surrounding elements. The operating temperature results from (**diagram 1**):

- the heat generated by the bearing, as a result of the combined bearing and seal frictional power loss
- the heat from the application transferred to the bearing via the shaft, housing, foundation and other elements in its surroundings
- the heat dissipated from the bearing via the shaft, housing, foundation, lubricant cooling system (if used) and other cooling devices

The bearing operating temperature depends as much on the application design as on the bearing generated friction. Therefore, the bearing, its adjacent parts and the application should all be thermally analysed.

# Bearing size, operating temperature and lubrication conditions

For a given bearing type, the bearing size, operating temperature and lubrication conditions are interdependent as follows (**diagram 2**):

- Bearing size is selected based on bearing load, speed and lubrication conditions.
- Operating temperature is a function of the bearing load, size, speed and lubrication conditions.
- Lubrication conditions depend on the operating temperature, the viscosity of the lubricant and the speed.

These interdependencies are dealt with by taking an iterative approach to the analysis, in order to achieve an optimum design for a bearing arrangement and select the most appropriate components for it.

# Thermal equilibrium

The operating temperature of a bearing reaches a steady state when there is thermal equilibrium – i.e. there is a balance between generated heat and dissipated heat.

Provided that the load ratio C/P > 10 and the speed is below 50% of the limiting speed $n_{lim}$, and there is no pronounced external heat input, then cooling via the surrounding air and foundation is usually sufficient to result in an operating temperature well below 100 °C (*210 °F*). Where these conditions are not met, perform a more detailed analysis, as additional heat dissipation may be required.

**Diagram 1**

**Bearing operating temperature as equilibrium between generated heat and dissipated heat**

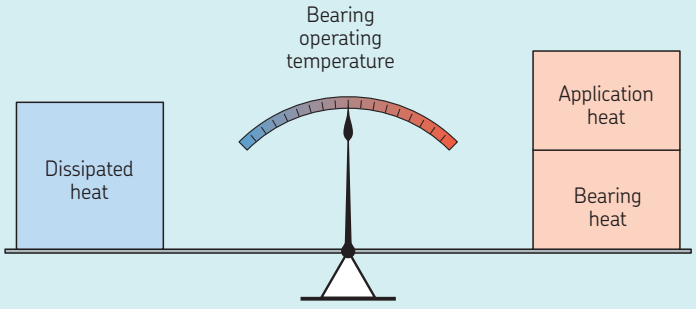
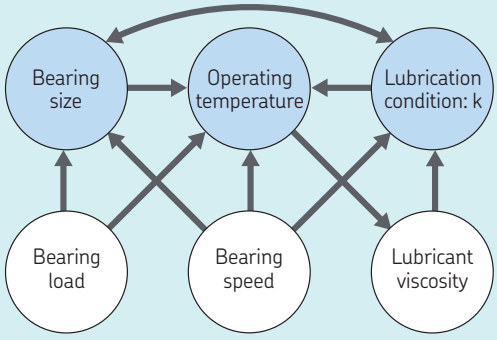



**Diagram 2**

**Dependencies between bearing size, operating temperature and lubrication conditions**




# Generated heat

The heat generated is the sum of:

- heat generated by the bearing, as a result of the combined bearing and seal frictional power loss
- heat flow from adjacent parts or processes

## Bearing frictional heat (power loss)

Bearing friction consists mainly of rolling friction, sliding friction, seal friction and oil drag losses (*Bearing friction, power loss and starting torque*, **page 132**).

## Heat flow from adjacent parts or processes

In many applications, the bearings are in locations where they receive:

- heat from working parts of the machine, e.g. caused by friction in gears or shaft seals
- external heat, e.g. from hot steam going through a hollow shaft

The operating temperature of the bearings is influenced by this, in addition to their self-generated heat. Examples of such applications include:

- drying cylinders in paper machines
- calender rolls in plastic foil machines
- compressors
- hot gas fans

The heat input from adjacent parts within the application or from the process can be very pronounced and is typically very difficult to estimate. The rule is to insulate the bearing, as far as possible, from the additional heat flow.

# Dissipated heat

The heat dissipated is the sum of:

- heat dissipated by the shaft, housing and ambient airflow, e.g. cooling effects in arctic conditions
- heat dissipated via the lubricant or lubrication system

# Bearing friction, power loss and starting torque

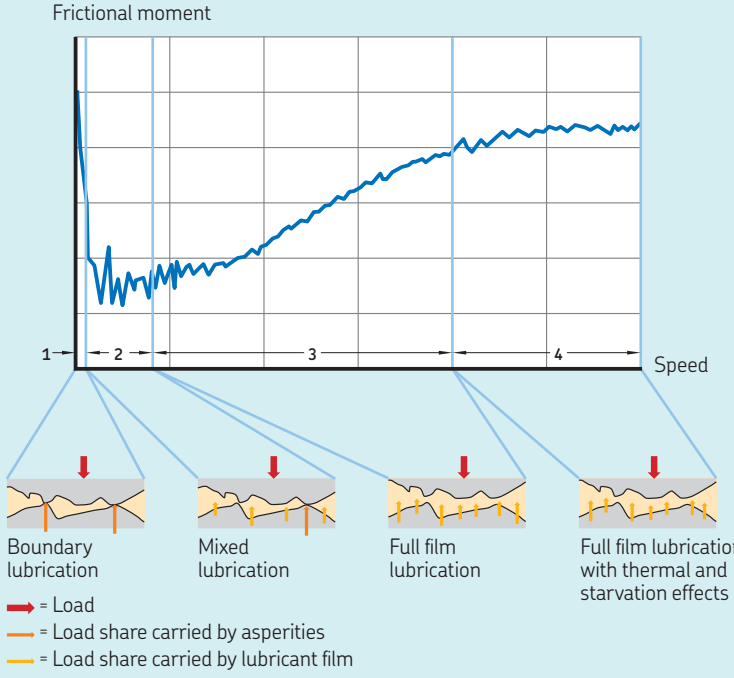
Bearing friction is not constant and depends on certain tribological phenomena that occur in the lubricant film between the rolling elements, raceways and cages.

Friction changes as a function of speed, in a bearing with a given lubricant, are shown in **diagram 3**. Four zones are distinguishable:

- **Zone 1 – Boundary lubrication condition**, in which only the asperities carry the load, and so friction between the moving surfaces is high.
- **Zone 2 – Mixed lubrication condition**, in which a separating oil film carries part of the load, with fewer asperities in contact, and so friction decreases.
- **Zone 3 – Full film lubrication condition**, in which the lubricant film carries the load, but with increased viscous losses, and so friction increases.
- **Zone 4 – Full film lubrication with thermal and starvation effects**, in which the inlet shear heating and kinematic replenishment reduction factors compensate partially for the viscous losses, and so friction evens off.

**Diagram 3**

**Bearing frictional moment as a function of speed**




# SKF model of bearing friction

In the SKF model for calculating bearing friction, the total frictional moment, M, is derived from four sources:

$$M = M_{rr} + M_{sl} + M_{seal} + M_{drag}$$

where

$M_{rr}$ = the rolling frictional moment, and includes effects of lubricant starvation and inlet shear heating [Nmm]

$M_{sl}$ = the sliding frictional moment, and includes the effects of the quality of lubrication conditions [Nmm]

$M_{seal}$ = the frictional moment from integral seals [Nmm]
Where bearings are fitted with contact seals, the frictional losses from the seals may exceed those generated in the bearing.

$M_{drag}$ = the frictional moment from drag losses, churning, splashing, etc., in an oil bath [Nmm]

Calculating values for these four sources of friction is complex. Therefore, we recommend using the *SKF Bearing Calculator* (skf.com/bearingcalculator).

For detailed information on the calculations, refer to *The SKF model for calculating the frictional moment* (skf.com/go/17000-B5).

When the total frictional moment, M, of the bearing is known, you can calculate the bearing frictional power loss using

$$P_{loss} = 1{,}05 \times 10^{-4} M\, n$$

where

$P_{loss}$ = bearing frictional power loss [W]

M = total frictional moment [Nmm]

n = rotational speed [r/min]

# Starting torque

The starting torque of a rolling bearing is defined as the frictional moment that must be overcome by the bearing to start rotating, at an ambient temperature of 20 to 30 °C *(70 to 85 °F)*. Therefore, only the sliding frictional moment and the frictional moment of seals, if applied, are taken into consideration.

$$M_{start} = M_{sl} + M_{seal}$$

where
$M_{start}$ = starting frictional moment [Nmm]
$M_{sl}$ = sliding frictional moment [Nmm]
$M_{seal}$ = frictional moment of the seals [Nmm]

We recommend using the *SKF Bearing Calculator* (skf.com/bearingcalculator) for calculating starting torque values.

# Estimating heat dissipation from SKF plummer (pillow) blocks

For SKF plummer (pillow) block housings, you can use a model based on bearing size to estimate heat dissipation values.

Using **diagram 4**, you can estimate the heat dissipation per degree above ambient temperature, $W_s$, for a bearing with bearing mean diameter $d_m$ in a plummer block housing, with the shaft exposed to the surrounding air.

The estimation is valid for SKF plummer block housings used with grease or oil bath lubrication and only where there is no significant heat input from external sources, such as steam heating of shafts or pronounced radiation from hot surfaces.

# Estimating bearing operating temperature

If you are able to estimate a value for the heat dissipation from a bearing, $W_s$, you can estimate the operating temperature, $T_{bear}$, for a bearing in thermal equilibrium, under steady-state conditions, using

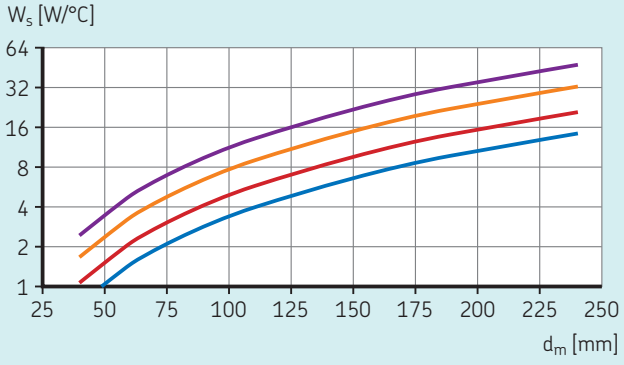
$$T_{bear} = (P_{loss} / W_s) + T_{amb}$$

where
$T_{bear}$ = estimated average bearing operating temperature [°C]
$P_{loss}$ = bearing frictional power loss [W]
$W_s$ = total heat dissipation per degree above ambient temperature [W/°C]
$T_{amb}$ = ambient temperature [°C]

Should the value of the estimated bearing operating temperature be too high for the application requirements – for example, resulting in a κ value that is too low, or a relubrication interval that is too short – a possible solution may be to reduce the operating temperature by means of a circulating oil lubrication system.

**Diagram 4**

**Heat dissipation for SKF plummer block housings**




| Key | Foundation material | Velocity of surrounding air | Dissipation method |
|---|---|---|---|
| | | m/s | |
| | concrete | 0,5 | by natural airflow |
| | steel | 0,5 | |
| | steel | 2,5 | by forced airflow |
| | steel | 5 | |

# Cooling via circulating oil

By circulating the oil, it is possible to cool it, and thereby remove heat from the bearing arrangement.

In **diagram 5**, the curved line shows the bearing frictional power loss, $P_{loss}$, and the angled line shows the heat dissipation, $W_s$.

Taking the heat dissipated via oil circulation into account, the bearing thermal equilibrium under steady-state conditions becomes:

$$P_{loss} = W_s (T_{bear} - T_{amb}) + P_{oil}$$

where
$P_{loss}$ = bearing frictional power loss [W]
$W_s$ = total heat dissipation per degree above ambient temperature [W/°C]
$T_{bear}$ = estimated required bearing operating temperature [°C]
$T_{amb}$ = the ambient temperature [°C]
$P_{oil}$ = estimated power dissipated in the oil cooler [W]

Taking the heat dissipation via oil circulation into account, you can estimate the bearing operating temperature using

$$T_{bear} = ((P_{loss} - P_{oil}) / W_s) + T_{amb}$$

You can estimate the power that must be dissipated by oil cooling, for a given bearing temperature, using

$$P_{oil} = P_{loss} - W_s (T_{bear} - T_{amb})$$

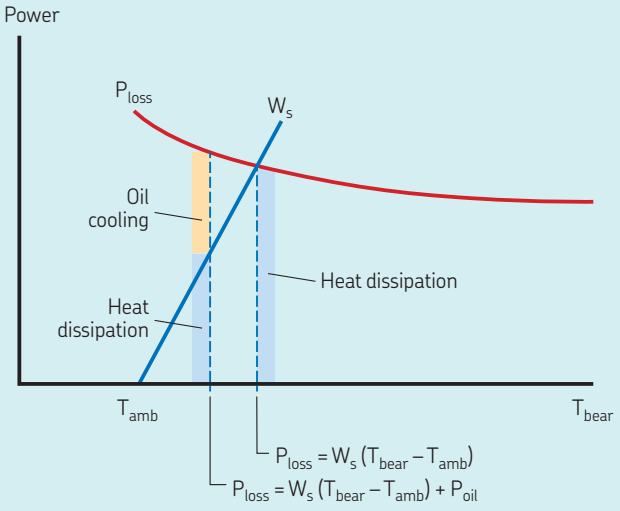
You can estimate the required oil flow, for a given quantity of power that must be dissipated by oil cooling ($P_{oil}$), using

$$Q = P_{oil} / (27 (T_{out} - T_{in}))$$

where
Q = required oil flow [l/min]
$P_{oil}$ = power dissipated in the oil cooler [W]
$T_{out}$ = oil temperature at the housing oil outlet [°C]
$T_{in}$ = oil temperature at the housing oil inlet [°C]

**Diagram 5**

**Relationship between power loss, heat dissipation and temperature**




If you do not have values for $T_{out}$ or $T_{in}$, you may assume a temperature difference of 5 to 10 °C *(10 to 20 °F)*.

The limit of cooling that is possible via circulating oil is determined by the degree of heat transfer that can be obtained from a given bearing. As a rule of thumb, you can determine the maximum oil flow, above which no significant temperature reduction is obtained, using

$$Q_{max} = (D\ B) / 12\,500$$

where
$Q_{max}$ = maximum oil flow [l/min]
D = bearing outer diameter [mm]
B = bearing width [mm]

## Further temperature-related checks

After you have estimated the operating temperature, check:

- that the temperature assumption for calculating bearing life (operating viscosity) was correct
- the lubricant selection and temperature limits
- the grease or oil change interval
- the cage and seal material limits

# Speed limitations

The speed capability of a bearing is normally determined by the bearing operating temperature. However, for certain bearing types and arrangements, the mechanical limits of the bearing components may have a significant influence.

The product tables typically provide two speed ratings:

- the reference speed, which is based on thermal conditions
- the limiting speed, which is based on mechanical limits

Both speed ratings are cautionary limits, rather than strict prohibiting limits, but approaching either of them signals that deeper analysis of the operating conditions is required.

For bearings with contact seals, no reference speeds are listed in the product tables. Typically, the limiting speed determines the maximum speed for these bearings.

## Approximate thermal speed limit based on ISO standard conditions

The reference speed listed in the product tables is based on the SKF friction model and derived from thermal equilibrium under the ISO 15312 standardized operating and cooling conditions. Its main purpose is to provide a quick assessment of the speed capabilities of a bearing. You can also use it to estimate a thermal speed limit.

The ISO reference speed is valid for open bearings only, operating under the following conditions:

- predefined reference heat dissipation
- light loads
  - radial load $P = 0{,}05\ C_0$ for radial bearings
  - axial load $P = 0{,}02\ C_0$ for thrust bearings
- nominal temperature increase of 50 °C *(90 °F)* above an ambient reference temperature of 20 °C *(70 °F)*
- oil lubrication with mineral oil without EP additives
  - ISO VG32 for radial bearings
  - ISO VG68 for thrust bearings
- clean conditions
- sufficient operating clearance (*Selecting initial internal clearance*, **page 183**)
- horizontal shaft, rotating inner ring and stationary outer ring

The ISO standard does not provide reference conditions for sealed bearings.

The ISO standard, established for oil lubrication, is also valid for grease lubrication, provided a lithium based grease with mineral base oil having a viscosity between 100 and 200 $mm^2/s$ is used. Grease lubricated bearings may, however, undergo a temperature peak during initial start-up, requiring a running-in period before they reach their steady-state operating temperature.

### Adjusted reference speed

The ISO reference speed is valid for a standardized set of operating conditions including standardized heat dissipation. Therefore, SKF recommends calculating the adjusted reference speed considering the actual load and lubricant viscosity in your application. Do this using the *SKF Bearing Calculator* (skf.com/bearingcalculator). However, this reference speed adjustment does not include the data regarding the actual heat dissipation for your application, so a conservative approach to the result is recommended. To include effects from heat dissipation, a detailed thermal analysis is required.

## Mechanical speed limit

The limiting speed indicated in the product tables is a maximum speed valid for the standard bearing execution that should not be exceeded unless the bearing design and the application is adapted to a higher speed.

The limiting speed is determined by:

- the form stability or strength of the cage
- lubrication of the cage guiding surfaces
- centrifugal and gyratory forces acting on the rolling elements
- other speed-limiting factors, such as seals and the lubricant for sealed bearings

**NOTE**

Some open ball bearings have very low friction, and the reference speeds listed for them might be higher than their limiting speeds. Do not use only the mechanical speed limit. Also calculate the adjusted reference speed. The lower of the two sets the speed limit.

# Speeds above the reference or limiting speed

It is possible to operate a bearing at speeds above its reference speed, its adjusted reference speed, or even the limiting speed. Before doing so, first make a detailed thermal analysis, and take whatever further measures may be required, such as use of special cage executions, or consider using high precision bearings. Regarding management of the effects of increased speed, consider the following options:

- Control the resulting increase in bearing temperature by additional cooling.
- Compensate for any reduction in bearing clearance resulting from increased bearing temperature.
- Revise the housing fitting tolerance choice to ensure that the influence of increased bearing temperature does not impair the axial displaceability of non-locating bearing outer rings.
- Revise the bearing tolerance class, together with the geometrical precision of the shaft and housing seats, to ensure these are sufficient to avoid excessive vibration.
- Consider using an alternative cage execution that is suitable for higher speed operation, in particular when approaching or exceeding the limiting speed.
- Ensure that the lubricant and lubrication method used are compatible with the higher operating temperature and the cage execution.
- Check that the relubrication interval is still acceptable, particularly for grease lubricated bearings. Oil lubrication may be required.

# B.6 Bearing interfaces

# B.6 Bearing interfaces


**The ISO tolerance system** . . . . . **140**

**Selecting fits** . . . . . **140**
Conditions of rotation . . . . . 142
Magnitude of load . . . . . 143
Temperature differences . . . . . 143
Precision requirements . . . . . 143
Design and material of the shaft and housing . . . . . 143
Ease of mounting and dismounting . . . . . 143
Axial displacement of the bearing in the non-locating position . . . . . 143

**Tolerances for bearing seats and abutments** . . . . . **144**
Tolerances for seats on hollow shafts . . . . . 146
Tolerances for tapered seats . . . . . 147
Taper position . . . . . 147
Checking tolerances . . . . . 147

**Surface texture of bearing seats** . . . . . **147**

**Seat tolerances for standard conditions** . . . . . **148**
Bearings with a tapered bore . . . . . 149

**Tolerances and resultant fits** . . . . . **153**

**Provisions for mounting and dismounting** . . . . . **176**

**Axial location of bearing rings** . . . . . **178**
Bearings with a tapered bore . . . . . 178
Abutments and fillets . . . . . 178

**Radially free mounted bearings for axial load** . . . . . **179**

**Raceways on shafts and in housings** . . . . . **179**

# B.6 Bearing interfaces



Bearing seats on shafts and in housings, and components which locate a bearing axially, have a significant impact on bearing performance. To fully exploit the load carrying ability of a bearing, its rings or washers should be fully supported around their complete circumference and across the entire width of the raceway. Bearing seats should be manufactured to adequate geometrical and dimensional tolerances and be uninterrupted by grooves, holes or other features.

In this section you can find recommendations and requirements for designing bearing interfaces, including:

- criteria when selecting bearing fits
- recommended fits for standard conditions
- tables to help determine minimum, maximum and probable values of clearance or interference between the bearing and its seat
- recommendations for specifying geometrical tolerances of bearing seats
- recommendations for the axial support of bearing rings
- further design considerations for bearing interfaces

## The ISO tolerance system

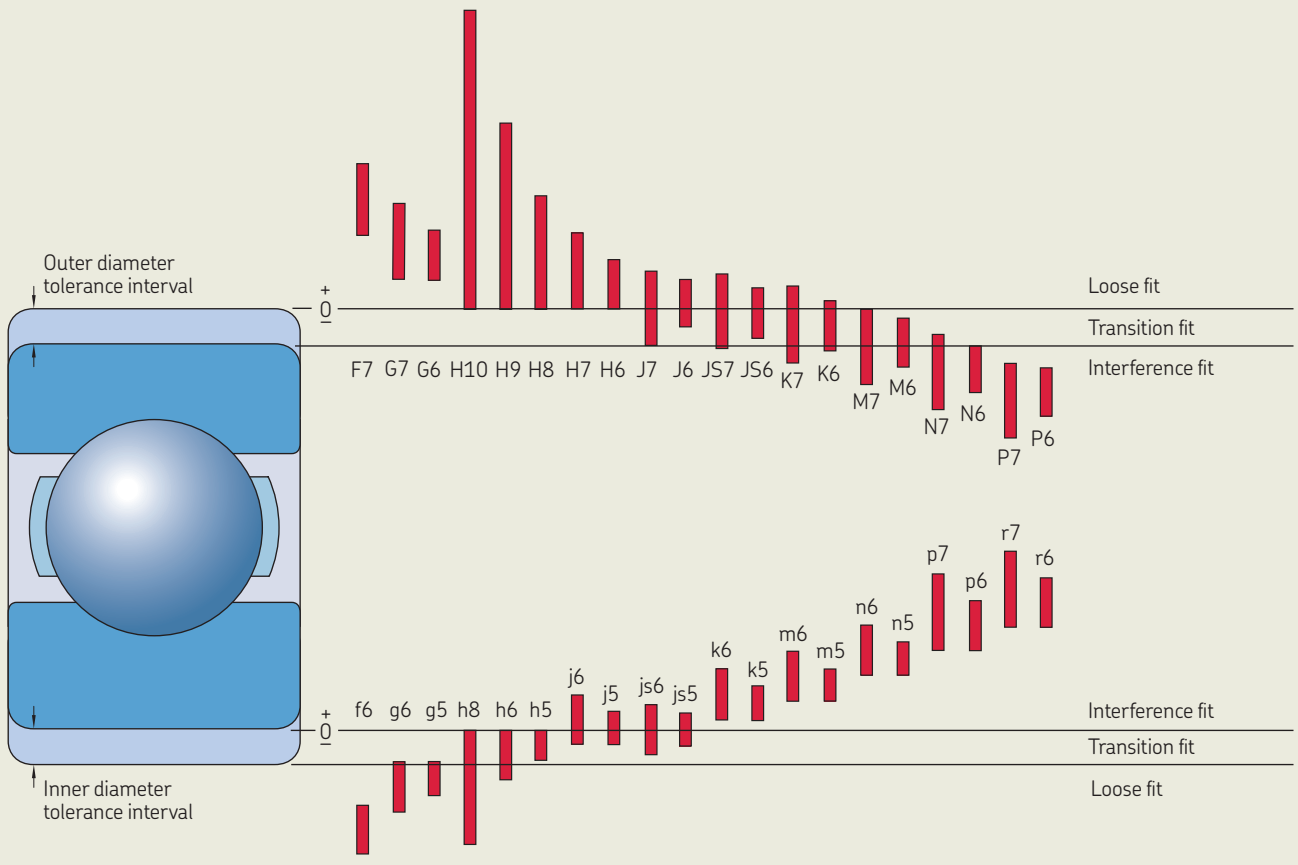
Fits for rolling bearings are typically specified with standard tolerance classes for holes and shafts as described in ISO 286-2. As bearings are typically manufactured to ISO tolerances (*Tolerances*, **page 36**), the selection of the tolerance class for the bearing seat determines the fit. The position and width of the tolerance intervals of commonly used tolerance classes relative to the bearing bore and outside diameter tolerances are illustrated in **fig. 1**, which is valid for bearings with Normal tolerances and of medium size. It is important to note that the ISO tolerance classes for rolling bearings and for holes and shafts are different. The tolerances for each size vary over the full range of actual sizes. You should therefore select the respective tolerance classes for bearing seats based on the actual bearing size for your application.

## Selecting fits

Fits can be selected by following the recommendations for bearing seat diameter tolerances (*Seat tolerances for standard conditions*, **page 148**). These recommendations will provide adequate solutions for the majority of applications. However, they do not cover all details of a specific application and so you may find that adjustments may be necessary. When selecting fits, you should consider the following topics.

**Fig. 1**

**Position and width of shaft and housing tolerance classes**



# Conditions of rotation

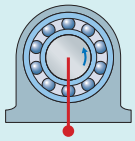
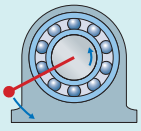
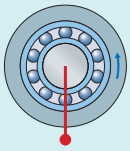
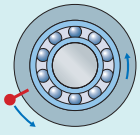
Conditions of rotation refer to the relative motion between a bearing ring and the load acting upon it (table 1). Essentially, there are three different conditions:

- **Rotating loads**
  These loads occur where either the bearing ring or the applied load is stationary while the other rotates. A bearing ring mounted with a loose fit will creep on its seat when subjected to a rotating load, and this can lead to fretting corrosion and eventually wear. To prevent this from happening, an adequate interference fit, between the ring subjected to rotating load and its seat, is required. For the purpose of selecting fits, loads that oscillate (such as loads acting on connecting rod bearings) are considered to be rotating loads.
- **Stationary loads**
  These loads occur where both the bearing ring and the applied load are stationary or both are rotating at the same speed. Under these conditions, a bearing ring normally does not creep and there is no risk of fretting corrosion or wear. In this case, the ring does not need to have an interference fit.
- **Direction of load indeterminate**
  This refers to variable or alternating external loads, sudden load peaks, vibration or unbalanced loads in high-speed applications. These give rise to changes in the direction of load, which cannot be accurately described. Where the direction of load is indeterminate and particularly where heavy loads are involved, there is a risk of fretting corrosion or wear. You should use an interference fit for both rings. The same fit as for a rotating load is normally suitable. Where the outer ring should be able to move axially in its housing, a loose fit must be used. However, a loose fit can result in housing wear. Where this cannot be tolerated, either protect the bearing seat surface or select a bearing that accommodates the axial displacement within itself (cylindrical roller, needle roller or CARB bearing). These bearings can be mounted with an interference fit for both rings.



**Table 1**

**Conditions of rotation**

| Operating conditions | Schematic illustration | Load condition | Recommended fits |
|---|---|---|---|
| Rotating inner ring<br>Stationary outer ring<br>Constant load direction |  | Rotating inner ring load<br>Stationary outer ring load | Interference fit for the inner ring<br>Loose fit for the outer ring possible |
| Rotating inner ring<br>Stationary outer ring<br>Load rotates with the inner ring |  | Stationary inner ring load<br>Rotating outer ring load | Loose fit for the inner ring possible<br>Interference fit for the outer ring |
| Stationary inner ring<br>Rotating outer ring<br>Constant load direction |  | Stationary inner ring load<br>Rotating outer ring load | Loose fit for the inner ring possible<br>Interference fit for the outer ring |
| Stationary inner ring<br>Rotating outer ring<br>Load rotates with outer ring |  | Rotating inner ring load<br>Stationary outer ring load | Interference fit for the inner ring<br>Loose fit for the outer ring possible |

## Magnitude of load

The ring of a bearing deforms proportionately to the load. For rotating inner ring loads, this deformation can loosen the interference fit between the inner ring and shaft, causing the ring to creep on its shaft seat. The heavier the load, the tighter the interference fit required. The required interference can be estimated using:

$$\Delta = 2{,}5\sqrt{F_r \frac{d}{B}}$$

where
$\Delta$ = required interference [µm]
$d$ = bearing bore diameter [mm]
$B$ = bearing width [mm]
$F_r$ = radial load [kN]

Where sudden load peaks or vibration occurs, a tighter fit can be required.

## Temperature differences

In operation, bearing rings normally reach a temperature that is higher than that of the components to which they are fitted. This can loosen the fit on the shaft seat, while outer ring expansion can prevent the desired axial displacement in the housing.

Rapid start-up can loosen the inner ring fit when the frictional heat generated by the bearing is not dissipated quickly enough. In some cases, friction from seals can generate enough heat to loosen the inner ring fit.

External heat and the direction of heat flow can have an effect on fits. Steady-state and transient conditions must be considered. For additional information about temperature differences, refer to *Selecting internal clearance or preload*, page 182.

## Precision requirements

To minimize deflections and vibration in precision or high-speed applications, interference or transition fits are recommended.

## Design and material of the shaft and housing

Distortion of the bearing rings caused by shaft or housing design, for example by discontinuities of the seat or uneven wall thickness, should be avoided.

For split housings, SKF generally recommends loose fits. The tighter (less loose) the fit is in a split housing, the higher are the requirements for the geometrical tolerances of the seat. Split housings machined to tight tolerances, such as SKF plummer block housings, can be used for transition fits up to K7.

Bearings mounted in thin-walled housings or on hollow shafts require tighter interference fits than those recommended for robust cast iron housings or solid shafts (*Tolerances for seats on hollow shafts*, page 146).

Shafts or housings made of materials other than steel or cast iron may require different fits depending on material strength and thermal properties.

## Ease of mounting and dismounting

Loose fits are beneficial for easy mounting and dismounting. In applications where interference fits are required for both the shaft and housing seat, separable bearings or bearings with a tapered bore should be considered. Bearings with a tapered bore can be mounted on tapered sleeves (fig. 2) or on a tapered shaft seat (fig. 3).

## Axial displacement of the bearing in the non-locating position

When a non-locating bearing needs to be able to move axially on its seat, the ring subjected to the stationary load should have a loose fit. For additional information about bearings in the non-locating position, refer to *Arrangements and their bearing types*, page 70.



**Fig. 2**

**Bearing with a tapered bore mounted on a plain shaft with an adapter sleeve**

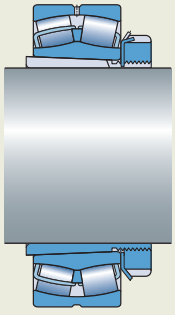
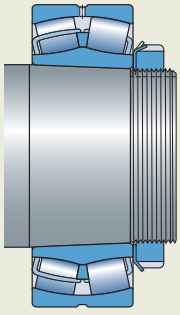


**Fig. 3**

**Bearing with a tapered bore mounted on a tapered seat**



# Tolerances for bearing seats and abutments

Dimensional tolerances for bearing seats are dictated by the required fit. Precision requirements of the application will direct you to which bearing tolerance class to use (*Bearing execution*, **page 182**) and, consequently, what run-out tolerance of the seat is needed. The run-out of the seat is specified by the total radial run-out of the seat surface and the total axial run-out of the abutment (ISO 1101, 18.16).

For bearings with Normal tolerances in general industrial applications, seats are typically machined to the following tolerances:

- shaft seats to grade IT6 dimensional tolerances and grade IT5 total run-out tolerances
- housing seats to grade IT7 dimensional tolerances and grade IT6 total run-out tolerances

Suitable combinations of tolerance grades are listed in **table 2**. The tolerance zone for the total radial run-out is limited to half of the ISO tolerance grade, because the run-out tolerance is specified as a difference in radii of two coaxial cylinders, and the ISO tolerance grade refers to the diameter.

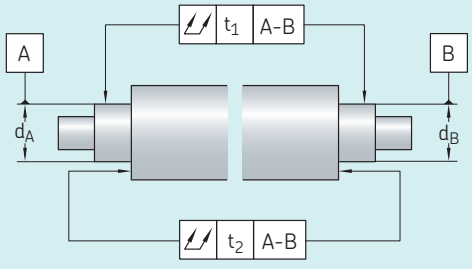
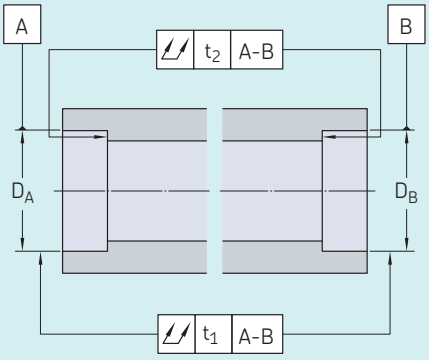
For seats of bearings mounted on withdrawal or adapter sleeves, wider diameter tolerances are permissible. The total run-out tolerances should be the same as for bearings on cylindrical seats.

Tolerance values for ISO tolerance grades are listed in **table 3**.



**Table 2**

**Tolerance grades for bearing seats**[1)]

| Application requirements | Shaft seat | | | Housing seat | | |
|---|---|---|---|---|---|---|
| | |  | | |  | |
| | **Dimensional tolerance grade** | **Geometrical tolerance grades** | | **Dimensional tolerance grade** | **Geometrical tolerance grades** | |
| | | Radial run-out $t_1$ | Axial run-out $t_2$ | | Radial run-out $t_1$ | Axial run-out $t_2$ |
| Bearing to Normal tolerances (moderate speed and running accuracy) | IT6 | IT5/2 | IT5 | IT7 | IT6/2 | IT6 |
| Bearing to P6 tolerances (higher speeds or running accuracy) | IT5 | IT4/2 | IT4 | IT6 | IT5/2 | IT5 |
| Bearing to P5 tolerances (high speeds and running accuracy) | IT4 | IT3/2 | IT3 | IT5 | IT4/2 | IT4 |

[1)] For very high-speed and high-precision applications, use SKF super-precision bearings and reduced IT tolerances (skf.com/super-precision).

## Example

A deep groove ball bearing 6030 is to be used in an electric motor. The bearing accommodates normal to heavy loads (0,05 C < P ≤ 0,1 C), and requirements for speed and precision are moderate. An interference fit on the shaft is required. For this fit, the shaft diameter should be 150 m6Ⓔ. The total radial run-out should be within IT5/2 (from **table 3**: 18/2 = 9 µm), and the total axial run-out of the abutment should be within IT5 (from **table 3**: 18 µm).

The dimensional tolerance zone in grey and the tolerance zone for the total radial run-out in blue are shown in **fig. 4**. The blue zone can be located at any place within the grey zone, but must not be wider than 9 µm.

**Fig. 4**

**Dimensional and total run-out tolerances zones**

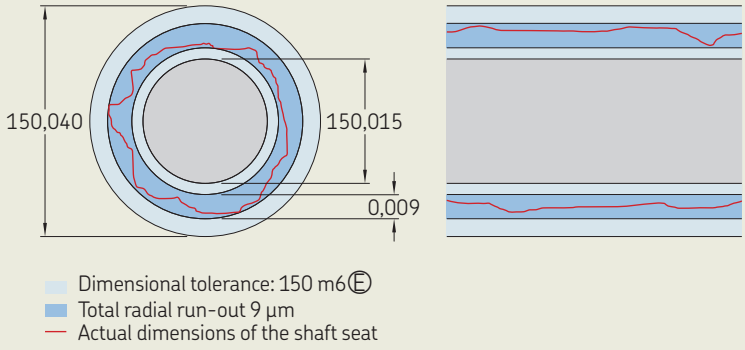



**Table 3**

**Values of ISO tolerance grades**

| Nominal dimension | | Tolerance grades | | | | | | |
|---|---|---|---|---|---|---|---|---|
| > | ≤ | IT3 max. | IT4 | IT5 | IT6 | IT7 | IT8 | IT9 |
| mm | | µm | | | | | | |
| **1** | **3** | 2 | 3 | 4 | 6 | 10 | 14 | 25 |
| **3** | **6** | 3 | 4 | 5 | 8 | 12 | 18 | 30 |
| **6** | **10** | 3 | 4 | 6 | 9 | 15 | 22 | 36 |
| **10** | **18** | 3 | 5 | 8 | 11 | 18 | 27 | 43 |
| **18** | **30** | 4 | 6 | 9 | 13 | 21 | 33 | 52 |
| **30** | **50** | 4 | 7 | 11 | 16 | 25 | 39 | 62 |
| **50** | **80** | 5 | 8 | 13 | 19 | 30 | 46 | 74 |
| **80** | **120** | 6 | 10 | 15 | 22 | 35 | 54 | 87 |
| **120** | **180** | 8 | 12 | 18 | 25 | 40 | 63 | 100 |
| **180** | **250** | 10 | 14 | 20 | 29 | 46 | 72 | 115 |
| **250** | **315** | 12 | 16 | 23 | 32 | 52 | 81 | 130 |
| **315** | **400** | 13 | 18 | 25 | 36 | 57 | 89 | 140 |
| **400** | **500** | 15 | 20 | 27 | 40 | 63 | 97 | 155 |
| **500** | **630** | - | - | 32 | 44 | 70 | 110 | 175 |
| **630** | **800** | - | - | 36 | 50 | 80 | 125 | 200 |
| **800** | **1 000** | - | - | 40 | 56 | 90 | 140 | 230 |
| **1 000** | **1 250** | - | - | 47 | 66 | 105 | 165 | 260 |
| **1 250** | **1 600** | - | - | 55 | 78 | 125 | 195 | 310 |
| **1 600** | **2 000** | - | - | 65 | 92 | 150 | 230 | 370 |
| **2 000** | **2 500** | - | - | 78 | 110 | 175 | 280 | 440 |

# Tolerances for seats on hollow shafts

When a bearing is mounted on a hollow shaft using an interference fit, the shaft experiences more elastic deformation than a solid shaft. As a result, the effectiveness of the fit is less than for the same size solid shaft. The effectiveness of an interference fit on a hollow shaft depends on certain diameter ratios (**fig. 5**):

- the diameter ratio of the hollow shaft
  $c_i = d_i / d$
  For diameter ratios $c_i \leq 0,5$ the reduction of effectiveness is negligible.
- the diameter ratio of the bearing inner ring $c_e = d / d_e$
  When the average outside diameter of the inner ring $d_e$ is not known, the diameter ratio can be estimated from

$$c_e = \frac{d}{k\,(D - d) + d}$$

where
$c_e$ = diameter ratio of the bearing inner ring
$d$ = bearing bore diameter [mm]
$D$ = bearing outside diameter [mm]
$k$ = adjustment factor
= 0,25 for self-aligning ball bearings in the 22 and 23 series
= 0,25 for cylindrical roller bearings
= 0,3 for other bearings

For shaft diameter ratios $c_i > 0,5$ the diameter tolerance determined for a seat on a solid shaft should be adjusted to achieve the same effectiveness of the fit on the hollow shaft. This can be done with the following procedure.

1 Determine the mean probable interference for the tolerance selected for a seat on a solid shaft, $\Delta_S$ (*Tolerances and resultant fits*, **page 153**).
2 Determine the required increase of interference for the seat on the hollow shaft from **diagram 1**, based on the diameter ratios $c_i$ and $c_e$.
3 Calculate the required mean probable interference for the seat on the hollow shaft and select the tolerance class accordingly.

## Example

A 6208 deep groove ball bearing with d = 40 mm and D = 80 mm is to be mounted on a hollow shaft with a diameter ratio $c_i = 0,8$. What is the appropriate tolerance class for the shaft seat?

The bearing is subjected to normal loads, and a tolerance class k5 is appropriate for a seat on a solid shaft.

- The diameter ratio of the bearing inner ring is

$$c_e = \frac{40}{0,3\,(80 - 40) + 40} = 0,77$$

- The mean probable interference on a solid shaft is
  $\Delta_S = (22 + 5) / 2 = 13,5$ µm (**table 14**, **page 160**, k5 for a 40 mm shaft diameter)
- The increase in interference for the seat on the hollow shaft is
  $\Delta_H / \Delta_S = 1,7$ (**diagram 1**, $c_i = 0,8$ and $c_e = 0,77$)
- The requisite interference for the seat on the hollow shaft is
  $\Delta_H = 1,7 \times 13,5 = 23$ µm
- The appropriate tolerance class for the seat on the hollow shaft is m6 (**table 14**, mean probable interference, (33 + 13) / 2 = 23 µm)

**Fig. 5**

**Seat on a hollow shaft**

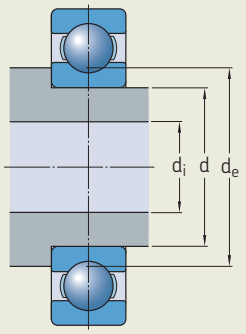
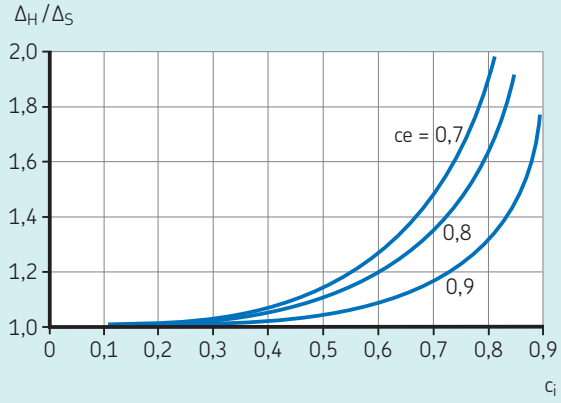



**Diagram 1**

**Relationship of interference $\Delta_H$, needed for a hollow steel shaft, to the known interference $\Delta_S$ for a solid steel shaft**



# Tolerances for tapered seats

For tapered shaft seats, SKF recommends the following tolerances (**fig. 6**):

- The permissible deviation for the rate of the taper is a ± tolerance in accordance with IT7/2. The bearing width B is the nominal size, which determines the standard tolerance values. The permissible deviation for the rate of the taper can be determined using

$$\Delta_k = \frac{IT7/2}{B}$$

  The permissible range of dispersion of the rate of the taper can be determined using

$$V_k = 1/k \pm \frac{IT7/2}{B}$$

  where
  $\Delta_k$ = the permissible deviation of the rate of the taper
  $V_k$ = the permissible range of dispersion of the rate of the taper
  B = bearing width [mm]
  IT7 = the value of the tolerance grade, based on the bearing width [mm]
  k = factor for the taper
  = 12 for taper 1:12
  = 30 for taper 1:30

- To determine the permissible dispersion of the taper angle α, use

  $\alpha = 2\text{atan}\,(V_k/2)$

- The roundness tolerance is defined as "distance t between two concentric circles in each radial plane perpendicular to the cone axis along the tapered surface of the shaft". t is the value of tolerance grade IT5/2, based on the diameter d. Where a high degree of precision is required, IT4/2 should be used instead.
- The straightness is defined as "In each axial plane through the tapered shaft, the tolerance zone is limited by two parallel lines a distance t apart". t is the value of tolerance grade IT5/2, based on the diameter d.

## Taper position

Only dimensional and geometrical tolerances of the taper are indicated in **fig. 6**. The axial position of the taper requires additional specifications. When specifying the axial position, you should also take into account the axial drive-up distance of the bearing, which is required to achieve a suitable interference fit.

## Checking tolerances

To check whether a tapered shaft seat is within its tolerances, SKF recommends measuring it with a special taper gauge, based on saddles and gauging pins. More practical, but less accurate measurement methods include ring gauges, taper gauges and sine bars. For information about SKF measuring devices, refer to skf.com (*GRA 30 ring gauges* and *DMB taper gauges*).

# Surface texture of bearing seats

The surface texture of a bearing seat has less of an impact on bearing performance compared to the dimensional and geometrical tolerances of the seat. However, the texture of the mating surfaces affects smoothing, which can reduce the interference in a fit. The surface texture should be limited to ensure the required fit is obtained.

Guideline values for the roughness profile parameter Ra are listed in **table 4**. These recommendations apply to ground seats, which are normally assumed for shaft seats. For housing seats, which are normally fine-turned, the Ra values may be one class higher. For applications where some loss of interference is not critical, rougher surfaces than recommended in **table 4** can be used.



**Table 4**

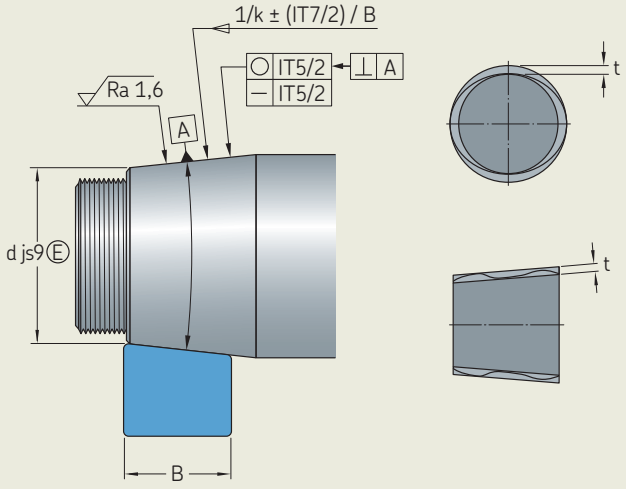
**Surface roughness of bearing seats**

| **Seat diameter** | | **Ra** (guideline values for ground seats) | | |
|---|---|---|---|---|
| d, D | | Diameter tolerance grade | | |
| > | ≤ | IT7 | IT6 | IT5 |
| mm | | µm | | |
| – | **80** | 1,6 | 0,8 | 0,4 |
| **80** | **500** | 1,6 | 1,6 | 0,8 |
| **500** | **1 250** | 3,2[1)] | 1,6 | 1,6 |

[1)] When using the oil injection method for mounting, Ra should not exceed 1,6 µm.

**Fig. 6**

**Tolerances for tapered shaft seats**



# Seat tolerances for standard conditions

The following tables provide recommendations for tolerances of shaft and housing seats. They are valid for standard applications but do not cover all details of a specific application. The information under *Selecting fits*, **page 140**, and *Tolerances for bearing seats and abutments*, **page 144**, should be additionally considered.

These recommendations are valid for bearings with Normal dimensional tolerances. They can also be used for bearings to P6 dimensional tolerances. The tighter P6 tolerance zone changes the resulting fit only slightly.

Recommended seat tolerances for metric bearings:

- For solid steel shafts:
  - Radial ball bearings (**table 5**, except insert bearings)
  - Radial roller bearings (**table 6**, except needle roller bearings)
  - Thrust ball bearings and spherical roller thrust bearings (**table 7**, **page 150**)
- For cast iron and steel housings:
  - Radial bearings (**table 8**, **page 151**)
  - Thrust bearings (**table 9**, **page 152**)

For the following bearing types, recommendations are listed in the product sections:

- Insert bearings, *Design considerations*, **page 356**
- Needle roller bearings, relevant sections under *Needle roller bearings*, **page 903**
- Cylindrical roller thrust bearings, *Design considerations*, **page 885**
- Needle roller thrust bearings, *Design considerations*, **page 903**
- Inch tapered roller bearings, *Design considerations*, **page 687**

All ISO tolerance classes used in the tables are valid with the envelope requirement (such as H7Ⓔ), in accordance with ISO 14405-1. For practical reasons, symbol Ⓔ is not indicated in the tables.

**Table 5**

**Tolerances for solid steel shafts – seats for radial ball bearings**[1]

| Conditions | Shaft diameter | Dimensional tolerance[2] | Total radial run-out tolerance[3] | Total axial run-out tolerance[3] | Ra |
|---|---|---|---|---|---|
| | mm | – | – | – | µm |
| **Rotating inner ring load or direction of load indeterminate** | | | | | |
| Light loads (P ≤ 0,05 C) | ≤ 17 | js5 | IT4/2 | IT4 | 0,4 |
| | > 17 to 100 | j6 | IT5/2 | IT5 | 0,8 |
| | > 100 to 140 | k6 | IT5/2 | IT5 | 1,6 |
| Normal to heavy loads (0,05 C < P ≤ 0,1 C) | ≤ 10 | js5 | IT4/2 | IT4 | 0,4 |
| | > 10 to 17 | j5 | IT4/2 | IT4 | 0,4 |
| | > 17 to 100 | k5 | IT4/2 | IT4 | 0,8 |
| | > 100 to 140 | m5 | IT4/2 | IT4 | 0,8 |
| | > 140 to 200 | m6 | IT5/2 | IT5 | 1,6 |
| | > 200 to 500 | n6 | IT5/2 | IT5 | 1,6 |
| | > 500 | p7 | IT6/2 | IT6 | 3,2 |
| **Stationary inner ring load** | | | | | |
| Easy axial displacement of inner ring on shaft desirable | | g6[4] | IT5/2 | IT5 | 1,6 |
| Easy axial displacement of inner ring on shaft unnecessary | | h6 | IT5/2 | IT5 | 1,6 |
| **Axial loads only** | | j6 | IT5/2 | IT5 | 1,6 |

1) For insert bearings, refer to *Design considerations*, **page 356**.
2) The envelope requirement (symbol Ⓔ from ISO 14405-1) is not shown but applies to all tolerance classes.
3) Values listed are for bearings to Normal tolerances. For bearings with tighter tolerance classes, use the recommendations in **table 2**, **page 144**.
4) Depending on bearing size, a shifted g6Ⓔ tolerance may be needed to obtain a loose fit.

# Bearings with a tapered bore

Bearings with a tapered bore are always mounted with an interference fit for the inner ring. The fit is determined by the distance through which the inner ring is driven up on a tapered seat or sleeve. For detailed information, refer to the information in the product sections:

- *Self-aligning ball bearings*, **page 438**
- *Spherical roller bearings*, **page 774**
- *CARB toroidal roller bearings*, **page 842**

For seats of bearings mounted on tapered sleeves, wider diameter tolerances are permissible. The total run-out tolerances should be the same as for bearings on cylindrical seats (*Tolerances for bearing seats and abutments*, **page 144**).

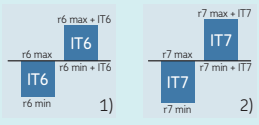
Suitable tolerances are listed in **table 10**, **page 152**. They are valid for moderate speeds and moderate precision requirements.

**Table 6**

**Tolerances for solid steel shafts – seats for radial roller bearings**[1]

| Conditions | Shaft diameter | Dimensional tolerance[2] | Total radial run-out tolerance[3] | Total axial run-out tolerance[3] | Ra |
|---|---|---|---|---|---|
| | mm | – | – | – | µm |
| **Rotating inner ring load or direction of load indeterminate** | | | | | |
| Light loads (P ≤ 0,05 C) | ≤ 25 | j6 | IT5/2 | IT5 | 0,8 |
| | > 25 to 60 | k6 | IT5/2 | IT5 | 0,8 |
| | > 60 to 140 | m6 | IT5/2 | IT5 | 0,8 |
| Normal to heavy loads (0,05 C < P ≤ 0,1 C) | ≤ 30 | k6 | IT5/2 | IT5 | 0,8 |
| | > 30 to 50 | m5 | IT5/2 | IT5 | 0,8 |
| | > 50 to 65 | n5 | IT5/2 | IT5 | 0,8 |
| | > 65 to 100 | n6 | IT5/2 | IT5 | 0,8 |
| | > 100 to 280 | p6 | IT5/2 | IT5 | 1,6 |
| | > 280 to 500 | r6 | IT5/2 | IT5 | 1,6 |
| | > 500 | r7 | IT6/2 | IT6 | 3,2 |
| Heavy to very heavy loads and high peak loads under difficult operating conditions (P > 0,1 C) | > 50 to 65 | n5 | IT5/2 | IT5 | 0,8 |
| | > 65 to 85 | n6 | IT5/2 | IT5 | 0,8 |
| | > 85 to 140 | p6 | IT5/2 | IT5 | 0,8 |
| | > 140 to 300 | r6 | IT5/2 | IT5 | 1,6 |
| | > 300 to 500 | r6 + IT6[4] | IT5/2 | IT5 | 1,6 |
| | > 500 | r7 + IT7[4] | IT6/2 | IT6 | 3,2 |
| **Stationary inner ring load** | | | | | |
| Easy axial displacement of inner ring on shaft desirable | | g6[5] | IT5/2 | IT5 | 1,6 |
| Easy axial displacement of inner ring on shaft unnecessary | | h6 | IT5/2 | IT5 | 1,6 |
| **Axial loads only** | | j6 | IT5/2 | IT5 | 1,6 |

1) For needle roller bearings, refer to the relevant sections under *Needle roller bearings*, **page 581**.
2) The envelope requirement (symbol Ⓔ from ISO 14405-1) is not shown but applies to all tolerance classes.
3) Values listed are for bearings to Normal tolerances. For bearings with tighter tolerance classes, use the recommendations in **table 2**, **page 144**.
4) Shifted tolerance field.




5) Depending on bearing size, a shifted g6Ⓔ tolerance may be needed to obtain a loose fit.

Table 7

**Tolerances for solid steel shafts – seats for thrust bearings**[1]

| Conditions | Shaft diameter | Dimensional tolerance[2] | Total radial run-out tolerance | Total axial run-out tolerance | Ra |
|---|---|---|---|---|---|
| | mm | – | – | – | µm |
| **Axial loads only on thrust ball bearings** | | | | | |
| | | h6 | IT5/2 | IT5 | 1,6[3] |
| **Combined radial and axial loads on spherical roller thrust bearings** | | | | | |
| Stationary load on shaft washer | all | j6 | IT5/2 | IT5 | 1,6[3] |
| Rotating load on shaft washer, or direction of load indeterminate | ≤ 200 | k6 | IT5/2 | IT5 | 1,6[3] |
| | > 200 to 400 | m6 | IT5/2 | IT5 | 1,6 |
| | > 400 | n6 | IT5/2 | IT5 | 1,6 |

1) For cylindrical roller thrust bearings, refer to *Design considerations*, page 885. For needle roller thrust bearings, refer to *Design considerations*, page 903.
2) The envelope requirement (symbol Ⓔ from ISO 14405-1) is not shown but applies to all tolerance classes.
3) For d ≤ 80 mm, use Ra = 0,8 µm.

**Table 8**

**Tolerances for cast iron and steel housings – seats for radial bearings**[1]

| | Conditions | Dimensional tolerance[2][3] | Total radial run-out tolerance | Total axial run-out tolerance | Ra[6] | Displacement of outer ring |
|---|---|---|---|---|---|---|
| | | – | – | – | µm | – |
| *For non-split housings only* | **Rotating outer ring load** | | | | | |
| | Heavy loads on bearings in thin-walled housings, heavy peak loads (P > 0,1 C) | P7 | IT6/2 | IT6 | 3,2 | Cannot be displaced |
| | Normal to heavy loads (P > 0,05 C) | N7 | IT6/2 | IT6 | 3,2 | Cannot be displaced |
| | Light and variable loads (P ≤ 0,05 C) | M7 | IT6/2 | IT6 | 3,2 | Cannot be displaced |
| | **Direction of load indeterminate** | | | | | |
| | Heavy peak loads | M7 | IT6/2 | IT6 | 3,2 | Cannot be displaced |
| | Normal to heavy loads (P > 0,05 C), axial displacement of outer ring unnecessary | K7[5] | IT6/2 | IT6 | 3,2 | In most cases, cannot be displaced |
| *For non-split housings and split housings* | **Direction of load indeterminate** | | | | | |
| | Light to normal loads (P ≤ 0,1 C), axial displacement of outer ring desirable | J7 | IT6/2 | IT6 | 3,2 | In most cases, can be displaced |
| | **Stationary outer ring load** | | | | | |
| | Loads of all kinds | H7[3] | IT6/2 | IT6 | 3,2 | Can be displaced |
| | Light to normal loads (P ≤ 0,1 C) with simple working conditions | H8[3] | IT6/2 | IT6 | 3,2 | Can be displaced |
| | Thermal expansion of the shaft | G7[4] | IT6/2 | IT6 | 3,2 | Can be displaced |

1) For drawn cup, alignment and combined needle roller bearings, refer to *Shaft and housing tolerances*, page 610.
2) The envelope requirement (symbol Ⓔ from ISO 14405-1) is not shown but applies to all tolerance classes.
3) For large bearings (D > 250 mm), or temperature differences between the outer ring and housing > 10 °C *(18 °F)*, tolerance class G7Ⓔ should be used instead of tolerance class H7Ⓔ.
4) For large bearings (D > 500 mm), or temperature differences between the outer ring and housing > 10 °C *(18 °F)*, tolerance class F7Ⓔ should be used instead of tolerance class G7Ⓔ.
5) A split housing is allowed provided housing halves are well aligned during machining of the housing, with relief chamfers at the split.
6) For D > 500 mm, use Ra = 6,3 µm.

Table 9

**Tolerances for cast iron and steel housings – seats for thrust bearings**[1]

| Conditions | Dimensional tolerance[2] | Total axial run-out tolerance | Ra | Remarks |
|---|---|---|---|---|
| | – | – | µm | – |
| **Axial loads only** | | | | |
| Thrust ball bearings | H8 | IT7 | 6,3 | For less precise bearing arrangements, there can be a radial clearance of up to 0,001 D. |
| Spherical roller thrust bearings where separate bearings provide radial location | – | IT6 | | Housing washer must be fitted with an adequate radial gap so that no radial load can act on the thrust bearings. |
| **Combined radial and axial loads on spherical roller thrust bearings** | | | | |
| Stationary load on housing washer arrangements | H7 | IT6 | 3,2[3] | For additional information, refer to *Design considerations*, page 918. |
| Rotating load on housing washer | M7 | IT6 | 3,2[3] | |

[1] For cylindrical roller thrust bearings, refer to *Design considerations*, page 885. For needle roller thrust bearings, refer to *Design considerations*, page 903.
[2] The envelope requirement (symbol Ⓔ from ISO 14405-1) is not shown but applies to all tolerance classes.
[3] For D < 80 mm, use Ra = 1,6 µm.

Table 10

**Tolerances for seats of bearings mounted on tapered sleeves**

| Shaft diameter | | Diameter tolerance | | Total radial run-out |
|---|---|---|---|---|
| d | | | | |
| Nominal | | h9Ⓔ | | IT5/2 |
| > | ≤ | U | L | max. |
| mm | | µm | | mm |
| **10** | **18** | 0 | –43 | 4 |
| **18** | **30** | 0 | –52 | 5 |
| **30** | **50** | 0 | –62 | 6 |
| **50** | **80** | 0 | –74 | 7 |
| **80** | **120** | 0 | –87 | 8 |
| **120** | **180** | 0 | –100 | 9 |
| **180** | **250** | 0 | –115 | 10 |
| **250** | **315** | 0 | –130 | 12 |
| **315** | **400** | 0 | –140 | 13 |
| **400** | **500** | 0 | –155 | 14 |
| **500** | **630** | 0 | –175 | 16 |
| **630** | **800** | 0 | –200 | 18 |
| **800** | **1 000** | 0 | –230 | 20 |
| **1 000** | **1 250** | 0 | –260 | 24 |

# Tolerances and resultant fits

The tables in this section provide information about bearing tolerances, seat tolerances and resultant fits (**fig. 7**). These should enable you to determine easily the maximum and minimum values of fits when using ISO tolerance classes for bearing seats and bearings with Normal tolerances for the bore and outside diameter. The *SKF Bearing Calculator* (skf.com/bearingcalculator) provides a similar function for every individual bearing.

The tables cannot be used for tapered roller bearings when d ≤ 30 mm or D ≤ 150 mm or for thrust bearings when D ≤ 150 mm. The diameter tolerances for these bearings deviate from the Normal tolerances for other rolling bearings.

The tables list:

- the upper and lower limits of bore or outside diameter deviations for bearings with Normal tolerances
- the upper and lower limits of shaft or housing bore diameter deviations for relevant tolerance classes in accordance with ISO 2862
- the smallest and largest values of the theoretical interference (–) or clearance (+)
- the smallest and largest values of the ±3σ probable interference (–) or clearance (+)

The appropriate values for shaft seats are listed for the following tolerance classes:

- f5, f6, g5, g6, h5 (**table 11**, **page 154**)
- h6, h8, h9, j5, j6 (**table 12**, **page 156**)
- js4, js5, js6, js7, k4 (**table 13**, **page 158**)
- k5, k6, m5, m6, n5 (**table 14**, **page 160**)
- n6, p6, p7, r6, r7 (**table 15**, **page 162**)
- r6+IT6, r7+IT7 (**table 16**, **page 164**)

The appropriate values for housing seats are listed for the following tolerance classes:

- F7, G6, G7, H5, H6 (**table 17**, **page 166**)
- H7, H8, H9, H10, J6 (**table 18**, **page 168**)
- J7, JS5, JS6, JS7, K5 (**table 19**, **page 170**)
- K6, K7, M5, M6, M7 (**table 20**, **page 172**)
- N6, N7, P6, P7 (**table 21**, **page 174**)

**Fig. 7**

**Shaft and housing tolerances and resultant fits**

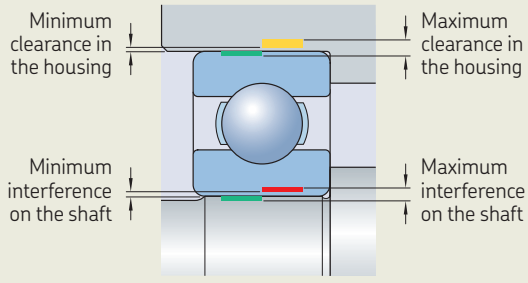


Table 11

**Shaft tolerances and resultant fits**

| Shaft Nominal diameter d | | Bearing Bore diameter tolerance $t_{\Delta dmp}$ | | Shaft diameter deviations, resultant fits[1] Tolerance classes | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | f5Ⓔ | | f6Ⓔ | | g5Ⓔ | | g6Ⓔ | | h5Ⓔ | |
| | | | | Deviations (shaft diameter)<br>Theoretical interference (–)<br>Probable interference (–) | | | | | | | | | |
| over | incl. | low | high | | | | | | | | | | |
| mm | | µm | | µm | | | | | | | | | |
| – | 3 | –8 | 0 | –6 | –10 | –6 | –12 | –2 | –6 | –2 | –8 | 0 | –4 |
| | | | | –2 | +10 | –2 | +12 | –6 | +6 | –6 | +8 | –8 | +4 |
| | | | | –1 | +9 | 0 | +10 | –5 | +5 | –4 | +6 | –7 | +3 |
| 3 | 6 | –8 | 0 | –10 | –15 | –10 | –18 | –4 | –9 | –4 | –12 | 0 | –5 |
| | | | | +2 | +15 | +2 | +18 | –4 | +9 | –4 | +12 | –8 | +5 |
| | | | | +3 | +14 | +4 | +16 | –3 | +8 | –2 | +10 | –7 | +4 |
| 6 | 10 | –8 | 0 | –13 | –19 | –13 | –22 | –5 | –11 | –5 | –14 | 0 | –6 |
| | | | | +5 | +19 | +5 | +22 | –3 | +11 | –3 | +14 | –8 | +6 |
| | | | | +7 | +17 | +7 | +20 | –1 | +9 | –1 | +12 | –6 | +4 |
| 10 | 18 | –8 | 0 | –16 | –24 | –16 | –27 | –6 | –14 | –6 | –17 | 0 | –8 |
| | | | | +8 | +24 | +8 | +27 | –2 | +14 | –2 | +17 | –8 | +8 |
| | | | | +10 | +22 | +10 | +25 | 0 | +12 | 0 | +15 | –6 | +6 |
| 18 | 30 | –10 | 0 | –20 | –29 | –20 | –33 | –7 | –16 | –7 | –20 | 0 | –9 |
| | | | | +10 | +29 | +10 | +33 | –3 | +16 | –3 | +20 | –10 | +9 |
| | | | | +12 | +27 | +13 | +30 | –1 | +14 | 0 | +17 | –8 | +7 |
| 30 | 50 | –12 | 0 | –25 | –36 | –25 | –41 | –9 | –20 | –9 | –25 | 0 | –11 |
| | | | | +13 | +36 | +13 | +41 | –3 | +20 | –3 | +25 | –12 | +11 |
| | | | | +16 | +33 | +17 | +37 | 0 | +17 | +1 | +21 | –9 | +8 |
| 50 | 80 | –15 | 0 | –30 | –43 | –30 | –49 | –10 | –23 | –10 | –29 | 0 | –13 |
| | | | | +15 | +43 | +15 | +49 | –5 | +23 | –5 | +29 | –15 | +13 |
| | | | | +19 | +39 | +19 | +45 | –1 | +19 | –1 | +25 | –11 | +9 |
| 80 | 120 | –20 | 0 | –36 | –51 | –36 | –58 | –12 | –27 | –12 | –34 | 0 | –15 |
| | | | | +16 | +51 | +16 | +58 | –8 | +27 | –8 | +34 | –20 | +15 |
| | | | | +21 | +46 | +22 | +52 | –3 | +22 | –2 | +28 | –15 | +10 |
| 120 | 180 | –25 | 0 | –43 | –61 | –43 | –68 | –14 | –32 | –14 | –39 | 0 | –18 |
| | | | | +18 | +61 | +18 | +68 | –11 | +32 | –11 | +39 | –25 | +18 |
| | | | | +24 | +55 | +25 | +61 | –5 | +26 | –4 | +32 | –19 | +12 |
| 180 | 250 | –30 | 0 | –50 | –70 | –50 | –79 | –15 | –35 | –15 | –44 | 0 | –20 |
| | | | | +20 | +70 | +20 | +79 | –15 | +35 | –15 | +44 | –30 | +20 |
| | | | | +26 | +64 | +28 | +71 | –9 | +29 | –7 | +36 | –24 | +14 |
| 250 | 315 | –35 | 0 | –56 | –79 | –56 | –88 | –17 | –40 | –17 | –49 | 0 | –23 |
| | | | | +21 | +79 | +21 | +88 | –18 | +40 | –18 | +49 | –35 | +23 |
| | | | | +29 | +71 | +30 | +79 | –10 | +32 | –9 | +40 | –27 | +15 |
| 315 | 400 | –45 | 0 | –62 | –87 | –62 | –98 | –18 | –43 | –18 | –54 | 0 | –25 |
| | | | | +22 | +87 | +22 | +98 | –22 | +43 | –22 | +54 | –40 | +25 |
| | | | | +30 | +79 | +33 | +87 | –14 | +35 | –11 | +43 | –32 | +17 |
| 400 | 500 | –45 | 0 | –68 | –95 | –68 | –108 | –20 | –47 | –20 | –60 | 0 | –27 |
| | | | | +23 | +95 | +23 | +108 | –25 | +47 | –25 | +60 | –45 | +27 |
| | | | | +32 | +86 | +35 | +96 | –16 | +38 | –13 | +48 | –36 | +18 |
| 500 | 630 | –50 | 0 | –76 | –104 | –76 | –120 | –22 | –50 | –22 | –66 | 0 | –28 |
| | | | | +26 | +104 | +26 | +120 | –28 | +50 | –28 | +66 | –50 | +28 |
| | | | | +36 | +94 | +39 | +107 | –18 | +40 | –15 | +53 | –40 | +18 |

**Table 11**

## Shaft tolerances and resultant fits

| **Shaft** Nominal diameter d | | **Bearing** Bore diameter tolerance $t_{\Delta dmp}$ | | **Shaft diameter deviations, resultant fits**[1] Tolerance classes | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | f5Ⓔ | | f6Ⓔ | | g5Ⓔ | | g6Ⓔ | | h5Ⓔ | |
| | | | | Deviations (shaft diameter) | | | | | | | | | |
| | | | | Theoretical interference (–) | | | | | | | | | |
| over | incl. | low | high | Probable interference (–) | | | | | | | | | |
| mm | | µm | | µm | | | | | | | | | |
| **630** | **800** | –75 | 0 | –80 | –112 | –80 | –130 | –24 | –56 | –24 | –74 | 0 | –32 |
| | | | | +5 | +112 | +5 | +130 | –51 | +56 | –51 | +74 | –75 | +32 |
| | | | | +17 | +100 | +22 | +113 | –39 | +44 | –34 | +57 | –63 | +20 |
| **800** | **1 000** | –100 | 0 | –86 | –122 | –86 | –142 | –26 | –62 | –26 | –82 | 0 | –36 |
| | | | | –14 | +122 | –14 | +142 | –74 | +62 | –74 | +82 | –100 | +36 |
| | | | | 0 | +108 | +6 | +122 | –60 | +48 | –54 | +62 | –86 | +22 |
| **1 000** | **1 250** | –125 | 0 | –98 | –140 | –98 | –164 | –28 | –70 | –28 | –94 | 0 | –42 |
| | | | | –27 | +140 | –27 | +164 | –97 | +70 | –97 | +94 | –125 | +42 |
| | | | | –10 | +123 | –3 | +140 | –80 | +53 | –73 | +70 | –108 | +25 |
| **1 250** | **1 600** | –160 | 0 | –110 | –160 | –110 | –188 | –30 | –80 | –30 | –108 | 0 | –50 |
| | | | | –50 | +160 | –50 | +188 | –130 | +80 | –130 | +108 | –160 | +50 |
| | | | | –29 | +139 | –20 | +158 | –109 | +59 | –100 | +78 | –139 | +29 |
| **1 600** | **2 000** | –200 | 0 | –120 | –180 | –120 | –212 | –32 | –92 | –32 | –124 | 0 | –60 |
| | | | | –80 | +180 | –80 | +212 | –168 | +92 | –168 | +124 | –200 | +60 |
| | | | | –55 | +155 | –45 | +177 | –143 | +67 | –133 | +89 | –175 | +35 |

[1] Values are valid for most bearings with Normal tolerances. For exceptions, refer to *Tolerances and resultant fits*, page 153.

Table 12

## Shaft tolerances and resultant fits

| Shaft Nominal diameter d | | Bearing Bore diameter tolerance $t_{\Delta dmp}$ | | Shaft diameter deviations, resultant fits[1] Tolerance classes | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | h6Ⓔ | | h8Ⓔ | | h9Ⓔ | | j5Ⓔ | | j6Ⓔ | |
| | | | | Deviations (shaft diameter) | | | | | | | | | |
| | | | | Theoretical interference (–)/clearance (+) | | | | | | | | | |
| > | ≤ | L | U | Probable interference (–)/clearance (+) | | | | | | | | | |
| mm | | µm | | µm | | | | | | | | | |
| – | 3 | –8 | 0 | 0 | –6 | 0 | –14 | 0 | –25 | +2 | –2 | +4 | –2 |
| | | | | –8 | +6 | –8 | +14 | –8 | +25 | –10 | +2 | –12 | +2 |
| | | | | –6 | +4 | –6 | +12 | –5 | +22 | –9 | +1 | –10 | 0 |
| 3 | 6 | –8 | 0 | 0 | –8 | 0 | –18 | 0 | –30 | +3 | –2 | +6 | –2 |
| | | | | –8 | +8 | –8 | +18 | –8 | +30 | –11 | +2 | –14 | +2 |
| | | | | –6 | +6 | –5 | +15 | –5 | +27 | –10 | +1 | –12 | 0 |
| 6 | 10 | –8 | 0 | 0 | –9 | 0 | –22 | 0 | –36 | +4 | –2 | +7 | –2 |
| | | | | –8 | +9 | –8 | +22 | –8 | +36 | –12 | +2 | –15 | +2 |
| | | | | –6 | +7 | –5 | +19 | –5 | +33 | –10 | 0 | –13 | 0 |
| 10 | 18 | –8 | 0 | 0 | –11 | 0 | –27 | 0 | –43 | +5 | –3 | +8 | –3 |
| | | | | –8 | +11 | –8 | +27 | –8 | +43 | –13 | +3 | –16 | +3 |
| | | | | –6 | +9 | –5 | +24 | –5 | +40 | –11 | +1 | –14 | +1 |
| 18 | 30 | –10 | 0 | 0 | –13 | 0 | –33 | 0 | –52 | +5 | –4 | +9 | –4 |
| | | | | –10 | +13 | –10 | +33 | –10 | +52 | –15 | +4 | –19 | +4 |
| | | | | –7 | +10 | –6 | +29 | –6 | +48 | –13 | +2 | –16 | +1 |
| 30 | 50 | –12 | 0 | 0 | –16 | 0 | –39 | 0 | –62 | +6 | –5 | +11 | –5 |
| | | | | –12 | +16 | –12 | +39 | –12 | +62 | –18 | +5 | –23 | +5 |
| | | | | –8 | +12 | –7 | +34 | –7 | +57 | –15 | +2 | –19 | +1 |
| 50 | 80 | –15 | 0 | 0 | –19 | 0 | –46 | 0 | –74 | +6 | –7 | +12 | –7 |
| | | | | –15 | +19 | –15 | +46 | –15 | +74 | –21 | +7 | –27 | +7 |
| | | | | –11 | +15 | –9 | +40 | –9 | +68 | –17 | +3 | –23 | +3 |
| 80 | 120 | –20 | 0 | 0 | –22 | 0 | –54 | 0 | –87 | +6 | –9 | +13 | –9 |
| | | | | –20 | +22 | –20 | +54 | –20 | +87 | –26 | +9 | –33 | +9 |
| | | | | –14 | +16 | –12 | +46 | –12 | +79 | –21 | +4 | –27 | +3 |
| 120 | 180 | –25 | 0 | 0 | –25 | 0 | –63 | 0 | –100 | +7 | –11 | +14 | –11 |
| | | | | –25 | +25 | –25 | +63 | –25 | +100 | –32 | +11 | –39 | +11 |
| | | | | –18 | +18 | –15 | +53 | –15 | +90 | –26 | +5 | –32 | +4 |
| 180 | 250 | –30 | 0 | 0 | –29 | 0 | –72 | 0 | –115 | +7 | –13 | +16 | –13 |
| | | | | –30 | +29 | –30 | +72 | –30 | +115 | –37 | +13 | –46 | +13 |
| | | | | –22 | +21 | –18 | +60 | –17 | +102 | –31 | +7 | –38 | +5 |
| 250 | 315 | –35 | 0 | 0 | –32 | 0 | –81 | 0 | –130 | +7 | –16 | +16 | –16 |
| | | | | –35 | +32 | –35 | +81 | –35 | +130 | –42 | +16 | –51 | +16 |
| | | | | –26 | +23 | –22 | +68 | –20 | +115 | –34 | +8 | –42 | +7 |
| 315 | 400 | –40 | 0 | 0 | –36 | 0 | –89 | 0 | –140 | +7 | –18 | +18 | –18 |
| | | | | –40 | +36 | –40 | +89 | –40 | +140 | –47 | +18 | –58 | +18 |
| | | | | –29 | +25 | –25 | +74 | –23 | +123 | –39 | +10 | –47 | +7 |
| 400 | 500 | –45 | 0 | 0 | –40 | 0 | –97 | 0 | –155 | +7 | –20 | +20 | –20 |
| | | | | –45 | +40 | –45 | +97 | –45 | +155 | –52 | +20 | –65 | +20 |
| | | | | –33 | +28 | –28 | +80 | –26 | +136 | –43 | +11 | –53 | +8 |

**Table 12**

## Shaft tolerances and resultant fits

| **Shaft** Nominal diameter d | | **Bearing** Bore diameter tolerance $t_{\Delta dmp}$ | | **Shaft diameter deviations, resultant fits**[1] Tolerance classes | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | h6Ⓔ | | h8Ⓔ | | h9Ⓔ | | j5Ⓔ | | j6Ⓔ | |
| | | | | Deviations (shaft diameter)<br>Theoretical interference (–)/clearance (+)<br>Probable interference (–)/clearance (+) | | | | | | | | | |
| > | ≤ | L | U | | | | | | | | | | |
| mm | | µm | | µm | | | | | | | | | |
| **500** | **630** | –50 | 0 | 0 | –44 | 0 | –110 | 0 | –175 | – | – | –22 | –22 |
| | | | | –50 | +44 | –50 | +110 | –50 | +175 | – | – | –72 | +22 |
| | | | | –37 | +31 | –31 | +91 | –29 | +154 | – | – | –59 | +9 |
| **630** | **800** | –75 | 0 | 0 | –50 | 0 | –125 | 0 | –200 | – | – | +25 | –25 |
| | | | | –75 | +50 | –75 | +125 | –75 | +200 | – | – | –100 | +25 |
| | | | | –58 | +33 | –48 | +98 | –45 | +170 | – | – | –83 | +8 |
| **800** | **1 000** | –100 | 0 | 0 | –56 | 0 | –140 | 0 | –230 | – | – | +28 | –28 |
| | | | | –100 | +56 | –100 | +140 | –100 | +230 | – | – | –128 | +28 |
| | | | | –80 | +36 | –67 | +107 | –61 | +191 | – | – | –108 | +8 |
| **1 000** | **1 250** | –125 | 0 | 0 | –66 | 0 | –165 | 0 | –260 | – | – | +33 | –33 |
| | | | | –125 | +66 | –125 | +165 | –125 | +260 | – | – | –158 | +33 |
| | | | | –101 | +42 | –84 | +124 | –77 | +212 | – | – | –134 | +9 |
| **1 250** | **1 600** | –160 | 0 | 0 | –78 | 0 | –195 | 0 | –310 | – | – | +39 | –39 |
| | | | | –160 | +78 | –160 | +195 | –160 | +310 | – | – | –199 | +39 |
| | | | | –130 | +48 | –109 | +144 | –100 | +250 | – | – | –169 | +9 |
| **1 600** | **2 000** | –200 | 0 | 0 | –92 | 0 | –230 | 0 | –370 | – | – | +46 | –46 |
| | | | | –200 | +92 | –200 | +230 | –200 | +370 | – | – | –246 | +46 |
| | | | | –165 | +57 | –138 | +168 | –126 | +296 | – | – | –211 | +11 |

[1] Values are valid for most bearings with Normal tolerances. For exceptions, refer to *Tolerances and resultant fits*, page 153.

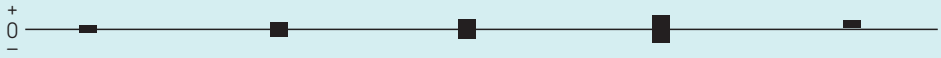
Table 13

## Shaft tolerances and resultant fits

| Shaft Nominal diameter | | Bearing Bore diameter tolerance | | Shaft diameter deviations, resultant fits[1] Tolerance classes | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | | $t_{\Delta dmp}$ | | js4Ⓔ | | js5Ⓔ | | js6Ⓔ | | js7Ⓔ | | k4Ⓔ | |
| | | | | Deviations (shaft diameter) | | | | | | | | | |
| | | | | Theoretical interference (–)/clearance (+) | | | | | | | | | |
| over | incl. | low | high | Probable interference (–)/clearance (+) | | | | | | | | | |
| mm | | µm | | µm | | | | | | | | | |
| – | 3 | –8 | 0 | +1,5 | –1,5 | +2 | –2 | +3 | –3 | +5 | –5 | +3 | 0 |
| | | | | –9,5 | +1,5 | –10 | +2 | –11 | +3 | –13 | +5 | –11 | 0 |
| | | | | –8,5 | +0,5 | –9 | +1 | –9 | +1 | –11 | +3 | –10 | –1 |
| 3 | 6 | –8 | 0 | +2 | –2 | +2,5 | –2,5 | +4 | –4 | +6 | –6 | +5 | +1 |
| | | | | –10 | +2 | –10,5 | +2,5 | –12 | +4 | –14 | +6 | –13 | –1 |
| | | | | –9 | +1 | –9 | +1 | –10 | +2 | –12 | +4 | –12 | –2 |
| 6 | 10 | –8 | 0 | +2 | –2 | +3 | –3 | +4,5 | –4,5 | +7,5 | –7,5 | +5 | +1 |
| | | | | –10 | +2 | –11 | +3 | –12,5 | +4,5 | –15,5 | +7,5 | –13 | –1 |
| | | | | –9 | +1 | –9 | +1 | –11 | +3 | –13 | +5 | –12 | –2 |
| 10 | 18 | –8 | 0 | +2,5 | –2,5 | +4 | –4 | +5,5 | –5,5 | +9 | –9 | +6 | +1 |
| | | | | –10,5 | +2,5 | –12 | +4 | –13,5 | +5,5 | –17 | +9 | –14 | –1 |
| | | | | –9,5 | +1,5 | –10 | +2 | –11 | +3 | –14 | +6 | –13 | –2 |
| 18 | 30 | –10 | 0 | +3 | –3 | +4,5 | –4,5 | +6,5 | –6,5 | +10,5 | –10,5 | +8 | +2 |
| | | | | –13 | +3 | –14,5 | +4,5 | –16,5 | +6,5 | –20,5 | +10,5 | –18 | –2 |
| | | | | –10,5 | +1,5 | –12 | +2 | –14 | +4 | –17 | +7 | –16 | –4 |
| 30 | 50 | –12 | 0 | +3,5 | –3,5 | +5,5 | –5,5 | +8 | –8 | +12,5 | –12,5 | +9 | +2 |
| | | | | –15,5 | +3,5 | –17,5 | +5,5 | –20 | +8 | –24,5 | +12,5 | –21 | –2 |
| | | | | –13,5 | +1,5 | –15 | +3 | –16 | +4 | –20 | +8 | –19 | –4 |
| 50 | 80 | –15 | 0 | +4 | –4 | +6,5 | –6,5 | +9,5 | –9,5 | +15 | –15 | +10 | +2 |
| | | | | –19 | +4 | –21,5 | +6,5 | –24,5 | +9,5 | –30 | +15 | –25 | –2 |
| | | | | –15,5 | +1,5 | –18 | +3 | –20 | +5 | –25 | +10 | –22 | –5 |
| 80 | 120 | –20 | 0 | +5 | –5 | +7,5 | –7,5 | +11 | –11 | +17,5 | –17,5 | +13 | +3 |
| | | | | –25 | +5 | –27,5 | +7,5 | –31 | +11 | –37,5 | +17,5 | –33 | –3 |
| | | | | –22 | +2 | –23 | +3 | –25 | +5 | –31 | +11 | –30 | –6 |
| 120 | 180 | –25 | 0 | +6 | –6 | +9 | –9 | +12,5 | –12,5 | +20 | –20 | +15 | +3 |
| | | | | –31 | +6 | –34 | +9 | –37,5 | +12,5 | –45 | +20 | –40 | –3 |
| | | | | –27 | +2 | –28 | +3 | –31 | +6 | –37 | +12 | –36 | –7 |
| 180 | 250 | –30 | 0 | +7 | –7 | +10 | –10 | +14,5 | –14,5 | +23 | –23 | +18 | +4 |
| | | | | –37 | +7 | –40 | +10 | –44,5 | +14,5 | –53 | +23 | –48 | –4 |
| | | | | –32 | +2 | –34 | +4 | –36 | +6 | –43 | +13 | –43 | –9 |
| 250 | 315 | –35 | 0 | +8 | –8 | +11,5 | –11,5 | +16 | –16 | +26 | –26 | +20 | +4 |
| | | | | –4 | +8 | –46,5 | +11,5 | –51 | +16 | –61 | +26 | –55 | –4 |
| | | | | –37 | +2 | –39 | +4 | –42 | +7 | –49 | +14 | –49 | –10 |
| 315 | 400 | –40 | 0 | +9 | –9 | +12,5 | –12,5 | +18 | –18 | +28,5 | –28,5 | +22 | +4 |
| | | | | –49 | +9 | –52,5 | +12,5 | –58 | +18 | –68,5 | +28,5 | –62 | –4 |
| | | | | –42 | +2 | –44 | +4 | –47 | +7 | –55 | +15 | –55 | –11 |
| 400 | 500 | –45 | 0 | +10 | –10 | +13,5 | –13,5 | +20 | –20 | +31,5 | –31,5 | +25 | +5 |
| | | | | –55 | +10 | –58,5 | +13,5 | –65 | +20 | –76,5 | +31,5 | –70 | –5 |
| | | | | –48 | +3 | –49 | +4 | –53 | +8 | –62 | +17 | –63 | –12 |
| 500 | 630 | –50 | 0 | – | – | +14 | –14 | +22 | –22 | +35 | –35 | – | – |
| | | | | – | – | –64 | +14 | –72 | +22 | –85 | +35 | – | – |
| | | | | – | – | –54 | +4 | –59 | +9 | –69 | +19 | – | – |

**Table 13**

## Shaft tolerances and resultant fits




| Shaft<br>Nominal diameter | | Bearing<br>Bore diameter tolerance | | Shaft diameter deviations, resultant fits[1]<br>Tolerance classes | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | | $t_{\Delta dmp}$ | | js4Ⓔ | | js5Ⓔ | | js6Ⓔ | | js7Ⓔ | | k4Ⓔ | |
| | | | | Deviations (shaft diameter)<br>Theoretical interference (–)/clearance (+)<br>Probable interference (–)/clearance (+) | | | | | | | | | |
| over | incl. | low | high | | | | | | | | | | |
| mm | | µm | | µm | | | | | | | | | |
| **630** | **800** | –75 | 0 | – | – | +16 | –16 | +25 | –25 | +40 | –40 | – | – |
| | | | | – | – | –91 | +16 | –100 | +25 | –115 | +40 | – | – |
| | | | | – | – | –79 | +4 | –83 | +8 | –93 | +18 | – | – |
| **800** | **1 000** | –100 | 0 | – | – | +18 | –18 | +28 | –28 | +45 | –45 | – | – |
| | | | | – | – | –118 | +18 | –128 | +28 | –145 | +45 | – | – |
| | | | | – | – | –104 | +4 | –108 | +8 | –118 | +18 | – | – |
| **1 000** | **1 250** | –125 | 0 | – | – | +21 | –21 | +33 | –33 | +52 | –52 | – | – |
| | | | | – | – | –146 | +21 | –158 | +33 | –177 | +52 | – | – |
| | | | | – | – | –129 | +4 | –134 | +9 | –145 | +20 | – | – |
| **1 250** | **1 600** | –160 | 0 | – | – | +25 | –25 | +39 | –39 | +62 | –62 | – | – |
| | | | | – | – | –185 | +25 | –199 | +39 | –222 | +62 | – | – |
| | | | | – | – | –164 | +4 | –169 | +9 | –182 | +22 | – | – |
| **1 600** | **2 000** | –200 | 0 | – | – | +30 | –30 | +46 | –46 | +75 | –75 | – | – |
| | | | | – | – | –230 | +30 | –246 | +46 | –275 | +75 | – | – |
| | | | | – | – | –205 | +5 | –211 | +11 | –225 | +25 | – | – |

[1] Values are valid for most bearings with Normal tolerances. For exceptions, refer to *Tolerances and resultant fits*, page 153.

Table 14

**Shaft tolerances and resultant fits**

| Shaft<br>Nominal diameter | | Bearing<br>Bore diameter tolerance | | Shaft diameter deviations, resultant fits[1]<br>Tolerance classes | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | | $t_{\Delta dmp}$ | | k5Ⓔ | | k6Ⓔ | | m5Ⓔ | | m6Ⓔ | | n5Ⓔ | |
| | | | | Deviations (shaft diameter)<br>Theoretical interference (–)<br>Probable interference (–) | | | | | | | | | |
| > | ≤ | L | U | | | | | | | | | | |
| mm | | µm | | µm | | | | | | | | | |
| – | 3 | –8 | 0 | +4 | 0 | +6 | 0 | +6 | +2 | +8 | +2 | +8 | +4 |
| | | | | –12 | 0 | –14 | 0 | –14 | –2 | –16 | –2 | –16 | –4 |
| | | | | –11 | –1 | –12 | –2 | –13 | –3 | –14 | –4 | –15 | –5 |
| 3 | 6 | –8 | 0 | +6 | +1 | +9 | +1 | +9 | +4 | +12 | +4 | +13 | +8 |
| | | | | –14 | –1 | –17 | –1 | –17 | –4 | –20 | –4 | –21 | –8 |
| | | | | –13 | –2 | –15 | –3 | –16 | –5 | –18 | –6 | –20 | –9 |
| 6 | 10 | –8 | 0 | +7 | +1 | +10 | +1 | +12 | +6 | +15 | +6 | +16 | +10 |
| | | | | –15 | –1 | –18 | –1 | –20 | –6 | –23 | –6 | –24 | –10 |
| | | | | –13 | –3 | –16 | –3 | –18 | –8 | –21 | –8 | –22 | –12 |
| 10 | 18 | –8 | 0 | +9 | +1 | +12 | +1 | 15 | +7 | +18 | +7 | +20 | +12 |
| | | | | –17 | –1 | –20 | –1 | –23 | –7 | –26 | –7 | –28 | –12 |
| | | | | –15 | –3 | –18 | –3 | –21 | –9 | –24 | –9 | –26 | –14 |
| 18 | 30 | –10 | 0 | +11 | +2 | +15 | +2 | +17 | +8 | +21 | +8 | +24 | +15 |
| | | | | –21 | –2 | –25 | –2 | –27 | –8 | –31 | –8 | –34 | –15 |
| | | | | –19 | –4 | –22 | –5 | –25 | –10 | –28 | –11 | –32 | –17 |
| 30 | 50 | –12 | 0 | +13 | +2 | +18 | +2 | +20 | +9 | +25 | +9 | +28 | +17 |
| | | | | –25 | –2 | –30 | –2 | –32 | –9 | –37 | –9 | –40 | –17 |
| | | | | –22 | –5 | –26 | –6 | –29 | –12 | –33 | –13 | –37 | –20 |
| 50 | 80 | –15 | 0 | +15 | +2 | +21 | +2 | +24 | +11 | +30 | +11 | +33 | +20 |
| | | | | –30 | –2 | –36 | –2 | –39 | –11 | –45 | –11 | –48 | –20 |
| | | | | –26 | –6 | –32 | –6 | –35 | –15 | –41 | –15 | –44 | –24 |
| 80 | 120 | –20 | 0 | +18 | +3 | +25 | +3 | +28 | +13 | +35 | +13 | +38 | +23 |
| | | | | –38 | –3 | –45 | –3 | –48 | –13 | –55 | –13 | –58 | –23 |
| | | | | –33 | –8 | –39 | –9 | –43 | –18 | –49 | –19 | –53 | –28 |
| 120 | 180 | –25 | 0 | +21 | +3 | +28 | +3 | +33 | +15 | +40 | +15 | +45 | +27 |
| | | | | –46 | –3 | –53 | –3 | –58 | –15 | –65 | –15 | –70 | –27 |
| | | | | –40 | –9 | –46 | –10 | –52 | –21 | –58 | –22 | –64 | –33 |
| 180 | 250 | –30 | 0 | +24 | +4 | +33 | +4 | +37 | +17 | +46 | +17 | +51 | +31 |
| | | | | –54 | –4 | –63 | –4 | –67 | –17 | –76 | –17 | –81 | –31 |
| | | | | –48 | –10 | –55 | –12 | –61 | –23 | –68 | –25 | –75 | –37 |
| 250 | 315 | –35 | 0 | +27 | +4 | +36 | +4 | +43 | +20 | +52 | +20 | +57 | +34 |
| | | | | –62 | –4 | –71 | –4 | –78 | –20 | –87 | –20 | –92 | –34 |
| | | | | –54 | –12 | –62 | –13 | –70 | –28 | –78 | –29 | –84 | –42 |
| 315 | 400 | –40 | 0 | +29 | +4 | +40 | +4 | +46 | +21 | +57 | +21 | +62 | +37 |
| | | | | –69 | –4 | –80 | –4 | –86 | –21 | –97 | –21 | –102 | –37 |
| | | | | –61 | –12 | –69 | –15 | –78 | –29 | –86 | –32 | –94 | –45 |
| 400 | 500 | –45 | 0 | +32 | +5 | +45 | +5 | +50 | +23 | +63 | +23 | +67 | +40 |
| | | | | –77 | –5 | –90 | –5 | –95 | –23 | –108 | –23 | –112 | –40 |
| | | | | –68 | –14 | –78 | –17 | –86 | –32 | –96 | –35 | –103 | –49 |

**Table 14**

## Shaft tolerances and resultant fits

| Shaft<br>Nominal diameter | | Bearing<br>Bore diameter tolerance | | Shaft diameter deviations, resultant fits[1]<br>Tolerance classes | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | | $t_{\Delta dmp}$ | | k5Ⓔ | | k6Ⓔ | | m5Ⓔ | | m6Ⓔ | | n5Ⓔ | |
| | | | | Deviations (shaft diameter)<br>Theoretical interference (–)<br>Probable interference (–) | | | | | | | | | |
| > | ≤ | L | U | | | | | | | | | | |
| mm | | µm | | µm | | | | | | | | | |
| **500** | **630** | –50 | 0 | +29 | 0 | +44 | 0 | +55 | +26 | +70 | +26 | +73 | +44 |
| | | | | –78 | 0 | –94 | 0 | –105 | –26 | –120 | –26 | –122 | –44 |
| | | | | –68 | –10 | –81 | –13 | –94 | –36 | –107 | –39 | –112 | –54 |
| **630** | **800** | –75 | 0 | +32 | 0 | +50 | 0 | +62 | +30 | +80 | +30 | +82 | +50 |
| | | | | –107 | 0 | –125 | 0 | –137 | –30 | –155 | –30 | –157 | –50 |
| | | | | –95 | –12 | –108 | –17 | –125 | –42 | –138 | –47 | –145 | –62 |
| **800** | **1 000** | –100 | 0 | +36 | 0 | +56 | 0 | +70 | +34 | +90 | +34 | +92 | +56 |
| | | | | –136 | 0 | –156 | 0 | –170 | –34 | –190 | –34 | –192 | –56 |
| | | | | –122 | –14 | –136 | –20 | –156 | –48 | –170 | –54 | –178 | –70 |
| **1 000** | **1 250** | –125 | 0 | +42 | 0 | +66 | 0 | +82 | +40 | +106 | +40 | +108 | +66 |
| | | | | –167 | 0 | –191 | 0 | –207 | –40 | –231 | –40 | –233 | –66 |
| | | | | –150 | –17 | –167 | –24 | –190 | –57 | –207 | –64 | –216 | –83 |
| **1 250** | **1 600** | –160 | 0 | +50 | 0 | +78 | 0 | +98 | +48 | +126 | +48 | +128 | +78 |
| | | | | –210 | 0 | –238 | 0 | –258 | –48 | –286 | –48 | –288 | –78 |
| | | | | –189 | –21 | –208 | –30 | –237 | –69 | –256 | –78 | –267 | –99 |
| **1 600** | **2 000** | –200 | 0 | +60 | 0 | +92 | 0 | +118 | +58 | +150 | +58 | +152 | +92 |
| | | | | –260 | 0 | –292 | 0 | –318 | –58 | –350 | –58 | –352 | –92 |
| | | | | –235 | –25 | –257 | –35 | –293 | –83 | –315 | –93 | –327 | –117 |

[1] Values are valid for most bearings with Normal tolerances. For exceptions, refer to *Tolerances and resultant fits*, page 153.

Table 15

## Shaft tolerances and resultant fits

| Shaft Nominal diameter | | Bearing Bore diameter tolerance | | Shaft diameter deviations, resultant fits[1] Tolerance classes | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | | $t_{\Delta dmp}$ | | n6Ⓔ | | p6Ⓔ | | p7Ⓔ | | r6Ⓔ | | r7Ⓔ | |
| | | | | Deviations (shaft diameter) | | | | | | | | | |
| | | | | Theoretical interference (–) | | | | | | | | | |
| over | incl. | low | high | Probable interference (–) | | | | | | | | | |
| mm | | µm | | µm | | | | | | | | | |
| **50** | **80** | –15 | 0 | +39 | +20 | +51 | +32 | +62 | +32 | – | – | – | – |
| | | | | –54 | –20 | –66 | –32 | –77 | –32 | – | – | – | – |
| | | | | –50 | –24 | –62 | –36 | –72 | –38 | – | – | – | – |
| **80** | **100** | –20 | 0 | +45 | +23 | +59 | +37 | +72 | +37 | +73 | +51 | +86 | +51 |
| | | | | –65 | –23 | –79 | –37 | –92 | –37 | –93 | –51 | –106 | –51 |
| | | | | –59 | –29 | –73 | –43 | –85 | –44 | –87 | –57 | –99 | –58 |
| **100** | **120** | –20 | 0 | +45 | +23 | +59 | +37 | +72 | +37 | +76 | +54 | +89 | +54 |
| | | | | –65 | –23 | –79 | –37 | –92 | –37 | –96 | –54 | –109 | –54 |
| | | | | –59 | –29 | –73 | –43 | –85 | –44 | –90 | –60 | –102 | –61 |
| **120** | **140** | –25 | 0 | +52 | +27 | +68 | +43 | +83 | +43 | +88 | +63 | +103 | +63 |
| | | | | –77 | –27 | –93 | –43 | –108 | –43 | –113 | –63 | –128 | –63 |
| | | | | –70 | –34 | –86 | –50 | –100 | –51 | –106 | –70 | –120 | –71 |
| **140** | **160** | –25 | 0 | +52 | +27 | +68 | +43 | +83 | +43 | +90 | +65 | +105 | +65 |
| | | | | –77 | –27 | –93 | –43 | –108 | –43 | –115 | –65 | –130 | –65 |
| | | | | –70 | –34 | –86 | –50 | –100 | –51 | –108 | –72 | –122 | –73 |
| **160** | **180** | –25 | 0 | +52 | +27 | +68 | +43 | +83 | +43 | +93 | +68 | +108 | +68 |
| | | | | –77 | –27 | –93 | –43 | –108 | –43 | –118 | –68 | –133 | –68 |
| | | | | –70 | –34 | –86 | –50 | –100 | –51 | –111 | –75 | –125 | –76 |
| **180** | **200** | –30 | 0 | +60 | +31 | +79 | +50 | +96 | +50 | +106 | +77 | +123 | +77 |
| | | | | –90 | –31 | –109 | –50 | –126 | –50 | –136 | –77 | –153 | –77 |
| | | | | –82 | –39 | –101 | –58 | –116 | –60 | –128 | –85 | –143 | –87 |
| **200** | **225** | –30 | 0 | +60 | +31 | +79 | +50 | +96 | +50 | +109 | +80 | +126 | +80 |
| | | | | –90 | –31 | –109 | –50 | –126 | –50 | –139 | –80 | –156 | –80 |
| | | | | –82 | –39 | –101 | –58 | –116 | –60 | –131 | –88 | –146 | –90 |
| **225** | **250** | –30 | 0 | +60 | +31 | +79 | +50 | +96 | +50 | +113 | +84 | +130 | +84 |
| | | | | –90 | –31 | –109 | –50 | –126 | –50 | –143 | –84 | –160 | –84 |
| | | | | –82 | –39 | –101 | –58 | –116 | –60 | –135 | –92 | –150 | –94 |
| **250** | **280** | –35 | 0 | +66 | +34 | +88 | +56 | +108 | +56 | +126 | +94 | +146 | +94 |
| | | | | –101 | –34 | –123 | –56 | –143 | –56 | –161 | –94 | –181 | –94 |
| | | | | –92 | –43 | –114 | –65 | –131 | –68 | –152 | –103 | –169 | –106 |
| **280** | **315** | –35 | 0 | +66 | +34 | +88 | +56 | +108 | +56 | +130 | +98 | +150 | +98 |
| | | | | –101 | –34 | –123 | –56 | –143 | –56 | –165 | –98 | –185 | –98 |
| | | | | –92 | –43 | –114 | –65 | –131 | –68 | –156 | –107 | –173 | –110 |
| **315** | **355** | –40 | 0 | +73 | +37 | +98 | +62 | +119 | +62 | +144 | +108 | +165 | +108 |
| | | | | –113 | –37 | –138 | –62 | –159 | –62 | –184 | –108 | –205 | –108 |
| | | | | –102 | –48 | –127 | –73 | –146 | –75 | –173 | –119 | –192 | –121 |
| **355** | **400** | –40 | 0 | +73 | +37 | +98 | +62 | +119 | +62 | +150 | +114 | +171 | +114 |
| | | | | –113 | –37 | –138 | –62 | –159 | –62 | –190 | –114 | –211 | –114 |
| | | | | –102 | –48 | –127 | –73 | –146 | –75 | –179 | –125 | –198 | –127 |
| **400** | **450** | –45 | 0 | +80 | +40 | +108 | +68 | +131 | +68 | +166 | +126 | +189 | +126 |
| | | | | –125 | –40 | –153 | –68 | –176 | –68 | –211 | –126 | –234 | –126 |
| | | | | –113 | –52 | –141 | –80 | –161 | –83 | –199 | –138 | –219 | –141 |

Table 15

## Shaft tolerances and resultant fits

| Shaft<br>Nominal diameter | | Bearing<br>Bore diameter tolerance | | Shaft diameter deviations, resultant fits[1]<br>Tolerance classes | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | | $t_{\Delta dmp}$ | | n6Ⓔ | | p6Ⓔ | | p7Ⓔ | | r6Ⓔ | | r7Ⓔ | |
| | | | | Deviations (shaft diameter)<br>Theoretical interference (–) | | | | | | | | | |
| over | incl. | low | high | Probable interference (–) | | | | | | | | | |
| mm | | µm | | µm | | | | | | | | | |
| **450** | **500** | –45 | 0 | +80 | +40 | +108 | +68 | +131 | +68 | +172 | +132 | +195 | +132 |
| | | | | –125 | –40 | –153 | –68 | –176 | –68 | –217 | –132 | –240 | –132 |
| | | | | –113 | –52 | –141 | –80 | –161 | –83 | –205 | –144 | –225 | –147 |
| **500** | **560** | –50 | 0 | +88 | +44 | +122 | +78 | +148 | +78 | +194 | +150 | +220 | +150 |
| | | | | –138 | –44 | –172 | –78 | –198 | –78 | –244 | –150 | –270 | –150 |
| | | | | –125 | –57 | –159 | –91 | –182 | –94 | –231 | –163 | –254 | –166 |
| **560** | **630** | –50 | 0 | +88 | +44 | +122 | +78 | +148 | +78 | +199 | +155 | +225 | +155 |
| | | | | –138 | –44 | –172 | –78 | –198 | –78 | –249 | –155 | –275 | –155 |
| | | | | –125 | –57 | –159 | –91 | –182 | –94 | –236 | –168 | –259 | –171 |
| **630** | **710** | –75 | 0 | +100 | +50 | +138 | +88 | +168 | +88 | +225 | +175 | +255 | +175 |
| | | | | –175 | –50 | –213 | –88 | –243 | –88 | –300 | –175 | –330 | –175 |
| | | | | –158 | –67 | –196 | –105 | –221 | –110 | –283 | –192 | –308 | –197 |
| **710** | **800** | –75 | 0 | +100 | +50 | +138 | +88 | +168 | +88 | +235 | +185 | +265 | +185 |
| | | | | –175 | –50 | –213 | –88 | –243 | –88 | –310 | –185 | –340 | –185 |
| | | | | –158 | –67 | –196 | –105 | –221 | –110 | –293 | –202 | –318 | –207 |
| **800** | **900** | –100 | 0 | +112 | +56 | +156 | +100 | +190 | +100 | +266 | +210 | +300 | +210 |
| | | | | –212 | –56 | –256 | –100 | –290 | –100 | –366 | –210 | –400 | –210 |
| | | | | –192 | –76 | –236 | –120 | –263 | –127 | –346 | –230 | –373 | –237 |
| **900** | **1 000** | –100 | 0 | +112 | +56 | +156 | +100 | +190 | +100 | +276 | +220 | +310 | +220 |
| | | | | –212 | –56 | –256 | –100 | –290 | –100 | –376 | –220 | –410 | –220 |
| | | | | –192 | –76 | –236 | –120 | –263 | –127 | –356 | –240 | –383 | –247 |
| **1 000** | **1 120** | –125 | 0 | +132 | +66 | +186 | +120 | +225 | +120 | +316 | +250 | +355 | +250 |
| | | | | –257 | –66 | –311 | –120 | –350 | –120 | –441 | –250 | –480 | –250 |
| | | | | –233 | –90 | –287 | –144 | –317 | –153 | –417 | –274 | –447 | –283 |
| **1 120** | **1 250** | –125 | 0 | +132 | +66 | +186 | +120 | +225 | +120 | +326 | +260 | +365 | +260 |
| | | | | –257 | –66 | –311 | –120 | –350 | –120 | –451 | –260 | –490 | –260 |
| | | | | –233 | –90 | –287 | –144 | –317 | –153 | –427 | –284 | –457 | –293 |
| **1 250** | **1 400** | –160 | 0 | +156 | +78 | +218 | +140 | +265 | +140 | +378 | +300 | +425 | +300 |
| | | | | –316 | –78 | –378 | –140 | –425 | –140 | –538 | –300 | –585 | –300 |
| | | | | –286 | –108 | –348 | –170 | –385 | –180 | –508 | –330 | –545 | –340 |
| **1 400** | **1 600** | –160 | 0 | +156 | +78 | +218 | +140 | +265 | +140 | +408 | +330 | +455 | +330 |
| | | | | –316 | –78 | –378 | –140 | –425 | –140 | –568 | –330 | –615 | –330 |
| | | | | –286 | –108 | –348 | –170 | –385 | –180 | –538 | –360 | –575 | –370 |
| **1 600** | **1 800** | –200 | 0 | +184 | +92 | +262 | +170 | +320 | +170 | +462 | +370 | +520 | +370 |
| | | | | –384 | –92 | –462 | –170 | –520 | –170 | –662 | –370 | –720 | –370 |
| | | | | –349 | –127 | –427 | –205 | –470 | –220 | –627 | –405 | –670 | –420 |
| **1 800** | **2 000** | –200 | 0 | +184 | +92 | +262 | +170 | +320 | +170 | +492 | +400 | +550 | +400 |
| | | | | –384 | –92 | –462 | –170 | –520 | –170 | –692 | –400 | –750 | –400 |
| | | | | –349 | –127 | –427 | –205 | –470 | –220 | –657 | –435 | –700 | –450 |

[1] Values are valid for most bearings with Normal tolerances. For exceptions, refer to *Tolerances and resultant fits*, page 153.

Table 16

**Shaft tolerances and resultant fits**

| **Shaft** Nominal diameter | | **Bearing** Bore diameter tolerance | | **Shaft diameter deviations, resultant fits**[1] Tolerance classes | | | |
|---|---|---|---|---|---|---|---|
| d | | $t_{\Delta dmp}$ | | r6+IT6 | | r7+IT7 | |
| | | | | Deviations (shaft diameter) | | | |
| | | | | Theoretical interference (–) | | | |
| over | incl. | low | high | Probable interference (–) | | | |
| mm | | µm | | µm | | | |
| **315** | **355** | –40 | 0 | +180 | +144 | +222 | +165 |
| | | | | –220 | –144 | –262 | –165 |
| | | | | –209 | –155 | –248 | –179 |
| **355** | **400** | –40 | 0 | +186 | +150 | +228 | +171 |
| | | | | –226 | –150 | –268 | –171 |
| | | | | –215 | –161 | –254 | –185 |
| **400** | **450** | –45 | 0 | +206 | +166 | +252 | +189 |
| | | | | –251 | –166 | –297 | –189 |
| | | | | –239 | –178 | –282 | –204 |
| **450** | **500** | –45 | 0 | +212 | +172 | +258 | +195 |
| | | | | –257 | –172 | –303 | –195 |
| | | | | –245 | –184 | –288 | –210 |
| **500** | **560** | –50 | 0 | +238 | +194 | +290 | +220 |
| | | | | –288 | –194 | –340 | –220 |
| | | | | –274 | –208 | –323 | –237 |
| **560** | **630** | –50 | 0 | +243 | +199 | +295 | +225 |
| | | | | –293 | –199 | –345 | –225 |
| | | | | –279 | –213 | –328 | –242 |
| **630** | **710** | –75 | 0 | +275 | +225 | +335 | +255 |
| | | | | –350 | –225 | –410 | –255 |
| | | | | –333 | –242 | –387 | –278 |
| **710** | **800** | –75 | 0 | +285 | +235 | +345 | +265 |
| | | | | –360 | –235 | –420 | –265 |
| | | | | –343 | –252 | –397 | –288 |
| **800** | **900** | –100 | 0 | +322 | +266 | +390 | +300 |
| | | | | –422 | –266 | –490 | –300 |
| | | | | –401 | –287 | –462 | –328 |
| **900** | **1 000** | –100 | 0 | +332 | +276 | +400 | +310 |
| | | | | –432 | –276 | –500 | –310 |
| | | | | –411 | –297 | –472 | –338 |
| **1 000** | **1 120** | –125 | 0 | +382 | +316 | +460 | +355 |
| | | | | –507 | –316 | –585 | –355 |
| | | | | –482 | –341 | –552 | –388 |
| **1 120** | **1 250** | –125 | 0 | +392 | +326 | +470 | +365 |
| | | | | –517 | –326 | –595 | –365 |
| | | | | –492 | –351 | –562 | –398 |

**Table 16**

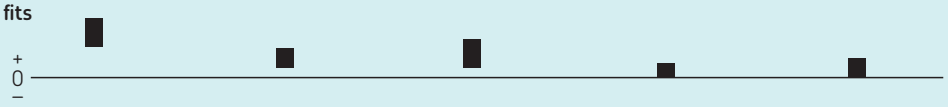
**Shaft tolerances and resultant fits**

| **Shaft** Nominal diameter | | **Bearing** Bore diameter tolerance | | **Shaft diameter deviations, resultant fits**[1] Tolerance classes | | | |
|---|---|---|---|---|---|---|---|
| d | | $t_{\Delta dmp}$ | | r6+IT6 | | r7+IT7 | |
| | | | | Deviations (shaft diameter) | | | |
| | | | | Theoretical interference (–) | | | |
| over | incl. | low | high | Probable interference (–) | | | |
| mm | | µm | | µm | | | |
| **1 250** | **1 400** | –160 | 0 | +456 | +378 | +550 | +425 |
| | | | | –616 | –378 | –710 | –425 |
| | | | | –586 | –408 | –669 | –466 |
| **1 400** | **1 600** | –160 | 0 | +486 | +408 | +580 | +455 |
| | | | | –646 | –408 | –740 | –455 |
| | | | | –616 | –438 | –699 | –496 |
| **1 600** | **1 800** | –200 | 0 | +554 | +462 | +670 | +520 |
| | | | | –754 | –462 | –870 | –520 |
| | | | | –718 | –498 | –820 | –570 |
| **1 800** | **2 000** | –200 | 0 | +584 | +492 | +700 | +550 |
| | | | | –784 | –492 | –900 | –550 |
| | | | | –748 | –528 | –850 | –600 |

[1] Values are valid for most bearings with Normal tolerances. For exceptions, refer to *Tolerances and resultant fits*, page 153.

Table 17

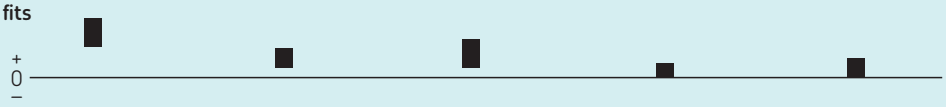
**Housing tolerances and resultant fits**




| **Housing** Nominal bore diameter D | | **Bearing** Outside diameter tolerance $t_{\Delta Dmp}$ | | **Housing bore diameter deviations, resultant fits**[1] Tolerance classes | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | F7Ⓔ | | G6Ⓔ | | G7Ⓔ | | H5Ⓔ | | H6Ⓔ | |
| | | | | Deviations (housing bore diameter)<br>Theoretical clearance (+)<br>Probable clearance (+) | | | | | | | | | |
| over | incl. | low | high | | | | | | | | | | |
| mm | | µm | | µm | | | | | | | | | |
| **6** | **10** | 0 | –8 | +13 | +28 | +5 | +14 | +5 | +20 | 0 | +6 | 0 | +9 |
| | | | | +13 | +36 | +5 | +22 | +5 | +28 | 0 | +14 | 0 | +17 |
| | | | | +16 | +33 | +7 | +20 | +8 | +25 | +2 | +12 | +2 | +15 |
| **10** | **18** | 0 | –8 | +16 | +34 | +6 | +17 | +6 | +24 | 0 | +8 | 0 | +11 |
| | | | | +16 | +42 | +6 | +25 | +6 | +32 | 0 | +16 | 0 | +19 |
| | | | | +19 | +39 | +8 | +23 | +9 | +29 | +2 | +14 | +2 | +17 |
| **18** | **30** | 0 | –9 | +20 | +41 | +7 | +20 | +7 | +28 | 0 | +9 | +0 | +13 |
| | | | | +20 | +50 | +7 | +29 | +7 | +37 | 0 | +18 | 0 | +22 |
| | | | | +23 | +47 | +10 | +26 | +10 | +34 | +2 | +16 | +3 | +19 |
| **30** | **50** | 0 | –11 | +25 | +50 | +9 | +25 | +9 | +34 | 0 | +11 | 0 | +16 |
| | | | | +25 | +61 | +9 | +36 | +9 | +45 | 0 | +22 | 0 | +27 |
| | | | | +29 | +57 | +12 | +33 | +13 | +41 | +3 | +19 | +3 | +24 |
| **50** | **80** | 0 | –13 | +30 | +60 | +10 | +29 | +10 | +40 | 0 | +13 | 0 | +19 |
| | | | | +30 | +73 | +10 | +42 | +10 | +53 | 0 | +26 | 0 | +32 |
| | | | | +35 | +68 | +14 | +38 | +15 | +48 | +3 | +23 | +4 | +28 |
| **80** | **120** | 0 | –15 | +36 | +71 | +12 | +34 | +12 | +47 | 0 | +15 | 0 | +22 |
| | | | | +36 | +86 | +12 | +49 | +12 | +62 | 0 | +30 | 0 | +37 |
| | | | | +41 | +81 | +17 | +44 | +17 | +57 | +4 | +26 | +5 | +32 |
| **120** | **150** | 0 | –18 | +43 | +83 | +14 | +39 | +14 | +54 | 0 | +18 | 0 | +25 |
| | | | | +43 | +101 | +14 | +57 | +14 | +72 | 0 | +36 | 0 | +43 |
| | | | | +50 | +94 | +20 | +51 | +21 | +65 | +5 | +31 | +6 | +37 |
| **150** | **180** | 0 | –25 | +43 | +83 | +14 | +39 | +14 | +54 | 0 | +18 | 0 | +25 |
| | | | | +43 | +108 | +14 | +64 | +14 | +79 | 0 | +43 | 0 | +50 |
| | | | | +51 | +100 | +21 | +57 | +22 | +71 | +6 | +37 | +7 | +43 |
| **180** | **250** | 0 | –30 | +50 | +96 | +15 | +44 | +15 | +61 | 0 | +20 | 0 | +29 |
| | | | | +50 | +126 | +15 | +74 | +15 | +91 | 0 | +50 | 0 | +59 |
| | | | | +60 | +116 | +23 | +66 | +25 | +81 | +6 | +44 | +8 | +51 |
| **250** | **315** | 0 | –35 | +56 | +108 | +17 | +49 | +17 | +69 | 0 | +23 | 0 | +32 |
| | | | | +56 | +143 | +17 | +84 | +17 | +104 | 0 | +58 | 0 | +67 |
| | | | | +68 | +131 | +26 | +75 | +29 | +92 | +8 | +50 | +9 | +58 |
| **315** | **400** | 0 | –40 | +62 | +119 | +18 | +54 | +18 | +75 | 0 | +25 | 0 | +36 |
| | | | | +62 | +159 | +18 | +94 | +18 | +115 | 0 | +65 | 0 | +76 |
| | | | | +75 | +146 | +29 | +83 | +31 | +102 | +8 | +57 | +11 | +65 |
| **400** | **500** | 0 | –45 | +68 | +131 | +20 | +60 | +20 | +83 | 0 | +27 | 0 | +40 |
| | | | | +68 | +176 | +20 | +105 | +20 | +128 | 0 | +72 | 0 | +85 |
| | | | | +83 | +161 | +32 | +93 | +35 | +113 | +9 | +63 | +12 | +73 |
| **500** | **630** | 0 | –50 | +76 | +146 | +22 | +66 | +22 | +92 | 0 | +28 | 0 | +44 |
| | | | | +76 | +196 | +22 | +116 | +22 | +142 | 0 | +78 | 0 | +94 |
| | | | | +92 | +180 | +35 | +103 | +38 | +126 | +10 | +68 | +13 | +81 |
| **630** | **800** | 0 | –75 | +80 | +160 | +24 | +74 | +24 | +104 | 0 | +32 | 0 | +50 |
| | | | | +80 | +235 | +24 | +149 | +24 | +179 | 0 | +107 | 0 | +125 |
| | | | | +102 | +213 | +41 | +132 | +46 | +157 | +12 | +95 | +17 | +108 |

**Table 17**

## Housing tolerances and resultant fits

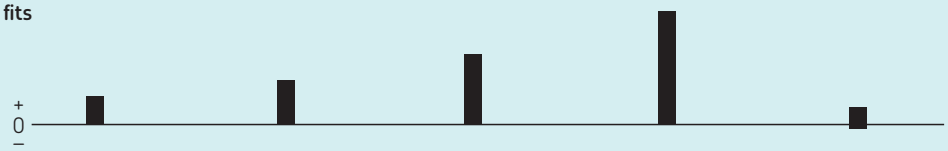



| Housing<br>Nominal bore diameter<br>D | | Bearing<br>Outside diameter tolerance<br>$t_{\Delta Dmp}$ | | Housing bore diameter deviations, resultant fits[1]<br>Tolerance classes | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | F7Ⓔ | | G6Ⓔ | | G7Ⓔ | | H5Ⓔ | | H6Ⓔ | |
| | | | | Deviations (housing bore diameter)<br>Theoretical clearance (+)<br>Probable clearance (+) | | | | | | | | | |
| over | incl. | low | high | | | | | | | | | | |
| mm | | µm | | µm | | | | | | | | | |
| **800** | **1 000** | 0 | –100 | +86 | +176 | +26 | +82 | +26 | +116 | 0 | +36 | 0 | +56 |
| | | | | +86 | +276 | +26 | +182 | +26 | +216 | 0 | +136 | 0 | +156 |
| | | | | +113 | +249 | +46 | +162 | +53 | +189 | +14 | +122 | +20 | +136 |
| **1 000** | **1 250** | 0 | –125 | +98 | +203 | +28 | +94 | +28 | +133 | 0 | +42 | 0 | +66 |
| | | | | +98 | +328 | +28 | +219 | +28 | +258 | 0 | +167 | 0 | +191 |
| | | | | +131 | +295 | +52 | +195 | +61 | +225 | +17 | +150 | +24 | +167 |
| **1 250** | **1 600** | 0 | –160 | +110 | +235 | +30 | +108 | +30 | +155 | 0 | +50 | 0 | +78 |
| | | | | +110 | +395 | +30 | +268 | +30 | +315 | 0 | +210 | 0 | +238 |
| | | | | +150 | +355 | +60 | +238 | +70 | +275 | +21 | +189 | +30 | +208 |
| **1 600** | **2 000** | 0 | –200 | +120 | +270 | +32 | +124 | +32 | +182 | 0 | +60 | 0 | +92 |
| | | | | +120 | +470 | +32 | +324 | +32 | +382 | 0 | +260 | 0 | +292 |
| | | | | +170 | +420 | +67 | +289 | +82 | +332 | +25 | +235 | +35 | +257 |
| **2 000** | **2 500** | 0 | –250 | +130 | +305 | +34 | +144 | +34 | +209 | 0 | +70 | 0 | +110 |
| | | | | +130 | +555 | +34 | +394 | +34 | +459 | 0 | +320 | 0 | +360 |
| | | | | +189 | +496 | +77 | +351 | +93 | +400 | +30 | +290 | +43 | +317 |

[1] Values are valid for most bearings with Normal tolerances. For exceptions, refer to *Tolerances and resultant fits*, page 153.

Table 18

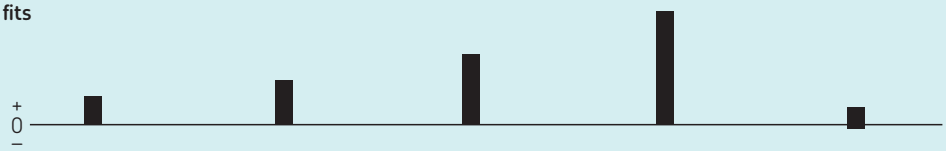
## Housing tolerances and resultant fits




| Housing Nominal bore diameter D | | Bearing Outside diameter tolerance $t_{\Delta Dmp}$ | | Housing bore diameter deviations, resultant fits[1] Tolerance classes | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | H7Ⓔ | | H8Ⓔ | | H9Ⓔ | | H10Ⓔ | | J6Ⓔ | |
| | | | | Deviations (housing bore diameter) | | | | | | | | | |
| | | | | Theoretical interference (–)/clearance (+) | | | | | | | | | |
| over | incl. | low | high | Probable interference (–)/clearance (+) | | | | | | | | | |
| mm | | µm | | µm | | | | | | | | | |
| **6** | **10** | 0 | –8 | 0 | +15 | 0 | +22 | 0 | +36 | 0 | +58 | –4 | +5 |
| | | | | 0 | +23 | 0 | +30 | 0 | +44 | 0 | +66 | –4 | +13 |
| | | | | +3 | +20 | +3 | +27 | +3 | +41 | +3 | +63 | –2 | +11 |
| **10** | **18** | 0 | –8 | 0 | +18 | 0 | +27 | 0 | +43 | 0 | +70 | –5 | +6 |
| | | | | 0 | +26 | 0 | +35 | 0 | +51 | 0 | +78 | –5 | +14 |
| | | | | +3 | +23 | +3 | +32 | +3 | +48 | +3 | +75 | –3 | +12 |
| **18** | **30** | 0 | –9 | 0 | +21 | 0 | +33 | 0 | +52 | 0 | +84 | –5 | +8 |
| | | | | 0 | +30 | 0 | +42 | 0 | +61 | 0 | +93 | –5 | +17 |
| | | | | +3 | +27 | +3 | +39 | +4 | +57 | +4 | +89 | –2 | +14 |
| **30** | **50** | 0 | –11 | 0 | +25 | 0 | +39 | 0 | +62 | 0 | +100 | –6 | +10 |
| | | | | 0 | +36 | 0 | +50 | 0 | +73 | 0 | +111 | –6 | +21 |
| | | | | +4 | +32 | +4 | +46 | +5 | +68 | +5 | +106 | –3 | +18 |
| **50** | **80** | 0 | –13 | 0 | +30 | 0 | +46 | 0 | +74 | 0 | +120 | –6 | +13 |
| | | | | 0 | +43 | 0 | +59 | 0 | +87 | 0 | +133 | –6 | +26 |
| | | | | +5 | +38 | +5 | +54 | +5 | +82 | +6 | +127 | –2 | +22 |
| **80** | **120** | 0 | –15 | 0 | +35 | 0 | +54 | 0 | +87 | 0 | +140 | –6 | +16 |
| | | | | 0 | +50 | 0 | +69 | 0 | +102 | 0 | +155 | –6 | +31 |
| | | | | +5 | +45 | +6 | +63 | +6 | +96 | +7 | +148 | –1 | +26 |
| **120** | **150** | 0 | –18 | 0 | +40 | 0 | +63 | 0 | +100 | 0 | +160 | –7 | +18 |
| | | | | 0 | +58 | 0 | +81 | 0 | +118 | 0 | +178 | –7 | +36 |
| | | | | +7 | +51 | +7 | +74 | +8 | +110 | +8 | +170 | –1 | +30 |
| **150** | **180** | 0 | –25 | 0 | +40 | 0 | +63 | 0 | +100 | 0 | +160 | –7 | +18 |
| | | | | 0 | +65 | 0 | +88 | 0 | +125 | 0 | +185 | –7 | +43 |
| | | | | +8 | +57 | +10 | +78 | +10 | +115 | +11 | +174 | 0 | +36 |
| **180** | **250** | 0 | –30 | 0 | +46 | 0 | +72 | 0 | +115 | 0 | +185 | –7 | +22 |
| | | | | 0 | +76 | 0 | +102 | 0 | +145 | 0 | +215 | –7 | +52 |
| | | | | +10 | +66 | +12 | +90 | +13 | +132 | +13 | +202 | +1 | +44 |
| **250** | **315** | 0 | –35 | 0 | +52 | 0 | +81 | 0 | +130 | 0 | +210 | –7 | +25 |
| | | | | 0 | +87 | 0 | +116 | 0 | +165 | 0 | +245 | –7 | +60 |
| | | | | +12 | +75 | +13 | +103 | +15 | +150 | +16 | +229 | +2 | +51 |
| **315** | **400** | 0 | –40 | 0 | +57 | 0 | +89 | 0 | +140 | 0 | +230 | –7 | +29 |
| | | | | 0 | +97 | 0 | +129 | 0 | +180 | 0 | +270 | –7 | +69 |
| | | | | +13 | +84 | +15 | +114 | +17 | +163 | +18 | +252 | +4 | +58 |
| **400** | **500** | 0 | –45 | 0 | +63 | 0 | +97 | 0 | +155 | 0 | +250 | –7 | +33 |
| | | | | 0 | +108 | 0 | +142 | 0 | +200 | 0 | +295 | –7 | +78 |
| | | | | +15 | +93 | +17 | +125 | +19 | +181 | +20 | +275 | +5 | +66 |
| **500** | **630** | 0 | –50 | 0 | +70 | 0 | +110 | 0 | +175 | 0 | +280 | – | – |
| | | | | 0 | +120 | 0 | +160 | 0 | +225 | 0 | +330 | – | – |
| | | | | +16 | +104 | +19 | +141 | +21 | +204 | +22 | +308 | – | – |

**Table 18**

## Housing tolerances and resultant fits

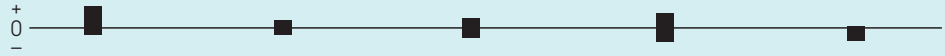



| **Housing** Nominal bore diameter D | | **Bearing** Outside diameter tolerance $t_{\Delta Dmp}$ | | **Housing bore diameter deviations, resultant fits**[1] Tolerance classes | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | H7Ⓔ | | H8Ⓔ | | H9Ⓔ | | H10Ⓔ | | J6Ⓔ | |
| | | | | Deviations (housing bore diameter) | | | | | | | | | |
| | | | | Theoretical interference (–)/clearance (+) | | | | | | | | | |
| over | incl. | low | high | Probable interference (–)/clearance (+) | | | | | | | | | |
| mm | | µm | | µm | | | | | | | | | |
| **630** | **800** | 0 | –75 | 0 | +80 | 0 | +125 | 0 | +200 | 0 | +320 | – | – |
| | | | | 0 | +155 | 0 | +200 | 0 | +275 | 0 | +395 | – | – |
| | | | | +22 | +133 | +27 | +173 | +30 | +245 | +33 | +362 | – | – |
| **800** | **1 000** | 0 | –100 | 0 | +90 | 0 | +140 | 0 | +230 | 0 | +360 | – | – |
| | | | | 0 | +190 | 0 | +240 | 0 | +330 | 0 | +460 | – | – |
| | | | | +27 | +163 | +33 | +207 | +39 | +291 | +43 | +417 | – | – |
| **1 000** | **1 250** | 0 | –125 | 0 | +105 | 0 | +165 | 0 | +260 | 0 | +420 | – | – |
| | | | | 0 | +230 | 0 | +290 | 0 | +385 | 0 | +545 | – | – |
| | | | | +33 | +197 | +41 | +249 | +48 | +337 | +53 | +492 | – | – |
| **1 250** | **1 600** | 0 | –160 | 0 | +125 | 0 | +195 | 0 | +310 | 0 | +500 | – | – |
| | | | | 0 | +285 | 0 | +355 | 0 | +470 | 0 | +660 | – | – |
| | | | | +40 | +245 | +51 | +304 | +60 | +410 | +67 | +593 | – | – |
| **1 600** | **2 000** | 0 | –200 | 0 | +150 | 0 | +230 | 0 | +370 | 0 | +600 | – | – |
| | | | | 0 | +350 | 0 | +430 | 0 | +570 | 0 | +800 | – | – |
| | | | | +50 | +300 | +62 | +368 | +74 | +496 | +83 | +717 | – | – |
| **2 000** | **2 500** | 0 | –250 | 0 | +175 | 0 | +280 | 0 | +440 | 0 | +700 | – | – |
| | | | | 0 | +425 | 0 | +530 | 0 | +690 | 0 | +950 | – | – |
| | | | | +59 | +366 | +77 | +453 | +91 | +599 | +103 | +847 | – | – |

[1] Values are valid for most bearings with Normal tolerances. For exceptions, refer to *Tolerances and resultant fits*, page 153.

Table 19

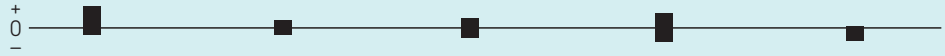
## Housing tolerances and resultant fits




| Housing Nominal bore diameter D | | Bearing Outside diameter tolerance $t_{\Delta Dmp}$ | | Housing bore diameter deviations, resultant fits[1] Tolerance classes | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | J7Ⓔ | | JS5Ⓔ | | JS6Ⓔ | | JS7Ⓔ | | K5Ⓔ | |
| | | | | Deviations (housing bore diameter)<br>Theoretical interference (–)/clearance (+)<br>Probable interference (–)/clearance (+) | | | | | | | | | |
| over | incl. | low | high | | | | | | | | | | |
| mm | | µm | | µm | | | | | | | | | |
| **6** | **10** | 0 | –8 | –7 | +8 | –3 | +3 | –4,5 | +4,5 | –7,5 | +7,5 | –5 | +1 |
| | | | | –7 | +16 | –3 | +11 | –4,5 | +12,5 | –7,5 | +15,5 | –5 | +9 |
| | | | | –4 | +13 | –1 | +9 | –3 | +11 | –5 | +13 | –3 | +7 |
| **10** | **18** | 0 | –8 | –8 | +10 | –4 | +4 | –5,5 | +5,5 | –9 | +9 | –6 | +2 |
| | | | | –8 | +18 | –4 | +12 | –5,5 | +13,5 | –9 | +17 | –6 | +10 |
| | | | | –5 | +15 | –2 | +10 | –3 | +11 | –6 | +14 | –4 | +8 |
| **18** | **30** | 0 | –9 | –9 | +12 | –4,5 | +4,5 | –6,5 | +6,5 | –10,5 | +10,5 | –8 | +1 |
| | | | | –9 | +21 | –4,5 | +13,5 | –6,5 | +15,5 | –10,5 | +19,5 | –8 | +10 |
| | | | | –6 | +18 | –2 | +11 | –4 | +13 | –7 | +16 | –6 | +8 |
| **30** | **50** | 0 | –11 | –11 | +14 | –5,5 | +5,5 | –8 | +8 | –12,5 | +12,5 | –9 | +2 |
| | | | | –11 | +25 | –5,5 | +16,5 | –8 | +19 | –12,5 | +23,5 | –9 | +13 |
| | | | | –7 | +21 | –3 | +14 | –5 | +16 | –9 | +20 | –6 | +10 |
| **50** | **80** | 0 | –13 | –12 | +18 | –6,5 | +6,5 | –9,5 | +9,5 | –15 | +15 | –10 | +3 |
| | | | | –12 | +31 | –6,5 | +19,5 | –9,5 | +22,5 | –15 | +28 | –10 | +16 |
| | | | | –7 | +26 | –3 | +16 | –6 | +19 | –10 | +23 | –7 | +13 |
| **80** | **120** | 0 | –15 | –13 | +22 | –7,5 | +7,5 | –11 | +11 | –17,5 | +17,5 | –13 | +2 |
| | | | | –13 | +37 | –7,5 | +22,5 | –11 | +26 | –17,5 | +32,5 | –13 | +17 |
| | | | | –8 | +32 | –4 | +19 | –6 | +21 | –12 | +27 | –9 | +13 |
| **120** | **150** | 0 | –18 | –14 | +26 | –9 | +9 | –12,5 | +12,5 | –20 | +20 | –15 | +3 |
| | | | | –14 | +44 | –9 | +27 | –12,5 | +30,5 | –20 | +38 | –15 | +21 |
| | | | | –7 | +37 | –4 | +22 | –7 | +25 | –13 | +31 | –10 | +16 |
| **150** | **180** | 0 | –25 | –14 | +26 | –9 | +9 | –12,5 | +12,5 | –20 | +20 | –15 | +3 |
| | | | | –14 | +51 | –9 | +34 | –12,5 | +37,5 | –20 | +45 | –15 | +28 |
| | | | | –6 | +43 | –3 | +28 | –6 | +31 | –12 | +37 | –9 | +22 |
| **180** | **250** | 0 | –30 | –16 | +30 | –10 | +10 | –14,5 | +14,5 | –23 | +23 | –18 | +2 |
| | | | | –16 | +60 | –10 | +40 | –14,5 | +44,5 | –23 | +53 | –18 | +32 |
| | | | | –6 | +50 | –4 | +34 | –6 | +36 | –13 | +43 | –12 | +26 |
| **250** | **315** | 0 | –35 | –16 | +36 | –11,5 | +11,5 | –16 | +16 | –26 | +26 | –20 | +3 |
| | | | | –16 | +71 | –11,5 | +46,5 | –16 | –51 | –26 | +61 | –20 | +38 |
| | | | | –4 | +59 | –4 | +39 | –7 | +42 | –14 | +49 | –12 | +30 |
| **315** | **400** | 0 | –40 | –18 | +39 | –12,5 | +12,5 | –18 | +18 | –28,5 | +28,5 | –22 | +3 |
| | | | | –18 | +79 | –12,5 | +52,5 | –18 | +58 | –28,5 | +68,5 | –22 | +43 |
| | | | | –5 | +66 | –4 | +44 | –7 | +47 | –15 | +55 | –14 | +35 |
| **400** | **500** | 0 | –45 | –20 | +43 | –13,5 | +13,5 | –20 | +20 | –31,5 | +31,5 | –25 | +2 |
| | | | | –20 | +88 | –13,5 | +58,5 | –20 | +65 | –31,5 | +76,5 | –25 | +47 |
| | | | | –5 | +73 | –4 | +49 | –8 | +53 | –17 | +62 | –16 | +38 |
| **500** | **630** | 0 | –50 | – | – | –14 | +14 | –22 | +22 | –35 | +35 | – | – |
| | | | | – | – | –14 | +64 | –22 | +72 | –35 | +85 | – | – |
| | | | | – | – | –4 | +54 | –9 | +59 | –19 | +69 | – | – |

**Table 19**

## Housing tolerances and resultant fits




| Housing Nominal bore diameter D | | Bearing Outside diameter tolerance $t_{\Delta Dmp}$ | | Housing bore diameter deviations, resultant fits[1] Tolerance classes | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | J7Ⓔ | | JS5Ⓔ | | JS6Ⓔ | | JS7Ⓔ | | K5Ⓔ | |
| | | | | Deviations (housing bore diameter) | | | | | | | | | |
| | | | | Theoretical interference (–)/clearance (+) | | | | | | | | | |
| over | incl. | low | high | Probable interference (–)/clearance (+) | | | | | | | | | |
| mm | | µm | | µm | | | | | | | | | |
| **630** | **800** | 0 | –75 | – | – | –16 | +16 | –25 | +25 | –40 | +40 | – | – |
| | | | | – | – | –16 | +91 | –25 | +100 | –40 | +115 | – | – |
| | | | | – | – | –4 | +79 | –8 | +83 | –18 | +93 | – | – |
| **800** | **1 000** | 0 | –100 | – | – | –18 | +18 | –28 | +28 | –45 | +45 | – | – |
| | | | | – | – | –18 | +118 | –28 | +128 | –45 | +145 | – | – |
| | | | | – | – | –4 | +104 | –8 | +108 | –18 | +118 | – | – |
| **1 000** | **1 250** | 0 | –125 | – | – | –21 | +21 | –33 | +33 | –52 | +52 | – | – |
| | | | | – | – | –21 | +146 | –33 | +158 | –52 | +177 | – | – |
| | | | | – | – | –4 | +129 | –9 | +134 | –20 | +145 | – | – |
| **1 250** | **1 600** | 0 | –160 | – | – | –25 | +25 | –39 | +39 | –62 | +62 | – | – |
| | | | | – | – | –25 | +185 | –39 | +199 | –62 | +222 | – | – |
| | | | | – | – | –4 | +164 | –9 | +169 | –22 | +182 | – | – |
| **1 600** | **2 000** | 0 | –200 | – | – | –30 | +30 | –46 | +46 | –75 | +75 | – | – |
| | | | | – | – | –30 | +230 | –46 | +246 | –75 | +275 | – | – |
| | | | | – | – | –5 | +205 | –11 | +211 | –25 | +225 | – | – |
| **2 000** | **2 500** | 0 | –250 | – | – | –35 | +35 | –55 | +55 | –87 | +87 | – | – |
| | | | | – | – | –35 | +285 | –55 | +305 | –87 | +337 | – | – |
| | | | | – | – | –5 | +255 | –12 | +262 | –28 | +278 | – | – |

[1] Values are valid for most bearings with Normal tolerances. For exceptions, refer to *Tolerances and resultant fits*, page 153.

Table 20

## Housing tolerances and resultant fits

| Housing Nominal bore diameter D | | Bearing Outside diameter tolerance $t_{\Delta Dmp}$ | | Housing bore diameter deviations, resultant fits[1] Tolerance classes | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | K6Ⓔ | | K7Ⓔ | | M5Ⓔ | | M6Ⓔ | | M7Ⓔ | |
| | | | | Deviations (housing bore diameter) | | | | | | | | | |
| | | | | Theoretical interference (–)/clearance (+) | | | | | | | | | |
| over | incl. | low | high | Probable interference (–)/clearance (+) | | | | | | | | | |
| mm | | µm | | µm | | | | | | | | | |
| **6** | **10** | 0 | –8 | –7 | +2 | –10 | +5 | –10 | –4 | –12 | –3 | –15 | 0 |
| | | | | –7 | +10 | –10 | +13 | –10 | +4 | –12 | +5 | –15 | +8 |
| | | | | –5 | +8 | –7 | +10 | –8 | +2 | –10 | +3 | –12 | +5 |
| **10** | **18** | 0 | –8 | –9 | +2 | –12 | +6 | –12 | –4 | –15 | –4 | –18 | 0 |
| | | | | –9 | +10 | –12 | +14 | –12 | +4 | –15 | +4 | –18 | +8 |
| | | | | –7 | +8 | –9 | +11 | –10 | +2 | –13 | +2 | –15 | +5 |
| **18** | **30** | 0 | –9 | –11 | +2 | –15 | +6 | –14 | –4 | –17 | –4 | –21 | 0 |
| | | | | –11 | +11 | –15 | +15 | –14 | +4 | –17 | +5 | –21 | +9 |
| | | | | –8 | +8 | –12 | +12 | –12 | +2 | –14 | +2 | –18 | +6 |
| **30** | **50** | 0 | –11 | –13 | +3 | –18 | +7 | –16 | –5 | –20 | –4 | –25 | 0 |
| | | | | –13 | +14 | –18 | +18 | –16 | +6 | –20 | +7 | –25 | +11 |
| | | | | –10 | +11 | –14 | +14 | –13 | +3 | –17 | +4 | –21 | +7 |
| **50** | **80** | 0 | –13 | –15 | +4 | –21 | +9 | –19 | –6 | –24 | –5 | –30 | 0 |
| | | | | –15 | +17 | –21 | +22 | –19 | +7 | –24 | +8 | –30 | +13 |
| | | | | –11 | +13 | –16 | +17 | –16 | +4 | –20 | +4 | –25 | +8 |
| **80** | **120** | 0 | –15 | –18 | +4 | –25 | +10 | –23 | –8 | –28 | –6 | –35 | 0 |
| | | | | –18 | +19 | –25 | +25 | –23 | +7 | –28 | +9 | –35 | +15 |
| | | | | –13 | +14 | –20 | +20 | –19 | +3 | –23 | +4 | –30 | +10 |
| **120** | **150** | 0 | –18 | –21 | +4 | –28 | +12 | –27 | –9 | –33 | –8 | –40 | 0 |
| | | | | –21 | +22 | –28 | +30 | –27 | +9 | –33 | +10 | –40 | +18 |
| | | | | –15 | +16 | –21 | +23 | –22 | +4 | –27 | +4 | –33 | +11 |
| **150** | **180** | 0 | –25 | –21 | +4 | –28 | +12 | –27 | –9 | –33 | –8 | –40 | 0 |
| | | | | –21 | +29 | –28 | +37 | –27 | +16 | –33 | +17 | –40 | +25 |
| | | | | –14 | +22 | –20 | +29 | –21 | +10 | –26 | +10 | –32 | +17 |
| **180** | **250** | 0 | –30 | –24 | +5 | –33 | +13 | –31 | –11 | –37 | –8 | –46 | 0 |
| | | | | –24 | +35 | –33 | +43 | –31 | +19 | –37 | +22 | –46 | +30 |
| | | | | –16 | +27 | –23 | +33 | –25 | +13 | –29 | +14 | –36 | +20 |
| **250** | **315** | 0 | –35 | –27 | +5 | –36 | +16 | –36 | –13 | –41 | –9 | –52 | 0 |
| | | | | –27 | +40 | –36 | +51 | –36 | +22 | –41 | +26 | –52 | +35 |
| | | | | –18 | +31 | –24 | +39 | –28 | +14 | –32 | +17 | –40 | +23 |
| **315** | **400** | 0 | –40 | –29 | +7 | –40 | +17 | –39 | –14 | –46 | –10 | –57 | 0 |
| | | | | –29 | +47 | –40 | +57 | –39 | +26 | –46 | +30 | –57 | +40 |
| | | | | –18 | +36 | –27 | +44 | –31 | +18 | –35 | +19 | –44 | +27 |
| **400** | **500** | 0 | –45 | –32 | +8 | –45 | +18 | –43 | –16 | –50 | –10 | –63 | 0 |
| | | | | –32 | +53 | –45 | +63 | –43 | +29 | –50 | +35 | –63 | +45 |
| | | | | –20 | +41 | –30 | +48 | –34 | +20 | –38 | +23 | –48 | +30 |
| **500** | **630** | 0 | –50 | –44 | 0 | –70 | 0 | – | – | –70 | –26 | –96 | –26 |
| | | | | –44 | +50 | –70 | +50 | – | – | –70 | +24 | –96 | +24 |
| | | | | –31 | +37 | –54 | +34 | – | – | –57 | +11 | –80 | +8 |

Table 20

## Housing tolerances and resultant fits

| Housing Nominal bore diameter D | | Bearing Outside diameter tolerance $t_{\Delta Dmp}$ | | Housing bore diameter deviations, resultant fits[1] Tolerance classes | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | K6Ⓔ | | K7Ⓔ | | M5Ⓔ | | M6Ⓔ | | M7Ⓔ | |
| | | | | Deviations (housing bore diameter) | | | | | | | | | |
| | | | | Theoretical interference (–)/clearance (+) | | | | | | | | | |
| over | incl. | low | high | Probable interference (–)/clearance (+) | | | | | | | | | |
| mm | | µm | | µm | | | | | | | | | |
| **630** | **800** | 0 | –75 | –50 | 0 | –80 | 0 | – | – | –80 | –30 | –110 | –30 |
| | | | | –50 | +75 | –80 | +75 | – | – | –80 | +45 | –110 | +45 |
| | | | | –33 | +58 | –58 | +53 | – | – | –63 | +28 | –88 | +23 |
| **800** | **1 000** | 0 | –100 | –56 | 0 | –90 | 0 | – | – | –90 | –34 | –124 | –34 |
| | | | | –56 | +100 | –90 | +100 | – | – | –90 | +66 | –124 | +66 |
| | | | | –36 | +80 | –63 | +73 | – | – | –70 | +46 | –97 | +39 |
| **1 000** | **1 250** | 0 | –125 | –66 | 0 | –105 | 0 | – | – | –106 | –40 | –145 | –40 |
| | | | | –66 | +125 | –105 | +125 | – | – | –106 | +85 | –145 | +85 |
| | | | | –42 | +101 | –72 | +92 | – | – | –82 | +61 | –112 | +52 |
| **1 250** | **1 600** | 0 | –160 | –78 | 0 | –125 | 0 | – | – | –126 | –48 | –173 | –48 |
| | | | | –78 | +160 | –125 | +160 | – | – | –126 | +112 | –173 | +112 |
| | | | | –48 | +130 | –85 | +120 | – | – | –96 | +82 | –133 | +72 |
| **1 600** | **2 000** | 0 | –200 | –92 | 0 | –150 | 0 | – | – | –158 | –58 | –208 | –58 |
| | | | | –92 | +200 | –150 | +200 | – | – | –150 | +142 | –208 | +142 |
| | | | | –57 | +165 | –100 | +150 | – | – | –115 | +107 | –158 | +92 |
| **2 000** | **2 500** | 0 | –250 | –110 | 0 | –175 | 0 | – | – | –178 | –68 | –243 | –68 |
| | | | | –110 | +250 | –175 | +250 | – | – | –178 | +182 | –243 | +182 |
| | | | | –67 | +207 | –116 | +191 | – | – | –135 | +139 | –184 | +123 |

[1] Values are valid for most bearings with Normal tolerances. For exceptions, refer to *Tolerances and resultant fits*, page 153.

Table 21

**Housing tolerances and resultant fits**

| Housing Nominal bore diameter D | | Bearing Outside diameter tolerance $t_{\Delta Dmp}$ | | Housing bore diameter deviations, resultant fits[1] Tolerance classes | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | N6Ⓔ | | N7Ⓔ | | P6Ⓔ | | P7Ⓔ | |
| | | | | Deviations (housing bore diameter) | | | | | | | |
| | | | | Theoretical interference (–)/clearance (+) | | | | | | | |
| ove | incl. | low | high | Probable interference (–)/clearance (+) | | | | | | | |
| mm | | µm | | µm | | | | | | | |
| **6** | **10** | 0 | –8 | –16 | –7 | –19 | –4 | –21 | –12 | –24 | –9 |
| | | | | –16 | +1 | –19 | +4 | –21 | –4 | –24 | –1 |
| | | | | –14 | –1 | –16 | +1 | –19 | –6 | –21 | –4 |
| **10** | **18** | 0 | –8 | –20 | –9 | –23 | –5 | –26 | –15 | –29 | –11 |
| | | | | –20 | –1 | –23 | +3 | –26 | –7 | –29 | –3 |
| | | | | –18 | –3 | –20 | 0 | –24 | –9 | –26 | –6 |
| **18** | **30** | 0 | –9 | –24 | –11 | –28 | –7 | –31 | –18 | –35 | –14 |
| | | | | –24 | –2 | –28 | +2 | –31 | –9 | –35 | –5 |
| | | | | –21 | –5 | –25 | –1 | –28 | –12 | –32 | –8 |
| **30** | **50** | 0 | –11 | –28 | –12 | –33 | –8 | –37 | –21 | –42 | –17 |
| | | | | –28 | –1 | –33 | +3 | –37 | –10 | –42 | –6 |
| | | | | –25 | –4 | –29 | –1 | –34 | –13 | –38 | –10 |
| **50** | **80** | 0 | –13 | –33 | –14 | –39 | –9 | –45 | –26 | –51 | –21 |
| | | | | –33 | –1 | –39 | +4 | –45 | –13 | –51 | –8 |
| | | | | –29 | –5 | –34 | –1 | –41 | –17 | –46 | –13 |
| **80** | **120** | 0 | –15 | –38 | –16 | –45 | –10 | –52 | –30 | –59 | –24 |
| | | | | –38 | –1 | –45 | +5 | –52 | –15 | –59 | –9 |
| | | | | –33 | –6 | –40 | 0 | –47 | –20 | –54 | –14 |
| **120** | **150** | 0 | –18 | –45 | –20 | –52 | –12 | –61 | –36 | –68 | –28 |
| | | | | –45 | –2 | –52 | +6 | –61 | –18 | –68 | –10 |
| | | | | –39 | –8 | –45 | –1 | –55 | –24 | –61 | –17 |
| **150** | **180** | 0 | –25 | –45 | –20 | –52 | –12 | –61 | –36 | –68 | –28 |
| | | | | –45 | +5 | –52 | +13 | –61 | –11 | –68 | –3 |
| | | | | –38 | –2 | –44 | +5 | –54 | –18 | –60 | –11 |
| **180** | **250** | 0 | –30 | –51 | –22 | –60 | –14 | –70 | –41 | –79 | –33 |
| | | | | –51 | +8 | –60 | +16 | –70 | –11 | –79 | –3 |
| | | | | –43 | 0 | –50 | +6 | –62 | –19 | –69 | –13 |
| **250** | **315** | 0 | –35 | –57 | –25 | –66 | –14 | –79 | –47 | –88 | –36 |
| | | | | –57 | +10 | –66 | +21 | –79 | –12 | –88 | –1 |
| | | | | –48 | +1 | –54 | +9 | –70 | –21 | –76 | –13 |
| **315** | **400** | 0 | –40 | –62 | –26 | –73 | –16 | –87 | –51 | –98 | –41 |
| | | | | –62 | +14 | –73 | +24 | –87 | –11 | –98 | –1 |
| | | | | –51 | +3 | –60 | +11 | –76 | –22 | –85 | –14 |
| **400** | **500** | 0 | –45 | –67 | –27 | –80 | –17 | –95 | –55 | –108 | –45 |
| | | | | –67 | +18 | –80 | +28 | –95 | –10 | –108 | 0 |
| | | | | –55 | +6 | –65 | +13 | –83 | –22 | –93 | –15 |
| **500** | **630** | 0 | –50 | –88 | –44 | –114 | –44 | –122 | –78 | –148 | –78 |
| | | | | –88 | +6 | –114 | +6 | –122 | –28 | –148 | –28 |
| | | | | –75 | –7 | –98 | –10 | –109 | –41 | –132 | –44 |

**Table 21**

## Housing tolerances and resultant fits

| **Housing** Nominal bore diameter D | | **Bearing** Outside diameter tolerance $t_{\Delta Dmp}$ | | **Housing bore diameter deviations, resultant fits**[1] Tolerance classes | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | N6Ⓔ | | N7Ⓔ | | P6Ⓔ | | P7Ⓔ | |
| | | | | Deviations (housing bore diameter) | | | | | | | |
| | | | | Theoretical interference (–)/clearance (+) | | | | | | | |
| over | incl. | low | high | Probable interference (–)/clearance (+) | | | | | | | |
| mm | | µm | | µm | | | | | | | |
| **630** | **800** | 0 | –75 | –100 | –50 | –130 | –50 | –138 | –88 | –168 | –88 |
| | | | | –100 | +25 | –130 | +25 | –138 | –13 | –168 | –13 |
| | | | | –83 | +8 | –108 | +3 | –121 | –30 | –146 | –35 |
| **800** | **1 000** | 0 | –100 | –112 | –56 | –146 | –56 | –156 | –100 | –190 | –100 |
| | | | | –112 | +44 | –146 | +44 | –156 | 0 | –190 | 0 |
| | | | | –92 | +24 | –119 | +17 | –136 | –20 | –163 | –27 |
| **1 000** | **1 250** | 0 | –125 | –132 | –66 | –171 | –66 | –186 | –120 | –225 | –120 |
| | | | | –132 | +59 | –171 | +59 | –186 | +5 | –225 | +5 |
| | | | | –108 | +35 | –138 | +26 | –162 | –19 | –192 | –28 |
| **1 250** | **1 600** | 0 | –160 | –156 | –78 | –203 | –78 | –218 | –140 | –265 | –140 |
| | | | | –156 | +82 | –203 | +82 | –218 | +20 | –265 | +20 |
| | | | | –126 | +52 | –163 | +42 | –188 | –10 | –225 | –20 |
| **1 600** | **2 000** | 0 | –200 | –184 | –92 | –242 | –92 | –262 | –170 | –320 | –170 |
| | | | | –184 | +108 | –242 | +108 | –262 | +30 | –320 | +30 |
| | | | | –149 | +73 | –192 | +58 | –227 | –5 | –270 | –20 |
| **2 000** | **2 500** | 0 | –250 | –220 | –110 | –285 | –110 | –305 | –195 | –370 | –195 |
| | | | | –220 | +140 | –285 | +140 | –305 | +55 | –370 | +55 |
| | | | | –177 | +97 | –226 | +81 | –262 | +12 | –311 | –4 |

[1] Values are valid for most bearings with Normal tolerances. For exceptions, refer to *Tolerances and resultant fits*, page 153.

# Provisions for mounting and dismounting

Particularly when large bearings are involved, SKF recommends that during the design stage you make provisions to facilitate mounting and dismounting, including:

- slots or recesses machined in the shaft or housing shoulders so that withdrawal tools can be used (fig. 8)
- threaded holes in the housing shoulders so that bolts can be used for dismounting (fig. 9)
- oil supply ducts and distribution grooves in the shaft to enable the oil injection method to be used (fig. 10)

  Recommended dimensions for oil supply ducts and distribution grooves are listed in table 22, and for threaded holes in table 23. When using the oil injection method, Ra should not exceed 1,6 µm.

Fig. 8

**Slots or recesses in the shaft to apply withdrawal tools**

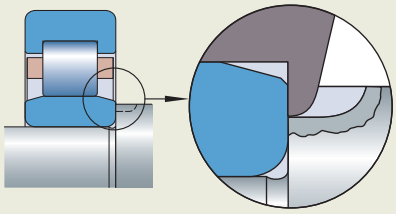


Fig. 9

**Threaded holes in the housing to push bearing with bolts from its seat**

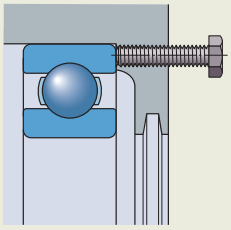


Fig. 10

**Duct and groove for oil injection**

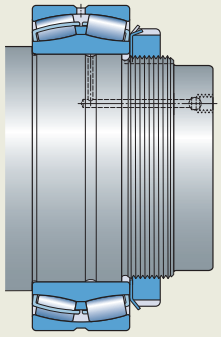
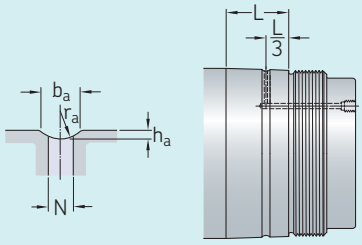


**Table 22**

**Recommended dimensions for oil supply ducts and distribution grooves**

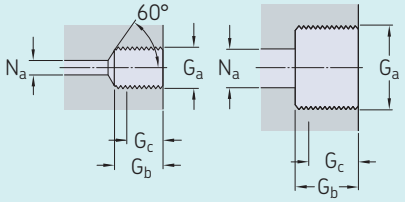



| Seat diameter > | ≤ | Dimensions $b_a$ | $h_a$ | $r_a$ | N |
|---|---|---|---|---|---|
| mm | | mm | | | |
| – | 100 | 3 | 0,5 | 2,5 | 2,5 |
| 100 | 150 | 4 | 0,8 | 3 | 3 |
| 150 | 200 | 4 | 0,8 | 3 | 3 |
| 200 | 250 | 5 | 1 | 4 | 4 |
| 250 | 300 | 5 | 1 | 4 | 4 |
| 300 | 400 | 6 | 1,25 | 4,5 | 5 |
| 400 | 500 | 7 | 1,5 | 5 | 5 |
| 500 | 650 | 8 | 1,5 | 6 | 6 |
| 650 | 800 | 10 | 2 | 7 | 7 |
| 800 | 1 000 | 12 | 2,5 | 8 | 8 |

L = width of bearing seat

**Table 23**

**Design and recommended dimensions for threaded holes for connecting oil supply**




Design A Design B

| Thread $G_a$ | Design | Dimensions $G_b$ | $G_c$[1)] | $N_a$ max. |
|---|---|---|---|---|
| – | – | mm | | |
| M6 | A | 10 | 8 | 3 |
| G 1/8 | A | 12 | 10 | 3 |
| G 1/4 | A | 15 | 12 | 5 |
| G 3/8 | B | 15 | 12 | 8 |
| G 1/2 | B | 18 | 14 | 8 |
| G 3/4 | B | 20 | 16 | 8 |

[1)] Effective threaded length

# Axial location of bearing rings

Typically, it is not sufficient to use an interference fit alone to axially locate a bearing ring on a cylindrical seat. Common ways of locating bearing rings axially include:

- shaft or housing shoulders
- lock nuts or threaded rings (fig. 11 and fig. 12)
- end plates or housing covers (fig. 13 and fig. 14)
- distance rings, which support against adjacent parts (fig. 15)
- snap rings (fig. 16)

Any axial location should be able to accommodate the axial loads that may be applied to the bearing.

# Bearings with a tapered bore

Depending on conditions and requirements, common ways of axially locating the inner ring of a bearing with a tapered bore are:

- a lock nut for bearings mounted on a tapered seat (fig. 17)
- an adapter sleeve only (fig. 18), if no precise axial positioning is required and the axial loads do not exceed the friction between sleeve and shaft
- an adapter sleeve and a distance ring (fig. 19), if precise axial positioning is required or elevated axial loads occur
- a withdrawal sleeve with a distance ring (or shaft shoulder) and lock nut (fig. 20)

# Abutments and fillets

When designing abutments, allow enough space to avoid contact between rotating and stationary parts.

Shaft and housing fillet dimensions should always be smaller than the bearing chamfer radii. Heavily loaded shafts can require large fillets and a spacing collar may be necessary (fig. 21).

Appropriate abutment and fillet dimensions are listed in the product tables.

**Fig. 11**

**Inner ring supported by a lock nut and shaft shoulder**

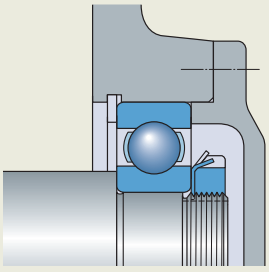


**Fig. 13**

**Inner ring supported by an end plate and shaft shoulder**

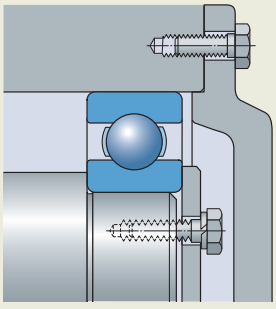


**Fig. 15**

**Inner ring supported by a distance ring and lock nut**

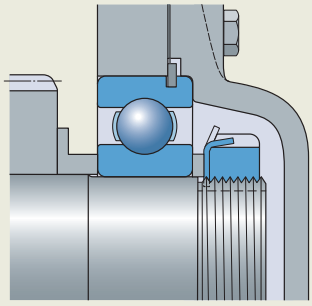


**Fig. 12**

**Outer ring supported by a threaded ring**

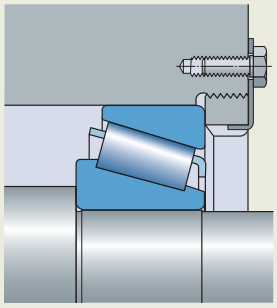


**Fig. 14**

**Outer ring supported by housing cover and housing shoulder**

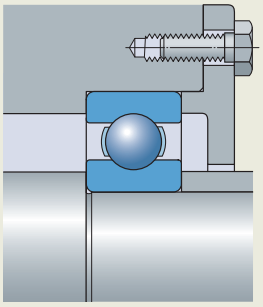
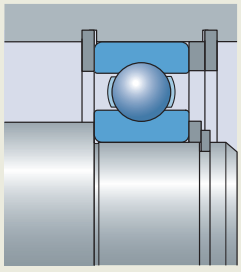


**Fig. 16**

**Bearing supported axially by snap rings and shaft shoulder**



# Radially free mounted bearings for axial load

You may want to use individual bearings in a bearing arrangement to separately accommodate the radial and axial component of the load. A typical arrangement is to use a cylindrical roller bearing and a four-point contact ball bearing (fig. 22).

When using an individual bearing to accommodate the axial load, you should ensure that this bearing is not subjected to unintended radial loads by:

- designing the bore diameter of its housing to be approximately 1 mm larger than the bearing outer diameter
- not clamping its outer ring in the axial direction to permit its free radial positioning

Also consider the use of an anti-rotation pin. The designation suffix N2 indicates that the bearing has two locating slots in the outer ring.

# Raceways on shafts and in housings

In order to save space, the rolling elements of cylindrical, needle or tapered roller bearings can run directly on raceways on the shaft and/or in the housing. To fully exploit the load carrying capacity, the raceways should comply with certain requirements, including:

- suitable material properties such as cleanliness, hardness and heat treatment
- suitable roughness and surface texture
- adequate tolerances for profile, roundness and total run-out

For additional information, contact the SKF application engineering service.

**Fig. 17**

**Bearing on a tapered seat, supported by a lock nut**

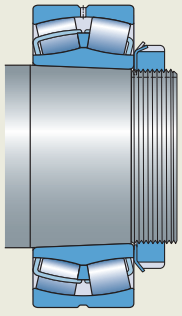


**Fig. 18**

**Bearing on an adapter sleeve**

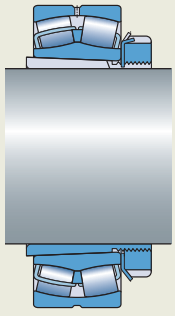


**Fig. 19**

**Bearing on an adapter sleeve, positioned by a distance ring**

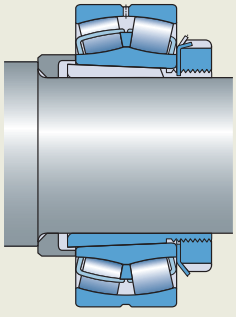


**Fig. 20**

**Bearing on a withdrawal sleeve**

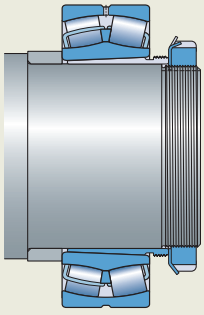


**Fig. 21**

**Spacing collar designed not to contact the shaft fillet**

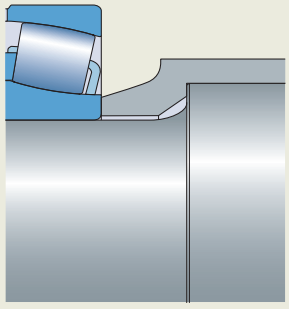
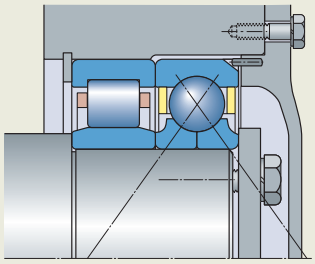


**Fig. 22**

**Cylindrical roller bearing for radial load and four-point contact ball bearing for axial load**



# B.7 Bearing execution

# B.7 Bearing execution


**Selecting internal clearance or preload** . . . . . **182**
Importance of selecting correct clearance/preload . . . . . 183
Selecting initial internal clearance . . . . . 183
Range of initial internal clearance . . . . . 184
Clearance reduction caused by interference fits . . . . . 184
Clearance reduction caused by temperature difference between shaft, bearing rings and housing . . . . . 184
Other influences on clearance/preload . . . . . 185
Required minimum initial internal clearance . . . . . 185
Selecting preload . . . . . 186
Considerations for preload . . . . . 186
Preloading with springs . . . . . 186

**Bearing tolerance class** . . . . . **187**

**Cages** . . . . . **187**

**Integral sealing** . . . . . **189**

**Additional options** . . . . . **189**
Coatings . . . . . 189
Features for special requirements . . . . . 190

# B.7 Bearing execution



As part of the bearing selection process, when the bearing type, size, and fit have been determined, additional factors must be considered to enable you to further define the final variant of the bearing.

In this section you can find recommendations and requirements for selecting:

- the bearing internal clearance or preload
- the bearing tolerances
- the appropriate cage (where applicable)
- integral seals (where applicable)
- additional options, such as coatings and other features to meet any special needs/ requirements

## Selecting internal clearance or preload

Bearing internal clearance (**fig. 1**) is defined as the total distance through which one bearing ring can be moved relative to the other in the radial direction (radial internal clearance) or in the axial direction (axial internal clearance).

Initial internal clearance is the internal clearance in the bearing prior to mounting.

Mounted clearance is the internal clearance in the bearing after mounting but prior to operation.

Operating clearance is the internal clearance in the bearing when it is in operation and has reached a stable temperature.

In most applications, the initial internal clearance in a bearing is greater than its operating clearance. This is because of the effects of (**fig. 2**):

- interference fits with the shaft and/or housing
- thermal expansion of the bearing rings and associated components

Bearings must have the appropriate operating clearance to operate satisfactorily (*Importance of selecting correct clearance/ preload*).

In most cases, bearings require a certain degree of clearance (*Selecting initial internal clearance*). However, in some cases, they may require preload (i.e. negative clearance, refer to *Selecting preload*, **page 186**).

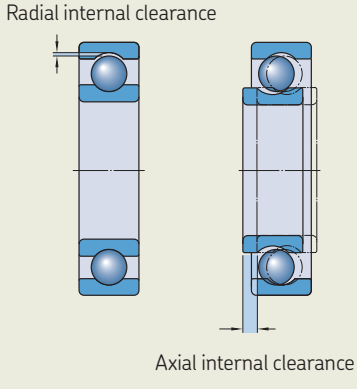
As a general rule:

- Ball bearings should have an operating clearance that is virtually zero.
- Cylindrical, needle, spherical and CARB toroidal roller bearings typically require at least a small operational clearance.
- Tapered roller and angular contact ball bearings should have a small operational clearance, except in applications where a high degree of stiffness or positional control is required, in which case they can be mounted with a degree of preload.

Sections *Selecting initial internal clearance* and *Selecting preload*, describe the influencing factors that you must consider and provide the methods by which you can calculate the initial internal clearance needed to achieve the degree of operational clearance/ preload required by your application.

**Fig. 1**

**Bearing internal clearance**



# Importance of selecting correct clearance/preload

The operating clearance or preload in a bearing influences, among other things, the friction, load zone size and fatigue life of a bearing. The relationship between these parameters is shown in **diagram 1**. The diagram is generalized and based on rolling bearings under radial load.

For general applications, the operating clearance range should be within the recommended zone shown in **diagram 1**.

# Selecting initial internal clearance

The operating clearance required for a bearing to perform satisfactorily is application dependent (*Importance of selecting correct clearance/preload*).

You must ensure that the bearing has a minimum initial internal clearance of a size that, when it is reduced by the effects of mounting and other influences, is equal to or greater than the required minimum operating clearance.

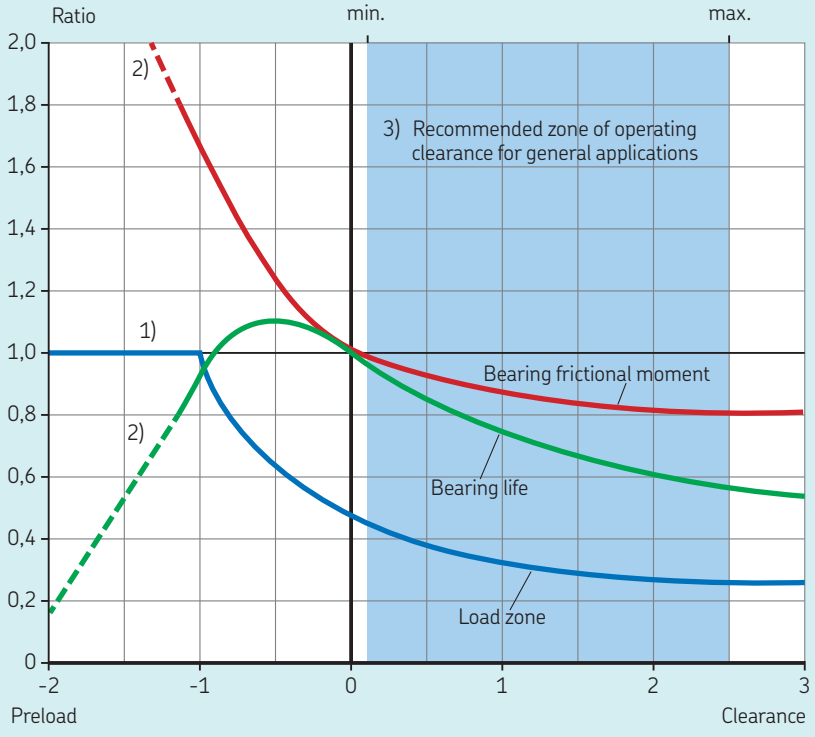
To achieve this, follow this procedure:

- consider the reduction of clearance caused by interference fits (**page 184**)
- consider the reduction of clearance caused by temperature difference between the shaft, bearing rings and housing (**page 184**)
- consider the reduction of clearance caused by other influences (**page 185**)
- consider the required minimum initial internal clearance (**page 185**)
- select the required minimum initial internal clearance (**page 185**)

In case of doubt, contact the SKF application engineering service for support.

**Diagram 1**

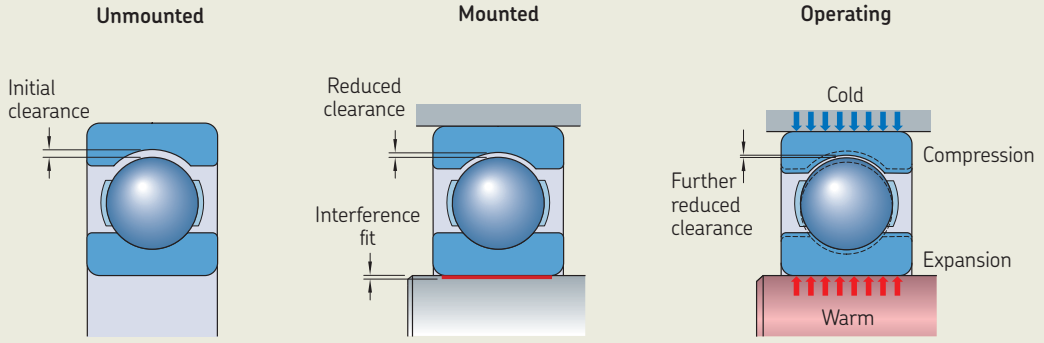
**Operational clearance or preload versus main operational criteria**




1) A ratio of 1 means that all rolling elements are loaded.
2) The dotted line indicates potentially unstable working conditions.
3) Limits of range are determined by initial clearance, fit and temperature effects.

**Fig. 2**

**Initial internal clearance and operating clearance**



## Range of initial internal clearance

Bearing types for adjusted bearing arrangements – such as angular contact ball bearings, tapered roller bearings and spherical roller thrust bearings – have their internal clearance set during mounting. The internal clearance of such an arrangement, even though set by adjustment during mounting, will nevertheless have a range.

For other bearing types, the initial internal clearance is determined during their manufacture. ISO has defined five clearance classes for specifying the degree of initial internal clearance in a bearing (*Internal clearance*, **page 26**). Each clearance class represents a range of values. The size of the ranges varies depending on bearing type and size. Clearance class details are listed in relevant product sections.

Initial clearances greater than Normal, such as C3 or even C4 clearance classes, are very common today. This is because modern bearings take higher loads and require tighter interference fits, and typical operating conditions are different, compared to when the clearance classes were defined.

For universally matchable single row angular contact ball bearings and matched tapered roller bearings, double row angular contact ball bearings and four-point contact ball bearings, values for the axial internal clearance are given instead of radial internal clearance, because the axial clearance is of greater practical importance for these bearing types. Radial internal clearance is related to axial internal clearance and that relationship is determined by the bearing type and its internal geometry. For detailed information, refer to the product sections.

## Clearance reduction caused by interference fits

An interference fit causes clearance reduction because inner rings are expanded and outer rings are compressed. The reduction equals the effective interference fit multiplied by a reduction factor using

$$\Delta r_{fit} = \Delta_1 f_1 + \Delta_2 f_2$$

where

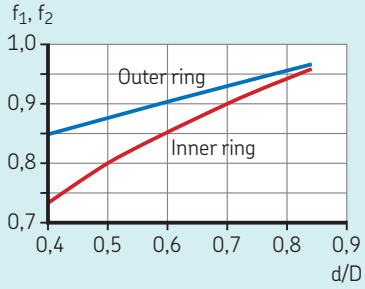
$\Delta r_{fit}$ = clearance reduction caused by the fit [µm]
$f_1$ = reduction factor for the inner ring
$f_2$ = reduction factor for the outer ring
$\Delta_1$ = effective interference between the inner ring and shaft [µm]
$\Delta_2$ = effective interference between the outer ring and housing [µm]

Reduction factors valid for a solid steel shaft and a thick-walled cast iron or steel housing can be obtained from **diagram 2** as a function of the ratio of the bearing bore diameter d to the outside diameter D. For the effective interference value, use the maximum probable interference value listed in the appropriate tables in *Tolerances and resultant fits*, **page 153**.

For a more detailed analysis, consider using SKF calculation tools, such as *SKF Bearing Calculator* (skf.com/bearingcalculator), SKF SimPro Quick or SKF SimPro Expert, or contact the SKF application engineering service.

**Diagram 2**

**Factors for clearance reduction caused by interference fits**




## Clearance reduction caused by temperature difference between shaft, bearing rings and housing

The temperature behaviour of an application can create a difference in temperature between a bearing inner ring and outer ring, which changes the mounted bearing clearance/preload. For a steel shaft and steel or cast iron housing, the change can be estimated using

$$\Delta r_{temp} = 0{,}012\ \Delta T\ d_m$$

where

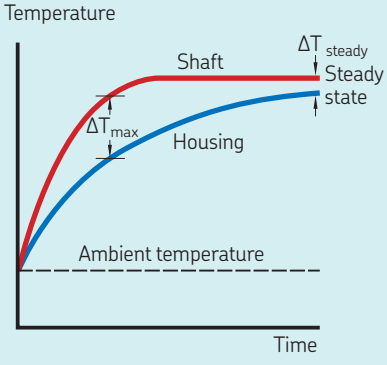
$\Delta r_{temp}$ = clearance reduction caused by temperature difference [µm]
$\Delta T$ = temperature difference between inner and outer ring [°C]
$d_m$ = the bearing mean diameter [mm] = (d + D)/2

### Steady state

The operating temperature of a bearing reaches a steady state when there is thermal equilibrium (**page 131**) – i.e. there is a balance between generated heat and dissipated heat. In the common case where the ambient temperature of the surroundings of the housing of a bearing arrangement is cooler than its shaft, a steady-state temperature gradient is developed that results in the inner ring of the bearing being hotter than the outer ring ($\Delta T_{steady}$ in **diagram 3**).

**Diagram 3**

**Temperature differences during start-up going into steady state**



### Start-up

During start-up, the temperature gradient over the bearing is largely determined by the transient heat flow. Among the various components in contact with the bearing, the one that has the smallest thermal capacity will rise in temperature faster than the one that has the largest thermal capacity. Therefore, the start-up sequence can result in a larger temperature differential between bearing inner and outer ring than in the steady-state condition. It results in a temperature peak during start-up ($\Delta T_{max}$ in **diagram 3**). This is especially pronounced in machines that either are working outdoors in a cold climate or have a heated shaft.

### Higher speeds

Whether during start-up or at steady state, higher speeds generate larger frictional losses. This typically results in a larger temperature differential between the bearing inner and outer ring and therefore a need for larger initial clearance.

## Other influences on clearance/preload

Axial clamping of a ring results in a small increase of its diameter. Normally, this has a negligible influence. For machines where there is a large axial load on any of the rings, or where two bearings (e.g. angular contact ball bearings or tapered roller bearings, with or without distance rings) are clamped axially, the influence on clearance or preload from the axial compression and the radial expansion must be considered.

Misalignment beyond the limits specified in the product sections will reduce the clearance which, because of unfavourable load distribution, will result in reduced service life and increased friction.

Where light alloy materials are used, the temperature differences between rings and shaft or housing may have a more pronounced influence on the clearance of the bearing.

## Required minimum initial internal clearance

The required minimum initial internal clearance can be estimated using

$$r = r_{op} + \Delta r_{fit} + \Delta r_{temp} + \Delta r_{other}$$

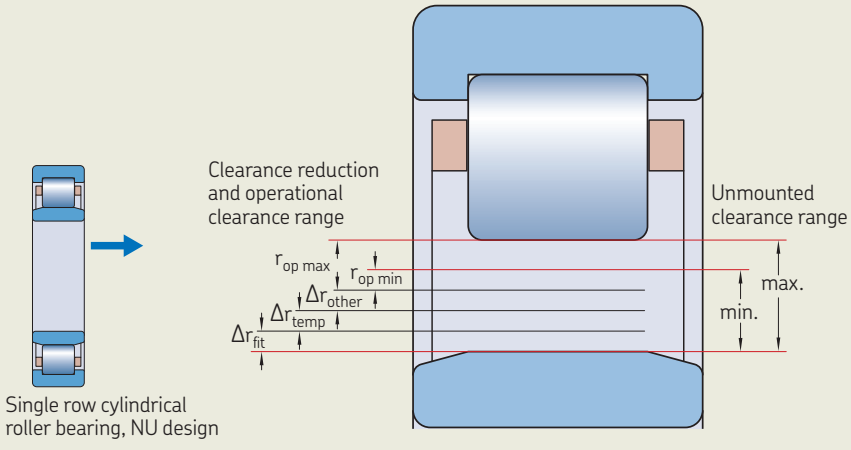
where

$r$ = required minimum initial internal clearance [µm]
$r_{op}$ = required operating clearance [µm]
$\Delta r_{fit}$ = clearance change caused by the maximum expected fits [µm]
$\Delta r_{temp}$ = maximum clearance change expected from the temperature difference during start-up or in steady state [µm]
$\Delta r_{other}$ = maximum clearance change expected from other effects such as axial clamping [µm]

- Bearing types for adjusted bearing arrangements – such as angular contact ball bearings, tapered roller bearings or spherical roller thrust bearings – have their internal clearance set during mounting (*Mounting adjusted bearing arrangements*, **page 203**).
- For other bearing types, select a bearing clearance class (*Internal clearance*, **page 26**: Normal, C3, C4, etc.) whose minimum clearance is equal to or greater than the estimated minimum initial internal clearance (**fig.3**). Then verify whether the resulting maximum clearance of the selected clearance class is acceptable for the application. If the maximum clearance, for whatever reason, is too large then consider choosing a reduced clearance group – e.g. C3L, which includes only the lower half of the C3 clearance group range.

**Fig.3**

**Relationship between minimum initial internal clearance and bearing clearance class**




The minimum clearance of the bearing clearance class must be equal to or greater than the estimated minimum initial internal clearance.

# Selecting preload

Depending on the application, there may be a need to preload a bearing arrangement. For example, if a high degree of stiffness or positional control is required then preload may be suitable. Similarly, where there is a very light or no external load on the bearing in operation then preload may be required to ensure a minimum load.

Applying the preload is typically done by measuring a force, sometimes a displacement over a distance or path, or by measuring the frictional torque during mounting.

Empirical preload values can be obtained from proven designs and can be applied to similar designs. For new designs, SKF recommends calculating the appropriate preload range by using SKF SimPro Quick or SKF SimPro Expert and then checking it by testing in the application. The agreement between the calculation and the actual application depends on how closely the estimated operating temperature and elastic behaviour of the associated components – most importantly the housing – coincide with the actual conditions in operation. In this context, the effects of start-up at low ambient temperature must be included in the testing.

## Considerations for preload

Depending on the bearing type, preload may be either radial or axial. Super-precision cylindrical roller bearings, for example, can only be preloaded radially because of their design, while angular contact ball bearings or tapered roller bearings can only be preloaded axially.

Single tapered roller bearings or angular contact ball bearings are generally mounted together with a second bearing of the same type and size in a back-to-back (load lines diverge, fig. 4) or face-to-face (load lines converge, fig. 5) arrangement. The same is true for single row angular contact ball bearings.

The distance L between the pressure centres is longer when the bearings are arranged back-to-back compared to bearings that are arranged face-to-face. The back-to-back arrangement can accommodate larger tilting moments.

If the shaft temperature in operation is higher than the housing temperature, the preload, which was adjusted at ambient temperature during mounting, will change. Since thermal growth of a shaft makes it larger both in the axial and in the radial direction, the back-to-back arrangements are less sensitive to thermal effects than the face-to-face arrangements.

When adjusting preload in a bearing system, it is important that the established preload value is attained with the least possible variation. To reduce variation when mounting tapered roller bearings, the shaft should be turned several times to ensure that the rollers are in correct contact with the guide flange of the inner ring.

## Preloading with springs

By preloading bearings it is possible to reduce the noise in, for example, small electric motors or similar applications. In this example, the bearing arrangement comprises a preloaded single row deep groove ball bearing at each end of the shaft (fig. 6). The simplest method of applying preload is to use a wave spring. The spring acts on the outer ring of one of the two bearings. This outer ring must be able to be axially displaced.

The preload force remains practically constant, even when there is axial displacement of the bearing as a result of thermal elongation.

The requisite preload force can be estimated using

$$F = k\,d$$

where
F = preload force [kN]
k = a factor, described in the following text
d = bearing bore diameter [mm]

Fig. 4

**Back-to-back arrangement, tapered roller bearings**

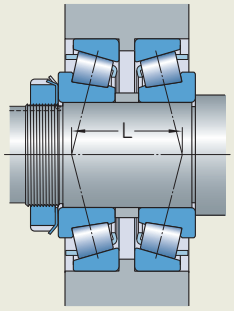



Fig. 5

**Face-to-face arrangement, tapered roller bearings**

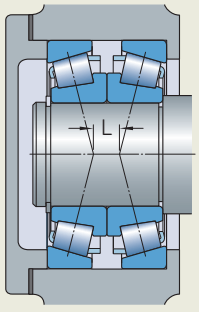
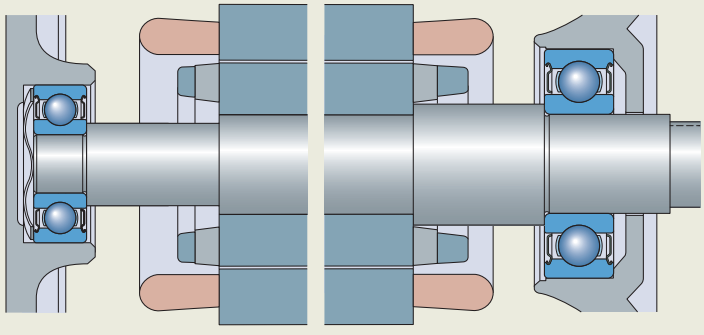



Fig. 6

**Preloading with springs**



For small electric motors, values of between 0,005 and 0,01 are used for the factor k. If preload is used primarily to protect the bearing from the damage caused by external vibrations when stationary, then greater preload is required and k = 0,02 should be used.

Spring loading is also a common method of applying preload to angular contact ball bearings in high-speed grinding spindles. The method is not suitable for bearing applications where a high degree of stiffness is required, where the direction of axial load changes, or where undefined peak loads can occur.

For additional information, refer to *Bearing preload*, (skf.com/go/17000-B7).

# Bearing tolerance class

The dimensional and geometrical tolerances of bearings are described by their tolerance classes (*Tolerances*, **page 36**). In addition to the Normal, P6 and P5 tolerance classes, SKF also manufactures bearings with even narrower tolerances. These include P4, UP and other tolerance classes. For information about SKF bearings that have a tolerance class better than P5, refer to skf.com/super-precision.

Select the tolerance class for a bearing based on the application requirements for precision of rotation and operational speed (**diagram 4**).

If the application requirements for precision of rotation are moderate (*Selecting fits*, **page 140**) and operational speed is moderate (*Speed limitations*, **page 135**), then choose a Normal tolerance class. If the requirements for precision of rotation and/or operational speed are greater than moderate, then choose an appropriately more accurate tolerance class (**diagram 4**).

For detailed information about standard tolerances, please refer to the product sections.

# Cages

The main cage types are described in *Components and materials*, **page 24**. Additionally, information about standard cages, and possible cage options, for a particular bearing type is given in the relevant product section. If a bearing with a non-standard cage is required, check availability before ordering.

There are fundamental design differences between bearings which, together with the influence of bearing size, make certain cage designs necessary. For example:

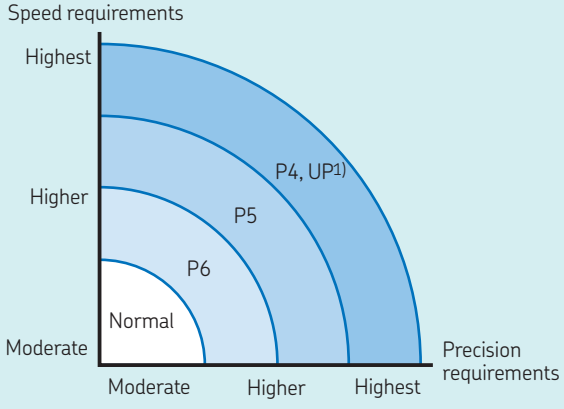
- some bearing types need either split or snap-type cages, because they are assembled after the rings and rolling elements have been sub-assembled
- other bearing types need roller-guided cages, to be self-containing
- bearings of a certain combination of size and series need ring-guided cages, to limit contact stress between rolling elements and cage

Given the specific functional demands and quantity of bearings being manufactured, the material and manufacturing methods are chosen to provide the most reliable and cost-effective cage.

Cages are mechanically stressed during bearing operation by frictional, impact, centrifugal and inertial forces. They can also be chemically influenced by certain organic solvents or coolants, lubricants, and lubricant additives. Therefore, the material type used for a cage has a significant influence on the suitability of a rolling bearing for a particular application.

**Diagram 4**

**Bearing tolerance class related to precision of rotation and operational speed**




1) For information about SKF bearings that have a tolerance class better than P5, refer to skf.com/super-precision.

## Steel cages

Steel cages can be used at operating temperatures up to 300 °C *(570 °F)*.

### Sheet steel cages

Stamped sheet steel cages are made of low carbon steel. These lightweight cages have relatively high strength and, for some bearing types, can be surface treated to further reduce friction and wear in critical conditions.

### Machined steel cages

Machined steel cages are normally made of non-alloyed structural steel. To reduce friction and wear, some machined steel cages are surface treated.

Machined steel cages are not affected by the mineral or synthetic oil-based lubricants normally used for rolling bearings, or by the organic solvents used to clean bearings.

## Brass cages

Brass cages can be used at operating temperatures up to 250 °C *(480 °F)*.

### Sheet brass cages

Stamped sheet brass cages are used for some small and medium-size bearings. In applications such as refrigeration compressors that use ammonia, machined brass or steel cages should be used.

### Machined brass cages

Most brass cages are machined from cast or wrought brass. They are unaffected by most common bearing lubricants, including synthetic oils and greases, and can be cleaned using organic solvents.

## Polymer cages

### Polyamide 66

Polyamide 66 (PA66) is the most commonly used material for injection moulded cages. This material, with or without glass fibres, is characterized by a favourable combination of strength and elasticity. The mechanical properties, such as strength and elasticity, of polymer materials are temperature dependent and subject to ageing. The factors that most influence the ageing process are temperature, time and the medium (lubricant) to which the polymer is exposed. The relationship between these factors for glass fibre reinforced PA66 is shown in **diagram 5**. Cage life decreases with increasing temperature and the aggressiveness of the lubricant.

Therefore, whether polyamide cages are suitable for a specific application depends on the operating conditions and life requirements. The classification of lubricants into "aggressive" and "mild" is reflected by the "permissible operating temperature" for cages made of glass fibre reinforced PA66 with various lubricants (**table 1**). The permissible operating temperature in **table 1** is defined as the temperature that provides a cage ageing life of at least 10 000 operating hours.

Some media are even more "aggressive" than those specified in **table 1**. A typical example is ammonia, used as a refrigerant in compressors. In those cases, cages made of glass fibre reinforced PA66 should not be used at operating temperatures above 70 °C *(160 °F)*.

Polyamide loses its elasticity at low temperatures. Therefore, cages made of glass fibre reinforced PA66 should not be used in applications where the continuous operating temperature is below –40 °C *(–40 °F)*.

### Polyamide 46

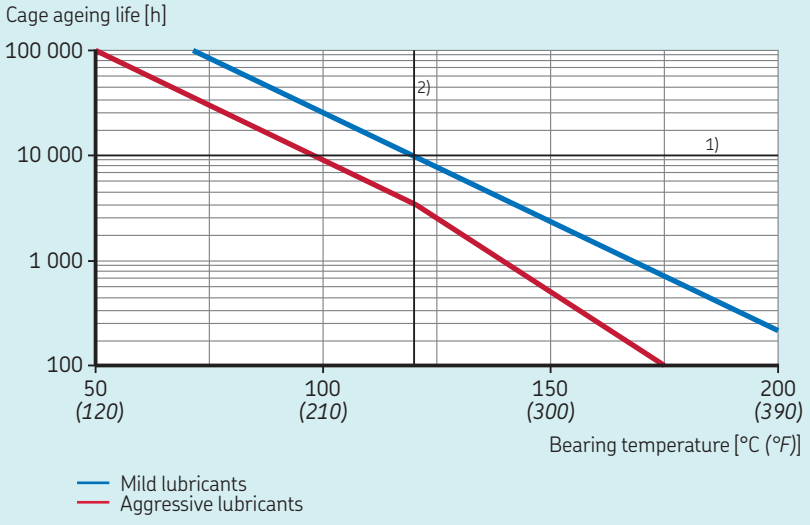
Glass fibre reinforced polyamide 46 (PA46) is the standard cage material for some small and medium-size CARB toroidal roller bearings. The permissible operating temperature is 15 °C *(25 °F)* higher than for glass fibre reinforced PA66.

### Polyetheretherketone

Glass fibre reinforced polyetheretherketone (PEEK) is more suitable for demanding conditions regarding high speeds, chemical resistance or high temperatures than PA66 and PA46. The exceptional properties of PEEK provide a superior combination of strength and flexibility, high operating temperature range, and high chemical and wear resistance. Because of these outstanding features, PEEK cages are commonly available for hybrid and/or super-precision ball and cylindrical roller bearings. The material does not show signs of ageing by temperature or oil additives up to 200 °C *(390 °F)*. However, the maximum temperature for high-speed use is limited to 150 °C *(300 °F)* as this is the softening temperature of the polymer.

**Diagram 5**

**Cage ageing life for glass fibre reinforced PA66**




1) The permissible operating temperature is defined as the temperature that provides a cage ageing life of at least 10 000 operating hours.
2) Generally, "aggressive" lubricants have a permissible temperature that is less than 120 °C *(250 °F)*.

## Cages made of other materials

In addition to the materials described previously, SKF bearings for special applications may be fitted with cages made of other engineered polymers, light alloys or special cast iron. For additional information about alternative cage materials, contact SKF.

# Integral sealing

Integral sealing can significantly prolong bearing service life by keeping lubricant in the bearing and contaminants out.

The various types of capping devices that are available for SKF bearings are described in *Components and materials*, **page 24**.

Information about which integral seal options are available for a particular bearing type is given in the relevant product section.

# Additional options

# Coatings

Coating is a well-established method to upgrade materials and to provide bearings with additional benefits for specific application conditions. Various coating methods developed by SKF are available and have been proven successful in many applications.

## Black oxide

Black oxide coating of rings and rollers improves reliability and performance in highly demanding applications, especially under low load conditions and high vibration. In addition, it improves corrosion protection and lubricant adhesion on the bearing surfaces.

SKF also supplies customized black oxide coating layers that are optimized for best tribological results and highest bearing performance, produced using well-defined processes and fine tuned to the individual steel grade, bearing type and size. SKF's evaluation and quality control technology for the black oxide application process includes a scanning electron microscope and a patented examination method.

## NoWear

NoWear is a wear-resistant surface coating that applies a low-friction carbon coating on the bearing inner ring raceway(s) and/or the rolling elements. It can withstand long periods of operation under marginal lubrication conditions. For additional information, refer to *NoWear coated bearings*, **page 1060**

## INSOCOAT

INSOCOAT bearings are standard bearings that have the external surfaces of their inner or outer ring plasma-sprayed with an aluminium oxide, impregnated with a resin sealant, to form a coating. It offers resistance to the damage that can be caused by the passage of stray electric current through the bearing. For additional information, refer to *INSOCOAT bearings*, **page 1030**.

Other coatings are available that provide an alternative to stainless steel bearings (especially for ready-to-mount bearing units) that are used in a corrosive environment.

**Table 1**

**Permissible operating temperatures for PA66 cages with various bearing lubricants**

| Lubricant | Permissible operating temperature[1] | |
|---|---|---|
| – | °C | *°F* |
| **Mineral oils** | | |
| Oils without EP additives, e.g. machine or hydraulic oils | 120 | *250* |
| Oils with EP additives, e.g. industrial and automotive gearbox oils | 110 | *230* |
| Oils with EP additives, e.g. automotive rear axle and differential gear oils (automotive), hypoid gear oils | 100 | *210* |
| **Synthetic oils** | | |
| Polyglycols, polyalphaolefins | 120 | *250* |
| Diesters, silicones | 110 | *230* |
| Phosphate esters | 80 | *175* |
| **Greases** | | |
| Lithium greases | 120 | *250* |
| Polyurea, bentonite, calcium complex greases | 120 | *250* |

For sodium and calcium greases and other greases with a maximum operating temperature ≤ 120 °C (*250 °F*), the maximum temperature for a polyamide cage is the same as the maximum operating temperature for the grease.

[1] Measured on the outside surface of the outer ring; defined as the temperature that provides a cage ageing life of at least 10 000 operating hours.

# Features for special requirements

SKF supplies many more bearing variants, in addition to those presented in the product sections, for accomplishing various tasks and satisfying special application needs. Among the more common special variants manufactured by SKF are:

- special chamfers – e.g. with a larger radius or with a modified shape (fig. 7)
- additional anti-rotation slots in the outer ring (standard for some bearing types, such as four-point contact ball bearings) (table 2, fig. 8)
- threaded holes in the rings to accommodate eye bolts to ease lifting (fig. 9)
- special greases
- sensors – e.g. to aid mounting (fig. 10) or for monitoring speed and direction of rotation (fig. 11)
- measuring reports, material certificate, additional inspections
- tailor-made bearings and units (fig.12 and fig.13)



Fig. 7

**Bearing with special-shaped chamfer**

Fig. 8

**Bearing with additional anti-rotation slots in the outer ring**

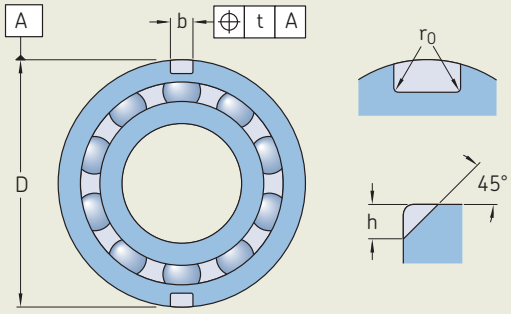



Fig. 9

**Eye bolts in bearing ring to ease lifting**

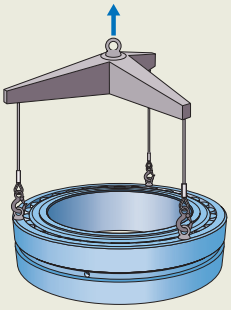


Fig. 10

**Mounting with SKF SensorMount**

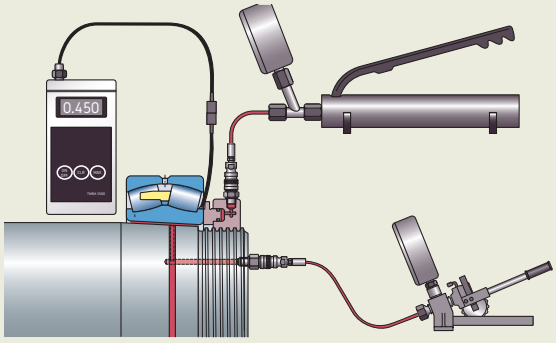
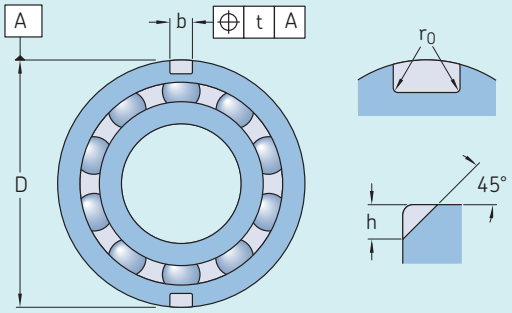


**Table 2**

**Locating slots in the outer ring of four-point contact ball bearings**




| Outside diameter | | Dimensions | | | | | | Tolerance[1] |
|---|---|---|---|---|---|---|---|---|
| | | Diameter series 2 | | | Diameter series 3 | | | |
| D | | h | b | $r_0$ | h | b | $r_0$ | t |
| > | ≤ | | | | | | | U |
| mm | | mm | | | | | | mm |
| **35** | **45** | 2,5 | 3,5 | 0,5 | – | – | – | 0,2 |
| **45** | **60** | 3 | 4,5 | 0,5 | 3,5 | 4,5 | 0,5 | 0,2 |
| **60** | **72** | 3,5 | 4,5 | 0,5 | 3,5 | 4,5 | 0,5 | 0,2 |
| **72** | **95** | 4 | 5,5 | 0,5 | 4 | 5,5 | 0,5 | 0,2 |
| **95** | **115** | 5 | 6,5 | 0,5 | 5 | 6,5 | 0,5 | 0,2 |
| **115** | **130** | 6,5 | 6,5 | 0,5 | 8,1 | 6,5 | 1 | 0,2 |
| **130** | **145** | 8,1 | 6,5 | 1 | 8,1 | 6,5 | 1 | 0,2 |
| **145** | **170** | 8,1 | 6,5 | 1 | 10,1 | 8,5 | 2 | 0,2 |
| **170** | **190** | 10,1 | 8,5 | 2 | 11,7 | 10,5 | 2 | 0,2 |
| **190** | **210** | 10,1 | 8,5 | 2 | 11,7 | 10,5 | 2 | 0,2 |
| **210** | **240** | 11,7 | 10,5 | 2 | 11,7 | 10,5 | 2 | 0,2 |
| **240** | **270** | 11,7 | 10,5 | 2 | 11,7 | 10,5 | 2 | 0,2 |
| **270** | **400** | 12,7 | 10,5 | 2 | 12,7 | 10,5 | 2 | 0,4 |

[1] Other tolerances are in accordance with ISO 20515.

**Fig. 11**

**Motor encoder unit**

**Fig.12**

**Special bearing used in pulp and paper manufacturing**

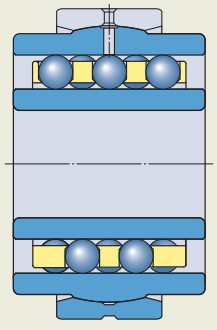


**Fig.13**

**SKF Agri Hub for seeding disc**

# B.8 Sealing, mounting and dismounting

# B.8 Sealing, mounting and dismounting


**External sealing** . . . . . **194**
Seal selection criteria . . . . . 195
Seal types . . . . . 195
Non-contact seals . . . . . 196
Contact seals . . . . . 197

**Mounting and dismounting** . . . . . **199**
Mounting . . . . . 200
Mounting bearings with a cylindrical bore . . . . . 201
SKF methods and tools . . . . . 202
Mounting adjusted bearing arrangements . . . . . 203
Mounting bearings with a tapered bore . . . . . 203
Test running . . . . . 206
Machines on standby . . . . . 207
Dismounting . . . . . 207
Dismounting bearings fitted on a cylindrical shaft seat . 207
Dismounting bearings fitted on a tapered shaft seat . . . 208
Dismounting bearings fitted on an adapter sleeve . . . . 209
Dismounting bearings fitted on a withdrawal sleeve . . . 210

**Inspection and monitoring** . . . . . **211**
Inspection during operation . . . . . 211
Inspection during a machine shutdown . . . . . 212
Troubleshooting . . . . . 213

# B.8 Sealing, mounting and dismounting

This section is the last step in the *Bearing selection process* and it covers:

- **External sealing**
  How to select appropriate seals for rolling bearing applications and the different types of seal available.
- **Mounting and dismounting**
  The preparation and guidelines for mounting and dismounting bearings.
- **Inspection and monitoring**
  Various aspects of inspecting and monitoring bearings in operation for the purpose of preventing problems, and an introduction to troubleshooting.

## External sealing

Bearing arrangements generally include a shaft, bearings, housing(s), lubricant, associated components, and seals. Seals are vital to the cleanliness of the lubricant and the service life of the bearings.

The section on *Integral sealing*, **page 189**, gives a general description of the integral seals used in capped bearings. For detailed information, refer to the relevant product sections.

This section describes seals outside the bearing, and how they affect bearing performance. Because of their importance for bearing applications, this section deals exclusively with non-contact and contact shaft seals, their various designs and executions.

# Seal selection criteria

Seals for bearing applications should provide maximum protection with a minimum amount of friction and wear, under the prevailing operating conditions. Because bearing performance and service life are so closely tied to the effectiveness and cleanliness of the lubricant, the seal is a key component. For additional information on the influence of solid contaminants on bearing performance, refer to *Contamination factor*, $\eta_c$, **page 104**

Many factors must be considered when selecting the most suitable seal for a particular bearing-shaft-housing system. These include:

- the lubricant type: oil or grease
- the contaminant type: particles or fluid or both
- the circumferential speed at the seal lip
- the shaft arrangement: horizontal or vertical
- possible shaft misalignment or deflection
- run-out and concentricity
- available space
- seal friction and the resulting temperature increase
- environmental influences
- cost
- required operating time
- maintenance requirements

For additional information, refer to *Power transmission seals*, (skf.com/seals).

# Seal types

The purpose of a seal is to retain lubricant and prevent any contaminants from entering into a controlled environment.

There are several basic seal types:

- non-contact seals
- contact seals
- static seals

Non-contact radial shaft seals form a narrow gap between the stationary and the rotating component. The gap can be arranged axially, radially or in combination. Non-contact seals, which range from simple gap-type seals to multi-stage labyrinths (**fig. 1**), do not wear.

Seals in contact with sliding surfaces are called contact seals and are used to seal passages between machine components that move relative to each other, either linearly or circumferentially.

The most common contact seal is the radial shaft seal (**fig. 2**), which is installed between a stationary and a rotating component.

Seals between stationary surfaces are called static seals. Their effectiveness depends on the radial or axial deformation of their cross section when installed. Gaskets (**fig. 3**) and O-rings (**fig. 4**) are typical examples of static seals.

**Fig. 1**

**Multi-stage labyrinth seal**

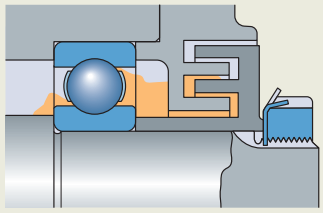


**Fig. 2**

**Radial shaft seal**

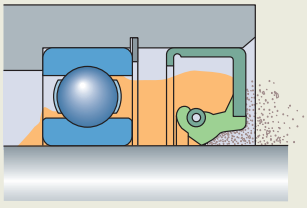


**Fig. 3**

**Gasket**

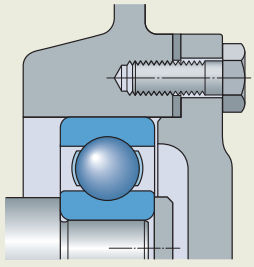
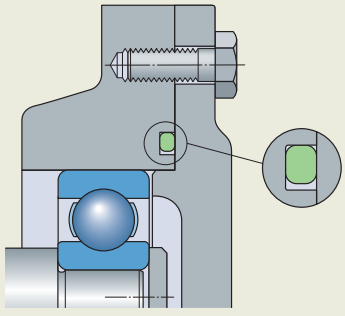


**Fig. 4**

**O-ring**



# Non-contact seals

The simplest seal used outside a bearing is the gap-type seal, which creates a small gap between the shaft and housing cover (fig. 5). This type of seal is mainly used for grease lubricated applications that operate in dry, dust-free environments. To enhance the effectiveness of this seal, one or more concentric grooves can be machined in the housing cover bore at the shaft end (fig. 6). The grease emerging through the gap fills the grooves and helps to prevent entry of contaminants.

With oil lubrication and horizontal shafts, helical grooves can be machined into the shaft or housing bore, either right-handed or left-handed, depending on the direction of shaft rotation (fig. 7). These grooves are designed to return emerging oil to the bearing; therefore, it is essential that the shaft rotates in one direction only.

Other shapes can be machined into the shaft. Non-helical grooves may be used on the shaft and in the housing; these function as disruptors/flingers. Additional shaft collars can prevent oil leakage, whatever the direction of rotation.

Single or multi-stage labyrinth seals, typically used with grease lubrication, are considerably more effective than simple gap-type seals, but are also more expensive. Their effectiveness can be further improved by periodically applying grease, via a duct, to the labyrinth passages. The passages of the labyrinth seal can be arranged axially (fig. 8) or radially (fig. 9), depending on the housing type (split or non-split), mounting procedures, available space, etc. The radial gaps of the labyrinth (fig. 8) remain unchanged when axial displacement of the shaft occurs in operation; therefore, the gaps can be very narrow. Where angular misalignment of the shaft relative to the housing can occur, labyrinths with inclined passages can be used (fig. 10).

Effective and inexpensive labyrinth seals can be made using SKF sealing washers (fig. 11). Sealing effectiveness increases with the number of washer sets and can be further improved by incorporating flocked washers. For additional information on these sealing washers, refer to *Power transmission seals*, (skf.com/seals).

Rotating discs (fig. 12) are often fitted to the shaft to act as a shield. Flingers, grooves or discs are also used with oil lubrication. The oil from the flinger is collected in a channel in the housing and returned to the housing sump through suitable ducts (fig. 13).

Fig. 5

**External gap-type seal**

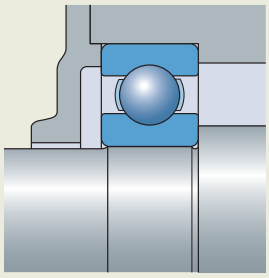


Fig. 6

**External gap-type seal with concentric grooves**

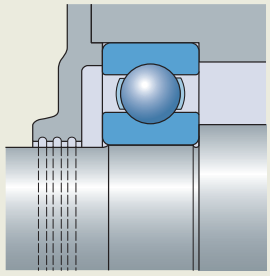


Fig. 7

**External gap-type seal with helical grooves**

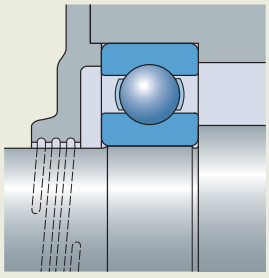


Fig. 8

**External labyrinth seal, passages arranged axially**

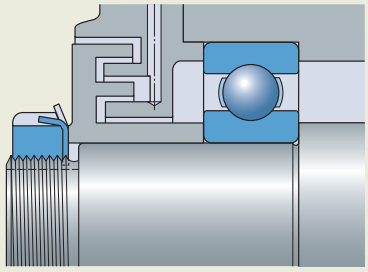


Fig. 9

**External labyrinth seal, passages arranged radially**

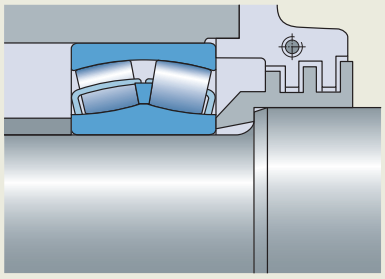


Fig. 10

**External labyrinth seal, with inclined passages**

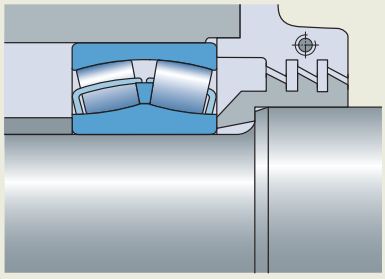


Fig. 11

**Labyrinth seal consisting of multiple SKF sealing washers**

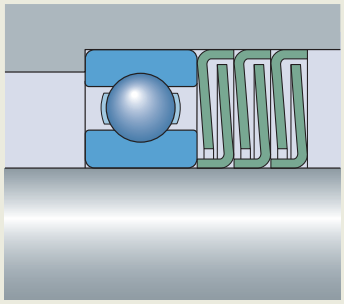
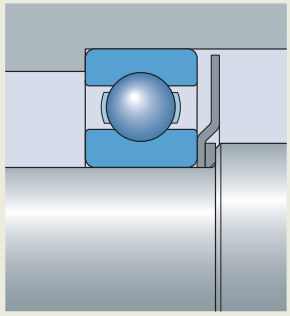


Fig. 12

**Rotating disc acting as a shield**



# Contact seals

There are four common types of contact seals:

- radial shaft seals
- V-ring seals
- axial clamp seals
- mechanical seals

The seal type selected for a particular application typically depends on:

- the primary purpose of the seal (to retain lubricant or exclude contaminants)
- the type of lubricant (oil, grease or other)
- the operating conditions (speed, temperature, pressure and environment)

## Radial shaft seals

Radial shaft seals (fig. 14 and fig. 15) are contact seals that are used for oil and grease lubricated applications. For detailed information, refer to the SKF catalogue *Industrial shaft seals*. These ready-to-mount components typically consist of a metal reinforcement or casing, a synthetic rubber body, a seal lip and a garter spring. The seal lip is pressed against the shaft by the garter spring. Depending on the seal material and medium to be retained and/or excluded, commonly used materials for radial shaft seals can be used at temperatures between –55 °C *(–65 °F)* and +200 °C *(390 °F)*.

The seal counterface, that part of the shaft where the seal lip makes contact, is of vital importance to sealing effectiveness. The surface hardness of the counterface should be at least 45 HRC at a depth of at least 0,3 mm. The surface texture should be in accordance with ISO 4288 and within the guidelines of Ra = 0,2 to 0,5 µm. In applications where speeds are low, lubrication is good, and contamination levels are minimal, a lower hardness can be acceptable. For oil lubrication, to avoid the pumping effect induced by helical grinding marks, SKF recommends plunge grinding the counterface.

If the primary purpose of the radial shaft seal is lubricant retention, the seal should be mounted with the lip facing inward (fig. 14). If the primary purpose is to exclude contaminants, the lip should face outward, away from the bearing (fig. 15).

SKF can also supply machined polyurethane radial shaft seals.

**Fig. 13**

**Oil caught by rotating flinger at the seal**

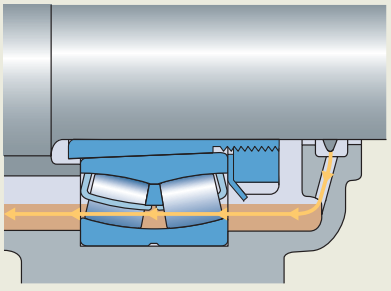


**Fig. 14**

**Radial shaft seal, mounted for lubricant retention**

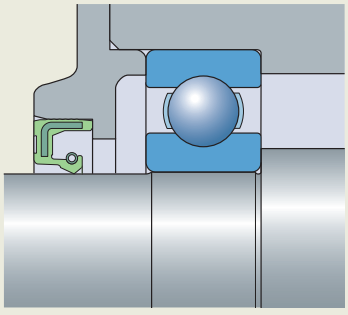
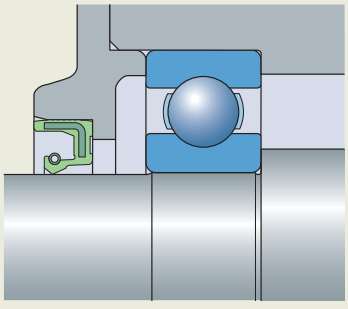


**Fig. 15**

**Radial shaft seal, mounted for contaminant exclusion**



**⚠ WARNING**

**Safety precautions for fluoro rubber and Polytetrafluoroethylene**

Fluoro rubber (FKM) and Polytetrafluoroethylene (PTFE) are very stable and harmless up to normal operating temperatures of 200 °C *(390 °F)*. However, if exposed to temperatures above 300 °C *(570 °F)*, such as fire or the open flame of a cutting torch, FKM and PTFE give off hazardous fumes. These fumes can be harmful if inhaled, as well as if they contact the eyes. In addition, once the seals have been heated to such temperatures, they are dangerous to handle even after they have cooled. Therefore, they should never come in contact with the skin.

If it is necessary to handle bearings with seals that have been subjected to high temperatures, such as when dismounting the bearing, the following safety precautions should be observed:

- Always wear protective goggles, gloves and appropriate breathing apparatus.
- Place all of the remains of the seals in an airtight plastic container marked with a symbol for “material will etch”.
- Follow the safety precautions in the appropriate safety data sheet (SDS).

If there is contact with the seals, wash hands with soap and plenty of water and, if contact has been made with the eyes, flush eyes with plenty of water and consult a doctor immediately. If the fumes have been inhaled, consult a doctor immediately.

The user is responsible for the correct use of the product during its service life and its proper disposal. SKF takes no responsibility for the improper handling of FKM or PTFE, or for any injury resulting from their use.

## V-ring seals

V-ring seals (fig. 16) can be used with either oil or grease lubrication. The elastic rubber body of the seal grips the shaft and rotates with it, while the seal lip exerts a light axial pressure on a stationary component, such as a housing. Depending on the material, V-rings can be used at operating temperatures between –40 °C *(–40 °F)* and +200 °C *(390 °F)*. They are simple to install and permit relatively large angular misalignments of the shaft at low speeds.

The recommended counterface surface finish (surface texture) depends on the circumferential speed (table 1). At circumferential speeds above 8 m/s, the body of the seal must be located axially on the shaft. At speeds above 12 m/s, the body must be prevented from lifting from the shaft. A sheet metal support ring can be used to do this. When circumferential speeds exceed 15 m/s, the seal lip lifts away from the counterface and the V-ring becomes a gap-type seal.

V-ring seals have good sealing abilities, which can be attributed to the body of the seal, which acts as a flinger, repelling dirt and fluids. As a result, these seals are generally arranged outside the housing in grease lubricated applications and inside the housing, with the lip pointing away from the bearing, in oil lubricated applications. Used as a secondary seal, V-rings protect the primary seal from excessive contaminants and moisture.

For added protection in extremely contaminated applications, SKF also supplies MVR seals (fig. 17 and SKF catalogue *Industrial shaft seals*).

## Axial clamp seals

Axial clamp seals (fig. 18) are used as secondary seals for large-diameter shafts in applications where protection is required for the primary seal. They are clamped in position on a non-rotating component and seal axially against a rotating counterface. For this type of seal, it is sufficient if the counterface is fine-turned and has a surface texture of Ra = 2,5 µm.

## Mechanical seals

Mechanical seals (fig. 19) are used to seal grease or oil lubricated applications, where speeds are relatively low and operating conditions arduous. Mechanical seals consist of two sliding steel rings with finely finished sealing surfaces and two Belleville rubber compound washers, which position the sliding rings in the housing bore and provide the necessary preload force to the sealing surfaces. There are no special requirements for the mating surfaces in the housing bore.

## Other seals

Felt seals (fig. 20) are generally used with grease lubrication. They are simple, cost-effective and can be used at circumferential speeds of up to 4 m/s and at operating temperatures up to 100 °C *(210 °F)*. The counterface should be ground to a surface texture of Ra ≤ 3,2 µm. The effectiveness of a felt seal can be improved substantially by mounting a simple labyrinth seal as a secondary seal. Before being inserted in the housing groove, felt seals should be soaked in oil at about 80 °C *(175 °F)* prior to mounting.

Metal seals (fig. 21) are simple, cost-effective and space-saving seals for grease lubricated bearings. The seals are clamped against either the inner or outer ring and exert a resilient axial pressure against the other ring. After a certain running-in period, a narrow gap forms and these become non-contact seals.

**Table 1**

**Recommended counterface surface finish**

| Circumferential speed | | Surface finish Ra | |
|---|---|---|---|
| m/s | ft/min. | µm | µin. |
| >10 | >1 969 | 0,4–0,8 | 16–32 |
| 5–10 | 984–1 969 | 0,8–1,6 | 32–64 |
| 1–5 | 199–984 | 1,6–2,0 | 64–80 |
| <1 | <199 | 2,0–2,5 | 80–100 |

The surface finish must not be lower than Ra = 0,05 µm (2 µin.).

**Fig. 16**

**V-ring seal**

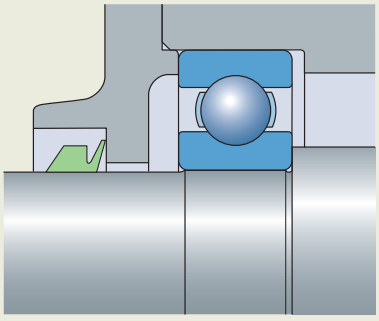


**Fig. 17**

**MVR seal designs**

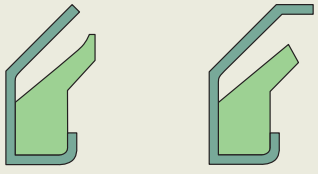
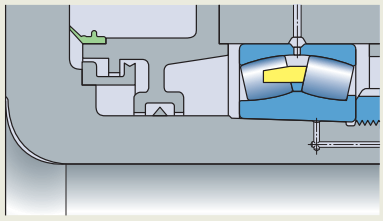



**Fig. 18**

**Axial clamp seal**



# Mounting and dismounting

Rolling bearings are reliable machine elements that can provide long service life, if they are mounted properly. Proper mounting requires experience, accuracy, a clean work environment, correct working methods and the appropriate tools. SKF offers a comprehensive assortment of high-quality tools for this purpose. For detailed information, refer to *Maintenance products*, (skf.com/mapro).

Mounting bearings correctly is often more difficult than it appears, especially where large bearings are concerned. As part of the SKF Services and Solutions program, SKF offers seminars and hands-on training courses. Mounting and maintenance assistance may also be available from your local SKF company or SKF Authorized Distributor.

The information provided in this section is quite general and is intended primarily to indicate what must be considered by machine and equipment designers to facilitate bearing mounting and dismounting. It includes:

- Mounting
- Test running
- Machines on standby
- Dismounting

**Further reading on bearing mounting and dismounting**

- *SKF bearing maintenance handbook* (ISBN 978-91-978966-4-1)
- Mounting instructions for individual bearings (skf.com/mount)



**Fig. 19**

**Mechanical seal**

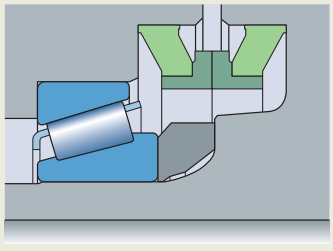


**Fig. 20**

**Felt seal**

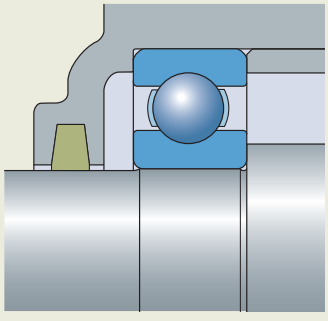
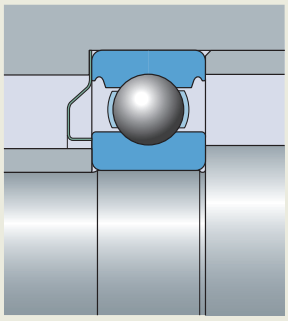


**Fig. 21**

**Metal seal**



# Mounting

Before mounting, be sure you have all the necessary parts, tools, equipment and data available and ready to use. Review any drawings or instructions to determine the correct sequence and orientation in which components are to be assembled. Leave the bearings in their original packages until immediately before mounting so that they are not exposed to any contaminants. If there is a risk that the bearings have become contaminated because of improper handling or damaged packaging, they should be washed, dried and inspected before mounting.

## Assembly area

Bearings should be mounted in a dry, dust-free area, away from machines producing swarf and dust. When bearings have to be mounted in an unprotected area, which is often the case with large bearings, steps should be taken to protect the bearing and mounting position from contaminants such as dust, dirt and moisture. This can be done by covering or wrapping bearings and machine components with plastic or foil.

## Checking associated components

Housings, shafts, seals and other components of the bearing-shaft-housing system should be checked to make sure they are clean. This is particularly important for lubrication holes and threaded holes, lead-ins or grooves where remnants of previous machining operations might have collected. Also, make sure that all unpainted surfaces of cast housings are free of core sand and that any burrs are removed.

When all components have been cleaned and dried, check the dimensional and geometrical tolerances of each piece. The bearings only perform satisfactorily if the associated components comply with the prescribed tolerances. The diameters of cylindrical shaft and housing seats are usually checked with a micrometer, or internal gauge, at two cross sections and in four directions (**fig. 22**). Tapered shaft seats can be checked using a *GRA 30 series ring gauge* or a *DMB* or *9205 series taper gauge* refer to skf.com, or a sine bar.

## Removing the preservative

Normally, the preservative applied to new bearings does not need to be removed. It is only necessary to wipe off the outside and bore surfaces. However, if the lubricant to be used is not compatible with the preservative, the bearing should be washed and dried carefully. Bearings capped with seals or shields are filled with grease and should not be washed prior to mounting.

## Bearing handling and safety

SKF recommends use of personal protection clothing and equipment, such as gloves, safety shoes and goggles, as well as carrying and lifting tools (**fig. 23**) that have been specially designed for handling bearings. Using the proper tools enhances safety, while saving time and effort.

When handling hot or oily bearings, SKF recommends wearing the appropriate heat or oil resistant gloves (**fig. 24**).

For large, heavy bearings, use lifting tackle that supports the bearing from the bottom (**fig. 25**). A spring between the hook and tackle can facilitate positioning of the bearing onto the shaft.

To ease lifting, large bearings can be provided, on request, with threaded holes in the ring side faces to accommodate eye bolts. These holes are designed to bear only the weight of the bearing, because the size and depth of the hole is limited by the ring thickness. Make sure that the eye bolts are only subjected to load in the direction of the shank axis (**fig. 26**).

Fig. 22

**Measuring of cylindrical shaft and housing seats**

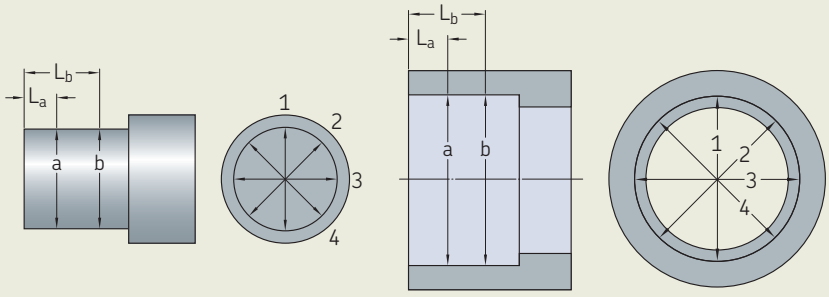



Fig. 23

**Carrying tool**

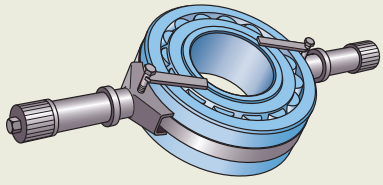


Fig. 24

**Heat resistant glove**

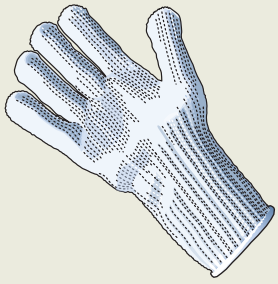
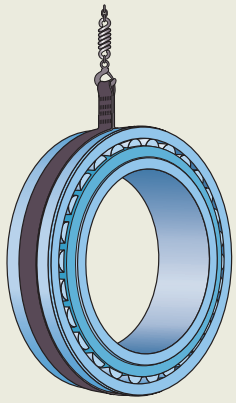


Fig. 25

**Lifting of heavy bearings**



## Methods and tools

Depending on the bearing type and size, mechanical, thermal or hydraulic methods are used for mounting (table 2, page 202). Bearing sizes are categorized as follows:

- small → d ≤ 80 mm
- medium-size → 80 mm < d < 200 mm
- large → d ≥ 200 mm

In all cases, it is important that the bearing rings, cages and rolling elements or seals are never struck directly with any hard object and that the mounting force is never applied through the rolling elements.

For an interference fit, the mating surfaces should be coated with a thin layer of light oil. For a loose fit, the mating surfaces should be coated with SKF anti-fretting agent.

# Mounting bearings with a cylindrical bore

## Non-separable bearings

With non-separable bearings, the ring that requires the tighter fit is usually mounted first.

## Separable bearings

With separable bearings, the inner ring can be mounted independently of the outer ring, which simplifies mounting, particularly where both rings have an interference fit. When mounting the shaft and inner ring assembly into the housing containing the outer ring, careful alignment is required to avoid scoring the raceways and rolling elements. When mounting cylindrical or needle roller bearings with an inner ring without flanges or with a flange on one side only, a guiding sleeve should be used (fig. 27). The outside diameter of the sleeve should be the same as the raceway diameter of the inner ring and should be machined to tolerance class d10Ⓔ for cylindrical roller bearings, and to tolerance 0/–0,025 mm for needle roller bearings.

## Cold mounting

If the fit is not too tight, small bearings can be driven into position by applying light hammer blows to a bearing fitting tool (fig. 28). The tool enables the mounting force to be applied centrally.

If a bearing has to be pressed onto the shaft and into the housing bore at the same time, the mounting force must be applied equally to both rings and the abutment surfaces of the mounting tool must lie in the same plane. Whenever possible, mounting should be done with an SKF bearing fitting tool (fig. 28).

With self-aligning bearings, the use of an intermediate mounting ring prevents the outer ring from tilting and swivelling when the bearing and shaft assembly is introduced into the housing bore (fig. 29). The balls of larger self-aligning ball bearings in the 12 and 13 series protrude from the sides of the bearing, therefore the mounting ring must have a recess.

Fig. 26

**Loading of eye bolts only in direction of the shank axis**

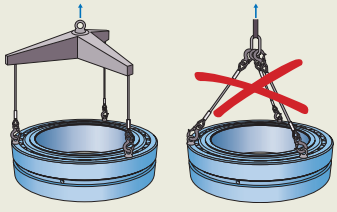


Fig. 27

**Use of a guiding sleeve for mounting of a cylindrical roller bearing**

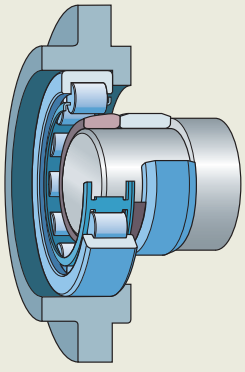


Fig. 28

**Bearing fitting tool**

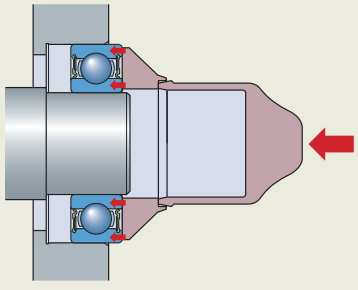


Fig. 29

**Mounting a self-aligning ball bearing by use of an intermediate mounting ring**

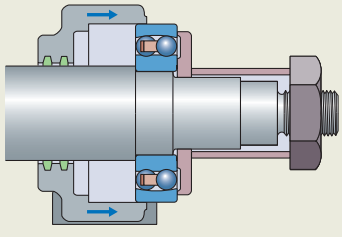
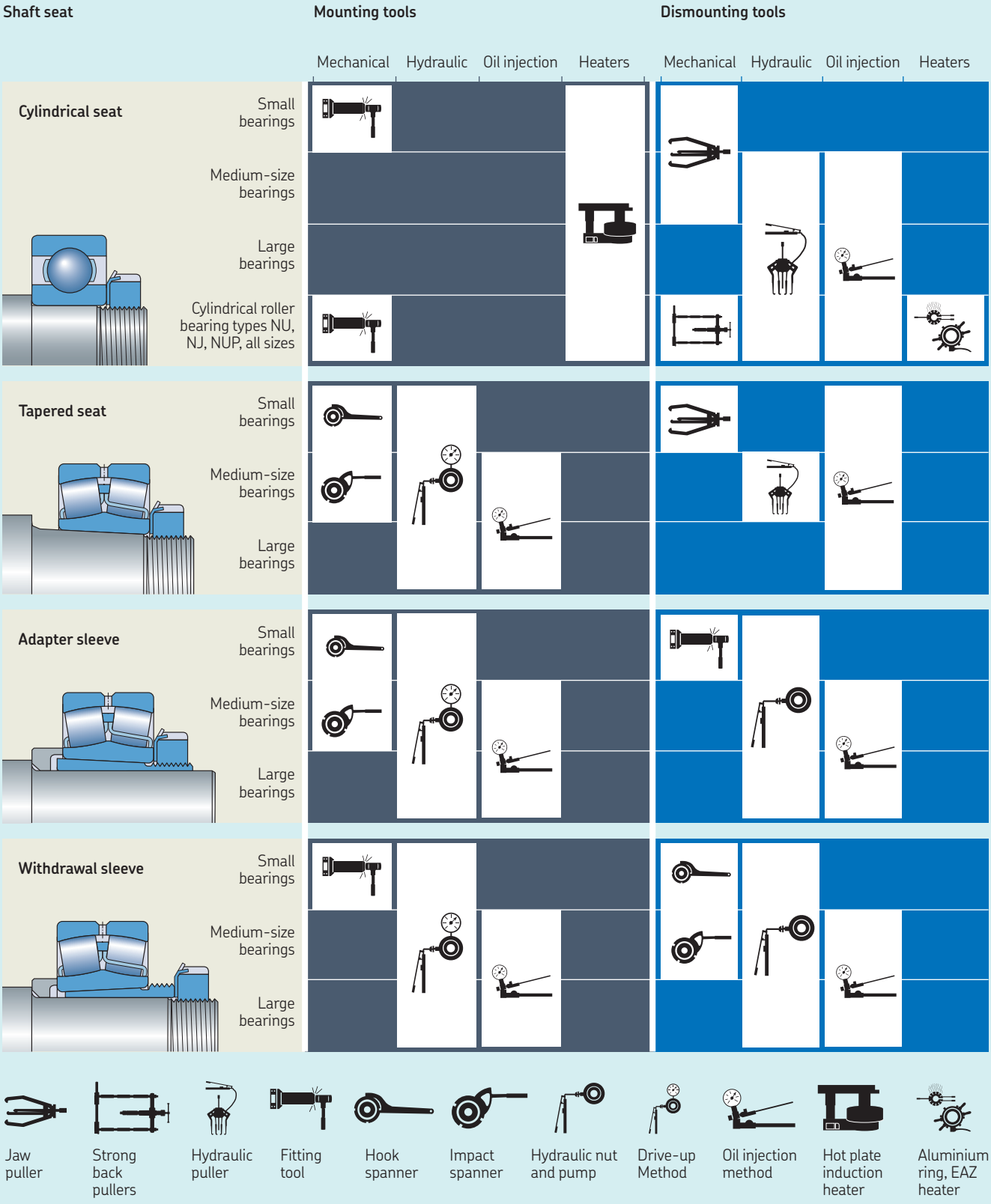


Table 2

# SKF methods and tools



## Hot mounting

It is generally not possible to mount larger bearings without heating either the bearing or the housing, as the force required to mount a bearing increases considerably with increasing bearing size.

The requisite difference in temperature between the bearing ring and shaft or housing depends on the degree of interference and the diameter of the bearing seat. Generally, open bearings must not be heated to more than 120 °C *(250 °F)*. SKF does not recommend heating bearings capped with seals or shields above 80 °C *(175 °F)*. However, if higher temperatures are necessary, make sure that the temperature does not exceed the permissible temperature of either the seal or grease, whichever is lowest.

When heating bearings, local overheating must be avoided. To heat bearings evenly and reliably, SKF recommends using SKF electric induction heaters (**fig. 30**). If hotplates are used, the bearing must be turned over a number of times. The seals on sealed bearings should never contact the heating plate directly. Place a ring between the plate and bearing. Read and follow the safety precautions on **page 197**.

For additional information about these mounting methods, refer to the *SKF bearing maintenance handbook*.

## Mounting adjusted bearing arrangements

The following recommendations refer only to the adjustment of the mounted clearance for bearing arrangements with single row angular contact ball bearings or tapered roller bearings.

The mounted clearance of single row angular contact ball bearings and single row tapered roller bearings is only established when the bearing is adjusted against a second bearing. Usually, they are arranged back-to-back or face-to-face, and one bearing ring is axially displaced until a given clearance or preload is obtained. For information about bearing preload, refer to *Selecting preload*, **page 186**.

The appropriate value for the clearance to be obtained when mounting depends on the bearing size and arrangement, and operating conditions such as load and temperature. Since there is a definite relationship between the radial and axial clearance of angular contact ball bearings and tapered roller bearings, it is sufficient to specify one value, generally the axial clearance for the arrangement. This specified value is then obtained by measuring the clearance during adjustment and by loosening or tightening a nut on the shaft or a threaded ring in the housing bore or by inserting calibrated washers or shims between one of the bearing rings and its abutment. The actual method used to adjust and measure the clearance depends on whether this is an occasional or repetitive process.

One way to check the axial clearance in a bearing arrangement is to use a dial indicator attached to the hub (**fig. 31**). When adjusting tapered roller bearings and measuring clearance, the shaft or housing should be turned through several revolutions in both directions to be sure that there is proper contact of the roller ends with the guide flange on the inner ring. Without proper contact, the measured result will not be correct.

## Mounting bearings with a tapered bore

For bearings with a tapered bore, inner rings are always mounted with an interference fit. The degree of interference is determined by how far the bearing is driven up onto a tapered shaft seat or an adapter or withdrawal sleeve. As the bearing is driven up the tapered seat, its radial internal clearance is reduced. This reduction in clearance, or the axial drive-up distance, can be measured to determine the degree of interference and the proper fit. Recommended values of clearance reduction and axial drive-up are listed in the relevant product section.

The SKF Drive-up Method is a reliable and well-proven method for mounting SKF bearings on tapered seats. For additional information, refer to the *SKF Drive-up Method Program* (skf.com/drive-up).

### Small and medium-size bearings

Bearings with bore diameters up to 80 mm ($d \leq 80$ mm), can be driven up onto a tapered seat using either a bearing fitting tool or, preferably, a lock nut. For adapter sleeves, use the sleeve nut that can be tightened with a hook or impact spanner. Withdrawal sleeves can be driven into the bearing bore using a bearing fitting tool or a nut. Starting from a 50 mm thread, SKF hydraulic nuts can also be used.

### Medium-size and large bearings

Larger bearings, with bore diameters greater than 80 mm ($d > 80$ mm), require considerably more force to mount. Therefore, SKF hydraulic nuts should be used. Where applicable, SKF also recommends using shafts and sleeves with grooves and ducts for the oil injection method. When combining the two methods, bearing mounting and dismounting becomes much faster, easier and safer. For additional information about the oil injection equipment required for both the hydraulic nut and the oil injection method, refer to skf.com/mapro and skf.com/mount.

Fig. 30

**SKF electric induction heater**

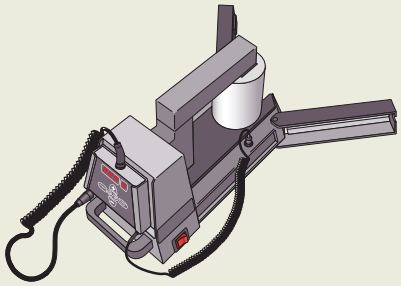
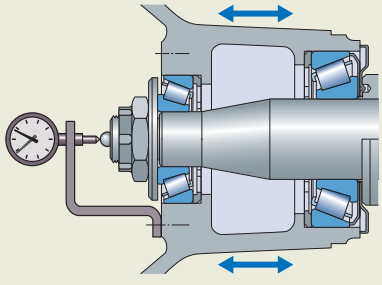


Fig. 31

**Checking of axial clearance using a dial indicator**



### Mounting with SKF hydraulic nuts

Bearings with a tapered bore can be mounted with the aid of an SKF hydraulic nut:

- on a tapered shaft seat (fig. 32)
- on an adapter sleeve (fig. 33)
- on a withdrawal sleeve (fig. 34)

The hydraulic nut can be positioned onto a threaded section of the shaft (fig. 32), or onto the thread of a sleeve (fig. 33 and fig. 34). The annular piston abuts the inner ring of the bearing (fig. 32 and fig. 33) or a stop on the shaft, which can be either a nut on a shaft thread (fig. 34) or a plate attached to the end of the shaft. Pumping oil into the hydraulic nut displaces the piston axially with the force needed to drive the inner ring up the taper for accurate and safe mounting.

### Oil injection method

With the oil injection method, oil under high pressure is injected via ducts and distribution grooves between the bearing and bearing seat to form an oil film. This oil film separates the mating surfaces and considerably reduces the friction between them. This method is typically used when mounting bearings directly on tapered shaft seats (fig. 35). The necessary ducts and grooves should be an integral part of the shaft design. This method can also be used to mount bearings on adapter or withdrawal sleeves if they are equipped with the relevant features, ducts and grooves.

A spherical roller bearing mounted on a withdrawal sleeve with oil ducts is shown in fig. 36. Oil is injected between all mating surfaces so that the withdrawal sleeve can be pressed into the bearing bore as the bolts are tightened.

## Verifying the interference fit

During mounting, the degree of interference is normally determined by one of the following methods:

- measuring the clearance reduction
- measuring the lock nut tightening angle
- measuring the axial drive-up
- measuring the inner ring expansion

For self-aligning ball bearings, feeling the clearance reduction by swivelling the outer ring is an additional method (*Mounting*, page 447).

Fig. 32

**Mounting on tapered seat with aid of a hydraulic nut**

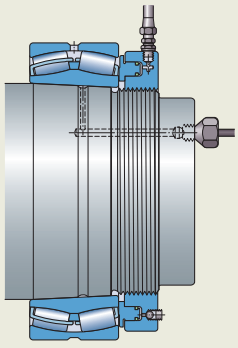


Fig. 33

**Mounting on adapter sleeve with aid of a hydraulic nut**

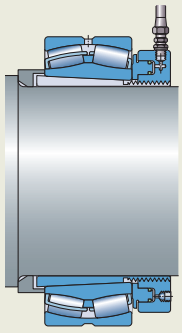


Fig. 34

**Mounting on withdrawal sleeve with aid of a hydraulic nut**

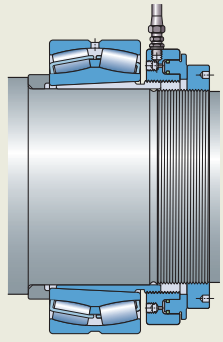


Fig. 35

**Mounting on tapered seat with aid of oil injection**

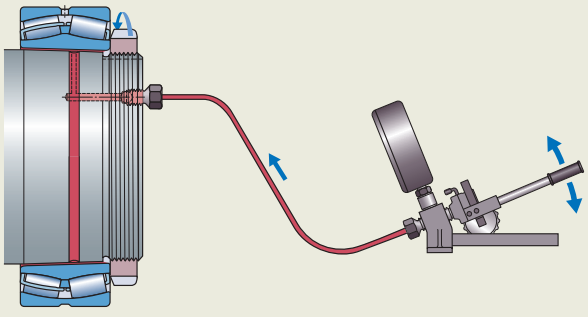
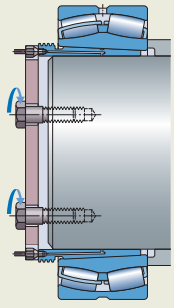


Fig. 36

**Mounting on withdrawal sleeve with aid of oil injection**



### Measuring the clearance reduction

A feeler gauge is most often used to measure the radial internal clearance in medium-size and large spherical and CARB toroidal roller bearings. Recommended values for the reduction of radial internal clearance to obtain the correct interference fit are listed in the relevant product section.

Before mounting, measure the clearance between the outer ring and upper-most roller (fig. 37). During mounting, measure the clearance between the inner or outer ring and lowest roller, depending on the bearing internal design (fig. 38).

Before measuring, rotate the inner or outer ring a few times. Both bearing rings and the roller complement must be centrically arranged relative to each other.

For larger bearings, especially those with a thin-walled outer ring, the measurements are affected by the elastic deformation of the rings, caused by the weight of the bearing or the force to draw the feeler gauge blade through the gap between the raceway and an unloaded roller. To establish the "true" clearance before and after mounting, use the following procedure (fig. 39):

1. Measure the clearance "c" at the 12 o'clock position for a standing bearing or at the 6 o'clock position for an unmounted bearing hanging from the shaft.
2. Measure the clearance "a" at the 9 o'clock position and "b" at the 3 o'clock position without moving the bearing.
3. Obtain the "true" radial internal clearance with relatively good accuracy from 0,5 (a + b + c).

### Measuring the lock nut tightening angle

This method can be used when mounting bearings with a bore diameter d ≤ 120 mm. Recommended values for the tightening angle α are listed in the relevant product section.

Before starting the final tightening procedure, push the bearing up onto the tapered seat until it is firmly in position. By tightening the nut through the recommended angle α (fig. 40), the bearing is driven up over the proper distance on the tapered seat. The bearing inner ring then has the requisite interference fit. The residual clearance should be checked if possible.

**Fig. 39**

**Procedure to establish the "true" clearance before and after mounting**

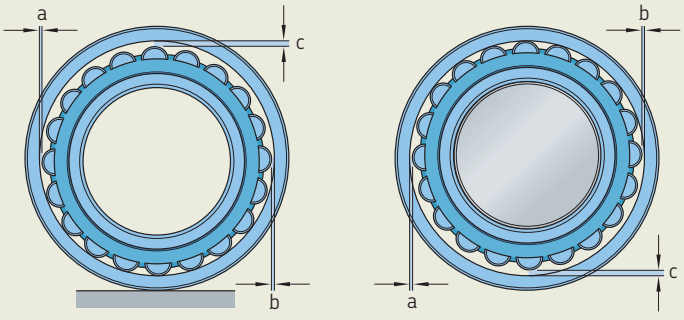



**Fig. 37**

**Measuring of internal clearance before mounting**

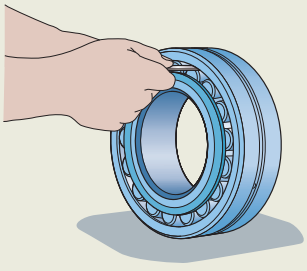


**Fig. 38**

**Measuring of internal clearance during mounting**

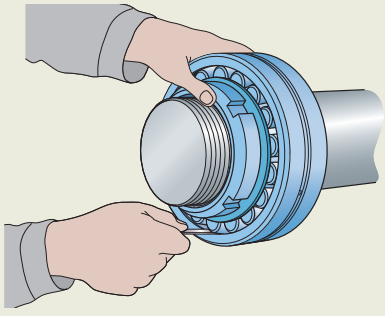
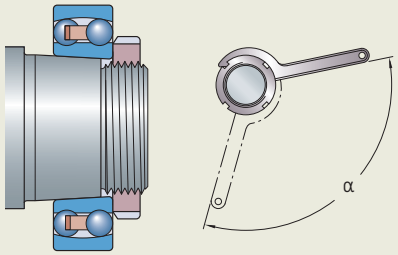


**Fig. 40**

**Tightening angle α**



### Measuring the axial drive-up

Bearings with a tapered bore can be mounted by measuring the axial drive-up of the inner ring on its seat. Recommended values for the required axial drive-up are listed in the relevant product section.

However, the SKF Drive-up Method is recommended for medium-size and large bearings. This method provides a reliable and easy way to determine the degree of interference. The correct fit is achieved by controlling the axial displacement of the bearing from a pre-determined position. The equipment for the SKF Drive-up Method is shown in **fig. 41**. It includes an SKF hydraulic nut (**1**) fitted with a dial indicator (**2**), and a hydraulic pump (**3**) fitted with a pressure gauge (**4**).

The SKF Drive-up Method is based on a two-step mounting procedure (**fig. 42**):

- Step 1
  Push the bearing to its starting position by applying the prescribed pressure to the hydraulic nut.
- Step 2
  Increase the pressure on the hydraulic nut so the bearing inner ring is pushed further on its tapered seat to its final position. The prescribed displacement is measured by the dial indicator.

Recommended values for the requisite oil pressure to reach the start position and the axial displacement to reach the final position for individual bearings are available from the *SKF Drive-up Method Program* (skf.com/drive-up).

### Measuring the inner ring expansion

Measuring the inner ring expansion is a quick and accurate method for determining the correct position of large spherical and CARB toroidal roller bearings on their seats ($d \geq 340$ mm, depending on the series). To apply this method, use common hydraulic mounting tools and a SensorMount, which consists of a bearing with a sensor embedded in the inner ring and a dedicated handheld indicator (**fig. 43**). Aspects such as bearing size, shaft material and design (solid or hollow), and surface finish do not need any special consideration.

## Test running

Once assembly is complete, an application should undergo a test run to determine that all components are operating properly. During a test run, the application should run under partial load and, where there is a wide speed range, at low or moderate speeds.

**IMPORTANT:** A rolling bearing should never be started up unloaded and then rapidly accelerated to high speed, as there is a significant risk that the rolling elements will slide and damage the raceways. A minimum bearing load needs to be applied (refer to *Minimum load* in the relevant product section).

Any noise or vibration can be checked using SKF condition monitoring equipment. Normally, bearings produce an even "purring" noise. Whistling or screeching indicates inadequate lubrication. An uneven rumbling or hammering is, in most cases, caused by the presence of contaminants in the bearing or to bearing damage caused during mounting.

An increase in bearing temperature immediately after start-up is normal. In the case of grease lubrication, the temperature does not drop until the grease has been evenly distributed in the bearing arrangement, after which an equilibrium temperature is reached. Unusually high or constantly peaking temperatures indicate too much lubricant in the arrangement, too heavy preload or that the bearing is radially or axially distorted. Other causes could be that associated components have not been made or mounted correctly, or that the seals are generating too much heat.

Fig. 41

**Equipment for the SKF Drive-up Method**

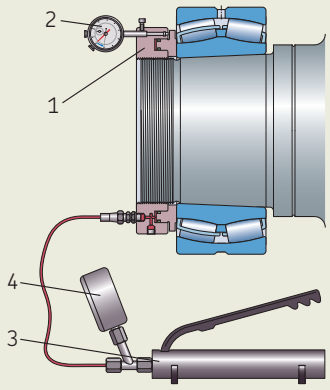



Fig. 42

**Two-step mounting procedure for the SKF Drive-up Method**

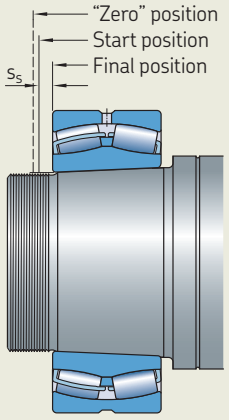
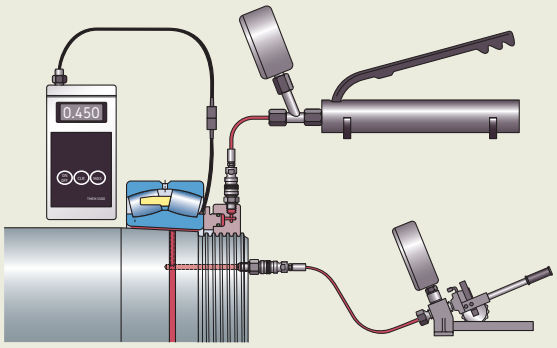



Fig. 43

**Mounting with SKF SensorMount**



During the test run, or immediately afterwards, check the seals, any lubrication systems and all fluid levels. If noise and vibration levels are severe, it is advisable to check the lubricant for signs of contamination.

# Machines on standby

Machines on standby should be rotated or run as frequently as possible to redistribute the lubricant within the bearings and change the position relative to the raceways to reduce the risk of false brinelling and standstill corrosion.

# Dismounting

There are several reasons why bearings may need to be dismounted. For example, the bearings may need to be replaced or they may have to be removed to access other components. If bearings are to be used again after dismounting, the force used to dismount them must never be applied through the rolling elements.

With separable bearings, the ring with the rolling element and cage assembly can be removed independently of the other ring. With non-separable bearings, the ring having the looser fit should be withdrawn from its seat first. To dismount a bearing with an interference fit, the tools described in the following section can be used. The choice of tools depends on the bearing type, size and fit (table 2, page 202). Bearing sizes are categorized as follows:

- small → d ≤ 80 mm
- medium-size → 80 mm < d < 200 mm
- large → d ≥ 200 mm

## Dismounting bearings fitted on a cylindrical shaft seat

### Cold dismounting

Small bearings can be dismounted from a shaft by applying light hammer blows via a suitable drift to the ring side face, or preferably by using a mechanical puller. The claws must be applied to the inner ring or an adjacent component (fig. 44). Dismounting is made easier if slots for the claws of a puller are provided in the shaft and/or housing shoulders. Alternatively, tapped holes in the housing shoulder can be provided to accommodate push-out bolts (fig. 45).

Medium-size and large bearings generally require greater force than a mechanical tool can provide. Therefore, SKF recommends using either hydraulically assisted tools or the oil injection method, or both. Using the oil injection method assumes that the necessary oil supply ducts and distribution grooves have been designed into the shaft (fig. 46).

Fig. 44

**Dismounting with aid of a mechanical puller**

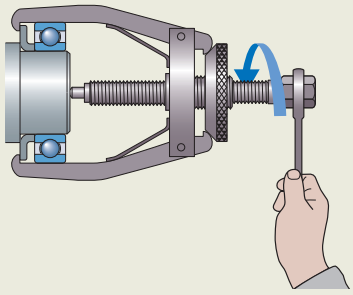


Fig. 45

**Dismounting with aid of push-out bolts**

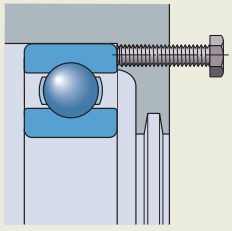
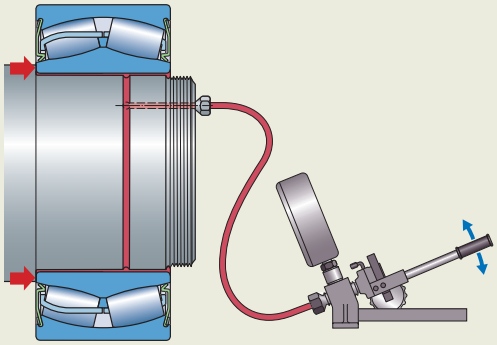


Fig. 46

**Dismounting with aid of oil injection**



## Hot dismounting

Dismounting by heating is a suitable method when removing the inner rings of needle roller bearings or cylindrical roller bearings of the type NU, NJ and NUP. Two different tools for this purpose are common: heating rings and adjustable induction heaters.

Heating rings are typically used to mount and dismount the inner ring of small to medium-size bearings that are all the same size. Heating rings are made of light alloy. They are radially slotted and equipped with insulated handles (**fig. 47**).

If inner rings with different diameters are dismounted frequently, SKF recommends using an adjustable induction heater. These heaters (**fig. 48**) heat the inner ring rapidly without heating the shaft.

Special, fixed induction heaters have been developed to dismount the inner rings of large cylindrical roller bearings (**fig. 49**).

Induction heaters and heating rings are available from SKF. For additional information, refer to the *SKF bearing maintenance handbook* or skf.com/mapro.

**⚠ WARNING**

Fire hazard. Never use an open flame for hot dismounting.

## Dismounting bearings fitted on a tapered shaft seat

Small bearings can be dismounted using a mechanical or hydraulic puller that engages the inner ring. Self-centring pullers equipped with spring-operated arms should be used to simplify the procedure and avoid damage to the bearing seat. If it is not possible to apply the claws of the puller to the inner ring, withdraw the bearing via the outer ring or use a puller in combination with a pulling plate (**fig. 50**).

It is much easier and safer to dismount medium-size and large bearings when the oil injection method is used. This method injects oil, under high pressure, between the two tapered mating surfaces, via a supply duct and a distribution groove. This significantly reduces the friction between the two surfaces and separates the bearing from its seat (**fig. 51**).

**⚠ WARNING**

To avoid the risk of serious injury, attach a provision such as a lock nut or end plate to the shaft end to limit the bearing travel when it suddenly comes loose.

Fig. 47

**Heating ring**

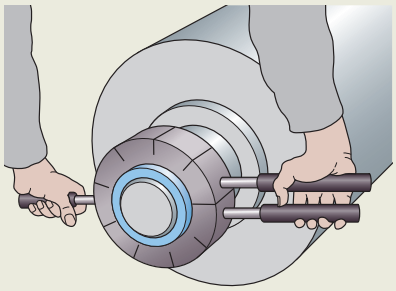


Fig. 48

**Adjustable induction heater**

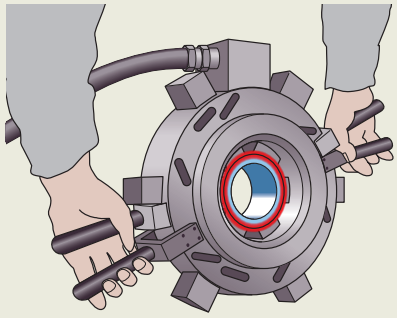


Fig. 49

**Special fixed induction heater**

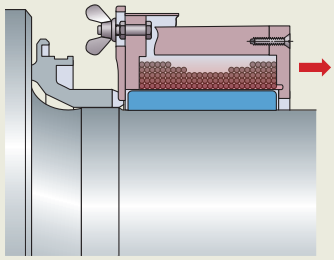


Fig. 50

**Dismounting with aid of a puller**

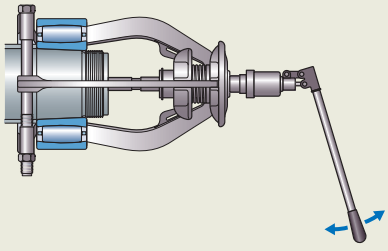
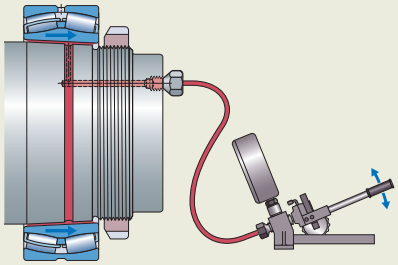


Fig. 51

**Dismounting with aid of oil injection – a stop is provided**



## Dismounting bearings fitted on an adapter sleeve

To dismount small bearings fitted on an adapter sleeve and a plain shaft, loosen the sleeve lock nut a few turns, then use a hammer of suitable size to tap a small steel block evenly around the bearing inner ring side face (fig. 52).

For small bearings fitted on an adapter sleeve and a stepped shaft with a spacing collar between the shoulder and the bearing side face, loosen the adapter sleeve lock nut a few turns and apply a couple of sharp hammer blows to a bearing fitting tool abutting the sleeve lock nut (fig. 53).

Using a hydraulic nut for dismounting bearings fitted on an adapter sleeve and a stepped shaft with a spacing collar makes bearing dismounting easy. However, to use this method, you should mount a suitable stop that abuts the piston of the hydraulic nut (fig. 54). If the sleeves are provided with oil supply ducts and distribution grooves, dismounting becomes easier because the oil injection method can be used.

Fig. 52

**Dismounting by tapping a small steel block with an appropriate hammer**

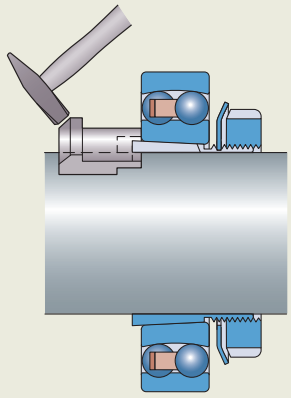


Fig. 53

**Dismounting by a couple of sharp hammer blows applied to a bearing fitting tool abutting the sleeve lock nut**

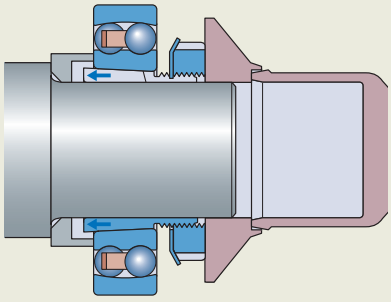
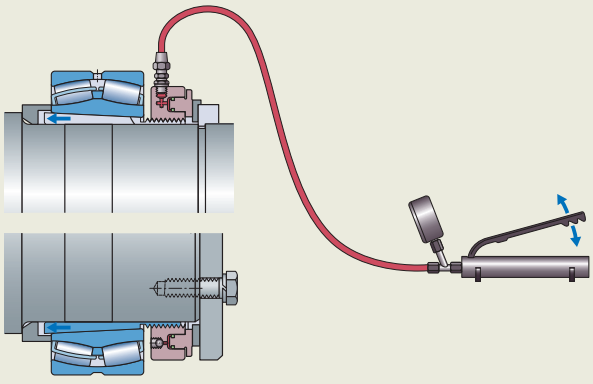


Fig. 54

**Dismounting from adapter sleeve with aid of a hydraulic nut**



## Dismounting bearings fitted on a withdrawal sleeve

When dismounting a bearing fitted on a withdrawal sleeve, the locking device (for example a lock nut or end plate) must be removed.

Small and medium-size bearings can be dismounted with a lock nut and a hook or impact spanner (fig. 55).

Medium-size and large bearings fitted on a withdrawal sleeve can be easily dismounted using a hydraulic nut.

Withdrawal sleeves with a bore diameter ≥ 200 mm are provided, as standard, with two oil supply ducts and distribution grooves in both the bore and outside surface. When using the oil injection method, two hydraulic pumps or oil injectors and appropriate extension pipes are needed (fig. 56).

**⚠ WARNING**

To avoid the risk of serious injury, attach a stop behind the hydraulic nut at the shaft end (fig. 57). The stop prevents the withdrawal sleeve and hydraulic nut from shooting off the shaft if the sleeve separates suddenly from its seat.



Fig. 55

**Dismounting with a lock nut and a hook or impact spanner**

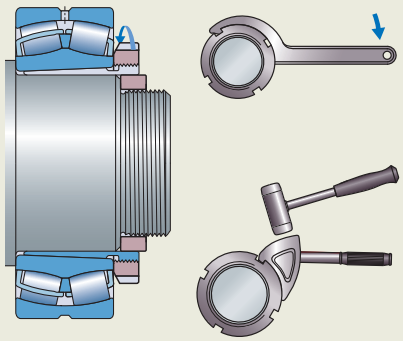


Fig. 56

**Dismounting from withdrawal sleeve with oil injection**

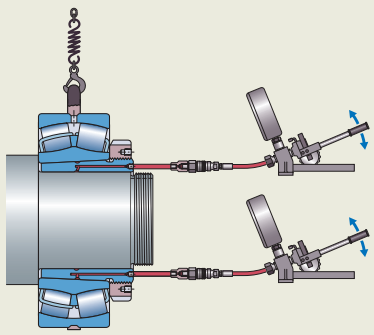
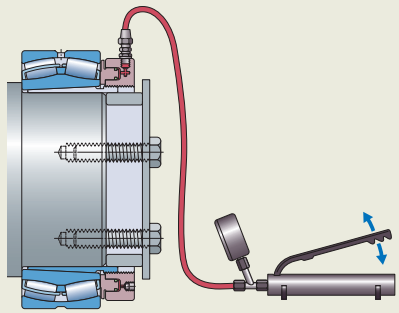


Fig. 57

**Dismounting from withdrawal sleeve with aid of a hydraulic nut**



# Inspection and monitoring

This section describes various aspects of inspecting and monitoring bearings in operation for the purpose of preventing problems. It also gives an introduction to troubleshooting and links to more detailed troubleshooting procedures.

# Inspection during operation

Spotting early indications of bearing damage makes it possible to replace bearings during regularly scheduled maintenance. This avoids otherwise costly unscheduled machine downtime if a bearing fails. Important parameters for monitoring machine condition include noise, temperature and vibration.

Bearings that are worn or damaged usually exhibit identifiable symptoms (*Troubleshooting*, **page 213**). There can be a number of possible causes and this section helps identify some of these.

For practical reasons, not all machines or machine functions can be monitored using advanced systems. In these cases, trouble can be detected by looking at or listening to the machine. However, if deterioration can be detected by human senses, damage may already be extensive. Using objective technologies, such as advanced vibration analysis, means damage can be detected before it becomes problematic (**diagram 1**). By using condition-monitoring instruments and the SKF enveloped acceleration technology, the pre-warning time can be maximized.

An example of how damage can progress is shown in **fig. 58** and shown conceptually in **diagram 1**. A damage scenario may follow this sequence:

**1** Bearing starts to show abrasive wear.
**2** First spall, detected by SKF enveloped acceleration technology.
**3** Spalling has developed to an extent that the damage can be detected by standard vibration monitoring.
**4** Advanced spalling causes high vibration and noise levels and an increase in operating temperature.
**5** Severe damage occurs: fatigue fracture of the bearing inner ring.
**6** Catastrophic failure occurs with secondary damage to other components.

## Monitoring noise and vibration

A common method used to try to identify deterioration or damage in a bearing is to listen. Bearings in good condition produce a soft purring noise. Grinding, squeaking and other irregular sounds usually indicate that the bearings are in poor condition, or that something is wrong. However, sound monitoring is of limited use. SKF recommends vibration monitoring. It is more thorough and allows better monitoring of bearings and rotating equipment.

Vibration monitoring is based on three fundamental facts:

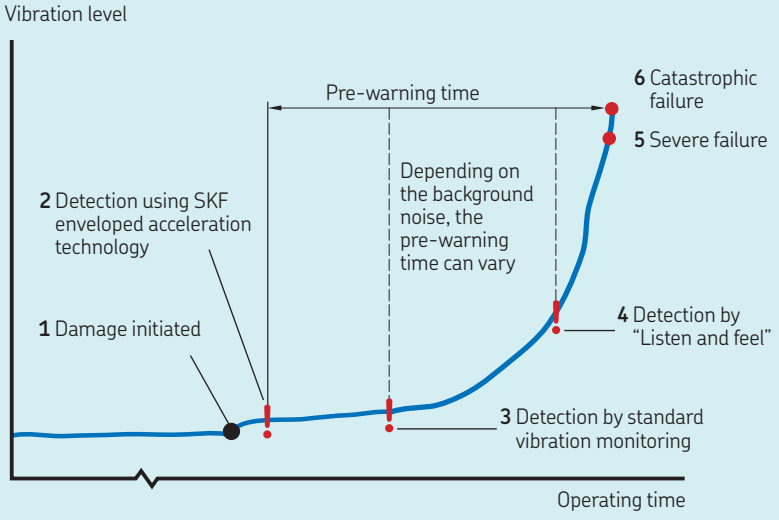
- All machines vibrate.
- The onset of a mechanical problem is generally accompanied by an increase in vibration levels.
- The nature of the fault can be determined by analyzing the vibration characteristics.

**Fig. 58**

**Progress of damage**

**Diagram 1**

**The advantage of advanced condition monitoring**



## Monitoring temperature

It is important to monitor the operating temperature at bearing positions. If the operating conditions have not been altered, a sudden increase in temperature is often an indication of developed bearing damage and possible imminent failure of the bearing. However, keep in mind that a natural temperature rise can last up to one or two days immediately after first machine start-up and after each relubrication when using grease.

## Monitoring lubrication conditions

Bearings can only achieve maximum performance levels with adequate lubrication. The lubrication conditions of a bearing should therefore be monitored closely. The condition of the lubricant itself should also be assessed periodically, preferably by taking samples and having them analysed.

SKF recommends the following general guidelines for lubrication-related inspection activities:

- Check for lubricant leaks in the areas surrounding the bearing positions.
- Keep protective collars and labyrinth seals filled with grease for maximum protection.
- Check that automatic lubricating systems are functioning properly and providing the appropriate amount of lubricant to the bearings.
- Check the lubricant level in sumps and reservoirs, and replenish as necessary.
- Where manual grease lubrication is employed, relubricate according to schedule.
- Where oil lubrication is used, change oil according to schedule.
- Always make sure that the specified lubricant is used.

# Inspection during a machine shutdown

When a machine is not in operation, it is an opportunity to assess the condition of bearings, seals, seal counterfaces, housings, and lubricant. A general inspection can often be done by removing a housing cover or cap. If a bearing appears to be damaged, it should be dismounted and thoroughly inspected.

Shaft and belt alignment, and a thorough inspection of the machine foundation and exterior, can also be done during a machine shutdown.

Any condition, whether it is a missing shim or a deteriorating foundation, can negatively affect machine performance. The sooner any problem is identified, the sooner corrective action can begin. It is far less costly to replace bearings and associated components during a regularly scheduled shutdown than during unscheduled downtime that unexpectedly takes the machine out of service.

## Inspecting bearings

Bearings are not always easily accessible. However, when bearings are partially or fully exposed, visual checks can be made. The most practical time to inspect bearings is during routine maintenance.

When inspecting a mounted bearing, SKF recommends following these general guidelines:

- **Preparation**
  - Clean the external surface of the machine.
  - Remove the housing cover, or the housing cap, to expose the bearing.
  - Take lubricant samples for analysis. For oil lubrication, take samples from the sump/reservoir. For grease lubricated open bearings, take samples from various positions within the bearing and surroundings. Inspect the condition of the lubricant. Impurities can often be detected by spreading a thin layer of the lubricant on a sheet of paper and examining it under a light.
  - Clean the exposed external surfaces of the bearing with a lint-free cloth.
- **Inspection**
  - Inspect the exposed external surfaces of the bearing for corrosion. Inspect the bearing rings for any abnormal signs.
  - For sealed bearings, inspect the seals for wear or damage.
  - Where possible, rotate the shaft very slowly and feel for uneven resistance in the bearing; an undamaged bearing turns smoothly.
- **Detailed inspection of grease lubricated bearings**
  Grease lubricated open bearings in split plummer blocks can be subjected to a more detailed in-situ inspection as follows:
  - Remove all grease around the bearing.
  - Remove as much grease from the bearing as possible using a non-metallic scraper.
  - Clean the bearing with a petroleum-based solvent by spraying the solvent into the bearing. Rotate the shaft very slowly while cleaning it, and continue to spray until the solvent ceases to collect dirt and grease. For large bearings that contain a build-up of severely oxidized lubricant, clean them with a strong alkaline solution containing up to 10% caustic soda and 1% wetting agent.
  - Dry the bearing, and surrounding parts, with a lint-free cloth or clean, moisture-free compressed air (but do not rotate or spin the bearing).
  - Inspect the bearing raceways, cage(s) and rolling elements for spalls, marks, scratches, streaks, discolouration and mirror-like areas. Where applicable, measure the radial internal clearance of the bearing (to determine if wear has taken place) and confirm that it is within the expected range.
  - If the condition of the bearing is satisfactory, apply the appropriate grease to the bearing and the housing and immediately close the housing. If bearing damage is evident, dismount the bearing and protect it from corrosion. Then conduct a full analysis.

- **General recommendations**
  - Take photographs throughout the inspection process to help document the condition of the bearing, lubricant and machine in general.
  - Check the condition of the grease at different places and compare with fresh grease (fig. 59). Keep a representative sample of the grease for further analysis.
  - Certain large and medium-size bearings are suitable for reconditioning. For additional information, refer to the *SKF bearing maintenance handbook* and publication *SKF Remanufacturing Services*.

## Inspecting seal counterfaces

To be effective, a seal lip must run on a smooth counterface. If the counterface is worn or damaged, the seal lip will cease to function properly.

When inspecting the seal counterface, also check for corrosion, shaft wear, scratches, dents, lip wear, lip tears and so on. If corrosion is evident but not severe, use a fine wet/dry abrasive paper to remove it, and then make sure all remnants are also removed. Worn counterface parts of the shaft can be repaired using SKF Speedi-Sleeve.

**⚠ WARNING**

Avoid inhaling, ingesting or contacting solvents and alkaline solutions. These can cause skin and eye burns or damage to respiratory or digestive tract. If necessary, seek medical assistance.

**Fig. 59**

**Condition of the grease**

Fresh grease: brown colour

Used grease: colour turned greyish

# Troubleshooting

Bearings that are not operating properly usually exhibit identifiable symptoms. The best way to identify these symptoms, and take corrective action at an early stage, is to establish a plant-wide condition monitoring programme.

In cases where condition monitoring equipment is not available or practical, the section *Troubleshooting* of the *SKF bearing maintenance handbook* presents some useful hints to help identify the most common symptoms, their causes and, whenever possible, some practical solutions. Depending on the degree of bearing damage, some symptoms may be misleading and, in many cases, are the result of secondary damage. To effectively troubleshoot bearing problems, it is necessary to analyse the symptoms according to those first observed in the application. This is dealt with in more detail in the publication *Bearing damage and failure analysis*.

C

# Bearing selection examples

# Bearing selection examples


C.1 **Vibrating screen** . . . . . 216

C.2 **Rope sheave** . . . . . 222

C.3 **Centrifugal pump** . . . . . 228


This section contains several worked examples that show the *Bearing selection process*, page 60, applied to various machines and application cases.

Each example is presented as a number of steps that generally follows the sequence in the bearing selection process. However, interdependencies in any particular application case may require looping back and forth between the process steps and where this occurs it is fully described in the example.

# C.1 Vibrating screen

This example shows the bearing selection process applied to an application case in which a vibrating screen manufacturer is selecting the bearings for a new machine.

The steps in the example follow the sequence in the bearing selection process. Refer to sections **B.1 – B.8** for a full description of each process step.

## Performance and operating conditions

The new machine is a free circular motion vibrating screen. The vibrator unit is composed of a shaft with two bearings and counterweights. This means the main radial load rotates with the shaft while the outer ring is stationary. The application drawing is shown in **fig. 1**.

The relevant performance requirements, operating conditions and input parameters for the bearing selection are:

- mass of screen box without charge: G = 6 100 kg
- shaft diameter: 140 mm
- rotational speed: n = 756 r/min
- angular velocity (n × 2π/60): ω = 79,2 rad/s
- radius of vibration: r = 8,1 mm
- distance between the centres of gravity of the counterweights and shaft axis: R = 80 mm
- distance between the bearings: 3 m
- lubrication method: grease
- operating temperature of the bearings: T = 75 °C *(165 °F)*
- environment: the screen may be located outdoors, in harsh, dusty and humid conditions
- required SKF rating life: 20 000 h

## Bearing type and arrangement

A locating/non-locating bearing arrangement is used. The bearing on the drive side is the locating bearing. This limits axial displacement of the transmission pulley, which saves energy and increases belt life. The opposite bearing is non-locating to accommodate axial displacement caused by thermal expansion of the shaft.

The distance between the bearings is 3 metres, and the vibrating screen structure is made of welded and bolted steel parts. Shaft deflection and misalignment of supports under load require bearings that can compensate for misalignment.

Spherical roller bearings are selected for this new vibrating screen (**fig. 2**), which is the typical solution. They can carry high loads and accommodate misalignment between the inner and outer ring without any reduction of their service life.

Fig. 1

**Free circular motion vibrating screen**

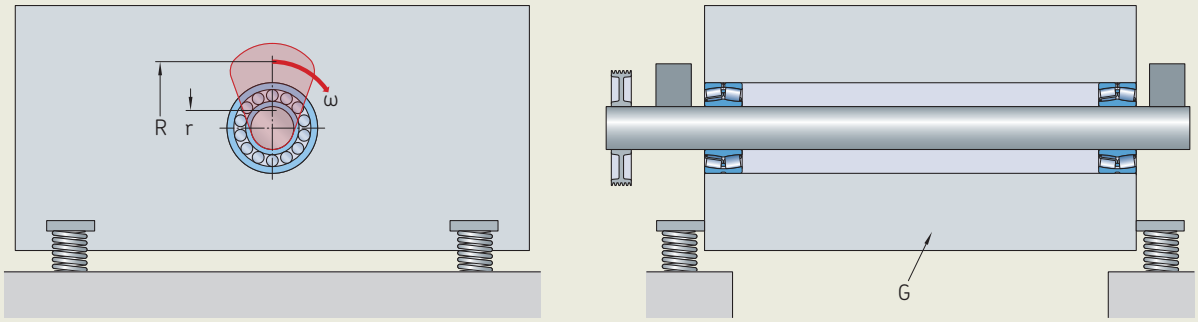
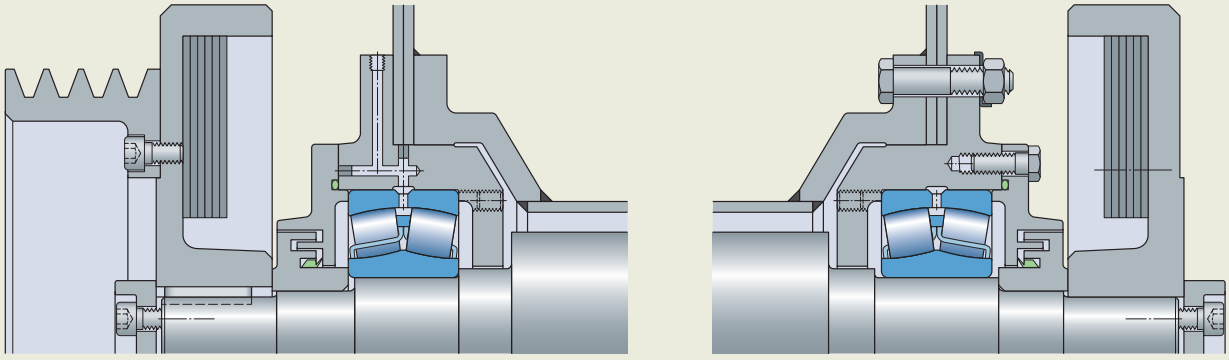



Fig. 2

**Bearing arrangement**



# Bearing size

A shaft diameter of 140 mm is needed to transmit the required shaft drive torque and limit shaft deflection.

SKF supplies bearings in the 223 series for vibratory applications. Based on the required shaft diameter, the 22328 CCJA/W33VA405 is selected. We will check its size using the SKF rating life.

Product data for 22328 CCJA/W33VA405 is on page 800.

For vibrating screens, the equivalent dynamic bearing load, P, can be estimated using:

$$P = \left(\frac{1{,}2 \times G \times r \times \omega^2}{2}\right) = \left(\frac{1{,}2 \times 6\,100 \times 0{,}0081 \times 79{,}2^2}{2}\right)$$

= 186 kN

The load ratio C/P = 1 357/186 = 7,3

## SKF rating life

$L_{10mh} = a_{SKF} L_{10h}$

### 1. Lubrication condition – the viscosity ratio, κ

$\kappa = \nu/\nu_1$

The rated viscosity $\nu_1$ = 10 mm²/s (diagram 14, page 101).

A viscosity ratio, κ, of about 4 is targeted to operate in full film lubrication conditions, therefore ν should be about 40 mm²/s.

You need to verify the viscosity ratio after you have selected your lubricant.

### 2. Contamination factor, $\eta_c$

Given:

- contamination conditions are typical (i.e. open bearings, no filtering, wear particles and ingress from surrounding and harsh environment)
- $d_m$ = 220 mm

then, using table 6, page 105, $\eta_c$ = 0,2

**3. Life modification factor, $a_{SKF}$**

Given:

- $\kappa = 4$
- $\eta_c P_u/P = 0{,}2 \times 132/186 = 0{,}14$
- 22328 CCJA/W33VA405 is an SKF Explorer bearing

then, using **diagram 10**, **page 97**, for radial roller bearings, $a_{SKF} = 1{,}3$

$$L_{10mh} = a_{SKF} \left(\frac{10^6}{60\,n}\right) \left(\frac{C}{P}\right)^{10/3}$$

$= 1{,}3 \times (10^6/(60 \times 756))\,(7{,}3)^{10/3} = 21\,500\ h > 20\,000\ h$

**Conclusion**

SKF bearing 22328 CCJA/W33VA405 is a suitable size to meet the rating life requirements.

# Lubrication

## Selecting grease or oil

On **page 113**, **table 1** provides limits for the $nd_m$ value, up to which grease lubrication is normally a suitable solution in terms of relubrication intervals at normal temperatures.

Input values:

- spherical roller bearing in the 223 series
- C/P = 7,3
- $n\,d_m = 756 \times (140 + 300)/2 = 166\,320$

From **table 1**, **page 113**, the recommended $nd_m$ limit for C/P ≈ 8 is 150 000, which is somewhat below the actual $nd_m$ value. The operating conditions are at the limits where grease lubrication is suitable, and you can expect short relubrication intervals. But this is not an issue for vibrating screens, and you can select grease lubrication.

## Grease selection

You can find a suitable SKF grease using the *SKF bearing grease selection chart*, **page 124**. Grease selection criteria are:

- temperature: 75 °C *(165 °F)* → M
- speed: $n\,d_m \approx 166\,000$ → M to H
- load: C/P ≈ 8 → M
- severe vibrations
- humid outdoor conditions → good rust inhibiting properties

SKF LGEP2 is a suitable choice provided a viscosity ratio, κ, of 4 is confirmed.

LGEP2 has the following properties:

- $\nu = 200\ mm^2/s$ at 40 °C *(105 °F)*
- $\nu = 16\ mm^2/s$ at 100 °C *(210 °F)*
- operating viscosity at 75 °C *(165 °F)* is around 40 $mm^2/s$, based on **diagram 13**, **page 100**.
- $\kappa = \nu/\nu_1 = 40/10 = 4$ is confirmed

## Relubrication interval and quantity

Experience suggests relubricating the bearings in the vibrating screen every 75 h with 30 g of grease. The short intervals are needed to push out contamination, while the reduced quantity limits heat generation caused by high grease volumes.

Using the standard relubrication interval from **diagram 2**, **page 112**, and input values gives:

- $n\,d_m\,b_f = 166\,320 \times 2 \approx 330\,000$
- C/P ≈ 8

The relubrication interval is 1 700 h. This needs to be reduced, with contamination and vibration considered (**table 2**, **page 115**), confirming approximately the experienced values used for vibrating screen bearings.

Relubrication quantity is:

$G_p = 0{,}002\,D\,B = 0{,}002 \times 300 \times 102 = 61\ g$

Standard relubrication of the bearings every 75 h with 30 g of grease will maintain adequate lubrication condition.

## Initial grease fill

The free volume in the bearing, which should be filled with grease, is approximately:

$$V = \frac{\pi}{4} B\,(D^2 - d^2) \times 10^{-3} - \frac{M}{7{,}8 \times 10^{-3}}$$

$V = 3{,}14/4 \times 102 \times (300^2 - 140^2) \times 10^{-3} - 36{,}5/0{,}0078 = 957\ cm^3$

For a filling degree of 50%, you need about 430 g of grease per bearing.

# Operating temperature and speed

Experience from similar applications is broad and a bearing operating temperature between 70 to 80 °C (*160 to 175 °F*) can be assumed.

The screen charge is at ambient temperature and there are no other external sources generating heat. The speed is < 50% of the limiting speed. Although the load ratio C/P < 10, no detailed thermal analysis is required.

The actual operating temperature should be checked on the real machine.

The bearing frictional losses are 1 900 W per bearing, calculated with the *SKF Bearing Calculator* (skf.com/bearingcalculator).

# Bearing interfaces

The radial load turns in phase with the rotating inner ring, while the outer ring stands still. Therefore, the inner ring has a stationary load condition and the outer ring a rotating load condition. An interference fit is needed between the outer ring and the housing. A loose fit can be used between the inner ring and the shaft.

The standard fit recommendations are listed in **table 1**.

There are reasons for choosing dimensional tolerances other than the standard fits:

- Choose f6Ⓔ for easy axial displacement of the inner ring. To reduce the risk of fretting corrosion, consider hardening the shaft seat.
- Select P6Ⓔ (tighter tolerances) to improve outer ring support and bearing service life.

## Additional recommendations

The following additional factors are recommended:

- The bearing centre should be aligned with the frame centre of the vibrating screen (**fig. 3**).
- The housing wall thickness should be greater than 40% of the bearing width.
- Design the housing to be as symmetrical as possible, so it has the same thickness on both sides of the vibrating screen frame, in order to avoid housing deformation (**fig. 4**).
- Machine threads in the housing to make it easier when dismounting the housing from the screen body and the bearing of the housing by the use of bolts (**fig. 5** and **fig. 6**, **page 220**).

**Table 1**

**Seat tolerances for standard conditions**

| | Dimensional tolerance | Total radial run-out tolerance | Total axial run-out tolerance | Ra |
|---|---|---|---|---|
| **Shaft** | g6Ⓔ | IT5/2 | IT5 | 1,6 µm |
| **Housing** | P7Ⓔ | IT6/2 | IT6 | 3,2 µm |

**Fig. 3**

**Aligning the bearing centrally with the vibrating screen frame**

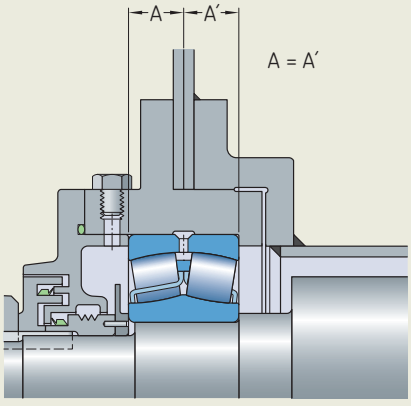
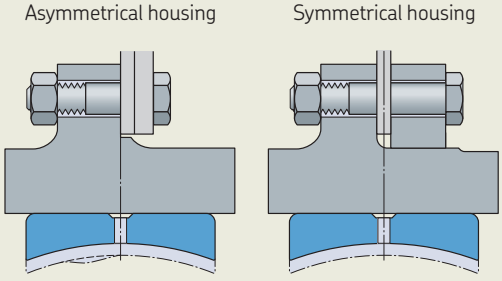



**Fig. 4**

**Symmetrical housing prevents raceway deformation**




Raceway profile before and after mounting

# Bearing execution

The bearing selected for this application is a spherical roller bearing for vibratory applications (*Designs and variants* **page 775**).

These bearings are identified by the designation suffixes VA405 and VA406. They have a C4 internal clearance, which is required because of the interference fit of the outer ring in combination with the temperature difference between inner and outer rings, particularly during start-up situations. Their hardened window-type cages reduce friction and wear in the bearing when operating under rotating outer ring load and high acceleration conditions, resulting in a lower operating temperature and longer lubricant life.

The VA406 execution is intended for the non-locating support and has a PTFE coated bore. This helps to prevent fretting corrosion, which can occur because of the loose fit and vibration.

# Sealing, mounting and dismounting

Vibrating screen designs generally use labyrinth seals to protect the rolling bearings. With this type of seal, it is important to maintain a sufficient quantity of grease in the labyrinth gaps so that dirt and moisture are kept away from the bearings. Quantities and relubrication intervals should be adjusted according to the operator's observations.

Check the total radial run-out of the housing seat when the housing is mounted to the screen frame. Inadmissible deformation might occur and can require corrective action.

# Overall conclusions

- The 22328 CCJA/W33VA405 bearing meets the rating life requirement.
- SKF grease LGEP2 is appropriate for the given operating conditions.
- Maintenance and condition monitoring aspects have not been included in this example. For additional information about SKF offers for vibrating screens, refer to the information on the SKF website under *Industry Solutions*.

**Fig. 5**

**Bolts used to dismount the housing from the screen body**

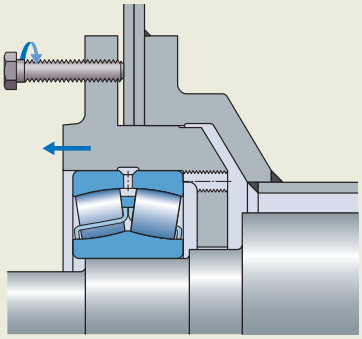
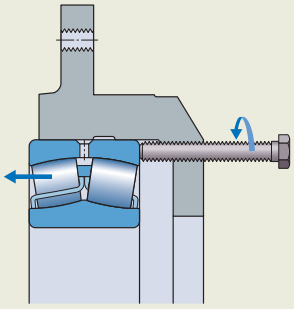


**Fig. 6**

**Bolts used to dismount the bearing from the housing**



# C.2 Rope sheave

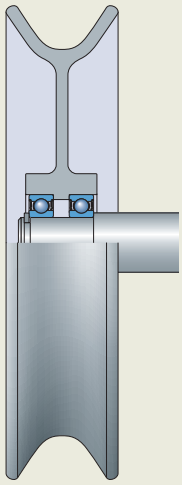
This example shows the bearing selection process applied to an application case in which bearings are to be selected for the rope sheaves on a new paper machine.

A paper machine manufacturer wants to build a new machine using rope sheaves of their standard design. The end customer requires the sheaves to be maintenance free for five years.

The steps in the example follow the sequence in the bearing selection process. Some steps, such as *Bearing size*, require more than one iteration if the calculation is dependent on a subsequent stage in the process. This is indicated in the heading (for example, *Bearing size (step 2)*, page 224). Refer to sections B.1 – B.8 for a full description of each process step.

Fig. 1

**Traditional rope sheave used in paper machines**



## Performance and operating conditions

The rope sheaves (fig. 1) are positioned between rolls/cylinders of the paper machine and rotate all the time that the machine is in operation. In this application the outer ring of each rope sheave rotates continuously. The operating conditions are:

- rotational speed: 2 450 r/min
- radial load: 1,1 kN created by the weight of the sheave and by the rope tension, shared between the bearings
- axial load: zero – because of the orientation of the sheaves, the rope creates no axial load
- environment: hot and humid, with 80 °C *(175 °F)* ambient temperature

## Bearing type and arrangement

Because loads are low and speeds moderate, rope sheaves use two deep groove ball bearings. For a long, maintenance-free period sealed bearings are required. SKF deep groove ball bearings are available with various seal executions.

A floating bearing arrangement is used, where each bearing locates the sheave axially in one direction and the whole arrangement is able to move axially over a small distance between the two end positions.

# Bearing size

The manufacturer's existing rope sheave design uses two 6207-2RS1 bearings. SKF has replaced the RS1 seal with the RSH seal. In this example we check the suitability of 6207-2RSH bearings (page 274).

The next step in the selection process is to determine the method, on which to base the size selection. The bearings are running in typical operating conditions and, therefore, rolling contact fatigue is the probable failure mode. We base the size selection on rating life.

## Basic rating life

$$L_{10h} = \left(\frac{10^6}{60\,n}\right)\left(\frac{C}{P}\right)^p$$

As there is no axial load, the equivalent dynamic bearing load, P, on each bearing is equal to the radial load divided by two.

- P = 0,55 kN
- load ratio C/P = 49

The basic rating life $L_{10h}$ = 804 800 h. This is much longer than the required maintenance-free period of 5 years (43 800 h).

## Conclusion

- With such a high basic rating life at 2 450 r/min, it is recommended to check that the bearing is sufficiently loaded to maintain ball rolling and avoid ball sliding. This will be done after the lubrication is checked, because lubricant viscosity influences the requisite minimum load.
- Grease life should be checked to see if the bearing fulfils the end-customer's requirement.

The SKF rating life, $L_{10mh}$, will be calculated after the lubrication is checked and the operating temperature and speed are checked, because lubricant viscosity influences the result. This will be done in *Bearing size (step 2)*, page 224.

# Lubrication

Bearing 6207-2RSH is filled with MT33 grease (table 2, page 245). The operating temperature should be defined before continuing.

# Operating temperature and speed

When the load ratio C/P > 10, the operating temperature is below 100 °C *(210 °F)*, the operating speed is below 50% of the limiting speed, and there is no pronounced external heat input, a detailed thermal analysis is not required. In this example:

- load ratio: C/P = 49 > 10
- operating speed: 2 450 r/min < 0,5 × 6 300 (limiting speed)
- From experience of rope sheaves operating in similar conditions, the bearing operating temperature is about 90 °C *(195 °F)*.

So a detailed thermal analysis is not required.

# Lubrication (step 2)

**1. Grease life MT33**

Grease life can be estimated using diagram 1, page 246. Because the bearing outer ring rotates, for grease life estimations, nD is used instead of $nd_m$ (table 2, page 115).

Then, using the input values:

- nD = 2 450 × 72 = 176 400
- MT33 grease with a grease performance factor, GPF = 1
- operating temperature of about 90 °C *(195 °F)*

The grease life, $L_{10h}$, is about 12 500 hours, which is less than the required 5-year maintenance-free period.

**2. Grease life WT**

The SKF bearing 6207-2RSH is available with the grease WT, which has a GPF = 4. It is a polyurea-type grease with an ester base oil, table 3, page 245.

From diagram 1, page 246 the grease life, $L_{10h}$, is 50 000 hours, which is greater than 5 years.

## Conclusion

The SKF bearing 6207-2RSH with the grease WT fulfils the requirement in terms of grease life.

# Bearing size (step 2)

From the conclusions in *Bearing size*, **page 223**, the minimum load needs to be checked and, now the lubrication has been selected, the SKF rating life can be verified.

## Minimum load

Using the minimum load equation from *Loads*, **page 254**, the minimum load, $F_{rm}$, is given by:

$$F_{rm} = k_r \left(\frac{\nu\, n}{1\,000}\right)^{2/3} \left(\frac{d_m}{100}\right)^2$$

where:
$k_r$ = 0,025
$\nu$ = 210 mm²/s
When determining the minimum load, to cover all critical operating conditions, use the highest oil viscosity that might occur. This will be at the lowest temperature, which is 20 °C *(70 °F)*. Base oil viscosity of WT grease at 40 °C *(105 °F)* is 70 mm²/s ≈ ISO VG 68. Estimated from **diagram 13**, **page 100**, or calculated with the *SKF Bearing Calculator* (skf.com/bearingcalculator), for WT grease $\nu$ = 210 mm²/s at 20 °C *(70 °F)*.
$d_m$ = (d+D)/2 = (35+72)/2 = 53,5 mm

Therefore:
$F_{rm}$ = 0,44 kN < 0,55 kN, so the bearing 6207-2RSH/WT is adequate.

## SKF rating life

$L_{10mh} = a_{SKF}\, L_{10h}$

Because P < $P_u$, fatigue is not a factor (*Fatigue load limit, $P_u$*, **page 104**). However, it is useful to verify the lubrication condition (viscosity ratio) and life modification factor.

**1. Lubrication condition – the viscosity ratio, κ**

$\kappa = \nu/\nu_1$

The following are used:

- $\nu_1$ is determined from **diagram 14**, **page 101**
- with $d_m$ = 53,5 and n = 2 450 r/min, $\nu_1$ is close to 12 mm²/s

For WT, the base oil viscosity at 90 °C *(195 °F)* can be estimated from **diagram 13**, **page 100**, or calculated with the *SKF Bearing Calculator* (skf.com/bearingcalculator) and is 12 mm²/s.

Viscosity ratio, κ = 12/12 = 1

**2. Life modification factor, $a_{SKF}$**

To determine the life modification factor for radial ball bearings, **diagram 9**, **page 96** is used, with:

- P = 0,55 kN
- κ = 1
- $P_u$ = 0,655 kN
- $\eta_c$ = 0,6
  The contamination factor is chosen based on **table 6**, **page 105**.
- SKF 6207-2RSH/WT is an SKF Explorer bearing.

With $\eta_c P_u/P$ = 0,7 and using **diagram 9**, **page 96**, the $a_{SKF}$ of about 50 is much greater than 1, so the SKF rating life is far above the required life.

## Conclusion

The bearing SKF 6207-2RSH/WT is adequate in terms of fatigue life.

# Bearing interfaces

The bearing inner rings have a stationary load condition and no spacer between the inner rings in the cross-located arrangement. They are mounted with a loose fit for easy mounting. The recommended fit for standard conditions is g6Ⓔ (table 5, page 148).

The outer rings have a rotating load condition, so they are mounted with an interference. The recommended fit for standard conditions is M7Ⓔ (table 8, page 151), which has a probable interference range of –25 to +8 (table 20, page 172).

Bearings in rope sheaves of paper machines should always have an interference for the outer ring (application handbook *Rolling bearings in paper machines*). To achieve this select N6Ⓔ, which has a probable interference range of –29 to –5 (table 21, page 174). For geometrical tolerances and surface roughness, standard recommendations can be applied.

The tolerances for the bearing seats are:

| | Dimensional tolerance | Total radial run-out tolerance | Total axial run-out tolerance | Ra |
|---|---|---|---|---|
| **Inner ring** | g6Ⓔ | IT5/2 | IT5 | 1,6 µm |
| **Outer ring** | N6Ⓔ | IT6/2 | IT6 | 3,2 µm |

# Bearing execution

## Intial internal clearance

The current design uses bearings with Normal initial clearance. The interference fit on the outer ring reduces the internal clearance. We determine the operational clearance for both Normal and C3 initial clearance, to select the most appropriate bearing execution.

### 1. Initial internal clearance

Refer to *Bearing data*, page 250. Values obtained from table 6, page 252.

| | Normal | C3 |
|---|---|---|
| min./avg./max. | 6 / 13 / 20 µm | 15 / 24 / 33 µm |

### 2. Clearance reduction caused by interference fits

There is no interference on the inner ring, therefore use:
$\Delta r_{fit} = \Delta_2 f_2$ (*Clearance reduction caused by interference fits*, page 184)

Obtain values for:

- factor, $f_2$ (diagram 2, page 184)
- probable fits for housings, $\Delta_2$ (table 21, page 174)

Results:

| | | |
|---|---|---|
| d/D | | 0,49 |
| $f_2$ | | 0,87 |
| $\Delta_2$ | min./avg./max. | –29 / –17 / –5 µm |
| **$\Delta r_{fit}$** | min./avg./max. | **–25** / **–15** / **–4** µm |

### 3. Internal clearance after mounting

| | Normal | C3 |
|---|---|---|
| min./avg./max. | **–19** / **–2** / **6** µm | **–10** / **9** / **29** µm |

At least C3 clearance is required. Analysis with SKF proprietary software, considering the effects from smoothing of the mating surfaces and the probability that maximum fit reduction coincides with minimum bearing clearance, provides the following values for a bearing with C3 internal clearance:

| | |
|---|---|
| min./avg./max. | **–2** / **16** / **32** µm |

A small negative clearance is not critical for ball bearings. C3 clearance is adequate for this application.

### Seals

It is not recommended to use shields (suffix 2Z) instead of contact seals (suffix 2RSH) in this application because there is a risk of grease leakage with outer ring rotation. The 2RSH seal design has the advantage of being more resistant to washout (high-pressure cleaning) that happens in paper machines, and so this will increase service life.

### Consider hybrid bearings

Depending on the paper machine and position of the rope sheave, the sheave may face higher operating temperatures, which will reduce the grease life. To increase grease life, the use of hybrid bearings (ceramic balls instead of steel ones) of the same size can increase the grease life by at least a factor of two.

### Consider design change

By changing the rope sheave hub design so that the bearing's inner ring rotates instead of the outer ring, grease life is increased. The speed factor will be n $d_m$ = 131 000 instead of nD = 176 400.

The grease life, $L_{10h}$, of the 6207-2RSH/C3WT bearing will increase from 50 000 h to 61 000 h.

SKF has developed a rope sheave hub to take the above consideration into account. The bearings have ceramic balls, and WT grease, and their inner rings rotate (fig. 2). An enhanced design has been created using special bearings. For additional information, see the handbook *Rolling bearings in paper machines*.

# Sealing, mounting and dismounting

Sometimes, simple labyrinth seals are added to protect the bearing integral seals further.

The normal mounting and dismounting methods are applicable.

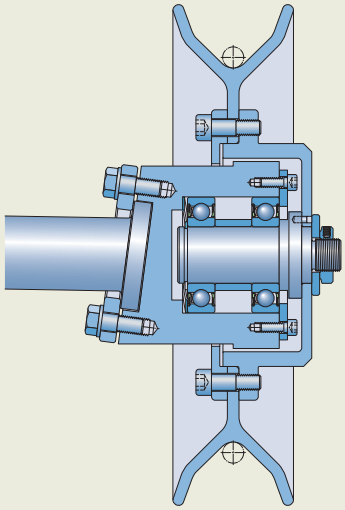
# Overall conclusions

The bearing that fulfils the requirements is a sealed and greased SKF Explorer bearing 6207-2RSH/C3WT.

For more demanding operating conditions, or to achieve an even longer maintenance-free period, SKF can provide other solutions.

Fig. 2

**SKF rope sheave hub**



# C.3 Centrifugal pump

This example shows the bearing selection process applied to an application case in which modification is required to a centrifugal pump.

The pump manufacturer wants to improve the efficiency of an existing centrifugal process pump by modifying the impeller. As a result, the bearing loads will be greater, and so the current bearing selection needs to be checked to verify that it can cope with the change. The application drawing is shown in **fig. 1**.

The steps in the example follow the sequence in the bearing selection process. Refer to sections **B.1 – B.8** for a full description of each process step.

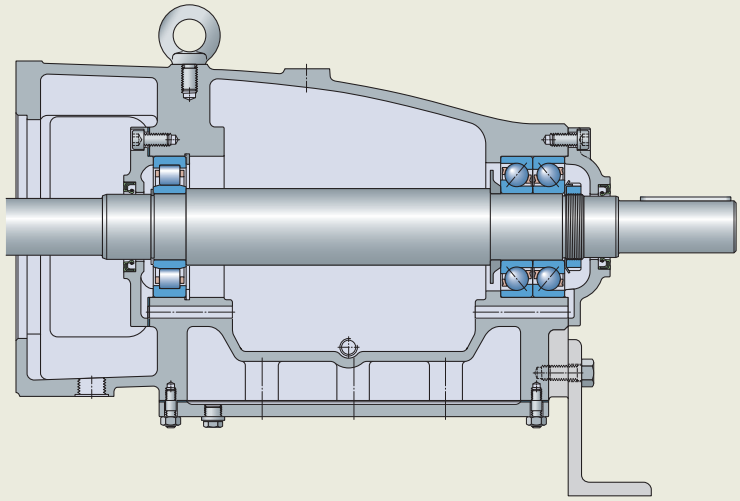
## Performance and operating conditions

The operating conditions are:

- rotational speed: n = 3 000 r/min
- lubrication:
  - method: oil bath
  - oil viscosity grade: ISO VG 68
- for the non-locating support – a cylindrical roller bearing, NU 311 ECP:
  - max. radial load: $F_r$ = 3,29 kN
  - estimated operating temperature: T = 70 °C *(160 °F)*

**Fig. 1**

**The centrifugal pump and its bearing arrangement**



- for the locating support – a pair of universally matchable single row angular contact ball bearings, 7312 BECBP, arranged back-to-back:
  - max. radial load: $F_r$ = 1,45kN
  - max. axial load: $F_a$ = 11,5 kN
  - estimated operating temperature: T = 85 °C *(185 °F)*

Following pump industry standards, the basic rating life $L_{10h}$ should be at least 16 000 h at maximum load conditions.

# Bearing type and arrangement

A cylindrical roller bearing is used as the non-locating support and a pair of universally matchable single row angular contact ball bearings are used as the locating support.

The cylindrical roller bearing, of type NU, is used for the following reasons:

- It can accommodate, within itself, thermal expansion of the shaft.
- The inner ring is separable from the outer ring, with rollers and cage – this simplifies assembly of the pump and the use of interference fits on both inner and outer ring.

For the pair of universally matchable single row angular contact ball bearings:

- Ball bearings with a 40° angle are well suited to accommodate high axial loads and medium to high speeds.
- The bearings are arranged back-to-back, with the inner rings clamped and mounted with an interference fit to the shaft. Because the clearance of the pair is controlled by clamping the inner rings, the outer rings can be positioned in the housing between a shoulder and a cover, without the need for precise clamping.

Both bearing housing seats are machined in one clamping position, which guarantees good alignment. Misalignment is less than 2 minutes of arc, which is within the acceptable misalignment limits for the angular contact ball bearing pair and cylindrical roller bearing.

## Conclusion

The current selection of bearing type and arrangement is adequate for this application.

# Bearing size, non-locating support

The given operating conditions, and the effects of rolling contact fatigue, indicate that bearing size should be determined using the basic rating life and SKF rating life.

Product data for NU 311 ECP is on **page 522**.

## Basic rating life

$$L_{10h} = \left(\frac{10^6}{60\,n}\right)\left(\frac{C}{P}\right)^p$$

From *Loads*, **page 509**, P = $F_r$. Therefore, the load ratio C/P = 156/3,29 = 47

$$L_{10h} = \left(\frac{10^6}{60 \times 3\,000}\right)\left(\frac{156}{3,29}\right)^{3,33} > 1\,000\,000 \text{ h}$$

The bearing is oversized.

## SKF rating life

$L_{10mh} = a_{SKF}\, L_{10h}$

**1. Lubrication condition – the viscosity ratio, κ**

$\kappa = \nu/\nu_1$

Given:
oil viscosity grade = ISO VG 68
operating temperature = 70 °C *(160 °F)*

then, using **diagram 13**, **page 100**, ν = 20 mm²/s

Given:
n = 3 000 r/min
$d_m$ = 0,5 (55 + 120) = 87,5 mm

then, using **diagram 14**, **page 101**, $\nu_1$ = 7 mm²/s

Therefore, κ = 20/7 = 2,8

**2. Contamination factor, $\eta_c$**

Given:

- contamination conditions are typical (i.e. open bearings, no filtering, wear particles and ingress from surrounding environment)
- $d_m$ = 87,5 mm

then, using **table 6**, **page 105**, $\eta_c$ = 0,2

Given:
$P_u$ = 18,6 kN
P = $F_r$ = 3,29 kN (*Loads*, **page 509**)

then $\eta_c P_u/P = 0,2 \times 18,6/3,29 = 1,13$

**3. Life modification factor, $a_{SKF}$**

Given:
$\kappa$ = 2,8
$\eta_c P_u/P$ = 1,13
NU 311 ECP is an SKF Explorer bearing

then, using **diagram 10**, **page 97**, $a_{SKF}$ = 50

Given:
$L_{10h}$ > 1 000 000 h

then $L_{10mh}$ > 50 × 1 000 000 h
then $L_{10mh}$ >> 1 000 000 h indicating that the bearing is oversized for the operating conditions.

## Minimum load

The fact that the basic rating life and SKF rating life are both very high and above the required bearing life indicates that the bearing may be too lightly loaded.

Using the minimum load equation from *Loads*, **page 509**, the minimum radial load, $F_{rm}$, required to avoid skidding and roller slip for cylindrical roller bearings is given by:

$$F_{rm} = k_r \left(6 + \frac{4\,n}{n_r}\right)\left(\frac{d_m}{100}\right)^2$$

Given:
$d_m$ = 87,5 mm
$k_r$ = 0,15
n = 3 000 r/min
$n_r$ = 6 000 r/min

then $F_{rm}$ = 0,94 kN < $F_r$ = 3,29 kN

## Conclusion

The bearing is oversized / lightly loaded. Options are:

- Continue to use the current bearing. There is no risk that the bearing will be damaged due to being too lightly loaded.
- Downsize the bearing, and in so doing reduce cost. Consider one of the following:
  - Keep the shaft diameter the same, but use the smaller NU 2 series bearing NU 211 ECP (refer to the product section).
  - Reduce the shaft diameter one step, provided the shaft design permits (strength and stiffness), and use the smaller NU 2 series bearing NU 210 ECP (refer to the product section).

However, both of these downsizing actions require design modifications to the adjacent components.

# Bearing size, locating support

The given operating conditions, and the effects of rolling contact fatigue, indicate that bearing size should be determined using the basic rating life and SKF rating life.

Product data for 7312 BECBP is on **page 414**

## Basic rating life

$$L_{10h} = \left(\frac{10^6}{60\,n}\right)\left(\frac{C}{P}\right)^p$$

From *Loads*, **page 398**:

$C = 1,62\ C_{single\ bearing} = 1,62 \times 104 = 168,5$ kN

From *Loads*, **page 398**, for bearing pairs arranged back-to-back:

$F_a/F_r = 11,5/1,45 > 1,14$

So use:

$P = 0,57\ F_r + 0,93\ F_a = (0,57 \times 1,45) + (0,93 \times 11,5) = 11,52$ kN

Therefore, the load ratio C/P = 168,5/11,52 = 14,6

$$L_{10h} = \left(\frac{10^6}{60 \times 3\,000}\right)\left(\frac{168,5}{11,52}\right)^3 = 17\,400 \text{ h}$$

## SKF rating life

$L_{10mh} = a_{SKF}\ L_{10h}$

**1. Lubrication condition – the viscosity ratio, $\kappa$**

$\kappa = \nu/\nu_1$

Given:
oil viscosity grade = ISO VG 68
operating temperature = 85 °C *(185 °F)*

then, using **diagram 13**, **page 100**, $\nu$ = 13 mm²/s

Given:
n = 3 000 r/min
$d_m$ = 0,5 (60 + 130) = 95 mm

then, using **diagram 14**, **page 101**, $\nu_1$ = 7 mm²/s

Therefore, $\kappa$ = 13/7 = 1,8

The next higher viscosity grade, ISO VG 100, would give $\kappa = 2,5$. But this would result in the NU 311 ECP bearing having $\kappa > 4$, which, during cold starts in particular, would give unwanted high $\kappa$ values.

**2. Contamination factor, $\eta_c$**

Given:

- contamination conditions are typical (i.e. open bearings, no filtering, wear particles and ingress from surrounding environment)
- $d_m = 95$ mm

then, using **table 6**, **page 105**, $\eta_c = 0,2$

Given:
$P_u = 2 \times 3,2 = 6,4$ kN
$P = 11,52$ kN (*Basic rating life*)

then $\eta_c P_u/P = 0,2 \times 6,4/11,52 = 0,11$

**3. Life modification factor $a_{SKF}$**

Given:
$\kappa = 1,8$
$\eta_c P_u/P = 0,11$
7312 BECBP are SKF Explorer bearings

then, using **diagram 9**, **page 96**, $a_{SKF} = 5$

Given:
$L_{10h} = 17\,400$ h

then $L_{10mh} = 5 \times 17\,400 = 87\,000$ h

### Conclusion

The pair of 7312 BECBP SKF Explorer bearings are of a suitable size.

# Lubrication

The pump has an oil bath. This is typical of process pumps, because of their requirement for long service intervals. In this pump, for simplicity, the locating and the non-locating support bearings are lubricated by the same oil bath.

As determined in previous steps, $\kappa$ is 1,8 for the pair of angular contact ball bearings and 2,8 for the cylindrical roller bearing, and so the viscosity grade of the selected oil is adequate.

# Operating temperature and speed

Determine whether a detailed thermal analysis is required (*Thermal equilibrium*, **page 131**) by checking that:

- the rotational speed is less than 50% of the bearing limiting speed:
  - This is true for the non-locating support.
  - For the locating support, it is 56%, which is just slightly above the limit. That is, for a pair of single row angular contact ball bearings, the limiting speed is reduced by 20% (*Permissible speed*, **page 402**), and so 3 000/(0,8 × 6 700) = 0,56.
- the load ratio C/P > 10:
  - This is true for the locating and non-locating supports.
- there is no pronounced external heat input:
  - The pump is located in an environment where the ambient temperature is 20 to 30 °C (*70 to 85 °F*).
  - The pump medium is at ambient temperature, so no additional heat flows to the bearings.

Therefore, no further thermal analysis is needed.

# Bearing interfaces

Because the loads on the bearings will be greater, as a result of the modification to the pump, you should check the bearing seat tolerances to make sure the bearings are mounted with adequate fits.

Given the standard steel shaft and cast iron housing, the bearing loads, speeds and temperatures, which are all within standard conditions, you can apply *Seat tolerances for standard conditions*, **page 148**.

### Shaft tolerances

You can find shaft tolerances for seats for radial ball bearings in **table 5**, **page 148**, and for radial roller bearings in **table 6**, **page 149**.

Given:

| | NU 311 ECP | 7312 BECBP |
|---|---|---|
| **Condition of rotation** | rotating inner ring load | rotating inner ring load |
| **P/C ratio** | 0,02 | 0,07 |
| **Bore diameter** | 55 mm | 60 mm |

Results:

| | Bearing seat | | | |
|---|---|---|---|---|
| **Bearing** | **Dimensional tolerance** | **Total radial run-out tolerance** | **Total axial run-out tolerance** | **Ra** |
| **NU 311 ECP** | k6Ⓔ | IT5/2 | IT5 | 0,8 µm |
| **7312 BECBP** | k5Ⓔ | IT4/2 | IT4 | 0,8 µm |

## Housing tolerances

Any wear developing during service may lead to imbalance of the impeller, leading to an indeterminate direction of load on the outer rings of both bearings.

You can find tolerances for seats for cast iron and steel housings, for radial ball bearings, in **table 8**, **page 151**.

Given:

| | NU 311 ECP | 7312 BECBP |
|---|---|---|
| **Condition of rotation** | indeterminate direction of load | indeterminate direction of load |
| **P/C ratio** | 0,02 | 0,07 |
| **Outer diameter** | 120 mm | 130 mm |

Results:

| **Bearing** | **Dimensional tolerance** | **Total radial run-out tolerance** | **Total axial run-out tolerance** | **Ra** |
|---|---|---|---|---|
| **NU 311 ECP** | K7Ⓔ | IT6/2 | IT6 | 3,2 µm |
| **7312 BECBP** | K7Ⓔ | IT6/2 | IT6 | 3,2 µm |

## Axial location

The current design has adequate axial location. Make sure that the lock nut that locates the inner rings of the angular contact ball bearings is sufficiently tightened. Apply the clamp force uniformly around the circumference and respect the abutment dimensions (product data for 7312 BECBP is on **page 414**). To avoid distortion of the inner rings and to achieve the desired axial clearance in the bearing pair, limit the clamping force. For centrifugal pumps, a clamping force of $C_0/4$ (19 kN) is recommended.

# Bearing execution

## Checking the initial internal clearance

The current design uses bearings with Normal initial clearance. The fits for the inner and outer rings, and a temperature difference between the inner and outer rings of 10 °C *(20 °F)*, reduce the internal clearance. Other influences on the internal clearance are negligible.

### 1. Initial internal clearance

| | NU 311 ECP | Pair of 7312 BECBP |
|---|---|---|
| min./avg./max. | **40 / 55 / 70 µm**<br>Refer to *Bearing data*, **page 504**. Values obtained from **table 3**, **page 506**. | **22 / 32 / 27 µm**<br>Refer to *Bearing data*, **page 392**. Axial values obtained from **table 4**, **page 394**, converted to radial (axial × tan 40°). |

### 2. Clearance reduction caused by interference fits

Use:

$\Delta r_{fit} = \Delta_1 f_1 + \Delta_2 f_2$ (*Clearance reduction caused by interference fits*, **page 184**)

Obtain values for:

- factors $f_1$ and $f_2$ (**diagram 2**, **page 184**)
- probable fits for shafts, $\Delta_1$ (**table 14**, **page 160**)
- probable fits for housings, $\Delta_2$ (**table 20**, **page 172**)

Results:

| | | NU 311 ECP | Pair of 7312 BECBP |
|---|---|---|---|
| d/D | | 0,46 | 0,46 |
| $f_1$ | | 0,78 | 0,78 |
| $f_2$ | | 0,86 | 0,86 |
| $\Delta_1$ | min./avg./max. | –32 / –19 / –6 µm | –26 / –16 / –6 µm |
| $\Delta_2$ | min./avg./max. | –20 / 0 / 20 µm | –21 / 1 / 23 µm |
| **$\Delta r_{fit}$** | min./avg./max. | **–42 / –15 / –5 µm** | **–38 / –12 / –5** µm |

### 3. Clearance reduction caused by temperature difference

Use:

$\Delta r_{temp} = 0{,}012\ \Delta T\ d_m$ (*Clearance reduction caused by temperature difference between shaft, bearing rings and housing*, **page 184**)

Results:

| | NU 311 ECP | Pair of 7312 BECBP |
|---|---|---|
| $d_m$ | 87,5 mm | 95 mm |
| **$\Delta r_{temp}$** | **–11 µm** | **–11 µm** |

**4. Operating clearance**

| | NU 311 ECP | Pair of 7312 BECBP |
|---|---|---|
| min./avg./max. | **–13 / 30 / 55 µm** | **–27 / 17 / 4 µm** |

For a cylindrical roller bearing, negative clearance (i.e. preload) is generally not recommended.

Pairs of angular contact ball bearings should have an average operating clearance close to zero (ranging between small clearance and light preload), particularly when the pairs are loaded predominantly axially. A small range is required to:

- limit preload – to limit friction (increased friction results in higher temperatures, and therefore reduced viscosity and reduced bearing life)
- limit clearance – to avoid ball skidding

This manual calculation does not consider smoothing of the mating surfaces, nor elastic deflection under load, nor the probability of extreme values occurring at the same time.

Analysis using more advanced SKF software gives operating clearance results:

| | NU 311 ECP | Pair of 7312 BECBP |
|---|---|---|
| min./avg./max. | **3 / 34 / 59 µm** | **–10 / 11 / 24 µm** |

These results indicate that Normal internal clearance is suitable.

## Cage selection

Given the estimated operating temperature of 85 °C *(185 °F)* (i.e. the higher temperature of the two bearing supports), a speed of well below the limiting speed, and considering availability and price, the standard rolling element guided polyamide cages are confirmed as adequate.

For historical reasons, in some geographical areas, brass cages are preferred for angular contact ball bearings. These are available as standard from SKF. This also applies to the cylindrical roller bearings.

## Conclusion

### Non-locating support

The NU 311 ECP bearing, currently used in the centrifugal pump, is adequate. As an alternative, the NU 311 ECM bearing could be used. Downsizing of the bearing is possible.

Bearing execution is described by suffixes in the bearing designation (*Designation system*, **page 514**).

Designation suffixes:

| | Suffix | Description |
|---|---|---|
| **Internal design** | **EC** | optimized internal design incorporating more and/or larger rollers and with a modified roller end / flange contact designed to minimize friction |
| **Cage design** | **P** | glass fibre reinforced PA66 cage, roller centred |
| | **M** | machined brass cage, riveted, roller centred |
| **Clearance class** | **–** | Normal |

### Locating support

The pair of universally matchable 7312 BECBP bearings, currently used in the centrifugal pump, are adequate. As an alternative, the 7312 BECBM bearing could be used.

Bearing execution is described by suffixes in the bearing designation (*Designation system*, **page 404**).

Designation suffixes:

| | Suffix | Description |
|---|---|---|
| **Internal design** | **B** | 40° contact angle |
| | **E** | optimized internal design – reinforced rolling element set |
| **External design / clearance class** | **CB** | bearing for universal matching; two bearings arranged back-to-back or face-to-face; have Normal axial internal clearance |
| **Cage design** | **P** | glass fibre reinforced PA66 cage, ball centred |
| | **M** | machined brass cage, ball centred |

**Fig. 2**

**Radial shaft seal, design HMS5**

**Fig. 3**

**Radial shaft seal, design HMSA10**

# Sealing, mounting and dismounting

## Sealing

The current pump design uses radial shaft seals to keep the oil bath lubricant in the pump and to protect the bearings from contamination (**fig. 1**, **page 228**). You can use seals SKF HMS5 (**fig. 2**) or HMSA10 (**fig. 3**). These are suitable for both oil and grease lubricated applications. The temperature range and speed capability of the nitrile rubber compound used for these seals suits the operating conditions of the pump.

When the seal counterface becomes worn, you can repair the shaft with a wear sleeve, such as SKF Speedi-Sleeve.

## Hot mounting of the bearings

The bearings are mounted with an interference fit on the shaft and a transition fit in their housings. You can mount the bearings easily by heating their inner rings to 100 °C *(210 °F)* and the housing seats to 50 °C *(160 °F)*. For heating the inner rings, use an SKF induction heater or electric hot plate.

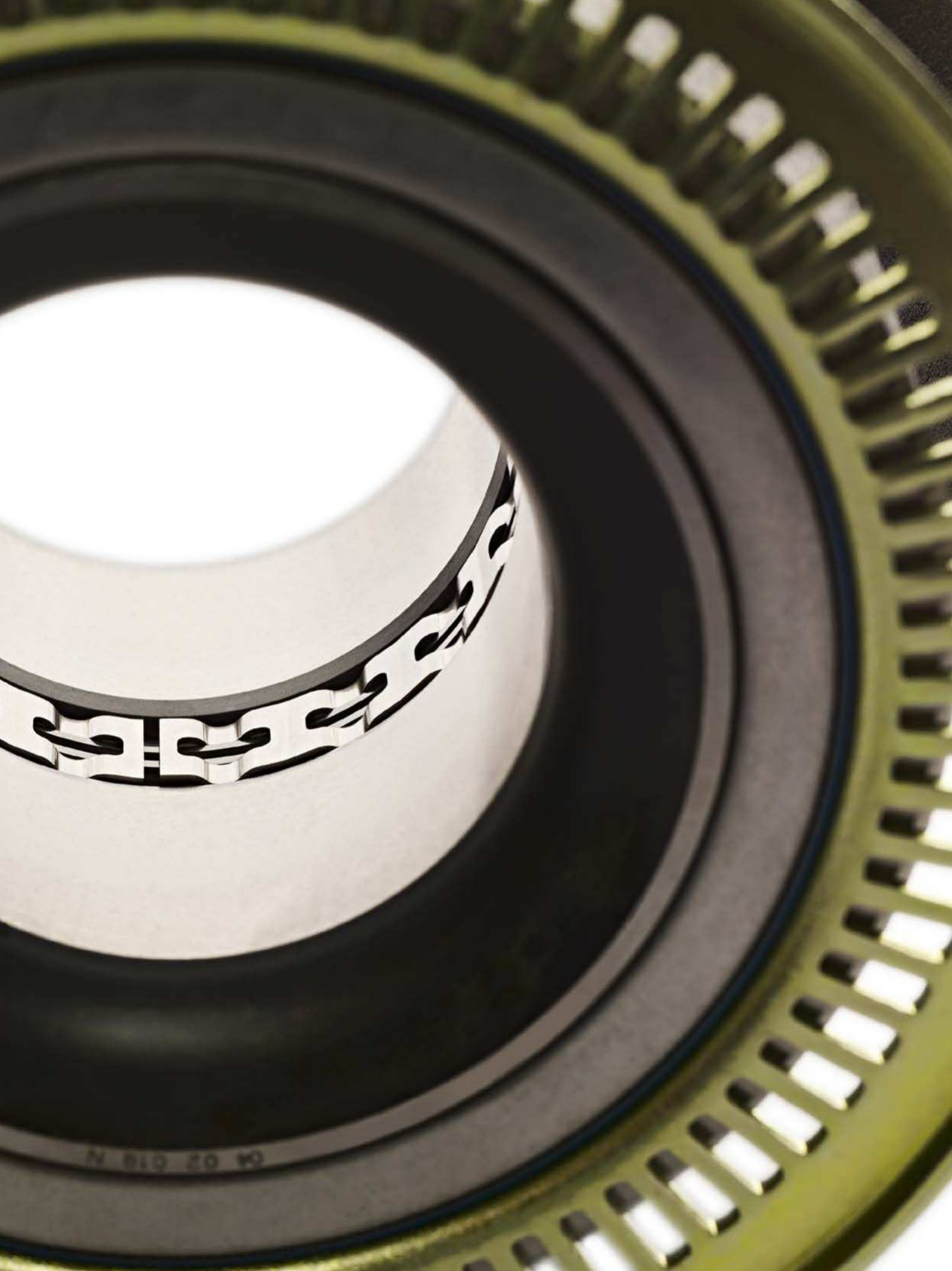
## Shaft alignment

To maximize pump life, the pump and its electric motor need to be well aligned. SKF alignment tools can help.

# Overall conclusions

The existing bearings can be used in combination with the new impeller design.

Downsizing of the cylindrical roller bearing is recommended.



# Product data

**Ball bearings**
1. Deep groove ball bearings . . . . . 239
2. Insert bearings (Y-bearings) . . . . . 339
3. Angular contact ball bearings . . . . . 383
4. Self-aligning ball bearings . . . . . 437
5. Thrust ball bearings . . . . . 465

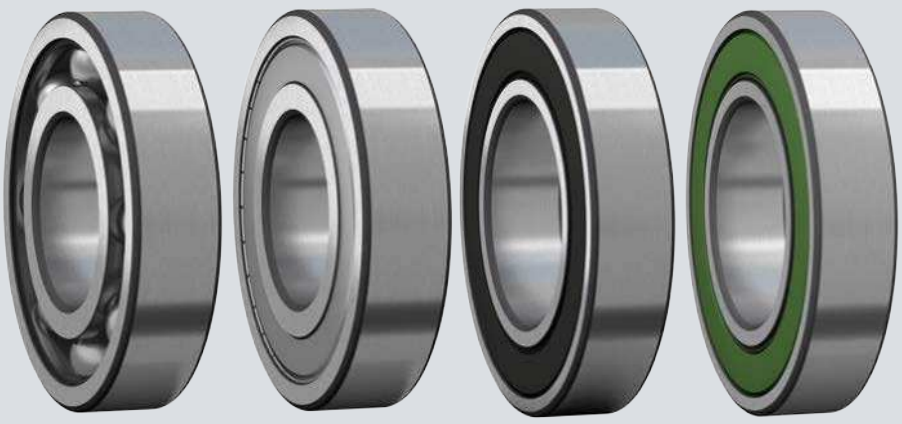
**Roller bearings**
6. Cylindrical roller bearings . . . . . 493
7. Needle roller bearings . . . . . 581
8. Tapered roller bearings . . . . . 665
9. Spherical roller bearings . . . . . 773
10. CARB toroidal roller bearings . . . . . 841
11. Cylindrical roller thrust bearings . . . . . 877
12. Needle roller thrust bearings . . . . . 895
13. Spherical roller thrust bearings . . . . . 913

**Track rollers**
14. Cam rollers . . . . . 931
15. Support rollers . . . . . 943
16. Cam followers . . . . . 963

**Engineered products**
17. Sensor bearing units . . . . . 987
18. High temperature bearings . . . . . 1005
19. Bearings with Solid Oil . . . . . 1023
20. INSOCOAT bearings . . . . . 1029
21. Hybrid bearings . . . . . 1043
22. NoWear coated bearings . . . . . 1059

**Bearing accessories**
23. Adapter sleeves . . . . . 1065
24. Withdrawal sleeves . . . . . 1087
25. Lock nuts . . . . . 1089

# 1 Deep groove ball bearings



# 1 Deep groove ball bearings




**Designs and variants** . . . . . **241**
Single row deep groove ball bearings . . . . . 241
Stainless steel deep groove ball bearings . . . . . 241
Single row deep groove ball bearings with filling slots . . . 241
Double row deep groove ball bearings . . . . . 242
Capped bearings . . . . . 242
Greases for capped bearings . . . . . 244
Bearings with a snap ring groove . . . . . 247
Bearings with a flanged outer ring . . . . . 247
SKF Explorer bearings . . . . . 248
Quiet running bearings for large electric generators . . . . . 248
Cages . . . . . 249
Matched bearings . . . . . 249

**Bearing data** . . . . . **250**
(Dimension standards, tolerances, internal clearance, permissible misalignment)

**Loads** . . . . . **254**
(Minimum load, axial load carrying capacity, load carrying capacity of matched bearing pairs, equivalent dynamic bearing load, equivalent static bearing load)

**Temperature limits** . . . . . **256**

**Permissible speed** . . . . . **256**

**Designation system** . . . . . **258**

**Product tables**
1.1 Single row deep groove ball bearings . . . . . 260
1.2 ICOS oil sealed bearing units . . . . . 308
1.3 Single row deep groove ball bearings with a snap ring groove . . . . . 310
1.4 Stainless steel deep groove ball bearings . . . . . 316
1.5 Single row deep groove ball bearings with filling slots . . . . . 328
1.6 Double row deep groove ball bearings . . . . . 334

**Other deep groove ball bearings**
Cam rollers . . . . . 931
Sensor bearing units . . . . . 987
High temperature bearings . . . . . 1005
Bearings with Solid Oil . . . . . 1023
INSOCOAT bearings . . . . . 1029
Hybrid bearings . . . . . 1043
NoWear coated bearings . . . . . 1059
Polymer ball bearings → skf.com/bearings

# 1 Deep groove ball bearings

## More information

**General bearing knowledge** . . . . **17**

**Bearing selection process** . . . . . **59**
Lubrication . . . . . 109
Bearing interfaces. . . . . 139
Seat tolerances for standard conditions . . . . . 148
Selecting internal clearance . . . . . 182
Sealing, mounting and dismounting . . . . . 193

**Mounting instructions for individual bearings** → skf.com/mount

*SKF bearing maintenance handbook* ISBN 978-91-978966-4-1

Deep groove ball bearings are particularly versatile. They are suitable for high and very high speeds, accommodate radial and axial loads in both directions, and require little maintenance. Because deep groove ball bearings are the most widely used bearing type, they are available from SKF in many designs, variants and sizes.

In addition to the bearings presented in this section, deep groove ball bearings for special applications are shown under:

- *Sensor bearing units*, **page 987**
- *High temperature bearings and bearing units*, **page 1005**
- *Bearings with Solid Oil*, **page 1023**
- *INSOCOAT bearings*, **page 1029**
- *Hybrid bearings*, **page 1043**
- *NoWear coated bearings*, **page 1059**

For single row cam rollers, refer to *Cam rollers*, **page 931**.

# Designs and variants

## Single row deep groove ball bearings

Single row deep groove ball bearings (**fig. 1**) are available capped (with seals or shields) or open. Open bearings that are also available capped may have recesses in the ring side faces (**fig. 2**).

SKF inch bearings in the EE(B), RLS and RMS series are intended as aftermarket items and, therefore, SKF recommends not using these bearings for new bearing arrangement designs (skf.com/go/17000-1-1).

SKF can also supply bearings with a tapered bore. For detailed information, contact SKF.

## Stainless steel deep groove ball bearings

Stainless steel deep groove ball bearings (**fig. 1**) are available capped (with seals or shields) or open. Open bearings that are also available capped may have recesses in the ring side faces (**fig. 2**).

These bearings have a lower load carrying capacity than same-sized bearings made of high chromium steel.

Inch stainless steel deep groove ball bearings are not listed in this catalogue, but can be found online at skf.com/go/17000-1-4.

## Single row deep groove ball bearings with filling slots

Single row deep groove ball bearings with filling slots have a filling slot in both the inner and outer rings (**fig. 3**) to accommodate more balls than standard deep groove ball bearings.

Filling slot bearings have a higher radial load carrying capacity than bearings without filling slots, but their axial load carrying capacity is limited. They are also unable to operate at the same high speeds as bearings without filling slots.

Deep groove ball bearings with filling slots are available open or with shields on one or both sides. They are also available with or without a snap ring groove. Open bearings that are also available with shields may have recesses in the outer ring (**fig. 4**).

Large size deep groove ball bearings with filling slots, without cage, are available on request.

**Fig. 1**

**Single row bearing**

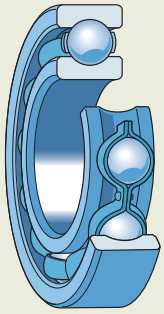


**Fig. 2**

**Open designs**

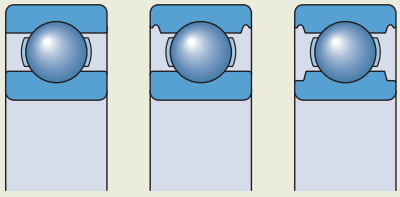


**Fig. 3**

**Bearing with filling slots**

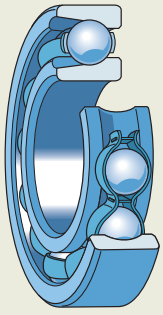
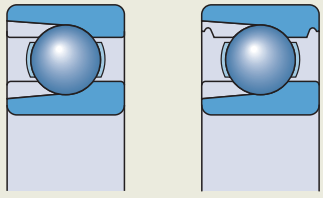


**Fig. 4**

**Open designs of bearings with filling slots**



# Double row deep groove ball bearings

Double row deep groove ball bearings (fig. 5) are very suitable for bearing arrangements where the load carrying capacity of a single row bearing is inadequate. For the same bore and outside diameter, double row bearings are slightly wider than single row bearings in the 62 and 63 series, but have a considerably higher load carrying capacity.

Double row deep groove ball bearings are only available as open bearings (without seals or shields).

# Capped bearings

Selection guidelines for different capping devices under various operating conditions are listed in table 1. However, these guidelines cannot substitute for testing a shield or seal in its application. For additional information, refer to *Integral sealing*, page 26.

The seals, which are fitted in a recess on the outer ring, make good, positive contact with the recess, without deforming the outer ring. The capping devices are available as:

Fig. 5

**Double row bearing**

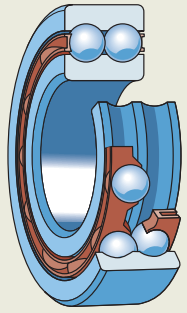


Table 1

**Selection guidelines for SKF capping devices**

| Requirement | Shields | Non-contact seals | Low-friction seals | | Contact seals | |
|---|---|---|---|---|---|---|
| | Z, ZS | RZ | RSL | RST | RSH | RS1 |
| **Low friction** | +++ | +++ | ++ | ++ | ○ | ○ |
| **High speed** | +++ | +++ | +++ | + | ○ | ○ |
| **Grease retention** | ○ | + | +++ | +++ | +++ | ++ |
| **Dust exclusion** | ○ | + | ++ | ++ | +++ | +++ |
| **Water exclusion** | | | | | | |
| static | – | – | ○ | +++ | +++ | ++ |
| dynamic | – | – | ○ | + | ++ | + |
| high pressure | – | – | ○ | ○ | +++ | ○ |
| **Symbols:** | +++ = best | ++ = very good | + = good | ○ = fair | – = not recommended | |

**Shields** (designation suffixes Z or ZS)

- are primarily intended for applications where the inner ring rotates
- are fitted in the outer ring and form a narrow gap with the inner ring
- are made of sheet steel, or stainless steel for stainless steel bearings
- protect from dirt and debris without friction losses
- are supplied in different designs (fig. 6):
  - with designation suffix Z: either with (**a**) or without (**b**) an extension in the shield bore or on some stainless steel bearings, the shield bore can extend into a recess in the inner ring (**c**)
  - with designation suffix ZS (stainless steel bearings only): fixed in the outer ring by a retaining ring and may extend into a recess (**d**)
  - available on request for stainless steel bearings only: shields made of PTFE

**Non-contact seals** (designation suffix RZ)

- provide better sealing effectiveness than shields
- can be operated at the same speeds as shields
- form an extremely narrow gap with the inner ring shoulder (fig. 7)
- are made of sheet steel reinforced NBR (oil- and wear-resistant)

**Low-friction seals** (designation suffixes RSL or RST)

- provide better sealing effectiveness than non-contact seals
- are made of sheet steel reinforced NBR (oil- and wear-resistant)

RSL design (fig. 8):

- can be operated at the same speeds as shields
- make virtually no contact with a recess in the inner ring shoulder
- are available for 60, 62, 63 series bearings in two designs, depending on the size

RST design (fig. 9):

- make positive contact with a recess in the inner ring shoulder for good sealing effectiveness
- are available on request for 60, 62 and 63 series bearings in three designs, depending on the size

**Fig. 6**

**Shields**

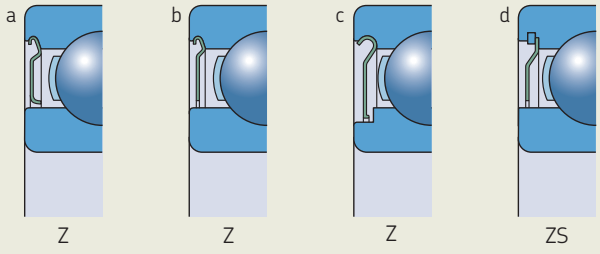



**Fig. 7**

**Non-contact seal**

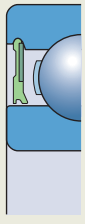



**Fig. 8**

**Low-friction seals, RSL**

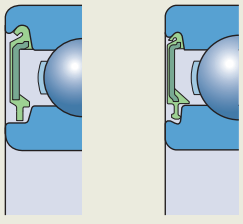
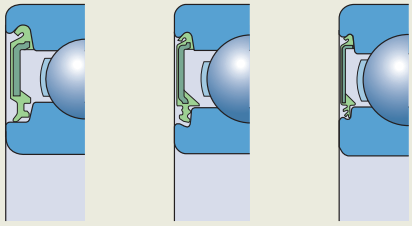



**Fig. 9**

**Low-friction seals, RST**



**Contact seals** (designation suffixes RSH, RSH2, RS1, RS1/VP311 or RS2)

- are made of sheet steel reinforced
  - NBR
  - FKM (designation suffix RS2 or RSH2, available on request)
  - food compatible, blue-coloured NBR* (designation suffix VP311 and for stainless steel bearings only)
- are available in different designs depending on the bearing they are used with (fig. 10):
  - for 60, 62 and 63 series bearings in two RSH designs (**a**, **b**), depending on the size
  - for RS1 designs, with sealing either against the inner ring shoulder (**c**) or against a recess in the inner ring side face for chromium steel bearings (**d**) or for stainless steel bearings (**e**), the relevant design is determined by dimension $d_1$ or $d_2$ in the product table.

### ICOS oil sealed bearing units

- are typically used for applications with sealing requirements exceeding the capabilities of standard sealing solutions, i.e. oil retention
- have the following features compared to bearings with external sealing solutions:
  - need less axial space
  - simplify mounting
  - avoid expensive machining of the shaft because the inner ring shoulder is the seal counterface
- consist of a 62 series deep groove ball bearing and an SKF WAVE seal (fig. 11):
  - single lip, spring loaded radial shaft seal
  - made of NBR
- have limiting speeds quoted in the product table that are based on the permissible circumferential speed for the seal (14 m/s)

* The material is FDA and EC approved. FDA approval is based on compliance with CFR 21 section 177.2600 "Rubber articles intented for repeated use" for use in contact with aqueous and fatty foods. EC approval is based on compliance with the overall migration requirements of the German BfR recomenndation XXI for category 3 materials.

## Greases for capped bearings

Bearings capped on both sides are lubricated for the life of the bearing and are virtually maintenance-free.

They are filled with one of the following greases:

### Single row bearings

- standard bearings (table 2)

On request, bearings can be supplied with the following special greases:

- high temperature grease GJN
- wide temperature range grease HT or WT
- wide temperature range and low-noise grease LHT23
- low temperature grease LT

### Stainless steel bearings

- wide temperature range and low-noise grease LHT23 as standard
- GFJ food-grade grease, registered by NSF as category H1 (designation suffix VP311)

  The NSF registration confirms the grease fulfils the requirements listed in the US Food and Drug Administration's guidelines under 21 CFR section 178.3570 (lubricant acceptable with incidental food contact for use in and around food processing areas).
- available on request: special non-toxic grease, registered by NSF as category H1 (designation suffix VT378)

### Bearings with filling slots

- high temperature grease GJN

On request, bearings can be supplied with the following special greases:

- wide temperature range grease HT or WT
- wide temperature range and low-noise grease LHT23
- low temperature grease LT

The technical specifications of the various greases are listed in table 3.

The standard grease is not identified in the bearing designation (no designation suffix). Special greases are indicated by the corresponding grease suffix. Check availability of bearings with special grease prior to ordering.

**⚠ WARNING**

Seals made of FKM (fluoro rubber) exposed to an open flame or temperatures above 300 °C *(570 °F)* are a health and environmental hazard! They remain dangerous even after they have cooled.

Read and follow the safety precautions on page 197.

**Fig. 10**

**Contact seals**

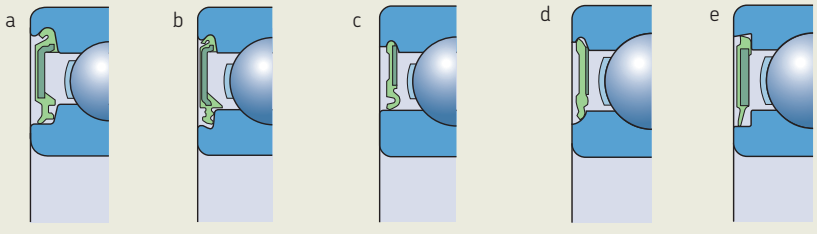



**Fig. 11**

**ICOS oil sealed bearing unit**

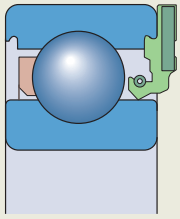


Table 2

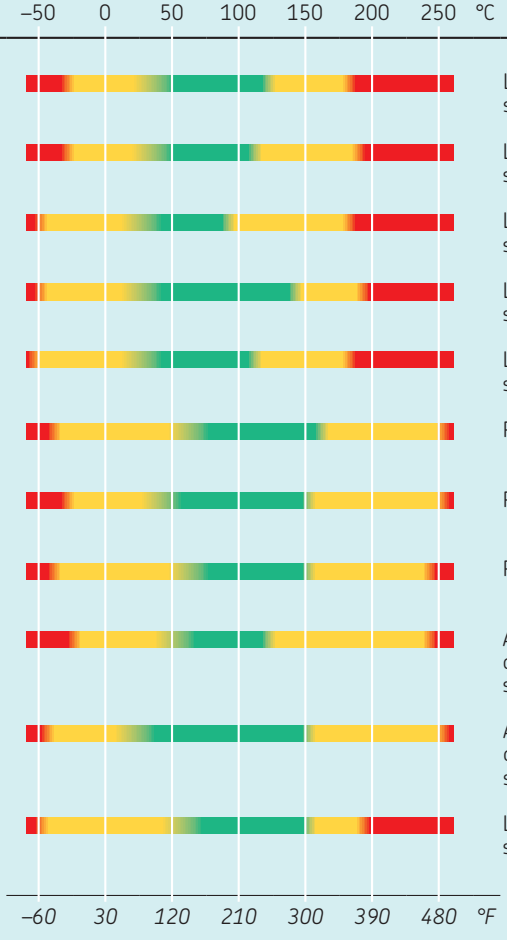
**SKF standard greases for capped single row deep groove ball bearings made of carbon chromium steel**

| Bearings in diameter series | SKF standard greases in bearings with outside diameter | | | |
|---|---|---|---|---|
| | D ≤ 30 mm<br>d < 10 mm | d ≥ 10 mm | 30 < D ≤ 62 mm | D > 62 mm |
| **8, 9** | LHT23 | LT10 | MT47 | MT33 |
| **0, 1, 2, 3** | MT47 | MT47 | MT47 | MT33 |

Table 3

**Technical specifications of SKF standard and special greases for capped deep groove ball bearings**

| Grease | Temperature range[1] | Thickener | Base oil type | NLGI grade | Base oil viscosity [mm²/s] at 40 °C *(105 °F)* | at 100 °C *(210 °F)* | Grease performance factor (GPF) |
|---|---|---|---|---|---|---|---|
| **MT33** | | Lithium soap | Mineral | 3 | 100 | 10 | 1 |
| **MT47** | | Lithium soap | Mineral | 2 | 70 | 7,3 | 1 |
| **LT10** | | Lithium soap | Diester | 2 | 12 | 3,3 | 2 |
| **LHT23** | | Lithium soap | Ester | 2–3 | 27 | 5,1 | 2 |
| **LT** | | Lithium soap | Diester | 2 | 15 | 3,7 | 1 |
| **WT** | | Polyurea | Ester | 2–3 | 70 | 9,4 | 4 |
| **GJN** | | Polyurea | Mineral | 2 | 115 | 12,2 | 2 |
| **HT** | | Polyurea | Mineral | 2–3 | 96 | 10,5 | 2 |
| **VT378** | | Aluminium complex soap | PAO | 2 | 150 | 15,5 | –[2] |
| **GFJ** | | Aluminium complex soap | Synthetic hydro-carbon | 2 | 100 | 14 | 1 |
| **GE2** | | Lithium soap | Synthetic | 2 | 25 | 4,9 | 2 |




1) Refer to the SKF traffic light concept (page 117).
2) For bearings filled with VT378 grease, use the scale corresponding to GPF = 1 and multiply the value obtained from diagram 1, page 246, by 0,2.

## Grease life for capped bearings

- is presented as $L_{10}$, i.e. the time period at the end of which 90% of the bearings are still reliably lubricated (**diagram 1**)
- depends on:
  - the operating temperature
  - the speed factor, $nd_m$
  - grease performance factor (GPF) (**table 3**, **page 245**)

The indicated grease life is valid under this combination of operating conditions:

- horizontal shaft
- inner ring rotation
- light load (P ≤ 0,05 C)
- operating temperature within the green temperature zone of the grease (**table 3**)
- stationary machine
- low vibration levels

Where the operating conditions differ as described below, the grease life obtained from the diagram should be adjusted:

- for vertical shafts, use 50% of the obtained value
- for heavier loads (P > 0,05 C), apply a reduction factor (**table 4**)

When capped bearings must operate under certain extreme conditions, such as very high speeds or high temperatures, grease may appear on the capping diameter. For bearing arrangements where this would be detrimental, appropriate actions could be taken. For additional information, contact the SKF application engineering service.

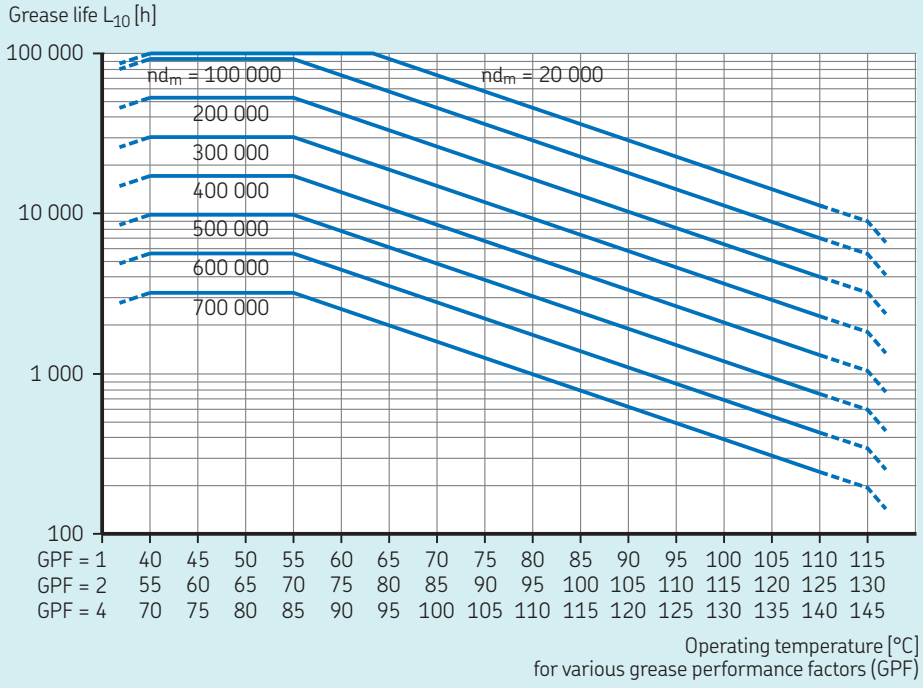
**Table 4**

**Reduction factor for the grease life, depending on the load**

| Load P | Reduction factor |
|---|---|
| **≤ 0,05 C** | 1 |
| **0,1 C** | 0,7 |
| **0,125 C** | 0,5 |
| **0,25 C** | 0,2 |

**Diagram 1**

**Grease life for capped deep groove ball bearings where P = 0,05 C**




n = rotational speed [r/min]
$d_m$ = bearing mean diameter [mm]
= 0,5 (d + D)

# Bearings with a snap ring groove

- can simplify the design of an arrangement
  - by locating the bearing axially in the housing by a snap ring (fig. 12)
  - by saving space
  - by significantly reducing mounting time.

Appropriate snap rings are shown in the product table along with their designation and dimensions.

The following variants are available (fig. 13):

- open bearings with a snap ring groove only (designation suffix N)
- open bearings with a snap ring (designation suffix NR)
- bearings with a snap ring and a shield on the opposite side (designation suffix ZNR)
- bearings with a snap ring and a shield on the same side (designation suffix ZNBR)
- bearings with a snap ring and a shield on both sides (designation suffix 2ZNR)

# Bearings with a flanged outer ring

Certain sizes of SKF stainless steel deep groove ball bearings are also available with a flange on the outer ring (designation suffix R, fig. 14). They:

- can be supplied open or capped
- are relatively easy to locate axially in the housing
- enable easier and more cost-effective housing bore manufacture, no shoulders required

These bearings with a flanged outer ring are not listed in this catalogue, but can be found online at skf.com/go/17000-1-4.

**Fig. 12**

**Bearing with a snap ring**

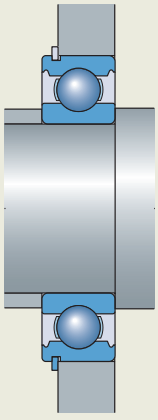


**Fig. 14**

**Bearing with a flanged outer ring**

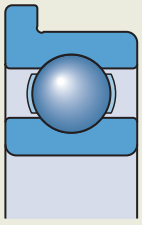
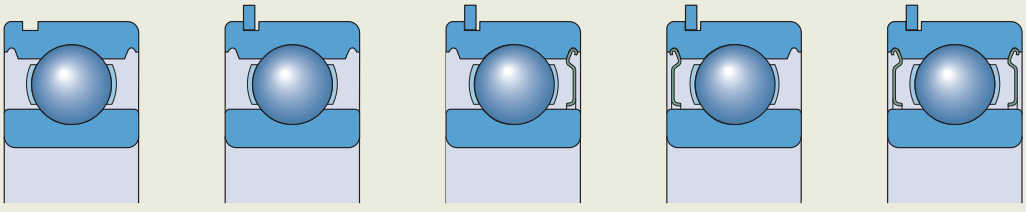


**Fig. 13**

**Bearing variants with a snap ring groove**



1

# SKF Explorer bearings

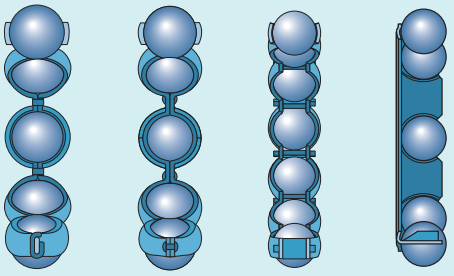
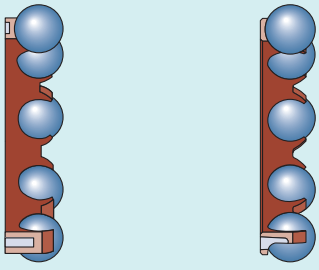
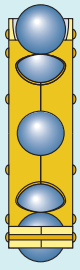
Single row deep groove ball bearings are also avilable as SKF Explorer bearings (page 7).

# Quiet running bearings for large electric generators

- are designed to comply with stringent noise requirements
- are typically used in wind turbine generators
- provide consistent performance over a variety of operating conditions
- are identified by the designation suffix VQ658

**Table 5**

**Cages**

| | Steel cages | | | | Polymer cages | | | Brass cages |
|---|---|---|---|---|---|---|---|---|
| |  a b | | | |  | | |  |
| **Cage type** | Ribbon-type, ball centred | Riveted, ball centred | | Snap-type, ball centred | Snap-type, ball centred | | | Riveted, ball, outer ring or inner ring centred |
| **Material** | Stamped steel / stainless steel | | | | PA66, glass fibre reinforced | PA46, glass fibre reinforced | PEEK, glass fibre reinforced | Machined brass |
| **Suffix** | – | – | | – | TN9 | TN9/VG1561 | TNH | M, MA or MB |
| **Single row bearings** | Standard (metric only) | Standard (a) | | – | Standard for inch bearings and ICOS oil sealed bearing units, check availability for other bearings | Check availa-bility (not available for inch bearings) | Check availa-bility (not available for inch bearings) | Standard (metric only) |
| **Stainless steel bearings** | Standard | Standard (a) | | Standard | Check availability | – | – | – |
| **Bearings with filling slots** | – | Standard (b) | | – | – | – | – | – |
| **Double row bearings** | – | – | – | – | Standard | – | – | – |

# Cages

Depending on their design, series and size, SKF deep groove ball bearings are fitted with one of the cages shown in **table 5**. Double row bearings are equipped with two cages. The standard stamped steel cage is not identified in the bearing designation. If non-standard cages are required, check availability prior to ordering.

When used at high temperatures, some lubricants can have a detrimental effect on polyamide cages. For additional information about the suitability of cages, refer to *Cages*, **page 187**.

# Matched bearings

- are used where the load carrying capacity of a single bearing is inadequate
- are used where the shaft has to be located axially in both directions with a specific axial clearance
- where mounted immediately adjacent to each other, distribute the load between the bearings without having to use shims or similar devices

A 'V-shaped' marking on the outside surface of the outer rings of matched bearings (**fig. 15**) indicates how the pair should be mounted. The bearing pairs are supplied as a packaged unit.

Matched pairs can be supplied in three different arrangements (**fig. 16**):

**Tandem arrangement** (designation suffix DT)

- is used where the load carrying capacity of a single bearing is inadequate
- has parallel load lines and therefore shares the radial and axial loads equally
- can accommodate axial loads in both directions

**Back-to-back arrangement** (designation suffix DB)

- has load lines that diverge towards the bearing axis
- provides a relatively stiff bearing arrangement
- can accommodate tilting moments
- can accommodate axial loads in both directions, but only by one bearing in each direction

**Face-to-face arrangement** (designation suffix DF)

- has load lines that converge towards the bearing axis
- is less sensitive to misalignment but not as stiff as a back-to-back arrangement
- can accommodate axial loads in both directions, but only by one bearing in each direction

**Fig. 15**

**'V-shaped' marking on matched bearings**

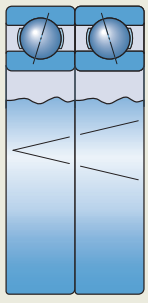
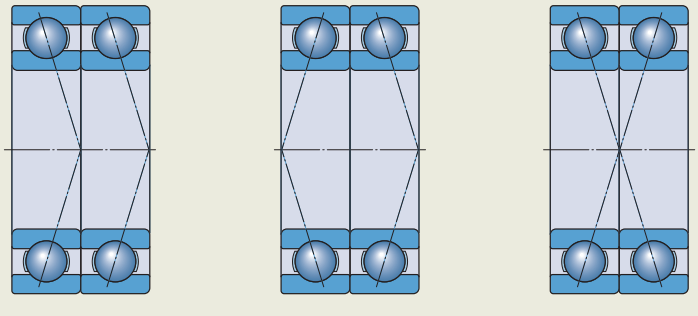


**Fig. 16**

**Matched bearings in different arrangements**



# Bearing data

| | Single row deep groove ball bearings |
|---|---|
| **Dimension standards** | Boundary dimensions: ISO 15<br>Snap rings and grooves: ISO 464 |
| **Tolerances** | Normal<br>P6 or P5 on request<br><br>Except for:<br>**SKF Explorer bearings**<br>Dimensional tolerances to P6 and tighter width tolerance:<br>D ≤ 110 mm → 0/ –60 µm<br>D > 110 mm → 0/ –100 µm<br>Geometrical tolerances:<br>D ≤ 52 mm → P5<br>52 mm < D ≤ 110 mm → P6<br>D > 110 mm → Normal |
| For additional information<br>→ page 35 | Values: ISO 492 (table 2, page 38, to table 4, page 40) |
| **Internal clearance** | **Single bearings**<br>Normal<br>Check availability of C2, C3, C4, C5, reduced ranges of standard clearance classes or partitions of adjacent classes.<br><br>**Matched bearing pairs**<br>Supplied either with clearance or preload:<br>• CA – small axial internal clearance<br>• GA – light preload |
| For additional information<br>→ page 182 | Values: ISO 5753-1 (table 6, page 252), except for stainless steel bearings with d < 10 mm (table 7, page 253) ... |
| **Permissible misalignment** | ≈ 2 to 10 minutes of arc (single bearings)<br><br>Misalignment increases bearing noise and reduces bearing service life, and when it exceeds the guideline values these effects become particularly noticeable. For matched bearing pairs, any misalignment increases bearing ... |

| | Stainless steel deep groove ball bearings | Single row deep groove ball bearings with filling slots | Double row deep groove ball bearings |
|---|---|---|---|
| | Boundary dimensions: ISO 15<br><br>Except for:<br>• bearings with suffix X<br>• bearings with prefix WBB1<br>• outer ring flange of flanged bearings: ISO 8443 | Boundary dimensions: ISO 15<br>Snap rings and grooves: ISO 464 | Boundary dimensions: ISO 15 |
| | Normal<br>P6 or P5 on request | Normal | Normal |
| | Normal<br>Check availability of other clearance classes | Normal | Normal<br>Check availability of C3 clearance class |

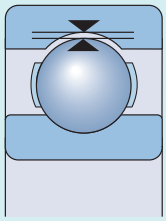
... and for matched bearing pairs (table 8, page 253). Values are valid for unmounted bearings under zero measuring load.

| | | | |
|---|---|---|---|
| | ≈ 2 to 10 minutes of arc | ≈ 2 to 5 minutes of arc | ≤ 2 minutes of arc |

... noise and reduces bearing service life. For additional information, contact the SKF application engineering service.

Table 6

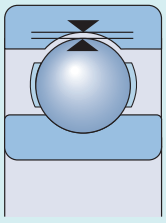
## Radial internal clearance of deep groove ball bearings



| Bore diameter | | Radial internal clearance | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | | C2 | | Normal | | C3 | | C4 | | C5 | |
| > | ≤ | min. | max. | min. | max. | min. | max. | min. | max. | min. | max. |
| mm | | µm | | | | | | | | | |
| **2,5** | **6** | 0 | 7 | 2 | 13 | 8 | 23 | – | – | – | – |
| **6** | **10** | 0 | 7 | 2 | 13 | 8 | 23 | 14 | 29 | 20 | 37 |
| **10** | **18** | 0 | 9 | 3 | 18 | 11 | 25 | 18 | 33 | 25 | 45 |
| **18** | **24** | 0 | 10 | 5 | 20 | 13 | 28 | 20 | 36 | 28 | 48 |
| **24** | **30** | 1 | 11 | 5 | 20 | 13 | 28 | 23 | 41 | 30 | 53 |
| **30** | **40** | 1 | 11 | 6 | 20 | 15 | 33 | 28 | 46 | 40 | 64 |
| **40** | **50** | 1 | 11 | 6 | 23 | 18 | 36 | 30 | 51 | 45 | 73 |
| **50** | **65** | 1 | 15 | 8 | 28 | 23 | 43 | 38 | 61 | 55 | 90 |
| **65** | **80** | 1 | 15 | 10 | 30 | 25 | 51 | 46 | 71 | 65 | 105 |
| **80** | **100** | 1 | 18 | 12 | 36 | 30 | 58 | 53 | 84 | 75 | 120 |
| **100** | **120** | 2 | 20 | 15 | 41 | 36 | 66 | 61 | 97 | 90 | 140 |
| **120** | **140** | 2 | 23 | 18 | 48 | 41 | 81 | 71 | 114 | 105 | 160 |
| **140** | **160** | 2 | 23 | 18 | 53 | 46 | 91 | 81 | 130 | 120 | 180 |
| **160** | **180** | 2 | 25 | 20 | 61 | 53 | 102 | 91 | 147 | 135 | 200 |
| **180** | **200** | 2 | 30 | 25 | 71 | 63 | 117 | 107 | 163 | 150 | 230 |
| **200** | **225** | 2 | 35 | 25 | 85 | 75 | 140 | 125 | 195 | 175 | 265 |
| **225** | **250** | 2 | 40 | 30 | 95 | 85 | 160 | 145 | 225 | 205 | 300 |
| **250** | **280** | 2 | 45 | 35 | 105 | 90 | 170 | 155 | 245 | 225 | 340 |
| **280** | **315** | 2 | 55 | 40 | 115 | 100 | 190 | 175 | 270 | 245 | 370 |
| **315** | **355** | 3 | 60 | 45 | 125 | 110 | 210 | 195 | 300 | 275 | 410 |
| **355** | **400** | 3 | 70 | 55 | 145 | 130 | 240 | 225 | 340 | 315 | 460 |
| **400** | **450** | 3 | 80 | 60 | 170 | 150 | 270 | 250 | 380 | 350 | 520 |
| **450** | **500** | 3 | 90 | 70 | 190 | 170 | 300 | 280 | 420 | 390 | 570 |
| **500** | **560** | 10 | 100 | 80 | 210 | 190 | 330 | 310 | 470 | 440 | 630 |
| **560** | **630** | 10 | 110 | 90 | 230 | 210 | 360 | 340 | 520 | 490 | 700 |
| **630** | **710** | 20 | 130 | 110 | 260 | 240 | 400 | 380 | 570 | 540 | 780 |
| **710** | **800** | 20 | 140 | 120 | 290 | 270 | 450 | 430 | 630 | 600 | 860 |
| **800** | **900** | 20 | 160 | 140 | 320 | 300 | 500 | 480 | 700 | 670 | 960 |
| **900** | **1 000** | 20 | 170 | 150 | 350 | 330 | 550 | 530 | 770 | 740 | 1 040 |
| **1 000** | **1 120** | 20 | 180 | 160 | 380 | 360 | 600 | 580 | 850 | 820 | 1 150 |
| **1 120** | **1 250** | 20 | 190 | 170 | 410 | 390 | 650 | 630 | 920 | 890 | 1 260 |
| **1 250** | **1 400** | 30 | 200 | 190 | 440 | 420 | 700 | 680 | 1 000 | – | – |
| **1 400** | **1 600** | 30 | 210 | 210 | 470 | 450 | 750 | 730 | 1 060 | – | – |

**Table 7**

**Radial internal clearance of stainless steel deep groove ball bearings with a bore diameter < 10 mm**



| Bore diameter | | Radial internal clearance | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | | C1 | | C2 | | Normal | | C3 | | C4 | | C5 | |
| > | ≤ | min. | max. | min. | max. | min. | max. | min. | max. | min. | max. | min. | max. |
| mm | | µm | | | | | | | | | | | |
| – | **9,525** | 0 | 5 | 3 | 8 | 5 | 10 | 8 | 13 | 13 | 20 | 20 | 28 |

**Table 8**

**Axial internal clearance and preload of matched bearings in the 60, 62 and 63 series**

| Bore diameter | | Axial internal clearance CA | | Preload GA | | |
|---|---|---|---|---|---|---|
| d | | | | Bearings of series | | |
| > | ≤ | min. | max. | 60 | 62 | 63 |
| mm | | µm | | N | | |
| – | **10** | 15 | 35 | 30 | 30 | – |
| **10** | **18** | 20 | 40 | 50 | 50 | 100 |
| **18** | **30** | 25 | 45 | 100 | 100 | 100 |
| **30** | **50** | 35 | 55 | 100 | 100 | 200 |
| **50** | **80** | 40 | 70 | 200 | 200 | 350 |
| **80** | **120** | 50 | 80 | 300 | 400 | 600 |
| **120** | **180** | 60 | 100 | 500 | 700 | 900 |
| **180** | **250** | 70 | 110 | 800 | 1 000 | 1 200 |
| **250** | **315** | 80 | 120 | – | – | – |
| **315** | **400** | 90 | 130 | – | – | – |
| **400** | **500** | 100 | 140 | – | – | – |

# Loads

| | Single row deep groove ball bearings | Stainless steel deep groove ball bearings |
|---|---|---|
| **Minimum load**<br>For additional information<br>→ page 106 | $F_{rm} = k_r \left(\frac{\nu n}{1\,000}\right)^{2/3} \left(\frac{d_m}{100}\right)^2$<br><br>If minimum load cannot be reached, consider preloading. | |
| **Axial load carrying capacity** | Pure axial load → $F_a \leq 0{,}5\ C_0$<br>Small bearings[1] and light series bearings[2] → $F_a \leq 0{,}25\ C_0$<br><br>Excessive axial load can lead to a considerable reduction in bearing service life. | Pure axial load → $F_a \leq 0{,}25\ C_0$ |
| **Load carrying capacity of matched bearing pairs** | The values for basic load ratings and fatigue load limits listed in the product table apply to single bearings. For matched bearing pairs mounted immediately adjacent to each other the following values apply:<br><br>• basic dynamic load rating<br>$C = 1{,}62\ C_{\text{single bearing}}$<br>• basic static load rating<br>$C_0 = 2\ C_{0\ \text{single bearing}}$<br>• fatigue load limit<br>$P_u = 2\ P_{u\ \text{single bearing}}$ | |
| **Equivalent dynamic bearing load**<br><br>For additional information<br>→ page 91 | **Single bearings and bearing pairs arranged in tandem:**<br>$F_a/F_r \leq e \rightarrow P = F_r$<br>$F_a/F_r > e \rightarrow P = X\,F_r + Y\,F_a$<br><br>**Bearing pairs arranged back-to-back or face-to-face:**<br>$F_a/F_r \leq e \rightarrow P = F_r + Y_1\,F_a$<br>$F_a/F_r > e \rightarrow P = 0{,}75\,F_r + Y_2\,F_a$ | $F_a/F_r \leq e \rightarrow P = F_r$<br>$F_a/F_r > e \rightarrow P = X\,F_r + Y\,F_a$ |
| **Equivalent static bearing load**<br><br>For additional information<br>→ page 105 | **Single bearings and bearing pairs arranged in tandem:**<br>$P_0 = 0{,}6\,F_r + 0{,}5\,F_a$<br>$P_0 < F_r \rightarrow P_0 = F_r$<br><br>**Bearing pairs arranged back-to-back or face-to-face:**<br>$P_0 = F_r + 1{,}7\,F_a$ | $P_0 = 0{,}6\,F_r + 0{,}5\,F_a$<br>$P_0 < F_r \rightarrow P_0 = F_r$ |

[1] d ≤ 12 mm
[2] Diameter series 8, 9, 0, and 1

| | Single row deep groove ball bearings with filling slots | Double row deep groove ball bearings |
|---|---|---|
| | | |
| | $F_a \leq 0,6\ F_r$ | Pure axial load → $F_a \leq 0,5\ C_0$ |
| | | |
| | $F_a/F_r \leq 0,6$ and $P \leq 0,5\ C_0$<br>→ $P = F_r + F_a$ | $F_a/F_r \leq e \rightarrow P = F_r$<br>$F_a/F_r > e \rightarrow P = X\ F_r + Y\ F_a$ |
| | $F_a/F_r \leq 0,6 \rightarrow P_0 = F_r + 0,5\ F_a$ | $P_0 = 0,6\ F_r + 0,5\ F_a$<br>$P_0 < F_r \rightarrow P_0 = F_r$ |

**Symbols**

| | |
|---|---|
| $C_0$ | basic static load rating [kN]<br>• single bearings (**product tables**, **page 260**)<br>• matched bearing pairs (*Load carrying capacity of matched bearing pairs*) |
| $d_m$ | bearing mean diameter [mm]<br>= 0,5 (d + D) |
| e | limit for the load ratio depending on the relationship $f_0F_a/C_0$ (**table 9**, **page 257**, and **table 10**, **page 257**) |
| $f_0$ | calculation factor (**product tables**) |
| $F_a$ | axial load [kN] |
| $F_r$ | radial load [kN] |
| $F_{rm}$ | minimum radial load [kN] |
| $k_r$ | minimum load factor (**product tables**) |
| n | rotational speed [r/min] |
| P | equivalent dynamic bearing load [kN] |
| $P_0$ | equivalent static bearing load [kN] |
| X | calculation factor for the radial load (**table 9**) |
| $Y, Y_1, Y_2$ | calculation factors for the axial load depending on the relationship $f_0F_a/C_0$ (**table 9** and **table 10**) |
| $\nu$ | actual operating viscosity of the lubricant [$mm^2/s$] |

# Temperature limits

The permissible operating temperature for deep groove ball bearings can be limited by:

- the dimensional stability of the bearing rings and balls
- the cage
- the seals
- the lubricant

Where temperatures outside the permissible range are expected, contact SKF.

## Bearing rings and balls

SKF deep groove ball bearings are heat stabilized up to at least 120 °C *(250 °F)*.

## Cages

Steel, stainless steel, brass or PEEK cages can be used at the same operating temperatures as the bearing rings and balls. For temperature limits of cages made of other polymer materials, refer to *Polymer cages*, page 188.

## Seals

The permissible operating temperature for seals depends on the seal material:

- NBR: –40 to +100 °C *(–40 to +210 °F)*
  Temperatures up to 120 °C *(250 °F)* can be tolerated for brief periods.
- FKM: –30 to +200 °C *(–20 to +390 °F)*
  Temperatures up to 230 °C *(445 °F)* can be tolerated for brief periods.

Typically, temperature peaks are at the seal lip.

## Lubricants

Temperature limits for greases used in SKF deep groove ball bearings capped on both sides are provided in table 3, page 245. For temperature limits of other SKF greases, refer to *Selecting a suitable SKF grease*, page 116.

When using lubricants not supplied by SKF, temperature limits should be evaluated according to the SKF traffic light concept (page 117).

# Permissible speed

The speed ratings in the product table indicate:

- the **reference speed,** which enables a quick assessment of the speed capabilities from a thermal frame of reference
- the **limiting speed**, which is a mechanical limit that should not be exceeded unless the bearing design and the application are adapted for higher speeds

For additional information, refer to *Operating temperature and speed*, page 130.

SKF recommends oil lubrication for bearings with a ring centred cage (designation suffix MA or MB). When these bearings are grease lubricated, the $nd_m$ value is limited to 250 000 mm/min.

where

$d_m$ = bearing mean diameter [mm]
= 0,5 (d + D)
n = rotational speed [r/min]

Table 9

**Calculation factors for deep groove ball bearings**

| | Single row and double row bearings<br>Normal clearance | | | Single row bearings<br>C3 clearance | | | C4 clearance | | |
|---|---|---|---|---|---|---|---|---|---|
| $f_0F_a/C_0$ | e | X | Y | e | X | Y | e | X | Y |
| **0,172** | 0,19 | 0,56 | 2,3 | 0,29 | 0,46 | 1,88 | 0,38 | 0,44 | 1,47 |
| **0,345** | 0,22 | 0,56 | 1,99 | 0,32 | 0,46 | 1,71 | 0,4 | 0,44 | 1,4 |
| **0,689** | 0,26 | 0,56 | 1,71 | 0,36 | 0,46 | 1,52 | 0,43 | 0,44 | 1,3 |
| **1,03** | 0,28 | 0,56 | 1,55 | 0,38 | 0,46 | 1,41 | 0,46 | 0,44 | 1,23 |
| **1,38** | 0,3 | 0,56 | 1,45 | 0,4 | 0,46 | 1,34 | 0,47 | 0,44 | 1,19 |
| **2,07** | 0,34 | 0,56 | 1,31 | 0,44 | 0,46 | 1,23 | 0,5 | 0,44 | 1,12 |
| **3,45** | 0,38 | 0,56 | 1,15 | 0,49 | 0,46 | 1,1 | 0,55 | 0,44 | 1,02 |
| **5,17** | 0,42 | 0,56 | 1,04 | 0,54 | 0,46 | 1,01 | 0,56 | 0,44 | 1 |
| **6,89** | 0,44 | 0,56 | 1 | 0,54 | 0,46 | 1 | 0,56 | 0,44 | 1 |

Calculation factors must be selected according to the operating clearance in the bearing, which may differ from the internal clearance before mounting. For additional information or for calculation factors for other clearance classes, contact the SKF application engineering service. Intermediate values can be obtained by linear interpolation.

Table 10

**Calculation factors for paired single row deep groove ball bearings arranged back-to-back and face-to-face**

| $f_0F_a/C_0$ | e | $Y_1$ | $Y_2$ |
|---|---|---|---|
| **0,17** | 0,23 | 2,8 | 3,7 |
| **0,69** | 0,30 | 2,1 | 2,8 |
| **2,08** | 0,40 | 1,6 | 2,15 |
| **3,46** | 0,45 | 1,4 | 1,85 |
| **5,19** | 0,50 | 1,26 | 1,7 |

# Designation system

| | | | | | |
|---|---|---|---|---|---|
| | | Group 1 | Group 2 | Group 3 | / |

**Prefixes**

| | |
|---|---|
| **ICOS-** | Oil sealed bearing unit |
| **D/W** | Stainless steel, inch dimensions |
| **W** | Stainless steel, metric dimensions |
| **WBB1** | Stainless steel, metric dimensions, not in accordance with ISO dimension series |

**Basic designation**

Listed in table 4, page 30

| | |
|---|---|
| **2..** | Single row bearing with filling slots in the 02 dimension series |
| **3..** | Single row bearing with filling slots in the 03 dimension series |
| **EE, EEB, R, RLS, RMS** | Inch bearing |
| Bearing size for inch bearings | |
| **2** | (/8) 1/4 in. *(6,35 mm)* bore diameter |
| to | |
| **40** | (/8) 5 in. *(127 mm)* bore diameter |

**Suffixes**

**Group 1: Internal design**

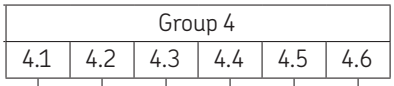
| | |
|---|---|
| **A, AA, C, D** | Deviating or modified internal design |
| **E** | Reinforced ball set |

**Group 2: External design (seals, snap ring groove, etc.)**

| | |
|---|---|
| **N** | Snap ring groove in the outer ring |
| **NR** | Snap ring groove in the outer ring, with snap ring |
| **N1** | One locating slot (notch) in one outer ring side face |
| **R** | Flanged outer ring |
| **-RS1, -2RS1** | Contact seal, NBR, on one or both sides |
| **-RS2, -2RS2** | Contact seal, FKM, on one or both sides |
| **-RSH, -2RSH** | Contact seal, NBR, on one or both sides |
| **-RSH2, -2RSH2** | Contact seal, FKM, on one or both sides |
| **-RSL, -2RSL** | Low-friction seal, NBR, on one or both sides |
| **-RST, -2RST** | Low-friction seal, NBR, on one or both sides |
| **-RZ, -2RZ** | Non-contact seal, NBR, on one or both sides |
| **-Z, -2Z** | Shield on one or both sides |
| **-ZNBR** | Shield on one side, snap ring groove in the outer ring, with snap ring on the same side as the shield |
| **-ZNR** | Shield on one side, snap ring groove in the outer ring, with snap ring on the opposite side of the shield |
| **-2ZNR** | Shield on both sides, snap ring groove in the outer ring, with snap ring |
| **-2ZS** | Shield on both sides, held in place by a retaining ring |
| **X** | Boundary dimensions not in accordance with ISO dimension series |

**Group 3: Cage design**

| | |
|---|---|
| **–** | **1** For stainless steel bearings: stamped stainless steel cage, ball centred<br>**2** For other bearings: stamped steel cage, ball centred |
| **M** | Machined brass cage, ball centred; different designs or material grades are identified by a number following the M, e.g. M2 |
| **MA(S)** | Machined brass cage, outer ring centred. The 'S' indicates a lubrication groove in the guiding surface. |
| **MB(S)** | Machined brass cage, inner ring centred. The 'S' indicates a lubrication groove in the guiding surface. |
| **TN** | PA66 cage, ball centred |
| **TN9** | Glass fibre reinforced PA66 cage, ball centred |
| **TN9/VG1561** | Glass fibre reinforced PA46 cage, ball centred |
| **TNH** | Glass fibre reinforced PEEK cage, ball centred |




**Group 4.6: Other variants**

| | |
|---|---|
| **VP311** | SKF Food Line bearing: Blue-coloured contact seal made of FDA and EC approved NBR and lubricant (GFJ) registered by NSF as category H1 |
| **VQ658** | Quiet running properties |

**Group 4.5: Lubrication**

**GE2**
**GFJ**
**GJN**
**HT**
**LHT23**
**LT**
**LT10**
**MT33**
**MT47**
**VT378**
**WT**

Grease suffixes (**table 3**, **page 245**)

**Group 4.4: Stabilization**

| | |
|---|---|
| **S0** | Bearing rings heat stabilized for operating temperatures ≤ 150 °C (*300 °F*) |
| **S1** | Bearing rings heat stabilized for operating temperatures ≤ 200 °C (*390 °F*) |

**Group 4.3: Bearing sets, matched bearings**

| | |
|---|---|
| **DB** | Two bearings matched for mounting back-to-back |
| **DF** | Two bearings matched for mounting face-to-face |
| **DT** | Two bearings matched for mounting in tandem |

**Group 4.2: Accuracy, clearance, preload, quiet running**

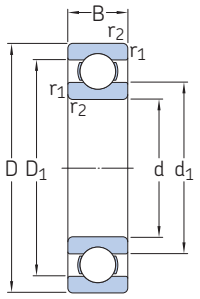
| | |
|---|---|
| **P5** | Dimensional and running tolerances to class P5 |
| **P6** | Dimensional and running tolerances to class P6 |
| **P52** | P5 + C2 |
| **P62** | P6 + C2 |
| **P63** | P6 + C3 |
| **CN** | Normal radial internal clearance; only used together with an additional letter that identifies a reduced or displaced clearance range<br>H = Reduced clearance range corresponding to the upper half of the actual clearance range<br>L = Reduced clearance range corresponding to the lower half of the actual clearance range<br>P = Displaced clearance range comprising the upper half of the actual clearance range plus the lower half of the next larger clearance range<br>The above letters are also used together with the clearance classes C2, C3, C4 and C5, e.g. C2H. |
| **C1** | Radial internal clearance smaller than C2 |
| **C2** | Radial internal clearance smaller than Normal |
| **C3** | Radial internal clearance greater than Normal |
| **C4** | Radial internal clearance greater than C3 |
| **C5** | Radial internal clearance greater than C4 |
| **CA** | Matched bearing set with small axial internal clearance |
| **GA** | Matched bearing set with light preload |

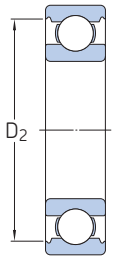
**Group 4.1: Materials, heat treatment**

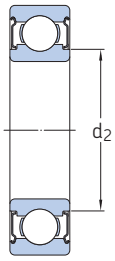
| | |
|---|---|
| **HA1** | Case-hardened inner and outer rings |

## 1.1 Single row deep groove ball bearings

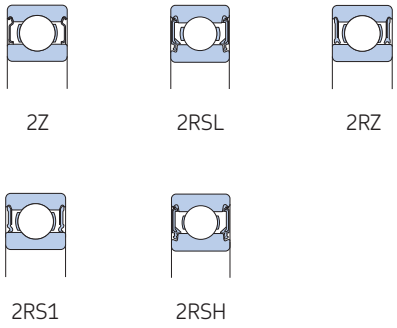
d **3 – 6** mm



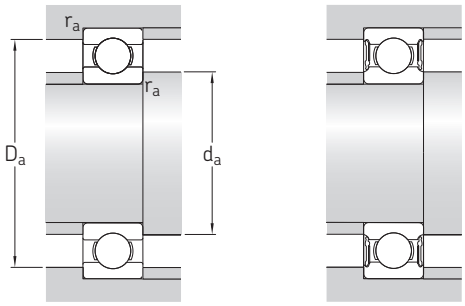




2Z




| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed[1] | Mass | Designations Bearing open or capped on both sides | capped on one side[1] |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **3** | 10 | 4 | 0,54 | 0,18 | 0,007 | 130 000 | 80 000 | 0,0015 | ▸ **623** | – |
| | 10 | 4 | 0,54 | 0,18 | 0,007 | – | 40 000 | 0,0015 | ▸ **623-2RS1** | **623-RS1** |
| | 10 | 4 | 0,54 | 0,18 | 0,007 | 130 000 | 60 000 | 0,0015 | ▸ **623-2Z** | **623-Z** |
| **4** | 9 | 2,5 | 0,423 | 0,116 | 0,005 | 140 000 | 85 000 | 0,0007 | **618/4** | – |
| | 9 | 3,5 | 0,54 | 0,18 | 0,07 | 140 000 | 70 000 | 0,001 | **628/4-2Z** | – |
| | 9 | 4 | 0,54 | 0,18 | 0,07 | 140 000 | 70 000 | 0,0013 | **638/4-2Z** | – |
| | 11 | 4 | 0,624 | 0,18 | 0,008 | 130 000 | 63 000 | 0,0017 | **619/4-2Z** | – |
| | 11 | 4 | 0,624 | 0,18 | 0,008 | 130 000 | 80 000 | 0,0017 | **619/4** | – |
| | 12 | 4 | 0,806 | 0,28 | 0,012 | 120 000 | 75 000 | 0,0021 | **604** | – |
| | 12 | 4 | 0,806 | 0,28 | 0,012 | 120 000 | 60 000 | 0,0021 | ▸ **604-2Z** | **604-Z** |
| | 13 | 5 | 0,936 | 0,29 | 0,012 | 110 000 | 67 000 | 0,0031 | ▸ **624** | – |
| | 13 | 5 | 0,936 | 0,29 | 0,012 | 110 000 | 53 000 | 0,0031 | ▸ **624-2Z** | **624-Z** |
| | 16 | 5 | 1,11 | 0,38 | 0,016 | 95 000 | 60 000 | 0,0054 | **634** | – |
| | 16 | 5 | 1,11 | 0,38 | 0,016 | – | 28 000 | 0,0054 | **634-2RS1** | **634-RS1** |
| | 16 | 5 | 1,11 | 0,38 | 0,016 | 95 000 | 48 000 | 0,0054 | **634-2RZ** | **634-RZ** |
| | 16 | 5 | 1,11 | 0,38 | 0,016 | 95 000 | 48 000 | 0,0054 | ▸ **634-2Z** | **634-Z** |
| **5** | 11 | 3 | 0,468 | 0,143 | 0,006 | 120 000 | 75 000 | 0,0012 | **618/5** | – |
| | 11 | 4 | 0,64 | 0,26 | 0,011 | 120 000 | 60 000 | 0,0014 | **628/5-2Z** | – |
| | 11 | 5 | 0,64 | 0,26 | 0,011 | 120 000 | 60 000 | 0,0016 | **638/5-2Z** | – |
| | 13 | 4 | 0,884 | 0,335 | 0,014 | 110 000 | 50 000 | 0,0025 | **619/5-2Z** | – |
| | 13 | 4 | 0,884 | 0,335 | 0,014 | 110 000 | 70 000 | 0,0025 | **619/5** | – |
| | 16 | 5 | 1,14 | 0,38 | 0,016 | 95 000 | 60 000 | 0,005 | ▸ **625** | – |
| | 16 | 5 | 1,14 | 0,38 | 0,016 | 95 000 | 48 000 | 0,005 | ▸ **625-2Z** | **625-Z** |
| | 19 | 6 | 2,34 | 0,95 | 0,04 | 80 000 | 50 000 | 0,0085 | **635** | – |
| | 19 | 6 | 2,34 | 0,95 | 0,04 | – | 24 000 | 0,009 | **635-2RS1** | **635-RS1** |
| | 19 | 6 | 2,34 | 0,95 | 0,04 | 80 000 | 40 000 | 0,009 | **635-2RZ** | **635-RZ** |
| | 19 | 6 | 2,34 | 0,95 | 0,04 | 80 000 | 40 000 | 0,0093 | ▸ **635-2Z** | **635-Z** |
| **6** | 13 | 3,5 | 0,715 | 0,224 | 0,01 | 110 000 | 67 000 | 0,002 | **618/6** | – |
| | 13 | 5 | 0,88 | 0,35 | 0,015 | 110 000 | 53 000 | 0,0026 | **628/6-2Z** | – |
| | 15 | 5 | 0,884 | 0,27 | 0,011 | 100 000 | 50 000 | 0,0039 | **619/6-2Z** | – |
| | 15 | 5 | 0,884 | 0,27 | 0,011 | 100 000 | 63 000 | 0,0039 | **619/6** | – |
| | 19 | 6 | 2,34 | 0,95 | 0,04 | 80 000 | 50 000 | 0,0081 | ▸ **626** | – |
| | 19 | 6 | 2,34 | 0,95 | 0,04 | – | 24 000 | 0,0083 | ▸ **626-2RSH** | **626-RSH** |
| | 19 | 6 | 2,34 | 0,95 | 0,04 | 80 000 | 40 000 | 0,0083 | ▸ **626-2RSL** | **626-RSL** |
| | 19 | 6 | 2,34 | 0,95 | 0,04 | 80 000 | 40 000 | 0,0088 | ▸ **626-2Z** | **626-Z** |

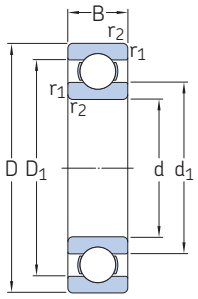
**SKF Explorer bearing**
▸ Popular item
[1] For bearings with only one shield or one non-contact seal (Z, RZ) the limiting speeds of the open bearings are valid.

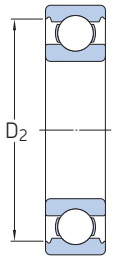


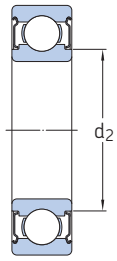

| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $d_2$ ≈ | $D_1$ ≈ | $D_2$ ≈ | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | $k_r$ | $f_0$ |
| mm | | | | | | mm | | | | – | |
| **3** | 5,2 | – | – | 8,2 | 0,15 | 4,2 | – | 8,8 | 0,1 | 0,025 | 7,5 |
| | 5,2 | – | – | 8,2 | 0,15 | 4,2 | 5,1 | 8,8 | 0,1 | 0,025 | 7,5 |
| | 5,2 | – | – | 8,2 | 0,15 | 4,2 | 5,1 | 8,8 | 0,1 | 0,025 | 7,5 |
| **4** | 5,2 | – | 7,5 | – | 0,1 | 4,6 | – | 8,4 | 0,1 | 0,015 | 6,5 |
| | 5,2 | – | – | 8,1 | 0,1 | 4,6 | 5,1 | 8,4 | 0,1 | 0,015 | 10 |
| | 5,2 | – | – | 8,1 | 0,1 | 4,6 | 5,1 | 8,4 | 0,1 | 0,015 | 10 |
| | 6,1 | – | – | 9,9 | 0,15 | 4,8 | 5,8 | 10,2 | 0,1 | 0,02 | 6,4 |
| | 6,1 | – | – | 9,9 | 0,15 | 4,8 | – | 10,2 | 0,1 | 0,02 | 6,4 |
| | 6,1 | – | – | 9,8 | 0,2 | 5,4 | – | 10,6 | 0,2 | 0,025 | 10 |
| | 6,1 | – | – | 9,8 | 0,2 | 5,4 | 6 | 10,6 | 0,2 | 0,025 | 10 |
| | 6,7 | – | – | 11,2 | 0,2 | 5,8 | – | 11,2 | 0,2 | 0,025 | 10 |
| | 6,7 | – | – | 11,2 | 0,2 | 5,8 | 6,6 | 11,2 | 0,2 | 0,025 | 7,3 |
| | 8,4 | – | – | 13,3 | 0,3 | 6,4 | – | 13,6 | 0,3 | 0,03 | 8,4 |
| | 8,4 | – | – | 13,3 | 0,3 | 6,4 | 8,3 | 13,6 | 0,3 | 0,03 | 8,4 |
| | 8,4 | – | – | 13,3 | 0,3 | 6,4 | 8,3 | 13,6 | 0,3 | 0,03 | 8,4 |
| | 8,4 | – | – | 13,3 | 0,3 | 6,4 | 8,3 | 13,6 | 0,3 | 0,03 | 8,4 |
| **5** | 6,8 | – | 9,2 | – | 0,15 | 5,8 | – | 10,2 | 0,1 | 0,015 | 7,1 |
| | 6,8 | – | – | 9,9 | 0,15 | 5,8 | 6,7 | 10,2 | 0,1 | 0,015 | 11 |
| | – | 6,2 | – | 9,9 | 0,15 | 5,8 | 6 | 10,2 | 0,1 | 0,015 | 11 |
| | 7,5 | – | – | 11,2 | 0,2 | 6,4 | 7,5 | 11,6 | 0,2 | 0,02 | 11 |
| | 7,5 | – | – | 11,2 | 0,2 | 6,4 | – | 11,6 | 0,2 | 0,02 | 11 |
| | 8,4 | – | – | 13,3 | 0,3 | 7,4 | – | 13,6 | 0,3 | 0,025 | 8,4 |
| | 8,4 | – | – | 13,3 | 0,3 | 7,4 | 8,3 | 13,6 | 0,3 | 0,025 | 8,4 |
| | 11,1 | – | – | 16,5 | 0,3 | 7,4 | – | 16,6 | 0,3 | 0,03 | 13 |
| | 11,1 | – | – | 16,5 | 0,3 | 7,4 | 10,6 | 16,6 | 0,3 | 0,03 | 13 |
| | 11,1 | – | – | 16,5 | 0,3 | 7,4 | 10,6 | 16,6 | 0,3 | 0,03 | 13 |
| | 11,1 | – | – | 16,5 | 0,3 | 7,4 | 10,6 | 16,6 | 0,3 | 0,03 | 13 |
| **6** | 8 | – | 11 | – | 0,15 | 6,8 | – | 12,2 | 0,1 | 0,015 | 7 |
| | – | 7,4 | – | 11,7 | 0,15 | 6,8 | 7,2 | 12,2 | 0,1 | 0,015 | 11 |
| | 8,2 | – | – | 13 | 0,2 | 7,4 | 8 | 13,6 | 0,2 | 0,02 | 6,8 |
| | 8,2 | – | – | 13 | 0,2 | 7,4 | – | 13,6 | 0,2 | 0,02 | 6,8 |
| | 11,1 | – | – | 16,5 | 0,3 | 8,4 | – | 16,6 | 0,3 | 0,025 | 13 |
| | – | 9,5 | – | 16,5 | 0,3 | 8,4 | 9,4 | 16,6 | 0,3 | 0,025 | 13 |
| | – | 9,5 | – | 16,5 | 0,3 | 8,4 | 9,4 | 16,6 | 0,3 | 0,025 | 13 |
| | 11,1 | – | – | 16,5 | 0,3 | 8,4 | 11 | 16,6 | 0,3 | 0,025 | 13 |

## 1.1 Single row deep groove ball bearings

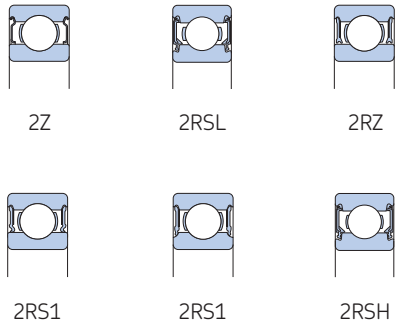
d **7 – 9** mm



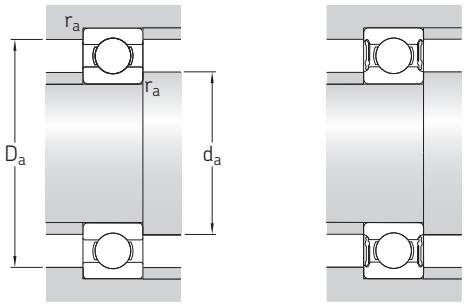




2Z




| Principal dimensions | | | Basic load ratings | | Fatigue load limit | Speed ratings | | Mass | Designations | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | dynamic | static | | Reference speed | Limiting speed[1] | | Bearing open or capped on both sides | capped on one side[1] |
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **7** | 14 | 3,5 | 0,78 | 0,26 | 0,011 | 100 000 | 63 000 | 0,0022 | **618/7** | – |
| | 14 | 5 | 0,956 | 0,4 | 0,017 | 100 000 | 50 000 | 0,0031 | **628/7-2Z** | – |
| | 17 | 5 | 1,06 | 0,375 | 0,016 | 90 000 | 45 000 | 0,0049 | **619/7-2Z** | – |
| | 17 | 5 | 1,06 | 0,375 | 0,016 | 90 000 | 56 000 | 0,0049 | **619/7** | – |
| | 19 | 6 | 2,34 | 0,95 | 0,04 | 85 000 | 53 000 | 0,0076 | ▸ 607 | – |
| | 19 | 6 | 2,34 | 0,95 | 0,04 | – | 24 000 | 0,0078 | ▸ 607-2RSH | 607-RSH |
| | 19 | 6 | 2,34 | 0,95 | 0,04 | 85 000 | 43 000 | 0,0078 | ▸ 607-2RSL | 607-RSL |
| | 19 | 6 | 2,34 | 0,95 | 0,04 | 85 000 | 43 000 | 0,0084 | ▸ 607-2Z | 607-Z |
| | 22 | 7 | 3,45 | 1,37 | 0,057 | 70 000 | 45 000 | 0,012 | ▸ 627 | – |
| | 22 | 7 | 3,45 | 1,37 | 0,057 | – | 22 000 | 0,013 | ▸ 627-2RSH | 627-RSH |
| | 22 | 7 | 3,45 | 1,37 | 0,057 | 70 000 | 36 000 | 0,013 | ▸ 627-2RSL | 627-RSL |
| | 22 | 7 | 3,45 | 1,37 | 0,057 | 70 000 | 36 000 | 0,013 | ▸ 627-2Z | 627-Z |
| **8** | 16 | 4 | 0,819 | 0,3 | 0,012 | 90 000 | 56 000 | 0,003 | **618/8** | – |
| | 16 | 5 | 1,33 | 0,57 | 0,024 | – | 26 000 | 0,0036 | ▸ 628/8-2RS1 | – |
| | 16 | 5 | 1,33 | 0,57 | 0,024 | 90 000 | 45 000 | 0,0036 | ▸ 628/8-2Z | – |
| | 16 | 6 | 1,33 | 0,57 | 0,024 | 90 000 | 45 000 | 0,0043 | **638/8-2Z** | – |
| | 19 | 6 | 1,46 | 0,465 | 0,02 | – | 24 000 | 0,0071 | **619/8-2RS1** | – |
| | 19 | 6 | 1,46 | 0,465 | 0,02 | 85 000 | 43 000 | 0,0071 | **619/8-2Z** | – |
| | 19 | 6 | 1,46 | 0,465 | 0,02 | 85 000 | 53 000 | 0,0071 | **619/8** | – |
| | 19 | 6 | 2,34 | 0,95 | 0,04 | 85 000 | 43 000 | 0,0072 | **607/8-2Z** | 607/8-Z |
| | 22 | 7 | 3,45 | 1,37 | 0,057 | 75 000 | 48 000 | 0,012 | ▸ 608 | – |
| | 22 | 7 | 3,45 | 1,37 | 0,057 | – | 22 000 | 0,012 | ▸ 608-2RSH | ▸ 608-RSH |
| | 22 | 7 | 3,45 | 1,37 | 0,057 | 75 000 | 38 000 | 0,012 | ▸ 608-2RSL | 608-RSL |
| | 22 | 7 | 3,45 | 1,37 | 0,057 | 75 000 | 38 000 | 0,013 | ▸ 608-2Z | 608-Z |
| | 22 | 11 | 3,45 | 1,37 | 0,057 | – | 22 000 | 0,016 | ▸ 630/8-2RS1 | – |
| | 24 | 8 | 3,9 | 1,66 | 0,071 | 63 000 | 40 000 | 0,018 | 628 | – |
| | 24 | 8 | 3,9 | 1,66 | 0,071 | – | 19 000 | 0,017 | 628-2RS1 | 628-RS1 |
| | 24 | 8 | 3,9 | 1,66 | 0,071 | 63 000 | 32 000 | 0,017 | 628-2RZ | 628-RZ |
| | 24 | 8 | 3,9 | 1,66 | 0,071 | 63 000 | 32 000 | 0,018 | ▸ 628-2Z | 628-Z |
| | 28 | 9 | 1,33 | 0,57 | 0,024 | 60 000 | 30 000 | 0,03 | **638-2RZ** | **638-RZ** |
| **9** | 17 | 4 | 0,871 | 0,34 | 0,014 | 85 000 | 53 000 | 0,0034 | **618/9** | – |
| | 17 | 5 | 1,43 | 0,64 | 0,027 | – | 24 000 | 0,0043 | **628/9-2RS1** | – |
| | 17 | 5 | 1,43 | 0,64 | 0,027 | 85 000 | 43 000 | 0,0043 | **628/9-2Z** | 628/9-Z |
| | 20 | 6 | 2,34 | 0,98 | 0,043 | 80 000 | 40 000 | 0,0076 | **619/9-2Z** | – |
| | 20 | 6 | 2,34 | 0,98 | 0,043 | 80 000 | 50 000 | 0,0076 | **619/9** | – |
| | 24 | 7 | 3,9 | 1,66 | 0,071 | 70 000 | 43 000 | 0,014 | ▸ 609 | – |

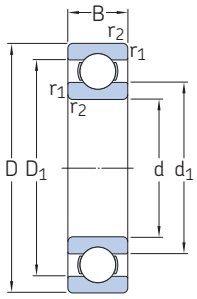
**SKF Explorer bearing**
▸ Popular item
[1] For bearings with only one shield or one non-contact seal (Z, RZ) the limiting speeds of the open bearings are valid.

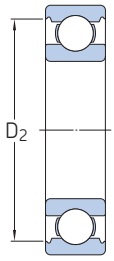


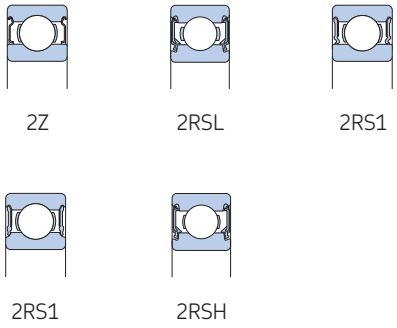

| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $d_2$ ≈ | $D_1$ ≈ | $D_2$ ≈ | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | $k_r$ | $f_0$ |
| mm | | | | | | mm | | | | – | |
| **7** | 9 | – | 12 | – | 0,15 | 7,8 | – | 13,2 | 0,1 | 0,015 | 7,2 |
| | – | 8,5 | – | 12,7 | 0,15 | 7,8 | 8 | 13,2 | 0,1 | 0,015 | 11 |
| | 10,4 | – | – | 14,3 | 0,3 | 9 | 9,7 | 15 | 0,3 | 0,02 | 7,3 |
| | 10,4 | – | – | 14,3 | 0,3 | 9 | – | 15 | 0,3 | 0,02 | 7,3 |
| | 11,1 | – | – | 16,5 | 0,3 | 9 | – | 17 | 0,3 | 0,025 | 13 |
| | – | 9,5 | – | 16,5 | 0,3 | 9 | 9,4 | 17 | 0,3 | 0,025 | 13 |
| | – | 9,5 | – | 16,5 | 0,3 | 9 | 9,4 | 17 | 0,3 | 0,025 | 13 |
| | 11,1 | – | – | 16,5 | 0,3 | 9 | 11 | 17 | 0,3 | 0,025 | 13 |
| | 12,1 | – | – | 19,2 | 0,3 | 9,4 | – | 19,6 | 0,3 | 0,025 | 12 |
| | – | 10,5 | – | 19,2 | 0,3 | 9,4 | 10,5 | 19,6 | 0,3 | 0,025 | 12 |
| | – | 10,5 | – | 19,2 | 0,3 | 9,4 | 10,5 | 19,6 | 0,3 | 0,025 | 12 |
| | 12,1 | – | – | 19,2 | 0,3 | 9,4 | 12,1 | 19,6 | 0,3 | 0,025 | 12 |
| **8** | 10,5 | – | 13,5 | – | 0,2 | 9,4 | – | 14,6 | 0,2 | 0,015 | 7,5 |
| | 10,1 | – | – | 14,2 | 0,2 | 9,4 | 9,4 | 14,6 | 0,2 | 0,015 | 11 |
| | 10,1 | – | – | 14,2 | 0,2 | 9,4 | 10 | 14,6 | 0,2 | 0,015 | 11 |
| | – | 9,6 | – | 14,2 | 0,2 | 9,4 | 9,5 | 14,6 | 0,2 | 0,015 | 11 |
| | – | 9,8 | – | 16,7 | 0,3 | 9,5 | 9,8 | 17 | 0,3 | 0,02 | 6,6 |
| | – | 9,8 | – | 16,7 | 0,3 | 9,5 | 9,8 | 17 | 0,3 | 0,02 | 6,6 |
| | 10,5 | – | – | 16,7 | 0,3 | 10 | – | 17 | 0,3 | 0,02 | 6,6 |
| | 11,1 | – | – | 16,5 | 0,3 | 10 | 11 | 17 | 0,3 | 0,025 | 13 |
| | 12,1 | – | – | 19,2 | 0,3 | 10 | – | 20 | 0,3 | 0,025 | 12 |
| | – | 10,5 | – | 19,2 | 0,3 | 10 | 10,5 | 20 | 0,3 | 0,025 | 12 |
| | – | 10,5 | – | 19,2 | 0,3 | 10 | 10,5 | 20 | 0,3 | 0,025 | 12 |
| | 12,1 | – | – | 19,2 | 0,3 | 10 | 12 | 20 | 0,3 | 0,025 | 12 |
| | 11,8 | – | – | 19 | 0,3 | 10 | 11,7 | 20 | 0,3 | 0,025 | 12 |
| | 14,4 | – | – | 21,2 | 0,3 | 10,4 | – | 21,6 | 0,3 | 0,025 | 13 |
| | 14,4 | – | – | 21,2 | 0,3 | 10,4 | 14,4 | 21,6 | 0,3 | 0,025 | 13 |
| | 14,4 | – | – | 21,2 | 0,3 | 10,4 | 14,4 | 21,6 | 0,3 | 0,025 | 13 |
| | 14,4 | – | – | 21,2 | 0,3 | 10,4 | 14,4 | 21,6 | 0,3 | 0,025 | 13 |
| | 14,8 | – | – | 22,6 | 0,3 | 10,4 | 14,7 | 25,6 | 0,3 | 0,03 | 12 |
| **9** | 11,5 | – | 14,5 | – | 0,2 | 10,4 | – | 15,6 | 0,2 | 0,015 | 7,7 |
| | – | 10,7 | – | 15,2 | 0,2 | 10,4 | 10,5 | 15,6 | 0,2 | 0,015 | 11 |
| | – | 10,7 | – | 15,2 | 0,2 | 10,4 | 10,5 | 15,6 | 0,2 | 0,015 | 11 |
| | 11,6 | – | – | 17,5 | 0,3 | 11 | 11,5 | 18 | 0,3 | 0,02 | 12 |
| | 11,6 | – | – | 17,5 | 0,3 | 11 | – | 18 | 0,3 | 0,02 | 12 |
| | 14,4 | – | – | 21,2 | 0,3 | 11 | – | 22 | 0,3 | 0,025 | 13 |

## 1.1 Single row deep groove ball bearings

d **9 – 10** mm



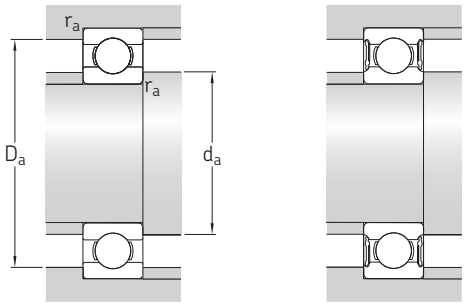




| Principal dimensions | | | Basic load ratings | | Fatigue load limit | Speed ratings | | Mass | Designations | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | dynamic | static | | Reference speed | Limiting speed[1] | | Bearing open or capped on both sides | capped on one side[1] |
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **9** | 24 | 7 | 3,9 | 1,66 | 0,071 | – | 19 000 | 0,015 | ▸ 609-2RSH | 609-RSH |
| cont. | 24 | 7 | 3,9 | 1,66 | 0,071 | 70 000 | 34 000 | 0,014 | ▸ 609-2RSL | 609-RSL |
| | 24 | 7 | 3,9 | 1,66 | 0,071 | 70 000 | 34 000 | 0,015 | ▸ 609-2Z | 609-Z |
| | 26 | 8 | 4,75 | 1,96 | 0,083 | 60 000 | 38 000 | 0,02 | ▸ 629 | – |
| | 26 | 8 | 4,75 | 1,96 | 0,083 | – | 19 000 | 0,02 | ▸ 629-2RSH | 629-RSH |
| | 26 | 8 | 4,75 | 1,96 | 0,083 | 60 000 | 30 000 | 0,02 | ▸ 629-2RSL | 629-RSL |
| | 26 | 8 | 4,75 | 1,96 | 0,083 | 60 000 | 30 000 | 0,021 | ▸ 629-2Z | 629-Z |
| **10** | 19 | 5 | 1,72 | 0,83 | 0,036 | – | 22 000 | 0,0055 | **61800-2RS1** | – |
| | 19 | 5 | 1,72 | 0,83 | 0,036 | 80 000 | 38 000 | 0,0055 | **61800-2Z** | – |
| | 19 | 5 | 1,72 | 0,83 | 0,036 | 80 000 | 48 000 | 0,0053 | **61800** | – |
| | 22 | 6 | 2,7 | 1,27 | 0,054 | – | 20 000 | 0,01 | **61900-2RS1** | – |
| | 22 | 6 | 2,7 | 1,27 | 0,054 | 70 000 | 36 000 | 0,01 | **61900-2Z** | – |
| | 22 | 6 | 2,7 | 1,27 | 0,054 | 70 000 | 45 000 | 0,01 | **61900** | – |
| | 26 | 8 | 4,75 | 1,96 | 0,083 | 67 000 | 40 000 | 0,019 | ▸ 6000 | – |
| | 26 | 8 | 4,75 | 1,96 | 0,083 | – | 19 000 | 0,019 | ▸ 6000-2RSH | 6000-RSH |
| | 26 | 8 | 4,75 | 1,96 | 0,083 | 67 000 | 34 000 | 0,019 | ▸ 6000-2RSL | 6000-RSL |
| | 26 | 8 | 4,75 | 1,96 | 0,083 | 67 000 | 34 000 | 0,02 | ▸ 6000-2Z | ▸ 6000-Z |
| | 26 | 12 | 4,62 | 1,96 | 0,083 | – | 19 000 | 0,025 | **63000-2RS1** | – |
| | 28 | 8 | 5,07 | 2,36 | 0,1 | 60 000 | 30 000 | 0,026 | **16100-2Z** | – |
| | 28 | 8 | 5,07 | 2,36 | 0,1 | 60 000 | 38 000 | 0,024 | **16100** | – |
| | 30 | 9 | 5,4 | 2,36 | 0,1 | 56 000 | 36 000 | 0,031 | ▸ 6200 | – |
| | 30 | 9 | 5,4 | 2,36 | 0,1 | – | 17 000 | 0,032 | ▸ 6200-2RSH | 6200-RSH |
| | 30 | 9 | 5,4 | 2,36 | 0,1 | 56 000 | 28 000 | 0,032 | ▸ 6200-2RSL | 6200-RSL |
| | 30 | 9 | 5,4 | 2,36 | 0,1 | 56 000 | 28 000 | 0,034 | ▸ 6200-2Z | 6200-Z |
| | 30 | 14 | 5,07 | 2,36 | 0,1 | – | 17 000 | 0,04 | **62200-2RS1** | – |
| | 35 | 11 | 8,52 | 3,4 | 0,143 | 50 000 | 32 000 | 0,053 | ▸ 6300 | – |
| | 35 | 11 | 8,52 | 3,4 | 0,143 | – | 15 000 | 0,054 | ▸ 6300-2RSH | 6300-RSH |
| | 35 | 11 | 8,52 | 3,4 | 0,143 | 50 000 | 26 000 | 0,053 | 6300-2RSL | 6300-RSL |
| | 35 | 11 | 8,52 | 3,4 | 0,143 | 50 000 | 26 000 | 0,055 | ▸ 6300-2Z | 6300-Z |
| | 35 | 17 | 8,06 | 3,4 | 0,143 | – | 15 000 | 0,06 | **62300-2RS1** | – |

**SKF Explorer bearing**

▸ Popular item

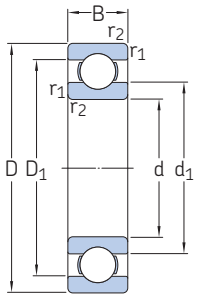
[1] For bearings with only one shield or one non-contact seal (Z, RZ) the limiting speeds of the open bearings are valid.

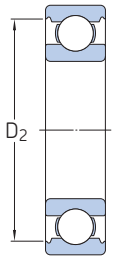


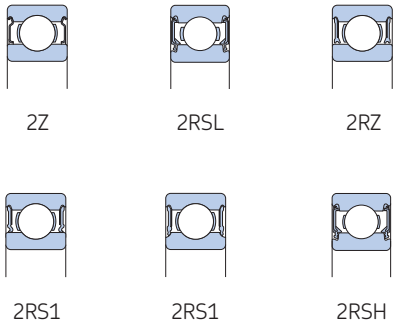

| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $d_2$ ≈ | $D_1$ ≈ | $D_2$ ≈ | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | $k_r$ | $f_0$ |
| mm | | | | | | mm | | | | – | |
| **9** | – | 12,8 | – | 21,2 | 0,3 | 11 | 12,5 | 22 | 0,3 | 0,025 | 13 |
| cont. | – | 12,8 | – | 21,2 | 0,3 | 11 | 12,5 | 22 | 0,3 | 0,025 | 13 |
| | 14,4 | – | – | 21,2 | 0,3 | 11 | 14,3 | 22 | 0,3 | 0,025 | 13 |
| | 14,8 | – | – | 22,6 | 0,3 | 11,4 | – | 23,6 | 0,3 | 0,025 | 12 |
| | – | 12,5 | – | 22,6 | 0,3 | 11,4 | 12,5 | 23,6 | 0,3 | 0,025 | 12 |
| | – | 12,5 | – | 22,6 | 0,3 | 11,4 | 12,5 | 23,6 | 0,3 | 0,025 | 12 |
| | 14,8 | – | – | 22,6 | 0,3 | 11,4 | 14,7 | 23,6 | 0,3 | 0,025 | 12 |
| **10** | – | 11,8 | – | 17,2 | 0,3 | 11,8 | 11,8 | 17 | 0,3 | 0,015 | 15 |
| | 12,7 | – | – | 17,2 | 0,3 | 12 | 12,5 | 17 | 0,3 | 0,015 | 15 |
| | 12,7 | – | 16,3 | – | 0,3 | 12 | – | 17 | 0,3 | 0,015 | 15 |
| | – | 13,2 | – | 19,4 | 0,3 | 12 | 12 | 20 | 0,3 | 0,02 | 14 |
| | 13,9 | – | – | 19,4 | 0,3 | 12 | 12,9 | 20 | 0,3 | 0,02 | 14 |
| | 13,9 | – | 18,2 | – | 0,3 | 12 | – | 20 | 0,3 | 0,02 | 14 |
| | 14,8 | – | – | 22,6 | 0,3 | 12 | – | 24 | 0,3 | 0,025 | 12 |
| | – | 12,5 | – | 22,6 | 0,3 | 12 | 12,5 | 24 | 0,3 | 0,025 | 12 |
| | – | 12,5 | – | 22,6 | 0,3 | 12 | 12,5 | 24 | 0,3 | 0,025 | 12 |
| | 14,8 | – | – | 22,6 | 0,3 | 12 | 14,7 | 24 | 0,3 | 0,025 | 12 |
| | 14,8 | – | – | 22,6 | 0,3 | 12 | 14,7 | 24 | 0,3 | 0,025 | 12 |
| | 17 | – | – | 24,8 | 0,3 | 14,2 | 16,6 | 23,8 | 0,3 | 0,025 | 13 |
| | 17 | – | – | 24,8 | 0,3 | 14,2 | – | 23,8 | 0,3 | 0,025 | 13 |
| | 17 | – | – | 24,8 | 0,6 | 14,2 | – | 25,8 | 0,6 | 0,025 | 13 |
| | – | 15 | – | 24,8 | 0,6 | 14,2 | 15 | 25,8 | 0,6 | 0,025 | 13 |
| | – | 15 | – | 24,8 | 0,6 | 14,2 | 15 | 25,8 | 0,6 | 0,025 | 13 |
| | 17 | – | – | 24,8 | 0,6 | 14,2 | 16,9 | 25,8 | 0,6 | 0,025 | 13 |
| | 17 | – | – | 24,8 | 0,6 | 14,2 | 16,9 | 25,8 | 0,6 | 0,025 | 13 |
| | 17,5 | – | – | 28,7 | 0,6 | 14,2 | – | 30,8 | 0,6 | 0,03 | 11 |
| | – | 15,5 | – | 28,7 | 0,6 | 14,2 | 15,5 | 30,8 | 0,6 | 0,03 | 11 |
| | – | 15,5 | – | 28,7 | 0,6 | 14,2 | 15,5 | 30,8 | 0,6 | 0,03 | 11 |
| | 17,5 | – | – | 28,7 | 0,6 | 14,2 | 17,4 | 30,8 | 0,6 | 0,03 | 11 |
| | 17,5 | – | – | 28,7 | 0,6 | 14,2 | 17,4 | 30,8 | 0,6 | 0,03 | 11 |

## 1.1 Single row deep groove ball bearings

d **12 – 15** mm

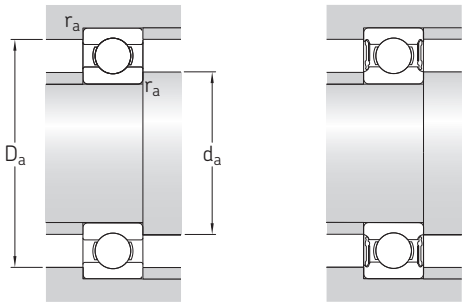



| Principal dimensions | | | Basic load ratings | | Fatigue load limit | Speed ratings | | Mass | Designations | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | dynamic | static | | Reference speed | Limiting speed[1] | | Bearing open or capped on both sides | capped on one side[1] |
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **12** | 21 | 5 | 1,74 | 0,915 | 0,039 | – | 20 000 | 0,0063 | ▸ **61801-2RS1** | – |
| | 21 | 5 | 1,74 | 0,915 | 0,039 | 70 000 | 36 000 | 0,0063 | ▸ **61801-2Z** | – |
| | 21 | 5 | 1,74 | 0,915 | 0,039 | 70 000 | 43 000 | 0,0063 | ▸ **61801** | – |
| | 24 | 6 | 2,91 | 1,46 | 0,062 | – | 19 000 | 0,011 | ▸ **61901-2RS1** | – |
| | 24 | 6 | 2,91 | 1,46 | 0,062 | 67 000 | 32 000 | 0,011 | ▸ **61901-2Z** | – |
| | 24 | 6 | 2,91 | 1,46 | 0,062 | 67 000 | 40 000 | 0,011 | ▸ **61901** | – |
| | 28 | 8 | 5,4 | 2,36 | 0,1 | 60 000 | 38 000 | 0,021 | ▸ 6001 | – |
| | 28 | 8 | 5,4 | 2,36 | 0,1 | – | 17 000 | 0,022 | ▸ 6001-2RSH | 6001-RSH |
| | 28 | 8 | 5,4 | 2,36 | 0,1 | 60 000 | 30 000 | 0,021 | ▸ 6001-2RSL | 6001-RSL |
| | 28 | 8 | 5,4 | 2,36 | 0,1 | 60 000 | 30 000 | 0,022 | ▸ 6001-2Z | 6001-Z |
| | 28 | 12 | 5,07 | 2,36 | 0,1 | – | 17 000 | 0,029 | **63001-2RS1** | – |
| | 30 | 8 | 5,07 | 2,36 | 0,1 | – | 17 000 | 0,028 | **16101-2RS1** | – |
| | 30 | 8 | 5,07 | 2,36 | 0,1 | 56 000 | 28 000 | 0,028 | **16101-2Z** | – |
| | 30 | 8 | 5,07 | 2,36 | 0,1 | 60 000 | 38 000 | 0,026 | **16101** | – |
| | 32 | 10 | 7,28 | 3,1 | 0,132 | 50 000 | 32 000 | 0,037 | ▸ 6201 | – |
| | 32 | 10 | 7,28 | 3,1 | 0,132 | – | 15 000 | 0,038 | ▸ 6201-2RSH | 6201-RSH |
| | 32 | 10 | 7,28 | 3,1 | 0,132 | 50 000 | 26 000 | 0,038 | ▸ 6201-2RSL | 6201-RSL |
| | 32 | 10 | 7,28 | 3,1 | 0,132 | 50 000 | 26 000 | 0,039 | ▸ 6201-2Z | 6201-Z |
| | 32 | 14 | 6,89 | 3,1 | 0,132 | – | 15 000 | 0,045 | **62201-2RS1** | – |
| | 37 | 12 | 10,1 | 4,15 | 0,176 | 45 000 | 28 000 | 0,06 | ▸ 6301 | – |
| | 37 | 12 | 10,1 | 4,15 | 0,176 | – | 14 000 | 0,062 | ▸ 6301-2RSH | 6301-RSH |
| | 37 | 12 | 10,1 | 4,15 | 0,176 | 45 000 | 22 000 | 0,06 | 6301-2RSL | 6301-RSL |
| | 37 | 12 | 10,1 | 4,15 | 0,176 | 45 000 | 22 000 | 0,063 | ▸ 6301-2Z | 6301-Z |
| | 37 | 17 | 9,75 | 4,15 | 0,176 | – | 14 000 | 0,07 | **62301-2RS1** | – |
| **15** | 24 | 5 | 1,9 | 1,1 | 0,048 | – | 17 000 | 0,0074 | ▸ **61802-2RS1** | – |
| | 24 | 5 | 1,9 | 1,1 | 0,048 | 60 000 | 30 000 | 0,0074 | ▸ **61802-2Z** | – |
| | 24 | 5 | 1,9 | 1,1 | 0,048 | 60 000 | 38 000 | 0,0065 | ▸ **61802** | – |
| | 28 | 7 | 4,36 | 2,24 | 0,095 | – | 16 000 | 0,016 | ▸ **61902-2RS1** | – |
| | 28 | 7 | 4,36 | 2,24 | 0,095 | 56 000 | 28 000 | 0,016 | ▸ **61902-2RZ** | – |
| | 28 | 7 | 4,36 | 2,24 | 0,095 | 56 000 | 28 000 | 0,016 | ▸ **61902-2Z** | – |
| | 28 | 7 | 4,36 | 2,24 | 0,095 | 56 000 | 34 000 | 0,016 | ▸ **61902** | – |
| | 32 | 8 | 5,85 | 2,85 | 0,12 | 50 000 | 32 000 | 0,027 | ▸ 16002 | – |
| | 32 | 8 | 5,85 | 2,85 | 0,12 | 50 000 | 26 000 | 0,025 | ▸ 16002-2Z | 16002-Z |
| | 32 | 9 | 5,85 | 2,85 | 0,12 | 50 000 | 32 000 | 0,03 | ▸ 6002 | – |
| | 32 | 9 | 5,85 | 2,85 | 0,12 | – | 14 000 | 0,03 | ▸ 6002-2RSH | 6002-RSH |
| | 32 | 9 | 5,85 | 2,85 | 0,12 | 50 000 | 26 000 | 0,03 | ▸ 6002-2RSL | 6002-RSL |

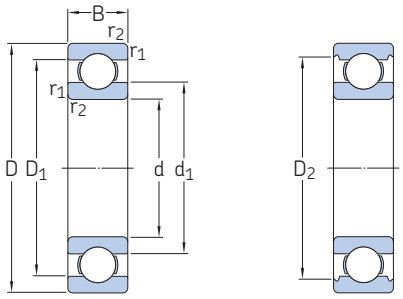
**SKF Explorer bearing**
▸ Popular item
[1] For bearings with only one shield or one non-contact seal (Z, RZ) the limiting speeds of the open bearings are valid.

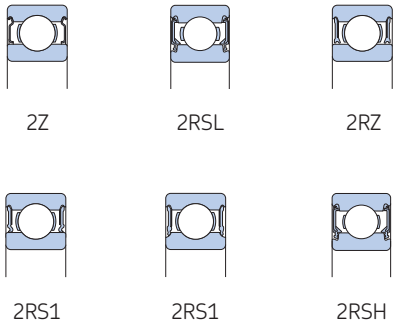



| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $d_2$ ≈ | $D_1$ ≈ | $D_2$ ≈ | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | $k_r$ | $f_0$ |
| mm | | | | | | mm | | | | – | |
| **12** | – | 14,1 | – | 19 | 0,3 | 13,6 | 13,8 | 19 | 0,3 | 0,015 | 13 |
| | 14,8 | – | – | 19 | 0,3 | 14 | 14,7 | 19 | 0,3 | 0,015 | 13 |
| | 14,8 | – | 18,3 | – | 0,3 | 14 | – | 19 | 0,3 | 0,015 | 13 |
| | – | 15,3 | – | 21,4 | 0,3 | 14 | 15,2 | 22 | 0,3 | 0,02 | 15 |
| | 16 | – | – | 21,4 | 0,3 | 14 | 15,8 | 22 | 0,3 | 0,02 | 15 |
| | 16 | – | 20,3 | – | 0,3 | 14 | – | 22 | 0,3 | 0,02 | 15 |
| | 17 | – | – | 24,8 | 0,3 | 14 | – | 26 | 0,3 | 0,025 | 13 |
| | – | 14,7 | – | 24,8 | 0,3 | 14 | 15 | 26 | 0,3 | 0,025 | 13 |
| | – | 14,7 | – | 24,8 | 0,3 | 14 | 15 | 26 | 0,3 | 0,025 | 13 |
| | 17 | – | – | 24,8 | 0,3 | 14 | 16,9 | 26 | 0,3 | 0,025 | 13 |
| | 17 | – | – | 24,8 | 0,3 | 14 | 16,9 | 26 | 0,3 | 0,025 | 13 |
| | 17 | – | – | 24,8 | 0,3 | 14,4 | 16,6 | 27,6 | 0,3 | 0,025 | 13 |
| | 17 | – | – | 24,8 | 0,3 | 14,4 | 16,6 | 27,6 | 0,3 | 0,025 | 13 |
| | 17 | – | – | 24,8 | 0,3 | 14,4 | – | 27,6 | 0,3 | 0,025 | 13 |
| | 18,4 | – | – | 27,4 | 0,6 | 16,2 | – | 27,8 | 0,6 | 0,025 | 12 |
| | – | 16,2 | – | 27,4 | 0,6 | 16,2 | 16,5 | 27,8 | 0,6 | 0,025 | 12 |
| | – | 16,2 | – | 27,4 | 0,6 | 16,2 | 16,5 | 27,8 | 0,6 | 0,025 | 12 |
| | 18,4 | – | – | 27,4 | 0,6 | 16,2 | 18,4 | 27,8 | 0,6 | 0,025 | 12 |
| | 18,5 | – | – | 27,4 | 0,6 | 16,2 | 18,4 | 27,8 | 0,6 | 0,025 | 12 |
| | 19,5 | – | – | 31,5 | 1 | 17,6 | – | 31,4 | 1 | 0,03 | 11 |
| | – | 17,5 | – | 31,5 | 1 | 17,6 | 17,8 | 31,4 | 1 | 0,03 | 11 |
| | – | 17,5 | – | 31,5 | 1 | 17,6 | 17,6 | 31,4 | 1 | 0,03 | 11 |
| | 19,5 | – | – | 31,5 | 1 | 17,6 | 19,4 | 31,4 | 1 | 0,03 | 11 |
| | 19,5 | – | – | 31,5 | 1 | 17,6 | 19,4 | 31,4 | 1 | 0,03 | 11 |
| **15** | 17,8 | – | – | 22,2 | 0,3 | 17 | 17,8 | 22 | 0,3 | 0,015 | 14 |
| | 17,8 | – | – | 22,2 | 0,3 | 17 | 17,8 | 22 | 0,3 | 0,015 | 14 |
| | 17,8 | – | 21,3 | – | 0,3 | 17 | – | 22 | 0,3 | 0,015 | 14 |
| | 18,8 | – | – | 25,3 | 0,3 | 17 | 18,3 | 26 | 0,3 | 0,02 | 14 |
| | 18,8 | – | – | 25,3 | 0,3 | 17 | 18,3 | 26 | 0,3 | 0,02 | 14 |
| | 18,8 | – | – | 25,3 | 0,3 | 17 | 18,3 | 26 | 0,3 | 0,02 | 14 |
| | 18,8 | – | – | 25,3 | 0,3 | 17 | – | 26 | 0,3 | 0,02 | 14 |
| | 20,5 | – | – | 28,2 | 0,3 | 17 | – | 30 | 0,3 | 0,02 | 14 |
| | 20,5 | – | – | 28,2 | 0,3 | 17 | 20,1 | 30 | 0,3 | 0,02 | 14 |
| | 20,5 | – | – | 28,2 | 0,3 | 17 | – | 30 | 0,3 | 0,025 | 14 |
| | – | 18,3 | – | 28,2 | 0,3 | 17 | 18,5 | 30 | 0,3 | 0,025 | 14 |
| | – | 18,3 | – | 28,2 | 0,3 | 17 | 18,5 | 30 | 0,3 | 0,025 | 14 |

## 1.1 Single row deep groove ball bearings

d **15 – 17** mm



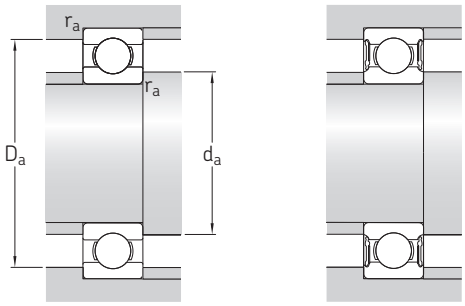




| Principal dimensions | | | Basic load ratings | | Fatigue load limit | Speed ratings | | Mass | Designations | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | dynamic | static | | Reference speed | Limiting speed[1] | | Bearing open or capped on both sides | capped on one side[1] |
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **15** | 32 | 9 | 5,85 | 2,85 | 0,12 | 50 000 | 26 000 | 0,032 | ▸ 6002-2Z | 6002-Z |
| cont. | 32 | 13 | 5,59 | 2,85 | 0,12 | – | 14 000 | 0,039 | 63002-2RS1 | – |
| | 35 | 11 | 8,06 | 3,75 | 0,16 | 43 000 | 28 000 | 0,045 | ▸ 6202 | – |
| | 35 | 11 | 8,06 | 3,75 | 0,16 | – | 13 000 | 0,046 | ▸ 6202-2RSH | 6202-RSH |
| | 35 | 11 | 8,06 | 3,75 | 0,16 | 43 000 | 22 000 | 0,046 | ▸ 6202-2RSL | 6202-RSL |
| | 35 | 11 | 8,06 | 3,75 | 0,16 | 43 000 | 22 000 | 0,048 | ▸ 6202-2Z | 6202-Z |
| | 35 | 14 | 7,8 | 3,75 | 0,16 | – | 13 000 | 0,054 | 62202-2RS1 | – |
| | 42 | 13 | 11,9 | 5,4 | 0,228 | 38 000 | 24 000 | 0,082 | ▸ 6302 | – |
| | 42 | 13 | 11,9 | 5,4 | 0,228 | – | 12 000 | 0,085 | ▸ 6302-2RSH | 6302-RSH |
| | 42 | 13 | 11,9 | 5,4 | 0,228 | 38 000 | 19 000 | 0,085 | ▸ 6302-2RSL | 6302-RSL |
| | 42 | 13 | 11,9 | 5,4 | 0,228 | 38 000 | 19 000 | 0,086 | ▸ 6302-2Z | 6302-Z |
| | 42 | 17 | 11,4 | 5,4 | 0,228 | – | 12 000 | 0,11 | 62302-2RS1 | – |
| | 52 | 7 | 4,49 | 3,75 | 0,16 | – | 7 500 | 0,034 | ▸ 61808-2RS1 | – |
| **17** | 26 | 5 | 2,03 | 1,27 | 0,054 | – | 16 000 | 0,0082 | ▸ 61803-2RS1 | – |
| | 26 | 5 | 2,03 | 1,27 | 0,054 | 56 000 | 28 000 | 0,0082 | 61803-2RZ | – |
| | 26 | 5 | 2,03 | 1,27 | 0,054 | 56 000 | 28 000 | 0,0082 | ▸ 61803-2Z | – |
| | 26 | 5 | 2,03 | 1,27 | 0,054 | 56 000 | 34 000 | 0,0075 | ▸ 61803 | – |
| | 30 | 7 | 4,62 | 2,55 | 0,108 | – | 14 000 | 0,017 | ▸ 61903-2RS1 | – |
| | 30 | 7 | 4,62 | 2,55 | 0,108 | 50 000 | 26 000 | 0,017 | ▸ 61903-2Z | – |
| | 30 | 7 | 4,62 | 2,55 | 0,108 | 50 000 | 26 000 | 0,018 | 61903-2RZ | – |
| | 30 | 7 | 4,62 | 2,55 | 0,108 | 50 000 | 32 000 | 0,016 | ▸ 61903 | – |
| | 35 | 8 | 6,37 | 3,25 | 0,137 | 45 000 | 22 000 | 0,032 | ▸ 16003-2Z | – |
| | 35 | 8 | 6,37 | 3,25 | 0,137 | 45 000 | 28 000 | 0,031 | ▸ 16003 | – |
| | 35 | 10 | 6,37 | 3,25 | 0,137 | 45 000 | 28 000 | 0,038 | ▸ 6003 | – |
| | 35 | 10 | 6,37 | 3,25 | 0,137 | – | 13 000 | 0,039 | ▸ 6003-2RSH | 6003-RSH |
| | 35 | 10 | 6,37 | 3,25 | 0,137 | 45 000 | 22 000 | 0,039 | ▸ 6003-2RSL | 6003-RSL |
| | 35 | 10 | 6,37 | 3,25 | 0,137 | 45 000 | 22 000 | 0,041 | ▸ 6003-2Z | 6003-Z |
| | 35 | 14 | 6,05 | 3,25 | 0,137 | – | 13 000 | 0,052 | 63003-2RS1 | – |
| | 40 | 12 | 9,95 | 4,75 | 0,2 | 38 000 | 24 000 | 0,065 | ▸ 6203 | – |
| | 40 | 12 | 9,95 | 4,75 | 0,2 | – | 12 000 | 0,067 | ▸ 6203-2RSH | 6203-RSH |
| | 40 | 12 | 9,95 | 4,75 | 0,2 | 38 000 | 19 000 | 0,067 | ▸ 6203-2RSL | 6203-RSL |
| | 40 | 12 | 9,95 | 4,75 | 0,2 | 38 000 | 19 000 | 0,068 | ▸ 6203-2Z | 6203-Z |
| | 40 | 12 | 11,4 | 5,4 | 0,228 | 38 000 | 24 000 | 0,064 | 6203 ETN9 | – |
| | 40 | 16 | 9,56 | 4,75 | 0,2 | – | 12 000 | 0,089 | 62203-2RS1 | – |

**SKF Explorer bearing**

▸ Popular item

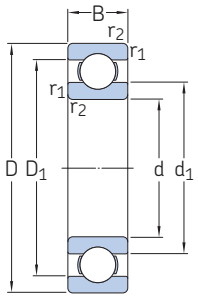
1) For bearings with only one shield or one non-contact seal (Z, RZ) the limiting speeds of the open bearings are valid.

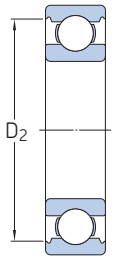


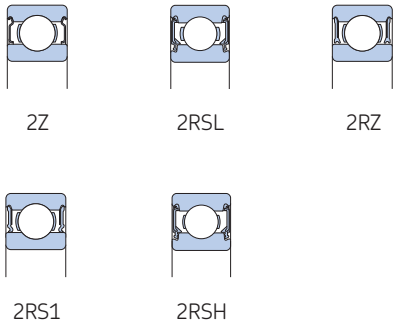

| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $d_2$ ≈ | $D_1$ ≈ | $D_2$ ≈ | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | $k_r$ | $f_0$ |
| mm | | | | | | mm | | | | – | |
| **15** | 20,5 | – | – | 28,2 | 0,3 | 17 | 20,4 | 30 | 0,3 | 0,025 | 14 |
| cont. | 20,5 | – | – | 28,2 | 0,3 | 17 | 20,4 | 30 | 0,3 | 0,025 | 14 |
| | 21,7 | – | – | 30,5 | 0,6 | 19,2 | – | 30,8 | 0,6 | 0,025 | 13 |
| | – | 18,6 | – | 30,5 | 0,6 | 19,2 | 19,4 | 31,3 | 0,6 | 0,025 | 13 |
| | – | 18,6 | – | 30,5 | 0,6 | 19,2 | 19,4 | 30,8 | 0,6 | 0,025 | 13 |
| | 21,7 | – | – | 30,5 | 0,6 | 19,2 | 21,6 | 30,8 | 0,6 | 0,025 | 13 |
| | 21,7 | – | – | 30,4 | 0,6 | 19,2 | 21,6 | 30,8 | 0,6 | 0,025 | 13 |
| | 23,7 | – | – | 36,3 | 1 | 20,6 | – | 36,4 | 1 | 0,03 | 12 |
| | – | 20,6 | – | 36,3 | 1 | 20,6 | 21 | 36,4 | 1 | 0,03 | 12 |
| | – | 20,6 | – | 36,3 | 1 | 20,6 | 21 | 36,4 | 1 | 0,03 | 12 |
| | 23,7 | – | – | 36,3 | 1 | 20,6 | 23,6 | 36,4 | 1 | 0,03 | 12 |
| | 23,7 | – | – | 36,3 | 1 | 20,6 | 23,6 | 36,4 | 1 | 0,03 | 12 |
| | – | 42,1 | – | 49,3 | 0,3 | 42 | 42 | 50 | 0,3 | 0,015 | 15 |
| **17** | 19,8 | – | – | 24,2 | 0,3 | 18 | 18,6 | 24 | 0,3 | 0,015 | 14 |
| | 19,8 | – | – | 24,2 | 0,3 | 19 | 19,6 | 24 | 0,3 | 0,015 | 14 |
| | 19,8 | – | – | 24,2 | 0,3 | 19 | 19,6 | 24 | 0,3 | 0,015 | 14 |
| | 19,8 | – | 23,3 | – | 0,3 | 19 | – | 24 | 0,3 | 0,015 | 14 |
| | – | 19,4 | – | 27,7 | 0,3 | 19 | 19,3 | 28 | 0,3 | 0,02 | 15 |
| | 20,4 | – | – | 27,7 | 0,3 | 19 | 20,3 | 28 | 0,3 | 0,02 | 15 |
| | 20,4 | – | – | 27,7 | 0,3 | 19 | 20,3 | 28 | 0,3 | 0,02 | 15 |
| | 20,4 | – | – | 27,7 | 0,3 | 19 | – | 28 | 0,3 | 0,02 | 15 |
| | 23 | – | – | 31,2 | 0,3 | 19 | 22,6 | 33 | 0,3 | 0,02 | 14 |
| | 23 | – | – | 31,2 | 0,3 | 19 | – | 33 | 0,3 | 0,02 | 14 |
| | 23 | – | – | 31,2 | 0,3 | 19 | – | 33 | 0,3 | 0,025 | 14 |
| | – | 20,4 | – | 31,2 | 0,3 | 19 | 20,5 | 33 | 0,3 | 0,025 | 14 |
| | – | 20,4 | – | 31,2 | 0,3 | 19 | 20,5 | 33 | 0,3 | 0,025 | 14 |
| | 23 | – | – | 31,2 | 0,3 | 19 | 22,9 | 33 | 0,3 | 0,025 | 14 |
| | 23 | – | – | 31,2 | 0,3 | 19 | 22,9 | 33 | 0,3 | 0,025 | 14 |
| | 24,5 | – | – | 35 | 0,6 | 21,2 | – | 35,8 | 0,6 | 0,025 | 13 |
| | – | 21,7 | – | 35 | 0,6 | 21,2 | 22 | 35,8 | 0,6 | 0,025 | 13 |
| | – | 21,7 | – | 35 | 0,6 | 21,2 | 22 | 35,8 | 0,6 | 0,025 | 13 |
| | 24,5 | – | – | 35 | 0,6 | 21,2 | 24,4 | 35,8 | 0,6 | 0,025 | 13 |
| | 24,5 | – | 32,7 | – | 0,6 | 21,2 | – | 35,8 | 0,6 | 0,03 | 12 |
| | – | 21,5 | – | 35 | 0,6 | 21,2 | 24,4 | 35,8 | 0,6 | 0,025 | 13 |

## 1.1 Single row deep groove ball bearings

d **17 – 22** mm



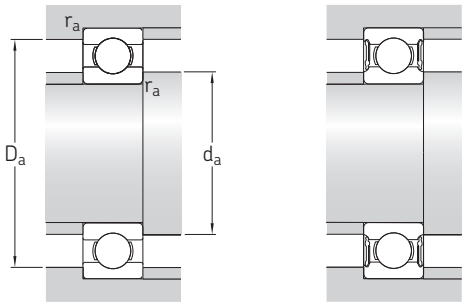




| Principal dimensions | | | Basic load ratings | | Fatigue load limit | Speed ratings | | Mass | Designations | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | dynamic | static | | Reference speed | Limiting speed[1] | | Bearing open or capped on both sides | capped on one side[1] |
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **17** | 47 | 14 | 14,3 | 6,55 | 0,275 | 34 000 | 22 000 | 0,11 | ▸ 6303 | – |
| cont. | 47 | 14 | 14,3 | 6,55 | 0,275 | – | 11 000 | 0,12 | ▸ 6303-2RSH | 6303-RSH |
| | 47 | 14 | 14,3 | 6,55 | 0,275 | 34 000 | 17 000 | 0,12 | 6303-2RSL | 6303-RSL |
| | 47 | 14 | 14,3 | 6,55 | 0,275 | 34 000 | 17 000 | 0,12 | ▸ 6303-2Z | 6303-Z |
| | 47 | 19 | 13,5 | 6,55 | 0,275 | – | 11 000 | 0,16 | 62303-2RS1 | – |
| | 62 | 17 | 22,9 | 10,8 | 0,455 | 28 000 | 18 000 | 0,27 | 6403 | – |
| **20** | 32 | 7 | 4,03 | 2,32 | 0,104 | – | 13 000 | 0,018 | ▸ 61804-2RS1 | – |
| | 32 | 7 | 4,03 | 2,32 | 0,104 | 45 000 | 22 000 | 0,018 | ▸ 61804-2RZ | – |
| | 32 | 7 | 4,03 | 2,32 | 0,104 | 45 000 | 28 000 | 0,018 | ▸ 61804 | – |
| | 37 | 9 | 6,37 | 3,65 | 0,156 | – | 12 000 | 0,038 | ▸ 61904-2RS1 | – |
| | 37 | 9 | 6,37 | 3,65 | 0,156 | 43 000 | 20 000 | 0,038 | ▸ 61904-2RZ | – |
| | 37 | 9 | 6,37 | 3,65 | 0,156 | 43 000 | 26 000 | 0,037 | ▸ 61904 | – |
| | 42 | 8 | 7,28 | 4,05 | 0,173 | 38 000 | 24 000 | 0,051 | ▸ 16004 | – |
| | 42 | 12 | 9,95 | 5 | 0,212 | 38 000 | 24 000 | 0,067 | ▸ 6004 | – |
| | 42 | 12 | 9,95 | 5 | 0,212 | – | 11 000 | 0,067 | ▸ 6004-2RSH | 6004-RSH |
| | 42 | 12 | 9,95 | 5 | 0,212 | 38 000 | 19 000 | 0,069 | ▸ 6004-2RSL | 6004-RSL |
| | 42 | 12 | 9,95 | 5 | 0,212 | 38 000 | 19 000 | 0,071 | ▸ 6004-2Z | 6004-Z |
| | 42 | 16 | 9,36 | 5 | 0,212 | – | 11 000 | 0,086 | 63004-2RS1 | – |
| | 47 | 14 | 13,5 | 6,55 | 0,28 | 32 000 | 20 000 | 0,11 | ▸ 6204 | – |
| | 47 | 14 | 13,5 | 6,55 | 0,28 | – | 10 000 | 0,11 | ▸ 6204-2RSH | 6204-RSH |
| | 47 | 14 | 13,5 | 6,55 | 0,28 | 32 000 | 17 000 | 0,11 | ▸ 6204-2RSL | 6204-RSL |
| | 47 | 14 | 13,5 | 6,55 | 0,28 | 32 000 | 17 000 | 0,11 | ▸ 6204-2Z | 6204-Z |
| | 47 | 14 | 15,6 | 7,65 | 0,325 | 32 000 | 20 000 | 0,098 | 6204 ETN9 | – |
| | 47 | 18 | 12,7 | 6,55 | 0,28 | – | 10 000 | 0,13 | 62204-2RS1 | – |
| | 52 | 15 | 15,9 | 7,8 | 0,335 | 30 000 | 15 000 | 0,15 | ▸ 6304-2RSL | 6304-RSL |
| | 52 | 15 | 16,8 | 7,8 | 0,335 | 30 000 | 19 000 | 0,14 | ▸ 6304 | – |
| | 52 | 15 | 16,8 | 7,8 | 0,335 | – | 9 500 | 0,15 | ▸ 6304-2RSH | 6304-RSH |
| | 52 | 15 | 16,8 | 7,8 | 0,335 | 30 000 | 15 000 | 0,15 | ▸ 6304-2Z | 6304-Z |
| | 52 | 15 | 18,2 | 9 | 0,38 | 30 000 | 19 000 | 0,14 | 6304 ETN9 | – |
| | 52 | 21 | 15,9 | 7,8 | 0,335 | – | 9 500 | 0,21 | 62304-2RS1 | – |
| | 72 | 19 | 30,7 | 15 | 0,64 | 24 000 | 15 000 | 0,41 | 6404 | – |
| **22** | 50 | 14 | 14 | 7,65 | 0,325 | – | 9 000 | 0,12 | 62/22-2RS1 | – |
| | 50 | 14 | 14 | 7,65 | 0,325 | 30 000 | 19 000 | 0,12 | 62/22 | – |
| | 56 | 16 | 18,6 | 9,3 | 0,39 | 28 000 | 18 000 | 0,18 | 63/22 | – |

**SKF Explorer bearing**

▸ Popular item

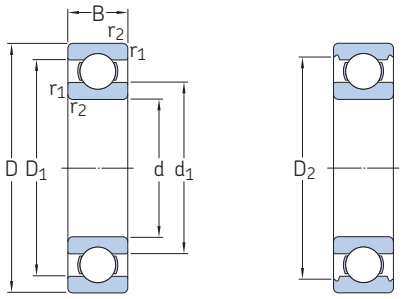
[1] For bearings with only one shield or one non-contact seal (Z, RZ) the limiting speeds of the open bearings are valid.

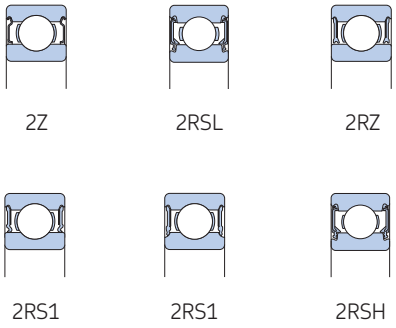



| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $d_2$ ≈ | $D_1$ ≈ | $D_2$ ≈ | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | $k_r$ | $f_0$ |
| mm | | | | | | mm | | | | – | |
| **17** | 26,5 | – | – | 39,6 | 1 | 22,6 | – | 41,4 | 1 | 0,03 | 12 |
| cont. | – | 23,4 | – | 39,6 | 1 | 22,6 | 23,5 | 41,4 | 1 | 0,03 | 12 |
| | – | 23,4 | – | 39,6 | 1 | 22,6 | 23,5 | 41,4 | 1 | 0,03 | 12 |
| | 26,5 | – | – | 39,6 | 1 | 22,6 | 26,4 | 41,4 | 1 | 0,03 | 12 |
| | 26,5 | – | – | 39,6 | 1 | 22,6 | 26,4 | 41,4 | 1 | 0,03 | 12 |
| | 32,4 | – | – | 48,7 | 1,1 | 23,5 | – | 55 | 1 | 0,035 | 11 |
| **20** | 23,8 | – | – | 29,4 | 0,6 | 22 | 23,6 | 30 | 0,3 | 0,015 | 15 |
| | 23,8 | – | – | 29,4 | 0,6 | 22 | 23,6 | 30 | 0,3 | 0,015 | 15 |
| | 23,8 | – | 28,3 | – | 0,3 | 22 | – | 30 | 0,3 | 0,015 | 15 |
| | 25,5 | – | – | 32,7 | 0,3 | 22 | 23 | 35 | 0,3 | 0,02 | 15 |
| | 25,5 | – | – | 32,7 | 0,3 | 22 | 25,5 | 35 | 0,3 | 0,02 | 15 |
| | 25,5 | – | – | 32,7 | 0,3 | 22 | – | 35 | 0,3 | 0,02 | 15 |
| | 27,2 | – | – | 37,2 | 0,3 | 22 | – | 40 | 0,3 | 0,02 | 15 |
| | 27,2 | – | – | 37,2 | 0,6 | 23,2 | – | 38,8 | 0,6 | 0,025 | 14 |
| | – | 24,6 | – | 37,2 | 0,6 | 23,2 | 24,5 | 38,8 | 0,6 | 0,025 | 14 |
| | – | 24,6 | – | 37,2 | 0,6 | 23,2 | 24,5 | 38,8 | 0,6 | 0,025 | 14 |
| | 27,2 | – | – | 37,2 | 0,6 | 23,2 | 27,1 | 38,8 | 0,6 | 0,025 | 14 |
| | 27,2 | – | – | 37,2 | 0,6 | 23,2 | 27,1 | 38,8 | 0,6 | 0,025 | 14 |
| | 28,8 | – | – | 40,6 | 1 | 25,6 | – | 41,4 | 1 | 0,025 | 13 |
| | – | 26 | – | 40,6 | 1 | 25,6 | 26 | 41,4 | 1 | 0,025 | 13 |
| | – | 26 | – | 40,6 | 1 | 25,6 | 26 | 41,4 | 1 | 0,025 | 13 |
| | 28,8 | – | – | 40,6 | 1 | 25,6 | 28,7 | 41,4 | 1 | 0,025 | 13 |
| | 28,2 | – | 39,6 | – | 1 | 25,6 | – | 41,4 | 1 | 0,025 | 12 |
| | 28,8 | – | – | 40,6 | 1 | 25,6 | 28,7 | 41,4 | 1 | 0,025 | 13 |
| | – | 26,9 | – | 44,8 | 1,1 | 27 | 27 | 45 | 1 | 0,03 | 12 |
| | 30,3 | – | – | 44,8 | 1,1 | 27 | – | 45 | 1 | 0,03 | 12 |
| | – | 26,9 | – | 44,8 | 1,1 | 27 | 27,3 | 45 | 1 | 0,03 | 12 |
| | 30,3 | – | – | 44,8 | 1,1 | 27 | 30,3 | 45 | 1 | 0,03 | 12 |
| | 30,3 | – | 42,6 | – | 1,1 | 27 | – | 45 | 1 | 0,03 | 12 |
| | 30,3 | – | – | 44,8 | 1,1 | 27 | 30,3 | 45 | 1 | 0,03 | 12 |
| | 37,1 | – | 54,8 | – | 1,1 | 29 | – | 63 | 1 | 0,035 | 11 |
| **22** | 32,2 | – | – | 44 | 1 | 27,6 | 32 | 44,4 | 1 | 0,025 | 14 |
| | 32,2 | – | – | 44 | 1 | 27,6 | – | 44,4 | 1 | 0,025 | 14 |
| | 32,9 | – | 45,3 | – | 1,1 | 29 | – | 47 | 1 | 0,03 | 12 |

## 1.1 Single row deep groove ball bearings

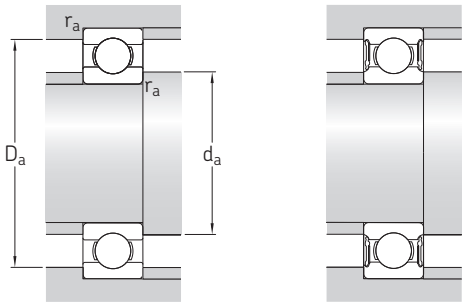
d **25 – 30** mm




| Principal dimensions | | | Basic load ratings | | Fatigue load limit | Speed ratings | | Mass | Designations | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | dynamic | static | | Reference speed | Limiting speed[1] | | Bearing open or capped on both sides | capped on one side[1] |
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **25** | 37 | 7 | 4,36 | 2,6 | 0,125 | – | 11 000 | 0,022 | ▸ **61805-2RS1** | – |
| | 37 | 7 | 4,36 | 2,6 | 0,125 | 38 000 | 19 000 | 0,022 | ▸ **61805-2RZ** | – |
| | 37 | 7 | 4,36 | 2,6 | 0,125 | 38 000 | 24 000 | 0,022 | ▸ **61805** | – |
| | 42 | 9 | 7,02 | 4,3 | 0,193 | – | 10 000 | 0,045 | ▸ **61905-2RS1** | – |
| | 42 | 9 | 7,02 | 4,3 | 0,193 | 36 000 | 18 000 | 0,045 | ▸ **61905-2RZ** | – |
| | 42 | 9 | 7,02 | 4,3 | 0,193 | 36 000 | 22 000 | 0,045 | ▸ **61905** | – |
| | 47 | 8 | 8,06 | 4,75 | 0,212 | 32 000 | 20 000 | 0,055 | ▸ **16005** | – |
| | 47 | 12 | 11,9 | 6,55 | 0,275 | 32 000 | 20 000 | 0,078 | ▸ **6005** | – |
| | 47 | 12 | 11,9 | 6,55 | 0,275 | – | 9 500 | 0,081 | ▸ **6005-2RSH** | **6005-RSH** |
| | 47 | 12 | 11,9 | 6,55 | 0,275 | 32 000 | 16 000 | 0,08 | ▸ **6005-2RSL** | **6005-RSL** |
| | 47 | 12 | 11,9 | 6,55 | 0,275 | 32 000 | 16 000 | 0,083 | ▸ **6005-2Z** | **6005-Z** |
| | 47 | 16 | 11,2 | 6,55 | 0,275 | – | 9 500 | 0,11 | **63005-2RS1** | – |
| | 52 | 15 | 14,8 | 7,8 | 0,335 | 28 000 | 18 000 | 0,13 | ▸ **6205** | – |
| | 52 | 15 | 14,8 | 7,8 | 0,335 | – | 8 500 | 0,13 | ▸ **6205-2RSH** | **6205-RSH** |
| | 52 | 15 | 14,8 | 7,8 | 0,335 | 28 000 | 14 000 | 0,13 | ▸ **6205-2RSL** | **6205-RSL** |
| | 52 | 15 | 14,8 | 7,8 | 0,335 | 28 000 | 14 000 | 0,13 | ▸ **6205-2Z** | **6205-Z** |
| | 52 | 15 | 17,8 | 9,3 | 0,4 | 28 000 | 18 000 | 0,12 | **6205 ETN9** | – |
| | 52 | 18 | 14 | 7,8 | 0,335 | – | 8 500 | 0,13 | **62205-2RS1** | – |
| | 62 | 17 | 23,4 | 11,6 | 0,49 | 24 000 | 16 000 | 0,23 | ▸ **6305** | – |
| | 62 | 17 | 23,4 | 11,6 | 0,49 | – | 7 500 | 0,24 | ▸ **6305-2RSH** | **6305-RSH** |
| | 62 | 17 | 23,4 | 11,6 | 0,49 | 24 000 | 13 000 | 0,23 | **6305-2RZ** | **6305-RZ** |
| | 62 | 17 | 23,4 | 11,6 | 0,49 | 24 000 | 13 000 | 0,23 | ▸ **6305-2Z** | **6305-Z** |
| | 62 | 17 | 26 | 13,4 | 0,57 | 24 000 | 16 000 | 0,22 | **6305 ETN9** | – |
| | 62 | 24 | 22,5 | 11,6 | 0,49 | – | 7 500 | 0,32 | **62305-2RS1** | – |
| | 80 | 21 | 35,8 | 19,3 | 0,815 | 20 000 | 13 000 | 0,54 | **6405** | – |
| **28** | 58 | 16 | 16,8 | 9,5 | 0,405 | 26 000 | 16 000 | 0,17 | **62/28** | – |
| | 68 | 18 | 25,1 | 13,7 | 0,585 | 22 000 | 14 000 | 0,3 | **63/28** | – |
| **30** | 42 | 7 | 4,49 | 2,9 | 0,146 | – | 9 500 | 0,025 | ▸ **61806-2RS1** | – |
| | 42 | 7 | 4,49 | 2,9 | 0,146 | 32 000 | 16 000 | 0,025 | ▸ **61806-2RZ** | – |
| | 42 | 7 | 4,49 | 2,9 | 0,146 | 32 000 | 20 000 | 0,025 | ▸ **61806** | – |
| | 47 | 9 | 7,28 | 4,55 | 0,212 | – | 8 500 | 0,051 | ▸ **61906-2RS1** | – |
| | 47 | 9 | 7,28 | 4,55 | 0,212 | 30 000 | 15 000 | 0,051 | ▸ **61906-2RZ** | – |
| | 47 | 9 | 7,28 | 4,55 | 0,212 | 30 000 | 19 000 | 0,049 | ▸ **61906** | – |

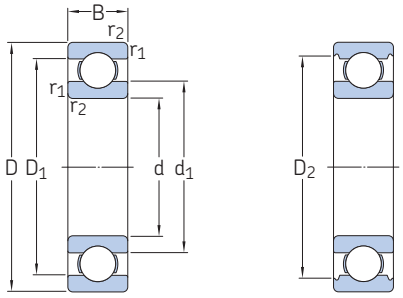
**SKF Explorer bearing**
▸ Popular item
[1] For bearings with only one shield or one non-contact seal (Z, RZ) the limiting speeds of the open bearings are valid.

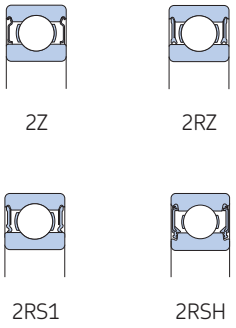



| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $d_2$ ≈ | $D_1$ ≈ | $D_2$ ≈ | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | $k_r$ | $f_0$ |
| mm | | | | | | mm | | | | – | |
| **25** | – | 27,4 | – | 34,2 | 0,6 | 27 | 27,3 | 35 | 0,3 | 0,015 | 14 |
| | 28,5 | – | – | 34,2 | 0,3 | 27 | 28,4 | 35 | 0,3 | 0,015 | 14 |
| | 28,5 | – | 33,2 | – | 0,6 | 27 | – | 35 | 0,3 | 0,015 | 14 |
| | 30,2 | – | – | 37,7 | 0,6 | 27 | 29 | 40 | 0,3 | 0,02 | 15 |
| | 30,2 | – | – | 37,7 | 0,6 | 27 | 29 | 40 | 0,3 | 0,02 | 15 |
| | 30,2 | – | – | 37,7 | 0,6 | 27 | – | 40 | 0,3 | 0,02 | 15 |
| | 33,3 | – | – | 42,4 | 0,3 | 27 | – | 45 | 0,3 | 0,02 | 15 |
| | 32 | – | – | 42,2 | 0,6 | 28,2 | – | 43,8 | 0,6 | 0,025 | 14 |
| | – | 29,4 | – | 42,2 | 0,6 | 28,2 | 29,5 | 43,8 | 0,6 | 0,025 | 14 |
| | – | 29,4 | – | 42,2 | 0,6 | 28,2 | 29,5 | 43,8 | 0,6 | 0,025 | 14 |
| | 32 | – | – | 42,2 | 0,6 | 28,2 | 31,9 | 43,8 | 0,6 | 0,025 | 14 |
| | 32 | – | – | 42,2 | 0,6 | 29,2 | 31,9 | 43,8 | 0,6 | 0,025 | 14 |
| | 34,3 | – | – | 46,3 | 1 | 30,6 | – | 46,4 | 1 | 0,025 | 14 |
| | – | 31,3 | – | 46,3 | 1 | 30,6 | 31,5 | 46,4 | 1 | 0,025 | 14 |
| | – | 31,3 | – | 46,3 | 1 | 30,6 | 31,5 | 46,4 | 1 | 0,025 | 14 |
| | 34,3 | – | – | 46,3 | 1 | 30,6 | 34,3 | 46,4 | 1 | 0,025 | 14 |
| | 33,1 | – | – | 46,3 | 1 | 30,6 | – | 46,4 | 1 | 0,025 | 13 |
| | 34,3 | – | – | 46,3 | 1 | 30,6 | 34,3 | 46,4 | 1 | 0,025 | 14 |
| | 36,6 | – | – | 52,7 | 1,1 | 32 | – | 55 | 1 | 0,03 | 12 |
| | – | 33 | – | 52,7 | 1,1 | 32 | 33 | 55 | 1 | 0,03 | 12 |
| | 36,6 | – | – | 52,7 | 1,1 | 32 | 36,5 | 55 | 1 | 0,03 | 12 |
| | 36,6 | – | – | 52,7 | 1,1 | 32 | 36,5 | 55 | 1 | 0,03 | 12 |
| | 36,3 | – | 51,7 | – | 1,1 | 32 | – | 55 | 1 | 0,03 | 12 |
| | 36,6 | – | – | 52,7 | 1,1 | 32 | 36,5 | 55 | 1 | 0,03 | 12 |
| | 45,4 | – | 62,9 | – | 1,5 | 34 | – | 71 | 1,5 | 0,035 | 12 |
| **28** | 37 | – | – | 51,5 | 1 | 33,6 | – | 52 | 1 | 0,025 | 14 |
| | 41,7 | – | – | 57,8 | 1,1 | 35 | – | 61 | 1 | 0,03 | 13 |
| **30** | – | 32,6 | – | 39,4 | 0,6 | 32 | 32,5 | 40 | 0,3 | 0,015 | 14 |
| | 33,7 | – | – | 39,4 | 0,6 | 32 | 33,6 | 40 | 0,3 | 0,015 | 14 |
| | 33,7 | – | 38,4 | – | 0,3 | 32 | – | 40 | 0,3 | 0,015 | 14 |
| | – | 34,2 | – | 42,7 | 0,3 | 32 | 34 | 45 | 0,3 | 0,02 | 14 |
| | 35,2 | – | – | 42,7 | 0,3 | 32 | 35,1 | 45 | 0,3 | 0,02 | 14 |
| | 35,2 | – | – | 42,7 | 0,3 | 32 | – | 45 | 0,3 | 0,02 | 14 |

## 1.1 Single row deep groove ball bearings

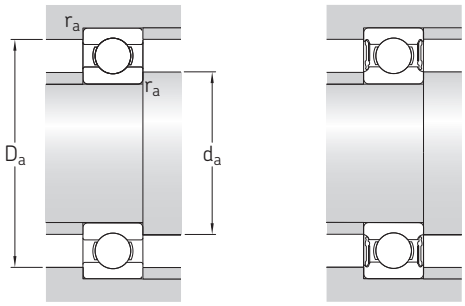
d **30 – 35** mm




| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed[1] | Mass | Designations Bearing open or capped on both sides | capped on one side[1] |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **30** | 55 | 9 | 11,9 | 7,35 | 0,31 | 28 000 | 17 000 | 0,089 | ▸ 16006 | – |
| cont. | 55 | 13 | 13,8 | 8,3 | 0,355 | 28 000 | 17 000 | 0,12 | ▸ 6006 | – |
| | 55 | 13 | 13,8 | 8,3 | 0,355 | – | 8 000 | 0,12 | ▸ 6006-2RS1 | 6006-RS1 |
| | 55 | 13 | 13,8 | 8,3 | 0,355 | 28 000 | 14 000 | 0,12 | ▸ 6006-2RZ | 6006-RZ |
| | 55 | 13 | 13,8 | 8,3 | 0,355 | 28 000 | 14 000 | 0,12 | ▸ 6006-2Z | 6006-Z |
| | 55 | 19 | 13,3 | 8,3 | 0,355 | – | 8 000 | 0,17 | 63006-2RS1 | – |
| | 62 | 16 | 20,3 | 11,2 | 0,475 | 24 000 | 15 000 | 0,2 | ▸ 6206 | – |
| | 62 | 16 | 20,3 | 11,2 | 0,475 | – | 7 500 | 0,21 | ▸ 6206-2RSH | 6206-RSH |
| | 62 | 16 | 20,3 | 11,2 | 0,475 | 24 000 | 12 000 | 0,2 | ▸ 6206-2RZ | 6206-RZ |
| | 62 | 16 | 20,3 | 11,2 | 0,475 | 24 000 | 12 000 | 0,21 | ▸ 6206-2Z | 6206-Z |
| | 62 | 16 | 23,4 | 12,9 | 0,54 | 24 000 | 15 000 | 0,18 | 6206 ETN9 | – |
| | 62 | 20 | 19,5 | 11,2 | 0,475 | – | 7 500 | 0,25 | 62206-2RS1 | – |
| | 72 | 19 | 29,6 | 16 | 0,67 | 20 000 | 13 000 | 0,35 | ▸ 6306 | – |
| | 72 | 19 | 29,6 | 16 | 0,67 | – | 6 300 | 0,35 | ▸ 6306-2RSH | ▸ 6306-RSH |
| | 72 | 19 | 29,6 | 16 | 0,67 | 20 000 | 11 000 | 0,36 | 6306-2RZ | 6306-RZ |
| | 72 | 19 | 29,6 | 16 | 0,67 | 20 000 | 11 000 | 0,36 | ▸ 6306-2Z | 6306-Z |
| | 72 | 19 | 32,5 | 17,3 | 0,735 | 22 000 | 14 000 | 0,33 | 6306 ETN9 | – |
| | 72 | 27 | 28,1 | 16 | 0,67 | – | 6 300 | 0,5 | 62306-2RS1 | – |
| | 90 | 23 | 43,6 | 23,6 | 1 | 18 000 | 11 000 | 0,75 | 6406 | – |
| **35** | 47 | 7 | 4,36 | 3,35 | 0,14 | – | 8 500 | 0,022 | ▸ 61807-2RS1 | – |
| | 47 | 7 | 4,36 | 3,35 | 0,14 | 30 000 | 15 000 | 0,03 | ▸ 61807-2RZ | – |
| | 47 | 7 | 4,36 | 3,35 | 0,14 | 30 000 | 18 000 | 0,029 | ▸ 61807 | – |
| | 55 | 10 | 10,8 | 7,8 | 0,325 | – | 7 500 | 0,08 | ▸ 61907-2RS1 | – |
| | 55 | 10 | 10,8 | 7,8 | 0,325 | 26 000 | 13 000 | 0,08 | ▸ 61907-2RZ | – |
| | 55 | 10 | 10,8 | 7,8 | 0,325 | 26 000 | 16 000 | 0,08 | ▸ 61907 | – |
| | 62 | 9 | 13 | 8,15 | 0,375 | 24 000 | 15 000 | 0,11 | ▸ 16007 | – |
| | 62 | 14 | 16,8 | 10,2 | 0,44 | 24 000 | 15 000 | 0,15 | ▸ 6007 | – |
| | 62 | 14 | 16,8 | 10,2 | 0,44 | – | 7 000 | 0,16 | ▸ 6007-2RS1 | 6007-RS1 |
| | 62 | 14 | 16,8 | 10,2 | 0,44 | 24 000 | 12 000 | 0,16 | 6007-2RZ | 6007-RZ |
| | 62 | 14 | 16,8 | 10,2 | 0,44 | 24 000 | 12 000 | 0,16 | ▸ 6007-2Z | 6007-Z |
| | 62 | 20 | 15,9 | 10,2 | 0,44 | – | 7 000 | 0,22 | 63007-2RS1 | – |
| | 72 | 17 | 27 | 15,3 | 0,655 | 20 000 | 13 000 | 0,29 | ▸ 6207 | – |
| | 72 | 17 | 27 | 15,3 | 0,655 | – | 6 300 | 0,3 | ▸ 6207-2RSH | ▸ 6207-RSH |
| | 72 | 17 | 27 | 15,3 | 0,655 | 20 000 | 10 000 | 0,3 | ▸ 6207-2Z | 6207-Z |

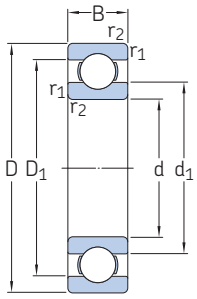
**SKF Explorer bearing**
▸ Popular item
[1] For bearings with only one shield or one non-contact seal (Z, RZ) the limiting speeds of the open bearings are valid.

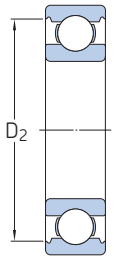


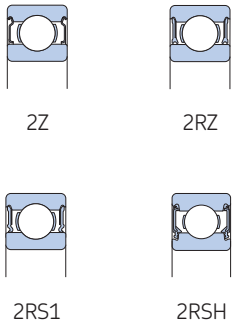

| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $d_2$ ≈ | $D_1$ ≈ | $D_2$ ≈ | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | $k_r$ | $f_0$ |
| mm | | | | | | mm | | | | – | |
| **30** | 37,7 | – | 47,3 | – | 0,3 | 32 | – | 53 | 0,3 | 0,02 | 15 |
| cont. | 38,2 | – | – | 49 | 1 | 34,6 | – | 50 | 1 | 0,025 | 15 |
| | 38,2 | – | – | 49 | 1 | 34,6 | 38,1 | 50 | 1 | 0,025 | 15 |
| | 38,2 | – | – | 49 | 1 | 34,6 | 38,1 | 50 | 1 | 0,025 | 15 |
| | 38,2 | – | – | 49 | 1 | 34,6 | 38,1 | 50 | 1 | 0,025 | 15 |
| | 38,2 | – | – | 49 | 1 | 34,6 | 38,1 | 50 | 1 | 0,025 | 15 |
| | 40,3 | – | – | 54,1 | 1 | 35,6 | – | 56 | 1 | 0,025 | 14 |
| | – | 37,3 | – | 54,1 | 1 | 35,6 | 37,3 | 56 | 1 | 0,025 | 14 |
| | 40,3 | – | – | 54,1 | 1 | 35,6 | 40,3 | 56 | 1 | 0,025 | 14 |
| | 40,3 | – | – | 54,1 | 1 | 35,6 | 40,3 | 56 | 1 | 0,025 | 14 |
| | 39,5 | – | 52,9 | – | 1 | 35,6 | – | 56 | 1 | 0,025 | 13 |
| | 40,3 | – | – | 54,1 | 1 | 35,6 | 40,3 | 56 | 1 | 0,025 | 14 |
| | 44,6 | – | – | 61,9 | 1,1 | 37 | – | 65 | 1 | 0,03 | 13 |
| | – | 41,1 | – | 63,2 | 1,1 | 37 | 40,8 | 65 | 1 | 0,03 | 13 |
| | 44,6 | – | – | 61,9 | 1,1 | 37 | 44,5 | 65 | 1 | 0,03 | 13 |
| | 44,6 | – | – | 61,9 | 1,1 | 37 | 44,5 | 65 | 1 | 0,03 | 13 |
| | 42,3 | – | 59,6 | – | 1,1 | 37 | – | 65 | 1 | 0,03 | 12 |
| | 44,6 | – | – | 61,9 | 1,1 | 37 | 44,5 | 65 | 1 | 0,03 | 13 |
| | 50,3 | – | 69,7 | – | 1,5 | 41 | – | 79 | 1,5 | 0,035 | 12 |
| **35** | 38,2 | – | – | 44,4 | 0,3 | 37 | 38 | 45 | 0,3 | 0,015 | 14 |
| | 38,2 | – | – | 44,4 | 0,3 | 37 | 38 | 45 | 0,3 | 0,015 | 14 |
| | 38,2 | – | 42,8 | – | 0,3 | 37 | – | 45 | 0,3 | 0,015 | 14 |
| | 42,2 | – | – | 52,2 | 0,6 | 38,2 | 41,5 | 51 | 0,6 | 0,02 | 16 |
| | 42,2 | – | – | 52,2 | 0,6 | 38,2 | 41,5 | 51 | 0,6 | 0,02 | 16 |
| | 42,2 | – | – | 52,2 | 0,6 | 38,2 | – | 51 | 0,6 | 0,02 | 16 |
| | 44 | – | 53 | – | 0,3 | 37 | – | 60 | 0,3 | 0,02 | 14 |
| | 43,7 | – | – | 55,7 | 1 | 39,6 | – | 57 | 1 | 0,025 | 15 |
| | 43,7 | – | – | 55,7 | 1 | 39,6 | 43,7 | 57 | 1 | 0,025 | 15 |
| | 43,7 | – | – | 55,7 | 1 | 39,6 | 43,7 | 57 | 1 | 0,025 | 15 |
| | 43,7 | – | – | 55,7 | 1 | 39,6 | 43,7 | 57 | 1 | 0,025 | 15 |
| | 43,7 | – | – | 55,7 | 1 | 39,6 | 43,7 | 57 | 1 | 0,025 | 15 |
| | 46,9 | – | – | 62,7 | 1,1 | 42 | – | 65 | 1 | 0,025 | 14 |
| | – | 43,5 | – | 64,1 | 1,1 | 42 | 43,2 | 65 | 1 | 0,025 | 14 |
| | 46,9 | – | – | 62,7 | 1,1 | 42 | 46,8 | 65 | 1 | 0,025 | 14 |

## 1.1 Single row deep groove ball bearings

d **35 – 40** mm

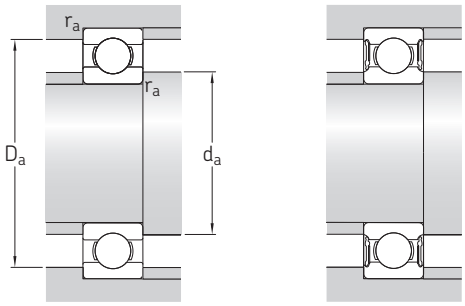



| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed[1] | Mass | Designations Bearing open or capped on both sides | capped on one side[1] |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **35** | 72 | 17 | 31,2 | 17,6 | 0,75 | 20 000 | 13 000 | 0,26 | **6207 ETN9** | – |
| cont. | 72 | 23 | 25,5 | 15,3 | 0,655 | – | 6 300 | 0,4 | **62207-2RS1** | – |
| | 80 | 21 | 35,1 | 19 | 0,815 | 19 000 | 12 000 | 0,46 | ▸ 6307 | – |
| | 80 | 21 | 35,1 | 19 | 0,815 | 19 000 | 17 000 | 0,54 | 6307 M | – |
| | 80 | 21 | 35,1 | 19 | 0,815 | – | 6 000 | 0,46 | ▸ 6307-2RSH | ▸ 6307-RSH |
| | 80 | 21 | 35,1 | 19 | 0,815 | 19 000 | 9 500 | 0,48 | ▸ 6307-2Z | 6307-Z |
| | 80 | 31 | 33,2 | 19 | 0,815 | – | 6 000 | 0,68 | **62307-2RS1** | – |
| | 100 | 25 | 55,3 | 31 | 1,29 | 16 000 | 10 000 | 0,97 | **6407** | – |
| **40** | 52 | 7 | 4,49 | 3,75 | 0,16 | 26 000 | 13 000 | 0,034 | ▸ **61808-2RZ** | – |
| | 52 | 7 | 4,49 | 3,75 | 0,16 | 26 000 | 16 000 | 0,032 | ▸ **61808** | – |
| | 62 | 12 | 13,8 | 10 | 0,425 | – | 6 700 | 0,12 | ▸ **61908-2RS1** | – |
| | 62 | 12 | 13,8 | 10 | 0,425 | 24 000 | 12 000 | 0,12 | ▸ **61908-2RZ** | – |
| | 62 | 12 | 13,8 | 10 | 0,425 | 24 000 | 14 000 | 0,12 | ▸ **61908** | – |
| | 68 | 9 | 13,8 | 10,2 | 0,44 | 22 000 | 14 000 | 0,13 | ▸ 16008 | – |
| | 68 | 15 | 17,8 | 11 | 0,49 | 22 000 | 14 000 | 0,19 | ▸ 6008 | – |
| | 68 | 15 | 17,8 | 11 | 0,49 | – | 6 300 | 0,2 | ▸ 6008-2RS1 | 6008-RS1 |
| | 68 | 15 | 17,8 | 11 | 0,49 | 22 000 | 11 000 | 0,2 | 6008-2RZ | 6008-RZ |
| | 68 | 15 | 17,8 | 11 | 0,49 | 22 000 | 11 000 | 0,2 | ▸ 6008-2Z | 6008-Z |
| | 68 | 21 | 16,8 | 11 | 0,49 | – | 6 300 | 0,27 | **63008-2RS1** | – |
| | 80 | 18 | 32,5 | 19 | 0,8 | 18 000 | 11 000 | 0,37 | ▸ 6208 | – |
| | 80 | 18 | 32,5 | 19 | 0,8 | – | 5 600 | 0,37 | ▸ 6208-2RSH | ▸ 6208-RSH |
| | 80 | 18 | 32,5 | 19 | 0,8 | 18 000 | 9 000 | 0,38 | 6208-2RZ | 6208-RZ |
| | 80 | 18 | 32,5 | 19 | 0,8 | 18 000 | 9 000 | 0,38 | ▸ 6208-2Z | 6208-Z |
| | 80 | 18 | 35,8 | 20,8 | 0,88 | 18 000 | 11 000 | 0,34 | **6208 ETN9** | – |
| | 80 | 23 | 30,7 | 19 | 0,8 | – | 5 600 | 0,47 | **62208-2RS1** | – |
| | 90 | 23 | 42,3 | 24 | 1,02 | 17 000 | 11 000 | 0,63 | ▸ 6308 | – |
| | 90 | 23 | 42,3 | 24 | 1,02 | – | 5 000 | 0,64 | ▸ 6308-2RSH | ▸ 6308-RSH |
| | 90 | 23 | 42,3 | 24 | 1,02 | 17 000 | 8 500 | 0,65 | ▸ 6308-2RZ | 6308-RZ |
| | 90 | 23 | 42,3 | 24 | 1,02 | 17 000 | 8 500 | 0,65 | ▸ 6308-2Z | 6308-Z |
| | 90 | 33 | 41 | 24 | 1,02 | – | 5 000 | 0,92 | **62308-2RS1** | – |
| | 110 | 27 | 63,7 | 36,5 | 1,53 | 14 000 | 9 000 | 1,25 | **6408** | – |

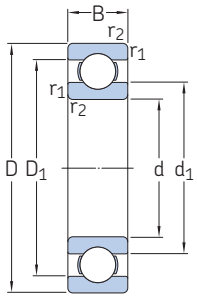
**SKF Explorer bearing**
▸ Popular item
[1] For bearings with only one shield or one non-contact seal (Z, RZ) the limiting speeds of the open bearings are valid.

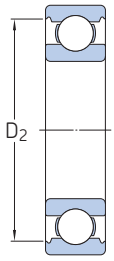


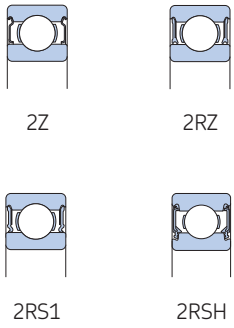

| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $d_2$ ≈ | $D_1$ ≈ | $D_2$ ≈ | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | $k_r$ | $f_0$ |
| mm | | | | | | mm | | | | – | |
| **35** | 46,1 | – | 61,7 | – | 1,1 | 42 | – | 65 | 1 | 0,025 | 13 |
| cont. | 46,9 | – | – | 62,7 | 1,1 | 42 | 46,8 | 65 | 1 | 0,025 | 14 |
| | 49,5 | – | – | 69,2 | 1,5 | 44 | – | 71 | 1,5 | 0,03 | 13 |
| | 49,5 | – | – | 69,2 | 1,5 | 44 | – | 71 | 1,5 | 0,03 | 13 |
| | – | 45,9 | – | 70,2 | 1,5 | 44 | 45,6 | 71 | 1,5 | 0,03 | 13 |
| | 49,5 | – | – | 69,2 | 1,5 | 44 | 49,5 | 71 | 1,5 | 0,03 | 13 |
| | 49,5 | – | – | 69,2 | 1,5 | 44 | 49,5 | 71 | 1,5 | 0,03 | 13 |
| | 57,4 | – | 79,6 | – | 1,5 | 46 | – | 89 | 1,5 | 0,035 | 12 |
| **40** | 43,2 | – | – | 49,3 | 0,3 | 42 | 43 | 50 | 0,3 | 0,015 | 15 |
| | 43,2 | – | 48,1 | – | 0,3 | 42 | – | 50 | 0,3 | 0,015 | 15 |
| | 46,9 | – | – | 57,3 | 0,6 | 43,2 | 46,8 | 58 | 0,6 | 0,02 | 16 |
| | 46,9 | – | – | 57,3 | 0,6 | 43,2 | 46,8 | 58 | 0,6 | 0,02 | 16 |
| | 46,9 | – | 55,6 | – | 0,6 | 43,2 | – | 58 | 0,6 | 0,02 | 16 |
| | 49,4 | – | 58,6 | – | 0,3 | 42 | – | 66 | 0,3 | 0,02 | 16 |
| | 49,2 | – | – | 61,1 | 1 | 44,6 | – | 63 | 1 | 0,025 | 15 |
| | 49,2 | – | – | 61,1 | 1 | 44,6 | 49,2 | 63 | 1 | 0,025 | 15 |
| | 49,2 | – | – | 61,1 | 1 | 44,6 | 49,2 | 63 | 1 | 0,025 | 15 |
| | 49,2 | – | – | 61,1 | 1 | 44,6 | 49,2 | 63 | 1 | 0,025 | 15 |
| | 49,2 | – | – | 61,1 | 1 | 44,6 | 49,2 | 63 | 1 | 0,025 | 15 |
| | 52,6 | – | – | 69,8 | 1,1 | 47 | – | 73 | 1 | 0,025 | 14 |
| | – | 49,1 | – | 71,5 | 1,1 | 47 | 48,8 | 73 | 1 | 0,025 | 14 |
| | 52,6 | – | – | 69,8 | 1,1 | 47 | 52 | 73 | 1 | 0,025 | 14 |
| | 52,6 | – | – | 69,8 | 1,1 | 47 | 52 | 73 | 1 | 0,025 | 14 |
| | 52 | – | 68,8 | – | 1,1 | 47 | – | 73 | 1 | 0,025 | 13 |
| | 52,6 | – | – | 69,8 | 1,1 | 47 | 52 | 73 | 1 | 0,025 | 14 |
| | 56,1 | – | – | 77,7 | 1,5 | 49 | – | 81 | 1,5 | 0,03 | 13 |
| | – | 52,3 | – | 78,6 | 1,5 | 49 | 52 | 81 | 1,5 | 0,03 | 13 |
| | 56,1 | – | – | 77,7 | 1,5 | 49 | 56 | 81 | 1,5 | 0,03 | 13 |
| | 56,1 | – | – | 77,7 | 1,5 | 49 | 56 | 81 | 1,5 | 0,03 | 13 |
| | 56,1 | – | – | 77,7 | 1,5 | 49 | 56 | 81 | 1,5 | 0,03 | 13 |
| | 62,8 | – | 87 | – | 2 | 53 | – | 97 | 2 | 0,035 | 12 |

## 1.1 Single row deep groove ball bearings

d **45 – 50** mm

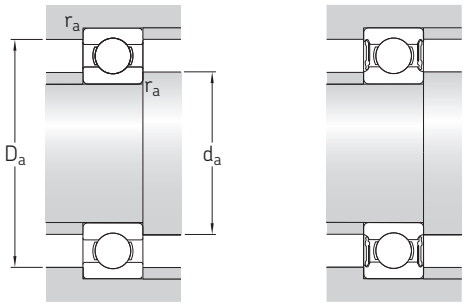



| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed[1] | Mass | Designations Bearing open or capped on both sides | capped on one side[1] |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **45** | 58 | 7 | 6,63 | 6,1 | 0,26 | – | 6 700 | 0,04 | ▸ **61809-2RS1** | – |
| | 58 | 7 | 6,63 | 6,1 | 0,26 | 22 000 | 11 000 | 0,04 | ▸ **61809-2RZ** | – |
| | 58 | 7 | 6,63 | 6,1 | 0,26 | 22 000 | 14 000 | 0,04 | ▸ **61809** | – |
| | 68 | 12 | 14 | 10,8 | 0,465 | – | 6 000 | 0,14 | ▸ **61909-2RS1** | – |
| | 68 | 12 | 14 | 10,8 | 0,465 | 20 000 | 10 000 | 0,14 | ▸ **61909-2RZ** | – |
| | 68 | 12 | 14 | 10,8 | 0,465 | 20 000 | 13 000 | 0,14 | ▸ **61909** | – |
| | 75 | 10 | 16,5 | 10,8 | 0,52 | 20 000 | 12 000 | 0,17 | ▸ 16009 | – |
| | 75 | 16 | 22,1 | 14,6 | 0,64 | 20 000 | 12 000 | 0,24 | ▸ 6009 | – |
| | 75 | 16 | 22,1 | 14,6 | 0,64 | – | 5 600 | 0,25 | ▸ 6009-2RS1 | 6009-RS1 |
| | 75 | 16 | 22,1 | 14,6 | 0,64 | 20 000 | 10 000 | 0,25 | ▸ 6009-2Z | 6009-Z |
| | 75 | 23 | 20,8 | 14,6 | 0,64 | – | 5 600 | 0,36 | **63009-2RS1** | – |
| | 85 | 19 | 35,1 | 21,6 | 0,915 | 17 000 | 11 000 | 0,42 | ▸ 6209 | – |
| | 85 | 19 | 35,1 | 21,6 | 0,915 | – | 5 000 | 0,42 | ▸ 6209-2RSH | ▸ 6209-RSH |
| | 85 | 19 | 35,1 | 21,6 | 0,92 | 17 000 | 8 500 | 0,43 | ▸ 6209-2Z | 6209-Z |
| | 85 | 23 | 33,2 | 21,6 | 0,915 | – | 5 000 | 0,51 | **62209-2RS1** | – |
| | 100 | 25 | 55,3 | 31,5 | 1,34 | 15 000 | 9 500 | 0,84 | ▸ 6309 | – |
| | 100 | 25 | 55,3 | 31,5 | 1,34 | 15 000 | 14 000 | 0,85 | 6309 M | – |
| | 100 | 25 | 55,3 | 31,5 | 1,34 | – | 4 500 | 0,85 | ▸ 6309-2RSH | ▸ 6309-RSH |
| | 100 | 25 | 55,3 | 31,5 | 1,34 | 15 000 | 7 500 | 0,87 | ▸ 6309-2Z | 6309-Z |
| | 100 | 36 | 52,7 | 31,5 | 1,34 | – | 4 500 | 1,2 | **62309-2RS1** | – |
| | 120 | 29 | 76,1 | 45 | 1,9 | 13 000 | 8 500 | 1,55 | **6409** | – |
| **50** | 65 | 7 | 6,76 | 6,8 | 0,285 | – | 6 000 | 0,052 | ▸ **61810-2RS1** | – |
| | 65 | 7 | 6,76 | 6,8 | 0,285 | 20 000 | 10 000 | 0,052 | ▸ **61810-2RZ** | – |
| | 65 | 7 | 6,76 | 6,8 | 0,285 | 20 000 | 13 000 | 0,052 | ▸ **61810** | – |
| | 72 | 12 | 14,6 | 11,8 | 0,5 | – | 5 600 | 0,14 | ▸ **61910-2RS1** | – |
| | 72 | 12 | 14,6 | 11,8 | 0,5 | 19 000 | 9 500 | 0,14 | ▸ **61910-2RZ** | – |
| | 72 | 12 | 14,6 | 11,8 | 0,5 | 19 000 | 12 000 | 0,14 | ▸ **61910** | – |
| | 80 | 10 | 16,8 | 11,4 | 0,56 | 18 000 | 11 000 | 0,18 | ▸ 16010 | – |
| | 80 | 16 | 22,9 | 16 | 0,71 | 18 000 | 11 000 | 0,26 | ▸ 6010 | – |
| | 80 | 16 | 22,9 | 15,6 | 0,71 | – | 5 000 | 0,27 | ▸ 6010-2RS1 | 6010-RS1 |
| | 80 | 16 | 22,9 | 15,6 | 0,71 | 18 000 | 9 000 | 0,27 | 6010-2RZ | 6010-RZ |
| | 80 | 16 | 22,9 | 15,6 | 0,71 | 18 000 | 9 000 | 0,27 | ▸ 6010-2Z | 6010-Z |
| | 80 | 23 | 21,6 | 15,6 | 0,71 | – | 5 000 | 0,38 | **63010-2RS1** | – |
| | 90 | 20 | 37,1 | 23,2 | 0,98 | 15 000 | 10 000 | 0,46 | ▸ 6210 | – |
| | 90 | 20 | 37,1 | 23,2 | 0,98 | 15 000 | 14 000 | 0,52 | 6210 M | – |
| | 90 | 20 | 37,1 | 23,2 | 0,98 | – | 4 800 | 0,46 | ▸ 6210-2RSH | ▸ 6210-RSH |

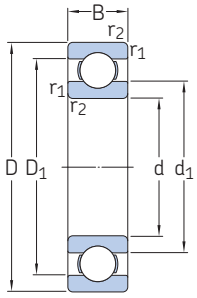
**SKF Explorer bearing**
▸ Popular item
[1] For bearings with only one shield or one non-contact seal (Z, RZ) the limiting speeds of the open bearings are valid.

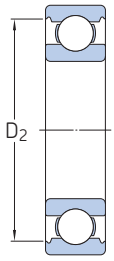


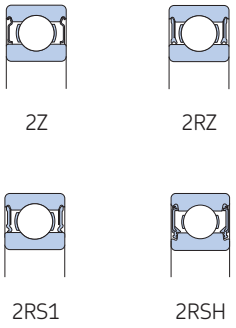

| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $d_2$ ≈ | $D_1$ ≈ | $D_2$ ≈ | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | $k_r$ | $f_0$ |
| mm | | | | | | mm | | | | – | |
| **45** | 48,2 | – | – | 55,4 | 0,3 | 47 | 49 | 56 | 0,3 | 0,015 | 17 |
| | 48,2 | – | – | 55,4 | 0,3 | 47 | 49 | 56 | 0,3 | 0,015 | 17 |
| | 48,2 | – | 54 | – | 0,3 | 47 | – | 56 | 0,3 | 0,015 | 17 |
| | 52,4 | – | – | 62,8 | 0,6 | 48,2 | 52 | 64 | 0,6 | 0,02 | 16 |
| | 52,4 | – | – | 62,8 | 0,6 | 48,2 | 52 | 64 | 0,6 | 0,02 | 16 |
| | 52,4 | – | 61,2 | – | 0,6 | 48,2 | – | 64 | 0,6 | 0,02 | 16 |
| | 55 | – | 65 | – | 0,6 | 48,2 | – | 71 | 0,6 | 0,02 | 14 |
| | 54,7 | – | – | 67,8 | 1 | 51 | – | 69 | 1 | 0,025 | 15 |
| | 54,7 | – | – | 67,8 | 1 | 51 | 54 | 69 | 1 | 0,025 | 15 |
| | 54,7 | – | – | 67,8 | 1 | 51 | 54 | 69 | 1 | 0,025 | 15 |
| | 54,7 | – | – | 67,8 | 1 | 51 | 54 | 69 | 1 | 0,025 | 15 |
| | 57,6 | – | – | 75,2 | 1,1 | 52 | – | 78 | 1 | 0,025 | 14 |
| | – | 54,1 | – | 76,5 | 1,1 | 52 | 53 | 78 | 1 | 0,025 | 14 |
| | 57,6 | – | – | 75,2 | 1,1 | 52 | 57 | 78 | 1 | 0,025 | 14 |
| | 57,6 | – | – | 75,2 | 1,1 | 52 | 57 | 78 | 1 | 0,025 | 14 |
| | 62,1 | – | – | 86,7 | 1,5 | 54 | – | 91 | 1,5 | 0,03 | 13 |
| | 62,1 | – | – | 86,7 | 1,5 | 54 | – | 91 | 1,5 | 0,03 | 13 |
| | – | 58,2 | – | 87,5 | 1,5 | 54 | 57 | 91 | 1,5 | 0,03 | 13 |
| | 62,1 | – | – | 86,7 | 1,5 | 54 | 62 | 91 | 1,5 | 0,03 | 13 |
| | 62,1 | – | – | 86,7 | 1,5 | 54 | 62 | 91 | 1,5 | 0,03 | 13 |
| | 68,9 | – | 95,9 | – | 2 | 58 | – | 107 | 2 | 0,035 | 12 |
| **50** | 54,6 | – | – | 61,8 | 0,3 | 52 | 55 | 63 | 0,3 | 0,015 | 17 |
| | 54,6 | – | – | 61,8 | 0,3 | 52 | 55 | 63 | 0,3 | 0,015 | 17 |
| | 54,6 | – | 60,3 | – | 0,3 | 52 | – | 63 | 0,3 | 0,015 | 17 |
| | 56,8 | – | – | 67,3 | 0,6 | 54 | 56 | 68 | 0,6 | 0,02 | 16 |
| | 56,8 | – | – | 67,3 | 0,6 | 54 | 56 | 68 | 0,6 | 0,02 | 16 |
| | 56,8 | – | 65,6 | – | 0,6 | 54 | – | 68 | 0,6 | 0,02 | 16 |
| | 60 | – | 70 | – | 0,6 | 54 | – | 76 | 0,6 | 0,02 | 14 |
| | 59,7 | – | – | 72,8 | 1 | 55 | – | 75 | 1 | 0,025 | 15 |
| | 59,7 | – | – | 72,8 | 1 | 55 | 59 | 75 | 1 | 0,025 | 15 |
| | 59,7 | – | – | 72,8 | 1 | 55 | 59 | 75 | 1 | 0,025 | 15 |
| | 59,7 | – | – | 72,8 | 1 | 55 | 59 | 75 | 1 | 0,025 | 15 |
| | 62,5 | – | – | 81,7 | 1,1 | 57 | – | 83 | 1 | 0,025 | 14 |
| | 62,5 | – | – | 81,7 | 1,1 | 57 | – | 83 | 1 | 0,025 | 14 |
| | – | 58,8 | – | 82,2 | 1,1 | 57 | 58 | 83 | 1 | 0,025 | 14 |

## 1.1 Single row deep groove ball bearings

d **50 – 55** mm

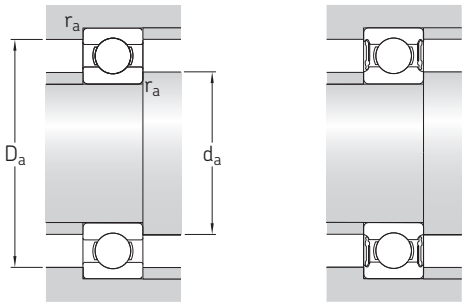



| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed[1] | Mass | Designations Bearing open or capped on both sides | capped on one side[1] |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **50** | 90 | 20 | 37,1 | 23,2 | 0,98 | 15 000 | 8 000 | 0,47 | ▸ 6210-2Z | 6210-Z |
| cont. | 90 | 20 | 37,1 | 23,2 | 0,98 | 15 000 | 8 000 | 0,48 | 6210-2RZ | 6210-RZ |
| | 90 | 23 | 35,1 | 23,2 | 0,98 | – | 4 800 | 0,54 | **62210-2RS1** | – |
| | 110 | 27 | 65 | 38 | 1,6 | 13 000 | 8 500 | 1,3 | 6310 M | – |
| | 110 | 27 | 65 | 38 | 1,6 | – | 4 300 | 1,1 | ▸ 6310-2RSH | ▸ 6310-RSH |
| | 110 | 27 | 65 | 38 | 1,6 | 13 000 | 8 500 | 1,1 | ▸ 6310 | – |
| | 110 | 27 | 65 | 38 | 1,6 | 13 000 | 6 700 | 1,1 | ▸ 6310-2Z | 6310-Z |
| | 110 | 40 | 61,8 | 38 | 1,6 | – | 4 300 | 1,6 | **62310-2RS1** | – |
| | 130 | 31 | 87,1 | 52 | 2,2 | 12 000 | 7 500 | 1,95 | **6410** | – |
| **55** | 72 | 9 | 9,04 | 8,8 | 0,375 | – | 5 300 | 0,083 | ▸ **61811-2RS1** | – |
| | 72 | 9 | 9,04 | 8,8 | 0,375 | 19 000 | 9 500 | 0,083 | ▸ **61811-2RZ** | – |
| | 72 | 9 | 9,04 | 8,8 | 0,375 | 19 000 | 12 000 | 0,083 | ▸ **61811** | – |
| | 80 | 13 | 16,5 | 14 | 0,6 | – | 5 000 | 0,19 | ▸ **61911-2RS1** | – |
| | 80 | 13 | 16,5 | 14 | 0,6 | 17 000 | 8 500 | 0,19 | **61911-2RZ** | – |
| | 80 | 13 | 16,5 | 14 | 0,6 | 17 000 | 11 000 | 0,19 | ▸ **61911** | – |
| | 90 | 11 | 20,3 | 14 | 0,695 | 16 000 | 10 000 | 0,26 | ▸ 16011 | – |
| | 90 | 18 | 29,6 | 21,2 | 0,9 | 16 000 | 14 000 | 0,44 | 6011 M | – |
| | 90 | 18 | 29,6 | 21,2 | 0,9 | 16 000 | 10 000 | 0,38 | ▸ 6011 | – |
| | 90 | 18 | 29,6 | 21,2 | 0,9 | – | 4 500 | 0,4 | ▸ 6011-2RS1 | 6011-RS1 |
| | 90 | 18 | 29,6 | 21,2 | 0,9 | 16 000 | 8 000 | 0,4 | ▸ 6011-2Z | 6011-Z |
| | 100 | 21 | 46,2 | 29 | 1,25 | 14 000 | 9 000 | 0,61 | ▸ 6211 | – |
| | 100 | 21 | 46,2 | 29 | 1,25 | 14 000 | 13 000 | 0,72 | 6211 M | – |
| | 100 | 21 | 46,2 | 29 | 1,25 | – | 4 300 | 0,62 | ▸ 6211-2RSH | ▸ 6211-RSH |
| | 100 | 21 | 46,2 | 29 | 1,25 | 14 000 | 7 000 | 0,64 | ▸ 6211-2Z | 6211-Z |
| | 100 | 25 | 43,6 | 29 | 1,25 | – | 4 300 | 0,75 | **62211-2RS1** | – |
| | 120 | 29 | 74,1 | 45 | 1,9 | 12 000 | 8 000 | 1,35 | ▸ 6311 | – |
| | 120 | 29 | 74,1 | 45 | 1,9 | 12 000 | 11 000 | 1,65 | 6311 M | – |
| | 120 | 29 | 74,1 | 45 | 1,9 | – | 3 800 | 1,4 | ▸ 6311-2RSH | ▸ 6311-RSH |
| | 120 | 29 | 74,1 | 45 | 1,9 | 12 000 | 6 300 | 1,4 | ▸ 6311-2Z | 6311-Z |
| | 120 | 43 | 71,5 | 45 | 1,9 | – | 3 800 | 2,05 | **62311-2RS1** | – |
| | 140 | 33 | 99,5 | 62 | 2,6 | 11 000 | 7 000 | 2,35 | **6411** | – |

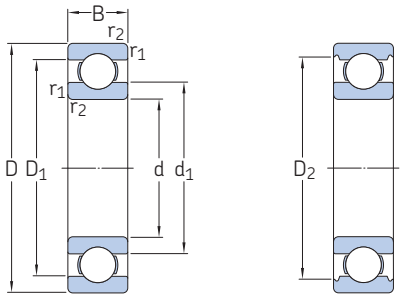
**SKF Explorer bearing**
▸ Popular item
[1] For bearings with only one shield or one non-contact seal (Z, RZ) the limiting speeds of the open bearings are valid.

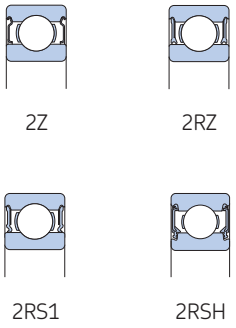



| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $d_2$ ≈ | $D_1$ ≈ | $D_2$ ≈ | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | $k_r$ | $f_0$ |
| mm | | | | | | mm | | | | – | |
| **50** | 62,5 | – | – | 81,7 | 1,1 | 57 | 62 | 83 | 1 | 0,025 | 14 |
| cont. | 62,5 | – | – | 81,7 | 1,1 | 57 | 62 | 83 | 1 | 0,025 | 14 |
| | 62,5 | – | – | 81,7 | 1,1 | 57 | 62 | 83 | 1 | 0,025 | 14 |
| | 68,7 | – | – | 95,2 | 2 | 61 | – | 99 | 2 | 0,03 | 13 |
| | – | 64,7 | – | 95,9 | 2 | 61 | 64 | 99 | 2 | 0,03 | 13 |
| | 68,7 | – | – | 95,2 | 2 | 61 | – | 99 | 2 | 0,03 | 13 |
| | 68,7 | – | – | 95,2 | 2 | 61 | 68 | 99 | 2 | 0,03 | 13 |
| | 68,7 | – | – | 95,2 | 2 | 61 | 68 | 99 | 2 | 0,03 | 13 |
| | 75,4 | – | 105 | – | 2,1 | 64 | – | 116 | 2 | 0,035 | 12 |
| **55** | 60,3 | – | – | 68,6 | 0,3 | 57 | 60 | 70 | 0,3 | 0,015 | 17 |
| | 60,3 | – | – | 68,6 | 0,3 | 57 | 60 | 70 | 0,3 | 0,015 | 17 |
| | 60,3 | – | 67 | – | 0,3 | 57 | – | 70 | 0,3 | 0,015 | 17 |
| | 63 | – | – | 74,2 | 1 | 60 | 63 | 75 | 1 | 0,02 | 16 |
| | 63 | – | – | 74,2 | 1 | 60 | 63 | 75 | 1 | 0,02 | 16 |
| | 63 | – | 72,3 | – | 1 | 60 | – | 75 | 1 | 0,02 | 16 |
| | 67 | – | 78,1 | – | 0,6 | 59 | – | 86 | 0,6 | 0,02 | 14 |
| | 66,3 | – | – | 81,5 | 1,1 | 61 | – | 84 | 1 | 0,025 | 15 |
| | 66,3 | – | – | 81,5 | 1,1 | 61 | – | 84 | 1 | 0,025 | 15 |
| | 66,3 | – | – | 81,5 | 1,1 | 61 | 66 | 84 | 1 | 0,025 | 15 |
| | 66,3 | – | – | 81,5 | 1,1 | 61 | 66 | 84 | 1 | 0,025 | 15 |
| | 69 | – | – | 89,4 | 1,5 | 64 | – | 91 | 1,5 | 0,025 | 14 |
| | 69 | – | – | 89,4 | 1,5 | 64 | – | 91 | 1,5 | 0,025 | 14 |
| | – | 65,2 | – | 90,5 | 1,5 | 64 | 64 | 91 | 1,5 | 0,025 | 14 |
| | 69 | – | – | 89,4 | 1,5 | 64 | 69 | 91 | 1,5 | 0,025 | 14 |
| | 69 | – | – | 89,4 | 1,5 | 64 | 69 | 91 | 1,5 | 0,025 | 14 |
| | 75,3 | – | – | 104 | 2 | 66 | – | 109 | 2 | 0,03 | 13 |
| | 75,3 | – | – | 104 | 2 | 66 | – | 109 | 2 | 0,03 | 13 |
| | – | 71,1 | – | 105 | 2 | 66 | 70 | 109 | 2 | 0,03 | 13 |
| | 75,3 | – | – | 104 | 2 | 66 | 75 | 109 | 2 | 0,03 | 13 |
| | 75,3 | – | – | 104 | 2 | 66 | 75 | 109 | 2 | 0,03 | 13 |
| | 81,5 | – | 114 | – | 2,1 | 69 | – | 126 | 2 | 0,035 | 12 |

## 1.1 Single row deep groove ball bearings

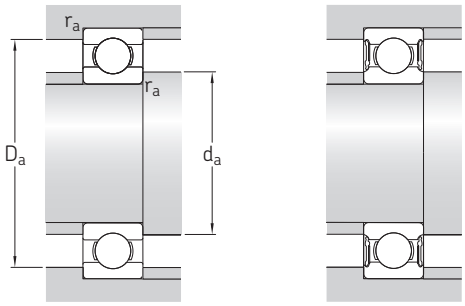
d **60 – 65** mm




| Principal dimensions | | | Basic load ratings | | Fatigue load limit | Speed ratings | | Mass | Designations | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | dynamic | static | | Reference speed | Limiting speed[1] | | Bearing open or capped on both sides | capped on one side[1] |
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **60** | 78 | 10 | 11,9 | 11,4 | 0,49 | – | 4 800 | 0,11 | ▸ **61812-2RS1** | – |
| | 78 | 10 | 11,9 | 11,4 | 0,49 | 17 000 | 8 500 | 0,11 | ▸ **61812-2RZ** | – |
| | 78 | 10 | 11,9 | 11,4 | 0,49 | 17 000 | 11 000 | 0,11 | ▸ **61812** | – |
| | 85 | 13 | 16,5 | 12 | 0,6 | – | 4 500 | 0,21 | ▸ **61912-2RS1** | – |
| | 85 | 13 | 16,5 | 12 | 0,6 | 16 000 | 10 000 | 0,2 | ▸ **61912** | – |
| | 85 | 13 | 16,5 | 14,3 | 0,6 | 16 000 | 8 000 | 0,2 | **61912-2RZ** | – |
| | 95 | 11 | 20,8 | 15 | 0,735 | 15 000 | 9 500 | 0,29 | ▸ 16012 | – |
| | 95 | 18 | 30,7 | 23,2 | 0,98 | 15 000 | 9 500 | 0,41 | ▸ 6012 | – |
| | 95 | 18 | 30,7 | 23,2 | 0,98 | – | 4 300 | 0,43 | ▸ 6012-2RS1 | 6012-RS1 |
| | 95 | 18 | 30,7 | 23,2 | 0,98 | 15 000 | 7 500 | 0,43 | 6012-2RZ | 6012-RZ |
| | 95 | 18 | 30,7 | 23,2 | 0,98 | 15 000 | 7 500 | 0,43 | ▸ 6012-2Z | 6012-Z |
| | 110 | 22 | 55,3 | 36 | 1,53 | 13 000 | 8 000 | 0,78 | ▸ 6212 | – |
| | 110 | 22 | 55,3 | 36 | 1,53 | 13 000 | 8 000 | 0,93 | 6212 M | – |
| | 110 | 22 | 55,3 | 36 | 1,53 | – | 4 000 | 0,79 | ▸ 6212-2RSH | ▸ 6212-RSH |
| | 110 | 22 | 55,3 | 36 | 1,53 | 13 000 | 6 300 | 0,81 | ▸ 6212-2Z | 6212-Z |
| | 110 | 28 | 52,7 | 36 | 1,53 | – | 4 000 | 1 | **62212-2RS1** | – |
| | 130 | 31 | 85,2 | 52 | 2,2 | 11 000 | 7 000 | 2,1 | 6312 M | – |
| | 130 | 31 | 85,2 | 52 | 2,2 | – | 3 400 | 1,75 | ▸ 6312-2RSH | ▸ 6312-RSH |
| | 130 | 31 | 85,2 | 52 | 2,2 | 11 000 | 5 600 | 1,8 | ▸ 6312-2Z | 6312-Z |
| | 130 | 31 | 85,2 | 52 | 2,2 | 11 000 | 7 000 | 1,7 | ▸ 6312 | – |
| | 130 | 46 | 81,9 | 52 | 2,2 | – | 3 400 | 2,55 | **62312-2RS1** | – |
| | 150 | 35 | 108 | 69,5 | 2,9 | 10 000 | 6 300 | 2,85 | **6412** | – |
| **65** | 85 | 10 | 12,4 | 12,7 | 0,54 | – | 4 500 | 0,13 | ▸ **61813-2RS1** | – |
| | 85 | 10 | 12,4 | 12,7 | 0,54 | 16 000 | 8 000 | 0,13 | ▸ **61813-2RZ** | – |
| | 85 | 10 | 12,4 | 12,7 | 0,54 | 16 000 | 10 000 | 0,13 | ▸ **61813** | – |
| | 90 | 13 | 17,4 | 16 | 0,68 | – | 4 300 | 0,22 | ▸ **61913-2RS1** | – |
| | 90 | 13 | 17,4 | 16 | 0,68 | 15 000 | 7 500 | 0,22 | **61913-2RZ** | – |
| | 90 | 13 | 17,4 | 16 | 0,68 | 15 000 | 9 500 | 0,22 | ▸ **61913** | – |
| | 100 | 11 | 22,5 | 19,6 | 0,83 | 14 000 | 9 000 | 0,3 | ▸ 16013 | – |
| | 100 | 18 | 31,9 | 25 | 1,06 | 14 000 | 9 000 | 0,44 | ▸ 6013 | – |
| | 100 | 18 | 31,9 | 25 | 1,06 | 14 000 | 12 000 | 0,44 | 6013 M | – |
| | 100 | 18 | 31,9 | 25 | 1,06 | – | 4 000 | 0,45 | ▸ 6013-2RS1 | 6013-RS1 |
| | 100 | 18 | 31,9 | 25 | 1,06 | 14 000 | 7 000 | 0,46 | ▸ 6013-2Z | 6013-Z |
| | 120 | 23 | 58,5 | 40,5 | 1,73 | 12 000 | 10 000 | 1,2 | 6213 M | – |

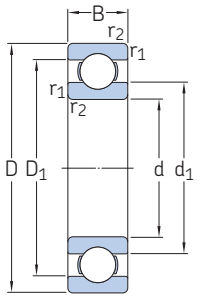
**SKF Explorer bearing**
▸ Popular item
[1] For bearings with only one shield or one non-contact seal (Z, RZ) the limiting speeds of the open bearings are valid.

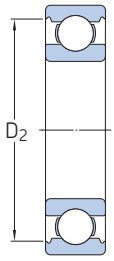


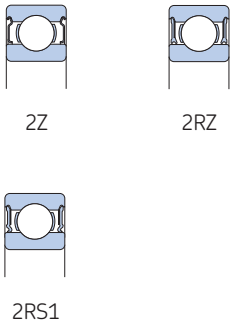

| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $d_2$ ≈ | $D_1$ ≈ | $D_2$ ≈ | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | $k_r$ | $f_0$ |
| mm | | | | | | mm | | | | – | |
| **60** | 65,4 | – | – | 74,5 | 0,3 | 62 | 65 | 76 | 0,3 | 0,015 | 17 |
| | 65,4 | – | – | 74,5 | 0,3 | 62 | 65 | 76 | 0,3 | 0,015 | 17 |
| | 65,4 | – | 72,9 | – | 0,3 | 62 | – | 76 | 0,3 | 0,015 | 17 |
| | 68,3 | – | – | 78,7 | 1 | 65 | 68 | 80 | 1 | 0,02 | 14 |
| | 68,3 | – | – | 78,7 | 1 | 65 | – | 80 | 1 | 0,02 | 14 |
| | 68,3 | – | – | 78,7 | 1 | 65 | 68 | 80 | 1 | 0,02 | 16 |
| | 72 | – | 83 | – | 0,6 | 64 | – | 91 | 0,6 | 0,02 | 14 |
| | 71,3 | – | – | 86,5 | 1,1 | 66 | – | 89 | 1 | 0,025 | 16 |
| | 71,3 | – | – | 86,5 | 1,1 | 66 | 71 | 89 | 1 | 0,025 | 16 |
| | 71,3 | – | – | 86,5 | 1,1 | 66 | 71 | 89 | 1 | 0,025 | 16 |
| | 71,3 | – | – | 86,5 | 1,1 | 66 | 71 | 89 | 1 | 0,025 | 16 |
| | 75,5 | – | – | 98 | 1,5 | 69 | – | 101 | 1,5 | 0,025 | 14 |
| | 75,5 | – | – | 98 | 1,5 | 69 | – | 101 | 1,5 | 0,025 | 14 |
| | – | 71,5 | – | 99,5 | 1,5 | 69 | 71 | 101 | 1,5 | 0,025 | 14 |
| | 75,5 | – | – | 98 | 1,5 | 69 | 75 | 101 | 1,5 | 0,025 | 14 |
| | 75,5 | – | – | 98 | 1,5 | 69 | 75 | 101 | 1,5 | 0,025 | 14 |
| | 81,8 | – | – | 113 | 2,1 | 72 | – | 118 | 2 | 0,03 | 13 |
| | – | 77,5 | – | 113 | 2,1 | 72 | 77 | 118 | 2 | 0,03 | 13 |
| | 81,8 | – | – | 113 | 2,1 | 72 | 81 | 118 | 2 | 0,03 | 13 |
| | 81,8 | – | – | 113 | 2,1 | 72 | – | 118 | 2 | 0,03 | 13 |
| | 81,8 | – | – | 113 | 2,1 | 72 | 81 | 118 | 2 | 0,03 | 13 |
| | 88,1 | – | 122 | – | 2,1 | 74 | – | 136 | 2 | 0,035 | 12 |
| **65** | 71,4 | – | – | 80,5 | 0,6 | 69 | 71 | 81 | 0,6 | 0,015 | 17 |
| | 71,4 | – | – | 80,5 | 0,6 | 69 | 71 | 81 | 0,6 | 0,015 | 17 |
| | 71,4 | – | 78,9 | – | 0,6 | 69 | – | 81 | 0,6 | 0,015 | 17 |
| | 73 | – | – | 84,2 | 1 | 70 | 73 | 85 | 1 | 0,02 | 17 |
| | 73 | – | – | 84,2 | 1 | 70 | 73 | 85 | 1 | 0,02 | 17 |
| | 73 | – | 82,3 | – | 1 | 70 | – | 85 | 1 | 0,02 | 17 |
| | 76,5 | – | 88,4 | – | 0,6 | 69 | – | 96 | 0,6 | 0,02 | 16 |
| | 76,3 | – | – | 91,5 | 1,1 | 71 | – | 94 | 1 | 0,025 | 16 |
| | 76,3 | – | – | 91,5 | 1,1 | 71 | – | 94 | 1 | 0,025 | 16 |
| | 76,3 | – | – | 91,5 | 1,1 | 71 | 76 | 94 | 1 | 0,025 | 16 |
| | 76,3 | – | – | 91,5 | 1,1 | 71 | 76 | 94 | 1 | 0,025 | 16 |
| | 83,3 | – | – | 106 | 1,5 | 74 | – | 111 | 1,5 | 0,025 | 15 |

## 1.1 Single row deep groove ball bearings

d **65 – 70** mm

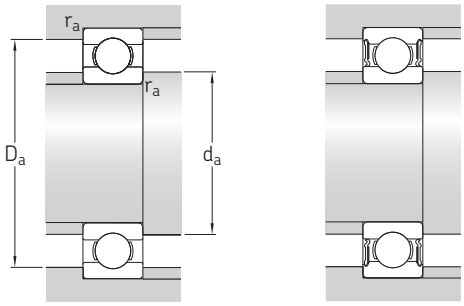



| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed[1] | Mass | Designations Bearing open or capped on both sides | capped on one side[1] |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **65** | 120 | 23 | 58,5 | 40,5 | 1,73 | 12 000 | 7 500 | 1 | ▸ 6213 | – |
| cont. | 120 | 23 | 58,5 | 40,5 | 1,73 | – | 3 600 | 1,05 | ▸ 6213-2RS1 | 6213-RS1 |
| | 120 | 23 | 58,5 | 40,5 | 1,73 | 12 000 | 6 000 | 1,05 | ▸ 6213-2Z | 6213-Z |
| | 120 | 31 | 55,9 | 40,5 | 1,73 | – | 3 600 | 1,4 | **62213-2RS1** | – |
| | 140 | 33 | 97,5 | 60 | 2,5 | 10 000 | 6 700 | 2,55 | 6313 M | – |
| | 140 | 33 | 97,5 | 60 | 2,5 | 10 000 | 6 700 | 2,1 | ▸ 6313 | – |
| | 140 | 33 | 97,5 | 60 | 2,5 | – | 3 200 | 2,15 | ▸ 6313-2RS1 | 6313-RS1 |
| | 140 | 33 | 97,5 | 60 | 2,5 | 10 000 | 5 300 | 2,15 | ▸ 6313-2Z | 6313-Z |
| | 140 | 48 | 92,3 | 60 | 2,5 | – | 3 200 | 3 | **62313-2RS1** | – |
| | 160 | 37 | 119 | 78 | 3,15 | 9 500 | 6 000 | 3,35 | **6413** | – |
| **70** | 90 | 10 | 12,4 | 13,2 | 0,56 | – | 4 300 | 0,14 | ▸ **61814-2RS1** | – |
| | 90 | 10 | 12,4 | 13,2 | 0,56 | 15 000 | 7 500 | 0,14 | ▸ **61814-2RZ** | – |
| | 90 | 10 | 12,4 | 13,2 | 0,56 | 15 000 | 9 000 | 0,14 | ▸ **61814** | – |
| | 100 | 16 | 23,8 | 18,3 | 0,9 | 14 000 | 8 500 | 0,34 | ▸ **61914** | – |
| | 100 | 16 | 23,8 | 21,2 | 0,9 | – | 4 000 | 0,35 | **61914-2RS1** | – |
| | 100 | 16 | 23,8 | 21,2 | 0,9 | 14 000 | 7 000 | 0,35 | **61914-2RZ** | – |
| | 110 | 13 | 29,1 | 25 | 1,06 | 13 000 | 8 000 | 0,44 | ▸ 16014 | – |
| | 110 | 20 | 39,7 | 31 | 1,32 | 13 000 | 11 000 | 0,7 | 6014 M | – |
| | 110 | 20 | 39,7 | 31 | 1,32 | 13 000 | 8 000 | 0,61 | ▸ 6014 | – |
| | 110 | 20 | 39,7 | 31 | 1,32 | – | 3 600 | 0,63 | ▸ 6014-2RS1 | 6014-RS1 |
| | 110 | 20 | 39,7 | 31 | 1,32 | 13 000 | 6 300 | 0,64 | ▸ 6014-2Z | 6014-Z |
| | 125 | 24 | 60,5 | 45 | 1,9 | 11 000 | 10 000 | 1,3 | 6214 M | – |
| | 125 | 24 | 63,7 | 45 | 1,9 | 11 000 | 7 000 | 1,1 | ▸ 6214 | – |
| | 125 | 24 | 63,7 | 45 | 1,9 | – | 3 400 | 1,1 | ▸ 6214-2RS1 | 6214-RS1 |
| | 125 | 24 | 63,7 | 45 | 1,9 | 11 000 | 5 600 | 1,15 | ▸ 6214-2Z | 6214-Z |
| | 125 | 31 | 60,5 | 45 | 1,9 | – | 3 400 | 1,4 | **62214-2RS1** | – |
| | 150 | 35 | 111 | 68 | 2,75 | 9 500 | 6 300 | 2,55 | ▸ 6314 | – |
| | 150 | 35 | 111 | 68 | 2,75 | 9 500 | 6 300 | 3,1 | 6314 M | – |
| | 150 | 35 | 111 | 68 | 2,75 | – | 3 000 | 2,6 | ▸ 6314-2RS1 | 6314-RS1 |
| | 150 | 35 | 111 | 68 | 2,75 | 9 500 | 5 000 | 2,65 | ▸ 6314-2Z | 6314-Z |
| | 150 | 51 | 104 | 68 | 2,75 | – | 3 000 | 3,75 | **62314-2RS1** | – |
| | 180 | 42 | 143 | 104 | 3,9 | 8 500 | 5 300 | 4,95 | **6414** | – |

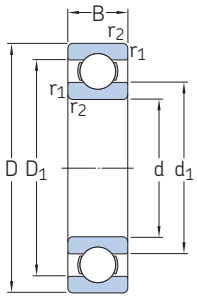
**SKF Explorer bearing**
▸ Popular item
[1] For bearings with only one shield or one non-contact seal (Z, RZ) the limiting speeds of the open bearings are valid.

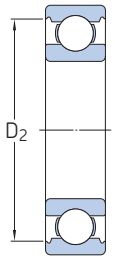


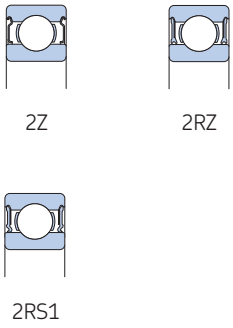

| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $d_2$ ≈ | $D_1$ ≈ | $D_2$ ≈ | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | $k_r$ | $f_0$ |
| mm | | | | | | mm | | | | – | |
| **65** | 83,3 | – | – | 106 | 1,5 | 74 | – | 111 | 1,5 | 0,025 | 15 |
| cont. | 83,3 | – | – | 106 | 1,5 | 74 | 83 | 111 | 1,5 | 0,025 | 15 |
| | 83,3 | – | – | 106 | 1,5 | 74 | 83 | 111 | 1,5 | 0,025 | 15 |
| | 83,3 | – | – | 106 | 1,5 | 74 | 83 | 111 | 1,5 | 0,025 | 15 |
| | 88,3 | – | – | 122 | 2,1 | 77 | – | 128 | 2 | 0,03 | 13 |
| | 88,3 | – | – | 122 | 2,1 | 77 | – | 128 | 2 | 0,03 | 13 |
| | 88,3 | – | – | 122 | 2,1 | 77 | 88 | 128 | 2 | 0,03 | 13 |
| | 88,3 | – | – | 122 | 2,1 | 77 | 88 | 128 | 2 | 0,03 | 13 |
| | 88,3 | – | – | 122 | 2,1 | 77 | 88 | 128 | 2 | 0,03 | 13 |
| | 94 | – | 131 | – | 2,1 | 79 | – | 146 | 2 | 0,035 | 12 |
| **70** | 76,4 | – | – | 85,5 | 0,6 | 74 | 76 | 86 | 0,6 | 0,015 | 17 |
| | 76,4 | – | – | 85,5 | 0,6 | 74 | 76 | 86 | 0,6 | 0,015 | 17 |
| | 76,4 | – | 83,9 | – | 0,6 | 74 | – | 86 | 0,6 | 0,015 | 17 |
| | 79,8 | – | – | 92,9 | 1 | 75 | – | 95 | 1 | 0,02 | 14 |
| | 79,8 | – | – | 92,9 | 1 | 75 | 79 | 95 | 1 | 0,02 | 16 |
| | 79,8 | – | – | 92,9 | 1 | 75 | 79 | 95 | 1 | 0,02 | 16 |
| | 83,3 | – | 96,8 | – | 0,6 | 74 | – | 106 | 0,6 | 0,02 | 16 |
| | 82,8 | – | – | 99,9 | 1,1 | 76 | – | 104 | 1 | 0,025 | 16 |
| | 82,8 | – | – | 99,9 | 1,1 | 76 | – | 104 | 1 | 0,025 | 16 |
| | 82,8 | – | – | 99,9 | 1,1 | 76 | 82 | 104 | 1 | 0,025 | 16 |
| | 82,8 | – | – | 99,9 | 1,1 | 76 | 82 | 104 | 1 | 0,025 | 16 |
| | 87 | – | – | 111 | 1,5 | 79 | – | 116 | 1,5 | 0,025 | 15 |
| | 87 | – | – | 111 | 1,5 | 79 | – | 116 | 1,5 | 0,025 | 15 |
| | 87 | – | – | 111 | 1,5 | 79 | 87 | 116 | 1,5 | 0,025 | 15 |
| | 87 | – | – | 111 | 1,5 | 79 | 87 | 116 | 1,5 | 0,025 | 15 |
| | 87 | – | – | 111 | 1,5 | 79 | 87 | 116 | 1,5 | 0,025 | 15 |
| | 94,9 | – | – | 130 | 2,1 | 82 | – | 138 | 2 | 0,03 | 13 |
| | 94,9 | – | – | 130 | 2,1 | 82 | – | 138 | 2 | 0,03 | 13 |
| | 94,9 | – | – | 130 | 2,1 | 82 | 94 | 138 | 2 | 0,03 | 13 |
| | 94,9 | – | – | 130 | 2,1 | 82 | 94 | 138 | 2 | 0,03 | 13 |
| | 94,9 | – | – | 130 | 2,1 | 82 | 94 | 138 | 2 | 0,03 | 13 |
| | 103 | – | 146 | – | 3 | 86 | – | 164 | 2,5 | 0,035 | 12 |

## 1.1 Single row deep groove ball bearings

d **75 – 80** mm

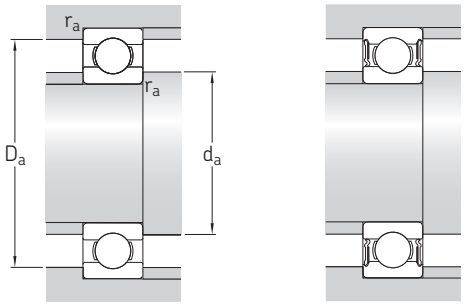



| Principal dimensions | | | Basic load ratings | | Fatigue load limit | Speed ratings | | Mass | Designations | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | dynamic | static | | Reference speed | Limiting speed[1] | | Bearing open or capped on both sides | capped on one side[1] |
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **75** | 95 | 10 | 12,5 | 10,8 | 0,585 | – | 4 000 | 0,15 | ▸ **61815-2RS1** | – |
| | 95 | 10 | 12,5 | 10,8 | 0,585 | 14 000 | 7 000 | 0,15 | ▸ **61815-2RZ** | – |
| | 95 | 10 | 12,5 | 10,8 | 0,585 | 14 000 | 8 500 | 0,15 | ▸ **61815** | – |
| | 105 | 16 | 24,2 | 19,3 | 0,965 | 13 000 | 8 000 | 0,36 | ▸ **61915** | – |
| | 105 | 16 | 24,2 | 22,4 | 0,965 | – | 3 600 | 0,37 | **61915-2RS1** | – |
| | 105 | 16 | 24,2 | 22,4 | 0,965 | 13 000 | 6 300 | 0,37 | **61915-2RZ** | – |
| | 115 | 13 | 30,2 | 27 | 1,14 | 12 000 | 7 500 | 0,46 | ▸ 16015 | – |
| | 115 | 20 | 41,6 | 33,5 | 1,43 | 12 000 | 10 000 | 0,74 | 6015 M | – |
| | 115 | 20 | 41,6 | 33,5 | 1,43 | 12 000 | 7 500 | 0,65 | ▸ 6015 | – |
| | 115 | 20 | 41,6 | 33,5 | 1,43 | – | 3 400 | 0,67 | ▸ 6015-2RS1 | 6015-RS1 |
| | 115 | 20 | 41,6 | 33,5 | 1,43 | 12 000 | 6 000 | 0,67 | 6015-2RZ | 6015-RZ |
| | 115 | 20 | 41,6 | 33,5 | 1,43 | 12 000 | 6 000 | 0,68 | ▸ 6015-2Z | 6015-Z |
| | 130 | 25 | 68,9 | 49 | 2,04 | 10 000 | 9 500 | 1,4 | 6215 M | – |
| | 130 | 25 | 68,9 | 49 | 2,04 | 10 000 | 6 700 | 1,2 | ▸ 6215 | – |
| | 130 | 25 | 68,9 | 49 | 2,04 | – | 3 200 | 1,2 | ▸ 6215-2RS1 | 6215-RS1 |
| | 130 | 25 | 68,9 | 49 | 2,04 | 10 000 | 5 300 | 1,25 | ▸ 6215-2Z | 6215-Z |
| | 160 | 37 | 119 | 76,5 | 3 | 9 000 | 5 600 | 3,05 | ▸ 6315 | – |
| | 160 | 37 | 119 | 76,5 | 3 | 9 000 | 5 600 | 3,7 | 6315 M | – |
| | 160 | 37 | 119 | 76,5 | 3 | – | 2 800 | 3,15 | ▸ 6315-2RS1 | 6315-RS1 |
| | 160 | 37 | 119 | 76,5 | 3 | 9 000 | 4 500 | 3,15 | ▸ 6315-2Z | 6315-Z |
| | 190 | 45 | 153 | 114 | 4,15 | 8 000 | 5 000 | 5,8 | **6415** | – |
| **80** | 100 | 10 | 12,7 | 11,2 | 0,61 | – | 3 600 | 0,16 | ▸ **61816-2RS1** | – |
| | 100 | 10 | 12,7 | 11,2 | 0,61 | 13 000 | 8 000 | 0,15 | ▸ **61816** | – |
| | 110 | 16 | 25,1 | 20,4 | 1,02 | – | 3 400 | 0,4 | ▸ **61916-2RS1** | – |
| | 110 | 16 | 25,1 | 20,4 | 1,02 | 12 000 | 6 000 | 0,4 | ▸ **61916-2RZ** | – |
| | 110 | 16 | 25,1 | 20,4 | 1,02 | 12 000 | 7 500 | 0,38 | ▸ **61916** | – |
| | 125 | 14 | 35,1 | 31,5 | 1,32 | 11 000 | 7 000 | 0,61 | ▸ 16016 | – |
| | 125 | 22 | 49,4 | 40 | 1,66 | 11 000 | 7 000 | 0,86 | ▸ 6016 | – |
| | 125 | 22 | 49,4 | 40 | 1,66 | – | 3 200 | 0,88 | ▸ 6016-2RS1 | 6016-RS1 |
| | 125 | 22 | 49,4 | 40 | 1,66 | 11 000 | 5 600 | 0,89 | ▸ 6016-2Z | 6016-Z |
| | 140 | 26 | 72,8 | 55 | 2,2 | 9 500 | 6 000 | 1,45 | ▸ 6216 | – |
| | 140 | 26 | 72,8 | 55 | 2,2 | 9 500 | 8 500 | 1,7 | 6216 M | – |
| | 140 | 26 | 72,8 | 55 | 2,2 | – | 3 000 | 1,5 | ▸ 6216-2RS1 | 6216-RS1 |

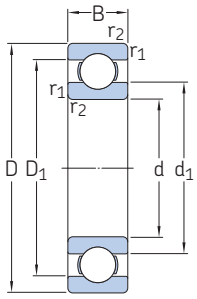
**SKF Explorer bearing**
▸ Popular item
[1] For bearings with only one shield or one non-contact seal (Z, RZ) the limiting speeds of the open bearings are valid.

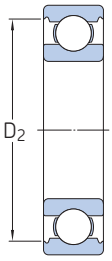


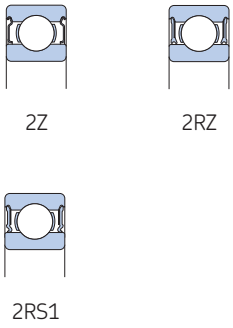

| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $d_2$ ≈ | $D_1$ ≈ | $D_2$ ≈ | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | $k_r$ | $f_0$ |
| mm | | | | | | mm | | | | – | |
| **75** | 81,7 | – | – | 90,7 | 1,3 | 79 | 81 | 91 | 0,6 | 0,015 | 13 |
| | 81,7 | – | – | 90,7 | 1,3 | 79 | 81 | 91 | 0,6 | 0,015 | 13 |
| | 81,7 | – | – | 90,7 | 1,3 | 79 | – | 91 | 0,6 | 0,015 | 13 |
| | 84,8 | – | – | 97,9 | 1,9 | 80 | – | 100 | 1 | 0,02 | 14 |
| | 84,7 | – | – | 98,3 | 1 | 80 | 84 | 100 | 1 | 0,02 | 17 |
| | 84,7 | – | – | 98,3 | 1 | 80 | 84 | 100 | 1 | 0,02 | 17 |
| | 88,3 | – | 102 | – | 0,6 | 79 | – | 111 | 0,6 | 0,02 | 16 |
| | 87,8 | – | – | 105 | 1,1 | 81 | – | 109 | 1 | 0,025 | 16 |
| | 87,8 | – | – | 105 | 1,1 | 81 | – | 109 | 1 | 0,025 | 16 |
| | 87,8 | – | – | 105 | 1,1 | 81 | 87 | 109 | 1 | 0,025 | 16 |
| | 87,8 | – | – | 105 | 1,1 | 81 | 87 | 109 | 1 | 0,025 | 16 |
| | 87,8 | – | – | 105 | 1,1 | 81 | 87 | 109 | 1 | 0,025 | 16 |
| | 92 | – | – | 117 | 1,5 | 84 | – | 121 | 1,5 | 0,025 | 15 |
| | 92 | – | – | 117 | 1,5 | 84 | – | 121 | 1,5 | 0,025 | 15 |
| | 92 | – | – | 117 | 1,5 | 84 | 92 | 121 | 1,5 | 0,025 | 15 |
| | 92 | – | – | 117 | 1,5 | 84 | 92 | 121 | 1,5 | 0,025 | 15 |
| | 101 | – | – | 139 | 2,1 | 87 | – | 148 | 2 | 0,03 | 13 |
| | 101 | – | – | 139 | 2,1 | 87 | – | 148 | 2 | 0,03 | 13 |
| | 101 | – | – | 139 | 2,1 | 87 | 100 | 148 | 2 | 0,03 | 13 |
| | 101 | – | – | 139 | 2,1 | 87 | 100 | 148 | 2 | 0,03 | 13 |
| | 110 | – | 155 | – | 3 | 91 | – | 174 | 2,5 | 0,035 | 12 |
| **80** | 86,7 | – | – | 95,7 | 1,3 | 84 | 86 | 96 | 0,6 | 0,015 | 13 |
| | 86,7 | – | – | 95,7 | 1,3 | 84 | – | 96 | 0,6 | 0,015 | 13 |
| | 89,8 | – | – | 103 | 1 | 85 | 89 | 105 | 1 | 0,02 | 14 |
| | 89,8 | – | – | 103 | 1 | 85 | 89 | 105 | 1 | 0,02 | 14 |
| | 89,8 | – | – | 103 | 1 | 85 | – | 105 | 1 | 0,02 | 14 |
| | 95,3 | – | 110 | – | 0,6 | 84 | – | 121 | 0,6 | 0,02 | 16 |
| | 94,4 | – | – | 115 | 1,1 | 86 | – | 119 | 1 | 0,025 | 16 |
| | 94,4 | – | – | 115 | 1,1 | 86 | 94 | 119 | 1 | 0,025 | 16 |
| | 94,4 | – | – | 115 | 1,1 | 86 | 94 | 119 | 1 | 0,025 | 16 |
| | 101 | – | – | 127 | 2 | 91 | – | 129 | 2 | 0,025 | 15 |
| | 101 | – | – | 127 | 2 | 91 | – | 129 | 2 | 0,025 | 15 |
| | 101 | – | – | 127 | 2 | 91 | 100 | 129 | 2 | 0,025 | 15 |

## 1.1 Single row deep groove ball bearings

d **80 – 90** mm



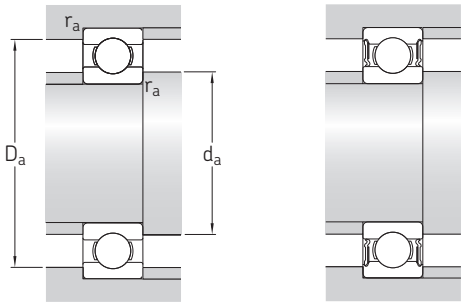




| Principal dimensions | | | Basic load ratings | | Fatigue load limit | Speed ratings | | Mass | Designations | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | dynamic | static | | Reference speed | Limiting speed[1] | | Bearing open or capped on both sides | capped on one side[1] |
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **80** | 140 | 26 | 72,8 | 55 | 2,2 | 9 500 | 4 800 | 1,55 | ▸ 6216-2Z | 6216-Z |
| cont. | 170 | 39 | 130 | 86,5 | 3,25 | 8 500 | 7 500 | 4,4 | 6316 M | – |
| | 170 | 39 | 130 | 86,5 | 3,25 | 8 500 | 5 300 | 3,65 | ▸ 6316 | – |
| | 170 | 39 | 130 | 86,5 | 3,25 | – | 2 600 | 3,7 | ▸ 6316-2RS1 | 6316-RS1 |
| | 170 | 39 | 130 | 86,5 | 3,25 | 8 500 | 4 300 | 3,75 | ▸ 6316-2Z | 6316-Z |
| | 200 | 48 | 163 | 125 | 4,5 | 7 500 | 4 800 | 6,85 | **6416** | – |
| **85** | 110 | 13 | 19,5 | 16,6 | 0,88 | – | 3 400 | 0,28 | ▸ **61817-2RS1** | – |
| | 110 | 13 | 19,5 | 16,6 | 0,88 | 12 000 | 6 000 | 0,28 | ▸ **61817-2RZ** | – |
| | 110 | 13 | 19,5 | 16,6 | 0,88 | 12 000 | 7 500 | 0,26 | ▸ **61817** | – |
| | 120 | 18 | 31,9 | 30 | 1,25 | 11 000 | 7 000 | 0,55 | ▸ **61917** | – |
| | 130 | 14 | 35,8 | 33,5 | 1,37 | 11 000 | 6 700 | 0,64 | ▸ 16017 | – |
| | 130 | 22 | 52 | 43 | 1,76 | 11 000 | 6 700 | 0,9 | ▸ 6017 | – |
| | 130 | 22 | 52 | 43 | 1,76 | – | 3 000 | 0,93 | ▸ 6017-2RS1 | 6017-RS1 |
| | 130 | 22 | 52 | 43 | 1,76 | 11 000 | 5 300 | 0,94 | ▸ 6017-2Z | 6017-Z |
| | 150 | 28 | 87,1 | 64 | 2,5 | 9 000 | 8 000 | 2 | 6217 M | – |
| | 150 | 28 | 87,1 | 64 | 2,5 | 9 000 | 5 600 | 1,8 | ▸ 6217 | – |
| | 150 | 28 | 87,1 | 64 | 2,5 | – | 2 800 | 1,9 | ▸ 6217-2RS1 | 6217-RS1 |
| | 150 | 28 | 87,1 | 64 | 2,5 | 9 000 | 4 500 | 1,9 | ▸ 6217-2Z | 6217-Z |
| | 180 | 41 | 140 | 96,5 | 3,55 | 8 000 | 5 000 | 4,25 | ▸ 6317 | – |
| | 180 | 41 | 140 | 96,5 | 3,55 | 8 000 | 7 500 | 5,2 | 6317 M | – |
| | 180 | 41 | 140 | 96,5 | 3,55 | – | 2 400 | 4,35 | ▸ 6317-2RS1 | 6317-RS1 |
| | 180 | 41 | 140 | 96,5 | 3,55 | 8 000 | 4 000 | 4,4 | ▸ 6317-2Z | 6317-Z |
| | 210 | 52 | 174 | 137 | 4,75 | 7 000 | 4 500 | 8,05 | **6417** | – |
| **90** | 115 | 13 | 19,5 | 17 | 0,915 | – | 3 200 | 0,29 | ▸ **61818-2RS1** | – |
| | 115 | 13 | 19,5 | 17 | 0,915 | 11 000 | 5 600 | 0,29 | ▸ **61818-2RZ** | – |
| | 115 | 13 | 19,5 | 17 | 0,915 | 11 000 | 7 000 | 0,28 | ▸ **61818** | – |
| | 125 | 18 | 33,2 | 31,5 | 1,29 | 11 000 | 6 700 | 0,59 | ▸ **61918** | – |
| | 140 | 16 | 43,6 | 39 | 1,56 | 10 000 | 6 300 | 0,85 | ▸ 16018 | – |
| | 140 | 24 | 60,5 | 50 | 1,96 | 10 000 | 8 500 | 1,35 | 6018 M | – |
| | 140 | 24 | 60,5 | 50 | 1,96 | 10 000 | 6 300 | 1,15 | ▸ 6018 | – |
| | 140 | 24 | 60,5 | 50 | 1,96 | – | 2 800 | 1,2 | ▸ 6018-2RS1 | 6018-RS1 |
| | 140 | 24 | 60,5 | 50 | 1,96 | 10 000 | 5 000 | 1,2 | ▸ 6018-2Z | 6018-Z |
| | 160 | 30 | 101 | 73,5 | 2,8 | 8 500 | 5 300 | 2,2 | ▸ 6218 | – |
| | 160 | 30 | 101 | 73,5 | 2,8 | 8 500 | 5 300 | 2,65 | 6218 M | – |
| | 160 | 30 | 101 | 73,5 | 2,8 | – | 2 600 | 2,3 | ▸ 6218-2RS1 | 6218-RS1 |

**SKF Explorer bearing**

▸ Popular item

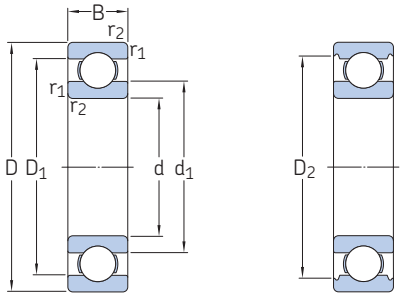
1) For bearings with only one shield or one non-contact seal (Z, RZ) the limiting speeds of the open bearings are valid.

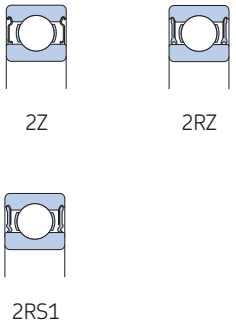



| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $d_2$ ≈ | $D_1$ ≈ | $D_2$ ≈ | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | $k_r$ | $f_0$ |
| mm | | | | | | mm | | | | – | |
| **80** cont. | 101 | – | – | 127 | 2 | 91 | 100 | 129 | 2 | 0,025 | 15 |
| | 108 | – | – | 147 | 2,1 | 92 | – | 158 | 2 | 0,03 | 13 |
| | 108 | – | – | 147 | 2,1 | 92 | – | 158 | 2 | 0,03 | 13 |
| | 108 | – | – | 147 | 2,1 | 92 | 107 | 158 | 2 | 0,03 | 13 |
| | 108 | – | – | 147 | 2,1 | 92 | 107 | 158 | 2 | 0,03 | 13 |
| | 116 | – | 163 | – | 3 | 96 | – | 184 | 2,5 | 0,035 | 12 |
| **85** | 93,3 | – | – | 105 | 1,9 | 90 | 93 | 105 | 1 | 0,015 | 14 |
| | 93,3 | – | – | 105 | 1,9 | 90 | 93 | 105 | 1 | 0,015 | 14 |
| | 93,3 | – | – | 105 | 1,9 | 90 | – | 105 | 1 | 0,015 | 14 |
| | 96,4 | – | 109 | – | 1,1 | 91 | – | 114 | 1 | 0,02 | 16 |
| | 100 | – | 115 | – | 0,6 | 89 | – | 126 | 0,6 | 0,02 | 17 |
| | 99,4 | – | – | 120 | 1,1 | 92 | – | 123 | 1 | 0,025 | 16 |
| | 99,4 | – | – | 120 | 1,1 | 92 | 99 | 123 | 1 | 0,025 | 16 |
| | 99,4 | – | – | 120 | 1,1 | 92 | 99 | 123 | 1 | 0,025 | 16 |
| | 106 | – | – | 135 | 2 | 96 | – | 139 | 2 | 0,025 | 15 |
| | 106 | – | – | 135 | 2 | 96 | – | 139 | 2 | 0,025 | 15 |
| | 106 | – | – | 135 | 2 | 96 | 105 | 139 | 2 | 0,025 | 15 |
| | 106 | – | – | 135 | 2 | 96 | 105 | 139 | 2 | 0,025 | 15 |
| | 114 | – | – | 156 | 3 | 99 | – | 166 | 2,5 | 0,03 | 13 |
| | 114 | – | – | 156 | 3 | 99 | – | 166 | 2,5 | 0,03 | 13 |
| | 114 | – | – | 156 | 3 | 99 | 114 | 166 | 2,5 | 0,03 | 13 |
| | 114 | – | – | 156 | 3 | 99 | 114 | 166 | 2,5 | 0,03 | 13 |
| | 123 | – | 172 | – | 4 | 105 | – | 190 | 3 | 0,035 | 12 |
| **90** | 98,3 | – | – | 110 | 1 | 95 | 98 | 110 | 1 | 0,015 | 13 |
| | 98,3 | – | – | 110 | 1 | 95 | 98 | 110 | 1 | 0,015 | 13 |
| | 98,3 | – | – | 110 | 1 | 95 | – | 110 | 1 | 0,015 | 13 |
| | 101 | – | 114 | – | 1,1 | 96 | – | 119 | 1 | 0,02 | 17 |
| | 106 | – | 124 | – | 1 | 95 | – | 135 | 1 | 0,02 | 16 |
| | 105 | – | – | 129 | 1,5 | 97 | – | 133 | 1,5 | 0,025 | 16 |
| | 105 | – | – | 129 | 1,5 | 97 | – | 133 | 1,5 | 0,025 | 16 |
| | 105 | – | – | 129 | 1,5 | 97 | 105 | 133 | 1,5 | 0,025 | 16 |
| | 105 | – | – | 129 | 1,5 | 97 | 105 | 133 | 1,5 | 0,025 | 16 |
| | 112 | – | – | 143 | 2 | 101 | – | 149 | 2 | 0,025 | 15 |
| | 112 | – | – | 143 | 2 | 101 | – | 149 | 2 | 0,025 | 15 |
| | 112 | – | – | 143 | 2 | 101 | 112 | 149 | 2 | 0,025 | 15 |

## 1.1 Single row deep groove ball bearings

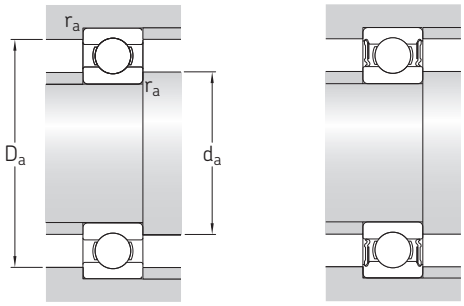
d **90 – 100** mm




| Principal dimensions | | | Basic load ratings | | Fatigue load limit | Speed ratings | | Mass | Designations | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | dynamic | static | | Reference speed | Limiting speed[1] | | Bearing open or capped on both sides | capped on one side[1] |
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **90** | 160 | 30 | 101 | 73,5 | 2,8 | 8 500 | 4 300 | 2,3 | ▸ 6218-2Z | 6218-Z |
| cont. | 190 | 43 | 151 | 108 | 3,8 | 7 500 | 7 000 | 6,1 | 6318 M | – |
| | 190 | 43 | 151 | 108 | 3,8 | 7 500 | 4 800 | 4,95 | ▸ 6318 | – |
| | 190 | 43 | 151 | 108 | 3,8 | – | 2 400 | 5,1 | ▸ 6318-2RS1 | 6318-RS1 |
| | 190 | 43 | 151 | 108 | 3,8 | 7 500 | 3 800 | 5,15 | ▸ 6318-2Z | 6318-Z |
| | 225 | 54 | 186 | 150 | 5 | 6 700 | 4 300 | 9,8 | **6418** | – |
| **95** | 120 | 13 | 19,9 | 17,6 | 0,93 | – | 3 000 | 0,31 | ▸ **61819-2RS1** | – |
| | 120 | 13 | 19,9 | 17,6 | 0,93 | 11 000 | 6 700 | 0,29 | ▸ **61819** | – |
| | 130 | 18 | 33,8 | 33,5 | 1,34 | – | 3 000 | 0,65 | **61919-2RS1** | – |
| | 130 | 18 | 33,8 | 33,5 | 1,34 | 10 000 | 6 300 | 0,61 | **61919** | – |
| | 145 | 16 | 44,9 | 41,5 | 1,63 | 9 500 | 6 000 | 0,89 | ▸ 16019 | – |
| | 145 | 24 | 63,7 | 54 | 2,08 | 9 500 | 6 000 | 1,2 | ▸ 6019 | – |
| | 145 | 24 | 63,7 | 54 | 2,08 | – | 2 800 | 1,25 | ▸ 6019-2RS1 | – |
| | 145 | 24 | 63,7 | 54 | 2,08 | 9 500 | 4 800 | 1,25 | ▸ 6019-2Z | 6019-Z |
| | 170 | 32 | 114 | 81,5 | 3 | 8 000 | 5 000 | 2,65 | ▸ 6219 | – |
| | 170 | 32 | 114 | 81,5 | 3 | 8 000 | 5 000 | 3,2 | 6219 M | – |
| | 170 | 32 | 114 | 81,5 | 3 | – | 2 400 | 2,7 | ▸ 6219-2RS1 | 6219-RS1 |
| | 170 | 32 | 114 | 81,5 | 3 | 8 000 | 4 000 | 2,7 | ▸ 6219-2Z | 6219-Z |
| | 200 | 45 | 159 | 118 | 4,15 | 7 000 | 4 500 | 5,75 | ▸ 6319 | – |
| | 200 | 45 | 159 | 118 | 4,15 | 7 000 | 6 300 | 7,05 | 6319 M | – |
| | 200 | 45 | 159 | 118 | 4,15 | – | 2 200 | 5,85 | ▸ 6319-2RS1 | 6319-RS1 |
| | 200 | 45 | 159 | 118 | 4,15 | 7 000 | 3 600 | 5,85 | ▸ 6319-2Z | 6319-Z |
| **100** | 125 | 13 | 17,8 | 18,3 | 0,95 | – | 3 000 | 0,32 | ▸ **61820-2RS1** | – |
| | 125 | 13 | 17,8 | 18,3 | 0,95 | 10 000 | 5 300 | 0,32 | ▸ **61820-2RZ** | – |
| | 125 | 13 | 17,8 | 18,3 | 0,95 | 10 000 | 6 300 | 0,3 | ▸ **61820** | – |
| | 140 | 20 | 42,3 | 41,5 | 1,63 | 9 500 | 6 000 | 0,83 | **61920** | – |
| | 150 | 16 | 46,2 | 44 | 1,7 | 9 500 | 5 600 | 0,94 | ▸ 16020 | – |
| | 150 | 24 | 63,7 | 54 | 2,04 | 9 500 | 7 500 | 1,45 | 6020 M | – |
| | 150 | 24 | 63,7 | 54 | 2,04 | 9 500 | 5 600 | 1,25 | ▸ 6020 | – |
| | 150 | 24 | 63,7 | 54 | 2,04 | – | 2 600 | 1,3 | ▸ 6020-2RS1 | 6020-RS1 |
| | 150 | 24 | 63,7 | 54 | 2,04 | 9 500 | 4 500 | 1,3 | ▸ 6020-2Z | 6020-Z |
| | 180 | 34 | 127 | 93 | 3,35 | 7 500 | 4 800 | 3,2 | ▸ 6220 | – |
| | 180 | 34 | 127 | 93 | 3,35 | 7 500 | 7 000 | 3,8 | 6220 M | – |
| | 180 | 34 | 127 | 93 | 3,35 | – | 2 400 | 3,3 | ▸ 6220-2RS1 | 6220-RS1 |

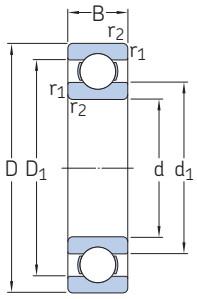
**SKF Explorer bearing**
▸ Popular item
[1] For bearings with only one shield or one non-contact seal (Z, RZ) the limiting speeds of the open bearings are valid.

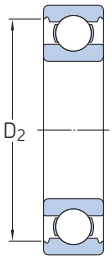


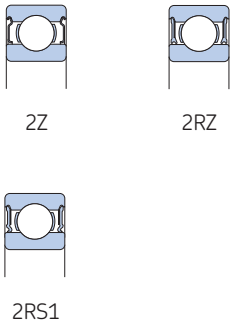

| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $d_2$ ≈ | $D_1$ ≈ | $D_2$ ≈ | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | $k_r$ | $f_0$ |
| mm | | | | | | mm | | | | – | |
| **90** cont. | 112 | – | – | 143 | 2 | 101 | 112 | 149 | 2 | 0,025 | 15 |
| | 121 | – | – | 164 | 3 | 104 | – | 176 | 2,5 | 0,03 | 13 |
| | 121 | – | – | 164 | 3 | 104 | – | 176 | 2,5 | 0,03 | 13 |
| | 121 | – | – | 164 | 3 | 104 | 120 | 176 | 2,5 | 0,03 | 13 |
| | 121 | – | – | 164 | 3 | 104 | 120 | 176 | 2,5 | 0,03 | 13 |
| | 132 | – | 181 | – | 4 | 110 | – | 205 | 3 | 0,035 | 13 |
| **95** | 103 | – | – | 115 | 1 | 100 | 102 | 115 | 1 | 0,015 | 13 |
| | 103 | – | – | 115 | 1 | 100 | – | 115 | 1 | 0,015 | 13 |
| | 106 | – | – | 122 | 1,1 | 101 | 105 | 124 | 1 | 0,02 | 17 |
| | 106 | – | 119 | – | 1,1 | 101 | – | 124 | 1 | 0,02 | 17 |
| | 111 | – | 129 | – | 1 | 100 | – | 140 | 1 | 0,02 | 16 |
| | 111 | – | – | 134 | 1,5 | 102 | – | 138 | 1,5 | 0,025 | 16 |
| | 111 | – | – | 134 | 1,5 | 102 | 111 | 138 | 1,5 | 0,025 | 16 |
| | 111 | – | – | 134 | 1,5 | 102 | 111 | 138 | 1,5 | 0,025 | 16 |
| | 118 | – | – | 152 | 2,1 | 107 | – | 158 | 2 | 0,025 | 14 |
| | 118 | – | – | 152 | 2,1 | 107 | – | 158 | 2 | 0,025 | 14 |
| | 118 | – | – | 152 | 2,1 | 107 | 118 | 158 | 2 | 0,025 | 14 |
| | 118 | – | – | 152 | 2,1 | 107 | 118 | 158 | 2 | 0,025 | 14 |
| | 127 | – | – | 172 | 3 | 109 | – | 186 | 2,5 | 0,03 | 13 |
| | 127 | – | – | 172 | 3 | 109 | – | 186 | 2,5 | 0,03 | 13 |
| | 127 | – | – | 172 | 3 | 109 | 127 | 186 | 2,5 | 0,03 | 13 |
| | 127 | – | – | 172 | 3 | 109 | 127 | 186 | 2,5 | 0,03 | 13 |
| **100** | 108 | – | – | 120 | 1 | 105 | 107 | 120 | 1 | 0,015 | 13 |
| | 108 | – | – | 120 | 1 | 105 | 107 | 120 | 1 | 0,015 | 13 |
| | 108 | – | – | 120 | 1 | 105 | – | 120 | 1 | 0,015 | 13 |
| | 112 | – | 128 | – | 1,1 | 106 | – | 134 | 1 | 0,02 | 16 |
| | 116 | – | 134 | – | 1 | 105 | – | 145 | 1 | 0,02 | 17 |
| | 115 | – | – | 139 | 1,5 | 107 | – | 143 | 1,5 | 0,025 | 16 |
| | 115 | – | – | 139 | 1,5 | 107 | – | 143 | 1,5 | 0,025 | 16 |
| | 115 | – | – | 139 | 1,5 | 107 | 115 | 143 | 1,5 | 0,025 | 16 |
| | 115 | – | – | 139 | 1,5 | 107 | 115 | 143 | 1,5 | 0,025 | 16 |
| | 124 | – | – | 160 | 2,1 | 112 | – | 168 | 2 | 0,025 | 14 |
| | 124 | – | – | 160 | 2,1 | 112 | – | 168 | 2 | 0,025 | 14 |
| | 124 | – | – | 160 | 2,1 | 112 | 124 | 168 | 2 | 0,025 | 14 |

## 1.1 Single row deep groove ball bearings

d **100 – 110** mm

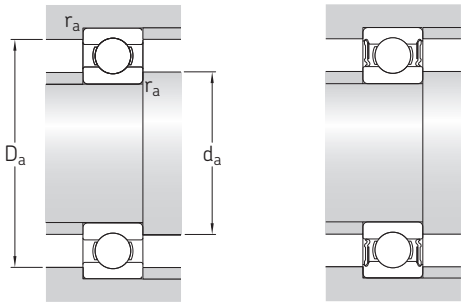



| Principal dimensions | | | Basic load ratings | | Fatigue load limit | Speed ratings | | Mass | Designations | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | dynamic | static | | Reference speed | Limiting speed[1] | | Bearing open or capped on both sides | capped on one side[1] |
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **100** | 180 | 34 | 127 | 93 | 3,35 | 7 500 | 3 800 | 3,3 | ▸ 6220-2Z | 6220-Z |
| cont. | 215 | 47 | 174 | 140 | 4,75 | 6 700 | 4 300 | 7,1 | ▸ **6320** | – |
| | 215 | 47 | 174 | 140 | 4,75 | 6 700 | 6 000 | 8,7 | **6320 M** | – |
| | 215 | 47 | 174 | 140 | 4,75 | – | 2 000 | 7,2 | ▸ **6320-2RS1** | **6320-RS1** |
| | 215 | 47 | 174 | 140 | 4,75 | 6 700 | 3 400 | 7,3 | ▸ **6320-2Z** | **6320-Z** |
| **105** | 130 | 13 | 20,8 | 19,6 | 1 | – | 2 800 | 0,33 | ▸ **61821-2RS1** | – |
| | 130 | 13 | 20,8 | 19,6 | 1 | 10 000 | 5 000 | 0,33 | ▸ **61821-2RZ** | – |
| | 130 | 13 | 20,8 | 19,6 | 1 | 10 000 | 6 300 | 0,31 | ▸ **61821** | – |
| | 145 | 20 | 44,2 | 44 | 1,7 | 9 500 | 5 600 | 0,87 | **61921** | – |
| | 160 | 18 | 54 | 51 | 1,86 | 8 500 | 5 300 | 1,2 | ▸ 16021 | – |
| | 160 | 26 | 76,1 | 65,5 | 2,4 | 8 500 | 5 300 | 1,6 | ▸ 6021 | – |
| | 160 | 26 | 76,1 | 65,5 | 2,4 | 8 500 | 7 500 | 1,85 | 6021 M | – |
| | 160 | 26 | 76,1 | 65,5 | 2,4 | – | 2 400 | 1,65 | ▸ 6021-2RS1 | 6021-RS1 |
| | 160 | 26 | 76,1 | 65,5 | 2,4 | 8 500 | 4 300 | 1,65 | ▸ 6021-2Z | 6021-Z |
| | 190 | 36 | 140 | 104 | 3,65 | 7 000 | 4 500 | 3,8 | ▸ 6221 | – |
| | 190 | 36 | 140 | 104 | 3,65 | 7 000 | 3 600 | 3,9 | ▸ 6221-2Z | 6221-Z |
| | 225 | 49 | 182 | 153 | 5,1 | 6 300 | 3 200 | 8,25 | 6321-2Z | 6321-Z |
| | 225 | 49 | 182 | 153 | 5,1 | 6 300 | 4 000 | 8,2 | ▸ **6321** | – |
| **110** | 140 | 16 | 28,1 | 26 | 1,25 | – | 2 600 | 0,6 | ▸ **61822-2RS1** | – |
| | 140 | 16 | 28,1 | 26 | 1,25 | 9 500 | 4 500 | 0,6 | ▸ **61822-2RZ** | – |
| | 140 | 16 | 28,1 | 26 | 1,25 | 9 500 | 5 600 | 0,47 | ▸ **61822** | – |
| | 150 | 20 | 43,6 | 45 | 1,66 | 9 000 | 5 600 | 0,9 | ▸ **61922** | – |
| | 150 | 20 | 43,6 | 45 | 1,66 | 9 000 | 7 500 | 1,05 | ▸ **61922 MA** | – |
| | 170 | 19 | 60,5 | 57 | 2,04 | 8 000 | 5 000 | 1,45 | ▸ 16022 | – |
| | 170 | 28 | 85,2 | 73,5 | 2,6 | 8 000 | 5 000 | 1,95 | ▸ 6022 | – |
| | 170 | 28 | 85,2 | 73,5 | 2,6 | 8 000 | 7 000 | 2,3 | 6022 M | – |
| | 170 | 28 | 85,2 | 73,5 | 2,6 | – | 2 400 | 2 | ▸ 6022-2RS1 | 6022-RS1 |
| | 170 | 28 | 85,2 | 73,5 | 2,6 | 8 000 | 4 000 | 2,05 | ▸ 6022-2Z | 6022-Z |
| | 200 | 38 | 151 | 118 | 4 | 6 700 | 4 300 | 4,45 | ▸ 6222 | – |
| | 200 | 38 | 151 | 118 | 4 | – | 2 000 | 4,6 | ▸ 6222-2RS1 | 6222-RS1 |
| | 200 | 38 | 151 | 118 | 4 | 6 700 | 3 400 | 4,6 | ▸ 6222-2Z | 6222-Z |
| | 240 | 50 | 203 | 180 | 5,7 | 6 000 | 3 800 | 9,65 | ▸ **6322** | – |
| | 240 | 50 | 203 | 180 | 5,7 | 6 000 | 5 300 | 11,5 | ▸ **6322 M** | – |

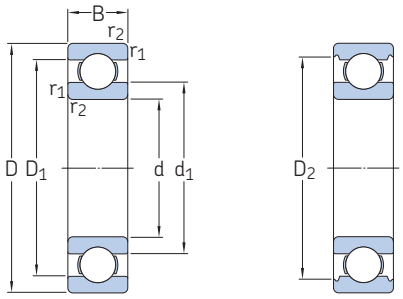
**SKF Explorer bearing**
▸ Popular item
[1] For bearings with only one shield or one non-contact seal (Z, RZ) the limiting speeds of the open bearings are valid.

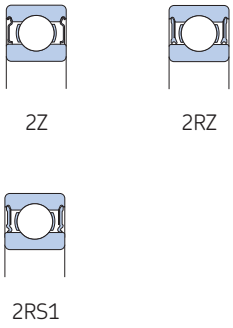



| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $d_2$ ≈ | $D_1$ ≈ | $D_2$ ≈ | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | $k_r$ | $f_0$ |
| mm | | | | | | mm | | | | – | |
| **100** | 124 | – | – | 160 | 2,1 | 112 | 124 | 168 | 2 | 0,025 | 14 |
| cont. | 135 | – | – | 184 | 3 | 114 | – | 201 | 2,5 | 0,03 | 13 |
| | 135 | – | – | 184 | 3 | 114 | – | 201 | 2,5 | 0,03 | 13 |
| | 135 | – | – | 184 | 3 | 114 | 135 | 201 | 2,5 | 0,03 | 13 |
| | 135 | – | – | 184 | 3 | 114 | 135 | 201 | 2,5 | 0,03 | 13 |
| **105** | 112 | – | – | 125 | 1 | 110 | 112 | 125 | 1 | 0,015 | 13 |
| | 112 | – | – | 125 | 1 | 110 | 112 | 125 | 1 | 0,015 | 13 |
| | 112 | – | – | 125 | 1 | 110 | – | 125 | 1 | 0,015 | 13 |
| | 117 | – | 133 | – | 1,1 | 111 | – | 139 | 1 | 0,02 | 17 |
| | 123 | – | 142 | – | 1 | 110 | – | 155 | 1 | 0,02 | 16 |
| | 122 | – | – | 147 | 2 | 116 | – | 149 | 2 | 0,025 | 16 |
| | 122 | – | – | 147 | 2 | 116 | – | 149 | 2 | 0,025 | 16 |
| | 122 | – | – | 147 | 2 | 116 | 122 | 149 | 2 | 0,025 | 16 |
| | 122 | – | – | 147 | 2 | 116 | 122 | 149 | 2 | 0,025 | 16 |
| | 131 | – | – | 167 | 2,1 | 117 | – | 178 | 2 | 0,025 | 14 |
| | 131 | – | – | 167 | 2,1 | 117 | 131 | 178 | 2 | 0,025 | 14 |
| | 141 | – | – | 194 | 3 | 119 | 140 | 211 | 2,5 | 0,03 | 13 |
| | 141 | – | 188 | – | 3 | 119 | – | 211 | 2,5 | 0,03 | 13 |
| **110** | 118 | – | – | 135 | 1 | 115 | 118 | 135 | 1 | 0,015 | 14 |
| | 118 | – | – | 135 | 1 | 115 | 118 | 135 | 1 | 0,015 | 14 |
| | 118 | – | – | 135 | 1 | 115 | – | 135 | 1 | 0,015 | 14 |
| | 122 | – | 138 | – | 1,1 | 116 | – | 144 | 1 | 0,02 | 17 |
| | 122 | – | – | 81,5 | 1,1 | 116 | – | 144 | 1 | 0,02 | 17 |
| | 130 | – | 150 | – | 1 | 115 | – | 165 | 1 | 0,02 | 16 |
| | 129 | – | – | 156 | 2 | 119 | – | 161 | 2 | 0,025 | 16 |
| | 129 | – | – | 156 | 2 | 119 | – | 161 | 2 | 0,025 | 16 |
| | 129 | – | – | 156 | 2 | 119 | 128 | 161 | 2 | 0,025 | 16 |
| | 129 | – | – | 156 | 2 | 119 | 128 | 161 | 2 | 0,025 | 16 |
| | 138 | – | – | 177 | 2,1 | 122 | – | 188 | 2 | 0,025 | 14 |
| | 138 | – | – | 177 | 2,1 | 122 | 137 | 188 | 2 | 0,025 | 14 |
| | 138 | – | – | 177 | 2,1 | 122 | 137 | 188 | 2 | 0,025 | 14 |
| | 149 | – | 200 | – | 3 | 124 | – | 226 | 2,5 | 0,03 | 13 |
| | 149 | – | 200 | – | 3 | 124 | – | 226 | 2,5 | 0,03 | 13 |

## 1.1 Single row deep groove ball bearings

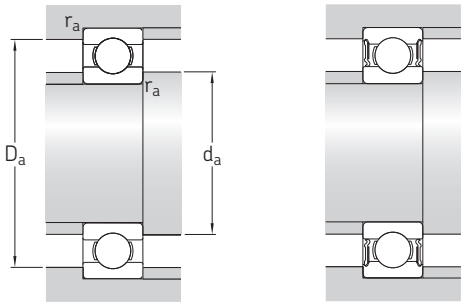
d **120 – 130** mm




| Principal dimensions | | | Basic load ratings | | Fatigue load limit | Speed ratings | | Mass | Designations | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | dynamic | static | | Reference speed | Limiting speed[1] | | Bearing open or capped on both sides | capped on one side[1] |
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **120** | 150 | 16 | 29,1 | 28 | 1,29 | – | 2 400 | 0,65 | ▸ **61824-2RS1** | – |
| | 150 | 16 | 29,1 | 28 | 1,29 | 8 500 | 4 300 | 0,65 | ▸ **61824-2RZ** | – |
| | 150 | 16 | 29,1 | 28 | 1,29 | 8 500 | 5 300 | 0,51 | ▸ **61824** | – |
| | 165 | 22 | 55,3 | 57 | 2,04 | 8 000 | 5 000 | 1,2 | **61924** | – |
| | 165 | 22 | 55,3 | 57 | 2,04 | 8 000 | 6 700 | 1,4 | **61924 MA** | – |
| | 180 | 19 | 63,7 | 64 | 2,2 | 7 500 | 4 800 | 1,55 | ▸ 16024 | – |
| | 180 | 28 | 88,4 | 80 | 2,75 | 7 500 | 6 300 | 2,45 | 6024 MA | – |
| | 180 | 28 | 88,4 | 80 | 2,75 | 7 500 | 4 800 | 2,1 | ▸ 6024 | – |
| | 180 | 28 | 88,4 | 80 | 2,75 | – | 2 200 | 2,15 | ▸ 6024-2RS1 | 6024-RS1 |
| | 180 | 28 | 88,4 | 80 | 2,75 | 7 500 | 3 800 | 2,2 | ▸ 6024-2Z | 6024-Z |
| | 215 | 40 | 146 | 118 | 3,9 | 6 300 | 4 000 | 5,25 | ▸ **6224** | – |
| | 215 | 40 | 146 | 118 | 3,9 | 6 300 | 5 600 | 6,1 | ▸ **6224 M** | – |
| | 215 | 40 | 146 | 118 | 3,9 | – | 1 900 | 5,35 | ▸ **6224-2RS1** | **6224-RS1** |
| | 215 | 40 | 146 | 118 | 3,9 | 6 300 | 3 200 | 5,35 | **6224-2Z** | **6224-Z** |
| | 260 | 55 | 208 | 186 | 5,7 | 5 600 | 3 400 | 12,5 | ▸ **6324** | – |
| | 260 | 55 | 208 | 186 | 5,7 | 5 600 | 5 000 | 14 | ▸ **6324 M** | – |
| | 260 | 55 | 208 | 186 | 5,7 | – | 1 700 | 12,5 | ▸ **6324-2RS1** | **6324-RS1** |
| | 260 | 55 | 208 | 186 | 5,7 | 5 600 | 2 800 | 12,5 | **6324-2Z** | **6324-Z** |
| **130** | 165 | 18 | 37,7 | 43 | 1,6 | – | 2 200 | 0,93 | ▸ **61826-2RS1** | – |
| | 165 | 18 | 37,7 | 43 | 1,6 | 8 000 | 3 800 | 0,93 | ▸ **61826-2RZ** | – |
| | 165 | 18 | 37,7 | 43 | 1,6 | 8 000 | 4 800 | 0,75 | ▸ **61826** | – |
| | 180 | 24 | 65 | 67 | 2,28 | 7 500 | 4 500 | 1,6 | ▸ **61926** | – |
| | 200 | 22 | 83,2 | 81,5 | 2,7 | 7 000 | 4 300 | 2,35 | ▸ 16026 | – |
| | 200 | 33 | 112 | 100 | 3,35 | 7 000 | 5 600 | 3,75 | 6026 M | – |
| | 200 | 33 | 112 | 100 | 3,35 | 7 000 | 4 300 | 3,3 | ▸ 6026 | – |
| | 200 | 33 | 112 | 100 | 3,35 | – | 2 000 | 3,3 | ▸ 6026-2RS1 | 6026-RS1 |
| | 200 | 33 | 112 | 100 | 3,35 | 7 000 | 3 400 | 3,35 | ▸ 6026-2Z | 6026-Z |
| | 230 | 40 | 156 | 132 | 4,15 | 5 600 | 5 300 | 6,95 | **6226 M** | – |
| | 230 | 40 | 156 | 132 | 4,15 | 5 600 | 3 600 | 5,85 | ▸ **6226** | – |
| | 230 | 40 | 156 | 132 | 4,15 | – | 1 800 | 6 | ▸ **6226-2RS1** | **6226-RS1** |
| | 230 | 40 | 156 | 132 | 4,15 | 5 600 | 3 000 | 6 | ▸ **6226-2Z** | **6226-Z** |
| | 280 | 58 | 229 | 216 | 6,3 | 5 000 | 3 200 | 15 | ▸ **6326** | – |
| | 280 | 58 | 229 | 216 | 6,3 | 5 000 | 4 500 | 17,5 | ▸ **6326 M** | – |

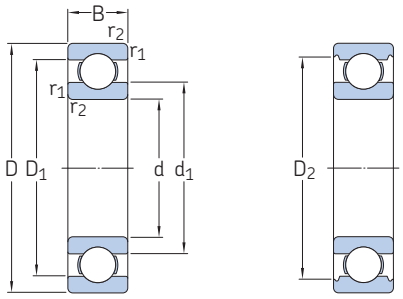
**SKF Explorer bearing**
▸ Popular item
[1] For bearings with only one shield or one non-contact seal (Z, RZ) the limiting speeds of the open bearings are valid.

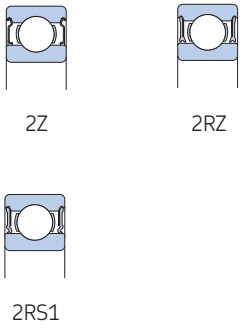



| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $d_2$ ≈ | $D_1$ ≈ | $D_2$ ≈ | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | $k_r$ | $f_0$ |
| mm | | | | | | mm | | | | – | |
| **120** | 128 | – | – | 145 | 1 | 125 | 128 | 145 | 1 | 0,015 | 14 |
| | 128 | – | – | 145 | 1 | 125 | 128 | 145 | 1 | 0,015 | 14 |
| | 128 | – | – | 145 | 1 | 125 | – | 145 | 1 | 0,015 | 14 |
| | 134 | – | 151 | – | 1,1 | 126 | – | 159 | 1 | 0,02 | 17 |
| | 134 | – | 152 | – | 1,1 | 126 | – | 159 | 1 | 0,02 | 17 |
| | 139 | – | 161 | – | 1 | 125 | – | 175 | 1 | 0,02 | 17 |
| | 139 | – | – | 166 | 2 | 129 | – | 171 | 2 | 0,025 | 16 |
| | 139 | – | – | 166 | 2 | 129 | – | 171 | 2 | 0,025 | 16 |
| | 139 | – | – | 166 | 2 | 129 | 139 | 171 | 2 | 0,025 | 16 |
| | 139 | – | – | 166 | 2 | 129 | 139 | 171 | 2 | 0,025 | 16 |
| | 150 | – | 185 | – | 2,1 | 132 | – | 203 | 2 | 0,025 | 14 |
| | 150 | – | 185 | – | 2,1 | 132 | – | 203 | 2 | 0,025 | 14 |
| | 150 | – | – | 190 | 2,1 | 132 | 150 | 203 | 2 | 0,025 | 14 |
| | 150 | – | – | 190 | 2,1 | 132 | 150 | 203 | 2 | 0,025 | 14 |
| | 164 | – | 215 | – | 3 | 134 | – | 246 | 2,5 | 0,03 | 14 |
| | 164 | – | 215 | – | 3 | 134 | – | 246 | 2,5 | 0,03 | 14 |
| | 164 | – | – | 221 | 3 | 134 | 164 | 246 | 2,5 | 0,03 | 14 |
| | 164 | – | – | 221 | 3 | 134 | 164 | 246 | 2,5 | 0,03 | 14 |
| **130** | 140 | – | – | 158 | 1,1 | 136 | 139 | 159 | 1 | 0,015 | 16 |
| | 140 | – | – | 158 | 1,1 | 136 | 139 | 159 | 1 | 0,015 | 16 |
| | 140 | – | – | 158 | 1,1 | 136 | – | 159 | 1 | 0,015 | 16 |
| | 145 | – | 164 | – | 1,5 | 137 | – | 173 | 1,5 | 0,02 | 16 |
| | 153 | – | 176 | – | 1,1 | 136 | – | 192 | 1 | 0,02 | 16 |
| | 152 | – | – | 182 | 2 | 139 | – | 191 | 2 | 0,025 | 16 |
| | 152 | – | – | 182 | 2 | 139 | – | 191 | 2 | 0,025 | 16 |
| | 152 | – | – | 182 | 2 | 139 | 152 | 191 | 2 | 0,025 | 16 |
| | 152 | – | – | 182 | 2 | 139 | 152 | 191 | 2 | 0,025 | 16 |
| | 160 | – | 198 | – | 3 | 144 | – | 216 | 2,5 | 0,025 | 15 |
| | 160 | – | 198 | – | 3 | 144 | – | 216 | 2,5 | 0,025 | 15 |
| | 160 | – | – | 203 | 3 | 144 | 160 | 216 | 2,5 | 0,025 | 15 |
| | 160 | – | – | 203 | 3 | 144 | 160 | 216 | 2,5 | 0,025 | 15 |
| | 177 | – | 232 | – | 4 | 147 | – | 263 | 3 | 0,03 | 14 |
| | 177 | – | 232 | – | 4 | 147 | – | 263 | 3 | 0,03 | 14 |

## 1.1 Single row deep groove ball bearings

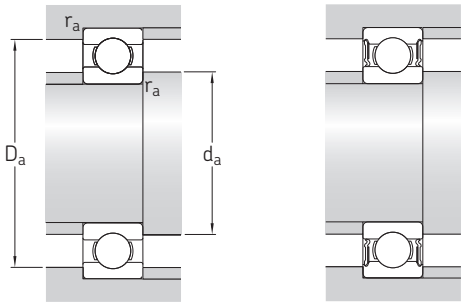
d **140 – 160** mm




| Principal dimensions | | | Basic load ratings | | Fatigue load limit | Speed ratings | | Mass | Designations | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | dynamic | static | | Reference speed | Limiting speed[1] | | Bearing open or capped on both sides | capped on one side[1] |
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **140** | 175 | 18 | 39 | 46,5 | 1,66 | – | 2 000 | 0,99 | **61828-2RS1** | – |
| | 175 | 18 | 39 | 46,5 | 1,66 | 7 500 | 3 600 | 0,99 | ▸ **61828-2RZ** | – |
| | 175 | 18 | 39 | 46,5 | 1,66 | 7 500 | 4 500 | 0,82 | ▸ **61828** | – |
| | 190 | 24 | 66,3 | 72 | 2,36 | 7 000 | 4 300 | 1,7 | **61928** | – |
| | 190 | 24 | 66,3 | 72 | 2,36 | 7 000 | 5 600 | 2 | ▸ **61928 MA** | – |
| | 210 | 22 | 80,6 | 86,5 | 2,8 | 6 700 | 4 000 | 2,55 | ▸ **16028** | – |
| | 210 | 33 | 111 | 108 | 3,45 | 6 700 | 5 300 | 4 | ▸ **6028 M** | – |
| | 210 | 33 | 111 | 108 | 3,45 | 6 700 | 4 000 | 3,45 | ▸ **6028** | – |
| | 210 | 33 | 111 | 108 | 3,45 | – | 1 800 | 3,55 | ▸ **6028-2RS1** | **6028-RS1** |
| | 210 | 33 | 111 | 108 | 3,45 | 6 700 | 3 200 | 3,55 | ▸ **6028-2Z** | **6028-Z** |
| | 250 | 42 | 165 | 150 | 4,55 | 5 300 | 3 400 | 7,75 | ▸ **6228** | – |
| | 250 | 42 | 165 | 150 | 4,55 | 5 300 | 4 800 | 9,4 | **6228 MA** | – |
| | 300 | 62 | 251 | 245 | 7,1 | 4 800 | 3 000 | 18,5 | ▸ **6328** | – |
| | 300 | 62 | 251 | 245 | 7,1 | 4 800 | 4 300 | 21 | ▸ **6328 M** | – |
| **150** | 190 | 20 | 48,8 | 61 | 1,96 | 6 700 | 4 300 | 1,2 | ▸ **61830** | – |
| | 190 | 20 | 48,8 | 61 | 1,96 | 6 700 | 4 300 | 1,35 | ▸ **61830 MA** | – |
| | 210 | 28 | 88,4 | 93 | 2,9 | 6 300 | 5 300 | 3,05 | **61930 MA** | – |
| | 225 | 24 | 92,2 | 98 | 3,05 | 6 000 | 3 800 | 3,15 | ▸ **16030** | – |
| | 225 | 35 | 125 | 125 | 3,9 | 6 000 | 5 000 | 4,9 | ▸ **6030 M** | – |
| | 225 | 35 | 125 | 125 | 3,9 | 6 000 | 3 800 | 4,3 | ▸ **6030** | – |
| | 225 | 35 | 125 | 125 | 3,9 | – | 1 700 | 4,35 | ▸ **6030-2RS1** | **6030-RS1** |
| | 225 | 35 | 125 | 125 | 3,9 | 6 000 | 3 000 | 4,4 | ▸ **6030-2Z** | **6030-Z** |
| | 270 | 45 | 174 | 166 | 4,9 | 5 000 | 3 200 | 10 | ▸ **6230** | – |
| | 270 | 45 | 174 | 166 | 4,9 | 5 000 | 4 500 | 11,5 | ▸ **6230 M** | – |
| | 320 | 65 | 276 | 285 | 7,8 | 4 300 | 2 800 | 23 | ▸ **6330** | – |
| | 320 | 65 | 276 | 285 | 7,8 | 4 300 | 4 000 | 25,5 | ▸ **6330 M** | – |
| **160** | 200 | 20 | 49,4 | 64 | 2 | 6 300 | 4 000 | 1,25 | ▸ **61832** | – |
| | 220 | 28 | 92,3 | 98 | 3,05 | 6 000 | 3 800 | 2,7 | **61932** | – |
| | 220 | 28 | 92,3 | 98 | 3,05 | 6 000 | 5 000 | 3,2 | ▸ **61932 MA** | – |
| | 240 | 25 | 99,5 | 108 | 3,25 | 5 600 | 3 600 | 3,65 | ▸ **16032** | – |
| | 240 | 38 | 143 | 143 | 4,3 | 5 600 | 4 800 | 6 | ▸ **6032 M** | – |
| | 240 | 38 | 143 | 143 | 4,3 | 5 600 | 3 600 | 5,2 | ▸ **6032** | – |
| | 240 | 38 | 143 | 143 | 4,3 | – | 1 600 | 5,3 | ▸ **6032-2RS1** | **6032-RS1** |
| | 240 | 38 | 143 | 143 | 4,3 | 5 600 | 2 800 | 5,4 | ▸ **6032-2Z** | **6032-Z** |
| | 290 | 48 | 186 | 186 | 5,3 | 4 500 | 3 000 | 13 | ▸ **6232** | – |

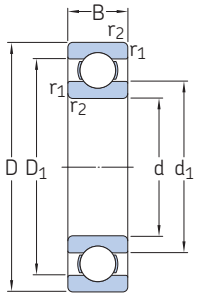
▸ Popular item
[1] For bearings with only one shield or one non-contact seal (Z, RZ) the limiting speeds of the open bearings are valid.




| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $d_2$ ≈ | $D_1$ ≈ | $D_2$ ≈ | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | $k_r$ | $f_0$ |
| mm | | | | | | mm | | | | – | |
| **140** | 150 | – | – | 167 | 1,1 | 146 | 150 | 169 | 1 | 0,015 | 16 |
| | 150 | – | – | 167 | 1,1 | 146 | 150 | 169 | 1 | 0,015 | 16 |
| | 150 | – | – | 167 | 2,5 | 146 | – | 169 | 1 | 0,015 | 16 |
| | 156 | – | 174 | – | 1,5 | 147 | – | 183 | 1,5 | 0,02 | 15 |
| | 156 | – | 175 | – | 1,5 | 147 | – | 183 | 1,5 | 0,02 | 17 |
| | 163 | – | 186 | – | 1,1 | 146 | – | 204 | 1 | 0,02 | 17 |
| | 162 | – | – | 192 | 2 | 149 | – | 201 | 2 | 0,025 | 16 |
| | 162 | – | – | 192 | 2 | 149 | – | 201 | 2 | 0,025 | 16 |
| | 162 | – | – | 192 | 2 | 149 | 162 | 201 | 2 | 0,025 | 16 |
| | 162 | – | – | 192 | 2 | 149 | 162 | 201 | 2 | 0,025 | 16 |
| | 175 | – | 213 | – | 3 | 154 | – | 236 | 2,5 | 0,025 | 15 |
| | 175 | – | 214 | – | 3 | 154 | – | 236 | 2,5 | 0,025 | 15 |
| | 190 | – | 249 | – | 4 | 157 | – | 283 | 3 | 0,03 | 14 |
| | 190 | – | 249 | – | 4 | 157 | – | 283 | 3 | 0,03 | 14 |
| **150** | 162 | – | 178 | – | 2,5 | 156 | – | 184 | 1 | 0,015 | 17 |
| | 162 | – | 178 | – | 1,1 | 156 | – | 184 | 1 | 0,015 | 17 |
| | 169 | – | 192 | – | 2 | 159 | – | 201 | 2 | 0,02 | 16 |
| | 174 | – | 200 | – | 1,1 | 156 | – | 219 | 1 | 0,02 | 17 |
| | 174 | – | – | 206 | 2,1 | 160 | – | 215 | 2 | 0,025 | 16 |
| | 174 | – | – | 206 | 2,1 | 160 | – | 215 | 2 | 0,025 | 16 |
| | 174 | – | – | 206 | 2,1 | 160 | 173 | 215 | 2 | 0,025 | 16 |
| | 174 | – | – | 206 | 2,1 | 160 | 173 | 215 | 2 | 0,025 | 16 |
| | 190 | – | 228 | – | 3 | 164 | – | 256 | 2,5 | 0,025 | 15 |
| | 190 | – | 228 | – | 3 | 164 | – | 256 | 2,5 | 0,025 | 15 |
| | 205 | – | 264 | – | 4 | 167 | – | 303 | 3 | 0,03 | 14 |
| | 205 | – | 264 | – | 4 | 167 | – | 303 | 3 | 0,03 | 14 |
| **160** | 172 | – | 188 | – | 1,1 | 166 | – | 194 | 1 | 0,015 | 17 |
| | 179 | – | 201 | – | 2 | 169 | – | 211 | 2 | 0,02 | 17 |
| | 179 | – | 202 | – | 2 | 169 | – | 211 | 2 | 0,02 | 17 |
| | 185 | – | 214 | – | 1,5 | 167 | – | 233 | 1,5 | 0,02 | 17 |
| | 185 | – | – | 219 | 2,1 | 169 | – | 231 | 2 | 0,025 | 16 |
| | 185 | – | – | 219 | 2,1 | 169 | – | 231 | 2 | 0,025 | 16 |
| | 185 | – | – | 219 | 2,1 | 169 | 185 | 231 | 2 | 0,025 | 16 |
| | 185 | – | – | 219 | 2,1 | 169 | 185 | 231 | 2 | 0,025 | 16 |
| | 205 | – | 243 | – | 3 | 174 | – | 276 | 2,5 | 0,025 | 15 |

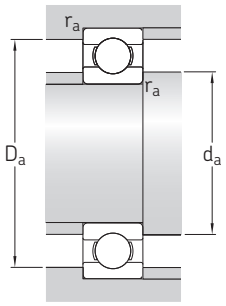
## 1.1 Single row deep groove ball bearings

d **160 – 200** mm




| Principal dimensions | | | Basic load ratings | | Fatigue load limit | Speed ratings | | Mass | Designations | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | dynamic | static | | Reference speed | Limiting speed[1] | | Bearing open or capped on both sides | capped on one side[1] |
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **160** | 290 | 48 | 186 | 186 | 5,3 | 4 500 | 4 300 | 14 | ▸ **6232 M** | – |
| cont. | 340 | 68 | 276 | 285 | 7,65 | 4 000 | 2 600 | 26 | ▸ **6332** | – |
| | 340 | 68 | 276 | 285 | 7,65 | 4 000 | 3 800 | 30 | ▸ **6332 M** | – |
| **170** | 215 | 22 | 61,8 | 78 | 2,4 | 6 000 | 3 600 | 1,65 | ▸ **61834** | – |
| | 230 | 28 | 93,6 | 106 | 3,15 | 5 600 | 4 800 | 3,35 | **61934 MA** | – |
| | 260 | 28 | 119 | 129 | 3,75 | 5 300 | 3 200 | 5 | ▸ **16034** | – |
| | 260 | 42 | 168 | 173 | 5 | 5 300 | 3 200 | 7 | **6034** | – |
| | 260 | 42 | 168 | 173 | 5 | 5 300 | 4 300 | 8,15 | ▸ **6034 M** | – |
| | 310 | 52 | 212 | 224 | 6,1 | 4 300 | 2 800 | 16 | ▸ **6234** | – |
| | 310 | 52 | 212 | 224 | 6,1 | 4 300 | 3 800 | 17,5 | ▸ **6234 M** | – |
| | 360 | 72 | 312 | 340 | 8,8 | 3 800 | 2 400 | 31 | ▸ **6334** | – |
| | 360 | 72 | 312 | 340 | 8,8 | 3 800 | 3 400 | 35 | ▸ **6334 M** | – |
| **180** | 225 | 22 | 62,4 | 81,5 | 2,45 | 5 600 | 3 400 | 1,75 | ▸ **61836** | – |
| | 250 | 33 | 119 | 134 | 3,9 | 5 300 | 3 200 | 5 | **61936** | – |
| | 250 | 33 | 119 | 134 | 3,9 | 5 300 | 4 300 | 5 | ▸ **61936 MA** | – |
| | 280 | 31 | 138 | 146 | 4,15 | 4 800 | 3 000 | 6,5 | ▸ **16036** | – |
| | 280 | 46 | 190 | 200 | 5,6 | 4 800 | 3 000 | 9,1 | **6036** | – |
| | 280 | 46 | 190 | 200 | 5,6 | 4 800 | 4 000 | 10,5 | ▸ **6036 M** | – |
| | 320 | 52 | 229 | 240 | 6,4 | 4 000 | 2 600 | 16 | **6236** | – |
| | 320 | 52 | 229 | 240 | 6,4 | 4 000 | 3 800 | 18 | ▸ **6236 M** | – |
| | 380 | 75 | 351 | 405 | 10,4 | 3 600 | 2 200 | 36,5 | ▸ **6336** | – |
| | 380 | 75 | 351 | 405 | 10,4 | 3 600 | 3 200 | 41 | ▸ **6336 M** | – |
| **190** | 240 | 24 | 76,1 | 98 | 2,8 | 5 300 | 3 200 | 2,25 | ▸ **61838** | – |
| | 260 | 33 | 117 | 134 | 3,8 | 5 000 | 3 200 | 4,5 | **61938** | – |
| | 260 | 33 | 117 | 134 | 3,8 | 5 000 | 4 300 | 5,2 | ▸ **61938 MA** | – |
| | 290 | 31 | 148 | 166 | 4,55 | 4 800 | 3 000 | 6,9 | ▸ **16038** | – |
| | 290 | 46 | 195 | 216 | 5,85 | 4 800 | 3 000 | 9,55 | **6038** | – |
| | 290 | 46 | 195 | 216 | 5,85 | 4 800 | 3 800 | 11 | ▸ **6038 M** | – |
| | 340 | 55 | 255 | 280 | 7,35 | 3 800 | 2 400 | 19,5 | ▸ **6238** | – |
| | 340 | 55 | 255 | 280 | 7,35 | 3 800 | 3 400 | 21,5 | ▸ **6238 M** | – |
| | 400 | 78 | 371 | 430 | 10,8 | 3 400 | 2 200 | 42 | **6338** | – |
| | 400 | 78 | 371 | 430 | 10,8 | 3 400 | 3 000 | 47,5 | ▸ **6338 M** | – |
| **200** | 250 | 24 | 76,1 | 102 | 2,9 | 5 000 | 3 200 | 2,35 | ▸ **61840** | – |
| | 280 | 38 | 148 | 166 | 4,55 | 4 800 | 3 000 | 6,3 | **61940** | – |
| | 280 | 38 | 148 | 166 | 4,55 | 4 800 | 3 800 | 7,3 | ▸ **61940 MA** | – |

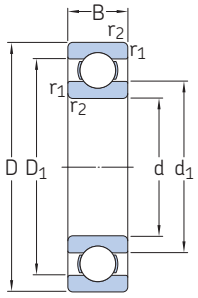
▸ Popular item
[1] For bearings with only one shield or one non-contact seal (Z, RZ) the limiting speeds of the open bearings are valid.




| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $d_2$ ≈ | $D_1$ ≈ | $D_2$ ≈ | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | $k_r$ | $f_0$ |
| mm | | | | | | mm | | | | – | |
| **160** | 205 | – | 243 | – | 3 | 174 | – | 276 | 2,5 | 0,025 | 15 |
| cont. | 218 | – | 281 | – | 4 | 177 | – | 323 | 3 | 0,03 | 14 |
| | 218 | – | 281 | – | 4 | 177 | – | 323 | 3 | 0,03 | 14 |
| **170** | 184 | – | 202 | – | 1,1 | 176 | – | 209 | 1 | 0,015 | 17 |
| | 189 | – | 212 | – | 2 | 179 | – | 221 | 2 | 0,02 | 17 |
| | 200 | – | 229 | – | 1,5 | 177 | – | 253 | 1,5 | 0,02 | 16 |
| | 198 | – | 232 | – | 2,1 | 180 | – | 250 | 2 | 0,025 | 16 |
| | 198 | – | 232 | – | 2,1 | 180 | – | 250 | 2 | 0,025 | 16 |
| | 218 | – | 259 | – | 4 | 187 | – | 293 | 3 | 0,025 | 15 |
| | 218 | – | 259 | – | 4 | 187 | – | 293 | 3 | 0,025 | 15 |
| | 230 | – | 299 | – | 4 | 187 | – | 343 | 3 | 0,03 | 14 |
| | 230 | – | 299 | – | 4 | 187 | – | 343 | 3 | 0,03 | 14 |
| **180** | 194 | – | 211 | – | 1,1 | 186 | – | 219 | 1 | 0,015 | 17 |
| | 202 | – | 228 | – | 2 | 189 | – | 241 | 2 | 0,02 | 17 |
| | 202 | – | 229 | – | 2 | 189 | – | 241 | 2 | 0,02 | 17 |
| | 213 | – | 246 | – | 2 | 189 | – | 271 | 2 | 0,02 | 16 |
| | 212 | – | 248 | – | 2,1 | 190 | – | 270 | 2 | 0,025 | 16 |
| | 212 | – | 248 | – | 2,1 | 190 | – | 270 | 2 | 0,025 | 16 |
| | 226 | – | 274 | – | 4 | 197 | – | 303 | 3 | 0,025 | 15 |
| | 226 | – | 274 | – | 4 | 197 | – | 303 | 3 | 0,025 | 15 |
| | 244 | – | 315 | – | 4 | 197 | – | 363 | 3 | 0,03 | 14 |
| | 244 | – | 315 | – | 4 | 197 | – | 363 | 3 | 0,03 | 14 |
| **190** | 206 | – | 224 | – | 1,5 | 197 | – | 233 | 1,5 | 0,015 | 17 |
| | 212 | – | 238 | – | 2 | 199 | – | 251 | 2 | 0,02 | 17 |
| | 212 | – | 239 | – | 2 | 199 | – | 251 | 2 | 0,02 | 17 |
| | 223 | – | 256 | – | 2 | 199 | – | 281 | 2 | 0,02 | 16 |
| | 222 | – | 258 | – | 2,1 | 200 | – | 280 | 2 | 0,025 | 16 |
| | 222 | – | 258 | – | 2,1 | 200 | – | 280 | 2 | 0,025 | 16 |
| | 239 | – | 290 | – | 4 | 207 | – | 323 | 3 | 0,025 | 15 |
| | 239 | – | 290 | – | 4 | 207 | – | 323 | 3 | 0,025 | 15 |
| | 259 | – | 331 | – | 5 | 210 | – | 380 | 4 | 0,03 | 14 |
| | 259 | – | 331 | – | 5 | 210 | – | 380 | 4 | 0,03 | 14 |
| **200** | 216 | – | 234 | – | 1,5 | 207 | – | 243 | 1,5 | 0,015 | 17 |
| | 225 | – | 255 | – | 2,1 | 210 | – | 270 | 2 | 0,02 | 16 |
| | 225 | – | 256 | – | 2,1 | 210 | – | 270 | 2 | 0,02 | 16 |

## 1.1 Single row deep groove ball bearings

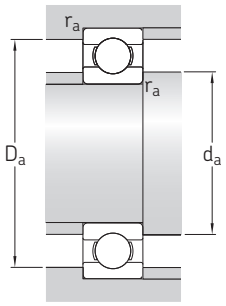
d **200 – 260** mm




| Principal dimensions | | | Basic load ratings | | Fatigue load limit | Speed ratings | | Mass | Designations | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | dynamic | static | | Reference speed | Limiting speed[1] | | Bearing open or capped on both sides | capped on one side[1] |
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **200** | 310 | 34 | 168 | 190 | 5,1 | 4 300 | 2 800 | 8,8 | ▸ **16040** | – |
| cont. | 310 | 51 | 216 | 245 | 6,4 | 4 300 | 2 800 | 12,5 | **6040** | – |
| | 310 | 51 | 216 | 245 | 6,4 | 4 300 | 3 600 | 14 | ▸ **6040 M** | – |
| | 360 | 58 | 270 | 310 | 7,8 | 3 600 | 2 200 | 23,5 | **6240** | – |
| | 360 | 58 | 270 | 310 | 7,8 | 3 600 | 3 200 | 26 | ▸ **6240 M** | – |
| **220** | 270 | 24 | 78 | 110 | 3 | 4 500 | 2 800 | 2,55 | ▸ **61844** | – |
| | 300 | 38 | 151 | 180 | 4,75 | 4 300 | 2 600 | 6,8 | **61944** | – |
| | 300 | 38 | 151 | 180 | 4,75 | 4 300 | 3 600 | 7,95 | ▸ **61944 MA** | – |
| | 340 | 37 | 174 | 204 | 5,2 | 4 000 | 2 400 | 11,5 | ▸ **16044** | – |
| | 340 | 56 | 247 | 290 | 7,35 | 4 000 | 2 400 | 16 | **6044** | – |
| | 340 | 56 | 247 | 290 | 7,35 | 4 000 | 3 200 | 18,5 | ▸ **6044 M** | – |
| | 400 | 65 | 296 | 365 | 8,8 | 3 200 | 2 000 | 33,5 | **6244** | – |
| | 400 | 65 | 296 | 365 | 8,8 | 3 200 | 3 000 | 36,5 | ▸ **6244 M** | – |
| | 460 | 88 | 410 | 520 | 12 | 3 000 | 2 600 | 73 | ▸ **6344 M** | – |
| **240** | 300 | 28 | 108 | 150 | 3,8 | 4 000 | 2 600 | 3,9 | ▸ **61848** | – |
| | 320 | 38 | 159 | 200 | 5,1 | 4 000 | 2 400 | 7,3 | **61948** | – |
| | 320 | 38 | 159 | 200 | 5,1 | 4 000 | 3 200 | 8,55 | ▸ **61948 MA** | – |
| | 360 | 37 | 203 | 255 | 6,3 | 3 600 | 2 200 | 12,5 | ▸ **16048** | – |
| | 360 | 37 | 203 | 255 | 6,3 | 3 600 | 3 000 | 14 | ▸ **16048 MA** | – |
| | 360 | 56 | 255 | 315 | 7,8 | 3 600 | 2 200 | 17 | **6048** | – |
| | 360 | 56 | 255 | 315 | 7,8 | 3 600 | 3 000 | 19,5 | ▸ **6048 M** | – |
| | 440 | 72 | 358 | 465 | 10,8 | 3 000 | 2 600 | 51 | ▸ **6248 M** | – |
| | 500 | 95 | 442 | 585 | 12,9 | 2 600 | 2 400 | 97 | **6348 M** | – |
| **260** | 320 | 28 | 111 | 163 | 4 | 3 800 | 2 400 | 4,15 | ▸ **61852** | – |
| | 360 | 46 | 212 | 270 | 6,55 | 3 600 | 2 200 | 12 | **61952** | – |
| | 360 | 46 | 212 | 270 | 6,55 | 3 600 | 3 000 | 14,5 | ▸ **61952 MA** | – |
| | 400 | 44 | 238 | 310 | 7,2 | 3 200 | 2 000 | 18 | **16052** | – |
| | 400 | 44 | 238 | 310 | 7,2 | 3 200 | 2 800 | 22,5 | ▸ **16052 MA** | – |
| | 400 | 65 | 291 | 375 | 8,8 | 3 200 | 2 000 | 25 | **6052** | – |
| | 400 | 65 | 291 | 375 | 8,8 | 3 200 | 2 800 | 29 | ▸ **6052 M** | – |
| | 480 | 80 | 390 | 530 | 11,8 | 2 600 | 2 400 | 65,5 | ▸ **6252 M** | – |

▸ Popular item

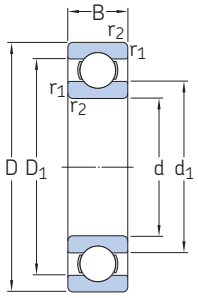
[1] For bearings with only one shield or one non-contact seal (Z, RZ) the limiting speeds of the open bearings are valid.




| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $d_2$ ≈ | $D_1$ ≈ | $D_2$ ≈ | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | $k_r$ | $f_0$ |
| mm | | | | | | mm | | | | – | |
| **200** | 237 | – | 273 | – | 2 | 209 | – | 301 | 2 | 0,02 | 16 |
| cont. | 235 | – | 275 | – | 2,1 | 210 | – | 300 | 2 | 0,025 | 16 |
| | 235 | – | 275 | – | 2,1 | 210 | – | 300 | 2 | 0,025 | 16 |
| | 254 | – | 303 | – | 4 | 217 | – | 343 | 3 | 0,025 | 15 |
| | 254 | – | 303 | – | 4 | 217 | – | 343 | 3 | 0,025 | 15 |
| **220** | 236 | – | 254 | – | 1,5 | 227 | – | 263 | 1,5 | 0,015 | 17 |
| | 245 | – | 275 | – | 2,1 | 230 | – | 290 | 2 | 0,02 | 17 |
| | 245 | – | 276 | – | 2,1 | 230 | – | 290 | 2 | 0,02 | 17 |
| | 261 | – | 298 | – | 2,1 | 230 | – | 330 | 2 | 0,02 | 17 |
| | 258 | – | 302 | – | 3 | 233 | – | 327 | 2,5 | 0,025 | 16 |
| | 258 | – | 302 | – | 3 | 233 | – | 327 | 2,5 | 0,025 | 16 |
| | 282 | – | 335 | – | 4 | 237 | – | 383 | 3 | 0,025 | 15 |
| | 282 | – | 335 | – | 4 | 237 | – | 383 | 3 | 0,025 | 15 |
| | 301 | – | 379 | – | 5 | 240 | – | 440 | 4 | 0,03 | 14 |
| **240** | 259 | – | 281 | – | 2 | 249 | – | 291 | 2 | 0,015 | 17 |
| | 265 | – | 295 | – | 2,1 | 250 | – | 310 | 2 | 0,02 | 17 |
| | 265 | – | 296 | – | 2,1 | 250 | – | 310 | 2 | 0,02 | 17 |
| | 279 | – | 318 | – | 2,1 | 250 | – | 350 | 2 | 0,02 | 17 |
| | 279 | – | 321 | – | 2,1 | 250 | – | 350 | 2 | 0,02 | 17 |
| | 277 | – | 322 | – | 3 | 253 | – | 347 | 2,5 | 0,025 | 16 |
| | 277 | – | 322 | – | 3 | 253 | – | 347 | 2,5 | 0,025 | 16 |
| | 309 | – | 371 | – | 4 | 257 | – | 423 | 3 | 0,025 | 15 |
| | 331 | – | 409 | – | 5 | 260 | – | 480 | 4 | 0,03 | 15 |
| **260** | 279 | – | 301 | – | 2 | 269 | – | 311 | 2 | 0,015 | 17 |
| | 291 | – | 329 | – | 2,1 | 270 | – | 350 | 2 | 0,02 | 17 |
| | 291 | – | 330 | – | 2,1 | 270 | – | 350 | 2 | 0,02 | 17 |
| | 307 | – | 351 | – | 3 | 273 | – | 387 | 2,5 | 0,02 | 16 |
| | 307 | – | 353 | – | 3 | 273 | – | 387 | 2,5 | 0,02 | 16 |
| | 304 | – | 356 | – | 4 | 277 | – | 383 | 3 | 0,025 | 16 |
| | 304 | – | 356 | – | 4 | 277 | – | 383 | 3 | 0,025 | 16 |
| | 337 | – | 403 | – | 5 | 280 | – | 460 | 4 | 0,025 | 15 |

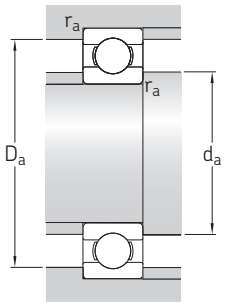
## 1.1 Single row deep groove ball bearings

d **280 – 380** mm




| Principal dimensions | | | Basic load ratings | | Fatigue load limit | Speed ratings | | Mass | Designations | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | dynamic | static | | Reference speed | Limiting speed[1] | | Bearing open or capped on both sides | capped on one side[1] |
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **280** | 350 | 33 | 138 | 200 | 4,75 | 3 400 | 2 200 | 6,25 | ▸ **61856** | – |
| | 350 | 33 | 138 | 200 | 4,75 | 3 400 | 2 800 | 7,25 | ▸ **61856 MA** | – |
| | 380 | 46 | 216 | 285 | 6,7 | 3 200 | 2 000 | 12 | **61956** | – |
| | 380 | 46 | 216 | 285 | 6,7 | 3 200 | 2 800 | 15,5 | ▸ **61956 MA** | – |
| | 420 | 44 | 242 | 335 | 7,5 | 3 000 | 1 900 | 19 | **16056** | – |
| | 420 | 44 | 242 | 335 | 7,5 | 3 000 | 2 600 | 23,5 | ▸ **16056 MA** | – |
| | 420 | 65 | 302 | 405 | 9,3 | 3 000 | 1 900 | 26 | **6056** | – |
| | 420 | 65 | 302 | 405 | 9,3 | 3 000 | 2 600 | 31 | ▸ **6056 M** | – |
| | 500 | 80 | 423 | 600 | 12,9 | 2 600 | 2 200 | 72 | **6256 M** | – |
| **300** | 380 | 38 | 172 | 245 | 5,6 | 3 200 | 2 000 | 8,9 | ▸ **61860** | – |
| | 380 | 38 | 172 | 245 | 5,6 | 3 200 | 2 600 | 10,5 | ▸ **61860 MA** | – |
| | 420 | 56 | 270 | 375 | 8,3 | 3 000 | 1 900 | 19 | **61960** | – |
| | 420 | 56 | 270 | 375 | 8,3 | 3 000 | 2 400 | 24,5 | ▸ **61960 MA** | – |
| | 460 | 50 | 286 | 405 | 8,8 | 2 800 | 1 800 | 32 | ▸ **16060 MA** | – |
| | 460 | 74 | 358 | 500 | 10,8 | 2 800 | 2 400 | 44 | ▸ **6060 M** | – |
| | 540 | 85 | 462 | 670 | 13,7 | 2 400 | 2 000 | 88,5 | **6260 M** | – |
| **320** | 400 | 38 | 172 | 255 | 5,7 | 3 000 | 1 900 | 9,5 | **61864** | – |
| | 400 | 38 | 172 | 255 | 5,7 | 3 000 | 2 400 | 11 | ▸ **61864 MA** | – |
| | 440 | 56 | 276 | 400 | 8,65 | 2 800 | 2 400 | 25,5 | ▸ **61964 MA** | – |
| | 480 | 50 | 281 | 405 | 8,65 | 2 600 | 2 200 | 34 | ▸ **16064 MA** | – |
| | 480 | 74 | 371 | 540 | 11,4 | 2 600 | 2 200 | 46 | ▸ **6064 M** | – |
| **340** | 420 | 38 | 178 | 275 | 6 | 2 800 | 1 800 | 10 | **61868** | – |
| | 420 | 38 | 178 | 275 | 6 | 2 800 | 2 400 | 11,5 | ▸ **61868 MA** | – |
| | 460 | 56 | 281 | 425 | 9 | 2 600 | 2 200 | 26,5 | ▸ **61968 MA** | – |
| | 520 | 57 | 345 | 520 | 10,6 | 2 400 | 2 000 | 45 | **16068 MA** | – |
| | 520 | 82 | 423 | 640 | 13,2 | 2 400 | 2 200 | 62 | ▸ **6068 M** | – |
| **360** | 440 | 38 | 182 | 285 | 6,1 | 2 600 | 2 200 | 12 | ▸ **61872 MA** | – |
| | 480 | 56 | 291 | 450 | 9,15 | 2 600 | 2 200 | 28 | ▸ **61972 MA** | – |
| | 540 | 57 | 351 | 550 | 11 | 1 800 | 1 400 | 49 | **16072 MA** | – |
| | 540 | 82 | 442 | 695 | 14 | 2 400 | 1 900 | 64,5 | ▸ **6072 M** | – |
| **380** | 480 | 46 | 242 | 390 | 8 | 2 400 | 2 000 | 20 | ▸ **61876 MA** | – |
| | 520 | 65 | 338 | 540 | 10,8 | 2 400 | 1 900 | 40 | ▸ **61976 MA** | – |
| | 560 | 57 | 377 | 620 | 12,2 | 2 200 | 1 400 | 51 | **16076 MA** | – |
| | 560 | 82 | 436 | 695 | 13,7 | 2 200 | 1 800 | 70,5 | ▸ **6076 M** | – |

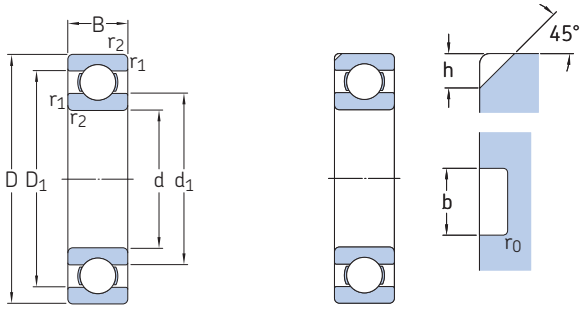
▸ Popular item
[1] For bearings with only one shield or one non-contact seal (Z, RZ) the limiting speeds of the open bearings are valid.




| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $d_2$ ≈ | $D_1$ ≈ | $D_2$ ≈ | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | $k_r$ | $f_0$ |
| mm | | | | | | mm | | | | – | |
| **280** | 302 | – | 327 | – | 2 | 289 | – | 341 | 2 | 0,015 | 17 |
| | 302 | – | 328 | – | 3,8 | 289 | – | 341 | 2 | 0,015 | 17 |
| | 311 | – | 349 | – | 2,1 | 291 | – | 369 | 2 | 0,02 | 17 |
| | 311 | – | 350 | – | 2,1 | 291 | – | 369 | 2 | 0,02 | 17 |
| | 327 | – | 371 | – | 3 | 293 | – | 407 | 2,5 | 0,02 | 17 |
| | 327 | – | 374 | – | 3 | 293 | – | 407 | 2,5 | 0,02 | 17 |
| | 324 | – | 376 | – | 4 | 296 | – | 404 | 3 | 0,025 | 16 |
| | 324 | – | 376 | – | 4 | 296 | – | 404 | 3 | 0,025 | 16 |
| | 355 | – | 425 | – | 5 | 300 | – | 480 | 4 | 0,025 | 15 |
| **300** | 325 | – | 355 | – | 2,1 | 309 | – | 371 | 2 | 0,015 | 17 |
| | 325 | – | 356 | – | 2,1 | 309 | – | 371 | 2 | 0,015 | 17 |
| | 338 | – | 382 | – | 3 | 313 | – | 407 | 2,5 | 0,02 | 16 |
| | 338 | – | 384 | – | 3 | 313 | – | 407 | 2,5 | 0,02 | 16 |
| | 352 | – | 407 | – | 4 | 315 | – | 445 | 3 | 0,02 | 16 |
| | 351 | – | 409 | – | 4 | 315 | – | 445 | 3 | 0,025 | 16 |
| | 383 | – | 457 | – | 5 | 320 | – | 520 | 4 | 0,025 | 15 |
| **320** | 345 | – | 375 | – | 2,1 | 332 | – | 388 | 2 | 0,015 | 17 |
| | 345 | – | 376 | – | 2,1 | 332 | – | 388 | 2 | 0,015 | 17 |
| | 357 | – | 403 | – | 3 | 333 | – | 427 | 2,5 | 0,02 | 16 |
| | 372 | – | 428 | – | 4 | 335 | – | 465 | 3 | 0,02 | 17 |
| | 370 | – | 431 | – | 4 | 335 | – | 465 | 3 | 0,025 | 16 |
| **340** | 365 | – | 395 | – | 2,1 | 352 | – | 408 | 2 | 0,015 | 17 |
| | 365 | – | 396 | – | 2,1 | 352 | – | 408 | 2 | 0,015 | 17 |
| | 378 | – | 422 | – | 3 | 353 | – | 447 | 2,5 | 0,02 | 17 |
| | 398 | – | 462 | – | 4 | 355 | – | 505 | 3 | 0,02 | 16 |
| | 397 | – | 463 | – | 5 | 360 | – | 500 | 4 | 0,025 | 16 |
| **360** | 385 | – | 415 | – | 2,1 | 372 | – | 428 | 2 | 0,015 | 17 |
| | 398 | – | 443 | – | 3 | 373 | – | 467 | 2,5 | 0,02 | 17 |
| | 418 | – | 482 | – | 4 | 375 | – | 525 | 3 | 0,02 | 16 |
| | 416 | – | 485 | – | 5 | 378 | – | 522 | 4 | 0,025 | 16 |
| **380** | 412 | – | 449 | – | 2,1 | 392 | – | 468 | 2 | 0,015 | 17 |
| | 425 | – | 476 | – | 4 | 395 | – | 505 | 3 | 0,02 | 17 |
| | 443 | – | 497 | – | 4 | 395 | – | 545 | 3 | 0,02 | 17 |
| | 437 | – | 503 | – | 5 | 400 | – | 542 | 4 | 0,025 | 16 |

## 1.1 Single row deep groove ball bearings

d **400 – 710** mm

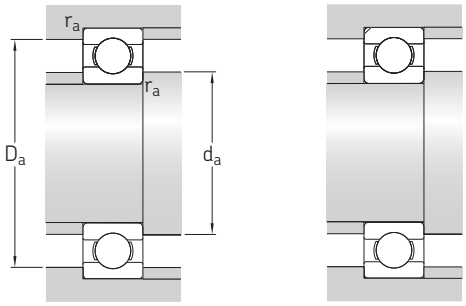



| Designation | Dimensions | | |
|---|---|---|---|
| | h | b | $r_0$ |
| – | mm | | |
| **60/500 N1MAS** | 20 | 15.5 | 3 |
| **60/530 N1MAS** | 20 | 15.5 | 3 |
| **60/560 N1MAS** | 25 | 20.5 | 3 |
| **619/630 N1MAS** | 25 | 20.5 | 3 |
| **60/630 N1MBS** | 32 | 20.5 | 3 |
| **60/670 N1MAS** | 32 | 20.5 | 3 |

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed[1] | Mass | Designations Bearing open or capped on both sides | capped on one side[1] |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **400** | 500 | 46 | 247 | 405 | 8,15 | 2 400 | 1 900 | 20,5 | ▸ **61880 MA** | – |
| | 540 | 65 | 345 | 570 | 11,2 | 2 200 | 1 800 | 41,5 | ▸ **61980 MA** | – |
| | 600 | 90 | 520 | 865 | 16,3 | 2 000 | 1 700 | 87,5 | ▸ **6080 M** | – |
| **420** | 520 | 46 | 251 | 425 | 8,3 | 2 200 | 1 800 | 21,5 | ▸ **61884 MA** | – |
| | 560 | 65 | 351 | 600 | 11,4 | 2 200 | 1 800 | 43 | ▸ **61984 MA** | – |
| | 620 | 90 | 507 | 880 | 16,3 | 2 000 | 1 600 | 91,5 | **6084 M** | – |
| **440** | 540 | 46 | 255 | 440 | 8,5 | 2 200 | 1 800 | 22,5 | ▸ **61888 MA** | – |
| | 600 | 74 | 410 | 720 | 13,2 | 2 000 | 1 600 | 60,5 | **61988 MA** | – |
| | 650 | 94 | 553 | 965 | 17,6 | 1 900 | 1 500 | 105 | **6088 M** | – |
| **460** | 580 | 56 | 319 | 570 | 10,6 | 2 000 | 1 600 | 35 | ▸ **61892 MA** | – |
| | 620 | 74 | 423 | 750 | 13,7 | 1 900 | 1 600 | 62,5 | **61992 MA** | – |
| | 680 | 100 | 582 | 1 060 | 19 | 1 800 | 1 500 | 120 | **6092 MB** | – |
| **480** | 600 | 56 | 325 | 600 | 10,8 | 1 900 | 1 600 | 36,5 | ▸ **61896 MA** | – |
| | 650 | 78 | 449 | 815 | 14,6 | 1 800 | 1 500 | 74 | **61996 MA** | – |
| | 700 | 100 | 618 | 1 140 | 20 | 1 700 | 1 400 | 125 | **6096 MB** | – |
| **500** | 620 | 56 | 332 | 620 | 11,2 | 1 800 | 1 500 | 40,5 | ▸ **618/500 MA** | – |
| | 670 | 78 | 462 | 865 | 15 | 1 700 | 1 400 | 81,5 | **619/500 MA** | – |
| | 720 | 100 | 605 | 1 140 | 19,6 | 1 600 | 1 300 | 135 | **60/500 N1MAS** | – |
| **530** | 650 | 56 | 332 | 655 | 11,2 | 1 700 | 1 400 | 39,5 | ▸ **618/530 MA** | – |
| | 710 | 82 | 488 | 930 | 15,6 | 1 600 | 1 300 | 90,5 | **619/530 MA** | – |
| | 780 | 112 | 650 | 1 270 | 20,8 | 1 500 | 1 200 | 185 | **60/530 N1MAS** | – |
| **560** | 680 | 56 | 345 | 695 | 11,8 | 1 600 | 1 300 | 42 | ▸ **618/560 MA** | – |
| | 750 | 85 | 494 | 980 | 16,3 | 1 500 | 1 200 | 105 | **619/560 MA** | – |
| | 820 | 115 | 663 | 1 370 | 22 | 1 400 | 1 200 | 210 | **60/560 N1MAS** | – |
| **600** | 730 | 60 | 364 | 765 | 12,5 | 1 500 | 1 200 | 52 | ▸ **618/600 MA** | – |
| | 800 | 90 | 585 | 1 220 | 19,6 | 1 400 | 1 100 | 125 | **619/600 MA** | – |
| | 870 | 118 | 728 | 1 500 | 23,6 | 1 300 | 1 100 | 230 | **60/600 MA** | – |
| **630** | 780 | 69 | 442 | 965 | 15,3 | 1 400 | 1 100 | 73 | ▸ **618/630 MA** | – |
| | 850 | 100 | 624 | 1 340 | 21,2 | 1 300 | 1 100 | 160 | **619/630 N1MA** | – |
| | 920 | 128 | 819 | 1 760 | 27 | 1 200 | 1 000 | 285 | **60/630 N1MBS** | – |
| **670** | 820 | 69 | 442 | 1 000 | 15,6 | 1 300 | 1 100 | 83,5 | ▸ **618/670 MA** | – |
| | 900 | 103 | 676 | 1 500 | 22,4 | 1 200 | 1 000 | 192 | **619/670 MA** | – |
| | 980 | 136 | 904 | 2 040 | 30 | 1 100 | 900 | 345 | **60/670 N1MAS** | – |
| **710** | 870 | 74 | 475 | 1 100 | 16,6 | 1 200 | 1 000 | 93,5 | ▸ **618/710 MA** | – |
| | 950 | 106 | 663 | 1 500 | 22 | 1 100 | 900 | 220 | **619/710 MA** | – |
| | 1 030 | 140 | 956 | 2 200 | 31,5 | 1 000 | 850 | 382 | **60/710 MA** | – |

▸ Popular item

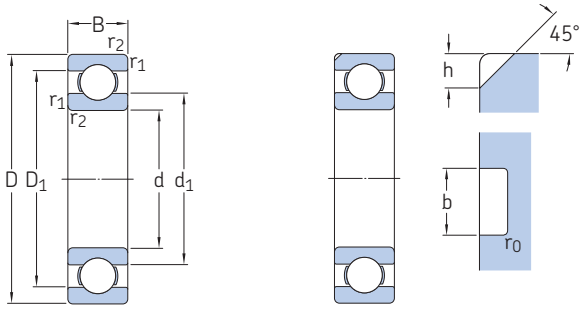
[1] For bearings with only one shield or one non-contact seal (Z, RZ) the limiting speeds of the open bearings are valid.




| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $d_2$ ≈ | $D_1$ ≈ | $D_2$ ≈ | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | $k_r$ | $f_0$ |
| mm | | | | | | mm | | | | – | |
| **400** | 432 | – | 471 | – | 2,1 | 412 | – | 488 | 2 | 0,015 | 17 |
| | 445 | – | 496 | – | 4 | 415 | – | 525 | 3 | 0,02 | 17 |
| | 463 | – | 537 | – | 5 | 418 | – | 582 | 4 | 0,025 | 16 |
| **420** | 452 | – | 491 | – | 2,1 | 432 | – | 508 | 2 | 0,015 | 17 |
| | 465 | – | 516 | – | 4 | 435 | – | 545 | 3 | 0,02 | 17 |
| | 482 | – | 557 | – | 5 | 438 | – | 602 | 4 | 0,025 | 16 |
| **440** | 472 | – | 510 | – | 2,1 | 452 | – | 528 | 2 | 0,015 | 17 |
| | 492 | – | 549 | – | 4 | 455 | – | 585 | 3 | 0,02 | 17 |
| | 506 | – | 584 | – | 6 | 463 | – | 627 | 5 | 0,025 | 16 |
| **460** | 498 | – | 542 | – | 3 | 473 | – | 567 | 2,5 | 0,015 | 17 |
| | 511 | – | 569 | – | 4 | 476 | – | 604 | 3 | 0,02 | 17 |
| | 528 | – | 614 | – | 6 | 483 | – | 657 | 5 | 0,025 | 16 |
| **480** | 518 | – | 564 | – | 3 | 493 | – | 587 | 2,5 | 0,015 | 17 |
| | 535 | – | 595 | – | 5 | 498 | – | 632 | 4 | 0,02 | 17 |
| | 550 | – | 630 | – | 6 | 503 | – | 677 | 5 | 0,025 | 16 |
| **500** | 538 | – | 582 | – | 3 | 513 | – | 607 | 2,5 | 0,015 | 17 |
| | 555 | – | 617 | – | 5 | 518 | – | 652 | 4 | 0,02 | 17 |
| | 568 | – | 650 | – | 6 | 523 | – | 697 | 5 | 0,025 | 16 |
| **530** | 568 | – | 613 | – | 3 | 543 | – | 637 | 2,5 | 0,015 | 17 |
| | 587 | – | 653 | – | 5 | 548 | – | 692 | 4 | 0,02 | 17 |
| | 612 | – | 700 | – | 6 | 553 | – | 757 | 5 | 0,025 | 16 |
| **560** | 598 | – | 644 | – | 3 | 573 | – | 667 | 2,5 | 0,015 | 17 |
| | 622 | – | 689 | – | 5 | 578 | – | 732 | 4 | 0,02 | 17 |
| | 648 | – | 732 | – | 6 | 583 | – | 797 | 5 | 0,025 | 16 |
| **600** | 642 | – | 688 | – | 3 | 613 | – | 717 | 2,5 | 0,015 | 17 |
| | 663 | – | 736 | – | 5 | 618 | – | 782 | 4 | 0,02 | 17 |
| | 689 | – | 781 | – | 6 | 623 | – | 847 | 5 | 0,025 | 16 |
| **630** | 678 | – | 732 | – | 4 | 645 | – | 765 | 3 | 0,015 | 17 |
| | 702 | – | 778 | – | 6 | 653 | – | 827 | 5 | 0,02 | 17 |
| | 725 | – | 825 | – | 7,5 | 658 | – | 892 | 6 | 0,025 | 16 |
| **670** | 718 | – | 772 | – | 4 | 685 | – | 805 | 3 | 0,015 | 17 |
| | 745 | – | 825 | – | 6 | 693 | – | 877 | 5 | 0,02 | 17 |
| | 771 | – | 878 | – | 7,5 | 698 | – | 952 | 6 | 0,025 | 16 |
| **710** | 761 | – | 818 | – | 4 | 725 | – | 855 | 3 | 0,015 | 17 |
| | 790 | – | 870 | – | 6 | 733 | – | 927 | 5 | 0,02 | 17 |
| | 811 | – | 928 | – | 7,5 | 738 | – | 1 002 | 6 | 0,025 | 16 |

## 1.1 Single row deep groove ball bearings

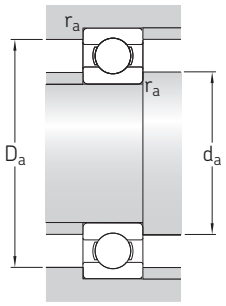
d **750 – 1 500** mm




| Designation | Dimensions | | |
|---|---|---|---|
| | h | b | $r_0$ |
| – | mm | | |
| **60/800 N1MAS** | 32 | 20.5 | 3 |

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed[1] | Mass | Designations Bearing open or capped on both sides | capped on one side[1] |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **750** | 920 | 78 | 527 | 1 250 | 18,3 | 1 100 | 900 | 110 | ▸ **618/750 MA** | – |
| | 1 000 | 112 | 761 | 1 800 | 25,5 | 1 000 | 850 | 255 | **619/750 MA** | – |
| | 1 090 | 150 | 995 | 2 360 | 33,5 | 950 | 800 | 485 | **60/750 MA** | – |
| **800** | 980 | 82 | 559 | 1 370 | 19,3 | 1 000 | 850 | 130 | ▸ **618/800 MA** | – |
| | 1 060 | 115 | 832 | 2 040 | 28,5 | 950 | 800 | 275 | **619/800 MA** | – |
| | 1 150 | 155 | 1 010 | 2 550 | 34,5 | 900 | 750 | 523 | **60/800 N1MAS** | – |
| **850** | 1 030 | 82 | 559 | 1 430 | 19,6 | 950 | 750 | 140 | ▸ **618/850 MA** | – |
| | 1 120 | 118 | 852 | 2 120 | 28,5 | 850 | 750 | 320 | **619/850 MA** | – |
| **900** | 1 090 | 85 | 618 | 1 600 | 21,6 | 850 | 700 | 167 | ▸ **618/900 MA** | – |
| **950** | 1 150 | 90 | 637 | 1 730 | 22,4 | 800 | 670 | 197 | ▸ **618/950 MA** | – |
| **1 000** | 1 220 | 100 | 637 | 1 800 | 22,8 | 750 | 600 | 245 | ▸ **618/1000 MA** | – |
| **1 060** | 1 280 | 100 | 728 | 2 120 | 26,5 | 670 | 560 | 260 | **618/1060 MA** | – |
| **1 120** | 1 360 | 106 | 741 | 2 200 | 26,5 | 630 | 530 | 315 | ▸ **618/1120 MA** | – |
| **1 180** | 1 420 | 106 | 761 | 2 360 | 27,5 | 560 | 480 | 337 | **618/1180 MB** | – |
| **1 320** | 1 600 | 122 | 956 | 3 150 | 35,5 | 480 | 400 | 500 | **618/1320 MA** | – |
| **1 500** | 1 820 | 140 | 1 170 | 4 150 | 43 | 380 | 240 | 638 | **618/1500 TN** | – |

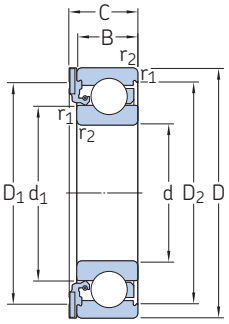
▸ Popular item
[1] For bearings with only one shield or one non-contact seal (Z, RZ) the limiting speeds of the open bearings are valid.




| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $d_2$ ≈ | $D_1$ ≈ | $D_2$ ≈ | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | $k_r$ | $f_0$ |
| mm | | | | | | mm | | | | – | |
| **750** | 804 | – | 866 | – | 5 | 768 | – | 902 | 4 | 0,015 | 17 |
| | 835 | – | 919 | – | 6 | 773 | – | 977 | 5 | 0,02 | 17 |
| | 862 | – | 978 | – | 7,5 | 778 | – | 1 062 | 6 | 0,025 | 16 |
| **800** | 857 | – | 922 | – | 5 | 818 | – | 962 | 4 | 0,015 | 17 |
| | 884 | – | 975 | – | 6 | 823 | – | 1 037 | 5 | 0,02 | 17 |
| | 914 | – | 1 032 | – | 7,5 | 828 | – | 1 122 | 6 | 0,025 | 16 |
| **850** | 907 | – | 972 | – | 5 | 868 | – | 1 012 | 4 | 0,015 | 17 |
| | 937 | – | 1 033 | – | 6 | 873 | – | 1 097 | 5 | 0,02 | 17 |
| **900** | 960 | – | 1 029 | – | 5 | 918 | – | 1 072 | 4 | 0,015 | 18 |
| **950** | 1 015 | – | 1 084 | – | 5 | 968 | – | 1 132 | 4 | 0,015 | 18 |
| **1 000** | 1 076 | – | 1 145 | – | 6 | 1 023 | – | 1 197 | 5 | 0,015 | 17 |
| **1 060** | 1 132 | – | 1 208 | – | 6 | 1 083 | – | 1 257 | 5 | 0,015 | 18 |
| **1 120** | 1 201 | – | 1 278 | – | 6 | 1 143 | – | 1 337 | 5 | 0,015 | 18 |
| **1 180** | 1 262 | – | 1 338 | – | 6 | 1 203 | – | 1 397 | 5 | 0,015 | 18 |
| **1 320** | 1 414 | – | 1 506 | – | 6 | 1 343 | – | 1 577 | 5 | 0,015 | 18 |
| **1 500** | 1 606 | – | 1 712 | – | 7,5 | 1 528 | – | 1 792 | 6 | 0,015 | 18 |

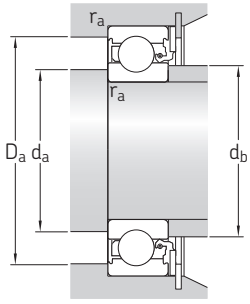
## 1.2 ICOS oil sealed bearing units

d **12 – 30** mm




| Principal dimensions | | | | Basic load ratings dynamic | static | Fatigue load limit | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | C | $C_0$ | $P_u$ | | | |
| mm | | | | kN | | kN | r/min | kg | – |
| **12** | 32 | 10 | 12,6 | 7,28 | 3,1 | 0,132 | 14 000 | 0,041 | ICOS-D1B01 TN9 |
| **15** | 35 | 11 | 13,2 | 8,06 | 3,75 | 0,16 | 12 000 | 0,048 | ICOS-D1B02 TN9 |
| **17** | 40 | 12 | 14,2 | 9,95 | 4,75 | 0,2 | 11 000 | 0,071 | ICOS-D1B03 TN9 |
| **20** | 47 | 14 | 16,2 | 13,5 | 6,55 | 0,28 | 9 300 | 0,11 | ICOS-D1B04 TN9 |
| **25** | 52 | 15 | 17,2 | 14,8 | 7,8 | 0,335 | 7 700 | 0,14 | ICOS-D1B05 TN9 |
| **30** | 62 | 16 | 19,4 | 20,3 | 11,2 | 0,475 | 6 500 | 0,22 | ICOS-D1B06 TN9 |

SKF Explorer bearing

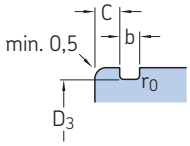


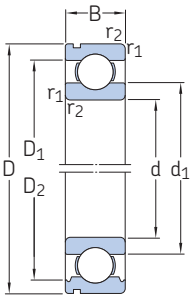

| Dimensions | | | | | Abutment and fillet dimensions | | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | $D_2$ ≈ | $r_{1,2}$ min. | $d_a$, $d_b$ min. | $d_a$ max. | $d_b$ max. | $D_a$ max. | $r_a$ max. | $k_r$ | $f_0$ |
| mm | | | | | mm | | | | | – | |
| **12** | 18,4 | –[1] | 27,4 | 0,6 | 16,2 | 18,4 | 18 | 27,8 | 0,6 | 0,025 | 12 |
| **15** | 21,7 | 30,8 | 30,5 | 0,6 | 19,2 | 21,7 | 21,5 | 30,8 | 0,6 | 0,025 | 13 |
| **17** | 24,5 | 35,6 | 35 | 0,6 | 21,2 | 24,5 | 24 | 35,8 | 0,6 | 0,025 | 13 |
| **20** | 28,8 | 42 | 40,6 | 1 | 25,6 | 28,8 | 28,5 | 41,4 | 1 | 0,025 | 13 |
| **25** | 34,3 | 47 | 46,3 | 1 | 30,6 | 34,3 | 34 | 46,4 | 1 | 0,025 | 14 |
| **30** | 40,3 | 55,6 | 54,1 | 1 | 35,6 | 40,3 | 40 | 56 | 1 | 0,025 | 14 |

[1] Full rubber cross section

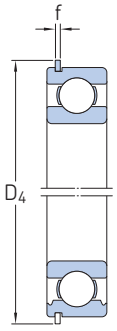
## 1.3 Single row deep groove ball bearings with a snap ring groove

d **10 – 35** mm

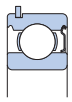


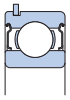

N




NR



ZNR

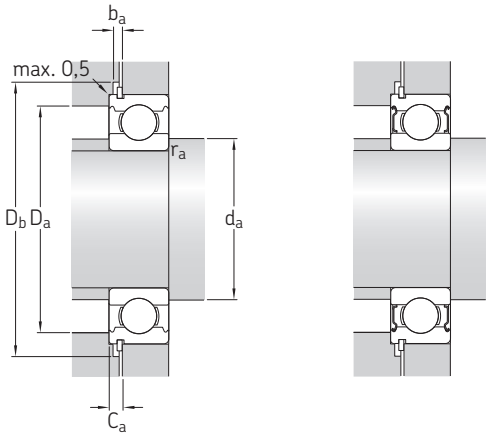


2ZNR

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed[1] | Mass | Designations Bearings[1] | | Snap ring |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | | |
| **10** | 30 | 9 | 5,4 | 2,36 | 0,1 | 56 000 | 28 000 | 0,035 | **6200-ZNR** | **6200-2ZNR** | SP 30 |
| | 30 | 9 | 5,4 | 2,36 | 0,1 | 56 000 | 36 000 | 0,032 | **6200 N** | **6200 NR** | SP 30 |
| **12** | 32 | 10 | 7,28 | 3,1 | 0,132 | 50 000 | 26 000 | 0,037 | **6201-ZNR** | **6201-2ZNR** | SP 32 |
| | 32 | 10 | 7,28 | 3,1 | 0,132 | 50 000 | 32 000 | 0,037 | **6201 N** | **6201 NR** | SP 32 |
| **15** | 35 | 11 | 8,06 | 3,75 | 0,16 | 43 000 | 22 000 | 0,045 | **6202-ZNR** | **6202-2ZNR** | SP 35 |
| | 35 | 11 | 8,06 | 3,75 | 0,16 | 43 000 | 28 000 | 0,045 | **6202 N** | **6202 NR** | SP 35 |
| **17** | 40 | 12 | 9,95 | 4,75 | 0,2 | 38 000 | 19 000 | 0,065 | **6203-ZNR** | **6203-2ZNR** | SP 40 |
| | 40 | 12 | 9,95 | 4,75 | 0,2 | 38 000 | 24 000 | 0,065 | **6203 N** | **6203 NR** | SP 40 |
| | 47 | 14 | 14,3 | 6,55 | 0,275 | 34 000 | 17 000 | 0,12 | **6303-ZNR** | **6303-2ZNR** | SP 47 |
| | 47 | 14 | 14,3 | 6,55 | 0,275 | 34 000 | 22 000 | 0,12 | **6303 N** | **6303 NR** | SP 47 |
| **20** | 42 | 12 | 9,95 | 5 | 0,212 | 38 000 | 19 000 | 0,069 | **6004-ZNR** | **6004-2ZNR** | SP 42 |
| | 42 | 12 | 9,95 | 5 | 0,212 | 38 000 | 24 000 | 0,069 | **6004 N** | **6004 NR** | SP 42 |
| | 47 | 14 | 13,5 | 6,55 | 0,28 | 32 000 | 17 000 | 0,11 | **6204-ZNR** | **6204-2ZNR** | SP 47 |
| | 47 | 14 | 13,5 | 6,55 | 0,28 | 32 000 | 20 000 | 0,11 | **6204 N** | **6204 NR** | SP 47 |
| | 52 | 15 | 16,8 | 7,8 | 0,335 | 30 000 | 15 000 | 0,16 | **6304-ZNR** | **6304-2ZNR** | SP 52 |
| | 52 | 15 | 16,8 | 7,8 | 0,335 | 30 000 | 19 000 | 0,15 | **6304 N** | **6304 NR** | SP 52 |
| **25** | 47 | 12 | 11,9 | 6,55 | 0,275 | 32 000 | 16 000 | 0,08 | **6005-ZNR** | **6005-2ZNR** | SP 47 |
| | 47 | 12 | 11,9 | 6,55 | 0,275 | 32 000 | 20 000 | 0,08 | **6005 N** | **6005 NR** | SP 47 |
| | 52 | 15 | 14,8 | 7,8 | 0,335 | 28 000 | 14 000 | 0,13 | **6205-ZNR** | **6205-2ZNR** | SP 52 |
| | 52 | 15 | 14,8 | 7,8 | 0,335 | 28 000 | 18 000 | 0,13 | **6205 N** | **6205 NR** | SP 52 |
| | 62 | 17 | 23,4 | 11,6 | 0,49 | 24 000 | 13 000 | 0,24 | **6305-ZNR** | **6305-2ZNR** | SP 62 |
| | 62 | 17 | 23,4 | 11,6 | 0,49 | 24 000 | 16 000 | 0,23 | **6305 N** | **6305 NR** | SP 62 |
| **30** | 55 | 13 | 13,8 | 8,3 | 0,355 | 28 000 | 17 000 | 0,12 | **6006 N** | **6006 NR** | SP 55 |
| | 62 | 16 | 20,3 | 11,2 | 0,475 | 24 000 | 12 000 | 0,21 | **6206-ZNR** | **6206-2ZNR** | SP 62 |
| | 62 | 16 | 20,3 | 11,2 | 0,475 | 24 000 | 15 000 | 0,21 | **6206 N** | **6206 NR** | SP 62 |
| | 72 | 19 | 29,6 | 16 | 0,67 | 20 000 | 11 000 | 0,37 | **6306-ZNR** | **6306-2ZNR** | SP 72 |
| | 72 | 19 | 29,6 | 16 | 0,67 | 20 000 | 13 000 | 0,36 | **6306 N** | **6306 NR** | SP 72 |
| **35** | 62 | 14 | 16,8 | 10,2 | 0,44 | 24 000 | 15 000 | 0,16 | **6007 N** | **6007 NR** | SP 62 |
| | 72 | 17 | 27 | 15,3 | 0,655 | 20 000 | 10 000 | 0,31 | **6207-ZNR** | **6207-2ZNR** | SP 72 |
| | 72 | 17 | 27 | 15,3 | 0,655 | 20 000 | 13 000 | 0,3 | **6207 N** | **6207 NR** | SP 72 |
| | 80 | 21 | 35,1 | 19 | 0,82 | 19 000 | 9 500 | 0,48 | **6307-ZNR** | **6307-2ZNR** | SP 80 |
| | 80 | 21 | 35,1 | 19 | 0,82 | 19 000 | 12 000 | 0,47 | **6307 N** | **6307 NR** | SP 80 |
| | 100 | 25 | 55,3 | 31 | 1,29 | 16 000 | 10 000 | 0,99 | **6407 N** | **6407 NR** | SP 100 |

**SKF Explorer bearing**

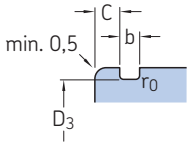
[1] For bearings with one shield (ZNR) the limiting speeds of the open bearings are valid.

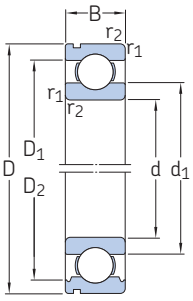



| Dimensions | | | | | | | | | | | Abutment and fillet dimensions | | | | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | $D_2$ ≈ | $D_3$ | $D_4$ | b | f | C | $r_{1,2}$ min. | $r_0$ max. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $D_b$ min. | $b_a$ min. | $C_a$ max. | $r_a$ max. | $k_r$ | $f_0$ |
| mm | | | | | | | | | | | mm | | | | | | | – | |
| **10** | 17 | – | 24,8 | 28,17 | 34,7 | 1,35 | 1,12 | 2,06 | 0,6 | 0,4 | 14,2 | 16,9 | 25,8 | 36 | 1,5 | 3,18 | 0,6 | 0,025 | 13 |
| | 17 | – | 24,8 | 28,17 | 34,7 | 1,35 | 1,12 | 2,06 | 0,6 | 0,4 | 14,2 | – | 25,8 | 36 | 1,5 | 3,18 | 0,6 | 0,025 | 13 |
| **12** | 18,4 | – | 27,4 | 30,15 | 36,7 | 1,35 | 1,12 | 2,06 | 0,6 | 0,4 | 16,2 | 18,4 | 27,8 | 38 | 1,5 | 3,18 | 0,6 | 0,025 | 12 |
| | 18,4 | – | 27,4 | 30,15 | 36,7 | 1,35 | 1,12 | 2,06 | 0,6 | 0,4 | 16,2 | – | 27,8 | 38 | 1,5 | 3,18 | 0,6 | 0,025 | 12 |
| **15** | 21,7 | – | 30,5 | 33,17 | 39,7 | 1,35 | 1,12 | 2,06 | 0,6 | 0,4 | 19,2 | 21,6 | 30,8 | 41 | 1,5 | 3,18 | 0,6 | 0,025 | 13 |
| | 21,7 | – | 30,5 | 33,17 | 39,7 | 1,35 | 1,12 | 2,06 | 0,6 | 0,4 | 19,2 | – | 30,8 | 41 | 1,5 | 3,18 | 0,6 | 0,025 | 13 |
| **17** | 24,5 | – | 35 | 38,1 | 44,6 | 1,35 | 1,12 | 2,06 | 0,6 | 0,4 | 21,2 | 24,4 | 35,8 | 46 | 1,5 | 3,18 | 0,6 | 0,025 | 13 |
| | 24,5 | – | 35 | 38,1 | 44,6 | 1,35 | 1,12 | 2,06 | 0,6 | 0,4 | 21,2 | – | 35,8 | 46 | 1,5 | 3,18 | 0,6 | 0,025 | 13 |
| | 26,5 | – | 39,6 | 44,6 | 52,7 | 1,35 | 1,12 | 2,46 | 1 | 0,4 | 22,6 | 26,4 | 41,4 | 54 | 1,5 | 3,58 | 1 | 0,03 | 12 |
| | 26,5 | – | 39,6 | 44,6 | 52,7 | 1,35 | 1,12 | 2,46 | 1 | 0,4 | 22,6 | – | 41,4 | 54 | 1,5 | 3,58 | 1 | 0,03 | 12 |
| **20** | 27,2 | – | 37,2 | 39,75 | 46,3 | 1,35 | 1,12 | 2,06 | 0,6 | 0,4 | 23,2 | 27,1 | 38,8 | 48 | 1,5 | 3,18 | 0,6 | 0,025 | 14 |
| | 27,2 | – | 37,2 | 39,75 | 46,3 | 1,35 | 1,12 | 2,06 | 0,6 | 0,4 | 23,2 | – | 38,8 | 48 | 1,5 | 3,18 | 0,6 | 0,025 | 14 |
| | 28,8 | – | 40,6 | 44,6 | 52,7 | 1,35 | 1,12 | 2,46 | 1 | 0,4 | 25,6 | 28,7 | 41,4 | 54 | 1,5 | 3,58 | 1 | 0,025 | 13 |
| | 28,8 | – | 40,6 | 44,6 | 52,7 | 1,35 | 1,12 | 2,46 | 1 | 0,4 | 25,6 | – | 41,4 | 54 | 1,5 | 3,58 | 1 | 0,025 | 13 |
| | 30,3 | – | 44,8 | 49,73 | 57,9 | 1,35 | 1,12 | 2,46 | 1,1 | 0,4 | 27 | 30,3 | 45 | 59 | 1,5 | 3,58 | 1 | 0,03 | 12 |
| | 30,3 | – | 44,8 | 49,73 | 57,9 | 1,35 | 1,12 | 2,46 | 1,1 | 0,4 | 27 | – | 45 | 59 | 1,5 | 3,58 | 1 | 0,03 | 12 |
| **25** | 32 | – | 42,2 | 44,6 | 52,7 | 1,35 | 1,12 | 2,06 | 0,6 | 0,4 | 28,2 | 31,9 | 43,8 | 54 | 1,5 | 3,18 | 0,6 | 0,025 | 14 |
| | 32 | – | 42,2 | 44,6 | 52,7 | 1,35 | 1,12 | 2,06 | 0,6 | 0,4 | 28,2 | – | 43,8 | 54 | 1,5 | 3,18 | 0,6 | 0,025 | 14 |
| | 34,3 | – | 46,3 | 49,73 | 57,9 | 1,35 | 1,12 | 2,46 | 1 | 0,4 | 30,6 | 34,3 | 46,4 | 59 | 1,5 | 3,58 | 1 | 0,025 | 14 |
| | 34,3 | – | 46,3 | 49,73 | 57,9 | 1,35 | 1,12 | 2,46 | 1 | 0,4 | 30,6 | – | 46,4 | 59 | 1,5 | 3,58 | 1 | 0,025 | 14 |
| | 36,6 | – | 52,7 | 59,61 | 67,7 | 1,9 | 1,7 | 3,28 | 1,1 | 0,6 | 32 | 36,5 | 55 | 69 | 2,2 | 4,98 | 1 | 0,03 | 12 |
| | 36,6 | – | 52,7 | 59,61 | 67,7 | 1,9 | 1,7 | 3,28 | 1,1 | 0,6 | 32 | – | 55 | 69 | 2,2 | 4,98 | 1 | 0,03 | 12 |
| **30** | 38,2 | – | 49 | 52,6 | 60,7 | 1,35 | 1,12 | 2,06 | 1 | 0,4 | 34,6 | – | 50 | 62 | 1,5 | 3,18 | 1 | 0,025 | 15 |
| | 40,3 | – | 54,1 | 59,61 | 67,7 | 1,9 | 1,7 | 3,28 | 1 | 0,6 | 35,6 | 40,3 | 56 | 69 | 2,2 | 4,98 | 1 | 0,025 | 14 |
| | 40,3 | – | 54,1 | 59,61 | 67,7 | 1,9 | 1,7 | 3,28 | 1 | 0,6 | 35,6 | – | 56 | 69 | 2,2 | 4,98 | 1 | 0,025 | 14 |
| | 44,6 | – | 61,9 | 68,81 | 78,6 | 1,9 | 1,7 | 3,28 | 1,1 | 0,6 | 37 | 44,5 | 65 | 80 | 2,2 | 4,98 | 1 | 0,03 | 13 |
| | 44,6 | – | 61,9 | 68,81 | 78,6 | 1,9 | 1,7 | 3,28 | 1,1 | 0,6 | 37 | – | 65 | 80 | 2,2 | 4,98 | 1 | 0,03 | 13 |
| **35** | 43,7 | – | 55,7 | 59,61 | 67,7 | 1,9 | 1,7 | 2,06 | 1 | 0,6 | 39,6 | – | 57 | 69 | 2,2 | 3,76 | 1 | 0,025 | 15 |
| | 46,9 | – | 62,7 | 68,81 | 78,6 | 1,9 | 1,7 | 3,28 | 1,1 | 0,6 | 42 | 46,8 | 65 | 80 | 2,2 | 4,98 | 1 | 0,025 | 14 |
| | 46,9 | – | 62,7 | 68,81 | 78,6 | 1,9 | 1,7 | 3,28 | 1,1 | 0,6 | 42 | – | 65 | 80 | 2,2 | 4,98 | 1 | 0,025 | 14 |
| | 49,5 | – | 69,2 | 76,81 | 86,6 | 1,9 | 1,7 | 3,28 | 1,5 | 0,6 | 44 | 49,5 | 71 | 88 | 2,2 | 4,98 | 1,5 | 0,03 | 13 |
| | 49,5 | – | 69,2 | 76,81 | 86,6 | 1,9 | 1,7 | 3,28 | 1,5 | 0,6 | 44 | – | 71 | 88 | 2,2 | 4,98 | 1,5 | 0,03 | 13 |
| | 57,4 | 79,6 | – | 96,8 | 106,5 | 2,7 | 2,46 | 3,28 | 1,5 | 0,6 | 46 | – | 89 | 108 | 3 | 5,74 | 1,5 | 0,035 | 12 |

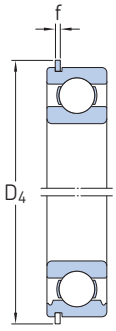
## 1.3 Single row deep groove ball bearings with a snap ring groove

d **40 – 65** mm

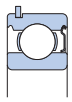


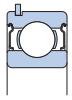

N




NR



ZNR

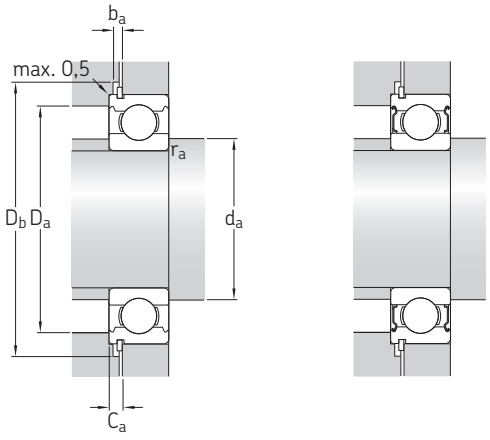


2ZNR

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed[1] | Mass | Designations Bearings[1] | | Snap ring |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | | |
| **40** | 68 | 15 | 17,8 | 11 | 0,49 | 22 000 | 14 000 | 0,19 | **6008 N** | **6008 NR** | SP 68 |
| | 80 | 18 | 32,5 | 19 | 0,8 | 18 000 | 9 000 | 0,39 | **6208-ZNR** | **6208-2ZNR** | SP 80 |
| | 80 | 18 | 32,5 | 19 | 0,8 | 18 000 | 11 000 | 0,38 | **6208 N** | **6208 NR** | SP 80 |
| | 90 | 23 | 42,3 | 24 | 1,02 | 17 000 | 8 500 | 0,64 | **6308-ZNR** | **6308-2ZNR** | SP 90 |
| | 90 | 23 | 42,3 | 24 | 1,02 | 17 000 | 11 000 | 0,64 | **6308 N** | **6308 NR** | SP 90 |
| | 110 | 27 | 63,7 | 36,5 | 1,53 | 14 000 | 9 000 | 1,3 | **6408 N** | **6408 NR** | SP 110 |
| **45** | 75 | 16 | 22,1 | 14,6 | 0,64 | 20 000 | 12 000 | 0,24 | **6009 N** | **6009 NR** | SP 75 |
| | 85 | 19 | 35,1 | 21,6 | 0,915 | 17 000 | 8 500 | 0,44 | **6209-ZNR** | **6209-2ZNR** | SP 85 |
| | 85 | 19 | 35,1 | 21,6 | 0,915 | 17 000 | 11 000 | 0,43 | **6209 N** | **6209 NR** | SP 85 |
| | 100 | 25 | 55,3 | 31,5 | 1,34 | 15 000 | 7 500 | 0,89 | **6309-ZNR** | **6309-2ZNR** | SP 100 |
| | 100 | 25 | 55,3 | 31,5 | 1,34 | 15 000 | 9 500 | 0,85 | **6309 N** | **6309 NR** | SP 100 |
| | 120 | 29 | 76,1 | 45 | 1,9 | 13 000 | 8 500 | 1,6 | **6409 N** | **6409 NR** | SP 120 |
| **50** | 80 | 16 | 22,9 | 15,6 | 0,71 | 18 000 | 11 000 | 0,27 | **6010 N** | **6010 NR** | SP 80 |
| | 90 | 20 | 37,1 | 23,2 | 0,98 | 15 000 | 8 000 | 0,49 | **6210-ZNR** | **6210-2ZNR** | SP 90 |
| | 90 | 20 | 37,1 | 23,2 | 0,98 | 15 000 | 10 000 | 0,47 | **6210 N** | **6210 NR** | SP 90 |
| | 110 | 27 | 65 | 38 | 1,6 | 13 000 | 6 700 | 1,15 | **6310-ZNR** | **6310-2ZNR** | SP 110 |
| | 110 | 27 | 65 | 38 | 1,6 | 13 000 | 8 500 | 1,1 | **6310 N** | **6310 NR** | SP 110 |
| | 130 | 31 | 87,1 | 52 | 2,2 | 12 000 | 7 500 | 2 | **6410 N** | **6410 NR** | SP 130 |
| **55** | 90 | 18 | 29,6 | 21,2 | 0,9 | 16 000 | 10 000 | 0,4 | **6011 N** | **6011 NR** | SP 90 |
| | 100 | 21 | 46,2 | 29 | 1,25 | 14 000 | 7 000 | 0,66 | **6211-ZNR** | **6211-2ZNR** | SP 100 |
| | 100 | 21 | 46,2 | 29 | 1,25 | 14 000 | 9 000 | 0,63 | **6211 N** | **6211 NR** | SP 100 |
| | 120 | 29 | 74,1 | 45 | 1,9 | 12 000 | 6 300 | 1,45 | **6311-ZNR** | **6311-2ZNR** | SP 120 |
| | 120 | 29 | 74,1 | 45 | 1,9 | 12 000 | 8 000 | 1,4 | **6311 N** | **6311 NR** | SP 120 |
| | 140 | 33 | 99,5 | 62 | 2,6 | 11 000 | 7 000 | 2,4 | **6411 N** | **6411 NR** | SP 140 |
| **60** | 95 | 18 | 30,7 | 23,2 | 0,98 | 15 000 | 9 500 | 0,43 | **6012 N** | **6012 NR** | SP 95 |
| | 110 | 22 | 55,3 | 36 | 1,53 | 13 000 | 6 300 | 0,83 | **6212-ZNR** | **6212-2ZNR** | SP 110 |
| | 110 | 22 | 55,3 | 36 | 1,53 | 13 000 | 8 000 | 0,8 | **6212 N** | **6212 NR** | SP 110 |
| | 130 | 31 | 85,2 | 52 | 2,2 | 11 000 | 5 600 | 1,8 | **6312-ZNR** | **6312-2ZNR** | SP 130 |
| | 130 | 31 | 85,2 | 52 | 2,2 | 11 000 | 7 000 | 1,75 | **6312 N** | **6312 NR** | SP 130 |
| | 150 | 35 | 108 | 69,5 | 2,9 | 10 000 | 6 300 | 2,9 | **6412 N** | **6412 NR** | SP 150 |
| **65** | 100 | 18 | 31,9 | 25 | 1,06 | 14 000 | 9 000 | 0,45 | **6013 N** | **6013 NR** | SP 100 |
| | 120 | 23 | 58,5 | 40,5 | 1,73 | 12 000 | 6 000 | 1,1 | **6213-ZNR** | **6213-2ZNR** | SP 120 |
| | 120 | 23 | 58,5 | 40,5 | 1,73 | 12 000 | 7 500 | 1,05 | **6213 N** | **6213 NR** | SP 120 |
| | 140 | 33 | 97,5 | 60 | 2,5 | 10 000 | 5 300 | 2,25 | **6313-ZNR** | **6313-2ZNR** | SP 140 |
| | 140 | 33 | 97,5 | 60 | 2,5 | 10 000 | 6 700 | 2,15 | **6313 N** | **6313 NR** | SP 140 |
| | 160 | 37 | 119 | 78 | 3,15 | 9 500 | 6 000 | 3,4 | **6413 N** | **6413 NR** | SP 160 |

**SKF Explorer bearing**

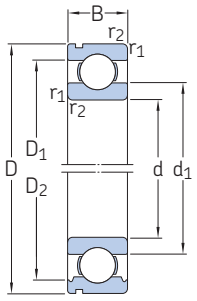
[1] For bearings with one shield (ZNR) the limiting speeds of the open bearings are valid.



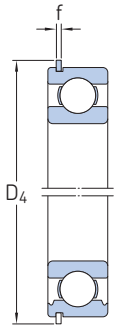

| Dimensions | | | | | | | | | | | Abutment and fillet dimensions | | | | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | $D_2$ ≈ | $D_3$ | $D_4$ | b | f | C | $r_{1,2}$ min. | $r_0$ max. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $D_b$ min. | $b_a$ min. | $C_a$ max. | $r_a$ max. | $k_r$ | $f_0$ |
| mm | | | | | | | | | | | mm | | | | | | | – | |
| **40** | 49,2 | – | 61,1 | 64,82 | 74,6 | 1,9 | 1,7 | 2,49 | 1 | 0,6 | 44,6 | – | 63 | 76 | 2,2 | 4,19 | 1 | 0,025 | 15 |
| | 52,6 | – | 69,8 | 76,81 | 86,6 | 1,9 | 1,7 | 3,28 | 1,1 | 0,6 | 47 | 52 | 73 | 88 | 2,2 | 4,98 | 1 | 0,025 | 14 |
| | 52,6 | – | 69,8 | 76,81 | 86,6 | 1,9 | 1,7 | 3,28 | 1,1 | 0,6 | 47 | – | 73 | 88 | 2,2 | 4,98 | 1 | 0,025 | 14 |
| | 56,1 | – | 77,7 | 86,79 | 96,5 | 2,7 | 2,46 | 3,28 | 1,5 | 0,6 | 49 | 56 | 81 | 98 | 3 | 5,74 | 1,5 | 0,03 | 13 |
| | 56,1 | – | 77,7 | 86,79 | 96,5 | 2,7 | 2,46 | 3,28 | 1,5 | 0,6 | 49 | – | 81 | 98 | 3 | 5,74 | 1,5 | 0,03 | 13 |
| | 62,8 | 87 | – | 106,81 | 116,6 | 2,7 | 2,46 | 3,28 | 2 | 0,6 | 53 | – | 97 | 118 | 3 | 5,74 | 2 | 0,035 | 12 |
| **45** | 54,7 | – | 67,8 | 71,83 | 81,6 | 1,9 | 1,7 | 2,49 | 1 | 0,6 | 51 | – | 69 | 83 | 2,2 | 4,19 | 1 | 0,025 | 15 |
| | 57,6 | – | 75,2 | 81,81 | 91,6 | 1,9 | 1,7 | 3,28 | 1,1 | 0,6 | 52 | 57 | 78 | 93 | 2,2 | 4,98 | 1 | 0,025 | 14 |
| | 57,6 | – | 75,2 | 81,81 | 91,6 | 1,9 | 1,7 | 3,28 | 1,1 | 0,6 | 52 | – | 78 | 93 | 2,2 | 4,98 | 1 | 0,025 | 14 |
| | 62,1 | – | 86,7 | 96,8 | 106,5 | 2,7 | 2,46 | 3,28 | 1,5 | 0,6 | 54 | 62 | 91 | 108 | 3 | 5,74 | 1,5 | 0,03 | 13 |
| | 62,1 | – | 86,7 | 96,8 | 106,5 | 2,7 | 2,46 | 3,28 | 1,5 | 0,6 | 54 | – | 91 | 108 | 3 | 5,74 | 1,5 | 0,03 | 13 |
| | 68,9 | 95,9 | – | 115 | 129,7 | 3,1 | 2,82 | 4,06 | 2 | 0,6 | 58 | – | 107 | 131 | 3,5 | 6,88 | 2 | 0,035 | 12 |
| **50** | 59,7 | – | 72,8 | 76,81 | 86,6 | 1,9 | 1,7 | 2,49 | 1 | 0,6 | 55 | – | 75 | 88 | 2,2 | 4,19 | 1 | 0,025 | 15 |
| | 62,5 | – | 81,7 | 86,79 | 96,5 | 2,7 | 2,46 | 3,28 | 1,1 | 0,6 | 57 | 62 | 83 | 98 | 3 | 5,74 | 1 | 0,025 | 14 |
| | 62,5 | – | 81,7 | 86,79 | 96,5 | 2,7 | 2,46 | 3,28 | 1,1 | 0,6 | 57 | – | 83 | 98 | 3 | 5,74 | 1 | 0,025 | 14 |
| | 68,7 | – | 95,2 | 106,81 | 116,6 | 2,7 | 2,46 | 3,28 | 2 | 0,6 | 61 | 68 | 99 | 118 | 3 | 5,74 | 2 | 0,03 | 13 |
| | 68,7 | – | 95,2 | 106,81 | 116,6 | 2,7 | 2,46 | 3,28 | 2 | 0,6 | 61 | – | 99 | 118 | 3 | 5,74 | 2 | 0,03 | 13 |
| | 75,4 | 105 | – | 125,22 | 139,7 | 3,1 | 2,82 | 4,06 | 2,1 | 0,6 | 64 | – | 116 | 141 | 3,5 | 6,88 | 2 | 0,035 | 12 |
| **55** | 66,3 | – | 81,5 | 86,79 | 96,5 | 2,7 | 2,46 | 2,87 | 1,1 | 0,6 | 61 | – | 84 | 98 | 3 | 5,33 | 1 | 0,025 | 15 |
| | 69 | – | 89,4 | 96,8 | 106,5 | 2,7 | 2,46 | 3,28 | 1,5 | 0,6 | 64 | 69 | 91 | 108 | 3 | 5,74 | 1,5 | 0,025 | 14 |
| | 69 | – | 89,4 | 96,8 | 106,5 | 2,7 | 2,46 | 3,28 | 1,5 | 0,6 | 64 | – | 91 | 108 | 3 | 5,74 | 1,5 | 0,025 | 14 |
| | 75,3 | – | 104 | 115,21 | 129,7 | 3,1 | 2,82 | 4,06 | 2 | 0,6 | 66 | 75 | 109 | 131 | 3,5 | 6,88 | 2 | 0,03 | 13 |
| | 75,3 | – | 104 | 115,21 | 129,7 | 3,1 | 2,82 | 4,06 | 2 | 0,6 | 66 | – | 109 | 131 | 3,5 | 6,88 | 2 | 0,03 | 13 |
| | 81,5 | 114 | – | 135,23 | 149,7 | 3,1 | 2,82 | 4,9 | 2,1 | 0,6 | 69 | – | 126 | 151 | 3,5 | 7,72 | 2 | 0,035 | 12 |
| **60** | 71,3 | – | 86,5 | 91,82 | 101,6 | 2,7 | 2,46 | 2,87 | 1,1 | 0,6 | 66 | – | 89 | 103 | 3 | 5,33 | 1 | 0,025 | 16 |
| | 75,5 | – | 98 | 106,81 | 116,6 | 2,7 | 2,46 | 3,28 | 1,5 | 0,6 | 69 | 75 | 101 | 118 | 3 | 5,74 | 1,5 | 0,025 | 14 |
| | 75,5 | – | 98 | 106,81 | 116,6 | 2,7 | 2,46 | 3,28 | 1,5 | 0,6 | 69 | – | 101 | 118 | 3 | 5,74 | 1,5 | 0,025 | 14 |
| | 81,8 | – | 113 | 125,22 | 139,7 | 3,1 | 2,82 | 4,06 | 2,1 | 0,6 | 72 | 81 | 118 | 141 | 3,5 | 6,88 | 2 | 0,03 | 13 |
| | 81,8 | – | 113 | 125,22 | 139,7 | 3,1 | 2,82 | 4,06 | 2,1 | 0,6 | 72 | – | 118 | 141 | 3,5 | 6,88 | 2 | 0,03 | 13 |
| | 88,1 | 122 | – | 145,24 | 159,7 | 3,1 | 2,82 | 4,9 | 2,1 | 0,6 | 74 | – | 136 | 162 | 3,5 | 7,72 | 2 | 0,035 | 12 |
| **65** | 76,3 | – | 91,5 | 96,8 | 106,5 | 2,7 | 2,46 | 2,87 | 1,1 | 0,6 | 71 | – | 94 | 108 | 3 | 5,33 | 1 | 0,025 | 16 |
| | 83,3 | – | 106 | 115,21 | 129,7 | 3,1 | 2,82 | 4,06 | 1,5 | 0,6 | 74 | 83 | 111 | 131 | 3,5 | 6,88 | 1,5 | 0,025 | 15 |
| | 83,3 | – | 106 | 115,21 | 129,7 | 3,1 | 2,82 | 4,06 | 1,5 | 0,6 | 74 | – | 111 | 131 | 3,5 | 6,88 | 1,5 | 0,025 | 15 |
| | 88,3 | – | 122 | 135,23 | 149,7 | 3,1 | 2,82 | 4,9 | 2,1 | 0,6 | 77 | 88 | 128 | 151 | 3,5 | 7,72 | 2 | 0,03 | 13 |
| | 88,3 | – | 122 | 135,23 | 149,7 | 3,1 | 2,82 | 4,9 | 2,1 | 0,6 | 77 | – | 128 | 151 | 3,5 | 7,72 | 2 | 0,03 | 13 |
| | 94 | 131 | – | 155,22 | 169,7 | 3,1 | 2,82 | 4,9 | 2,1 | 0,6 | 79 | – | 146 | 172 | 3,5 | 7,72 | 2 | 0,035 | 12 |

## 1.3 Single row deep groove ball bearings with a snap ring groove

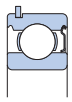
d **70 – 120** mm



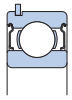

N




NR



ZNR

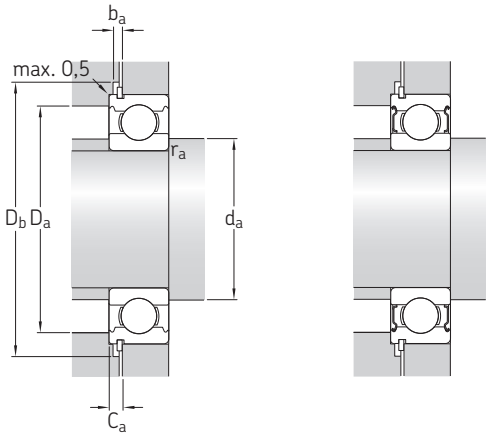


2ZNR

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed[1] | Mass | Designations Bearings[1] | | Snap ring |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | | |
| **70** | 110 | 20 | 39,7 | 31 | 1,32 | 13 000 | 8 000 | 0,63 | **6014 N** | **6014 NR** | SP 110 |
| | 125 | 24 | 63,7 | 45 | 1,9 | 11 000 | 5 600 | 1,15 | **6214-ZNR** | **6214-2ZNR** | SP 125 |
| | 125 | 24 | 63,7 | 45 | 1,9 | 11 000 | 7 000 | 1,15 | **6214 N** | **6214 NR** | SP 125 |
| | 150 | 35 | 111 | 68 | 2,75 | 9 500 | 5 000 | 2,65 | **6314-ZNR** | **6314-2ZNR** | SP 150 |
| | 150 | 35 | 111 | 68 | 2,75 | 9 500 | 6 300 | 2,6 | **6314 N** | **6314 NR** | SP 150 |
| **75** | 115 | 20 | 41,6 | 33,5 | 1,43 | 12 000 | 7 500 | 0,67 | **6015 N** | **6015 NR** | SP 115 |
| | 130 | 25 | 68,9 | 49 | 2,04 | 10 000 | 6 700 | 1,25 | **6215 N** | **6215 NR** | SP 130 |
| | 160 | 37 | 119 | 76,5 | 3 | 9 000 | 5 600 | 3,05 | **6315 N** | **6315 NR** | SP 160 |
| **80** | 125 | 22 | 49,4 | 40 | 1,66 | 11 000 | 7 000 | 0,92 | **6016 N** | **6016 NR** | SP 125 |
| | 140 | 26 | 72,8 | 55 | 2,2 | 9 500 | 6 000 | 1,5 | **6216 N** | **6216 NR** | SP 140 |
| **85** | 130 | 22 | 52 | 43 | 1,76 | 11 000 | 6 700 | 0,94 | **6017 N** | **6017 NR** | SP 130 |
| | 150 | 28 | 87,1 | 64 | 2,5 | 9 000 | 5 600 | 1,85 | **6217 N** | **6217 NR** | SP 150 |
| **90** | 140 | 24 | 60,5 | 50 | 1,96 | 10 000 | 6 300 | 1,2 | **6018 N** | **6018 NR** | SP 140 |
| | 160 | 30 | 101 | 73,5 | 2,8 | 8 500 | 5 300 | 2,25 | **6218 N** | **6218 NR** | SP 160 |
| **95** | 170 | 32 | 114 | 81,5 | 3 | 8 000 | 5 000 | 2,7 | **6219 N** | **6219 NR** | SP 170 |
| **100** | 150 | 24 | 63,7 | 54 | 2,04 | 9 500 | 5 600 | 1,3 | **6020 N** | **6020 NR** | SP 150 |
| | 180 | 34 | 127 | 93 | 3,35 | 7 500 | 4 800 | 3,25 | **6220 N** | **6220 NR** | SP 180 |
| **105** | 160 | 26 | 76,1 | 65,5 | 2,4 | 8 500 | 5 300 | 1,65 | **6021 N** | **6021 NR** | SP 160 |
| **110** | 170 | 28 | 85,2 | 73,5 | 2,6 | 8 000 | 5 000 | 2,05 | **6022 N** | **6022 NR** | SP 170 |
| **120** | 180 | 28 | 88,4 | 80 | 2,75 | 7 500 | 4 800 | 2,2 | **6024 N** | **6024 NR** | SP 180 |

**SKF Explorer bearing**

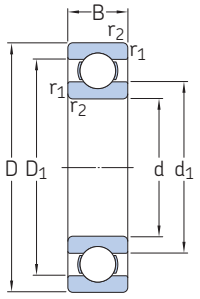
[1] For bearings with one shield (ZNR) the limiting speeds of the open bearings are valid.

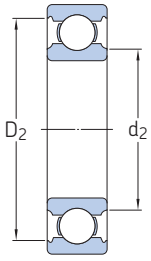


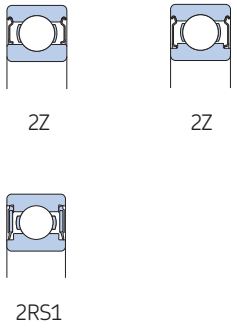

| Dimensions | | | | | | | | | | | Abutment and fillet dimensions | | | | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | $D_2$ ≈ | $D_3$ | $D_4$ | b | f | C | $r_{1,2}$ min. | $r_0$ max. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $D_b$ min. | $b_a$ min. | $C_a$ max. | $r_a$ max. | $k_r$ | $f_0$ |
| mm | | | | | | | | | | | mm | | | | | | | – | |
| **70** | 82,8 | – | 99,9 | 106,81 | 116,6 | 2,7 | 2,46 | 2,87 | 1,1 | 0,6 | 76 | – | 104 | 118 | 3 | 5,33 | 1 | 0,025 | 16 |
| | 87 | – | 111 | 120,22 | 134,7 | 3,1 | 2,82 | 4,06 | 1,5 | 0,6 | 79 | 87 | 116 | 136 | 3,5 | 6,88 | 1,5 | 0,025 | 15 |
| | 87 | – | 111 | 120,22 | 134,7 | 3,1 | 2,82 | 4,06 | 1,5 | 0,6 | 79 | – | 116 | 136 | 3,5 | 6,88 | 1,5 | 0,025 | 15 |
| | 94,9 | – | 130 | 145,25 | 159,7 | 3,1 | 2,82 | 4,9 | 2,1 | 0,6 | 82 | 94 | 138 | 162 | 3,5 | 7,72 | 2 | 0,03 | 13 |
| | 94,9 | – | 130 | 145,25 | 159,7 | 3,1 | 2,82 | 4,9 | 2,1 | 0,6 | 82 | – | 138 | 162 | 3,5 | 7,72 | 2 | 0,03 | 13 |
| **75** | 87,8 | – | 105 | 111,81 | 121,6 | 2,7 | 2,46 | 2,87 | 1,1 | 0,6 | 81 | – | 109 | 123 | 3 | 5,33 | 1 | 0,025 | 16 |
| | 92 | – | 117 | 125,22 | 139,7 | 3,1 | 2,82 | 4,06 | 1,5 | 0,6 | 84 | – | 121 | 141 | 3,5 | 6,88 | 1,5 | 0,025 | 15 |
| | 101 | – | 139 | 155,22 | 169,7 | 3,1 | 2,82 | 4,9 | 2,1 | 0,6 | 87 | – | 148 | 172 | 3,5 | 7,72 | 2 | 0,03 | 13 |
| **80** | 94,4 | – | 115 | 120,22 | 134,7 | 3,1 | 2,82 | 2,87 | 1,1 | 0,6 | 86 | – | 119 | 136 | 3,5 | 5,69 | 1 | 0,025 | 16 |
| | 101 | – | 127 | 135,23 | 149,7 | 3,1 | 2,82 | 4,9 | 2 | 0,6 | 91 | – | 129 | 151 | 3,5 | 7,72 | 2 | 0,025 | 15 |
| **85** | 99,4 | – | 120 | 125,22 | 139,7 | 3,1 | 2,82 | 2,87 | 1,1 | 0,6 | 92 | – | 123 | 141 | 3,5 | 5,69 | 1 | 0,025 | 16 |
| | 106 | – | 135 | 145,24 | 159,7 | 3,1 | 2,82 | 4,9 | 2 | 0,6 | 96 | – | 139 | 162 | 3,5 | 7,72 | 2 | 0,025 | 15 |
| **90** | 105 | – | 129 | 135,23 | 149,7 | 3,1 | 2,82 | 3,71 | 1,5 | 0,6 | 97 | – | 133 | 151 | 3,5 | 6,53 | 1,5 | 0,025 | 16 |
| | 112 | – | 143 | 155,22 | 169,7 | 3,1 | 2,82 | 4,9 | 2 | 0,6 | 101 | – | 149 | 172 | 3,5 | 7,72 | 2 | 0,025 | 15 |
| **95** | 118 | – | 152 | 163,65 | 182,9 | 3,5 | 3,1 | 5,69 | 2,1 | 0,6 | 107 | – | 158 | 185 | 4 | 8,79 | 2 | 0,025 | 14 |
| **100** | 115 | – | 139 | 145,24 | 159,7 | 3,1 | 2,82 | 3,71 | 1,5 | 0,6 | 107 | – | 143 | 162 | 3,5 | 6,53 | 1,5 | 0,025 | 16 |
| | 124 | – | 160 | 173,66 | 192,9 | 3,5 | 3,1 | 5,69 | 2,1 | 0,6 | 112 | – | 168 | 195 | 4 | 8,79 | 2 | 0,025 | 14 |
| **105** | 122 | – | 147 | 155,22 | 169,7 | 3,1 | 2,82 | 3,71 | 2 | 0,6 | 116 | – | 149 | 172 | 3,5 | 6,53 | 2 | 0,025 | 16 |
| **110** | 129 | – | 156 | 163,65 | 182,9 | 3,5 | 3,1 | 3,71 | 2 | 0,6 | 119 | – | 161 | 185 | 4 | 6,81 | 2 | 0,025 | 16 |
| **120** | 139 | – | 166 | 173,66 | 192,9 | 3,5 | 3,1 | 3,71 | 2 | 0,6 | 129 | – | 171 | 195 | 4 | 6,81 | 2 | 0,025 | 16 |

## 1.4 Stainless steel deep groove ball bearings

d **1 – 5** mm

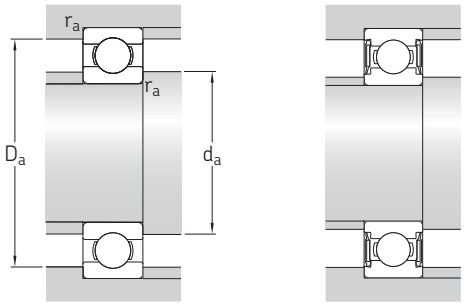



| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | g | – |
| **1** | 3 | 1 | 0,052 | 0,012 | 0,001 | 240 000 | 150 000 | 0,03 | **W 618/1** |
| **1,5** | 4 | 1,2 | 0,062 | 0,016 | 0,001 | 220 000 | 140 000 | 0,1 | **W 618/1.5** |
| | 4 | 2 | 0,062 | 0,016 | 0,001 | 220 000 | 110 000 | 0,1 | **W 638/1.5-2Z** |
| **2** | 5 | 1,5 | 0,094 | 0,025 | 0,001 | 200 000 | 120 000 | 0,1 | **W 618/2** |
| | 5 | 2,3 | 0,094 | 0,025 | 0,001 | 200 000 | 100 000 | 0,2 | ▸ **W 638/2-2Z** |
| | 6 | 3 | 0,19 | 0,051 | 0,002 | 180 000 | 90 000 | 0,31 | **W 639/2-2Z** |
| **2,5** | 6 | 2,6 | 0,117 | 0,036 | 0,002 | 170 000 | 85 000 | 0,31 | ▸ **W 638/2.5-2Z** |
| **3** | 6 | 3 | 0,117 | 0,036 | 0,002 | 170 000 | 85 000 | 0,31 | ▸ **W 637/3-2Z** |
| | 7 | 2 | 0,178 | 0,057 | 0,002 | 160 000 | 100 000 | 0,3 | **W 618/3** |
| | 7 | 3 | 0,178 | 0,057 | 0,002 | 160 000 | 80 000 | 0,41 | ▸ **W 638/3-2Z** |
| | 8 | 3 | 0,225 | 0,072 | 0,003 | 150 000 | 75 000 | 0,61 | ▸ **W 619/3-2Z** |
| | 8 | 4 | 0,319 | 0,09 | 0,004 | 150 000 | 75 000 | 0,82 | ▸ **W 639/3-2Z** |
| | 10 | 4 | 0,358 | 0,11 | 0,005 | – | 40 000 | 1,5 | **W 623-2RS1** |
| | 10 | 4 | 0,358 | 0,11 | 0,005 | 140 000 | 70 000 | 1,6 | ▸ **W 623-2Z** |
| **4** | 7 | 2,5 | 0,143 | 0,053 | 0,002 | 150 000 | 75 000 | 0,31 | **W 627/4-2Z** |
| | 9 | 2,5 | 0,364 | 0,114 | 0,005 | 140 000 | 85 000 | 0,6 | ▸ **W 618/4** |
| | 9 | 4 | 0,364 | 0,114 | 0,005 | 140 000 | 70 000 | 0,93 | ▸ **W 638/4-2Z** |
| | 11 | 4 | 0,54 | 0,176 | 0,008 | 130 000 | 63 000 | 1,65 | ▸ **W 619/4-2Z** |
| | 12 | 4 | 0,54 | 0,176 | 0,008 | – | 36 000 | 2,15 | **W 604-2RS1** |
| | 12 | 4 | 0,54 | 0,176 | 0,008 | 130 000 | 63 000 | 2,15 | ▸ **W 604-2Z** |
| | 12 | 4 | 0,54 | 0,176 | 0,008 | 130 000 | 80 000 | 2 | **W 604** |
| | 13 | 5 | 0,741 | 0,25 | 0,011 | – | 32 000 | 3,05 | ▸ **W 624-2RS1** |
| | 13 | 5 | 0,741 | 0,25 | 0,011 | 110 000 | 56 000 | 2,95 | ▸ **W 624-2Z** |
| | 16 | 5 | 0,761 | 0,265 | 0,011 | – | 30 000 | 5,15 | **W 634-2RS1** |
| | 16 | 5 | 0,761 | 0,265 | 0,011 | 100 000 | 50 000 | 5,15 | **W 634-2Z** |
| **5** | 8 | 2,5 | 0,121 | 0,045 | 0,002 | 140 000 | 70 000 | 0,41 | **W 627/5-2Z** |
| | 11 | 3 | 0,403 | 0,143 | 0,006 | 120 000 | 75 000 | 1,2 | **W 618/5** |
| | 11 | 4 | 0,403 | 0,143 | 0,006 | 120 000 | 60 000 | 1,55 | **W 628/5-2Z** |
| | 11 | 5 | 0,403 | 0,143 | 0,006 | 120 000 | 60 000 | 1,85 | ▸ **W 638/5-2Z** |
| | 13 | 4 | 0,761 | 0,335 | 0,014 | – | 32 000 | 2,35 | **W 619/5-2RS1** |
| | 13 | 4 | 0,761 | 0,335 | 0,014 | 110 000 | 56 000 | 2,35 | ▸ **W 619/5-2Z** |
| | 13 | 4 | 0,761 | 0,335 | 0,014 | 110 000 | 70 000 | 2,1 | **W 619/5** |
| | 14 | 5 | 0,761 | 0,26 | 0,011 | – | 30 000 | 3,45 | **W 605-2RS1** |
| | 14 | 5 | 0,761 | 0,26 | 0,011 | 110 000 | 53 000 | 3,35 | **W 605-2Z** |

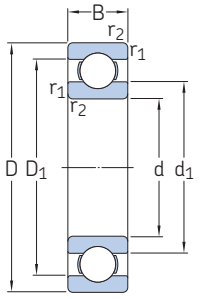
▸ Popular item

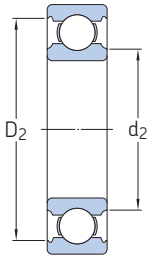


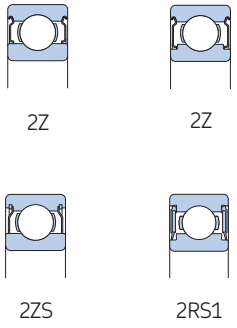

| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $d_2$ ≈ | $D_1$ ≈ | $D_2$ ≈ | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | $k_r$ | $f_0$ |
| mm | | | | | | mm | | | | – | |
| **1** | 1,5 | – | 2,5 | – | 0,05 | 1,4 | – | 2,6 | 0,05 | 0,02 | 5,6 |
| **1,5** | 2,1 | – | 3,1 | – | 0,05 | 2 | – | 3,6 | 0,05 | 0,02 | 6,4 |
| | 2,1 | – | – | 3,5 | 0,05 | 1,9 | 2,1 | 3,6 | 0,05 | 0,02 | 6,4 |
| **2** | 2,7 | – | 3,9 | – | 0,08 | 2,5 | – | 4,4 | 0,08 | 0,02 | 6,5 |
| | 2,7 | – | – | 4,4 | 0,08 | 2,5 | 2,6 | 4,5 | 0,08 | 0,02 | 6,5 |
| | 3 | – | – | 5,4 | 0,15 | 2,9 | 2,9 | 5,4 | 0,15 | 0,025 | 6 |
| **2,5** | 3,7 | – | – | 5,4 | 0,08 | 3,1 | 3,6 | 5,5 | 0,08 | 0,02 | 7,1 |
| **3** | – | 3,7 | – | 5,4 | 0,1 | 3,6 | 3,6 | 5,5 | 0,1 | 0,02 | 7,1 |
| | 4,2 | – | 5,8 | – | 0,1 | 3,8 | – | 6,2 | 0,1 | 0,02 | 7,1 |
| | – | 3,8 | – | 6,4 | 0,1 | 3,7 | 3,8 | 6,5 | 0,1 | 0,02 | 7,1 |
| | 5 | – | – | 7,4 | 0,1 | 3,8 | 4,9 | 7,5 | 0,1 | 0,025 | 7,2 |
| | 4,3 | – | – | 7,3 | 0,15 | 3,9 | 4,3 | 7,3 | 0,15 | 0,025 | 6,1 |
| | – | 4,3 | – | 8 | 0,15 | 3,9 | 4,3 | 8,8 | 0,15 | 0,03 | 6,3 |
| | – | 4,3 | – | 8 | 0,15 | 3,9 | 4,3 | 8,8 | 0,15 | 0,03 | 6,3 |
| **4** | 4,8 | – | – | 6,5 | 0,1 | 4,6 | 4,7 | 6,5 | 0,1 | 0,015 | 7,6 |
| | 5,2 | – | 7,5 | – | 0,1 | 4,8 | – | 8,2 | 0,1 | 0,02 | 6,5 |
| | 5,2 | – | – | 8,1 | 0,1 | 4,8 | 5,1 | 8,2 | 0,1 | 0,02 | 6,5 |
| | – | 5,6 | – | 9,9 | 0,15 | 5,2 | 5,5 | 10 | 0,15 | 0,025 | 6,4 |
| | – | 5,6 | – | 9,9 | 0,2 | 5,3 | 5,5 | 10,4 | 0,2 | 0,03 | 6,4 |
| | – | 5,6 | – | 9,9 | 0,2 | 5,3 | 5,5 | 10,4 | 0,2 | 0,03 | 6,4 |
| | – | 5,6 | – | 9,9 | 0,2 | 5,3 | – | 10,4 | 0,2 | 0,03 | 6,4 |
| | – | 6 | – | 11,4 | 0,2 | 5,6 | 5,9 | 11,5 | 0,2 | 0,03 | 6,4 |
| | – | 6 | – | 11,4 | 0,2 | 5,6 | 5,9 | 11,5 | 0,2 | 0,03 | 6,4 |
| | – | 6,7 | – | 13 | 0,3 | 6 | 6,6 | 14 | 0,3 | 0,035 | 6,8 |
| | – | 6,7 | – | 13 | 0,3 | 6 | 6,6 | 14 | 0,3 | 0,035 | 6,8 |
| **5** | 5,8 | – | – | 7,5 | 0,1 | 5,6 | 5,7 | 7,5 | 0,1 | 0,015 | 7,8 |
| | 6,8 | – | 9,2 | – | 0,15 | 6,2 | – | 9,8 | 0,15 | 0,02 | 7,1 |
| | 6,8 | – | – | 9,9 | 0,15 | 6,2 | 6,7 | 10 | 0,15 | 0,02 | 7,1 |
| | – | 6,2 | – | 9,9 | 0,15 | 5,9 | 6,1 | 10 | 0,15 | 0,02 | 7,1 |
| | – | 6,6 | – | 11,2 | 0,2 | 6,3 | 6,5 | 11,4 | 0,2 | 0,025 | 11 |
| | – | 6,6 | – | 11,2 | 0,2 | 6,3 | 6,5 | 11,4 | 0,2 | 0,025 | 11 |
| | – | 6,6 | – | 11,2 | 0,2 | 6,3 | – | 11,4 | 0,2 | 0,025 | 11 |
| | – | 6,9 | – | 12,2 | 0,2 | 6,6 | 6,8 | 12,4 | 0,2 | 0,03 | 6,6 |
| | – | 6,9 | – | 12,2 | 0,2 | 6,6 | 6,8 | 12,4 | 0,2 | 0,03 | 6,6 |

## 1.4 Stainless steel deep groove ball bearings

d **5 – 8** mm

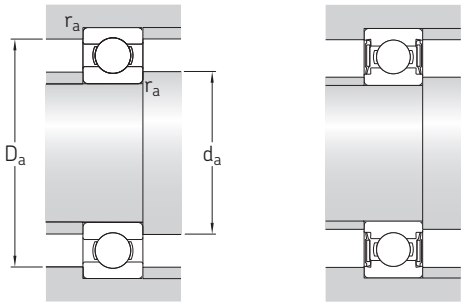



| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | g | – |
| **5** | 16 | 5 | 1,43 | 0,63 | 0,027 | – | 28 000 | 4,85 | ▸ **W 625-2RS1** |
| cont. | 16 | 5 | 1,43 | 0,63 | 0,027 | 100 000 | 50 000 | 4,85 | ▸ **W 625-2Z** |
| | 16 | 5 | 1,43 | 0,63 | 0,027 | 100 000 | 63 000 | 4,4 | **W 625** |
| **6** | 10 | 3 | 0,286 | 0,112 | 0,005 | 120 000 | 60 000 | 0,72 | **W 627/6-2Z** |
| | 13 | 3,5 | 0,618 | 0,224 | 0,01 | 110 000 | 67 000 | 1,8 | ▸ **W 618/6** |
| | 13 | 5 | 0,618 | 0,224 | 0,01 | – | 30 000 | 2,55 | **W 628/6-2RS1** |
| | 13 | 5 | 0,618 | 0,224 | 0,01 | 110 000 | 53 000 | 2,55 | ▸ **W 628/6-2Z** |
| | 15 | 5 | 0,761 | 0,265 | 0,011 | 100 000 | 50 000 | 3,85 | ▸ **W 619/6-2Z** |
| | 15 | 5 | 0,761 | 0,265 | 0,011 | 100 000 | 63 000 | 3,5 | **W 619/6** |
| | 17 | 6 | 1,95 | 0,83 | 0,036 | – | 26 000 | 5,8 | **W 606-2RS1** |
| | 17 | 6 | 1,95 | 0,83 | 0,036 | 95 000 | 48 000 | 6 | ▸ **W 606-2Z** |
| | 19 | 6 | 1,53 | 0,585 | 0,025 | – | 24 000 | 7,65 | ▸ **W 626-2RS1** |
| | 19 | 6 | 1,53 | 0,585 | 0,025 | 85 000 | 43 000 | 7,75 | ▸ **W 626-2Z** |
| | 19 | 6 | 1,53 | 0,585 | 0,025 | 85 000 | 56 000 | 7,1 | ▸ **W 626** |
| **7** | 11 | 3 | 0,26 | 0,104 | 0,004 | 110 000 | 56 000 | 0,72 | **W 627/7-2ZS** |
| | 14 | 3,5 | 0,663 | 0,26 | 0,011 | 100 000 | 63 000 | 2 | **W 618/7** |
| | 14 | 5 | 0,663 | 0,26 | 0,011 | 100 000 | 50 000 | 2,75 | **W 628/7-2Z** |
| | 17 | 5 | 0,923 | 0,365 | 0,016 | 90 000 | 45 000 | 5,1 | **W 619/7-2Z** |
| | 17 | 5 | 0,923 | 0,365 | 0,016 | 90 000 | 56 000 | 4,8 | **W 619/7** |
| | 19 | 6 | 1,53 | 0,585 | 0,025 | – | 24 000 | 7,25 | ▸ **W 607-2RS1** |
| | 19 | 6 | 1,53 | 0,585 | 0,025 | 85 000 | 43 000 | 7,35 | **W 607-2Z** |
| | 19 | 6 | 1,53 | 0,585 | 0,025 | 85 000 | 56 000 | 6,7 | **W 607** |
| | 22 | 7 | 1,99 | 0,78 | 0,034 | – | 22 000 | 12,5 | **W 627-2RS1** |
| | 22 | 7 | 1,99 | 0,78 | 0,034 | 75 000 | 38 000 | 12,5 | **W 627-2Z** |
| | 22 | 7 | 1,99 | 0,78 | 0,034 | 75 000 | 48 000 | 11,5 | **W 627** |
| **8** | 12 | 3,5 | 0,312 | 0,14 | 0,006 | 100 000 | 53 000 | 1,05 | **W 637/8-2Z** |
| | 16 | 4 | 0,715 | 0,3 | 0,012 | 90 000 | 56 000 | 3,1 | ▸ **W 618/8** |
| | 16 | 5 | 0,715 | 0,3 | 0,012 | – | 26 000 | 3,85 | ▸ **W 628/8-2RS1** |
| | 16 | 5 | 0,715 | 0,3 | 0,012 | 90 000 | 45 000 | 3,75 | ▸ **W 628/8-2Z** |
| | 16 | 6 | 0,715 | 0,3 | 0,012 | 90 000 | 45 000 | 4,6 | ▸ **W 638/8-2Z** |
| | 19 | 6 | 1,25 | 0,455 | 0,02 | – | 24 000 | 6,65 | ▸ **W 619/8-2RS1** |
| | 19 | 6 | 1,25 | 0,455 | 0,02 | 85 000 | 43 000 | 6,75 | ▸ **W 619/8-2Z** |
| | 19 | 6 | 1,25 | 0,455 | 0,02 | 85 000 | 53 000 | 6,1 | **W 619/8** |
| | 22 | 7 | 1,99 | 0,78 | 0,034 | – | 22 000 | 11,5 | ▸ **W 608-2RS1** |

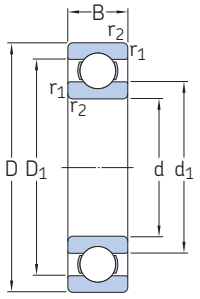
▸ Popular item

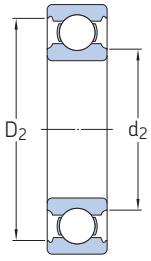


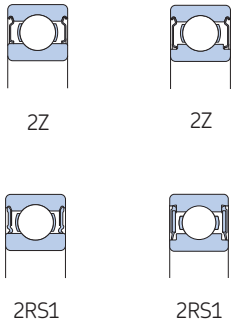

| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $d_2$ ≈ | $D_1$ ≈ | $D_2$ ≈ | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | $k_r$ | $f_0$ |
| mm | | | | | | mm | | | | – | |
| **5** | – | 7,5 | – | 13,4 | 0,3 | 7 | 7,4 | 14 | 0,3 | 0,03 | 12 |
| cont. | – | 7,5 | – | 13,4 | 0,3 | 7 | 7,4 | 14 | 0,3 | 0,03 | 12 |
| | – | 7,5 | – | 13,4 | 0,3 | 7 | – | 14 | 0,3 | 0,03 | 12 |
| **6** | 7 | – | – | 9,4 | 0,1 | 6,8 | 6,9 | 9,5 | 0,1 | 0,015 | 7,8 |
| | 8 | – | 11 | – | 0,15 | 7,2 | – | 11,8 | 0,15 | 0,02 | 7 |
| | – | 7,4 | – | 11,7 | 0,15 | 7,2 | 7,3 | 11,8 | 0,15 | 0,02 | 7 |
| | – | 7,4 | – | 11,7 | 0,15 | 7,2 | 7,3 | 11,8 | 0,15 | 0,02 | 7 |
| | – | 7,5 | – | 13 | 0,2 | 7,3 | 7,4 | 13,4 | 0,2 | 0,025 | 6,8 |
| | – | 7,5 | – | 13 | 0,2 | 7,3 | – | 13,4 | 0,2 | 0,025 | 6,8 |
| | – | 8,2 | – | 14,8 | 0,3 | 7,7 | 8,1 | 15 | 0,3 | 0,03 | 11 |
| | – | 8,2 | – | 14,8 | 0,3 | 7,7 | 8,1 | 15 | 0,3 | 0,03 | 11 |
| | – | 8,5 | – | 16,5 | 0,3 | 8 | 8,4 | 17 | 0,3 | 0,03 | 7,9 |
| | – | 8,5 | – | 16,5 | 0,3 | 8 | 8,4 | 17 | 0,3 | 0,03 | 7,9 |
| | – | 8,5 | – | 16,5 | 0,3 | 8 | – | 17 | 0,3 | 0,03 | 7,9 |
| **7** | 8 | – | – | 10,3 | 0,15 | 7,9 | 7,9 | 10,3 | 0,15 | 0,015 | 8,1 |
| | 9 | – | 12 | – | 0,15 | 8,2 | – | 12,8 | 0,15 | 0,02 | 7,2 |
| | – | 8,5 | – | 12,7 | 0,15 | 8,2 | 8,4 | 12,8 | 0,15 | 0,02 | 7,2 |
| | – | 9,2 | – | 14,3 | 0,3 | 8,7 | 9,1 | 15 | 0,3 | 0,025 | 7,3 |
| | – | 9,2 | – | 14,3 | 0,3 | 8,7 | – | 15 | 0,3 | 0,025 | 7,3 |
| | – | 9 | – | 16,5 | 0,3 | 8,7 | 8,9 | 17 | 0,3 | 0,03 | 7,9 |
| | – | 9 | – | 16,5 | 0,3 | 8,7 | 8,9 | 17 | 0,3 | 0,03 | 7,9 |
| | – | 9 | – | 16,5 | 0,3 | 8,7 | – | 17 | 0,3 | 0,03 | 7,9 |
| | – | 10,5 | – | 19,1 | 0,3 | 9 | 10,4 | 20 | 0,3 | 0,03 | 7,2 |
| | – | 10,5 | – | 19,1 | 0,3 | 9 | 10,4 | 20 | 0,3 | 0,03 | 7,2 |
| | – | 10,5 | – | 19,1 | 0,3 | 9 | – | 20 | 0,3 | 0,03 | 7,2 |
| **8** | 9 | – | – | 11,4 | 0,1 | 8,6 | 8,9 | 11,5 | 0,1 | 0,02 | 8,2 |
| | 10,5 | – | 13,5 | – | 0,2 | 9,6 | – | 14,4 | 0,2 | 0,02 | 7,5 |
| | – | 9,6 | – | 14,2 | 0,2 | 9,5 | 9,6 | 14,4 | 0,2 | 0,02 | 7,5 |
| | – | 9,6 | – | 14,2 | 0,2 | 9,5 | 9,6 | 14,4 | 0,2 | 0,02 | 7,5 |
| | – | 9,6 | – | 14,2 | 0,2 | 9,5 | 9,6 | 14,4 | 0,2 | 0,02 | 7,5 |
| | – | 9,8 | – | 16,7 | 0,3 | 9,7 | 9,7 | 17 | 0,3 | 0,025 | 6,6 |
| | – | 9,8 | – | 16,7 | 0,3 | 9,7 | 9,7 | 17 | 0,3 | 0,025 | 6,6 |
| | – | 9,8 | – | 16,7 | 0,3 | 9,7 | – | 17 | 0,3 | 0,025 | 6,6 |
| | – | 10,5 | – | 19,1 | 0,3 | 10 | 10,4 | 20 | 0,3 | 0,03 | 7,2 |

## 1.4 Stainless steel deep groove ball bearings

d **8 – 12** mm

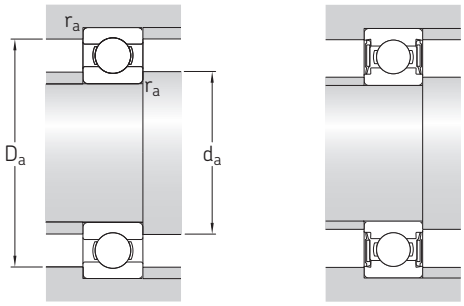



| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | g | – |
| **8** | 22 | 7 | 1,99 | 0,78 | 0,034 | 75 000 | 38 000 | 11,5 | ▸ **W 608-2Z** |
| cont. | 22 | 7 | 1,99 | 0,78 | 0,034 | 75 000 | 48 000 | 11 | ▸ **W 608** |
| | 24 | 8 | 2,47 | 1,12 | 0,048 | 70 000 | 36 000 | 17,5 | **W 628-2Z** |
| **9** | 17 | 4 | 0,761 | 0,335 | 0,014 | 85 000 | 53 000 | 3,4 | **W 618/9** |
| | 17 | 5 | 0,761 | 0,335 | 0,014 | – | 24 000 | 4,2 | **W 628/9-2RS1** |
| | 17 | 5 | 0,761 | 0,335 | 0,014 | 85 000 | 43 000 | 4,2 | **W 628/9-2Z** |
| | 20 | 6 | 1,95 | 0,93 | 0,045 | 80 000 | 40 000 | 7,65 | ▸ **W 619/9-2Z** |
| | 20 | 6 | 1,95 | 0,93 | 0,045 | 80 000 | 50 000 | 7 | **W 619/9** |
| | 24 | 7 | 2,03 | 0,815 | 0,036 | – | 20 000 | 14 | ▸ **W 609-2RS1** |
| | 24 | 7 | 2,03 | 0,815 | 0,036 | 70 000 | 36 000 | 14 | **W 609-2Z** |
| | 24 | 7 | 2,03 | 0,815 | 0,036 | 70 000 | 43 000 | 13 | **W 609** |
| | 26 | 8 | 3,97 | 1,96 | 0,083 | – | 19 000 | 19 | **W 629-2RS1** |
| | 26 | 8 | 3,97 | 1,96 | 0,083 | 67 000 | 32 000 | 19 | **W 629-2Z** |
| **10** | 19 | 5 | 1,48 | 0,83 | 0,036 | – | 22 000 | 5,2 | ▸ **W 61800-2RS1** |
| | 19 | 5 | 1,48 | 0,83 | 0,036 | 80 000 | 38 000 | 5,1 | ▸ **W 61800-2Z** |
| | 19 | 5 | 1,48 | 0,83 | 0,036 | 80 000 | 48 000 | 4,8 | **W 61800** |
| | 19 | 7 | 1,48 | 0,83 | 0,036 | 80 000 | 38 000 | 7,1 | ▸ **W 63800-2Z** |
| | 22 | 6 | 2,34 | 1,25 | 0,054 | – | 20 000 | 9,3 | ▸ **W 61900-2RS1** |
| | 22 | 6 | 2,34 | 1,25 | 0,054 | 70 000 | 36 000 | 9,4 | ▸ **W 61900-2Z** |
| | 22 | 6 | 2,34 | 1,25 | 0,054 | 70 000 | 45 000 | 8,7 | **W 61900** |
| | 26 | 8 | 3,97 | 1,96 | 0,083 | – | 19 000 | 18,5 | ▸ **W 6000-2RS1** |
| | 26 | 8 | 3,97 | 1,96 | 0,083 | 67 000 | 32 000 | 18,5 | ▸ **W 6000-2Z** |
| | 26 | 8 | 3,97 | 1,96 | 0,083 | 67 000 | 40 000 | 17 | ▸ **W 6000** |
| | 30 | 9 | 4,36 | 2,32 | 0,1 | – | 16 000 | 30 | ▸ **W 6200-2RS1** |
| | 30 | 9 | 4,36 | 2,32 | 0,1 | 60 000 | 30 000 | 30,5 | ▸ **W 6200-2Z** |
| | 30 | 9 | 4,36 | 2,32 | 0,1 | 60 000 | 36 000 | 28,5 | **W 6200** |
| | 35 | 11 | 7,02 | 3,4 | 0,146 | – | 15 000 | 52,5 | ▸ **W 6300-2RS1** |
| | 35 | 11 | 7,02 | 3,4 | 0,146 | 53 000 | 26 000 | 53 | **W 6300-2Z** |
| | 35 | 11 | 7,02 | 3,4 | 0,146 | 53 000 | 34 000 | 49,5 | **W 6300** |
| **12** | 21 | 5 | 1,51 | 0,9 | 0,039 | – | 20 000 | 6 | ▸ **W 61801-2RS1** |
| | 21 | 5 | 1,51 | 0,9 | 0,039 | 70 000 | 36 000 | 5,7 | **W 61801-2Z** |
| | 24 | 6 | 2,51 | 1,46 | 0,062 | – | 19 000 | 10,5 | ▸ **W 61901-2RS1** |
| | 24 | 6 | 2,51 | 1,46 | 0,062 | 67 000 | 32 000 | 11 | ▸ **W 61901-2Z** |
| | 24 | 6 | 2,51 | 1,46 | 0,062 | 67 000 | 40 000 | 9,8 | **W 61901** |
| | 28 | 8 | 4,42 | 2,36 | 0,102 | – | 16 000 | 20 | ▸ **W 6001-2RS1** |

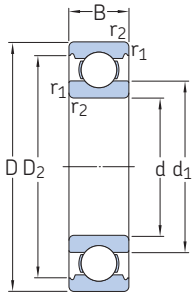
▸ Popular item

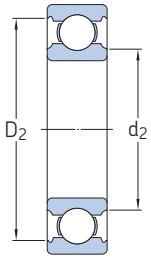


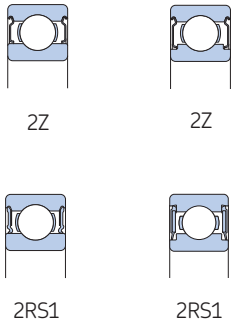

| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $d_2$ ≈ | $D_1$ ≈ | $D_2$ ≈ | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | $k_r$ | $f_0$ |
| mm | | | | | | mm | | | | – | |
| **8** | – | 10,5 | – | 19,1 | 0,3 | 10 | 10,4 | 20 | 0,3 | 0,03 | 7,2 |
| cont. | – | 10,5 | – | 19,1 | 0,3 | 10 | – | 20 | 0,3 | 0,03 | 7,2 |
| | – | 11,9 | – | 19,9 | 0,3 | 10 | 11,8 | 22 | 0,3 | 0,03 | 10 |
| **9** | 11,5 | – | 14,5 | – | 0,2 | 10,6 | – | 15,4 | 0,2 | 0,02 | 7,7 |
| | – | 10,7 | – | 15,2 | 0,2 | 10,3 | 10,6 | 15,4 | 0,2 | 0,02 | 7,7 |
| | – | 10,7 | – | 15,2 | 0,2 | 10,3 | 10,6 | 15,4 | 0,2 | 0,02 | 7,7 |
| | 11,6 | – | – | 17,5 | 0,3 | 11 | 11,1 | 18 | 0,3 | 0,025 | 12 |
| | 11,6 | – | – | 17,5 | 0,3 | 11 | – | 18 | 0,3 | 0,025 | 12 |
| | – | 12,1 | – | 20,5 | 0,3 | 11 | 12 | 22 | 0,3 | 0,03 | 7,5 |
| | – | 12,1 | – | 20,5 | 0,3 | 11 | 12 | 22 | 0,3 | 0,03 | 7,5 |
| | – | 12,1 | – | 20,5 | 0,3 | 11 | – | 22 | 0,3 | 0,03 | 7,5 |
| | – | 13,9 | – | 22,4 | 0,6 | 13 | 13,8 | 22,6 | 0,6 | 0,03 | 12 |
| | – | 13,9 | – | 22,4 | 0,6 | 13 | 13,8 | 22,6 | 0,6 | 0,03 | 12 |
| **10** | – | 11,8 | – | 17,2 | 0,3 | 11,5 | 11,5 | 17,5 | 0,3 | 0,02 | 15 |
| | – | 11,8 | – | 17,2 | 0,3 | 11,5 | 11,5 | 17,5 | 0,3 | 0,02 | 15 |
| | – | 11,8 | – | 17,2 | 0,3 | 11,5 | – | 17,5 | 0,3 | 0,02 | 15 |
| | – | 11,8 | – | 17,2 | 0,3 | 11,5 | 11,5 | 17,5 | 0,3 | 0,02 | 15 |
| | – | 13,2 | – | 19,4 | 0,3 | 12 | 13 | 20 | 0,3 | 0,025 | 14 |
| | – | 13,2 | – | 19,4 | 0,3 | 12 | 13 | 20 | 0,3 | 0,025 | 14 |
| | – | 13,2 | – | 19,4 | 0,3 | 12 | – | 20 | 0,3 | 0,025 | 14 |
| | – | 13,9 | – | 22,4 | 0,3 | 12 | 13,5 | 24 | 0,3 | 0,03 | 12 |
| | – | 13,9 | – | 22,4 | 0,3 | 12 | 13,5 | 24 | 0,3 | 0,03 | 12 |
| | – | 13,9 | – | 22,4 | 0,3 | 12 | – | 24 | 0,3 | 0,03 | 12 |
| | – | 15,3 | – | 25,3 | 0,6 | 14 | 15 | 26 | 0,6 | 0,03 | 13 |
| | – | 15,3 | – | 25,3 | 0,6 | 14 | 15 | 26 | 0,6 | 0,03 | 13 |
| | – | 15,3 | – | 25,3 | 0,6 | 14 | – | 26 | 0,6 | 0,03 | 13 |
| | 17,7 | – | – | 29,3 | 0,6 | 14 | 17,5 | 31 | 0,6 | 0,035 | 11 |
| | 17,7 | – | – | 29,3 | 0,6 | 14 | 17,5 | 31 | 0,6 | 0,035 | 11 |
| | 17,7 | – | – | 29,3 | 0,6 | 14 | – | 31 | 0,6 | 0,035 | 11 |
| **12** | – | 13,8 | – | 19,2 | 0,3 | 13,5 | 13,5 | 19,5 | 0,3 | 0,02 | 13 |
| | – | 13,8 | – | 19,2 | 0,3 | 13,5 | 13,5 | 19,5 | 0,3 | 0,02 | 13 |
| | – | 15,3 | – | 21,4 | 0,3 | 14 | 15 | 22 | 0,3 | 0,025 | 15 |
| | – | 15,3 | – | 21,4 | 0,3 | 14 | 15 | 22 | 0,3 | 0,025 | 15 |
| | – | 15,3 | – | 21,4 | 0,3 | 14 | – | 22 | 0,3 | 0,025 | 15 |
| | – | 16 | – | 25,2 | 0,3 | 14 | 15,5 | 26 | 0,3 | 0,03 | 13 |

## 1.4 Stainless steel deep groove ball bearings

d **12 – 17** mm

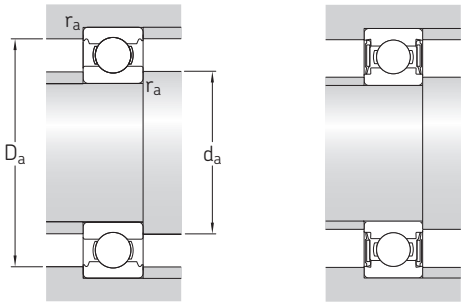



| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | g | – |
| **12** | 28 | 8 | 4,42 | 2,36 | 0,102 | 60 000 | 30 000 | 20 | ▸ **W 6001-2Z** |
| cont. | 28 | 8 | 4,42 | 2,36 | 0,102 | 60 000 | 36 000 | 18 | ▸ **W 6001** |
| | 32 | 10 | 5,72 | 3 | 0,127 | – | 15 000 | 36 | ▸ **W 6201-2RS1** |
| | 32 | 10 | 5,72 | 3 | 0,127 | 53 000 | 28 000 | 36 | ▸ **W 6201-2Z** |
| | 32 | 10 | 5,72 | 3 | 0,127 | 53 000 | 34 000 | 33,5 | **W 6201** |
| | 37 | 12 | 8,32 | 4,15 | 0,176 | – | 14 000 | 58,5 | ▸ **W 6301-2RS1** |
| | 37 | 12 | 8,32 | 4,15 | 0,176 | 48 000 | 24 000 | 59,5 | **W 6301-2Z** |
| | 37 | 12 | 8,32 | 4,15 | 0,176 | 48 000 | 30 000 | 55,5 | **W 6301** |
| **15** | 24 | 5 | 1,65 | 1,08 | 0,048 | – | 17 000 | 7,1 | **W 61802-2RS1** |
| | 24 | 5 | 1,65 | 1,08 | 0,048 | 60 000 | 30 000 | 6,7 | **W 61802-2Z** |
| | 28 | 7 | 3,71 | 2,24 | 0,095 | – | 16 000 | 15,5 | ▸ **W 61902-2RS1** |
| | 28 | 7 | 3,71 | 2,24 | 0,095 | 56 000 | 28 000 | 16 | ▸ **W 61902-2Z** |
| | 28 | 7 | 3,71 | 2,24 | 0,095 | 56 000 | 34 000 | 14,5 | **W 61902** |
| | 32 | 9 | 4,88 | 2,8 | 0,12 | – | 14 000 | 28,5 | ▸ **W 6002-2RS1** |
| | 32 | 9 | 4,88 | 2,8 | 0,12 | 50 000 | 26 000 | 29 | ▸ **W 6002-2Z** |
| | 32 | 9 | 4,88 | 2,8 | 0,12 | 50 000 | 32 000 | 26,5 | **W 6002** |
| | 35 | 11 | 6,37 | 3,6 | 0,156 | – | 13 000 | 44 | ▸ **W 6202-2RS1** |
| | 35 | 11 | 6,37 | 3,6 | 0,156 | 48 000 | 24 000 | 44 | ▸ **W 6202-2Z** |
| | 35 | 11 | 6,37 | 3,6 | 0,156 | 48 000 | 30 000 | 41,5 | **W 6202** |
| | 42 | 13 | 9,95 | 5,4 | 0,232 | – | 11 000 | 81 | ▸ **W 6302-2RS1** |
| | 42 | 13 | 9,95 | 5,4 | 0,232 | 40 000 | 20 000 | 82 | **W 6302-2Z** |
| | 42 | 13 | 9,95 | 5,4 | 0,232 | 40 000 | 26 000 | 77 | **W 6302** |
| **17** | 26 | 5 | 1,78 | 1,27 | 0,054 | – | 16 000 | 8 | **W 61803-2RS1** |
| | 26 | 5 | 1,78 | 1,27 | 0,054 | 56 000 | 28 000 | 7,6 | ▸ **W 61803-2Z** |
| | 30 | 7 | 3,97 | 2,55 | 0,108 | – | 14 000 | 16,5 | ▸ **W 61903-2RS1** |
| | 30 | 7 | 3,97 | 2,55 | 0,108 | 50 000 | 24 000 | 17 | ▸ **W 61903-2Z** |
| | 30 | 7 | 3,97 | 2,55 | 0,108 | 50 000 | 32 000 | 15,5 | **W 61903** |
| | 35 | 10 | 4,94 | 3,15 | 0,137 | – | 13 000 | 38 | ▸ **W 6003-2RS1** |
| | 35 | 10 | 4,94 | 3,15 | 0,137 | 45 000 | 22 000 | 38,5 | ▸ **W 6003-2Z** |
| | 35 | 10 | 4,94 | 3,15 | 0,137 | 45 000 | 28 000 | 36 | **W 6003** |
| | 40 | 12 | 8,06 | 4,75 | 0,2 | – | 12 000 | 64,5 | ▸ **W 6203-2RS1** |
| | 40 | 12 | 8,06 | 4,75 | 0,2 | 40 000 | 20 000 | 65,5 | ▸ **W 6203-2Z** |
| | 40 | 12 | 8,06 | 4,75 | 0,2 | 40 000 | 26 000 | 61,5 | **W 6203** |
| | 47 | 14 | 11,7 | 6,55 | 0,28 | – | 10 000 | 112 | ▸ **W 6303-2RS1** |
| | 47 | 14 | 11,7 | 6,55 | 0,28 | 36 000 | 18 000 | 113 | **W 6303-2Z** |
| | 47 | 14 | 11,7 | 6,55 | 0,28 | 36 000 | 22 000 | 107 | **W 6303** |

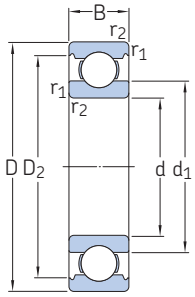
▸ Popular item

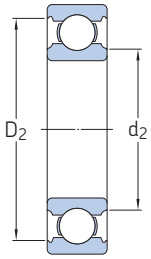


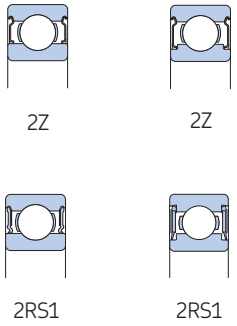

| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $d_2$ ≈ | $D_1$ ≈ | $D_2$ ≈ | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | $k_r$ | $f_0$ |
| mm | | | | | | mm | | | | – | |
| **12** | – | 16 | – | 25,2 | 0,3 | 14 | 15,5 | 26 | 0,3 | 0,03 | 13 |
| cont. | – | 16 | – | 25,2 | 0,3 | 14 | – | 26 | 0,3 | 0,03 | 13 |
| | 18,5 | – | – | 28 | 0,6 | 16 | 18 | 28,5 | 0,6 | 0,03 | 12 |
| | 18,5 | – | – | 28 | 0,6 | 16 | 18 | 28,5 | 0,6 | 0,03 | 12 |
| | 18,5 | – | – | 28 | 0,6 | 16 | – | 28,5 | 0,6 | 0,03 | 12 |
| | 19,3 | – | – | 32 | 1 | 17 | 19 | 32,5 | 1 | 0,035 | 11 |
| | 19,3 | – | – | 32 | 1 | 17 | 19 | 32,5 | 1 | 0,035 | 11 |
| | 19,3 | – | – | 32 | 1 | 17 | – | 32,5 | 1 | 0,035 | 11 |
| **15** | – | 16,8 | – | 22,2 | 0,3 | 16,5 | 16,5 | 22,5 | 0,3 | 0,02 | 14 |
| | – | 16,8 | – | 22,2 | 0,3 | 16,5 | 16,5 | 22,5 | 0,3 | 0,02 | 14 |
| | 18,8 | – | – | 25,3 | 0,3 | 17 | 18,5 | 26 | 0,3 | 0,025 | 14 |
| | 18,8 | – | – | 25,3 | 0,3 | 17 | 18,5 | 26 | 0,3 | 0,025 | 14 |
| | 18,8 | – | – | 25,3 | 0,3 | 17 | – | 26 | 0,3 | 0,025 | 14 |
| | – | 18,6 | – | 29,1 | 0,3 | 17 | 18,5 | 30 | 0,3 | 0,03 | 14 |
| | – | 18,6 | – | 29,1 | 0,3 | 17 | 18,5 | 30 | 0,3 | 0,03 | 14 |
| | – | 18,6 | – | 29,1 | 0,3 | 17 | – | 30 | 0,3 | 0,03 | 14 |
| | 21,7 | – | – | 31,4 | 0,6 | 19 | 21,5 | 32 | 0,6 | 0,03 | 13 |
| | 21,7 | – | – | 31,4 | 0,6 | 19 | 21,5 | 32 | 0,6 | 0,03 | 13 |
| | 21,7 | – | – | 31,4 | 0,6 | 19 | – | 32 | 0,6 | 0,03 | 13 |
| | 24,5 | – | – | 36,8 | 1 | 20 | 24 | 37,5 | 1 | 0,035 | 12 |
| | 24,5 | – | – | 36,8 | 1 | 20 | 24 | 37,5 | 1 | 0,035 | 12 |
| | 24,5 | – | – | 36,8 | 1 | 20 | – | 37,5 | 1 | 0,035 | 12 |
| **17** | – | 18,8 | – | 24,2 | 0,3 | 18,5 | 18,5 | 24,5 | 0,3 | 0,02 | 14 |
| | – | 18,8 | – | 24,2 | 0,3 | 18,5 | 18,5 | 24,5 | 0,3 | 0,02 | 14 |
| | 21 | – | – | 27,8 | 0,3 | 19 | 20,5 | 28,5 | 0,3 | 0,025 | 15 |
| | 21 | – | – | 27,8 | 0,3 | 19 | 20,5 | 28,5 | 0,3 | 0,025 | 15 |
| | 21 | – | – | 27,8 | 0,3 | 19 | – | 28,5 | 0,3 | 0,025 | 15 |
| | 23,5 | – | – | 31,9 | 0,3 | 19 | 23 | 33 | 0,3 | 0,03 | 14 |
| | 23,5 | – | – | 31,9 | 0,3 | 19 | 23 | 33 | 0,3 | 0,03 | 14 |
| | 23,5 | – | – | 31,9 | 0,3 | 19 | – | 33 | 0,3 | 0,03 | 14 |
| | 24,9 | – | – | 35,8 | 0,6 | 21 | 24,5 | 37,5 | 0,6 | 0,03 | 13 |
| | 24,9 | – | – | 35,8 | 0,6 | 21 | 24,5 | 37,5 | 0,6 | 0,03 | 13 |
| | 24,9 | – | – | 35,8 | 0,6 | 21 | – | 37,5 | 0,6 | 0,03 | 13 |
| | 27,5 | – | – | 41,1 | 1 | 22 | 27 | 42 | 1 | 0,035 | 12 |
| | 27,5 | – | – | 41,1 | 1 | 22 | 27 | 42 | 1 | 0,035 | 12 |
| | 27,5 | – | – | 41,1 | 1 | 22 | – | 42 | 1 | 0,035 | 12 |

## 1.4 Stainless steel deep groove ball bearings

d **20 – 30** mm

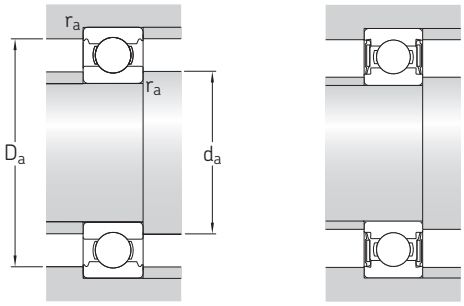



| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | g | – |
| **20** | 32 | 7 | 3,12 | 2,08 | 0,09 | – | 13 000 | 17 | ▸ **W 61804-2RS1** |
| | 32 | 7 | 3,12 | 2,08 | 0,09 | 48 000 | 24 000 | 17 | ▸ **W 61804-2Z** |
| | 37 | 9 | 5,53 | 3,65 | 0,156 | – | 12 000 | 35,5 | ▸ **W 61904-2RS1** |
| | 37 | 9 | 5,53 | 3,65 | 0,156 | 43 000 | 26 000 | 32,5 | **W 61904** |
| | 42 | 12 | 8,06 | 5 | 0,212 | – | 11 000 | 64,5 | ▸ **W 6004-2RS1** |
| | 42 | 12 | 8,06 | 5 | 0,212 | 38 000 | 19 000 | 64,5 | ▸ **W 6004-2Z** |
| | 42 | 12 | 8,06 | 5 | 0,212 | 38 000 | 24 000 | 60,5 | **W 6004** |
| | 47 | 14 | 10,8 | 6,55 | 0,28 | – | 10 000 | 105 | ▸ **W 6204-2RS1** |
| | 47 | 14 | 10,8 | 6,55 | 0,28 | 34 000 | 17 000 | 106 | ▸ **W 6204-2Z** |
| | 47 | 14 | 10,8 | 6,55 | 0,28 | 34 000 | 22 000 | 100 | **W 6204** |
| | 52 | 15 | 13,8 | 7,8 | 0,335 | – | 9 500 | 143 | ▸ **W 6304-2RS1** |
| | 52 | 15 | 13,8 | 7,8 | 0,335 | 34 000 | 17 000 | 144 | **W 6304-2Z** |
| | 52 | 15 | 13,8 | 7,8 | 0,335 | 34 000 | 20 000 | 136 | **W 6304** |
| **25** | 37 | 7 | 3,38 | 2,5 | 0,108 | – | 11 000 | 21 | ▸ **W 61805-2RS1** |
| | 37 | 7 | 3,38 | 2,5 | 0,108 | 38 000 | 19 000 | 21 | **W 61805-2Z** |
| | 42 | 9 | 6,05 | 4,5 | 0,193 | – | 10 000 | 39,5 | ▸ **W 61905-2RS1** |
| | 47 | 12 | 8,71 | 5,85 | 0,25 | – | 9 500 | 76,5 | ▸ **W 6005-2RS1** |
| | 47 | 12 | 8,71 | 5,85 | 0,25 | 32 000 | 16 000 | 77,5 | ▸ **W 6005-2Z** |
| | 47 | 12 | 8,71 | 5,85 | 0,25 | 32 000 | 20 000 | 71,5 | **W 6005** |
| | 52 | 15 | 11,7 | 7,65 | 0,335 | – | 8 500 | 128 | ▸ **W 6205-2RS1** |
| | 52 | 15 | 11,7 | 7,65 | 0,335 | 30 000 | 15 000 | 130 | ▸ **W 6205-2Z** |
| | 52 | 15 | 11,7 | 7,65 | 0,335 | 30 000 | 19 000 | 122 | ▸ **W 6205** |
| | 62 | 17 | 17,8 | 11,2 | 0,48 | – | 7 500 | 234 | ▸ **W 6305-2RS1** |
| | 62 | 17 | 17,8 | 11,2 | 0,48 | 26 000 | 13 000 | 235 | **W 6305-2Z** |
| | 62 | 17 | 17,8 | 11,2 | 0,48 | 26 000 | 17 000 | 224 | **W 6305** |
| **30** | 42 | 7 | 3,58 | 2,9 | 0,125 | – | 9 500 | 24 | **W 61806-2RS1** |
| | 47 | 9 | 6,24 | 5 | 0,212 | – | 8 500 | 47 | ▸ **W 61906-2RS1** |
| | 47 | 9 | 6,24 | 5 | 0,212 | 30 000 | 19 000 | 43,5 | **W 61906** |
| | 55 | 13 | 11,4 | 8,15 | 0,355 | – | 8 000 | 112 | ▸ **W 6006-2RS1** |
| | 55 | 13 | 11,4 | 8,15 | 0,355 | 28 000 | 14 000 | 113 | ▸ **W 6006-2Z** |
| | 55 | 13 | 11,4 | 8,15 | 0,355 | 28 000 | 17 000 | 105 | **W 6006** |
| | 62 | 16 | 16,5 | 11,2 | 0,48 | – | 7 000 | 196 | ▸ **W 6206-2RS1** |
| | 62 | 16 | 16,5 | 11,2 | 0,48 | 26 000 | 13 000 | 196 | ▸ **W 6206-2Z** |
| | 62 | 16 | 16,5 | 11,2 | 0,48 | 26 000 | 16 000 | 186 | **W 6206** |

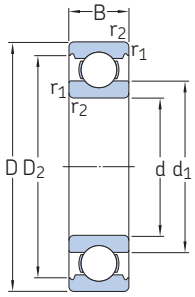
▸ Popular item

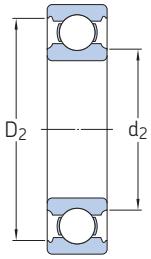


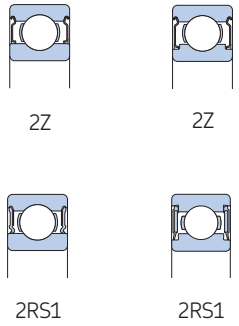

| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $d_2$ ≈ | $D_1$ ≈ | $D_2$ ≈ | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | $k_r$ | $f_0$ |
| mm | | | | | | mm | | | | – | |
| **20** | – | 22,6 | – | 29,6 | 0,3 | 22 | 22,5 | 30,5 | 0,3 | 0,02 | 13 |
| | – | 22,6 | – | 29,6 | 0,3 | 22 | 22,5 | 30,5 | 0,3 | 0,02 | 13 |
| | – | 23,6 | – | 33,5 | 0,3 | 22 | 23,5 | 35 | 0,3 | 0,025 | 15 |
| | – | 23,6 | – | 33,5 | 0,3 | 22 | – | 35 | 0,3 | 0,025 | 15 |
| | 27,6 | – | – | 38,8 | 0,6 | 24 | 27,5 | 39,5 | 0,6 | 0,03 | 14 |
| | 27,6 | – | – | 38,8 | 0,6 | 24 | 27,5 | 39,5 | 0,6 | 0,03 | 14 |
| | 27,6 | – | – | 38,8 | 0,6 | 24 | – | 39,5 | 0,6 | 0,03 | 14 |
| | 29,5 | – | – | 41 | 1 | 25 | 29 | 42 | 1 | 0,03 | 13 |
| | 29,5 | – | – | 41 | 1 | 25 | 29 | 42 | 1 | 0,03 | 13 |
| | 29,5 | – | – | 41 | 1 | 25 | – | 42 | 1 | 0,03 | 13 |
| | 30 | – | – | 45,4 | 1,1 | 26,5 | 29,5 | 46 | 1 | 0,035 | 12 |
| | 30 | – | – | 45,4 | 1,1 | 26,5 | 29,5 | 46 | 1 | 0,035 | 12 |
| | 30 | – | – | 45,4 | 1,1 | 26,5 | – | 46 | 1 | 0,035 | 12 |
| **25** | 28,2 | – | – | 34,2 | 0,3 | 27 | 28 | 35 | 0,3 | 0,02 | 14 |
| | 28,2 | – | – | 34,2 | 0,3 | 27 | 28 | 35 | 0,3 | 0,02 | 14 |
| | 30,9 | – | – | 39,5 | 0,3 | 27 | 30,5 | 40,5 | 0,3 | 0,025 | 15 |
| | 31,7 | – | – | 42,8 | 0,6 | 29 | 31,5 | 44,5 | 0,6 | 0,03 | 15 |
| | 31,7 | – | – | 42,8 | 0,6 | 29 | 31,5 | 44,5 | 0,6 | 0,03 | 15 |
| | 31,7 | – | – | 42,8 | 0,6 | 29 | – | 44,5 | 0,6 | 0,03 | 15 |
| | 34 | – | – | 45,8 | 1 | 30 | 33,5 | 47 | 1 | 0,03 | 14 |
| | 34 | – | – | 45,8 | 1 | 30 | 33,5 | 47 | 1 | 0,03 | 14 |
| | 34 | – | – | 45,8 | 1 | 30 | – | 47 | 1 | 0,03 | 14 |
| | 38,1 | – | – | 53,3 | 1,1 | 31,5 | 38 | 55 | 1 | 0,035 | 13 |
| | 38,1 | – | – | 53,3 | 1,1 | 31,5 | 38 | 55 | 1 | 0,035 | 13 |
| | 38,1 | – | – | 53,3 | 1,1 | 31,5 | – | 55 | 1 | 0,035 | 13 |
| **30** | 33,1 | – | – | 39,2 | 0,3 | 32 | 33 | 40 | 0,3 | 0,02 | 14 |
| | 35,1 | – | – | 44,1 | 0,3 | 32 | 35 | 45 | 0,3 | 0,025 | 16 |
| | 35,1 | – | – | 44,1 | 0,3 | 32 | – | 45 | 0,3 | 0,025 | 16 |
| | 38 | – | – | 50 | 1 | 35 | 37,5 | 50 | 1 | 0,03 | 15 |
| | 38 | – | – | 50 | 1 | 35 | 37,5 | 50 | 1 | 0,03 | 15 |
| | 38 | – | – | 50 | 1 | 35 | – | 50 | 1 | 0,03 | 15 |
| | 40,7 | – | – | 55,2 | 1 | 35 | 40,5 | 57 | 1 | 0,03 | 14 |
| | 40,7 | – | – | 55,2 | 1 | 35 | 40,5 | 57 | 1 | 0,03 | 14 |
| | 40,7 | – | – | 55,2 | 1 | 35 | – | 57 | 1 | 0,03 | 14 |

## 1.4 Stainless steel deep groove ball bearings

d **30 – 50** mm

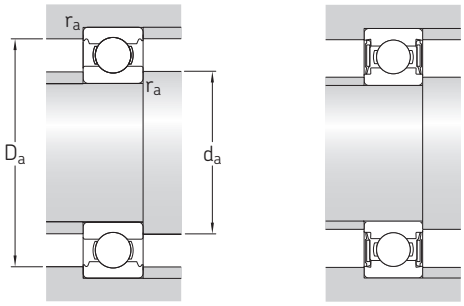



| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | g | – |
| **30** | 72 | 19 | 22,9 | 15 | 0,64 | – | 6 300 | 346 | ▸ **W 6306-2RS1** |
| cont. | 72 | 19 | 22,9 | 15 | 0,64 | 22 000 | 11 000 | 345 | **W 6306-2Z** |
| | 72 | 19 | 22,9 | 15 | 0,64 | 22 000 | 14 000 | 331 | **W 6306** |
| **35** | 47 | 7 | 3,71 | 3,35 | 0,14 | – | 8 500 | 29,5 | **W 61807-2RS1** |
| | 55 | 10 | 9,36 | 7,65 | 0,325 | – | 7 500 | 73,5 | **W 61907-2RS1** |
| | 62 | 14 | 13,8 | 10,2 | 0,44 | – | 6 700 | 147 | ▸ **W 6007-2RS1** |
| | 62 | 14 | 13,8 | 10,2 | 0,44 | 24 000 | 12 000 | 148 | **W 6007-2Z** |
| | 62 | 14 | 13,8 | 10,2 | 0,44 | 24 000 | 15 000 | 138 | **W 6007** |
| | 72 | 17 | 22,1 | 15,3 | 0,655 | – | 6 000 | 276 | ▸ **W 6207-2RS1** |
| | 72 | 17 | 22,1 | 15,3 | 0,655 | 22 000 | 11 000 | 277 | **W 6207-2Z** |
| | 72 | 17 | 22,1 | 15,3 | 0,655 | 22 000 | 14 000 | 262 | **W 6207** |
| | 80 | 21 | 28,6 | 19 | 0,815 | – | 5 600 | 441 | **W 6307-2RS1** |
| **40** | 62 | 12 | 11,9 | 9,8 | 0,425 | – | 6 700 | 107 | **W 61908-2RS1** |
| | 68 | 15 | 14,6 | 11,4 | 0,49 | – | 6 300 | 182 | ▸ **W 6008-2RS1** |
| | 68 | 15 | 14,6 | 11,4 | 0,49 | 22 000 | 11 000 | 183 | ▸ **W 6008-2Z** |
| | 68 | 15 | 14,6 | 11,4 | 0,49 | 22 000 | 14 000 | 172 | **W 6008** |
| | 80 | 18 | 25,1 | 17,6 | 0,75 | – | 5 600 | 359 | ▸ **W 6208-2RS1** |
| | 80 | 18 | 25,1 | 17,6 | 0,75 | 20 000 | 10 000 | 359 | ▸ **W 6208-2Z** |
| | 80 | 18 | 25,1 | 17,6 | 0,75 | 20 000 | 12 000 | 342 | **W 6208** |
| **45** | 68 | 12 | 12,1 | 10,8 | 0,465 | – | 6 000 | 125 | ▸ **W 61909-2RS1** |
| | 75 | 16 | 18,2 | 15 | 0,64 | – | 5 600 | 236 | ▸ **W 6009-2RS1** |
| | 75 | 16 | 18,2 | 15 | 0,64 | 20 000 | 10 000 | 237 | **W 6009-2Z** |
| | 85 | 19 | 28,1 | 20,4 | 0,865 | – | 5 000 | 395 | ▸ **W 6209-2RS1** |
| | 85 | 19 | 28,1 | 20,4 | 0,865 | 18 000 | 9 000 | 394 | **W 6209-2Z** |
| **50** | 65 | 7 | 5,07 | 5,5 | 0,236 | – | 6 000 | 51 | **W 61810-2RS1** |
| | 80 | 16 | 19 | 16,6 | 0,71 | – | 5 000 | 256 | ▸ **W 6010-2RS1** |
| | 80 | 16 | 19 | 16,6 | 0,71 | 18 000 | 9 000 | 256 | **W 6010-2Z** |
| | 90 | 20 | 30,2 | 23,2 | 0,98 | – | 4 800 | 449 | ▸ **W 6210-2RS1** |
| | 90 | 20 | 30,2 | 23,2 | 0,98 | 17 000 | 8 500 | 453 | **W 6210-2Z** |

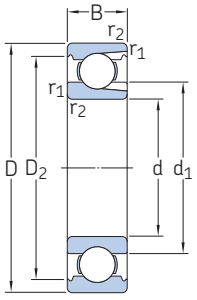
▸ Popular item

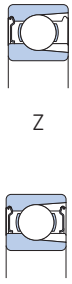



| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $d_2$ ≈ | $D_1$ ≈ | $D_2$ ≈ | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | $k_r$ | $f_0$ |
| mm | | | | | | mm | | | | – | |
| **30** | 44,9 | – | – | 62,4 | 1,1 | 36,5 | 44,5 | 65 | 1 | 0,035 | 13 |
| cont. | 44,9 | – | – | 62,4 | 1,1 | 36,5 | 44,5 | 65 | 1 | 0,035 | 13 |
| | 44,9 | – | – | 62,4 | 1,1 | 36,5 | – | 65 | 1 | 0,035 | 13 |
| **35** | 38,2 | – | – | 43,7 | 0,3 | 37 | 38 | 45 | 0,3 | 0,02 | 14 |
| | 42,2 | – | – | 52,2 | 0,6 | 39 | 42 | 52 | 0,6 | 0,025 | 16 |
| | 44 | – | – | 57,1 | 1 | 40 | 43,5 | 57 | 1 | 0,03 | 15 |
| | 44 | – | – | 57,1 | 1 | 40 | 43,5 | 57 | 1 | 0,03 | 15 |
| | 44 | – | – | 57,1 | 1 | 40 | – | 57 | 1 | 0,03 | 15 |
| | 47,6 | – | – | 64,9 | 1,1 | 41,5 | 46,5 | 65 | 1 | 0,03 | 14 |
| | 47,6 | – | – | 64,9 | 1,1 | 41,5 | 46,5 | 65 | 1 | 0,03 | 14 |
| | 47,6 | – | – | 64,9 | 1,1 | 41,5 | – | 65 | 1 | 0,03 | 14 |
| | – | 46,7 | – | 71,6 | 1,5 | 43 | 46,5 | 73 | 1,5 | 0,035 | 13 |
| **40** | 46,9 | – | – | 57,6 | 0,6 | 44 | 46,5 | 59 | 0,6 | 0,025 | 16 |
| | 49,2 | – | – | 62,5 | 1 | 45 | 49 | 63 | 1 | 0,03 | 15 |
| | 49,2 | – | – | 62,5 | 1 | 45 | 49 | 63 | 1 | 0,03 | 15 |
| | 49,2 | – | – | 62,5 | 1 | 45 | – | 63 | 1 | 0,03 | 15 |
| | – | 50,1 | – | 70,8 | 1,1 | 46,5 | 50 | 73 | 1 | 0,03 | 14 |
| | – | 50,1 | – | 70,8 | 1,1 | 46,5 | 50 | 73 | 1 | 0,03 | 14 |
| | – | 50,1 | – | 70,8 | 1,1 | 46,5 | – | 73 | 1 | 0,03 | 14 |
| **45** | – | 50,3 | – | 63,2 | 0,6 | 49 | 52 | 64 | 0,6 | 0,025 | 16 |
| | 54,5 | – | – | 69 | 1 | 50 | 54 | 70 | 1 | 0,03 | 15 |
| | 54,5 | – | – | 69 | 1 | 50 | 54 | 70 | 1 | 0,03 | 15 |
| | – | 53,5 | – | 76,4 | 1,1 | 52 | 53 | 78 | 1 | 0,03 | 14 |
| | – | 53,5 | – | 76,4 | 1,1 | 52 | 53 | 78 | 1 | 0,03 | 14 |
| **50** | 54,6 | – | – | 61,6 | 0,3 | 52 | 54 | 63 | 0,3 | 0,02 | 15 |
| | 60 | – | – | 74,6 | 1 | 55 | 59 | 75 | 1 | 0,03 | 16 |
| | 60 | – | – | 74,6 | 1 | 55 | 59 | 75 | 1 | 0,03 | 16 |
| | – | 60 | – | 82,2 | 1,1 | 55 | 59 | 83 | 1 | 0,03 | 14 |
| | – | 60 | – | 82,2 | 1,1 | 55 | 59 | 83 | 1 | 0,03 | 14 |

## 1.5 Single row deep groove ball bearings with filling slots

d **25 – 50** mm

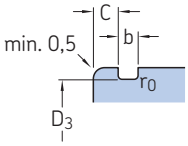


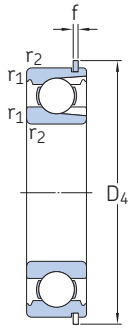



Z

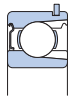


2Z

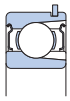



NR

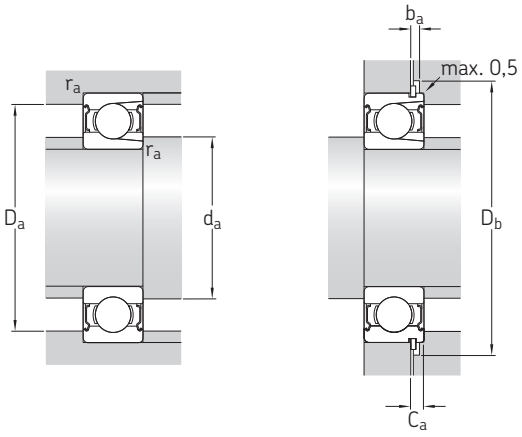


ZNR



2ZNR

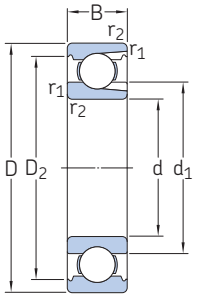
| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designations Bearing without a snap ring | with a snap ring | Snap ring |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | | |
| mm | | | kN | | kN | r/min | | kg | - | | |
| **25** | 62 | 17 | 22,9 | 15,6 | 0,67 | 20 000 | 13 000 | 0,24 | **305** | **305 NR** | SP 62 |
| | 62 | 17 | 22,9 | 15,6 | 0,67 | 20 000 | 13 000 | 0,24 | **305-Z** | **305-ZNR** | SP 62 |
| | 62 | 17 | 22,9 | 15,6 | 0,67 | 20 000 | 10 400 | 0,24 | **305-2Z** | **305-2ZNR** | SP 62 |
| **30** | 62 | 16 | 20,9 | 16,3 | 0,695 | 20 000 | 12 000 | 0,21 | **206** | **206 NR** | SP 62 |
| | 62 | 16 | 20,9 | 16,3 | 0,695 | 20 000 | 12 000 | 0,21 | **206-Z** | **206-ZNR** | SP 62 |
| | 62 | 16 | 20,9 | 16,3 | 0,695 | 20 000 | 9 600 | 0,21 | **206-2Z** | **206-2ZNR** | SP 62 |
| | 72 | 19 | 29,7 | 21,6 | 0,93 | 18 000 | 11 000 | 0,37 | **306** | **306 NR** | SP 72 |
| | 72 | 19 | 29,7 | 21,6 | 0,93 | 18 000 | 11 000 | 0,37 | **306-Z** | **306-ZNR** | SP 72 |
| | 72 | 19 | 29,7 | 21,6 | 0,93 | 18 000 | 8 800 | 0,37 | **306-2Z** | **306-2ZNR** | SP 72 |
| **35** | 72 | 17 | 27,5 | 22 | 0,93 | 17 000 | 10 000 | 0,31 | **207** | **207 NR** | SP 72 |
| | 72 | 17 | 27,5 | 22 | 0,93 | 17 000 | 10 000 | 0,31 | **207-Z** | **207-ZNR** | SP 72 |
| | 72 | 17 | 27,5 | 22 | 0,93 | 17 000 | 8 000 | 0,31 | **207-2Z** | **207-2ZNR** | SP 72 |
| | 80 | 21 | 34,7 | 26,5 | 1,12 | 16 000 | 9 500 | 0,48 | **307** | **307 NR** | SP 80 |
| | 80 | 21 | 34,7 | 26,5 | 1,12 | 16 000 | 9 500 | 0,48 | **307-Z** | **307-ZNR** | SP 80 |
| | 80 | 21 | 34,7 | 26,5 | 1,12 | 16 000 | 7 600 | 0,48 | **307-2Z** | **307-2ZNR** | SP 80 |
| **40** | 80 | 18 | 33,6 | 27 | 1,16 | 15 000 | 9 500 | 0,39 | **208** | **208 NR** | SP 80 |
| | 80 | 18 | 33,6 | 27 | 1,16 | 15 000 | 9 500 | 0,39 | **208-Z** | **208-ZNR** | SP 80 |
| | 80 | 18 | 33,6 | 27 | 1,16 | 15 000 | 7 600 | 0,39 | **208-2Z** | **208-2ZNR** | SP 80 |
| | 90 | 23 | 45,7 | 36 | 1,53 | 14 000 | 8 500 | 0,64 | **308** | **308 NR** | SP 90 |
| | 90 | 23 | 45,7 | 36 | 1,53 | 14 000 | 8 500 | 0,64 | **308-Z** | **308-ZNR** | SP 90 |
| | 90 | 23 | 45,7 | 36 | 1,53 | 14 000 | 6 800 | 0,64 | **308-2Z** | **308-2ZNR** | SP 90 |
| **45** | 85 | 19 | 35,2 | 30 | 1,27 | 14 000 | 8 500 | 0,44 | **209** | **209 NR** | SP 85 |
| | 85 | 19 | 35,2 | 30 | 1,27 | 14 000 | 8 500 | 0,44 | **209-Z** | **209-ZNR** | SP 85 |
| | 85 | 19 | 35,2 | 30 | 1,27 | 14 000 | 6 800 | 0,44 | **209-2Z** | **209-2ZNR** | SP 85 |
| | 100 | 25 | 55 | 44 | 1,86 | 13 000 | 7 500 | 0,88 | **309** | **309 NR** | SP 100 |
| | 100 | 25 | 55 | 44 | 1,86 | 13 000 | 7 500 | 0,88 | **309-Z** | **309-ZNR** | SP 100 |
| | 100 | 25 | 55 | 44 | 1,86 | 13 000 | 6 000 | 0,88 | **309-2Z** | **309-2ZNR** | SP 100 |
| **50** | 90 | 20 | 39,1 | 34,5 | 1,46 | 13 000 | 8 000 | 0,5 | **210** | **210 NR** | SP 90 |
| | 90 | 20 | 39,1 | 34,5 | 1,46 | 13 000 | 8 000 | 0,5 | **210-Z** | **210-ZNR** | SP 90 |
| | 90 | 20 | 39,1 | 34,5 | 1,46 | 13 000 | 6 400 | 0,5 | **210-2Z** | **210-2ZNR** | SP 90 |
| | 110 | 27 | 64,4 | 52 | 2,2 | 11 000 | 7 000 | 1,15 | **310** | **310 NR** | SP 110 |
| | 110 | 27 | 64,4 | 52 | 2,2 | 11 000 | 7 000 | 1,15 | **310-Z** | **310-ZNR** | SP 110 |
| | 110 | 27 | 64,4 | 52 | 2,2 | 11 000 | 5 600 | 1,15 | **310-2Z** | **310-2ZNR** | SP 110 |

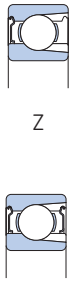



| Dimensions | | | | | | | | | | Abutment and fillet dimensions | | | | | | | Minimum load factor |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_2$ ≈ | $D_3$ | $D_4$ | b | f | C | $r_{1,2}$ min. | $r_0$ max. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $D_b$ min. | $b_a$ min. | $C_a$ max. | $r_a$ max. | $k_r$ |
| mm | | | | | | | | | | mm | | | | | | | – |
| **25** | 36,6 | 52,7 | 59,61 | 67,7 | 1,9 | 1,7 | 3,28 | 1,1 | 0,6 | 32 | – | 55 | 69 | 2,2 | 4,98 | 1 | 0,05 |
| | 36,6 | 52,7 | 59,61 | 67,7 | 1,9 | 1,7 | 3,28 | 1,1 | 0,6 | 32 | 32,7 | 55 | 69 | 2,2 | 4,98 | 1 | 0,05 |
| | 36,6 | 52,7 | 59,61 | 67,7 | 1,9 | 1,7 | 3,28 | 1,1 | 0,6 | 32 | 32,7 | 55 | 69 | 2,2 | 4,98 | 1 | 0,05 |
| **30** | 40,3 | 54,06 | 59,61 | 67,7 | 1,9 | 1,7 | 3,28 | 1 | 0,6 | 35,6 | – | 56 | 69 | 2,2 | 4,98 | 1 | 0,04 |
| | 40,3 | 54,06 | 59,61 | 67,7 | 1,9 | 1,7 | 3,28 | 1 | 0,6 | 35,6 | 40,2 | 56 | 69 | 2,2 | 4,98 | 1 | 0,04 |
| | 40,3 | 54,06 | 59,61 | 67,7 | 1,9 | 1,7 | 3,28 | 1 | 0,6 | 35,6 | 40,2 | 56 | 69 | 2,2 | 4,98 | 1 | 0,04 |
| | 44,6 | 61,88 | 68,81 | 78,6 | 1,9 | 1,7 | 3,28 | 1,1 | 0,6 | 37 | – | 65 | 80 | 2,2 | 4,98 | 1 | 0,05 |
| | 44,6 | 61,88 | 68,81 | 78,6 | 1,9 | 1,7 | 3,28 | 1,1 | 0,6 | 37 | 44,5 | 65 | 80 | 2,2 | 4,98 | 1 | 0,05 |
| | 44,6 | 61,88 | 68,81 | 78,6 | 1,9 | 1,7 | 3,28 | 1,1 | 0,6 | 37 | 44,5 | 65 | 80 | 2,2 | 4,98 | 1 | 0,05 |
| **35** | 46,9 | 62,69 | 68,81 | 78,6 | 1,9 | 1,7 | 3,28 | 1,1 | 0,6 | 42 | – | 65 | 80 | 2,2 | 4,98 | 1 | 0,04 |
| | 46,9 | 62,69 | 68,81 | 78,6 | 1,9 | 1,7 | 3,28 | 1,1 | 0,6 | 42 | 46,8 | 65 | 80 | 2,2 | 4,98 | 1 | 0,04 |
| | 46,9 | 62,69 | 68,81 | 78,6 | 1,9 | 1,7 | 3,28 | 1,1 | 0,6 | 42 | 46,8 | 65 | 80 | 2,2 | 4,98 | 1 | 0,04 |
| | 49,5 | 69,2 | 76,81 | 86,6 | 1,9 | 1,7 | 3,28 | 1,5 | 0,6 | 44 | – | 71 | 88 | 2,2 | 4,98 | 1,5 | 0,05 |
| | 49,5 | 69,2 | 76,81 | 86,6 | 1,9 | 1,7 | 3,28 | 1,5 | 0,6 | 44 | 49,4 | 71 | 88 | 2,2 | 4,98 | 1,5 | 0,05 |
| | 49,5 | 69,2 | 76,81 | 86,6 | 1,9 | 1,7 | 3,28 | 1,5 | 0,6 | 44 | 49,4 | 71 | 88 | 2,2 | 4,98 | 1,5 | 0,05 |
| **40** | 52,6 | 69,8 | 76,81 | 86,6 | 1,9 | 1,7 | 3,28 | 1,1 | 0,6 | 47 | – | 73 | 88 | 2,2 | 4,98 | 1 | 0,04 |
| | 52,6 | 69,8 | 76,81 | 86,6 | 1,9 | 1,7 | 3,28 | 1,1 | 0,6 | 47 | 52 | 73 | 88 | 2,2 | 4,98 | 1 | 0,04 |
| | 52,6 | 69,8 | 76,81 | 86,6 | 1,9 | 1,7 | 3,28 | 1,1 | 0,6 | 47 | 52 | 73 | 88 | 2,2 | 4,98 | 1 | 0,04 |
| | 56,1 | 77,7 | 86,79 | 96,5 | 2,7 | 2,46 | 3,28 | 1,5 | 0,6 | 49 | – | 81 | 98 | 3 | 5,74 | 1,5 | 0,05 |
| | 56,1 | 77,7 | 86,79 | 96,5 | 2,7 | 2,46 | 3,28 | 1,5 | 0,6 | 49 | 56 | 81 | 98 | 3 | 5,74 | 1,5 | 0,05 |
| | 56,1 | 77,7 | 86,79 | 96,5 | 2,7 | 2,46 | 3,28 | 1,5 | 0,6 | 49 | 56 | 81 | 98 | 3 | 5,74 | 1,5 | 0,05 |
| **45** | 57,6 | 75,19 | 81,81 | 91,6 | 1,9 | 1,7 | 3,28 | 1,1 | 0,6 | 52 | – | 78 | 93 | 2,2 | 4,98 | 1 | 0,04 |
| | 57,6 | 75,19 | 81,81 | 91,6 | 1,9 | 1,7 | 3,28 | 1,1 | 0,6 | 52 | 57 | 78 | 93 | 2,2 | 4,98 | 1 | 0,04 |
| | 57,6 | 75,19 | 81,81 | 91,6 | 1,9 | 1,7 | 3,28 | 1,1 | 0,6 | 52 | 57 | 78 | 93 | 2,2 | 4,98 | 1 | 0,04 |
| | 62,1 | 86,7 | 96,8 | 106,5 | 2,7 | 2,46 | 3,28 | 1,5 | 0,6 | 54 | – | 91 | 108 | 3 | 5,74 | 1,5 | 0,05 |
| | 62,1 | 86,7 | 96,8 | 106,5 | 2,7 | 2,46 | 3,28 | 1,5 | 0,6 | 54 | 62 | 91 | 108 | 3 | 5,74 | 1,5 | 0,05 |
| | 62,1 | 86,7 | 96,8 | 106,5 | 2,7 | 2,46 | 3,28 | 1,5 | 0,6 | 54 | 62 | 91 | 108 | 3 | 5,74 | 1,5 | 0,05 |
| **50** | 62,5 | 81,61 | 86,79 | 96,5 | 2,7 | 2,46 | 3,28 | 1,1 | 0,6 | 57 | – | 83 | 98 | 3 | 5,74 | 1 | 0,04 |
| | 62,5 | 81,61 | 86,79 | 96,5 | 2,7 | 2,46 | 3,28 | 1,1 | 0,6 | 57 | 62 | 83 | 98 | 3 | 5,74 | 1 | 0,04 |
| | 62,5 | 81,61 | 86,79 | 96,5 | 2,7 | 2,46 | 3,28 | 1,1 | 0,6 | 57 | 62 | 83 | 98 | 3 | 5,74 | 1 | 0,04 |
| | 68,7 | 95,2 | 106,81 | 116,6 | 2,7 | 2,46 | 3,28 | 2 | 0,6 | 61 | – | 99 | 118 | 3 | 5,74 | 2 | 0,05 |
| | 68,7 | 95,2 | 106,81 | 116,6 | 2,7 | 2,46 | 3,28 | 2 | 0,6 | 61 | 68 | 99 | 118 | 3 | 5,74 | 2 | 0,05 |
| | 68,7 | 95,2 | 106,81 | 116,6 | 2,7 | 2,46 | 3,28 | 2 | 0,6 | 61 | 68 | 99 | 118 | 3 | 5,74 | 2 | 0,05 |

## 1.5 Single row deep groove ball bearings with filling slots

d **55 – 80** mm

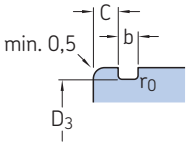


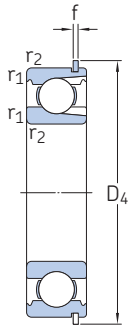



Z

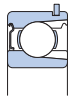


2Z

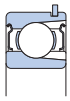



NR

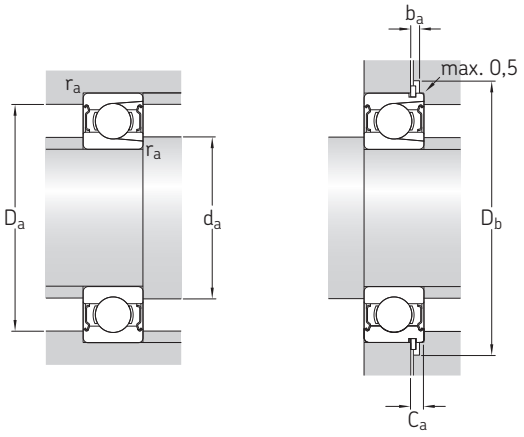


ZNR



2ZNR

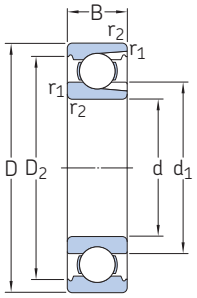
| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designations Bearing without a snap ring | with a snap ring | Snap ring |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | | |
| mm | | | kN | | kN | r/min | | kg | - | | |
| **55** | 100 | 21 | 48,4 | 44 | 1,86 | 12 000 | 7 000 | 0,66 | **211** | **211 NR** | SP 100 |
| | 100 | 21 | 48,4 | 44 | 1,86 | 12 000 | 7 000 | 0,66 | **211-Z** | **211-ZNR** | SP 100 |
| | 100 | 21 | 48,4 | 44 | 1,86 | 12 000 | 5 600 | 0,66 | **211-2Z** | **211-2ZNR** | SP 100 |
| | 120 | 29 | 79,2 | 67 | 2,85 | 10 000 | 6 300 | 1,5 | **311** | **311 NR** | SP 120 |
| | 120 | 29 | 79,2 | 67 | 2,85 | 10 000 | 6 300 | 1,5 | **311-Z** | **311-ZNR** | SP 120 |
| | 120 | 29 | 79,2 | 67 | 2,85 | 10 000 | 5 000 | 1,5 | **311-2Z** | **311-2ZNR** | SP 120 |
| **60** | 110 | 22 | 56,1 | 50 | 2,12 | 11 000 | 6 700 | 0,85 | **212** | **212 NR** | SP 110 |
| | 110 | 22 | 56,1 | 50 | 2,12 | 11 000 | 6 700 | 0,85 | **212-Z** | **212-ZNR** | SP 110 |
| | 110 | 22 | 56,1 | 50 | 2,12 | 11 000 | 5 400 | 0,85 | **212-2Z** | **212-2ZNR** | SP 110 |
| | 130 | 31 | 91,3 | 78 | 3,35 | 9 500 | 6 000 | 1,85 | **312** | **312 NR** | SP 130 |
| | 130 | 31 | 91,3 | 78 | 3,35 | 9 500 | 6 000 | 1,85 | **312-Z** | **312-ZNR** | SP 130 |
| | 130 | 31 | 91,3 | 78 | 3,35 | 9 500 | 4 800 | 1,85 | **312-2Z** | **312-2ZNR** | SP 130 |
| **65** | 120 | 23 | 60,5 | 58,5 | 2,5 | 10 000 | 6 000 | 1,05 | **213** | **213 NR** | SP 120 |
| | 120 | 23 | 60,5 | 58,5 | 2,5 | 10 000 | 6 000 | 1,05 | **213-Z** | **213-ZNR** | SP 120 |
| | 120 | 23 | 60,5 | 58,5 | 2,5 | 10 000 | 4 800 | 1,05 | **213-2Z** | **213-2ZNR** | SP 120 |
| | 140 | 33 | 102 | 90 | 3,75 | 9 000 | 5 300 | 2,3 | **313** | **313 NR** | SP 140 |
| | 140 | 33 | 102 | 90 | 3,75 | 9 000 | 5 300 | 2,3 | **313-Z** | **313-ZNR** | SP 140 |
| | 140 | 33 | 102 | 90 | 3,75 | 9 000 | 4 300 | 2,3 | **313-2Z** | **313-2ZNR** | SP 140 |
| **70** | 125 | 24 | 66 | 65,5 | 2,75 | 9 500 | 5 600 | 1,15 | **214** | **214 NR** | SP 125 |
| | 125 | 24 | 66 | 65,5 | 2,75 | 9 500 | 5 600 | 1,15 | **214-Z** | **214-ZNR** | SP 125 |
| | 125 | 24 | 66 | 65,5 | 2,75 | 9 500 | 4 500 | 1,15 | **214-2Z** | **214-2ZNR** | SP 125 |
| | 150 | 35 | 114 | 102 | 4,15 | 8 000 | 5 000 | 2,75 | **314** | **314 NR** | SP 150 |
| | 150 | 35 | 114 | 102 | 4,15 | 8 000 | 5 000 | 2,75 | **314-Z** | **314-ZNR** | SP 150 |
| | 150 | 35 | 114 | 102 | 4,15 | 8 000 | 4 000 | 2,75 | **314-2Z** | **314-2ZNR** | SP 150 |
| **75** | 130 | 25 | 72,1 | 72 | 3 | 9 000 | 5 300 | 1,25 | **215** | **215 NR** | SP 130 |
| | 130 | 25 | 72,1 | 72 | 3 | 9 000 | 5 300 | 1,25 | **215-Z** | **215-ZNR** | SP 130 |
| | 130 | 25 | 72,1 | 72 | 3 | 9 000 | 4 300 | 1,25 | **215-2Z** | **215-2ZNR** | SP 130 |
| | 160 | 37 | 125 | 116 | 4,55 | 7 500 | 4 800 | 3,25 | **315** | – | – |
| | 160 | 37 | 125 | 116 | 4,55 | 7 500 | 4 800 | 3,25 | **315-Z** | – | – |
| | 160 | 37 | 125 | 116 | 4,55 | 7 500 | 3 840 | 3,25 | **315-2Z** | – | – |
| **80** | 140 | 26 | 88 | 85 | 3,45 | 8 500 | 5 000 | 1,55 | **216** | **216 NR** | SP 140 |
| | 140 | 26 | 88 | 85 | 3,45 | 8 500 | 5 000 | 1,55 | **216-Z** | **216-ZNR** | SP 140 |
| | 140 | 26 | 88 | 85 | 3,45 | 8 500 | 4 000 | 1,55 | **216-2Z** | **216-2ZNR** | SP 140 |
| | 170 | 39 | 138 | 129 | 4,9 | 7 000 | 4 300 | 3,95 | **316** | – | – |
| | 170 | 39 | 138 | 129 | 4,9 | 7 000 | 4 300 | 3,95 | **316-Z** | – | – |
| | 170 | 39 | 138 | 129 | 4,9 | 7 000 | 3 440 | 3,95 | **316-2Z** | – | – |




| Dimensions | | | | | | | | | | Abutment and fillet dimensions | | | | | | | Minimum load factor |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_2$ ≈ | $D_3$ | $D_4$ | b | f | C | $r_{1,2}$ min. | $r_0$ max. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $D_b$ min. | $b_a$ min. | $C_a$ max. | $r_a$ max. | $k_r$ |
| mm | | | | | | | | | | mm | | | | | | | – |
| **55** | 69 | 89,4 | 96,8 | 106,5 | 2,7 | 2,46 | 3,28 | 1,5 | 0,6 | 64 | – | 91 | 108 | 3 | 5,74 | 1,5 | 0,04 |
| | 69 | 89,4 | 96,8 | 106,5 | 2,7 | 2,46 | 3,28 | 1,5 | 0,6 | 64 | 68 | 91 | 108 | 3 | 5,74 | 1,5 | 0,04 |
| | 69 | 89,4 | 96,8 | 106,5 | 2,7 | 2,46 | 3,28 | 1,5 | 0,6 | 64 | 68 | 91 | 108 | 3 | 5,74 | 1,5 | 0,04 |
| | 75,3 | 103,7 | 115,21 | 129,7 | 3,1 | 2,82 | 4,06 | 2 | 0,6 | 66 | – | 109 | 131 | 3,5 | 6,88 | 2 | 0,05 |
| | 75,3 | 103,7 | 115,21 | 129,7 | 3,1 | 2,82 | 4,06 | 2 | 0,6 | 66 | 75 | 109 | 131 | 3,5 | 6,88 | 2 | 0,05 |
| | 75,3 | 103,7 | 115,21 | 129,7 | 3,1 | 2,82 | 4,06 | 2 | 0,6 | 66 | 75 | 109 | 131 | 3,5 | 6,88 | 2 | 0,05 |
| **60** | 75,5 | 98 | 106,81 | 116,6 | 2,7 | 2,46 | 3,28 | 1,5 | 0,6 | 69 | – | 101 | 118 | 3 | 5,74 | 1,5 | 0,04 |
| | 75,5 | 98 | 106,81 | 116,6 | 2,7 | 2,46 | 3,28 | 1,5 | 0,6 | 69 | 75 | 101 | 118 | 3 | 5,74 | 1,5 | 0,04 |
| | 75,5 | 98 | 106,81 | 116,6 | 2,7 | 2,46 | 3,28 | 1,5 | 0,6 | 69 | 75 | 101 | 118 | 3 | 5,74 | 1,5 | 0,04 |
| | 81,8 | 112,2 | 125,22 | 139,7 | 3,1 | 2,82 | 4,06 | 2,1 | 0,6 | 72 | – | 118 | 141 | 3,5 | 6,88 | 2 | 0,05 |
| | 81,8 | 112,2 | 125,22 | 139,7 | 3,1 | 2,82 | 4,06 | 2,1 | 0,6 | 72 | 81 | 118 | 141 | 3,5 | 6,88 | 2 | 0,05 |
| | 81,8 | 112,2 | 125,22 | 139,7 | 3,1 | 2,82 | 4,06 | 2,1 | 0,6 | 72 | 81 | 118 | 141 | 3,5 | 6,88 | 2 | 0,05 |
| **65** | 83,3 | 105,8 | 115,21 | 129,7 | 3,1 | 2,82 | 4,06 | 1,5 | 0,6 | 74 | – | 111 | 131 | 3,5 | 6,88 | 1,5 | 0,04 |
| | 83,3 | 105,8 | 115,21 | 129,7 | 3,1 | 2,82 | 4,06 | 1,5 | 0,6 | 74 | 83 | 111 | 131 | 3,5 | 6,88 | 1,5 | 0,04 |
| | 83,3 | 105,8 | 115,21 | 129,7 | 3,1 | 2,82 | 4,06 | 1,5 | 0,6 | 74 | 83 | 111 | 131 | 3,5 | 6,88 | 1,5 | 0,04 |
| | 88,3 | 121,3 | 135,23 | 149,7 | 3,1 | 2,82 | 4,9 | 2,1 | 0,6 | 77 | – | 128 | 151 | 3,5 | 7,72 | 2 | 0,05 |
| | 88,3 | 121,3 | 135,23 | 149,7 | 3,1 | 2,82 | 4,9 | 2,1 | 0,6 | 77 | 88 | 128 | 151 | 3,5 | 7,72 | 2 | 0,05 |
| | 88,3 | 121,3 | 135,23 | 149,7 | 3,1 | 2,82 | 4,9 | 2,1 | 0,6 | 77 | 88 | 128 | 151 | 3,5 | 7,72 | 2 | 0,05 |
| **70** | 87 | 111 | 120,22 | 134,7 | 3,1 | 2,82 | 4,06 | 1,5 | 0,6 | 79 | – | 116 | 136 | 3,5 | 6,88 | 1,5 | 0,04 |
| | 87 | 111 | 120,22 | 134,7 | 3,1 | 2,82 | 4,06 | 1,5 | 0,6 | 79 | 87 | 116 | 136 | 3,5 | 6,88 | 1,5 | 0,04 |
| | 87 | 111 | 120,22 | 134,7 | 3,1 | 2,82 | 4,06 | 1,5 | 0,6 | 79 | 87 | 116 | 136 | 3,5 | 6,88 | 1,5 | 0,04 |
| | 93,7 | 129,9 | 145,24 | 159,7 | 3,1 | 2,82 | 4,9 | 2,1 | 0,6 | 82 | – | 138 | 162 | 3,5 | 7,72 | 2 | 0,05 |
| | 93,7 | 129,9 | 145,24 | 159,7 | 3,1 | 2,82 | 4,9 | 2,1 | 0,6 | 82 | 93 | 138 | 162 | 3,5 | 7,72 | 2 | 0,05 |
| | 93,7 | 129,9 | 145,24 | 159,7 | 3,1 | 2,82 | 4,9 | 2,1 | 0,6 | 82 | 93 | 138 | 162 | 3,5 | 7,72 | 2 | 0,05 |
| **75** | 92 | 116,5 | 125,22 | 139,7 | 3,1 | 2,82 | 4,06 | 1,5 | 0,6 | 84 | – | 121 | 141 | 3,5 | 6,88 | 1,5 | 0,04 |
| | 92 | 116,5 | 125,22 | 139,7 | 3,1 | 2,82 | 4,06 | 1,5 | 0,6 | 84 | 92 | 121 | 141 | 3,5 | 6,88 | 1,5 | 0,04 |
| | 92 | 116,5 | 125,22 | 139,7 | 3,1 | 2,82 | 4,06 | 1,5 | 0,6 | 84 | 92 | 121 | 141 | 3,5 | 6,88 | 1,5 | 0,04 |
| | 99,7 | 138,4 | – | – | – | – | – | 2,1 | – | 87 | – | 148 | – | – | – | 2 | 0,05 |
| | 99,7 | 138,4 | – | – | – | – | – | 2,1 | – | 87 | 99 | 148 | – | – | – | 2 | 0,05 |
| | 99,7 | 138,4 | – | – | – | – | – | 2,1 | – | 87 | 99 | 148 | – | – | – | 2 | 0,05 |
| **80** | 95,8 | 126,5 | 135,23 | 149,7 | 3,1 | 2,82 | 4,9 | 2 | 0,6 | 89 | – | 129 | 151 | 3,5 | 7,72 | 2 | 0,04 |
| | 95,8 | 126,5 | 135,23 | 149,7 | 3,1 | 2,82 | 4,9 | 2 | 0,6 | 89 | 88 | 129 | 151 | 3,5 | 7,72 | 2 | 0,04 |
| | 95,8 | 126,5 | 135,23 | 149,7 | 3,1 | 2,82 | 4,9 | 2 | 0,6 | 89 | 88 | 129 | 151 | 3,5 | 7,72 | 2 | 0,04 |
| | 106 | 146,9 | – | – | – | – | – | 2,1 | – | 92 | – | 158 | – | – | – | 2 | 0,05 |
| | 106 | 146,9 | – | – | – | – | – | 2,1 | – | 92 | 105 | 158 | – | – | – | 2 | 0,05 |
| | 106 | 146,9 | – | – | – | – | – | 2,1 | – | 92 | 105 | 158 | – | – | – | 2 | 0,05 |

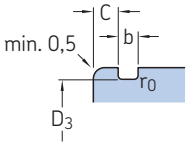
## 1.5 Single row deep groove ball bearings with filling slots

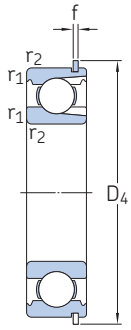
d **85 – 100** mm



Z

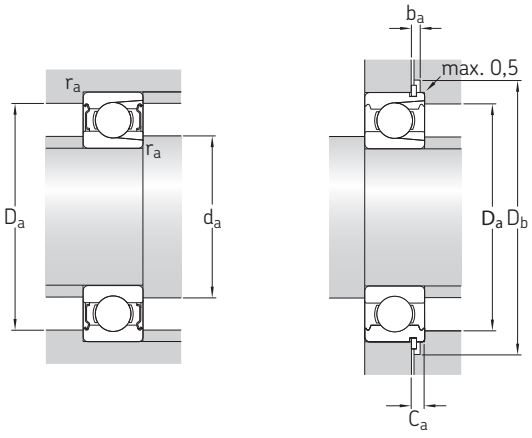
2Z




NR

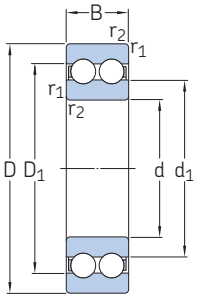
| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designations Bearing without a snap ring | with a snap ring | Snap ring |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | | |
| mm | | | kN | | kN | r/min | | kg | - | | |
| **85** | 150 | 28 | 96,8 | 100 | 3,9 | 7 500 | 4 800 | 1,95 | **217** | **217 NR** | SP 150 |
| | 150 | 28 | 96,8 | 100 | 3,9 | 7 500 | 4 800 | 1,95 | **217-Z** | – | – |
| | 150 | 28 | 96,8 | 100 | 3,9 | 7 500 | 3 900 | 1,95 | **217-2Z** | – | – |
| | 180 | 41 | 147 | 146 | 5,3 | 6 700 | 4 000 | 4,6 | **317** | – | – |
| | 180 | 41 | 147 | 146 | 5,3 | 6 700 | 4 000 | 4,6 | **317-Z** | – | – |
| | 180 | 41 | 147 | 146 | 5,3 | 6 700 | 3 200 | 4,6 | **317-2Z** | – | – |
| **90** | 160 | 30 | 112 | 114 | 4,3 | 7 000 | 4 300 | 2,35 | **218** | **218 NR** | SP 160 |
| | 160 | 30 | 112 | 114 | 4,3 | 7 000 | 4 300 | 2,35 | **218-Z** | – | – |
| | 160 | 30 | 112 | 114 | 4,3 | 7 000 | 4 300 | 2,35 | **218-2Z** | – | – |
| | 190 | 43 | 157 | 160 | 5,7 | 6 300 | 4 000 | 5,4 | **318** | – | – |
| | 190 | 43 | 157 | 160 | 5,7 | 6 300 | 4 000 | 5,4 | **318-Z** | – | – |
| | 190 | 43 | 157 | 160 | 5,7 | 6 300 | 3 200 | 5,4 | **318-2Z** | – | – |
| **95** | 170 | 32 | 121 | 122 | 4,5 | 6 700 | 4 000 | 2,7 | **219** | **219 NR** | SP 170 |
| | 170 | 32 | 121 | 122 | 4,5 | 6 700 | 4 000 | 2,7 | **219-Z** | – | – |
| | 170 | 32 | 121 | 122 | 4,5 | 6 700 | 4 000 | 2,7 | **219-2Z** | – | – |
| **100** | 180 | 34 | 134 | 140 | 5 | 6 300 | 4 000 | 3,45 | **220** | – | – |
| | 180 | 34 | 134 | 140 | 5 | 6 300 | 4 000 | 3,45 | **220-Z** | – | – |
| | 180 | 34 | 134 | 140 | 5 | 6 300 | 4 000 | 3,45 | **220-2Z** | – | – |



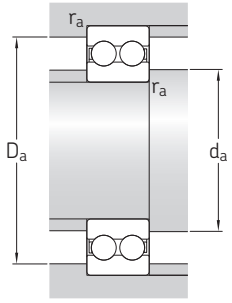

| Dimensions | | | | | | | | | | Abutment and fillet dimensions | | | | | | | Minimum load factor |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_2$ ≈ | $D_3$ | $D_4$ | b | f | C | $r_{1,2}$ min. | $r_0$ max. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $D_b$ min. | $b_a$ min. | $C_a$ max. | $r_a$ max. | $k_r$ |
| mm | | | | | | | | | | mm | | | | | | | – |
| **85** | 104 | 134,3 | 145,24 | 159,7 | 3,1 | 2,82 | 4,9 | 2 | 0,6 | 96 | – | 139 | 162 | 3,5 | 7,72 | 2 | 0,04 |
| | 104 | 134,3 | – | – | – | – | – | 2 | – | 96 | 96 | 139 | – | – | – | 2 | 0,04 |
| | 104 | 134,3 | – | – | – | – | – | 2 | – | 96 | 96 | 139 | – | – | – | 2 | 0,04 |
| | 112 | 155,4 | – | – | – | – | – | 3 | – | 98 | – | 167 | – | – | – | 2,5 | 0,05 |
| | 112 | 155,4 | – | – | – | – | – | 3 | – | 98 | 112 | 167 | – | – | – | 2,5 | 0,05 |
| | 112 | 155,4 | – | – | – | – | – | 3 | – | 98 | 112 | 167 | – | – | – | 2,5 | 0,05 |
| **90** | 110 | 142,6 | 155,22 | 169,7 | 3,1 | 2,82 | 4,9 | 2 | 0,6 | 100 | – | 150 | 172 | 3,5 | 7,72 | 2 | 0,04 |
| | 110 | 142,6 | – | – | – | – | – | 2 | – | 100 | 110 | 150 | – | – | – | 2 | 0,04 |
| | 110 | 142,6 | – | – | – | – | – | 2 | – | 100 | 110 | 150 | – | – | – | 2 | 0,04 |
| | 119 | 163,9 | – | – | – | – | – | 3 | – | 103 | – | 177 | – | – | – | 2,5 | 0,05 |
| | 119 | 163,9 | – | – | – | – | – | 3 | – | 103 | 118 | 177 | – | – | – | 2,5 | 0,05 |
| | 119 | 163,9 | – | – | – | – | – | 3 | – | 103 | 118 | 177 | – | – | – | 2,5 | 0,05 |
| **95** | 116 | 151,3 | 163,65 | 182,9 | 3,5 | 3,1 | 5,69 | 2,1 | 0,6 | 107 | – | 158 | 185 | 4 | 8,79 | 2 | 0,04 |
| | 116 | 151,3 | – | – | – | – | – | 2,1 | – | 107 | 116 | 158 | – | – | – | 2 | 0,04 |
| | 116 | 151,3 | – | – | – | – | – | 2,1 | – | 107 | 116 | 158 | – | – | – | 2 | 0,04 |
| **100** | 123 | 159,9 | – | – | – | – | – | 2,1 | – | 112 | – | 168 | – | – | – | 2 | 0,04 |
| | 123 | 159,9 | – | – | – | – | – | 2,1 | – | 112 | 122 | 168 | – | – | – | 2 | 0,04 |
| | 123 | 159,9 | – | – | – | – | – | 2,1 | – | 112 | 122 | 168 | – | – | – | 2 | 0,04 |

## 1.6 Double row deep groove ball bearings

d **10 – 75** mm



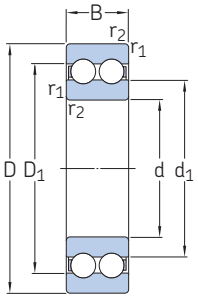

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | kg | – |
| **10** | 30 | 14 | 9,23 | 5,2 | 0,224 | 40 000 | 22 000 | 0,049 | **4200 ATN9** |
| **12** | 32 | 14 | 10,6 | 6,2 | 0,26 | 36 000 | 20 000 | 0,052 | **4201 ATN9** |
| | 37 | 17 | 13 | 7,8 | 0,325 | 34 000 | 18 000 | 0,092 | **4301 ATN9** |
| **15** | 35 | 14 | 11,9 | 7,5 | 0,32 | 32 000 | 17 000 | 0,059 | **4202 ATN9** |
| | 42 | 17 | 14,8 | 9,5 | 0,405 | 28 000 | 15 000 | 0,12 | **4302 ATN9** |
| **17** | 40 | 16 | 14,8 | 9,5 | 0,405 | 28 000 | 15 000 | 0,09 | **4203 ATN9** |
| | 47 | 19 | 19,5 | 13,2 | 0,56 | 24 000 | 13 000 | 0,16 | **4303 ATN9** |
| **20** | 47 | 18 | 17,8 | 12,5 | 0,53 | 24 000 | 13 000 | 0,14 | **4204 ATN9** |
| | 52 | 21 | 23,4 | 16 | 0,68 | 22 000 | 12 000 | 0,21 | **4304 ATN9** |
| **25** | 52 | 18 | 19 | 14,6 | 0,62 | 20 000 | 11 000 | 0,17 | **4205 ATN9** |
| | 62 | 24 | 31,9 | 22,4 | 0,95 | 18 000 | 10 000 | 0,34 | **4305 ATN9** |
| **30** | 62 | 20 | 26 | 20,8 | 0,88 | 17 000 | 9 500 | 0,29 | **4206 ATN9** |
| | 72 | 27 | 41 | 30 | 1,27 | 16 000 | 8 500 | 0,5 | **4306 ATN9** |
| **35** | 72 | 23 | 35,1 | 28,5 | 1,2 | 15 000 | 8 000 | 0,4 | **4207 ATN9** |
| | 80 | 31 | 50,7 | 38 | 1,63 | 14 000 | 7 500 | 0,68 | **4307 ATN9** |
| **40** | 80 | 23 | 37,1 | 32,5 | 1,37 | 13 000 | 7 000 | 0,5 | **4208 ATN9** |
| | 90 | 33 | 55,9 | 45 | 1,9 | 12 000 | 6 700 | 0,95 | **4308 ATN9** |
| **45** | 85 | 23 | 39 | 36 | 1,53 | 12 000 | 6 700 | 0,54 | **4209 ATN9** |
| | 100 | 36 | 68,9 | 56 | 2,4 | 11 000 | 6 000 | 1,25 | **4309 ATN9** |
| **50** | 90 | 23 | 41 | 40 | 1,7 | 11 000 | 6 000 | 0,58 | **4210 ATN9** |
| | 110 | 40 | 81,9 | 69,5 | 2,9 | 10 000 | 5 300 | 1,7 | **4310 ATN9** |
| **55** | 100 | 25 | 44,9 | 44 | 1,9 | 10 000 | 5 600 | 0,8 | **4211 ATN9** |
| | 120 | 43 | 97,5 | 83 | 3,45 | 9 000 | 5 000 | 2,15 | **4311 ATN9** |
| **60** | 110 | 28 | 57,2 | 55 | 2,36 | 9 500 | 5 300 | 1,1 | **4212 ATN9** |
| | 130 | 46 | 112 | 98 | 4,15 | 8 500 | 4 500 | 2,65 | **4312 ATN9** |
| **65** | 120 | 31 | 67,6 | 67 | 2,8 | 8 500 | 4 800 | 1,45 | **4213 ATN9** |
| | 140 | 48 | 121 | 106 | 4,5 | 8 000 | 4 300 | 3,25 | **4313 ATN9** |
| **70** | 125 | 31 | 70,2 | 73,5 | 3,1 | 8 000 | 4 300 | 1,5 | **4214 ATN9** |
| **75** | 130 | 31 | 72,8 | 80 | 3,35 | 7 500 | 4 000 | 1,6 | **4215 ATN9** |
| | 160 | 55 | 156 | 143 | 5,5 | 6 700 | 3 600 | 4,8 | **4315 ATN9** |



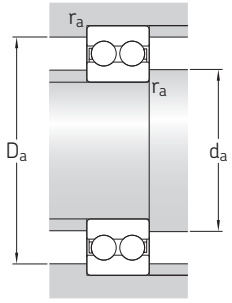

| Dimensions | | | | Abutment and fillet dimensions | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | $r_{1,2}$ min. | $d_a$ min. | $D_a$ max. | $r_a$ max. | $k_r$ | $f_0$ |
| mm | | | | mm | | | – | |
| **10** | 16,7 | 23,3 | 0,6 | 14,2 | 25,8 | 0,6 | 0,05 | 12 |
| **12** | 18,3 | 25,7 | 0,6 | 16,2 | 27,8 | 0,6 | 0,05 | 12 |
| | 20,5 | 28,5 | 1 | 17,6 | 31,4 | 1 | 0,06 | 12 |
| **15** | 21,5 | 29 | 0,6 | 19,2 | 30,8 | 0,6 | 0,05 | 13 |
| | 24,5 | 32,5 | 1 | 20,6 | 36,4 | 1 | 0,06 | 13 |
| **17** | 24,3 | 32,7 | 0,6 | 21,2 | 35,8 | 0,6 | 0,05 | 13 |
| | 28,7 | 38,3 | 1 | 22,6 | 41,4 | 1 | 0,06 | 13 |
| **20** | 29,7 | 38,3 | 1 | 25,6 | 41,4 | 1 | 0,05 | 14 |
| | 31,8 | 42,2 | 1,1 | 27 | 45 | 1 | 0,06 | 13 |
| **25** | 34,2 | 42,8 | 1 | 30,6 | 46,4 | 1 | 0,05 | 14 |
| | 37,3 | 49,7 | 1,1 | 32 | 55 | 1 | 0,06 | 13 |
| **30** | 40,9 | 51,1 | 1 | 35,6 | 56 | 1 | 0,05 | 14 |
| | 43,9 | 58,1 | 1,1 | 37 | 65 | 1 | 0,06 | 13 |
| **35** | 47,5 | 59,5 | 1,1 | 42 | 65 | 1 | 0,05 | 14 |
| | 49,5 | 65,4 | 1,5 | 44 | 71 | 1,5 | 0,06 | 13 |
| **40** | 54 | 66 | 1,1 | 47 | 73 | 1 | 0,05 | 15 |
| | 56,9 | 73,1 | 1,5 | 49 | 81 | 1,5 | 0,06 | 14 |
| **45** | 59,5 | 71,5 | 1,1 | 52 | 78 | 1 | 0,05 | 15 |
| | 63,5 | 81,5 | 1,5 | 54 | 91 | 1,5 | 0,06 | 14 |
| **50** | 65,5 | 77,5 | 1,1 | 57 | 83 | 1 | 0,05 | 15 |
| | 70 | 90 | 2 | 61 | 99 | 2 | 0,06 | 14 |
| **55** | 71,2 | 83,8 | 1,5 | 64 | 91 | 1,5 | 0,05 | 16 |
| | 76,5 | 98,5 | 2 | 66 | 109 | 2 | 0,06 | 14 |
| **60** | 75,6 | 90,4 | 1,5 | 69 | 101 | 1,5 | 0,05 | 15 |
| | 83,1 | 107 | 2,1 | 72 | 118 | 2 | 0,06 | 14 |
| **65** | 82,9 | 99,1 | 1,5 | 74 | 111 | 1,5 | 0,05 | 15 |
| | 89,6 | 115 | 2,1 | 77 | 128 | 2 | 0,06 | 14 |
| **70** | 89,4 | 106 | 1,5 | 79 | 116 | 1,5 | 0,05 | 15 |
| **75** | 96,9 | 114 | 1,5 | 84 | 121 | 1,5 | 0,05 | 16 |
| | 103 | 132 | 2,1 | 87 | 148 | 2 | 0,06 | 14 |

## 1.6 Double row deep groove ball bearings

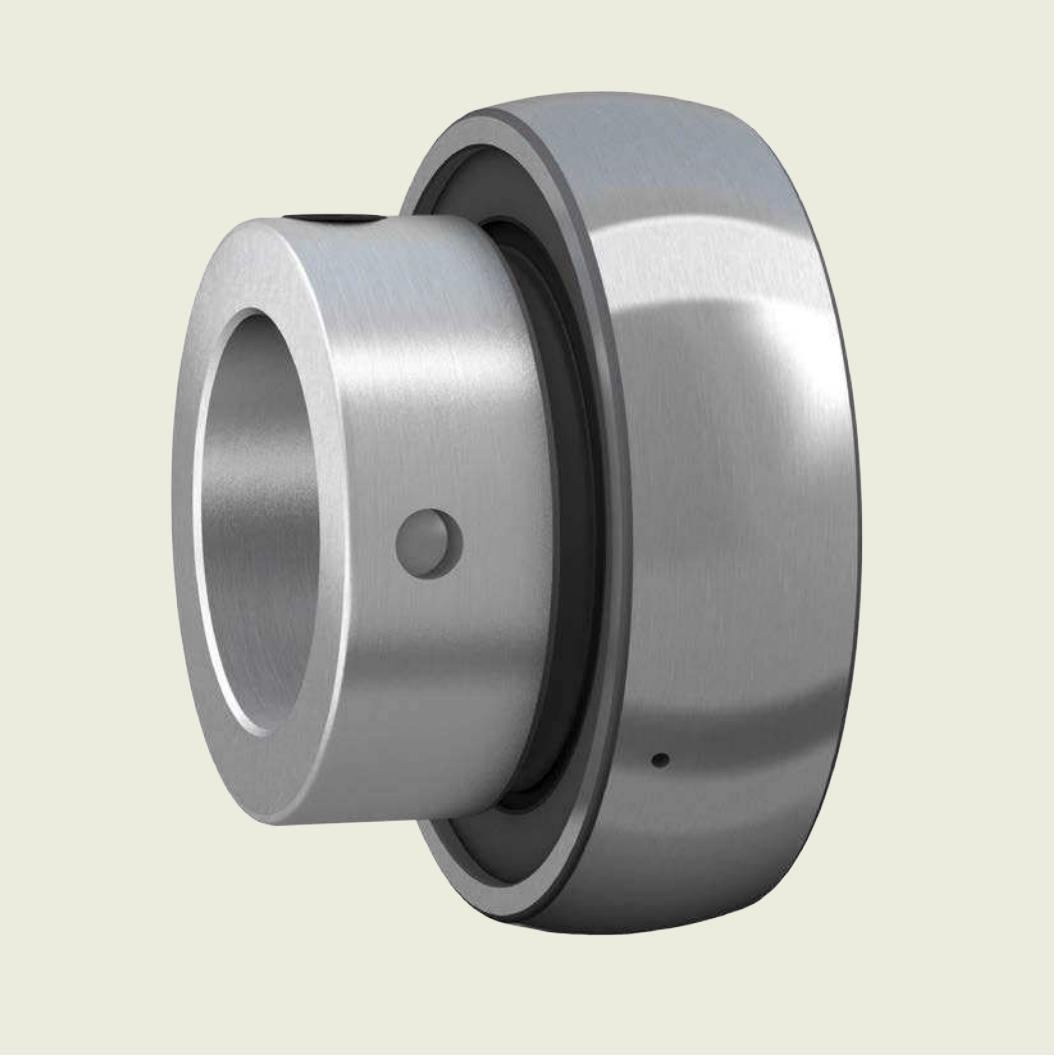
d **80 – 90** mm




| Principal dimensions | | | Basic load ratings | | Fatigue load limit | Speed ratings | | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| | | | dynamic | static | | Reference speed | Limiting speed | | |
| d | D | B | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | kg | – |
| **80** | 140 | 33 | 80,6 | 90 | 3,6 | 7 000 | 3 800 | 2 | **4216 ATN9** |
| **85** | 150 | 36 | 93,6 | 102 | 4 | 7 000 | 3 600 | 2,55 | **4217 ATN9** |
| **90** | 160 | 40 | 112 | 122 | 4,65 | 6 300 | 3 400 | 3,2 | **4218 ATN9** |




| Dimensions | | | | Abutment and fillet dimensions | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | $r_{1,2}$ min. | $d_a$ min. | $D_a$ max. | $r_a$ max. | $k_r$ | $f_0$ |
| mm | | | | mm | | | – | |
| **80** | 102 | 120 | 2 | 91 | 129 | 2 | 0,05 | 16 |
| **85** | 105 | 125 | 2 | 96 | 139 | 2 | 0,05 | 15 |
| **90** | 114 | 136 | 2 | 101 | 149 | 2 | 0,05 | 15 |



# 2 Insert bearings (Y-bearings)

# 2 Insert bearings (Y-bearings)




**Designs and variants** . . . . . **341**
Insert bearings with grub screws . . . . . 342
Basic design bearings . . . . . 342
Bearings with zinc-coated rings . . . . . 342
Stainless steel bearings . . . . . 342
Insert bearings with an eccentric locking collar . . . . . 343
SKF ConCentra insert bearings . . . . . 344
Insert bearings with a tapered bore . . . . . 344
Insert bearings with a standard inner ring . . . . . 345
Sealing solutions . . . . . 345
Standard seals . . . . . 345
Standard seals with additional flingers . . . . . 345
Multiple seals . . . . . 346
5-lip seals . . . . . 346
RS1 seals . . . . . 346
Shields . . . . . 346
Cages . . . . . 347
Rubber seating rings . . . . . 347

**Lubrication** . . . . . **348**
Greases for capped bearings . . . . . 348
Grease life for insert bearings . . . . . 348
Relubrication . . . . . 348

**Bearing data** . . . . . **350**
(Dimension standards, tolerances, radial internal clearance, permissible misalignment)

**Loads** . . . . . **353**
(Minimum load, axial load carrying capacity, equivalent dynamic bearing load, equivalent static bearing load)

**Temperature limits** . . . . . **355**

**Permissible speed** . . . . . **355**

**Design considerations** . . . . . **356**
Axial displacement . . . . . 356
Shaft tolerances . . . . . 358

**Mounting and dismounting** . . . . . **359**
Assembling insert bearings into housings with fitting slots . . . . . 362
SKF ConCentra insert bearings . . . . . 363

**Designation system** . . . . . **364**

**Product tables**
2.1 Insert bearings with grub screws, metric shafts . . . 366
2.2 Insert bearings with grub screws, inch shafts . . . . . 368
2.3 Insert bearings with an eccentric locking collar, metric shafts . . . . . 372
2.4 Insert bearings with an eccentric locking collar, inch shafts . . . . . 374
2.5 SKF ConCentra insert bearings, metric shafts . . . . 376
2.6 SKF ConCentra insert bearings, inch shafts . . . . . 377
2.7 Insert bearings with a tapered bore on an adapter sleeve, metric shafts . . . . . 378
2.8 Insert bearings with a tapered bore on an adapter sleeve, inch shafts . . . . . 379
2.9 Insert bearings with a standard inner ring, metric shafts . . . . . 380

**Other insert bearings (Y-bearings)**
High temperature bearings . . . . . 1005
Bearings with Solid Oil . . . . . 1023
Bearings with a customized design or customized dimensions → contact SKF
Ball bearing units (Y-bearing units) → skf.com/bearings

# 2 Insert bearings (Y-bearings)



## More information

**General bearing knowledge** . . . . **17**

**Bearing selection process** . . . . . **59**

*SKF bearing maintenance handbook* ISBN 978-91-978966-4-1

Insert bearings (SKF Y-bearings) are based on sealed deep groove ball bearings in the 62 and 63 series, but have a convex outer ring and in most cases an extended inner ring with a specific locking device (fig. 1), enabling quick and easy mounting onto the shaft.

## Bearing features

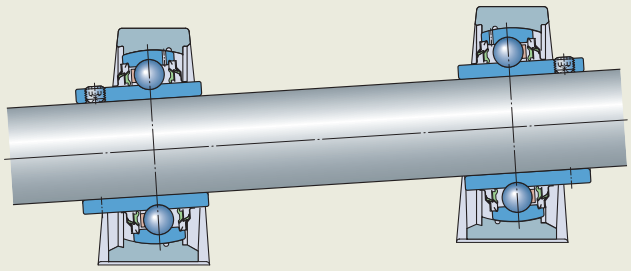
- **Quick and easy to mount**
  The different locking methods enable quick and easy mounting of insert bearings onto the shaft.
- **Accommodate initial misalignment**
  The spherically shaped outside surface enables initial misalignment by tilting in the housing (fig. 2).
- **Long service life**
  The different sealing solutions available provide a long service life for a wide variety of applications with high contamination levels.
- **Reduced noise and vibration levels**
  Where high requirements on noise and vibration levels are important, SKF can provide the appropriate shaft locking method.

Fig. 1

**Insert bearing**

Fig. 2

**Insert bearings accommodate static initial misalignment**



## Typical applications

Because of their versatility and cost-effectiveness, insert bearings are typically used in the following applications:

- Agricultural machinery
- Food and beverage processing and packaging
- Conveyor systems
- Material handling systems
- Textile equipment
- Industrial fans
- Special machinery, e.g. car wash systems, gym equipment, go-karts

## Ball bearing units (Y-bearing units)

SKF also supplies a wide variety of ball bearing units that are not listed in this rolling bearing catalogue. For information about ball bearing units, refer to the product information available online at skf.com/bearings.

# Designs and variants

Insert bearings typically have a spherically shaped (convex) outside surface and an extended inner ring (fig. 3) with different types of locking device. The various insert bearing series differ in the way the bearing is locked onto the shaft:

- with grub (set) screws (fig. 4)
- with an eccentric locking collar (fig. 5)
- with SKF ConCentra locking technology (fig. 6)
- with an adapter sleeve (fig. 7)
- with an interference fit (fig. 8)

Insert bearings with an inner ring that is extended on both sides run more smoothly, as the extent to which the inner ring can tilt on the shaft is reduced.

The standard SKF insert bearing assortment presented in this section also includes application-specific variants, such as:

- bearings made of stainless steel or with zinc-coated rings for the food industry (*Insert bearings with grub screws*, page 342)
- bearings for agricultural applications

Fig. 3

**Spherically shaped outside surface and extended inner ring**

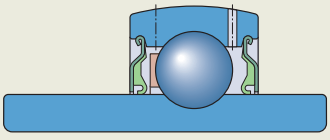


Fig. 4

**Bearing locked with grub screws**

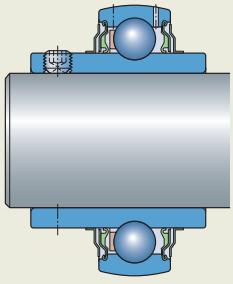


Fig. 5

**Bearing locked with an eccentric locking collar**

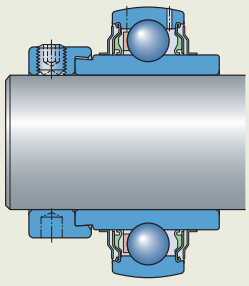


Fig. 6

**Bearing locked with SKF ConCentra locking technology**

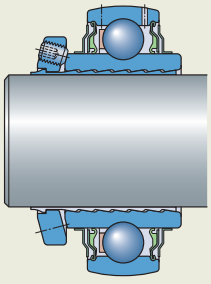


Fig. 7

**Bearing locked with an adapter sleeve assembly**

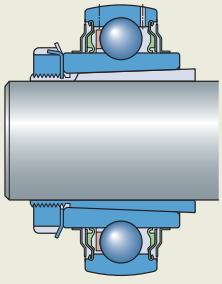
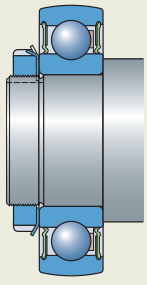


Fig. 8

**Bearing locked with an interference fit and a lock nut**



# Insert bearings with grub screws

- are suitable for applications for both constant and alternating directions of rotation
- are locked onto the shaft by tightening the two cup point hexagonal grub (set) screws, positioned 120° apart in the inner ring

## Basic design bearings

- are available with an inner ring extended on one side (fig. 9, bearing series YAT 2)
- are available with an inner ring extended on both sides (fig. 10, bearing series YAR 2)
- are capped on both sides with:
  - a rugged standard seal (*Standard seals*, page 345) for bearing series YAT 2
  - a rugged standard seal and an additional plain sheet steel flinger (*Standard seals with additional flingers*, page 345, designation suffix 2F) or a rubberized sheet steel flinger (*Multiple seals*, page 346, designation suffix 2RF) for bearing series YAR 2
- have two lubrication holes in the outer ring as standard, one on each side, positioned 120° apart
- can be supplied without lubrication holes on request (designation suffix W)

For demanding operating conditions that occur in agricultural applications, such as combines and balers, harvesters and disk harrows, SKF has designed the YARAG 2 bearing series (fig. 11). These bearings:

- are fitted with a patented 5-lip seal (*5-lip seals*, page 346)
- are supplied without any lubrication holes in the outer ring

## Bearings with zinc-coated rings

- are intended for use in corrosive environments
- are available with an inner ring extended on both sides (bearing series YAR 2..-2RF/VE495)
- have grub screws made of stainless steel
- are capped on both sides with a highly effective multiple seal (*Multiple seals*, page 346) made of food-compatible rubber with a stainless steel insert and a stainless steel flinger
- are filled with a food-grade grease
- have two lubrication holes in the outer ring, one on each side, positioned 120° apart

## Stainless steel bearings

- are intended for use in corrosive environments
- are available with an inner ring extended on both sides (bearing series YAR 2..-2RF/HV)
- have all steel components made of stainless steel, including rings, balls, sheet metal parts of both seals and flingers, and grub screws
- are capped on both sides with a highly effective multiple seal (*Multiple seals*, page 346) made of food-compatible rubber with a stainless steel insert and a stainless steel flinger
- are filled with a food-grade grease
- have an annular groove with one lubrication hole in the outer ring, located on the side opposite the locking device
- have a lower dynamic load carrying capacity than same-sized bearings made of high grade carbon chromium steel

**Fig. 9**

**Bearing in the YAT 2 series**

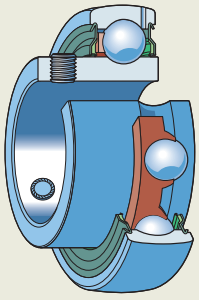


**Fig. 10**

**Bearing in the YAR 2 series**

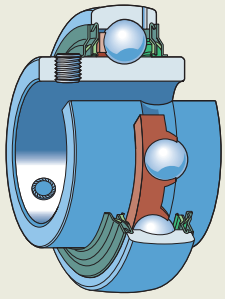
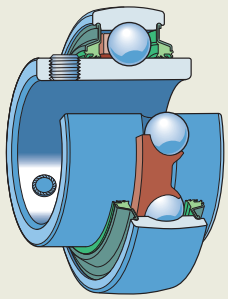


**Fig. 11**

**Bearing in the YARAG 2 series**



# Insert bearings with an eccentric locking collar

- are intended for use in applications where the direction of rotation is constant
- have, on one side, an eccentric step at the extended inner ring to accommodate the locking collar, which is:
  - zinc-coated for bearings with a metric bore
  - black-oxidized for bearings with an inch bore
- are locked onto the shaft by turning the locking collar in the direction of rotation; a single grub screw further secures the collar to the shaft
- are available with an inner ring extended on one side (**fig. 12**, bearing series YET 2)
- are available with an inner ring extended on both sides (**fig. 13**, bearing series YEL 2)
- are capped on both sides with:
  - a rugged standard seal (*Standard seals*, **page 345**) for bearing series YET 2
  - a rugged standard seal and an additional plain sheet steel flinger (*Standard seals with additional flingers*, **page 345**, designation suffix 2F) or a rubberized sheet steel flinger (*Multiple seals*, **page 346** designation suffix 2RF/VL065) for bearing series YEL 2
- have two lubrication holes in the outer ring as standard, one on each side, positioned 120° apart
- can be supplied without lubrication holes on request (designation suffix W)

For demanding operating conditions that occur in agricultural applications, such as combines and balers, harvesters and disk harrows, SKF has designed the YELAG 2 bearing series (**fig. 14**). These bearings:

- are fitted with a patented 5-lip seal (*5-lip seals*, **page 346**)
- are supplied without any lubrication holes in the outer ring

**Fig. 12**

**Bearing in the YET 2 series**

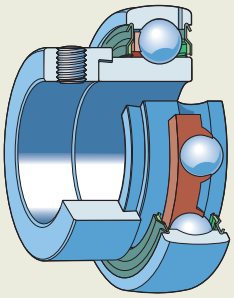


**Fig. 13**

**Bearing in the YEL 2 series**

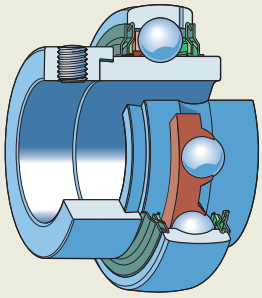
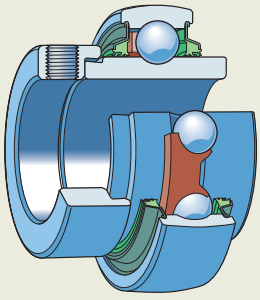


**Fig. 14**

**Bearing in the YELAG 2 series**



# SKF ConCentra insert bearings

- are suitable for applications for both constant and alternating directions of rotation
- provide an easy, quick and reliable way to lock a bearing onto a shaft, even in applications where there are heavy loads and/or high speeds
- permit the full limiting speed to be achieved, even where using commercial grade shafts
- have an inner ring symmetrically extended on both sides (**fig. 15**, bearing series YSP 2)
- comprise the patented SKF ConCentra locking technology, which is based on the expansion and contraction of the following two mating surfaces, which have precision-engineered serrations:
  - the bearing bore
  - the external surface of the stepped sleeve
- provide a true concentric fit on the shaft, because when the grub screws in the mounting collar are tightened, the inner ring is axially displaced relative to the stepped sleeve (**fig. 16**), forcing the bearing inner ring to expand and the stepped sleeve to contract evenly
- provide low noise and vibration levels, and virtually eliminate fretting corrosion
- are capped on both sides with a rugged standard seal and an additional plain sheet steel flinger (*Standard seals with additional flingers*)
- have two lubrication holes in the outer ring as standard, one on each side, positioned 120° apart
- can be supplied without lubrication holes on request (designation suffix W)

For demanding operating conditions that occur in agricultural applications, such as combines and balers, harvesters and disk harrows, SKF has designed the YSPAG 2 bearing series (**fig. 17**). These bearings:

- are fitted with a patented 5-lip seal (*5-lip seals*, **page 346**)
- are supplied without any lubrication holes in the outer ring

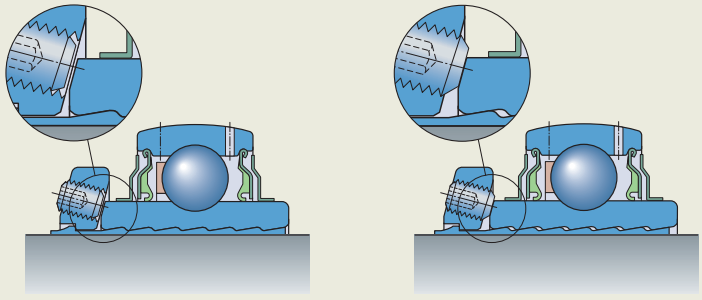
# Insert bearings with a tapered bore

- are suitable for applications for both constant and alternating directions of rotation
- fit the following adapter sleeves:
  - H 23 series for metric shafts
  - HA 23 and HE 23 series for inch shafts
- permit the full limiting speed to be achieved when mounted on an adapter sleeve, even where using commercial grade shafts
- have an inner ring symmetrically extended on both sides and a tapered bore (taper 1:12) (**fig. 18**, bearing series YSA 2)
- are capped on both sides with a rugged standard seal and an additional plain sheet steel flinger (*Standard seals with additional flingers*)
- have two lubrication holes in the outer ring as standard, one on each side, positioned 120° apart
- can be supplied without lubrication holes on request (designation suffix W)

The associated adapter sleeves must be ordered separately from the bearings.

**Fig. 16**

**SKF ConCentra locking technology**



Prior to mounting | After mounting

**Fig. 15**

**Bearing in the YSP 2 series**

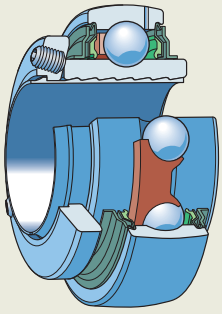


**Fig. 17**

**Bearing in the YSPAG 2 series**

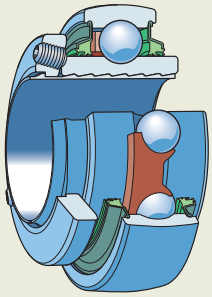
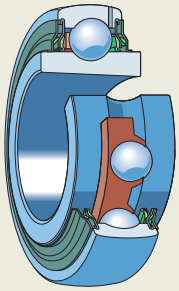


**Fig. 18**

**Bearing with a tapered bore**



# Insert bearings with a standard inner ring

- are suitable for applications where smooth running is a key operational parameter
- have normal tolerances for the bearing bore diameter and are locked onto the shaft using an appropriate interference fit
- have the same dimensions and features as deep groove ball bearings in the 62 and 63 series, but have a spherically shaped (convex) outside surface (**fig. 19**, bearing series 17262 and 17263)
- accommodate heavier axial loads than any other insert bearing
- can operate at the same speeds as a corresponding sealed deep groove ball bearing
- are capped on both sides with:
  - an NBR contact seal (*RS1 seals*, **page 346**, designation suffix 2FRS1) as standard
  - a rugged standard seal (*Standard seals*, designation suffix 2FRS1/VP274)
- do not have any lubrication holes in the outer ring as standard
- can be supplied with two lubrication holes in the outer ring, one on each side, positioned 120° apart (designation suffix B)

# Sealing solutions

SKF supplies all insert bearings capped with a seal or shield on both sides. In typical insert bearing applications, no additional external protection is necessary. Therefore, insert bearings are available with several sealing arrangement designs to meet the demands of a wide range of operating conditions.

When capped bearings must operate under certain conditions, such as very high speeds or high temperatures, grease may appear between the inner ring and capping device. For bearing arrangements where this would be detrimental, appropriate actions should be taken.

## Standard seals

- consist of a stamped sheet steel washer with a seal lip made of NBR, vulcanized to its inner surface (**fig. 20**, designation suffix VP274 for bearings with a standard inner ring and no designation suffix for other insert bearings)
- form, with its non-contact sheet steel washer, a narrow gap with the inner ring shoulder to protect the seal against coarse contaminants

## Standard seals with additional flingers

- are recommended for the more contaminated environments
- consist of a a standard seal and an additional sheet steel or stainless sheet steel plain flinger (**fig. 21**, designation suffix 2F)
- have an interference fit for the flinger on the inner ring shoulder to improve considerably the effectiveness of the seal without increasing friction
- are only available for bearings with an inner ring extended on both sides

**Fig. 19**

**Bearing with a standard inner ring**

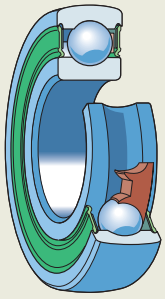


**Fig. 20**

**Standard seals**

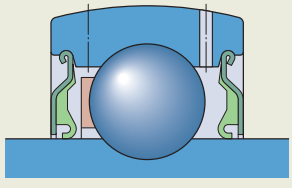
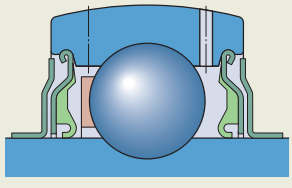


**Fig. 21**

**Standard seals with additional flinger**



## Multiple seals

- are recommended for very contaminated environments
- consist of a standard seal and a flinger with a vulcanized NBR lip, which seals axially against the standard seal (fig. 22, designation suffix 2RF)
- have the space between the flinger lip and the inner ring shoulder filled with grease to provide additional protection
- are only available for bearings with an inner ring extended on both sides

## 5-lip seals

- are recommended for extremely contaminated environments, such as agricultural applications
- are patented by SKF
- consist of a sheet steel insert with a vulcanized 5-lip contact seal made of a low-friction NBR compound (fig. 23):
  - The steel insert is held in place by a groove in the bearing outer ring and protects the seal from solid contaminants.
  - Each seal lip has a different design to provide superior sealing performance in response to different operating conditions, including dynamic misalignment.
  - The outermost and innermost lips act as a labyrinth to prevent contaminant ingress and grease leakage, respectively.
  - The three inner lips make constant contact with the inner ring shoulder.
- are only available for bearings with an inner ring extended on both sides

## RS1 seals

- were originally developed for standard SKF deep groove ball bearings
- are fitted in a recess on the outer ring and ride against the inner ring shoulder to act as contact seals (fig. 24, designation suffix 2RS1)
- are made of sheet steel reinforced NBR

## Shields

- are designed for applications where the contamination level is low and additional friction should be avoided
- are fitted in a recess on the outer ring (fig. 25, designation suffix VP076)
- do not make contact with the inner ring, but form a narrow gap
- are made of sheet steel
- are only available for insert bearings on request

Bearings with shields should not be used where water, steam or moisture can enter the bearing.

Fig. 22

**Multiple seals**

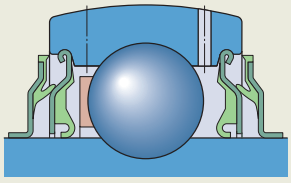


Fig. 23

**5-lip seals**

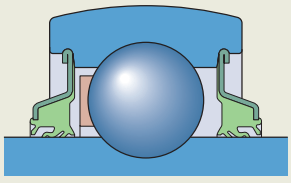


Fig. 24

**RS1 seals**

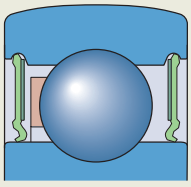


Fig. 25

**Shields**

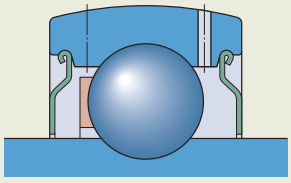


Fig. 26

**Snap-type, glass fibre reinforced PA66 cage**

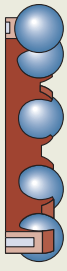


Fig. 27

**Rubber seating rings in the RIS 2 series**

# Cages

SKF insert bearings are fitted as standard with a snap-type, glass fibre reinforced PA66 cage (**fig. 26**), no designation suffix.

When used at high temperatures, some lubricants can have a detrimental effect on polyamide cages. For additional information about the suitability of cages, refer to *Cages*, **page 187**.

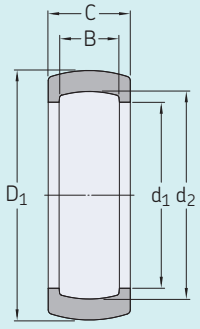
# Rubber seating rings

- are available in the RIS 2 series (**fig. 27**, **table 1**)
- can be fitted on all SKF insert bearings, except for those with a standard inner ring (17262 and 17263 series)
- are primarily intended to "cushion" insert bearings in pressed steel plummer block housings
- are intended to dampen vibration and noise
- are intended to enable the bearings to be displaced slightly in their housings to accommodate minor shaft expansion or misalignment
- are located on the bearing outer ring and in the housing bore (**fig. 28**)
- are made of NBR
- can withstand temperatures ranging from –30 to +100 °C *(–20 to +210 °F)*

Rubber seating rings are available as an accessory and must be ordered separately. However, insert bearings in the YET 2 series can be supplied with the seating ring already fitted (**fig. 29**). These products are identified by the series prefix CYS, followed by the bearing bore diameter and the bearing identification suffix FM, e.g. CYS 20 FM is a YET 204 bearing with a 20 mm bore, fitted with an RIS 204 rubber seating ring.

**Table 1**

**Rubber seating rings**




| Insert bearing Outside diameter D | Size | Rubber seating ring Designation | Dimensions $D_1$ | $d_1$ | $d_2$ | B | C | Mass |
|---|---|---|---|---|---|---|---|---|
| mm | – | – | mm | | | | | g |
| **40** | 03 | **RIS 203** | 47,3 | 35,5 | 39,8 | 12 | 18 | 12 |
| **47** | 04 | **RIS 204** | 52,3 | 41,2 | 46,8 | 14 | 19 | 11,5 |
| **52** | 05 | **RIS 205** | 62,3 | 46,4 | 51,8 | 15 | 20,5 | 26,5 |
| **62** | 06 | **RIS 206 A** | 72,3 | 54,6 | 61,8 | 18 | 21,5 | 31 |
| **72** | 07 | **RIS 207 A** | 80,3 | 63,7 | 71,8 | 19 | 23 | 32 |
| **80** | 08 | **RIS 208 A** | 85,3 | 70,7 | 79,7 | 21 | 24 | 26 |

**Fig. 28**

**Rubber seating ring, located between bearing and housing**

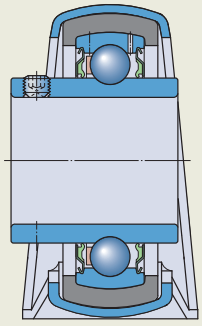
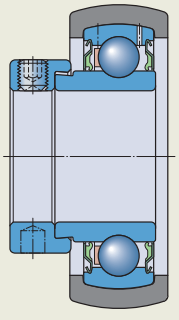


**Fig. 29**

**Bearing in the YET 2 series with rubber seating ring (CYS .. FM)**



# Lubrication

SKF insert bearings are supplied capped on both sides and are greased.

## Greases for capped bearings

Insert bearings are filled with one of the following greases (**table 2**):

- zinc-coated and stainless steel insert bearings
  → food-grade grease GFJ, registered by NSF as category H1
  The NSF registration confirms the grease fulfils the requirements listed in the US Food and Drug Administration's guidelines under 21 CFR section 178.3570 (lubricant acceptable with incidental food contact, for use in and around food processing areas).
- all other insert bearings
  → standard grease VT307

## Grease life for insert bearings

- is presented as $L_{10}$, i.e. the time period at the end of which 90% of the bearings are still reliably lubricated
- depends on the load, operating temperature and the $nd_m$ value (**diagram 1**)

The indicated grease life is valid for the following combination of operating conditions:

- horizontal shaft
- very light to moderate loads (P ≤ 0,05 C)
- stationary machine
- low vibration levels

Where the operating conditions vary, the grease life obtained from the diagram should be adjusted as follows:

- vertical shafts → 50% of the obtained value
- heavier loads (P > 0,05 C) → apply reduction factor (**table 4**)

The values for adjusting the grease life are estimates. Vibration can have a negative influence on grease life. The extent cannot be quantified, and the influence increases with increasing operating temperature.

## Relubrication

Insert bearings do not need relubrication if the grease life exceeds the *SKF rating life*, **page 89** of the bearing.

Relubrication can extend bearing service life under any of the following conditions:

- The bearings are exposed to high humidity or severe contamination.
- The bearings accommodate normal or heavy loads.
- The bearings operate for extended periods at high speeds or at temperatures above 55 °C *(130 °F)*.
- The bearings are subjected to high vibration levels.

To relubricate insert bearings, the following greases can be used:

- zinc-coated and stainless steel insert bearings
  → food-grade grease SKF LGFP 2
- all other insert bearings
  → SKF LGWA 2, LGMT 2 or LGMT 3 grease

**Table 2**

**Technical specifications of SKF greases for insert bearings**

| Grease | Temperature range[1] | Thickener | Base oil type | NLGI grade | Base oil viscosity [mm²/s] at 40 °C *(105 °F)* | at 100 °C *(210 °F)* |
|---|---|---|---|---|---|---|
| | –50 0 50 100 150 200 250 °C<br>*–60 30 120 210 300 390 480 °F* | | | | | |
| **VT307** | | Lithium-calcium soap | Mineral | 2 | 190 | 15 |
| **GFJ** | | Aluminium-complex soap | Synthetic hydrocarbon | 2 | 100 | 14 |

[1] Refer to the SKF traffic light concept (**page 117**).

If relubrication is needed, the relubrication intervals can be estimated by following the method explained under *Estimating the relubrication interval for grease*, **page 111**.

When relubricating, the shaft should be turned and the grease pumped slowly until fresh grease starts to escape from the seal(s). Excessive pressure from pumping too quickly can damage the seals. When machines and equipment are used for a limited period of time, SKF recommends relubricating each bearing at the end of the operational period, i.e. immediately before being laid up.

## Relubrication features

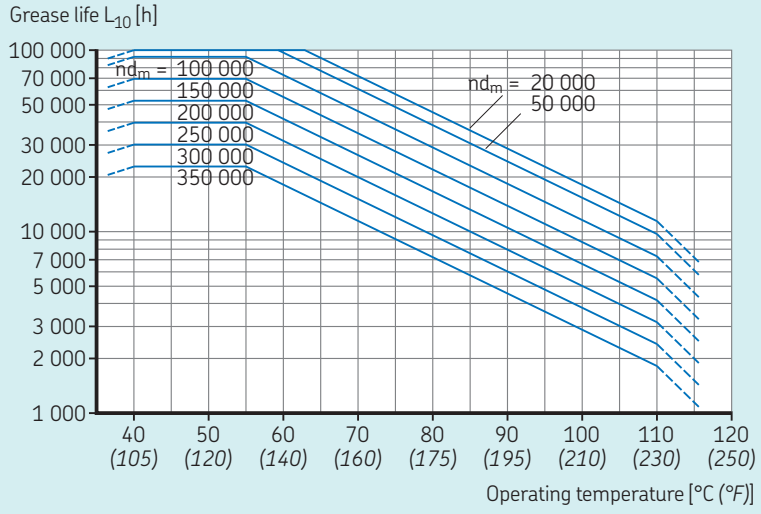
SKF insert bearings are designed to facilitate relubrication. They have two lubrication holes in the outer ring as standard, one on each side, positioned 120° apart. Bearings without lubrication holes can be supplied on request (designation suffix W).

The following bearings do not have the standard relubrication features:

- Stainless steel insert bearings with grub screws have a lubrication groove in the outer ring located on the side opposite the locking device and one lubrication hole within this groove.
- Insert bearings with a standard inner ring without designation suffix B and insert bearings with 5-lip seals are lubricated for life and cannot be relubricated. They do not have any lubrication holes.

**Diagram 1**

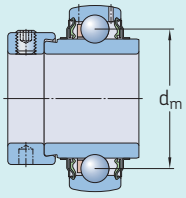
**Grease life for insert bearings with VT307 or GFJ grease where P = 0,05 C**




n = rotational speed [r/min]
$d_m$ = mean diameter [mm] (**table 3**)

**Table 3**

**Bearing mean diameter $d_m$**




| Bearing size[1] | Bearing mean diameter $d_m$ |
|---|---|
| – | mm |
| **03** | 28,5 |
| **04** | 33,5 |
| **05** | 39 |
| **06** | 46 |
| **07** | 53,5 |
| **08** | 60 |
| **09** | 65 |
| **10** | 70 |
| **11** | 77,5 |
| **12** | 85 |
| **13** | 92,5 |
| **14** | 97,5 |
| **15** | 102,5 |
| **16** | 110 |
| **17** | 117,5 |
| **18** | 126 |
| **20** | 141 |

[1] For example, bearing size 06 includes all bearings based on a 206 insert bearing, such as YAR 206-2F, YAR 206-101-2F, YAR 206-102-2F, YAR 206-103-2F, YAR 206-104-2F.

**Table 4**

**Reduction factor for the grease life, depending on the load**

| Load P | Reduction factor |
|---|---|
| **≤ 0,05 C** | 1 |
| **0,1 C** | 0,7 |
| **0,125 C** | 0,5 |
| **0,25 C** | 0,2 |

# Bearing data

| | |
|---|---|
| **Dimension standards** | Boundary dimensions: ISO 9628<br>Except for:<br><br>**Bearing series YAT 2**<br>• not standardized<br>• bore, outside diameter and outer ring width: ISO 9628<br><br>**Bearing series YSP 2, YSPAG 2**<br>• not standardized<br>• outside diameter and outer ring width: ISO 9628<br><br>**Bearing series YSA 2**<br>• JIS B 1558<br>• ISO 2982-1 for H 23 series adapter sleeves<br>• ANSI/ABMA Std. 8.2 for HA 23 and HE 23 series adapter sleeves<br><br>**Bearing series 17262, 17263**<br>• ISO 15<br>• outside diameter: ISO 9628 |
| **Tolerances**<br><br>For additional information<br>→ page 35 | **Bearing series YAT 2, YAR 2, YARAG 2, YET 2, YEL 2, YELAG 2**<br>• Bore and outside diameter: table 5, page 352<br>• Bore and outside diameter tolerance values are slightly tighter than those listed in ISO 9628.<br><br>**Bearing series YSP 2, YSPAG 2**<br>• Outside diameter: table 5<br>• Before mounting, the sleeve bore is larger than the nominal value to ease sliding on the shaft.<br><br>**Bearing series YSA 2**<br>• Outside diameter: table 5<br>• The tapered bore fits H 23 series adapter sleeves for metric shafts and HA 23 and HE 23 series adapter sleeves for inch shafts.<br><br>**Bearing series 17262, 17263**<br>• Normal: Values (ISO 492, table 2, page 38)<br>• Outside diameter: table 5 |
| **Radial internal clearance**<br><br>For additional information<br>→ page 182 | Values: ISO 9628 – Group N (table 6, page 352)<br>Except for:<br><br>**Bearing series 17262, 17263**<br>• Normal: Values (ISO 5753-1, table 6, page 252)<br><br>Values are valid for unmounted bearings under zero measuring load. |

Bearing data, continued

| | |
|---|---|
| **Permissible misalignment** | **Static misalignment**<br>Insert bearings can accommodate static initial misalignment by tilting in the housing (**fig. 2**, **page 340**). The permissible values are:<br>• SKF housings<br>– relubrication is not required: 5°<br>– relubrication is required (where applicable): 2°<br>• SKF pressed steel housings<br>– Misalignment cannot be accommodated once the attachment bolts have been fully tightened, unless a rubber seating ring is used (**page 347**).<br><br>**Dynamic misalignment**<br>Insert bearings can accommodate a few minutes of arc (misalignment) between the inner and outer rings. |

Table 5

**Tolerances for SKF insert bearings**

| Nominal diameter | | Inner ring<br>Bearing series<br>YAT 2, YAR 2, YARAG 2,<br>YET 2, YEL 2, YELAG 2 | | Outer ring<br>All bearings | |
|---|---|---|---|---|---|
| d, D | | $\Delta_{dmp}$ | | $\Delta_{Dmp}$ | |
| > | ≤ | U | L | U | L |
| mm | | µm | | µm | |
| **10** | **18** | +15 | +5 | – | – |
| **18** | **31,75** | +18 | +5 | – | – |
| **31,75** | **50,8** | +19 | +5 | 0 | –10 |
| **50,8** | **80,962** | +21 | +5 | 0 | –10 |
| **80,962** | **120** | +25 | +5 | 0 | –15 |
| **120** | **150** | – | – | 0 | –15 |
| **150** | **180** | – | – | 0 | –20 |

d = nominal bore diameter
D = nominal outside diameter

Table 6

**Radial internal clearance for insert bearings**

| Bearing size[1] | Radial internal clearance of insert bearings in the series<br>YAT 2, YAR 2, YARAG 2,<br>YET 2, YEL 2, YELAG 2 | | YSP 2, YSPAG 2,<br>YSA 2 | |
|---|---|---|---|---|
| | min. | max. | min. | max. |
| – | µm | | | |
| **03** | 10 | 25 | – | – |
| **04** | 12 | 28 | – | – |
| **05-06** | 12 | 28 | 23 | 41 |
| **07-08** | 13 | 33 | 28 | 46 |
| **09-10** | 14 | 36 | 30 | 51 |
| **11-13** | 18 | 43 | 38 | 61 |
| **14-16** | 20 | 51 | – | – |
| **17-20** | 24 | 58 | – | – |

[1] For example, bearing size 06 includes all bearings based on a 206 insert bearing, such as YAR 206-2F, YAR 206-101-2F, YAR 206-102-2F, YAR 206-103-2F, YAR 206-104-2F.

# Loads

| | | |
|---|---|---|
| **Minimum load**<br><br>For additional information<br>→ **page 111** | $F_{rm} = 0{,}01\ C$<br><br>The importance of imposing a minimum load increases where accelerations in the bearing are rapid, and where speeds are in the region of 75% or more of the limiting speed quoted in the **product tables**. | **Symbols**<br><br>C basic dynamic load rating [kN] (**product tables**, **page 366**)<br>$C_0$ basic static load rating [kN] (**product tables**)<br>e limiting value (**table 7**, **page 354**)<br>$f_0$ calculation factor (**table 8**, **page 354**)<br>$F_a$ axial load [kN]<br>$F_r$ radial load [kN]<br>$F_{rm}$ minimum radial load [kN]<br>P equivalent dynamic bearing load [kN]<br>$P_0$ equivalent static bearing load [kN]<br>X radial load factor (**table 7**)<br>Y axial load factor (**table 7**) |
| **Axial load carrying capacity** | $F_a \leq 0{,}25\ C_0$<br><br>The maximal permissible axial load of any locking mechanism is always > $0{,}25\ C_0$. | |
| **Equivalent dynamic bearing load**<br><br>For additional information<br>→ **page 96** | $F_a/F_r \leq e \rightarrow P = F_r$<br>$F_a/F_r > e \rightarrow P = X\,F_r + Y\,F_a$ | |
| **Equivalent static bearing load**<br><br>For additional information<br>→ **page 110** | $P_0 = 0{,}6\ F_r + 0{,}5\ F_a$ | |

Table 7

**Calculation factors**

| | Bearing series YAT 2, YAR 2, YARAG 2, YET 2, YEL 2, YELAG, YSP 2, YSPAG 2, YSA 2 | | | 17262, 17263 | | |
|---|---|---|---|---|---|---|
| $f_0 F_a/C_0$ | e | X | Y | e | X | Y |
| **0,172** | 0,29 | 0,46 | 1,88 | 0,19 | 0,56 | 2,3 |
| **0,345** | 0,32 | 0,46 | 1,71 | 0,22 | 0,56 | 1,99 |
| **0,689** | 0,36 | 0,46 | 1,52 | 0,26 | 0,56 | 1,71 |
| **1,03** | 0,38 | 0,46 | 1,41 | 0,28 | 0,56 | 1,55 |
| **1,38** | 0,4 | 0,46 | 1,34 | 0,3 | 0,56 | 1,45 |
| **2,07** | 0,44 | 0,46 | 1,23 | 0,34 | 0,56 | 1,31 |
| **3,45** | 0,49 | 0,46 | 1,1 | 0,38 | 0,56 | 1,15 |
| **5,17** | 0,54 | 0,46 | 1,01 | 0,42 | 0,56 | 1,04 |
| **6,89** | 0,54 | 0,46 | 1 | 0,44 | 0,56 | 1 |

Table 8

**Calculation factor $f_0$**

| **Bearing series** sizes | **Factor $f_0$** |
|---|---|
| **YAT 2, YAR 2, YARAG 2, YET 2, YEL 2, YELAG 2, YSP 2, YSPAG 2, YSA 2** | |
| 03-04 | 13 |
| 05-12 | 14 |
| 13-18 | 15 |
| 20 | 14 |
| **17262** | |
| 03-04 | 13 |
| 05-12 | 14 |
| **17263** | |
| 05 | 12 |
| 06-10 | 13 |

# Temperature limits

The permissible operating temperature for insert bearings can be limited by:

- the dimensional stability of the bearing rings and balls
- the cage
- the seals
- the lubricant

Where temperatures outside the permissible range are expected, contact SKF.

## Bearing rings and balls

SKF insert bearings are heat stabilized up to at least 150 °C *(300 °F)*.

## Cages

For temperature limits of PA66 cages, refer to *Polymer cages*, **page 188**.

## Seals

The permissible operating temperature for NBR seals is –40 to +100 °C *(–40 to +210 °F)*. Temperatures up to 120 °C *(250 °F)* can be tolerated for brief periods.

Typically, temperature peaks are at the seal lip.

## Lubricants

Temperature limits for the greases used in SKF insert bearings are provided in **table 2**, **page 348**. For temperature limits of other SKF greases, refer to *Selecting a suitable SKF grease*, **page 116**.

When using lubricants not supplied by SKF, temperature limits should be evaluated according to the SKF traffic light concept (**page 117**).

# Permissible speed

Insert bearings should not operate at speeds above the limiting speed listed in the **product tables**, **page 366**. This speed limit is set by the seal design.

For insert bearings with grub screws or an eccentric locking collar, the permissible speed is also influenced by the shaft tolerance. Where using these bearings on shafts with tolerances other than h6, compare the speed values listed in the product tables with those in **table 9**. The lower value is the permissible speed.

The permissible speed of insert bearings with 5-lip seals is valid under the following conditions:

- outer ring temperature ≤ 60 °C *(140 °F)*
- ambient temperature ≤ 25 °C *(80 °F)*
- very light to moderate loads (P ≤ 0,05 C)
- cast iron housing

For other conditions, contact SKF.

For applications operating at elevated speeds or where low vibration levels or quiet running is required, SKF recommends the use of either SKF ConCentra insert bearings, insert bearings on an adapter sleeve or insert bearings with a standard inner ring.

**Table 9**

**Permissible speeds for insert bearings with grub screws or an eccentric locking collar**

| Bearing size[1] | Permissible speed for shafts machined to tolerance class | | | |
|---|---|---|---|---|
| | h7Ⓔ | h8Ⓔ | h9Ⓔ | h11Ⓔ |
| – | r/min | | | |
| **03** | 6 000 | 4 300 | 1 500 | 950 |
| **04** | 5 300 | 3 800 | 1 300 | 850 |
| **05** | 4 500 | 3 200 | 1 000 | 700 |
| **06** | 4 000 | 2 800 | 900 | 630 |
| **07** | 3 400 | 2 200 | 750 | 530 |
| **08** | 3 000 | 1 900 | 670 | 480 |
| **09** | 2 600 | 1 700 | 600 | 430 |
| **10** | 2 400 | 1 600 | 560 | 400 |
| **11** | 2 000 | 1 400 | 500 | 360 |
| **12** | 1 900 | 1 300 | 480 | 340 |
| **13** | 1 700 | 1 100 | 430 | 300 |
| **14** | 1 600 | 1 000 | 400 | 280 |
| **15** | 1 500 | 950 | 380 | 260 |
| **16** | 1 400 | 900 | 360 | 240 |
| **17** | 1 300 | 850 | 340 | 220 |
| **18** | 1 200 | 800 | 320 | 200 |
| **20** | 1 100 | 750 | 300 | 190 |

[1] For example, bearing size 06 includes all bearings based on a 206 insert bearing, such as YAR 206-2F, YAR 206-101-2F, YAR 206-102-2F, YAR 206-103-2F, YAR 206-104-2F.

# Design considerations



## Axial displacement

Insert bearings are not intended to accommodate axial displacement of the shaft relative to the housing. The distance between bearing positions should therefore be short to avoid excessive induced axial loads as a result of thermal expansion of the shaft.

### Design for small axial displacement

To accommodate small axial displacement, the bearings should be supported by resilient sheet metal support surfaces or walls (fig. 30).

### Design for larger axial displacement

In applications where there are low speeds and light loads, an insert bearing with grub screws can be used to accommodate axial displacement. The shaft at the non-locating bearing position should be provided with one or two grooves, 120° apart, to engage a modified grub screw:

- Hexagon socket grub (set) screws with a dog point, in accordance with ISO 4028, but with a fine thread according to table 10. The grub screw should be secured by a nut and a spring or star lock washer (fig. 31).

The screws and groove(s) accommodate changes in shaft length and prevent the shaft from turning independently of the bearing. The sliding surfaces between the shaft and inner ring and those in the shaft grooves should be coated with a lubricant paste.

Fig. 30

**Design for small axial displacement**

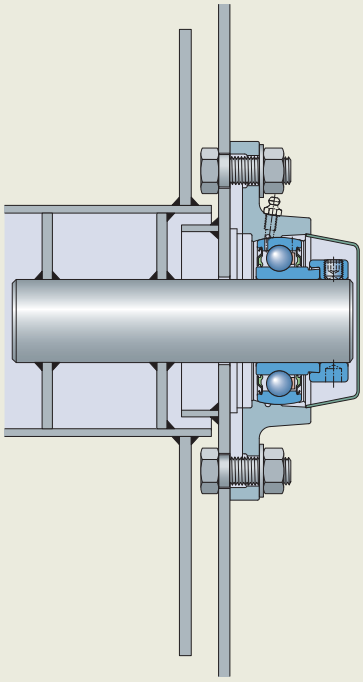


Fig. 31

**Hexagon socket grub screw with a dog point secured by a nut and a star lock washer**

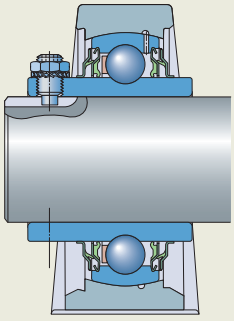
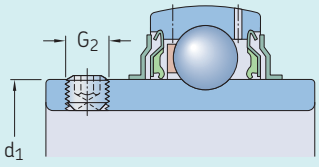


**Table 10**

**Threaded holes in the inner ring of bearings in the YAT 2, YAR 2 and YARAG 2 series**




| **Bearing size**[1] | **Outside diameter of inner ring** $d_1$ | **Threaded holes** YAR bearing with metric bore $G_2$ | YAR bearing with inch bore $G_2$ | YAT bearing with metric bore $G_2$ | YAT bearing with inch bore $G_2$ |
|---|---|---|---|---|---|
| – | mm | – | | | |
| **03** | 24,2 | M 6x0,75 | #10-32 UNF | M 6x0,75 | #10-32 UNF |
| **04** | 28,2 | M 6x0,75 | 1/4-28 UNF | M 6x0,75 | 1/4-28 UNF |
| **05** | 33,7 | M 6x0,75 | 1/4-28 UNF | M 6x0,75 | 1/4-28 UNF |
| **06** | 39,7 | M 6x0,75 | 1/4-28 UNF | M 6x0,75 | 5/16-24 UNF |
| **07** | 46,1 | M 6x0,75 | 5/16-24 UNF | M 6x0,75 | 5/16-24 UNF |
| **08** | 51,8 | M 8x1 | 5/16-24 UNF | M 6x0,75 | 5/16-24 UNF |
| **09** | 56,8 | M 8x1 | 5/16-24 UNF | M 6x0,75 | 5/16-24 UNF |
| **10** | 62,5 | M 10x1 | 3/8-24 UNF | M 8x1 | 3/8-24 UNF |
| **11** | 69,1 | M 10x1 | 3/8-24 UNF | – | 3/8-24 UNF |
| **12** | 75,6 | M 10x1 | 3/8-24 UNF | – | 3/8-24 UNF |
| **13** | 82,5 | M 10x1 | 3/8-24 UNF | – | – |
| **14** | 87 | M 10x1 | 7/16-20 UNF | – | – |
| **15** | 92 | M 10x1 | 7/16-20 UNF | – | 3/8-24 UNF |
| **16** | 97,4 | M 10x1 | 7/16-20 UNF | – | 3/8-24 UNF |
| **17** | 105 | M 12x1,5 | – | – | – |
| **18** | 112,5 | M 12x1,5 | – | – | – |
| **20** | 124,8 | M 12x1,5 | – | – | – |

[1] For example, bearing size 06 includes all bearings based on a 206 insert bearing, such as YAR 206-2F, YAR 206-101-2F, YAR 206-102-2F, YAR 206-103-2F, YAR 206-104-2F.

# Shaft tolerances

Recommended seat tolerances for insert bearings are listed in table 11. The relative position of the upper and lower limits of the most commonly used ISO shaft tolerance classes for insert bearings, except for those with a standard inner ring, is illustrated in fig. 32. The values for these tolerance classes are listed in table 12.

## Insert bearings on an adapter sleeve or SKF ConCentra insert bearings

The shaft seat total radial run-out should be IT5/2 for ISO tolerance class h9Ⓔ (table 12).

## Insert bearings with a standard inner ring

The same recommendations apply as for standard deep groove ball bearings (table 11). The values for these ISO tolerance classes are listed in table 14, page 160.

**Table 11**

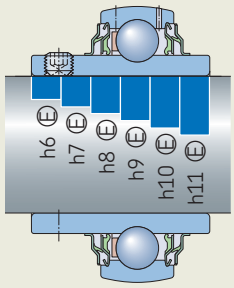
**Recommended shaft seat tolerances**

| Operating conditions | Tolerance class[1)] |
|---|---|
| **Insert bearings with grub screws or an eccentric locking collar** | |
| P > 0,05 C and/or high speeds | h6 |
| 0,035 C < P ≤ 0,05 C | h7 |
| 0,02 C < P ≤ 0,035 C and/or low speeds | h8 |
| Simple bearing arrangements or P ≤ 0,02 C | h9 – h11 |
| **Insert bearings with a tapered bore on an adapter sleeve or SKF ConCentra insert bearings** | |
| All loads and speeds | h9/IT5 |
| **Insert bearings with a standard inner ring** | |
| P > 0,035 C | |
| Shaft diameter ≤ 17 mm | j5 |
| Shaft diameter ≥ 20 mm | k5 |
| P ≤ 0,035 C | |
| Shaft diameter ≥ 20 mm | j6 |

[1)] The envelope requirement (symbol Ⓔ from ISO 14405-1) is not shown but applies to all tolerance classes.

**Fig. 32**

**Recommended fits**



# Mounting and dismounting



When mounting insert bearings on a shaft, suitable tools should be used and the locking components should be tightened to the torque values / tightening angles listed in:

- **table 13**, **page 360**, for bearings with grub screws and bearings with an eccentric locking collar
- **table 14**, **page 361**, for bearings on an adapter sleeve
- **table 15**, **page 362**, for SKF ConCentra bearings

For additional information about mounting and dismounting insert bearings and assembling ball bearing units, refer to the *SKF bearing maintenance handbook*.

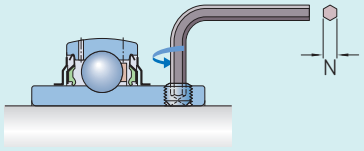
**Table 12**

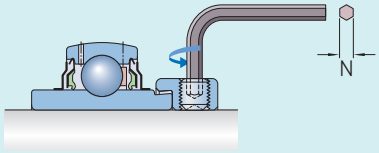
**ISO shaft deviations for insert bearings, except for those with a standard inner ring**

| **Shaft diameter** d | | **Shaft diameter deviations** Tolerance class h6Ⓔ | | h7Ⓔ | | h8Ⓔ | | h9Ⓔ | | h10Ⓔ | | h11Ⓔ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Deviation | | | | | | | | | | | |
| > | ≤ | U | L | U | L | U | L | U | L | U | L | U | L |
| mm | | µm | | | | | | | | | | | |
| **10** | **18** | 0 | –11 | 0 | –18 | 0 | –27 | 0 | –43 | 0 | –70 | 0 | –110 |
| **18** | **30** | 0 | –13 | 0 | –21 | 0 | –33 | 0 | –52 | 0 | –84 | 0 | –130 |
| **30** | **50** | 0 | –16 | 0 | –25 | 0 | –39 | 0 | –62 | 0 | –100 | 0 | –160 |
| **50** | **80** | 0 | –19 | 0 | –30 | 0 | –46 | 0 | –74 | 0 | –120 | 0 | –190 |
| **80** | **120** | 0 | –22 | 0 | –35 | 0 | –54 | 0 | –87 | 0 | –140 | 0 | –220 |

Table 13

**Grub screws in inner rings and eccentric locking collars – key sizes and recommended tightening torques**



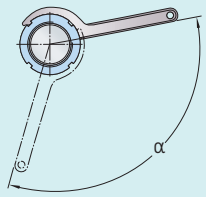

| Bearing size[1] | Bearing with metric bore | | Bearing with inch bore | |
|---|---|---|---|---|
| | Hexagonal key size N | Tightening torque | Hexagonal key size N | Tightening torque |
| – | mm | Nm | in. | Nm |
| **Bearings in the YAR 2 or YARAG 2 series** | | | | |
| **03** | 3 | 4 | 3/32 | 4 |
| **04** | 3 | 4 | 1/8 | 4 |
| **05** | 3 | 4 | 1/8 | 4 |
| **06** | 3 | 4 | 1/8 | 4 |
| **07** | 3 | 4 | 5/32 | 6,5 |
| **08** | 4 | 6,5 | 5/32 | 6,5 |
| **09** | 4 | 6,5 | 5/32 | 6,5 |
| **10** | 5 | 16,5 | 3/16 | 16,5 |
| **11** | 5 | 16,5 | 3/16 | 16,5 |
| **12** | 5 | 16,5 | 3/16 | 16,5 |
| **13** | 5 | 16,5 | 3/16 | 16,5 |
| **14** | 5 | 16,5 | 7/32 | 28,5 |
| **15** | 5 | 16,5 | 7/32 | 28,5 |
| **16** | 5 | 16,5 | 7/32 | 28,5 |
| **17** | 6 | 28,5 | – | – |
| **18** | 6 | 28,5 | – | – |
| **20** | 6 | 28,5 | – | – |

| Bearing size[1] | Bearing with metric bore | | Bearing with inch bore | |
|---|---|---|---|---|
| | Hexagonal key size N | Tightening torque | Hexagonal key size N | Tightening torque |
| – | mm | Nm | in. | Nm |
| **Bearings in the YAT 2 series** | | | | |
| **03** | 3 | 4 | 3/32 | 4 |
| **04** | 3 | 4 | 1/8 | 4 |
| **05** | 3 | 4 | 1/8 | 4 |
| **06** | 3 | 4 | 5/32 | 6,5 |
| **07** | 3 | 4 | 5/32 | 6,5 |
| **08** | 3 | 4 | 5/32 | 6,5 |
| **09** | 3 | 4 | 5/32 | 6,5 |
| **10** | 4 | 6,5 | 5/32 | 6,5 |
| **11** | – | – | 3/16 | 16,5 |
| **12** | – | – | 3/16 | 16,5 |
| **15** | – | – | 3/16 | 16,5 |
| **16** | – | – | 3/16 | 16,5 |
| **Bearings in the YET 2, YEL 2 or YELAG 2 series** | | | | |
| **03** | 3 | 4 | 1/8 | 4 |
| **04** | 3 | 4 | 1/8 | 4 |
| **05** | 3 | 4 | 1/8 | 4 |
| **06** | 4 | 6,5 | 5/32 | 6,5 |
| **07** | 5 | 16,5 | 3/16 | 16,5 |
| **08** | 5 | 16,5 | 3/16 | 16,5 |
| **09** | 5 | 16,5 | 3/16 | 16,5 |
| **10** | 5 | 16,5 | 3/16 | 16,5 |
| **11** | 5 | 16,5 | 7/32 | 28,5 |
| **12** | 5 | 16,5 | 7/32 | 28,5 |

[1] For example, bearing size 06 includes all bearings based on a 206 insert bearing, such as YAR 206-2F, YAR 206-101-2F, YAR 206-102-2F, YAR 206-103-2F, YAR 206-104-2F.

**Table 14**

**Hook spanners for insert bearings on an adapter sleeve – sizes and recommended tightening angles**

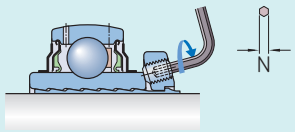



| **Designation**<br>Insert bearing + adapter sleeve | **Shaft diameter**<br>d | | **Hook spanner** | **Lock nut tightening angle**[1]<br>α |
|---|---|---|---|---|
| – | mm | in. | – | ° |
| YSA 205-2FK + HE 2305 | – | 3/4 | HN 5 | 90 |
| YSA 205-2FK + H 2305 | 20 | – | HN 5 | 90 |
| YSA 206-2FK + HA 2306 | – | 15/16 | HN 6 | 95 |
| YSA 206-2FK + H 2306 | 25 | – | HN 6 | 95 |
| YSA 206-2FK + HE 2306 | – | 1 | HN 6 | 95 |
| YSA 207-2FK + H 2307 | 30 | – | HN 7 | 100 |
| YSA 207-2FK + HA 2307 | – | 1 3/16 | HN 7 | 100 |
| YSA 208-2FK + HE 2308 | – | 1 1/4 | HN 8 | 105 |
| YSA 208-2FK + H 2308 | 35 | – | HN 8 | 105 |
| YSA 209-2FK + HA 2309 | – | 1 7/16 | HN 9 | 110 |
| YSA 209-2FK + HE 2309 | – | 1 1/2 | HN 9 | 110 |
| YSA 209-2FK + H 2309 | 40 | – | HN 9 | 110 |
| YSA 210-2FK + HA 2310 | – | 1 11/16 | HN 10 | 115 |
| YSA 210-2FK + HE 2310 | – | 1 3/4 | HN 10 | 115 |
| YSA 210-2FK + H 2310 | 45 | – | HN 10 | 115 |
| YSA 211-2FK + HA 2311 | – | 1 15/16 | HN 11 | 90 |
| YSA 211-2FK + H 2311 | 50 | – | HN 11 | 90 |
| YSA 211-2FK + HE 2311 B | – | 2 | HN 11 | 90 |
| YSA 212-2FK + H 2312 | 55 | – | HN 12 | 95 |
| YSA 213-2FK + HA 2313 | – | 2 3/16 | HN 13 | 100 |
| YSA 213-2FK + HE 2313 | – | 2 1/4 | HN 13 | 100 |
| YSA 213-2FK + H 2313 | 60 | – | HN 13 | 100 |

[1] The listed values are to be used as guideline values only, as it is difficult to establish an exact starting position.

Table 15

**Grub screws in SKF ConCentra insert bearings – key sizes and recommended tightening torques**




| Bearing size[1] | | Screw size | Hexagonal key size | Tightening torque |
|---|---|---|---|---|
| ≥ | ≤ | | N | |
| – | | – | mm | Nm |
| 05 | 06 | M5 | 2,5 | 4,2 |
| 07 | 13 | M6 | 3 | 7,4 |

[1] For example, bearing size 07 includes all bearings based on a 207 insert bearing, such as YSP 207 SB-2F, YSP 207-104 SB-2F, YSP 207-106 SB-2F, YSP 207-107 SB-2F.

Fig. 33

**Assembling a bearing into a housing with fitting slots**

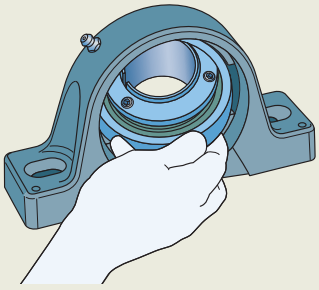
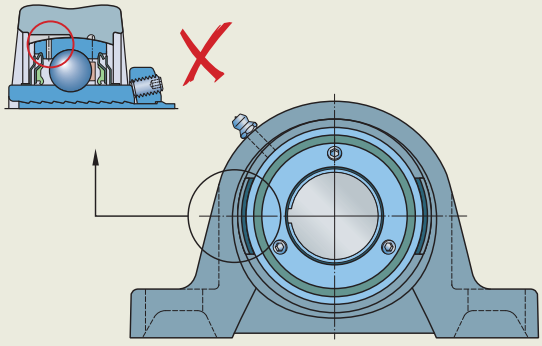


Fig. 34

**Relubrication hole or groove not to coincide with fitting slots**



# Assembling insert bearings into housings with fitting slots

When mounting an insert bearing into a housing with fitting slots, the bearing should be inserted into the fitting slot in the housing bore (fig. 33) and then swivelled into position. The misalignment of the bearing relative to the housing should not exceed 5°. Eccentric locking collars should be removed from the bearing prior to mounting and reinstalled when the bearing is in position in the housing.

The locking device should face in the same direction as the fitting slots, except for stainless steel housings and composite housings for SKF Food Line with designation suffix L. Where mounting bearings into these housings, the locking device should face in the opposite direction to the fitting slots.

Make sure that no relubrication hole or groove in the bearing outside diameter coincides with either of the fitting slots in the housing, otherwise grease leakage may result or contamination might enter the bearing (fig. 34).

If the bearing has to be relubricated, make sure the relubrication features in the outer ring (hole, or groove and hole) coincide with the relubrication feature in the housing bore. The misalignment of the bearing relative to the housing should not exceed 2°, otherwise relubrication will not be possible (fig. 35).

SKF recommends mounting SKF insert bearings only into SKF housings to avoid a mismatch of components and to enable proper bearing relubrication.

# SKF ConCentra insert bearings

When mounting SKF ConCentra insert bearings, position the collar so that one grub screw is directly opposite the slit in the sleeve.

**CAUTION:** Do not tighten the grub (set) screws until the bearing is positioned on the shaft. If the screws are tightened prematurely, the stepped sleeve may deform. No attempt should be made to remove the sleeve and the mounting collar from the bearing prior to mounting.

To dismount SKF ConCentra insert bearings, loosen the grub screws first. Then gently tap the edge of the sleeve on the collar side or the inner ring side face on the opposite side to loosen the lock (fig. 36).

Fig. 35

**Misalignment ≤ 2° where relubrication is required**

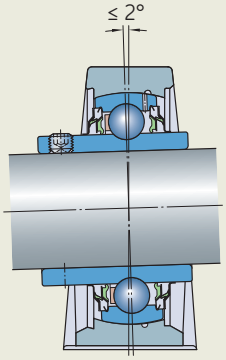
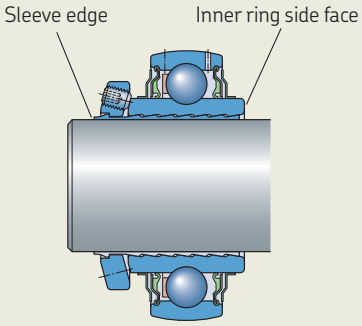
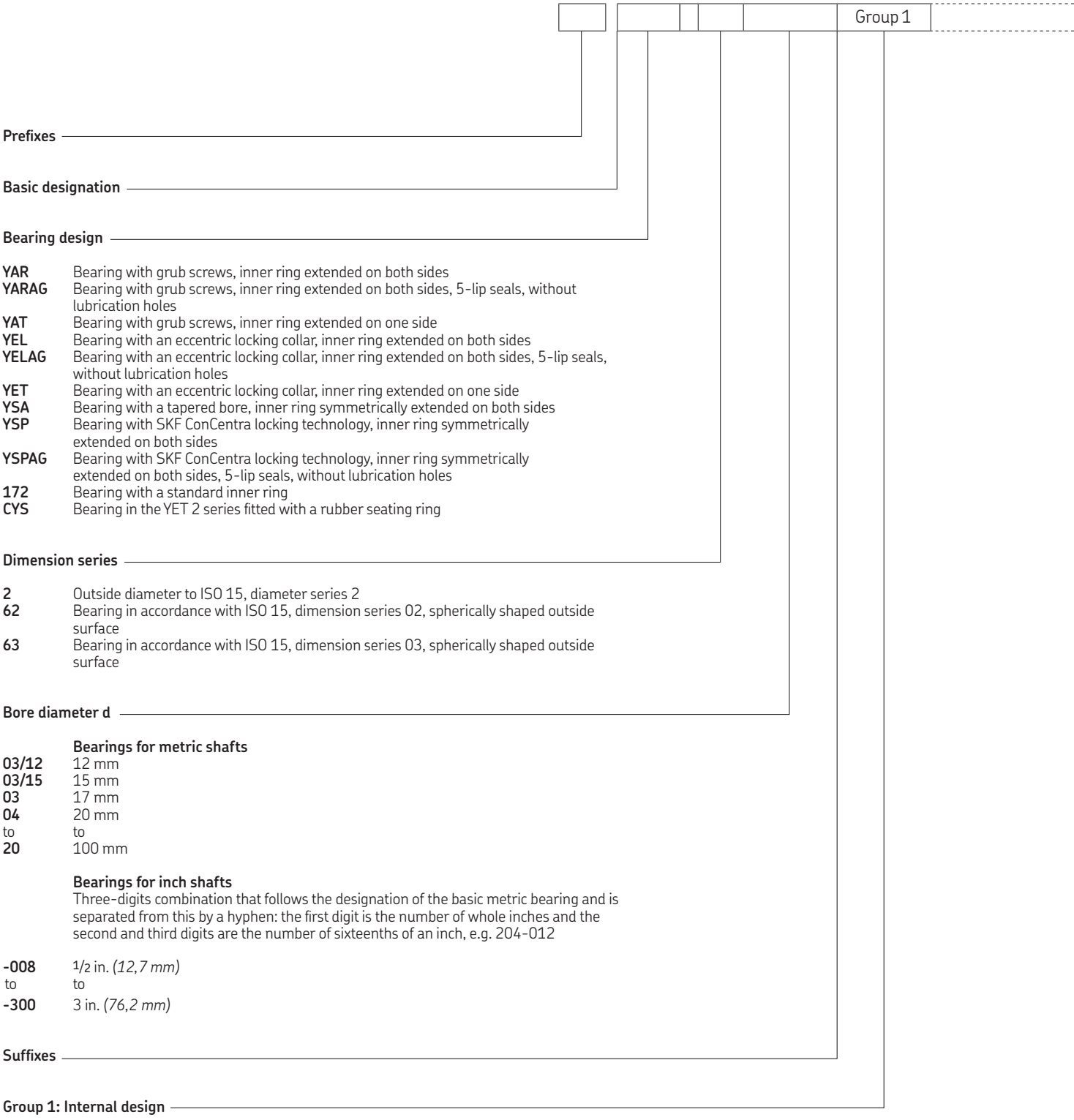



Fig. 36

**Dismounting an SKF ConCentra insert bearing**



# Designation system




**Prefixes**

**Basic designation**

**Bearing design**

| | |
|---|---|
| **YAR** | Bearing with grub screws, inner ring extended on both sides |
| **YARAG** | Bearing with grub screws, inner ring extended on both sides, 5-lip seals, without lubrication holes |
| **YAT** | Bearing with grub screws, inner ring extended on one side |
| **YEL** | Bearing with an eccentric locking collar, inner ring extended on both sides |
| **YELAG** | Bearing with an eccentric locking collar, inner ring extended on both sides, 5-lip seals, without lubrication holes |
| **YET** | Bearing with an eccentric locking collar, inner ring extended on one side |
| **YSA** | Bearing with a tapered bore, inner ring symmetrically extended on both sides |
| **YSP** | Bearing with SKF ConCentra locking technology, inner ring symmetrically extended on both sides |
| **YSPAG** | Bearing with SKF ConCentra locking technology, inner ring symmetrically extended on both sides, 5-lip seals, without lubrication holes |
| **172** | Bearing with a standard inner ring |
| **CYS** | Bearing in the YET 2 series fitted with a rubber seating ring |

**Dimension series**

| | |
|---|---|
| **2** | Outside diameter to ISO 15, diameter series 2 |
| **62** | Bearing in accordance with ISO 15, dimension series 02, spherically shaped outside surface |
| **63** | Bearing in accordance with ISO 15, dimension series 03, spherically shaped outside surface |

**Bore diameter d**

**Bearings for metric shafts**

| | |
|---|---|
| **03/12** | 12 mm |
| **03/15** | 15 mm |
| **03** | 17 mm |
| **04** | 20 mm |
| to | to |
| **20** | 100 mm |

**Bearings for inch shafts**

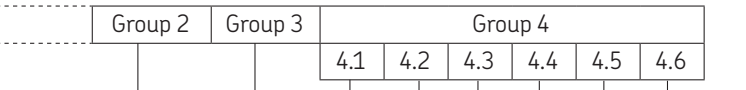
Three-digits combination that follows the designation of the basic metric bearing and is separated from this by a hyphen: the first digit is the number of whole inches and the second and third digits are the number of sixteenths of an inch, e.g. 204-012

| | |
|---|---|
| **-008** | 1/2 in. *(12,7 mm)* |
| to | to |
| **-300** | 3 in. *(76,2 mm)* |

**Suffixes**

**Group 1: Internal design**

| | |
|---|---|
| **B** | Lubrication holes in the outer ring (only for bearings with a standard inner ring) |
| **SB** | SKF ConCentra ball bearing with shortened inner ring |




**Group 4.6: Other variants**

| | |
|---|---|
| **AH** | Bearing for air-handling applications |
| **VP076** | Shield on both sides |
| **VP274** | Contact seal, NBR, on both sides (only for bearings with a standard inner ring) |

**Group 4.5: Lubrication**

**Group 4.4: Stabilization**

**Group 4.3: Bearing sets, paired bearings**

**Group 4.2: Accuracy, clearance, preload, quiet running**

**Group 4.1: Materials, heat treatment**

| | |
|---|---|
| **HV** | Bearing components of stainless steel; seals and flingers with food-compatible rubber; food-grade grease |
| **VE495** | Zinc-coated inner and outer rings; seals and flingers with stainless steel inserts and food-compatible rubber; food-grade grease |
| **VL065** | Zinc-coated inner ring bore and side faces |

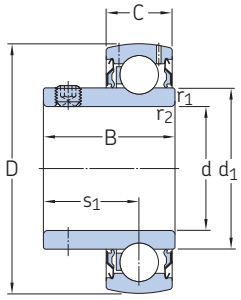
**Group 3: Cage design**

**Group 2: External design (seals, snap ring groove, etc.)**

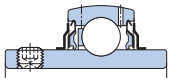
| | |
|---|---|
| **-2F** | Contact seal, NBR, additional plain flinger, on both sides |
| **-2RF** | Contact seal, NBR, additional rubberized flinger, on both sides |
| **-2RS1** | Contact seal, NBR, on both sides |
| **C** | Cylindrical outside surface |
| **G** | Lubrication groove in the outside surface, located at the side opposite the locking device |
| **GR** | Lubrication groove in the outside surface, located at the side of the locking device |
| **K** | Tapered bore, taper 1:12 |
| **U** | Bearing without locking device |
| **W** | Bearing without lubrication hole(s) |

## 2.1 Insert bearings with grub screws, metric shafts

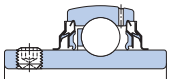
d **12 – 100** mm



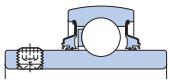

YAT



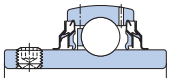
YAR ..-2F



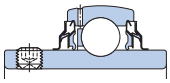
YAR ..-2RF/HV



YARAG



YAR ..-2RF



YAR ..-2RFGR/HV

| Dimensions | | | | | | | Basic load ratings dynamic | static | Fatigue load limit | Limiting speed with shaft tolerance h6 | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $d_1$ ≈ | $s_1$ | $r_{1,2}$ min. | C | $C_0$ | $P_u$ | | | |
| mm | | | | | | | kN | | kN | r/min | kg | – |
| **12** | 40 | 27,4 | 12 | 24,2 | 15,9 | 0,3 | 9,56 | 4,75 | 0,2 | 9 500 | 0,12 | ▸ **YAR 203/12-2F** |
| **15** | 40 | 27,4 | 12 | 24,2 | 15,9 | 0,3 | 9,56 | 4,75 | 0,2 | 9 500 | 0,11 | ▸ **YAR 203/15-2F** |
| **17** | 40 | 22,1 | 12 | 24,2 | 15,9 | 0,3 | 9,56 | 4,75 | 0,2 | 9 500 | 0,08 | ▸ **YAT 203** |
| | 40 | 27,4 | 12 | 24,2 | 15,9 | 0,3 | 9,56 | 4,75 | 0,2 | 9 500 | 0,1 | ▸ **YAR 203-2F** |
| **20** | 47 | 25,5 | 14 | 28,2 | 18,3 | 0,6 | 12,7 | 6,55 | 0,28 | 8 500 | 0,13 | ▸ **YAT 204** |
| | 47 | 31 | 14 | 28,2 | 18,3 | 0,6 | 10,8 | 6,55 | 0,28 | 5 000 | 0,15 | ▸ **YAR 204-2RF/HV** |
| | 47 | 31 | 14 | 28,2 | 18,3 | 0,6 | 10,8 | 6,55 | 0,28 | 5 000 | 0,15 | **YAR 204-2RFGR/HV** |
| | 47 | 31 | 14 | 28,2 | 18,3 | 0,6 | 12,7 | 6,55 | 0,28 | 1 800 | 0,15 | **YARAG 204** |
| | 47 | 31 | 14 | 28,2 | 18,3 | 0,6 | 12,7 | 6,55 | 0,28 | 5 000 | 0,15 | ▸ **YAR 204-2RF** |
| | 47 | 31 | 14 | 28,2 | 18,3 | 0,6 | 12,7 | 6,55 | 0,28 | 5 000 | 0,15 | **YAR 204-2RF/VE495** |
| | 47 | 31 | 14 | 28,2 | 18,3 | 0,6 | 12,7 | 6,55 | 0,28 | 8 500 | 0,15 | ▸ **YAR 204-2F** |
| **25** | 52 | 27,2 | 15 | 33,7 | 19,5 | 0,6 | 14 | 7,8 | 0,335 | 7 000 | 0,16 | ▸ **YAT 205** |
| | 52 | 34,1 | 15 | 33,7 | 19,8 | 0,6 | 11,9 | 7,8 | 0,335 | 4 300 | 0,19 | ▸ **YAR 205-2RF/HV** |
| | 52 | 34,1 | 15 | 33,7 | 19,8 | 0,6 | 11,9 | 7,8 | 0,335 | 4 300 | 0,19 | **YAR 205-2RFGR/HV** |
| | 52 | 34,1 | 15 | 33,7 | 19,8 | 0,6 | 14 | 7,8 | 0,335 | 1 500 | 0,19 | ▸ **YARAG 205** |
| | 52 | 34,1 | 15 | 33,7 | 19,8 | 0,6 | 14 | 7,8 | 0,335 | 4 300 | 0,19 | ▸ **YAR 205-2RF** |
| | 52 | 34,1 | 15 | 33,7 | 19,8 | 0,6 | 14 | 7,8 | 0,335 | 4 300 | 0,19 | **YAR 205-2RF/VE495** |
| | 52 | 34,1 | 15 | 33,7 | 19,8 | 0,6 | 14 | 7,8 | 0,335 | 7 000 | 0,19 | ▸ **YAR 205-2F** |
| **30** | 62 | 30,2 | 18 | 39,7 | 21 | 0,6 | 19,5 | 11,2 | 0,475 | 6 300 | 0,26 | ▸ **YAT 206** |
| | 62 | 38,1 | 18 | 39,7 | 22,2 | 0,6 | 16,3 | 11,2 | 0,475 | 3 800 | 0,3 | ▸ **YAR 206-2RF/HV** |
| | 62 | 38,1 | 18 | 39,7 | 22,2 | 0,6 | 16,3 | 11,2 | 0,475 | 3 800 | 0,3 | **YAR 206-2RFGR/HV** |
| | 62 | 38,1 | 18 | 39,7 | 22,2 | 0,6 | 19,5 | 11,2 | 0,475 | 1 200 | 0,3 | **YARAG 206** |
| | 62 | 38,1 | 18 | 39,7 | 22,2 | 0,6 | 19,5 | 11,2 | 0,475 | 3 800 | 0,31 | ▸ **YAR 206-2RF** |
| | 62 | 38,1 | 18 | 39,7 | 22,2 | 0,6 | 19,5 | 11,2 | 0,475 | 3 800 | 0,31 | **YAR 206-2RF/VE495** |
| | 62 | 38,1 | 18 | 39,7 | 22,2 | 0,6 | 19,5 | 11,2 | 0,475 | 6 300 | 0,31 | ▸ **YAR 206-2F** |
| **35** | 72 | 33 | 19 | 46,1 | 23,3 | 1 | 25,5 | 15,3 | 0,655 | 5 300 | 0,38 | ▸ **YAT 207** |
| | 72 | 42,9 | 19 | 46,1 | 25,4 | 1 | 21,6 | 15,3 | 0,655 | 3 200 | 0,45 | ▸ **YAR 207-2RF/HV** |
| | 72 | 42,9 | 19 | 46,1 | 25,4 | 1 | 21,6 | 15,3 | 0,655 | 3 200 | 0,45 | ▸ **YAR 207-2RFGR/HV** |
| | 72 | 42,9 | 19 | 46,1 | 25,4 | 1 | 25,5 | 15,3 | 0,655 | 1 100 | 0,44 | ▸ **YARAG 207** |
| | 72 | 42,9 | 19 | 46,1 | 25,4 | 1 | 25,5 | 15,3 | 0,655 | 3 200 | 0,45 | ▸ **YAR 207-2RF** |
| | 72 | 42,9 | 19 | 46,1 | 25,4 | 1 | 25,5 | 15,3 | 0,655 | 3 200 | 0,45 | **YAR 207-2RF/VE495** |
| | 72 | 42,9 | 19 | 46,1 | 25,4 | 1 | 25,5 | 15,3 | 0,655 | 5 300 | 0,45 | ▸ **YAR 207-2F** |

▸ Popular item

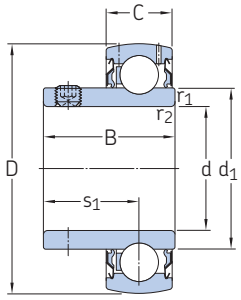
| Dimensions | | | | | | | Basic load ratings dynamic | static | Fatigue load limit | Limiting speed with shaft tolerance h6 | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $d_1$ ≈ | $s_1$ | $r_{1,2}$ min. | C | $C_0$ | $P_u$ | | | |
| mm | | | | | | | kN | | kN | r/min | kg | – |
| **40** | 80 | 36 | 21 | 51,8 | 25,3 | 1 | 30,7 | 19 | 0,8 | 4 800 | 0,5 | ▸ **YAT 208** |
| | 80 | 49,2 | 21 | 51,8 | 30,2 | 1 | 24,7 | 19 | 0,8 | 2 800 | 0,6 | ▸ **YAR 208-2RF/HV** |
| | 80 | 49,2 | 21 | 51,8 | 30,2 | 1 | 24,7 | 19 | 0,8 | 2 800 | 0,6 | **YAR 208-2RFGR/HV** |
| | 80 | 49,2 | 21 | 51,8 | 30,2 | 1 | 30,7 | 19 | 0,8 | 950 | 0,59 | ▸ **YARAG 208** |
| | 80 | 49,2 | 21 | 51,8 | 30,2 | 1 | 30,7 | 19 | 0,8 | 2 800 | 0,6 | ▸ **YAR 208-2RF** |
| | 80 | 49,2 | 21 | 51,8 | 30,2 | 1 | 30,7 | 19 | 0,8 | 2 800 | 0,61 | **YAR 208-2RF/VE495** |
| | 80 | 49,2 | 21 | 51,8 | 30,2 | 1 | 30,7 | 19 | 0,8 | 4 800 | 0,6 | ▸ **YAR 208-2F** |
| **45** | 85 | 37 | 22 | 56,8 | 25,8 | 1 | 33,2 | 21,6 | 0,915 | 4 300 | 0,56 | ▸ **YAT 209** |
| | 85 | 49,2 | 22 | 56,8 | 30,2 | 1 | 33,2 | 21,6 | 0,915 | 850 | 0,66 | **YARAG 209** |
| | 85 | 49,2 | 22 | 56,8 | 30,2 | 1 | 33,2 | 21,6 | 0,915 | 2 400 | 0,67 | ▸ **YAR 209-2RF** |
| | 85 | 49,2 | 22 | 56,8 | 30,2 | 1 | 33,2 | 21,6 | 0,915 | 4 300 | 0,67 | ▸ **YAR 209-2F** |
| **50** | 90 | 38,8 | 22 | 62,5 | 27,6 | 1 | 35,1 | 23,2 | 0,98 | 4 000 | 0,63 | ▸ **YAT 210** |
| | 90 | 51,6 | 22 | 62,5 | 32,6 | 1 | 29,6 | 23,2 | 0,98 | 2 200 | 0,76 | ▸ **YAR 210-2RF/HV** |
| | 90 | 51,6 | 22 | 62,5 | 32,6 | 1 | 29,6 | 23,2 | 0,98 | 2 200 | 0,76 | ▸ **YAR 210-2RFGR/HV** |
| | 90 | 51,6 | 22 | 62,5 | 32,6 | 1 | 35,1 | 23,2 | 0,98 | 800 | 0,75 | ▸ **YARAG 210** |
| | 90 | 51,6 | 22 | 62,5 | 32,6 | 1 | 35,1 | 23,2 | 0,98 | 2 200 | 0,77 | ▸ **YAR 210-2RF** |
| | 90 | 51,6 | 22 | 62,5 | 32,6 | 1 | 35,1 | 23,2 | 0,98 | 2 200 | 0,77 | ▸ **YAR 210-2RF/VE495** |
| | 90 | 51,6 | 22 | 62,5 | 32,6 | 1 | 35,1 | 23,2 | 0,98 | 4 000 | 0,76 | ▸ **YAR 210-2F** |
| **55** | 100 | 55,6 | 25 | 69 | 33,4 | 1 | 43,6 | 29 | 1,25 | 1 900 | 1,05 | **YAR 211-2RF** |
| | 100 | 55,6 | 25 | 69 | 33,4 | 1 | 43,6 | 29 | 1,25 | 3 600 | 1,05 | ▸ **YAR 211-2F** |
| **60** | 110 | 65,1 | 26 | 75,6 | 39,7 | 1,5 | 52,7 | 36 | 1,53 | 1 800 | 1,4 | ▸ **YAR 212-2RF** |
| | 110 | 65,1 | 26 | 75,6 | 39,7 | 1,5 | 52,7 | 36 | 1,53 | 3 400 | 1,4 | ▸ **YAR 212-2F** |
| **65** | 120 | 68,3 | 27 | 82,5 | 42,9 | 1,5 | 57,2 | 40 | 1,7 | 1 600 | 1,8 | **YAR 213-2RF** |
| | 120 | 68,3 | 27 | 82,5 | 42,9 | 1,5 | 57,2 | 40 | 1,7 | 3 000 | 1,8 | ▸ **YAR 213-2F** |
| **70** | 125 | 69,9 | 28 | 87 | 39,7 | 1,5 | 62,4 | 45 | 1,86 | 2 800 | 1,95 | ▸ **YAR 214-2F** |
| **75** | 130 | 73,3 | 29 | 92 | 46,3 | 1,5 | 66,3 | 49 | 2,04 | 2 600 | 2,15 | ▸ **YAR 215-2F** |
| **80** | 140 | 77,8 | 30 | 97,4 | 47,6 | 2 | 72,8 | 53 | 2,16 | 2 400 | 2,5 | ▸ **YAR 216-2F** |
| **90** | 160 | 89 | 36 | 112 | 54 | 2 | 95,6 | 72 | 2,7 | 2 000 | 4 | **YAR 218-2F** |
| **100** | 180 | 98,4 | 40 | 124 | 63,4 | 1,9 | 124 | 93 | 3,35 | 1 900 | 5,6 | **YAR 220-2F** |

▸ Popular item

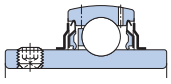
## 2.2 Insert bearings with grub screws, inch shafts

d **1/2 – 1 3/4** in.
*12,7 – 44,45 mm*

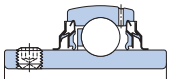




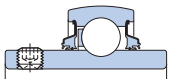

YAT



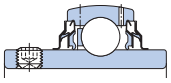
YAR ..-2F



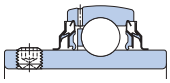
YAR ..-2RF/HV



YARAG



YAR ..-2RF



YAR ..-2RFGR/HV

| Dimensions | | | | | | | Basic load ratings dynamic | static | Fatigue load limit | Limiting speed with shaft tolerance h6 | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $d_1$ ≈ | $s_1$ | $r_{1,2}$ min. | C | $C_0$ | $P_u$ | | | |
| in./*mm* | mm | | | | | | kN | | kN | r/min | kg | – |
| **1/2** | 40 | 27,4 | 12 | 24,2 | 15,9 | 0,3 | 9,56 | 4,75 | 0,2 | 9 500 | 0,12 | **YAR 203-008-2F** |
| *12,7* | | | | | | | | | | | | |
| **5/8** | 40 | 22,1 | 12 | 24,2 | 15,9 | 0,3 | 9,56 | 4,75 | 0,2 | 9 500 | 0,09 | **YAT 203-010** |
| *15,875* | 40 | 27,4 | 12 | 24,2 | 15,9 | 0,3 | 9,56 | 4,75 | 0,2 | 9 500 | 0,1 | **YAR 203-010-2F** |
| **3/4** | 47 | 25,5 | 14 | 28,2 | 18,3 | 0,6 | 12,7 | 6,55 | 0,28 | 8 500 | 0,14 | **YAT 204-012** |
| *19,05* | 47 | 31 | 14 | 28,2 | 18,3 | 0,6 | 10,8 | 6,55 | 0,28 | 5 000 | 0,16 | **YAR 204-012-2RF/HV** |
| | 47 | 31 | 14 | 28,2 | 18,3 | 0,6 | 10,8 | 6,55 | 0,28 | 5 000 | 0,16 | **YAR 204-012-2RFGR/HV** |
| | 47 | 31 | 14 | 28,2 | 18,3 | 0,6 | 12,7 | 6,55 | 0,28 | 5 000 | 0,16 | **YAR 204-012-2RF** |
| | 47 | 31 | 14 | 28,2 | 18,3 | 0,6 | 12,7 | 6,55 | 0,28 | 5 000 | 0,16 | **YAR 204-012-2RF/VE495** |
| | 47 | 31 | 14 | 28,2 | 18,3 | 0,6 | 12,7 | 6,55 | 0,28 | 8 500 | 0,16 | ▸ **YAR 204-012-2F** |
| **7/8** | 52 | 27,2 | 15 | 33,7 | 19,5 | 0,6 | 14 | 7,8 | 0,335 | 7 000 | 0,19 | **YAT 205-014** |
| *22,225* | | | | | | | | | | | | |
| **15/16** | 52 | 27,2 | 15 | 33,7 | 19,5 | 0,6 | 14 | 7,8 | 0,335 | 7 000 | 0,17 | **YAT 205-015** |
| *23,813* | 52 | 34,1 | 15 | 33,7 | 19,8 | 0,6 | 14 | 7,8 | 0,335 | 4 300 | 0,21 | **YAR 205-015-2RF/VE495** |
| | 52 | 34,1 | 15 | 33,7 | 19,8 | 0,6 | 14 | 7,8 | 0,335 | 7 000 | 0,2 | **YAR 205-015-2F** |
| **1** | 52 | 27,2 | 15 | 33,7 | 19,5 | 0,6 | 14 | 7,8 | 0,335 | 7 000 | 0,16 | **YAT 205-100** |
| *25,4* | 52 | 34,1 | 15 | 33,7 | 19,8 | 0,6 | 11,9 | 7,8 | 0,335 | 4 300 | 0,19 | **YAR 205-100-2RF/HV** |
| | 52 | 34,1 | 15 | 33,7 | 19,8 | 0,6 | 11,9 | 7,8 | 0,335 | 4 300 | 0,19 | **YAR 205-100-2RFGR/HV** |
| | 52 | 34,1 | 15 | 33,7 | 19,8 | 0,6 | 14 | 7,8 | 0,335 | 1 500 | 0,18 | **YARAG 205-100** |
| | 52 | 34,1 | 15 | 33,7 | 19,8 | 0,6 | 14 | 7,8 | 0,335 | 4 300 | 0,19 | ▸ **YAR 205-100-2RF** |
| | 52 | 34,1 | 15 | 33,7 | 19,8 | 0,6 | 14 | 7,8 | 0,335 | 4 300 | 0,19 | **YAR 205-100-2RF/VE495** |
| | 52 | 34,1 | 15 | 33,7 | 19,8 | 0,6 | 14 | 7,8 | 0,335 | 7 000 | 0,19 | ▸ **YAR 205-100-2F** |
| **1 1/16** | 62 | 38,1 | 18 | 39,7 | 22,2 | 0,6 | 19,5 | 11,2 | 0,475 | 6 300 | 0,35 | **YAR 206-101-2F** |
| *26,988* | | | | | | | | | | | | |
| **1 1/8** | 62 | 38,1 | 18 | 39,7 | 22,2 | 0,6 | 19,5 | 11,2 | 0,475 | 1 200 | 0,32 | **YARAG 206-102** |
| *28,575* | 62 | 38,1 | 18 | 39,7 | 22,2 | 0,6 | 19,5 | 11,2 | 0,475 | 6 300 | 0,32 | **YAR 206-102-2F** |
| **1 3/16** | 62 | 30,2 | 18 | 39,7 | 21 | 0,6 | 19,5 | 11,2 | 0,475 | 6 300 | 0,26 | **YAT 206-103** |
| *30,163* | 62 | 38,1 | 18 | 39,7 | 22,2 | 0,6 | 16,3 | 11,2 | 0,475 | 3 800 | 0,3 | **YAR 206-103-2RF/HV** |
| | 62 | 38,1 | 18 | 39,7 | 22,2 | 0,6 | 16,3 | 11,2 | 0,475 | 3 800 | 0,3 | **YAR 206-103-2RFGR/HV** |
| | 62 | 38,1 | 18 | 39,7 | 22,2 | 0,6 | 19,5 | 11,2 | 0,475 | 1 200 | 0,3 | **YARAG 206-103** |
| | 62 | 38,1 | 18 | 39,7 | 22,2 | 0,6 | 19,5 | 11,2 | 0,475 | 3 800 | 0,3 | **YAR 206-103-2RF/VE495** |
| | 62 | 38,1 | 18 | 39,7 | 22,2 | 0,6 | 19,5 | 11,2 | 0,475 | 6 300 | 0,3 | **YAR 206-103-2F** |

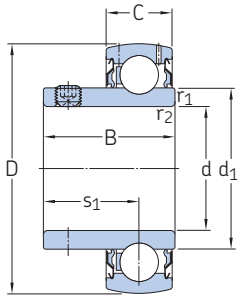
▸ Popular item

| Dimensions | | | | | | | Basic load ratings dynamic | static | Fatigue load limit | Limiting speed with shaft tolerance h6 | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $d_1$ ≈ | $s_1$ | $r_{1,2}$ min. | C | $C_0$ | $P_u$ | | | |
| in./*mm* | mm | | | | | | kN | | kN | r/min | kg | – |
| **1 1/4** | 62 | 30,2 | 18 | 39,7 | 21 | 0,6 | 19,5 | 11,2 | 0,475 | 6 300 | 0,24 | **YAT 206-104** |
| *31,75* | 62 | 38,1 | 18 | 39,7 | 22,2 | 0,6 | 16,3 | 11,2 | 0,475 | 3 800 | 0,28 | **YAR 206-104-2RF/HV** |
| | 62 | 38,1 | 18 | 39,7 | 22,2 | 0,6 | 16,3 | 11,2 | 0,475 | 3 800 | 0,28 | **YAR 206-104-2RFGR/HV** |
| | 62 | 38,1 | 18 | 39,7 | 22,2 | 0,6 | 19,5 | 11,2 | 0,475 | 1 200 | 0,27 | **YARAG 206-104** |
| | 62 | 38,1 | 18 | 39,7 | 22,2 | 0,6 | 19,5 | 11,2 | 0,475 | 3 800 | 0,28 | **YAR 206-104-2RF/VE495** |
| | 62 | 38,1 | 18 | 39,7 | 22,2 | 0,6 | 19,5 | 11,2 | 0,475 | 6 300 | 0,28 | **YAR 206-104-2F** |
| | 72 | 42,9 | 19 | 46,1 | 25,4 | 1 | 21,6 | 15,3 | 0,655 | 3 200 | 0,5 | ▸ **YAR 207-104-2RF/HV** |
| | 72 | 42,9 | 19 | 46,1 | 25,4 | 1 | 21,6 | 15,3 | 0,655 | 3 200 | 0,5 | **YAR 207-104-2RFGR/HV** |
| | 72 | 42,9 | 19 | 46,1 | 25,4 | 1 | 25,5 | 15,3 | 0,655 | 1 100 | 0,49 | **YARAG 207-104** |
| | 72 | 42,9 | 19 | 46,1 | 25,4 | 1 | 25,5 | 15,3 | 0,655 | 3 200 | 0,51 | **YAR 207-104-2RF** |
| | 72 | 42,9 | 19 | 46,1 | 25,4 | 1 | 25,5 | 15,3 | 0,655 | 3 200 | 0,51 | **YAR 207-104-2RF/VE495** |
| | 72 | 42,9 | 19 | 46,1 | 25,4 | 1 | 25,5 | 15,3 | 0,655 | 5 300 | 0,5 | ▸ **YAR 207-104-2F** |
| **1 5/16** | 72 | 42,9 | 19 | 46,1 | 25,4 | 1 | 25,5 | 15,3 | 0,655 | 5 300 | 0,48 | **YAR 207-105-2F** |
| *33,338* | | | | | | | | | | | | |
| **1 3/8** | 72 | 42,9 | 19 | 46,1 | 25,4 | 1 | 21,6 | 15,3 | 0,655 | 3 200 | 0,45 | **YAR 207-106-2RF/HV** |
| *34,925* | 72 | 42,9 | 19 | 46,1 | 25,4 | 1 | 21,6 | 15,3 | 0,655 | 3 200 | 0,45 | **YAR 207-106-2RFGR/HV** |
| | 72 | 42,9 | 19 | 46,1 | 25,4 | 1 | 25,5 | 15,3 | 0,655 | 1 100 | 0,44 | **YARAG 207-106** |
| | 72 | 42,9 | 19 | 46,1 | 25,4 | 1 | 25,5 | 15,3 | 0,655 | 3 200 | 0,45 | **YAR 207-106-2RF/VE495** |
| | 72 | 42,9 | 19 | 46,1 | 25,4 | 1 | 25,5 | 15,3 | 0,655 | 5 300 | 0,45 | **YAR 207-106-2F** |
| **1 7/16** | 72 | 33 | 19 | 46,1 | 23,3 | 1 | 25,5 | 15,3 | 0,655 | 5 300 | 0,36 | **YAT 207-107** |
| *36,513* | 72 | 42,9 | 19 | 46,1 | 25,4 | 1 | 21,6 | 15,3 | 0,655 | 3 200 | 0,42 | ▸ **YAR 207-107-2RF/HV** |
| | 72 | 42,9 | 19 | 46,1 | 25,4 | 1 | 21,6 | 15,3 | 0,655 | 3 200 | 0,42 | **YAR 207-107-2RFGR/HV** |
| | 72 | 42,9 | 19 | 46,1 | 25,4 | 1 | 25,5 | 15,3 | 0,655 | 1 100 | 0,41 | **YARAG 207-107** |
| | 72 | 42,9 | 19 | 46,1 | 25,4 | 1 | 25,5 | 15,3 | 0,655 | 3 200 | 0,42 | **YAR 207-107-2RF/VE495** |
| | 72 | 42,9 | 19 | 46,1 | 25,4 | 1 | 25,5 | 15,3 | 0,655 | 5 300 | 0,42 | **YAR 207-107-2F** |
| | 80 | 49,2 | 21 | 51,8 | 30,2 | 1 | 30,7 | 19 | 0,8 | 4 800 | 0,68 | **YAR 208-107-2F** |
| **1 1/2** | 80 | 36 | 21 | 51,8 | 25,3 | 1 | 30,7 | 19 | 0,8 | 4 800 | 0,53 | **YAT 208-108** |
| *38,1* | 80 | 49,2 | 21 | 51,8 | 30,2 | 1 | 24,7 | 19 | 0,8 | 2 800 | 0,65 | ▸ **YAR 208-108-2RF/HV** |
| | 80 | 49,2 | 21 | 51,8 | 30,2 | 1 | 24,7 | 19 | 0,8 | 2 800 | 0,65 | **YAR 208-108-2RFGR/HV** |
| | 80 | 49,2 | 21 | 51,8 | 30,2 | 1 | 30,7 | 19 | 0,8 | 950 | 0,63 | **YARAG 208-108** |
| | 80 | 49,2 | 21 | 51,8 | 30,2 | 1 | 30,7 | 19 | 0,8 | 2 800 | 0,65 | ▸ **YAR 208-108-2RF** |
| | 80 | 49,2 | 21 | 51,8 | 30,2 | 1 | 30,7 | 19 | 0,8 | 2 800 | 0,65 | **YAR 208-108-2RF/VE495** |
| | 80 | 49,2 | 21 | 51,8 | 30,2 | 1 | 30,7 | 19 | 0,8 | 4 800 | 0,65 | ▸ **YAR 208-108-2F** |
| | 85 | 49,2 | 22 | 56,8 | 30,2 | 1 | 33,2 | 21,6 | 0,915 | 4 300 | 0,84 | **YAR 209-108-2F** |
| **1 9/16** | 80 | 49,2 | 21 | 51,8 | 30,2 | 1 | 30,7 | 19 | 0,8 | 4 800 | 0,61 | **YAR 208-109-2F** |
| *39,688* | | | | | | | | | | | | |
| **1 5/8** | 85 | 49,2 | 22 | 56,8 | 30,2 | 1 | 33,2 | 21,6 | 0,915 | 850 | 0,75 | **YARAG 209-110** |
| *41,275* | 85 | 49,2 | 22 | 56,8 | 30,2 | 1 | 33,2 | 21,6 | 0,915 | 4 300 | 0,77 | **YAR 209-110-2F** |
| **1 11/16** | 85 | 37 | 22 | 56,8 | 25,8 | 1 | 33,2 | 21,6 | 0,915 | 4 300 | 0,61 | **YAT 209-111** |
| *42,863* | 85 | 49,2 | 22 | 56,8 | 30,2 | 1 | 33,2 | 21,6 | 0,915 | 850 | 0,71 | **YARAG 209-111** |
| | 85 | 49,2 | 22 | 56,8 | 30,2 | 1 | 33,2 | 21,6 | 0,915 | 4 300 | 0,73 | **YAR 209-111-2F** |
| **1 3/4** | 85 | 37 | 22 | 56,8 | 25,8 | 1 | 33,2 | 21,6 | 0,915 | 4 300 | 0,58 | **YAT 209-112** |
| *44,45* | 85 | 49,2 | 22 | 56,8 | 30,2 | 1 | 33,2 | 21,6 | 0,915 | 2 400 | 0,69 | **YAR 209-112-2RF** |
| | 85 | 49,2 | 22 | 56,8 | 30,2 | 1 | 33,2 | 21,6 | 0,915 | 4 300 | 0,69 | ▸ **YAR 209-112-2F** |

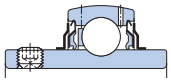
▸ Popular item

## 2.2 Insert bearings with grub screws, inch shafts

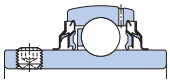
d **1 15/16 – 3** in.
*49,213 – 76,2 mm*



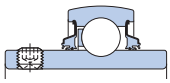

YAT



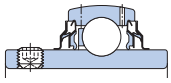
YAR ..-2F



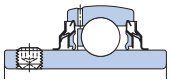
YAR ..-2RF/HV



YARAG



YAR ..-2RF



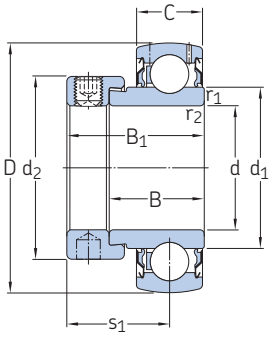
YAR ..-2RFGR/HV

| Dimensions | | | | | | | Basic load ratings dynamic | static | Fatigue load limit | Limiting speed with shaft tolerance h6 | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $d_1$ ≈ | $s_1$ | $r_{1,2}$ min. | C | $C_0$ | $P_u$ | | | |
| in./*mm* | mm | | | | | | kN | | kN | r/min | kg | – |
| **1 15/16** | 90 | 38,8 | 22 | 62,5 | 27,6 | 1 | 35,1 | 23,2 | 0,98 | 4 000 | 0,65 | **YAT 210-115** |
| *49,213* | 90 | 51,6 | 22 | 62,5 | 32,6 | 1 | 29,6 | 23,2 | 0,98 | 2 200 | 0,79 | **YAR 210-115-2RF/HV** |
| | 90 | 51,6 | 22 | 62,5 | 32,6 | 1 | 29,6 | 23,2 | 0,98 | 2 200 | 0,79 | **YAR 210-115-2RFGR/HV** |
| | 90 | 51,6 | 22 | 62,5 | 32,6 | 1 | 35,1 | 23,2 | 0,98 | 800 | 0,77 | **YARAG 210-115** |
| | 90 | 51,6 | 22 | 62,5 | 32,6 | 1 | 35,1 | 23,2 | 0,98 | 2 200 | 0,79 | **YAR 210-115-2RF** |
| | 90 | 51,6 | 22 | 62,5 | 32,6 | 1 | 35,1 | 23,2 | 0,98 | 2 200 | 0,79 | **YAR 210-115-2RF/VE495** |
| | 90 | 51,6 | 22 | 62,5 | 32,6 | 1 | 35,1 | 23,2 | 0,98 | 4 000 | 0,79 | **YAR 210-115-2F** |
| **2** | 100 | 45 | 25 | 69 | 32,5 | 1 | 43,6 | 29 | 1,25 | 3 600 | 1 | **YAT 211-200** |
| *50,8* | 100 | 55,6 | 25 | 69 | 33,4 | 1 | 43,6 | 29 | 1,25 | 1 900 | 1,2 | **YAR 211-200-2RF** |
| | 100 | 55,6 | 25 | 69 | 33,4 | 1 | 43,6 | 29 | 1,25 | 3 600 | 1,2 | ▸ **YAR 211-200-2F** |
| **2 3/16** | 100 | 55,6 | 25 | 69 | 33,4 | 1 | 43,6 | 29 | 1,25 | 3 600 | 1 | **YAR 211-203-2F** |
| *55,563* | 110 | 65,1 | 26 | 75,6 | 39,7 | 1,5 | 52,7 | 36 | 1,53 | 3 400 | 1,6 | **YAR 212-203-2F** |
| **2 1/4** | 110 | 48,5 | 26 | 75,6 | 35 | 1,5 | 52,7 | 36 | 1,53 | 3 400 | 1,25 | **YAT 212-204** |
| *57,15* | 110 | 65,1 | 26 | 75,6 | 39,7 | 1,5 | 52,7 | 36 | 1,53 | 3 400 | 1,55 | **YAR 212-204-2F** |
| **2 7/16** | 110 | 48,5 | 26 | 75,6 | 35 | 1,5 | 52,7 | 36 | 1,53 | 3 400 | 1,1 | **YAT 212-207** |
| *61,913* | 110 | 65,1 | 26 | 75,6 | 39,7 | 1,5 | 52,7 | 36 | 1,53 | 3 400 | 1,3 | **YAR 212-207-2F** |
| | 125 | 69,9 | 28 | 87 | 39,7 | 1,5 | 62,4 | 45 | 1,86 | 2 800 | 2,4 | **YAR 214-207-2F** |
| **2 1/2** | 120 | 68,3 | 27 | 82,5 | 42,9 | 1,5 | 57,2 | 40 | 1,7 | 1 600 | 1,9 | **YAR 213-208-2RF** |
| *63,5* | 120 | 68,3 | 27 | 82,5 | 42,9 | 1,5 | 57,2 | 40 | 1,7 | 3 000 | 1,85 | ▸ **YAR 213-208-2F** |
| | 125 | 69,9 | 28 | 87 | 39,7 | 1,5 | 62,4 | 45 | 1,86 | 2 800 | 2,3 | **YAR 214-208-2F** |
| **2 11/16** | 120 | 68,3 | 27 | 82,5 | 42,9 | 1,5 | 57,2 | 40 | 1,7 | 3 000 | 1,6 | **YAR 213-211-2F** |
| *68,263* | | | | | | | | | | | | |
| **2 15/16** | 130 | 53,5 | 29 | 92 | 39 | 1,5 | 66,3 | 49 | 2,04 | 2 600 | 1,75 | **YAT 215-215** |
| *74,613* | 130 | 73,3 | 29 | 92 | 46,3 | 1,5 | 66,3 | 49 | 2,04 | 2 600 | 2,15 | **YAR 215-215-2F** |
| **3** | 140 | 55,5 | 30 | 97,4 | 39 | 2 | 72,8 | 53 | 2,16 | 2 400 | 2,2 | **YAT 216-300** |
| *76,2* | 140 | 77,8 | 30 | 97,4 | 47,6 | 2 | 72,8 | 53 | 2,16 | 2 400 | 2,8 | **YAR 216-300-2F** |

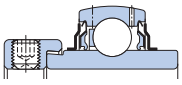
▸ Popular item

## 2.3 Insert bearings with an eccentric locking collar, metric shafts

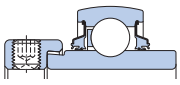
d **15 – 60** mm



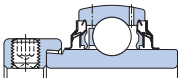

YET



YEL ..-2F



YEL AG



YEL ..-2RF

| Dimensions | | | | | | | | | Basic load ratings dynamic | static | Fatigue load limit | Limiting speed with shaft tolerance h6 | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | $B_1$ | C | $d_1$ ≈ | $d_2$ | $s_1$ | $r_{1,2}$ min. | C | $C_0$ | $P_u$ | | | |
| mm | | | | | | | | | kN | | kN | r/min | kg | – |
| **15** | 40 | 19,1 | 28,6 | 12 | 24,2 | 27,2 | 22,1 | 0,3 | 9,56 | 4,75 | 0,2 | 9 500 | 0,12 | ▸ **YET 203/15** |
| **17** | 40 | 19,1 | 28,6 | 12 | 24,2 | 27,2 | 22,1 | 0,3 | 9,56 | 4,75 | 0,2 | 9 500 | 0,11 | ▸ **YET 203** |
| **20** | 47 | 21 | 30,5 | 14 | 28,2 | 32,4 | 23,5 | 0,6 | 12,7 | 6,55 | 0,28 | 8 500 | 0,16 | ▸ **YET 204** |
| | 47 | 21 | 30,5 | 14 | 28,2 | 32,4 | 23,5 | 0,6 | 12,7 | 6,55 | 0,28 | 8 500 | 0,16 | **YET 204/VL065** |
| | 47 | 34,2 | 43,7 | 14 | 28,2 | 32,4 | 26,6 | 0,6 | 12,7 | 6,55 | 0,28 | 1 800 | 0,2 | ▸ **YELAG 204** |
| | 47 | 34,2 | 43,7 | 14 | 28,2 | 32,4 | 26,6 | 0,6 | 12,7 | 6,55 | 0,28 | 5 000 | 0,2 | **YEL 204-2RF/VL065** |
| | 47 | 34,2 | 43,7 | 14 | 28,2 | 32,4 | 26,6 | 0,6 | 12,7 | 6,55 | 0,28 | 8 500 | 0,2 | ▸ **YEL 204-2F** |
| **25** | 52 | 21,5 | 31 | 15 | 33,7 | 37,4 | 23,5 | 0,6 | 14 | 7,8 | 0,335 | 7 000 | 0,2 | ▸ **YET 205** |
| | 52 | 21,5 | 31 | 15 | 33,7 | 37,4 | 23,5 | 0,6 | 14 | 7,8 | 0,335 | 7 000 | 0,2 | **YET 205/VL065** |
| | 52 | 34,9 | 44,4 | 15 | 33,7 | 37,4 | 26,9 | 0,6 | 14 | 7,8 | 0,335 | 1 500 | 0,24 | ▸ **YELAG 205** |
| | 52 | 34,9 | 44,4 | 15 | 33,7 | 37,4 | 26,9 | 0,6 | 14 | 7,8 | 0,335 | 4 300 | 0,25 | ▸ **YEL 205-2RF/VL065** |
| | 52 | 34,9 | 44,4 | 15 | 33,7 | 37,4 | 26,9 | 0,6 | 14 | 7,8 | 0,335 | 7 000 | 0,24 | ▸ **YEL 205-2F** |
| **30** | 62 | 23,8 | 35,7 | 18 | 39,7 | 44,1 | 26,7 | 0,6 | 19,5 | 11,2 | 0,475 | 6 300 | 0,32 | ▸ **YET 206** |
| | 62 | 23,8 | 35,7 | 18 | 39,7 | 44,1 | 26,7 | 0,6 | 19,5 | 11,2 | 0,475 | 6 300 | 0,32 | **YET 206/VL065** |
| | 62 | 36,5 | 48,4 | 18 | 39,7 | 44,1 | 30,1 | 0,6 | 19,5 | 11,2 | 0,475 | 1 200 | 0,38 | ▸ **YELAG 206** |
| | 62 | 36,5 | 48,4 | 18 | 39,7 | 44,1 | 30,1 | 0,6 | 19,5 | 11,2 | 0,475 | 3 800 | 0,38 | ▸ **YEL 206-2RF/VL065** |
| | 62 | 36,5 | 48,4 | 18 | 39,7 | 44,1 | 30,1 | 0,6 | 19,5 | 11,2 | 0,475 | 6 300 | 0,38 | ▸ **YEL 206-2F** |
| **35** | 72 | 25,4 | 38,9 | 19 | 46,1 | 51,1 | 29,4 | 1 | 25,5 | 15,3 | 0,655 | 5 300 | 0,46 | ▸ **YET 207** |
| | 72 | 25,4 | 38,9 | 19 | 46,1 | 51,1 | 29,4 | 1 | 25,5 | 15,3 | 0,655 | 5 300 | 0,46 | **YET 207/VL065** |
| | 72 | 37,6 | 51,1 | 19 | 46,1 | 51,1 | 32,3 | 1 | 25,5 | 15,3 | 0,655 | 1 100 | 0,53 | **YELAG 207** |
| | 72 | 37,6 | 51,1 | 19 | 46,1 | 51,1 | 32,3 | 1 | 25,5 | 15,3 | 0,655 | 3 200 | 0,54 | ▸ **YEL 207-2RF/VL065** |
| | 72 | 37,6 | 51,1 | 19 | 46,1 | 51,1 | 32,3 | 1 | 25,5 | 15,3 | 0,655 | 5 300 | 0,54 | ▸ **YEL 207-2F** |
| **40** | 80 | 29,7 | 43,2 | 21 | 51,8 | 56,5 | 32,7 | 1 | 30,7 | 19 | 0,8 | 4 800 | 0,6 | ▸ **YET 208** |
| | 80 | 29,7 | 43,2 | 21 | 51,8 | 56,5 | 32,7 | 1 | 30,7 | 19 | 0,8 | 4 800 | 0,6 | **YET 208/VL065** |
| | 80 | 42,8 | 56,3 | 21 | 51,8 | 56,5 | 34,9 | 1 | 30,7 | 19 | 0,8 | 950 | 0,69 | **YELAG 208** |
| | 80 | 42,8 | 56,3 | 21 | 51,8 | 56,5 | 34,9 | 1 | 30,7 | 19 | 0,8 | 2 800 | 0,71 | ▸ **YEL 208-2RF/VL065** |
| | 80 | 42,8 | 56,3 | 21 | 51,8 | 56,5 | 34,9 | 1 | 30,7 | 19 | 0,8 | 4 800 | 0,7 | ▸ **YEL 208-2F** |

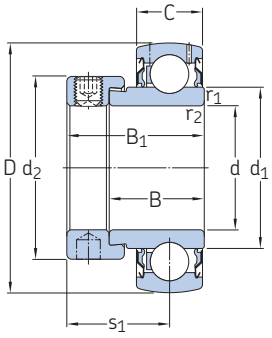
▸ Popular item

| Dimensions | | | | | | | | | Basic load ratings dynamic | static | Fatigue load limit | Limiting speed with shaft tolerance h6 | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | $B_1$ | C | $d_1$ ≈ | $d_2$ | $s_1$ | $r_{1,2}$ min. | C | $C_0$ | $P_u$ | | | |
| mm | | | | | | | | | kN | | kN | r/min | kg | – |
| **45** | 85 | 30,2 | 43,7 | 22 | 56,8 | 62 | 32,7 | 1 | 33,2 | 21,6 | 0,915 | 4 300 | 0,68 | ▸ **YET 209** |
| | 85 | 42,8 | 56,3 | 22 | 56,8 | 62 | 34,9 | 1 | 33,2 | 21,6 | 0,915 | 850 | 0,78 | ▸ **YELAG 209** |
| | 85 | 42,8 | 56,3 | 22 | 56,8 | 62 | 34,9 | 1 | 33,2 | 21,6 | 0,915 | 4 300 | 0,79 | ▸ **YEL 209-2F** |
| **50** | 90 | 30,2 | 43,7 | 22 | 62,5 | 67,2 | 32,7 | 1 | 35,1 | 23,2 | 0,98 | 4 000 | 0,74 | ▸ **YET 210** |
| | 90 | 49,2 | 62,7 | 22 | 62,5 | 67,2 | 38,1 | 1 | 35,1 | 23,2 | 0,98 | 800 | 0,9 | ▸ **YELAG 210** |
| | 90 | 49,2 | 62,7 | 22 | 62,5 | 67,2 | 38,1 | 1 | 35,1 | 23,2 | 0,98 | 4 000 | 0,92 | ▸ **YEL 210-2F** |
| **55** | 100 | 32,6 | 48,4 | 25 | 69 | 74,5 | 35,9 | 1 | 43,6 | 29 | 1,25 | 3 600 | 1,05 | **YET 211** |
| | 100 | 55,6 | 71,4 | 25 | 69 | 74,5 | 43,6 | 1 | 43,6 | 29 | 1,25 | 3 600 | 1,3 | ▸ **YEL 211-2F** |
| **60** | 110 | 36,7 | 52,6 | 26 | 75,6 | 82 | 39,6 | 1,5 | 52,7 | 36 | 1,53 | 3 400 | 1,35 | ▸ **YET 212** |
| | 110 | 61,9 | 77,8 | 26 | 75,6 | 82 | 46,8 | 1,5 | 52,7 | 36 | 1,53 | 3 400 | 1,7 | ▸ **YEL 212-2F** |

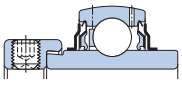
▸ Popular item

## 2.4 Insert bearings with an eccentric locking collar, inch shafts

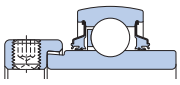
d **1/2 – 2 7/16** in.
*12,7 – 61,913 mm*




YET



YEL ..-2F



YEL AG

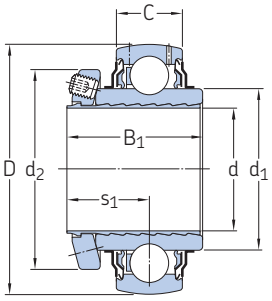
| Dimensions | | | | | | | | | Basic load ratings dynamic | static | Fatigue load limit | Limiting speed with shaft tolerance h6 | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | $B_1$ | C | $d_1$ ≈ | $d_2$ | $s_1$ | $r_{1,2}$ min. | C | $C_0$ | $P_u$ | | | |
| in./*mm* | mm | | | | | | | | kN | | kN | r/min | kg | – |
| **1/2** | 40 | 19,1 | 28,6 | 12 | 24,2 | 27,2 | 22,1 | 0,3 | 9,56 | 4,75 | 0,2 | 9 500 | 0,13 | **YET 203-008** |
| *12,7* | | | | | | | | | | | | | | |
| **3/4** | 47 | 21 | 30,5 | 14 | 28,2 | 32,4 | 23,5 | 0,6 | 12,7 | 6,55 | 0,28 | 8 500 | 0,17 | ▸ **YET 204-012** |
| *19,05* | 47 | 34,2 | 43,7 | 14 | 28,2 | 32,4 | 26,6 | 0,6 | 12,7 | 6,55 | 0,28 | 8 500 | 0,21 | **YEL 204-012-2F** |
| **1** | 52 | 21,5 | 31 | 15 | 33,7 | 37,4 | 23,5 | 0,6 | 14 | 7,8 | 0,335 | 7 000 | 0,19 | ▸ **YET 205-100** |
| *25,4* | 52 | 34,9 | 44,4 | 15 | 33,7 | 37,4 | 26,9 | 0,6 | 14 | 7,8 | 0,335 | 1 500 | 0,23 | **YELAG 205-100** |
| | 52 | 34,9 | 44,4 | 15 | 33,7 | 37,4 | 26,9 | 0,6 | 14 | 7,8 | 0,335 | 7 000 | 0,24 | **YEL 205-100-2F** |
| **1 1/8** | 62 | 23,8 | 35,7 | 18 | 39,7 | 44,1 | 26,7 | 0,6 | 19,5 | 11,2 | 0,475 | 6 300 | 0,34 | **YET 206-102** |
| *28,575* | 62 | 36,5 | 48,4 | 18 | 39,7 | 44,1 | 30,1 | 0,6 | 19,5 | 11,2 | 0,475 | 1 200 | 0,4 | **YELAG 206-102** |
| | 62 | 36,5 | 48,4 | 18 | 39,7 | 44,1 | 30,1 | 0,6 | 19,5 | 11,2 | 0,475 | 6 300 | 0,41 | **YEL 206-102-2F** |
| **1 3/16** | 62 | 23,8 | 35,7 | 18 | 39,7 | 44,1 | 26,7 | 0,6 | 19,5 | 11,2 | 0,475 | 6 300 | 0,32 | **YET 206-103** |
| *30,163* | 62 | 36,5 | 48,4 | 18 | 39,7 | 44,1 | 30,1 | 0,6 | 19,5 | 11,2 | 0,475 | 1 200 | 0,37 | **YELAG 206-103** |
| | 62 | 36,5 | 48,4 | 18 | 39,7 | 44,1 | 30,1 | 0,6 | 19,5 | 11,2 | 0,475 | 6 300 | 0,38 | **YEL 206-103-2F** |
| **1 1/4** | 62 | 23,8 | 35,7 | 18 | 39,7 | 44,1 | 26,7 | 0,6 | 19,5 | 11,2 | 0,475 | 6 300 | 0,3 | **YET 206-104** |
| *31,75* | 72 | 25,4 | 38,9 | 19 | 46,1 | 51,1 | 29,4 | 1 | 25,5 | 15,3 | 0,655 | 5 300 | 0,51 | **YET 207-104** |
| | 72 | 37,6 | 51,1 | 19 | 46,1 | 51,1 | 32,3 | 1 | 25,5 | 15,3 | 0,655 | 1 100 | 0,6 | **YELAG 207-104** |
| | 72 | 37,6 | 51,1 | 19 | 46,1 | 51,1 | 32,3 | 1 | 25,5 | 15,3 | 0,655 | 5 300 | 0,61 | **YEL 207-104-2F** |
| **1 5/16** | 72 | 25,4 | 38,9 | 19 | 46,1 | 51,1 | 29,4 | 1 | 25,5 | 15,3 | 0,655 | 5 300 | 0,49 | **YET 207-105** |
| *33,338* | | | | | | | | | | | | | | |
| **1 3/8** | 72 | 25,4 | 38,9 | 19 | 46,1 | 51,1 | 29,4 | 1 | 25,5 | 15,3 | 0,655 | 5 300 | 0,46 | **YET 207-106** |
| *34,925* | 72 | 37,6 | 51,1 | 19 | 46,1 | 51,1 | 32,3 | 1 | 25,5 | 15,3 | 0,655 | 1 100 | 0,54 | **YELAG 207-106** |
| | 72 | 37,6 | 51,1 | 19 | 46,1 | 51,1 | 32,3 | 1 | 25,5 | 15,3 | 0,655 | 5 300 | 0,55 | **YEL 207-106-2F** |
| **1 7/16** | 72 | 25,4 | 38,9 | 19 | 46,1 | 51,1 | 29,4 | 1 | 25,5 | 15,3 | 0,655 | 5 300 | 0,44 | **YET 207-107** |
| *36,513* | 72 | 37,6 | 51,1 | 19 | 46,1 | 51,1 | 32,3 | 1 | 25,5 | 15,3 | 0,655 | 1 100 | 0,5 | **YELAG 207-107** |
| | 72 | 37,6 | 51,1 | 19 | 46,1 | 51,1 | 32,3 | 1 | 25,5 | 15,3 | 0,655 | 5 300 | 0,51 | **YEL 207-107-2F** |
| **1 1/2** | 80 | 29,7 | 43,2 | 21 | 51,8 | 56,5 | 32,7 | 1 | 30,7 | 19 | 0,8 | 4 800 | 0,64 | ▸ **YET 208-108** |
| *38,1* | 80 | 42,8 | 56,3 | 21 | 51,8 | 56,5 | 34,9 | 1 | 30,7 | 19 | 0,8 | 950 | 0,74 | **YELAG 208-108** |
| | 80 | 42,8 | 56,3 | 21 | 51,8 | 56,5 | 34,9 | 1 | 30,7 | 19 | 0,8 | 4 800 | 0,76 | **YEL 208-108-2F** |
| **1 11/16** | 85 | 30,2 | 43,7 | 22 | 56,8 | 62 | 32,7 | 1 | 33,2 | 21,6 | 0,915 | 4 300 | 0,73 | **YET 209-111** |
| *42,863* | 85 | 42,8 | 56,3 | 22 | 56,8 | 62 | 34,9 | 1 | 33,2 | 21,6 | 0,915 | 850 | 0,84 | **YELAG 209-111** |
| | 85 | 42,8 | 56,3 | 22 | 56,8 | 62 | 34,9 | 1 | 33,2 | 21,6 | 0,915 | 4 300 | 0,86 | **YEL 209-111-2F** |

▸ Popular item

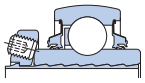
| Dimensions | | | | | | | | | Basic load ratings dynamic | static | Fatigue load limit | Limiting speed with shaft tolerance h6 | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | $B_1$ | C | $d_1$ ≈ | $d_2$ | $s_1$ | $r_{1,2}$ min. | C | $C_0$ | $P_u$ | | | |
| in./*mm* | mm | | | | | | | | kN | | kN | r/min | kg | – |
| **1 3/4** | 85 | 30,2 | 43,7 | 22 | 56,8 | 62 | 32,7 | 1 | 33,2 | 21,6 | 0,915 | 4 300 | 0,69 | **YET 209-112** |
| *44,45* | 85 | 42,8 | 56,3 | 22 | 56,8 | 62 | 34,9 | 1 | 33,2 | 21,6 | 0,915 | 850 | 0,8 | **YELAG 209-112** |
| | 85 | 42,8 | 56,3 | 22 | 56,8 | 62 | 34,9 | 1 | 33,2 | 21,6 | 0,915 | 4 300 | 0,81 | **YEL 209-112-2F** |
| **1 15/16** | 90 | 49,2 | 62,7 | 22 | 62,5 | 67,2 | 38,1 | 1 | 35,1 | 23,2 | 0,98 | 800 | 0,94 | **YELAG 210-115** |
| *49,213* | 90 | 49,2 | 62,7 | 22 | 62,5 | 67,2 | 38,1 | 1 | 35,1 | 23,2 | 0,98 | 4 000 | 0,95 | **YEL 210-115-2F** |
| **2** | 100 | 55,6 | 71,4 | 25 | 69 | 74,5 | 43,6 | 1 | 43,6 | 29 | 1,25 | 3 600 | 1,5 | **YEL 211-200-2F** |
| *50,8* | | | | | | | | | | | | | | |
| **2 3/16** | 100 | 55,6 | 71,4 | 25 | 69 | 74,5 | 43,6 | 1 | 43,6 | 29 | 1,25 | 3 600 | 1,25 | **YEL 211-203-2F** |
| *55,563* | | | | | | | | | | | | | | |
| **2 7/16** | 110 | 36,7 | 52,6 | 26 | 75,6 | 82 | 39,6 | 1,5 | 52,7 | 36 | 1,53 | 3 400 | 1,25 | **YET 212-207** |
| *61,913* | 110 | 61,9 | 77,8 | 26 | 75,6 | 82 | 46,8 | 1,5 | 52,7 | 36 | 1,53 | 3 400 | 1,6 | **YEL 212-207-2F** |

## 2.5 SKF ConCentra insert bearings, metric shafts

d **25 – 60** mm




YSP .. SB-2F



YSPAG

| Dimensions | | | | | | | Basic load ratings dynamic | static | Fatigue load limit | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | D | $B_1$ ≈ [1)] | C | $d_1$ ≈ | $d_2$ | $s_1$ ≈ [1)] | C | $C_0$ | $P_u$ | | | |
| mm | | | | | | | kN | | | r/min | kg | – |
| **25** | 52 | 33,2 | 15 | 33,7 | 41,7 | 21,2 | 14 | 7,8 | 0,335 | 1 500 | 0,18 | **YSPAG 205** |
| | 52 | 33,2 | 15 | 33,7 | 41,7 | 21,2 | 14 | 7,8 | 0,335 | 7 000 | 0,19 | **YSP 205 SB-2F** |
| **30** | 62 | 37,2 | 18 | 39,7 | 48 | 23,2 | 19,5 | 11,2 | 0,475 | 1 200 | 0,3 | **YSPAG 206** |
| | 62 | 37,2 | 18 | 39,7 | 48 | 23,2 | 19,5 | 11,2 | 0,475 | 6 300 | 0,31 | **YSP 206 SB-2F** |
| **35** | 72 | 39,7 | 19 | 46,1 | 57 | 24,5 | 25,5 | 15,3 | 0,655 | 1 100 | 0,44 | **YSPAG 207** |
| | 72 | 39,7 | 19 | 46,1 | 57 | 24,5 | 25,5 | 15,3 | 0,655 | 5 300 | 0,45 | ▸ **YSP 207 SB-2F** |
| **40** | 80 | 43,1 | 21 | 51,8 | 62 | 26,2 | 30,7 | 19 | 0,8 | 950 | 0,58 | **YSPAG 208** |
| | 80 | 43,1 | 21 | 51,8 | 62 | 26,2 | 30,7 | 19 | 0,8 | 4 800 | 0,59 | ▸ **YSP 208 SB-2F** |
| **45** | 85 | 44,2 | 22 | 56,8 | 67 | 26,7 | 33,2 | 21,6 | 0,915 | 850 | 0,64 | **YSPAG 209** |
| | 85 | 44,2 | 22 | 56,8 | 67 | 26,7 | 33,2 | 21,6 | 0,915 | 4 300 | 0,66 | **YSP 209 SB-2F** |
| **50** | 90 | 46,2 | 22 | 62,5 | 72 | 27,7 | 35,1 | 23,2 | 0,98 | 800 | 0,72 | **YSPAG 210** |
| | 90 | 46,2 | 22 | 62,5 | 72 | 27,7 | 35,1 | 23,2 | 0,98 | 4 000 | 0,74 | ▸ **YSP 210 SB-2F** |
| **55** | 100 | 49,2 | 25 | 69 | 77,6 | 29,2 | 43,6 | 29 | 1,25 | 3 600 | 0,98 | **YSP 211 SB-2F** |
| **60** | 110 | 51,7 | 26 | 75,6 | 83 | 30,5 | 52,7 | 36 | 1,53 | 3 400 | 1,25 | **YSP 212 SB-2F** |

▸ Popular item
1) Width/distance before the grub screw is tightened (sleeve and inner ring bore at starting position).

## 2.6 SKF ConCentra insert bearings, inch shafts

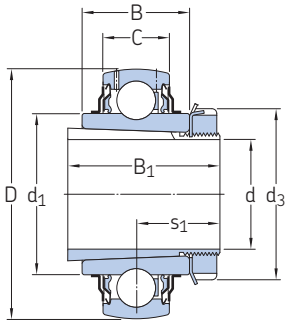
d **1 – 2 11/16** in.
*25,4 – 68,263 mm*

| Dimensions | | | | | | | Basic load ratings dynamic | static | Fatigue load limit | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | D | $B_1$ [1] ≈ | C | $d_1$ ≈ | $d_2$ | $s_1$ [1] ≈ | C | $C_0$ | $P_u$ | | | |
| in./*mm* | mm | | | | | | kN | | kN | r/min | kg | – |
| **1**<br>*25,4* | 52<br>52 | 33,2<br>33,2 | 15<br>15 | 33,74<br>33,74 | 41,7<br>41,7 | 21,2<br>21,2 | 14<br>14 | 7,8<br>7,8 | 0,335<br>0,335 | 1 500<br>7 000 | 0,18<br>0,18 | **YSPAG 205-100**<br>**YSP 205-100 SB-2F** |
| **1 3/16**<br>*30,163* | 62<br>62 | 37,2<br>37,2 | 18<br>18 | 39,7<br>39,7 | 48<br>48 | 23,2<br>23,2 | 19,5<br>19,5 | 11,2<br>11,2 | 0,475<br>0,475 | 1 200<br>6 300 | 0,3<br>0,3 | **YSPAG 206-103**<br>**YSP 206-103 SB-2F** |
| **1 1/4**<br>*31,75* | 72<br>72 | 39,7<br>39,7 | 19<br>19 | 46,1<br>46,1 | 57<br>57 | 24,5<br>24,5 | 25,5<br>25,5 | 15,3<br>15,3 | 0,655<br>0,655 | 1 100<br>5 300 | 0,49<br>0,5 | **YSPAG 207-104**<br>**YSP 207-104 SB-2F** |
| **1 3/8**<br>*34,925* | 72<br>72 | 39,7<br>39,7 | 19<br>19 | 46,1<br>46,1 | 57<br>57 | 24,5<br>24,5 | 25,5<br>25,5 | 15,3<br>15,3 | 0,655<br>0,655 | 1 100<br>5 300 | 0,44<br>0,45 | **YSPAG 207-106**<br>**YSP 207-106 SB-2F** |
| **1 7/16**<br>*36,513* | 72<br>72 | 39,7<br>39,7 | 19<br>19 | 46,1<br>46,1 | 57<br>57 | 24,5<br>24,5 | 25,5<br>25,5 | 15,3<br>15,3 | 0,655<br>0,655 | 1 100<br>5 300 | 0,42<br>0,42 | **YSPAG 207-107**<br>**YSP 207-107 SB-2F** |
| **1 1/2**<br>*38,1* | 80<br>80 | 43,1<br>43,1 | 21<br>21 | 51,8<br>51,8 | 62<br>62 | 26,2<br>26,2 | 30,7<br>30,7 | 19<br>19 | 0,8<br>0,8 | 950<br>4 800 | 0,61<br>0,62 | **YSPAG 208-108**<br>**YSP 208-108 SB-2F** |
| **1 11/16**<br>*42,863* | 85<br>85 | 44,2<br>44,2 | 22<br>22 | 56,8<br>56,8 | 67<br>67 | 26,7<br>26,7 | 33,2<br>33,2 | 21,6<br>21,6 | 0,915<br>0,915 | 850<br>4 300 | 0,69<br>0,7 | **YSPAG 209-111**<br>**YSP 209-111 SB-2F** |
| **1 15/16**<br>*49,213* | 90<br>90 | 46,2<br>46,2 | 22<br>22 | 62,51<br>62,51 | 72<br>72 | 27,7<br>27,7 | 35,1<br>35,1 | 23,2<br>23,2 | 0,98<br>0,98 | 800<br>4 000 | 0,74<br>0,76 | **YSPAG 210-115**<br>**YSP 210-115 SB-2F** |
| **2**<br>*50,8* | 100 | 49,2 | 25 | 69,06 | 77,6 | 29,2 | 43,6 | 29 | 1,25 | 3 600 | 1,1 | **YSP 211-200 SB-2F** |
| **2 3/16**<br>*55,563* | 100 | 49,2 | 25 | 69,06 | 77,6 | 29,2 | 43,6 | 29 | 1,25 | 3 600 | 0,97 | **YSP 211-203 SB-2F** |
| **2 1/4**<br>*57,15* | 110 | 51,7 | 26 | 75,64 | 83 | 30,5 | 52,7 | 36 | 1,53 | 3 400 | 1,35 | **YSP 212-204 SB-2F** |
| **2 7/16**<br>*61,913* | 110 | 51,7 | 26 | 75,64 | 87,6 | 30,5 | 52,7 | 36 | 1,53 | 3 400 | 1,2 | **YSP 212-207 SB-2F** |
| **2 11/16**<br>*68,263* | 120 | 52,7 | 27 | 82,5 | 89,4 | 31 | 57,2 | 40 | 1,7 | 3 000 | 1,4 | **YSP 213-211 SB-2F** |

▸ Popular item
[1] Width/distance before the grub screw is tightened (sleeve and inner ring bore at starting position).

## 2.7 Insert bearings with a tapered bore on an adapter sleeve, metric shafts

d **20 – 60** mm




| Dimensions | | | | | | | | Basic load ratings dynamic | static | Fatigue load limit | Limiting speed | Mass Bearing + sleeve | Designations Bearing | Adapter sleeve |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | $B_1$ | C | $d_1$ ≈ | $d_3$ | $s_1$ [1] ≈ | C | $C_0$ | $P_u$ | | | | |
| mm | | | | | | | | kN | | kN | r/min | kg | – | |
| **20** | 52 | 24 | 35 | 15 | 33,7 | 38 | 20,5 | 14 | 7,8 | 0,335 | 7 000 | 0,25 | **YSA 205-2FK** | **H 2305** |
| **25** | 62 | 28 | 38 | 18 | 39,7 | 45 | 22,5 | 19,5 | 11,2 | 0,475 | 6 300 | 0,38 | **YSA 206-2FK** | **H 2306** |
| **30** | 72 | 30,5 | 43 | 19 | 46,1 | 52 | 24,8 | 25,5 | 15,3 | 0,655 | 5 300 | 0,54 | **YSA 207-2FK** | **H 2307** |
| **35** | 80 | 33,9 | 46 | 21 | 51,8 | 58 | 27,5 | 30,7 | 19 | 0,8 | 4 800 | 0,71 | **YSA 208-2FK** | **H 2308** |
| **40** | 85 | 35 | 50 | 22 | 56,8 | 65 | 29 | 33,2 | 21,6 | 0,915 | 4 300 | 0,84 | **YSA 209-2FK** | **H 2309** |
| **45** | 90 | 37 | 55 | 22 | 62,5 | 70 | 31,1 | 35,1 | 23,2 | 0,98 | 4 000 | 0,97 | **YSA 210-2FK** | **H 2310** |
| **50** | 100 | 40 | 59 | 25 | 69 | 75 | 32,5 | 43,6 | 29 | 1,25 | 3 600 | 1,25 | **YSA 211-2FK** | **H 2311** |
| **55** | 110 | 42,5 | 62 | 26 | 75,6 | 80 | 33,8 | 52,7 | 36 | 1,53 | 3 400 | 1,55 | **YSA 212-2FK** | **H 2312** |
| **60** | 120 | 43,5 | 65 | 27 | 82,5 | 85 | 35,3 | 57,2 | 40 | 1,7 | 3 000 | 1,9 | **YSA 213-2FK** | **H 2313** |

[1] Distance before the sleeve is driven into the bearing bore (sleeve and inner ring bore at starting position).

## 2.8 Insert bearings with a tapered bore on an adapter sleeve, inch shafts

d **3/4 – 2 1/4** in.
*19,05 – 57,15 mm*

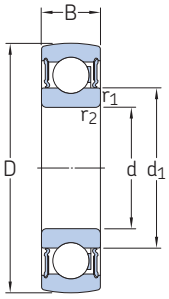


| Dimensions | | | | | | | | Basic load ratings dynamic | static | Fatigue load limit | Limiting speed | Mass Bearing + sleeve | Designations Bearing | Adapter sleeve |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | $B_1$ | C | $d_1$ ≈ | $d_3$ | $s_1$[1] ≈ | C | $C_0$ | $P_u$ | | | | |
| in./*mm* | mm | | | | | | | kN | | | r/min | kg | | |
| **3/4** *19,05* | 52 | 24 | 35 | 15 | 33,74 | 38 | 20,5 | 14 | 7,8 | 0,335 | 7 000 | 0,25 | **YSA 205-2FK** | **HE 2305** |
| **15/16** *23,813* | 62 | 28 | 38 | 18 | 39,7 | 45 | 22,5 | 19,5 | 11,2 | 0,475 | 6 300 | 0,39 | **YSA 206-2FK** | **HA 2306** |
| **1** *25,4* | 62 | 28 | 38 | 18 | 39,7 | 45 | 22,5 | 19,5 | 11,2 | 0,475 | 6 300 | 0,37 | **YSA 206-2FK** | **HE 2306** |
| **1.187** *30,136* | 72 | 30,5 | 43 | 19 | 46,1 | 52 | 24,8 | 25,5 | 15,3 | 0,655 | 5 300 | 0,54 | **YSA 207-2FK** | **HA 2307** |
| **1 1/4** *31,75* | 80 | 33,9 | 46 | 21 | 51,8 | 58 | 27,5 | 30,7 | 19 | 0,8 | 4 800 | 0,77 | **YSA 208-2FK** | **HE 2308** |
| **1 7/16** *36,513* | 85 | 35 | 50 | 22 | 56,8 | 65 | 29 | 33,2 | 21,6 | 0,915 | 4 300 | 0,92 | **YSA 209-2FK** | **HA 2309** |
| **1 1/2** *38,1* | 85 | 35 | 50 | 22 | 56,8 | 65 | 29 | 33,2 | 21,6 | 0,915 | 4 300 | 0,88 | **YSA 209-2FK** | **HE 2309** |
| **1 11/16** *42,863* | 90 | 37 | 55 | 22 | 62,51 | 70 | 31,1 | 35,1 | 23,2 | 0,98 | 4 000 | 1,05 | **YSA 210-2FK** | **HA 2310** |
| **1 3/4** *44,45* | 90 | 37 | 55 | 22 | 62,51 | 70 | 31,1 | 35,1 | 23,2 | 0,98 | 4 000 | 0,98 | **YSA 210-2FK** | **HE 2310** |
| **1 15/16** *49,213* | 100 | 40 | 59 | 25 | 69,06 | 75 | 32,5 | 43,6 | 29 | 1,25 | 3 600 | 1,3 | **YSA 211-2FK** | **HA 2311** |
| **2** *50,8* | 100 | 40 | 59 | 25 | 69,06 | 75 | 32,5 | 43,6 | 29 | 1,25 | 3 600 | 1,2 | **YSA 211-2FK** | **HE 2311 B** |
| **2 3/16** *55,563* | 120 | 43,5 | 65 | 27 | 82,5 | 85 | 35,3 | 57,2 | 40 | 1,7 | 3 000 | 2,1 | **YSA 213-2FK** | **HA 2313** |
| **2 1/4** *57,15* | 120 | 43,5 | 65 | 27 | 82,5 | 85 | 35,3 | 57,2 | 40 | 1,7 | 3 000 | 2,05 | **YSA 213-2FK** | **HE 2313** |

[1] Distance before the sleeve is driven into the bearing bore (sleeve and inner ring bore at starting position).

## 2.9 Insert bearings with a standard inner ring, metric shafts

d **17 – 60** mm

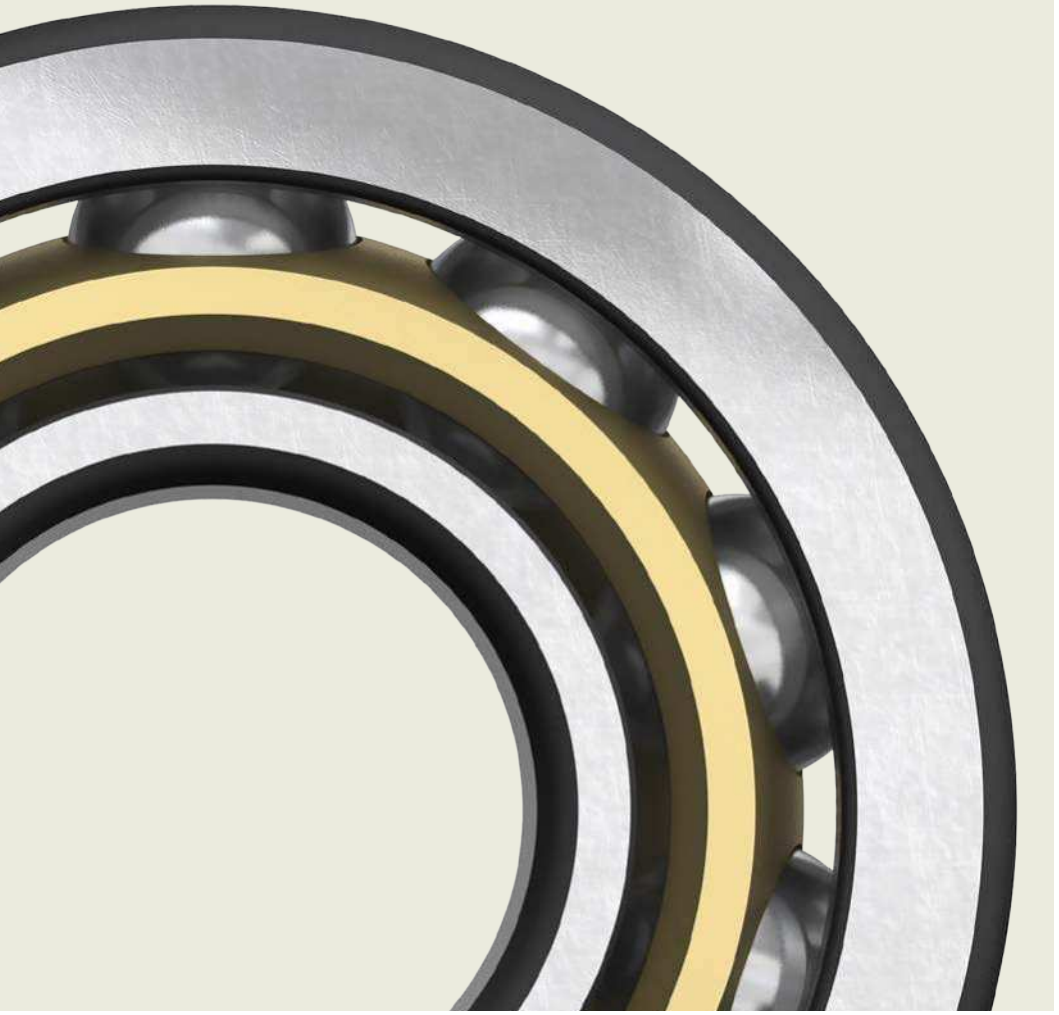



-2RS1

B-2RS1/VP274

| Dimensions | | | | | Basic load ratings dynamic | static | Fatigue load limit | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | $d_1$ ≈ | $r_{1,2}$ min. | C | $C_0$ | $P_u$ | | | |
| mm | | | | | kN | | kN | r/min | kg | – |
| **17** | 40 | 12 | 24,5 | 0,6 | 9,56 | 4,75 | 0,2 | 12 000 | 0,06 | ▸ **1726203-2RS1** |
| **20** | 47 | 14 | 28,8 | 1 | 12,7 | 6,55 | 0,28 | 10 000 | 0,1 | ▸ **1726204-2RS1** |
| **25** | 52 | 15 | 34,3 | 1 | 14 | 7,8 | 0,335 | 8 500 | 0,12 | ▸ **1726205-2RS1** |
| | 62 | 17 | 36,6 | 1,1 | 22,5 | 11,6 | 0,49 | 7 500 | 0,22 | **1726305-2RS1** |
| **30** | 62 | 16 | 40,3 | 1 | 19,5 | 11,2 | 0,475 | 7 500 | 0,19 | ▸ **1726206-2RS1** |
| | 72 | 19 | 44,6 | 1,1 | 28,1 | 16 | 0,67 | 6 300 | 0,34 | **1726306-2RS1** |
| **35** | 72 | 17 | 46,9 | 1,1 | 25,5 | 15,3 | 0,655 | 6 300 | 0,28 | ▸ **1726207-2RS1** |
| | 80 | 21 | 49,5 | 1,5 | 33,2 | 19 | 0,815 | 6 000 | 0,44 | ▸ **1726307-2RS1** |
| **40** | 80 | 18 | 52,6 | 1,1 | 30,7 | 19 | 0,8 | 5 600 | 0,35 | ▸ **1726208-2RS1** |
| | 90 | 23 | 56,1 | 1,5 | 41 | 24 | 1 | 5 000 | 0,61 | ▸ **1726308-2RS1** |
| **45** | 85 | 19 | 56,6 | 1 | 33,2 | 21,6 | 0,915 | 4 300 | 0,39 | **1726209 B-2RS1/VP274** |
| | 85 | 19 | 56,6 | 1 | 33,2 | 21,6 | 0,915 | 5 000 | 0,4 | ▸ **1726209-2RS1** |
| | 100 | 25 | 62,1 | 1,5 | 52,7 | 31,5 | 1,34 | 4 500 | 0,8 | **1726309-2RS1** |
| | 100 | 25 | 62,1 | 1,5 | 52,7 | 31,5 | 1,34 | 4 500 | 0,81 | **1726309 B-2RS1/VP274** |
| **50** | 90 | 20 | 62,5 | 1,1 | 35,1 | 23,2 | 0,98 | 4 800 | 0,44 | ▸ **1726210-2RS1** |
| | 110 | 27 | 68,7 | 2 | 61,8 | 38 | 1,6 | 4 300 | 1 | **1726310 B-2RS1/VP274** |
| | 110 | 27 | 68,7 | 2 | 61,8 | 38 | 1,6 | 4 300 | 1,05 | **1726310-2RS1** |
| **55** | 100 | 21 | 69 | 1,5 | 43,6 | 29 | 1,25 | 4 300 | 0,6 | ▸ **1726211-2RS1** |
| **60** | 110 | 22 | 75,5 | 1,5 | 52,7 | 36 | 1,53 | 4 000 | 0,77 | ▸ **1726212-2RS1** |

▸ Popular items



# 3 Angular contact ball bearings

# 3 Angular contact ball bearings




**Designs and variants** . . . . . **385**
Single row angular contact ball bearings . . . . . 385
Basic design bearings . . . . . 385
Bearings for universal matching . . . . . 385
Bearings with 25° contact angle (AC series) . . . . . 386
Double row angular contact ball bearings . . . . . 386
Basic design bearings . . . . . 386
Bearings with a two-piece inner ring . . . . . 386
Four-point contact ball bearings . . . . . 387
Bearings with locating slots . . . . . 387
SKF Explorer bearings . . . . . 387
Capped bearings . . . . . 388
Greases for capped bearings . . . . . 389
Grease life for capped bearings . . . . . 389
Cages . . . . . 390

**Bearing data** . . . . . **392**
(Dimension standards, tolerances, contact angle, internal clearance, preload, permissible misalignment)

**Loads** . . . . . **398**
(Minimum load, equivalent dynamic bearing load, equivalent static bearing load)
Calculating the axial load for bearings mounted singly or paired in tandem . . . . . 400
Load carrying capacity of bearing pairs . . . . . 400

**Temperature limits** . . . . . **402**

**Permissible speed** . . . . . **402**

**Design considerations** . . . . . **403**
Single row angular contact ball bearings . . . . . 403
Proper adjustment . . . . . 403
Axial loads in one direction . . . . . 403
Load ratio . . . . . 403
Four-point contact ball bearings . . . . . 403
Used as a thrust bearing . . . . . 403
Load ratio . . . . . 403

**Designation system** . . . . . **404**

**Product tables**
3.1 Single row angular contact ball bearings . . . . . 406
3.2 Double row angular contact ball bearings . . . . . 424
3.3 Capped double row angular contact ball bearings . 428
3.4 Four-point contact ball bearings . . . . . 430

**Other angular contact ball bearings**
Cam rollers . . . . . 931
Bearings with Solid Oil . . . . . 1023
NoWear coated bearings . . . . . 1059
Super-precision bearings → skf.com/super-precision
Hybrid bearings → skf.com/super-precision

# 3 Angular contact ball bearings



## More information

**General bearing knowledge** . . . . **17**

**Bearing selection process** . . . . . **59**
Lubrication . . . . . 109
Bearing interfaces. . . . . 139
Seat tolerances for standard conditions . . . . . 148
Selecting internal clearance or preload . . . . . 182
Sealing, mounting and dismounting . . . . . 193

**Mounting instructions for individual bearings** → skf.com/mount

Angular contact ball bearings have inner and outer ring raceways that are displaced relative to each other in the direction of the bearing axis. This means that these bearings are designed to accommodate combined loads, i.e. simultaneously acting radial and axial loads.

The axial load carrying capacity of angular contact ball bearings increases as the contact angle increases. The contact angle is defined as the angle between the line joining the points of contact of the ball and the raceways in the radial plane, along which the combined load is transmitted from one raceway to another, and a line perpendicular to the bearing axis (**fig. 1**).

The most commonly used designs are:

- single row angular contact ball bearings (**fig. 2**)
- double row angular contact ball bearings (**fig. 3**)
- four-point contact ball bearings (**fig. 4**)

In addition to the bearings presented in this catalogue, other angular contact ball bearings include:

- **Super-precision angular contact ball bearings**
  → skf.com/super-precision
- **Fixed section angular contact ball bearings**
  These bearings have very thin rings and a constant cross-sectional height within a particular series, irrespective of the bearing size. They are characterized by a low weight and high stiffness. SKF fixed section bearings have inch sizes and are available open or sealed in up to eight different cross-sectional heights.
  The designs include:
  – single row angular contact ball bearings
  – four-point contact ball bearings

**Fig. 1**

**Contact angle α - load transmission**

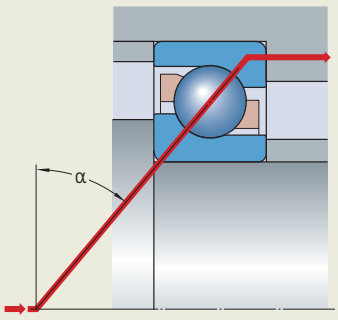
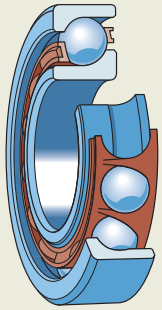



**Fig. 2**

**Single row bearing**



- **Hub bearing units**
  Hub bearing units (HBU) for the automotive industry are based on double row angular contact ball bearings. They have made an appreciable contribution to the achievement of more compact weight-saving designs, simplified assembly and enhanced reliability.
  Detailed information about these products and variants for industrial applications can be supplied on request.

## Bearing features

- **Accommodate combined loads**
  - Axial loads in one direction only for single row bearings
  - Axial loads in either direction for double row and four-point contact bearings
- **High load carrying capacity**
  - The lower shoulder enables a large number of balls to be incorporated in single row bearings, giving them their relatively high load carrying capacity.
  - Because of the second row of balls, a large number of balls are incorporated in double row bearings, giving them their high load carrying capacity.
  - A large number of balls are incorporated in four-point contact bearings, giving them their high load carrying capacity.
- **Good running properties**
  High speeds, rapid accelerations and decelerations are possible.

# Designs and variants

# Single row angular contact ball bearings

SKF single row angular contact ball bearings (**fig. 2**) can accommodate axial loads in one direction only. This type of bearing is typically adjusted against a second bearing. Their bearing rings have an upper and a lower shoulder and are non-separable.

## SKF standard assortment

- bearings in the 72 B(E) and 73 B(E) series with 40° contact angle
- some sizes in the 70 B series
- sealed bearings:
  - in series 72 B(E) ($15 \leq d \leq 55$ mm)
  - in series 73 B(E) ($12 \leq d \leq 50$ mm)
- bearings in the 72 AC series with 25° contact angle ($15 \leq d \leq 70$ mm)
- bearings in the 73 AC series with 25° contact angle ($17 \leq d \leq 70$ mm)
- some large size bearings with a flanged outer ring (skf.com/go/17000-3-1)
- SKF inch bearings (ALS and AMS series, skf.com/go/17000-3-1)

## Basic design bearings

- are intended for adjusted arrangements where only one bearing is used at each bearing position and are not suitable for mounting immediately adjacent to each other
- have Normal tolerances on bearing width and standout of the rings
- have different performance capabilities compared with SKF Explorer bearings

## Bearings for universal matching

- are available with 25° and 40° contact angles
- are intended to be used in sets
- have ring widths and standouts manufactured to tight tolerances
- can also be used in place of basic design bearings for arrangements with single bearings, as they typically have higher precision, and increased load carrying capacity and speed capability

When two bearings are mounted immediately adjacent to each other, a given internal clearance or preload or an even load distribution between the two bearings is obtained without the use of shims or similar devices.
Bearings for universal matching are identified by the following suffixes:

- CA, CB, CC or G for internal clearance
- GA, GB or GC for preload

When ordering, indicate the number of individual bearings required and not the number of sets.

**Fig. 3**
**Double row bearing**

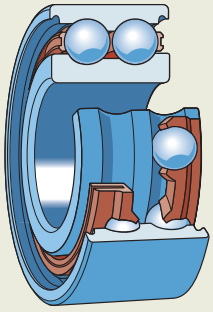
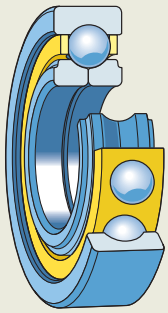


**Fig. 4**
**Four-point contact bearing**



## Paired mounting

Paired mounting can be done in three ways (fig. 5):

- **Tandem arrangement**
  - is used where the load carrying capacity of a single bearing is inadequate
  - shares the radial and axial loads equally
  - has parallel load lines
  - can accommodate axial loads in one direction only
    If axial loads act in both directions, a third bearing, adjusted against the tandem pair, must be added.
- **Back-to-back arrangement**
  - provides a relatively stiff bearing arrangement
  - can accommodate tilting moments
  - has load lines that diverge from the bearing axis
  - can accommodate axial loads in both directions, but only by one bearing in each direction
- **Face-to-face arrangement**
  - is less sensitive to misalignment but not as stiff as a back-to-back arrangement
  - has load lines that converge towards the bearing axis
  - can accommodate axial loads in both directions, but only by one bearing in each direction

## Bearings with 25° contact angle (AC series)

- have a raceway geometry optimized for high speeds
- have reduced sensitivity to axial loading and misalignment, including the ability to accommodate two times higher impact loads before edge stresses can occur
- are equipped with an optimized machined brass cage as standard

Compared with bearings with 40° contact angle, benefits include:

- 20% higher limiting speeds
- higher radial load carrying capacity (by trading off lower axial load carrying capacity)
- increased robustness when used as the backup bearing in sets that are predominantly loaded in one direction

# Double row angular contact ball bearings

The design of SKF double row angular contact ball bearings (fig. 3, page 385) corresponds to two single row angular contact ball bearings arranged back-to-back, but takes up less axial space. They can accommodate radial loads, axial loads in either direction and tilting moments. Double row angular contact ball bearings provide stiff bearing arrangements.

### SKF standard assortment

- bearings in the 32 A and 33 A series
- bearings with a two-piece inner ring
- capped bearings
- open bearings (that are also available capped) that may have recesses in the ring side faces

Bearings in the 52 and 53 series are no longer available and have been replaced with 32 A and 33 A series bearings, which are dimensionally interchangeable. Only size 3200 A is different, and has a width of 14 mm instead of 14,3 mm.

## Basic design bearings

- have different tolerances and performance capabilities compared with SKF Explorer bearings

## Bearings with a two-piece inner ring

- incorporate a larger number of balls, and have a larger contact angle, giving the bearing its high load carrying capacity, especially in the axial direction
- are separable in the 33 D series (fig. 6), i.e. the outer ring with ball and cage assemblies can be mounted independently of the inner ring halves
- are non-separable in the 33 DNRCBM series (fig. 6)
  - have a snap ring groove with a snap ring in the outer ring, enabling simple and space-saving axial location in the housing
  - have been designed specifically for centrifugal pumps, but can also be used in other applications

Fig. 5

**Paired mounting**

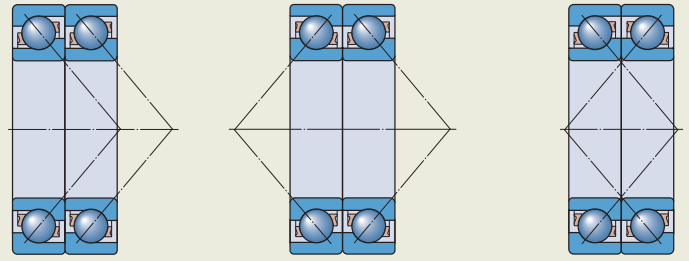
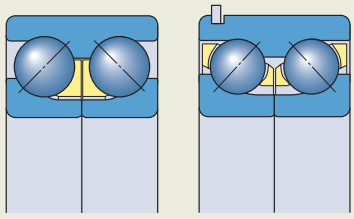



Fig. 6

**Double row bearings with a two-piece inner ring**



# Four-point contact ball bearings

Four-point contact ball bearings (**fig. 4**, **page 385**) are radial single row angular contact ball bearings with raceways that are designed to support axial loads in both directions. For a given axial load, a limited radial load can also be supported (*Load ratio*, **page 403**). The bearings are separable, i.e. the outer ring with ball and cage assembly can be mounted separately from the two inner ring halves.

These bearings take up considerably less axial space than double row bearings.

Both inner ring halves of SKF Explorer four-point contact ball bearings have a recessed shoulder. This improves oil flow when the bearing is used in combination with an SKF cylindrical roller bearing (**fig. 12**, **page 403**). In addition, these recesses can be used to facilitate dismounting.

When four-point contact ball bearings are subjected to high clamping forces their inner ring deformation is limited.

## SKF standard assortment

- bearings in the QJ 2 and QJ 3 series
- some sizes in the QJ 10 and QJ 12 series (skf.com/go/17000-3-4)

## Bearings with locating slots

Four-point contact ball bearings can be supplied with two locating slots in the outer ring (designation suffix N2, **fig. 7**):

- preventing the bearing from turning
- positioned 180° apart

The dimensions and tolerances of the locating slots are in accordance with ISO 20515 and are listed in **table 1**.

# SKF Explorer bearings

For information, refer to **page 7**

3

**Fig. 7**

**Four-point contact bearing with locating slots**

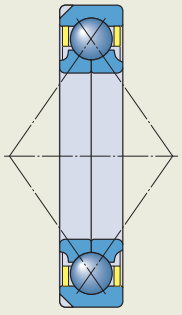
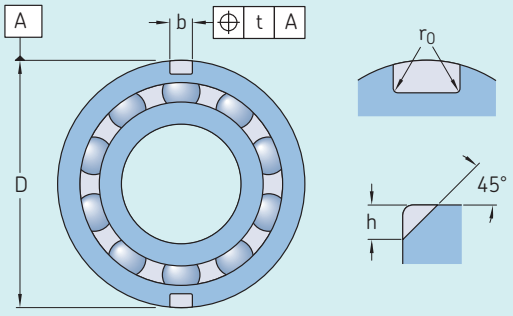


**Table 1**

**Locating slots in the outer ring of four-point contact ball bearings**




| Outside diameter | | Dimensions | | | | | | Tolerance[1] |
|---|---|---|---|---|---|---|---|---|
| | | Diameter series 2 | | | Diameter series 3 | | | |
| D | | h | b | $r_0$ | h | b | $r_0$ | t |
| > | ≤ | | | | | | | U |
| mm | | mm | | | | | | mm |
| **35** | **45** | 2,5 | 3,5 | 0,5 | – | – | – | 0,2 |
| **45** | **60** | 3 | 4,5 | 0,5 | 3,5 | 4,5 | 0,5 | 0,2 |
| **60** | **72** | 3,5 | 4,5 | 0,5 | 3,5 | 4,5 | 0,5 | 0,2 |
| **72** | **95** | 4 | 5,5 | 0,5 | 4 | 5,5 | 0,5 | 0,2 |
| **95** | **115** | 5 | 6,5 | 0,5 | 5 | 6,5 | 0,5 | 0,2 |
| **115** | **130** | 6,5 | 6,5 | 0,5 | 8,1 | 6,5 | 1 | 0,2 |
| **130** | **145** | 8,1 | 6,5 | 1 | 8,1 | 6,5 | 1 | 0,2 |
| **145** | **170** | 8,1 | 6,5 | 1 | 10,1 | 8,5 | 2 | 0,2 |
| **170** | **190** | 10,1 | 8,5 | 2 | 11,7 | 10,5 | 2 | 0,2 |
| **190** | **210** | 10,1 | 8,5 | 2 | 11,7 | 10,5 | 2 | 0,2 |
| **210** | **240** | 11,7 | 10,5 | 2 | 11,7 | 10,5 | 2 | 0,2 |
| **240** | **270** | 11,7 | 10,5 | 2 | 11,7 | 10,5 | 2 | 0,2 |
| **270** | **400** | 12,7 | 10,5 | 2 | 12,7 | 10,5 | 2 | 0,4 |

[1] Other tolerances are in accordance with ISO 20515.

# Capped bearings

SKF supplies the following angular contact ball bearings capped with a shield or seal on both sides:

- single row bearings in the 72 B(E) and 73 B(E) series:
  - non-contact seals (designation suffix 2RZ, fig. 8)
- most common double row basic design and SKF Explorer bearings:
  - shields (designation suffix 2Z, fig. 9)
  - contact seals (designation suffix 2RS1, fig. 10)

For additional information, refer to *Integral sealing*, page 26.

When capped bearings must operate under certain conditions, such as very high speeds or high temperatures, grease may appear between the inner ring and capping device. For bearing arrangements where this would be detrimental, appropriate actions should be taken.

## Shields

- are made of sheet steel
- extend into a recess on the inner ring

## Non-contact seals

- have no additional frictional moment
- have the same limiting speeds as open bearings
- form an extremely narrow gap with the inner ring shoulder
- are made of sheet steel reinforced NBR (oil and wear-resistant)
- make good, positive contact with the recess in which they are fitted

## Contact seals

- are made of NBR
- are reinforced with a sheet steel insert
- are fitted in a recess on the outer ring and make good, positive contact with the recess
- have a lip that exerts light pressure against the recess on the inner ring to provide an effective seal

**Fig. 8**

**Capped bearing – non-contact seals**

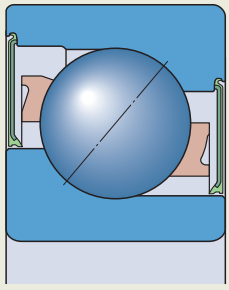


**Fig. 9**

**Capped bearing – shields**

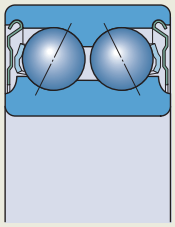
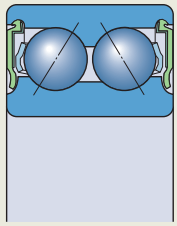


**Fig. 10**

**Capped bearing – contact seals**



## Greases for capped bearings

Bearings capped on both sides are lubricated for the life of the bearing and are virtually maintenance-free. They are filled with one of the following greases (table 2):

- single row bearings
  - as standard → GXN
- double row bearings
  - as standard → GJN
  - in Europe → MT33 (commonly used and widely available)
  - low-friction grease → GE2
- other greases (table 2) can be supplied on request

The standard grease is not identified in the bearing designation (no designation suffix). Other greases are indicated by the corresponding grease suffix.

## Grease life for capped bearings

Grease life for capped angular contact ball bearings can be estimated as described for deep groove ball bearings (page 246). The required grease information is provided in table 2.



**Table 2**

**Technical specifications of SKF standard and special greases for capped angular contact ball bearings**

| Grease | Temperature range[1)] | Thickener | Base oil type | NLGI grade | Base oil viscosity [mm²/s] | | Grease performance factor (GPF) |
|---|---|---|---|---|---|---|---|
| | | | | | at 40 °C *(105 °F)* | at 100 °C *(210 °F)* | |
| **GXN** | | Polyurea | Mineral | 2–3 | 96 | 10,5 | 2 |
| **GJN** | | Polyurea | Mineral | 2 | 115 | 12,2 | 2 |
| **MT33** | | Lithium soap | Mineral | 3 | 100 | 10 | 1 |
| **VT113** | | Lithium complex | Mineral | 3 | 113 | 12,1 | 1 |
| **WT** | | Polyurea | Ester | 2–3 | 70 | 9,4 | 4 |
| **GWF** | | Polyurea | Synthetic hydrocarbon | 2–3 | 67,5 | 9,6 | 4 |
| **GE2** | | Lithium | Synthetic | 2 | 25 | 4,9 | 2 |

1) Refer to the SKF traffic light concept (page 117).

# Cages

SKF angular contact ball bearings are fitted with one or two (double row bearings) of the cages shown in table 3.

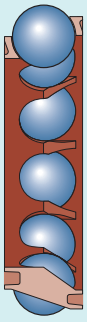
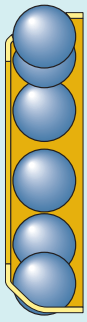
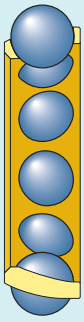
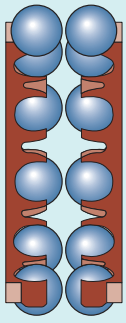
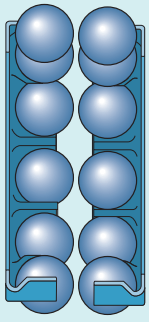
The standard cages of double row bearings are either made of PA66 or of stamped steel.

The machined brass cage (designation suffix M) of single row bearings has been upgraded as follows:

- optimized cage pocket geometry
- a smaller cross section and reduced mass
- increased material strength with reduced lead content

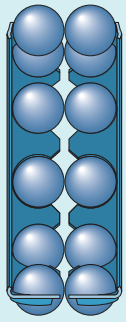
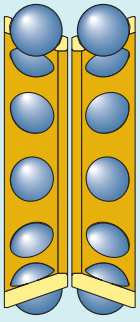
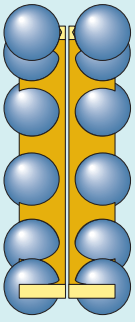
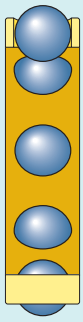
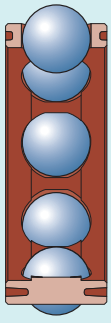
When used at high temperatures, some lubricants can have a detrimental effect on polyamide cages. For additional information about the suitability of cages, refer to *Cages*, page 187.

**Cages for angular contact ball bearings**

| | Single row angular contact ball bearings | | | | Double row angular contact ball bearings | |
|---|---|---|---|---|---|---|
| |  | |  |  |  |  |
| **Cage type** | Window-type, ball centred | | Window-type, ball centred | Window-type, ball centred | Snap-type, ball centred | Snap-type, ball centred |
| **Material** | PA66, glass fibre reinforced | PEEK, glass fibre reinforced | Stamped brass, stamped steel | Machined brass, machined steel[1)] | PA66, glass fibre reinforced | Stamped steel |
| **Suffix** | P | PH | Y, J | M, F[1)] | TN9 | –, J1 |

1) Check availability prior to ordering

**Table 3**

| | | | Four-point contact ball bearings | |
|---|---|---|---|---|
|  |  |  |  |  |
| Snap-type,<br>crown, ball centred | Window-type,<br>ball centred | Prong-type,<br>outer ring centred | Window-type,<br>outer ring centred | Window-type,<br>lubrication grooves in the guiding surface,<br>outer ring centred |
| Stamped steel | Machined brass | Machined brass | Machined brass | PEEK, glass fibre reinforced |
| – | M | MA | MA | PHAS |

# Bearing data

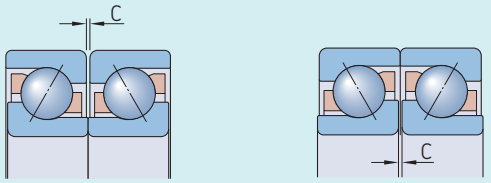
| | Single row angular contact ball bearings |
|---|---|
| **Dimension standards** | Boundary dimensions: ISO 15 and ISO 12044 |
| **Tolerances**<br><br>For additional information → page 35 | Normal<br>Except for:<br>• SKF Explorer bearings:<br>– P6 dimensional tolerance<br>– P5 geometrical tolerance<br>• Bearings with D ≥ 400 mm:<br>– P6 geometrical tolerance<br><br>Values: ISO 492 (table 2, page 38, to table 4, page 40) |
| **Contact angle** | • suffix B: 40°<br>• suffix AC: 25°<br><br>For availability of bearings with 30° contact angle, contact SKF. |
| **Internal clearance**<br><br>For additional information → page 182 | **Single bearings**<br>Obtained after mounting, depending on adjustment against a second bearing.<br><br>**Pairs of universally matchable bearings**<br>• CA – smaller than Normal axial clearance (table 4, page 394)<br>• CB – Normal axial clearance (standard) (table 4)<br>• CC – larger than Normal axial clearance (table 4)<br>• G (standard for larger bearings) - Normal axial clearance (table 5, page 394)<br><br>Values are valid for unmounted bearing sets, arranged back-to-back or face-to-face under zero measuring load. |
| **Preload**<br><br>For additional information → page 182 | **Single bearings**<br>Obtained after mounting, depending on adjustment against a second bearing.<br><br>**Pairs of universally matchable bearings**<br>• GA – light preload (standard)<br>• GB – moderate preload<br>• GC – heavy preload<br><br>Values (table 6, page 395) apply to unmounted bearing sets, arranged back-to-back or face-to-face. |
| **Permissible misalignment** | Back-to-back: ≈ 2 minutes of arc<br>Face-to-face: ≈ 4 minutes of arc<br><br>Misalignment increases bearing noise and reduces bearing service life, and when it exceeds ... |

| | Double row angular contact ball bearings | Four-point contact ball bearings |
|---|---|---|
| | Boundary dimensions: ISO 15<br>Except for:<br>• bearing 3200 A: width = 14 mm instead of 14,3 mm<br>• snap rings and grooves: ISO 464 (**table 7**, **page 395**) | Boundary dimensions: ISO 15<br>Except for:<br>• Locating slots: ISO 20515 (**table 1**, **page 387**) |
| | Normal<br>Except for:<br>• SKF Explorer bearings and 33 DNRCBM series:<br>– P6 | Normal<br>P6 geometrical tolerance on request<br>Except for:<br>• SKF Explorer bearings:<br>– P6<br>– width tolerance reduced to 0/–40 µm |
| | • 32 A and 33 A series: 30°<br>• 33 D series: 45°<br>• 33 DNRCBM series: 40° | • 35° |
| | Normal<br>Check availability of C2, C3 or C4 clearance classes<br><br>Values: (**table 8**, **page 396**) | Normal<br>Check availability of C2, C3, C4 or reduced ranges of standard clearance classes<br><br>Values: ISO 5753-2 (**table 9**, **page 397**) |
| | Values are valid for unmounted bearings under zero measuring load. | |
| | – | – |
| | ≈ 2 minutes of arc | ≈ 2 minutes of arc |

... the guideline values, these effects become particularly noticeable.

Table 4

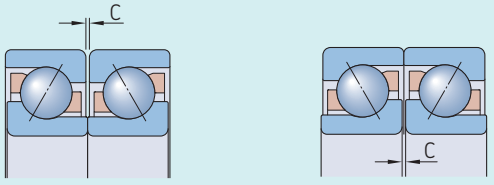
**Axial internal clearance of universally matchable single row angular contact ball bearings arranged back-to-back or face-to-face**




| Bore diameter | | Axial internal clearance Class | | | | | |
|---|---|---|---|---|---|---|---|
| d | | CA | | CB | | CC | |
| > | ≤ | min. | max. | min. | max. | min. | max. |
| mm | | µm | | | | | |
| – | 18 | 5 | 13 | 15 | 23 | 24 | 32 |
| 18 | 30 | 7 | 15 | 18 | 26 | 32 | 40 |
| 30 | 50 | 9 | 17 | 22 | 30 | 40 | 48 |
| 50 | 80 | 11 | 23 | 26 | 38 | 48 | 60 |
| 80 | 120 | 14 | 26 | 32 | 44 | 55 | 67 |
| 120 | 160 | 17 | 29 | 35 | 47 | 62 | 74 |
| 160 | 180 | 17 | 29 | 35 | 47 | 62 | 74 |
| 180 | 250 | 21 | 37 | 45 | 61 | 74 | 90 |
| 250 | 315 | 26 | 42 | 52 | 68 | 90 | 106 |

Table 5

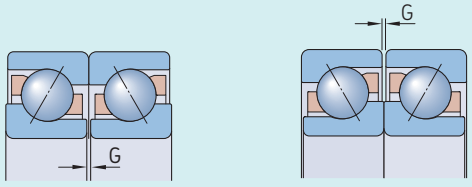
**Axial internal clearance of G design universally matchable single row angular contact ball bearings arranged back-to-back or face-to-face**




| Bore diameter | | Axial internal clearance of bearings in the series | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | | 718 A | | 719 A | | 70 A | | 70 B | | 72 B | | 73 B | | 74 B | |
| > | ≤ | min. | max. | min. | max. | min. | max. | min. | max. | min. | max. | min. | max. | min. | max. |
| mm | | µm | | | | | | | | | | | | | |
| 30 | 60 | – | – | – | – | – | – | – | – | – | – | – | – | 24 | 64 |
| 60 | 70 | – | – | – | – | – | – | – | – | – | – | – | – | 24 | 74 |
| 100 | 160 | – | – | – | – | 24 | 76 | 26 | 76 | – | – | – | – | – | – |
| 160 | 240 | – | – | – | – | 15 | 68 | 20 | 72 | – | – | – | – | – | – |
| 240 | 280 | 15 | 68 | 15 | 68 | 15 | 68 | 20 | 72 | 30 | 80 | – | – | – | – |
| 280 | 300 | 15 | 68 | 15 | 68 | 30 | 80 | 30 | 80 | 30 | 80 | – | – | – | – |
| 300 | 340 | 15 | 68 | 30 | 80 | 30 | 80 | 30 | 80 | 30 | 80 | 40 | 100 | – | – |
| 340 | 400 | 15 | 68 | 40 | 100 | 40 | 100 | 40 | 100 | 30 | 80 | 60 | 120 | – | – |
| 400 | 420 | 40 | 100 | 40 | 100 | 40 | 100 | 40 | 100 | 40 | 100 | 60 | 120 | – | – |
| 420 | 460 | 40 | 100 | 40 | 100 | 40 | 100 | 40 | 100 | 60 | 120 | 60 | 120 | – | – |
| 460 | 500 | 60 | 120 | 60 | 120 | 60 | 120 | 60 | 120 | 60 | 120 | 60 | 120 | – | – |
| 500 | 750 | – | – | – | – | 160 | 260 | – | – | – | – | – | – | – | – |

**Table 6**

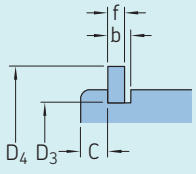
**Preload of universally matchable single row angular contact ball bearings arranged back-to-back or face-to-face**




| Bore diameter | | Preload Class | | | | | |
|---|---|---|---|---|---|---|---|
| d | | GA | | GB | | GC | |
| > | ≤ | min. | max. | min. | max. | min. | max. |
| mm | | µm | | µm | | µm | |
| **10** | **18** | +4 | –4 | –2 | –10 | –8 | –16 |
| **18** | **30** | +4 | –4 | –2 | –10 | –8 | –16 |
| **30** | **50** | +4 | –4 | –2 | –10 | –8 | –16 |
| **50** | **80** | +6 | –6 | –3 | –15 | –12 | –24 |
| **80** | **120** | +6 | –6 | –3 | –15 | –12 | –24 |
| **120** | **180** | +6 | –6 | –3 | –15 | –12 | –24 |
| **180** | **250** | +8 | –8 | –4 | –20 | –16 | –32 |
| **250** | **315** | +8 | –8 | –4 | –20 | –16 | –32 |

**Table 7**

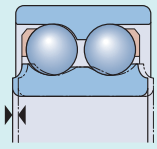
**Dimensions of snap ring grooves and snap rings**




| Bearing Designation | Dimensions | | | | | Snap ring Designation |
|---|---|---|---|---|---|---|
| | C | b | f | $D_3$ | $D_4$ | |
| – | mm | | | | | – |
| **3308 DNRCBM** | 3,28 | 2,7 | 2,46 | 86,8 | 96,5 | **SP 90** |
| **3309 DNRCBM** | 3,28 | 2,7 | 2,46 | 96,8 | 106,5 | **SP 100** |
| **3310 DNRCBM** | 3,28 | 2,7 | 2,46 | 106,8 | 116,6 | **SP 110** |
| **3311 DNRCBM** | 4,06 | 3,1 | 2,82 | 115,2 | 129,7 | **SP 120** |
| **3313 DNRCBM** | 4,9 | 3,1 | 2,82 | 135,2 | 149,7 | **SP 140** |

Table 8

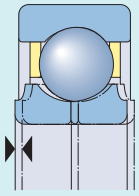
**Axial internal clearance of double row angular contact ball bearings**



| Bore diameter | | Axial internal clearance of bearings in the series 32 A and 33 A | | | | | | | | 33 D | | 33 DNRCBM | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | | C2 | | Normal | | C3 | | C4 | | | | | |
| > | ≤ | min. | max. | min. | max. | min. | max. | min. | max. | min. | max. | min. | max. |
| mm | | µm | | | | | | | | µm | | µm | |
| – | 10 | 1 | 11 | 5 | 21 | 12 | 28 | 25 | 45 | 25 | 45 | – | – |
| 10 | 18 | 1 | 12 | 6 | 23 | 13 | 31 | 27 | 47 | 27 | 47 | – | – |
| 18 | 24 | 2 | 14 | 7 | 25 | 16 | 34 | 28 | 48 | 27 | 47 | 6 | 26 |
| 24 | 30 | 2 | 15 | 8 | 27 | 18 | 37 | 30 | 50 | 30 | 50 | 6 | 26 |
| 30 | 40 | 2 | 16 | 9 | 29 | 21 | 40 | 33 | 54 | 33 | 54 | 10 | 30 |
| 40 | 50 | 2 | 18 | 11 | 33 | 23 | 44 | 36 | 58 | 36 | 58 | 10 | 30 |
| 50 | 65 | 3 | 22 | 13 | 36 | 26 | 48 | 40 | 63 | 40 | 63 | 18 | 38 |
| 65 | 80 | 3 | 24 | 15 | 40 | 30 | 54 | 46 | 71 | 46 | 71 | 18 | 38 |
| 80 | 100 | 3 | 26 | 18 | 46 | 35 | 63 | 55 | 83 | 55 | 83 | – | – |
| 100 | 110 | 4 | 30 | 22 | 53 | 42 | 73 | 65 | 96 | 65 | 96 | – | – |

**Table 9**

## Axial internal clearance of four-point contact ball bearings



| Bore diameter d | | Axial internal clearance C2 | | Normal | | C3 | | C4 | |
|---|---|---|---|---|---|---|---|---|---|
| > | ≤ | min. | max. | min. | max. | min. | max. | min. | max. |
| mm | | µm | | | | | | | |
| **10** | **18** | 15 | 65 | 50 | 95 | 85 | 130 | 120 | 165 |
| **18** | **40** | 25 | 75 | 65 | 110 | 100 | 150 | 135 | 185 |
| **40** | **60** | 35 | 85 | 75 | 125 | 110 | 165 | 150 | 200 |
| **60** | **80** | 45 | 100 | 85 | 140 | 125 | 175 | 165 | 215 |
| **80** | **100** | 55 | 110 | 95 | 150 | 135 | 190 | 180 | 235 |
| **100** | **140** | 70 | 130 | 115 | 175 | 160 | 220 | 205 | 265 |
| **140** | **180** | 90 | 155 | 135 | 200 | 185 | 250 | 235 | 300 |
| **180** | **220** | 105 | 175 | 155 | 225 | 210 | 280 | 260 | 330 |
| **220** | **260** | 120 | 195 | 175 | 250 | 230 | 305 | 290 | 360 |
| **260** | **300** | 135 | 215 | 195 | 275 | 255 | 335 | 315 | 390 |
| **300** | **350** | 155 | 240 | 220 | 305 | 285 | 370 | 350 | 430 |
| **350** | **400** | 175 | 265 | 245 | 330 | 310 | 400 | 380 | 470 |
| **400** | **450** | 190 | 285 | 265 | 360 | 340 | 435 | 415 | 510 |
| **450** | **500** | 210 | 310 | 290 | 390 | 365 | 470 | 445 | 545 |

# Loads

| | Single row angular contact ball bearings | Double row angular contact ball bearings |
|---|---|---|
| **Minimum load** | **Minimum axial load for single bearings and bearing pairs arranged in tandem:**<br>$F_{am} = A \left( \frac{n}{1\,000} \right)^2$ | – |
| For additional information → page 106 | **Minimum radial load for bearing pairs arranged back-to-back or face-to-face:**<br>$F_{rm} = k_r \left( \frac{\nu\, n}{1\,000} \right)^{2/3} \left( \frac{d_m}{100} \right)^2$ | **Minimum radial load:**<br>$F_{rm} = k_r \left( \frac{\nu\, n}{1\,000} \right)^{2/3} \left( \frac{d_m}{100} \right)^2$ |
| **Equivalent dynamic bearing load** | **Single bearings and bearing pairs arranged in tandem:**<br>$F_a/F_r \leq e \rightarrow P = F_r$<br>$F_a/F_r > e \rightarrow P = X F_r + Y_2 F_a$<br><br>When determining the axial load $F_a$, refer to *Calculating the axial load for bearings mounted singly or paired in tandem* page 400. | $F_a/F_r \leq e \rightarrow P = F_r + Y_1 F_a$<br>$F_a/F_r > e \rightarrow P = X F_r + Y_2 F_a$ |
| For additional information → page 91 | **Bearing pairs arranged back-to-back or face-to-face:**<br>$F_a/F_r \leq e \rightarrow P = F_r + Y_1 F_a$<br>$F_a/F_r > e \rightarrow P = X F_r + Y_2 F_a$ | |
| **Equivalent static bearing load** | **Single bearings and bearing pairs arranged in tandem:**<br>$P_0 = 0{,}5 F_r + Y_0 F_a$<br>$P_0 < F_r \rightarrow P_0 = F_r$<br><br>When determining the axial load $F_a$, refer to *Calculating the axial load for bearings mounted singly or paired in tandem*, page 400. | $P_0 = F_r + Y_0 F_a$ |
| For additional information → page 105 | **Bearing pairs arranged back-to-back or face-to-face:**<br>$P_0 = F_r + Y_0 F_a$ | |

| | Four-point contact ball bearings |
|---|---|
| | **Minimum axial load:**<br>$F_{am} = A \left( \frac{n}{1\,000} \right)^2$ |
| | – |
| | Locating bearings to accommodate radial and axial load:<br>$F_a/F_r \leq 0,95 \rightarrow P = F_r + 0,66\ F_a$<br>$F_a/F_r > 0,95 \rightarrow P = 0,6\ F_r + 1,07\ F_a$<br><br>For a proper functionality, SKF recommends $F_a \geq 1,27\ F_r$.<br><br>Thrust bearings with radial clearance in the housing in combination with a radial bearing (**fig. 12**, **page 403**):<br>$P = 1,07\ F_a$ |
| | $P_0 = F_r + 0,58\ F_a$ |

**Symbols**

| | |
|---|---|
| A | minimum axial load factor (**product tables**)<br>• Single row bearings, **page 406**<br>• Four-point contact bearings, **page 430** |
| $d_m$ | bearing mean diameter [mm]<br>= 0,5 (d + D) |
| e | calculation factor for single and double row bearings (**table 10**, **page 400**) |
| $F_a$ | axial load [kN] |
| $F_{am}$ | minimum axial load [kN] |
| $F_r$ | radial load [kN] |
| $F_{rm}$ | minimum radial load [kN] |
| $k_r$ | minimum radial load factor (**product tables**)<br>• Single row bearings, **page 406**<br>• Double row bearings, **page 424** |
| n | rotational speed [r/min] |
| P | equivalent dynamic bearing load [kN] |
| $P_0$ | equivalent static bearing load [kN] |
| $X, Y_0, Y_1, Y_2$ | calculation factors for single and double row bearings (**table 10**) |
| $\nu$ | actual operating viscosity of the lubricant [$mm^2/s$] |

# Calculating the axial load for bearings mounted singly or paired in tandem

When a radial load is applied to a single row angular contact ball bearing, the load is transmitted from one raceway to the other at an angle to the bearing axis and an internal axial load is induced. This must be considered when calculating the equivalent bearing loads for bearings in adjusted arrangements consisting of two single bearings and/or bearing pairs arranged in tandem.

The equations (**table 11**) are only valid if the bearings have identical contact angles and are adjusted against each other to practically zero clearance, but without any preload. In the table, bearing A is subjected to a radial load $F_{rA}$ and bearing B to a radial load $F_{rB}$. Both $F_{rA}$ and $F_{rB}$ are always considered positive, even when they act in the direction opposite to that shown in the figures. The radial loads act at the pressure centres of the bearings (distance a, refer to **product tables**, **page 406**).

These calculations can easily be done with SKF's online calculation tools. When the bearings are adjusted with clearance or preload, or when bearings with different contact angles are used, the equations become more complex and can be done using the SKF SimPro platform (skf.com/simpro).

# Load carrying capacity of bearing pairs

The values for basic load ratings and fatigue load limits listed in the **product tables**, **page 406**, apply to single bearings. For bearing pairs mounted immediately adjacent to each other, the following values apply:

- basic dynamic load rating for standard bearings in all arrangements and for SKF Explorer bearings in a back-to-back or face-to-face arrangement
  $C = 1{,}62\ C_{\text{single bearing}}$
- basic dynamic load rating for SKF Explorer bearings in a tandem arrangement
  $C = 2\ C_{\text{single bearing}}$
- basic static load rating
  $C_0 = 2\ C_{0\ \text{single bearing}}$
- fatigue load limit
  $P_u = 2\ P_{u\ \text{single bearing}}$

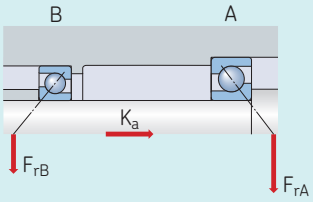
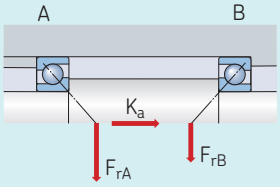
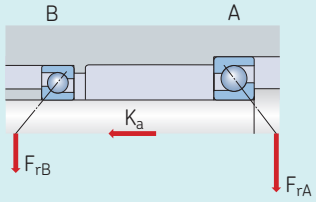
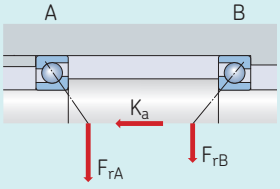
**Table 10**

**Calculation factors for single and double row angular contact ball bearings**

| Bearing types | Calculation factor e | X | $Y_1$ | $Y_2$ | $Y_0$ |
|---|---|---|---|---|---|
| **Single row bearings** | | | | | |
| **Single bearings or bearing pairs arranged in tandem** | | | | | |
| **Suffix B** | 1,4 | 0,35 | – | 0,57 | 0,26 |
| **Suffix AC** | 0,68 | 0,41 | – | 0,87 | 0,38 |
| **Bearing pairs arranged back-to-back or face-to-face** | | | | | |
| **Suffix B** | 1,14 | 0,57 | 0,55 | 0,93 | 0,52 |
| **Suffix AC** | 0,68 | 0,67 | 0,92 | 1,41 | 0,76 |
| **Double row bearings** | | | | | |
| **Series 32 A, 33 A** | 0,8 | 0,63 | 0,78 | 1,24 | 0,66 |
| **Series 33 D** | 1,34 | 0,54 | 0,47 | 0,81 | 0,44 |
| **Series 33 DNRCBM** | 1,14 | 0,57 | 0,55 | 0,93 | 0,52 |

Table 11

**Axial loading of bearing arrangements incorporating two single row angular contact ball bearings and/or bearing pairs in tandem**

| Bearing arrangement | Load case | Axial loads | |
|---|---|---|---|
| **Back-to-back**   **Face-to-face**   | **Case 1a**<br>$F_{rA} \geq F_{rB}$<br>$K_a \geq 0$ | $F_{aA} = R\,F_{rA}$ | $F_{aB} = F_{aA} + K_a$ |
| | **Case 1b**<br>$F_{rA} < F_{rB}$<br>$K_a \geq R\,(F_{rB} - F_{rA})$ | $F_{aA} = R\,F_{rA}$ | $F_{aB} = F_{aA} + K_a$ |
| | **Case 1c**<br>$F_{rA} < F_{rB}$<br>$K_a < R\,(F_{rB} - F_{rA})$ | $F_{aA} = F_{aB} - K_a$ | $F_{aB} = R\,F_{rB}$ |
| **Back-to-back**   **Face-to-face**   | **Case 2a**<br>$F_{rA} \leq F_{rB}$<br>$K_a \geq 0$ | $F_{aA} = F_{aB} + K_a$ | $F_{aB} = R\,F_{rB}$ |
| | **Case 2b**<br>$F_{rA} > F_{rB}$<br>$K_a \geq R\,(F_{rA} - F_{rB})$ | $F_{aA} = F_{aB} + K_a$ | $F_{aB} = R\,F_{rB}$ |
| | **Case 2c**<br>$F_{rA} > F_{rB}$<br>$K_a < R\,(F_{rA} - F_{rB})$ | $F_{aA} = R\,F_{rA}$ | $F_{aB} = F_{aA} - K_a$ |

For bearings with:
- 20° contact angle → R = 0,50
- 25° contact angle → R = 0,57
- 30° contact angle → R = 0,66
- 40° contact angle → R = 0,88

# Temperature limits

The permissible operating temperature for angular contact ball bearings can be limited by:

- the dimensional stability of the bearing rings and balls
- the cage
- the seals
- the lubricant

Where temperatures outside the permissible range are expected, contact SKF.

## Bearing rings and balls

The bearings are heat stabilized up to at least 150 °C *(300 °F)*.

## Cages

Steel, brass or PEEK cages can be used at the same operating temperatures as the bearing rings and balls. For temperature limits of cages made of other polymer materials, refer to *Polymer cages*, page 188.

## Seals

The permissible operating temperature for NBR seals is –40 to +100 °C *(–40 to +210 °F)*. Temperatures up to 120 °C *(250 °F)* can be tolerated for brief periods.

Typically, temperature peaks are at the seal lip.

## Lubricants

Temperature limits for greases used in sealed SKF angular contact ball bearings are provided in table 2, page 389. For temperature limits of other SKF greases, refer to *Selecting a suitable SKF grease*, page 116.

When using lubricants not supplied by SKF, temperature limits should be evaluated according to the SKF traffic light concept (page 117).

# Permissible speed

The speed ratings in the **product tables** indicate:

- the **reference speed**, which enables a quick assessment of the speed capabilities from a thermal frame of reference
- the **limiting speed**, which is a mechanical limit that should not be exceeded unless the bearing design and the application are adapted for higher speeds

For additional information, refer to *Operating temperature and speed*, page 130.

SKF recommends oil lubrication for bearings with a ring centred cage (designation suffix MA or PHAS). When these bearings are grease lubricated, the $nd_m$ value is limited to 250 000 mm/min.

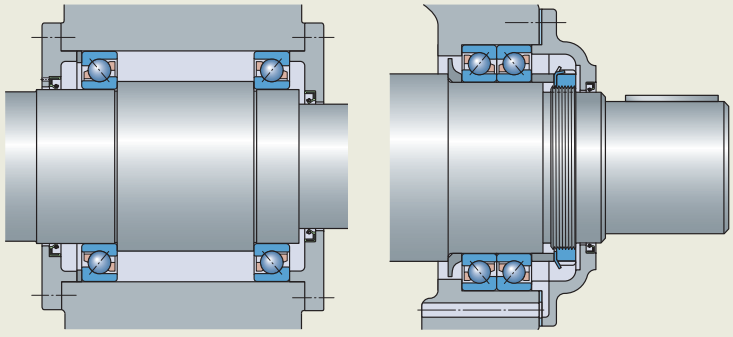
where
$d_m$ = bearing mean diameter [mm]
= 0,5 (d + D)
n = rotational speed [r/min]

## Bearing pairs

For bearings arranged in pairs, the limiting speed should be reduced to approximately 80% of the value quoted for a single bearing.

Fig. 11

**Proper adjustments**



Single bearing, face-to-face

Bearing set, back-to-back

# Design considerations

## Single row angular contact ball bearings

### Proper adjustment

Single row angular contact ball bearings must be used (**fig. 11**):

- with a second bearing
- in sets

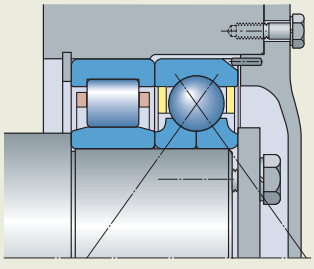
  The bearings must be adjusted against each other until the requisite clearance or preload is obtained (*Selecting preload*, **page 186**.

Universally matchable bearings mounted immediately adjacent to each other:

- require no further adjustment (*Bearings for universal matching*, **page 385**)
- obtain requisite clearance or preload by:
  - choosing bearings from an appropriate clearance or preload class
  - applying suitable fits for the bearings on the shaft and in the housing

**Fig. 12**

**Bearing mounted with radial clearance in the housing**



Performance and operational reliability depend on:

- proper adjustment for single bearings
- the correct selection of clearance and preload for universally matchable bearings

  If there is too much clearance in the bearing arrangement during operation, the load carrying capacity of the bearings will not be fully utilized. Excessive preload produces more friction and higher operating temperatures, leading to a reduction in bearing service life.

### Axial loads in one direction

When the axial load acts predominantly in one direction in back-to-back and face-to-face arrangements, unfavourable rolling conditions for the balls of the axially unloaded bearing may occur, which can lead to:

- increased noise levels
- discontinuity in the lubricant film
- increased stresses on the cage

Under these circumstances, SKF recommends zero operating clearance, which can be attained by using springs. When springs are not sufficient, using bearings with a 25° contact angle as a backup bearing may help.

### Load ratio

- of $F_a/F_r \geq 1$ is required by bearings in the 70 B, 72 B(E) and 73 B(E) series
- of $F_a/F_r \geq 0{,}55$ is required by bearings in the 72 AC and 73 AC series

If the load ratio requirement is not met in each case, bearing service life can be reduced.

## Four-point contact ball bearings

### Used as a thrust bearing

Four-point contact ball bearings are often used as entirely thrust bearings, together with a radial bearing. When used in this way, the four-point contact ball bearing should be mounted with radial clearance in the housing (**fig. 12**).

- in combination with a cylindrical roller bearing:
  - the radial internal clearance of the cylindrical roller bearing should be smaller than the theoretical radial internal clearance of the four-point contact ball bearing after both have been mounted
  - the theoretical radial clearance can be calculated from:

    $C_r = 0{,}7\ C_a$

    where
    $C_r$ = theoretical radial internal clearance
    $C_a$ = axial internal clearance (**table 9**, **page 397**)

  - the outer ring of the four-point contact ball bearing must be able to accommodate thermal movements

    Therefore, it should not be clamped axially, but a small gap should be maintained between the outer ring and the cover flange.
  - bearings with locating slots should be used (**fig. 12**) to prevent the outer ring from turning

    If clamping the outer ring cannot be avoided, the outer ring must be carefully centred during mounting.

### Load ratio

For proper functionality, the balls should contact only one inner ring raceway and the opposite side of the outer ring raceway. This is the case when the load ratio is $F_a/F_r \geq 1{,}27$.

A load ratio that is smaller than recommended can reduce bearing service life.

# Designation system

**Prefixes**

**Basic designation**

Listed in table 4, page 30

**ALS** Inch bearing
**AMS** Inch bearing

**Suffixes**

**Group 1: Internal design**

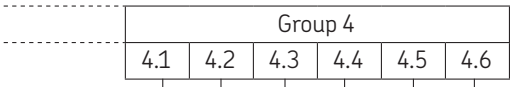
**A** Single row bearing, 30° contact angle
**A** Double row bearing, no filling slots
**AB** Single row inch bearing, 20° contact angle
**AC** Single row bearing, 25° contact angle
**B** Single row bearing, 40° contact angle
**D** Two-piece inner ring
**E** Optimized internal design

**Group 2: External design (seals, snap ring groove, execution, etc.)**

**N** Snap ring groove in the outer ring
**NR** Snap ring groove in the outer ring, with appropriate snap ring
**N1** One locating slot (notch) in one outer ring side face
**N2** Two locating slots (notches) in one outer ring side face, 180° apart
**CB** Double row bearing, controlled axial internal clearance
**CA** Bearing for universal matching. Two bearings arranged back-to-back or face-to-face have axial internal clearance smaller than Normal (CB).
**CB** Bearing for universal matching. Two bearings arranged back-to-back or face-to-face have Normal axial internal clearance.
**CC** Bearing for universal matching. Two bearings arranged back-to-back or face-to-face have axial internal clearance greater than Normal (CB).
**G** Bearing for universal matching. Two bearings arranged back-to-back or face-to-face have axial internal clearance.
**GA** Bearing for universal matching. Two bearings arranged back-to-back or face-to-face have light preload.
**GB** Bearing for universal matching. Two bearings arranged back-to-back or face-to-face have moderate preload.
**GC** Bearing for universal matching. Two bearings arranged back-to-back or face-to-face have heavy preload.
**-2RS1** Contact seal, NBR, on both sides
**-2RZ** Non-contact seal, NBR, on both sides
**-2Z** Shield on both sides

**Group 3: Cage design**

**–** Stamped steel cage, ball centred (double row bearing)
**F** Machined steel cage, ball centred
**FA** Machined steel cage, outer ring centred
**J** Stamped steel cage, ball centred (single row bearing)
**J1** Stamped steel cage, ball centred (double row bearing with a two-piece inner ring)
**M** Machined brass cage, ball centred; different designs are identified by a number following the M, e.g. M2
**MA** Machined brass cage, outer ring centred.
**MB** Machined brass cage, inner ring centred
**P** Glass fibre reinforced PA66 cage, ball centred
**PH** Glass fibre reinforced PEEK cage, ball centred
**PHAS** Glass fibre reinforced PEEK cage, with lubrication grooves in the guiding surfaces, outer ring centred
**TN9** Glass fibre reinforced PA66 cage, ball centred
**Y** Stamped brass cage, ball centred




**Group 4.6: Other variants**

**309829** Larger balls

**Group 4.5: Lubrication**

**GE2, GWF, MT33, VT113, WT** Grease suffixes (**table 2**, **page 389**)

**Group 4.4: Stabilization**

**S1** Bearing rings heat stabilized for operating temperatures ≤ 200 °C *(390 °F)*

**Group 4.3: Bearing sets, matched bearings**

**DB** Two bearings matched for mounting back-to-back
**DF** Two bearings matched for mounting face-to-face
**DT** Two bearings matched for mounting in tandem

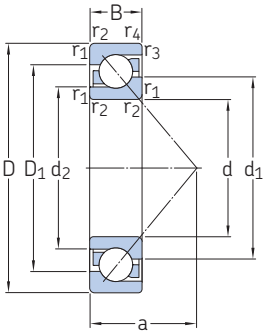
**Group 4.2: Accuracy, clearance, preload, quiet running**

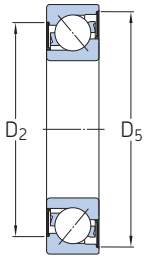
**P5** Dimensional and geometrical tolerances to class P5
**P6** Dimensional and geometrical tolerances to class P6
**P62** P6 + C2
**P63** P6 + C3
**P64** P6 + C4
**P6CNL** P6 + CNL
**CNL** Axial internal clearance in the lower half of the Normal range
**C2** Axial internal clearance smaller than Normal
**C2H** Axial internal clearance in the upper half of the C2 range
**C2L** Axial internal clearance in the lower half of the C2 range
**C3** Axial internal clearance greater than Normal
**C4** Axial internal clearance greater than C3
**344524** C2H + CNL

**Group 4.1: Materials, heat treatment**

## 3.1 Single row angular contact ball bearings

d **10 – 20** mm

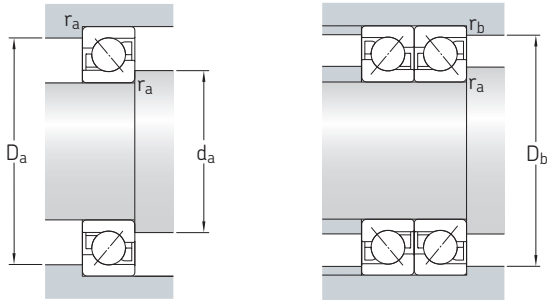



2RZ

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designations Universally matchable bearing | Basic design / sealed bearing |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **10** | 30 | 9 | 7,02 | 3,35 | 0,14 | 30 000 | 30 000 | 0,03 | ▸ **7200 BECBP** | ▸ **7200 BEP** |
| **12** | 32 | 10 | 7,61 | 3,8 | 0,16 | 28 000 | 26 000 | 0,036 | ▸ **7201 BECBP** | ▸ **7201 BEP** |
| | 37 | 12 | 10,6 | 5 | 0,208 | 26 000 | 20 000 | 0,06 | – | ▸ **7301 BE-2RZP** |
| | 37 | 12 | 10,6 | 5 | 0,208 | 26 000 | 24 000 | 0,06 | – | ▸ **7301 BEP** |
| **15** | 35 | 11 | 8,32 | 4,4 | 0,183 | 24 000 | 20 000 | 0,045 | – | ▸ **7202 BE-2RZP** |
| | 35 | 11 | 8,32 | 4,4 | 0,183 | 24 000 | 24 000 | 0,045 | – | ▸ **7202 BEP** |
| | 35 | 11 | 8,8 | 4,65 | 0,196 | 24 000 | 26 000 | 0,045 | ▸ 7202 BECBP | – |
| | 35 | 11 | 10,2 | 5,2 | 0,224 | 26 000 | 40 000 | 0,045 | 7202 ACCBM | – |
| | 42 | 13 | 13 | 6,7 | 0,28 | 22 000 | 17 000 | 0,082 | – | ▸ **7302 BE-2RZP** |
| | 42 | 13 | 13 | 6,7 | 0,28 | 22 000 | 20 000 | 0,08 | ▸ **7302 BECBP** | ▸ **7302 BEP** |
| **17** | 40 | 12 | 10,4 | 5,5 | 0,236 | 22 000 | 17 000 | 0,063 | – | ▸ **7203 BE-2RZP** |
| | 40 | 12 | 10,4 | 5,5 | 0,236 | 22 000 | 20 000 | 0,065 | – | ▸ **7203 BEP** |
| | 40 | 12 | 11 | 5,85 | 0,25 | 22 000 | 22 000 | 0,065 | ▸ 7203 BECBP | – |
| | 40 | 12 | 11 | 5,85 | 0,25 | 22 000 | 28 000 | 0,065 | ▸ 7203 BECBM | – |
| | 40 | 12 | 11,1 | 6,1 | 0,26 | 22 000 | 20 000 | 0,065 | – | 7203 BEY |
| | 40 | 12 | 12,5 | 6,7 | 0,285 | 24 000 | 34 000 | 0,065 | 7203 ACCBM | – |
| | 47 | 14 | 15,9 | 8,3 | 0,355 | 20 000 | 15 000 | 0,11 | – | ▸ **7303 BE-2RZP** |
| | 47 | 14 | 15,9 | 8,3 | 0,355 | 20 000 | 19 000 | 0,11 | ▸ **7303 BECBP** | ▸ **7303 BEP** |
| **20** | 47 | 14 | 13,3 | 7,65 | 0,325 | 19 000 | 14 000 | 0,15 | – | ▸ **7204 BE-2RZP** |
| | 47 | 14 | 13,3 | 7,65 | 0,325 | 19 000 | 18 000 | 0,11 | – | ▸ **7204 BEP** |
| | 47 | 14 | 14,3 | 8,15 | 0,345 | 19 000 | 19 000 | 0,11 | ▸ 7204 BECBP | – |
| | 47 | 14 | 14,3 | 8,15 | 0,345 | 19 000 | 19 000 | 0,11 | 7204 BECBPH | – |
| | 47 | 14 | 14,3 | 8,15 | 0,345 | 19 000 | 19 000 | 0,11 | ▸ 7204 BECBY | – |
| | 47 | 14 | 14,3 | 8,15 | 0,345 | 19 000 | 24 000 | 0,11 | ▸ 7204 BECBM | – |
| | 47 | 14 | 16 | 9,3 | 0,39 | 20 000 | 30 000 | 0,11 | 7204 ACCBM | – |
| | 52 | 15 | 17,4 | 9,5 | 0,4 | 17 000 | 13 000 | 0,14 | – | ▸ **7304 BE-2RZP** |
| | 52 | 15 | 17,4 | 9,5 | 0,4 | 17 000 | 16 000 | 0,14 | – | ▸ **7304 BEP** |
| | 52 | 15 | 19 | 10 | 0,425 | 17 000 | 18 000 | 0,14 | ▸ 7304 BECBP | – |
| | 52 | 15 | 19 | 10 | 0,425 | 17 000 | 18 000 | 0,14 | 7304 BECBPH | – |
| | 52 | 15 | 19 | 10 | 0,425 | 17 000 | 22 000 | 0,14 | ▸ 7304 BECBM | – |
| | 52 | 15 | 20,4 | 11,2 | 0,475 | 17 000 | 18 000 | 0,14 | ▸ 7304 BECBY | – |
| | 52 | 15 | 20,8 | 11,2 | 0,475 | 19 000 | 26 000 | 0,14 | ▸ 7304 ACCBM | – |

**SKF Explorer bearing**
▸ Popular item

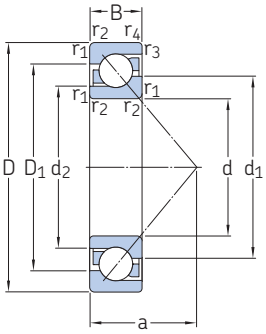


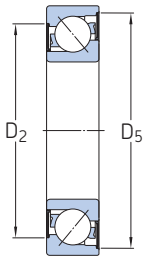



| Dimensions | | | | | | | | Abutment and fillet dimensions | | | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $d_2$ ≈ | $D_1$, $D_2$ ≈ | $D_5$ ≈ | $r_{1,2}$ min. | $r_{3,4}$ min. | a | $d_a$ min. | $d_a$ max. | $D_a$ max. | $D_b$ max. | $r_a$ max. | $r_b$ max. | A | $k_r$ |
| mm | | | | | | | | mm | | | | | | – | |
| **10** | 18,3 | 14,5 | 22,9 | – | 0,6 | 0,3 | 13 | 14,2 | – | 25,8 | 27,6 | 0,6 | 0,3 | 0,000 224 | 0,095 |
| **12** | 20,2 | 16,5 | 25 | – | 0,6 | 0,3 | 14 | 16,2 | – | 27,8 | 30 | 0,6 | 0,3 | 0,000 283 | 0,095 |
| | 21,9 | 16,9 | 29,5 | 33,5 | 1 | 0,6 | 16,3 | 17,6 | 21,5 | 31,4 | 32,8 | 1 | 0,6 | 0,000 537 | 0,1 |
| | 21,7 | 16,9 | 28,3 | – | 1 | 0,6 | 16,3 | 17,6 | – | 31,4 | 32,8 | 1 | 0,6 | 0,000 537 | 0,1 |
| **15** | 22,7 | 18,9 | 28,5 | 32,4 | 0,6 | 0,3 | 16 | 19,2 | 22,5 | 30,8 | 32,6 | 0,6 | 0,3 | 0,000 383 | 0,095 |
| | 22,7 | 18,9 | 27,8 | – | 0,6 | 0,3 | 16 | 19,2 | – | 30,8 | 32,6 | 0,6 | 0,3 | 0,000 383 | 0,095 |
| | 22,7 | 18,9 | 27,8 | – | 0,6 | 0,3 | 16 | 19,2 | – | 30,8 | 32,6 | 0,6 | 0,3 | 0,000 383 | 0,095 |
| | 22,8 | 18,8 | 27,6 | – | 0,6 | 0,3 | 16 | 19,2 | – | 30,8 | 32,6 | 0,6 | 0,3 | 0,000 156 | 0,095 |
| | 26 | 20,7 | 33,8 | 38,6 | 1 | 0,6 | 18,6 | 21 | 25,5 | 36 | 38 | 1 | 0,6 | 0,000 907 | 0,1 |
| | 26 | 20,7 | 32,6 | – | 1 | 0,6 | 18,6 | 21 | – | 36 | 38 | 1 | 0,6 | 0,000 907 | 0,1 |
| **17** | 26,2 | 21,6 | 34 | 36,5 | 0,6 | 0,6 | 18 | 21,2 | 26,2 | 35,8 | 35,8 | 0,6 | 0,6 | 0,000 625 | 0,095 |
| | 26,2 | 21,6 | 31,2 | – | 0,6 | 0,6 | 18 | 21,2 | – | 35,8 | 35,8 | 0,6 | 0,6 | 0,000 625 | 0,095 |
| | 26,2 | 21,6 | 31,2 | – | 0,6 | 0,6 | 18 | 21,2 | – | 35,8 | 35,8 | 0,6 | 0,6 | 0,000 625 | 0,095 |
| | 26,2 | 21,6 | 31,2 | – | 0,6 | 0,6 | 18 | 21,2 | – | 35,8 | 35,8 | 0,6 | 0,6 | 0,000 625 | 0,095 |
| | 26,2 | 21,6 | 31,2 | – | 0,6 | 0,6 | 18 | 21,2 | – | 35,8 | 35,8 | 0,6 | 0,6 | 0,000 687 | 0,095 |
| | 26 | 21,5 | 31,4 | – | 0,6 | 0,6 | 12 | 21,2 | – | 35,8 | 35,8 | 0,6 | 0,6 | 0,000 254 | 0,095 |
| | 28,6 | 22,8 | 37,4 | 42,6 | 1 | 0,6 | 20,4 | 22,6 | 28 | 41,4 | 42,8 | 1 | 0,6 | 0,00141 | 0,1 |
| | 28,6 | 22,8 | 36,2 | – | 1 | 0,6 | 20,4 | 22,6 | – | 41,4 | 42,8 | 1 | 0,6 | 0,00141 | 0,1 |
| **20** | 30,8 | 25,8 | 37,7 | 43,2 | 1 | 0,6 | 21 | 25,6 | 30 | 41,4 | 42,8 | 1 | 0,6 | 0,00113 | 0,095 |
| | 30,8 | 25,8 | 37 | – | 1 | 0,6 | 21 | 25,6 | – | 41,4 | 42,8 | 1 | 0,6 | 0,00113 | 0,095 |
| | 30,8 | 25,8 | 37 | – | 1 | 0,6 | 21 | 25,6 | – | 41,4 | 42,8 | 1 | 0,6 | 0,00113 | 0,095 |
| | 30,8 | 25,8 | 37 | – | 1 | 0,6 | 21 | 25,6 | – | 41,4 | 42,8 | 1 | 0,6 | 0,00113 | 0,095 |
| | 30,8 | 25,8 | 37 | – | 1 | 0,6 | 21 | 25,6 | – | 41,4 | 42,8 | 1 | 0,6 | 0,00113 | 0,095 |
| | 30,7 | 25,7 | 36,7 | – | 1 | 0,6 | 14 | 25,6 | – | 41,4 | 42,8 | 1 | 0,6 | 0,000 461 | 0,095 |
| | 33,1 | 26,7 | 41,6 | 48,1 | 1,1 | 0,6 | 22,8 | 27 | 30,5 | 45 | 47,8 | 1 | 0,6 | 0,00191 | 0,1 |
| | 33,1 | 26,7 | 40,5 | – | 1,1 | 0,6 | 22,8 | 27 | – | 45 | 47,8 | 1 | 0,6 | 0,00191 | 0,1 |
| | 33,1 | 26,7 | 40,5 | – | 1,1 | 0,6 | 22,8 | 27 | – | 45 | 47,8 | 1 | 0,6 | 0,00191 | 0,1 |
| | 33,1 | 26,7 | 40,5 | – | 1,1 | 0,6 | 22,8 | 27 | – | 45 | 47,8 | 1 | 0,6 | 0,00191 | 0,1 |
| | 33,1 | 26,7 | 40,5 | – | 1,1 | 0,6 | 22,8 | 27 | – | 45 | 47,8 | 1 | 0,6 | 0,00212 | 0,1 |
| | 32,9 | 26,6 | 40,4 | – | 1,1 | 0,6 | 15 | 27 | – | 45 | 47,8 | 1 | 0,6 | 0,000 771 | 0,1 |

## 3.1 Single row angular contact ball bearings

d **25 – 30** mm

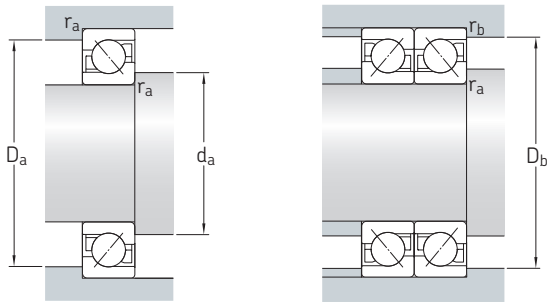



2RZ

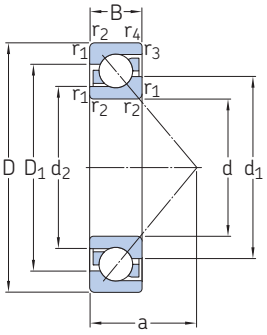
| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designations Universally matchable bearing | Basic design / sealed bearing |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **25** | 52 | 15 | 14,8 | 9,3 | 0,4 | 16 000 | 12 000 | 0,13 | – | ▸ **7205 BE-2RZP** |
| | 52 | 15 | 14,8 | 9,3 | 0,4 | 16 000 | 15 000 | 0,13 | – | ▸ **7205 BEP** |
| | 52 | 15 | 14,8 | 9,3 | 0,4 | 16 000 | 15 000 | 0,13 | – | ▸ **7205 BEY** |
| | 52 | 15 | 15,6 | 10 | 0,43 | 16 000 | 17 000 | 0,13 | ▸ 7205 BECBP | – |
| | 52 | 15 | 15,6 | 10 | 0,43 | 16 000 | 17 000 | 0,13 | ▸ 7205 BECBY | – |
| | 52 | 15 | 15,6 | 10 | 0,43 | 16 000 | 20 000 | 0,13 | ▸ 7205 BECBM | – |
| | 52 | 15 | 15,6 | 10 | 0,43 | 16 000 | 17 000 | 0,13 | 7205 BECBPH | – |
| | 52 | 15 | 18 | 11,4 | 0,49 | 17 000 | 26 000 | 0,13 | 7205 ACCBM | – |
| | 62 | 17 | 24,2 | 14 | 0,6 | 14 000 | 11 000 | 0,23 | – | ▸ **7305 BE-2RZP** |
| | 62 | 17 | 24,2 | 14 | 0,6 | 14 000 | 14 000 | 0,23 | – | ▸ **7305 BEP** |
| | 62 | 17 | 24,2 | 14 | 0,6 | 14 000 | 14 000 | 0,23 | – | **7305 BEY** |
| | 62 | 17 | 26,5 | 15,3 | 0,655 | 14 000 | 15 000 | 0,23 | ▸ 7305 BECBP | – |
| | 62 | 17 | 26,5 | 15,3 | 0,655 | 14 000 | 15 000 | 0,23 | 7305 BECBPH | – |
| | 62 | 17 | 26,5 | 15,3 | 0,655 | 14 000 | 15 000 | 0,23 | ▸ 7305 BECBY | – |
| | 62 | 17 | 26,5 | 15,3 | 0,655 | 14 000 | 19 000 | 0,23 | ▸ 7305 BECBM | – |
| | 62 | 17 | 29 | 17 | 0,72 | 15 000 | 22 000 | 0,23 | ▸ 7305 ACCBM | – |
| **30** | 62 | 16 | 22,5 | 14,3 | 0,61 | 13 000 | 10 000 | 0,26 | – | ▸ **7206 BE-2RZP** |
| | 62 | 16 | 22,5 | 14,3 | 0,61 | 13 000 | 13 000 | 0,2 | – | ▸ **7206 BEP** |
| | 62 | 16 | 24 | 15,6 | 0,655 | 13 000 | 14 000 | 0,2 | ▸ 7206 BECBP | – |
| | 62 | 16 | 24 | 15,6 | 0,655 | 13 000 | 14 000 | 0,2 | 7206 BECBPH | – |
| | 62 | 16 | 24 | 15,6 | 0,655 | 13 000 | 18 000 | 0,2 | ▸ 7206 BECBM | – |
| | 62 | 16 | 25,5 | 17 | 0,71 | 13 000 | 14 000 | 0,2 | ▸ 7206 BECBY | – |
| | 62 | 16 | 27,5 | 17,3 | 0,735 | 15 000 | 20 000 | 0,2 | 7206 ACCBM | – |
| | 72 | 19 | 32,5 | 19,3 | 0,815 | 12 000 | 9 500 | 0,35 | – | ▸ **7306 BE-2RZP** |
| | 72 | 19 | 32,5 | 19,3 | 0,815 | 12 000 | 12 000 | 0,34 | – | ▸ **7306 BEP** |
| | 72 | 19 | 35,5 | 21,2 | 0,9 | 12 000 | 13 000 | 0,34 | ▸ 7306 BECBP | – |
| | 72 | 19 | 35,5 | 21,2 | 0,9 | 12 000 | 13 000 | 0,34 | 7306 BEGAPH | – |
| | 72 | 19 | 35,5 | 21,2 | 0,9 | 12 000 | 16 000 | 0,34 | ▸ 7306 BECBM | – |
| | 72 | 19 | 37,5 | 23,2 | 0,98 | 12 000 | 13 000 | 0,34 | ▸ 7306 BECBY | – |
| | 72 | 19 | 39 | 23,6 | 1 | 13 000 | 19 000 | 0,34 | ▸ 7306 ACCBM | – |

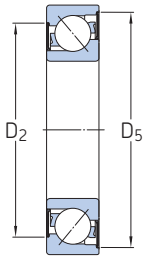
**SKF Explorer bearing**
▸ Popular item






| Dimensions | | | | | | | | Abutment and fillet dimensions | | | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $d_2$ ≈ | $D_1$, $D_2$ ≈ | $D_5$ ≈ | $r_{1,2}$ min. | $r_{3,4}$ min. | a | $d_a$ min. | $d_a$ max. | $D_a$ max. | $D_b$ max. | $r_a$ max. | $r_b$ max. | A | $k_r$ |
| mm | | | | | | | | mm | | | | | | – | |
| **25** | 36,1 | 30,8 | 42,7 | 48 | 1 | 0,6 | 24 | 30,6 | 35,5 | 46,4 | 47,8 | 1 | 0,6 | 0,00159 | 0,095 |
| | 36,1 | 30,8 | 41,6 | – | 1 | 0,6 | 24 | 30,6 | – | 46,4 | 47,8 | 1 | 0,6 | 0,00159 | 0,095 |
| | 36,1 | 30,8 | 41,6 | – | 1 | 0,6 | 24 | 30,6 | – | 46,4 | 47,8 | 1 | 0,6 | 0,00159 | 0,095 |
| | 36,1 | 30,8 | 41,5 | – | 1 | 0,6 | 24 | 30,6 | – | 46,4 | 47,8 | 1 | 0,6 | 0,00159 | 0,095 |
| | 36,1 | 30,8 | 41,5 | – | 1 | 0,6 | 24 | 30,6 | – | 46,4 | 47,8 | 1 | 0,6 | 0,00159 | 0,095 |
| | 36,1 | 30,8 | 41,5 | – | 1 | 0,6 | 24 | 30,6 | – | 46,4 | 47,8 | 1 | 0,6 | 0,00159 | 0,095 |
| | 36,1 | 30,8 | 41,5 | – | 1 | 0,6 | 24 | 30,6 | – | 46,4 | 47,8 | 1 | 0,6 | 0,00159 | 0,095 |
| | 35,8 | 30,7 | 41,7 | – | 1 | 0,6 | 16 | 30,6 | – | 46,4 | 47,8 | 1 | 0,6 | 0,00656 | 0,095 |
| | 39,7 | 32,3 | 50,5 | 56,9 | 1,1 | 0,6 | 26,8 | 32 | 39 | 55 | 57 | 1 | 0,6 | 0,00391 | 0,1 |
| | 39,7 | 32,3 | 48,3 | – | 1,1 | 0,6 | 26,8 | 32 | – | 55 | 57 | 1 | 0,6 | 0,00391 | 0,1 |
| | 39,7 | 32,3 | 48,3 | – | 1,1 | 0,6 | 26,8 | 32 | – | 55 | 57 | 1 | 0,6 | 0,00391 | 0,1 |
| | 39,7 | 32,3 | 48,3 | – | 1,1 | 0,6 | 26,8 | 32 | – | 55 | 57 | 1 | 0,6 | 0,00391 | 0,1 |
| | 39,7 | 32,3 | 48,3 | – | 1,1 | 0,6 | 26,8 | 32 | – | 55 | 57 | 1 | 0,6 | 0,00391 | 0,1 |
| | 39,7 | 32,3 | 48,3 | – | 1,1 | 0,6 | 26,8 | 32 | – | 55 | 57 | 1 | 0,6 | 0,00391 | 0,1 |
| | 39,7 | 32,3 | 48,3 | – | 1,1 | 0,6 | 26,8 | 32 | – | 55 | 57 | 1 | 0,6 | 0,00391 | 0,1 |
| | 39,5 | 32,2 | 48,1 | – | 1,1 | 0,6 | 18 | 32 | – | 55 | 57 | 1 | 0,6 | 0,00158 | 0,1 |
| **30** | 42,6 | 36,1 | 51,8 | 57,6 | 1 | 0,6 | 27,3 | 35,6 | 42 | 56 | 57 | 1 | 0,6 | 0,00377 | 0,095 |
| | 42,6 | 36,1 | 50,1 | – | 1 | 0,6 | 27,3 | 35,6 | – | 56 | 57 | 1 | 0,6 | 0,00377 | 0,095 |
| | 42,6 | 36,1 | 50,1 | – | 1 | 0,6 | 27,3 | 35,6 | – | 56 | 57 | 1 | 0,6 | 0,00377 | 0,095 |
| | 42,6 | 36,1 | 50,1 | – | 1 | 0,6 | 27,3 | 35,6 | – | 56 | 57 | 1 | 0,6 | 0,00377 | 0,095 |
| | 42,6 | 36,1 | 50,1 | – | 1 | 0,6 | 27,3 | 35,6 | – | 56 | 57 | 1 | 0,6 | 0,00377 | 0,095 |
| | 42,6 | 36,1 | 50,1 | – | 1 | 0,6 | 27,3 | 35,6 | – | 56 | 57 | 1 | 0,6 | 0,00408 | 0,095 |
| | 42,4 | 35,9 | 50,1 | – | 1 | 0,6 | 18 | 35,6 | – | 56 | 57 | 1 | 0,6 | 0,00155 | 0,095 |
| | 46,5 | 37,9 | 58,8 | 66,45 | 1,1 | 0,6 | 31 | 37 | 46 | 65 | 67 | 1 | 0,6 | 0,0074 | 0,1 |
| | 46,5 | 37,9 | 56,6 | – | 1,1 | 0,6 | 31 | 37 | – | 65 | 67 | 1 | 0,6 | 0,0074 | 0,1 |
| | 46,5 | 37,9 | 56,6 | – | 1,1 | 0,6 | 31 | 37 | – | 65 | 67 | 1 | 0,6 | 0,0074 | 0,1 |
| | 46,5 | 37,9 | 56,6 | – | 1,1 | 0,6 | 31 | 37 | – | 65 | 67 | 1 | 0,6 | 0,0074 | 0,1 |
| | 46,5 | 37,9 | 56,6 | – | 1,1 | 0,6 | 31 | 37 | – | 65 | 67 | 1 | 0,6 | 0,0074 | 0,1 |
| | 46,5 | 37,9 | 56,6 | – | 1,1 | 0,6 | 31 | 37 | – | 65 | 67 | 1 | 0,6 | 0,00814 | 0,1 |
| | 46,3 | 37,8 | 56,4 | – | 1,1 | 0,6 | 21 | 37 | – | 65 | 67 | 1 | 0,6 | 0,003 | 0,1 |

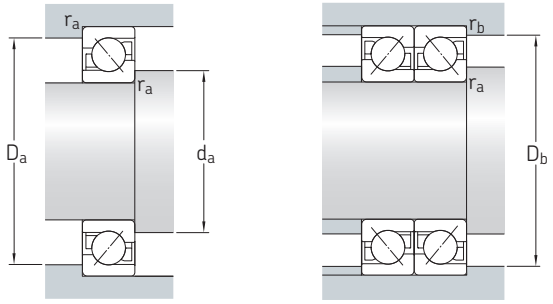



2RZ

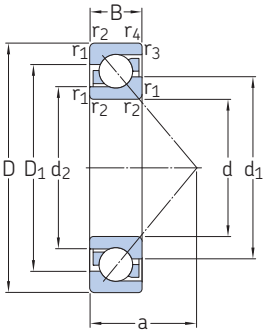
| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designations Universally matchable bearing | Basic design / sealed bearing |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **35** | 72 | 17 | 29,1 | 19 | 0,815 | 11 000 | 9 000 | 0,35 | – | ▸ **7207 BE-2RZP** |
| | 72 | 17 | 29,1 | 19 | 0,815 | 11 000 | 11 000 | 0,28 | – | ▸ **7207 BEP** |
| | 72 | 17 | 31 | 20,8 | 0,88 | 11 000 | 12 000 | 0,28 | ▸ 7207 BECBP | – |
| | 72 | 17 | 31 | 20,8 | 0,88 | 11 000 | 15 000 | 0,28 | ▸ 7207 BECBM | – |
| | 72 | 17 | 32,5 | 22,4 | 0,95 | 11 000 | 12 000 | 0,28 | ▸ 7207 BECBY | – |
| | 72 | 17 | 35,5 | 23,2 | 0,98 | 12 000 | 18 000 | 0,28 | 7207 ACCBM | – |
| | 80 | 21 | 39 | 24,5 | 1,04 | 11 000 | 8 500 | 0,45 | – | ▸ **7307 BE-2RZP** |
| | 80 | 21 | 39 | 24,5 | 1,04 | 11 000 | 10 000 | 0,45 | – | ▸ **7307 BEP** |
| | 80 | 21 | 41,5 | 26,5 | 1,14 | 11 000 | 11 000 | 0,45 | ▸ 7307 BECBP | – |
| | 80 | 21 | 41,5 | 26,5 | 1,14 | 11 000 | 11 000 | 0,45 | ▸ 7307 BECBY | – |
| | 80 | 21 | 41,5 | 26,5 | 1,14 | 11 000 | 11 000 | 0,45 | 7307 BEGAPH | – |
| | 80 | 21 | 41,5 | 26,5 | 1,14 | 11 000 | 14 000 | 0,45 | ▸ 7307 BECBM | – |
| | 80 | 21 | 46,5 | 30 | 1,27 | 11 000 | 17 000 | 0,45 | ▸ 7307 ACCBM | – |
| **40** | 80 | 18 | 34,5 | 24 | 1,02 | 10 000 | 8 000 | 0,42 | – | ▸ **7208 BE-2RZP** |
| | 80 | 18 | 34,5 | 24 | 1,02 | 10 000 | 10 000 | 0,37 | – | ▸ **7208 BEP** |
| | 80 | 18 | 36,5 | 26 | 1,1 | 10 000 | 11 000 | 0,37 | ▸ 7208 BECBP | – |
| | 80 | 18 | 36,5 | 26 | 1,1 | 10 000 | 11 000 | 0,37 | 7208 BECBPH | – |
| | 80 | 18 | 36,5 | 26 | 1,1 | 10 000 | 13 000 | 0,37 | ▸ 7208 BECBM | – |
| | 80 | 18 | 39 | 28 | 1,2 | 10 000 | 11 000 | 0,37 | ▸ 7208 BECBY | – |
| | 80 | 18 | 41,5 | 29 | 1,25 | 11 000 | 16 000 | 0,37 | 7208 ACCBM | – |
| | 90 | 23 | 46,2 | 30,5 | 1,29 | 9 500 | 7 500 | 0,62 | – | ▸ **7308 BE-2RZP** |
| | 90 | 23 | 46,2 | 30,5 | 1,29 | 9 500 | 9 000 | 0,62 | – | ▸ **7308 BEP** |
| | 90 | 23 | 50 | 32,5 | 1,37 | 9 500 | 10 000 | 0,62 | ▸ 7308 BECBP | – |
| | 90 | 23 | 50 | 32,5 | 1,37 | 9 500 | 10 000 | 0,62 | 7308 BEGAPH | – |
| | 90 | 23 | 50 | 32,5 | 1,37 | 9 500 | 12 000 | 0,68 | ▸ 7308 BECBM | – |
| | 90 | 23 | 53 | 35,5 | 1,5 | 9 500 | 10 000 | 0,64 | ▸ 7308 BECBY | – |
| | 90 | 23 | 56 | 36 | 1,53 | 10 000 | 15 000 | 0,68 | ▸ 7308 ACCBM | – |

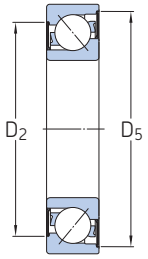
**SKF Explorer bearing**
▸ Popular item






| Dimensions | | | | | | | | Abutment and fillet dimensions | | | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $d_2$ ≈ | $D_1$, $D_2$ ≈ | $D_5$ ≈ | $r_{1,2}$ min. | $r_{3,4}$ min. | a | $d_a$ min. | $d_a$ max. | $D_a$ max. | $D_b$ max. | $r_a$ max. | $r_b$ max. | A | $k_r$ |
| mm | | | | | | | | mm | | | | | | – | |
| **35** | 49,6 | 41,9 | 59,9 | 67,7 | 1,1 | 0,6 | 31 | 42 | 49 | 65 | 67 | 1 | 0,6 | 0,00674 | 0,095 |
| | 49,6 | 41,9 | 58,3 | – | 1,1 | 0,6 | 31 | 42 | – | 65 | 67 | 1 | 0,6 | 0,00674 | 0,095 |
| | 49,6 | 41,9 | 58,3 | – | 1,1 | 0,6 | 31 | 42 | – | 65 | 67 | 1 | 0,6 | 0,00674 | 0,095 |
| | 49,6 | 41,9 | 58,3 | – | 1,1 | 0,6 | 31 | 42 | – | 65 | 67 | 1 | 0,6 | 0,00674 | 0,095 |
| | 49,6 | 41,9 | 58,3 | – | 1,1 | 0,6 | 31 | 42 | – | 65 | 67 | 1 | 0,6 | 0,0073 | 0,095 |
| | 49,4 | 41,9 | 58,3 | – | 1,1 | 0,6 | 20 | 42 | – | 65 | 67 | 1 | 0,6 | 0,00277 | 0,095 |
| | 52,5 | 43,6 | 65,1 | 74,3 | 1,5 | 1 | 35 | 44 | 52 | 71 | 74 | 1,5 | 1 | 0,0111 | 0,1 |
| | 52,5 | 43,6 | 63,5 | – | 1,5 | 1 | 35 | 44 | – | 71 | 74 | 1,5 | 1 | 0,0111 | 0,1 |
| | 52,5 | 43,6 | 63,5 | – | 1,5 | 1 | 35 | 44 | – | 71 | 74 | 1,5 | 1 | 0,0111 | 0,1 |
| | 52,5 | 43,6 | 63,5 | – | 1,5 | 1 | 35 | 44 | – | 71 | 74 | 1,5 | 1 | 0,0111 | 0,1 |
| | 52,5 | 43,6 | 63,5 | – | 1,5 | 1 | 35 | 44 | – | 71 | 74 | 1,5 | 1 | 0,0111 | 0,1 |
| | 52,5 | 43,6 | 63,5 | – | 1,5 | 1 | 35 | 44 | – | 71 | 74 | 1,5 | 1 | 0,0111 | 0,1 |
| | 52,5 | 43,5 | 63,2 | – | 1,5 | 1 | 23 | 44 | – | 71 | 74 | 1,5 | 1 | 0,00453 | 0,1 |
| **40** | 56,2 | 48 | 67,2 | 75,3 | 1,1 | 0,6 | 34 | 47 | 55 | 73 | 75 | 1 | 0,6 | 0,0102 | 0,095 |
| | 56,2 | 48 | 65,6 | – | 1,1 | 0,6 | 34 | 47 | – | 73 | 75 | 1 | 0,6 | 0,0102 | 0,095 |
| | 56,2 | 48 | 65,6 | – | 1,1 | 0,6 | 34 | 47 | – | 73 | 75 | 1 | 0,6 | 0,0102 | 0,095 |
| | 56,2 | 48 | 65,6 | – | 1,1 | 0,6 | 34 | 47 | – | 73 | 75 | 1 | 0,6 | 0,0102 | 0,095 |
| | 56,2 | 48 | 65,6 | – | 1,1 | 0,6 | 34 | 47 | – | 73 | 75 | 1 | 0,6 | 0,0102 | 0,095 |
| | 56,2 | 48 | 65,6 | – | 1,1 | 0,6 | 34 | 47 | – | 73 | 75 | 1 | 0,6 | 0,0109 | 0,095 |
| | 56 | 48 | 65,5 | – | 1,1 | 0,6 | 23 | 47 | – | 73 | 75 | 1 | 0,6 | 0,00419 | 0,095 |
| | 59,7 | 49,5 | 73,9 | 83 | 1,5 | 1 | 39 | 49 | 59 | 81 | 84 | 1,5 | 1 | 0,0173 | 0,1 |
| | 59,7 | 49,5 | 71,6 | – | 1,5 | 1 | 39 | 49 | – | 81 | 84 | 1,5 | 1 | 0,0173 | 0,1 |
| | 59,7 | 49,5 | 71,6 | – | 1,5 | 1 | 39 | 49 | – | 81 | 84 | 1,5 | 1 | 0,0173 | 0,1 |
| | 59,7 | 49,5 | 71,6 | – | 1,5 | 1 | 39 | 49 | – | 81 | 84 | 1,5 | 1 | 0,0173 | 0,1 |
| | 59,5 | 49,5 | 71,6 | – | 1,5 | 1 | 39 | 49 | – | 81 | 84 | 1,5 | 1 | 0,0173 | 0,1 |
| | 59,5 | 49,5 | 71,6 | – | 1,5 | 1 | 39 | 49 | – | 81 | 84 | 1,5 | 1 | 0,0189 | 0,1 |
| | 59,7 | 49,5 | 71,4 | – | 1,5 | 1 | 26 | 49 | – | 81 | 84 | 1,5 | 1 | 0,00707 | 0,1 |

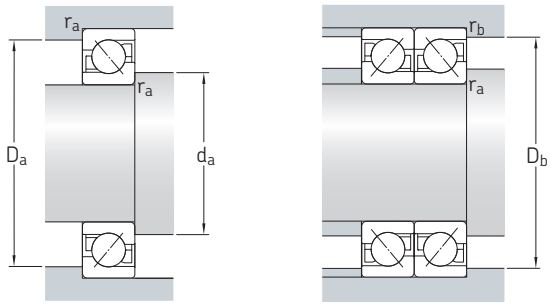



2RZ

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designations Universally matchable bearing | Basic design / sealed bearing |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **45** | 85 | 19 | 35,8 | 26 | 1,12 | 9 500 | 7 500 | 0,52 | – | ▸ **7209 BE-2RZP** |
| | 85 | 19 | 38 | 28,5 | 1,22 | 9 500 | 10 000 | 0,42 | ▸ 7209 BECBP | – |
| | 85 | 19 | 38 | 28,5 | 1,22 | 9 500 | 10 000 | 0,42 | 7209 BEGAPH | – |
| | 85 | 19 | 38 | 28,5 | 1,22 | 9 500 | 12 000 | 0,42 | ▸ 7209 BECBM | – |
| | 85 | 19 | 40 | 30,5 | 1,29 | 9 500 | 10 000 | 0,42 | 7209 BECBY | – |
| | 85 | 19 | 44 | 32 | 1,37 | 10 000 | 15 000 | 0,42 | 7209 ACCBM | – |
| | 100 | 25 | 55,9 | 37,5 | 1,6 | 8 500 | 6 700 | 0,85 | – | ▸ **7309 BE-2RZP** |
| | 100 | 25 | 55,9 | 37,5 | 1,6 | 8 500 | 8 000 | 0,82 | – | ▸ **7309 BEP** |
| | 100 | 25 | 61 | 40,5 | 1,73 | 8 500 | 9 000 | 0,82 | ▸ 7309 BECBP | – |
| | 100 | 25 | 61 | 40,5 | 1,73 | 8 500 | 9 000 | 0,82 | 7309 BEGAPH | – |
| | 100 | 25 | 61 | 40,5 | 1,73 | 8 500 | 11 000 | 0,91 | ▸ 7309 BECBM | – |
| | 100 | 25 | 64 | 45 | 1,9 | 8 500 | 9 000 | 0,87 | ▸ 7309 BECBY | – |
| | 100 | 25 | 68 | 45,5 | 1,93 | 9 000 | 13 000 | 0,91 | 7309 ACCBM | – |
| **50** | 90 | 20 | 37,7 | 28,5 | 1,22 | 9 000 | 7 000 | 0,55 | – | ▸ **7210 BE-2RZP** |
| | 90 | 20 | 37,7 | 28,5 | 1,22 | 9 000 | 8 500 | 0,47 | – | ▸ **7210 BEP** |
| | 90 | 20 | 40 | 31 | 1,32 | 9 000 | 9 000 | 0,47 | ▸ 7210 BECBP | – |
| | 90 | 20 | 40 | 31 | 1,32 | 9 000 | 9 000 | 0,47 | 7210 BECBPH | – |
| | 90 | 20 | 40 | 31 | 1,32 | 9 000 | 11 000 | 0,47 | ▸ 7210 BECBM | – |
| | 90 | 20 | 41,5 | 33,5 | 1,4 | 9 000 | 9 000 | 0,47 | ▸ 7210 BECBY | – |
| | 90 | 20 | 45,5 | 35,5 | 1,5 | 9 500 | 14 000 | 0,47 | 7210 ACCBM | – |
| | 110 | 27 | 68,9 | 47,5 | 2 | 7 500 | 6 000 | 1,2 | – | ▸ **7310 BE-2RZP** |
| | 110 | 27 | 75 | 51 | 2,16 | 7 500 | 8 000 | 1,1 | ▸ 7310 BECBP | – |
| | 110 | 27 | 75 | 51 | 2,16 | 7 500 | 8 000 | 1,1 | ▸ 7310 BEGAPH | – |
| | 110 | 27 | 75 | 51 | 2,16 | 7 500 | 10 000 | 1,1 | ▸ 7310 BECBM | – |
| | 110 | 27 | 78 | 56 | 2,36 | 7 500 | 8 000 | 1,15 | ▸ 7310 BECBY | – |
| | 110 | 27 | 83 | 57 | 2,4 | 8 000 | 12 000 | 1,1 | 7310 ACCBM | – |

**SKF Explorer bearing**
▸ Popular item

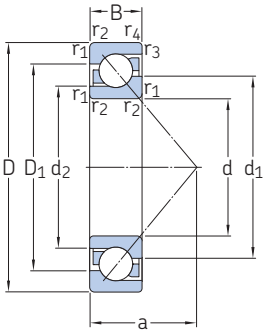


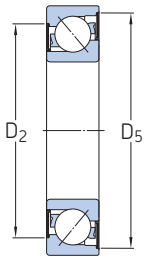



| Dimensions | | | | | | | | Abutment and fillet dimensions | | | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $d_2$ ≈ | $D_1$, $D_2$ ≈ | $D_5$ ≈ | $r_{1,2}$ min. | $r_{3,4}$ min. | a | $d_a$ min. | $d_a$ max. | $D_a$ max. | $D_b$ max. | $r_a$ max. | $r_b$ max. | A | $k_r$ |
| mm | | | | | | | | mm | | | | | | – | |
| **45** | 60,8 | 52,6 | 71,8 | 79,9 | 1,1 | 0,6 | 37 | 52 | 60 | 78 | 80 | 1 | 0,6 | 0,012 | 0,095 |
| | 60,8 | 52,6 | 70,2 | – | 1,1 | 0,6 | 37 | 52 | – | 78 | 80 | 1 | 0,6 | 0,012 | 0,095 |
| | 60,8 | 52,6 | 70,2 | – | 1,1 | 0,6 | 37 | 52 | – | 78 | 80 | 1 | 0,6 | 0,012 | 0,095 |
| | 60,8 | 52,6 | 70,2 | – | 1,1 | 0,6 | 37 | 52 | – | 78 | 80 | 1 | 0,6 | 0,012 | 0,095 |
| | 60,8 | 52,6 | 70,2 | – | 1,1 | 0,6 | 37 | 52 | – | 78 | 80 | 1 | 0,6 | 0,0128 | 0,095 |
| | 60,6 | 52,6 | 70,1 | – | 1,1 | 0,6 | 24 | 52 | – | 78 | 80 | 1 | 0,6 | 0,00496 | 0,095 |
| | 66,5 | 55,2 | 81,4 | 90,8 | 1,5 | 1 | 43 | 54 | 66 | 91 | 94 | 1,5 | 1 | 0,0268 | 0,1 |
| | 66,5 | 55,2 | 79,9 | – | 1,5 | 1 | 43 | 54 | – | 91 | 94 | 1,5 | 1 | 0,0268 | 0,1 |
| | 66,5 | 55,2 | 79,9 | – | 1,5 | 1 | 43 | 54 | – | 91 | 94 | 1,5 | 1 | 0,0268 | 0,1 |
| | 66,5 | 55,2 | 79,9 | – | 1,5 | 1 | 43 | 54 | – | 91 | 94 | 1,5 | 1 | 0,0268 | 0,1 |
| | 66,5 | 55,2 | 79,9 | – | 1,5 | 1 | 43 | 54 | – | 91 | 94 | 1,5 | 1 | 0,0268 | 0,1 |
| | 66,5 | 55,2 | 79,9 | – | 1,5 | 1 | 43 | 54 | – | 91 | 94 | 1,5 | 1 | 0,0292 | 0,1 |
| | 66,3 | 55,2 | 79,6 | – | 1,5 | 1 | 29 | 54 | – | 91 | 94 | 1,5 | 1 | 0,0109 | 0,1 |
| **50** | 65,7 | 57,6 | 76,8 | 84,9 | 1,1 | 0,6 | 39 | 57 | 65 | 83 | 85 | 1 | 0,6 | 0,014 | 0,095 |
| | 65,7 | 57,6 | 75,2 | – | 1,1 | 0,6 | 39 | 57 | – | 83 | 85 | 1 | 0,6 | 0,014 | 0,095 |
| | 65,7 | 57,6 | 75,2 | – | 1,1 | 0,6 | 39 | 57 | – | 83 | 85 | 1 | 0,6 | 0,014 | 0,095 |
| | 65,7 | 57,6 | 75,2 | – | 1,1 | 0,6 | 39 | 57 | – | 83 | 85 | 1 | 0,6 | 0,014 | 0,095 |
| | 65,7 | 57,6 | 75,2 | – | 1,1 | 0,6 | 39 | 57 | – | 83 | 85 | 1 | 0,6 | 0,014 | 0,095 |
| | 65,7 | 57,6 | 75,2 | – | 1,1 | 0,6 | 39 | 57 | – | 83 | 85 | 1 | 0,6 | 0,015 | 0,095 |
| | 65,6 | 57,6 | 75,1 | – | 1,1 | 0,6 | 26 | 57 | – | 83 | 85 | 1 | 0,6 | 0,00584 | 0,095 |
| | 73,8 | 61,1 | 91,6 | 101 | 2 | 1 | 47 | 61 | 73 | 99 | 104 | 2 | 1 | 0,0418 | 0,1 |
| | 73,8 | 61,1 | 88,8 | – | 2 | 1 | 47 | 61 | – | 99 | 104 | 2 | 1 | 0,0418 | 0,1 |
| | 73,8 | 61,1 | 88,8 | – | 2 | 1 | 47 | 61 | – | 99 | 104 | 2 | 1 | 0,0418 | 0,1 |
| | 73,8 | 61,1 | 88,8 | – | 2 | 1 | 47 | 61 | – | 99 | 104 | 2 | 1 | 0,0418 | 0,1 |
| | 73,8 | 61,1 | 88,8 | – | 2 | 1 | 47 | 61 | – | 99 | 104 | 2 | 1 | 0,0456 | 0,1 |
| | 73,6 | 61,1 | 88,4 | – | 2 | 1 | 32 | 61 | – | 99 | 104 | 2 | 1 | 0,017 | 0,1 |

## 3.1 Single row angular contact ball bearings

d **55 – 60** mm

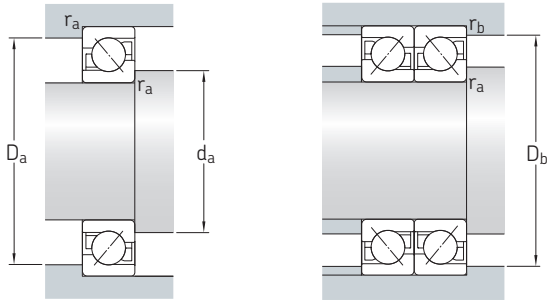



2RZ

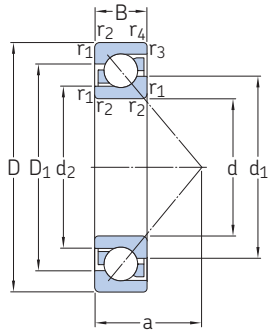
| Principal dimensions | | | Basic load ratings | | Fatigue load limit | Speed ratings | | Mass | Designations | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | dynamic | static | | Reference speed | Limiting speed | | Universally matchable bearing | Basic design / sealed bearing |
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **55** | 100 | 21 | 46,2 | 36 | 1,53 | 8 000 | 6 300 | 0,62 | – | ▸ **7211 BE-2RZP** |
| | 100 | 21 | 46,2 | 36 | 1,53 | 8 000 | 7 500 | 0,62 | – | ▸ **7211 BEP** |
| | 100 | 21 | 49 | 40 | 1,66 | 8 000 | 8 000 | 0,62 | ▸ 7211 BECBP | – |
| | 100 | 21 | 49 | 40 | 1,66 | 8 000 | 8 000 | 0,62 | 7211 BECBPH | – |
| | 100 | 21 | 49 | 40 | 1,66 | 8 000 | 10 000 | 0,62 | ▸ 7211 BECBM | – |
| | 100 | 21 | 51 | 42,5 | 1,8 | 8 000 | 8 000 | 0,62 | ▸ 7211 BECBY | – |
| | 100 | 21 | 57 | 45 | 1,9 | 8 500 | 12 000 | 0,62 | 7211 ACCBM | – |
| | 120 | 29 | 79,3 | 55 | 2,32 | 7 000 | 6 700 | 1,4 | – | ▸ **7311 BEP** |
| | 120 | 29 | 85 | 60 | 2,55 | 7 000 | 7 000 | 1,4 | ▸ 7311 BECBP | – |
| | 120 | 29 | 85 | 60 | 2,55 | 7 000 | 7 000 | 1,4 | 7311 BECBPH | – |
| | 120 | 29 | 85 | 60 | 2,55 | 7 000 | 9 000 | 1,4 | ▸ 7311 BECBM | – |
| | 120 | 29 | 90 | 65,5 | 2,75 | 7 000 | 7 000 | 1,4 | ▸ 7311 BECBY | – |
| | 120 | 29 | 96,5 | 67 | 2,85 | 7 500 | 11 000 | 1,4 | 7311 ACCBM | – |
| **60** | 110 | 22 | 57,2 | 45,5 | 1,93 | 7 000 | 7 000 | 0,8 | – | ▸ **7212 BEP** |
| | 110 | 22 | 61 | 50 | 2,12 | 7 000 | 7 500 | 0,8 | ▸ 7212 BECBP | – |
| | 110 | 22 | 61 | 50 | 2,12 | 7 000 | 7 500 | 0,8 | 7212 BECBPH | – |
| | 110 | 22 | 61 | 50 | 2,12 | 7 000 | 7 500 | 0,8 | ▸ 7212 BECBY | – |
| | 110 | 22 | 61 | 50 | 2,12 | 7 000 | 9 500 | 0,8 | ▸ 7212 BECBM | – |
| | 110 | 22 | 69,5 | 56 | 2,36 | 8 000 | 11 000 | 0,8 | 7212 ACCBM | – |
| | 130 | 31 | 95,6 | 69,5 | 3 | 6 300 | 6 000 | 1,75 | – | ▸ **7312 BEP** |
| | 130 | 31 | 104 | 76,5 | 3,2 | 6 300 | 6 700 | 1,75 | ▸ 7312 BECBP | – |
| | 130 | 31 | 104 | 76,5 | 3,2 | 6 300 | 6 700 | 1,75 | 7312 BECBPH | – |
| | 130 | 31 | 104 | 76,5 | 3,2 | 6 300 | 6 700 | 1,75 | ▸ 7312 BECBY | – |
| | 130 | 31 | 104 | 76,5 | 3,2 | 6 300 | 8 500 | 1,75 | ▸ 7312 BECBM | – |
| | 130 | 31 | 116 | 85 | 3,6 | 7 000 | 10 000 | 1,75 | 7312 ACCBM | – |

**SKF Explorer bearing**
▸ Popular item





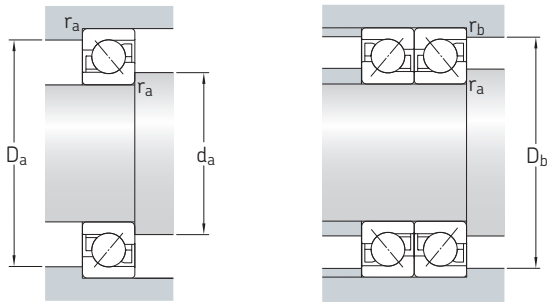

| Dimensions | | | | | | | | Abutment and fillet dimensions | | | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $d_2$ ≈ | $D_1$, $D_2$ ≈ | $D_5$ ≈ | $r_{1,2}$ min. | $r_{3,4}$ min. | a | $d_a$ min. | $d_a$ max. | $D_a$ max. | $D_b$ max. | $r_a$ max. | $r_b$ max. | A | $k_r$ |
| mm | | | | | | | | mm | | | | | | – | |
| **55** | 72,5 | 63,6 | 85,1 | 94,3 | 1,5 | 1 | 43 | 64 | 72 | 91 | 94 | 1,5 | 1 | 0,022 | 0,095 |
| | 72,5 | 63,6 | 83,7 | – | 1,5 | 1 | 43 | 64 | – | 91 | 94 | 1,5 | 1 | 0,022 | 0,095 |
| | 72,4 | 63,6 | 83,7 | – | 1,5 | 1 | 43 | 64 | – | 91 | 94 | 1,5 | 1 | 0,022 | 0,095 |
| | 72,4 | 63,6 | 83,7 | – | 1,5 | 1 | 43 | 64 | – | 91 | 94 | 1,5 | 1 | 0,022 | 0,095 |
| | 72,4 | 63,6 | 83,7 | – | 1,5 | 1 | 43 | 64 | – | 91 | 94 | 1,5 | 1 | 0,022 | 0,095 |
| | 72,4 | 63,6 | 83,7 | – | 1,5 | 1 | 43 | 64 | – | 91 | 94 | 1,5 | 1 | 0,0235 | 0,095 |
| | 72,6 | 63,6 | 83,2 | – | 1,5 | 1 | 28 | 64 | – | 91 | 94 | 1,5 | 1 | 0,00917 | 0,095 |
| | 80,3 | 66,6 | 96,6 | – | 2 | 1 | 51 | 66 | – | 109 | 114 | 2 | 1 | 0,0574 | 0,1 |
| | 80,3 | 66,6 | 96,6 | – | 2 | 1 | 51 | 66 | – | 109 | 114 | 2 | 1 | 0,0574 | 0,1 |
| | 80,3 | 66,6 | 96,6 | – | 2 | 1 | 51 | 66 | – | 109 | 114 | 2 | 1 | 0,0574 | 0,1 |
| | 80,3 | 66,6 | 96,6 | – | 2 | 1 | 51 | 66 | – | 109 | 114 | 2 | 1 | 0,0574 | 0,1 |
| | 80,3 | 66,6 | 96,6 | – | 2 | 1 | 51 | 66 | – | 109 | 114 | 2 | 1 | 0,0627 | 0,1 |
| | 80,1 | 66,6 | 96,2 | – | 2 | 1 | 34 | 66 | – | 109 | 114 | 2 | 1 | 0,0234 | 0,1 |
| **60** | 79,6 | 69,3 | 91,6 | – | 1,5 | 1 | 47 | 69 | – | 101 | 104 | 1,5 | 1 | 0,0344 | 0,095 |
| | 79,6 | 69,3 | 91,6 | – | 1,5 | 1 | 47 | 69 | – | 101 | 104 | 1,5 | 1 | 0,0344 | 0,095 |
| | 79,6 | 69,3 | 91,6 | – | 1,5 | 1 | 47 | 69 | – | 101 | 104 | 1,5 | 1 | 0,0344 | 0,095 |
| | 79,6 | 69,3 | 91,6 | – | 1,5 | 1 | 47 | 69 | – | 101 | 104 | 1,5 | 1 | 0,0344 | 0,095 |
| | 79,6 | 69,3 | 91,6 | – | 1,5 | 1 | 46 | 69 | – | 101 | 104 | 1,5 | 1 | 0,0344 | 0,095 |
| | 79,5 | 69,2 | 91,5 | – | 1,5 | 1 | 30 | 69 | – | 101 | 104 | 1,5 | 1 | 0,0143 | 0,095 |
| | 87,2 | 72,6 | 105 | – | 2,1 | 1,1 | 55 | 72 | – | 118 | 123 | 2 | 1 | 0,0846 | 0,1 |
| | 87,2 | 72,6 | 105 | – | 2,1 | 1,1 | 55 | 72 | – | 118 | 123 | 2 | 1 | 0,0846 | 0,1 |
| | 87,2 | 72,6 | 105 | – | 2,1 | 1,1 | 55 | 72 | – | 118 | 123 | 2 | 1 | 0,0846 | 0,1 |
| | 87,2 | 72,6 | 105 | – | 2,1 | 1,1 | 55 | 72 | – | 118 | 123 | 2 | 1 | 0,0846 | 0,1 |
| | 87,2 | 72,6 | 105 | – | 2,1 | 1,1 | 55 | 72 | – | 118 | 123 | 2 | 1 | 0,0846 | 0,1 |
| | 87,1 | 72,6 | 105 | – | 2,1 | 1,1 | 37 | 72 | – | 118 | 123 | 2 | 1 | 0,0345 | 0,1 |





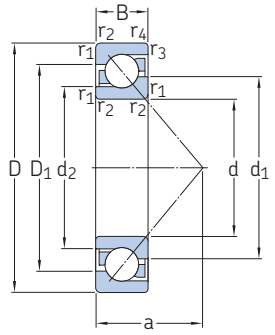

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designations Universally matchable bearing | Basic design / sealed bearing |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **65** | 120 | 23 | 66,3 | 54 | 2,28 | 6 700 | 6 300 | 1 | – | ▸ **7213 BEP** |
| | 120 | 23 | 69,5 | 57 | 2,45 | 6 700 | 6 700 | 1 | ▸ 7213 BECBP | – |
| | 120 | 23 | 69,5 | 57 | 2,45 | 6 700 | 6 700 | 1 | ▸ 7213 BECBY | – |
| | 120 | 23 | 69,5 | 57 | 2,45 | 6 700 | 6 700 | 1 | 7213 BEGAPH | – |
| | 120 | 23 | 69,5 | 57 | 2,45 | 6 700 | 8 500 | 1 | ▸ 7213 BECBM | – |
| | 120 | 23 | 81,5 | 65,5 | 2,8 | 7 000 | 10 000 | 1 | 7213 ACCBM | – |
| | 140 | 33 | 108 | 80 | 3,35 | 6 000 | 5 600 | 2,15 | – | ▸ **7313 BEP** |
| | 140 | 33 | 116 | 86,5 | 3,65 | 6 000 | 6 300 | 2,15 | ▸ 7313 BECBP | – |
| | 140 | 33 | 116 | 86,5 | 3,65 | 6 000 | 6 300 | 2,15 | 7313 BECBPH | – |
| | 140 | 33 | 116 | 86,5 | 3,65 | 6 000 | 6 300 | 2,15 | ▸ 7313 BECBY | – |
| | 140 | 33 | 116 | 86,5 | 3,65 | 6 000 | 8 000 | 2,15 | ▸ 7313 BECBM | – |
| | 140 | 33 | 132 | 96,5 | 4,05 | 6 300 | 9 500 | 2,15 | 7313 ACCBM | – |
| **70** | 125 | 24 | 67,6 | 56 | 2,36 | 6 300 | 6 000 | 1,1 | – | ▸ **7214 BEP** |
| | 125 | 24 | 72 | 60 | 2,55 | 6 300 | 6 300 | 1,1 | ▸ 7214 BECBP | – |
| | 125 | 24 | 72 | 60 | 2,55 | 6 300 | 6 300 | 1,1 | 7214 BECBPH | – |
| | 125 | 24 | 72 | 60 | 2,55 | 6 300 | 8 000 | 1,1 | ▸ 7214 BECBM | – |
| | 125 | 24 | 75 | 64 | 2,7 | 6 300 | 6 300 | 1,1 | ▸ 7214 BECBY | – |
| | 125 | 24 | 83 | 68 | 2,9 | 6 700 | 10 000 | 1,1 | 7214 ACCBM | – |
| | 150 | 35 | 119 | 90 | 3,65 | 5 600 | 5 300 | 2,65 | – | ▸ **7314 BEP** |
| | 150 | 35 | 127 | 98 | 3,9 | 5 600 | 5 600 | 2,65 | ▸ 7314 BECBP | – |
| | 150 | 35 | 127 | 98 | 3,9 | 5 600 | 5 600 | 2,65 | ▸ 7314 BECBPH | – |
| | 150 | 35 | 127 | 98 | 3,9 | 5 600 | 5 600 | 2,65 | ▸ 7314 BECBY | – |
| | 150 | 35 | 127 | 98 | 3,9 | 5 600 | 5 600 | 2,65 | 7314 BEGAPH | – |
| | 150 | 35 | 127 | 98 | 3,9 | 5 600 | 7 000 | 2,65 | ▸ 7314 BECBM | – |
| | 150 | 35 | 143 | 110 | 4,4 | 6 000 | 8 500 | 2,65 | 7314 ACCBM | – |
| **75** | 130 | 25 | 70,2 | 60 | 2,5 | 6 000 | 5 600 | 1,2 | – | ▸ **7215 BEP** |
| | 130 | 25 | 73,5 | 65,5 | 2,7 | 6 000 | 6 300 | 1,2 | ▸ 7215 BECBM | – |
| | 130 | 25 | 73,5 | 65,5 | 2,7 | 6 000 | 6 300 | 1,2 | ▸ 7215 BECBP | – |
| | 130 | 25 | 73,5 | 65,5 | 2,7 | 6 000 | 6 300 | 1,2 | 7215 BECBPH | – |
| | 130 | 25 | 76,5 | 69,5 | 2,9 | 6 000 | 6 300 | 1,2 | ▸ 7215 BECBY | – |
| | 160 | 37 | 125 | 98 | 3,8 | 5 300 | 5 000 | 3,2 | – | ▸ **7315 BEP** |
| | 160 | 37 | 132 | 104 | 4,15 | 5 300 | 5 300 | 3,2 | ▸ 7315 BECBP | – |
| | 160 | 37 | 132 | 104 | 4,15 | 5 300 | 5 300 | 3,2 | ▸ 7315 BECBY | – |
| | 160 | 37 | 132 | 104 | 4,15 | 5 300 | 5 300 | 3,2 | 7315 BEGAPH | – |
| | 160 | 37 | 132 | 104 | 4,15 | 5 300 | 6 700 | 3,2 | ▸ 7315 BECBM | – |

**SKF Explorer bearing**
▸ Popular item





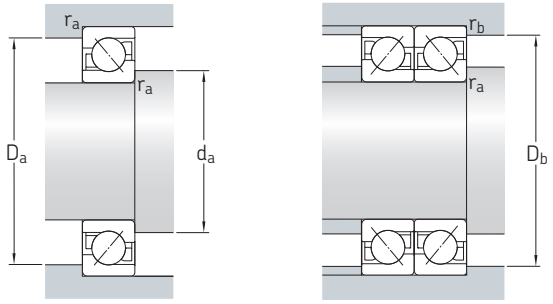

| Dimensions | | | | | | | | Abutment and fillet dimensions | | | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $d_2$ ≈ | $D_1$, $D_2$ ≈ | $D_5$ ≈ | $r_{1,2}$ min. | $r_{3,4}$ min. | a | $d_a$ min. | $d_a$ max. | $D_a$ max. | $D_b$ max. | $r_a$ max. | $r_b$ max. | A | $k_r$ |
| mm | | | | | | | | mm | | | | | | – | |
| **65** | 86,3 | 75,4 | 100 | – | 1,5 | 1 | 50 | 74 | – | 111 | 114 | 1,5 | 1 | 0,0478 | 0,095 |
| | 86,3 | 75,4 | 99,5 | – | 1,5 | 1 | 50 | 74 | – | 111 | 114 | 1,5 | 1 | 0,0478 | 0,095 |
| | 86,3 | 75,4 | 99,5 | – | 1,5 | 1 | 50 | 74 | – | 111 | 114 | 1,5 | 1 | 0,0478 | 0,095 |
| | 86,3 | 75,4 | 100 | – | 1,5 | 1 | 50 | 74 | – | 111 | 114 | 1,5 | 1 | 0,0478 | 0,095 |
| | 86,3 | 75,4 | 99,5 | – | 1,5 | 1 | 50 | 74 | – | 111 | 114 | 1,5 | 1 | 0,0478 | 0,095 |
| | 86,5 | 75,5 | 99,5 | – | 1,5 | 1 | 33 | 74 | – | 111 | 114 | 1,5 | 1 | 0,0199 | 0,095 |
| | 94,1 | 78,4 | 113 | – | 2,1 | 1,1 | 60 | 77 | – | 128 | 133 | 2 | 1 | 0,112 | 0,1 |
| | 94,1 | 78,4 | 113 | – | 2,1 | 1,1 | 60 | 77 | – | 128 | 133 | 2 | 1 | 0,112 | 0,1 |
| | 94,1 | 78,4 | 113 | – | 2,1 | 1,1 | 60 | 77 | – | 128 | 133 | 2 | 1 | 0,112 | 0,1 |
| | 94,1 | 78,4 | 113 | – | 2,1 | 1,1 | 60 | 77 | – | 128 | 133 | 2 | 1 | 0,112 | 0,1 |
| | 94,1 | 78,4 | 113 | – | 2,1 | 1,1 | 60 | 77 | – | 128 | 133 | 2 | 1 | 0,112 | 0,1 |
| | 94 | 78,4 | 113 | – | 2,1 | 1,1 | 40 | 77 | – | 128 | 133 | 2 | 1 | 0,0456 | 0,1 |
| **70** | 91,5 | 80,2 | 105 | – | 1,5 | 1 | 53 | 79 | – | 116 | 119 | 1,5 | 1 | 0,0529 | 0,095 |
| | 91,5 | 80,2 | 105 | – | 1,5 | 1 | 53 | 79 | – | 116 | 119 | 1,5 | 1 | 0,0529 | 0,095 |
| | 91,5 | 80,2 | 105 | – | 1,5 | 1 | 53 | 79 | – | 116 | 119 | 1,5 | 1 | 0,0529 | 0,095 |
| | 91,5 | 80,2 | 105 | – | 1,5 | 1 | 53 | 79 | – | 116 | 119 | 1,5 | 1 | 0,0529 | 0,095 |
| | 91,5 | 80,2 | 105 | – | 1,5 | 1 | 53 | 79 | – | 116 | 119 | 1,5 | 1 | 0,0564 | 0,095 |
| | 91,4 | 80,2 | 105 | – | 1,5 | 1 | 34 | 79 | – | 116 | 119 | 1,5 | 1 | 0,022 | 0,095 |
| | 101 | 84,4 | 122 | – | 2,1 | 1,1 | 64 | 82 | – | 138 | 143 | 2 | 1 | 0,145 | 0,1 |
| | 101 | 84,4 | 122 | – | 2,1 | 1,1 | 64 | 82 | – | 138 | 143 | 2 | 1 | 0,145 | 0,1 |
| | 101 | 84,4 | 122 | – | 2,1 | 1,1 | 64 | 82 | – | 138 | 143 | 2 | 1 | 0,145 | 0,1 |
| | 101 | 84,4 | 122 | – | 2,1 | 1,1 | 64 | 82 | – | 138 | 143 | 2 | 1 | 0,145 | 0,1 |
| | 101 | 84,4 | 122 | – | 2,1 | 1,1 | 64 | 82 | – | 138 | 143 | 2 | 1 | 0,145 | 0,1 |
| | 100 | 84,4 | 121 | – | 2,1 | 1,1 | 43 | 82 | – | 138 | 143 | 2 | 1 | 0,0592 | 0,1 |
| **75** | 96,3 | 85,2 | 111 | – | 1,5 | 1 | 56 | 84 | – | 121 | 124 | 1,5 | 1 | 0,0599 | 0,095 |
| | 96,3 | 85,2 | 111 | – | 1,5 | 1 | 56 | 84 | – | 121 | 124 | 1,5 | 1 | 0,0599 | 0,095 |
| | 96,3 | 85,2 | 111 | – | 1,5 | 1 | 56 | 84 | – | 121 | 124 | 1,5 | 1 | 0,0599 | 0,095 |
| | 96,3 | 85,2 | 111 | – | 1,5 | 1 | 56 | 84 | – | 121 | 124 | 1,5 | 1 | 0,0599 | 0,095 |
| | 96,3 | 85,2 | 111 | – | 1,5 | 1 | 56 | 84 | – | 121 | 124 | 1,5 | 1 | 0,0636 | 0,095 |
| | 108 | 91,1 | 129 | – | 2,1 | 1,1 | 68 | 87 | – | 148 | 153 | 2 | 1 | 0,171 | 0,1 |
| | 108 | 91,1 | 129 | – | 2,1 | 1,1 | 68 | 87 | – | 148 | 153 | 2 | 1 | 0,171 | 0,1 |
| | 108 | 91,1 | 129 | – | 2,1 | 1,1 | 68 | 87 | – | 148 | 153 | 2 | 1 | 0,171 | 0,1 |
| | 108 | 91,1 | 129 | – | 2,1 | 1,1 | 68 | 87 | – | 148 | 153 | 2 | 1 | 0,171 | 0,1 |
| | 108 | 91,1 | 129 | – | 2,1 | 1,1 | 68 | 87 | – | 148 | 153 | 2 | 1 | 0,171 | 0,1 |





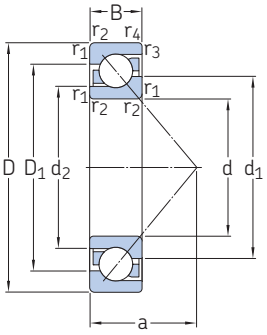

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designations Universally matchable bearing | Basic design / sealed bearing |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **80** | 140 | 26 | 80,6 | 69,5 | 2,8 | 5 600 | 5 300 | 1,45 | – | ▸ **7216 BEP** |
| | 140 | 26 | 85 | 75 | 3,05 | 5 600 | 5 600 | 1,45 | ▸ 7216 BECBP | – |
| | 140 | 26 | 85 | 75 | 3,05 | 5 600 | 5 600 | 1,45 | 7216 BECBPH | – |
| | 140 | 26 | 85 | 75 | 3,05 | 5 600 | 5 600 | 1,45 | ▸ 7216 BECBY | – |
| | 140 | 26 | 85 | 75 | 3,05 | 5 600 | 5 600 | 1,45 | 7216 BEGAPH | – |
| | 140 | 26 | 85 | 75 | 3,05 | 5 600 | 7 000 | 1,45 | ▸ 7216 BECBM | – |
| | 170 | 39 | 135 | 110 | 4,15 | 5 000 | 4 500 | 3,8 | – | ▸ **7316 BEP** |
| | 170 | 39 | 135 | 110 | 4,15 | 5 000 | 4 800 | 3,8 | – | ▸ **7316 BEM** |
| | 170 | 39 | 143 | 118 | 4,5 | 5 000 | 5 000 | 3,8 | ▸ 7316 BECBP | – |
| | 170 | 39 | 143 | 118 | 4,5 | 5 000 | 5 000 | 3,8 | 7316 BECBPH | – |
| | 170 | 39 | 143 | 118 | 4,5 | 5 000 | 5 000 | 3,8 | ▸ 7316 BECBY | – |
| | 170 | 39 | 143 | 118 | 4,5 | 5 000 | 6 300 | 3,8 | ▸ 7316 BECBM | – |
| **85** | 150 | 28 | 95,6 | 83 | 3,25 | 5 300 | 5 000 | 1,85 | – | ▸ **7217 BEP** |
| | 150 | 28 | 102 | 90 | 3,55 | 5 300 | 5 300 | 1,85 | ▸ 7217 BECBP | – |
| | 150 | 28 | 102 | 90 | 3,55 | 5 300 | 5 300 | 1,85 | ▸ 7217 BECBY | – |
| | 150 | 28 | 102 | 90 | 3,55 | 5 300 | 6 700 | 1,85 | ▸ 7217 BECBM | – |
| | 180 | 41 | 146 | 122 | 4,5 | 4 500 | 4 300 | 4,45 | – | ▸ **7317 BEP** |
| | 180 | 41 | 146 | 122 | 4,5 | 4 500 | 4 500 | 4,45 | – | **7317 BEM** |
| | 180 | 41 | 156 | 132 | 4,9 | 4 500 | 4 800 | 4,45 | ▸ 7317 BECBP | – |
| | 180 | 41 | 156 | 132 | 4,9 | 4 500 | 4 800 | 4,45 | ▸ 7317 BECBY | – |
| | 180 | 41 | 156 | 132 | 4,9 | 4 500 | 4 800 | 4,45 | 7317 BEGAPH | – |
| | 180 | 41 | 156 | 132 | 4,9 | 4 500 | 6 000 | 4,45 | ▸ 7317 BECBM | – |
| **90** | 160 | 30 | 108 | 96,5 | 3,65 | 5 000 | 4 500 | 2,3 | – | ▸ **7218 BEP** |
| | 160 | 30 | 116 | 104 | 4 | 5 000 | 5 000 | 2,3 | ▸ 7218 BECBP | – |
| | 160 | 30 | 116 | 104 | 4 | 5 000 | 5 000 | 2,3 | ▸ 7218 BECBY | – |
| | 160 | 30 | 116 | 104 | 4 | 5 000 | 6 300 | 2,3 | ▸ 7218 BECBM | – |
| | 190 | 43 | 156 | 134 | 4,8 | 4 300 | 4 000 | 5,2 | – | ▸ **7318 BEP** |
| | 190 | 43 | 156 | 134 | 4,8 | 4 300 | 4 300 | 5,2 | – | ▸ **7318 BEM** |
| | 190 | 43 | 166 | 146 | 5,3 | 4 300 | 4 500 | 5,2 | ▸ 7318 BECBP | – |
| | 190 | 43 | 166 | 146 | 5,3 | 4 300 | 4 500 | 5,2 | ▸ 7318 BECBY | – |
| | 190 | 43 | 166 | 146 | 5,3 | 4 300 | 4 500 | 5,2 | 7318 BEGAPH | – |
| | 190 | 43 | 166 | 146 | 5,3 | 4 300 | 5 600 | 5,2 | ▸ 7318 BECBM | – |

**SKF Explorer bearing**
▸ Popular item





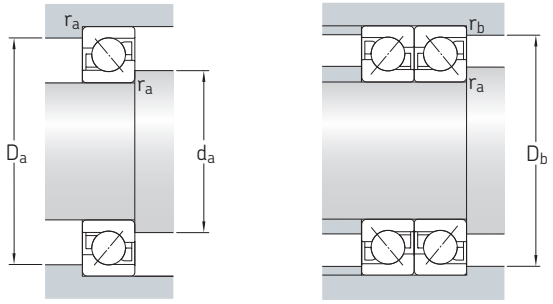

| Dimensions | | | | | | | | Abutment and fillet dimensions | | | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $d_2$ ≈ | $D_1$, $D_2$ ≈ | $D_5$ ≈ | $r_{1,2}$ min. | $r_{3,4}$ min. | a | $d_a$ min. | $d_a$ max. | $D_a$ max. | $D_b$ max. | $r_a$ max. | $r_b$ max. | A | $k_r$ |
| mm | | | | | | | | mm | | | | | | – | |
| **80** | 103 | 91,4 | 118 | – | 2 | 1 | 59 | 91 | – | 130 | 134 | 2 | 1 | 0,0801 | 0,095 |
| | 103 | 91,4 | 118 | – | 2 | 1 | 59 | 91 | – | 130 | 134 | 2 | 1 | 0,0801 | 0,095 |
| | 103 | 91,4 | 118 | – | 2 | 1 | 59 | 91 | – | 130 | 134 | 2 | 1 | 0,0801 | 0,095 |
| | 103 | 91,4 | 118 | – | 2 | 1 | 59 | 91 | – | 130 | 134 | 2 | 1 | 0,0801 | 0,095 |
| | 103 | 91,4 | 118 | – | 2 | 1 | 59 | 91 | – | 130 | 134 | 2 | 1 | 0,0801 | 0,095 |
| | 103 | 91,4 | 118 | – | 2 | 1 | 59 | 91 | – | 130 | 134 | 2 | 1 | 0,0801 | 0,095 |
| | 115 | 97 | 137 | – | 2,1 | 1,1 | 72 | 92 | – | 158 | 163 | 2 | 1 | 0,216 | 0,1 |
| | 115 | 97 | 137 | – | 2,1 | 1,1 | 72 | 92 | – | 158 | 163 | 2 | 1 | 0,216 | 0,1 |
| | 115 | 97 | 137 | – | 2,1 | 1,1 | 72 | 92 | – | 158 | 163 | 2 | 1 | 0,216 | 0,1 |
| | 115 | 97 | 137 | – | 2,1 | 1,1 | 72 | 92 | – | 158 | 163 | 2 | 1 | 0,216 | 0,1 |
| | 115 | 97 | 137 | – | 2,1 | 1,1 | 72 | 92 | – | 158 | 163 | 2 | 1 | 0,216 | 0,1 |
| | 115 | 97 | 137 | – | 2,1 | 1,1 | 72 | 92 | – | 158 | 163 | 2 | 1 | 0,216 | 0,1 |
| **85** | 110 | 97 | 127 | – | 2 | 1 | 63 | 96 | – | 139 | 144 | 2 | 1 | 0,114 | 0,095 |
| | 110 | 97 | 127 | – | 2 | 1 | 63 | 96 | – | 139 | 144 | 2 | 1 | 0,114 | 0,095 |
| | 110 | 97 | 127 | – | 2 | 1 | 63 | 96 | – | 139 | 144 | 2 | 1 | 0,114 | 0,095 |
| | 110 | 97 | 127 | – | 2 | 1 | 63 | 96 | – | 139 | 144 | 2 | 1 | 0,114 | 0,095 |
| | 122 | 103 | 145 | – | 3 | 1,1 | 76 | 99 | – | 166 | 173 | 2,5 | 1 | 0,27 | 0,1 |
| | 122 | 103 | 145 | – | 3 | 1,1 | 76 | 99 | – | 166 | 173 | 2,5 | 1 | 0,27 | 0,1 |
| | 122 | 103 | 145 | – | 3 | 1,1 | 76 | 99 | – | 166 | 173 | 2,5 | 1 | 0,27 | 0,1 |
| | 122 | 103 | 145 | – | 3 | 1,1 | 76 | 99 | – | 166 | 173 | 2,5 | 1 | 0,27 | 0,1 |
| | 122 | 103 | 145 | – | 3 | 1,1 | 76 | 99 | – | 166 | 173 | 2,5 | 1 | 0,27 | 0,1 |
| | 122 | 103 | 145 | – | 3 | 1,1 | 76 | 99 | – | 166 | 173 | 2,5 | 1 | 0,27 | 0,1 |
| **90** | 117 | 103 | 135 | – | 2 | 1 | 67 | 101 | – | 149 | 154 | 2 | 1 | 0,149 | 0,095 |
| | 117 | 103 | 135 | – | 2 | 1 | 67 | 101 | – | 149 | 154 | 2 | 1 | 0,149 | 0,095 |
| | 117 | 103 | 135 | – | 2 | 1 | 67 | 101 | – | 149 | 154 | 2 | 1 | 0,149 | 0,095 |
| | 117 | 103 | 135 | – | 2 | 1 | 67 | 101 | – | 149 | 154 | 2 | 1 | 0,149 | 0,095 |
| | 129 | 108 | 154 | – | 3 | 1,1 | 80 | 104 | – | 176 | 183 | 2,5 | 1 | 0,333 | 0,1 |
| | 129 | 108 | 154 | – | 3 | 1,1 | 80 | 104 | – | 176 | 183 | 2,5 | 1 | 0,333 | 0,1 |
| | 129 | 108 | 154 | – | 3 | 1,1 | 80 | 104 | – | 176 | 183 | 2,5 | 1 | 0,333 | 0,1 |
| | 129 | 108 | 154 | – | 3 | 1,1 | 80 | 104 | – | 176 | 183 | 2,5 | 1 | 0,333 | 0,1 |
| | 129 | 108 | 154 | – | 3 | 1,1 | 80 | 104 | – | 176 | 183 | 2,5 | 1 | 0,333 | 0,1 |
| | 129 | 108 | 154 | – | 3 | 1,1 | 80 | 104 | – | 176 | 183 | 2,5 | 1 | 0,333 | 0,1 |





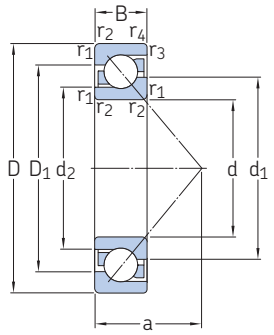

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designations Universally matchable bearing | Basic design / sealed bearing |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **95** | 170 | 32 | 124 | 108 | 4 | 4 500 | 4 300 | 2,7 | – | ▸ **7219 BEP** |
| | 170 | 32 | 129 | 118 | 4,4 | 4 500 | 4 800 | 2,7 | ▸ 7219 BECBP | – |
| | 170 | 32 | 129 | 118 | 4,4 | 4 500 | 4 800 | 2,7 | ▸ 7219 BECBY | – |
| | 170 | 32 | 129 | 118 | 4,4 | 4 500 | 4 800 | 2,7 | 7219 BEGAPH | – |
| | 170 | 32 | 129 | 118 | 4,4 | 4 500 | 6 000 | 2,7 | ▸ 7219 BECBM | – |
| | 200 | 45 | 168 | 150 | 5,2 | 4 000 | 3 800 | 6,05 | – | ▸ **7319 BEP** |
| | 200 | 45 | 168 | 150 | 5,2 | 4 000 | 4 000 | 6,05 | – | ▸ **7319 BEM** |
| | 200 | 45 | 180 | 163 | 5,7 | 4 000 | 4 300 | 6,05 | ▸ 7319 BECBP | – |
| | 200 | 45 | 180 | 163 | 5,7 | 4 000 | 4 300 | 6,05 | ▸ 7319 BECBY | – |
| | 200 | 45 | 180 | 163 | 5,7 | 4 000 | 5 300 | 6,05 | ▸ 7319 BECBM | – |
| **100** | 180 | 34 | 135 | 122 | 4,4 | 4 300 | 4 000 | 3,3 | – | ▸ **7220 BEP** |
| | 180 | 34 | 143 | 134 | 4,75 | 4 300 | 4 500 | 3,3 | ▸ 7220 BECBP | – |
| | 180 | 34 | 143 | 134 | 4,75 | 4 300 | 4 500 | 3,3 | ▸ 7220 BECBY | – |
| | 180 | 34 | 143 | 134 | 4,75 | 4 300 | 5 600 | 3,3 | ▸ 7220 BECBM | – |
| | 215 | 47 | 203 | 190 | 6,4 | 3 800 | 3 600 | 7,5 | – | ▸ **7320 BEM** |
| | 215 | 47 | 203 | 190 | 6,4 | 3 800 | 3 600 | 7,5 | – | ▸ **7320 BEP** |
| | 215 | 47 | 216 | 208 | 6,95 | 3 800 | 4 000 | 7,5 | ▸ 7320 BECBP | – |
| | 215 | 47 | 216 | 208 | 6,95 | 3 800 | 4 000 | 7,5 | ▸ 7320 BECBY | – |
| | 215 | 47 | 216 | 208 | 6,95 | 3 800 | 5 000 | 7,5 | ▸ 7320 BECBM | – |
| **105** | 190 | 36 | 156 | 150 | 5,2 | 4 000 | 4 300 | 3,95 | ▸ 7221 BECBP | - |
| | 190 | 36 | 156 | 150 | 5,2 | 4 000 | 5 300 | 3,95 | ▸ 7221 BECBM | - |
| | 225 | 49 | 203 | 193 | 6,4 | 3 600 | 3 400 | 8,55 | – | ▸ **7321 BEP** |
| | 225 | 49 | 216 | 208 | 6,95 | 3 600 | 3 800 | 8,55 | ▸ 7321 BECBP | - |
| | 225 | 49 | 216 | 208 | 6,95 | 3 600 | 4 800 | 8,55 | ▸ 7321 DECBM | - |
| **110** | 200 | 38 | 153 | 143 | 4,9 | 4 000 | 3 600 | 4,6 | – | ▸ **7222 BEP** |
| | 200 | 38 | 163 | 156 | 5,3 | 4 000 | 4 000 | 4,6 | ▸ 7222 BECBP | – |
| | 200 | 38 | 163 | 156 | 5,3 | 4 000 | 4 000 | 4,6 | ▸ 7222 BECBY | – |
| | 200 | 38 | 163 | 156 | 5,3 | 4 000 | 5 000 | 4,6 | ▸ 7222 BECBM | – |
| | 240 | 50 | 225 | 224 | 7,2 | 3 400 | 3 200 | 10 | – | **7322 BEY** |
| | 240 | 50 | 225 | 224 | 7,2 | 3 400 | 3 400 | 10 | – | ▸ **7322 BEM** |
| | 240 | 50 | 240 | 245 | 7,8 | 3 400 | 3 600 | 10 | ▸ 7322 BECBP | – |
| | 240 | 50 | 240 | 245 | 7,8 | 3 400 | 3 600 | 10 | ▸ 7322 BECBY | – |
| | 240 | 50 | 240 | 245 | 7,8 | 3 400 | 4 500 | 10 | ▸ 7322 BECBM | – |

**SKF Explorer bearing**
▸ Popular item





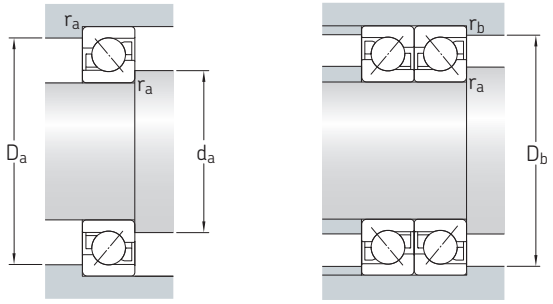

| Dimensions | | | | | | | | Abutment and fillet dimensions | | | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $d_2$ ≈ | $D_1$, $D_2$ ≈ | $D_5$ ≈ | $r_{1,2}$ min. | $r_{3,4}$ min. | a | $d_a$ min. | $d_a$ max. | $D_a$ max. | $D_b$ max. | $r_a$ max. | $r_b$ max. | A | $k_r$ |
| mm | | | | | | | | mm | | | | | | – | |
| **95** | 124 | 109 | 143 | – | 2,1 | 1,1 | 72 | 107 | – | 158 | 163 | 2 | 1 | 0,191 | 0,095 |
| | 124 | 109 | 143 | – | 2,1 | 1,1 | 72 | 107 | – | 158 | 163 | 2 | 1 | 0,191 | 0,095 |
| | 124 | 109 | 143 | – | 2,1 | 1,1 | 72 | 107 | – | 158 | 163 | 2 | 1 | 0,191 | 0,095 |
| | 124 | 109 | 143 | – | 2,1 | 1,1 | 72 | 107 | – | 158 | 163 | 2 | 1 | 0,191 | 0,095 |
| | 124 | 109 | 143 | – | 2,1 | 1,1 | 72 | 107 | – | 158 | 163 | 2 | 1 | 0,191 | 0,095 |
| | 136 | 114 | 162 | – | 3 | 1,1 | 84 | 109 | – | 186 | 193 | 2,5 | 1 | 0,406 | 0,1 |
| | 136 | 114 | 162 | – | 3 | 1,1 | 84 | 109 | – | 186 | 193 | 2,5 | 1 | 0,406 | 0,1 |
| | 136 | 114 | 162 | – | 3 | 1,1 | 84 | 109 | – | 186 | 193 | 2,5 | 1 | 0,406 | 0,1 |
| | 136 | 114 | 162 | – | 3 | 1,1 | 84 | 109 | – | 186 | 193 | 2,5 | 1 | 0,406 | 0,1 |
| **100** | 130 | 115 | 151 | – | 2,1 | 1,1 | 76 | 112 | – | 168 | 173 | 2 | 1 | 0,239 | 0,095 |
| | 130 | 115 | 151 | – | 2,1 | 1,1 | 76 | 112 | – | 168 | 173 | 2 | 1 | 0,239 | 0,095 |
| | 130 | 115 | 151 | – | 2,1 | 1,1 | 76 | 112 | – | 168 | 173 | 2 | 1 | 0,239 | 0,095 |
| | 130 | 115 | 151 | – | 2,1 | 1,1 | 76 | 112 | – | 168 | 173 | 2 | 1 | 0,239 | 0,095 |
| | 144 | 120 | 174 | – | 3 | 1,1 | 90 | 114 | – | 201 | 208 | 2,5 | 1 | 0,63 | 0,1 |
| | 144 | 120 | 174 | – | 3 | 1,1 | 90 | 114 | – | 201 | 208 | 2,5 | 1 | 0,63 | 0,1 |
| | 144 | 120 | 174 | – | 3 | 1,1 | 90 | 114 | – | 201 | 208 | 2,5 | 1 | 0,63 | 0,1 |
| | 144 | 120 | 174 | – | 3 | 1,1 | 90 | 114 | – | 201 | 208 | 2,5 | 1 | 0,63 | 0,1 |
| | 144 | 120 | 174 | – | 3 | 1,1 | 90 | 114 | – | 201 | 208 | 2,5 | 1 | 0,63 | 0,1 |
| **105** | 137 | 121 | 160 | – | 2,1 | 1,1 | 80 | 117 | – | 178 | 183 | 2 | 1 | 0,302 | 0,095 |
| | 137 | 121 | 160 | – | 2,1 | 1,1 | 80 | 117 | – | 178 | 183 | 2 | 1 | 0,302 | 0,095 |
| | 151 | 127 | 182 | – | 3 | 1,1 | 94 | 119 | – | 211 | 218 | 2,5 | 1 | 0,669 | 0,1 |
| | 151 | 127 | 182 | – | 3 | 1,1 | 94 | 119 | – | 211 | 218 | 2,5 | 1 | 0,669 | 0,1 |
| | 151 | 127 | 182 | – | 3 | 1,1 | 94 | 119 | – | 211 | 218 | 2,5 | 1 | 0,669 | 0,1 |
| **110** | 144 | 127 | 168 | – | 2,1 | 1,1 | 84 | 122 | – | 188 | 193 | 2 | 1 | 0,353 | 0,095 |
| | 144 | 127 | 168 | – | 2,1 | 1,1 | 84 | 122 | – | 188 | 193 | 2 | 1 | 0,353 | 0,095 |
| | 144 | 127 | 168 | – | 2,1 | 1,1 | 84 | 122 | – | 188 | 193 | 2 | 1 | 0,353 | 0,095 |
| | 144 | 127 | 168 | – | 2,1 | 1,1 | 84 | 122 | – | 188 | 193 | 2 | 1 | 0,353 | 0,095 |
| | 160 | 134 | 194 | – | 3 | 1,1 | 99 | 124 | – | 226 | 233 | 2,5 | 1 | 0,906 | 0,1 |
| | 160 | 134 | 194 | – | 3 | 1,1 | 99 | 124 | – | 226 | 233 | 2,5 | 1 | 0,906 | 0,1 |
| | 160 | 134 | 194 | – | 3 | 1,1 | 99 | 124 | – | 226 | 233 | 2,5 | 1 | 0,906 | 0,1 |
| | 160 | 134 | 194 | – | 3 | 1,1 | 99 | 124 | – | 226 | 233 | 2,5 | 1 | 0,906 | 0,1 |
| | 160 | 134 | 194 | – | 3 | 1,1 | 99 | 124 | – | 226 | 233 | 2,5 | 1 | 0,906 | 0,1 |






| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designations Universally matchable bearing | Basic design / sealed bearing |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **120** | 180 | 28 | 87,1 | 93 | 3,2 | 4 000 | 4 000 | 2,4 | ▸ **7024 BGM** | – |
| | 215 | 40 | 165 | 163 | 5,3 | 3 600 | 4 000 | 5,9 | ▸ **7224 BCBM** | ▸ **7224 BM** |
| | 260 | 55 | 238 | 250 | 7,65 | 3 000 | 3 600 | 14,5 | ▸ **7324 BCBM** | – |
| **130** | 230 | 40 | 186 | 193 | 6,1 | 3 400 | 3 800 | 6,95 | ▸ **7226 BCBM** | ▸ **7226 BM** |
| | 280 | 58 | 276 | 305 | 9 | 2 800 | 3 400 | 17 | ▸ **7326 BCBM** | ▸ **7326 BM** |
| **140** | 210 | 33 | 114 | 129 | 4,15 | 3 400 | 3 400 | 3,85 | ▸ **7028 BGM** | – |
| | 250 | 42 | 199 | 212 | 6,4 | 3 000 | 3 600 | 8,85 | ▸ **7228 BCBM** | ▸ **7228 BM** |
| | 300 | 62 | 302 | 345 | 9,8 | 2 600 | 3 000 | 21,5 | ▸ **7328 BCBM** | – |
| **150** | 225 | 35 | 133 | 146 | 4,55 | 3 200 | 3 200 | 4,7 | **7030 BGM** | – |
| | 270 | 45 | 216 | 240 | 6,95 | 2 800 | 3 200 | 11,5 | ▸ **7230 BCBM** | – |
| | 320 | 65 | 332 | 390 | 10,8 | 2 400 | 2 800 | 26 | ▸ **7330 BCBM** | – |
| **160** | 290 | 48 | 255 | 300 | 8,5 | 2 600 | 3 000 | 14 | ▸ **7232 BCBM** | – |
| **170** | 260 | 42 | 172 | 204 | 5,85 | 2 800 | 2 800 | 7,65 | **7034 BGM** | – |
| | 310 | 52 | 281 | 345 | 9,5 | 2 400 | 2 800 | 17,5 | ▸ **7234 BCBM** | – |
| | 360 | 72 | 390 | 490 | 12,7 | 2 200 | 2 600 | 36 | ▸ **7334 BCBM** | – |
| **180** | 280 | 46 | 195 | 240 | 6,7 | 2 600 | 2 600 | 10 | **7036 BGM** | – |
| | 320 | 52 | 291 | 375 | 10 | 2 400 | 2 600 | 18 | ▸ **7236 BCBM** | – |
| | 380 | 75 | 410 | 540 | 13,7 | 2 000 | 2 400 | 42 | ▸ **7336 BCBM** | – |
| **190** | 290 | 46 | 199 | 255 | 6,95 | 2 400 | 2 400 | 10,5 | **7038 BGM** | – |
| | 340 | 55 | 307 | 405 | 10,4 | 2 000 | 2 600 | 22 | ▸ **7238 BCBM** | – |
| | 400 | 78 | 442 | 600 | 14,6 | 2 000 | 2 200 | 48,5 | ▸ **7338 BCBM** | – |
| **200** | 310 | 51 | 225 | 290 | 7,8 | 2 200 | 2 200 | 18 | ▸ **7040 BGM** | – |
| | 360 | 58 | 325 | 430 | 11 | 2 000 | 2 400 | 25 | ▸ **7240 BCBM** | – |
| | 420 | 80 | 462 | 655 | 15,6 | 1 900 | 2 200 | 53 | **7340 BCBM** | – |
| **220** | 340 | 56 | 255 | 355 | 9 | 2 000 | 2 000 | 18 | **7044 BGM** | – |
| | 400 | 65 | 390 | 560 | 13,4 | 1 900 | 2 200 | 37 | **7244 BCBM** | – |
| **240** | 360 | 56 | 260 | 375 | 9,15 | 1 900 | 1 900 | 19 | ▸ **7048 BGM** | – |
| | 440 | 72 | 449 | 670 | 15,3 | 1 600 | 2 600 | 49 | ▸ **7248 BCBM** | – |
| **260** | 400 | 65 | 332 | 510 | 11,8 | 1 700 | 1 700 | 30 | **7052 BGM** | – |
| **280** | 420 | 65 | 338 | 540 | 12,2 | 1 600 | 1 600 | 30 | **7056 BGM** | – |
| | 500 | 80 | 507 | 830 | 17,6 | 1 400 | 1 400 | 67,5 | – | **7256 BM** |
| **300** | 540 | 85 | 553 | 930 | 19,3 | 1 300 | 1 300 | 85 | **7260 BCBM** | – |

▸ Popular item

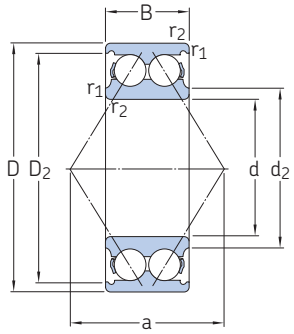




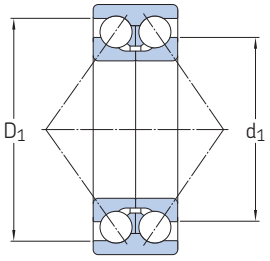

| Dimensions | | | | | | | | Abutment and fillet dimensions | | | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $d_2$ ≈ | $D_1$, $D_2$ ≈ | $D_5$ ≈ | $r_{1,2}$ min. | $r_{3,4}$ min. | a | $d_a$ min. | $d_a$ max. | $D_a$ max. | $D_b$ max. | $r_a$ max. | $r_b$ max. | A | $k_r$ |
| mm | | | | | | | | mm | | | | | | – | |
| **120** | 143 | 132 | 158 | – | 2 | 1 | 77 | 130 | – | 170 | 174 | 2 | 1 | 0,139 | 0,083 |
| | 157 | 138 | 180 | – | 2,1 | 1,1 | 90 | 132 | – | 203 | 208 | 2 | 1 | 0,45 | 0,08 |
| | 178 | 153 | 211 | – | 3 | 1,5 | 107 | 134 | – | 246 | 253 | 2,5 | 1 | 1,11 | 0,09 |
| **130** | 168 | 149 | 193 | – | 3 | 1,1 | 96 | 144 | – | 216 | 222 | 2,5 | 1 | 0,605 | 0,08 |
| | 189 | 161 | 228 | – | 4 | 1,5 | 115 | 147 | – | 263 | 271 | 3 | 1,5 | 1,65 | 0,09 |
| **140** | 167 | 154 | 185 | – | 2 | 1 | 90 | 150 | – | 200 | 204 | 2 | 1 | 0,263 | 0,083 |
| | 183 | 163 | 210 | – | 3 | 1,1 | 103 | 154 | – | 236 | 243 | 2,5 | 1 | 0,763 | 0,08 |
| | 202 | 172 | 243 | – | 4 | 1,5 | 123 | 158 | – | 283 | 291 | 3 | 1,5 | 2,14 | 0,09 |
| **150** | 179 | 166 | 198 | – | 2,1 | 1,1 | 96 | 162 | – | 213 | 218 | 2 | 1 | 0,349 | 0,083 |
| | 197 | 175 | 226 | – | 3 | 1,1 | 111 | 164 | – | 256 | 263 | 2,5 | 1 | 1,01 | 0,08 |
| | 216 | 183 | 259 | – | 4 | 1,5 | 131 | 167 | – | 303 | 311 | 3 | 1,5 | 2,74 | 0,09 |
| **160** | 211 | 187 | 243 | – | 3 | 1,1 | 118 | 174 | – | 276 | 283 | 2,5 | 1 | 1,48 | 0,08 |
| **170** | 205 | 189 | 227 | – | 2,1 | 1,1 | 111 | 182 | – | 248 | 253 | 2 | 1 | 0,643 | 0,083 |
| | 227 | 202 | 262 | – | 4 | 1,5 | 127 | 187 | – | 293 | 301 | 3 | 1,5 | 2 | 0,08 |
| | 243 | 207 | 292 | – | 4 | 2 | 147 | 187 | – | 343 | 351 | 3 | 2 | 4,32 | 0,09 |
| **180** | 219 | 201 | 244 | – | 2,1 | 1,1 | 119 | 192 | – | 268 | 273 | 2 | 1 | 0,912 | 0,083 |
| | 234 | 209 | 269 | – | 4 | 1,5 | 131 | 197 | – | 303 | 311 | 3 | 1,5 | 2,21 | 0,08 |
| | 257 | 219 | 308 | – | 4 | 2 | 156 | 197 | – | 363 | 370 | 3 | 2 | 5,33 | 0,09 |
| **190** | 229 | 211 | 254 | – | 2,1 | 1,1 | 124 | 202 | – | 278 | 283 | 2 | 1 | 1 | 0,083 |
| | 250 | 224 | 286 | – | 4 | 1,5 | 139 | 207 | – | 323 | 331 | 3 | 1,5 | 2,63 | 0,08 |
| | 271 | 231 | 325 | – | 5 | 2 | 164 | 210 | – | 380 | 390 | 4 | 2 | 6,5 | 0,09 |
| **200** | 243 | 224 | 270 | – | 2,1 | 1,1 | 145 | 234 | – | 285 | 333 | 2,5 | 1,1 | 1,37 | 0,083 |
| | 263 | 235 | 301 | – | 4 | 1,5 | 146 | 217 | – | 343 | 351 | 3 | 1,5 | 3,2 | 0,08 |
| | 286 | 247 | 340 | – | 5 | 2 | 170 | 220 | – | 400 | 410 | 4 | 2 | 7,5 | 0,09 |
| **220** | 267 | 245 | 296 | – | 3 | 1,1 | 145 | 234 | – | 326 | 333 | 2,5 | 1,1 | 1,97 | 0,083 |
| | 291 | 259 | 334 | – | 4 | 1,5 | 164 | 237 | – | 383 | 391 | 3 | 1,5 | 5,13 | 0,08 |
| **240** | 287 | 265 | 316 | – | 3 | 1,1 | 154 | 254 | – | 346 | 353 | 2,5 | 1,1 | 2,23 | 0,082 |
| | 322 | 292 | 361 | – | 4 | 1,5 | 180 | 257 | – | 423 | 431 | 4 | 1,5 | 5,12 | 0,08 |
| **260** | 314 | 289 | 349 | – | 4 | 1,5 | 171 | 276 | – | 373 | 380 | 3 | 1,5 | 3,94 | 0,083 |
| **280** | 334 | 309 | 369 | – | 4 | 1,5 | 179 | 298 | – | 402 | 411 | 3 | 1,5 | 4,4 | 0,083 |
| | 367 | 328 | 418 | – | 5 | 2 | 204 | 300 | – | 480 | 489 | 4 | 2 | 11,3 | 0,08 |
| **300** | 395 | 351 | 450 | – | 5 | 2 | 219 | 322 | – | 518 | 528 | 4 | 2 | 15,2 | 0,08 |

## 3.2 Double row angular contact ball bearings

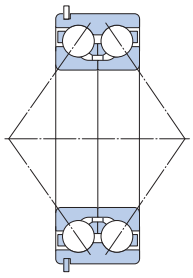
d **10 – 50** mm




32 A, 33 A



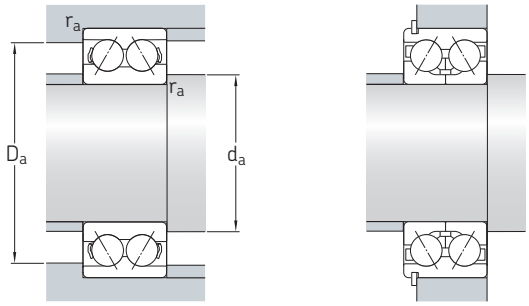

33 D



33 DNRCBM[1)]

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designations Bearing with metal cage | polyamide cage |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **10** | 30 | 14 | 7,61 | 4,3 | 0,183 | 26 000 | 24 000 | 0,051 | – | ▸ **3200 ATN9** |
| **12** | 32 | 15,9 | 10,1 | 5,6 | 0,24 | 24 000 | 22 000 | 0,058 | – | ▸ **3201 ATN9** |
| **15** | 35 | 15,9 | 11,2 | 6,8 | 0,285 | 22 000 | 18 000 | 0,066 | – | ▸ **3202 ATN9** |
| | 42 | 19 | 15,1 | 9,3 | 0,4 | 18 000 | 16 000 | 0,13 | – | ▸ **3302 ATN9** |
| **17** | 40 | 17,5 | 14,3 | 8,8 | 0,365 | 19 000 | 16 000 | 0,096 | – | ▸ **3203 ATN9** |
| | 47 | 22,2 | 21,6 | 12,7 | 0,54 | 17 000 | 14 000 | 0,18 | – | **3303 ATN9** |
| **20** | 47 | 20,6 | 20,4 | 12,9 | 0,55 | 16 000 | 14 000 | 0,16 | ▸ **3204 A** | ▸ **3204 ATN9** |
| | 52 | 22,2 | 23,6 | 14,6 | 0,62 | 15 000 | 13 000 | 0,22 | ▸ **3304 A** | ▸ **3304 ATN9** |
| **25** | 52 | 20,6 | 21,6 | 14,3 | 0,6 | 14 000 | 12 000 | 0,18 | ▸ **3205 A** | ▸ **3205 ATN9** |
| | 62 | 25,4 | 32 | 20,4 | 0,865 | 12 000 | 11 000 | 0,35 | ▸ **3305 A** | ▸ **3305 ATN9** |
| **30** | 62 | 23,8 | 30 | 20,4 | 0,865 | 11 000 | 10 000 | 0,29 | ▸ **3206 A** | ▸ **3206 ATN9** |
| | 72 | 30,2 | 42,5 | 30 | 1,27 | 10 000 | 9 000 | 0,52 | ▸ **3306 A** | ▸ **3306 ATN9** |
| **35** | 72 | 27 | 40 | 28 | 1,18 | 10 000 | 9 000 | 0,44 | ▸ **3207 A** | ▸ **3207 ATN9** |
| | 80 | 34,9 | 52 | 35,5 | 1,5 | 9 500 | 8 500 | 0,74 | ▸ **3307 A** | ▸ **3307 ATN9** |
| | 80 | 34,9 | 52,7 | 41,5 | 1,76 | 9 000 | 8 000 | 0,79 | **3307 DJ1** | – |
| **40** | 80 | 30,2 | 48 | 36,5 | 1,56 | 9 000 | 8 000 | 0,57 | ▸ **3208 A** | ▸ **3208 ATN9** |
| | 90 | 36,5 | 49,4 | 41,5 | 1,76 | 8 000 | 7 000 | 1,2 | **3308 DNRCBM** | – |
| | 90 | 36,5 | 64 | 44 | 1,86 | 8 000 | 7 500 | 0,93 | ▸ **3308 A** | ▸ **3308 ATN9** |
| | 90 | 36,5 | 68,9 | 57 | 2,45 | 8 000 | 7 000 | 1,05 | ▸ **3308 DMA** | – |
| | 90 | 36,5 | 68,9 | 57 | 2,45 | 8 000 | 7 000 | 1,05 | **3308 DTN9** | – |
| **45** | 85 | 30,2 | 51 | 39 | 1,63 | 8 500 | 7 500 | 0,63 | ▸ **3209 A** | ▸ **3209 ATN9** |
| | 100 | 39,7 | 61,8 | 52 | 2,2 | 7 500 | 6 300 | 1,5 | **3309 DNRCBM** | – |
| | 100 | 39,7 | 75 | 53 | 2,24 | 7 500 | 6 700 | 1,25 | ▸ **3309 A** | ▸ **3309 ATN9** |
| | 100 | 39,7 | 79,3 | 69,5 | 3 | 7 500 | 6 300 | 1,65 | **3309 DMA** | – |
| **50** | 90 | 30,2 | 51 | 42,5 | 1,8 | 8 000 | 7 000 | 0,65 | ▸ **3210 A** | ▸ **3210 ATN9** |
| | 110 | 44,4 | 81,9 | 69,5 | 3 | 6 700 | 5 600 | 1,95 | **3310 DNRCBM** | – |
| | 110 | 44,4 | 90 | 64 | 2,75 | 6 700 | 6 000 | 1,7 | ▸ **3310 A** | ▸ **3310 ATN9** |
| | 110 | 44,4 | 93,6 | 85 | 3,6 | 6 700 | 5 600 | 2,2 | ▸ **3310 DMA** | – |

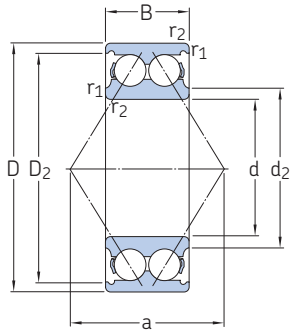
**SKF Explorer bearing**
▸ Popular item
1) For dimensions of snap ring groove and snap ring → table 7, page 395



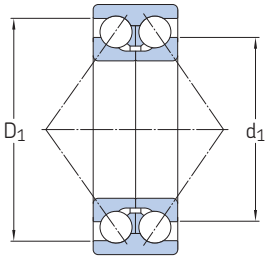

| Dimensions | | | | | | | Abutment and fillet dimensions | | | Calculation factor |
|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $d_2$ ≈ | $D_1$ ≈ | $D_2$ ≈ | $r_{1,2}$ min. | a | $d_a$ min. | $D_a$ max. | $r_a$ max. | $k_r$ |
| mm | | | | | | | mm | | | – |
| **10** | – | 15,8 | – | 25 | 0,6 | 16 | 14,4 | 25,6 | 0,6 | 0,06 |
| **12** | – | 17,2 | – | 27,7 | 0,6 | 19 | 16,4 | 27,6 | 0,6 | 0,06 |
| **15** | – | 20,2 | – | 30,7 | 0,6 | 21 | 19,4 | 30,6 | 0,6 | 0,06 |
| | – | 23,7 | – | 35,7 | 1 | 24 | 20,6 | 36,4 | 1 | 0,07 |
| **17** | – | 23,3 | – | 35 | 0,6 | 23 | 21,4 | 35,6 | 0,6 | 0,06 |
| | – | 25,7 | – | 40,2 | 1 | 28 | 22,6 | 41,4 | 1 | 0,07 |
| **20** | – | 27,7 | – | 40,9 | 1 | 28 | 25,6 | 41,4 | 1 | 0,06 |
| | – | 29,9 | – | 44 | 1,1 | 30 | 27 | 45 | 1 | 0,07 |
| **25** | – | 32,7 | – | 45,9 | 1 | 30 | 31 | 46 | 1 | 0,06 |
| | – | 35,7 | – | 53,4 | 1,1 | 36 | 32 | 55 | 1 | 0,07 |
| **30** | – | 38,7 | – | 55,2 | 1 | 36 | 36 | 56 | 1 | 0,06 |
| | – | 39,8 | – | 64,1 | 1,1 | 42 | 37 | 65 | 1 | 0,07 |
| **35** | – | 45,4 | – | 63,9 | 1,1 | 42 | 42 | 65 | 1 | 0,06 |
| | – | 44,6 | – | 70,5 | 1,5 | 47 | 44 | 71 | 1,5 | 0,07 |
| | 52,8 | – | 69 | – | 1,5 | 76 | 44 | 71 | 1,5 | 0,095 |
| **40** | – | 47,8 | – | 72,1 | 1,1 | 46 | 47 | 73 | 1 | 0,06 |
| | 61,1 | – | 77,5 | – | 1,5 | 71 | 49 | – | 1,5 | 0,095 |
| | – | 50,8 | – | 80,5 | 1,5 | 53 | 49 | 81 | 1,5 | 0,07 |
| | 59,4 | – | 77,8 | – | 1,5 | 84 | 49 | 81 | 1,5 | 0,095 |
| | 59,4 | – | 77,8 | – | 1,5 | 84 | 49 | 81 | 1,5 | 0,095 |
| **45** | – | 52,8 | – | 77,1 | 1,1 | 46 | 52 | 78 | 1 | 0,06 |
| | 67,9 | – | 86,6 | – | 1,5 | 79 | 54 | – | 1,5 | 0,095 |
| | – | 55,6 | – | 90 | 1,5 | 58 | 54 | 91 | 1,5 | 0,07 |
| | 70 | – | 86,4 | – | 1,5 | 93 | 54 | 91 | 1,5 | 0,095 |
| **50** | – | 57,8 | – | 82,1 | 1,1 | 52 | 57 | 83 | 1 | 0,06 |
| | 74,6 | – | 96,4 | – | 2 | 102 | 61 | – | 2 | 0,095 |
| | – | 62 | – | 99,5 | 2 | 65 | 61 | 99 | 2 | 0,07 |
| | 76,5 | – | 94,2 | – | 2 | 102 | 61 | 99 | 2 | 0,095 |

## 3.2 Double row angular contact ball bearings

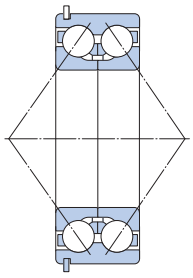
d **55 – 110** mm




32 A, 33 A



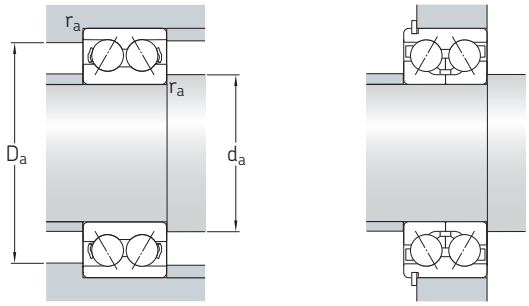

33 D



33 DNRCBM[1)]

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designations Bearing with metal cage | polyamide cage |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **55** | 100 | 33,3 | 60 | 47,5 | 2 | 6 300 | 6 300 | 0,91 | ▸ 3211 A | ▸ 3211 ATN9 |
| | 120 | 49,2 | 95,6 | 83 | 3,55 | 5 000 | 5 300 | 2,55 | **3311 DNRCBM** | – |
| | 120 | 49,2 | 111 | 100 | 4,3 | 4 800 | 5 000 | 2,8 | **3311 DMA** | – |
| | 120 | 49,2 | 112 | 81,5 | 3,45 | 5 300 | 5 300 | 2,65 | 3311 A | 3311 ATN9 |
| **60** | 110 | 36,5 | 73,5 | 58,5 | 2,5 | 6 300 | 5 600 | 1,2 | ▸ 3212 A | ▸ 3212 ATN9 |
| | 130 | 54 | 127 | 95 | 4,05 | 5 600 | 5 000 | 2,8 | ▸ 3312 A | – |
| **65** | 120 | 38,1 | 80,6 | 73,5 | 3,1 | 5 600 | 4 800 | 1,75 | ▸ **3213 A** | – |
| | 140 | 58,7 | 138 | 122 | 5,1 | 5 300 | 4 500 | 4 | **3313 DNRCBM** | – |
| | 140 | 58,7 | 146 | 110 | 4,55 | 5 300 | 4 500 | 4,1 | ▸ 3313 A | – |
| **70** | 125 | 39,7 | 88,4 | 80 | 3,4 | 5 600 | 4 500 | 1,9 | ▸ **3214 A** | – |
| | 150 | 63,5 | 163 | 125 | 5 | 5 000 | 4 300 | 5,05 | ▸ 3314 A | – |
| **75** | 130 | 41,3 | 95,6 | 88 | 3,75 | 5 300 | 4 500 | 2,1 | ▸ **3215 A** | – |
| | 160 | 68,3 | 176 | 140 | 5,5 | 4 500 | 4 000 | 5,55 | ▸ 3315 A | – |
| **80** | 140 | 44,4 | 106 | 95 | 3,9 | 5 000 | 4 300 | 2,65 | ▸ **3216 A** | – |
| | 170 | 68,3 | 193 | 156 | 6 | 4 300 | 3 800 | 6,8 | ▸ 3316 A | – |
| **85** | 150 | 49,2 | 124 | 110 | 4,4 | 4 500 | 3 800 | 3,4 | ▸ **3217 A** | – |
| | 180 | 73 | 208 | 176 | 6,55 | 4 000 | 3 600 | 8,3 | ▸ 3317 A | – |
| **90** | 160 | 52,4 | 130 | 120 | 4,55 | 4 300 | 3 600 | 4,15 | ▸ **3218 A** | – |
| | 190 | 73 | 208 | 180 | 6,4 | 3 800 | 3 400 | 9,25 | ▸ 3318 A | – |
| **95** | 170 | 55,6 | 159 | 146 | 5,4 | 4 000 | 3 400 | 5 | ▸ **3219 A** | – |
| | 200 | 77,8 | 240 | 216 | 7,5 | 3 600 | 3 200 | 11 | ▸ 3319 A | – |
| **100** | 180 | 60,3 | 178 | 166 | 6 | 3 800 | 3 200 | 6,1 | ▸ **3220 A** | – |
| | 215 | 82,6 | 255 | 255 | 8,65 | 3 400 | 2 800 | 13,5 | ▸ **3320 A** | – |
| **110** | 200 | 69,8 | 212 | 212 | 7,2 | 3 400 | 2 800 | 8,8 | ▸ **3222 A** | – |
| | 240 | 92,1 | 291 | 305 | 9,8 | 3 000 | 2 600 | 19 | **3322 A** | – |

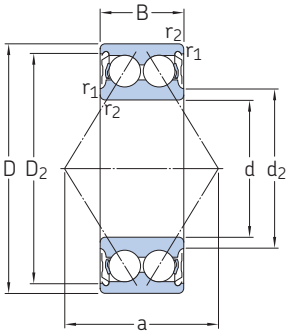
**SKF Explorer bearing**
▸ Popular item
1) For dimensions of snap ring groove and snap ring → table 7, page 395



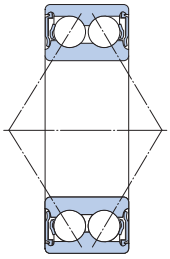

| Dimensions | | | | | | | Abutment and fillet dimensions | | | Calculation factor |
|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $d_2$ ≈ | $D_1$ ≈ | $D_2$ ≈ | $r_{1,2}$ min. | a | $d_a$ min. | $D_a$ max. | $r_a$ max. | $k_r$ |
| mm | | | | | | | mm | | | – |
| **55** | – | 63,2 | – | 92,3 | 1,5 | 57 | 63 | 91 | 1,5 | 0,06 |
| | 81,5 | – | 106 | – | 2 | 97 | 66 | – | 2 | 0,095 |
| | 81,4 | – | 105 | – | 2 | 114 | 66 | 109 | 2 | 0,095 |
| | – | 68,4 | – | 110 | 2 | 72 | 66 | 109 | 2 | 0,07 |
| **60** | 74,4 | – | 96,2 | – | 1,5 | 63 | 69 | 101 | 1,5 | 0,06 |
| | 84,2 | – | 110 | – | 2,1 | 78 | 72 | 118 | 2 | 0,07 |
| **65** | 84,9 | – | 103 | – | 1,5 | 71 | 74 | 111 | 1,5 | 0,06 |
| | 95 | – | 125 | – | 2,1 | 114 | 77 | – | 2 | 0,095 |
| | 89,8 | – | 116 | – | 2,1 | 84 | 77 | 128 | 2 | 0,07 |
| **70** | 88,5 | – | 108 | – | 1,5 | 74 | 79 | 116 | 1,5 | 0,06 |
| | 96,5 | – | 125 | – | 2,1 | 89 | 82 | 138 | 2 | 0,07 |
| **75** | 92 | – | 112 | – | 1,5 | 77 | 84 | 121 | 1,5 | 0,06 |
| | 103 | – | 135 | – | 2,1 | 97 | 87 | 148 | 2 | 0,07 |
| **80** | 97,6 | – | 120 | – | 2 | 82 | 91 | 129 | 2 | 0,06 |
| | 109 | – | 144 | – | 2,1 | 101 | 92 | 158 | 2 | 0,07 |
| **85** | 103 | – | 136 | – | 2 | 88 | 96 | 139 | 2 | 0,06 |
| | 116 | – | 153 | – | 3 | 107 | 99 | 166 | 2,5 | 0,07 |
| **90** | 111 | – | 137 | – | 2 | 94 | 101 | 149 | 2 | 0,06 |
| | 123 | – | 160 | – | 3 | 112 | 104 | 176 | 2,5 | 0,07 |
| **95** | 119 | – | 146 | – | 2,1 | 101 | 107 | 158 | 2 | 0,06 |
| | 127 | – | 176 | – | 3 | 127 | 109 | 186 | 2,5 | 0,07 |
| **100** | 126 | – | 162 | – | 2,1 | 107 | 112 | 168 | 2 | 0,06 |
| | 135 | – | 180 | – | 3 | 127 | 114 | 201 | 2,5 | 0,07 |
| **110** | 139 | – | 174 | – | 2,1 | 119 | 122 | 188 | 2 | 0,06 |
| | 152 | – | 201 | – | 3 | 142 | 124 | 226 | 2,5 | 0,07 |

## 3.3 Capped double row angular contact ball bearings

d **10 – 75** mm



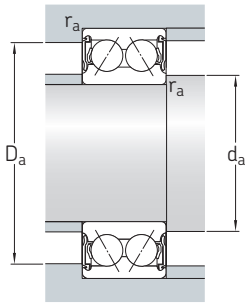

2Z



2RS1

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Limiting speed Bearing with shields | seals | Mass | Designations Bearing with shields | seals |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **10** | 30 | 14 | 7,61 | 4,3 | 0,183 | 24 000 | 17 000 | 0,051 | **3200 A-2Z** | **3200 A-2RS1** |
| **12** | 32 | 15,9 | 10,1 | 5,6 | 0,24 | 22 000 | 15 000 | 0,058 | **3201 A-2Z** | **3201 A-2RS1** |
| **15** | 35 | 15,9 | 11,2 | 6,8 | 0,285 | 18 000 | 14 000 | 0,066 | **3202 A-2Z** | **3202 A-2RS1** |
| | 42 | 19 | 15,1 | 9,3 | 0,4 | 16 000 | 12 000 | 0,13 | **3302 A-2Z** | **3302 A-2RS1** |
| **17** | 40 | 17,5 | 14,3 | 8,8 | 0,365 | 16 000 | 12 000 | 0,1 | **3203 A-2Z** | **3203 A-2RS1** |
| | 47 | 22,2 | 21,6 | 12,7 | 0,54 | 14 000 | 11 000 | 0,18 | **3303 A-2Z** | **3303 A-2RS1** |
| **20** | 47 | 20,6 | 20,4 | 12,9 | 0,55 | 14 000 | 10 000 | 0,16 | ▸ 3204 A-2Z | ▸ 3204 A-2RS1 |
| | 52 | 22,2 | 23,6 | 14,6 | 0,62 | 13 000 | 9 000 | 0,22 | 3304 A-2Z | ▸ 3304 A-2RS1 |
| **25** | 52 | 20,6 | 21,6 | 14,3 | 0,6 | 12 000 | 8 500 | 0,18 | ▸ 3205 A-2Z | ▸ 3205 A-2RS1 |
| | 62 | 25,4 | 32 | 20,4 | 0,865 | 11 000 | 7 500 | 0,35 | ▸ 3305 A-2Z | 3305 A-2RS1 |
| **30** | 62 | 23,8 | 30 | 20,4 | 0,865 | 10 000 | 7 500 | 0,29 | ▸ 3206 A-2Z | ▸ 3206 A-2RS1 |
| | 72 | 30,2 | 42,5 | 30 | 1,27 | 9 000 | 6 300 | 0,52 | ▸ 3306 A-2Z | ▸ 3306 A-2RS1 |
| **35** | 72 | 27 | 40 | 28 | 1,18 | 9 000 | 6 300 | 0,44 | ▸ 3207 A-2Z | ▸ 3207 A-2RS1 |
| | 80 | 34,9 | 52 | 35,5 | 1,5 | 8 500 | 6 000 | 0,74 | 3307 A-2Z | ▸ 3307 A-2RS1 |
| **40** | 80 | 30,2 | 48 | 36,5 | 1,56 | 8 000 | 5 600 | 0,57 | ▸ 3208 A-2Z | ▸ 3208 A-2RS1 |
| | 90 | 36,5 | 64 | 44 | 1,86 | 7 500 | 5 000 | 0,93 | ▸ 3308 A-2Z | 3308 A-2RS1 |
| **45** | 85 | 30,2 | 51 | 39 | 1,63 | 7 500 | 5 300 | 0,63 | ▸ 3209 A-2Z | ▸ 3209 A-2RS1 |
| | 100 | 39,7 | 75 | 53 | 2,24 | 6 700 | 4 800 | 1,25 | 3309 A-2Z | ▸ 3309 A-2RS1 |
| **50** | 90 | 30,2 | 51 | 42,5 | 1,8 | 7 000 | 4 800 | 0,65 | ▸ 3210 A-2Z | ▸ 3210 A-2RS1 |
| | 110 | 44,4 | 90 | 64 | 2,75 | 6 000 | 4 300 | 1,7 | ▸ 3310 A-2Z | 3310 A-2RS1 |
| **55** | 100 | 33,3 | 60 | 47,5 | 2 | 6 300 | 4 500 | 0,91 | 3211 A-2Z | ▸ 3211 A-2RS1 |
| | 120 | 49,2 | 112 | 81,5 | 3,45 | 5 300 | 3 800 | 2,65 | 3311 A-2Z | 3311 A-2RS1 |
| **60** | 110 | 36,5 | 73,5 | 58,5 | 2,5 | 5 600 | 4 000 | 1,2 | 3212 A-2Z | ▸ 3212 A-2RS1 |
| | 130 | 54 | 127 | 95 | 4,05 | 5 000 | – | 2,8 | 3312 A-2Z | – |
| **65** | 120 | 38,1 | 80,6 | 73,5 | 3,1 | 4 800 | 3 600 | 1,75 | **3213 A-2Z** | **3213 A-2RS1** |
| | 140 | 58,7 | 146 | 110 | 4,55 | 4 500 | – | 4,1 | 3313 A-2Z | – |
| **70** | 125 | 39,7 | 88,4 | 80 | 3,4 | 4 500 | – | 1,9 | **3214 A-2Z** | – |
| | 150 | 63,5 | 163 | 125 | 5 | 4 300 | – | 5,05 | 3314 A-2Z | – |
| **75** | 130 | 41,3 | 95,6 | 88 | 3,75 | 4 500 | – | 2,1 | ▸ **3215 A-2Z** | – |
| | 160 | 68,3 | 176 | 140 | 5,5 | 4 000 | – | 5,6 | 3315 A-2Z | – |

**SKF Explorer bearing**
▸ Popular item

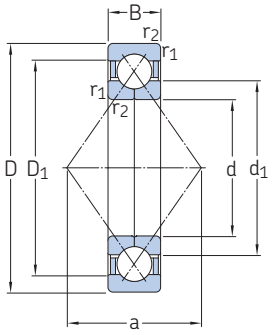




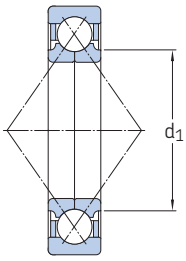

| Dimensions | | | | | Abutment and fillet dimensions | | | | Calculation factor |
|---|---|---|---|---|---|---|---|---|---|
| d | $d_2$ ≈ | $D_2$ ≈ | $r_{1,2}$ min. | a | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | $k_r$ |
| mm | | | | | mm | | | | – |
| **10** | 15,8 | 25 | 0,6 | 16 | 14,4 | 15,5 | 25,6 | 0,6 | 0,06 |
| **12** | 17,2 | 27,7 | 0,6 | 19 | 16,4 | 17 | 27,6 | 0,6 | 0,06 |
| **15** | 20,2<br>23,7 | 30,7<br>35,7 | 0,6<br>1 | 21<br>24 | 19,4<br>20,6 | 20<br>23,5 | 30,6<br>36,4 | 0,6<br>1 | 0,06<br>0,07 |
| **17** | 23,3<br>25,7 | 35<br>40,2 | 0,6<br>1 | 23<br>28 | 21,4<br>22,6 | 23<br>25,5 | 35,6<br>41,4 | 0,6<br>1 | 0,06<br>0,07 |
| **20** | 27,7<br>29,9 | 40,9<br>44 | 1<br>1,1 | 28<br>30 | 25,6<br>27 | 27,5<br>29,5 | 41,4<br>45 | 1<br>1 | 0,06<br>0,07 |
| **25** | 32,7<br>35,7 | 45,9<br>53,4 | 1<br>1,1 | 30<br>36 | 30,6<br>32 | 32,5<br>35,5 | 46,4<br>55 | 1<br>1 | 0,06<br>0,07 |
| **30** | 38,7<br>39,8 | 55,2<br>64,1 | 1<br>1,1 | 36<br>42 | 35,6<br>37 | 38,5<br>39,5 | 56<br>65 | 1<br>1 | 0,06<br>0,07 |
| **35** | 45,4<br>44,6 | 63,9<br>70,5 | 1,1<br>1,5 | 42<br>47 | 42<br>44 | 45<br>44,5 | 65<br>71 | 1<br>1,5 | 0,06<br>0,07 |
| **40** | 47,8<br>50,8 | 72,1<br>80,5 | 1,1<br>1,5 | 46<br>53 | 47<br>49 | 48<br>50 | 73<br>81 | 1<br>1,5 | 0,06<br>0,07 |
| **45** | 52,8<br>55,6 | 77,1<br>90 | 1,1<br>1,5 | 46<br>58 | 52<br>54 | 52<br>91 | 78<br>91 | 1<br>1,5 | 0,06<br>0,07 |
| **50** | 57,8<br>62 | 82,1<br>99,5 | 1,1<br>2 | 52<br>65 | 57<br>61 | 57<br>61 | 83<br>99 | 1<br>2 | 0,06<br>0,07 |
| **55** | 63,2<br>68,4 | 92,3<br>110 | 1,5<br>2 | 57<br>72 | 63<br>66 | 63<br>68 | 91<br>109 | 1,5<br>2 | 0,06<br>0,07 |
| **60** | 68,8<br>73,4 | 101<br>118 | 1,5<br>2,1 | 63<br>78 | 69<br>72 | 68<br>73 | 101<br>118 | 1,5<br>2 | 0,06<br>0,07 |
| **65** | 77,5<br>79,2 | 111<br>128 | 1,5<br>2,1 | 71<br>84 | 74<br>77 | 76<br>78 | 111<br>128 | 1,5<br>2 | 0,06<br>0,07 |
| **70** | 82,5<br>86,5 | 116<br>137 | 1,5<br>2,1 | 74<br>89 | 79<br>82 | 82<br>84 | 116<br>138 | 1,5<br>2 | 0,06<br>0,07 |
| **75** | 87,5<br>95,4 | 121<br>147 | 1,5<br>2,1 | 77<br>97 | 84<br>87 | 84<br>88 | 121<br>148 | 1,5<br>2 | 0,06<br>0,07 |

## 3.4 Four-point contact ball bearings

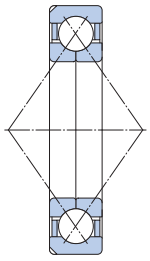
d **15 – 65** mm




Basic design



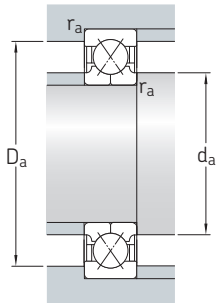

SKF Explorer bearing



Bearing with locating slots

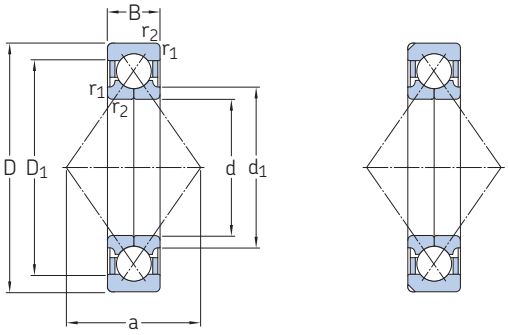
| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Limiting speed | Mass | Designations Bearing with locating slots[1] | without locating slots |
|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | kg | – | |
| **15** | 35 | 11 | 12,7 | 8,3 | 0,355 | 36 000 | 0,062 | **QJ 202 N2MA** | – |
| **17** | 40 | 12 | 17 | 11,4 | 0,48 | 30 000 | 0,082 | QJ 203 N2MA | – |
| | 47 | 14 | 23,4 | 15 | 0,64 | 28 000 | 0,14 | **QJ 303 N2MA** | – |
| **20** | 52 | 15 | 32 | 21,6 | 0,93 | 24 000 | 0,18 | QJ 304 N2MA | ▸ QJ 304 MA |
| | 52 | 15 | 32 | 21,6 | 0,93 | 24 000 | 0,18 | QJ 304 N2PHAS | – |
| **25** | 52 | 15 | 27 | 21,2 | 0,9 | 22 000 | 0,16 | QJ 205 N2MA | – |
| | 62 | 17 | 42,5 | 30 | 1,27 | 20 000 | 0,29 | QJ 305 N2MA | QJ 305 MA |
| **30** | 62 | 16 | 37,5 | 30,5 | 1,29 | 19 000 | 0,24 | QJ 206 N2MA | ▸ QJ 206 MA |
| | 72 | 19 | 53 | 41,5 | 1,76 | 17 000 | 0,42 | QJ 306 N2MA | ▸ QJ 306 MA |
| | 72 | 19 | 53 | 41,5 | 1,76 | 17 000 | 0,42 | QJ 306 N2PHAS | – |
| **35** | 72 | 17 | 49 | 41,5 | 1,76 | 17 000 | 0,35 | QJ 207 N2MA | – |
| | 80 | 21 | 64 | 51 | 2,16 | 15 000 | 0,57 | QJ 307 N2MA | ▸ QJ 307 MA |
| | 80 | 21 | 64 | 51 | 2,16 | 15 000 | 0,57 | QJ 307 N2PHAS | – |
| **40** | 80 | 18 | 56 | 49 | 2,08 | 15 000 | 0,45 | – | ▸ QJ 208 MA |
| | 90 | 23 | 78 | 64 | 2,7 | 14 000 | 0,78 | QJ 308 N2MA | ▸ QJ 308 MA |
| | 90 | 23 | 78 | 64 | 2,7 | 14 000 | 0,78 | QJ 308 N2PHAS | – |
| **45** | 85 | 19 | 63 | 56 | 2,36 | 14 000 | 0,52 | – | ▸ QJ 209 MA |
| | 100 | 25 | 100 | 83 | 3,55 | 12 000 | 1,05 | QJ 309 N2MA | ▸ QJ 309 MA |
| | 100 | 25 | 100 | 83 | 3,55 | 12 000 | 1,05 | QJ 309 N2PHAS | QJ 309 PHAS |
| **50** | 90 | 20 | 65,5 | 61 | 2,6 | 13 000 | 0,59 | – | ▸ QJ 210 MA |
| | 110 | 27 | 118 | 100 | 4,25 | 11 000 | 1,35 | – | ▸ QJ 310 MA |
| | 110 | 27 | 118 | 100 | 4,25 | 11 000 | 1,35 | – | QJ 310 PHAS |
| **55** | 100 | 21 | 85 | 83 | 3,55 | 11 000 | 0,77 | QJ 211 N2MA | ▸ QJ 211 MA |
| | 120 | 29 | 137 | 118 | 5 | 10 000 | 1,75 | QJ 311 N2MA | ▸ QJ 311 MA |
| **60** | 110 | 22 | 96,5 | 93 | 4 | 10 000 | 0,99 | QJ 212 N2PHAS | – |
| | 110 | 22 | 96,5 | 93 | 4 | 10 000 | 0,99 | QJ 212 N2MA | ▸ QJ 212 MA |
| | 130 | 31 | 156 | 137 | 5,85 | 9 000 | 2,15 | QJ 312 N2MA | ▸ QJ 312 MA |
| | 130 | 31 | 156 | 137 | 5,85 | 9 000 | 2,15 | – | ▸ QJ 312 PHAS |
| **65** | 120 | 23 | 110 | 112 | 4,75 | 9 500 | 1,2 | QJ 213 N2PHAS | – |
| | 120 | 23 | 110 | 112 | 4,75 | 9 500 | 1,2 | QJ 213 N2MA | ▸ QJ 213 MA |
| | 140 | 33 | 176 | 156 | 6,55 | 8 500 | 2,7 | QJ 313 N2PHAS | – |
| | 140 | 33 | 176 | 156 | 6,55 | 8 500 | 2,7 | – | ▸ QJ 313 MA |

**SKF Explorer bearing**
▸ Popular item
[1] For dimensions of locating slots → **table 1, page 387**





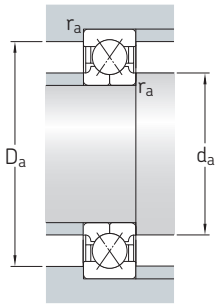

| Dimensions | | | | | Abutment and fillet dimensions | | | Calculation factor |
|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | $r_{1,2}$ min. | a | $d_a$ min. | $D_a$ max. | $r_a$ max. | A |
| mm | | | | | mm | | | – |
| **15** | 22 | 28,1 | 0,6 | 18 | 19,2 | 30,8 | 0,6 | 0,000 257 |
| **17** | 23,5 | 32,5 | 0,6 | 20 | 21,2 | 35,8 | 0,6 | 0,000 427 |
| | 27,7 | 36,3 | 1 | 22 | 22,6 | 41,4 | 1 | 0,00087 |
| **20** | 27,5 | 40,8 | 1,1 | 25 | 27 | 45 | 1 | 0,00143 |
| | 27,5 | 40,8 | 1,1 | 25 | 27 | 45 | 1 | 0,00143 |
| **25** | 31,5 | 43 | 1 | 27 | 30,6 | 46,4 | 1 | 0,00126 |
| | 34 | 49 | 1,1 | 30 | 32 | 55 | 1 | 0,00278 |
| **30** | 37,5 | 50,8 | 1 | 32 | 35,6 | 56 | 1 | 0,00256 |
| | 40,5 | 58,2 | 1,1 | 36 | 37 | 65 | 1 | 0,00508 |
| | 40,5 | 58,2 | 1,1 | 36 | 37 | 65 | 1 | 0,00508 |
| **35** | 44 | 59 | 1,1 | 37 | 42 | 65 | 1 | 0,00473 |
| | 46,2 | 64,3 | 1,5 | 40 | 44 | 71 | 1,5 | 0,00744 |
| | 46,2 | 64,3 | 1,5 | 40 | 44 | 71 | 1,5 | 0,00744 |
| **40** | 49,5 | 66 | 1,1 | 42 | 47 | 73 | 1 | 0,0066 |
| | 52 | 72,5 | 1,5 | 46 | 49 | 81 | 1,5 | 0,0118 |
| | 52 | 72,5 | 1,5 | 46 | 49 | 81 | 1,5 | 0,0118 |
| **45** | 54,5 | 72 | 1,1 | 46 | 52 | 78 | 1 | 0,00871 |
| | 58 | 81,2 | 1,5 | 51 | 54 | 91 | 1,5 | 0,0202 |
| | 58 | 81,2 | 1,5 | 51 | 54 | 91 | 1,5 | 0,0202 |
| **50** | 59,5 | 76,5 | 1,1 | 49 | 57 | 83 | 1 | 0,0103 |
| | 65 | 90 | 2 | 56 | 61 | 99 | 2 | 0,029 |
| | 65 | 90 | 2 | 56 | 61 | 99 | 2 | 0,029 |
| **55** | 66 | 84,7 | 1,5 | 54 | 64 | 91 | 1,5 | 0,0173 |
| | 70,5 | 97,8 | 2 | 61 | 66 | 109 | 2 | 0,0404 |
| **60** | 72 | 93 | 1,5 | 60 | 69 | 101 | 1,5 | 0,0242 |
| | 72 | 93 | 1,5 | 60 | 69 | 101 | 1,5 | 0,0242 |
| | 77 | 106 | 2,1 | 67 | 72 | 118 | 2 | 0,0549 |
| | 77 | 106 | 2,1 | 67 | 72 | 118 | 2 | 0,0549 |
| **65** | 78,5 | 101 | 1,5 | 65 | 74 | 111 | 1,5 | 0,033 |
| | 78,5 | 101 | 1,5 | 65 | 74 | 111 | 1,5 | 0,033 |
| | 82,5 | 115 | 2,1 | 72 | 77 | 128 | 2 | 0,0731 |
| | 82,5 | 115 | 2,1 | 72 | 77 | 128 | 2 | 0,0731 |




Bearing with locating slots

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Limiting speed | Mass | Designations Bearing with locating slots[1] | without locating slots |
|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | kg | – | |
| **70** | 125 | 24 | 120 | 122 | 5,2 | 9 000 | 1,3 | ▸ QJ 214 N2MA | QJ 214 MA |
| | 125 | 24 | 120 | 122 | 5,2 | 9 000 | 1,3 | QJ 214 N2PHAS | – |
| | 150 | 35 | 200 | 180 | 7,35 | 8 000 | 3,15 | QJ 314 N2MA | ▸ QJ 314 MA |
| | 150 | 35 | 200 | 180 | 7,35 | 8 000 | 3,15 | QJ 314 N2PHAS | – |
| **75** | 130 | 25 | 125 | 132 | 5,6 | 8 500 | 1,45 | QJ 215 N2MA | ▸ QJ 215 MA |
| | 130 | 25 | 125 | 132 | 5,6 | 8 500 | 1,45 | QJ 215 N2PHAS | – |
| | 160 | 37 | 216 | 200 | 7,8 | 7 500 | 3,9 | ▸ QJ 315 N2MA | – |
| | 160 | 37 | 216 | 200 | 7,8 | 7 500 | 3,9 | QJ 315 N2PHAS | – |
| **80** | 140 | 26 | 146 | 156 | 6,4 | 8 000 | 1,85 | ▸ QJ 216 N2MA | ▸ QJ 216 MA |
| | 170 | 39 | 232 | 228 | 8,65 | 7 000 | 4,6 | ▸ QJ 316 N2MA | – |
| | 170 | 39 | 232 | 228 | 8,65 | 7 000 | 4,6 | QJ 316 N2PHAS | – |
| **85** | 150 | 28 | 156 | 173 | 6,7 | 7 500 | 2,25 | ▸ QJ 217 N2MA | ▸ QJ 217 MA |
| | 180 | 41 | 250 | 255 | 8,65 | 6 700 | 5,45 | ▸ QJ 317 N2MA | – |
| **90** | 160 | 30 | 186 | 200 | 7,65 | 7 000 | 2,75 | ▸ QJ 218 N2MA | – |
| | 190 | 43 | 285 | 305 | 11 | 6 300 | 6,45 | ▸ QJ 318 N2MA | – |
| | 190 | 43 | 285 | 305 | 11 | 6 300 | 6,45 | QJ 318 N2PHAS | – |
| **95** | 170 | 32 | 212 | 232 | 8,5 | 6 700 | 3,35 | ▸ QJ 219 N2MA | – |
| | 200 | 45 | 305 | 340 | 11,8 | 6 000 | 7,45 | ▸ QJ 319 N2MA | – |
| | 200 | 45 | 305 | 340 | 11,8 | 6 000 | 7,45 | QJ 319 N2PHAS | – |
| **100** | 180 | 34 | 236 | 265 | 9,5 | 6 300 | 4,05 | ▸ QJ 220 N2MA | – |
| | 215 | 47 | 345 | 400 | 13,7 | 5 600 | 9,3 | ▸ QJ 320 N2MA | – |
| **110** | 200 | 38 | 280 | 325 | 11,2 | 5 600 | 5,6 | ▸ QJ 222 N2MA | – |
| | 240 | 50 | 390 | 480 | 15,3 | 4 800 | 12,5 | ▸ QJ 322 N2MA | – |
| **120** | 215 | 40 | 300 | 365 | 12 | 5 000 | 6,95 | ▸ QJ 224 N2MA | – |
| | 260 | 55 | 415 | 530 | 16,3 | 4 500 | 16 | ▸ QJ 324 N2MA | – |
| **130** | 230 | 40 | 310 | 400 | 12,7 | 4 800 | 7,75 | ▸ QJ 226 N2MA | – |
| | 280 | 58 | 455 | 610 | 18 | 4 000 | 19,5 | ▸ QJ 326 N2MA | – |
| **140** | 250 | 42 | 345 | 475 | 14,3 | 4 300 | 9,85 | ▸ QJ 228 N2MA | – |
| | 300 | 62 | 500 | 695 | 20 | 3 800 | 24 | ▸ QJ 328 N2MA | – |
| **150** | 270 | 45 | 400 | 570 | 16,6 | 4 000 | 12,5 | ▸ QJ 230 N2MA | – |
| | 320 | 65 | 530 | 765 | 21,2 | 3 600 | 29 | QJ 330 N2MA | – |

**SKF Explorer bearing**
▸ Popular item
[1] For dimensions of locating slots → table 1, page 387

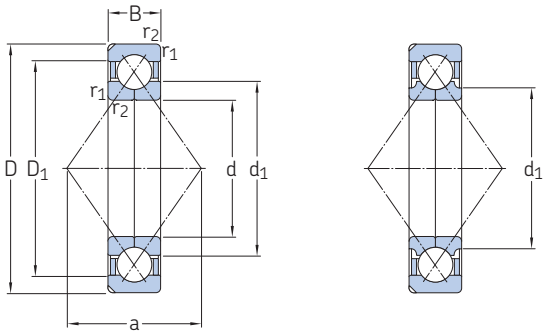





| Dimensions | | | | | Abutment and fillet dimensions | | | Calculation factor |
|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | $r_{1,2}$ min. | a | $d_a$ min. | $D_a$ max. | $r_a$ max. | A |
| mm | | | | | mm | | | – |
| **70** | 83,5 | 106 | 1,5 | 68 | 79 | 116 | 1,5 | 0,04 |
| | 83,5 | 106 | 1,5 | 68 | 79 | 116 | 1,5 | 0,04 |
| | 89 | 123 | 2,1 | 77 | 82 | 138 | 2 | 0,0954 |
| | 89 | 123 | 2,1 | 77 | 82 | 138 | 2 | 0,0954 |
| **75** | 88,5 | 112 | 1,5 | 72 | 84 | 121 | 1,5 | 0,0453 |
| | 88,5 | 112 | 1,5 | 72 | 84 | 121 | 1,5 | 0,0453 |
| | 104 | 131 | 2,1 | 82 | 87 | 148 | 2 | 0,122 |
| | 104 | 131 | 2,1 | 82 | 87 | 148 | 2 | 0,122 |
| **80** | 95,3 | 120 | 2 | 77 | 91 | 130 | 2 | 0,0629 |
| | 111 | 139 | 2,1 | 88 | 92 | 158 | 2 | 0,155 |
| | 111 | 139 | 2,1 | 88 | 92 | 158 | 2 | 0,155 |
| **85** | 100 | 128 | 2 | 83 | 96 | 139 | 2 | 0,0768 |
| | 117 | 148 | 3 | 93 | 99 | 166 | 2,5 | 0,193 |
| **90** | 114 | 136 | 2 | 88 | 101 | 149 | 2 | 0,106 |
| | 124 | 156 | 3 | 98 | 104 | 176 | 2,5 | 0,26 |
| | 124 | 156 | 3 | 98 | 104 | 176 | 2,5 | 0,26 |
| **95** | 120 | 145 | 2,1 | 93 | 107 | 158 | 2 | 0,138 |
| | 131 | 165 | 3 | 103 | 109 | 186 | 2,5 | 0,317 |
| | 131 | 165 | 3 | 103 | 109 | 186 | 2,5 | 0,317 |
| **100** | 127 | 153 | 2,1 | 98 | 112 | 168 | 2 | 0,176 |
| | 139 | 176 | 3 | 110 | 114 | 201 | 2 | 0,442 |
| **110** | 141 | 169 | 2,1 | 109 | 122 | 188 | 2 | 0,277 |
| | 154 | 196 | 3 | 123 | 124 | 226 | 2,5 | 0,635 |
| **120** | 152 | 183 | 2,1 | 117 | 132 | 203 | 2 | 0,354 |
| | 169 | 211 | 3 | 133 | 134 | 246 | 2,5 | 0,785 |
| **130** | 165 | 195 | 3 | 126 | 144 | 216 | 2,5 | 0,411 |
| | 182 | 227 | 4 | 144 | 147 | 263 | 3 | 1,06 |
| **140** | 179 | 211 | 3 | 137 | 154 | 236 | 2,5 | 0,556 |
| | 196 | 244 | 4 | 154 | 158 | 282 | 3 | 1,4 |
| **150** | 194 | 226 | 3 | 147 | 164 | 256 | 2,5 | 0,793 |
| | 211 | 259 | 4 | 165 | 167 | 303 | 3 | 1,65 |

## 3.4 Four-point contact ball bearings

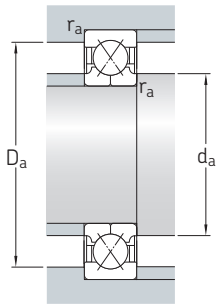
d **160 – 200** mm




SKF Explorer bearing

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Limiting speed | Mass | Designations Bearing with locating slots[1] | without locating slots |
|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | kg | – | |
| **160** | 290 | 48 | 450 | 670 | 19 | 3 800 | 15,5 | ▸ QJ 232 N2MA | – |
| | 340 | 68 | 570 | 880 | 23,6 | 3 400 | 34,5 | ▸ QJ 332 N2MA | – |
| **170** | 310 | 52 | 455 | 720 | 20 | 3 400 | 19,5 | ▸ QJ 234 N2MA | – |
| | 360 | 72 | 655 | 1 040 | 27 | 3 200 | 41,5 | ▸ QJ 334 N2MA | – |
| **180** | 320 | 52 | 475 | 765 | 20,8 | 3 400 | 20,5 | ▸ QJ 236 N2MA | – |
| | 380 | 75 | 680 | 1 100 | 28 | 3 000 | 47,5 | QJ 336 N2MA | – |
| **190** | 340 | 55 | 510 | 850 | 22,4 | 3 200 | 23,5 | QJ 238 N2MA | – |
| | 400 | 78 | 702 | 1 160 | 28,5 | 2 800 | 49 | **QJ 338 N2MA** | – |
| **200** | 360 | 58 | 540 | 915 | 23,2 | 3 000 | 28,5 | **QJ 240 N2MA** | – |

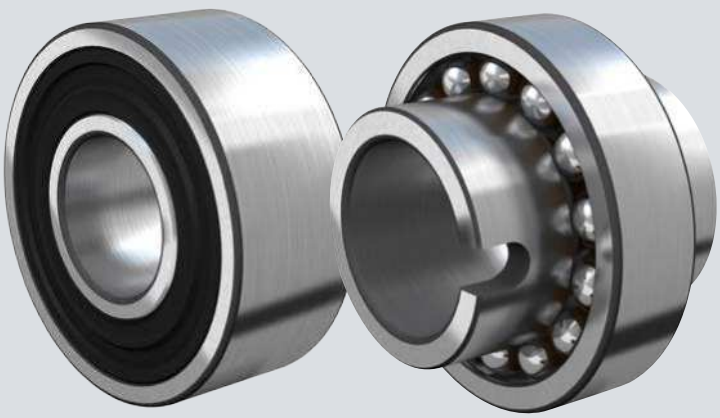
**SKF Explorer bearing**
▸ Popular item
[1] For dimensions of locating slots → table 1, page 387






| Dimensions | | | | | Abutment and fillet dimensions | | | Calculation factor |
|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | $r_{1,2}$ min. | a | $d_a$ min. | $D_a$ max. | $r_a$ max. | A |
| mm | | | | | mm | | | – |
| **160** | 204 | 243 | 3 | 158 | 174 | 276 | 2,5 | 1,1 |
| | 224 | 276 | 4 | 175 | 177 | 323 | 3 | 2,12 |
| **170** | 204 | 243 | 4 | 168 | 187 | 293 | 3 | 1,26 |
| | 237 | 293 | 4 | 186 | 187 | 343 | 3 | 2,92 |
| **180** | 231 | 269 | 4 | 175 | 197 | 303 | 3 | 1,39 |
| | 252 | 309 | 4 | 196 | 197 | 363 | 3 | 3,38 |
| **190** | 244 | 285 | 4 | 185 | 207 | 323 | 3 | 1,77 |
| | 263 | 326 | 5 | 207 | 210 | 380 | 4 | 4,45 |
| **200** | 258 | 302 | 4 | 196 | 217 | 363 | 3 | 2,33 |

# 4 Self-aligning ball bearings



# 4 Self-aligning ball bearings



**Designs and variants** . . . . . **439**
Sealed bearings . . . . . 439
Greases for capped bearings . . . . . 440
Grease life for capped bearings . . . . . 440
Large self-aligning ball bearings . . . . . 440
Bearings with an extended inner ring . . . . . 440
Cages. . . . . 442

**Bearing data** . . . . . **443**
(Dimension standards, tolerances, internal clearance, permissible misalignment)

**Loads** . . . . . **445**
(Minimum load, axial load carrying capacity, equivalent dynamic bearing load, equivalent static bearing load)

**Temperature limits** . . . . . **445**

**Permissible speed** . . . . . **446**

**Design considerations** . . . . . **446**
Ball protrusion . . . . . 446
Bearings on sleeves . . . . . 446
Bearings with an extended inner ring . . . . . 446
Appropriate bearing housings . . . . . 447

**Mounting** . . . . . **447**
Mounting bearings with a cylindrical bore . . . . . 447
Mounting bearings with a tapered bore . . . . . 447

**Designation system** . . . . . **449**

**Product tables**
**4.1** Self-aligning ball bearings. . . . . 450
**4.2** Self-aligning ball bearings on an adapter sleeve . . 458
**4.3** Self-aligning ball bearings with an extended inner ring . . . . . 462

**Other self-aligning ball bearings**
Bearings with Solid Oil . . . . . 1023

# 4 Self-aligning ball bearings



## More information

**General bearing knowledge** . . . . **17**

**Bearing selection process** . . . . . **59**
Lubrication . . . . . 109
Bearing interfaces. . . . . 139
Seat tolerances for standard conditions . . . . . 148
Selecting internal clearance . . . . . 182
Sealing, mounting and dismounting . . . . . 193

**Mounting instructions for individual bearings** → skf.com/mount

**SKF Drive-up Method** → skf.com/drive-up

*SKF bearing maintenance handbook* ISBN 978-91-978966-4-1

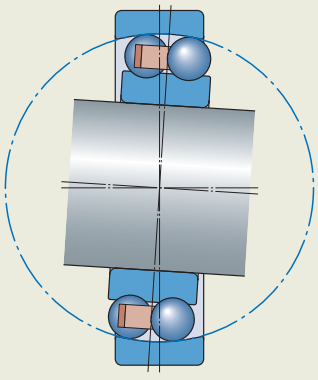
Self-aligning ball bearings have two rows of balls, a common sphered raceway in the outer ring and two deep uninterrupted raceway grooves in the inner ring. They are available open or sealed. The bearings are insensitive to angular misalignment of the shaft relative to the housing (**fig. 1**), which can be caused, for example, by shaft deflection.

### Bearing features

- **Accommodate static and dynamic misalignment**
  The bearings are self-aligning like spherical roller bearings or CARB bearings.
- **Excellent high-speed performance**
  Self-aligning ball bearings generate less friction than any other type of rolling bearing, which enables them to run cooler even at high speeds.
- **Minimum maintenance**
  Because of low heat generation, the bearing temperature is lower, leading to extended bearing life and maintenance intervals.
- **Low friction**
  Very loose conformity between balls and outer ring keeps friction and frictional heat at low levels.
- **Excellent light load performance**
  Self-aligning ball bearings have low minimum load requirements.
- **Low noise**
  Self-aligning ball bearings can reduce noise and vibration levels, for example, in fans.

**Fig. 1**

**Self-aligning ball bearing accommodates misalignment**



# Designs and variants

## SKF standard assortment

SKF self-aligning ball bearing variants are:

- open (fig. 2)
  - with cylindrical bore
  - with tapered bore, e.g. for use with adapter sleeves (fig. 3)
  - with extended inner ring (fig. 4)
- sealed (fig. 5)
  - with cylindrical bore
  - with tapered bore, e.g. for use with adapter sleeves

## Sealed bearings

Sealed bearings equipped with contact seals on both sides (fig. 6) are available:

- in the 22 and 23 series
- with bore diameter $10 \leq d \leq 70$ mm
- with seals made of sheet steel reinforced NBR (oil and wear-resistant, designation suffix -2RS1)

Permissible angular misalignment of sealed bearings is slightly reduced compared to open design bearings.



Fig. 2

**Open bearing**

Fig. 4

**Bearing with an extended inner ring**

Fig. 3

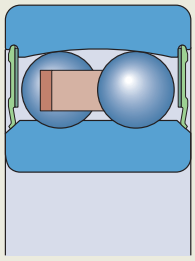
**Bearing on adapter sleeve with a lock nut**

Fig. 5

**Sealed bearing**

Fig. 6

**Contact seal on both sides**



## Greases for capped bearings

Bearings sealed on both sides are lubricated for the life of the bearing and are virtually maintenance-free. They are filled with one of the following standard greases, which have good corrosion-inhibiting properties (**table 1**):

- D ≤ 62 → MT47 grease
- D > 62 → MT33 grease

## Grease life for capped bearings

- is presented as $L_{10}$, i.e. the time period at the end of which 90% of the bearings are still reliably lubricated
- depends on the operating temperature and the $nd_m$ value (**diagram 1**)

The grease life specified in **diagram 1** is valid for the following combination of operating conditions:

- horizontal shaft
- inner ring rotation
- light load (P ≤ 0,05 C)
- operating temperature within the green temperature zone of the grease (**table 1**)
- stationary machine
- low vibration levels

Where the operating conditions differ, the grease life obtained from the diagram should be adjusted:

- vertical shafts → 50% of the obtained value
- heavier loads (P > 0,05 C) → apply reduction factor (**table 2**)

When sealed bearings must operate under certain extreme conditions, such as very high speeds or high temperatures, grease may appear on the capping diameter. For bearing arrangements where this would be detrimental, appropriate actions should be taken. For additional information, contact the SKF application engineering service.

# Large self-aligning ball bearings

- are available in the 130 and 139 series
- are equipped with an annular groove in the outer ring and (**fig. 7**):
  - three equally-spaced lubrication holes in the outer ring
  - six equally-spaced lubrication holes in the inner ring
- can be used in any application where low friction is preferred over high load carrying capacity (e.g. in the paper industry)

# Bearings with an extended inner ring

- are (**fig. 8**) designed for less demanding applications that use commercial grade shafting
- have a special bore tolerance, class JS7 (**table 3**), that facilitates mounting and dismounting
- are located axially on the shaft by means of a slot at one end of the inner ring that engages a pin or shoulder screw (**fig. 9**) fitted to the shaft

  This also prevents the shaft from spinning in the bearing bore.

**Diagram 1**

**Grease life for standard capped self-aligning ball bearings where P = 0,05 C**

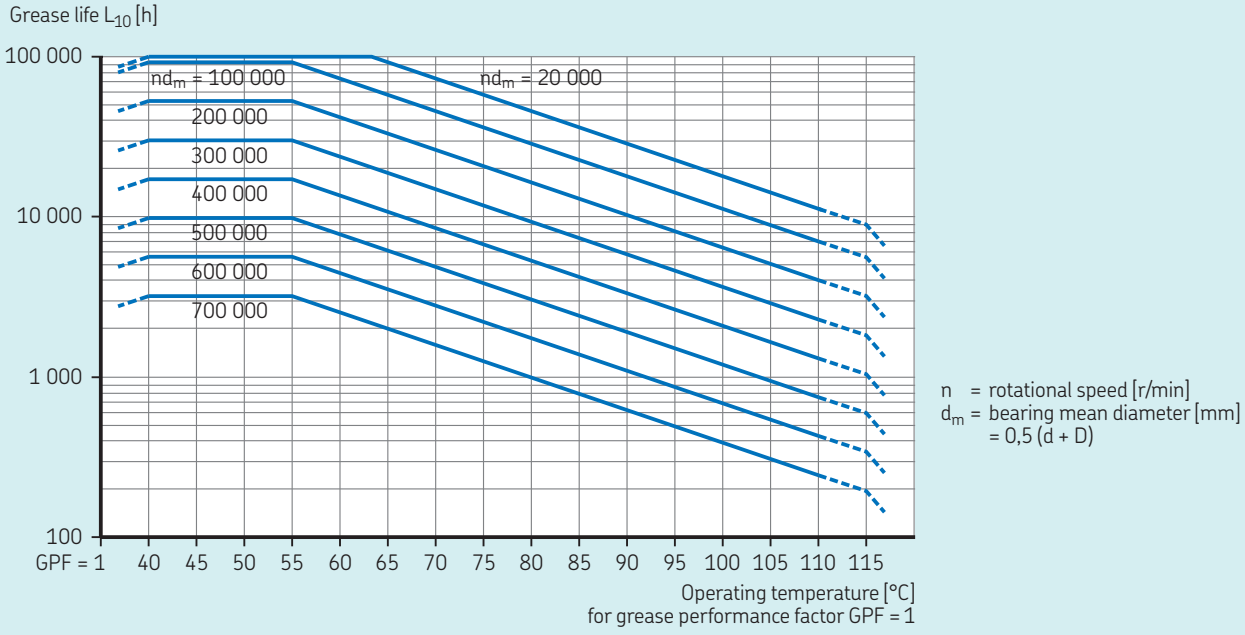


**Table 1**

**Technical specifications of SKF standard greases for sealed self-aligning ball bearings**

| Bearing outside diameter [mm] | Grease | Temperature range[1] | Thickener | Base oil type | NLGI grade | Base oil viscosity [mm²/s] at 40 °C (105 °F) | at 100 °C (210 °F) |
|---|---|---|---|---|---|---|---|
| | | –50 0 50 100 150 200 250 °C<br>–60 30 120 210 300 390 480 °F | | | | | |
| **D ≤ 62** | MT47 | | Lithium soap | Mineral | 2 | 70 | 7,3 |
| **D > 62** | MT33 | | Lithium soap | Mineral | 3 | 100 | 10 |

[1] Refer to the SKF traffic light concept (page 117).

**Fig. 7**

**Annular groove and lubrication holes**

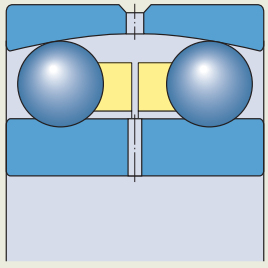


**Table 2**

**Reduction factor for the grease life, depending on the load**

| Load P | Reduction factor |
|---|---|
| ≤ 0,05 C | 1 |
| 0,1 C | 0,7 |
| 0,125 C | 0,5 |
| 0,25 C | 0,2 |

**Table 3**

**Bore tolerance of self-aligning ball bearings with an extended inner ring**

| Bore diameter d > | ≤ | Tolerance class JS7 Deviation U | L |
|---|---|---|---|
| mm | | µm | |
| **18** | **30** | +10,5 | –10,5 |
| **30** | **50** | +12,5 | –12,5 |
| **50** | **80** | +15 | –15 |

**Fig. 8**

**Bearing with an extended inner ring**

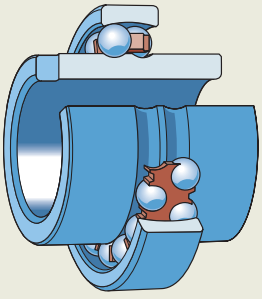


**Fig. 9**

**Axial location of bearings with an extended inner ring**

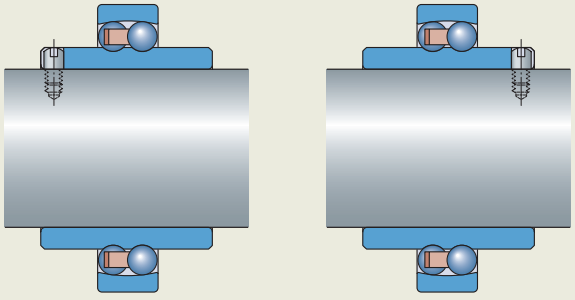
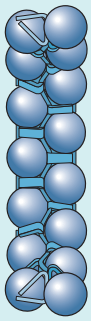
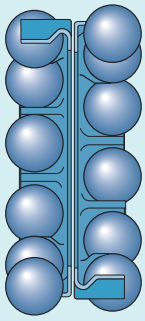
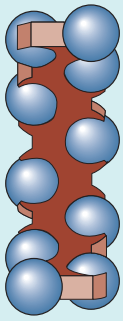
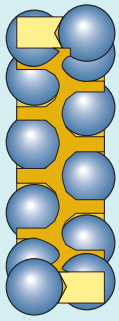
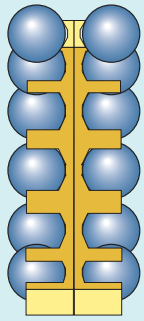


Table 4

**Cages for self-aligning ball bearings**

| | | | | | |
|---|---|---|---|---|---|
| |  |  |  |  |  |
| **Cage type** | One-piece, ball centred | Two-piece, ball centred | One-piece snap-type, ball centred | One-piece, ball centred | Two-piece, ball centred |
| **Material** | Stamped steel | Stamped steel | PA66, glass fibre reinforced | Machined brass | Machined brass |
| **Suffix** | – | – | TN9 | M<br>(no designation suffix when d ≥ 150 mm) | M<br>(no designation suffix when d ≥ 150 mm) |

For bearings with non-standard cages, contact SKF.

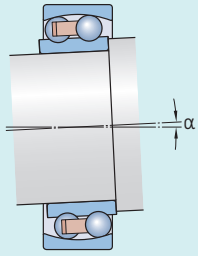
# Cages

Depending on their series and size, SKF self-aligning ball bearings are fitted with one of the cages shown in **table 4**.

When used at high temperatures, some lubricants can have a detrimental effect on polyamide cages. For additional information about the suitability of cages, refer to *Cages*, **page 187**.

Table 5

**Permissible angular misalignment**



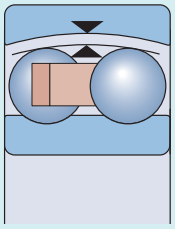

| Bearings/series | Misalignment<br>α |
|---|---|
| – | ° |
| **108, 126, 127, 129, 135** | 3 |
| **12 (E)** | 2,5 |
| **13 (E)** | 3 |
| **22 (E)** | 2,5 |
| **22 E-2RS1** | 1,5 |
| **23 (E)** | 3 |
| **23 E-2RS1** | 1,5 |
| **112 (E)** | 2,5 |
| **130, 139** | 3 |

# Bearing data

| | |
|---|---|
| **Dimension standards** | Boundary dimensions: ISO 15<br>Except for:<br>• Bearings with an extended inner ring |
| **Tolerances**<br><br>For additional information<br>→ **page 35** | Normal<br>Except for:<br>• Bearings with an extended inner ring:<br>bore to tolerance class JS7 (**table 3**, **page 441**) in accordance with ISO 286-2<br><br>Values: ISO 492 (**table 2**, **page 38**) |
| **Internal clearance**<br><br>For additional information<br>→ **page 182** | Normal, C3<br>Check availability of C2 (cylindrical bore only)<br>Except for:<br>• Bearings in the 130 and 139 series:<br>C3<br>• Bearings with an extended inner ring:<br>ranging from the minimum value of C2 to the maximum value of Normal<br><br>Values: ISO 5753-1 (**table 6**, **page 444**)<br>Values are valid for unmounted bearings under zero measuring load. |
| **Permissible misalignment** | Guideline values for normal operating condition (**table 5**). Whether these values can be fully exploited depends on the design of the adjacent components, such as external seals. |

Table 6

## Radial internal clearance of self-aligning ball bearings



### Bearings with a cylindrical bore

| Bore diameter d | | Radial internal clearance C2 | | Normal | | C3 | |
|---|---|---|---|---|---|---|---|
| > | ≤ | min. | max. | min. | max. | min. | max. |
| mm | | µm | | | | | |
| **2,5** | **6** | 1 | 8 | 5 | 15 | 10 | 20 |
| **6** | **10** | 2 | 9 | 6 | 17 | 12 | 25 |
| **10** | **14** | 2 | 10 | 6 | 19 | 13 | 26 |
| **14** | **18** | 3 | 12 | 8 | 21 | 15 | 28 |
| **18** | **24** | 4 | 14 | 10 | 23 | 17 | 30 |
| **24** | **30** | 5 | 16 | 11 | 24 | 19 | 35 |
| **30** | **40** | 6 | 18 | 13 | 29 | 23 | 40 |
| **40** | **50** | 6 | 19 | 14 | 31 | 25 | 44 |
| **50** | **65** | 7 | 21 | 16 | 36 | 30 | 50 |
| **65** | **80** | 8 | 24 | 18 | 40 | 35 | 60 |
| **80** | **100** | 9 | 27 | 22 | 48 | 42 | 70 |
| **100** | **120** | 10 | 31 | 25 | 56 | 50 | 83 |
| **120** | **140** | 10 | 38 | 30 | 68 | 60 | 100 |
| **140** | **160** | – | – | – | – | 70 | 120 |
| **160** | **180** | – | – | – | – | 82 | 138 |
| **180** | **200** | – | – | – | – | 93 | 157 |
| **200** | **225** | – | – | – | – | 100 | 170 |
| **225** | **250** | – | – | – | – | 115 | 195 |

### Bearings with a tapered bore

| Bore diameter d | | Radial internal clearance C2 | | Normal | | C3 | |
|---|---|---|---|---|---|---|---|
| > | ≤ | min. | max. | min. | max. | min. | max. |
| mm | | µm | | | | | |
| **18** | **24** | – | – | 13 | 26 | 30 | 33 |
| **24** | **30** | – | – | 15 | 28 | 23 | 39 |
| **30** | **40** | – | – | 19 | 35 | 29 | 46 |
| **40** | **50** | – | – | 22 | 39 | 33 | 52 |
| **50** | **65** | – | – | 27 | 47 | 41 | 61 |
| **65** | **80** | – | – | 35 | 57 | 50 | 75 |
| **80** | **100** | – | – | 42 | 68 | 62 | 90 |
| **100** | **120** | – | – | 50 | 81 | 75 | 108 |

# Loads

| | |
|---|---|
| **Minimum load**<br><br>For additional information<br>→ **page 106** | $F_{rm} = k_r \left(\frac{\nu n}{1\,000}\right)^{2/3} \left(\frac{d_m}{100}\right)^2$ |
| **Axial load carrying capacity** | Bearings mounted on an adapter sleeve on plain shafts without a fixed abutment:<br>$F_{ap} = 0{,}003\ B\ d$<br>provided the bearings are correctly mounted. |
| **Equivalent dynamic bearing load**<br><br>For additional information<br>→ **page 91** | $F_a/F_r \leq e \rightarrow P = F_r + Y_1 F_a$<br>$F_a/F_r > e \rightarrow P = 0{,}65\ F_r + Y_2 F_a$ |
| **Equivalent static bearing load**<br><br>For additional information<br>→ **page 105** | $P_0 = F_r + Y_0 F_a$ |

**Symbols**

| | |
|---|---|
| B | bearing width [mm] |
| d | bearing bore diameter [mm] |
| $d_m$ | bearing mean diameter [mm] = 0,5 (d + D) |
| e | calculation factor (**product tables**, **page 450**) |
| $F_a$ | axial load [kN] |
| $F_{ap}$ | maximum permissible axial load [kN] |
| $F_r$ | radial load [kN] |
| $F_{rm}$ | minimum radial load [kN] |
| $k_r$ | minimum load factor (**product tables**) |
| n | rotational speed [r/min] |
| P | equivalent dynamic bearing load [kN] |
| $P_0$ | equivalent static bearing load [kN] |
| $Y_0, Y_1, Y_2$ | calculation factors (**product tables**) |
| ν | oil viscosity at operating temperature [mm²/s] |

# Temperature limits

The permissible operating temperature for self-aligning ball bearings can be limited by:

- the dimensional stability of the bearing rings and balls
- the cage
- the seals
- the lubricant

Where temperatures outside the permissible range are expected, contact SKF.

## Bearing rings and balls

SKF self-aligning ball bearings are heat stabilized up to 120 °C *(250 °F)*.

## Cages

Steel or brass cages can be used at the same operating temperatures as the bearing rings and balls. For temperature limits of polymer cages, refer to *Polymer cages*, **page 188**.

## Seals

The permissible operating temperature for NBR seals is –40 to +100 °C *(–40 to +210 °F)*. Temperatures up to 120 °C *(250 °F)* can be tolerated for brief periods.

Typically, temperature peaks are at the seal lip.

## Lubricants

Temperature limits for the greases used in sealed SKF self-aligning ball bearings are provided in **table 1**, **page 441**. For temperature limits of other SKF greases, refer to *Selecting a suitable SKF grease*, **page 116**.

When using lubricants not supplied by SKF, temperature limits should be evaluated according to the SKF traffic light concept (**page 117**).

# Permissible speed

The speed ratings in the **product tables** indicate:

- the **reference speed**, which enables a quick assessment of the speed capabilities from a thermal frame of reference
- the **limiting speed**, which is a mechanical limit that should not be exceeded unless the bearing design and the application are adapted for higher speeds

For additional information, refer to *Operating temperature and speed*, **page 130**.

# Design considerations

## Ball protrusion

The balls of some bearings in the 12 and 13 series protrude from the side faces of the bearing (**fig. 10**). The values of the protrusion are listed in the **product table**, **page 457**, and should be considered when designing components in close proximity to the bearing.

## Bearings on sleeves

Self-aligning ball bearings with a tapered bore can be mounted with:

- an adapter sleeve on plain or stepped shafts (**fig. 11**)
- a withdrawal sleeve on stepped shafts (**fig. 12**)

Adapter sleeves are supplied complete with a locking device.

For appropriate SKF adapter sleeves, refer to the **product table**, **page 458**.

When using sealed bearings, make sure appropriate SKF adapter sleeve assemblies (e.g. E design sleeve, refer to the **product table**) are used to prevent the locking device from interfering with the seal (**fig. 13**). Alternatively, use a spacer ring between the bearing and the lock washer.

For additional information

- *Adapter sleeves*, **page 1065**
- *Withdrawal sleeves*, **page 1087**

## Bearings with an extended inner ring

When two of these bearings are used to support a shaft, to locate the shaft axially the inner ring slots must be arranged facing towards or away from each other (**fig. 9**, **page 441**).

**Fig. 10**

**Protrusion of balls from side faces**

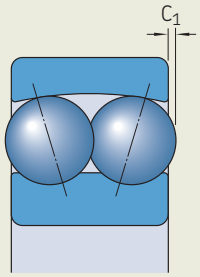
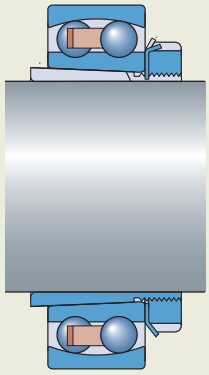
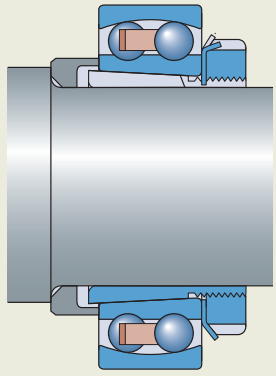



**Fig. 11**

**Bearings with a tapered bore mounted with an adapter sleeve**



On a plain shaft



On a stepped shaft

## Appropriate bearing housings

Appropriate SKF bearing housings are available in a variety of designs and sizes for a wide range of applications. The designs include:

- SNL, SE plummer (pillow) block housings in the 2, 3, 5 and 6 series
- FNL flanged housings
- SAF plummer (pillow) block housings for inch shafts

Additional information about SKF bearing housings is available online at skf.com/housings.

# Mounting

## Mounting bearings with a cylindrical bore

Refer to *Mounting bearings with a cylindrical bore*, **page 201**.

## Mounting bearings with a tapered bore

Bearings with a tapered bore are mounted with an interference fit, by using one of the following methods:

**1 Feeling the clearance reduction by turning and swivelling the outer ring (fig. 14)**
- This method is valid for bearings with Normal radial clearance (not for sealed bearings).
- The clearance reduction in the bearing is sufficient when the outer ring can be turned easily, but a slight resistance is felt when it is swivelled out.

**2 Measuring the lock nut tightening angle (table 7, page 448)**

**3 Measuring the axial drive-up (table 7)**

**4 Applying the SKF Drive-up Method**
For bearings with d ≥ 50 mm, SKF recommends using the SKF Drive-up Method. This is a fast, reliable and safe method to determine the appropriate interference fit. Additional information is available online at skf.com/drive-up.

For additional information about these mounting methods, refer to *Mounting bearings with a tapered bore*, **page 203**, or the *SKF bearing maintenance handbook*.

**Fig. 12**

**Bearing with a tapered bore mounted with a withdrawal sleeve on a stepped shaft**

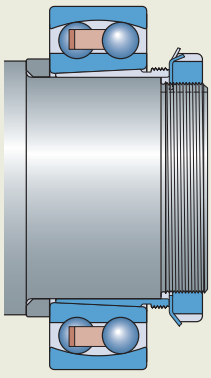


**Fig. 13**

**Sealed bearing with a tapered bore mounted with an E design adapter sleeve**

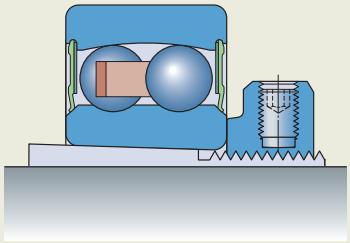


**Fig. 14**

**Check clearance reduction**

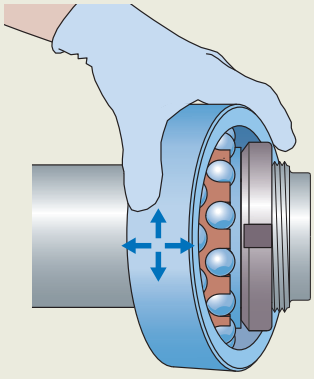
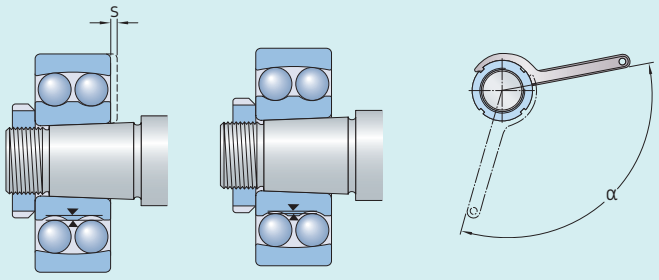


Table 7

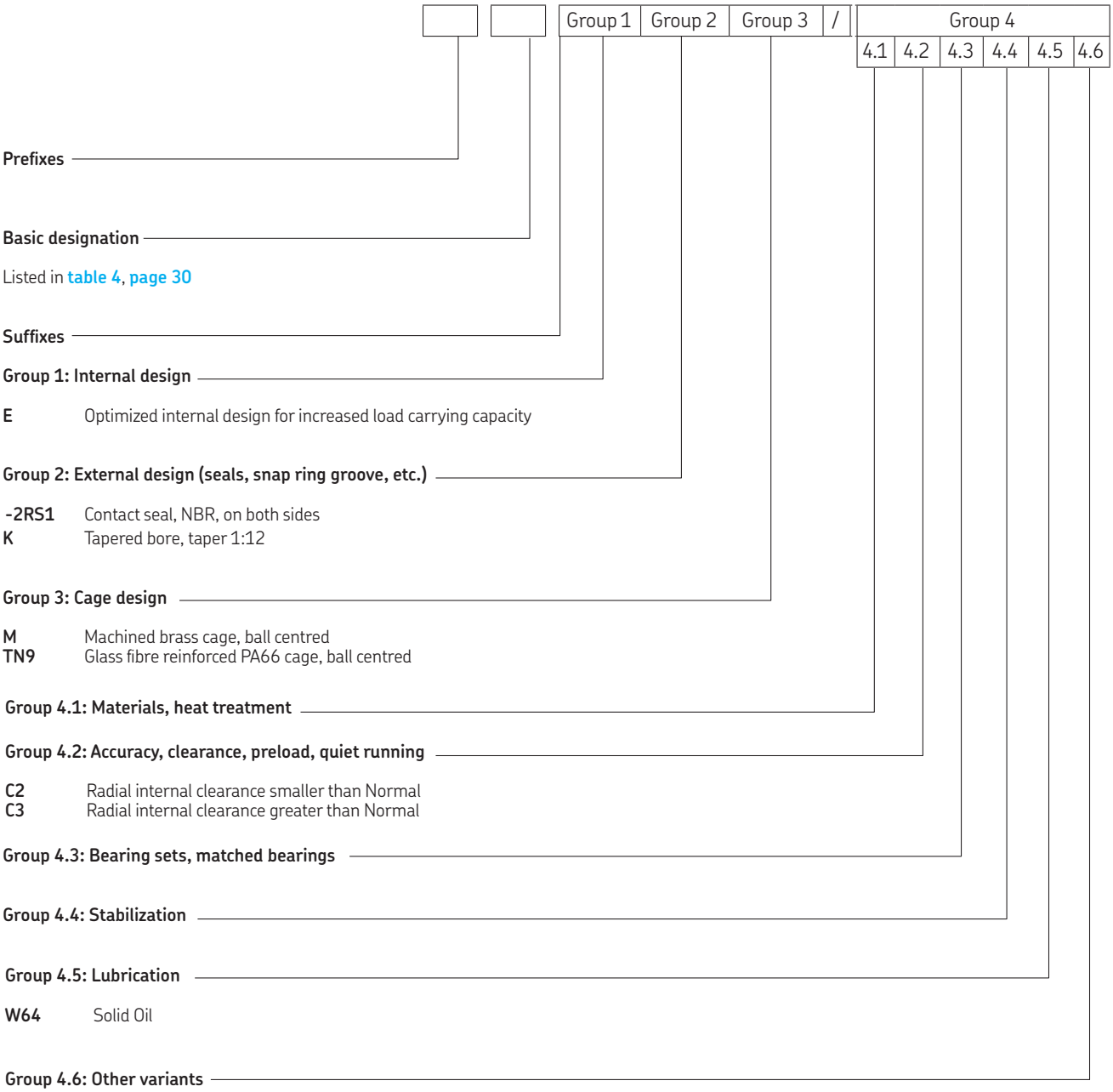
## Drive-up data for self-aligning ball bearings with a tapered bore




| Bore diameter<br>d | Axial drive-up<br>s[1)2)] | Lock nut tightening angle<br>α[2)] |
|---|---|---|
| mm | mm | ° |
| **20** | 0,22 | 80 |
| **25** | 0,22 | 55 |
| **30** | 0,22 | 55 |
| **35** | 0,30 | 70 |
| **40** | 0,30 | 70 |
| **45** | 0,35 | 80 |
| **50** | 0,35 | 80 |
| **55** | 0,40 | 75 |
| **60** | 0,40 | 75 |
| **65** | 0,40 | 80 |
| **70** | 0,40 | 80 |
| **75** | 0,45 | 85 |
| **80** | 0,45 | 85 |
| **85** | 0,60 | 110 |
| **90** | 0,60 | 110 |
| **95** | 0,60 | 110 |
| **100** | 0,60 | 110 |
| **110** | 0,70 | 125 |
| **120** | 0,70 | 125 |

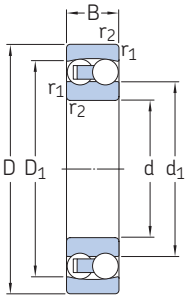
1) Not valid for the SKF Drive-up Method.
2) The listed values are valid only for solid steel shafts and general applications. They are to be used as guideline values only, as it is difficult to establish an exact starting position. Also, the axial drive-up, s, differs slightly between the different bearings series.

# Designation system

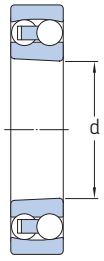


## 4.1 Self-aligning ball bearings

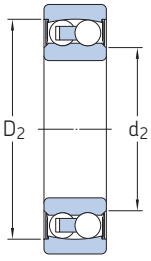
d **5 – 20** mm




Cylindrical bore




Tapered bore

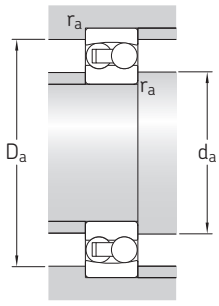


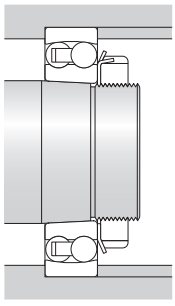

Sealed

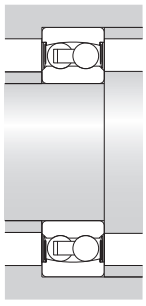
4.1

| Principal dimensions | | | Basic load ratings dynamic | static | Fatique load limit | Speed ratings Reference speed | Limiting speed | Mass | Designations Bearing with cylindrical bore | tapered bore |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **5** | 19 | 6 | 2,51 | 0,48 | 0,025 | 63 000 | 45 000 | 0,009 | ▸ **135 TN9** | – |
| **6** | 19 | 6 | 2,51 | 0,48 | 0,025 | 70 000 | 45 000 | 0,009 | ▸ **126 TN9** | – |
| **7** | 22 | 7 | 2,65 | 0,56 | 0,029 | 63 000 | 40 000 | 0,014 | ▸ **127 TN9** | – |
| **8** | 22 | 7 | 2,65 | 0,56 | 0,029 | 60 000 | 40 000 | 0,014 | ▸ **108 TN9** | – |
| **9** | 26 | 8 | 3,9 | 0,82 | 0,043 | 60 000 | 38 000 | 0,022 | ▸ **129 TN9** | – |
| **10** | 30 | 9 | 5,53 | 1,18 | 0,061 | 56 000 | 36 000 | 0,034 | ▸ **1200 ETN9** | – |
| | 30 | 14 | 5,53 | 1,18 | 0,06 | – | 17 000 | 0,048 | ▸ **2200 E-2RS1TN9** | – |
| | 30 | 14 | 8,06 | 1,73 | 0,09 | 50 000 | 34 000 | 0,047 | ▸ **2200 ETN9** | – |
| **12** | 32 | 10 | 6,24 | 1,43 | 0,072 | 50 000 | 32 000 | 0,04 | ▸ **1201 ETN9** | – |
| | 32 | 14 | 6,24 | 1,43 | 0,08 | – | 16 000 | 0,053 | ▸ **2201 E-2RS1TN9** | – |
| | 32 | 14 | 8,52 | 1,9 | 0,098 | 45 000 | 30 000 | 0,053 | ▸ **2201 ETN9** | – |
| | 37 | 12 | 9,36 | 2,16 | 0,12 | 40 000 | 28 000 | 0,067 | ▸ **1301 ETN9** | – |
| | 37 | 17 | 11,7 | 2,7 | 0,14 | 38 000 | 28 000 | 0,095 | **2301** | – |
| **15** | 35 | 11 | 7,41 | 1,76 | 0,09 | 45 000 | 28 000 | 0,049 | ▸ **1202 ETN9** | – |
| | 35 | 14 | 7,41 | 1,76 | 0,09 | – | 14 000 | 0,058 | ▸ **2202 E-2RS1TN9** | – |
| | 35 | 14 | 8,71 | 2,04 | 0,11 | 38 000 | 26 000 | 0,06 | ▸ **2202 ETN9** | – |
| | 42 | 13 | 10,8 | 2,6 | 0,14 | 34 000 | 24 000 | 0,094 | ▸ **1302 ETN9** | – |
| | 42 | 17 | 10,8 | 2,6 | 0,14 | – | 12 000 | 0,11 | ▸ **2302 E-2RS1TN9** | – |
| | 42 | 17 | 11,9 | 2,9 | 0,15 | 32 000 | 24 000 | 0,12 | ▸ **2302** | – |
| **17** | 40 | 12 | 8,84 | 2,2 | 0,12 | 38 000 | 24 000 | 0,073 | ▸ **1203 ETN9** | – |
| | 40 | 16 | 8,84 | 2,2 | 0,12 | – | 12 000 | 0,089 | ▸ **2203 E-2RS1TN9** | – |
| | 40 | 16 | 10,6 | 2,55 | 0,14 | 34 000 | 24 000 | 0,088 | ▸ **2203 ETN9** | – |
| | 47 | 14 | 12,7 | 3,4 | 0,18 | 28 000 | 20 000 | 0,12 | ▸ **1303 ETN9** | – |
| | 47 | 19 | 12,7 | 3,4 | 0,18 | – | 11 000 | 0,16 | ▸ **2303 E-2RS1TN9** | – |
| | 47 | 19 | 14,3 | 3,55 | 0,19 | 30 000 | 22 000 | 0,18 | **2303 M** | – |
| **20** | 47 | 14 | 12,7 | 3,4 | 0,18 | 32 000 | 20 000 | 0,12 | ▸ **1204 ETN9** | **1204 EKTN9** |
| | 47 | 18 | 12,7 | 3,4 | 0,18 | – | 10 000 | 0,14 | ▸ **2204 E-2RS1TN9** | – |
| | 47 | 18 | 16,8 | 4,15 | 0,22 | 28 000 | 20 000 | 0,14 | ▸ **2204 ETN9** | – |
| | 52 | 15 | 14,3 | 4 | 0,21 | 26 000 | 18 000 | 0,16 | ▸ **1304 ETN9** | – |
| | 52 | 21 | 14,3 | 4 | 0,21 | – | 9 000 | 0,21 | ▸ **2304 E-2RS1TN9** | – |
| | 52 | 21 | 18,2 | 4,75 | 0,24 | 26 000 | 19 000 | 0,22 | **2304 TN9** | – |

▸ Popular item

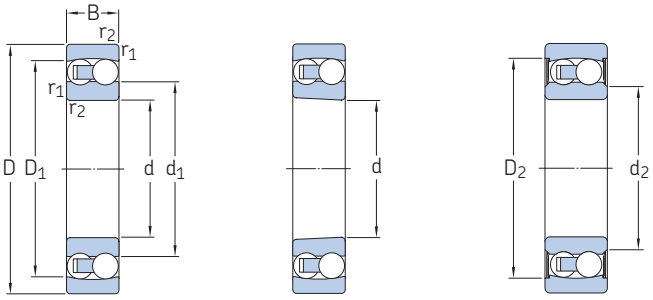






| Dimensions | | | | | | | Abutment and fillet dimensions | | | | Calculation factors | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$, $d_2$ ≈ | $D_1$, $D_2$ ≈ | $C_1$ | b | K | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | $k_r$ | e | $Y_1$ | $Y_2$ | $Y_0$ |
| mm | | | | | | | mm | | | | – | | | | |
| **5** | 10,3 | 15,4 | – | – | – | 0,3 | 7,4 | – | 16,6 | 0,3 | 0,045 | 0,33 | 1,9 | 3 | 2 |
| **6** | 10,3 | 15,4 | – | – | – | 0,3 | 8,4 | – | 16,6 | 0,3 | 0,04 | 0,33 | 1,9 | 3 | 2 |
| **7** | 12,7 | 17,6 | – | – | – | 0,3 | 9,4 | – | 19,6 | 0,3 | 0,04 | 0,33 | 1,9 | 3 | 2 |
| **8** | 12,7 | 17,6 | – | – | – | 0,3 | 10,4 | – | 19,6 | 0,3 | 0,03 | 0,33 | 1,9 | 3 | 2 |
| **9** | 14,8 | 20,4 | – | – | – | 0,3 | 11,4 | – | 23,6 | 0,3 | 0,04 | 0,33 | 1,9 | 3 | 2 |
| **10** | 16,5 | 23,5 | – | – | – | 0,6 | 14,2 | – | 25,8 | 0,6 | 0,04 | 0,33 | 1,9 | 3 | 2 |
| | 14,6 | 24,8 | – | – | – | 0,6 | 14 | 14 | 25,8 | 0,6 | 0,045 | 0,33 | 1,9 | 3 | 2 |
| | 15,3 | 24,3 | – | – | – | 0,6 | 14,2 | – | 25,8 | 0,6 | 0,045 | 0,54 | 1,15 | 1,8 | 1,3 |
| **12** | 18,2 | 25,7 | – | – | – | 0,6 | 16,2 | – | 27,8 | 0,6 | 0,04 | 0,33 | 1,9 | 3 | 2 |
| | 15,5 | 27,4 | – | – | – | 0,6 | 15,5 | 15,5 | 27,8 | 0,6 | 0,045 | 0,33 | 1,9 | 3 | 2 |
| | 17,4 | 26,4 | – | – | – | 0,6 | 16,2 | – | 27,8 | 0,6 | 0,045 | 0,5 | 1,25 | 2 | 1,3 |
| | 20,2 | 29,5 | – | – | – | 1 | 17,6 | – | 31,4 | 1 | 0,04 | 0,35 | 1,8 | 2,8 | 1,8 |
| | 18,9 | 29,1 | – | – | – | 1 | 17,6 | – | 31,4 | 1 | 0,05 | 0,6 | 1,05 | 1,6 | 1,1 |
| **15** | 21,1 | 28,9 | – | – | – | 0,6 | 19,2 | – | 30,8 | 0,6 | 0,04 | 0,33 | 1,9 | 3 | 2 |
| | 19 | 30,4 | – | – | – | 0,6 | 19 | 19 | 30,8 | 0,6 | 0,045 | 0,33 | 1,9 | 3 | 2 |
| | 20,8 | 29,5 | – | – | – | 0,6 | 19,2 | – | 30,8 | 0,6 | 0,045 | 0,43 | 1,5 | 2,3 | 1,6 |
| | 23,9 | 34,3 | – | – | – | 1 | 20,6 | – | 36,4 | 1 | 0,04 | 0,31 | 2 | 3,1 | 2,2 |
| | 20,3 | 36,3 | – | – | – | 1 | 20 | 20 | 36,4 | 1 | 0,05 | 0,31 | 2 | 3,1 | 2,2 |
| | 23,1 | 33,3 | – | – | – | 1 | 20,6 | – | 36,4 | 1 | 0,05 | 0,52 | 1,2 | 1,9 | 1,3 |
| **17** | 24 | 32,9 | – | – | – | 0,6 | 21,2 | – | 35,8 | 0,6 | 0,04 | 0,31 | 2 | 3,1 | 2,2 |
| | 21,1 | 35 | – | – | – | 0,6 | 21 | 21 | 35,8 | 0,6 | 0,045 | 0,31 | 2 | 3,1 | 2,2 |
| | 23,8 | 33,4 | – | – | – | 0,6 | 21,2 | – | 35,8 | 0,6 | 0,045 | 0,43 | 1,5 | 2,3 | 1,6 |
| | 28,8 | 40 | – | – | – | 1 | 22,6 | – | 41,4 | 1 | 0,04 | 0,3 | 2,1 | 3,3 | 2,2 |
| | 25,5 | 41,3 | – | – | – | 1 | 22 | 25,5 | 41,4 | 1 | 0,05 | 0,3 | 2,1 | 3,3 | 2,2 |
| | 26,1 | 37,2 | – | – | – | 1 | 22,6 | – | 41,4 | 1 | 0,05 | 0,52 | 1,2 | 1,9 | 1,3 |
| **20** | 28,8 | 40 | – | – | – | 1 | 25,6 | – | 41,4 | 1 | 0,04 | 0,3 | 2,1 | 3,3 | 2,2 |
| | 25,9 | 41,3 | – | – | – | 1 | 25 | 25,5 | 41,4 | 1 | 0,045 | 0,3 | 2,1 | 3,3 | 2,2 |
| | 27,3 | 40 | – | – | – | 1 | 25,6 | – | 41,4 | 1 | 0,045 | 0,4 | 1,6 | 2,4 | 1,6 |
| | 33,3 | 44,6 | – | – | – | 1 | 27 | – | 45 | 1 | 0,04 | 0,28 | 2,2 | 3,5 | 2,5 |
| | 28,6 | 46,3 | – | – | – | 1,1 | 26,5 | 28,5 | 45 | 1,1 | 0,05 | 0,28 | 2,2 | 3,5 | 2,5 |
| | 29,1 | 41,9 | – | – | – | 1,1 | 27 | – | 45 | 1,1 | 0,05 | 0,52 | 1,2 | 1,9 | 1,3 |

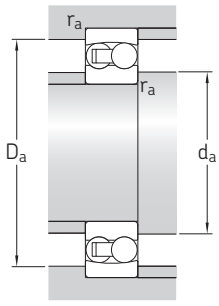


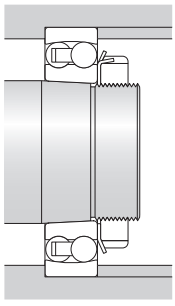

Cylindrical bore | Tapered bore | Sealed

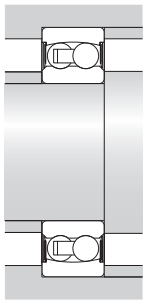


| Principal dimensions | | | Basic load ratings dynamic | static | Fatique load limit | Speed ratings Reference speed | Limiting speed | Mass | Designations Bearing with cylindrical bore | tapered bore |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **25** | 52 | 15 | 14,3 | 4 | 0,21 | 28 000 | 18 000 | 0,14 | ▸ **1205 ETN9** | ▸ **1205 EKTN9** |
| | 52 | 18 | 14,3 | 4 | 0,21 | – | 9 000 | 0,16 | ▸ **2205 E-2RS1TN9** | ▸ **2205 E-2RS1KTN9** |
| | 52 | 18 | 16,8 | 4,4 | 0,23 | 26 000 | 18 000 | 0,16 | ▸ **2205 ETN9** | **2205 EKTN9** |
| | 62 | 17 | 19 | 5,4 | 0,28 | 22 000 | 15 000 | 0,26 | ▸ **1305 ETN9** | **1305 EKTN9** |
| | 62 | 24 | 19 | 5,4 | 0,28 | – | 7 500 | 0,34 | ▸ **2305 E-2RS1TN9** | **2305 E-2RS1KTN9** |
| | 62 | 24 | 27 | 7,1 | 0,37 | 22 000 | 16 000 | 0,34 | ▸ **2305 ETN9** | **2305 EKTN9** |
| **30** | 62 | 16 | 15,6 | 4,65 | 0,24 | 24 000 | 15 000 | 0,22 | ▸ **1206 ETN9** | ▸ **1206 EKTN9** |
| | 62 | 20 | 15,6 | 4,65 | 0,24 | – | 7 500 | 0,26 | ▸ **2206 E-2RS1TN9** | ▸ **2206 E-2RS1KTN9** |
| | 62 | 20 | 23,8 | 6,7 | 0,35 | 22 000 | 15 000 | 0,26 | ▸ **2206 ETN9** | **2206 EKTN9** |
| | 72 | 19 | 22,5 | 6,8 | 0,36 | 19 000 | 13 000 | 0,39 | ▸ **1306 ETN9** | **1306 EKTN9** |
| | 72 | 27 | 22,5 | 6,8 | 0,36 | – | 6 700 | 0,51 | ▸ **2306 E-2RS1TN9** | **2306 E-2RS1KTN9** |
| | 72 | 27 | 31,2 | 8,8 | 0,45 | 18 000 | 13 000 | 0,5 | ▸ **2306** | **2306 K** |
| **35** | 72 | 17 | 19 | 6 | 0,31 | 20 000 | 13 000 | 0,32 | ▸ **1207 ETN9** | ▸ **1207 EKTN9** |
| | 72 | 23 | 19 | 6 | 0,31 | – | 6 300 | 0,41 | ▸ **2207 E-2RS1TN9** | ▸ **2207 E-2RS1KTN9** |
| | 72 | 23 | 30,2 | 8,8 | 0,455 | 18 000 | 12 000 | 0,4 | ▸ **2207 ETN9** | ▸ **2207 EKTN9** |
| | 80 | 21 | 26,5 | 8,5 | 0,43 | 16 000 | 11 000 | 0,51 | ▸ **1307 ETN9** | **1307 EKTN9** |
| | 80 | 31 | 26,5 | 8,5 | 0,43 | – | 5 600 | 0,7 | ▸ **2307 E-2RS1TN9** | **2307 E-2RS1KTN9** |
| | 80 | 31 | 39,7 | 11,2 | 0,59 | 16 000 | 12 000 | 0,68 | ▸ **2307 ETN9** | ▸ **2307 EKTN9** |
| **40** | 80 | 18 | 19,9 | 6,95 | 0,36 | 18 000 | 11 000 | 0,42 | ▸ **1208 ETN9** | ▸ **1208 EKTN9** |
| | 80 | 23 | 19,9 | 6,95 | 0,36 | – | 5 600 | 0,5 | ▸ **2208 E-2RS1TN9** | ▸ **2208 E-2RS1KTN9** |
| | 80 | 23 | 31,9 | 10 | 0,51 | 16 000 | 11 000 | 0,51 | ▸ **2208 ETN9** | ▸ **2208 EKTN9** |
| | 90 | 23 | 33,8 | 11,2 | 0,57 | 14 000 | 9 500 | 0,68 | ▸ **1308 ETN9** | ▸ **1308 EKTN9** |
| | 90 | 33 | 33,8 | 11,2 | 0,57 | – | 5 000 | 0,96 | ▸ **2308 E-2RS1TN9** | **2308 E-2RS1KTN9** |
| | 90 | 33 | 54 | 16 | 0,82 | 14 000 | 10 000 | 0,93 | ▸ **2308 ETN9** | ▸ **2308 EKTN9** |
| **45** | 85 | 19 | 22,9 | 7,8 | 0,4 | 17 000 | 11 000 | 0,47 | ▸ **1209 ETN9** | ▸ **1209 EKTN9** |
| | 85 | 23 | 22,9 | 7,8 | 0,4 | – | 5 300 | 0,53 | ▸ **2209 E-2RS1TN9** | ▸ **2209 E-2RS1KTN9** |
| | 85 | 23 | 32,5 | 10,6 | 0,54 | 15 000 | 10 000 | 0,55 | ▸ **2209 ETN9** | ▸ **2209 EKTN9** |
| | 100 | 25 | 39 | 13,4 | 0,7 | 12 000 | 8 500 | 0,96 | ▸ **1309 ETN9** | ▸ **1309 EKTN9** |
| | 100 | 36 | 39 | 13,4 | 0,7 | – | 4 500 | 1,3 | ▸ **2309 E-2RS1TN9** | **2309 E-2RS1KTN9** |
| | 100 | 36 | 63,7 | 19,3 | 1 | 13 000 | 9 000 | 1,25 | ▸ **2309 ETN9** | ▸ **2309 EKTN9** |

▸ Popular item

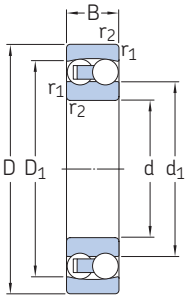


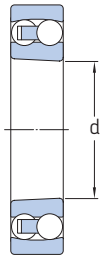




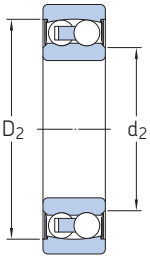
| Dimensions | | | | | | | Abutment and fillet dimensions | | | | Calculation factors | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$, $d_2$ ≈ | $D_1$, $D_2$ ≈ | $C_1$ | b | K | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | $k_r$ | e | $Y_1$ | $Y_2$ | $Y_0$ |
| mm | | | | | | | mm | | | | – | | | | |
| **25** | 33,3 | 44,6 | – | – | – | 1 | 30,6 | – | 46,4 | 1 | 0,04 | 0,28 | 2,2 | 3,5 | 2,5 |
| | 31 | 46,3 | – | – | – | 1 | 30,6 | 31 | 46,4 | 1 | 0,045 | 0,28 | 2,2 | 3,5 | 2,5 |
| | 32,2 | 45,1 | – | – | – | 1 | 30,6 | – | 46,4 | 1 | 0,045 | 0,35 | 1,8 | 2,8 | 1,8 |
| | 38 | 50,7 | – | – | – | 1,1 | 32 | – | 55 | 1,1 | 0,04 | 0,28 | 2,2 | 3,5 | 2,5 |
| | 32,8 | 52,7 | – | – | – | 1,1 | 32 | 32,5 | 55 | 1,1 | 0,05 | 0,28 | 2,2 | 3,5 | 2,5 |
| | 35,5 | 52,3 | – | – | – | 1,1 | 32 | – | 55 | 1,1 | 0,05 | 0,44 | 1,4 | 2,2 | 1,4 |
| **30** | 40,3 | 51,9 | – | – | – | 1 | 35,6 | – | 56,4 | 1 | 0,04 | 0,25 | 2,5 | 3,9 | 2,5 |
| | 36,7 | 54,1 | – | – | – | 1 | 35,6 | 36,5 | 56,4 | 1 | 0,045 | 0,25 | 2,5 | 3,9 | 2,5 |
| | 38,7 | 54 | – | – | – | 1 | 35,6 | – | 56,4 | 1 | 0,045 | 0,33 | 1,9 | 3 | 2 |
| | 45,1 | 59,1 | – | – | – | 1,1 | 37 | – | 65 | 1,1 | 0,04 | 0,25 | 2,5 | 3,9 | 2,5 |
| | 40,4 | 61,9 | – | – | – | 1,1 | 37 | 40 | 65 | 1,1 | 0,05 | 0,25 | 2,5 | 3,9 | 2,5 |
| | 41,9 | 59,8 | – | – | – | 1,1 | 37 | – | 65 | 1,1 | 0,05 | 0,44 | 1,4 | 2,2 | 1,4 |
| **35** | 47 | 60,9 | – | – | – | 1,1 | 42 | – | 65 | 1,1 | 0,04 | 0,23 | 2,7 | 4,2 | 2,8 |
| | 42,7 | 62,7 | – | – | – | 1,1 | 42 | 42,5 | 65 | 1,1 | 0,045 | 0,23 | 2,7 | 4,2 | 2,8 |
| | 45,3 | 62,9 | – | – | – | 1,1 | 42 | – | 65 | 1,1 | 0,045 | 0,31 | 2 | 3,1 | 2,2 |
| | 51,5 | 67,5 | – | – | – | 1,5 | 44 | – | 71 | 1,5 | 0,04 | 0,25 | 2,5 | 3,9 | 2,5 |
| | 43,7 | 69,2 | – | – | – | 1,5 | 43,5 | 43,5 | 71 | 1,5 | 0,05 | 0,25 | 2,5 | 3,9 | 2,5 |
| | 46,7 | 67 | – | – | – | 1,5 | 44 | – | 71 | 1,5 | 0,05 | 0,46 | 1,35 | 2,1 | 1,4 |
| **40** | 53,8 | 67,5 | – | – | – | 1,1 | 47 | – | 73 | 1,1 | 0,04 | 0,22 | 2,9 | 4,5 | 2,8 |
| | 49 | 69,8 | – | – | – | 1,1 | 47 | 49 | 73 | 1,1 | 0,045 | 0,22 | 2,9 | 4,5 | 2,8 |
| | 52,3 | 70,2 | – | – | – | 1,1 | 47 | – | 73 | 1,1 | 0,045 | 0,28 | 2,2 | 3,5 | 2,5 |
| | 61,4 | 80,2 | – | – | – | 1,1 | 49 | – | 81 | 1,1 | 0,04 | 0,23 | 2,7 | 4,2 | 2,8 |
| | 55,4 | 81,8 | – | – | – | 1,5 | 49 | 55 | 81 | 1,5 | 0,05 | 0,23 | 2,7 | 4,2 | 2,8 |
| | 53,7 | 77,8 | – | – | – | 1,5 | 49 | – | 81 | 1,5 | 0,05 | 0,4 | 1,6 | 2,4 | 1,6 |
| **45** | 57,5 | 72,5 | – | – | – | 1,1 | 52 | – | 78 | 1,1 | 0,04 | 0,21 | 3 | 4,6 | 3,2 |
| | 52,9 | 75,3 | – | – | – | 1,1 | 52 | 53 | 78 | 1,1 | 0,045 | 0,21 | 3 | 4,6 | 3,2 |
| | 55,3 | 73,2 | – | – | – | 1,1 | 52 | – | 78 | 1,1 | 0,045 | 0,26 | 2,4 | 3,7 | 2,5 |
| | 67,7 | 87,8 | – | – | – | 1,5 | 54 | – | 91 | 1,5 | 0,04 | 0,23 | 2,7 | 4,2 | 2,8 |
| | 60,9 | 90 | – | – | – | 1,5 | 54 | 60,5 | 91 | 1,5 | 0,05 | 0,23 | 2,7 | 4,2 | 2,8 |
| | 60,1 | 86 | – | – | – | 1,5 | 54 | – | 91 | 1,5 | 0,05 | 0,33 | 1,9 | 3 | 2 |




Cylindrical bore




Tapered bore

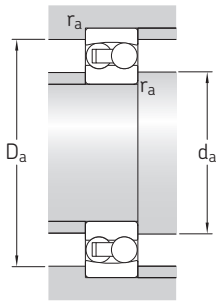


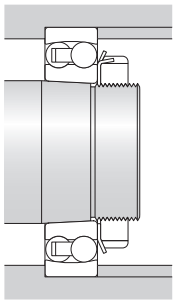

Sealed

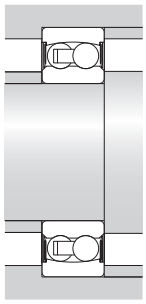


| Principal dimensions | | | Basic load ratings dynamic | static | Fatique load limit | Speed ratings Reference speed | Limiting speed | Mass | Designations Bearing with cylindrical bore | tapered bore |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **50** | 90 | 20 | 26,5 | 9,15 | 0,48 | 16 000 | 10 000 | 0,53 | ▸ **1210 ETN9** | ▸ **1210 EKTN9** |
| | 90 | 23 | 22,9 | 8,15 | 0,42 | – | 4 800 | 0,57 | ▸ **2210 E-2RS1TN9** | ▸ **2210 E-2RS1KTN9** |
| | 90 | 23 | 33,8 | 11,2 | 0,57 | 14 000 | 9 500 | 0,6 | ▸ **2210 ETN9** | ▸ **2210 EKTN9** |
| | 110 | 27 | 43,6 | 14 | 0,72 | 12 000 | 8 000 | 1,2 | ▸ **1310 ETN9** | ▸ **1310 EKTN9** |
| | 110 | 40 | 43,6 | 14 | 0,72 | – | 4 000 | 1,65 | ▸ **2310 E-2RS1TN9** | **2310 E-2RS1KTN9** |
| | 110 | 40 | 63,7 | 20 | 1,04 | 14 000 | 9 500 | 1,65 | ▸ **2310** | ▸ **2310 K** |
| **55** | 100 | 21 | 27,6 | 10,6 | 0,54 | 14 000 | 9 000 | 0,71 | ▸ **1211 ETN9** | ▸ **1211 EKTN9** |
| | 100 | 25 | 27,6 | 10,6 | 0,54 | – | 4 300 | 0,79 | ▸ **2211 E-2RS1TN9** | ▸ **2211 E-2RS1KTN9** |
| | 100 | 25 | 39 | 13,4 | 0,7 | 12 000 | 8 500 | 0,81 | ▸ **2211 ETN9** | ▸ **2211 EKTN9** |
| | 120 | 29 | 50,7 | 18 | 0,92 | 11 000 | 7 500 | 1,6 | ▸ **1311 ETN9** | ▸ **1311 EKTN9** |
| | 120 | 43 | 76,1 | 24 | 1,25 | 11 000 | 7 500 | 2,1 | ▸ **2311** | ▸ **2311 K** |
| **60** | 110 | 22 | 31,2 | 12,2 | 0,62 | 12 000 | 8 500 | 0,9 | ▸ **1212 ETN9** | ▸ **1212 EKTN9** |
| | 110 | 28 | 31,2 | 12,2 | 0,62 | – | 3 800 | 1,05 | ▸ **2212 E-2RS1TN9** | **2212 E-2RS1KTN9** |
| | 110 | 28 | 48,8 | 17 | 0,88 | 11 000 | 8 000 | 1,1 | ▸ **2212 ETN9** | ▸ **2212 EKTN9** |
| | 130 | 31 | 58,5 | 22 | 1,12 | 9 000 | 6 300 | 1,95 | ▸ **1312 ETN9** | **1312 EKTN9** |
| | 130 | 46 | 87,1 | 28,5 | 1,46 | 9 500 | 7 000 | 2,6 | ▸ **2312** | ▸ **2312 K** |
| **65** | 120 | 23 | 35,1 | 14 | 0,72 | 11 000 | 7 000 | 1,15 | **1213 ETN9** | ▸ **1213 EKTN9** |
| | 120 | 31 | 35,1 | 14 | 0,72 | – | 3 600 | 1,4 | ▸ **2213 E-2RS1TN9** | ▸ **2213 E-2RS1KTN9** |
| | 120 | 31 | 57,2 | 20 | 1,02 | 10 000 | 7 000 | 1,45 | ▸ **2213 ETN9** | ▸ **2213 EKTN9** |
| | 140 | 33 | 65 | 25,5 | 1,25 | 8 500 | 6 000 | 2,45 | ▸ **1313 ETN9** | **1313 EKTN9** |
| | 140 | 48 | 95,6 | 32,5 | 1,66 | 9 000 | 6 300 | 3,25 | ▸ **2313** | ▸ **2313 K** |
| **70** | 125 | 24 | 35,8 | 14,6 | 0,75 | 11 000 | 7 000 | 1,25 | ▸ **1214 ETN9** | – |
| | 125 | 31 | 35,8 | 14,6 | 0,75 | – | 3 400 | 1,45 | ▸ **2214 E-2RS1TN9** | – |
| | 125 | 31 | 44,2 | 17 | 0,88 | 10 000 | 6 700 | 1,5 | ▸ **2214** | – |
| | 150 | 35 | 74,1 | 27,5 | 1,34 | 8 500 | 6 000 | 3 | ▸ **1314** | – |
| | 150 | 51 | 111 | 37,5 | 1,86 | 8 000 | 6 000 | 3,9 | ▸ **2314** | – |
| **75** | 130 | 25 | 39 | 15,6 | 0,8 | 10 000 | 6 700 | 1,35 | ▸ **1215** | ▸ **1215 K** |
| | 130 | 31 | 58,5 | 22 | 1,12 | 9 000 | 6 300 | 1,6 | ▸ **2215 ETN9** | ▸ **2215 EKTN9** |
| | 160 | 37 | 79,3 | 30 | 1,43 | 8 000 | 5 600 | 3,55 | ▸ **1315** | ▸ **1315 K** |
| | 160 | 55 | 124 | 43 | 2,04 | 7 500 | 5 600 | 4,7 | **2315** | ▸ **2315 K** |
| **80** | 140 | 26 | 39,7 | 17 | 0,83 | 9 500 | 6 000 | 1,65 | **1216** | ▸ **1216 K** |
| | 140 | 33 | 65 | 25,5 | 1,25 | 8 500 | 6 000 | 2 | ▸ **2216 ETN9** | ▸ **2216 EKTN9** |
| | 170 | 39 | 88,4 | 33,5 | 1,5 | 7 500 | 5 300 | 4,2 | ▸ **1316** | ▸ **1316 K** |
| | 170 | 58 | 135 | 49 | 2,24 | 7 000 | 5 300 | 6,1 | ▸ **2316** | ▸ **2316 K** |

▸ Popular item

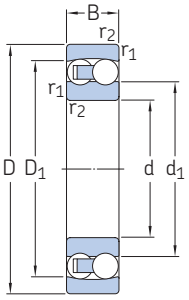


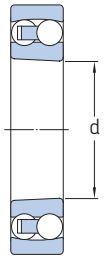




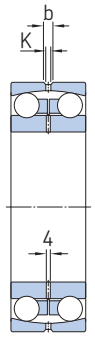
| Dimensions | | | | | | | Abutment and fillet dimensions | | | | Calculation factors | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$, $d_2$ ≈ | $D_1$, $D_2$ ≈ | $C_1$ | b | K | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | $k_r$ | e | $Y_1$ | $Y_2$ | $Y_0$ |
| mm | | | | | | | mm | | | | – | | | | |
| **50** | 61,7 | 78,1 | – | – | – | 1,1 | 57 | – | 83 | 1,1 | 0,04 | 0,21 | 3 | 4,6 | 3,2 |
| | 57,7 | 79,4 | – | – | – | 1,1 | 57 | 58 | 83 | 1,1 | 0,045 | 0,2 | 3,2 | 4,9 | 3,2 |
| | 61,4 | 80,2 | – | – | – | 1,1 | 57 | – | 83 | 1,1 | 0,045 | 0,23 | 2,7 | 4,2 | 2,8 |
| | 70,3 | 92,6 | – | – | – | 2 | 61 | – | 99 | 2 | 0,04 | 0,24 | 2,6 | 4,1 | 2,8 |
| | 62,9 | 95,2 | – | – | – | 2 | 61 | 62,5 | 99 | 2 | 0,05 | 0,24 | 2,6 | 4,1 | 2,8 |
| | 66 | 92,5 | – | – | – | 2 | 61 | – | 99 | 2 | 0,05 | 0,43 | 1,5 | 2,3 | 1,6 |
| **55** | 70,3 | 86,5 | – | – | – | 1,5 | 64 | – | 91 | 1,5 | 0,04 | 0,19 | 3,3 | 5,1 | 3,6 |
| | 65,9 | 88,5 | – | – | – | 1,5 | 64 | 65,5 | 91 | 1,5 | 0,045 | 0,19 | 3,3 | 5,1 | 3,6 |
| | 67,7 | 87,8 | – | – | – | 1,5 | 64 | – | 91 | 1,5 | 0,045 | 0,23 | 2,7 | 4,2 | 2,8 |
| | 77,9 | 102 | – | – | – | 2 | 66 | – | 109 | 2 | 0,04 | 0,23 | 2,7 | 4,2 | 2,8 |
| | 72 | 101 | – | – | – | 2 | 66 | – | 109 | 2 | 0,05 | 0,4 | 1,6 | 2,4 | 1,6 |
| **60** | 78 | 95,6 | – | – | – | 1,5 | 69 | – | 101 | 1,5 | 0,04 | 0,19 | 3,3 | 5,1 | 3,6 |
| | 73,2 | 97 | – | – | – | 1,5 | 69 | 73 | 101 | 1,5 | 0,045 | 0,19 | 3,3 | 5,1 | 3,6 |
| | 74,4 | 96,9 | – | – | – | 1,5 | 69 | – | 101 | 1,5 | 0,045 | 0,24 | 2,6 | 4,1 | 2,8 |
| | 91,6 | 117 | – | – | – | 2,1 | 72 | – | 118 | 2 | 0,04 | 0,22 | 2,9 | 4,5 | 2,8 |
| | 77,1 | 110 | – | – | – | 2,1 | 72 | – | 118 | 2 | 0,05 | 0,33 | 1,9 | 3 | 2 |
| **65** | 85,1 | 104 | – | – | – | 1,5 | 74 | – | 111 | 1,5 | 0,04 | 0,18 | 3,5 | 5,4 | 3,6 |
| | 79,3 | 106 | – | – | – | 1,5 | 74 | 79 | 111 | 1,5 | 0,045 | 0,18 | 3,5 | 5,4 | 3,6 |
| | 80,6 | 106 | – | – | – | 1,5 | 74 | – | 111 | 1,5 | 0,045 | 0,24 | 2,6 | 4,1 | 2,8 |
| | 99 | 126 | – | – | – | 2 | 77 | – | 128 | 2 | 0,04 | 0,22 | 2,9 | 4,5 | 2,8 |
| | 86 | 120 | – | – | – | 2,1 | 77 | – | 128 | 2 | 0,05 | 0,37 | 1,7 | 2,6 | 1,8 |
| **70** | 87,4 | 107 | – | – | – | 1,5 | 79 | – | 116 | 1,5 | 0,04 | 0,18 | 3,5 | 5,4 | 3,6 |
| | 81,4 | 109 | – | – | – | 1,5 | 79 | 81 | 116 | 1,5 | 0,045 | 0,18 | 3,5 | 5,4 | 3,6 |
| | 88 | 109 | – | – | – | 1,5 | 79 | – | 116 | 1,5 | 0,04 | 0,27 | 2,3 | 3,6 | 2,5 |
| | 97,5 | 127 | – | – | – | 2,1 | 82 | – | 138 | 2 | 0,045 | 0,22 | 2,9 | 4,5 | 2,8 |
| | 92 | 129 | – | – | – | 2,1 | 82 | – | 138 | 2 | 0,05 | 0,37 | 1,7 | 2,6 | 1,8 |
| **75** | 93 | 115 | – | – | – | 1,5 | 84 | – | 121 | 1,5 | 0,04 | 0,17 | 3,7 | 5,7 | 4 |
| | 91,6 | 117 | – | – | – | 1,5 | 84 | – | 121 | 1,5 | 0,045 | 0,22 | 2,9 | 4,5 | 2,8 |
| | 104 | 136 | – | – | – | 2,1 | 87 | – | 148 | 2 | 0,045 | 0,22 | 2,9 | 4,5 | 2,8 |
| | 97,8 | 137 | – | – | – | 2,1 | 87 | – | 148 | 2 | 0,05 | 0,37 | 1,7 | 2,6 | 1,8 |
| **80** | 102 | 123 | – | – | – | 2 | 91 | – | 129 | 2 | 0,04 | 0,16 | 3,9 | 6,1 | 4 |
| | 99 | 126 | – | – | – | 2 | 91 | – | 129 | 2 | 0,045 | 0,22 | 2,9 | 4,5 | 2,8 |
| | 110 | 145 | – | – | – | 2,1 | 92 | – | 158 | 2 | 0,045 | 0,22 | 2,9 | 4,5 | 2,8 |
| | 104 | 146 | – | – | – | 2,1 | 92 | – | 158 | 2 | 0,05 | 0,37 | 1,7 | 2,6 | 1,8 |



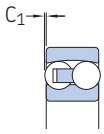

Cylindrical bore




Tapered bore



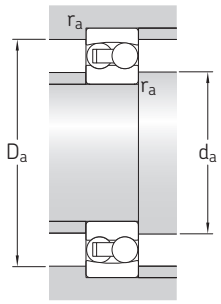

130.., 139..

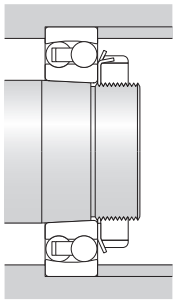


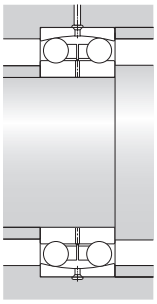



| Principal dimensions | | | Basic load ratings dynamic | static | Fatique load limit | Speed ratings Reference speed | Limiting speed | Mass | Designations Bearing with cylindrical bore | tapered bore |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **85** | 150 | 28 | 48,8 | 20,8 | 0,98 | 9 000 | 5 600 | 2,05 | ▸ **1217** | ▸ **1217 K** |
| | 150 | 36 | 58,5 | 23,6 | 1,12 | 8 000 | 5 600 | 2,5 | ▸ **2217** | ▸ **2217 K** |
| | 180 | 41 | 97,5 | 38 | 1,7 | 7 000 | 4 800 | 5 | **1317** | ▸ **1317 K** |
| | 180 | 60 | 140 | 51 | 2,28 | 6 700 | 4 800 | 7,05 | **2317** | – |
| | 180 | 60 | 140 | 51 | 2,28 | 6 700 | 4 800 | 7,05 | **2317 M** | **2317 KM** |
| **90** | 160 | 30 | 57,2 | 23,6 | 1,08 | 8 500 | 5 300 | 2,5 | ▸ **1218** | ▸ **1218 K** |
| | 160 | 40 | 70,2 | 28,5 | 1,32 | 7 500 | 5 300 | 3,4 | ▸ **2218** | ▸ **2218 K** |
| | 190 | 43 | 117 | 44 | 1,93 | 6 700 | 4 500 | 5,8 | **1318** | **1318 K** |
| | 190 | 64 | 151 | 57 | 2,5 | 6 300 | 4 500 | 8,45 | **2318** | **2318 K** |
| **95** | 170 | 32 | 63,7 | 27 | 1,2 | 8 000 | 5 000 | 3,1 | **1219** | ▸ **1219 K** |
| | 170 | 43 | 83,2 | 34,5 | 1,53 | 7 000 | 5 000 | 4,1 | **2219** | **2219 K** |
| | 200 | 45 | 133 | 51 | 2,16 | 6 300 | 4 300 | 6,7 | **1319** | **1319 K** |
| | 200 | 67 | 165 | 64 | 2,75 | 6 000 | 4 500 | 9,8 | **2319 M** | **2319 KM** |
| **100** | 180 | 34 | 68,9 | 30 | 1,29 | 7 500 | 4 800 | 3,7 | ▸ **1220** | ▸ **1220 K** |
| | 180 | 46 | 97,5 | 40,5 | 1,76 | 6 700 | 4 800 | 5 | **2220** | **2220 K** |
| | 215 | 47 | 143 | 57 | 2,36 | 6 000 | 4 000 | 8,3 | **1320** | ▸ **1320 K** |
| | 215 | 73 | 190 | 80 | 3,25 | 5 600 | 4 000 | 12,5 | **2320** | **2320 K** |
| **110** | 200 | 38 | 88,4 | 39 | 1,6 | 6 700 | 4 300 | 5,15 | ▸ **1222** | ▸ **1222 K** |
| | 200 | 53 | 124 | 52 | 2,12 | 6 000 | 4 300 | 7,1 | **2222** | **2222 K** |
| | 240 | 50 | 163 | 72 | 2,75 | 5 300 | 3 600 | 12 | **1322 M** | **1322 KM** |
| **120** | 215 | 42 | 119 | 53 | 2,12 | 6 300 | 4 000 | 6,75 | **1224 M** | **1224 KM** |
| **130** | 230 | 46 | 127 | 58,5 | 2,24 | 5 600 | 3 600 | 8,3 | ▸ **1226 M** | **1226 KM** |
| **150** | 225 | 56 | 57,2 | 23,6 | 0,88 | 5 600 | 3 400 | 7,5 | **13030** | – |
| **180** | 280 | 74 | 95,6 | 40 | 1,34 | 4 500 | 2 800 | 16 | **13036** | – |
| **200** | 280 | 60 | 60,5 | 29 | 0,97 | 4 300 | 2 600 | 10,5 | **13940** | – |
| **220** | 300 | 60 | 60,5 | 30,5 | 0,97 | 3 800 | 2 400 | 11 | **13944** | – |
| **240** | 320 | 60 | 60,5 | 32 | 0,98 | 3 800 | 2 200 | 11,5 | **13948** | – |

▸ Popular item



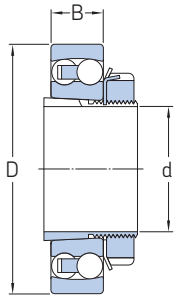




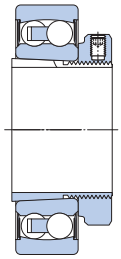
| Dimensions | | | | | | | Abutment and fillet dimensions | | | | Calculation factors | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$, $d_2$ ≈ | $D_1$, $D_2$ ≈ | $C_1$ | b | K | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | $k_r$ | e | $Y_1$ | $Y_2$ | $Y_0$ |
| mm | | | | | | | mm | | | | – | | | | |
| **85** | 107 | 131 | – | – | – | 2 | 96 | – | 139 | 2 | 0,04 | 0,17 | 3,7 | 5,7 | 4 |
| | 106 | 131 | – | – | – | 2 | 96 | – | 139 | 2 | 0,04 | 0,25 | 2,5 | 3,9 | 2,5 |
| | 117 | 153 | – | – | – | 3 | 99 | – | 166 | 3 | 0,045 | 0,22 | 2,9 | 4,5 | 2,8 |
| | 115 | 154 | – | – | – | 3 | 99 | – | 166 | 3 | 0,05 | 0,37 | 1,7 | 2,6 | 1,8 |
| | 115 | 154 | – | – | – | 3 | 99 | – | 166 | 3 | 0,05 | 0,37 | 1,7 | 2,6 | 1,8 |
| **90** | 112 | 139 | – | – | – | 2 | 101 | – | 149 | 2 | 0,04 | 0,17 | 3,7 | 5,7 | 4 |
| | 112 | 140 | – | – | – | 2 | 101 | – | 149 | 2 | 0,04 | 0,27 | 2,3 | 3,6 | 2,5 |
| | 122 | 163 | 1 | – | – | 3 | 104 | – | 176 | 3 | 0,045 | 0,22 | 2,9 | 4,5 | 2,8 |
| | 121 | 163 | – | – | – | 3 | 104 | – | 176 | 3 | 0,05 | 0,37 | 1,7 | 2,6 | 1,8 |
| **95** | 120 | 149 | – | – | – | 2,1 | 107 | – | 158 | 2 | 0,04 | 0,17 | 3,7 | 5,7 | 4 |
| | 119 | 149 | – | – | – | 2,1 | 107 | – | 158 | 2 | 0,04 | 0,27 | 2,3 | 3,6 | 2,5 |
| | 127 | 171 | 1,5 | – | – | 3 | 109 | – | 186 | 3 | 0,045 | 0,23 | 2,7 | 4,2 | 2,8 |
| | 128 | 171 | – | – | – | 3 | 109 | – | 186 | 3 | 0,05 | 0,37 | 1,7 | 2,6 | 1,8 |
| **100** | 127 | 156 | – | – | – | 2,1 | 112 | – | 168 | 2 | 0,04 | 0,17 | 3,7 | 5,7 | 4 |
| | 124 | 157 | – | – | – | 2,1 | 112 | – | 168 | 2 | 0,04 | 0,27 | 2,3 | 3,6 | 2,5 |
| | 136 | 182 | 2,5 | – | – | 3 | 114 | – | 201 | 3 | 0,045 | 0,23 | 2,7 | 4,2 | 2,8 |
| | 135 | 184 | – | – | – | 3 | 114 | – | 201 | 3 | 0,05 | 0,37 | 1,7 | 2,6 | 1,8 |
| **110** | 140 | 174 | – | – | – | 2,1 | 122 | – | 188 | 2 | 0,04 | 0,17 | 3,7 | 5,7 | 4 |
| | 138 | 175 | – | – | – | 2,1 | 122 | – | 188 | 2 | 0,04 | 0,28 | 2,2 | 3,5 | 2,5 |
| | 154 | 203 | 2,5 | – | – | 3 | 124 | – | 226 | 3 | 0,045 | 0,22 | 2,9 | 4,5 | 2,8 |
| **120** | 149 | 188 | 1,3 | – | – | 2,1 | 132 | – | 203 | 2 | 0,04 | 0,19 | 3,3 | 5,1 | 3,6 |
| **130** | 163 | 202 | 1,3 | – | – | 3 | 144 | – | 216 | 3 | 0,04 | 0,19 | 3,3 | 5,1 | 3,6 |
| **150** | 175 | 204 | – | 8,3 | 4,5 | 2,1 | 161 | – | 214 | 2 | 0,02 | 0,24 | 2,6 | 4,1 | 2,8 |
| **180** | 212 | 250 | – | 13,9 | 7,5 | 2,1 | 191 | – | 269 | 2 | 0,02 | 0,25 | 2,5 | 3,9 | 2,5 |
| **200** | 229 | 258 | – | 8,3 | 4,5 | 2,1 | 211 | – | 269 | 2 | 0,015 | 0,19 | 3,3 | 5,1 | 3,6 |
| **220** | 248 | 278 | – | 8,3 | 4,5 | 2,1 | 231 | – | 289 | 2 | 0,015 | 0,18 | 3,5 | 5,4 | 3,6 |
| **240** | 268 | 298 | – | 8,3 | 4,5 | 2,1 | 251 | – | 309 | 2 | 0,015 | 0,16 | 3,9 | 6,1 | 4 |

## 4.2 Self-aligning ball bearings on an adapter sleeve

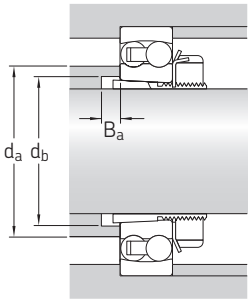
d **17 – 90** mm




Open bearing on a standard sleeve



Sealed bearing on an E design sleeve






| Principal dimensions | | | Abutment and fillet dimensions | | | Mass | Designations | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Bearing + sleeve | Bearing[1] | Sleeve[2] |
| d | D | B | $d_a$ max. | $d_b$ min. | $B_a$ min. | | | |
| mm | | | mm | | | kg | – | |
| **17** | 47 | 14 | 28,5 | 23 | 5 | 0,16 | **1204 EKTN9** | **H 204** |
| **20** | 52 | 15 | 33 | 28 | 5 | 0,21 | ▸ **1205 EKTN9** | **H 205** |
| | 52 | 18 | 31 | 28 | 5 | 0,23 | **2205 E-2RS1KTN9** | **H 305 E** |
| | 52 | 18 | 32 | 28 | 5 | 0,23 | **2205 EKTN9** | **H 305** |
| | 62 | 17 | 37 | 28 | 6 | 0,33 | **1305 EKTN9** | **H 305** |
| | 62 | 24 | 32,5 | 29 | 5 | 0,42 | **2305 E-2RS1KTN9** | **H 2305** |
| | 62 | 24 | 35,5 | 29 | 5 | 0,42 | **2305 EKTN9** | **H 2305** |
| **25** | 62 | 16 | 40 | 33 | 5 | 0,32 | ▸ **1206 EKTN9** | **H 206** |
| | 62 | 20 | 36,5 | 33 | 5 | 0,36 | **2206 E-2RS1KTN9** | **H 306 E** |
| | 62 | 20 | 38 | 33 | 5 | 0,36 | **2206 EKTN9** | **H 306** |
| | 72 | 19 | 44 | 33 | 6 | 0,49 | **1306 EKTN9** | **H 306** |
| | 72 | 27 | 40 | 35 | 5 | 0,62 | **2306 E-2RS1KTN9** | **H 2306** |
| | 72 | 27 | 41 | 35 | 5 | 0,61 | **2306 K** | **H 2306** |
| **30** | 72 | 17 | 47 | 38 | 5 | 0,44 | ▸ **1207 EKTN9** | **H 207** |
| | 72 | 23 | 42,5 | 39 | 5 | 0,55 | **2207 E-2RS1KTN9** | **H 307 E** |
| | 72 | 23 | 45 | 39 | 5 | 0,54 | **2207 EKTN9** | **H 307** |
| | 80 | 21 | 51 | 39 | 7 | 0,65 | **1307 EKTN9** | **H 307** |
| | 80 | 31 | 43,5 | 40 | 5 | 0,86 | **2307 E-2RS1KTN9** | **H 2307 E** |
| | 80 | 31 | 46 | 40 | 5 | 0,84 | ▸ **2307 EKTN9** | **H 2307** |
| **35** | 80 | 18 | 53 | 43 | 6 | 0,58 | ▸ **1208 EKTN9** | **H 208** |
| | 80 | 23 | 49 | 44 | 6 | 0,67 | **2208 E-2RS1KTN9** | **H 308 E** |
| | 80 | 23 | 52 | 44 | 6 | 0,58 | **2208 EKTN9** | **H 308** |
| | 90 | 23 | 61 | 44 | 6 | 0,85 | **1308 EKTN9** | **H 308** |
| | 90 | 33 | 53 | 45 | 6 | 1,1 | ▸ **2308 EKTN9** | **H 2308** |
| | 90 | 33 | 55 | 45 | 6 | 1,2 | **2308 E-2RS1KTN9** | **H 2308** |
| **40** | 85 | 19 | 57 | 48 | 6 | 0,68 | ▸ **1209 EKTN9** | **H 209** |
| | 85 | 23 | 53 | 50 | 8 | 0,76 | **2209 E-2RS1KTN9** | **H 309 E** |
| | 85 | 23 | 55 | 50 | 8 | 0,78 | **2209 EKTN9** | **H 309** |
| | 100 | 25 | 67 | 50 | 6 | 1,2 | **1309 EKTN9** | **H 309** |
| | 100 | 36 | 60 | 50 | 6 | 1,4 | ▸ **2309 EKTN9** | **H 2309** |
| | 100 | 36 | 60,5 | 50 | 6 | 1,55 | **2309 E-2RS1KTN9** | **H 2309** |

▸ Popular item
[1] For additional bearing data → **product table**, **page 450**
[2] For additional adapter sleeve data → **product table**, **page 1072**

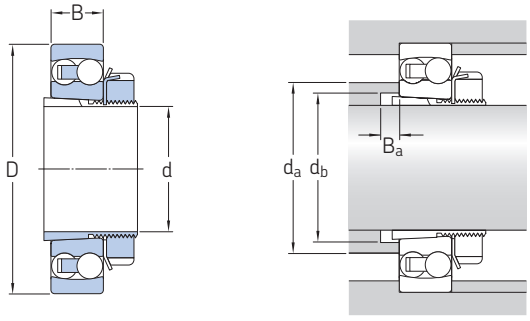
| Principal dimensions | | | Abutment and fillet dimensions | | | Mass | Designations | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Bearing + sleeve | Bearing[1] | Sleeve[2] |
| d | D | B | $d_a$ max. | $d_b$ min. | $B_a$ min. | | | |
| mm | | | mm | | | kg | – | |
| **45** | 90 | 20 | 62 | 53 | 6 | 0,77 | ▸ **1210 EKTN9** | **H 210** |
| | 90 | 23 | 58 | 55 | 10 | 0,84 | **2210 E-2RS1KTN9** | **H 310 E** |
| | 90 | 23 | 61 | 55 | 10 | 0,87 | **2210 EKTN9** | **H 310** |
| | 110 | 27 | 70 | 55 | 6 | 1,45 | **1310 EKTN9** | **H 310** |
| | 110 | 40 | 62,5 | 56 | 6 | 2 | **2310 E-2RS1KTN9** | **H 2310** |
| | 110 | 40 | 65 | 56 | 6 | 1,9 | ▸ **2310 K** | **H 2310** |
| **50** | 100 | 21 | 70 | 60 | 7 | 0,99 | ▸ **1211 EKTN9** | **H 211** |
| | 100 | 25 | 65,5 | 60 | 11 | 1,1 | **2211 E-2RS1KTN9** | **H 311 E** |
| | 100 | 25 | 67 | 60 | 11 | 1,15 | **2211 EKTN9** | **H 311** |
| | 120 | 29 | 77 | 60 | 7 | 1,9 | **1311 EKTN9** | **H 311** |
| | 120 | 43 | 72 | 61 | 7 | 2,4 | ▸ **2311 K** | **H 2311** |
| **55** | 110 | 22 | 78 | 64 | 7 | 1,2 | ▸ **1212 EKTN9** | **H 212** |
| | 110 | 28 | 73 | 65 | 9 | 1,4 | **2212 E-2RS1KTN9** | **H 312 E** |
| | 110 | 28 | 74 | 65 | 9 | 1,45 | **2212 EKTN9** | **H 312** |
| | 130 | 31 | 87 | 65 | 7 | 2,15 | **1312 EKTN9** | **H 312** |
| | 130 | 46 | 76 | 66 | 7 | 2,95 | ▸ **2312 K** | **H 2312** |
| **60** | 120 | 23 | 85 | 70 | 7 | 1,45 | ▸ **1213 EKTN9** | **H 213** |
| | 120 | 31 | 79 | 70 | 7 | 1,75 | ▸ **2213 E-2RS1KTN9** | **H 313 E** |
| | 120 | 31 | 80 | 70 | 9 | 1,8 | **2213 EKTN9** | **H 313** |
| | 140 | 33 | 98 | 70 | 7 | 2,85 | **1313 EKTN9** | **H 313** |
| | 140 | 48 | 85 | 72 | 7 | 3,6 | ▸ **2313 K** | **H 2313** |
| **65** | 130 | 25 | 93 | 80 | 7 | 2 | ▸ **1215 K** | **H 215** |
| | 130 | 31 | 93 | 80 | 13 | 2,3 | **2215 EKTN9** | **H 315** |
| | 160 | 37 | 104 | 80 | 7 | 4,2 | **1315 K** | **H 315** |
| | 160 | 55 | 97 | 82 | 7 | 5,55 | ▸ **2315 K** | **H 2315** |
| **70** | 140 | 26 | 101 | 85 | 7 | 2,4 | ▸ **1216 K** | **H 216** |
| | 140 | 33 | 99 | 85 | 13 | 2,85 | **2216 EKTN9** | **H 316** |
| | 170 | 39 | 109 | 85 | 7 | 5 | **1316 K** | **H 316** |
| | 170 | 58 | 104 | 88 | 7 | 7,1 | ▸ **2316 K** | **H 2316** |
| **75** | 150 | 28 | 107 | 90 | 8 | 2,95 | ▸ **1217 K** | **H 217** |
| | 150 | 36 | 105 | 91 | 13 | 3,3 | **2217 K** | **H 317** |
| | 180 | 41 | 117 | 91 | 8 | 6 | **1317 K** | **H 317** |
| **80** | 160 | 30 | 112 | 95 | 8 | 3,5 | ▸ **1218 K** | **H 218** |
| | 160 | 40 | 112 | 96 | 11 | 5,5 | **2218 K** | **H 318** |
| | 190 | 43 | 122 | 96 | 8 | 6,9 | **1318 K** | **H 318** |
| | 190 | 64 | 115 | 100 | 8 | 9,8 | **2318 K** | **H 2318** |
| **85** | 170 | 32 | 120 | 100 | 8 | 4,25 | ▸ **1219 K** | **H 219** |
| | 170 | 43 | 118 | 102 | 10 | 5,3 | **2219 K** | **H 319** |
| | 200 | 45 | 127 | 102 | 8 | 7,9 | **1319 K** | **H 319** |
| | 200 | 67 | 128 | 105 | 8 | 11,5 | **2319 KM** | **H 2319** |
| **90** | 180 | 34 | 127 | 106 | 8 | 5 | ▸ **1220 K** | **H 220** |
| | 180 | 46 | 124 | 108 | 9 | 6,4 | **2220 K** | **H 320** |
| | 215 | 47 | 136 | 108 | 8 | 9,65 | **1320 K** | **H 320** |
| | 215 | 73 | 130 | 110 | 8 | 14 | **2320 K** | **H 2320** |



▸ Popular item
[1] For additional bearing data → product table, page 450
[2] For additional adapter sleeve data → product table, page 1072

## 4.2 Self-aligning ball bearings on an adapter sleeve

d **100 – 115** mm



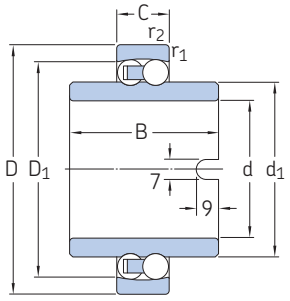



| Principal dimensions | | | Abutment and fillet dimensions | | | Mass | Designations | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Bearing + sleeve | Bearing[1] | Sleeve[2] |
| d | D | B | $d_a$ max. | $d_b$ min. | $B_a$ min. | | | |
| mm | | | mm | | | kg | – | |
| **100** | 200 | 38 | 140 | 116 | 8 | 6,8 | ▸ **1222 K** | **H 222** |
| | 200 | 53 | 137 | 118 | 8 | 8,85 | **2222 K** | **H 322** |
| | 240 | 50 | 154 | 118 | 10 | 13,5 | **1322 KM** | **H 322** |
| **110** | 215 | 42 | 150 | 127 | 12 | 8,3 | **1224 KM** | **H 3024** |
| **115** | 230 | 46 | 163 | 137 | 15 | 11 | **1226 KM** | **H 3026** |

▸ Popular item
[1] For additional bearing data → **product table**, **page 450**
[2] For additional adapter sleeve data → **product table**, **page 1072**

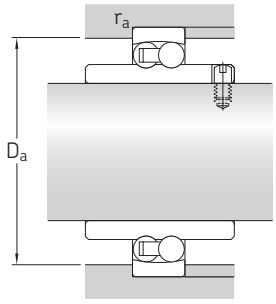
## 4.3 Self-aligning ball bearings with an extended inner ring

d **20 – 60** mm



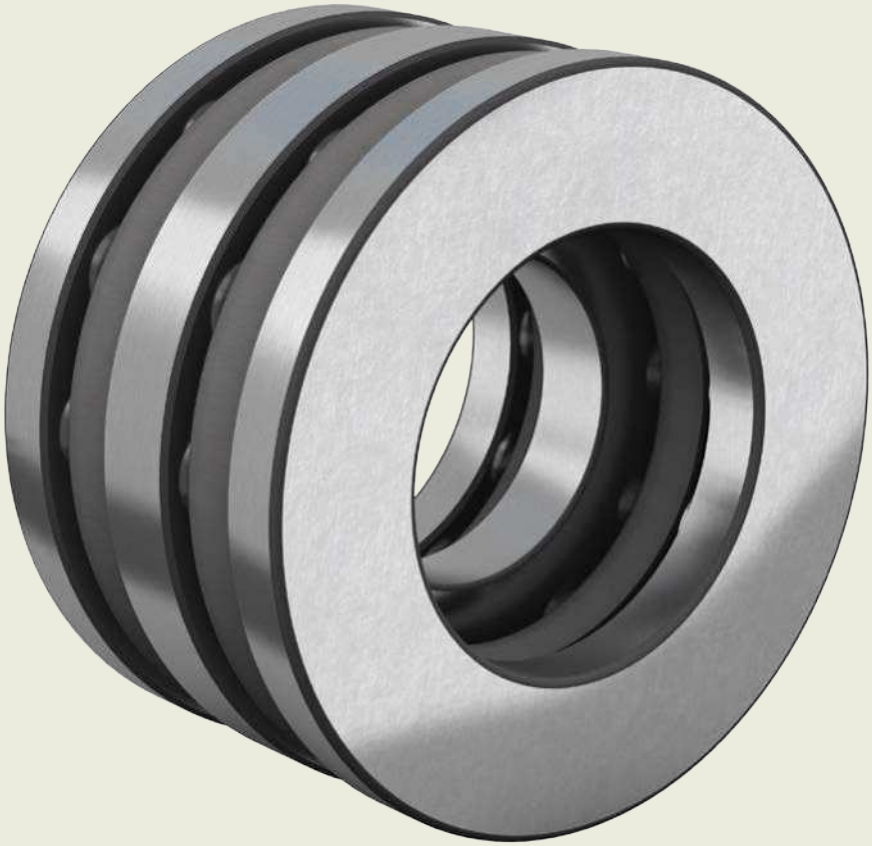



| Principal dimensions | | | Basic load ratings dynamic | static | Fatique load limit | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|
| d | D | C | C | $C_0$ | $P_u$ | | | |
| mm | | | kN | | kN | r/min | kg | – |
| **20** | 47 | 14 | 12,7 | 3,4 | 0,18 | 9 000 | 0,18 | **11204 ETN9** |
| **25** | 52 | 15 | 14,3 | 4 | 0,21 | 8 000 | 0,22 | **11205 ETN9** |
| **30** | 62 | 16 | 15,6 | 4,65 | 0,24 | 6 700 | 0,35 | **11206 TN9** |
| **35** | 72 | 17 | 19 | 6 | 0,305 | 5 600 | 0,54 | **11207 TN9** |
| **40** | 80 | 18 | 19 | 6,55 | 0,335 | 5 000 | 0,72 | **11208 TN9** |
| **45** | 85 | 19 | 22,9 | 7,8 | 0,4 | 4 500 | 0,77 | **11209 TN9** |
| **50** | 90 | 20 | 26,5 | 9,15 | 0,475 | 4 300 | 0,85 | **11210 TN9** |
| **60** | 110 | 22 | 31,2 | 12,2 | 0,62 | 3 400 | 1,15 | **11212 TN9** |






| Dimensions | | | | | Abutment and fillet dimensions | | Calculation factors | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | B | $r_{1,2}$ min. | $D_a$ max. | $r_a$ max. | $k_r$ | e | $Y_1$ | $Y_2$ | $Y_0$ |
| mm | | | | | mm | | – | | | | |
| **20** | 28,8 | 40 | 40 | 1 | 41,4 | 1 | 0,04 | 0,3 | 2,1 | 3,3 | 2,2 |
| **25** | 33,3 | 44,6 | 44 | 1 | 46,4 | 1 | 0,04 | 0,28 | 2,2 | 3,5 | 2,5 |
| **30** | 40,1 | 51,9 | 48 | 1 | 56,4 | 1 | 0,04 | 0,25 | 2,5 | 3,9 | 2,5 |
| **35** | 47 | 60,9 | 52 | 1,1 | 65 | 1,1 | 0,04 | 0,23 | 2,7 | 4,2 | 2,8 |
| **40** | 54 | 67,5 | 56 | 1,1 | 73 | 1,1 | 0,04 | 0,22 | 2,9 | 4,5 | 2,8 |
| **45** | 57,7 | 72,5 | 58 | 1,1 | 78 | 1,1 | 0,04 | 0,21 | 3 | 4,6 | 3,2 |
| **50** | 61,7 | 78,1 | 58 | 1,1 | 83 | 1,1 | 0,04 | 0,21 | 3 | 4,6 | 3,2 |
| **60** | 78 | 95,6 | 62 | 1,5 | 101 | 1,5 | 0,04 | 0,19 | 3,3 | 5,1 | 3,6 |



# 5 Thrust ball bearings

# 5 Thrust ball bearings


**Designs and variants** . . . . . **467**
Single direction thrust ball bearings. . . . . 467
Double direction thrust ball bearings . . . . . 467
Bearings with sphered housing washers . . . . . 468
Cages. . . . . 468

**Bearing data** . . . . . **469**
(Dimension standards, tolerances, permissible misalignment)

**Loads** . . . . . **469**
(Minimum load, equivalent dynamic bearing load, equivalent static bearing load)

**Temperature limits** . . . . . **470**

**Permissible speed** . . . . . **470**

**Mounting** . . . . . **470**

**Designation system** . . . . . **471**

**Product tables**
5.1 Single direction thrust ball bearings . . . . . 472
5.2 Single direction thrust ball bearings with a sphered housing washer . . . . . 482
5.3 Double direction thrust ball bearings . . . . . 486
5.4 Double direction thrust ball bearings with sphered housing washers . . . . . 490

**Other thrust ball bearings**
Bearings with Solid Oil . . . . . 1023
NoWear coated bearings . . . . . 1059
Polymer ball bearings → skf.com/bearings

# 5 Thrust ball bearings



## More information

**General bearing knowledge** . . . . **17**

**Bearing selection process** . . . . . **59**
Lubrication . . . . . 109
Bearing interfaces. . . . . 139
Seat tolerances for standard conditions . . . . . 148
Sealing, mounting and dismounting . . . . . 193

SKF thrust ball bearings (fig. 1) are manufactured as single direction or double direction thrust ball bearings. They are designed to accommodate axial loads only and must not be subjected to any radial load.

## Bearing features

- **Separable and interchangeable**
  The separable components of SKF thrust ball bearings are interchangeable (fig. 2). This facilitates mounting and dismounting, and maintenance inspections.
- **Initial misalignment**
  Bearings with sphered housing washer(s) (fig. 3) can accommodate initial misalignment.
- **Interference fit**
  Shaft washers have a ground bore to enable an interference fit. The bore of the housing washer is turned and always larger than the shaft washer bore.

**Fig. 1**

**Thrust ball bearings**

Single direction | Double direction

# Designs and variants

## Single direction thrust ball bearings

- consist of a shaft washer, a housing washer and a ball and cage assembly (fig. 4)
- can accommodate axial loads and locate a shaft axially, in one direction only

## Double direction thrust ball bearings

- consist of one shaft washer, two housing washers and two ball and cage assemblies (fig. 5)

  The housing washers and ball and cage assemblies of double direction bearings are identical to those used in single direction bearings.
- can accommodate axial loads and locate a shaft axially, in both directions



Fig. 2

**Interchangeable components**

Single direction bearing | Double direction bearing

Fig. 3

**Bearing with sphered housing washer and appropriate seat washer**

Fig. 4

**Single direction bearing**

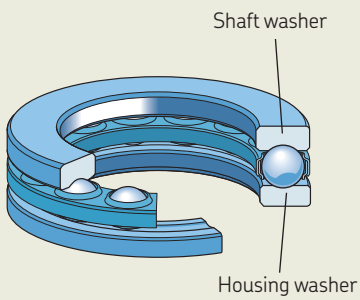
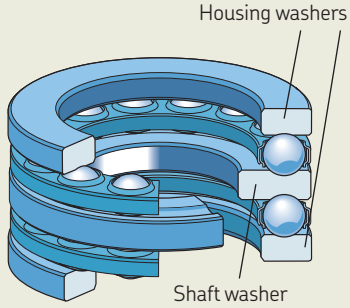



Fig. 5

**Double direction bearing**



# Bearings with sphered housing washers

- can accommodate initial misalignment
- are available in both single (fig. 6) and double direction designs
- can be used together with a sphered seat washer adjacent to the housing washer (fig. 7) or adjacent to a machine component manufactured with a sphered surface

Appropriate sphered seat washers must be ordered separately (product tables, page 482, and page 490). Depending on the bearing series, they have the basic designation U 2, U 3 or U 4 followed by a two-digit number, which identifies the size, e.g. sphered seat washer U 320 for bearing 53320.



# Cages

SKF thrust ball bearings are fitted with one of the cages shown in table 1.

For additional information about the suitability of cages , refer to *Cages*, page 187.

**Table 1**

**Cages for thrust ball bearings**

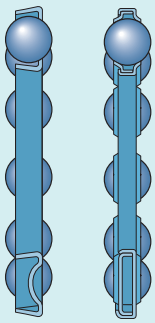
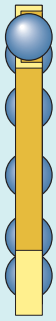
| | | | |
|---|---|---|---|
| |  |  | |
| **Cage description** | Stamped steel, ball centred | Machined brass, ball centred | Machined steel, ball centred |
| **Suffix** | – | M | F |

**Fig. 6**

**Single direction bearing with a sphered housing washer**

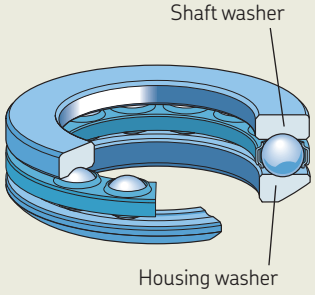
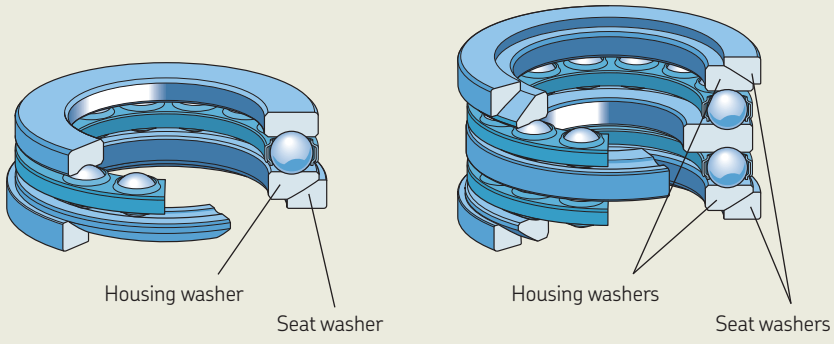



**Fig. 7**

**Bearings with sphered housing washer(s) and sphered seat washer(s)**



# Bearing data

| | Thrust ball bearings with flat housing washers | Thrust ball bearings with sphered housing washers |
|---|---|---|
| **Dimension standards** | ISO 104<br>Bearings in the BA series are not standardized. | ISO 20516 |
| **Tolerances**<br><br>For additional information<br>→ **page 35** | Normal<br>P5 or P6 on request (single direction bearings only)<br><br>Values: ISO 199 (**table 10**, **page 46**)<br>Bearings in the BA series are not standardized. | Normal |
| **Permissible misalignment** | Cannot tolerate any misalignment. | Accommodate only initial misalignment. |



# Loads

| | | |
|---|---|---|
| **Minimum load**<br><br>For additional information<br>→ **page 106** | $F_{am} = A\left(\frac{n}{1\,000}\right)^2$ | **Symbols**<br><br>A minimum load factor (**product tables**, **page 472**)<br>$F_a$ axial load [kN]<br>$F_{am}$ minimum axial load [kN]<br>n rotational speed [r/min]<br>P equivalent dynamic bearing load [kN]<br>$P_0$ equivalent static bearing load [kN] |
| **Equivalent dynamic bearing load**<br>For additional information<br>→ **page 91** | $P = F_a$ | |
| **Equivalent static bearing load**<br>For additional information<br>→ **page 105** | $P_0 = F_a$ | |

# Temperature limits

The permissible operating temperature for thrust ball bearings can be limited by:

- the dimensional stability of the bearing washers and balls
- the cage
- the seat washer(s)
- the lubricant

Where temperatures outside the permissible range are expected, contact SKF.

## Bearing washers and balls

Depending on their size, washers and balls of SKF thrust ball bearings are heat stabilized up to:

- 125 °C *(260 °F)* where d ≤ 300 mm
- 150 °C *(300 °F)* where d > 300 mm

## Cages

Steel and brass cages can be used at the same operating temperatures as the bearing washers and balls.

## Seat washers

Seat washers are made of steel and can be used at the same operating temperatures as the bearing washers and balls.

## Lubricants

For temperature limits of SKF greases, refer to *Selecting a suitable SKF grease*, page 116.

When using lubricants not supplied by SKF, temperature limits should be evaluated according to the SKF traffic light concept (page 117).

# Permissible speed

The speed ratings in the **product tables** indicate:

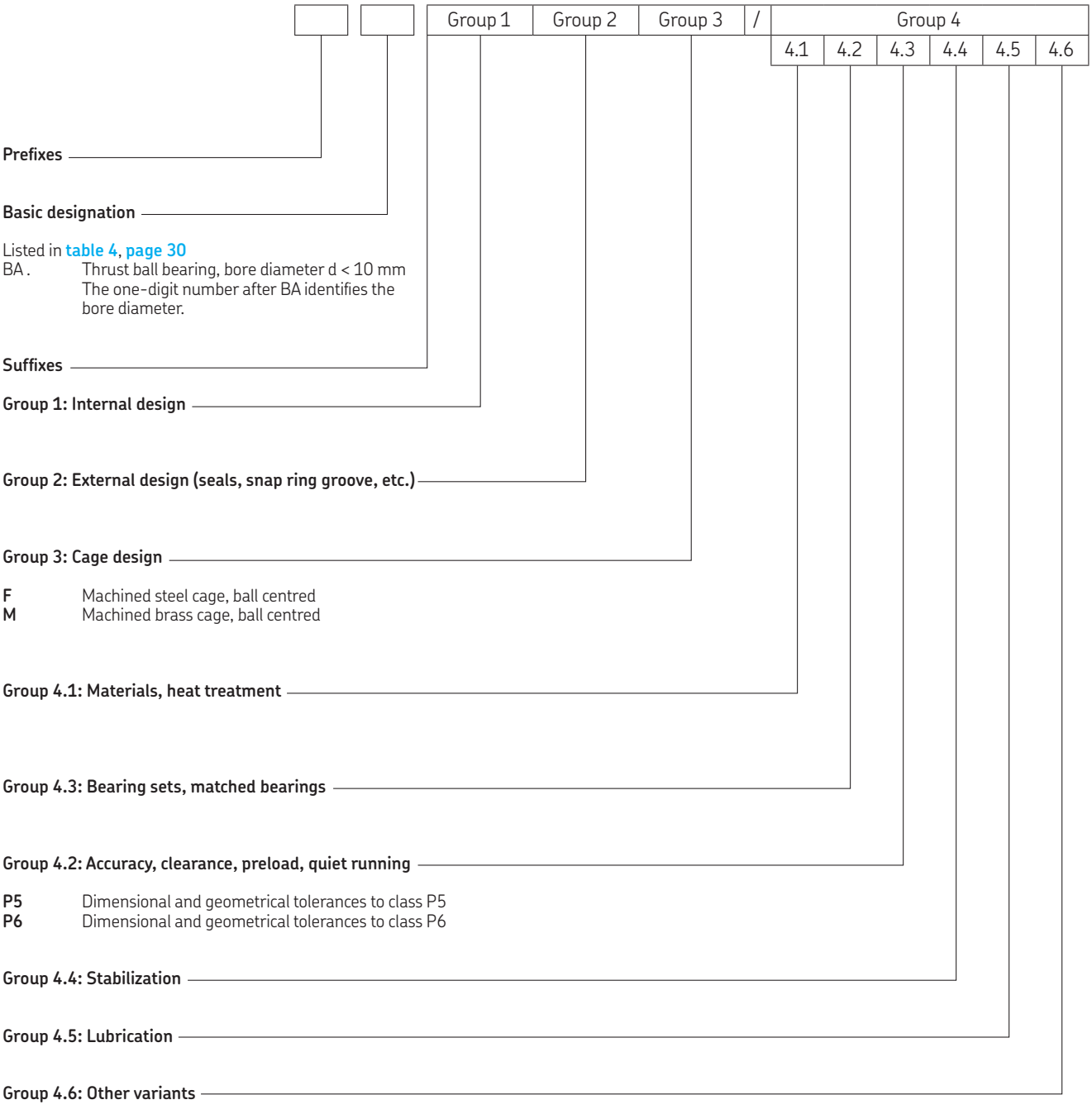
- the **reference speed**, which enables a quick assessment of the speed capabilities from a thermal frame of reference
- the **limiting speed**, which is a mechanical limit that should not be exceeded unless the bearing design and the application are adapted for higher speeds

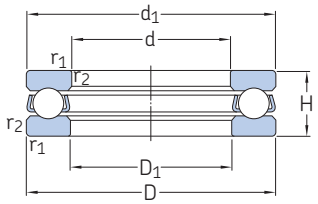
For additional information, refer to *Operating temperature and speed*, page 130.

# Mounting

Where mounting a single direction thrust ball bearing, it is important to differentiate between the shaft washer and the housing washer. The bore of the shaft washer is ground and always smaller than the bore of the housing washer. The shaft washer should always be placed against a shaft step or fixed shaft component.

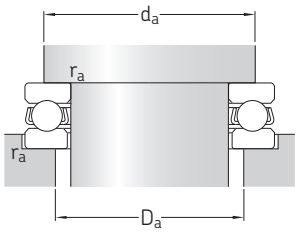
# Designation system



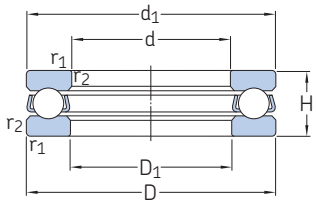



| Principal dimensions | | | Basic load ratings dynamic | static | Fatique load limit | Minimum load factor | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | H | C | $C_0$ | $P_u$ | A | | | | |
| mm | | | kN | | kN | – | r/min | | kg | – |
| **3** | 8 | 3,5 | 0,806 | 0,72 | 0,027 | 0,000 003 | 26 000 | 36 000 | 0,0009 | ▸ **BA 3** |
| **4** | 10 | 4 | 0,761 | 0,72 | 0,027 | 0,000 003 | 22 000 | 30 000 | 0,0015 | ▸ **BA 4** |
| **5** | 12 | 4 | 0,852 | 0,965 | 0,036 | 0,000 005 | 20 000 | 28 000 | 0,0021 | ▸ **BA 5** |
| **6** | 14 | 5 | 1,78 | 1,92 | 0,071 | 0,000 019 | 17 000 | 24 000 | 0,0035 | ▸ **BA 6** |
| **7** | 17 | 6 | 2,51 | 2,9 | 0,108 | 0,000 044 | 14 000 | 19 000 | 0,0065 | ▸ **BA 7** |
| **8** | 19 | 7 | 3,19 | 3,8 | 0,143 | 0,000 075 | 12 000 | 17 000 | 0,0091 | ▸ **BA 8** |
| **9** | 20 | 7 | 3,12 | 3,8 | 0,143 | 0,000 075 | 12 000 | 16 000 | 0,01 | ▸ **BA 9** |
| **10** | 24 | 9 | 9,95 | 15,3 | 0,56 | 0,0012 | 9 500 | 13 000 | 0,02 | ▸ **51100** |
| | 26 | 11 | 12,7 | 18,6 | 0,695 | 0,0018 | 8 000 | 11 000 | 0,03 | ▸ **51200** |
| **12** | 26 | 9 | 10,4 | 16,6 | 0,62 | 0,0014 | 9 000 | 13 000 | 0,022 | ▸ **51101** |
| | 28 | 11 | 13,3 | 20,8 | 0,765 | 0,0022 | 8 000 | 11 000 | 0,034 | ▸ **51201** |
| **15** | 28 | 9 | 10,6 | 18,3 | 0,67 | 0,0017 | 8 500 | 12 000 | 0,023 | ▸ **51102** |
| | 32 | 12 | 15,9 | 25 | 0,915 | 0,0038 | 7 000 | 10 000 | 0,046 | ▸ **51202** |
| **17** | 30 | 9 | 11,4 | 21,2 | 0,78 | 0,0023 | 8 500 | 12 000 | 0,025 | ▸ **51103** |
| | 35 | 12 | 16,3 | 27 | 1 | 0,0047 | 6 700 | 9 500 | 0,053 | ▸ **51203** |
| **20** | 35 | 10 | 15,1 | 29 | 1,08 | 0,0044 | 7 500 | 10 000 | 0,037 | ▸ **51104** |
| | 40 | 14 | 21,2 | 37,5 | 1,4 | 0,0085 | 6 000 | 8 000 | 0,083 | ▸ **51204** |
| **25** | 42 | 11 | 18,2 | 39 | 1,43 | 0,0079 | 6 300 | 9 000 | 0,056 | ▸ **51105** |
| | 47 | 15 | 26,5 | 50 | 1,86 | 0,015 | 5 300 | 7 500 | 0,11 | ▸ **51205** |
| | 52 | 18 | 34,5 | 60 | 2,24 | 0,018 | 4 500 | 6 300 | 0,17 | ▸ **51305** |
| | 60 | 24 | 42,3 | 67 | 2,45 | 0,048 | 3 600 | 5 000 | 0,34 | ▸ **51405** |
| **30** | 47 | 11 | 19 | 43 | 1,6 | 0,0096 | 6 000 | 8 500 | 0,063 | ▸ **51106** |
| | 52 | 16 | 25,1 | 51 | 1,86 | 0,013 | 4 800 | 6 700 | 0,13 | ▸ **51206** |
| | 60 | 21 | 35,8 | 65,5 | 2,4 | 0,026 | 3 800 | 5 300 | 0,26 | ▸ **51306** |
| | 70 | 28 | 70,2 | 122 | 4,5 | 0,097 | 3 000 | 4 300 | 0,52 | ▸ **51406** |
| **35** | 52 | 12 | 19,9 | 51 | 1,86 | 0,013 | 5 600 | 7 500 | 0,08 | ▸ **51107** |
| | 62 | 18 | 35,1 | 73,5 | 2,7 | 0,028 | 4 000 | 5 600 | 0,22 | ▸ **51207** |
| | 68 | 24 | 49,4 | 96,5 | 3,55 | 0,048 | 3 400 | 4 800 | 0,39 | ▸ **51307** |
| | 80 | 32 | 76,1 | 137 | 5,1 | 0,15 | 2 600 | 3 600 | 0,79 | ▸ **51407** |

▸ Popular item

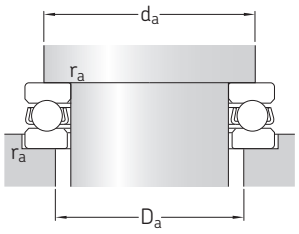



| Dimensions | | | | Abutment and fillet dimensions | | |
|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | $r_{1,2}$ min. | $d_a$ min. | $D_a$ max. | $r_a$ max. |
| mm | | | | mm | | |
| **3** | 7,8 | 3,2 | 0,15 | 5,8 | 5 | 0,15 |
| **4** | 9,8 | 4,2 | 0,15 | 7,5 | 6,5 | 0,15 |
| **5** | 11,8 | 5,2 | 0,15 | 8 | 9 | 0,15 |
| **6** | 13,8 | 6,2 | 0,2 | 11 | 9,5 | 0,2 |
| **7** | 16,8 | 7,2 | 0,2 | 12,5 | 11 | 0,2 |
| **8** | 18,8 | 8,2 | 0,3 | 14,5 | 12,5 | 0,3 |
| **9** | 19,8 | 9,2 | 0,3 | 15,5 | 13,5 | 0,3 |
| **10** | 24 | 11 | 0,3 | 19 | 15 | 0,3 |
| | 26 | 12 | 0,6 | 20 | 16 | 0,6 |
| **12** | 26 | 13 | 0,3 | 21 | 17 | 0,3 |
| | 28 | 14 | 0,6 | 22 | 18 | 0,6 |
| **15** | 28 | 16 | 0,3 | 23 | 20 | 0,3 |
| | 32 | 17 | 0,6 | 25 | 22 | 0,6 |
| **17** | 30 | 18 | 0,3 | 25 | 22 | 0,3 |
| | 35 | 19 | 0,6 | 28 | 24 | 0,6 |
| **20** | 35 | 21 | 0,3 | 29 | 26 | 0,3 |
| | 40 | 22 | 0,6 | 32 | 28 | 0,6 |
| **25** | 42 | 26 | 0,6 | 35 | 32 | 0,6 |
| | 47 | 27 | 0,6 | 38 | 34 | 0,6 |
| | 52 | 27 | 1 | 41 | 36 | 1 |
| | 60 | 27 | 1 | 46 | 39 | 1 |
| **30** | 47 | 32 | 0,6 | 40 | 37 | 0,6 |
| | 52 | 32 | 0,6 | 43 | 39 | 0,6 |
| | 60 | 32 | 1 | 48 | 42 | 1 |
| | 70 | 32 | 1 | 54 | 46 | 1 |
| **35** | 52 | 37 | 0,6 | 45 | 42 | 0,6 |
| | 62 | 37 | 1 | 51 | 46 | 1 |
| | 68 | 37 | 1 | 55 | 48 | 1 |
| | 80 | 37 | 1,1 | 62 | 53 | 1 |

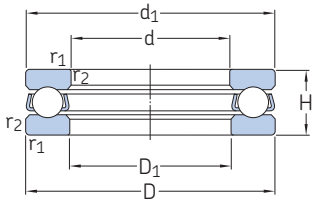



| Principal dimensions | | | Basic load ratings dynamic | static | Fatique load limit | Minimum load factor | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | H | C | $C_0$ | $P_u$ | A | | | | |
| mm | | | kN | | kN | – | r/min | | kg | – |
| **40** | 60 | 13 | 25,5 | 63 | 2,32 | 0,02 | 5 000 | 7 000 | 0,12 | ▸ **51108** |
| | 68 | 19 | 44,2 | 96,5 | 3,6 | 0,058 | 3 800 | 5 300 | 0,28 | ▸ **51208** |
| | 78 | 26 | 61,8 | 122 | 4,5 | 0,077 | 3 000 | 4 300 | 0,53 | ▸ **51308** |
| | 90 | 36 | 95,6 | 183 | 6,8 | 0,26 | 2 400 | 3 400 | 1,1 | ▸ **51408** |
| **45** | 65 | 14 | 26,5 | 69,5 | 2,55 | 0,025 | 4 500 | 6 300 | 0,14 | ▸ **51109** |
| | 73 | 20 | 39 | 86,5 | 3,2 | 0,038 | 3 600 | 5 000 | 0,3 | ▸ **51209** |
| | 85 | 28 | 76,1 | 153 | 5,6 | 0,12 | 2 800 | 4 000 | 0,66 | ▸ **51309** |
| | 100 | 39 | 124 | 240 | 9 | 0,37 | 2 200 | 3 000 | 1,4 | ▸ **51409** |
| **50** | 70 | 14 | 27 | 75 | 2,8 | 0,029 | 4 300 | 6 300 | 0,16 | ▸ **51110** |
| | 78 | 22 | 49,4 | 116 | 4,3 | 0,069 | 3 400 | 4 500 | 0,37 | ▸ **51210** |
| | 95 | 31 | 81,9 | 170 | 6,3 | 0,19 | 2 600 | 3 600 | 0,94 | ▸ **51310** |
| | 110 | 43 | 159 | 340 | 12,5 | 0,6 | 2 000 | 2 800 | 2 | ▸ **51410** |
| **55** | 78 | 16 | 30,2 | 81,5 | 3 | 0,039 | 3 800 | 5 300 | 0,23 | ▸ **51111** |
| | 90 | 25 | 58,5 | 134 | 4,9 | 0,11 | 2 800 | 4 000 | 0,59 | ▸ **51211** |
| | 105 | 35 | 101 | 224 | 8,3 | 0,26 | 2 200 | 3 200 | 1,3 | ▸ **51311** |
| | 120 | 48 | 195 | 400 | 14,6 | 0,79 | 1 800 | 2 400 | 2,55 | ▸ **51411** |
| **60** | 85 | 17 | 41,6 | 122 | 4,55 | 0,077 | 3 600 | 5 000 | 0,27 | ▸ **51112** |
| | 95 | 26 | 59,2 | 140 | 5,1 | 0,12 | 2 800 | 3 800 | 0,65 | ▸ **51212** |
| | 110 | 35 | 101 | 224 | 8,3 | 0,26 | 2 200 | 3 000 | 1,35 | ▸ **51312** |
| | 130 | 51 | 199 | 430 | 16 | 0,96 | 1 600 | 2 200 | 3,1 | ▸ **51412 M** |
| **65** | 90 | 18 | 37,7 | 108 | 4 | 0,06 | 3 400 | 4 800 | 0,33 | ▸ **51113** |
| | 100 | 27 | 60,5 | 150 | 5,5 | 0,14 | 2 600 | 3 600 | 0,72 | ▸ **51213** |
| | 115 | 36 | 106 | 240 | 8,8 | 0,3 | 2 000 | 3 000 | 1,5 | ▸ **51313** |
| | 140 | 56 | 216 | 490 | 18 | 1,2 | 1 500 | 2 200 | 4 | ▸ **51413 M** |
| **70** | 95 | 18 | 40,3 | 120 | 4,4 | 0,074 | 3 400 | 4 500 | 0,35 | ▸ **51114** |
| | 105 | 27 | 62,4 | 160 | 5,85 | 0,16 | 2 600 | 3 600 | 0,79 | ▸ **51214** |
| | 125 | 40 | 135 | 320 | 11,8 | 0,53 | 1 900 | 2 600 | 2 | ▸ **51314** |
| | 150 | 60 | 234 | 550 | 19,3 | 1,6 | 1 400 | 2 000 | 5 | ▸ **51414 M** |
| **75** | 100 | 19 | 44,2 | 134 | 4,9 | 0,11 | 3 200 | 4 300 | 0,4 | ▸ **51115** |
| | 110 | 27 | 63,7 | 170 | 6,2 | 0,17 | 2 400 | 3 400 | 0,83 | ▸ **51215** |
| | 135 | 44 | 163 | 390 | 14 | 0,79 | 1 700 | 2 400 | 2,6 | ▸ **51315** |
| | 160 | 65 | 251 | 610 | 20,8 | 1,9 | 1 300 | 1 800 | 6,75 | ▸ **51415 M** |

▸ Popular item

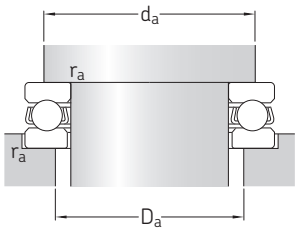



| Dimensions | | | | Abutment and fillet dimensions | | |
|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | $r_{1,2}$ min. | $d_a$ min. | $D_a$ max. | $r_a$ max. |
| mm | | | | mm | | |
| **40** | 60 | 42 | 0,6 | 52 | 48 | 0,6 |
| | 68 | 42 | 1 | 57 | 51 | 1 |
| | 78 | 42 | 1 | 63 | 55 | 1 |
| | 90 | 42 | 1,1 | 70 | 60 | 1 |
| **45** | 65 | 47 | 0,6 | 57 | 53 | 0,6 |
| | 73 | 47 | 1 | 62 | 56 | 1 |
| | 85 | 47 | 1 | 69 | 61 | 1 |
| | 100 | 47 | 1,1 | 78 | 67 | 1 |
| **50** | 70 | 52 | 0,6 | 62 | 58 | 0,6 |
| | 78 | 52 | 1 | 67 | 61 | 1 |
| | 95 | 52 | 1,1 | 77 | 68 | 1 |
| | 110 | 52 | 1,5 | 86 | 74 | 1,5 |
| **55** | 78 | 57 | 0,6 | 69 | 64 | 0,6 |
| | 90 | 57 | 1 | 76 | 69 | 1 |
| | 105 | 57 | 1,1 | 85 | 75 | 1 |
| | 120 | 57 | 1,5 | 94 | 81 | 1,5 |
| **60** | 85 | 62 | 1 | 75 | 70 | 1 |
| | 95 | 62 | 1 | 81 | 74 | 1 |
| | 110 | 62 | 1,1 | 90 | 80 | 1 |
| | 130 | 62 | 1,5 | 102 | 88 | 1,5 |
| **65** | 90 | 67 | 1 | 80 | 75 | 1 |
| | 100 | 67 | 1 | 86 | 79 | 1 |
| | 115 | 67 | 1,1 | 95 | 85 | 1 |
| | 140 | 68 | 2 | 110 | 95 | 2 |
| **70** | 95 | 72 | 1 | 85 | 80 | 1 |
| | 105 | 72 | 1 | 91 | 84 | 1 |
| | 125 | 72 | 1,1 | 103 | 92 | 1 |
| | 150 | 73 | 2 | 118 | 102 | 2 |
| **75** | 100 | 77 | 1 | 90 | 85 | 1 |
| | 110 | 77 | 1 | 96 | 89 | 1 |
| | 135 | 77 | 1,5 | 111 | 99 | 1,5 |
| | 160 | 78 | 2 | 126 | 109 | 2 |

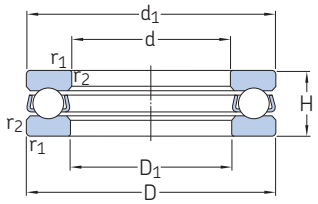



| Principal dimensions | | | Basic load ratings | | Fatique load limit | Minimum load factor | Speed ratings | | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | dynamic | static | | | Reference speed | Limiting speed | | |
| d | D | H | C | $C_0$ | $P_u$ | A | | | | |
| mm | | | kN | | kN | – | r/min | | kg | – |
| **80** | 105 | 19 | 44,9 | 140 | 5,1 | 0,12 | 3 000 | 4 300 | 0,42 | ▸ **51116** |
| | 115 | 28 | 76,1 | 208 | 7,65 | 0,22 | 2 400 | 3 400 | 0,91 | ▸ **51216** |
| | 140 | 44 | 159 | 390 | 13,7 | 0,79 | 1 700 | 2 400 | 2,7 | ▸ **51316** |
| | 170 | 68 | 302 | 750 | 25 | 2,3 | 1 200 | 1 700 | 7,95 | ▸ **51416 M** |
| **85** | 110 | 19 | 44,9 | 146 | 5,4 | 0,14 | 3 000 | 4 300 | 0,44 | ▸ **51117** |
| | 125 | 31 | 97,5 | 275 | 9,8 | 0,39 | 2 200 | 3 000 | 1,2 | ▸ **51217** |
| | 150 | 49 | 174 | 405 | 14 | 1,1 | 1 600 | 2 200 | 3,55 | ▸ **51317** |
| | 180 | 72 | 286 | 750 | 24 | 2,9 | 1 200 | 1 600 | 9,45 | ▸ **51417 M** |
| **90** | 120 | 22 | 59,2 | 208 | 7,5 | 0,22 | 2 600 | 3 800 | 0,67 | ▸ **51118** |
| | 135 | 35 | 112 | 290 | 10,4 | 0,55 | 2 000 | 2 800 | 1,7 | ▸ **51218** |
| | 155 | 50 | 182 | 440 | 14,6 | 1,3 | 1 500 | 2 200 | 3,8 | ▸ **51318** |
| | 190 | 77 | 307 | 815 | 25,5 | 3,5 | 1 100 | 1 500 | 11 | ▸ **51418 M** |
| **100** | 135 | 25 | 80,6 | 265 | 9,15 | 0,44 | 2 400 | 3 200 | 0,97 | ▸ **51120** |
| | 150 | 38 | 119 | 325 | 10,8 | 0,62 | 1 800 | 2 400 | 2,2 | ▸ **51220** |
| | 170 | 55 | 225 | 570 | 18,3 | 1,9 | 1 400 | 1 900 | 4,95 | ▸ **51320** |
| | 210 | 85 | 371 | 1 060 | 31,5 | 5,8 | 950 | 1 400 | 15 | ▸ **51420 M** |
| **110** | 145 | 25 | 83,2 | 285 | 9,5 | 0,52 | 2 200 | 3 200 | 1,05 | ▸ **51122** |
| | 160 | 38 | 125 | 365 | 11,6 | 0,79 | 1 700 | 2 400 | 2,4 | ▸ **51222** |
| | 190 | 63 | 281 | 815 | 24,5 | 3,2 | 1 200 | 1 700 | 7,85 | ▸ **51322 M** |
| | 230 | 95 | 410 | 1 220 | 34,5 | 7,7 | 900 | 1 300 | 20 | **51422 M** |
| **120** | 155 | 25 | 85,2 | 305 | 9,65 | 0,58 | 2 200 | 3 000 | 1,15 | ▸ **51124** |
| | 170 | 39 | 127 | 390 | 11,8 | 1 | 1 600 | 2 200 | 2,65 | ▸ **51224** |
| | 210 | 70 | 325 | 980 | 28,5 | 5 | 1 100 | 1 500 | 11 | ▸ **51324 M** |
| | 250 | 102 | 432 | 1 320 | 36 | 16 | 800 | 1 100 | 25,5 | **51424 M** |
| **130** | 170 | 30 | 119 | 440 | 13,4 | 0,94 | 1 900 | 2 600 | 1,85 | ▸ **51126** |
| | 190 | 45 | 186 | 585 | 17 | 1,8 | 1 400 | 2 000 | 4 | ▸ **51226** |
| | 225 | 75 | 358 | 1 140 | 32 | 6,8 | 1 000 | 1 400 | 13 | ▸ **51326 M** |
| | 270 | 110 | 520 | 1 730 | 45 | 16 | 750 | 1 000 | 32 | **51426 M** |
| **140** | 180 | 31 | 111 | 440 | 12,9 | 1 | 1 800 | 2 600 | 2,05 | ▸ **51128** |
| | 200 | 46 | 190 | 620 | 17,6 | 2 | 1 400 | 1 900 | 4,35 | ▸ **51228** |
| | 240 | 80 | 377 | 1 220 | 32,5 | 9,1 | 950 | 1 300 | 15,5 | ▸ **51328 M** |
| | 280 | 112 | 520 | 1 730 | 44 | 16 | 700 | 1 000 | 34,5 | **51428 M** |

▸ Popular item

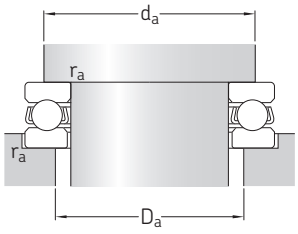



| Dimensions | | | | Abutment and fillet dimensions | | |
|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | $r_{1,2}$ min. | $d_a$ min. | $D_a$ max. | $r_a$ max. |
| mm | | | | mm | | |
| **80** | 105 | 82 | 1 | 95 | 90 | 1 |
| | 115 | 82 | 1 | 101 | 94 | 1 |
| | 140 | 82 | 1,5 | 116 | 104 | 1,5 |
| | 170 | 83 | 2,1 | 133 | 117 | 2 |
| **85** | 110 | 87 | 1 | 100 | 95 | 1 |
| | 125 | 88 | 1 | 109 | 101 | 1 |
| | 150 | 88 | 1,5 | 124 | 111 | 1,5 |
| | 177 | 88 | 2,1 | 141 | 124 | 2 |
| **90** | 120 | 92 | 1 | 108 | 102 | 1 |
| | 135 | 93 | 1,1 | 117 | 108 | 1 |
| | 155 | 93 | 1,5 | 129 | 116 | 1,5 |
| | 187 | 93 | 2,1 | 149 | 131 | 2 |
| **100** | 135 | 102 | 1 | 121 | 114 | 1 |
| | 150 | 103 | 1,1 | 130 | 120 | 1 |
| | 170 | 103 | 1,5 | 142 | 128 | 1,5 |
| | 205 | 103 | 3 | 165 | 145 | 2,5 |
| **110** | 145 | 112 | 1 | 131 | 124 | 1 |
| | 160 | 113 | 1,1 | 140 | 130 | 1 |
| | 187 | 113 | 2 | 158 | 142 | 2 |
| | 225 | 113 | 3 | 181 | 159 | 2,5 |
| **120** | 155 | 122 | 1 | 141 | 134 | 1 |
| | 170 | 123 | 1,1 | 150 | 140 | 1 |
| | 205 | 123 | 2,1 | 173 | 157 | 2 |
| | 245 | 123 | 4 | 197 | 173 | 3 |
| **130** | 170 | 132 | 1 | 154 | 146 | 1 |
| | 187 | 133 | 1,5 | 166 | 154 | 1,5 |
| | 220 | 134 | 2,1 | 186 | 169 | 2 |
| | 265 | 134 | 4 | 213 | 187 | 3 |
| **140** | 178 | 142 | 1 | 164 | 156 | 1 |
| | 197 | 143 | 1,5 | 176 | 164 | 1,5 |
| | 235 | 144 | 2,1 | 199 | 181 | 2 |
| | 275 | 144 | 4 | 223 | 197 | 3 |

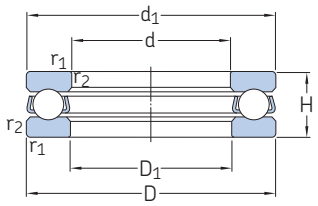



| Principal dimensions | | | Basic load ratings | | Fatique load limit | Minimum load factor | Speed ratings | | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | dynamic | static | | | Reference speed | Limiting speed | | |
| d | D | H | C | $C_0$ | $P_u$ | A | | | | |
| mm | | | kN | | kN | – | r/min | | kg | – |
| **150** | 190 | 31 | 111 | 440 | 12,5 | 1 | 1 700 | 2 400 | 2,2 | ▸ **51130 M** |
| | 215 | 50 | 238 | 800 | 22 | 3,3 | 1 300 | 1 800 | 6,1 | ▸ **51230 M** |
| | 250 | 80 | 390 | 1 290 | 34 | 10 | 900 | 1 300 | 16,5 | ▸ **51330 M** |
| | 300 | 120 | 559 | 1 960 | 48 | 20 | 670 | 950 | 42,5 | **51430 M** |
| **160** | 200 | 31 | 112 | 465 | 12,9 | 1,1 | 1 700 | 2 400 | 2,35 | ▸ **51132 M** |
| | 225 | 51 | 238 | 830 | 22,4 | 3,8 | 1 200 | 1 700 | 6,55 | ▸ **51232 M** |
| | 270 | 87 | 449 | 1 660 | 41,5 | 14 | 850 | 1 200 | 21 | ▸ **51332 M** |
| **170** | 215 | 34 | 133 | 540 | 14,3 | 1,5 | 1 600 | 2 200 | 3,3 | ▸ **51134 M** |
| | 240 | 55 | 270 | 930 | 24 | 5,4 | 1 200 | 1 700 | 8,15 | ▸ **51234 M** |
| | 280 | 87 | 468 | 1 760 | 43 | 16 | 800 | 1 100 | 22 | ▸ **51334 M** |
| **180** | 225 | 34 | 135 | 570 | 15 | 1,7 | 1 500 | 2 200 | 3,5 | ▸ **51136 M** |
| | 250 | 56 | 302 | 1 120 | 28,5 | 6,1 | 1 200 | 1 600 | 8,6 | ▸ **51236 M** |
| | 300 | 95 | 520 | 2 000 | 47,5 | 21 | 750 | 1 100 | 28,5 | ▸ **51336 M** |
| **190** | 240 | 37 | 172 | 710 | 18 | 2,6 | 1 400 | 2 000 | 4,05 | ▸ **51138 M** |
| | 270 | 62 | 332 | 1 270 | 31 | 8,4 | 1 100 | 1 600 | 12 | ▸ **51238 M** |
| | 320 | 105 | 559 | 2 200 | 51 | 30 | 700 | 950 | 36,5 | **51338 M** |
| **200** | 250 | 37 | 168 | 710 | 17,6 | 2,6 | 1 400 | 1 900 | 4,25 | ▸ **51140 M** |
| | 280 | 62 | 338 | 1 320 | 31,5 | 9,1 | 1 100 | 1 500 | 12 | ▸ **51240 M** |
| | 340 | 110 | 624 | 2 600 | 58,5 | 35 | 630 | 900 | 44,5 | **51340 M** |
| **220** | 270 | 37 | 178 | 800 | 19 | 3,3 | 1 300 | 1 900 | 4,6 | ▸ **51144 M** |
| | 300 | 63 | 358 | 1 460 | 33,5 | 11 | 950 | 1 300 | 13 | ▸ **51244 M** |
| **240** | 300 | 45 | 234 | 1 040 | 23,6 | 5,6 | 1 100 | 1 600 | 7,55 | ▸ **51148 M** |
| | 340 | 78 | 449 | 1 960 | 42,5 | 21 | 800 | 1 100 | 23 | ▸ **51248 M** |
| **260** | 320 | 45 | 238 | 1 100 | 24 | 6,3 | 1 100 | 1 500 | 8,1 | ▸ **51152 M** |
| | 360 | 79 | 488 | 2 240 | 46,5 | 24 | 750 | 1 100 | 25 | ▸ **51252 M** |
| **280** | 350 | 53 | 319 | 1 460 | 30,5 | 11 | 950 | 1 300 | 12 | ▸ **51156 M** |
| | 380 | 80 | 488 | 2 320 | 47,5 | 28 | 750 | 1 000 | 26,5 | ▸ **51256 M** |
| **300** | 380 | 62 | 364 | 1 760 | 35,5 | 16 | 850 | 1 200 | 17,5 | ▸ **51160 M** |
| | 420 | 95 | 585 | 3 000 | 57 | 47 | 630 | 850 | 42 | ▸ **51260 M** |
| **320** | 400 | 63 | 371 | 1 860 | 36,5 | 18 | 800 | 1 100 | 19 | ▸ **51164 M** |
| | 440 | 95 | 572 | 3 000 | 56 | 47 | 600 | 800 | 45,5 | **51264 F** |
| | 440 | 95 | 572 | 3 000 | 56 | 47 | 600 | 800 | 45 | **51264 M** |
| **340** | 420 | 64 | 377 | 1 960 | 37,5 | 20 | 800 | 1 100 | 20,5 | ▸ **51168 M** |
| | 460 | 96 | 605 | 3 200 | 25,5 | 53 | 600 | 800 | 48,5 | **51268 F** |

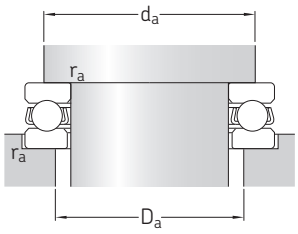
▸ Popular item




| Dimensions | | | | Abutment and fillet dimensions | | |
|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | $r_{1,2}$ min. | $d_a$ min. | $D_a$ max. | $r_a$ max. |
| mm | | | | mm | | |
| **150** | 188 | 152 | 1 | 174 | 166 | 1 |
| | 212 | 153 | 1,5 | 189 | 176 | 1,5 |
| | 245 | 154 | 2,1 | 209 | 191 | 2 |
| | 295 | 154 | 4 | 239 | 211 | 3 |
| **160** | 198 | 162 | 1 | 184 | 176 | 1 |
| | 222 | 163 | 1,5 | 199 | 186 | 1,5 |
| | 265 | 164 | 3 | 225 | 205 | 2,5 |
| **170** | 213 | 172 | 1,1 | 197 | 188 | 1 |
| | 237 | 173 | 1,5 | 212 | 198 | 1,5 |
| | 275 | 174 | 3 | 235 | 215 | 2,5 |
| **180** | 222 | 183 | 1,1 | 207 | 198 | 1 |
| | 245 | 183 | 1,5 | 222 | 208 | 1,5 |
| | 295 | 184 | 3 | 251 | 229 | 2,5 |
| **190** | 237 | 193 | 1,1 | 220 | 210 | 1 |
| | 265 | 194 | 2 | 238 | 222 | 2 |
| | 315 | 195 | 4 | 267 | 243 | 3 |
| **200** | 247 | 203 | 1,1 | 230 | 220 | 1 |
| | 275 | 204 | 2 | 248 | 232 | 2 |
| | 335 | 205 | 4 | 283 | 257 | 3 |
| **220** | 267 | 223 | 1,1 | 250 | 240 | 1 |
| | 295 | 224 | 2 | 268 | 252 | 2 |
| **240** | 297 | 243 | 1,5 | 276 | 264 | 1,5 |
| | 335 | 244 | 2,1 | 299 | 281 | 2 |
| **260** | 317 | 263 | 1,5 | 296 | 284 | 1,5 |
| | 355 | 264 | 2,1 | 319 | 301 | 2 |
| **280** | 347 | 283 | 1,5 | 322 | 308 | 1,5 |
| | 375 | 284 | 2,1 | 339 | 321 | 2 |
| **300** | 376 | 304 | 2 | 348 | 332 | 2 |
| | 415 | 304 | 3 | 371 | 349 | 2,5 |
| **320** | 396 | 324 | 2 | 368 | 352 | 2 |
| | 435 | 325 | 3 | 391 | 369 | 2,5 |
| | 435 | 325 | 3 | 391 | 369 | 2,5 |
| **340** | 416 | 344 | 2 | 388 | 372 | 2 |
| | 455 | 345 | 3 | 411 | 389 | 2,5 |



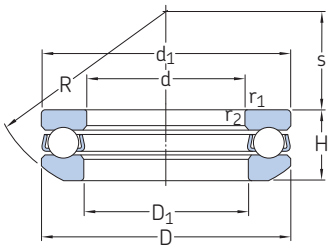

| Principal dimensions | | | Basic load ratings dynamic | static | Fatique load limit | Minimum load factor | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | H | C | $C_0$ | $P_u$ | A | | | | |
| mm | | | kN | | kN | – | r/min | | kg | – |
| **360** | 440 | 65 | 390 | 2 080 | 38 | 22 | 750 | 1 100 | 22 | **51172 F** |
| | 500 | 110 | 741 | 4 150 | 73,5 | 90 | 500 | 700 | 70 | **51272 F** |
| **380** | 460 | 65 | 397 | 2 200 | 40 | 25 | 750 | 1 000 | 23 | **51176 F** |
| | 520 | 112 | 728 | 4 150 | 72 | 90 | 500 | 700 | 73 | **51276 F** |
| **400** | 480 | 65 | 403 | 2 280 | 40,5 | 27 | 700 | 1 000 | 24 | **51180 F** |
| **420** | 500 | 65 | 410 | 2 400 | 41,5 | 30 | 700 | 1 000 | 25,5 | **51184 F** |
| **440** | 540 | 80 | 527 | 3 250 | 55 | 55 | 600 | 850 | 42 | **51188 F** |
| **460** | 560 | 80 | 527 | 3 250 | 54 | 55 | 600 | 800 | 43,5 | **51192 F** |
| **480** | 580 | 80 | 540 | 3 550 | 56 | 66 | 560 | 800 | 45,5 | **51196 F** |
| **500** | 600 | 80 | 553 | 3 600 | 57 | 67 | 560 | 800 | 47 | **511/500 F** |
| **530** | 640 | 85 | 650 | 4 400 | 68 | 100 | 530 | 750 | 58,5 | **511/530 F** |
| **560** | 670 | 85 | 650 | 4 650 | 68 | 110 | 500 | 700 | 61 | **511/560 F** |
| **600** | 710 | 85 | 663 | 4 800 | 69,5 | 120 | 500 | 700 | 65 | **511/600 F** |
| **630** | 750 | 95 | 728 | 5 400 | 76,5 | 150 | 450 | 630 | 84 | **511/630 F** |
| **670** | 800 | 105 | 852 | 6 700 | 91,5 | 230 | 400 | 560 | 105 | **511/670 F** |
| | 800 | 105 | 852 | 6 700 | 91,5 | 230 | 400 | 560 | 105 | **511/670 M** |

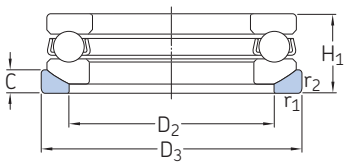



| Dimensions | | | | Abutment and fillet dimensions | | |
|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | $r_{1,2}$ min. | $d_a$ min. | $D_a$ max. | $r_a$ max. |
| mm | | | | mm | | |
| **360** | 436 | 364 | 2 | 408 | 392 | 2 |
| | 495 | 365 | 4 | 443 | 417 | 3 |
| **380** | 456 | 384 | 2 | 428 | 412 | 2 |
| | 515 | 385 | 4 | 463 | 437 | 3 |
| **400** | 476 | 404 | 2 | 448 | 432 | 2 |
| **420** | 496 | 424 | 2 | 468 | 452 | 2 |
| **440** | 536 | 444 | 2,1 | 499 | 481 | 2 |
| **460** | 556 | 464 | 2,1 | 519 | 501 | 2 |
| **480** | 576 | 484 | 2,1 | 539 | 521 | 2 |
| **500** | 596 | 504 | 2,1 | 559 | 541 | 2 |
| **530** | 636 | 534 | 3 | 595 | 575 | 2,5 |
| **560** | 666 | 564 | 3 | 625 | 606 | 2,5 |
| **600** | 706 | 604 | 3 | 665 | 645 | 2,5 |
| **630** | 746 | 634 | 3 | 701 | 679 | 2,5 |
| **670** | 795 | 675 | 4 | 747 | 723 | 3 |
| | 795 | 675 | 4 | 747 | 723 | 3 |

## 5.2 Single direction thrust ball bearings with a sphered housing washer

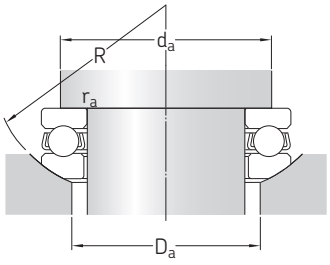
d **12 – 75** mm




| Principal dimensions | | | Basic load ratings | | Fatique load limit | Minimum load factor | Speed ratings | | Mass | Designations | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | dynamic | static | | | Reference speed | Limiting speed | Bearing + washer | Bearing | Seat washer |
| d | D | $H_1$ | C | $C_0$ | $P_u$ | A | | | | | |
| mm | | | kN | | kN | – | r/min | | kg | – | |
| **12** | 28 | 13 | 13,3 | 20,8 | 0,765 | 0,0022 | 8 000 | 11 000 | 0,045 | ▸ **53201** | **U 201** |
| **15** | 32 | 15 | 15,9 | 25 | 0,915 | 0,0038 | 7 000 | 10 000 | 0,063 | ▸ **53202** | **U 202** |
| **17** | 35 | 15 | 16,3 | 27 | 1 | 0,0047 | 6 700 | 9 500 | 0,071 | ▸ **53203** | **U 203** |
| **20** | 40 | 17 | 21,2 | 37,5 | 1,4 | 0,0085 | 5 600 | 8 000 | 0,1 | ▸ **53204** | **U 204** |
| **25** | 47 | 19 | 26,5 | 50 | 1,86 | 0,015 | 5 000 | 7 000 | 0,15 | ▸ **53205** | **U 205** |
| **30** | 52 | 20 | 25,1 | 51 | 1,86 | 0,013 | 4 500 | 6 300 | 0,18 | ▸ **53206** | **U 206** |
| | 60 | 25 | 35,8 | 65,5 | 2,4 | 0,026 | 3 800 | 5 300 | 0,33 | ▸ **53306** | **U 306** |
| **35** | 62 | 22 | 35,1 | 73,5 | 2,7 | 0,028 | 4 000 | 5 600 | 0,28 | ▸ **53207** | **U 207** |
| | 68 | 28 | 49,4 | 96,5 | 3,55 | 0,048 | 3 200 | 4 500 | 0,46 | ▸ **53307** | **U 307** |
| **40** | 68 | 23 | 44,2 | 96,5 | 3,6 | 0,058 | 3 600 | 5 300 | 0,35 | ▸ **53208** | **U 208** |
| | 78 | 31 | 61,8 | 122 | 4,5 | 0,077 | 2 800 | 4 000 | 0,67 | ▸ **53308** | **U 308** |
| | 90 | 42 | 95,6 | 183 | 6,8 | 0,26 | 2 400 | 3 200 | 1,35 | **53408** | **U 408** |
| **45** | 73 | 24 | 39 | 86,5 | 3,2 | 0,038 | 3 400 | 4 800 | 0,39 | ▸ **53209** | **U 209** |
| | 85 | 33 | 76,1 | 153 | 5,6 | 0,12 | 2 600 | 3 800 | 0,83 | ▸ **53309** | **U 309** |
| **50** | 78 | 26 | 49,4 | 116 | 4,3 | 0,069 | 3 200 | 4 500 | 0,47 | ▸ **53210** | **U 210** |
| | 95 | 37 | 81,9 | 170 | 6,3 | 0,19 | 2 400 | 3 400 | 1,2 | ▸ **53310** | **U 310** |
| | 110 | 50 | 159 | 340 | 12,5 | 0,6 | 1 900 | 2 600 | 2,3 | **53410** | **U 410** |
| **55** | 90 | 30 | 58,5 | 134 | 4,9 | 0,11 | 2 800 | 3 800 | 0,75 | ▸ **53211** | **U 211** |
| | 105 | 42 | 101 | 224 | 8,3 | 0,26 | 2 200 | 3 000 | 1,7 | ▸ **53311** | **U 311** |
| | 120 | 55 | 195 | 400 | 14,6 | 0,79 | 1 700 | 2 400 | 3,1 | **53411** | **U 411** |
| **60** | 95 | 31 | 59,2 | 140 | 5,1 | 0,12 | 2 600 | 3 600 | 0,82 | ▸ **53212** | **U 212** |
| | 110 | 42 | 101 | 224 | 8,3 | 0,26 | 2 000 | 3 000 | 1,7 | ▸ **53312** | **U 312** |
| | 130 | 58 | 199 | 430 | 16 | 0,96 | 1 600 | 2 200 | 3,8 | **53412 M** | **U 412** |
| **65** | 100 | 32 | 60,5 | 150 | 5,5 | 0,14 | 2 600 | 3 600 | 0,91 | ▸ **53213** | **U 213** |
| | 115 | 43 | 106 | 240 | 8,8 | 0,3 | 2 000 | 2 800 | 1,9 | ▸ **53313** | **U 313** |
| **70** | 105 | 32 | 62,4 | 160 | 5,85 | 0,16 | 2 600 | 3 600 | 0,97 | ▸ **53214** | **U 214** |
| | 125 | 48 | 135 | 320 | 11,8 | 0,53 | 1 800 | 2 600 | 2,5 | ▸ **53314** | **U 314** |
| | 150 | 69 | 234 | 550 | 19,3 | 1,6 | 1 400 | 2 000 | 6,5 | **53414 M** | **U 414** |
| **75** | 110 | 32 | 63,7 | 170 | 6,2 | 0,17 | 2 400 | 3 400 | 1 | ▸ **53215** | **U 215** |
| | 135 | 52 | 163 | 390 | 14 | 0,79 | 1 700 | 2 400 | 3,2 | ▸ **53315** | **U 315** |
| | 160 | 75 | 251 | 610 | 20,8 | 1,9 | 1 300 | 1 800 | 8,1 | **53415 M** | **U 415** |

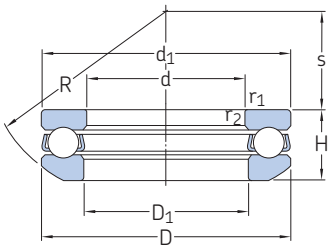
▸ Popular item

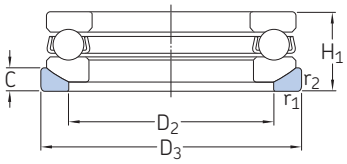


| Dimensions | | | | | | | | | | Abutment and fillet dimensions | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | $D_2$ | $D_3$ | H | C | R | s | $r_{1,2}$ min. | $d_a$ min. | $D_a$ max. | $r_a$ max. |
| mm | | | | | | | | | | mm | | |
| **12** | 28 | 14 | 20 | 30 | 11,4 | 3,5 | 25 | 11,5 | 0,6 | 22 | 20 | 0,6 |
| **15** | 32 | 17 | 24 | 35 | 13,3 | 4 | 28 | 12 | 0,6 | 25 | 24 | 0,6 |
| **17** | 35 | 19 | 26 | 38 | 13,2 | 4 | 32 | 16 | 0,6 | 28 | 26 | 0,6 |
| **20** | 40 | 22 | 30 | 42 | 14,7 | 5 | 36 | 18 | 0,6 | 32 | 30 | 0,6 |
| **25** | 47 | 27 | 36 | 50 | 16,7 | 5,5 | 40 | 19 | 0,6 | 38 | 36 | 0,6 |
| **30** | 52 | 32 | 42 | 55 | 17,8 | 5,5 | 45 | 22 | 0,6 | 43 | 42 | 0,6 |
| | 60 | 32 | 45 | 62 | 22,6 | 7 | 50 | 22 | 1 | 48 | 45 | 1 |
| **35** | 62 | 37 | 48 | 65 | 19,9 | 7 | 50 | 24 | 1 | 51 | 48 | 1 |
| | 68 | 37 | 52 | 72 | 25,6 | 7,5 | 56 | 24 | 1 | 55 | 52 | 1 |
| **40** | 68 | 42 | 55 | 72 | 20,3 | 7 | 56 | 28,5 | 1 | 57 | 55 | 1 |
| | 78 | 42 | 60 | 82 | 28,5 | 8,5 | 64 | 28 | 1 | 63 | 60 | 1 |
| | 90 | 42 | 65 | 95 | 38,2 | 12 | 72 | 26 | 1,1 | 70 | 65 | 1 |
| **45** | 73 | 47 | 60 | 78 | 21,3 | 7,5 | 56 | 26 | 1 | 62 | 60 | 1 |
| | 85 | 47 | 65 | 90 | 30,1 | 10 | 64 | 25 | 1 | 69 | 65 | 1 |
| **50** | 78 | 52 | 62 | 82 | 23,5 | 7,5 | 64 | 32,5 | 1 | 67 | 62 | 1 |
| | 95 | 52 | 72 | 100 | 34,3 | 11 | 72 | 28 | 1,1 | 77 | 72 | 1 |
| | 110 | 52 | 80 | 115 | 45,6 | 14 | 90 | 35 | 1,5 | 86 | 80 | 1,5 |
| **55** | 90 | 57 | 72 | 95 | 27,3 | 9 | 72 | 35 | 1 | 76 | 72 | 1 |
| | 105 | 57 | 80 | 110 | 39,3 | 11,5 | 80 | 30 | 1,1 | 85 | 80 | 1 |
| | 120 | 57 | 88 | 125 | 50,5 | 15,5 | 90 | 28 | 1,5 | 94 | 88 | 1,5 |
| **60** | 95 | 62 | 78 | 100 | 28 | 9 | 72 | 32,5 | 1 | 81 | 78 | 1 |
| | 110 | 62 | 85 | 115 | 38,3 | 11,5 | 90 | 41 | 1,1 | 90 | 85 | 1 |
| | 130 | 62 | 95 | 135 | 54 | 16 | 100 | 34 | 1,5 | 102 | 95 | 1 |
| **65** | 100 | 67 | 82 | 105 | 28,7 | 9 | 80 | 40 | 1 | 86 | 82 | 1 |
| | 115 | 67 | 90 | 120 | 39,4 | 12,5 | 90 | 38,5 | 1,1 | 95 | 90 | 1 |
| **70** | 105 | 72 | 88 | 110 | 27 | 9 | 80 | 38 | 1 | 91 | 88 | 1 |
| | 125 | 72 | 98 | 130 | 44,2 | 13 | 100 | 43 | 1,1 | 103 | 98 | 1 |
| | 150 | 73 | 110 | 155 | 63,6 | 19,5 | 112 | 34 | 2 | 118 | 110 | 2 |
| **75** | 110 | 77 | 92 | 115 | 28,3 | 9,5 | 90 | 49 | 1 | 96 | 92 | 1 |
| | 135 | 77 | 105 | 140 | 48,1 | 15 | 100 | 37 | 1,5 | 111 | 105 | 1 |
| | 160 | 78 | 115 | 165 | 69 | 21 | 125 | 42 | 2 | 126 | 115 | 2 |

## 5.2 Single direction thrust ball bearings with a sphered housing washer

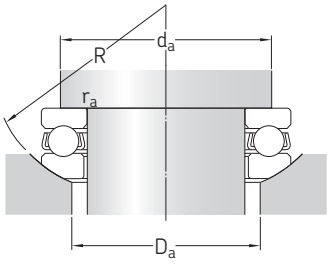
d **80 – 140** mm




| Principal dimensions | | | Basic load ratings dynamic | static | Fatique load limit | Minimum load factor | Speed ratings Reference speed | Limiting speed | Mass Bearing + washer | Designations Bearing | Seat washer |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | D | $H_1$ | C | $C_0$ | $P_u$ | A | | | | | |
| mm | | | kN | | kN | – | r/min | | kg | – | |
| **80** | 115 | 33 | 76,1 | 208 | 7,65 | 0,22 | 2 400 | 3 200 | 1,1 | ▸ **53216** | **U 216** |
| | 140 | 52 | 159 | 390 | 13,7 | 0,79 | 1 600 | 2 200 | 3,2 | ▸ **53316** | **U 316** |
| **85** | 125 | 37 | 97,5 | 275 | 9 | 0,39 | 2 000 | 3 000 | 1,5 | ▸ **53217** | **U 217** |
| | 150 | 58 | 174 | 405 | 14 | 1,1 | 1 500 | 2 000 | 4,35 | ▸ **53317** | **U 317** |
| **90** | 135 | 42 | 112 | 290 | 10,4 | 0,55 | 1 900 | 2 600 | 2,1 | ▸ **53218** | **U 218** |
| | 155 | 59 | 182 | 440 | 14,6 | 1,3 | 1 400 | 2 000 | 4,7 | ▸ **53318** | **U 318** |
| | 190 | 88 | 307 | 815 | 25,5 | 3,5 | 1 100 | 1 500 | 13 | **53418 M** | **U 418** |
| **100** | 150 | 45 | 119 | 325 | 10,8 | 0,62 | 1 700 | 2 400 | 2,7 | ▸ **53220** | **U 220** |
| | 170 | 64 | 225 | 570 | 18,3 | 1,9 | 1 300 | 1 800 | 5,95 | ▸ **53320** | **U 320** |
| | 210 | 98 | 371 | 1 060 | 31,5 | 5,8 | 950 | 1 300 | 18 | ▸ **53420 M** | **U 420** |
| **110** | 160 | 45 | 125 | 365 | 11,6 | 0,79 | 1 700 | 2 400 | 2,9 | ▸ **53222** | **U 222** |
| | 190 | 72 | 281 | 815 | 24,5 | 3,2 | 1 100 | 1 600 | 9,1 | ▸ **53322 M** | **U 322** |
| **120** | 170 | 46 | 127 | 390 | 11,8 | 1 | 1 500 | 2 200 | 3,2 | ▸ **53224** | **U 224** |
| | 210 | 80 | 325 | 980 | 28,5 | 5 | 1 000 | 1 400 | 12,5 | ▸ **53324 M** | **U 324** |
| **130** | 190 | 53 | 186 | 585 | 17 | 1,8 | 1 300 | 1 800 | 4,85 | ▸ **53226** | **U 226** |
| **140** | 200 | 55 | 190 | 620 | 17,6 | 2 | 1 300 | 1 800 | 5,45 | ▸ **53228** | **U 228** |

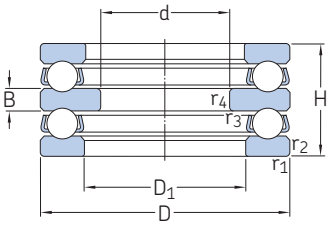
▸ Popular item



| Dimensions | | | | | | | | | | Abutment and fillet dimensions | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | $D_2$ | $D_3$ | H | C | R | s | $r_{1,2}$ min. | $d_a$ min. | $D_a$ max. | $r_a$ max. |
| mm | | | | | | | | | | mm | | |
| **80** | 115 | 82 | 98 | 120 | 29,5 | 10 | 90 | 46 | 1 | 101 | 98 | 1 |
| | 140 | 82 | 110 | 145 | 47,6 | 15 | 112 | 50 | 1,5 | 116 | 110 | 1 |
| **85** | 125 | 88 | 105 | 130 | 33,1 | 11 | 100 | 52 | 1 | 109 | 105 | 1 |
| | 150 | 88 | 115 | 155 | 53,1 | 17,5 | 112 | 43 | 1,5 | 124 | 115 | 1 |
| **90** | 135 | 93 | 110 | 140 | 38,5 | 13,5 | 100 | 45 | 1,1 | 117 | 110 | 1 |
| | 155 | 93 | 120 | 160 | 54,6 | 18 | 112 | 40 | 1,5 | 129 | 120 | 1 |
| | 187 | 93 | 140 | 195 | 81,2 | 25,5 | 140 | 40 | 2,1 | 133 | 140 | 2 |
| **100** | 150 | 103 | 125 | 155 | 40,9 | 14 | 112 | 52 | 1,1 | 130 | 125 | 1 |
| | 170 | 103 | 135 | 175 | 59,2 | 18 | 125 | 46 | 1,5 | 142 | 135 | 1 |
| | 205 | 103 | 155 | 220 | 90 | 27 | 160 | 50 | 3 | 165 | 155 | 2 |
| **110** | 160 | 113 | 135 | 165 | 40,2 | 14 | 125 | 65 | 1,1 | 140 | 135 | 1 |
| | 187 | 113 | 150 | 195 | 67,2 | 20 | 140 | 51 | 2 | 140 | 150 | 1 |
| **120** | 170 | 123 | 145 | 175 | 40,8 | 15 | 125 | 61 | 1,1 | 150 | 145 | 1 |
| | 205 | 123 | 165 | 220 | 74,1 | 22 | 160 | 63 | 2,1 | 173 | 165 | 1 |
| **130** | 187 | 133 | 160 | 195 | 47,9 | 17 | 140 | 67 | 1,5 | 166 | 160 | 1 |
| **140** | 197 | 143 | 170 | 210 | 48,6 | 17 | 160 | 87 | 1,5 | 176 | 170 | 1 |

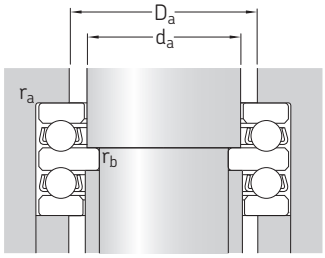
## 5.3 Double direction thrust ball bearings

d **10 – 65** mm




| Principal dimensions | | | Basic load ratings dynamic | static | Fatique load limit | Minimum load factor | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | H | C | $C_0$ | $P_u$ | A | | | | |
| mm | | | kN | | kN | – | r/min | | kg | – |
| **10** | 32 | 22 | 15,9 | 25 | 0,915 | 0,0038 | 5 300 | 7 500 | 0,081 | ▸ **52202** |
| **15** | 40 | 26 | 21,2 | 37,5 | 1,4 | 0,0085 | 4 300 | 6 000 | 0,15 | ▸ **52204** |
| **20** | 47 | 28 | 26,5 | 50 | 1,86 | 0,015 | 3 800 | 5 300 | 0,22 | ▸ **52205** |
| | 52 | 34 | 34,5 | 60 | 2,24 | 0,018 | 3 200 | 4 500 | 0,33 | ▸ **52305** |
| | 70 | 52 | 70,2 | 122 | 4,5 | 0,097 | 2 200 | 3 200 | 1 | **52406** |
| **25** | 52 | 29 | 25,1 | 51 | 1,86 | 0,013 | 3 600 | 5 000 | 0,25 | ▸ **52206** |
| | 60 | 38 | 35,8 | 65,5 | 2,4 | 0,026 | 2 800 | 4 000 | 0,47 | ▸ **52306** |
| | 80 | 59 | 76,1 | 137 | 5,1 | 0,15 | 2 000 | 2 800 | 1,45 | **52407** |
| **30** | 62 | 34 | 35,1 | 73,5 | 2,7 | 0,028 | 3 000 | 4 300 | 0,41 | ▸ **52207** |
| | 68 | 36 | 44,2 | 96,5 | 3,6 | 0,058 | 2 800 | 3 800 | 0,55 | ▸ **52208** |
| | 68 | 44 | 49,4 | 96,5 | 3,55 | 0,048 | 2 400 | 3 400 | 0,68 | ▸ **52307** |
| | 78 | 49 | 61,8 | 122 | 4,5 | 0,077 | 2 200 | 3 000 | 1,05 | ▸ **52308** |
| | 90 | 65 | 95,6 | 183 | 6,8 | 0,26 | 1 800 | 2 400 | 2,05 | **52408** |
| **35** | 73 | 37 | 39 | 86,5 | 3,2 | 0,038 | 2 600 | 3 600 | 0,6 | ▸ **52209** |
| | 85 | 52 | 76,1 | 153 | 5,6 | 0,12 | 2 000 | 2 800 | 1,25 | ▸ **52309** |
| | 100 | 72 | 124 | 240 | 9 | 0,37 | 1 600 | 2 200 | 2,7 | **52409** |
| **40** | 78 | 39 | 49,4 | 116 | 4,3 | 0,069 | 2 400 | 3 400 | 0,71 | ▸ **52210** |
| | 95 | 58 | 81,9 | 170 | 6,3 | 0,19 | 1 800 | 2 600 | 1,75 | ▸ **52310** |
| **45** | 90 | 45 | 58,5 | 134 | 4,9 | 0,11 | 2 200 | 3 000 | 1,1 | ▸ **52211** |
| | 105 | 64 | 101 | 224 | 8,3 | 0,26 | 1 600 | 2 200 | 2,4 | ▸ **52311** |
| | 120 | 87 | 195 | 400 | 14,6 | 0,79 | 1 300 | 1 800 | 4,7 | **52411** |
| **50** | 95 | 46 | 59,2 | 140 | 5,1 | 0,12 | 2 000 | 2 800 | 1,2 | ▸ **52212** |
| | 110 | 64 | 101 | 224 | 8,3 | 0,26 | 1 600 | 2 200 | 2,55 | ▸ **52312** |
| | 130 | 93 | 199 | 430 | 16 | 0,96 | 1 200 | 1 700 | 6,35 | **52412 M** |
| **55** | 100 | 47 | 60,5 | 150 | 5,5 | 0,14 | 2 000 | 2 800 | 1,35 | ▸ **52213** |
| | 105 | 47 | 62,4 | 160 | 5,85 | 0,16 | 1 900 | 2 600 | 1,5 | ▸ **52214** |
| | 115 | 64 | 106 | 240 | 8,8 | 0,3 | 1 600 | 2 200 | 2,75 | **52313** |
| | 125 | 72 | 135 | 320 | 11,8 | 0,53 | 1 400 | 2 000 | 3,65 | **52314** |
| | 250 | 107 | 234 | 550 | 19,3 | 1,6 | 800 | 1 100 | 9,7 | **52414 M** |
| **60** | 110 | 47 | 63,7 | 170 | 6,2 | 0,17 | 1 900 | 2 600 | 1,55 | ▸ **52215** |
| | 135 | 79 | 163 | 390 | 14 | 0,79 | 1 300 | 1 800 | 4,8 | **52315** |
| **65** | 115 | 48 | 76,1 | 208 | 7,65 | 0,22 | 2 400 | 3 400 | 1,7 | ▸ **52216** |
| | 140 | 79 | 159 | 390 | 13,7 | 0,79 | 1 300 | 1 800 | 4,95 | **52316** |

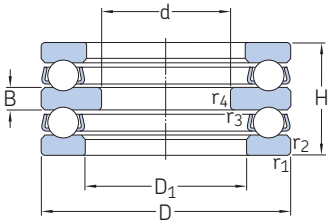
▸ Popular item




| Dimensions | | | | | Abutment and fillet dimensions | | | |
|---|---|---|---|---|---|---|---|---|
| d | $D_1$ ≈ | B | $r_{1,2}$ min. | $r_{3,4}$ min. | $d_a$ | $D_a$ max. | $r_a$ max. | $r_b$ max. |
| mm | | | | | mm | | | |
| **10** | 17 | 5 | 0,6 | 0,3 | 15 | 22 | 0,6 | 0,3 |
| **15** | 22 | 6 | 0,6 | 0,3 | 20 | 28 | 0,6 | 0,3 |
| **20** | 27 | 7 | 0,6 | 0,3 | 25 | 34 | 0,6 | 0,3 |
| | 27 | 8 | 1 | 0,3 | 25 | 36 | 1 | 0,3 |
| | 32 | 12 | 1 | 0,6 | 30 | 46 | 1 | 0,6 |
| **25** | 30 | 7 | 0,6 | 0,3 | 30 | 39 | 0,6 | 0,3 |
| | 32 | 9 | 1 | 0,3 | 30 | 42 | 1 | 0,3 |
| | 42 | 14 | 1,1 | 0,6 | 35 | 53 | 1 | 0,6 |
| **30** | 37 | 8 | 1 | 0,3 | 35 | 46 | 1 | 0,3 |
| | 42 | 9 | 1 | 0,6 | 40 | 51 | 1 | 0,6 |
| | 35 | 10 | 1 | 0,3 | 35 | 48 | 1 | 0,3 |
| | 40 | 12 | 1 | 0,6 | 40 | 55 | 1 | 0,6 |
| | 42 | 15 | 1,1 | 0,6 | 40 | 60 | 1 | 0,6 |
| **35** | 47 | 9 | 1 | 0,6 | 45 | 56 | 1 | 0,6 |
| | 47 | 12 | 1 | 0,6 | 46 | 61 | 1 | 0,6 |
| | 47 | 17 | 1,1 | 0,6 | 45 | 67 | 1 | 0,6 |
| **40** | 52 | 9 | 1 | 0,6 | 50 | 61 | 1 | 0,6 |
| | 52 | 14 | 1,1 | 0,6 | 50 | 68 | 1 | 0,6 |
| **45** | 57 | 10 | 1 | 0,6 | 55 | 69 | 1 | 0,6 |
| | 57 | 15 | 1,1 | 0,6 | 55 | 75 | 1 | 0,6 |
| | 57 | 20 | 1,5 | 0,6 | 55 | 81 | 1,5 | 0,6 |
| **50** | 62 | 10 | 1 | 0,6 | 60 | 74 | 1 | 0,6 |
| | 62 | 15 | 1,1 | 0,6 | 60 | 80 | 1 | 0,6 |
| | 62 | 21 | 1,5 | 0,6 | 60 | 88 | 1,5 | 0,6 |
| **55** | 67 | 10 | 1 | 0,6 | 65 | 79 | 1 | 0,6 |
| | 72 | 10 | 1 | 1 | 70 | 84 | 1 | 1 |
| | 67 | 15 | 1,1 | 0,6 | 65 | 85 | 1 | 0,6 |
| | 72 | 16 | 1,1 | 1 | 70 | 92 | 1 | 1 |
| | 123 | 24 | 2 | 1 | 70 | 120 | 1,5 | 1 |
| **60** | 77 | 10 | 1 | 1 | 75 | 89 | 1 | 1 |
| | 77 | 18 | 1,5 | 1 | 75 | 99 | 1,5 | 1 |
| **65** | 82 | 10 | 1 | 0,6 | 80 | 94 | 1 | 1 |
| | 82 | 18 | 1,5 | 1 | 80 | 104 | 1 | 1 |

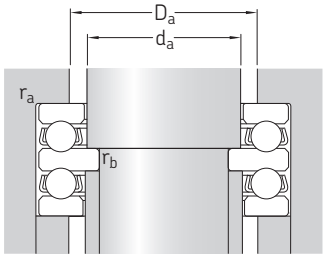
## 5.3 Double direction thrust ball bearings

d **70 – 150** mm




| Principal dimensions | | | Basic load ratings dynamic | static | Fatique load limit | Minimum load factor | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | H | C | $C_0$ | $P_u$ | A | | | | |
| mm | | | kN | | kN | – | r/min | | kg | – |
| **70** | 125 | 55 | 97,5 | 275 | 9,8 | 0,39 | 1 600 | 2 200 | 2,4 | ▸ **52217** |
| **75** | 135 | 62 | 112 | 290 | 116 | 0,55 | 1 500 | 2 000 | 3,2 | ▸ **52218** |
| **85** | 150 | 67 | 119 | 325 | 10,8 | 0,62 | 1 300 | 1 800 | 4,2 | ▸ **52220** |
| | 170 | 97 | 225 | 570 | 18,3 | 1,9 | 1 000 | 1 400 | 8,95 | ▸ **52320** |
| **95** | 160 | 67 | 125 | 365 | 11,6 | 0,79 | 1 300 | 1 800 | 4,65 | **52222** |
| **100** | 170 | 68 | 127 | 390 | 11,8 | 1 | 1 200 | 1 700 | 5,25 | **52224** |
| **110** | 190 | 80 | 182 | 585 | 16,6 | 1,8 | 1 100 | 1 500 | 8 | ▸ **52226** |
| **120** | 200 | 81 | 190 | 620 | 17,6 | 2 | 1 000 | 1 400 | 8,65 | **52228** |
| **130** | 215 | 89 | 238 | 800 | 22 | 3,3 | 950 | 1 300 | 11,5 | **52230 M** |
| **140** | 225 | 90 | 238 | 830 | 22,4 | 3,8 | 900 | 1 300 | 12 | ▸ **52232 M** |
| **150** | 240 | 97 | 270 | 930 | 24 | 5,4 | 850 | 1 200 | 15 | ▸ **52234 M** |
| | 250 | 98 | 302 | 1 120 | 28,5 | 6,1 | 800 | 1 100 | 16 | **52236 M** |

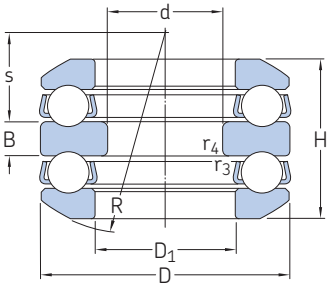
▸ Popular item

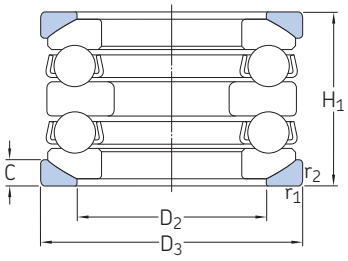



| Dimensions | | | | | Abutment and fillet dimensions | | | |
|---|---|---|---|---|---|---|---|---|
| d | $D_1$ ≈ | B | $r_{1,2}$ min. | $r_{3,4}$ min. | $d_a$ | $D_a$ max. | $r_a$ max. | $r_b$ max. |
| mm | | | | | mm | | | |
| **70** | 88 | 12 | 1 | 1 | 85 | 101 | 1 | 1 |
| **75** | 93 | 14 | 1,1 | 1 | 90 | 108 | 1 | 1 |
| **85** | 103<br>103 | 15<br>21 | 1,1<br>1,5 | 1<br>1 | 100<br>100 | 120<br>128 | 1<br>1 | 1<br>1 |
| **95** | 113 | 15 | 1,1 | 1 | 110 | 130 | 1 | 1 |
| **100** | 123 | 15 | 1,1 | 1,1 | 120 | 140 | 1 | 1 |
| **110** | 133 | 18 | 1,5 | 1,1 | 130 | 154 | 1,5 | 1 |
| **120** | 143 | 18 | 1,5 | 1,1 | 140 | 164 | 1,5 | 1 |
| **130** | 153 | 20 | 1,5 | 1,1 | 150 | 176 | 1,5 | 1 |
| **140** | 163 | 20 | 1,5 | 1,1 | 160 | 186 | 1,5 | 1 |
| **150** | 173<br>183 | 21<br>21 | 1,5<br>1,5 | 1,1<br>2 | 170<br>180 | 198<br>208 | 1,5<br>1,5 | 1<br>2 |

## 5.4 Double direction thrust ball bearings with sphered housing washers

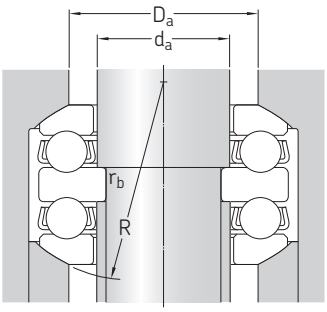
d **25 – 80** mm

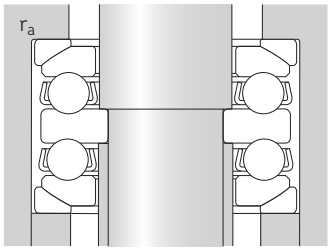


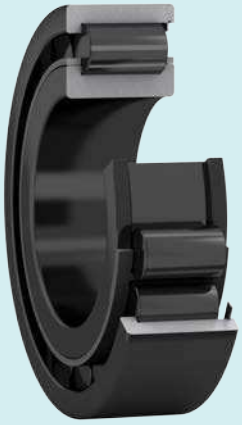

| Principal dimensions | | | Basic load ratings dynamic | static | Fatique load limit | Minimum load factor | Speed ratings Reference speed | Limiting speed | Mass Bearing + washer | | Designations Bearing | Seat washer |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | D | $H_1$ | C | $C_0$ | $P_u$ | A | | | | | | |
| mm | | | kN | | kN | – | r/min | | kg | – | | |
| **25** | 60 | 46 | 35,8 | 65,5 | 2,4 | 0,026 | 2 800 | 3 800 | 0,58 | ▸ | **54306** | **U 306** |
| **30** | 62 | 42 | 35,1 | 73,5 | 2,7 | 0,028 | 2 800 | 4 000 | 0,53 | ▸ | **54207** | **U 207** |
| | 68 | 44 | 44,2 | 96,5 | 3,6 | 0,058 | 2 800 | 3 800 | 0,63 | | **54208** | **U 208** |
| | 68 | 52 | 49,4 | 96,5 | 3,55 | 0,048 | 2 400 | 3 400 | 0,85 | ▸ | **54307** | **U 307** |
| | 78 | 59 | 61,8 | 122 | 4,5 | 0,077 | 2 200 | 3 000 | 1,15 | | **54308** | **U 308** |
| **35** | 73 | 45 | 39 | 86,5 | 3,2 | 0,038 | 2 600 | 3 600 | 0,78 | | **54209** | **U 209** |
| | 85 | 62 | 76,1 | 153 | 5,6 | 0,12 | 1 900 | 2 800 | 1,6 | ▸ | **54309** | **U 309** |
| | 100 | 86 | 124 | 240 | 9 | 0,37 | 1 500 | 2 000 | 3 | | **54409** | **U 409** |
| **40** | 95 | 70 | 81,9 | 170 | 6,3 | 0,19 | 1 700 | 2 400 | 2,3 | | **54310** | **U 310** |
| | 110 | 92 | 148 | 305 | 11,4 | 0,6 | 1 400 | 1 900 | 4,45 | | **54410** | **U 410** |
| **45** | 90 | 55 | 58,5 | 134 | 4,9 | 0,11 | 2 200 | 3 000 | 1,3 | | **54211** | **U 211** |
| **50** | 110 | 78 | 101 | 224 | 8,3 | 0,26 | 1 500 | 2 200 | 2,9 | | **54312** | **U 312** |
| **65** | 140 | 95 | 159 | 390 | 13,7 | 0,79 | 1 300 | 1 800 | 5,55 | | **54316** | **U 316** |
| | 170 | 140 | 307 | 750 | 25 | 2,3 | 850 | 1 200 | 17,5 | | **54416 M** | **U 416** |
| **70** | 150 | 105 | 174 | 405 | 14 | 1,1 | 1 100 | 1 500 | 7,95 | ▸ | **54317** | **U 317** |
| **80** | 210 | 176 | 371 | 1 060 | 31,5 | 5,8 | 700 | 950 | 29 | | **54420 M** | **U 420** |

▸ Popular item




| Dimensions | | | | | | | | | | | Abutment and fillet dimensions | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $D_1$ ≈ | $D_2$ | $D_3$ | H | B | C | R | s | $r_{1,2}$ min. | $r_{3,4}$ min. | $d_a$ | $D_a$ max. | $r_a$ max. | $r_b$ max. |
| mm | | | | | | | | | | | mm | | | |
| **25** | 32 | 45 | 62 | 41,3 | 9 | 7 | 50 | 19,5 | 1 | 0,3 | 30 | 45 | 1 | 0,3 |
| **30** | 37 | 48 | 65 | 37,8 | 8 | 7 | 50 | 21 | 1 | 0,3 | 35 | 48 | 1 | 0,3 |
| | 42 | 55 | 72 | 38,6 | 9 | 7 | 56 | 25 | 1 | 0,6 | 40 | 55 | 1 | 0,6 |
| | 37 | 52 | 72 | 47,2 | 10 | 7,5 | 56 | 21 | 1 | 0,3 | 35 | 52 | 1 | 0,3 |
| | 42 | 60 | 82 | 54,1 | 12 | 8,5 | 64 | 23,5 | 1 | 0,6 | 40 | 60 | 1 | 0,6 |
| **35** | 47 | 60 | 78 | 39,6 | 9 | 7,5 | 56 | 23 | 1 | 0,6 | 45 | 60 | 1 | 0,6 |
| | 47 | 65 | 90 | 56,2 | 12 | 10 | 64 | 21 | 1 | 0,6 | 45 | 65 | 1 | 0,6 |
| | 47 | 72 | 105 | 78,9 | 17 | 12,5 | 80 | 23,5 | 1,1 | 0,6 | 45 | 72 | 1 | 0,6 |
| **40** | 52 | 72 | 100 | 64,7 | 14 | 11 | 72 | 23 | 1,1 | 0,6 | 50 | 72 | 1 | 0,6 |
| | 52 | 80 | 115 | 83,2 | 18 | 14 | 90 | 30 | 1,5 | 0,6 | 50 | 80 | 1,5 | 0,6 |
| **45** | 57 | 72 | 95 | 49,6 | 10 | 9 | 72 | 32,5 | 1 | 0,6 | 55 | 72 | 1 | 0,6 |
| **50** | 62 | 85 | 115 | 70,7 | 15 | 11,5 | 90 | 36,5 | 1,1 | 0,6 | 60 | 85 | 1 | 0,6 |
| **65** | 82 | 110 | 145 | 86,1 | 18 | 15 | 112 | 45,5 | 1,5 | 1 | 80 | 110 | 1,5 | 1 |
| | 83 | 125 | 175 | 128,5 | 27 | 22 | 125 | 30,5 | 2,1 | 1 | 80 | 125 | 2 | 1 |
| **70** | 88 | 115 | 155 | 95,2 | 19 | 17,5 | 112 | 39 | 1,5 | 1 | 85 | 115 | 1,5 | 1 |
| **80** | 103 | 155 | 220 | 159,9 | 33 | 27 | 160 | 43,5 | 3 | 1,1 | 100 | 155 | 2,5 | 1 |



# 6 Cylindrical roller bearings

# 6 Cylindrical roller bearings


**Designs and variants** . . . . . **496**
Single row cylindrical roller bearings . . . . . 496
Common designs . . . . . 496
Other designs . . . . . 497
Other variants . . . . . 497
High-capacity cylindrical roller bearings . . . . . 498
Bearings with an inner ring centred cage . . . . . 499
Bearings with an outer ring centred cage . . . . . 499
Separable bearings with an inner ring raceway centred cage . . . . . 499
Double row bearings . . . . . 499
Single row full complement cylindrical roller bearings . . . 500
NCF design bearings . . . . . 500
NJG design bearings . . . . . 500
Double row full complement cylindrical roller bearings . . . 500
NNCL design bearings . . . . . 501
NNCF design bearings . . . . . 501
NNC design bearings . . . . . 501
NNF design sealed bearings . . . . . 501
SKF Explorer bearings . . . . . 502
Matched bearings . . . . . 502
Cages . . . . . 502

**Bearing data** . . . . . **504**
(Dimension standards, tolerances, radial internal clearance, axial clearance, permissible misalignment, permissible axial displacement)

**Loads** . . . . . **509**
(Minimum load, equivalent dynamic bearing load, equivalent static bearing load)
Dynamic axial load carrying capacity . . . . . 510
Permissible axial loads . . . . . 510

**Temperature limits** . . . . . **511**

**Permissible speed** . . . . . **511**

**Design considerations** . . . . . **512**
Flange support . . . . . 512

**Mounting** . . . . . **512**

**Designation system** . . . . . **514**

**Product tables**
**6.1** Single row cylindrical roller bearings . . . . . 516
**6.2** High-capacity cylindrical roller bearings . . . . . 550
**6.3** Single row full complement cylindrical roller bearings . . . . . 554
**6.4** Double row full complement cylindrical roller bearings . . . . . 564
**6.5** Sealed double row full complement cylindrical roller bearings . . . . . 576

**Other cylindrical roller bearings**
Bearings with Solid Oil . . . . . 1023
INSOCOAT bearings . . . . . 1029
Hybrid bearings . . . . . 1043
NoWear coated bearings . . . . . 1059
Super-precision bearings → skf.com/super-precision
Double and four-row cylindrical roller bearings → skf.com/bearings
Split cylindrical roller bearings → skf.com/bearings
Backing bearings → skf.com/bearings
Indexing roller units → skf.com/bearings
Cylindrical roller bearings and bearing units for railway applications → contact SKF

# 6 Cylindrical roller bearings



## More information

**General bearing knowledge** . . . . **17**

**Bearing selection process** . . . . . **59**
Lubrication . . . . . 109
Bearing interfaces. . . . . 139
Seat tolerances for standard conditions . . . . . 148
Selecting internal clearance . . . . . 182
Sealing, mounting and dismounting . . . . . 193

**Mounting instructions for individual bearings** → skf.com/mount

*SKF bearing maintenance handbook* ISBN 978-91-978966-4-1

SKF cylindrical roller bearings are available in many designs, series and sizes. The major design differences between the cylindrical roller bearings presented in this catalogue are in:

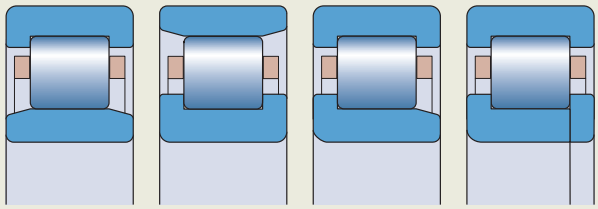
- the number of roller rows (one or two)
- the type of cage (with, without or special designs)
  - Bearings with a cage can accommodate heavy radial loads and peak loads, rapid accelerations and high speeds.
  - Full complement bearings (without cage) incorporate a maximum number of rollers and are therefore suitable for very heavy radial loads at moderate speeds.
  - SKF high-capacity cylindrical roller bearings combine the high load carrying capacity of a full complement bearing with the high speed capability of a bearing with cage.
- the configuration of the inner and outer ring flanges (position and number of guide flanges, **fig. 1**)

## Bearing features

- **High load carrying capacity**
- **High stiffness**
- **Accommodate axial displacement** (**fig. 2**)
  Except for bearings with flanges on both the inner and outer rings.
- **Low friction**
  The open flange design (**fig. 3**), together with the roller end design and surface finish, promote lubricant film formation resulting in lower friction and higher axial load carrying capacity.
- **Long service life**
  The logarithmic roller profile reduces edge stresses at the roller/raceway contact (**fig. 4**) and sensitivity to misalignment and shaft deflection.

**Fig. 1**

**Configuration examples guide flanges**



- **Enhanced operational reliability**
  The surface finish on the contact surfaces of the rollers and raceways supports the formation of a hydrodynamic lubricant film.

- **Separable and interchangeable**
  The separable components of SKF cylindrical roller bearings are interchangeable (**fig. 5**). This facilitates mounting and dismounting, as well as maintenance inspections.

In addition to the cylindrical roller bearings presented in this catalogue, SKF supplies cylindrical roller bearings for special application requirements. This assortment includes:

- *Double row cylindrical roller bearings* → skf.com/bearings
- *Four-row cylindrical roller bearings* → skf.com/bearings
- *Split cylindrical roller bearings* → skf.com/bearings
- *Super-precision bearings* → skf.com/super-precision
- *Backing bearings* → skf.com/bearings
- *Indexing roller units* → skf.com/bearings
- Cylindrical roller bearings and bearing units for railway applications → contact SKF



Fig. 2

**Axial displacement**

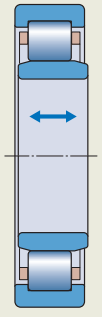


Fig. 4

**Load distribution for the logarithmic roller profile**

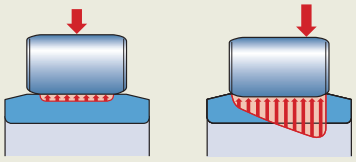


Fig. 3

**Open flange design**

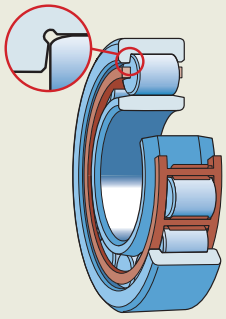
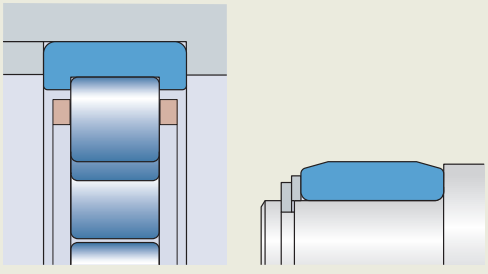


Fig. 5

**Interchangeable components**



# Designs and variants

## Single row cylindrical roller bearings

The major design differences between the single row cylindrical roller bearings presented in this catalogue are in:

- the cage design and material
- the configuration of the inner and outer ring flanges

SKF inch bearings (CRL and CRM series, skf.com/go/17000-6-1), which are not presented in this catalogue, conform to the metric N design (**fig. 6**). They are mainly used in the aftermarket and, therefore, SKF recommends not to use these bearings for new bearing arrangement designs.

### Common designs

The most common designs of single row cylindrical roller bearings are shown in **fig. 6**.

#### NU design bearings

- have two integral flanges on the outer ring and no flanges on the inner ring
- can accommodate axial displacement of the shaft relative to the housing in both directions
- can be used together with an appropriate angle ring to stabilize the bearing in the axial direction (**fig. 7**, *Appropriate angle rings*)

#### N design bearings

- have two integral flanges on the inner ring and no flanges on the outer ring
- can accommodate axial displacement of the shaft relative to the housing in both directions

#### NJ design bearings

- have two integral flanges on the outer ring and one on the inner ring
- can accommodate axial displacement of the shaft relative to the housing in one direction only
- are used to locate the shaft axially in one direction
- can be used together with an appropriate angle ring to stabilize the bearing in the other axial direction (**fig. 8**, *Appropriate angle rings*)

#### NUP design bearings

- have two integral flanges on the outer ring and one integral flange and one non-integral flange, i.e. a loose flange ring, on the inner ring
- are used to locate the shaft axially in both directions

#### Appropriate angle rings (thrust collars)

- are used with NU design bearings to locate the shaft axially in one direction (**fig. 7**)
  Angle rings should not be used on both sides of NU design bearings as this can lead to axial clamping of the rollers.
- are used with NJ design bearings to locate the shaft axially in both directions (**fig. 8**)
- are made of carbon chromium steel
- are hardened and ground
- have a maximum axial run-out that is in accordance with the Normal tolerance class for the appropriate bearing
- are identified by the series designation HJ followed by the appropriate bearing dimension series and size
- are available as listed in the **product table**, **page 517**
- must be ordered separately

Fig. 6

**Common designs**

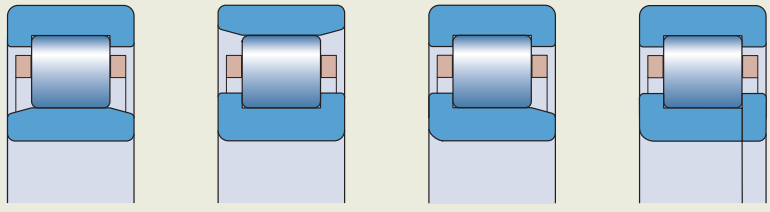



Fig. 7

**NU design bearing + HJ angle ring**

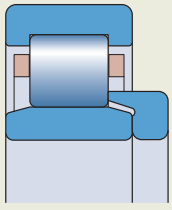
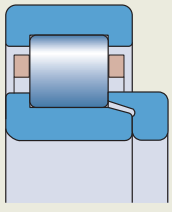


Fig. 8

**NJ design bearing + HJ angle ring**



Reasons to design angle rings into a bearing arrangement include:

- no NJ or NUP design locating bearings in the product range
- to provide an extend inner ring seat for heavily loaded bearings in the locating position:
  - full width inner ring seat of NJ design bearings with an HJ angle ring compared to NUP design bearings having a shorter inner ring and a loose flange
- to simplify design or mounting procedures

## Other designs

For the assortment of other design bearings (**fig. 9**), visit skf.com/go/17000-6-1.

### NUB design bearings

- have two integral flanges on the outer ring and no flanges on the inner ring that is extended on both sides
- can accommodate axial displacement of the shaft relative to the housing in both directions

### NJP design bearings

- have two integral flanges on the outer ring and one non-integral flange, i.e. a loose flange ring, on the inner ring
- are used to locate the shaft axially in one direction

### NF design bearings

- have two integral flanges on the inner ring and one integral flange on the outer ring
- are used to locate the shaft axially in one direction

### NP design bearings

- have two integral flanges on the inner ring and one integral flange and one non-integral flange, i.e. a loose flange ring, on the outer ring
- are used to locate the shaft axially in both directions

## Other variants

### Bearings without an inner or outer ring

- are available based on:
  - NU design bearings without an inner ring (RNU series, **fig. 10**)
    - enable the shaft diameter to be larger to provide a stronger, stiffer shaft
    - provide inside diameter $F_w$ tolerance limits to be within F6Ⓔ when the rollers are in contact with the outer ring raceway
    - are listed online for certain sizes (skf.com/go/17000-6-6)
  - N design bearings without an outer ring (RN series, **fig. 11**)
- can accommodate axial displacement of the shaft relative to the housing, limited by the width of the raceway:
  - on the shaft for RNU bearings
  - in the housing for RN bearings
- are typically used in applications where hardened and ground raceways can be machined on the shaft or in the housing (*Raceways on shafts and in housings*, **page 179**)

**Fig. 9**

**Other designs**

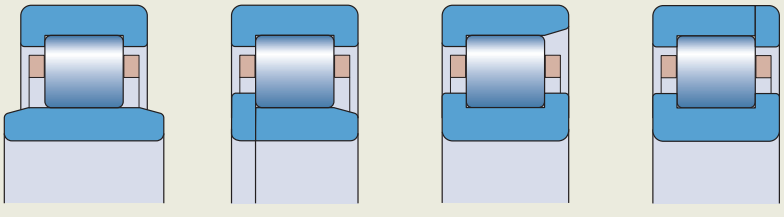



**Fig. 10**

**Bearing without inner ring, RNU**

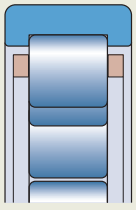
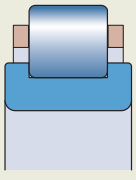


**Fig. 11**

**Bearing without outer ring, RN**



### Bearings with a tapered bore

- are available with a 1:12 tapered bore (designation suffix K, fig. 12)
- have radial internal clearance greater than corresponding bearings with a cylindrical bore

### Bearings with a snap ring groove in the outer ring

- are identified by the designation suffix N (fig. 13)
- can be axially located in the housing by a snap ring:
  - to save space
  - to reduce mounting time

### Bearings with locating slots in the outer ring

- are available with one or two locating slots (designation suffix N1 or N2, fig. 14)
  The two locating slots are positioned 180° apart.
- can be used to prevent the outer ring from turning where it must be mounted with a loose fit

## High-capacity cylindrical roller bearings

SKF high-capacity cylindrical roller bearings (fig. 15) are designed for applications such as industrial gearboxes, wind turbine gearboxes and mining equipment.

The cage bars are displaced relative to the roller pitch diameter to enable the rollers to be placed closer to each other, creating room for additional rollers (fig. 16) and thereby increasing load carrying capacity and radial stiffness.

The black oxide coating of rings and rollers (designation suffix L4B) contributes to extended service life by improving:

- smearing damage resistance
- running-in properties and reducing friction
- performance under poor lubrication conditions
- chemical resistance (from agressive oil additives)
- corrosion resistance

SKF high-capacity cylindrical roller bearings are available in three different main designs and some variants.

**Fig. 12**

**Bearing with a tapered bore**

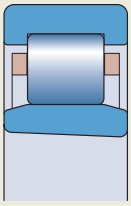


**Fig. 14**

**Bearing with locating slot(s)**

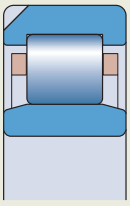


**Fig. 15**

**High-capacity bearing**

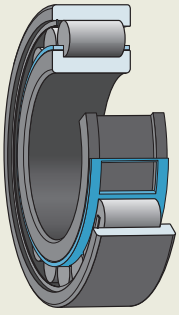


**Fig. 13**

**Bearing with a snap ring groove**

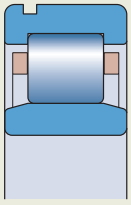
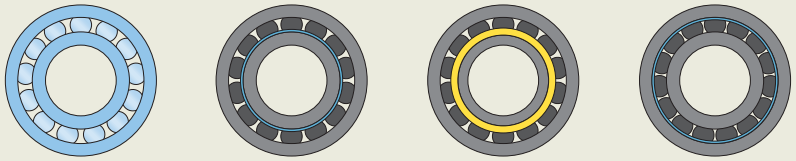


**Fig. 16**

**Roller distances**



Roller distance of a standard bearing with cage (cage not shown)

High-capacity bearing with inner ring centred cage

Separable high-capacity bearing with inner ring raceway centred cage

High-capacity bearing with outer ring centred cage

## Bearings with an inner ring centred cage

- are identified by the series designation NCF .. ECJB (**fig. 17**)
- are used to locate the shaft axially in one direction and eventually to accommodate axial displacement of the shaft relative to the housing in the opposite direction
- can be supplied without an outer ring (RN .. ECJB series, **fig. 17**), where the outer raceway is integrated into the application (*Raceways on shafts and in housings*, **page 179**)

## Bearings with an outer ring centred cage

- are identified by the series designation NJF .. ECJA (**fig. 18**)
- for some sizes, contain more rollers than same-sized bearings with an inner ring centred cage
- are used to locate the shaft axially in one direction and eventually to accommodate axial displacement of the shaft relative to the housing in the opposite direction
- can be supplied without an inner ring (RNU .. ECJA series, **fig. 18**), where the inner raceway is integrated into the application (*Raceways on shafts and in housings*, **page 179**)

## Separable bearings with an inner ring raceway centred cage

- are identified by the series designation NUH .. ECMH (**fig. 19**)
- can accommodate axial displacement of the shaft relative to the housing in both directions
- can be separated (outer ring with the roller and cage assembly from the inner ring), which simplifies mounting and dismounting, particularly where load conditions require both rings to have an interference fit

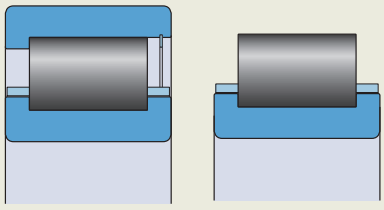
## Double row bearings

- are available on request



**Fig. 17**

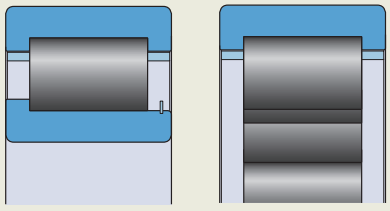
**Bearings with an inner ring centred cage**



NCF .. ECJB RN .. ECJB

**Fig. 18**

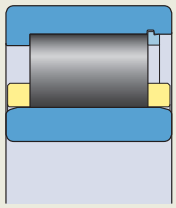
**Bearings with an outer ring centred cage**



NJF .. ECJA RNU .. ECJA

**Fig. 19**

**Separable bearing with an inner ring raceway centred cage**



NUH .. ECMH

# Single row full complement cylindrical roller bearings

SKF single row full complement cylindrical roller bearings are suitable for very heavy radial loads and provide increased radial stiffness.

The basic SKF assortment of single row full complement cylindrical roller bearings provided in this catalogue includes NCF and NJG design bearings (fig. 20). They are used to locate the shaft axially in one direction and eventually to accommodate axial displacement of the shaft relative to the housing in the opposite direction.

## NCF design bearings

- have two integral flanges on the inner ring and one on the outer ring
- have a retaining ring in the outer ring, on the side opposite the integral flange, to hold the bearing together

  The retaining ring should not be loaded axially during operation.

## NJG design bearings

- comprise the heavy 23 dimension series
- are intended for very heavily loaded, low-speed applications
- have two integral flanges on the outer ring and one on the inner ring
- have a self-retaining roller complement

  Therefore, the outer ring with the roller complement can be separated from the inner ring without having to take special precautions to prevent the rollers from falling out (fig. 21). This simplifies mounting and dismounting.

# Double row full complement cylindrical roller bearings

SKF double row full complement cylindrical roller bearings are, because of their second row of rollers, suitable for very heavy radial loads and provide increased radial stiffness.

The basic SKF assortment provided in this catalogue includes (fig. 22):

- three different designs of open bearings:
  - NNCL design
  - NNCF design
  - NNC design
- NNF design sealed bearings

SKF double row full complement cylindrical roller bearings are non-separable and have an annular groove and lubrication holes in the outer ring to facilitate lubrication. NNF design bearings have additional lubrication holes in the inner ring.

Fig. 20

**Single row full complement bearings**

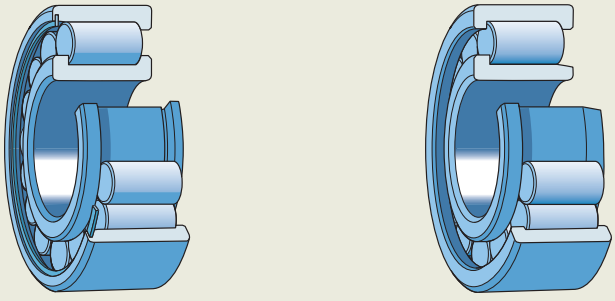



Fig. 21

**Self-retaining roller complement**

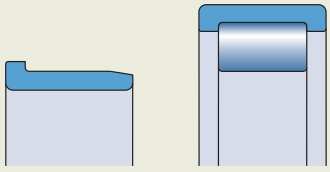
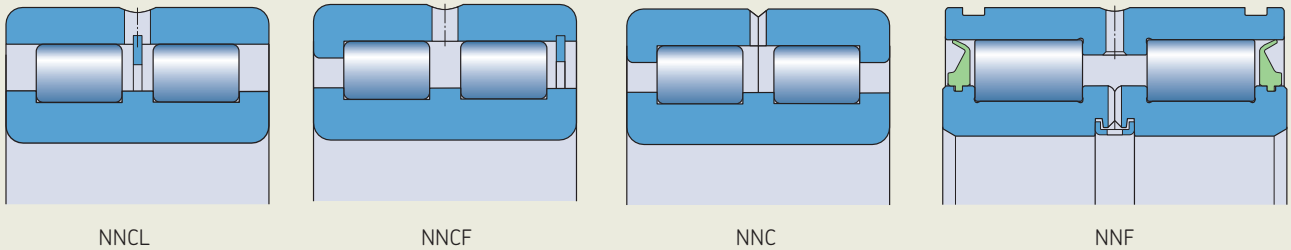


Fig. 22

**Double row full complement bearings**



## NNCL design bearings

- have three integral flanges on the inner ring and no flanges on the outer ring
- have a retaining ring in the outer ring between the roller rows to hold the bearing together
  The retaining ring should not be loaded axially during operation.
- can accommodate axial displacement of the shaft relative to the housing in both directions

## NNCF design bearings

- have three integral flanges on the inner ring and one on the outer ring
- have a retaining ring in the outer ring, on the side opposite the integral flange, to hold the bearing together
  The retaining ring should not be loaded axially during operation.
- are used to locate the shaft axially in one direction and eventually to accommodate axial displacement of the shaft relative to the housing in the opposite direction

## NNC design bearings

- have the same inner ring as NNCL and NNCF design bearings
- have a two-piece outer ring:
  - held together by retaining elements, which should never be loaded axially
  - consisting of two identical outer ring parts with one integral flange on each
- are used to locate the shaft axially in both directions

Alternative NNC design bearings may consist of a one-piece outer ring with one integral flange and a flange ring.

## NNF design sealed bearings

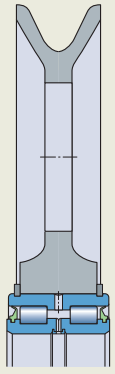
- comprise the 50 and 3194.. series
- have a two-piece inner ring:
  - held together by a retaining ring
  - with three integral flanges
- have one integral central flange on the outer ring
- are used to locate the shaft axially in both directions
- can accommodate tilting moments because of the distance between the two rows of rollers
- have an outer ring that is 1 mm narrower than the inner ring
- do not require spacer rings between the inner ring and adjacent components, in applications with a rotating outer ring
- have two snap ring grooves in the outer ring:
  - to simplify mounting
  - to save space axially
    This is especially valuable where the bearing is mounted in/on an adjacent component, e.g. in rope sheaves (**fig. 23**).
- have a PUR contact seal on both sides, fitted in a recess on the inner ring shoulder (**fig. 22**)
  The seal lip exerts slight pressure against the outer ring raceway.
- are filled with a high-quality grease with good rust-inhibiting properties (**table 1**, **page 503**)
  For additional information about greases, refer to *Lubrication*, **page 109**.
- can be supplied open and without grease, for applications where oil lubrication is to be used
  If a small quantity of bearings without seals is required, the seals can be removed and the bearings can be washed prior to mounting.

### Relubrication

For many application conditions, NNF design sealed bearings do not require relubrication and can be considered relubrication-free. However, if they operate in a moist or contaminated environment, or if speeds are moderate to high, relubrication may be necessary (*Estimating the relubrication interval for grease*, **page 111**). The bearings can be relubricated via lubrication holes in both the inner and outer rings.

**Fig. 23**

**NNF design sealed bearing in a rope sheave**



# SKF Explorer bearings

Single row and high-capacity bearings are also available as SKF Explorer bearings (page 7).

# Matched bearings

- are combined so that any difference in cross-sectional height of the bearings used in a matched set lies within a very small tolerance range

  This tighter tolerance is a precondition for equal load sharing between the bearings.
- can be supplied as:
  - sets of two bearings (designation suffix DR)
  - sets of three bearings (designation suffix TR)
  - sets of four bearings (designation suffix QR)

# Cages

SKF single row and high-capacity cylindrical roller bearings are fitted with one of the cages shown in **table 2**.

When used at high temperatures, some lubricants can have a detrimental effect on polyamide cages. For additional information about the suitability of cages, refer to *Cages*, page 187.



**Cages for cylindrical roller bearings**

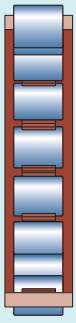
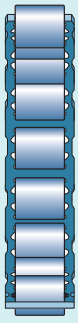
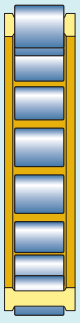
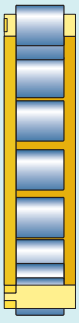
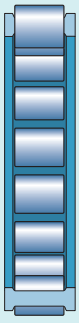
| | Single row bearings | | | | | |
|---|---|---|---|---|---|---|
| |  |  |  |  |  | |
| **Cage type** | Window-type<br>• roller centred<br>• outer ring centred | Window-type, roller centred | Window-type, inner or outer ring centred (depending on bearing design) | Riveted<br>• roller centred<br>• outer ring centred<br>• inner ring centred | Window-type, inner or outer ring centred (depending on bearing design) | Riveted<br>• roller centred<br>• outer ring centred<br>• inner ring centred |
| **Material** | • PA66, glass fibre reinforced<br>• PEEK, glass fibre reinforced | Stamped steel | Machined brass | Machined brass | Machined light alloy | Machined light alloy |
| **Suffix** | • P or PH<br>• PA or PHA | • –<br>• J | • ML | • M<br>• MA<br>• MB | • LL | • L<br>• LA<br>• LB |

**Table 1**

**Technical specifications of SKF standard grease for sealed double row full complement cylindrical roller bearings**

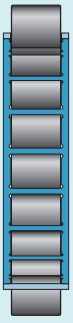
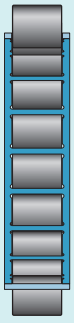
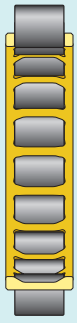
| Grease | Temperature range[1] | Thickener | Base oil type | NLGI grade | Base oil viscosity [mm²/s] at 40 °C (105 °F) | at 100 °C (210 °F) |
|---|---|---|---|---|---|---|
| | –50 0 50 100 150 200 250 °C<br>–60 30 120 210 300 390 480 °F | | | | | |
| GHU | | Lithium complex soap | Mineral | 2 | 150 | 15 |

[1] Refer to the SKF traffic light concept (page 117).



**Table 2**

**High-capacity bearings**

| | | |
|---|---|---|
|  |  |  |
| Window-type, inner ring centred | Window-type, outer ring centred | Window-type, inner ring raceway centred |
| Sheet steel, manganese phosphated | Sheet steel, manganese phosphated | Machined brass |
| JB | JA | MH |

# Bearing data

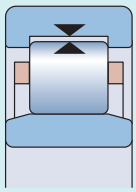
| | Single row bearings | High-capacity bearings |
|---|---|---|
| **Dimension standards** | Boundary dimensions: ISO 15<br><br>Except for:<br>• HJ angle rings: ISO 246<br>• Snap rings and grooves: ISO 464<br>• Locating slots: ISO 20515 | Boundary dimensions: ISO 15 |
| **Tolerances**<br><br>For additional information → page 35 | Normal dimensional tolerance<br>P6 geometrical tolerance<br>Check availability of P5 or P6 tolerance class for bearings in the 10 series<br><br>Values: ISO 492 (table 2, page 38, to table 4, page 40) | Normal dimensional tolerance<br>P6 geometrical tolerance |
| **Radial internal clearance**<br><br>For additional information → page 182 | Normal, C3<br>Check availability of other clearance classes<br>Values: ISO 5753-1 (table 3, page 506)<br>Values are valid for unmounted bearings under zero measuring load. | |
| **Axial internal clearance** | Guideline values:<br>• NUP design (table 4, page 507)<br>• NJ design with an HJ angle ring (table 5, page 508)<br>When measuring the axial internal clearance, the rollers may tilt, causing an enlargement of the measured axial clearance:<br>• 10, 18, 19, 2, 3 and 4 series: ≈ the radial internal clearance<br>• 22, 23, 29 and 39 series: ≈ 2/3 the radial internal clearance | – |
| **Permissible misalignment** | • 10, 12, 18, 19, 2, 3 and 4 series: ≈ 4 minutes of arc<br>• 20, 22, 23, 29 and 39 series: ≈ 3 minutes of arc<br>The values are not valid for bearings of the NUP design or the NJ design with an HJ angle ring.<br>Misalignment increases bearing noise and reduces bearing service life, and ... | ≈ 3 minutes of arc |
| **Permissible axial displacement (fig. 2, page 495)** | $s_{max}$ → **product tables**,<br><br>page 516<br><br>Bearings having no flange, or only one integral flange on either the inner or outer ring, can accommodate axial displacement. Displacement of the shaft ... | page 550 |

| | Single row full complement bearings | Double row full complement bearings |
|---|---|---|
| | Boundary dimensions: ISO 15 | Boundary dimensions: ISO 15<br><br>Except for:<br>• outer ring width of NNF 50 series bearings:<br>C = 1 mm smaller than ISO standard<br>• bearings in the 3194.. series:<br>dimensions not standardized |
| | Normal | |
| | | |
| | | |
| | | |
| | • 18 series: ≈ 4 minutes of arc<br>• 22, 23, 28, 29 and 30 series:<br>≈ 3 minutes of arc<br><br>... when it exceeds the guideline values these | For information, contact the SKF application engineering service.<br><br>effects become particularly noticeable. |
| | | |
| | page 554 | page 564 |

... relative to the housing occurs within these bearings. As a result, there is virtually no increase in friction.

Table 3

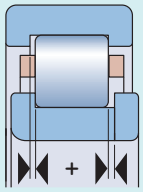
## Radial internal clearance of cylindrical roller bearings with a cylindrical bore



| Bore diameter d | | Radial internal clearance | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | C2 | | Normal | | C3 | | C4 | | C5 | |
| > | ≤ | min. | max. | min. | max. | min. | max. | min. | max. | min. | max. |
| mm | | µm | | | | | | | | | |
| – | 24 | 0 | 25 | 20 | 45 | 35 | 60 | 50 | 75 | 65 | 90 |
| 24 | 30 | 0 | 25 | 20 | 45 | 35 | 60 | 50 | 75 | 70 | 95 |
| 30 | 40 | 5 | 30 | 25 | 50 | 45 | 70 | 60 | 85 | 80 | 105 |
| 40 | 50 | 5 | 35 | 30 | 60 | 50 | 80 | 70 | 100 | 95 | 125 |
| 50 | 65 | 10 | 40 | 40 | 70 | 60 | 90 | 80 | 110 | 110 | 140 |
| 65 | 80 | 10 | 45 | 40 | 75 | 65 | 100 | 90 | 125 | 130 | 165 |
| 80 | 100 | 15 | 50 | 50 | 85 | 75 | 110 | 105 | 140 | 155 | 190 |
| 100 | 120 | 15 | 55 | 50 | 90 | 85 | 125 | 125 | 165 | 180 | 220 |
| 120 | 140 | 15 | 60 | 60 | 105 | 100 | 145 | 145 | 190 | 200 | 245 |
| 140 | 160 | 20 | 70 | 70 | 120 | 115 | 165 | 165 | 215 | 225 | 275 |
| 160 | 180 | 25 | 75 | 75 | 125 | 120 | 170 | 170 | 220 | 250 | 300 |
| 180 | 200 | 35 | 90 | 90 | 145 | 140 | 195 | 195 | 250 | 275 | 330 |
| 200 | 225 | 45 | 105 | 105 | 165 | 160 | 220 | 220 | 280 | 305 | 365 |
| 225 | 250 | 45 | 110 | 110 | 175 | 170 | 235 | 235 | 300 | 330 | 395 |
| 250 | 280 | 55 | 125 | 125 | 195 | 190 | 260 | 260 | 330 | 370 | 440 |
| 280 | 315 | 55 | 130 | 130 | 205 | 200 | 275 | 275 | 350 | 410 | 485 |
| 315 | 355 | 65 | 145 | 145 | 225 | 225 | 305 | 305 | 385 | 455 | 535 |
| 355 | 400 | 100 | 190 | 190 | 280 | 280 | 370 | 370 | 460 | 510 | 600 |
| 400 | 450 | 110 | 210 | 210 | 310 | 310 | 410 | 410 | 510 | 565 | 665 |
| 450 | 500 | 110 | 220 | 220 | 330 | 330 | 440 | 440 | 550 | 625 | 735 |
| 500 | 560 | 120 | 240 | 240 | 360 | 360 | 480 | 480 | 600 | 690 | 810 |
| 560 | 630 | 140 | 260 | 260 | 380 | 380 | 500 | 500 | 620 | 780 | 900 |
| 630 | 710 | 145 | 285 | 285 | 425 | 425 | 565 | 565 | 705 | 865 | 1 005 |
| 710 | 800 | 150 | 310 | 310 | 470 | 470 | 630 | 630 | 790 | 975 | 1 135 |
| 800 | 900 | 180 | 350 | 350 | 520 | 520 | 690 | 690 | 860 | 1 095 | 1 265 |
| 900 | 1 000 | 200 | 390 | 390 | 580 | 580 | 770 | 770 | 960 | 1 215 | 1 405 |
| 1 000 | 1 120 | 220 | 430 | 430 | 640 | 640 | 850 | 850 | 1 060 | 1 355 | 1 565 |
| 1 120 | 1 250 | 230 | 470 | 470 | 710 | 710 | 950 | 950 | 1 190 | 1 510 | 1 750 |
| 1 250 | 1 400 | 270 | 530 | 530 | 790 | 790 | 1 050 | 1 050 | 1 310 | 1 680 | 1 940 |
| 1 400 | 1 600 | 330 | 610 | 610 | 890 | 890 | 1 170 | 1 170 | 1 450 | 1 920 | 2 200 |
| 1 600 | 1 800 | 380 | 700 | 700 | 1 020 | 1 020 | 1 340 | 1 340 | 1 660 | 2 160 | 2 480 |
| 1 800 | 2 000 | 400 | 760 | 760 | 1 120 | 1 120 | 1 480 | 1 480 | 1 840 | 2 390 | 2 760 |

Table 4

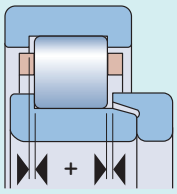
## Axial internal clearance of NUP cylindrical roller bearings



| Bearing Bore diameter | Size code | Axial internal clearance of bearings in the series NUP 2 | | NUP 3 | | NUP 22 | | NUP 23 | |
|---|---|---|---|---|---|---|---|---|---|
| | | min. | max. | min. | max. | min. | max. | min. | max. |
| mm | – | µm | | | | | | | |
| **17** | **03** | 37 | 140 | 37 | 140 | 37 | 140 | 47 | 155 |
| **20** | **04** | 37 | 140 | 37 | 140 | 47 | 155 | 47 | 155 |
| **25** | **05** | 37 | 140 | 47 | 155 | 47 | 155 | 47 | 155 |
| **30** | **06** | 37 | 140 | 47 | 155 | 47 | 155 | 47 | 155 |
| **35** | **07** | 47 | 155 | 47 | 155 | 47 | 155 | 62 | 180 |
| **40** | **08** | 47 | 155 | 47 | 155 | 47 | 155 | 62 | 180 |
| **45** | **09** | 47 | 155 | 47 | 155 | 47 | 155 | 62 | 180 |
| **50** | **10** | 47 | 155 | 47 | 155 | 47 | 155 | 62 | 180 |
| **55** | **11** | 47 | 155 | 62 | 180 | 47 | 155 | 62 | 180 |
| **60** | **12** | 47 | 155 | 62 | 180 | 62 | 180 | 87 | 230 |
| **65** | **13** | 47 | 155 | 62 | 180 | 62 | 180 | 87 | 230 |
| **70** | **14** | 47 | 155 | 62 | 180 | 62 | 180 | 87 | 230 |
| **75** | **15** | 47 | 155 | 62 | 180 | 62 | 180 | 87 | 230 |
| **80** | **16** | 47 | 155 | 62 | 180 | 62 | 180 | 87 | 230 |
| **85** | **17** | 62 | 180 | 62 | 180 | 62 | 180 | 87 | 230 |
| **90** | **18** | 62 | 180 | 62 | 180 | 62 | 180 | 87 | 230 |
| **95** | **19** | 62 | 180 | 62 | 180 | 62 | 180 | 87 | 230 |
| **100** | **20** | 62 | 180 | 87 | 230 | 87 | 230 | 120 | 315 |
| **105** | **21** | 62 | 180 | – | – | – | – | – | – |
| **110** | **22** | 62 | 180 | 87 | 230 | 87 | 230 | 120 | 315 |
| **120** | **24** | 62 | 180 | 87 | 230 | 87 | 230 | 120 | 315 |
| **130** | **26** | 62 | 180 | 87 | 230 | 87 | 230 | 120 | 315 |
| **140** | **28** | 62 | 180 | 87 | 230 | 87 | 230 | 120 | 315 |
| **150** | **30** | 62 | 180 | – | – | 87 | 230 | 120 | 315 |
| **160** | **32** | 87 | 230 | – | – | – | – | – | – |
| **170** | **34** | 87 | 230 | – | – | – | – | – | – |
| **180** | **36** | 87 | 230 | – | – | – | – | – | – |
| **190** | **38** | 87 | 230 | – | – | – | – | – | – |
| **200** | **40** | 87 | 230 | – | – | – | – | – | – |
| **220** | **44** | 95 | 230 | – | – | – | – | – | – |
| **240** | **48** | 95 | 250 | – | – | – | – | – | – |
| **260** | **52** | 95 | 250 | – | – | – | – | – | – |

Table 5

## Axial internal clearance of NJ + HJ cylindrical roller bearings



| Bearing Bore diameter | Size code | Axial internal clearance of bearings in the series NJ 2 + HJ 2 | | NJ 3 + HJ 3 | | NJ 4 + HJ 4 | | NJ 22 + HJ 22 | | NJ 23 + HJ 23 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | min. | max. | min. | max. | min. | max. | min. | max. | min. | max. |
| mm | – | µm | | | | | | | | | |
| **20** | **04** | 42 | 165 | 42 | 165 | – | – | 52 | 185 | 52 | 183 |
| **25** | **05** | 42 | 165 | 52 | 185 | – | – | 52 | 185 | 52 | 183 |
| **30** | **06** | 42 | 165 | 52 | 185 | 60 | 200 | 52 | 185 | 52 | 183 |
| **35** | **07** | 52 | 185 | 52 | 185 | 60 | 200 | 52 | 185 | 72 | 215 |
| **40** | **08** | 52 | 185 | 52 | 185 | 60 | 200 | 52 | 185 | 72 | 215 |
| **45** | **09** | 52 | 185 | 52 | 185 | 60 | 200 | 52 | 185 | 72 | 215 |
| **50** | **10** | 52 | 185 | 52 | 185 | 80 | 235 | 52 | 185 | 72 | 215 |
| **55** | **11** | 52 | 185 | 72 | 215 | 80 | 235 | 52 | 185 | 72 | 215 |
| **60** | **12** | 52 | 185 | 72 | 215 | 80 | 235 | 72 | 215 | 102 | 275 |
| **65** | **13** | 52 | 185 | 72 | 215 | 80 | 235 | 72 | 215 | 102 | 275 |
| **70** | **14** | 52 | 185 | 72 | 215 | 80 | 235 | 72 | 215 | 102 | 275 |
| **75** | **15** | 52 | 185 | 72 | 215 | 80 | 235 | 72 | 215 | 102 | 275 |
| **80** | **16** | 52 | 185 | 72 | 215 | 80 | 235 | 72 | 215 | 102 | 275 |
| **85** | **17** | 72 | 215 | 72 | 215 | 110 | 290 | 72 | 215 | 102 | 275 |
| **90** | **18** | 72 | 215 | 72 | 215 | 110 | 290 | 72 | 215 | 102 | 275 |
| **95** | **19** | 72 | 215 | 72 | 215 | 110 | 290 | 72 | 215 | 102 | 275 |
| **100** | **20** | 72 | 215 | 102 | 275 | 110 | 290 | 102 | 275 | 140 | 375 |
| **105** | **21** | 72 | 215 | 102 | 275 | 110 | 290 | 102 | 275 | 140 | 375 |
| **110** | **22** | 72 | 215 | 102 | 275 | 110 | 290 | 102 | 275 | 140 | 375 |
| **120** | **24** | 72 | 215 | 102 | 275 | 110 | 310 | 102 | 275 | 140 | 375 |
| **130** | **26** | 72 | 215 | 102 | 275 | 110 | 310 | 102 | 275 | 140 | 375 |
| **140** | **28** | 72 | 215 | 102 | 275 | 140 | 385 | 102 | 275 | 140 | 375 |
| **150** | **30** | 72 | 215 | 102 | 275 | 140 | 385 | 102 | 275 | 140 | 375 |
| **160** | **32** | 102 | 275 | 102 | 275 | – | – | 140 | 375 | 140 | 375 |
| **170** | **34** | 102 | 275 | – | – | – | – | 140 | 375 | – | – |
| **180** | **36** | 102 | 275 | – | – | – | – | 140 | 375 | – | – |
| **190** | **38** | 102 | 275 | – | – | – | – | – | – | – | – |
| **200** | **40** | 102 | 275 | – | – | – | – | – | – | – | – |
| **220** | **44** | 110 | 290 | – | – | – | – | – | – | – | – |
| **240** | **48** | 110 | 310 | – | – | – | – | – | – | – | – |
| **260** | **52** | 110 | 310 | – | – | – | – | – | – | – | – |
| **280** | **56** | 110 | 310 | – | – | – | – | – | – | – | – |

# Loads

| | Single row, high-capacity and single row full complement bearings | Double row full complement bearings |
|---|---|---|
| **Minimum load**<br><br>For additional information<br>→ **page 106** | $F_{rm} = k_r \left(6 + \frac{4\,n}{n_r}\right) \left(\frac{d_m}{100}\right)^2$ | |
| **Equivalent dynamic bearing load**<br><br>For additional information<br>→ **page 91** | **Non-locating bearings**<br>$P = F_r$<br><br>**Locating bearings**<br>$F_a/F_r \leq e \rightarrow P = F_r$<br>$F_a/F_r > e \rightarrow P = 0{,}92\,F_r + Y\,F_a$<br><br>$F_a$ must not exceed $0{,}5\,F_r$. | $F_a/F_r \leq 0{,}15 \rightarrow P = F_r$<br>$F_a/F_r > 0{,}15 \rightarrow P = 0{,}92\,F_r + 0{,}4\,F_a$<br><br>$F_a$ must not exceed $0{,}25\,F_r$. |
| **Equivalent static bearing load**<br><br>For additional information<br>→ **page 105** | $P_0 = F_r$ | |

**Symbols**

- $d_m$ bearing mean diameter [mm] = 0,5 (d + D)
- e limiting value
  - = 0,2 for bearings in the 10, 18, 19, 2, 3 and 4 series
  - = 0,3 for bearings in the 12, 20, 22, 23, 28, 29, 30 and 39 series
- $F_a$ axial load [kN]
- $F_r$ radial load [kN]
- $F_{rm}$ minimum radial load [kN]
- $k_r$ minimum load factor (**product tables**, **page 516**)
- n rotational speed [r/min]
- $n_r$ reference speed [r/min] (**product tables**)
  For sealed double row full complement bearings with seals removed and oil lubrication → 1,3 times the limiting speed
- P equivalent dynamic bearing load [kN]
- $P_0$ equivalent static bearing load [kN]
- Y axial load factor
  - = 0,6 for bearings in the 10, 18, 19, 2, 3 and 4 series
  - = 0,4 for bearings in the 12, 20, 22, 23, 28, 29, 30 and 39 series

# Dynamic axial load carrying capacity

Cylindrical roller bearings with flanges on both the inner and outer rings can support, in addition to radial loads, axial loads up to:

- $F_a \leq 0{,}25\ F_r$ for double row full complement bearings
- $F_a \leq 0{,}5\ F_r$ for other design bearings

The axial load carrying capacity is determined by the lubrication condition, operating temperature and heat dissipation at the roller end / flange contact.

The formulae below are valid for normal operating conditions:

- $\Delta T \approx 60$ °C between the bearing operating and ambient temperature
- specific heat loss ≈ 0,5 mW/mm²
- viscosity ratio $\kappa \geq 2$
- misalignment ≤ 1 minute of arc
  For misalignment > 1 minute of arc, contact the SKF application engineering service.

## Permissible axial loads

| Conditions | Mechanical limitations | Thermal limitations |
|---|---|---|
| **Continuous** | **Bearings in the 2.. series**<br>$F_{ap\ max} \leq 0{,}0045\ D^{1,5}$<br>**Bearings in other series**<br>$F_{ap\ max} \leq 0{,}0023\ D^{1,7}$<br>**High-capacity bearings**<br>$F_{ap\ max} \leq 0{,}0035\ D^{1,7}$ | **Circulating oil lubrication**<br>$F_{ap\ oil} = F_{ap} + \frac{15 \times 10^4\ k_1\ \Delta T_s\ \dot{V}_s}{n\ (d + D)}$<br>**Other lubrication**<br>• Reference surface $A \leq 50\ 000$ mm²<br>$F_{ap} = \frac{k_1\ C_0\ 10^4}{n\ (d + D)} - k_2\ F_r$<br>• Reference surface $A > 50\ 000$ mm²<br>$F_{ap} = \frac{7{,}5\ k_1\ C_0^{2/3}\ 10^4}{n\ (d + D)} - k_2\ F_r$ |
| **Brief periods** | $F_{ap\ brief} \leq 2\ (F_{ap}, F_{ap\ oil}, F_{ap\ max})$<br>• provided it does not increase the bearing operating temperature > 5 °C temporarily<br>• "brief period" is the approximate time for 1 000 revolutions to take place | |
| **Occasional peak loads** | **High-capacity bearings**<br>$F_{ap\ peak} \leq 0{,}0085\ D^{1,7}$<br>**Other bearings**<br>$F_{ap\ peak} \leq 3\ (F_{ap}, F_{ap\ oil}, F_{ap\ max})$ | |

**Symbols**

| | |
|---|---|
| A | reference surface [mm²] = π B (D + d) |
| B | bearing width [mm] |
| $C_0$ | basic static load rating [kN] (**product tables, page 516**) |
| d | bearing bore diameter [mm] |
| D | bearing outside diameter [mm] |
| $\Delta T_S$ | temperature difference between incoming and outgoing oil flow [°C] |
| $F_a$ | axial load [kN] |
| $F_{ap}$ | permissible axial load [kN] |
| $F_{ap\ brief}$ | maximal axial load for brief periods [kN] |
| $F_{ap\ max}$ | maximal constantly acting axial load [kN] |
| $F_{ap\ oil}$ | maximum permissible axial load in circulating oil applications [kN] |
| $F_{ap\ peak}$ | maximal occasional axial peak load [kN] |
| $F_r$ | radial load [kN] |
| $k_1, k_2$ | lubrication factors (**table 6**) |
| n | rotational speed [r/min] |
| $\dot{V}_S$ | amount of oil flow [l/min] |

# Temperature limits

The permissible operating temperature for cylindrical roller bearings can be limited by:

- the dimensional stability of the bearing rings and rollers
- the cage
- the seals
- the lubricant

Where temperatures outside the permissible range are expected, contact SKF.

## Bearing rings and rollers

SKF cylindrical roller bearings are heat stabilized up to 150 °C *(300 °F)*.

## Cages

Steel, brass, light alloy or PEEK cages can be used at the same operating temperatures as the bearing rings and rollers. For temperature limits of cages made of other polymer materials, refer to *Polymer cages*, page 188.

## Seals

The permissible operating temperature for PUR seals is –20 to +80 °C *(–5 to +175 °F)*.

Typically, temperature peaks are at the seal lip.

## Lubricants

Temperature limits for greases used in sealed double row full complement cylindrical roller bearings are provided in table 1, page 503. For temperature limits of other SKF greases, refer to *Selecting a suitable SKF grease*, page 116.

When using lubricants not supplied by SKF, temperature limits should be evaluated according to the SKF traffic light concept (page 117).

# Permissible speed

The speed ratings in the **product tables** indicate:

- the **reference speed**, which enables a quick assessment of the speed capabilities from a thermal frame of reference
- the **limiting speed**, which is a mechanical limit that should not be exceeded unless the bearing design and the application are adapted for higher speeds

For additional information, refer to *Operating temperature and speed*, page 130.

SKF recommends oil lubrication for bearings with a ring centred cage. When these bearings are grease lubricated, the $nd_m$ value is limited:

- for bearings with an LA, LB, LL, MA, MB, ML, MP, JA, JB or MH cage
  → $nd_m \leq 250\,000$ mm/min
- for bearings with a PA or PHA cage
  → $nd_m \leq 450\,000$ mm/min

where
$d_m$ = bearing mean diameter [mm]
= 0,5 (d + D)
n = rotational speed [r/min]

For single row bearings with a standard cage, the values for the limiting speed are listed in the product tables. Conversion factors to estimate the limiting speed for bearings with an alternative standard cage are listed in table 7.

**Table 7**

**Conversion factors for limiting speeds of single row cylindrical roller bearings**

| Bearing with standard cage | alternative standard cage | | |
|---|---|---|---|
| | P, PH, J, M, MR | PA, PHA, MA, MB | ML |
| **P, PH, J, M, MR** | 1 | 1,3 | 1,5 |
| **PA, PHA, MA, MB** | 0,75 | 1 | 1,2 |
| **ML** | 0,65 | 0,85 | 1 |

**Table 6**

**Lubrication factors for cylindrical roller bearings**

| Bearing types | Lubrication factors | | | |
|---|---|---|---|---|
| | Oil lubrication | | Grease lubrication | |
| | $k_1$ | $k_2$ | $k_1$ | $k_2$ |
| **Single row and high-capacity bearings** | 1,5 | 0,15 | 1 | 0,1 |
| **Single row full complement bearings** | 1 | 0,3 | 0,5 | 0,15 |
| **Double row full complement bearings** | 0,35 | 0,1 | 0,2 | 0,06 |

# Design considerations

## Flange support

Where cylindrical roller bearings are subjected to axial loads, total axial run-out (*Tolerances for bearing seats and abutments*, page 144) and the size of the abutment surfaces of adjacent components are particularly important for an even load distribution on the flange.

The inner ring flange should only be supported up to half of its height (fig. 24) so that it is not subjected to damaging alternating stresses that can result, for example, from shaft deflection.

For single row bearings and high-capacity bearings the recommended shaft abutment diameter can be obtained using

$$d_{as} = 0{,}5\,(d_1 + F)$$

where
$d_{as}$ = shaft abutment diameter for axially loaded bearings [mm]
$d_1$ = inner ring flange diameter [mm] (product tables, page 516)
F = inner ring raceway diameter [mm] (product tables)

For full complement bearings, the recommended shaft abutment diameter $d_{as}$ is listed in the product tables.

# Mounting

Because of the design and position of the cage of high-capacity cylindrical roller bearings in the NCF .. ECJB and NJF .. ECJA series, the cage cannot prevent the rollers from falling out when the inner and outer rings of the bearing are separated. SKF recommends mounting these high-capacity cylindrical roller bearings as a complete bearing, like full complement cylindrical roller bearings.

Where it is necessary to mount the inner and outer rings separately, use a mounting sleeve (fig. 25) or a retaining strap (fig. 26) to keep the rollers in place.

Fig. 24

**Flange support**

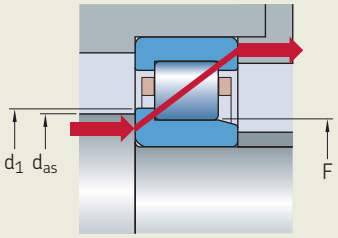



Fig. 25

**Mounting sleeve**

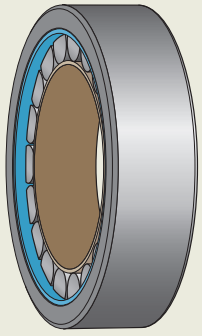
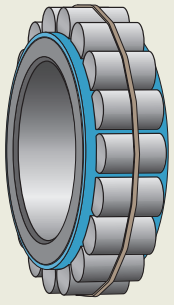


Fig. 26

**Retaining strap**



# Designation system

**Prefixes**

| | |
|---|---|
| **L** | Separate inner or outer ring of a separable bearing |
| **R** | Inner or outer ring with roller and cage assembly of a separable bearing |

**Basic designation**

Listed in **table 4, page 30**

| | |
|---|---|
| **CRL** | Inch bearing |
| **CRM** | Inch bearing |
| **HJ** | Angle ring |

**Suffixes**

**Group 1: Internal design**

| | |
|---|---|
| **A** | Deviating or modified internal design |
| **CV** | Modified internal design, full complement roller set |
| **EC** | Optimized internal design incorporating more and/or larger rollers and with modified roller end / flange contact |

**Group 2: External design (seals, snap ring groove, etc.)**

| | |
|---|---|
| **ADB** | Modified internal design and seal (for NNF 50 series) |
| **B** | Improved seal and grease |
| **DA** | Modified internal design and seal (for 3194.. series) |
| **K** | Tapered bore, taper 1:12 |
| **N** | Snap ring groove in the outer ring |
| **NR** | Snap ring groove in the outer ring, with associated snap ring |
| **N1** | One locating slot (notch) in one outer ring side face |
| **N2** | Two locating slots (notches) in one outer ring side face, 180° apart |
| **-2LS** | Contact seal, PUR, on both sides |

**Group 3: Cage design**

| | |
|---|---|
| **FR** | Pin-type steel cage, pierced rollers |
| **J** | Stamped steel cage, roller centred |
| **JA** | Sheet steel cage, outer ring centred |
| **JB** | Sheet steel cage, inner ring centred |
| **L** | Machined light alloy cage, roller centred |
| **LA** | Machined light alloy cage, outer ring centred |
| **LB** | Machined light alloy cage, inner ring centred |
| **LL** | Machined light alloy cage, window-type, inner or outer ring centred (depending on bearing design) |
| **M** | Machined brass cage, roller centred |
| **MA(S)** | Machined brass cage, outer ring centred. The S indicates a lubrication groove in the guiding surface. |
| **MB** | Machined brass cage, inner ring centred |
| **MH** | Machined brass cage, inner ring raceway centred |
| **ML** | Machined brass cage, window-type, inner or outer ring centred (depending on bearing design) |
| **MP** | Machined brass cage, window-type, inner or outer ring centred (depending on bearing size) |
| **MR** | Machined brass cage, window-type, roller centred |
| **P** | Glass fibre reinforced PA66 cage, roller centred |
| **PA** | Glass fibre reinforced PA66 cage, outer ring centred |
| **PH** | Glass fibre reinforced PEEK cage, roller centred |
| **PHA** | Glass fibre reinforced PEEK cage, outer ring centred |
| **V** | Full complement of rollers (no cage) |
| **VH** | Full complement of rollers (no cage), self-retaining |

| Group 4 | | | | | |
|---|---|---|---|---|---|
| 4.1 | 4.2 | 4.3 | 4.4 | 4.5 | 4.6 |

**Group 4.6: Other variants**

| | |
|---|---|
| **PEX** | SKF Explorer bearing, used only when same-sized conventional and SKF Explorer bearings are available |
| **VA301** | Bearing for railway vehicle traction motors |
| **VA305** | VA301 + special inspection routines |
| **VA350** | Bearing for railway axleboxes |
| **VA380** | Bearing for railway axleboxes in accordance with EN 12080, class 1 |
| **VA3091** | VA301 + external surfaces of the outer ring are coated with aluminium oxide |
| **VC025** | Bearing with special wear-resistant raceways for applications in heavily contaminated environments |
| **VE901** | Modified internal design |
| **VQ015** | Inner ring with crowned raceway for increased permissible misalignment |

**Group 4.5: Lubrication**

| | |
|---|---|
| **W33** | Annular groove and three lubrication holes in the outer ring |

**Group 4.4: Stabilization**

| | |
|---|---|
| **S1** | Bearing rings heat stabilized for operating temperatures ≤ 200 °C *(390 °F)* |
| **S2** | Bearing rings heat stabilized for operating temperatures ≤ 250 °C *(480 °F)* |

**Group 4.3: Bearing sets, matched bearings**

| | |
|---|---|
| **DR** | Set of two matched bearings |
| **TR** | Set of three matched bearings |
| **QR** | Set of four matched bearings |

**Group 4.2: Accuracy, clearance, preload, quiet running**

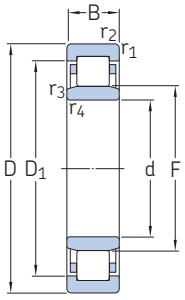
| | |
|---|---|
| **CN** | Normal radial internal clearance; only used together with an additional letter that identifies a reduced or displaced clearance range<br>H Reduced clearance range corresponding to the upper half of the actual clearance range<br>L Reduced clearance range corresponding to the lower half of the actual clearance range<br>M Reduced clearance range corresponding to the middle half of the actual clearance range<br>The above letters are also used together with the clearance classes C2, C3, C4 and C5, e.g. C2H. |
| **C2** | Radial internal clearance smaller than Normal |
| **C3** | Radial internal clearance greater than Normal |
| **C4** | Radial internal clearance greater than C3 |
| **C5** | Radial internal clearance greater than C4 |

**Group 4.1: Materials, heat treatment**

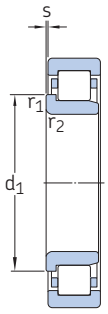
| | |
|---|---|
| **HA1** | Case-hardened inner and outer rings |
| **HA2** | Case-hardened outer ring |
| **HA3** | Case-hardened inner ring |
| **HB1** | Bainite-hardened inner and outer rings |
| **HB3** | Bainite-hardened inner ring |
| **HN1** | Inner and outer rings with special surface heat treatment |
| **L4B** | Bearing rings and rollers black oxidized |
| **L5B** | Rollers black oxidized |
| **L7B** | Inner ring and rollers black oxidized |

## 6.1 Single row cylindrical roller bearings

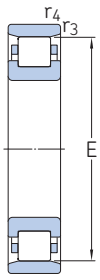
d **15 – 25** mm



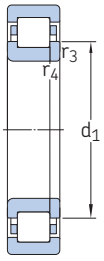

NU




NJ




N



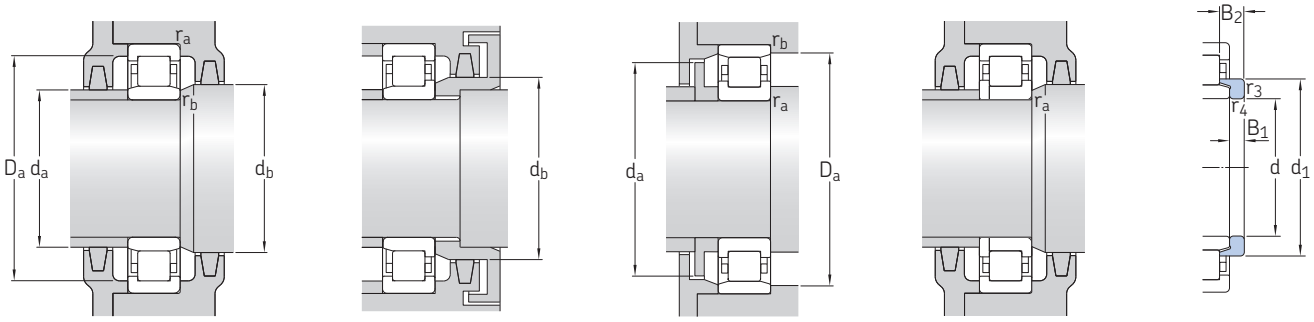

NUP

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designations Bearing with standard cage | Alternative standard cage[1] |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **15** | 35 | 11 | 12,5 | 10,2 | 1,22 | 22 000 | 26 000 | 0,047 | ▸ **NU 202 ECP** | **PHA** |
| | 35 | 11 | 12,5 | 10,2 | 1,22 | 22 000 | 26 000 | 0,048 | ▸ **NJ 202 ECP** | **PHA** |
| **17** | 40 | 12 | 20 | 14,3 | 1,73 | 20 000 | 22 000 | 0,066 | ▸ **N 203 ECP** | **PH** |
| | 40 | 12 | 20 | 14,3 | 1,73 | 20 000 | 22 000 | 0,068 | ▸ **NU 203 ECP** | **PHA** |
| | 40 | 12 | 20 | 14,3 | 1,73 | 20 000 | 22 000 | 0,069 | ▸ **NJ 203 ECP** | **PHA** |
| | 40 | 12 | 20 | 14,3 | 1,73 | 20 000 | 22 000 | 0,072 | ▸ **NUP 203 ECP** | **PHA** |
| | 40 | 16 | 27,5 | 21,6 | 2,65 | 20 000 | 22 000 | 0,087 | ▸ **NU 2203 ECP** | **–** |
| | 40 | 16 | 27,5 | 21,6 | 2,65 | 20 000 | 22 000 | 0,093 | ▸ **NJ 2203 ECP** | **–** |
| | 40 | 16 | 27,5 | 21,6 | 2,65 | 20 000 | 22 000 | 0,097 | ▸ **NUP 2203 ECP** | **–** |
| | 47 | 14 | 28,5 | 20,4 | 2,55 | 17 000 | 20 000 | 0,12 | N 303 ECP | **–** |
| | 47 | 14 | 28,5 | 20,4 | 2,55 | 17 000 | 20 000 | 0,12 | ▸ NJ 303 ECP | **–** |
| | 47 | 14 | 28,5 | 20,4 | 2,55 | 17 000 | 20 000 | 0,12 | ▸ NU 303 ECP | **–** |
| **20** | 47 | 14 | 28,5 | 22 | 2,75 | 17 000 | 19 000 | 0,11 | ▸ N 204 ECP | **–** |
| | 47 | 14 | 28,5 | 22 | 2,75 | 17 000 | 19 000 | 0,11 | ▸ NJ 204 ECP | **ML, PHA** |
| | 47 | 14 | 28,5 | 22 | 2,75 | 17 000 | 19 000 | 0,11 | ▸ NU 204 ECP | **ML, PHA** |
| | 47 | 14 | 28,5 | 22 | 2,75 | 17 000 | 19 000 | 0,12 | ▸ NUP 204 ECP | **ML, PHA** |
| | 47 | 18 | 34,5 | 27,5 | 3,45 | 17 000 | 19 000 | 0,14 | ▸ NJ 2204 ECP | **–** |
| | 47 | 18 | 34,5 | 27,5 | 3,45 | 17 000 | 19 000 | 0,14 | ▸ NU 2204 ECP | **–** |
| | 52 | 15 | 35,5 | 26 | 3,25 | 15 000 | 18 000 | 0,14 | ▸ NU 304 ECP | **–** |
| | 52 | 15 | 35,5 | 26 | 3,25 | 15 000 | 18 000 | 0,15 | ▸ N 304 ECP | **–** |
| | 52 | 15 | 35,5 | 26 | 3,25 | 15 000 | 18 000 | 0,15 | ▸ NJ 304 ECP | **–** |
| | 52 | 15 | 35,5 | 26 | 3,25 | 15 000 | 18 000 | 0,16 | ▸ NUP 304 ECP | **–** |
| | 52 | 21 | 47,5 | 38 | 4,8 | 15 000 | 18 000 | 0,21 | ▸ NU 2304 ECP | **–** |
| | 52 | 21 | 47,5 | 38 | 4,8 | 15 000 | 18 000 | 0,22 | ▸ NJ 2304 ECP | **–** |
| | 52 | 21 | 47,5 | 38 | 4,8 | 15 000 | 18 000 | 0,22 | ▸ NUP 2304 ECP | **–** |
| **25** | 47 | 12 | 14,2 | 13,2 | 1,4 | 18 000 | 18 000 | 0,082 | ▸ **NU 1005** | **–** |
| | 52 | 15 | 32,5 | 27 | 3,35 | 15 000 | 16 000 | 0,13 | ▸ N 205 ECP | **–** |
| | 52 | 15 | 32,5 | 27 | 3,35 | 15 000 | 16 000 | 0,13 | ▸ NU 205 ECP | **J, ML, PH, PHA** |
| | 52 | 15 | 32,5 | 27 | 3,35 | 15 000 | 16 000 | 0,14 | ▸ NJ 205 ECP | **J, ML, PH, PHA** |
| | 52 | 15 | 32,5 | 27 | 3,35 | 15 000 | 16 000 | 0,14 | ▸ NUP 205 ECP | **J, ML, PH, PHA** |
| | 52 | 18 | 39 | 34 | 4,25 | 15 000 | 16 000 | 0,16 | ▸ NU 2205 ECP | **ML, PH** |
| | 52 | 18 | 39 | 34 | 4,25 | 15 000 | 16 000 | 0,17 | ▸ NJ 2205 ECP | **ML, PH** |
| | 52 | 18 | 39 | 34 | 4,25 | 15 000 | 16 000 | 0,17 | ▸ NUP 2205 ECP | **ML, PH** |
| | 62 | 17 | 46,5 | 36,5 | 4,55 | 12 000 | 15 000 | 0,23 | ▸ N 305 ECP | **–** |

**SKF Explorer bearing**

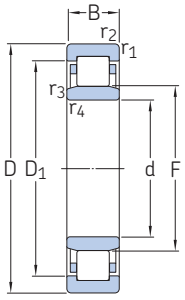
▸ Popular item

1) When ordering bearings with an alternative standard cage the suffix of the standard cage has to be replaced by the suffix of the alternative cage. For example NU .. ECP becomes NU .. ECML (for permissible speed → page 511).

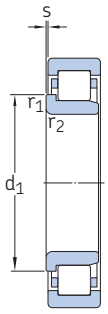



Angle ring

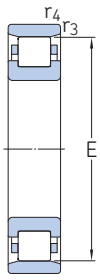
| Dimensions | | | | | | | Abutment and fillet dimensions | | | | | | Calculation factor | Angle ring Designation | Mass | Dimensions | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | F, E | $r_{1,2}$ min. | $r_{3,4}$ min. | s max. | $d_a$ min. | $d_a$ max. | $d_b$, $D_a$ min. | $D_a$ max. | $r_a$ max. | $r_b$ max. | $k_r$ | | | $B_1$ | $B_2$ |
| mm | | | | | | | mm | | | | | | – | – | kg | mm | |
| **15** | – | 27,7 | 19,3 | 0,6 | 0,3 | 1 | 17,4 | 18,4 | 21 | 31,3 | 0,6 | 0,3 | 0,15 | **–** | – | – | – |
| | 21,9 | 27,7 | 19,3 | 0,6 | 0,3 | 1 | 18,2 | 18,4 | 23 | 31,3 | 0,6 | – | 0,15 | **–** | – | – | – |
| **17** | 25 | – | 35,1 | 0,6 | 0,3 | 1 | 20,7 | 33 | 37 | 37,1 | 0,6 | 0,3 | 0,12 | **–** | – | – | – |
| | – | 32,35 | 22,1 | 0,6 | 0,3 | 1 | 19,9 | 21,1 | 24 | 36 | 0,6 | 0,3 | 0,15 | **–** | – | – | – |
| | 25 | 32,35 | 22,1 | 0,6 | 0,6 | 1 | 20,7 | 21,1 | 27 | 36 | 0,6 | – | 0,15 | **–** | – | – | – |
| | 25 | 32,35 | 22,1 | 0,6 | 0,3 | – | 20,7 | – | 27 | 36 | 0,6 | – | 0,15 | **–** | – | – | – |
| | – | 32,35 | 22,1 | 0,6 | 0,3 | 1,5 | 19,9 | 21,1 | 24 | 36 | 0,6 | 0,3 | 0,2 | **–** | – | – | – |
| | 25 | 32,35 | 22,1 | 0,6 | 0,3 | 1,5 | 20,7 | 21,1 | 27 | 36 | 0,6 | – | 0,2 | **–** | – | – | – |
| | 25 | 32,35 | 22,1 | 0,6 | 0,3 | – | 20,7 | – | 27 | 36 | 0,6 | – | 0,2 | **–** | – | – | – |
| | 27,7 | – | 40,2 | 1 | 0,6 | 1 | 22,1 | 38 | 42 | 42,7 | 1 | 0,6 | 0,12 | **–** | – | – | – |
| | 27,7 | 36,75 | 24,2 | 1 | 0,6 | 1 | 22,1 | 23,1 | 29 | 41,7 | 1 | – | 0,15 | **–** | – | – | – |
| | – | 36,75 | 24,2 | 1 | 0,6 | 1 | 21,1 | 23,1 | 26 | 41,7 | 1 | 0,6 | 0,15 | **–** | – | – | – |
| **20** | 29,7 | – | 41,5 | 1 | 0,6 | 1 | 25 | 40 | 43 | 43,5 | 1 | 0,6 | 0,12 | **–** | – | – | – |
| | 29,7 | 38,44 | 26,5 | 1 | 0,6 | 1 | 25 | 25,4 | 31 | 41,7 | 1 | – | 0,15 | **–** | – | – | – |
| | – | 38,44 | 26,5 | 1 | 0,6 | 1 | 24 | 25,4 | 28 | 41,7 | 1 | 0,6 | 0,15 | **–** | – | – | – |
| | 29,7 | 38,44 | 26,5 | 1 | 0,6 | – | 25 | – | 31 | 41,7 | 1 | – | 0,15 | **–** | – | – | – |
| | 29,7 | 38,3 | 26,5 | 1 | 0,6 | 2 | 25 | 25,4 | 31 | 41,7 | 1 | – | 0,2 | **–** | – | – | – |
| | – | 38,3 | 26,5 | 1 | 0,6 | 2 | 24 | 25,4 | 28 | 41,7 | 1 | 0,6 | 0,2 | **–** | – | – | – |
| | – | 41,85 | 27,5 | 1,1 | 0,6 | 0,9 | 24,1 | 26,2 | 29 | 45,4 | 1 | 0,6 | 0,15 | **HJ 304 EC** | 0,017 | 4 | 6,5 |
| | 31,2 | – | 45,5 | 1,1 | 0,6 | 0,9 | 26,1 | 44 | 47 | 48 | 1 | 0,6 | 0,12 | **–** | – | – | – |
| | 31,2 | 41,85 | 27,5 | 1,1 | 0,6 | 0,9 | 26,1 | 26,2 | 33 | 45,4 | 1 | – | 0,15 | **HJ 304 EC** | 0,017 | 4 | 6,5 |
| | 31,2 | 41,85 | 27,5 | 1,1 | 0,6 | – | 26,1 | – | 33 | 45,4 | 1 | – | 0,15 | **–** | – | – | – |
| | – | 41,85 | 27,5 | 1,1 | 0,6 | 1,9 | 24,1 | 26,2 | 29 | 45,4 | 1 | 0,6 | 0,25 | **–** | – | – | – |
| | 31,2 | 41,85 | 27,5 | 1,1 | 0,6 | 1,9 | 26,1 | 26,2 | 33 | 45,4 | 1 | – | 0,25 | **–** | – | – | – |
| | 31,2 | 41,85 | 27,5 | 1,1 | 0,6 | – | 26,1 | – | 33 | 45,4 | 1 | – | 0,25 | **–** | – | – | – |
| **25** | – | 38,8 | 30,5 | 0,6 | 0,3 | 1,5 | 27,1 | 29,5 | 32 | 43,1 | 0,6 | 0,3 | 0,1 | **–** | – | – | – |
| | 34,7 | – | 46,5 | 1 | 0,6 | 1,3 | 29,9 | 45 | 48 | 48,5 | 1 | 0,6 | 0,12 | **–** | – | – | – |
| | – | 43,3 | 31,5 | 1 | 0,6 | 1,3 | 28,9 | 30,4 | 33 | 46,4 | 1 | 0,6 | 0,15 | **HJ 205 EC** | 0,015 | 3 | 6 |
| | 34,7 | 43,3 | 31,5 | 1 | 0,6 | 1,3 | 29,9 | 30,4 | 36 | 46,4 | 1 | – | 0,15 | **–** | – | – | – |
| | 34,7 | 43,3 | 31,5 | 1 | 0,6 | – | 29,9 | – | 36 | 46,4 | 1 | – | 0,15 | **–** | – | – | – |
| | – | 43,3 | 31,5 | 1 | 0,6 | 1,8 | 28,9 | 30,4 | 33 | 46,4 | 1 | 0,6 | 0,2 | **HJ 2205 EC** | 0,014 | 3 | 6,5 |
| | 34,7 | 43,3 | 31,5 | 1 | 0,6 | 1,8 | 29,9 | 30,4 | 36 | 46,4 | 1 | – | 0,2 | **HJ 2205 EC** | 0,014 | 3 | 6,5 |
| | 34,7 | 43,3 | 31,5 | 1 | 0,6 | – | 29,9 | – | 36 | 46,4 | 1 | – | 0,2 | **–** | – | – | – |
| | 38,1 | – | 54 | 1,1 | 1,1 | 1,3 | 31 | 52 | 56 | 56,4 | 1 | 1 | 0,12 | **–** | – | – | – |



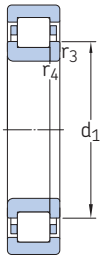

NU




NJ



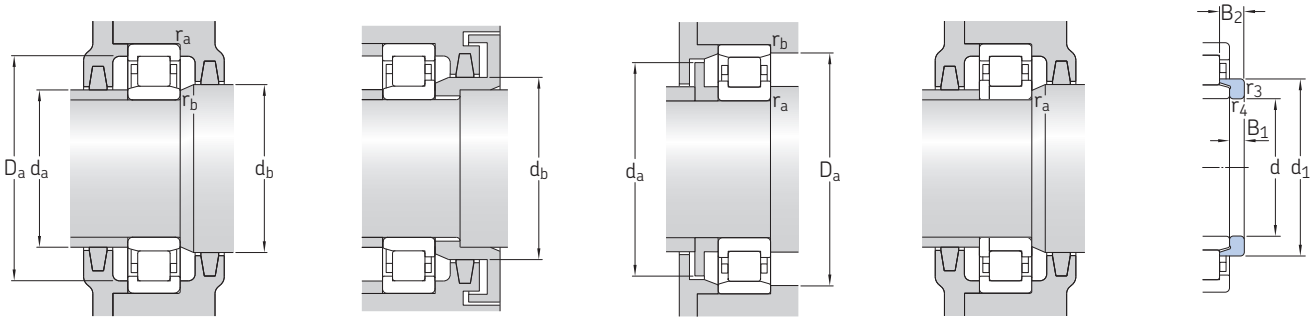

N




NUP

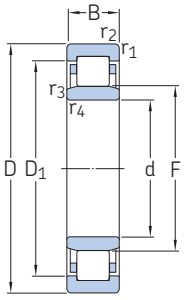
| Principal dimensions | | | Basic load ratings | | Fatigue load limit | Speed ratings | | Mass | Designations | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | dynamic | static | | Reference speed | Limiting speed | | Bearing with standard cage | Alternative standard cage[1] |
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **25** | 62 | 17 | 46,5 | 36,5 | 4,55 | 12 000 | 15 000 | 0,23 | ▸ NU 305 ECP | J, ML |
| cont. | 62 | 17 | 46,5 | 36,5 | 4,55 | 12 000 | 15 000 | 0,24 | ▸ NJ 305 ECP | J, ML |
| | 62 | 17 | 46,5 | 36,5 | 4,55 | 12 000 | 15 000 | 0,25 | ▸ NUP 305 ECP | J, ML |
| | 62 | 24 | 64 | 55 | 6,95 | 12 000 | 15 000 | 0,34 | ▸ NU 2305 ECP | J, ML |
| | 62 | 24 | 64 | 55 | 6,95 | 12 000 | 15 000 | 0,35 | ▸ NJ 2305 ECP | J, ML |
| | 62 | 24 | 64 | 55 | 6,95 | 12 000 | 15 000 | 0,36 | ▸ NUP 2305 ECP | J, ML |
| **30** | 55 | 13 | 17,9 | 17,3 | 1,86 | 15 000 | 15 000 | 0,11 | ▸ **NU 1006** | – |
| | 62 | 16 | 44 | 36,5 | 4,5 | 13 000 | 14 000 | 0,2 | ▸ N 206 ECP | – |
| | 62 | 16 | 44 | 36,5 | 4,5 | 13 000 | 14 000 | 0,2 | ▸ NU 206 ECP | J, ML, PH |
| | 62 | 16 | 44 | 36,5 | 4,55 | 13 000 | 14 000 | 0,21 | ▸ NJ 206 ECP | J, ML, PH |
| | 62 | 16 | 44 | 36,5 | 4,55 | 13 000 | 14 000 | 0,21 | ▸ NUP 206 ECP | J, ML, PH |
| | 62 | 20 | 55 | 49 | 6,1 | 13 000 | 14 000 | 0,26 | ▸ NJ 2206 ECP | J, ML, PH |
| | 62 | 20 | 55 | 49 | 6,1 | 13 000 | 14 000 | 0,26 | ▸ NU 2206 ECP | J, ML, PH |
| | 62 | 20 | 55 | 49 | 6,1 | 13 000 | 14 000 | 0,27 | ▸ NUP 2206 ECP | J, ML, PH |
| | 72 | 19 | 58,5 | 48 | 6,2 | 11 000 | 12 000 | 0,36 | ▸ N 306 ECP | – |
| | 72 | 19 | 58,5 | 48 | 6,2 | 11 000 | 12 000 | 0,36 | ▸ NU 306 ECP | J, M, ML |
| | 72 | 19 | 58,5 | 48 | 6,2 | 11 000 | 12 000 | 0,37 | ▸ NJ 306 ECP | J, M, ML |
| | 72 | 19 | 58,5 | 48 | 6,2 | 11 000 | 12 000 | 0,38 | ▸ NUP 306 ECP | J, M, ML |
| | 72 | 27 | 83 | 75 | 9,65 | 11 000 | 12 000 | 0,53 | ▸ NU 2306 ECP | ML, PH |
| | 72 | 27 | 83 | 75 | 9,65 | 11 000 | 12 000 | 0,54 | ▸ NJ 2306 ECP | ML, PH |
| | 72 | 27 | 83 | 75 | 9,65 | 11 000 | 12 000 | 0,54 | ▸ NUP 2306 ECP | ML, PH |
| | 90 | 23 | 60,5 | 53 | 6,8 | 9 000 | 11 000 | 0,75 | ▸ **NU 406** | MA |
| | 90 | 23 | 60,5 | 53 | 6,8 | 9 000 | 11 000 | 0,78 | ▸ **NJ 406** | MA |
| **35** | 62 | 14 | 35,8 | 38 | 4,55 | 13 000 | 13 000 | 0,16 | ▸ **NU 1007 ECP** | PH |
| | 72 | 17 | 56 | 48 | 6,1 | 11 000 | 12 000 | 0,29 | ▸ NU 207 ECP | J, M, ML, PH, PHA |
| | 72 | 17 | 56 | 48 | 6,1 | 11 000 | 12 000 | 0,3 | ▸ N 207 ECP | – |
| | 72 | 17 | 56 | 48 | 6,1 | 11 000 | 12 000 | 0,3 | ▸ NJ 207 ECP | J, M, ML, PH, PHA |
| | 72 | 17 | 56 | 48 | 6,1 | 11 000 | 12 000 | 0,31 | ▸ NUP 207 ECP | J, M, ML, PH, PHA |
| | 72 | 23 | 69,5 | 63 | 8,15 | 11 000 | 12 000 | 0,4 | ▸ NU 2207 ECP | J, ML, PH |
| | 72 | 23 | 69,5 | 63 | 8,15 | 11 000 | 12 000 | 0,41 | ▸ NJ 2207 ECP | J, ML, PH |
| | 72 | 23 | 69,5 | 63 | 8,15 | 11 000 | 12 000 | 0,42 | ▸ NUP 2207 ECP | J, ML, PH |
| | 80 | 21 | 75 | 63 | 8,15 | 9 500 | 11 000 | 0,47 | ▸ NU 307 ECP | J, M, ML, PH |
| | 80 | 21 | 75 | 63 | 8,15 | 9 500 | 11 000 | 0,48 | N 307 ECP | – |
| | 80 | 21 | 75 | 63 | 8,15 | 9 500 | 11 000 | 0,49 | ▸ NJ 307 ECP | J, M, ML, PH |
| | 80 | 21 | 75 | 63 | 8,15 | 9 500 | 11 000 | 0,49 | ▸ NUP 307 ECP | J, M, ML, PH |

**SKF Explorer bearing**
▸ Popular item
[1] When ordering bearings with an alternative standard cage the suffix of the standard cage has to be replaced by the suffix of the alternative cage. For example NU .. ECP becomes NU .. ECML (for permissible speed → page 511).

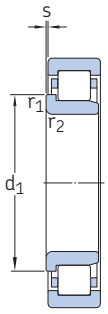



Angle ring

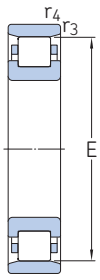
| Dimensions | | | | | | | Abutment and fillet dimensions | | | | | | Calculation factor | Angle ring Designation | Mass | Dimensions | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | F, E | $r_{1,2}$ min. | $r_{3,4}$ min. | s max. | $d_a$ min. | $d_a$ max. | $d_b$, $D_a$ min. | $D_a$ max. | $r_a$ max. | $r_b$ max. | $k_r$ | | | $B_1$ | $B_2$ |
| mm | | | | | | | mm | | | | | | – | – | kg | mm | |
| **25** | – | 50,15 | 34 | 1,1 | 1,1 | 1,3 | 31 | 32,5 | 36 | 54,9 | 1 | 1 | 0,15 | **HJ 305 EC** | 0,025 | 4 | 7 |
| cont. | 38,1 | 50,15 | 34 | 1,1 | 1,1 | 1,3 | 31 | 32,5 | 40 | 54,9 | 1 | – | 0,15 | **HJ 305 EC** | 0,025 | 4 | 7 |
| | 38,1 | 50,15 | 34 | 1,1 | 1,1 | – | 31 | – | 40 | 54,9 | 1 | – | 0,15 | – | – | – | – |
| | – | 50,15 | 34 | 1,1 | 1,1 | 2,3 | 31 | 32,5 | 36 | 54,9 | 1 | 1 | 0,25 | **HJ 2305 EC** | 0,023 | 4 | 8 |
| | 38,1 | 50,15 | 34 | 1,1 | 1,1 | 2,3 | 31 | 32,5 | 40 | 54,9 | 1 | – | 0,25 | **HJ 2305 EC** | 0,023 | 4 | 8 |
| | 38,1 | 50,15 | 34 | 1,1 | 1,1 | – | 31 | – | 40 | 54,9 | 1 | – | 0,25 | – | – | – | – |
| **30** | – | 45,56 | 36,5 | 1 | 0,6 | 1,6 | 32,9 | 35,6 | 38 | 49,8 | 1 | 0,6 | 0,1 | – | – | – | – |
| | 41,2 | – | 55,5 | 1 | 0,6 | 1,3 | 35,3 | 54 | 57 | 58,1 | 1 | 0,6 | 0,12 | – | – | – | – |
| | – | 51,95 | 37,5 | 1 | 0,6 | 1,3 | 34,3 | 36,1 | 39 | 55,9 | 1 | 0,6 | 0,15 | **HJ 206 EC** | 0,025 | 4 | 7 |
| | 41,2 | 51,95 | 37,5 | 1 | 0,6 | 1,3 | 35,3 | 36,1 | 43 | 55,9 | 1 | – | 0,15 | **HJ 206 EC** | 0,025 | 4 | 7 |
| | 41,2 | 51,95 | 37,5 | 1 | 0,6 | – | 35,3 | – | 43 | 55,9 | 1 | – | 0,15 | – | – | – | – |
| | 41,2 | 51,95 | 37,5 | 1 | 0,6 | 1,8 | 35,3 | 36,1 | 43 | 55,9 | 1 | – | 0,2 | – | – | – | – |
| | – | 51,95 | 37,5 | 1 | 0,6 | 1,8 | 34,3 | 36,1 | 39 | 55,9 | 1 | 0,6 | 0,2 | – | – | – | – |
| | 41,2 | 51,95 | 37,5 | 1 | 0,6 | – | 35,3 | – | 43 | 55,9 | 1 | – | 0,2 | – | – | – | – |
| | 45 | – | 62,5 | 1,1 | 1,1 | 1,4 | 37 | 61 | 64 | 65,5 | 1 | 1 | 0,12 | – | – | – | – |
| | – | 58,35 | 40,5 | 1,1 | 1,1 | 1,4 | 37 | 39 | 43 | 65,1 | 1 | 1 | 0,15 | **HJ 306 EC** | 0,042 | 5 | 8,5 |
| | 45 | 58,35 | 40,5 | 1,1 | 1,1 | 1,4 | 37 | 39 | 47 | 65,1 | 1 | – | 0,15 | **HJ 306 EC** | 0,042 | 5 | 8,5 |
| | 45 | 58,35 | 40,5 | 1,1 | 1,1 | – | 37 | – | 47 | 65,1 | 1 | – | 0,15 | – | – | – | – |
| | – | 58,35 | 40,5 | 1,1 | 1,1 | 2,4 | 37 | 39 | 43 | 65,1 | 1 | 1 | 0,25 | – | – | – | – |
| | 45 | 58,35 | 40,5 | 1,1 | 1,1 | 2,4 | 37 | 39 | 47 | 65,1 | 1 | – | 0,25 | – | – | – | – |
| | 45 | 58,35 | 40,5 | 1,1 | 1,1 | – | 37 | – | 47 | 65,1 | 1 | – | 0,25 | – | – | – | – |
| | – | 66,1 | 45 | 1,5 | 1,5 | 1,6 | 41 | 43 | 47 | 81 | 1,5 | 1,5 | 0,15 | **HJ 406** | 0,08 | 7 | 11,5 |
| | 50,5 | 66,1 | 45 | 1,5 | 1,5 | 1,6 | 41 | 43 | 53 | 81 | 1,5 | – | 0,15 | **HJ 406** | 0,08 | 7 | 11,5 |
| **35** | – | 53,95 | 42 | 1 | 0,6 | 1 | 38 | 41 | 44 | 56,5 | 1 | 0,6 | 0,1 | – | – | – | – |
| | – | 60,2 | 44 | 1,1 | 0,6 | 1,3 | 39,8 | 42,2 | 46 | 65,1 | 1 | 0,6 | 0,15 | **HJ 207 EC** | 0,033 | 4 | 7 |
| | 48,1 | – | 64 | 1,1 | 0,6 | 1,3 | 41,8 | 62 | 66 | 67,2 | 1 | 0,6 | 0,12 | – | – | – | – |
| | 48,1 | 60,2 | 44 | 1,1 | 0,6 | 1,3 | 41,8 | 42,2 | 50 | 65,1 | 1 | – | 0,15 | **HJ 207 EC** | 0,033 | 4 | 7 |
| | 48,1 | 60,2 | 44 | 1,1 | 0,6 | – | 41,8 | – | 50 | 65,1 | 1 | – | 0,15 | – | – | – | – |
| | – | 60,2 | 44 | 1,1 | 0,6 | 2,8 | 39,8 | 42,2 | 46 | 65,1 | 1 | 0,6 | 0,2 | – | – | – | – |
| | 48,1 | 60,2 | 44 | 1,1 | 0,6 | 2,8 | 41,8 | 42,2 | 50 | 65,1 | 1 | – | 0,2 | – | – | – | – |
| | 48,1 | 60,2 | 44 | 1,1 | 0,6 | – | 42 | – | 50 | 65,1 | 1 | – | 0,2 | – | – | – | – |
| | – | 65,8 | 46,2 | 1,5 | 1,1 | 1,2 | 42 | 44 | 48 | 72,2 | 1,5 | 1 | 0,15 | **HJ 307 EC** | 0,058 | 6 | 9,5 |
| | 51 | – | 70,2 | 1,5 | 1,1 | 1,2 | 43 | 68 | 72 | 73,4 | 1,5 | 1 | 0,12 | – | – | – | – |
| | 51 | 65,8 | 46,2 | 1,5 | 1,1 | 1,2 | 43 | 44 | 53 | 72,2 | 1,5 | – | 0,15 | **HJ 307 EC** | 0,058 | 6 | 9,5 |
| | 51 | 65,8 | 46,2 | 1,5 | 1,1 | – | 44 | – | 53 | 72,2 | 1,5 | – | 0,15 | – | – | – | – |



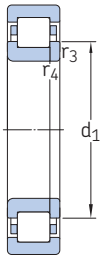

NU




NJ



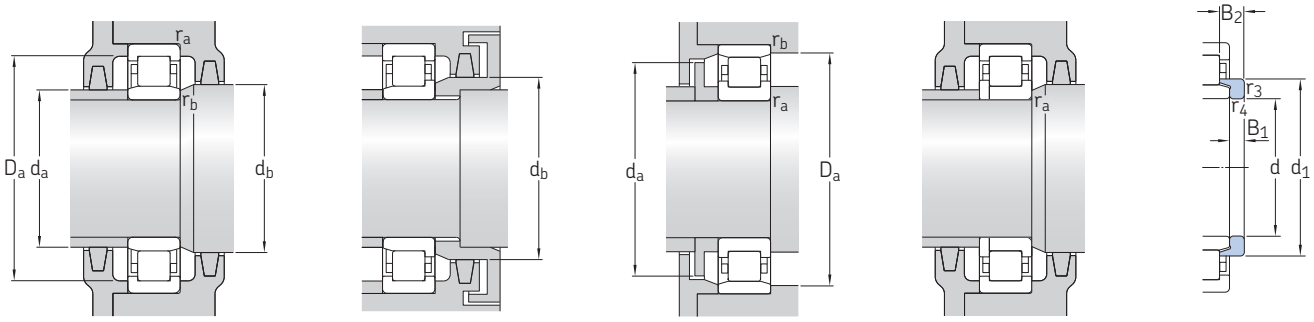

N




NUP

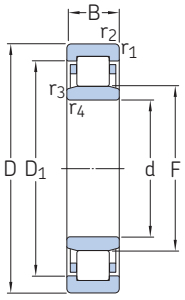
| Principal dimensions | | | Basic load ratings | | Fatigue load limit | Speed ratings | | Mass | Designations | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | dynamic | static | | Reference speed | Limiting speed | | Bearing with standard cage | Alternative standard cage[1] |
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **35** | 80 | 31 | 106 | 98 | 12,7 | 9 500 | 11 000 | 0,72 | ▸ NU 2307 ECP | PH |
| cont. | 80 | 31 | 106 | 98 | 12,7 | 9 500 | 11 000 | 0,73 | ▸ NJ 2307 ECP | PH |
| | 80 | 31 | 106 | 98 | 12,7 | 9 500 | 11 000 | 0,76 | ▸ NUP 2307 ECP | PH |
| | 100 | 25 | 76,5 | 69,5 | 9 | 8 000 | 9 500 | 1 | ▸ **NJ 407** | – |
| | 100 | 25 | 76,5 | 69,5 | 9 | 8 000 | 9 500 | 1 | ▸ **NU 407** | – |
| **40** | 68 | 15 | 25,1 | 26 | 3 | 12 000 | 18 000 | 0,23 | ▸ **NU 1008 ML** | – |
| | 80 | 18 | 62 | 53 | 6,7 | 9 500 | 11 000 | 0,37 | ▸ N 208 ECP | PH |
| | 80 | 18 | 62 | 53 | 6,7 | 9 500 | 11 000 | 0,37 | ▸ NU 208 ECP | J, M, ML, PH |
| | 80 | 18 | 62 | 53 | 6,7 | 9 500 | 11 000 | 0,38 | ▸ NJ 208 ECP | J, M, ML, PH |
| | 80 | 18 | 62 | 53 | 6,7 | 9 500 | 11 000 | 0,39 | ▸ NUP 208 ECP | J, M, ML, PH |
| | 80 | 23 | 81,5 | 75 | 9,65 | 9 500 | 11 000 | 0,49 | ▸ NU 2208 ECP | J, ML, PH |
| | 80 | 23 | 81,5 | 75 | 9,65 | 9 500 | 11 000 | 0,5 | ▸ NJ 2208 ECP | J, ML, PH |
| | 80 | 23 | 81,5 | 75 | 9,65 | 9 500 | 11 000 | 0,51 | ▸ NUP 2208 ECP | J, ML, PH |
| | 90 | 23 | 93 | 78 | 10,2 | 8 000 | 9 500 | 0,65 | ▸ N 308 ECP | M |
| | 90 | 23 | 93 | 78 | 10,2 | 8 000 | 9 500 | 0,65 | ▸ NU 308 ECP | J, M, ML, PH |
| | 90 | 23 | 93 | 78 | 10,2 | 8 000 | 9 500 | 0,67 | ▸ NJ 308 ECP | J, M, ML, PH |
| | 90 | 23 | 93 | 78 | 10,2 | 8 000 | 9 500 | 0,68 | ▸ NUP 308 ECP | J, M, ML, PH |
| | 90 | 33 | 129 | 120 | 15,3 | 8 000 | 9 500 | 0,93 | ▸ NU 2308 ECP | J, M, ML, PH |
| | 90 | 33 | 129 | 120 | 15,3 | 8 000 | 9 500 | 0,95 | ▸ NJ 2308 ECP | J, M, ML, PH |
| | 90 | 33 | 129 | 120 | 15,3 | 8 000 | 9 500 | 0,98 | ▸ NUP 2308 ECP | J, M, ML, PH |
| | 110 | 27 | 96,8 | 90 | 11,6 | 7 000 | 8 500 | 1,3 | ▸ **NJ 408** | M, MA |
| | 110 | 27 | 96,8 | 90 | 11,6 | 7 000 | 8 500 | 1,3 | ▸ **NU 408** | M, MA |
| **45** | 75 | 16 | 44,6 | 52 | 6,3 | 11 000 | 11 000 | 0,25 | ▸ **NU 1009 ECP** | – |
| | 75 | 16 | 44,6 | 52 | 6,3 | 11 000 | 11 000 | 0,26 | ▸ **NJ 1009 ECP** | PH |
| | 85 | 19 | 69,5 | 64 | 8,15 | 9 000 | 9 500 | 0,42 | ▸ NU 209 ECP | J, M, ML |
| | 85 | 19 | 69,5 | 64 | 8,15 | 9 000 | 9 500 | 0,43 | ▸ N 209 ECP | M |
| | 85 | 19 | 69,5 | 64 | 8,15 | 9 000 | 9 500 | 0,44 | ▸ NJ 209 ECP | J, M, ML |
| | 85 | 19 | 69,5 | 64 | 8,15 | 9 000 | 9 500 | 0,44 | ▸ NUP 209 ECP | J, M, ML |
| | 85 | 23 | 85 | 81,5 | 10,6 | 9 000 | 9 500 | 0,52 | ▸ NU 2209 ECP | J, PH |
| | 85 | 23 | 85 | 81,5 | 10,6 | 9 000 | 9 500 | 0,54 | ▸ NJ 2209 ECP | J, PH |
| | 85 | 23 | 85 | 81,5 | 10,6 | 9 000 | 9 500 | 0,55 | ▸ NUP 2209 ECP | J, PH |
| | 100 | 25 | 112 | 100 | 12,9 | 7 500 | 8 500 | 0,88 | ▸ N 309 ECP | – |
| | 100 | 25 | 112 | 100 | 12,9 | 7 500 | 8 500 | 0,89 | ▸ NJ 309 ECP | J, M, ML, PH |
| | 100 | 25 | 112 | 100 | 12,9 | 7 500 | 8 500 | 0,9 | ▸ NU 309 ECP | J, M, ML, PH |

**SKF Explorer bearing**
▸ Popular item
[1] When ordering bearings with an alternative standard cage the suffix of the standard cage has to be replaced by the suffix of the alternative cage. For example NU .. ECP becomes NU .. ECML (for permissible speed → page 511).

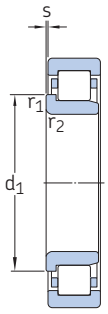



Angle ring

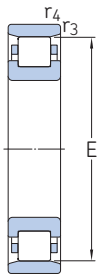
| Dimensions | | | | | | | Abutment and fillet dimensions | | | | | | Calculation factor | Angle ring Designation | Mass | Dimensions | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | F, E | $r_{1,2}$ min. | $r_{3,4}$ min. | s max. | $d_a$ min. | $d_a$ max. | $d_b$, $D_a$ min. | $D_a$ max. | $r_a$ max. | $r_b$ max. | $k_r$ | | | $B_1$ | $B_2$ |
| mm | | | | | | | mm | | | | | | – | – | kg | mm | |
| **35** | – | 65,8 | 46,2 | 1,5 | 1,1 | 2,7 | 42 | 44 | 48 | 72,2 | 1,5 | 1 | 0,25 | **–** | – | – | – |
| cont. | 51 | 65,8 | 46,2 | 1,5 | 1,1 | 2,7 | 43 | 44 | 53 | 72,2 | 1,5 | – | 0,25 | **–** | – | – | – |
| | 51 | 65,8 | 46,2 | 1,5 | 1,1 | – | 43 | – | 53 | 72,2 | 1,5 | – | 0,25 | **–** | – | – | – |
| | 59 | 77,15 | 53 | 1,5 | 1,5 | 1,7 | 48 | 51 | 61 | 90 | 1,5 | – | 0,15 | **–** | – | – | – |
| | – | 77,15 | 53 | 1,5 | 1,5 | 1,7 | 48 | 51 | 55 | 90 | 1,5 | 1,5 | 0,15 | **–** | – | – | – |
| **40** | – | 57,6 | 47 | 1 | 0,6 | 2,4 | 43 | 46 | 49 | 62,3 | 1 | 0,6 | 0,15 | **–** | – | – | – |
| | 54 | – | 71,5 | 1,1 | 1,1 | 1,4 | 47 | 69 | 73 | 74,1 | 1 | 1 | 0,12 | **–** | – | – | – |
| | – | 67,4 | 49,5 | 1,1 | 1,1 | 1,4 | 47 | 48 | 51 | 72,8 | 1 | 1 | 0,15 | **HJ 208 EC** | 0,047 | 5 | 8,5 |
| | 54 | 67,4 | 49,5 | 1,1 | 1,1 | 1,4 | 47 | 48 | 56 | 72,8 | 1 | – | 0,15 | **HJ 208 EC** | 0,047 | 5 | 8,5 |
| | 54 | 67,4 | 49,5 | 1,1 | 1,1 | – | 47 | – | 56 | 72,8 | 1 | – | 0,15 | **–** | – | – | – |
| | – | 67,4 | 49,5 | 1,1 | 1,1 | 1,9 | 47 | 48 | 51 | 72,8 | 1 | 1 | 0,2 | **HJ 2208 EC** | 0,048 | 5 | 9 |
| | 54 | 67,4 | 49,5 | 1,1 | 1,1 | 1,9 | 47 | 48 | 56 | 72,8 | 1 | – | 0,2 | **HJ 2208 EC** | 0,048 | 5 | 9 |
| | 54 | 67,4 | 49,5 | 1,1 | 1,1 | – | 47 | – | 56 | 72,8 | 1 | – | 0,2 | **–** | – | – | – |
| | 57,5 | – | 80 | 1,5 | 1,5 | 1,4 | 48 | 78 | 82 | 83,2 | 1,5 | 1,5 | 0,12 | **–** | – | – | – |
| | – | 75 | 52 | 1,5 | 1,5 | 1,4 | 48 | 50 | 54 | 81,8 | 1,5 | 1,5 | 0,15 | **HJ 308 EC** | 0,084 | 7 | 11 |
| | 57,5 | 75 | 52 | 1,5 | 1,5 | 1,4 | 48 | 50 | 60 | 81,8 | 1,5 | – | 0,15 | **HJ 308 EC** | 0,084 | 7 | 11 |
| | 57,5 | 75 | 52 | 1,5 | 1,5 | – | 48 | – | 60 | 81,8 | 1,5 | – | 0,15 | **–** | – | – | – |
| | – | 75 | 52 | 1,5 | 1,5 | 2,9 | 48 | 50 | 54 | 81,8 | 1,5 | 1,5 | 0,25 | **–** | – | – | – |
| | 57,5 | 75 | 52 | 1,5 | 1,5 | 2,9 | 48 | 50 | 60 | 81,8 | 1,5 | – | 0,25 | **–** | – | – | – |
| | 57,5 | 75 | 52 | 1,5 | 1,5 | – | 48 | – | 60 | 81,8 | 1,5 | – | 0,25 | **–** | – | – | – |
| | 64,8 | 85,3 | 58 | 2 | 2 | 2,5 | 52 | 56 | 67 | 99 | 2 | – | 0,15 | **–** | – | – | – |
| | – | 85,3 | 58 | 2 | 2 | 2,5 | 52 | 56 | 60 | 99 | 2 | 2 | 0,15 | **–** | – | – | – |
| **45** | – | 65,3 | 52,5 | 1 | 0,6 | 0,9 | 48,4 | 51 | 54 | 69,8 | 1 | 0,6 | 0,1 | **–** | – | – | – |
| | 56 | 65,3 | 52,5 | 1 | 0,6 | 0,9 | 48,4 | 51 | 57,5 | 69,8 | 1 | – | 0,1 | **–** | – | – | – |
| | – | 72,4 | 54,5 | 1,1 | 1,1 | 1,2 | 52 | 53 | 56 | 77,6 | 1 | 1 | 0,15 | **HJ 209 EC** | 0,052 | 5 | 8,5 |
| | 59 | – | 76,5 | 1,1 | 1,1 | 1,2 | 52 | 74 | 78 | 79,1 | 1 | 1 | 0,12 | **–** | – | – | – |
| | 59 | 72,4 | 54,5 | 1,1 | 1,1 | 1,2 | 52 | 53 | 61 | 77,6 | 1 | – | 0,15 | **HJ 209 EC** | 0,052 | 5 | 8,5 |
| | 59 | 72,4 | 54,5 | 1,1 | 1,1 | – | 52 | – | 61 | 77,6 | 1 | – | 0,15 | **–** | – | – | – |
| | – | 72,4 | 54,5 | 1,1 | 1,1 | 1,7 | 52 | 53 | 56 | 77,6 | 1 | 1 | 0,2 | **–** | – | – | – |
| | 59 | 72,4 | 54,5 | 1,1 | 1,1 | 1,7 | 52 | 53 | 61 | 77,6 | 1 | – | 0,2 | **–** | – | – | – |
| | 59 | 72,4 | 54,5 | 1,1 | 1,1 | – | 52 | – | 61 | 77,6 | 1 | – | 0,2 | **–** | – | – | – |
| | 64,4 | – | 88,5 | 1,5 | 1,5 | 1,7 | 54 | 86 | 91 | 92,3 | 1,5 | 1,5 | 0,12 | **–** | – | – | – |
| | 64,4 | 83,2 | 58,5 | 1,5 | 1,5 | 1,7 | 54 | 56 | 67 | 91,4 | 1,5 | – | 0,15 | **HJ 309 EC** | 0,11 | 7 | 11,5 |
| | – | 83,2 | 58,5 | 1,5 | 1,5 | 1,7 | 54 | 56 | 60 | 91,4 | 1,5 | 1,5 | 0,15 | **HJ 309 EC** | 0,11 | 7 | 11,5 |



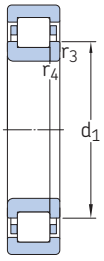

NU




NJ



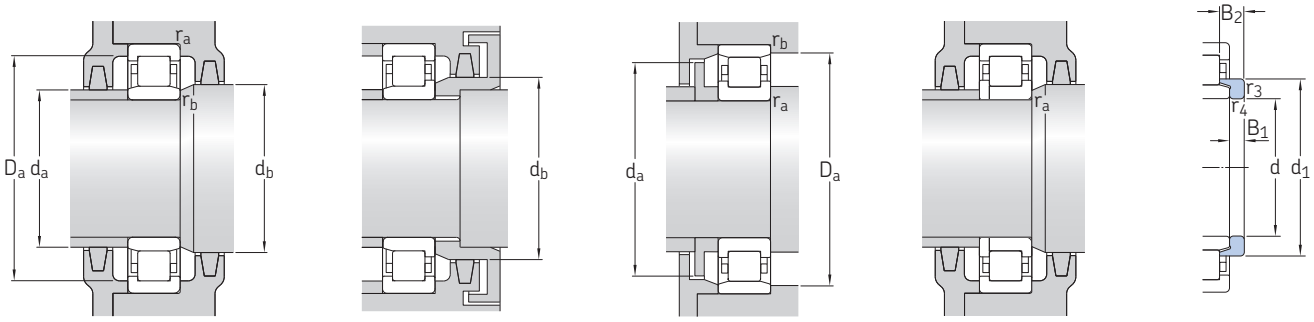

N




NUP

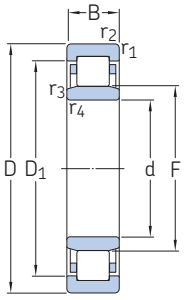
| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designations Bearing with standard cage | Alternative standard cage[1] |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **45** | 100 | 25 | 112 | 100 | 12,9 | 7 500 | 8 500 | 0,93 | ▸ NUP 309 ECP | J, M, ML, PH |
| cont. | 100 | 36 | 160 | 153 | 20 | 7 500 | 8 500 | 1,3 | ▸ NU 2309 ECP | ML |
| | 100 | 36 | 160 | 153 | 20 | 7 500 | 8 500 | 1,35 | ▸ NJ 2309 ECP | ML |
| | 100 | 36 | 160 | 153 | 20 | 7 500 | 8 500 | 1,35 | ▸ NUP 2309 ECP | ML |
| | 120 | 29 | 106 | 102 | 13,4 | 6 700 | 7 500 | 1,65 | ▸ NJ 409 | – |
| | 120 | 29 | 106 | 102 | 13,4 | 6 700 | 7 500 | 1,65 | ▸ NU 409 | – |
| **50** | 80 | 16 | 46,8 | 56 | 6,7 | 9 500 | 9 500 | 0,27 | ▸ NU 1010 ECP | – |
| | 90 | 20 | 73,5 | 69,5 | 8,8 | 8 500 | 9 000 | 0,47 | ▸ NU 210 ECP | J, M, ML, PH |
| | 90 | 20 | 73,5 | 69,5 | 8,8 | 8 500 | 9 000 | 0,48 | N 210 ECP | M |
| | 90 | 20 | 73,5 | 69,5 | 8,8 | 8 500 | 9 000 | 0,49 | ▸ NJ 210 ECP | J, M, ML, PH |
| | 90 | 20 | 73,5 | 69,5 | 8,8 | 8 500 | 9 000 | 0,5 | ▸ NUP 210 ECP | J, M, ML, PH |
| | 90 | 23 | 90 | 88 | 11,4 | 8 500 | 9 000 | 0,56 | ▸ NU 2210 ECP | J, M, ML, PH |
| | 90 | 23 | 90 | 88 | 11,4 | 8 500 | 9 000 | 0,57 | ▸ NJ 2210 ECP | J, M, ML, PH |
| | 90 | 23 | 90 | 88 | 11,4 | 8 500 | 9 000 | 0,59 | ▸ NUP 2210 ECP | J, M, ML, PH |
| | 110 | 27 | 127 | 112 | 15 | 6 700 | 8 000 | 1,1 | N 310 ECP | – |
| | 110 | 27 | 127 | 112 | 15 | 6 700 | 8 000 | 1,1 | ▸ NU 310 ECP | J, M, ML, PH |
| | 110 | 27 | 127 | 112 | 15 | 6 700 | 8 000 | 1,15 | ▸ NJ 310 ECP | J, M, ML, PH |
| | 110 | 27 | 127 | 112 | 15 | 6 700 | 8 000 | 1,15 | ▸ NUP 310 ECP | J, M, ML, PH |
| | 110 | 40 | 186 | 186 | 24,5 | 6 700 | 8 000 | 1,75 | ▸ NJ 2310 ECP | ML, PH |
| | 110 | 40 | 186 | 186 | 24,5 | 6 700 | 8 000 | 1,75 | ▸ NU 2310 ECP | ML, PH |
| | 110 | 40 | 186 | 186 | 24,5 | 6 700 | 8 000 | 1,75 | ▸ NUP 2310 ECP | ML, PH |
| | 130 | 31 | 130 | 127 | 16,6 | 6 000 | 7 000 | 2 | ▸ NU 410 | – |
| | 130 | 31 | 130 | 127 | 16,6 | 6 000 | 7 000 | 2,05 | ▸ NJ 410 | – |
| **55** | 90 | 18 | 57,2 | 69,5 | 8,3 | 8 500 | 8 500 | 0,39 | ▸ NU 1011 ECP | ML |
| | 90 | 18 | 57,2 | 69,5 | 8,3 | 8 500 | 8 500 | 0,42 | NJ 1011 ECP | ML |
| | 100 | 21 | 96,5 | 95 | 12,2 | 7 500 | 8 000 | 0,65 | ▸ N 211 ECP | – |
| | 100 | 21 | 96,5 | 95 | 12,2 | 7 500 | 8 000 | 0,66 | ▸ NU 211 ECP | J, M, ML |
| | 100 | 21 | 96,5 | 95 | 12,2 | 7 500 | 8 000 | 0,67 | ▸ NJ 211 ECP | J, M, ML |
| | 100 | 21 | 96,5 | 95 | 12,2 | 7 500 | 8 000 | 0,68 | ▸ NUP 211 ECP | J, M, ML |
| | 100 | 25 | 114 | 118 | 15,3 | 7 500 | 8 000 | 0,79 | ▸ NU 2211 ECP | J, M, ML, PH |
| | 100 | 25 | 114 | 118 | 15,3 | 7 500 | 8 000 | 0,81 | ▸ NJ 2211 ECP | J, M, ML, PH |
| | 100 | 25 | 114 | 118 | 15,3 | 7 500 | 8 000 | 0,82 | ▸ NUP 2211 ECP | J, M, ML, PH |
| | 120 | 29 | 156 | 143 | 18,6 | 6 000 | 7 000 | 1,45 | ▸ N 311 ECP | M |
| | 120 | 29 | 156 | 143 | 18,6 | 6 000 | 7 000 | 1,45 | ▸ NU 311 ECP | J, M, ML |
| | 120 | 29 | 156 | 143 | 18,6 | 6 000 | 7 000 | 1,5 | ▸ NJ 311 ECP | J, M, ML |

**SKF Explorer bearing**
▸ Popular item
1) When ordering bearings with an alternative standard cage the suffix of the standard cage has to be replaced by the suffix of the alternative cage. For example NU .. ECP becomes NU .. ECML (for permissible speed → page 511).

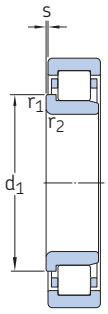



Angle ring

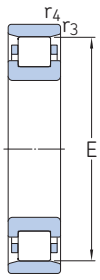
| Dimensions | | | | | | | Abutment and fillet dimensions | | | | | | Calculation factor | Angle ring Designation | Mass | Dimensions | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | F, E | $r_{1,2}$ min. | $r_{3,4}$ min. | s max. | $d_a$ min. | $d_a$ max. | $d_b$, $D_a$ min. | $D_a$ max. | $r_a$ max. | $r_b$ max. | $k_r$ | | | $B_1$ | $B_2$ |
| mm | | | | | | | mm | | | | | | – | – | kg | mm | |
| **45** | 64,4 | 83,2 | 58,5 | 1,5 | 1,5 | – | 54 | – | 67 | 91,4 | 1,5 | – | 0,15 | **–** | – | – | – |
| cont. | – | 83,2 | 58,5 | 1,5 | 1,5 | 3,2 | 54 | 56 | 60 | 91,4 | 1,5 | 1,5 | 0,25 | **–** | – | – | – |
| | 64,4 | 83,2 | 58,5 | 1,5 | 1,5 | 3,2 | 54 | 56 | 67 | 91,4 | 1,5 | – | 0,25 | **–** | – | – | – |
| | 64,4 | 83,2 | 58,5 | 1,5 | 1,5 | – | 54 | – | 67 | 91,4 | 1,5 | – | 0,25 | **–** | – | – | – |
| | 71,8 | 93,4 | 64,5 | 2 | 2 | 2,5 | 58 | 62 | 75 | 108 | 2 | – | 0,15 | **HJ 409** | 0,18 | 8 | 13,5 |
| | – | 93,4 | 64,5 | 2 | 2 | 2,5 | 58 | 62 | 66 | 108 | 2 | 2 | 0,15 | **HJ 409** | 0,18 | 8 | 13,5 |
| **50** | – | 70,5 | 57,5 | 1 | 0,6 | 1 | 57 | 56 | 59 | 74,6 | 1 | 0,6 | 0,1 | **–** | – | – | – |
| | – | 77,4 | 59,5 | 1,1 | 1,1 | 1,5 | 57 | 57,5 | 61 | 82,4 | 1 | 1 | 0,15 | **HJ 210 EC** | 0,058 | 5 | 9 |
| | 64 | – | 81,5 | 1,1 | 1,1 | 1,5 | 57 | 79 | 83 | 84 | 1 | 1 | 0,12 | **–** | – | – | – |
| | 64 | 77,4 | 59,5 | 1,1 | 1,1 | 1,5 | 57 | 57,5 | 66 | 82,4 | 1 | – | 0,15 | **–** | – | – | – |
| | 64 | 77,4 | 59,5 | 1,1 | 1,1 | – | 57 | – | 66 | 82,4 | 1 | – | 0,15 | **–** | – | – | – |
| | – | 77,4 | 59,5 | 1,1 | 1,1 | 1,5 | 57 | 57,5 | 61 | 82,4 | 1 | 1 | 0,2 | **–** | – | – | – |
| | 64 | 77,4 | 59,5 | 1,1 | 1,1 | 1,5 | 57 | 57,5 | 66 | 82,4 | 1 | – | 0,2 | **–** | – | – | – |
| | 64 | 77,4 | 59,5 | 1,1 | 1,1 | – | 57 | – | 66 | 82,4 | 1 | – | 0,2 | **–** | – | – | – |
| | 71,2 | – | 97 | 2 | 2 | 1,9 | 60 | 95 | 99 | 101 | 2 | 2 | 0,12 | **–** | – | – | – |
| | – | 91,4 | 65 | 2 | 2 | 1,9 | 60 | 63 | 67 | 99,6 | 2 | 2 | 0,15 | **HJ 310 EC** | 0,15 | 8 | 13 |
| | 71,2 | 91,4 | 65 | 2 | 2 | 1,9 | 60 | 63 | 73 | 99,6 | 2 | – | 0,15 | **HJ 310 EC** | 0,15 | 8 | 13 |
| | 71,2 | 91,4 | 65 | 2 | 2 | – | 60 | – | 73 | 99,6 | 2 | – | 0,15 | **–** | – | – | – |
| | 71,2 | 91,4 | 65 | 2 | 2 | 3,4 | 60 | 63 | 73 | 99,6 | 2 | – | 0,25 | **–** | – | – | – |
| | – | 91,4 | 65 | 2 | 2 | 3,4 | 60 | 63 | 67 | 99,6 | 2 | 2 | 0,25 | **–** | – | – | – |
| | 71,2 | 91,4 | 65 | 2 | 2 | – | 60 | – | 73 | 99,6 | 2 | – | 0,25 | **–** | – | – | – |
| | – | 101,6 | 70,8 | 2,1 | 2,1 | 2,6 | 64 | 68 | 73 | 116 | 2 | 2 | 0,15 | **HJ 410** | 0,15 | 9 | 14,5 |
| | 78,8 | 101,6 | 70,8 | 2,1 | 2,1 | 2,6 | 64 | 68 | 81 | 116 | 2 | – | 0,15 | **HJ 410** | 0,15 | 9 | 14,5 |
| **55** | – | 79 | 64,5 | 1,1 | 1 | 0,5 | 59,7 | 63 | 66 | 83 | 1 | 1 | 0,1 | **–** | – | – | – |
| | 68 | 79 | 64,5 | 1,1 | 1 | 0,5 | 60 | 63 | 70 | 83 | 2 | – | 0,1 | **–** | – | – | – |
| | 70,8 | – | 90 | 1,5 | 1,1 | 1 | 63 | 88 | 92 | 93 | 1,5 | 1 | 0,12 | **–** | – | – | – |
| | – | 85,6 | 66 | 1,5 | 1,1 | 1 | 62 | 64 | 68 | 91,4 | 1,5 | 1 | 0,15 | **HJ 211 EC** | 0,083 | 6 | 9,5 |
| | 70,8 | 85,6 | 66 | 1,5 | 1,1 | 1 | 63 | 64 | 73 | 91,4 | 1,5 | – | 0,15 | **HJ 211 EC** | 0,083 | 6 | 9,5 |
| | 70,8 | 85,6 | 66 | 1,5 | 1,1 | – | 63 | – | 73 | 91,4 | 1,5 | – | 0,15 | **–** | – | – | – |
| | – | 85,6 | 66 | 1,5 | 1,1 | 1,5 | 62 | 64 | 68 | 91,4 | 1,5 | 1 | 0,2 | **HJ 2211 EC** | 0,085 | 6 | 10 |
| | 70,8 | 85,6 | 66 | 1,5 | 1,1 | 1,5 | 63 | 64 | 73 | 91,4 | 1 | – | 0,2 | **HJ 2211 EC** | 0,085 | 6 | 10 |
| | 70,8 | 85,6 | 66 | 1,5 | 1,1 | – | 63 | – | 73 | 91,4 | 1,5 | – | 0,2 | **–** | – | – | – |
| | 77,5 | – | 106,5 | 2 | 2 | 2 | 65 | 104 | 109 | 111 | 2 | 2 | 0,12 | **–** | – | – | – |
| | – | 100,3 | 70,5 | 2 | 2 | 2 | 65 | 68 | 73 | 109,2 | 2 | 2 | 0,15 | **HJ 311 EC** | 0,19 | 9 | 14 |
| | 77,5 | 100,3 | 70,5 | 2 | 2 | 2 | 65 | 68 | 80 | 109,2 | 2 | – | 0,15 | **HJ 311 EC** | 0,19 | 9 | 14 |



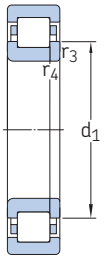

NU




NJ



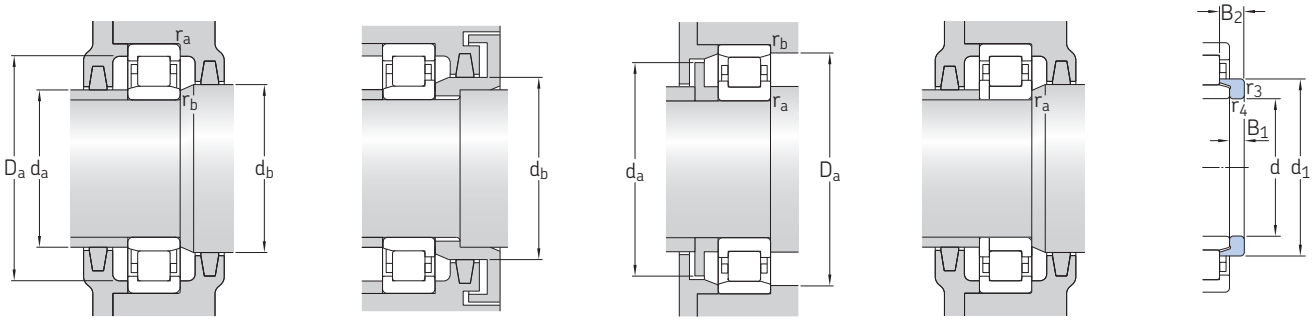

N




NUP

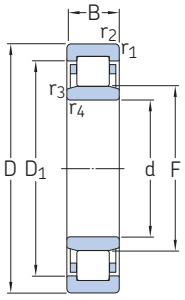
| Principal dimensions | | | Basic load ratings | | Fatigue load limit | Speed ratings | | Mass | Designations | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | dynamic | static | | Reference speed | Limiting speed | | Bearing with standard cage | Alternative standard cage[1] |
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **55** | 120 | 29 | 156 | 143 | 18,6 | 6 000 | 7 000 | 1,5 | ▸ NUP 311 ECP | J, M, ML |
| cont. | 120 | 43 | 232 | 232 | 30,5 | 6 000 | 7 000 | 2,25 | ▸ NJ 2311 ECP | ML, PH |
| | 120 | 43 | 232 | 232 | 30,5 | 6 000 | 7 000 | 2,25 | ▸ NU 2311 ECP | ML, PH |
| | 120 | 43 | 232 | 232 | 30,5 | 6 000 | 7 000 | 2,3 | ▸ NUP 2311 ECP | ML, PH |
| | 140 | 33 | 142 | 140 | 18,6 | 5 600 | 6 300 | 2,5 | ▸ NU 411 | – |
| | 140 | 33 | 142 | 140 | 18,6 | 5 600 | 6 300 | 2,55 | NJ 411 | – |
| **60** | 95 | 18 | 37,4 | 44 | 5,3 | 8 000 | 13 000 | 0,5 | ▸ NU 1012 ML | – |
| | 110 | 22 | 108 | 102 | 13,4 | 6 700 | 7 500 | 0,79 | ▸ N 212 ECP | M |
| | 110 | 22 | 108 | 102 | 13,4 | 6 700 | 7 500 | 0,8 | ▸ NU 212 ECP | J, M, ML |
| | 110 | 22 | 108 | 102 | 13,4 | 6 700 | 7 500 | 0,82 | ▸ NJ 212 ECP | J, M, ML |
| | 110 | 22 | 108 | 102 | 13,4 | 6 700 | 7 500 | 0,86 | ▸ NUP 212 ECP | J, M, ML |
| | 110 | 28 | 146 | 153 | 20 | 6 700 | 7 500 | 1,05 | ▸ NU 2212 ECP | J, M, ML, PH |
| | 110 | 28 | 146 | 153 | 20 | 6 700 | 7 500 | 1,1 | ▸ NJ 2212 ECP | J, M, ML, PH |
| | 110 | 28 | 146 | 153 | 20 | 6 700 | 7 500 | 1,1 | ▸ NUP 2212 ECP | J, M, ML, PH |
| | 130 | 31 | 173 | 160 | 21,2 | 5 600 | 6 700 | 1,75 | ▸ N 312 ECP | J, M |
| | 130 | 31 | 173 | 160 | 21,2 | 5 600 | 6 700 | 1,75 | ▸ NU 312 ECP | J, M, ML, PH |
| | 130 | 31 | 173 | 160 | 21,2 | 5 600 | 6 700 | 1,85 | ▸ NJ 312 ECP | J, M, ML, PH |
| | 130 | 31 | 173 | 160 | 21,2 | 5 600 | 6 700 | 1,9 | ▸ NUP 312 ECP | J, M, ML, PH |
| | 130 | 46 | 260 | 265 | 34,5 | 5 600 | 6 700 | 2,75 | ▸ NU 2312 ECP | M, ML, PH |
| | 130 | 46 | 260 | 265 | 34,5 | 5 600 | 6 700 | 2,8 | ▸ NJ 2312 ECP | M, ML, PH |
| | 130 | 46 | 260 | 265 | 34,5 | 5 600 | 6 700 | 2,85 | ▸ NUP 2312 ECP | M, ML, PH |
| | 150 | 35 | 168 | 173 | 22 | 5 000 | 6 000 | 3 | ▸ NU 412 | – |
| | 150 | 35 | 168 | 173 | 22 | 5 000 | 6 000 | 3,05 | ▸ NJ 412 | – |
| **65** | 100 | 18 | 38 | 46,5 | 5,5 | 7 500 | 12 000 | 0,51 | ▸ NU 1013 ML | – |
| | 100 | 18 | 62,7 | 81,5 | 9,8 | 7 500 | 7 500 | 0,45 | ▸ NU 1013 ECP | PH |
| | 120 | 23 | 122 | 118 | 15,6 | 6 300 | 6 700 | 1 | ▸ NU 213 ECP | J, M, ML, PH |
| | 120 | 23 | 122 | 118 | 15,6 | 6 300 | 6 700 | 1,05 | ▸ N 213 ECP | – |
| | 120 | 23 | 122 | 118 | 15,6 | 6 300 | 6 700 | 1,05 | ▸ NJ 213 ECP | J, M, ML, PH |
| | 120 | 23 | 122 | 118 | 15,6 | 6 300 | 6 700 | 1,05 | ▸ NUP 213 ECP | J, M, ML, PH |
| | 120 | 31 | 170 | 180 | 24 | 6 300 | 6 700 | 1,4 | ▸ NU 2213 ECP | J, ML, PH |
| | 120 | 31 | 170 | 180 | 24 | 6 300 | 6 700 | 1,45 | ▸ NJ 2213 ECP | J, ML, PH |
| | 120 | 31 | 170 | 180 | 24 | 6 300 | 6 700 | 1,45 | ▸ NUP 2213 ECP | J, ML, PH |
| | 140 | 33 | 212 | 196 | 25,5 | 5 300 | 6 000 | 2,2 | ▸ N 313 ECP | M |
| | 140 | 33 | 212 | 196 | 25,5 | 5 300 | 6 000 | 2,2 | ▸ NU 313 ECP | J, M, ML, PH |
| | 140 | 33 | 212 | 196 | 25,5 | 5 300 | 6 000 | 2,3 | ▸ NJ 313 ECP | J, M, ML, PH |

**SKF Explorer bearing**
▸ Popular item
1) When ordering bearings with an alternative standard cage the suffix of the standard cage has to be replaced by the suffix of the alternative cage. For example NU .. ECP becomes NU .. ECML (for permissible speed → page 511).

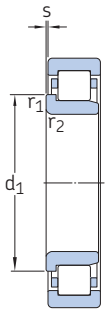



Angle ring

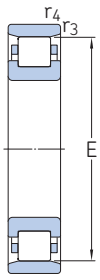
| Dimensions | | | | | | | Abutment and fillet dimensions | | | | | | Calculation factor | Angle ring Designation | Mass | Dimensions | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | F, E | $r_{1,2}$ min. | $r_{3,4}$ min. | s max. | $d_a$ min. | $d_a$ max. | $d_b$, $D_a$ min. | $D_a$ max. | $r_a$ max. | $r_b$ max. | $k_r$ | | | $B_1$ | $B_2$ |
| mm | | | | | | | mm | | | | | | – | – | kg | mm | |
| **55** | 77,5 | 100,3 | 70,5 | 2 | 2 | – | 65 | – | 80 | 109,2 | 2 | – | 0,15 | **–** | – | – | – |
| cont. | 77,5 | 100,3 | 70,5 | 2 | 2 | 3,5 | 65 | 68 | 80 | 109,2 | 2 | – | 0,25 | **HJ 2311 EC** | 0,19 | 9 | 15,5 |
| | – | 100,3 | 70,5 | 2 | 2 | 3,5 | 65 | 68 | 73 | 109,2 | 2 | 2 | 0,25 | **HJ 2311 EC** | 0,19 | 9 | 15,5 |
| | 77,5 | 100,3 | 70,5 | 2 | 2 | – | 65 | – | 80 | 109,2 | 2 | – | 0,25 | **–** | – | – | – |
| | – | 109,45 | 77,2 | 2,1 | 2,1 | 2,6 | 69 | 74 | 79 | 126 | 2 | 2 | 0,15 | **–** | – | – | – |
| | 85,2 | 109,45 | 77,2 | 2,1 | 2,1 | 2,6 | 69 | 74 | 88 | 126 | 2 | – | 0,15 | **–** | – | – | – |
| **60** | – | 81,8 | 69,5 | 1,1 | 1 | 2,9 | 64,6 | 68 | 71 | 88 | 1 | 1 | 0,15 | **–** | – | – | – |
| | 77,5 | – | 100 | 1,5 | 1,5 | 1,4 | 68 | 98 | 102 | 103 | 1,5 | 1,5 | 0,12 | **–** | – | – | – |
| | – | 95 | 72 | 1,5 | 1,5 | 1,4 | 68 | 70 | 74 | 101 | 1,5 | 1,5 | 0,15 | **HJ 212 EC** | 0,1 | 6 | 10 |
| | 77,5 | 95 | 72 | 1,5 | 1,5 | 1,4 | 68 | 70 | 80 | 101 | 1,5 | – | 0,15 | **HJ 212 EC** | 0,1 | 6 | 10 |
| | 77,5 | 95 | 72 | 1,5 | 1,5 | – | 68 | – | 80 | 101 | 1,5 | – | 0,15 | **–** | – | – | – |
| | – | 95 | 72 | 1,5 | 1,5 | 1,4 | 68 | 70 | 74 | 101 | 1,5 | 1,5 | 0,2 | **HJ 212 EC** | 0,1 | 6 | 10 |
| | 77,5 | 95 | 72 | 1,5 | 1,5 | 1,4 | 68 | 70 | 80 | 101 | 1,5 | – | 0,2 | **HJ 212 EC** | 0,1 | 6 | 10 |
| | 77,5 | 95 | 72 | 1,5 | 1,5 | – | 68 | – | 80 | 101 | 1,5 | – | 0,2 | **–** | – | – | – |
| | 84,3 | – | 115 | 2,1 | 2,1 | 2,1 | 72 | 113 | 118 | 119 | 2 | 2 | 0,12 | **–** | – | – | – |
| | – | 108,5 | 77 | 2,1 | 2,1 | 2,1 | 72 | 74 | 79 | 118,1 | 2 | 2 | 0,15 | **HJ 312 EC** | 0,23 | 9 | 14,5 |
| | 84,3 | 108,5 | 77 | 2,1 | 2,1 | 2,1 | 72 | 74 | 87 | 118,1 | 2 | – | 0,15 | **HJ 312 EC** | 0,23 | 9 | 14,5 |
| | 84,3 | 108,5 | 77 | 2,1 | 2,1 | – | 72 | – | 87 | 118,1 | 2 | – | 0,15 | **–** | – | – | – |
| | – | 108,5 | 77 | 2,1 | 2,1 | 3,6 | 72 | 74 | 79 | 118,1 | 2 | 2 | 0,25 | **HJ 2312 EC** | 0,24 | 9 | 16 |
| | 84,3 | 108,5 | 77 | 2,1 | 2,1 | 3,6 | 72 | 74 | 87 | 118,1 | 2 | – | 0,25 | **HJ 2312 EC** | 0,24 | 9 | 16 |
| | 84,3 | 108,5 | 77 | 2,1 | 2,1 | – | 72 | – | 87 | 118,1 | 2 | – | 0,25 | **–** | – | – | – |
| | – | 118,5 | 83 | 2,1 | 2,1 | 2,5 | 74 | 80 | 85 | 136 | 2 | 2 | 0,15 | **–** | – | – | – |
| | 91,8 | 118,5 | 83 | 2,1 | 2,1 | 2,5 | 74 | 80 | 94 | 136 | 2 | – | 0,15 | **–** | – | – | – |
| **65** | – | 86,6 | 74,5 | 1,1 | 1 | 2,9 | 69,6 | 72 | 76 | 94 | 1 | 1 | 0,15 | **–** | – | – | – |
| | – | 88,5 | 74 | 1,1 | 1 | 1 | 69,6 | 72 | 76 | 94 | 1 | 1 | 0,1 | **–** | – | – | – |
| | – | 103,2 | 78,5 | 1,5 | 1,5 | 1,4 | 74 | 76 | 81 | 110,6 | 1,5 | 1,5 | 0,15 | **HJ 213 EC** | 0,12 | 6 | 10 |
| | 84,4 | – | 108,5 | 1,5 | 1,5 | 1,4 | 74 | 106 | 111 | 112 | 1,5 | 1,5 | 0,12 | **–** | – | – | – |
| | 84,4 | 103,2 | 78,5 | 1,5 | 1,5 | 1,4 | 74 | 76 | 87 | 110,6 | 1,5 | – | 0,15 | **HJ 213 EC** | 0,12 | 6 | 10 |
| | 84,4 | 103,2 | 78,5 | 1,5 | 1,5 | – | 76 | – | 87 | 110,6 | 1,5 | – | 0,15 | **–** | – | – | – |
| | – | 103,2 | 78,5 | 1,5 | 1,5 | 1,9 | 74 | 76 | 81 | 110,6 | 1,5 | 1,5 | 0,2 | **HJ 2213 EC** | 0,12 | 6 | 10,5 |
| | 84,4 | 103,2 | 78,5 | 1,5 | 1,5 | 1,9 | 74 | 76 | 87 | 110,6 | 1,5 | – | 0,2 | **HJ 2213 EC** | 0,12 | 6 | 10,5 |
| | 84,4 | 103,2 | 78,5 | 1,5 | 1,5 | – | 74 | – | 87 | 110,6 | 1,5 | – | 0,2 | **–** | – | – | – |
| | 90,5 | – | 124,5 | 2,1 | 2,1 | 2,2 | 77 | 122 | 127 | 129 | 2 | 2 | 0,12 | **–** | – | – | – |
| | – | 117,4 | 82,5 | 2,1 | 2,1 | 2,2 | 77 | 80 | 85 | 127,8 | 2 | 2 | 0,15 | **HJ 313 EC** | 0,27 | 10 | 15,5 |
| | 90,5 | 117,4 | 82,5 | 2,1 | 2,1 | 2,2 | 77 | 80 | 93 | 127,8 | 2 | – | 0,15 | **HJ 313 EC** | 0,27 | 10 | 15,5 |



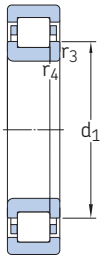

NU




NJ



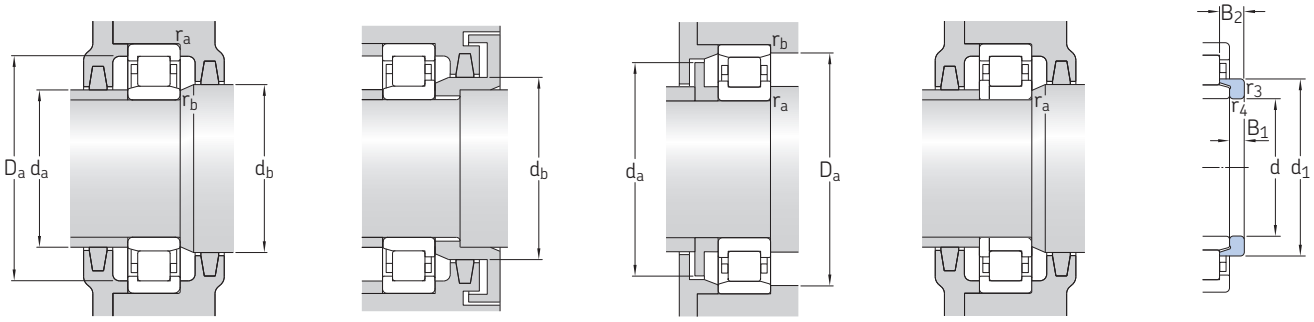

N




NUP

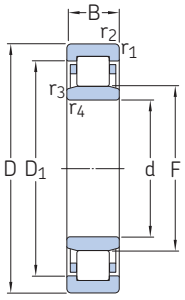
| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designations Bearing with standard cage | Alternative standard cage[1] |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **65** | 140 | 33 | 212 | 196 | 25,5 | 5 300 | 6 000 | 2,35 | ▸ NUP 313 ECP | J, M, ML, PH |
| cont. | 140 | 48 | 285 | 290 | 38 | 5 300 | 6 000 | 3,2 | ▸ NU 2313 ECP | ML, PH |
| | 140 | 48 | 285 | 290 | 38 | 5 300 | 6 000 | 3,35 | ▸ NJ 2313 ECP | ML, PH |
| | 140 | 48 | 285 | 290 | 38 | 5 300 | 6 000 | 3,45 | ▸ NUP 2313 ECP | ML, PH |
| | 160 | 37 | 183 | 190 | 24 | 4 800 | 5 600 | 3,55 | ▸ **NU 413** | – |
| | 160 | 37 | 183 | 190 | 24 | 4 800 | 5 600 | 3,65 | ▸ **NJ 413** | – |
| **70** | 110 | 20 | 56,1 | 67 | 8 | 7 000 | 11 000 | 0,7 | ▸ **NU 1014 ML** | – |
| | 110 | 20 | 76,5 | 93 | 12 | 7 000 | 7 000 | 0,61 | ▸ **NU 1014 ECP** | – |
| | 125 | 24 | 137 | 137 | 18 | 6 000 | 6 300 | 1,1 | ▸ N 214 ECP | M |
| | 125 | 24 | 137 | 137 | 18 | 6 000 | 6 300 | 1,15 | ▸ NU 214 ECP | J, M, ML, PH |
| | 125 | 24 | 137 | 137 | 18 | 6 000 | 6 300 | 1,2 | ▸ NJ 214 ECP | J, M, ML, PH |
| | 125 | 24 | 137 | 137 | 18 | 6 000 | 6 300 | 1,2 | ▸ NUP 214 ECP | J, M, ML, PH |
| | 125 | 31 | 180 | 193 | 25,5 | 6 000 | 6 300 | 1,5 | ▸ NJ 2214 ECP | J, M, ML, PH |
| | 125 | 31 | 180 | 193 | 25,5 | 6 000 | 6 300 | 1,5 | ▸ NU 2214 ECP | J, M, ML, PH |
| | 125 | 31 | 180 | 193 | 25,5 | 6 000 | 6 300 | 1,55 | ▸ NUP 2214 ECP | J, M, ML, PH |
| | 150 | 35 | 236 | 228 | 29 | 4 800 | 5 600 | 2,65 | ▸ N 314 ECP | M |
| | 150 | 35 | 236 | 228 | 29 | 4 800 | 5 600 | 2,7 | ▸ NU 314 ECP | J, M, ML, PH |
| | 150 | 35 | 236 | 228 | 29 | 4 800 | 5 600 | 2,75 | ▸ NJ 314 ECP | J, M, ML, PH |
| | 150 | 35 | 236 | 228 | 29 | 4 800 | 5 600 | 2,85 | ▸ NUP 314 ECP | J, M, ML, PH |
| | 150 | 51 | 315 | 325 | 41,5 | 4 800 | 5 600 | 3,95 | ▸ NU 2314 ECP | ML, PH |
| | 150 | 51 | 315 | 325 | 41,5 | 4 800 | 5 600 | 4 | ▸ NJ 2314 ECP | ML, PH |
| | 150 | 51 | 315 | 325 | 41,5 | 4 800 | 5 600 | 4,15 | ▸ NUP 2314 ECP | ML, PH |
| | 180 | 42 | 229 | 240 | 30 | 4 300 | 5 000 | 5,25 | ▸ **NU 414** | MA |
| | 180 | 42 | 229 | 240 | 30 | 4 300 | 5 000 | 5,45 | ▸ **NJ 414** | MA |
| **75** | 115 | 20 | 58,3 | 71 | 8,5 | 6 700 | 10 000 | 0,75 | ▸ **NU 1015 ML** | M |
| | 130 | 25 | 150 | 156 | 20,4 | 5 600 | 6 000 | 1,2 | ▸ N 215 ECP | – |
| | 130 | 25 | 150 | 156 | 20,4 | 5 600 | 6 000 | 1,25 | ▸ NU 215 ECP | J, M, ML, PH |
| | 130 | 25 | 150 | 156 | 20,4 | 5 600 | 6 000 | 1,3 | ▸ NJ 215 ECP | J, M, ML, PH |
| | 130 | 25 | 150 | 156 | 20,4 | 5 600 | 6 000 | 1,3 | ▸ NUP 215 ECP | J, M, ML, PH |
| | 130 | 31 | 186 | 208 | 27 | 5 600 | 6 000 | 1,6 | ▸ NJ 2215 ECP | J, ML, PH |
| | 130 | 31 | 186 | 208 | 27 | 5 600 | 6 000 | 1,6 | ▸ NU 2215 ECP | J, ML, PH |
| | 130 | 31 | 186 | 208 | 27 | 5 600 | 6 000 | 1,6 | ▸ NUP 2215 ECP | J, ML, PH |
| | 160 | 37 | 280 | 265 | 33,5 | 4 500 | 5 300 | 3,3 | ▸ N 315 ECP | M |

**SKF Explorer bearing**
▸ Popular item
[1] When ordering bearings with an alternative standard cage the suffix of the standard cage has to be replaced by the suffix of the alternative cage. For example NU .. ECP becomes NU .. ECML (for permissible speed → page 511).

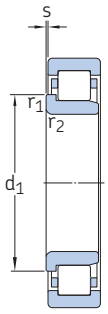



Angle ring

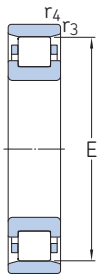
| Dimensions | | | | | | | Abutment and fillet dimensions | | | | | | Calculation factor | Angle ring Designation | Mass | Dimensions | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | F, E | $r_{1,2}$ min. | $r_{3,4}$ min. | s max. | $d_a$ min. | $d_a$ max. | $d_b$, $D_a$ min. | $D_a$ max. | $r_a$ max. | $r_b$ max. | $k_r$ | | | $B_1$ | $B_2$ |
| mm | | | | | | | mm | | | | | | – | – | kg | mm | |
| **65** | 90,5 | 117,4 | 82,5 | 2,1 | 2,1 | – | 77 | – | 93 | 127,8 | 2 | – | 0,15 | **–** | – | – | – |
| cont. | – | 117,4 | 82,5 | 2,1 | 2,1 | 4,7 | 77 | 80 | 85 | 127,8 | 2 | 2 | 0,25 | **HJ 2313 EC** | 0,3 | 10 | 18 |
| | 90,5 | 117,4 | 82,5 | 2,1 | 2,1 | 4,7 | 77 | 80 | 93 | 127,8 | 2 | – | 0,25 | **HJ 2313 EC** | 0,3 | 10 | 18 |
| | 90,5 | 117,4 | 82,5 | 2,1 | 2,1 | – | 77 | – | 93 | 127,8 | 2 | – | 0,25 | **–** | – | – | – |
| | – | 126,85 | 89,3 | 2,1 | 2,1 | 2,6 | 78 | 86 | 91 | 146 | 2 | 2 | 0,15 | **HJ 413** | 0,42 | 11 | 18 |
| | 98,5 | 126,85 | 89,3 | 2,1 | 2,1 | 2,6 | 78 | 86 | 101 | 146 | 2 | – | 0,15 | **HJ 413** | 0,42 | 11 | 18 |
| **70** | – | 95,7 | 80 | 1,1 | 1 | 3 | 74,6 | 78 | 82 | 104 | 1 | 1 | 0,15 | **–** | – | – | – |
| | – | 97,55 | 79,5 | 1,1 | 1 | 1,3 | 74,6 | 78 | 82 | 104 | 1 | 1 | 0,1 | **HJ 1014 EC** | 0,082 | 5 | 10 |
| | 89,4 | – | 113,5 | 1,5 | 1,5 | 1,2 | 79 | 111 | 116 | 117 | 1,5 | 1,5 | 0,12 | **–** | – | – | – |
| | – | 108,3 | 83,5 | 1,5 | 1,5 | 1,2 | 79 | 81 | 86 | 115,4 | 1,5 | 1,5 | 0,15 | **HJ 214 EC** | 0,15 | 7 | 11 |
| | 89,4 | 108,3 | 83,5 | 1,5 | 1,5 | 1,2 | 79 | 81 | 92 | 115,4 | 1,5 | – | 0,15 | **HJ 214 EC** | 0,15 | 7 | 11 |
| | 89,4 | 108,3 | 83,5 | 1,5 | 1,5 | – | 79 | – | 92 | 115,4 | 1,5 | – | 0,15 | **–** | – | – | – |
| | 89,4 | 108,2 | 83,5 | 1,5 | 1,5 | 1,7 | 79 | 81 | 92 | 115,4 | 1,5 | – | 0,2 | **HJ 2214 EC** | 0,15 | 7 | 11,5 |
| | – | 108,2 | 83,5 | 1,5 | 1,5 | 1,7 | 79 | 81 | 86 | 115,4 | 1,5 | 1,5 | 0,2 | **HJ 2214 EC** | 0,15 | 7 | 11,5 |
| | 89,4 | 108,2 | 83,5 | 1,5 | 1,5 | – | 79 | – | 92 | 115,4 | 1,5 | – | 0,2 | **–** | – | – | – |
| | 97,3 | – | 133 | 2,1 | 2,1 | 1,8 | 82 | 130 | 136 | 138 | 2 | 2 | 0,12 | **–** | – | – | – |
| | – | 125,6 | 89 | 2,1 | 2,1 | 1,8 | 82 | 86 | 92 | 137,5 | 2 | 2 | 0,15 | **HJ 314 EC** | 0,32 | 10 | 15,5 |
| | 97,3 | 125,6 | 89 | 2,1 | 2,1 | 1,8 | 82 | 86 | 100 | 137,5 | 2 | – | 0,15 | **HJ 314 EC** | 0,32 | 10 | 15,5 |
| | 97,3 | 125,6 | 89 | 2,1 | 2,1 | – | 82 | – | 100 | 137,5 | 2 | – | 0,15 | **–** | – | – | – |
| | – | 125,6 | 89 | 2,1 | 2,1 | 4,8 | 82 | 86 | 92 | 137,5 | 2 | 2 | 0,25 | **HJ 2314 EC** | 0,35 | 10 | 18,5 |
| | 97,3 | 125,6 | 89 | 2,1 | 2,1 | 4,8 | 82 | 86 | 100 | 137,5 | 2 | – | 0,25 | **HJ 2314 EC** | 0,35 | 10 | 18,5 |
| | 97,3 | 125,6 | 89 | 2,1 | 2,1 | – | 82 | – | 100 | 137,5 | 2 | – | 0,25 | **–** | – | – | – |
| | – | 141 | 100 | 3 | 3 | 3,5 | 87 | 97 | 102 | 164 | 2,5 | 2,5 | 0,15 | **HJ 414** | 0,61 | 12 | 20 |
| | 110 | 141 | 100 | 3 | 3 | 3,5 | 87 | 97 | 113 | 164 | 2,5 | – | 0,15 | **HJ 414** | 0,61 | 12 | 20 |
| **75** | – | 100,4 | 85 | 1,1 | 1 | 3 | 80 | 83 | 87 | 109 | 1 | 1 | 0,15 | **–** | – | – | – |
| | 94,3 | – | 118,5 | 1,5 | 1,5 | 1,2 | 84 | 116 | 121 | 122 | 1,5 | 1,5 | 0,12 | **–** | – | – | – |
| | – | 113,3 | 88,5 | 1,5 | 1,5 | 1,2 | 84 | 86 | 91 | 121,5 | 1,5 | 1,5 | 0,15 | **HJ 215 EC** | 0,16 | 7 | 11 |
| | 94,3 | 113,3 | 88,5 | 1,5 | 1,5 | 1,2 | 84 | 86 | 97 | 121,5 | 1,5 | – | 0,15 | **HJ 215 EC** | 0,16 | 7 | 11 |
| | 94,3 | 113,3 | 88,5 | 1,5 | 1,5 | – | 84 | – | 97 | 121,5 | 1,5 | – | 0,15 | **–** | – | – | – |
| | 94,3 | 113,2 | 88,5 | 1,5 | 1,5 | 1,7 | 84 | 86 | 97 | 121,5 | 1,5 | – | 0,2 | **–** | – | – | – |
| | – | 113,2 | 88,5 | 1,5 | 1,5 | 1,7 | 84 | 86 | 91 | 121,5 | 1,5 | 1,5 | 0,2 | **–** | – | – | – |
| | 94,3 | 113,2 | 88,5 | 1,5 | 1,5 | – | 84 | – | 97 | 121,5 | 1,5 | – | 0,2 | **–** | – | – | – |
| | 104 | – | 143 | 2,1 | 2,1 | 1,8 | 87 | 140 | 146 | 148 | 2 | 2 | 0,12 | **–** | – | – | – |



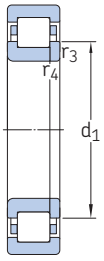

NU




NJ



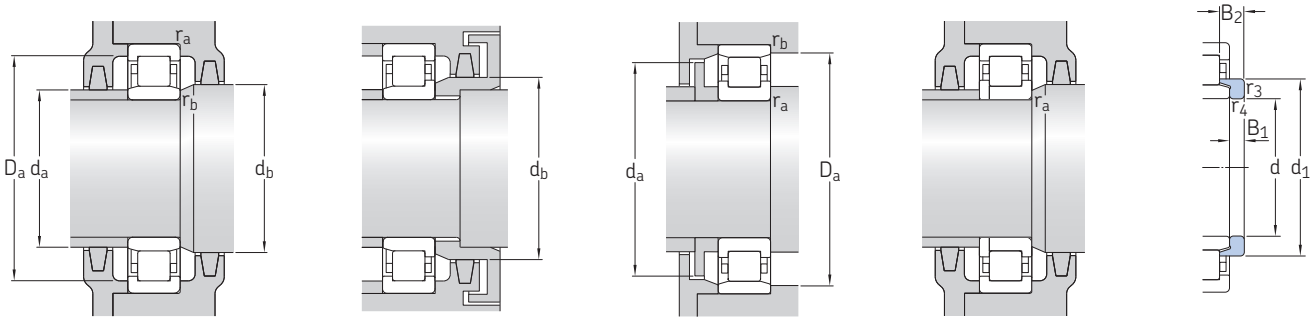

N




NUP

| Principal dimensions | | | Basic load ratings | | Fatigue load limit | Speed ratings | | Mass | Designations | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | dynamic | static | | Reference speed | Limiting speed | | Bearing with standard cage | Alternative standard cage[1] |
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **75** | 160 | 37 | 280 | 265 | 33,5 | 4 500 | 5 300 | 3,3 | ▸ NU 315 ECP | J, M, ML, PH |
| cont. | 160 | 37 | 280 | 265 | 33,5 | 4 500 | 5 300 | 3,35 | ▸ NJ 315 ECP | J, M, ML, PH |
| | 160 | 37 | 280 | 265 | 33,5 | 4 500 | 5 300 | 3,45 | ▸ NUP 315 ECP | J, M, ML, PH |
| | 160 | 55 | 380 | 400 | 50 | 4 500 | 5 300 | 4,8 | ▸ NU 2315 ECP | J, ML |
| | 160 | 55 | 380 | 400 | 50 | 4 500 | 5 300 | 5 | ▸ NJ 2315 ECP | J, ML |
| | 160 | 55 | 380 | 400 | 50 | 4 500 | 5 300 | 5,1 | ▸ NUP 2315 ECP | J, ML |
| | 190 | 45 | 264 | 280 | 34 | 4 000 | 4 800 | 6,2 | NU 415 | – |
| | 190 | 45 | 264 | 280 | 34 | 4 000 | 4 800 | 6,4 | NJ 415 | – |
| **80** | 125 | 22 | 64,4 | 78 | 9,8 | 6 300 | 6 300 | 0,88 | ▸ NU 1016 | – |
| | 125 | 22 | 99 | 127 | 16,3 | 6 000 | 9 500 | 1,05 | NJ 1016 ECML | M |
| | 140 | 26 | 160 | 166 | 21,2 | 5 300 | 5 600 | 1,55 | ▸ N 216 ECP | – |
| | 140 | 26 | 160 | 166 | 21,2 | 5 300 | 5 600 | 1,55 | ▸ NJ 216 ECP | J, M, ML, PH |
| | 140 | 26 | 160 | 166 | 21,2 | 5 300 | 5 600 | 1,55 | ▸ NU 216 ECP | J, M, ML, PH |
| | 140 | 26 | 160 | 166 | 21,2 | 5 300 | 5 600 | 1,55 | ▸ NUP 216 ECP | J, M, ML, PH |
| | 140 | 33 | 212 | 245 | 31 | 5 300 | 5 600 | 1,95 | ▸ NU 2216 ECP | J, M, ML, PH |
| | 140 | 33 | 212 | 245 | 31 | 5 300 | 5 600 | 2 | ▸ NUP 2216 ECP | J, M, ML, PH |
| | 140 | 33 | 212 | 245 | 31 | 5 300 | 5 600 | 2,05 | ▸ NJ 2216 ECP | J, M, ML, PH |
| | 170 | 39 | 300 | 290 | 36 | 4 300 | 5 000 | 3,85 | ▸ NU 316 ECP | J, M, ML, PH |
| | 170 | 39 | 300 | 290 | 36 | 4 300 | 5 000 | 3,9 | ▸ N 316 ECP | M |
| | 170 | 39 | 300 | 290 | 36 | 4 300 | 5 000 | 4 | ▸ NJ 316 ECP | J, M, ML, PH |
| | 170 | 39 | 300 | 290 | 36 | 4 300 | 5 000 | 4,1 | ▸ NUP 316 ECP | J, M, ML, PH |
| | 170 | 58 | 415 | 440 | 55 | 4 300 | 5 000 | 5,75 | ▸ NU 2316 ECP | M, ML |
| | 170 | 58 | 415 | 440 | 55 | 4 300 | 5 000 | 5,95 | ▸ NJ 2316 ECP | M, ML |
| | 170 | 58 | 415 | 440 | 55 | 4 300 | 5 000 | 6 | NUP 2316 ECP | M, ML |
| | 200 | 48 | 303 | 320 | 39 | 3 800 | 4 500 | 7,25 | ▸ NU 416 | – |
| | 200 | 48 | 303 | 320 | 39 | 3 800 | 4 500 | 7,55 | NJ 416 | – |
| **85** | 130 | 22 | 68,2 | 86,5 | 10,8 | 6 000 | 9 000 | 1,05 | ▸ NU 1017 ML | – |
| | 130 | 22 | 68,2 | 86,5 | 10,8 | 6 000 | 9 000 | 1,1 | NJ 1017 ML | – |
| | 130 | 22 | 68,2 | 86,5 | 10,8 | 6 000 | 9 000 | 1,1 | NUP 1017 ML | – |
| | 150 | 28 | 190 | 200 | 25 | 4 800 | 5 300 | 1,9 | ▸ N 217 ECP | M |
| | 150 | 28 | 190 | 200 | 25 | 4 800 | 5 300 | 1,9 | ▸ NJ 217 ECP | J, M, ML |
| | 150 | 28 | 190 | 200 | 25 | 4 800 | 5 300 | 1,9 | ▸ NU 217 ECP | J, M, ML |
| | 150 | 28 | 190 | 200 | 25 | 4 800 | 5 300 | 1,9 | ▸ NUP 217 ECP | J, M, ML |
| | 150 | 36 | 250 | 280 | 34,5 | 4 800 | 5 300 | 2,5 | ▸ NU 2217 ECP | J, M, ML, PH |
| | 150 | 36 | 250 | 280 | 34,5 | 4 800 | 5 300 | 2,55 | ▸ NJ 2217 ECP | J, M, ML, PH |

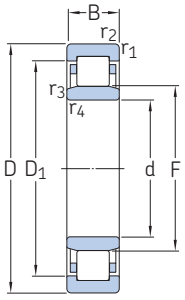
**SKF Explorer bearing**
▸ Popular item
[1] When ordering bearings with an alternative standard cage the suffix of the standard cage has to be replaced by the suffix of the alternative cage. For example NU .. ECP becomes NU .. ECML (for permissible speed → page 511).



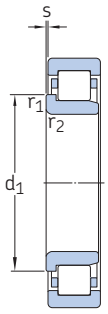

Angle ring

| Dimensions | | | | | | | Abutment and fillet dimensions | | | | | | Calculation factor | Angle ring Designation | Mass | Dimensions | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | F, E | $r_{1,2}$ min. | $r_{3,4}$ min. | s max. | $d_a$ min. | $d_a$ max. | $d_b$, $D_a$ min. | $D_a$ max. | $r_a$ max. | $r_b$ max. | $k_r$ | | | $B_1$ | $B_2$ |
| mm | | | | | | | mm | | | | | | – | – | kg | mm | |
| **75** | – | 135 | 95 | 2,1 | 2,1 | 1,8 | 87 | 92 | 97 | 148 | 2 | 2 | 0,15 | **HJ 315 EC** | 0,39 | 11 | 16,5 |
| cont. | 104 | 135 | 95 | 2,1 | 2,1 | 1,8 | 87 | 92 | 107 | 148 | 2 | – | 0,15 | **HJ 315 EC** | 0,39 | 11 | 16,5 |
| | 104 | 135 | 95 | 2,1 | 2,1 | – | 87 | – | 107 | 148 | 2 | – | 0,15 | **–** | – | – | – |
| | – | 135 | 95 | 2,1 | 2,1 | 4,8 | 87 | 92 | 97 | 148 | 2 | 2 | 0,25 | **HJ 2315 EC** | 0,42 | 11 | 19,5 |
| | 104 | 135 | 95 | 2,1 | 2,1 | 4,8 | 87 | 92 | 107 | 148 | 2 | – | 0,25 | **HJ 2315 EC** | 0,42 | 11 | 19,5 |
| | 104 | 135 | 95 | 2,1 | 2,1 | – | 87 | – | 107 | 148 | 2 | – | 0,25 | **–** | – | – | – |
| | – | 149,1 | 104,5 | 3 | 3 | 3,8 | 91 | 101 | 107 | 174 | 2,5 | 2,5 | 0,15 | **HJ 415** | 0,71 | 13 | 21,5 |
| | 116 | 149,1 | 104,5 | 3 | 3 | 3,8 | 91 | 101 | 119 | 174 | 2,5 | – | 0,15 | **HJ 415** | 0,71 | 13 | 21,5 |
| **80** | – | 108,55 | 91,5 | 1,1 | 1 | 3,3 | 86 | 90 | 94 | 119 | 1 | 1 | 0,1 | **–** | – | – | – |
| | 96,2 | 111,6 | 91,5 | 1,1 | 1 | 1,5 | 86 | 90 | 99 | 119 | 1 | – | 0,15 | **–** | – | – | – |
| | 101 | – | 127,3 | 2 | 2 | 1,4 | 90 | 125 | 130 | 131 | 2 | 2 | 0,12 | **–** | – | – | – |
| | 101 | 121,7 | 95,3 | 2 | 2 | 1,4 | 90 | 93 | 104 | 129,8 | 2 | – | 0,15 | **HJ 216 EC** | 0,21 | 8 | 12,5 |
| | – | 121,7 | 95,3 | 2 | 2 | 1,4 | 90 | 93 | 98 | 129,8 | 2 | 2 | 0,15 | **HJ 216 EC** | 0,21 | 8 | 12,5 |
| | 101 | 121,7 | 95,3 | 2 | 2 | – | 90 | – | 104 | 129,8 | 2 | – | 0,15 | **–** | – | – | – |
| | – | 121,7 | 95,3 | 2 | 2 | 1,4 | 90 | 93 | 98 | 129,8 | 2 | 2 | 0,2 | **HJ 216 EC** | 0,21 | 8 | 12,5 |
| | 101 | 121,7 | 95,3 | 2 | 2 | – | 90 | – | 104 | 129,8 | 2 | – | 0,2 | **–** | – | – | – |
| | 101 | 121,7 | 95,3 | 2 | 2 | 1,4 | 90 | 93 | 104 | 129,8 | 2 | – | 0,2 | **HJ 216 EC** | 0,21 | 8 | 12,5 |
| | – | 142,7 | 101 | 2,1 | 2,1 | 2,1 | 92 | 98 | 104 | 157,8 | 2 | 2 | 0,15 | **HJ 316 EC** | 0,44 | 11 | 17 |
| | 110 | – | 151 | 2,1 | 2,1 | 2,1 | 92 | 148 | 154 | 157 | 2 | 2 | 0,12 | **–** | – | – | – |
| | 110 | 142,7 | 101 | 2,1 | 2,1 | 2,1 | 92 | 98 | 113 | 157,8 | 2 | – | 0,15 | **HJ 316 EC** | 0,44 | 11 | 17 |
| | 110 | 142,7 | 101 | 2,1 | 2,1 | – | 92 | – | 113 | 157,8 | 2 | – | 0,15 | **–** | – | – | – |
| | – | 142,7 | 101 | 2,1 | 2,1 | 5,1 | 92 | 98 | 104 | 157,8 | 2 | 2 | 0,25 | **HJ 2316 EC** | 0,48 | 11 | 20 |
| | 110 | 142,7 | 101 | 2,1 | 2,1 | 5,1 | 92 | 98 | 113 | 157,8 | 2 | – | 0,25 | **HJ 2316 EC** | 0,48 | 11 | 20 |
| | 110 | 142,7 | 101 | 2,1 | 2,1 | – | 92 | – | 113 | 157,8 | 2 | – | 0,25 | **–** | – | – | – |
| | – | 158,1 | 110 | 3 | 3 | 3,7 | 96 | 107 | 112 | 184 | 2,5 | 2,5 | 0,15 | **HJ 416** | 0,8 | 13 | 22 |
| | 122 | 158,1 | 110 | 3 | 3 | 3,7 | 96 | 107 | 125 | 184 | 2,5 | – | 0,15 | **HJ 416** | 0,8 | 13 | 22 |
| **85** | – | 114 | 96,5 | 1,1 | 1 | 3,3 | 91 | 94 | 99 | 123 | 1 | 1 | 0,15 | **–** | – | – | – |
| | 101 | 114 | 96,5 | 1,1 | 1 | 3,3 | 91 | 94 | 104 | 123 | 1 | – | 0,15 | **–** | – | – | – |
| | 101 | 114 | 96,5 | 1,1 | 1 | – | 91 | – | 104 | 123 | 1 | – | 0,15 | **–** | – | – | – |
| | 107 | – | 136,5 | 2 | 2 | 1,5 | 96 | 134 | 139 | 140 | 2 | 2 | 0,12 | **–** | – | – | – |
| | 107 | 130,3 | 100,5 | 2 | 2 | 1,5 | 96 | 98 | 110 | 138,5 | 2 | – | 0,15 | **HJ 217 EC** | 0,24 | 8 | 12,5 |
| | – | 130,3 | 100,5 | 2 | 2 | 1,5 | 96 | 98 | 103 | 138,5 | 2 | 2 | 0,15 | **HJ 217 EC** | 0,24 | 8 | 12,5 |
| | 107 | 130,3 | 100,5 | 2 | 2 | – | 96 | – | 110 | 138,5 | 2 | – | 0,15 | **–** | – | – | – |
| | – | 130,3 | 100,5 | 2 | 2 | 2 | 96 | 98 | 103 | 138,5 | 2 | 2 | 0,2 | **–** | – | – | – |
| | 107 | 130,3 | 100,5 | 2 | 2 | 2 | 96 | 98 | 110 | 138,5 | 2 | – | 0,2 | **–** | – | – | – |

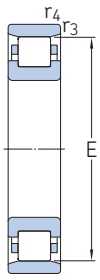
## d 85 – 95 mm



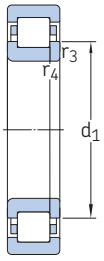

NU




NJ




N



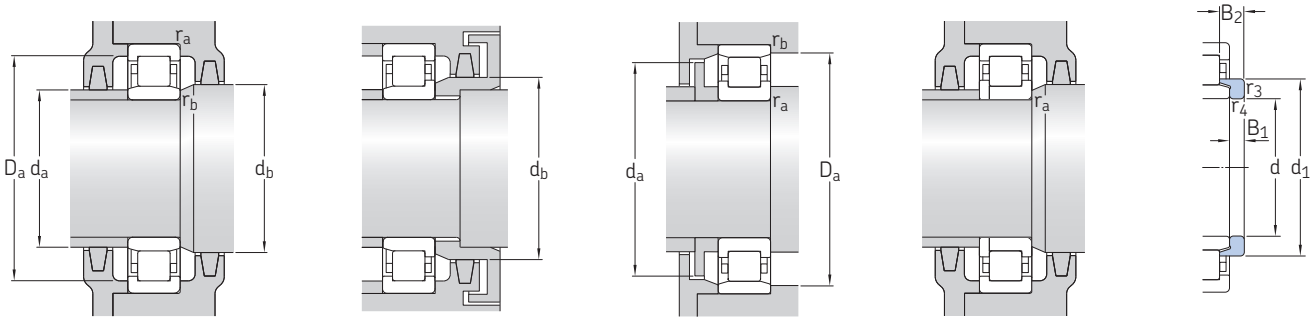

NUP

| Principal dimensions | | | Basic load ratings | | Fatigue load limit | Speed ratings | | Mass | Designations | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | dynamic | static | | Reference speed | Limiting speed | | Bearing with standard cage | Alternative standard cage[1] |
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **85** | 150 | 36 | 250 | 280 | 34,5 | 4 800 | 5 300 | 2,6 | ▸ NUP 2217 ECP | J, M, ML, PH |
| cont. | 180 | 41 | 340 | 335 | 41,5 | 4 000 | 4 800 | 4,55 | ▸ N 317 ECP | M |
| | 180 | 41 | 340 | 335 | 41,5 | 4 000 | 4 800 | 4,65 | ▸ NU 317 ECP | J, M, ML, PH |
| | 180 | 41 | 340 | 335 | 41,5 | 4 000 | 4 800 | 4,8 | ▸ NJ 317 ECP | J, M, ML, PH |
| | 180 | 41 | 340 | 335 | 41,5 | 4 000 | 4 800 | 4,9 | ▸ NUP 317 ECP | J, M, ML, PH |
| | 180 | 60 | 455 | 490 | 60 | 4 000 | 4 800 | 6,85 | ▸ NU 2317 ECP | J, M, ML |
| | 180 | 60 | 455 | 490 | 60 | 4 000 | 4 800 | 7 | ▸ NJ 2317 ECP | J, M, ML |
| | 180 | 60 | 455 | 490 | 60 | 4 000 | 4 800 | 7 | NUP 2317 ECP | J, M, ML |
| **90** | 140 | 24 | 80,9 | 104 | 12,7 | 5 600 | 8 500 | 1,35 | ▸ NU 1018 ML | M |
| | 140 | 24 | 80,9 | 104 | 12,7 | 5 600 | 8 500 | 1,4 | NJ 1018 ML | M |
| | 160 | 30 | 208 | 220 | 27 | 4 500 | 5 000 | 2,3 | ▸ N 218 ECP | M |
| | 160 | 30 | 208 | 220 | 27 | 4 500 | 5 000 | 2,3 | ▸ NJ 218 ECP | J, M, ML |
| | 160 | 30 | 208 | 220 | 27 | 4 500 | 5 000 | 2,3 | ▸ NU 218 ECP | J, M, ML |
| | 160 | 30 | 208 | 220 | 27 | 4 500 | 5 000 | 2,45 | ▸ NUP 218 ECP | J, M, ML |
| | 160 | 40 | 280 | 315 | 39 | 4 500 | 5 000 | 3,15 | ▸ NU 2218 ECP | J, M, ML |
| | 160 | 40 | 280 | 315 | 39 | 4 500 | 5 000 | 3,25 | ▸ NJ 2218 ECP | J, M, ML |
| | 160 | 40 | 280 | 315 | 39 | 4 500 | 5 000 | 3,3 | ▸ NUP 2218 ECP | J, M, ML |
| | 190 | 43 | 365 | 360 | 43 | 3 800 | 4 500 | 5,25 | ▸ NU 318 ECP | J, M, ML |
| | 190 | 43 | 365 | 360 | 43 | 3 800 | 4 500 | 5,3 | ▸ N 318 ECP | M |
| | 190 | 43 | 365 | 360 | 43 | 3 800 | 4 500 | 5,45 | ▸ NJ 318 ECP | J, M, ML |
| | 190 | 43 | 365 | 360 | 43 | 3 800 | 4 500 | 5,55 | ▸ NUP 318 ECJ | M, ML, P |
| | 190 | 64 | 500 | 540 | 65,5 | 3 800 | 4 500 | 8 | ▸ NU 2318 ECP | J, M, ML |
| | 190 | 64 | 500 | 540 | 65,5 | 3 800 | 4 500 | 8,15 | ▸ NJ 2318 ECP | J, M, ML |
| | 190 | 64 | 500 | 540 | 65,5 | 3 800 | 4 500 | 8,25 | NUP 2318 ECP | J, M, ML |
| | 225 | 54 | 380 | 415 | 48 | 3 400 | 4 000 | 10 | NU 418 | M |
| **95** | 145 | 24 | 84,2 | 110 | 13,2 | 5 300 | 8 000 | 1,45 | ▸ NU 1019 ML | – |
| | 170 | 32 | 255 | 265 | 32,5 | 4 300 | 4 800 | 2,85 | ▸ N 219 ECP | – |
| | 170 | 32 | 255 | 265 | 32,5 | 4 300 | 4 800 | 2,85 | ▸ NU 219 ECP | J, M, ML |
| | 170 | 32 | 255 | 265 | 32,5 | 4 300 | 4 800 | 2,9 | ▸ NJ 219 ECP | J, M, ML |
| | 170 | 32 | 255 | 265 | 32,5 | 4 300 | 4 800 | 2,9 | ▸ NUP 219 ECP | J, M, ML |
| | 170 | 43 | 325 | 375 | 45,5 | 4 300 | 4 800 | 3,8 | ▸ NU 2219 ECP | J, ML |
| | 170 | 43 | 325 | 375 | 45,5 | 4 300 | 4 800 | 3,95 | ▸ NJ 2219 ECP | J, ML |
| | 170 | 43 | 325 | 375 | 45,5 | 4 300 | 4 800 | 4 | NUP 2219 ECP | J, ML |
| | 200 | 45 | 390 | 390 | 46,5 | 3 600 | 4 300 | 6,2 | ▸ N 319 ECP | M |

**SKF Explorer bearing**

▸ Popular item

[1] When ordering bearings with an alternative standard cage the suffix of the standard cage has to be replaced by the suffix of the alternative cage. For example NU .. ECP becomes NU .. ECML (for permissible speed → page 511).

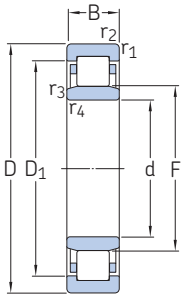



Angle ring

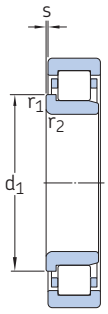
| Dimensions | | | | | | | Abutment and fillet dimensions | | | | | | Calculation factor | Angle ring Designation | Mass | Dimensions | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | F, E | $r_{1,2}$ min. | $r_{3,4}$ min. | s max. | $d_a$ min. | $d_a$ max. | $d_b$, $D_a$ min. | $D_a$ max. | $r_a$ max. | $r_b$ max. | $k_r$ | | | $B_1$ | $B_2$ |
| mm | | | | | | | mm | | | | | | – | – | kg | mm | |
| **85** | 107 | 130,3 | 100,5 | 2 | 2 | – | 96 | – | 110 | 138,5 | 2 | – | 0,2 | **–** | – | – | – |
| cont. | 117 | – | 160 | 3 | 3 | 2,3 | 99 | 157 | 163 | 166 | 2,5 | 2,5 | 0,12 | **–** | – | – | – |
| | – | 151,4 | 108 | 3 | 3 | 2,3 | 99 | 105 | 111 | 165,5 | 2,5 | 2,5 | 0,15 | **HJ 317 EC** | 0,55 | 12 | 18,5 |
| | 117 | 151,4 | 108 | 3 | 3 | 2,3 | 99 | 105 | 120 | 165,5 | 2,5 | – | 0,15 | **HJ 317 EC** | 0,55 | 12 | 18,5 |
| | 117 | 151,4 | 108 | 3 | 3 | – | 99 | – | 120 | 165,5 | 2,5 | – | 0,15 | **–** | – | – | – |
| | – | 151,4 | 108 | 3 | 3 | 5,8 | 99 | 105 | 111 | 165,5 | 2,5 | 2,5 | 0,25 | **HJ 2317 EC** | 0,59 | 12 | 22 |
| | 117 | 151,4 | 108 | 3 | 3 | 5,8 | 99 | 105 | 120 | 165,5 | 2,5 | – | 0,25 | **HJ 2317 EC** | 0,59 | 12 | 22 |
| | 117 | 151,4 | 108 | 3 | 3 | – | 99 | – | 120 | 165,5 | 2,5 | – | 0,25 | **–** | – | – | – |
| **90** | – | 122,1 | 103 | 1,5 | 1,1 | 3,5 | 96 | 101 | 106 | 133 | 1,5 | 1 | 0,15 | **–** | – | – | – |
| | 108 | 122,1 | 103 | 1,5 | 1,1 | 3,5 | 96 | 101 | 111 | 133 | 1,5 | – | 0,15 | **–** | – | – | – |
| | 114 | – | 145 | 2 | 2 | 1,8 | 101 | 142 | 148 | 149 | 2 | 2 | 0,12 | **–** | – | – | – |
| | 114 | 138,45 | 107 | 2 | 2 | 1,8 | 101 | 104 | 117 | 149 | 2 | – | 0,15 | **HJ 218 EC** | 0,31 | 9 | 14 |
| | – | 138,45 | 107 | 2 | 2 | 1,8 | 101 | 104 | 110 | 149 | 2 | 2 | 0,15 | **HJ 218 EC** | 0,31 | 9 | 14 |
| | 114 | 138,45 | 107 | 2 | 2 | – | 101 | – | 117 | 149 | 2 | – | 0,15 | **–** | – | – | – |
| | – | 138,5 | 107 | 2 | 2 | 2,6 | 101 | 104 | 110 | 149 | 2 | 2 | 0,2 | **HJ 2218 EC** | 0,31 | 9 | 15 |
| | 114 | 138,5 | 107 | 2 | 2 | 2,6 | 101 | 104 | 117 | 149 | 2 | – | 0,2 | **HJ 2218 EC** | 0,31 | 9 | 15 |
| | 114 | 138,5 | 107 | 2 | 2 | – | 101 | – | 117 | 149 | 2 | – | 0,2 | **–** | – | – | – |
| | – | 160,3 | 113,5 | 3 | 3 | 2,5 | 104 | 110 | 116 | 175,3 | 2,5 | 2,5 | 0,15 | **HJ 318 EC** | 0,62 | 12 | 18,5 |
| | 124 | – | 169,5 | 3 | 3 | 2,5 | 104 | 166 | 173 | 175 | 2,5 | 2,5 | 0,12 | **–** | – | – | – |
| | 124 | 160,3 | 113,5 | 3 | 3 | 2,5 | 104 | 110 | 127 | 175,3 | 2,5 | – | 0,15 | **HJ 318 EC** | 0,62 | 12 | 18,5 |
| | 124 | 160,3 | 113,5 | 3 | 3 | – | 104 | – | 127 | 175,3 | 2,5 | – | 0,15 | **–** | – | – | – |
| | – | 160,3 | 113,5 | 3 | 3 | 6 | 104 | 110 | 116 | 175,3 | 2,5 | 2,5 | 0,25 | **HJ 2318 EC** | 0,66 | 12 | 22 |
| | 124 | 160,3 | 113,5 | 3 | 3 | 6 | 104 | 110 | 127 | 175,3 | 2,5 | – | 0,25 | **HJ 2318 EC** | 0,66 | 12 | 22 |
| | 124 | 160,3 | 113,5 | 3 | 3 | – | 104 | – | 127 | 175,3 | 2,5 | – | 0,25 | **–** | – | – | – |
| | – | 179,5 | 123,5 | 4 | 4 | 4,9 | 108 | 120 | 126 | 205 | 3 | 3 | 0,15 | **–** | – | – | – |
| **95** | – | 127,1 | 108 | 1,5 | 1,1 | 3,5 | 101 | 106 | 111 | 138 | 1,5 | 1 | 0,15 | **–** | – | – | – |
| | 120 | – | 154,5 | 2,1 | 2,1 | 1,7 | 107 | 152 | 157 | 159 | 2 | 2 | 0,12 | **–** | – | – | – |
| | – | 147,4 | 112,5 | 2,1 | 2,1 | 1,7 | 107 | 110 | 115 | 157,8 | 2 | 2 | 0,15 | **HJ 219 EC** | 0,33 | 9 | 14 |
| | 120 | 147,4 | 112,5 | 2,1 | 2,1 | 1,7 | 107 | 110 | 123 | 157,8 | 2 | – | 0,15 | **HJ 219 EC** | 0,33 | 9 | 14 |
| | 120 | 147,4 | 112,5 | 2,1 | 2,1 | – | 107 | – | 123 | 157,8 | 2 | – | 0,15 | **–** | – | – | – |
| | – | 147,4 | 112,5 | 2,1 | 2,1 | 3 | 107 | 110 | 115 | 157,8 | 2 | 2 | 0,2 | **–** | – | – | – |
| | 120 | 147,4 | 112,5 | 2,1 | 2,1 | 3 | 107 | 110 | 123 | 157,8 | 2 | – | 0,2 | **–** | – | – | – |
| | 120 | 147,4 | 112,5 | 2,1 | 2,1 | – | 107 | – | 123 | 157,8 | 2 | – | 0,2 | **–** | – | – | – |
| | 132 | – | 177,5 | 3 | 3 | 2,9 | 110 | 174 | 181 | 185 | 2,5 | 2,5 | 0,12 | **–** | – | – | – |

## 6.1 Single row cylindrical roller bearings

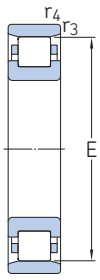
d **95 – 105** mm



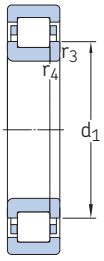

NU




NJ




N



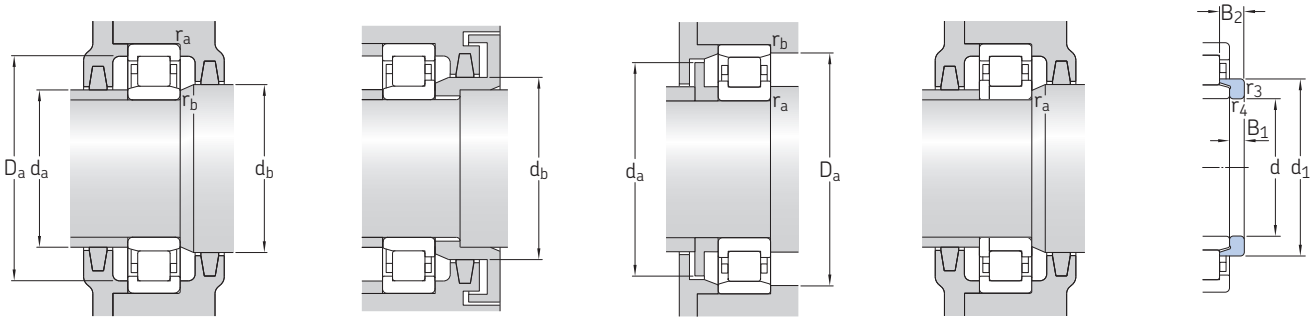

NUP

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designations Bearing with standard cage | Alternative standard cage[1] |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **95** | 200 | 45 | 390 | 390 | 46,5 | 3 600 | 4 300 | 6,2 | ▸ NU 319 ECP | J, M, ML |
| cont. | 200 | 45 | 390 | 390 | 46,5 | 3 600 | 4 300 | 6,3 | ▸ NJ 319 ECP | J, M, ML |
| | 200 | 45 | 390 | 390 | 46,5 | 3 600 | 4 300 | 6,3 | NUP 319 ECP | J, M, ML |
| | 200 | 67 | 530 | 585 | 69,5 | 3 600 | 4 300 | 9,35 | ▸ NU 2319 ECP | J, ML |
| | 200 | 67 | 530 | 585 | 69,5 | 3 600 | 4 300 | 9,55 | ▸ NJ 2319 ECJ | ML, P |
| | 200 | 67 | 530 | 585 | 69,5 | 3 600 | 4 300 | 9,7 | ▸ NUP 2319 ECJ | ML, P |
| | 240 | 55 | 413 | 455 | 52 | 3 200 | 3 600 | 13,5 | **NU 419 M** | – |
| **100** | 150 | 24 | 85,8 | 114 | 13,7 | 5 000 | 7 500 | 1,45 | ▸ **NU 1020 ML** | M |
| | 180 | 34 | 285 | 305 | 36,5 | 4 000 | 4 500 | 3,35 | ▸ NU 220 ECP | J, M, ML |
| | 180 | 34 | 285 | 305 | 36,5 | 4 000 | 4 500 | 3,45 | ▸ N 220 ECP | – |
| | 180 | 34 | 285 | 305 | 36,5 | 4 000 | 4 500 | 3,45 | ▸ NJ 220 ECP | J, M, ML |
| | 180 | 34 | 285 | 305 | 36,5 | 4 000 | 4 500 | 3,6 | ▸ NUP 220 ECP | J, M, ML |
| | 180 | 46 | 380 | 450 | 54 | 4 000 | 4 500 | 4,75 | ▸ NU 2220 ECP | J, M, ML, PH |
| | 180 | 46 | 380 | 450 | 54 | 4 000 | 4 500 | 4,8 | ▸ NJ 2220 ECP | J, M, ML, PH |
| | 180 | 46 | 380 | 450 | 54 | 4 000 | 4 500 | 4,8 | ▸ NUP 2220 ECP | J, M, ML, PH |
| | 215 | 47 | 450 | 440 | 51 | 3 200 | 3 800 | 7,35 | ▸ N 320 ECP | M |
| | 215 | 47 | 450 | 440 | 51 | 3 200 | 3 800 | 7,45 | ▸ NU 320 ECP | J, M, ML |
| | 215 | 47 | 450 | 440 | 51 | 3 200 | 3 800 | 7,65 | ▸ NJ 320 ECJ | M, ML, P |
| | 215 | 47 | 450 | 440 | 51 | 3 200 | 3 800 | 7,7 | ▸ NUP 320 ECJ | M, ML, P |
| | 215 | 73 | 670 | 735 | 85 | 3 200 | 3 800 | 12 | ▸ NJ 2320 ECJ | M, ML, P |
| | 215 | 73 | 670 | 735 | 85 | 3 200 | 3 800 | 12 | ▸ NU 2320 ECP | J, M, ML |
| | 215 | 73 | 670 | 735 | 85 | 3 200 | 3 800 | 12,5 | ▸ NUP 2320 ECJ | M, ML, P |
| | 250 | 58 | 457 | 520 | 58,5 | 3 000 | 3 600 | 15,5 | **NU 420 M** | – |
| **105** | 160 | 26 | 101 | 137 | 16 | 4 800 | 7 500 | 1,9 | ▸ **NU 1021 ML** | – |
| | 190 | 36 | 300 | 315 | 36,5 | 3 800 | 4 300 | 3,9 | N 221 ECP | – |
| | 190 | 36 | 300 | 315 | 36,5 | 3 800 | 4 300 | 3,95 | ▸ NU 221 ECP | J, ML |
| | 190 | 36 | 300 | 315 | 36,5 | 3 800 | 4 300 | 4 | ▸ NJ 221 ECP | J, ML |
| | 190 | 36 | 300 | 315 | 36,5 | 3 800 | 4 300 | 4,2 | NUP 221 ECP | J, ML |
| | 225 | 49 | 500 | 500 | 57 | 3 200 | 3 800 | 8,5 | ▸ NU 321 ECP | J, ML |
| | 225 | 49 | 500 | 500 | 57 | 3 200 | 3 800 | 8,6 | ▸ N 321 ECP | – |
| | 225 | 49 | 500 | 500 | 57 | 3 200 | 3 800 | 9,05 | NJ 321 ECP | J, ML |
| | 260 | 60 | 501 | 570 | 64 | 2 800 | 3 400 | 17,5 | **NU 421 M** | – |

**SKF Explorer bearing**

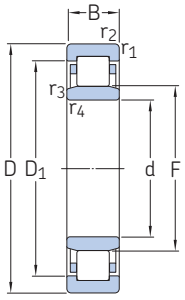
▸ Popular item

[1] When ordering bearings with an alternative standard cage the suffix of the standard cage has to be replaced by the suffix of the alternative cage. For example NU .. ECP becomes NU .. ECML (for permissible speed → page 511).

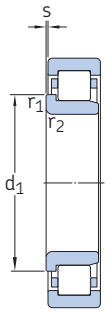



Angle ring

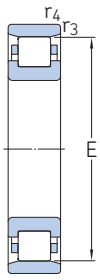
| Dimensions | | | | | | | Abutment and fillet dimensions | | | | | | Calculation factor | Angle ring Designation | Mass | Dimensions | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | F, E | $r_{1,2}$ min. | $r_{3,4}$ min. | s max. | $d_a$ min. | $d_a$ max. | $d_b$, $D_a$ min. | $D_a$ max. | $r_a$ max. | $r_b$ max. | $k_r$ | | | $B_1$ | $B_2$ |
| mm | | | | | | | mm | | | | | | – | – | kg | mm | |
| **95** | – | 168,3 | 121,5 | 3 | 3 | 2,9 | 110 | 118 | 125 | 185 | 2,5 | 2,5 | 0,15 | **HJ 319 EC** | 0,78 | 13 | 20,5 |
| cont. | 132 | 168,3 | 121,5 | 3 | 3 | 2,9 | 110 | 118 | 135 | 185 | 2,5 | – | 0,15 | **HJ 319 EC** | 0,78 | 13 | 20,5 |
| | 132 | 168,3 | 121,5 | 3 | 3 | – | 110 | – | 135 | 185 | 2,5 | – | 0,15 | **–** | – | – | – |
| | – | 168,3 | 121,5 | 3 | 3 | 6,9 | 110 | 118 | 125 | 185 | 2,5 | 2,5 | 0,25 | **HJ 2319 EC** | 0,76 | 13 | 24,5 |
| | 132 | 168,3 | 121,5 | 3 | 3 | 6,9 | 110 | 118 | 135 | 185 | 2,5 | – | 0,25 | **HJ 2319 EC** | 0,76 | 13 | 24,5 |
| | 132 | 168,3 | 121,5 | 3 | 3 | – | 110 | – | 135 | 185 | 2,5 | – | 0,25 | **–** | – | – | – |
| | – | 188 | 133,5 | 4 | 4 | 5 | 114 | 130 | 136 | 220 | 3 | 3 | 0,15 | **–** | – | – | – |
| **100** | – | 132,1 | 113 | 1,5 | 1,1 | 3,5 | 106 | 111 | 116 | 143 | 1,5 | 1 | 0,15 | **–** | – | – | – |
| | – | 155,6 | 119 | 2,1 | 2,1 | 1,7 | 113 | 116 | 122 | 167,5 | 2 | 2 | 0,15 | **HJ 220 EC** | 0,43 | 10 | 15 |
| | 127 | – | 163 | 2,1 | 2,1 | 1,7 | 113 | 160 | 166 | 168 | 2 | 2 | 0,12 | **–** | – | – | – |
| | 127 | 155,6 | 119 | 2,1 | 2,1 | 1,7 | 113 | 116 | 130 | 167,5 | 2 | – | 0,15 | **HJ 220 EC** | 0,43 | 10 | 15 |
| | 127 | 155,6 | 119 | 2,1 | 2,1 | – | 113 | – | 130 | 167,5 | 2 | – | 0,15 | **–** | – | – | – |
| | – | 155,6 | 119 | 2,1 | 2,1 | 2,5 | 113 | 116 | 122 | 167,5 | 2 | 2 | 0,2 | **HJ 2220 EC** | 0,43 | 10 | 16 |
| | 127 | 155,6 | 119 | 2,1 | 2,1 | 2,5 | 113 | 116 | 130 | 167,5 | 2 | – | 0,2 | **HJ 2220 EC** | 0,43 | 10 | 16 |
| | 127 | 155,6 | 119 | 2,1 | 2,1 | – | 113 | – | 130 | 167,5 | 2 | – | 0,2 | **–** | – | – | – |
| | 139 | – | 191,5 | 3 | 3 | 2,9 | 114 | 188 | 195 | 200 | 2,5 | 2,5 | 0,12 | **–** | – | – | – |
| | – | 181,1 | 127,5 | 3 | 3 | 2,9 | 114 | 124 | 131 | 199,6 | 2,5 | 2,5 | 0,15 | **HJ 320 EC** | 0,87 | 13 | 20,5 |
| | 139 | 181,1 | 127,5 | 3 | 3 | 2,9 | 114 | 124 | 142 | 199,6 | 2,5 | – | 0,15 | **HJ 320 EC** | 0,87 | 13 | 20,5 |
| | 139 | 181,1 | 127,5 | 3 | 3 | – | 114 | – | 142 | 199,6 | 2,5 | – | 0,15 | **–** | – | – | – |
| | 139 | 181,1 | 127,5 | 3 | 3 | 5,9 | 114 | 124 | 142 | 199,6 | 2,5 | – | 0,25 | **HJ 2320 EC** | 0,91 | 13 | 23,5 |
| | – | 181,1 | 127,5 | 3 | 3 | 5,9 | 114 | 124 | 131 | 199,6 | 2,5 | 2,5 | 0,25 | **HJ 2320 EC** | 0,91 | 13 | 23,5 |
| | 139 | 181,1 | 127,5 | 3 | 3 | – | 114 | – | 142 | 199,6 | 2,5 | – | 0,25 | **–** | – | – | – |
| | – | 197,45 | 139 | 4 | 4 | 4,9 | 119 | 135 | 142 | 230 | 3 | 3 | 0,15 | **HJ 420** | 1,5 | 16 | 27 |
| **105** | – | 140,8 | 119,5 | 2 | 1,1 | 3,8 | 111 | 117 | 122 | 151 | 2 | 1 | 0,15 | **–** | – | – | – |
| | 134 | – | 173 | 2,1 | 2,1 | 2 | 117 | 170 | 176 | 178 | 2 | 2 | 0,12 | **–** | – | – | – |
| | – | 164 | 125 | 2,1 | 2,1 | 2 | 117 | 122 | 128 | 177,3 | 2 | 2 | 0,15 | **HJ 221 EC** | 0,5 | 10 | 16 |
| | 134 | 164 | 125 | 2,1 | 2,1 | 2 | 117 | 122 | 137 | 177,3 | 2 | – | 0,15 | **HJ 221 EC** | 0,5 | 10 | 16 |
| | 134 | 164 | 125 | 2,1 | 2,1 | – | 117 | – | 137 | 177,3 | 2 | – | 0,15 | **–** | – | – | – |
| | – | 189 | 133 | 3 | 3 | 3,4 | 119 | 129 | 136 | 209,4 | 2,5 | 2,5 | 0,15 | **–** | – | – | – |
| | 145 | – | 201 | 3 | 3 | 3,4 | 119 | 198 | 205 | 210 | 2,5 | 2,5 | 0,12 | **–** | – | – | – |
| | 145 | 189 | 133 | 3 | 3 | 3,4 | 119 | 129 | 148 | 209,4 | 2,5 | – | 0,15 | **–** | – | – | – |
| | – | 206,3 | 144,5 | 4 | 4 | 4,9 | 124 | 140 | 147 | 241 | 3 | 3 | 0,15 | **–** | – | – | – |



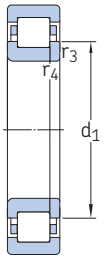

NU




NJ



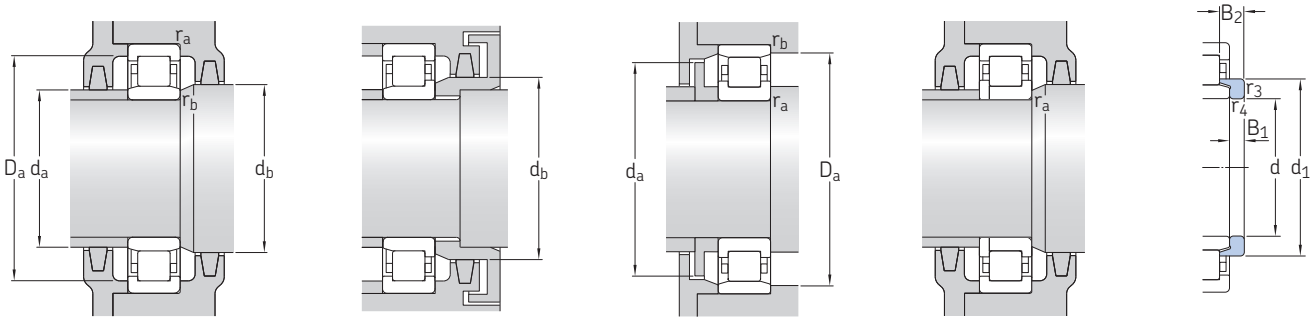

N




NUP

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designations Bearing with standard cage | Alternative standard cage[1] |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **110** | 170 | 28 | 128 | 166 | 19,3 | 4 500 | 7 000 | 2,3 | ▸ **NU 1022 ML** | **M** |
| | 200 | 38 | 335 | 365 | 42,5 | 3 600 | 4 000 | 4,7 | ▸ NU 222 ECP | J, M, ML |
| | 200 | 38 | 335 | 365 | 42,5 | 3 600 | 4 000 | 4,8 | ▸ N 222 ECP | M |
| | 200 | 38 | 335 | 365 | 42,5 | 3 600 | 4 000 | 4,8 | ▸ NJ 222 ECP | J, M, ML |
| | 200 | 38 | 335 | 365 | 42,5 | 3 600 | 4 000 | 5 | ▸ NUP 222 ECP | J, M, ML |
| | 200 | 53 | 440 | 520 | 61 | 3 600 | 4 000 | 6,7 | ▸ NJ 2222 ECP | J, ML |
| | 200 | 53 | 440 | 520 | 61 | 3 600 | 4 000 | 6,7 | ▸ NU 2222 ECP | J, ML |
| | 200 | 53 | 440 | 520 | 61 | 3 600 | 4 000 | 7 | ▸ NUP 2222 ECP | J, ML |
| | 240 | 50 | 530 | 540 | 61 | 3 000 | 3 400 | 10 | ▸ N 322 ECP | M |
| | 240 | 50 | 530 | 540 | 61 | 3 000 | 3 400 | 10,5 | ▸ NJ 322 ECJ | M, ML, P |
| | 240 | 50 | 530 | 540 | 61 | 3 000 | 3 400 | 10,5 | ▸ NU 322 ECP | J, M, ML |
| | 240 | 50 | 530 | 540 | 61 | 3 000 | 3 400 | 10,5 | NUP 322 ECP | J, M, ML |
| | 240 | 80 | 780 | 900 | 102 | 3 000 | 3 400 | 17 | NJ 2322 ECP | ML |
| | 240 | 80 | 780 | 900 | 102 | 3 000 | 3 400 | 17 | ▸ NU 2322 ECP | ML |
| | 240 | 80 | 780 | 900 | 102 | 3 000 | 3 400 | 17,5 | NUP 2322 ECP | ML |
| | 280 | 65 | 550 | 630 | 69,5 | 2 600 | 3 200 | 22,5 | **NJ 422 M** | – |
| **120** | 180 | 28 | 134 | 183 | 20,8 | 4 000 | 6 300 | 2,55 | ▸ **NU 1024 ML** | **M** |
| | 215 | 40 | 390 | 430 | 49 | 3 400 | 3 600 | 5,75 | ▸ N 224 ECP | M |
| | 215 | 40 | 390 | 430 | 49 | 3 400 | 3 600 | 5,75 | ▸ NU 224 ECP | J, M, ML |
| | 215 | 40 | 390 | 430 | 49 | 3 400 | 3 600 | 5,85 | ▸ NJ 224 ECP | J, M, ML |
| | 215 | 40 | 390 | 430 | 49 | 3 400 | 3 600 | 5,95 | ▸ NUP 224 ECJ | M, ML, P |
| | 215 | 58 | 520 | 630 | 72 | 3 400 | 3 600 | 8,2 | ▸ NU 2224 ECP | J, M, ML |
| | 215 | 58 | 520 | 630 | 72 | 3 400 | 3 600 | 8,65 | ▸ NJ 2224 ECJ | M, ML, P |
| | 215 | 58 | 520 | 630 | 72 | 3 400 | 3 600 | 8,65 | NUP 2224 ECP | J, M, ML |
| | 260 | 55 | 610 | 620 | 69,5 | 2 800 | 3 200 | 13 | ▸ N 324 ECP | M |
| | 260 | 55 | 610 | 620 | 69,5 | 2 800 | 3 200 | 13 | ▸ NU 324 ECP | J, M, ML |
| | 260 | 55 | 610 | 620 | 69,5 | 2 800 | 3 200 | 13,5 | ▸ NJ 324 ECJ | M, ML, P |
| | 260 | 55 | 610 | 620 | 69,5 | 2 800 | 3 200 | 14 | NUP 324 ECP | J, M, ML |
| | 260 | 86 | 915 | 1 040 | 116 | 2 800 | 5 000 | 22,5 | ▸ NU 2324 ECML | M |
| | 260 | 86 | 915 | 1 040 | 116 | 2 800 | 5 000 | 23 | ▸ NJ 2324 ECML | M |
| | 260 | 86 | 915 | 1 040 | 116 | 2 800 | 5 000 | 23,5 | NUP 2324 ECML | M |
| | 310 | 72 | 644 | 735 | 78 | 2 400 | 2 800 | 27,5 | **NU 424** | M |

**SKF Explorer bearing**
▸ Popular item
[1] When ordering bearings with an alternative standard cage the suffix of the standard cage has to be replaced by the suffix of the alternative cage. For example NU .. ECP becomes NU .. ECML (for permissible speed → page 511).

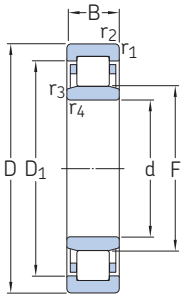



Angle ring

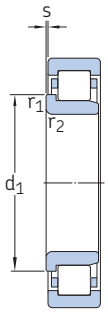
| Dimensions | | | | | | | Abutment and fillet dimensions | | | | | | Calculation factor | Angle ring Designation | Mass | Dimensions | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | F, E | $r_{1,2}$ min. | $r_{3,4}$ min. | s max. | $d_a$ min. | $d_a$ max. | $d_b$, $D_a$ min. | $D_a$ max. | $r_a$ max. | $r_b$ max. | $k_r$ | | | $B_1$ | $B_2$ |
| mm | | | | | | | mm | | | | | | – | – | kg | mm | |
| **110** | – | 149,7 | 125 | 2 | 1,1 | 3,8 | 116 | 122 | 128 | 160 | 2 | 1 | 0,15 | **–** | – | – | – |
| | – | 172,5 | 132,5 | 2,1 | 2,1 | 2,1 | 122 | 129 | 135 | 187 | 2 | 2 | 0,15 | **HJ 222 EC** | 0,62 | 11 | 17 |
| | 141 | – | 180,5 | 2,1 | 2,1 | 2,1 | 122 | 177 | 184 | 188 | 2 | 2 | 0,12 | **–** | – | – | – |
| | 141 | 172,5 | 132,5 | 2,1 | 2,1 | 2,1 | 122 | 129 | 144 | 187 | 2 | – | 0,15 | **HJ 222 EC** | 0,62 | 11 | 17 |
| | 141 | 172,5 | 132,5 | 2,1 | 2,1 | – | 122 | – | 144 | 187 | 2 | – | 0,15 | **–** | – | – | – |
| | 141 | 172,5 | 132,5 | 2,1 | 2,1 | 3,7 | 122 | 129 | 144 | 187 | 2 | – | 0,2 | **–** | – | – | – |
| | – | 172,5 | 132,5 | 2,1 | 2,1 | 3,7 | 122 | 129 | 135 | 187 | 2 | 2 | 0,2 | **–** | – | – | – |
| | 141 | 172,5 | 132,5 | 2,1 | 2,1 | – | 122 | – | 144 | 187 | 2 | – | 0,2 | **–** | – | – | – |
| | 155 | – | 211 | 3 | 3 | 3 | 124 | 208 | 215 | 225 | 2,5 | 2,5 | 0,12 | **–** | – | – | – |
| | 155 | 200 | 143 | 3 | 3 | 3 | 124 | 139 | 159 | 225,2 | 2,5 | – | 0,15 | **HJ 322 EC** | 1,2 | 14 | 22 |
| | – | 200 | 143 | 3 | 3 | 3 | 124 | 139 | 146 | 225,2 | 2,5 | 2,5 | 0,15 | **HJ 322 EC** | 1,2 | 14 | 22 |
| | 155 | 200 | 143 | 3 | 3 | – | 124 | – | 159 | 225,2 | 2,5 | – | 0,15 | **–** | – | – | – |
| | 155 | 200 | 143 | 3 | 3 | 7,5 | 124 | 139 | 159 | 225,2 | 2,5 | – | 0,25 | **HJ 2322 EC** | 1,25 | 14 | 26,5 |
| | – | 200 | 143 | 3 | 3 | 7,5 | 124 | 139 | 146 | 225,2 | 2,5 | 2,5 | 0,25 | **HJ 2322 EC** | 1,25 | 14 | 26,5 |
| | 155 | 200 | 143 | 3 | 3 | – | 124 | – | 159 | 225,2 | 2,5 | – | 0,25 | **–** | – | – | – |
| | 171 | 219,65 | 155 | 4 | 4 | 4,8 | 131 | 151 | 175 | 260 | 3 | – | 0,15 | **HJ 422** | 2,1 | 17 | 29,5 |
| **120** | – | 159,7 | 135 | 2 | 1,1 | 3,8 | 126 | 133 | 138 | 171 | 2 | 1 | 0,15 | **–** | – | – | – |
| | 153 | – | 195,5 | 2,1 | 2,1 | 1,9 | 132 | 192 | 199 | 203 | 2 | 2 | 0,12 | **–** | – | – | – |
| | – | 186,55 | 143,5 | 2,1 | 2,1 | 1,9 | 132 | 140 | 146 | 201,6 | 2 | 2 | 0,15 | **HJ 224 EC** | 0,71 | 11 | 17 |
| | 153 | 186,55 | 143,5 | 2,1 | 2,1 | 1,9 | 132 | 140 | 156 | 201,6 | 2 | – | 0,15 | **HJ 224 EC** | 0,71 | 11 | 17 |
| | 153 | 186,55 | 143,5 | 2,1 | 2,1 | – | 132 | – | 156 | 201,6 | 2 | – | 0,15 | **–** | – | – | – |
| | – | 186,9 | 143,5 | 2,1 | 2,1 | 3,8 | 132 | 140 | 146 | 201,6 | 2 | 2 | 0,2 | **HJ 2224 EC** | 0,73 | 11 | 20 |
| | 153 | 186,9 | 143,5 | 2,1 | 2,1 | 3,8 | 132 | 140 | 156 | 201,6 | 2 | – | 0,2 | **HJ 2224 EC** | 0,73 | 11 | 20 |
| | 153 | 186,9 | 143,5 | 2,1 | 2,1 | – | 132 | – | 156 | 201,6 | 2 | – | 0,2 | **–** | – | – | – |
| | 168 | – | 230 | 3 | 3 | 3,7 | 134 | 226 | 235 | 245 | 2,5 | 2,5 | 0,12 | **–** | – | – | – |
| | – | 217,8 | 154 | 3 | 3 | 3,7 | 134 | 150 | 157 | 244,8 | 2,5 | 2,5 | 0,15 | **HJ 324 EC** | 1,4 | 14 | 22,5 |
| | 168 | 217,8 | 154 | 3 | 3 | 3,7 | 134 | 150 | 171 | 244,8 | 2,5 | – | 0,15 | **HJ 324 EC** | 1,4 | 14 | 22,5 |
| | 168 | 217,8 | 154 | 3 | 3 | – | 134 | – | 171 | 244,8 | 2,5 | – | 0,15 | **–** | – | – | – |
| | – | 218,7 | 154 | 3 | 3 | 7,2 | 134 | 150 | 157 | 244,8 | 2,5 | 2,5 | 0,38 | **HJ 2324 EC** | 1,45 | 14 | 26 |
| | 168 | 218,7 | 154 | 3 | 3 | 7,2 | 134 | 150 | 171 | 244,8 | 2,5 | – | 0,38 | **HJ 2324 EC** | 1,45 | 14 | 26 |
| | 168 | 218,7 | 154 | 3 | 3 | – | 134 | – | 171 | 244,8 | 2,5 | – | 0,38 | **–** | – | – | – |
| | – | 238,5 | 170 | 5 | 5 | 6,3 | 144 | 165 | 173 | 286 | 4 | 4 | 0,15 | **HJ 424** | 2,6 | 17 | 30,5 |

## 6.1 Single row cylindrical roller bearings

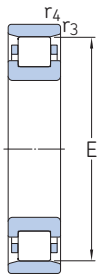
d **130 – 150** mm



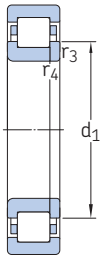

NU




NJ




N



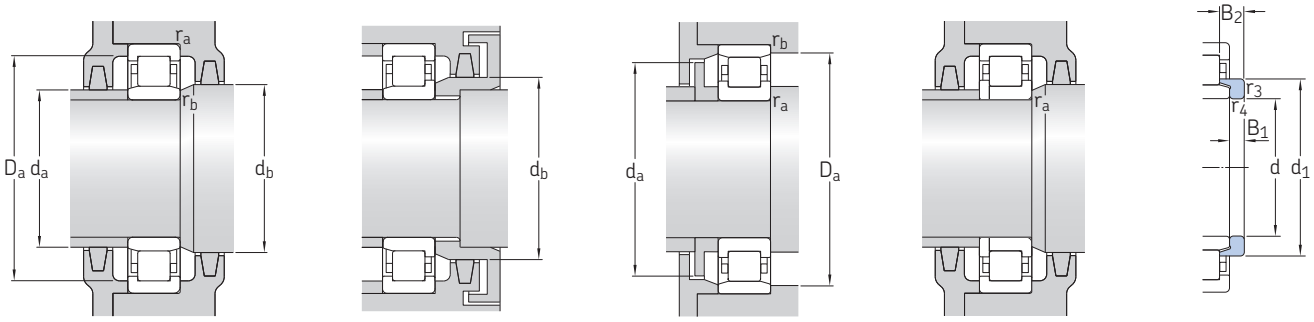

NUP

| Principal dimensions | | | Basic load ratings | | Fatigue load limit | Speed ratings | | Mass | Designations | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | dynamic | static | | Reference speed | Limiting speed | | Bearing with standard cage | Alternative standard cage[1] |
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **130** | 200 | 33 | 165 | 224 | 25 | 3 800 | 5 600 | 3,85 | ▸ **NU 1026 ML** | **M** |
| | 200 | 33 | 165 | 224 | 25 | 3 800 | 5 600 | 3,9 | **NJ 1026 ML** | **M** |
| | 230 | 40 | 415 | 455 | 51 | 3 200 | 3 400 | 6,45 | ▸ N 226 ECP | – |
| | 230 | 40 | 415 | 455 | 51 | 3 200 | 3 400 | 6,45 | ▸ NU 226 ECP | J, M, ML |
| | 230 | 40 | 415 | 455 | 51 | 3 200 | 3 400 | 6,5 | ▸ NUP 226 ECJ | M, ML, P |
| | 230 | 40 | 415 | 455 | 51 | 3 200 | 3 400 | 6,6 | ▸ NJ 226 ECP | J, M, ML |
| | 230 | 64 | 610 | 735 | 83 | 3 200 | 3 400 | 10 | ▸ NU 2226 ECP | ML |
| | 230 | 64 | 610 | 735 | 83 | 3 200 | 3 400 | 10,5 | NUP 2226 ECP | – |
| | 230 | 64 | 610 | 735 | 83 | 3 200 | 5 300 | 12 | ▸ NJ 2226 ECML | P |
| | 280 | 58 | 720 | 750 | 81,5 | 2 400 | 3 000 | 16 | ▸ NU 326 ECP | J, M, ML |
| | 280 | 58 | 720 | 750 | 81,5 | 2 400 | 3 000 | 16,5 | ▸ NJ 326 ECJ | M, ML, P |
| | 280 | 58 | 720 | 750 | 81,5 | 2 400 | 3 000 | 18 | ▸ N 326 ECM | P |
| | 280 | 58 | 720 | 750 | 81,5 | 2 400 | 3 000 | 19,5 | NUP 326 ECP | J, M, ML |
| | 280 | 93 | 1 060 | 1 250 | 137 | 2 400 | 4 500 | 28,5 | ▸ NU 2326 ECML | PA |
| | 280 | 93 | 1 060 | 1 250 | 137 | 2 400 | 4 500 | 29,5 | ▸ NJ 2326 ECML | PA |
| | 280 | 93 | 1 060 | 1 250 | 137 | 2 400 | 4 500 | 29,5 | NUP 2326 ECML | – |
| **140** | 210 | 33 | 179 | 255 | 28 | 3 600 | 5 300 | 4,05 | ▸ **NU 1028 ML** | **M** |
| | 250 | 42 | 450 | 510 | 57 | 2 800 | 3 200 | 8,45 | ▸ NUP 228 ECJ | M, ML |
| | 250 | 42 | 450 | 510 | 57 | 2 800 | 3 200 | 8,6 | ▸ NJ 228 ECJ | M, ML |
| | 250 | 42 | 450 | 510 | 57 | 2 800 | 3 200 | 9,4 | ▸ NU 228 ECM | J, ML |
| | 250 | 68 | 655 | 830 | 93 | 2 800 | 4 800 | 15 | ▸ NU 2228 ECML | PA |
| | 250 | 68 | 655 | 830 | 93 | 2 800 | 4 800 | 15,5 | ▸ NJ 2228 ECML | PA |
| | 250 | 68 | 655 | 830 | 93 | 2 800 | 4 800 | 15,5 | NUP 2228 ECML | – |
| | 300 | 62 | 780 | 830 | 88 | 2 400 | 2 800 | 20 | ▸ NJ 328 ECJ | M, ML |
| | 300 | 62 | 780 | 830 | 88 | 2 400 | 2 800 | 22,5 | ▸ NU 328 ECM | J, ML |
| | 300 | 62 | 780 | 830 | 88 | 2 400 | 2 800 | 23,5 | NUP 328 ECM | – |
| | 300 | 102 | 1 200 | 1 430 | 150 | 2 400 | 4 300 | 36 | ▸ NU 2328 ECML | – |
| | 300 | 102 | 1 200 | 1 430 | 150 | 2 400 | 4 300 | 36,5 | ▸ NJ 2328 ECML | – |
| | 300 | 102 | 1 200 | 1 430 | 150 | 2 400 | 4 300 | 37 | NUP 2328 ECML | – |
| **150** | 225 | 35 | 198 | 290 | 31,5 | 3 200 | 5 000 | 4,9 | ▸ **NU 1030 ML** | **M** |
| | 270 | 45 | 510 | 600 | 64 | 2 600 | 2 800 | 10,5 | ▸ NUP 230 ECJ | M, ML |
| | 270 | 45 | 510 | 600 | 64 | 2 600 | 2 800 | 11,5 | ▸ NU 230 ECM | J, ML |

**SKF Explorer bearing**

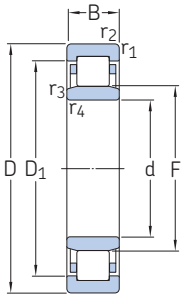
▸ Popular item

1) When ordering bearings with an alternative standard cage the suffix of the standard cage has to be replaced by the suffix of the alternative cage. For example NU .. ECP becomes NU .. ECML (for permissible speed → page 511).

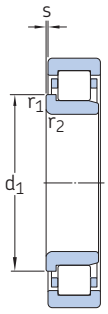



Angle ring

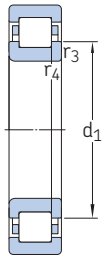
| Dimensions | | | | | | | Abutment and fillet dimensions | | | | | | Calculation factor | Angle ring Designation | Mass | Dimensions | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | F, E | $r_{1,2}$ min. | $r_{3,4}$ min. | s max. | $d_a$ min. | $d_a$ max. | $d_b$, $D_a$ min. | $D_a$ max. | $r_a$ max. | $r_b$ max. | $k_r$ | | | $B_1$ | $B_2$ |
| mm | | | | | | | mm | | | | | | – | – | kg | mm | |
| **130** | – | 175,2 | 148 | 2 | 1,1 | 4,7 | 137 | 145 | 151 | 191 | 2 | 1 | 0,15 | **–** | – | – | – |
| | 154 | 175,2 | 148 | 2 | 1,1 | 4,7 | 137 | 145 | 158 | 191 | 2 | – | 0,15 | **–** | – | – | – |
| | 164 | – | 209,5 | 3 | 3 | 2,1 | 144 | 206 | 213 | 217 | 2,5 | 2,5 | 0,12 | **–** | – | – | – |
| | – | 200,3 | 153,5 | 3 | 3 | 2,1 | 144 | 150 | 157 | 215,4 | 2,5 | 2,5 | 0,15 | **HJ 226 EC** | 0,75 | 11 | 17 |
| | 164 | 200,3 | 153,5 | 3 | 3 | – | 144 | – | 167 | 215,4 | 2,5 | – | 0,15 | **–** | – | – | – |
| | 164 | 200,3 | 153,5 | 3 | 3 | 2,1 | 144 | 150 | 167 | 215,4 | 2,5 | – | 0,15 | **HJ 226 EC** | 0,75 | 11 | 17 |
| | – | 200,3 | 153,5 | 3 | 3 | 4,3 | 144 | 150 | 157 | 215,4 | 2,5 | 2,5 | 0,2 | **HJ 2226 EC** | 0,83 | 11 | 21 |
| | 164 | 200,3 | 153,5 | 3 | 3 | – | 144 | – | 167 | 215,4 | 2,5 | – | 0,2 | **–** | – | – | – |
| | 164 | 201,2 | 153,5 | 3 | 3 | 4,3 | 144 | 150 | 167 | 215,4 | 2,5 | – | 0,3 | **HJ 2226 EC** | 0,83 | 11 | 21 |
| | – | 234,2 | 167 | 4 | 4 | 3,7 | 147 | 163 | 170 | 261,4 | 3 | 3 | 0,15 | **HJ 326 EC** | 1,65 | 14 | 23 |
| | 181 | 234,2 | 167 | 4 | 4 | 3,7 | 147 | 163 | 184 | 261,4 | 3 | – | 0,15 | **HJ 326 EC** | 1,65 | 14 | 23 |
| | 181 | – | 247 | 4 | 4 | 3,7 | 147 | 243 | 251 | 262 | 3 | 3 | 0,12 | **–** | – | – | – |
| | 181 | 234,2 | 167 | 4 | 4 | – | 147 | – | 184 | 261,4 | 3 | – | 0,15 | **–** | – | – | – |
| | – | 235,2 | 167 | 4 | 4 | 8,7 | 147 | 163 | 170 | 261,4 | 3 | 3 | 0,38 | **HJ 2326 EC** | 1,6 | 14 | 28 |
| | 181 | 235,2 | 167 | 4 | 4 | 8,7 | 147 | 163 | 184 | 261,4 | 3 | – | 0,38 | **HJ 2326 EC** | 1,6 | 14 | 28 |
| | 181 | 235,2 | 167 | 4 | 4 | – | 147 | – | 184 | 261,4 | 3 | – | 0,38 | **–** | – | – | – |
| **140** | – | 184,2 | 158 | 2 | 1,1 | 4,4 | 147 | 155 | 161 | 201 | 2 | 1 | 0,15 | **–** | – | – | – |
| | 179 | 215,78 | 169 | 3 | 3 | – | 154 | – | 182 | 235 | 2,5 | – | 0,15 | **–** | – | – | – |
| | 179 | 215,78 | 169 | 3 | 3 | 2,5 | 154 | 165 | 182 | 235 | 2,5 | – | 0,15 | **HJ 228 EC** | 0,97 | 11 | 18 |
| | – | 215,78 | 169 | 3 | 3 | 2,5 | 154 | 165 | 172 | 235 | 2,5 | 2,5 | 0,15 | **HJ 228 EC** | 0,97 | 11 | 18 |
| | – | 216,7 | 169 | 3 | 3 | 4,4 | 154 | 165 | 172 | 235 | 2,5 | 2,5 | 0,3 | **HJ 2228 EC** | 1,05 | 11 | 23 |
| | 179 | 216,7 | 169 | 3 | 3 | 4,4 | 154 | 165 | 182 | 235 | 2,5 | – | 0,3 | **HJ 2228 EC** | 1,05 | 11 | 23 |
| | 179 | 216,7 | 169 | 3 | 3 | – | 154 | – | 182 | 235 | 2,5 | – | 0,3 | **–** | – | – | – |
| | 195 | 250,6 | 180 | 4 | 4 | 3,7 | 157 | 175 | 199 | 282,5 | 3 | – | 0,15 | **HJ 328 EC** | 2,05 | 15 | 25 |
| | – | 250,6 | 180 | 4 | 4 | 3,7 | 157 | 175 | 183 | 282,5 | 3 | 3 | 0,15 | **HJ 328 EC** | 2,05 | 15 | 25 |
| | 195 | 250,6 | 180 | 4 | 4 | – | 157 | – | 199 | 282,5 | 3 | – | 0,15 | **–** | – | – | – |
| | – | 251,7 | 180 | 4 | 4 | 9,7 | 157 | 175 | 183 | 282,5 | 3 | 3 | 0,38 | **HJ 2328 EC** | 2,15 | 15 | 31 |
| | 195 | 251,7 | 180 | 4 | 4 | 9,7 | 157 | 175 | 199 | 282,5 | 3 | – | 0,38 | **HJ 2328 EC** | 2,15 | 15 | 31 |
| | 195 | 251,7 | 180 | 4 | 4 | – | 157 | – | 199 | 282,5 | 3 | – | 0,38 | **–** | – | – | – |
| **150** | – | 199,05 | 169,5 | 2,1 | 1,5 | 4,9 | 158 | 167 | 173 | 215 | 2 | 1,5 | 0,15 | **–** | – | – | – |
| | 193 | 232,2 | 182 | 3 | 3 | – | 164 | – | 196 | 254,6 | 2,5 | – | 0,15 | **–** | – | – | – |
| | – | 232,2 | 182 | 3 | 3 | 2,5 | 164 | 178 | 186 | 254,6 | 2,5 | 2,5 | 0,15 | **HJ 230 EC** | 1,25 | 12 | 19,5 |




NU



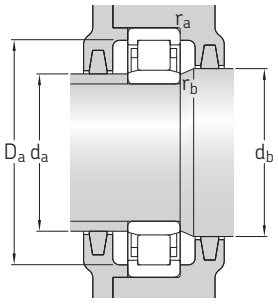

NJ

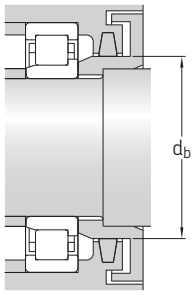


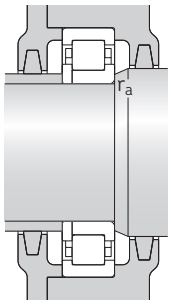

NUP

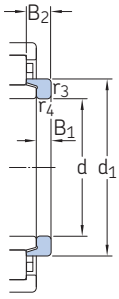
| Principal dimensions | | | Basic load ratings | | Fatigue load limit | Speed ratings | | Mass | Designations | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | dynamic | static | | Reference speed | Limiting speed | | Bearing with standard cage | Alternative standard cage[1] |
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **150** | 270 | 45 | 510 | 600 | 64 | 2 600 | 2 800 | 12 | ▸ NJ 230 ECM | J, ML |
| cont. | 270 | 73 | 735 | 930 | 100 | 2 600 | 2 800 | 18,5 | ▸ NU 2230 ECM | ML |
| | 270 | 73 | 735 | 930 | 100 | 2 600 | 2 800 | 19 | NJ 2230 ECM | ML |
| | 320 | 65 | 900 | 965 | 100 | 2 200 | 2 600 | 26,5 | ▸ NU 330 ECM | ML |
| | 320 | 65 | 900 | 965 | 100 | 2 200 | 4 000 | 26,5 | NJ 330 ECML | M |
| | 320 | 108 | 1 370 | 1 630 | 170 | 2 200 | 4 000 | 42,5 | ▸ NU 2330 ECML | – |
| | 320 | 108 | 1 370 | 1 630 | 170 | 2 200 | 4 000 | 43 | ▸ NJ 2330 ECML | – |
| **160** | 240 | 38 | 229 | 325 | 35,5 | 3 000 | 4 800 | 6 | ▸ NU 1032 ML | M |
| | 290 | 48 | 585 | 680 | 72 | 2 400 | 2 600 | 14 | ▸ NU 232 ECM | ML |
| | 290 | 48 | 585 | 680 | 72 | 2 400 | 2 600 | 15,5 | NUP 232 ECM | – |
| | 290 | 48 | 585 | 680 | 72 | 2 400 | 4 000 | 14,5 | ▸ NJ 232 ECML | M |
| | 290 | 80 | 930 | 1 200 | 129 | 2 400 | 4 000 | 23 | ▸ NU 2232 ECML | M |
| | 290 | 80 | 930 | 1 200 | 129 | 2 400 | 4 000 | 23,5 | NJ 2232 ECML | M |
| | 340 | 68 | 1 000 | 1 080 | 112 | 2 000 | 3 600 | 31 | ▸ NJ 332 ECML | M |
| | 340 | 68 | 1 000 | 1 080 | 112 | 2 000 | 3 600 | 31 | ▸ NU 332 ECML | M |
| | 340 | 114 | 1 250 | 1 730 | 173 | 1 800 | 3 600 | 50 | NU 2332 ECML | – |
| | 340 | 114 | 1 250 | 1 730 | 173 | 1 800 | 3 600 | 50,5 | ▸ NJ 2332 ECML | – |
| **170** | 260 | 42 | 275 | 400 | 41,5 | 2 800 | 4 300 | 8 | ▸ NU 1034 ML | M |
| | 260 | 42 | 275 | 400 | 41,5 | 2 800 | 4 300 | 8,2 | NJ 1034 ML | M |
| | 310 | 52 | 695 | 815 | 85 | 2 200 | 3 800 | 17,5 | ▸ NJ 234 ECML | M |
| | 310 | 52 | 695 | 815 | 85 | 2 200 | 3 800 | 17,5 | ▸ NU 234 ECML | M |
| | 310 | 86 | 1 060 | 1 340 | 140 | 2 200 | 3 800 | 28 | ▸ NU 2234 ECML | – |
| | 310 | 86 | 1 060 | 1 340 | 140 | 2 200 | 3 800 | 29 | NJ 2234 ECML | – |
| | 360 | 72 | 952 | 1 180 | 116 | 1 700 | 2 200 | 33 | ▸ NU 334 ECM | – |
| | 360 | 120 | 1 450 | 2 040 | 204 | 1 700 | 3 400 | 60,5 | NJ 2334 ECML | – |
| | 360 | 120 | 1 450 | 2 040 | 204 | 1 700 | 3 400 | 60,5 | ▸ NU 2334 ECML | – |
| **180** | 280 | 46 | 336 | 475 | 51 | 2 600 | 4 000 | 10,5 | NJ 1036 ML | M |
| | 280 | 46 | 336 | 475 | 51 | 2 600 | 4 000 | 10,5 | ▸ NU 1036 ML | M |
| | 320 | 52 | 720 | 850 | 88 | 2 200 | 3 600 | 18,5 | ▸ NJ 236 ECML | M |
| | 320 | 52 | 720 | 850 | 88 | 2 200 | 3 600 | 18,5 | ▸ NU 236 ECML | M |
| | 320 | 86 | 1 100 | 1 430 | 146 | 2 200 | 3 600 | 30 | NJ 2236 ECML | M |
| | 320 | 86 | 1 100 | 1 430 | 146 | 2 200 | 3 600 | 30 | ▸ NU 2236 ECML | M |

**SKF Explorer bearing**
▸ Popular item
1) When ordering bearings with an alternative standard cage the suffix of the standard cage has to be replaced by the suffix of the alternative cage. For example NU .. ECP becomes NU .. ECML (for permissible speed → page 511).



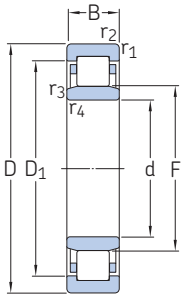



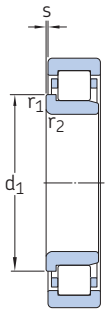




Angle ring

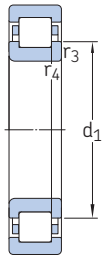
| Dimensions | | | | | | | Abutment and fillet dimensions | | | | | | Calculation factor | Angle ring | | Dimensions | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Designation | Mass | | |
| d | $d_1$ ≈ | $D_1$ ≈ | F, E | $r_{1,2}$ min. | $r_{3,4}$ min. | s max. | $d_a$ min. | $d_a$ max. | $d_b$, $D_a$ min. | $D_a$ max. | $r_a$ max. | $r_b$ max. | $k_r$ | | | $B_1$ | $B_2$ |
| mm | | | | | | | mm | | | | | | – | – | kg | mm | |
| **150** | 193 | 232,2 | 182 | 3 | 3 | 2,5 | 164 | 178 | 196 | 254,6 | 2,5 | – | 0,15 | **HJ 230 EC** | 1,25 | 12 | 19,5 |
| cont. | – | 232,2 | 182 | 3 | 3 | 4,9 | 164 | 178 | 186 | 254,6 | 2,5 | 2,5 | 0,2 | **HJ 2230 EC** | 1,35 | 12 | 24,5 |
| | 194 | 232,2 | 182 | 3 | 3 | 4,9 | 164 | 178 | 197 | 254,6 | 2,5 | – | 0,2 | **HJ 2230 EC** | 1,35 | 12 | 24,5 |
| | – | 268,7 | 193 | 4 | 4 | 4 | 167 | 188 | 196 | 302,2 | 3 | 3 | 0,15 | **HJ 330 EC** | 2,3 | 15 | 25 |
| | 209 | 269,8 | 193 | 4 | 4 | 4 | 167 | 188 | 213 | 302,2 | 3 | – | 0,23 | **HJ 330 EC** | 2,3 | 15 | 25 |
| | – | 269,8 | 193 | 4 | 4 | 10,5 | 167 | 188 | 196 | 302,2 | 3 | 3 | 0,38 | – | – | – | – |
| | 209 | 269,8 | 193 | 4 | 4 | 10,5 | 167 | 188 | 213 | 302,2 | 3 | – | 0,38 | – | – | – | – |
| **160** | – | 210,8 | 180 | 2,1 | 1,5 | 5,2 | 167 | 177 | 183 | 230 | 2 | 1,5 | 0,15 | **HJ 1032** | 0,72 | 10 | 19 |
| | – | 248,6 | 195 | 3 | 3 | 2,7 | 175 | 191 | 198 | 274,2 | 2,5 | 2,5 | 0,15 | **HJ 232 EC** | 1,5 | 12 | 20 |
| | 206 | 248,6 | 195 | 3 | 3 | – | 175 | – | 210 | 274,2 | 2,5 | – | 0,15 | – | – | – | – |
| | 206 | 249,6 | 195 | 3 | 3 | 2,7 | 175 | 191 | 210 | 274,2 | 2,5 | – | 0,23 | **HJ 232 EC** | 1,5 | 12 | 20 |
| | – | 251,1 | 193 | 3 | 3 | 4,5 | 174 | 189 | 196 | 274,2 | 2,5 | 2,5 | 0,3 | **HJ 2232 EC** | 1,55 | 12 | 24,5 |
| | 205 | 251,1 | 193 | 3 | 3 | 4,5 | 174 | 189 | 209 | 274,2 | 2,5 | – | 0,3 | **HJ 2232 EC** | 1,55 | 12 | 24,5 |
| | 221 | 286 | 204 | 4 | 4 | 4 | 177 | 199 | 225 | 321,9 | 3 | – | 0,23 | **HJ 332 EC** | 2,6 | 15 | 25 |
| | – | 286 | 204 | 4 | 4 | 4 | 177 | 199 | 207 | 321,9 | 3 | 3 | 0,23 | **HJ 332 EC** | 2,6 | 15 | 25 |
| | – | 286 | 204 | 4 | 4 | 11 | 177 | 199 | 207 | 321,9 | 3 | 3 | 0,38 | – | – | – | – |
| | 221 | 286 | 204 | 4 | 4 | 11 | 177 | 199 | 225 | 321,9 | 3 | – | 0,38 | – | – | – | – |
| **170** | – | 226,9 | 193 | 2,1 | 2,1 | 5,8 | 180 | 189 | 197 | 250 | 2 | 2 | 0,15 | **HJ 1034** | 0,93 | 11 | 21 |
| | 201 | 226,9 | 193 | 2,1 | 2,1 | 5,8 | 180 | 189 | 206 | 250 | 2 | – | 0,15 | **HJ 1034** | 0,93 | 11 | 21 |
| | 220 | 268,5 | 207 | 4 | 4 | 2,9 | 188 | 203 | 224 | 292,4 | 3 | – | 0,23 | **HJ 234 EC** | 1,65 | 12 | 20 |
| | – | 268,5 | 207 | 4 | 4 | 2,9 | 188 | 203 | 210 | 292,4 | 3 | 3 | 0,23 | **HJ 234 EC** | 1,65 | 12 | 20 |
| | – | 269,9 | 205 | 4 | 4 | 4,2 | 187 | 201 | 208 | 292,4 | 3 | 3 | 0,3 | **HJ 2234 EC** | 1,8 | 12 | 24 |
| | 220 | 269,9 | 205 | 4 | 4 | 4,2 | 187 | 201 | 226 | 292 | 3 | – | 0,3 | **HJ 2234 EC** | 1,8 | 12 | 24 |
| | – | 300,45 | 218 | 4 | 4 | 4,6 | 187 | 213 | 221 | 341,6 | 3 | 3 | 0,15 | – | – | – | – |
| | 234 | 300,2 | 216 | 4 | 4 | 10 | 186 | 211 | 238 | 341,6 | 3 | – | 0,38 | – | – | – | – |
| | – | 300,2 | 216 | 4 | 4 | 10 | 186 | 211 | 219 | 341,6 | 3 | 3 | 0,38 | – | – | – | – |
| **180** | 215 | 246,1 | 205 | 2,1 | 2,1 | 6,1 | 190 | 202 | 218 | 270 | 2 | – | 0,15 | – | – | – | – |
| | – | 246,1 | 205 | 2,1 | 2,1 | 6,1 | 190 | 202 | 208 | 270 | 2 | 2 | 0,15 | **HJ 1036** | 1,25 | 12 | 22,5 |
| | 230 | 278,6 | 217 | 4 | 4 | 2,9 | 198 | 213 | 234 | 302,2 | 3 | – | 0,23 | **HJ 236 EC** | 1,7 | 12 | 20 |
| | – | 278,6 | 217 | 4 | 4 | 2,9 | 198 | 213 | 220 | 302,2 | 3 | 3 | 0,23 | **HJ 236 EC** | 1,7 | 12 | 20 |
| | 229 | 280 | 215 | 4 | 4 | 4,2 | 197 | 211 | 233 | 302,2 | 3 | – | 0,3 | **HJ 2236 EC** | 1,9 | 12 | 24 |
| | – | 280 | 215 | 4 | 4 | 4,2 | 197 | 211 | 218 | 302,2 | 3 | 3 | 0,3 | **HJ 2236 EC** | 1,9 | 12 | 24 |




NU



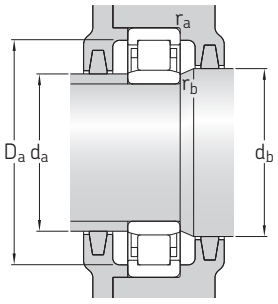

NJ

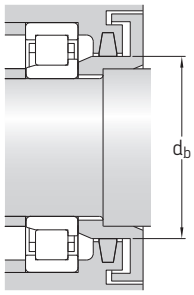


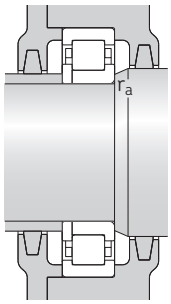

NUP

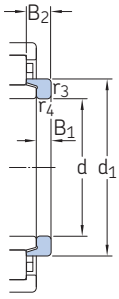
| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designations Bearing with standard cage | Alternative standard cage[1] |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **180** | 380 | 75 | 1 020 | 1 290 | 125 | 1 600 | 2 200 | 42,5 | ▸ **NU 336 ECM** | – |
| cont. | 380 | 75 | 1 020 | 1 290 | 125 | 1 600 | 2 200 | 44 | **NJ 336 ECM** | – |
| | 380 | 126 | 1 610 | 2 240 | 216 | 1 600 | 3 200 | 69,5 | **NU 2336 ECML** | – |
| | 380 | 126 | 1 610 | 2 240 | 216 | 1 600 | 3 200 | 70,5 | **NJ 2336 ECML** | – |
| **190** | 290 | 46 | 347 | 500 | 53 | 2 600 | 3 800 | 11 | **NJ 1038 ML** | M |
| | 290 | 46 | 347 | 500 | 53 | 2 600 | 3 800 | 11 | ▸ **NU 1038 ML** | M |
| | 340 | 55 | 800 | 965 | 98 | 2 000 | 3 400 | 22 | ▸ NJ 238 ECML | M |
| | 340 | 55 | 800 | 965 | 98 | 2 000 | 3 400 | 22,5 | ▸ NU 238 ECML | M |
| | 340 | 55 | 800 | 965 | 98 | 2 000 | 3 400 | 22,5 | NUP 238 ECML | M |
| | 340 | 92 | 1 220 | 1 600 | 160 | 2 000 | 3 400 | 35,5 | ▸ NU 2238 ECML | M |
| | 340 | 92 | 1 220 | 1 600 | 160 | 2 000 | 3 400 | 37 | NJ 2238 ECML | M |
| | 400 | 78 | 1 140 | 1 500 | 143 | 1 500 | 2 000 | 50 | ▸ **NU 338 ECM** | – |
| | 400 | 132 | 1 830 | 2 550 | 236 | 1 500 | 3 000 | 80,5 | **NU 2338 ECML** | – |
| | 400 | 132 | 1 830 | 2 550 | 236 | 1 500 | 3 000 | 82 | **NJ 2338 ECML** | – |
| **200** | 310 | 51 | 380 | 570 | 58,5 | 2 400 | 3 600 | 14 | ▸ **NU 1040 ML** | M |
| | 360 | 58 | 880 | 1 060 | 106 | 1 900 | 3 200 | 26,5 | ▸ NU 240 ECML | M |
| | 360 | 58 | 880 | 1 060 | 106 | 1 900 | 3 200 | 27 | ▸ NJ 240 ECML | M |
| | 360 | 98 | 1 370 | 1 800 | 180 | 1 900 | 3 200 | 44 | NJ 2240 ECML | – |
| | 360 | 98 | 1 370 | 1 800 | 180 | 1 900 | 3 200 | 44 | ▸ NU 2240 ECML | – |
| | 420 | 80 | 1 230 | 1 630 | 150 | 1 400 | 2 800 | 56,5 | **NJ 340 ECML** | – |
| | 420 | 80 | 1 230 | 1 630 | 150 | 1 400 | 2 800 | 57 | **NU 340 ECML** | – |
| | 420 | 138 | 1 980 | 2 800 | 255 | 1 400 | 2 800 | 92,5 | **NU 2340 ECML** | – |
| | 420 | 138 | 1 980 | 2 800 | 255 | 1 400 | 2 800 | 94 | **NJ 2340 ECML** | – |
| **220** | 340 | 56 | 495 | 735 | 73,5 | 2 200 | 3 200 | 18,5 | **NJ 1044 ML** | M |
| | 340 | 56 | 495 | 735 | 73,5 | 2 200 | 3 200 | 18,5 | ▸ **NU 1044 ML** | - |
| | 400 | 65 | 1 060 | 1 290 | 125 | 1 700 | 3 000 | 37 | ▸ NJ 244 ECML | M |
| | 400 | 65 | 1 060 | 1 290 | 125 | 1 700 | 3 000 | 37 | ▸ NU 244 ECML | M |
| | 400 | 65 | 1 060 | 1 290 | 125 | 1 700 | 3 000 | 37,5 | NUP 244 ECML | M |
| | 400 | 108 | 1 570 | 2 280 | 212 | 1 600 | 3 000 | 58 | ▸ **NU 2244 ECML** | – |
| | 400 | 108 | 1 570 | 2 280 | 212 | 1 600 | 3 000 | 60 | **NJ 2244 ECML** | – |
| | 460 | 88 | 1 210 | 1 630 | 150 | 1 500 | 1 700 | 73,5 | **NJ 344 M** | – |
| | 460 | 88 | 1 210 | 1 630 | 150 | 1 500 | 1 700 | 75 | ▸ **NU 344 M** | – |
| | 460 | 145 | 2 380 | 3 450 | 310 | 1 300 | 2 600 | 118 | ▸ **NU 2344 ECML** | – |

**SKF Explorer bearing**
▸ Popular item
[1] When ordering bearings with an alternative standard cage the suffix of the standard cage has to be replaced by the suffix of the alternative cage. For example NU .. ECP becomes NU .. ECML (for permissible speed → page 511).



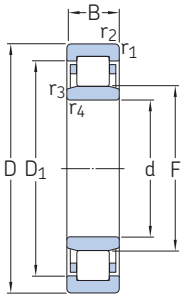



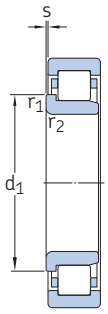




Angle ring

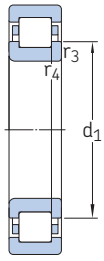
| Dimensions | | | | | | | Abutment and fillet dimensions | | | | | | Calculation factor | Angle ring Designation | Mass | Dimensions | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | F, E | $r_{1,2}$ min. | $r_{3,4}$ min. | s max. | $d_a$ min. | $d_a$ max. | $d_b$, $D_a$ min. | $D_a$ max. | $r_a$ max. | $r_b$ max. | $k_r$ | | | $B_1$ | $B_2$ |
| mm | | | | | | | mm | | | | | | – | – | kg | mm | |
| **180** | – | 318,6 | 231 | 4 | 4 | 4,2 | 197 | 226 | 234 | 361,3 | 3 | 3 | 0,15 | **–** | – | – | – |
| cont. | 250 | 318,6 | 231 | 4 | 4 | 4,2 | 197 | 226 | 254,5 | 361 | 3 | – | 0,15 | **–** | – | – | – |
| | – | 321,4 | 227 | 4 | 4 | 10,5 | 196 | 222 | 230 | 361,3 | 3 | 3 | 0,38 | **–** | – | – | – |
| | 248 | 321,4 | 227 | 4 | 4 | 10,5 | 196 | 222 | 252 | 361 | 3 | – | 0,38 | **–** | – | – | – |
| **190** | 225 | 256,1 | 215 | 2,1 | 2,1 | 6,1 | 200 | 212 | 231 | 280 | 2 | – | 0,15 | **HJ 1038** | 1,35 | 12 | 22,5 |
| | – | 256,1 | 215 | 2,1 | 2,1 | 6,1 | 200 | 212 | 219 | 280 | 2 | 2 | 0,15 | **HJ 1038** | 1,35 | 12 | 22,5 |
| | 244 | 295 | 230 | 4 | 4 | 3 | 207 | 226 | 248 | 321,9 | 3 | – | 0,23 | **HJ 238 EC** | 2,2 | 13 | 21,5 |
| | – | 295 | 230 | 4 | 4 | 3 | 207 | 226 | 233 | 321,9 | 3 | 3 | 0,23 | **HJ 238 EC** | 2,2 | 13 | 21,5 |
| | 244 | 295 | 230 | 4 | 4 | – | 207 | – | 248 | 321,9 | 3 | – | 0,23 | **–** | – | – | – |
| | – | 296,4 | 228 | 4 | 4 | 5 | 207 | 224 | 231 | 321,9 | 3 | 3 | 0,3 | **–** | – | – | – |
| | 243 | 296,4 | 228 | 4 | 4 | 5 | 207 | 224 | 247 | 322 | 3 | – | 0,3 | **–** | – | – | – |
| | – | 336,3 | 245 | 5 | 5 | 4,3 | 210 | 240 | 249 | 380 | 4 | 4 | 0,15 | **HJ 338 EC** | 4,3 | 18 | 29 |
| | – | 342,75 | 240 | 5 | 5 | 9,5 | 209 | 234 | 244 | 380 | 4 | 4 | 0,38 | **–** | – | – | – |
| | 262 | 342,75 | 240 | 5 | 5 | 9,5 | 209 | 234 | 266 | 378 | 4 | – | 0,38 | **–** | – | – | – |
| **200** | – | 269 | 229 | 2,1 | 2,1 | 7 | 211 | 225 | 234 | 300 | 2 | 2 | 0,15 | **HJ 1040** | 1,65 | 13 | 25,5 |
| | – | 311,5 | 243 | 4 | 4 | 2,6 | 217 | 238 | 247 | 341,6 | 3 | 3 | 0,23 | **HJ 240 EC** | 2,55 | 14 | 23 |
| | 258 | 311,5 | 243 | 4 | 4 | 2,6 | 217 | 238 | 262 | 341,6 | 3 | – | 0,23 | **HJ 240 EC** | 2,55 | 14 | 23 |
| | 256 | 312,9 | 241 | 4 | 4 | 5,1 | 217 | 236 | 260 | 342 | 3 | – | 0,3 | **–** | – | – | – |
| | – | 312,9 | 241 | 4 | 4 | 5,1 | 217 | 236 | 245 | 341,6 | 3 | 3 | 0,3 | **–** | – | – | – |
| | 278 | 352,4 | 258 | 5 | 5 | 6 | 220 | 253 | 282 | 400 | 4 | – | 0,23 | **–** | – | – | – |
| | – | 352,4 | 258 | 5 | 5 | 6 | 220 | 253 | 262 | 399,8 | 4 | 4 | 0,23 | **–** | – | – | – |
| | – | 357,6 | 253 | 5 | 5 | 9,4 | 220 | 247 | 257 | 399,8 | 4 | 4 | 0,38 | **–** | – | – | – |
| | 278 | 357,6 | 253 | 5 | 5 | 9,4 | 220 | 247 | 282 | 399,8 | 4 | – | 0,38 | **–** | – | – | – |
| **220** | 262 | 296,2 | 250 | 3 | 3 | 7,5 | 233 | 246 | 266 | 328 | 2,5 | – | 0,15 | **HJ 1044** | 2,15 | 14 | 27 |
| | – | 296,2 | 250 | 3 | 3 | 7,5 | 233 | 246 | 254 | 328 | 2,5 | 2,5 | 0,15 | **HJ 1044** | 2,15 | 14 | 27 |
| | 284 | 343,7 | 268 | 4 | 4 | 2,3 | 238 | 263 | 288 | 383 | 3 | – | 0,23 | **HJ 244 EC** | 3,25 | 15 | 25 |
| | – | 343,7 | 268 | 4 | 4 | 2,3 | 238 | 263 | 272 | 383 | 3 | 3 | 0,23 | **HJ 244 EC** | 3,25 | 15 | 25 |
| | 284 | 343,7 | 268 | 4 | 4 | – | 238 | – | 288 | 383 | 3 | – | 0,23 | **–** | – | – | – |
| | – | 350 | 259 | 4 | 4 | 7,9 | 237 | 254 | 263 | 383 | 3 | 3 | 0,3 | **–** | – | – | – |
| | 278 | 350 | 259 | 4 | 4 | 7,9 | 237 | 254 | 282 | 383 | 3 | – | 0,3 | **–** | – | – | – |
| | 307 | 371 | 284 | 5 | 5 | 5,2 | 240 | 277 | 311 | 440 | 4 | – | 0,15 | **–** | – | – | – |
| | – | 371 | 284 | 5 | 5 | 5,2 | 240 | 277 | 288 | 440 | 4 | 4 | 0,15 | **–** | – | – | – |
| | – | 391 | 277 | 5 | 5 | 10,4 | 238 | 272 | 272 | 442 | 4 | 4 | 0,1 | **–** | – | – | – |




NU



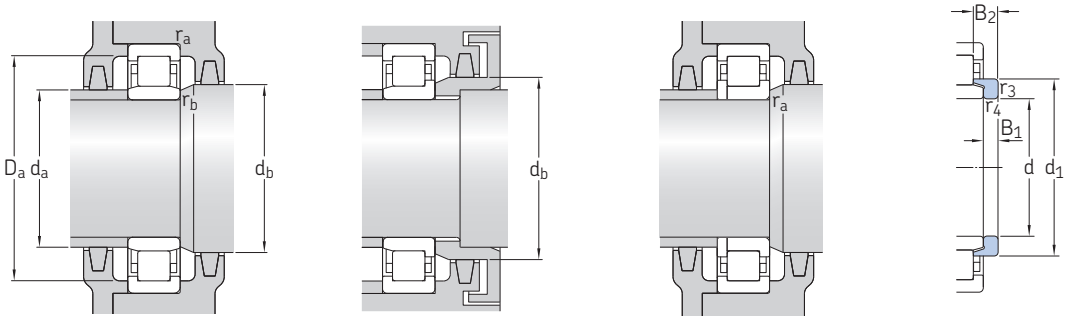

NJ




NUP

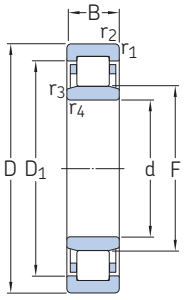
| Principal dimensions | | | Basic load ratings | | Fatigue load limit | Speed ratings | | Mass | Designations | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | dynamic | static | | Reference speed | Limiting speed | | Bearing with standard cage | Alternative standard cage[1] |
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **240** | 360 | 56 | 523 | 800 | 78 | 2 000 | 3 000 | 19,5 | ▸ **NU 1048 ML** | **M** |
| | 440 | 72 | 952 | 1 370 | 129 | 1 600 | 2 200 | 51,5 | ▸ **NU 248 MA** | **–** |
| | 440 | 72 | 952 | 1 370 | 129 | 1 600 | 2 200 | 53 | ▸ **NJ 248 MA** | **–** |
| | 440 | 72 | 952 | 1 370 | 129 | 1 600 | 2 200 | 53 | **NUP 248 MA** | **–** |
| | 440 | 120 | 1 450 | 2 360 | 216 | 1 500 | 2 200 | 84 | ▸ **NU 2248 MA** | **–** |
| | 440 | 120 | 1 450 | 2 360 | 224 | 1 500 | 2 200 | 86 | ▸ **NJ 2248 MA** | **–** |
| | 500 | 95 | 1 450 | 2 000 | 180 | 1 300 | 2 000 | 94,5 | **NU 348 MA** | **–** |
| | 500 | 95 | 1 450 | 2 000 | 180 | 1 300 | 2 000 | 98,5 | **NJ 348 MA** | **–** |
| | 500 | 155 | 2 750 | 4 000 | 345 | 1 200 | 2 400 | 137 | ▸ **NU 2348 ECML** | **–** |
| **260** | 400 | 65 | 627 | 965 | 96,5 | 1 800 | 2 800 | 29,5 | ▸ **NU 1052 ML** | **M** |
| | 400 | 65 | 627 | 965 | 96,5 | 1 800 | 2 800 | 30 | **NJ 1052 ML** | **M** |
| | 480 | 80 | 1 170 | 1 700 | 150 | 1 400 | 2 000 | 68,5 | ▸ **NU 252 MA** | **–** |
| | 480 | 80 | 1 170 | 1 700 | 150 | 1 400 | 2 000 | 69 | ▸ **NJ 252 MA** | **–** |
| | 480 | 80 | 1 170 | 1 700 | 150 | 1 400 | 2 000 | 72 | **NUP 252 MA** | **–** |
| | 480 | 130 | 1 790 | 3 000 | 265 | 1 300 | 2 000 | 112 | **NJ 2252 MA** | **–** |
| | 480 | 130 | 1 790 | 3 000 | 265 | 1 400 | 2 000 | 110 | ▸ **NU 2252 MA** | **–** |
| | 540 | 102 | 1 940 | 2 700 | 236 | 1 100 | 1 800 | 121 | **NU 352 ECMA** | **–** |
| | 540 | 165 | 3 140 | 4 550 | 400 | 1 100 | 1 900 | 196 | **NJ 2352 ECMA** | **–** |
| | 540 | 165 | 3 190 | 4 550 | 400 | 1 100 | 1 800 | 193 | **NU 2352 ECMA** | **–** |
| **280** | 420 | 65 | 660 | 1 060 | 102 | 1 700 | 2 600 | 31 | ▸ **NU 1056 ML** | **M** |
| | 460 | 146 | 2 290 | 3 900 | 335 | 1 200 | 2 000 | 101 | **NU 3156 ECMA** | **–** |
| | 500 | 80 | 1 140 | 1 800 | 156 | 1 400 | 1 900 | 73 | **NJ 256 MA** | **–** |
| | 500 | 80 | 1 190 | 1 800 | 156 | 1 400 | 1 900 | 71,5 | ▸ **NU 256 MA** | **–** |
| | 500 | 130 | 2 330 | 3 750 | 320 | 1 200 | 2 200 | 115 | ▸ **NU 2256 ECML** | **–** |
| | 580 | 175 | 2 700 | 4 300 | 365 | 1 000 | 1 700 | 230 | **NU 2356 MA** | **–** |
| **300** | 460 | 74 | 858 | 1 370 | 129 | 1 500 | 2 000 | 46 | **NJ 1060 MA** | **–** |
| | 460 | 74 | 858 | 1 370 | 129 | 1 500 | 2 000 | 46 | ▸ **NU 1060 MA** | **–** |
| | 460 | 95 | 1 510 | 2 600 | 245 | 1 300 | 2 000 | 62 | **NU 2060 ECMA** | **–** |
| | 540 | 85 | 1 420 | 2 120 | 183 | 1 300 | 1 400 | 89,5 | ▸ **NU 260 M** | **–** |
| | 540 | 140 | 2 090 | 3 450 | 300 | 1 200 | 1 800 | 145 | **NU 2260 MA** | **–** |
| | 620 | 109 | 2 330 | 3 350 | 280 | 950 | 1 200 | 174 | **NU 360 ECM** | **–** |
| | 620 | 185 | 4 020 | 5 850 | 480 | 950 | 1 600 | 270 | **NU 2360 ECMA** | **–** |

▸ Popular item
1) When ordering bearings with an alternative standard cage the suffix of the standard cage has to be replaced by the suffix of the alternative cage. For example NU .. ECP becomes NU .. ECML (for permissible speed → page 511).

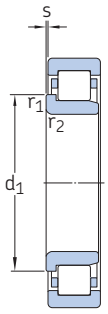



Angle ring

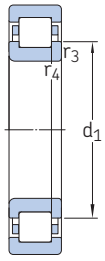
| Dimensions | | | | | | | Abutment and fillet dimensions | | | | | | Calculation factor | Angle ring | Mass | Dimensions | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Designation | | | |
| d | $d_1$ ≈ | $D_1$ ≈ | F, E | $r_{1,2}$ min. | $r_{3,4}$ min. | s max. | $d_a$ min. | $d_a$ max. | $d_b$, $D_a$ min. | $D_a$ max. | $r_a$ max. | $r_b$ max. | $k_r$ | | | $B_1$ | $B_2$ |
| mm | | | | | | | mm | | | | | | – | – | kg | mm | |
| **240** | – | 316,2 | 270 | 3 | 3 | 7,5 | 252 | 266 | 274 | 348 | 2,5 | 2,5 | 0,15 | **HJ 1048** | 2,25 | 14 | 27 |
| | – | 365 | 295 | 4 | 4 | 3,4 | 257 | 288 | 299 | 423 | 3 | 3 | 0,15 | – | – | – | – |
| | 313 | 365 | 295 | 4 | 4 | 3,4 | 257 | 288 | 317 | 423 | 3 | – | 0,15 | – | – | – | – |
| | 313 | 365 | 295 | 4 | 4 | – | 257 | – | 316 | 423 | 3 | – | 0,15 | – | – | – | – |
| | – | 365 | 295 | 4 | 4 | 4,3 | 257 | 284 | 299 | 423 | 3 | 3 | 0,2 | – | – | – | – |
| | 313 | 365 | 295 | 4 | 4 | 4,3 | 257 | 284 | 317 | 423 | 3 | – | 0,2 | – | – | – | – |
| | – | 410 | 310 | 5 | 5 | 5 | 258 | 305 | 314 | 482 | 4 | 4 | 0,1 | – | – | – | – |
| | 322 | 403 | 310 | 5 | 5 | 5,6 | 260 | 302 | 339 | 480 | 4 | – | 0,15 | – | – | – | – |
| | – | 425 | 299 | 5 | 5 | 1,5 | 258 | 294 | 314 | 482 | 4 | 4 | 0,38 | – | – | – | – |
| **260** | – | 353,1 | 296 | 4 | 4 | 8 | 275 | 292 | 300 | 385 | 3 | 3 | 0,15 | **HJ 1052** | 3,4 | 16 | 31,5 |
| | 309 | 353,1 | 296 | 4 | 4 | 8 | 275 | 292 | 313 | 385 | 3 | – | 0,15 | **HJ 1052** | 3,4 | 16 | 31,5 |
| | – | 397 | 320 | 5 | 5 | 3,4 | 280 | 313 | 324 | 460 | 4 | 4 | 0,15 | – | – | – | – |
| | 340 | 397 | 320 | 5 | 5 | 3,4 | 280 | 313 | 344 | 460 | 4 | – | 0,15 | – | – | – | – |
| | 340 | 397 | 320 | 5 | 5 | – | 280 | – | 344 | 460 | 4 | – | 0,23 | – | – | – | – |
| | 340 | 397 | 320 | 5 | 5 | 4,3 | 280 | 309 | 344 | 460 | 4 | – | 0,3 | – | – | – | – |
| | – | 397 | 320 | 5 | 5 | 4,3 | 280 | 309 | 324 | 460 | 4 | 4 | 0,2 | – | – | – | – |
| | – | 455 | 337 | 6 | 6 | 4,2 | 286 | 330 | 341 | 514 | 5 | 5 | 0,15 | – | – | – | – |
| | 350 | 458 | 324 | 6 | 6 | 5 | 284 | 320 | 355 | 516 | 5 | – | 0,4 | – | – | – | – |
| | – | 463 | 324 | 6 | 6 | 1,8 | 286 | 310 | 323 | 514 | 5 | 5 | 0,25 | – | – | – | – |
| **280** | – | 373,1 | 316 | 4 | 4 | 8 | 295 | 312 | 321 | 405 | 3 | 3 | 0,15 | **HJ 1056** | 3,6 | 16 | 31,5 |
| | – | 406 | 321 | 5 | 5 | 0,4 | 300 | 316 | 325 | 440 | 4 | 4 | 0,21 | – | – | – | – |
| | 360 | 417 | 340 | 5 | 5 | 3,8 | 300 | 333 | 364 | 480 | 4 | – | 0,15 | – | – | – | – |
| | – | 417 | 340 | 5 | 5 | 3,8 | 300 | 333 | 344 | 480 | 4 | 4 | 0,15 | – | – | – | – |
| | – | 433 | 333 | 5 | 5 | 4,5 | 298 | 328 | 331 | 482 | 4 | 4 | 0,3 | – | – | – | – |
| | – | 467 | 362 | 6 | 6 | 6,6 | 306 | 347 | 366 | 554 | 5 | 5 | 0,25 | – | – | – | – |
| **300** | 356 | 402 | 340 | 4 | 4 | 9,7 | 317 | 335 | 360 | 443 | 3 | – | 0,1 | – | – | – | – |
| | – | 402 | 340 | 4 | 4 | 9,7 | 317 | 335 | 344 | 443 | 3 | 3 | 0,15 | – | – | – | – |
| | – | 410 | 341 | 4 | 4 | 4,1 | 317 | 336 | 345 | 443 | 3 | 3 | 0,14 | – | – | – | – |
| | – | 451 | 364 | 5 | 5 | 4,8 | 320 | 358 | 368 | 520 | 4 | 4 | 0,15 | – | – | – | – |
| | – | 451 | 364 | 5 | 5 | 5,6 | 320 | 352 | 368 | 520 | 4 | 4 | 0,2 | – | – | – | – |
| | – | 505 | 385 | 7,5 | 7,5 | 4 | 328 | 380 | 368 | 592 | 6 | 6 | 0,1 | – | – | – | – |
| | – | 535 | 371 | 7,5 | 7,5 | 11 | 332 | 365 | 375 | 588 | 6 | 6 | 0,27 | – | – | – | – |




NU



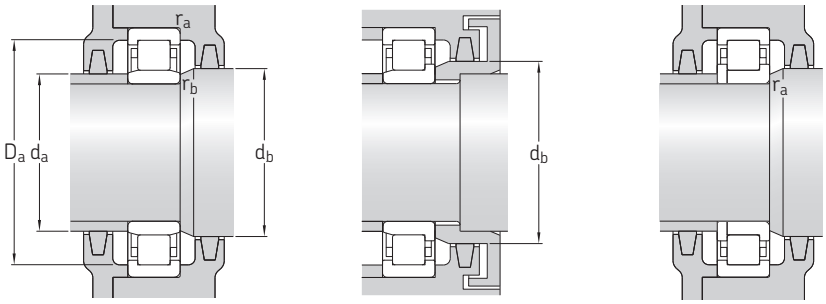

NJ



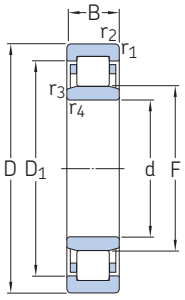

NUP

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designations Bearing with standard cage | Alternative standard cage[1] |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **320** | 440 | 56 | 693 | 1 200 | 110 | 1 500 | 2 000 | 26 | **NU 1964 ECMA** | – |
| | 480 | 74 | 880 | 1 430 | 132 | 1 400 | 1 400 | 48 | ▸ **NJ 1064 MA** | – |
| | 480 | 74 | 880 | 1 430 | 132 | 1 400 | 1 400 | 48,5 | ▸ **NU 1064 MA** | – |
| | 580 | 92 | 1 830 | 2 750 | 232 | 1 000 | 1 200 | 115 | **NU 264 ECM** | – |
| | 580 | 150 | 3 190 | 5 000 | 415 | 1 000 | 1 900 | 176 | **NU 2264 ECML** | – |
| | 670 | 200 | 4 730 | 7 500 | 600 | 850 | 1 500 | 370 | **NU 2364 ECMA** | – |
| **340** | 460 | 56 | 682 | 1 200 | 108 | 1 400 | 1 900 | 27,5 | **NU 1968 ECMA** | – |
| | 460 | 72 | 1 020 | 2 040 | 186 | 1 400 | 1 900 | 37 | **NJ 2968 ECMA** | – |
| | 520 | 133 | 2 200 | 4 150 | 365 | 1 100 | 1 700 | 109 | **NU 3068 MA** | – |
| | 580 | 190 | 3 470 | 5 850 | 490 | 950 | 1 600 | 217 | **NU 3168 ECMA** | – |
| | 620 | 165 | 2 640 | 4 500 | 365 | 1 000 | 1 500 | 226 | ▸ **NU 2268 MA** | – |
| | 710 | 212 | 5 610 | 8 650 | 680 | 800 | 1 400 | 439 | **NU 2368 ECMA** | – |
| **360** | 480 | 56 | 781 | 1 460 | 129 | 1 400 | 2 000 | 29 | **NU 1972 ECMP** | – |
| | 540 | 82 | 1 100 | 1 830 | 163 | 1 300 | 1 600 | 67,5 | ▸ **NU 1072 MA** | – |
| | 600 | 192 | 3 410 | 6 100 | 490 | 900 | 1 500 | 226 | **NU 3172 ECMA** | – |
| | 650 | 170 | 2 920 | 4 900 | 400 | 950 | 1 400 | 257 | **NU 2272 MA** | – |
| | 750 | 224 | 5 010 | 8 150 | 630 | 850 | 1 300 | 510 | **NU 2372 ECMA** | – |
| **380** | 480 | 46 | 561 | 1 120 | 98 | 1 300 | 2 000 | 20 | **NU 1876 ECMP** | – |
| | 480 | 46 | 561 | 1 120 | 98 | 1 300 | 2 000 | 21 | **NJ 1876 ECMP** | – |
| | 560 | 82 | 1 140 | 1 930 | 170 | 1 200 | 1 600 | 70 | ▸ **NU 1076 MA** | – |
| | 560 | 82 | 1 140 | 1 930 | 170 | 1 200 | 1 600 | 71 | ▸ **NJ 1076 MA** | – |
| | 560 | 135 | 2 380 | 4 750 | 400 | 1 000 | 1 800 | 109 | **NU 3076 ECMP** | – |
| | 680 | 175 | 3 960 | 6 400 | 510 | 850 | 1 300 | 288 | **NU 2276 ECMA** | – |
| **400** | 500 | 46 | 572 | 1 180 | 100 | 1 300 | 1 900 | 21,5 | **NU 1880 MP** | – |
| | 500 | 46 | 572 | 1 180 | 96,5 | 1 300 | 1 900 | 22 | **NJ 1880 MP** | – |
| | 500 | 46 | 572 | 1 180 | 96,5 | 1 300 | 1 900 | 22,5 | **NUP 1880 MP** | – |
| | 540 | 82 | 1 380 | 2 800 | 245 | 1 200 | 1 600 | 57 | **NJ 2980 ECMA** | – |
| | 540 | 106 | 1 760 | 3 750 | 320 | 1 000 | 1 500 | 74,5 | **NU 3980 ECMA** | – |
| | 600 | 90 | 1 380 | 2 320 | 196 | 1 100 | 1 500 | 90 | ▸ **NU 1080 MA** | – |
| | 600 | 90 | 1 380 | 2 320 | 196 | 1 100 | 1 500 | 93 | **NJ 1080 MA** | – |

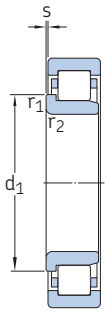
▸ Popular item
[1] When ordering bearings with an alternative standard cage the suffix of the standard cage has to be replaced by the suffix of the alternative cage. For example NU .. ECP becomes NU .. ECML (for permissible speed → page 511).



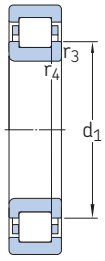

| Dimensions | | | | | | | Abutment and fillet dimensions | | | | | | Calculation factor | Angle ring Designation | Mass | Dimensions | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | F, E | $r_{1,2}$ min. | $r_{3,4}$ min. | s max. | $d_a$ min. | $d_a$ max. | $d_b$, $D_a$ min. | $D_a$ max. | $r_a$ max. | $r_b$ max. | $k_r$ | | | $B_1$ | $B_2$ |
| mm | | | | | | | mm | | | | | | – | – | kg | mm | |
| **320** | – | 404 | 348 | 3 | 3 | 1,5 | 333 | 347 | 355 | 427 | 2,5 | 2,5 | 0,11 | – | – | – | – |
| | 376 | 422 | 360 | 4 | 4 | 9,7 | 335 | 355 | 380 | 465 | 3 | – | 0,1 | – | – | – | – |
| | – | 422 | 360 | 4 | 4 | 9,7 | 335 | 355 | 364 | 465 | 3 | 3 | 0,15 | – | – | – | – |
| | – | 494 | 392 | 5 | 5 | 4,8 | 338 | 386 | 394 | 562 | 4 | 4 | 0,13 | – | – | – | – |
| | – | 506 | 380 | 5 | 5 | 5 | 338 | 376 | 394 | 562 | 4 | 4 | 0,1 | – | – | – | – |
| | – | 565 | 405 | 7,5 | 7,5 | 11 | 348 | 400 | 394 | 642 | 6 | 6 | 0,15 | – | – | – | – |
| **340** | – | 421 | 370 | 3 | 3 | 1,8 | 353 | 365 | 374 | 447 | 2,5 | 2,5 | 0,07 | – | – | – | – |
| | 377 | 421 | 367 | 3 | 3 | 3,8 | 353 | 363 | 381 | 447 | 2,5 | – | 0,07 | – | – | – | – |
| | – | 465 | 385 | 5 | 5 | 7 | 360 | 380 | 389 | 502 | 4 | 4 | 0,15 | – | – | – | – |
| | – | 507 | 390,5 | 5 | 5 | 14 | 360 | 388 | 403 | 560 | 4 | 4 | 0,27 | – | – | – | – |
| | – | 515 | 416 | 6 | 6 | 8 | 366 | 401 | 421 | 594 | 5 | 5 | 0,3 | – | – | – | – |
| | – | 602 | 425 | 7,5 | 7,5 | 11 | 368 | 420 | 389 | 682 | 6 | 6 | 0,15 | – | – | – | – |
| **360** | – | 438 | 387,5 | 3 | 3 | 2 | 375 | 382 | 392 | 465 | 2,5 | 2,5 | 0,1 | – | – | – | – |
| | – | 475 | 405 | 5 | 5 | 6,5 | 378 | 400 | 410 | 522 | 4 | 4 | 0,15 | – | – | – | – |
| | – | 475 | 420 | 5 | 5 | 9,4 | 380 | 407 | 425 | 580 | 4 | 4 | 0,21 | – | – | – | – |
| | – | 542 | 437 | 6 | 6 | 16,7 | 386 | 428 | 442 | 624 | 5 | 5 | 0,2 | – | – | – | – |
| | – | 617 | 465 | 7,5 | 7,5 | 10 | 392 | 453 | 470 | 718 | 6 | 6 | 0,25 | – | – | – | – |
| **380** | – | 449 | 406 | 2,1 | 2,1 | 2,5 | 390 | 400 | 410 | 470 | 1 | 1 | 0,1 | – | – | – | – |
| | 415 | 449 | 406 | 2,1 | 2,1 | 1,5 | 392 | 400 | 421 | 469 | 2 | – | 0,1 | – | – | – | – |
| | – | 495 | 425 | 5 | 5 | 10,8 | 398 | 420 | 430 | 542 | 4 | 4 | 0,15 | – | – | – | – |
| | 443 | 495 | 425 | 5 | 5 | 10,8 | 398 | 420 | 448 | 542 | 4 | – | 0,1 | – | – | – | – |
| | – | 506 | 425 | 5 | 5 | 8,5 | 398 | 417 | 430 | 542 | 4 | 4 | 0,17 | – | – | – | – |
| | – | 595 | 451 | 6 | 6 | 8,3 | 406 | 445 | 457 | 654 | 5 | 5 | 0,2 | – | – | – | – |
| **400** | – | 465 | 423 | 2,1 | 2,1 | 3,3 | 410 | 419 | 428 | 490 | 2 | 2 | 0,05 | – | – | – | – |
| | 433 | 465 | 423 | 2,1 | 2,1 | 3,3 | 410 | 419 | 436 | 490 | 2 | – | 0,05 | – | – | – | – |
| | 432 | 464 | 423 | 2,1 | 2,1 | – | 410 | – | 438 | 488 | 2 | – | 0,1 | – | – | – | – |
| | 448 | 495 | 435 | 4 | 4 | 0,9 | 415 | 430 | 454 | 525 | 3 | – | 0,15 | – | – | – | – |
| | – | 500 | 434,5 | 4 | 4 | 4 | 415 | 429 | 439 | 524 | 3 | 3 | 0,1 | – | – | – | – |
| | – | 527 | 450 | 5 | 5 | 14 | 418 | 446 | 455 | 582 | 4 | 4 | 0,15 | – | – | – | – |
| | 472 | 526 | 450 | 5 | 5 | 5 | 418 | 445 | 478 | 582 | 4 | – | 0,15 | – | – | – | – |




NU



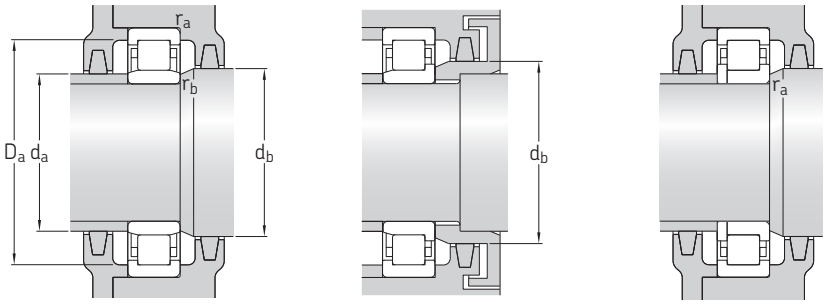

NJ




NUP

| Principal dimensions | | | Basic load ratings | | Fatigue load limit | Speed ratings | | Mass | Designations | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | dynamic | static | | Reference speed | Limiting speed | | Bearing with standard cage | Alternative standard cage[1] |
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **420** | 520 | 46 | 572 | 1 200 | 102 | 1 200 | 1 800 | 22 | **NU 1884 MP** | – |
| | 560 | 82 | 1 400 | 2 850 | 255 | 1 100 | 1 500 | 60 | **NU 2984 ECMA** | – |
| | 560 | 106 | 1 680 | 3 650 | 310 | 950 | 1 500 | 79,5 | **NUP 3984 ECMA** | – |
| | 620 | 90 | 1 420 | 2 450 | 200 | 1 100 | 1 400 | 94 | **NU 1084 MA** | – |
| | 700 | 224 | 4 950 | 9 000 | 695 | 750 | 1 300 | 365 | **NU 3184 ECMA** | – |
| **440** | 600 | 74 | 1 060 | 2 000 | 170 | 1 100 | 1 400 | 53 | **NU 1988 MA** | – |
| | 600 | 95 | 1 870 | 3 900 | 340 | 1 100 | 1 600 | 81 | ▸ **NU 2988 ECML** | – |
| | 600 | 95 | 1 870 | 3 900 | 340 | 1 100 | 1 600 | 83 | **NJ 2988 ECML** | – |
| | 650 | 122 | 2 550 | 4 900 | 390 | 8 500 | 1 300 | 145 | **NU 2088 ECMA** | – |
| | 720 | 226 | 5 120 | 10 000 | 765 | 700 | 1 200 | 388 | **NU 3188 ECMA/HB1** | – |
| **460** | 580 | 72 | 1 080 | 2 400 | 193 | 1 100 | 1 400 | 48 | **NJ 2892 ECMA** | – |
| | 620 | 95 | 1 720 | 3 600 | 310 | 1 000 | 1 300 | 89 | **NJ 2992 ECMA** | – |
| | 620 | 118 | 2 050 | 4 550 | 375 | 850 | 1 300 | 112 | **NUP 3992 ECMA** | – |
| | 680 | 100 | 1 650 | 2 850 | 224 | 950 | 1 200 | 115 | **NU 1092 MA** | – |
| | 760 | 240 | 5 280 | 9 650 | 735 | 670 | 1 100 | 450 | **NU 3192 ECMA/HB1** | – |
| | 830 | 165 | 4 180 | 6 800 | 510 | 750 | 1 100 | 415 | **NU 1292 MA** | – |
| | 830 | 212 | 5 120 | 8 650 | 655 | 700 | 1 100 | 527 | ▸ **NU 2292 MA** | – |
| **480** | 650 | 78 | 1 170 | 2 240 | 183 | 950 | 1 300 | 76 | **NU 1996 MA** | – |
| | 700 | 100 | 1 680 | 3 000 | 232 | 900 | 1 200 | 130 | **NU 1096 MA** | – |
| | 700 | 128 | 2 860 | 5 600 | 430 | 750 | 1 200 | 179 | **NU 2096 ECMA** | – |
| | 790 | 248 | 5 940 | 10 800 | 800 | 630 | 1 100 | 507 | **NU 3196 ECMA/HB1** | – |
| **500** | 670 | 100 | 2 050 | 4 250 | 355 | 900 | 1 200 | 107 | **NU 29/500 ECMA** | – |
| | 720 | 100 | 1 720 | 3 100 | 236 | 900 | 1 100 | 135 | ▸ **NU 10/500 MA** | – |
| | 720 | 128 | 2 920 | 5 850 | 440 | 750 | 1 100 | 180 | **NU 20/500 ECMA** | – |
| | 720 | 167 | 3 800 | 7 350 | 560 | 750 | 1 100 | 233 | **NU 30/500 ECMA** | – |
| | 830 | 264 | 6 440 | 12 000 | 880 | 600 | 1 000 | 595 | **NU 31/500 ECMA/HB1** | – |
| | 920 | 185 | 5 280 | 8 500 | 620 | 670 | 950 | 575 | **NU 12/500 MA** | – |
| **530** | 710 | 106 | 2 380 | 5 000 | 390 | 850 | 1 100 | 130 | **NUP 29/530 ECMA** | – |
| | 780 | 112 | 2 290 | 4 050 | 305 | 800 | 1 000 | 190 | **NU 10/530 MA** | – |
| | 780 | 145 | 3 740 | 7 350 | 550 | 670 | 1 000 | 253 | **NU 20/530 ECMA** | – |
| | 870 | 272 | 7 480 | 14 600 | 1 040 | 560 | 950 | 660 | **NU 31/530 ECMA/HB1** | – |

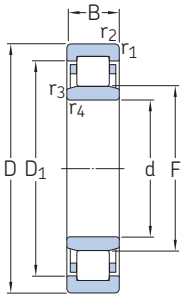
▸ Popular item
[1] When ordering bearings with an alternative standard cage the suffix of the standard cage has to be replaced by the suffix of the alternative cage. For example NU .. ECP becomes NU .. ECML (for permissible speed → page 511).



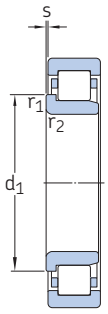

| Dimensions | | | | | | | Abutment and fillet dimensions | | | | | | Calculation factor | Angle ring Designation | Mass | Dimensions | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | F, E | $r_{1,2}$ min. | $r_{3,4}$ min. | s max. | $d_a$ min. | $d_a$ max. | $d_b$, $D_a$ min. | $D_a$ max. | $r_a$ max. | $r_b$ max. | $k_r$ | | | $B_1$ | $B_2$ |
| mm | | | | | | | mm | | | | | | – | – | kg | mm | |
| **420** | – | 488 | 447 | 2,1 | 2,1 | 3,3 | 431 | 442 | 452 | 508 | 2 | 2 | 0,1 | – | – | – | – |
| | – | 512 | 449 | 4 | 4 | 2,4 | 435 | 444 | 463 | 545 | 3 | 3 | 0,07 | – | – | – | – |
| | 468 | 518 | 455 | 4 | 4 | – | 436 | – | 472 | 544 | 3 | – | 0,15 | – | – | – | – |
| | – | 547 | 470 | 5 | 5 | 14 | 438 | 466 | 475 | 602 | 4 | 4 | 0,15 | – | – | – | – |
| | – | 613 | 485 | 6 | 6 | 14,2 | 446 | 478 | 490 | 694 | 5 | 5 | 0,21 | – | – | – | – |
| **440** | – | 544 | 482 | 4 | 4 | 5,5 | 455 | 477 | 487 | 585 | 3 | 3 | 0,07 | – | – | – | – |
| | – | 552 | 481,5 | 4 | 4 | 2,4 | 455 | 476 | 487 | 584 | 3 | 3 | 0,07 | – | – | – | – |
| | 496 | 551 | 481,5 | 4 | 4 | 1,5 | 455 | 475 | 502 | 585 | 3 | – | 0,15 | – | – | – | – |
| | – | 577 | 487 | 6 | 6 | 11,9 | 463 | 483 | 492 | 627 | 5 | 5 | 0,14 | – | – | – | – |
| | – | 637 | 509 | 6 | 6 | 12,5 | 466 | 500 | 514 | 694 | 5 | 5 | 0,21 | – | – | – | – |
| **460** | 499 | 543 | 489 | 3 | 3 | 1,1 | 473 | 485 | 505 | 567 | 2,5 | – | 0,07 | – | – | – | – |
| | 508 | 566 | 495 | 4 | 4 | 4 | 475 | 490 | 515 | 605 | 3 | – | 0,07 | – | – | – | – |
| | 515 | 571 | 501 | 4 | 4 | – | 476 | – | 520 | 604 | 3 | – | 0,15 | – | – | – | – |
| | – | 600 | 516 | 6 | 6 | 15,9 | 483 | 511 | 521 | 657 | 5 | 5 | 0,15 | – | – | – | – |
| | – | 662 | 529,3 | 7,5 | 7,5 | 13 | 492 | 519 | 534 | 728 | 6 | 6 | 0,27 | – | – | – | – |
| | – | 715 | 554 | 7,5 | 7,5 | 6,4 | 492 | 542 | 559 | 798 | 6 | 6 | 0,13 | – | – | – | – |
| | – | 706 | 554 | 7,5 | 7,5 | 16,5 | 492 | 542 | 559 | 798 | 6 | 6 | 0,2 | – | – | – | – |
| **480** | – | 592 | 525 | 5 | 5 | 6,5 | 498 | 517 | 530 | 632 | 4 | 4 | 0,07 | – | – | – | – |
| | – | 620 | 536 | 6 | 6 | 15,9 | 503 | 531 | 541 | 677 | 5 | 5 | 0,15 | – | – | – | – |
| | – | 629 | 533 | 6 | 6 | 12,7 | 503 | 529 | 538 | 677 | 5 | 5 | 0,14 | – | – | – | – |
| | – | 699 | 547 | 7,5 | 7,5 | 16 | 512 | 536 | 552 | 758 | 6 | 6 | 0,21 | – | – | – | – |
| **500** | – | 619 | 539,5 | 5 | 5 | 3 | 518 | 534 | 549 | 652 | 4 | 4 | 0,1 | – | – | – | – |
| | – | 640 | 556 | 6 | 6 | 11,2 | 523 | 550 | 561 | 697 | 5 | 5 | 0,15 | – | – | – | – |
| | – | 649 | 553 | 6 | 6 | 12,7 | 523 | 549 | 558 | 697 | 5 | 5 | 0,14 | – | – | – | – |
| | – | 650 | 540,8 | 6 | 6 | 8,6 | 523 | 532 | 546 | 697 | 5 | 5 | 0,21 | – | – | – | – |
| | – | 728 | 576 | 7,5 | 7,5 | 14,5 | 532 | 564 | 581 | 798 | 6 | 6 | 0,21 | – | – | – | – |
| | – | 780 | 603,1 | 7,5 | 7,5 | 13,9 | 532 | 593 | 610 | 888 | 6 | 6 | 0,17 | – | – | – | – |
| **530** | 590 | 656 | 573 | 5 | 5 | – | 548 | – | 595 | 692 | 4 | – | 0,15 | – | – | – | – |
| | – | 692 | 593 | 6 | 6 | 10,4 | 553 | 585 | 598 | 757 | 5 | 5 | 0,15 | – | – | – | – |
| | – | 704 | 591 | 6 | 6 | 6,8 | 553 | 587 | 596 | 757 | 5 | 5 | 0,2 | – | – | – | – |
| | – | 764 | 612 | 7,5 | 7,5 | 3 | 562 | 605 | 617 | 838 | 6 | 6 | 0,21 | – | – | – | – |

## 6.1 Single row cylindrical roller bearings

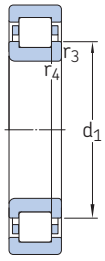
d **560 – 1 000** mm




NU



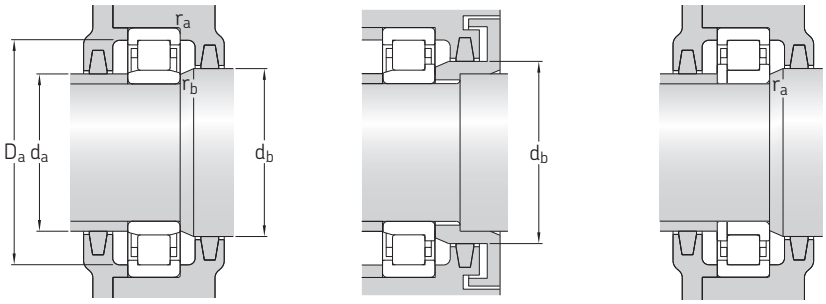

NJ




NUP

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designations Bearing with standard cage | Alternative standard cage[1] |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **560** | 750 | 112 | 2 460 | 5 700 | 450 | 800 | 1 000 | 145 | **NU 29/560 ECMA** | – |
| | 820 | 115 | 2 330 | 4 250 | 310 | 750 | 1 000 | 210 | **NU 10/560 MA** | – |
| | 820 | 150 | 3 800 | 7 650 | 560 | 630 | 1 000 | 290 | **NU 20/560 ECMA** | – |
| | 1 030 | 206 | 7 210 | 11 200 | 780 | 560 | 800 | 805 | **NU 12/560 MA** | – |
| | 1 030 | 272 | 9 900 | 16 600 | 1 160 | 530 | 800 | 1 090 | **NU 22/560 ECMA** | – |
| **600** | 730 | 60 | 897 | 2 080 | 108 | 800 | 1 000 | 54 | **NU 18/600 ECMA/HB1** | – |
| | 870 | 118 | 2 750 | 5 100 | 365 | 700 | 900 | 240 | **NU 10/600 MA** | – |
| | 870 | 155 | 4 180 | 8 000 | 570 | 600 | 900 | 325 | **NU 20/600 ECMA** | – |
| **630** | 780 | 69 | 1 100 | 2 500 | 183 | 750 | 950 | 75 | **NJ 18/630 ECMA/HB1** | – |
| | 850 | 100 | 2 240 | 4 400 | 315 | 700 | 900 | 168 | **NU 19/630 ECMA/HB1** | – |
| | 850 | 128 | 3 300 | 7 200 | 510 | 700 | 900 | 224 | **NU 29/630 ECMA/HB1** | – |
| | 850 | 128 | 3 300 | 7 200 | 510 | 700 | 900 | 230 | **NJ 29/630 ECMA/HB1** | – |
| | 920 | 170 | 4 730 | 9 500 | 670 | 560 | 850 | 400 | **NU 20/630 ECMA** | – |
| **710** | 870 | 95 | 1 940 | 5 000 | 375 | 630 | 850 | 130 | **NJ 28/710 ECMA** | – |
| | 950 | 140 | 3 740 | 8 300 | 570 | 600 | 800 | 297 | **NU 29/710 ECMA** | – |
| | 1 030 | 140 | 4 680 | 8 500 | 570 | 560 | 750 | 415 | **NU 10/710 ECMA** | – |
| | 1 030 | 185 | 5 940 | 12 000 | 815 | 480 | 700 | 540 | **NU 20/710 ECMA/HB1** | – |
| **750** | 1 090 | 150 | 4 730 | 8 800 | 585 | 430 | 670 | 487 | **NU 10/750 ECMA/HB1** | – |
| | 1 090 | 195 | 7 040 | 14 600 | 980 | 430 | 670 | 635 | **NU 20/750 ECMA** | – |
| **800** | 980 | 82 | 1 720 | 4 150 | 190 | 530 | 700 | 137 | **NU 18/800 ECMA** | – |
| | 1 150 | 200 | 7 040 | 14 600 | 950 | 400 | 630 | 715 | **NU 20/800 ECMA** | – |
| **850** | 1 030 | 106 | 2 120 | 6 000 | 240 | 500 | 670 | 193 | **NU 28/850 MA** | – |
| | 1 220 | 212 | 8 420 | 18 600 | 1 200 | 360 | 560 | 880 | **NU 20/850 ECMA** | – |
| **900** | 1 090 | 85 | 1 980 | 4 900 | 240 | 450 | 600 | 169 | **NU 18/900 ECMA** | – |
| | 1 180 | 165 | 5 280 | 12 500 | 800 | 430 | 560 | 514 | **NU 29/900 ECMA/HB1** | – |
| **1 000** | 1 220 | 100 | 2 640 | 6 550 | 400 | 400 | 530 | 265 | **NU 18/1000 MA/HB1** | – |
| | 1 220 | 100 | 2 640 | 6 550 | 400 | 400 | 530 | 269 | **NUP 18/1000 MA/HB1** | – |

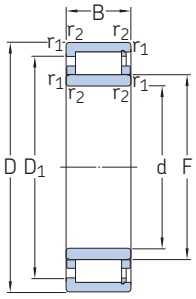
[1] When ordering bearings with an alternative standard cage the suffix of the standard cage has to be replaced by the suffix of the alternative cage. For example NU .. ECP becomes NU .. ECML (for permissible speed → page 511).



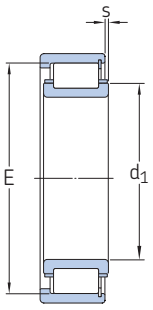

| Dimensions | | | | | | | Abutment and fillet dimensions | | | | | | Calculation factor | Angle ring Designation | Mass | Dimensions | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | F, E | $r_{1,2}$ min. | $r_{3,4}$ min. | s max. | $d_a$ min. | $d_a$ max. | $d_b$, $D_a$ min. | $D_a$ max. | $r_a$ max. | $r_b$ max. | $k_r$ | | | $B_1$ | $B_2$ |
| mm | | | | | | | mm | | | | | | – | – | kg | mm | |
| **560** | – | 693 | 608 | 5 | 5 | 4,5 | 578 | 600 | 613 | 732 | 4 | 4 | 0,07 | – | – | – | – |
| | – | 726 | 625 | 6 | 6 | 12,3 | 583 | 617 | 630 | 797 | 5 | 5 | 0,15 | – | – | – | – |
| | – | 741 | 626 | 6 | 6 | 6,7 | 583 | 616 | 631 | 797 | 5 | 5 | 0,14 | – | – | – | – |
| | – | 892 | 668 | 9,5 | 9,5 | 10,3 | 600 | 657 | 674 | 990 | 8 | 8 | 0,13 | – | – | – | – |
| | – | 900 | 664 | 9,5 | 9,5 | 3 | 594 | 658 | 674 | 990 | 8 | 8 | 0,1 | – | – | – | – |
| **600** | – | 681 | 632 | 3 | 3 | 0,7 | 613 | 625 | 637 | 717 | 2,5 | 2,5 | 0,05 | – | – | – | – |
| | – | 779 | 667 | 6 | 6 | 14 | 623 | 658 | 672 | 847 | 5 | 5 | 0,15 | – | – | – | – |
| | – | 793 | 661 | 6 | 6 | 6,1 | 623 | 652 | 667 | 847 | 5 | 5 | 0,14 | – | – | – | – |
| **630** | 682 | 724 | 667 | 4 | 4 | 1,5 | 645 | 662 | 685 | 765 | 3 | – | 0,1 | – | – | – | – |
| | – | 785 | 683 | 6 | 6 | 4,5 | 653 | 678 | 688 | 827 | 5 | 5 | 0,07 | – | – | – | – |
| | – | 782 | 683 | 6 | 6 | 7,1 | 653 | 678 | 688 | 827 | 5 | 5 | 0,07 | – | – | – | – |
| | 703 | 782 | 683 | 6 | 6 | 7,1 | 653 | 678 | 709 | 827 | 5 | – | 0,07 | – | – | – | – |
| | – | 832 | 699 | 7,5 | 7,5 | 8,7 | 658 | 690 | 705 | 892 | 6 | 6 | 0,14 | – | – | – | – |
| **710** | 766 | 817 | 751 | 4 | 4 | 1,5 | 728 | 745 | 771 | 853 | 3 | – | 0,15 | – | – | – | – |
| | – | 875 | 766 | 6 | 6 | 8,7 | 734 | 760 | 772 | 648 | 5 | 5 | 0,1 | – | – | – | – |
| | – | 939 | 778 | 7,5 | 7,5 | 17 | 738 | 769 | 783 | 1 002 | 6 | 6 | 0,15 | – | – | – | – |
| | – | 939 | 787 | 7,5 | 7,5 | 10 | 738 | 780 | 793 | 1 002 | 6 | 6 | 0,14 | – | – | – | – |
| **750** | – | 993 | 830 | 7,5 | 7,5 | 12,8 | 778 | 823 | 838 | 1 062 | 6 | 6 | 0,15 | – | – | – | – |
| | – | 993 | 832 | 7,5 | 7,5 | 12,8 | 778 | 823 | 838 | 1 062 | 6 | 6 | 0,14 | – | – | – | – |
| **800** | – | 920 | 846 | 5 | 5 | 1 | 818 | 840 | 861 | 962 | 4 | 4 | 0,15 | – | – | – | – |
| | – | 1 051 | 882 | 7,5 | 7,5 | 2 | 828 | 868 | 888 | 1 122 | 6 | 6 | 0,14 | – | – | – | – |
| **850** | – | 961 | 902 | 5 | 5 | 7 | 868 | 891 | 908 | 1 012 | 4 | 4 | 0,07 | – | – | – | – |
| | – | 1 110 | 942 | 7,5 | 7,5 | 2 | 878 | 936 | 956 | 1 190 | 6 | 6 | 0,17 | – | – | – | – |
| **900** | – | 1 026 | 948 | 5 | 5 | 4,7 | 918 | 942 | 956 | 1 072 | 4 | 4 | 0,05 | – | – | – | – |
| | – | 1 096 | 969 | 6 | 6 | 5,9 | 923 | 958 | 975 | 1 157 | 5 | 5 | 0,07 | – | – | – | – |
| **1 000** | – | 1 143 | 1 053 | 6 | 6 | 12,1 | 1 023 | 1 040 | 1 060 | 1 197 | 5 | 5 | 0,05 | – | – | – | – |
| | 1 072 | 1 146 | 1 053 | 6 | 6 | – | 1 025 | – | 1 080 | 1 196 | 5 | – | 0,2 | – | – | – | – |

## 6.2 High-capacity cylindrical roller bearings

d **100 – 170** mm



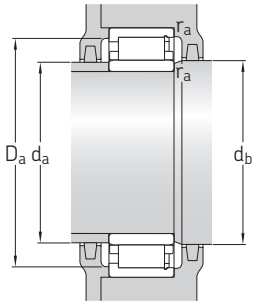

NUH .. ECMH

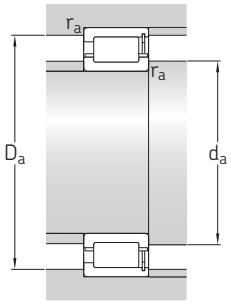



NCF .. ECJB

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | kg | – |
| **100** | 180 | 46 | 400 | 475 | 57 | 4 000 | 4 500 | 5,1 | NUH 2220 ECMH |
| | 215 | 73 | 710 | 800 | 91,5 | 3 200 | 3 800 | 13 | NUH 2320 ECMH |
| **110** | 200 | 53 | 465 | 550 | 64 | 3 600 | 4 000 | 7,3 | NUH 2222 ECMH |
| | 240 | 80 | 830 | 965 | 110 | 3 000 | 3 400 | 18 | NUH 2322 ECMH |
| **120** | 215 | 58 | 550 | 670 | 76,5 | 3 400 | 3 600 | 9 | NUH 2224 ECMH |
| | 260 | 86 | 965 | 1 120 | 125 | 2 800 | 3 200 | 22,5 | NUH 2324 ECMH |
| **130** | 230 | 64 | 630 | 780 | 88 | 3 200 | 3 400 | 11 | NUH 2226 ECMH |
| | 280 | 93 | 1 120 | 1 340 | 146 | 2 400 | 3 000 | 28 | NUH 2326 ECMH |
| | 280 | 93 | 1 120 | 1 340 | 146 | 2 400 | 3 400 | 29 | NCF 2326 ECJB |
| **140** | 250 | 68 | 680 | 880 | 96,5 | 2 800 | 3 200 | 14,5 | NUH 2228 ECMH |
| | 250 | 68 | 680 | 880 | 96,5 | 2 800 | 3 600 | 14,5 | NCF 2228 ECJB |
| | 300 | 102 | 1 250 | 1 530 | 163 | 2 400 | 2 800 | 35 | NUH 2328 ECMH |
| | 300 | 102 | 1 250 | 1 530 | 163 | 2 400 | 3 200 | 35,5 | NCF 2328 ECJB |
| **150** | 270 | 73 | 780 | 1 040 | 112 | 2 600 | 2 800 | 18 | NUH 2230 ECMH |
| | 270 | 73 | 780 | 1 040 | 112 | 2 600 | 3 400 | 18 | NCF 2230 ECJB |
| | 320 | 108 | 1 430 | 1 760 | 183 | 2 200 | 2 600 | 42 | NUH 2330 ECMH |
| | 320 | 108 | 1 430 | 1 760 | 183 | 2 200 | 3 000 | 43,5 | NCF 2330 ECJB |
| **160** | 290 | 80 | 980 | 1 270 | 134 | 2 400 | 2 600 | 23 | NUH 2232 ECMH |
| | 290 | 80 | 980 | 1 270 | 134 | 2 400 | 3 000 | 23,5 | NCF 2232 ECJB |
| | 340 | 114 | 1 400 | 2 000 | 196 | 1 800 | 2 400 | 50,5 | NUH 2332 ECMH |
| | 340 | 114 | 1 400 | 2 000 | 196 | 1 800 | 2 800 | 50,5 | NCF 2332 ECJB |
| | 340 | 114 | 1 600 | 2 000 | 196 | 2 000 | 2 800 | 50,5 | NCF 2332 ECJB/PEX |
| | 340 | 114 | 1 600 | 2 000 | 196 | 2 000 | 2 400 | 50,5 | NUH 2332 ECMH/PEX |
| **170** | 310 | 86 | 1 600 | 1 530 | 156 | 2 200 | 2 400 | 28,5 | NUH 2234 ECMH |
| | 310 | 86 | 1 160 | 1 530 | 156 | 2 200 | 2 800 | 28 | NCF 2234 ECJB |
| | 360 | 120 | 1 540 | 2 200 | 216 | 1 700 | 2 200 | 59,5 | NUH 2334 ECMH |
| | 360 | 120 | 1 540 | 2 200 | 216 | 1 700 | 2 600 | 58,5 | NCF 2334 ECJB |
| | 360 | 120 | 1 760 | 2 200 | 216 | 1 900 | 2 600 | 58,5 | NCF 2334 ECJB/PEX |
| | 360 | 120 | 1 760 | 2 200 | 216 | 1 900 | 2 200 | 59,5 | NUH 2334 ECMH/PEX |

SKF Explorer bearing

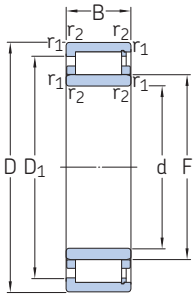


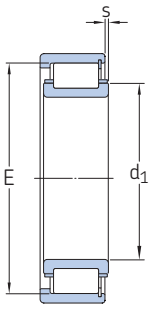

| Dimensions | | | | | | Abutment and fillet dimensions | | | | | | Calculation factor |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | F, E | $r_{1,2}$ min. | s max. | $d_a$ min. | $d_a$ max. | $d_b$ min. | $D_a$ min. | $D_a$ max. | $r_a$ max. | $k_r$ |
| mm | | | | | | mm | | | | | | – |
| **100** | – | 156 | 119 | 2,1 | 1 | 113 | 116 | 122 | 159 | 167 | 2 | 0,16 |
| | – | 182 | 127,5 | 3 | 2,2 | 114 | 124 | 131 | 186 | 199 | 2,5 | 0,2 |
| **110** | – | 173 | 132,5 | 2,1 | 2,2 | 122 | 129 | 135 | 177 | 187 | 2 | 0,16 |
| | – | 200 | 143 | 3 | 2,3 | 124 | 139 | 146 | 206 | 225 | 2,5 | 0,2 |
| **120** | – | 187 | 143,5 | 2,1 | 2,2 | 132 | 140 | 146 | 191 | 201 | 2 | 0,16 |
| | – | 218 | 154 | 3 | 2,4 | 134 | 150 | 157 | 224 | 244 | 2,5 | 0,2 |
| **130** | – | 201 | 153,5 | 3 | 2,6 | 144 | 150 | 157 | 205 | 215 | 2,5 | 0,16 |
| | – | 235 | 167 | 4 | 3,1 | 147 | 163 | 170 | 241 | 261 | 3 | 0,2 |
| | 181 | 235 | 247 | 4 | 8,7 | 147 | 174 | – | 241 | 261 | 3 | 0,2 |
| **140** | – | 216 | 169 | 3 | 3,2 | 154 | 165 | 172 | 220 | 235 | 2,5 | 0,16 |
| | 179 | 216 | 225 | 3 | 4,4 | 154 | 174 | – | 220 | 235 | 2,5 | 0,16 |
| | – | 251 | 180 | 4 | 3,9 | 157 | 175 | 183 | 257 | 282 | 3 | 0,2 |
| | 195 | 251 | 264 | 4 | 9,7 | 157 | 188 | – | 257 | 282 | 3 | 0,2 |
| **150** | – | 233 | 182 | 3 | 3,3 | 164 | 178 | 186 | 237 | 254 | 2,5 | 0,16 |
| | 193 | 233 | 242 | 3 | 4,9 | 164 | 188 | – | 237 | 254 | 2,5 | 0,16 |
| | – | 285 | 193 | 4 | 4,1 | 167 | 188 | 196 | 284 | 302 | 3 | 0,2 |
| | 209 | 269 | 283 | 4 | 10,5 | 167 | 201 | – | 276 | 302 | 3 | 0,2 |
| **160** | – | 250 | 193 | 3 | 3 | 174 | 189 | 196 | 256 | 274 | 2,5 | 0,16 |
| | 205 | 250 | 261 | 3 | 4,5 | 174 | 199 | – | 256 | 274 | 2,5 | 0,16 |
| | – | 285 | 204 | 4 | 2,5 | 177 | 199 | 207 | 292 | 321 | 3 | 0,2 |
| | 221 | 281 | 300 | 4 | 11 | 177 | 213 | – | 290 | 321 | 3 | 0,2 |
| | 221 | 281 | 300 | 4 | 11 | 177 | 213 | – | 290 | 321 | 3 | 0,2 |
| | – | 285 | 204 | 4 | 2,5 | 177 | 199 | 207 | 292 | 321 | 3 | 0,2 |
| **170** | – | 269 | 205 | 4 | 2,4 | 187 | 201 | 208 | 275 | 292 | 3 | 0,16 |
| | 219 | 270 | 281 | 4 | 4,2 | 187 | 212 | – | 275 | 292 | 3 | 0,16 |
| | – | 301 | 216 | 4 | 3,8 | 186 | 211 | 219 | 308 | 341 | 3 | 0,2 |
| | 234 | 301 | 316 | 4 | 10 | 186 | 225 | – | 308 | 341 | 3 | 0,2 |
| | 234 | 301 | 316 | 4 | 10 | 186 | 225 | – | 308 | 341 | 3 | 0,2 |
| | – | 301 | 216 | 4 | 3,8 | 186 | 211 | 219 | 308 | 341 | 3 | 0,2 |

## 6.2 High-capacity cylindrical roller bearings

d **180 – 240** mm



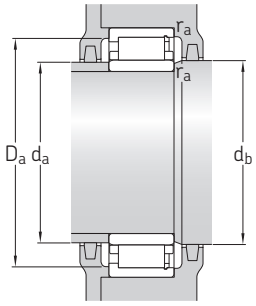

NUH .. ECMH

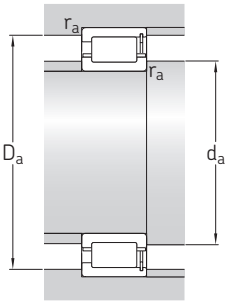



NCF .. ECJB

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | kg | – |
| **180** | 320 | 86 | 1 200 | 1 600 | 166 | 2 200 | 2 400 | 29,5 | NUH 2236 ECMH |
| | 320 | 86 | 1 200 | 1 600 | 166 | 2 200 | 2 800 | 30 | NCF 2236 ECJB |
| | 380 | 126 | 1 720 | 2 400 | 232 | 1 600 | 2 200 | 68 | NUH 2336 ECMH |
| | 380 | 126 | 1 720 | 2 400 | 232 | 1 600 | 2 400 | 67,5 | NCF 2336 ECJB |
| | 380 | 126 | 1 960 | 2 400 | 232 | 1 800 | 2 400 | 67,5 | NCF 2336 ECJB/PEX |
| | 380 | 126 | 1 960 | 2 400 | 232 | 1 800 | 2 200 | 68 | NUH 2336 ECMH/PEX |
| **190** | 340 | 92 | 1 320 | 1 760 | 180 | 2 000 | 2 200 | 36 | NUH 2238 ECMH |
| | 340 | 92 | 1 320 | 1 760 | 180 | 2 000 | 2 600 | 36,5 | NCF 2238 ECJB |
| | 400 | 132 | 1 940 | 2 750 | 255 | 1 500 | 2 000 | 78,5 | NUH 2338 ECMH |
| | 400 | 132 | 1 940 | 2 750 | 255 | 1 500 | 2 200 | 78 | NCF 2338 ECJB |
| | 400 | 132 | 2 240 | 2 750 | 255 | 1 700 | 2 200 | 78 | NCF 2338 ECJB/PEX |
| | 400 | 132 | 2 240 | 2 750 | 255 | 1 700 | 2 000 | 78,5 | NUH 2338 ECMH/PEX |
| **200** | 360 | 98 | 1 460 | 2 000 | 200 | 1 900 | 2 200 | 43,5 | NUH 2240 ECMH |
| | 360 | 98 | 1 460 | 2 000 | 200 | 1 900 | 2 400 | 43 | NCF 2240 ECJB |
| | 420 | 138 | 2 200 | 3 200 | 300 | 1 400 | 1 900 | 92,5 | NUH 2340 ECMH |
| | 420 | 138 | 2 200 | 3 200 | 300 | 1 400 | 2 200 | 91,5 | NCF 2340 ECJB |
| | 420 | 138 | 2 550 | 3 200 | 300 | 1 600 | 2 200 | 91,5 | NCF 2340 ECJB/PEX |
| | 420 | 138 | 2 550 | 3 200 | 300 | 1 600 | 1 900 | 92,5 | NUH 2340 ECMH/PEX |
| **220** | 400 | 108 | 1 760 | 2 600 | 240 | 1 600 | 1 900 | 59 | NUH 2244 ECMH |
| | 400 | 108 | 1 760 | 2 600 | 240 | 1 600 | 2 200 | 58,5 | NCF 2244 ECJB |
| | 400 | 108 | 2 000 | 2 600 | 240 | 1 700 | 1 900 | 59 | NUH 2244 ECMH/PEX |
| | 400 | 108 | 2 000 | 2 600 | 240 | 1 700 | 2 200 | 58,5 | NCF 2244 ECJB/PEX |
| | 460 | 145 | 2 510 | 3 650 | 335 | 1 300 | 1 700 | 116 | NUH 2344 ECMH |
| | 460 | 145 | 2 510 | 3 650 | 335 | 1 300 | 2 000 | 116 | NCF 2344 ECJB |
| | 460 | 145 | 2 900 | 3 650 | 335 | 1 400 | 1 700 | 116 | NUH 2344 ECMH/PEX |
| **240** | 440 | 120 | 1 980 | 3 050 | 275 | 1 400 | 1 700 | 80 | NUH 2248 ECMH |
| | 440 | 120 | 2 279 | 3 050 | 275 | 1 600 | 1 700 | 80 | NUH 2248 ECMH/PEX |
| | 500 | 155 | 2 750 | 4 000 | 345 | 1 200 | 1 500 | 143 | NUH 2348 ECMH |
| | 500 | 155 | 3 150 | 4 000 | 345 | 1 300 | 1 500 | 143 | NUH 2348 ECMH/PEX |

SKF Explorer bearing

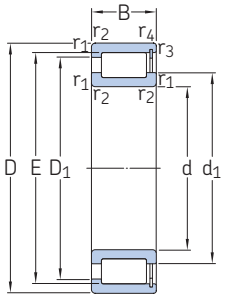


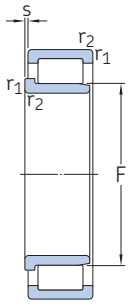

| Dimensions | | | | | | Abutment and fillet dimensions | | | | | | Calculation factor |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | F, E | $r_{1,2}$ min. | s max. | $d_a$ min. | $d_a$ max. | $d_b$ min. | $D_a$ min. | $D_a$ max. | $r_a$ max. | $k_r$ |
| mm | | | | | | mm | | | | | | – |
| **180** | – | 279 | 215 | 4 | 2,4 | 197 | 211 | 218 | 285 | 302 | 3 | 0,16 |
| | 229 | 279 | 291 | 4 | 4,2 | 197 | 222 | – | 285 | 302 | 3 | 0,16 |
| | – | 322 | 227 | 4 | 3,7 | 196 | 222 | 230 | 330 | 361 | 3 | 0,2 |
| | 247 | 320 | 339 | 4 | 10,5 | 196 | 237 | – | 329 | 361 | 3 | 0,2 |
| | 247 | 320 | 339 | 4 | 10,5 | 196 | 237 | – | 329 | 361 | 3 | 0,2 |
| | – | 322 | 227 | 4 | 3,7 | 196 | 222 | 230 | 311 | 361 | 3 | 0,2 |
| **190** | – | 296 | 228 | 4 | 3,1 | 207 | 224 | 231 | 302 | 321 | 3 | 0,16 |
| | 242 | 293 | 308 | 4 | 5 | 207 | 235 | – | 300 | 321 | 3 | 0,16 |
| | – | 342 | 240 | 5 | 4,1 | 209 | 234 | 244 | 351 | 380 | 4 | 0,2 |
| | 262 | 342 | 360 | 5 | 9,5 | 209 | 251 | – | 351 | 380 | 4 | 0,2 |
| | 262 | 342 | 360 | 5 | 9,5 | 209 | 251 | – | 351 | 380 | 4 | 0,2 |
| | – | 342 | 240 | 5 | 4,1 | 209 | 234 | 244 | 351 | 380 | 4 | 0,2 |
| **200** | – | 312 | 241 | 4 | 3,4 | 217 | 236 | 245 | 318 | 341 | 3 | 0,16 |
| | 256 | 312 | 325 | 4 | 5,1 | 217 | 249 | – | 318 | 341 | 3 | 0,16 |
| | – | 358 | 253 | 5 | 4,3 | 220 | 247 | 257 | 367 | 399 | 4 | 0,2 |
| | 275 | 356 | 377 | 5 | 9,4 | 220 | 264 | – | 367 | 399 | 4 | 0,2 |
| | 275 | 356 | 377 | 5 | 9,4 | 220 | 264 | – | 367 | 399 | 4 | 0,2 |
| | – | 358 | 253 | 5 | 4,3 | 220 | 247 | 257 | 367 | 399 | 4 | 0,2 |
| **220** | – | 350 | 259 | 4 | 2,5 | 237 | 254 | 263 | 359 | 383 | 3 | 0,16 |
| | 279 | 349 | 367 | 4 | 7,9 | 237 | 269 | – | 358 | 383 | 3 | 0,16 |
| | – | 350 | 259 | 4 | 2,5 | 237 | 254 | 263 | 359 | 383 | 3 | 0,16 |
| | 279 | 349 | 367 | 4 | 7,9 | 237 | 269 | – | 358 | 383 | 3 | 0,16 |
| | – | 392 | 277 | 5 | 3 | 240 | 270 | 281 | 334 | 439 | 4 | 0,2 |
| | 302 | 392 | 413 | 5 | 10,4 | 240 | 290 | – | 386 | 440 | 4 | 0,2 |
| | – | 392 | 277 | 5 | 3 | 240 | 270 | 281 | 334 | 439 | 4 | 0,2 |
| **240** | – | 312 | 287 | 4 | 3,5 | 258 | 294 | 299 | 299 | 422 | 3 | 0,16 |
| | – | 312 | 287 | 4 | 3,5 | 258 | 294 | 299 | 299 | 422 | 3 | 0,16 |
| | – | 426 | 299 | 5 | 3,1 | 260 | 298 | 303 | 362 | 479 | 4 | 0,2 |
| | – | 426 | 299 | 5 | 3,1 | 260 | 298 | 303 | 362 | 479 | 4 | 0,2 |

## 6.3 Single row full complement cylindrical roller bearings

d **20 – 85** mm



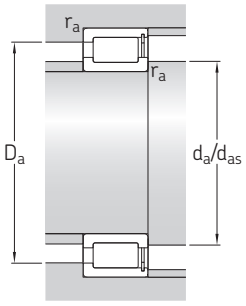

NCF

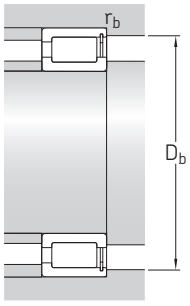


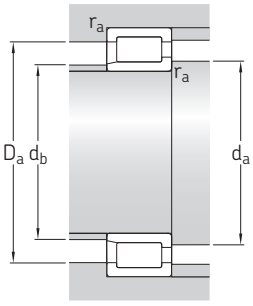

NJG

| Principal dimensions | | | Basic load ratings | | Fatigue load limit | Speed ratings | | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| | | | dynamic | static | | Reference speed | Limiting speed | | |
| d | D | B | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | kg | – |
| **20** | 42 | 16 | 28,1 | 28,5 | 3,1 | 8 500 | 10 000 | 0,11 | ▸ **NCF 3004 CV** |
| **25** | 47 | 16 | 31,9 | 35,5 | 3,8 | 7 000 | 9 000 | 0,12 | **NCF 3005 CV** |
| | 62 | 24 | 68,2 | 68 | 8,5 | 4 500 | 5 600 | 0,38 | **NJG 2305 VH** |
| **30** | 55 | 19 | 39,6 | 44 | 5,3 | 13 000 | 15 000 | 0,2 | ▸ **NCF 3006 CV** |
| | 72 | 27 | 84,2 | 86,5 | 11 | 4 000 | 4 800 | 0,56 | **NJG 2306 VH** |
| **35** | 62 | 20 | 48,4 | 56 | 6,55 | 5 300 | 6 700 | 0,26 | **NCF 3007 CV** |
| | 80 | 31 | 108 | 114 | 14,3 | 3 400 | 4 300 | 0,75 | **NJG 2307 VH** |
| **40** | 68 | 21 | 57,2 | 69,5 | 8,15 | 4 800 | 6 000 | 0,31 | ▸ **NCF 3008 CV** |
| | 90 | 33 | 145 | 156 | 20 | 3 000 | 3 600 | 1 | ▸ **NJG 2308 VH** |
| **45** | 75 | 23 | 60,5 | 78 | 9,15 | 4 300 | 5 300 | 0,4 | **NCF 3009 CV** |
| | 100 | 25 | 110 | 112 | 14 | 7 500 | 9 000 | 0,94 | **NJG 309 VH** |
| | 100 | 36 | 172 | 196 | 25,5 | 2 800 | 3 400 | 1,4 | **NJG 2309 VH** |
| **50** | 80 | 23 | 76,5 | 98 | 11,8 | 4 000 | 5 000 | 0,43 | ▸ **NCF 3010 CV** |
| **55** | 90 | 26 | 105 | 140 | 17,3 | 3 400 | 4 300 | 0,64 | **NCF 3011 CV** |
| | 120 | 43 | 233 | 260 | 33,5 | 2 200 | 2 800 | 2,3 | **NJG 2311 VH** |
| **60** | 85 | 16 | 55 | 80 | 9,15 | 3 600 | 4 500 | 0,27 | **NCF 2912 CV** |
| | 95 | 26 | 106 | 146 | 18,3 | 3 400 | 4 000 | 0,69 | **NCF 3012 CV** |
| **65** | 90 | 16 | 58,3 | 88 | 10,2 | 3 200 | 4 000 | 0,31 | **NCF 2913 CV** |
| | 100 | 26 | 112 | 163 | 20 | 3 000 | 3 800 | 0,73 | **NCF 3013 CV** |
| | 140 | 48 | 303 | 360 | 46,5 | 1 900 | 2 400 | 3,55 | **NJG 2313 VH** |
| **70** | 100 | 19 | 76,5 | 116 | 13,7 | 3 000 | 3 800 | 0,49 | ▸ **NCF 2914 CV** |
| | 110 | 30 | 128 | 173 | 22,4 | 6 000 | 7 000 | 1 | **NCF 3014 CV** |
| | 150 | 51 | 336 | 400 | 50 | 1 800 | 2 200 | 4,4 | **NJG 2314 VH** |
| **75** | 105 | 19 | 79,2 | 125 | 14,6 | 2 800 | 3 600 | 0,52 | **NCF 2915 CV** |
| | 115 | 30 | 134 | 190 | 24,5 | 2 600 | 3 200 | 1,05 | **NCF 3015 CV** |
| | 160 | 55 | 396 | 480 | 60 | 1 600 | 2 000 | 5,35 | **NJG 2315 VH** |
| **80** | 110 | 19 | 80,9 | 132 | 15,6 | 2 600 | 3 400 | 0,55 | ▸ **NCF 2916 CV** |
| | 125 | 34 | 165 | 228 | 29 | 2 400 | 3 000 | 1,45 | **NCF 3016 CV** |
| | 170 | 58 | 457 | 570 | 71 | 1 500 | 1 900 | 6,4 | **NJG 2316 VH** |
| **85** | 120 | 22 | 102 | 166 | 20,4 | 6 300 | 6 300 | 0,81 | **NCF 2917 CV** |
| | 130 | 34 | 172 | 236 | 30 | 2 400 | 3 000 | 1,5 | **NCF 3017 CV** |
| | 180 | 60 | 484 | 620 | 76,5 | 1 400 | 1 800 | 7,4 | **NJG 2317 VH** |

▸ Popular item



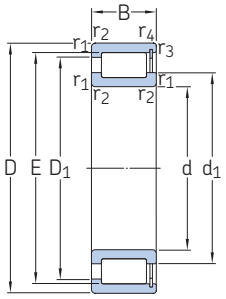




| Dimensions | | | | | | | Abutment and fillet dimensions | | | | | | | Calculation factor |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | E, F | $r_{1,2}$ min. | $r_{3,4}$ min. | s max. | $d_a$ min. | $d_{as}$[1] | $d_b$ max. | $D_a$ max. | $D_b$ max. | $r_a$ max. | $r_b$ max. | $k_r$ |
| mm | | | | | | | mm | | | | | | | – |
| **20** | 29 | 33 | 36,81 | 0,6 | 0,3[2] | 1,5 | 24 | 26,9 | – | 38 | 39 | 0,6 | 0,3 | 0,3 |
| **25** | 34 | 39 | 42,51 | 0,6 | 0,3 | 1,5 | 29 | 32,3 | – | 43 | 44 | 0,6 | 0,3 | 0,3 |
| | 36,1 | 48,2 | 31,74 | 1,1 | – | 1,7 | 31 | 33,9 | 30 | 55 | – | 1 | – | 0,35 |
| **30** | 40 | 45 | 49,6 | 1 | 0,3[2] | 2 | 35 | 37,8 | – | 50 | 52 | 1 | 0,3 | 0,3 |
| | 43,2 | 56,4 | 38,36 | 1,1 | – | 1,8 | 37 | 40,8 | 36,5 | 64 | – | 1 | – | 0,35 |
| **35** | 45 | 51 | 55,52 | 1 | 0,3 | 2 | 40 | 42,8 | – | 57 | 58 | 1 | 0,3 | 0,3 |
| | 50,4 | 65,8 | 44,75 | 1,5 | – | 2 | 43 | 47,6 | 42 | 71 | – | 1,5 | – | 0,35 |
| **40** | 50 | 58 | 61,74 | 1 | 0,3[2] | 2 | 45 | 47,9 | – | 63 | 65 | 1 | 0,3 | 0,3 |
| | 57,6 | 75,2 | 51,15 | 1,5 | – | 2,4 | 49 | 54,4 | 49 | 81 | – | 1,5 | – | 0,35 |
| **45** | 55 | 62 | 66,85 | 1 | 0,3 | 2 | 50 | 53 | – | 70 | 71 | 1 | 0,3 | 0,3 |
| | 62,5 | 80,1 | 56,14 | 1,5 | – | 1,7 | 54 | 59,3 | 54 | 91 | – | 1,5 | – | 0,35 |
| | 62,5 | 80,1 | 56,14 | 1,5 | – | 2,4 | 54 | 59,3 | 54 | 91 | – | 1,5 | – | 0,35 |
| **50** | 59 | 68 | 72,33 | 1 | 0,3[2] | 2 | 54 | 56,7 | – | 75 | 76 | 1 | 0,3 | 0,3 |
| **55** | 68 | 79 | 83,54 | 1,1 | 0,6[2] | 2 | 62 | 65,8 | – | 84 | 86 | 1 | 0,6 | 0,3 |
| | 75,5 | 98,6 | 67,14 | 2 | – | 2,6 | 65 | 71,3 | 64 | 109 | – | 2 | – | 0,35 |
| **60** | 69 | 74,5 | 78,65 | 1 | 0,6 | 1 | 64 | 66,8 | – | 80 | 80 | 1 | 0,5 | 0,2 |
| | 71 | 82 | 86,74 | 1,1 | 0,6 | 2 | 66 | 68,9 | – | 89 | 91 | 1 | 0,5 | 0,3 |
| **65** | 75,5 | 81 | 85,24 | 1 | 0,6 | 1 | 70 | 73,4 | – | 85 | 86 | 1 | 0,5 | 0,2 |
| | 78 | 88 | 93,09 | 1,1 | 0,6 | 2 | 71 | 75,6 | – | 94 | 95 | 1 | 0,5 | 0,3 |
| | 89,9 | 116 | 80,7 | 2,1 | – | 3 | 77 | 85,3 | 78 | 128 | – | 2 | – | 0,35 |
| **70** | 80,5 | 88,5 | 92,5 | 1 | 0,6[2] | 1 | 75 | 78,5 | – | 95 | 96 | 1 | 0,5 | 0,2 |
| | 81 | 95 | 100,28 | 1,1 | 0,6[2] | 3 | 75 | 78,6 | – | 104 | 105 | 1 | 0,5 | 0,3 |
| | 93,8 | 121 | 84,2 | 2,1 | – | 3 | 81 | 89 | 81 | 138 | – | 2 | – | 0,35 |
| **75** | 86 | 93 | 97,5 | 1 | 0,6 | 1 | 80 | 83,8 | – | 100 | 101 | 1 | 0,5 | 0,2 |
| | 89 | 103 | 107,9 | 1,1 | 0,6 | 3 | 81 | 86,5 | – | 109 | 110 | 1 | 0,5 | 0,3 |
| | 101 | 131 | 91,2 | 2,1 | – | 3 | 87 | 96,1 | 88 | 147 | – | 2 | – | 0,35 |
| **80** | 90,5 | 99 | 102,7 | 1 | 0,6[2] | 1 | 85 | 88,6 | – | 105 | 106 | 1 | 0,5 | 0,2 |
| | 95 | 111 | 116,99 | 1,1 | 0,6 | 4 | 86 | 92 | – | 119 | 120 | 1 | 0,5 | 0,3 |
| | 109 | 141 | 98,3 | 2,1 | – | 4 | 92 | 104 | 95 | 157 | – | 2 | – | 0,35 |
| **85** | 96 | 105 | 109,5 | 1,1 | 1 | 1 | 90 | 93,8 | – | 114 | 114 | 1 | 1 | 0,2 |
| | 99 | 116 | 121,44 | 1,1 | 0,6 | 4 | 91 | 96,2 | – | 123 | 125 | 1 | 0,5 | 0,3 |
| | 118 | 149 | 107 | 3 | – | 4 | 100 | 113 | 104 | 165 | – | 2,5 | – | 0,35 |

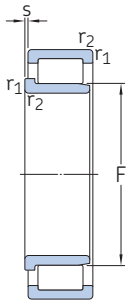
[1] Recommended shaft abutment diameter for axially loaded bearings → *Flange support*, page 512
[2] Parameter $r_{3,4}$ has either the value specified here or the same value as $r_{1,2}$.

## 6.3 Single row full complement cylindrical roller bearings

d **90 – 180** mm



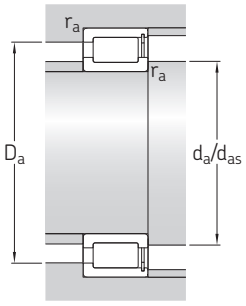

NCF

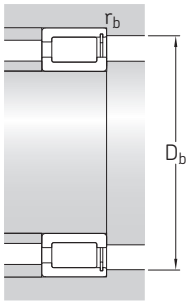


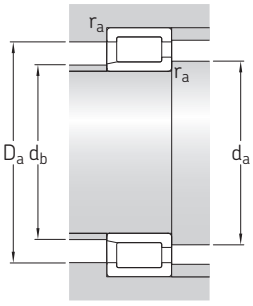

NJG

| Principal dimensions | | | Basic load ratings | | Fatigue load limit | Speed ratings | | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| | | | dynamic | static | | Reference speed | Limiting speed | | |
| d | D | B | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | kg | – |
| **90** | 125 | 22 | 105 | 176 | 20,8 | 2 400 | 3 000 | 0,84 | **NCF 2918 CV** |
| | 140 | 37 | 198 | 280 | 35,5 | 2 200 | 2 800 | 1,95 | **NCF 3018 CV** |
| | 190 | 64 | 550 | 680 | 83 | 1 400 | 1 700 | 8,75 | **NJG 2318 VH** |
| **100** | 140 | 24 | 128 | 200 | 24,5 | 2 000 | 2 600 | 1,1 | ▸ **NCF 2920 CV** |
| | 150 | 37 | 209 | 310 | 37,5 | 2 000 | 2 600 | 2,15 | **NCF 3020 CV** |
| | 215 | 73 | 704 | 900 | 106 | 1 200 | 1 500 | 13 | **NJG 2320 VH** |
| **110** | 150 | 24 | 134 | 220 | 26 | 1 900 | 2 400 | 1,2 | ▸ **NCF 2922 CV** |
| | 170 | 45 | 275 | 400 | 48 | 3 800 | 4 500 | 3,5 | **NCF 3022 CV** |
| | 240 | 80 | 858 | 1 060 | 122 | 1 100 | 1 300 | 17,5 | **NJG 2322 VH** |
| **120** | 165 | 27 | 172 | 290 | 34,5 | 4 300 | 4 300 | 1,75 | ▸ **NCF 2924 CV** |
| | 180 | 46 | 292 | 440 | 52 | 1 700 | 2 000 | 3,8 | **NCF 3024 CV** |
| | 215 | 58 | 512 | 735 | 85 | 1 400 | 1 700 | 9,05 | **NCF 2224 V** |
| | 260 | 86 | 952 | 1 250 | 140 | 1 000 | 1 200 | 22,5 | **NJG 2324 VH** |
| **130** | 180 | 30 | 205 | 360 | 40,5 | 1 600 | 2 000 | 2,35 | ▸ **NCF 2926 CV** |
| | 200 | 52 | 413 | 620 | 72 | 1 500 | 1 900 | 5,8 | **NCF 3026 CV** |
| | 280 | 93 | 1 080 | 1 430 | 156 | 950 | 1 200 | 28 | **NJG 2326 VH** |
| **140** | 190 | 30 | 220 | 390 | 43 | 1 500 | 1 900 | 2,4 | ▸ **NCF 2928 CV** |
| | 210 | 53 | 440 | 680 | 78 | 1 400 | 1 800 | 6,1 | **NCF 3028 CV** |
| | 250 | 68 | 693 | 1 020 | 114 | 1 200 | 1 500 | 14,5 | **NCF 2228 V** |
| | 300 | 102 | 1 230 | 1 660 | 180 | 850 | 1 100 | 35,5 | **NJG 2328 VH** |
| **150** | 210 | 36 | 292 | 490 | 55 | 1 400 | 1 700 | 3,75 | ▸ **NCF 2930 CV** |
| | 225 | 56 | 457 | 710 | 80 | 1 300 | 1 700 | 7,5 | **NCF 3030 CV** |
| | 270 | 73 | 781 | 1 220 | 132 | 950 | 1 200 | 18,5 | **NCF 2230 V** |
| | 320 | 108 | 1 450 | 1 930 | 196 | 800 | 1 000 | 42,5 | **NJG 2330 VH** |
| **160** | 220 | 36 | 303 | 530 | 58,5 | 1 300 | 1 600 | 4 | ▸ **NCF 2932 CV** |
| | 240 | 60 | 512 | 800 | 90 | 1 200 | 1 500 | 9,1 | **NCF 3032 CV** |
| | 290 | 80 | 990 | 1 500 | 160 | 950 | 1 200 | 23 | **NCF 2232 V** |
| **170** | 230 | 36 | 314 | 560 | 60 | 1 200 | 1 500 | 4,3 | ▸ **NCF 2934 CV** |
| | 260 | 67 | 671 | 1 060 | 118 | 1 100 | 1 400 | 12,5 | **NCF 3034 CV** |
| | 310 | 86 | 1 100 | 1 700 | 176 | 900 | 1 100 | 28,5 | **NCF 2234 V** |
| | 360 | 120 | 1 760 | 2 450 | 236 | 700 | 900 | 59,5 | **NJG 2334 VH** |
| **180** | 250 | 42 | 391 | 695 | 75 | 1 100 | 1 400 | 6,2 | ▸ **NCF 2936 CV** |
| | 280 | 74 | 781 | 1 250 | 134 | 1 100 | 1 300 | 16,5 | **NCF 3036 CV** |
| | 380 | 126 | 1 870 | 2 650 | 255 | 670 | 800 | 69,5 | **NJG 2336 VH** |

▸ Popular item



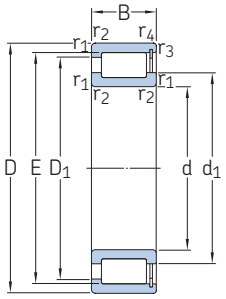




| Dimensions | | | | | | | Abutment and fillet dimensions | | | | | | | Calculation factor |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | E, F | $r_{1,2}$ min. | $r_{3,4}$ min. | s max. | $d_a$ min. | $d_{as}$[1] | $d_b$ max. | $D_a$ max. | $D_b$ max. | $r_a$ max. | $r_b$ max. | $k_r$ |
| mm | | | | | | | mm | | | | | | | – |
| **90** | 102 | 111 | 115,6 | 1,1 | 1 | 1 | 96 | 99,8 | – | 119 | 119 | 1 | 1 | 0,2 |
| | 106 | 124 | 130,11 | 1,5 | 1 | 4 | 97 | 103 | – | 133 | 133 | 1,5 | 1 | 0,3 |
| | 117 | 152 | 108,8 | 3 | – | 4 | 102 | 111 | 102 | 176 | – | 2,5 | – | 0,35 |
| **100** | 114 | 126 | 130,6 | 1,1 | 1 | 1,3 | 106 | 111 | – | 134 | 134 | 1 | 1 | 0,2 |
| | 115 | 134 | 139,65 | 1,5 | 1 | 4 | 107 | 112 | – | 142 | 143 | 1,5 | 1 | 0,3 |
| | 133 | 173 | 122,8 | 3 | – | 4 | 114 | 128 | 119 | 201 | – | 2,5 | – | 0,35 |
| **110** | 124 | 136 | 141,1 | 1,1 | 1 | 1,3 | 116 | 122 | – | 144 | 144 | 1 | 1 | 0,2 |
| | 127 | 149 | 156,13 | 2 | 1 | 5,5 | 119 | 124 | – | 160 | 163 | 2 | 1 | 0,3 |
| | 151 | 198 | 134,3 | 3 | – | 5 | 124 | 143 | 130 | 225 | – | 2,5 | – | 0,35 |
| **120** | 136 | 149 | 154,3 | 1,1 | 1 | 1,3 | 126 | 133 | – | 159 | 159 | 1 | 1 | 0,2 |
| | 139 | 160 | 167,58 | 2 | 1 | 5,5 | 129 | 135 | – | 170 | 174 | 2 | 1 | 0,3 |
| | 150 | 184 | 192,32 | 2,1 | 2,1 | 4 | 131 | 145 | – | 204 | 204 | 2 | 2 | 0,3 |
| | 164 | 213 | 147,39 | 3 | – | 5 | 134 | 156 | 143 | 245 | – | 2,5 | – | 0,35 |
| **130** | 147 | 161 | 167,1 | 1,5 | 1,1 | 2 | 138 | 144 | – | 172 | 173 | 1,5 | 1 | 0,2 |
| | 149 | 175 | 183,81 | 2 | 1 | 5,5 | 138 | 144 | – | 190 | 193 | 2 | 1 | 0,3 |
| | 175 | 226 | 157,9 | 4 | – | 6 | 147 | 166 | 153 | 263 | – | 3 | – | 0,35 |
| **140** | 158 | 173 | 180 | 1,5 | 1,1 | 2 | 148 | 155 | – | 182 | 183 | 1,5 | 1 | 0,2 |
| | 163 | 189 | 197,82 | 2 | 1 | 5,5 | 150 | 158 | – | 200 | 203 | 2 | 1 | 0,3 |
| | 173 | 212 | 221,92 | 3 | 3 | 5 | 153 | 167 | – | 236 | 236 | 2,5 | 2,5 | 0,3 |
| | 187 | 241 | 168,5 | 4 | – | 6,5 | 157 | 178 | 163 | 283 | – | 3 | – | 0,35 |
| **150** | 169 | 189 | 196,4 | 2 | 1,1 | 2 | 159 | 166 | – | 201 | 203 | 2 | 1 | 0,2 |
| | 170 | 198 | 206,8 | 2,1 | 1,1 | 7 | 159 | 165 | – | 214 | 217 | 2 | 1 | 0,3 |
| | 184 | 227 | 236,71 | 3 | 3 | 6 | 163 | 178 | – | 256 | 256 | 2,5 | 2,5 | 0,3 |
| | 202 | 261 | 182,5 | 4 | – | 6,5 | 168 | 192 | 178 | 302 | – | 3 | – | 0,35 |
| **160** | 180 | 200 | 207,2 | 2 | 1,1 | 2,5 | 169 | 177 | – | 211 | 211 | 2 | 1 | 0,2 |
| | 185 | 215 | 224,86 | 2,1 | 1,1 | 7 | 171 | 180 | – | 230 | 233 | 2 | 1 | 0,3 |
| | 208 | 255 | 266,36 | 3 | 3 | 6 | 176 | 201 | – | 276 | 276 | 2,5 | 2,5 | 0,3 |
| **170** | 191 | 211 | 218 | 2 | 1,1 | 2,5 | 179 | 188 | – | 221 | 223 | 2 | 1 | 0,2 |
| | 198 | 232 | 242,85 | 2,1 | 1,1 | 7 | 181 | 192 | – | 249 | 252 | 2 | 1 | 0,3 |
| | 219 | 269 | 281,09 | 4 | 4 | 7 | 189 | 212 | – | 295 | 294 | 3 | 3 | 0,3 |
| | 227 | 291 | 203,55 | 4 | – | 7 | 187 | 215 | 198 | 342 | – | 3 | – | 0,35 |
| **180** | 203 | 223 | 232 | 2 | 1,1 | 2,5 | 189 | 199 | – | 241 | 243 | 2 | 1 | 0,2 |
| | 212 | 248 | 260,22 | 2,1 | 2,1 | 7 | 192 | 206 | – | 269 | 269 | 2 | 2 | 0,3 |
| | 245 | 309 | 221,75 | 4 | – | 8 | 199 | 233 | 215 | 361 | – | 3 | – | 0,35 |

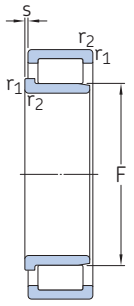
[1] Recommended shaft abutment diameter for axially loaded bearings → *Flange support*, page 512

## 6.3 Single row full complement cylindrical roller bearings

d **190 – 340** mm



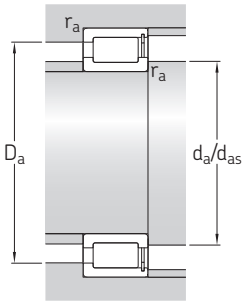

NCF

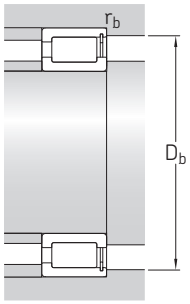


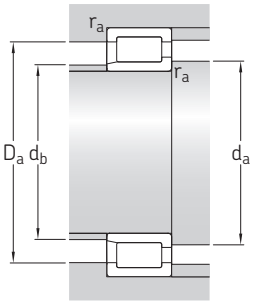

NJG

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | kg | – |
| **190** | 260 | 42 | 440 | 780 | 81,5 | 1 100 | 1 400 | 6,5 | ▸ **NCF 2938 CV** |
| | 290 | 75 | 792 | 1 290 | 140 | 1 000 | 1 300 | 17 | **NCF 3038 CV** |
| | 340 | 92 | 1 250 | 1 900 | 196 | 800 | 1 000 | 35,5 | **NCF 2238 V** |
| | 400 | 132 | 2 160 | 3 000 | 280 | 630 | 800 | 80 | **NJG 2338 VH** |
| **200** | 250 | 24 | 176 | 335 | 32,5 | 1 100 | 1 400 | 2,6 | **NCF 1840 V** |
| | 280 | 48 | 528 | 965 | 100 | 1 000 | 1 300 | 9,1 | ▸ **NCF 2940 CV** |
| | 310 | 82 | 913 | 1 530 | 160 | 950 | 1 200 | 22,5 | **NCF 3040 CV** |
| | 420 | 138 | 2 290 | 3 200 | 290 | 600 | 750 | 92 | **NJG 2340 VH** |
| **220** | 270 | 24 | 183 | 365 | 34,5 | 1 000 | 1 200 | 2,85 | **NCF 1844 V** |
| | 300 | 48 | 550 | 1 060 | 106 | 900 | 1 200 | 9,9 | ▸ **NCF 2944 CV** |
| | 340 | 90 | 1 080 | 1 800 | 186 | 850 | 1 100 | 29,5 | **NCF 3044 CV** |
| | 400 | 108 | 1 830 | 2 750 | 255 | 700 | 850 | 58 | **NCF 2244 V** |
| | 460 | 145 | 2 700 | 3 750 | 335 | 530 | 670 | 111 | **NJG 2344 VH** |
| **240** | 300 | 28 | 260 | 510 | 47,5 | 900 | 1 100 | 4,4 | **NCF 1848 V** |
| | 320 | 48 | 583 | 1 140 | 114 | 850 | 1 100 | 10,5 | ▸ **NCF 2948 CV** |
| | 360 | 92 | 1 140 | 1 960 | 200 | 800 | 1 000 | 32 | **NCF 3048 CV** |
| | 500 | 155 | 3 140 | 4 400 | 390 | 480 | 600 | 147 | **NJG 2348 VH** |
| **260** | 320 | 28 | 270 | 550 | 50 | 800 | 1 000 | 4,55 | **NCF 1852 V** |
| | 360 | 60 | 737 | 1 430 | 143 | 750 | 950 | 18 | ▸ **NCF 2952 CV** |
| | 400 | 104 | 1 540 | 2 550 | 250 | 700 | 900 | 46,5 | **NCF 3052 CV** |
| | 540 | 165 | 3 580 | 5 000 | 430 | 430 | 530 | 177 | **NJG 2352 VH** |
| **280** | 350 | 33 | 341 | 695 | 64 | 750 | 950 | 7,1 | **NCF 1856 V** |
| | 380 | 60 | 880 | 1 730 | 166 | 700 | 900 | 19,5 | ▸ **NCF 2956 CV** |
| | 420 | 106 | 1 570 | 2 650 | 260 | 670 | 850 | 50 | **NCF 3056 CV** |
| **300** | 380 | 38 | 418 | 850 | 75 | 670 | 850 | 10 | **NCF 1860 V** |
| | 420 | 72 | 1 120 | 2 200 | 208 | 630 | 800 | 31 | ▸ **NCF 2960 CV** |
| | 460 | 118 | 1 900 | 3 250 | 300 | 600 | 750 | 65,5 | **NCF 3060 CV** |
| **320** | 400 | 38 | 440 | 900 | 80 | 630 | 800 | 10,5 | **NCF 1864 V** |
| | 440 | 72 | 1 140 | 2 360 | 220 | 600 | 750 | 33 | ▸ **NCF 2964 V** |
| | 480 | 121 | 1 980 | 3 450 | 310 | 560 | 700 | 71 | **NCF 3064 CV** |
| **340** | 420 | 38 | 446 | 950 | 83 | 600 | 750 | 11 | **NCF 1868 V** |
| | 460 | 72 | 1 190 | 2 500 | 228 | 560 | 700 | 35 | **NCF 2968 V** |
| | 520 | 133 | 2 380 | 4 150 | 355 | 530 | 670 | 95 | **NCF 3068 CV** |

▸ Popular item



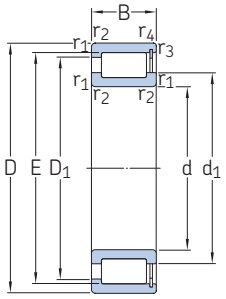



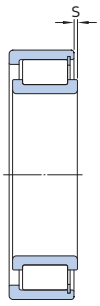

| Dimensions | | | | | | | Abutment and fillet dimensions | | | | | | | Calculation factor |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | E, F | $r_{1,2}$ min. | $r_{3,4}$ min. | s max. | $d_a$ min. | $d_{as}$[1] | $d_b$ max. | $D_a$ max. | $D_b$ max. | $r_a$ max. | $r_b$ max. | $k_r$ |
| mm | | | | | | | mm | | | | | | | – |
| **190** | 212 | 236 | 244 | 2 | 1,1 | 2 | 199 | 208 | – | 250 | 252 | 2 | 1 | 0,2 |
| | 222 | 258 | 269,76 | 2,1 | 2,1 | 8 | 202 | 216 | – | 279 | 279 | 2 | 2 | 0,3 |
| | 243 | 296 | 310,68 | 4 | 4 | 7 | 209 | 235 | – | 325 | 324 | 3 | 3 | 0,3 |
| | 250 | 320 | 224,544 | 5 | – | 8 | 210 | 239 | 222 | 378 | – | 4 | – | 0,35 |
| **200** | 218 | 231 | 237,5 | 1,5 | 1,1 | 1,8 | 207 | 215 | – | 243 | 244 | 1,5 | 1 | 0,1 |
| | 226 | 253 | 262 | 2,1 | 1,5 | 3 | 211 | 222 | – | 269 | 271 | 2 | 1,5 | 0,2 |
| | 237 | 275 | 287,75 | 2,1 | 2,1 | 9 | 213 | 230 | – | 299 | 299 | 2 | 2 | 0,3 |
| | 266 | 342 | 238,65 | 5 | – | 9 | 221 | 252 | 232 | 398 | – | 4 | – | 0,35 |
| **220** | 238 | 252 | 258 | 1,5 | 1,1 | 1,8 | 227 | 235 | – | 263 | 264 | 1,5 | 1 | 0,1 |
| | 247 | 274 | 283 | 2,1 | 1,5 | 3 | 231 | 243 | – | 289 | 291 | 2 | 1,5 | 0,2 |
| | 255 | 298 | 312,2 | 3 | 3 | 9 | 233 | 248 | – | 327 | 327 | 2,5 | 2,5 | 0,3 |
| | 277 | 349 | 366 | 4 | 4 | 8 | 239 | 268 | – | 385 | 383 | 3 | 3 | 0,3 |
| | 295 | 383 | 266,7 | 5 | – | 10 | 240 | 281 | 259 | 440 | – | 4 | – | 0,35 |
| **240** | 263 | 279 | 287 | 2 | 1,1 | 1,8 | 249 | 259 | – | 291 | 294 | 2 | 1 | 0,1 |
| | 267 | 294 | 303 | 2,1 | 1,5 | 3 | 251 | 263 | – | 309 | 311 | 2 | 1,5 | 0,2 |
| | 278 | 321 | 335,1 | 3 | 3 | 11 | 254 | 271 | – | 347 | 347 | 2,5 | 2,5 | 0,3 |
| | 310 | 403 | 287,75 | 5 | – | 10 | 260 | 295 | 282 | 480 | – | 4 | – | 0,35 |
| **260** | 283 | 299 | 307,2 | 2 | 1,1 | 1,8 | 269 | 279 | – | 311 | 313 | 2 | 1 | 0,1 |
| | 291 | 323 | 333,7 | 2,1 | 1,5 | 3,5 | 271 | 287 | – | 348 | 350 | 2 | 1,5 | 0,2 |
| | 304 | 358 | 375,97 | 4 | 4 | 11 | 277 | 295 | – | 384 | 384 | 3 | 3 | 0,3 |
| | 349 | 456 | 315,9 | 6 | – | 11 | 286 | 332 | 308 | 514 | – | 5 | – | 0,35 |
| **280** | 307 | 325 | 334 | 2 | 1,1 | 2,5 | 290 | 303 | – | 341 | 343 | 2 | 1 | 0,1 |
| | 314 | 348 | 359,1 | 2,1 | 1,5 | 3 | 291 | 309 | – | 368 | 370 | 2 | 1,5 | 0,2 |
| | 319 | 373 | 390,3 | 4 | 4 | 11 | 295 | 310 | – | 404 | 404 | 3 | 3 | 0,3 |
| **300** | 331 | 353 | 363 | 2,1 | 1,5 | 3 | 311 | 326 | – | 369 | 372 | 2 | 1,5 | 0,1 |
| | 341 | 375 | 390,5 | 3 | 3 | 5 | 314 | 334 | – | 405 | 405 | 2,5 | 2,5 | 0,2 |
| | 355 | 413 | 433 | 4 | 4 | 14 | 315 | 344 | – | 445 | 445 | 3 | 3 | 0,3 |
| **320** | 351 | 373 | 383 | 2,1 | 1,5 | 3 | 331 | 346 | – | 389 | 392 | 2 | 1,5 | 0,1 |
| | 359 | 401 | 411 | 3 | 3 | 5 | 333 | 353 | – | 427 | 427 | 2,5 | 2,5 | 0,2 |
| | 368 | 434 | 449,5 | 4 | 4 | 14 | 335 | 359 | – | 465 | 465 | 3 | 3 | 0,3 |
| **340** | 371 | 393 | 403 | 2,1 | 1,5 | 3 | 351 | 366 | – | 409 | 412 | 2 | 1,5 | 0,1 |
| | 378 | 421 | 431 | 3 | 3 | 5 | 353 | 373 | – | 447 | 447 | 2,5 | 2,5 | 0,2 |
| | 395 | 468 | 485,65 | 5 | 5 | 14 | 358 | 384 | – | 502 | 502 | 4 | 4 | 0,3 |

[1] Recommended shaft abutment diameter for axially loaded bearings → *Flange support*, page 512

## 6.3 Single row full complement cylindrical roller bearings

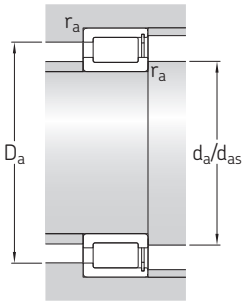
d **360 – 560** mm

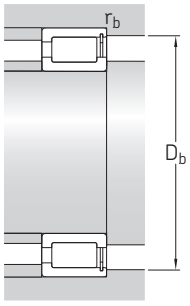



| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | kg | – |
| **360** | 440 | 38 | 402 | 900 | 76,5 | 560 | 700 | 11,5 | ▸ **NCF 1872 V** |
| | 480 | 72 | 1 230 | 2 600 | 240 | 530 | 670 | 36,5 | ▸ **NCF 2972 CV** |
| | 540 | 134 | 2 420 | 4 300 | 365 | 500 | 630 | 105 | **NCF 3072 CV** |
| **380** | 480 | 46 | 627 | 1 290 | 114 | 530 | 670 | 19,5 | ▸ **NCF 1876 V** |
| | 520 | 82 | 1 570 | 3 250 | 300 | 500 | 630 | 52 | ▸ **NCF 2976 V** |
| | 560 | 135 | 2 700 | 5 100 | 425 | 480 | 600 | 110 | **NCF 3076 V** |
| **400** | 500 | 46 | 627 | 1 340 | 118 | 500 | 630 | 20,5 | ▸ **NCF 1880 V** |
| | 540 | 82 | 1 650 | 3 450 | 310 | 480 | 600 | 54,5 | ▸ **NCF 2980 CV** |
| | 600 | 148 | 2 970 | 5 500 | 450 | 450 | 560 | 145 | **NCF 3080 CV** |
| **420** | 520 | 46 | 660 | 1 430 | 122 | 480 | 600 | 20,5 | ▸ **NCF 1884 V** |
| | 560 | 82 | 1 650 | 3 600 | 315 | 450 | 560 | 57 | ▸ **NCF 2984 V** |
| | 620 | 150 | 3 030 | 5 700 | 455 | 430 | 530 | 150 | **NCF 3084 CV** |
| **440** | 540 | 46 | 671 | 1 460 | 125 | 450 | 560 | 22 | ▸ **NCF 1888 V** |
| | 540 | 60 | 1 060 | 2 700 | 232 | 450 | 560 | 30 | **NCF 2888 V** |
| | 600 | 95 | 2 010 | 4 400 | 380 | 430 | 530 | 80 | ▸ **NCF 2988 V** |
| **460** | 580 | 72 | 1 300 | 3 050 | 260 | 430 | 530 | 44 | **NCF 2892 V/HB1** |
| | 620 | 95 | 2 050 | 4 500 | 390 | 400 | 500 | 83 | ▸ **NCF 2992 V** |
| | 680 | 163 | 3 690 | 6 950 | 540 | 380 | 480 | 195 | **NCF 3092 CV** |
| **480** | 600 | 56 | 935 | 2 040 | 170 | 400 | 500 | 35,5 | **NCF 1896 V** |
| | 600 | 72 | 1 320 | 3 150 | 265 | 400 | 500 | 46 | **NCF 2896 V** |
| | 650 | 100 | 2 290 | 4 900 | 405 | 380 | 480 | 93 | ▸ **NCF 2996 V** |
| | 700 | 165 | 3 740 | 7 200 | 550 | 360 | 450 | 205 | **NCF 3096 CV** |
| **500** | 620 | 56 | 952 | 2 120 | 173 | 380 | 480 | 35,5 | ▸ **NCF 18/500 V** |
| | 620 | 72 | 1 340 | 3 350 | 275 | 380 | 480 | 47 | **NCF 28/500 V** |
| | 670 | 100 | 2 380 | 5 300 | 430 | 360 | 450 | 100 | **NCF 29/500 V** |
| | 720 | 167 | 3 800 | 7 500 | 570 | 360 | 450 | 215 | **NCF 30/500 CV** |
| **530** | 650 | 56 | 990 | 2 240 | 180 | 360 | 450 | 38,5 | ▸ **NCF 18/530 V** |
| | 650 | 72 | 1 400 | 3 450 | 285 | 360 | 450 | 49,5 | **NCF 28/530 V** |
| | 710 | 106 | 2 700 | 6 000 | 465 | 340 | 430 | 120 | **NCF 29/530 V** |
| | 780 | 185 | 5 230 | 10 600 | 780 | 320 | 400 | 300 | **NCF 30/530 V** |
| **560** | 680 | 56 | 1 020 | 2 360 | 186 | 340 | 430 | 39 | ▸ **NCF 18/560 V/HB1** |
| | 680 | 72 | 1 420 | 3 650 | 300 | 340 | 430 | 54 | ▸ **NCF 28/560 V** |
| | 750 | 112 | 3 030 | 6 700 | 490 | 320 | 400 | 140 | **NCF 29/560 V/HB1** |
| | 820 | 195 | 5 830 | 11 800 | 865 | 300 | 380 | 345 | **NCF 30/560 V** |

▸ Popular item



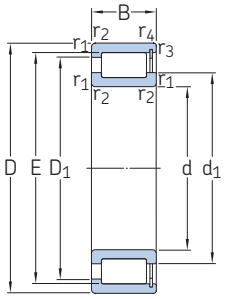



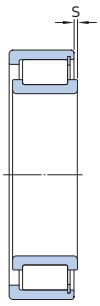

| Dimensions | | | | | | | Abutment and fillet dimensions | | | | | | | Calculation factor |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | E, F | $r_{1,2}$ min. | $r_{3,4}$ min. | s max. | $d_a$ min. | $d_{as}$[1] | $d_b$ max. | $D_a$ max. | $D_b$ max. | $r_a$ max. | $r_b$ max. | $k_r$ |
| mm | | | | | | | mm | | | | | | | – |
| **360** | 388 | 413 | 418,9 | 2,1 | 2,1 | 3 | 371 | 384 | – | 429 | 433 | 2 | 2 | 0,1 |
| | 404 | 437 | 451,5 | 3 | 3 | 5 | 373 | 396 | – | 467 | 467 | 2,5 | 2,5 | 0,2 |
| | 412 | 486 | 503,45 | 5 | 5 | 14 | 378 | 402 | – | 522 | 522 | 4 | 4 | 0,3 |
| **380** | 416 | 448 | 458 | 2,1 | 2,1 | 3,5 | 391 | 411 | – | 469 | 473 | 2 | 2 | 0,1 |
| | 427 | 474 | 488 | 4 | 4 | 5 | 395 | 420 | – | 505 | 505 | 3 | 3 | 0,2 |
| | 431 | 504 | 520,5 | 5 | 5 | 14 | 398 | 420 | – | 542 | 542 | 4 | 4 | 0,3 |
| **400** | 433 | 465 | 475 | 2,1 | 2,1 | 3,5 | 411 | 428 | – | 489 | 493 | 2 | 2 | 0,1 |
| | 449 | 499 | 511 | 4 | 4 | 5 | 415 | 442 | – | 525 | 525 | 3 | 3 | 0,2 |
| | 460 | 540 | 558 | 5 | 5 | 14 | 418 | 449 | – | 582 | 582 | 4 | 4 | 0,3 |
| **420** | 457 | 489 | 499 | 2,1 | 2,1 | 3,5 | 431 | 452 | – | 509 | 513 | 2 | 2 | 0,1 |
| | 462 | 512 | 524 | 4 | 4 | 5 | 435 | 455 | – | 545 | 545 | 3 | 3 | 0,2 |
| | 480 | 559 | 577,6 | 5 | 5 | 15 | 438 | 469 | – | 602 | 602 | 4 | 4 | 0,3 |
| **440** | 474 | 506 | 516 | 2,1 | 2,1 | 3,5 | 451 | 469 | – | 529 | 533 | 2 | 2 | 0,1 |
| | 474 | 508 | 516 | 2,1 | 2,1 | 3,5 | 451 | 469 | – | 529 | 533 | 2 | 2 | 0,11 |
| | 502 | 545 | 565,5 | 4 | 4 | 6 | 455 | 492 | – | 585 | 585 | 3 | 3 | 0,2 |
| **460** | 501 | 543 | 553 | 3 | 3 | 5 | 473 | 495 | – | 567 | 567 | 2,5 | 2,5 | 0,11 |
| | 516 | 558 | 579 | 4 | 4 | 6 | 475 | 506 | – | 605 | 605 | 3 | 3 | 0,2 |
| | 522 | 611 | 632,97 | 6 | 6 | 16 | 483 | 511 | – | 657 | 657 | 5 | 5 | 0,3 |
| **480** | 522 | 561 | 573,5 | 3 | 3 | 5 | 493 | 516 | – | 587 | 587 | 2,5 | 2,5 | 0,1 |
| | 520 | 562 | 573,5 | 3 | 3 | 5 | 493 | 515 | – | 587 | 587 | 2,5 | 2,5 | 0,11 |
| | 538 | 584 | 615 | 5 | 5 | 7 | 498 | 527 | – | 632 | 632 | 4 | 4 | 0,2 |
| | 546 | 628 | 654 | 6 | 6 | 16 | 503 | 532 | – | 677 | 677 | 5 | 5 | 0,3 |
| **500** | 542 | 582 | 594 | 3 | 3 | 5 | 513 | 536 | – | 607 | 607 | 2,5 | 2,5 | 0,1 |
| | 541 | 582 | 594 | 3 | 3 | 2,4 | 513 | 536 | – | 607 | 607 | 2,5 | 2,5 | 0,11 |
| | 553 | 611 | 634,5 | 5 | 5 | 7 | 518 | 544 | – | 652 | 652 | 4 | 4 | 0,2 |
| | 565 | 650 | 676 | 6 | 6 | 16 | 523 | 553 | – | 697 | 697 | 5 | 5 | 0,3 |
| **530** | 573 | 612 | 624,5 | 3 | 3 | 5 | 543 | 567 | – | 637 | 637 | 2,5 | 2,5 | 0,1 |
| | 572 | 614 | 624,5 | 3 | 3 | 5 | 543 | 566 | – | 637 | 637 | 2,5 | 2,5 | 0,11 |
| | 598 | 648 | 673 | 5 | 5 | 7 | 548 | 587 | – | 692 | 692 | 4 | 4 | 0,2 |
| | 610 | 702 | 732 | 6 | 6 | 16 | 553 | 595 | – | 757 | 757 | 5 | 5 | 0,3 |
| **560** | 603 | 643 | 655 | 3 | 3 | 5 | 573 | 597 | – | 667 | 667 | 2,5 | 2,5 | 0,1 |
| | 606 | 637 | 655 | 3 | 3 | 4,3 | 573 | 599 | – | 667 | 667 | 2,5 | 2,5 | 0,11 |
| | 628 | 682 | 709 | 5 | 5 | 7 | 578 | 615 | – | 732 | 732 | 4 | 4 | 0,2 |
| | 642 | 738 | 770 | 6 | 6 | 16 | 583 | 626 | – | 797 | 797 | 5 | 5 | 0,3 |

[1] Recommended shaft abutment diameter for axially loaded bearings → *Flange support*, page 512

## 6.3 Single row full complement cylindrical roller bearings

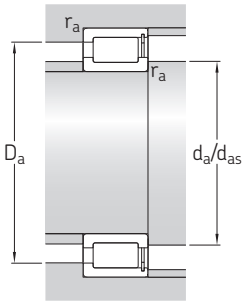
d **600 – 1 120** mm

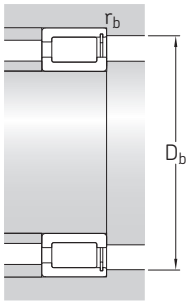



| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | kg | – |
| **600** | 730 | 60 | 1 050 | 2 550 | 196 | 320 | 400 | 51,5 | ▸ **NCF 18/600 V** |
| | 730 | 78 | 1 570 | 4 300 | 340 | 320 | 400 | 67,5 | **NCF 28/600 V/HB1** |
| | 800 | 118 | 3 360 | 7 500 | 550 | 300 | 380 | 170 | **NCF 29/600 V** |
| **630** | 780 | 69 | 1 250 | 2 900 | 232 | 300 | 360 | 72,5 | ▸ **NCF 18/630 V** |
| | 780 | 88 | 1 940 | 5 000 | 390 | 300 | 360 | 92 | **NCF 28/630 V** |
| | 850 | 128 | 3 740 | 8 650 | 610 | 280 | 340 | 205 | **NCF 29/630 V** |
| **670** | 820 | 69 | 1 300 | 3 150 | 245 | 280 | 340 | 74 | ▸ **NCF 18/670 V** |
| | 820 | 88 | 1 940 | 5 300 | 415 | 280 | 340 | 98 | ▸ **NCF 28/670 V** |
| | 900 | 136 | 3 910 | 9 000 | 630 | 260 | 320 | 245 | **NCF 29/670 V** |
| **710** | 870 | 74 | 1 540 | 3 750 | 285 | 260 | 320 | 92,5 | **NCF 18/710 V** |
| | 870 | 95 | 2 330 | 6 300 | 480 | 260 | 320 | 115 | **NCF 28/710 V** |
| | 950 | 140 | 4 290 | 10 000 | 695 | 240 | 300 | 275 | **NCF 29/710 V** |
| **750** | 920 | 78 | 1 760 | 4 300 | 315 | 240 | 300 | 105 | ▸ **NCF 18/750 V** |
| | 920 | 100 | 2 640 | 6 950 | 520 | 240 | 300 | 139 | **NCF 28/750 V** |
| | 1 000 | 145 | 4 460 | 10 600 | 710 | 220 | 280 | 313 | **NCF 29/750 V** |
| **800** | 980 | 82 | 1 940 | 4 800 | 345 | 220 | 280 | 126 | **NCF 18/800 V** |
| | 980 | 106 | 2 750 | 7 500 | 550 | 220 | 280 | 169 | ▸ **NCF 28/800 V** |
| | 1 060 | 150 | 4 950 | 12 000 | 800 | 200 | 260 | 359 | **NCF 29/800 V** |
| **850** | 1 030 | 82 | 2 050 | 5 200 | 375 | 200 | 260 | 131 | **NCF 18/850 V** |
| | 1 030 | 106 | 2 860 | 8 000 | 570 | 200 | 260 | 175 | **NCF 28/850 V** |
| | 1 120 | 155 | 5 230 | 12 700 | 830 | 190 | 240 | 406 | **NCF 29/850 V** |
| **900** | 1 090 | 85 | 2 240 | 5 700 | 405 | 190 | 240 | 154 | **NCF 18/900 V/HB1** |
| | 1 090 | 112 | 3 190 | 9 150 | 655 | 190 | 240 | 210 | **NCF 28/900 V** |
| | 1 180 | 165 | 5 940 | 14 600 | 950 | 170 | 220 | 472 | **NCF 29/900 V** |
| **950** | 1 150 | 90 | 2 420 | 6 300 | 425 | 170 | 220 | 185 | **NCF 18/950 V** |
| | 1 150 | 118 | 3 410 | 9 800 | 655 | 170 | 220 | 240 | **NCF 28/950 V** |
| | 1 250 | 175 | 6 600 | 16 300 | 1 020 | 160 | 200 | 565 | **NCF 29/950 V** |
| **1 000** | 1 220 | 100 | 2 920 | 7 500 | 455 | 160 | 200 | 230 | **NCF 18/1000 V** |
| | 1 220 | 128 | 4 130 | 11 600 | 720 | 160 | 200 | 309 | **NCF 28/1000 V** |
| | 1 320 | 185 | 7 480 | 18 600 | 1 160 | 150 | 180 | 680 | **NCF 29/1000 V** |
| **1 120** | 1 360 | 106 | 3 740 | 9 650 | 585 | 130 | 170 | 298 | **NCF 18/1120 V** |

▸ Popular item



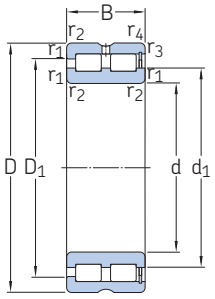




| Dimensions | | | | | | | Abutment and fillet dimensions | | | | | | | Calculation factor |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | E, F | $r_{1,2}$ min. | $r_{3,4}$ min. | s max. | $d_a$ min. | $d_{as}$[1] | $d_b$ max. | $D_a$ max. | $D_b$ max. | $r_a$ max. | $r_b$ max. | $k_r$ |
| mm | | | | | | | mm | | | | | | | – |
| **600** | 644 | 684 | 696 | 3 | 3 | 7 | 613 | 638 | – | 717 | 717 | 2,5 | 2,5 | 0,1 |
| | 642 | 685 | 696 | 3 | 3 | 5,4 | 613 | 637 | – | 717 | 717 | 2,5 | 2,5 | 0,11 |
| | 662 | 726 | 754 | 5 | 5 | 7 | 618 | 652 | – | 782 | 782 | 4 | 4 | 0,2 |
| **630** | 681 | 725 | 739 | 4 | 4 | 8 | 645 | 674 | – | 765 | 765 | 3 | 3 | 0,1 |
| | 680 | 728 | 741,4 | 4 | 4 | 8 | 645 | 674 | – | 765 | 765 | 3 | 3 | 0,11 |
| | 709 | 788 | 807 | 6 | 6 | 8 | 653 | 698 | – | 827 | 827 | 5 | 5 | 0,2 |
| **670** | 725 | 769 | 783 | 4 | 4 | 8 | 685 | 718 | – | 805 | 805 | 3 | 3 | 0,1 |
| | 724 | 772 | 783 | 4 | 4 | 8 | 685 | 718 | – | 805 | 805 | 3 | 3 | 0,11 |
| | 748 | 827 | 846 | 6 | 6 | 10 | 693 | 737 | – | 877 | 877 | 5 | 5 | 0,2 |
| **710** | 767 | 815 | 831 | 4 | 4 | 8 | 725 | 759 | – | 855 | 855 | 3 | 3 | 0,1 |
| | 766 | 818 | 831 | 4 | 4 | 8 | 725 | 759 | – | 855 | 855 | 3 | 3 | 0,11 |
| | 790 | 876 | 896 | 6 | 6 | 10 | 733 | 761 | – | 927 | 927 | 5 | 5 | 0,2 |
| **750** | 811 | 863 | 880 | 5 | 5 | 8 | 768 | 802 | – | 902 | 902 | 4 | 4 | 0,1 |
| | 810 | 867 | 878 | 5 | 5 | 8 | 768 | 799 | – | 902 | 902 | 4 | 4 | 0,11 |
| | 832 | 918 | 938 | 6 | 6 | 11 | 773 | 820 | – | 977 | 977 | 5 | 5 | 0,2 |
| **800** | 863 | 922 | 936 | 5 | 5 | 9 | 818 | 855 | – | 962 | 962 | 4 | 4 | 0,1 |
| | 863 | 922 | 936 | 5 | 5 | 10 | 818 | 855 | – | 962 | 962 | 4 | 4 | 0,11 |
| | 891 | 981 | 1 002 | 6 | 6 | 11 | 823 | 860 | – | 1 037 | 1 037 | 5 | 5 | 0,2 |
| **850** | 911 | 972 | 986 | 5 | 5 | 9 | 868 | 903 | – | 1 012 | 1 012 | 4 | 4 | 0,1 |
| | 911 | 972 | 986 | 5 | 5 | 10 | 868 | 903 | – | 1 012 | 1 012 | 4 | 4 | 0,11 |
| | 943 | 1 039 | 1 061 | 6 | 6 | 13 | 873 | 914 | – | 1 097 | 1 097 | 5 | 5 | 0,2 |
| **900** | 966 | 1 029 | 1 044 | 5 | 5 | 9 | 918 | 957 | – | 1 072 | 1 072 | 4 | 4 | 0,1 |
| | 966 | 1 029 | 1 044 | 5 | 5 | 10 | 918 | 957 | – | 1 072 | 1 072 | 4 | 4 | 0,11 |
| | 996 | 1 096 | 1 120 | 6 | 6 | 13 | 923 | 982 | – | 1 127 | 1 127 | 5 | 5 | 0,2 |
| **950** | 1 021 | 1 087 | 1 103 | 5 | 5 | 10 | 968 | 1 012 | – | 1 132 | 1 132 | 4 | 4 | 0,1 |
| | 1 021 | 1 087 | 1 103 | 5 | 5 | 12 | 968 | 1 012 | – | 1 132 | 1 132 | 4 | 4 | 0,11 |
| | 1 048 | 1 154 | 1 179 | 7,5 | 7,5 | 14 | 978 | 1 033 | – | 1 222 | 1 222 | 6 | 6 | 0,2 |
| **1 000** | 1 073 | 1 148 | 1 165 | 6 | 6 | 12 | 1 023 | 1 063 | – | 1 197 | 1 197 | 5 | 5 | 0,1 |
| | 1 073 | 1 148 | 1 165 | 6 | 6 | 12 | 1 023 | 1 063 | – | 1 197 | 1 197 | 5 | 5 | 0,11 |
| | 1 113 | 1 226 | 1 252 | 7,5 | 7,5 | 14 | 1 028 | 1 091 | – | 1 292 | 1 292 | 6 | 6 | 0,2 |
| **1 120** | 1 206 | 1 290 | 1 310 | 6 | 6 | 12 | 1 143 | 1 194 | – | 1 337 | 1 337 | 5 | 5 | 0,1 |

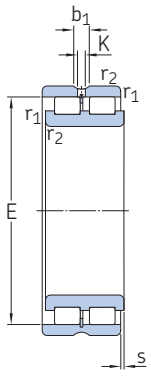
[1] Recommended shaft abutment diameter for axially loaded bearings → *Flange support*, page 512

## 6.4 Double row full complement cylindrical roller bearings

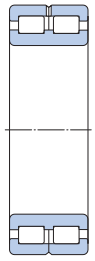
d **20 – 90** mm




NNCF

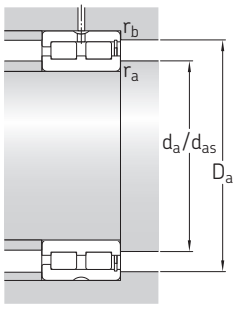


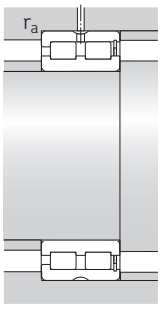

NNCL

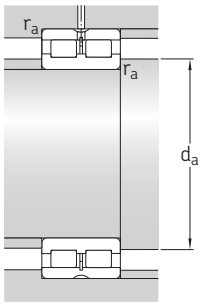


NNC

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | kg | – |
| **20** | 42 | 30 | 52,3 | 57 | 6,2 | 8 500 | 10 000 | 0,2 | **NNCF 5004 CV** |
| **25** | 47 | 30 | 59,4 | 71 | 7,65 | 7 000 | 9 000 | 0,23 | **NNCF 5005 CV** |
| **30** | 55 | 34 | 73,7 | 88 | 10 | 6 000 | 7 500 | 0,35 | **NNCF 5006 CV** |
| **35** | 62 | 36 | 89,7 | 112 | 12,9 | 5 300 | 6 700 | 0,46 | **NNCF 5007 CV** |
| **40** | 68 | 38 | 106 | 140 | 17 | 4 800 | 6 000 | 0,56 | **NNCF 5008 CV** |
| **45** | 75 | 40 | 112 | 156 | 18,3 | 4 300 | 5 300 | 0,71 | **NNCF 5009 CV** |
| **50** | 80 | 40 | 142 | 196 | 23,6 | 4 000 | 5 000 | 0,76 | **NNCF 5010 CV** |
| **55** | 90 | 46 | 190 | 280 | 34,5 | 3 400 | 4 300 | 1,15 | **NNCF 5011 CV** |
| **60** | 85 | 25 | 78,1 | 137 | 14,3 | 3 600 | 4 500 | 0,48 | **NNCF 4912 CV** |
| | 85 | 25 | 78,1 | 137 | 14,3 | 3 600 | 4 500 | 0,47 | **NNCL 4912 CV** |
| | 85 | 25 | 78,1 | 137 | 14,3 | 3 600 | 4 500 | 0,49 | **NNC 4912 CV** |
| | 95 | 46 | 198 | 300 | 36,5 | 3 400 | 4 000 | 1,25 | **NNCF 5012 CV** |
| **65** | 100 | 46 | 209 | 325 | 40 | 3 000 | 3 800 | 1,3 | **NNCF 5013 CV** |
| **70** | 100 | 30 | 114 | 193 | 22,4 | 3 000 | 3 800 | 0,77 | **NNCF 4914 CV** |
| | 100 | 30 | 114 | 193 | 22,4 | 3 000 | 3 800 | 0,75 | **NNCL 4914 CV** |
| | 100 | 30 | 114 | 193 | 22,4 | 3 000 | 3 800 | 0,78 | **NNC 4914 CV** |
| | 110 | 54 | 238 | 345 | 45 | 2 800 | 3 600 | 1,85 | **NNCF 5014 CV** |
| **75** | 115 | 54 | 251 | 380 | 49 | 2 600 | 3 200 | 1,95 | **NNCF 5015 CV** |
| **80** | 110 | 30 | 121 | 216 | 25 | 2 600 | 3 400 | 0,87 | **NNCF 4916 CV** |
| | 110 | 30 | 121 | 216 | 25 | 2 600 | 3 400 | 0,85 | **NNCL 4916 CV** |
| | 110 | 30 | 121 | 216 | 25 | 2 600 | 3 400 | 0,88 | **NNC 4916 CV** |
| | 125 | 60 | 308 | 455 | 58,5 | 2 400 | 3 000 | 2,6 | **NNCF 5016 CV** |
| **85** | 130 | 60 | 314 | 475 | 60 | 2 400 | 3 000 | 2,7 | **NNCF 5017 CV** |
| **90** | 125 | 35 | 161 | 300 | 35,5 | 2 400 | 3 000 | 1,35 | **NNCF 4918 CV** |
| | 125 | 35 | 161 | 300 | 35,5 | 2 400 | 3 000 | 1,3 | **NNCL 4918 CV** |
| | 125 | 35 | 161 | 300 | 35,5 | 2 400 | 3 000 | 1,35 | **NNC 4918 CV** |
| | 140 | 67 | 369 | 560 | 69,5 | 2 200 | 2 800 | 3,6 | **NNCF 5018 CV** |



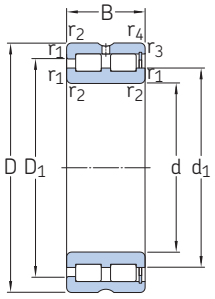




| Dimensions | | | | | | | | | Abutment and fillet dimensions | | | | | Calculation factor |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | E | $b_1$ | K | $r_{1,2}$ min. | $r_{3,4}$ min. | s max. | $d_a$ min. | $d_{as}$[1] | $D_a$ max. | $r_a$ max. | $r_b$ max. | $k_r$ |
| mm | | | | | | | | | mm | | | | | |
| **20** | 28,4 | 33,2 | – | 4,5 | 3 | 0,6 | 0,3[2] | 1 | 23,2 | 25,6 | 38,7 | 0,5 | 0,3 | 0,5 |
| **25** | 34,5 | 38,5 | – | 4,5 | 3 | 0,6 | 0,3[2] | 1 | 28,7 | 31,5 | 43,5 | 0,5 | 0,3 | 0,5 |
| **30** | 40 | 45,5 | – | 4,5 | 3 | 1 | 0,3[2] | 1,5 | 34,7 | 37,8 | 50 | 1 | 0,3 | 0,5 |
| **35** | 45 | 51,5 | – | 4,5 | 3 | 1 | 0,3[2] | 1,5 | 40,2 | 42,6 | 57 | 1 | 0,3 | 0,5 |
| **40** | 50,5 | 57,2 | – | 4,5 | 3 | 1 | 0,3[2] | 1,5 | 44,8 | 47,7 | 63 | 1 | 0,3 | 0,5 |
| **45** | 55,3 | 62,5 | – | 4,5 | 3 | 1 | 0,3[2] | 1,5 | 51 | 52,8 | 70 | 1 | 0,3 | 0,5 |
| **50** | 59 | 67,5 | – | 4,5 | 3 | 1 | 0,3[2] | 1,5 | 56 | 56,7 | 74 | 1 | 0,3 | 0,5 |
| **55** | 68,5 | 78,7 | – | 4,5 | 3,5 | 1,1 | 0,6[2] | 1,5 | 61 | 64,8 | 84 | 1 | 0,5 | 0,5 |
| **60** | 70,5 | 73,5 | – | 4,5 | 3,5 | 1 | 1 | 1 | 65 | 67,6 | 80 | 1 | 1 | 0,25 |
| | 70,5 | – | 77,51 | 4,5 | 3,5 | 1 | – | 1 | 65 | – | 80 | 1 | – | 0,25 |
| | 70,5 | 73,5 | – | 4,5 | 3,5 | 1 | – | – | 65 | 67,6 | 80 | 1 | – | 0,25 |
| | 71,5 | 82 | – | 4,5 | 3,5 | 1,1 | 0,6[2] | 1,5 | 66 | 68,9 | 89 | 1 | 0,5 | 0,5 |
| **65** | 78 | 88,3 | – | 4,5 | 3,5 | 1,1 | 0,6[2] | 1,5 | 72 | 75 | 94 | 1 | 0,5 | 0,5 |
| **70** | 83 | 87 | – | 4,5 | 3,5 | 1 | 1 | 1 | 76 | 79 | 95 | 1 | 1 | 0,25 |
| | 83 | – | 91,87 | 4,5 | 3,5 | 1 | – | 1 | 76 | – | 95 | 1 | – | 0,25 |
| | 83 | 87 | – | 4,5 | 3,5 | 1 | – | – | 76 | 79 | 95 | 1 | – | 0,25 |
| | 81,5 | 95 | – | 5 | 3,5 | 1,1 | 0,6[2] | 3 | 76 | 79 | 105 | 1 | 0,5 | 0,5 |
| **75** | 89 | 103 | – | 5 | 3,5 | 1,1 | 0,6[2] | 3 | 81 | 85 | 109 | 1 | 0,5 | 0,5 |
| **80** | 92 | 96 | – | 5 | 3,5 | 1 | 1 | 1 | 85 | 88 | 105 | 1 | 1 | 0,25 |
| | 92 | – | 100,78 | 5 | 3,5 | 1 | – | 1 | 85 | – | 105 | 1 | – | 0,25 |
| | 92 | 96 | – | 5 | 3,5 | 1 | – | – | 85 | 88 | 105 | 1 | – | 0,25 |
| | 95 | 111 | – | 5 | 3,5 | 1,1 | 0,6[2] | 3,5 | 86 | 91 | 119 | 1 | 0,5 | 0,5 |
| **85** | 99,5 | 116 | – | 5 | 3,5 | 1,1 | 0,6[2] | 3,5 | 91 | 95 | 124 | 1 | 0,5 | 0,5 |
| **90** | 103 | 110 | – | 5 | 3,5 | 1,1 | 1,1 | 1,5 | 96 | 99 | 119 | 1 | 1 | 0,25 |
| | 103 | – | 115,2 | 5 | 3,5 | 1,1 | – | 1,5 | 96 | – | 119 | 1 | – | 0,25 |
| | 103 | 110 | – | 5 | 3,5 | 1,1 | – | – | 96 | 99 | 119 | 1 | – | 0,25 |
| | 106 | 124 | – | 5 | 3,5 | 1,5 | 1[2] | 4 | 98 | 102 | 133 | 1,5 | 1 | 0,5 |

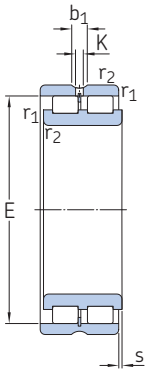
[1] Recommended shaft abutment diameter for axially loaded bearings → *Flange support*, page 512
[2] Parameter $r_{3,4}$ has either the value specified here or the same value as $r_{1,2}$.

## 6.4 Double row full complement cylindrical roller bearings

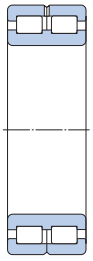
d **100 – 150** mm




NNCF

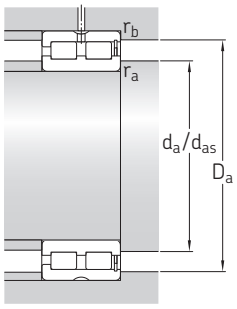


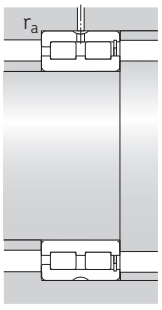

NNCL

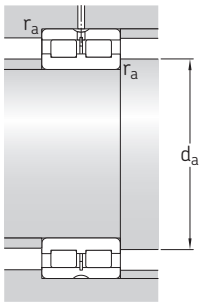


NNC

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | kg | – |
| **100** | 140 | 40 | 209 | 400 | 46,5 | 2 000 | 2 600 | 1,95 | **NNCF 4920 CV** |
| | 140 | 40 | 209 | 400 | 46,5 | 2 000 | 2 600 | 1,9 | **NNCL 4920 CV** |
| | 140 | 40 | 209 | 400 | 46,5 | 2 000 | 2 600 | 1,95 | **NNC 4920 CV** |
| | 150 | 67 | 391 | 620 | 75 | 2 000 | 2 600 | 3,95 | **NNCF 5020 CV** |
| **110** | 150 | 40 | 220 | 430 | 49 | 1 900 | 2 400 | 2,1 | **NNCF 4922 CV** |
| | 150 | 40 | 220 | 430 | 49 | 1 900 | 2 400 | 2,1 | **NNCL 4922 CV** |
| | 150 | 40 | 220 | 430 | 49 | 1 900 | 2 400 | 2,15 | **NNC 4922 CV** |
| | 170 | 80 | 512 | 800 | 95 | 1 800 | 2 200 | 6,3 | **NNCF 5022 CV** |
| **120** | 165 | 45 | 242 | 480 | 53 | 1 700 | 2 200 | 2,9 | **NNCF 4924 CV** |
| | 165 | 45 | 242 | 480 | 53 | 1 700 | 2 200 | 2,85 | **NNCL 4924 CV** |
| | 165 | 45 | 242 | 480 | 53 | 1 700 | 2 200 | 2,95 | **NNC 4924 CV** |
| | 180 | 80 | 539 | 880 | 104 | 1 700 | 2 000 | 6,75 | **NNCF 5024 CV** |
| **130** | 180 | 50 | 297 | 530 | 60 | 1 600 | 2 000 | 3,9 | **NNCF 4926 CV** |
| | 180 | 50 | 297 | 530 | 60 | 1 600 | 2 000 | 3,8 | **NNCL 4926 CV** |
| | 180 | 50 | 297 | 530 | 60 | 1 600 | 2 000 | 3,95 | **NNC 4926 CV** |
| | 200 | 95 | 765 | 1 250 | 143 | 1 500 | 1 900 | 10 | **NNCF 5026 CV** |
| **140** | 190 | 50 | 308 | 570 | 63 | 1 500 | 1 900 | 4,15 | **NNCF 4928 CV** |
| | 190 | 50 | 308 | 570 | 63 | 1 500 | 1 900 | 4,1 | **NNCL 4928 CV** |
| | 190 | 50 | 308 | 570 | 63 | 1 500 | 1 900 | 4,2 | **NNC 4928 CV** |
| | 210 | 95 | 809 | 1 370 | 153 | 1 400 | 1 800 | 11 | **NNCF 5028 CV** |
| **150** | 190 | 40 | 255 | 585 | 60 | 1 500 | 1 800 | 2,8 | **NNCF 4830 CV** |
| | 190 | 40 | 255 | 585 | 60 | 1 500 | 1 800 | 2,7 | **NNCL 4830 CV** |
| | 190 | 40 | 255 | 585 | 60 | 1 500 | 1 800 | 2,9 | **NNC 4830 CV** |
| | 210 | 60 | 429 | 830 | 91,5 | 1 400 | 1 700 | 6,55 | **NNCF 4930 CV** |
| | 210 | 60 | 429 | 830 | 91,5 | 1 400 | 1 700 | 6,45 | **NNCL 4930 CV** |
| | 210 | 60 | 429 | 830 | 91,5 | 1 400 | 1 700 | 6,65 | **NNC 4930 CV** |
| | 225 | 100 | 842 | 1 430 | 160 | 1 300 | 1 700 | 13,5 | **NNCF 5030 CV** |



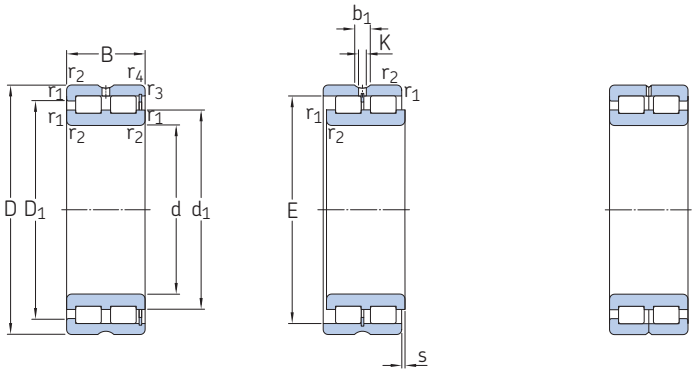




| Dimensions | | | | | | | | | Abutment and fillet dimensions | | | | | Calculation factor |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | E | $b_1$ | K | $r_{1,2}$ min. | $r_{3,4}$ min. | s max. | $d_a$ min. | $d_{as}$[1] | $D_a$ max. | $r_a$ max. | $r_b$ max. | $k_r$ |
| mm | | | | | | | | | mm | | | | | |
| **100** | 116 | 125 | – | 5 | 3,5 | 1,1 | 1,1 | 2 | 106 | 111 | 134 | 1 | 1 | 0,25 |
| | 116 | – | 129,6 | 5 | 3,5 | 1,1 | – | 2 | 106 | – | 134 | 1 | – | 0,25 |
| | 116 | 125 | – | 5 | 3,5 | 1,1 | – | – | 106 | 111 | 134 | 1 | – | 0,25 |
| | 116 | 134 | – | 6 | 3,5 | 1,5 | 1[2] | 4 | 108 | 113 | 143 | 1,5 | 1 | 0,5 |
| **110** | 125 | 134 | – | 6 | 3,5 | 1,1 | 1,1 | 2 | 116 | 121 | 144 | 1 | 1 | 0,25 |
| | 125 | – | 138,2 | 6 | 3,5 | 1,1 | – | 2 | 116 | – | 144 | 1 | – | 0,25 |
| | 125 | 134 | – | 6 | 3,5 | 1,1 | – | – | 116 | 121 | 144 | 1 | – | 0,25 |
| | 127 | 149 | – | 6 | 3,5 | 2 | 1[2] | 5 | 120 | 124 | 161 | 2 | 1 | 0,5 |
| **120** | 139 | 148 | – | 6 | 3,5 | 1,1 | 1,1 | 3 | 126 | 136 | 159 | 1 | 1 | 0,25 |
| | 139 | – | 153,55 | 6 | 3,5 | 1,1 | – | 3 | 126 | – | 159 | 1 | – | 0,25 |
| | 139 | 148 | – | 6 | 3,5 | 1,1 | – | – | 126 | 133 | 159 | 1 | – | 0,25 |
| | 139 | 160 | – | 6 | 3,5 | 2 | 1[2] | 5 | 130 | 130 | 171 | 2 | 1 | 0,5 |
| **130** | 149 | 160 | – | 6 | 3,5 | 1,5 | 1,5 | 4 | 138 | 144 | 173 | 1,5 | 1,5 | 0,25 |
| | 149 | – | 165,4 | 6 | 3,5 | 1,5 | – | 4 | 138 | – | 173 | 1,5 | – | 0,25 |
| | 149 | 160 | – | 6 | 3,5 | 1,5 | – | – | 138 | 144 | 173 | 1,5 | – | 0,25 |
| | 149 | 175 | – | 7 | 4 | 2 | 1[2] | 5 | 141 | 145 | 190 | 2 | 1 | 0,5 |
| **140** | 160 | 170 | – | 6 | 3,5 | 1,5 | 1,5 | 4 | 148 | 154 | 182 | 1,5 | 1,5 | 0,25 |
| | 160 | – | 175,9 | 6 | 3,5 | 1,5 | – | 4 | 148 | – | 182 | 1,5 | – | 0,25 |
| | 160 | 170 | – | 6 | 3,5 | 1,5 | – | – | 148 | 154 | 182 | 1,5 | – | 0,25 |
| | 163 | 189 | – | 7 | 4 | 2 | 1[2] | 5 | 151 | 157 | 200 | 2 | 1 | 0,5 |
| **150** | 166 | 173 | – | 7 | 4 | 1,1 | 1,1 | 2 | 156 | 161 | 184 | 1 | 1 | 0,2 |
| | 166 | – | 178,3 | 7 | 4 | 1,1 | – | 2 | 156 | – | 184 | 1 | – | 0,2 |
| | 166 | 173 | – | 7 | 4 | 1,1 | – | – | 156 | 161 | 184 | 1 | – | 0,2 |
| | 171 | 187 | – | 7 | 4 | 2 | 2 | 4 | 159 | 165 | 201 | 2 | 2 | 0,25 |
| | 171 | – | 192,77 | 7 | 4 | 2 | – | 4 | 159 | – | 201 | 2 | – | 0,25 |
| | 171 | 187 | – | 7 | 4 | 2 | – | – | 159 | 165 | 201 | 2 | – | 0,25 |
| | 170 | 198 | – | 7 | 4 | 2 | 1,1[2] | 6 | 160 | 166 | 217 | 2 | 1 | 0,5 |

[1] Recommended shaft abutment diameter for axially loaded bearings → *Flange support*, page 512
[2] Parameter $r_{3,4}$ has either the value specified here or the same value as $r_{1,2}$.

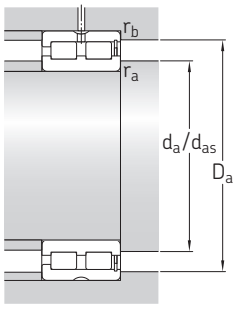
## 6.4 Double row full complement cylindrical roller bearings

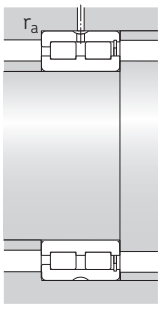
d **160 – 190** mm

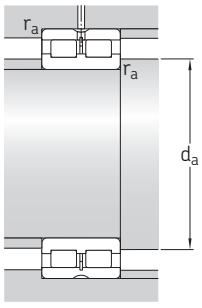



NNCF NNCL NNC

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | kg | – |
| **160** | 200 | 40 | 260 | 610 | 62 | 1 400 | 1 700 | 3 | **NNCF 4832 CV** |
| | 200 | 40 | 260 | 610 | 62 | 1 400 | 1 700 | 2,9 | **NNCL 4832 CV** |
| | 200 | 40 | 260 | 610 | 62 | 1 400 | 1 700 | 3,1 | **NNC 4832 CV** |
| | 220 | 60 | 446 | 915 | 96,5 | 1 300 | 1 600 | 6,9 | **NNCF 4932 CV** |
| | 220 | 60 | 446 | 915 | 96,5 | 1 300 | 1 600 | 6,8 | **NNCL 4932 CV** |
| | 220 | 60 | 446 | 915 | 96,5 | 1 300 | 1 600 | 7 | **NNC 4932 CV** |
| | 240 | 109 | 952 | 1 600 | 180 | 1 200 | 1 500 | 16 | **NNCF 5032 CV** |
| **170** | 215 | 45 | 286 | 655 | 65,5 | 1 300 | 1 600 | 4 | **NNCF 4834 CV** |
| | 215 | 45 | 286 | 655 | 65,5 | 1 300 | 1 600 | 3,9 | **NNCL 4834 CV** |
| | 215 | 45 | 286 | 655 | 65,5 | 1 300 | 1 600 | 4 | **NNC 4834 CV** |
| | 230 | 60 | 457 | 950 | 100 | 1 200 | 1 500 | 7,2 | **NNCF 4934 CV** |
| | 230 | 60 | 457 | 950 | 100 | 1 200 | 1 500 | 7,1 | **NNCL 4934 CV** |
| | 230 | 60 | 457 | 950 | 100 | 1 200 | 1 500 | 7,35 | **NNC 4934 CV** |
| | 260 | 122 | 1 230 | 2 120 | 236 | 1 100 | 1 400 | 23 | **NNCF 5034 CV** |
| **180** | 225 | 45 | 297 | 695 | 69,5 | 1 200 | 1 500 | 4,2 | **NNCF 4836 CV** |
| | 225 | 45 | 297 | 695 | 69,5 | 1 200 | 1 500 | 4,1 | **NNCL 4836 CV** |
| | 225 | 45 | 297 | 695 | 69,5 | 1 200 | 1 500 | 4,3 | **NNC 4836 CV** |
| | 250 | 69 | 594 | 1 220 | 127 | 1 100 | 1 400 | 10,5 | **NNCF 4936 CV** |
| | 250 | 69 | 594 | 1 220 | 127 | 1 100 | 1 400 | 10,5 | **NNCL 4936 CV** |
| | 250 | 69 | 594 | 1 220 | 127 | 1 100 | 1 400 | 11 | **NNC 4936 CV** |
| | 280 | 136 | 1 420 | 2 500 | 270 | 1 100 | 1 300 | 30,5 | **NNCF 5036 CV** |
| **190** | 240 | 50 | 358 | 750 | 76,5 | 1 100 | 1 400 | 5,5 | **NNCF 4838 CV** |
| | 240 | 50 | 358 | 750 | 76,5 | 1 100 | 1 400 | 5,3 | **NNCL 4838 CV** |
| | 240 | 50 | 358 | 750 | 76,5 | 1 100 | 1 400 | 5,65 | **NNC 4838 CV** |
| | 260 | 69 | 605 | 1 290 | 132 | 1 100 | 1 400 | 11 | **NNCF 4938 CV** |
| | 260 | 69 | 605 | 1 290 | 132 | 1 100 | 1 400 | 11 | **NNCL 4938 CV** |
| | 260 | 69 | 605 | 1 290 | 132 | 1 100 | 1 400 | 11 | **NNC 4938 CV** |
| | 290 | 136 | 1 470 | 2 600 | 280 | 1 000 | 1 300 | 31,5 | **NNCF 5038 CV** |





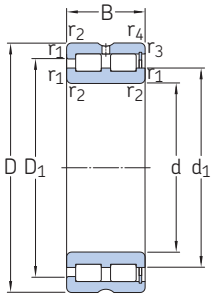



| Dimensions | | | | | | | | | Abutment and fillet dimensions | | | | | Calculation factor |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | E | $b_1$ | K | $r_{1,2}$ min. | $r_{3,4}$ min. | s max. | $d_a$ min. | $d_{as}$[1] | $D_a$ max. | $r_a$ max. | $r_b$ max. | $k_r$ |
| mm | | | | | | | | | mm | | | | | |
| **160** | 174 | 182 | – | 7 | 4 | 1,1 | 1,1 | 2 | 166 | 170 | 194 | 1 | 1 | 0,2 |
| | 174 | – | 186,9 | 7 | 4 | 1,1 | – | 2 | 166 | – | 194 | 1 | – | 0,2 |
| | 174 | 182 | – | 7 | 4 | 1,1 | – | – | 166 | 170 | 194 | 1 | – | 0,2 |
| | 185 | 200 | – | 7 | 4 | 2 | 2 | 4 | 170 | 177 | 211 | 2 | 2 | 0,25 |
| | 185 | – | 206,16 | 7 | 4 | 2 | – | 4 | 170 | – | 211 | 2 | – | 0,25 |
| | 185 | 200 | – | 7 | 4 | 2 | – | – | 170 | 177 | 211 | 2 | – | 0,25 |
| | 185 | 216 | – | 7 | 4 | 2,1 | 1,1[2] | 6 | 171 | 178 | 231 | 2 | 1 | 0,5 |
| **170** | 187 | 196 | – | 7 | 4 | 1,1 | 1,1 | 3 | 176 | 182 | 209 | 1 | 1 | 0,2 |
| | 187 | – | 201,3 | 7 | 4 | 1,1 | – | 3 | 176 | – | 209 | 1 | – | 0,2 |
| | 187 | 196 | – | 7 | 4 | 1,1 | – | – | 176 | 182 | 209 | 1 | – | 0,2 |
| | 194 | 209 | – | 7 | 4 | 2 | 2 | 4 | 180 | 187 | 220 | 2 | 2 | 0,25 |
| | 194 | – | 215,08 | 7 | 4 | 2 | – | 4 | 180 | – | 220 | 2 | – | 0,25 |
| | 194 | 209 | – | 7 | 4 | 2 | – | – | 180 | 187 | 220 | 2 | – | 0,25 |
| | 198 | 232 | – | 7 | 4 | 2,1 | 1,1 | 6 | 181 | 193 | 251 | 2 | 1 | 0,5 |
| **180** | 200 | 209 | – | 7 | 4 | 1,1 | 1,1 | 3 | 186 | 193 | 219 | 1 | 1 | 0,2 |
| | 200 | – | 214,1 | 7 | 4 | 1,1 | – | 3 | 186 | – | 219 | 1 | – | 0,2 |
| | 200 | 209 | – | 7 | 4 | 1,1 | – | – | 186 | 193 | 219 | 1 | – | 0,2 |
| | 206 | 224 | – | 7 | 4 | 2 | 2 | 4 | 190 | 198 | 240 | 2 | 2 | 0,25 |
| | 206 | – | 230,5 | 7 | 4 | 2 | – | 4 | 190 | – | 240 | 2 | – | 0,25 |
| | 206 | 224 | – | 7 | 4 | 2 | – | – | 190 | 198 | 240 | 2 | – | 0,25 |
| | 212 | 248 | – | 8 | 4 | 2,1 | 2,1 | 8 | 191 | 206 | 270 | 2 | 2 | 0,5 |
| **190** | 209 | 219 | – | 7 | 4 | 1,5 | 1,5 | 4 | 197 | 203 | 233 | 1,5 | 1,5 | 0,2 |
| | 209 | – | 225 | 7 | 4 | 1,5 | – | 4 | 197 | – | 233 | 1,5 | – | 0,2 |
| | 209 | 219 | – | 7 | 4 | 1,5 | – | – | 197 | 203 | 233 | 1,5 | – | 0,2 |
| | 216 | 233 | – | 7 | 4 | 2 | 2 | 4 | 201 | 208 | 250 | 2 | 2 | 0,25 |
| | 216 | – | 240,7 | 7 | 4 | 2 | – | 4 | 201 | – | 250 | 2 | – | 0,25 |
| | 216 | 233 | – | 7 | 4 | 2 | – | – | 201 | 208 | 250 | 2 | – | 0,25 |
| | 222 | 258 | – | 8 | 4 | 2,1 | 2,1 | 8 | 202 | 216 | 280 | 2 | 2 | 0,5 |

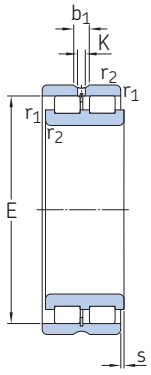
[1] Recommended shaft abutment diameter for axially loaded bearings → *Flange support*, page 512
[2] Parameter $r_{3,4}$ has either the value specified here or the same value as $r_{1,2}$.

## 6.4 Double row full complement cylindrical roller bearings

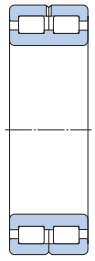
d **200 – 260** mm




NNCF

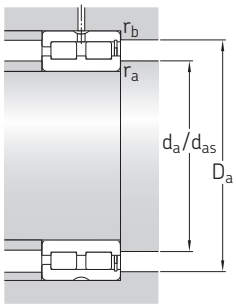


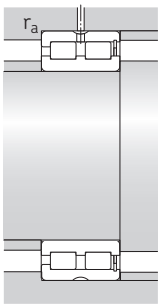

NNCL

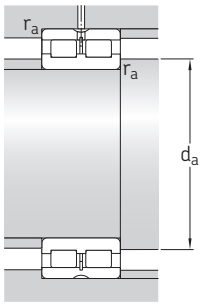


NNC

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | kg | – |
| **200** | 250 | 50 | 369 | 800 | 80 | 1 100 | 1 400 | 5,8 | **NNCF 4840 CV** |
| | 250 | 50 | 369 | 800 | 80 | 1 100 | 1 400 | 5,7 | **NNCL 4840 CV** |
| | 250 | 50 | 369 | 800 | 80 | 1 100 | 1 400 | 5,9 | **NNC 4840 CV** |
| | 280 | 80 | 704 | 1 500 | 153 | 1 000 | 1 300 | 15,5 | **NNCF 4940 CV** |
| | 280 | 80 | 704 | 1 500 | 153 | 1 000 | 1 300 | 15,5 | **NNCL 4940 CV** |
| | 280 | 80 | 704 | 1 500 | 153 | 1 000 | 1 300 | 16 | **NNC 4940 CV** |
| | 310 | 150 | 1 680 | 3 050 | 320 | 950 | 1 200 | 41 | **NNCF 5040 CV** |
| **220** | 270 | 50 | 380 | 865 | 85 | 1 000 | 1 200 | 6,3 | **NNCF 4844 CV** |
| | 270 | 50 | 380 | 865 | 85 | 1 000 | 1 200 | 6,2 | **NNCL 4844 CV** |
| | 270 | 50 | 380 | 865 | 85 | 1 000 | 1 200 | 6,4 | **NNC 4844 CV** |
| | 300 | 80 | 737 | 1 600 | 160 | 950 | 1 200 | 17 | **NNCF 4944 CV** |
| | 300 | 80 | 737 | 1 600 | 160 | 950 | 1 200 | 17 | **NNCL 4944 CV** |
| | 300 | 80 | 737 | 1 600 | 160 | 950 | 1 200 | 17 | **NNC 4944 CV** |
| | 340 | 160 | 2 010 | 3 600 | 375 | 850 | 1 100 | 52,5 | **NNCF 5044 CV** |
| **240** | 300 | 60 | 539 | 1 290 | 125 | 900 | 1 100 | 9,9 | **NNCF 4848 CV** |
| | 300 | 60 | 539 | 1 290 | 125 | 900 | 1 100 | 9,8 | **NNCL 4848 CV** |
| | 300 | 60 | 539 | 1 290 | 125 | 900 | 1 100 | 10 | **NNC 4848 CV** |
| | 320 | 80 | 781 | 1 760 | 173 | 850 | 1 100 | 18,5 | **NNCF 4948 CV** |
| | 320 | 80 | 781 | 1 760 | 173 | 850 | 1 100 | 18 | **NNCL 4948 CV** |
| | 320 | 80 | 781 | 1 760 | 173 | 850 | 1 100 | 18,5 | **NNC 4948 CV** |
| | 360 | 160 | 2 120 | 3 900 | 400 | 800 | 1 000 | 56 | **NNCF 5048 CV** |
| **260** | 320 | 60 | 561 | 1 400 | 132 | 800 | 1 000 | 11 | **NNCF 4852 CV** |
| | 320 | 60 | 561 | 1 400 | 132 | 800 | 1 000 | 10,5 | **NNCL 4852 CV** |
| | 320 | 60 | 561 | 1 400 | 132 | 800 | 1 000 | 11 | **NNC 4852 CV** |
| | 360 | 100 | 1 170 | 2 550 | 245 | 750 | 950 | 31,5 | **NNCF 4952 CV** |
| | 360 | 100 | 1 170 | 2 550 | 245 | 750 | 950 | 31 | **NNCL 4952 CV** |
| | 360 | 100 | 1 170 | 2 550 | 245 | 750 | 950 | 32 | **NNC 4952 CV** |
| | 400 | 190 | 2 860 | 5 100 | 500 | 700 | 900 | 85,5 | **NNCF 5052 CV** |



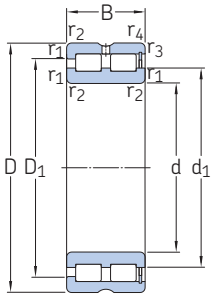




| Dimensions | | | | | | | | | Abutment and fillet dimensions | | | | | Calculation factor |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | E | $b_1$ | K | $r_{1,2}$ min. | $r_{3,4}$ min. | s max. | $d_a$ min. | $d_{as}$[1] | $D_a$ max. | $r_a$ max. | $r_b$ max. | $k_r$ |
| mm | | | | | | | | | mm | | | | | |
| **200** | 220 | 230 | – | 7 | 4 | 1,5 | 1,5 | 4 | 207 | 213 | 243 | 1,5 | 1,5 | 0,2 |
| | 220 | – | 235,5 | 7 | 4 | 1,5 | – | 4 | 207 | – | 243 | 1,5 | – | 0,2 |
| | 220 | 230 | – | 7 | 4 | 1,5 | – | – | 207 | 213 | 243 | 1,5 | – | 0,2 |
| | 233 | 252 | – | 8 | 4 | 2,1 | 2,1 | 5 | 211 | 219 | 269 | 2 | 2 | 0,25 |
| | 233 | – | 259,34 | 8 | 4 | 2,1 | – | 5 | 211 | – | 269 | 2 | – | 0,25 |
| | 233 | 252 | – | 8 | 4 | 2,1 | – | – | 211 | 221 | 269 | 2 | – | 0,25 |
| | 237 | 275 | – | 8 | 4 | 2,1 | 2,1 | 9 | 212 | 224 | 300 | 2 | 2 | 0,5 |
| **220** | 241 | 251 | – | 7 | 4 | 1,5 | 1,5 | 4 | 227 | 233 | 263 | 1,5 | 1,5 | 0,2 |
| | 241 | – | 256,5 | 7 | 4 | 1,5 | – | 4 | 227 | – | 263 | 1,5 | – | 0,2 |
| | 241 | 251 | – | 7 | 4 | 1,5 | – | – | 227 | 233 | 263 | 1,5 | – | 0,2 |
| | 248 | 269 | – | 8 | 4 | 2,1 | 2,1 | 5 | 232 | 240 | 288 | 2 | 2 | 0,25 |
| | 248 | – | 276,52 | 8 | 4 | 2,1 | – | 5 | 232 | – | 288 | 2 | – | 0,25 |
| | 248 | 269 | – | 8 | 4 | 2,1 | – | – | 232 | 240 | 288 | 2 | – | 0,25 |
| | 255 | 302 | – | 8 | 6 | 3 | 3 | 9 | 235 | 245 | 327 | 2,5 | 2,5 | 0,5 |
| **240** | 261 | 275 | – | 8 | 4 | 2 | 2 | 4 | 249 | 254 | 292 | 2 | 2 | 0,2 |
| | 261 | – | 281,9 | 8 | 4 | 2 | – | 4 | 249 | – | 292 | 2 | – | 0,2 |
| | 261 | 275 | – | 8 | 4 | 2 | – | – | 249 | 254 | 292 | 2 | – | 0,2 |
| | 271 | 291 | – | 8 | 4 | 2,1 | 2,1 | 5 | 251 | 261 | 308 | 2 | 2 | 0,25 |
| | 271 | – | 299,46 | 8 | 4 | 2,1 | – | 5 | 251 | – | 308 | 2 | – | 0,25 |
| | 271 | 291 | – | 8 | 4 | 2,1 | – | – | 251 | 261 | 308 | 2 | – | 0,25 |
| | 276 | 324 | – | 9,4 | 5 | 3 | 3 | 9 | 256 | 267 | 347 | 2,5 | 2,5 | 0,5 |
| **260** | 283 | 297 | – | 8 | 4 | 2 | 2 | 4 | 269 | 276 | 311 | 2 | 2 | 0,2 |
| | 283 | – | 304,2 | 8 | 4 | 2 | – | 4 | 269 | – | 311 | 2 | – | 0,2 |
| | 283 | 297 | – | 8 | 4 | 2 | – | – | 269 | 276 | 311 | 2 | – | 0,2 |
| | 295 | 321 | – | 9,4 | 5 | 2,1 | 2,1 | 6 | 272 | 283 | 349 | 2 | 2 | 0,25 |
| | 295 | – | 331,33 | 9,4 | 5 | 2,1 | – | 6 | 272 | – | 349 | 2 | – | 0,25 |
| | 295 | 321 | – | 9,4 | 5 | 2,1 | – | – | 272 | 283 | 349 | 2 | – | 0,25 |
| | 302 | 362 | – | 9,4 | 5 | 4 | 4 | 10 | 278 | 291 | 384 | 3 | 3 | 0,5 |

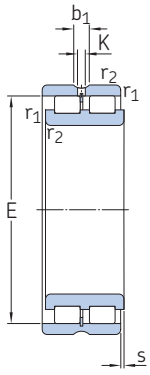
[1] Recommended shaft abutment diameter for axially loaded bearings → *Flange support*, page 512

## 6.4 Double row full complement cylindrical roller bearings

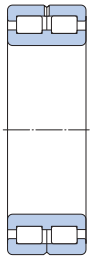
d **280 – 340** mm




NNCF

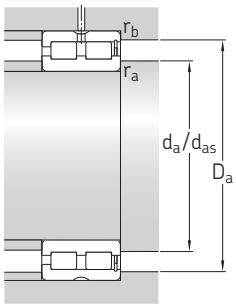


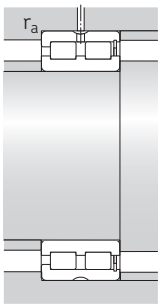

NNCL

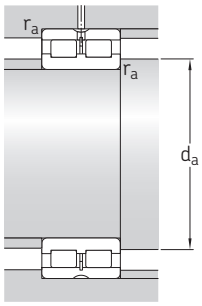


NNC

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | kg | – |
| **280** | 350 | 69 | 737 | 1 860 | 173 | 750 | 950 | 16 | **NNCF 4856 CV** |
| | 350 | 69 | 737 | 1 860 | 173 | 750 | 950 | 15,5 | **NNCL 4856 CV** |
| | 350 | 69 | 737 | 1 860 | 173 | 750 | 950 | 16 | **NNC 4856 CV** |
| | 380 | 100 | 1 210 | 2 700 | 255 | 700 | 900 | 33,5 | **NNCF 4956 CV** |
| | 380 | 100 | 1 210 | 2 700 | 255 | 700 | 900 | 33 | **NNCL 4956 CV** |
| | 380 | 100 | 1 210 | 2 700 | 255 | 700 | 900 | 34 | **NNC 4956 CV** |
| | 420 | 190 | 2 920 | 5 300 | 520 | 670 | 850 | 90,5 | **NNCF 5056 CV** |
| **300** | 380 | 80 | 858 | 2 120 | 196 | 700 | 850 | 22,5 | **NNCF 4860 CV** |
| | 380 | 80 | 858 | 2 120 | 196 | 700 | 850 | 22 | **NNCL 4860 CV** |
| | 380 | 80 | 858 | 2 120 | 196 | 700 | 850 | 23 | **NNC 4860 CV** |
| | 420 | 118 | 1 680 | 3 750 | 355 | 670 | 800 | 52,5 | **NNCF 4960 CV** |
| | 420 | 118 | 1 680 | 3 750 | 355 | 670 | 800 | 52 | **NNCL 4960 CV** |
| | 420 | 118 | 1 680 | 3 750 | 355 | 670 | 800 | 53 | **NNC 4960 CV** |
| | 460 | 218 | 3 520 | 6 550 | 600 | 600 | 750 | 130 | **NNCF 5060 CV** |
| **320** | 400 | 80 | 897 | 2 280 | 208 | 630 | 800 | 23,5 | **NNCF 4864 CV** |
| | 400 | 80 | 897 | 2 280 | 208 | 630 | 800 | 23 | **NNCL 4864 CV** |
| | 400 | 80 | 897 | 2 280 | 208 | 630 | 800 | 24 | **NNC 4864 CV** |
| | 440 | 118 | 1 760 | 4 050 | 375 | 600 | 750 | 55,5 | **NNCF 4964 CV** |
| | 440 | 118 | 1 760 | 4 050 | 375 | 600 | 750 | 55 | **NNCL 4964 CV** |
| | 440 | 118 | 1 760 | 4 050 | 375 | 600 | 750 | 56 | **NNC 4964 CV** |
| | 480 | 218 | 3 690 | 6 950 | 620 | 560 | 700 | 135 | **NNCF 5064 CV** |
| **340** | 420 | 80 | 913 | 2 400 | 216 | 600 | 750 | 25 | **NNCF 4868 CV** |
| | 420 | 80 | 913 | 2 400 | 216 | 600 | 750 | 25,5 | **NNCL 4868 CV** |
| | 420 | 80 | 913 | 2 400 | 216 | 600 | 750 | 25,5 | **NNC 4868 CV** |
| | 460 | 118 | 1 790 | 4 250 | 390 | 560 | 700 | 58,5 | **NNCF 4968 CV** |
| | 460 | 118 | 1 790 | 4 250 | 390 | 560 | 700 | 58 | **NNCL 4968 CV** |
| | 460 | 118 | 1 790 | 4 250 | 390 | 560 | 700 | 59 | **NNC 4968 CV** |
| | 520 | 243 | 4 400 | 8 300 | 710 | 530 | 670 | 185 | **NNCF 5068 CV** |



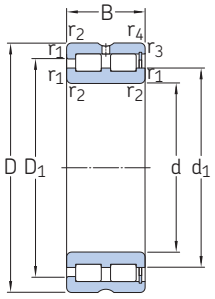




| Dimensions | | | | | | | | | Abutment and fillet dimensions | | | | | Calculation factor |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | E | $b_1$ | K | $r_{1,2}$ min. | $r_{3,4}$ min. | s max. | $d_a$ min. | $d_{as}$[1] | $D_a$ max. | $r_a$ max. | $r_b$ max. | $k_r$ |
| mm | | | | | | | | | mm | | | | | |
| **280** | 308 | 326 | – | 8 | 4 | 2 | 2 | 4 | 290 | 299 | 341 | 2 | 2 | 0,2 |
| | 308 | – | 332,4 | 8 | 4 | 2 | – | 4 | 290 | – | 341 | 2 | – | 0,2 |
| | 308 | 326 | – | 8 | 4 | 2 | – | – | 290 | 299 | 341 | 2 | – | 0,2 |
| | 317 | 343 | – | 9,4 | 5 | 2,1 | 2,1 | 6 | 293 | 312 | 368 | 2 | 2 | 0,25 |
| | 317 | – | 353,34 | 9,4 | 5 | 2,1 | – | 6 | 293 | – | 368 | 2 | – | 0,25 |
| | 317 | 343 | – | 9,4 | 5 | 2,1 | – | – | 293 | 305 | 368 | 2 | – | 0,25 |
| | 318 | 372 | – | 9,4 | 5 | 4 | 4 | 10 | 299 | 310 | 404 | 3 | 3 | 0,5 |
| **300** | 330 | 349 | – | 9,4 | 5 | 2,1 | 2,1 | 6 | 310 | 319 | 370 | 2 | 2 | 0,2 |
| | 330 | – | 356,7 | 9,4 | 5 | 2,1 | – | 6 | 310 | – | 370 | 2 | – | 0,2 |
| | 330 | 349 | – | 9,4 | 5 | 2,1 | – | – | 310 | 319 | 370 | 2 | – | 0,2 |
| | 340 | 374 | – | 9,4 | 5 | 3 | 3 | 6 | 315 | 335 | 406 | 2,5 | 2,5 | 0,25 |
| | 340 | – | 385,51 | 9,4 | 5 | 3 | – | 6 | 315 | – | 406 | 2,5 | – | 0,25 |
| | 341 | 374 | – | 9,4 | 5 | 3 | – | – | 315 | 328 | 406 | 2,5 | – | 0,25 |
| | 352 | 418 | – | 9,4 | 5 | 4 | 4 | 9 | 319 | 336 | 443 | 3 | 3 | 0,5 |
| **320** | 352 | 372 | – | 9,4 | 5 | 2,1 | 2,1 | 6 | 331 | 341 | 390 | 2 | 2 | 0,2 |
| | 352 | – | 379,7 | 9,4 | 5 | 2,1 | – | 6 | 331 | – | 390 | 2 | – | 0,2 |
| | 352 | 372 | – | 9,4 | 5 | 2,1 | – | – | 331 | 341 | 390 | 2 | – | 0,2 |
| | 368 | 401 | – | 9,4 | 5 | 3 | 3 | 6 | 336 | 352 | 425 | 2,5 | 2,5 | 0,25 |
| | 368 | – | 412,27 | 9,4 | 5 | 3 | – | 6 | 336 | – | 425 | 2,5 | – | 0,25 |
| | 368 | 401 | – | 9,4 | 5 | 3 | – | – | 336 | 352 | 425 | 2,5 | – | 0,25 |
| | 370 | 434 | – | 9,4 | 5 | 4 | 4 | 9 | 339 | 360 | 462 | 3 | 3 | 0,5 |
| **340** | 368 | 390 | – | 9,4 | 5 | 2,1 | 2,1 | 6 | 351 | 360 | 410 | 2 | 2 | 0,2 |
| | 368 | – | 396,9 | 9,4 | 5 | 2,1 | – | 6 | 351 | – | 410 | 2 | – | 0,2 |
| | 369 | 369 | – | 9,4 | 5 | 2,1 | – | – | 551 | 360 | 410 | 2 | – | 0,2 |
| | 385 | 419 | – | 9,4 | 5 | 3 | 3 | 6 | 356 | 371 | 445 | 2,5 | 2,5 | 0,25 |
| | 385 | – | 430,11 | 9,4 | 5 | 3 | – | 6 | 356 | – | 445 | 2,5 | – | 0,25 |
| | 385 | 419 | – | 9,4 | 5 | 3 | – | – | 356 | 371 | 445 | 2,5 | – | 0,25 |
| | 395 | 468 | – | 9,4 | 5 | 5 | 5 | 11 | 362 | 384 | 500 | 4 | 4 | 0,5 |

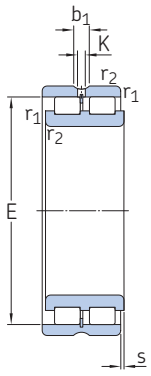
[1] Recommended shaft abutment diameter for axially loaded bearings → *Flange support*, page 512

## 6.4 Double row full complement cylindrical roller bearings

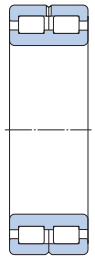
d **360 – 400** mm




NNCF

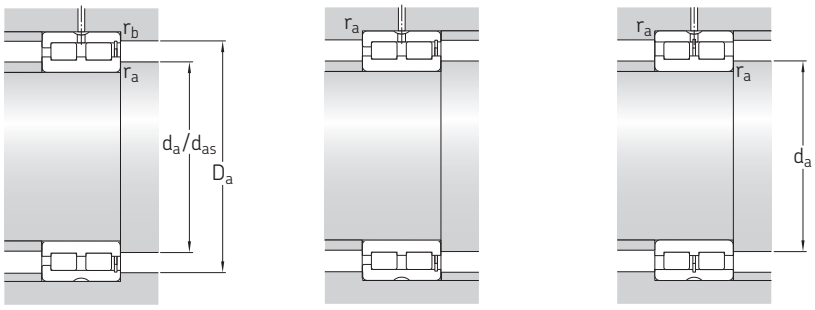



NNCL



NNC

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | kg | – |
| **360** | 440 | 80 | 935 | 2 550 | 224 | 560 | 700 | 26,5 | **NNCF 4872 CV** |
| | 440 | 80 | 935 | 2 550 | 224 | 560 | 700 | 26 | **NNCL 4872 CV** |
| | 440 | 80 | 935 | 2 550 | 224 | 560 | 700 | 27 | **NNC 4872 CV** |
| | 480 | 118 | 1 830 | 4 500 | 405 | 530 | 670 | 61,5 | **NNCF 4972 CV** |
| | 480 | 118 | 1 830 | 4 500 | 405 | 530 | 670 | 61 | **NNCL 4972 CV** |
| | 480 | 118 | 1 830 | 4 500 | 405 | 530 | 670 | 62 | **NNC 4972 CV** |
| | 540 | 243 | 4 180 | 8 650 | 735 | 500 | 630 | 195 | **NNCF 5072 CV** |
| **380** | 480 | 100 | 1 400 | 3 650 | 315 | 530 | 670 | 45 | **NNCF 4876 CV** |
| | 480 | 100 | 1 400 | 3 650 | 315 | 530 | 670 | 44 | **NNCL 4876 CV** |
| | 480 | 100 | 1 400 | 3 650 | 315 | 530 | 670 | 45,5 | **NNC 4876 CV** |
| | 520 | 140 | 2 380 | 5 700 | 500 | 500 | 630 | 91,5 | **NNCF 4976 CV** |
| | 520 | 140 | 2 380 | 5 700 | 500 | 500 | 630 | 90,5 | **NNCL 4976 CV** |
| | 520 | 140 | 2 380 | 5 700 | 500 | 500 | 630 | 92,5 | **NNC 4976 CV** |
| | 560 | 243 | 4 680 | 9 150 | 750 | 480 | 600 | 200 | **NNCF 5076 CV** |
| **400** | 500 | 100 | 1 420 | 3 750 | 325 | 500 | 630 | 46 | **NNCF 4880 CV** |
| | 500 | 100 | 1 420 | 3 750 | 325 | 500 | 630 | 46 | **NNCL 4880 CV** |
| | 500 | 100 | 1 420 | 3 750 | 325 | 500 | 630 | 46,5 | **NNC 4880 CV** |
| | 540 | 140 | 2 420 | 6 000 | 520 | 480 | 600 | 95,5 | **NNCF 4980 CV** |
| | 540 | 140 | 2 420 | 6 000 | 520 | 480 | 600 | 94,5 | **NNCL 4980 CV** |
| | 540 | 140 | 2 420 | 6 000 | 520 | 480 | 600 | 96,5 | **NNC 4980 CV** |
| | 600 | 272 | 5 500 | 11 000 | 900 | 450 | 560 | 270 | **NNCF 5080 CV** |

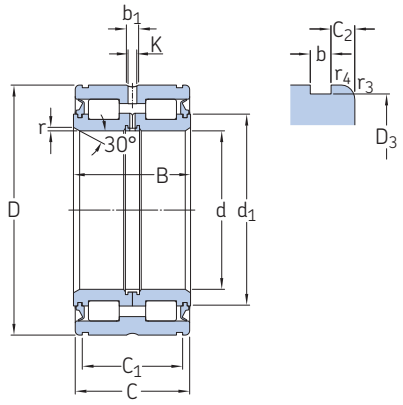



| Dimensions | | | | | | | | | Abutment and fillet dimensions | | | | | Calculation factor |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | E | $b_1$ | K | $r_{1,2}$ min. | $r_{3,4}$ min. | s max. | $d_a$ min. | $d_{as}$ [1] | $D_a$ max. | $r_a$ max. | $r_b$ max. | $k_r$ |
| mm | | | | | | | | | mm | | | | | |
| **360** | 391 | 413 | – | 9,4 | 5 | 2,1 | 2,1 | 6 | 371 | 381 | 429 | 2 | 2 | 0,2 |
| | 391 | – | 419,8 | 9,4 | 5 | 2,1 | – | 6 | 371 | – | 429 | 2 | – | 0,2 |
| | 391 | 413 | – | 9,4 | 5 | 2,1 | – | – | 371 | 381 | 429 | 2 | – | 0,2 |
| | 404 | 437 | – | 9,4 | 5 | 3 | 3 | 6 | 375 | 390 | 464 | 2,5 | 2,5 | 0,25 |
| | 404 | – | 447,95 | 9,4 | 5 | 3 | – | 6 | 375 | – | 464 | 2,5 | – | 0,25 |
| | 404 | 437 | – | 9,4 | 5 | 3 | – | – | 375 | 390 | 464 | 2,5 | – | 0,25 |
| | 412 | 486 | – | 9,4 | 5 | 5 | 5 | 11 | 383 | 402 | 519 | 4 | 4 | 0,5 |
| **380** | 419 | 447 | – | 9,4 | 5 | 2,1 | 2,1 | 6 | 391 | 405 | 469 | 2 | 2 | 0,2 |
| | 419 | – | 455,8 | 9,4 | 5 | 2,1 | – | 6 | 391 | – | 469 | 2 | – | 0,2 |
| | 419 | 447 | – | 9,4 | 5 | 2,1 | – | – | 391 | 405 | 469 | 2 | – | 0,2 |
| | 430 | 469 | – | 9,4 | 5 | 4 | 4 | 7 | 398 | 414 | 502 | 3 | 3 | 0,25 |
| | 430 | – | 481,35 | 9,4 | 5 | 4 | – | 7 | 398 | – | 502 | 3 | – | 0,25 |
| | 430 | 469 | – | 9,4 | 5 | 4 | – | – | 398 | 414 | 502 | 3 | – | 0,25 |
| | 485 | 531 | – | 9,4 | 5 | 5 | 5 | 11 | 403 | 417 | 539 | 4 | 4 | 0,5 |
| **400** | 434 | 462 | – | 9,4 | 5 | 2,1 | 2,1 | 6 | 411 | 423 | 488 | 2 | 2 | 0,2 |
| | 434 | – | 470,59 | 9,4 | 5 | 2,1 | – | 6 | 411 | – | 488 | 2 | – | 0,2 |
| | 434 | 462 | – | 9,4 | 5 | 2,1 | – | – | 411 | 423 | 488 | 2 | – | 0,2 |
| | 451 | 489 | – | 9,4 | 5 | 4 | 4 | 7 | 418 | 435 | 521 | 3 | 3 | 0,25 |
| | 451 | – | 501,74 | 9,4 | 5 | 4 | – | 7 | 418 | – | 521 | 3 | – | 0,25 |
| | 451 | 489 | – | 9,4 | 5 | 4 | – | – | 418 | 435 | 521 | 3 | – | 0,25 |
| | 460 | 540 | – | 9,4 | 5 | 5 | 5 | 11 | 424 | 442 | 578 | 4 | 4 | 0,5 |

[1] Recommended shaft abutment diameter for axially loaded bearings → *Flange support*, page 512

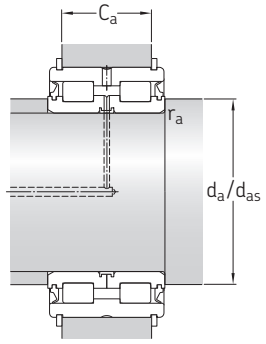
## 6.5 Sealed double row full complement cylindrical roller bearings

d **20 – 140** mm




| Principal dimensions | | | | Basic load ratings dynamic | static | Fatigue load limit | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | | $C_0$ | $P_u$ | | | |
| mm | | | | kN | | kN | r/min | kg | – |
| **20** | 42 | 30 | 29 | 45,7 | 55 | 5,7 | 3 400 | 0,2 | ▸ **NNF 5004 ADB-2LSV** |
| **25** | 47 | 30 | 29 | 50,1 | 65,5 | 6,8 | 3 000 | 0,24 | ▸ **NNF 5005 ADB-2LSV** |
| **30** | 55 | 34 | 33 | 57,2 | 75 | 7,8 | 2 600 | 0,37 | ▸ **NNF 5006 ADB-2LSV** |
| **35** | 62 | 36 | 35 | 70,4 | 98 | 10,6 | 2 200 | 0,48 | ▸ **NNF 5007 ADB-2LSV** |
| **40** | 68 | 38 | 37 | 85,8 | 116 | 13,2 | 2 000 | 0,56 | ▸ **NNF 5008 ADB-2LSV** |
| **45** | 75 | 40 | 39 | 102 | 146 | 17 | 1 800 | 0,7 | ▸ **NNF 5009 ADB-2LSV** |
| **50** | 80 | 40 | 39 | 108 | 160 | 18,6 | 1 700 | 0,76 | ▸ **NNF 5010 ADB-2LSV** |
| **55** | 90 | 46 | 45 | 128 | 193 | 22,8 | 1 500 | 1,2 | ▸ **NNF 5011 ADB-2LSV** |
| **60** | 95 | 46 | 45 | 134 | 208 | 25 | 1 400 | 1,25 | ▸ **NNF 5012 ADB-2LSV** |
| **65** | 100 | 46 | 45 | 138 | 224 | 26,5 | 1 300 | 1,35 | ▸ **NNF 5013 ADB-2LSV** |
| **70** | 110 | 54 | 53 | 187 | 285 | 34,5 | 1 200 | 1,85 | ▸ **NNF 5014 ADB-2LSV** |
| **75** | 115 | 54 | 53 | 224 | 310 | 40 | 1 100 | 1,95 | ▸ **NNF 5015 ADB-2LSV** |
| **80** | 125 | 60 | 59 | 251 | 415 | 53 | 1 000 | 2,7 | ▸ **NNF 5016 B-2LS** |
| **85** | 130 | 60 | 59 | 270 | 430 | 55 | 1 000 | 2,85 | ▸ **NNF 5017 B-2LS** |
| **90** | 140 | 67 | 66 | 319 | 550 | 69,5 | 900 | 3,7 | ▸ **NNF 5018 B-2LS** |
| **95** | 145 | 67 | 66 | 330 | 570 | 71 | 900 | 3,9 | **NNF 5019 B-2LS** |
| **100** | 150 | 67 | 66 | 336 | 570 | 68 | 850 | 3,95 | ▸ **NNF 5020 B-2LS** |
| **110** | 170 | 80 | 79 | 413 | 695 | 81,5 | 750 | 6,45 | ▸ **NNF 5022 B-2LS** |
| **120** | 180 | 80 | 79 | 429 | 750 | 86,5 | 700 | 6,9 | ▸ **NNF 5024 B-2LS** |
| **130** | 190 | 80 | 79 | 446 | 815 | 91,5 | 670 | 7,3 | **319426 B-2LS** |
| | 200 | 95 | 94 | 616 | 1 040 | 120 | 630 | 10,5 | ▸ **NNF 5026 B-2LS** |
| **140** | 200 | 80 | 79 | 468 | 865 | 96,5 | 630 | 8 | **319428 DA-2LS** |
| | 210 | 95 | 94 | 644 | 1 120 | 127 | 600 | 11 | ▸ **NNF 5028 B-2LS** |

▸ Popular item

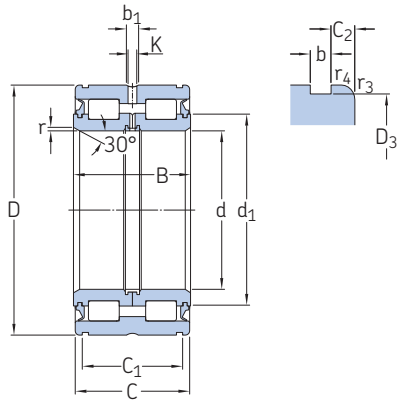



| Dimensions | | | | | | | | | | Abutment and fillet dimensions[1] | | | | | Calculation factor | Associated snap rings[2] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_3$ | $C_1$ +0.2 | $C_2$ | b | $b_1$ | K | r min. | $r_{3,4}$ min. | $d_a$ min. | $d_{as}$[3] | $C_{a1}$ -0,2 | $C_{a2}$ -0,2 | $r_a$ max. | $k_r$ | Seeger | DIN 471 |
| mm | | | | | | | | | | mm | | | | | – | – | |
| **20** | 30,6 | 40,2 | 24,7 | 2,15 | 1,8 | 6,5 | 3,5 | 0,5 | 0,3 | 24 | 28,8 | 21,5 | 21 | 0,3 | 0,4 | SW 42 | 42x1.75 |
| **25** | 35,4 | 45,2 | 24,7 | 2,15 | 1,8 | 6,5 | 3,5 | 0,5 | 0,3 | 29 | 33,6 | 21,5 | 21 | 0,3 | 0,4 | SW 47 | 47x1.75 |
| **30** | 40,6 | 53 | 28,2 | 2,4 | 2,1 | 7,5 | 4,5 | 0,5 | 0,3 | 34 | 38,7 | 25 | 24 | 0,3 | 0,4 | SW 55 | 55x2 |
| **35** | 46,1 | 60 | 30,2 | 2,4 | 2,1 | 7,5 | 4,5 | 0,5 | 0,3 | 39 | 44 | 27 | 26 | 0,3 | 0,4 | SW 62 | 62x2 |
| **40** | 51,4 | 65,8 | 32,2 | 2,4 | 2,7 | 7,5 | 4,5 | 0,8 | 0,6 | 44 | 49,2 | 28 | 27 | 0,4 | 0,4 | SW 68 | 68x2.5 |
| **45** | 57 | 72,8 | 34,2 | 2,4 | 2,7 | 8,5 | 4,5 | 0,8 | 0,6 | 49 | 54,7 | 30 | 29 | 0,4 | 0,4 | SW 75 | 75x2.5 |
| **50** | 61,8 | 77,8 | 34,2 | 2,4 | 2,7 | 8,5 | 4,5 | 0,8 | 0,6 | 54 | 59,5 | 30 | 29 | 0,4 | 0,4 | SW 80 | 80x2.5 |
| **55** | 68,6 | 87,4 | 40,2 | 2,4 | 3,2 | 8,5 | 4,5 | 1 | 0,6 | 60 | 66,1 | 35 | 34 | 0,6 | 0,4 | SW 90 | 90x3 |
| **60** | 73,7 | 92,4 | 40,2 | 2,4 | 3,2 | 9,5 | 5 | 1 | 0,6 | 65 | 71,2 | 35 | 34 | 0,6 | 0,4 | SW 95 | 95x3 |
| **65** | 78,8 | 97,4 | 40,2 | 2,4 | 3,2 | 9,5 | 5 | 1 | 0,6 | 70 | 76,3 | 35 | 34 | 0,6 | 0,4 | SW 100 | 100x3 |
| **70** | 84,5 | 107,1 | 48,2 | 2,4 | 4,2 | 9,5 | 5 | 1 | 0,6 | 75 | 82 | 43 | 40 | 0,6 | 0,4 | SW 110 | 110x4 |
| **75** | 90 | 112,1 | 48,2 | 2,4 | 4,2 | 9,5 | 5 | 1 | 0,6 | 80 | 87 | 43 | 40 | 0,6 | 0,4 | SW 115 | 115x4 |
| **80** | 97 | 122,1 | 54,2 | 2,4 | 4,2 | 6 | 3,5 | 1,5 | 0,6 | 86 | 94,3 | 49 | 46 | 1 | 0,4 | SW 125 | 125x4 |
| **85** | 101 | 127,1 | 54,2 | 2,4 | 4,2 | 6 | 3,5 | 1,5 | 0,6 | 91 | 100 | 49 | 46 | 1 | 0,4 | SW 130 | 130x4 |
| **90** | 109 | 137 | 59,2 | 3,4 | 4,2 | 6 | 3,5 | 1,5 | 0,6 | 96 | 106 | 54 | 51 | 1 | 0,4 | SW 140 | 140x4 |
| **95** | 113 | 142 | 59,2 | 3,4 | 4,2 | 6 | 3,5 | 1,5 | 0,6 | 101 | 110 | 54 | 51 | 1 | 0,4 | SW 145 | 145x4 |
| **100** | 118 | 147 | 59,2 | 3,4 | 4,2 | 6 | 3,5 | 1,5 | 0,6 | 106 | 115 | 54 | 51 | 1 | 0,4 | SW 150 | 150x4 |
| **110** | 132 | 167 | 70,2 | 4,4 | 4,2 | 6 | 3,5 | 1,8 | 0,6 | 117 | 128 | 65 | 62 | 1,5 | 0,4 | SW 170 | 170x4 |
| **120** | 141 | 176 | 71,2 | 3,9 | 4,2 | 6 | 3,5 | 1,8 | 0,6 | 127 | 138 | 65 | 63 | 1,5 | 0,4 | SW 180 | 180x4 |
| **130** | 151<br>155 | 186<br>196 | 71,2<br>83,2 | 3,9<br>5,4 | 4,2<br>4,2 | 6<br>7 | 3,5<br>4 | 1,8<br>1,8 | 0,6<br>0,6 | 137<br>137 | 147<br>150 | 65<br>77 | 63<br>75 | 1,5<br>1,5 | 0,4<br>0,4 | SW 190<br>SW 200 | 190x4<br>200x4 |
| **140** | 160<br>167 | 196<br>206 | 71,2<br>83,2 | 3,9<br>5,4 | 4,2<br>5,2 | 7<br>7 | 4<br>4 | 1,8<br>1,8 | 0,6<br>0,6 | 147<br>147 | 156<br>162 | 65<br>77 | 63<br>73 | 1<br>1,5 | 0,4<br>0,4 | SW 200<br>SW 210 | 200x4<br>210x5 |

[1] The values for $C_{a1}$ apply for SW snap rings, the values for $C_{a2}$ for snap rings in accordance with DIN 471.
[2] Snap rings are not supplied by SKF.
[3] Recommended shaft abutment diameter for axially loaded bearings → *Flange support*, page 512

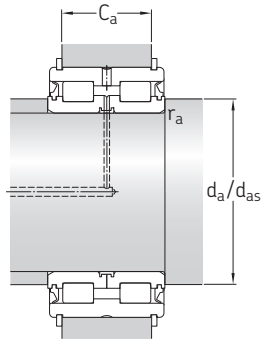
## 6.5 Sealed double row full complement cylindrical roller bearings

d **150 – 280** mm



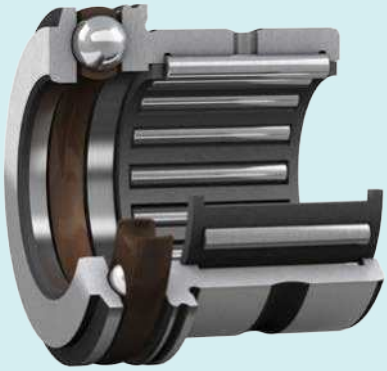

| Principal dimensions | | | | Basic load ratings dynamic | static | Fatigue load limit | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | | $C_0$ | $P_u$ | | | |
| mm | | | | kN | | kN | r/min | kg | – |
| **150** | 210 | 80 | 79 | 484 | 915 | 100 | 600 | 8,4 | **319430 B-2LS** |
| | 225 | 100 | 99 | 748 | 1 290 | 143 | 560 | 13,5 | ▸ **NNF 5030 B-2LS** |
| **160** | 220 | 80 | 79 | 501 | 1 000 | 106 | 530 | 8,8 | **319432 DA-2LS** |
| | 240 | 109 | 108 | 781 | 1 400 | 153 | 500 | 16,5 | **NNF 5032 B-2LS** |
| **170** | 230 | 80 | 79 | 512 | 1 060 | 110 | 530 | 9,2 | **319434 B-2LS** |
| | 260 | 122 | 121 | 1 010 | 1 800 | 193 | 480 | 22,5 | ▸ **NNF 5034 B-2LS** |
| **180** | 240 | 80 | 79 | 528 | 1 100 | 114 | 480 | 9,8 | **319436 DA-2LS** |
| | 280 | 136 | 135 | 1 170 | 2 120 | 228 | 450 | 31 | **NNF 5036 B-2LS** |
| **190** | 260 | 80 | 79 | 550 | 1 180 | 120 | 450 | 12,5 | **319438 DA-2LS** |
| | 290 | 136 | 135 | 1 190 | 2 200 | 236 | 430 | 31,5 | **NNF 5038 B-2LS** |
| **200** | 270 | 80 | 79 | 583 | 1 370 | 137 | 430 | 13 | **319440 B-2LS** |
| | 310 | 150 | 149 | 1 450 | 2 900 | 300 | 400 | 42 | **NNF 5040 B-2LS** |
| **220** | 300 | 95 | 94 | 880 | 1 860 | 190 | 380 | 19 | **319444 B-2LS** |
| | 340 | 160 | 159 | 1 610 | 3 100 | 315 | 360 | 54 | **NNF 5044 B-2LS** |
| **240** | 320 | 95 | 94 | 952 | 2 040 | 200 | 360 | 20 | **319448 B-2LS** |
| | 360 | 160 | 159 | 1 680 | 3 350 | 335 | 340 | 57,5 | **NNF 5048 B-2LS** |
| **260** | 340 | 95 | 94 | 990 | 2 160 | 212 | 340 | 22 | **319452 B-2LS** |
| | 400 | 190 | 189 | 2 420 | 4 650 | 455 | 300 | 86 | **NNF 5052 B-2LS** |
| **280** | 420 | 190 | 189 | 2 550 | 5 000 | 490 | 280 | 91 | **NNF 5056 B-2LS** |

▸ Popular item




| Dimensions | | | | | | | | | | Abutment and fillet dimensions[1] | | | | | Calculation factor | Associated snap rings[2] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_3$ | $C_1$ +0.2 | $C_2$ | b | $b_1$ | K | r min. | $r_{3,4}$ min. | $d_a$ min. | $d_{as}$[3] | $C_{a1}$ -0,2 | $C_{a2}$ -0,2 | $r_a$ max. | $k_r$ | Seeger | DIN 471 |
| mm | | | | | | | | | | mm | | | | | – | – | |
| **150** | 170 | 206 | 71,2 | 3,9 | 5,2 | 7 | 4 | 1,8 | 0,6 | 157 | 166 | 65 | 61 | 1,5 | 0,4 | SW 210 | 210x5 |
| | 177 | 221 | 87,2 | 5,9 | 5,2 | 7 | 4 | 2 | 0,6 | 157 | 172 | 81 | 77 | 2 | 0,4 | SW 225 | 225x5 |
| **160** | 184 | 216 | 71,2 | 3,9 | 5,2 | 7 | 4 | 1,8 | 0,6 | 167 | 180 | 65 | 61 | 1 | 0,4 | SW 220 | 220x5 |
| | 191 | 236 | 95,2 | 6,4 | 5,2 | 7 | 4 | 2 | 0,6 | 167 | 186 | 89 | 85 | 2 | 0,4 | SW 240 | 240x5 |
| **170** | 194 | 226 | 71,2 | 3,9 | 5,2 | 7 | 4 | 1,8 | 0,6 | 177 | 190 | 65 | 61 | 1,5 | 0,4 | SW 230 | 230x5 |
| | 203 | 254 | 107,2 | 6,9 | 5,2 | 7 | 4 | 2 | 0,6 | 177 | 197 | 99 | 97 | 2 | 0,4 | SW 260 | 260x5 |
| **180** | 203 | 236 | 71,2 | 3,9 | 5,2 | 7 | 4 | 1,8 | 0,6 | 187 | 199 | 65 | 61 | 1 | 0,4 | SW 240 | 240x5 |
| | 220 | 274 | 118,2 | 8,4 | 5,2 | 8 | 4 | 2 | 0,6 | 187 | 214 | 110 | 108 | 2 | 0,4 | SW 280 | 280x5 |
| **190** | 218 | 254 | 73,2 | 2,9 | 5,2 | 7 | 4 | 1,8 | 0,6 | 197 | 214 | 65 | 63 | 1 | 0,4 | SW 260 | 260x5 |
| | 228 | 284 | 118,2 | 8,4 | 5,2 | 8 | 4 | 2 | 0,6 | 197 | 222 | 110 | 108 | 2 | 0,4 | SW 290 | 290x5 |
| **200** | 227 | 264 | 73,2 | 2,9 | 5,2 | 7 | 4 | 1,8 | 0,6 | 207 | 223 | 65 | 63 | 1,5 | 0,4 | SW 270 | 270x5 |
| | 245 | 304 | 128,2 | 10,4 | 6,3 | 8 | 4 | 2 | 0,6 | 207 | 239 | 120 | 116 | 2 | 0,4 | SW 310 | 310x6 |
| **220** | 250 | 295 | 83,2 | 5,4 | 5,2 | 8 | 6 | 1,8 | 1 | 227 | 246 | 75 | 73 | 1,5 | 0,4 | SW 300 | 300x5 |
| | 263 | 334 | 138,2 | 10,4 | 6,3 | 9,5 | 6 | 2 | 1 | 227 | 256 | 130 | 126 | 2 | 0,4 | SW 340 | 340x6 |
| **240** | 269 | 314 | 83,2 | 5,4 | 6,3 | 8 | 6 | 1,8 | 1 | 247 | 265 | 75 | 71 | 1,5 | 0,4 | SW 320 | 320x6 |
| | 282 | 354 | 138,2 | 10,4 | 6,3 | 9,5 | 6 | 2 | 1 | 247 | 275 | 130 | 126 | 2 | 0,4 | SW 360 | 360x6 |
| **260** | 291 | 334 | 83,2 | 5,4 | 6,3 | 8 | 6 | 1,8 | 1 | 267 | 286 | 75 | 71 | 1,5 | 0,4 | SW 340 | 340x6 |
| | 309 | 394 | 162,2 | 13,4 | 6,3 | 9,5 | 6 | 2 | 1,1 | 268 | 300 | 154 | 150 | 2 | 0,4 | SW 400 | 400x6 |
| **280** | 333 | 413 | 163,2 | 12,9 | 7,3 | 9,5 | 6 | 2 | 1,1 | 288 | 324 | 154 | 149 | 2 | 0,4 | SW 420 | 420x7 |

[1] The values for $C_{a1}$ apply for SW snap rings, the values for $C_{a2}$ for snap rings in accordance with DIN 471.
[2] Snap rings are not supplied by SKF.
[3] Recommended shaft abutment diameter for axially loaded bearings → *Flange support*, page 512



# 7 Needle roller bearings

# 7 Needle roller bearings


**Designs and variants** . . . . . **583**
Needle roller and cage assemblies . . . . . 583
Basic design bearings . . . . . 583
Other needle roller and cage assemblies . . . . . 584
Drawn cup needle roller bearings . . . . . 584
Basic design bearings . . . . . 585
Arrangements with components and other bearings . . 586
Needle roller bearings with machined rings . . . . . 586
Basic design bearings . . . . . 587
Arrangements with other bearings . . . . . 587
Alignment needle roller bearings . . . . . 588
Combined needle roller bearings . . . . . 588
Needle roller / angular contact ball bearings . . . . . 588
Needle roller / thrust ball bearings . . . . . 590
Needle roller / cylindrical roller thrust bearings . . . . . 592
Needle roller bearing components . . . . . 593
Needle roller bearing inner rings . . . . . 593
Needle rollers . . . . . 593
Sealing solutions . . . . . 594
Associated external seals . . . . . 594
Capped bearings . . . . . 594
Greases for capped bearings . . . . . 595
Relubrication features . . . . . 595
Cages . . . . . 596

**Bearing data** . . . . . **598**
(Dimension standards, tolerances, operating clearance, internal clearance, permissible misalignment)

**Loads** . . . . . **606**
(Minimum load, equivalent dynamic bearing load, equivalent static bearing load)

**Temperature limits** . . . . . **608**

**Permissible speed** . . . . . **608**

**Design considerations** . . . . . **609**
Abutment dimensions . . . . . 609
Shaft and housing tolerances . . . . . 610

**Mounting** . . . . . **611**
Paired mounting . . . . . 611

**Designation system** . . . . . **612**

**Product tables**
7.1 Needle roller and cage assemblies . . . . . 614
7.2 Drawn cup needle roller bearings . . . . . 618
7.3 Needle roller bearings with machined rings with flanges, without an inner ring . . . . . 624
7.4 Needle roller bearings with machined rings with flanges, with an inner ring . . . . . 636
7.5 Alignment needle roller bearings, without an inner ring . . . . . 648
7.6 Alignment needle roller bearings, with an inner ring . . . . . 650
7.7 Needle roller / angular contact ball bearings . . . . . 652
7.8 Needle roller / thrust ball bearings, full complement thrust bearing . . . . . 654
7.9 Needle roller / thrust ball bearings, thrust bearing with a cage . . . . . 656
7.10 Needle roller / cylindrical roller thrust bearings . . . 658
7.11 Needle roller bearing inner rings . . . . . 660

**Other needle roller bearings**
Support rollers . . . . . 943
Cam followers . . . . . 963
Needle roller thrust bearings . . . . . 895
Bearings with Solid Oil . . . . . 1023
NoWear coated bearings . . . . . 1059
Inner rings as wear sleeves → skf.com/seals
Universal joint bearings → skf.com/bearings

# 7 Needle roller bearings

## More information


**General bearing knowledge** . . . . **17**

**Bearing selection process** . . . . . **59**
Lubrication . . . . . 109
Bearing interfaces. . . . . 139
Selecting internal clearance . . . . . 182
Sealing, mounting and dismounting . . . . . 193


SKF needle roller bearings are bearings with cylindrical rollers that are small in diameter relative to their length. The modified roller/raceway profile prevents stress peaks to extend bearing service life.

SKF supplies needle roller bearings in many different designs, series and in a wide range of sizes, which make them appropriate for a wide variety of operating conditions and applications.

## Bearing features

- **Low cross section**
  In applications where less space is available, needle roller bearings offer a very compact solution (fig. 1), and drawn cup needle roller bearings enable downsizing.
- **High load carrying capacity**
  Owing to their large number of rollers, needle roller bearings have a high load carrying capacity.
- **High stiffness**
  Because of their large number of small-diameter rollers, needle roller bearings have high stiffness.
- **Separable design**
  The possibility of assembling inner and outer rings separately permits interference fits for shaft and housing and also enables easy maintenance inspections (fig. 2).
- **Accommodate axial displacement**
  Except for bearings with flanges on both the inner and outer rings, needle roller bearings with machined rings can accommodate axial displacement (fig. 3).
- **Accommodate static misalignment**
  Alignment needle roller bearings are self-aligning up to 3° of static misalignment.
- **Locating bearing arrangement**
  Combined needle roller bearings accommodate combined radial and axial loads in one or both directions.

Fig. 1

**Low cross section**

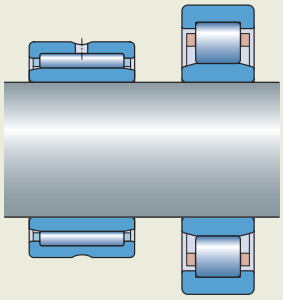
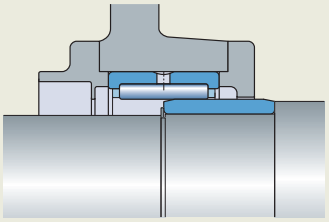


Fig. 2

**Separable design**



# Designs and variants

## Needle roller and cage assemblies

SKF needle roller and cage assemblies are self-contained, ready-to-mount bearings. In applications where the shaft and housing bore can serve as raceways, the assemblies can be used to create bearing arrangements that require minimal radial space.

### Basic design bearings

- are identified by the series designation K
- are available as (**fig. 4**):
  - single row design (no designation suffix)
  - double row design (designation suffix ZW)

They are characterized by the following properties:
- simple to mount and robust
- accurate roller guidance in the cage pockets
- good running performance



**Fig. 3**

**Axial displacement**

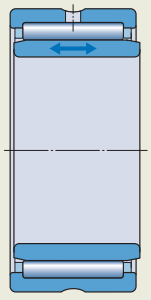
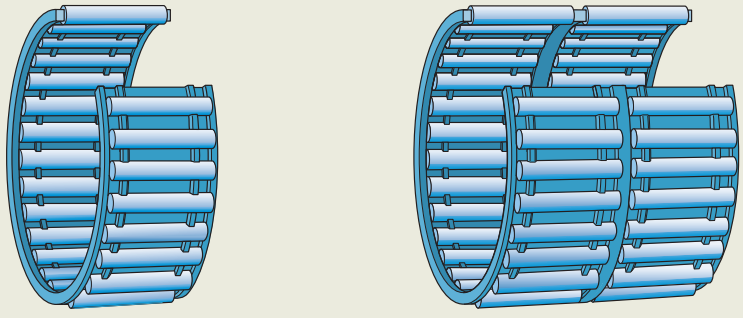


**Fig. 4**

**Needle roller and cage assembly**



Single row

Double row

## Other needle roller and cage assemblies

Needle roller and cage assemblies with a split cage can be used where raceways are recessed in the shaft (fig. 5).

Special needle roller and cage assemblies are used for the gudgeon (wrist) pin (fig. 6) and crankpin (crankshaft journal) (fig. 7) for connecting rods of internal combustion engines and compressors. They provide excellent service in spite of rapid accelerations, elevated temperatures, unfavourable load, and poor lubrication conditions.

For additional information about special sizes and designs, which are available on request, contact SKF.

# Drawn cup needle roller bearings

SKF drawn cup needle roller bearings have a deep drawn, thin-walled outer ring. Drawn cup needle roller bearings are typically used in applications where the housing bore cannot be used as a raceway for a needle roller and cage assembly, but where a very compact and economical bearing arrangement is required. These bearings are mounted with a tight interference fit in the housing. This enables a simple and economic design of the housing bore, as shoulders or snap rings are not required to locate the bearing axially.

The drawn cup of hardened steel and the needle roller and cage assembly of these bearings form a non-separable unit.

### SKF standard assortment

SKF supplies a wide assortment of drawn cup needle roller bearings. This includes:

- bearings with open ends (fig. 8)
- bearings with a closed end (fig. 9)
- full complement bearings with open ends (fig. 10)

SKF drawn cup needle roller bearings:

- are supplied without an inner ring
- are generally designed with one needle roller and cage assembly – except wide sizes, which incorporate two needle roller and cage assemblies immediately adjacent to each other, with a lubrication hole in the outer ring (fig. 11).

Fig. 5

**Needle roller and cage assemblies with a split cage**

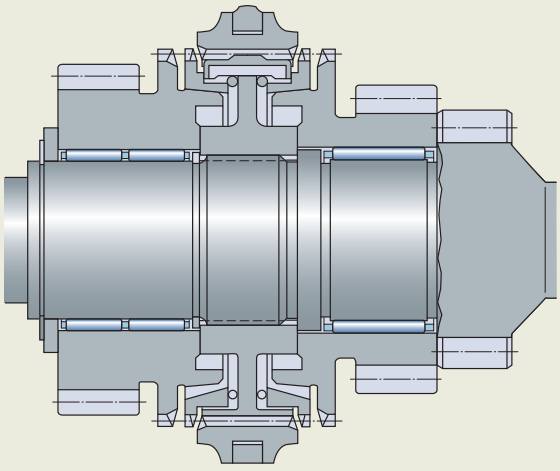


Fig. 6

**Special needle roller and cage assembly for the gudgeon (wrist) pin**

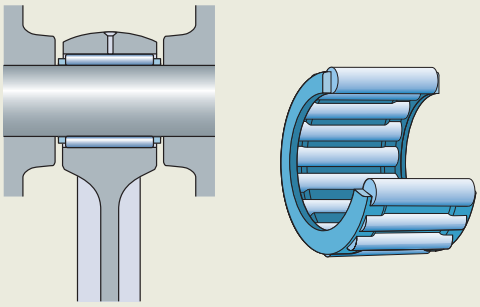
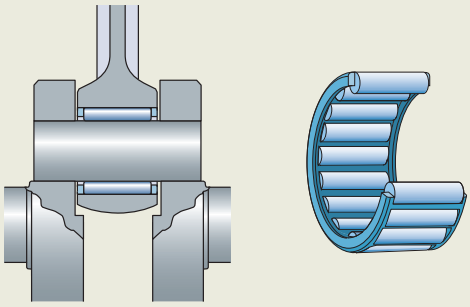


Fig. 7

**Special needle roller and cage assembly for the crankpin (crankshaft journal)**



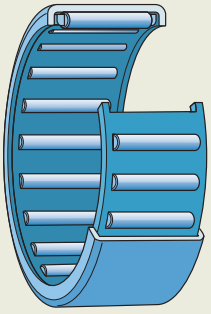
## Basic design bearings

- **Drawn cup needle roller bearings with open ends** (series designation HK, fig. 8)
  - are available open (without seals) or sealed on one or both sides (*Sealing solutions*, page 594)
- **Drawn cup needle roller bearings with a closed end** (series designation BK, fig. 9)
  - are available open or sealed (*Sealing solutions*)
  - are suitable for bearing arrangements where they are situated at the end of a shaft
  - accommodate small axial guidance forces, because of the profiled design of their closed end
- **Full complement bearings with open ends (**series designation HN, fig. 10)
  - are suitable for very heavy radial loads at moderate speeds
  - are available with open ends and without seals only

  Full complement drawn cup needle roller bearings are supplied with a special grease to secure the rollers during transport. However, SKF recommends relubricating after mounting. Depending on the required grade, SKF recommends SKF LGEP 2 or SKF LGWM 1 grease for relubrication. The technical specifications of the initial grease fill and the relubrication greases are listed in table 1.

**Fig. 8**

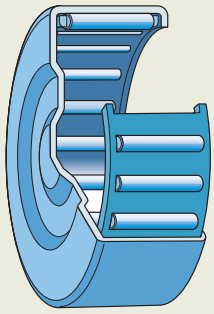
**Drawn cup needle roller bearing with open ends**



HK

**Fig. 9**

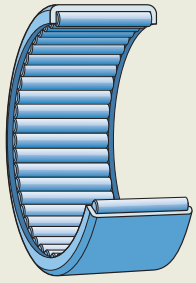
**Drawn cup needle roller bearing with a closed end**



BK

**Fig. 10**

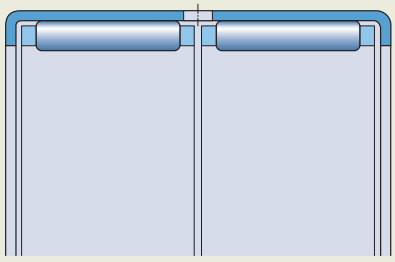
**Full complement drawn cup needle roller bearing with open ends**



HN

**Fig. 11**

**Double row drawn cup needle roller bearing with open ends**



HK

**Table 1**

**Technical specifications of SKF standard greases for full complement drawn cup needle roller bearings**

| Grease | Temperature range[1] | Thickener | Base oil type | NLGI grade | Base oil viscosity [mm²/s] at 40 °C (105 °F) | at 100 °C (210 °F) |
|---|---|---|---|---|---|---|
| | –50 0 50 100 150 200 250 °C<br>–60 30 120 210 300 390 480 °F | | | | | |
| **Initial grease fill** | | Lithium soap | Mineral | 1–2 | 200 | 18,7 |
| **LGEP 2** | | Lithium soap | Mineral | 2 | 200 | 16 |
| **LGWM 1** | | Lithium soap | Mineral | 1 | 200 | 16 |

[1] Refer to the SKF traffic light concept (page 117).

## Arrangements with components and other bearings

- Generally, drawn cup needle roller bearings run directly on a shaft. However, in applications where the shaft cannot be hardened and ground, bearings should be combined with an inner ring (**fig. 12**, and *Needle roller bearing inner rings*, **page 593**).
- Drawn cup needle roller bearings with wide inner rings (**fig. 12** and *Needle roller bearing inner rings*) provide an excellent counterface for the lips of external G or SD design seals (skf.com/seals).
- Certain sizes of drawn cup needle roller bearings can be combined with a needle roller thrust bearing with a centring flange, AXW series (**fig. 13** and *Needle roller thrust bearings*, **page 895**), to accommodate combined radial and axial loads.

# Needle roller bearings with machined rings

SKF needle roller bearings with machined rings are made of carbon chromium bearing steel. SKF supplies these bearings with or without flanges on the outer ring, in a wide range of series and sizes. SKF also supplies them with or without an inner ring.

### Needle roller bearings with machined inner and outer rings

- are used for applications where the shaft cannot be hardened and ground (**fig. 14**)
- have limited permissible axial displacement of the shaft relative to the housing (**fig. 3**, **page 583** and **product table**, **page 636**), which can be extended, if needed, by using a wide inner ring (*Needle roller bearing inner rings*, **page 593**)

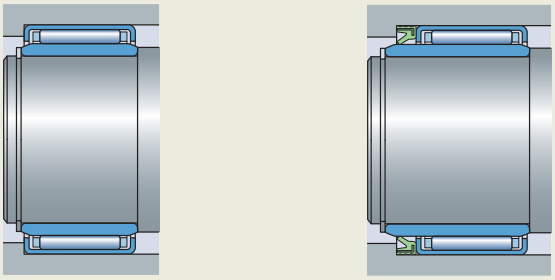
### Needle roller bearings with a machined outer ring, without an inner ring

- are an excellent choice for compact bearing arrangements if the shaft can be hardened and ground (**fig. 15**)
- enable a larger shaft diameter and a stiffer bearing arrangement compared to arrangements with bearings with inner rings

Axial displacement of the shaft relative to the housing is only limited by the width of the raceway on the shaft. By machining the shaft raceways to the appropriate dimensional and geometrical tolerances, it is possible to obtain bearing arrangements with tighter geometrical tolerances. For additional information, refer to *Raceways on shafts and in housings*, **page 179**.

**Fig. 12**

**Drawn cup needle roller bearing**



With a standard inner ring

With a wide inner ring and an external seal

**Fig. 13**

**Drawn cup needle roller bearing combined with a needle roller thrust bearing**

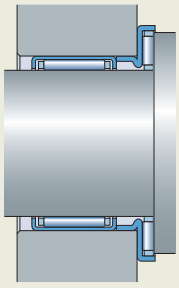


**Fig. 14**

**Needle roller bearing with machined rings**

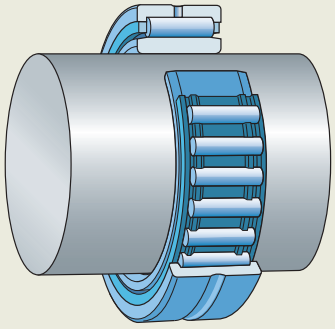


**Fig. 15**

**Needle roller bearing with a machined outer ring**

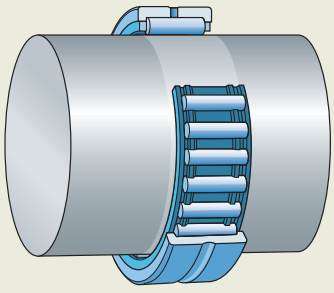
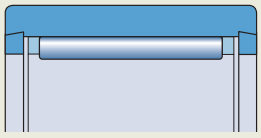


**Fig. 16**

**Needle roller bearing with non-separable closure rings**



NK ($F_w \leq 10$ mm)

# Basic design bearings

## Needle roller bearings with machined rings, with flanges

- are available open (without seals) or sealed on one or both sides
- are available with or without an inner ring
- with D ≤ 17 mm ($F_w$ ≤ 10 mm), are available with non-separable closure rings that act as flanges (fig. 16)

  The flanges on larger bearings are an integral part of the outer ring, and the bearings have an annular groove and one or more lubrication holes in the outer ring (fig. 17).
- are generally designed as single row bearings, with the exception of RNA 69 (fig. 18) and NA 69 series double row bearings with D ≥ 52 mm ($F_w$ ≥ 40 mm)

The roller and cage assembly and outer ring of a needle roller bearing with flanges form a non-separable unit.

## Needle roller bearings with machined rings, without flanges

- are separable, i.e. the outer ring, needle roller and cage assembly, and inner ring, can all be mounted separately (fig. 19)

  Needle roller and cage assemblies can, depending on the arrangement design, either be mounted:
  - together with the outer ring
  - together with the shaft
  - together with the inner ring
  - between the outer ring and shaft or inner ring as the final step

  However, needle roller and cage assemblies and bearing outer rings must always be kept together as supplied.
- are generally designed with one needle roller and cage assembly

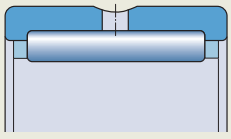
  However, wide sizes incorporate two needle roller and cage assemblies immediately adjacent to each other and have an annular groove and a lubrication hole in the outer ring (fig. 20).

# Arrangements with other bearings

To accommodate combined radial and axial loads, needle roller bearings with machined rings can be combined with a needle roller thrust bearing with a centring flange, AXW series, if the outside diameter D of the radial bearing is equal to the flange diameter $D_1$ of the thrust bearing (fig. 21, and *Needle roller thrust bearings*, page 895).

**Fig. 17**

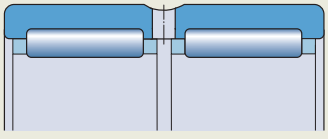
**Needle roller bearing with integral flanges in the outer ring**



NK ($F_w$ ≥ 12 mm)
NKS
RNA 48, RNA 49
RNA 69 ($F_w$ ≤ 35 mm)

**Fig. 18**

**Double row needle roller bearing with flanges**



RNA 69 ($F_w$ ≥ 40 mm)

**Fig. 19**

**Separable design**

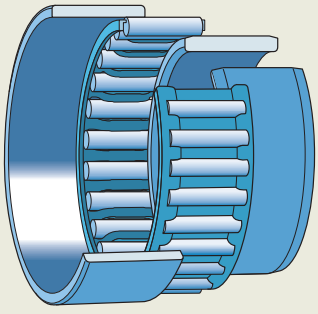


**Fig. 20**

**Double row needle roller bearing without flanges**

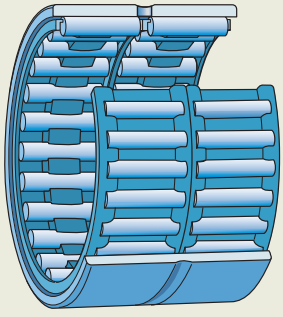
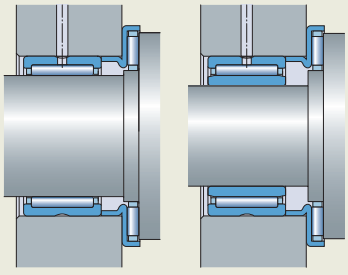


**Fig. 21**

**Needle roller bearing with a needle roller thrust bearing**



Without an inner ring

With an inner ring

# Alignment needle roller bearings

SKF alignment needle roller bearings have an outer ring with a sphered (convex) outside surface. Two polymer seating rings with a sphered (concave) inside surface are encased in a drawn sheet steel sleeve and fitted over the outer ring.

SKF supplies alignment needle roller bearings with or without an inner ring (fig. 22).

## Bearings with an inner ring

- should be used in applications where the shaft cannot be hardened and ground
- have limited permissible axial displacement of the shaft relative to the housing (product table, page 650), which can be extended, if needed, by using a wide inner ring (*Needle roller bearing inner rings*, page 593)

## Bearings without an inner ring

- are an excellent choice for compact bearing arrangements, if the shaft can be hardened and ground.

# Combined needle roller bearings

SKF combined needle roller bearings consist of a radial needle roller bearing combined with a thrust bearing. They can accommodate both radial and axial loads. They are particularly suitable for applications where other types of locating bearing arrangements occupy too much space, or where the axial loads are too heavy, the speeds are too high, or the lubricant is inadequate for arrangements with simple thrust washers. SKF supplies combined needle roller bearings in the following basic designs:

- needle roller / angular contact ball bearing
- needle roller / thrust ball bearing
- needle roller / cylindrical roller thrust bearing

Relubrication intervals for the radial and thrust part of the bearing must be calculated separately. The shorter of the two intervals should be used. For additional information about lubrication, refer to *Lubrication*, page 110.

## Needle roller / angular contact ball bearings

SKF supplies needle roller / angular contact ball bearings without seals in two series (fig. 23):

- NKIA 59 series bearings can accommodate axial loads in one direction
- NKIB 59 series bearings can accommodate axial loads in both directions

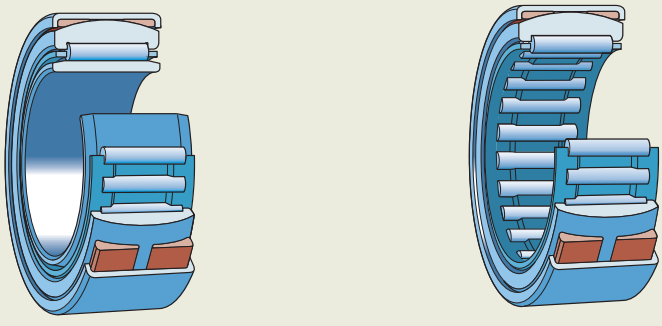
These combined bearings:

- consist of a radial needle roller bearing and an angular contact ball bearing
- accommodate heavy radial loads, carried exclusively by the needle roller bearing
- accommodate light axial loads, carried exclusively by the angular contact ball bearing
- are low cross section bearings
- can operate at high speeds
- are separable, i.e. the inner ring can be mounted separately from the outer ring and rolling element and cage assemblies
- can be grease or oil lubricated, depending on the application

  In the case of grease lubrication, both the needle roller and angular contact ball bearings should be filled with the same lubricant prior to mounting.

Fig. 22

**Alignment needle roller bearing**



With an inner ring, PNA

Without an inner ring, RPNA

## NKIA series bearings

- can accommodate axial loads in one direction and, therefore, locate the shaft in one direction only
- can be mounted back-to-back (fig. 24), for short shafts and where changes in length due to thermal expansion are relatively minor

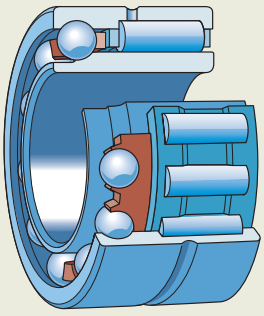
## NKIB series bearings

- can locate the shaft in both directions
- have axial clearance, between 0,08 and 0,25 mm
- have a two-piece inner ring to facilitate mounting

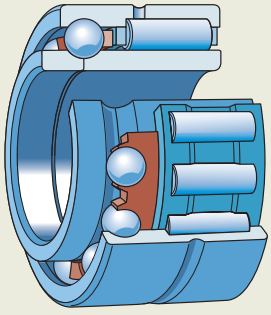
  When mounting the inner ring, it is important that the two pieces are axially clamped to one another.
- have inner rings, which are not interchangeable with those from another seemingly identical bearing (keep together as supplied)

**Fig. 23**

**Needle roller / angular contact ball bearing**



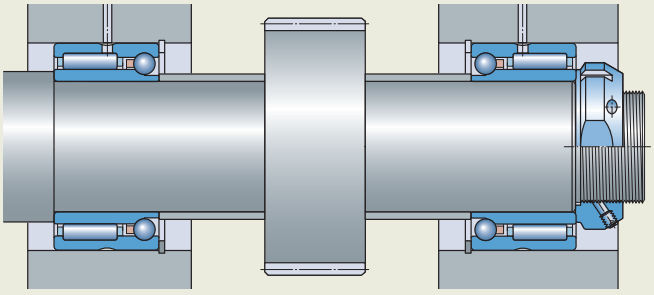
NKIA 59



NKIB 59

**Fig. 24**

**NKIA series bearings arranged back-to-back**



## Needle roller / thrust ball bearings

SKF supplies needle roller / thrust ball bearings in two series (fig. 25):

- NX series with a full complement thrust ball bearing
- NKX series with a thrust ball bearing with a cage

These combined bearings:

- consist of a radial needle roller bearing and a thrust ball bearing
- are supplied without an inner ring
- can be combined with an inner ring (fig. 26), where the shaft cannot be hardened and ground (**product tables**, **page 654** and **page 656**, must be ordered separately)
- can accommodate axial loads in one direction and, therefore, locate the shaft in one direction only
- can be mounted back-to-back (fig. 27), for short shafts and where changes in length due to thermal expansion are relatively minor

  For these types of arrangements, SKF recommends preloading the thrust ball bearings with Belleville washers (cup springs). This preload helps to prevent the balls from skidding if one of the thrust bearings becomes unloaded. Preload also improves performance of the thrust ball bearings while reducing noise levels.

### NX series bearings

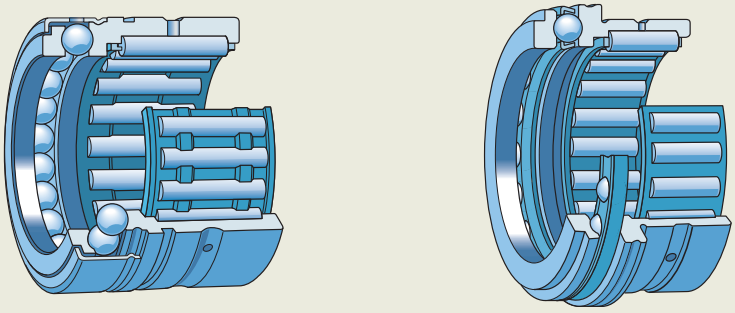
- consist of a radial needle roller bearing and a full complement thrust ball bearing (fig. 28)
- are suitable for applications where there are moderate radial loads and lighter, single direction axial loads
- have low cross-sectional height, which enables shaft centrelines to be positioned close together like for multi-spindle drills
- can be mounted with a snap ring, or against a shoulder in the housing bore, for axial support

  The snap ring groove in the outer ring provides a cost-effective and axially space-saving solution (fig. 29 and **product tables, 7.8**, **page 654**).
- are most often oil lubricated and therefore supplied without grease
- have a stamped steel cover that
  - extends over the shaft washer of the full complement thrust ball bearing
  - is firmly attached to the radial needle roller bearing
  - makes these bearings non-separable
  - has lubrication holes as standard
  - has no lubrication holes for bearings with designation suffix Z (fig. 28)

    These bearings can be grease lubricated.

Fig. 25

**Needle roller / thrust ball bearing**



Full complement thrust bearing, NX

Thrust bearing with a cage, NKX

Fig. 26

**NX series bearing with an inner ring**

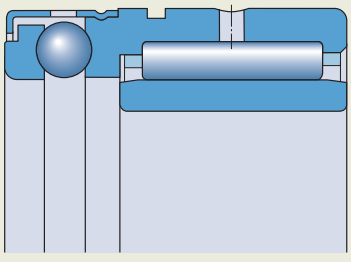
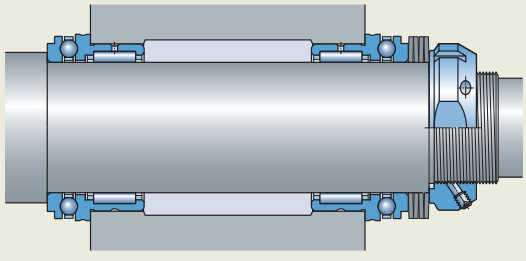


Fig. 27

**NKX series bearings arranged back-to-back, incorporating Belleville washers**



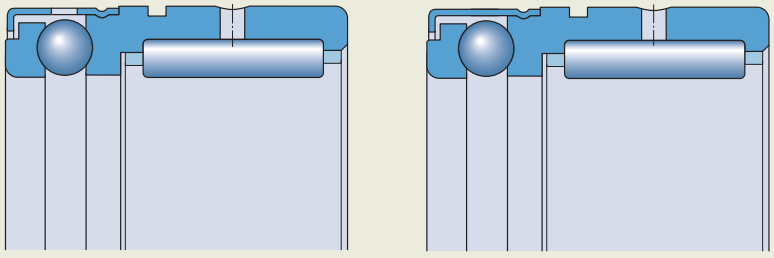
## NKX series bearings with a cage

- consist of a radial needle roller bearing and a thrust ball bearing with a ball and cage thrust assembly identical to the 511 series (fig. 30)
- permit relatively high-speed operation
- are located axially in one direction by the outer ring flange
- can be mounted separately from both the ball and cage assembly and shaft washer
- should be oil lubricated, as there is no cover that retains the grease in the bearing
- have no stamped steel cover, as standard
- have a stamped steel cover for bearings with designation Z (fig. 30) that
  - has no lubrication holes
  - extends over the shaft washer of the thrust ball bearing
  - is firmly attached to the housing washer that is integral to the needle roller bearing outer ring
  - makes these bearings non-separable



**Fig. 28**

**Needle roller / full complement thrust ball bearing**



NX NX .. Z

**Fig. 29**

**NX series bearing mounted with a snap ring**

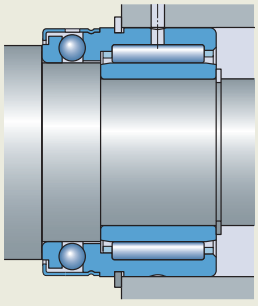
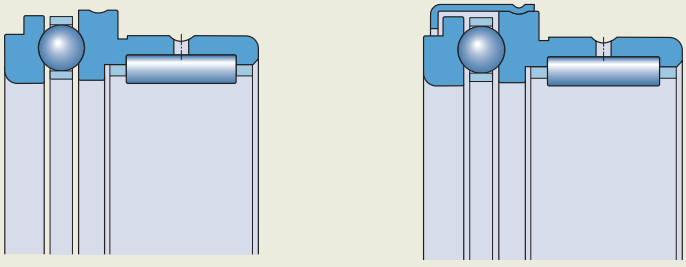


**Fig. 30**

**Needle roller / thrust ball bearing with a cage**



NKX NKX .. Z

# Needle roller / cylindrical roller thrust bearings

SKF supplies needle roller / cylindrical roller thrust bearings in the NKXR series (fig. 31).

These combined bearings:

- consist of a radial needle roller bearing and a cylindrical roller thrust bearing
  The cylindrical roller and cage thrust assembly is identical to the 811 series.
- are supplied without an inner ring
- can be combined with an inner ring (fig. 32), where the shaft cannot be hardened and ground (product table, page 658, must be ordered separately)
- can accommodate axial loads in one direction
- can locate the shaft in one direction only
- can be mounted back-to-back (fig. 33) for short shafts and where changes in length due to thermal expansion are relatively minor
  For these types of arrangements, SKF recommends preloading the thrust ball bearings with Belleville washers (cup springs). This elastic preload helps to prevent the balls from skidding if one of the thrust bearings becomes unloaded. Preload also improves performance of the thrust ball bearings while reducing noise levels.

## NKXR series bearings

- are separable
- can be mounted separately from both the cylindrical roller and cage thrust assembly and the shaft washer
- should be oil lubricated, as oil facilitates an adequate supply of lubricant to the bearing
- have no stamped steel cover, as standard
- have a stamped steel cover for bearings with designation suffix Z (fig. 34) that
  - has no lubrication holes
  - extends over the shaft washer of the cylindrical roller thrust bearing
  - is firmly attached to the housing washer that is integral to the needle roller bearing outer ring
  - makes these bearings non-separable

Fig. 31

**Needle roller / cylindrical roller thrust bearing**

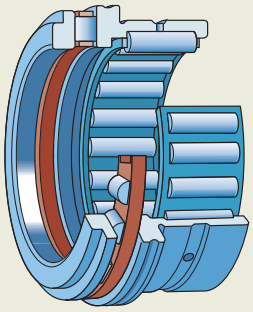


Fig. 32

**NKXR .. Z bearing with an inner ring**

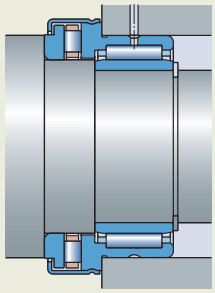


Fig. 33

**NKXR series bearings arranged back-to-back, incorporating Belleville washers**

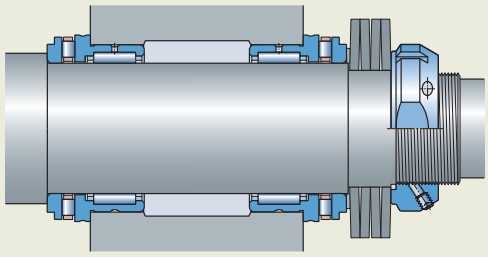
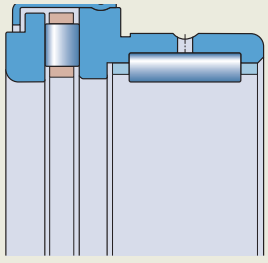


Fig. 34

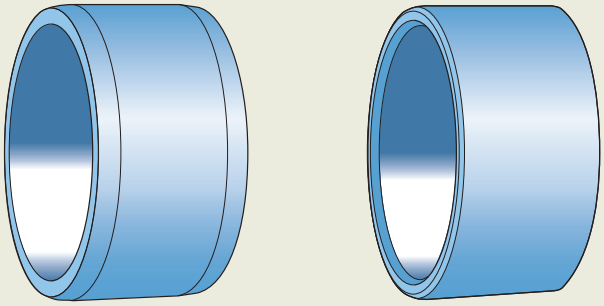
**Needle roller / cylindrical roller thrust bearing**



NKXR .. Z

Fig. 35

**Inner rings**



IR LR

# Needle roller bearing components

## Needle roller bearing inner rings

SKF supplies inner rings for needle roller bearings separately. They are typically combined with needle roller and cage assemblies (page 583) or drawn cup needle roller bearings (page 584) in applications where the shaft cannot be hardened and ground.

Inner rings are available in two series (fig. 35):

- IR series
  - with or without a lubrication hole
  - with or without a machining allowance
- LR series

Both inner ring series:

- are also available in different widths
- permit greater axial displacement of the shaft, relative to the housing, when they are wider than standard
  - provide an excellent counterface for the lips of contact seals (fig. 12, page 586)
- should be located on both sides to prevent axial movement (regardless of whether the ring has an interference or loose fit)
  - one side can be located against a shoulder
  - the other side can be located by either a snap ring, a distance ring or a nut

### IR series inner rings

- are the standard SKF inner rings for needle roller bearings
- are hardened and ground
- have a precision ground raceway surface with a lead-in chamfer on both sides

  The chamfers facilitate assembly and protect the seal lips from damage during the mounting process.
- are available in some sizes with a lubrication hole (designation suffix IS1, fig. 36)

  Inner rings with additional lubrication holes are available on request.
- are available on request with a pre-ground raceway and a machining allowance (designation suffix VGS, table 2)

  They can be finish ground after mounting on a shaft in applications where extremely tight geometrical tolerances are required.

### LR series inner rings

- are hardened, and the bore and raceway diameter are ground
- side faces are turned and the edges are smoothed
- can be used to provide a cost-effective bearing arrangement for applications where the larger run-out and width tolerances are less important

## Needle rollers

Needle rollers can be used to design full complement bearing arrangements for low-speed or oscillating applications. These compact bearing arrangements have a very high load carrying capacity when compared to bearings with a cage and are economical, provided the shaft and housing bore can serve as raceways (*Raceways on shafts and in housings*, page 179).

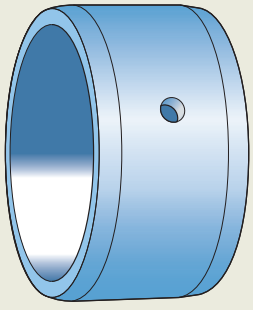
Needle rollers:

- are not listed in this catalogue, but can be found online at skf.com/go/17000-7-12
- are made of carbon chromium steel
- have a hardness of 58 to 65 HRC
- have a precision ground surface

For assistance in designing full complement bearing arrangements or to calculate performance data for these bearing arrangements, contact the SKF application engineering service.

**Fig. 36**

**Inner ring with a lubrication hole**



IR .. IS1

**Table 2**

**Machining allowance of inner ring raceway diameter**

| Raceway diameter F | | Machining allowance z | Pre-ground raceway diameter $F_{VGS}$ |
|---|---|---|---|
| > | ≤ | | |
| mm | | mm | mm |
| – | 50 | 0,10 | $F_{VGS} = F + z$ (tolerance class h7Ⓔ) |
| **50** | 80 | 0,15 | |
| **80** | 180 | 0,20 | |
| **180** | 250 | 0,25 | |
| **250** | 315 | 0,30 | |
| **315** | 400 | 0,35 | |
| **400** | 500 | 0,40 | |

# Sealing solutions

## Associated external seals

- can be used for needle roller bearing arrangements (**fig. 12**, **page 586**)
- can be supplied in various sizes, as listed in the product tables:
  - *Needle roller and cage assemblies*, **page 614**
  - *Drawn cup needle roller bearings*, **page 618**
  - *Needle roller bearings with machined rings with flanges, without an inner ring*, **page 624**

For information about associated power transmission seals, refer to skf.com/seals.

## Capped bearings

SKF supplies certain needle roller bearings capped with a seal or steel cover. The assortment of capped bearings includes:

- drawn cup needle roller bearings, sealed on one or both sides
- needle roller bearings with machined rings in the (R)NA 49 series, sealed on one or both sides
- combined needle roller bearings, capped with a steel cover over the thrust part of the bearing

When capped bearings must operate under certain conditions, such as very high speeds or high temperatures, some grease may leak. For bearing arrangements where this would be detrimental, appropriate actions could be taken.

## Sealed drawn cup needle roller bearings

For applications where a sufficiently effective seal is not available, or cannot be used for space reasons, SKF supplies certain drawn cup needle roller bearings as sealed bearings. The assortment includes:

- drawn cup needle roller bearings with open ends (**fig. 37**)
  - available for $8 \leq F_w \leq 50$ mm
  - sealed on one side (designation suffix RS)
  - sealed on both sides (designation suffix .2RS)
- sealed drawn cup needle roller bearings with a closed end (designation suffix RS, **fig. 38**)
  - available for $10 \leq F_w \leq 25$ mm

These integral contact seals are made of PUR, FKM or NBR. Sealed drawn cup needle roller bearings are, under normal conditions and with appropriate counterface, an extremely cost-effective solution to exclude solid contaminants and moisture, and retain the lubricant in the bearing.

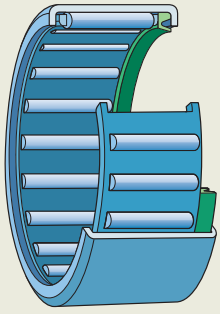
**⚠ WARNING**

Seals made of FKM (fluoro rubber) exposed to an open flame or temperatures above 300 °C *(570 °F)* are a health and environmental hazard! They remain dangerous even after they have cooled.

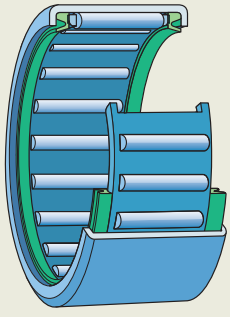
Read and follow the safety precautions on **page 197**.

**Fig. 37**

**Sealed drawn cup needle roller bearing with open ends**



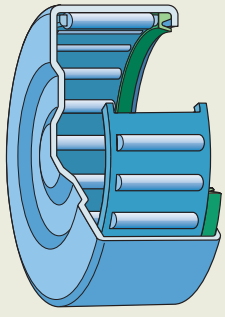
HK .. RS



HK ...2RS

**Fig. 38**

**Sealed drawn cup needle roller bearing with a closed end**



BK .. RS

## Sealed needle roller bearings with machined rings

- are available in the (R)NA 49 series with a contact seal made of NBR (effective at keeping the lubricant in and contaminants out of the bearing) on one (designation suffix RS) or both sides (designation suffix .2RS) (fig. 39)
- have an inner ring that is 1 mm wider than the outer ring, which maintains the effectiveness of the seals and simplifies the bearing arrangements even when small axial displacements occur

## Capped combined needle roller bearings

SKF supplies certain combined needle roller bearings capped with a stamped steel cover over the thrust part of the bearing (designation suffix Z). The cover, which has no lubrication holes, forms a gap-type seal to retain the grease in the bearing. The assortment includes:

- needle roller / full complement thrust ball bearings (fig. 28, page 591)
- needle roller / thrust ball bearings (fig. 30, page 591)
- needle roller / cylindrical roller thrust bearings (fig. 34, page 592)

## Greases for capped bearings

Needle roller bearings with one or two seals are supplied greased. The thrust part of combined needle roller bearings with the designation suffix Z is also supplied greased. They are filled with high-quality grease (table 3) under clean conditions.

The relatively large quantity of grease in the bearings means they can be operated for long periods before relubrication is required. SKF recommends SKF LGWA 2 grease (table 3), if relubrication is required.

# Relubrication features

SKF supplies needle roller bearings with different features to facilitate effective lubrication and relubrication.

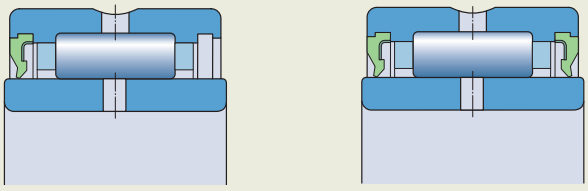
## Drawn cup needle roller bearings

All double row drawn cup needle roller bearings have one lubrication hole in the outer ring (fig. 11, page 585), as standard.

On request, SKF can supply any single row drawn cup needle roller bearing for inside diameters under the rollers $F_w \geq 7$ mm with a lubrication hole in the outer ring (fig. 40).

**Fig. 39**

**Sealed needle roller bearing with machined rings**



NA 49.. RS NA 49...2RS

**Fig. 40**

**Single row drawn cup needle roller bearing with a lubrication hole in the outer ring**

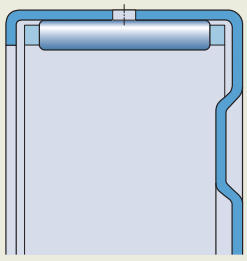


**Table 3**

**Technical specifications of greases for capped needle roller bearings**

| Grease | Temperature range[1] | Thickener | Base oil type | NLGI grade | Base oil viscosity [mm²/s] at 40 °C (105 °F) | at 100 °C (210 °F) |
|---|---|---|---|---|---|---|
| Initial grease fill | –50 to 250 °C / –60 to 480 °F | Lithium complex soap | Mineral | 2 | 160 | 15,5 |
| LGWA 2 | –50 to 250 °C / –60 to 480 °F | Lithium complex soap | Mineral | 2 | 185 | 15 |

[1] Refer to the SKF traffic light concept (page 117).

## Needle roller bearings with machined rings

- with flanges and D ≥ 19 mm ($F$, $F_w$ ≥ 12 mm) have an annular groove and, depending on the bearing size, one or more lubrication holes in the outer ring (**fig. 17**, **page 587**)
- with seal(s) have an additional lubrication hole in the inner ring (**fig. 39**, **page 595**)
- double row and without flanges have an annular groove with one lubrication hole in the outer ring (**fig. 20**, **page 587**)
- without flanges and with an inner ring have one lubrication hole in the inner ring for certain sizes (**product table**, **page 636**)

## Combined needle roller bearings

The needle roller bearing used in combined bearings has an annular groove with one lubrication hole in the outer ring.

Needle roller / full complement thrust ball bearings in the NX series without the designation suffix Z have a cover with lubrication holes over the thrust part of the bearing (**fig. 28**, **page 591**). Most often they are oil lubricated and, therefore, SKF supplies these bearings without grease.

# Cages

SKF needle roller bearings are fitted with one of the cage designs shown in **table 4**.

When used at high temperatures, some lubricants can have a detrimental effect on polyamide cages. For additional information about the suitability of cages, refer to *Cages*, **page 187**.

## Double row needle roller bearings

Double row needle roller and cage assemblies have a double row cage in the same design as a single row cage (**fig. 4**, **page 583**).

Other double row needle roller bearings are fitted with two cage assemblies (**fig. 11**, **page 585**, and **fig. 18**, **page 587**).

**Cages for needle roller bearings**

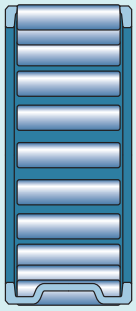
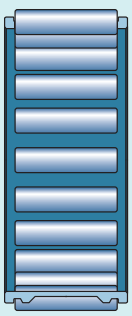
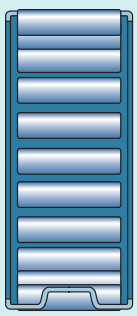
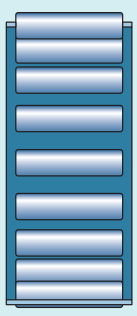
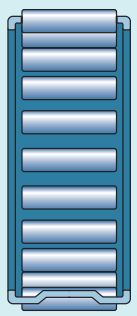
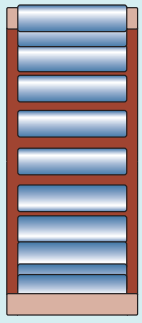
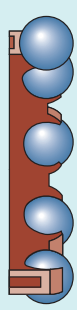
| | Cages for radial bearings |
|---|---|
| |  |
| **Cage type** | Window-type |
| **Material** | Sheet steel or machined steel |
| **Suffix** | – |
| **Bearing types** | |
| **Needle roller and cage assemblies** | Standard |
| **Drawn cup needle roller bearings** | – |
| **Needle roller bearings with machined rings** | – |
| **Alignment needle roller bearings** | – |
| **Needle roller / angular contact ball bearings** | – |
| **Needle roller / thrust ball bearings** | – |
| **Needle roller / cylindrical roller thrust bearings** | – |

**Table 4**

| | | | | | | Cages for thrust bearings | | |
|---|---|---|---|---|---|---|---|---|
| |  |  |  |  |  | |  | |
| | Window-type | Window-type | Window-type | Window-type | Window-type | Window-type | Snap-type | Window-type |
| | Sheet steel or machined steel | Sheet steel | Sheet steel | Sheet steel or machined steel | Glass fibre reinforced PA66 | Sheet steel | Glass fibre reinforced PA66 | Glass fibre reinforced PA66 |
| | – | – | – | – | TN | – | – | – |
| | | | | | | | | |
| | – | Standard | – | – | Standard | – | – | – |
| | – | – | Standard | – | Standard | – | – | – |
| | Standard | – | – | Standard | Standard | – | – | – |
| | Standard | – | – | Standard | – | – | – | – |
| | Standard | – | – | Standard | – | – | Standard | – |
| | Standard | – | – | Standard | Standard | Standard | – | – |
| | Standard | – | – | Standard | – | – | – | Standard |

# Bearing data

| | Needle roller and cage assemblies | Drawn cup needle roller bearings |
|---|---|---|
| **Dimension standards** | ISO 3030 when $F_w \leq 100$ mm, as far as standardized | Boundary dimensions:<br>ISO 3245, as far as standardized |
| **Tolerances**<br><br>For additional information<br>→ page 35 | • rollers: ISO 3096 Grade 2 (grade G2)<br>– tolerance of each gauge 2 µm<br>– standard gauges (table 5, page 601)<br>– specific gauge to be stated when ordering<br>• U: ISO 3030, as far as standardized (–0,2/–0,8 mm) | ISO 3245, as far as standardized<br>• $F_w$ ≈ within F8 (table 8, page 602)<br>Measuring of $F_w$:<br>– bearing must be pressed into a thick-walled ring gauge, bore diameter listed in table 8<br>– check deviation of $F_w$ with measuring mandrel<br>• C: 0/–0,3 mm<br><br>Dimensional tolerances can be checked only if bearings are mounted. |
| **Operating clearance** | Range of C2 to Normal if:<br>• fitted with standard gauge rollers (table 5, page 601)<br>• recommended raceway tolerances (table 6, page 601) applied<br>• normal operating conditions | Range of C2 to C3 if recommended tolerances (table 17, page 610) applied |
| **Internal clearance** | Specific ranges: table 7, page 602 | – |
| **Permissible misalignment** | ≈ 1 minute of arc | ≈ 1 minute of arc |
| | Misalignment increases bearing noise and reduces bearing service life, ... | |

| | Needle roller bearings with machined rings | Alignment needle roller bearings |
|---|---|---|
| | Boundary dimensions:<br>ISO 1206 for bearings in the (R)NA 48, (R)NA 49 and (R)NA 69 series | d, D: ISO 15<br>D ≤ 47 mm → diameter series 0<br>D ≥ 55 mm → diameter series 9 |
| | Normal<br>P6 or P5 on request<br>• Fw: F6 (**table 9**, **page 603**)<br>Values are valid for unmounted bearings when rollers are in contact with the outer ring raceway.<br><br>Tighter tolerance for inside diameter under the rollers on request (designation suffix H followed by two numbers that identify the tolerance limit, e.g. H+24+20).<br><br>Values: ISO 492 (**table 2**, **page 38**, to **table 4**, **page 40**) | • Normal for the inner ring and the outer ring with sphered outside surface<br>• C of the external drawn sheet steel sleeve: ± 0,5 mm<br>• $F_w$: F6 (**table 9**, **page 603**)<br>Values are valid for unmounted bearings and when rollers are in contact with the outer ring raceway.<br><br>Values: ISO 492 (**table 2**, **page 38**) |
| | **Bearings without an inner ring**<br>Suitable ranges (**table 10**, **page 603**) where:<br>• recommended shaft tolerance classes applied<br>• housing bore tolerance not tighter than K7Ⓔ | **Bearings without an inner ring**<br>Range of C2 to C3 if recommended tolerances (**table 17**, **page 610**) applied |
| | Normal (bearings with an inner ring)<br>Check availability of C2, C3 or C4 clearance classes<br><br>Values: ISO 5753-1 (**table 11**, **page 603**)<br>Values are valid for unmounted bearings under zero measuring load. | |
| | ≈ 1 minute of arc | ≤ 3° static misalignment<br>No dynamic misalignment |

... and when it exceeds the guideline value these effects become particularly noticeable.

Bearing data, continued

| | Needle roller / angular contact ball bearings | Needle roller / thrust ball bearings | Needle roller / cylindrical roller thrust bearings |
|---|---|---|---|
| **Dimension standards** | Boundary dimensions:<br>ISO 15 – dimension series 59, except for following inner ring parameters in the NKIB 59 series:<br>• extended width on one side<br>• slightly larger bore diameter of the narrow part | Boundary dimensions:<br>DIN 5429-1, except for NX and NX .. Z series bearings (not standardized) | Boundary dimensions:<br>DIN 5429-1 |
| **Tolerances**<br><br>For additional information<br>→ page 35 | Normal, except for width of the complete inner ring in the NKIB 59 series: 0/–0,3 mm<br><br>Values: ISO 492 (table 2, page 38) | D: Normal<br>$F_w$: F6 (table 9, page 603)<br>d: E8 (table 9)<br>C: 0/–0,25 mm<br>$C_1$ (applicable to NKX(R) series only): 0/–0,2 mm<br><br>Values:<br>Radial bearings → ISO 492 (table 2, page 38)<br>Thrust bearings → ISO 199 (table 10, page 46) | |
| **Operating clearance** | – | **Bearings without an inner ring**<br>Range slightly less than Normal if recommended tolerances (table 17, page 610) applied | |
| **Internal clearance** | Normal (bearings with an inner ring)<br>Check availability of C2, C3 or C4 clearance classes<br><br>Values: ISO 5753-1 (table 11, page 603)<br>Values are valid for unmounted bearings under zero measuring load. | – | |
| **Permissible misalignment** | Misalignment increases bearing noise and reduces bearing service life. | Cannot tolerate any misalignment. | |

Bearing data, continued

| | Needle roller bearing inner rings | | Needle rollers |
|---|---|---|---|
| | IR series | LR series | |
| **Dimension standards** | – | | ISO 3096, except for RN-2x6.3 BF/G2 that is not standardized |
| **Tolerances**<br><br>For additional information<br>→ page 35 | Normal<br><br>Values: ISO 492 (table 2, page 38), except for raceway tolerances (table 12, page 604) | F: h6<br>B: h12<br>d: K6<br><br>Values: table 13, page 604 | ISO 3096 Grade 2 for flat end needle rollers<br>Available tolerances (table 14, page 604) |
| **Operating clearance** | Depends on the bearing type with which the inner ring is combined. | | – |
| **Internal clearance** | Depends on the bearing type with which the inner ring is combined. | | – |

**Table 5**

**Needle roller gauges**

| Gauge type | Gauge |
|---|---|
| – | µm |
| Standard gauges | 0/–2<br>–1/–3<br>–2/–4<br>–3/–5<br>–4/–6<br>–5/–7 |

For additional gauges available on request, contact SKF.

**Table 6**

**Raceway tolerance classes for needle roller and cage assemblies**

| Shaft Nominal diameter | | Housing/shaft tolerance classes for operating clearance[1] | | |
|---|---|---|---|---|
| > | ≤ | lower side | medium | higher side |
| mm | | – | | |
| – | 80 | G6/j5<br>H6/h5 | G6/h5<br>H6/g5 | G6/g6<br>H6/f6 |
| 80 | 120 | G6/h5 | G6/g5 | G6/f6 |
| 120 | – | G6/h5<br>– | G6/g5<br>H6/f5 | G6/f6<br>H6/e6 |

[1] The envelope requirement (symbol Ⓔ from ISO 14405-1) is not shown but applies to all tolerance classes.

Table 7

**Mounting scheme – example**

Needle roller and cage assembly: K 16x22x12
Housing bore diameter: 22H6Ⓔ [mm], deviation 0/+13 µm
Shaft diameter: 16h5Ⓔ [mm], deviation 0/–8 µm

| **Shaft diameter** Deviation group | **Housing bore diameter** Deviation groups | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 0 to +3 | | +3 to +6 | | +6 to +9 | | +9 to +13 | |
| | Needle roller gauge limits | Radial internal clearance | Needle roller gauge limits | Radial internal clearance | Needle roller gauge limits | Radial internal clearance | Needle roller gauge limits | Radial internal clearance |
| µm | µm | | | | | | | |
| **0 to –3** | | | | | –5/–7 | 18–24 | –3/–5 | 17–24 |
| **–3 to –6** | | | –5/–7 | 18–24 | –3/–5<br>–4/–6 | 17–25 | –2/–4 | 18–25 |
| **–6 to –8** | –5/–7<br>–6/–8 | 18–25 | –3/–5<br>–4/–6 | 17–24 | –2/–4<br>–3/–5 | 18–25 | 0/–2<br>–1/–3 | 17–25 |

The mean value of the needle roller gauge should be used to calculate the internal clearance, e.g. –6 µm for the gauge –5 to –7 µm.

Table 8

**Tolerances for drawn cup needle roller bearings**

| **Bearing** Inside diameter $F_w$ | Outside diameter D | **Ring gauge** Bore diameter (measured) | **Deviations from nominal inside diameter** U | L |
|---|---|---|---|---|
| mm | | mm | µm | |
| **3** | 6,5 | 6,484 | +24 | +6 |
| **4** | 8 | 7,984 | +28 | +10 |
| **5** | 9 | 8,984 | +28 | +10 |
| **6** | 10 | 9,984 | +28 | +10 |
| **7** | 11 | 10,980 | +31 | +13 |
| **8** | 12 | 11,980 | +31 | +13 |
| **9** | 13 | 12,980 | +31 | +13 |
| **10** | 14 | 13,980 | +31 | +13 |
| **12** | 16 | 15,980 | +34 | +16 |
| **12** | 18 | 17,980 | +34 | +16 |
| **13** | 19 | 18,976 | +34 | +16 |
| **14** | 20 | 19,976 | +34 | +16 |
| **15** | 21 | 20,976 | +34 | +16 |
| **16** | 22 | 21,976 | +34 | +16 |
| **17** | 23 | 22,976 | +34 | +16 |
| **18** | 24 | 23,976 | +34 | +16 |
| **20** | 26 | 25,976 | +41 | +20 |
| **22** | 28 | 27,976 | +41 | +20 |
| **25** | 32 | 31,972 | +41 | +20 |
| **28** | 35 | 34,972 | +41 | +20 |
| **30** | 37 | 36,972 | +41 | +20 |
| **32** | 39 | 38,972 | +50 | +25 |
| **35** | 42 | 41,972 | +50 | +25 |
| **40** | 47 | 46,972 | +50 | +25 |
| **45** | 52 | 51,967 | +50 | +25 |
| **50** | 58 | 57,967 | +50 | +25 |
| **55** | 63 | 62,967 | +60 | +30 |
| **60** | 68 | 67,967 | +60 | +30 |

**Table 9**

**ISO tolerance classes**

| Nominal diameter | | E8Ⓔ Deviation | | F6Ⓔ Deviation | |
|---|---|---|---|---|---|
| > | ≤ | U | L | U | L |
| mm | | µm | | µm | |
| – | 3 | – | – | +12 | +6 |
| 3 | 6 | – | – | +27 | +10 |
| 6 | 10 | +47 | +25 | +33 | +13 |
| 10 | 18 | +59 | +32 | +27 | +16 |
| 18 | 30 | +73 | +40 | +33 | +20 |
| 30 | 50 | +89 | +50 | +41 | +25 |
| 50 | 80 | +106 | +60 | +49 | +30 |
| 80 | 120 | – | – | +58 | +36 |
| 120 | 180 | – | – | +68 | +43 |
| 180 | 250 | – | – | +79 | +50 |
| 250 | 315 | – | – | +88 | +56 |
| 315 | 400 | – | – | +98 | +62 |
| 400 | 500 | – | – | +108 | +68 |

**Table 10**

**Shaft tolerance classes for machined needle roller bearings without an inner ring**

| Nominal inside diameter $F_w$ | | Shaft tolerance classes[1] for shaft raceways to give operating clearance | | |
|---|---|---|---|---|
| | | lower side | medium | higher side |
| > | ≤ | – | | |
| mm | | | | |
| – | 65 | k5 | h5 | g6 |
| 65 | 80 | k5 | h5 | f6 |
| 80 | 160 | k5 | g5 | f6 |
| 160 | 180 | k5 | g5 | e6 |
| 180 | 200 | j5 | g5 | e6 |
| 200 | 250 | j5 | f6 | e6 |
| 250 | 315 | h5 | f6 | d6 |
| 315 | 400 | g5 | f6 | d6 |

[1] The envelope requirement (symbol Ⓔ from ISO 14405-1) is not shown but applies to all tolerance classes.

**Table 11**

**Radial internal clearance for needle roller bearings**

| Bore diameter d | | Radial internal clearance C2 | | Normal | | C3 | | C4 | |
|---|---|---|---|---|---|---|---|---|---|
| > | ≤ | min. | max. | min. | max. | min. | max. | min. | max. |
| mm | | µm | | | | | | | |
| – | 30 | 0 | 25 | 20 | 45 | 35 | 60 | 50 | 75 |
| 30 | 40 | 5 | 30 | 25 | 50 | 45 | 70 | 60 | 85 |
| 40 | 50 | 5 | 35 | 30 | 60 | 50 | 80 | 70 | 100 |
| 50 | 65 | 10 | 40 | 40 | 70 | 60 | 90 | 80 | 100 |
| 65 | 80 | 10 | 45 | 40 | 75 | 65 | 100 | 90 | 125 |
| 80 | 100 | 15 | 50 | 50 | 85 | 75 | 110 | 105 | 140 |
| 100 | 120 | 15 | 55 | 50 | 90 | 85 | 125 | 125 | 165 |
| 120 | 140 | 15 | 60 | 60 | 105 | 100 | 145 | 145 | 190 |
| 140 | 160 | 20 | 70 | 70 | 120 | 115 | 165 | 165 | 215 |
| 160 | 180 | 25 | 75 | 75 | 125 | 120 | 170 | 170 | 220 |
| 180 | 200 | 35 | 90 | 90 | 145 | 140 | 195 | 195 | 250 |
| 200 | 225 | 45 | 105 | 105 | 165 | 160 | 220 | 220 | 280 |
| 225 | 250 | 45 | 110 | 110 | 175 | 170 | 235 | 235 | 300 |
| 250 | 280 | 55 | 125 | 125 | 195 | 190 | 260 | 260 | 330 |
| 280 | 315 | 55 | 130 | 130 | 205 | 200 | 275 | 275 | 350 |
| 315 | 355 | 65 | 145 | 145 | 225 | 225 | 305 | 305 | 385 |
| 355 | 400 | 100 | 190 | 190 | 280 | 280 | 370 | 370 | 460 |

Table 12

**Inner ring raceway tolerances**

| Nominal diameter | | F | | $t_{\Delta Fmp}$ for CN and EGS | |
|---|---|---|---|---|---|
| > | ≤ | > | ≤ | U | L |
| mm | | mm | | µm | |
| – | 3 | 3 | 6 | –10 | –27 |
| 3 | 6 | 6 | 10 | –7 | –23 |
| 6 | 10 | 6 | 10 | –7 | –23 |
| 6 | 18 | 10 | 18 | –4 | –18 |
| 10 | 24 | 18 | 30 | 0 | –12 |
| 18 | 24 | 30 | 50 | 5 | –4 |
| 24 | 30 | 24 | 30 | 0 | –12 |
| 24 | 30 | 30 | 50 | 5 | –4 |
| 30 | 40 | 30 | 50 | 0 | –9 |
| 40 | 50 | 40 | 50 | –5 | –19 |
| 40 | 50 | 50 | 80 | 0 | –11 |
| 50 | 65 | 50 | 80 | –10 | –21 |
| 65 | 80 | 65 | 80 | –10 | –26 |
| 65 | 80 | 80 | 120 | –4 | –17 |
| 80 | 100 | 80 | 120 | –14 | –27 |
| 100 | 120 | 100 | 120 | –14 | –32 |
| 100 | 120 | 120 | 180 | –7 | –22 |
| 120 | 140 | 120 | 180 | –17 | –37 |
| 140 | 160 | 140 | 180 | –27 | –52 |
| 160 | 180 | 160 | 180 | –32 | –57 |
| 160 | 180 | 180 | 250 | –25 | –46 |
| 180 | 200 | 180 | 250 | –40 | –66 |
| 200 | 225 | 200 | 250 | –55 | –86 |
| 225 | 250 | 250 | 315 | –54 | –87 |
| 250 | 280 | 250 | 315 | –69 | –107 |
| 280 | 315 | 315 | 400 | –68 | –107 |
| 315 | 335 | 315 | 400 | –83 | –127 |
| 355 | 400 | 355 | 400 | –128 | –182 |
| 355 | 400 | 400 | 500 | –122 | –172 |

Table 13

**ISO tolerance classes for LR series inner rings**

| Nominal diameter | | h6Ⓔ | | h12Ⓔ | | K6Ⓔ | |
|---|---|---|---|---|---|---|---|
| > | ≤ | U | L | U | L | U | L |
| mm | | µm | | µm | | µm | |
| 6 | 10 | 0 | –9 | – | – | +2 | –7 |
| 10 | 18 | 0 | –11 | 0 | –180 | +2 | –9 |
| 18 | 30 | 0 | –13 | 0 | –210 | +2 | –11 |
| 30 | 50 | 0 | –16 | 0 | –250 | +3 | –13 |
| 50 | 80 | 0 | –19 | – | – | – | – |

Table 14

**Dimensional and geometrical tolerances of SKF needle rollers, grade G2**

| Diameter $D_w$ Deviation | | Gauge tolerance | Gauge limits | Roundness (max. circularity deviation in accordance with ISO 3096) | Length $L_w$ Tolerance class |
|---|---|---|---|---|---|
| U | L | | | | |
| µm | | | | | – |
| 0 | –10 | 2 | 0/–2<br>–1/–3<br>–2/–4<br>–3/–5<br>–4/–6<br>–5/–7<br>–6/–8<br>–7/–9<br>–8/–10 | 1 | h13Ⓔ |

Preferred diameter deviations range from 0 to –7 µm.
Each gauge is packed separately and marked with the gauge limits, e.g. N/M2 or M2/M4, where M signifies minus and N zero. For a needle roller with a 2 mm nominal diameter and gauge limits M2/M4, the actual diameter is between 1,998 mm and 1,996 mm.

# Loads

| | Needle rollers and cage assemblies | Drawn cup needle roller bearings | Needle roller bearings with machined rings | Alignment needle roller bearings |
|---|---|---|---|---|
| **Minimum load**<br><br>For additional information<br>→ page 106 | $F_{rm} = 0{,}02\ C$ | | | |
| **Equivalent dynamic bearing load**<br><br>For additional information<br>→ page 91 | $P = F_r$ | | | |
| **Equivalent static bearing load**<br><br>For additional information<br>→ page 105 | $P_0 = F_r$<br><br>For drawn cup needle roller bearings, SKF recommends applying a static safety factor $s_0 \geq 3$, i.e. $s_0 = C_0/P_0 \geq 3$. | | | |
| | **Symbols**<br><br>A minimum load factor (product tables)<br>C basic dynamic load rating [kN] (product tables)<br>$C_0$ basic static load rating [kN] (product tables)<br>$d_m$ bearing mean diameter [mm]<br>= 0,5 (d +D)<br>$F_a$ axial load [kN]<br>$F_{am}$ minimum axial load [kN]<br>$F_r$ radial load [kN]<br>$F_{rm}$ minimum radial load [kN]<br>n rotational speed [r/min]<br>P equivalent dynamic bearing load [kN]<br>$P_0$ equivalent static bearing load [kN]<br>$s_0$ static safety factor | | | |

| | **Combined needle roller bearings**<br>Thrust part<br>Angular contact ball bearing | Thrust ball bearing | Cylindrical roller thrust bearing |
|---|---|---|---|
| | $F_{am} = 0{,}25 \frac{C_0}{1\,000} \left( \frac{n\, d_m}{100\,000} \right)^2$ | $F_{am} = A \left( \frac{n}{1\,000} \right)^2$ | $F_{am} = 0{,}0005\, C_0 + A \left( \frac{n}{1\,000} \right)^2$ |
| | $P = F_a$<br><br>$F_a$ must not exceed 0,25 $F_r$. | $P = F_a$ | $P = F_a$ |
| | $P_0 = F_a$<br><br>$F_a$ must not exceed 0,25 $F_r$. | $P_0 = F_a$ | $P_0 = F_a$ |

# Temperature limits

The permissible operating temperature for needle roller bearings can be limited by:

- the dimensional stability of the bearing rings and rolling elements
- the cages
- the seals
- the seating rings
- the lubricant

Where temperatures outside the permissible range are expected, contact SKF.

## Bearing rings and rolling elements

SKF needle roller bearings, and roller and cage assemblies are heat stabilized up to 120 °C (*250 °F*).

Drawn cup needle roller bearings are heat stabilized up to 140 °C (*285 °F*).

## Cages

Steel cages can be used at the same operating temperatures as the bearing rings and rolling elements. For temperature limits of polymer cages, refer to *Polymer cages*, page 188.

## Seals

The permissible operating temperature for seals depends on the seal material:

- NBR: –40 to +100 °C *(–40 to +210 °F)*
  Temperatures up to 120 °C *(250 °F)* can be tolerated for brief periods.
- PUR: –30 to +100 °C *(–20 to +210 °F)*
- FKM: –30 to +200 °C *(–20 to +390 °F)*
  Temperatures up to 230 °C *(445 °F)* can be tolerated for brief periods.

Typically, temperature peaks are at the seal lip.

## Seating rings

The permissible operating temperature for seating rings is –30 to +100 °C *(–20 to +210 °F)*.

## Lubricants

Temperature limits for greases used in capped needle roller bearings are provided in table 3, page 595, and for full complement drawn cup needle roller bearings in table 1, page 585. For temperature limits of other SKF greases, refer to *Selecting a suitable SKF grease*, page 116.

When using lubricants not supplied by SKF, temperature limits should be evaluated according to the SKF traffic light concept (page 117).

# Permissible speed

The speed ratings in the **product tables** indicate:

- the **reference speed**, which enables a quick assessment of the speed capabilities from a thermal frame of reference
- the **limiting speed**, which is a mechanical limit that should not be exceeded unless the bearing design and the application are adapted for higher speeds

For additional information, refer to *Operating temperature and speed*, page 129.

# Design considerations

For general information, refer to *Bearing interfaces*, **page 140**.

# Abutment dimensions

## Needle roller and cage assemblies

Appropriate abutment diameters are provided in **table 15**.

Recommendations for surfaces of adjacent machine components that guide needle roller and cage assemblies axially:

- fine turned and polished
- hardened and ground for high-speed operations
- no interruptions

For less demanding applications, snap rings can be used. Otherwise, use an intermediate ring, e.g. a spring steel washer, between the snap ring and the cage assembly.

## Needle roller bearings with machined rings, without flanges

Appropriate abutment diameters are listed in the **product tables**.

Recommendations for surfaces of adjacent machine components that guide the cage of needle roller bearings without flanges axially:

- fine turned and polished
- hardened and ground for high-speed operations
- no interruptions

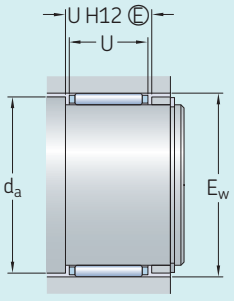
For less demanding applications, snap rings can be used. Otherwise, use an intermediate ring, e.g. a spring steel washer, between the snap ring and the cage assembly.

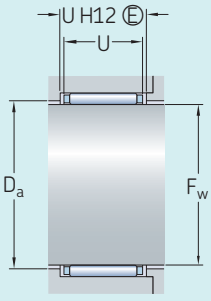
## Combined needle roller bearings

The diameter of the thrust bearing support surface in the housing should be at least 0,5 mm larger than the dimension $D_1$ or $D_2$ (**fig. 41** and product tables of *Needle roller / thrust ball bearings*, **page 656**, and *Needle roller / cylindrical roller thrust bearings*, **page 658**).

**Table 15**

**Abutment dimensions for needle roller and cage assemblies**

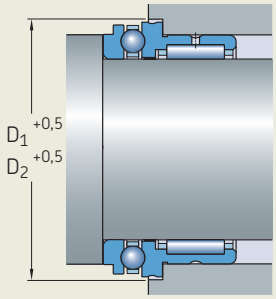



| Needle roller and cage assembly Inside diameter $F_w$ | | Shaft abutment $d_a$ | Housing abutment $D_a$ |
|---|---|---|---|
| > | ≤ | | |
| mm | | mm | mm |
| – | 25 | $E_w - 0,3$ | $F_w + 0,4$ |
| 25 | 65 | $E_w - 0,5$ | $F_w + 0,5$ |
| 65 | – | $E_w - 1$ | $F_w + 1$ |

**Fig. 41**

**Abutment dimensions, combined needle roller bearing**



# Shaft and housing tolerances

The following tables provide tolerance classes to obtain suitable fits and an appropriate operating clearance (page 598) for the following bearings:

- drawn cup needle roller bearings
- needle roller bearings with machined rings
- alignment needle roller bearings
- combined needle roller bearings

Shaft and housing raceway tolerances significantly influence the operating clearance of needle roller and cage assemblies and needle roller bearings with a machined outer ring (without an inner ring) and, therefore, are provided under *Operating clearance*, page 598.

For additional information about raceways, refer to *Raceways on shafts and in housings*, page 179.

## Drawn cup needle roller bearings

Suitable tolerance classes for the housing bore and shaft for bearings with or without an inner ring are provided in table 16.

## Needle roller bearings with machined rings

- Suitable tolerance classes for the shaft for bearings with machined inner and outer rings are provided in table 18.
- Housing seat tolerances for standard conditions are provided in table 8, page 151.

## Alignment needle roller bearings

Suitable tolerance classes for the housing bore and shaft for bearings with or without an inner ring are provided in table 16.

## Combined needle roller bearings

Suitable tolerance classes for the housing bore and shaft for bearings with or without an inner ring are provided in table 17.

**Table 16**

**Shaft and housing tolerance classes for drawn cup and alignment needle roller bearings**

| Housing material[1] | Tolerance classes[2] Housing bore seat[3] | Raceway on the shaft | Shaft inner ring seat |
|---|---|---|---|
| **Steel, cast iron** | N6 | h5 | k5 |
| **Light alloy** | R6 | h5 | k5 |

[1] For housings that are not rigid, determine the shaft tolerance by trial and error.
[2] The envelope requirement (symbol Ⓔ from ISO 14405-1) is not shown but applies to all tolerance classes.
[3] The geometrical tolerance in accordance with ISO 1101 for the housing bore of drawn cup needle roller bearings must correspond to IT5/2 tolerance grade.

**Table 17**

**Shaft and housing tolerance classes for combined needle roller bearings**

| Thrust part | Tolerance class[1] Housing bore seat | Shaft (raceway and inner ring seat) |
|---|---|---|
| **Angular contact ball bearing** | M6 | k5 |
| **Thrust ball bearing** | K6[2] | k5 |
| **Cylindrical roller thrust bearing** | K6[2] | k5 |

[1] The envelope requirement (symbol Ⓔ from ISO 14405-1) is not shown but applies to all tolerance classes.
[2] For stiff bearing arrangements, SKF recommends an M6 Ⓔ housing bore tolerance class.

# Mounting

Drawn cup and alignment needle roller bearings should be pressed into the housing bore using a mounting dolly (**fig. 42**). An O-ring provides a simple means of retaining the bearing on the mounting dolly. The stamped side (side face with the designation) should abut the flange of the mounting dolly.

Special care should be taken to prevent the bearing from skewing or tilting when it is being pressed into the housing. Otherwise the rollers and raceways could easily be damaged.

For grease lubricated bearings, the bearing should be lubricated prior to mounting.

# Paired mounting

If bearings are to be mounted immediately adjacent to each other, the load should be shared equally by both bearings. Therefore, the following need to be considered:

- Full complement needle roller arrangements should incorporate rollers of the same gauge.
- Needle roller and cage assemblies should incorporate rollers of the same gauge
- Drawn cup needle roller bearings should have the same deviations from the nominal inside diameter $F_w$.

A delivery of needle rollers of the same nominal diameter may contain packages of one or more gauges. The gauge limits are also printed on the package.

For needle roller and cage assemblies, the deviation from the nominal dimensions of the fitted needle rollers is printed on the package.

For additional information about gauges and inside diameter, refer to *Tolerances*, **page 598**.

**Fig. 42**

**Mounting dolly**

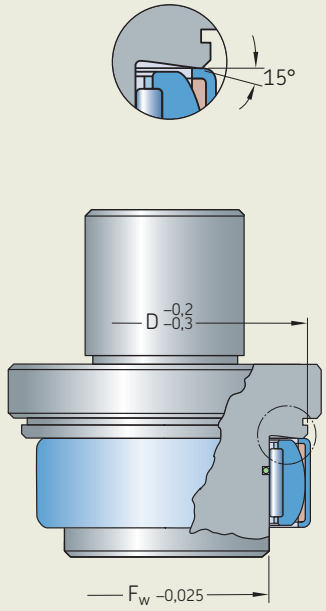



**Table 18**

**Shaft tolerance classes for needle roller bearings with machined inner and outer rings on solid steel shafts**

| Conditions | Shaft diameter | Dimensional tolerance[1] | Total radial run-out tolerance[2] | Ra |
|---|---|---|---|---|
| – | mm | – | – | µm |
| **Rotating inner ring load or direction of load indeterminate** | | | | |
| **Light and variable loads** | | | | |
| (P ≤ 0,05 C) | ≤ 10 | k5 | IT5/2 | 0,4 |
| | > 10 to 25 | k6 | IT5/2 | 0,8 |
| | > 25 to 100 | m6 | IT5/2 | 0,8 |
| **Normal to heavy loads** | ≤ 25 | k5 | IT5/2 | 0,4 |
| (0,05 C < P ≤ 0,1 C) | > 25 to 60 | m6 | IT5/2 | 0,8 |
| | > 60 to 100 | n6 | IT5/2 | 0,8 |
| | > 100 to 400 | p6[3] | IT5/2 | 1,6 |
| **Heavy to very heavy loads** | > 50 to 100 | n6[3] | IT5/2 | 0,8 |
| (P > 0,1 C) | > 100 to 200 | p6[3] | IT5/2 | 1,6 |
| | > 200 | r6[3] | IT5/2 | 1,6 |
| **Stationary inner ring load** | | | | |
| Easy axial displacement of the inner ring on the shaft desirable | | g6 | IT5/2 | 1,6 |
| Easy axial displacement of the inner ring on the shaft unnecessary | | h6 | IT5/2 | 1,6 |

[1] The envelope requirement (symbol Ⓔ from ISO 14405-1) is not shown but applies to all tolerance classes.
[2] Values listed are for bearings to Normal tolerances.
[3] Bearings with radial internal clearance greater than Normal may be necessary.

# Designation system

**Prefixes**

| | |
|---|---|
| **R** | Bearing without an inner ring |

**Basic designation**

| | |
|---|---|
| **BK** | Drawn cup needle roller bearing with a closed end |
| **HK** | Drawn cup needle roller bearing with open ends |
| **HN** | Drawn cup needle roller bearing with open ends, full complement |
| **IR** | Needle roller bearing inner ring |
| **K** | Needle roller and cage assembly |
| **LR** | Needle roller bearing inner ring |
| **NA 48, NA 49, NA 69** | Needle roller bearing with machined rings, with flanges, with an inner ring |
| **NAO** | Needle roller bearing with machined rings, without flanges, with an inner ring |
| **NK, NKS** | Needle roller bearing with machined rings, with flanges, without an inner ring |
| **NKI, NKIS** | Needle roller bearing with machined rings, with flanges, with an inner ring |
| **NKIA 59, NKIB 59** | Needle roller / angular contact ball bearing |
| **NKX** | Needle roller / thrust ball bearing |
| **NKXR** | Needle roller / cylindrical roller thrust bearing |
| **NX** | Needle roller / full complement thrust ball bearing |
| **PNA** | Alignment needle roller bearing |
| **RN** | Needle roller |

**Suffixes**

**Group 1: Internal design**

| | |
|---|---|
| **BF** | Needle roller with flat ends |
| **D** | Deviating or modified internal design with the same boundary dimensions.<br>Example: K 40x45x17 D (Needle roller and cage assembly with a double split cage) |
| **DS** | Single split needle roller and cage assembly |
| **EGS** | Inner ring with a non-directionally ground raceway |
| **VGS** | Inner ring with a pre-ground raceway and a machining allowance |
| **ZW** | Double row needle roller and cage assembly (double row cage) |

**Group 2: External design (seals, snap ring groove, etc.)**

| | |
|---|---|
| **AS..** | Outer ring with lubrication hole(s), the number following indicates the number of holes |
| **ASR..** | Outer ring with annular groove and lubrication hole(s), the number following indicates the number of holes |
| **IS..** | Inner ring with lubrication hole(s), the number following indicates the number of holes |
| **ISR..** | Inner ring with annular groove and lubrication hole(s), the number following indicates the number of holes |
| **RS, .2RS** | Contact seal on one or both sides, respectively<br>• NBR or FKM or PUR for a drawn cup needle roller bearing<br>• NBR for a machined needle roller bearing |
| **Z** | Combined needle roller bearing, factory greased thrust bearing with a cover without lubrication holes over the outside diameter |

**Group 3: Cage design**

| | |
|---|---|
| **TN** | Glass fibre reinforced PA66 cage |

| Group 4 | | | | | |
|---|---|---|---|---|---|
| 4.1 | 4.2 | 4.3 | 4.4 | 4.5 | 4.6 |

**Group 4.6: Other variants**

**VG052** Single split PES (polyethersulfone) cage

**Group 4.5: Lubrication**

**SM..** Special grease, two numbers following identify the grease

**Group 4.4: Stabilization**

**S0** Bearing or inner ring heat stabilized for operating temperatures ≤ 150 °C (*300 °F*)
**S1** Bearing or inner ring heat stabilized for operating temperatures ≤ 200 °C (*390 °F*)
**S2** Bearing or inner ring heat stabilized for operating temperatures ≤ 250 °C (*480 °F*)
**S3** Bearing or inner ring heat stabilized for operating temperatures ≤ 300 °C (*570 °F*)

**Group 4.3: Bearing sets, matched bearings**

**..S** Matched bearings for an equal load distribution. The number preceding indicates the number of bearings, e.g. NK 50/25 TN/2S

**Group 4.2: Accuracy, clearance, preload, quiet running**

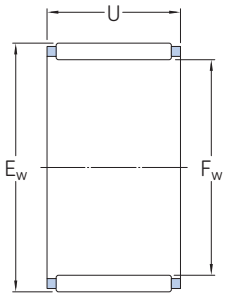
**/SORT..** Tolerance grade of needle rollers of a needle roller and cage assembly, the numbers following identify the actual limits in µm, e.g. /SORT-2-4
**CN** Normal radial internal clearance; only used together with an additional letter that identifies a reduced or displaced clearance range
- H Reduced clearance range corresponding to the upper half of the actual clearance range
- L Reduced clearance range corresponding to the lower half of the actual clearance range
- M Reduced clearance range corresponding to the two middle quarters of the actual clearance range
- P Displaced clearance range comprising the upper half of the actual clearance range plus the lower half of the next larger clearance range
- R Normal clearance range in accordance with the withdrawn DIN 620-4

The above letters H, L, M and P are also used together with the clearance classes C2, C3, C4.
**C2** Radial internal clearance smaller than Normal
**C3** Radial internal clearance greater than Normal
**C4** Radial internal clearance greater than C3
**G2** Needle roller in accordance with ISO 3096 Grade 2
**H..** Bearing without an inner ring and reduced inside diameter (under rollers) tolerance, the numbers following indicate the tolerance limits in µm, e.g. H+27+20
**M../M..** Diameter tolerance of needle rollers, e.g. M2/M4 indicates diameter tolerance –2 to –4 µm
**N/M..** Diameter tolerance of needle rollers, e.g. N/M2 indicates diameter tolerance 0 to –2 µm
**P5** Dimensional and geometrical tolerances to class P5
**P6** Dimensional and geometrical tolerances to class P6
**P62** P6 + C2
**P63** P6 + C3
**P6CNR** P6 + CNR

**Group 4.1: Materials, heat treatment**

## 7.1 Needle roller and cage assemblies

$F_w$ **3 – 30** mm




| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | | Designation | Associated radial shaft seals[1] Single lip | Double lip |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $F_w$ | $E_w$ | U | C | $C_0$ | $P_u$ | | | | | | | |
| mm | | | kN | | kN | r/min | | g | | – | – | |
| **3** | 5 | 7 | 1,51 | 1,34 | 0,134 | 40 000 | 45 000 | 0,3 | | **K 3x5x7 TN** | – | – |
| | 5 | 9 | 1,68 | 1,53 | 0,153 | 40 000 | 45 000 | 0,4 | ▸ | **K 3x5x9 TN** | – | – |
| **4** | 7 | 7 | 1,72 | 1,32 | 0,137 | 36 000 | 43 000 | 0,5 | | **K 4x7x7 TN** | – | – |
| | 7 | 10 | 2,29 | 1,9 | 0,204 | 36 000 | 43 000 | 0,7 | | **K 4x7x10 TN** | – | – |
| **5** | 8 | 8 | 2,29 | 2 | 0,212 | 36 000 | 40 000 | 0,7 | | **K 5x8x8 TN** | – | – |
| | 8 | 10 | 2,92 | 2,7 | 0,29 | 36 000 | 40 000 | 0,9 | ▸ | **K 5x8x10 TN** | – | – |
| **6** | 9 | 8 | 2,55 | 2,36 | 0,25 | 34 000 | 38 000 | 0,8 | | **K 6x9x8 TN** | – | – |
| | 9 | 10 | 3,3 | 3,2 | 0,345 | 34 000 | 38 000 | 1,1 | | **K 6x9x10 TN** | – | – |
| **7** | 10 | 8 | 2,81 | 2,75 | 0,29 | 32 000 | 36 000 | 0,9 | | **K 7x10x8 TN** | – | – |
| | 10 | 10 | 3,58 | 3,75 | 0,415 | 32 000 | 36 000 | 1 | | **K 7x10x10 TN** | – | – |
| **8** | 11 | 10 | 3,8 | 4,25 | 0,465 | 32 000 | 36 000 | 1,2 | | **K 8x11x10 TN** | – | – |
| | 11 | 13 | 5,01 | 5,85 | 0,67 | 32 000 | 36 000 | 1,7 | | **K 8x11x13 TN** | – | – |
| | 12 | 10 | 4,84 | 4,75 | 0,54 | 30 000 | 34 000 | 2 | | **K 8x12x10 TN** | G 8x12x3 | – |
| **9** | 12 | 10 | 4,4 | 5,2 | 0,57 | 30 000 | 34 000 | 1,5 | | **K 9x12x10 TN** | – | – |
| **10** | 13 | 10 | 4,57 | 5,7 | 0,63 | 28 000 | 32 000 | 1,6 | ▸ | **K 10x13x10 TN** | – | – |
| | 13 | 13 | 5,94 | 8 | 0,9 | 28 000 | 32 000 | 2,3 | | **K 10x13x13 TN** | – | – |
| | 14 | 10 | 5,61 | 6,1 | 0,695 | 28 000 | 32 000 | 2,5 | | **K 10x14x10 TN** | G 10x14x3 | – |
| | 14 | 13 | 7,21 | 8,5 | 0,98 | 28 000 | 32 000 | 4,6 | | **K 10x14x13 TN** | G 10x14x3 | – |
| | 16 | 12 | 7,65 | 7,2 | 0,85 | 28 000 | 32 000 | 5,5 | | **K 10x16x12 TN** | – | – |
| **12** | 15 | 10 | 4,73 | 6,2 | 0,695 | 26 000 | 30 000 | 2,9 | | **K 12x15x10 TN** | – | – |
| | 15 | 13 | 6,16 | 8,65 | 0,98 | 26 000 | 30 000 | 2,3 | | **K 12x15x13 TN** | – | – |
| | 16 | 13 | 7,65 | 9,5 | 1,1 | 26 000 | 30 000 | 3,6 | | **K 12x16x13 TN** | G 12x16x3 | – |
| | 17 | 13 | 9,13 | 10,4 | 1,22 | 26 000 | 30 000 | 4,9 | | **K 12x17x13 TN** | – | – |
| | 18 | 12 | 9,52 | 10 | 1,18 | 26 000 | 30 000 | 6 | | **K 12x18x12 TN** | G 12x18x3 | SD 12x18x3 |
| **14** | 18 | 10 | 6,93 | 8,65 | 1 | 24 000 | 28 000 | 4 | | **K 14x18x10** | – | – |
| | 18 | 13 | 7,92 | 10,2 | 1,18 | 24 000 | 28 000 | 6,5 | | **K 14x18x13** | – | – |
| | 18 | 15 | 9,13 | 12,5 | 1,46 | 24 000 | 28 000 | 5 | | **K 14x18x15 TN** | – | – |
| | 18 | 17 | 10,5 | 14,6 | 1,7 | 24 000 | 28 000 | 8 | | **K 14x18x17** | – | – |
| **15** | 19 | 13 | 8,25 | 11,2 | 1,29 | 24 000 | 28 000 | 7 | ▸ | **K 15x19x13** | – | – |
| | 19 | 17 | 10,8 | 15,6 | 1,86 | 24 000 | 28 000 | 9,5 | ▸ | **K 15x19x17** | – | – |
| | 21 | 15 | 13,8 | 16,3 | 2 | 24 000 | 26 000 | 11 | | **K 15x21x15** | G 15x21x3 | SD 15x21x3 |
| | 21 | 21 | 18,7 | 24,5 | 3 | 24 000 | 26 000 | 17 | | **K 15x21x21** | G 15x21x3 | SD 15x21x3 |

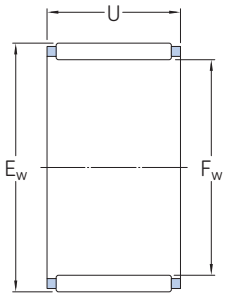
▸ Popular item
[1] For additional information → skf.com/seals

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation | Associated radial shaft seals[1] Single lip | Double lip |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $F_w$ | $E_w$ | U | C | $C_0$ | $P_u$ | | | | | | |
| mm | | | kN | | kN | r/min | | g | – | – | |
| **16** | 20 | 10 | 7,48 | 10 | 1,16 | 24 000 | 26 000 | 5,5 | **K 16x20x10** | – | – |
| | 20 | 13 | 8,58 | 12 | 1,37 | 24 000 | 26 000 | 7,5 | **K 16x20x13** | – | – |
| | 20 | 17 | 11,2 | 17 | 2 | 24 000 | 26 000 | 10 | **K 16x20x17** | – | – |
| | 22 | 12 | 11 | 12,5 | 1,5 | 22 000 | 26 000 | 10 | **K 16x22x12** | G 16x22x3 | SD 16x22x3 |
| | 22 | 16 | 14,2 | 17,6 | 2,12 | 22 000 | 26 000 | 12 | **K 16x22x16** | G 16x22x3 | SD 16x22x3 |
| | 22 | 20 | 17,6 | 22,8 | 2,8 | 22 000 | 26 000 | 17 | **K 16x22x20** | G 16x22x3 | SD 16x22x3 |
| | 24 | 20 | 20,5 | 23,6 | 2,9 | 22 000 | 24 000 | 22 | **K 16x24x20** | G 16x24x3 | SD 16x24x3 |
| **17** | 21 | 10 | 7,81 | 10,8 | 1,22 | 22 000 | 26 000 | 5,5 | **K 17x21x10** | – | – |
| **18** | 24 | 12 | 12,1 | 15 | 1,8 | 20 000 | 24 000 | 12 | **K 18x24x12** | G 18x24x3 | SD 18x24x3 |
| **19** | 23 | 13 | 9,13 | 13,7 | 1,6 | 20 000 | 24 000 | 8 | **K 19x23x13** | – | – |
| **20** | 24 | 10 | 8,58 | 12,9 | 1,46 | 20 000 | 22 000 | 6,5 | **K 20x24x10** | – | – |
| | 24 | 13 | 9,52 | 14,6 | 1,66 | 20 000 | 22 000 | 9 | **K 20x24x13** | – | – |
| | 24 | 17 | 12,5 | 20,8 | 2,4 | 20 000 | 22 000 | 12 | **K 20x24x17** | – | – |
| | 26 | 17 | 18,3 | 26 | 3,2 | 19 000 | 22 000 | 16 | **K 20x26x17** | G 20x26x4 | SD 20x26x4 |
| | 26 | 20 | 20,1 | 29 | 3,6 | 19 000 | 22 000 | 19 | ▸ **K 20x26x20** | G 20x26x4 | SD 20x26x4 |
| | 28 | 20 | 22,9 | 28,5 | 3,45 | 18 000 | 20 000 | 27 | **K 20x28x20** | G 20x28x4 | SD 20x28x4 |
| | 28 | 25 | 29,2 | 39 | 4,9 | 18 000 | 20 000 | 32 | ▸ **K 20x28x25** | G 20x28x4 | SD 20x28x4 |
| | 30 | 30 | 34,1 | 41,5 | 5,2 | 17 000 | 20 000 | 49 | **K 20x30x30** | – | – |
| **21** | 25 | 13 | 9,68 | 15,3 | 1,76 | 19 000 | 22 000 | 9 | **K 21x25x13** | – | – |
| **22** | 26 | 10 | 8,8 | 13,7 | 1,56 | 18 000 | 20 000 | 7,5 | ▸ **K 22x26x10** | – | – |
| | 26 | 13 | 10,1 | 16,3 | 1,86 | 18 000 | 20 000 | 9,5 | **K 22x26x13** | – | – |
| | 26 | 17 | 13,2 | 22,8 | 2,7 | 18 000 | 20 000 | 12 | **K 22x26x17** | – | – |
| | 28 | 17 | 18,3 | 27 | 3,25 | 17 000 | 20 000 | 18 | **K 22x28x17** | G 22x28x4 | SD 22x28x4 |
| | 29 | 16 | 19,4 | 25,5 | 3,05 | 17 000 | 19 000 | 16 | **K 22x29x16** | – | – |
| | 30 | 15 | 19 | 23,6 | 2,8 | 17 000 | 19 000 | 18 | **K 22x30x15 TN** | G 22x30x4 | SD 22x30x4 |
| **23** | 35 | 16 | 24,2 | 23,2 | 2,9 | 15 000 | 17 000 | 29 | **K 23x35x16 TN** | – | – |
| **24** | 28 | 10 | 9,35 | 15 | 1,73 | 17 000 | 19 000 | 8,5 | **K 24x28x10** | – | – |
| | 28 | 13 | 10,6 | 18 | 2,08 | 17 000 | 19 000 | 10 | **K 24x28x13** | – | – |
| | 30 | 17 | 18,7 | 27,5 | 3,4 | 16 000 | 18 000 | 19 | **K 24x30x17** | – | – |
| **25** | 29 | 10 | 9,52 | 15,6 | 1,8 | 16 000 | 18 000 | 8,5 | **K 25x29x10** | – | – |
| | 29 | 13 | 10,8 | 18,6 | 2,16 | 16 000 | 18 000 | 11 | **K 25x29x13** | – | – |
| | 30 | 17 | 17,9 | 30,5 | 3,6 | 16 000 | 18 000 | 16 | **K 25x30x17** | – | – |
| | 30 | 20 | 20,9 | 36,5 | 4,4 | 16 000 | 18 000 | 18 | **K 25x30x20** | – | – |
| | 32 | 16 | 19,8 | 27,5 | 3,35 | 15 000 | 17 000 | 21 | **K 25x32x16** | G 25x32x4 | – |
| | 33 | 20 | 27,5 | 38 | 4,65 | 15 000 | 17 000 | 33 | **K 25x33x20** | G 25x33x4 | SD 25x33x4 |
| | 35 | 30 | 44,6 | 62 | 7,8 | 15 000 | 17 000 | 65 | ▸ **K 25x35x30** | G 25x35x4 | SD 25x35x4 |
| **26** | 30 | 13 | 11,2 | 19,6 | 2,28 | 16 000 | 18 000 | 11 | **K 26x30x13** | – | – |
| **28** | 33 | 13 | 14,7 | 24,5 | 2,85 | 14 000 | 16 000 | 13 | **K 28x33x13** | – | – |
| | 33 | 17 | 19 | 33,5 | 4,05 | 14 000 | 16 000 | 17 | **K 28x33x17** | – | – |
| **30** | 35 | 13 | 15,1 | 25,5 | 3 | 13 000 | 15 000 | 14 | **K 30x35x13** | – | – |
| | 35 | 17 | 18,7 | 34 | 4,05 | 13 000 | 15 000 | 19 | **K 30x35x17** | – | – |
| | 35 | 27 | 29,2 | 60 | 7,35 | 13 000 | 15 000 | 30 | **K 30x35x27** | – | – |
| | 37 | 18 | 25,1 | 39 | 4,65 | 13 000 | 15 000 | 30 | **K 30x37x18** | G 30x37x4 | SD 30x37x4 |
| | 40 | 30 | 46,8 | 69,5 | 8,65 | 12 000 | 14 000 | 73 | **K 30x40x30** | G 30x40x4 | SD 30x40x4 |

▸ Popular item
[1] For additional information → skf.com/seals

## 7.1 Needle roller and cage assemblies

$F_w$ **32 – 100** mm




| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation | Associated radial shaft seals[1] Single lip | Double lip |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $F_w$ | $E_w$ | U | C | $C_0$ | $P_u$ | | | | | | |
| mm | | | kN | | kN | r/min | | g | – | – | |
| **32** | 37 | 13 | 14,7 | 25,5 | 3 | 13 000 | 14 000 | 18 | **K 32x37x13** | – | – |
| | 37 | 17 | 19 | 35,5 | 4,25 | 13 000 | 14 000 | 19 | **K 32x37x17** | – | – |
| | 38 | 20 | 25,1 | 45 | 5,6 | 12 000 | 14 000 | 30 | **K 32x38x20** | – | – |
| | 40 | 25 | 35,8 | 58,5 | 7,2 | 12 000 | 14 000 | 49 | **K 32x40x25** | – | – |
| **35** | 40 | 13 | 15,4 | 28 | 3,25 | 12 000 | 13 000 | 19 | **K 35x40x13** | – | – |
| | 40 | 17 | 19,8 | 39 | 4,65 | 12 000 | 13 000 | 21 | **K 35x40x17** | – | – |
| | 40 | 27 | 23,8 | 49 | 6 | 12 000 | 13 000 | 39 | **K 35x40x27 TN** | – | – |
| | 42 | 16 | 23,3 | 37,5 | 4,5 | 11 000 | 13 000 | 34 | **K 35x42x16** | G 35x42x4 | SD 35x42x4 |
| | 42 | 18 | 26,4 | 44 | 5,3 | 11 000 | 13 000 | 34 | **K 35x42x18** | G 35x42x4 | SD 35x42x4 |
| | 45 | 20 | 35,2 | 50 | 6,2 | 11 000 | 12 000 | 56 | **K 35x45x20** | G 35x45x4 | SD 35x45x4 |
| **37** | 42 | 17 | 21,6 | 43 | 5,2 | 11 000 | 13 000 | 22 | **K 37x42x17** | – | – |
| **38** | 43 | 17 | 19,8 | 39 | 4,65 | 11 000 | 12 000 | 29 | **K 38x43x17** | – | – |
| | 46 | 32 | 52,3 | 100 | 12,5 | 10 000 | 12 000 | 76 | **K 38x46x32** | – | – |
| **40** | 45 | 17 | 20,5 | 41,5 | 5 | 10 000 | 12 000 | 31 | **K 40x45x17** | – | – |
| | 45 | 27 | 31,4 | 73,5 | 9 | 10 000 | 12 000 | 46 | **K 40x45x27** | – | – |
| | 48 | 20 | 34,7 | 58,5 | 7,35 | 10 000 | 11 000 | 49 | ▸ **K 40x48x20** | – | – |
| **42** | 47 | 17 | 20,9 | 43 | 5,2 | 10 000 | 11 000 | 32 | **K 42x47x17** | – | – |
| | 50 | 20 | 33,6 | 57 | 7,1 | 9 500 | 11 000 | 53 | **K 42x50x20** | – | – |
| **43** | 48 | 17 | 20,9 | 43 | 5,2 | 9 500 | 11 000 | 30 | **K 43x48x17** | – | – |
| **45** | 50 | 17 | 21,6 | 46,5 | 5,6 | 9 000 | 10 000 | 34 | **K 45x50x17** | – | – |
| | 50 | 27 | 33 | 81,5 | 10 | 9 000 | 10 000 | 52 | **K 45x50x27** | – | – |
| | 53 | 28 | 49,5 | 98 | 12,2 | 9 000 | 10 000 | 81 | **K 45x53x28** | – | – |
| **47** | 52 | 17 | 22,4 | 49 | 6 | 9 000 | 10 000 | 35 | **K 47x52x17** | – | – |
| **50** | 55 | 20 | 25,5 | 60 | 7,2 | 8 500 | 9 500 | 43 | ▸ **K 50x55x20** | – | – |
| | 55 | 30 | 37,4 | 98 | 12 | 8 500 | 9 500 | 65 | **K 50x55x30** | – | – |
| | 57 | 18 | 31,9 | 64 | 7,8 | 8 000 | 9 000 | 47 | **K 50x57x18** | – | – |
| | 58 | 25 | 41,8 | 81,5 | 10,2 | 8 000 | 9 000 | 90 | **K 50x58x25** | G 50x58x4 | SD 50x58x4 |
| **55** | 60 | 20 | 27 | 67 | 8,15 | 7 500 | 8 500 | 40 | **K 55x60x20** | – | – |
| | 60 | 30 | 39,6 | 108 | 13,4 | 7 500 | 8 500 | 71 | **K 55x60x30** | – | – |
| | 62 | 18 | 34,1 | 71 | 8,5 | 7 500 | 8 500 | 52 | **K 55x62x18** | – | – |
| | 63 | 32 | 59,4 | 129 | 16,3 | 7 500 | 8 500 | 102 | **K 55x63x32** | G 55x63x5 | – |

▸ Popular item
[1] For additional information → skf.com/seals

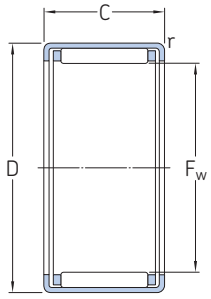
| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation | Associated radial shaft seals[1] Single lip | Double lip |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $F_w$ | $E_w$ | U | C | $C_0$ | $P_u$ | | | | | | |
| mm | | | kN | | kN | r/min | | g | – | – | |
| **60** | 65 | 20 | 28,1 | 72 | 8,8 | 7 000 | 8 000 | 52 | **K 60x65x20** | – | – |
| | 68 | 25 | 51,2 | 112 | 14 | 6 700 | 7 500 | 89 | **K 60x68x25** | – | – |
| **65** | 73 | 30 | 53,9 | 125 | 15,6 | 6 300 | 7 000 | 141 | ▸ **K 65x73x30** | – | – |
| **70** | 76 | 20 | 34,1 | 86,5 | 10,6 | 6 000 | 6 700 | 71 | **K 70x76x20** | – | – |
| | 78 | 30 | 57,2 | 137 | 17 | 6 000 | 6 700 | 148 | **K 70x78x30** | G 70x78x5 | – |
| **75** | 83 | 23 | 47,3 | 110 | 13,7 | 5 300 | 6 300 | 124 | **K 75x83x23** | – | – |
| **80** | 88 | 30 | 68,2 | 176 | 22 | 5 000 | 6 000 | 138 | **K 80x88x30** | – | – |
| **85** | 92 | 20 | 42,9 | 108 | 13,2 | 4 800 | 5 600 | 102 | **K 85x92x20** | – | – |
| **90** | 97 | 20 | 42,9 | 114 | 13,7 | 4 500 | 5 300 | 109 | **K 90x97x20** | – | – |
| | 98 | 30 | 64,4 | 173 | 21,6 | 4 500 | 5 300 | 172 | **K 90x98x30** | – | – |
| **95** | 103 | 30 | 66 | 180 | 22,8 | 4 300 | 5 000 | 165 | **K 95x103x30** | – | – |
| **100** | 108 | 27 | 55 | 143 | 17,6 | 4 000 | 4 800 | 185 | **K 100x108x27** | – | – |



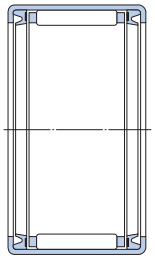
▸ Popular item
[1] For additional information → skf.com/seals

## 7.2 Drawn cup needle roller bearings

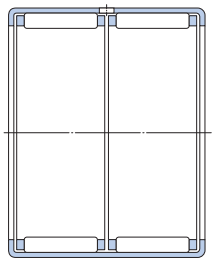
$F_w$ **3 – 17** mm




HK



HK ...2RS



HK (double row)

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| $F_w$ | D | C | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | g | – |
| **3** | 6,5 | 6 | 1,23 | 0,88 | 0,088 | 24 000 | 26 000 | 1 | ▸ **HK 0306 TN** |
| **4** | 8 | 8 | 1,76 | 1,37 | 0,14 | 22 000 | 26 000 | 2 | ▸ **HK 0408** |
| **5** | 9 | 9 | 2,38 | 2,08 | 0,22 | 22 000 | 24 000 | 2 | ▸ **HK 0509** |
| **6** | 10 | 8 | 2,01 | 1,73 | 0,18 | 20 000 | 22 000 | 2,1 | ▸ **HK 0608** |
| | 10 | 9 | 2,81 | 2,7 | 0,285 | 20 000 | 22 000 | 2,5 | **HK 0609** |
| **7** | 11 | 9 | 3,03 | 3,05 | 0,325 | 20 000 | 22 000 | 2,6 | **HK 0709** |
| **8** | 12 | 8 | 2,7 | 2,75 | 0,285 | 19 000 | 22 000 | 2,7 | ▸ **HK 0808** |
| | 12 | 10 | 3,69 | 4,05 | 0,44 | 19 000 | 22 000 | 3 | ▸ **HK 0810** |
| | 12 | 12 | 2,7 | 2,75 | 0,285 | – | 13 000 | 3,3 | ▸ **HK 0812.2RS** |
| **9** | 13 | 8 | 3,52 | 3,9 | 0,415 | 18 000 | 20 000 | 3 | ▸ **HK 0908** |
| | 13 | 10 | 4,13 | 4,8 | 0,53 | 18 000 | 20 000 | 4 | ▸ **HK 0910** |
| | 13 | 12 | 5,12 | 6,4 | 0,72 | 18 000 | 20 000 | 4,6 | **HK 0912** |
| **10** | 14 | 10 | 4,29 | 5,3 | 0,57 | 18 000 | 20 000 | 4,1 | **HK 1010** |
| | 14 | 12 | 5,39 | 6,95 | 0,78 | 18 000 | 20 000 | 4,8 | ▸ **HK 1012** |
| | 14 | 14 | 4,29 | 5,3 | 0,57 | – | 12 000 | 4,6 | ▸ **HK 1014.2RS** |
| | 14 | 15 | 6,6 | 9 | 1,02 | 18 000 | 20 000 | 6 | ▸ **HK 1015** |
| **12** | 16 | 10 | 4,84 | 6,4 | 0,71 | 16 000 | 18 000 | 4,6 | ▸ **HK 1210** |
| | 18 | 12 | 6,27 | 7,35 | 0,85 | 16 000 | 18 000 | 9,5 | ▸ **HK 1212** |
| | 18 | 16 | 6,27 | 7,35 | 0,85 | – | 10 000 | 11 | ▸ **HK 1216.2RS** |
| **13** | 19 | 12 | 6,6 | 8 | 0,915 | 16 000 | 17 000 | 10,5 | ▸ **HK 1312** |
| **14** | 20 | 12 | 6,82 | 8,65 | 0,98 | 15 000 | 17 000 | 10,5 | ▸ **HK 1412** |
| **15** | 21 | 12 | 7,65 | 9,5 | 1,08 | 15 000 | 16 000 | 11 | ▸ **HK 1512** |
| | 21 | 16 | 10,1 | 14,6 | 1,7 | 15 000 | 16 000 | 15 | ▸ **HK 1516** |
| | 21 | 22 | 13 | 20 | 2,28 | 15 000 | 16 000 | 20 | ▸ **HK 1522**[1)] |
| **16** | 22 | 12 | 7,37 | 9,8 | 1,12 | 14 000 | 16 000 | 12 | ▸ **HK 1612** |
| | 22 | 16 | 10,5 | 15,6 | 1,8 | 14 000 | 16 000 | 16 | ▸ **HK 1616** |
| | 22 | 20 | 10,5 | 15,6 | 1,8 | – | 9 000 | 18 | **HK 1620.2RS** |
| | 22 | 22 | 12,8 | 19,6 | 2,24 | 14 000 | 16 000 | 24 | ▸ **HK 1622**[1)] |
| **17** | 23 | 12 | 7,65 | 10,6 | 1,2 | 14 000 | 15 000 | 13 | ▸ **HK 1712** |

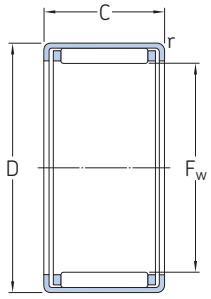
▸ Popular item
1) Double row, outer ring with a lubrication hole.

| Dimensions | | Associated inner rings[1] | | Associated radial shaft seals[2] | |
|---|---|---|---|---|---|
| | | IR series | LR series | Single lip | Double lip |
| $F_w$ | r min. | | | | |
| mm | | – | | – | |
| **3** | 0,3 | – | – | – | – |
| **4** | 0,3 | – | – | G 4x8x2 S | – |
| **5** | 0,4 | – | – | G 5x9x2 S | – |
| **6** | 0,4 | – | – | G 6x10x2 S | – |
| | 0,4 | – | – | G 6x10x2 S | – |
| **7** | 0,4 | – | – | G 7x11x2 S | – |
| **8** | 0,4 | – | – | G 8x12x3 | – |
| | 0,4 | IR 5x8x12 | – | G 8x12x3 | – |
| | 0,4 | – | – | – | – |
| **9** | 0,4 | – | – | G 9x13x3 | – |
| | 0,4 | – | – | G 9x13x3 | – |
| | 0,4 | IR 6x9x12 | – | G 9x13x3 | – |
| **10** | 0,4 | IR 7x10x10.5 | LR 7x10x10.5 | G 10x14x3 | – |
| | 0,4 | IR 7x10x12 | – | G 10x14x3 | – |
| | 0,4 | – | – | – | – |
| | 0,4 | IR 7x10x16 | – | G 10x14x3 | – |
| **12** | 0,4 | IR 8x12x10.5 | LR 8x12x10.5 | G 12x16x3 | – |
| | 0,8 | IR 8x12x12.5 | LR 8x12x12.5 | G 12x18x3 | SD 12x18x3 |
| | 0,8 | – | – | – | – |
| **13** | 0,8 | IR 10x13x12.5 | LR 10x13x12.5 | G 13x19x3 | – |
| **14** | 0,8 | IR 10x14x13 | – | G 14x20x3 | SD 14x20x3 |
| **15** | 0,8 | IR 12x15x12.5 | LR 12x15x12.5 | G 15x21x3 | SD 15x21x3 |
| | 0,8 | IR 12x15x16.5 | LR 12x15x16.5 | G 15x21x3 | SD 15x21x3 |
| | 0,8 | IR 12x15x22.5 | LR 12x15x22.5 | G 15x21x3 | SD 15x21x3 |
| **16** | 0,8 | IR 12x16x13 | – | G 16x22x3 | SD 16x22x3 |
| | 0,8 | IR 12x16x16 | – | G 16x22x3 | SD 16x22x3 |
| | 0,8 | – | – | – | – |
| | 0,8 | IR 12x16x22 | – | G 16x22x3 | SD 16x22x3 |
| **17** | 0,8 | – | – | G 17x23x3 | SD 17x23x3 |

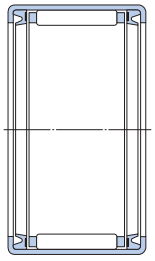
[1] For additional information → *Needle roller bearing inner rings*, **page 593**
[2] For additional information → skf.com/seals

## 7.2 Drawn cup needle roller bearings

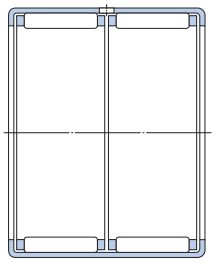
$F_w$ **18 – 30** mm




HK



HK ...2RS



HK (double row)

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| $F_w$ | D | C | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | g | – |
| **18** | 24 | 12 | 7,92 | 11,2 | 1,27 | 13 000 | 15 000 | 13 | ▸ **HK 1812** |
| | 24 | 16 | 7,92 | 11,2 | 1,27 | – | 8 500 | 15 | **HK 1816.2RS** |
| | 24 | 16 | 11,2 | 17,6 | 2,04 | 13 000 | 15 000 | 18 | ▸ **HK 1816** |
| **20** | 26 | 10 | 6,16 | 8,5 | 0,93 | 12 000 | 14 000 | 12 | **HK 2010** |
| | 26 | 12 | 8,42 | 12,5 | 1,4 | 12 000 | 14 000 | 14 | ▸ **HK 2012** |
| | 26 | 16 | 8,42 | 12,5 | 1,4 | – | 8 000 | 18 | **HK 2016.2RS** |
| | 26 | 16 | 12,3 | 20,4 | 2,36 | 12 000 | 14 000 | 19 | ▸ **HK 2016** |
| | 26 | 20 | 12,3 | 20,4 | 2,36 | – | 8 000 | 23 | ▸ **HK 2020.2RS** |
| | 26 | 20 | 15,1 | 26,5 | 3,15 | 12 000 | 14 000 | 24 | ▸ **HK 2020** |
| | 26 | 30 | 20,9 | 40,5 | 4,75 | 12 000 | 14 000 | 35 | ▸ **HK 2030**[1)] |
| **22** | 28 | 10 | 7,21 | 10,6 | 1,2 | 11 000 | 12 000 | 13 | **HK 2210** |
| | 28 | 12 | 8,8 | 13,7 | 1,56 | 11 000 | 12 000 | 15 | ▸ **HK 2212** |
| | 28 | 16 | 8,8 | 13,7 | 1,56 | – | 7 500 | 18 | **HK 2216.2RS** |
| | 28 | 16 | 13 | 22,4 | 2,6 | 11 000 | 12 000 | 21 | ▸ **HK 2216** |
| | 28 | 20 | 13 | 22,4 | 2,6 | – | 7 500 | 23 | **HK 2220.2RS** |
| | 28 | 20 | 15,7 | 29 | 3,45 | 11 000 | 12 000 | 26 | ▸ **HK 2220** |
| **25** | 32 | 12 | 10,5 | 15,3 | 1,76 | 9 500 | 11 000 | 20 | ▸ **HK 2512** |
| | 32 | 16 | 10,5 | 15,3 | 1,76 | – | 6 700 | 27 | **HK 2516.2RS** |
| | 32 | 16 | 15,1 | 24 | 2,85 | 9 500 | 11 000 | 25 | ▸ **HK 2516** |
| | 32 | 20 | 15,1 | 24 | 2,85 | – | 6 700 | 31 | ▸ **HK 2520.2RS** |
| | 32 | 20 | 19 | 32,5 | 4 | 9 500 | 11 000 | 33 | ▸ **HK 2520** |
| | 32 | 26 | 24,2 | 45 | 5,5 | 9 500 | 11 000 | 44 | ▸ **HK 2526** |
| | 32 | 30 | 24,2 | 45 | 5,5 | – | 6 700 | 47 | ▸ **HK 2530.2RS** |
| | 32 | 38 | 33 | 65,5 | 8 | 9 500 | 11 000 | 64 | ▸ **HK 2538**[1)] |
| **28** | 35 | 16 | 15,7 | 26,5 | 3,15 | 9 000 | 9 500 | 26,5 | ▸ **HK 2816** |
| | 35 | 20 | 15,7 | 26,5 | 3,15 | – | 6 300 | 34 | **HK 2820.2RS** |
| | 35 | 20 | 20,1 | 36,5 | 4,4 | 9 000 | 9 500 | 36 | ▸ **HK 2820** |
| **30** | 37 | 12 | 11,7 | 18,3 | 2,12 | 8 000 | 9 000 | 23 | ▸ **HK 3012** |
| | 37 | 16 | 11,7 | 18,3 | 2,12 | – | 5 600 | 31 | **HK 3016.2RS** |
| | 37 | 16 | 16,5 | 29 | 3,4 | 8 000 | 9 000 | 31 | ▸ **HK 3016** |
| | 37 | 20 | 20,9 | 40 | 4,75 | 8 000 | 9 000 | 38 | ▸ **HK 3020** |
| | 37 | 26 | 27 | 54 | 6,55 | 8 000 | 9 000 | 51 | ▸ **HK 3026** |
| | 37 | 38 | 35,8 | 80 | 9,5 | 8 000 | 9 000 | 76 | ▸ **HK 3038**[1)] |

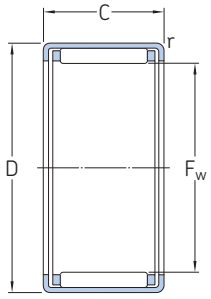
▸ Popular item
[1)] Double row, outer ring with a lubrication hole.

| Dimensions | | Associated inner rings[1] | | Associated radial shaft seals[2] | |
|---|---|---|---|---|---|
| | | IR series | LR series | Single lip | Double lip |
| $F_w$ | r min. | | | | |
| mm | | – | | – | |
| **18** | 0,8 | – | LR 15x18x12.5 | G 18x24x3 | SD 18x24x3 |
| | 0,8 | IR 15x18x16.5 | LR 15x18x16.5 | – | – |
| | 0,8 | IR 15x18x16.5 | LR 15x18x16.5 | G 18x24x3 | SD 18x24x3 |
| **20** | 0,8 | – | – | G 20x26x4 | SD 20x26x4 |
| | 0,8 | IR 15x20x13 | – | G 20x26x4 | SD 20x26x4 |
| | 0,8 | IR 17x20x16.5 | LR 17x20x16.5 | – | – |
| | 0,8 | IR 17x20x16.5 | LR 17x20x16.5 | G 20x26x4 | SD 20x26x4 |
| | 0,8 | IR 17x20x20.5 | LR 17x20x20.5 | – | – |
| | 0,8 | IR 17x20x20.5 | LR 17x20x20.5 | G 20x26x4 | SD 20x26x4 |
| | 0,8 | IR 17x20x30.5 | LR 17x20x30.5 | G 20x26x4 | SD 20x26x4 |
| **22** | 0,8 | – | – | G 22x28x4 | SD 22x28x4 |
| | 0,8 | IR 17x22x13 | – | G 22x28x4 | SD 22x28x4 |
| | 0,8 | IR 17x22x23 | – | – | – |
| | 0,8 | IR 17x22x23 | – | G 22x28x4 | SD 22x28x4 |
| | 0,8 | IR 17x22x23 | – | – | – |
| | 0,8 | IR 17x22x23 | – | G 22x28x4 | SD 22x28x4 |
| **25** | 0,8 | – | LR 20x25x12.5 | G 25x32x4 | – |
| | 0,8 | IR 20x25x17 | LR 20x25x16.5 | – | – |
| | 0,8 | IR 20x25x17 | LR 20x25x16.5 | G 25x32x4 | – |
| | 0,8 | IR 20x25x20.5 | LR 20x25x20.5 | – | – |
| | 0,8 | IR 20x25x20.5 | LR 20x25x20.5 | G 25x32x4 | – |
| | 0,8 | IR 20x25x26.5 | LR 20x25x26.5 | G 25x32x4 | – |
| | 0,8 | IR 20x25x30 | – | – | – |
| | 0,8 | IR 20x25x38.5 | LR 20x25x38.5 | G 25x32x4 | – |
| **28** | 0,8 | IR 22x28x17 | – | G 28x35x4 | SD 28x35x4 |
| | 0,8 | IR 22x28x20.5 | LR 22x28x20.5 | – | – |
| | 0,8 | IR 22x28x20.5 | LR 22x28x20.5 | G 28x35x4 | SD 28x35x4 |
| **30** | 0,8 | – | LR 25x30x12.5 | G 30x37x4 | SD 30x37x4 |
| | 0,8 | IR 25x30x17 | LR 25x30x16.5 | – | – |
| | 0,8 | IR 25x30x17 | LR 25x30x16.5 | G 30x37x4 | SD 30x37x4 |
| | 0,8 | IR 25x30x20.5 | LR 25x30x20.5 | G 30x37x4 | SD 30x37x4 |
| | 0,8 | IR 25x30x26.5 | LR 25x30x26.5 | G 30x37x4 | SD 30x37x4 |
| | 0,8 | IR 25x30x38.5 | LR 25x30x38.5 | G 30x37x4 | SD 30x37x4 |

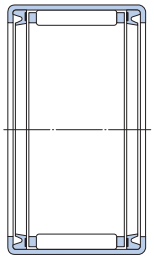
[1] For additional information → *Needle roller bearing inner rings*, **page 593**
[2] For additional information → skf.com/seals

## 7.2 Drawn cup needle roller bearings

$F_w$ **35 – 60** mm




HK



HK ...2RS

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| $F_w$ | D | C | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | g | – |
| **35** | 42 | 12 | 12,5 | 21,6 | 2,45 | 7 000 | 8 000 | 27 | ▸ **HK 3512** |
| | 42 | 16 | 17,9 | 34 | 4 | 7 000 | 8 000 | 36 | ▸ **HK 3516** |
| | 42 | 20 | 17,9 | 34 | 4 | – | 5 000 | 41 | **HK 3520.2RS** |
| | 42 | 20 | 22,9 | 46,5 | 5,6 | 7 000 | 8 000 | 44 | ▸ **HK 3520** |
| **40** | 47 | 12 | 13,4 | 24,5 | 2,8 | 6 300 | 7 000 | 30 | ▸ **HK 4012** |
| | 47 | 16 | 14,5 | 27,5 | 3,15 | – | 4 500 | 37 | **HK 4016.2RS** |
| | 47 | 16 | 19 | 39 | 4,55 | 6 300 | 7 000 | 39 | ▸ **HK 4016** |
| | 47 | 20 | 19 | 39 | 4,55 | – | 4 500 | 48 | **HK 4020.2RS** |
| | 47 | 20 | 24,2 | 53 | 6,4 | 6 300 | 7 000 | 54 | ▸ **HK 4020** |
| **45** | 52 | 12 | 14,2 | 27,5 | 3,2 | 5 600 | 6 300 | 33 | **HK 4512** |
| | 52 | 16 | 20,5 | 43 | 5,1 | 5 600 | 6 300 | 47 | ▸ **HK 4516** |
| | 52 | 20 | 20,5 | 43 | 5,1 | – | 4 000 | 54 | **HK 4520.2RS** |
| | 52 | 20 | 26 | 60 | 7,2 | 5 600 | 6 300 | 56 | ▸ **HK 4520** |
| **50** | 58 | 20 | 29,2 | 63 | 7,8 | 5 000 | 5 600 | 70 | ▸ **HK 5020** |
| | 58 | 24 | 29,2 | 63 | 7,8 | – | 3 600 | 81 | **HK 5024.2RS** |
| | 58 | 25 | 36,9 | 85 | 10,6 | 5 000 | 5 600 | 85 | ▸ **HK 5025** |
| **55** | 63 | 20 | 30,3 | 67 | 8,3 | 4 500 | 5 000 | 74 | ▸ **HK 5520** |
| | 63 | 28 | 41,8 | 104 | 12,9 | 4 500 | 5 000 | 105 | **HK 5528** |
| **60** | 68 | 12 | 17,6 | 32 | 3,8 | 4 300 | 4 800 | 49 | **HK 6012** |
| | 68 | 20 | 31,9 | 75 | 9,3 | 4 300 | 4 800 | 81 | **HK 6020** |
| | 68 | 32 | 51,2 | 137 | 17 | 4 300 | 4 800 | 136 | **HK 6032** |

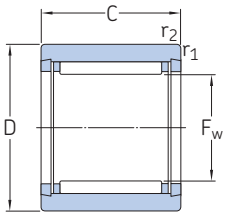
▸ Popular item

| Dimensions | | Associated inner rings[1] | | Associated radial shaft seals[2] | |
|---|---|---|---|---|---|
| | | IR series | LR series | Single lip | Double lip |
| $F_w$ | r min. | | | | |
| mm | | – | | – | |
| **35** | 0,8 | – | LR 30x35x12.5 | G 35x42x4 | SD 35x42x4 |
| | 0,8 | IR 30x35x17 | LR 30x35x16.5 | G 35x42x4 | SD 35x42x4 |
| | 0,8 | IR 30x35x20.5 | LR 30x35x20.5 | – | – |
| | 0,8 | IR 30x35x20.5 | LR 30x35x20.5 | G 35x42x4 | SD 35x42x4 |
| **40** | 0,8 | – | LR 35x40x12.5 | G 40x47x4 | SD 40x47x4 |
| | 0,8 | IR 35x40x20 | LR 35x40x16.5 | – | – |
| | 0,8 | IR 35x40x20 | LR 35x40x16.5 | G 40x47x4 | SD 40x47x4 |
| | 0,8 | IR 35x40x20.5 | LR 35x40x20.5 | – | – |
| | 0,8 | IR 35x40x20.5 | LR 35x40x20.5 | G 40x47x4 | SD 40x47x4 |
| **45** | 0,8 | – | – | G 45x52x4 | SD 45x52x4 |
| | 0,8 | IR 40x45x17 | LR 40x45x16.5 | G 45x52x4 | SD 45x52x4 |
| | 0,8 | IR 40x45x20.5 | LR 40x45x20.5 | – | – |
| | 0,8 | IR 40x45x20.5 | – | G 45x52x4 | SD 45x52x4 |
| **50** | 0,8 | – | LR 45x50x20.5 | G 50x58x4 | SD 50x58x4 |
| | 0,8 | IR 45x50x25.5 | LR 45x50x25.5 | – | – |
| | 0,8 | IR 45x50x25.5 | LR 45x50x25.5 | G 50x58x4 | SD 50x58x4 |
| **55** | 0,8 | – | LR 50x55x20.5 | G 55x63x5 | – |
| | 0,8 | – | – | G 55x63x5 | – |
| **60** | 0,8 | – | – | – | – |
| | 0,8 | – | – | – | – |
| | 0,8 | – | – | – | – |

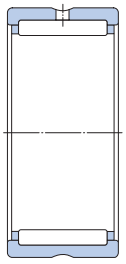
[1] For additional information → *Needle roller bearing inner rings*, **page 593**
[2] For additional information → skf.com/seals

## 7.3 Needle roller bearings with machined rings with flanges, without an inner ring

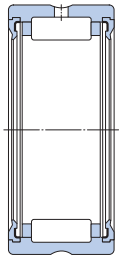
$F_w$ **5 – 19** mm




NK ($F_w \leq 10$ mm)



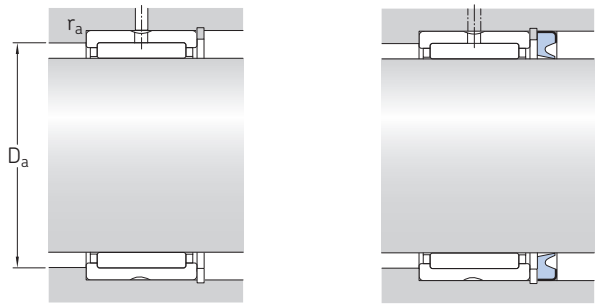
NK ($F_w \geq 12$ mm)
RNA 49
RNA 69



RNA 49 ...2RS

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| $F_w$ | D | C | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | kg | – |
| **5** | 10 | 10 | 2,29 | 2 | 0,212 | 36 000 | 40 000 | 0,0031 | ▸ **NK 5/10 TN** |
| | 10 | 12 | 2,92 | 2,7 | 0,29 | 36 000 | 40 000 | 0,0037 | ▸ **NK 5/12 TN** |
| **6** | 12 | 10 | 2,55 | 2,36 | 0,25 | 34 000 | 38 000 | 0,0047 | ▸ **NK 6/10 TN** |
| | 12 | 12 | 3,3 | 3,2 | 0,345 | 34 000 | 38 000 | 0,0057 | ▸ **NK 6/12 TN** |
| **7** | 14 | 10 | 2,81 | 2,75 | 0,29 | 32 000 | 36 000 | 0,0069 | **NK 7/10 TN** |
| | 14 | 12 | 3,58 | 3,75 | 0,415 | 32 000 | 36 000 | 0,0082 | **NK 7/12 TN** |
| **8** | 15 | 12 | 3,8 | 4,25 | 0,465 | 32 000 | 36 000 | 0,0087 | ▸ **NK 8/12 TN** |
| | 15 | 16 | 5,01 | 5,85 | 0,67 | 32 000 | 36 000 | 0,012 | ▸ **NK 8/16 TN** |
| **9** | 16 | 12 | 4,4 | 5,2 | 0,57 | 30 000 | 34 000 | 0,01 | ▸ **NK 9/12 TN** |
| | 16 | 16 | 5,72 | 7,2 | 0,815 | 30 000 | 34 000 | 0,013 | **NK 9/16 TN** |
| **10** | 17 | 12 | 4,57 | 5,7 | 0,63 | 28 000 | 32 000 | 0,01 | ▸ **NK 10/12 TN** |
| | 17 | 16 | 5,94 | 8 | 0,9 | 28 000 | 32 000 | 0,013 | ▸ **NK 10/16 TN** |
| **12** | 19 | 12 | 6,71 | 8,15 | 0,965 | 26 000 | 30 000 | 0,012 | ▸ **NK 12/12** |
| | 19 | 16 | 9,13 | 12 | 1,43 | 26 000 | 30 000 | 0,016 | ▸ **NK 12/16** |
| **14** | 22 | 13 | 7,37 | 8,15 | 0,965 | – | 12 000 | 0,016 | ▸ **RNA 4900.2RS** |
| | 22 | 13 | 8,8 | 10,4 | 1,22 | 24 000 | 28 000 | 0,017 | ▸ **RNA 4900** |
| | 22 | 16 | 10,2 | 12,5 | 1,5 | 24 000 | 28 000 | 0,021 | ▸ **NK 14/16** |
| | 22 | 20 | 12,8 | 16,6 | 2 | 24 000 | 28 000 | 0,026 | ▸ **NK 14/20** |
| **15** | 23 | 16 | 11 | 14 | 1,66 | 24 000 | 26 000 | 0,022 | ▸ **NK 15/16** |
| | 23 | 20 | 13,8 | 18,3 | 2,2 | 24 000 | 26 000 | 0,027 | ▸ **NK 15/20** |
| **16** | 24 | 13 | 8,09 | 9,65 | 1,14 | – | 11 000 | 0,018 | ▸ **RNA 4901.2RS** |
| | 24 | 13 | 9,9 | 12,2 | 1,46 | 22 000 | 26 000 | 0,017 | ▸ **RNA 4901** |
| | 24 | 16 | 11,7 | 15,3 | 1,8 | 22 000 | 26 000 | 0,022 | ▸ **NK 16/16** |
| | 24 | 20 | 14,5 | 20 | 2,4 | 22 000 | 26 000 | 0,028 | ▸ **NK 16/20** |
| | 24 | 22 | 16,1 | 23,2 | 2,75 | 22 000 | 26 000 | 0,031 | ▸ **RNA 6901** |
| **17** | 25 | 16 | 12,1 | 16,6 | 1,96 | 22 000 | 26 000 | 0,024 | ▸ **NK 17/16** |
| | 25 | 20 | 15,1 | 22 | 2,65 | 22 000 | 26 000 | 0,03 | ▸ **NK 17/20** |
| **18** | 26 | 16 | 12,8 | 17,6 | 2,12 | 22 000 | 24 000 | 0,025 | ▸ **NK 18/16** |
| | 26 | 20 | 16,1 | 23,6 | 2,85 | 22 000 | 24 000 | 0,031 | ▸ **NK 18/20** |
| **19** | 27 | 16 | 13,4 | 19 | 2,28 | 20 000 | 24 000 | 0,026 | ▸ **NK 19/16** |
| | 27 | 20 | 16,5 | 25,5 | 3,05 | 20 000 | 24 000 | 0,032 | **NK 19/20** |

▸ Popular item

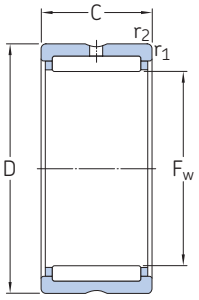



| Dimensions | | Abutment and fillet dimensions | | Associated radial shaft seals[1] | | |
|---|---|---|---|---|---|---|
| | | | | Single lip | Double lip | Spring loaded lip |
| $F_w$ | $r_{1,2}$ min. | $D_a$ max. | $r_a$ max. | | | |
| mm | | mm | | – | | |
| **5** | 0,15 | 8,8 | 0,1 | G 5x10x2 S | – | – |
| | 0,15 | 8,8 | 0,1 | G 5x10x2 S | – | – |
| **6** | 0,15 | 10,8 | 0,1 | G 6x12x2 S | – | – |
| | 0,15 | 10,8 | 0,1 | G 6x12x2 S | – | – |
| **7** | 0,3 | 12 | 0,3 | G 7x14x2 | – | – |
| | 0,3 | 12 | 0,3 | G 7x14x2 | – | – |
| **8** | 0,3 | 13 | 0,3 | G 8x15x3 | SD 8x15x3 | – |
| | 0,3 | 13 | 0,3 | G 8x15x3 | SD 8x15x3 | – |
| **9** | 0,3 | 14 | 0,3 | G 9x16x3 | – | – |
| | 0,3 | 14 | 0,3 | G 9x16x3 | – | – |
| **10** | 0,3 | 15 | 0,3 | G 10x17x3 | SD 10x17x3 | – |
| | 0,3 | 15 | 0,3 | G 10x17x3 | SD 10x17x3 | – |
| **12** | 0,3 | 17 | 0,3 | G 12x19x3 | SD 12x19x3 | – |
| | 0,3 | 17 | 0,3 | G 12x19x3 | SD 12x19x3 | – |
| **14** | 0,3 | 20 | 0,3 | – | – | – |
| | 0,3 | 20 | 0,3 | G 14x22x3 | SD 14x22x3 | – |
| | 0,3 | 20 | 0,3 | G 14x22x3 | SD 14x22x3 | – |
| | 0,3 | 20 | 0,3 | G 14x22x3 | SD 14x22x3 | – |
| **15** | 0,3 | 21 | 0,3 | G 15x23x3 | SD 15x23x3 | – |
| | 0,3 | 21 | 0,3 | G 15x23x3 | SD 15x23x3 | – |
| **16** | 0,3 | 22 | 0,3 | – | – | – |
| | 0,3 | 22 | 0,3 | G 16x24x3 | SD 16x24x3 | – |
| | 0,3 | 22 | 0,3 | G 16x24x3 | SD 16x24x3 | – |
| | 0,3 | 22 | 0,3 | G 16x24x3 | SD 16x24x3 | – |
| | 0,3 | 22 | 0,3 | G 16x24x3 | SD 16x24x3 | – |
| **17** | 0,3 | 23 | 0,3 | G 17x25x3 | SD 17x25x3 | – |
| | 0,3 | 23 | 0,3 | G 17x25x3 | SD 17x25x3 | – |
| **18** | 0,3 | 24 | 0,3 | G 18x26x4 | SD 18x26x4 | – |
| | 0,3 | 24 | 0,3 | G 18x26x4 | SD 18x26x4 | – |
| **19** | 0,3 | 25 | 0,3 | G 19x27x4 | SD 19x27x4 | – |
| | 0,3 | 25 | 0,3 | G 19x27x4 | SD 19x27x4 | – |

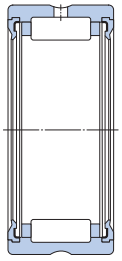
[1] For additional information → skf.com/seals

## 7.3 Needle roller bearings with machined rings with flanges, without an inner ring

$F_w$ **20 – 29** mm



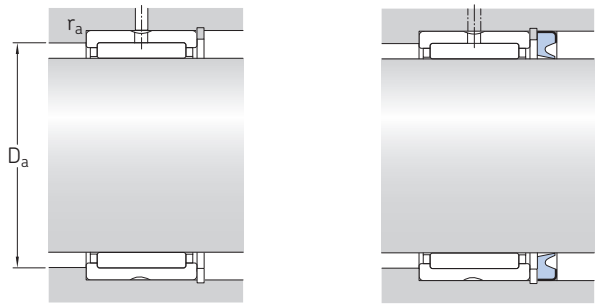

NK(S)
RNA 49
RNA 69



RNA 49 ...2RS

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| $F_w$ | D | C | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | kg | – |
| **20** | 28 | 13 | 9,13 | 12 | 1,43 | – | 9 500 | 0,022 | ▸ **RNA 4902.2RS** |
| | 28 | 13 | 11,2 | 15,3 | 1,83 | 19 000 | 22 000 | 0,022 | ▸ **RNA 4902** |
| | 28 | 16 | 13,2 | 19,3 | 2,28 | 19 000 | 22 000 | 0,027 | ▸ **NK 20/16** |
| | 28 | 20 | 16,5 | 25,5 | 3,05 | 19 000 | 22 000 | 0,034 | ▸ **NK 20/20** |
| | 28 | 23 | 17,2 | 27 | 3,35 | 19 000 | 22 000 | 0,04 | ▸ **RNA 6902** |
| | 32 | 20 | 23,3 | 27 | 3,25 | 18 000 | 20 000 | 0,049 | ▸ **NKS 20** |
| **21** | 29 | 16 | 13,8 | 20,4 | 2,45 | 19 000 | 22 000 | 0,028 | **NK 21/16** |
| | 29 | 20 | 17,2 | 27 | 3,35 | 19 000 | 22 000 | 0,035 | **NK 21/20** |
| **22** | 30 | 13 | 9,52 | 12,9 | 1,53 | – | 9 000 | 0,023 | **RNA 4903.2RS** |
| | 30 | 13 | 11,4 | 16,3 | 1,96 | 18 000 | 20 000 | 0,022 | ▸ **RNA 4903** |
| | 30 | 16 | 14,2 | 21,6 | 2,6 | 18 000 | 20 000 | 0,03 | ▸ **NK 22/16** |
| | 30 | 20 | 17,9 | 29 | 3,55 | 18 000 | 20 000 | 0,037 | ▸ **NK 22/20** |
| | 30 | 23 | 18,7 | 30,5 | 3,75 | 18 000 | 20 000 | 0,042 | ▸ **RNA 6903** |
| **24** | 32 | 16 | 15,4 | 24,5 | 2,9 | 16 000 | 19 000 | 0,032 | ▸ **NK 24/16** |
| | 32 | 20 | 19 | 32,5 | 4 | 16 000 | 19 000 | 0,04 | ▸ **NK 24/20** |
| | 37 | 20 | 26 | 33,5 | 4 | 15 000 | 17 000 | 0,066 | **NKS 24** |
| **25** | 33 | 16 | 15,1 | 24,5 | 2,9 | 16 000 | 18 000 | 0,033 | ▸ **NK 25/16** |
| | 33 | 20 | 19 | 32,5 | 4 | 16 000 | 18 000 | 0,042 | ▸ **NK 25/20** |
| | 37 | 17 | 19,4 | 22,4 | 2,65 | – | 7 500 | 0,056 | ▸ **RNA 4904.2RS** |
| | 37 | 17 | 21,6 | 28 | 3,35 | 15 000 | 17 000 | 0,052 | ▸ **RNA 4904** |
| | 37 | 30 | 35,2 | 53 | 6,55 | 15 000 | 17 000 | 0,1 | ▸ **RNA 6904** |
| | 38 | 20 | 27,5 | 36 | 4,4 | 15 000 | 17 000 | 0,068 | ▸ **NKS 25** |
| **26** | 34 | 16 | 15,7 | 26 | 3,1 | 15 000 | 17 000 | 0,034 | ▸ **NK 26/16** |
| | 34 | 20 | 19,4 | 34,5 | 4,25 | 15 000 | 17 000 | 0,042 | ▸ **NK 26/20** |
| **28** | 37 | 20 | 22 | 36,5 | 4,55 | 14 000 | 16 000 | 0,052 | ▸ **NK 28/20** |
| | 37 | 30 | 31,9 | 60 | 7,5 | 14 000 | 16 000 | 0,082 | ▸ **NK 28/30** |
| | 39 | 17 | 23,3 | 32 | 3,9 | 14 000 | 15 000 | 0,05 | **RNA 49/22** |
| | 39 | 30 | 36,9 | 57 | 7,2 | 14 000 | 15 000 | 0,098 | **RNA 69/22** |
| | 42 | 20 | 28,6 | 39 | 4,75 | 13 000 | 15 000 | 0,084 | **NKS 28** |
| **29** | 38 | 20 | 24,6 | 42,5 | 5,2 | 14 000 | 15 000 | 0,05 | **NK 29/20 TN** |
| | 38 | 30 | 31,9 | 60 | 7,5 | 14 000 | 15 000 | 0,084 | **NK 29/30** |

▸ Popular item

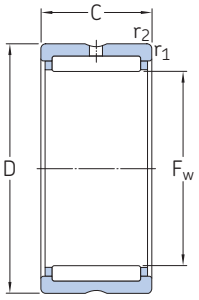



| Dimensions | | Abutment and fillet dimensions | | Associated radial shaft seals[1] | | |
|---|---|---|---|---|---|---|
| | | | | Single lip | Double lip | Spring loaded lip |
| $F_w$ | $r_{1,2}$ min. | $D_a$ max. | $r_a$ max. | | | |
| mm | | mm | | – | | |
| **20** | 0,3 | 26 | 0,3 | – | – | – |
| | 0,3 | 26 | 0,3 | G 20x28x4 | SD 20x28x4 | – |
| | 0,3 | 26 | 0,3 | G 20x28x4 | SD 20x28x4 | – |
| | 0,3 | 26 | 0,3 | G 20x28x4 | SD 20x28x4 | – |
| | 0,3 | 26 | 0,3 | G 20x28x4 | SD 20x28x4 | – |
| | 0,6 | 28 | 0,6 | – | – | 20x32x7 HMS5 RG |
| **21** | 0,3 | 27 | 0,3 | G 21x29x4 | – | – |
| | 0,3 | 27 | 0,3 | G 21x29x4 | – | – |
| **22** | 0,3 | 28 | 0,3 | – | – | – |
| | 0,3 | 28 | 0,3 | G 22x30x4 | SD 22x30x4 | – |
| | 0,3 | 28 | 0,3 | G 22x30x4 | SD 22x30x4 | – |
| | 0,3 | 28 | 0,3 | G 22x30x4 | SD 22x30x4 | – |
| | 0,3 | 28 | 0,3 | G 22x30x4 | SD 22x30x4 | – |
| **24** | 0,3 | 30 | 0,3 | G 24x32x4 | SD 24x32x4 | – |
| | 0,3 | 30 | 0,3 | G 24x32x4 | SD 24x32x4 | – |
| | 0,6 | 33 | 0,6 | – | – | 24x37x7 HMS5 RG |
| **25** | 0,3 | 31 | 0,3 | G 25x33x4 | SD 25x33x4 | – |
| | 0,3 | 31 | 0,3 | G 25x33x4 | SD 25x33x4 | – |
| | 0,3 | 35 | 0,3 | – | – | – |
| | 0,3 | 35 | 0,3 | – | – | 25x37x5 HMS5 RG |
| | 0,3 | 35 | 0,3 | – | – | 25x37x5 HMS5 RG |
| | 0,6 | 34 | 0,6 | – | – | 25x38x7 HMS5 RG |
| **26** | 0,3 | 32 | 0,3 | G 26x34x4 | SD 26x34x4 | – |
| | 0,3 | 32 | 0,3 | G 26x34x4 | SD 26x34x4 | – |
| **28** | 0,3 | 35 | 0,3 | G 28x37x4 | – | – |
| | 0,3 | 35 | 0,3 | G 28x37x4 | – | – |
| | 0,3 | 37 | 0,3 | – | – | – |
| | 0,3 | 37 | 0,3 | – | – | – |
| | 0,6 | 38 | 0,6 | – | – | 28x42x7 HMS5 RG |
| **29** | 0,3 | 36 | 0,3 | G 29x38x4 | – | – |
| | 0,3 | 36 | 0,3 | G 29x38x4 | – | – |

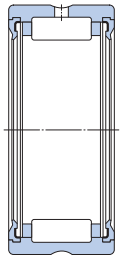
[1] For additional information → skf.com/seals

## 7.3 Needle roller bearings with machined rings with flanges, without an inner ring

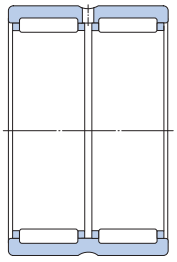
$F_w$ **30 – 43** mm




NK(S)
RNA 49
RNA 69 ($F_w \leq 38$ mm)



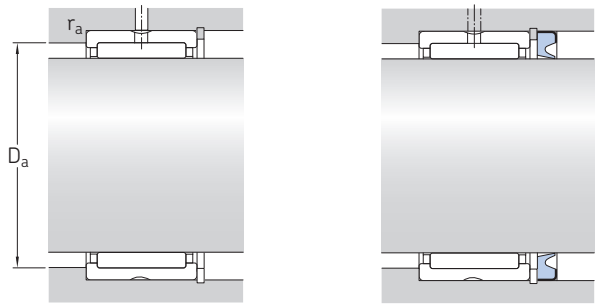
RNA 49 ...2RS



RNA 69 ($F_w \geq 40$ mm)

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| $F_w$ | D | C | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | kg | – |
| **30** | 40 | 20 | 25,1 | 44 | 5,5 | 13 000 | 15 000 | 0,061 | ▸ **NK 30/20 TN** |
| | 40 | 30 | 36,9 | 72 | 9 | 13 000 | 15 000 | 0,092 | ▸ **NK 30/30 TN** |
| | 42 | 17 | 21,6 | 27,5 | 3,25 | – | 6 300 | 0,06 | ▸ **RNA 4905.2RS** |
| | 42 | 17 | 24,2 | 34,5 | 4,15 | 13 000 | 15 000 | 0,061 | ▸ **RNA 4905** |
| | 42 | 30 | 38 | 62 | 7,65 | 13 000 | 15 000 | 0,11 | ▸ **RNA 6905** |
| | 45 | 22 | 31,9 | 43 | 5,3 | 12 000 | 14 000 | 0,1 | ▸ **NKS 30** |
| **32** | 42 | 20 | 26,4 | 48 | 6 | 12 000 | 14 000 | 0,064 | ▸ **NK 32/20 TN** |
| | 42 | 30 | 34,1 | 65,5 | 8,3 | 12 000 | 14 000 | 0,1 | **NK 32/30** |
| | 45 | 17 | 25,1 | 36,5 | 4,4 | 12 000 | 14 000 | 0,073 | **RNA 49/28** |
| | 45 | 30 | 39,6 | 65,5 | 8,3 | 12 000 | 14 000 | 0,14 | ▸ **RNA 69/28** |
| | 47 | 22 | 34,1 | 46,5 | 5,7 | 12 000 | 13 000 | 0,11 | **NKS 32** |
| **35** | 45 | 20 | 27,5 | 52 | 6,55 | 11 000 | 13 000 | 0,069 | ▸ **NK 35/20 TN** |
| | 45 | 30 | 40,2 | 85 | 10,6 | 11 000 | 13 000 | 0,11 | ▸ **NK 35/30 TN** |
| | 47 | 17 | 23,3 | 32 | 3,8 | – | 5 600 | 0,069 | ▸ **RNA 4906.2RS** |
| | 47 | 17 | 25,5 | 39 | 4,65 | 11 000 | 13 000 | 0,069 | ▸ **RNA 4906** |
| | 47 | 30 | 42,9 | 75 | 9,3 | 11 000 | 13 000 | 0,13 | ▸ **RNA 6906** |
| | 50 | 22 | 35,2 | 50 | 6,2 | 11 000 | 12 000 | 0,12 | ▸ **NKS 35** |
| **37** | 47 | 20 | 25,1 | 46,5 | 5,85 | 11 000 | 12 000 | 0,077 | **NK 37/20** |
| | 47 | 30 | 36,9 | 76,5 | 9,5 | 11 000 | 12 000 | 0,11 | **NK 37/30** |
| | 52 | 22 | 36,9 | 54 | 6,55 | 10 000 | 12 000 | 0,12 | **NKS 37** |
| **38** | 48 | 20 | 25,5 | 49 | 6,1 | 11 000 | 12 000 | 0,079 | ▸ **NK 38/20** |
| | 48 | 30 | 37,4 | 80 | 10 | 11 000 | 12 000 | 0,12 | **NK 38/30** |
| **40** | 50 | 20 | 29,7 | 60 | 7,5 | 10 000 | 11 000 | 0,078 | ▸ **NK 40/20 TN** |
| | 50 | 30 | 38 | 83 | 10,4 | 10 000 | 11 000 | 0,13 | ▸ **NK 40/30** |
| | 52 | 20 | 30,8 | 51 | 6,3 | 10 000 | 11 000 | 0,089 | ▸ **RNA 49/32** |
| | 52 | 36 | 47,3 | 90 | 10,8 | 10 000 | 11 000 | 0,16 | ▸ **RNA 69/32** |
| | 55 | 22 | 38 | 57 | 7,1 | 9 500 | 11 000 | 0,13 | ▸ **NKS 40** |
| **42** | 52 | 20 | 27 | 53 | 6,55 | 9 500 | 11 000 | 0,086 | ▸ **NK 42/20** |
| | 52 | 30 | 39,1 | 86,5 | 10,8 | 9 500 | 11 000 | 0,13 | **NK 42/30** |
| | 55 | 20 | 27 | 43 | 5,3 | – | 4 800 | 0,11 | **RNA 4907.2RS** |
| | 55 | 20 | 31,9 | 54 | 6,7 | 9 500 | 11 000 | 0,11 | **RNA 4907** |
| | 55 | 36 | 48,4 | 93 | 11,4 | 9 500 | 11 000 | 0,19 | **RNA 6907** |
| **43** | 53 | 20 | 27,5 | 55 | 6,8 | 9 500 | 11 000 | 0,086 | **NK 43/20** |
| | 53 | 30 | 40,2 | 90 | 11,2 | 9 500 | 11 000 | 0,13 | **NK 43/30** |
| | 58 | 22 | 39,1 | 61 | 7,5 | 9 000 | 10 000 | 0,14 | **NKS 43** |

▸ Popular item

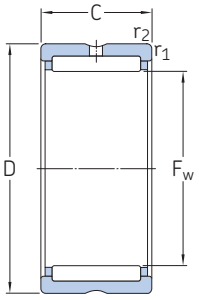



| Dimensions | | Abutment and fillet dimensions | | Associated radial shaft seals[1] | | |
|---|---|---|---|---|---|---|
| | | | | Single lip | Double lip | Spring loaded lip |
| $F_w$ | $r_{1,2}$ min. | $D_a$ max. | $r_a$ max. | | | |
| mm | | mm | | – | | |
| **30** | 0,3 | 38 | 0,3 | G 30x40x4 | SD 30x40x4 | – |
| | 0,3 | 38 | 0,3 | G 30x40x4 | SD 30x40x4 | – |
| | 0,3 | 40 | 0,3 | – | – | – |
| | 0,3 | 40 | 0,3 | – | – | 30x42x6 HMS5 RG |
| | 0,3 | 40 | 0,3 | – | – | 30x42x6 HMS5 RG |
| | 0,6 | 41 | 0,6 | – | – | 30x45x7 HMS5 RG |
| **32** | 0,3 | 40 | 0,3 | G 32x42x4 | SD 32x42x4 | – |
| | 0,3 | 40 | 0,3 | G 32x42x4 | SD 32x42x4 | – |
| | 0,3 | 43 | 0,3 | G 32x45x4 | – | – |
| | 0,3 | 43 | 0,3 | G 32x45x4 | – | – |
| | 0,6 | 43 | 0,6 | – | – | 32x47x6 HMS5 RG |
| **35** | 0,3 | 43 | 0,3 | G 35x45x4 | SD 35x45x4 | – |
| | 0,3 | 43 | 0,3 | G 35x45x4 | SD 35x45x4 | – |
| | 0,3 | 45 | 0,3 | – | – | – |
| | 0,3 | 45 | 0,3 | – | – | 35x47x6 HMS5 RG |
| | 0,3 | 45 | 0,3 | – | – | 35x47x6 HMS5 RG |
| | 0,6 | 46 | 0,6 | – | – | 35x50x7 HMS5 RG |
| **37** | 0,3 | 45 | 0,3 | G 37x47x4 | SD 37x47x4 | – |
| | 0,3 | 45 | 0,3 | G 37x47x4 | SD 37x47x4 | – |
| | 0,6 | 48 | 0,6 | – | – | 37x52x8 HMS4 R |
| **38** | 0,3 | 46 | 0,3 | G 38x48x4 | SD 38x48x4 | – |
| | 0,3 | 46 | 0,3 | G 38x48x4 | SD 38x48x4 | – |
| **40** | 0,3 | 48 | 0,3 | G 40x50x4 | SD 40x50x4 | – |
| | 0,3 | 48 | 0,3 | G 40x50x4 | SD 40x50x4 | – |
| | 0,6 | 48 | 0,6 | G 40x52x5 | SD 40x52x5 | – |
| | 0,6 | 48 | 0,6 | G 40x52x5 | SD 40x52x5 | – |
| | 0,6 | 51 | 0,6 | – | – | 40x55x7 HMS5 RG |
| **42** | 0,3 | 50 | 0,3 | G 42x52x4 | SD 42x52x4 | – |
| | 0,3 | 50 | 0,3 | G 42x52x4 | SD 42x52x4 | – |
| | 0,6 | 51 | 0,6 | – | – | – |
| | 0,6 | 51 | 0,6 | – | – | 42x55x7 HMS5 RG |
| | 0,6 | 51 | 0,6 | – | – | 42x55x7 HMS5 RG |
| **43** | 0,3 | 51 | 0,3 | G 43x53x4 | – | – |
| | 0,3 | 51 | 0,3 | G 43x53x4 | – | – |
| | 0,6 | 53 | 0,6 | – | – | – |

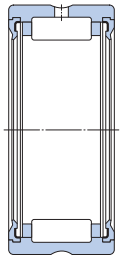
[1] For additional information → skf.com/seals

## 7.3 Needle roller bearings with machined rings with flanges, without an inner ring

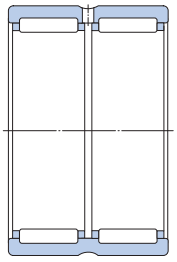
$F_w$ **45 – 70** mm




NK(S)
RNA 49



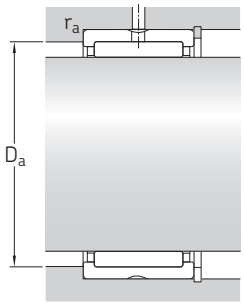
RNA 49 ...2RS

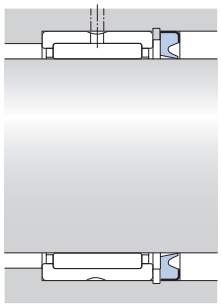


RNA 69

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| $F_w$ | D | C | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | kg | – |
| **45** | 55 | 20 | 31,4 | 65,5 | 8,3 | 9 000 | 10 000 | 0,085 | ▸ **NK 45/20 TN** |
| | 55 | 30 | 45,7 | 108 | 13,7 | 9 000 | 10 000 | 0,13 | ▸ **NK 45/30 TN** |
| | 60 | 22 | 40,2 | 64 | 8 | 8 500 | 10 000 | 0,15 | ▸ **NKS 45** |
| **47** | 57 | 20 | 29,2 | 61 | 7,65 | 8 500 | 10 000 | 0,095 | **NK 47/20** |
| | 57 | 30 | 41,8 | 98 | 12,5 | 8 500 | 10 000 | 0,14 | ▸ **NK 47/30** |
| **48** | 62 | 22 | 36,9 | 58,5 | 7,1 | – | 4 000 | 0,15 | **RNA 4908.2RS** |
| | 62 | 22 | 42,9 | 71 | 8,8 | 8 000 | 9 500 | 0,14 | ▸ **RNA 4908** |
| | 62 | 40 | 67,1 | 125 | 15,3 | 8 000 | 9 500 | 0,26 | ▸ **RNA 6908** |
| **50** | 62 | 25 | 42,9 | 91,5 | 11,2 | 8 000 | 9 000 | 0,15 | ▸ **NK 50/25 TN** |
| | 62 | 35 | 58,3 | 137 | 17 | 8 000 | 9 000 | 0,21 | ▸ **NK 50/35 TN** |
| | 65 | 22 | 42,9 | 72 | 8,8 | 8 000 | 9 000 | 0,16 | **NKS 50** |
| **52** | 68 | 22 | 39,1 | 64 | 7,8 | – | 3 800 | 0,16 | **RNA 4909.2RS** |
| | 68 | 22 | 45,7 | 78 | 9,65 | 7 500 | 8 500 | 0,18 | **RNA 4909** |
| | 68 | 40 | 70,4 | 137 | 17 | 7 500 | 8 500 | 0,34 | ▸ **RNA 6909** |
| **55** | 68 | 25 | 40,2 | 88 | 10,8 | 7 500 | 8 500 | 0,18 | ▸ **NK 55/25** |
| | 68 | 35 | 52,3 | 122 | 15,3 | 7 500 | 8 500 | 0,25 | **NK 55/35** |
| | 72 | 22 | 44,6 | 78 | 9,8 | 7 000 | 8 000 | 0,22 | ▸ **NKS 55** |
| **58** | 72 | 22 | 40,2 | 69,5 | 8,5 | – | 3 400 | 0,16 | ▸ **RNA 4910.2RS** |
| | 72 | 22 | 47,3 | 85 | 10,6 | 7 000 | 8 000 | 0,16 | ▸ **RNA 4910** |
| | 72 | 40 | 73,7 | 150 | 18,6 | 7 000 | 8 000 | 0,31 | ▸ **RNA 6910** |
| **60** | 72 | 25 | 46,8 | 110 | 13,4 | 6 700 | 7 500 | 0,17 | **NK 60/25 TN** |
| | 72 | 35 | 55 | 134 | 17 | 6 700 | 7 500 | 0,26 | ▸ **NK 60/35** |
| | 80 | 28 | 62,7 | 104 | 13,2 | 6 300 | 7 500 | 0,34 | ▸ **NKS 60** |
| **63** | 80 | 25 | 57,2 | 106 | 13,2 | 6 300 | 7 000 | 0,26 | ▸ **RNA 4911** |
| | 80 | 45 | 89,7 | 190 | 23,2 | 6 300 | 7 000 | 0,47 | ▸ **RNA 6911** |
| **65** | 78 | 25 | 44 | 104 | 12,7 | 6 300 | 7 000 | 0,22 | ▸ **NK 65/25** |
| | 78 | 35 | 58,3 | 146 | 18,3 | 6 300 | 7 000 | 0,31 | ▸ **NK 65/35** |
| | 85 | 28 | 66 | 114 | 14,6 | 6 000 | 6 700 | 0,36 | **NKS 65** |
| **68** | 82 | 25 | 44 | 95 | 11,8 | 6 000 | 6 700 | 0,24 | **NK 68/25** |
| | 82 | 35 | 60,5 | 146 | 18,3 | 6 000 | 6 700 | 0,34 | **NK 68/35** |
| | 85 | 25 | 60,5 | 114 | 14,3 | 6 000 | 6 700 | 0,28 | ▸ **RNA 4912** |
| | 85 | 45 | 93,5 | 204 | 25 | 6 000 | 6 700 | 0,49 | ▸ **RNA 6912** |
| **70** | 85 | 25 | 44,6 | 98 | 12,2 | 6 000 | 6 700 | 0,26 | ▸ **NK 70/25** |
| | 85 | 35 | 61,6 | 150 | 19 | 6 000 | 6 700 | 0,37 | ▸ **NK 70/35** |
| | 90 | 28 | 68,2 | 120 | 15,3 | 5 600 | 6 300 | 0,38 | ▸ **NKS 70** |

▸ Popular item



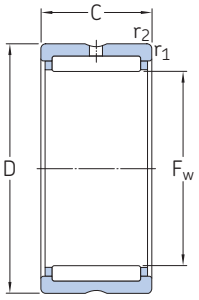



| Dimensions | | Abutment and fillet dimensions | | Associated radial shaft seals[1] | | |
|---|---|---|---|---|---|---|
| | | | | Single lip | Double lip | Spring loaded lip |
| $F_w$ | $r_{1,2}$ min. | $D_a$ max. | $r_a$ max. | | | |
| mm | | mm | | – | | |
| **45** | 0,3 | 53 | 0,3 | G 45x55x4 | SD 45x55x4 | – |
| | 0,3 | 53 | 0,3 | G 45x55x4 | SD 45x55x4 | – |
| | 0,6 | 56 | 0,6 | – | – | 45x60x7 HMS5 RG |
| **47** | 0,3 | 55 | 0,3 | – | – | – |
| | 0,3 | 55 | 0,3 | – | – | – |
| **48** | 0,6 | 58 | 0,6 | – | – | – |
| | 0,6 | 58 | 0,6 | – | – | 48x62x8 HMS5 RG |
| | 0,6 | 58 | 0,6 | – | – | 48x62x8 HMS5 RG |
| **50** | 0,6 | 58 | 0,6 | G 50x62x5 | SD 50x62x5 | – |
| | 0,6 | 58 | 0,6 | G 50x62x5 | SD 50x62x5 | – |
| | 1 | 60 | 1 | – | – | 50x65x8 HMS5 RG |
| **52** | 0,6 | 64 | 0,6 | – | – | – |
| | 0,6 | 64 | 0,6 | – | – | 52x68x8 HMS5 RG |
| | 0,6 | 64 | 0,6 | – | – | 52x68x8 HMS5 RG |
| **55** | 0,6 | 64 | 0,6 | – | – | 55x68x8 HMS5 RG |
| | 0,6 | 64 | 0,6 | – | – | 55x68x8 HMS5 RG |
| | 1 | 67 | 1 | – | – | 55x72x8 HMS5 RG |
| **58** | 0,6 | 68 | 0,6 | – | – | – |
| | 0,6 | 68 | 0,6 | – | – | 58x72x8 HMS5 RG |
| | 0,6 | 68 | 0,6 | – | – | 58x72x8 HMS5 RG |
| **60** | 0,6 | 68 | 0,6 | – | – | 60x72x8 HMS5 RG |
| | 0,6 | 68 | 0,6 | – | – | 60x72x8 HMS5 RG |
| | 1,1 | 73,5 | 1 | – | – | 60x80x8 HMS5 RG |
| **63** | 1 | 75 | 1 | – | – | 63x80x8 CRW1 R |
| | 1 | 75 | 1 | – | – | 63x80x8 CRW1 R |
| **65** | 0,6 | 74 | 0,6 | – | – | – |
| | 0,6 | 74 | 0,6 | – | – | – |
| | 1,1 | 78,5 | 1 | – | – | 65x85x8 HMS5 RG |
| **68** | 0,6 | 78 | 0,6 | – | – | – |
| | 0,6 | 78 | 0,6 | – | – | – |
| | 1 | 80 | 1 | – | – | – |
| | 1 | 80 | 1 | – | – | 68x85x8 CRW1 R |
| **70** | 0,6 | 81 | 0,6 | – | – | 70x85x8 HMS5 RG |
| | 0,6 | 81 | 0,6 | – | – | 70x85x8 HMS5 RG |
| | 1,1 | 83,5 | 1 | – | – | 70x90x10 HMS5 RG |

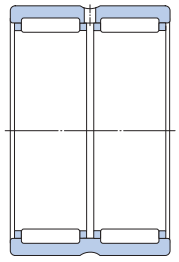
[1] For additional information → skf.com/seals

## 7.3 Needle roller bearings with machined rings with flanges, without an inner ring

$F_w$ **72 – 105** mm



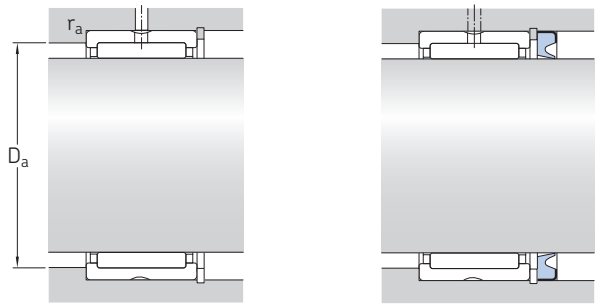

NK(S)
RNA 49



RNA 69

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| $F_w$ | D | C | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | kg | – |
| **72** | 90 | 25 | 61,6 | 120 | 14,6 | 5 600 | 6 300 | 0,31 | **RNA 4913** |
| | 90 | 45 | 95,2 | 212 | 26 | 5 600 | 6 300 | 0,58 | ▸ **RNA 6913** |
| **73** | 90 | 25 | 52,8 | 106 | 13,2 | 5 600 | 6 300 | 0,3 | **NK 73/25** |
| | 90 | 35 | 73,7 | 163 | 20,4 | 5 600 | 6 300 | 0,43 | **NK 73/35** |
| **75** | 92 | 25 | 53,9 | 110 | 13,7 | 5 300 | 6 000 | 0,32 | **NK 75/25** |
| | 92 | 35 | 74,8 | 170 | 21,2 | 5 300 | 6 000 | 0,45 | ▸ **NK 75/35** |
| | 95 | 28 | 70,4 | 132 | 16,6 | 5 300 | 6 000 | 0,4 | **NKS 75** |
| **80** | 95 | 25 | 56,1 | 127 | 15,6 | 5 000 | 5 600 | 0,3 | ▸ **NK 80/25** |
| | 95 | 35 | 76,5 | 190 | 24 | 5 000 | 5 600 | 0,43 | ▸ **NK 80/35** |
| | 100 | 30 | 84,2 | 163 | 20,8 | 5 000 | 5 600 | 0,46 | ▸ **RNA 4914** |
| | 100 | 54 | 128 | 285 | 36 | 5 000 | 5 600 | 0,86 | ▸ **RNA 6914** |
| **85** | 105 | 25 | 69,3 | 132 | 16,6 | 4 800 | 5 300 | 0,43 | ▸ **NK 85/25** |
| | 105 | 30 | 84,2 | 170 | 21,6 | 4 800 | 5 300 | 0,49 | **RNA 4915** |
| | 105 | 35 | 96,8 | 200 | 26 | 4 800 | 5 300 | 0,6 | ▸ **NK 85/35** |
| | 105 | 54 | 130 | 290 | 37,5 | 4 800 | 5 300 | 0,94 | **RNA 6915** |
| **90** | 110 | 25 | 72,1 | 140 | 18 | 4 500 | 5 000 | 0,45 | ▸ **NK 90/25** |
| | 110 | 30 | 88 | 183 | 23,2 | 4 500 | 5 000 | 0,52 | ▸ **RNA 4916** |
| | 110 | 35 | 101 | 216 | 28 | 4 500 | 5 000 | 0,63 | ▸ **NK 90/35** |
| | 110 | 54 | 134 | 315 | 40 | 4 500 | 5 000 | 0,99 | ▸ **RNA 6916** |
| **95** | 115 | 26 | 73,7 | 146 | 18,6 | 4 300 | 4 800 | 0,49 | **NK 95/26** |
| | 115 | 36 | 105 | 232 | 30 | 4 300 | 4 800 | 0,68 | **NK 95/36** |
| **100** | 120 | 26 | 76,5 | 156 | 19,6 | 4 000 | 4 500 | 0,52 | ▸ **NK 100/26** |
| | 120 | 35 | 108 | 250 | 31 | 4 000 | 4 500 | 0,66 | **RNA 4917** |
| | 120 | 36 | 108 | 250 | 31 | 4 000 | 4 500 | 0,72 | ▸ **NK 100/36** |
| | 120 | 63 | 165 | 425 | 53 | 4 000 | 4 500 | 1,2 | ▸ **RNA 6917** |
| **105** | 125 | 26 | 78,1 | 166 | 20,4 | 3 800 | 4 300 | 0,54 | **NK 105/26** |
| | 125 | 35 | 112 | 265 | 32,5 | 3 800 | 4 300 | 0,75 | **RNA 4918** |
| | 125 | 36 | 112 | 265 | 32,5 | 3 800 | 4 300 | 0,71 | **NK 105/36** |
| | 125 | 63 | 172 | 450 | 55 | 3 800 | 4 300 | 1,35 | **RNA 6918** |

▸ Popular item

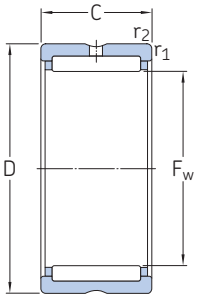



| Dimensions | | Abutment and fillet dimensions | | Associated radial shaft seals[1] | | |
|---|---|---|---|---|---|---|
| | | | | Single lip | Double lip | Spring loaded lip |
| $F_w$ | $r_{1,2}$ min. | $D_a$ max. | $r_a$ max. | | | |
| mm | | mm | | – | | |
| **72** | 1 | 85 | 1 | – | – | 72x90x10 HMS5 RG |
| | 1 | 85 | 1 | – | – | 72x90x10 HMS5 RG |
| **73** | 1 | 85 | 1 | – | – | – |
| | 1 | 85 | 1 | – | – | – |
| **75** | 1 | 87 | 1 | – | – | 73x92x11.1 CRWH1 R |
| | 1 | 87 | 1 | – | – | 73x92x11.1 CRWH1 R |
| | 1,1 | 88,5 | 1 | – | – | 75x95x10 HMS5 RG |
| **80** | 1 | 90 | 1 | – | – | 80x95x10 HMS5 RG |
| | 1 | 90 | 1 | – | – | 80x95x10 HMS5 RG |
| | 1 | 95 | 1 | – | – | 80x100x10 HMS5 RG |
| | 1 | 95 | 1 | – | – | 80x100x10 HMS5 RG |
| **85** | 1 | 100 | 1 | – | – | 85x105x12 HMS5 RG |
| | 1 | 100 | 1 | – | – | 85x105x12 HMS5 RG |
| | 1 | 100 | 1 | – | – | 85x105x12 HMS5 RG |
| | 1 | 100 | 1 | – | – | 85x105x12 HMS5 RG |
| **90** | 1 | 105 | 1 | – | – | 90x110x10 HMS5 RG |
| | 1 | 105 | 1 | – | – | 90x110x10 HMS5 RG |
| | 1 | 105 | 1 | – | – | 90x110x10 HMS5 RG |
| | 1 | 105 | 1 | – | – | 90x110x10 HMS5 RG |
| **95** | 1 | 110 | 1 | – | – | 95x115x12 HMS5 RG |
| | 1 | 110 | 1 | – | – | 95x115x12 HMS5 RG |
| **100** | 1 | 115 | 1 | – | – | 100x120x10 HMS5 RG |
| | 1,1 | 113,5 | 1 | – | – | 100x120x10 HMS5 RG |
| | 1 | 115 | 1 | – | – | 100x120x10 HMS5 RG |
| | 1,1 | 113,5 | 1 | – | – | 100x120x10 HMS5 RG |
| **105** | 1 | 120 | 1 | – | – | 105x125x13 HMS4 R |
| | 1,1 | 118,5 | 1 | – | – | 105x125x13 HMS4 R |
| | 1 | 120 | 1 | – | – | 105x125x13 HMS4 R |
| | 1,1 | 118,5 | 1 | – | – | 105x125x13 HMS4 R |

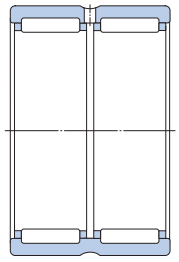
[1] For additional information → skf.com/seals

## 7.3 Needle roller bearings with machined rings with flanges, without an inner ring

$F_w$ **110 – 330** mm



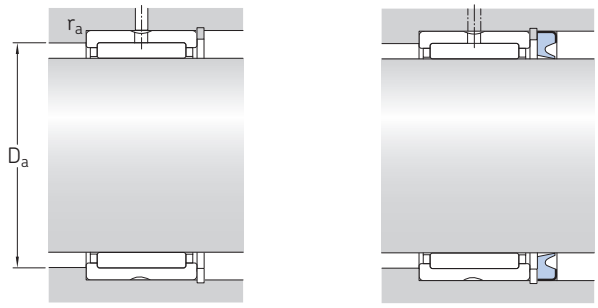

NK
RNA 48
RNA 49



RNA 69

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| $F_w$ | D | C | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | kg | – |
| **110** | 130 | 30 | 96,8 | 220 | 27 | 3 600 | 4 000 | 0,65 | ▸ **NK 110/30** |
| | 130 | 35 | 114 | 270 | 33,5 | 3 600 | 4 000 | 0,72 | **RNA 4919** |
| | 130 | 40 | 123 | 305 | 37,5 | 3 600 | 4 000 | 0,83 | ▸ **NK 110/40** |
| | 130 | 63 | 172 | 465 | 56 | 3 600 | 4 000 | 1,45 | ▸ **RNA 6919** |
| **115** | 140 | 40 | 125 | 280 | 34 | 3 400 | 4 000 | 1,15 | **RNA 4920** |
| **120** | 140 | 30 | 93,5 | 232 | 27 | 3 400 | 3 800 | 0,66 | ▸ **RNA 4822** |
| **125** | 150 | 40 | 130 | 300 | 35,5 | 3 200 | 3 600 | 1,25 | **RNA 4922** |
| **130** | 150 | 30 | 99 | 255 | 29 | 3 200 | 3 600 | 0,73 | ▸ **RNA 4824** |
| **135** | 165 | 45 | 176 | 405 | 49 | 3 000 | 3 400 | 1,85 | ▸ **RNA 4924** |
| **145** | 165 | 35 | 119 | 325 | 36,5 | 2 800 | 3 200 | 0,99 | **RNA 4826** |
| **150** | 180 | 50 | 198 | 480 | 57 | 2 600 | 3 000 | 2,2 | **RNA 4926** |
| **155** | 175 | 35 | 121 | 345 | 37,5 | 2 600 | 3 000 | 0,97 | ▸ **RNA 4828** |
| **160** | 190 | 50 | 205 | 510 | 60 | 2 400 | 2 800 | 2,35 | **RNA 4928** |
| **165** | 190 | 40 | 147 | 415 | 46,5 | 2 400 | 2 800 | 1,6 | **RNA 4830** |
| **175** | 200 | 40 | 157 | 450 | 49 | 2 200 | 2 600 | 1,7 | ▸ **RNA 4832** |
| **185** | 215 | 45 | 179 | 520 | 56 | 2 200 | 2 400 | 2,55 | **RNA 4834** |
| **195** | 225 | 45 | 190 | 570 | 60 | 2 000 | 2 400 | 2,7 | **RNA 4836** |
| **210** | 240 | 50 | 220 | 710 | 73,5 | 1 900 | 2 200 | 3,2 | ▸ **RNA 4838** |
| **220** | 250 | 50 | 224 | 735 | 75 | 1 800 | 2 000 | 3,35 | **RNA 4840** |
| **240** | 270 | 50 | 238 | 815 | 81,5 | 1 700 | 1 900 | 3,6 | ▸ **RNA 4844** |
| **265** | 300 | 60 | 347 | 1 120 | 112 | 1 500 | 1 700 | 5,4 | **RNA 4848** |
| **285** | 320 | 60 | 358 | 1 200 | 118 | 1 400 | 1 500 | 5,8 | **RNA 4852** |
| **305** | 350 | 69 | 429 | 1 320 | 129 | 1 300 | 1 400 | 9,3 | **RNA 4856** |
| **330** | 380 | 80 | 594 | 1 800 | 173 | 1 100 | 1 300 | 12,5 | **RNA 4860** |

▸ Popular item

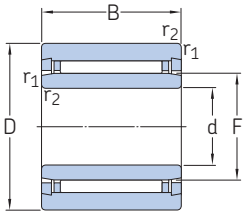



| Dimensions | | Abutment and fillet dimensions | | Associated radial shaft seals[1] | | |
|---|---|---|---|---|---|---|
| | | | | Single lip | Double lip | Spring loaded lip |
| $F_w$ | $r_{1,2}$ min. | $D_a$ max. | $r_a$ max. | | | |
| mm | | mm | | – | | |
| **110** | 1,1 | 123,5 | 1 | – | – | 110x130x12 HMS5 RG |
| | 1,1 | 123,5 | 1 | – | – | 110x130x12 HMS5 RG |
| | 1,1 | 123,5 | 1 | – | – | 110x130x12 HMS5 RG |
| | 1,1 | 123,5 | 1 | – | – | 110x130x12 HMS5 RG |
| **115** | 1,1 | 133,5 | 1 | – | – | 115x140x12 HMS5 RG |
| **120** | 1 | 135 | 1 | – | – | 120x140x12 HMS5 RG |
| **125** | 1,1 | 143,5 | 1 | – | – | 125x150x12 HMS5 RG |
| **130** | 1 | 145 | 1 | – | – | 130x150x10 CRSA1 R |
| **135** | 1,1 | 158,5 | 1 | – | – | 135x165x14 HMSA7 R |
| **145** | 1,1 | 158,5 | 1 | – | – | – |
| **150** | 1,5 | 172 | 1,5 | – | – | 150x180x12 HMS5 RG |
| **155** | 1,1 | 168,5 | 1 | – | – | – |
| **160** | 1,5 | 182 | 1,5 | – | – | 160x190x15 HMS5 RG |
| **165** | 1,1 | 183,5 | 1 | – | – | 165x190x15 HMS5 RG |
| **175** | 1,1 | 193,5 | 1 | – | – | 175x200x15 HMS5 RG |
| **185** | 1,1 | 208,5 | 1 | – | – | 185x215x15 HMS42 R |
| **195** | 1,1 | 218,5 | 1 | – | – | – |
| **210** | 1,5 | 232 | 1,5 | – | – | 210x240x15 HMS5 RG |
| **220** | 1,5 | 242 | 1,5 | – | – | 220x250x15 HMS5 RG |
| **240** | 1,5 | 262 | 1,5 | – | – | 240x270x15 HMS5 RG |
| **265** | 2 | 291 | 2 | – | – | Available on request |
| **285** | 2 | 311 | 2 | – | – | 285x320x16 HDS2 R |
| **305** | 2 | 341 | 2 | – | – | Available on request |
| **330** | 2,1 | 369 | 2 | – | – | Available on request |

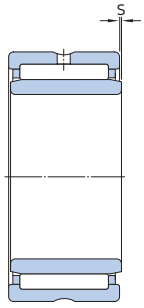
[1] For additional information → skf.com/seals

## 7.4 Needle roller bearings with machined rings with flanges, with an inner ring

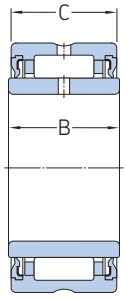
d **5 – 17** mm




NKI (d ≤ 7 mm)



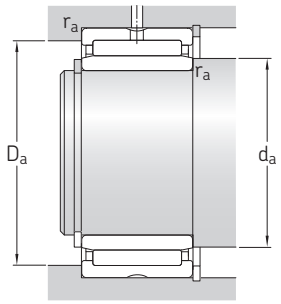

NKI(S) (d ≥ 9 mm)
NA 49
NA 69




NA 49 ...2RS

| Principal dimensions | | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | C | $C_0$ | $P_u$ | | | | |
| mm | | | | kN | | kN | r/min | | kg | – |
| **5** | 15 | 12 | – | 3,8 | 4,25 | 0,465 | 32 000 | 36 000 | 0,012 | ▸ **NKI 5/12 TN** |
| | 15 | 16 | – | 5,01 | 5,85 | 0,67 | 32 000 | 36 000 | 0,015 | **NKI 5/16 TN** |
| **6** | 16 | 12 | – | 4,4 | 5,2 | 0,57 | 30 000 | 34 000 | 0,014 | ▸ **NKI 6/12 TN** |
| | 16 | 16 | – | 5,72 | 7,2 | 0,815 | 30 000 | 34 000 | 0,017 | ▸ **NKI 6/16 TN** |
| **7** | 17 | 12 | – | 4,57 | 5,7 | 0,63 | 28 000 | 32 000 | 0,014 | **NKI 7/12 TN** |
| | 17 | 16 | – | 5,94 | 8 | 0,9 | 28 000 | 32 000 | 0,018 | **NKI 7/16 TN** |
| **9** | 19 | 12 | – | 6,71 | 8,15 | 0,965 | 26 000 | 30 000 | 0,017 | ▸ **NKI 9/12** |
| | 19 | 16 | – | 9,13 | 12 | 1,43 | 26 000 | 30 000 | 0,022 | ▸ **NKI 9/16** |
| **10** | 22 | 13 | – | 8,8 | 10,4 | 1,22 | 24 000 | 28 000 | 0,024 | ▸ **NA 4900** |
| | 22 | 14 | 13 | 7,37 | 8,15 | 0,965 | – | 12 000 | 0,025 | ▸ **NA 4900.2RS** |
| | 22 | 16 | – | 10,2 | 12,5 | 1,5 | 24 000 | 28 000 | 0,029 | ▸ **NKI 10/16** |
| | 22 | 20 | – | 12,8 | 16,6 | 2 | 24 000 | 28 000 | 0,037 | ▸ **NKI 10/20** |
| **12** | 24 | 13 | – | 9,9 | 12,2 | 1,46 | 22 000 | 26 000 | 0,026 | ▸ **NA 4901** |
| | 24 | 14 | 13 | 8,09 | 9,65 | 1,14 | – | 11 000 | 0,028 | ▸ **NA 4901.2RS** |
| | 24 | 16 | – | 11,7 | 15,3 | 1,8 | 22 000 | 26 000 | 0,033 | ▸ **NKI 12/16** |
| | 24 | 20 | – | 14,5 | 20 | 2,4 | 22 000 | 26 000 | 0,042 | ▸ **NKI 12/20** |
| | 24 | 22 | – | 16,1 | 23,2 | 2,75 | 22 000 | 26 000 | 0,046 | ▸ **NA 6901** |
| **15** | 27 | 16 | – | 13,4 | 19 | 2,28 | 20 000 | 24 000 | 0,039 | ▸ **NKI 15/16** |
| | 27 | 20 | – | 16,5 | 25,5 | 3,05 | 20 000 | 24 000 | 0,049 | ▸ **NKI 15/20** |
| | 28 | 13 | – | 11,2 | 15,3 | 1,83 | 19 000 | 22 000 | 0,034 | ▸ **NA 4902** |
| | 28 | 14 | 13 | 9,13 | 12 | 1,43 | – | 9 500 | 0,037 | ▸ **NA 4902.2RS** |
| | 28 | 23 | – | 17,2 | 27 | 3,35 | 19 000 | 22 000 | 0,064 | ▸ **NA 6902** |
| | 35 | 20 | – | 24,6 | 30 | 3,65 | 16 000 | 19 000 | 0,092 | **NKIS 15** |
| **17** | 29 | 16 | – | 13,8 | 20,4 | 2,45 | 19 000 | 22 000 | 0,042 | ▸ **NKI 17/16** |
| | 29 | 20 | – | 17,2 | 27 | 3,35 | 19 000 | 22 000 | 0,053 | ▸ **NKI 17/20** |
| | 30 | 13 | – | 11,4 | 16,3 | 1,96 | 18 000 | 20 000 | 0,038 | ▸ **NA 4903** |
| | 30 | 14 | 13 | 9,52 | 12,9 | 1,53 | – | 9 000 | 0,04 | ▸ **NA 4903.2RS** |
| | 30 | 23 | – | 18,7 | 30,5 | 3,75 | 18 000 | 20 000 | 0,072 | ▸ **NA 6903** |
| | 37 | 20 | – | 26 | 33,5 | 4 | 15 000 | 17 000 | 0,098 | ▸ **NKIS 17** |

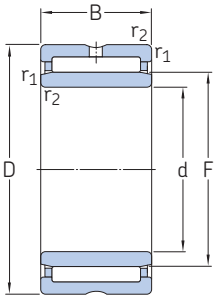
▸ Popular item



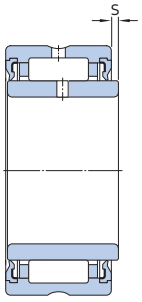

| Dimensions | | | | Abutment and fillet dimensions | | |
|---|---|---|---|---|---|---|
| d | F | $r_{1,2}$ min. | s max. | $d_a$ min. | $D_a$ max. | $r_a$ max. |
| mm | | | | mm | | |
| **5** | 8 | 0,3 | 1,5 | 7 | 13 | 0,3 |
| | 8 | 0,3 | 2 | 7 | 13 | 0,3 |
| **6** | 9 | 0,3 | 1,5 | 8 | 14 | 0,3 |
| | 9 | 0,3 | 2 | 8 | 14 | 0,3 |
| **7** | 10 | 0,3 | 1,5 | 9 | 15 | 0,3 |
| | 10 | 0,3 | 2 | 9 | 15 | 0,3 |
| **9** | 12 | 0,3 | 1,5 | 11 | 17 | 0,3 |
| | 12 | 0,3 | 2 | 11 | 17 | 0,3 |
| **10** | 14 | 0,3 | 0,5 | 12 | 20 | 0,3 |
| | 14 | 0,3 | 0,5 | 12 | 20 | 0,3 |
| | 14 | 0,3 | 0,5 | 12 | 20 | 0,3 |
| | 14 | 0,3 | 0,5 | 12 | 20 | 0,3 |
| **12** | 16 | 0,3 | 0,5 | 14 | 22 | 0,3 |
| | 16 | 0,3 | 0,5 | 14 | 22 | 0,3 |
| | 16 | 0,3 | 0,5 | 14 | 22 | 0,3 |
| | 16 | 0,3 | 0,5 | 14 | 22 | 0,3 |
| | 16 | 0,3 | 1 | 14 | 22 | 0,3 |
| **15** | 19 | 0,3 | 0,5 | 17 | 25 | 0,3 |
| | 19 | 0,3 | 0,5 | 17 | 25 | 0,3 |
| | 20 | 0,3 | 0,5 | 17 | 26 | 0,3 |
| | 20 | 0,3 | 0,5 | 17 | 26 | 0,3 |
| | 20 | 0,3 | 1 | 17 | 26 | 0,3 |
| | 22 | 0,6 | 0,5 | 19 | 31 | 0,6 |
| **17** | 21 | 0,3 | 0,5 | 19 | 27 | 0,3 |
| | 21 | 0,3 | 0,5 | 19 | 27 | 0,3 |
| | 22 | 0,3 | 0,5 | 19 | 28 | 0,3 |
| | 22 | 0,3 | 0,5 | 19 | 28 | 0,3 |
| | 22 | 0,3 | 1 | 19 | 28 | 0,3 |
| | 24 | 0,6 | 0,5 | 21 | 33 | 0,6 |

## 7.4 Needle roller bearings with machined rings with flanges, with an inner ring

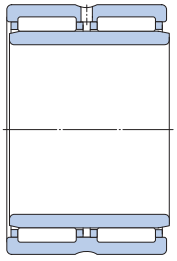
d **20 – 32** mm




NKI(S)
NA 49
NA 69 (d ≤ 30 mm)



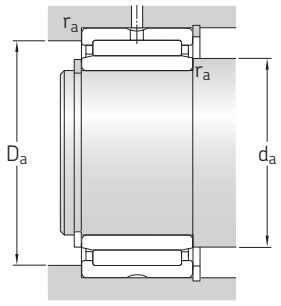

NA 49 ...2RS



NA 69 (d ≥ 32 mm)

| Principal dimensions | | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | C | $C_0$ | $P_u$ | | | | |
| mm | | | | kN | | kN | r/min | | kg | – |
| **20** | 32 | 16 | – | 15,4 | 24,5 | 2,9 | 16 000 | 19 000 | 0,048 | ▸ **NKI 20/16** |
| | 32 | 20 | – | 19 | 32,5 | 4 | 16 000 | 19 000 | 0,06 | ▸ **NKI 20/20** |
| | 37 | 17 | – | 21,6 | 28 | 3,35 | 15 000 | 17 000 | 0,075 | ▸ **NA 4904** |
| | 37 | 18 | 17 | 19,4 | 22,4 | 2,65 | – | 7 500 | 0,08 | ▸ **NA 4904.2RS** |
| | 37 | 30 | – | 35,2 | 53 | 6,55 | 15 000 | 17 000 | 0,14 | ▸ **NA 6904** |
| | 42 | 20 | – | 28,6 | 39 | 4,75 | 13 000 | 15 000 | 0,13 | **NKIS 20** |
| **22** | 34 | 16 | – | 15,7 | 26 | 3,1 | 15 000 | 17 000 | 0,052 | ▸ **NKI 22/16** |
| | 34 | 20 | – | 19,4 | 34,5 | 4,25 | 15 000 | 17 000 | 0,065 | ▸ **NKI 22/20** |
| | 39 | 17 | – | 23,3 | 32 | 3,9 | 14 000 | 15 000 | 0,08 | ▸ **NA 49/22** |
| | 39 | 30 | – | 36,9 | 57 | 7,2 | 14 000 | 15 000 | 0,15 | ▸ **NA 69/22** |
| **25** | 38 | 20 | – | 24,6 | 42,5 | 5,2 | 14 000 | 15 000 | 0,08 | ▸ **NKI 25/20 TN** |
| | 38 | 30 | – | 31,9 | 60 | 7,5 | 14 000 | 15 000 | 0,12 | ▸ **NKI 25/30** |
| | 42 | 17 | – | 24,2 | 34,5 | 4,15 | 13 000 | 15 000 | 0,088 | ▸ **NA 4905** |
| | 42 | 18 | 17 | 21,6 | 27,5 | 3,25 | – | 6 300 | 0,09 | ▸ **NA 4905.2RS** |
| | 42 | 30 | – | 38 | 62 | 7,65 | 13 000 | 15 000 | 0,16 | ▸ **NA 6905** |
| | 47 | 22 | – | 34,1 | 46,5 | 5,7 | 12 000 | 13 000 | 0,16 | **NKIS 25** |
| **28** | 42 | 20 | – | 26,4 | 48 | 6 | 12 000 | 14 000 | 0,092 | ▸ **NKI 28/20 TN** |
| | 42 | 30 | – | 34,1 | 65,5 | 8,3 | 12 000 | 14 000 | 0,14 | ▸ **NKI 28/30** |
| | 45 | 17 | – | 25,1 | 36,5 | 4,4 | 12 000 | 14 000 | 0,098 | ▸ **NA 49/28** |
| | 45 | 30 | – | 39,6 | 65,5 | 8,3 | 12 000 | 14 000 | 0,18 | **NA 69/28** |
| **30** | 45 | 20 | – | 27,5 | 52 | 6,55 | 11 000 | 13 000 | 0,11 | ▸ **NKI 30/20 TN** |
| | 45 | 30 | – | 40,2 | 85 | 10,6 | 11 000 | 13 000 | 0,17 | ▸ **NKI 30/30 TN** |
| | 47 | 17 | – | 25,5 | 39 | 4,65 | 11 000 | 13 000 | 0,1 | ▸ **NA 4906** |
| | 47 | 18 | 17 | 23,3 | 32 | 3,8 | – | 5 600 | 0,1 | ▸ **NA 4906.2RS** |
| | 47 | 30 | – | 42,9 | 75 | 9,3 | 11 000 | 13 000 | 0,19 | ▸ **NA 6906** |
| | 52 | 22 | – | 36,9 | 54 | 6,55 | 10 000 | 12 000 | 0,18 | ▸ **NKIS 30** |
| **32** | 47 | 20 | – | 25,1 | 46,5 | 5,85 | 11 000 | 12 000 | 0,11 | ▸ **NKI 32/20** |
| | 47 | 30 | – | 36,9 | 76,5 | 9,5 | 11 000 | 12 000 | 0,17 | ▸ **NKI 32/30** |
| | 52 | 20 | – | 30,8 | 51 | 6,3 | 10 000 | 11 000 | 0,16 | ▸ **NA 49/32** |
| | 52 | 36 | – | 47,3 | 90 | 10,8 | 10 000 | 11 000 | 0,29 | ▸ **NA 69/32** |

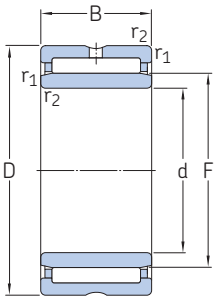
▸ Popular item



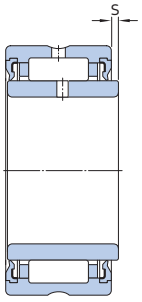

| Dimensions | | | | Abutment and fillet dimensions | | |
|---|---|---|---|---|---|---|
| d | F | $r_{1,2}$ min. | s max. | $d_a$ min. | $D_a$ max. | $r_a$ max. |
| mm | | | | mm | | |
| **20** | 24 | 0,3 | 0,5 | 22 | 30 | 0,3 |
| | 24 | 0,3 | 0,5 | 22 | 30 | 0,3 |
| | 25 | 0,3 | 0,8 | 22 | 35 | 0,3 |
| | 25 | 0,3 | 0,5 | 22 | 35 | 0,3 |
| | 25 | 0,3 | 1 | 22 | 35 | 0,3 |
| | 28 | 0,6 | 0,5 | 24 | 38 | 0,6 |
| **22** | 26 | 0,3 | 0,5 | 24 | 32 | 0,3 |
| | 26 | 0,3 | 0,5 | 24 | 32 | 0,3 |
| | 28 | 0,3 | 0,8 | 24 | 37 | 0,3 |
| | 28 | 0,3 | 0,5 | 24 | 37 | 0,3 |
| **25** | 29 | 0,3 | 1 | 27 | 36 | 0,3 |
| | 29 | 0,3 | 1,5 | 27 | 36 | 0,3 |
| | 30 | 0,3 | 0,8 | 27 | 40 | 0,3 |
| | 30 | 0,3 | 0,5 | 27 | 40 | 0,3 |
| | 30 | 0,3 | 1 | 27 | 40 | 0,3 |
| | 32 | 0,6 | 1 | 29 | 43 | 0,6 |
| **28** | 32 | 0,3 | 1 | 30 | 40 | 0,3 |
| | 32 | 0,3 | 1,5 | 30 | 40 | 0,3 |
| | 32 | 0,3 | 0,8 | 30 | 43 | 0,3 |
| | 32 | 0,3 | 1 | 30 | 43 | 0,3 |
| **30** | 35 | 0,3 | 0,5 | 32 | 43 | 0,3 |
| | 35 | 0,3 | 1 | 32 | 43 | 0,3 |
| | 35 | 0,3 | 0,8 | 32 | 45 | 0,3 |
| | 35 | 0,3 | 0,5 | 32 | 45 | 0,3 |
| | 35 | 0,3 | 1 | 32 | 45 | 0,3 |
| | 37 | 0,6 | 1 | 34 | 48 | 0,6 |
| **32** | 37 | 0,3 | 0,5 | 34 | 45 | 0,3 |
| | 37 | 0,3 | 1 | 34 | 45 | 0,3 |
| | 40 | 0,6 | 0,8 | 36 | 48 | 0,6 |
| | 40 | 0,6 | 0,5 | 36 | 48 | 0,6 |

## 7.4 Needle roller bearings with machined rings with flanges, with an inner ring

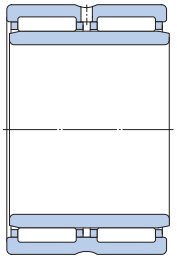
d **35 – 55** mm




NKI(S)
NA 49



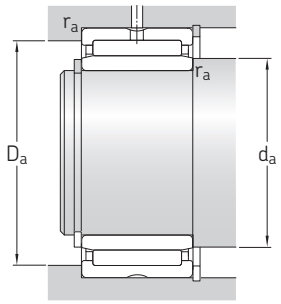

NA 49 ...2RS



NA 69

| Principal dimensions | | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | C | $C_0$ | $P_u$ | | | | |
| mm | | | | kN | | kN | r/min | | kg | – |
| **35** | 50 | 20 | – | 29,7 | 60 | 7,5 | 10 000 | 11 000 | 0,12 | ▸ **NKI 35/20 TN** |
| | 50 | 30 | – | 38 | 83 | 10,4 | 10 000 | 11 000 | 0,19 | ▸ **NKI 35/30** |
| | 55 | 20 | – | 31,9 | 54 | 6,7 | 9 500 | 11 000 | 0,17 | ▸ **NA 4907** |
| | 55 | 21 | 20 | 27 | 43 | 5,3 | – | 4 800 | 0,18 | ▸ **NA 4907.2RS** |
| | 55 | 36 | – | 48,4 | 93 | 11,4 | 9 500 | 11 000 | 0,31 | ▸ **NA 6907** |
| | 58 | 22 | – | 39,1 | 61 | 7,5 | 9 000 | 10 000 | 0,22 | **NKIS 35** |
| **38** | 53 | 20 | – | 27,5 | 55 | 6,8 | 9 500 | 11 000 | 0,13 | **NKI 38/20** |
| | 53 | 30 | – | 40,2 | 90 | 11,2 | 9 500 | 11 000 | 0,21 | ▸ **NKI 38/30** |
| **40** | 55 | 20 | – | 31,4 | 65,5 | 8,3 | 9 000 | 10 000 | 0,14 | ▸ **NKI 40/20 TN** |
| | 55 | 30 | – | 45,7 | 108 | 13,7 | 9 000 | 10 000 | 0,22 | ▸ **NKI 40/30 TN** |
| | 62 | 22 | – | 42,9 | 71 | 8,8 | 8 000 | 9 500 | 0,23 | ▸ **NA 4908** |
| | 62 | 23 | 22 | 36,9 | 58,5 | 7,1 | – | 4 000 | 0,25 | ▸ **NA 4908.2RS** |
| | 62 | 40 | – | 67,1 | 125 | 15,3 | 8 000 | 9 500 | 0,43 | ▸ **NA 6908** |
| | 65 | 22 | – | 42,9 | 72 | 8,8 | 8 000 | 9 000 | 0,28 | **NKIS 40** |
| **42** | 57 | 20 | – | 29,2 | 61 | 7,65 | 8 500 | 10 000 | 0,14 | **NKI 42/20** |
| | 57 | 30 | – | 41,8 | 98 | 12,5 | 8 500 | 10 000 | 0,22 | **NKI 42/30** |
| **45** | 62 | 25 | – | 42,9 | 91,5 | 11,2 | 8 000 | 9 000 | 0,22 | ▸ **NKI 45/25 TN** |
| | 62 | 35 | – | 58,3 | 137 | 17 | 8 000 | 9 000 | 0,31 | ▸ **NKI 45/35 TN** |
| | 68 | 22 | – | 45,7 | 78 | 9,65 | 7 500 | 8 500 | 0,27 | ▸ **NA 4909** |
| | 68 | 23 | 22 | 39,1 | 64 | 7,8 | – | 3 800 | 0,29 | ▸ **NA 4909.2RS** |
| | 68 | 40 | – | 70,4 | 137 | 17 | 7 500 | 8 500 | 0,5 | ▸ **NA 6909** |
| | 72 | 22 | – | 44,6 | 78 | 9,8 | 7 000 | 8 000 | 0,34 | ▸ **NKIS 45** |
| **50** | 68 | 25 | – | 40,2 | 88 | 10,8 | 7 500 | 8 500 | 0,26 | ▸ **NKI 50/25** |
| | 68 | 35 | – | 52,3 | 122 | 15,3 | 7 500 | 8 500 | 0,36 | ▸ **NKI 50/35** |
| | 72 | 22 | – | 47,3 | 85 | 10,6 | 7 000 | 8 000 | 0,27 | ▸ **NA 4910** |
| | 72 | 23 | 22 | 40,2 | 69,5 | 8,5 | – | 3 400 | 0,3 | ▸ **NA 4910.2RS** |
| | 72 | 40 | – | 73,7 | 150 | 18,6 | 7 000 | 8 000 | 0,52 | ▸ **NA 6910** |
| | 80 | 28 | – | 62,7 | 104 | 13,2 | 6 300 | 7 500 | 0,52 | ▸ **NKIS 50** |
| **55** | 72 | 25 | – | 46,8 | 110 | 13,4 | 6 700 | 7 500 | 0,26 | ▸ **NKI 55/25 TN** |
| | 72 | 35 | – | 55 | 134 | 17 | 6 700 | 7 500 | 0,36 | ▸ **NKI 55/35** |
| | 80 | 25 | – | 57,2 | 106 | 13,2 | 6 300 | 7 000 | 0,39 | ▸ **NA 4911** |
| | 80 | 45 | – | 89,7 | 190 | 23,2 | 6 300 | 7 000 | 0,78 | ▸ **NA 6911** |
| | 85 | 28 | – | 66 | 114 | 14,6 | 6 000 | 6 700 | 0,56 | **NKIS 55** |

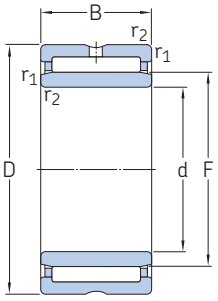
▸ Popular item



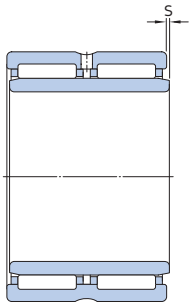

| Dimensions | | | | Abutment and fillet dimensions | | |
|---|---|---|---|---|---|---|
| d | F | $r_{1,2}$ min. | s max. | $d_a$ min. | $D_a$ max. | $r_a$ max. |
| mm | | | | mm | | |
| **35** | 40 | 0,3 | 0,5 | 37 | 48 | 0,3 |
| | 40 | 0,3 | 1 | 37 | 48 | 0,3 |
| | 42 | 0,6 | 0,8 | 39 | 51 | 0,6 |
| | 42 | 0,6 | 0,5 | 39 | 51 | 0,6 |
| | 42 | 0,6 | 0,5 | 39 | 51 | 0,6 |
| | 43 | 0,6 | 0,5 | 39 | 53 | 0,6 |
| **38** | 43 | 0,3 | 0,5 | 40 | 51 | 0,3 |
| | 43 | 0,3 | 1 | 40 | 51 | 0,3 |
| **40** | 45 | 0,3 | 0,5 | 42 | 53 | 0,3 |
| | 45 | 0,3 | 1 | 42 | 53 | 0,3 |
| | 48 | 0,6 | 1 | 44 | 58 | 0,6 |
| | 48 | 0,6 | 0,5 | 44 | 58 | 0,6 |
| | 48 | 0,6 | 0,5 | 44 | 58 | 0,6 |
| | 50 | 1 | 0,5 | 45 | 60 | 1 |
| **42** | 47 | 0,3 | 0,5 | 44 | 55 | 0,3 |
| | 47 | 0,3 | 1 | 44 | 55 | 0,3 |
| **45** | 50 | 0,6 | 1,5 | 49 | 58 | 0,6 |
| | 50 | 0,6 | 2 | 49 | 58 | 0,6 |
| | 52 | 0,6 | 1 | 49 | 64 | 0,6 |
| | 52 | 0,6 | 0,5 | 49 | 64 | 0,6 |
| | 52 | 0,6 | 0,5 | 49 | 64 | 0,6 |
| | 55 | 1 | 0,5 | 50 | 67 | 1 |
| **50** | 55 | 0,6 | 1,5 | 54 | 64 | 0,6 |
| | 55 | 0,6 | 2 | 54 | 64 | 0,6 |
| | 58 | 0,6 | 1 | 54 | 68 | 0,6 |
| | 58 | 0,6 | 0,5 | 54 | 68 | 0,6 |
| | 58 | 0,6 | 0,5 | 54 | 68 | 0,6 |
| | 60 | 1,1 | 2 | 56,5 | 73,5 | 1 |
| **55** | 60 | 0,6 | 1,5 | 59 | 68 | 0,6 |
| | 60 | 0,6 | 2 | 59 | 68 | 0,6 |
| | 63 | 1 | 1,5 | 60 | 75 | 1 |
| | 63 | 1 | 1,5 | 60 | 75 | 1 |
| | 65 | 1,1 | 2 | 61,5 | 78,5 | 1 |

## 7.4 Needle roller bearings with machined rings with flanges, with an inner ring

d **60 – 90** mm



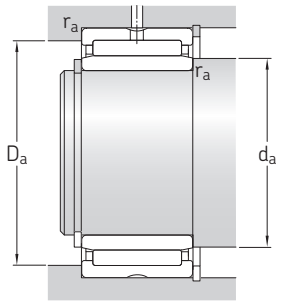

NKI(S)
NA 49




NA 69

| Principal dimensions | | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | C | $C_0$ | $P_u$ | | | | |
| mm | | | | kN | | kN | r/min | | kg | – |
| **60** | 82 | 25 | – | 44 | 95 | 11,8 | 6 000 | 6 700 | 0,39 | ▸ **NKI 60/25** |
| | 82 | 35 | – | 60,5 | 146 | 18,3 | 6 000 | 6 700 | 0,55 | ▸ **NKI 60/35** |
| | 85 | 25 | – | 60,5 | 114 | 14,3 | 6 000 | 6 700 | 0,43 | ▸ **NA 4912** |
| | 85 | 45 | – | 93,5 | 204 | 25 | 6 000 | 6 700 | 0,81 | ▸ **NA 6912** |
| | 90 | 28 | – | 68,2 | 120 | 15,3 | 5 600 | 6 300 | 0,56 | ▸ **NKIS 60** |
| **65** | 90 | 25 | – | 52,8 | 106 | 13,2 | 5 600 | 6 300 | 0,46 | **NKI 65/25** |
| | 90 | 25 | – | 61,6 | 120 | 14,6 | 5 600 | 6 300 | 0,46 | ▸ **NA 4913** |
| | 90 | 35 | – | 73,7 | 163 | 20,4 | 5 600 | 6 300 | 0,66 | ▸ **NKI 65/35** |
| | 90 | 45 | – | 95,2 | 212 | 26 | 5 600 | 6 300 | 0,83 | ▸ **NA 6913** |
| | 95 | 28 | – | 70,4 | 132 | 16,6 | 5 300 | 6 000 | 0,64 | ▸ **NKIS 65** |
| **70** | 95 | 25 | – | 56,1 | 127 | 15,6 | 5 000 | 5 600 | 0,51 | **NKI 70/25** |
| | 95 | 35 | – | 76,5 | 190 | 24 | 5 000 | 5 600 | 0,72 | ▸ **NKI 70/35** |
| | 100 | 30 | – | 84,2 | 163 | 20,8 | 5 000 | 5 600 | 0,73 | ▸ **NA 4914** |
| | 100 | 54 | – | 128 | 285 | 36 | 5 000 | 5 600 | 1,35 | ▸ **NA 6914** |
| **75** | 105 | 25 | – | 69,3 | 132 | 16,6 | 4 800 | 5 300 | 0,64 | ▸ **NKI 75/25** |
| | 105 | 30 | – | 84,2 | 170 | 21,6 | 4 800 | 5 300 | 0,78 | ▸ **NA 4915** |
| | 105 | 35 | – | 96,8 | 200 | 26 | 4 800 | 5 300 | 0,91 | ▸ **NKI 75/35** |
| | 105 | 54 | – | 130 | 290 | 37,5 | 4 800 | 5 300 | 1,45 | ▸ **NA 6915** |
| **80** | 110 | 25 | – | 72,1 | 140 | 18 | 4 500 | 5 000 | 0,68 | ▸ **NKI 80/25** |
| | 110 | 30 | – | 88 | 183 | 23,2 | 4 500 | 5 000 | 0,88 | ▸ **NA 4916** |
| | 110 | 35 | – | 101 | 216 | 28 | 4 500 | 5 000 | 0,96 | ▸ **NKI 80/35** |
| | 110 | 54 | – | 134 | 315 | 40 | 4 500 | 5 000 | 1,5 | ▸ **NA 6916** |
| **85** | 115 | 26 | – | 73,7 | 146 | 18,6 | 4 300 | 4 800 | 0,74 | ▸ **NKI 85/26** |
| | 115 | 36 | – | 105 | 232 | 30 | 4 300 | 4 800 | 1,05 | ▸ **NKI 85/36** |
| | 120 | 35 | – | 108 | 250 | 31 | 4 000 | 4 500 | 1,25 | ▸ **NA 4917** |
| | 120 | 63 | – | 165 | 425 | 53 | 4 000 | 4 500 | 2,2 | ▸ **NA 6917** |
| **90** | 120 | 26 | – | 76,5 | 156 | 19,6 | 4 000 | 4 500 | 0,78 | ▸ **NKI 90/26** |
| | 120 | 36 | – | 108 | 250 | 31 | 4 000 | 4 500 | 1,1 | ▸ **NKI 90/36** |
| | 125 | 35 | – | 112 | 265 | 32,5 | 3 800 | 4 300 | 1,3 | ▸ **NA 4918** |
| | 125 | 63 | – | 172 | 450 | 55 | 3 800 | 4 300 | 2,3 | ▸ **NA 6918** |

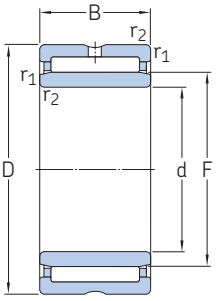
▸ Popular item



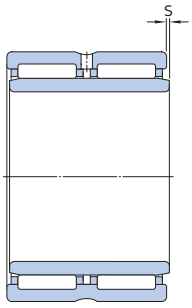

| Dimensions | | | | Abutment and fillet dimensions | | |
|---|---|---|---|---|---|---|
| d | F | $r_{1,2}$ min. | s max. | $d_a$ min. | $D_a$ max. | $r_a$ max. |
| mm | | | | mm | | |
| **60** | 68 | 0,6 | 1 | 64 | 78 | 0,6 |
| | 68 | 0,6 | 1 | 64 | 78 | 0,6 |
| | 68 | 1 | 1,5 | 65 | 80 | 1 |
| | 68 | 1 | 1,5 | 65 | 80 | 1 |
| | 70 | 1,1 | 2 | 66,5 | 83,5 | 1 |
| **65** | 73 | 1 | 1 | 70 | 85 | 1 |
| | 72 | 1 | 1,5 | 70 | 85 | 1 |
| | 73 | 1 | 1 | 70 | 85 | 1 |
| | 72 | 1 | 1,5 | 70 | 85 | 1 |
| | 75 | 1,1 | 2 | 71,5 | 88,5 | 1 |
| **70** | 80 | 1 | 0,8 | 75 | 90 | 1 |
| | 80 | 1 | 0,8 | 75 | 90 | 1 |
| | 80 | 1 | 1,5 | 75 | 95 | 1 |
| | 80 | 1 | 1 | 75 | 95 | 1 |
| **75** | 85 | 1 | 1 | 80 | 100 | 1 |
| | 85 | 1 | 1,5 | 80 | 100 | 1 |
| | 85 | 1 | 1 | 80 | 100 | 1 |
| | 85 | 1 | 1 | 80 | 100 | 1 |
| **80** | 90 | 1 | 1 | 85 | 105 | 1 |
| | 90 | 1 | 1,5 | 85 | 105 | 1 |
| | 90 | 1 | 1 | 85 | 105 | 1 |
| | 90 | 1 | 1 | 85 | 105 | 1 |
| **85** | 95 | 1 | 1,5 | 90 | 110 | 1 |
| | 95 | 1 | 1,5 | 90 | 110 | 1 |
| | 100 | 1,1 | 1 | 91,5 | 113,5 | 1 |
| | 100 | 1,1 | 1 | 91,5 | 113,5 | 1 |
| **90** | 100 | 1 | 1,5 | 95 | 115 | 1 |
| | 100 | 1 | 1,5 | 95 | 115 | 1 |
| | 105 | 1,1 | 1 | 96,5 | 118,5 | 1 |
| | 105 | 1,1 | 1 | 96,5 | 118,5 | 1 |

## 7.4 Needle roller bearings with machined rings with flanges, with an inner ring

d **95 – 320** mm



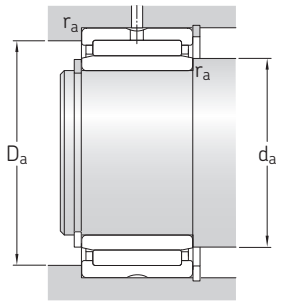

NKI
NA 48
NA 49




NA 69

| Principal dimensions | | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | C | $C_0$ | $P_u$ | | | | |
| mm | | | | kN | | kN | r/min | | kg | – |
| **95** | 125 | 26 | – | 78,1 | 166 | 20,4 | 3 800 | 4 300 | 0,82 | ▸ **NKI 95/26** |
| | 125 | 36 | – | 112 | 265 | 32,5 | 3 800 | 4 300 | 1,15 | **NKI 95/36** |
| | 130 | 35 | – | 114 | 270 | 33,5 | 3 600 | 4 000 | 1,35 | ▸ **NA 4919** |
| | 130 | 63 | – | 172 | 465 | 56 | 3 600 | 4 000 | 2,5 | ▸ **NA 6919** |
| **100** | 130 | 30 | – | 96,8 | 220 | 27 | 3 600 | 4 000 | 0,99 | ▸ **NKI 100/30** |
| | 130 | 40 | – | 123 | 305 | 37,5 | 3 600 | 4 000 | 1,35 | ▸ **NKI 100/40** |
| | 140 | 40 | – | 125 | 280 | 34 | 3 400 | 4 000 | 1,9 | ▸ **NA 4920** |
| **110** | 140 | 30 | – | 93,5 | 232 | 27 | 3 400 | 3 800 | 1,1 | ▸ **NA 4822** |
| | 150 | 40 | – | 130 | 300 | 35,5 | 3 200 | 3 600 | 2,05 | ▸ **NA 4922** |
| **120** | 150 | 30 | – | 99 | 255 | 29 | 3 200 | 3 600 | 1,15 | ▸ **NA 4824** |
| | 165 | 45 | – | 176 | 405 | 49 | 3 000 | 3 400 | 2,85 | ▸ **NA 4924** |
| **130** | 165 | 35 | – | 119 | 325 | 36,5 | 2 800 | 3 200 | 1,8 | ▸ **NA 4826** |
| | 180 | 50 | – | 198 | 480 | 57 | 2 600 | 3 000 | 3,9 | ▸ **NA 4926** |
| **140** | 175 | 35 | – | 121 | 345 | 37,5 | 2 600 | 3 000 | 1,9 | ▸ **NA 4828** |
| | 190 | 50 | – | 205 | 510 | 60 | 2 400 | 2 800 | 4,15 | ▸ **NA 4928** |
| **150** | 190 | 40 | – | 147 | 415 | 46,5 | 2 400 | 2 800 | 2,7 | ▸ **NA 4830** |
| **160** | 200 | 40 | – | 157 | 450 | 49 | 2 200 | 2 600 | 2,85 | ▸ **NA 4832** |
| **170** | 215 | 45 | – | 179 | 520 | 56 | 2 200 | 2 400 | 3,95 | ▸ **NA 4834** |
| **180** | 225 | 45 | – | 190 | 570 | 60 | 2 000 | 2 400 | 4,2 | ▸ **NA 4836** |
| **190** | 240 | 50 | – | 220 | 710 | 73,5 | 1 900 | 2 200 | 5,55 | ▸ **NA 4838** |
| **200** | 250 | 50 | – | 224 | 735 | 75 | 1 800 | 2 000 | 5,8 | ▸ **NA 4840** |
| **220** | 270 | 50 | – | 238 | 815 | 81,5 | 1 700 | 1 900 | 6,35 | ▸ **NA 4844** |
| **240** | 300 | 60 | – | 347 | 1 120 | 112 | 1 500 | 1 700 | 9,9 | ▸ **NA 4848** |
| **260** | 320 | 60 | – | 358 | 1 200 | 118 | 1 400 | 1 500 | 10,5 | ▸ **NA 4852** |
| **280** | 350 | 69 | – | 429 | 1 320 | 129 | 1 300 | 1 400 | 15,5 | ▸ **NA 4856** |
| **300** | 380 | 80 | – | 594 | 1 800 | 173 | 1 100 | 1 300 | 22 | **NA 4860** |
| **320** | 400 | 80 | – | 605 | 1 900 | 176 | 1 100 | 1 200 | 23 | **NA 4864** |

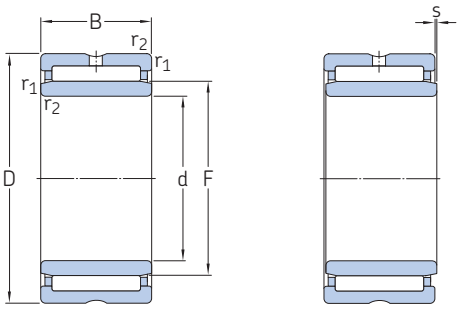
▸ Popular item



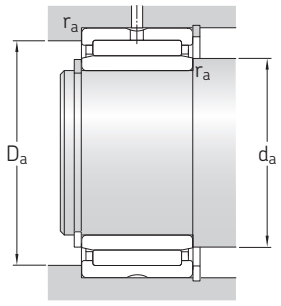

| Dimensions | | | | Abutment and fillet dimensions | | |
|---|---|---|---|---|---|---|
| d | F | $r_{1,2}$ min. | s max. | $d_a$ min. | $D_a$ max. | $r_a$ max. |
| mm | | | | mm | | |
| **95** | 105 | 1 | 1,5 | 100 | 120 | 1 |
| | 105 | 1 | 1,5 | 100 | 120 | 1 |
| | 110 | 1,1 | 1 | 101,5 | 123,5 | 1 |
| | 110 | 1,1 | 1 | 101,5 | 123,5 | 1 |
| **100** | 110 | 1,1 | 1,5 | 106,5 | 123,5 | 1 |
| | 110 | 1,1 | 2 | 106,5 | 123,5 | 1 |
| | 115 | 1,1 | 2 | 106,5 | 133,5 | 1 |
| **110** | 120 | 1 | 0,8 | 115 | 135 | 1 |
| | 125 | 1,1 | 2 | 116,5 | 143,5 | 1 |
| **120** | 130 | 1 | 0,8 | 125 | 145 | 1 |
| | 135 | 1,1 | 2 | 126,5 | 158,5 | 1 |
| **130** | 145 | 1,1 | 1 | 136,5 | 158,5 | 1 |
| | 150 | 1,5 | 1,5 | 138 | 172 | 1,5 |
| **140** | 155 | 1,1 | 1 | 146,5 | 168,5 | 1 |
| | 160 | 1,5 | 1,5 | 148 | 182 | 1,5 |
| **150** | 165 | 1,1 | 1,5 | 156,5 | 183,5 | 1 |
| **160** | 175 | 1,1 | 1,5 | 166,5 | 193,5 | 1 |
| **170** | 185 | 1,1 | 1,5 | 176,5 | 208,5 | 1 |
| **180** | 195 | 1,1 | 1,5 | 186,5 | 218,5 | 1 |
| **190** | 210 | 1,5 | 1,5 | 198 | 232 | 1,5 |
| **200** | 220 | 1,5 | 1,5 | 208 | 242 | 1,5 |
| **220** | 240 | 1,5 | 1,5 | 228 | 262 | 1,5 |
| **240** | 265 | 2 | 2 | 249 | 291 | 2 |
| **260** | 285 | 2 | 2 | 269 | 311 | 2 |
| **280** | 305 | 2 | 2,5 | 289 | 341 | 2 |
| **300** | 330 | 2,1 | 2 | 311 | 369 | 2 |
| **320** | 350 | 2,1 | 2 | 331 | 389 | 2 |

## 7.4 Needle roller bearings with machined rings with flanges, with an inner ring

d **340 – 380** mm



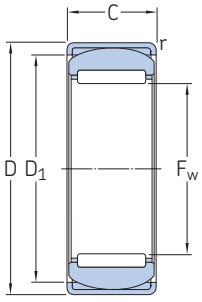

| Principal dimensions | | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | C | $C_0$ | $P_u$ | | | | |
| mm | | | | kN | | kN | r/min | | kg | – |
| **340** | 420 | 80 | – | 616 | 1 960 | 183 | 1 000 | 1 200 | 24 | **NA 4868** |
| **360** | 440 | 80 | – | 627 | 2 040 | 186 | 950 | 1 100 | 25,5 | **NA 4872** |
| **380** | 480 | 100 | – | 968 | 3 000 | 270 | 900 | 1 000 | 42,5 | **NA 4876** |




| Dimensions | | | | Abutment and fillet dimensions | | |
|---|---|---|---|---|---|---|
| d | F | $r_{1,2}$ min. | s max. | $d_a$ min. | $D_a$ max. | $r_a$ max. |
| mm | | | | mm | | |
| **340** | 370 | 2,1 | 2 | 351 | 409 | 2 |
| **360** | 390 | 2,1 | 2 | 371 | 429 | 2 |
| **380** | 415 | 2,1 | 2 | 391 | 469 | 2 |

## 7.5 Alignment needle roller bearings, without an inner ring

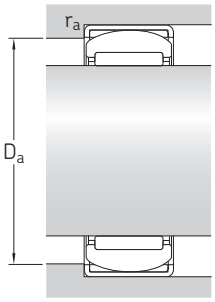
$F_w$ **15 – 45** mm




| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| $F_w$ | D | C | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | kg | – |
| **15** | 28 | 12 | 7,37 | 9,15 | 1,08 | 24 000 | 28 000 | 0,032 | **RPNA 15/28** |
| **18** | 32 | 16 | 12,8 | 17,6 | 2,12 | 22 000 | 24 000 | 0,052 | **RPNA 18/32** |
| **20** | 35 | 16 | 13,2 | 19,3 | 2,28 | 19 000 | 22 000 | 0,062 | ▸ **RPNA 20/35** |
| **25** | 42 | 20 | 19 | 32,5 | 4 | 16 000 | 18 000 | 0,11 | ▸ **RPNA 25/42** |
| **30** | 47 | 20 | 22,9 | 38 | 4,8 | 13 000 | 15 000 | 0,13 | ▸ **RPNA 30/47** |
| **35** | 52 | 20 | 24,6 | 45 | 5,6 | 11 000 | 13 000 | 0,13 | ▸ **RPNA 35/52** |
| **40** | 55 | 20 | 26,4 | 51 | 6,3 | 10 000 | 11 000 | 0,14 | **RPNA 40/55** |
| **45** | 62 | 20 | 27,5 | 57 | 7,1 | 9 000 | 10 000 | 0,18 | ▸ **RPNA 45/62** |



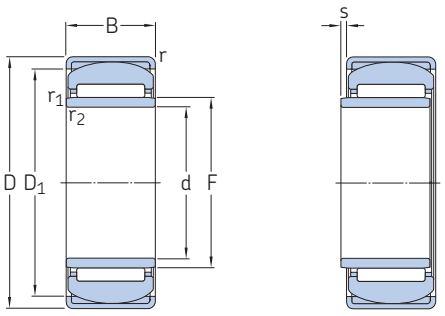
▸ Popular item




| Dimensions | | | Abutment and fillet dimensions | | |
|---|---|---|---|---|---|
| $F_w$ | $D_1$ | r<br>min. | $D_a$<br>min. | $D_a$<br>max. | $r_a$<br>max. |
| mm | | | mm | | |
| **15** | 24,5 | 0,8 | 23,5 | 24,5 | 0,8 |
| **18** | 27 | 0,8 | 26 | 27 | 0,8 |
| **20** | 30,5 | 0,8 | 29,5 | 30,5 | 0,8 |
| **25** | 36,5 | 0,8 | 35 | 37 | 0,8 |
| **30** | 42 | 0,8 | 41 | 42 | 0,8 |
| **35** | 47,5 | 0,8 | 46,5 | 47,5 | 0,8 |
| **40** | 50,5 | 0,8 | 49,5 | 50,5 | 0,8 |
| **45** | 58 | 0,8 | 57 | 58 | 0,8 |

## 7.6 Alignment needle roller bearings, with an inner ring

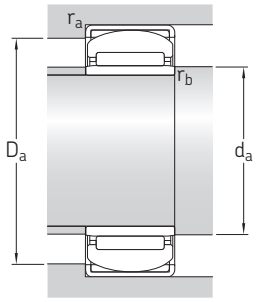
d **12 – 40** mm




| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | kg | – |
| **12** | 28 | 12 | 7,37 | 9,15 | 1,08 | 24 000 | 28 000 | 0,037 | **PNA 12/28** |
| **15** | 32 | 16 | 12,8 | 17,6 | 2,12 | 22 000 | 24 000 | 0,062 | ▸ **PNA 15/32** |
| **17** | 35 | 16 | 13,2 | 19,3 | 2,28 | 19 000 | 22 000 | 0,073 | ▸ **PNA 17/35** |
| **20** | 42 | 20 | 19 | 32,5 | 4 | 16 000 | 18 000 | 0,14 | ▸ **PNA 20/42** |
| **22** | 44 | 20 | 22 | 36,5 | 4,55 | 14 000 | 16 000 | 0,15 | **PNA 22/44** |
| **25** | 47 | 20 | 22,9 | 38 | 4,8 | 13 000 | 15 000 | 0,16 | **PNA 25/47** |
| **30** | 52 | 20 | 24,6 | 45 | 5,6 | 11 000 | 13 000 | 0,18 | ▸ **PNA 30/52** |
| **35** | 55 | 20 | 26,4 | 51 | 6,3 | 10 000 | 11 000 | 0,18 | ▸ **PNA 35/55** |
| **40** | 62 | 20 | 27,5 | 57 | 7,1 | 9 000 | 10 000 | 0,23 | ▸ **PNA 40/62** |



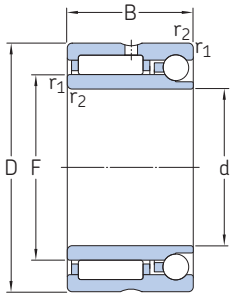
▸ Popular item



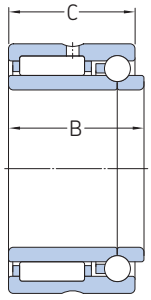

| Dimensions | | | | | | Abutment and fillet dimensions | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| d | F | $D_1$ | r min. | $r_{1,2}$ min. | s max. | $d_a$ min. | $D_a$ min. | $D_a$ max. | $r_a$ max. | $r_b$ max. |
| mm | | | | | | mm | | | | |
| **12** | 15 | 24,5 | 0,8 | 0,3 | 0,5 | 14 | 23,5 | 24,5 | 0,8 | 0,3 |
| **15** | 18 | 27 | 0,8 | 0,3 | 0,5 | 17 | 26 | 27 | 0,8 | 0,3 |
| **17** | 20 | 30,5 | 0,8 | 0,3 | 0,5 | 19 | 29,5 | 30,5 | 0,8 | 0,3 |
| **20** | 25 | 36,5 | 0,8 | 0,3 | 0,5 | 22 | 35 | 37 | 0,8 | 0,3 |
| **22** | 28 | 38,5 | 0,8 | 0,3 | 0,5 | 24 | 37,5 | 39 | 0,8 | 0,3 |
| **25** | 30 | 42 | 0,8 | 0,3 | 0,5 | 25 | 41 | 42 | 0,8 | 0,3 |
| **30** | 35 | 47,5 | 0,8 | 0,3 | 0,5 | 32 | 46,5 | 47,5 | 0,8 | 0,3 |
| **35** | 40 | 50,5 | 0,8 | 0,3 | 0,5 | 37 | 49,5 | 50,5 | 0,8 | 0,3 |
| **40** | 45 | 58 | 0,8 | 0,3 | 0,5 | 42 | 57 | 58 | 0,8 | 0,3 |

## 7.7 Needle roller / angular contact ball bearings

d **12 – 70** mm



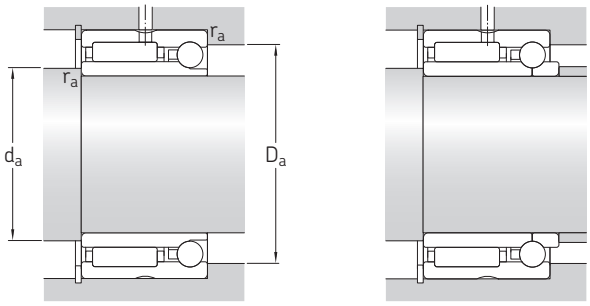

NKIA




NKIB

| Principal dimensions | | | | Basic load ratings | | | | Fatigue load limit | | Speed ratings | | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | radial dynamic | radial static | axial dynamic | axial static | radial | axial | Reference speed | Limiting speed | | |
| d | D | B | C | C | $C_0$ | C | $C_0$ | $P_u$ | $P_u$ | | | | |
| mm | | | | kN | | | | kN | | r/min | | kg | – |
| **12** | 24 | 16 | – | 8,09 | 9,65 | 2,07 | 1,92 | 1,14 | 0,083 | 22 000 | 26 000 | 0,04 | ▸ **NKIA 5901** |
| | 24 | 17,5 | 16 | 8,09 | 9,65 | 2,07 | 1,92 | 1,14 | 0,083 | 22 000 | 26 000 | 0,043 | ▸ **NKIB 5901** |
| **15** | 28 | 18 | – | 11,2 | 15,3 | 2,27 | 2,37 | 1,83 | 0,099 | 19 000 | 22 000 | 0,05 | ▸ **NKIA 5902** |
| | 28 | 20 | 18 | 11,2 | 15,3 | 2,27 | 2,37 | 1,83 | 0,099 | 19 000 | 22 000 | 0,052 | ▸ **NKIB 5902** |
| **17** | 30 | 18 | – | 11,4 | 16,3 | 2,24 | 2,74 | 1,96 | 0,116 | 18 000 | 20 000 | 0,056 | ▸ **NKIA 5903** |
| | 30 | 20 | 18 | 11,4 | 16,3 | 2,24 | 2,74 | 1,96 | 0,116 | 18 000 | 20 000 | 0,058 | ▸ **NKIB 5903** |
| **20** | 37 | 23 | – | 21,6 | 28 | 3,79 | 4,21 | 3,35 | 0,176 | 15 000 | 17 000 | 0,1 | ▸ **NKIA 5904** |
| | 37 | 25 | 23 | 21,6 | 28 | 3,79 | 4,21 | 3,35 | 0,176 | 15 000 | 17 000 | 0,11 | ▸ **NKIB 5904** |
| **22** | 39 | 23 | – | 23,3 | 32 | 4,14 | 4,93 | 3,9 | 0,205 | 14 000 | 15 000 | 0,12 | **NKIA 59/22** |
| | 39 | 25 | 23 | 23,3 | 32 | 4,14 | 4,93 | 3,9 | 0,205 | 14 000 | 15 000 | 0,12 | ▸ **NKIB 59/22** |
| **25** | 42 | 23 | – | 24,2 | 34,5 | 4,24 | 5,26 | 4,15 | 0,224 | 13 000 | 15 000 | 0,13 | ▸ **NKIA 5905** |
| | 42 | 25 | 23 | 24,2 | 34,5 | 4,24 | 5,26 | 4,15 | 0,224 | 13 000 | 15 000 | 0,13 | ▸ **NKIB 5905** |
| **30** | 47 | 23 | – | 25,5 | 39 | 4,54 | 6,32 | 4,65 | 0,268 | 11 000 | 13 000 | 0,15 | ▸ **NKIA 5906** |
| | 47 | 25 | 23 | 25,5 | 39 | 4,54 | 6,32 | 4,65 | 0,268 | 11 000 | 13 000 | 0,15 | ▸ **NKIB 5906** |
| **35** | 55 | 27 | – | 31,9 | 54 | 5,83 | 8,42 | 6,7 | 0,355 | 9 500 | 11 000 | 0,24 | ▸ **NKIA 5907** |
| | 55 | 30 | 27 | 31,9 | 54 | 5,83 | 8,42 | 6,7 | 0,355 | 9 500 | 11 000 | 0,25 | ▸ **NKIB 5907** |
| **40** | 62 | 30 | – | 42,9 | 71 | 7,17 | 10,9 | 8,8 | 0,467 | 8 000 | 9 500 | 0,32 | ▸ **NKIA 5908** |
| | 62 | 34 | 30 | 42,9 | 71 | 7,17 | 10,9 | 8,8 | 0,467 | 8 000 | 9 500 | 0,32 | ▸ **NKIB 5908** |
| **45** | 68 | 30 | – | 45,7 | 78 | 7,47 | 12 | 9,65 | 0,513 | 7 500 | 8 500 | 0,38 | **NKIA 5909** |
| | 68 | 34 | 30 | 45,7 | 78 | 7,47 | 12 | 9,65 | 0,513 | 7 500 | 8 500 | 0,38 | ▸ **NKIB 5909** |
| **50** | 72 | 30 | – | 47,3 | 85 | 7,74 | 13,7 | 10,6 | 0,579 | 7 000 | 8 000 | 0,38 | ▸ **NKIA 5910** |
| | 72 | 34 | 30 | 47,3 | 85 | 7,74 | 13,7 | 10,6 | 0,579 | 7 000 | 8 000 | 0,39 | ▸ **NKIB 5910** |
| **55** | 80 | 34 | – | 57,2 | 106 | 9,27 | 16,7 | 13,2 | 0,697 | 6 300 | 7 000 | 0,55 | **NKIA 5911** |
| | 80 | 38 | 34 | 57,2 | 106 | 9,27 | 16,7 | 13,2 | 0,697 | 6 300 | 7 000 | 0,56 | ▸ **NKIB 5911** |
| **60** | 85 | 34 | – | 60,5 | 114 | 9,58 | 18 | 14,3 | 0,77 | 6 000 | 6 700 | 0,59 | ▸ **NKIA 5912** |
| | 85 | 38 | 34 | 60,5 | 114 | 9,58 | 18 | 14,3 | 0,77 | 6 000 | 6 700 | 0,6 | ▸ **NKIB 5912** |
| **65** | 90 | 34 | – | 61,6 | 120 | 9,96 | 19,2 | 14,6 | 0,816 | 5 600 | 6 300 | 0,64 | **NKIA 5913** |
| | 90 | 38 | 34 | 61,6 | 120 | 9,96 | 19,2 | 14,6 | 0,816 | 5 600 | 6 300 | 0,64 | ▸ **NKIB 5913** |
| **70** | 100 | 40 | – | 84,2 | 163 | 13,2 | 25 | 20,8 | 1,05 | 5 000 | 5 600 | 0,98 | **NKIA 5914** |
| | 100 | 45 | 40 | 84,2 | 163 | 13,2 | 25 | 20,8 | 1,05 | 5 000 | 5 600 | 0,99 | ▸ **NKIB 5914** |

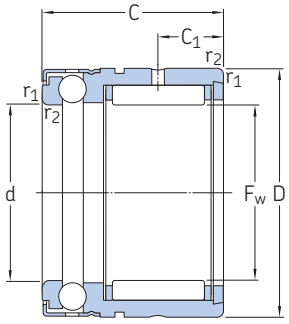
▸ Popular item



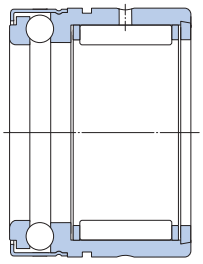

| Dimensions | | | Abutment and fillet dimensions | | |
|---|---|---|---|---|---|
| d | F | $r_{1,2}$ min. | $d_a$ min. | $D_a$ max. | $r_a$ max. |
| mm | | | mm | | |
| **12** | 16 | 0,3 | 14 | 22 | 0,3 |
| | 16 | 0,3 | 14 | 22 | 0,3 |
| **15** | 20 | 0,3 | 17 | 26 | 0,3 |
| | 20 | 0,3 | 17 | 26 | 0,3 |
| **17** | 22 | 0,3 | 19 | 28 | 0,3 |
| | 22 | 0,3 | 19 | 28 | 0,3 |
| **20** | 25 | 0,3 | 22 | 35 | 0,3 |
| | 25 | 0,3 | 22 | 35 | 0,3 |
| **22** | 28 | 0,3 | 24 | 37 | 0,3 |
| | 28 | 0,3 | 24 | 37 | 0,3 |
| **25** | 30 | 0,3 | 27 | 40 | 0,3 |
| | 30 | 0,3 | 27 | 40 | 0,3 |
| **30** | 35 | 0,3 | 32 | 45 | 0,3 |
| | 35 | 0,3 | 32 | 45 | 0,3 |
| **35** | 42 | 0,6 | 39 | 51 | 0,6 |
| | 42 | 0,6 | 39 | 51 | 0,6 |
| **40** | 48 | 0,6 | 44 | 58 | 0,6 |
| | 48 | 0,6 | 44 | 58 | 0,6 |
| **45** | 52 | 0,6 | 49 | 64 | 0,6 |
| | 52 | 0,6 | 49 | 64 | 0,6 |
| **50** | 58 | 0,6 | 54 | 68 | 0,6 |
| | 58 | 0,6 | 54 | 68 | 0,6 |
| **55** | 63 | 1 | 60 | 75 | 1 |
| | 63 | 1 | 60 | 75 | 1 |
| **60** | 68 | 1 | 65 | 80 | 1 |
| | 68 | 1 | 65 | 80 | 1 |
| **65** | 72 | 1 | 70 | 85 | 1 |
| | 72 | 1 | 70 | 85 | 1 |
| **70** | 80 | 1 | 75 | 95 | 1 |
| | 80 | 1 | 75 | 95 | 1 |

## 7.8 Needle roller / thrust ball bearings, full complement thrust bearing

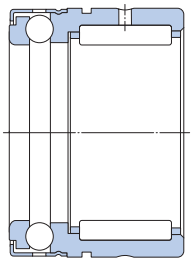
$F_w$ **7 – 35** mm



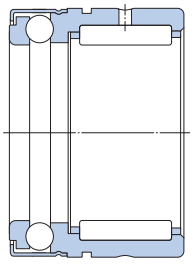

NX
($F_w$ = 7 mm)



NX .. Z
($F_w$ = 7 mm)



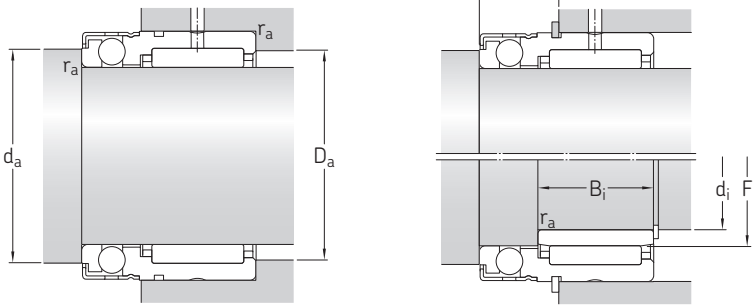
NX
($F_w$ ≥ 10 mm)



NX .. Z
($F_w$ ≥ 10 mm)

| Principal dimensions | | | Basic load ratings | | | | Fatigue load limit | | Minimum load factor | Speed ratings | | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | radial dynamic | radial static | axial dynamic | axial static | radial | axial | | Reference speed | Limiting speed | | |
| $F_w$ | D | C | C | $C_0$ | C | $C_0$ | $P_u$ | $P_u$ | A | | | | |
| mm | | | kN | | | | kN | | – | r/min | | kg | – |
| **7** | 14 | 18 | 2,81 | 2,75 | 3,45 | 5 | 0,29 | 0,186 | 0,00013 | 10 000 | 6 000 | 0,014 | ▸ **NX 7 ZTN** |
| | 14 | 18 | 2,81 | 2,75 | 3,45 | 5 | 0,29 | 0,186 | 0,00013 | 10 000 | 11 000 | 0,014 | **NX 7 TN** |
| **10** | 19 | 18 | 4,95 | 4,55 | 5,07 | 8,5 | 0,53 | 0,31 | 0,00038 | 8 500 | 5 600 | 0,025 | ▸ **NX 10 Z** |
| | 19 | 18 | 4,95 | 4,55 | 5,07 | 8,5 | 0,53 | 0,31 | 0,00038 | 8 500 | 9 500 | 0,025 | **NX 10** |
| **12** | 21 | 18 | 5,39 | 5,2 | 5,27 | 9,65 | 0,61 | 0,355 | 0,00048 | 8 000 | 5 300 | 0,028 | ▸ **NX 12 Z** |
| | 21 | 18 | 5,39 | 5,2 | 5,27 | 9,65 | 0,61 | 0,355 | 0,00048 | 8 000 | 9 000 | 0,028 | **NX 12** |
| **15** | 24 | 28 | 11 | 14 | 6,18 | 12,2 | 1,66 | 0,45 | 0,00077 | 7 500 | 5 300 | 0,048 | **NX 15 Z** |
| | 24 | 28 | 11 | 14 | 6,18 | 12,2 | 1,66 | 0,45 | 0,00077 | 7 500 | 8 500 | 0,048 | **NX 15** |
| **17** | 26 | 28 | 12,1 | 16,6 | 6,37 | 13,4 | 1,96 | 0,5 | 0,00093 | 7 000 | 5 000 | 0,053 | **NX 17 Z** |
| | 26 | 28 | 12,1 | 16,6 | 6,37 | 13,4 | 1,96 | 0,5 | 0,00093 | 7 000 | 8 500 | 0,053 | **NX 17** |
| **20** | 30 | 28 | 13,2 | 19,3 | 7,8 | 17,3 | 2,28 | 0,64 | 0,0016 | 6 300 | 4 500 | 0,068 | ▸ **NX 20 Z** |
| | 30 | 28 | 13,2 | 19,3 | 7,8 | 17,3 | 2,28 | 0,64 | 0,0016 | 6 300 | 7 500 | 0,068 | **NX 20** |
| **25** | 37 | 30 | 15,1 | 24,5 | 12,4 | 28,5 | 2,9 | 1,06 | 0,0042 | 5 600 | 3 800 | 0,12 | **NX 25 Z** |
| | 37 | 30 | 15,1 | 24,5 | 12,4 | 28,5 | 2,9 | 1,06 | 0,0042 | 5 600 | 6 300 | 0,12 | **NX 25** |
| **30** | 42 | 30 | 22,9 | 38 | 12,7 | 32,5 | 4,8 | 1,2 | 0,0055 | 5 300 | 3 600 | 0,13 | ▸ **NX 30 Z** |
| | 42 | 30 | 22,9 | 38 | 12,7 | 32,5 | 4,8 | 1,2 | 0,0055 | 5 300 | 6 000 | 0,13 | **NX 30** |
| **35** | 47 | 30 | 24,6 | 45 | 13,5 | 38 | 5,6 | 1,4 | 0,0075 | 5 000 | 3 400 | 0,16 | **NX 35 Z** |
| | 47 | 30 | 24,6 | 45 | 13,5 | 38 | 5,6 | 1,4 | 0,0075 | 5 000 | 5 600 | 0,16 | **NX 35** |

▸ Popular item

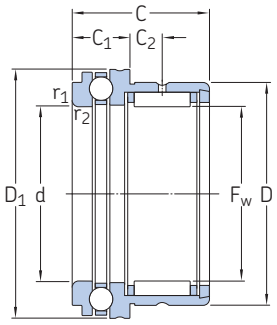



| Dimensions | | | | Abutment and fillet dimensions | | | | Associated inner ring[1] Dimensions | | | Designation | Associated snap ring[2] Designation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $F_w$ | $C_1$ | d | $r_{1,2}$ min. | $d_a$ min. | $D_a$ max. | $C_a$ | $r_a$ max. | $d_i$ | F | $B_i$ | | |
| mm | | | | mm | | | | mm | | | – | – |
| **7** | 4,7 | 7 | 0,3 | 9,6 | 12 | 10 | 0,3 | – | – | – | – | SW 14 |
| | 4,7 | 7 | 0,3 | 9,6 | 12 | 10 | 0,3 | – | – | – | – | SW 14 |
| **10** | 4,7 | 10 | 0,3 | 14,6 | 17 | 10 | 0,3 | 6 | 10 | 10 | IR 6x10x10 IS1 | SW 19 |
| | 4,7 | 10 | 0,3 | 14,6 | 17 | 10 | 0,3 | 6 | 10 | 10 | IR 6x10x10 IS1 | SW 19 |
| **12** | 4,7 | 12 | 0,3 | 16,6 | 19 | 10 | 0,3 | 8 | 12 | 10 | IR 8x12x10 IS1 | SW 21 |
| | 4,7 | 12 | 0,3 | 16,6 | 19 | 10 | 0,3 | 8 | 12 | 10 | IR 8x12x10 IS1 | SW 21 |
| **15** | 8 | 15 | 0,3 | 19 | 22 | 12,2 | 0,3 | 12 | 15 | 16 | IR 12x15x16 | SW 24 |
| | 8 | 15 | 0,3 | 19 | 22 | 12,2 | 0,3 | 12 | 15 | 16 | IR 12x15x16 | SW 24 |
| **17** | 8 | 17 | 0,3 | 21 | 24 | 12,2 | 0,3 | 14 | 17 | 17 | IR 14x17x17 | SW 26 |
| | 8 | 17 | 0,3 | 21 | 24 | 12,2 | 0,3 | 14 | 17 | 17 | IR 14x17x17 | SW 26 |
| **20** | 8 | 20 | 0,3 | 25 | 28 | 12,2 | 0,3 | 17 | 20 | 16 | IR 17x20x16 | SW 30 |
| | 8 | 20 | 0,3 | 25 | 28 | 12,2 | 0,3 | 17 | 20 | 16 | IR 17x20x16 | SW 30 |
| **25** | 8 | 25 | 0,3 | 31,6 | 35 | 14,2 | 0,3 | 20 | 25 | 16 | IR 20x25x16 IS1 | SW 37 |
| | 8 | 25 | 0,3 | 31,6 | 35 | 14,2 | 0,3 | 20 | 25 | 16 | IR 20x25x16 IS1 | SW 37 |
| **30** | 10 | 30 | 0,3 | 36,5 | 40 | 14,2 | 0,3 | 25 | 30 | 20 | IR 25x30x20 | SW 42 |
| | 10 | 30 | 0,3 | 36,5 | 40 | 14,2 | 0,3 | 25 | 30 | 20 | IR 25x30x20 | SW 42 |
| **35** | 10 | 35 | 0,3 | 40,5 | 45 | 14,2 | 0,3 | 30 | 35 | 20 | IR 30x35x20 | SW 47 |
| | 10 | 35 | 0,3 | 40,5 | 45 | 14,2 | 0,3 | 30 | 35 | 20 | IR 30x35x20 | SW 47 |

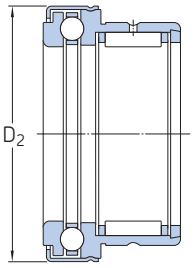
[1] For additional information → *Needle roller bearing inner rings*, page 593
[2] In accordance with DIN 471, not supplied by SKF.

## 7.9 Needle roller / thrust ball bearings, thrust bearing with a cage

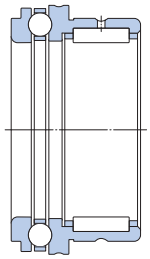
$F_w$ **10 – 70** mm



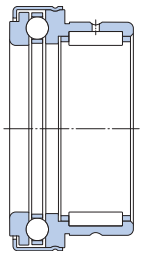

NKX
($F_w$ = 10 mm)




NKX .. Z
($F_w$ = 10 mm)



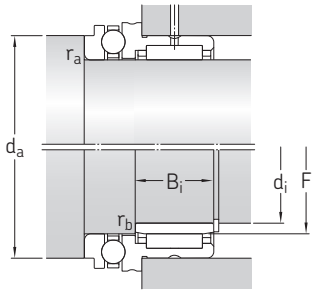
NKX
($F_w \geq 12$ mm)

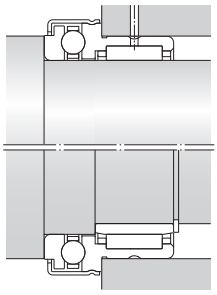


NKX .. Z
($F_w \geq 12$ mm)

| Principal dimensions | | | Basic load ratings | | | | Fatigue load limit | | Minimum load factor | Speed ratings | | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | radial | | axial | | radial | axial | | Reference speed | Limiting speed | | |
| $F_w$ | D | C | dynamic C | static $C_0$ | dynamic C | static $C_0$ | $P_u$ | $P_u$ | A | | | | |
| mm | | | kN | | | | kN | | – | r/min | | kg | – |
| **10** | 19 | 23 | 5,94 | 8 | 9,95 | 15,3 | 0,9 | 0,56 | 0,0012 | 9 500 | 8 000 | 0,036 | **NKX 10 ZTN** |
| | 19 | 23 | 5,94 | 8 | 9,95 | 15,3 | 0,9 | 0,56 | 0,0012 | 9 500 | 13 000 | 0,034 | ▸ **NKX 10 TN** |
| **12** | 21 | 23 | 9,13 | 12 | 10,4 | 16,6 | 1,43 | 0,62 | 0,0014 | 9 000 | 7 500 | 0,04 | ▸ **NKX 12 Z** |
| | 21 | 23 | 9,13 | 12 | 10,4 | 16,6 | 1,43 | 0,62 | 0,0014 | 9 000 | 13 000 | 0,038 | **NKX 12** |
| **15** | 24 | 23 | 11 | 14 | 10,6 | 18,3 | 1,66 | 0,67 | 0,0017 | 8 500 | 7 000 | 0,047 | ▸ **NKX 15 Z** |
| | 24 | 23 | 11 | 14 | 10,6 | 18,3 | 1,66 | 0,67 | 0,0017 | 8 500 | 12 000 | 0,044 | ▸ **NKX 15** |
| **17** | 26 | 25 | 12,1 | 16,6 | 10,8 | 19,6 | 1,96 | 0,735 | 0,002 | 8 500 | 7 000 | 0,055 | ▸ **NKX 17 Z** |
| | 26 | 25 | 12,1 | 16,6 | 10,8 | 19,6 | 1,96 | 0,735 | 0,002 | 8 500 | 12 000 | 0,053 | **NKX 17** |
| **20** | 30 | 30 | 16,5 | 25,5 | 14,3 | 27 | 3,05 | 1 | 0,0038 | 7 500 | 6 000 | 0,09 | ▸ **NKX 20 Z** |
| | 30 | 30 | 16,5 | 25,5 | 14,3 | 27 | 3,05 | 1 | 0,0038 | 7 500 | 10 000 | 0,083 | ▸ **NKX 20** |
| **25** | 37 | 30 | 19 | 32,5 | 19,5 | 40,5 | 4 | 1,5 | 0,0085 | 6 300 | 5 500 | 0,13 | ▸ **NKX 25 Z** |
| | 37 | 30 | 19 | 32,5 | 19,5 | 40,5 | 4 | 1,5 | 0,0085 | 6 300 | 9 000 | 0,13 | **NKX 25** |
| **30** | 42 | 30 | 22,9 | 38 | 20,3 | 45,5 | 4,8 | 1,7 | 0,01 | 6 000 | 5 000 | 0,14 | ▸ **NKX 30 Z** |
| | 42 | 30 | 22,9 | 38 | 20,3 | 45,5 | 4,8 | 1,7 | 0,01 | 6 000 | 8 500 | 0,14 | ▸ **NKX 30** |
| **35** | 47 | 30 | 24,6 | 45 | 21,2 | 51 | 5,6 | 1,9 | 0,013 | 5 600 | 4 500 | 0,17 | ▸ **NKX 35 Z** |
| | 47 | 30 | 24,6 | 45 | 21,2 | 51 | 5,6 | 1,9 | 0,013 | 5 600 | 7 500 | 0,16 | ▸ **NKX 35** |
| **40** | 52 | 32 | 26,4 | 51 | 27 | 68 | 6,3 | 2,55 | 0,024 | 5 000 | 4 000 | 0,21 | ▸ **NKX 40 Z** |
| | 52 | 32 | 26,4 | 51 | 27 | 68 | 6,3 | 2,55 | 0,024 | 5 000 | 7 000 | 0,2 | **NKX 40** |
| **45** | 58 | 32 | 27,5 | 57 | 28,1 | 75 | 7,1 | 2,8 | 0,029 | 4 500 | 3 800 | 0,27 | ▸ **NKX 45 Z** |
| | 58 | 32 | 27,5 | 57 | 28,1 | 75 | 7,1 | 2,8 | 0,029 | 4 500 | 6 300 | 0,25 | **NKX 45** |
| **50** | 62 | 35 | 38 | 78 | 28,6 | 81,5 | 9,65 | 3,05 | 0,034 | 4 300 | 3 600 | 0,3 | ▸ **NKX 50 Z** |
| | 62 | 35 | 38 | 78 | 28,6 | 81,5 | 9,65 | 3,05 | 0,034 | 4 300 | 6 300 | 0,28 | ▸ **NKX 50** |
| **60** | 72 | 40 | 41,8 | 96,5 | 41,6 | 122 | 11,8 | 4,55 | 0,077 | 3 600 | 3 000 | 0,38 | ▸ **NKX 60 Z** |
| | 72 | 40 | 41,8 | 96,5 | 41,6 | 122 | 11,8 | 4,55 | 0,077 | 3 600 | 5 000 | 0,36 | ▸ **NKX 60** |
| **70** | 85 | 40 | 44,6 | 98 | 43,6 | 137 | 12,2 | 5,1 | 0,097 | 3 400 | 2 700 | 0,52 | ▸ **NKX 70 Z** |
| | 85 | 40 | 44,6 | 98 | 43,6 | 137 | 12,2 | 5,1 | 0,097 | 3 400 | 4 500 | 0,5 | ▸ **NKX 70** |

▸ Popular item



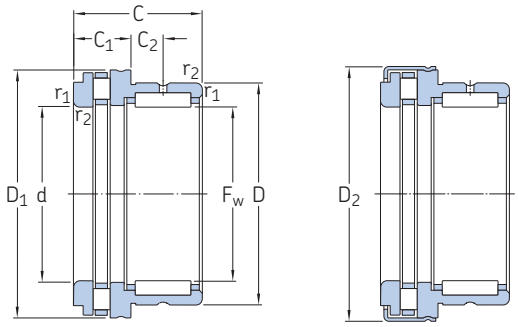



| Dimensions | | | | | | | Abutment and fillet dimensions | | | Associated inner ring[1] Dimensions | | | Designation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $F_w$ | $C_1$ | $C_2$ | d | $D_1$ | $D_2$ | $r_{1,2}$ min. | $d_a$ min. | $r_a$ max. | $r_b$ max. | $d_i$ | F | $B_i$ | |
| mm | | | | | | | mm | | | mm | | | – |
| **10** | 9 | 6,5 | 10 | – | 25,2 | 0,3 | 19,7 | 0,3 | 0,3 | 7 | 10 | 16 | IR 7x10x16 |
| | 9 | 6,5 | 10 | 24,1 | – | 0,3 | 19,7 | 0,3 | 0,3 | 7 | 10 | 16 | IR 7x10x16 |
| **12** | 9 | 6,5 | 12 | – | 27,2 | 0,3 | 21,7 | 0,3 | 0,3 | 9 | 12 | 16 | IR 9x12x16 |
| | 9 | 6,5 | 12 | 26,1 | – | 0,3 | 21,7 | 0,3 | 0,3 | 9 | 12 | 16 | IR 9x12x16 |
| **15** | 9 | 6,5 | 15 | – | 29,2 | 0,3 | 23,7 | 0,3 | 0,3 | 12 | 15 | 16 | IR 12x15x16 |
| | 9 | 6,5 | 15 | 28,1 | – | 0,3 | 23,7 | 0,3 | 0,3 | 12 | 15 | 16 | IR 12x15x16 |
| **17** | 9 | 8 | 17 | – | 31,2 | 0,3 | 25,7 | 0,3 | 0,3 | 14 | 17 | 17 | IR 14x17x17 |
| | 9 | 8 | 17 | 30,1 | – | 0,3 | 25,7 | 0,3 | 0,3 | 14 | 17 | 17 | IR 14x17x17 |
| **20** | 10 | 10,5 | 20 | – | 36,2 | 0,3 | 30,7 | 0,3 | 0,3 | 17 | 20 | 20 | IR 17x20x20 |
| | 10 | 10,5 | 20 | 35,1 | – | 0,3 | 30,7 | 0,3 | 0,3 | 17 | 20 | 20 | IR 17x20x20 |
| **25** | 11 | 9,5 | 25 | – | 43,2 | 0,6 | 37,7 | 0,6 | 0,3 | 20 | 25 | 20 | IR 20x25x20 |
| | 11 | 9,5 | 25 | 42,1 | – | 0,6 | 37,7 | 0,6 | 0,3 | 20 | 25 | 20 | IR 20x25x20 |
| **30** | 11 | 9,5 | 30 | – | 48,2 | 0,6 | 42,7 | 0,6 | 0,3 | 25 | 30 | 20 | IR 25x30x20 |
| | 11 | 9,5 | 30 | 47,1 | – | 0,6 | 42,7 | 0,6 | 0,3 | 25 | 30 | 20 | IR 25x30x20 |
| **35** | 12 | 9 | 35 | – | 53,2 | 0,6 | 47,7 | 0,6 | 0,3 | 30 | 35 | 20 | IR 30x35x20 |
| | 12 | 9 | 35 | 52,1 | – | 0,6 | 47,7 | 0,6 | 0,3 | 30 | 35 | 20 | IR 30x35x20 |
| **40** | 13 | 10 | 40 | – | 61,2 | 0,6 | 55,7 | 0,6 | 0,3 | 35 | 40 | 20 | IR 35x40x20 |
| | 13 | 10 | 40 | 60,1 | – | 0,6 | 55,7 | 0,6 | 0,3 | 35 | 40 | 20 | IR 35x40x20 |
| **45** | 14 | 9 | 45 | – | 66,5 | 0,6 | 60,5 | 0,6 | 0,3 | 40 | 45 | 20 | IR 40x45x20 |
| | 14 | 9 | 45 | 65,2 | – | 0,6 | 60,5 | 0,6 | 0,3 | 40 | 45 | 20 | IR 40x45x20 |
| **50** | 14 | 10 | 50 | – | 71,5 | 0,6 | 65,5 | 0,6 | 0,6 | 45 | 50 | 25 | IR 45x50x25 |
| | 14 | 10 | 50 | 70,2 | – | 0,6 | 65,5 | 0,6 | 0,6 | 45 | 50 | 25 | IR 45x50x25 |
| **60** | 17 | 12 | 60 | – | 86,5 | 1 | 80,5 | 1 | 1 | 50 | 60 | 25 | IR 50x60x25 |
| | 17 | 12 | 60 | 85,2 | – | 1 | 80,5 | 1 | 1 | 50 | 60 | 25 | IR 50x60x25 |
| **70** | 18 | 11 | 70 | – | 96,5 | 1 | 90,5 | 1 | 1 | 60 | 70 | 25 | IR 60x70x25 |
| | 18 | 11 | 70 | 95,2 | – | 1 | 90,5 | 1 | 1 | 60 | 70 | 25 | IR 60x70x25 |

[1] For additional information → *Needle roller bearing inner rings*, page 593

## 7.10 Needle roller / cylindrical roller thrust bearings

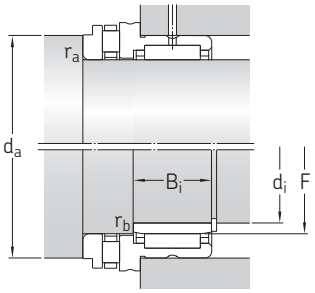
$F_w$ **15 – 50** mm

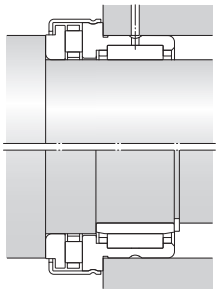



NKXR NKXR .. Z

| Principal dimensions | | | Basic load ratings | | | | Fatigue load limit | | Minimum load factor | Speed ratings | | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | radial | | axial | | radial | axial | | Reference speed | Limiting speed | | |
| | | | dynamic | static | dynamic | static | | | | | | | |
| $F_w$ | D | C | C | $C_0$ | C | $C_0$ | $P_u$ | $P_u$ | A | | | | |
| mm | | | kN | | | | kN | | – | r/min | | kg | – |
| **15** | 24 | 23 | 11 | 14 | 11,2 | 27 | 1,66 | 2,45 | 0,000 058 | 4 300 | 8 500 | 0,042 | **NKXR 15** |
| | 24 | 23 | 11 | 14 | 11,2 | 27 | 1,66 | 2,45 | 0,000 058 | 4 300 | 8 500 | 0,045 | ▸ **NKXR 15 Z** |
| **17** | 26 | 25 | 12,1 | 16,6 | 12,2 | 31,5 | 1,96 | 2,85 | 0,000 079 | 4 300 | 8 500 | 0,05 | ▸ **NKXR 17** |
| | 26 | 25 | 12,1 | 16,6 | 12,2 | 31,5 | 1,96 | 2,85 | 0,000 079 | 4 300 | 8 500 | 0,053 | ▸ **NKXR 17 Z** |
| **20** | 30 | 30 | 16,5 | 25,5 | 18,6 | 48 | 3,05 | 4,65 | 0,00018 | 3 800 | 7 500 | 0,08 | ▸ **NKXR 20** |
| | 30 | 30 | 16,5 | 25,5 | 18,6 | 48 | 3,05 | 4,65 | 0,00018 | 3 800 | 7 500 | 0,084 | ▸ **NKXR 20 Z** |
| **25** | 37 | 30 | 19 | 32,5 | 25 | 69,5 | 4 | 6,8 | 0,00039 | 3 200 | 6 300 | 0,12 | **NKXR 25** |
| | 37 | 30 | 19 | 32,5 | 25 | 69,5 | 4 | 6,8 | 0,00039 | 3 200 | 6 300 | 0,13 | ▸ **NKXR 25 Z** |
| **30** | 42 | 30 | 22,9 | 38 | 27 | 78 | 4,8 | 7,65 | 0,00049 | 3 000 | 6 000 | 0,14 | **NKXR 30** |
| | 42 | 30 | 22,9 | 38 | 27 | 78 | 4,8 | 7,65 | 0,00049 | 3 000 | 6 000 | 0,14 | ▸ **NKXR 30 Z** |
| **35** | 47 | 30 | 24,6 | 45 | 29 | 93 | 5,6 | 9,15 | 0,00069 | 2 800 | 5 600 | 0,16 | **NKXR 35** |
| | 47 | 30 | 24,6 | 45 | 29 | 93 | 5,6 | 9,15 | 0,00069 | 2 800 | 5 600 | 0,17 | ▸ **NKXR 35 Z** |
| **40** | 52 | 32 | 26,4 | 51 | 43 | 137 | 6,3 | 13,7 | 0,0015 | 2 400 | 5 000 | 0,2 | **NKXR 40** |
| | 52 | 32 | 26,4 | 51 | 43 | 137 | 6,3 | 13,7 | 0,0015 | 2 400 | 5 000 | 0,21 | ▸ **NKXR 40 Z** |
| **45** | 58 | 32 | 27,5 | 57 | 45 | 153 | 7,1 | 15,3 | 0,0019 | 2 200 | 4 500 | 0,24 | **NKXR 45** |
| | 58 | 32 | 27,5 | 57 | 45 | 153 | 7,1 | 15,3 | 0,0019 | 2 200 | 4 500 | 0,26 | ▸ **NKXR 45 Z** |
| **50** | 62 | 35 | 38 | 78 | 47,5 | 166 | 9,65 | 16,6 | 0,0022 | 2 200 | 4 300 | 0,27 | **NKXR 50** |
| | 62 | 35 | 38 | 78 | 47,5 | 166 | 9,65 | 16,6 | 0,0022 | 2 200 | 4 300 | 0,29 | ▸ **NKXR 50 Z** |

▸ Popular item



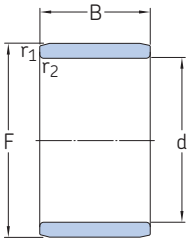



| Dimensions | | | | | | | Abutment and fillet dimensions | | | Associated inner ring[1] Dimensions | | | Designation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $F_w$ | $C_1$ | $C_2$ | d | $D_1$ | $D_2$ | $r_{1,2}$ min. | $d_a$ min. | $r_a$ max. | $r_b$ max. | $d_i$ | F | $B_i$ | |
| mm | | | | | | | mm | | | mm | | | – |
| **15** | 9 | 6,5 | 15 | 28,1 | – | 0,3 | 23,7 | 0,3 | 0,3 | 12 | 15 | 16 | IR 12x15x16 |
| | 9 | 6,5 | 15 | – | 29,2 | 0,3 | 23,7 | 0,3 | 0,3 | 12 | 15 | 16 | IR 12x15x16 |
| **17** | 9 | 8 | 17 | 30,1 | – | 0,3 | 25,7 | 0,3 | 0,3 | 14 | 17 | 17 | IR 14x17x17 |
| | 9 | 8 | 17 | – | 31,2 | 0,3 | 25,7 | 0,3 | 0,3 | 14 | 17 | 17 | IR 14x17x17 |
| **20** | 10 | 10,5 | 20 | 35,1 | – | 0,3 | 30,7 | 0,3 | 0,3 | 17 | 20 | 20 | IR 17x20x20 |
| | 10 | 10,5 | 20 | – | 36,2 | 0,3 | 30,7 | 0,3 | 0,3 | 17 | 20 | 20 | IR 17x20x20 |
| **25** | 11 | 9,5 | 25 | 42,1 | – | 0,6 | 37,7 | 0,6 | 0,3 | 20 | 25 | 20 | IR 20x25x20 |
| | 11 | 9,5 | 25 | – | 43,2 | 0,6 | 37,7 | 0,6 | 0,3 | 20 | 25 | 20 | IR 20x25x20 |
| **30** | 11 | 9,5 | 30 | 47,1 | – | 0,6 | 42,7 | 0,6 | 0,3 | 25 | 30 | 20 | IR 25x30x20 |
| | 11 | 9,5 | 30 | – | 48,2 | 0,6 | 42,7 | 0,6 | 0,3 | 25 | 30 | 20 | IR 25x30x20 |
| **35** | 12 | 9 | 35 | 52,1 | – | 0,6 | 47,7 | 0,6 | 0,3 | 30 | 35 | 20 | IR 30x35x20 |
| | 12 | 9 | 35 | – | 53,2 | 0,6 | 47,7 | 0,6 | 0,3 | 30 | 35 | 20 | IR 30x35x20 |
| **40** | 13 | 10 | 40 | 60,1 | – | 0,6 | 55,7 | 0,6 | 0,3 | 35 | 40 | 20 | IR 35x40x20 |
| | 13 | 10 | 40 | – | 61,2 | 0,6 | 55,7 | 0,6 | 0,3 | 35 | 40 | 20 | IR 35x40x20 |
| **45** | 14 | 9 | 45 | 65,2 | – | 0,6 | 60,6 | 0,6 | 0,3 | 40 | 45 | 20 | IR 40x45x20 |
| | 14 | 9 | 45 | – | 66,5 | 0,6 | 60,6 | 0,6 | 0,3 | 40 | 45 | 20 | IR 40x45x20 |
| **50** | 14 | 10 | 50 | 70,2 | – | 0,6 | 65,5 | 0,6 | 0,6 | 45 | 50 | 25 | IR 45x50x25 |
| | 14 | 10 | 50 | – | 71,5 | 0,6 | 65,5 | 0,6 | 0,6 | 45 | 50 | 25 | IR 45x50x25 |

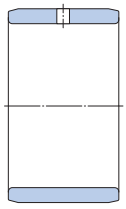
[1] For additional information → *Needle roller bearing inner rings*, page 593

## 7.11 Needle roller bearing inner rings

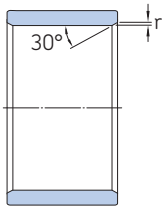
d **5 – 75** mm




IR



IR .. IS1




LR

| Dimensions | | | | Mass | | Designation |
|---|---|---|---|---|---|---|
| d | F | B | r, $r_{1,2}$ min. | | | |
| mm | | | | kg | | – |
| **5** | 8 | 12 | 0,3 | 0,0028 | | **IR 5x8x12** |
| | 8 | 16 | 0,3 | 0,0037 | | **IR 5x8x16** |
| **6** | 9 | 12 | 0,3 | 0,003 | ▸ | **IR 6x9x12** |
| | 9 | 16 | 0,3 | 0,0043 | | **IR 6x9x16** |
| **7** | 10 | 10,5 | 0,3 | 0,0031 | ▸ | **IR 7x10x10.5** |
| | 10 | 10,5 | 0,3 | 0,0031 | | **LR 7x10x10.5** |
| | 10 | 12 | 0,3 | 0,0036 | ▸ | **IR 7x10x12** |
| | 10 | 16 | 0,3 | 0,0049 | | **IR 7x10x16** |
| **8** | 12 | 10 | 0,3 | 0,0048 | ▸ | **IR 8X12X10 IS1** |
| | 12 | 10,5 | 0,3 | 0,005 | | **IR 8x12x10.5** |
| | 12 | 10,5 | 0,3 | 0,005 | | **LR 8x12x10.5** |
| | 12 | 12,5 | 0,3 | 0,0059 | ▸ | **IR 8x12x12.5** |
| **9** | 12 | 12 | 0,3 | 0,0044 | | **IR 9x12x12** |
| | 12 | 16 | 0,3 | 0,006 | | **IR 9x12x16** |
| **10** | 13 | 12,5 | 0,3 | 0,0052 | ▸ | **IR 10x13x12.5** |
| | 13 | 12,5 | 0,3 | 0,0052 | | **LR 10x13x12.5** |
| | 14 | 13 | 0,3 | 0,0074 | | **IR 10x14x13** |
| | 14 | 16 | 0,3 | 0,0092 | ▸ | **IR 10x14x16** |
| | 14 | 20 | 0,3 | 0,012 | | **IR 10x14x20** |
| **12** | 15 | 12 | 0,3 | 0,0057 | | **IR 12x15x12** |
| | 15 | 12,5 | 0,3 | 0,0061 | ▸ | **IR 12x15x12.5** |
| | 15 | 12,5 | 0,3 | 0,0061 | | **LR 12x15x12.5** |
| | 15 | 16 | 0,3 | 0,0076 | ▸ | **IR 12x15x16** |
| | 15 | 16,5 | 0,3 | 0,0081 | | **IR 12x15x16.5** |
| | 15 | 22,5 | 0,3 | 0,011 | | **IR 12x15x22.5** |
| | 15 | 22,5 | 0,3 | 0,011 | | **LR 12x15x22.5** |
| | 16 | 13 | 0,3 | 0,0085 | ▸ | **IR 12x16x13** |
| | 16 | 16 | 0,3 | 0,011 | | **IR 12x16x16** |
| | 16 | 20 | 0,3 | 0,014 | ▸ | **IR 12x16x20** |
| | 16 | 22 | 0,3 | 0,015 | | **IR 12x16x22** |
| **14** | 17 | 17 | 0,3 | 0,0095 | ▸ | **IR 14x17x17** |

| Dimensions | | | | Mass | | Designation |
|---|---|---|---|---|---|---|
| d | F | B | r, $r_{1,2}$ min. | | | |
| mm | | | | kg | | – |
| **15** | 18 | 12,5 | 0,3 | 0,0072 | | **LR 15x18x12.5** |
| | 18 | 16 | 0,3 | 0,0094 | | **IR 15x18x16** |
| | 18 | 16,5 | 0,3 | 0,0098 | | **IR 15x18x16.5** |
| | 19 | 16 | 0,3 | 0,013 | | **IR 15x19x16** |
| | 19 | 20 | 0,3 | 0,016 | | **IR 15x19x20** |
| | 20 | 13 | 0,3 | 0,014 | | **IR 15x20x13** |
| | 20 | 23 | 0,3 | 0,024 | | **IR 15x20x23** |
| **17** | 20 | 16 | 0,3 | 0,011 | ▸ | **IR 17x20x16** |
| | 20 | 16,5 | 0,3 | 0,011 | ▸ | **IR 17x20x16.5** |
| | 20 | 16,5 | 0,3 | 0,011 | | **LR 17x20x16.5** |
| | 20 | 20 | 0,3 | 0,014 | ▸ | **IR 17x20x20** |
| | 20 | 20,5 | 0,3 | 0,014 | ▸ | **IR 17x20x20.5** |
| | 20 | 20,5 | 0,3 | 0,014 | | **LR 17x20x20.5** |
| | 20 | 30,5 | 0,3 | 0,021 | ▸ | **IR 17x20x30.5** |
| | 20 | 30,5 | 0,3 | 0,021 | | **LR 17x20x30.5** |
| | 22 | 13 | 0,3 | 0,015 | ▸ | **IR 17x22x13** |
| | 22 | 16 | 0,3 | 0,018 | ▸ | **IR 17x22x16** |
| | 22 | 23 | 0,3 | 0,027 | ▸ | **IR 17x22x23** |
| | 24 | 20 | 0,6 | 0,034 | ▸ | **IR 17x24x20** |
| **20** | 24 | 16 | 0,3 | 0,015 | | **IR 20x24x16** |
| | 24 | 20 | 0,3 | 0,021 | ▸ | **IR 20x24x20** |
| | 25 | 12,5 | 0,3 | 0,016 | | **LR 20x25x12.5** |
| | 25 | 16,5 | 0,3 | 0,022 | | **LR 20x25x16.5** |
| | 25 | 17 | 0,3 | 0,025 | | **IR 20x25x17** |
| | 25 | 20 | 0,3 | 0,028 | ▸ | **IR 20x25x20** |
| | 25 | 20,5 | 0,3 | 0,027 | ▸ | **IR 20x25x20.5** |
| | 25 | 20,5 | 0,3 | 0,027 | | **LR 20x25x20.5** |
| | 25 | 26,5 | 0,3 | 0,038 | ▸ | **IR 20x25x26.5** |
| | 25 | 26,5 | 0,3 | 0,038 | | **LR 20x25x26.5** |
| | 25 | 30 | 0,3 | 0,04 | ▸ | **IR 20x25x30** |
| | 25 | 38,5 | 0,3 | 0,053 | ▸ | **IR 20x25x38.5** |
| | 28 | 20 | 0,6 | 0,045 | | **IR 20x28x20** |

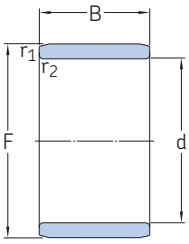
▸ Popular item

| Dimensions | | | | Mass | Designation |
|---|---|---|---|---|---|
| d | F | B | r, $r_{1,2}$ min. | | |
| mm | | | | kg | – |
| **22** | 26 | 16 | 0,3 | 0,018 | **IR 22x26x16** |
| | 26 | 20 | 0,3 | 0,023 | **IR 22x26x20** |
| | 28 | 17 | 0,3 | 0,03 | ▸ **IR 22x28x17** |
| | 28 | 20 | 0,3 | 0,035 | **IR 22x28x20** |
| | 28 | 20,5 | 0,3 | 0,036 | **IR 22x28x20.5** |
| | 28 | 30 | 0,3 | 0,054 | **IR 22x28x30** |
| **25** | 29 | 20 | 0,3 | 0,026 | **IR 25x29x20** |
| | 29 | 30 | 0,3 | 0,039 | **IR 25x29x30** |
| | 30 | 12,5 | 0,3 | 0,02 | ▸ **LR 25x30x12.5** |
| | 30 | 16,5 | 0,3 | 0,027 | **LR 25x30x16.5** |
| | 30 | 17 | 0,3 | 0,027 | ▸ **IR 25x30x17** |
| | 30 | 20 | 0,3 | 0,033 | ▸ **IR 25x30x20** |
| | 30 | 20,5 | 0,3 | 0,033 | ▸ **IR 25x30x20.5** |
| | 30 | 20,5 | 0,3 | 0,033 | **LR 25x30x20.5** |
| | 30 | 26,5 | 0,3 | 0,046 | ▸ **IR 25x30x26.5** |
| | 30 | 26,5 | 0,3 | 0,046 | **LR 25x30x26.5** |
| | 30 | 30 | 0,3 | 0,053 | ▸ **IR 25x30x30** |
| | 30 | 32 | 0,3 | 0,056 | **IR 25x30x32** |
| | 30 | 38,5 | 0,3 | 0,065 | ▸ **IR 25x30x38.5** |
| | 30 | 38,5 | 0,3 | 0,065 | **LR 25x30x38.5** |
| | 32 | 22 | 0,6 | 0,053 | **IR 25x32x22** |
| **28** | 32 | 17 | 0,3 | 0,025 | **IR 28x32x17** |
| | 32 | 20 | 0,3 | 0,029 | **IR 28x32x20** |
| | 32 | 30 | 0,3 | 0,044 | **IR 28x32x30** |
| **30** | 35 | 12,5 | 0,3 | 0,023 | **LR 30x35x12.5** |
| | 35 | 13 | 0,3 | 0,025 | ▸ **IR 30x35x13** |
| | 35 | 16 | 0,3 | 0,034 | **IR 30x35x16** |
| | 35 | 17 | 0,3 | 0,036 | ▸ **IR 30x35x17** |
| | 35 | 20 | 0,3 | 0,039 | ▸ **IR 30x35x20** |
| | 35 | 20,5 | 0,3 | 0,04 | **IR 30x35x20.5** |
| | 35 | 20,5 | 0,3 | 0,04 | **LR 30x35x20.5** |
| | 35 | 26 | 0,3 | 0,05 | ▸ **IR 30x35x26** |
| | 35 | 30 | 0,3 | 0,059 | ▸ **IR 30x35x30** |
| | 37 | 22 | 0,6 | 0,062 | **IR 30x37x22** |
| **32** | 37 | 20 | 0,3 | 0,042 | **IR 32x37x20** |
| | 37 | 30 | 0,3 | 0,062 | ▸ **IR 32x37x30** |
| | 40 | 20 | 0,6 | 0,068 | **IR 32x40x20** |
| | 40 | 36 | 0,6 | 0,12 | ▸ **IR 32x40x36** |
| **35** | 40 | 12,5 | 0,3 | 0,027 | **LR 35x40x12.5** |
| | 40 | 16,5 | 0,3 | 0,037 | **LR 35x40x16.5** |
| | 40 | 17 | 0,3 | 0,038 | **IR 35x40x17** |
| | 40 | 20 | 0,3 | 0,044 | ▸ **IR 35x40x20** |
| | 40 | 20,5 | 0,3 | 0,046 | ▸ **IR 35x40x20.5** |
| | 40 | 20,5 | 0,3 | 0,046 | **LR 35x40x20.5** |
| | 40 | 30 | 0,3 | 0,067 | ▸ **IR 35x40x30** |
| | 42 | 36 | 0,6 | 0,12 | ▸ **IR 35x42x36** |
| | 43 | 22 | 0,6 | 0,082 | **IR 35x43x22** |
| **38** | 43 | 20 | 0,3 | 0,048 | **IR 38x43x20** |
| | 43 | 30 | 0,3 | 0,074 | **IR 38x43x30** |

| Dimensions | | | | Mass | Designation |
|---|---|---|---|---|---|
| d | F | B | r, $r_{1,2}$ min. | | |
| mm | | | | kg | – |
| **40** | 45 | 16,5 | 0,3 | 0,041 | **LR 40x45x16.5** |
| | 45 | 17 | 0,3 | 0,043 | **IR 40x45x17** |
| | 45 | 20 | 0,3 | 0,049 | ▸ **IR 40x45x20** |
| | 45 | 20,5 | 0,3 | 0,052 | **IR 40x45x20.5** |
| | 45 | 20,5 | 0,3 | 0,052 | **LR 40x45x20.5** |
| | 45 | 30 | 0,3 | 0,084 | ▸ **IR 40x45x30** |
| | 48 | 22 | 0,6 | 0,092 | ▸ **IR 40x48x22** |
| | 48 | 40 | 0,6 | 0,17 | ▸ **IR 40x48x40** |
| | 50 | 22 | 1 | 0,12 | **IR 40x50x22** |
| **42** | 47 | 20 | 0,3 | 0,053 | **IR 42x47x20** |
| | 47 | 30 | 0,3 | 0,081 | **IR 42x47x30** |
| **45** | 50 | 20,5 | 0,3 | 0,059 | **LR 45x50x20.5** |
| | 50 | 25 | 0,6 | 0,071 | ▸ **IR 45x50x25** |
| | 50 | 25,5 | 0,3 | 0,075 | **IR 45x50x25.5** |
| | 50 | 25,5 | 0,3 | 0,075 | **LR 45x50x25.5** |
| | 50 | 35 | 0,6 | 0,1 | ▸ **IR 45x50x35** |
| | 52 | 22 | 0,6 | 0,089 | ▸ **IR 45x52x22** |
| | 52 | 40 | 0,6 | 0,16 | **IR 45x52x40** |
| | 55 | 22 | 1 | 0,13 | ▸ **IR 45x55x22** |
| **50** | 55 | 20,5 | 0,6 | 0,064 | **LR 50x55x20.5** |
| | 55 | 25 | 0,6 | 0,078 | ▸ **IR 50x55x25** |
| | 55 | 35 | 0,6 | 0,11 | ▸ **IR 50x55x35** |
| | 58 | 22 | 0,6 | 0,12 | **IR 50x58x22** |
| | 58 | 40 | 0,6 | 0,21 | **IR 50x58x40** |
| | 60 | 25 | 1 | 0,16 | ▸ **IR 50x60x25** |
| | 60 | 28 | 1,1 | 0,18 | **IR 50x60x28** |
| **55** | 60 | 25 | 0,6 | 0,086 | ▸ **IR 55x60x25** |
| | 60 | 35 | 0,6 | 0,12 | ▸ **IR 55x60x35** |
| | 63 | 25 | 1 | 0,14 | **IR 55x63x25** |
| | 63 | 45 | 1 | 0,26 | **IR 55x63x45** |
| | 65 | 28 | 1,1 | 0,2 | ▸ **IR 55x65x28** |
| **60** | 68 | 25 | 1 | 0,15 | **IR 60x68x25** |
| | 68 | 35 | 0,6 | 0,21 | ▸ **IR 60x68x35** |
| | 68 | 45 | 1 | 0,28 | ▸ **IR 60x68x45** |
| | 70 | 25 | 1 | 0,2 | ▸ **IR 60x70x25** |
| | 70 | 28 | 1,1 | 0,22 | ▸ **IR 60x70x28** |
| **65** | 72 | 25 | 1 | 0,14 | ▸ **IR 65x72x25** |
| | 72 | 45 | 1 | 0,26 | **IR 65x72x45** |
| | 73 | 35 | 1 | 0,23 | **IR 65x73x35** |
| | 75 | 28 | 1,1 | 0,23 | ▸ **IR 65x75x28** |
| **70** | 80 | 25 | 1 | 0,22 | ▸ **IR 70x80x25** |
| | 80 | 30 | 1 | 0,27 | **IR 70x80x30** |
| | 80 | 35 | 1 | 0,31 | ▸ **IR 70x80x35** |
| | 80 | 54 | 1 | 0,49 | ▸ **IR 70x80x54** |
| **75** | 85 | 25 | 1 | 0,24 | **IR 75x85x25** |
| | 85 | 35 | 1 | 0,34 | ▸ **IR 75x85x35** |
| | 85 | 54 | 1 | 0,53 | ▸ **IR 75x85x54** |



▸ Popular item




| Dimensions | | | | Mass | Designation |
|---|---|---|---|---|---|
| d | F | B | r, $r_{1,2}$ min. | | |
| mm | | | | kg | – |
| **80** | 90 | 25 | 1 | 0,25 | ▸ **IR 80x90x25** |
| | 90 | 30 | 1 | 0,3 | ▸ **IR 80x90x30** |
| | 90 | 35 | 1 | 0,36 | ▸ **IR 80x90x35** |
| | 90 | 54 | 1 | 0,56 | ▸ **IR 80x90x54** |
| **85** | 95 | 26 | 1 | 0,28 | ▸ **IR 85x95x26** |
| | 95 | 36 | 1 | 0,39 | **IR 85x95x36** |
| | 100 | 35 | 1,1 | 0,58 | ▸ **IR 85x100x35** |
| | 100 | 63 | 1,1 | 1,05 | **IR 85x100x63** |
| **90** | 100 | 26 | 1 | 0,29 | ▸ **IR 90x100x26** |
| | 100 | 30 | 1 | 0,34 | **IR 90x100x30** |
| | 100 | 36 | 1 | 0,41 | ▸ **IR 90x100x36** |
| | 105 | 35 | 1,1 | 0,61 | ▸ **IR 90x105x35** |
| **95** | 105 | 26 | 1 | 0,31 | **IR 95x105x26** |
| **100** | 110 | 40 | 1,1 | 0,51 | ▸ **IR 100x110x40** |
| | 115 | 40 | 1,1 | 0,8 | ▸ **IR 100x115x40** |
| **110** | 120 | 30 | 1 | 0,41 | ▸ **IR 110x120x30** |
| | 125 | 40 | 1,1 | 0,84 | ▸ **IR 110x125x40** |
| **120** | 130 | 30 | 1 | 0,44 | ▸ **IR 120x130x30** |
| | 135 | 45 | 1,1 | 1,05 | ▸ **IR 120x135x45** |
| **130** | 145 | 35 | 1,1 | 0,86 | ▸ **IR 130x145x35** |
| | 150 | 50 | 1,5 | 1,7 | ▸ **IR 130x150x50** |
| **140** | 155 | 35 | 1,1 | 0,92 | ▸ **IR 140x155x35** |
| | 160 | 50 | 1,5 | 1,8 | ▸ **IR 140x160x50** |
| **150** | 165 | 40 | 1,1 | 1,1 | ▸ **IR 150x165x40** |
| **160** | 175 | 40 | 1,1 | 1,2 | ▸ **IR 160x175x40** |
| **170** | 185 | 45 | 1,1 | 1,45 | ▸ **IR 170x185x45** |
| **180** | 195 | 45 | 1,1 | 1,5 | ▸ **IR 180x195x45** |
| **190** | 210 | 50 | 1,5 | 2,4 | ▸ **IR 190x210x50** |
| **200** | 220 | 50 | 1,5 | 2,5 | ▸ **IR 200x220x50** |
| **220** | 240 | 50 | 1,5 | 2,75 | ▸ **IR 220x240x50** |
| **240** | 265 | 60 | 2 | 4,6 | **IR 240x265x60** |

▸ Popular item

# 8 Tapered roller bearings

# 8 Tapered roller bearings


**Designs and variants** . . . . . **669**
Single row tapered roller bearings . . . . . 669
Basic design bearings . . . . . 669
Application-specific bearings . . . . . 669
Bearings with a flanged outer ring . . . . . 670
Matched tapered roller bearings . . . . . 670
Matched bearings arranged face-to-face . . . . . 670
Matched bearings arranged back-to-back . . . . . 670
Matched bearings arranged in tandem . . . . . 671
Double row tapered roller bearings . . . . . 671
TDO design bearings . . . . . 671
TDI design bearings . . . . . 672
Variants/features . . . . . 674
SKF Explorer bearings . . . . . 675
Cages . . . . . 675

**Bearing data** . . . . . **676**
(Dimension standards, tolerances, internal clearance, preload, permissible misalignment)

**Loads** . . . . . **680**
(Minimum load, equivalent dynamic bearing load, equivalent static bearing load)
Calculating the axial load for bearings mounted singly or paired in tandem . . . . . 681
Calculating the radial load acting on matched bearings . . 683
Comparative load ratings for double row tapered roller bearings . . . . . 685

**Temperature limits** . . . . . **685**

**Permissible speed** . . . . . **686**

**Design considerations** . . . . . **687**
Single row and matched tapered roller bearings . . . . . 687
Adjustment procedure . . . . . 687
Fits . . . . . 687

**Mounting** . . . . . **690**
Double row tapered roller bearings . . . . . 690
Load zone . . . . . 690

**Bearing designations** . . . . . **691**
Metric bearings . . . . . 691
Inch bearings . . . . . 691

**Designation system** . . . . . **692**

**Product tables**
**8.1** Metric single row tapered roller bearings . . . . . 694
**8.2** Inch single row tapered roller bearings . . . . . 714
**8.3** Single row tapered roller bearings with a flanged outer ring . . . . . 742
**8.4** Matched bearings arranged face-to-face . . . . . 744
**8.5** Matched bearings arranged back-to-back . . . . . 754
**8.6** Matched bearings arranged in tandem . . . . . 760
**8.7** Double row tapered roller bearings, TDO design . . 762
**8.8** Double row tapered roller bearings, TDI design . . . 766

**Other tapered roller bearings**
Bearings with Solid Oil . . . . . 1023
Four-row tapered roller bearings → skf.com/bearings
INSOCOAT bearings → contact SKF
NoWear coated bearings → contact SKF
Hub units for industrial, automotive, railway and off-highway applications → contact SKF

# 8 Tapered roller bearings

## More information


**General bearing knowledge** . . . . **17**

**Bearing selection process** . . . . . **59**
Lubrication . . . . . 109
Bearing interfaces. . . . . 139
Seat tolerances for standard conditions . . . . . 148
Selecting internal clearance or preload . . . . . 182
Sealing, mounting and dismounting . . . . . 193

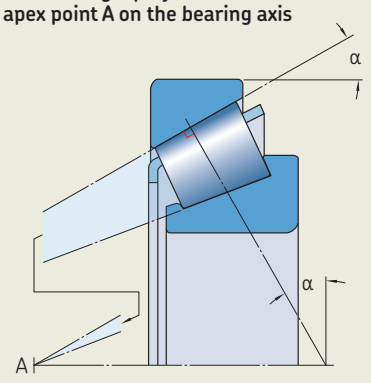

**Mounting instructions for individual bearings** → skf.com/mount


*SKF bearing maintenance handbook* ISBN 978-91-978966-4-1


Tapered roller bearings have tapered inner and outer ring raceways as well as tapered rollers. They are designed to accommodate combined loads, i.e. simultaneously acting radial and axial loads. The projection lines of the raceways meet at a common point on the bearing axis (apex point A, **fig. 1**) to provide a true rolling action and therefore low frictional moments during operation. The axial load carrying capacity of tapered roller bearings increases with increasing contact angle α. The size of the contact angle, which is usually between 10° and 30°, is related to the calculation factor e (**product tables**, **page 694**): the larger the value of e, the larger the contact angle.

**Fig. 1**

**Contact angle projection lines meet at apex point A on the bearing axis**



## Bearing features

- **Low friction**
  The optimized roller end design and surface finish on the flange (fig. 2) promote lubricant film formation, resulting in lower friction. This also reduces frictional heat and flange wear. In addition, the bearings can better maintain preload and run at reduced noise levels.

- **Long service life**
  The crowned raceway profiles of basic design bearings and the logarithmic raceway profiles of SKF Explorer bearings optimize the load distribution along the contact surfaces, reduce stress peaks at the roller ends (fig. 3), and reduce the sensitivity to misalignment and shaft deflection compared with conventional straight raceway profiles (fig. 4).

- **Enhanced operational reliability**
  Optimized surface finish on the contact surfaces of the rollers and raceways supports the formation of a hydrodynamic lubricant film.

Fig. 2

**Roller end / flange contact area**

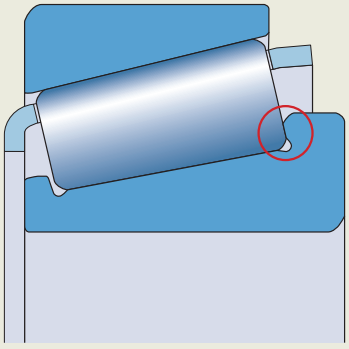


Fig. 3

**Load distribution and stress reduction**

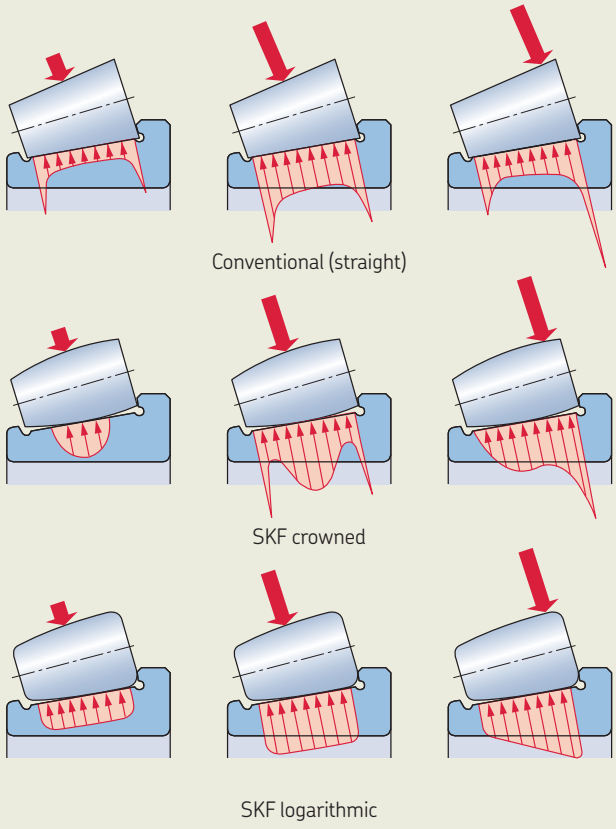
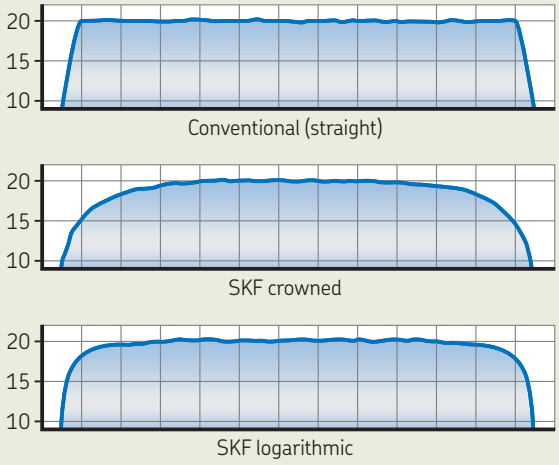



Fig. 4

**Raceway profiles**




8

- **Consistency of roller profiles and sizes**
  The rollers incorporated in SKF tapered roller bearings are manufactured to such close dimensional and geometrical tolerances that they are practically identical. This provides optimal load distribution, reduces noise and vibration, and enables preload to be set more accurately.

- **Rigid bearing application**
  A single row tapered roller bearing is typically adjusted against a second tapered roller bearing. By applying a preload, a rigid bearing application can be achieved.

- **Running-in period with reduced temperature peaks**
  Tapered roller bearings typically have a running-in period, during which a conventional design tapered roller bearing experiences a significant amount of friction, resulting in wear. This effect is noticed as a temperature spike (**diagram 1**). With SKF tapered roller bearing designs, friction, frictional heat and wear are significantly reduced, provided the bearings are mounted and lubricated correctly.

- **Separable and interchangeable**
  Depending on the design, tapered roller bearings are separable and components of same-sized bearings are fully interchangeable. For example, single row tapered roller bearings are separable (**fig. 5**), i.e. the inner ring with roller and cage assembly (cone) can be mounted separately from the outer ring (cup). This facilitates mounting, dismounting and also maintenance inspection routines.

SKF manufactures tapered roller bearings in many designs, series and sizes. In addition to the bearings presented in this catalogue, SKF supplies tapered roller bearings for special application requirements. This assortment includes:

- *Four-row tapered roller bearings*
  → skf.com/bearings
- hub units for industrial, automotive, railway and off-highway applications
  → contact SKF

On request, SKF can also supply customized tapered roller bearings for various operating conditions to meet the customer and application requirements.

**Fig. 5**

**Separable bearing**

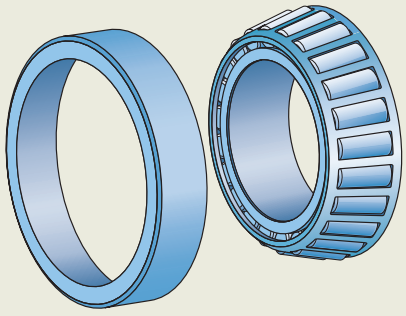
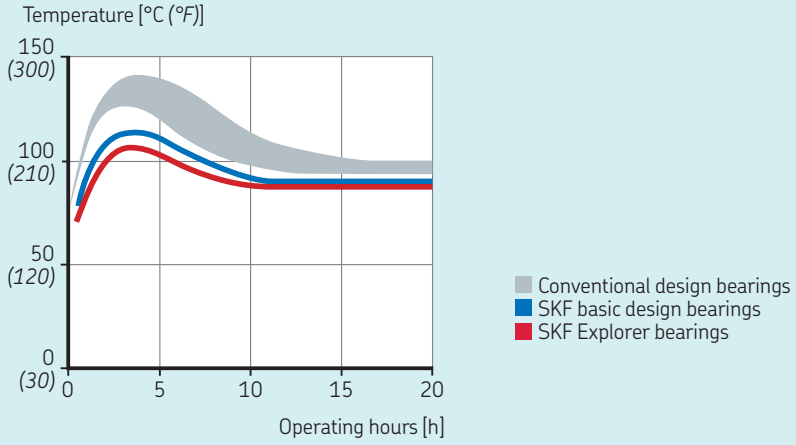


**Diagram 1**

**Typical temperature behaviour of tapered roller bearings during the running-in period (approximate values)**



# Designs and variants

## Single row tapered roller bearings

SKF single row tapered roller bearings (fig. 6) are available in many designs and variants and in many series and sizes, including:

- basic design bearings
- application-specific bearings
- bearings with a flanged outer ring
- SKF Explorer bearings (page 675)

### Basic design bearings

- have a design and internal geometry that provide long service life
- have crowned raceway profiles and an optimized surface finish of the inner ring guide flange that enables them to run cooler and consume less lubricant than conventional design bearings
- have load rating values that are in accordance with ISO and even above (product tables, page 762)
- offer a cost-effective solution for standard industrial applications

On request, SKF can also supply any inner ring with roller and cage assembly (cone) or any outer ring (cup) separately (fig. 7).

### Application-specific bearings

For applications where the bearings are subjected to unique operating conditions, SKF manufactures customized single row tapered roller bearings on request. To meet the needs of these particular applications, SKF manufactures, for example, pinion or low-friction bearings with the following features:

### Pinion bearings

- are designed for pinion shafts in the differentials of automotive transmissions to provide a constant, accurate gear mesh
- have very narrow geometrical tolerances and high preload capability
- have special friction characteristics and can be axially adjusted within narrow limits using the friction-torque method
- have an internal design that supports the formation of a hydrodynamic lubricant film to substantially reduce friction, and consequently the operating temperature, during the running-in period
- retain their preload setting when mounted, lubricated and maintained properly
- are identified by the designation suffix CL7C

### Low-friction bearings

- are designed to meet the ever-increasing demands to reduce friction and energy use
- optimize a reduction in friction through their internal geometry, number of rollers, surface finish and redesign of their cage
- have a frictional moment that is at least 30% lower when compared with a same-sized SKF standard bearing
- normally do not need a running-in procedure because their optimized contact profiles provide optimum load distribution and they experience only a small, controlled loss of initial preload
- generate less frictional heat and therefore enable extended lubrication intervals or operation at higher speeds
- have a roller and cage assembly with a lower mass and therefore reduced inertial forces in the bearing, which reduce the risk of skidding and smearing
- are typically used in automotive and industrial transmissions

Fig. 6

**Single row tapered roller bearing**

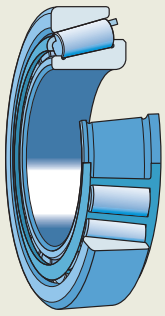


Fig. 7

**Separately packed components**

## Bearings with a flanged outer ring

SKF also manufactures certain sizes of single row tapered roller bearings with a flange on the outer ring (fig. 8). These bearings are easy to locate axially in the housing. The housing bore can be manufactured more easily and more cost-effectively because housing shoulders are not required.

# Matched tapered roller bearings

The SKF assortment of matched single row tapered roller bearings (fig. 9) is based on popular sizes of single row tapered roller bearings. Depending on the application requirements, matched tapered roller bearings are available in different designs and variants:

- matched bearings arranged face-to-face
- matched bearings arranged back-to-back
- matched bearings arranged in tandem
- basic design and SKF Explorer bearings (page 675)

The matched bearings listed in the product tables constitute the basic SKF assortment. SKF can supply other matched bearings on request.

Depending on the design, matched bearings can locate the shaft axially in both directions with a specific axial clearance or preload. Also depending on the design, these bearings can provide a relatively stiff bearing arrangement.

The bearings and ring spacer(s) are matched in production, are delivered as a set and are ready-to-mount.

## Matched bearings arranged face-to-face

- have load lines that converge toward the bearing axis (fig. 10)
- can accommodate a limited amount of misalignment
- can accommodate axial loads in both directions
- are supplied with an intermediate outer ring spacer as a set

## Matched bearings arranged back-to-back

- have load lines that diverge toward the bearing axis (fig. 11)
- provide a relatively stiff bearing arrangement
- can accommodate tilting moments
- can accommodate axial loads in both directions
- are supplied with intermediate inner and outer ring spacers as a set

Fig. 8

**Bearing with a flanged outer ring**

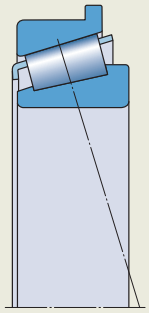


Fig. 9

**Matched single row tapered roller bearings**

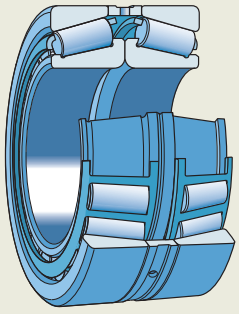


Fig. 10

**Matched bearings arranged face-to-face**

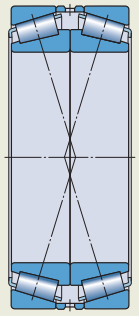
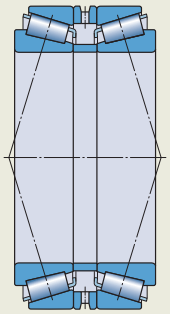


Fig. 11

**Matched bearings arranged back-to-back**



## Matched bearings arranged in tandem

- have load lines that are parallel (fig. 12)
- share radial and axial loads equally
- are used when the load carrying capacity of a single bearing is inadequate
- can accommodate axial loads in one direction only

  If axial loads act in both directions, a third bearing must be added and adjusted against the tandem pair.
- are supplied with intermediate inner and outer ring spacers as a set

# Double row tapered roller bearings

SKF manufactures double row tapered roller bearings in the TDO (fig. 13) and TDI (fig. 14) designs, in many variants and with different features.

Depending on the design, these bearings can accommodate heavy radial loads, axial loads in both directions and have a high degree of stiffness. Therefore, they provide a stiff bearing arrangement and locate the shaft in both directions with a specific axial clearance or preload. Because of their second row of rollers, double row tapered roller bearings are suitable for heavy radial and axial loads.

Double row tapered roller bearings are typically used in gearboxes, hoisting equipment, rolling mills and machines in the mining industry, e.g. tunnelling machines.

## TDO design bearings

- have one double row outer ring (double cup) and two inner rings with roller and cage assemblies (cones), usually with an intermediate ring between the two inner rings (fig. 13)
- have rows of rollers arranged back-to-back (load lines diverge toward the bearing axis), which enable stiff arrangements and accommodate considerable tilting moments
- are ready-to-mount units, manufactured with the predetermined axial clearance or preload
- can be used either as locating or non-locating bearings:
  - for non-locating arrangements, the axial displacement should take place between the outer ring and the housing bore
  - bearings with a blind hole or locating slot in the outer ring can be used with a cylindrical pin engaged in the hole or slot to prevent the outer ring from turning in its seat

SKF manufactures TDO design bearings in many variants (table 1, page 672).

Fig. 12

**Matched bearings arranged in tandem**

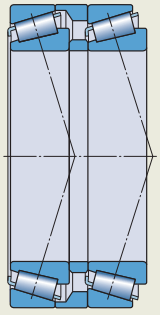


Fig. 13

**TDO design**

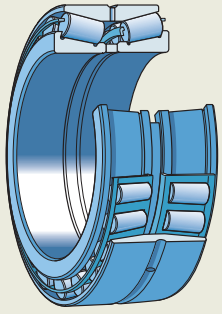
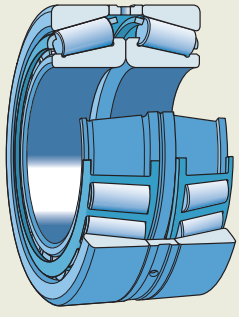


Fig. 14

**TDI design**



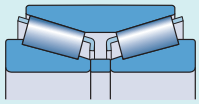
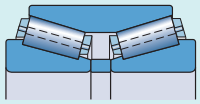
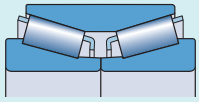
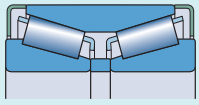
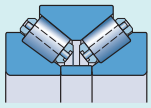
## TDI design bearings

- have two outer rings (cups) and one double row inner ring with two roller and cage assemblies (double cone), usually with an intermediate ring between the two outer rings (fig. 14, page 671)
- have rows of rollers arranged face-to-face (load lines converge toward the bearing axis)
- are available open or capped with shields or seals
  - HNBR or FKM contact seal on both sides
- are ready-to-mount units, manufactured with the predetermined axial clearance or preload
- are designed primarily for use as locating bearings
- are available with a helical groove in the bore and/or lubrication grooves in the side faces of the bearing rings (fig. 15):
  - where a loose fit on the shaft is needed, these grooves counteract the disadvantage of a loose fit
  - when the inner ring turns on its seat under load, these grease-filled grooves enable lubricant to be supplied between the inner ring and seat surfaces
  - in addition, the grooves can absorb wear particles

SKF manufactures TDI design bearings in many variants (table 2).

Table 1

**TDO design variants and characteristics**

| Design variant | | Characteristics |
|---|---|---|
| TDO |  | • intermediate ring between two inner rings<br>• steel window-type cages |
| TDO.1 |  | • intermediate ring between two inner rings<br>• steel pin-type cages (pierced rollers) for higher loads |
| TDON |  | • without intermediate ring<br>• inner rings abut each other<br>• steel window-type cages |
| TDO/Z |  | • intermediate ring between two inner rings<br>• steel window-type cages<br>• sheet steel shield on both sides |
| TDOS.1 |  | • steep contact angle α<br>• for applications where high axial loads or high tilting moments occur in combination with radial loads<br>• intermediate ring between two inner rings<br>• steel pin-type cages (pierced rollers) for higher loads |

**⚠ WARNING**

Seals made of FKM (fluoro rubber) exposed to an open flame or temperatures above 300 °C *(570 °F)* are a health and environmental hazard! They remain dangerous even after they have cooled.

Read and follow the safety precautions on page 197.

Fig. 15

**Helical groove in the bore and lubrication grooves in the side faces of the bearing rings**

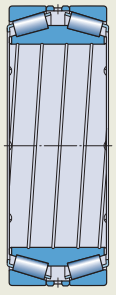
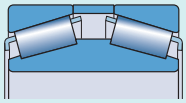
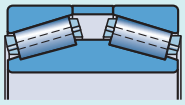
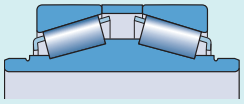
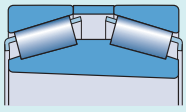
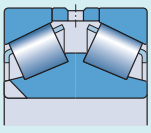
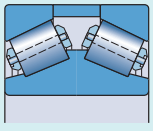
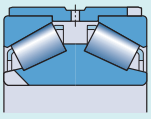


Table 2

**TDI design variants and characteristics**

| Design variant | | Characteristics |
|---|---|---|
| **TDI** |  | • intermediate ring between two outer rings<br>• steel window-type cages |
| **TDI.1** |  | • intermediate ring between two outer rings<br>• steel pin-type cages (pierced rollers) for higher loads |
| **TDIE** |  | • intermediate ring between two outer rings<br>• steel window-type cages<br>• inner ring extensions at both sides<br>– extensions are ground as counterface for seal lips |
| **TDIT** |  | • intermediate ring between two outer rings<br>• tapered bore, taper 1:12<br>• steel window-type cages |
| **TDIS** |  | • steel contact angle α<br>• for applications where high axial loads in combination with radial loads occur<br>• intermediate ring between two outer rings<br>• steel window-type cages<br>• used in rolling mill applications with a loose fit on the roll neck and only subjected to purely axial load<br>• the inner ring has one or more locating slots (notches) in one or both side faces to prevent it from turning on its seat<br>• depending on the application, the bearings can be supplied with or without an intermediate ring between the two outer rings |
| **TDIS.1** |  | • steel contact angle α<br>• for applications where high axial loads in combination with radial loads occur<br>• intermediate ring between two outer rings<br>• steel pin-type cages (pierced rollers) for higher loads |
| **TDIS.2** |  | • self-retaining unit with a retention sleeve over the outer rings<br>• the outer rings are pressed into the sleeve<br>• the deformation of the outer rings normally resulting from heavy axial loads is considerably reduced<br>– as a consequence, the stress distribution in the rolling contacts is more favourable and extends bearing service life<br>• the axial internal clearance is determined by the sleeve<br>• preloading by means of springs is unnecessary<br>• steel contact angle α<br>• for applications where high axial loads in combination with radial loads occur<br>• the simplified and economic design facilitates mounting, dismounting and also maintenance inspection routines |

## Optional TDI design bearings composed of four-row tapered roller bearing components

On request, TDI design bearings with dimensions different from those listed in the TDI design product table can be specially created as tailored double row bearings using standard components of SKF four-row tapered roller bearings in the TQO design, but without intermediate rings (TQO design, skf.com/go/17000-8-9). For example, it is possible to combine standard components as follows (**fig. 16**):

- two single row outer rings (cups)
- one double row inner ring (double cone)
- two roller and cage assemblies

This option may be advantageous as regards both price and delivery time and should be considered if sealed double row bearings are required, although this will require a non-standard inner ring. For details about this option, contact the SKF application engineering service.

## Variants/features

SKF manufactures TDO and TDI design bearings in many variants and with different features. Bearing-related design variants and features are identified in the **product tables**, **page 762**, under *Design variant/feature*. For other sizes, design variants or feature combinations not listed in the product tables, contact SKF. Design variants and features are identified by the following characters within designation suffixes:

### Design variants

**E** Extended inner ring
**N** Without intermediate ring
**S** Steep contact angle α
**T** Tapered bore, taper 1:12
**.1** Steel pin-type cages and pierced rollers
**.2** Retention sleeve over the outer rings

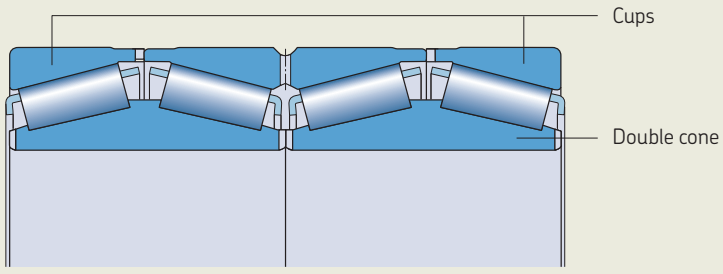
### Features

(TDO → **fig. 17**, TDI → **fig. 18**)

**C** Outer ring with blind hole to prevent, together with a cylindrical pin, the outer ring from turning in its seat
**D** Outer ring with annular groove and lubrication holes (TDO), inner ring with annular groove and lubrication holes (TDI)
**D0** Outer ring with annular groove and lubrication holes, without intermediate ring between the inner rings
**D2** Outer ring with annular groove and lubrication holes, intermediate ring with lubrication holes or lubrication grooves between the inner rings
**D3** Outer ring with annular groove and lubrication holes, intermediate ring with annular groove and lubrication holes or lubrication grooves between the inner rings
**G** Helical groove in the inner ring bore
**N** Two locating slots (notches) at 180° in one side face of the inner ring
**N1** One locating slot in each side face of the inner ring, at 180° to slot in opposite side face
**N2** Two locating slots at 180° in both side faces of the inner ring, at 90° to slots in opposite side face
**TN9** Glass fibre reinforced PA66 cage
**V** Contact seals on both sides
**W** Lubrication grooves in the side faces of the bearing rings
**WI** Lubrication grooves in the side faces of the inner ring(s)
**WO** Lubrication grooves in the side faces of the outer ring(s)
**X** Bearings with retention sleeve with annular groove and lubrication holes over the outer rings (TDI, replaced by design variant .2)
**XD** Outer ring with lubrication holes (TDO)
**Y** Bearing without intermediate ring between the outer rings
**Y2** Intermediate ring with annular groove and lubrication holes between the outer rings (TDI)
**Z** Sheet steel shield on both sides

**Fig. 16**

**Composition of bearing components**



# SKF Explorer bearings

SKF continuously expands its assortment of SKF Explorer bearings (**page 7**). In addition to the existing SKF Explorer tapered roller bearings (**product tables**, **page 694**), SKF can also manufacture basic design tapered roller bearings as SKF Explorer bearings, on request. These SKF Explorer tapered roller bearings are identified by the designation suffix PEX.

# Cages

SKF single row and matched tapered roller bearings are fitted with one, double row tapered roller bearings are fitted with two of the cages shown in **table 3**. The standard stamped steel cage is not identified in the bearing designation. If non-standard cages are required, check availability prior to ordering.

When used at high temperatures, some lubricants can have a detrimental effect on polyamide cages. For information about the suitability of cages, refer to *Cages*, **page 187**.

**Fig. 17**

**Identification of variants/features, TDO design**

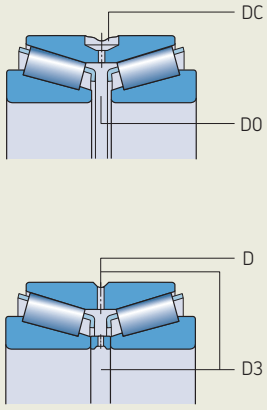



**Fig. 18**

**Identification of variants/features, TDI design**

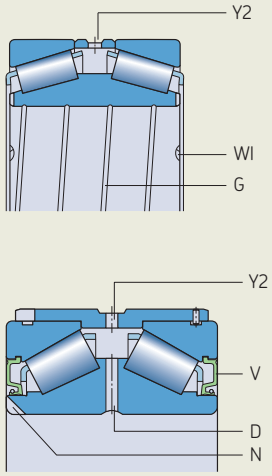
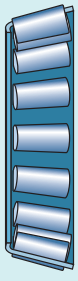
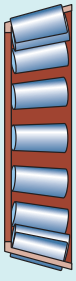
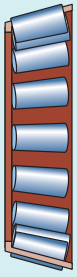
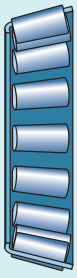
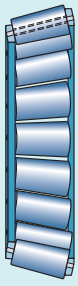
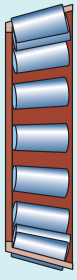



**Table 3**

**Cages for tapered roller bearings**

| | Single row and matched bearings | | | Double row bearings | | |
|---|---|---|---|---|---|---|
| |  |  |  |  |  |  |
| **Cage Type** | Window-type, roller centred | | | Window-type, roller centred | Pin-type, pierced rollers | Window-type, roller centred |
| **Material** | Stamped steel | PA66, glass fibre reinforced | PEEK, glass fibre reinforced | Stamped steel | Machined steel | PA66, glass fibre reinforced |
| **Suffix** | – | TN9 | TNH | – | .1 | TN9 |

# Bearing data

| | Metric single row bearings | Inch single row bearings |
|---|---|---|
| **Dimension standards** | Boundary dimensions:<br>ISO 355<br><br>Bearings with designation prefix J:<br>ANSI/ABMA Standard 19.1 | Boundary dimensions:<br>AFBMA Standard 19 (ANSI B3.19)<br>ANSI/ABMA Standard 19.2 has replaced the above standard, but does not include dimensions. |
| **Tolerances**<br><br>For additional information → page 35 | • Normal<br>• tighter geometrical tolerances for bearings with designation suffix CL7C<br><br>Bearings with designation prefix J:<br>ANSI/ABMA Standard 19.1<br><br>Check availability of tighter width tolerance to 6 X tolerance class (designation suffix CLN) or P5<br><br>Values: ISO 492 (table 5, page 41 to table 7, page 43 ) | Check availability of CL3, CL0 or tighter width tolerance<br><br>Values: ANSI/ABMA Standard 19.2 (table 9, page 45)<br><br>Deviating width tolerances for cups and cones are identified by a designation suffix (table 4, page 678).<br><br>The inner ring with roller and cage assembly (cone) and outer ring (cup) with the same basic designation are interchangeable. The tolerance for the total abutment width T of the bearing is not exceeded if the cones and cups are interchanged. |
| **Internal clearance**<br><br>For additional information → page 182 | Obtained after mounting, depending on adjustment against a second bearing. | |
| **Preload**<br><br>For additional information → page 182 | Obtained after mounting, depending on adjustment against a second bearing. | |
| **Permissible misalignment** | SKF Explorer bearings: ≈ 2 to 4 minutes of arc<br><br>Where misalignment cannot be avoided, SKF recommends using only SKF Explorer bearings.<br><br>The permissible angular misalignment between the inner and outer rings depends on the size and internal design of the bearing, the radial internal clearance in operation and the forces and moments acting on the bearing. As a result, only approximate values are listed here.<br>Any misalignment increases bearing noise and reduces bearing service life. | |

| | Matched bearings | Double row bearings |
|---|---|---|
| | Boundary dimensions: ISO 355 (single bearing) | • metric bearings: not standardized<br>• inch bearings: cones and cups dimensions of many inch bearings → AFBMA Standard 19 (ANSI B3.19)<br>ANSI/ABMA Standard 19.2 has replaced the above standard, but does not include dimensions. |
| | • Normal<br>• tighter geometrical tolerances for bearings with designation suffix CL7C<br>• check availability of P5<br><br>Values: ISO 492 (**table 5**, **page 41**, and **table 7**, **page 43**)<br><br>Total width tolerances: not standardized (**table 5**, **page 678**) | • dimensional tolerances (except for width T): Normal<br>• geometrical tolerances: P5<br><br>Values: ISO 492 (**table 5**, **page 41**, **table 7**, **page 43**, and **table 9**, **page 45**) |
| | Standard (**table 6**, **page 679**)<br><br>Other clearance values are identified by the designation suffix C followed by a three-digit number. For clearance values not listed in the product tables, contact SKF.<br><br>Values are valid for unmounted bearing sets under measuring loads of:<br><br>• $D \leq 90$ mm → 0,1 kN<br>• $90 < D \leq 240$ mm → 0,3 kN<br>• $D > 240$ mm → 0,5 kN | • bearings are ready-to-mount units with an axial internal clearance adapted for the actual application<br>• bearing components should be arranged in the prescribed order and may not be interchanged with components of another bearing<br>• designations with suffix C followed by a three- or four-digit number expresses mean value of the axial internal clearance in µm (for clearance values not listed in the product tables, contact SKF) |
| | – | |
| | Where misalignment cannot be avoided, SKF recommends using a face-to-face arrangement.<br>Any misalignment increases bearing noise and reduces bearing service life. | If misalignment cannot be avoided, SKF recommends using TDI design bearings (face-to-face arrangement). For information, contact the SKF application engineering service.<br>Any misalignment increases bearing noise and reduces bearing service life. |

Table 4

**Deviating width tolerances of cups and cones for inch bearings**

| Designation suffix | Width tolerance[1] $t_{\Delta Ts}$ | |
|---|---|---|
| | U | L |
| – | µm | |
| **/1** | +25 | 0 |
| **/1A** | +38 | +12 |
| **/-1** | 0 | –25 |
| **/11** | +25 | –25 |
| **/2** | +50 | 0 |
| **/2B** | +75 | +25 |
| **/2C** | +88 | +37 |
| **/-2** | 0 | –50 |
| **/22** | +50 | –55 |
| **/3** | +75 | 0 |
| **/-3** | 0 | –75 |
| **/4** | +100 | 0 |

[1] The total width tolerance for a complete bearing is equal to the sum of the tolerances for the cup and cone.

Table 5

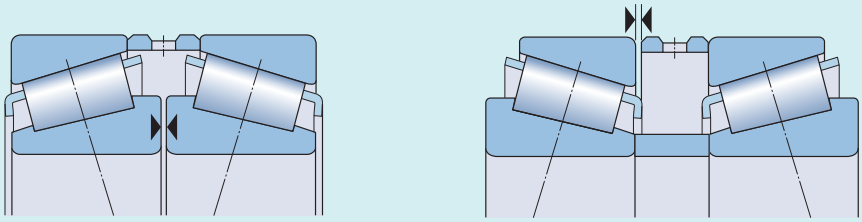
**Total width tolerances of matched metric single row tapered roller bearings**

| Bore diameter d | | Total width tolerance $\Delta_{TsD}$ of matched bearings in the series | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 329 | | 320 | | 330 | | 331 | | 302, 322 | | 332 | | 303, 323 | | 313 | |
| | | $\Delta_{TsD}$ | | $\Delta_{TsD}$ | | $\Delta_{TsD}$ | | $\Delta_{TsD}$ | | $\Delta_{TsD}$ | | $\Delta_{TsD}$ | | $\Delta_{TsD}$ | | $\Delta_{TsD}$ | |
| > | ≤ | U | L | U | L | U | L | U | L | U | L | U | L | U | L | U | L |
| mm | | µm | | | | | | | | | | | | | | | |
| **–** | **30** | – | – | +550 | +50 | – | – | – | – | +550 | +100 | +550 | +100 | +600 | +100 | +500 | +50 |
| **30** | **40** | +600 | +150 | +550 | +100 | – | – | +600 | +100 | +600 | +100 | +600 | +100 | +600 | +100 | +550 | +50 |
| **40** | **50** | +650 | +150 | +600 | +100 | +650 | +150 | +600 | +100 | +600 | +100 | +600 | +100 | +600 | +150 | +550 | +50 |
| **50** | **65** | +650 | +200 | +600 | +100 | +650 | +200 | +600 | +150 | +600 | +150 | +600 | +150 | +650 | +150 | +550 | +100 |
| **65** | **80** | +700 | +200 | +600 | +150 | +700 | +250 | +650 | +150 | +650 | +150 | +650 | +150 | +700 | +200 | +600 | +100 |
| **80** | **100** | +750 | –150 | +650 | –250 | +800 | –50 | +700 | -200 | +700 | –200 | +700 | -200 | +700 | –200 | +600 | –300 |
| **100** | **120** | +750 | –150 | +700 | –200 | +800 | –100 | +700 | -200 | +700 | –200 | +700 | -200 | +750 | –150 | +600 | –300 |
| **120** | **140** | +1 100 | –200 | +1 000 | –300 | +1 100 | –200 | – | – | +1 000 | –300 | – | – | +1 100 | –200 | +950 | –350 |
| **140** | **160** | +1 150 | –150 | +1 050 | –250 | +1 100 | –200 | – | – | +1 050 | –250 | – | – | +1 150 | –150 | +950 | –350 |
| **160** | **180** | +1 150 | –150 | +1 100 | –200 | – | – | – | – | +1 100 | –200 | – | – | +1 150 | –150 | – | – |
| **180** | **190** | +1 150 | –150 | +1 100 | –200 | – | – | – | – | +1 100 | –200 | – | – | +1 200 | –100 | – | – |
| **190** | **200** | +1 150 | –150 | +1 100 | –200 | – | – | – | – | +1 100 | –200 | – | – | +1 200 | –100 | – | – |
| **200** | **225** | +1 200 | –100 | +1 150 | –150 | – | – | – | – | +1 150 | –150 | – | – | +1 250 | –50 | – | – |
| **225** | **250** | +1 200 | –100 | +1 200 | –100 | – | – | – | – | +1 200 | –100 | – | – | +1 300 | 0 | – | – |
| **250** | **280** | +1 300 | 0 | +1 250 | –50 | – | – | – | – | +1 250 | –50 | – | – | – | – | – | – |
| **280** | **300** | +1 400 | +100 | +1 300 | 0 | – | – | – | – | +1 300 | 0 | – | – | – | – | – | – |
| **300** | **315** | +1 400 | +100 | +1 350 | +50 | – | – | – | – | +1 350 | +50 | – | – | – | – | – | – |
| **315** | **340** | +1 500 | –200 | +1 450 | –250 | – | – | – | – | +1 450 | –250 | – | – | – | – | – | – |

$\Delta_{TsD}$ designates the deviation of a single total abutment width of a matched bearing set from the nominal.

**Table 6**

## Axial internal clearance of matched metric single row tapered roller bearings, arranged face-to-face or back-to-back



| Bore diameter d | | Axial internal clearance of matched bearings in the series | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 329 | | 320 | | 330 | | 331 | | 302, 322 | | 332 | | 303, 323 | | 313 | |
| > | ≤ | min. | max. | min. | max. | min. | max. | min. | max. | min. | max. | min. | max. | min. | max. | min. | max. |
| mm | | μm | | | | | | | | | | | | | | | |
| – | 30 | – | – | 80 | 120 | – | – | – | – | 100 | 140 | 110 | 150 | 130 | 170 | 60 | 100 |
| 30 | 40 | 160 | 200 | 100 | 140 | – | – | 120 | 160 | 120 | 160 | 130 | 170 | 140 | 180 | 70 | 110 |
| 40 | 50 | 180 | 220 | 120 | 160 | 180 | 220 | 140 | 180 | 140 | 180 | 130 | 170 | 160 | 200 | 80 | 120 |
| 50 | 65 | 210 | 250 | 140 | 180 | 200 | 240 | 160 | 200 | 160 | 200 | 150 | 190 | 180 | 220 | 100 | 140 |
| 65 | 80 | 230 | 270 | 160 | 200 | 250 | 290 | 180 | 240 | 180 | 220 | 180 | 220 | 200 | 260 | 110 | 170 |
| 80 | 100 | 270 | 310 | 190 | 230 | 350 | 390 | 210 | 270 | 210 | 270 | 200 | 260 | 240 | 300 | 110 | 170 |
| 100 | 120 | 270 | 330 | 220 | 280 | 340 | 400 | 240 | 300 | 220 | 280 | 240 | 300 | 280 | 340 | 130 | 190 |
| 120 | 140 | 310 | 370 | 240 | 300 | 340 | 400 | – | – | 240 | 300 | – | – | 330 | 390 | 160 | 220 |
| 140 | 160 | 370 | 430 | 270 | 330 | 340 | 400 | – | – | 270 | 330 | – | – | 370 | 430 | 180 | 240 |
| 160 | 180 | 370 | 430 | 310 | 370 | – | – | – | – | 310 | 370 | – | – | 390 | 450 | – | – |
| 180 | 190 | 370 | 430 | 340 | 400 | – | – | – | – | 340 | 400 | – | – | 440 | 500 | – | – |
| 190 | 200 | 390 | 450 | 340 | 400 | – | – | – | – | 340 | 400 | – | – | 440 | 500 | – | – |
| 200 | 225 | 440 | 500 | 390 | 450 | – | – | – | – | 390 | 450 | – | – | 490 | 550 | – | – |
| 225 | 250 | 440 | 500 | 440 | 500 | – | – | – | – | 440 | 500 | – | – | 540 | 600 | – | – |
| 250 | 280 | 540 | 600 | 490 | 550 | – | – | – | – | 490 | 550 | – | – | – | – | – | – |
| 280 | 300 | 640 | 700 | 540 | 600 | – | – | – | – | 540 | 600 | – | – | – | – | – | – |
| 300 | 340 | 640 | 700 | 590 | 650 | – | – | – | – | 590 | 650 | – | – | – | – | – | – |

# Loads

| | Single row bearings | Matched bearings | Double row bearings |
|---|---|---|---|
| **Minimum load**<br><br>For additional information<br>→ page 106 | $F_{rm} = 0{,}02\ C$<br><br>Except for SKF Explorer bearings: $F_{rm} = 0{,}017\ C$ | | |
| **Equivalent dynamic bearing load**<br><br>For additional information<br>→ page 91 | $F_a/F_r \leq e \rightarrow P = F_r$<br><br>$F_a/F_r > e \rightarrow P = 0{,}4\ F_r + Y\ F_a$ [1] | **Face-to-face or back-to-back arrangement**<br>$F_a/F_r \leq e \rightarrow P = F_r + Y_1\ F_a$<br><br>$F_a/F_r > e \rightarrow P = 0{,}67\ F_r + Y_2\ F_a$<br><br>**Tandem arrangement**[1]<br>$F_a/F_r \leq e \rightarrow P = F_r$<br><br>$F_a/F_r > e \rightarrow P = 0{,}4\ F_r + Y\ F_a$ | $F_a/F_r \leq e \rightarrow P = F_r + Y_1\ F_a$<br><br>$F_a/F_r > e \rightarrow P = 0{,}67\ F_r + Y_2\ F_a$ |
| **Equivalent static bearing load**<br><br>For additional information<br>→ page 105 | $P_0 = 0{,}5\ F_r + Y_0\ F_a$ [1]<br><br>$P_0 < F_r \rightarrow P_0 = F_r$ | **Face-to-face or back-to-back arrangement**<br>$P_0 = F_r + Y_0\ F_a$<br><br>$P_0 < F_r \rightarrow P_0 = F_r$<br><br>**Tandem arrangement**[1]<br>$P_0 = 0{,}5\ F_r + Y_0\ F_a$ | $P_0 = F_r + Y_0\ F_a$<br><br>$P_0 < F_r \rightarrow P_0 = F_r$ |

**Symbols**

| | |
|---|---|
| C | basic dynamic load rating [kN] (product tables, page 694) |
| e | calculation factor (product tables) |
| $F_a$ | axial load [kN] |
| $F_r$ | radial load [kN] |
| $F_{rm}$ | minimum radial load [kN] |
| P | equivalent dynamic bearing load [kN] |
| $P_0$ | equivalent static bearing load [kN] |
| $Y, Y_0, Y_1, Y_2$ | calculation factors (product tables) |

[1] When determining the axial load $F_a$, refer to *Calculating the axial load for bearings mounted singly or paired in tandem.*

# Calculating the axial load for bearings mounted singly or paired in tandem

When a radial load is applied to a single row tapered roller bearing, the load is transmitted from one raceway to the other at an angle to the bearing axis and an internal axial load is induced. This should be considered when calculating the equivalent bearing loads for bearing applications consisting of two single bearing arrangements and/or bearing pairs arranged in tandem.

Necessary equations for various bearing applications and load cases are provided in **table 7**, **page 682**. The equations are valid under the following conditions:

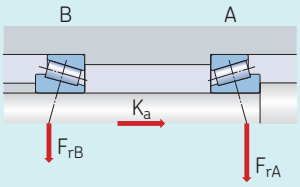
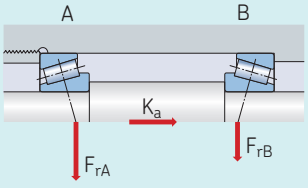
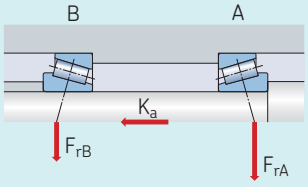
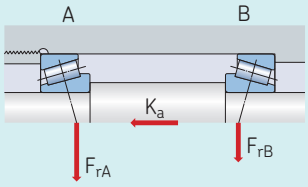
- the bearings are adjusted against each other to practically zero clearance, but without any preload
- bearing A is subjected to a radial load $F_{rA}$ and bearing B to a radial load $F_{rB}$
- both $F_{rA}$ and $F_{rB}$ are always considered positive, even when they act in a direction opposite to that shown in the figures
- the radial loads act at the pressure centres of the bearings (distance a, refer to **product tables**, **page 694**)

$K_a$ is the external axial force acting on the shaft or on the housing. Load cases 1c and 2c are also valid when $K_a = 0$.

Values of the calculation factor Y are listed in the product tables.

Table 7

**Axial loading of bearing applications incorporating two single row tapered roller bearing arrangements and/or bearing pairs in tandem**

| Bearing arrangement | Load case | Axial loads | |
|---|---|---|---|
| **Back-to-back**   | **Case 1a** $\frac{F_{rA}}{Y_A} \geq \frac{F_{rB}}{Y_B}$ $K_a \geq 0$ | $F_{aA} = \frac{0{,}5\ F_{rA}}{Y_A}$ | $F_{aB} = F_{aA} + K_a$ |
| **Face-to-face**   | **Case 1b** $\frac{F_{rA}}{Y_A} < \frac{F_{rB}}{Y_B}$ $K_a \geq 0{,}5\left(\frac{F_{rB}}{Y_B} - \frac{F_{rA}}{Y_A}\right)$ | $F_{aA} = \frac{0{,}5\ F_{rA}}{Y_A}$ | $F_{aB} = F_{aA} + K_a$ |
| | **Case 1c** $\frac{F_{rA}}{Y_A} < \frac{F_{rB}}{Y_B}$ $K_a < 0{,}5\left(\frac{F_{rB}}{Y_B} - \frac{F_{rA}}{Y_A}\right)$ | $F_{aA} = F_{aB} - K_a$ | $F_{aB} = \frac{0{,}5\ F_{rB}}{Y_B}$ |
| **Back-to-back**   | **Case 2a** $\frac{F_{rA}}{Y_A} \leq \frac{F_{rB}}{Y_B}$ $K_a \geq 0$ | $F_{aA} = F_{aB} + K_a$ | $F_{aB} = \frac{0{,}5\ F_{rB}}{Y_B}$ |
| **Face-to-face**   | **Case 2b** $\frac{F_{rA}}{Y_A} > \frac{F_{rB}}{Y_B}$ $K_a \geq 0{,}5\left(\frac{F_{rA}}{Y_A} - \frac{F_{rB}}{Y_B}\right)$ | $F_{aA} = F_{aB} + K_a$ | $F_{aB} = \frac{0{,}5\ F_{rB}}{Y_B}$ |
| | **Case 2c** $\frac{F_{rA}}{Y_A} > \frac{F_{rB}}{Y_B}$ $K_a < 0{,}5\left(\frac{F_{rA}}{Y_A} - \frac{F_{rB}}{Y_B}\right)$ | $F_{aA} = \frac{0{,}5\ F_{rA}}{Y_A}$ | $F_{aB} = F_{aA} - K_a$ |

# Calculating the radial load acting on matched bearings

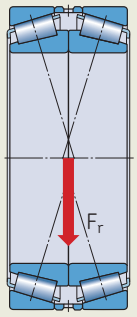
When matched tapered roller bearings, arranged face-to-face or back-to-back, are mounted together with a third bearing, the bearing arrangement is statically indeterminate. In these cases, the radial load $F_r$ acting on the bearing pair must be calculated first.

## Matched bearings arranged face-to-face

For matched bearings, where two bearings are arranged face-to-face (fig. 19), it can be assumed that the radial load acts at the geometric centre of the matched bearings, as the distance between the pressure centres of the two bearings is short when compared with the distance between the geometric centres of the set and the other bearing. In this case, it can be assumed that the bearing arrangement is statically determined.

**Fig. 19**

**Matched bearings arranged face-to-face, radial load**



## Matched bearings arranged back-to-back

The distance a between the pressure centres of two matched bearings arranged back-to-back is significant when compared with the distance L between the geometric centres of the matched bearings and the other bearing (fig. 20). Therefore, it is necessary to calculate the magnitude of the load acting on the bearing pair and also the distance $a_1$ at which the load acts. The magnitude of the radial load can be obtained using:

$$F_r = \frac{L_1}{L - a_1} K_r$$

where
$F_r$ = radial load acting on a bearing pair [kN]
$K_r$ = radial force acting on the shaft [kN]
L = distance between the geometric centres of the two bearing positions [mm]
$L_1$ = distance between the centre of bearing position I and the point of action of the force $K_r$ [mm]
a = distance between the bearing pressure centres [mm] (**product table**, **page 754**)
$a_1$ = distance between the geometric centre of the matched bearings and the point of action of the radial load $F_r$ [mm]
- **diagram 2**
- calculation factor $Y_2$, **product table**

The distance $a_1$ can be determined from **diagram 2** by making an initial assumption for $F_r$ and if necessary followed by several iterative calculations.

**Fig. 20**

**Matched bearings arranged back-to-back, radial load**

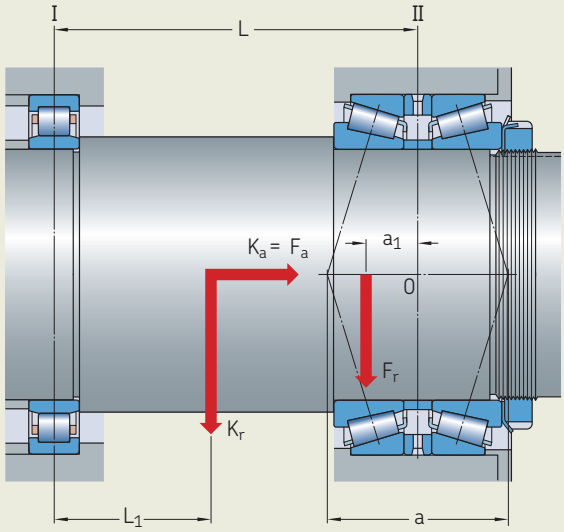
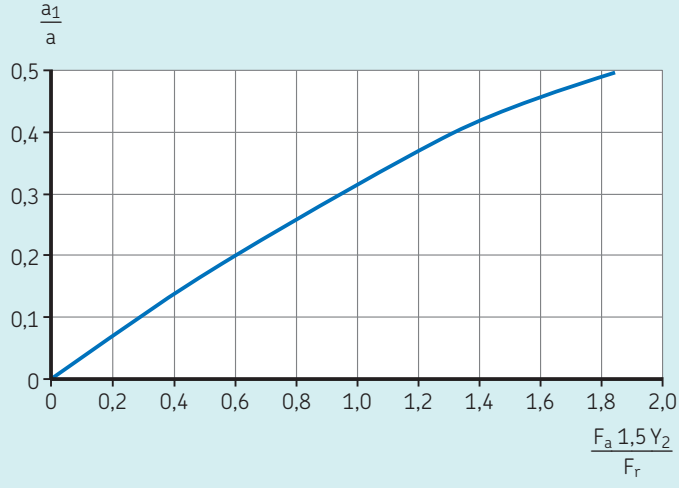



**Diagram 2**

**Distance of point of action of radial load**



# Comparative load ratings for double row tapered roller bearings

For rolling mill applications, load ratings are not necessarily calculated according to ISO 281. Instead, they are often calculated by a different method based on a rating life of 90 million revolutions (500 r/min for 3 000 operating hours). Therefore, for double row tapered roller bearings these comparative load ratings are provided in the product tables because a direct comparison between the comparative and ISO load ratings is not possible, even if the comparative ratings are converted for 1 million revolutions (ISO life definition).

These comparative load ratings may not be used to calculate an ISO rating life. They may only be used together with the comparative rating life and equivalent load equations specified as follows:

$$L_{F10} = 90 \left(\frac{C_F}{P_F}\right)^{10/3}$$

or

$$L_{F10h} = \left(\frac{C_F}{P_F}\right)^{10/3} \left(\frac{1\,500\,000}{n}\right)$$

where

$L_{F10}$ = comparative rating life [million revolutions]
$L_{F10h}$ = comparative rating life [operating hours]
$C_F$ = comparative dynamic load rating to give a rating life of 90 million revolutions [kN] (**product tables**, **page 762**)
$P_F$ = comparative equivalent dynamic bearing load [kN] (**table 8**, **page 686**)
$n$ = constant rotational speed [r/min]

# Temperature limits

The permissible operating temperature for tapered roller bearings can be limited by:

- the dimensional stability of the bearing rings and rollers
- the cages
- the seals
- the lubricant

Where temperatures outside the permissible range are expected, contact SKF.

## Bearing rings and rollers

SKF single row and matched tapered roller bearings are heat stabilized up to:

- D ≤ 160 mm → 120 °C *(250 °F)*
- D > 160 mm → 150 °C *(300 °F)*

SKF double row tapered roller bearings are heat stabilized up to 150 °C *(300 °F)*.

## Seals

The permissible operating temperature for seals depends on the seal material:

- HNBR: –40 to +150 °C *(–40 to +300 °F)*
- FKM: –30 to +200 °C *(–20 to +390 °F)*

Typically, temperature peaks are at the seal lip.

## Cages

Steel or PEEK cages can be used at the same operating temperatures as the bearing rings and rollers. For temperature limits of cages made of other polymer materials, refer to *Polymer cages*, **page 188**.

## Lubricants

For temperature limits of SKF greases, refer to *Selecting a suitable SKF grease*, **page 116**.

When using lubricants not supplied by SKF, temperature limits should be evaluated according to the SKF traffic light concept (**page 117**).

# Permissible speed

The speed ratings in the **product tables** indicate:

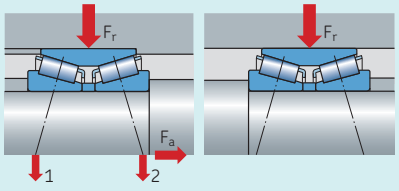
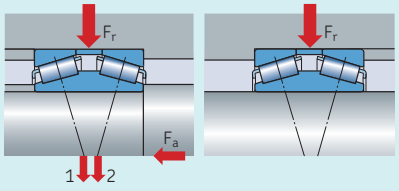
- the **reference speed**, which enables a quick assessment of the speed capabilities from a thermal frame of reference
- the **limiting speed**, which is a mechanical limit that should not be exceeded unless the bearing design and the application are adapted for higher speeds

For additional information, refer to *Operating temperature and speed*, **page 130**.



**Table 8**

**Equivalent dynamic bearing load $P_F$ for calculating comparative rating life**

| Bearing arrangement | Load case | | Comparative equivalent dynamic radial load |
|---|---|---|---|
|  Locating Non-locating | 1a) | $F_a \leq 0{,}6\ F_{rL}/K_L$ | $P_{FL1} = 0{,}5\ F_{rL} + 0{,}83\ K_L\ F_a$<br>$P_{FL2} = 0{,}5\ F_{rL} - 0{,}83\ K_L\ F_a$<br>$P_{FN} = F_{rN}$ |
| | 1b) | $F_a > 0{,}6\ F_{rL}/K_L$ | $P_{FL1} = 0{,}4\ F_{rL} + K_L\ F_a$<br>$P_{FL2} = 0$<br>$P_{FN} = F_{rN}$ |
|  Locating Non-locating | 1c) | $F_a = 0$ | $P_{FL1} = F_{rL}$<br>$P_{FN} = F_{rN}$ |

Values of the thrust factor $K_L$ are listed as K in the product tables.

For load cases 1a) and 1b), the load rating for one roller row needs to be applied when using $P_{FL}$.
The load rating for one roller row can be obtained from

$C_{F(row)} = 0{,}58\ C_{F(bearing)}$

# Design considerations

## Single row and matched tapered roller bearings

Single row tapered roller bearings must be used either with a second bearing (**fig. 21**) or as a matched pair (**fig. 10**, **page 670**, and **fig. 11**, **page 670**). The bearings must be adjusted against each other until the requisite clearance or preload is obtained (*Selecting preload*, **page 186**).

When the operating clearance in a bearing arrangement is too large, the load carrying capacity of both bearings cannot be fully utilized. Excessive preload increases friction, which increases the amount of frictional heat and reduces bearing service life.

### Adjustment procedure

When adjusting tapered roller bearings against each other, the bearings must be rotated so that the rollers assume their correct position, i.e. the large end face of the rollers must be in contact with the guide flange.

### Fits

#### Inch bearings

In contrast to metric bearings, which are machined to a minus tolerance, inch bearings are machined to a plus tolerance (**table 9**, **page 45**). Therefore, the deviations for shaft and housing diameters for metric bearings are not applicable. Suitable shaft and housing fits for inch tapered roller bearings are provided in **table 9**, **page 688**, and **table 10**, **page 689**. These fits are valid for bearings with Normal tolerances in typical applications.

#### Matched bearings

The axial internal clearance of matched bearings arranged face-to-face or back-to-back (**table 6**, **page 679**) provides an appropriate operating clearance when the bearings are mounted on shafts machined to:

- $d \leq 50$ mm → m5Ⓔ
- $50 \text{ mm} < d \leq 140$ mm → m6Ⓔ
- $140 \text{ mm} < d \leq 200$ mm → n6Ⓔ
- $d > 200$ mm → p6Ⓔ

SKF recommends these shaft seat tolerance classes for rotating loads on the inner ring where $P \leq 0{,}06\ C$. If tighter fits are selected, be sure that the bearings are not preloaded and are able to rotate freely. The reduction of internal clearance caused by axial locating forces should also be taken into consideration.

For stationary outer ring loads, SKF recommends housing bore tolerance classes J6Ⓔ or H7Ⓔ.

**Fig. 21**

**Single bearings mounted back-to-back**

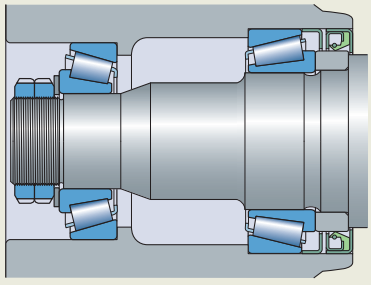


Table 9

**Shaft diameter deviations for inch tapered roller bearings with Normal tolerances**

| Nominal diameter | | Deviations for fits clearance/interference in accordance with | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | f6Ⓔ | | g6Ⓔ | | h6Ⓔ | | j6Ⓔ | | k6Ⓔ | | m6Ⓔ | |
| > | ≤ | U | L | U | L | U | L | U | L | U | L | U | L |
| mm | | µm | | | | | | | | | | | |
| **10** | **18** | – | – | 2 | –4 | 8 | 2 | 16 | 10 | 20 | 14 | – | – |
| **18** | **30** | – | – | 3 | –7 | 10 | 0 | 19 | 9 | 25 | 15 | – | – |
| **30** | **50** | – | – | 3 | –12 | 12 | –3 | 23 | 8 | 30 | 15 | – | – |
| **50** | **76,2** | – | – | 5 | –16 | 15 | –6 | 27 | 6 | – | – | 45 | 24 |
| **80** | **120** | – | – | 8 | –9 | 20 | 3 | 33 | 16 | – | – | 55 | 38 |
| **120** | **180** | – | – | 11 | –14 | 25 | 0 | 39 | 14 | – | – | 65 | 40 |
| **180** | **250** | – | – | 15 | –19 | 30 | –4 | 46 | 12 | – | – | – | – |
| **250** | **304,8** | – | – | 18 | –24 | 35 | –7 | 51 | 9 | – | – | – | – |
| **315** | **400** | –22 | –47 | 22 | –3 | 40 | 15 | 58 | 33 | – | – | – | – |
| **400** | **500** | –23 | –57 | 25 | –9 | 45 | 11 | 65 | 31 | – | – | – | – |
| **500** | **609,6** | –26 | –69 | 28 | –15 | 50 | 7 | 72 | 29 | – | – | – | – |
| **630** | **800** | –5 | –54 | 51 | 2 | 75 | 26 | 100 | 51 | – | – | – | – |
| **800** | **914,4** | 14 | –66 | 74 | 6 | 100 | 20 | 128 | 48 | – | – | – | – |

| Nominal diameter | | Deviations for fits clearance/interference in accordance with | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | n6Ⓔ | | p6Ⓔ | | r6Ⓔ | | r7Ⓔ | | r6Ⓔ + IT6 | | r7Ⓔ + IT7 | |
| > | ≤ | U | L | U | L | U | L | U | L | U | L | U | L |
| mm | | µm | | | | | | | | | | | |
| **50** | **76,2** | 54 | 33 | – | – | – | – | – | – | – | – | – | – |
| **80** | **100** | 65 | 48 | 79 | 62 | – | – | – | – | – | – | – | – |
| **100** | **120** | 65 | 48 | 79 | 62 | – | – | – | – | – | – | – | – |
| **120** | **140** | 77 | 52 | 93 | 68 | 113 | 88 | – | – | – | – | – | – |
| **140** | **160** | 77 | 52 | 93 | 68 | 115 | 90 | – | – | – | – | – | – |
| **160** | **180** | 77 | 52 | 93 | 68 | 118 | 93 | – | – | – | – | – | – |
| **180** | **200** | – | – | 109 | 75 | 136 | 102 | – | – | – | – | – | – |
| **200** | **225** | – | – | 109 | 75 | 139 | 105 | – | – | – | – | – | – |
| **225** | **250** | – | – | 109 | 75 | 143 | 109 | – | – | – | – | – | – |
| **250** | **280** | – | – | 123 | 81 | 161 | 119 | – | – | – | – | – | – |
| **280** | **304,8** | – | – | – | – | 165 | 123 | – | – | – | – | – | – |
| **315** | **355** | – | – | – | – | 184 | 159 | – | – | 220 | 195 | – | – |
| **355** | **400** | – | – | – | – | 190 | 165 | – | – | 226 | 201 | – | – |
| **400** | **450** | – | – | – | – | 211 | 177 | – | – | 251 | 217 | – | – |
| **450** | **500** | – | – | – | – | 217 | 183 | – | – | 257 | 223 | – | – |
| **500** | **560** | – | – | – | – | – | – | 270 | 201 | 288 | 245 | 340 | 271 |
| **560** | **609,6** | – | – | – | – | – | – | 275 | 206 | 293 | 250 | 345 | 276 |
| **630** | **710** | – | – | – | – | – | – | 330 | 251 | 350 | 301 | 410 | 331 |
| **710** | **800** | – | – | – | – | – | – | 340 | 281 | 360 | 311 | 420 | 341 |
| **800** | **900** | – | – | – | – | – | – | 400 | 286 | 422 | 342 | 490 | 376 |

For nominal diameter ranges not listed or higher requirements on accuracy, contact the SKF application engineering service.

**Table 10**

**Housing bore diameter deviations for inch bearings with Normal tolerances**

| Nominal diameter | | Deviations for fits clearance/interference in accordance with | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | F6Ⓔ | | G6Ⓔ | | H7Ⓔ | | H8Ⓔ | | J7Ⓔ | |
| > | ≤ | U | L | U | L | U | L | U | L | U | L |
| mm | | µm | | | | | | | | | |
| **30** | **50** | – | – | – | – | 36 | 25 | 50 | 25 | 25 | 14 |
| **50** | **80** | – | – | – | – | 43 | 25 | 59 | 25 | 31 | 13 |
| **80** | **120** | – | – | – | – | 50 | 25 | 69 | 25 | 37 | 12 |
| **120** | **150** | – | – | – | – | 58 | 25 | 81 | 25 | 44 | 11 |
| **150** | **180** | – | – | – | – | 65 | 25 | 88 | 25 | 51 | 11 |
| **180** | **250** | – | – | – | – | 76 | 25 | 102 | 25 | 60 | 9 |
| **250** | **304,8** | – | – | 104 | 42 | 87 | 25 | 116 | 25 | 71 | 9 |
| **304,8** | **315** | – | – | 104 | 68 | 87 | 51 | 116 | 51 | 71 | 35 |
| **315** | **400** | – | – | 115 | 69 | 97 | 51 | 129 | 51 | 79 | 33 |
| **400** | **500** | – | – | 128 | 71 | 108 | 51 | 142 | 51 | 88 | 31 |
| **500** | **609,6** | 196 | 127 | 142 | 73 | 120 | 51 | 160 | 51 | – | – |
| **609,6** | **630** | 196 | 152 | 142 | 98 | 120 | 76 | 160 | 76 | – | – |
| **630** | **800** | 235 | 156 | 179 | 100 | 155 | 76 | 200 | 76 | – | – |
| **800** | **914,4** | 276 | 162 | 216 | 102 | 190 | 76 | 240 | 76 | – | – |
| **914,4** | **1 000** | 276 | 188 | 216 | 128 | 190 | 102 | 240 | 102 | – | – |
| **1 000** | **1 219,2** | 328 | 200 | 258 | 130 | 230 | 102 | 290 | 102 | – | – |

| Nominal diameter | | Deviations for fits clearance/interference in accordance with | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | K7Ⓔ | | M7Ⓔ | | N7Ⓔ | | P7Ⓔ | |
| > | ≤ | U | L | U | L | U | L | U | L |
| mm | | µm | | | | | | | |
| **30** | **50** | 18 | 7 | 11 | 0 | 3 | –8 | –6 | –17 |
| **50** | **80** | 22 | 4 | 13 | –5 | 4 | –14 | –8 | –26 |
| **80** | **120** | 25 | 0 | 15 | –10 | 5 | –20 | –9 | –34 |
| **120** | **150** | 30 | –3 | 18 | –15 | 6 | –27 | –10 | –43 |
| **150** | **180** | 37 | –3 | 25 | –15 | 13 | –27 | –3 | –43 |
| **180** | **250** | 43 | –8 | 30 | –21 | 16 | –35 | –3 | –54 |
| **250** | **304,8** | 51 | –11 | 35 | –27 | 21 | –41 | –1 | –63 |
| **304,8** | **315** | 51 | 15 | 35 | –1 | 21 | –15 | –1 | –37 |
| **315** | **400** | 57 | 11 | 40 | –6 | 24 | –22 | –1 | –47 |
| **400** | **500** | 63 | 6 | 45 | –12 | 28 | –29 | 0 | –57 |
| **500** | **609,6** | 50 | –19 | 24 | –45 | 6 | –63 | –28 | –97 |
| **609,6** | **630** | 50 | 6 | 24 | –20 | 6 | –38 | –28 | –72 |
| **630** | **800** | 75 | –4 | 45 | –34 | 25 | –54 | –13 | –92 |
| **800** | **914,4** | 100 | –14 | 66 | –48 | 44 | –70 | 0 | –114 |
| **914,4** | **1 000** | 100 | 12 | 66 | –22 | 44 | –44 | 0 | –88 |
| **1 000** | **1 219,2** | 125 | –3 | 85 | –43 | 59 | –69 | 5 | –123 |

For higher requirements on accuracy, contact the SKF application engineering service.

# Mounting

## Double row tapered roller bearings

Depending on their design, components of double row tapered roller bearings can also be mounted separately. The individual rings of one bearing must be mounted in the correct order and position. They must also not be mixed with those of another bearing when several bearings are mounted at the same time. Therefore, some precautions have been taken to ease mounting:

- Components of one bearing are marked with letters that indicate their correct order and position (fig. 22).
- All components of one bearing are marked with the same serial number.

Special care should be taken not to deform or compress the relatively thin-walled intermediate rings when mounting smaller TDI design bearings. This can happen, for example, when tightening the cover screws and can have a negative impact on the axial clearance or the preload. Therefore, SKF recommends applying a cover with a centring spigot that is appropriate to the widths of the bearing and the housing seat.

If the knowledge and experience required to mount double row tapered roller bearings is unavailable, especially where large bearings are concerned, SKF recommends that the assistance of SKF service personnel be requested. Further details of the SKF mounting service are available on request.

### Load zone

In the majority of rolling mill applications, the direction of a radial load is constant. Depending on the ratio between axial and radial loads, usually only approximately one quarter of the outer ring raceway is under load. Therefore (fig. 23):

- Outer rings are divided into four zones identified by a marking I to IV on the outer ring side faces, on request.
- Markings for zone I are also joined by a line across the outside surface.
- For initial mounting, zone I (line across the outside surface) should be positioned in the direction of the load.
- Depending on the operating conditions, after a period of service the outer rings should be turned through 90° so that a new (the next) zone becomes the loaded zone.

Fig. 22

**Components are marked with letters that indicate their correct order and position**

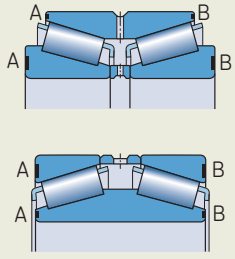
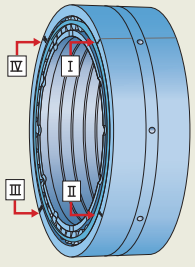



Fig. 23

**Side face of the outer ring divided into four zones by a marking I to IV and marking of zone I by a line across the outside surface**



# Bearing designations

## Metric bearings

The designations of metric tapered roller bearings follow one of the following principles:

- The series designations in accordance with ISO 355 consist of a digit and two letters. The digit represents the contact angle. The two letters represent the diameter and width series, respectively. This is followed by a three-digit bore diameter d [mm]. The basic designations of SKF tapered roller bearings start with the letter T, e.g. T2ED 045.
- Designations established prior to 1977 are based on the system shown under *Basic designations*, **page 31**, e.g. 32206 (**table 4**, **page 30**).
- Metric bearings with the designation prefix J follow the ABMA designation system, which is used for inch bearings (ANSI/ABMA Std. 19.1).

## Inch bearings

Inch tapered roller bearing designations are in accordance with ANSI/ABMA Std. 19.2.

Within a series:

- roller and cage assemblies are equal but the inner and outer rings can have different sizes and designs
- any inner ring with roller and cage assembly (cone) can be assembled with any outer ring (cup)

General:

- Cup and cone have individual designations and can be supplied separately (**fig. 24**).
- The designations of cups and cones, as well as the series, consist of a three- to six-digit number, which may be prefixed to characterize a bearing series from extra-light to extra-heavy.
- The complete bearing designation is an abbreviated combination of cone and cup designations. It consists of the cone designation followed by the complete or parts of the cup designation, separated by an oblique stroke (**table 11**).

**Fig. 24**

**Separately packed components**

**Table 11**

**Examples of inch tapered roller bearing designations**

| Complete bearing | Cone | Cup | Series |
|---|---|---|---|
| **LM 11749/710**[1] | LM 11749 | LM 11710 | LM 11700 |
| **JL 26749/710**[1] | JL 26749 | JL 26710 | L 26700 |
| **HM 89449/410**[1] | HM 89449 | HM 89410 | HM 89400 |
| **H 913842/810**[1] | H 913842 | H 913810 | H 913800 |
| **4580/2/4535/2**[2] | 4580/2 | 4535/2 | 4500 |
| **9285/9220**[2] | 9285 | 9220 | 9200 |

[1] Complete bearing designation abbreviated (latest ABMA designations)
[2] Complete bearing designation not abbreviated (earlier ABMA designations)

# Designation system

| x | y | Group 1 | Group 2 | Group 3 | / |
|---|---|---|---|---|---|

**Prefixes**

| | |
|---|---|
| **J** | Metric bearing following the ABMA designation system (ANSI/ABMA Std. 19.2) |
| **T** | Metric bearing in accordance with ISO 355 |

**Basic designation**

Refer to *Bearing designations*, page 691 or drawing number identification.

| | |
|---|---|
| **BT2-**<br>**BT2B** | Drawing number prefixes that may precede a four- or six-digit drawing number |

**Suffixes**

**Group 1: Internal design**

| | |
|---|---|
| **A, C, D** | Deviating or modified internal design, combinations are possible |
| **B** | Steep contact angle |

**Group 2: External design (seals, grooves, etc)**

| | |
|---|---|
| **E** | SKF Explorer bearing (only for double row bearings) |
| **G** | Helical groove in the inner ring bore (only for double row bearings) |
| **R** | Flanged outer ring |
| **T..** | A number immediately following the T identifies the total width of matched bearings, arranged back-to-back or in tandem. |
| **X** | Boundary dimensions changed to conform to ISO |

**Group 3: Cage design**

| | |
|---|---|
| **TN9** | Glass fibre reinforced PA66 cage, roller centred |
| **TNH** | Glass fibre reinforced PEEK cage, roller centred |

**Group 4.1: Materials, heat treatment**

| | |
|---|---|
| **HA1** | Case-hardened inner and outer rings |
| **HA2** | Case-hardened outer ring |
| **HA3** | Case-hardened inner ring |
| **HA4** | Case-hardened inner and outer rings and rollers |
| **HA5** | Case-hardened rollers |
| **HA6** | Case-hardened outer ring(s) and rollers |
| **HA7** | Case-hardened inner ring(s) and rollers |
| **HB1** | Bainite-hardened inner and outer rings |
| **HB2** | Bainite-hardened outer ring(s) |
| **HN3** | Inner ring with special surface heat treatment |
| **L4B** | Bearing rings and rollers with special surface coating |

**Group 4.2: Accuracy, clearance, preload, quiet running**

| | |
|---|---|
| **/1**<br>**/-1**<br>to<br>**/-3**<br>**/4** | Deviating width tolerances of cups and cones for inch bearings (table 4, page 678) |
| **C...** | Axial internal clearance (only for double row bearings)<br>The three- or four-digit number immediately following the C is the mean axial internal clearance in µm. |
| **CL0** | Geometrical tolerances to ABMA tolerance class 0 (inch bearing) |
| **CL00** | Geometrical tolerances to ABMA tolerance class 00 (inch bearing) |
| **P5** | Geometrical tolerances to P5 tolerance class |
| **U..** | U combined with a one- or two-digit number identifies tighter total width tolerance, e.g.:<br>U2 → +5/0 µm<br>U4 → +10/0 µm |
| **W** | Modified ring width tolerance to +5/0 µm |

| Group 4 | | | | | |
|---|---|---|---|---|---|
| 4.1 | 4.2 | 4.3 | 4.4 | 4.5 | 4.6 |

**Group 4.6: Other variants**

| | |
|---|---|
| **CL7A** | Pinion bearing, superseded by CL7C |
| **CL7C** | High-performance design |
| **CLN** | Tighter tolerances for ring widths and total (abutment) width in accordance with ISO tolerance class 6X |
| **PEX** | SKF Explorer bearing, used only when same-sized basic design bearing and SKF Explorer bearing are available |
| **V001** | CL7C and /2 |
| **VA321** | Optimized internal design |
| **VA606** | Crowned raceway on the outer ring, logarithmic profile on the inner ring and special heat treatment |
| **VA607** | Same as VA606, but other outside diameter tolerance |
| **VA901** | Contact seal on both sides, outer ring side faces with lubrication grooves, sealing ring between the inner rings |
| **VA902** | Contact seal on both sides, without relubrication features, sealing ring between the inner rings |
| **VA903** | Contact seal on both sides, outer ring side faces with lubrication grooves, without sealing ring between the inner rings |
| **VA919** | Contact seal on both sides, relubrication features in the outer rings, annular groove in the bore and lubrication holes in the inner ring guide flanges |
| **VA941** | Contact seal on both sides, inner ring inner side faces with lubrication grooves, inner rings with annular grooves in the bore and lubrication holes in their outer shoulders |
| **VB022** | Chamfer dimension of large outer ring side face 0,3 mm |
| **VB026** | Chamfer dimension of large inner ring side face 3 mm |
| **VB061** | Chamfer dimension of large inner ring side face 8 mm |
| **VB134** | Chamfer dimension of large inner ring side face 1 mm |
| **VB406** | Chamfer dimension of large inner ring side face 3 mm and of large outer ring side face 2 mm |
| **VB481** | Chamfer dimension of large inner ring side face 8,5 mm |
| **VC027** | Modified internal geometry for increased permissible misalignment |
| **VC068** | Tighter geometrical tolerances and special heat treatment |
| **VE141** | One locating slot (notch) in the outer ring |
| **VE174** | One locating slot (notch) in the large side face of the outer ring, tighter geometrical tolerances |
| **VQ051** | Modified internal geometry for increased permissible misalignment |
| **VQ117** | Special radial and axial run-out tolerances |
| **VQ267** | Tighter inner ring width tolerance to ± 25 µm |
| **VQ492** | Special inner ring width tolerance |
| **VQ494** | Tighter radial run-out tolerances |
| **VQ495** | CL7C with tighter or shifted tolerance range for the outside diameter |
| **VQ506** | Tighter inner ring width tolerance |
| **VQ507** | CL7C with tighter or shifted tolerance range for the outside diameter |
| **VQ523** | CL7C with tighter inner ring width tolerance and tighter or shifted tolerance range for the outside diameter |
| **VQ601** | Geometrical tolerances to ABMA tolerance class 0 (inch bearing) |

**Group 4.5: Lubrication**

**Group 4.4: Stabilization**

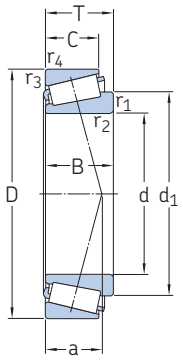
**Group 4.3: Bearing sets, matched bearings**

| | |
|---|---|
| **DB..** | Two bearings matched for mounting back-to-back. A number immediately following the DB identifies the design of the ring spacers. |
| **DF..** | Two bearings matched for mounting face-to-face. A number immediately following the DF identifies the design of the ring spacer. |
| **DT..** | Two bearings matched for mounting in tandem. A number immediately following the DT identifies the design of the ring spacers. |
| **C...** | Special clearance<br>The two- or three-digit number immediately following the C is the mean axial internal clearance in µm. The range remains the same as specified in **table 6**, **page 679**. |

In addition to their designation, double row bearings are also identified by their design variants/features (**product tables**, **page 762**). Some of these features may not be part of the bearing designation, but are always part of the design variants/features (*Variants/features*, **page 674**).

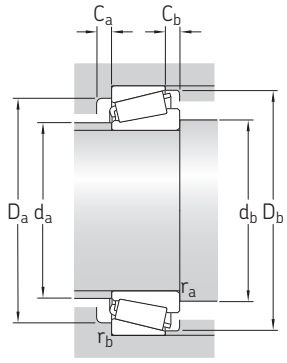
## 8.1 Metric single row tapered roller bearings

d **15 – 32** mm




| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation | Dimension series to ISO 355 (ABMA) |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | T | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | – |
| **15** | 35 | 11,75 | 18,5 | 14,6 | 1,43 | 17 000 | 20 000 | 0,055 | ▸ 30202 | 2CC |
| | 42 | 14,25 | 27,7 | 20 | 2,08 | 15 000 | 18 000 | 0,094 | ▸ 30302 | 2FB |
| **17** | 40 | 13,25 | 23,4 | 18,6 | 1,83 | 15 000 | 18 000 | 0,079 | ▸ 30203 | 2DB |
| | 47 | 15,25 | 34,2 | 25 | 2,7 | 13 000 | 16 000 | 0,13 | ▸ 30303 | 2FB |
| | 47 | 20,25 | 42,8 | 33,5 | 3,65 | 12 000 | 16 000 | 0,17 | ▸ 32303 | 2FD |
| **20** | 42 | 15 | 29,7 | 27 | 2,65 | 13 000 | 16 000 | 0,099 | ▸ 32004 X | 3CC |
| | 47 | 15,25 | 34,1 | 28 | 3 | 12 000 | 15 000 | 0,12 | ▸ 30204 | 2DB |
| | 52 | 16,25 | 41,9 | 32,5 | 3,55 | 12 000 | 14 000 | 0,17 | ▸ 30304 | 2FB |
| | 52 | 22,25 | 54,3 | 45,5 | 5 | 11 000 | 14 000 | 0,23 | ▸ 32304 | 2FD |
| **22** | 44 | 15 | 30,9 | 29 | 2,85 | 13 000 | 15 000 | 0,1 | ▸ 320/22 X | 3CC |
| **25** | 47 | 15 | 33,2 | 32,5 | 3,25 | 12 000 | 14 000 | 0,11 | ▸ 32005 X | 4CC |
| | 52 | 16,25 | 38,1 | 33,5 | 3,45 | 11 000 | 13 000 | 0,15 | ▸ 30205 | 3CC |
| | 52 | 19,25 | 44,5 | 44 | 4,65 | 10 000 | 13 000 | 0,19 | ▸ 32205 B | 5CD |
| | 52 | 19,25 | 50,4 | 45,5 | 4,9 | 11 000 | 13 000 | 0,19 | 32205 | 2CD |
| | 52 | 22 | 57,9 | 56 | 6 | 10 000 | 13 000 | 0,22 | ▸ 33205 | 2CE |
| | 62 | 18,25 | 46,6 | 40 | 4,4 | 8 500 | 11 000 | 0,27 | ▸ 31305 | 7FB |
| | 62 | 18,25 | 55,3 | 43 | 4,75 | 9 500 | 12 000 | 0,26 | ▸ 30305 | 2FB |
| | 62 | 25,25 | 74,1 | 63 | 7,1 | 9 000 | 12 000 | 0,36 | ▸ 32305 | 2FD |
| **28** | 52 | 16 | 39 | 38 | 4 | 10 000 | 13 000 | 0,14 | ▸ 320/28 X | 4CC |
| | 58 | 17,25 | 46,6 | 41,5 | 4,4 | 10 000 | 12 000 | 0,2 | ▸ 302/28 | 3DC |
| | 58 | 20,25 | 51,9 | 50 | 5,5 | 9 500 | 12 000 | 0,25 | ▸ 322/28 B | 5CD |
| **30** | 55 | 17 | 43,9 | 44 | 4,55 | 10 000 | 12 000 | 0,17 | ▸ 32006 X | 4CC |
| | 62 | 17,25 | 50 | 44 | 4,8 | 9 000 | 11 000 | 0,23 | ▸ 30206 | 3DB |
| | 62 | 21,25 | 61,8 | 57 | 6,3 | 9 000 | 11 000 | 0,29 | ▸ 32206 | 3DC |
| | 62 | 25 | 79,7 | 76,5 | 8,5 | 8 500 | 11 000 | 0,35 | ▸ 33206 | 2DE |
| | 72 | 20,75 | 58,3 | 50 | 5,7 | 7 500 | 9 500 | 0,39 | ▸ 31306 | 7FB |
| | 72 | 20,75 | 69,2 | 56 | 6,4 | 8 000 | 10 000 | 0,38 | ▸ 30306 | 2FB |
| | 72 | 28,75 | 95 | 85 | 9,65 | 7 500 | 10 000 | 0,55 | ▸ 32306 | 2FD |
| **32** | 53 | 14,5 | 33 | 35,5 | 3,65 | 10 000 | 12 000 | 0,12 | JL 26749/710 | L 26700 |
| | 58 | 17 | 45,1 | 46,5 | 4,8 | 9 000 | 11 000 | 0,19 | ▸ 320/32 X | 4CC |

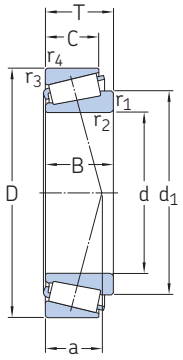
**SKF Explorer bearing**
▸ Popular item




| Dimensions | | | | | | | Abutment and fillet dimensions | | | | | | | | | Calculation factors | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | B | C | $r_{1,2}$ min. | $r_{3,4}$ min. | a | $d_a$ max. | $d_b$ min. | $D_a$ min. | $D_a$ max. | $D_b$ min. | $C_a$ min. | $C_b$ min. | $r_a$ max. | $r_b$ max. | e | Y | $Y_0$ |
| mm | | | | | | | mm | | | | | | | | | – | | |
| **15** | 25,6 | 11 | 9,25 | 0,6 | 0,6 | 8 | 20 | 20,5 | 30 | 30,5 | 32 | 2 | 2,5 | 0,6 | 0,6 | 0,35 | 1,7 | 0,9 |
| | 27,8 | 13 | 11 | 1 | 1 | 9 | 22 | 21,5 | 36 | 36,5 | 38 | 2 | 3 | 1 | 1 | 0,28 | 2,1 | 1,1 |
| **17** | 29 | 12 | 11 | 1 | 1 | 9 | 23 | 23,5 | 34 | 34,5 | 37 | 2 | 2 | 1 | 1 | 0,35 | 1,7 | 0,9 |
| | 30,5 | 14 | 12 | 1 | 1 | 10 | 25 | 23,5 | 40 | 41,5 | 42 | 2 | 3 | 1 | 1 | 0,28 | 2,1 | 1,1 |
| | 30,7 | 19 | 16 | 1 | 1 | 12 | 24 | 23,5 | 39 | 41,5 | 43 | 3 | 4 | 1 | 1 | 0,28 | 2,1 | 1,1 |
| **20** | 32,1 | 15 | 12 | 0,6 | 0,6 | 10 | 25 | 25,5 | 36 | 37,5 | 39 | 3 | 3 | 0,6 | 0,6 | 0,37 | 1,6 | 0,9 |
| | 33,7 | 14 | 12 | 1 | 1 | 11 | 28 | 26,5 | 40 | 41,5 | 43 | 2 | 3 | 1 | 1 | 0,35 | 1,7 | 0,9 |
| | 34,4 | 15 | 13 | 1,5 | 1,5 | 11 | 28 | 27,5 | 44 | 45,5 | 47 | 2 | 3 | 1,5 | 1,5 | 0,3 | 2 | 1,1 |
| | 34,6 | 21 | 18 | 1,5 | 1,5 | 13 | 27 | 27,5 | 43 | 45,5 | 47 | 3 | 4 | 1,5 | 1,5 | 0,3 | 2 | 1,1 |
| **22** | 34,3 | 15 | 11,5 | 0,6 | 0,6 | 10 | 27 | 27,5 | 38 | 39 | 41 | 3 | 3,5 | 0,6 | 0,6 | 0,4 | 1,5 | 0,8 |
| **25** | 37,5 | 15 | 11,5 | 0,6 | 0,6 | 11 | 30 | 31 | 40 | 42 | 44 | 3 | 3,5 | 0,6 | 0,6 | 0,43 | 1,4 | 0,8 |
| | 38 | 15 | 13 | 1 | 1 | 12 | 32 | 31,5 | 44 | 46 | 48 | 2 | 3 | 1 | 1 | 0,37 | 1,6 | 0,9 |
| | 41,5 | 18 | 15 | 1 | 1 | 15 | 30 | 32 | 41 | 46,5 | 50 | 3 | 4 | 1 | 1 | 0,57 | 1,05 | 0,6 |
| | 38,4 | 18 | 16 | 1 | 1 | 13 | 31 | 32 | 44 | 46 | 50 | 3 | 3 | 1 | 1 | 0,35 | 1,7 | 0,9 |
| | 38,7 | 22 | 18 | 1 | 1 | 13 | 31 | 32 | 43 | 46 | 49 | 4 | 4 | 1 | 1 | 0,35 | 1,7 | 0,9 |
| | 45,8 | 17 | 13 | 1,5 | 1,5 | 19 | 34 | 33 | 47 | 55 | 59 | 3 | 5 | 1,5 | 1,5 | 0,83 | 0,72 | 0,4 |
| | 41,5 | 17 | 15 | 1,5 | 1,5 | 12 | 35 | 33 | 54 | 55 | 57 | 2 | 3 | 1,5 | 1,5 | 0,3 | 2 | 1,1 |
| | 41,7 | 24 | 20 | 1,5 | 1,5 | 15 | 33 | 33 | 52 | 55 | 57 | 3 | 5 | 1,5 | 1,5 | 0,3 | 2 | 1,1 |
| **28** | 41,3 | 16 | 12 | 1 | 1 | 12 | 34 | 35 | 45 | 46 | 49 | 3 | 4 | 1 | 1 | 0,43 | 1,4 | 0,8 |
| | 42 | 16 | 14 | 1 | 1 | 13 | 35 | 35 | 50 | 52 | 54 | 2 | 3 | 1 | 1 | 0,37 | 1,6 | 0,9 |
| | 43,9 | 19 | 16 | 1 | 1 | 16 | 33 | 35 | 46 | 52 | 55 | 3 | 4 | 1 | 1 | 0,57 | 1,05 | 0,6 |
| **30** | 43,6 | 17 | 13 | 1 | 1 | 13 | 36 | 37 | 48 | 49 | 52 | 3 | 4 | 1 | 1 | 0,43 | 1,4 | 0,8 |
| | 45,3 | 16 | 14 | 1 | 1 | 13 | 38 | 37 | 53 | 56 | 57 | 2 | 3 | 1 | 1 | 0,37 | 1,6 | 0,9 |
| | 45,2 | 20 | 17 | 1 | 1 | 15 | 37 | 37 | 52 | 56 | 58 | 3 | 4 | 1 | 1 | 0,37 | 1,6 | 0,9 |
| | 45,8 | 25 | 19,5 | 1 | 1 | 15 | 37 | 37 | 53 | 56 | 59 | 4 | 5,5 | 1 | 1 | 0,35 | 1,7 | 0,9 |
| | 52,7 | 19 | 14 | 1,5 | 1,5 | 22 | 40 | 38,5 | 55 | 65 | 68 | 3 | 6,5 | 1,5 | 1,5 | 0,83 | 0,72 | 0,4 |
| | 48,4 | 19 | 16 | 1,5 | 1,5 | 14 | 41 | 38 | 62 | 64 | 66 | 3 | 4,5 | 1,5 | 1,5 | 0,31 | 1,9 | 1,1 |
| | 48,7 | 27 | 23 | 1,5 | 1,5 | 17 | 39 | 38 | 59 | 65 | 66 | 4 | 5,5 | 1,5 | 1,5 | 0,31 | 1,9 | 1,1 |
| **32** | 43,6 | 15 | 11,5 | 3,6 | 1,3 | 11 | 38 | 44 | 48 | 46,5 | 50 | 2 | 3 | 3,6 | 1,3 | 0,33 | 1,8 | 1 |
| | 46,2 | 17 | 13 | 1 | 1 | 13 | 38 | 39 | 50 | 52 | 55 | 3 | 4 | 1 | 1 | 0,46 | 1,3 | 0,7 |

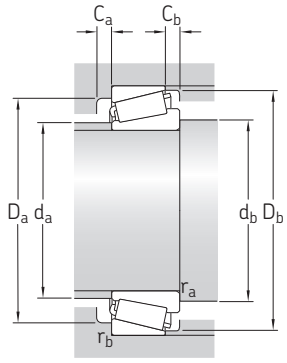
## 8.1 Metric single row tapered roller bearings

d **35 – 45** mm




| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation | Dimension series to ISO 355 (ABMA) |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | T | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | – |
| **35** | 62 | 18 | 52,3 | 54 | 5,85 | 8 500 | 10 000 | 0,23 | ▸ 32007 X | 4CC |
| | 72 | 18,25 | 63,2 | 56 | 6,1 | 8 000 | 9 500 | 0,33 | ▸ 30207 | 3DB |
| | 72 | 24,25 | 81,2 | 78 | 8,5 | 8 000 | 9 500 | 0,44 | ▸ 32207 | 3DC |
| | 72 | 28 | 104 | 106 | 11,8 | 7 000 | 9 500 | 0,53 | ▸ 33207 | 2DE |
| | 80 | 22,75 | 75,4 | 67 | 7,8 | 6 300 | 8 500 | 0,52 | ▸ 31307 | 7FB |
| | 80 | 22,75 | 88,9 | 73,5 | 8,3 | 7 500 | 9 000 | 0,51 | ▸ 30307 | 2FB |
| | 80 | 32,75 | 115 | 114 | 12,9 | 6 300 | 8 500 | 0,8 | ▸ 32307 B | 5FE |
| | 80 | 32,75 | 117 | 106 | 12,2 | 6 700 | 9 000 | 0,75 | ▸ 32307 | 2FE |
| **38** | 63 | 17 | 45,7 | 52 | 5,4 | 8 500 | 10 000 | 0,2 | JL 69349/310 | L 69300 |
| | 63 | 17 | 45,7 | 52 | 5,4 | 8 500 | 10 000 | 0,21 | JL 69345/310 | L 69300 |
| | 63 | 17 | 45,7 | 52 | 5,4 | 8 500 | 10 000 | 0,21 | JL 69349 A/310 | L 69300 |
| | 63 | 17 | 45,7 | 52 | 5,4 | 8 500 | 10 000 | 0,21 | JL 69349 X/310 | L 69300 |
| **40** | 68 | 19 | 64,7 | 71 | 7,65 | 7 500 | 9 500 | 0,28 | ▸ 32008 X | 3CD |
| | 75 | 26 | 97,5 | 104 | 11,4 | 7 000 | 9 000 | 0,5 | ▸ 33108 | 2CE |
| | 80 | 19,75 | 75,8 | 68 | 7,65 | 7 000 | 8 500 | 0,42 | ▸ 30208 | 3DB |
| | 80 | 24,75 | 91,6 | 86,5 | 9,8 | 7 000 | 8 500 | 0,53 | ▸ 32208 | 3DC |
| | 80 | 32 | 128 | 132 | 15 | 6 300 | 8 500 | 0,73 | ▸ 33208 | 2DE |
| | 85 | 33 | 150 | 150 | 17,3 | 6 700 | 8 000 | 0,9 | T2EE 040 | 2EE |
| | 90 | 25,25 | 91,1 | 81,5 | 9,5 | 5 600 | 7 500 | 0,72 | 31308 | 7FB |
| | 90 | 25,25 | 106 | 95 | 10,8 | 6 300 | 8 000 | 0,73 | ▸ 30308 | 2FB |
| | 90 | 35,25 | 134 | 140 | 16 | 5 600 | 7 500 | 1,1 | 32308 B | 5FD |
| | 90 | 35,25 | 143 | 140 | 16 | 6 000 | 8 000 | 1,05 | ▸ 32308 | 2FD |
| **45** | 75 | 20 | 71,7 | 80 | 8,8 | 7 000 | 8 500 | 0,34 | ▸ 32009 X | 3CC |
| | 80 | 26 | 104 | 114 | 12,9 | 6 700 | 8 000 | 0,55 | ▸ 33109 | 3CE |
| | 85 | 20,75 | 81,6 | 76,5 | 8,65 | 6 300 | 8 000 | 0,47 | ▸ 30209 | 3DB |
| | 85 | 24,75 | 98,7 | 98 | 11 | 6 300 | 8 000 | 0,58 | ▸ 32209 | 3DC |
| | 85 | 32 | 132 | 143 | 16,3 | 6 000 | 7 500 | 0,79 | ▸ 33209 | 3DE |
| | 95 | 29 | 110 | 112 | 12,7 | 5 300 | 7 000 | 0,93 | T7FC 045 | 7FC |
| | 95 | 36 | 182 | 186 | 20,8 | 6 000 | 7 000 | 1,2 | ▸ T2ED 045 | 2ED |
| | 100 | 27,25 | 113 | 102 | 12,5 | 5 000 | 6 700 | 0,95 | 31309 | 7FB |
| | 100 | 27,25 | 132 | 120 | 14,3 | 5 600 | 7 000 | 0,97 | ▸ 30309 | 2FB |
| | 100 | 38,25 | 166 | 176 | 20 | 5 000 | 6 700 | 1,5 | 32309 B | 5FD |
| | 100 | 38,25 | 173 | 170 | 20,4 | 5 300 | 7 000 | 1,4 | ▸ 32309 | 2FD |

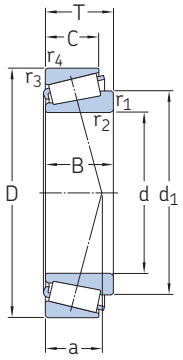
**SKF Explorer bearing**
▸ Popular item




| Dimensions | | | | | | | Abutment and fillet dimensions | | | | | | | | | Calculation factors | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | B | C | $r_{1,2}$ min. | $r_{3,4}$ min. | a | $d_a$ max. | $d_b$ min. | $D_a$ min. | $D_a$ max. | $D_b$ min. | $C_a$ min. | $C_b$ min. | $r_a$ max. | $r_b$ max. | e | Y | $Y_0$ |
| mm | | | | | | | mm | | | | | | | | | – | | |
| **35** | 49,6 | 18 | 14 | 1 | 1 | 14 | 41 | 42 | 54 | 56 | 59 | 4 | 4 | 1 | 1 | 0,46 | 1,3 | 0,7 |
| | 51,9 | 17 | 15 | 1,5 | 1,5 | 14 | 44 | 43,5 | 62 | 64 | 67 | 3 | 3 | 1,5 | 1,5 | 0,37 | 1,6 | 0,9 |
| | 52,4 | 23 | 19 | 1,5 | 1,5 | 17 | 43 | 43,5 | 61 | 64 | 67 | 3 | 5 | 1,5 | 1,5 | 0,37 | 1,6 | 0,9 |
| | 53,4 | 28 | 22 | 1,5 | 1,5 | 18 | 43 | 43,5 | 61 | 64 | 68 | 5 | 6 | 1,5 | 1,5 | 0,35 | 1,7 | 0,9 |
| | 59,6 | 21 | 15 | 2 | 1,5 | 24 | 45 | 44,5 | 62 | 72 | 76 | 3 | 7,5 | 2 | 1,5 | 0,83 | 0,72 | 0,4 |
| | 54,5 | 21 | 18 | 2 | 1,5 | 16 | 46 | 44,5 | 70 | 72 | 74 | 3 | 4,5 | 2 | 1,5 | 0,31 | 1,9 | 1,1 |
| | 59,3 | 31 | 25 | 2 | 1,5 | 24 | 43 | 44,5 | 61 | 72 | 76 | 4 | 7,5 | 2 | 1,5 | 0,54 | 1,1 | 0,6 |
| | 54,8 | 31 | 25 | 2 | 1,5 | 20 | 44 | 44,5 | 66 | 72 | 74 | 4 | 7,5 | 2 | 1,5 | 0,31 | 1,9 | 1,1 |
| **38** | 52,2 | 17 | 13,5 | 3,6 | 1,3 | 14 | 44 | 50,5 | 55 | 56 | 60 | 3 | 3,5 | 3,6 | 1,3 | 0,43 | 1,4 | 0,8 |
| | 52,2 | 19 | 13,5 | 3,6 | 1,3 | 14 | 44 | 50,5 | 55 | 56 | 60 | 3 | 3,5 | 3,6 | 1,3 | 0,43 | 1,4 | 0,8 |
| | 52,2 | 17 | 13,5 | 1,3 | 1,3 | 14 | 44 | 46 | 55 | 56 | 60 | 3 | 3,5 | 1,3 | 1,3 | 0,43 | 1,4 | 0,8 |
| | 52,2 | 17 | 13,5 | 2,3 | 1,3 | 14 | 44 | 48 | 55 | 56 | 60 | 3 | 3,5 | 2,3 | 1,3 | 0,43 | 1,4 | 0,8 |
| **40** | 54,7 | 19 | 14,5 | 1 | 1 | 14 | 46 | 47,5 | 60 | 61 | 65 | 4 | 4,5 | 1 | 1 | 0,37 | 1,6 | 0,9 |
| | 57,5 | 26 | 20,5 | 1,5 | 1,5 | 17 | 47 | 48,5 | 65 | 67 | 71 | 4 | 5,5 | 1,5 | 1,5 | 0,35 | 1,7 | 0,9 |
| | 57,5 | 18 | 16 | 1,5 | 1,5 | 16 | 49 | 48,5 | 69 | 72 | 74 | 3 | 3,5 | 1,5 | 1,5 | 0,37 | 1,6 | 0,9 |
| | 58,4 | 23 | 19 | 1,5 | 1,5 | 18 | 49 | 48,5 | 68 | 72 | 75 | 3 | 5,5 | 1,5 | 1,5 | 0,37 | 1,6 | 0,9 |
| | 59,7 | 32 | 25 | 1,5 | 1,5 | 20 | 47 | 48,5 | 67 | 72 | 76 | 5 | 7 | 1,5 | 1,5 | 0,35 | 1,7 | 0,9 |
| | 61,2 | 32,5 | 28 | 2,5 | 2 | 21 | 48 | 50,5 | 70 | 76 | 80 | 5 | 5 | 2,5 | 2 | 0,35 | 1,7 | 0,9 |
| | 67,1 | 23 | 17 | 2 | 1,5 | 28 | 51 | 50 | 71 | 82 | 86 | 3 | 8 | 2 | 1,5 | 0,83 | 0,72 | 0,4 |
| | 62,5 | 23 | 20 | 2 | 1,5 | 19 | 53 | 49,5 | 77 | 82 | 82 | 3 | 5 | 2 | 1,5 | 0,35 | 1,7 | 0,9 |
| | 67,1 | 33 | 27 | 2 | 1,5 | 27 | 50 | 50 | 67 | 82 | 84 | 4 | 8 | 2 | 1,5 | 0,54 | 1,1 | 0,6 |
| | 62,9 | 33 | 27 | 2 | 1,5 | 22 | 51 | 49,5 | 73 | 82 | 82 | 4 | 8 | 2 | 1,5 | 0,35 | 1,7 | 0,9 |
| **45** | 60,7 | 20 | 15,5 | 1 | 1 | 16 | 52 | 52,5 | 67 | 68 | 72 | 4 | 4,5 | 1 | 1 | 0,4 | 1,5 | 0,8 |
| | 63 | 26 | 20,5 | 1,5 | 1,5 | 18 | 52 | 53,5 | 69 | 72 | 77 | 4 | 5,5 | 1,5 | 1,5 | 0,37 | 1,6 | 0,9 |
| | 63,1 | 19 | 16 | 1,5 | 1,5 | 17 | 54 | 53,5 | 74 | 77 | 80 | 3 | 4,5 | 1,5 | 1,5 | 0,4 | 1,5 | 0,8 |
| | 64,1 | 23 | 19 | 1,5 | 1,5 | 19 | 54 | 53,5 | 73 | 77 | 80 | 3 | 5,5 | 1,5 | 1,5 | 0,4 | 1,5 | 0,8 |
| | 65,3 | 32 | 25 | 1,5 | 1,5 | 21 | 52 | 53,5 | 72 | 77 | 81 | 5 | 7 | 1,5 | 1,5 | 0,4 | 1,5 | 0,8 |
| | 73,4 | 26,5 | 20 | 2,5 | 2,5 | 32 | 54 | 56 | 71 | 85 | 91 | 3 | 9 | 2,5 | 2,5 | 0,88 | 0,68 | 0,4 |
| | 68,7 | 35 | 30 | 2,5 | 2,5 | 23 | 55 | 56 | 80 | 85 | 89 | 6 | 6 | 2,5 | 2,5 | 0,33 | 1,8 | 1 |
| | 74,7 | 25 | 18 | 2 | 1,5 | 31 | 57 | 55 | 79 | 92 | 95 | 4 | 9 | 2 | 1,5 | 0,83 | 0,72 | 0,4 |
| | 70,2 | 25 | 22 | 2 | 1,5 | 20 | 59 | 55 | 86 | 92 | 92 | 3 | 5 | 2 | 1,5 | 0,35 | 1,7 | 0,9 |
| | 76,1 | 36 | 30 | 2 | 1,5 | 29 | 56 | 55 | 76 | 92 | 94 | 5 | 8 | 2 | 1,5 | 0,54 | 1,1 | 0,6 |
| | 71,1 | 36 | 30 | 2 | 1,5 | 24 | 57 | 55 | 82 | 92 | 93 | 4 | 8 | 2 | 1,5 | 0,35 | 1,7 | 0,9 |

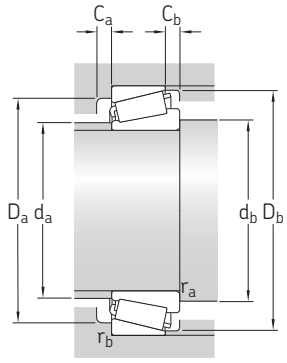
## 8.1 Metric single row tapered roller bearings

d **50 – 55** mm




| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation | Dimension series to ISO 355 (ABMA) |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | T | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | – |
| **50** | 72 | 15 | 41,3 | 53 | 5,6 | 7 000 | 8 500 | 0,19 | **32910** | 2BC |
| | 80 | 20 | 75,1 | 88 | 9,65 | 6 300 | 8 000 | 0,38 | ▸ **32010 X** | 3CC |
| | 80 | 24 | 84,8 | 102 | 11,4 | 6 300 | 8 000 | 0,45 | ▸ **33010** | 2CE |
| | 82 | 21,5 | 88,9 | 100 | 11 | 6 300 | 8 000 | 0,43 | **JLM 104948 AA/910 AA** | LM 104900 |
| | 82 | 21,501 | 88,9 | 100 | 11 | 6 300 | 8 000 | 0,46 | **JLM 104945/910** | LM 104900 |
| | 85 | 26 | 106 | 122 | 13,4 | 6 000 | 7 500 | 0,58 | ▸ **33110** | 3CE |
| | 90 | 21,75 | 93,1 | 91,5 | 10,4 | 6 000 | 7 500 | 0,54 | ▸ **30210** | 3DB |
| | 90 | 24,75 | 101 | 100 | 11,4 | 6 000 | 7 500 | 0,62 | ▸ **32210** | 3DC |
| | 90 | 28 | 130 | 140 | 16 | 6 000 | 7 500 | 0,75 | **JM 205149/110** | M 205100 |
| | 90 | 28 | 130 | 140 | 16 | 6 000 | 7 500 | 0,75 | **JM 205149/110 A** | M 205100 |
| | 90 | 32 | 142 | 160 | 18,3 | 5 300 | 7 000 | 0,86 | ▸ **33210** | 3DE |
| | 100 | 36 | 189 | 200 | 22,4 | 5 600 | 6 700 | 1,3 | ▸ **T2ED 050** | 2ED |
| | 105 | 32 | 134 | 137 | 16 | 4 800 | 6 300 | 1,25 | **T7FC 050** | 7FC |
| | 110 | 29,25 | 131 | 120 | 14,3 | 4 500 | 6 000 | 1,2 | **31310** | 7FB |
| | 110 | 29,25 | 154 | 140 | 16,6 | 5 300 | 6 300 | 1,25 | ▸ **30310** | 2FB |
| | 110 | 42,25 | 196 | 216 | 24,5 | 4 500 | 6 000 | 1,95 | **32310 B** | 5FD |
| | 110 | 42,25 | 211 | 212 | 24 | 4 800 | 6 300 | 1,85 | ▸ **32310** | 2FD |
| **55** | 80 | 17 | 51,7 | 69,5 | 7,2 | 6 300 | 7 500 | 0,28 | ▸ **32911** | 2BC |
| | 90 | 23 | 99,4 | 116 | 12,9 | 5 600 | 7 000 | 0,56 | ▸ **32011 X** | 3CC |
| | 90 | 27 | 111 | 137 | 15,3 | 5 600 | 7 000 | 0,66 | ▸ **33011** | 2CE |
| | 95 | 30 | 136 | 156 | 17,6 | 5 600 | 6 700 | 0,85 | ▸ **33111** | 3CE |
| | 100 | 22,75 | 111 | 106 | 12 | 5 300 | 6 700 | 0,7 | ▸ **30211** | 3DB |
| | 100 | 26,75 | 130 | 129 | 15 | 5 300 | 6 700 | 0,84 | ▸ **32211** | 3DC |
| | 100 | 35 | 170 | 190 | 21,6 | 4 800 | 6 300 | 1,15 | ▸ **33211** | 3DE |
| | 110 | 39 | 220 | 232 | 26 | 5 000 | 6 000 | 1,7 | **T2ED 055** | 2ED |
| | 115 | 34 | 155 | 163 | 19,3 | 4 300 | 5 600 | 1,6 | **T7FC 055** | 7FC |
| | 120 | 31,5 | 149 | 137 | 16,6 | 4 300 | 5 600 | 1,55 | ▸ **31311** | 7FB |
| | 120 | 31,5 | 176 | 163 | 19,3 | 4 800 | 5 600 | 1,55 | ▸ **30311** | 2FB |
| | 120 | 45,5 | 233 | 260 | 30 | 4 300 | 5 600 | 2,5 | **32311 B** | 5FD |
| | 120 | 45,5 | 245 | 250 | 28,5 | 4 300 | 5 600 | 2,35 | ▸ **32311** | 2FD |

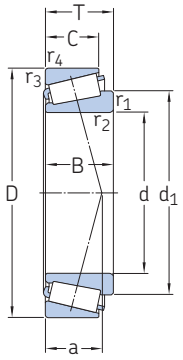
**SKF Explorer bearing**
▸ Popular item




| Dimensions | | | | | | | Abutment and fillet dimensions | | | | | | | | | Calculation factors | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | B | C | $r_{1,2}$ min. | $r_{3,4}$ min. | a | $d_a$ max. | $d_b$ min. | $D_a$ min. | $D_a$ max. | $D_b$ min. | $C_a$ min. | $C_b$ min. | $r_a$ max. | $r_b$ max. | e | Y | $Y_0$ |
| mm | | | | | | | mm | | | | | | | | | – | | |
| **50** | 62,2 | 15 | 12 | 1 | 1 | 13 | 56 | 57,5 | 66 | 65 | 69 | 3 | 3 | 1 | 1 | 0,35 | 1,7 | 0,9 |
| | 65,9 | 20 | 15,5 | 1 | 1 | 17 | 57 | 57,5 | 72 | 73 | 77 | 4 | 4,5 | 1 | 1 | 0,43 | 1,4 | 0,8 |
| | 65,3 | 24 | 19 | 1 | 1 | 17 | 57 | 57,5 | 72 | 73 | 76 | 4 | 5 | 1 | 1 | 0,31 | 1,9 | 1,1 |
| | 65,1 | 21,5 | 17 | 3,6 | 1,2 | 15 | 57 | 63 | 74 | 75 | 78 | 4 | 4,5 | 3,6 | 1,2 | 0,3 | 2 | 1,1 |
| | 65,2 | 27,7 | 17 | 3 | 0,5 | 15 | 57 | 61,5 | 74 | 76 | 78 | 4 | 4,5 | 3 | 0,5 | 0,3 | 2 | 1,1 |
| | 68 | 26 | 20 | 1,5 | 1,5 | 20 | 57 | 59 | 74 | 77 | 82 | 4 | 6 | 1,5 | 1,5 | 0,4 | 1,5 | 0,8 |
| | 68 | 20 | 17 | 1,5 | 1,5 | 19 | 59 | 59 | 79 | 82 | 85 | 3 | 4,5 | 1,5 | 1,5 | 0,43 | 1,4 | 0,8 |
| | 68,6 | 23 | 19 | 1,5 | 1,5 | 20 | 58 | 59 | 78 | 82 | 85 | 3 | 5,5 | 1,5 | 1,5 | 0,43 | 1,4 | 0,8 |
| | 68,8 | 28 | 23 | 3 | 2,5 | 20 | 58 | 62 | 78 | 80 | 85 | 5 | 5 | 3 | 2,5 | 0,33 | 1,8 | 1 |
| | 68,8 | 28 | 23 | 3 | 0,8 | 20 | 58 | 62 | 78 | 83 | 85 | 5 | 5 | 3 | 0,8 | 0,33 | 1,8 | 1 |
| | 70,8 | 32 | 24,5 | 1,5 | 1,5 | 22 | 57 | 59 | 77 | 82 | 87 | 5 | 7,5 | 1,5 | 1,5 | 0,4 | 1,5 | 0,8 |
| | 73,5 | 35 | 30 | 2,5 | 2,5 | 24 | 59 | 61 | 84 | 90 | 94 | 6 | 6 | 2,5 | 2,5 | 0,35 | 1,7 | 0,9 |
| | 81,3 | 29 | 22 | 3 | 3 | 35 | 60 | 62 | 78 | 94 | 100 | 4 | 10 | 3 | 3 | 0,88 | 0,68 | 0,4 |
| | 81,5 | 27 | 19 | 2,5 | 2 | 33 | 63 | 61 | 87 | 101 | 104 | 4 | 10 | 2,5 | 2 | 0,83 | 0,72 | 0,4 |
| | 77,2 | 27 | 23 | 2,5 | 2 | 22 | 66 | 61 | 95 | 101 | 102 | 4 | 6 | 2,5 | 2 | 0,35 | 1,7 | 0,9 |
| | 83,1 | 40 | 33 | 2,5 | 2 | 33 | 62 | 61,5 | 83 | 101 | 103 | 5 | 9 | 2,5 | 2 | 0,54 | 1,1 | 0,6 |
| | 77,7 | 40 | 33 | 2,5 | 2 | 27 | 63 | 61 | 90 | 101 | 102 | 5 | 9 | 2,5 | 2 | 0,35 | 1,7 | 0,9 |
| **55** | 68,8 | 17 | 14 | 1 | 1 | 14 | 62 | 62,5 | 73 | 73 | 76 | 3 | 3 | 1 | 1 | 0,31 | 1,9 | 1,1 |
| | 73,3 | 23 | 17,5 | 1,5 | 1,5 | 19 | 63 | 64 | 81 | 82 | 86 | 4 | 5,5 | 1,5 | 1,5 | 0,4 | 1,5 | 0,8 |
| | 73,1 | 27 | 21 | 1,5 | 1,5 | 19 | 64 | 64 | 81 | 82 | 86 | 5 | 6 | 1,5 | 1,5 | 0,31 | 1,9 | 1,1 |
| | 75,1 | 30 | 23 | 1,5 | 1,5 | 22 | 63 | 64 | 83 | 87 | 91 | 5 | 7 | 1,5 | 1,5 | 0,37 | 1,6 | 0,9 |
| | 74,7 | 21 | 18 | 2 | 1,5 | 20 | 64 | 65 | 88 | 92 | 94 | 4 | 4,5 | 2 | 1,5 | 0,4 | 1,5 | 0,8 |
| | 75,3 | 25 | 21 | 2 | 1,5 | 22 | 64 | 65 | 87 | 92 | 95 | 4 | 5,5 | 2 | 1,5 | 0,4 | 1,5 | 0,8 |
| | 78,1 | 35 | 27 | 2 | 1,5 | 24 | 63 | 65 | 85 | 92 | 96 | 6 | 8 | 2 | 1,5 | 0,4 | 1,5 | 0,8 |
| | 80,9 | 39 | 32 | 2,5 | 2,5 | 26 | 65 | 66 | 93 | 100 | 104 | 7 | 7 | 2,5 | 2,5 | 0,35 | 1,7 | 0,9 |
| | 89,5 | 31 | 23,5 | 3 | 3 | 38 | 66 | 67,5 | 86 | 104 | 109 | 4 | 10,5 | 3 | 3 | 0,88 | 0,68 | 0,4 |
| | 88,4 | 29 | 21 | 2,5 | 2 | 37 | 68 | 66,5 | 94 | 111 | 113 | 4 | 10,5 | 2,5 | 2 | 0,83 | 0,72 | 0,4 |
| | 84 | 29 | 25 | 2,5 | 2 | 23 | 72 | 66,5 | 104 | 110 | 111 | 4 | 6,5 | 2,5 | 2 | 0,35 | 1,7 | 0,9 |
| | 90,5 | 43 | 35 | 2,5 | 2 | 36 | 67 | 66,5 | 91 | 111 | 112 | 5 | 10,5 | 2,5 | 2 | 0,54 | 1,1 | 0,6 |
| | 84,6 | 43 | 35 | 2,5 | 2 | 29 | 68 | 66,5 | 99 | 110 | 111 | 5 | 10,5 | 2,5 | 2 | 0,35 | 1,7 | 0,9 |

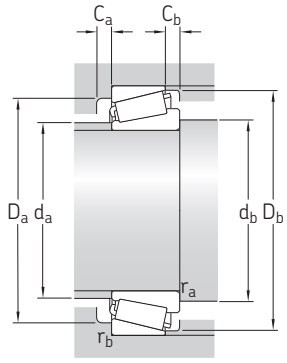
## 8.1 Metric single row tapered roller bearings

d **60 – 65** mm




| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation | Dimension series to ISO 355 (ABMA) |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | T | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | – |
| **60** | 85 | 17 | 53,2 | 75 | 7,8 | 6 000 | 7 000 | 0,3 | **32912** | 2BC |
| | 95 | 23 | 101 | 122 | 13,4 | 5 300 | 6 700 | 0,59 | **32012 X** | 4CC |
| | 95 | 24 | 103 | 132 | 15 | 5 300 | 6 700 | 0,62 | **JLM 508748/710** | LM 508700 |
| | 95 | 27 | 113 | 143 | 16 | 5 300 | 6 700 | 0,7 | ▸ **33012** | 2CE |
| | 100 | 30 | 144 | 170 | 19,6 | 5 300 | 6 300 | 0,92 | ▸ **33112** | 3CE |
| | 110 | 23,75 | 120 | 114 | 13,2 | 5 000 | 6 000 | 0,88 | ▸ **30212** | 3EB |
| | 110 | 29,75 | 155 | 160 | 18,6 | 5 000 | 6 000 | 1,15 | ▸ **32212** | 3EC |
| | 110 | 38 | 207 | 236 | 26,5 | 4 500 | 6 000 | 1,55 | ▸ **33212** | 3EE |
| | 115 | 40 | 239 | 260 | 30 | 4 800 | 5 600 | 1,85 | ▸ **T2EE 060** | 2EE |
| | 125 | 37 | 190 | 204 | 24,5 | 4 000 | 5 300 | 2,05 | **T7FC 060** | 7FC |
| | 130 | 33,5 | 177 | 166 | 20,4 | 3 800 | 5 300 | 1,9 | ▸ **31312** | 7FB |
| | 130 | 33,5 | 208 | 196 | 23,6 | 4 300 | 5 300 | 1,95 | ▸ **30312** | 2FB |
| | 130 | 48,5 | 271 | 305 | 35,5 | 3 800 | 5 000 | 3,1 | **32312 B** | 5FD |
| | 130 | 48,5 | 282 | 290 | 34 | 4 000 | 5 300 | 2,9 | ▸ **32312** | 2FD |
| **65** | 90 | 17 | 54,7 | 80 | 8,15 | 5 600 | 6 700 | 0,32 | **32913** | 2BC |
| | 100 | 23 | 103 | 127 | 14 | 5 000 | 6 000 | 0,63 | ▸ **32013 X** | 4CC |
| | 100 | 27 | 119 | 153 | 17,3 | 5 000 | 6 300 | 0,75 | ▸ **33013** | 2CE |
| | 105 | 24 | 122 | 137 | 16 | 5 000 | 6 000 | 0,76 | **JLM 710949/910** | LM 710900 |
| | 110 | 28 | 152 | 183 | 21,2 | 4 800 | 5 600 | 1,05 | **JM 511946/910** | M 511900 |
| | 110 | 31 | 170 | 193 | 22,4 | 4 800 | 6 000 | 1,15 | ▸ **T2DD 065** | 2DD |
| | 110 | 34 | 175 | 208 | 24 | 4 800 | 5 600 | 1,3 | ▸ **33113** | 3DE |
| | 120 | 24,75 | 141 | 134 | 16,3 | 4 500 | 5 600 | 1,1 | ▸ **30213** | 3EB |
| | 120 | 32,75 | 186 | 193 | 22,8 | 4 500 | 5 600 | 1,5 | ▸ **32213** | 3EC |
| | 120 | 41 | 239 | 270 | 30,5 | 4 000 | 5 300 | 2 | ▸ **33213** | 3EE |
| | 130 | 37 | 194 | 216 | 25,5 | 3 800 | 5 000 | 2,2 | **T7FC 065** | 7FC |
| | 140 | 36 | 203 | 193 | 23,6 | 3 600 | 4 800 | 2,35 | **31313** | 7GB |
| | 140 | 36 | 240 | 228 | 27,5 | 4 000 | 4 800 | 2,4 | ▸ **30313** | 2GB |
| | 140 | 51 | 305 | 345 | 40 | 3 600 | 4 800 | 3,75 | **32313 B** | 5GD |
| | 140 | 51 | 323 | 335 | 40 | 3 600 | 4 800 | 3,5 | ▸ **32313** | 2GD |

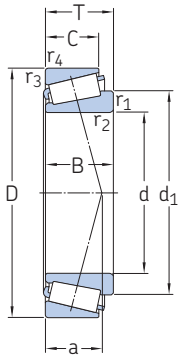
**SKF Explorer bearing**
▸ Popular item




| Dimensions | | | | | | | Abutment and fillet dimensions | | | | | | | | | Calculation factors | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | B | C | $r_{1,2}$ min. | $r_{3,4}$ min. | a | $d_a$ max. | $d_b$ min. | $D_a$ min. | $D_a$ max. | $D_b$ min. | $C_a$ min. | $C_b$ min. | $r_a$ max. | $r_b$ max. | e | Y | $Y_0$ |
| mm | | | | | | | mm | | | | | | | | | – | | |
| **60** | 73,8 | 17 | 14 | 1 | 1 | 15 | 67 | 68 | 78 | 78 | 81 | 3 | 3 | 1 | 1 | 0,33 | 1,8 | 1 |
| | 77,8 | 23 | 17,5 | 1,5 | 1,5 | 20 | 67 | 69 | 85 | 87 | 91 | 4 | 5,5 | 1,5 | 1,5 | 0,43 | 1,4 | 0,8 |
| | 78,5 | 24 | 19 | 5 | 2,5 | 20 | 68 | 76 | 84 | 85 | 91 | 4 | 5 | 5 | 2,5 | 0,4 | 1,5 | 0,8 |
| | 77,2 | 27 | 21 | 1,5 | 1,5 | 19 | 67 | 69 | 85 | 87 | 90 | 5 | 6 | 1,5 | 1,5 | 0,33 | 1,8 | 1 |
| | 80,5 | 30 | 23 | 1,5 | 1,5 | 23 | 68 | 69 | 88 | 92 | 96 | 5 | 7 | 1,5 | 1,5 | 0,4 | 1,5 | 0,8 |
| | 80,9 | 22 | 19 | 2 | 1,5 | 21 | 70 | 70 | 96 | 101 | 103 | 3 | 4,5 | 2 | 1,5 | 0,4 | 1,5 | 0,8 |
| | 81,9 | 28 | 24 | 2 | 1,5 | 24 | 69 | 70,5 | 95 | 102 | 104 | 4 | 5,5 | 2 | 1,5 | 0,4 | 1,5 | 0,8 |
| | 85,3 | 38 | 29 | 2 | 1,5 | 27 | 69 | 70,5 | 93 | 102 | 105 | 6 | 9 | 2 | 1,5 | 0,4 | 1,5 | 0,8 |
| | 85,6 | 39 | 33 | 2,5 | 2,5 | 27 | 70 | 71,5 | 98 | 104 | 109 | 6 | 7 | 2,5 | 2,5 | 0,33 | 1,8 | 1 |
| | 97,2 | 33,5 | 26 | 3 | 3 | 40 | 72 | 72,5 | 94 | 113 | 119 | 4 | 11 | 3 | 3 | 0,83 | 0,72 | 0,4 |
| | 96 | 31 | 22 | 3 | 2,5 | 39 | 74 | 72,5 | 103 | 119 | 123 | 5 | 11,5 | 3 | 2,5 | 0,83 | 0,72 | 0,4 |
| | 91,8 | 31 | 26 | 3 | 2,5 | 25 | 77 | 72,5 | 112 | 119 | 120 | 5 | 7,5 | 3 | 2,5 | 0,35 | 1,7 | 0,9 |
| | 98,6 | 46 | 37 | 3 | 2,5 | 38 | 73 | 72,5 | 99 | 119 | 122 | 6 | 11,5 | 3 | 2,5 | 0,54 | 1,1 | 0,6 |
| | 91,9 | 46 | 37 | 3 | 2,5 | 31 | 74 | 72,5 | 107 | 119 | 120 | 6 | 11,5 | 3 | 2,5 | 0,35 | 1,7 | 0,9 |
| **65** | 78,8 | 17 | 14 | 1 | 1 | 16 | 71 | 73 | 83 | 83 | 86 | 3 | 3 | 1 | 1 | 0,35 | 1,7 | 0,9 |
| | 83,3 | 23 | 17,5 | 1,5 | 1,5 | 22 | 73 | 74 | 90 | 92 | 97 | 4 | 5,5 | 1,5 | 1,5 | 0,46 | 1,3 | 0,7 |
| | 82,6 | 27 | 21 | 1,5 | 1,5 | 21 | 72 | 74 | 89 | 92 | 96 | 5 | 6 | 1,5 | 1,5 | 0,35 | 1,7 | 0,9 |
| | 84,1 | 23 | 18,5 | 3 | 1 | 23 | 73 | 77,5 | 93 | 97 | 101 | 4 | 5,5 | 3 | 1 | 0,46 | 1,3 | 0,7 |
| | 87,9 | 28 | 22,5 | 3 | 2,5 | 23 | 75 | 77,5 | 96 | 99 | 104 | 5 | 5,5 | 3 | 2,5 | 0,4 | 1,5 | 0,8 |
| | 85,7 | 31 | 25 | 2 | 2 | 23 | 74 | 75,5 | 97 | 100 | 105 | 5 | 6 | 2 | 2 | 0,33 | 1,8 | 1 |
| | 88,3 | 34 | 26,5 | 1,5 | 1,5 | 25 | 74 | 74,5 | 96 | 101 | 106 | 6 | 7,5 | 1,5 | 1,5 | 0,4 | 1,5 | 0,8 |
| | 89 | 23 | 20 | 2 | 1,5 | 23 | 78 | 75,5 | 106 | 111 | 113 | 4 | 4,5 | 2 | 1,5 | 0,4 | 1,5 | 0,8 |
| | 90,3 | 31 | 27 | 2 | 1,5 | 26 | 76 | 75,5 | 104 | 111 | 115 | 4 | 5,5 | 2 | 1,5 | 0,4 | 1,5 | 0,8 |
| | 92,5 | 41 | 32 | 2 | 1,5 | 29 | 75 | 75,5 | 102 | 111 | 115 | 6 | 9 | 2 | 1,5 | 0,4 | 1,5 | 0,8 |
| | 102 | 33,5 | 26 | 3 | 3 | 44 | 77 | 78 | 98 | 118 | 124 | 4 | 11 | 3 | 3 | 0,88 | 0,68 | 0,4 |
| | 103 | 33 | 23 | 3 | 2,5 | 42 | 80 | 78 | 111 | 129 | 132 | 5 | 13 | 3 | 2,5 | 0,83 | 0,72 | 0,4 |
| | 98,7 | 33 | 28 | 3 | 2,5 | 27 | 84 | 78 | 122 | 129 | 130 | 5 | 8 | 3 | 2,5 | 0,35 | 1,7 | 0,9 |
| | 105 | 48 | 39 | 3 | 2,5 | 41 | 79 | 78 | 107 | 129 | 131 | 6 | 12 | 3 | 2,5 | 0,54 | 1,1 | 0,6 |
| | 99,2 | 48 | 39 | 3 | 2,5 | 33 | 81 | 78 | 117 | 129 | 130 | 6 | 12 | 3 | 2,5 | 0,35 | 1,7 | 0,9 |

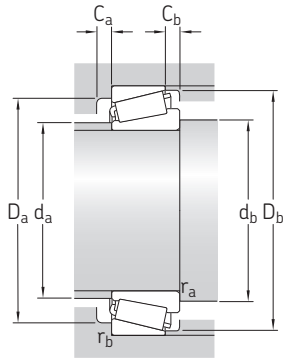
## 8.1 Metric single row tapered roller bearings

d **70 – 75** mm




| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation | Dimension series to ISO 355 (ABMA) |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | T | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | – |
| **70** | 100 | 20 | 85,8 | 112 | 12,7 | 5 000 | 6 000 | 0,49 | **32914** | 2BC |
| | 110 | 25 | 125 | 153 | 17,3 | 4 500 | 5 600 | 0,85 | ▸ **32014 X** | 4CC |
| | 110 | 31 | 159 | 196 | 22,8 | 4 800 | 5 600 | 1,05 | ▸ **33014** | 2CE |
| | 120 | 37 | 211 | 250 | 28,5 | 4 300 | 5 300 | 1,7 | ▸ **33114** | 3DE |
| | 125 | 26,25 | 155 | 156 | 18 | 4 300 | 5 300 | 1,25 | ▸ **30214** | 3EB |
| | 125 | 33,25 | 195 | 208 | 24,5 | 4 300 | 5 300 | 1,6 | ▸ **32214** | 3EC |
| | 125 | 41 | 247 | 285 | 32,5 | 3 800 | 5 000 | 2,1 | ▸ **33214** | 3EE |
| | 130 | 43 | 289 | 325 | 38 | 4 000 | 5 000 | 2,5 | **T2ED 070** | 2ED |
| | 140 | 39 | 219 | 240 | 27,5 | 3 400 | 4 500 | 2,65 | **T7FC 070** | 7FC |
| | 150 | 38 | 229 | 220 | 27 | 3 400 | 4 500 | 2,85 | **31314** | 7GB |
| | 150 | 38 | 271 | 260 | 31 | 3 800 | 4 500 | 2,95 | ▸ **30314** | 2GB |
| | 150 | 54 | 346 | 400 | 45 | 3 400 | 4 300 | 4,55 | **32314 B** | 5GD |
| | 150 | 54 | 363 | 380 | 45 | 3 400 | 4 500 | 4,3 | ▸ **32314** | 2GD |
| **75** | 105 | 20 | 86,8 | 116 | 13,2 | 4 800 | 5 600 | 0,51 | **32915** | 2BC |
| | 115 | 25 | 130 | 163 | 18,6 | 4 300 | 5 300 | 0,91 | ▸ **32015 X** | 4CC |
| | 115 | 31 | 167 | 228 | 26 | 4 300 | 5 300 | 1,2 | ▸ **33015** | 2CE |
| | 120 | 31 | 170 | 216 | 25 | 4 300 | 5 300 | 1,3 | **JM 714249/210** | M 714200 |
| | 125 | 37 | 216 | 265 | 30 | 4 000 | 5 000 | 1,8 | ▸ **33115** | 3DE |
| | 130 | 27,25 | 171 | 176 | 20,4 | 4 000 | 5 000 | 1,4 | ▸ **30215** | 4DB |
| | 130 | 33,25 | 197 | 212 | 24,5 | 4 000 | 5 000 | 1,65 | ▸ **32215** | 4DC |
| | 130 | 41 | 255 | 300 | 34 | 3 600 | 4 800 | 2,2 | ▸ **33215** | 3DE |
| | 145 | 51 | 380 | 450 | 51 | 3 600 | 4 500 | 3,9 | **JH 415647/610** | H 415600 |
| | 145 | 52 | 364 | 450 | 50 | 3 600 | 4 500 | 3,95 | **T3FE 075** | 3FE |
| | 150 | 42 | 249 | 280 | 31 | 3 200 | 4 300 | 3,25 | **T7FC 075** | 7FC |
| | 160 | 40 | 255 | 245 | 29 | 3 200 | 4 300 | 3,4 | **31315** | 7GB |
| | 160 | 40 | 301 | 290 | 34 | 3 400 | 4 300 | 3,5 | ▸ **30315** | 2GB |
| | 160 | 58 | 410 | 475 | 53 | 3 200 | 4 000 | 5,55 | **32315 B** | 5GD |
| | 160 | 58 | 416 | 440 | 51 | 3 200 | 4 300 | 5,2 | ▸ **32315** | 2GD |

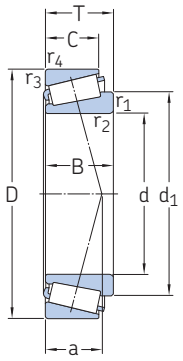
**SKF Explorer bearing**
▸ Popular item




| Dimensions | | | | | | | Abutment and fillet dimensions | | | | | | | | | Calculation factors | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | B | C | $r_{1,2}$ min. | $r_{3,4}$ min. | a | $d_a$ max. | $d_b$ min. | $D_a$ min. | $D_a$ max. | $D_b$ min. | $C_a$ min. | $C_b$ min. | $r_a$ max. | $r_b$ max. | e | Y | $Y_0$ |
| mm | | | | | | | mm | | | | | | | | | – | | |
| **70** | 84,7 | 20 | 16 | 1 | 1 | 17 | 77 | 78 | 93 | 92 | 96 | 4 | 4 | 1 | 1 | 0,31 | 1,9 | 1,1 |
| | 89,9 | 25 | 19 | 1,5 | 1,5 | 23 | 78 | 79,5 | 98 | 101 | 105 | 5 | 6 | 1,5 | 1,5 | 0,43 | 1,4 | 0,8 |
| | 88,9 | 31 | 25,5 | 1,5 | 1,5 | 22 | 78 | 79,5 | 99 | 101 | 105 | 5 | 5,5 | 1,5 | 1,5 | 0,28 | 2,1 | 1,1 |
| | 95,3 | 37 | 29 | 2 | 1,5 | 27 | 80 | 80,5 | 104 | 111 | 115 | 6 | 8 | 2 | 1,5 | 0,37 | 1,6 | 0,9 |
| | 94 | 24 | 21 | 2 | 1,5 | 25 | 82 | 80,5 | 110 | 116 | 118 | 4 | 5 | 2 | 1,5 | 0,43 | 1,4 | 0,8 |
| | 95 | 31 | 27 | 2 | 1,5 | 28 | 81 | 80,5 | 108 | 116 | 119 | 4 | 6 | 2 | 1,5 | 0,43 | 1,4 | 0,8 |
| | 97,4 | 41 | 32 | 2 | 1,5 | 30 | 80 | 80,5 | 107 | 116 | 120 | 6 | 9 | 2 | 1,5 | 0,4 | 1,5 | 0,8 |
| | 98,1 | 42 | 35 | 3 | 2,5 | 30 | 81 | 82,5 | 111 | 119 | 123 | 7 | 8 | 3 | 2,5 | 0,33 | 1,8 | 1 |
| | 110 | 35,5 | 27 | 3 | 3 | 46 | 82 | 83 | 106 | 128 | 133 | 5 | 12 | 3 | 3 | 0,88 | 0,68 | 0,4 |
| | 111 | 35 | 25 | 3 | 2,5 | 45 | 85 | 83 | 118 | 139 | 141 | 5 | 13 | 3 | 2,5 | 0,83 | 0,72 | 0,4 |
| | 105 | 35 | 30 | 3 | 2,5 | 29 | 90 | 83 | 130 | 139 | 140 | 5 | 8 | 3 | 2,5 | 0,35 | 1,7 | 0,9 |
| | 113 | 51 | 42 | 3 | 2,5 | 43 | 85 | 83 | 115 | 139 | 141 | 7 | 12 | 3 | 2,5 | 0,54 | 1,1 | 0,6 |
| | 106 | 51 | 42 | 3 | 2,5 | 35 | 87 | 83 | 125 | 139 | 140 | 6 | 12 | 3 | 2,5 | 0,35 | 1,7 | 0,9 |
| **75** | 89,7 | 20 | 16 | 1 | 1 | 18 | 82 | 83,5 | 98 | 97 | 101 | 4 | 4 | 1 | 1 | 0,33 | 1,8 | 1 |
| | 95,1 | 25 | 19 | 1,5 | 1,5 | 24 | 83 | 84,5 | 103 | 106 | 110 | 5 | 6 | 1,5 | 1,5 | 0,46 | 1,3 | 0,7 |
| | 95 | 31 | 25,5 | 1,5 | 1,5 | 23 | 84 | 84,5 | 104 | 106 | 110 | 6 | 5,5 | 1,5 | 1,5 | 0,3 | 2 | 1,1 |
| | 98,1 | 29,5 | 25 | 3 | 2,5 | 28 | 84 | 87,5 | 104 | 109 | 115 | 5 | 6 | 3 | 2,5 | 0,44 | 1,35 | 0,8 |
| | 100 | 37 | 29 | 2 | 1,5 | 28 | 84 | 85,5 | 109 | 116 | 120 | 6 | 8 | 2 | 1,5 | 0,4 | 1,5 | 0,8 |
| | 99,8 | 25 | 22 | 2 | 1,5 | 26 | 87 | 85,5 | 115 | 121 | 124 | 4 | 5 | 2 | 1,5 | 0,43 | 1,4 | 0,8 |
| | 100 | 31 | 27 | 2 | 1,5 | 29 | 85 | 85,5 | 114 | 121 | 125 | 4 | 6 | 2 | 1,5 | 0,43 | 1,4 | 0,8 |
| | 102 | 41 | 31 | 2 | 1,5 | 31 | 84 | 86 | 111 | 121 | 125 | 6 | 10 | 2 | 1,5 | 0,43 | 1,4 | 0,8 |
| | 111 | 51 | 42 | 3 | 2,5 | 35 | 89 | 88 | 123 | 134 | 139 | 9 | 9 | 3 | 2,5 | 0,37 | 1,6 | 0,9 |
| | 111 | 51 | 43 | 5 | 3 | 39 | 88 | 92 | 117 | 133 | 138 | 7 | 9 | 5 | 3 | 0,43 | 1,4 | 0,8 |
| | 116 | 38 | 29 | 3 | 3 | 50 | 88 | 88 | 114 | 138 | 143 | 5 | 13 | 3 | 3 | 0,88 | 0,68 | 0,4 |
| | 118 | 37 | 26 | 3 | 2,5 | 48 | 91 | 88 | 127 | 149 | 151 | 5 | 14 | 3 | 2,5 | 0,83 | 0,72 | 0,4 |
| | 112 | 37 | 31 | 3 | 2,5 | 30 | 96 | 88 | 139 | 149 | 149 | 5 | 9 | 3 | 2,5 | 0,35 | 1,7 | 0,9 |
| | 119 | 55 | 45 | 3 | 2,5 | 46 | 89 | 88 | 122 | 149 | 151 | 7 | 13 | 3 | 2,5 | 0,54 | 1,1 | 0,6 |
| | 113 | 55 | 45 | 3 | 2,5 | 37 | 92 | 88 | 133 | 149 | 149 | 7 | 13 | 3 | 2,5 | 0,35 | 1,7 | 0,9 |

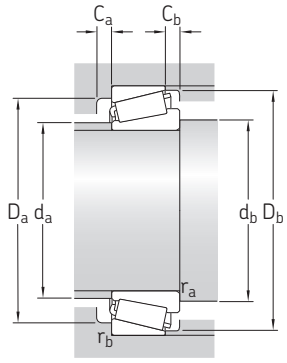
## 8.1 Metric single row tapered roller bearings

d **80 – 85** mm




| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation | Dimension series to ISO 355 (ABMA) |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | T | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | – |
| **80** | 110 | 20 | 89,7 | 125 | 14 | 4 500 | 5 600 | 0,54 | **32916** | 2BC |
| | 125 | 29 | 168 | 216 | 24,5 | 4 000 | 5 000 | 1,3 | ▸ **32016 X** | 3CC |
| | 125 | 36 | 207 | 285 | 32 | 4 000 | 5 000 | 1,65 | ▸ **33016** | 2CE |
| | 130 | 35 | 216 | 275 | 31 | 4 000 | 4 800 | 1,75 | **JM 515649/610** | M 515600 |
| | 130 | 37 | 221 | 280 | 31 | 4 000 | 4 800 | 1,85 | ▸ **33116** | 3DE |
| | 140 | 28,25 | 184 | 183 | 21,2 | 3 800 | 4 800 | 1,6 | ▸ **30216** | 3EB |
| | 140 | 35,25 | 228 | 245 | 28,5 | 3 800 | 4 500 | 2,05 | ▸ **32216** | 3EC |
| | 140 | 46 | 308 | 375 | 41,5 | 3 400 | 4 500 | 2,9 | ▸ **33216** | 3EE |
| | 160 | 45 | 280 | 315 | 35,5 | 3 000 | 4 000 | 4 | **T7FC 080** | 7FC |
| | 170 | 42,5 | 276 | 265 | 30,5 | 3 000 | 4 000 | 4,05 | **31316** | 7GB |
| | 170 | 42,5 | 333 | 320 | 36,5 | 3 200 | 4 000 | 4,15 | ▸ **30316** | 2GB |
| | 170 | 61,5 | 440 | 520 | 57 | 3 200 | 3 800 | 6,65 | **32316 B** | 5GD |
| | 170 | 61,5 | 404 | 500 | 56 | 3 200 | 4 000 | 6,2 | ▸ **32316** | 2GD |
| **85** | 120 | 23 | 115 | 156 | 17,6 | 4 000 | 5 000 | 0,78 | **32917** | 2CC |
| | 130 | 29 | 171 | 224 | 25,5 | 3 800 | 4 800 | 1,35 | ▸ **32017 X** | 4CC |
| | 130 | 30 | 172 | 228 | 26 | 3 800 | 4 800 | 1,4 | **JM 716649/610** | M 716600 |
| | 130 | 36 | 223 | 310 | 34,5 | 3 800 | 4 800 | 1,75 | ▸ **33017** | 2CE |
| | 140 | 41 | 268 | 340 | 38 | 3 600 | 4 500 | 2,45 | ▸ **33117** | 3DE |
| | 150 | 30,5 | 216 | 220 | 25,5 | 3 600 | 4 300 | 2,05 | ▸ **30217** | 3EB |
| | 150 | 38,5 | 263 | 285 | 33,5 | 3 600 | 4 300 | 2,6 | ▸ **32217** | 3EC |
| | 150 | 49 | 353 | 430 | 48 | 3 200 | 4 300 | 3,55 | ▸ **33217** | 3EE |
| | 170 | 48 | 333 | 380 | 43 | 2 800 | 3 800 | 4,85 | **T7FC 085** | 7FC |
| | 180 | 44,5 | 297 | 285 | 32 | 2 800 | 3 800 | 4,6 | ▸ **31317** | 7GB |
| | 180 | 44,5 | 372 | 365 | 40,5 | 3 000 | 3 800 | 4,85 | ▸ **30317** | 2GB |
| | 180 | 63,5 | 417 | 560 | 62 | 3 000 | 3 600 | 7,6 | **32317 B** | 5GD |
| | 180 | 63,5 | 435 | 530 | 60 | 3 000 | 3 800 | 7,1 | ▸ **32317** | 2GD |

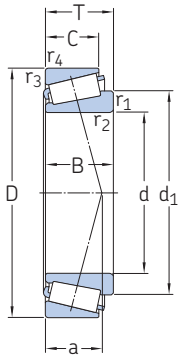
**SKF Explorer bearing**
▸ Popular item




| Dimensions | | | | | | | Abutment and fillet dimensions | | | | | | | | | Calculation factors | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | B | C | $r_{1,2}$ min. | $r_{3,4}$ min. | a | $d_a$ max. | $d_b$ min. | $D_a$ min. | $D_a$ max. | $D_b$ min. | $C_a$ min. | $C_b$ min. | $r_a$ max. | $r_b$ max. | e | Y | $Y_0$ |
| mm | | | | | | | mm | | | | | | | | | – | | |
| **80** | 94,8 | 20 | 16 | 1 | 1 | 19 | 86 | 88,5 | 102 | 102 | 106 | 4 | 4 | 1 | 1 | 0,35 | 1,7 | 0,9 |
| | 103 | 29 | 22 | 1,5 | 1,5 | 26 | 90 | 90 | 112 | 116 | 120 | 6 | 7 | 1,5 | 1,5 | 0,43 | 1,4 | 0,8 |
| | 102 | 36 | 29,5 | 1,5 | 1,5 | 25 | 90 | 89,5 | 112 | 116 | 119 | 6 | 6,5 | 1,5 | 1,5 | 0,28 | 2,1 | 1,1 |
| | 104 | 34 | 28,5 | 3 | 2,5 | 28 | 90 | 93 | 114 | 119 | 124 | 6 | 6,5 | 3 | 2,5 | 0,4 | 1,5 | 0,8 |
| | 105 | 37 | 29 | 2 | 1,5 | 30 | 89 | 91 | 114 | 121 | 126 | 6 | 8 | 2 | 1,5 | 0,43 | 1,4 | 0,8 |
| | 105 | 26 | 22 | 2,5 | 2 | 27 | 92 | 92 | 124 | 130 | 132 | 4 | 6 | 2,5 | 2 | 0,43 | 1,4 | 0,8 |
| | 106 | 33 | 28 | 2,5 | 2 | 30 | 91 | 92 | 122 | 130 | 134 | 5 | 7 | 2,5 | 2 | 0,43 | 1,4 | 0,8 |
| | 110 | 46 | 35 | 2,5 | 2 | 34 | 90 | 92 | 119 | 130 | 135 | 7 | 11 | 2,5 | 2 | 0,43 | 1,4 | 0,8 |
| | 125 | 41 | 31 | 3 | 3 | 53 | 94 | 93,5 | 121 | 148 | 152 | 5 | 14 | 3 | 3 | 0,88 | 0,68 | 0,4 |
| | 125 | 39 | 27 | 3 | 2,5 | 51 | 97 | 93,5 | 134 | 159 | 159 | 5 | 15,5 | 3 | 2,5 | 0,83 | 0,72 | 0,4 |
| | 122 | 39 | 33 | 3 | 2,5 | 33 | 103 | 93,5 | 148 | 158 | 159 | 5 | 9,5 | 3 | 2,5 | 0,35 | 1,7 | 0,9 |
| | 128 | 58 | 48 | 3 | 2,5 | 49 | 97 | 93,5 | 130 | 159 | 160 | 7 | 13,5 | 3 | 2,5 | 0,54 | 1,1 | 0,6 |
| | 120 | 58 | 48 | 3 | 2,5 | 40 | 98 | 93,5 | 142 | 159 | 159 | 7 | 13,5 | 3 | 2,5 | 0,35 | 1,7 | 0,9 |
| **85** | 101 | 23 | 18 | 1,5 | 1,5 | 21 | 93 | 94,5 | 111 | 111 | 115 | 4 | 5 | 1,5 | 1,5 | 0,33 | 1,8 | 1 |
| | 108 | 29 | 22 | 1,5 | 1,5 | 27 | 95 | 95 | 117 | 121 | 125 | 6 | 7 | 1,5 | 1,5 | 0,44 | 1,35 | 0,8 |
| | 107 | 29 | 24 | 3 | 2,5 | 29 | 94 | 98 | 115 | 119 | 125 | 5 | 6 | 3 | 2,5 | 0,44 | 1,35 | 0,8 |
| | 107 | 36 | 29,5 | 1,5 | 1,5 | 26 | 95 | 95 | 118 | 121 | 125 | 6 | 6,5 | 1,5 | 1,5 | 0,3 | 2 | 1,1 |
| | 112 | 41 | 32 | 2,5 | 2 | 32 | 95 | 97 | 122 | 130 | 135 | 7 | 9 | 2,5 | 2 | 0,4 | 1,5 | 0,8 |
| | 112 | 28 | 24 | 2,5 | 2 | 29 | 97 | 97 | 132 | 140 | 141 | 5 | 6,5 | 2,5 | 2 | 0,43 | 1,4 | 0,8 |
| | 113 | 36 | 30 | 2,5 | 2 | 33 | 97 | 97 | 130 | 140 | 142 | 5 | 8,5 | 2,5 | 2 | 0,43 | 1,4 | 0,8 |
| | 117 | 49 | 37 | 2,5 | 2 | 36 | 96 | 97 | 128 | 140 | 144 | 7 | 12 | 2,5 | 2 | 0,43 | 1,4 | 0,8 |
| | 132 | 45 | 33 | 4 | 4 | 53 | 100 | 100 | 131 | 156 | 161 | 6 | 15 | 4 | 4 | 0,79 | 0,76 | 0,4 |
| | 131 | 41 | 28 | 4 | 3 | 53 | 104 | 100 | 143 | 167 | 169 | 5 | 16,5 | 4 | 3 | 0,83 | 0,72 | 0,4 |
| | 126 | 41 | 34 | 4 | 3 | 34 | 108 | 100 | 156 | 167 | 167 | 5 | 10,5 | 4 | 3 | 0,35 | 1,7 | 0,9 |
| | 135 | 60 | 49 | 4 | 3 | 51 | 102 | 100 | 138 | 168 | 169 | 7 | 14,5 | 4 | 3 | 0,54 | 1,1 | 0,6 |
| | 127 | 60 | 49 | 4 | 3 | 41 | 103 | 100 | 150 | 167 | 167 | 7 | 14,5 | 4 | 3 | 0,35 | 1,7 | 0,9 |

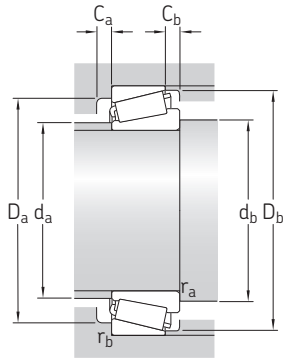
## 8.1 Metric single row tapered roller bearings

d **90 – 100** mm




| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation | Dimension series to ISO 355 (ABMA) |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | T | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | – |
| **90** | 125 | 23 | 119 | 166 | 18,3 | 4 000 | 4 800 | 0,83 | 32918 | 2CC |
| | 140 | 32 | 208 | 270 | 31 | 3 600 | 4 300 | 1,75 | ▸ 32018 X | 3CC |
| | 140 | 39 | 266 | 355 | 39 | 3 600 | 4 500 | 2,2 | ▸ 33018 | 2CE |
| | 145 | 35 | 246 | 305 | 33,5 | 3 600 | 4 300 | 2,15 | JM 718149 A/110 | M 718100 |
| | 145 | 35 | 246 | 305 | 33,5 | 3 600 | 4 300 | 2,15 | JM 718149/110 | M 718100 |
| | 150 | 45 | 310 | 390 | 43 | 3 400 | 4 300 | 3,1 | ▸ 33118 | 3DE |
| | 160 | 32,5 | 240 | 245 | 28,5 | 3 400 | 4 000 | 2,5 | ▸ 30218 | 3FB |
| | 160 | 42,5 | 309 | 340 | 38 | 3 400 | 4 000 | 3,35 | ▸ 32218 | 3FC |
| | 160 | 55 | 415 | 520 | 57 | 3 000 | 4 000 | 4,6 | ▸ 33218 | 3FE |
| | 190 | 46,5 | 283 | 315 | 35,5 | 2 400 | 3 400 | 5,4 | ▸ 31318 | 7GB |
| | 190 | 46,5 | 353 | 400 | 44 | 2 600 | 3 600 | 5,65 | ▸ 30318 | 2GB |
| | 190 | 67,5 | 487 | 610 | 65,5 | 2 600 | 3 600 | 8,4 | ▸ 32318 | 2GD |
| | 190 | 67,5 | 540 | 630 | 69,5 | 2 800 | 3 400 | 8,95 | 32318 B | 5GD |
| **95** | 130 | 23 | 121 | 173 | 18,6 | 3 800 | 4 500 | 0,86 | 32919 | 2CC |
| | 145 | 32 | 206 | 270 | 30,5 | 3 400 | 4 300 | 1,85 | ▸ 32019 X | 4CC |
| | 145 | 39 | 272 | 375 | 40,5 | 3 400 | 4 300 | 2,3 | ▸ 33019 | 2CE |
| | 170 | 34,5 | 266 | 275 | 31,5 | 3 200 | 3 800 | 3 | ▸ 30219 | 3FB |
| | 170 | 45,5 | 348 | 390 | 43 | 3 200 | 3 800 | 4,1 | ▸ 32219 | 3FC |
| | 170 | 58 | 460 | 560 | 62 | 2 800 | 3 800 | 5,45 | ▸ 33219 | 3FE |
| | 200 | 49,5 | 314 | 355 | 39 | 2 400 | 3 400 | 6,3 | ▸ 31319 | 7GB |
| | 200 | 49,5 | 353 | 390 | 42,5 | 2 600 | 3 400 | 6,45 | 30319 | 2GB |
| | 200 | 71,5 | 535 | 670 | 72 | 2 400 | 3 400 | 9,8 | ▸ 32319 | 2GD |
| **100** | 140 | 25 | 147 | 204 | 22,4 | 3 400 | 4 300 | 1,15 | ▸ 32920 | 2CC |
| | 145 | 24 | 154 | 190 | 20,8 | 3 400 | 4 300 | 1,2 | ▸ T4CB 100 | 4CB |
| | 150 | 32 | 209 | 280 | 31 | 3 200 | 4 000 | 1,9 | 32020 X | 4CC |
| | 150 | 39 | 278 | 390 | 41,5 | 3 400 | 4 000 | 2,4 | ▸ 33020 | 2CE |
| | 165 | 47 | 383 | 480 | 52 | 3 200 | 3 800 | 3,9 | ▸ T2EE 100 | 2EE |
| | 180 | 37 | 304 | 320 | 36 | 3 000 | 3 600 | 3,65 | ▸ 30220 | 3FB |
| | 180 | 49 | 390 | 440 | 48 | 3 000 | 3 600 | 4,95 | ▸ 32220 | 3FC |
| | 180 | 63 | 532 | 655 | 71 | 2 600 | 3 600 | 6,75 | ▸ 33220 | 3FE |
| | 215 | 51,5 | 431 | 490 | 53 | 2 400 | 3 200 | 7,95 | ▸ 30320 | 2GB |
| | 215 | 56,5 | 399 | 465 | 51 | 2 200 | 3 000 | 8,6 | ▸ 31320 X | 7GB |
| | 215 | 77,5 | 617 | 780 | 83 | 2 200 | 3 200 | 12,5 | ▸ 32320 | 2GD |

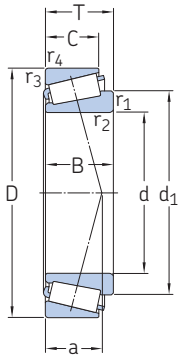
**SKF Explorer bearing**
▸ Popular item




| Dimensions | | | | | | | Abutment and fillet dimensions | | | | | | | | | Calculation factors | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | B | C | $r_{1,2}$ min. | $r_{3,4}$ min. | a | $d_a$ max. | $d_b$ min. | $D_a$ min. | $D_a$ max. | $D_b$ min. | $C_a$ min. | $C_b$ min. | $r_a$ max. | $r_b$ max. | e | Y | $Y_0$ |
| mm | | | | | | | mm | | | | | | | | | – | | |
| **90** | 106 | 23 | 18 | 1,5 | 1,5 | 22 | 98 | 100 | 116 | 116 | 120 | 4 | 5 | 1,5 | 1,5 | 0,35 | 1,7 | 0,9 |
| | 115 | 32 | 24 | 2 | 1,5 | 29 | 100 | 101 | 125 | 131 | 134 | 6 | 8 | 2 | 1,5 | 0,43 | 1,4 | 0,8 |
| | 114 | 39 | 32,5 | 2 | 1,5 | 27 | 101 | 101 | 127 | 131 | 135 | 7 | 6,5 | 2 | 1,5 | 0,27 | 2,2 | 1,3 |
| | 117 | 34 | 27 | 6 | 2,5 | 32 | 100 | 109 | 127 | 134 | 139 | 6 | 8 | 6 | 2,5 | 0,44 | 1,35 | 0,8 |
| | 117 | 34 | 27 | 3 | 2,5 | 32 | 100 | 103 | 127 | 134 | 139 | 6 | 8 | 3 | 2,5 | 0,44 | 1,35 | 0,8 |
| | 120 | 45 | 35 | 2,5 | 2 | 34 | 101 | 102 | 130 | 140 | 144 | 7 | 10 | 2,5 | 2 | 0,4 | 1,5 | 0,8 |
| | 120 | 30 | 26 | 2,5 | 2 | 31 | 104 | 102 | 140 | 150 | 150 | 5 | 6,5 | 2,5 | 2 | 0,43 | 1,4 | 0,8 |
| | 121 | 40 | 34 | 2,5 | 2 | 35 | 103 | 102 | 138 | 150 | 152 | 5 | 8,5 | 2,5 | 2 | 0,43 | 1,4 | 0,8 |
| | 125 | 55 | 42 | 2,5 | 2 | 40 | 101 | 102 | 135 | 150 | 154 | 8 | 13 | 2,5 | 2 | 0,43 | 1,4 | 0,8 |
| | 138 | 43 | 30 | 4 | 3 | 57 | 110 | 105 | 151 | 177 | 179 | 5 | 16,5 | 4 | 3 | 0,83 | 0,72 | 0,4 |
| | 133 | 43 | 36 | 4 | 3 | 36 | 114 | 105 | 165 | 177 | 176 | 6 | 10,5 | 4 | 3 | 0,35 | 1,7 | 0,9 |
| | 133 | 64 | 53 | 4 | 3 | 44 | 109 | 105 | 157 | 177 | 177 | 7 | 14,5 | 4 | 3 | 0,35 | 1,7 | 0,9 |
| | 141 | 64 | 53 | 4 | 3 | 55 | 107 | 105 | 145 | 177 | 179 | 7 | 14,5 | 4 | 3 | 0,54 | 1,1 | 0,6 |
| **95** | 112 | 23 | 18 | 1,5 | 1,5 | 23 | 103 | 105 | 121 | 121 | 125 | 4 | 5 | 1,5 | 1,5 | 0,35 | 1,7 | 0,9 |
| | 120 | 32 | 24 | 2 | 1,5 | 31 | 106 | 106 | 130 | 136 | 140 | 6 | 8 | 2 | 1,5 | 0,44 | 1,35 | 0,8 |
| | 118 | 39 | 32,5 | 2 | 1,5 | 28 | 105 | 106 | 131 | 136 | 139 | 7 | 6,5 | 2 | 1,5 | 0,28 | 2,1 | 1,1 |
| | 126 | 32 | 27 | 3 | 2,5 | 32 | 110 | 108 | 149 | 158 | 159 | 5 | 7,5 | 3 | 2,5 | 0,43 | 1,4 | 0,8 |
| | 128 | 43 | 37 | 3 | 2,5 | 38 | 109 | 108 | 145 | 158 | 161 | 5 | 8,5 | 3 | 2,5 | 0,43 | 1,4 | 0,8 |
| | 132 | 58 | 44 | 3 | 2,5 | 42 | 107 | 108 | 144 | 158 | 163 | 9 | 14 | 3 | 2,5 | 0,4 | 1,5 | 0,8 |
| | 145 | 45 | 32 | 4 | 3 | 59 | 114 | 111 | 157 | 187 | 187 | 5 | 17,5 | 4 | 3 | 0,83 | 0,72 | 0,4 |
| | 139 | 45 | 38 | 4 | 3 | 38 | 119 | 111 | 172 | 187 | 184 | 7 | 11,5 | 4 | 3 | 0,35 | 1,7 | 0,9 |
| | 141 | 67 | 55 | 4 | 3 | 47 | 115 | 111 | 166 | 187 | 186 | 8 | 16,5 | 4 | 3 | 0,35 | 1,7 | 0,9 |
| **100** | 119 | 25 | 20 | 1,5 | 1,5 | 23 | 110 | 110 | 131 | 131 | 135 | 5 | 5 | 1,5 | 1,5 | 0,33 | 1,8 | 1 |
| | 121 | 22,5 | 17,5 | 3 | 3 | 29 | 109 | 113 | 133 | 133 | 140 | 4 | 6,5 | 3 | 3 | 0,48 | 1,25 | 0,7 |
| | 125 | 32 | 24 | 2 | 1,5 | 32 | 110 | 111 | 134 | 141 | 144 | 6 | 8 | 2 | 1,5 | 0,46 | 1,3 | 0,7 |
| | 122 | 39 | 32,5 | 2 | 1,5 | 28 | 109 | 111 | 135 | 141 | 143 | 7 | 6,5 | 2 | 1,5 | 0,28 | 2,1 | 1,1 |
| | 129 | 46 | 39 | 3 | 3 | 35 | 111 | 113 | 145 | 152 | 157 | 7 | 8 | 3 | 3 | 0,31 | 1,9 | 1,1 |
| | 134 | 34 | 29 | 3 | 2,5 | 35 | 116 | 113 | 157 | 168 | 168 | 5 | 8 | 3 | 2,5 | 0,43 | 1,4 | 0,8 |
| | 136 | 46 | 39 | 3 | 2,5 | 40 | 115 | 113 | 154 | 168 | 171 | 5 | 10 | 3 | 2,5 | 0,43 | 1,4 | 0,8 |
| | 139 | 63 | 48 | 3 | 2,5 | 44 | 112 | 113 | 151 | 168 | 172 | 10 | 15 | 3 | 2,5 | 0,4 | 1,5 | 0,8 |
| | 149 | 47 | 39 | 4 | 3 | 40 | 128 | 116 | 184 | 202 | 197 | 6 | 12,5 | 4 | 3 | 0,35 | 1,7 | 0,9 |
| | 158 | 51 | 35 | 4 | 3 | 64 | 121 | 116 | 168 | 202 | 202 | 7 | 21,5 | 4 | 3 | 0,83 | 0,72 | 0,4 |
| | 152 | 73 | 60 | 4 | 3 | 51 | 123 | 116 | 177 | 202 | 200 | 8 | 17,5 | 4 | 3 | 0,35 | 1,7 | 0,9 |

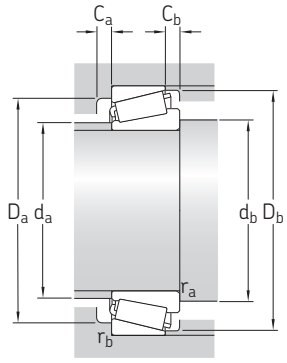
## 8.1 Metric single row tapered roller bearings

d **105 – 130** mm




| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation | Dimension series to ISO 355 (ABMA) |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | T | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | – |
| **105** | 145 | 25 | 149 | 212 | 22,8 | 3 400 | 4 000 | 1,2 | 32921 | 2CC |
| | 160 | 35 | 248 | 335 | 37,5 | 3 200 | 3 800 | 2,45 | ▸ 32021 X | 4DC |
| | 160 | 43 | 303 | 430 | 45,5 | 3 200 | 3 800 | 3 | ▸ 33021 | 2DE |
| | 190 | 39 | 333 | 355 | 40 | 2 800 | 3 400 | 4,3 | ▸ 30221 | 3FB |
| | 190 | 53 | 443 | 510 | 55 | 2 800 | 3 400 | 6 | ▸ 32221 | 3FC |
| | 225 | 53,5 | 462 | 530 | 57 | 2 200 | 3 000 | 9,1 | **30321** | 2GB |
| | 225 | 58 | 429 | 500 | 53 | 2 000 | 3 000 | 9,65 | **31321 X** | 7GB |
| | 225 | 81,5 | 645 | 815 | 85 | 2 000 | 3 000 | 14 | ▸ **32321** | 2GD |
| **110** | 150 | 25 | 154 | 224 | 24 | 3 200 | 4 000 | 1,25 | 32922 | 2CC |
| | 165 | 35 | 256 | 355 | 37,5 | 3 000 | 3 600 | 2,55 | JM 822049/010 | M 822000 |
| | 170 | 38 | 288 | 390 | 40 | 3 000 | 3 600 | 3,05 | ▸ 32022 X | 4DC |
| | 170 | 47 | 343 | 500 | 53 | 3 000 | 3 600 | 3,85 | ▸ 33022 | 2DE |
| | 180 | 56 | 455 | 630 | 65,5 | 2 800 | 3 400 | 5,5 | 33122 | 3EE |
| | 200 | 41 | 327 | 405 | 43 | 2 600 | 3 200 | 5,05 | ▸ **30222** | 3FB |
| | 200 | 56 | 491 | 570 | 61 | 2 600 | 3 200 | 7,1 | ▸ 32222 | 3FC |
| | 240 | 54,5 | 507 | 585 | 62 | 2 200 | 2 800 | 11 | **30322** | 2GB |
| | 240 | 63 | 491 | 585 | 61 | 1 900 | 2 800 | 12 | ▸ **31322 X** | 7GB |
| | 240 | 84,5 | 675 | 830 | 86,5 | 1 900 | 2 800 | 16,5 | ▸ **32322** | 2GD |
| **120** | 165 | 29 | 204 | 305 | 32 | 3 000 | 3 600 | 1,8 | ▸ 32924 | 2CC |
| | 170 | 27 | 195 | 250 | 26,5 | 2 800 | 3 600 | 1,75 | ▸ T4CB 120 | 4CB |
| | 180 | 38 | 299 | 415 | 42,5 | 2 800 | 3 400 | 3,3 | ▸ 32024 X | 4DC |
| | 180 | 48 | 356 | 540 | 56 | 2 800 | 3 400 | 4,2 | ▸ 33024 | 2DE |
| | 215 | 43,5 | 417 | 465 | 49 | 2 400 | 3 000 | 6,15 | ▸ 30224 | 4FB |
| | 215 | 61,5 | 573 | 695 | 72 | 2 400 | 3 000 | 9,05 | ▸ 32224 | 4FD |
| | 260 | 59,5 | 601 | 710 | 73,5 | 2 000 | 2 600 | 13,5 | ▸ **30324** | 2GB |
| | 260 | 68 | 578 | 695 | 72 | 1 700 | 2 400 | 15,5 | ▸ **31324 X** | 7GB |
| | 260 | 90,5 | 855 | 1 120 | 110 | 1 800 | 2 600 | 21,5 | ▸ **32324** | 2GD |
| **130** | 180 | 32 | 245 | 365 | 38 | 2 600 | 3 200 | 2,4 | ▸ 32926 | 2CC |
| | 200 | 45 | 388 | 540 | 55 | 2 400 | 3 000 | 4,95 | ▸ 32026 X | 4EC |
| | 200 | 55 | 470 | 680 | 69,5 | 2 400 | 3 000 | 6,15 | 33026 | 2EE |
| | 230 | 43,75 | 451 | 490 | 51 | 2 200 | 2 800 | 6,85 | ▸ 30226 | 4FB |
| | 230 | 67,75 | 590 | 830 | 85 | 2 000 | 2 800 | 11 | ▸ **32226** | 4FD |
| | 280 | 63,75 | 679 | 800 | 81,5 | 1 800 | 2 400 | 17 | ▸ **30326** | 2GB |
| | 280 | 72 | 647 | 780 | 80 | 1 600 | 2 400 | 18,5 | ▸ **31326 X** | 7GB |
| | 280 | 98,75 | 1 019 | 1 340 | 132 | 1 600 | 2 400 | 27,5 | **32326** | 2GD |

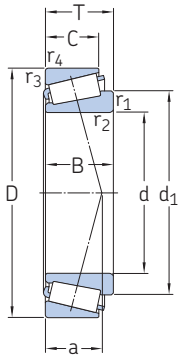
SKF Explorer bearing
▸ Popular item




| Dimensions | | | | | | | Abutment and fillet dimensions | | | | | | | | | Calculation factors | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | B | C | $r_{1,2}$ min. | $r_{3,4}$ min. | a | $d_a$ max. | $d_b$ min. | $D_a$ min. | $D_a$ max. | $D_b$ min. | $C_a$ min. | $C_b$ min. | $r_a$ max. | $r_b$ max. | e | Y | $Y_0$ |
| mm | | | | | | | mm | | | | | | | | | – | | |
| **105** | 124 | 25 | 20 | 1,5 | 1,5 | 25 | 114 | 115 | 135 | 135 | 140 | 5 | 5 | 1,5 | 1,5 | 0,35 | 1,7 | 0,9 |
| | 132 | 35 | 26 | 2,5 | 2 | 34 | 116 | 117 | 143 | 149 | 154 | 6 | 9 | 2,5 | 2 | 0,44 | 1,35 | 0,8 |
| | 131 | 43 | 34 | 2,5 | 2 | 30 | 117 | 117 | 145 | 149 | 153 | 7 | 9 | 2,5 | 2 | 0,28 | 2,1 | 1,1 |
| | 143 | 36 | 30 | 3 | 2,5 | 37 | 123 | 118 | 165 | 178 | 177 | 5 | 9 | 3 | 2,5 | 0,43 | 1,4 | 0,8 |
| | 143 | 50 | 43 | 3 | 2,5 | 44 | 121 | 119 | 161 | 178 | 180 | 6 | 10 | 3 | 2,5 | 0,43 | 1,4 | 0,8 |
| | 155 | 49 | 41 | 4 | 3 | 41 | 133 | 121 | 193 | 212 | 206 | 7 | 12,5 | 4 | 3 | 0,35 | 1,7 | 0,9 |
| | 165 | 53 | 36 | 4 | 3 | 67 | 127 | 121 | 176 | 212 | 211 | 7 | 22 | 4 | 3 | 0,83 | 0,72 | 0,4 |
| | 158 | 77 | 63 | 4 | 3 | 53 | 129 | 121 | 185 | 212 | 209 | 9 | 18,5 | 4 | 3 | 0,35 | 1,7 | 0,9 |
| **110** | 129 | 25 | 20 | 1,5 | 1,5 | 26 | 119 | 120 | 140 | 140 | 145 | 5 | 5 | 1,5 | 1,5 | 0,35 | 1,7 | 0,9 |
| | 137 | 35 | 26,5 | 3 | 2,5 | 37 | 119 | 123 | 145 | 153 | 158 | 6 | 8,5 | 3 | 2,5 | 0,5 | 1,2 | 0,7 |
| | 140 | 38 | 29 | 2,5 | 2 | 36 | 123 | 122 | 152 | 159 | 163 | 7 | 9 | 2,5 | 2 | 0,43 | 1,4 | 0,8 |
| | 139 | 47 | 37 | 2,5 | 2 | 33 | 123 | 122 | 152 | 159 | 161 | 7 | 10 | 2,5 | 2 | 0,28 | 2,1 | 1,1 |
| | 146 | 56 | 43 | 2,5 | 2 | 43 | 122 | 123 | 155 | 169 | 174 | 9 | 13 | 2,5 | 2 | 0,43 | 1,4 | 0,8 |
| | 149 | 38 | 32 | 3 | 2,5 | 39 | 129 | 124 | 174 | 188 | 187 | 6 | 9 | 3 | 2,5 | 0,43 | 1,4 | 0,8 |
| | 151 | 53 | 46 | 3 | 2,5 | 46 | 127 | 124 | 170 | 188 | 190 | 6 | 10 | 3 | 2,5 | 0,43 | 1,4 | 0,8 |
| | 166 | 50 | 42 | 4 | 3 | 42 | 142 | 126 | 206 | 226 | 220 | 8 | 12,5 | 4 | 3 | 0,35 | 1,7 | 0,9 |
| | 176 | 57 | 38 | 4 | 3 | 72 | 136 | 126 | 188 | 227 | 224 | 8 | 25 | 4 | 3 | 0,83 | 0,72 | 0,4 |
| | 169 | 80 | 65 | 4 | 3 | 55 | 138 | 126 | 198 | 227 | 222 | 9 | 19,5 | 4 | 3 | 0,35 | 1,7 | 0,9 |
| **120** | 142 | 29 | 23 | 1,5 | 1,5 | 28 | 130 | 130 | 154 | 155 | 160 | 5 | 6 | 1,5 | 1,5 | 0,35 | 1,7 | 0,9 |
| | 143 | 25 | 19,5 | 3 | 3 | 34 | 131 | 133 | 157 | 157 | 164 | 5 | 7,5 | 3 | 3 | 0,48 | 1,25 | 0,7 |
| | 150 | 38 | 29 | 2,5 | 2 | 38 | 132 | 133 | 161 | 169 | 173 | 7 | 9 | 2,5 | 2 | 0,46 | 1,3 | 0,7 |
| | 149 | 48 | 38 | 2,5 | 2 | 36 | 132 | 133 | 160 | 169 | 171 | 6 | 10 | 2,5 | 2 | 0,3 | 2 | 1,1 |
| | 161 | 40 | 34 | 3 | 2,5 | 42 | 141 | 134 | 187 | 203 | 201 | 6 | 9,5 | 3 | 2,5 | 0,43 | 1,4 | 0,8 |
| | 164 | 58 | 50 | 3 | 2,5 | 51 | 137 | 134 | 181 | 203 | 204 | 7 | 11,5 | 3 | 2,5 | 0,43 | 1,4 | 0,8 |
| | 178 | 55 | 46 | 4 | 3 | 47 | 153 | 136 | 221 | 246 | 237 | 8 | 13,5 | 4 | 3 | 0,35 | 1,7 | 0,9 |
| | 191 | 62 | 42 | 4 | 3 | 78 | 146 | 136 | 203 | 246 | 244 | 9 | 26 | 4 | 3 | 0,83 | 0,72 | 0,4 |
| | 181 | 86 | 69 | 4 | 3 | 59 | 148 | 136 | 213 | 246 | 239 | 10 | 21,5 | 4 | 3 | 0,35 | 1,7 | 0,9 |
| **130** | 153 | 32 | 25 | 2 | 1,5 | 31 | 141 | 142 | 167 | 170 | 173 | 6 | 7 | 2 | 1,5 | 0,33 | 1,8 | 1 |
| | 165 | 45 | 34 | 2,5 | 2 | 42 | 144 | 143 | 178 | 189 | 192 | 7 | 11 | 2,5 | 2 | 0,43 | 1,4 | 0,8 |
| | 165 | 55 | 43 | 2,5 | 2 | 42 | 144 | 143 | 178 | 189 | 192 | 8 | 12 | 2,5 | 2 | 0,35 | 1,7 | 0,9 |
| | 173 | 40 | 34 | 4 | 3 | 44 | 152 | 146 | 203 | 216 | 217 | 6 | 9,5 | 4 | 3 | 0,43 | 1,4 | 0,8 |
| | 176 | 64 | 54 | 4 | 3 | 55 | 146 | 146 | 193 | 216 | 219 | 7 | 13,5 | 4 | 3 | 0,43 | 1,4 | 0,8 |
| | 192 | 58 | 49 | 5 | 4 | 50 | 165 | 149 | 239 | 264 | 255 | 8 | 14,5 | 5 | 4 | 0,35 | 1,7 | 0,9 |
| | 204 | 66 | 44 | 5 | 4 | 83 | 157 | 149 | 218 | 264 | 261 | 8 | 28 | 5 | 4 | 0,83 | 0,72 | 0,4 |
| | 196 | 93 | 78 | 5 | 5 | 65 | 160 | 149 | 230 | 262 | 260 | 10 | 20,5 | 5 | 5 | 0,35 | 1,7 | 0,9 |

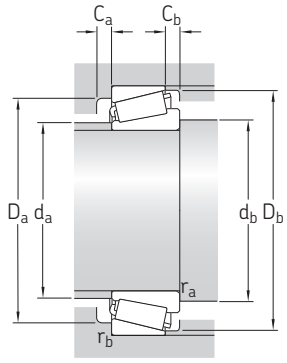
## 8.1 Metric single row tapered roller bearings

d **140 – 180** mm




| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation | Dimension series to ISO 355 (ABMA) |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | T | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | – |
| **140** | 190 | 32 | 252 | 390 | 40 | 2 600 | 3 000 | 2,55 | ▸ 32928 | 2CC |
| | 195 | 29 | 241 | 325 | 33,5 | 2 400 | 3 000 | 2,4 | ▸ T4CB 140 | 4CB |
| | 210 | 45 | 404 | 585 | 58,5 | 2 400 | 2 800 | 5,25 | ▸ 32028 X | 4DC |
| | 250 | 45,75 | 451 | 570 | 58,5 | 1 900 | 2 600 | 8,7 | ▸ **30228** | 4FB |
| | 250 | 71,75 | 691 | 1 000 | 100 | 1 900 | 2 600 | 14 | ▸ **32228** | 4FD |
| | 300 | 67,75 | 787 | 950 | 93 | 1 700 | 2 200 | 20,5 | **30328** | 2GB |
| | 300 | 77 | 737 | 900 | 90 | 1 500 | 2 200 | 22,5 | ▸ **31328 X** | 7GB |
| | 300 | 107,75 | 1 220 | 1 660 | 156 | 1 600 | 2 200 | 34,5 | **32328** | 2GD |
| **150** | 210 | 32 | 287 | 390 | 40 | 2 200 | 2 800 | 3,1 | ▸ T4DB 150 | 4DB |
| | 210 | 38 | 346 | 530 | 52 | 2 200 | 2 800 | 3,95 | 32930 | 2DC |
| | 225 | 48 | 456 | 655 | 65,5 | 2 200 | 2 600 | 6,4 | ▸ 32030 X | 4DC |
| | 225 | 59 | 487 | 865 | 85 | 2 200 | 2 600 | 8,05 | **33030** | 2EE |
| | 270 | 49 | 455 | 560 | 57 | 1 800 | 2 400 | 10,5 | **30230** | 4GB |
| | 270 | 77 | 782 | 1 140 | 112 | 1 700 | 2 400 | 18 | ▸ **32230** | 4GD |
| | 320 | 72 | 879 | 1 060 | 104 | 1 600 | 2 000 | 25 | ▸ **30330** | 2GB |
| | 320 | 82 | 832 | 1 020 | 100 | 1 400 | 2 000 | 27 | ▸ **31330 X** | 7GB |
| **160** | 220 | 32 | 257 | 415 | 41,5 | 2 200 | 2 600 | 3,25 | ▸ **T4DB 160** | 4DB |
| | 220 | 38 | 349 | 540 | 53 | 2 200 | 2 600 | 4,2 | 32932 | 2DC |
| | 240 | 51 | 532 | 780 | 76,5 | 2 000 | 2 400 | 7,8 | ▸ 32032 X | 4EC |
| | 245 | 61 | 649 | 980 | 96,5 | 2 000 | 2 400 | 10,5 | T4EE 160 | 4EE |
| | 290 | 52 | 566 | 735 | 72 | 1 600 | 2 200 | 13 | ▸ **30232** | 4GB |
| | 290 | 84 | 934 | 1 400 | 132 | 1 600 | 2 200 | 23 | ▸ **32232** | 4GD |
| | 340 | 75 | 970 | 1 180 | 114 | 1 500 | 2 000 | 29 | ▸ **30332** | 2GB |
| **170** | 230 | 32 | 307 | 440 | 43 | 2 000 | 2 600 | 3,45 | ▸ T4DB 170 | 4DB |
| | 230 | 38 | 351 | 585 | 55 | 2 000 | 2 400 | 4,5 | ▸ 32934 | 3DC |
| | 260 | 57 | 625 | 915 | 88 | 1 900 | 2 200 | 10,5 | ▸ 32034 X | 4EC |
| | 310 | 57 | 657 | 865 | 83 | 1 500 | 2 000 | 16,5 | ▸ **30234** | 4GB |
| | 310 | 91 | 1 075 | 1 630 | 150 | 1 500 | 2 000 | 28,5 | ▸ **32234** | 4GD |
| | 360 | 80 | 1 103 | 1 340 | 129 | 1 400 | 1 800 | 34,5 | **30334** | 2GB |
| **180** | 240 | 32 | 309 | 450 | 44 | 2 000 | 2 400 | 3,65 | T4DB 180 | 4DB |
| | 250 | 45 | 435 | 735 | 68 | 1 900 | 2 200 | 6,65 | ▸ 32936 | 4DC |
| | 280 | 64 | 793 | 1 160 | 110 | 1 700 | 2 200 | 14 | ▸ 32036 X | 3FD |
| | 320 | 57 | 629 | 815 | 80 | 1 500 | 2 000 | 17 | ▸ **30236** | 4GB |
| | 320 | 91 | 1 069 | 1 630 | 150 | 1 400 | 1 900 | 29,5 | ▸ **32236** | 4GD |

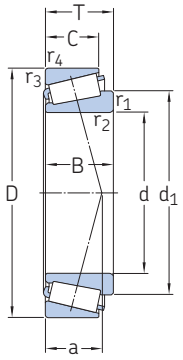
**SKF Explorer bearing**
▸ Popular item




| Dimensions | | | | | | | Abutment and fillet dimensions | | | | | | | | | Calculation factors | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | B | C | $r_{1,2}$ min. | $r_{3,4}$ min. | a | $d_a$ max. | $d_b$ min. | $D_a$ min. | $D_a$ max. | $D_b$ min. | $C_a$ min. | $C_b$ min. | $r_a$ max. | $r_b$ max. | e | Y | $Y_0$ |
| mm | | | | | | | mm | | | | | | | | | – | | |
| **140** | 164 | 32 | 25 | 2 | 1,5 | 33 | 151 | 152 | 177 | 180 | 184 | 6 | 7 | 2 | 1,5 | 0,35 | 1,7 | 0,9 |
| | 165 | 27 | 21 | 3 | 3 | 40 | 150 | 154 | 180 | 182 | 189 | 6 | 8 | 3 | 3 | 0,5 | 1,2 | 0,7 |
| | 175 | 45 | 34 | 2,5 | 2 | 45 | 153 | 153 | 187 | 199 | 202 | 8 | 11 | 2,5 | 2 | 0,46 | 1,3 | 0,7 |
| | 187 | 42 | 36 | 4 | 3 | 47 | 164 | 156 | 219 | 236 | 234 | 8 | 9,5 | 4 | 3 | 0,43 | 1,4 | 0,8 |
| | 191 | 68 | 58 | 4 | 3 | 59 | 159 | 156 | 210 | 236 | 238 | 8 | 13,5 | 4 | 3 | 0,43 | 1,4 | 0,8 |
| | 205 | 62 | 53 | 5 | 4 | 54 | 176 | 159 | 255 | 284 | 273 | 8 | 14,5 | 5 | 4 | 0,35 | 1,7 | 0,9 |
| | 220 | 70 | 47 | 5 | 4 | 90 | 169 | 159 | 235 | 284 | 280 | 9 | 30 | 5 | 4 | 0,83 | 0,72 | 0,4 |
| | 212 | 102 | 85 | 5 | 4 | 71 | 172 | 159 | 247 | 284 | 280 | 12 | 22,5 | 5 | 4 | 0,35 | 1,7 | 0,9 |
| **150** | 177 | 30 | 23 | 3 | 3 | 41 | 162 | 164 | 194 | 196 | 203 | 5 | 9 | 3 | 3 | 0,46 | 1,3 | 0,7 |
| | 177 | 38 | 30 | 2,5 | 2 | 35 | 163 | 163 | 194 | 198 | 202 | 7 | 8 | 2,5 | 2 | 0,33 | 1,8 | 1 |
| | 187 | 48 | 36 | 3 | 2,5 | 48 | 165 | 164 | 200 | 212 | 216 | 8 | 12 | 3 | 2,5 | 0,46 | 1,3 | 0,7 |
| | 188 | 59 | 46 | 3 | 2,5 | 48 | 165 | 164 | 200 | 212 | 217 | 8 | 13 | 3 | 2,5 | 0,37 | 1,6 | 0,9 |
| | 200 | 45 | 38 | 4 | 3 | 50 | 176 | 167 | 234 | 256 | 250 | 9 | 11 | 4 | 3 | 0,43 | 1,4 | 0,8 |
| | 205 | 73 | 60 | 4 | 3 | 64 | 171 | 167 | 226 | 256 | 254 | 8 | 17 | 4 | 3 | 0,43 | 1,4 | 0,8 |
| | 223 | 65 | 55 | 5 | 4 | 58 | 189 | 169 | 273 | 303 | 292 | 9 | 17 | 5 | 4 | 0,35 | 1,7 | 0,9 |
| | 234 | 75 | 50 | 5 | 4 | 96 | 181 | 169 | 251 | 304 | 300 | 9 | 32 | 5 | 4 | 0,83 | 0,72 | 0,4 |
| **160** | 187 | 30 | 23 | 3 | 3 | 44 | 172 | 174 | 204 | 206 | 213 | 5 | 9 | 3 | 3 | 0,48 | 1,25 | 0,7 |
| | 188 | 38 | 30 | 2,5 | 2 | 38 | 173 | 173 | 204 | 208 | 212 | 7 | 8 | 2,5 | 2 | 0,35 | 1,7 | 0,9 |
| | 200 | 51 | 38 | 3 | 2,5 | 51 | 176 | 175 | 213 | 227 | 231 | 8 | 13 | 3 | 2,5 | 0,46 | 1,3 | 0,7 |
| | 204 | 59 | 50 | 6 | 4 | 57 | 174 | 181 | 212 | 229 | 236 | 10 | 11 | 6 | 4 | 0,44 | 1,35 | 0,8 |
| | 215 | 48 | 40 | 4 | 3 | 53 | 190 | 177 | 252 | 276 | 269 | 7 | 12 | 4 | 3 | 0,43 | 1,4 | 0,8 |
| | 222 | 80 | 67 | 4 | 3 | 69 | 183 | 177 | 242 | 276 | 274 | 10 | 17 | 4 | 3 | 0,43 | 1,4 | 0,8 |
| | 233 | 68 | 58 | 5 | 4 | 61 | 201 | 179 | 290 | 323 | 310 | 9 | 17 | 5 | 4 | 0,35 | 1,7 | 0,9 |
| **170** | 197 | 30 | 23 | 3 | 3 | 44 | 182 | 184 | 215 | 216 | 223 | 6 | 9 | 3 | 3 | 0,46 | 1,3 | 0,7 |
| | 200 | 38 | 30 | 2,5 | 2 | 41 | 183 | 183 | 213 | 218 | 222 | 7 | 8 | 2,5 | 2 | 0,37 | 1,6 | 0,9 |
| | 214 | 57 | 43 | 3 | 2,5 | 55 | 188 | 185 | 230 | 247 | 249 | 10 | 14 | 3 | 2,5 | 0,44 | 1,35 | 0,8 |
| | 231 | 52 | 43 | 5 | 4 | 58 | 203 | 189 | 269 | 293 | 288 | 8 | 14 | 5 | 4 | 0,43 | 1,4 | 0,8 |
| | 238 | 86 | 71 | 5 | 4 | 75 | 196 | 189 | 259 | 293 | 294 | 10 | 20 | 5 | 4 | 0,43 | 1,4 | 0,8 |
| | 248 | 72 | 62 | 5 | 4 | 65 | 213 | 190 | 307 | 343 | 329 | 9 | 18 | 5 | 4 | 0,35 | 1,7 | 0,9 |
| **180** | 207 | 30 | 23 | 3 | 3 | 47 | 191 | 195 | 224 | 226 | 233 | 6 | 9 | 3 | 3 | 0,48 | 1,25 | 0,7 |
| | 216 | 45 | 34 | 2,5 | 2 | 53 | 194 | 194 | 225 | 238 | 241 | 8 | 11 | 2,5 | 2 | 0,48 | 1,25 | 0,7 |
| | 230 | 64 | 48 | 3 | 2,5 | 59 | 200 | 195 | 247 | 267 | 267 | 10 | 16 | 3 | 2,5 | 0,43 | 1,4 | 0,8 |
| | 240 | 52 | 43 | 5 | 4 | 60 | 212 | 199 | 278 | 303 | 297 | 8 | 14 | 5 | 4 | 0,46 | 1,3 | 0,7 |
| | 247 | 86 | 71 | 5 | 4 | 77 | 205 | 199 | 267 | 303 | 303 | 10 | 20 | 5 | 4 | 0,46 | 1,3 | 0,7 |

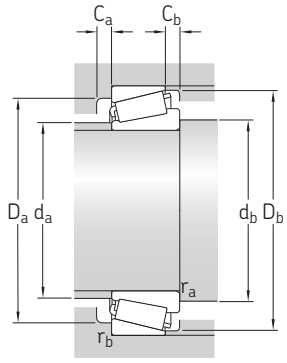
## 8.1 Metric single row tapered roller bearings

d **190 – 360** mm




| Principal dimensions | | | Basic load ratings | | Fatigue load limit | Speed ratings | | Mass | Designation | Dimension series to ISO 355 (ABMA) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | dynamic | static | | Reference speed | Limiting speed | | | |
| d | D | T | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | – |
| **190** | 260 | 45 | 443 | 765 | 72 | 1 800 | 2 200 | 7 | ▸ 32938 | 4DC |
| | 260 | 46 | 443 | 765 | 72 | 1 800 | 2 200 | 7,1 | JM 738249/210 | M 738200 |
| | 290 | 64 | 806 | 1 200 | 112 | 1 600 | 2 000 | 15 | ▸ 32038 X | 4FD |
| | 340 | 60 | 763 | 1 000 | 95 | 1 400 | 1 800 | 20,5 | ▸ **30238** | 4GB |
| | 340 | 97 | 1 267 | 1 930 | 176 | 1 300 | 1 800 | 36 | ▸ **32238** | 4GD |
| **200** | 270 | 37 | 401 | 600 | 57 | 1 700 | 2 200 | 5,45 | ▸ T4DB 200 | 4DB |
| | 280 | 51 | 588 | 950 | 88 | 1 700 | 2 000 | 9,5 | ▸ 32940 | 3EC |
| | 310 | 70 | 800 | 1 370 | 127 | 1 400 | 1 900 | 19 | ▸ **32040 X** | 4FD |
| | 360 | 64 | 845 | 1 120 | 106 | 1 300 | 1 700 | 24,5 | ▸ **30240** | 4GB |
| | 360 | 104 | 1 300 | 2 000 | 180 | 1 300 | 1 700 | 42,5 | ▸ **32240** | 3GD |
| **220** | 285 | 41 | 489 | 830 | 75 | 1 600 | 2 000 | 6,45 | T2DC 220 | 2DC |
| | 300 | 51 | 601 | 1 000 | 91,5 | 1 500 | 1 900 | 10 | ▸ 32944 | 3EC |
| | 340 | 76 | 955 | 1 660 | 150 | 1 300 | 1 700 | 24,5 | ▸ **32044 X** | 4FD |
| | 400 | 72 | 1 059 | 1 400 | 127 | 1 200 | 1 600 | 34,5 | ▸ **30244** | 3GB |
| | 400 | 114 | 1 720 | 2 700 | 232 | 1 100 | 1 500 | 59,5 | ▸ **32244** | 4GD |
| **240** | 320 | 42 | 458 | 815 | 73,5 | 1 400 | 1 700 | 8,45 | **T4EB 240** | 4EB |
| | 320 | 51 | 624 | 1 080 | 96,5 | 1 400 | 1 700 | 11 | ▸ 32948 | 4EC |
| | 320 | 57 | 761 | 1 320 | 118 | 1 400 | 1 700 | 12,5 | T2EE 240 | 2EE |
| | 360 | 76 | 989 | 1 800 | 156 | 1 200 | 1 600 | 26,5 | ▸ **32048 X** | 4FD |
| | 440 | 79 | 1 300 | 1 760 | 156 | 1 000 | 1 400 | 47 | **30248** | 3GB |
| | 440 | 127 | 1 918 | 3 350 | 270 | 1 000 | 1 300 | 81,5 | **32248** | 4GD |
| **260** | 360 | 63,5 | 910 | 1 530 | 134 | 1 300 | 1 600 | 19 | 32952 | 3EC |
| | 400 | 87 | 1 241 | 2 200 | 190 | 1 100 | 1 400 | 38 | ▸ **32052 X** | 4FC |
| | 480 | 137 | 2 340 | 3 650 | 300 | 900 | 1 200 | 105 | **32252** | 4GD |
| **280** | 380 | 63,5 | 950 | 1 660 | 143 | 1 200 | 1 400 | 20 | 32956 | 4EC |
| | 420 | 87 | 1 288 | 2 360 | 200 | 1 000 | 1 300 | 40,5 | ▸ **32056 X** | 4FC |
| | 500 | 137 | 2 410 | 3 900 | 310 | 850 | 1 200 | 108 | **32256** | 4GD |
| **300** | 420 | 76 | 1 126 | 2 240 | 186 | 950 | 1 300 | 31,5 | ▸ **32960** | 3FD |
| | 460 | 100 | 1 644 | 3 000 | 245 | 900 | 1 200 | 58 | **32060 X** | 4GD |
| | 540 | 149 | 2 935 | 4 750 | 365 | 800 | 1 100 | 140 | **32260** | 4GD |
| **320** | 440 | 76 | 1 156 | 2 360 | 193 | 900 | 1 200 | 33,5 | **32964** | 3FD |
| | 480 | 100 | 1 663 | 3 100 | 250 | 850 | 1 100 | 64 | **32064 X** | 4GD |
| | 580 | 159 | 3 353 | 5 500 | 415 | 750 | 1 000 | 174 | **32264** | 4GD |
| **340** | 460 | 76 | 1 163 | 2 400 | 196 | 850 | 1 200 | 35 | **32968** | 4FD |
| **360** | 480 | 76 | 1 191 | 2 550 | 204 | 800 | 1 100 | 37 | **32972** | 4FD |

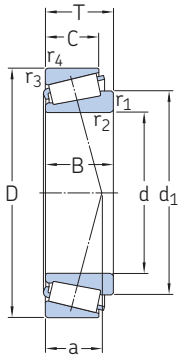
SKF Explorer bearing
▸ Popular item




| Dimensions | | | | | | | Abutment and fillet dimensions | | | | | | | | | Calculation factors | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | B | C | $r_{1,2}$ min. | $r_{3,4}$ min. | a | $d_a$ max. | $d_b$ min. | $D_a$ min. | $D_a$ max. | $D_b$ min. | $C_a$ min. | $C_b$ min. | $r_a$ max. | $r_b$ max. | e | Y | $Y_0$ |
| mm | | | | | | | mm | | | | | | | | | – | | |
| **190** | 227 | 45 | 34 | 2,5 | 2 | 54 | 205 | 204 | 235 | 248 | 251 | 8 | 11 | 2,5 | 2 | 0,48 | 1,25 | 0,7 |
| | 227 | 44 | 36,5 | 3 | 2,5 | 54 | 205 | 205 | 235 | 247 | 252 | 8 | 9,5 | 3 | 2,5 | 0,48 | 1,25 | 0,7 |
| | 240 | 64 | 48 | 3 | 2,5 | 62 | 210 | 205 | 257 | 276 | 279 | 10 | 16 | 3 | 2,5 | 0,44 | 1,35 | 0,8 |
| | 254 | 55 | 46 | 5 | 4 | 63 | 225 | 210 | 298 | 323 | 318 | 8 | 14 | 5 | 4 | 0,43 | 1,4 | 0,8 |
| | 261 | 92 | 75 | 5 | 4 | 80 | 217 | 210 | 286 | 323 | 323 | 12 | 22 | 5 | 4 | 0,43 | 1,4 | 0,8 |
| **200** | 232 | 34 | 27 | 3 | 3 | 53 | 214 | 215 | 251 | 255 | 262 | 6 | 10 | 3 | 3 | 0,48 | 1,25 | 0,7 |
| | 240 | 51 | 39 | 3 | 2,5 | 53 | 217 | 215 | 257 | 266 | 271 | 9 | 12 | 3 | 2,5 | 0,4 | 1,5 | 0,8 |
| | 254 | 70 | 53 | 3 | 2,5 | 65 | 222 | 215 | 273 | 296 | 297 | 11 | 17 | 3 | 2,5 | 0,43 | 1,4 | 0,8 |
| | 269 | 58 | 48 | 5 | 4 | 67 | 237 | 220 | 315 | 343 | 336 | 9 | 16 | 5 | 4 | 0,43 | 1,4 | 0,8 |
| | 274 | 98 | 82 | 4 | 4 | 82 | 231 | 218 | 302 | 343 | 340 | 11 | 22 | 4 | 4 | 0,4 | 1,5 | 0,8 |
| **220** | 249 | 40 | 33 | 4 | 3 | 45 | 233 | 237 | 270 | 270 | 277 | 7 | 8 | 4 | 3 | 0,31 | 1,9 | 1,1 |
| | 259 | 51 | 39 | 3 | 2,5 | 58 | 235 | 236 | 275 | 286 | 290 | 9 | 12 | 3 | 2,5 | 0,43 | 1,4 | 0,8 |
| | 280 | 76 | 57 | 4 | 3 | 72 | 244 | 238 | 300 | 325 | 326 | 12 | 19 | 4 | 3 | 0,43 | 1,4 | 0,8 |
| | 295 | 65 | 54 | 5 | 4 | 73 | 259 | 240 | 348 | 382 | 371 | 10 | 18 | 5 | 4 | 0,43 | 1,4 | 0,8 |
| | 306 | 108 | 90 | 5 | 4 | 95 | 253 | 240 | 334 | 382 | 379 | 13 | 24 | 5 | 4 | 0,43 | 1,4 | 0,8 |
| **240** | 276 | 39 | 30 | 3 | 3 | 60 | 256 | 256 | 299 | 305 | 310 | 8 | 12 | 3 | 3 | 0,46 | 1,3 | 0,7 |
| | 280 | 51 | 39 | 3 | 2,5 | 64 | 255 | 256 | 294 | 306 | 311 | 9 | 12 | 3 | 2,5 | 0,46 | 1,3 | 0,7 |
| | 277 | 56 | 46 | 6 | 4 | 57 | 254 | 262 | 296 | 303 | 311 | 9 | 11 | 6 | 4 | 0,35 | 1,7 | 0,9 |
| | 300 | 76 | 57 | 4 | 3 | 77 | 262 | 258 | 318 | 345 | 346 | 12 | 19 | 4 | 3 | 0,46 | 1,3 | 0,7 |
| | 324 | 72 | 60 | 4 | 4 | 80 | 285 | 261 | 383 | 420 | 409 | 8 | 19 | 4 | 4 | 0,43 | 1,4 | 0,8 |
| | 346 | 120 | 100 | 5 | 4 | 105 | 276 | 262 | 365 | 420 | 415 | 7 | 27 | 4 | 3 | 0,43 | 1,4 | 0,8 |
| **260** | 308 | 63,5 | 48 | 3 | 2,5 | 68 | 280 | 276 | 328 | 345 | 347 | 11 | 15,5 | 3 | 2,5 | 0,4 | 1,5 | 0,8 |
| | 328 | 87 | 65 | 5 | 4 | 84 | 288 | 281 | 352 | 382 | 383 | 14 | 22 | 5 | 4 | 0,43 | 1,4 | 0,8 |
| | 366 | 130 | 106 | 5 | 5 | 112 | 303 | 286 | 401 | 458 | 454 | 10 | 31 | 5 | 4 | 0,43 | 1,4 | 0,8 |
| **280** | 329 | 63,5 | 48 | 3 | 2,5 | 74 | 299 | 297 | 348 | 365 | 368 | 11 | 15,5 | 3 | 2,5 | 0,43 | 1,4 | 0,8 |
| | 348 | 87 | 65 | 5 | 4 | 89 | 306 | 301 | 370 | 402 | 402 | 14 | 22 | 5 | 4 | 0,46 | 1,3 | 0,7 |
| | 384 | 130 | 106 | 6 | 5 | 116 | 319 | 302 | 418 | 478 | 473 | 10 | 31 | 5 | 4 | 0,44 | 1,35 | 0,8 |
| **300** | 359 | 76 | 57 | 4 | 3 | 79 | 325 | 319 | 383 | 404 | 405 | 13 | 19 | 4 | 3 | 0,4 | 1,5 | 0,8 |
| | 377 | 100 | 74 | 5 | 4 | 97 | 330 | 322 | 404 | 440 | 439 | 10 | 26 | 4 | 3 | 0,43 | 1,4 | 0,8 |
| | 412 | 140 | 115 | 6 | 5 | 126 | 343 | 326 | 453 | 518 | 511 | 10 | 34 | 5 | 4 | 0,43 | 1,4 | 0,8 |
| **320** | 379 | 76 | 57 | 4 | 3 | 84 | 343 | 337 | 402 | 424 | 426 | 9 | 19 | 3 | 2,5 | 0,43 | 1,4 | 0,8 |
| | 399 | 100 | 74 | 5 | 4 | 103 | 350 | 342 | 424 | 460 | 461 | 10 | 26 | 4 | 3 | 0,46 | 1,3 | 0,7 |
| | 442 | 150 | 125 | 6 | 5 | 133 | 368 | 343 | 486 | 559 | 550 | 12 | 34 | 6 | 5 | 0,43 | 1,4 | 0,8 |
| **340** | 399 | 76 | 57 | 4 | 3 | 90 | 361 | 357 | 421 | 444 | 446 | 14 | 19 | 3 | 2,5 | 0,44 | 1,35 | 0,8 |
| **360** | 419 | 76 | 57 | 4 | 3 | 96 | 380 | 377 | 439 | 464 | 466 | 10 | 19 | 3 | 2,5 | 0,46 | 1,3 | 0,7 |

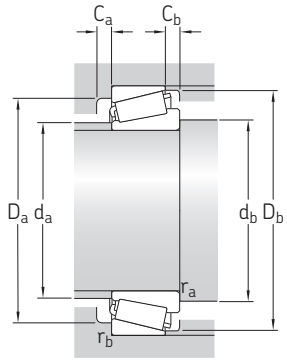
## 8.2 Inch single row tapered roller bearings

d **15 – 27,487** mm
*0.5906 – 1.0822 in.*




| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation | Series |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | T | C | $C_0$ | $P_u$ | | | | | |
| mm/*in.* | | | kN | | kN | r/min | | kg | – | – |
| **15**<br>*0.5906* | 34,988<br>*1.3775* | 10,998<br>*0.433* | 16,5 | 13,2 | 1,29 | 17 000 | 22 000 | 0,051 | **A 4059/A 4138** | A 4000 |
| **15,875**<br>*0.625* | 42,862<br>*1.6875* | 14,288<br>*0.5625* | 21,5 | 17,6 | 1,8 | 13 000 | 17 000 | 0,1 | **11590/11520** | 11500 |
| **17,462**<br>*0.6875* | 39,878<br>*1.57* | 13,843<br>*0.545* | 26,1 | 20,8 | 2,12 | 15 000 | 18 000 | 0,082 | ▸ **LM 11749/710** | LM 11700 |
| **19,05**<br>*0.75* | 45,237<br>*1.781* | 15,494<br>*0.61* | 33,8 | 27,5 | 2,9 | 13 000 | 16 000 | 0,12 | ▸ **LM 11949/910** | LM 11900 |
| **21,43**<br>*0.8437* | 50,005<br>*1.9687* | 17,526<br>*0.69* | 45,4 | 38 | 4,15 | 12 000 | 15 000 | 0,17 | **M 12649/610** | M 12600 |
| **22**<br>*0.8661* | 45,237<br>*1.781* | 15,494<br>*0.61* | 33,9 | 31 | 3,2 | 12 000 | 15 000 | 0,12 | ▸ **LM 12749/710** | LM 12700 |
| | 45,974<br>*1.81* | 15,494<br>*0.61* | 33,9 | 31 | 3,2 | 12 000 | 15 000 | 0,12 | **LM 12749/711** | LM 12700 |
| **22,225**<br>*0.875* | 52,388<br>*2.0625* | 19,368<br>*0.7625* | 51,5 | 44 | 4,8 | 11 000 | 14 000 | 0,2 | **1380/1328** | 1300 |
| **25,4**<br>*1* | 50,292<br>*1.98* | 14,224<br>*0.56* | 32 | 30 | 3 | 11 000 | 13 000 | 0,13 | ▸ **L 44643/610** | L 44600 |
| | 57,15<br>*2.25* | 17,462<br>*0.6875* | 49,1 | 45,5 | 4,9 | 10 000 | 12 000 | 0,22 | **15578/15520** | 15500 |
| | 57,15<br>*2.25* | 19,431<br>*0.765* | 48,8 | 45 | 5 | 10 000 | 12 000 | 0,24 | **M 84548/510** | M 84500 |
| | 62<br>*2.4409* | 19,05<br>*0.75* | 59,5 | 57 | 6,2 | 9 000 | 11 000 | 0,3 | **15101/15245** | 15000 |
| **26,162**<br>*1.03* | 61,912<br>*2.4375* | 19,05<br>*0.75* | 59,5 | 57 | 6,2 | 9 000 | 11 000 | 0,29 | **15103 S/15243** | 15000 |
| | 62<br>*2.4409* | 19,05<br>*0.75* | 59,5 | 57 | 6,2 | 9 000 | 11 000 | 0,29 | **15103 S/15245** | 15000 |
| **26,988**<br>*1.0625* | 50,292<br>*1.98* | 14,224<br>*0.56* | 32 | 30 | 3 | 11 000 | 13 000 | 0,12 | ▸ **L 44649/610** | L 44600 |
| **27,487**<br>*1.0822* | 57,159<br>*2.2504* | 19,845<br>*0.7813* | 55,6 | 51 | 5,6 | 10 000 | 12 000 | 0,23 | **1982/1924 A** | 1900 |

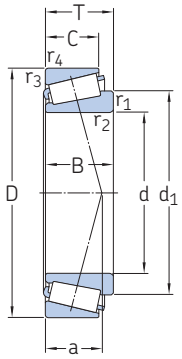
**SKF Explorer bearing**
▸ Popular item




| Dimensions | | | | | | | Abutment and fillet dimensions | | | | | | | | | Calculation factors | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | B | C | $r_{1,2}$ min. | $r_{3,4}$ min. | a | $d_a$ max. | $d_b$ min. | $D_a$ min. | $D_a$ max. | $D_b$ min. | $C_a$ min. | $C_b$ min. | $r_a$ max. | $r_b$ max. | e | Y | $Y_0$ |
| mm/*in.* | | | | | | | mm | | | | | | | | | – | | |
| **15**<br>*0.5906* | 25,3 | 10,988<br>*0.436* | 8,73<br>*0.3437* | 0,8<br>*0.03* | 1,3<br>*0.05* | 8 | 20 | 20,5 | 28 | 29 | 31 | 2 | 2 | 0,8 | 1,3 | 0,46 | 1,3 | 0,7 |
| **15,875**<br>*0.625* | 31,1 | 14,288<br>*0.5625* | 9,525<br>*0.375* | 1,5<br>*0.06* | 1,5<br>*0.06* | 12 | 23 | 23,5 | 32 | 36,5 | 38 | 2 | 4,5 | 1,5 | 1,5 | 0,72 | 0,84 | 0,45 |
| **17,462**<br>*0.6875* | 28,7 | 14,605<br>*0.575* | 10,668<br>*0.42* | 1,3<br>*0.05* | 1,3<br>*0.05* | 8 | 23 | 24,5 | 35 | 34 | 36 | 2 | 3 | 1,3 | 1,3 | 0,28 | 2,1 | 1,1 |
| **19,05**<br>*0.75* | 31,4 | 16,6373<br>*0.655* | 12,065<br>*0.475* | 1,3<br>*0.05* | 1,3<br>*0.05* | 9 | 26 | 26 | 38 | 39 | 41 | 3 | 3 | 1,3 | 1,3 | 0,3 | 2 | 1,1 |
| **21,43**<br>*0.8437* | 34,6 | 18,288<br>*0.72* | 13,97<br>*0.55* | 1,3<br>*0.05* | 1,3<br>*0.05* | 10 | 28 | 28,5 | 43 | 43,5 | 46 | 3 | 3,5 | 1,3 | 1,3 | 0,28 | 2,1 | 1,1 |
| **22**<br>*0.8661* | 34,8 | 16,637<br>*0.655* | 12,065<br>*0.475* | 1,3<br>*0.05* | 1,3<br>*0.05* | 10 | 28 | 29 | 39 | 39 | 42 | 3 | 3 | 1,3 | 1,3 | 0,31 | 1,9 | 1,1 |
| | 34,8 | 16,637<br>*0.655* | 12,065<br>*0.475* | 1,3<br>*0.05* | 1,3<br>*0.05* | 10 | 28 | 29 | 39 | 40 | 42 | 3 | 3 | 1,3 | 1,3 | 0,31 | 1,9 | 1,1 |
| **22,225**<br>*0.875* | 36 | 20,168<br>*0.794* | 14,288<br>*0.5625* | 1,5<br>*0.06* | 1,5<br>*0.06* | 11 | 29 | 30 | 45 | 45,5 | 48 | 4 | 5 | 1,5 | 1,5 | 0,3 | 2 | 1,1 |
| **25,4**<br>*1* | 39,6 | 14,732<br>*0.58* | 10,668<br>*0.42* | 1,3<br>*0.05* | 1,3<br>*0.05* | 10 | 33 | 32,5 | 44 | 44 | 47 | 2 | 3,5 | 1,3 | 1,3 | 0,37 | 1,6 | 0,9 |
| | 42,3 | 17,462<br>*0.6875* | 13,495<br>*0.5313* | 1,3<br>*0.05* | 1,5<br>*0.06* | 12 | 35 | 33 | 49 | 50 | 53 | 3 | 3,5 | 1,3 | 1,5 | 0,35 | 1,7 | 0,9 |
| | 42,5 | 19,431<br>*0.765* | 14,732<br>*0.58* | 1,5<br>*0.06* | 1,5<br>*0.06* | 15 | 33 | 33,5 | 45 | 50 | 53 | 3 | 4,5 | 1,5 | 1,5 | 0,54 | 1,1 | 0,6 |
| | 45,8 | 20,638<br>*0.8125* | 14,288<br>*0.5625* | 0,8<br>*0.03* | 1,3<br>*0.05* | 12 | 38 | 32 | 54 | 55 | 58 | 4 | 4,5 | 0,8 | 1,3 | 0,35 | 1,7 | 0,9 |
| **26,162**<br>*1.03* | 45,8 | 19,939<br>*0.785* | 14,288<br>*0.5525* | 0,8<br>*0.03* | 2<br>*0.08* | 12 | 38 | 33 | 54 | 54 | 58 | 4 | 4,5 | 0,8 | 2 | 0,35 | 1,7 | 0,9 |
| | 45,8 | 19,939<br>*0.785* | 14,288<br>*0.5625* | 0,8<br>*0.03* | 1,3<br>*0.05* | 12 | 38 | 33 | 54 | 55 | 58 | 4 | 4,5 | 0,8 | 1,3 | 0,35 | 1,7 | 0,9 |
| **26,988**<br>*1.0625* | 39,6 | 14,732<br>*0.58* | 10,668<br>*0.42* | 3,5<br>*0.14* | 1,3<br>*0.05* | 10 | 33 | 38,5 | 44 | 44 | 47 | 2 | 3,5 | 3,5 | 1,3 | 0,37 | 1,6 | 0,9 |
| **27,487**<br>*1.0822* | 42 | 19,355<br>*0.762* | 15,875<br>*0.625* | 2,5<br>*0.10* | 0,8<br>*0.03* | 13 | 35 | 37,5 | 49 | 51 | 54 | 3 | 3,5 | 2,5 | 0,8 | 0,33 | 1,8 | 1 |

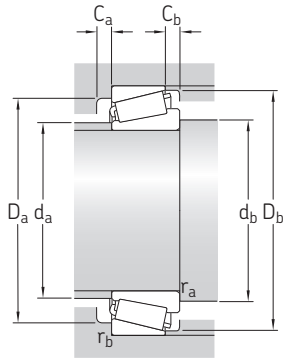
## 8.2 Inch single row tapered roller bearings

d **28,575 – 34,925** mm
*1.125 – 1.375 in.*




| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation | Series |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | T | C | $C_0$ | $P_u$ | | | | | |
| mm/*in.* | | | kN | | kN | r/min | | kg | – | – |
| **28,575** | 57,15 | 19,845 | 58,2 | 55 | 6 | 10 000 | 12 000 | 0,23 | **1985/1922** | 1900 |
| *1.125* | *2.25* | *0.7813* | | | | | | | | |
| | 57,15 | 19,845 | 58,2 | 55 | 6 | 10 000 | 12 000 | 0,23 | **1988/1922** | 1900 |
| | *2.25* | *0.7813* | | | | | | | | |
| | 64,292 | 21,433 | 60,4 | 61 | 6,8 | 8 500 | 11 000 | 0,35 | **M 86647/610** | M 86600 |
| | *2.5312* | *0.8438* | | | | | | | | |
| **29** | 50,292 | 14,224 | 31,8 | 32,5 | 3,35 | 11 000 | 13 000 | 0,11 | ▸ **L 45449/410** | L 45400 |
| *1.1417* | *1.98* | *0.56* | | | | | | | | |
| **30,162** | 64,292 | 21,433 | 60,4 | 61 | 6,8 | 8 500 | 11 000 | 0,34 | **M 86649/610** | M 86600 |
| *1.1875* | *2.5312* | *0.8438* | | | | | | | | |
| | 68,262 | 22,225 | 67,1 | 69,5 | 7,8 | 8 000 | 10 000 | 0,41 | **M 88043/010** | M 88000 |
| | *2.6875* | *0.875* | | | | | | | | |
| **31,75** | 59,131 | 15,875 | 42,8 | 41,5 | 4,4 | 9 500 | 11 000 | 0,18 | **LM 67048/010** | LM 67000 |
| *1.25* | *2.328* | *0.625* | | | | | | | | |
| | 61,912 | 18,161 | 59,5 | 57 | 6,2 | 9 000 | 11 000 | 0,24 | **15123/15243** | 15000 |
| | *2.4375* | *0.715* | | | | | | | | |
| | 62 | 18,161 | 59,5 | 57 | 6,2 | 9 000 | 11 000 | 0,24 | ▸ **15123/15245** | 15000 |
| | *2.4409* | *0.715* | | | | | | | | |
| | 73,025 | 29,37 | 86,5 | 95 | 10,4 | 7 500 | 9 000 | 0,62 | **HM 88542/510** | HM 88500 |
| | *2.875* | *1.1563* | | | | | | | | |
| **33,338** | 68,262 | 22,225 | 67,1 | 69,5 | 7,8 | 8 000 | 10 000 | 0,38 | **M 88048/010** | M 88000 |
| *1.3125* | *2.6875* | *0.875* | | | | | | | | |
| | 69,012 | 19,845 | 65,8 | 67 | 7,35 | 8 000 | 10 000 | 0,35 | **14131/14276** | 14000 |
| | *2.717* | *0.7813* | | | | | | | | |
| **34,925** | 65,088 | 18,034 | 58 | 57 | 6,2 | 8 500 | 10 000 | 0,25 | ▸ **LM 48548/510** | LM 48500 |
| *1.375* | *2.5625* | *0.71* | | | | | | | | |
| | 65,088 | 18,034 | 58 | 57 | 6,2 | 8 500 | 10 000 | 0,26 | ▸ **LM 48548 A/510** | LM 48500 |
| | *2.5625* | *0.71* | | | | | | | | |
| | 69,012 | 19,845 | 65,8 | 67 | 7,35 | 8 000 | 10 000 | 0,34 | **14137 A/14276** | 14000 |
| | *2.717* | *0.7831* | | | | | | | | |
| | 72,233 | 25,4 | 83 | 90 | 10 | 7 500 | 9 000 | 0,5 | **HM 88649 X/610** | HM 88600 |
| | *2.8438* | *1* | | | | | | | | |
| | 72,233 | 25,4 | 83 | 90 | 10 | 7 500 | 9 000 | 0,5 | **HM 88649/610** | HM 88600 |
| | *2.8438* | *1* | | | | | | | | |
| | 73,025 | 23,812 | 89,1 | 88 | 9,8 | 8 000 | 9 500 | 0,48 | **25877/25821** | 25800 |
| | *2.875* | *0.9375* | | | | | | | | |
| | 73,025 | 26,988 | 94,6 | 93 | 10,4 | 8 000 | 9 500 | 0,53 | **23690/23620** | 23600 |
| | *2.875* | *1.0625* | | | | | | | | |
| | 76,2 | 29,37 | 95,2 | 106 | 11,8 | 7 000 | 8 500 | 0,66 | **HM 89446/410** | HM 89400 |
| | *3* | *1.1563* | | | | | | | | |

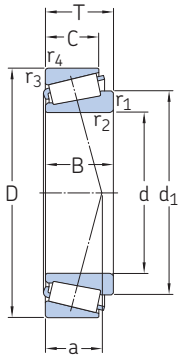
**SKF Explorer bearing**
▸ Popular item




| Dimensions | | | | | | | Abutment and fillet dimensions | | | | | | | | | Calculation factors | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | B | C | $r_{1,2}$ min. | $r_{3,4}$ min. | a | $d_a$ max. | $d_b$ min. | $D_a$ min. | $D_a$ max. | $D_b$ min. | $C_a$ min. | $C_b$ min. | $r_a$ max. | $r_b$ max. | e | Y | $Y_0$ |
| mm/*in.* | | | | | | | mm | | | | | | | | | – | | |
| **28,575** | 42,1 | 19,355 | 15,875 | 0,8 | 1,5 | 13 | 35 | 35 | 49 | 50 | 54 | 3 | 3,5 | 0,8 | 1,5 | 0,33 | 1,8 | 1 |
| *1.125* | | *0.762* | *0.625* | *0.03* | *0.06* | | | | | | | | | | | | | |
| | 42 | 19,355 | 15,875 | 3,5 | 1,5 | 13 | 35 | 40,5 | 49 | 50 | 54 | 3 | 3,5 | 3,5 | 1,5 | 0,33 | 1,8 | 1 |
| | | *0.762* | *0.625* | *0.04* | *0.06* | | | | | | | | | | | | | |
| | 50,1 | 21,433 | 16,67 | 1,5 | 1,5 | 17 | 38 | 36,5 | 51 | 57 | 60 | 3 | 4,5 | 1,5 | 1,5 | 0,54 | 1,1 | 0,6 |
| | | *0.8438* | *0.6563* | *0.06* | *0.06* | | | | | | | | | | | | | |
| **29** | 40,7 | 14,732 | 10,668 | 3,5 | 1,3 | 10 | 34 | 41 | 45 | 44 | 48 | 3 | 3,5 | 3,5 | 1,3 | 0,37 | 1,6 | 0,9 |
| *1.1417* | | *0.58* | *0.42* | *0.14* | *0.05* | | | | | | | | | | | | | |
| **30,162** | 50,1 | 21,433 | 16,67 | 1,5 | 1,5 | 17 | 38 | 38,5 | 51 | 57 | 60 | 3 | 4,5 | 1,5 | 1,5 | 0,54 | 1,1 | 0,6 |
| *1.1875* | | *0.8438* | *0.6563* | *0.06* | *0.06* | | | | | | | | | | | | | |
| | 52,3 | 22,28 | 17,462 | 2,4 | 1,6 | 18 | 41 | 40 | 54 | 61 | 64 | 3 | 4,5 | 2,4 | 1,6 | 0,54 | 1,1 | 0,6 |
| | | *0.8772* | *0.6875* | *0.09* | *0.06* | | | | | | | | | | | | | |
| **31,75** | 45,6 | 16,77 | 11,811 | 3,6 | 1,3 | 12 | 38 | 44 | 51 | 52 | 55 | 3 | 4 | 3,6 | 1,3 | 0,4 | 1,5 | 0,8 |
| *1.25* | | *0.6602* | *0.465* | *0.14* | *0.05* | | | | | | | | | | | | | |
| | 45,7 | 19,05 | 14,288 | 3,6 | 2 | 12 | 38 | 44 | 54 | 54 | 58 | 4 | 3,5 | 3,6 | 2 | 0,35 | 1,7 | 0,9 |
| | | *0.75* | *0.5625* | *0.14* | *0.08* | | | | | | | | | | | | | |
| | 45,7 | 19,05 | 14,288 | 3,6 | 1,3 | 12 | 38 | 44 | 54 | 55 | 58 | 4 | 3,5 | 3,6 | 1,3 | 0,35 | 1,7 | 0,9 |
| | | *0.75* | *0.5625* | *0.14* | *0.05* | | | | | | | | | | | | | |
| | 56,9 | 27,783 | 23,02 | 1,2 | 3,3 | 23 | 42 | 39,5 | 55 | 62 | 69 | 3 | 6 | 1,2 | 3,3 | 0,54 | 1,1 | 0,6 |
| | | *1.0938* | *0.9063* | *0.05* | *0.13* | | | | | | | | | | | | | |
| **33,338** | 52,3 | 22,28 | 17,462 | 0,8 | 1,6 | 18 | 41 | 40 | 54 | 61 | 64 | 3 | 4,5 | 0,8 | 1,6 | 0,54 | 1,1 | 0,6 |
| *1.3125* | | *0.8872* | *0.6875* | *0.03* | *0.06* | | | | | | | | | | | | | |
| | 50,7 | 19,583 | 15,875 | 0,8 | 1,3 | 15 | 43 | 40 | 57 | 62 | 63 | 3 | 3,5 | 0,8 | 1,3 | 0,37 | 1,6 | 0,9 |
| | | *0.771* | *0.625* | *0.03* | *0.05* | | | | | | | | | | | | | |
| **34,925** | 50 | 18,288 | 13,97 | 3,6 | 1,3 | 14 | 42 | 47,5 | 57 | 58 | 61 | 3 | 4 | 3,6 | 1,3 | 0,37 | 1,6 | 0,9 |
| *1.375* | | *0.72* | *0.55* | *0.14* | *0.05* | | | | | | | | | | | | | |
| | 50 | 18,288 | 13,97 | 0,8 | 1,3 | 14 | 42 | 41,5 | 57 | 58 | 61 | 3 | 4 | 0,8 | 1,3 | 0,37 | 1,6 | 0,9 |
| | | *0.72* | *0.55* | *0.03* | *0.05* | | | | | | | | | | | | | |
| | 50,7 | 19,583 | 15,875 | 1,5 | 1,3 | 15 | 43 | 43 | 57 | 62 | 63 | 3 | 3,5 | 1,5 | 1,3 | 0,37 | 1,6 | 0,9 |
| | | *0.771* | *0.625* | *0.06* | *0.05* | | | | | | | | | | | | | |
| | 56,6 | 25,4 | 19,842 | 1 | 2,3 | 20 | 42 | 42,5 | 57 | 63 | 68 | 5 | 5,5 | 1 | 2,3 | 0,54 | 1,1 | 0,6 |
| | | *1* | *0.7812* | *0.04* | *0.09* | | | | | | | | | | | | | |
| | 56,6 | 25,4 | 19,842 | 2,3 | 2,3 | 20 | 42 | 45 | 57 | 63 | 68 | 5 | 5,5 | 2,3 | 2,3 | 0,54 | 1,1 | 0,6 |
| | | *1* | *0.7812* | *0.09* | *0.09* | | | | | | | | | | | | | |
| | 52,5 | 24,608 | 19,05 | 1,5 | 0,8 | 15 | 44 | 43 | 62 | 67 | 67 | 5 | 4,5 | 1,5 | 0,8 | 0,3 | 2 | 1,1 |
| | | *0.9688* | *0.75* | *0.06* | *0.03* | | | | | | | | | | | | | |
| | 52,3 | 26,975 | 22,225 | 3,5 | 1,5 | 18 | 42 | 47 | 59 | 65 | 67 | 3 | 4,5 | 3,5 | 1,5 | 0,37 | 1,6 | 0,9 |
| | | *1.062* | *0.875* | *0.14* | *0.06* | | | | | | | | | | | | | |
| | 59,3 | 28,575 | 23,02 | 3,5 | 3,3 | 23 | 44 | 47,5 | 58 | 65 | 72 | 3 | 6 | 3,5 | 3,3 | 0,54 | 1,1 | 0,6 |
| | | *1.125* | *0.9063* | *0.14* | *0.13* | | | | | | | | | | | | | |

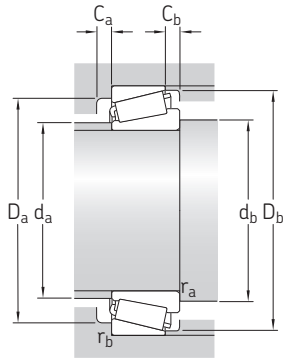
## 8.2 Inch single row tapered roller bearings

d **34,987 – 39,688** mm
*1.3774 – 1.5625 in.*




| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation | Series |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | T | C | $C_0$ | $P_u$ | | | | | |
| mm/*in.* | | | kN | | kN | r/min | | kg | – | – |
| **34,987**<br>*1.3774* | 59,131<br>*2.328* | 15,875<br>*0.625* | 40,6 | 44 | 4,5 | 9 000 | 11 000 | 0,17 | ▸ L 68149/110 | L 68100 |
| | 59,975<br>*2.3612* | 15,875<br>*0.625* | 40,6 | 44 | 4,5 | 9 000 | 11 000 | 0,18 | ▸ L 68149/111 | L 68100 |
| **35,717**<br>*1.4062* | 72,233<br>*2.8438* | 25,4<br>*1* | 83 | 90 | 10 | 7 500 | 9 000 | 0,49 | HM 88648/610 | HM 88600 |
| **36,487**<br>*1.4365* | 73,025<br>*2.875* | 23,812<br>*0.9375* | 89,1 | 88 | 9,8 | 8 000 | 9 500 | 0,46 | 25880/25820 | 25800 |
| **36,512**<br>*1.4375* | 76,2<br>*3* | 29,37<br>*1.1563* | 95,2 | 106 | 11,8 | 7 000 | 8 500 | 0,64 | HM 89449/410 | HM 89400 |
| **38,1**<br>*1.5* | 65,088<br>*2.5625* | 18,034<br>*0.71* | 53 | 57 | 6,1 | 8 000 | 10 000 | 0,23 | ▸ LM 29748/710 | LM 29700 |
| | 65,088<br>*2.5625* | 18,034<br>*0.71* | 53 | 57 | 6,1 | 8 000 | 10 000 | 0,24 | ▸ LM 29749/710 | LM 29700 |
| | 65,088<br>*2.5625* | 19,812<br>*0.78* | 53 | 57 | 6,1 | 8 000 | 10 000 | 0,25 | LM 29749/711 | LM 29700 |
| | 72,238<br>*2.844* | 20,638<br>*0.8125* | 60,3 | 60 | 6,55 | 8 000 | 9 500 | 0,36 | ▸ 16150/16284 | 16000 |
| | 72,238<br>*2.844* | 23,813<br>*0.9375* | 60,3 | 60 | 6,55 | 8 000 | 9 500 | 0,39 | 16150/16283 | 16000 |
| | 76,2<br>*3* | 23,812<br>*0.9375* | 92,1 | 93 | 10,4 | 7 500 | 9 000 | 0,5 | 2788/2720 | 2700 |
| | 79,375<br>*3.125* | 29,37<br>*1.1563* | 112 | 110 | 12,5 | 7 000 | 8 500 | 0,68 | 3490/3420 | 3400 |
| | 82,55<br>*3.25* | 29,37<br>*1.1563* | 106 | 118 | 13,4 | 6 700 | 8 000 | 0,77 | HM 801346 X/310 | HM 801300 |
| | 82,55<br>*3.25* | 29,37<br>*1.1563* | 106 | 118 | 13,4 | 6 700 | 8 000 | 0,78 | ▸ HM 801346/310 | HM 801300 |
| | 82,931<br>*3.265* | 23,812<br>*0.9375* | 99,1 | 106 | 11,8 | 6 700 | 8 000 | 0,65 | ▸ 25572/25520 | 25500 |
| | 88,5<br>*3.4843* | 26,988<br>*1.0625* | 123 | 114 | 13,2 | 6 700 | 8 500 | 0,83 | 418/414 | 415 |
| **39,688**<br>*1.5625* | 76,2<br>*3* | 23,812<br>*0.9375* | 92,1 | 93 | 10,4 | 7 500 | 9 000 | 0,48 | 2789/2729 | 2700 |

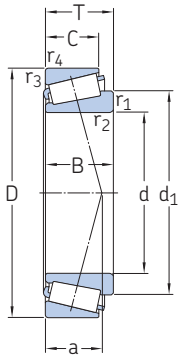
**SKF Explorer bearing**
▸ Popular item




| Dimensions | | | | | | | Abutment and fillet dimensions | | | | | | | | | Calculation factors | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | B | C | $r_{1,2}$ min. | $r_{3,4}$ min. | a | $d_a$ max. | $d_b$ min. | $D_a$ min. | $D_a$ max. | $D_b$ min. | $C_a$ min. | $C_b$ min. | $r_a$ max. | $r_b$ max. | e | Y | $Y_0$ |
| mm/*in.* | | | | | | | mm | | | | | | | | | – | | |
| **34,987** | 48,4 | 16,764 | 11,938 | 3,5 | 1,3 | 13 | 41 | 47 | 52 | 52 | 56 | 3 | 3,5 | 3,5 | 1,3 | 0,43 | 1,4 | 0,8 |
| *1.3774* | | *0.66* | *0.47* | *0.14* | *0.05* | | | | | | | | | | | | | |
| | 48,4 | 16,764 | 11,938 | 3,5 | 1,3 | 13 | 41 | 47 | 52 | 53 | 56 | 3 | 3,5 | 3,5 | 1,3 | 0,43 | 1,4 | 0,8 |
| | | *0.66* | *0.47* | *0.14* | *0.05* | | | | | | | | | | | | | |
| **35,717** | 56,6 | 25,4 | 19,842 | 3,5 | 2,3 | 20 | 42 | 48 | 57 | 63 | 68 | 5 | 5,5 | 3,5 | 2,3 | 0,54 | 1,1 | 0,6 |
| *1.4062* | | *1* | *0.7812* | *0.14* | *0.09* | | | | | | | | | | | | | |
| **36,487** | 52,5 | 24,608 | 19,05 | 1,5 | 2,3 | 15 | 44 | 45 | 62 | 64 | 67 | 5 | 4,5 | 1,5 | 2,3 | 0,3 | 2 | 1,1 |
| *1.4365* | | *0.9688* | *0.75* | *0.06* | *0.09* | | | | | | | | | | | | | |
| **36,512** | 59,3 | 28,575 | 23,02 | 3,5 | 3,3 | 23 | 44 | 49 | 58 | 65 | 72 | 3 | 6 | 3,5 | 3,3 | 0,54 | 1,1 | 0,6 |
| *1.4375* | | *1.125* | *0.9063* | *0.14* | *0.13* | | | | | | | | | | | | | |
| **38,1** | 52 | 18,288 | 13,97 | 3,6 | 1,3 | 13 | 44 | 51 | 58 | 58 | 61 | 3 | 4 | 3,6 | 1,3 | 0,33 | 1,8 | 1 |
| *1.5* | | *0.72* | *0.55* | *0.14* | *0.05* | | | | | | | | | | | | | |
| | 51,8 | 18,288 | 13,97 | 2,3 | 1,3 | 13 | 45 | 48 | 58 | 58 | 61 | 3 | 4 | 2,3 | 1,3 | 0,33 | 1,8 | 1 |
| | | *0.72* | *0.55* | *0.09* | *0.05* | | | | | | | | | | | | | |
| | 51,8 | 18,288 | 15,748 | 2,3 | 1,3 | 15 | 45 | 48 | 57 | 58 | 61 | 2 | 4 | 2,3 | 1,3 | 0,33 | 1,8 | 1 |
| | | *0.72* | *0.62* | *0.09* | *0.05* | | | | | | | | | | | | | |
| | 53,8 | 20,638 | 15,875 | 3,5 | 1,3 | 16 | 45 | 51 | 60 | 65 | 66 | 3 | 4,5 | 3,5 | 1,3 | 0,4 | 1,5 | 0,8 |
| | | *0.8125* | *0.625* | *0.14* | *0.05* | | | | | | | | | | | | | |
| | 53,8 | 20,638 | 19,05 | 3,5 | 2,3 | 19 | 45 | 51 | 58 | 63 | 66 | 3 | 4,5 | 3,5 | 2,3 | 0,4 | 1,5 | 0,8 |
| | | *0.8125* | *0.75* | *0.14* | *0.09* | | | | | | | | | | | | | |
| | 54,8 | 25,654 | 19,05 | 3,5 | 3,3 | 15 | 46 | 51 | 64 | 65 | 69 | 5 | 4,5 | 3,5 | 3,3 | 0,3 | 2 | 1,1 |
| | | *1.01* | *0.75* | *0.14* | *0.13* | | | | | | | | | | | | | |
| | 57,3 | 29,771 | 23,812 | 3,5 | 3,3 | 20 | 46 | 51 | 65 | 68 | 73 | 4 | 5,5 | 3,5 | 3,3 | 0,37 | 1,6 | 0,9 |
| | | *1.1721* | *0.9375* | *0.14* | *0.13* | | | | | | | | | | | | | |
| | 64,1 | 28,575 | 23,02 | 2,3 | 3,3 | 24 | 49 | 48,5 | 64 | 71 | 78 | 4 | 6 | 2,3 | 3,3 | 0,54 | 1,1 | 0,6 |
| | | *1.125* | *0.9063* | *0.09* | *0.13* | | | | | | | | | | | | | |
| | 64,1 | 28,575 | 23,02 | 0,8 | 3,3 | 24 | 49 | 45,5 | 64 | 71 | 78 | 4 | 6 | 0,8 | 3,3 | 0,54 | 1,1 | 0,6 |
| | | *1.125* | *0.9063* | *0.03* | *0.13* | | | | | | | | | | | | | |
| | 62,2 | 25,4 | 19,05 | 0,8 | 0,8 | 16 | 53 | 45,5 | 71 | 76 | 76 | 5 | 4,5 | 0,8 | 0,8 | 0,33 | 1,8 | 1 |
| | | *1* | *0.75* | *0.03* | *0.03* | | | | | | | | | | | | | |
| | 58,8 | 29,083 | 22,225 | 3,5 | 1,5 | 16 | 49 | 51 | 73 | 81 | 78 | 5 | 4,5 | 3,5 | 1,5 | 0,26 | 2,3 | 1,3 |
| | | *1.145* | *0.875* | *0.14* | *0.06* | | | | | | | | | | | | | |
| **39,688** | 54,8 | 25,654 | 19,05 | 3,5 | 0,8 | 15 | 46 | 52 | 64 | 70 | 69 | 5 | 4,5 | 3,5 | 0,8 | 0,3 | 2 | 1,1 |
| *1.5625* | | *1.01* | *0.75* | *0.14* | *0.03* | | | | | | | | | | | | | |

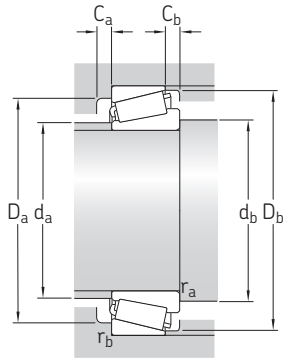
## 8.2 Inch single row tapered roller bearings

d **40 – 42,875** mm
*1.5748 – 1.688 in.*




| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation | Series |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | T | C | $C_0$ | $P_u$ | | | | | |
| mm/*in.* | | | kN | | kN | r/min | | kg | – | – |
| **40** | 80 | 21 | 87,6 | 80 | 9,15 | 7 000 | 8 500 | 0,47 | 344/332 | 335 |
| *1.5748* | *3.1496* | *0.8268* | | | | | | | | |
| | 80 | 21 | 87,6 | 80 | 9,15 | 7 000 | 8 500 | 0,47 | 344/332 AA | 335 |
| | *3.1496* | *0.8268* | | | | | | | | |
| | 80 | 21 | 87,6 | 80 | 9,15 | 7 000 | 8 500 | 0,48 | 344 A/332 | 335 |
| | *3.1496* | *0.8268* | | | | | | | | |
| **41** | 68 | 17,5 | 53,6 | 58,5 | 6,3 | 8 000 | 9 500 | 0,24 | ▸ LM 300849/811 | LM 300800 |
| *1.6142* | *2.6772* | *0.689* | | | | | | | | |
| **41,275** | 73,025 | 16,667 | 57,7 | 56 | 6,2 | 7 500 | 9 000 | 0,28 | ▸ 18590/18520 | 18500 |
| *1.625* | *2.875* | *0.6562* | | | | | | | | |
| | 73,431 | 19,558 | 67,6 | 68 | 7,65 | 7 500 | 9 000 | 0,34 | ▸ LM 501349/310 | LM 501300 |
| | *2.891* | *0.77* | | | | | | | | |
| | 73,431 | 21,43 | 67,6 | 68 | 7,65 | 7 500 | 9 000 | 0,36 | ▸ LM 501349/314 | LM 501300 |
| | *2.891* | *0.8437* | | | | | | | | |
| | 76,2 | 18,009 | 55,7 | 56 | 6,1 | 7 000 | 9 000 | 0,34 | 11162/11300 | 11000 |
| | *3* | *0.709* | | | | | | | | |
| | 76,2 | 18,009 | 55,7 | 56 | 6,1 | 7 000 | 9 000 | 0,34 | 11163/11300 | 11000 |
| | *3* | *0.709* | | | | | | | | |
| | 76,2 | 22,225 | 84,2 | 86,5 | 9,65 | 7 000 | 9 000 | 0,44 | ▸ 24780/24720 | 24700 |
| | *3* | *0.875* | | | | | | | | |
| | 82,55 | 26,543 | 91,2 | 91,5 | 10,6 | 6 700 | 8 000 | 0,62 | M 802048/011 | M 802000 |
| | *3.25* | *1.045* | | | | | | | | |
| | 87,312 | 30,162 | 126 | 132 | 15 | 6 300 | 8 000 | 0,85 | 3585/3525 | 3500 |
| | *3.4375* | *1.1875* | | | | | | | | |
| | 88,9 | 30,162 | 116 | 127 | 14,6 | 6 000 | 7 500 | 0,91 | HM 803146/110 | HM 803100 |
| | *3.5* | *1.1875* | | | | | | | | |
| | 101,6 | 34,925 | 184 | 190 | 21,6 | 5 600 | 6 700 | 1,45 | 526/522 | 525 |
| | *4* | *1.375* | | | | | | | | |
| **42,875** | 82,931 | 23,812 | 99,1 | 106 | 11,8 | 6 700 | 8 000 | 0,59 | ▸ 25577/25520 | 25500 |
| *1.688* | *3.265* | *0.9375* | | | | | | | | |
| | 82,931 | 26,988 | 99,1 | 106 | 12 | 6 700 | 8 000 | 0,63 | 25577/25523 | 25500 |
| | *3.265* | *1.0625* | | | | | | | | |

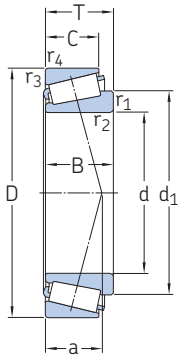
**SKF Explorer bearing**
▸ Popular item




| Dimensions | | | | | | | Abutment and fillet dimensions | | | | | | | | | Calculation factors | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | B | C | $r_{1,2}$ min. | $r_{3,4}$ min. | a | $d_a$ max. | $d_b$ min. | $D_a$ min. | $D_a$ max. | $D_b$ min. | $C_a$ min. | $C_b$ min. | $r_a$ max. | $r_b$ max. | e | Y | $Y_0$ |
| mm/*in.* | | | | | | | mm | | | | | | | | | – | | |
| **40** | 57,6 | 22,403 | 17,826 | 3,5 | 1,3 | 14 | 50 | 53 | 72 | 73 | 75 | 4 | 3 | 3,5 | 1,3 | 0,27 | 2,2 | 1,3 |
| *1.5748* | | *0.882* | *0.7018* | *0.14* | *0.05* | | | | | | | | | | | | | |
| | 57,6 | 22,403 | 17,826 | 3,5 | 0,8 | 14 | 50 | 53 | 72 | 74 | 75 | 4 | 3 | 3,5 | 0,8 | 0,27 | 2,2 | 1,3 |
| | | *0.882* | *0.7018* | *0.14* | *0.03* | | | | | | | | | | | | | |
| | 57,6 | 22,403 | 17,826 | 0,8 | 1,3 | 14 | 50 | 47 | 72 | 73 | 75 | 4 | 3 | 0,8 | 1,3 | 0,27 | 2,2 | 1,3 |
| | | *0.882* | *0.7018* | *0.03* | *0.05* | | | | | | | | | | | | | |
| **41** | 55,4 | 18 | 13,5 | 3,6 | 1,5 | 13 | 47 | 54 | 61 | 60 | 64 | 3 | 4 | 3,6 | 1,5 | 0,35 | 1,7 | 0,9 |
| *1.6142* | | *0.7087* | *0.5315* | *0.14* | *0.06* | | | | | | | | | | | | | |
| **41,275** | 56,2 | 17,463 | 12,7 | 3,5 | 1,5 | 13 | 50 | 54 | 66 | 65 | 68 | 3 | 3,5 | 3,5 | 1,5 | 0,35 | 1,7 | 0,9 |
| *1.625* | | *0.6875* | *0.5* | *0.14* | *0.06* | | | | | | | | | | | | | |
| | 57,7 | 19,812 | 14,732 | 3,5 | 0,8 | 15 | 48 | 54 | 64 | 67 | 69 | 4 | 4,5 | 3,5 | 0,8 | 0,4 | 1,5 | 0,8 |
| | | *0.78* | *0.58* | *0.14* | *0.03* | | | | | | | | | | | | | |
| | 57,7 | 19,812 | 16,604 | 3,5 | 0,8 | 17 | 48 | 54 | 63 | 67 | 69 | 3 | 4,5 | 3,5 | 0,8 | 0,4 | 1,5 | 0,8 |
| | | *0.78* | *0.6537* | *0.14* | *0.03* | | | | | | | | | | | | | |
| | 58,2 | 17,384 | 14,288 | 1,5 | 1,5 | 16 | 50 | 49,5 | 65 | 68 | 71 | 3 | 3,5 | 1,5 | 1,5 | 0,48 | 1,25 | 0,7 |
| | | *0.6844* | *0.5625* | *0.06* | *0.06* | | | | | | | | | | | | | |
| | 58,2 | 17,384 | 14,288 | 0,8 | 1,5 | 16 | 50 | 48,5 | 65 | 68 | 71 | 3 | 3,5 | 0,8 | 1,5 | 0,48 | 1,25 | 0,7 |
| | | *0.6844* | *0.5625* | *0.03* | *0.06* | | | | | | | | | | | | | |
| | 57,7 | 23,02 | 17,462 | 3,5 | 0,8 | 17 | 49 | 54 | 65 | 70 | 71 | 4 | 4,5 | 3,5 | 0,8 | 0,4 | 1,5 | 0,8 |
| | | *0.9063* | *0.6875* | *0.14* | *0.03* | | | | | | | | | | | | | |
| | 62,3 | 25,654 | 20,193 | 3,5 | 3,3 | 22 | 49 | 54 | 66 | 71 | 78 | 4 | 6 | 3,5 | 3,3 | 0,54 | 1,1 | 0,6 |
| | | *1.01* | *0.795* | *0.14* | *0.13* | | | | | | | | | | | | | |
| | 63,1 | 30,886 | 23,812 | 1,5 | 3,3 | 19 | 53 | 50 | 73 | 76 | 80 | 4 | 6 | 1,5 | 3,3 | 0,31 | 1,9 | 1,1 |
| | | *1.216* | *0.9375* | *0.06* | *0.13* | | | | | | | | | | | | | |
| | 69 | 29,37 | 23,02 | 3,5 | 3,3 | 25 | 53 | 54 | 70 | 77 | 84 | 4 | 7 | 3,5 | 3,3 | 0,54 | 1,1 | 0,6 |
| | | *1.1563* | *0.9063* | *0.14* | *0.13* | | | | | | | | | | | | | |
| | 72,9 | 36,068 | 26,988 | 3,5 | 3,3 | 21 | 61 | 55 | 87 | 90 | 94 | 6 | 7,5 | 3,5 | 3,3 | 0,28 | 2,1 | 1,1 |
| | | *1.42* | *1.0625* | *0.14* | *0.13* | | | | | | | | | | | | | |
| **42,875** | 62,2 | 25,4 | 19,05 | 3,5 | 0,8 | 16 | 53 | 56 | 71 | 76 | 76 | 5 | 4,5 | 3,5 | 0,8 | 0,33 | 1,8 | 1 |
| *1.688* | | *1* | *0.75* | *0.13* | *0.03* | | | | | | | | | | | | | |
| | 62,2 | 25,4 | 22,225 | 3,5 | 2,3 | 20 | 53 | 56 | 70 | 73 | 76 | 3 | 4,5 | 3,5 | 2,3 | 0,33 | 1,8 | 1 |
| | | *1* | *0.875* | *0.14* | *0.09* | | | | | | | | | | | | | |

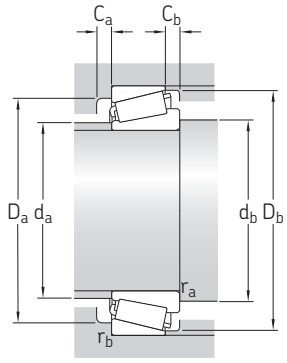
## 8.2 Inch single row tapered roller bearings

d **44,45 – 45,618** mm
*1.75 – 1.796 in.*




| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation | Series |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | T | C | $C_0$ | $P_u$ | | | | | |
| mm/*in.* | | | kN | | kN | r/min | | kg | – | – |
| **44,45** | 82,931 | 23,812 | 99,1 | 106 | 11,8 | 6 700 | 8 000 | 0,57 | **25580/25520** | 25500 |
| *1.75* | *3.265* | *0.9375* | | | | | | | | |
| | 82,931 | 26,988 | 99,1 | 106 | 11,8 | 6 700 | 8 000 | 0,61 | **25580/25522** | 25500 |
| | *3.265* | *1.0625* | | | | | | | | |
| | 82,931 | 26,988 | 99,1 | 106 | 11,8 | 6 700 | 8 000 | 0,61 | **25580/25523** | 25500 |
| | *3.265* | *1.0625* | | | | | | | | |
| | 88,9 | 30,162 | 116 | 127 | 14,6 | 6 000 | 7 500 | 0,86 | **HM 803149/110** | HM 803000 |
| | *3.5* | *1.1875* | | | | | | | | |
| | 93,264 | 30,163 | 134 | 146 | 17 | 5 600 | 7 000 | 0,98 | **3782/3720** | 3700 |
| | *3.6718* | *1.1875* | | | | | | | | |
| | 95,25 | 30,958 | 108 | 96,5 | 11,4 | 5 300 | 7 000 | 0,93 | ▸ **53178/53377** | 53000 |
| | *3.75* | *1.2188* | | | | | | | | |
| | 95,25 | 30,958 | 124 | 122 | 14 | 5 300 | 7 000 | 1 | **HM 903249/210** | HM 903200 |
| | *3.75* | *1.2188* | | | | | | | | |
| | 104,775 | 36,512 | 180 | 204 | 22,4 | 5 000 | 6 300 | 1,65 | **HM 807040/010** | HM-807000 |
| | *4.125* | *1.4375* | | | | | | | | |
| | 107,95 | 36,512 | 183 | 190 | 21,6 | 5 300 | 6 300 | 1,7 | ▸ **535/532 X** | 535 |
| | *4.25* | *1.4375* | | | | | | | | |
| | 111,125 | 38,1 | 183 | 190 | 21,6 | 5 300 | 6 300 | 1,85 | ▸ **535/532 A** | 535 |
| | *4.375* | *1.5* | | | | | | | | |
| **45** | 85 | 20,638 | 87,3 | 81,5 | 9,3 | 6 700 | 8 000 | 0,5 | **358 X/354 X** | 355 |
| *1.7717* | *3.3465* | *0.8125* | | | | | | | | |
| **45,237** | 87,312 | 30,162 | 126 | 132 | 15 | 6 300 | 8 000 | 0,78 | **3586/3525** | 3500 |
| *1.781* | *3.4375* | *1.1875* | | | | | | | | |
| **45,242** | 73,431 | 19,558 | 66 | 75 | 8,15 | 7 000 | 8 500 | 0,31 | ▸ **LM 102949/910** | LM 102900 |
| *1.7812* | *2.891* | *0.77* | | | | | | | | |
| | 77,788 | 19,842 | 66,8 | 69,5 | 7,65 | 7 000 | 8 500 | 0,37 | **LM 603049/011** | LM 603000 |
| | *3.0625* | *0.7812* | | | | | | | | |
| | 77,788 | 19,842 | 66,8 | 69,5 | 7,65 | 7 000 | 8 500 | 0,37 | **LM 603049/011 AA** | LM 603000 |
| | *3.0625* | *0.7812* | | | | | | | | |
| | 77,788 | 21,43 | 66,8 | 69,5 | 7,65 | 7 000 | 8 500 | 0,39 | **LM 603049/012** | LM 603000 |
| | *3.0625* | *0.8437* | | | | | | | | |
| **45,618** | 82,931 | 23,812 | 99,1 | 106 | 11,8 | 6 700 | 8 000 | 0,55 | **25590/25520** | 25500 |
| *1.796* | *3.265* | *0.9375* | | | | | | | | |
| | 82,931 | 26,988 | 99,1 | 106 | 11,8 | 6 700 | 8 000 | 0,59 | **25590/25523** | 25500 |
| | *3.265* | *1.0625* | | | | | | | | |
| | 83,058 | 23,876 | 99,1 | 106 | 11,8 | 6 700 | 8 000 | 0,55 | **25590/25522** | 25500 |
| | *3.27* | *0.94* | | | | | | | | |

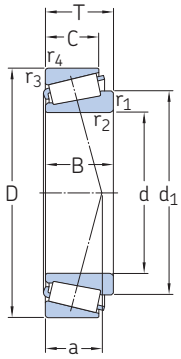
**SKF Explorer bearing**
▸ Popular item




| Dimensions | | | | | | | Abutment and fillet dimensions | | | | | | | | | Calculation factors | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | B | C | $r_{1,2}$ min. | $r_{3,4}$ min. | a | $d_a$ max. | $d_b$ min. | $D_a$ min. | $D_a$ max. | $D_b$ min. | $C_a$ min. | $C_b$ min. | $r_a$ max. | $r_b$ max. | e | Y | $Y_0$ |
| mm/*in.* | | | | | | | mm | | | | | | | | | – | | |
| **44,45** | 62,2 | 25,4 | 19,05 | 3,5 | 0,8 | 16 | 53 | 57 | 71 | 76 | 76 | 5 | 4,5 | 3,5 | 0,8 | 0,33 | 1,8 | 1 |
| *1.75* | | *1* | *0.75* | *0.14* | *0.03* | | | | | | | | | | | | | |
| | 62,2 | 25,4 | 22,225 | 3,5 | 2,3 | 20 | 53 | 57 | 70 | 73 | 76 | 3 | 4,5 | 3,5 | 2,3 | 0,33 | 1,8 | 1 |
| | | *1* | *0.875* | *0.14* | *0.09* | | | | | | | | | | | | | |
| | 62,2 | 25,4 | 22,225 | 3,5 | 2,3 | 20 | 53 | 57 | 70 | 73 | 76 | 3 | 4,5 | 3,5 | 2,3 | 0,33 | 1,8 | 1 |
| | | *1* | *0.875* | *0.14* | *0.09* | | | | | | | | | | | | | |
| | 69 | 29,37 | 23,02 | 3,5 | 3,3 | 25 | 53 | 58 | 70 | 77 | 84 | 4 | 7 | 3,5 | 3,3 | 0,54 | 1,1 | 0,6 |
| | | *1.1563* | *0.9063* | *0.14* | *0.13* | | | | | | | | | | | | | |
| | 71,2 | 30,302 | 23,812 | 3,5 | 3,3 | 21 | 60 | 58 | 80 | 81 | 87 | 4 | 6 | 3,5 | 3,3 | 0,33 | 1,8 | 1 |
| | | *1.193* | *0.9375* | *0.14* | *0.13* | | | | | | | | | | | | | |
| | 69,3 | 28,3 | 20,638 | 2 | 2,3 | 30 | 53 | 55 | 72 | 86 | 89 | 4 | 10 | 2 | 2,3 | 0,75 | 0,8 | 0,45 |
| | | *1.1142* | *0.8125* | *0.08* | *0.09* | | | | | | | | | | | | | |
| | 71,6 | 28,575 | 22,225 | 3,5 | 0,8 | 30 | 53 | 58 | 71 | 89 | 90 | 4 | 8,5 | 3,5 | 0,8 | 0,75 | 0,8 | 0,45 |
| | | *1.125* | *0.875* | *0.14* | *0.03* | | | | | | | | | | | | | |
| | 81,5 | 36,512 | 28,575 | 3,5 | 3,3 | 28 | 63 | 58 | 85 | 93 | 100 | 6 | 7,5 | 3,5 | 3,3 | 0,48 | 1,25 | 0,7 |
| | | *1.4375* | *1.125* | *0.14* | *0.13* | | | | | | | | | | | | | |
| | 76,5 | 36,957 | 28,575 | 3,5 | 3,3 | 23 | 64 | 58 | 90 | 96 | 97 | 5 | 7,5 | 3,5 | 3,3 | 0,3 | 2 | 1,1 |
| | | *1.455* | *1.125* | *0.14* | *0.13* | | | | | | | | | | | | | |
| | 76,5 | 36,957 | 30,162 | 3,5 | 3,3 | 25 | 64 | 58 | 89 | 99 | 97 | 4 | 7,5 | 3,5 | 3,3 | 0,3 | 2 | 1,1 |
| | | *1.455* | *1.1875* | *0.14* | *0.13* | | | | | | | | | | | | | |
| **45** | 62,4 | 21,692 | 17,462 | 2 | 1,5 | 15 | 55 | 55 | 76 | 77 | 80 | 3 | 3 | 2 | 1,5 | 0,31 | 1,9 | 1,1 |
| *1.7717* | | *0.854* | *0.6875* | *0.08* | *0.06* | | | | | | | | | | | | | |
| **45,237** | 63,1 | 30,886 | 23,812 | 3,5 | 3,3 | 19 | 53 | 58 | 73 | 76 | 80 | 4 | 6 | 3,5 | 3,3 | 0,31 | 1,9 | 1,1 |
| *1.781* | | *1.216* | *0.9375* | *0.14* | *0.13* | | | | | | | | | | | | | |
| **45,242** | 59,4 | 19,812 | 15,748 | 3,5 | 0,8 | 14 | 52 | 58 | 66 | 67 | 70 | 3 | 3,5 | 3,5 | 0,8 | 0,3 | 2 | 1,1 |
| *1.7812* | | *0.78* | *0.62* | *0.14* | *0.03* | | | | | | | | | | | | | |
| | 62 | 19,842 | 15,08 | 3,5 | 0,8 | 17 | 52 | 58 | 68 | 71 | 74 | 4 | 4,5 | 3,5 | 0,8 | 0,43 | 1,4 | 0,8 |
| | | *0.7812* | *0.5937* | *0.14* | *0.03* | | | | | | | | | | | | | |
| | 62 | 19,842 | 15,08 | 3,5 | 0,3 | 17 | 52 | 58 | 68 | 72 | 74 | 4 | 4,5 | 3,5 | 0,3 | 0,43 | 1,4 | 0,8 |
| | | *0.7812* | *0.5937* | *0.14* | *0.01* | | | | | | | | | | | | | |
| | 62 | 19,842 | 16,667 | 3,5 | 0,8 | 18 | 52 | 58 | 67 | 71 | 74 | 3 | 4,5 | 3,5 | 0,8 | 0,43 | 1,4 | 0,8 |
| | | *0.7812* | *0.6562* | *0.14* | *0.03* | | | | | | | | | | | | | |
| **45,618** | 62,1 | 25,4 | 19,05 | 3,5 | 0,8 | 16 | 53 | 58 | 71 | 76 | 76 | 5 | 4,5 | 3,5 | 0,8 | 0,33 | 1,8 | 1 |
| *1.796* | | *1* | *0.75* | *0.14* | *0.03* | | | | | | | | | | | | | |
| | 62,1 | 25,4 | 22,225 | 3,5 | 2,3 | 20 | 53 | 58 | 70 | 73 | 76 | 3 | 4,5 | 3,5 | 2,3 | 0,33 | 1,8 | 1 |
| | | *1* | *0.875* | *0.14* | *0.09* | | | | | | | | | | | | | |
| | 62,1 | 25,4 | 19,114 | 3,5 | 2 | 17 | 53 | 58 | 71 | 74 | 76 | 5 | 4,5 | 3,5 | 2 | 0,33 | 1,8 | 1 |
| | | *1* | *0.7525* | *0.14* | *0.08* | | | | | | | | | | | | | |

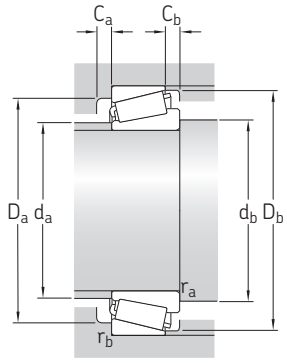
## 8.2 Inch single row tapered roller bearings

d **46 – 50,8** mm
*1.811 – 2 in.*




| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation | Series |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | T | C | $C_0$ | $P_u$ | | | | | |
| mm/*in.* | | | kN | | kN | r/min | | kg | – | – |
| **46** | 75 | 18 | 62,1 | 71 | 7,65 | 7 000 | 8 500 | 0,3 | ▸ LM 503349 A/310 | LM 503300 |
| *1.811* | *2.9528* | *0.7087* | | | | | | | | |
| | 75 | 18 | 62,1 | 71 | 7,65 | 7 000 | 8 500 | 0,3 | ▸ LM 503349/310 | LM 503300 |
| | *2.9528* | *0.7087* | | | | | | | | |
| **46,038** | 79,375 | 17,462 | 61,1 | 62 | 6,8 | 7 000 | 8 500 | 0,33 | ▸ 18690/18620 | 18600 |
| *1.8125* | *3.125* | *0.6875* | | | | | | | | |
| | 85 | 20,638 | 87,3 | 81,5 | 9,3 | 6 700 | 8 000 | 0,49 | 359 S/354 X | 355 |
| | *3.3465* | *0.8125* | | | | | | | | |
| **47,625** | 88,9 | 20,638 | 94 | 91,5 | 10,4 | 6 300 | 7 500 | 0,55 | 369 S/362 A | 365 |
| *1.875* | *3.5* | *0.8125* | | | | | | | | |
| | 95,25 | 30,162 | 133 | 146 | 17,3 | 5 600 | 7 000 | 0,99 | HM 804846/810 | HM 804800 |
| | *3.75* | *1.1875* | | | | | | | | |
| | 101,6 | 34,925 | 184 | 190 | 21,6 | 5 600 | 6 700 | 1,3 | 528 R/522 | 525 |
| | *4* | *1.375* | | | | | | | | |
| **49,212** | 114,3 | 44,45 | 226 | 224 | 25 | 5 000 | 6 300 | 2,2 | 65390/65320 | 65300 |
| *1.9375* | *4.5* | *1.75* | | | | | | | | |
| **50,8** | 82,55 | 21,59 | 88,9 | 100 | 11 | 6 300 | 8 000 | 0,43 | LM 104949/911 | LM 104900 |
| *2* | *3.25* | *0.85* | | | | | | | | |
| | 85 | 17,462 | 62,1 | 65,5 | 7,2 | 6 300 | 8 000 | 0,37 | 18790/18720 | 18700 |
| | *3.3465* | *0.6875* | | | | | | | | |
| | 88,9 | 20,638 | 94 | 91,5 | 10,4 | 6 300 | 7 500 | 0,5 | 368 A/362 A | 365 |
| | *3.5* | *0.8125* | | | | | | | | |
| | 90 | 25 | 94 | 91,5 | 10,4 | 6 300 | 7 500 | 0,58 | 368 A/362 X | 365 |
| | *3.5433* | *0.9843* | | | | | | | | |
| | 93,264 | 30,162 | 134 | 146 | 17 | 5 600 | 7 000 | 0,87 | 3780/3720 | 3700 |
| | *3.6718* | *1.1875* | | | | | | | | |
| | 104,775 | 36,512 | 180 | 204 | 22,4 | 5 000 | 6 300 | 1,5 | HM 807046/010 | HM 807000 |
| | *4.125* | *1.4375* | | | | | | | | |
| | 104,775 | 39,688 | 195 | 224 | 25 | 5 300 | 6 300 | 1,65 | ▸ 4580/4535 | 4500 |
| | *4.125* | *1.5625* | | | | | | | | |
| | 107,95 | 36,512 | 183 | 190 | 21,6 | 5 300 | 6 300 | 1,55 | ▸ 537/532 X | 535 |
| | *4.25* | *1.4375* | | | | | | | | |

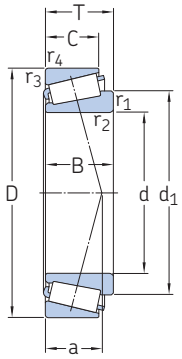
**SKF Explorer bearing**
▸ Popular item




| Dimensions | | | | | | | Abutment and fillet dimensions | | | | | | | | | Calculation factors | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | B | C | $r_{1,2}$ min. | $r_{3,4}$ min. | a | $d_a$ max. | $d_b$ min. | $D_a$ min. | $D_a$ max. | $D_b$ min. | $C_a$ min. | $C_b$ min. | $r_a$ max. | $r_b$ max. | e | Y | $Y_0$ |
| mm/*in.* | | | | | | | mm | | | | | | | | | – | | |
| **46** | 61 | 18 | 14 | 3,6 | 1,6 | 15 | 53 | 59 | 67 | 67 | 71 | 3 | 4 | 3,6 | 1,6 | 0,4 | 1,5 | 0,8 |
| *1.811* | | *0.7087* | *0.5512* | *0.14* | *0.06* | | | | | | | | | | | | | |
| | 61 | 18 | 14 | 2,3 | 1,6 | 15 | 53 | 56 | 67 | 67 | 71 | 3 | 4 | 2,3 | 1,6 | 0,4 | 1,5 | 0,8 |
| | | *0.7087* | *0.5512* | *0.09* | *0.06* | | | | | | | | | | | | | |
| **46,038** | 60,2 | 17,462 | 13,495 | 2,8 | 1,5 | 14 | 53 | 57 | 69 | 71 | 73 | 3 | 3,5 | 2,8 | 1,5 | 0,37 | 1,6 | 0,9 |
| *1.8125* | | *0.6875* | *0.5313* | *0.11* | *0.06* | | | | | | | | | | | | | |
| | 62,4 | 21,692 | 17,462 | 2,3 | 1,5 | 15 | 55 | 57 | 76 | 77 | 80 | 3 | 3 | 2,3 | 1,5 | 0,31 | 1,9 | 1,1 |
| | | *0.854* | *0.6875* | *0.09* | *0.06* | | | | | | | | | | | | | |
| **47,625** | 66,2 | 22,225 | 16,513 | 2,3 | 1,3 | 16 | 58 | 58 | 80 | 81 | 83 | 4 | 4 | 2,3 | 1,3 | 0,31 | 1,9 | 1,1 |
| *1.875* | | *0.875* | *0.6501* | *0.09* | *0.05* | | | | | | | | | | | | | |
| | 73,6 | 29,37 | 23,02 | 3,5 | 3,3 | 25 | 57 | 61 | 76 | 84 | 90 | 5 | 7 | 3,5 | 3,3 | 0,54 | 1,1 | 0,6 |
| | | *1.1563* | *0.9063* | *0.14* | *0.13* | | | | | | | | | | | | | |
| | 72,9 | 36,068 | 26,988 | 8 | 3,3 | 21 | 61 | 70 | 87 | 90 | 94 | 6 | 7,5 | 8 | 3,3 | 0,28 | 2,1 | 1,1 |
| | | *1.42* | *1.0625* | *0.32* | *0.13* | | | | | | | | | | | | | |
| **49,212** | 79,3 | 44,45 | 34,925 | 3,5 | 3,3 | 31 | 60 | 63 | 89 | 102 | 105 | 5 | 9,5 | 3,5 | 3,3 | 0,43 | 1,4 | 0,8 |
| *1.9375* | | *1.75* | *1.375* | *0.14* | *0.13* | | | | | | | | | | | | | |
| **50,8** | 65,2 | 22,225 | 16,51 | 3,5 | 1,3 | 15 | 57 | 64 | 75 | 75 | 78 | 5 | 5 | 3,5 | 1,3 | 0,3 | 2 | 1,1 |
| *2* | | *0.875* | *0.65* | *0.13* | *0.05* | | | | | | | | | | | | | |
| | 66 | 17,462 | 13,495 | 3,5 | 1,5 | 16 | 59 | 64 | 75 | 77 | 79 | 3 | 3,5 | 3,5 | 1,5 | 0,4 | 1,5 | 0,8 |
| | | *0.6875* | *0.5313* | *0.14* | *0.06* | | | | | | | | | | | | | |
| | 66,2 | 22,225 | 16,513 | 3,5 | 1,3 | 16 | 58 | 64 | 80 | 81 | 83 | 4 | 4 | 3,5 | 1,3 | 0,31 | 1,9 | 1,1 |
| | | *0.875* | *0.6501* | *0.14* | *0.05* | | | | | | | | | | | | | |
| | 66,2 | 22,225 | 20 | 3,5 | 2 | 20 | 58 | 64 | 78 | 81 | 83 | 3 | 5 | 3,5 | 2 | 0,31 | 1,9 | 1,1 |
| | | *0.875* | *0.7874* | *0.14* | *0.08* | | | | | | | | | | | | | |
| | 71,2 | 30,302 | 23,812 | 3,5 | 3,3 | 21 | 60 | 64 | 80 | 81 | 87 | 4 | 6 | 3,5 | 3,3 | 0,33 | 1,8 | 1 |
| | | *1.193* | *0.9375* | *0.14* | *0.13* | | | | | | | | | | | | | |
| | 81,5 | 36,512 | 28,575 | 3,5 | 3,3 | 28 | 63 | 64 | 85 | 93 | 100 | 6 | 7,5 | 3,5 | 3,3 | 0,48 | 1,25 | 0,7 |
| | | *1.4375* | *1.125* | *0.14* | *0.13* | | | | | | | | | | | | | |
| | 79,5 | 40,157 | 33,338 | 3,5 | 3,3 | 27 | 65 | 64 | 87 | 93 | 98 | 5 | 6 | 3,5 | 3,3 | 0,33 | 1,8 | 1 |
| | | *1.581* | *1.3125* | *0.14* | *0.13* | | | | | | | | | | | | | |
| | 76,5 | 36,957 | 28,575 | 3,5 | 3,3 | 23 | 64 | 64 | 90 | 96 | 97 | 5 | 7,5 | 3,5 | 3,3 | 0,3 | 2 | 1,1 |
| | | *1.455* | *1.125* | *0.14* | *0.13* | | | | | | | | | | | | | |

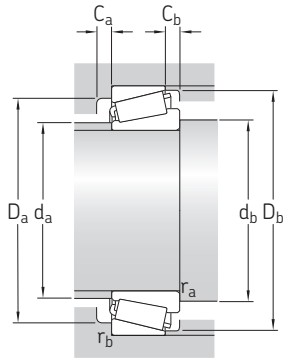
## 8.2 Inch single row tapered roller bearings

d **53,975 – 60,325** mm
*2.125 – 2.375 in.*




| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation | Series |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | T | C | $C_0$ | $P_u$ | | | | | |
| mm/*in.* | | | kN | | kN | r/min | | kg | – | – |
| **53,975** | 88,9 | 19,05 | 71,5 | 78 | 9 | 6 000 | 7 000 | 0,44 | LM 806649/610 | LM 806600 |
| *2.125* | *3.5* | *0.75* | | | | | | | | |
| | 95,25 | 27,783 | 129 | 137 | 16 | 5 600 | 7 000 | 0,81 | 33895/33821 | 33800 |
| | *3.75* | *1.0938* | | | | | | | | |
| | 95,25 | 27,783 | 129 | 137 | 16 | 5 600 | 7 000 | 0,81 | 33895/33822 | 33800 |
| | *3.75* | *1.0938* | | | | | | | | |
| | 107,95 | 36,512 | 183 | 190 | 21,6 | 5 300 | 6 300 | 1,45 | ▸ 539/532 X | 535 |
| | *4.25* | *1.4375* | | | | | | | | |
| | 111,125 | 38,1 | 183 | 190 | 21,6 | 5 300 | 6 300 | 1,65 | ▸ 539/532 A | 535 |
| | *4.375* | *1.5* | | | | | | | | |
| | 123,825 | 36,512 | 174 | 160 | 19,6 | 4 300 | 5 600 | 2 | 72212/72487 | 72000 |
| | *4.875* | *1.4375* | | | | | | | | |
| **57,15** | 96,838 | 21 | 99,9 | 102 | 11,6 | 5 600 | 6 700 | 0,59 | 387 A/382 A | 385 |
| *2.25* | *3.8125* | *0.8268* | | | | | | | | |
| | 96,838 | 21 | 99,9 | 102 | 11,6 | 5 600 | 6 700 | 0,59 | 387/382 A | 385 |
| | *3.8125* | *0.8268* | | | | | | | | |
| | 96,838 | 25,4 | 99,9 | 102 | 11,6 | 5 600 | 6 700 | 0,65 | 387 A/382 S | 385 |
| | *3.8125* | *1* | | | | | | | | |
| | 98,425 | 21 | 99,9 | 102 | 11,6 | 5 600 | 6 700 | 0,64 | 387/382 | 385 |
| | *3.875* | *0.8268* | | | | | | | | |
| | 104,775 | 30,162 | 150 | 160 | 18,6 | 5 300 | 6 300 | 1,05 | ▸ 462/453 X | 455 |
| | *4.125* | *1.1875* | | | | | | | | |
| | 112,712 | 30,162 | 175 | 204 | 23,6 | 4 500 | 5 600 | 1,4 | 39580/39520 | 39500 |
| | *4.4375* | *1.1875* | | | | | | | | |
| | 112,712 | 30,162 | 175 | 204 | 23,6 | 4 500 | 5 600 | 1,4 | ▸ 39581/39520 | 39500 |
| | *4.4375* | *1.1875* | | | | | | | | |
| | 119,985 | 32,751 | 175 | 204 | 23,6 | 4 500 | 5 600 | 1,75 | 39580/39528 | 39500 |
| | *4.7238* | *1.2894* | | | | | | | | |
| | 119,985 | 32,751 | 175 | 204 | 23,6 | 4 500 | 5 600 | 1,75 | 39581/39528 | 39500 |
| | *4.7238* | *1.2894* | | | | | | | | |
| **59,987** | 130,175 | 34,099 | 187 | 180 | 22 | 3 800 | 5 000 | 2,05 | HM 911244/210 | HM 911200 |
| *2.3617* | *5.125* | *1.3425* | | | | | | | | |
| | 135,755 | 53,975 | 353 | 400 | 45,5 | 4 000 | 5 000 | 3,95 | 6391/K-6320 | 6300 |
| | *5.3447* | *2.125* | | | | | | | | |
| **60,325** | 130,175 | 36,512 | 187 | 180 | 22,4 | 3 800 | 5 000 | 2,1 | HM 911245/210 | HM 911200 |
| *2.375* | *5.125* | *1.4375* | | | | | | | | |

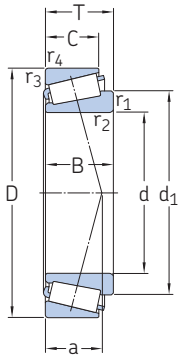
**SKF Explorer bearing**
▸ Popular item




| Dimensions | | | | | | | Abutment and fillet dimensions | | | | | | | | | Calculation factors | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | B | C | $r_{1,2}$ min. | $r_{3,4}$ min. | a | $d_a$ max. | $d_b$ min. | $D_a$ min. | $D_a$ max. | $D_b$ min. | $C_a$ min. | $C_b$ min. | $r_a$ max. | $r_b$ max. | e | Y | $Y_0$ |
| mm/*in.* | | | | | | | mm | | | | | | | | | – | | |
| **53,975** | 72,1 | 19,05 | 13,492 | 2,3 | 2 | 20 | 62 | 65 | 78 | 80 | 84 | 4 | 5,5 | 2,3 | 2 | 0,54 | 1,1 | 0,6 |
| *2.125* | | *0.75* | *0.5312* | *0.09* | *0.08* | | | | | | | | | | | | | |
| | 72,5 | 28,575 | 22,225 | 1,5 | 2,3 | 20 | 61 | 63 | 83 | 85 | 90 | 6 | 5,5 | 1,5 | 2,3 | 0,33 | 1,8 | 1 |
| | | *1.125* | *0.875* | *0.06* | *0.09* | | | | | | | | | | | | | |
| | 72,5 | 28,575 | 22,225 | 1,5 | 0,8 | 20 | 61 | 63 | 83 | 88 | 90 | 6 | 5,5 | 1,5 | 0,8 | 0,33 | 1,8 | 1 |
| | | *1.125* | *0.875* | *0.06* | *0.03* | | | | | | | | | | | | | |
| | 76,5 | 36,957 | 28,575 | 3,5 | 3,3 | 23 | 64 | 67 | 90 | 96 | 97 | 5 | 7,5 | 3,5 | 3,3 | 0,3 | 2 | 1,1 |
| | | *1.455* | *1.125* | *0.14* | *0.13* | | | | | | | | | | | | | |
| | 76,5 | 36,957 | 30,162 | 3,5 | 3,3 | 25 | 64 | 67 | 89 | 99 | 97 | 4 | 7,5 | 3,5 | 3,3 | 0,3 | 2 | 1,1 |
| | | *1.455* | *1.1875* | *0.14* | *0.13* | | | | | | | | | | | | | |
| | 89,2 | 32,791 | 25,4 | 3,5 | 3,3 | 36 | 67 | 68 | 93 | 112 | 114 | 4 | 11 | 3,5 | 3,3 | 0,75 | 0,8 | 0,45 |
| | | *1.291* | *1* | *0.14* | *0.13* | | | | | | | | | | | | | |
| **57,15** | 74,2 | 21,946 | 15,875 | 3,5 | 0,8 | 17 | 65 | 70 | 87 | 90 | 91 | 5 | 5 | 3,5 | 0,8 | 0,35 | 1,7 | 0,9 |
| *2.25* | | *0.864* | *0.625* | *0.14* | *0.03* | | | | | | | | | | | | | |
| | 74,1 | 21,946 | 15,875 | 2,3 | 0,8 | 17 | 65 | 68 | 87 | 90 | 91 | 5 | 5 | 2,3 | 0,8 | 0,35 | 1,7 | 0,9 |
| | | *0.864* | *0.625* | *0.09* | *0.03* | | | | | | | | | | | | | |
| | 74,2 | 21,946 | 20,274 | 3,5 | 2,3 | 21 | 65 | 70 | 85 | 87 | 91 | 3 | 5 | 3,5 | 2,3 | 0,35 | 1,7 | 0,9 |
| | | *0.864* | *0.7982* | *0.14* | *0.09* | | | | | | | | | | | | | |
| | 74,1 | 21,946 | 17,826 | 2,3 | 0,8 | 17 | 65 | 68 | 87 | 91 | 92 | 5 | 3 | 2,3 | 0,8 | 0,35 | 1,7 | 0,9 |
| | | *0.864* | *0.7018* | *0.09* | *0.03* | | | | | | | | | | | | | |
| | 79 | 29,317 | 24,605 | 2,3 | 3,3 | 23 | 68 | 68 | 91 | 93 | 98 | 4 | 5,5 | 2,3 | 3,3 | 0,33 | 1,8 | 1 |
| | | *1.52* | *0.9687* | *0.09* | *0.13* | | | | | | | | | | | | | |
| | 88,3 | 30,162 | 23,812 | 3,5 | 3,3 | 23 | 76 | 71 | 100 | 100 | 107 | 6 | 6 | 3,5 | 3,3 | 0,33 | 1,8 | 1 |
| | | *1.1875* | *0.9375* | *0.14* | *0.13* | | | | | | | | | | | | | |
| | 88,3 | 30,162 | 23,812 | 8 | 3,3 | 23 | 76 | 80 | 100 | 100 | 107 | 6 | 6 | 8 | 3,3 | 0,33 | 1,8 | 1 |
| | | *1.1875* | *0.9375* | *0.32* | *0.13* | | | | | | | | | | | | | |
| | 88,3 | 30,162 | 26,949 | 3,5 | 0,8 | 25 | 76 | 71 | 99 | 113 | 107 | 4 | 5,5 | 3,5 | 0,8 | 0,33 | 1,8 | 1 |
| | | *1.1875* | *1.061* | *0.14* | *0.03* | | | | | | | | | | | | | |
| | 88,3 | 30,162 | 26,949 | 8 | 0,8 | 25 | 76 | 80 | 99 | 113 | 107 | 4 | 5,5 | 8 | 0,8 | 0,33 | 1,8 | 1 |
| | | *1.1875* | *1.061* | *0.32* | *0.03* | | | | | | | | | | | | | |
| **59,987** | 97,1 | 30,924 | 23,812 | 3,5 | 3,3 | 40 | 74 | 74 | 102 | 118 | 124 | 5 | 10 | 3,5 | 3,3 | 0,83 | 0,72 | 0,4 |
| *2.3617* | | *1.2175* | *0.9375* | *0.14* | *0.13* | | | | | | | | | | | | | |
| | 97,5 | 56,007 | 44,45 | 3,5 | 3,3 | 34 | 78 | 74 | 110 | 123 | 125 | 7 | 9,5 | 3,5 | 3,3 | 0,33 | 1,8 | 1 |
| | | *2.205* | *1.75* | *0.14* | *0.13* | | | | | | | | | | | | | |
| **60,325** | 97,2 | 33,39 | 23,812 | 5 | 3,3 | 40 | 74 | 77 | 102 | 118 | 124 | 5 | 12,5 | 5 | 3,3 | 0,83 | 0,72 | 0,4 |
| *2.375* | | *1.3146* | *0.9375* | *0.20* | *0.13* | | | | | | | | | | | | | |

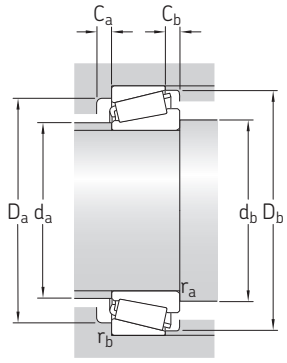
## 8.2 Inch single row tapered roller bearings

d **63,5 – 71,438** mm
*2.5 – 2.8125 in.*




| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation | Series |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | T | C | $C_0$ | $P_u$ | | | | | |
| mm/*in.* | | | kN | | kN | r/min | | kg | – | – |
| **63,5** | 110 | 22 | 108 | 118 | 13,4 | 4 800 | 6 000 | 0,84 | **395/394 A** | 395 |
| *2.5* | *4.3307* | *0.8661* | | | | | | | | |
| | 112,712 | 30,162 | 175 | 204 | 23,6 | 4 500 | 5 600 | 1,25 | **39585/39520** | 39500 |
| | *4.4375* | *1.1875* | | | | | | | | |
| | 112,712 | 30,163 | 152 | 183 | 21,2 | 4 800 | 5 600 | 1,25 | **3982/3920** | 3980 |
| | *4.4375* | *1.1875* | | | | | | | | |
| **65,088** | 135,755 | 53,975 | 353 | 400 | 45,5 | 4 000 | 5 000 | 3,7 | **6379/K-6320** | 6300 |
| *2.5625* | *5.3447* | *2.125* | | | | | | | | |
| **66,675** | 110 | 22 | 108 | 118 | 13,4 | 4 800 | 6 000 | 0,78 | **395 S/394 A** | 395 |
| *2.625* | *4.3307* | *0.8661* | | | | | | | | |
| | 110 | 22 | 108 | 118 | 13,4 | 4 800 | 6 000 | 0,79 | **395 A/394 A** | 395 |
| | *4.3307* | *0.8661* | | | | | | | | |
| | 112,712 | 30,162 | 152 | 183 | 21,2 | 4 800 | 5 600 | 1,15 | **3984/3920** | 3900 |
| | *4.4375* | *1.1875* | | | | | | | | |
| | 112,712 | 30,162 | 175 | 204 | 23,6 | 4 500 | 5 600 | 1,2 | **39590/39520** | 39500 |
| | *4.4375* | *1.1875* | | | | | | | | |
| | 119,985 | 32,751 | 175 | 204 | 23,6 | 4 500 | 5 600 | 1,55 | **39590/39528** | 39500 |
| | *4.7238* | *1.2894* | | | | | | | | |
| | 122,238 | 38,1 | 229 | 245 | 28 | 4 500 | 5 300 | 1,85 | ▸ **HM 212049/011** | HM 212000 |
| | *4.8125* | *1.5* | | | | | | | | |
| | 135,755 | 53,975 | 353 | 400 | 45,5 | 4 000 | 5 000 | 3,65 | **6386/K-6320** | 6300 |
| | *5.3447* | *2.125* | | | | | | | | |
| **69,85** | 112,712 | 25,4 | 121 | 156 | 17,6 | 4 500 | 5 300 | 0,97 | **29675/29620** | 29600 |
| *2.75* | *4.4375* | *1* | | | | | | | | |
| | 120 | 29,795 | 163 | 186 | 21,6 | 4 500 | 5 300 | 1,35 | **482/472** | 475 |
| | *4.7244* | *1.173* | | | | | | | | |
| | 120 | 32,545 | 188 | 228 | 26,5 | 4 300 | 5 300 | 1,5 | ▸ **47487/47420** | 47400 |
| | *4.7244* | *1.2813* | | | | | | | | |
| | 120 | 32,545 | 188 | 228 | 26,5 | 4 300 | 5 300 | 1,5 | ▸ **47487/47420 A** | 47400 |
| | *4.7244* | *1.2813* | | | | | | | | |
| | 127 | 36,512 | 217 | 255 | 29 | 4 300 | 5 000 | 1,95 | **566/563** | 565 |
| | *5* | *1.4375* | | | | | | | | |
| | 152,4 | 41,275 | 270 | 320 | 35,5 | 3 600 | 4 300 | 3,65 | **655/652** | 655 |
| | *6* | *1.625* | | | | | | | | |
| **71,438** | 117,475 | 30,162 | 152 | 190 | 21,6 | 4 500 | 5 300 | 1,25 | **33281/33462** | 33000 |
| *2.8125* | *4.625* | *1.1875* | | | | | | | | |
| | 136,525 | 46,038 | 273 | 355 | 39 | 3 800 | 4 500 | 3,1 | **H 715345/311** | H 715300 |
| | *5.375* | *1.8125* | | | | | | | | |

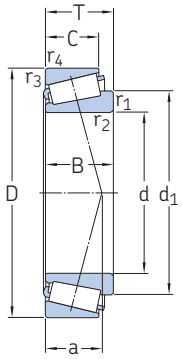
**SKF Explorer bearing**
▸ Popular item




| Dimensions | | | | | | | Abutment and fillet dimensions | | | | | | | | | Calculation factors | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | B | C | $r_{1,2}$ min. | $r_{3,4}$ min. | a | $d_a$ max. | $d_b$ min. | $D_a$ min. | $D_a$ max. | $D_b$ min. | $C_a$ min. | $C_b$ min. | $r_a$ max. | $r_b$ max. | e | Y | $Y_0$ |
| mm/*in.* | | | | | | | mm | | | | | | | | | – | | |
| **63,5** | 86,5 | 21,996 | 18,824 | 3,5 | 1,3 | 20 | 77 | 77 | 98 | 102 | 105 | 4 | 3 | 3,5 | 1,3 | 0,4 | 1,5 | 0,8 |
| *2.5* | | *0.866* | *0.7411* | *0.14* | *0.05* | | | | | | | | | | | | | |
| | 88,4 | 30,162 | 23,812 | 3,5 | 3,3 | 23 | 76 | 77 | 100 | 100 | 107 | 6 | 6 | 3,5 | 3,3 | 0,33 | 1,8 | 1 |
| | | *1.1875* | *0.9375* | *0.14* | *0.13* | | | | | | | | | | | | | |
| | 87,9 | 30,048 | 23,812 | 3,5 | 3,3 | 25 | 75 | 77 | 96 | 101 | 105 | 4 | 6 | 3,5 | 3,3 | 0,4 | 1,5 | 0,8 |
| | | *1.183* | *0.9375* | *0.14* | *0.13* | | | | | | | | | | | | | |
| **65,088** | 97,5 | 56,007 | 44,45 | 3,5 | 3,3 | 34 | 78 | 79 | 110 | 123 | 125 | 7 | 9,5 | 3,5 | 3,3 | 0,33 | 1,8 | 1 |
| *2.5625* | | *2.205* | *1.75* | *0.14* | *0.13* | | | | | | | | | | | | | |
| **66,675** | 86,5 | 21,996 | 18,824 | 3,5 | 1,3 | 20 | 77 | 80 | 98 | 102 | 105 | 4 | 3 | 3,5 | 1,3 | 0,4 | 1,5 | 0,8 |
| *2.625* | | *0.866* | *0.7411* | *0.14* | *0.05* | | | | | | | | | | | | | |
| | 86,5 | 21,996 | 18,824 | 0,8 | 1,3 | 20 | 77 | 75 | 98 | 102 | 105 | 4 | 3 | 0,8 | 1,3 | 0,4 | 1,5 | 0,8 |
| | | *0.866* | *0.7411* | *0.03* | *0.05* | | | | | | | | | | | | | |
| | 87,9 | 30,048 | 23,812 | 3,5 | 3,3 | 25 | 75 | 80 | 96 | 101 | 105 | 4 | 6 | 3,5 | 3,3 | 0,4 | 1,5 | 0,8 |
| | | *1.183* | *0.9375* | *0.14* | *0.13* | | | | | | | | | | | | | |
| | 88,3 | 30,162 | 23,812 | 3,5 | 3,3 | 23 | 76 | 80 | 100 | 100 | 107 | 6 | 6 | 3,5 | 3,3 | 0,33 | 1,8 | 1 |
| | | *1.1875* | *0.9375* | *0.14* | *0.13* | | | | | | | | | | | | | |
| | 88,3 | 30,162 | 26,949 | 3,5 | 0,8 | 25 | 76 | 80 | 99 | 113 | 107 | 4 | 5,5 | 3,5 | 0,8 | 0,33 | 1,8 | 1 |
| | | *1.1875* | *1.061* | *0.14* | *0.32* | | | | | | | | | | | | | |
| | 90,9 | 38,354 | 29,718 | 3,5 | 3,3 | 26 | 76 | 80 | 106 | 110 | 115 | 7 | 8 | 3,5 | 3,3 | 0,33 | 1,8 | 1 |
| | | *1.5* | *1.17* | *0.14* | *0.13* | | | | | | | | | | | | | |
| | 97,5 | 56,007 | 44,45 | 4,3 | 3,3 | 34 | 78 | 82 | 110 | 123 | 125 | 7 | 9,5 | 4,3 | 3,3 | 0,33 | 1,8 | 1 |
| | | *2.205* | *1.75* | *0.17* | *0.13* | | | | | | | | | | | | | |
| **69,85** | 94,4 | 25,4 | 19,05 | 1,5 | 3,3 | 26 | 82 | 80 | 100 | 100 | 108 | 4 | 6 | 1,5 | 3,3 | 0,48 | 1,25 | 0,7 |
| *2.75* | | *1* | *0.75* | *0.06* | *0.13* | | | | | | | | | | | | | |
| | 92,5 | 29,007 | 24,237 | 3,5 | 2 | 25 | 80 | 84 | 103 | 110 | 112 | 4 | 5,5 | 3,5 | 2 | 0,37 | 1,6 | 0,9 |
| | | *1.142* | *0.9542* | *0.14* | *0.08* | | | | | | | | | | | | | |
| | 94,3 | 32,545 | 26,195 | 3,5 | 3,3 | 25 | 81 | 84 | 105 | 108 | 113 | 6 | 6 | 3,5 | 3,3 | 0,35 | 1,7 | 0,9 |
| | | *1.2813* | *1.0313* | *0.14* | *0.13* | | | | | | | | | | | | | |
| | 94,3 | 32,545 | 26,195 | 3,5 | 0,5 | 25 | 81 | 84 | 105 | 113 | 113 | 6 | 6 | 3,5 | 0,5 | 0,35 | 1,7 | 0,9 |
| | | *1.2813* | *1.0313* | *0.14* | *0.02* | | | | | | | | | | | | | |
| | 97,6 | 36,17 | 28,575 | 3,5 | 3,3 | 28 | 83 | 84 | 109 | 115 | 119 | 5 | 7,5 | 3,5 | 3,3 | 0,37 | 1,6 | 0,9 |
| | | *1.424* | *1.125* | *0.14* | *0.13* | | | | | | | | | | | | | |
| | 113 | 41,275 | 31,75 | 3,5 | 3,3 | 32 | 96 | 84 | 125 | 140 | 138 | 6 | 9,5 | 3,5 | 3,3 | 0,4 | 1,5 | 0,8 |
| | | *1.625* | *1.25* | *0.14* | *0.13* | | | | | | | | | | | | | |
| **71,438** | 94,1 | 30,162 | 23,812 | 3,5 | 3,3 | 26 | 81 | 85 | 101 | 105 | 111 | 5 | 6 | 3,5 | 3,3 | 0,44 | 1,35 | 0,8 |
| *2.8125* | | *1.1875* | *0.9375* | *0.14* | *0.13* | | | | | | | | | | | | | |
| | 110 | 46,038 | 36,513 | 3,5 | 3,3 | 36 | 88 | 86 | 113 | 124 | 132 | 7 | 9,5 | 3,5 | 3,3 | 0,48 | 1,25 | 0,7 |
| | | *1.8125* | *1.4375* | *0.14* | *0.13* | | | | | | | | | | | | | |

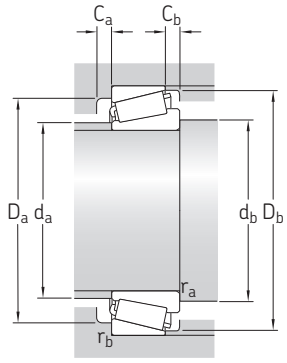
## 8.2 Inch single row tapered roller bearings

d **73,025 – 88,9** mm
*2.875 – 3.5 in.*




| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation | Series |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | T | C | $C_0$ | $P_u$ | | | | | |
| mm/*in.* | | | kN | | kN | r/min | | kg | – | – |
| **73,025** | 112,712 | 25,4 | 121 | 156 | 17,6 | 4 500 | 5 300 | 0,89 | **29685/29620** | 29600 |
| *2.875* | *4.4375* | *1* | | | | | | | | |
| | 117,475 | 30,162 | 152 | 190 | 21,6 | 4 500 | 5 300 | 1,2 | **33287/33462** | 33000 |
| | *4.625* | *1.1875* | | | | | | | | |
| | 127 | 36,512 | 217 | 255 | 29 | 4 300 | 5 000 | 1,85 | **567/563** | 565 |
| | *5* | *1.4375* | | | | | | | | |
| **76** | 132 | 39 | 255 | 305 | 34,5 | 4 000 | 4 800 | 2,15 | **HM 215249/210** | HM 215200 |
| *2.9921* | *5.1969* | *1.5354* | | | | | | | | |
| **76,2** | 109,538 | 19,05 | 72,1 | 102 | 11 | 4 500 | 5 600 | 0,57 | ▸ **L 814749/710** | L 814700 |
| *3* | *4.3125* | *0.75* | | | | | | | | |
| | 127 | 30,162 | 171 | 204 | 24 | 4 000 | 5 000 | 1,45 | ▸ **42687/42620** | 42600 |
| | *5* | *1.1875* | | | | | | | | |
| | 133,35 | 33,338 | 202 | 260 | 30 | 3 800 | 4 800 | 1,95 | **47678/47620** | 47600 |
| | *5.25* | *1.3125* | | | | | | | | |
| | 139,992 | 36,512 | 227 | 280 | 31 | 3 800 | 4 500 | 2,45 | **575/572** | 575 |
| | *5.5115* | *1.4375* | | | | | | | | |
| | 161,925 | 49,212 | 318 | 335 | 38 | 3 000 | 4 000 | 4,4 | **9285/9220** | 9200 |
| | *6.375* | *1.9375* | | | | | | | | |
| **77,788** | 121,442 | 24,608 | 115 | 134 | 15,3 | 4 300 | 5 300 | 0,92 | **34306/34478** | 34000 |
| *3.0625* | *4.7812* | *0.9688* | | | | | | | | |
| | 127 | 30,163 | 171 | 204 | 24 | 4 000 | 5 000 | 1,4 | ▸ **42690/42620** | 42600 |
| | *5* | *1.1875* | | | | | | | | |
| **82,55** | 139,992 | 36,512 | 227 | 280 | 31 | 3 800 | 4 500 | 2,2 | **580/572** | 575 |
| *3.25* | *5.5115* | *1.4375* | | | | | | | | |
| | 146,05 | 41,275 | 270 | 320 | 35,5 | 3 600 | 4 300 | 2,8 | **663/653** | 655 |
| | *5.75* | *1.625* | | | | | | | | |
| | 150,089 | 44,45 | 351 | 405 | 46,5 | 3 600 | 4 300 | 3,4 | **749 A/742** | 745 |
| | *5.909* | *1.75* | | | | | | | | |
| **85,725** | 133,35 | 30,163 | 178 | 220 | 25,5 | 3 800 | 4 500 | 1,45 | **497/492 A** | 495 |
| *3.375* | *5.25* | *1.1875* | | | | | | | | |
| | 146,05 | 41,275 | 270 | 320 | 35,5 | 3 600 | 4 300 | 2,65 | **665/653** | 655 |
| | *5.75* | *1.625* | | | | | | | | |
| **88,9** | 152,4 | 39,688 | 237 | 305 | 33,5 | 3 400 | 4 300 | 2,8 | **593/592 A** | 593 |
| *3.5* | *6* | *1.5625* | | | | | | | | |
| | 152,4 | 39,688 | 300 | 355 | 39 | 3 400 | 4 000 | 2,85 | **HM 518445/410** | HM 518400 |
| | *6* | *1.5625* | | | | | | | | |
| | 161,925 | 53,975 | 404 | 510 | 56 | 3 200 | 4 000 | 4,8 | **6580/6535** | 6500 |
| | *6.375* | *2.125* | | | | | | | | |

**SKF Explorer bearing**
▸ Popular item

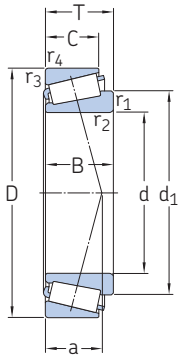



| Dimensions | | | | | | | Abutment and fillet dimensions | | | | | | | | | Calculation factors | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | B | C | $r_{1,2}$ min. | $r_{3,4}$ min. | a | $d_a$ max. | $d_b$ min. | $D_a$ min. | $D_a$ max. | $D_b$ min. | $C_a$ min. | $C_b$ min. | $r_a$ max. | $r_b$ max. | e | Y | $Y_0$ |
| mm/*in.* | | | | | | | mm | | | | | | | | | – | | |
| **73,025** | 94,4 | 25,4 | 19,05 | 3,5 | 3,3 | 26 | 82 | 87 | 100 | 100 | 108 | 4 | 6 | 3,5 | 3,3 | 0,48 | 1,25 | 0,7 |
| *2.875* | | *1* | *0.75* | *0.14* | *0.13* | | | | | | | | | | | | | |
| | 94,1 | 30,162 | 23,812 | 3,5 | 3,3 | 26 | 81 | 87 | 101 | 105 | 111 | 5 | 6 | 3,5 | 3,3 | 0,44 | 1,35 | 0,8 |
| | | *1.1875* | *0.9375* | *0.14* | *0.13* | | | | | | | | | | | | | |
| | 97,6 | 36,17 | 28,575 | 3,5 | 3,3 | 28 | 83 | 87 | 109 | 115 | 119 | 5 | 7,5 | 3,5 | 3,3 | 0,37 | 1,6 | 0,9 |
| | | *1.424* | *1.125* | *0.14* | *0.13* | | | | | | | | | | | | | |
| **76** | 102 | 39 | 32 | 7 | 3,5 | 27 | 88 | 97 | 116 | 119 | 126 | 7 | 7 | 7 | 3,5 | 0,33 | 1,8 | 1 |
| *2.9921* | | *1.5354* | *1.2598* | *0.28* | *0.14* | | | | | | | | | | | | | |
| **76,2** | 94,5 | 19,05 | 15,083 | 1,5 | 1,5 | 23 | 85 | 86 | 98 | 101 | 105 | 3 | 3,5 | 1,5 | 1,5 | 0,5 | 1,2 | 0,7 |
| *3* | | *0.75* | *0.5938* | *0.06* | *0.06* | | | | | | | | | | | | | |
| | 101 | 31 | 22,225 | 3,5 | 3,3 | 26 | 88 | 90 | 112 | 114 | 120 | 5 | 7,5 | 3,5 | 3,3 | 0,43 | 1,4 | 0,8 |
| | | *1.2205* | *0.875* | *0.14* | *0.13* | | | | | | | | | | | | | |
| | 107 | 33,338 | 26,195 | 6,4 | 3,3 | 29 | 93 | 96 | 117 | 121 | 126 | 5 | 7 | 6,4 | 3,3 | 0,4 | 1,5 | 0,8 |
| | | *1.3125* | *1.0313* | *0.25* | *0.13* | | | | | | | | | | | | | |
| | 109 | 36,098 | 28,575 | 3,5 | 3,3 | 30 | 94 | 90 | 120 | 127 | 131 | 5 | 7,5 | 3,5 | 3,3 | 0,4 | 1,5 | 0,8 |
| | | *1.4212* | *1.125* | *0.14* | *0.13* | | | | | | | | | | | | | |
| | 121 | 46,038 | 31,75 | 3,5 | 3,3 | 47 | 93 | 91 | 128 | 149 | 153 | 7 | 17 | 3,5 | 3,3 | 0,72 | 0,84 | 0,45 |
| | | *1.8125* | *1.25* | *0.14* | *0.13* | | | | | | | | | | | | | |
| **77,788** | 97,8 | 23,012 | 17,462 | 3,5 | 2 | 25 | 88 | 92 | 108 | 112 | 114 | 3 | 7 | 3,5 | 2 | 0,46 | 1,3 | 0,7 |
| *3.0625* | | *0.906* | *0.6875* | *0.14* | *0.08* | | | | | | | | | | | | | |
| | 101 | 31 | 22,225 | 3,5 | 3,3 | 26 | 88 | 92 | 112 | 114 | 120 | 5 | 7,5 | 3,5 | 3,3 | 0,43 | 1,4 | 0,8 |
| | | *1.2205* | *0.875* | *0.14* | *0.13* | | | | | | | | | | | | | |
| **82,55** | 109 | 36,098 | 28,575 | 3,5 | 3,3 | 30 | 94 | 97 | 120 | 127 | 131 | 5 | 7,5 | 3,5 | 3,3 | 0,4 | 1,5 | 0,8 |
| *3.25* | | *1.4212* | *1.125* | *0.14* | *0.13* | | | | | | | | | | | | | |
| | 113 | 41,275 | 31,75 | 3,5 | 3,3 | 32 | 96 | 97 | 125 | 133 | 138 | 6 | 9,5 | 3,5 | 3,3 | 0,4 | 1,5 | 0,8 |
| | | *1.625* | *1.25* | *0.14* | *0.13* | | | | | | | | | | | | | |
| | 113 | 46,672 | 36,512 | 3,5 | 3,3 | 31 | 95 | 97 | 130 | 137 | 142 | 8 | 7,5 | 3,5 | 3,3 | 0,33 | 1,8 | 1 |
| | | *1.8375* | *1.4375* | *0.14* | *0.13* | | | | | | | | | | | | | |
| **85,725** | 108 | 29,769 | 22,225 | 3,5 | 3,3 | 29 | 95 | 100 | 119 | 121 | 128 | 5 | 7,5 | 3,5 | 3,3 | 0,44 | 1,35 | 0,8 |
| *3.375* | | *1.172* | *0.875* | *0.14* | *0.13* | | | | | | | | | | | | | |
| | 113 | 41,275 | 31,75 | 3,5 | 3,3 | 32 | 96 | 100 | 125 | 133 | 138 | 6 | 9,5 | 3,5 | 3,3 | 0,4 | 1,5 | 0,8 |
| | | *1.625* | *1.25* | *0.14* | *0.13* | | | | | | | | | | | | | |
| **88,9** | 121 | 36,322 | 30,162 | 3,5 | 3,3 | 36 | 104 | 103 | 128 | 139 | 141 | 4 | 9,5 | 3,5 | 3,3 | 0,44 | 1,35 | 0,8 |
| *3.5* | | *1.43* | *1.1875* | *0.14* | *0.13* | | | | | | | | | | | | | |
| | 119 | 39,688 | 30,162 | 6,4 | 3,3 | 32 | 102 | 109 | 135 | 139 | 146 | 7 | 9,5 | 6,4 | 3,3 | 0,4 | 1,5 | 0,8 |
| | | *1.5625* | *1.1875* | *0.25* | *0.13* | | | | | | | | | | | | | |
| | 125 | 55,1 | 42,862 | 3,5 | 3,3 | 39 | 102 | 103 | 134 | 149 | 153 | 8 | 11 | 3,5 | 3,3 | 0,4 | 1,5 | 0,8 |
| | | *2.1693* | *1.6875* | *0.14* | *0.13* | | | | | | | | | | | | | |

## 8.2 Inch single row tapered roller bearings

d **90 – 110** mm

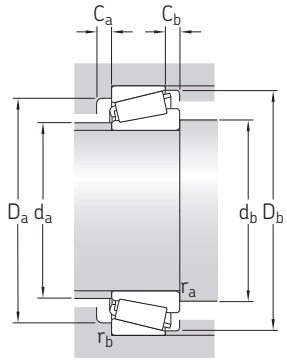
*3.5433 – 4.3307 in.*




| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation | Series |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | T | C | $C_0$ | $P_u$ | | | | | |
| mm/*in.* | | | kN | | kN | r/min | | kg | – | – |
| **90** | 147 | 40 | 280 | 355 | 39 | 3 400 | 4 300 | 2,55 | **HM 218248/210** | HM 218200 |
| *3.5433* | *5.7874* | *1.5748* | | | | | | | | |
| | 161,925 | 53,975 | 404 | 510 | 56 | 3 200 | 4 000 | 4,75 | **6581 X/6535** | 6500 |
| | *6.375* | *2.125* | | | | | | | | |
| **92,075** | 146,05 | 33,338 | 209 | 280 | 31,5 | 3 400 | 4 300 | 2,1 | **47890/47820** | 47800 |
| *3.625* | *5.75* | *1.3125* | | | | | | | | |
| | 152,4 | 39,688 | 237 | 305 | 33,5 | 3 400 | 4 300 | 2,7 | **598/592 A** | 595 |
| | *6* | *1.5625* | | | | | | | | |
| **95,25** | 146,05 | 33,338 | 209 | 280 | 31,5 | 3 400 | 4 300 | 1,95 | **47896/47820** | 47800 |
| *3.75* | *5.75* | *1.3125* | | | | | | | | |
| | 152,4 | 39,688 | 237 | 305 | 33,5 | 3 400 | 4 300 | 2,55 | **594 A/592 A** | 595 |
| | *6* | *1.5625* | | | | | | | | |
| | 152,4 | 39,688 | 237 | 305 | 33,5 | 3 400 | 4 300 | 2,55 | **594/592 A** | 595 |
| | *6* | *1.5625* | | | | | | | | |
| | 168,275 | 41,275 | 288 | 365 | 39 | 3 000 | 3 800 | 3,75 | **683/672** | 675 |
| | *6.625* | *1.625* | | | | | | | | |
| **96,838** | 188,912 | 50,8 | 348 | 375 | 41,5 | 2 600 | 3 400 | 5,75 | **90381/90744** | 90300 |
| *3.8125* | *7.4375* | *2* | | | | | | | | |
| **99,975** | 212,725 | 66,675 | 619 | 830 | 88 | 2 200 | 3 000 | 11,5 | **HH 224334/310** | HH 224300 |
| *3.936* | *8.375* | *2.625* | | | | | | | | |
| **100** | 157 | 42 | 303 | 400 | 42,5 | 3 200 | 4 000 | 2,9 | **HM 220149 A/110** | HM 220100 |
| *3.937* | *6.1811* | *1.6535* | | | | | | | | |
| | 157 | 42 | 303 | 400 | 42,5 | 3 200 | 4 000 | 2,9 | ▸ **HM 220149/110** | HM 220100 |
| | *6.1811* | *1.6535* | | | | | | | | |
| **101,6** | 168,275 | 41,275 | 288 | 365 | 39 | 3 000 | 3 800 | 3,45 | **687/672** | 675 |
| *4* | *6.625* | *1.625* | | | | | | | | |
| | 190,5 | 57,15 | 537 | 630 | 68 | 2 800 | 3 400 | 7 | **HH 221449/410** | HH 221400 |
| | *7.5* | *2.25* | | | | | | | | |
| | 212,725 | 66,675 | 619 | 830 | 88 | 2 200 | 3 000 | 11 | **HH 224335/310** | HH 224300 |
| | *8.375* | *2.625* | | | | | | | | |
| **107,95** | 158,75 | 23,02 | 124 | 163 | 18,3 | 3 200 | 3 800 | 1,4 | **37425/37625** | 37000 |
| *4.25* | *6.25* | *0.9063* | | | | | | | | |
| | 165,1 | 36,512 | 256 | 355 | 37,5 | 3 000 | 3 600 | 2,7 | **56425/56650** | 56000 |
| | *6.5* | *1.4375* | | | | | | | | |
| **110** | 180 | 41,275 | 307 | 415 | 42,5 | 2 800 | 3 400 | 3,95 | **64432/64708** | 64000 |
| *4.3307* | *7.0866* | *1.625* | | | | | | | | |

**SKF Explorer bearing**

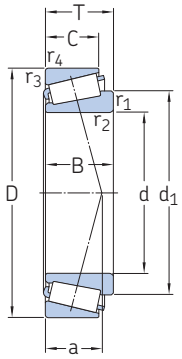
▸ Popular item




| Dimensions | | | | | | | Abutment and fillet dimensions | | | | | | | | | Calculation factors | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | B | C | $r_{1,2}$ min. | $r_{3,4}$ min. | a | $d_a$ max. | $d_b$ min. | $D_a$ min. | $D_a$ max. | $D_b$ min. | $C_a$ min. | $C_b$ min. | $r_a$ max. | $r_b$ max. | e | Y | $Y_0$ |
| mm/*in.* | | | | | | | mm | | | | | | | | | – | | |
| **90** | 116 | 40 | 32,5 | 7 | 3,5 | 29 | 101 | 111 | 130 | 134 | 140 | 7 | 7,5 | 7 | 3,5 | 0,33 | 1,8 | 1 |
| *3.5433* | | *1.5748* | *1.2795* | *0.28* | *0.14* | | | | | | | | | | | | | |
| | 125 | 55,1 | 42,862 | 3 | 3,3 | 39 | 102 | 104 | 134 | 149 | 153 | 8 | 11 | 3 | 3,3 | 0,4 | 1,5 | 0,8 |
| | | *2.1693* | *1.6875* | *0.12* | *0.13* | | | | | | | | | | | | | |
| **92,075** | 120 | 34,925 | 26,195 | 3,5 | 3,3 | 32 | 105 | 106 | 128 | 133 | 139 | 6 | 7 | 3,5 | 3,3 | 0,44 | 1,35 | 0,8 |
| *3.625* | | *1.375* | *1.0313* | *0.14* | *0.13* | | | | | | | | | | | | | |
| | 121 | 36,322 | 30,162 | 3,5 | 3,3 | 36 | 104 | 107 | 128 | 139 | 141 | 4 | 9,5 | 3,5 | 3,3 | 0,44 | 1,35 | 0,8 |
| | | *1.43* | *1.1875* | *0.14* | *0.13* | | | | | | | | | | | | | |
| **95,25** | 120 | 34,925 | 26,195 | 3,5 | 3,3 | 32 | 105 | 110 | 128 | 133 | 139 | 6 | 7 | 3,5 | 3,3 | 0,44 | 1,35 | 0,8 |
| *3.75* | | *1.375* | *1.0313* | *0.14* | *0.13* | | | | | | | | | | | | | |
| | 121 | 36,322 | 30,162 | 5 | 3,3 | 36 | 104 | 113 | 128 | 139 | 141 | 4 | 9,5 | 5 | 3,3 | 0,44 | 1,35 | 0,8 |
| | | *1.43* | *1.1875* | *0.20* | *0.13* | | | | | | | | | | | | | |
| | 121 | 36,322 | 30,162 | 3,5 | 3,3 | 36 | 104 | 110 | 128 | 139 | 141 | 4 | 9,5 | 3,5 | 3,3 | 0,44 | 1,35 | 0,8 |
| | | *1.43* | *1.1875* | *0.14* | *0.13* | | | | | | | | | | | | | |
| | 133 | 41,275 | 30,162 | 3,5 | 3,3 | 38 | 114 | 110 | 143 | 155 | 157 | 6 | 11 | 3,5 | 3,3 | 0,48 | 1,25 | 0,7 |
| | | *1.625* | *1.1875* | *0.14* | *0.13* | | | | | | | | | | | | | |
| **96,838** | 145 | 46,038 | 31,75 | 3,5 | 3,3 | 61 | 114 | 112 | 148 | 176 | 179 | 6 | 19 | 3,5 | 3,3 | 0,88 | 0,68 | 0,4 |
| *3.8125* | | *1.8125* | *1.25* | *0.14* | *0.13* | | | | | | | | | | | | | |
| **99,975** | 158 | 66,675 | 53,975 | 3,5 | 3,3 | 46 | 132 | 115 | 184 | 199 | 202 | 10 | 12,5 | 3,5 | 3,3 | 0,33 | 1,8 | 1 |
| *3.936* | | *2.625* | *2.125* | *0.14* | *0.13* | | | | | | | | | | | | | |
| **100** | 127 | 42 | 34 | 5 | 3,5 | 31 | 111 | 118 | 140 | 143 | 151 | 7 | 8 | 5 | 3,5 | 0,33 | 1,8 | 1 |
| *3.937* | | *1.6535* | *1.3386* | *0.20* | *0.14* | | | | | | | | | | | | | |
| | 127 | 42 | 34 | 8 | 3,5 | 31 | 111 | 124 | 140 | 143 | 151 | 7 | 8 | 8 | 3,5 | 0,33 | 1,8 | 1 |
| | | *1.6535* | *1.3386* | *0.32* | *0.14* | | | | | | | | | | | | | |
| **101,6** | 133 | 41,275 | 30,162 | 3,5 | 3,3 | 38 | 114 | 116 | 143 | 155 | 157 | 6 | 11 | 3,5 | 3,3 | 0,48 | 1,25 | 0,7 |
| *4* | | *1.625* | *1.1875* | *0.14* | *0.13* | | | | | | | | | | | | | |
| | 142 | 57,531 | 46,038 | 8 | 3,3 | 40 | 119 | 126 | 163 | 177 | 179 | 9 | 11 | 8 | 3,3 | 0,33 | 1,8 | 1 |
| | | *2.265* | *1.8125* | *0.32* | *0.13* | | | | | | | | | | | | | |
| | 158 | 66,675 | 53,975 | 7 | 3,3 | 46 | 132 | 124 | 184 | 199 | 202 | 10 | 12,5 | 7 | 3,3 | 0,33 | 1,8 | 1 |
| | | *2.625* | *2.125* | *0.28* | *0.13* | | | | | | | | | | | | | |
| **107,95** | 132 | 21,438 | 15,875 | 3,5 | 3,3 | 36 | 120 | 123 | 140 | 145 | 149 | 4 | 7 | 3,5 | 3,3 | 0,6 | 1 | 0,6 |
| *4.25* | | *0.844* | *0.625* | *0.14* | *0.13* | | | | | | | | | | | | | |
| | 137 | 36,512 | 26,988 | 3,5 | 3,3 | 37 | 119 | 123 | 145 | 152 | 158 | 6 | 9,5 | 3,5 | 3,3 | 0,5 | 1,2 | 0,7 |
| | | *1.4375* | *1.0625* | *0.14* | *0.13* | | | | | | | | | | | | | |
| **110** | 146 | 41,275 | 30,162 | 3,5 | 3,3 | 41 | 126 | 125 | 155 | 167 | 171 | 6 | 11 | 3,5 | 3,3 | 0,52 | 1,15 | 0,6 |
| *4.3307* | | *1.625* | *1.1875* | *0.14* | *0.13* | | | | | | | | | | | | | |

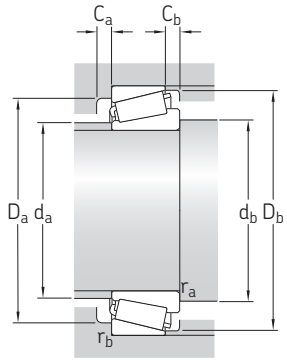
## 8.2 Inch single row tapered roller bearings

d **114,3 – 152,4** mm
*4.5 – 6 in.*




| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation | Series |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | T | C | $C_0$ | $P_u$ | | | | | |
| mm/*in.* | | | kN | | kN | r/min | | kg | – | – |
| **114,3**<br>*4.5* | 177,8<br>*7* | 41,275<br>*1.625* | 307 | 415 | 42,5 | 2 800 | 3 400 | 3,6 | **64450/64700** | 64000 |
| | 180,975<br>*7.125* | 34,925<br>*1.375* | 227 | 280 | 30 | 2 800 | 3 400 | 2,95 | **68450/68712** | 68000 |
| | 212,725<br>*8.375* | 66,675<br>*2.625* | 619 | 830 | 88 | 2 200 | 3 000 | 10 | **HH 224346/310** | HH 224300 |
| | 212,725<br>*8.375* | 66,675<br>*2.625* | 626 | 765 | 81,5 | 2 600 | 3 200 | 10 | **938/932** | 935 |
| **114,975**<br>*4.5266* | 212,725<br>*8.375* | 66,675<br>*2.625* | 619 | 830 | 88 | 2 200 | 3 000 | 10 | **HH 224349/310** | HH 224300 |
| **120,65**<br>*4.75* | 190,5<br>*7.5* | 46,038<br>*1.8125* | 388 | 540 | 56 | 2 600 | 3 200 | 4,85 | **HM 624749/710** | HM 624700 |
| **127**<br>*5* | 182,562<br>*7.1875* | 39,688<br>*1.5625* | 281 | 440 | 44 | 2 600 | 3 200 | 3,3 | **48290/48220** | 48200 |
| | 196,85<br>*7.75* | 46,038<br>*1.8125* | 395 | 585 | 60 | 2 400 | 3 000 | 5,2 | **67388/67322** | 67300 |
| | 206,375<br>*8.125* | 47,625<br>*1.875* | 424 | 585 | 61 | 2 400 | 3 000 | 6,1 | **798/792** | 795 |
| **133,35**<br>*5.25* | 177,008<br>*6.9688* | 25,4<br>*1* | 166 | 280 | 28 | 2 600 | 3 200 | 1,7 | ▸ **L 327249/210** | L 327200 |
| | 196,85<br>*7.75* | 46,038<br>*1.8125* | 395 | 585 | 60 | 2 400 | 3 000 | 4,65 | **67391/67322** | 67300 |
| | 234,95<br>*9.25* | 63,5<br>*2.5* | 683 | 900 | 91,5 | 2 200 | 2 800 | 11 | **95525/95925** | 95000 |
| **139,7**<br>*5.5* | 228,6<br>*9* | 57,15<br>*2.25* | 578 | 800 | 80 | 2 200 | 2 800 | 8,95 | **898/892** | 895 |
| | 236,538<br>*9.3125* | 57,15<br>*2.25* | 629 | 850 | 86,5 | 2 200 | 2 600 | 10 | **HM 231132/110** | HM 231100 |
| **149,225**<br>*5.875* | 236,538<br>*9.3125* | 57,15<br>*2.25* | 629 | 850 | 86,5 | 2 200 | 2 600 | 9,05 | **HM 231148/110** | HM 231100 |
| **152,4**<br>*6* | 203,2<br>*8* | 41,275<br>*1.625* | 251 | 480 | 45,5 | 2 400 | 2 800 | 3,7 | **LM 330448/410** | LM 330400 |
| | 222,25<br>*8.75* | 46,83<br>*1.8437* | 400 | 630 | 62 | 2 200 | 2 600 | 5,85 | **M 231649/610** | M 231600 |

**SKF Explorer bearing**
▸ Popular item

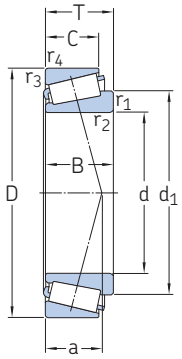



| Dimensions | | | | | | | Abutment and fillet dimensions | | | | | | | | | Calculation factors | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | B | C | $r_{1,2}$ min. | $r_{3,4}$ min. | a | $d_a$ max. | $d_b$ min. | $D_a$ min. | $D_a$ max. | $D_b$ min. | $C_a$ min. | $C_b$ min. | $r_a$ max. | $r_b$ max. | e | Y | $Y_0$ |
| mm/*in.* | | | | | | | mm | | | | | | | | | – | | |
| **114,3** | 146 | 41,275 | 30,162 | 3,5 | 3,3 | 41 | 126 | 129 | 155 | 164 | 171 | 6 | 11 | 3,5 | 3,3 | 0,52 | 1,15 | 0,6 |
| *4.5* | | *1.625* | *1.1875* | *0.14* | *0.13* | | | | | | | | | | | | | |
| | 144 | 31,75 | 25,4 | 3,5 | 3,3 | 39 | 129 | 129 | 158 | 167 | 170 | 4 | 9,5 | 3,5 | 3,3 | 0,5 | 1,2 | 0,7 |
| | | *1.25* | *1* | *0.14* | *0.13* | | | | | | | | | | | | | |
| | 158 | 66,675 | 53,975 | 7 | 3,3 | 46 | 131 | 137 | 184 | 199 | 202 | 10 | 12,5 | 7 | 3,3 | 0,33 | 1,8 | 1 |
| | | *2.625* | *2.125* | *0.28* | *0.13* | | | | | | | | | | | | | |
| | 154 | 66,675 | 53,975 | 7 | 3,3 | 46 | 130 | 137 | 175 | 199 | 193 | 8 | 12,5 | 7 | 3,3 | 0,33 | 1,8 | 1 |
| | | *2.625* | *2.125* | *0.28* | *0.13* | | | | | | | | | | | | | |
| **114,975** | 158 | 66,675 | 53,975 | 7 | 3,3 | 46 | 132 | 137 | 184 | 199 | 202 | 10 | 12,5 | 7 | 3,3 | 0,33 | 1,8 | 1 |
| *4.5266* | | *2.625* | *2.125* | *0.28* | *0.13* | | | | | | | | | | | | | |
| **120,65** | 156 | 46,038 | 34,925 | 3,5 | 1,5 | 41 | 135 | 136 | 167 | 180 | 182 | 8 | 11 | 3,5 | 1,5 | 0,43 | 1,4 | 0,8 |
| *4.75* | | *1.8125* | *1.375* | *0.14* | *0.06* | | | | | | | | | | | | | |
| **127** | 154 | 38,1 | 33,338 | 3,5 | 3,3 | 34 | 140 | 142 | 165 | 169 | 174 | 6 | 6 | 3,5 | 3,3 | 0,3 | 2 | 1,1 |
| *5* | | *1.5* | *1.3125* | *0.14* | *0.13* | | | | | | | | | | | | | |
| | 164 | 46,038 | 38,1 | 3,5 | 3,3 | 39 | 146 | 142 | 177 | 183 | 189 | 7 | 7,5 | 3,5 | 3,3 | 0,35 | 1,7 | 0,9 |
| | | *1.8125* | *1.5* | *0.14* | *0.13* | | | | | | | | | | | | | |
| | 167 | 50,013 | 34,925 | 3,3 | 3,3 | 45 | 144 | 142 | 178 | 192 | 195 | 8 | 12,5 | 3,3 | 3,3 | 0,46 | 1,3 | 0,7 |
| | | *1.969* | *1.375* | *0.13* | *0.13* | | | | | | | | | | | | | |
| **133,35** | 155 | 26,195 | 20,638 | 1,5 | 1,5 | 28 | 145 | 144 | 165 | 167 | 170 | 5 | 4,5 | 1,5 | 1,5 | 0,35 | 1,7 | 0,9 |
| *5.25* | | *1.0313* | *0.8125* | *0.06* | *0.06* | | | | | | | | | | | | | |
| | 164 | 46,038 | 38,1 | 8 | 3,3 | 39 | 146 | 158 | 177 | 183 | 189 | 7 | 7,5 | 8 | 3,3 | 0,35 | 1,7 | 0,9 |
| | | *1.8125* | *1.5* | *0.32* | *0.13* | | | | | | | | | | | | | |
| | 178 | 63,5 | 49,213 | 9,7 | 3,3 | 48 | 152 | 161 | 198 | 221 | 217 | 10 | 14 | 9,7 | 3,3 | 0,37 | 1,6 | 0,9 |
| | | *2.5* | *1.9375* | *0.38* | *0.13* | | | | | | | | | | | | | |
| **139,7** | 181 | 57,15 | 44,45 | 3,5 | 3,3 | 49 | 155 | 155 | 195 | 214 | 215 | 8 | 12,5 | 3,5 | 3,3 | 0,43 | 1,4 | 0,8 |
| *5.5* | | *2.25* | *1.75* | *0.14* | *0.13* | | | | | | | | | | | | | |
| | 187 | 56,642 | 44,45 | 3,5 | 3,3 | 44 | 165 | 156 | 210 | 222 | 223 | 9 | 12,5 | 3,5 | 3,3 | 0,31 | 1,9 | 1,1 |
| | | *2.23* | *1.75* | *0.14* | *0.13* | | | | | | | | | | | | | |
| **149,225** | 187 | 56,642 | 44,45 | 6,4 | 3,3 | 44 | 165 | 171 | 210 | 222 | 223 | 10 | 12,5 | 6,4 | 3,3 | 0,31 | 1,9 | 1,1 |
| *5.875* | | *2.23* | *1.75* | *0.25* | *0.13* | | | | | | | | | | | | | |
| **152,4** | 180 | 41,275 | 34,925 | 3,3 | 3,3 | 38 | 166 | 168 | 186 | 189 | 197 | 5 | 6 | 3,3 | 3,3 | 0,35 | 1,7 | 0,9 |
| *6* | | *1.625* | *1.375* | *0.13* | *0.13* | | | | | | | | | | | | | |
| | 185 | 46,83 | 34,925 | 3,5 | 1,5 | 40 | 169 | 168 | 200 | 211 | 210 | 7 | 11,5 | 3,5 | 1,5 | 0,33 | 1,8 | 1 |
| | | *1.8437* | *1.375* | *0.14* | *0.06* | | | | | | | | | | | | | |

## 8.2 Inch single row tapered roller bearings

d **158,75 – 203,2** mm

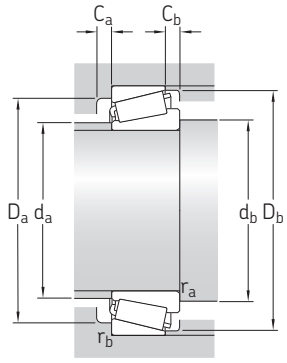
*6.25 – 8 in.*




| Principal dimensions | | | Basic load ratings | | Fatigue load limit | Speed ratings | | Mass | Designation | Series |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | dynamic | static | | Reference speed | Limiting speed | | | |
| d | D | T | C | $C_0$ | $P_u$ | | | | | |
| mm/*in.* | | | kN | | kN | r/min | | kg | – | – |
| **158,75** | 205,583 | 23,812 | 168 | 280 | 27 | 2 200 | 2 800 | 1,9 | ▸ L 432348/310 | L 432300 |
| *6.25* | *8.0938* | *0.9375* | | | | | | | | |
| | 205,583 | 23,813 | 168 | 280 | 27 | 2 200 | 2 800 | 1,95 | ▸ L 432349/310 | L 432300 |
| | *8.0938* | *0.9375* | | | | | | | | |
| **165,1** | 336,55 | 92,075 | 1 198 | 1 700 | 156 | 1 400 | 1 900 | 37 | **HH 437549/510** | HH 437500 |
| *6.5* | *13.25* | *3.625* | | | | | | | | |
| **177,8** | 227,012 | 30,162 | 231 | 425 | 40 | 2 000 | 2 400 | 2,95 | ▸ 36990/36920 | 36900 |
| *7* | *8.9375* | *1.1875* | | | | | | | | |
| | 288,925 | 63,5 | 774 | 1 140 | 108 | 1 700 | 2 000 | 16 | 94700/94113 | 94000 |
| | *11.375* | *2.5* | | | | | | | | |
| **178,595** | 265,112 | 51,595 | 532 | 880 | 85 | 1 800 | 2 200 | 9,55 | **M 336948/912** | M 336900 |
| *7.0313* | *10.4375* | *2.0313* | | | | | | | | |
| **179,934** | 265,112 | 51,595 | 532 | 880 | 85 | 1 800 | 2 200 | 9,4 | **M 336949/912** | M 336900 |
| *7.084* | *10.4375* | *2.0313* | | | | | | | | |
| **187,325** | 282,575 | 50,8 | 427 | 695 | 67 | 1 700 | 2 000 | 9,9 | **87737/87111** | 87000 |
| *7.375* | *11.125* | *2* | | | | | | | | |
| **189,738** | 279,4 | 52,388 | 643 | 980 | 93 | 1 700 | 2 000 | 11 | M 239447/410 | M 239400 |
| *7.47* | *11* | *2.0625* | | | | | | | | |
| **190,5** | 282,575 | 50,8 | 427 | 695 | 67 | 1 700 | 2 000 | 9,55 | **87750/87111** | 87000 |
| *7.5* | *11.125* | *2* | | | | | | | | |
| **196,85** | 241,3 | 23,812 | 189 | 315 | 29 | 1 900 | 2 400 | 2,1 | ▸ LL 639249/210 | LL 639200 |
| *7.75* | *9.5* | *0.9375* | | | | | | | | |
| | 257,175 | 39,688 | 339 | 655 | 58,5 | 1 800 | 2 200 | 5,35 | LM 739749/710 | LM 739700 |
| | *10.125* | *1.5625* | | | | | | | | |
| **198,298** | 279,4 | 46,038 | 465 | 830 | 76,5 | 1 600 | 2 000 | 9,2 | 67981/67919 | 67900 |
| *7.807* | *11* | *1.8125* | | | | | | | | |
| **199,949** | 279,4 | 46,038 | 465 | 830 | 76,5 | 1 600 | 2 000 | 9 | 67982/67919 | 67900 |
| *7.872* | *11* | *1.8125* | | | | | | | | |
| **200,025** | 276,225 | 42,862 | 478 | 780 | 72 | 1 700 | 2 000 | 7,7 | LM 241147/110 | LM 241100 |
| *7.875* | *10.875* | *1.6875* | | | | | | | | |
| **203,2** | 282,575 | 46,038 | 465 | 830 | 76,5 | 1 600 | 2 000 | 8,85 | 67983/67920 | 67900 |
| *8* | *11.125* | *1.8125* | | | | | | | | |

**SKF Explorer bearing**

▸ Popular item

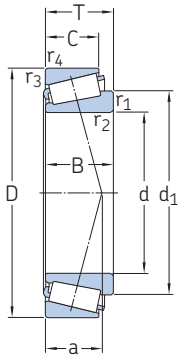



| Dimensions | | | | | | | Abutment and fillet dimensions | | | | | | | | | Calculation factors | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | B | C | $r_{1,2}$ min. | $r_{3,4}$ min. | a | $d_a$ max. | $d_b$ min. | $D_a$ min. | $D_a$ max. | $D_b$ min. | $C_a$ min. | $C_b$ min. | $r_a$ max. | $r_b$ max. | e | Y | $Y_0$ |
| mm/*in.* | | | | | | | mm | | | | | | | | | – | | |
| **158,75** | 181 | 23,812 | 18,258 | 4,8 | 1,5 | 32 | 172 | 177 | 194 | 195 | 197 | 5 | 5,5 | 4,8 | 1,5 | 0,37 | 1,6 | 0,9 |
| *6.25* | | *0.9375* | *0.7188* | *0.19* | *0.06* | | | | | | | | | | | | | |
| | 181 | 23,812 | 18,258 | 1,5 | 1,5 | 32 | 172 | 170 | 194 | 195 | 197 | 5 | 5,5 | 1,5 | 1,5 | 0,37 | 1,6 | 0,9 |
| | | *0.9375* | *0.7188* | *0.06* | *0.06* | | | | | | | | | | | | | |
| **165,1** | 242 | 95,25 | 69,85 | 3,3 | 6,4 | 69 | 203 | 182 | 280 | 315 | 308 | 14 | 22 | 3,3 | 6,4 | 0,37 | 1,6 | 0,9 |
| *6.5* | | *3.75* | *2.75* | *0.13* | *0.25* | | | | | | | | | | | | | |
| **177,8** | 203 | 30,162 | 23,02 | 1,5 | 1,5 | 42 | 190 | 190 | 212 | 216 | 220 | 5 | 7 | 1,5 | 1,5 | 0,44 | 1,35 | 0,8 |
| *7* | | *1.1875* | *0.9063* | *0.13* | *0.13* | | | | | | | | | | | | | |
| | 232 | 63,5 | 47,625 | 7 | 3,3 | 62 | 201 | 201 | 247 | 274 | 270 | 10 | 15,5 | 7 | 3,3 | 0,46 | 1,3 | 0,7 |
| | | *2.5* | *1.875* | *0.28* | *0.13* | | | | | | | | | | | | | |
| **178,595** | 216 | 57,15 | 38,895 | 3,3 | 3,3 | 46 | 196 | 195 | 240 | 250 | 251 | 9 | 12,5 | 3,3 | 3,3 | 0,33 | 1,8 | 1 |
| *7.0313* | | *2.25* | *1.5313* | *0.13* | *0.13* | | | | | | | | | | | | | |
| **179,934** | 216 | 57,15 | 38,895 | 3,3 | 3,3 | 46 | 196 | 196 | 240 | 250 | 251 | 9 | 12,5 | 3,3 | 3,3 | 0,33 | 1,8 | 1 |
| *7.084* | | *2.25* | *1.5313* | *0.13* | *0.13* | | | | | | | | | | | | | |
| **187,325** | 232 | 47,625 | 36,512 | 3,5 | 3,3 | 54 | 213 | 204 | 253 | 267 | 267 | 6 | 14 | 3,5 | 3,3 | 0,43 | 1,4 | 0,8 |
| *7.375* | | *1.875* | *1.4375* | *0.14* | *0.13* | | | | | | | | | | | | | |
| **189,738** | 232 | 57,15 | 41,275 | 3,3 | 3,3 | 48 | 211 | 206 | 254 | 264 | 266 | 9 | 11 | 3,3 | 3,3 | 0,33 | 1,8 | 1 |
| *7.47* | | *2.25* | *1.625* | *0.13* | *0.13* | | | | | | | | | | | | | |
| **190,5** | 232 | 47,625 | 36,512 | 3,5 | 3,3 | 54 | 213 | 207 | 253 | 267 | 267 | 6 | 14 | 3,5 | 3,3 | 0,43 | 1,4 | 0,8 |
| *7.5* | | *1.875* | *1.4375* | *0.14* | *0.13* | | | | | | | | | | | | | |
| **196,85** | 217 | 23,017 | 17,462 | 1,5 | 1,5 | 40 | 207 | 209 | 232 | 230 | 235 | 5 | 6 | 1,5 | 1,5 | 0,43 | 1,4 | 0,8 |
| *7.75* | | *0.9062* | *0.6875* | *0.06* | *0.06* | | | | | | | | | | | | | |
| | 229 | 39,688 | 30,162 | 3,5 | 3,3 | 50 | 210 | 213 | 236 | 242 | 247 | 8 | 9,5 | 3,5 | 3,3 | 0,44 | 1,35 | 0,8 |
| | | *1.5625* | *1.1875* | *0.14* | *0.13* | | | | | | | | | | | | | |
| **198,298** | 246 | 49,212 | 36,512 | 3,5 | 3,3 | 60 | 223 | 215 | 254 | 264 | 272 | 8 | 9,5 | 3,5 | 3,3 | 0,5 | 1,2 | 0,7 |
| *7.807* | | *1.9375* | *1.4375* | *0.14* | *0.13* | | | | | | | | | | | | | |
| **199,949** | 246 | 49,212 | 36,512 | 3,5 | 3,3 | 60 | 223 | 217 | 254 | 264 | 272 | 8 | 9,5 | 3,5 | 3,3 | 0,5 | 1,2 | 0,7 |
| *7.872* | | *1.9375* | *1.4375* | *0.14* | *0.13* | | | | | | | | | | | | | |
| **200,025** | 236 | 46,038 | 34,133 | 3,5 | 3,3 | 44 | 220 | 217 | 257 | 261 | 265 | 7 | 8,5 | 3,5 | 3,3 | 0,31 | 1,9 | 1,1 |
| *7.875* | | *1.8125* | *1.3438* | *0.14* | *0.13* | | | | | | | | | | | | | |
| **203,2** | 246 | 46,038 | 36,512 | 3,5 | 3,3 | 60 | 222 | 220 | 254 | 267 | 272 | 8 | 9,5 | 3,5 | 3,3 | 0,5 | 1,2 | 0,7 |
| *8* | | *1.8125* | *1.4375* | *0.14* | *0.13* | | | | | | | | | | | | | |

## 8.2 Inch single row tapered roller bearings

d **203,987 – 304,8** mm

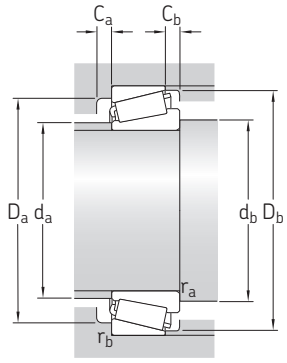
*8.031 – 12 in.*




| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation | Series |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | T | C | $C_0$ | $P_u$ | | | | | |
| mm/*in.* | | | kN | | kN | r/min | | kg | – | – |
| **203,987**<br>*8.031* | 276,225<br>*10.875* | 42,862<br>*1.6875* | 478 | 780 | 72 | 1 700 | 2 000 | 7,2 | LM 241148/110 | LM 241100 |
| **206,375**<br>*8.125* | 282,575<br>*11.125* | 46,038<br>*1.8125* | 465 | 830 | 76,5 | 1 600 | 2 000 | 8,45 | 67985/67920 | 67900 |
| | 336,55<br>*13.25* | 98,425<br>*3.875* | 1 230 | 2 160 | 190 | 1 300 | 1 800 | 34 | **H 242649/610** | H 242600 |
| **216,408**<br>*8.52* | 285,75<br>*11.25* | 46,038<br>*1.8125* | 466 | 850 | 76,5 | 1 600 | 2 000 | 7,9 | LM 742747/710 | LM 742700 |
| **220,662**<br>*8.6875* | 314,325<br>*12.375* | 61,912<br>*2.4375* | 784 | 1 320 | 118 | 1 500 | 1 800 | 15 | M 244249 A/210 | M 244200 |
| **230,188**<br>*9.0625* | 317,5<br>*12.5* | 47,625<br>*1.875* | 556 | 980 | 90 | 1 500 | 1 800 | 11 | **LM 245846/810** | LM 245800 |
| **231,775**<br>*9.125* | 300,038<br>*11.8125* | 33,338<br>*1.3125* | 267 | 425 | 39 | 1 500 | 1 900 | 5,2 | ▸ 544091/544118 | 544000 |
| | 317,5<br>*12.5* | 47,625<br>*1.875* | 556 | 980 | 90 | 1 500 | 1 800 | 10,5 | ▸ **LM 245848/810** | LM 245800 |
| **234,848**<br>*9.246* | 314,325<br>*12.375* | 49,212<br>*1.9375* | 608 | 1 000 | 91,5 | 1 500 | 1 800 | 10,5 | ▸ LM 545848/810 | LM 545800 |
| **255,6**<br>*10.063* | 342,9<br>*13.5* | 57,15<br>*2.25* | 698 | 1 400 | 125 | 1 300 | 1 600 | 15 | **M 349547/510** | M 349500 |
| **257,175**<br>*10.125* | 342,9<br>*13.5* | 57,15<br>*2.25* | 698 | 1 400 | 125 | 1 300 | 1 600 | 14 | **M 349549/510** | M 349500 |
| | 358,775<br>*14.125* | 71,438<br>*2.8125* | 1 030 | 1 760 | 156 | 1 300 | 1 600 | 21,5 | M 249747/710 | M 249700 |
| **263,525**<br>*10.375* | 325,438<br>*12.8125* | 28,575<br>*1.125* | 273 | 550 | 48 | 1 400 | 1 700 | 5,3 | 38880/38820 | 38800 |
| | 355,6<br>*14* | 57,15<br>*2.25* | 789 | 1 400 | 122 | 1 300 | 1 600 | 16 | LM 451345/310 | LM 451300 |
| **292,1**<br>*11.5* | 374,65<br>*14.75* | 47,625<br>*1.875* | 539 | 1 140 | 98 | 1 200 | 1 500 | 12,5 | ▸ **L 555249/210** | L 555200 |
| **304,8**<br>*12* | 393,7<br>*15.5* | 50,8<br>*2* | 655 | 1 220 | 104 | 1 100 | 1 400 | 15 | ▸ L 357049/010 | L 357000 |
| | 406,4<br>*16* | 63,5<br>*2.5* | 775 | 1 700 | 143 | 1 100 | 1 300 | 22,5 | **LM 757049/010** | LM 757000 |

**SKF Explorer bearing**

▸ Popular item

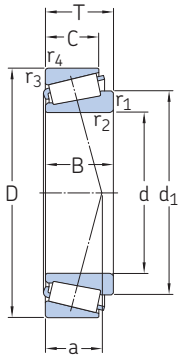



| Dimensions | | | | | | | Abutment and fillet dimensions | | | | | | | | | Calculation factors | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | B | C | $r_{1,2}$ min. | $r_{3,4}$ min. | a | $d_a$ max. | $d_b$ min. | $D_a$ min. | $D_a$ max. | $D_b$ min. | $C_a$ min. | $C_b$ min. | $r_a$ max. | $r_b$ max. | e | Y | $Y_0$ |
| mm/*in.* | | | | | | | mm | | | | | | | | | – | | |
| **203,987** | 236 | 46,038 | 34,133 | 3,5 | 3,3 | 44 | 220 | 221 | 257 | 261 | 265 | 7 | 8,5 | 3,5 | 3,3 | 0,31 | 1,9 | 1,1 |
| *8.031* | | *1.8125* | *1.3438* | *0.14* | *0.13* | | | | | | | | | | | | | |
| **206,375** | 246 | 46,038 | 36,512 | 3,5 | 3,3 | 60 | 222 | 223 | 254 | 267 | 272 | 8 | 9,5 | 3,5 | 3,3 | 0,5 | 1,2 | 0,7 |
| *8.125* | | *1.8125* | *1.4375* | *0.14* | *0.13* | | | | | | | | | | | | | |
| | 268 | 100,013 | 77,788 | 3,3 | 3,3 | 72 | 231 | 223 | 290 | 321 | 318 | 14 | 20,5 | 3,3 | 3,3 | 0,33 | 1,8 | 1 |
| | | *3.9375* | *3.0625* | *0.13* | *0.13* | | | | | | | | | | | | | |
| **216,408** | 253 | 49,212 | 34,925 | 3,5 | 3,3 | 60 | 230 | 233 | 261 | 270 | 277 | 7 | 11 | 3,5 | 3,3 | 0,48 | 1,25 | 0,7 |
| *8.52* | | *1.9375* | *1.375* | *0.14* | *0.13* | | | | | | | | | | | | | |
| **220,662** | 264 | 66,675 | 49,212 | 1,5 | 3,3 | 56 | 241 | 234 | 284 | 299 | 300 | 9 | 12,5 | 1,5 | 3,3 | 0,33 | 1,8 | 1 |
| *8.6875* | | *2.625* | *1.9375* | *0.06* | *0.13* | | | | | | | | | | | | | |
| **230,188** | 268 | 52,388 | 36,512 | 3,3 | 3,3 | 49 | 249 | 247 | 296 | 302 | 304 | 9 | 11 | 3,3 | 3,3 | 0,31 | 1,9 | 1,1 |
| *9.0625* | | *2.0625* | *1.4375* | *0.13* | *0.13* | | | | | | | | | | | | | |
| **231,775** | 260 | 31,75 | 23,812 | 3,5 | 3,3 | 49 | 247 | 249 | 278 | 284 | 284 | 5 | 9,5 | 3,5 | 3,3 | 0,4 | 1,5 | 0,8 |
| *9.125* | | *1.25* | *0.9375* | *0.14* | *0.13* | | | | | | | | | | | | | |
| | 268 | 52,388 | 36,512 | 3,3 | 3,3 | 49 | 249 | 249 | 296 | 302 | 304 | 9 | 11 | 3,3 | 3,3 | 0,31 | 1,9 | 1,1 |
| | | *2.0625* | *1.4375* | *0.13* | *0.13* | | | | | | | | | | | | | |
| **234,848** | 271 | 53,975 | 36,512 | 3,5 | 3,3 | 57 | 250 | 252 | 291 | 299 | 304 | 9 | 12,5 | 3,5 | 3,3 | 0,4 | 1,5 | 0,8 |
| *9.246* | | *2.125* | *1.4375* | *0.14* | *0.13* | | | | | | | | | | | | | |
| **255,6** | 296 | 63,5 | 44,45 | 1,5 | 3,3 | 59 | 273 | 269 | 318 | 327 | 331 | 9 | 12,5 | 1,5 | 3,3 | 0,35 | 1,7 | 0,9 |
| *10.063* | | *2.5* | *1.75* | *0.06* | *0.13* | | | | | | | | | | | | | |
| **257,175** | 296 | 57,15 | 44,45 | 6,4 | 3,3 | 59 | 273 | 281 | 318 | 327 | 331 | 9 | 12,5 | 6,4 | 3,3 | 0,35 | 1,7 | 0,9 |
| *10.125* | | *2.25* | *1.75* | *0.25* | *0.13* | | | | | | | | | | | | | |
| | 303 | 76,2 | 53,975 | 1,5 | 3,3 | 64 | 276 | 271 | 326 | 343 | 343 | 11 | 17 | 1,5 | 3,3 | 0,33 | 1,8 | 1 |
| | | *3* | *2.125* | *0.06* | *0.13* | | | | | | | | | | | | | |
| **263,525** | 293 | 28,575 | 25,4 | 1,5 | 1,5 | 48 | 282 | 277 | 307 | 313 | 313 | 4 | 3 | 1,5 | 1,5 | 0,37 | 1,6 | 0,9 |
| *10.375* | | *1.125* | *1* | *0.06* | *0.06* | | | | | | | | | | | | | |
| | 309 | 57,15 | 44,45 | 3,5 | 3,3 | 61 | 285 | 281 | 329 | 339 | 343 | 10 | 12,5 | 3,5 | 3,3 | 0,35 | 1,7 | 0,9 |
| | | *2.25* | *1.75* | *0.14* | *0.13* | | | | | | | | | | | | | |
| **292,1** | 330 | 47,625 | 34,925 | 3,5 | 3,3 | 64 | 310 | 310 | 350 | 358 | 361 | 9 | 12,5 | 3,5 | 3,3 | 0,4 | 1,5 | 0,8 |
| *11.5* | | *1.875* | *1.375* | *0.14* | *0.13* | | | | | | | | | | | | | |
| **304,8** | 347 | 50,8 | 38,1 | 6,4 | 3,3 | 64 | 327 | 329 | 368 | 377 | 379 | 7 | 12,5 | 6,4 | 3,3 | 0,35 | 1,7 | 0,9 |
| *12* | | *2* | *1.5* | *0.25* | *0.13* | | | | | | | | | | | | | |
| | 356 | 63,5 | 47,625 | 6,4 | 3,3 | 79 | 327 | 329 | 370 | 389 | 391 | 10 | 15,5 | 6,4 | 3,3 | 0,44 | 1,35 | 0,8 |
| | | *2.5* | *1.875* | *0.25* | *0.13* | | | | | | | | | | | | | |

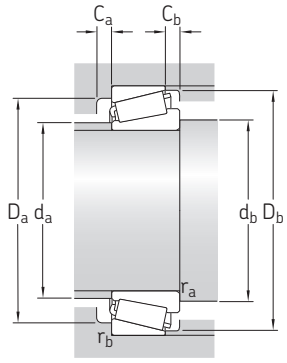
## 8.2 Inch single row tapered roller bearings

d **317,5 – 457,2** mm

*12.5 – 18 in.*



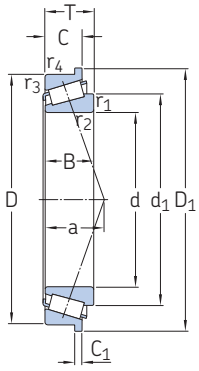

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation | Series |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | T | C | $C_0$ | $P_u$ | | | | | |
| mm/*in.* | | | kN | | kN | r/min | | kg | – | – |
| **317,5**<br>*12.5* | 447,675<br>*17.625* | 85,725<br>*3.375* | 1 363 | 2 700 | 220 | 900 | 1 200 | 41 | **HM 259048/010/HA4** | HM 259000 |
| **333,375**<br>*13.125* | 469,9<br>*18.5* | 90,488<br>*3.5625* | 1 428 | 2 850 | 232 | 850 | 1 200 | 47 | **HM 261049/010** | HM 261000 |
| **342,9**<br>*13.5* | 450,85<br>*17.75* | 66,675<br>*2.625* | 1 000 | 2 200 | 180 | 900 | 1 200 | 28 | **LM 361649/610** | LM 361600 |
| **343,154**<br>*13.51* | 450,85<br>*17.75* | 66,675<br>*2.625* | 1 000 | 2 200 | 180 | 900 | 1 200 | 28 | **LM 361649 A/610** | LM 361600 |
| **346,075**<br>*13.625* | 488,95<br>*19.25* | 95,25<br>*3.75* | 1 533 | 3 150 | 255 | 850 | 1 100 | 55 | **HM 262749/710** | HM 262700 |
| **381**<br>*15* | 479,425<br>*18.875* | 49,213<br>*1.9375* | 638 | 1 500 | 120 | 800 | 1 100 | 20 | **L 865547/512** | L 865500 |
| **406,4**<br>*16* | 549,275<br>*21.625* | 85,725<br>*3.375* | 1 467 | 3 050 | 236 | 700 | 950 | 53,5 | **LM 567949/910/HA1** | LM 567900 |
| **431,8**<br>*17* | 571,5<br>*22.5* | 74,612<br>*2.9375* | 1 145 | 2 550 | 204 | 670 | 900 | 49 | **LM 869448/410** | LM 869400 |
| **457,2**<br>*18* | 573,088<br>*22.5625* | 74,612<br>*2.9375* | 1 205 | 3 000 | 228 | 670 | 900 | 43,5 | **L 570649/610** | L 570600 |




| Dimensions | | | | | | | Abutment and fillet dimensions | | | | | | | | | Calculation factors | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | B | C | $r_{1,2}$ min. | $r_{3,4}$ min. | a | $d_a$ max. | $d_b$ min. | $D_a$ min. | $D_a$ max. | $D_b$ min. | $C_a$ min. | $C_b$ min. | $r_a$ max. | $r_b$ max. | e | Y | $Y_0$ |
| mm/*in.* | | | | | | | mm | | | | | | | | | – | | |
| **317,5**<br>*12.5* | 376 | 85,725<br>*3.375* | 68,262<br>*2.6875* | 3,5<br>*0.14* | 3,3<br>*0.13* | 80 | 341 | 339 | 405 | 428 | 428 | 9 | 17 | 3,5 | 3,3 | 0,33 | 1,8 | 1 |
| **333,375**<br>*13.125* | 399 | 90,488<br>*3.5625* | 71,438<br>*2.1825* | 6,4<br>*0.25* | 3,3<br>*0.13* | 85 | 362 | 365 | 428 | 453 | 452 | 6 | 19 | 6 | 3,1 | 0,33 | 1,8 | 1 |
| **342,9**<br>*13.5* | 393 | 66,675<br>*2.625* | 52,388<br>*2.0625* | 8,5<br>*0.33* | 3,5<br>*0.14* | 75 | 365 | 385 | 417 | 433 | 434 | 9 | 14 | 7,5 | 3,3 | 0,35 | 1,7 | 0,9 |
| **343,154**<br>*13.51* | 393 | 66,675<br>*2.625* | 52,388<br>*2.0625* | 8,5<br>*0.33* | 3,5<br>*0.14* | 75 | 365 | 385 | 417 | 433 | 434 | 9 | 14 | 7,5 | 3,3 | 0,35 | 1,7 | 0,9 |
| **346,075**<br>*13.625* | 413 | 95,25<br>*3.75* | 74,612<br>*2.9375* | 6,4<br>*0.25* | 3,3<br>*0.13* | 88 | 379 | 378 | 442 | 472 | 467 | 8 | 21 | 6 | 3,1 | 0,33 | 1,8 | 1 |
| **381**<br>*15* | 430 | 47,625<br>*1.875* | 34,925<br>*1.375* | 6,4<br>*0.25* | 3,3<br>*0.13* | 92 | 406 | 413 | 448 | 462 | 463 | 6 | 14 | 6 | 3,1 | 0,5 | 1,2 | 0,7 |
| **406,4**<br>*16* | 473 | 84,138<br>*3.3125* | 61,612<br>*2.4257* | 6,4<br>*0.25* | 3,3<br>*0.13* | 100 | 434 | 438 | 502 | 532 | 526 | 9 | 23,5 | 6 | 3,1 | 0,4 | 1,5 | 0,8 |
| **431,8**<br>*17* | 500 | 74,612<br>*2.9375* | 52,388<br>*2.0625* | 3,3<br>*0.13* | 3,3<br>*0.13* | 120 | 462 | 455 | 520 | 550 | 549 | 8 | 22 | 3,3 | 3,3 | 0,54 | 1,1 | 0,6 |
| **457,2**<br>*18* | 516 | 74,612<br>*2.9375* | 57,15<br>*2.25* | 6,4<br>*0.25* | 6,4<br>*0.25* | 101 | 482 | 489 | 534 | 541 | 556 | 9 | 17 | 6 | 6 | 0,4 | 1,5 | 0,8 |

## 8.3 Single row tapered roller bearings with a flanged outer ring

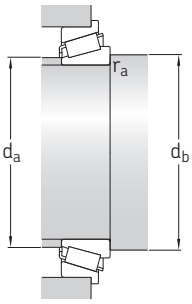
d **35 – 65** mm




| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| d | D | T | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | kg | – |
| **35** | 80 | 22,75 | 88,9 | 73,5 | 8,3 | 7 500 | 9 000 | 0,53 | **30307 R** |
| **40** | 68 | 19 | 64,7 | 71 | 7,65 | 7 500 | 9 500 | 0,29 | **32008 XR** |
| | 80 | 19,75 | 75,8 | 68 | 7,65 | 7 000 | 8 500 | 0,44 | **30208 R** |
| **45** | 100 | 38,25 | 166 | 176 | 20 | 5 000 | 6 700 | 1,55 | **32309 BR** |
| **55** | 120 | 45,5 | 233 | 260 | 30 | 4 300 | 5 600 | 2,55 | **32311 BR** |
| **65** | 110 | 34 | 175 | 208 | 24 | 4 800 | 5 600 | 1,3 | **33113 R** |
| | 140 | 36 | 240 | 228 | 27,5 | 4 000 | 4 800 | 2,5 | **30313 R** |



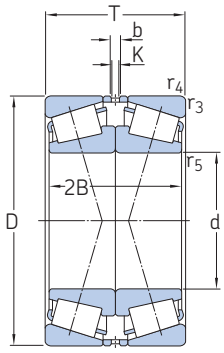
SKF Explorer bearing




| Dimensions | | | | | | | | | Abutment and fillet dimensions | | | Calculation factors | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ | B | C | $C_1$ | $r_{1,2}$ min. | $r_{3,4}$ min. | a | $d_a$ max. | $d_b$ min. | $r_a$ max. | e | Y | $Y_0$ |
| mm | | | | | | | | | mm | | | – | | |
| **35** | 54,5 | 85 | 21 | 18 | 4,5 | 2 | 1,5 | 16 | 46 | 44,5 | 2 | 0,31 | 1,9 | 1,1 |
| **40** | 54,7<br>57,5 | 72<br>85 | 19<br>18 | 14,5<br>16 | 3,5<br>4 | 1<br>1,5 | 1<br>1,5 | 14<br>16 | 46<br>49 | 47,5<br>48,5 | 1<br>1,5 | 0,37<br>0,37 | 1,6<br>1,6 | 0,9<br>0,9 |
| **45** | 76,1 | 106 | 36 | 30 | 7 | 2 | 1,5 | 29 | 56 | 55 | 2 | 0,54 | 1,1 | 0,6 |
| **55** | 90,5 | 127 | 43 | 35 | 8 | 2,5 | 2 | 36 | 67 | 67 | 2,5 | 0,54 | 1,1 | 0,6 |
| **65** | 88,3<br>98,7 | 116<br>147 | 34<br>33 | 26,5<br>28 | 5,5<br>6 | 1,5<br>3 | 1,5<br>2,5 | 25<br>27 | 74<br>84 | 75<br>78 | 1,5<br>3 | 0,4<br>0,35 | 1,5<br>1,7 | 0,8<br>0,9 |

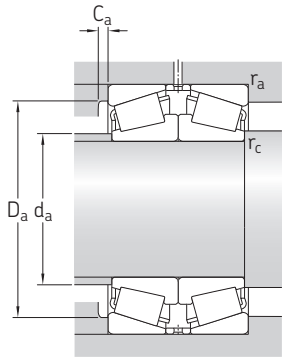
## 8.4 Matched bearings arranged face-to-face

d **25 – 55** mm




| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| d | D | T | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | kg | – |
| **25** | 62 | 36,5 | 79,9 | 80 | 8,65 | 6 700 | 11 000 | 0,55 | ▸ 31305/DF |
| **30** | 62 | 34,5 | 85,7 | 88 | 9,65 | 7 500 | 11 000 | 0,48 | 30206/DF |
| | 62 | 42,5 | 106 | 116 | 12,7 | 7 500 | 11 000 | 0,59 | 32206/DF |
| | 72 | 41,5 | 100 | 100 | 11,4 | 5 600 | 9 500 | 0,82 | ▸ 31306/DF |
| | 72 | 41,5 | 119 | 112 | 12,7 | 6 700 | 10 000 | 0,81 | 30306/DF |
| **35** | 62 | 36 | 89,7 | 108 | 11,6 | 7 000 | 10 000 | 0,46 | 32007 X/DF |
| | 72 | 48,5 | 139 | 156 | 17 | 6 300 | 9 500 | 0,91 | 32207/DF |
| | 72 | 56 | 178 | 212 | 23,6 | 6 300 | 9 500 | 1,1 | 33207/DF |
| | 80 | 45,5 | 129 | 134 | 15,6 | 5 000 | 8 500 | 1,1 | 31307/DF |
| | 80 | 45,5 | 152 | 150 | 16,6 | 6 000 | 9 000 | 1,05 | 30307/DF |
| **40** | 75 | 52 | 167 | 208 | 22,8 | 6 000 | 9 000 | 1,05 | 33108/DF |
| | 80 | 39,5 | 130 | 137 | 15,3 | 5 600 | 8 500 | 0,87 | 30208/DF |
| | 90 | 50,5 | 156 | 163 | 19 | 4 500 | 7 500 | 1,5 | 31308/DF |
| **45** | 75 | 40 | 123 | 160 | 17,6 | 5 600 | 8 500 | 0,71 | 32009 X/DF |
| | 85 | 49,5 | 169 | 196 | 22 | 5 300 | 8 000 | 1,2 | 32209/DF |
| | 100 | 54,5 | 194 | 204 | 24,5 | 4 000 | 6 700 | 2 | 31309/DF |
| | 100 | 54,5 | 227 | 240 | 28,5 | 4 500 | 7 000 | 2 | 30309/DF |
| **50** | 80 | 40 | 129 | 176 | 19,3 | 5 300 | 8 000 | 0,78 | 32010 X/DF |
| | 80 | 48 | 145 | 204 | 22,8 | 5 300 | 8 000 | 0,92 | 33010/DF |
| | 90 | 43,5 | 160 | 183 | 20,8 | 4 800 | 7 500 | 1,1 | 30210/DF |
| | 90 | 49,5 | 173 | 200 | 22,8 | 4 800 | 7 500 | 1,3 | 32210/DF |
| | 90 | 64 | 243 | 320 | 36,5 | 4 800 | 7 000 | 1,75 | 33210/DF |
| | 110 | 58,5 | 224 | 240 | 28,5 | 3 600 | 6 000 | 2,55 | 31310/DF |
| **55** | 90 | 46 | 170 | 232 | 26 | 4 500 | 7 000 | 1,15 | 32011 X/DF |
| | 90 | 54 | 191 | 270 | 30,5 | 4 500 | 7 000 | 1,35 | 33011/DF |
| | 100 | 45,5 | 190 | 212 | 24 | 4 500 | 6 700 | 1,45 | 30211/DF |
| | 100 | 53,5 | 222 | 260 | 30 | 4 300 | 6 700 | 1,75 | 32211/DF |
| | 120 | 63 | 256 | 275 | 33,5 | 3 400 | 5 600 | 3,25 | 31311/DF |
| | 120 | 63 | 302 | 325 | 39 | 3 800 | 5 600 | 3,25 | 30311/DF |

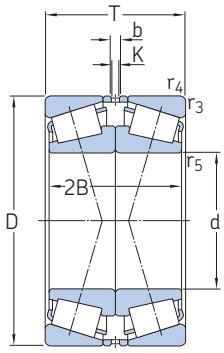
**SKF Explorer bearing**
▸ Popular item




| Dimensions | | | | | | Abutment and fillet dimensions | | | | | | Calculation factors | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | 2B | b | K | $r_{3,4}$ min. | $r_5$ min. | $d_a$ max. | $D_a$ min. | $D_a$ max. | $C_a$ min. | $r_a$ max. | $r_c$ max. | e | $Y_1$ | $Y_2$ | $Y_0$ |
| mm | | | | | | mm | | | | | | – | | | |
| **25** | 34 | 6 | 4 | 1,5 | 0,6 | 34 | 47 | 55 | 3 | 1,5 | 0,6 | 0,83 | 0,81 | 1,2 | 0,8 |
| **30** | 32 | 3 | 3 | 1 | 0,3 | 38 | 53 | 56 | 2 | 1 | 0,3 | 0,37 | 1,8 | 2,7 | 1,8 |
| | 40 | 4 | 3 | 1 | 0,3 | 37 | 52 | 56 | 3 | 1 | 0,3 | 0,37 | 1,8 | 2,7 | 1,8 |
| | 38 | 8 | 5,5 | 1,5 | 0,6 | 40 | 55 | 65 | 3 | 1,5 | 0,6 | 0,83 | 0,81 | 1,2 | 0,8 |
| | 38 | 6 | 3 | 1,5 | 0,6 | 41 | 62 | 64 | 3 | 1,5 | 0,6 | 0,31 | 2,2 | 3,3 | 2,2 |
| **35** | 36 | 5 | 3 | 1 | 0,3 | 41 | 54 | 56 | 4 | 1 | 0,3 | 0,46 | 1,5 | 2,2 | 1,4 |
| | 46 | 5 | 3 | 1,5 | 0,6 | 43 | 61 | 64 | 3 | 1,5 | 0,6 | 0,37 | 1,8 | 2,7 | 1,8 |
| | 56 | 7 | 4 | 1,5 | 0,6 | 43 | 61 | 64 | 5 | 1,5 | 0,6 | 0,35 | 1,9 | 2,9 | 1,8 |
| | 42 | 8 | 6 | 1,5 | 0,6 | 45 | 62 | 72 | 3 | 1,5 | 0,6 | 0,83 | 0,81 | 1,2 | 0,8 |
| | 42 | 5 | 3 | 1,5 | 0,6 | 46 | 70 | 72 | 3 | 1,5 | 0,6 | 0,31 | 2,2 | 3,3 | 2,2 |
| **40** | 52 | 7 | 4 | 1,5 | 0,6 | 47 | 65 | 67 | 4 | 1,5 | 0,6 | 0,35 | 1,9 | 2,9 | 1,8 |
| | 36 | 4 | 3 | 1,5 | 0,6 | 49 | 69 | 72 | 3 | 1,5 | 0,6 | 0,37 | 1,8 | 2,7 | 1,8 |
| | 46 | 11 | 8 | 1,5 | 0,6 | 51 | 71 | 82 | 3 | 1,5 | 0,6 | 0,83 | 0,81 | 1,2 | 0,8 |
| **45** | 40 | 5 | 4,5 | 1 | 0,3 | 52 | 67 | 68 | 4 | 1 | 0,3 | 0,4 | 1,7 | 2,5 | 1,6 |
| | 46 | 7 | 3 | 1,5 | 0,6 | 54 | 73 | 77 | 3 | 1,5 | 0,6 | 0,4 | 1,7 | 2,5 | 1,6 |
| | 50 | 10 | 8,5 | 1,5 | 0,6 | 57 | 79 | 92 | 4 | 1,5 | 0,6 | 0,83 | 0,81 | 1,2 | 0,8 |
| | 50 | 6 | 3 | 1,5 | 0,6 | 59 | 86 | 92 | 3 | 1,5 | 0,6 | 0,35 | 1,9 | 2,9 | 1,8 |
| **50** | 40 | 5 | 4,5 | 1 | 0,3 | 57 | 72 | 73 | 4 | 1 | 0,3 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 48 | 6 | 4 | 1 | 0,3 | 57 | 72 | 73 | 4 | 1 | 0,3 | 0,31 | 2,2 | 3,3 | 2,2 |
| | 40 | 4 | 3 | 1,5 | 0,6 | 59 | 79 | 82 | 3 | 1,5 | 0,6 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 46 | 7 | 3 | 1,5 | 0,6 | 58 | 78 | 82 | 3 | 1,5 | 0,6 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 64 | 9 | 5 | 1,5 | 0,6 | 57 | 77 | 82 | 5 | 1,5 | 0,6 | 0,4 | 1,7 | 2,5 | 1,6 |
| | 54 | 10 | 7,5 | 2 | 0,6 | 63 | 87 | 101 | 4 | 2 | 0,6 | 0,83 | 0,81 | 1,2 | 0,8 |
| **55** | 46 | 7 | 4,5 | 1,5 | 0,6 | 63 | 81 | 82 | 4 | 1,5 | 0,6 | 0,4 | 1,7 | 2,5 | 1,6 |
| | 54 | 7 | 4,5 | 1,5 | 0,6 | 64 | 81 | 82 | 5 | 1,5 | 0,6 | 0,31 | 2,2 | 3,3 | 2,2 |
| | 42 | 6 | 3 | 1,5 | 0,6 | 64 | 88 | 92 | 4 | 1,5 | 0,6 | 0,4 | 1,7 | 2,5 | 1,6 |
| | 50 | 7 | 3 | 1,5 | 0,6 | 64 | 87 | 92 | 4 | 1,5 | 0,6 | 0,4 | 1,7 | 2,5 | 1,6 |
| | 58 | 10 | 7,5 | 2 | 0,6 | 68 | 94 | 111 | 4 | 2 | 0,6 | 0,83 | 0,81 | 1,2 | 0,8 |
| | 58 | 8 | 4,5 | 2 | 0,6 | 72 | 104 | 110 | 4 | 2 | 0,6 | 0,35 | 1,9 | 2,9 | 1,8 |

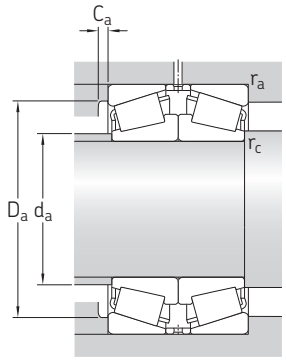
## 8.4 Matched bearings arranged face-to-face

d **60 – 80** mm




| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| d | D | T | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | kg | – |
| **60** | 95 | 46 | 173 | 245 | 27 | 4 300 | 6 700 | 1,2 | 32012 X/DF |
| | 110 | 47,5 | 207 | 228 | 26,5 | 4 000 | 6 000 | 1,8 | 30212/DF |
| | 110 | 59,5 | 266 | 320 | 37,5 | 4 000 | 6 000 | 2,4 | 32212/DF |
| | 110 | 76 | 354 | 475 | 53 | 3 800 | 6 000 | 3,15 | 33212/DF |
| | 130 | 67 | 303 | 335 | 40,5 | 3 000 | 5 300 | 4,05 | 31312/DF |
| | 130 | 67 | 357 | 390 | 47,5 | 3 600 | 5 300 | 4,1 | 30312/DF |
| | 130 | 97 | 483 | 585 | 68 | 3 200 | 5 300 | 6,05 | 32312/DF |
| **65** | 100 | 46 | 176 | 255 | 28 | 4 000 | 6 000 | 1,3 | 32013 X/DF |
| | 100 | 54 | 204 | 310 | 34,5 | 4 000 | 6 300 | 1,55 | 33013/DF |
| | 120 | 49,5 | 242 | 270 | 32,5 | 3 600 | 5 600 | 2,3 | 30213/DF |
| | 120 | 65,5 | 320 | 390 | 45,5 | 3 600 | 5 600 | 3,1 | 32213/DF |
| | 140 | 72 | 348 | 380 | 47,5 | 2 800 | 4 800 | 5 | 31313/DF |
| **70** | 110 | 50 | 214 | 305 | 34,5 | 3 800 | 5 600 | 1,75 | 32014 X/DF |
| | 110 | 62 | 273 | 400 | 45,5 | 3 800 | 5 600 | 2,2 | 33014/DF |
| | 120 | 74 | 361 | 500 | 57 | 3 600 | 5 300 | 3,45 | 33114/DF |
| | 125 | 66,5 | 334 | 415 | 49 | 3 400 | 5 300 | 3,3 | 32214/DF |
| | 150 | 76 | 393 | 440 | 54 | 2 600 | 4 500 | 6,1 | 31314/DF |
| **75** | 115 | 62 | 286 | 455 | 52 | 3 600 | 5 300 | 2,4 | 33015/DF |
| | 115 | 62 | 286 | 455 | 52 | 3 600 | 5 300 | 2,4 | 33015/DFC240 |
| | 125 | 74 | 370 | 530 | 60 | 3 400 | 5 000 | 3,65 | 33115/DF |
| | 130 | 54,5 | 293 | 355 | 41,5 | 3 400 | 5 000 | 2,85 | 30215/DF |
| | 130 | 66,5 | 337 | 425 | 49 | 3 200 | 5 000 | 3,4 | 32215/DF |
| | 130 | 82 | 436 | 600 | 68 | 3 200 | 4 800 | 4,5 | 33215/DF |
| | 160 | 80 | 438 | 490 | 58,5 | 2 400 | 4 300 | 7,15 | ▸ 31315/DF |
| | 160 | 116 | 713 | 880 | 102 | 2 600 | 4 300 | 11 | 32315/DF |
| **80** | 125 | 58 | 288 | 430 | 49 | 3 200 | 5 000 | 2,65 | 32016 X/DF |
| | 130 | 74 | 379 | 560 | 62 | 3 200 | 4 800 | 3,8 | 33116/DF |
| | 140 | 70,5 | 391 | 490 | 57 | 3 000 | 4 500 | 4,25 | 32216/DF |
| | 140 | 92 | 527 | 750 | 83 | 3 000 | 4 500 | 5,95 | 33216/DF |
| | 170 | 85 | 473 | 530 | 61 | 2 400 | 4 000 | 8,65 | 31316/DF |
| | 170 | 123 | 693 | 1 000 | 112 | 2 600 | 4 000 | 13 | **32316/DF** |

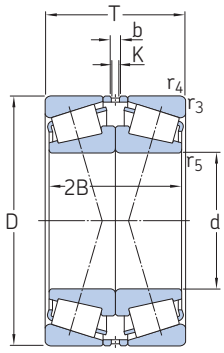
**SKF Explorer bearing**
▸ Popular item




| Dimensions | | | | | | Abutment and fillet dimensions | | | | | | Calculation factors | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | 2B | b | K | $r_{3,4}$ min. | $r_5$ min. | $d_a$ max. | $D_a$ min. | $D_a$ max. | $C_a$ min. | $r_a$ max. | $r_c$ max. | e | $Y_1$ | $Y_2$ | $Y_0$ |
| mm | | | | | | mm | | | | | | – | | | |
| **60** | 46 | 7 | 4,5 | 1,5 | 0,6 | 67 | 85 | 87 | 4 | 1,5 | 0,6 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 44 | 4 | 3 | 1,5 | 0,6 | 70 | 96 | 101 | 3 | 1,5 | 0,6 | 0,4 | 1,7 | 2,5 | 1,6 |
| | 56 | 7 | 3 | 1,5 | 0,6 | 69 | 95 | 102 | 4 | 1,5 | 0,6 | 0,4 | 1,7 | 2,5 | 1,6 |
| | 76 | 10 | 7,5 | 1,5 | 0,6 | 69 | 93 | 102 | 6 | 1,5 | 0,6 | 0,4 | 1,7 | 2,5 | 1,6 |
| | 62 | 13 | 10 | 2,5 | 1 | 74 | 103 | 119 | 5 | 2,5 | 1 | 0,83 | 0,81 | 1,2 | 0,8 |
| | 62 | 9 | 6 | 2,5 | 1 | 77 | 112 | 119 | 5 | 2,5 | 1 | 0,35 | 1,9 | 2,9 | 1,8 |
| | 92 | 15 | 6 | 2,5 | 1 | 74 | 107 | 119 | 6 | 2,5 | 1 | 0,35 | 1,9 | 2,9 | 1,8 |
| **65** | 46 | 7 | 4,5 | 1,5 | 0,6 | 73 | 90 | 92 | 4 | 1,5 | 0,6 | 0,46 | 1,5 | 2,2 | 1,4 |
| | 54 | 7 | 4,5 | 1,5 | 0,6 | 72 | 89 | 92 | 5 | 1,5 | 0,6 | 0,35 | 1,9 | 2,9 | 1,8 |
| | 46 | 5 | 3 | 1,5 | 0,6 | 78 | 106 | 111 | 4 | 1,5 | 0,6 | 0,4 | 1,7 | 2,5 | 1,6 |
| | 62 | 7 | 3 | 1,5 | 0,6 | 76 | 104 | 111 | 4 | 1,5 | 0,6 | 0,4 | 1,7 | 2,5 | 1,6 |
| | 66 | 12 | 9 | 2,5 | 1 | 80 | 111 | 129 | 5 | 2,5 | 1 | 0,83 | 0,81 | 1,2 | 0,8 |
| **70** | 50 | 6 | 4,5 | 1,5 | 0,6 | 78 | 98 | 101 | 5 | 1,5 | 0,6 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 62 | 6 | 4,5 | 1,5 | 0,6 | 78 | 99 | 101 | 5 | 1,5 | 0,6 | 0,28 | 2,4 | 3,6 | 2,5 |
| | 74 | 9 | 6 | 1,5 | 0,6 | 80 | 104 | 111 | 6 | 1,5 | 0,6 | 0,37 | 1,8 | 2,7 | 1,8 |
| | 62 | 7 | 3 | 1,5 | 0,6 | 81 | 108 | 116 | 4 | 1,5 | 0,6 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 70 | 10 | 7,5 | 2,5 | 1 | 85 | 118 | 139 | 5 | 2,5 | 1 | 0,83 | 0,81 | 1,2 | 0,8 |
| **75** | 62 | 7 | 5 | 1,5 | 0,6 | 84 | 104 | 106 | 6 | 1,5 | 0,6 | 0,3 | 2,3 | 3,4 | 2,2 |
| | 62 | 7 | 5 | 1,5 | 0,6 | 84 | 104 | 106 | 6 | 1,5 | 0,6 | 0,3 | 2,3 | 3,4 | 2,2 |
| | 74 | 9 | 7 | 1,5 | 0,6 | 84 | 109 | 116 | 6 | 1,5 | 0,6 | 0,4 | 1,7 | 2,5 | 1,6 |
| | 50 | 4 | 3 | 1,5 | 0,6 | 87 | 115 | 121 | 4 | 1,5 | 0,6 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 62 | 7 | 3 | 1,5 | 0,6 | 85 | 114 | 121 | 4 | 1,5 | 0,6 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 82 | 11 | 7,5 | 1,5 | 0,6 | 84 | 111 | 121 | 6 | 1,5 | 0,6 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 74 | 15 | 10 | 2,5 | 1 | 91 | 127 | 149 | 5 | 2,5 | 1 | 0,83 | 0,81 | 1,2 | 0,8 |
| | 110 | 15 | 7,5 | 2,5 | 1 | 92 | 133 | 149 | 7 | 2,5 | 1 | 0,35 | 1,9 | 2,9 | 1,8 |
| **80** | 58 | 5 | 2 | 1,5 | 0,6 | 90 | 112 | 116 | 6 | 1,5 | 0,6 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 74 | 9 | 6 | 1,5 | 0,6 | 89 | 114 | 121 | 6 | 1,5 | 0,6 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 66 | 4 | 4,5 | 2 | 0,6 | 91 | 122 | 130 | 5 | 2 | 0,6 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 92 | 13 | 7,5 | 2 | 0,6 | 90 | 119 | 130 | 7 | 2 | 0,6 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 78 | 15 | 10 | 2,5 | 1 | 97 | 134 | 159 | 5 | 2,5 | 1 | 0,83 | 0,81 | 1,2 | 0,8 |
| | 116 | 15 | 7,5 | 2,5 | 1 | 98 | 142 | 159 | 7 | 2,5 | 1 | 0,35 | 1,9 | 2,9 | 1,8 |

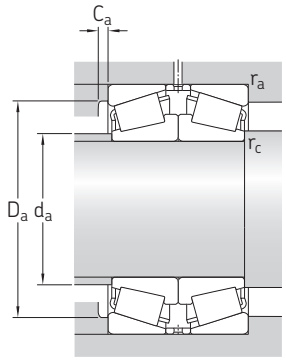
## 8.4 Matched bearings arranged face-to-face

d **85 – 110** mm




| Principal dimensions | | | Basic load ratings | | Fatigue load limit | Speed ratings | | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| | | | dynamic | static | | Reference speed | Limiting speed | | |
| d | D | T | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | kg | – |
| **85** | 130 | 58 | 293 | 450 | 51 | 3 200 | 4 800 | 2,8 | 32017 X/DF |
| | 130 | 72 | 382 | 620 | 69,5 | 3 200 | 4 800 | 3,5 | 33017/DF |
| | 150 | 61 | 370 | 440 | 51 | 3 000 | 4 300 | 4,25 | 30217/DF |
| | 150 | 77 | 451 | 570 | 65,5 | 2 800 | 4 300 | 5,4 | 32217/DF |
| | 150 | 98 | 606 | 850 | 96,5 | 2 800 | 4 300 | 7,3 | 33217/DF |
| | 180 | 89 | 510 | 570 | 64 | 2 200 | 3 800 | 9,9 | 31317/DF |
| **90** | 140 | 64 | 356 | 540 | 62 | 3 000 | 4 300 | 3,65 | 32018 X/DF |
| | 140 | 78 | 457 | 710 | 78 | 3 000 | 4 500 | 4,5 | 33018/DF |
| | 160 | 65 | 411 | 490 | 57 | 2 800 | 4 000 | 5,2 | ▸ 30218/DF |
| | 160 | 85 | 529 | 680 | 76,5 | 2 600 | 4 000 | 6,85 | 32218/DF |
| | 190 | 93 | 486 | 630 | 71 | 1 900 | 3 400 | 11,5 | ▸ 31318/DF |
| | 190 | 135 | 835 | 1 220 | 132 | 2 200 | 3 600 | 17,5 | 32318/DF |
| **95** | 145 | 64 | 353 | 540 | 61 | 2 800 | 4 300 | 3,8 | 32019 X/DF |
| | 145 | 78 | 467 | 735 | 81,5 | 2 800 | 4 300 | 4,7 | 33019/DF |
| | 170 | 91 | 597 | 780 | 86,5 | 2 600 | 3 800 | 8,4 | ▸ 32219/DF |
| | 200 | 99 | 539 | 710 | 78 | 1 800 | 3 400 | 13,5 | ▸ 31319/DF |
| **100** | 140 | 50 | 252 | 405 | 45 | 2 800 | 4 300 | 2,35 | 32920/DF |
| | 150 | 64 | 359 | 560 | 62 | 2 600 | 4 000 | 3,9 | 32020 X/DF |
| | 180 | 74 | 521 | 640 | 72 | 2 400 | 3 600 | 7,5 | ▸ 30220/DF |
| | 180 | 98 | 668 | 880 | 96,5 | 2 400 | 3 600 | 10 | ▸ 32220/DF |
| | 215 | 103 | 739 | 980 | 106 | 1 900 | 3 200 | 17 | 30320/DF |
| | 215 | 113 | 685 | 930 | 102 | 1 700 | 3 000 | 18,5 | ▸ 31320 X/DF |
| | 215 | 155 | 1 057 | 1 560 | 166 | 1 900 | 3 200 | 26 | 32320/DF |
| **105** | 160 | 70 | 426 | 670 | 73,5 | 2 600 | 3 800 | 5,05 | 32021 X/DF |
| | 190 | 78 | 571 | 710 | 80 | 2 200 | 3 400 | 9 | 30221/DF |
| | 190 | 106 | 760 | 1 020 | 110 | 2 200 | 3 400 | 12,5 | 32221/DF |
| **110** | 170 | 76 | 494 | 780 | 80 | 2 400 | 3 600 | 6,3 | 32022 X/DF |
| | 170 | 76 | 494 | 780 | 80 | 2 400 | 3 600 | 6,3 | 32022 X/DFC200 |
| | 180 | 112 | 781 | 1 250 | 132 | 2 200 | 3 400 | 11,5 | 33122/DF |
| | 200 | 82 | 561 | 800 | 86,5 | 2 200 | 3 200 | 10,5 | ▸ 30222/DF |
| | 200 | 112 | 842 | 1 140 | 122 | 2 200 | 3 200 | 14,5 | ▸ 32222/DF |
| | 240 | 126 | 841 | 1 160 | 122 | 1 500 | 2 800 | 26 | ▸ 31322 X/DF |
| | 240 | 169 | 1 158 | 1 660 | 173 | 1 700 | 2 800 | 35 | 32322/DF |

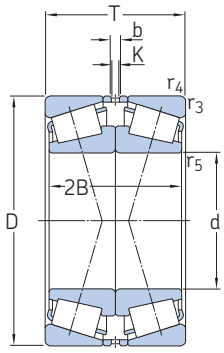
SKF Explorer bearing
▸ Popular item




| Dimensions | | | | | | Abutment and fillet dimensions | | | | | | Calculation factors | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | 2B | b | K | $r_{3,4}$ min. | $r_5$ min. | $d_a$ max. | $D_a$ min. | $D_a$ max. | $C_a$ min. | $r_a$ max. | $r_c$ max. | e | $Y_1$ | $Y_2$ | $Y_0$ |
| mm | | | | | | mm | | | | | | – | | | |
| **85** | 58 | 8 | 4,5 | 1,5 | 0,6 | 95 | 117 | 121 | 6 | 1,5 | 0,6 | 0,44 | 1,5 | 2,3 | 1,4 |
| | 72 | 6 | 4,5 | 1,5 | 0,6 | 95 | 118 | 121 | 6 | 1,5 | 0,6 | 0,3 | 2,3 | 3,4 | 2,2 |
| | 56 | 6 | 4,5 | 2 | 0,6 | 97 | 132 | 140 | 5 | 2 | 0,6 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 72 | 10 | 4,5 | 2 | 0,6 | 97 | 130 | 140 | 5 | 2 | 0,6 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 98 | 10 | 7,5 | 2 | 0,6 | 96 | 128 | 140 | 7 | 2 | 0,6 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 82 | 15 | 10 | 3 | 1 | 104 | 143 | 167 | 5 | 3 | 1 | 0,83 | 0,81 | 1,2 | 0,8 |
| **90** | 64 | 8 | 6 | 1,5 | 0,6 | 100 | 125 | 131 | 6 | 1,5 | 0,6 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 78 | 8 | 6 | 1,5 | 0,6 | 101 | 127 | 131 | 7 | 1,5 | 0,6 | 0,27 | 2,5 | 3,7 | 2,5 |
| | 60 | 6 | 4,5 | 2 | 0,6 | 104 | 140 | 150 | 5 | 2 | 0,6 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 80 | 10 | 4,5 | 2 | 0,6 | 103 | 138 | 150 | 5 | 2 | 0,6 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 86 | 15 | 10 | 3 | 1 | 110 | 151 | 177 | 5 | 3 | 1 | 0,83 | 0,81 | 1,2 | 0,8 |
| | 128 | 16 | 7,5 | 3 | 1 | 109 | 157 | 177 | 7 | 3 | 1 | 0,35 | 1,9 | 2,9 | 1,8 |
| **95** | 64 | 9 | 6 | 1,5 | 0,6 | 106 | 130 | 136 | 6 | 1,5 | 0,6 | 0,44 | 1,5 | 2,3 | 1,4 |
| | 78 | 8 | 4,5 | 1,5 | 0,6 | 105 | 131 | 136 | 7 | 1,5 | 0,6 | 0,28 | 2,4 | 3,6 | 2,5 |
| | 86 | 10 | 6 | 2,5 | 1 | 109 | 145 | 158 | 5 | 2,5 | 1 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 90 | 15 | 10 | 3 | 1 | 114 | 157 | 187 | 5 | 3 | 1 | 0,83 | 0,81 | 1,2 | 0,8 |
| **100** | 50 | 6 | 3 | 1,5 | 0,6 | 110 | 131 | 131 | 5 | 1,5 | 0,6 | 0,33 | 2 | 3 | 2 |
| | 64 | 10 | 8 | 1,5 | 0,6 | 110 | 134 | 141 | 6 | 1,5 | 0,6 | 0,46 | 1,5 | 2,2 | 1,4 |
| | 68 | 8 | 6 | 2,5 | 1 | 116 | 157 | 168 | 5 | 2,5 | 1 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 92 | 8 | 6 | 2,5 | 1 | 115 | 154 | 168 | 5 | 2,5 | 1 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 94 | 14 | 7 | 3 | 1 | 128 | 184 | 202 | 6 | 3 | 1 | 0,35 | 1,9 | 2,9 | 1,8 |
| | 102 | 13 | 10 | 3 | 1 | 121 | 168 | 202 | 7 | 3 | 1 | 0,83 | 0,81 | 1,2 | 0,8 |
| | 146 | 18 | 12 | 3 | 1 | 123 | 177 | 202 | 8 | 3 | 1 | 0,35 | 1,9 | 2,9 | 1,8 |
| **105** | 70 | 10 | 7,5 | 2 | 0,6 | 116 | 143 | 149 | 6 | 2 | 0,6 | 0,44 | 1,5 | 2,3 | 1,4 |
| | 72 | 10 | 4 | 2,5 | 1 | 123 | 165 | 178 | 5 | 2,5 | 1 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 100 | 11 | 7,5 | 2,5 | 1 | 121 | 161 | 178 | 6 | 2,5 | 1 | 0,43 | 1,6 | 2,3 | 1,6 |
| **110** | 76 | 10 | 7,5 | 2 | 0,6 | 123 | 152 | 159 | 7 | 2 | 0,6 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 76 | 10 | 7,5 | 2 | 0,6 | 123 | 152 | 159 | 7 | 2 | 0,6 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 112 | 15 | 7,5 | 2 | 0,6 | 122 | 155 | 169 | 9 | 2 | 0,6 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 76 | 10 | 7,5 | 2,5 | 1 | 129 | 174 | 188 | 6 | 2,5 | 1 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 106 | 11 | 7,5 | 2,5 | 1 | 127 | 170 | 188 | 6 | 2,5 | 1 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 114 | 13 | 10 | 3 | 1 | 136 | 188 | 227 | 8 | 3 | 1 | 0,83 | 0,81 | 1,2 | 0,8 |
| | 160 | 11 | 8 | 3 | 1 | 138 | 198 | 227 | 9 | 3 | 1 | 0,35 | 1,9 | 2,9 | 1,8 |

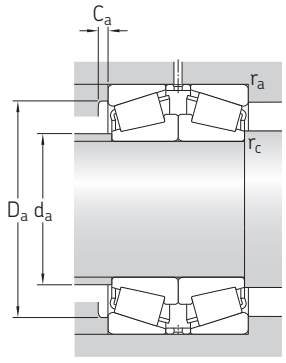
## 8.4 Matched bearings arranged face-to-face

d **120 – 180** mm




| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| d | D | T | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | kg | – |
| **120** | 180 | 76 | 513 | 830 | 85 | 2 200 | 3 400 | 6,75 | ▸ 32024 X/DF |
| | 180 | 96 | 611 | 1 080 | 112 | 2 200 | 3 400 | 8,6 | 33024/DF |
| | 215 | 87 | 716 | 915 | 98 | 2 000 | 3 000 | 12,5 | 30224/DF |
| | 215 | 123 | 983 | 1 400 | 143 | 2 000 | 3 000 | 18,5 | ▸ 32224/DF |
| | 260 | 119 | 1 031 | 1 400 | 146 | 1 600 | 2 600 | 29 | 30324/DF |
| | 260 | 136 | 992 | 1 400 | 146 | 1 400 | 2 400 | 32,5 | ▸ 31324 X/DF |
| | 260 | 181 | 1 466 | 2 240 | 220 | 1 600 | 2 600 | 45 | 32324/DF |
| **130** | 180 | 64 | 420 | 735 | 76,5 | 2 200 | 3 200 | 4,95 | 32926/DF |
| | 230 | 135,5 | 1 012 | 1 660 | 170 | 1 600 | 2 800 | 23 | ▸ 32226/DF |
| | 230 | 87,5 | 774 | 980 | 102 | 1 800 | 2 800 | 14 | 30226/DF |
| | 280 | 127,5 | 1 165 | 1 600 | 163 | 1 400 | 2 400 | 35 | 30326/DF |
| | 280 | 144 | 1 110 | 1 560 | 160 | 1 300 | 2 400 | 39,5 | ▸ 31326 X/DF |
| **140** | 190 | 64 | 432 | 780 | 80 | 2 000 | 3 000 | 5,2 | 32928/DF |
| | 210 | 90 | 692 | 1 160 | 116 | 1 900 | 2 800 | 11 | ▸ 32028 X/DF |
| | 250 | 143,5 | 1 185 | 2 000 | 200 | 1 500 | 2 600 | 29,5 | ▸ 32228/DF |
| | 250 | 91,5 | 773 | 1 140 | 116 | 1 500 | 2 600 | 18 | 30228/DF |
| | 300 | 154 | 1 264 | 1 800 | 180 | 1 200 | 2 200 | 49 | ▸ 31328 X/DF |
| **150** | 225 | 96 | 782 | 1 320 | 132 | 1 800 | 2 600 | 13,5 | ▸ 32030 X/DF |
| | 270 | 98 | 781 | 1 120 | 114 | 1 400 | 2 400 | 22 | 30230/DF |
| | 270 | 154 | 1 341 | 2 280 | 224 | 1 400 | 2 400 | 37,5 | ▸ 32230/DF |
| | 320 | 144 | 1 507 | 2 120 | 208 | 1 300 | 2 000 | 52 | 30330/DF |
| | 320 | 164 | 1 427 | 2 040 | 200 | 1 100 | 2 000 | 58,5 | ▸ 31330 X/DF |
| **160** | 240 | 102 | 912 | 1 560 | 153 | 1 600 | 2 400 | 16 | ▸ 32032 X/DF |
| | 290 | 104 | 971 | 1 460 | 143 | 1 300 | 2 200 | 27,5 | 30232/DF |
| | 290 | 168 | 1 602 | 2 800 | 265 | 1 300 | 2 200 | 48 | ▸ 32232/DF |
| **170** | 260 | 114 | 1 071 | 1 830 | 176 | 1 500 | 2 200 | 21,5 | ▸ 32034 X/DF |
| | 310 | 114 | 1 126 | 1 730 | 166 | 1 200 | 2 000 | 34,5 | 30234/DF |
| | 310 | 182 | 1 843 | 3 250 | 300 | 1 200 | 2 000 | 59,5 | ▸ 32234/DF |
| **180** | 250 | 90 | 746 | 1 460 | 137 | 1 500 | 2 200 | 14 | 32936/DF |
| | 280 | 128 | 1 360 | 2 320 | 220 | 1 400 | 2 200 | 29 | ▸ 32036 X/DF |
| | 320 | 114 | 1 079 | 1 630 | 160 | 1 200 | 2 000 | 35,5 | 30236/DF |
| | 320 | 182 | 1 833 | 3 250 | 300 | 1 100 | 1 900 | 61 | ▸ 32236/DF |

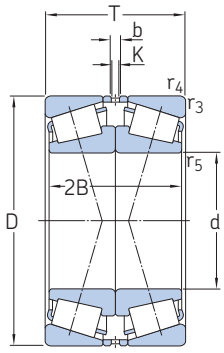
**SKF Explorer bearing**
▸ Popular item




| Dimensions | | | | | | Abutment and fillet dimensions | | | | | | Calculation factors | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | 2B | b | K | $r_{3,4}$ min. | $r_5$ min. | $d_a$ max. | $D_a$ min. | $D_a$ max. | $C_a$ min. | $r_a$ max. | $r_c$ max. | e | $Y_1$ | $Y_2$ | $Y_0$ |
| mm | | | | | | mm | | | | | | – | | | |
| **120** | 76 | 10 | 7,5 | 2 | 0,6 | 132 | 161 | 169 | 7 | 2 | 0,6 | 0,46 | 1,5 | 2,2 | 1,4 |
| | 96 | 10 | 7,5 | 2 | 0,6 | 132 | 160 | 169 | 6 | 2 | 0,6 | 0,3 | 2,3 | 3,4 | 2,2 |
| | 80 | 10 | 7,5 | 2,5 | 1 | 141 | 187 | 203 | 6 | 2,5 | 1 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 116 | 10 | 7,5 | 2,5 | 1 | 137 | 181 | 203 | 7 | 2,5 | 1 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 110 | 15 | 8 | 3 | 1 | 153 | 221 | 246 | 8 | 3 | 1 | 0,35 | 1,9 | 2,9 | 1,8 |
| | 124 | 24 | 14 | 3 | 1 | 146 | 203 | 246 | 9 | 3 | 1 | 0,83 | 0,81 | 1,2 | 0,8 |
| | 172 | 21 | 7,5 | 3 | 1 | 148 | 213 | 246 | 10 | 3 | 1 | 0,35 | 1,9 | 2,9 | 1,8 |
| **130** | 64 | 6 | 4,5 | 1,5 | 0,6 | 141 | 167 | 170 | 6 | 1,5 | 0,6 | 0,33 | 2 | 3 | 2 |
| | 128 | 10 | 7,5 | 3 | 1 | 146 | 193 | 216 | 7 | 3 | 1 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 80 | 10 | 7,5 | 3 | 1 | 152 | 203 | 216 | 6 | 3 | 1 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 116 | 17 | 10 | 4 | 1,5 | 165 | 239 | 264 | 8 | 4 | 1,5 | 0,35 | 1,9 | 2,9 | 1,8 |
| | 132 | 20 | 15 | 4 | 1,5 | 157 | 218 | 264 | 8 | 4 | 1,5 | 0,83 | 0,81 | 1,2 | 0,8 |
| **140** | 64 | 9 | 6 | 1,5 | 0,6 | 151 | 177 | 180 | 6 | 1,5 | 0,6 | 0,35 | 1,9 | 2,9 | 1,8 |
| | 90 | 13 | 7,5 | 2 | 0,6 | 153 | 187 | 199 | 8 | 2 | 0,6 | 0,46 | 1,5 | 2,2 | 1,4 |
| | 136 | 10 | 7,5 | 3 | 1 | 159 | 210 | 236 | 8 | 3 | 1 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 84 | 10 | 7,5 | 3 | 1 | 164 | 219 | 236 | 8 | 3 | 1 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 140 | 20 | 15 | 4 | 1,5 | 169 | 235 | 284 | 9 | 4 | 1,5 | 0,83 | 0,81 | 1,2 | 0,8 |
| **150** | 96 | 10 | 7,5 | 2,5 | 1 | 165 | 200 | 212 | 8 | 2,5 | 1 | 0,46 | 1,5 | 2,2 | 1,4 |
| | 90 | 15 | 10 | 3 | 1 | 176 | 234 | 256 | 9 | 3 | 1 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 146 | 10 | 7,5 | 3 | 1 | 171 | 226 | 256 | 8 | 3 | 1 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 130 | 19 | 10 | 4 | 1,5 | 189 | 273 | 303 | 9 | 4 | 1,5 | 0,35 | 1,9 | 2,9 | 1,8 |
| | 150 | 20 | 15 | 4 | 1,5 | 181 | 251 | 304 | 9 | 4 | 1,5 | 0,83 | 0,81 | 1,2 | 0,8 |
| **160** | 102 | 11 | 9 | 2,5 | 1 | 176 | 213 | 227 | 8 | 2,5 | 1 | 0,46 | 1,5 | 2,2 | 1,4 |
| | 96 | 15 | 10 | 3 | 1 | 190 | 252 | 276 | 7 | 3 | 1 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 160 | 10 | 7,5 | 3 | 1 | 183 | 242 | 276 | 10 | 3 | 1 | 0,43 | 1,6 | 2,3 | 1,6 |
| **170** | 114 | 15 | 10 | 2,5 | 1 | 188 | 230 | 247 | 10 | 2,5 | 1 | 0,44 | 1,5 | 2,3 | 1,4 |
| | 104 | 16 | 10 | 4 | 1,5 | 203 | 269 | 293 | 8 | 4 | 1,5 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 172 | 15 | 10 | 4 | 1,5 | 196 | 259 | 293 | 10 | 4 | 1,5 | 0,43 | 1,6 | 2,3 | 1,6 |
| **180** | 90 | 10 | 7,5 | 2 | 0,6 | 194 | 225 | 238 | 8 | 2 | 0,6 | 0,48 | 1,4 | 2,1 | 1,4 |
| | 128 | 15 | 10 | 2,5 | 1 | 200 | 247 | 267 | 10 | 2,5 | 1 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 104 | 15 | 10 | 4 | 1,5 | 212 | 278 | 303 | 8 | 4 | 1,5 | 0,46 | 1,5 | 2,2 | 1,4 |
| | 172 | 16 | 12 | 4 | 1,5 | 205 | 267 | 303 | 10 | 4 | 1,5 | 0,46 | 1,5 | 2,2 | 1,4 |

## 8.4 Matched bearings arranged face-to-face

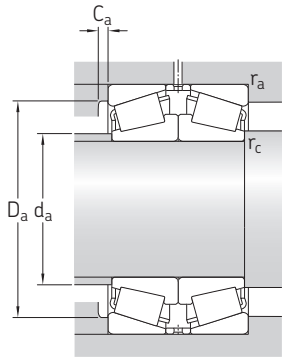
d **190 – 360** mm




| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| d | D | T | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | kg | – |
| **190** | 260 | 90 | 760 | 1 530 | 143 | 1 400 | 2 200 | 14,5 | 32938/DF |
| | 290 | 128 | 1 381 | 2 400 | 224 | 1 300 | 2 000 | 30,5 | ▸ 32038 X/DF |
| | 290 | 128 | 1 381 | 2 400 | 224 | 1 300 | 2 000 | 30,5 | ▸ 32038 X/L4BDF |
| | 340 | 120 | 1 308 | 2 000 | 190 | 1 100 | 1 800 | 42,5 | 30238/DF |
| **200** | 310 | 140 | 1 372 | 2 750 | 255 | 1 100 | 1 900 | 39 | ▸ 32040 X/DF |
| | 360 | 128 | 1 448 | 2 240 | 212 | 1 000 | 1 700 | 52 | 30240/DF |
| | 360 | 208 | 2 229 | 4 000 | 360 | 1 000 | 1 700 | 88 | ▸ 32240/DF |
| **220** | 300 | 102 | 1 030 | 2 000 | 183 | 1 200 | 1 900 | 21 | 32944/DF |
| | 340 | 152 | 1 637 | 3 350 | 300 | 1 000 | 1 700 | 51 | ▸ 32044 X/DF |
| | 400 | 144 | 1 816 | 2 800 | 255 | 950 | 1 600 | 72 | 30244/DF |
| | 400 | 228 | 2 949 | 5 400 | 465 | 900 | 1 500 | 124 | ▸ 32244/DF |
| **240** | 320 | 102 | 1 069 | 2 160 | 193 | 1 200 | 1 700 | 22,5 | 32948/DF |
| | 360 | 152 | 1 695 | 3 550 | 315 | 950 | 1 600 | 54,5 | ▸ 32048 X/DF |
| | 440 | 254 | 3 300 | 6 550 | 550 | 1 000 | 1 500 | 172 | 32248/DF |
| **260** | 400 | 174 | 2 127 | 4 400 | 380 | 850 | 1 400 | 79 | ▸ 32052 X/DF |
| | 480 | 274 | 4 013 | 7 350 | 600 | 750 | 1 200 | 213 | 32252/DF |
| **280** | 420 | 174 | 2 208 | 4 750 | 400 | 800 | 1 300 | 84 | ▸ 32056 X/DF |
| | 500 | 274 | 2 410 | 7 800 | 620 | 700 | 1 200 | 226 | 32256/DF |
| **300** | 460 | 200 | 2 818 | 6 000 | 490 | 750 | 1 200 | 119 | 32060 X/DF |
| | 540 | 280 | 2 935 | 9 500 | 735 | 630 | 1 100 | 290 | 32260/DF |
| **320** | 440 | 152 | 1 982 | 4 650 | 390 | 750 | 1 200 | 69 | 32964/DF |
| | 480 | 200 | 2 852 | 6 200 | 500 | 700 | 1 100 | 104 | 32064 X/DF |
| **340** | 460 | 152 | 1 995 | 4 800 | 390 | 700 | 1 200 | 73 | 32968/DF |
| **360** | 480 | 152 | 2 043 | 5 100 | 405 | 670 | 1 100 | 302 | 32972/DF |



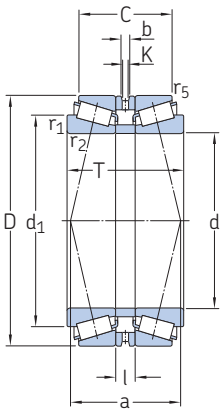
SKF Explorer bearing
▸ Popular item



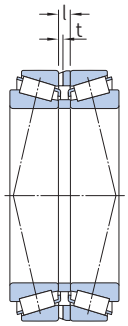

| Dimensions | | | | | | Abutment and fillet dimensions | | | | | | Calculation factors | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | 2B | b | K | $r_{3,4}$ min. | $r_5$ min. | $d_a$ max. | $D_a$ min. | $D_a$ max. | $C_a$ min. | $r_a$ max. | $r_c$ max. | e | $Y_1$ | $Y_2$ | $Y_0$ |
| mm | | | | | | mm | | | | | | – | | | |
| **190** | 90 | 10 | 7,5 | 2 | 0,6 | 205 | 235 | 248 | 8 | 2 | 0,6 | 0,48 | 1,4 | 2,1 | 1,4 |
| | 128 | 15 | 10 | 2,5 | 1 | 210 | 257 | 276 | 10 | 2,5 | 1 | 0,44 | 1,5 | 2,3 | 1,4 |
| | 128 | 15 | 10 | 2,5 | 1 | 210 | 257 | 276 | 10 | 2,5 | 1 | 0,44 | 1,5 | 2,3 | 1,4 |
| | 110 | 16 | 10 | 4 | 1,5 | 225 | 298 | 323 | 8 | 4 | 1,5 | 0,43 | 1,6 | 2,3 | 1,6 |
| **200** | 140 | 15 | 10 | 2,5 | 1 | 222 | 273 | 296 | 11 | 2,5 | 1 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 116 | 19 | 12 | 4 | 1,5 | 237 | 315 | 343 | 9 | 4 | 1,5 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 196 | 15 | 10 | 4 | 1 | 231 | 302 | 343 | 11 | 4 | 1 | 0,4 | 1,7 | 2,5 | 1,6 |
| **220** | 102 | 10 | 7,5 | 2,5 | 1 | 235 | 275 | 286 | 9 | 2,5 | 1 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 152 | 20 | 15 | 3 | 1 | 244 | 300 | 325 | 12 | 3 | 1 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 130 | 15 | 10 | 4 | 1,5 | 259 | 348 | 382 | 10 | 4 | 1,5 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 216 | 25 | 18 | 4 | 1,5 | 253 | 334 | 382 | 13 | 4 | 1,5 | 0,43 | 1,6 | 2,3 | 1,6 |
| **240** | 102 | 12 | 7,5 | 2,5 | 1 | 255 | 294 | 306 | 9 | 2,5 | 1 | 0,46 | 1,5 | 2,2 | 1,4 |
| | 152 | 20 | 15 | 3 | 1 | 262 | 318 | 345 | 12 | 3 | 1 | 0,46 | 1,5 | 2,2 | 1,4 |
| | 240 | 20 | 16 | 4 | 1,5 | 276 | 365 | 420 | 7 | 3 | 1,5 | 0,43 | 1,6 | 2,3 | 1,6 |
| **260** | 174 | 25 | 15 | 4 | 1,5 | 288 | 352 | 382 | 14 | 4 | 1,5 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 260 | 35 | 16 | 5 | 1,5 | 303 | 401 | 458 | 10 | 1,5 | 1,5 | 0,43 | 1,6 | 2,3 | 1,6 |
| **280** | 174 | 20 | 15 | 4 | 1,5 | 306 | 370 | 402 | 14 | 4 | 1,5 | 0,46 | 1,5 | 2,2 | 1,4 |
| | 260 | 20 | 16 | 5 | 1,5 | 319 | 418 | 478 | 10 | 4 | 1,5 | 0,44 | 1,5 | 2,3 | 1,4 |
| **300** | 200 | 20 | 12 | 4 | 1,5 | 330 | 404 | 440 | 10 | 1,5 | 1,5 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 298 | 36 | 18 | 5 | 1,5 | 343 | 453 | 518 | 10 | 4 | 1,5 | 0,43 | 1,6 | 2,3 | 1,6 |
| **320** | 152 | 17 | 15 | 3 | 1 | 343 | 402 | 424 | 9 | 1 | 1 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 200 | 20 | 16 | 4 | 1,5 | 350 | 424 | 460 | 15 | 1,5 | 1,5 | 0,46 | 1,5 | 2,2 | 1,4 |
| **340** | 152 | 18 | 16 | 3 | 1 | 361 | 421 | 444 | 10 | 1 | 1 | 0,44 | 1,5 | 2,3 | 1,4 |
| **360** | 152 | 22 | 16 | 3 | 1 | 380 | 439 | 464 | 10 | 2,5 | 1 | 0,46 | 1,5 | 2,2 | 1,4 |

## 8.5 Matched bearings arranged back-to-back

d **35 – 90** mm

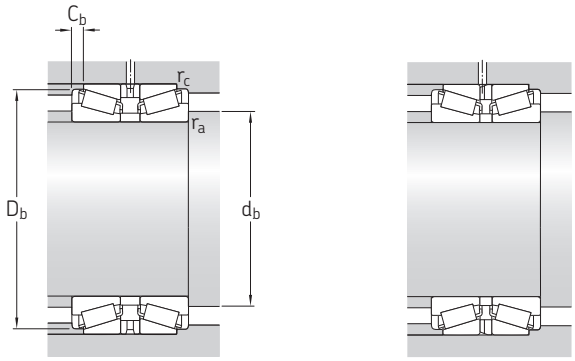



l ≥ 7 mm




l < 7 mm

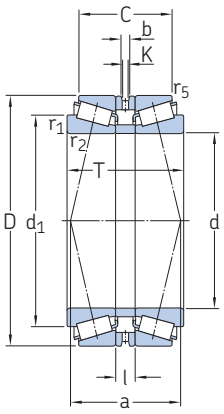
| Principal dimensions | | | Basic load ratings | | Fatigue load limit | Speed ratings | | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| | | | dynamic | static | | Reference speed | Limiting speed | | |
| d | D | T | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | kg | – |
| **35** | 72 | 64 | 178 | 212 | 23,6 | 6 300 | 9 500 | 1,15 | **33207T64/DB** |
| **40** | 68 | 41,5 | 111 | 143 | 15,3 | 6 300 | 9 500 | 0,58 | **32008T41.5 X/DB** |
| | 90 | 72 | 182 | 190 | 21,6 | 5 300 | 8 000 | 1,9 | **30308T72/DB** |
| **45** | 100 | 62,5 | 194 | 204 | 24,5 | 4 000 | 6 700 | 2,1 | **31309T62.5/DB** |
| **50** | 80 | 50 | 129 | 176 | 19,3 | 5 300 | 8 000 | 0,86 | **32010T50 X/DB** |
| | 90 | 67,5 | 173 | 200 | 22,8 | 4 800 | 7 500 | 1,5 | **32210T67.5/DB** |
| **55** | 90 | 59 | 191 | 270 | 30,5 | 4 500 | 7 000 | 1,4 | **33011T59/DB** |
| | 95 | 88 | 232 | 310 | 35,5 | 4 500 | 6 700 | 2,1 | **33111T88/DB** |
| **60** | 95 | 65 | 173 | 245 | 27 | 4 300 | 6 700 | 1,45 | **32012T65 X/DB** |
| | 110 | 53 | 207 | 228 | 26,5 | 4 000 | 6 000 | 1,9 | **30212T53/DB** |
| **65** | 100 | 53 | 176 | 255 | 28 | 4 000 | 6 000 | 1,35 | **32013T53 X/DB** |
| | 100 | 60 | 204 | 310 | 34,5 | 4 000 | 6 300 | 1,6 | **33013T60/DB** |
| | 140 | 82 | 411 | 455 | 55 | 3 200 | 4 800 | 5,3 | **30313T82/DB** |
| **70** | 110 | 63 | 214 | 305 | 34,5 | 3 800 | 5 600 | 1,9 | **32014T63 X/DB** |
| | 110 | 108,8 | 273 | 400 | 45,5 | 3 800 | 5 600 | 3,05 | **33014T108.8/DB** |
| | 125 | 59 | 267 | 310 | 36 | 3 400 | 5 300 | 2,7 | **30214T59/DB** |
| | 150 | 84 | 465 | 520 | 62 | 3 000 | 4 500 | 6,3 | **30314T84/DB** |
| **75** | 130 | 70 | 293 | 355 | 41,5 | 3 400 | 5 000 | 3,2 | **30215T70/DB** |
| | 130 | 78 | 337 | 425 | 49 | 3 200 | 5 000 | 3,7 | **32215T78/DB** |
| **80** | 140 | 78 | 391 | 490 | 57 | 3 000 | 4 500 | 4,4 | **32216T78/DB** |
| **85** | 130 | 66 | 293 | 450 | 51 | 3 200 | 4 800 | 2,85 | **32017T66 X/DB** |
| | 150 | 87 | 451 | 570 | 65,5 | 2 800 | 4 300 | 5,65 | **32217T87/DB** |
| | 150 | 145 | 606 | 850 | 96,5 | 2 800 | 4 300 | 9 | **33217T145/DB** |
| | 180 | 132 | 858 | 1 060 | 120 | 2 600 | 3 800 | 14,5 | **32317T132/DB** |
| | 180 | 133,19 | 510 | 570 | 64 | 2 200 | 3 800 | 12 | **31317T133.19/DB** |
| **90** | 150 | 104 | 532 | 780 | 85 | 2 800 | 4 300 | 6,7 | **33118T104/DB** |



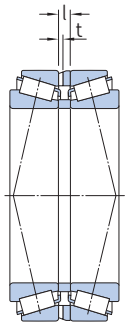

| Dimensions | | | | | | | | | | Abutment and fillet dimensions | | | | | Calculation factors | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | C | l | b | K | t | $r_{1,2}$ min. | $r_5$ min. | a | $d_b$ min. | $D_b$ min. | $C_b$ min. | $r_a$ max. | $r_c$ max. | e | $Y_1$ | $Y_2$ | $Y_0$ |
| mm | | | | | | | | | | mm | | | | | – | | | |
| **35** | 53,4 | 52 | 8 | 4 | 1,5 | – | 1,5 | 0,6 | 44 | 43,5 | 68 | 6 | 1,5 | 0,6 | 0,35 | 1,9 | 2,9 | 1,8 |
| **40** | 54,7 | 32,5 | 3,5 | – | – | 1,5 | 1 | 0,3 | 33 | 47,5 | 65 | 4,5 | 1 | 0,3 | 0,37 | 1,8 | 2,7 | 1,8 |
| | 62,5 | 61,5 | 21,5 | 9 | 6 | – | 2 | 0,6 | 60 | 49,5 | 82 | 5 | 2 | 0,6 | 0,35 | 1,9 | 2,9 | 1,8 |
| **45** | 74,7 | 44 | 8 | 5 | 3 | – | 2 | 0,6 | 70 | 55 | 95 | 9 | 2 | 0,6 | 0,83 | 0,81 | 1,2 | 0,8 |
| **50** | 65,9 | 41 | 10 | 6 | 4 | – | 1 | 0,3 | 45 | 58 | 77 | 4,5 | 1 | 0,3 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 68,6 | 56 | 18 | 10 | 2 | – | 1,5 | 0,6 | 60 | 59 | 85 | 5,5 | 1,5 | 0,6 | 0,43 | 1,6 | 2,3 | 1,6 |
| **55** | 73,1 | 47 | 5 | – | – | 2 | 1,5 | 0,6 | 43 | 64 | 86 | 6 | 1,5 | 0,6 | 0,31 | 2,2 | 3,3 | 2,2 |
| | 75,1 | 74 | 28 | 16 | 8 | – | 1,5 | 0,6 | 72 | 64 | 91 | 7 | 1,5 | 0,6 | 0,37 | 1,8 | 2,7 | 1,8 |
| **60** | 77,8 | 54 | 19 | 7 | 4,5 | – | 1,5 | 0,6 | 60 | 69 | 91 | 5,5 | 1,5 | 0,6 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 80,9 | 43,5 | 5,5 | – | – | 2 | 2 | 0,6 | 49 | 70 | 103 | 4,5 | 2 | 0,6 | 0,4 | 1,7 | 2,5 | 1,6 |
| **65** | 83,3 | 42 | 7 | 4 | 3 | – | 1,5 | 0,6 | 51 | 74 | 97 | 5,5 | 1,5 | 0,6 | 0,46 | 1,5 | 2,2 | 1,4 |
| | 82,6 | 48 | 6 | – | – | 2 | 1,5 | 0,6 | 48 | 74 | 96 | 6 | 1,5 | 0,6 | 0,35 | 1,9 | 2,9 | 1,8 |
| | 98,7 | 66 | 10 | 4 | 2 | – | 3 | 1 | 65 | 78 | 130 | 8 | 3 | 1 | 0,35 | 1,9 | 2,9 | 1,8 |
| **70** | 89,9 | 51 | 13 | 3 | 2 | – | 1,5 | 0,6 | 60 | 80 | 105 | 6 | 1,5 | 0,6 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 88,9 | 97,8 | 46,8 | 10 | 4,5 | – | 1,5 | 0,6 | 92 | 80 | 105 | 5,5 | 1,5 | 0,6 | 0,28 | 2,4 | 3,6 | 2,5 |
| | 94 | 48,5 | 6,5 | – | – | 2 | 2 | 0,6 | 57 | 81 | 118 | 5 | 2 | 0,6 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 105 | 68 | 8 | 4 | 3 | – | 3 | 1 | 66 | 83 | 140 | 8 | 3 | 1 | 0,35 | 1,9 | 2,9 | 1,8 |
| **75** | 99,8 | 59,5 | 15,5 | 8,6 | 5 | – | 2 | 0,6 | 69 | 86 | 124 | 5 | 2 | 0,6 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 100 | 65,5 | 11,5 | 7 | 2 | – | 2 | 0,6 | 70 | 86 | 125 | 6 | 2 | 0,6 | 0,43 | 1,6 | 2,3 | 1,6 |
| **80** | 106 | 63,5 | 7,5 | 4 | 3 | – | 2,5 | 0,6 | 68 | 92 | 134 | 7 | 2,5 | 0,6 | 0,43 | 1,6 | 2,3 | 1,6 |
| **85** | 108 | 52 | 8 | 4 | 3 | – | 1,5 | 0,6 | 64 | 95 | 125 | 7 | 1,5 | 0,6 | 0,44 | 1,5 | 2,3 | 1,4 |
| | 113 | 70 | 10 | 6 | 3 | – | 2,5 | 0,6 | 76 | 97 | 142 | 8,5 | 2,5 | 0,6 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 117 | 121 | 47 | 26 | 14 | – | 2,5 | 0,6 | 120 | 97 | 144 | 12 | 2,5 | 0,6 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 127 | 103 | 5 | – | – | 3 | 4 | 1 | 88 | 101 | 167 | 16,5 | 4 | 1 | 0,35 | 1,9 | 2,9 | 1,8 |
| | 131 | 100,19 | 44,19 | 15 | 10 | – | 4 | 1 | 152 | 101 | 169 | 14,5 | 4 | 1 | 0,83 | 0,81 | 1,2 | 0,8 |
| **90** | 120 | 84 | 14 | 8 | 4 | – | 2,5 | 0,6 | 83 | 102 | 144 | 10 | 2,5 | 0,6 | 0,4 | 1,7 | 2,5 | 1,6 |

## 8.5 Matched bearings arranged back-to-back

d **95 – 160** mm

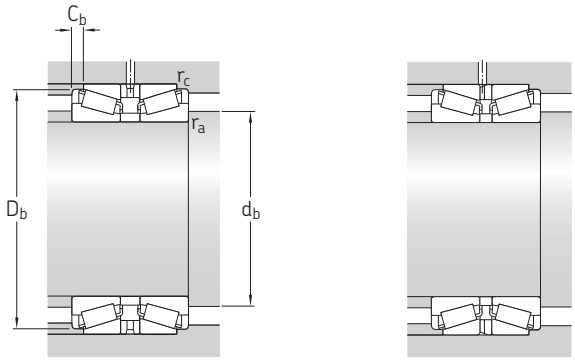



l ≥ 7 mm




l < 7 mm

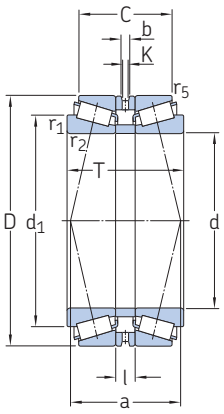
| Principal dimensions | | | Basic load ratings | | Fatigue load limit | Speed ratings | | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| | | | dynamic | static | | Reference speed | Limiting speed | | |
| d | D | T | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | kg | – |
| **95** | 170 | 105 | 597 | 780 | 86,5 | 2 600 | 3 800 | 9 | **32219T105/DB** |
| **100** | 150 | 88 | 477 | 765 | 83 | 2 800 | 4 000 | 5 | **33020T88/DB** |
| | 180 | 100 | 521 | 640 | 72 | 2 400 | 3 600 | 8,85 | **30220T100/DB** |
| | 180 | 107 | 668 | 880 | 96,5 | 2 400 | 3 600 | 10,5 | **32220T107/DB** |
| | 180 | 135 | 912 | 1 320 | 140 | 2 400 | 3 600 | 14 | **33220T135/DB** |
| | 215 | 125 | 685 | 930 | 102 | 1 700 | 3 000 | 19 | **31320T125 X/DB** |
| **105** | 190 | 88 | 571 | 710 | 80 | 2 200 | 3 400 | 9,35 | **30221T88/DB** |
| **110** | 170 | 84 | 494 | 780 | 80 | 2 400 | 3 600 | 6,5 | **32022T84 X/DB** |
| | 200 | 122 | 842 | 1 140 | 122 | 2 200 | 3 200 | 15 | **32222T122/DB** |
| | 240 | 140 | 841 | 1 160 | 122 | 1 500 | 2 800 | 26 | **31322T140 X/DB** |
| **120** | 215 | 133 | 716 | 915 | 98 | 2 000 | 3 000 | 16 | **30224T133/DB** |
| **130** | 180 | 76 | 420 | 735 | 76,5 | 2 200 | 3 200 | 5,25 | **32926T76/DB** |
| | 200 | 102 | 666 | 1 080 | 110 | 2 000 | 3 000 | 10,5 | **32026T102 X/DB** |
| | 230 | 142 | 1 012 | 1 660 | 170 | 1 600 | 2 800 | 23 | **32226T142/DB** |
| | 280 | 142 | 1 165 | 1 600 | 163 | 1 400 | 2 400 | 36,5 | **30326T142/DB** |
| | 280 | 164 | 1 110 | 1 560 | 160 | 1 300 | 2 400 | 41 | **31326T164 X/DB** |
| **140** | 210 | 130 | 692 | 1 160 | 116 | 1 900 | 2 800 | 13 | **32028T130 X/DB** |
| | 250 | 102 | 773 | 1 140 | 116 | 1 500 | 2 600 | 18,5 | **30228T102/DB** |
| | 250 | 106 | 773 | 1 140 | 116 | 1 500 | 2 600 | 19 | **30228T106/DB** |
| | 250 | 158 | 1 185 | 2 000 | 200 | 1 500 | 2 600 | 30 | **32228T158/DB** |
| | 300 | 170 | 1 264 | 1 800 | 180 | 1 200 | 2 200 | 49 | **31328T170 X/DB** |
| **150** | 225 | 112 | 782 | 1 320 | 132 | 1 800 | 2 600 | 14 | **32030T112 X/DB** |
| | 225 | 132 | 836 | 1 730 | 170 | 1 700 | 2 600 | 17 | **33030T132/DB** |
| | 270 | 164 | 1 341 | 2 280 | 224 | 1 400 | 2 400 | 37,5 | **32230T164/DB** |
| | 270 | 168 | 781 | 1 120 | 114 | 1 400 | 2 400 | 32 | **30230T168/DB** |
| | 320 | 179 | 1 427 | 2 040 | 200 | 1 100 | 2 000 | 58,5 | **31330T179 X/DB** |
| **160** | 290 | 114 | 971 | 1 460 | 143 | 1 300 | 2 200 | 28 | **30232T114/DB** |
| | 290 | 179 | 1 602 | 2 800 | 265 | 1 300 | 2 200 | 49 | **32232T179/DB** |



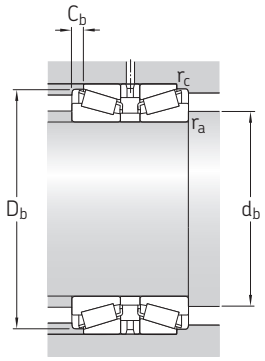

| Dimensions | | | | | | | | | | Abutment and fillet dimensions | | | | | Calculation factors | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | C | l | b | K | t | $r_{1,2}$ min. | $r_5$ min. | a | $d_b$ min. | $D_b$ min. | $C_b$ min. | $r_a$ max. | $r_c$ max. | e | $Y_1$ | $Y_2$ | $Y_0$ |
| mm | | | | | | | | | | mm | | | | | – | | | |
| **95** | 128 | 88 | 14 | 4,5 | 3 | – | 3 | 1 | 91 | 109 | 161 | 8,5 | 3 | 1 | 0,43 | 1,6 | 2,3 | 1,6 |
| **100** | 122 | 75 | 10 | 6 | 3 | – | 2 | 0,6 | 68 | 111 | 143 | 6,5 | 2 | 0,6 | 0,28 | 2,4 | 3,6 | 2,5 |
| | 134 | 84 | 26 | 9 | 3 | – | 3 | 1 | 97 | 114 | 168 | 8 | 3 | 1 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 136 | 87 | 9 | 4 | 3 | – | 3 | 1 | 91 | 114 | 171 | 10 | 3 | 1 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 139 | 105 | 9 | 4 | 3 | – | 3 | 1 | 99 | 114 | 172 | 15 | 3 | 1 | 0,4 | 1,7 | 2,5 | 1,6 |
| | 158 | 82 | 12 | 7 | 3 | – | 4 | 1 | 142 | 116 | 202 | 21,5 | 4 | 1 | 0,83 | 0,81 | 1,2 | 0,8 |
| **105** | 143 | 70 | 10 | 5 | 2 | – | 3 | 1 | 85 | 119 | 177 | 9 | 3 | 1 | 0,43 | 1,6 | 2,3 | 1,6 |
| **110** | 140 | 66 | 8 | 4,5 | 3 | – | 2,5 | 0,6 | 80 | 123 | 163 | 9 | 2,5 | 0,6 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 151 | 102 | 10 | 5 | 3 | – | 3 | 1 | 103 | 124 | 190 | 10 | 3 | 1 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 176 | 90 | 14 | 8 | 6 | – | 4 | 1 | 159 | 127 | 224 | 25 | 4 | 1 | 0,83 | 0,81 | 1,2 | 0,8 |
| **120** | 161 | 114 | 46 | 10 | 7,5 | – | 3 | 1 | 131 | 134 | 201 | 9,5 | 3 | 1 | 0,43 | 1,6 | 2,3 | 1,6 |
| **130** | 153 | 62 | 12 | 7 | 3 | – | 2 | 0,6 | 75 | 142 | 173 | 7 | 2 | 0,6 | 0,33 | 2 | 3 | 2 |
| | 165 | 80 | 12 | 8 | 6 | – | 2,5 | 0,6 | 98 | 143 | 192 | 11 | 2,5 | 0,6 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 176 | 114,5 | 6,5 | – | – | 3 | 4 | 1 | 118 | 147 | 219 | 13,5 | 4 | 1 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 192 | 112,5 | 14,5 | 6 | 3 | – | 5 | 1,5 | 116 | 149 | 255 | 14,5 | 5 | 1,5 | 0,35 | 1,9 | 2,9 | 1,8 |
| | 204 | 108 | 20 | 8 | 6 | – | 5 | 1,5 | 188 | 149 | 261 | 28 | 5 | 1,5 | 0,83 | 0,81 | 1,2 | 0,8 |
| **140** | 175 | 108 | 40 | 10,7 | 6 | – | 2,5 | 0,6 | 131 | 154 | 202 | 11 | 2,5 | 0,6 | 0,46 | 1,5 | 2,2 | 1,4 |
| | 187 | 82,5 | 10,5 | 5,5 | 4 | – | 4 | 1 | 105 | 157 | 234 | 9,5 | 4 | 1 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 187 | 86,5 | 14,5 | 5,5 | 4 | – | 4 | 1 | 109 | 157 | 234 | 9,5 | 4 | 1 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 191 | 130,5 | 14,5 | 4 | 3 | – | 4 | 1 | 134 | 157 | 238 | 13,5 | 4 | 1 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 220 | 110 | 16 | 7,5 | 6 | – | 5 | 1,5 | 196 | 160 | 280 | 30 | 5 | 1,5 | 0,83 | 0,81 | 1,2 | 0,8 |
| **150** | 187 | 88 | 16 | 4 | 3 | – | 3 | 1 | 114 | 165 | 216 | 12 | 3 | 1 | 0,46 | 1,5 | 2,2 | 1,4 |
| | 188 | 106 | 14 | 8 | 3 | – | 3 | 1 | 110 | 165 | 217 | 13 | 3 | 1 | 0,37 | 1,8 | 2,7 | 1,8 |
| | 205 | 130 | 10 | 5 | 2 | – | 4 | 1 | 138 | 167 | 254 | 17 | 4 | 1 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 200 | 146 | 70 | 6 | 4,5 | – | 4 | 1 | 171 | 167 | 250 | 11 | 4 | 1 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 234 | 115 | 15 | 8 | 6 | – | 5 | 1,5 | 207 | 170 | 300 | 32 | 5 | 1,5 | 0,83 | 0,81 | 1,2 | 0,8 |
| **160** | 215 | 90 | 10 | 4,5 | 3 | – | 4 | 1 | 118 | 177 | 269 | 12 | 4 | 1 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 222 | 145 | 11 | 6 | 4,5 | – | 4 | 1 | 150 | 178 | 274 | 17 | 4 | 1 | 0,43 | 1,6 | 2,3 | 1,6 |

## 8.5 Matched bearings arranged back-to-back

d **170 – 320** mm



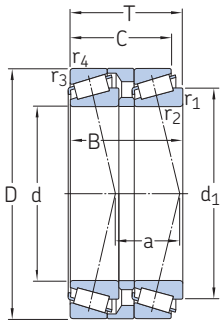

| Principal dimensions | | | Basic load ratings | | Fatigue load limit | Speed ratings | | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| | | | dynamic | static | | Reference speed | Limiting speed | | |
| d | D | T | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | kg | – |
| **170** | 310 | 194 | 1 843 | 3 250 | 300 | 1 200 | 2 000 | 60 | **32234T194/DB** |
| **180** | 250 | 103 | 746 | 1 460 | 137 | 1 500 | 2 200 | 14,5 | **32936T103/DB** |
| | 280 | 138 | 1 360 | 2 320 | 220 | 1 400 | 2 200 | 29,5 | **32036T138 X/DB** |
| | 320 | 192 | 1 833 | 3 250 | 300 | 1 100 | 1 900 | 61 | **32236T192/DB** |
| **190** | 260 | 102 | 760 | 1 530 | 143 | 1 400 | 2 200 | 15 | **32938T102/DB** |
| | 340 | 136 | 1 308 | 2 000 | 190 | 1 100 | 1 800 | 44,5 | **30238T136/DB** |
| **200** | 360 | 288 | 2 229 | 4 000 | 360 | 1 000 | 1 700 | 105 | **32240T228/DB** |
| **220** | 340 | 164 | 1 637 | 3 350 | 300 | 1 000 | 1 700 | 51,5 | **32044T164 X/DB** |
| | 400 | 248 | 2 949 | 5 400 | 465 | 900 | 1 500 | 126 | **32244T248/DB** |
| **240** | 320 | 114 | 1 069 | 2 160 | 193 | 1 200 | 1 700 | 23,5 | **32948T114/DB** |
| | 360 | 164 | 1 695 | 3 550 | 315 | 950 | 1 600 | 54,5 | **32048T164 X/DB** |
| **260** | 400 | 189 | 2 127 | 4 400 | 380 | 850 | 1 400 | 79,5 | **32052T189 X/DB** |
| **280** | 380 | 170 | 1 629 | 3 350 | 285 | 950 | 1 400 | 47,5 | **32956T170/DB** |
| **320** | 480 | 220 | 2 852 | 6 200 | 500 | 700 | 1 100 | 128 | **32064T220 X/DB** |




| Dimensions | | | | | | | | | | Abutment and fillet dimensions | | | | | Calculation factors | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | C | l | b | K | t | $r_{1,2}$ min. | $r_5$ min. | a | $d_b$ min. | $D_b$ min. | $C_b$ min. | $r_a$ max. | $r_c$ max. | e | $Y_1$ | $Y_2$ | $Y_0$ |
| mm | | | | | | | | | | mm | | | | | – | | | |
| **170** | 238 | 154 | 12 | 6 | 4,5 | – | 5 | 1,5 | 162 | 190 | 294 | 20 | 5 | 1,5 | 0,43 | 1,6 | 2,3 | 1,6 |
| **180** | 216 | 81 | 13 | 7,5 | 5 | – | 2,5 | 0,6 | 120 | 194 | 241 | 11 | 2,5 | 0,6 | 0,48 | 1,4 | 2,1 | 1,4 |
| | 230 | 106 | 10 | 4 | 3 | – | 3 | 1 | 128 | 196 | 267 | 16 | 3 | 1 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 247 | 152 | 10 | 5 | 2 | – | 5 | 1,5 | 165 | 200 | 303 | 20 | 5 | 1,5 | 0,46 | 1,5 | 2,2 | 1,4 |
| **190** | 227 | 80 | 12 | 6,5 | 5 | – | 2,5 | 0,6 | 122 | 204 | 251 | 11 | 2,5 | 0,6 | 0,48 | 1,4 | 2,1 | 1,4 |
| | 254 | 108 | 16 | 9 | 4,5 | – | 5 | 1,5 | 142 | 210 | 318 | 14 | 5 | 1,5 | 0,43 | 1,6 | 2,3 | 1,6 |
| **200** | 274 | 244 | 80 | 13,5 | 8 | – | 4 | 1 | 245 | 218 | 340 | 22 | 4 | 1 | 0,4 | 1,7 | 2,5 | 1,6 |
| **220** | 280 | 126 | 12 | 6,4 | 5 | – | 4 | 1 | 156 | 238 | 326 | 19 | 4 | 1 | 0,43 | 1,6 | 2,3 | 1,6 |
| | 306 | 200 | 20 | 8 | 5 | – | 5 | 1,5 | 210 | 241 | 379 | 24 | 5 | 1,5 | 0,43 | 1,6 | 2,3 | 1,6 |
| **240** | 280 | 90 | 12 | 7 | 4,5 | – | 3 | 1 | 140 | 256 | 311 | 12 | 3 | 1 | 0,46 | 1,5 | 2,2 | 1,4 |
| | 300 | 126 | 12 | 6 | 4,5 | – | 4 | 1 | 167 | 259 | 346 | 19 | 4 | 1 | 0,46 | 1,5 | 2,2 | 1,4 |
| **260** | 328 | 145 | 15 | 9 | 6 | – | 5 | 1,5 | 183 | 281 | 383 | 22 | 5 | 1,5 | 0,43 | 1,6 | 2,3 | 1,6 |
| **280** | 329 | 139 | 43 | 20 | 10 | – | 3 | 1 | 191 | 297 | 368 | 15,5 | 3 | 1 | 0,43 | 1,6 | 2,3 | 1,6 |
| **320** | 399 | 168 | 20 | 10 | 6 | – | 5 | 1,5 | 226 | 342 | 461 | 26 | 4 | 5 | 0,46 | 1,5 | 2,2 | 1,4 |

## 8.6 Matched bearings arranged in tandem

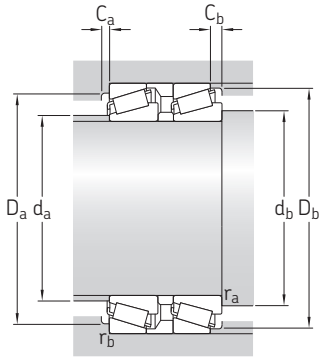
d **45 – 80** mm




| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| d | D | T | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | kg | – |
| **45** | 95 | 62 | 189 | 224 | 25,5 | 4 000 | 7 000 | 2,05 | **T7FC 045T62/DTC10** |
| **50** | 105 | 69 | 229 | 275 | 31,5 | 3 600 | 6 300 | 2,75 | **T7FC 050T69/DTC10** |
| **55** | 115 | 73 | 266 | 325 | 39 | 3 400 | 5 600 | 3,5 | **T7FC 055T73/DTC10** |
| **60** | 125 | 80 | 325 | 405 | 49 | 3 000 | 5 300 | 4,55 | **T7FC 060T80/DTC15** |
| **65** | 130 | 80 | 332 | 430 | 51 | 3 000 | 5 000 | 4,8 | **T7FC 065T80/DTC15** |
| **80** | 160 | 98 | 480 | 630 | 71 | 2 400 | 4 000 | 8,8 | **T7FC 080T98/DTC20** |



SKF Explorer bearing

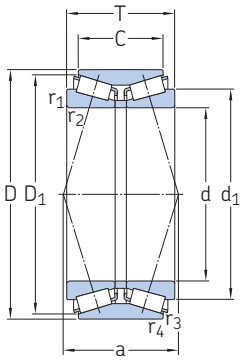



| Dimensions | | | | | | | Abutment and fillet dimensions | | | | | | | | | Calculation factors | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | B | C | $r_{1,2}$ min. | $r_{3,4}$ min. | a | $d_a$ max. | $d_b$ min. | $D_a$ min. | $D_a$ max. | $D_b$ min. | $C_a$ min. | $C_b$ min. | $r_a$ max. | $r_b$ max. | e | Y | $Y_0$ |
| mm | | | | | | | mm | | | | | | | | | – | | |
| **45** | 73,4 | 59,5 | 53 | 2,5 | 2,5 | 33 | 54 | 56 | 71 | 85 | 91 | 3 | 9 | 2,5 | 2,5 | 0,88 | 0,68 | 0,4 |
| **50** | 81,3 | 66 | 59 | 3 | 3 | 37 | 60 | 62 | 78 | 94 | 100 | 4 | 10 | 3 | 3 | 0,88 | 0,68 | 0,4 |
| **55** | 89,5 | 70 | 62,5 | 3 | 3 | 39 | 66 | 68 | 86 | 104 | 109 | 4 | 10,5 | 3 | 3 | 0,88 | 0,68 | 0,4 |
| **60** | 97,2 | 76,5 | 69 | 3 | 3 | 43 | 72 | 73 | 94 | 113 | 119 | 4 | 11 | 3 | 3 | 0,83 | 0,72 | 0,4 |
| **65** | 102 | 76,5 | 69 | 3 | 3 | 43 | 77 | 78 | 98 | 118 | 124 | 4 | 11 | 3 | 3 | 0,88 | 0,68 | 0,4 |
| **80** | 125 | 94 | 84 | 3 | 3 | 53 | 94 | 94 | 121 | 148 | 152 | 5 | 14 | 3 | 3 | 0,88 | 0,68 | 0,4 |

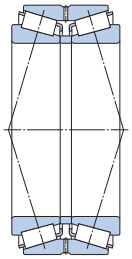
## 8.7 Double row tapered roller bearings, TDO design

d **101,6 – 355,6** mm

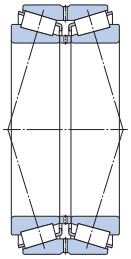
*4 – 14 in.*



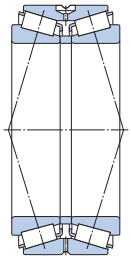

TDO



TDO/D



TDO/D2



TDO/XDC

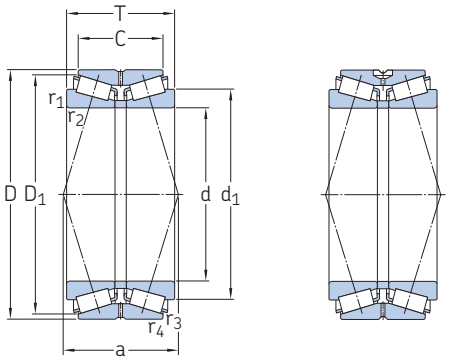
| Principal dimensions | | | | Basic load ratings dynamic | static | Fatigue load limit | Mass | Designation | Design variant/ feature |
|---|---|---|---|---|---|---|---|---|---|
| d | D | T | C | C | $C_0$ | $P_u$ | | | |
| mm/*in.* | | | | kN | | kN | kg | – | – |
| **101,6**<br>*4* | 146,05<br>*5.75* | 49,212<br>*1.9375* | 38,94<br>*1.5331* | 267 | 375 | 40,5 | 2,45 | **BT2B 332767 A** | TDO/D |
| **155**<br>*6.1024* | 200<br>*7.874* | 66<br>*2.5984* | 54<br>*2.126* | 312 | 620 | 60 | 4,85 | **BT2B 328957** | TDO/D |
| **228,6**<br>*9* | 488,95<br>*19.25* | 254<br>*10* | 152,4<br>*6* | 3 143 | 4 500 | 390 | 205 | **331945** | TDO/D |
| **254**<br>*10* | 422,275<br>*16.625* | 173,038<br>*6.8125* | 128,66<br>*5.0654* | 2 393 | 4 050 | 355 | 87,5 | **BT2B 328615** | TDO/D |
| | 422,275<br>*16.625* | 178,592<br>*7.0312* | 139,7<br>*5.5* | 2 393 | 4 050 | 355 | 97,5 | **BT2B 331782** | TDO/D |
| **260**<br>*10.2362* | 440<br>*17.3228* | 144<br>*5.6693* | 128<br>*5.0394* | 1 994 | 3 450 | 305 | 86,5 | **617479 B** | TDO/XDC |
| | 480<br>*18.8976* | 284<br>*11.1811* | 220<br>*8.6614* | 4 330 | 7 350 | 600 | 210 | **BT2B 328130** | TDO |
| **300**<br>*11.811* | 500<br>*19.6851* | 203<br>*7.9921* | 152<br>*5.9843* | 2 992 | 5 100 | 425 | 140 | **BT2B 328383/HA1** | TDO/D2 |
| **300,038**<br>*11.8125* | 422,275<br>*16.625* | 174,625<br>*6.875* | 136,525<br>*5.375* | 2 177 | 4 750 | 400 | 71,5 | **BT2B 332504/HA2** | TDO/XDC |
| **317,5**<br>*12.5* | 447,675<br>*17.625* | 180,975<br>*7.125* | 146,05<br>*5.75* | 2 521 | 5 400 | 440 | 84 | **BT2B 332516 A/HA1** | TDO/XDC |
| **330,2**<br>*13* | 482,6<br>*19* | 177,8<br>*7* | 127<br>*5* | 1 293 | 5 000 | 415 | 100 | **BT2B 332845/HA2** | TDO/D |
| **333,375**<br>*13.125* | 469,9<br>*18.5* | 190,5<br>*7.5* | 152,4<br>*6* | 2 642 | 5 700 | 465 | 98 | **331775 B** | TDO/XDC |
| **340**<br>*13.3858* | 460<br>*18.1102* | 160<br>*6.2992* | 128<br>*5.0394* | 2 196 | 4 900 | 400 | 71 | **BT2B 332830** | TDO/D |
| **342,9**<br>*13.5* | 533,4<br>*21* | 174,625<br>*6.875* | 123,825<br>*4.875* | 2 540 | 4 400 | 365 | 130 | **BT2B 332802 A** | TDO/D |
| **346,075**<br>*13.625* | 488,95<br>*19.25* | 200,025<br>*7.875* | 158,75<br>*6.25* | 2 835 | 6 300 | 510 | 110 | **331981** | TDO/D |
| **355,6**<br>*14* | 444,5<br>*17.5* | 136,525<br>*5.375* | 111,125<br>*4.375* | 1 353 | 3 650 | 300 | 46 | **BT2B 332505/HA2** | TDO/XDC |
| | 501,65<br>*19.75* | 155,575<br>*6.125* | 107,95<br>*4.25* | 1 976 | 4 250 | 345 | 87 | **BT2B 332506/HA2** | TDO/D |

| Dimensions | | | | | | Calculation factors | | | | Comparative data[1] Load ratings | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | $r_{1,2}$ min. | $r_{3,4}$ min. | a | e | $Y_1$ | $Y_2$ | $Y_0$ | radial $C_F$ | axial $C_{Fa}$ | Thrust factor K |
| mm/*in.* | mm | | | | | – | | | | kN | | – |
| **101,6**<br>*4* | 106 | 142 | 1,5 | 0,8 | 54 | 0,37 | 1,8 | 2,7 | 1,8 | 71 | 25,2 | 1,61 |
| **155**<br>*6.1024* | 161 | 189 | 1,5 | 0,6 | 75 | 0,35 | 1,9 | 2,9 | 1,8 | 83 | 28,9 | 1,66 |
| **228,6**<br>*9* | 400 | 456 | 6,4 | 1,5 | 326 | 0,94 | 0,72 | 1,07 | 0,7 | 780 | 726 | 0,62 |
| **254**<br>*10* | 331 | 400 | 6,8 | 1,5 | 153 | 0,33 | 2 | 3 | 2 | 585 | 193 | 1,76 |
| | 331 | 400 | 6,8 | 1,5 | 158 | 0,33 | 2 | 3 | 2 | 585 | 193 | 1,76 |
| **260**<br>*10.2362* | 341 | 406 | 5 | 1,5 | 156 | 0,37 | 1,8 | 2,7 | 1,8 | 490 | 179 | 1,56 |
| | 366 | 454 | 5 | 1,5 | 233 | 0,43 | 1,6 | 2,3 | 1,6 | 1 080 | 456 | 1,36 |
| **300**<br>*11.811* | 387 | 465 | 5 | 1,5 | 205 | 0,4 | 1,7 | 2,5 | 1,6 | 735 | 297 | 1,43 |
| **300,038**<br>*11.8125* | 357 | 403 | 6,4 | 1,5 | 162 | 0,33 | 2 | 3 | 2 | 540 | 176 | 1,73 |
| **317,5**<br>*12.5* | 376 | 428 | 3,5 | 1,5 | 170 | 0,33 | 2 | 3 | 2 | 620 | 204 | 1,74 |
| **330,2**<br>*13* | 401 | 454 | 3,3 | 1,5 | 184 | 0,4 | 1,7 | 2,5 | 1,6 | 585 | 225 | 1,49 |
| **333,375**<br>*13.125* | 398 | 452 | 6,4 | 1,5 | 180 | 0,33 | 2 | 3 | 2 | 655 | 217 | 1,73 |
| **340**<br>*13.3858* | 394 | 442 | 3 | 1 | 161 | 0,31 | 2,2 | 3,3 | 2,2 | 540 | 167 | 1,86 |
| **342,9**<br>*13.5* | 422 | 496 | 4,8 | 1,5 | 180 | 0,33 | 2 | 3 | 2 | 620 | 202 | 1,76 |
| **346,075**<br>*13.625* | 413 | 467 | 6,4 | 1,5 | 186 | 0,33 | 2 | 3 | 2 | 695 | 230 | 1,74 |
| **355,6**<br>*14* | 398 | 428 | 3,5 | 1,5 | 151 | 0,31 | 2,2 | 3,3 | 2,2 | 325 | 100 | 1,9 |
| | 431 | 481 | 6,4 | 1,5 | 197 | 0,44 | 1,5 | 2,3 | 1,4 | 480 | 207 | 1,33 |

[1] For additional information → *Comparative load ratings for double row tapered roller bearings*, page 685

## 8.7 Double row tapered roller bearings, TDO design

d **360 – 431,8** mm
*14.1732 – 17 in.*




TDO/D



TDO/XDC

| Principal dimensions | | | | Basic load ratings dynamic | static | Fatigue load limit | Mass | Designation | Design variant/ feature |
|---|---|---|---|---|---|---|---|---|---|
| d | D | T | C | C | $C_0$ | $P_u$ | | | |
| mm/*in.* | | | | kN | | kN | kg | – | – |
| **360**<br>*14.1732* | 480<br>*18.8976* | 160<br>*6.2992* | 128<br>*5.0394* | 2 211 | 5 000 | 405 | 73 | **BT2B 332831** | TDO/D |
| **368,249**<br>*14.498* | 523,875<br>*20.625* | 214,312<br>*8.4375* | 169,862<br>*6.6875* | 3 380 | 7 500 | 585 | 140 | **BT2B 332603/HA1** | TDO/D |
| **368,3**<br>*14.5* | 596,9<br>*23.5* | 203,2<br>*8* | 133,35<br>*5.25* | 3 270 | 5 850 | 465 | 188 | **BT2B 332754** | TDO/XDC |
| **371,475**<br>*14.625* | 501,65<br>*19.75* | 155,575<br>*6.125* | 107,95<br>*4.25* | 1 976 | 4 250 | 345 | 76,5 | **331606 A** | TDO/XDC |
| **380**<br>*14.9606* | 520<br>*20.4725* | 148<br>*5.8268* | 112<br>*4.4095* | 2 289 | 4 500 | 365 | 80 | **BT2B 328020** | TDO/D |
| **384,175**<br>*15.125* | 546,1<br>*21.5* | 222,25<br>*8.75* | 177,8<br>*7* | 3 724 | 8 300 | 640 | 161 | **331197 A** | TDO/D |
| **406,4**<br>*16* | 539,75<br>*21.25* | 142,875<br>*5.625* | 101,6<br>*4* | 1 817 | 4 400 | 345 | 82,5 | **BT2B 328389** | TDO/XDC |
| **415,925**<br>*16.375* | 590,55<br>*23.25* | 244,475<br>*9.625* | 193,675<br>*7.625* | 4 175 | 9 650 | 720 | 205 | **331656** | TDO/XDC |
| **431,8**<br>*17* | 571,5<br>*22.5* | 155,575<br>*6.125* | 111,125<br>*4.375* | 1 145 | 5 100 | 405 | 100 | **BT2B 332604/HA1** | TDO/D |
| | 571,5<br>*22.5* | 192,088<br>*7.5625* | 146,05<br>*5.75* | 2 847 | 6 950 | 530 | 127 | **BT2B 332237 A/HA1** | TDO/XDC |

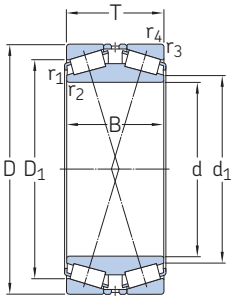
| Dimensions | | | | | | Calculation factors | | | | Comparative data[1] Load ratings | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | $r_{1,2}$ min. | $r_{3,4}$ min. | a | e | $Y_1$ | $Y_2$ | $Y_0$ | radial $C_F$ | axial $C_{Fa}$ | Thrust factor K |
| mm/*in.* | mm | | | | | – | | | | kN | | – |
| **360**<br>*14.1732* | 414 | 462 | 3 | 1 | 169 | 0,33 | 2 | 3 | 2 | 540 | 175 | 1,77 |
| **368,249**<br>*14.498* | 438 | 499 | 6,4 | 1,5 | 196 | 0,33 | 2 | 3 | 2 | 830 | 273 | 1,76 |
| **368,3**<br>*14.5* | 469 | 552 | 9,7 | 2,3 | 220 | 0,4 | 1,7 | 2,5 | 1,6 | 800 | 330 | 1,41 |
| **371,475**<br>*14.625* | 431 | 481 | 6,4 | 1,5 | 198 | 0,44 | 1,5 | 2,3 | 1,4 | 480 | 207 | 1,33 |
| **380**<br>*14.9606* | 438 | 497 | 4 | 1,5 | 162 | 0,3 | 2,3 | 3,4 | 2,2 | 560 | 167 | 1,92 |
| **384,175**<br>*15.125* | 457 | 521 | 6,4 | 0,6 | 205 | 0,33 | 2 | 3 | 2 | 915 | 301 | 1,76 |
| **406,4**<br>*16* | 473 | 516 | 6,4 | 1,5 | 215 | 0,48 | 1,4 | 2,1 | 1,4 | 440 | 207 | 1,23 |
| **415,925**<br>*16.375* | 497 | 563 | 6,4 | 1,5 | 225 | 0,33 | 2 | 3 | 2 | 1 040 | 332 | 1,76 |
| **431,8**<br>*17* | 500 | 547 | 3,3 | 1,5 | 254 | 0,54 | 1,25 | 1,8 | 1,3 | 510 | 280 | 1,07 |
| | 500 | 550 | 6,4 | 1,5 | 234 | 0,44 | 1,5 | 2,3 | 1,4 | 695 | 301 | 1,33 |

[1] For additional information → *Comparative load ratings for double row tapered roller bearings*, page 685

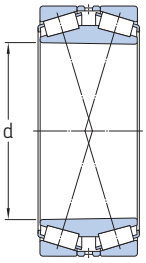
## 8.8 Double row tapered roller bearings, TDI design

d **203,2 – 343,052** mm

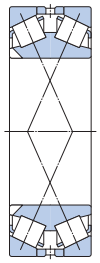
*8 – 13.506 in.*



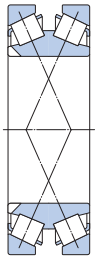

TDI/Y2



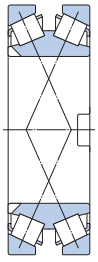

TDIT/Y2



TDIS/N



TDIS/NY



TDIS/N2Y

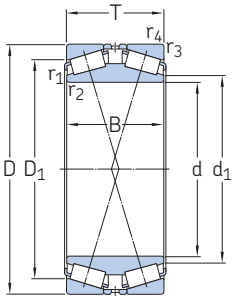
| Principal dimensions | | | | Basic load ratings dynamic | static | Fatigue load limit | Mass | Designation | Design variant/ feature |
|---|---|---|---|---|---|---|---|---|---|
| d | D | T | B | C | $C_0$ | $P_u$ | | | |
| mm/*in.* | | | | kN | | kN | kg | – | – |
| **203,2**<br>*8* | 368,3<br>*14.5* | 158,75<br>*6.25* | 152,4<br>*6.25* | 1 985 | 3 350 | 305 | 75 | **BT2B 332683/HA1** | TDI/WIY2 |
| **240**<br>*9.4488* | 480<br>*18.8976* | 220<br>*8.6614* | 200<br>*7.874* | 3 615 | 5 500 | 465 | 183 | **BT2B 332931** | TDI/WIY2 |
| **254**<br>*10* | 438,15<br>*17.25* | 165,1<br>*6.5* | 165,1<br>*6.5* | 2 685 | 4 250 | 365 | 100 | **BT2B 332536/HA1** | TDI/WIY2 |
| **300**<br>*11.811* | 440<br>*17.3228* | 105<br>*4.1339* | 105<br>*4.1339* | 1 076 | 2 040 | 180 | 48,5 | **332168** | TDIS/NY |
| **300,038**<br>*11.8125* | 422,275<br>*16.625* | 150,812<br>*5.9375* | 150,812<br>*5.9375* | 2 177 | 4 750 | 400 | 70 | **331951** | TDI/GWIY2 |
| **303,212**<br>*11.9375* | 495,3<br>*19.5* | 263,525<br>*10.375* | 263,525<br>*10.375* | 4 919 | 9 800 | 750 | 212 | **BT2B 332685/HA1** | TDIT/Y2 |
| **305,033**<br>*12.0092* | 560<br>*22.0473* | 199,263<br>*7.874* | 200<br>*7.874* | 1 677 | 5 300 | 430 | 205 | **BT2B 334087/HA3** | TDIS/N2Y |
| | 560<br>*22.0473* | 200<br>*7.845* | 200<br>*7.874* | 1 677 | 5 300 | 430 | 200 | **332068** | TDIS/N2Y |
| **305,07**<br>*12.0106* | 500<br>*19.6851* | 200<br>*7.874* | 200<br>*7.874* | 2 734 | 5 200 | 425 | 150 | **332169 A** | TDIS/N |
| | 500<br>*22.0473* | 200<br>*7.844* | 200<br>*7.844* | 2 734 | 5 200 | 425 | 150 | **332169 AA** | TDIS/NY |
| | 560<br>*19.6851* | 199,237<br>*7.874* | 199,237<br>*7.874* | 3 102 | 5 300 | 430 | 200 | **331617** | TDIS/N2Y |
| **317,5**<br>*12.5* | 422,275<br>*16.625* | 128,588<br>*5.0625* | 128,588<br>*5.0625* | 1 785 | 4 150 | 345 | 51,5 | **BT2B 328699 G/HA1** | TDI/GWIY2 |
| **333,375**<br>*13.125* | 469,9<br>*18.5* | 166,688<br>*6.5625* | 166,688<br>*6.5625* | 2 642 | 5 700 | 465 | 92,5 | **BT2B 328695 A/HA1** | TDIT/Y2 |
| **342,9**<br>*13.5* | 533,4<br>*21* | 139,7<br>*5.5* | 146,05<br>*5.75* | 1 373 | 4 400 | 365 | 115 | **331713 A** | TDI/WIY2 |
| | 533,4<br>*21* | 139,7<br>*5.5* | 146,05<br>*5.75* | 1 373 | 4 400 | 365 | 115 | **331713 B** | TDI/GWIY2 |
| **343,052**<br>*13.506* | 457,098<br>*17.996* | 122,238<br>*4.8125* | 122,238<br>*4.8125* | 1 610 | 3 400 | 280 | 54 | **332240 A** | TDI/GWIY2 |

| Dimensions | | | | | Calculation factors | | | | Comparative data[1] Load ratings | | Thrust factor |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | $r_{1,2}$ min. | $r_{3,4}$ min | e | $Y_1$ | $Y_2$ | $Y_0$ | radial $C_F$ | axial $C_{Fa}$ | K |
| mm/*in.* | mm | | | | – | | | | kN | | |
| **203,2**<br>*8* | 237 | 310 | 3,3 | 3,3 | 0,4 | 1,7 | 2,5 | 1,6 | 490 | 193 | 1,45 |
| **240**<br>*9.4488* | 284 | 377 | 2,5 | 5 | 0,72 | 0,94 | 1,4 | 0,9 | 900 | 634 | 0,82 |
| **254**<br>*10* | 295 | 380 | 3,3 | 6,4 | 0,35 | 1,9 | 2,9 | 1,8 | 670 | 233 | 1,63 |
| **300**<br>*11.811* | 340 | 377 | 4 | 4 | 0,88 | 0,77 | 1,15 | 0,8 | 260 | 224 | 0,67 |
| **300,038**<br>*11.8125* | 327 | 375 | 3,3 | 3,3 | 0,33 | 2 | 3 | 2 | 540 | 176 | 1,73 |
| **303,212**<br>*11.9375* | 338 | 417 | 3,3 | 6,4 | 0,33 | 2 | 3 | 2 | 1 220 | 403 | 1,76 |
| **305,033**<br>*12.0092* | 355 | 450 | 3,3 | 6,4 | 0,88 | 0,77 | 1,15 | 0,8 | 765 | 657 | 0,67 |
| | 369 | 446 | 3,3 | 6 | 0,88 | 0,77 | 1,15 | 0,8 | 765 | 657 | 0,67 |
| **305,07**<br>*12.0106* | 352 | 405 | 6,4 | 4,8 | 0,88 | 0,77 | 1,15 | 0,8 | 680 | 582 | 0,67 |
| | 352 | 405 | 6,4 | 4,8 | 0,88 | 0,77 | 1,15 | 0,8 | 680 | 582 | 0,67 |
| | 369 | 446 | 3,3 | 18 | 0,88 | 0,77 | 1,15 | 0,8 | 765 | 657 | 0,67 |
| **317,5**<br>*12.5* | 341 | 382 | 1,5 | 3,3 | 0,31 | 2,2 | 3,3 | 2,2 | 440 | 137 | 1,83 |
| **333,375**<br>*13.125* | 364 | 419 | 3,3 | 3,3 | 0,33 | 2 | 3 | 2 | 655 | 217 | 1,73 |
| **342,9**<br>*13.5* | 393 | 474 | 3,3 | 3,3 | 0,33 | 2 | 3 | 2 | 620 | 202 | 1,76 |
| | 393 | 474 | 3,3 | 3,3 | 0,33 | 2 | 3 | 2 | 620 | 202 | 1,76 |
| **343,052**<br>*13.506* | 369 | 410 | 1,5 | 3,3 | 0,48 | 1,4 | 2,1 | 1,4 | 390 | 184 | 1,24 |

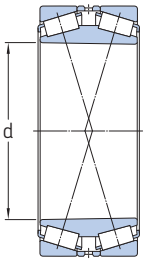
[1] For additional information → *Comparative load ratings for double row tapered roller bearings*, page 685

## 8.8 Double row tapered roller bearings, TDI design

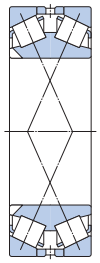
d **346,075 – 408,4** mm
*13.625 – 16.0787 in.*



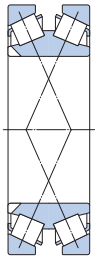

TDI/Y2



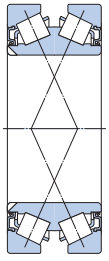

TDIT/Y2



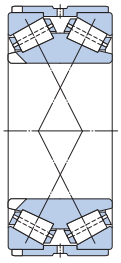
TDIS/N



TDIS/NY



TDIS/NVY



TDIS.2/N

| Principal dimensions | | | | Basic load ratings dynamic | static | Fatigue load limit | Mass | Designation | Design variant/ feature |
|---|---|---|---|---|---|---|---|---|---|
| d | D | T | B | C | $C_0$ | $P_u$ | | | |
| mm/*in.* | | | | kN | | kN | kg | – | – |
| **346,075**<br>*13.625* | 488,95<br>*19.25* | 104,775<br>*4.125* | 95,25<br>*3.75* | 675 | 2 750 | 228 | 62 | **BT2B 332913/HB1** | TDI/Y2 |
| | 488,95<br>*19.25* | 174,625<br>*6.875* | 174,625<br>*6.875* | 2 835 | 6 300 | 510 | 110 | **331527 C** | TDI/WIY2 |
| | 488,95<br>*19.25* | 174,625<br>*6.875* | 174,625<br>*6.875* | 2 835 | 6 300 | 510 | 113 | **BT2B 328410 C/HA1** | TDIT/Y2 |
| **360**<br>*14.1732* | 560<br>*22.0473* | 160<br>*6.2992* | 160<br>*6.2992* | 2 556 | 4 650 | 390 | 140 | **BT2-8000/HA3** | TDIS/N |
| **368,3**<br>*14.5* | 523,875<br>*20.625* | 185,738<br>*7.3125* | 185,738<br>*7.3125* | 3 380 | 7 500 | 585 | 133 | **BT2B 331836** | TDI/Y2 |
| | 523,875<br>*20.625* | 185,738<br>*7.3125* | 185,738<br>*7.3125* | 3 380 | 7 500 | 585 | 140 | **BT2B 332468 A/HA1** | TDIT/Y2 |
| **380**<br>*14.9606* | 560<br>*22.0473* | 200<br>*7.874* | 200<br>*7.874* | 1 617 | 6 550 | 520 | 165 | **BT2-8009/HA3** | TDIS/NY |
| **384,175**<br>*15.125* | 546,1<br>*21.5* | 193,675<br>*7.625* | 193,675<br>*7.625* | 3 724 | 8 300 | 640 | 152 | **331158 A** | TDI/GWIY2 |
| | 546,1<br>*21.5* | 193,675<br>*7.625* | 193,675<br>*7.625* | 3 724 | 8 300 | 640 | 152 | **BT2B 331837** | TDI/Y2 |
| | 546,1<br>*21.5* | 193,675<br>*7.625* | 193,675<br>*7.625* | 3 724 | 8 300 | 640 | 166 | **BT2B 328580/HA1** | TDIT/Y2 |
| **386**<br>*15.1969* | 574<br>*22.5984* | 220<br>*8.6614* | 220<br>*8.6614* | 2 967 | 6 550 | 510 | 185 | **BT2-8010/HA3VA901** | TDIS/NVY |
| **390**<br>*15.3543* | 546,1<br>*22.441* | 141,288<br>*7.874* | 141,288<br>*7.874* | 2 339 | 5 100 | 405 | 102 | **BT2B 328705/HA1** | TDI/Y2 |
| | 570<br>*21.5* | 200<br>*5.5625* | 200<br>*5.5625* | 2 967 | 6 550 | 510 | 170 | **BT2B 328896/HA3** | TDIS/NY |
| | 590<br>*23.2284* | 200<br>*7.874* | 200<br>*7.874* | 2 967 | 6 550 | 510 | 200 | **BT2B 328934/HA3** | TDIS.2/N |
| **406,4**<br>*16* | 546,1<br>*21.5* | 138,113<br>*5.4375* | 138,113<br>*5.4375* | 2 339 | 5 100 | 405 | 89 | **BT2B 331840 C/HA1** | TDI/WIY2 |
| **408,4**<br>*16.0787* | 546,1<br>*21.5* | 120<br>*4.7244* | 98<br>*3.8583* | 1 603 | 3 450 | 285 | 76,5 | **BT2B 328874/HA1** | TDI/Y2 |
| | 546,1<br>*21.5* | 150<br>*5.9055* | 125<br>*4.9213* | 1 963 | 4 750 | 375 | 99 | **BT2B 328466/HA1** | TDI/Y2 |

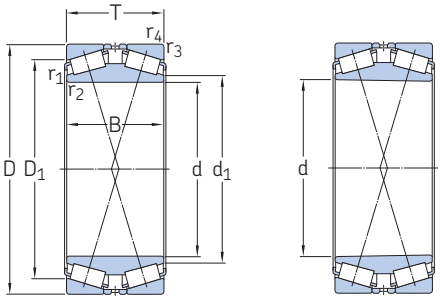
| Dimensions | | | | | Calculation factors | | | | Comparative data[1] Load ratings | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | $r_{1,2}$ min. | $r_{3,4}$ min | e | $Y_1$ | $Y_2$ | $Y_0$ | radial $C_F$ | axial $C_{Fa}$ | Thrust factor K |
| mm/*in.* | mm | | | | – | | | | kN | | |
| **346,075** *13.625* | 391 | 429 | 1,5 | 6,4 | 0,5 | 1,35 | 2 | 1,3 | 300 | 148 | 1,17 |
| | 378 | 434 | 3,3 | 3,3 | 0,33 | 2 | 3 | 2 | 695 | 230 | 1,74 |
| | 378 | 434 | 3,3 | 3,3 | 0,33 | 2 | 3 | 2 | 695 | 230 | 1,74 |
| **360** *14.1732* | 400 | 480 | 3 | 5 | 0,72 | 0,94 | 1,4 | 0,9 | 630 | 450 | 0,8 |
| **368,3** *14.5* | 401 | 464 | 3,3 | 6,4 | 0,33 | 2 | 3 | 2 | 830 | 273 | 1,76 |
| | 401 | 464 | 3,3 | 6,4 | 0,33 | 2 | 3 | 2 | 830 | 273 | 1,76 |
| **380** *14.9606* | 420 | 474 | 5 | 5 | 0,79 | 0,85 | 1,25 | 0,8 | 735 | 582 | 0,73 |
| **384,175** *15.125* | 417 | 484 | 3,3 | 6,4 | 0,33 | 2 | 3 | 2 | 915 | 301 | 1,76 |
| | 417 | 484 | 3,3 | 6,4 | 0,33 | 2 | 3 | 2 | 915 | 301 | 1,76 |
| | 417 | 484 | 3,3 | 6,4 | 0,33 | 2 | 3 | 2 | 915 | 301 | 1,76 |
| **386** *15.1969* | 416 | 498 | 3 | 5 | 0,83 | 0,81 | 1,2 | 0,8 | 735 | 599 | 0,71 |
| **390** *15.3543* | 435 | 491 | 3,3 | 6,4 | 0,48 | 1,4 | 2,1 | 1,4 | 570 | 264 | 1,23 |
| | 426 | 475 | 5 | 5 | 0,83 | 0,81 | 1,2 | 0,8 | 735 | 599 | 0,71 |
| | 426 | 474 | 5 | 5 | 0,83 | 0,81 | 1,2 | 0,8 | 735 | 599 | 0,71 |
| **406,4** *16* | 435 | 491 | 1,5 | 6,4 | 0,48 | 1,4 | 2,1 | 1,4 | 570 | 264 | 1,23 |
| **408,4** *16.0787* | 442 | 480 | 1 | 3 | 0,88 | 0,77 | 1,15 | 0,8 | 390 | 329 | 0,68 |
| | 437 | 470 | 1,5 | 3,3 | 0,83 | 0,81 | 1,2 | 0,8 | 480 | 387 | 0,71 |

[1] For additional information → *Comparative load ratings for double row tapered roller bearings*, page 685

## 8.8 Double row tapered roller bearings, TDI design

d **409,575 – 450** mm

*16.125 – 17.7165 in.*




TDI/Y2 TDIT/Y2

| Principal dimensions | | | | Basic load ratings dynamic | static | Fatigue load limit | Mass | Designation | Design variant/ feature |
|---|---|---|---|---|---|---|---|---|---|
| d | D | T | B | C | $C_0$ | $P_u$ | | | |
| mm/*in.* | | | | kN | | kN | kg | – | – |
| **409,575**<br>*16.125* | 546,1<br>*21.5* | 161,925<br>*6.375* | 161,925<br>*6.375* | 2 669 | 6 550 | 500 | 110 | **331714 B** | TDI/GWIY2 |
| **415,925**<br>*16.375* | 590,55<br>*23.25* | 209,55<br>*8.25* | 209,55<br>*8.25* | 4 175 | 9 650 | 720 | 192 | **331445** | TDI/GWIY2 |
| | 590,55<br>*23.25* | 209,55<br>*8.25* | 209,55<br>*8.25* | 4 175 | 9 650 | 720 | 192 | **BT2B 328283/HA1** | TDIT/Y2 |
| **430**<br>*16.9291* | 535<br>*21.063* | 84<br>*3.3071* | 84<br>*3.3071* | 1 080 | 3 000 | 240 | 44,5 | **BT2B 334013/HA1** | TDI/Y2 |
| **450**<br>*17.7165* | 595<br>*23.4252* | 178<br>*7.0079* | 178<br>*7.0079* | 3 169 | 8 150 | 610 | 140 | **BT2B 328523/HA1** | TDI/WIY2 |

| Dimensions | | | | | Calculation factors | | | | Comparative data[1] Load ratings | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | $r_{1,2}$ min. | $r_{3,4}$ min | e | $Y_1$ | $Y_2$ | $Y_0$ | radial $C_F$ | axial $C_{Fa}$ | Thrust factor K |
| mm/*in.* | mm | | | | – | | | | kN | | |
| **409,575** *16.125* | 439 | 496 | 1,5 | 6,4 | 0,43 | 1,6 | 2,3 | 1,6 | 655 | 268 | 1,4 |
| **415,925** *16.375* | 454 | 523 | 3,3 | 6,4 | 0,33 | 2 | 3 | 2 | 1 040 | 332 | 1,76 |
| | 455 | 523 | 3,3 | 6,4 | 0,33 | 2 | 3 | 2 | 1 040 | 332 | 1,76 |
| **430** *16.9291* | 462 | 494 | 1 | 3 | 0,54 | 1,25 | 1,8 | 1,3 | 260 | 142 | 1,06 |
| **450** *17.7165* | 488 | 540 | 3 | 6 | 0,33 | 2 | 3 | 2 | 780 | 256 | 1,76 |



[1] For additional information → *Comparative load ratings for double row tapered roller bearings*, page 685

# 9 Spherical roller bearings

# 9 Spherical roller bearings


**Designs and variants** . . . . . **775**
CC, CA and E design bearings . . . . . 775
Sealed bearings . . . . . 776
Bearings for vibratory applications. . . . . 778
Bearings for wind energy applications . . . . . 780
Customized bearings . . . . . 780
Bearings for high-speed applications. . . . . 780

**Bearing data** . . . . . **781**
(Dimension standards, tolerances, internal clearance, permissible misalignment)

**Loads** . . . . . **784**
(Minimum load, axial load carrying capacity, equivalent dynamic bearing load, equivalent static bearing load)

**Temperature limits** . . . . . **785**

**Permissible speed** . . . . . **785**

**Design considerations** . . . . . **786**
Free space on both sides of the bearing. . . . . 786
Abutments for sealed bearings . . . . . 786
Bearings on sleeves . . . . . 787
Appropriate bearing housings . . . . . 788

**Mounting** . . . . . **788**

**Designation system** . . . . . **790**

**Product tables**
**9.1** Spherical roller bearings . . . . . 792
**9.2** Spherical roller bearings on an adapter sleeve . . . . 824
**9.3** Spherical roller bearings on a withdrawal sleeve . . 832

**Other spherical roller bearings**
NoWear coated bearings . . . . . 1059

# 9 Spherical roller bearings

## More information


**General bearing knowledge** . . . . **17**

**Bearing selection process** . . . . . **59**
Lubrication . . . . . 109
Bearing interfaces. . . . . 139
Seat tolerances for standard conditions . . . . . 148
Selecting internal clearance . . . . . 182
Sealing, mounting and dismounting . . . . . 193

**Mounting instructions for individual bearings** → skf.com/mount

**SKF Drive-up Method** → skf.com/drive-up



*SKF bearing maintenance handbook* ISBN 978-91-978966-4-1


Spherical roller bearings have two rows of symmetrical rollers, a common sphered outer ring raceway and two inner ring raceways inclined at an angle to the bearing axis (fig. 1). The centre point of the sphere in the outer ring raceway is at the bearing axis.

### Bearing features

- **Accommodate misalignment**
  Spherical roller bearings are self-aligning like self-aligning ball bearings or CARB bearings (fig. 2).
- **High load carrying capacity**
  Spherical roller bearings are designed to accommodate both heavy radial loads and axial loads in both directions.
- **Long service life**
  The rollers are manufactured to such tight dimensional and geometrical tolerances that they are practically identical in a roller set. The symmetrical rollers self-adjust (fig. 3), providing optimal load distribution along the roller length and together with the special profile prevent stress peaks at the roller ends (fig. 4).
- **Low friction**
  Self-guiding rollers keep friction and frictional heat at low levels (fig. 5). A floating guide ring guides unloaded rollers so that they enter the load zone in the optimal position.
- **Robust**
  All SKF spherical roller bearings contain strong window- or prong-type cages.

Fig. 1

**Spherical roller bearing**

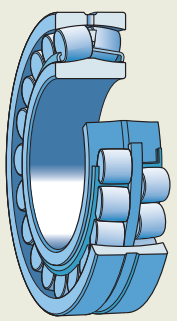
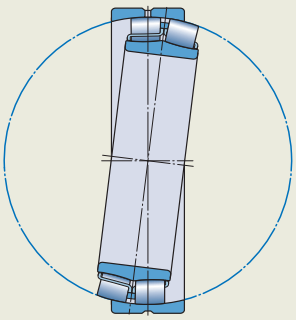


Fig. 2

**Self-aligning property of the bearing**



# Designs and variants

## SKF standard assortment

The assortment of SKF spherical roller bearings is the widest available on the market. The standard assortment includes:

- CC, CA and E design bearings
- sealed bearings
- bearings for vibratory applications
- bearings for wind energy applications

All SKF spherical roller bearings are SKF Explorer bearings (page 7) and almost all bearings are available with the option of a tapered bore. Depending on the bearing series, the tapered bore has:

- a taper 1:12 (designation suffix K)
- a taper 1:30 (designation suffix K30)

For sizes and variants not listed in the product tables, contact SKF.

# CC, CA and E design bearings

## CC design bearings

- have two stamped window-type steel cages, an inner ring without flanges and a floating guide ring centred on the inner ring (fig. 6)
- are indicated in the product table by the designation suffix C or CC
- are indicated in the product table by the designation suffix EC or ECC for larger bearings and have an optimized internal design for increased load carrying capacity

## CA design bearings

- have a machined double prong-type brass cage, an inner ring with a retaining flange on both sides and a floating guide ring centred on the inner ring (fig. 6)

  The flanges on the inner ring are designed to keep the rollers in place when swivelling the bearing during mounting or maintenance and are not designed to guide the rollers or accommodate any axial load.
- are indicated in the product table by the designation suffix CA
- are indicated in the product table by the designation suffix ECA for larger bearings and have an optimized internal design for increased load carrying capacity

## E design bearings

- have two stamped window-type steel cages, an inner ring without flanges and a floating guide ring centred on the inner ring ($d \leq 65$ mm) or on the cages ($d > 65$ mm) (fig. 6)
- are indicated in the product table by the designation suffix E
- have an optimized internal design for increased load carrying capacity

## Cages

For information about the suitability of cages, refer to *Cages*, page 187.

**Fig. 3**

**Self-adjusting property of the rollers**

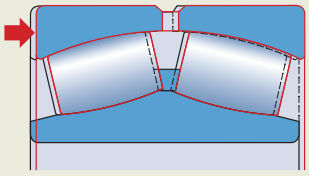


**Fig. 4**

**Load distribution over the roller length**

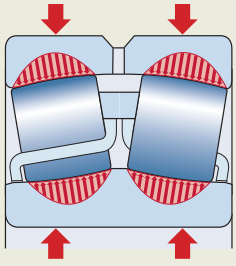


**Fig. 5**

**Optimal roller guidance**

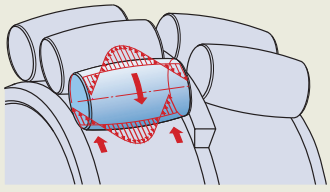
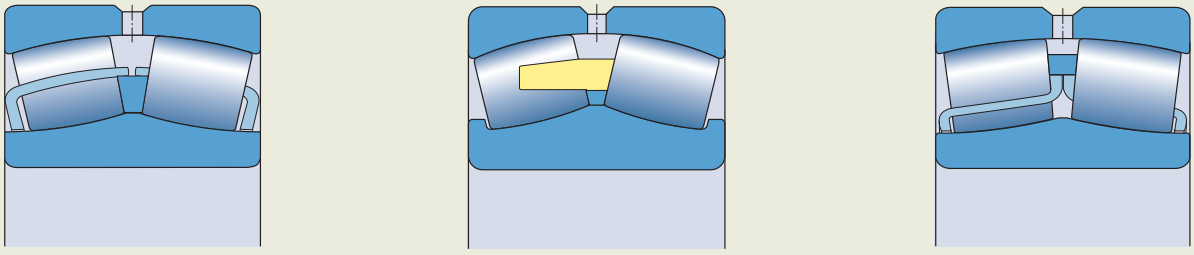


**Fig. 6**

**Basic design bearings**



CC design

CA design

E design

### Annular groove and lubrication holes

- CC and CA design bearings are available with an annular groove and three lubrication holes in the outer ring (designation suffix W33) or three lubrication holes in the outer ring (designation suffix W20) (**fig. 7**).
- E design bearings have an annular groove and three lubrication holes as standard (**fig. 6**, **page 775**). This feature is not identified in the bearing designation (no designation suffix).

# Sealed bearings

- have the same features and internal design as open spherical roller bearings
- are available with a cylindrical bore as standard
- are supplied grease lubricated and should not be washed
- are equipped with an annular groove and three lubrication holes in the outer ring, except for those with the designation suffix W
- are fitted with a contact seal, on one or both sides, made of one of the following materials:
  - sheet steel reinforced NBR (designation suffix CS or RS)
  - sheet steel reinforced HNBR (designation suffix CS5 or RS5)
  - sheet steel reinforced FKM (designation suffix CS2)

The seals are fitted in a recess on the outer ring and seal against the inner ring (**fig. 8**). On larger bearings, the seals are fixed by a retaining ring (**fig. 9**).

Bearings sealed on both sides are lubricated for the life of the bearing and are virtually maintenance-free (*Grease life for sealed bearings*). They are filled with one of the following greases (**table 1**):

- SKF LGEP 2 grease (designation suffix VT143) as standard
- SKF LGHB 2 grease (designation suffix GEM9) or LGWM 2 grease (designation suffix GLE) on request

For additional information about greases, refer to *Selecting a suitable SKF grease*, **page 116**.

### Grease life for sealed bearings

The grease life for sealed bearings is presented as $L_{10}$, i.e. the time period at the end of which 90% of the bearings are still reliably lubricated, and depends on the load, operating temperature and speed value. It can be obtained for bearings with standard SKF LGEP 2 grease (designation suffix VT143) from:

- **diagram 1**, for light load ($P \leq 0{,}067\ C$)
- **diagram 2**, **page 778**, for normal load ($P \leq 0{,}125\ C$)

The grease life is valid under the following operating conditions:

- horizontal shaft
- inner ring rotation
- operating temperature within the green temperature zone of the grease (**table 1**)
- stationary machine
- low vibration levels
- load ratio $F_a/F_r \leq e$ (**product table**, **page 792**)
- rotational speed below the limiting speed (**product table**) and below the limits listed in **table 2**, **page 778**

For other operating conditions, the grease life can be estimated by multiplying the relubrication interval for open bearings (*Estimating the relubrication interval for grease*, **page 111**) by a factor of 2,7.

**Fig. 7**

**Annular groove and lubrication holes**

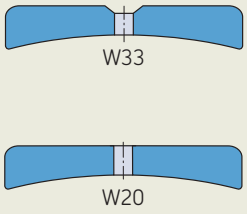



**Fig. 8**

**Seals fitted in outer ring recess**

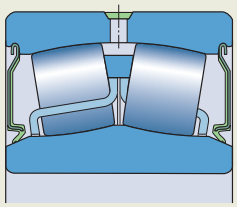
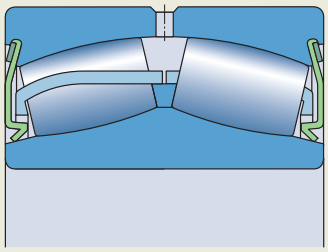


**Fig. 9**

**Seals fixed by a retaining ring**



## Relubrication of sealed bearings

When the required service life is longer than the grease life, the bearings may require relubrication. A suitable grease quantity to relubricate sealed bearings can be obtained using

$G_p = 0{,}0015\ D\ B$

where

$G_p$ = grease quantity [g]
D = bearing outside diameter [mm]
B = bearing width [mm]

The grease should be applied slowly through the lubrication holes in the outer ring, preferably while the bearing is rotating to avoid damaging the seals. SKF recommends relubricating with the same grease as the initial fill.

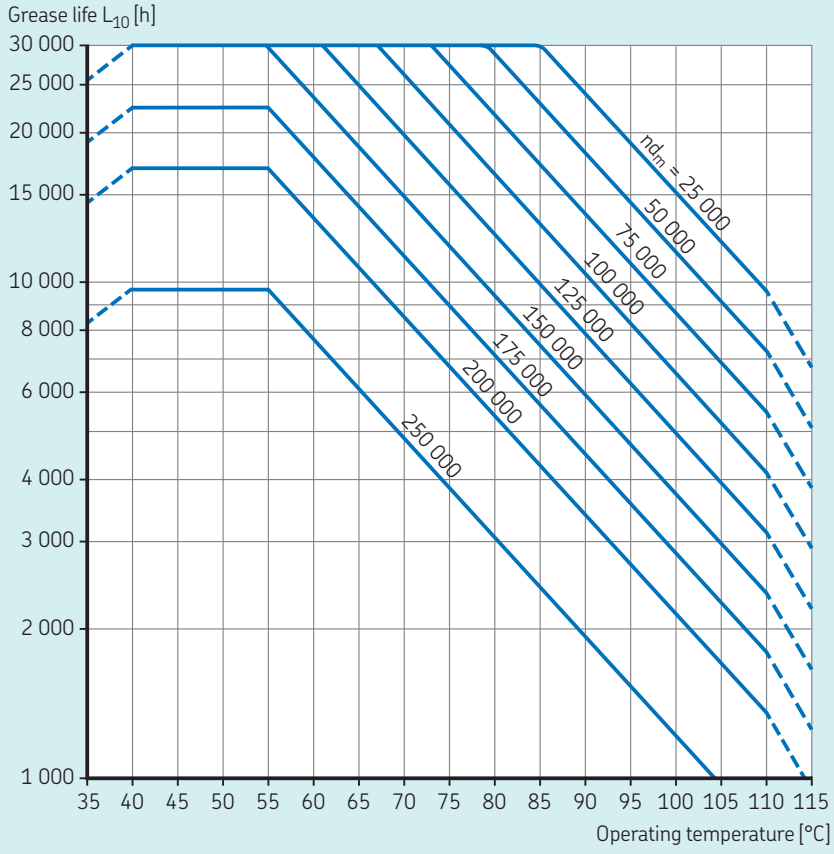
**⚠ WARNING**

Seals made of FKM (fluoro rubber) exposed to an open flame or temperatures above 300 °C *(570 °F)* are a health and environmental hazard! They remain dangerous even after they have cooled.

Read and follow the safety precautions on page 197.

**Diagram 1**

**Grease life for sealed spherical roller bearings with designation suffix VT143 where P ≤ 0,067 C**




n = rotational speed [r/min]
$d_m$ = bearing mean diameter [mm]
= 0,5 (d + D)

**Table 1**

**Technical specifications of SKF greases for sealed spherical roller bearings**

| Designation suffix | Grease | Temperature range[1] | Thickener | Base oil type | NLGI grade | Base oil viscosity [mm²/s] at 40 °C *(105 °F)* | at 100 °C *(210 °F)* |
|---|---|---|---|---|---|---|---|
| | | –50 0 50 100 150 200 250 °C<br>*–60 30 120 210 300 390 480 °F* | | | | | |
| **VT143** | LGEP 2 | | Lithium soap | Mineral | 2 | 200 | 16 |
| **GEM9** | LGHB 2 | | Calcium complex sulphonate | Mineral | 2 | 400 | 26,5 |
| **GLE** | LGWM 2 | | Calcium complex sulphonate | Mineral/ Synthetic | 2 | 80 | 8,6 |

[1] Refer to the SKF traffic light concept (page 117).

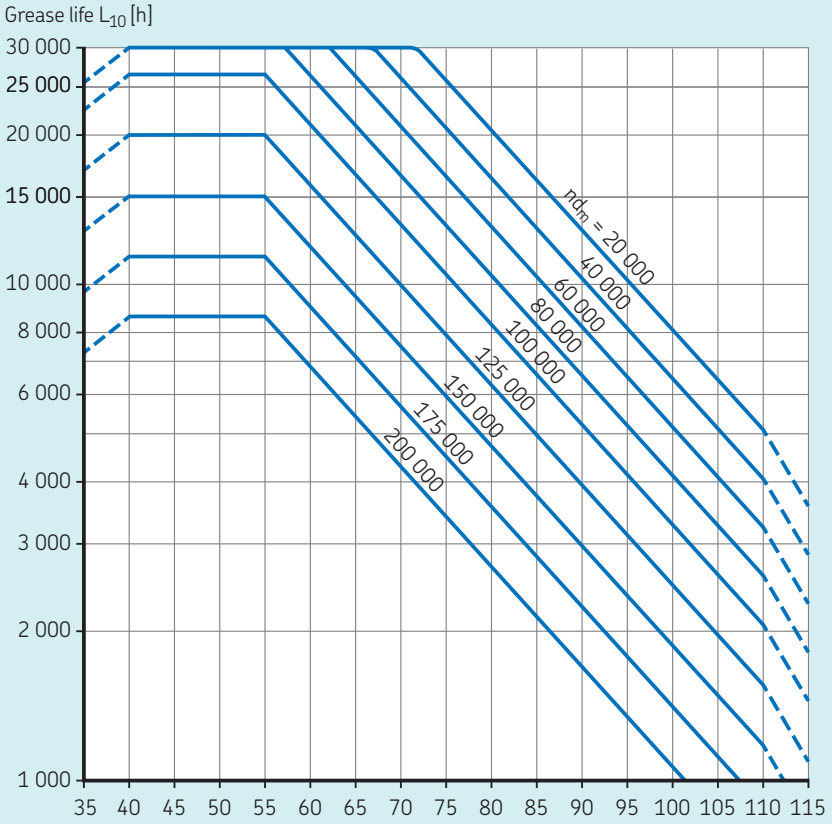
# Bearings for vibratory applications

- are available in the 223 series
- are available with a cylindrical or tapered bore
- have C4 radial internal clearance as standard
- are equipped with an annular groove and three lubrication holes in the outer ring
- are available with a PTFE coated cylindrical bore (designation suffix VA406), which prevents fretting corrosion between the shaft and the bearing bore, for shaft thermal elongation in non-locating bearing positions that have a rotating outer ring load

  Therefore, shafts do not require special heat treatments or coatings.
- are manufactured to one of the following designs (fig. 10):
  - E/VA405 bearings have two surface-hardened stamped window-type steel cages, an inner ring without flanges and a guide ring centred on the inner ring or on the cages.
  - EJA/VA405 and CCJA/W33VA405 bearings have two surface-hardened stamped window-type steel cages, an inner ring without flanges and a guide ring centred on the outer ring raceway.

**Diagram 2**

**Grease life for sealed spherical roller bearings with designation suffix VT143 where P ≤ 0,125 C**




n = rotational speed [r/min]
$d_m$ = bearing mean diameter [mm]
= 0,5 (d + D)

**Table 2**

**Speed limits for grease life calculation for sealed spherical roller bearings**

| Bearing series | Maximum $nd_m$ value<br>Light load<br>(P ≤ 0,067 C) | <br>Normal load<br>(P ≤ 0,125 C) |
|---|---|---|
| – | mm/min | |
| **222, 239** | 250 000 | 200 000 |
| **223, 230, 231, 232, 240** | 250 000 | 150 000 |
| **241** | 150 000 | 80 000 |

## Acceleration

Vibratory applications induce accelerations of the rollers and cages in the bearings. This puts extra demands on the bearing design. SKF spherical roller bearings for vibratory applications can withstand considerably higher accelerations than corresponding standard bearings. The permissible acceleration depends on the lubricant and the mode of acceleration.

- **Mode 1**
  The bearing is subjected to a rotating outer ring load in combination with a rotating acceleration field, or an internally induced angular acceleration field caused by rapid speed variations. These accelerations cause the unloaded rollers to generate cyclic loads on the cages. Examples: vibrating screens (**fig. 11**), exciters, planetary gears and general arrangements subjected to rapid starts or rapid speed variations.

- **Mode 2**
  The bearing is subjected to impact loads, which generate a linear acceleration in a constant radial direction, causing the unloaded rollers to "hammer" the cage pockets. Example: acceleration generated when rail wheels roll over rail joints (**fig. 12**).

Road rollers, where the roller is vibrating against a relatively hard surface, are subjected to a combination of mode 1 and 2 acceleration. Values for the permissible acceleration are listed in the **product table**, **page 792**, and are valid for oil lubricated bearings. The values are expressed in multiples of g, where g is the acceleration of gravity (g = 9,81 m/s$^2$).

**⚠ WARNING**

PTFE coatings exposed to an open flame or temperatures above 300 °C *(570 °F)* are a health and environmental hazard! They remain dangerous even after they have cooled.

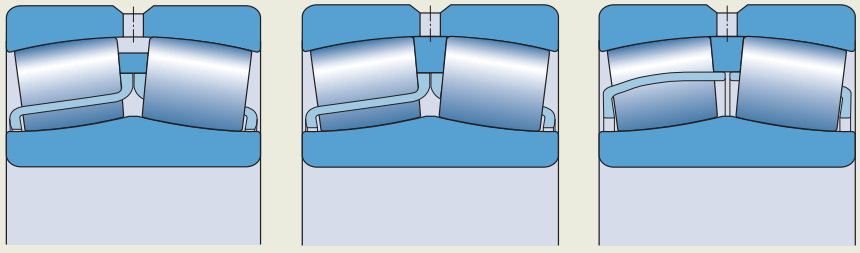
Read and follow the safety precautions on **page 197**.

## System solutions for vibrating screens

In addition to single bearings for vibrating screens, SKF has developed fault detection and bearing arrangements that can improve performance, reduce maintenance and monitor machine condition in vibratory equipment.

**Fig. 10**

**Bearings for vibratory applications**



E/VA405 design | EJA/VA405 design | CCJA/W33VA405 design

**Fig. 11**

**Vibrating screen**

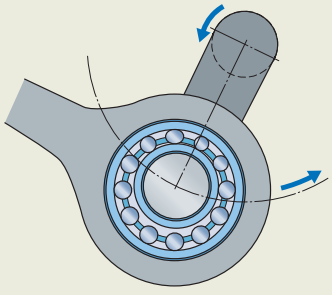
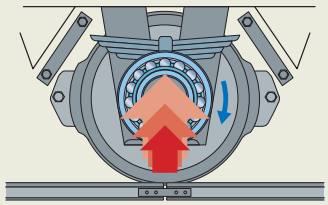


**Fig. 12**

**Rail wheel rolls over rail joints**



# Bearings for wind energy applications

- are available in the 240 series, from d ≥ 530 mm
- are designed explicitly for wind turbine main shafts
- have an optimized internal geometry with large diameter rollers and increased contact angle for increased axial load carrying capacity (fig. 13)
- have a roller-guided cast iron cage for increased robustness
- have no guide ring
- have a wide outer ring lubrication groove and six lubrication holes
- are indicated in the product table, page 792, by the designation suffix BC

# Customized bearings

SKF can customize bearings to meet the needs of applications where the bearings are subjected to unique operating conditions. For example, bearings for:

- printing presses, paper mills or high-precision coating systems
- very arduous operating conditions, e.g. continuous casters
- bearings for high-speed applications
- mounting with loose fit on roll necks
- railway vehicles

# Bearings for high-speed applications

- have 50% higher limiting speeds than standard bearings
- are available in the 223, 232, 240 and 241 series in a special execution
- are identified by the designation suffix VA991
- address a market need in multi-megawatt industrial gearboxes

For additional information about application-specific spherical roller bearings, contact SKF.

Fig. 13

**Bearing for wind turbine main shaft**

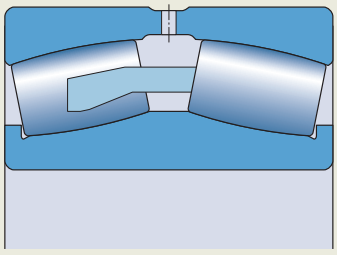


Fig. 14

**Rotating shaft deflection**

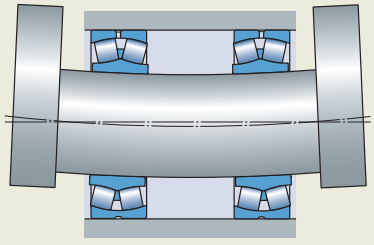


Table 3

**Width tolerances for SKF Explorer spherical roller bearings**

| Bore diameter d | | Width tolerances $t_{\Delta Bs}$ | |
|---|---|---|---|
| > | ≤ | U | L |
| mm | | µm | |
| **18** | **80** | 0 | –60 |
| **80** | **250** | 0 | –80 |
| **250** | **300** | 0 | –100 |

Table 6

**Permissible angular misalignment**

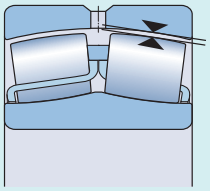
| Bearing series Sizes | Permissible angular misalignment |
|---|---|
| – | ° |
| **Series 213** | 2 |
| **Series 222** | |
| Sizes < 52 | 2 |
| Sizes ≥ 52 | 1,5 |
| **Series 223** | 3 |
| **Series 230** | |
| Sizes < 56 | 2 |
| Sizes ≥ 56 | 2,5 |
| **Series 231** | |
| Sizes < 60 | 2 |
| Sizes ≥ 60 | 3 |
| **Series 232** | |
| Sizes < 52 | 2,5 |
| Sizes ≥ 52 | 3,5 |
| **Series 238** | 1,5 |
| **Series 239** | 1,5 |
| **Series 240** | 2 |
| **Series 241** | |
| Sizes < 64 | 2,5 |
| Sizes ≥ 64 | 3,5 |
| **Series 248** | 1,5 |
| **Series 249** | 2,5 |

# Bearing data

| | |
|---|---|
| **Dimension standards** | Boundary dimensions: ISO 15, except for the width of sealed bearings with a BS2- designation prefix |
| **Tolerances**<br><br>For additional information<br>→ page 35 | Normal<br>P5 geometrical tolerance on request (designation suffix C08)<br><br>Except for:<br><br>• **Bearings with d ≤ 300 mm:**<br>– width tolerance at least 50% tighter than ISO standard (table 3)<br>– P5 geometrical tolerance<br><br>• **Bearings for vibratory applications:**<br>– P5 bore diameter<br>– P6 outside diameter<br><br>Values: ISO 492, (table 2, page 38, to table 4, page 40) |
| **Internal clearance**<br><br>For additional information<br>→ page 182 | Normal, C3<br>Check availability of C2, C4 or C5 clearance classes<br>**Bearings for vibratory applications:** C4<br><br>Values:<br>• cylindrical bore (table 4, page 782)<br>• tapered bore (table 5, page 783)<br><br>Values are in accordance with ISO 5753-1 (as far as standardized) and are valid for unmounted bearings under zero measuring load. |
| **Permissible misalignment** | • Guideline values for light to normal loads (P ≤ 0,1 C) and constant position of misalignment relative to the outer ring: table 6<br>Whether these values can be fully exploited depends on the design of the bearing arrangement, the bearing abutments in the housing, etc.<br>• When the position of the misalignment is not constant relative to the outer ring, additional sliding may occur in the bearing, limiting misalignment to a few tenths of a degree. Examples are:<br>– vibrating screens with rotating imbalance and therefore rotating deflection of the shaft (fig. 14)<br>– deflection-compensating rolls of paper machines where the stationary shaft is not straight<br>• To avoid detrimental effects on sealing performance, misalignment for sealed bearings should not exceed 0,5°. |

Table 4

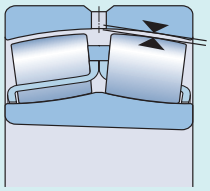
**Radial internal clearance of spherical roller bearings with a cylindrical bore**



| Bore diameter | | Radial internal clearance | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | | C2 | | Normal | | C3 | | C4 | | C5 | |
| > | ≤ | min. | max. | min. | max. | min. | max. | min. | max. | min. | max. |
| mm | | µm | | | | | | | | | |
| **18** | **24** | 10 | 20 | 20 | 35 | 35 | 45 | 45 | 60 | 60 | 75 |
| **24** | **30** | 15 | 25 | 25 | 40 | 40 | 55 | 55 | 75 | 75 | 95 |
| **30** | **40** | 15 | 30 | 30 | 45 | 45 | 60 | 60 | 80 | 80 | 100 |
| **40** | **50** | 20 | 35 | 35 | 55 | 55 | 75 | 75 | 100 | 100 | 125 |
| **50** | **65** | 20 | 40 | 40 | 65 | 65 | 90 | 90 | 120 | 120 | 150 |
| **65** | **80** | 30 | 50 | 50 | 80 | 80 | 110 | 110 | 145 | 145 | 185 |
| **80** | **100** | 35 | 60 | 60 | 100 | 100 | 135 | 135 | 180 | 180 | 225 |
| **100** | **100** | 40 | 75 | 75 | 120 | 120 | 160 | 160 | 210 | 210 | 260 |
| **120** | **140** | 50 | 95 | 95 | 145 | 145 | 190 | 190 | 240 | 240 | 300 |
| **140** | **160** | 60 | 110 | 110 | 170 | 170 | 220 | 220 | 280 | 280 | 350 |
| **160** | **180** | 65 | 120 | 120 | 180 | 180 | 240 | 240 | 310 | 310 | 390 |
| **180** | **200** | 70 | 130 | 130 | 200 | 200 | 260 | 260 | 340 | 340 | 430 |
| **200** | **225** | 80 | 140 | 140 | 220 | 220 | 290 | 290 | 380 | 380 | 470 |
| **225** | **250** | 90 | 150 | 150 | 240 | 240 | 320 | 320 | 420 | 420 | 520 |
| **250** | **280** | 100 | 170 | 170 | 260 | 260 | 350 | 350 | 460 | 460 | 570 |
| **280** | **315** | 110 | 190 | 190 | 280 | 280 | 370 | 370 | 500 | 500 | 630 |
| **315** | **355** | 120 | 200 | 200 | 310 | 310 | 410 | 410 | 550 | 550 | 690 |
| **355** | **400** | 130 | 220 | 220 | 340 | 340 | 450 | 450 | 600 | 600 | 750 |
| **400** | **450** | 140 | 240 | 240 | 370 | 370 | 500 | 500 | 660 | 660 | 820 |
| **450** | **500** | 140 | 260 | 260 | 410 | 410 | 550 | 550 | 720 | 720 | 900 |
| **500** | **560** | 150 | 280 | 280 | 440 | 440 | 600 | 600 | 780 | 780 | 1 000 |
| **560** | **630** | 170 | 310 | 310 | 480 | 480 | 650 | 650 | 850 | 850 | 1 100 |
| **630** | **710** | 190 | 350 | 350 | 530 | 530 | 700 | 700 | 920 | 920 | 1 190 |
| **710** | **800** | 210 | 390 | 390 | 580 | 580 | 770 | 770 | 1 010 | 1 010 | 1 300 |
| **800** | **900** | 230 | 430 | 430 | 650 | 650 | 860 | 860 | 1 120 | 1 120 | 1 440 |
| **900** | **1 000** | 260 | 480 | 480 | 710 | 710 | 930 | 930 | 1 220 | 1 220 | 1 570 |
| **1 000** | **1 120** | 290 | 530 | 530 | 780 | 780 | 1 020 | 1 020 | 1 330 | 1 330 | 1 720 |
| **1 120** | **1 250** | 320 | 580 | 580 | 860 | 860 | 1 120 | 1 120 | 1 460 | 1 460 | 1 870 |
| **1 250** | **1 400** | 350 | 640 | 640 | 950 | 950 | 1 240 | 1 240 | 1 620 | 1 620 | 2 060 |
| **1 400** | **1 600** | 400 | 720 | 720 | 1 060 | 1 060 | 1 380 | 1 380 | 1 800 | 1 800 | 2 300 |
| **1 600** | **1 800** | 450 | 810 | 810 | 1 180 | 1 180 | 1 550 | 1 550 | 2 000 | 2 000 | 2 550 |

**Table 5**

## Radial internal clearance of spherical roller bearings with a tapered bore



| Bore diameter | | Radial internal clearance | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | | C2 | | Normal | | C3 | | C4 | | C5 | |
| > | ≤ | min. | max. | min. | max. | min. | max. | min. | max. | min. | max. |
| mm | | µm | | | | | | | | | |
| **24** | **30** | 20 | 30 | 30 | 40 | 40 | 55 | 55 | 75 | – | – |
| **30** | **40** | 25 | 35 | 35 | 50 | 50 | 65 | 65 | 85 | 85 | 105 |
| **40** | **50** | 30 | 45 | 45 | 60 | 60 | 80 | 80 | 100 | 100 | 130 |
| **50** | **65** | 40 | 55 | 55 | 75 | 75 | 95 | 95 | 120 | 120 | 160 |
| **65** | **80** | 50 | 70 | 70 | 95 | 95 | 120 | 120 | 150 | 150 | 200 |
| **80** | **100** | 55 | 80 | 80 | 110 | 110 | 140 | 140 | 180 | 180 | 230 |
| **100** | **120** | 65 | 100 | 100 | 135 | 135 | 170 | 170 | 220 | 220 | 280 |
| **120** | **140** | 80 | 120 | 120 | 160 | 160 | 200 | 200 | 260 | 260 | 330 |
| **140** | **160** | 90 | 130 | 130 | 180 | 180 | 230 | 230 | 300 | 300 | 380 |
| **160** | **180** | 100 | 140 | 140 | 200 | 200 | 260 | 260 | 340 | 340 | 430 |
| **180** | **200** | 110 | 160 | 160 | 220 | 220 | 290 | 290 | 370 | 370 | 470 |
| **200** | **225** | 120 | 180 | 180 | 250 | 250 | 320 | 320 | 410 | 410 | 520 |
| **225** | **250** | 140 | 200 | 200 | 270 | 270 | 350 | 350 | 450 | 450 | 570 |
| **250** | **280** | 150 | 220 | 220 | 300 | 300 | 390 | 390 | 490 | 490 | 620 |
| **280** | **315** | 170 | 240 | 240 | 330 | 330 | 430 | 430 | 540 | 540 | 680 |
| **315** | **355** | 190 | 270 | 270 | 360 | 360 | 470 | 470 | 590 | 590 | 740 |
| **355** | **400** | 210 | 300 | 300 | 400 | 400 | 520 | 520 | 650 | 650 | 820 |
| **400** | **450** | 230 | 330 | 330 | 440 | 440 | 570 | 570 | 720 | 720 | 910 |
| **450** | **500** | 260 | 370 | 370 | 490 | 490 | 630 | 630 | 790 | 790 | 1 000 |
| **500** | **560** | 290 | 410 | 410 | 540 | 540 | 680 | 680 | 870 | 870 | 1 100 |
| **560** | **630** | 320 | 460 | 460 | 600 | 600 | 760 | 760 | 980 | 980 | 1 230 |
| **630** | **710** | 350 | 510 | 510 | 670 | 670 | 850 | 850 | 1 090 | 1 090 | 1 360 |
| **710** | **800** | 390 | 570 | 570 | 750 | 750 | 960 | 960 | 1 220 | 1 220 | 1 500 |
| **800** | **900** | 440 | 640 | 640 | 840 | 840 | 1 070 | 1 070 | 1 370 | 1 370 | 1 690 |
| **900** | **1 000** | 490 | 710 | 710 | 930 | 930 | 1 190 | 1 190 | 1 520 | 1 520 | 1 860 |
| **1 000** | **1 120** | 530 | 770 | 770 | 1 030 | 1 030 | 1 300 | 1 300 | 1 670 | 1 670 | 2 050 |
| **1 120** | **1 250** | 570 | 830 | 830 | 1 120 | 1 120 | 1 420 | 1 420 | 1 830 | 1 830 | 2 250 |
| **1 250** | **1 400** | 620 | 910 | 910 | 1 230 | 1 230 | 1 560 | 1 560 | 2 000 | 2 000 | 2 450 |
| **1 400** | **1 600** | 680 | 1 000 | 1 000 | 1 350 | 1 350 | 1 720 | 1 720 | 2 200 | 2 200 | 2 700 |
| **1 600** | **1 800** | 750 | 1 110 | 1 110 | 1 500 | 1 500 | 1 920 | 1 920 | 2 400 | 2 400 | 2 950 |

# Loads

**Minimum load**

$P_m = 0{,}01\ C_0$

**Oil lubricated bearings:**

$n/n_r \leq 0{,}3 \quad \rightarrow \quad P_m = 0{,}003\ C_0$

$0{,}3 < n/n_r \leq 2 \quad \rightarrow \quad P_m = 0{,}003\ C_0 \left(1 + 2\sqrt{\frac{n}{n_r} - 0{,}3}\right)$

For additional information → page 106

**Axial load carrying capacity**

SKF spherical roller bearings are able to accommodate axial loads and even accommodate purely axial loads.

Bearings correctly mounted on an adapter sleeve on plain shafts without fixed abutment:

$F_{ap} = 0{,}003\ B\ d$

**Equivalent dynamic bearing load**

$F_a/F_r \leq e \quad \rightarrow \quad P = F_r + Y_1 F_a$
$F_a/F_r > e \quad \rightarrow \quad P = 0{,}67\ F_r + Y_2 F_a$

For additional information → page 91

**Equivalent static bearing load**

$P_0 = F_r + Y_0 F_a$

For additional information → page 105

**Symbols**

| | |
|---|---|
| B | bearing width [mm] |
| $C_0$ | basic static load rating [kN] (product table, page 792) |
| d | bearing bore diameter [mm] |
| e | calculation factor (product table) |
| $F_a$ | axial load [kN] |
| $F_{ap}$ | maximum permissible axial load [kN] |
| $F_r$ | radial load [kN] |
| P | equivalent dynamic bearing load [kN] |
| $P_0$ | equivalent static bearing load [kN] |
| $P_m$ | equivalent minimum load [kN] |
| n | rotational speed [r/min] |
| $n_r$ | reference speed [r/min] (product table) |
| $Y_0, Y_1, Y_2$ | calculation factors (product table) |

# Temperature limits

The permissible operating temperature for spherical roller bearings can be limited by:

- the dimensional stability of the bearing rings
- the seals
- the lubricant

Where temperatures outside the permissible range are expected, contact SKF.

## Bearing rings

SKF spherical roller bearings undergo a special heat treatment. The bearings are heat stabilized up to at least 200 °C *(390 °F)*.

## Seals

The permissible operating temperature for seals depends on the seal material:

- NBR: –40 to +90 °C *(–40 to +195 °F)*
  Temperatures up to 120 °C *(250 °F)* can be tolerated for brief periods.
- HNBR: –40 to +150 °C *(–40 to +300 °F)*
- FKM: –30 to +200 °C *(–20 to +390 °F)*

Typically, temperature peaks are at the seal lip.

## Lubricants

Temperature limits for the greases used in sealed SKF spherical roller bearings are provided in **table 1**, **page 777** . For temperature limits of other SKF greases, refer to *Selecting a suitable SKF grease*, **page 116**.

When using lubricants not supplied by SKF, temperature limits should be evaluated according to the SKF traffic light concept (**page 117**).

# Permissible speed

The speed ratings in the **product table** indicate:

- the **reference speed,** which enables a quick assessment of the speed capabilities from a thermal frame of reference
- the **limiting speed**, which is a mechanical limit that shoud not be exceeded unless the bearing design and the application are adapted for higher speeds

For additional information, refer to *Operating temperature and speed*, **page 130**.

# Design considerations

## Free space on both sides of the bearing

To prevent interference between rotating bearing parts and stationary machine parts, free space ($C_a$) should be provided as indicated in fig. 15. The requisite width of the free space depends on:

- the actual misalignment
- lubricant space requirements

The requisite free space should be at least 20 times the minimum value of the radial internal clearance in the unmounted bearing:

- with a cylindrical bore (table 4, page 782)
- with a tapered bore (table 5, page 783)

## Abutments for sealed bearings

The diameter of the shaft abutment should not exceed $d_{a\,max}$ (product table, page 792), certainly for the 1 to 2 mm closest to the bearing, to prevent interference with the seal (fig. 16). If the bearings are to be located axially on the shaft by a lock nut, SKF recommends using a KMFE lock nut (fig. 17) or fitting a spacer ring (fig. 18) between the bearing and the lock washer to prevent interference with the seal.

**Fig. 15**

**Free space on both sides of the bearing**

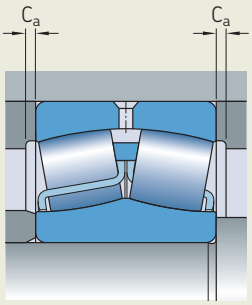



**Fig. 16**

**Shaft abutment for a sealed bearing**

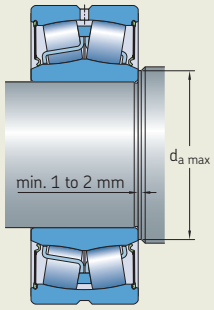



**Fig. 17**

**Sealed bearing axially located by a KMFE lock nut**

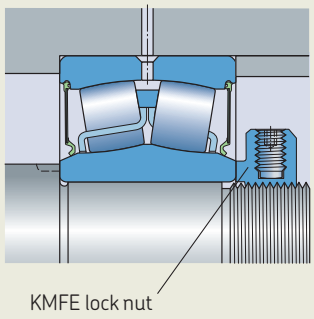
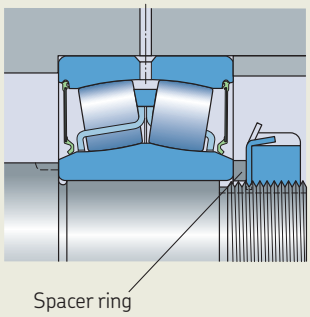



**Fig. 18**

**Sealed bearing axially located by a KM(L) lock nut with inserted spacer ring between lock washer and bearing**



# Bearings on sleeves

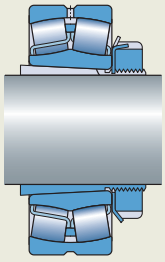
Spherical roller bearings with a tapered bore can be mounted with:

- an adapter sleeve on plain or stepped shafts (fig. 19):
  - SKF adapter sleeves are supplied complete with a locking device.
  - Use appropriate SKF adapter sleeve assemblies for sealed bearings (fig. 20) to prevent the locking device interfering with the seal (**product table**, **page 824**). Alternatively, a spacer ring can be inserted between the bearing and the lock washer.
- a withdrawal sleeve on stepped shafts (fig. 21)

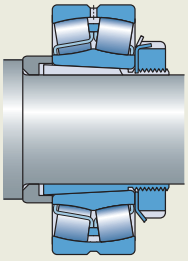
For additional information about sleeves, refer to *Adapter sleeves*, **page 1065**, and *Withdrawal sleeves*, **page 1087**.

**Fig. 19**

**Bearing with a tapered bore mounted with an adapter sleeve**



On a plain shaft



On a stepped shaft

**Fig. 20**

**SKF adapter sleeve assembly for sealed bearings**

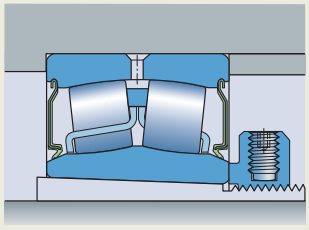
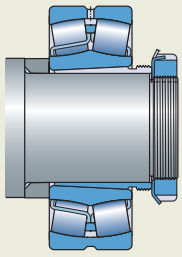


**Fig. 21**

**Bearing with a tapered bore mounted on a stepped shaft with a withdrawal sleeve**



# Appropriate bearing housings

The combination of a spherical roller bearing, appropriate sleeve (where needed), and an appropriate SKF bearing housing provides a cost-effective, interchangeable and reliable solution that fulfils the demand for easy maintenance.

The comprehensive assortment of SKF bearing housings is provided online at skf.com/housings.

# Mounting

During handling, the rings and roller complement of spherical roller bearings may be axially displaced from their normal position. This is especially likely where the bearings are mounted with the shaft or housing in the vertical position:

- The roller complement, together with the inner or outer ring, will move downward and result in no more clearance.
- When the bearing rings expand or contract as a result of an interference fit, preload is likely to result.

Therefore, wherever possible:

- Mount spherical roller bearings with the shaft or housing in the horizontal position.
- Rotate the inner or outer ring to align the rollers during mounting.

  Where this is not feasible, use a bearing handling tool or other device to keep the bearing components arranged centrally.

## Mounting sealed bearings

SKF does not recommend heating sealed spherical roller bearings above 80 °C *(175 °F)* during the mounting process. However, if higher temperatures are necessary, make sure that the temperature does not exceed the permissible temperature of either the seal or grease, whichever is the lowest.

## Mounting bearings with a tapered bore

Bearings with a tapered bore are mounted with an interference fit. To obtain the proper degree of interference, one of the following methods can be used:

1 **Measuring the clearance reduction (table 7)**

2 **Measuring the lock nut tightening angle (table 7)**

3 **Measuring the axial drive-up (table 7)**

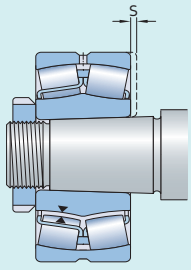
4 **Applying the SKF Drive-up Method**
For bearings with d > 100 mm, SKF recommends using the SKF Drive-up Method. This is a fast, reliable and safe method to achieve the appropriate interference fit. Additional information is available online at skf.com/drive-up.

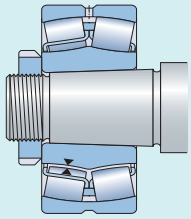
5 **Measuring the inner ring expansion**
Additional information is available online at skf.com/sensormount.

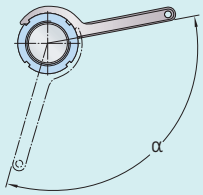
For additional information about these mounting methods, refer to *Mounting bearings with a tapered bore*, **page 203**, or the *SKF bearing maintenance handbook*.

**Table 7**

## Drive-up data for spherical roller bearings with a tapered bore






| Bore diameter | | Reduction of radial internal clearance | | Axial drive-up[1) 2)] | | | | Lock nut tightening angle[2)] |
|---|---|---|---|---|---|---|---|---|
| d | | | | s | | | | α |
| | | | | Taper 1:12 | | Taper 1:30 | | Taper 1:12 |
| > | ≤ | min. | max. | min. | max. | min. | max. | |
| mm | | mm | | mm | | | | ° |
| **24** | **30** | 0,01 | 0,015 | 0,25 | 0,29 | – | – | 100 |
| **30** | **40** | 0,015 | 0,02 | 0,3 | 0,35 | – | – | 115 |
| **40** | **50** | 0,02 | 0,025 | 0,37 | 0,44 | – | – | 130 |
| **50** | **65** | 0,025 | 0,035 | 0,45 | 0,54 | 1,15 | 1,35 | 115 |
| **65** | **80** | 0,035 | 0,04 | 0,55 | 0,65 | 1,4 | 1,65 | 130 |
| **80** | **100** | 0,04 | 0,05 | 0,66 | 0,79 | 1,65 | 2 | 150 |
| **100** | **120** | 0,05 | 0,06 | 0,79 | 0,95 | 2 | 2,35 | |
| **120** | **140** | 0,06 | 0,075 | 0,93 | 1,1 | 2,3 | 2,8 | |
| **140** | **160** | 0,07 | 0,085 | 1,05 | 1,3 | 2,65 | 3,2 | |
| **160** | **180** | 0,08 | 0,095 | 1,2 | 1,45 | 3 | 3,6 | |
| **180** | **200** | 0,09 | 0,105 | 1,3 | 1,6 | 3,3 | 4 | |
| **200** | **225** | 0,1 | 0,12 | 1,45 | 1,8 | 3,7 | 4,45 | |
| **225** | **250** | 0,11 | 0,13 | 1,6 | 1,95 | 4 | 4,85 | |
| **250** | **280** | 0,12 | 0,15 | 1,8 | 2,15 | 4,5 | 5,4 | |
| **280** | **315** | 0,135 | 0,165 | 2 | 2,4 | 4,95 | 6 | |
| **315** | **355** | 0,15 | 0,18 | 2,15 | 2,65 | 5,4 | 6,6 | |
| **355** | **400** | 0,17 | 0,21 | 2,5 | 3 | 6,2 | 7,6 | |
| **400** | **450** | 0,195 | 0,235 | 2,8 | 3,4 | 7 | 8,5 | |
| **450** | **500** | 0,215 | 0,265 | 3,1 | 3,8 | 7,8 | 9,5 | |
| **500** | **560** | 0,245 | 0,3 | 3,4 | 4,1 | 8,4 | 10,3 | |
| **560** | **630** | 0,275 | 0,34 | 3,80 | 4,65 | 9,50 | 11,60 | |
| **630** | **710** | 0,31 | 0,38 | 4,25 | 5,2 | 10,6 | 13 | |
| **710** | **800** | 0,35 | 0,425 | 4,75 | 5,8 | 11,9 | 14,5 | |
| **800** | **900** | 0,395 | 0,48 | 5,4 | 6,6 | 13,5 | 16,4 | |
| **900** | **1 000** | 0,44 | 0,535 | 6 | 7,3 | 15 | 18,3 | |
| **1 000** | **1 120** | 0,49 | 0,6 | 6,4 | 7,8 | 16 | 19,5 | |
| **1 120** | **1 250** | 0,55 | 0,67 | 7,1 | 8,7 | 17,8 | 21,7 | |
| **1 250** | **1 400** | 0,61 | 0,75 | 8 | 9,7 | 19,9 | 24,3 | |
| **1 400** | **1 600** | 0,7 | 0,85 | 9,1 | 11,1 | 22,7 | 27,7 | |
| **1 600** | **1 800** | 0,79 | 0,96 | 10,2 | 12,5 | 25,6 | 31,2 | |

Applying the recommended values prevents the inner ring from creeping, but does not ensure correct radial internal clearance in operation. Additional influences from the bearing housing fit and temperature differences between the inner and outer rings must be considered carefully when selecting the bearing radial internal clearance class (*Selecting initial internal clearance*, **page 183**).

1) Not valid for the SKF Drive-up Method.
2) The listed values are valid only for solid steel shafts and general applications. They are to be used as guideline values only, as it is difficult to establish an exact starting position. Also, the axial drive-up, s, differs slightly between the different bearings series.

# Designation system

**Prefixes**

| | |
|---|---|
| **BS2-..** | Bearing, designated by a drawing number |
| **ZE** | Bearing with SensorMount feature |

**Basic designation**

Listed in **table 4**, **page 30**
Figure with four digits: drawing number identification

**Suffixes**

**Group 1: Internal design**

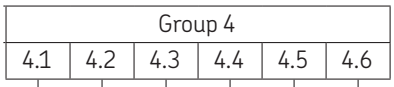
| | |
|---|---|
| **BC** | Bearing for wind turbine main shafts with roller-guided cast iron cage |
| **CA, CAC** | Retaining flanges on the inner ring, guide ring centred on the inner ring, machined brass cage |
| **CC(J), CJ** | Flangeless inner ring, guide ring centred on the inner ring, two stamped steel cages |
| **CCJA, EJA** | Flangeless inner ring, guide ring centred on the outer ring raceway, two stamped steel cages |
| **E** | Optimized internal design for increased load carrying capacity<br>213, 222 and 223 series: Flangeless inner ring and two stamped steel cages. Annular groove and three lubrication holes in the outer ring.<br>$d \leq 65$ mm: Guide ring centred on the inner ring<br>$d > 65$ mm: Guide ring centred on the cage |

**Group 2: External design (seals, snap ring groove, etc.)**

| | |
|---|---|
| **-CS, -2CS** | Contact seal, NBR, on one or both sides |
| **-CS2, -2CS2** | Contact seal, FKM, on one or both sides |
| **-CS5, -2CS5** | Contact seal, HNBR, on one or both sides |
| **-RS, -2RS** | Contact seal, NBR, on one or both sides |
| **-RS5, -2RS5** | Contact seal, HNBR, on one or both sides |
| **K** | Tapered bore, taper 1:12 |
| **K30** | Tapered bore, taper 1:30 |

**Group 3: Cage design**

| | |
|---|---|
| **F** | Machined steel cage, inner ring centred |
| **FA** | Machined steel cage, outer ring centred |
| **J** | Stamped steel cage, inner ring centred |
| **JA** | Stamped steel cage, outer ring centred |
| **MA** | Machined brass cage, outer ring centred |




**Group 4.6: Other variants**

| | |
|---|---|
| **R505** | Bearing for railway axleboxes |
| **VA405** | Bearing for vibratory applications, surface-hardened stamped steel cages |
| **VA406** | Same as VA405, and PTFE coated cylindrical inner ring bore |
| **VA991** | Bearing for high-speed applications |
| **VE552(E)** | Outer ring with three equally-spaced threaded holes in one side face to accommodate lifting tackle. The E indicates that appropriate eye bolts are supplied with the bearing. |
| **VE553(E)** | Same as VE552(E), but threaded holes in both side faces |
| **VG114** | Surface-hardened stamped steel cages |
| **VQ424** | Running accuracy better than C08 |

**Group 4.5: Lubrication**

| | |
|---|---|
| **GEM9** | Filled to 70 – 100% with SKF LGHB 2 grease |
| **GLE** | Filled to 25 – 45% with SKF LGWM 2 grease |
| **VT143** | Filled to 25 – 45% with SKF LGEP 2 grease |
| **VT143B** | Filled to 45 – 60% with SKF LGEP 2 grease |
| **VT143C** | Filled to 70 – 100% with SKF LGEP 2 grease |
| **W64** | Solid Oil |
| **W** | Without annular groove and lubrication holes in the outer ring |
| **W20** | Three lubrication holes in the outer ring |
| **W26** | Six lubrication holes in the inner ring |
| **W33** | Annular groove and three lubrication holes in the outer ring |
| **W33X** | Annular groove and six lubrication holes in the outer ring |
| **W77** | Plugged W33 lubrication holes |
| **W513** | W26 + W33 |

**Group 4.4: Stabilization**

**Group 4.3: Bearing sets, matched bearings**

**Group 4.2: Accuracy, clearance, preload, quiet running**

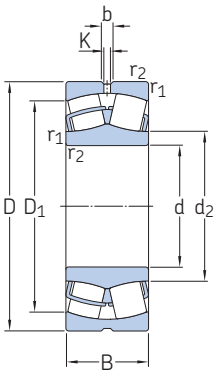
| | |
|---|---|
| **C08** | Running accuracy to P5 tolerance class |
| **C083** | C08 + C3 |
| **C084** | C08 + C4 |
| **C2** | Radial internal clearance smaller than Normal |
| **C3** | Radial internal clearance greater than Normal |
| **C4** | Radial internal clearance greater than C3 |
| **C5** | Radial internal clearance greater than C4 |
| **P5** | Dimensional and running accuracy to P5 tolerance class |
| **P6** | Dimensional and running accuracy to P6 tolerance class |
| **P62** | P6 + C2 |

**Group 4.1: Materials, heat treatment**

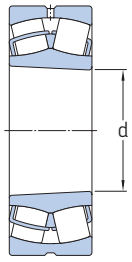
| | |
|---|---|
| **235220** | Case-hardened inner ring with a helical groove in the bore |
| **HA3** | Case-hardened inner ring |

## 9.1 Spherical roller bearings

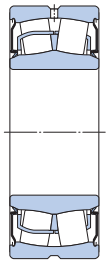
d **20 – 55** mm




Cylindrical bore



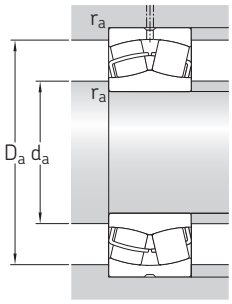

Tapered bore

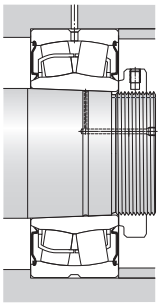


Sealed (2RS)

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designations Bearing with cylindrical bore | tapered bore |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **20** | 52 | 18 | 49,9 | 44 | 4,75 | 13 000 | 17 000 | 0,28 | 22205/20 E | – |
| **25** | 52 | 18 | 49,9 | 44 | 4,75 | 13 000 | 17 000 | 0,26 | ▸ 22205 E | ▸ 22205 EK |
| | 52 | 23 | 49,9 | 44 | 4,75 | – | 6 100 | 0,26 | ▸ BS2-2205-2RS/VT143 | – |
| | 62 | 17 | 49,1 | 41,5 | 4,55 | 9 300 | 12 000 | 0,28 | 21305 CC | – |
| **30** | 62 | 20 | 66,1 | 60 | 6,4 | 10 000 | 14 000 | 0,29 | ▸ 22206 E | ▸ 22206 EK |
| | 62 | 25 | 66,1 | 60 | 6,4 | – | 5 100 | 0,34 | ▸ BS2-2206-2RS/VT143 | – |
| | 72 | 19 | 65,7 | 61 | 6,8 | 8 200 | 10 000 | 0,41 | 21306 CC | – |
| **35** | 72 | 23 | 88,8 | 85 | 9,3 | 9 000 | 12 000 | 0,45 | ▸ 22207 E | ▸ 22207 EK |
| | 72 | 28 | 88,8 | 85 | 9,3 | – | 4 300 | 0,52 | ▸ BS2-2207-2RS/VT143 | – |
| | 80 | 21 | 79,2 | 72 | 8,15 | 7 300 | 9 500 | 0,55 | 21307 CC | – |
| **40** | 80 | 23 | 98,5 | 90 | 9,8 | 8 000 | 11 000 | 0,53 | ▸ 22208 E | ▸ 22208 EK |
| | 80 | 28 | 98,5 | 90 | 9,8 | – | 3 900 | 0,57 | ▸ BS2-2208-2RS/VT143 | ▸ BS2-2208-2RSK/VT143 |
| | 90 | 23 | 107 | 108 | 11,8 | 7 000 | 9 500 | 0,75 | ▸ 21308 E | 21308 EK |
| | 90 | 33 | 155 | 140 | 15 | 6 000 | 8 000 | 1,05 | ▸ 22308 E/VA405 | – |
| | 90 | 33 | 155 | 140 | 15 | 6 000 | 8 000 | 1,05 | ▸ 22308 E | ▸ 22308 EK |
| | 90 | 38 | 155 | 140 | 15 | – | 3 900 | 1,2 | ▸ BS2-2308-2RS/VT143 | – |
| **45** | 85 | 23 | 104 | 98 | 10,8 | 7 500 | 10 000 | 0,58 | ▸ 22209 E | ▸ 22209 EK |
| | 85 | 28 | 104 | 98 | 10,8 | – | 3 500 | 0,66 | ▸ BS2-2209-2RS/VT143 | ▸ BS2-2209-2RSK/VT143 |
| | 100 | 25 | 129 | 127 | 13,7 | 6 300 | 8 500 | 0,99 | 21309 E | ▸ 21309 EK |
| | 100 | 36 | 190 | 183 | 19,6 | 5 300 | 7 000 | 1,4 | ▸ 22309 E/VA405 | – |
| | 100 | 36 | 190 | 183 | 19,6 | 5 300 | 7 000 | 1,4 | ▸ 22309 E | ▸ 22309 EK |
| | 100 | 42 | 190 | 183 | 19,6 | – | 3 400 | 1,6 | ▸ BS2-2309-2RS/VT143 | – |
| **50** | 90 | 23 | 107 | 108 | 11,8 | 7 000 | 9 500 | 0,63 | ▸ 22210 E | ▸ 22210 EK |
| | 90 | 28 | 107 | 108 | 11,8 | – | 3 200 | 0,7 | ▸ BS2-2210-2RS/VT143 | ▸ BS2-2210-2RSK/VT143 |
| | 110 | 27 | 159 | 166 | 18,6 | 5 600 | 7 500 | 1,35 | ▸ 21310 E | ▸ 21310 EK |
| | 110 | 40 | 228 | 224 | 24 | 4 800 | 6 300 | 1,9 | ▸ 22310 E/VA405 | – |
| | 110 | 40 | 228 | 224 | 24 | 4 800 | 6 300 | 1,9 | ▸ 22310 E | ▸ 22310 EK |
| | 110 | 45 | 228 | 224 | 24 | – | 3 000 | 2,1 | ▸ BS2-2310-2RS/VT143 | – |
| **55** | 100 | 25 | 129 | 127 | 13,7 | 6 300 | 8 500 | 0,84 | ▸ 22211 E | ▸ 22211 EK |
| | 100 | 31 | 129 | 127 | 13,7 | – | 2 900 | 1 | ▸ BS2-2211-2RS/VT143 | ▸ BS2-2211-2RSK/VT143 |
| | 120 | 29 | 159 | 166 | 18,6 | 5 600 | 7 500 | 1,7 | ▸ 21311 E | ▸ 21311 EK |
| | 120 | 43 | 280 | 280 | 30 | 4 300 | 5 600 | 2,45 | ▸ 22311 E | ▸ 22311 EK |
| | 120 | 43 | 280 | 280 | 30 | 4 300 | 5 600 | 2,45 | ▸ 22311 E/VA405 | 22311 EK/VA405 |
| | 120 | 49 | 280 | 280 | 30 | – | 2 800 | 2,8 | ▸ BS2-2311-2RS/VT143 | – |

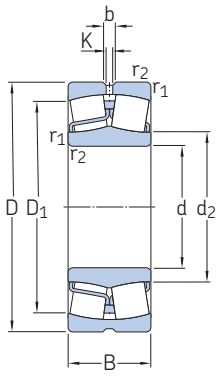
**SKF Explorer bearing**
▸ Popular item



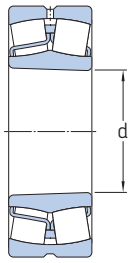



| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | | | | Permissible acceleration for oil lubrication[1] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_2$ ≈ | $D_1$ ≈ | b | K | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | e | $Y_1$ | $Y_2$ | $Y_0$ | rotational | linear |
| mm | | | | | | mm | | | | – | | | | m/s² | |
| **20** | 31,3 | 44,2 | 3,7 | 2 | 1 | 25,6 | – | 46,4 | 1 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| **25** | 31,3 | 44,2 | 3,7 | 2 | 1 | 30,6 | – | 46,4 | 1 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| | 30 | 46,6 | 4,4 | 2 | 1 | 30 | 30 | 46,4 | 1 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| | 35,7 | 50,7 | – | – | 1,1 | 32 | – | 55 | 1 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| **30** | 37,6 | 53 | 3,7 | 2 | 1 | 35,6 | – | 56,4 | 1 | 0,31 | 2,2 | 3,3 | 2,2 | – | – |
| | 35,8 | 56,4 | 4,4 | 2 | 1 | 35,5 | 35,5 | 56,4 | 1 | 0,31 | 2,2 | 3,3 | 2,2 | – | – |
| | 43,3 | 58,8 | – | – | 1,1 | 37 | – | 65 | 1 | 0,27 | 2,5 | 3,7 | 2,5 | – | – |
| **35** | 44,5 | 61,8 | 3,7 | 2 | 1,1 | 42 | – | 65 | 1 | 0,31 | 2,2 | 3,3 | 2,2 | – | – |
| | 42,4 | 65,3 | 4,4 | 2 | 1,1 | 42 | 42 | 65 | 1 | 0,31 | 2,2 | 3,3 | 2,2 | – | – |
| | 47,2 | 65,6 | – | – | 1,5 | 44 | – | 71 | 1,5 | 0,28 | 2,4 | 3,6 | 2,5 | – | – |
| **40** | 49,6 | 69,4 | 6 | 3 | 1,1 | 47 | – | 73 | 1 | 0,28 | 2,4 | 3,6 | 2,5 | – | – |
| | 47,2 | 72,8 | 6 | 3 | 1,1 | 47 | 47 | 73 | 1 | 0,28 | 2,4 | 3,6 | 2,5 | – | – |
| | 60 | 79,8 | 5,5 | 3 | 1,5 | 49 | – | 81 | 1,5 | 0,24 | 2,8 | 4,2 | 2,8 | – | – |
| | 49,9 | 74,3 | 6 | 3 | 1,5 | 49 | – | 81 | 1,5 | 0,37 | 1,8 | 2,7 | 1,8 | 115 g | 31 g |
| | 49,9 | 74,3 | 6 | 3 | 1,5 | 49 | – | 81 | 1,5 | 0,37 | 1,8 | 2,7 | 1,8 | – | – |
| | 47,5 | 79,3 | 6 | 3 | 1,5 | 47,5 | 47,5 | 81 | 1,5 | 0,37 | 1,8 | 2,7 | 1,8 | – | – |
| **45** | 54,4 | 74,4 | 5,5 | 3 | 1,1 | 52 | – | 78 | 1 | 0,26 | 2,6 | 3,9 | 2,5 | – | – |
| | 52,5 | 77,8 | 6 | 3 | 1,1 | 52 | 52 | 78 | 1 | 0,26 | 2,6 | 3,9 | 2,5 | – | – |
| | 65,3 | 88 | 6 | 3 | 1,5 | 54 | – | 91 | 1,5 | 0,24 | 2,8 | 4,2 | 2,8 | – | – |
| | 57,6 | 83,4 | 6 | 3 | 1,5 | 54 | – | 91 | 1,5 | 0,37 | 1,8 | 2,7 | 1,8 | 97 g | 29 g |
| | 57,6 | 83,4 | 6 | 3 | 1,5 | 54 | – | 91 | 1,5 | 0,37 | 1,8 | 2,7 | 1,8 | – | – |
| | 55 | 88,5 | 6 | 3 | 1,5 | 54 | 55 | 91 | 1,5 | 0,37 | 1,8 | 2,7 | 1,8 | – | – |
| **50** | 60 | 79 | 5,5 | 3 | 1,1 | 57 | – | 83 | 1 | 0,24 | 2,8 | 4,2 | 2,8 | – | – |
| | 58,1 | 82,3 | 6 | 3 | 1,1 | 57 | 58 | 83 | 1 | 0,24 | 2,8 | 4,2 | 2,8 | – | – |
| | 72,7 | 96,8 | 6 | 3 | 2 | 61 | – | 99 | 2 | 0,24 | 2,8 | 4,2 | 2,8 | – | – |
| | 63,9 | 91,9 | 6 | 3 | 2 | 61 | – | 99 | 2 | 0,37 | 1,8 | 2,7 | 1,8 | 85 g | 28 g |
| | 63,9 | 91,9 | 6 | 3 | 2 | 61 | – | 99 | 2 | 0,37 | 1,8 | 2,7 | 1,8 | – | – |
| | 61,5 | 96,8 | 6 | 3 | 2 | 61 | 61 | 99 | 2 | 0,37 | 1,8 | 2,7 | 1,8 | – | – |
| **55** | 65,3 | 88 | 6 | 3 | 1,5 | 64 | – | 91 | 1,5 | 0,24 | 2,8 | 4,2 | 2,8 | – | – |
| | 63,5 | 92 | 6 | 3 | 1,5 | 63,5 | 63,5 | 91 | 1,5 | 0,24 | 2,8 | 4,2 | 2,8 | – | – |
| | 72,7 | 96,2 | 6 | 3 | 2 | 66 | – | 109 | 2 | 0,24 | 2,8 | 4,2 | 2,8 | – | – |
| | 70,1 | 102 | 5,5 | 3 | 2 | 66 | – | 109 | 2 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| | 70,1 | 102 | 5,5 | 3 | 2 | 66 | – | 109 | 2 | 0,35 | 1,9 | 2,9 | 1,8 | 78 g | 26 g |
| | 67,5 | 107 | 6 | 3 | 2 | 66 | 67 | 109 | 2 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |

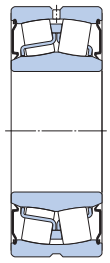
[1] For details about permissible accelerations → page 779




Cylindrical bore



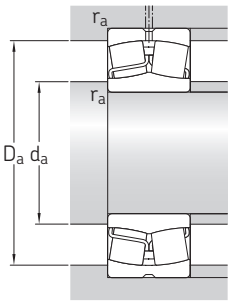

Tapered bore

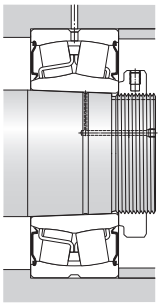


Sealed (2RS, 2RS5)

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designations Bearing with cylindrical bore | tapered bore |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **60** | 110 | 28 | 159 | 166 | 18,6 | 5 600 | 7 500 | 1,15 | ▸ 22212 E | ▸ 22212 EK |
| | 110 | 34 | 159 | 166 | 18,6 | – | 2 700 | 1,3 | ▸ BS2-2212-2RS/VT143 | ▸ BS2-2212-2RSK/VT143 |
| | 130 | 31 | 217 | 240 | 26,5 | 4 800 | 6 300 | 2,1 | ▸ 21312 E | ▸ 21312 EK |
| | 130 | 46 | 325 | 335 | 36 | 4 000 | 5 300 | 3,1 | ▸ 22312 E | ▸ 22312 EK |
| | 130 | 46 | 325 | 335 | 36 | 4 000 | 5 300 | 3,1 | ▸ 22312 E/VA405 | 22312 EK/VA405 |
| | 130 | 53 | 325 | 335 | 36 | – | 2 500 | 3,4 | ▸ BS2-2312-2RS/VT143 | – |
| **65** | 100 | 35 | 137 | 173 | 20,4 | – | 2 600 | 0,95 | 24013-2RS5W/VT143 | – |
| | 100 | 35 | 137 | 173 | 20,4 | 4 300 | 6 300 | 0,95 | 24013 CC/W33 | 24013 CCK30/W33 |
| | 120 | 31 | 198 | 216 | 24 | 5 000 | 7 000 | 1,55 | ▸ 22213 E | ▸ 22213 EK |
| | 120 | 38 | 198 | 216 | 24 | – | 2 400 | 1,6 | ▸ BS2-2213-2RS/VT143 | ▸ BS2-2213-2RSK/VT143 |
| | 140 | 33 | 243 | 270 | 29 | 4 300 | 6 000 | 2,55 | ▸ 21313 E | ▸ 21313 EK |
| | 140 | 48 | 357 | 360 | 38 | 3 800 | 5 000 | 3,75 | ▸ 22313 E | ▸ 22313 EK |
| | 140 | 48 | 357 | 360 | 38 | 3 800 | 5 000 | 3,75 | ▸ 22313 E/VA405 | 22313 EK/VA405 |
| | 140 | 56 | 357 | 360 | 38 | – | 2 400 | 4,15 | ▸ BS2-2313-2RS/VT143 | – |
| **70** | 125 | 31 | 213 | 228 | 25,5 | 5 000 | 6 700 | 1,55 | ▸ 22214 E | ▸ 22214 EK |
| | 125 | 38 | 213 | 228 | 25,5 | – | 2 300 | 1,8 | ▸ BS2-2214-2RS/VT143 | ▸ BS2-2214-2RSK/VT143 |
| | 150 | 35 | 291 | 325 | 34,5 | 4 000 | 5 600 | 3,1 | ▸ 21314 E | ▸ 21314 EK |
| | 150 | 51 | 413 | 430 | 45 | 3 400 | 4 500 | 4,55 | ▸ 22314 E | ▸ 22314 EK |
| | 150 | 51 | 413 | 430 | 45 | 3 400 | 4 500 | 4,55 | ▸ 22314 E/VA405 | ▸ 22314 EK/VA405 |
| | 150 | 60 | 413 | 430 | 45 | – | 2 100 | 5,1 | ▸ BS2-2314-2RS/VT143 | – |
| **75** | 115 | 40 | 181 | 232 | 28,5 | – | 2 300 | 1,55 | 24015-2RS5/VT143 | – |
| | 115 | 40 | 181 | 232 | 28,5 | 3 800 | 5 300 | 1,55 | ▸ 24015 CC/W33 | 24015 CCK30/W33 |
| | 130 | 31 | 217 | 240 | 26,5 | 4 800 | 6 300 | 1,7 | ▸ 22215 E | ▸ 22215 EK |
| | 130 | 38 | 217 | 240 | 26,5 | – | 2 200 | 2,1 | ▸ BS2-2215-2RS/VT143 | ▸ BS2-2215-2RSK/VT143 |
| | 160 | 37 | 291 | 325 | 34,5 | 4 000 | 5 600 | 3,75 | ▸ 21315 E | ▸ 21315 EK |
| | 160 | 55 | 462 | 475 | 48 | 3 200 | 4 300 | 5,55 | ▸ 22315 E | ▸ 22315 EK |
| | 160 | 55 | 462 | 475 | 48 | 3 200 | 4 300 | 5,55 | ▸ 22315 EJA/VA405 | 22315 EKJA/VA405 |
| | 160 | 64 | 462 | 475 | 48 | – | 2 100 | 6,5 | ▸ BS2-2315-2RS/VT143 | ▸ BS2-2315-2RSK/VT143 |
| **80** | 140 | 33 | 243 | 270 | 29 | 4 300 | 6 000 | 2,1 | ▸ 22216 E | ▸ 22216 EK |
| | 140 | 40 | 243 | 270 | 29 | – | 2 000 | 2,4 | ▸ BS2-2216-2RS/VT143 | ▸ BS2-2216-2RSK/VT143 |
| | 170 | 39 | 331 | 375 | 39 | 3 800 | 5 300 | 4,45 | ▸ 21316 E | ▸ 21316 EK |
| | 170 | 58 | 516 | 530 | 54 | 3 000 | 4 000 | 6,6 | ▸ 22316 E | ▸ 22316 EK |
| | 170 | 58 | 516 | 530 | 54 | 3 000 | 4 000 | 6,6 | ▸ 22316 EJA/VA405 | 22316 EKJA/VA405 |
| | 170 | 67 | 516 | 530 | 54 | – | 2 000 | 7,2 | BS2-2316-2RS/VT143 | – |

**SKF Explorer bearing**
▸ Popular item



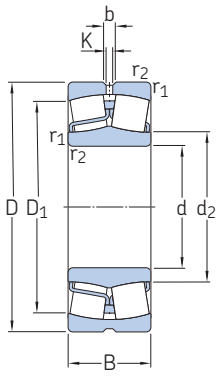



| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | | | | Permissible acceleration for oil lubrication[1] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_2$ ≈ | $D_1$ ≈ | b | K | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | e | $Y_1$ | $Y_2$ | $Y_0$ | rotational | linear |
| mm | | | | | | mm | | | | – | | | | $m/s^2$ | |
| **60** | 72,7 | 96,5 | 6 | 3 | 1,5 | 69 | – | 101 | 1,5 | 0,24 | 2,8 | 4,2 | 2,8 | – | – |
| | 69,7 | 101 | 6 | 3 | 1,5 | 69 | 69 | 101 | 1,5 | 0,24 | 2,8 | 4,2 | 2,8 | – | – |
| | 87,8 | 115 | 6 | 3 | 2,1 | 72 | – | 118 | 2 | 0,22 | 3 | 4,6 | 2,8 | – | – |
| | 77,9 | 110 | 8,3 | 4,5 | 2,1 | 72 | – | 118 | 2 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| | 77,9 | 110 | 8,3 | 4,5 | 2,1 | 72 | – | 118 | 2 | 0,35 | 1,9 | 2,9 | 1,8 | 70 g | 25 g |
| | 75 | 117 | 8,3 | 4,5 | 2,1 | 72 | 75 | 118 | 2 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| **65** | 71,6 | 93,5 | – | – | 1,1 | 71 | 71 | 94 | 1 | 0,27 | 2,5 | 3,7 | 2,5 | – | – |
| | 73,9 | 87,3 | 3,7 | 2 | 1,1 | 71 | – | 94 | 1 | 0,27 | 2,5 | 3,7 | 2,5 | – | – |
| | 80,1 | 106 | 6 | 3 | 1,5 | 74 | – | 111 | 1,5 | 0,24 | 2,8 | 4,2 | 2,8 | – | – |
| | 76,5 | 110 | 6 | 3 | 1,5 | 74 | 76 | 111 | 1,5 | 0,24 | 2,8 | 4,2 | 2,8 | – | – |
| | 94,7 | 124 | 6 | 3 | 2,1 | 77 | – | 128 | 2 | 0,22 | 3 | 4,6 | 2,8 | – | – |
| | 81,6 | 118 | 8,3 | 4,5 | 2,1 | 77 | – | 128 | 2 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| | 81,6 | 118 | 8,3 | 4,5 | 2,1 | 77 | – | 128 | 2 | 0,35 | 1,9 | 2,9 | 1,8 | 69 g | 24 g |
| | 78,7 | 125 | 8,3 | 4,5 | 2,1 | 77 | 78 | 128 | 2 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| **70** | 83 | 111 | 6 | 3 | 1,5 | 79 | – | 116 | 1,5 | 0,23 | 2,9 | 4,4 | 2,8 | – | – |
| | 80,1 | 116 | 6 | 3 | 1,5 | 79 | 80 | 116 | 1,5 | 0,23 | 2,9 | 4,4 | 2,8 | – | – |
| | 101 | 133 | 6 | 3 | 2,1 | 82 | – | 138 | 2 | 0,22 | 3 | 4,6 | 2,8 | – | – |
| | 90,3 | 128 | 8,3 | 4,5 | 2,1 | 82 | – | 138 | 2 | 0,33 | 2 | 3 | 2 | – | – |
| | 90,3 | 128 | 8,3 | 4,5 | 2,1 | 82 | – | 138 | 2 | 0,33 | 2 | 3 | 2 | 61 g | 23 g |
| | 86,7 | 136 | 8,3 | 4,5 | 2,1 | 82 | 86 | 138 | 2 | 0,33 | 2 | 3 | 2 | – | – |
| **75** | 81,8 | 106 | 6 | 3 | 1,1 | 81 | 81 | 109 | 1 | 0,28 | 2,4 | 3,6 | 2,5 | – | – |
| | 84,2 | 100 | 5,5 | 3 | 1,1 | 81 | – | 109 | 1 | 0,28 | 2,4 | 3,6 | 2,5 | – | – |
| | 87,8 | 115 | 6 | 3 | 1,5 | 84 | – | 121 | 1,5 | 0,22 | 3 | 4,6 | 2,8 | – | – |
| | 84,5 | 120 | 6 | 3 | 1,5 | 84 | 84 | 121 | 1,5 | 0,22 | 3 | 4,6 | 2,8 | – | – |
| | 101 | 133 | 6 | 3 | 2,1 | 87 | – | 148 | 2 | 0,22 | 3 | 4,6 | 2,8 | – | – |
| | 92,8 | 135 | 8,3 | 4,5 | 2,1 | 87 | – | 148 | 2 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| | 92,8 | 135 | 8,3 | 4,5 | 2,1 | 87 | – | 148 | 2 | 0,35 | 1,9 | 2,9 | 1,8 | 88 g | 23 g |
| | 89,9 | 140 | 8,3 | 4,5 | 2,1 | 87 | 89 | 148 | 2 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| **80** | 94,7 | 124 | 6 | 3 | 2 | 91 | – | 129 | 2 | 0,22 | 3 | 4,6 | 2,8 | – | – |
| | 91,7 | 129 | 6 | 3 | 2 | 91 | 91 | 129 | 2 | 0,22 | 3 | 4,6 | 2,8 | – | – |
| | 106 | 141 | 6 | 3 | 2,1 | 92 | – | 158 | 2 | 0,24 | 2,8 | 4,2 | 2,8 | – | – |
| | 98,3 | 143 | 8,3 | 4,5 | 2,1 | 92 | – | 158 | 2 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| | 98,3 | 143 | 8,3 | 4,5 | 2,1 | 92 | – | 158 | 2 | 0,35 | 1,9 | 2,9 | 1,8 | 80 g | 22 g |
| | 94,2 | 150 | 8,3 | 4,5 | 2,1 | 92 | 94 | 158 | 2 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |

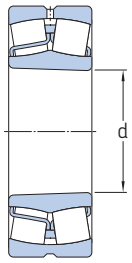
[1] For details about permissible accelerations → page 779

## 9.1 Spherical roller bearings

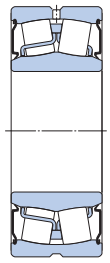
d **85 – 100** mm




Cylindrical bore



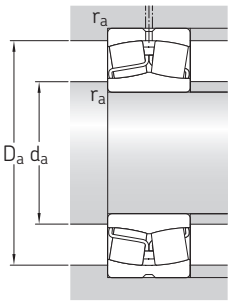

Tapered bore

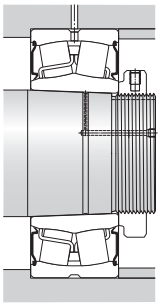


Sealed (2RS, 2RS5)

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designations Bearing with cylindrical bore | tapered bore |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **85** | 150 | 36 | 291 | 325 | 34,5 | 4 000 | 5 600 | 2,7 | ▸ 22217 E | ▸ 22217 EK |
| | 150 | 44 | 291 | 325 | 34,5 | – | 1 900 | 3 | ▸ BS2-2217-2RS/VT143 | ▸ BS2-2217-2RSK/VT143 |
| | 180 | 41 | 331 | 375 | 39 | 3 800 | 5 300 | 5,2 | ▸ 21317 E | ▸ 21317 EK |
| | 180 | 60 | 577 | 620 | 61 | 2 800 | 3 800 | 7,65 | ▸ 22317 E | ▸ 22317 EK |
| | 180 | 60 | 577 | 620 | 61 | 2 800 | 3 800 | 7,65 | ▸ 22317 EJA/VA405 | 22317 EKJA/VA405 |
| | 180 | 60 | 577 | 620 | 61 | 2 800 | 3 800 | 7,65 | 22317 EJA/VA406 | – |
| **90** | 160 | 40 | 331 | 375 | 39 | 3 800 | 5 300 | 3,4 | ▸ 22218 E | ▸ 22218 EK |
| | 160 | 48 | 331 | 375 | 39 | – | 1 800 | 3,7 | ▸ BS2-2218-2RS/VT143 | ▸ BS2-2218-2RSK/VT143 |
| | 160 | 52,4 | 372 | 440 | 48 | 2 800 | 3 800 | 4,65 | ▸ 23218 CC/W33 | ▸ 23218 CCK/W33 |
| | 190 | 43 | 393 | 450 | 45,5 | 3 600 | 4 800 | 6,1 | ▸ 21318 E | ▸ 21318 EK |
| | 190 | 64 | 637 | 695 | 67 | 2 600 | 3 600 | 9,05 | ▸ 22318 E | ▸ 22318 EK |
| | 190 | 64 | 637 | 695 | 67 | 2 600 | 3 600 | 9,05 | ▸ 22318 EJA/VA405 | 22318 EKJA/VA405 |
| | 190 | 73 | 637 | 695 | 67 | – | 1 700 | 9,8 | ▸ BS2-2318-2RS5/VT143 | ▸ BS2-2318-2RS5K/VT143 |
| **95** | 170 | 43 | 393 | 450 | 45,5 | 3 600 | 4 800 | 4,15 | ▸ 22219 E | ▸ 22219 EK |
| | 170 | 51 | 393 | 450 | 45,5 | – | 1 700 | 4,65 | BS2-2219-2RS/VT143 | – |
| | 200 | 45 | 433 | 490 | 49 | 3 400 | 4 500 | 7,05 | 21319 E | 21319 EK |
| | 200 | 67 | 699 | 765 | 73,5 | 2 600 | 3 400 | 10,5 | ▸ 22319 E | ▸ 22319 EK |
| | 200 | 67 | 699 | 765 | 73,5 | 2 600 | 3 400 | 10,5 | ▸ 22319 EJA/VA405 | 22319 EKJA/VA405 |
| **100** | 150 | 50 | 296 | 415 | 45,5 | – | 1 700 | 3,15 | 24020-2RS5/VT143 | – |
| | 150 | 50 | 296 | 415 | 45,5 | 2 800 | 4 000 | 3,15 | ▸ 24020 CC/W33 | 24020 CCK30/W33 |
| | 165 | 52 | 385 | 490 | 53 | 3 000 | 4 000 | 4,55 | ▸ 23120 CC/W33 | ▸ 23120 CCK/W33 |
| | 165 | 52 | 386 | 490 | 53 | – | 1 700 | 4,55 | ▸ 23120-2RS5/VT143 | – |
| | 165 | 65 | 468 | 640 | 68 | 2 400 | 3 200 | 5,65 | ▸ 24120 CC/W33 | 24120 CCK30/W33 |
| | 165 | 65 | 470 | 640 | 68 | – | 1 700 | 5,65 | 24120-2RS5/VT143 | – |
| | 180 | 46 | 433 | 490 | 49 | 3 400 | 4 500 | 4,9 | ▸ 22220 E | ▸ 22220 EK |
| | 180 | 55 | 433 | 490 | 49 | – | 1 600 | 5,5 | BS2-2220-2RS5/VT143 | BS2-2220-2RS5K/VT143 |
| | 180 | 60,3 | 498 | 600 | 63 | 2 400 | 3 400 | 6,85 | ▸ 23220 CC/W33 | ▸ 23220 CCK/W33 |
| | 180 | 60,3 | 499 | 600 | 63 | – | 1 600 | 6,85 | ▸ 23220-2RS/VT143 | – |
| | 180 | 60,3 | 499 | 600 | 63 | – | 1 600 | 6,85 | 23220-2RS5/VT143 | – |
| | 215 | 47 | 433 | 490 | 49 | 3 400 | 4 500 | 8,6 | 21320 E | 21320 EK |
| | 215 | 73 | 847 | 950 | 88 | 2 400 | 3 000 | 13,5 | ▸ 22320 E | ▸ 22320 EK |
| | 215 | 73 | 847 | 950 | 88 | 2 400 | 3 000 | 13,5 | ▸ 22320 EJA/VA405 | ▸ 22320 EKJA/VA405 |
| | 215 | 73 | 847 | 950 | 88 | 2 400 | 3 000 | 13,5 | 22320 EJA/VA406 | – |

**SKF Explorer bearing**
▸ Popular item

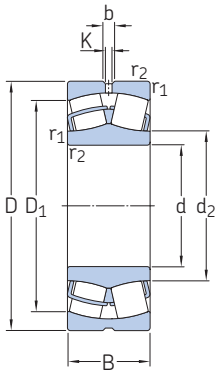


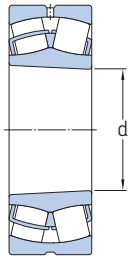
| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | | | | Permissible acceleration for oil lubrication[1] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_2$ ≈ | $D_1$ ≈ | b | K | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | e | $Y_1$ | $Y_2$ | $Y_0$ | rotational | linear |
| mm | | | | | | mm | | | | – | | | | $m/s^2$ | |
| **85** | 101 | 133 | 6 | 3 | 2 | 96 | – | 139 | 2 | 0,22 | 3 | 4,6 | 2,8 | – | – |
| | 98,2 | 137 | 6 | 3 | 2 | 96 | 98 | 139 | 2 | 0,22 | 3 | 4,6 | 2,8 | – | – |
| | 106 | 141 | 6 | 3 | 3 | 99 | – | 166 | 2,5 | 0,24 | 2,8 | 4,2 | 2,8 | – | – |
| | 108 | 154 | 8,3 | 4,5 | 3 | 99 | – | 166 | 2,5 | 0,33 | 2 | 3 | 2 | – | – |
| | 108 | 154 | 8,3 | 4,5 | 3 | 99 | – | 166 | 2,5 | 0,33 | 2 | 3 | 2 | 74 g | 21 g |
| | 108 | 154 | 8,3 | 4,5 | 3 | 99 | – | 166 | 2,5 | 0,33 | 2 | 3 | 2 | 74 g | 21 g |
| **90** | 106 | 141 | 6 | 3 | 2 | 101 | – | 149 | 2 | 0,24 | 2,8 | 4,2 | 2,8 | – | – |
| | 102 | 146 | 6 | 3 | 2 | 101 | 102 | 149 | 2 | 0,24 | 2,8 | 4,2 | 2,8 | – | – |
| | 106 | 137 | 5,5 | 3 | 2 | 101 | – | 149 | 2 | 0,31 | 2,2 | 3,3 | 2,2 | – | – |
| | 112 | 150 | 8,3 | 4,5 | 3 | 104 | – | 176 | 2,5 | 0,24 | 2,8 | 4,2 | 2,8 | – | – |
| | 113 | 161 | 11,1 | 6 | 3 | 104 | – | 176 | 2,5 | 0,33 | 2 | 3 | 2 | – | – |
| | 113 | 161 | 11,1 | 6 | 3 | 104 | – | 176 | 2,5 | 0,33 | 2 | 3 | 2 | 68 g | 21 g |
| | 109 | 165 | 11,1 | 6 | 3 | 104 | 109 | 176 | 2,5 | 0,33 | 2 | 3 | 2 | – | – |
| **95** | 112 | 150 | 8,3 | 4,5 | 2,1 | 107 | – | 158 | 2 | 0,24 | 2,8 | 4,2 | 2,8 | – | – |
| | 109 | 155 | 8,3 | 4,5 | 2,1 | 107 | 109 | 158 | 2 | 0,24 | 2,8 | 4,2 | 2,8 | – | – |
| | 118 | 159 | 8,3 | 4,5 | 3 | 109 | – | 186 | 2,5 | 0,24 | 2,8 | 4,2 | 2,8 | – | – |
| | 118 | 168 | 11,1 | 6 | 3 | 109 | – | 186 | 2,5 | 0,33 | 2 | 3 | 2 | – | – |
| | 118 | 168 | 11,1 | 6 | 3 | 109 | – | 186 | 2,5 | 0,33 | 2 | 3 | 2 | 64 g | 20 g |
| **100** | 108 | 138 | 6 | 3 | 1,5 | 107 | 108 | 143 | 1,5 | 0,28 | 2,4 | 3,6 | 2,5 | – | – |
| | 111 | 132 | 6 | 3 | 1,5 | 107 | – | 143 | 1,5 | 0,28 | 2,4 | 3,6 | 2,5 | – | – |
| | 115 | 144 | 6 | 3 | 2 | 111 | – | 154 | 2 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 112 | 149 | 6 | 3 | 2 | 111 | 112 | 154 | 2 | 0,27 | 2,5 | 3,7 | 2,5 | – | – |
| | 113 | 141 | 4,4 | 2 | 2 | 111 | – | 154 | 2 | 0,37 | 1,8 | 2,7 | 1,8 | – | – |
| | 110 | 147 | 4,4 | 2 | 2 | 110 | 110 | 154 | 2 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| | 118 | 159 | 8,3 | 4,5 | 2,1 | 112 | – | 168 | 2 | 0,24 | 2,8 | 4,2 | 2,8 | – | – |
| | 114 | 163 | 8,3 | 4,5 | 2,1 | 112 | 114 | 168 | 2 | 0,24 | 2,8 | 4,2 | 2,8 | – | – |
| | 117 | 153 | 8,3 | 4,5 | 2,1 | 112 | – | 168 | 2 | 0,33 | 2 | 3 | 2 | – | – |
| | 114 | 159 | 8,3 | 4,5 | 2,1 | 112 | 114 | 168 | 2 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 114 | 159 | 8,3 | 4,5 | 2,1 | 112 | 114 | 168 | 2 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 118 | 159 | 8,3 | 4,5 | 3 | 114 | – | 201 | 2,5 | 0,24 | 2,8 | 4,2 | 2,8 | – | – |
| | 130 | 184 | 11,1 | 6 | 3 | 114 | – | 201 | 2,5 | 0,33 | 2 | 3 | 2 | – | – |
| | 130 | 184 | 11,1 | 6 | 3 | 114 | – | 201 | 2,5 | 0,33 | 2 | 3 | 2 | 56 g | 20 g |
| | 130 | 184 | 11,1 | 6 | 3 | 114 | – | 201 | 2,5 | 0,33 | 2 | 3 | 2 | 56 g | 20 g |

[1] For details about permissible accelerations → page 779

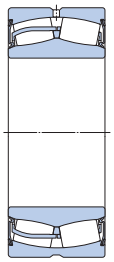
## d 110 – 120 mm




Cylindrical bore



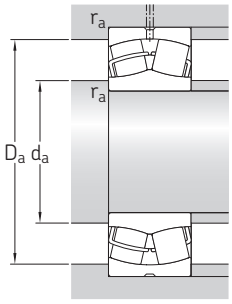

Tapered bore

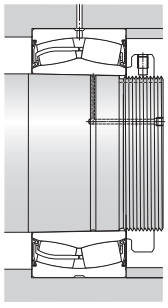


Sealed (2RS, 2RS5, 2CS5)

| Principal dimensions | | | Basic load ratings | | Fatigue load limit | Speed ratings | | Mass | Designations | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | dynamic | static | | Reference speed | Limiting speed | | Bearing with cylindrical bore | tapered bore |
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **110** | 170 | 45 | 326 | 440 | 46,5 | – | 1 500 | 3,8 | ▸ 23022-2RS/VT143 | – |
| | 170 | 45 | 326 | 440 | 46,5 | 3 400 | 4 300 | 3,8 | ▸ 23022 CC/W33 | ▸ 23022 CCK/W33 |
| | 170 | 60 | 437 | 620 | 67 | 2 400 | 3 600 | 5 | ▸ 24022 CC/W33 | 24022 CCK30/W33 |
| | 170 | 60 | 438 | 620 | 67 | – | 1 600 | 5 | 24022-2RS5/VT143 | – |
| | 180 | 56 | 450 | 585 | 61 | 2 800 | 3 600 | 5,75 | ▸ 23122 CC/W33 | ▸ 23122 CCK/W33 |
| | 180 | 56 | 451 | 585 | 61 | – | 800 | 5,75 | ▸ 23122-2CS5/VT143 | ▸ 23122-2CS5K/VT143 |
| | 180 | 69 | 539 | 750 | 78 | 2 000 | 3 000 | 7,1 | ▸ 24122 CC/W33 | ▸ 24122 CCK30/W33 |
| | 180 | 69 | 540 | 750 | 78 | – | 630 | 7,1 | ▸ 24122-2CS5/VT143 | – |
| | 200 | 53 | 572 | 640 | 63 | 3 000 | 4 000 | 7 | ▸ 22222 E | ▸ 22222 EK |
| | 200 | 63 | 572 | 640 | 63 | – | 1 500 | 7,6 | ▸ BS2-2222-2RS5/VT143 | ▸ BS2-2222-2RS5K/VT143 |
| | 200 | 69,8 | 626 | 765 | 76,5 | 2 200 | 3 200 | 9,85 | ▸ 23222 CC/W33 | ▸ 23222 CCK/W33 |
| | 200 | 69,8 | 627 | 765 | 76,5 | – | 640 | 9,85 | ▸ 23222-2CS5/VT143 | ▸ 23222-2CS5K/VT143 |
| | 240 | 80 | 989 | 1 120 | 100 | 2 000 | 2 800 | 18,5 | ▸ 22322 E | ▸ 22322 EK |
| | 240 | 80 | 989 | 1 120 | 100 | 2 000 | 2 800 | 18,5 | ▸ 22322 EJA/VA405 | ▸ 22322 EKJA/VA405 |
| | 240 | 80 | 989 | 1 120 | 100 | 2 000 | 2 800 | 18,5 | 22322 EJA/VA406 | – |
| **120** | 180 | 46 | 366 | 500 | 52 | 3 200 | 4 000 | 4,2 | ▸ 23024 CC/W33 | ▸ 23024 CCK/W33 |
| | 180 | 46 | 367 | 500 | 52 | – | 1 400 | 4,2 | ▸ 23024-2RS5/VT143 | – |
| | 180 | 60 | 456 | 670 | 68 | 2 400 | 3 400 | 5,45 | ▸ 24024 CC/W33 | ▸ 24024 CCK30/W33 |
| | 180 | 60 | 457 | 670 | 68 | – | 670 | 5,45 | ▸ 24024-2CS5/VT143 | – |
| | 200 | 62 | 534 | 695 | 71 | 2 600 | 3 400 | 8 | ▸ 23124 CC/W33 | ▸ 23124 CCK/W33 |
| | 200 | 62 | 535 | 695 | 71 | – | 720 | 7,55 | 23124-2CS5/VT143 | – |
| | 200 | 80 | 679 | 950 | 95 | 1 900 | 2 600 | 10,5 | ▸ 24124 CC/W33 | 24124 CCK30/W33 |
| | 200 | 80 | 680 | 950 | 95 | – | 560 | 10,5 | ▸ 24124-2CS5/VT143 | – |
| | 215 | 58 | 652 | 765 | 73,5 | 2 800 | 3 800 | 8,7 | ▸ 22224 E | ▸ 22224 EK |
| | 215 | 69 | 652 | 765 | 73,5 | – | 1 400 | 9,75 | ▸ BS2-2224-2RS5/VT143 | ▸ BS2-2224-2RS5K/VT143 |
| | 215 | 76 | 732 | 930 | 93 | 2 000 | 2 800 | 12 | ▸ 23224 CC/W33 | ▸ 23224 CCK/W33 |
| | 215 | 76 | 734 | 930 | 93 | – | 600 | 12 | ▸ 23224-2CS5/VT143 | ▸ 23224-2CS5K/VT143 |
| | 260 | 86 | 1 019 | 1 120 | 100 | 2 000 | 2 600 | 23 | ▸ 22324 CC/W33 | ▸ 22324 CCK/W33 |
| | 260 | 86 | 1 019 | 1 120 | 100 | 2 000 | 2 600 | 23 | ▸ 22324 CCJA/W33VA405 | ▸ 22324 CCKJA/W33VA405 |
| | 260 | 86 | 1 019 | 1 120 | 100 | 2 000 | 2 600 | 23 | ▸ 22324 CCJA/W33VA406 | – |
| | 260 | 86 | 1 022 | 1 120 | 100 | – | 600 | 23 | ▸ 22324-2CS5/VT143 | ▸ 22324-2CS5K/VT143 |

**SKF Explorer bearing**
▸ Popular item

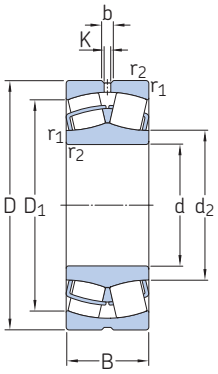


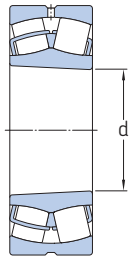
| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | | | | Permissible acceleration for oil lubrication[1] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_2$ ≈ | $D_1$ ≈ | b | K | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | e | $Y_1$ | $Y_2$ | $Y_0$ | rotational | linear |
| mm | | | | | | mm | | | | – | | | | m/s² | |
| **110** | 122 | 156 | 6 | 3 | 2 | 119 | 122 | 161 | 2 | 0,21 | 3,2 | 4,8 | 3,2 | – | – |
| | 125 | 151 | 6 | 3 | 2 | 119 | – | 161 | 2 | 0,23 | 2,9 | 4,4 | 2,8 | – | – |
| | 122 | 149 | 5,5 | 3 | 2 | 119 | – | 161 | 2 | 0,33 | 2 | 3 | 2 | – | – |
| | 120 | 154 | 6 | 3 | 2 | 119 | 120 | 161 | 2 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 126 | 157 | 8,3 | 4,5 | 2 | 121 | – | 169 | 2 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 122 | 166 | 8,3 | 4,5 | 2 | 121 | 122 | 169 | 2 | 0,27 | 2,5 | 3,7 | 2,5 | – | – |
| | 123 | 153 | 6 | 3 | 2 | 121 | – | 169 | 2 | 0,37 | 1,8 | 2,7 | 1,8 | – | – |
| | 120 | 163 | 6 | 3 | 2 | 121 | 121 | 169 | 2 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| | 130 | 178 | 8,3 | 4,5 | 2,1 | 122 | – | 188 | 2 | 0,25 | 2,7 | 4 | 2,5 | – | – |
| | 126 | 183 | 8,3 | 4,5 | 2,1 | 122 | 126 | 188 | 2 | 0,25 | 2,7 | 4 | 2,5 | – | – |
| | 130 | 169 | 8,3 | 4,5 | 2,1 | 122 | – | 188 | 2 | 0,33 | 2 | 3 | 2 | – | – |
| | 126 | 178 | 8,3 | 4,5 | 2,1 | 122 | 126 | 188 | 2 | 0,33 | 2 | 3 | 2 | – | – |
| | 143 | 204 | 13,9 | 7,5 | 3 | 124 | – | 226 | 2,5 | 0,33 | 2 | 3 | 2 | – | – |
| | 143 | 204 | 13,9 | 7,5 | 3 | 124 | – | 226 | 2,5 | 0,33 | 2 | 3 | 2 | 53 g | 19 g |
| | 143 | 204 | 13,9 | 7,5 | 3 | 124 | – | 226 | 2,5 | 0,33 | 2 | 3 | 2 | 53 g | 19 g |
| **120** | 135 | 163 | 6 | 3 | 2 | 129 | – | 171 | 2 | 0,22 | 3 | 4,6 | 2,8 | – | – |
| | 132 | 168 | 6 | 3 | 2 | 129 | 132 | 171 | 2 | 0,2 | 3,4 | 5 | 3,2 | – | – |
| | 132 | 159 | 6 | 3 | 2 | 129 | – | 171 | 2 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 130 | 166 | 6 | 3 | 2 | 129 | 130 | 171 | 2 | 0,28 | 2,4 | 3,6 | 2,5 | – | – |
| | 139 | 174 | 8,3 | 4,5 | 2 | 131 | – | 189 | 2 | 0,28 | 2,4 | 3,6 | 2,5 | – | – |
| | 135 | 183 | 8,3 | 4,5 | 2 | 131 | 135 | 189 | 2 | 0,27 | 2,5 | 3,7 | 2,5 | – | – |
| | 135 | 168 | 6 | 3 | 2 | 131 | – | 189 | 2 | 0,37 | 1,8 | 2,7 | 1,8 | – | – |
| | 132 | 179 | 6 | 3 | 2 | 131 | 132 | 189 | 2 | 0,37 | 1,8 | 2,7 | 1,8 | – | – |
| | 141 | 189 | 11,1 | 6 | 2,1 | 132 | – | 203 | 2 | 0,26 | 2,6 | 3,9 | 2,5 | – | – |
| | 136 | 194 | 11,1 | 6 | 2,1 | 132 | 136 | 203 | 2 | 0,26 | 2,6 | 3,9 | 2,5 | – | – |
| | 141 | 182 | 8,3 | 4,5 | 2,1 | 132 | – | 203 | 2 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| | 137 | 193 | 8,3 | 4,5 | 2,1 | 132 | 137 | 203 | 2 | 0,33 | 2 | 3 | 2 | – | – |
| | 152 | 216 | 13,9 | 7,5 | 3 | 134 | – | 246 | 2,5 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| | 152 | 216 | 13,9 | 7,5 | 3 | 134 | – | 246 | 2,5 | 0,35 | 1,9 | 2,9 | 1,8 | 96 g | 21 g |
| | 152 | 216 | 13,9 | 7,5 | 3 | 134 | – | 246 | 2,5 | 0,35 | 1,9 | 2,9 | 1,8 | 96 g | 21 g |
| | 147 | 229 | 13,9 | 7,5 | 3 | 134 | 147 | 246 | 2,5 | 0,33 | 2 | 3 | 2 | – | – |

[1] For details about permissible accelerations → page 779

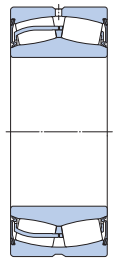
## d 130 – 140 mm




Cylindrical bore



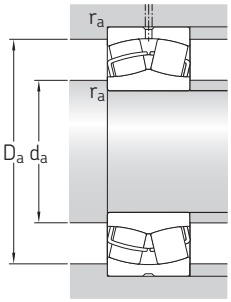

Tapered bore

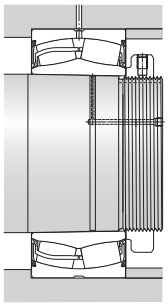


Sealed (2CS5)

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designations Bearing with cylindrical bore | tapered bore |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **130** | 200 | 52 | 452 | 610 | 61 | 2 800 | 3 600 | 6 | ▸ 23026 CC/W33 | ▸ 23026 CCK/W33 |
| | 200 | 52 | 452 | 610 | 62 | – | 800 | 6 | ▸ 23026-2CS5/VT143 | ▸ 23026-2CS5K/VT143 |
| | 200 | 69 | 569 | 815 | 81,5 | 2 000 | 3 000 | 8,05 | ▸ 24026 CC/W33 | ▸ 24026 CCK30/W33 |
| | 200 | 69 | 570 | 830 | 81,5 | – | 600 | 8,05 | ▸ 24026-2CS5/VT143 | – |
| | 210 | 64 | 586 | 780 | 78 | 2 400 | 3 200 | 8,8 | ▸ 23126 CC/W33 | ▸ 23126 CCK/W33 |
| | 210 | 80 | 699 | 1 000 | 100 | 1 700 | 2 400 | 11 | ▸ 24126 CC/W33 | 24126 CCK30/W33 |
| | 210 | 80 | 701 | 1 000 | 100 | – | 530 | 11 | ▸ 24126-2CS5/VT143 | – |
| | 220 | 73 | 640 | 930 | 93 | 1 600 | 2 400 | 11,5 | 229750 J/C3R505 | – |
| | 230 | 64 | 758 | 930 | 88 | 2 600 | 3 600 | 11 | ▸ 22226 E | ▸ 22226 EK |
| | 230 | 75 | 758 | 930 | 88 | – | 700 | 11 | ▸ BS2-2226-2CS5/VT143 | ▸ BS2-2226-2CS5K/VT143 |
| | 230 | 80 | 826 | 1 060 | 104 | 1 900 | 2 600 | 14,5 | ▸ 23226 CC/W33 | ▸ 23226 CCK/W33 |
| | 230 | 80 | 828 | 1 060 | 104 | – | 530 | 14,5 | ▸ 23226-2CS5/VT143 | ▸ 23226-2CS5K/VT143 |
| | 280 | 93 | 1 176 | 1 320 | 114 | 1 800 | 2 400 | 29 | ▸ 22326 CC/W33 | ▸ 22326 CCK/W33 |
| | 280 | 93 | 1 176 | 1 320 | 114 | 1 800 | 2 400 | 29 | ▸ 22326 CCJA/W33VA405 | ▸ 22326 CCKJA/W33VA405 |
| | 280 | 93 | 1 176 | 1 320 | 114 | 1 800 | 2 400 | 29 | 22326 CCJA/W33VA406 | – |
| | 280 | 93 | 1 178 | 1 320 | 114 | – | 500 | 29 | ▸ 22326-2CS5/VT143 | ▸ 22326-2CS5K/VT143 |
| **140** | 210 | 53 | 485 | 680 | 68 | – | 700 | 6,55 | ▸ 23028-2CS5/VT143 | ▸ 23028-2CS5K/VT143 |
| | 210 | 53 | 485 | 680 | 68 | 2 600 | 3 400 | 6,55 | ▸ 23028 CC/W33 | ▸ 23028 CCK/W33 |
| | 210 | 69 | 600 | 900 | 88 | 2 000 | 2 800 | 8,55 | ▸ 24028 CC/W33 | ▸ 24028 CCK30/W33 |
| | 210 | 69 | 601 | 900 | 88 | – | 560 | 8,55 | ▸ 24028-2CS5/VT143 | – |
| | 225 | 68 | 659 | 900 | 88 | 2 200 | 2 800 | 10,5 | ▸ 23128 CC/W33 | ▸ 23128 CCK/W33 |
| | 225 | 85 | 796 | 1 160 | 112 | 1 600 | 2 200 | 13,5 | ▸ 24128 CC/W33 | ▸ 24128 CCK30/W33 |
| | 225 | 85 | 797 | 1 160 | 112 | – | 450 | 13,5 | ▸ 24128-2CS5/VT143 | 24128-2CS5K30/VT143 |
| | 250 | 68 | 743 | 900 | 86,5 | 2 400 | 3 200 | 14 | ▸ 22228 CC/W33 | ▸ 22228 CCK/W33 |
| | 250 | 68 | 744 | 900 | 86,5 | – | 670 | 14 | ▸ 22228-2CS5/VT143 | ▸ 22228-2CS5K/VT143 |
| | 250 | 88 | 962 | 1 250 | 120 | 1 700 | 2 400 | 19 | ▸ 23228 CC/W33 | ▸ 23228 CCK/W33 |
| | 250 | 88 | 963 | 1 250 | 120 | – | 480 | 19 | ▸ 23228-2CS5/VT143 | ▸ 23228-2CS5K/VT143 |
| | 300 | 102 | 1 357 | 1 560 | 132 | 1 700 | 2 200 | 36,5 | ▸ 22328 CC/W33 | ▸ 22328 CCK/W33 |
| | 300 | 102 | 1 357 | 1 560 | 132 | 1 700 | 2 200 | 36,5 | ▸ 22328 CCJA/W33VA405 | ▸ 22328 CCKJA/W33VA405 |
| | 300 | 102 | 1 357 | 1 560 | 132 | 1 700 | 2 200 | 36,5 | 22328 CCJA/W33VA406 | – |
| | 300 | 102 | 1 359 | 1 560 | 132 | – | 430 | 36,5 | ▸ 22328-2CS5/VT143 | ▸ 22328-2CS5K/VT143 |

**SKF Explorer bearing**
▸ Popular item

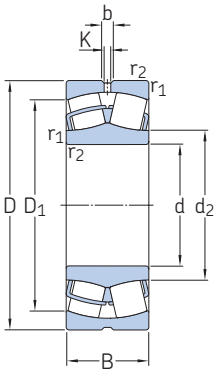


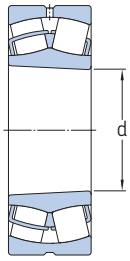
| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | | | | Permissible acceleration for oil lubrication[1] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_2$ ≈ | $D_1$ ≈ | b | K | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | e | $Y_1$ | $Y_2$ | $Y_0$ | rotational | linear |
| mm | | | | | | mm | | | | – | | | | $m/s^2$ | |
| **130** | 148 | 180 | 8,3 | 4,5 | 2 | 139 | – | 191 | 2 | 0,23 | 2,9 | 4,4 | 2,8 | – | – |
| | 145 | 186 | 8,3 | 4,5 | 2 | 139 | 145 | 191 | 2 | 0,21 | 3,2 | 4,8 | 3,2 | – | – |
| | 145 | 175 | 6 | 3 | 2 | 139 | – | 191 | 2 | 0,31 | 2,2 | 3,3 | 2,2 | – | – |
| | 140 | 183 | 6 | 3 | 2 | 139 | 140 | 191 | 2 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 148 | 184 | 8,3 | 4,5 | 2 | 141 | – | 199 | 2 | 0,28 | 2,4 | 3,6 | 2,5 | – | – |
| | 146 | 180 | 6 | 3 | 2 | 141 | – | 199 | 2 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| | 141 | 190 | 6 | 3 | 2 | 141 | 141 | 199 | 2 | 0,33 | 2 | 3 | 2 | – | – |
| | 154 | 190 | – | – | 2,1 | 142 | – | 208 | 2 | 0,31 | 2,2 | 3,3 | 2,2 | – | – |
| | 152 | 201 | 11,1 | 6 | 3 | 144 | – | 216 | 2,5 | 0,27 | 2,5 | 3,7 | 2,5 | – | – |
| | 147 | 205 | 11,1 | 6 | 3 | 144 | 147 | 216 | 2,5 | 0,27 | 2,5 | 3,7 | 2,5 | – | – |
| | 151 | 196 | 8,3 | 4,5 | 3 | 144 | – | 216 | 2,5 | 0,33 | 2 | 3 | 2 | – | – |
| | 147 | 209 | 8,3 | 4,5 | 3 | 144 | 147 | 216 | 2,5 | 0,31 | 2,2 | 3,3 | 2,2 | – | – |
| | 164 | 233 | 16,7 | 9 | 4 | 147 | – | 263 | 3 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| | 164 | 233 | 16,7 | 9 | 4 | 147 | – | 263 | 3 | 0,35 | 1,9 | 2,9 | 1,8 | 87 g | 20 g |
| | 164 | 233 | 16,7 | 9 | 4 | 147 | – | 263 | 3 | 0,35 | 1,9 | 2,9 | 1,8 | 87 g | 20 g |
| | 159 | 246 | 16,7 | 9 | 4 | 147 | 159 | 263 | 3 | 0,33 | 2 | 3 | 2 | – | – |
| **140** | 155 | 197 | 8,3 | 4,5 | 2 | 149 | 155 | 201 | 2 | 0,2 | 3,4 | 5 | 3,2 | – | – |
| | 158 | 190 | 8,3 | 4,5 | 2 | 149 | – | 201 | 2 | 0,22 | 3 | 4,6 | 2,8 | – | – |
| | 155 | 185 | 6 | 3 | 2 | 149 | – | 201 | 2 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 151 | 195 | 6 | 3 | 2 | 149 | 151 | 201 | 2 | 0,28 | 2,4 | 3,6 | 2,5 | – | – |
| | 159 | 197 | 8,3 | 4,5 | 2,1 | 152 | – | 213 | 2 | 0,28 | 2,4 | 3,6 | 2,5 | – | – |
| | 156 | 193 | 8,3 | 4,5 | 2,1 | 152 | – | 213 | 2 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| | 153 | 203 | 8,3 | 4,5 | 2,1 | 152 | 153 | 213 | 2 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| | 166 | 216 | 11,1 | 6 | 3 | 154 | – | 236 | 2,5 | 0,26 | 2,6 | 3,9 | 2,5 | – | – |
| | 161 | 225 | 11,1 | 6 | 3 | 154 | 161 | 236 | 2,5 | 0,24 | 2,8 | 4,2 | 2,8 | – | – |
| | 165 | 212 | 11,1 | 6 | 3 | 154 | – | 236 | 2,5 | 0,33 | 2 | 3 | 2 | – | – |
| | 161 | 225 | 11,1 | 6 | 3 | 154 | 161 | 236 | 2,5 | 0,33 | 2 | 3 | 2 | – | – |
| | 175 | 247 | 16,7 | 9 | 4 | 157 | – | 283 | 3 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| | 175 | 247 | 16,7 | 9 | 4 | 157 | – | 283 | 3 | 0,35 | 1,9 | 2,9 | 1,8 | 78 g | 20 g |
| | 175 | 247 | 16,7 | 9 | 4 | 157 | – | 283 | 3 | 0,35 | 1,9 | 2,9 | 1,8 | 78 g | 20 g |
| | 169 | 261 | 16,7 | 9 | 4 | 157 | 169 | 283 | 3 | 0,33 | 2 | 3 | 2 | – | – |

[1] For details about permissible accelerations → page 779

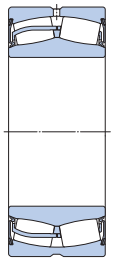
## d 150 – 160 mm




Cylindrical bore



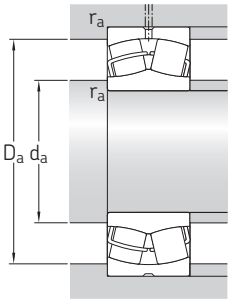

Tapered bore

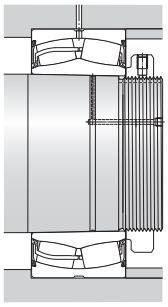


Sealed (2CS5)

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designations Bearing with cylindrical bore | tapered bore |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **150** | 225 | 56 | 531 | 750 | 73,5 | 2 400 | 3 200 | 7,95 | ▸ 23030 CC/W33 | ▸ 23030 CCK/W33 |
| | 225 | 56 | 532 | 750 | 73,5 | – | 670 | 7,95 | ▸ 23030-2CS5/VT143 | ▸ 23030-2CS5K/VT143 |
| | 225 | 75 | 680 | 1 040 | 100 | 1 800 | 2 600 | 10,5 | ▸ 24030 CC/W33 | 24030 CCK30/W33 |
| | 225 | 75 | 681 | 1 040 | 100 | – | 530 | 10,5 | ▸ 24030-2CS5/VT143 | – |
| | 250 | 80 | 883 | 1 200 | 114 | 2 000 | 2 600 | 16 | ▸ 23130 CC/W33 | ▸ 23130 CCK/W33 |
| | 250 | 80 | 884 | 1 200 | 114 | – | 560 | 16 | ▸ 23130-2CS5/VT143 | ▸ 23130-2CS5K/VT143 |
| | 250 | 100 | 1 054 | 1 530 | 146 | 1 400 | 2 000 | 20 | ▸ 24130 CC/W33 | ▸ 24130 CCK30/W33 |
| | 250 | 100 | 1 056 | 1 530 | 146 | – | 400 | 20 | ▸ 24130-2CS5/VT143 | ▸ 24130-2CS5K30/VT143 |
| | 270 | 73 | 898 | 1 080 | 102 | 2 200 | 3 000 | 18 | ▸ 22230 CC/W33 | ▸ 22230 CCK/W33 |
| | 270 | 73 | 899 | 1 080 | 102 | – | 630 | 18 | ▸ 22230-2CS5/VT143 | ▸ 22230-2CS5K/VT143 |
| | 270 | 96 | 1 129 | 1 460 | 137 | 1 600 | 2 200 | 24,5 | ▸ 23230 CC/W33 | ▸ 23230 CCK/W33 |
| | 270 | 96 | 1 132 | 1 460 | 137 | – | 430 | 24,5 | ▸ 23230-2CS5/VT143 | ▸ 23230-2CS5K/VT143 |
| | 320 | 108 | 1 539 | 1 760 | 146 | 1 600 | 2 000 | 43,5 | ▸ 22330 CC/W33 | ▸ 22330 CCK/W33 |
| | 320 | 108 | 1 539 | 1 760 | 146 | 1 600 | 2 000 | 43,5 | ▸ 22330 CCJA/W33VA405 | ▸ 22330 CCKJA/W33VA405 |
| | 320 | 108 | 1 539 | 1 760 | 146 | 1 600 | 2 000 | 43,5 | 22330 CCJA/W33VA406 | – |
| | 320 | 108 | 1 541 | 1 760 | 146 | – | 400 | 43,5 | ▸ 22330-2CS5/VT143 | ▸ 22330-2CS5K/VT143 |
| **160** | 240 | 60 | 614 | 880 | 83 | 2 400 | 3 000 | 9,7 | ▸ 23032 CC/W33 | ▸ 23032 CCK/W33 |
| | 240 | 60 | 615 | 880 | 83 | – | 670 | 9,7 | ▸ 23032-2CS5/VT143 | ▸ 23032-2CS5K/VT143 |
| | 240 | 80 | 783 | 1 200 | 114 | 1 700 | 2 400 | 13 | ▸ 24032 CC/W33 | ▸ 24032 CCK30/W33 |
| | 240 | 80 | 784 | 1 200 | 114 | – | 450 | 13 | ▸ 24032-2CS5/VT143 | – |
| | 270 | 86 | 1 029 | 1 370 | 129 | 1 900 | 2 400 | 20,5 | ▸ 23132 CC/W33 | ▸ 23132 CCK/W33 |
| | 270 | 86 | 1 030 | 1 400 | 129 | – | 530 | 20,5 | ▸ 23132-2CS5/VT143 | 23132-2CS5K/VT143 |
| | 270 | 109 | 1 227 | 1 760 | 163 | 1 300 | 1 900 | 25 | ▸ 24132 CC/W33 | ▸ 24132 CCK30/W33 |
| | 270 | 109 | 1 229 | 1 760 | 163 | – | 380 | 25 | ▸ 24132-2CS5/VT143 | – |
| | 290 | 80 | 1 043 | 1 290 | 118 | 2 000 | 2 800 | 22,5 | ▸ 22232 CC/W33 | ▸ 22232 CCK/W33 |
| | 290 | 80 | 1 044 | 1 290 | 118 | – | 600 | 22,5 | ▸ 22232-2CS5/VT143 | ▸ 22232-2CS5K/VT143 |
| | 290 | 104 | 1 281 | 1 660 | 153 | 1 500 | 2 200 | 31 | ▸ 23232 CC/W33 | ▸ 23232 CCK/W33 |
| | 340 | 114 | 1 680 | 1 960 | 160 | 1 500 | 1 900 | 52 | ▸ 22332 CC/W33 | ▸ 22332 CCK/W33 |
| | 340 | 114 | 1 680 | 1 960 | 160 | 1 500 | 1 900 | 52 | ▸ 22332 CCJA/W33VA405 | 22332 CCKJA/W33VA405 |
| | 340 | 114 | 1 680 | 1 960 | 160 | 1 500 | 1 900 | 52 | 22332 CCJA/W33VA406 | – |
| | 340 | 114 | 1 683 | 1 960 | 160 | – | 380 | 52 | ▸ 22332-2CS5/VT143 | ▸ 22332-2CS5K/VT143 |

**SKF Explorer bearing**
▸ Popular item



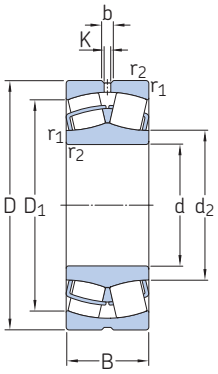



| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | | | | Permissible acceleration for oil lubrication[1] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_2$ ≈ | $D_1$ ≈ | b | K | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | e | $Y_1$ | $Y_2$ | $Y_0$ | rotational | linear |
| mm | | | | | | mm | | | | – | | | | $m/s^2$ | |
| **150** | 169 | 203 | 8,3 | 4,5 | 2,1 | 161 | – | 214 | 2 | 0,22 | 3 | 4,6 | 2,8 | – | – |
| | 165 | 211 | 8,3 | 4,5 | 2,1 | 161 | 165 | 214 | 2 | 0,2 | 3,4 | 5 | 3,2 | – | – |
| | 165 | 197 | 6 | 3 | 2,1 | 161 | – | 214 | 2 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 162 | 206 | 6 | 3 | 2,1 | 161 | 162 | 214 | 2 | 0,28 | 2,4 | 3,6 | 2,5 | – | – |
| | 172 | 216 | 11,1 | 6 | 2,1 | 162 | – | 238 | 2 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 168 | 226 | 11,1 | 6 | 2,1 | 162 | 168 | 238 | 2 | 0,28 | 2,4 | 3,6 | 2,5 | – | – |
| | 169 | 211 | 8,3 | 4,5 | 2,1 | 162 | – | 238 | 2 | 0,37 | 1,8 | 2,7 | 1,8 | – | – |
| | 163 | 222 | 8,3 | 4,5 | 2,1 | 162 | 163 | 238 | 2 | 0,37 | 1,8 | 2,7 | 1,8 | – | – |
| | 178 | 234 | 13,9 | 7,5 | 3 | 164 | – | 256 | 2,5 | 0,26 | 2,6 | 3,9 | 2,5 | – | – |
| | 174 | 248 | 13,9 | 7,5 | 3 | 164 | 174 | 256 | 2,5 | 0,24 | 2,8 | 4,2 | 2,8 | – | – |
| | 175 | 228 | 11,1 | 6 | 3 | 164 | – | 256 | 2,5 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| | 171 | 243 | 11,1 | 6 | 3 | 164 | 171 | 256 | 2,5 | 0,33 | 2 | 3 | 2 | – | – |
| | 188 | 266 | 16,7 | 9 | 4 | 167 | – | 303 | 3 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| | 188 | 266 | 16,7 | 9 | 4 | 167 | – | 303 | 3 | 0,35 | 1,9 | 2,9 | 1,8 | 72 g | 19 g |
| | 188 | 266 | 16,7 | 9 | 4 | 167 | – | 303 | 3 | 0,35 | 1,9 | 2,9 | 1,8 | 72 g | 19 g |
| | 181 | 281 | 16,7 | 9 | 4 | 167 | 181 | 303 | 3 | 0,33 | 2 | 3 | 2 | – | – |
| **160** | 180 | 217 | 11,1 | 6 | 2,1 | 171 | – | 229 | 2 | 0,22 | 3 | 4,6 | 2,8 | – | – |
| | 177 | 225 | 11,1 | 6 | 2,1 | 171 | 177 | 229 | 2 | 0,2 | 3,4 | 5 | 3,2 | – | – |
| | 176 | 211 | 8,3 | 4,5 | 2,1 | 171 | – | 229 | 2 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 173 | 218 | 8,3 | 4,5 | 2,1 | 171 | 173 | 229 | 2 | 0,28 | 2,4 | 3,6 | 2,5 | – | – |
| | 184 | 234 | 13,9 | 7,5 | 2,1 | 172 | – | 258 | 2 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 180 | 244 | 13,9 | 7,5 | 2,1 | 172 | 180 | 258 | 2 | 0,28 | 2,4 | 3,6 | 2,5 | – | – |
| | 181 | 228 | 8,3 | 4,5 | 2,1 | 172 | – | 258 | 2 | 0,4 | 1,7 | 2,5 | 1,6 | – | – |
| | 176 | 239 | 8,3 | 4,5 | 2,1 | 172 | 176 | 258 | 2 | 0,37 | 1,8 | 2,7 | 1,8 | – | – |
| | 191 | 250 | 13,9 | 7,5 | 3 | 174 | – | 276 | 2,5 | 0,26 | 2,6 | 3,9 | 2,5 | – | – |
| | 185 | 264 | 13,9 | 7,5 | 3 | 174 | 185 | 276 | 2,5 | 0,25 | 2,7 | 4 | 2,5 | – | – |
| | 188 | 244 | 13,9 | 7,5 | 3 | 174 | – | 276 | 2,5 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| | 200 | 282 | 16,7 | 9 | 4 | 177 | – | 323 | 3 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| | 200 | 282 | 16,7 | 9 | 4 | 177 | – | 323 | 3 | 0,35 | 1,9 | 2,9 | 1,8 | 69 g | 18 g |
| | 200 | 282 | 16,7 | 9 | 4 | 177 | – | 323 | 3 | 0,35 | 1,9 | 2,9 | 1,8 | 69 g | 18 g |
| | 193 | 296 | 16,7 | 9 | 4 | 177 | 193 | 323 | 3 | 0,33 | 2 | 3 | 2 | – | – |

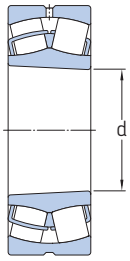
[1] For details about permissible accelerations → page 779

## 9.1 Spherical roller bearings

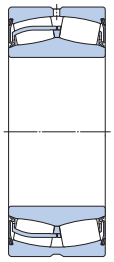
d **170 – 180** mm




Cylindrical bore



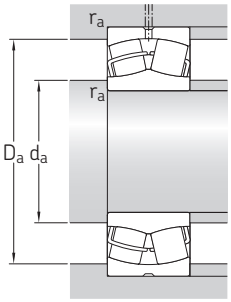

Tapered bore

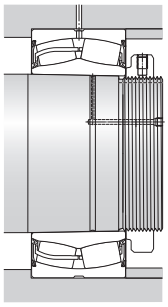


Sealed (2CS5)

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designations Bearing with cylindrical bore | tapered bore |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **170** | 260 | 67 | 745 | 1 060 | 100 | 2 200 | 2 800 | 13 | ▸ 23034 CC/W33 | ▸ 23034 CCK/W33 |
| | 260 | 67 | 746 | 1 080 | 100 | – | 630 | 13 | ▸ 23034-2CS5/VT143 | ▸ 23034-2CS5K/VT143 |
| | 260 | 90 | 963 | 1 460 | 137 | 1 600 | 2 400 | 17,5 | ▸ 24034 CC/W33 | ▸ 24034 CCK30/W33 |
| | 260 | 90 | 966 | 1 500 | 137 | – | 400 | 17,5 | ▸ 24034-2CS5/VT143 | – |
| | 280 | 88 | 1 086 | 1 500 | 137 | 1 800 | 2 400 | 22 | ▸ 23134 CC/W33 | ▸ 23134 CCK/W33 |
| | 280 | 88 | 1 088 | 1 500 | 137 | – | 480 | 22 | ▸ 23134-2CS5/VT143 | ▸ 23134-2CS5K/VT143 |
| | 280 | 109 | 1 270 | 1 860 | 170 | 1 200 | 1 800 | 27,5 | ▸ 24134 CC/W33 | ▸ 24134 CCK30/W33 |
| | 280 | 109 | 1 273 | 1 860 | 170 | – | 360 | 27,5 | ▸ 24134-2CS5/VT143 | – |
| | 310 | 86 | 1 183 | 1 460 | 132 | 1 900 | 2 600 | 28,5 | ▸ 22234 CC/W33 | ▸ 22234 CCK/W33 |
| | 310 | 86 | 1 185 | 1 460 | 134 | – | 500 | 28,5 | ▸ 22234-2CS5/VT143 | ▸ 22234-2CS5K/VT143 |
| | 310 | 110 | 1 472 | 1 930 | 173 | 1 400 | 2 000 | 37,5 | ▸ 23234 CC/W33 | ▸ 23234 CCK/W33 |
| | 360 | 120 | 1 863 | 2 160 | 176 | 1 400 | 1 800 | 61 | ▸ 22334 CC/W33 | ▸ 22334 CCK/W33 |
| | 360 | 120 | 1 863 | 2 160 | 176 | 1 400 | 1 800 | 61 | ▸ 22334 CCJA/W33VA405 | 22334 CCKJA/W33VA405 |
| | 360 | 120 | 1 863 | 2 160 | 176 | 1 400 | 1 800 | 61 | 22334 CCJA/W33VA406 | – |
| **180** | 250 | 52 | 519 | 830 | 76,5 | 2 600 | 2 800 | 7,9 | ▸ 23936 CC/W33 | 23936 CCK/W33 |
| | 280 | 74 | 883 | 1 250 | 114 | 2 000 | 2 600 | 17 | ▸ 23036 CC/W33 | ▸ 23036 CCK/W33 |
| | 280 | 74 | 884 | 1 270 | 114 | – | 560 | 17 | ▸ 23036-2CS5/VT143 | ▸ 23036-2CS5K/VT143 |
| | 280 | 100 | 1 134 | 1 730 | 156 | 1 500 | 2 200 | 23 | ▸ 24036 CC/W33 | 24036 CCK30/W33 |
| | 280 | 100 | 1 136 | 1 730 | 156 | – | 380 | 23 | ▸ 24036-2CS5/VT143 | – |
| | 300 | 96 | 1 263 | 1 760 | 160 | 1 700 | 2 200 | 28 | ▸ 23136 CC/W33 | ▸ 23136 CCK/W33 |
| | 300 | 96 | 1 264 | 1 800 | 160 | – | 430 | 28 | ▸ 23136-2CS5/VT143 | ▸ 23136-2CS5K/VT143 |
| | 300 | 118 | 1 449 | 2 160 | 196 | 1 100 | 1 600 | 34,5 | ▸ 24136 CC/W33 | ▸ 24136 CCK30/W33 |
| | 300 | 118 | 1 452 | 2 160 | 196 | – | 360 | 34,5 | ▸ 24136-2CS5/VT143 | – |
| | 320 | 86 | 1 237 | 1 560 | 140 | 1 800 | 2 600 | 29,5 | ▸ 22236 CC/W33 | ▸ 22236 CCK/W33 |
| | 320 | 86 | 1 239 | 1 560 | 140 | – | 530 | 29 | ▸ 22236-2CS5/VT143 | ▸ 22236-2CS5K/VT143 |
| | 320 | 112 | 1 557 | 2 120 | 186 | 1 300 | 1 900 | 39,5 | ▸ 23236 CC/W33 | ▸ 23236 CCK/W33 |
| | 380 | 126 | 2 077 | 2 450 | 193 | 1 300 | 1 700 | 71,5 | ▸ 22336 CC/W33 | ▸ 22336 CCK/W33 |
| | 380 | 126 | 2 077 | 2 450 | 193 | 1 300 | 1 700 | 71,5 | ▸ 22336 CCJA/W33VA405 | 22336 CCKJA/W33VA405 |
| | 380 | 126 | 2 077 | 2 450 | 193 | 1 300 | 1 700 | 71,5 | 22336 CCJA/W33VA406 | – |

**SKF Explorer bearing**
▸ Popular item



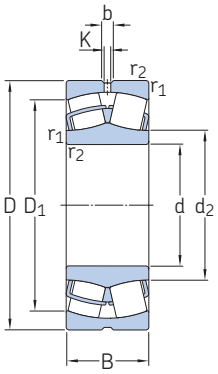



| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | | | | Permissible acceleration for oil lubrication[1] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_2$ ≈ | $D_1$ ≈ | b | K | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | e | $Y_1$ | $Y_2$ | $Y_0$ | rotational | linear |
| mm | | | | | | mm | | | | – | | | | $m/s^2$ | |
| **170** | 191 | 232 | 11,1 | 6 | 2,1 | 181 | – | 249 | 2 | 0,23 | 2,9 | 4,4 | 2,8 | – | – |
| | 188 | 243 | 11,1 | 6 | 2,1 | 181 | 188 | 249 | 2 | 0,22 | 3 | 4,6 | 2,8 | – | – |
| | 188 | 226 | 8,3 | 4,5 | 2,1 | 181 | – | 249 | 2 | 0,33 | 2 | 3 | 2 | – | – |
| | 184 | 235 | 8,3 | 4,5 | 2,1 | 181 | 184 | 249 | 2 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 195 | 244 | 13,9 | 7,5 | 2,1 | 182 | – | 268 | 2 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 190 | 256 | 13,9 | 7,5 | 2,1 | 182 | 190 | 268 | 2 | 0,28 | 2,4 | 3,6 | 2,5 | – | – |
| | 190 | 237 | 8,3 | 4,5 | 2,1 | 182 | – | 268 | 2 | 0,37 | 1,8 | 2,7 | 1,8 | – | – |
| | 185 | 248 | 8,3 | 4,5 | 2,1 | 182 | 185 | 268 | 2 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| | 203 | 267 | 16,7 | 9 | 4 | 187 | – | 293 | 3 | 0,27 | 2,5 | 3,7 | 2,5 | – | – |
| | 198 | 282 | 16,7 | 9 | 4 | 187 | 198 | 293 | 3 | 0,25 | 2,7 | 4 | 2,5 | – | – |
| | 200 | 261 | 13,9 | 7,5 | 4 | 187 | – | 293 | 3 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| | 213 | 300 | 16,7 | 9 | 4 | 187 | – | 343 | 3 | 0,33 | 2 | 3 | 2 | – | – |
| | 213 | 300 | 16,7 | 9 | 4 | 187 | – | 343 | 3 | 0,33 | 2 | 3 | 2 | 65 g | 18 g |
| | 213 | 300 | 16,7 | 9 | 4 | 187 | – | 343 | 3 | 0,33 | 2 | 3 | 2 | 65 g | 18 g |
| **180** | 199 | 231 | 6 | 3 | 2 | 189 | – | 241 | 2 | 0,18 | 3,8 | 5,6 | 3,6 | – | – |
| | 204 | 249 | 13,9 | 7,5 | 2,1 | 191 | – | 269 | 2 | 0,24 | 2,8 | 4,2 | 2,8 | – | – |
| | 199 | 262 | 13,9 | 7,5 | 2,1 | 191 | 199 | 269 | 2 | 0,22 | 3 | 4,6 | 2,8 | – | – |
| | 201 | 243 | 8,3 | 4,5 | 2,1 | 191 | – | 269 | 2 | 0,33 | 2 | 3 | 2 | – | – |
| | 194 | 251 | 8,3 | 4,5 | 2,1 | 191 | 194 | 269 | 2 | 0,31 | 2,2 | 3,3 | 2,2 | – | – |
| | 207 | 259 | 13,9 | 7,5 | 3 | 194 | – | 286 | 2,5 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 202 | 272 | 13,9 | 7,5 | 3 | 194 | 202 | 286 | 2,5 | 0,28 | 2,4 | 3,6 | 2,5 | – | – |
| | 203 | 253 | 11,1 | 6 | 3 | 194 | – | 286 | 2,5 | 0,37 | 1,8 | 2,7 | 1,8 | – | – |
| | 198 | 266 | 11,1 | 6 | 3 | 194 | 198 | 286 | 2,5 | 0,37 | 1,8 | 2,7 | 1,8 | – | – |
| | 213 | 278 | 16,7 | 9 | 4 | 197 | – | 303 | 3 | 0,26 | 2,6 | 3,9 | 2,5 | – | – |
| | 208 | 289 | 16,7 | 9 | 4 | 197 | 208 | 303 | 3 | 0,24 | 2,8 | 4,2 | 2,8 | – | – |
| | 211 | 271 | 13,9 | 7,5 | 4 | 197 | – | 303 | 3 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| | 224 | 317 | 22,3 | 12 | 4 | 197 | – | 363 | 3 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| | 224 | 317 | 22,3 | 12 | 4 | 197 | – | 363 | 3 | 0,35 | 1,9 | 2,9 | 1,8 | 59 g | 17 g |
| | 224 | 317 | 22,3 | 12 | 4 | 197 | – | 363 | 3 | 0,35 | 1,9 | 2,9 | 1,8 | 59 g | 17 g |

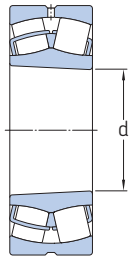
[1] For details about permissible accelerations → page 779

## 9.1 Spherical roller bearings

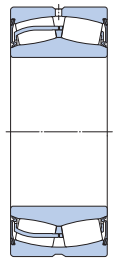
d **190 – 200** mm




Cylindrical bore



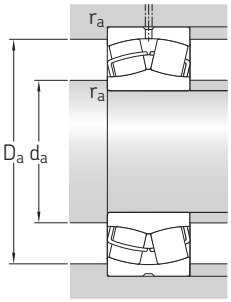

Tapered bore

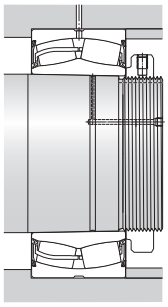


Sealed (2CS5)

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designations Bearing with cylindrical bore | tapered bore |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **190** | 260 | 52 | 499 | 800 | 76,5 | 2 400 | 2 600 | 8,3 | ▸ 23938 CC/W33 | 23938 CCK/W33 |
| | 290 | 75 | 916 | 1 340 | 122 | 1 900 | 2 400 | 18 | ▸ 23038 CC/W33 | ▸ 23038 CCK/W33 |
| | 290 | 100 | 1 164 | 1 800 | 163 | 1 400 | 2 000 | 24,5 | ▸ 24038 CC/W33 | 24038 CCK30/W33 |
| | 320 | 104 | 1 456 | 2 080 | 183 | 1 500 | 2 000 | 35 | ▸ 23138 CC/W33 | ▸ 23138 CCK/W33 |
| | 320 | 104 | 1 458 | 2 080 | 183 | – | 400 | 35 | ▸ 23138-2CS5/VT143 | ▸ 23138-2CS5K/VT143 |
| | 320 | 128 | 1 652 | 2 500 | 212 | 1 100 | 1 500 | 43 | ▸ 24138 CC/W33 | ▸ 24138 CCK30/W33 |
| | 320 | 128 | 1 655 | 2 500 | 212 | – | 340 | 43 | ▸ 24138-2CS5/VT143 | – |
| | 340 | 92 | 1 342 | 1 700 | 150 | 1 700 | 2 400 | 36,5 | ▸ 22238 CC/W33 | ▸ 22238 CCK/W33 |
| | 340 | 92 | 1 345 | 1 700 | 150 | – | 480 | 35 | ▸ 22238-2CS5/VT143 | ▸ 22238-2CS5K/VT143 |
| | 340 | 120 | 1 759 | 2 400 | 208 | 1 300 | 1 800 | 48 | ▸ 23238 CC/W33 | ▸ 23238 CCK/W33 |
| | 400 | 132 | 2 232 | 2 650 | 208 | 1 200 | 1 600 | 82,5 | ▸ 22338 CC/W33 | ▸ 22338 CCK/W33 |
| | 400 | 132 | 2 232 | 2 650 | 208 | 1 200 | 1 600 | 82,5 | ▸ 22338 CCJA/W33VA405 | 22338 CCKJA/W33VA405 |
| | 400 | 132 | 2 232 | 2 650 | 208 | 1 200 | 1 600 | 82,5 | 22338 CCJA/W33VA406 | – |
| | 400 | 132 | 2 236 | 2 650 | 208 | – | 340 | 77,5 | 22338-2CS5/VT143 | – |
| **200** | 280 | 60 | 651 | 1 040 | 93 | 2 200 | 2 400 | 11,5 | ▸ 23940 CC/W33 | 23940 CCK/W33 |
| | 310 | 82 | 1 058 | 1 530 | 137 | 1 800 | 2 200 | 23,5 | ▸ 23040 CC/W33 | ▸ 23040 CCK/W33 |
| | 310 | 82 | 1 059 | 1 530 | 137 | – | 480 | 22 | ▸ 23040-2CS5/VT143 | ▸ 23040-2CS5K/VT143 |
| | 310 | 109 | 1 353 | 2 120 | 186 | 1 300 | 1 900 | 31 | ▸ 24040 CC/W33 | ▸ 24040 CCK30/W33 |
| | 340 | 112 | 1 665 | 2 360 | 204 | 1 500 | 1 900 | 43 | ▸ 23140 CC/W33 | ▸ 23140 CCK/W33 |
| | 340 | 112 | 1 668 | 2 360 | 204 | – | 380 | 43 | ▸ 23140-2CS5/VT143 | ▸ 23140-2CS5K/VT143 |
| | 340 | 140 | 1 865 | 2 800 | 232 | 1 000 | 1 400 | 53,5 | ▸ 24140 CC/W33 | ▸ 24140 CCK30/W33 |
| | 340 | 140 | 1 871 | 2 800 | 232 | – | 320 | 53,5 | ▸ 24140-2CS5/VT143 | – |
| | 360 | 98 | 1 526 | 1 930 | 166 | 1 600 | 2 200 | 43,5 | ▸ 22240 CC/W33 | ▸ 22240 CCK/W33 |
| | 360 | 98 | 1 529 | 1 930 | 166 | – | 430 | 42 | ▸ 22240-2CS5/VT143 | ▸ 22240-2CS5K/VT143 |
| | 360 | 128 | 1 947 | 2 700 | 228 | 1 200 | 1 700 | 58 | ▸ 23240 CC/W33 | ▸ 23240 CCK/W33 |
| | 360 | 128 | 1 950 | 2 700 | 232 | – | 340 | 58 | ▸ 23240-2CS5/VT143 | ▸ 23240-2CS5K/VT143 |
| | 420 | 138 | 2 439 | 2 900 | 224 | 1 200 | 1 500 | 95 | ▸ 22340 CC/W33 | ▸ 22340 CCK/W33 |
| | 420 | 138 | 2 439 | 2 900 | 224 | 1 200 | 1 500 | 95 | ▸ 22340 CCJA/W33VA405 | 22340 CCKJA/W33VA405 |
| | 420 | 138 | 2 439 | 2 900 | 224 | 1 200 | 1 500 | 95 | 22340 CCJA/W33VA406 | – |

**SKF Explorer bearing**
▸ Popular item

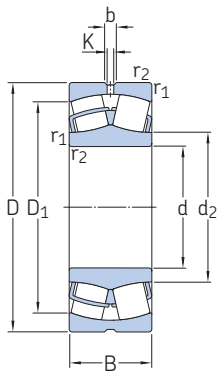


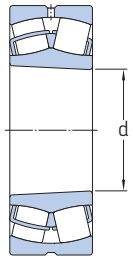
| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | | | | Permissible acceleration for oil lubrication[1] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_2$ ≈ | $D_1$ ≈ | b | K | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | e | $Y_1$ | $Y_2$ | $Y_0$ | rotational | linear |
| mm | | | | | | mm | | | | – | | | | $m/s^2$ | |
| **190** | 209 | 240 | 6 | 3 | 2 | 199 | – | 251 | 2 | 0,16 | 4,2 | 6,3 | 4 | – | – |
| | 216 | 261 | 13,9 | 7,5 | 2,1 | 201 | – | 279 | 2 | 0,23 | 2,9 | 4,4 | 2,8 | – | – |
| | 210 | 253 | 8,3 | 4,5 | 2,1 | 201 | – | 279 | 2 | 0,31 | 2,2 | 3,3 | 2,2 | – | – |
| | 220 | 275 | 13,9 | 7,5 | 3 | 204 | – | 306 | 2,5 | 0,31 | 2,2 | 3,3 | 2,2 | – | – |
| | 215 | 288 | 13,9 | 7,5 | 3 | 204 | 215 | 306 | 2,5 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 215 | 268 | 11,1 | 6 | 3 | 204 | – | 306 | 2,5 | 0,4 | 1,7 | 2,5 | 1,6 | – | – |
| | 210 | 282 | 11,1 | 6 | 3 | 204 | 210 | 306 | 2,5 | 0,37 | 1,8 | 2,7 | 1,8 | – | – |
| | 225 | 294 | 16,7 | 9 | 4 | 207 | – | 323 | 3 | 0,26 | 2,6 | 3,9 | 2,5 | – | – |
| | 220 | 306 | 16,7 | 9 | 4 | 207 | 220 | 323 | 3 | 0,24 | 2,8 | 4,2 | 2,8 | – | – |
| | 222 | 287 | 16,7 | 9 | 4 | 207 | – | 323 | 3 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| | 236 | 333 | 22,3 | 12 | 5 | 210 | – | 380 | 4 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| | 236 | 333 | 22,3 | 12 | 5 | 210 | – | 380 | 4 | 0,35 | 1,9 | 2,9 | 1,8 | 57 g | 17 g |
| | 236 | 333 | 22,3 | 12 | 5 | 210 | – | 380 | 4 | 0,35 | 1,9 | 2,9 | 1,8 | 57 g | 17 g |
| | 228 | 352 | 22,3 | 12 | 5 | 210 | 228 | 380 | 4 | 0,33 | 2 | 3 | 2 | – | – |
| **200** | 222 | 258 | 8,3 | 4,5 | 2,1 | 211 | – | 269 | 2 | 0,19 | 3,6 | 5,3 | 3,6 | – | – |
| | 228 | 278 | 13,9 | 7,5 | 2,1 | 211 | – | 299 | 2 | 0,24 | 2,8 | 4,2 | 2,8 | – | – |
| | 223 | 286 | 13,9 | 7,5 | 2,1 | 211 | 223 | 299 | 2 | 0,22 | 3 | 4,6 | 2,8 | – | – |
| | 223 | 268 | 11,1 | 6 | 2,1 | 211 | – | 299 | 2 | 0,33 | 2 | 3 | 2 | – | – |
| | 231 | 293 | 16,7 | 9 | 3 | 214 | – | 326 | 2,5 | 0,31 | 2,2 | 3,3 | 2,2 | – | – |
| | 227 | 306 | 16,7 | 9 | 3 | 214 | 227 | 326 | 2,5 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 226 | 284 | 11,1 | 6 | 3 | 214 | – | 326 | 2,5 | 0,4 | 1,7 | 2,5 | 1,6 | – | – |
| | 221 | 294 | 11,1 | 6 | 3 | 214 | 221 | 326 | 2,5 | 0,37 | 1,8 | 2,7 | 1,8 | – | – |
| | 238 | 313 | 16,7 | 9 | 4 | 217 | – | 343 | 3 | 0,26 | 2,6 | 3,9 | 2,5 | – | – |
| | 232 | 324 | 16,7 | 9 | 4 | 217 | 232 | 343 | 3 | 0,24 | 2,8 | 4,2 | 2,8 | – | – |
| | 235 | 304 | 16,7 | 9 | 4 | 217 | – | 343 | 3 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| | 230 | 320 | 16,7 | 9 | 4 | 217 | 230 | 343 | 3 | 0,33 | 2 | 3 | 2 | – | – |
| | 249 | 351 | 22,3 | 12 | 5 | 220 | – | 400 | 4 | 0,33 | 2 | 3 | 2 | – | – |
| | 249 | 351 | 22,3 | 12 | 5 | 220 | – | 400 | 4 | 0,33 | 2 | 3 | 2 | 55 g | 17 g |
| | 249 | 351 | 22,3 | 12 | 5 | 220 | – | 400 | 4 | 0,33 | 2 | 3 | 2 | 55 g | 17 g |

[1] For details about permissible accelerations → page 779

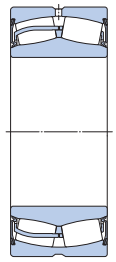
## d 220 – 260 mm




Cylindrical bore



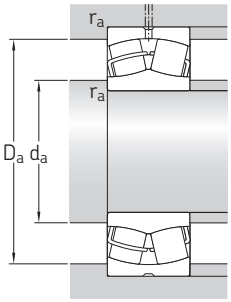

Tapered bore

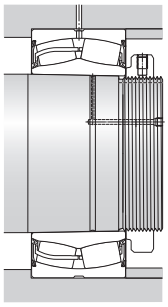


Sealed (2CS5)

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designations Bearing with cylindrical bore | tapered bore |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **220** | 300 | 60 | 661 | 1 080 | 93 | 2 000 | 2 200 | 12,5 | ▸ 23944 CC/W33 | 23944 CCK/W33 |
| | 300 | 60 | 662 | 1 080 | 93 | – | 600 | 12,5 | 23944-2CS/VT143 | – |
| | 340 | 90 | 1 261 | 1 860 | 163 | 1 600 | 2 000 | 30,5 | ▸ 23044 CC/W33 | ▸ 23044 CCK/W33 |
| | 340 | 90 | 1 262 | 1 860 | 163 | – | 430 | 29 | ▸ 23044-2CS5/VT143 | ▸ 23044-2CS5K/VT143 |
| | 340 | 118 | 1 628 | 2 600 | 212 | 1 200 | 1 700 | 40 | ▸ 24044 CC/W33 | ▸ 24044 CCK30/W33 |
| | 370 | 120 | 1 888 | 2 750 | 232 | 1 300 | 1 700 | 53,5 | ▸ 23144 CC/W33 | ▸ 23144 CCK/W33 |
| | 370 | 120 | 1 891 | 2 750 | 232 | – | 360 | 53,5 | ▸ 23144-2CS5/VT143 | ▸ 23144-2CS5K/VT143 |
| | 370 | 150 | 2 197 | 3 350 | 285 | 850 | 1 200 | 67 | ▸ 24144 CC/W33 | ▸ 24144 CCK30/W33 |
| | 400 | 108 | 1 835 | 2 360 | 196 | 1 500 | 2 000 | 60,5 | ▸ 22244 CC/W33 | ▸ 22244 CCK/W33 |
| | 400 | 108 | 1 839 | 2 360 | 200 | – | 380 | 58 | ▸ 22244-2CS5/VT143 | ▸ 22244-2CS5K/VT143 |
| | 400 | 144 | 2 485 | 3 450 | 285 | 1 100 | 1 500 | 81,5 | ▸ 23244 CC/W33 | ▸ 23244 CCK/W33 |
| | 460 | 145 | 2 839 | 3 450 | 260 | 1 000 | 1 400 | 120 | ▸ 22344 CC/W33 | ▸ 22344 CCK/W33 |
| | 460 | 145 | 2 839 | 3 450 | 260 | 1 000 | 1 400 | 120 | ▸ 22344 CCJA/W33VA405 | 22344 CCKJA/W33VA405 |
| | 460 | 145 | 2 844 | 3 450 | 260 | – | 300 | 115 | ▸ 22344-2CS5/VT143 | ▸ 22344-2CS5K/VT143 |
| **240** | 320 | 60 | 685 | 1 160 | 98 | 1 900 | 2 000 | 13,5 | ▸ 23948 CC/W33 | 23948 CCK/W33 |
| | 360 | 92 | 1 340 | 2 080 | 176 | 1 500 | 1 900 | 33,5 | ▸ 23048 CC/W33 | ▸ 23048 CCK/W33 |
| | 360 | 92 | 1 341 | 2 080 | 176 | – | 400 | 32 | ▸ 23048-2CS5/VT143 | 23048-2CS5K/VT143 |
| | 360 | 118 | 1 663 | 2 700 | 228 | 1 100 | 1 600 | 43 | ▸ 24048 CC/W33 | 24048 CCK30/W33 |
| | 400 | 128 | 2 187 | 3 200 | 255 | 1 200 | 1 600 | 66,5 | ▸ 23148 CC/W33 | ▸ 23148 CCK/W33 |
| | 400 | 128 | 2 191 | 3 200 | 255 | – | 340 | 66,5 | ▸ 23148-2CS5/VT143 | ▸ 23148-2CS5K/VT143 |
| | 400 | 160 | 2 489 | 3 900 | 320 | 750 | 1 100 | 83 | ▸ 24148 CC/W33 | ▸ 24148 CCK30/W33 |
| | 440 | 120 | 2 258 | 3 000 | 245 | 1 300 | 1 800 | 83 | ▸ 22248 CC/W33 | ▸ 22248 CCK/W33 |
| | 440 | 160 | 3 042 | 4 300 | 345 | 950 | 1 300 | 110 | ▸ 23248 CC/W33 | ▸ 23248 CCK/W33 |
| | 500 | 155 | 3 229 | 4 000 | 290 | 950 | 1 300 | 155 | ▸ 22348 CC/W33 | ▸ 22348 CCK/W33 |
| | 500 | 155 | 3 229 | 4 000 | 290 | 950 | 1 300 | 155 | 22348 CCJA/W33VA405 | 22348 CCKJA/W33VA405 |
| **260** | 360 | 75 | 1 055 | 1 800 | 156 | 1 700 | 1 900 | 23,5 | ▸ 23952 CC/W33 | 23952 CCK/W33 |
| | 400 | 104 | 1 675 | 2 550 | 212 | 1 300 | 1 700 | 48,5 | ▸ 23052 CC/W33 | ▸ 23052 CCK/W33 |
| | 400 | 104 | 1 677 | 2 550 | 212 | – | 360 | 46 | ▸ 23052-2CS5/VT143 | ▸ 23052-2CS5K/VT143 |
| | 400 | 140 | 2 135 | 3 450 | 285 | 1 000 | 1 400 | 65,5 | ▸ 24052 CC/W33 | ▸ 24052 CCK30/W33 |
| | 440 | 144 | 2 664 | 3 900 | 290 | 1 100 | 1 400 | 90,5 | ▸ 23152 CC/W33 | ▸ 23152 CCK/W33 |
| | 440 | 144 | 2 668 | 3 900 | 290 | – | 320 | 90,5 | ▸ 23152-2CS5/VT143 | ▸ 23152-2CS5K/VT143 |
| | 440 | 180 | 3 086 | 4 800 | 380 | 670 | 950 | 110 | ▸ 24152 CC/W33 | ▸ 24152 CCK30/W33 |
| | 440 | 180 | 3 092 | 4 900 | 380 | – | 240 | 109 | 24152-2CS5/VT143 | – |
| | 480 | 130 | 2 722 | 3 550 | 285 | 1 200 | 1 600 | 110 | ▸ 22252 CC/W33 | 22252 CCK/W33 |
| | 480 | 174 | 3 395 | 4 750 | 360 | 850 | 1 200 | 140 | ▸ 23252 CC/W33 | ▸ 23252 CCK/W33 |
| | 540 | 165 | 3 680 | 4 550 | 325 | 850 | 1 100 | 190 | ▸ 22352 CC/W33 | ▸ 22352 CCK/W33 |

**SKF Explorer bearing**
▸ Popular item

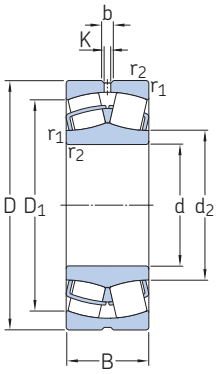


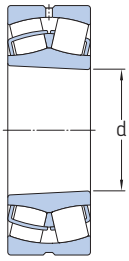
| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | | | | Permissible acceleration for oil lubrication[1] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_2$ ≈ | $D_1$ ≈ | b | K | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | e | $Y_1$ | $Y_2$ | $Y_0$ | rotational | linear |
| mm | | | | | | mm | | | | – | | | | $m/s^2$ | |
| **220** | 241 | 278 | 8,3 | 4,5 | 2,1 | 231 | – | 289 | 2 | 0,16 | 4,2 | 6,3 | 4 | – | – |
| | 238 | 284 | 8,3 | 4,5 | 2,1 | 231 | 238 | 289 | 2 | 0,15 | 4,5 | 6,7 | 4,5 | – | – |
| | 250 | 306 | 13,9 | 7,5 | 3 | 233 | – | 327 | 2,5 | 0,24 | 2,8 | 4,2 | 2,8 | – | – |
| | 245 | 314 | 13,9 | 7,5 | 3 | 233 | 245 | 327 | 2,5 | 0,22 | 3 | 4,6 | 2,8 | – | – |
| | 244 | 295 | 11,1 | 6 | 3 | 233 | – | 327 | 2,5 | 0,33 | 2 | 3 | 2 | – | – |
| | 255 | 320 | 16,7 | 9 | 4 | 237 | – | 353 | 3 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 249 | 332 | 16,7 | 9 | 4 | 237 | 249 | 353 | 3 | 0,28 | 2,4 | 3,6 | 2,5 | – | – |
| | 248 | 310 | 11,1 | 6 | 4 | 237 | – | 353 | 3 | 0,4 | 1,7 | 2,5 | 1,6 | – | – |
| | 263 | 346 | 16,7 | 9 | 4 | 237 | – | 383 | 3 | 0,27 | 2,5 | 3,7 | 2,5 | – | – |
| | 257 | 359 | 16,7 | 9 | 4 | 237 | 257 | 383 | 3 | 0,25 | 2,7 | 4 | 2,5 | – | – |
| | 259 | 338 | 16,7 | 9 | 4 | 237 | – | 383 | 3 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| | 279 | 389 | 22,3 | 12 | 5 | 240 | – | 440 | 4 | 0,31 | 2,2 | 3,3 | 2,2 | – | – |
| | 279 | 389 | 22,3 | 12 | 5 | 240 | – | 440 | 4 | 0,31 | 2,2 | 3,3 | 2,2 | 49 g | 16 g |
| | 270 | 406 | 22,3 | 12 | 5 | 240 | 270 | 440 | 4 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| **240** | 261 | 298 | 8,3 | 4,5 | 2,1 | 251 | – | 309 | 2 | 0,15 | 4,5 | 6,7 | 4,5 | – | – |
| | 271 | 326 | 13,9 | 7,5 | 3 | 253 | – | 347 | 2,5 | 0,23 | 2,9 | 4,4 | 2,8 | – | – |
| | 265 | 333 | 13,9 | 7,5 | 3 | 253 | 265 | 347 | 2,5 | 0,21 | 3,2 | 4,8 | 3,2 | – | – |
| | 265 | 316 | 11,1 | 6 | 3 | 253 | – | 347 | 2,5 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 277 | 348 | 16,7 | 9 | 4 | 257 | – | 383 | 3 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 270 | 360 | 16,7 | 9 | 4 | 257 | 270 | 383 | 3 | 0,28 | 2,4 | 3,6 | 2,5 | – | – |
| | 271 | 336 | 11,1 | 6 | 4 | 257 | – | 383 | 3 | 0,4 | 1,7 | 2,5 | 1,6 | – | – |
| | 290 | 383 | 22,3 | 12 | 4 | 257 | – | 423 | 3 | 0,27 | 2,5 | 3,7 | 2,5 | – | – |
| | 286 | 374 | 22,3 | 12 | 4 | 257 | – | 423 | 3 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| | 303 | 423 | 22,3 | 12 | 5 | 260 | – | 480 | 4 | 0,31 | 2,2 | 3,3 | 2,2 | – | – |
| | 303 | 423 | 22,3 | 12 | 5 | 260 | – | 480 | 4 | 0,31 | 2,2 | 3,3 | 2,2 | 45 g | 15 g |
| **260** | 287 | 331 | 8,3 | 4,5 | 2,1 | 271 | – | 349 | 2 | 0,18 | 3,8 | 5,6 | 3,6 | – | – |
| | 295 | 360 | 16,7 | 9 | 4 | 275 | – | 385 | 3 | 0,23 | 2,9 | 4,4 | 2,8 | – | – |
| | 289 | 369 | 16,7 | 9 | 4 | 275 | 289 | 385 | 3 | 0,22 | 3 | 4,6 | 2,8 | – | – |
| | 289 | 347 | 11,1 | 6 | 4 | 275 | – | 385 | 3 | 0,33 | 2 | 3 | 2 | – | – |
| | 301 | 380 | 16,7 | 9 | 4 | 277 | – | 423 | 3 | 0,31 | 2,2 | 3,3 | 2,2 | – | – |
| | 293 | 398 | 16,7 | 9 | 4 | 277 | 293 | 423 | 3 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 293 | 368 | 13,9 | 7,5 | 4 | 277 | – | 423 | 3 | 0,4 | 1,7 | 2,5 | 1,6 | – | – |
| | 286 | 391 | 13,9 | 7,5 | 4 | 277 | 286 | 423 | 3 | 0,4 | 1,7 | 2,5 | 1,6 | – | – |
| | 312 | 421 | 22,3 | 12 | 5 | 280 | – | 460 | 4 | 0,27 | 2,5 | 3,7 | 2,5 | – | – |
| | 312 | 408 | 22,3 | 12 | 5 | 280 | – | 460 | 4 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| | 328 | 458 | 22,3 | 12 | 6 | 286 | – | 514 | 5 | 0,31 | 2,2 | 3,3 | 2,2 | – | – |

[1] For details about permissible accelerations → page 779

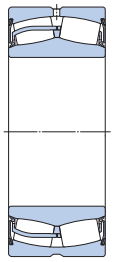
## d 280 – 320 mm




Cylindrical bore



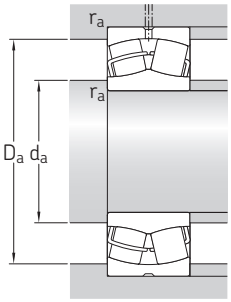

Tapered bore

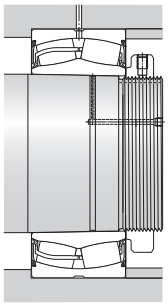


Sealed (2CS5)

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designations Bearing with cylindrical bore | tapered bore |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **280** | 380 | 75 | 1 016 | 1 760 | 143 | 1 600 | 1 700 | 25 | ▸ 23956 CC/W33 | 23956 CCK/W33 |
| | 420 | 106 | 1 797 | 2 850 | 224 | 1 300 | 1 600 | 52,5 | ▸ 23056 CC/W33 | ▸ 23056 CCK/W33 |
| | 420 | 140 | 2 248 | 3 800 | 285 | 950 | 1 400 | 69,5 | ▸ 24056 CC/W33 | ▸ 24056 CCK30/W33 |
| | 460 | 146 | 2 784 | 4 250 | 335 | 1 000 | 1 300 | 97 | ▸ 23156 CC/W33 | ▸ 23156 CCK/W33 |
| | 460 | 146 | 2 788 | 4 250 | 335 | – | 300 | 97 | ▸ 23156-2CS5/VT143 | ▸ 23156-2CS5K/VT143 |
| | 460 | 180 | 3 183 | 5 100 | 415 | 630 | 900 | 120 | ▸ 24156 CC/W33 | ▸ 24156 CCK30/W33 |
| | 460 | 180 | 3 190 | 5 100 | 415 | – | 220 | 115 | 24156-2CS5/VT143 | 24156-2CS5K30/VT143 |
| | 500 | 130 | 2 795 | 3 750 | 300 | 1 100 | 1 500 | 115 | ▸ 22256 CC/W33 | 22256 CCK/W33 |
| | 500 | 176 | 3 425 | 4 900 | 365 | 800 | 1 100 | 150 | ▸ 23256 CC/W33 | ▸ 23256 CCK/W33 |
| | 580 | 175 | 4 158 | 5 200 | 365 | 800 | 1 100 | 235 | ▸ 22356 CC/W33 | ▸ 22356 CCK/W33 |
| **300** | 420 | 90 | 1 413 | 2 500 | 200 | 1 400 | 1 600 | 39,5 | ▸ 23960 CC/W33 | 23960 CCK/W33 |
| | 460 | 118 | 2 219 | 3 450 | 265 | 1 200 | 1 500 | 71,5 | ▸ 23060 CC/W33 | ▸ 23060 CCK/W33 |
| | 460 | 118 | 2 222 | 3 450 | 265 | – | 320 | 71,5 | 23060-2CS5/VT143 | 23060-2CS5K/VT143 |
| | 460 | 160 | 2 821 | 4 750 | 355 | 850 | 1 200 | 97 | ▸ 24060 CC/W33 | ▸ 24060 CCK30/W33 |
| | 460 | 160 | 2 827 | 4 750 | 355 | – | 240 | 95 | 24060-2CS5/VT143 | – |
| | 500 | 160 | 3 368 | 5 100 | 380 | 950 | 1 200 | 125 | ▸ 23160 CC/W33 | ▸ 23160 CCK/W33 |
| | 500 | 160 | 3 373 | 5 100 | 380 | – | 260 | 125 | ▸ 23160-2CS5/VT143 | ▸ 23160-2CS5K/VT143 |
| | 500 | 200 | 3 876 | 6 300 | 465 | 560 | 800 | 160 | ▸ 24160 CC/W33 | ▸ 24160 CCK30/W33 |
| | 500 | 200 | 3 881 | 6 300 | 465 | – | 212 | 156 | 24160-2CS5/VT143 | 24160-2CS5K30/VT143 |
| | 540 | 140 | 3 239 | 4 250 | 325 | 1 000 | 1 400 | 135 | ▸ 22260 CC/W33 | 22260 CCK/W33 |
| | 540 | 192 | 4 052 | 5 850 | 425 | 750 | 1 000 | 190 | ▸ 23260 CC/W33 | ▸ 23260 CCK/W33 |
| **320** | 440 | 90 | 1 480 | 2 700 | 212 | 1 400 | 1 500 | 42 | ▸ 23964 CC/W33 | 23964 CCK/W33 |
| | 480 | 121 | 2 348 | 3 800 | 285 | – | 320 | 7,55 | 23064-2CS5/VT143 | 23064-2CS5K/VT143 |
| | 480 | 121 | 2 348 | 3 800 | 285 | 1 100 | 1 400 | 78 | ▸ 23064 CC/W33 | ▸ 23064 CCK/W33 |
| | 480 | 160 | 2 969 | 5 100 | 400 | 800 | 1 200 | 100 | ▸ 24064 CC/W33 | 24064 CCK30/W33 |
| | 540 | 176 | 3 923 | 6 000 | 440 | 850 | 1 100 | 165 | ▸ 23164 CC/W33 | ▸ 23164 CCK/W33 |
| | 540 | 176 | 3 929 | 6 100 | 440 | – | 260 | 165 | ▸ 23164-2CS5/VT143 | ▸ 23164-2CS5K/VT143 |
| | 540 | 218 | 4 395 | 7 100 | 510 | 500 | 700 | 210 | ▸ 24164 CC/W33 | 24164 CCK30/W33 |
| | 580 | 150 | 3 708 | 4 900 | 375 | 950 | 1 300 | 175 | ▸ 22264 CC/W33 | 22264 CCK/W33 |
| | 580 | 208 | 4 607 | 6 700 | 475 | 700 | 950 | 240 | ▸ 23264 CC/W33 | ▸ 23264 CCK/W33 |

**SKF Explorer bearing**
▸ Popular item

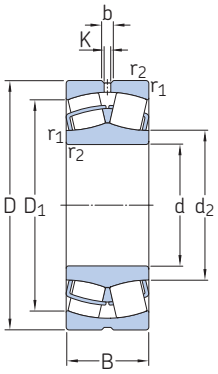


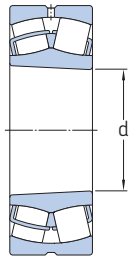
| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | | | | Permissible acceleration for oil lubrication[1] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_2$ ≈ | $D_1$ ≈ | b | K | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | e | $Y_1$ | $Y_2$ | $Y_0$ | rotational | linear |
| mm | | | | | | mm | | | | – | | | | $m/s^2$ | |
| **280** | 308 | 352 | 11,1 | 6 | 2,1 | 291 | – | 369 | 2 | 0,16 | 4,2 | 6,3 | 4 | – | – |
| | 315 | 380 | 16,7 | 9 | 4 | 295 | – | 405 | 3 | 0,23 | 2,9 | 4,4 | 2,8 | – | – |
| | 309 | 368 | 11,1 | 6 | 4 | 295 | – | 405 | 3 | 0,31 | 2,2 | 3,3 | 2,2 | – | – |
| | 321 | 401 | 16,7 | 9 | 5 | 300 | – | 440 | 4 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 314 | 417 | 16,7 | 9 | 5 | 300 | 314 | 440 | 4 | 0,28 | 2,4 | 3,6 | 2,5 | – | – |
| | 314 | 390 | 13,9 | 7,5 | 5 | 300 | – | 440 | 4 | 0,4 | 1,7 | 2,5 | 1,6 | – | – |
| | 307 | 413 | 13,9 | 7,5 | 5 | 300 | 307 | 440 | 4 | 0,37 | 1,8 | 2,7 | 1,8 | – | – |
| | 333 | 441 | 22,3 | 12 | 5 | 300 | – | 480 | 4 | 0,26 | 2,6 | 3,9 | 2,5 | – | – |
| | 332 | 429 | 22,3 | 12 | 5 | 300 | – | 480 | 4 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| | 354 | 492 | 22,3 | 12 | 6 | 306 | – | 554 | 5 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| **300** | 333 | 385 | 11,1 | 6 | 3 | 313 | – | 407 | 2,5 | 0,19 | 3,6 | 5,3 | 3,6 | – | – |
| | 340 | 414 | 16,7 | 9 | 4 | 315 | – | 445 | 3 | 0,23 | 2,9 | 4,4 | 2,8 | – | – |
| | 334 | 433 | 16,7 | 9 | 4 | 315 | 334 | 445 | 3 | 0,22 | 3 | 4,6 | 2,8 | – | – |
| | 331 | 400 | 13,9 | 7,5 | 4 | 315 | – | 445 | 3 | 0,33 | 2 | 3 | 2 | – | – |
| | 325 | 416 | 13,9 | 7,5 | 4 | 315 | 325 | 445 | 3 | 0,31 | 2,2 | 3,3 | 2,2 | – | – |
| | 345 | 434 | 16,7 | 9 | 5 | 320 | – | 480 | 4 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 337 | 451 | 16,7 | 9 | 5 | 320 | 337 | 480 | 4 | 0,28 | 2,4 | 3,6 | 2,5 | – | – |
| | 338 | 422 | 13,9 | 7,5 | 5 | 320 | – | 480 | 4 | 0,4 | 1,7 | 2,5 | 1,6 | – | – |
| | 330 | 447 | 13,9 | 7,5 | 5 | 320 | 330 | 480 | 4 | 0,37 | 1,8 | 2,7 | 1,8 | – | – |
| | 354 | 477 | 22,3 | 12 | 5 | 311 | – | 520 | 4 | 0,26 | 2,6 | 3,9 | 2,5 | – | – |
| | 356 | 461 | 22,3 | 12 | 5 | 320 | – | 520 | 4 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| **320** | 354 | 406 | 11,1 | 6 | 3 | 333 | – | 427 | 2,5 | 0,17 | 4 | 5,9 | 4 | – | – |
| | 354 | 448 | 16,7 | 9 | 4 | 335 | 354 | 465 | 3 | 0,23 | 2,9 | 4,4 | 2,8 | – | – |
| | 360 | 434 | 16,7 | 9 | 4 | 335 | – | 465 | 3 | 0,23 | 2,9 | 4,4 | 2,8 | – | – |
| | 354 | 423 | 13,9 | 7,5 | 4 | 335 | – | 465 | 3 | 0,31 | 2,2 | 3,3 | 2,2 | – | – |
| | 370 | 465 | 22,3 | 12 | 5 | 340 | – | 520 | 4 | 0,31 | 2,2 | 3,3 | 2,2 | – | – |
| | 361 | 483 | 22,3 | 12 | 5 | 340 | 361 | 520 | 4 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 364 | 455 | 16,7 | 9 | 5 | 340 | – | 520 | 4 | 0,4 | 1,7 | 2,5 | 1,6 | – | – |
| | 379 | 513 | 22,3 | 12 | 5 | 340 | – | 560 | 4 | 0,26 | 2,6 | 3,9 | 2,5 | – | – |
| | 382 | 493 | 22,3 | 12 | 5 | 340 | – | 560 | 4 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |

[1] For details about permissible accelerations → page 779

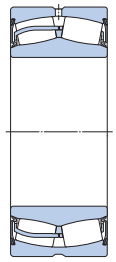
## d 340 – 400 mm




Cylindrical bore



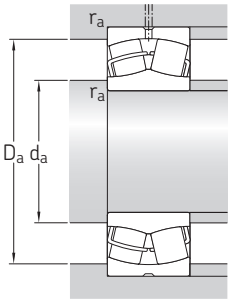

Tapered bore

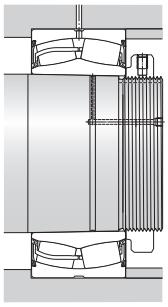


Sealed (2CS5)

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designations Bearing with cylindrical bore | tapered bore |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **340** | 460 | 90 | 1 490 | 2 800 | 216 | 1 300 | 1 400 | 45,5 | ▸ 23968 CC/W33 | 23968 CCK/W33 |
| | 520 | 133 | 2 812 | 4 550 | 335 | 1 000 | 1 300 | 105 | ▸ 23068 CC/W33 | ▸ 23068 CCK/W33 |
| | 520 | 180 | 3 621 | 6 200 | 475 | 750 | 1 100 | 140 | ▸ 24068 CC/W33 | ▸ 24068 CCK30/W33 |
| | 580 | 190 | 4 445 | 6 800 | 480 | 800 | 1 000 | 210 | ▸ 23168 CC/W33 | ▸ 23168 CCK/W33 |
| | 580 | 190 | 4 452 | 6 800 | 490 | – | 240 | 210 | ▸ 23168-2CS5/VT143 | ▸ 23168-2CS5K/VT143 |
| | 580 | 243 | 5 487 | 8 650 | 630 | 430 | 630 | 280 | ▸ 24168 ECCJ/W33 | 24168 ECCK30J/W33 |
| | 620 | 224 | 5 362 | 7 800 | 550 | 560 | 800 | 295 | ▸ 23268 CA/W33 | ▸ 23268 CAK/W33 |
| **360** | 480 | 90 | 1 456 | 2 750 | 220 | 1 200 | 1 300 | 46 | ▸ 23972 CC/W33 | 23972 CCK/W33 |
| | 540 | 134 | 2 850 | 4 800 | 345 | 950 | 1 200 | 110 | ▸ 23072 CC/W33 | ▸ 23072 CCK/W33 |
| | 540 | 180 | 3 705 | 6 550 | 490 | 700 | 1 000 | 145 | ▸ 24072 CC/W33 | 24072 CCK30/W33 |
| | 600 | 192 | 4 515 | 6 950 | 490 | 750 | 1 000 | 220 | ▸ 23172 CC/W33 | ▸ 23172 CCK/W33 |
| | 600 | 192 | 4 521 | 6 950 | 490 | – | 220 | 214 | ▸ 23172-2CS5/VT143 | ▸ 23172-2CS5K/VT143 |
| | 600 | 243 | 5 737 | 9 300 | 670 | 400 | 600 | 280 | 24172 ECCJ/W33 | 24172 ECCK30J/W33 |
| | 650 | 170 | 4 430 | 6 200 | 440 | 630 | 850 | 255 | 22272 CA/W33 | 22272 CAK/W33 |
| | 650 | 232 | 5 663 | 8 300 | 570 | 530 | 750 | 335 | ▸ 23272 CA/W33 | ▸ 23272 CAK/W33 |
| | 650 | 232 | 5 669 | 8 300 | 570 | – | 160 | 332 | 23272-2CS5/VT143 | ▸ 23272-2CS5K/VT143 |
| **380** | 520 | 106 | 2 011 | 3 800 | 285 | 1 100 | 1 200 | 69 | ▸ 23976 CC/W33 | 23976 CCK/W33 |
| | 560 | 135 | 2 984 | 5 000 | 360 | 900 | 1 200 | 115 | ▸ 23076 CC/W33 | ▸ 23076 CCK/W33 |
| | 560 | 180 | 3 786 | 6 800 | 475 | 670 | 950 | 150 | ▸ 24076 CC/W33 | 24076 CCK30/W33 |
| | 620 | 194 | 4 561 | 7 100 | 500 | – | 160 | 232 | 23176-2CS5/VT143 | ▸ 23176-2CS5K/VT143 |
| | 620 | 194 | 4 561 | 7 100 | 500 | 560 | 1 000 | 230 | ▸ 23176 CA/W33 | ▸ 23176 CAK/W33 |
| | 620 | 243 | 5 936 | 9 800 | 710 | 360 | 530 | 300 | ▸ 24176 ECA/W33 | 24176 ECAK30/W33 |
| | 680 | 240 | 6 126 | 9 150 | 620 | 500 | 750 | 375 | ▸ 23276 CA/W33 | ▸ 23276 CAK/W33 |
| **400** | 540 | 106 | 2 038 | 3 900 | 290 | 1 100 | 1 200 | 71 | ▸ 23980 CC/W33 | 23980 CCK/W33 |
| | 600 | 148 | 3 511 | 5 850 | 415 | 850 | 1 100 | 150 | ▸ 23080 CC/W33 | ▸ 23080 CCK/W33 |
| | 600 | 148 | 3 515 | 5 850 | 415 | – | 240 | 144 | 23080-2CS5/VT143 | 23080-2CS5K/VT143 |
| | 600 | 200 | 4 507 | 8 000 | 560 | 630 | 900 | 205 | ▸ 24080 ECCJ/W33 | 24080 ECCK30J/W33 |
| | 650 | 200 | 4 864 | 7 650 | 530 | – | 150 | 255 | 23180-2CS5/VT143 | ▸ 23180-2CS5K/VT143 |
| | 650 | 200 | 4 864 | 7 650 | 530 | 530 | 950 | 265 | ▸ 23180 CA/W33 | ▸ 23180 CAK/W33 |
| | 650 | 250 | 6 331 | 10 600 | 735 | 340 | 500 | 340 | ▸ 24180 ECA/W33 | 24180 ECAK30/W33 |
| | 720 | 256 | 6 881 | 10 400 | 680 | 480 | 670 | 450 | 23280 CA/W33 | 23280 CAK/W33 |
| | 820 | 243 | 7 832 | 10 400 | 670 | 430 | 750 | 650 | ▸ 22380 CA/W33 | 22380 CAK/W33 |

**SKF Explorer bearing**
▸ Popular item

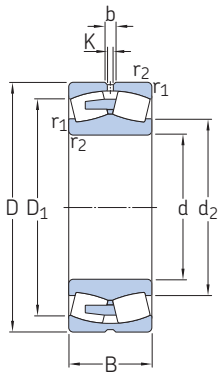


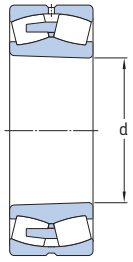
| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | | | | Permissible acceleration for oil lubrication[1] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_2$ ≈ | $D_1$ ≈ | b | K | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | e | $Y_1$ | $Y_2$ | $Y_0$ | rotational | linear |
| mm | | | | | | mm | | | | – | | | | $m/s^2$ | |
| **340** | 373 | 426 | 11,1 | 6 | 3 | 353 | – | 447 | 2,5 | 0,17 | 4 | 5,9 | 4 | – | – |
| | 385 | 468 | 22,3 | 12 | 5 | 358 | – | 502 | 4 | 0,24 | 2,8 | 4,2 | 2,8 | – | – |
| | 377 | 453 | 16,7 | 9 | 5 | 358 | – | 502 | 4 | 0,33 | 2 | 3 | 2 | – | – |
| | 394 | 498 | 22,3 | 12 | 5 | 360 | – | 560 | 4 | 0,31 | 2,2 | 3,3 | 2,2 | – | – |
| | 385 | 515 | 22,3 | 12 | 5 | 360 | 385 | 560 | 4 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 383 | 491 | 16,7 | 9 | 5 | 360 | – | 560 | 4 | 0,4 | 1,7 | 2,5 | 1,6 | – | – |
| | 427 | 528 | 22,3 | 12 | 6 | 366 | – | 594 | 5 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| **360** | 394 | 447 | 11,1 | 6 | 3 | 373 | – | 467 | 2,5 | 0,15 | 4,5 | 6,7 | 4,5 | – | – |
| | 404 | 483 | 22,3 | 12 | 5 | 378 | – | 522 | 4 | 0,23 | 2,9 | 4,4 | 2,8 | – | – |
| | 397 | 474 | 16,7 | 9 | 5 | 378 | – | 522 | 4 | 0,31 | 2,2 | 3,3 | 2,2 | – | – |
| | 418 | 524 | 22,3 | 12 | 5 | 380 | – | 580 | 4 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 408 | 541 | 22,3 | 12 | 5 | 380 | 408 | 580 | 4 | 0,28 | 2,4 | 3,6 | 2,5 | – | – |
| | 404 | 511 | 16,7 | 9 | 5 | 380 | – | 580 | 4 | 0,4 | 1,7 | 2,5 | 1,6 | – | – |
| | 454 | 568 | 22,3 | 12 | 6 | 386 | – | 624 | 5 | 0,26 | 2,6 | 3,9 | 2,5 | – | – |
| | 449 | 552 | 22,3 | 12 | 6 | 386 | – | 624 | 5 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| | 429 | 581 | 22,3 | 12 | 6 | 386 | 429 | 624 | 5 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| **380** | 419 | 481 | 13,9 | 7,5 | 4 | 395 | – | 505 | 3 | 0,17 | 4 | 5,9 | 4 | – | – |
| | 426 | 509 | 22,3 | 12 | 5 | 398 | – | 542 | 4 | 0,22 | 3 | 4,6 | 2,8 | – | – |
| | 419 | 497 | 16,7 | 9 | 5 | 398 | – | 542 | 4 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 438 | 573 | 22,3 | 12 | 5 | 400 | 438 | 600 | 4 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 454 | 541 | 22,3 | 12 | 5 | 400 | – | 600 | 4 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 444 | 532 | 16,7 | 9 | 5 | 400 | – | 600 | 4 | 0,37 | 1,8 | 2,7 | 1,8 | – | – |
| | 473 | 581 | 22,3 | 12 | 6 | 406 | – | 654 | 5 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| **400** | 439 | 500 | 13,9 | 7,5 | 4 | 415 | – | 525 | 3 | 0,16 | 4,2 | 6,3 | 4 | – | – |
| | 450 | 543 | 22,3 | 12 | 5 | 418 | – | 582 | 4 | 0,23 | 2,9 | 4,4 | 2,8 | – | – |
| | 443 | 557 | 22,3 | 12 | 5 | 418 | 443 | 582 | 4 | 0,21 | 3,2 | 4,8 | 3,2 | – | – |
| | 442 | 527 | 22,3 | 12 | 5 | 418 | – | 582 | 4 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 458 | 587 | 22,3 | 12 | 6 | 426 | 458 | 624 | 5 | 0,28 | 2,4 | 3,6 | 2,5 | – | – |
| | 475 | 566 | 22,3 | 12 | 6 | 426 | – | 624 | 5 | 0,28 | 2,4 | 3,6 | 2,5 | – | – |
| | 467 | 559 | 22,3 | 12 | 6 | 426 | – | 624 | 5 | 0,37 | 1,8 | 2,7 | 1,8 | – | – |
| | 500 | 615 | 22,3 | 12 | 6 | 426 | – | 694 | 5 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| | 534 | 697 | 22,3 | 12 | 7,5 | 432 | – | 788 | 6 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |

[1] For details about permissible accelerations → page 779

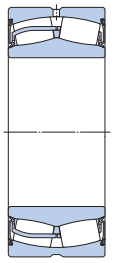
d **420 – 480** mm




Cylindrical bore



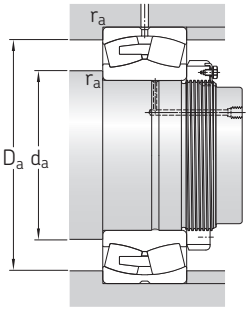

Tapered bore

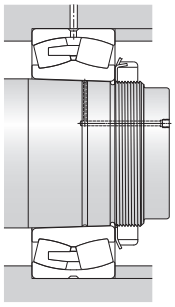


Sealed (2CS5)

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designations Bearing with cylindrical bore | tapered bore |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **420** | 560 | 106 | 2 083 | 4 150 | 300 | 1 000 | 1 100 | 74,5 | ▸ 23984 CC/W33 | 23984 CCK/W33 |
| | 620 | 150 | 3 541 | 6 000 | 415 | 600 | 1 100 | 155 | ▸ 23084 CA/W33 | 23084 CAK/W33 |
| | 620 | 200 | 4 610 | 8 300 | 585 | 530 | 900 | 210 | ▸ 24084 ECA/W33 | 24084 ECAK30/W33 |
| | 700 | 224 | 5 919 | 9 300 | 620 | – | 190 | 350 | 23184-2CS5/VT143 | 23184-2CS5K/VT143 |
| | 700 | 224 | 5 919 | 9 300 | 620 | 480 | 900 | 350 | 23184 CJ/W33 | ▸ 23184 CKJ/W33 |
| | 700 | 280 | 7 577 | 12 500 | 850 | 320 | 480 | 445 | ▸ 24184 ECA/W33 | 24184 ECAK30/W33 |
| | 760 | 272 | 7 677 | 11 600 | 765 | 450 | 630 | 535 | 23284 CA/W33 | 23284 CAK/W33 |
| | 760 | 272 | 7 683 | 11 600 | 765 | – | 128 | 535 | 23284-2CS5/VT143 | 23284-2CS5K/VT143 |
| **440** | 600 | 118 | 2 506 | 4 900 | 345 | 950 | 1 000 | 99,5 | ▸ 23988 CC/W33 | 23988 CCK/W33 |
| | 650 | 157 | 3 831 | 6 550 | 450 | 560 | 1 000 | 180 | ▸ 23088 CA/W33 | ▸ 23088 CAK/W33 |
| | 650 | 157 | 3 834 | 6 550 | 450 | – | 190 | 178 | 23088-2CS5/VT143 | – |
| | 650 | 212 | 4 987 | 9 150 | 630 | 500 | 850 | 245 | ▸ 24088 ECA/W33 | 24088 ECAK30/W33 |
| | 720 | 226 | 6 215 | 10 000 | 670 | 450 | 850 | 360 | ▸ 23188 CA/W33 | ▸ 23188 CAK/W33 |
| | 720 | 226 | 6 220 | 10 000 | 670 | – | 180 | 360 | 23188-2CS5/VT143 | 23188-2CS5K/VT143 |
| | 720 | 280 | 7 777 | 13 200 | 900 | 300 | 450 | 460 | 24188 ECA/W33 | 24188 ECAK30/W33 |
| | 790 | 280 | 8 150 | 12 500 | 800 | 430 | 600 | 590 | 23288 CA/W33 | 23288 CAK/W33 |
| **460** | 580 | 118 | 2 082 | 4 900 | 345 | 630 | 1 100 | 75,5 | 24892 CAMA/W20 | 24892 CAK30MA/W20 |
| | 620 | 118 | 2 558 | 5 000 | 355 | 600 | 1 000 | 105 | ▸ 23992 CA/W33 | 23992 CAK/W33 |
| | 680 | 163 | 4 065 | 6 950 | 465 | 560 | 950 | 205 | ▸ 23092 CA/W33 | 23092 CAK/W33 |
| | 680 | 218 | 5 401 | 10 000 | 670 | 480 | 800 | 275 | ▸ 24092 ECA/W33 | 24092 ECAK30/W33 |
| | 760 | 240 | 6 760 | 10 800 | 680 | 430 | 800 | 440 | ▸ 23192 CA/W33 | 23192 CAK/W33 |
| | 760 | 240 | 6 765 | 10 800 | 680 | – | 128 | 427 | ▸ 23192-2CS5/VT143 | 23192-2CS5K/VT143 |
| | 760 | 300 | 8 608 | 14 600 | 1 000 | 280 | 430 | 560 | 24192 ECA/W33 | 24192 ECAK30/W33 |
| | 830 | 296 | 8 958 | 13 700 | 880 | 400 | 560 | 695 | 23292 CA/W33 | 23292 CAK/W33 |
| **480** | 650 | 128 | 2 990 | 5 700 | 405 | 560 | 1 000 | 125 | ▸ 23996 CA/W33 | 23996 CAK/W33 |
| | 700 | 165 | 3 996 | 6 800 | 450 | 530 | 950 | 215 | ▸ 23096 CA/W33 | 23096 CAK/W33 |
| | 700 | 218 | 5 524 | 10 400 | 695 | 450 | 750 | 285 | ▸ 24096 ECA/W33 | 24096 ECAK30/W33 |
| | 790 | 248 | 7 362 | 12 000 | 780 | 400 | 750 | 485 | 23196 CA/W33 | 23196 CAK/W33 |
| | 790 | 248 | 7 367 | 12 000 | 780 | – | 170 | 485 | 23196-2CS5/VT143 | 23196-2CS5K/VT143 |
| | 790 | 308 | 9 198 | 15 600 | 1 040 | 260 | 400 | 605 | 24196 ECA/W33 | 24196 ECAK30/W33 |
| | 870 | 310 | 9 805 | 15 000 | 950 | 380 | 530 | 800 | 23296 CA/W33 | 23296 CAK/W33 |

**SKF Explorer bearing**
▸ Popular item

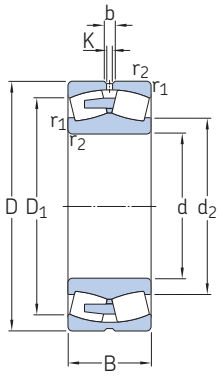


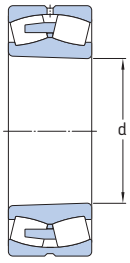
| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | | | | Permissible acceleration for oil lubrication[1] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_2$ ≈ | $D_1$ ≈ | b | K | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | e | $Y_1$ | $Y_2$ | $Y_0$ | rotational | linear |
| mm | | | | | | mm | | | | – | | | | $m/s^2$ | |
| **420** | 459 | 520 | 16,7 | 9 | 4 | 435 | – | 545 | 3 | 0,16 | 4,2 | 6,3 | 4 | – | – |
| | 487 | 563 | 22,3 | 12 | 5 | 438 | – | 602 | 4 | 0,22 | 3 | 4,6 | 2,8 | – | – |
| | 477 | 547 | 22,3 | 12 | 5 | 438 | – | 602 | 4 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 490 | 634 | 22,3 | 12 | 6 | 446 | 490 | 674 | 5 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 483 | 607 | 22,3 | 12 | 6 | 446 | – | 674 | 5 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 494 | 597 | 22,3 | 12 | 6 | 446 | – | 674 | 5 | 0,4 | 1,7 | 2,5 | 1,6 | – | – |
| | 526 | 649 | 22,3 | 12 | 7,5 | 452 | – | 728 | 6 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| | 500 | 676 | 22,3 | 12 | 7,5 | 452 | 500 | 728 | 6 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| **440** | 484 | 553 | 16,7 | 9 | 4 | 455 | – | 585 | 3 | 0,16 | 4,2 | 6,3 | 4 | – | – |
| | 511 | 590 | 22,3 | 12 | 6 | 463 | – | 627 | 5 | 0,22 | 3 | 4,6 | 2,8 | – | – |
| | 505 | 614 | 22,3 | 12 | 6 | 463 | 505 | 627 | 5 | 0,21 | 3,2 | 4,8 | 3,2 | – | – |
| | 499 | 572 | 22,3 | 12 | 6 | 463 | – | 627 | 5 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 529 | 632 | 22,3 | 12 | 6 | 466 | – | 694 | 5 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 513 | 664 | 22,3 | 12 | 6 | 466 | 513 | 694 | 5 | 0,28 | 2,4 | 3,6 | 2,5 | – | – |
| | 516 | 618 | 22,3 | 12 | 6 | 466 | – | 694 | 5 | 0,37 | 1,8 | 2,7 | 1,8 | – | – |
| | 549 | 676 | 22,3 | 12 | 7,5 | 472 | – | 758 | 6 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| **460** | 505 | 541 | – | 7,5 | 3 | 473 | – | 567 | 2,5 | 0,17 | 4 | 5,9 | 4 | – | – |
| | 516 | 574 | 16,7 | 9 | 4 | 475 | – | 605 | 3 | 0,16 | 4,2 | 6,3 | 4 | – | – |
| | 533 | 617 | 22,3 | 12 | 6 | 483 | – | 657 | 5 | 0,22 | 3 | 4,6 | 2,8 | – | – |
| | 524 | 601 | 22,3 | 12 | 6 | 483 | – | 657 | 5 | 0,28 | 2,4 | 3,6 | 2,5 | – | – |
| | 555 | 666 | 22,3 | 12 | 7,5 | 492 | – | 728 | 6 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 536 | 704 | 22,3 | 12 | 7,5 | 492 | 536 | 728 | 6 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 543 | 649 | 22,3 | 12 | 7,5 | 492 | – | 728 | 6 | 0,37 | 1,8 | 2,7 | 1,8 | – | – |
| | 574 | 706 | 22,3 | 12 | 7,5 | 492 | – | 798 | 6 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| **480** | 537 | 602 | 16,7 | 9 | 5 | 498 | – | 632 | 4 | 0,18 | 3,8 | 5,6 | 3,6 | – | – |
| | 549 | 633 | 22,3 | 12 | 6 | 503 | – | 677 | 5 | 0,21 | 3,2 | 4,8 | 3,2 | – | – |
| | 542 | 619 | 22,3 | 12 | 6 | 503 | – | 677 | 5 | 0,28 | 2,4 | 3,6 | 2,5 | – | – |
| | 579 | 692 | 22,3 | 12 | 7,5 | 512 | – | 758 | 6 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 560 | 723 | 22,3 | 12 | 7,5 | 512 | 560 | 758 | 6 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 564 | 678 | 22,3 | 12 | 7,5 | 512 | – | 758 | 6 | 0,37 | 1,8 | 2,7 | 1,8 | – | – |
| | 602 | 741 | 22,3 | 12 | 7,5 | 512 | – | 838 | 6 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |

[1] For details about permissible accelerations → page 779

## d 500 – 630 mm



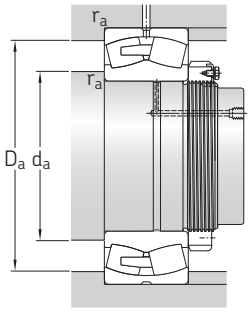

Cylindrical bore

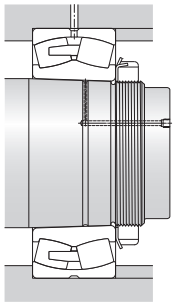



Tapered bore

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designations Bearing with cylindrical bore | tapered bore |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **500** | 670 | 128 | 2 967 | 6 000 | 415 | 530 | 950 | 130 | ▸ 239/500 CA/W33 | 239/500 CAK/W33 |
| | 720 | 167 | 4 358 | 7 800 | 510 | 500 | 900 | 225 | ▸ 230/500 CA/W33 | 230/500 CAK/W33 |
| | 720 | 218 | 5 777 | 11 000 | 735 | 430 | 700 | 295 | 240/500 ECA/W33 | 240/500 ECAK30/W33 |
| | 830 | 264 | 8 037 | 12 900 | 830 | 380 | 700 | 580 | 231/500 CA/W33 | 231/500 CAK/W33 |
| | 830 | 325 | 10 123 | 17 000 | 1 120 | 260 | 380 | 700 | 241/500 ECA/W33 | 241/500 ECAK30/W33 |
| | 920 | 336 | 11 183 | 17 300 | 1 060 | 360 | 500 | 985 | 232/500 CA/W33 | 232/500 CAK/W33 |
| **530** | 650 | 118 | 2 124 | 5 300 | 380 | 530 | 950 | 86 | 248/530 CAMA/W20 | 248/530 CAK30MA/W20 |
| | 710 | 136 | 3 308 | 6 700 | 465 | 500 | 900 | 155 | ▸ 239/530 CA/W33 | 239/530 CAK/W33 |
| | 780 | 185 | 5 267 | 9 300 | 610 | 450 | 800 | 310 | ▸ 230/530 CA/W33 | 230/530 CAK/W33 |
| | 780 | 250 | 6 973 | 13 200 | 830 | 400 | 670 | 410 | ▸ 240/530 ECA/W33 | 240/530 ECAK30/W33 |
| | 870 | 272 | 8 526 | 14 000 | 880 | 360 | 670 | 645 | 231/530 CA/W33 | 231/530 CAK/W33 |
| | 870 | 335 | 10 909 | 19 000 | 1 220 | 240 | 360 | 830 | 241/530 ECA/W33 | 241/530 ECAK30/W33 |
| | 980 | 355 | 13 268 | 20 400 | 1 220 | 320 | 480 | 1 200 | 232/530 CA/W33 | 232/530 CAK/W33 |
| **560** | 750 | 140 | 3 571 | 7 200 | 500 | 450 | 850 | 175 | ▸ 239/560 CA/W33 | 239/560 CAK/W33 |
| | 820 | 195 | 5 779 | 10 200 | 670 | 430 | 750 | 355 | 230/560 CA/W33 | 230/560 CAK/W33 |
| | 820 | 258 | 7 530 | 14 000 | 980 | 20 | 50 | 445 | 240/560 BC | – |
| | 820 | 258 | 7 621 | 14 600 | 980 | 380 | 630 | 465 | 240/560 ECA/W33 | 240/560 ECAK30/W33 |
| | 920 | 280 | 9 596 | 16 000 | 980 | 340 | 630 | 740 | 231/560 CA/W33 | 231/560 CAK/W33 |
| | 920 | 355 | 12 366 | 21 600 | 1 340 | 220 | 320 | 985 | 241/560 ECJ/W33 | 241/560 ECK30J/W33 |
| | 1 030 | 365 | 13 940 | 22 000 | 1 320 | 280 | 430 | 1 350 | 232/560 CA/W33 | 232/560 CAK/W33 |
| **600** | 800 | 150 | 4 022 | 8 300 | 570 | 430 | 750 | 220 | ▸ 239/600 CA/W33 | ▸ 239/600 CAK/W33 |
| | 870 | 200 | 6 252 | 11 400 | 735 | 400 | 700 | 405 | 230/600 CA/W33 | 230/600 CAK/W33 |
| | 870 | 272 | 8 502 | 16 300 | 1 100 | 20 | 45 | 519 | 240/600 BC | – |
| | 870 | 272 | 8 580 | 17 000 | 1 080 | 340 | 560 | 520 | ▸ 240/600 ECA/W33 | 240/600 ECAK30/W33 |
| | 980 | 300 | 10 738 | 18 000 | 1 100 | 320 | 560 | 895 | 231/600 CA/W33 | 231/600 CAK/W33 |
| | 980 | 375 | 13 522 | 23 600 | 1 460 | 200 | 300 | 1 200 | 241/600 ECA/W33 | 241/600 ECAK30/W33 |
| | 1 090 | 388 | 15 652 | 25 500 | 1 460 | 260 | 400 | 1 600 | 232/600 CA/W33 | 232/600 CAK/W33 |
| **630** | 780 | 112 | 2 545 | 6 100 | 415 | 430 | 750 | 120 | 238/630 CAMA/W20 | – |
| | 850 | 165 | 4 744 | 9 800 | 630 | 400 | 700 | 280 | 239/630 CA/W33 | ▸ 239/630 CAK/W33 |
| | 920 | 212 | 6 898 | 12 500 | 780 | 380 | 670 | 485 | ▸ 230/630 CA/W33 | 230/630 CAK/W33 |
| | 920 | 290 | 9 150 | 18 000 | 1 120 | 320 | 530 | 645 | 240/630 ECJ/W33 | 240/630 ECK30J/W33 |
| | 920 | 290 | 9 307 | 17 600 | 1 180 | 20 | 45 | 623 | 240/630 BC | – |
| | 1 030 | 315 | 12 600 | 20 800 | 1 220 | 260 | 530 | 1 050 | 231/630 CA/W33 | 231/630 CAK/W33 |
| | 1 030 | 400 | 15 001 | 27 000 | 1 630 | 190 | 280 | 1 400 | 241/630 ECA/W33 | 241/630 ECAK30/W33 |

**SKF Explorer bearing**
▸ Popular item



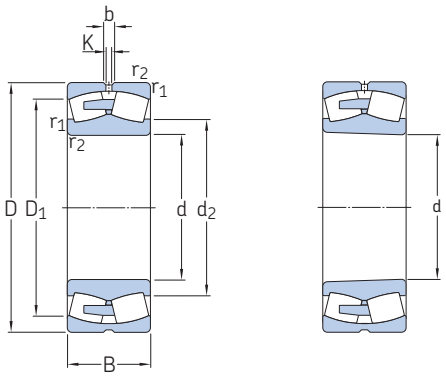



| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | | | | Permissible acceleration for oil lubrication[1] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_2$ ≈ | $D_1$ ≈ | b | K | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | e | $Y_1$ | $Y_2$ | $Y_0$ | rotational | linear |
| mm | | | | | | mm | | | | – | | | | $m/s^2$ | |
| **500** | 561 | 622 | 22,3 | 12 | 5 | 518 | – | 652 | 4 | 0,17 | 4 | 5,9 | 4 | – | – |
| | 573 | 658 | 22,3 | 12 | 6 | 523 | – | 697 | 5 | 0,21 | 3,2 | 4,8 | 3,2 | – | – |
| | 566 | 644 | 22,3 | 12 | 6 | 523 | – | 697 | 5 | 0,26 | 2,6 | 3,9 | 2,5 | – | – |
| | 605 | 726 | 22,3 | 12 | 7,5 | 532 | – | 798 | 6 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 588 | 713 | 22,3 | 12 | 7,5 | 532 | – | 798 | 6 | 0,37 | 1,8 | 2,7 | 1,8 | – | – |
| | 633 | 779 | 22,3 | 12 | 7,5 | 532 | – | 888 | 6 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| **530** | 573 | 612 | – | 7,5 | 3 | 543 | – | 637 | 2,5 | 0,15 | 4,5 | 6,7 | 4,5 | – | – |
| | 594 | 661 | 22,3 | 12 | 5 | 548 | – | 692 | 4 | 0,17 | 4 | 5,9 | 4 | – | – |
| | 613 | 710 | 22,3 | 12 | 6 | 553 | – | 757 | 5 | 0,22 | 3 | 4,6 | 2,8 | – | – |
| | 601 | 687 | 22,3 | 12 | 6 | 553 | – | 757 | 5 | 0,28 | 2,4 | 3,6 | 2,5 | – | – |
| | 638 | 763 | 22,3 | 12 | 7,5 | 562 | – | 838 | 6 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 623 | 748 | 22,3 | 12 | 7,5 | 562 | – | 838 | 6 | 0,37 | 1,8 | 2,7 | 1,8 | – | – |
| | 670 | 836 | 22,3 | 12 | 9,5 | 570 | – | 940 | 8 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| **560** | 627 | 697 | 22,3 | 12 | 5 | 578 | – | 732 | 4 | 0,16 | 4,2 | 6,3 | 4 | – | – |
| | 646 | 746 | 22,3 | 12 | 6 | 583 | – | 797 | 5 | 0,22 | 3 | 4,6 | 2,8 | – | – |
| | 640 | 739 | 53,2 | 15 | 6 | 583 | – | 797 | 5 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 637 | 728 | 22,3 | 12 | 6 | 583 | – | 797 | 5 | 0,28 | 2,4 | 3,6 | 2,5 | – | – |
| | 675 | 809 | 22,3 | 12 | 7,5 | 592 | – | 888 | 6 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 634 | 796 | 22,3 | 12 | 7,5 | 592 | – | 888 | 6 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| | 706 | 878 | 22,3 | 12 | 9,5 | 600 | – | 990 | 8 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| **600** | 671 | 744 | 22,3 | 12 | 5 | 618 | – | 782 | 4 | 0,17 | 4 | 5,9 | 4 | – | – |
| | 685 | 789 | 22,3 | 12 | 6 | 623 | – | 847 | 5 | 0,22 | 3 | 4,6 | 2,8 | – | – |
| | 682 | 784 | 46,1 | 15 | 6 | 623 | – | 847 | 5 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 675 | 774 | 22,3 | 12 | 6 | 623 | – | 847 | 5 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 722 | 863 | 22,3 | 12 | 7,5 | 632 | – | 948 | 6 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 702 | 845 | 22,3 | 12 | 7,5 | 632 | – | 948 | 6 | 0,37 | 1,8 | 2,7 | 1,8 | – | – |
| | 754 | 929 | 22,3 | 12 | 9,5 | 640 | – | 1 050 | 8 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| **630** | 682 | 738 | – | 9 | 4 | 645 | – | 765 | 3 | 0,12 | 5,6 | 8,4 | 5,6 | – | – |
| | 708 | 787 | 22,3 | 12 | 6 | 653 | – | 827 | 5 | 0,17 | 4 | 5,9 | 4 | – | – |
| | 727 | 839 | 22,3 | 12 | 7,5 | 658 | – | 892 | 6 | 0,21 | 3,2 | 4,8 | 3,2 | – | – |
| | 697 | 823 | 22,3 | 12 | 7,5 | 658 | – | 892 | 6 | 0,28 | 2,4 | 3,6 | 2,5 | – | – |
| | 718 | 828 | 56,5 | 15 | 7,5 | 658 | – | 892 | 6 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 755 | 918 | 22,3 | 12 | 7,5 | 662 | – | 998 | 6 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 738 | 885 | 22,3 | 12 | 7,5 | 662 | – | 998 | 6 | 0,37 | 1,8 | 2,7 | 1,8 | – | – |

[1] For details about permissible accelerations → page 779

## 9.1 Spherical roller bearings

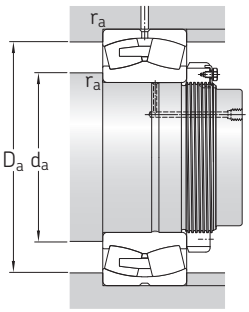
d **670 – 800** mm

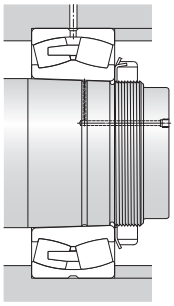



Cylindrical bore | Tapered bore

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designations Bearing with cylindrical bore | tapered bore |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **670** | 820 | 112 | 2 643 | 6 400 | 430 | 400 | 700 | 130 | 238/670 CAMA/W20 | – |
| | 820 | 150 | 3 598 | 9 500 | 655 | 400 | 700 | 172 | 248/670 CAMA/W20 | – |
| | 900 | 170 | 5 146 | 10 800 | 680 | 360 | 670 | 315 | 239/670 CA/W33 | 239/670 CAK/W33 |
| | 980 | 230 | 7 919 | 14 600 | 880 | 340 | 600 | 600 | 230/670 CA/W33 | 230/670 CAK/W33 |
| | 980 | 308 | 10 435 | 20 400 | 1 290 | 300 | 500 | 790 | 240/670 ECA/W33 | 240/670 ECAK30/W33 |
| | 1 090 | 336 | 13 101 | 22 400 | 1 320 | 240 | 500 | 1 250 | 231/670 CA/W33 | 231/670 CAK/W33 |
| | 1 090 | 412 | 16 381 | 29 000 | 1 760 | 180 | 260 | 1 600 | 241/670 ECA/W33 | 241/670 ECAK30/W33 |
| | 1 220 | 438 | 18 650 | 30 500 | 1 700 | 220 | 360 | 2 270 | 232/670 CA/W33 | 232/670 CAK/W33 |
| **710** | 870 | 118 | 3 013 | 7 500 | 500 | 360 | 670 | 153 | 238/710 CAMA/W20 | – |
| | 950 | 180 | 5 702 | 12 000 | 750 | 340 | 600 | 365 | 239/710 CA/W33 | 239/710 CAK/W33 |
| | 950 | 243 | 6 860 | 15 600 | 930 | 300 | 500 | 495 | 249/710 CA/W33 | 249/710 CAK30/W33 |
| | 1 030 | 236 | 8 669 | 16 300 | 965 | 300 | 560 | 670 | 230/710 CA/W33 | 230/710 CAK/W33 |
| | 1 030 | 315 | 11 164 | 22 800 | 1 430 | 260 | 450 | 895 | ▸ 240/710 ECA/W33 | 240/710 ECAK30/W33 |
| | 1 030 | 315 | 11 166 | 22 000 | 1 430 | 20 | 40 | 843 | 240/710 BC | – |
| | 1 150 | 345 | 14 732 | 26 000 | 1 530 | 240 | 450 | 1 450 | 231/710 CA/W33 | 231/710 CAK/W33 |
| | 1 150 | 438 | 17 935 | 32 500 | 1 900 | 160 | 240 | 1 900 | 241/710 ECA/W33 | 241/710 ECAK30/W33 |
| | 1 280 | 450 | 21 208 | 34 500 | 2 000 | 200 | 320 | 2 610 | 232/710 CA/W33 | 232/710 CAK/W33 |
| **750** | 920 | 128 | 3 405 | 8 500 | 550 | 340 | 600 | 185 | 238/750 CAMA/W20 | – |
| | 1 000 | 185 | 6 138 | 13 200 | 800 | 320 | 560 | 420 | 239/750 CA/W33 | 239/750 CAK/W33 |
| | 1 000 | 250 | 7 699 | 18 000 | 1 100 | 280 | 480 | 560 | 249/750 CA/W33 | 249/750 CAK30/W33 |
| | 1 090 | 250 | 10 061 | 18 600 | 1 100 | 280 | 530 | 795 | ▸ 230/750 CA/W33 | 230/750 CAK/W33 |
| | 1 090 | 335 | 12 235 | 25 000 | 1 460 | 240 | 430 | 1 070 | ▸ 240/750 ECA/W33 | 240/750 ECAK30/W33 |
| | 1 090 | 335 | 12 309 | 24 500 | 1 530 | 20 | 40 | 1 010 | 240/750 BC | – |
| | 1 220 | 365 | 16 518 | 29 000 | 1 700 | 220 | 430 | 1 700 | 231/750 CA/W33 | 231/750 CAK/W33 |
| | 1 220 | 475 | 20 434 | 37 500 | 2 160 | 150 | 220 | 2 100 | 241/750 ECA/W33 | 241/750 ECAK30/W33 |
| **800** | 980 | 180 | 4 780 | 12 900 | 830 | 320 | 560 | 300 | 248/800 CAMA/W20 | 248/800 CAK30MA/W20 |
| | 1 060 | 195 | 6 595 | 14 300 | 865 | 280 | 530 | 470 | 239/800 CA/W33 | 239/800 CAK/W33 |
| | 1 060 | 258 | 8 136 | 19 300 | 1 060 | 240 | 430 | 640 | 249/800 CA/W33 | 249/800 CAK30/W33 |
| | 1 150 | 258 | 10 335 | 20 000 | 1 160 | 260 | 480 | 895 | ▸ 230/800 CA/W33 | 230/800 CAK/W33 |
| | 1 150 | 345 | 13 431 | 28 500 | 1 660 | 220 | 400 | 1 200 | 240/800 ECA/W33 | 240/800 ECAK30/W33 |
| | 1 150 | 345 | 13 447 | 27 500 | 1 700 | 20 | 40 | 1 140 | 240/800 BC | – |
| | 1 280 | 375 | 18 033 | 31 500 | 1 800 | 200 | 400 | 1 920 | 231/800 CA/W33 | 231/800 CAK/W33 |
| | 1 280 | 475 | 21 587 | 40 500 | 2 320 | 140 | 200 | 2 300 | 241/800 ECA/W33 | 241/800 ECAK30/W33 |
| | 1 420 | 488 | 24 973 | 43 000 | 2 360 | 180 | 280 | 3 280 | 232/800 CAF/W33 | 232/800 CAKF/W33 |

**SKF Explorer bearing**
▸ Popular item



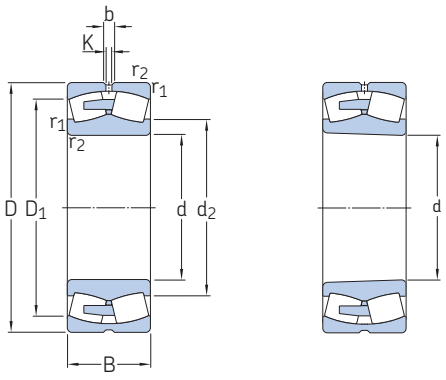



| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | | | | Permissible acceleration for oil lubrication[1] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_2$ ≈ | $D_1$ ≈ | b | K | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | e | $Y_1$ | $Y_2$ | $Y_0$ | rotational | linear |
| mm | | | | | | mm | | | | – | | | | $m/s^2$ | |
| **670** | 724 | 778 | – | 9 | 4 | 685 | – | 805 | 3 | 0,11 | 6,1 | 9,1 | 6,3 | – | – |
| | 726 | 772 | – | 9 | 4 | 685 | – | 805 | 3 | 0,16 | 4,2 | 6,3 | 4 | – | – |
| | 752 | 835 | 22,3 | 12 | 6 | 693 | – | 877 | 5 | 0,17 | 4 | 5,9 | 4 | – | – |
| | 772 | 892 | 22,3 | 12 | 7,5 | 698 | – | 952 | 6 | 0,21 | 3,2 | 4,8 | 3,2 | – | – |
| | 758 | 866 | 22,3 | 12 | 7,5 | 698 | – | 952 | 6 | 0,28 | 2,4 | 3,6 | 2,5 | – | – |
| | 804 | 959 | 22,3 | 12 | 7,5 | 702 | – | 1 058 | 6 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 782 | 942 | 22,3 | 12 | 7,5 | 702 | – | 1 058 | 6 | 0,37 | 1,8 | 2,7 | 1,8 | – | – |
| | 832 | 1 028 | 22,3 | 12 | 12 | 718 | – | 1 172 | 10 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| **710** | 766 | 826 | – | 12 | 4 | 725 | – | 855 | 3 | 0,11 | 6,1 | 9,1 | 6,3 | – | – |
| | 794 | 882 | 22,3 | 12 | 6 | 733 | – | 927 | 5 | 0,17 | 4 | 5,9 | 4 | – | – |
| | 792 | 868 | 22,3 | 12 | 6 | 733 | – | 927 | 5 | 0,22 | 3 | 4,6 | 2,8 | – | – |
| | 816 | 941 | 22,3 | 12 | 7,5 | 738 | – | 1 002 | 6 | 0,21 | 3,2 | 4,8 | 3,2 | – | – |
| | 809 | 918 | 22,3 | 12 | 7,5 | 738 | – | 1 002 | 6 | 0,27 | 2,5 | 3,7 | 2,5 | – | – |
| | 810 | 931 | 61,8 | 15 | 7,5 | 738 | – | 1 002 | 6 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 851 | 1 017 | 22,3 | 12 | 9,5 | 750 | – | 1 110 | 8 | 0,28 | 2,4 | 3,6 | 2,5 | – | – |
| | 826 | 989 | 22,3 | 12 | 9,5 | 750 | – | 1 110 | 8 | 0,37 | 1,8 | 2,7 | 1,8 | – | – |
| | 875 | 1 097 | 22,3 | 12 | 12 | 758 | – | 1 232 | 10 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| **750** | 812 | 873 | – | 12 | 5 | 768 | – | 902 | 4 | 0,11 | 6,1 | 9,1 | 6,3 | – | – |
| | 838 | 930 | 22,3 | 12 | 6 | 773 | – | 977 | 5 | 0,16 | 4,2 | 6,3 | 4 | – | – |
| | 830 | 916 | 22,3 | 12 | 6 | 773 | – | 977 | 5 | 0,22 | 3 | 4,6 | 2,8 | – | – |
| | 859 | 998 | 22,3 | 12 | 7,5 | 778 | – | 1 062 | 6 | 0,21 | 3,2 | 4,8 | 3,2 | – | – |
| | 855 | 970 | 22,3 | 12 | 7,5 | 778 | – | 1 062 | 6 | 0,28 | 2,4 | 3,6 | 2,5 | – | – |
| | 856 | 984 | 72,8 | 15 | 7,5 | 778 | – | 1 062 | 6 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 900 | 1 080 | 22,3 | 12 | 9,5 | 790 | – | 1 180 | 8 | 0,28 | 2,4 | 3,6 | 2,5 | – | – |
| | 875 | 1 050 | 22,3 | 12 | 9,5 | 790 | – | 1 180 | 8 | 0,37 | 1,8 | 2,7 | 1,8 | – | – |
| **800** | 865 | 921 | – | 12 | 5 | 818 | – | 962 | 4 | 0,15 | 4,5 | 6,7 | 4,5 | – | – |
| | 891 | 986 | 22,3 | 12 | 6 | 823 | – | 1 037 | 5 | 0,16 | 4,2 | 6,3 | 4 | – | – |
| | 887 | 973 | 22,3 | 12 | 6 | 823 | – | 1 037 | 5 | 0,21 | 3,2 | 4,8 | 3,2 | – | – |
| | 917 | 1 053 | 22,3 | 12 | 7,5 | 828 | – | 1 122 | 6 | 0,2 | 3,4 | 5 | 3,2 | – | – |
| | 910 | 1 028 | 22,3 | 12 | 7,5 | 828 | – | 1 122 | 6 | 0,27 | 2,5 | 3,7 | 2,5 | – | – |
| | 911 | 1 042 | 66,4 | 15 | 7,5 | 828 | – | 1 122 | 6 | 0,28 | 2,4 | 3,6 | 2,5 | – | – |
| | 949 | 1 141 | 22,3 | 12 | 9,5 | 840 | – | 1 240 | 8 | 0,28 | 2,4 | 3,6 | 2,5 | – | – |
| | 930 | 1 111 | 22,3 | 12 | 9,5 | 840 | – | 1 240 | 8 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| | 995 | 1 218 | 22,3 | 12 | 15 | 858 | – | 1 362 | 12 | 0,33 | 2 | 3 | 2 | – | – |

[1] For details about permissible accelerations → page 779

## 9.1 Spherical roller bearings

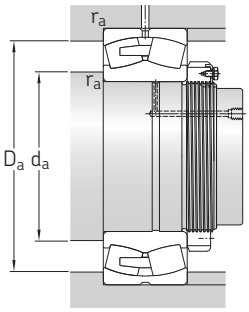
d **850 – 1 120** mm

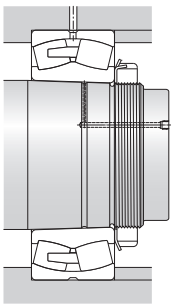



Cylindrical bore | Tapered bore

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designations Bearing with cylindrical bore | tapered bore |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **850** | 1 030 | 136 | 3 882 | 10 000 | 630 | 260 | 530 | 240 | 238/850 CAMA/W20 | 238/850 CAKMA/W20 |
| | 1 120 | 200 | 7 072 | 15 600 | 930 | 260 | 480 | 560 | 239/850 CA/W33 | 239/850 CAK/W33 |
| | 1 120 | 272 | 9 390 | 22 800 | 1 370 | 220 | 400 | 740 | 249/850 CA/W33 | 249/850 CAK30/W33 |
| | 1 220 | 272 | 11 291 | 21 600 | 1 250 | 240 | 450 | 1 050 | ▸ 230/850 CA/W33 | 230/850 CAK/W33 |
| | 1 220 | 365 | 15 078 | 31 000 | 1 900 | 20 | 40 | 1 360 | 240/850 BC | – |
| | 1 220 | 365 | 15 183 | 31 500 | 1 900 | 200 | 360 | 1 410 | 240/850 ECA/W33 | 240/850 ECAK30/W33 |
| | 1 360 | 500 | 23 827 | 45 000 | 2 500 | 130 | 190 | 2 770 | 241/850 ECAF/W33 | 241/850 ECAK30F/W33 |
| | 1 500 | 515 | 27 636 | 48 000 | 2 600 | 160 | 260 | 3 940 | 232/850 CAF/W33 | – |
| **900** | 1 090 | 190 | 5 428 | 15 300 | 950 | 240 | 480 | 370 | 248/900 CAMA/W20 | 248/900 CAK30MA/W20 |
| | 1 180 | 206 | 7 652 | 17 000 | 1 000 | 240 | 450 | 605 | 239/900 CA/W33 | 239/900 CAK/W33 |
| | 1 280 | 280 | 12 002 | 23 200 | 1 320 | 220 | 400 | 1 200 | 230/900 CA/W33 | 230/900 CAK/W33 |
| | 1 280 | 375 | 16 185 | 34 500 | 2 040 | 190 | 340 | 1 570 | ▸ 240/900 ECA/W33 | 240/900 ECAK30/W33 |
| | 1 280 | 375 | 16 215 | 34 000 | 2 040 | 20 | 40 | 1 520 | 240/900 BC | |
| | 1 420 | 515 | 25 310 | 49 000 | 2 700 | 120 | 180 | 3 350 | 241/900 ECAF/W33 | 241/900 ECAK30F/W33 |
| **950** | 1 250 | 224 | 8 606 | 19 600 | 1 120 | 220 | 430 | 755 | 239/950 CA/W33 | 239/950 CAK/W33 |
| | 1 250 | 300 | 10 701 | 26 000 | 1 500 | 180 | 340 | 1 020 | 249/950 CA/W33 | 249/950 CAK30/W33 |
| | 1 360 | 300 | 14 363 | 28 500 | 1 600 | 200 | 380 | 1 450 | 230/950 CA/W33 | 230/950 CAK/W33 |
| | 1 360 | 412 | 17 847 | 39 000 | 2 240 | 170 | 300 | 1 990 | 240/950 CAF/W33 | 240/950 CAK30F/W33 |
| | 1 360 | 412 | 18 228 | 38 000 | 2 240 | 20 | 35 | 1 880 | 240/950 BC | – |
| | 1 500 | 545 | 27 892 | 55 000 | 3 000 | 110 | 160 | 3 540 | 241/950 ECAF/W33 | 241/950 ECAK30F/W33 |
| **1 000** | 1 220 | 165 | 5 405 | 14 300 | 850 | 220 | 400 | 410 | 238/1000 CAMA/W20 | 238/1000 CAKMA/W20 |
| | 1 320 | 315 | 11 939 | 29 000 | 1 460 | 170 | 320 | 1 200 | 249/1000 CA/W33 | 249/1000 CAK30/W33 |
| | 1 420 | 412 | 18 592 | 40 500 | 2 240 | 160 | 280 | 2 140 | 240/1000 CAF/W33 | 240/1000 CAK30F/W33 |
| | 1 580 | 462 | 25 650 | 48 000 | 2 550 | 140 | 280 | 3 500 | 231/1000 CAF/W33 | 231/1000 CAKF/W33 |
| | 1 580 | 580 | 31 174 | 62 000 | 3 350 | 100 | 150 | 4 300 | 241/1000 ECAF/W33 | 241/1000 ECAK30F/W33 |
| **1 060** | 1 280 | 165 | 5 555 | 15 000 | 865 | 200 | 380 | 435 | 238/1060 CAMA/W20 | – |
| | 1 400 | 250 | 11 333 | 26 000 | 1 430 | 180 | 360 | 1 100 | 239/1060 CAF/W33 | 239/1060 CAKF/W33 |
| | 1 400 | 335 | 13 354 | 32 500 | 1 800 | 160 | 280 | 1 400 | 249/1060 CAF/W33 | 249/1060 CAK30F/W33 |
| | 1 500 | 438 | 20 724 | 45 500 | 2 450 | 150 | 260 | 2 520 | 240/1060 CAF/W33 | 240/1060 CAK30F/W33 |
| **1 120** | 1 460 | 335 | 13 718 | 34 500 | 1 830 | 140 | 260 | 1 500 | 249/1120 CAF/W33 | 249/1120 CAK30F/W33 |
| | 1 580 | 462 | 22 364 | 50 000 | 2 700 | 130 | 240 | 2 930 | 240/1120 CAF/W33 | 240/1120 CAK30F/W33 |
| | 1 580 | 462 | 22 936 | 49 000 | 2 750 | 20 | 35 | 2 770 | 240/1120 BC | – |

**SKF Explorer bearing**
▸ Popular item



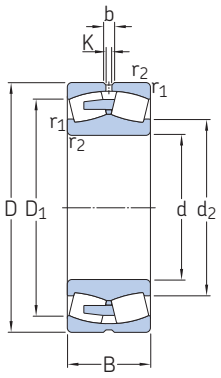



| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | | | | Permissible acceleration for oil lubrication[1] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_2$ ≈ | $D_1$ ≈ | b | K | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | e | $Y_1$ | $Y_2$ | $Y_0$ | rotational | linear |
| mm | | | | | | mm | | | | – | | | | $m/s^2$ | |
| **850** | 912 | 981 | – | 12 | 5 | 868 | – | 1 012 | 4 | 0,11 | 6,1 | 9,1 | 6,3 | – | – |
| | 946 | 1 046 | 22,3 | 12 | 6 | 873 | – | 1 097 | 5 | 0,16 | 4,2 | 6,3 | 4 | – | – |
| | 940 | 1 029 | 22,3 | 12 | 6 | 873 | – | 1 097 | 5 | 0,22 | 3 | 4,6 | 2,8 | – | – |
| | 972 | 1 117 | 22,3 | 12 | 7,5 | 878 | – | 1 192 | 6 | 0,2 | 3,4 | 5 | 3,2 | – | – |
| | 966 | 1 105 | 67,9 | 15 | 7,5 | 878 | – | 1 192 | 6 | 0,28 | 2,4 | 3,6 | 2,5 | – | – |
| | 957 | 1 088 | 22,3 | 12 | 7,5 | 878 | – | 1 192 | 6 | 0,27 | 2,5 | 3,7 | 2,5 | – | – |
| | 988 | 1 182 | 22,3 | 12 | 12 | 898 | – | 1 312 | 10 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| | 1 049 | 1 284 | 22,3 | 12 | 15 | 908 | – | 1 442 | 12 | 0,33 | 2 | 3 | 2 | – | – |
| **900** | 969 | 1 029 | – | 12 | 5 | 918 | – | 1 072 | 4 | 0,14 | 4,8 | 7,2 | 4,5 | – | – |
| | 996 | 1 101 | 22,3 | 12 | 6 | 923 | – | 1 157 | 5 | 0,15 | 4,5 | 6,7 | 4,5 | – | – |
| | 1 025 | 1 176 | 22,3 | 12 | 7,5 | 928 | – | 1 252 | 6 | 0,2 | 3,4 | 5 | 3,2 | – | – |
| | 1 015 | 1 149 | 22,3 | 12 | 7,5 | 928 | – | 1 252 | 6 | 0,26 | 2,6 | 3,9 | 2,5 | – | – |
| | 1 024 | 1 164 | 69,1 | 15 | 7,5 | 928 | – | 1 252 | 6 | 0,27 | 2,5 | 3,7 | 2,5 | – | – |
| | 1 043 | 1 235 | 22,3 | 12 | 12 | 948 | – | 1 372 | 10 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| **950** | 1 056 | 1 164 | 22,3 | 12 | 7,5 | 978 | – | 1 222 | 6 | 0,15 | 4,5 | 6,7 | 4,5 | – | – |
| | 1 051 | 1 150 | 22,3 | 12 | 7,5 | 978 | – | 1 222 | 6 | 0,21 | 3,2 | 4,8 | 3,2 | – | – |
| | 1 086 | 1 246 | 22,3 | 12 | 7,5 | 978 | – | 1 332 | 6 | 0,2 | 3,4 | 5 | 3,2 | – | – |
| | 1 077 | 1 214 | 22,3 | 12 | 7,5 | 978 | – | 1 332 | 6 | 0,27 | 2,5 | 3,7 | 2,5 | – | – |
| | 1 076 | 1 230 | 85,9 | 15 | 7,5 | 978 | – | 1 332 | 6 | 0,3 | 2,3 | 3,4 | 2,2 | – | – |
| | 1 102 | 1 305 | 22,3 | 12 | 12 | 998 | – | 1 452 | 10 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| **1 000** | 1 079 | 1 161 | – | 12 | 6 | 1 023 | – | 1 197 | 5 | 0,12 | 5,6 | 8,4 | 5,6 | – | – |
| | 1 109 | 1 212 | 22,3 | 12 | 7,5 | 1 028 | – | 1 292 | 6 | 0,21 | 3,2 | 4,8 | 3,2 | – | – |
| | 1 136 | 1 278 | 22,3 | 12 | 7,5 | 1 028 | – | 1 392 | 6 | 0,26 | 2,6 | 3,9 | 2,5 | – | – |
| | 1 185 | 1 403 | 22,3 | 12 | 12 | 1 048 | – | 1 532 | 10 | 0,28 | 2,4 | 3,6 | 2,5 | – | – |
| | 1 159 | 1 373 | 22,3 | 12 | 12 | 1 048 | – | 1 532 | 10 | 0,35 | 1,9 | 2,9 | 1,8 | – | – |
| **1 060** | 1 137 | 1 219 | – | 12 | 6 | 1 083 | – | 1 257 | 5 | 0,11 | 6,1 | 9,1 | 6,3 | – | – |
| | 1 171 | 1 305 | 22,3 | 12 | 7,5 | 1 088 | – | 1 372 | 6 | 0,16 | 4,2 | 6,3 | 4 | – | – |
| | 1 168 | 1 286 | 22,3 | 12 | 7,5 | 1 088 | – | 1 372 | 6 | 0,21 | 3,2 | 4,8 | 3,2 | – | – |
| | 1 199 | 1 349 | 22,3 | 12 | 9,5 | 1 094 | – | 1 466 | 8 | 0,26 | 2,6 | 3,9 | 2,5 | – | – |
| **1 120** | 1 231 | 1 350 | 22,3 | 12 | 7,5 | 1 148 | – | 1 432 | 6 | 0,2 | 3,4 | 5 | 3,2 | – | – |
| | 1 268 | 1 423 | 22,3 | 12 | 9,5 | 1 154 | – | 1 546 | 8 | 0,26 | 2,6 | 3,9 | 2,5 | – | – |
| | 1 259 | 1 436 | 104 | 15 | 9,5 | 1 154 | – | 1 546 | 8 | 0,28 | 2,4 | 3,6 | 2,5 | – | – |

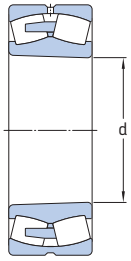
[1] For details about permissible accelerations → page 779

## 9.1 Spherical roller bearings

d **1 180 – 1 800** mm




Cylindrical bore

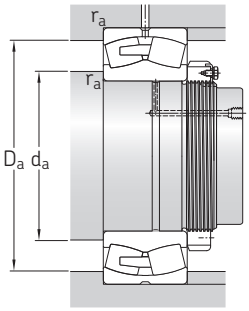


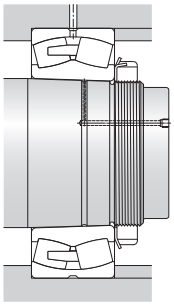

Tapered bore

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designations Bearing with cylindrical bore | tapered bore |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **1 180** | 1 420 | 180 | 6 778 | 18 600 | 1 080 | 170 | 320 | 575 | **238/1180 CAFA/W20** | **238/1180 CAKFA/W20** |
| | 1 540 | 272 | 13 076 | 31 000 | 1 660 | 150 | 300 | 1 400 | **239/1180 CAF/W33** | **239/1180 CAKF/W33** |
| | 1 540 | 355 | 15 751 | 40 500 | 2 160 | 130 | 240 | 1 800 | **249/1180 CAF/W33** | **249/1180 CAK30F/W33** |
| | 1 660 | 475 | 25 471 | 58 500 | 3 050 | 130 | 220 | 3 320 | **240/1180 CAF/W33** | **240/1180 CAK30F/W33** |
| **1 250** | 1 750 | 375 | 21 256 | 45 000 | 2 320 | 130 | 240 | 2 840 | **230/1250 CAF/W33** | **230/1250 CAKF/W33** |
| **1 320** | 1 720 | 400 | 18 714 | 49 000 | 2 500 | 110 | 200 | 2 500 | **249/1320 CAF/W33** | **249/1320 CAK30F/W33** |
| **1 500** | 1 820 | 315 | 14 684 | 45 000 | 2 400 | 110 | 220 | 1 710 | **248/1500 CAFA/W20** | **248/1500 CAK30FA/W20** |
| **1 800** | 2 180 | 375 | 20 274 | 63 000 | 3 050 | 75 | 140 | 2 900 | **248/1800 CAFA/W20** | **248/1800 CAK30FA/W20** |



SKF Explorer bearing



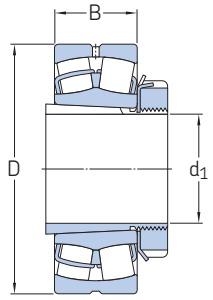



| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | | | | Permissible acceleration for oil lubrication[1] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_2$ ≈ | $D_1$ ≈ | b | K | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | e | $Y_1$ | $Y_2$ | $Y_0$ | rotational | linear |
| mm | | | | | | mm | | | | – | | | | $m/s^2$ | |
| **1 180** | 1 264 | 1 355 | – | 12 | 6 | 1 203 | – | 1 397 | 5 | 0,11 | 6,1 | 9,1 | 6,3 | – | – |
| | 1 305 | 1 439 | 22,3 | 12 | 7,5 | 1 208 | – | 1 512 | 6 | 0,16 | 4,2 | 6,3 | 4 | – | – |
| | 1 297 | 1 422 | 22,3 | 12 | 7,5 | 1 208 | – | 1 512 | 6 | 0,2 | 3,4 | 5 | 3,2 | – | – |
| | 1 325 | 1 507 | 22,3 | 12 | 9,5 | 1 200 | – | 1 626 | 8 | 0,26 | 2,6 | 3,9 | 2,5 | – | – |
| **1 250** | 1 415 | 1 611 | 22,3 | 12 | 9,5 | 1 284 | – | 1 716 | 8 | 0,19 | 3,6 | 5,3 | 3,6 | – | – |
| **1 320** | 1 449 | 1 589 | 22,3 | 12 | 7,5 | 1 348 | – | 1 692 | 6 | 0,21 | 3,2 | 4,8 | 3,2 | – | – |
| **1 500** | 1 612 | 1 719 | – | 12 | 7,5 | 1 528 | – | 1 792 | 6 | 0,15 | 4,5 | 6,7 | 4,5 | – | – |
| **1 800** | 1 932 | 2 060 | – | 12 | 9,5 | 1 834 | – | 2 146 | 8 | 0,15 | 4,5 | 6,7 | 4,5 | – | – |

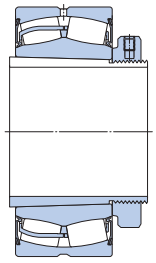
[1] For details about permissible accelerations → page 779

## 9.2 Spherical roller bearings on an adapter sleeve

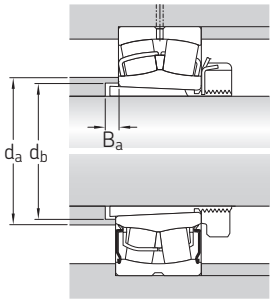
$d_1$ **20 – 100** mm




Bearing on an H .. sleeve



Sealed bearing on an H .. E sleeve




| Principal dimensions | | | Abutment and fillet dimensions | | | Mass | Designations | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Bearing + sleeve | Bearing[1] | Sleeve[2] |
| $d_1$ | D | B | $d_a$ max. | $d_b$ min. | $B_a$ min. | | | |
| mm | | | mm | | | kg | – | |
| **20** | 52 | 18 | 31 | 28 | 5 | 0,33 | ▸ 22205 EK | H 305 |
| **25** | 62 | 20 | 37 | 33 | 5 | 0,39 | ▸ 22206 EK | H 306 |
| **30** | 72 | 23 | 44 | 39 | 5 | 0,59 | ▸ 22207 EK | H 307 |
| **35** | 80 | 23 | 49 | 44 | 5 | 0,68 | ▸ 22208 EK | H 308 |
| | 80 | 28 | 47 | 44 | 8 | 0,8 | BS2-2208-2RSK/VT143 | H 2308 E |
| | 90 | 23 | 60 | 44 | 5 | 0,92 | 21308 EK | H 308 |
| | 90 | 33 | 49 | 45 | 6 | 1,25 | ▸ 22308 EK | H 2308 |
| **40** | 85 | 23 | 54 | 50 | 7 | 0,81 | ▸ 22209 EK | H 309 |
| | 85 | 28 | 52 | 48 | 0 | 0,9 | ▸ BS2-2209-2RSK/VT143 | H 309 E |
| | 100 | 25 | 65 | 50 | 5 | 1,2 | ▸ 21309 EK | H 309 |
| | 100 | 36 | 57 | 50 | 6 | 1,7 | ▸ 22309 EK | H 2309 |
| **45** | 90 | 23 | 60 | 55 | 9 | 0,9 | ▸ 22210 EK | H 310 |
| | 90 | 28 | 58 | 54 | 2 | 1 | ▸ BS2-2210-2RSK/VT143 | H 310 E |
| | 110 | 27 | 72 | 55 | 6 | 1,6 | ▸ 21310 EK | H 310 |
| | 110 | 40 | 63 | 56 | 5 | 2,25 | ▸ 22310 EK | H 2310 |
| **50** | 100 | 25 | 65 | 60 | 10 | 1,1 | ▸ 22211 EK | H 311 |
| | 100 | 31 | 63 | 59 | 2 | 1,3 | ▸ BS2-2211-2RSK/VT143 | H 311 E |
| | 120 | 29 | 72 | 60 | 6 | 1,95 | ▸ 21311 EK | H 311 |
| | 120 | 43 | 70 | 61 | 6 | 2,85 | ▸ 22311 EK | H 2311 |
| **55** | 110 | 28 | 72 | 65 | 9 | 1,45 | ▸ 22212 EK | H 312 |
| | 110 | 34 | 69 | 64 | 1 | 1,7 | ▸ BS2-2212-2RSK/VT143 | H 312 E |
| | 130 | 31 | 87 | 65 | 6 | 2,35 | ▸ 21312 EK | H 312 |
| | 130 | 46 | 77 | 66 | 6 | 3,5 | ▸ 22312 EK | H 2312 |

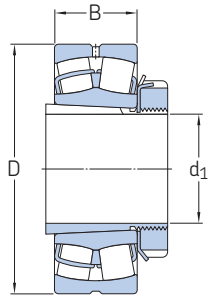
**SKF Explorer bearing**
▸ Popular item
[1] For additional bearing data → **product table, page 792**
[2] For additional adapter sleeve data → **product table, page 1072**

| Principal dimensions | | | Abutment and fillet dimensions | | | Mass | Designations | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Bearing + sleeve | Bearing[1] | Sleeve[2] |
| $d_1$ | D | B | $d_a$ max. | $d_b$ min. | $B_a$ min. | | | |
| mm | | | mm | | | kg | – | |
| **60** | 120 | 31 | 80 | 70 | 8 | 1,95 | ▸ 22213 EK | H 313 |
| | 120 | 38 | 76 | 70 | 14 | 2,1 | BS2-2213-2RSK/VT143 | H 2313 E |
| | 125 | 31 | 83 | 75 | 9 | 2,15 | ▸ 22214 EK | H 314 |
| | 125 | 38 | 80 | 74 | 1 | 2,4 | BS2-2214-2RSK/VT143 | H 314 E |
| | 140 | 33 | 94 | 70 | 6 | 2,9 | ▸ 21313 EK | H 313 |
| | 140 | 48 | 81 | 72 | 5 | 4,2 | ▸ 22313 EK | H 2313 |
| | 150 | 35 | 101 | 75 | 6 | 3,7 | ▸ 21314 EK | H 314 |
| | 150 | 51 | 90 | 76 | 6 | 5,35 | ▸ 22314 EK | H 2314 |
| **65** | 130 | 31 | 87 | 80 | 12 | 2,45 | ▸ 22215 EK | H 315 |
| | 130 | 38 | 84 | 80 | 3 | 2,8 | ▸ BS2-2215-2RSK/VT143 | H 315 E |
| | 160 | 37 | 101 | 80 | 6 | 4,5 | ▸ 21315 EK | H 315 |
| | 160 | 55 | 92 | 82 | 5 | 6,5 | ▸ 22315 EK | H 2315 |
| **70** | 140 | 33 | 94 | 85 | 12 | 3 | ▸ 22216 EK | H 316 |
| | 140 | 40 | 91 | 85 | 2,5 | 3,3 | ▸ BS2-2216-2RSK/VT143 | H 316 E |
| | 170 | 39 | 106 | 85 | 6 | 5,3 | ▸ 21316 EK | H 316 |
| | 170 | 58 | 98 | 88 | 6 | 7,65 | ▸ 22316 EK | H 2316 |
| **75** | 150 | 36 | 101 | 91 | 12 | 3,7 | ▸ 22217 EK | H 317 |
| | 150 | 44 | 98 | 90 | 1,5 | 4,1 | ▸ BS2-2217-2RSK/VT143 | H 317 E |
| | 180 | 41 | 106 | 91 | 7 | 6,2 | ▸ 21317 EK | H 317 |
| | 180 | 60 | 108 | 94 | 7 | 8,85 | ▸ 22317 EK | H 2317 |
| **80** | 160 | 40 | 106 | 96 | 10 | 4,55 | ▸ 22218 EK | H 318 |
| | 160 | 48 | 102 | 97 | 7,5 | 5,1 | ▸ BS2-2218-2RSK/VT143 | H 2318 E/L73 |
| | 160 | 52,4 | 106 | 100 | 18 | 6 | ▸ 23218 CCK/W33 | H 2318 |
| | 190 | 43 | 112 | 96 | 7 | 7,25 | ▸ 21318 EK | H 318 |
| | 190 | 64 | 113 | 100 | 7 | 10,5 | ▸ 22318 EK | H 2318 |
| **85** | 170 | 43 | 112 | 102 | 9 | 5,45 | ▸ 22219 EK | H 319 |
| | 200 | 45 | 118 | 102 | 7 | 8,25 | 21319 EK | H 319 |
| | 200 | 67 | 118 | 105 | 7 | 12 | ▸ 22319 EK | H 2319 |
| **90** | 165 | 52 | 115 | 107 | 6 | 6,15 | ▸ 23120 CCK/W33 | H 3120 |
| | 180 | 46 | 118 | 108 | 8 | 6,4 | ▸ 22220 EK | H 320 |
| | 180 | 55 | 114 | 108 | 22,5 | 7,4 | BS2-2220-2RS5K/VT143 | H 2320 E |
| | 180 | 60,3 | 117 | 110 | 19 | 8,75 | ▸ 23220 CCK/W33 | H 2320 |
| | 215 | 47 | 118 | 108 | 7 | 10,5 | 21320 EK | H 320 |
| | 215 | 73 | 130 | 110 | 7 | 15 | ▸ 22320 EK | H 2320 |
| **100** | 170 | 45 | 125 | 118 | 14 | 5,75 | ▸ 23022 CCK/W33 | H 322 |
| | 180 | 56 | 122 | 65 | 9 | 7,7 | 23122-2CS5K/VT143 | H 3122 E |
| | 180 | 56 | 126 | 117 | 7 | 7,7 | ▸ 23122 CCK/W33 | H 3122 |
| | 200 | 53 | 130 | 118 | 6 | 8,9 | ▸ 22222 EK | H 322 |
| | 200 | 63 | 126 | 118 | 21,5 | 10 | BS2-2222-2RS5K/VT143 | H 2322 E |
| | 200 | 69,8 | 126 | 121 | 17 | 12,5 | 23222-2CS5K/VT143 | H 2322 E |
| | 200 | 69,8 | 130 | 121 | 17 | 12,5 | ▸ 23222 CCK/W33 | H 2322 |
| | 240 | 80 | 143 | 121 | 7 | 21 | ▸ 22322 EK | H 2322 |

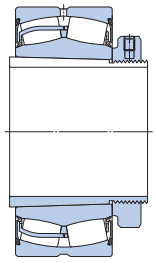
**SKF Explorer bearing**
▸ Popular item
[1] For additional bearing data → product table, page 792
[2] For additional adapter sleeve data → product table, page 1072

## 9.2 Spherical roller bearings on an adapter sleeve

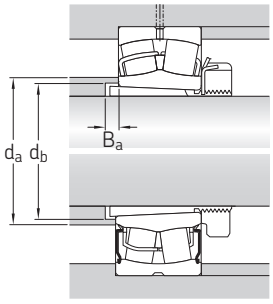
$d_1$ **110 – 170** mm




Bearing on an H .. sleeve



Sealed bearing on an H .. E sleeve




| Principal dimensions | | | Abutment and fillet dimensions | | | Mass | Designations | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Bearing + sleeve | Bearing[1] | Sleeve[2] |
| $d_1$ | D | B | $d_a$ max. | $d_b$ min. | $B_a$ min. | | | |
| mm | | | mm | | | kg | – | |
| **110** | 180 | 46 | 135 | 127 | 7 | 5,95 | ▸ 23024 CCK/W33 | H 3024 |
| | 200 | 62 | 139 | 128 | 7 | 10 | ▸ 23124 CCK/W33 | H 3124 |
| | 215 | 58 | 141 | 128 | 11 | 11 | ▸ 22224 EK | H 3124 |
| | 215 | 69 | 136 | 129 | 21,5 | 12,5 | BS2-2224-2RS5K/VT143 | H 2324 EH |
| | 215 | 76 | 137 | 131 | 17 | 14,5 | ▸ 23224-2CS5K/VT143 | H 2324 L |
| | 215 | 76 | 141 | 131 | 17 | 14,5 | ▸ 23224 CCK/W33 | H 2324 |
| | 260 | 86 | 147 | 131 | 7 | 25,5 | ▸ 22324-2CS5K/VT143 | H 2324 |
| | 260 | 86 | 152 | 131 | 7 | 25,5 | ▸ 22324 CCK/W33 | H 2324 |
| **115** | 200 | 52 | 145 | 137 | 8 | 8,7 | 23026-2CS5K/VT143 | H 3026 E |
| | 200 | 52 | 148 | 137 | 8 | 8,6 | ▸ 23026 CCK/W33 | H 3026 |
| | 210 | 64 | 148 | 138 | 8 | 12 | ▸ 23126 CCK/W33 | H 3126 |
| | 230 | 64 | 152 | 138 | 8 | 14 | ▸ 22226 EK | H 3126 |
| | 230 | 75 | 147 | 139 | 23,5 | 14,5 | BS2-2226-2CS5K/VT143 | H 2326 L |
| | 230 | 80 | 147 | 142 | 21 | 18 | 23226-2CS5K/VT143 | H 2326 L |
| | 230 | 80 | 151 | 142 | 21 | 18,5 | ▸ 23226 CCK/W33 | H 2326 |
| | 280 | 93 | 159 | 142 | 8 | 33 | ▸ 22326-2CS5K/VT143 | H 2326 |
| | 280 | 93 | 164 | 142 | 8 | 33 | ▸ 22326 CCK/W33 | H 2326 |
| **125** | 210 | 53 | 155 | 147 | 8 | 9,4 | 23028-2CS5K/VT143 | H 3028 E |
| | 210 | 53 | 158 | 147 | 8 | 9,4 | ▸ 23028 CCK/W33 | H 3028 |
| | 225 | 68 | 159 | 149 | 8 | 14,5 | ▸ 23128 CCK/W33 | H 3128 |
| | 250 | 68 | 161 | 149 | 8 | 17,5 | ▸ 22228-2CS5K/VT143 | H 3128 L |
| | 250 | 68 | 166 | 149 | 8 | 18 | ▸ 22228 CCK/W33 | H 3128 |
| | 250 | 88 | 161 | 152 | 22 | 24 | ▸ 23228-2CS5K/VT143 | H 2328 |
| | 250 | 88 | 165 | 152 | 22 | 24 | ▸ 23228 CCK/W33 | H 2328 |
| | 300 | 102 | 169 | 152 | 8 | 41 | ▸ 22328-2CS5K/VT143 | H 2328 |
| | 300 | 102 | 175 | 152 | 8 | 41 | ▸ 22328 CCK/W33 | H 2328 |

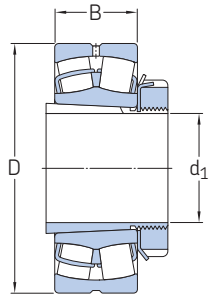
**SKF Explorer bearing**
▸ Popular item
[1] For additional bearing data → **product table, page 792**
[2] For additional adapter sleeve data → **product table, page 1072**

| Principal dimensions | | | Abutment and fillet dimensions | | | Mass | Designations | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Bearing + sleeve | Bearing[1] | Sleeve[2] |
| $d_1$ | D | B | $d_a$ max. | $d_b$ min. | $B_a$ min. | | | |
| mm | | | mm | | | kg | – | |
| **135** | 225 | 56 | 165 | 158 | 8 | 11,5 | 23030-2CS5K/VT143 | H 3030 E |
| | 225 | 56 | 169 | 158 | 8 | 11 | ▸ 23030 CCK/W33 | H 3030 |
| | 250 | 80 | 168 | 160 | 8 | 20 | 23130-2CS5K/VT143 | H 3130 E |
| | 250 | 80 | 172 | 160 | 8 | 21 | ▸ 23130 CCK/W33 | H 3130 |
| | 270 | 73 | 174 | 160 | 15 | 23 | ▸ 22230-2CS5K/VT143 | H 3130 |
| | 270 | 73 | 178 | 160 | 15 | 23 | ▸ 22230 CCK/W33 | H 3130 |
| | 270 | 96 | 171 | 163 | 20 | 30 | 23230-2CS5K/VT143 | H 2330 L |
| | 270 | 96 | 175 | 163 | 20 | 30 | ▸ 23230 CCK/W33 | H 2330 |
| | 320 | 108 | 181 | 163 | 8 | 49 | ▸ 22330-2CS5K/VT143 | H 2330 |
| | 320 | 108 | 188 | 163 | 8 | 47,5 | ▸ 22330 CCK/W33 | H 2330 |
| **140** | 240 | 60 | 177 | 168 | 9 | 14,5 | 23032-2CS5K/VT143 | H 3032 E |
| | 240 | 60 | 180 | 168 | 9 | 14,5 | ▸ 23032 CCK/W33 | H 3032 |
| | 270 | 86 | 180 | 170 | 8 | 27,5 | 23132-2CS5K/VT143 | H 3132 E |
| | 270 | 86 | 184 | 170 | 8 | 27,5 | ▸ 23132 CCK/W33 | H 3132 |
| | 290 | 80 | 185 | 170 | 14 | 29,5 | ▸ 22232-2CS5K/VT143 | H 3132 |
| | 290 | 80 | 191 | 170 | 14 | 29,5 | ▸ 22232 CCK/W33 | H 3132 |
| | 290 | 104 | 188 | 174 | 18 | 39 | ▸ 23232 CCK/W33 | H 2332 |
| | 340 | 114 | 193 | 174 | 8 | 60 | ▸ 22332-2CS5K/VT143 | H 2332 |
| | 340 | 114 | 200 | 174 | 8 | 60 | ▸ 22332 CCK/W33 | H 2332 |
| **150** | 260 | 67 | 188 | 179 | 9 | 18,5 | 23034-2CS5K/VT143 | H 3034 E |
| | 260 | 67 | 191 | 179 | 9 | 18,5 | ▸ 23034 CCK/W33 | H 3034 |
| | 280 | 88 | 190 | 180 | 8 | 29,5 | 23134-2CS5K/VT143 | H 3134 E |
| | 280 | 88 | 195 | 180 | 8 | 29,5 | ▸ 23134 CCK/W33 | H 3134 |
| | 310 | 86 | 198 | 180 | 10 | 36 | ▸ 22234-2CS5K/VT143 | H 3134 |
| | 310 | 86 | 203 | 180 | 10 | 36 | ▸ 22234 CCK/W33 | H 3134 |
| | 310 | 110 | 200 | 185 | 18 | 46,5 | ▸ 23234 CCK/W33 | H 2334 |
| | 360 | 120 | 213 | 185 | 8 | 69,5 | ▸ 22334 CCK/W33 | H 2334 |
| **160** | 250 | 52 | 199 | 188 | 9 | 13,5 | 23936 CCK/W33 | H 3936 |
| | 280 | 74 | 199 | 189 | 9 | 23 | 23036-2CS5K/VT143 | H 3036 E |
| | 280 | 74 | 204 | 189 | 9 | 23 | ▸ 23036 CCK/W33 | H 3036 |
| | 300 | 96 | 202 | 191 | 8 | 35 | 23136-2CS5K/VT143 | H 3136 L |
| | 300 | 96 | 207 | 191 | 8 | 37 | ▸ 23136 CCK/W33 | H 3136 |
| | 320 | 86 | 208 | 191 | 18 | 37,5 | ▸ 22236-2CS5K/VT143 | H 3136 |
| | 320 | 86 | 213 | 191 | 18 | 38 | ▸ 22236 CCK/W33 | H 3136 |
| | 320 | 112 | 211 | 195 | 22 | 49,5 | ▸ 23236 CCK/W33 | H 2336 |
| | 380 | 126 | 224 | 195 | 8 | 80 | ▸ 22336 CCK/W33 | H 2336 |
| **170** | 260 | 52 | 209 | 198 | 10 | 14,5 | 23938 CCK/W33 | H 3938 |
| | 290 | 75 | 216 | 199 | 10 | 25 | ▸ 23038 CCK/W33 | H 3038 |
| | 320 | 104 | 215 | 202 | 9 | 44,5 | ▸ 23138-2CS5K/VT143 | H 3138 |
| | 320 | 104 | 220 | 202 | 9 | 44,5 | ▸ 23138 CCK/W33 | H 3138 |
| | 340 | 92 | 220 | 202 | 21 | 44,5 | ▸ 22238-2CS5K/VT143 | H 3138 |
| | 340 | 92 | 225 | 202 | 21 | 46 | ▸ 22238 CCK/W33 | H 3138 |
| | 340 | 120 | 222 | 206 | 21 | 59 | ▸ 23238 CCK/W33 | H 2338 |
| | 400 | 132 | 236 | 206 | 9 | 93 | ▸ 22338 CCK/W33 | H 2338 |

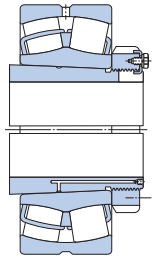
**SKF Explorer bearing**
▸ Popular item
[1] For additional bearing data → **product table, page 792**
[2] For additional adapter sleeve data → **product table, page 1072**

## 9.2 Spherical roller bearings on an adapter sleeve

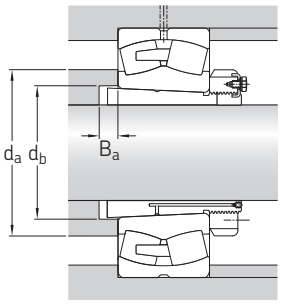
$d_1$ **180 – 380** mm




Bearing on an
H .. sleeve



Bearing on an
OH .. H sleeve




| Principal dimensions | | | Abutment and fillet dimensions | | | Mass | Designations | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Bearing + sleeve | Bearing[1] | Sleeve[2] |
| $d_1$ | D | B | $d_a$ max. | $d_b$ min. | $B_a$ min. | | | |
| mm | | | mm | | | kg | – | |
| **180** | 280 | 60 | 222 | 208 | 10 | 19 | 23940 CCK/W33 | H 3940 |
| | 310 | 82 | 223 | 210 | 10 | 30 | ▸ 23040-2CS5K/VT143 | H 3040 |
| | 310 | 82 | 228 | 210 | 10 | 31,5 | ▸ 23040 CCK/W33 | H 3040 |
| | 340 | 112 | 227 | 212 | 9 | 53,5 | ▸ 23140-2CS5K/VT143 | H 3140 |
| | 340 | 112 | 231 | 212 | 9 | 55,5 | ▸ 23140 CCK/W33 | H 3140 |
| | 360 | 98 | 232 | 212 | 24 | 53 | ▸ 22240-2CS5K/VT143 | H 3140 |
| | 360 | 98 | 238 | 212 | 24 | 66 | ▸ 22240 CCK/W33 | H 3140 |
| | 360 | 128 | 229 | 216 | 19 | 69,5 | 23240-2CS5K/VT143 | H 2340 L |
| | 360 | 128 | 235 | 216 | 19 | 70 | ▸ 23240 CCK/W33 | H 2340 |
| | 420 | 138 | 249 | 216 | 9 | 107 | ▸ 22340 CCK/W33 | H 2340 |
| **200** | 300 | 60 | 241 | 229 | 12 | 22,5 | 23944 CCK/W33 | OH 3944 H |
| | 340 | 90 | 245 | 231 | 10 | 38 | ▸ 23044-2CS5K/VT143 | OH 3044 H |
| | 340 | 90 | 250 | 231 | 10 | 39,5 | ▸ 23044 CCK/W33 | OH 3044 H |
| | 370 | 120 | 249 | 233 | 10 | 66,5 | 23144-2CS5K/VT143 | OH 3144 HTL |
| | 370 | 120 | 255 | 233 | 10 | 67,5 | ▸ 23144 CCK/W33 | OH 3144 H |
| | 400 | 108 | 257 | 233 | 21 | 71,5 | ▸ 22244-2CS5K/VT143 | OH 3144 H |
| | 400 | 108 | 263 | 233 | 21 | 74 | ▸ 22244 CCK/W33 | OH 3144 H |
| | 400 | 144 | 259 | 236 | 11 | 96,5 | ▸ 23244 CCK/W33 | OH 2344 H |
| | 460 | 145 | 270 | 236 | 10 | 131 | ▸ 22344-2CS5K/VT143 | OH 2344 H |
| | 460 | 145 | 279 | 236 | 10 | 135 | ▸ 22344 CCK/W33 | OH 2344 H |
| **220** | 320 | 60 | 261 | 249 | 12 | 24,5 | 23948 CCK/W33 | OH 3948 H |
| | 360 | 92 | 265 | 251 | 11 | 42,5 | 23048-2CS5K/VT143 | OH 3048 HE |
| | 360 | 92 | 271 | 251 | 11 | 44,5 | ▸ 23048 CCK/W33 | OH 3048 H |
| | 400 | 128 | 270 | 254 | 11 | 79,5 | 23148-2CS5K/VT143 | OH 3148 HTL |
| | 400 | 128 | 277 | 254 | 11 | 80,5 | ▸ 23148 CCK/W33 | OH 3148 H |
| | 440 | 120 | 290 | 254 | 19 | 99 | ▸ 22248 CCK/W33 | OH 3148 H |
| | 440 | 160 | 286 | 257 | 6 | 125 | 23248 CCK/W33 | OH 2348 H |
| | 500 | 155 | 303 | 257 | 11 | 170 | 22348 CCK/W33 | OH 2348 H |

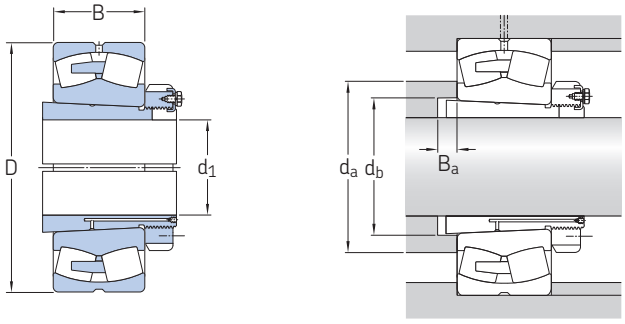
**SKF Explorer bearing**
▸ Popular item
1) For additional bearing data → **product table, page 792**
2) For additional adapter sleeve data → **product table, page 1072**

| Principal dimensions | | | Abutment and fillet dimensions | | | Mass | Designations | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Bearing + sleeve | Bearing[1] | Sleeve[2] |
| $d_1$ | D | B | $d_a$ max. | $d_b$ min. | $B_a$ min. | | | |
| mm | | | mm | | | kg | – | |
| **240** | 360 | 75 | 287 | 270 | 12 | 35 | 23952 CCK/W33 | OH 3952 H |
| | 400 | 104 | 289 | 272 | 11 | 58 | 23052-2CS5K/VT143 | OH 3052 HE |
| | 400 | 104 | 295 | 272 | 11 | 60,5 | ▸ 23052 CCK/W33 | OH 3052 H |
| | 440 | 144 | 293 | 276 | 11 | 105 | ▸ 23152-2CS5K/VT143 | OH 3152 HTL |
| | 440 | 144 | 301 | 276 | 11 | 109 | ▸ 23152 CCK/W33 | OH 3152 H |
| | 480 | 130 | 312 | 276 | 25 | 130 | 22252 CCK/W33 | OH 3152 H |
| | 480 | 174 | 312 | 278 | 2 | 160 | ▸ 23252 CCK/W33 | OH 2352 H |
| | 540 | 165 | 328 | 278 | 11 | 215 | ▸ 22352 CCK/W33 | OH 2352 H |
| **260** | 380 | 75 | 308 | 290 | 12 | 40 | 23956 CCK/W33 | OH 3956 H |
| | 420 | 106 | 315 | 292 | 12 | 67 | ▸ 23056 CCK/W33 | OH 3056 H |
| | 460 | 146 | 314 | 296 | 12 | 114 | 23156-2CS5K/VT143 | OH 3156 HTL |
| | 460 | 146 | 321 | 296 | 12 | 115 | ▸ 23156 CCK/W33 | OH 3156 H |
| | 500 | 130 | 333 | 296 | 28 | 135 | 22256 CCK/W33 | OH 3156 H |
| | 500 | 176 | 332 | 299 | 11 | 165 | ▸ 23256 CCK/W33 | OH 2356 H |
| | 580 | 175 | 354 | 299 | 12 | 250 | ▸ 22356 CCK/W33 | OH 2356 H |
| **280** | 420 | 90 | 333 | 312 | 13 | 58,5 | 23960 CCK/W33 | OH 3960 H |
| | 460 | 118 | 340 | 313 | 12 | 90 | ▸ 23060 CCK/W33 | OH 3060 H |
| | 500 | 160 | 337 | 318 | 12 | 153 | 23160-2CS5K/VT143 | OH 3160 HE |
| | 500 | 160 | 345 | 318 | 12 | 150 | ▸ 23160 CCK/W33 | OH 3160 H |
| | 540 | 140 | 354 | 318 | 32 | 170 | 22260 CCK/W33 | OH 3160 H |
| | 540 | 192 | 356 | 321 | 12 | 210 | ▸ 23260 CCK/W33 | OH 3260 H |
| **300** | 440 | 90 | 354 | 332 | 13 | 61 | 23964 CCK/W33 | OH 3964 H |
| | 480 | 121 | 360 | 334 | 13 | 97 | ▸ 23064 CCK/W33 | OH 3064 H |
| | 540 | 176 | 361 | 338 | 13 | 192 | ▸ 23164-2CS5K/VT143 | OH 3164 H |
| | 540 | 176 | 370 | 338 | 13 | 185 | ▸ 23164 CCK/W33 | OH 3164 H |
| | 580 | 150 | 379 | 338 | 39 | 200 | 22264 CCK/W33 | OH 3164 H |
| | 580 | 208 | 382 | 343 | 13 | 260 | 23264 CCK/W33 | OH 3264 H |
| **320** | 460 | 90 | 373 | 352 | 14 | 67,5 | 23968 CCK/W33 | OH 3968 H |
| | 520 | 133 | 385 | 355 | 14 | 130 | ▸ 23068 CCK/W33 | OH 3068 H |
| | 580 | 190 | 385 | 360 | 14 | 252 | 23168-2CS5K/VT143 | OH 3168 HE |
| | 580 | 190 | 394 | 360 | 14 | 250 | ▸ 23168 CCK/W33 | OH 3168 H |
| | 620 | 224 | 427 | 364 | 14 | 335 | ▸ 23268 CAK/W33 | OH 3268 H |
| **340** | 480 | 90 | 394 | 372 | 14 | 70,5 | 23972 CCK/W33 | OH 3972 H |
| | 540 | 134 | 404 | 375 | 14 | 135 | ▸ 23072 CCK/W33 | OH 3072 H |
| | 600 | 192 | 408 | 380 | 14 | 265 | 23172-2CS5K/VT143 | OH 3172 HE |
| | 600 | 192 | 418 | 380 | 14 | 260 | ▸ 23172 CCK/W33 | OH 3172 H |
| | 650 | 170 | 454 | 380 | 36 | 375 | 22272 CAK/W33 | OH 3172 H |
| | 650 | 232 | 449 | 385 | 14 | 375 | 23272 CAK/W33 | OH 3272 H |
| **360** | 520 | 106 | 419 | 393 | 15 | 95 | 23976 CCK/W33 | OH 3976 H |
| | 560 | 135 | 426 | 396 | 15 | 145 | ▸ 23076 CCK/W33 | OH 3076 H |
| | 620 | 194 | 454 | 401 | 15 | 275 | ▸ 23176 CAK/W33 | OH 3176 H |
| | 680 | 240 | 473 | 405 | 15 | 420 | 23276 CAK/W33 | OH 3276 H |
| **380** | 540 | 106 | 439 | 413 | 15 | 100 | 23980 CCK/W33 | OH 3980 H |
| | 600 | 148 | 450 | 417 | 15 | 180 | 23080 CCK/W33 | OH 3080 H |
| | 650 | 200 | 458 | 421 | 15 | 312 | 23180-2CS5K/VT143 | OH 3180 HE |
| | 650 | 200 | 475 | 421 | 15 | 325 | ▸ 23180 CAK/W33 | OH 3180 H |
| | 720 | 256 | 500 | 427 | 15 | 505 | 23280 CAK/W33 | OH 3280 H |
| | 820 | 243 | 534 | 427 | 28 | 735 | 22380 CAK/W33 | OH 3280 H |

**SKF Explorer bearing**
▸ Popular item
[1] For additional bearing data → product table, page 792
[2] For additional adapter sleeve data → product table, page 1072

## 9.2 Spherical roller bearings on an adapter sleeve

$d_1$ **400 – 1 000** mm




| Principal dimensions | | | Abutment and fillet dimensions | | | Mass | Designations | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Bearing + sleeve | Bearing[1] | Sleeve[2] |
| $d_1$ | D | B | $d_a$ max. | $d_b$ min. | $B_a$ min. | | | |
| mm | | | mm | | | kg | – | |
| **400** | 560 | 106 | 459 | 433 | 15 | 105 | 23984 CCK/W33 | OH 3984 H |
| | 620 | 150 | 487 | 437 | 16 | 190 | 23084 CAK/W33 | OH 3084 H |
| | 700 | 224 | 483 | 443 | 16 | 410 | ▸ 23184 CKJ/W33 | OH 3184 H |
| | 760 | 272 | 526 | 446 | 16 | 590 | 23284 CAK/W33 | OH 3284 H |
| **410** | 600 | 118 | 484 | 454 | 17 | 150 | 23988 CCK/W33 | OH 3988 H |
| | 650 | 157 | 511 | 458 | 17 | 235 | 23088 CAK/W33 | OH 3088 H |
| | 720 | 226 | 529 | 463 | 17 | 430 | 23188 CAK/W33 | OH 3188 H |
| | 790 | 280 | 549 | 469 | 17 | 670 | 23288 CAK/W33 | OH 3288 H |
| **430** | 620 | 118 | 516 | 474 | 17 | 160 | 23992 CAK/W33 | OH 3992 H |
| | 680 | 163 | 533 | 478 | 17 | 265 | 23092 CAK/W33 | OH 3092 H |
| | 760 | 240 | 555 | 484 | 17 | 530 | 23192 CAK/W33 | OH 3192 H |
| | 830 | 296 | 574 | 490 | 17 | 790 | 23292 CAK/W33 | OH 3292 H |
| **450** | 650 | 128 | 537 | 496 | 18 | 185 | 23996 CAK/W33 | OH 3996 H |
| | 700 | 165 | 549 | 499 | 18 | 275 | 23096 CAK/W33 | OH 3096 H |
| | 790 | 248 | 579 | 505 | 18 | 590 | 23196 CAK/W33 | OH 3196 H |
| | 870 | 310 | 602 | 512 | 18 | 935 | 23296 CAK/W33 | OH 3296 H |
| **470** | 670 | 128 | 561 | 516 | 18 | 195 | 239/500 CAK/W33 | OH 39/500 H |
| | 720 | 167 | 573 | 519 | 18 | 290 | 230/500 CAK/W33 | OH 30/500 H |
| | 830 | 264 | 605 | 527 | 18 | 690 | 231/500 CAK/W33 | OH 31/500 H |
| | 920 | 336 | 633 | 534 | 18 | 1 100 | 232/500 CAK/W33 | OH 32/500 H |
| **500** | 710 | 136 | 594 | 547 | 20 | 255 | 239/530 CAK/W33 | OH 39/530 H |
| | 780 | 185 | 613 | 551 | 20 | 405 | 230/530 CAK/W33 | OH 30/530 H |
| | 870 | 272 | 638 | 558 | 20 | 785 | 231/530 CAK/W33 | OH 31/530 H |
| | 980 | 355 | 670 | 566 | 20 | 1 360 | 232/530 CAK/W33 | OH 32/530 H |
| **530** | 750 | 140 | 627 | 577 | 20 | 260 | 239/560 CAK/W33 | OH 39/560 H |
| | 820 | 195 | 646 | 582 | 20 | 445 | 230/560 CAK/W33 | OH 30/560 H |
| | 920 | 280 | 675 | 589 | 20 | 880 | 231/560 CAK/W33 | OH 31/560 H |
| | 1 030 | 365 | 706 | 595 | 20 | 1 490 | 232/560 CAK/W33 | OH 32/560 H |

**SKF Explorer bearing**
▸ Popular item
[1] For additional bearing data → product table, page 792
[2] For additional adapter sleeve data → product table, page 1072

| Principal dimensions | | | Abutment and fillet dimensions | | | Mass | Designations | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Bearing + sleeve | Bearing[1] | Sleeve[2] |
| $d_1$ | D | B | $d_a$ max. | $d_b$ min. | $B_a$ min. | | | |
| mm | | | mm | | | kg | – | |
| **560** | 800 | 150 | 671 | 619 | 22 | 330 | 239/600 CAK/W33 | OH 39/600 H |
| | 870 | 200 | 685 | 623 | 22 | 525 | 230/600 CAK/W33 | OH 30/600 H |
| | 980 | 300 | 722 | 629 | 22 | 1 070 | 231/600 CAK/W33 | OH 31/600 H |
| | 1 090 | 388 | 754 | 639 | 22 | 1 780 | 232/600 CAK/W33 | OH 32/600 H |
| **600** | 850 | 165 | 708 | 650 | 22 | 385 | 239/630 CAK/W33 | OH 39/630 H |
| | 920 | 212 | 727 | 654 | 22 | 595 | 230/630 CAK/W33 | OH 30/630 H |
| | 1 030 | 315 | 755 | 663 | 22 | 1 240 | 231/630 CAK/W33 | OH 31/630 H |
| **630** | 900 | 170 | 752 | 691 | 22 | 455 | 239/670 CAK/W33 | OH 39/670 H |
| | 980 | 230 | 772 | 696 | 22 | 755 | 230/670 CAK/W33 | OH 30/670 H |
| | 1 090 | 336 | 804 | 705 | 22 | 1 510 | 231/670 CAK/W33 | OH 31/670 H |
| | 1 220 | 438 | 832 | 711 | 22 | 2 540 | 232/670 CAK/W33 | OH 32/670 H |
| **670** | 950 | 180 | 794 | 732 | 26 | 525 | 239/710 CAK/W33 | OH 39/710 H |
| | 1 030 | 236 | 816 | 736 | 26 | 860 | 230/710 CAK/W33 | OH 30/710 H |
| | 1 150 | 345 | 851 | 745 | 26 | 1 750 | 231/710 CAK/W33 | OH 31/710 H |
| | 1 280 | 450 | 875 | 753 | 26 | 3 000 | 232/710 CAK/W33 | OH 32/710 H |
| **710** | 1 000 | 185 | 838 | 772 | 26 | 605 | 239/750 CAK/W33 | OH 39/750 H |
| | 1 090 | 250 | 859 | 778 | 26 | 990 | 230/750 CAK/W33 | OH 30/750 H |
| | 1 220 | 365 | 900 | 787 | 26 | 2 050 | 231/750 CAK/W33 | OH 31/750 H |
| **750** | 1 060 | 195 | 891 | 822 | 28 | 730 | 239/800 CAK/W33 | OH 39/800 H |
| | 1 150 | 258 | 917 | 829 | 28 | 1 200 | 230/800 CAK/W33 | OH 30/800 H |
| | 1 280 | 375 | 949 | 838 | 28 | 2 430 | 231/800 CAK/W33 | OH 31/800 H |
| **800** | 1 120 | 200 | 946 | 872 | 28 | 950 | 239/850 CAK/W33 | OH 39/850 H |
| | 1 220 | 272 | 972 | 880 | 28 | 1 390 | 230/850 CAK/W33 | OH 30/850 H |
| **850** | 1 180 | 206 | 996 | 924 | 30 | 930 | 239/900 CAK/W33 | OH 39/900 H |
| | 1 280 | 280 | 1 025 | 931 | 30 | 1 580 | 230/900 CAK/W33 | OH 30/900 H |
| **900** | 1 250 | 224 | 1 056 | 976 | 30 | 1 120 | 239/950 CAK/W33 | OH 39/950 H |
| | 1 360 | 300 | 1 086 | 983 | 30 | 1 870 | 230/950 CAK/W33 | OH 30/950 H |
| **950** | 1 580 | 462 | 1 185 | 1 047 | 33 | 4 340 | 231/1000 CAKF/W33 | OH 31/1000 H |
| **1 000** | 1 400 | 250 | 1 179 | 1 087 | 33 | 1 590 | 239/1060 CAKF/W33 | OH 39/1060 H |



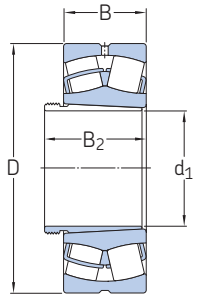
**SKF Explorer bearing**

1) For additional bearing data → product table, page 792

2) For additional adapter sleeve data → product table, page 1072

## 9.3 Spherical roller bearings on a withdrawal sleeve

$d_1$ **35 – 145** mm




| Principal dimensions | | | | Mass | Designations | |
|---|---|---|---|---|---|---|
| | | | | Bearing + sleeve | Bearing[1] | Sleeve[2] |
| $d_1$ | D | B | $B_2$[3] ≈ | | | |
| mm | | | | kg | – | |
| **35** | 80 | 23 | 32 | 0,6 | ▸ 22208 EK | AH 308 |
| | 90 | 23 | 32 | 0,84 | 21308 EK | AH 308 |
| | 90 | 33 | 43 | 1,2 | 22308 EK | AH 2308 |
| **40** | 85 | 23 | 34 | 0,7 | ▸ 22209 EK | AH 309 |
| | 100 | 25 | 34 | 1,1 | ▸ 21309 EK | AH 309 |
| | 100 | 36 | 47 | 1,55 | ▸ 22309 EK | AH 2309 |
| **45** | 90 | 23 | 38 | 0,75 | ▸ 22210 EK | AHX 310 |
| | 110 | 27 | 38 | 1,45 | ▸ 21310 EK | AHX 310 |
| | 110 | 40 | 53 | 2,1 | ▸ 22310 EK | AHX 2310 |
| **50** | 100 | 25 | 40 | 0,95 | ▸ 22211 EK | AHX 311 |
| | 120 | 29 | 40 | 1,8 | ▸ 21311 EK | AHX 311 |
| | 120 | 43 | 57 | 2,7 | ▸ 22311 EK | AHX 2311 |
| **55** | 110 | 28 | 43 | 1,3 | ▸ 22212 EK | AHX 312 |
| | 130 | 31 | 43 | 2,2 | ▸ 21312 EK | AHX 312 |
| | 130 | 46 | 61 | 3,3 | ▸ 22312 EK | AHX 2312 |
| **60** | 120 | 31 | 45 | 1,7 | ▸ 22213 EK | AH 313 G |
| | 140 | 33 | 45 | 2,75 | ▸ 21313 EK | AH 313 G |
| | 140 | 48 | 64 | 4,1 | ▸ 22313 EK | AH 2313 G |
| **65** | 125 | 31 | 47 | 1,8 | ▸ 22214 EK | AH 314 G |
| | 150 | 35 | 47 | 3,35 | ▸ 21314 EK | AH 314 G |
| | 150 | 51 | 68 | 4,9 | ▸ 22314 EK | AHX 2314 G |
| **70** | 130 | 31 | 49 | 1,95 | ▸ 22215 EK | AH 315 G |
| | 160 | 37 | 49 | 4,15 | ▸ 21315 EK | AH 315 G |
| | 160 | 55 | 72 | 6 | ▸ 22315 EK | AHX 2315 G |
| **75** | 140 | 33 | 52 | 2,4 | ▸ 22216 EK | AH 316 |
| | 170 | 39 | 52 | 4,75 | ▸ 21316 EK | AH 316 |
| | 170 | 58 | 75 | 7 | ▸ 22316 EK | AHX 2316 |
| **80** | 150 | 36 | 56 | 3,05 | ▸ 22217 EK | AHX 317 |
| | 180 | 41 | 56 | 5,55 | ▸ 21317 EK | AHX 317 |
| | 180 | 60 | 78 | 8,15 | ▸ 22317 EK | AHX 2317 |
| **85** | 160 | 40 | 57 | 3,7 | ▸ 22218 EK | AHX 318 |
| | 160 | 52,4 | 67 | 5 | ▸ 23218 CCK/W33 | AHX 3218 |
| | 190 | 43 | 57 | 6,4 | ▸ 21318 EK | AHX 318 |
| | 190 | 64 | 83 | 9,5 | ▸ 22318 EK | AHX 2318 |

**SKF Explorer bearing**
▸ Popular item
1) For additional bearing data → **product table, page 792**
2) For additional withdrawal sleeve data → skf.com/go/17000-24-1
3) Width before the sleeve is driven into the bearing bore

| Principal dimensions | | | | Mass | Designations | |
|---|---|---|---|---|---|---|
| | | | | Bearing + sleeve | Bearing[1] | Sleeve[2] |
| $d_1$ | D | B | $B_2$[3] ≈ | | | |
| mm | | | | kg | – | |
| **90** | 170 | 43 | 61 | 4,6 | ▸ 22219 EK | AHX 319 |
| | 200 | 45 | 61 | 7,4 | 21319 EK | AHX 319 |
| | 200 | 67 | 89 | 11 | ▸ 22319 EK | AHX 2319 |
| **95** | 165 | 52 | 68 | 5 | ▸ 23120 CCK/W33 | AHX 3120 |
| | 180 | 46 | 63 | 5,4 | ▸ 22220 EK | AHX 320 |
| | 180 | 60,3 | 77 | 7,3 | ▸ 23220 CCK/W33 | AHX 3220 |
| | 215 | 47 | 63 | 9,1 | 21320 EK | AHX 320 |
| | 215 | 73 | 94 | 14 | ▸ 22320 EK | AHX 2320 |
| **105** | 170 | 45 | 67 | 4,45 | 23022 CCK/W33 | AHX 322 |
| | 180 | 56 | 72 | 6,35 | ▸ 23122 CCK/W33 | AHX 3122 |
| | 180 | 69 | 91 | 7,7 | 24122 CCK30/W33 | AH 24122 |
| | 200 | 53 | 72 | 7,5 | ▸ 22222 EK | AHX 3122 |
| | 200 | 69,8 | 86 | 10,5 | ▸ 23222 CCK/W33 | AHX 3222 G |
| | 240 | 80 | 102 | 19,5 | ▸ 22322 EK | AHX 2322 G |
| **115** | 180 | 46 | 64 | 4,8 | ▸ 23024 CCK/W33 | AHX 3024 |
| | 180 | 60 | 82 | 5,95 | ▸ 24024 CCK30/W33 | AH 24024 |
| | 200 | 62 | 79 | 8,7 | ▸ 23124 CCK/W33 | AHX 3124 |
| | 200 | 80 | 102 | 11 | 24124 CCK30/W33 | AH 24124 |
| | 215 | 58 | 79 | 9,55 | ▸ 22224 EK | AHX 3124 |
| | 215 | 76 | 94 | 13 | ▸ 23224 CCK/W33 | AHX 3224 G |
| | 260 | 86 | 109 | 24 | ▸ 22324 CCK/W33 | AHX 2324 G |
| **125** | 200 | 52 | 71 | 6,75 | ▸ 23026 CCK/W33 | AHX 3026 |
| | 200 | 69 | 93 | 8,65 | ▸ 24026 CCK30/W33 | AH 24026 |
| | 210 | 64 | 82 | 9,6 | ▸ 23126 CCK/W33 | AHX 3126 |
| | 210 | 80 | 104 | 11,5 | 24126 CCK30/W33 | AH 24126 |
| | 230 | 64 | 82 | 11,5 | ▸ 22226 EK | AHX 3126 |
| | 230 | 80 | 102 | 15,5 | ▸ 23226 CCK/W33 | AHX 3226 G |
| | 280 | 93 | 119 | 30,5 | ▸ 22326 CCK/W33 | AHX 2326 G |
| **135** | 210 | 53 | 73 | 7,35 | ▸ 23028 CCK/W33 | AHX 3028 |
| | 210 | 69 | 93 | 9,2 | ▸ 24028 CCK30/W33 | AH 24028 |
| | 225 | 68 | 88 | 11,5 | ▸ 23128 CCK/W33 | AHX 3128 |
| | 225 | 85 | 109 | 14,5 | ▸ 24128 CCK30/W33 | AH 24128 |
| | 250 | 68 | 88 | 15 | ▸ 22228 CCK/W33 | AHX 3128 |
| | 250 | 88 | 109 | 20,5 | ▸ 23228 CCK/W33 | AHX 3228 G |
| | 300 | 102 | 130 | 38 | ▸ 22328 CCK/W33 | AHX 2328 G |
| **145** | 225 | 56 | 77 | 8,85 | ▸ 23030 CCK/W33 | AHX 3030 |
| | 225 | 75 | 101 | 11,5 | 24030 CCK30/W33 | AH 24030 |
| | 250 | 80 | 101 | 17 | ▸ 23130 CCK/W33 | AHX 3130 G |
| | 250 | 100 | 126 | 21 | ▸ 24130 CCK30/W33 | AH 24130 |
| | 270 | 73 | 101 | 19 | ▸ 22230 CCK/W33 | AHX 3130 G |
| | 270 | 96 | 119 | 26 | ▸ 23230 CCK/W33 | AHX 3230 G |
| | 320 | 108 | 140 | 45,5 | ▸ 22330 CCK/W33 | AHX 2330 G |

**SKF Explorer bearing**

▸ Popular item

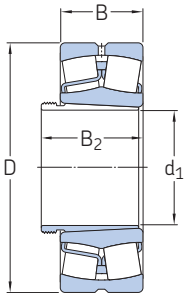
1) For additional bearing data → **product table, page 792**

2) For additional withdrawal sleeve data → skf.com/go/17000-24-1

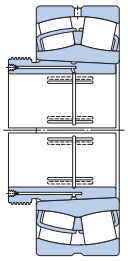
3) Width before the sleeve is driven into the bearing bore

## 9.3 Spherical roller bearings on a withdrawal sleeve

$d_1$ **150 – 300** mm




Bearing on an AH sleeve



Bearing on an AOH sleeve

| Principal dimensions | | | | Mass | Designations | |
|---|---|---|---|---|---|---|
| | | | | Bearing + sleeve | Bearing[1] | Sleeve[2] |
| $d_1$ | D | B | $B_2$[3] ≈ | | | |
| mm | | | | kg | – | |
| **150** | 240 | 60 | 82 | 11,5 | ▸ 23032 CCK/W33 | AH 3032 |
| | 240 | 80 | 106 | 15 | ▸ 24032 CCK30/W33 | AH 24032 |
| | 270 | 86 | 108 | 23 | ▸ 23132 CCK/W33 | AH 3132 G |
| | 270 | 109 | 135 | 28,5 | ▸ 24132 CCK30/W33 | AH 24132 |
| | 290 | 80 | 108 | 25 | ▸ 22232 CCK/W33 | AH 3132 G |
| | 290 | 104 | 130 | 34,5 | ▸ 23232 CCK/W33 | AH 3232 G |
| | 340 | 114 | 146 | 56 | 22332 CCK/W33 | AH 2332 G |
| **160** | 260 | 67 | 90 | 15 | ▸ 23034 CCK/W33 | AH 3034 |
| | 260 | 90 | 117 | 20 | ▸ 24034 CCK30/W33 | AH 24034 |
| | 280 | 88 | 109 | 25 | ▸ 23134 CCK/W33 | AH 3134 G |
| | 280 | 109 | 136 | 30 | ▸ 24134 CCK30/W33 | AH 24134 |
| | 310 | 86 | 109 | 31 | ▸ 22234 CCK/W33 | AH 3134 G |
| | 310 | 110 | 140 | 41 | ▸ 23234 CCK/W33 | AH 3234 G |
| | 360 | 120 | 152 | 65 | 22334 CCK/W33 | AH 2334 G |
| **170** | 280 | 74 | 98 | 19,5 | ▸ 23036 CCK/W33 | AH 3036 |
| | 280 | 100 | 127 | 25,5 | 24036 CCK30/W33 | AH 24036 |
| | 300 | 96 | 122 | 32 | ▸ 23136 CCK/W33 | AH 3136 G |
| | 300 | 118 | 145 | 37 | 24136 CCK30/W33 | AH 24136 |
| | 320 | 86 | 110 | 32,5 | 22236 CCK/W33 | AH 2236 G |
| | 320 | 112 | 146 | 43,5 | ▸ 23236 CCK/W33 | AH 3236 G |
| | 380 | 126 | 160 | 76 | ▸ 22336 CCK/W33 | AH 2336 G |
| **180** | 290 | 75 | 102 | 21 | ▸ 23038 CCK/W33 | AH 3038 G |
| | 290 | 100 | 131 | 27,5 | 24038 CCK30/W33 | AH 24038 |
| | 320 | 104 | 131 | 38,5 | ▸ 23138 CCK/W33 | AH 3138 G |
| | 320 | 128 | 159 | 46,5 | 24138 CCK30/W33 | AH 24138 |
| | 340 | 92 | 117 | 39,5 | 22238 CCK/W33 | AH 2238 G |
| | 340 | 120 | 152 | 52,5 | ▸ 23238 CCK/W33 | AH 3238 G |
| | 400 | 132 | 167 | 87,5 | ▸ 22338 CCK/W33 | AH 2338 G |

**SKF Explorer bearing**

▸ Popular item

1) For additional bearing data → **product table, page 792**

2) For additional withdrawal sleeve data → skf.com/go/17000-24-1

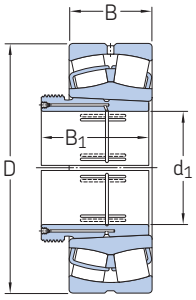
3) Width before the sleeve is driven into the bearing bore

| Principal dimensions | | | | Mass | Designations | |
|---|---|---|---|---|---|---|
| | | | | Bearing + sleeve | Bearing[1] | Sleeve[2] |
| $d_1$ | D | B | $B_2$[3] ≈ | | | |
| mm | | | | kg | – | |
| **190** | 310 | 82 | 108 | 26,5 | ▸ 23040 CCK/W33 | AH 3040 G |
| | 310 | 109 | 140 | 34,5 | ▸ 24040 CCK30/W33 | AH 24040 |
| | 340 | 112 | 140 | 48,5 | ▸ 23140 CCK/W33 | AH 3140 |
| | 340 | 140 | 171 | 57,5 | ▸ 24140 CCK30/W33 | AH 24140 |
| | 360 | 128 | 160 | 63 | ▸ 23240 CCK/W33 | AH 3240 |
| | 420 | 138 | 177 | 100 | ▸ 22340 CCK/W33 | AH 2340 |
| **200** | 340 | 90 | 117 | 36,5 | ▸ 23044 CCK/W33 | AOH 3044 G |
| | 340 | 118 | 152 | 47,5 | ▸ 24044 CCK30/W33 | AOH 24044 |
| | 370 | 120 | 151 | 61,5 | ▸ 23144 CCK/W33 | AOH 3144 |
| | 370 | 150 | 184 | 76 | ▸ 24144 CCK30/W33 | AOH 24144 |
| | 400 | 108 | 136 | 68 | 22244 CCK/W33 | AOH 2244 |
| | 400 | 144 | 189 | 93 | ▸ 23244 CCK/W33 | AOH 2344 |
| | 460 | 145 | 189 | 130 | ▸ 22344 CCK/W33 | AOH 2344 |
| **220** | 360 | 92 | 123 | 40,5 | ▸ 23048 CCK/W33 | AOH 3048 |
| | 360 | 118 | 153 | 50,5 | 24048 CCK30/W33 | AOH 24048 |
| | 400 | 128 | 161 | 76,5 | ▸ 23148 CCK/W33 | AOH 3148 |
| | 400 | 160 | 195 | 91,5 | ▸ 24148 CCK30/W33 | AOH 24148 |
| | 440 | 160 | 197 | 120 | ▸ 23248 CCK/W33 | AOH 2348 |
| | 500 | 155 | 197 | 165 | ▸ 22348 CCK/W33 | AOH 2348 |
| **240** | 400 | 104 | 135 | 56,5 | ▸ 23052 CCK/W33 | AOH 3052 |
| | 400 | 140 | 178 | 75 | 24052 CCK30/W33 | AOH 24052 G |
| | 440 | 144 | 179 | 105 | ▸ 23152 CCK/W33 | AOH 3152 G |
| | 440 | 180 | 218 | 120 | ▸ 24152 CCK30/W33 | AOH 24152 |
| | 480 | 130 | 161 | 120 | 22252 CCK/W33 | AOH 2252 G |
| | 480 | 174 | 213 | 155 | ▸ 23252 CCK/W33 | AOH 2352 G |
| | 540 | 165 | 213 | 205 | ▸ 22352 CCK/W33 | AOH 2352 G |
| **260** | 420 | 106 | 139 | 62 | ▸ 23056 CCK/W33 | AOH 3056 |
| | 420 | 140 | 179 | 79 | ▸ 24056 CCK30/W33 | AOH 24056 G |
| | 460 | 146 | 183 | 110 | 23156 CCK/W33 | AOH 3156 G |
| | 460 | 180 | 219 | 130 | ▸ 24156 CCK30/W33 | AOH 24156 |
| | 500 | 130 | 163 | 125 | 22256 CCK/W33 | AOH 2256 G |
| | 500 | 176 | 220 | 160 | 23256 CCK/W33 | AOH 2356 G |
| | 580 | 175 | 220 | 245 | 22356 CCK/W33 | AOH 2356 G |
| **280** | 460 | 118 | 153 | 82,5 | 23060 CCK/W33 | AOH 3060 |
| | 460 | 160 | 202 | 110 | ▸ 24060 CCK30/W33 | AOH 24060 G |
| | 500 | 160 | 200 | 140 | 23160 CCK/W33 | AOH 3160 G |
| | 500 | 200 | 242 | 180 | ▸ 24160 CCK30/W33 | AOH 24160 |
| | 540 | 140 | 178 | 155 | 22260 CCK/W33 | AOH 2260 G |
| | 540 | 192 | 236 | 200 | 23260 CCK/W33 | AOH 3260 G |
| **300** | 480 | 121 | 157 | 89 | ▸ 23064 CCK/W33 | AOH 3064 G |
| | 480 | 160 | 202 | 115 | 24064 CCK30/W33 | AOH 24064 G |
| | 540 | 176 | 217 | 175 | ▸ 23164 CCK/W33 | AOH 3164 G |
| | 540 | 218 | 260 | 225 | 24164 CCK30/W33 | AOH 24164 |
| | 580 | 150 | 190 | 185 | 22264 CCK/W33 | AOH 2264 G |
| | 580 | 208 | 254 | 250 | ▸ 23264 CCK/W33 | AOH 3264 G |

**SKF Explorer bearing**
▸ Popular item
1) For additional bearing data → **product table, page 792**
2) For additional withdrawal sleeve data → skf.com/go/17000-24-1
3) Width before the sleeve is driven into the bearing bore

## 9.3 Spherical roller bearings on a withdrawal sleeve

$d_1$ **320 – 670** mm




| Principal dimensions | | | | Mass | Designations | |
|---|---|---|---|---|---|---|
| | | | | Bearing + sleeve | Bearing[1] | Sleeve[2] |
| $d_1$ | D | B | $B_2$[3] ≈ | | | |
| mm | | | | kg | – | |
| **320** | 520 | 133 | 171 | 120 | ▸ 23068 CCK/W33 | AOH 3068 G |
| | 520 | 180 | 225 | 160 | ▸ 24068 CCK30/W33 | AOH 24068 |
| | 580 | 190 | 234 | 225 | ▸ 23168 CCK/W33 | AOH 3168 G |
| | 580 | 243 | 288 | 295 | 24168 ECCK30J/W33 | AOH 24168 |
| | 620 | 224 | 273 | 315 | 23268 CAK/W33 | AOH 3268 G |
| **340** | 540 | 134 | 176 | 125 | 23072 CCK/W33 | AOH 3072 G |
| | 540 | 180 | 226 | 165 | 24072 CCK30/W33 | AOH 24072 |
| | 600 | 192 | 238 | 235 | 23172 CCK/W33 | AOH 3172 G |
| | 600 | 243 | 289 | 295 | 24172 ECCK30J/W33 | AOH 24172 |
| | 650 | 170 | 238 | 275 | 22272 CAK/W33 | AOH 3172 G |
| | 650 | 232 | 283 | 345 | 23272 CAK/W33 | AOH 3272 G |
| **360** | 560 | 135 | 180 | 135 | 23076 CCK/W33 | AOH 3076 G |
| | 560 | 180 | 228 | 170 | 24076 CCK30/W33 | AOH 24076 |
| | 620 | 194 | 242 | 250 | ▸ 23176 CAK/W33 | AOH 3176 G |
| | 620 | 243 | 291 | 325 | 24176 ECAK30/W33 | AOH 24176 |
| | 680 | 240 | 294 | 390 | 23276 CAK/W33 | AOH 3276 G |
| **380** | 600 | 148 | 193 | 165 | 23080 CCK/W33 | AOH 3080 G |
| | 600 | 200 | 248 | 220 | 24080 ECCK30J/W33 | AOH 24080 |
| | 650 | 200 | 250 | 290 | 23180 CAK/W33 | AOH 3180 G |
| | 650 | 250 | 298 | 365 | 24180 ECAK30/W33 | AOH 24180 |
| | 720 | 256 | 312 | 470 | 23280 CAK/W33 | AOH 3280 G |
| | 820 | 243 | 312 | 675 | 22380 CAK/W33 | AOH 3280 G |
| **400** | 620 | 150 | 196 | 175 | 23084 CAK/W33 | AOH 3084 G |
| | 620 | 200 | 252 | 230 | 24084 ECAK30/W33 | AOH 24084 |
| | 700 | 224 | 276 | 375 | 23184 CKJ/W33 | AOH 3184 G |
| | 700 | 280 | 332 | 470 | 24184 ECAK30/W33 | AOH 24184 |
| | 760 | 272 | 331 | 550 | 23284 CAK/W33 | AOH 3284 G |
| **420** | 650 | 157 | 205 | 200 | 23088 CAK/W33 | AOHX 3088 G |
| | 650 | 212 | 264 | 275 | 24088 ECAK30/W33 | AOH 24088 |
| | 720 | 226 | 281 | 380 | 23188 CAK/W33 | AOHX 3188 G |
| | 720 | 280 | 332 | 490 | 24188 ECAK30/W33 | AOH 24188 |
| | 790 | 280 | 341 | 620 | 23288 CAK/W33 | AOHX 3288 G |

**SKF Explorer bearing**
▸ Popular item
1) For additional bearing data → **product table, page 792**
2) For additional withdrawal sleeve data → skf.com/go/17000-24-1
3) Width before the sleeve is driven into the bearing bore

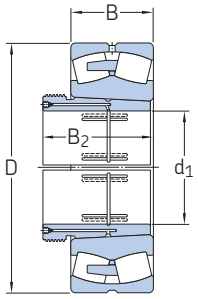
| Principal dimensions | | | | Mass | Designations | |
|---|---|---|---|---|---|---|
| | | | | Bearing + sleeve | Bearing[1] | Sleeve[2] |
| $d_1$ | D | B | $B_2$[3] ≈ | | | |
| mm | | | | kg | – | |
| **440** | 680 | 163 | 213 | 225 | 23092 CAK/W33 | AOHX 3092 G |
| | 680 | 218 | 273 | 300 | 24092 ECAK30/W33 | AOH 24092 |
| | 760 | 240 | 296 | 465 | 23192 CAK/W33 | AOHX 3192 G |
| | 760 | 300 | 355 | 590 | 24192 ECAK30/W33 | AOH 24192 |
| | 830 | 296 | 360 | 725 | 23292 CAK/W33 | AOHX 3292 G |
| **460** | 700 | 165 | 217 | 235 | 23096 CAK/W33 | AOHX 3096 G |
| | 700 | 218 | 273 | 310 | 24096 ECAK30/W33 | AOH 24096 |
| | 790 | 248 | 307 | 515 | 23196 CAK/W33 | AOHX 3196 G |
| | 790 | 308 | 363 | 635 | 24196 ECAK30/W33 | AOH 24196 |
| | 870 | 310 | 376 | 860 | 23296 CAK/W33 | AOHX 3296 G |
| **480** | 720 | 167 | 221 | 250 | 230/500 CAK/W33 | AOHX 30/500 G |
| | 720 | 218 | 276 | 325 | 240/500 ECAK30/W33 | AOH 240/500 |
| | 830 | 264 | 325 | 610 | 231/500 CAK/W33 | AOHX 31/500 G |
| | 830 | 325 | 383 | 735 | 241/500 ECAK30/W33 | AOH 241/500 |
| | 920 | 336 | 405 | 1 020 | 232/500 CAK/W33 | AOHX 32/500 G |
| **500** | 780 | 185 | 242 | 365 | 230/530 CAK/W33 | AOH 30/530 |
| | 780 | 250 | 309 | 455 | 240/530 ECAK30/W33 | AOH 240/530 G |
| | 870 | 272 | 337 | 720 | 231/530 CAK/W33 | AOH 31/530 |
| | 870 | 335 | 394 | 885 | 241/530 ECAK30/W33 | AOH 241/530 G |
| | 980 | 355 | 424 | 1 290 | 232/530 CAK/W33 | AOH 32/530 G |
| **530** | 820 | 195 | 252 | 430 | 230/560 CAK/W33 | AOHX 30/560 |
| | 820 | 258 | 320 | 515 | 240/560 ECAK30/W33 | AOH 240/560 G |
| | 920 | 280 | 347 | 850 | 231/560 CAK/W33 | AOH 31/560 |
| | 920 | 355 | 417 | 1 060 | 241/560 ECK30J/W33 | AOH 241/560 G |
| | 1 030 | 365 | 434 | 1 500 | 232/560 CAK/W33 | AOHX 32/560 |
| **570** | 870 | 200 | 259 | 480 | 230/600 CAK/W33 | AOHX 30/600 |
| | 870 | 272 | 336 | 600 | 240/600 ECAK30/W33 | AOHX 240/600 |
| | 980 | 300 | 369 | 1 010 | 231/600 CAK/W33 | AOHX 31/600 |
| | 980 | 375 | 439 | 1 290 | 241/600 ECAK30/W33 | AOHX 241/600 |
| | 1 090 | 388 | 459 | 1 760 | 232/600 CAK/W33 | AOHX 32/600 G |
| **600** | 920 | 212 | 272 | 575 | 230/630 CAK/W33 | AOH 30/630 |
| | 920 | 290 | 356 | 730 | 240/630 ECK30J/W33 | AOH 240/630 G |
| | 1 030 | 315 | 389 | 1 190 | 231/630 CAK/W33 | AOH 31/630 |
| | 1 030 | 400 | 466 | 1 500 | 241/630 ECAK30/W33 | AOH 241/630 G |
| **630** | 980 | 230 | 294 | 720 | 230/670 CAK/W33 | AOH 30/670 |
| | 980 | 308 | 374 | 900 | 240/670 ECAK30/W33 | AOH 240/670 G |
| | 1 090 | 336 | 409 | 1 430 | 231/670 CAK/W33 | AOHX 31/670 |
| | 1 090 | 412 | 478 | 1 730 | 241/670 ECAK30/W33 | AOH 241/670 |
| | 1 220 | 438 | 514 | 2 500 | 232/670 CAK/W33 | AOH 32/670 G |
| **670** | 1 030 | 236 | 302 | 800 | 230/710 CAK/W33 | AOHX 30/710 |
| | 1 030 | 315 | 386 | 1 010 | 240/710 ECAK30/W33 | AOH 240/710 G |
| | 1 150 | 345 | 421 | 1 650 | 231/710 CAK/W33 | AOHX 31/710 |
| | 1 150 | 438 | 509 | 2 040 | 241/710 ECAK30/W33 | AOH 241/710 |
| | 1 280 | 450 | 531 | 2 810 | 232/710 CAK/W33 | AOH 32/710 G |

**SKF Explorer bearing**

1) For additional bearing data → **product table, page 792**
2) For additional withdrawal sleeve data → skf.com/go/17000-24-1
3) Width before the sleeve is driven into the bearing bore

## 9.3 Spherical roller bearings on a withdrawal sleeve

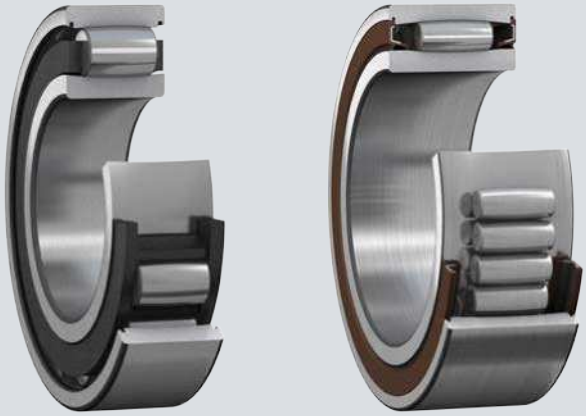
$d_1$ **710 – 1 000** mm



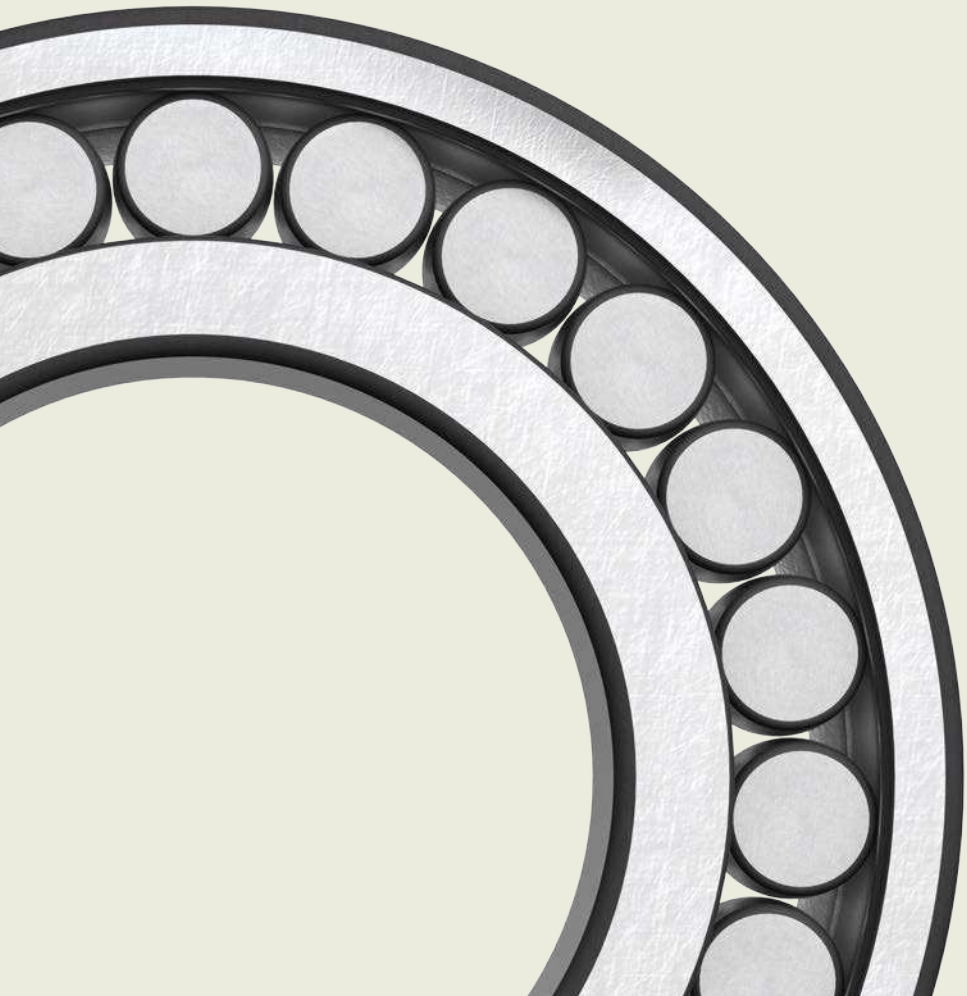

| Principal dimensions | | | | Mass<br>Bearing + sleeve | Designations<br>Bearing[1] | Sleeve[2] |
|---|---|---|---|---|---|---|
| $d_1$ | D | B | $B_2$[3] ≈ | | | |
| mm | | | | kg | – | |
| **710** | 1 090 | 250 | 316 | 950 | 230/750 CAK/W33 | AOH 30/750 |
| | 1 090 | 335 | 408 | 1 200 | 240/750 ECAK30/W33 | AOH 240/750 G |
| | 1 220 | 365 | 441 | 1 930 | 231/750 CAK/W33 | AOH 31/750 |
| | 1 220 | 475 | 548 | 2 280 | 241/750 ECAK30/W33 | AOH 241/750 G |
| **750** | 1 150 | 258 | 326 | 1 100 | 230/800 CAK/W33 | AOH 30/800 |
| | 1 150 | 345 | 423 | 1 380 | 240/800 ECAK30/W33 | AOH 240/800 G |
| | 1 280 | 375 | 456 | 2 200 | 231/800 CAK/W33 | AOH 31/800 |
| | 1 280 | 475 | 553 | 2 540 | 241/800 ECAK30/W33 | AOH 241/800 G |
| **800** | 1 220 | 272 | 343 | 1 250 | 230/850 CAK/W33 | AOH 30/850 |
| | 1 220 | 365 | 445 | 1 670 | 240/850 ECAK30/W33 | AOH 240/850 G |
| | 1 360 | 500 | 600 | 3 050 | 241/850 ECAK30F/W33 | AOH 241/850 |
| **850** | 1 280 | 280 | 355 | 1 450 | 230/900 CAK/W33 | AOH 30/900 |
| | 1 280 | 375 | 475 | 1 850 | 240/900 ECAK30/W33 | AOH 240/900 |
| | 1 420 | 515 | 620 | 3 700 | 241/900 ECAK30F/W33 | AOH 241/900 |
| **900** | 1 360 | 300 | 375 | 1 720 | 230/950 CAK/W33 | AOH 30/950 |
| | 1 360 | 412 | 512 | 2 300 | 240/950 CAK30F/W33 | AOH 240/950 |
| | 1 500 | 545 | 650 | 3 950 | 241/950 ECAK30F/W33 | AOH 241/950 |
| **950** | 1 420 | 412 | 519 | 2 500 | 240/1000 CAK30F/W33 | AOH 240/1000 |
| | 1 580 | 462 | 547 | 3 950 | 231/1000 CAKF/W33 | AOH 31/1000 |
| | 1 580 | 580 | 695 | 4 800 | 241/1000 ECAK30F/W33 | AOH 241/1000 |
| **1 000** | 1 500 | 438 | 548 | 2 950 | 240/1060 CAK30F/W33 | AOH 240/1060 |

**SKF Explorer bearing**

1) For additional bearing data → **product table, page 792**
2) For additional withdrawal sleeve data → skf.com/go/17000-24-1
3) Width before the sleeve is driven into the bearing bore



# 10 CARB toroidal roller bearings



# 10 CARB toroidal roller bearings


**Designs and variants** . . . . . **844**
Basic design bearings . . . . . 844
Sealed bearings . . . . . 845
Cages . . . . . 845
Customized bearings . . . . . 845

**Bearing data** . . . . . **846**
(Dimension standards, tolerances, internal clearance, permissible misalignment, permissible axial displacement)

**Loads** . . . . . **849**
(Minimum load, equivalent dynamic bearing load, equivalent static bearing load)

**Temperature limits** . . . . . **850**

**Permissible speed** . . . . . **850**

**Design considerations** . . . . . **850**
Verification of axial displacement . . . . . 850
Free space on both sides of the bearing . . . . . 852
Offset mounting . . . . . 852
Bearings on sleeves . . . . . 852
Appropriate bearing housings . . . . . 852

**Mounting** . . . . . **853**
Mounting bearings with a tapered bore . . . . . 853

**Designation system** . . . . . **855**

**Product tables**
10.1 CARB toroidal roller bearings . . . . . 856
10.2 CARB toroidal roller bearings on an adapter sleeve 868
10.3 CARB toroidal roller bearings on a withdrawal sleeve . . . . . 872

**Other CARB toroidal roller bearings**
NoWear coated bearings . . . . . 1059

# 10 CARB toroidal roller bearings

## More information


**General bearing knowledge** . . . . **17**

**Bearing selection process** . . . . . **59**
Lubrication . . . . . 109
Bearing interfaces. . . . . 139
Seat tolerances for standard conditions . . . . . 148
Selecting internal clearance . . . . . 182
Sealing, mounting and dismounting . . . . . 193


**Mounting instructions for individual bearings** → skf.com/mount

**SKF Drive-up Method** → skf.com/drive-up

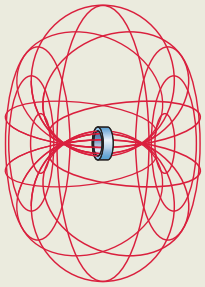

*SKF bearing maintenance handbook* ISBN 978-91-978966-4-1


Fig. 1

**CARB toroidal roller bearing**

Fig. 2

**A torus, with outer ring of CARB bearing at its centre**



CARB toroidal roller bearings (fig. 1) have one row of long, slightly barrel-shaped symmetrical rollers and torus-shaped raceway profiles (fig. 2). They are non-locating bearings and accommodate exclusively radial loads. CARB bearings are often used to replace the non-locating spherical roller bearing in a locating/non-locating bearing arrangement.

## Bearing features

- **Accommodate misalignment**
  CARB bearings are self-aligning like spherical roller bearings or self-aligning ball bearings (fig. 3).
- **Accommodate axial displacement**
  CARB bearings compensate for thermal expansion of the shaft like cylindrical or needle roller bearings (fig. 4).
- **Wide assortment of dimension series**
  CARB bearings are available with the same boundary dimensions as corresponding spherical roller bearings, self-aligning ball bearings, cylindrical roller bearings and needle roller bearings (fig. 5).
- **Long service life**
  The special roller profile prevents stress peaks at the roller ends (fig. 6).
- **Low friction**
  Self-guiding rollers keep friction and frictional heat at low levels (fig. 7).
- **Improved wear resistance**
  All CARB bearings are upgraded SKF Explorer bearings (page 7).
- **Low noise**
  CARB bearings can reduce noise and vibration levels, for example, in paper machines and fans.

Fig. 3

**Misalignment**

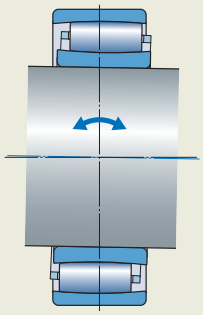


Fig. 5

**Interchangeability**

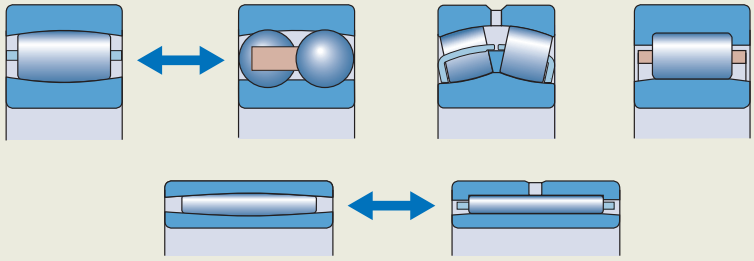


Fig. 4

**Axial displacement**

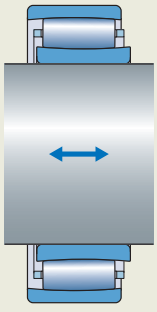


Fig. 6

**Optimal stress distribution**

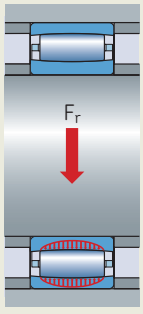
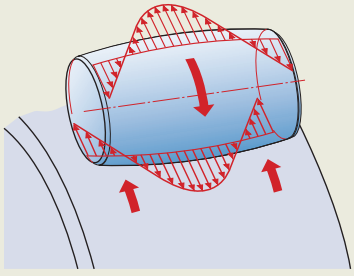



Fig. 7

**Low friction and frictional heat**



## Long bearing system life

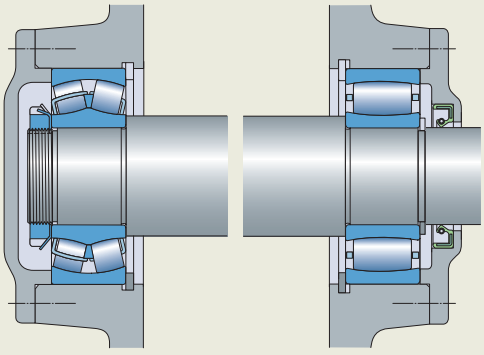
CARB bearings provide benefits in self-aligning bearing arrangements (fig. 8). With a CARB bearing in the non-locating position, there are no internally induced axial forces, which results in multiple benefits:

- Less load extends the service life.
- The bearings run cooler, the lubricant lasts longer and maintenance intervals can be extended.
- Noise and vibration levels can be reduced.

Learn more about the SKF self-aligning bearing arrangement in the video available at skf.com/go/17000-10 (4 min).

Fig. 8

**Self-aligning bearing arrangement: Locating spherical roller bearing and non-locating CARB bearing**



# Designs and variants

## SKF standard assortment

The SKF standard assortment of CARB toroidal roller bearings matches the assortment of spherical roller bearings. It also includes bearings with a low cross-sectional height to meet requirements for minimum radial space. All CARB bearings are upgraded SKF Explorer bearings and are shown coloured blue in the product tables. The standard assortment includes:

- basic design bearings with cylindrical or tapered bore
  - taper 1:12 (designation suffix K)
  - taper 1:30 (designation suffix K30)
- sealed bearings

For sizes and variants not listed in the product tables, contact SKF.

# Basic design bearings

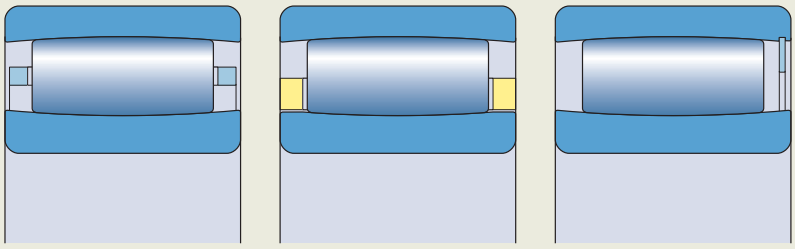
Depending on their series and size the following basic design CARB toroidal roller bearings are available as standard (fig. 9):

- bearings with a roller centred cage
- bearings with an inner ring centred cage
- full complement bearings with a retaining ring

The load carrying capacity of full complement CARB bearings is considerably higher than that of same-sized bearings with a cage.

Fig. 9

**Basic designs**



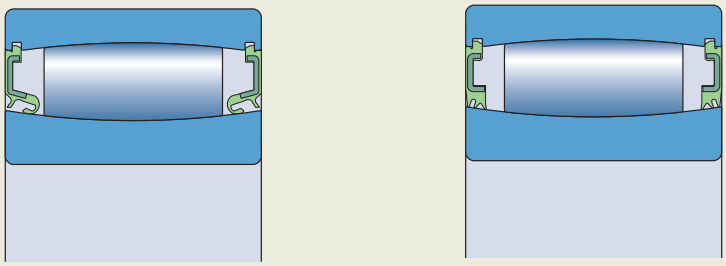
Bearing with a roller centred cage

Bearing with an inner ring centred cage

Full complement bearing with a retaining ring

Fig. 10

**Sealed bearings**



HNBR seals

NBR seals

# Sealed bearings

- are available, as standard, as small and medium-size full complement bearings with a cylindrical bore
- are typically used for low speeds and very heavy loads
- are suitable for both inner or outer ring rotation
- are fitted with a double-lip contact seal on one or both sides in a recess on the outer ring, sealing against the inner ring raceway
- are available with two different seal materials / designs (**fig. 10**):
  - sheet steel reinforced HNBR (designation suffix CS5)
  - sheet steel reinforced NBR (designation suffix NS) with enhanced sealing effectiveness – mainly intended for oscillating or very low speed applications

Bearings sealed on both sides are lubricated for the life of the bearing and are virtually maintenance-free. They are filled with one of the following greases (**table 1**):

- bearings with HNBR seals → SKF LGHB 2 grease as standard
- bearings with NBR seals → SKF LGEP 2 grease as standard
- other SKF greases on request

For additional information about greases, refer to *Selecting a suitable SKF grease*, **page 116**.

# Cages

CARB bearings, if not a full complement of rollers, are fitted with one of the following cages:

- glass fibre reinforced PA46 cage, window-type, roller centred (designation suffix TN9)
- stamped steel cage, window-type, roller centred (no designation suffix)
- machined brass cage, window-type, roller centred (designation suffix M)
- machined brass cage, inner ring centred (designation suffix MB)

When used at high temperatures, some lubricants can have a detrimental effect on polyamide cages. For additional information about the suitability of cages, refer to *Cages*, **page 187**.

# Customized bearings

SKF can customize bearings to meet the needs of applications where the bearings are subjected to unique operating conditions. For example, bearings for:

- paper mills or coaters in high precision execution
- very arduous operating conditions, e.g. continuous casters
- high temperature applications

For additional information about application-specific CARB bearings, contact the SKF application engineering service.

**Table 1**

**Technical specifications of SKF greases for sealed CARB bearings**

| Grease | Designation suffix | Temperature range[1] | Thickener | Base oil type | NLGI grade | Base oil viscosity [mm²/s] at 40 °C (105 °F) | Base oil viscosity [mm²/s] at 100 °C (210 °F) |
|---|---|---|---|---|---|---|---|
| | | –50 0 50 100 150 200 250 °C<br>–60 30 120 210 300 390 480 °F | | | | | |
| **LGEP 2** | VT143 | | Lithium soap | Mineral | 2 | 200 | 16 |
| **LGHB 2** | GEM9 | | Calcium sulphonate complex | Mineral | 2 | 400 | 26,5 |

[1] Refer to the SKF traffic light concept (**page 117**).

# Bearing data

| | |
|---|---|
| **Dimension standards** | Boundary dimensions: ISO 15 |
| **Tolerances**<br><br>For additional information<br>→ page 35 | Normal<br><br>**d ≤ 300 mm**<br>• width tolerance at least 50% tighter than ISO standard (table 2)<br>• P5 geometrical tolerances<br><br>**d > 300 mm**<br>• P5 geometrical tolerances on request (designation suffix C08)<br><br>Values: ISO 492 (table 2, page 38, to table 4, page 40) |
| **Internal clearance**<br><br>For additional information<br>→ page 182 | Normal<br>Check availability of C2, C3, C4 or C5 clearance classes<br><br>Values: ISO 5753-1<br>• cylindrical bore (table 3)<br>• tapered bore (table 4, page 848)<br><br>Values are valid for unmounted bearings under zero measuring load, with no misalignment, no axial displacement between the inner and outer rings, and the rollers centred.<br><br>Axial displacement of one bearing ring relative to the other reduces the radial internal clearance. Typical clearance window → diagram 1, page 850. |
| **Permissible misalignment** | 0,5°<br>For misalignment > 0,5°, contact the SKF application engineering service. |
| **Permissible axial displacement (fig. 11, page 850)** | $s_{1\,max}$, $s_{2\,max}$ (product table, page 856)<br><br>The actual internal clearance can limit the possible axial displacement. Misalignment reduces the possible axial displacement. For details, refer to *Verification of axial displacement*, page 850.<br>Free space must be provided on both sides of the bearing (*Free space on both sides of the bearing*, page 852). |

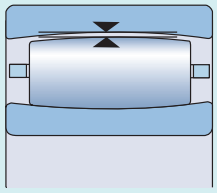
**Table 2**

**Width tolerances for CARB bearings**

| Bore diameter | | Width tolerances | |
|---|---|---|---|
| d | | $t_{\Delta Bs}$ | |
| > | ≤ | U | L |
| mm | | µm | |
| **18** | **50** | 0 | –40 |
| **50** | **80** | 0 | –60 |
| **80** | **250** | 0 | –80 |
| **250** | **300** | 0 | –100 |

**Table 3**

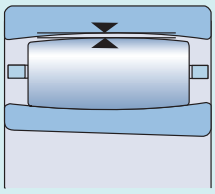
## Radial internal clearance of CARB bearings with a cylindrical bore



| Bore diameter | | Radial internal clearance | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | | C2 | | Normal | | C3 | | C4 | | C5 | |
| > | ≤ | min. | max. | min. | max. | min. | max. | min. | max. | min. | max. |
| mm | | µm | | | | | | | | | |
| **18** | **24** | 15 | 30 | 25 | 40 | 35 | 55 | 50 | 65 | 65 | 85 |
| **24** | **30** | 15 | 35 | 30 | 50 | 45 | 60 | 60 | 80 | 75 | 95 |
| **30** | **40** | 20 | 40 | 35 | 55 | 55 | 75 | 70 | 95 | 90 | 120 |
| **40** | **50** | 25 | 45 | 45 | 65 | 65 | 85 | 85 | 110 | 105 | 140 |
| **50** | **65** | 30 | 55 | 50 | 80 | 75 | 105 | 100 | 140 | 135 | 175 |
| **65** | **80** | 40 | 70 | 65 | 100 | 95 | 125 | 120 | 165 | 160 | 210 |
| **80** | **100** | 50 | 85 | 80 | 120 | 120 | 160 | 155 | 210 | 205 | 260 |
| **100** | **120** | 60 | 100 | 100 | 145 | 140 | 190 | 185 | 245 | 240 | 310 |
| **120** | **140** | 75 | 120 | 115 | 170 | 165 | 215 | 215 | 280 | 280 | 350 |
| **140** | **160** | 85 | 140 | 135 | 195 | 195 | 250 | 250 | 325 | 320 | 400 |
| **160** | **180** | 95 | 155 | 150 | 220 | 215 | 280 | 280 | 365 | 360 | 450 |
| **180** | **200** | 105 | 175 | 170 | 240 | 235 | 310 | 305 | 395 | 390 | 495 |
| **200** | **225** | 115 | 190 | 185 | 265 | 260 | 340 | 335 | 435 | 430 | 545 |
| **225** | **250** | 125 | 205 | 200 | 285 | 280 | 370 | 365 | 480 | 475 | 605 |
| **250** | **280** | 135 | 225 | 220 | 310 | 305 | 410 | 405 | 520 | 515 | 655 |
| **280** | **315** | 150 | 240 | 235 | 330 | 330 | 435 | 430 | 570 | 570 | 715 |
| **315** | **355** | 160 | 260 | 255 | 360 | 360 | 485 | 480 | 620 | 620 | 790 |
| **355** | **400** | 175 | 280 | 280 | 395 | 395 | 530 | 525 | 675 | 675 | 850 |
| **400** | **450** | 190 | 310 | 305 | 435 | 435 | 580 | 575 | 745 | 745 | 930 |
| **450** | **500** | 205 | 335 | 335 | 475 | 475 | 635 | 630 | 815 | 810 | 1 015 |
| **500** | **560** | 220 | 360 | 360 | 520 | 510 | 690 | 680 | 890 | 890 | 1 110 |
| **560** | **630** | 240 | 400 | 390 | 570 | 560 | 760 | 750 | 980 | 970 | 1 220 |
| **630** | **710** | 260 | 440 | 430 | 620 | 610 | 840 | 830 | 1 080 | 1 070 | 1 340 |
| **710** | **800** | 300 | 500 | 490 | 680 | 680 | 920 | 920 | 1 200 | 1 200 | 1 480 |
| **800** | **900** | 320 | 540 | 530 | 760 | 750 | 1 020 | 1 010 | 1 330 | 1 320 | 1 660 |
| **900** | **1 000** | 370 | 600 | 590 | 830 | 830 | 1 120 | 1 120 | 1 460 | 1 460 | 1 830 |
| **1 000** | **1 120** | 410 | 660 | 660 | 930 | 930 | 1 260 | 1 260 | 1 640 | 1 640 | 2 040 |
| **1 120** | **1 250** | 450 | 720 | 720 | 1 020 | 1 020 | 1 380 | 1 380 | 1 800 | 1 800 | 2 240 |
| **1 250** | **1 400** | 490 | 800 | 800 | 1 130 | 1 130 | 1 510 | 1 510 | 1 970 | 1 970 | 2 460 |
| **1 400** | **1 600** | 570 | 890 | 890 | 1 250 | 1 250 | 1 680 | 1 680 | 2 200 | 2 200 | 2 740 |
| **1 600** | **1 800** | 650 | 1 010 | 1 010 | 1 390 | 1 390 | 1 870 | 1 870 | 2 430 | 2 430 | 3 000 |

Table 4

**Radial internal clearance of CARB bearings with a tapered bore**



| Bore diameter | | Radial internal clearance | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | | C2 | | Normal | | C3 | | C4 | | C5 | |
| > | ≤ | min. | max. | min. | max. | min. | max. | min. | max. | min. | max. |
| mm | | µm | | | | | | | | | |
| **18** | **24** | 15 | 35 | 30 | 45 | 40 | 55 | 55 | 70 | 65 | 85 |
| **24** | **30** | 20 | 40 | 35 | 55 | 50 | 65 | 65 | 85 | 80 | 100 |
| **30** | **40** | 25 | 50 | 45 | 65 | 60 | 80 | 80 | 100 | 100 | 125 |
| **40** | **50** | 30 | 55 | 50 | 75 | 70 | 95 | 90 | 120 | 115 | 145 |
| **50** | **65** | 40 | 65 | 60 | 90 | 85 | 115 | 110 | 150 | 145 | 185 |
| **65** | **80** | 50 | 80 | 75 | 110 | 105 | 140 | 135 | 180 | 175 | 220 |
| **80** | **100** | 60 | 100 | 95 | 135 | 130 | 175 | 170 | 220 | 215 | 275 |
| **100** | **120** | 75 | 115 | 115 | 155 | 155 | 205 | 200 | 255 | 255 | 325 |
| **120** | **140** | 90 | 135 | 135 | 180 | 180 | 235 | 230 | 295 | 290 | 365 |
| **140** | **160** | 100 | 155 | 155 | 215 | 210 | 270 | 265 | 340 | 335 | 415 |
| **160** | **180** | 115 | 175 | 170 | 240 | 235 | 305 | 300 | 385 | 380 | 470 |
| **180** | **200** | 130 | 195 | 190 | 260 | 260 | 330 | 325 | 420 | 415 | 520 |
| **200** | **225** | 140 | 215 | 210 | 290 | 285 | 365 | 360 | 460 | 460 | 575 |
| **225** | **250** | 160 | 235 | 235 | 315 | 315 | 405 | 400 | 515 | 510 | 635 |
| **250** | **280** | 170 | 260 | 255 | 345 | 340 | 445 | 440 | 560 | 555 | 695 |
| **280** | **315** | 195 | 285 | 280 | 380 | 375 | 485 | 480 | 620 | 615 | 765 |
| **315** | **355** | 220 | 320 | 315 | 420 | 415 | 545 | 540 | 680 | 675 | 850 |
| **355** | **400** | 250 | 350 | 350 | 475 | 470 | 600 | 595 | 755 | 755 | 920 |
| **400** | **450** | 280 | 385 | 380 | 525 | 525 | 655 | 650 | 835 | 835 | 1 005 |
| **450** | **500** | 305 | 435 | 435 | 575 | 575 | 735 | 730 | 915 | 910 | 1 115 |
| **500** | **560** | 330 | 480 | 470 | 640 | 630 | 810 | 800 | 1 010 | 1 000 | 1 230 |
| **560** | **630** | 380 | 530 | 530 | 710 | 700 | 890 | 880 | 1 110 | 1 110 | 1 350 |
| **630** | **710** | 420 | 590 | 590 | 780 | 770 | 990 | 980 | 1 230 | 1 230 | 1 490 |
| **710** | **800** | 480 | 680 | 670 | 860 | 860 | 1 100 | 1 100 | 1 380 | 1 380 | 1 660 |
| **800** | **900** | 520 | 740 | 730 | 960 | 950 | 1 220 | 1 210 | 1 530 | 1 520 | 1 860 |
| **900** | **1 000** | 580 | 820 | 810 | 1 040 | 1 040 | 1 340 | 1 340 | 1 670 | 1 670 | 2 050 |
| **1 000** | **1 120** | 640 | 900 | 890 | 1 170 | 1 160 | 1 500 | 1 490 | 1 880 | 1 870 | 2 280 |
| **1 120** | **1 250** | 700 | 980 | 970 | 1 280 | 1 270 | 1 640 | 1 630 | 2 060 | 2 050 | 2 500 |
| **1 250** | **1 400** | 770 | 1 080 | 1 080 | 1 410 | 1 410 | 1 790 | 1 780 | 2 250 | 2 250 | 2 740 |
| **1 400** | **1 600** | 870 | 1 200 | 1 200 | 1 550 | 1 550 | 1 990 | 1 990 | 2 500 | 2 500 | 3 050 |
| **1 600** | **1 800** | 950 | 1 320 | 1 320 | 1 690 | 1 690 | 2 180 | 2 180 | 2 730 | 2 730 | 3 310 |

# Loads

| | Bearings with a cage | Full complement bearings |
|---|---|---|
| **Minimum load**<br><br>For additional information<br>→ **page 106** | $F_{rm} = 0{,}007\ C_0$<br><br>**Oil lubricated bearings:**<br><br>$n/n_r \leq 0{,}3 \rightarrow F_{rm} = 0{,}002\ C_0$<br><br>$0{,}3 < n/n_r \leq 2 \rightarrow F_{rm} = 0{,}002\ C_0 \left(1 + 2 \sqrt{\frac{n}{n_r} - 0{,}3}\right)$<br><br>When starting up at low temperatures or when the lubricant is highly viscous, greater minimum loads than $F_{rm} = 0{,}007\ C_0$ and $0{,}01\ C_0$, respectively, may be required. | $F_{rm} = 0{,}01\ C_0$ |
| **Equivalent dynamic bearing load**<br><br>For additional information<br>→ **page 91** | $P = F_r$ | |
| **Equivalent static bearing load**<br><br>For additional information<br>→ **page 105** | $P_0 = F_r$ | |
| | **Symbols**<br><br>$C_0$ basic static load rating [kN] (**product table**, **page 856**)<br>$F_r$ radial load [kN]<br>$F_{rm}$ minimum radial load [kN]<br>$P$ equivalent dynamic bearing load [kN]<br>$P_0$ equivalent static bearing load [kN]<br>$n$ rotational speed [r/min]<br>$n_r$ reference speed [r/min] (**product table**) | |

# Temperature limits

The permissible operating temperature for CARB bearings can be limited by:

- the dimensional stability of the bearing rings
- the cage
- the seals
- the lubricant

Where temperatures outside the permissible range are expected, contact SKF.

## Bearing rings

The rings of CARB bearings are heat stabilized up to 200 °C *(390 °F)*.

## Cages

Steel or brass cages can be used at the same operating temperatures as the bearing rings. For temperature limits of polymer cages, refer to *Polymer cages*, **page 188**.

## Seals

The permissible operating temperature for seals depends on the seal material:

- HNBR: –40 to +150 °C *(–40 to +300 °F)*
- NBR: –40 to +90 °C *(–40 to +195 °F)*
  Temperatures up to 120 °C *(250 °F)* can be tolerated for brief periods.

Typically, temperature peaks are at the seal lip.

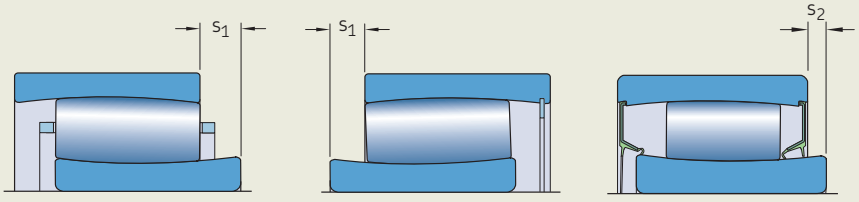
## Lubricants

Temperature limits for greases used in sealed CARB bearings are provided in **table 1**, **page 845**. For temperature limits of other SKF greases, refer to *Selecting a suitable SKF grease*, **page 116**.

When using lubricants not supplied by SKF, temperature limits should be evaluated according to the SKF traffic light concept (**page 117**).

Fig. 11

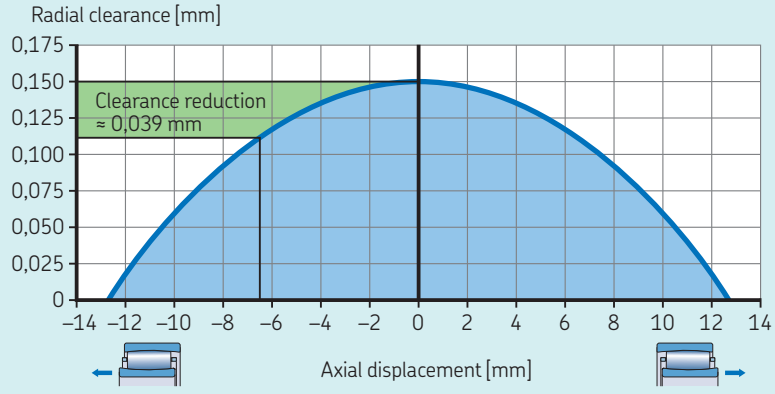
**Permissible axial displacement**




Open bearing with a cage | Open full complement bearing | Sealed full complement bearing

Diagram 1

**The clearance window for a C 3052 CARB bearing with a maximum operating clearance of 0,150 mm**




# Permissible speed

The speed ratings in the **product table** indicate:

- the **reference speed**, which enables a quick assessment of the speed capabilities from a thermal frame of reference
- the **limiting speed**, which is a mechanical limit that should not be exceeded unless the bearing design and the application are adapted for higher speeds

For additional information, refer to *Operating temperature and speed*, **page 130**.

# Design considerations

## Verification of axial displacement

The actual internal clearance can limit the possible axial displacement. Misalignment reduces the possible axial displacement. Therefore, the actual axial displacement should be verified.

**1 Determine the required axial displacement**

- Thermal expansion of the shaft can be estimated using
  $s_{req} = \alpha L \Delta T$
- Where additional effects need to be considered, advanced simulation or tests may be required.

**2 Determine the maximum misalignment**

- Estimate the misalignment β of the housing seats based on specified tolerances.
- Where additional effects need to be considered, advanced simulation or tests may be required.

**3 Check the permissible axial displacement**

Check the permissible axial displacement in both directions, depending on the bearing used (**fig. 11**):

- open bearing with a cage
- full complement bearing with a retaining ring
- sealed bearing

$$s_{req} < s_1 - \beta\, k_1\, B$$

or

$$s_{req} < s_2 - \beta\, k_1\, B$$

Where $s_{req}$ is too large, consider *Offset mounting*, **page 852**.

**4 Check the internal clearance**

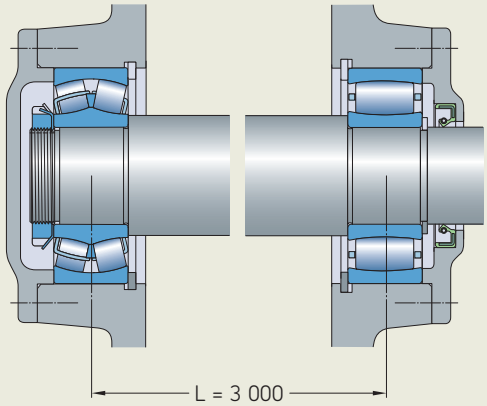
- Determine the clearance reduction caused by axial displacement.

$$C_{red} = \frac{k_2\, s_{req}^2}{B}$$

- Determine the amount of clearance reduction from other effects and evaluate the residual clearance (*Selecting initial internal clearance*, **page 183**).

**Fig. 12**

**Example application**




### Symbols

| | |
|---|---|
| B | bearing width [mm] |
| $C_{red}$ | reduction of radial clearance as a result of an axial displacement from a centred position [mm] |
| $k_1$ | misalignment factor (**product table**, **page 856**) |
| L | shaft length between the bearings [mm] |
| $s_1$ | axial displacement limit in bearings with a cage or in full complement bearings when displacing away from the retaining ring [mm] (**fig. 11**) |
| $s_2$ | axial displacement limit in sealed and full complement bearings when displacing toward the seal or retaining ring respectively [mm] (**fig. 11**) |
| $s_{req}$ | required axial displacement from a centred position [mm] |
| α | thermal coefficient of expansion [°C$^{-1}$] = 12 × 10$^{-6}$ for steel |
| β | misalignment [°] |
| ΔT | temperature difference [°C] |

### Calculation example

Application (**fig. 12**)

- Bearing C 3040
  - d = 200 mm
  - D = 310 mm
  - B = 82 mm
  - Normal clearance: min. 170 µm
  - $s_1$ = 15,2 mm
  - $k_1$ = 0,123
  - $k_2$ = 0,095
- Shaft length L = 3 000 mm
- Temperature range for the shaft: 20 to 90 °C (*70 to 195 °F*)
- Max. misalignment: 0,46°

Verification of axial displacement:

**1** Required axial displacement
$s_{req} = \alpha\, L\, \Delta T$
$s_{req} = 12 \times 10^{-6} \times 3\,000 \times (90 - 20)$
= 2,5 mm

**2** Max. misalignment
Input provided: 0,46°

**3** Checking the permissible axial displacement
$s_{req} < s_1 - \beta\, k_1\, B$
$2{,}5 < 15{,}2 - 0{,}46 \times 0{,}123 \times 82 \approx 10{,}5$
→ okay

**4** Checking the internal clearance

$$C_{red} = \frac{k_2\, s_{req}^2}{B}$$

$$C_{red} = \frac{0{,}095 \times 2{,}5^2}{82} \approx 0{,}007$$

Min. internal clearance when the bearing is displaced:
170 – 7 = 163 µm

Determine the clearance reduction caused by other effects (e.g. interference fit, temperature difference between inner and outer rings) and evaluate the residual clearance (*Selecting initial internal clearance*, **page 183**)

# Free space on both sides of the bearing

To enable axial displacement of the shaft relative to the housing, free space must be provided on both sides of the bearing as indicated in fig. 13. The value for the width of this free space is based on:

- the value $C_a$ (product table, page 856)
- the expected axial displacement of the bearing rings from the central position during operation
- the displacement of the rings caused by misalignment

**Calculating the free space required on both sides of the bearing**

$$C_{areq} = C_a + 0{,}5\,(s + \beta\, k_1\, B)$$

where
$B$ = bearing width [mm]
$C_a$ = minimum width of space required on both sides of the bearing [mm] (product table)
$C_{areq}$ = width of space required on both sides of the bearing [mm]
$k_1$ = misalignment factor (product table)
$s$ = relative axial displacement of rings, e.g. thermal shaft expansion [mm]
$\beta$ = misaligment [°]

# Offset mounting

Where considerable thermal changes in shaft length are a possibility, the inner ring can be mounted offset, relative to the outer ring, up to the axial displacement limit $s_1$ or $s_2$ (fig. 11, page 850) in the direction opposite to the expected axial displacement (fig. 14). The extended permissible axial displacement is used, for example, in the self-aligning bearing arrangements of drying cylinders in paper machines.

Fig. 13

**Free space to enable axial displacement**

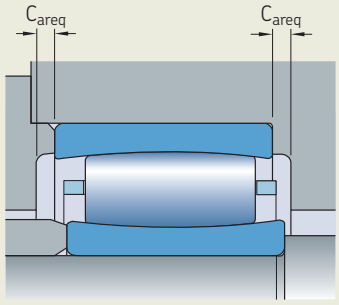
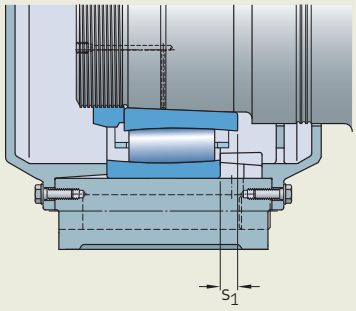



Fig. 14

**Bearing rings mounted offset to accommodate shaft expansion**




# Bearings on sleeves

CARB bearings with a tapered bore can be mounted with:

- an adapter sleeve on plain or stepped shafts (fig. 15):
  - Adapter sleeves are supplied complete with a locking device.
  - Use appropriate SKF adapter sleeve assemblies to prevent the locking device from interfering with the cage (product table, page 868).
- a withdrawal sleeve on stepped shafts (fig. 16)

Check axial displacement carefully, as it could be that $s_1$ (product table, page 856) cannot be fully realized.

For additional information about sleeves, refer to *Adapter sleeves*, page 1065, and *Withdrawal sleeves*, page 1087.

# Appropriate bearing housings

SKF standard bearing housings are available for most CARB bearings in the C 30, C 31, C 22 and C 23 series.

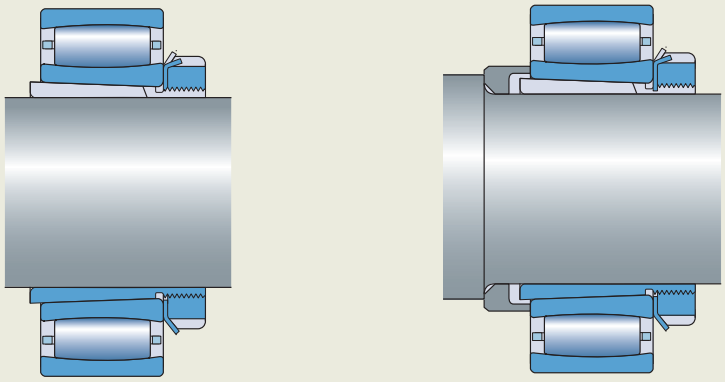
The two common arrangements when using standard housings are:

- CARB bearings with a tapered bore on an adapter sleeve and a plain shaft
- CARB bearings with a cylindrical bore on a stepped shaft

The comprehensive assortment of SKF bearing housings is provided online at skf.com/housings.

Fig. 15

**Bearings with an adapter sleeve**

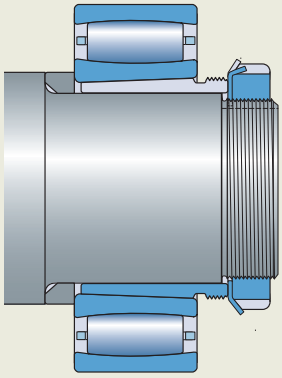


On a plain shaft

On a stepped shaft

Fig. 16

**Bearing with a withdrawal sleeve**



# Mounting

During handling, the rings and roller complement of CARB toroidal roller bearings may be axially displaced from their normal position. This is especially likely where CARB bearings are mounted with the shaft or housing in the vertical position:

1 The roller complement, together with the inner or outer ring, will move downward and result in no more clearance.
2 When the bearing rings expand or contract as a result of an interference fit, preload is likely to result.

Therefore, wherever possible:

- Mount CARB bearings with the shaft or housing in the horizontal position.
- Rotate the inner or outer ring to align the rollers during mounting.
  Where this is not feasible, use a bearing handling tool or other device to keep the bearing components arranged centrally.

# Mounting bearings with a tapered bore

Bearings with a tapered bore are mounted with an interference fit, by using one of the following methods:

1 **Measuring the clearance reduction (table 5, page 854)**

2 **Measuring the lock nut tightening angle (table 5)**

3 **Measuring the axial drive-up (table 5)**

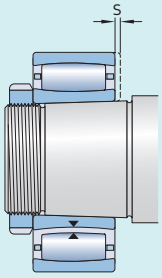
4 **Applying the SKF Drive-up Method**
For bearings with d > 100 mm, SKF recommends using the SKF Drive-up Method. This is a fast, reliable and safe method to achieve the appropriate interference fit. Additional information is available online at skf.com/drive-up.

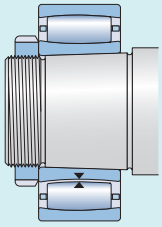
5 **Measuring the inner ring expansion**
Additional information is available online at skf.com/sensormount.

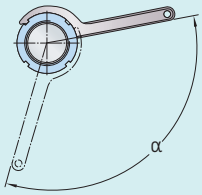
For additional information about these mounting methods, refer to *Mounting bearings with a tapered bore*, **page 203**, or the *SKF bearing maintenance handbook*.

Table 5

## Drive-up data for CARB bearings with a tapered bore



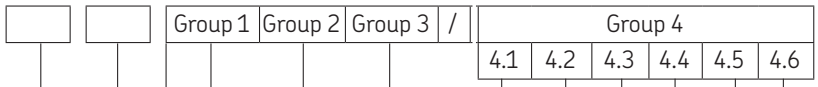



| Bore diameter | | Reduction of radial internal clearance | | Axial drive-up[1)2)] | | | | Lock nut tightening angle[2)] |
|---|---|---|---|---|---|---|---|---|
| d | | | | s | | | | α |
| | | | | Taper 1:12 | | Taper 1:30 | | Taper 1:12 |
| > | ≤ | min. | max. | min. | max. | min. | max. | |
| mm | | mm | | mm | | | | ° |
| **24** | **30** | 0,01 | 0,015 | 0,25 | 0,29 | – | – | 100 |
| **30** | **40** | 0,015 | 0,02 | 0,3 | 0,35 | 0,75 | 0,9 | 115 |
| **40** | **50** | 0,02 | 0,025 | 0,37 | 0,44 | 0,95 | 1,1 | 130 |
| **50** | **65** | 0,025 | 0,035 | 0,45 | 0,54 | 1,15 | 1,35 | 115 |
| **65** | **80** | 0,035 | 0,04 | 0,55 | 0,65 | 1,4 | 1,65 | 130 |
| **80** | **100** | 0,04 | 0,05 | 0,66 | 0,79 | 1,65 | 2 | 150 |
| **100** | **120** | 0,05 | 0,06 | 0,79 | 0,95 | 2 | 2,35 | |
| **120** | **140** | 0,06 | 0,075 | 0,93 | 1,1 | 2,3 | 2,8 | |
| **140** | **160** | 0,07 | 0,085 | 1,05 | 1,3 | 2,65 | 3,2 | |
| **160** | **180** | 0,08 | 0,095 | 1,2 | 1,45 | 3 | 3,6 | |
| **180** | **200** | 0,09 | 0,105 | 1,3 | 1,6 | 3,3 | 4 | |
| **200** | **225** | 0,1 | 0,12 | 1,45 | 1,8 | 3,7 | 4,45 | |
| **225** | **250** | 0,11 | 0,13 | 1,6 | 1,95 | 4 | 4,85 | |
| **250** | **280** | 0,12 | 0,15 | 1,8 | 2,15 | 4,5 | 5,4 | |
| **280** | **315** | 0,135 | 0,165 | 2 | 2,4 | 4,95 | 6 | |
| **315** | **355** | 0,15 | 0,18 | 2,15 | 2,65 | 5,4 | 6,6 | |
| **355** | **400** | 0,17 | 0,21 | 2,5 | 3 | 6,2 | 7,6 | |
| **400** | **450** | 0,195 | 0,235 | 2,8 | 3,4 | 7 | 8,5 | |
| **450** | **500** | 0,215 | 0,265 | 3,1 | 3,8 | 7,8 | 9,5 | |
| **500** | **560** | 0,245 | 0,3 | 3,4 | 4,1 | 8,4 | 10,3 | |
| **560** | **630** | 0,275 | 0,34 | 3,8 | 4,65 | 9,5 | 11,6 | |
| **630** | **710** | 0,31 | 0,38 | 4,25 | 5,2 | 10,6 | 13 | |
| **710** | **800** | 0,35 | 0,425 | 4,75 | 5,8 | 11,9 | 14,5 | |
| **800** | **900** | 0,395 | 0,48 | 5,4 | 6,6 | 13,5 | 16,4 | |
| **900** | **1 000** | 0,44 | 0,535 | 6 | 7,3 | 15 | 18,3 | |
| **1 000** | **1 120** | 0,49 | 0,6 | 6,4 | 7,8 | 16 | 19,5 | |
| **1 120** | **1 250** | 0,55 | 0,67 | 7,1 | 8,7 | 17,8 | 21,7 | |
| **1 250** | **1 400** | 0,61 | 0,75 | 8 | 9,7 | 19,9 | 24,3 | |
| **1 400** | **1 600** | 0,7 | 0,85 | 9,1 | 11,1 | 22,7 | 27,7 | |
| **1 600** | **1 800** | 0,79 | 0,96 | 10,2 | 12,5 | 25,6 | 31,2 | |

Applying the recommended values prevents the inner ring from creeping, but does not ensure correct radial internal clearance in operation. Additional influences from the bearing housing fit and temperature differences between the inner and outer rings must be considered carefully when selecting the bearing radial internal clearance class (*Selecting initial internal clearance*, page 183).

1) Not valid for the SKF Drive-up Method.
2) The listed values are valid only for solid steel shafts and general applications. They are to be used as guideline values only, as it is difficult to establish an exact starting position. Also, the axial drive-up, s, differs slightly between the different bearings series.

# Designation system




**Prefixes**

| | |
|---|---|
| **ZE** | Bearing with SensorMount feature |

**Basic designation**

Listed in table 4, page 30

**Suffixes**

**Group 1: Internal design**

**Group 2: External design (seals, snap ring groove, etc.)**

| | |
|---|---|
| **-CS5, -2CS5** | Contact seal, HNBR, on one or both sides |
| **-NS, -2NS** | Contact seal, NBR, on one or both sides |
| **K** | Tapered bore, taper 1:12 |
| **K30** | Tapered bore, taper 1:30 |

**Group 3: Cage design**

| | |
|---|---|
| **–** | Stamped steel cage, roller centred |
| **M** | Machined brass cage, roller centred |
| **MB(1)** | Machined brass cage, inner ring centred |
| **TN9** | Glass fibre reinforced PA46 cage, roller centred |
| **V** | Full complement of rollers (no cage) |

**Group 4.1: Materials, heat treatment**

| | |
|---|---|
| **HA3** | Case-hardened inner ring |

**Group 4.2: Accuracy, clearance, preload, quiet running**

| | |
|---|---|
| **C08** | Geometrical tolerances to class P5 |
| **C2** | Radial internal clearance smaller than Normal |
| **C3** | Radial internal clearance greater than Normal |
| **C4** | Radial internal clearance greater than C3 |
| **C5** | Radial internal clearance greater than C4 |

**Group 4.3: Bearing sets, matched bearings**

**Group 4.4: Stabilization**

| | |
|---|---|
| **S3** | Bearing rings heat stabilized for operating temperatures ≤ 300 °C *(570 °F)* |

**Group 4.5: Lubrication**

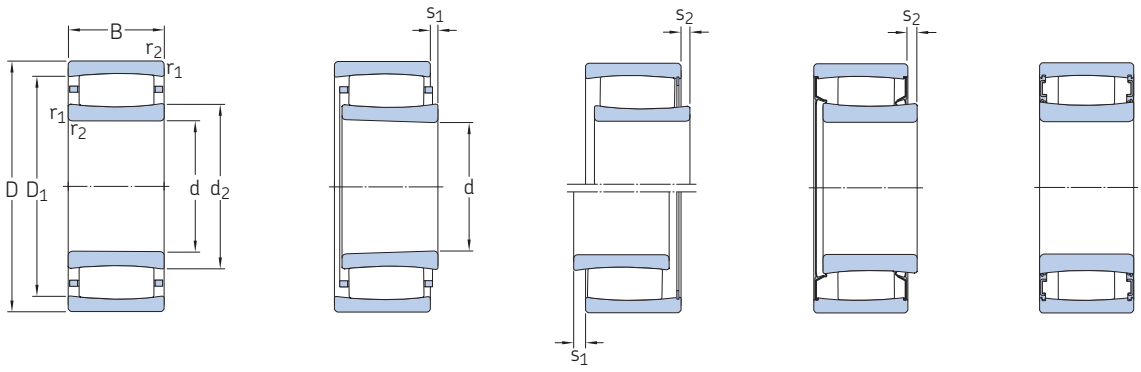
| | |
|---|---|
| **GEM9** | Filled to 70 – 100% with SKF LGHB 2 grease |

**Group 4.6: Other variants**

| | |
|---|---|
| **VE240** | Bearing with shorter rollers |
| **VG114** | Surface-hardened stamped steel cage |
| **VM118** | Full complement bearing without retaining ring |
| **VT143** | Filled to 25 – 45% with SKF LGEP 2 grease |

## 10.1 CARB toroidal roller bearings

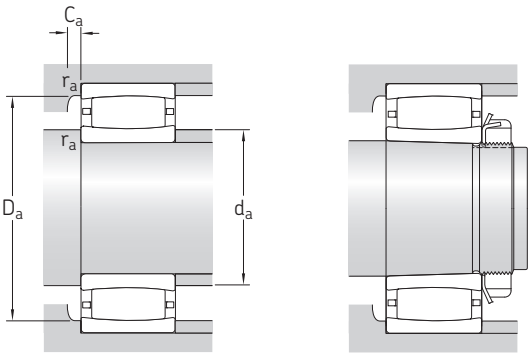
d **30 – 70** mm




Cylindrical bore | Tapered bore | Full complement | Sealed (2CS5) | Sealed (2NS)

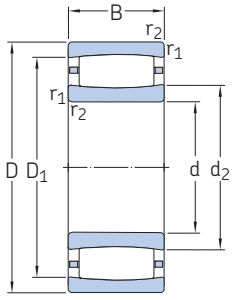
| Principal dimensions | | | Basic load ratings dynamic | static | Fatique load limit | Speed ratings Reference speed | Limiting speed | Mass | Designations Bearing with cylindrical bore | tapered bore |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **30** | 55 | 45 | 134 | 180 | 21,2 | – | 3 200 | 0,49 | ▸ C 6006 V | – |
| | 62 | 20 | 69,5 | 62 | 7,2 | 11 000 | 15 000 | 0,28 | ▸ C 2206 TN9 | C 2206 KTN9 |
| | 62 | 20 | 76,5 | 71 | 8,3 | – | 6 000 | 0,29 | C 2206 V | – |
| **35** | 72 | 23 | 83 | 80 | 9,3 | 9 500 | 13 000 | 0,44 | ▸ C 2207 TN9 | C 2207 KTN9 |
| | 72 | 23 | 95 | 96 | 11,2 | – | 5 300 | 0,46 | C 2207 V | – |
| **40** | 62 | 22 | 76,5 | 100 | 11,8 | – | 4 300 | 0,25 | ▸ C 4908 V | – |
| | 80 | 23 | 90 | 86,5 | 10,2 | 8 000 | 11 000 | 0,51 | ▸ C 2208 TN9 | C 2208 KTN9 |
| | 80 | 23 | 102 | 104 | 12,2 | – | 4 500 | 0,53 | ▸ C 2208 V | – |
| **45** | 68 | 40 | 132 | 200 | 23,6 | – | 2 600 | 0,53 | C 6909 V | – |
| | 85 | 23 | 93 | 93 | 10,8 | 7 500 | 11 000 | 0,56 | ▸ C 2209 TN9 | ▸ C 2209 KTN9 |
| | 85 | 23 | 106 | 110 | 12,9 | – | 4 300 | 0,58 | C 2209 V | – |
| **50** | 72 | 22 | 86,5 | 125 | 14,6 | – | 3 600 | 0,29 | C 4910 V | – |
| | 72 | 40 | 140 | 224 | 26 | – | 2 400 | 0,54 | ▸ C 6910 V | – |
| | 80 | 30 | 116 | 140 | 16,3 | 5 600 | 7 500 | 0,55 | ▸ C 4010 TN9 | – |
| | 80 | 30 | 137 | 176 | 20,8 | – | 3 000 | 0,58 | C 4010 V | – |
| | 90 | 23 | 98 | 100 | 11,8 | 7 000 | 9 500 | 0,6 | ▸ C 2210 TN9 | ▸ C 2210 KTN9 |
| | 90 | 23 | 114 | 122 | 14,3 | – | 3 800 | 0,63 | C 2210 V | – |
| **55** | 80 | 45 | 180 | 300 | 35,5 | – | 2 200 | 0,78 | C 6911 V | – |
| | 100 | 25 | 116 | 114 | 13,4 | 6 300 | 9 000 | 0,8 | ▸ C 2211 TN9 | ▸ C 2211 KTN9 |
| | 100 | 25 | 132 | 134 | 15,6 | – | 3 400 | 0,82 | ▸ C 2211 V | C 2211 KV |
| **60** | 85 | 45 | 190 | 335 | 39 | – | – | 0,83 | ▸ C 6912-2NSV | – |
| | 85 | 45 | 190 | 335 | 39 | – | 1 900 | 0,83 | ▸ C 6912 V | – |
| | 110 | 28 | 143 | 156 | 18,3 | 5 600 | 7 500 | 1,1 | ▸ C 2212 TN9 | ▸ C 2212 KTN9 |
| | 110 | 28 | 166 | 190 | 22,4 | – | 2 800 | 1,15 | C 2212 V | C 2212 KV |
| **65** | 100 | 35 | 102 | 173 | 20,4 | – | 150 | 1,05 | C 4013-2CS5V/GEM9 | – |
| | 120 | 31 | 180 | 180 | 21,2 | 5 300 | 7 500 | 1,45 | ▸ C 2213 TN9 | ▸ C 2213 KTN9 |
| | 120 | 31 | 204 | 216 | 25,5 | – | 2 400 | 1,5 | C 2213 V | C 2213 KV |
| **70** | 125 | 31 | 186 | 196 | 22,8 | 5 000 | 7 000 | 1,5 | ▸ C 2214 TN9 | C 2214 KTN9 |
| | 125 | 31 | 212 | 228 | 26,5 | – | 2 400 | 1,55 | C 2214 V | – |
| | 150 | 51 | 405 | 430 | 49 | 3 800 | 5 000 | 4,3 | ▸ C 2314 | C 2314 K |

**SKF Explorer bearing**
▸ Popular item

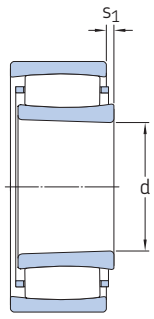



| Dimensions | | | | | | Abutment and fillet dimensions | | | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_2$ ≈ | $D_1$ ≈ | $r_{1,2}$ min. | $s_1$[1] max. | $s_2$[1] max. | $d_a$ min. | $d_a$ max. | $D_a$ min. | $D_a$ max. | $C_a$[2] min. | $r_a$ max. | $k_1$ | $k_2$ |
| mm | | | | | | mm | | | | | | – | |
| **30** | 38,5 | 47,3 | 1 | 7,9 | 4,9 | 34,6 | 43 | – | 50,4 | – | 1 | 0,102 | 0,096 |
| | 37,4 | 53,1 | 1 | 4,5 | – | 35,6 | 37,4 | 50,6 | 56,4 | 0,3 | 1 | 0,101 | 0,111 |
| | 37,4 | 53,1 | 1 | 4,5 | 1,5 | 35,6 | 49 | – | 56,4 | – | 1 | 0,101 | 0,111 |
| **35** | 44,8 | 60,7 | 1,1 | 5,7 | – | 42 | 44,8 | 58,5 | 65 | 0,1 | 1 | 0,094 | 0,121 |
| | 44,8 | 60,7 | 1,1 | 5,7 | 2,7 | 42 | 57 | – | 65 | – | 1 | 0,094 | 0,121 |
| **40** | 46,1 | 55,3 | 0,6 | 4,7 | 1,7 | 43,2 | 52 | – | 58,8 | – | 0,6 | 0,099 | 0,114 |
| | 52,4 | 69,9 | 1,1 | 7,1 | – | 47 | 52,4 | 67,1 | 73 | 0,3 | 1 | 0,093 | 0,128 |
| | 52,4 | 69,9 | 1,1 | 7,1 | 4,1 | 47 | 66 | – | 73 | – | 1 | 0,093 | 0,128 |
| **45** | 52 | 59,5 | 0,6 | 9,4 | 6,4 | 48,2 | 55 | – | 64,8 | – | 0,6 | 0,091 | 0,113 |
| | 55,6 | 73,1 | 1,1 | 7,1 | – | 52 | 55,6 | 70,4 | 78 | 0,3 | 1 | 0,095 | 0,128 |
| | 55,6 | 73,1 | 1,1 | 7,1 | 4,1 | 52 | 69 | – | 78 | – | 1 | 0,095 | 0,128 |
| **50** | 56,9 | 66,1 | 0,6 | 4,7 | 1,7 | 53,2 | 62 | – | 68,8 | – | 0,6 | 0,103 | 0,114 |
| | 57,5 | 65 | 0,6 | 9,4 | 6,4 | 53,2 | 61 | – | 68,8 | – | 0,6 | 0,093 | 0,113 |
| | 57,6 | 70,8 | 1 | 6 | – | 54,6 | 57,6 | 69,7 | 75,4 | 0,1 | 1 | 0,103 | 0,107 |
| | 57,6 | 70,8 | 1 | 6 | 3 | 54,6 | 67 | – | 75,4 | – | 1 | 0,103 | 0,107 |
| | 61,9 | 79,4 | 1,1 | 7,1 | – | 57 | 61,9 | 76,7 | 83 | -0,8 | 1 | 0,097 | 0,128 |
| | 61,9 | 79,4 | 1,1 | 7,1 | 3,9 | 57 | 73 | – | 83 | – | 1 | 0,097 | 0,128 |
| **55** | 62,7 | 71,5 | 1 | 7,9 | 4,9 | 59,6 | 67 | – | 75,4 | – | 1 | 0,107 | 0,096 |
| | 65,8 | 86,7 | 1,5 | 8,6 | – | 64 | 65,8 | 83,1 | 91 | 0,3 | 1,5 | 0,094 | 0,133 |
| | 65,8 | 86,7 | 1,5 | 8,6 | 5,4 | 64 | 80 | – | 91 | – | 1,5 | 0,094 | 0,133 |
| **60** | 68,7 | 77,5 | 1 | – | 0,5 | 64,6 | 68,7 | – | 80,4 | – | 1 | 0,108 | 0,096 |
| | 68,7 | 77,5 | 1 | 7,9 | 4,7 | 64,6 | 72 | – | 80,4 | – | 1 | 0,108 | 0,096 |
| | 77,1 | 97,9 | 1,5 | 8,5 | – | 69 | 77,1 | 94,7 | 101 | 0,3 | 1,5 | 0,1 | 0,123 |
| | 77,1 | 97,9 | 1,5 | 8,5 | 5,3 | 69 | 91 | – | 101 | – | 1,5 | 0,1 | 0,123 |
| **65** | 78,6 | 87,5 | 1,1 | – | 5,9 | 71 | 78,6 | – | 94 | – | 1 | 0,071 | 0,181 |
| | 79 | 106 | 1,5 | 9,6 | – | 74 | 79 | 102 | 111 | 0,2 | 1,5 | 0,097 | 0,127 |
| | 79 | 106 | 1,5 | 9,6 | 5,3 | 74 | 97 | – | 111 | – | 1,5 | 0,097 | 0,127 |
| **70** | 83,7 | 111 | 1,5 | 9,6 | – | 79 | 83,7 | 107 | 116 | 0,4 | 1,5 | 0,098 | 0,127 |
| | 83,7 | 111 | 1,5 | 9,6 | 5,3 | 79 | 102 | – | 116 | – | 1,5 | 0,098 | 0,127 |
| | 91,4 | 130 | 2,1 | 9,1 | – | 82 | 106 | 119 | 138 | 2,2 | 2 | 0,11 | 0,099 |

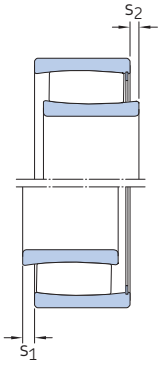
[1] → *Verification of axial displacement*, page 850
[2] → *Free space on both sides of the bearing*, page 852, negative values used only for calculation



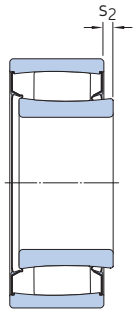

Cylindrical bore




Tapered bore



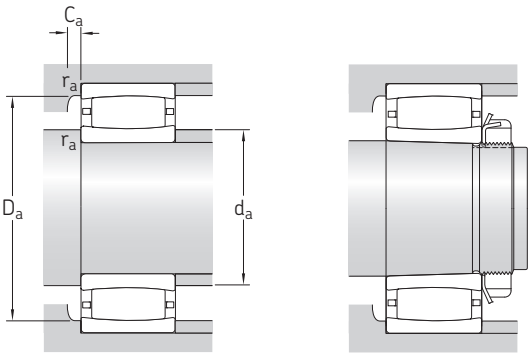

Full complement




Sealed (2CS5)

| Principal dimensions | | | Basic load ratings dynamic | static | Fatique load limit | Speed ratings Reference speed | Limiting speed | Mass | Designations Bearing with cylindrical bore | tapered bore |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **75** | 105 | 40 | 166 | 232 | 30 | – | 130 | 3,9 | ▸ C 5915-2CS5V/GEM9 | – |
| | 105 | 40 | 204 | 325 | 38 | – | 1 900 | 1,1 | ▸ C 5915 V | – |
| | 105 | 54 | 204 | 325 | 37,5 | – | 140 | 1,4 | C 6915-2CS5V/GEM9 | – |
| | 105 | 54 | 204 | 325 | 37,5 | – | 1 900 | 1,4 | C 6915 V/VE240 | – |
| | 115 | 40 | 208 | 345 | 40,5 | – | 2 000 | 1,6 | C 4015 V | – |
| | 130 | 31 | 196 | 208 | 24 | 4 800 | 6 700 | 1,6 | ▸ C 2215 | ▸ C 2215 K |
| | 130 | 31 | 220 | 240 | 28 | – | 2 200 | 1,65 | C 2215 V | C 2215 KV |
| | 160 | 55 | 425 | 465 | 52 | 3 600 | 4 800 | 5,3 | ▸ C 2315 | ▸ C 2315 K |
| **80** | 140 | 33 | 220 | 250 | 28,5 | 4 300 | 6 000 | 2,05 | ▸ C 2216 | ▸ C 2216 K |
| | 140 | 33 | 255 | 305 | 34,5 | – | 2 000 | 2,15 | C 2216 V | C 2216 KV |
| | 170 | 58 | 510 | 550 | 60 | 3 400 | 4 500 | 6,3 | ▸ C 2316 | ▸ C 2316 K |
| **85** | 150 | 36 | 275 | 320 | 35,5 | 4 000 | 5 600 | 2,65 | ▸ C 2217 | ▸ C 2217 K |
| | 180 | 60 | 540 | 600 | 64 | 3 200 | 4 300 | 7,4 | ▸ C 2317 | ▸ C 2317 K |
| **90** | 125 | 46 | 193 | 325 | 37,5 | 2 600 | 4 000 | 1,75 | C 5918 MB | – |
| | 125 | 46 | 224 | 400 | 44 | – | 110 | 1,75 | C 5918-2CS5V/GEM9 | – |
| | 125 | 46 | 224 | 400 | 45,5 | – | 1 600 | 1,75 | ▸ C 5918 V | – |
| | 160 | 40 | 325 | 380 | 41,5 | 3 800 | 5 300 | 3,3 | ▸ C 2218 | ▸ C 2218 K |
| | 190 | 64 | 610 | 695 | 73,5 | 2 800 | 4 000 | 8,65 | ▸ C 2318 | C 2318 K |
| **95** | 200 | 67 | 610 | 695 | 73,5 | 2 800 | 4 000 | 10 | C 2319 | C 2319 K |
| **100** | 150 | 50 | 355 | 530 | 58,5 | – | 1 400 | 3,05 | ▸ C 4020 V | – |
| | 150 | 67 | 510 | 865 | 95 | – | 1 100 | 4,3 | ▸ C 5020 V | – |
| | 165 | 52 | 475 | 655 | 71 | – | 1 300 | 4,45 | ▸ C 3120 V | – |
| | 165 | 65 | 475 | 655 | 69,5 | – | 90 | 5,2 | C 4120-2CS5V/GEM9 | – |
| | 165 | 65 | 475 | 655 | 71 | – | 1 300 | 5,3 | C 4120 V/VE240 | – |
| | 180 | 46 | 415 | 465 | 49 | 3 600 | 4 800 | 4,95 | ▸ C 2220 | ▸ C 2220 K |
| | 215 | 73 | 800 | 880 | 90 | 2 600 | 3 600 | 12,5 | ▸ C 2320 | ▸ C 2320 K |
| **110** | 170 | 60 | 415 | 585 | 63 | – | 85 | 4,6 | C 4022-2CS5V/GEM9 | – |
| | 170 | 60 | 430 | 655 | 69,5 | 2 600 | 3 400 | 5,3 | C 4022 MB | – |
| | 170 | 60 | 500 | 800 | 85 | – | 1 200 | 5,2 | C 4022 V | – |
| | 180 | 69 | 500 | 710 | 75 | – | 80 | 6,6 | C 4122-2CS5V/GEM9 | – |
| | 180 | 69 | 670 | 1 000 | 104 | – | 900 | 7,1 | ▸ C 4122 V | – |
| | 200 | 53 | 530 | 620 | 64 | 3 200 | 4 300 | 7 | ▸ C 2222 | ▸ C 2222 K |

SKF Explorer bearing
▸ Popular item

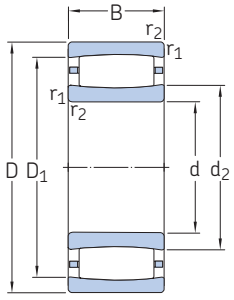



| Dimensions | | | | | | Abutment and fillet dimensions | | | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_2$ ≈ | $D_1$ ≈ | $r_{1,2}$ min. | $s_1$[1] max. | $s_2$[1] max. | $d_a$ min. | $d_a$ max. | $D_a$ min. | $D_a$ max. | $C_a$[2] min. | $r_a$ max. | $k_1$ | $k_2$ |
| mm | | | | | | mm | | | | | | – | |
| **75** | 82,9 | 96,1 | 1 | – | 5 | 79,6 | 84,1 | – | 100 | – | 1 | 0,083 | 0,142 |
| | 83,6 | 95,5 | 1 | 9,4 | 6,2 | 79,6 | 89 | – | 100 | – | 1 | 0,098 | 0,114 |
| | 83,6 | 95,5 | 1 | – | 7,1 | 79,6 | 83 | – | 100 | – | 1 | 0,073 | 0,154 |
| | 83,6 | 95,5 | 1 | 9,2 | 9,2 | 79,6 | 88 | – | 100 | – | 1 | 0,073 | 0,154 |
| | 88,7 | 101 | 1,1 | 9,4 | 5,1 | 81 | 94 | – | 109 | – | 1 | 0,099 | 0,114 |
| | 88,5 | 116 | 1,5 | 9,6 | – | 84 | 98,3 | 106 | 121 | 1,2 | 1,5 | 0,099 | 0,127 |
| | 88,5 | 116 | 1,5 | 9,6 | 5,3 | 84 | 107 | – | 121 | – | 1,5 | 0,099 | 0,127 |
| | 98,5 | 137 | 2,1 | 13,1 | – | 87 | 113 | 126 | 148 | 2,2 | 2 | 0,103 | 0,107 |
| **80** | 98,1 | 125 | 2 | 9,1 | – | 91 | 107 | 116 | 129 | 1,2 | 2 | 0,104 | 0,121 |
| | 98,1 | 125 | 2 | 9,1 | 4,8 | 91 | 116 | – | 129 | – | 2 | 0,104 | 0,121 |
| | 102 | 146 | 2,1 | 10,1 | – | 92 | 119 | 133 | 158 | 2,4 | 2 | 0,107 | 0,101 |
| **85** | 103 | 133 | 2 | 7,1 | – | 96 | 114 | 123 | 139 | 1,3 | 2 | 0,114 | 0,105 |
| | 110 | 153 | 3 | 12,1 | – | 99 | 126 | 141 | 166 | 2,4 | 2,5 | 0,105 | 0,105 |
| **90** | 100 | 113 | 1,1 | 2,9 | – | 96 | 99 | 113 | 119 | -0,9 | 1 | 0 | 0,131 |
| | 102 | 113 | 1,1 | – | 4,5 | 96 | 101 | – | 119 | – | 1 | 0,089 | 0,131 |
| | 102 | 113 | 1,1 | 15,4 | 11,1 | 96 | 106 | – | 119 | – | 1 | 0,089 | 0,131 |
| | 111 | 144 | 2 | 9,5 | – | 101 | 124 | 133 | 149 | 1,4 | 2 | 0,104 | 0,117 |
| | 119 | 166 | 3 | 9,6 | – | 104 | 138 | 154 | 176 | 2 | 2,5 | 0,108 | 0,101 |
| **95** | 119 | 166 | 3 | 12,6 | – | 109 | 138 | 154 | 186 | 2,1 | 2,5 | 0,103 | 0,106 |
| **100** | 113 | 135 | 1,5 | 14 | 9,7 | 107 | 126 | – | 143 | – | 1,5 | 0,098 | 0,118 |
| | 114 | 136 | 1,5 | 9,3 | 5 | 107 | 127 | – | 143 | – | 1,5 | 0,112 | 0,094 |
| | 119 | 150 | 2 | 10,1 | 4,7 | 111 | 136 | – | 154 | – | 2 | 0,112 | 0,1 |
| | 120 | 148 | 2 | – | 7,3 | 111 | 119 | – | 154 | – | 2 | 0,09 | 0,125 |
| | 120 | 148 | 2 | 17,7 | 17,7 | 111 | 135 | – | 154 | – | 2 | 0,09 | 0,125 |
| | 118 | 157 | 2,1 | 10,1 | – | 112 | 134 | 146 | 168 | 0,9 | 2 | 0,108 | 0,11 |
| | 126 | 185 | 3 | 11 | – | 114 | 150 | 168 | 201 | 3,2 | 2,5 | 0,113 | 0,096 |
| **110** | 128 | 155 | 2 | – | 7,9 | 119 | 127 | – | 161 | – | 2 | 0,142 | 0,083 |
| | 126 | 150 | 2 | 4,8 | – | 120 | 125 | 146 | 160 | 1,3 | 2 | 0 | 0,103 |
| | 126 | 150 | 2 | 12 | 6,6 | 120 | 136 | – | 160 | – | 2 | 0,107 | 0,103 |
| | 130 | 161 | 2 | – | 8,2 | 121 | 130 | – | 169 | – | 2 | 0,086 | 0,133 |
| | 132 | 163 | 2 | 11,4 | 4,6 | 121 | 149 | – | 169 | – | 2 | 0,111 | 0,097 |
| | 132 | 176 | 2,1 | 11,1 | – | 122 | 150 | 161 | 188 | 1,9 | 2 | 0,113 | 0,103 |

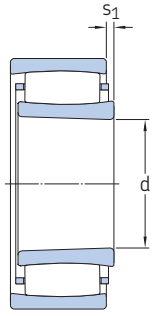
[1] → *Verification of axial displacement*, page 850
[2] → *Free space on both sides of the bearing*, page 852, negative values used only for calculation

## 10.1 CARB toroidal roller bearings

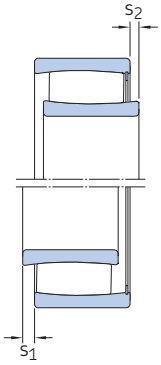
d **120 – 170** mm



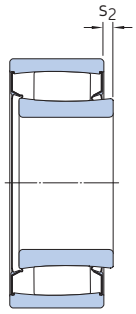

Cylindrical bore




Tapered bore



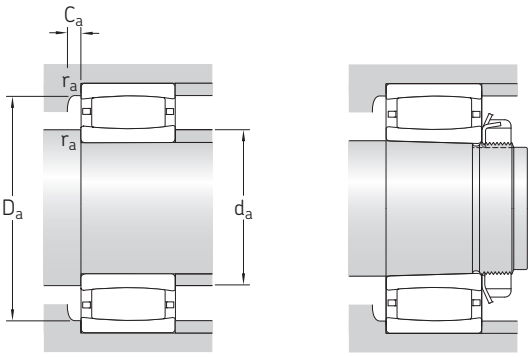

Full complement




Sealed (2CS5)

| Principal dimensions | | | Basic load ratings dynamic | static | Fatique load limit | Speed ratings Reference speed | Limiting speed | Mass | Designations Bearing with cylindrical bore | tapered bore |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **120** | 180 | 46 | 430 | 640 | 65,5 | – | 1 400 | 4,1 | C 3024 V | – |
| | 180 | 60 | 430 | 640 | 67 | – | 80 | 5,1 | C 4024-2CS5V/GEM9 | – |
| | 180 | 60 | 430 | 640 | 65,5 | – | 1 400 | 5,05 | C 4024 V/VE240 | C 4024 K30V/VE240 |
| | 180 | 60 | 530 | 880 | 91,5 | – | 1 100 | 5,55 | ▸ C 4024 V | C 4024 K30V |
| | 200 | 80 | 780 | 1 120 | 114 | – | 750 | 10 | C 4124 V | – |
| | 215 | 76 | 750 | 980 | 98 | 2 400 | 3 200 | 12 | ▸ C 3224 | ▸ C 3224 K |
| **130** | 200 | 69 | 550 | 830 | 85 | – | 70 | 7,5 | C 4026-2CS5V/GEM9 | – |
| | 200 | 69 | 620 | 930 | 93 | 2 200 | 2 800 | 7,85 | ▸ C 4026 | C 4026 K30 |
| | 200 | 69 | 720 | 1 120 | 112 | – | 850 | 8,15 | ▸ C 4026 V | C 4026 K30V |
| | 210 | 80 | 750 | 1 100 | 108 | – | 70 | 10,5 | C 4126-2CS5V/GEM9 | – |
| | 230 | 64 | 735 | 930 | 91,5 | 2 800 | 3 800 | 11,5 | ▸ C 2226 | ▸ C 2226 K |
| | 280 | 93 | 980 | 1 220 | 114 | 2 400 | 3 200 | 27 | C 2326 K/VE240 | – |
| **140** | 210 | 69 | 750 | 1 220 | 120 | – | 800 | 8,6 | ▸ C 4028 V | C 4028 K30V |
| | 225 | 85 | 780 | 1 200 | 116 | – | 63 | 12,5 | C 4128-2CS5V/GEM9 | – |
| | 225 | 85 | 780 | 1 200 | 116 | – | 800 | 12,5 | C 4128 V/VE240 | – |
| | 250 | 68 | 830 | 1 060 | 102 | 2 400 | 3 200 | 14 | ▸ C 2228 | ▸ C 2228 K |
| **150** | 225 | 56 | 540 | 850 | 81,5 | 2 400 | 3 200 | 8,45 | C 3030 MB | – |
| | 225 | 56 | 585 | 960 | 93 | – | 1 000 | 8 | C 3030 V | C 3030 KV |
| | 225 | 75 | 585 | 965 | 93 | – | 63 | 10 | C 4030-2CS5V/GEM9 | – |
| | 225 | 75 | 780 | 1 320 | 127 | – | 750 | 10,5 | ▸ C 4030 V | C 4030 K30V |
| | 250 | 80 | 880 | 1 290 | 122 | 2 000 | 2 800 | 15,5 | C 3130 | C 3130 K |
| | 250 | 100 | 1 220 | 1 860 | 176 | – | 450 | 20 | ▸ C 4130 V | – |
| | 270 | 73 | 980 | 1 220 | 114 | 2 400 | 3 200 | 18 | ▸ C 2230 | C 2230 K |
| **160** | 240 | 80 | 765 | 1 160 | 110 | 1 700 | 2 400 | 12,5 | ▸ C 4032 | C 4032 K30 |
| | 240 | 80 | 830 | 1 290 | 122 | – | 60 | 12,5 | C 4032-2CS5V/GEM9 | – |
| | 240 | 80 | 915 | 1 460 | 140 | – | 600 | 13 | ▸ C 4032 V | C 4032 K30V |
| | 270 | 86 | 1 000 | 1 400 | 129 | 1 900 | 2 600 | 21,5 | C 3132 | C 3132 K |
| | 290 | 104 | 1 370 | 1 830 | 170 | 1 800 | 2 400 | 29,5 | C 3232 | C 3232 K |
| **170** | 260 | 67 | 750 | 1 080 | 100 | 2 200 | 2 800 | 12,5 | C 3034 M | – |
| | 260 | 90 | 1 140 | 1 860 | 173 | – | 500 | 17,5 | ▸ C 4034 V | C 4034 K30V |
| | 310 | 86 | 1 270 | 1 630 | 146 | 1 900 | 2 600 | 28 | C 2234 | C 2234 K |

**SKF Explorer bearing**
▸ Popular item

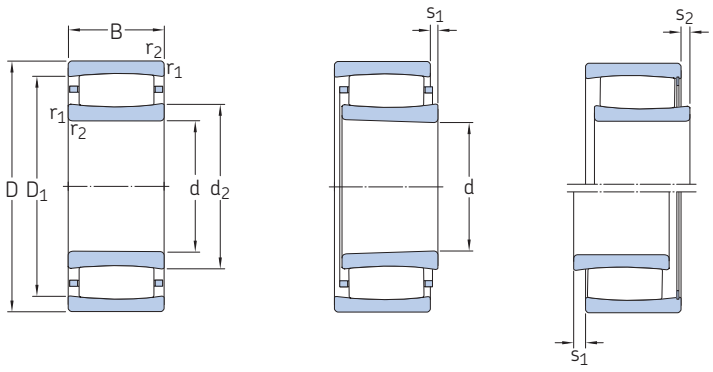



| Dimensions | | | | | | Abutment and fillet dimensions | | | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_2$ ≈ | $D_1$ ≈ | $r_{1,2}$ min. | $s_1$[1] max. | $s_2$[1] max. | $d_a$ min. | $d_a$ max. | $D_a$ min. | $D_a$ max. | $C_a$[2] min. | $r_a$ max. | $k_1$ | $k_2$ |
| mm | | | | | | mm | | | | | | – | |
| **120** | 138 | 166 | 2 | 10,6 | 3,8 | 130 | 154 | – | 170 | – | 2 | 0,111 | 0,109 |
| | 140 | 164 | 2 | – | 7,5 | 129 | 139 | – | 171 | – | 2 | 0,085 | 0,142 |
| | 139 | 164 | 2 | 17,8 | 17,8 | 130 | 152 | – | 170 | – | 2 | 0,085 | 0,142 |
| | 140 | 164 | 2 | 12 | 5,2 | 130 | 152 | – | 170 | – | 2 | 0,109 | 0,103 |
| | 140 | 176 | 2 | 18 | 11,2 | 131 | 160 | – | 189 | – | 2 | 0,104 | 0,103 |
| | 149 | 190 | 2,1 | 17,1 | – | 132 | 162 | 179 | 203 | 2,4 | 2 | 0,103 | 0,108 |
| **130** | 152 | 182 | 2 | – | 8,2 | 139 | 151 | – | 191 | – | 2 | 0,089 | 0,133 |
| | 149 | 181 | 2 | 11,4 | – | 140 | 157 | 174 | 190 | 1,9 | 2 | 0,113 | 0,097 |
| | 149 | 181 | 2 | 11,4 | 4,6 | 140 | 167 | – | 190 | – | 2 | 0,113 | 0,097 |
| | 153 | 190 | 2 | – | 7,5 | 141 | 152 | – | 199 | – | 2 | 0,09 | 0,126 |
| | 152 | 199 | 3 | 9,6 | – | 144 | 171 | 185 | 216 | 1,1 | 2,5 | 0,113 | 0,101 |
| | 179 | 234 | 4 | 31,2 | – | – | – | 216 | 263 | -7,5 | 3 | 0,093 | 0,122 |
| **140** | 161 | 193 | 2 | 11,4 | 5,9 | 150 | 177 | – | 200 | – | 2 | 0,115 | 0,097 |
| | 167 | 204 | 2,1 | – | 8,9 | 152 | 166 | – | 213 | – | 2 | 0,086 | 0,134 |
| | 166 | 204 | 2,1 | 9,7 | 9,7 | 152 | 189 | – | 213 | – | 2 | 0,086 | 0,134 |
| | 173 | 223 | 3 | 13,7 | – | 154 | 191 | 207 | 236 | 2,3 | 2,5 | 0,109 | 0,108 |
| **150** | 173 | 204 | 2,1 | 8,7 | – | 161 | 172 | 198 | 214 | 1,3 | 2 | 0 | 0,108 |
| | 174 | 204 | 2,1 | 14,1 | 7,3 | 161 | 190 | – | 214 | – | 2 | 0,113 | 0,108 |
| | 175 | 204 | 2,1 | – | 10,8 | 161 | 174 | – | 214 | – | 2 | 0,084 | 0,144 |
| | 173 | 204 | 2,1 | 17,4 | 10,6 | 161 | 189 | – | 214 | – | 2 | 0,107 | 0,106 |
| | 182 | 226 | 2,1 | 13,9 | – | 162 | 196 | 214 | 238 | 2,3 | 2 | 0,12 | 0,092 |
| | 179 | 222 | 2,1 | 20 | 10,1 | 162 | 204 | – | 238 | – | 2 | 0,105 | 0,103 |
| | 177 | 236 | 3 | 11,2 | – | 164 | 202 | 215 | 256 | 2,5 | 2,5 | 0,119 | 0,096 |
| **160** | 181 | 217 | 2,1 | 18,1 | – | 171 | 190 | 209 | 229 | 2,2 | 2 | 0,109 | 0,103 |
| | 180 | 218 | 2,1 | – | 7,7 | 171 | 180 | – | 229 | – | 2 | 0,093 | 0,126 |
| | 181 | 217 | 2,1 | 18,1 | 8,2 | 171 | 199 | – | 229 | – | 2 | 0,109 | 0,103 |
| | 191 | 240 | 2,1 | 10,3 | – | 172 | 208 | 229 | 258 | 2,4 | 2 | 0,112 | 0,099 |
| | 194 | 256 | 3 | 19,3 | – | 174 | 218 | 242 | 276 | 2,6 | 2,5 | 0,112 | 0,096 |
| **170** | 195 | 236 | 2,1 | 19 | – | 181 | 210 | 226 | 249 | 1,2 | 2 | 0,105 | 0,117 |
| | 195 | 236 | 2,1 | 17,1 | 7,2 | 181 | 218 | – | 249 | – | 2 | 0,108 | 0,103 |
| | 209 | 274 | 4 | 16,4 | – | 187 | 233 | 254 | 293 | 3 | 3 | 0,114 | 0,1 |

[1] → *Verification of axial displacement*, page 850
[2] → *Free space on both sides of the bearing*, page 852, negative values used only for calculation

## 10.1 CARB toroidal roller bearings

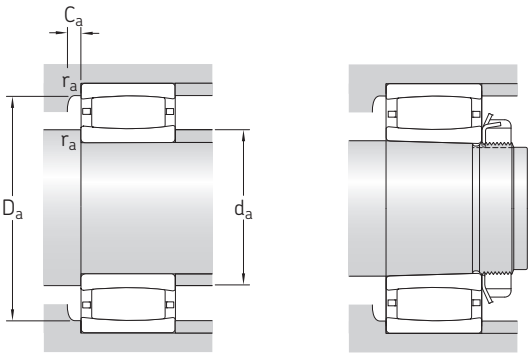
d **180 – 360** mm




Cylindrical bore | Tapered bore | Full complement

| Principal dimensions | | | Basic load ratings dynamic | static | Fatique load limit | Speed ratings Reference speed | Limiting speed | Mass | Designations Bearing with cylindrical bore | tapered bore |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **180** | 280 | 74 | 880 | 1 340 | 122 | 2 000 | 2 600 | 17 | C 3036 | C 3036 K |
| | 280 | 100 | 1 320 | 2 120 | 196 | – | 430 | 23,5 | C 4036 V | – |
| | 300 | 96 | 1 250 | 1 730 | 156 | 1 700 | 2 400 | 26,5 | ▸ C 3136 | ▸ C 3136 K |
| | 300 | 118 | 1 760 | 2 700 | 240 | – | 220 | 34,5 | C 4136 V | – |
| | 320 | 112 | 1 530 | 2 200 | 193 | 1 500 | 2 000 | 38 | C 3236 | C 3236 K |
| **190** | 290 | 75 | 930 | 1 460 | 132 | 1 800 | 2 400 | 17,5 | C 3038 | C 3038 K |
| | 320 | 104 | 1 700 | 2 550 | 224 | – | 190 | 34 | C 3138 V | C 3138 KV |
| | 340 | 92 | 1 370 | 1 730 | 153 | 1 800 | 2 400 | 34,5 | ▸ C 2238 | C 2238 K |
| **200** | 310 | 82 | 1 120 | 1 730 | 153 | 1 700 | 2 400 | 22,5 | ▸ C 3040 | C 3040 K |
| | 310 | 109 | 1 630 | 2 650 | 236 | – | 260 | 30,5 | C 4040 V | |
| | 340 | 112 | 1 600 | 2 320 | 200 | 1 500 | 2 000 | 41 | ▸ C 3140 | ▸ C 3140 K |
| **220** | 340 | 90 | 1 320 | 2 040 | 176 | 1 600 | 2 200 | 29,5 | ▸ C 3044 | ▸ C 3044 K |
| | 340 | 118 | 1 930 | 3 250 | 280 | – | 200 | 40 | C 4044 V | C 4044 K30V |
| | 370 | 120 | 1 900 | 2 900 | 245 | 1 400 | 1 800 | 52 | ▸ C 3144 | ▸ C 3144 K |
| | 400 | 108 | 2 000 | 2 500 | 208 | 1 500 | 2 000 | 57,5 | C 2244 | C 2244 K |
| **240** | 360 | 92 | 1 340 | 2 160 | 183 | 1 500 | 2 000 | 32 | C 3048 | C 3048 K |
| | 400 | 128 | 2 320 | 3 450 | 285 | 1 300 | 1 700 | 64 | ▸ C 3148 | ▸ C 3148 K |
| **260** | 400 | 104 | 1 760 | 2 850 | 232 | 1 300 | 1 800 | 47 | C 3052 | C 3052 K |
| | 440 | 144 | 2 650 | 4 050 | 325 | 1 100 | 1 500 | 88 | ▸ C 3152 | ▸ C 3152 K |
| **280** | 420 | 106 | 1 860 | 3 100 | 250 | 1 200 | 1 600 | 50,5 | C 3056 | C 3056 K |
| | 460 | 146 | 2 850 | 4 500 | 355 | 1 100 | 1 400 | 94,5 | C 3156 | C 3156 K |
| **300** | 460 | 118 | 2 160 | 3 750 | 290 | 1 100 | 1 500 | 72 | C 3060 M | C 3060 KM |
| | 460 | 160 | 2 900 | 4 900 | 390 | 900 | 1 200 | 95,5 | C 4060 M | C 4060 K30M |
| | 500 | 160 | 3 250 | 5 200 | 400 | 950 | 1 300 | 125 | C 3160 | C 3160 K |
| **320** | 480 | 121 | 2 280 | 4 000 | 305 | 1 000 | 1 400 | 78 | C 3064 M | C 3064 KM |
| | 540 | 176 | 4 150 | 6 300 | 480 | 900 | 1 300 | 164 | ▸ C 3164 M | C 3164 KM |
| **340** | 520 | 133 | 2 900 | 5 000 | 375 | 950 | 1 300 | 100 | C 3068 M | C 3068 KM |
| | 580 | 190 | 4 900 | 7 500 | 560 | 850 | 1 100 | 205 | C 3168 M | C 3168 KM |
| | 580 | 243 | 5 600 | 9 150 | 680 | 670 | 900 | 271 | C 4168 K30MB | |
| **360** | 480 | 90 | 1 760 | 3 250 | 245 | 1 000 | 1 400 | 45 | C 3972 M | C 3972 KM |
| | 540 | 134 | 2 900 | 5 000 | 375 | 900 | 1 300 | 106 | C 3072 M | C 3072 KM |
| | 600 | 192 | 5 000 | 8 000 | 585 | 800 | 1 100 | 220 | C 3172 M | C 3172 KM |

**SKF Explorer bearing**
▸ Popular item

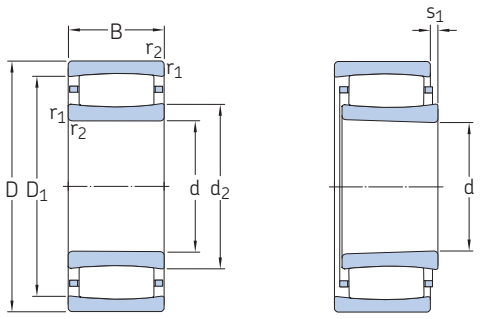



| Dimensions | | | | | | Abutment and fillet dimensions | | | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_2$ ≈ | $D_1$ ≈ | $r_{1,2}$ min. | $s_1$[1] max. | $s_2$[1] max. | $d_a$ min. | $d_a$ max. | $D_a$ min. | $D_a$ max. | $C_a$[2] min. | $r_a$ max. | $k_1$ | $k_2$ |
| mm | | | | | | mm | | | | | | – | |
| **180** | 209 | 251 | 2,1 | 15,1 | – | 191 | 223 | 239 | 269 | 2 | 2 | 0,112 | 0,105 |
| | 203 | 247 | 2,1 | 20,1 | 10,2 | 191 | 229 | – | 269 | – | 2 | 0,107 | 0,103 |
| | 210 | 266 | 3 | 23,2 | – | 194 | 231 | 252 | 286 | 2,2 | 2,5 | 0,102 | 0,111 |
| | 211 | 265 | 3 | 20 | 10,1 | 194 | 223 | – | 286 | – | 2,5 | 0,1 | 0,108 |
| | 228 | 289 | 4 | 27,3 | – | 197 | 249 | 271 | 303 | 3,2 | 3 | 0,107 | 0,104 |
| **190** | 225 | 266 | 2,1 | 16,1 | – | 201 | 238 | 254 | 279 | 1,9 | 2 | 0,113 | 0,107 |
| | 228 | 289 | 3 | 19 | 9,1 | 204 | 267 | – | 306 | – | 2,5 | 0,115 | 0,096 |
| | 224 | 296 | 4 | 22,5 | – | 207 | 254 | 275 | 323 | 1,6 | 3 | 0,108 | 0,108 |
| **200** | 235 | 285 | 2,1 | 15,2 | – | 211 | 250 | 272 | 299 | 2,9 | 2 | 0,123 | 0,095 |
| | 228 | 280 | 2,1 | 21 | 11,1 | 211 | 263 | – | 299 | – | 2 | 0,11 | 0,101 |
| | 244 | 305 | 3 | 27,3 | – | 214 | 264 | 288 | 326 | -0,6 | 2,5 | 0,108 | 0,104 |
| **220** | 257 | 310 | 3 | 17,2 | – | 233 | 274 | 295 | 327 | 3,1 | 2,5 | 0,114 | 0,104 |
| | 251 | 306 | 3 | 20 | 10,1 | 233 | 284 | – | 327 | – | 2,5 | 0,115 | 0,095 |
| | 268 | 333 | 4 | 22,3 | – | 237 | 290 | 315 | 353 | 3,5 | 3 | 0,114 | 0,097 |
| | 259 | 350 | 4 | 20,5 | – | 237 | 298 | 321 | 383 | 1,7 | 3 | 0,113 | 0,101 |
| **240** | 276 | 329 | 3 | 19,2 | – | 253 | 293 | 312 | 347 | 1,3 | 2,5 | 0,113 | 0,106 |
| | 281 | 357 | 4 | 20,4 | – | 257 | 309 | 334 | 383 | 3,7 | 3 | 0,116 | 0,095 |
| **260** | 305 | 367 | 4 | 19,3 | – | 275 | 326 | 349 | 385 | 3,4 | 3 | 0,122 | 0,096 |
| | 314 | 394 | 4 | 26,4 | – | 277 | 341 | 371 | 423 | 4,1 | 3 | 0,115 | 0,096 |
| **280** | 328 | 389 | 4 | 21,3 | – | 295 | 352 | 373 | 405 | 1,8 | 3 | 0,121 | 0,098 |
| | 336 | 416 | 5 | 28,4 | – | 300 | 363 | 392 | 440 | 4,1 | 4 | 0,115 | 0,097 |
| **300** | 351 | 417 | 4 | 20 | – | 315 | 376 | 402 | 445 | 1,7 | 3 | 0,123 | 0,095 |
| | 338 | 410 | 4 | 30,4 | – | 315 | 362 | 396 | 445 | 2,8 | 3 | 0,105 | 0,106 |
| | 362 | 448 | 5 | 30,5 | – | 320 | 392 | 422 | 480 | 4,9 | 4 | 0,106 | 0,106 |
| **320** | 375 | 441 | 4 | 23,3 | – | 335 | 398 | 426 | 465 | 1,8 | 3 | 0,121 | 0,098 |
| | 371 | 477 | 5 | 26,7 | – | 340 | 411 | 452 | 520 | 4,2 | 4 | 0,114 | 0,096 |
| **340** | 394 | 475 | 5 | 25 | – | 358 | 430 | 454 | 502 | 2,1 | 4 | 0,12 | 0,099 |
| | 402 | 517 | 5 | 25,9 | – | 360 | 446 | 489 | 560 | 4,2 | 4 | 0,118 | 0,093 |
| | 403 | 514 | 5 | 20,2 | – | – | – | 487 | 560 | 10,7 | 4 | 0 | 0,096 |
| **360** | 394 | 450 | 3 | 17,2 | – | 373 | 409 | 435 | 467 | 1,6 | 2,5 | 0,127 | 0,104 |
| | 416 | 497 | 5 | 26,4 | – | 378 | 448 | 476 | 522 | 2 | 4 | 0,12 | 0,099 |
| | 423 | 537 | 5 | 27,9 | – | 380 | 464 | 507 | 580 | 3,9 | 4 | 0,117 | 0,094 |

[1] → *Verification of axial displacement*, page 850
[2] → *Free space on both sides of the bearing*, page 852, negative values used only for calculation

# 10.1 CARB toroidal roller bearings

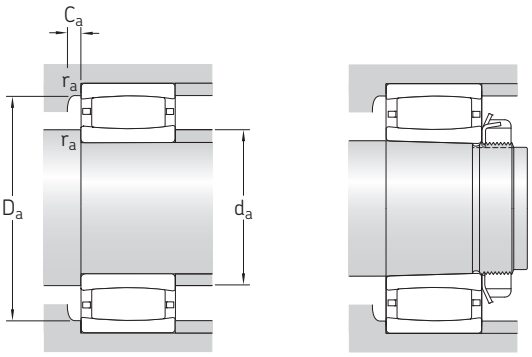
d **380 – 630** mm




Cylindrical bore Tapered bore

| Principal dimensions | | | Basic load ratings dynamic | static | Fatique load limit | Speed ratings Reference speed | Limiting speed | Mass | Designations Bearing with cylindrical bore | tapered bore |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **380** | 560 | 135 | 3 000 | 5 200 | 380 | 900 | 1 200 | 110 | C 3076 M | C 3076 KM |
| | 620 | 194 | 4 400 | 7 200 | 520 | 750 | 1 000 | 243 | C 3176 MB | C 3176 KMB |
| **400** | 540 | 106 | 2 120 | 4 000 | 290 | 900 | 1 300 | 66,5 | C 3980 KM | – |
| | 600 | 148 | 3 650 | 6 200 | 450 | 800 | 1 100 | 145 | ▸ C 3080 M | C 3080 KM |
| | 650 | 200 | 4 800 | 8 300 | 585 | 700 | 950 | 258 | C 3180 M | C 3180 KM |
| **420** | 560 | 106 | 2 160 | 4 250 | 310 | 850 | 1 200 | 72 | C 3984 M | C 3984 KM |
| | 620 | 150 | 3 800 | 6 400 | 455 | 800 | 1 100 | 150 | C 3084 M | C 3084 KM |
| | 700 | 224 | 6 000 | 10 400 | 720 | 670 | 900 | 355 | C 3184 M | C 3184 KM |
| **440** | 650 | 157 | 3 750 | 6 400 | 450 | 750 | 1 000 | 190 | C 3088 MB | C 3088 KMB |
| | 720 | 226 | 6 700 | 11 400 | 780 | 630 | 850 | 385 | C 3188 MB | C 3188 KMB |
| | 720 | 280 | 7 500 | 12 900 | 900 | 500 | 670 | 471 | C 4188 MB | C 4188 K30MB |
| **460** | 680 | 163 | 4 000 | 7 500 | 520 | 700 | 950 | 205 | C 3092 M | C 3092 KM |
| | 760 | 240 | 6 800 | 12 000 | 815 | 600 | 800 | 435 | C 3192 M | C 3192 KM |
| | 760 | 300 | 8 650 | 15 000 | 1 020 | 480 | 630 | 571 | C 4192 MB | C 4192 K30MB |
| | 830 | 296 | 9 300 | 15 000 | 1 000 | 530 | 750 | 735 | C 3292 MB | C 3292 KMB |
| **480** | 650 | 128 | 3 100 | 6 100 | 425 | 750 | 1 000 | 120 | C 3996 M | – |
| | 700 | 165 | 4 050 | 7 800 | 530 | 670 | 900 | 215 | C 3096 M | C 3096 KM |
| | 790 | 248 | 6 950 | 12 500 | 830 | 560 | 750 | 523 | C 3196 MB | C 3196 KMB |
| **500** | 670 | 128 | 3 150 | 6 300 | 430 | 700 | 950 | 125 | C 39/500 M | C 39/500 KM |
| | 720 | 167 | 4 250 | 8 300 | 560 | 630 | 900 | 225 | C 30/500 M | – |
| | 830 | 264 | 7 500 | 12 700 | 850 | 530 | 750 | 560 | C 31/500 M | C 31/500 KM |
| | 830 | 325 | 9 800 | 17 600 | 1 160 | 430 | 560 | 710 | C 41/500 M | C 41/500 K30M |
| **530** | 780 | 185 | 5 100 | 9 500 | 630 | 600 | 800 | 300 | C 30/530 M | ▸ C 30/530 KM |
| | 870 | 272 | 8 800 | 15 600 | 1 020 | 500 | 670 | 636 | C 31/530 M | C 31/530 KM |
| **560** | 750 | 140 | 3 600 | 7 350 | 490 | 600 | 850 | 175 | C 39/560 M | C 39/560 KM |
| | 820 | 195 | 5 600 | 11 000 | 720 | 530 | 750 | 350 | C 30/560 M | C 30/560 KM |
| | 920 | 355 | 10 400 | 19 600 | 1 270 | 380 | 500 | 989 | C 41/560 K30MB | – |
| **600** | 870 | 200 | 6 300 | 12 200 | 780 | 500 | 700 | 395 | C 30/600 M | C 30/600 KM |
| | 980 | 300 | 10 200 | 18 000 | 1 140 | 430 | 600 | 929 | C 31/600 MB | C 31/600 KMB |
| | 980 | 375 | 12 900 | 23 200 | 1 460 | 340 | 450 | 1 150 | C 41/600 MB | C 41/600 K30MB |
| **630** | 850 | 165 | 4 650 | 10 000 | 640 | 530 | 700 | 275 | C 39/630 M | C 39/630 KM |
| | 920 | 212 | 6 800 | 12 900 | 815 | 480 | 670 | 470 | C 30/630 M | ▸ C 30/630 KM |
| | 1 030 | 315 | 11 800 | 20 800 | 1 290 | 400 | 560 | 1 090 | C 31/630 MB | C 31/630 KMB |

**SKF Explorer bearing**
▸ Popular item

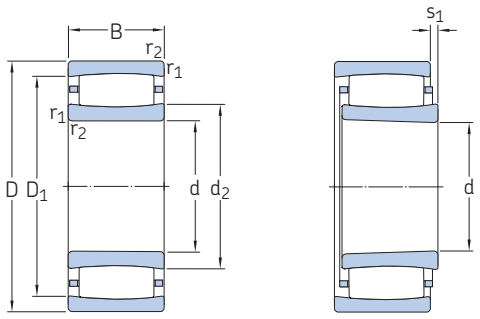



| Dimensions | | | | | | Abutment and fillet dimensions | | | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_2$ ≈ | $D_1$ ≈ | $r_{1,2}$ min. | $s_1$[1] max. | $s_2$[1] max. | $d_a$ min. | $d_a$ max. | $D_a$ min. | $D_a$ max. | $C_a$[2] min. | $r_a$ max. | $k_1$ | $k_2$ |
| mm | | | | | | mm | | | | | | – | |
| **380** | 431 | 512 | 5 | 27 | – | 398 | 462 | 491 | 542 | 2 | 4 | 0,12 | 0,1 |
| | 446 | 551 | 5 | 25,4 | – | 400 | 445 | 526 | 600 | 7,3 | 4 | 0 | 0,106 |
| **400** | 439 | 501 | 4 | 21 | – | – | – | 487 | 525 | 1,8 | 3 | 0,13 | 0,098 |
| | 457 | 554 | 5 | 30,6 | – | 418 | 486 | 523 | 582 | 2,1 | 4 | 0,121 | 0,099 |
| | 488 | 589 | 6 | 50,7 | – | 426 | 525 | 566 | 624 | 4 | 5 | 0,106 | 0,109 |
| **420** | 461 | 523 | 4 | 21,3 | – | 435 | 484 | 510 | 545 | 1,8 | 3 | 0,132 | 0,098 |
| | 475 | 571 | 5 | 32,6 | – | 438 | 513 | 544 | 602 | 2,2 | 4 | 0,12 | 0,1 |
| | 507 | 618 | 6 | 34,8 | – | 446 | 544 | 592 | 674 | 3,8 | 5 | 0,113 | 0,098 |
| **440** | 490 | 587 | 6 | 24,6 | – | 463 | 489 | 563 | 627 | 1,7 | 5 | 0 | 0,105 |
| | 522 | 647 | 6 | 16 | – | 466 | 521 | 613 | 694 | 7,5 | 5 | 0 | 0,099 |
| | 510 | 637 | 6 | 27,8 | – | 466 | 509 | 606 | 694 | 7,3 | 5 | 0 | 0,1 |
| **460** | 539 | 624 | 6 | 33,5 | – | 483 | 570 | 604 | 657 | 2,3 | 5 | 0,114 | 0,108 |
| | 559 | 679 | 7,5 | 51 | – | 492 | 603 | 651 | 728 | 4,2 | 6 | 0,108 | 0,105 |
| | 537 | 671 | 7,5 | 23,3 | – | 477 | 536 | 638 | 728 | 12,6 | 6 | 0 | 0,097 |
| | 555 | 720 | 7,5 | 32,4 | – | 492 | 554 | 676 | 798 | 11 | 6 | 0 | 0,106 |
| **480** | 528 | 604 | 5 | 20,4 | – | 498 | 552 | 585 | 632 | 2 | 4 | 0,133 | 0,095 |
| | 555 | 640 | 6 | 35,5 | – | 503 | 586 | 620 | 677 | 2,3 | 5 | 0,113 | 0,11 |
| | 578 | 701 | 7,5 | 35,1 | – | 512 | 577 | 673 | 758 | 8,7 | 6 | 0 | 0,109 |
| **500** | 555 | 632 | 5 | 20,4 | – | 518 | 580 | 614 | 652 | 2 | 4 | 0,135 | 0,095 |
| | 571 | 656 | 6 | 37,5 | – | 523 | 600 | 637 | 697 | 2,3 | 5 | 0,113 | 0,111 |
| | 605 | 738 | 7,5 | 75,3 | – | 532 | 654 | 706 | 798 | -11,7 | 6 | 0,099 | 0,116 |
| | 600 | 740 | 7,5 | 46,3 | – | 532 | 637 | 721 | 798 | 5,9 | 6 | 0,115 | 0,093 |
| **530** | 601 | 705 | 6 | 35,7 | – | 553 | 638 | 681 | 757 | 2,5 | 5 | 0,12 | 0,101 |
| | 635 | 781 | 7,5 | 44,4 | – | 562 | 685 | 745 | 838 | 5,4 | 6 | 0,115 | 0,097 |
| **560** | 621 | 701 | 5 | 32,4 | – | 578 | 648 | 682 | 732 | 2,3 | 4 | 0,128 | 0,104 |
| | 659 | 761 | 6 | 45,7 | – | 583 | 696 | 736 | 797 | 2,7 | 5 | 0,116 | 0,106 |
| | 664 | 802 | 7,5 | 23 | – | – | – | 770 | 888 | 13,8 | 6 | 0 | 0,101 |
| **600** | 692 | 805 | 6 | 35,9 | – | 623 | 728 | 776 | 847 | 2,7 | 5 | 0,125 | 0,098 |
| | 705 | 871 | 7,5 | 26,1 | – | 632 | 704 | 827 | 948 | 5,1 | 6 | 0 | 0,107 |
| | 697 | 869 | 7,5 | 24,6 | – | 632 | 696 | 823 | 948 | 5,5 | 6 | 0 | 0,097 |
| **630** | 699 | 785 | 6 | 35,5 | – | 653 | 723 | 766 | 827 | 2,4 | 5 | 0,121 | 0,11 |
| | 716 | 840 | 7,5 | 48,1 | – | 658 | 759 | 807 | 892 | 2,9 | 6 | 0,118 | 0,104 |
| | 741 | 916 | 7,5 | 23,8 | – | 662 | 740 | 868 | 998 | 5,7 | 6 | 0 | 0,102 |

[1] → *Verification of axial displacement*, page 850
[2] → *Free space on both sides of the bearing*, page 852, negative values used only for calculation

## 10.1 CARB toroidal roller bearings

d **670 – 1 700** mm

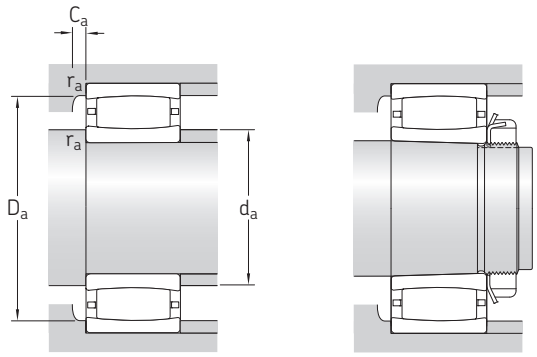



Cylindrical bore Tapered bore

| Principal dimensions | | | Basic load ratings dynamic | static | Fatique load limit | Speed ratings Reference speed | Limiting speed | Mass | Designations Bearing with cylindrical bore | tapered bore |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | | |
| mm | | | kN | | kN | r/min | | kg | – | |
| **670** | 980 | 230 | 8 150 | 16 300 | 1 000 | 430 | 600 | 590 | C 30/670 M | ▸ C 30/670 KM |
| | 1 090 | 336 | 11 800 | 21 200 | 1 290 | 380 | 500 | 1 300 | C 31/670 MB | C 31/670 KMB |
| | 1 090 | 412 | 16 000 | 29 000 | 1 760 | 300 | 400 | 1 570 | C 41/670 MB | C 41/670 K30MB |
| **710** | 950 | 180 | 6 000 | 12 500 | 780 | 450 | 630 | 360 | C 39/710 M | C 39/710 KM |
| | 1 030 | 236 | 8 800 | 17 300 | 1 060 | 400 | 560 | 655 | C 30/710 M | C 30/710 KM |
| | 1 030 | 315 | 10 600 | 21 600 | 1 320 | 320 | 430 | 865 | C 40/710 M | C 40/710 K30M |
| | 1 150 | 345 | 13 400 | 25 500 | 1 530 | 340 | 480 | 1 470 | C 31/710 MB | C 31/710 KMB |
| **750** | 1 000 | 185 | 6 100 | 13 400 | 815 | 430 | 560 | 410 | C 39/750 M | C 39/750 KM |
| | 1 090 | 250 | 9 500 | 19 300 | 1 160 | 380 | 530 | 838 | C 30/750 MB | ▸ C 30/750 KMB |
| | 1 220 | 365 | 16 000 | 30 500 | 1 800 | 320 | 450 | 1 800 | C 31/750 MB | C 31/750 KMB |
| **800** | 1 060 | 195 | 6 400 | 14 600 | 880 | 380 | 530 | 480 | C 39/800 M | – |
| | 1 150 | 258 | 9 300 | 19 300 | 1 140 | 360 | 480 | 941 | C 30/800 MB | C 30/800 KMB |
| **850** | 1 120 | 200 | 7 350 | 16 300 | 960 | 360 | 480 | 540 | C 39/850 M | C 39/850 KM |
| | 1 220 | 272 | 11 600 | 24 500 | 1 430 | 320 | 450 | 1 110 | C 30/850 MB | C 30/850 KMB |
| **900** | 1 280 | 280 | 12 700 | 26 500 | 1 530 | 300 | 400 | 1 200 | C 30/900 MB | C 30/900 KMB |
| **950** | 1 360 | 300 | 13 200 | 28 500 | 1 600 | 280 | 380 | 1 480 | C 30/950 MB | – |
| **1 000** | 1 420 | 308 | 13 700 | 30 500 | 1 700 | 260 | 360 | 1 680 | C 30/1000 MB | – |
| | 1 580 | 462 | 20 400 | 45 500 | 2 500 | 220 | 300 | 3 800 | C 31/1000 MB | C 31/1000 KMB |
| **1 060** | 1 400 | 250 | 11 000 | 26 000 | 1 430 | 260 | 360 | 1 120 | C 39/1060 MB | C 39/1060 KMB |
| **1 120** | 1 460 | 335 | 13 200 | 31 500 | 1 700 | 200 | 260 | 1 630 | C 49/1120 MB1 | – |
| **1 180** | 1 540 | 272 | 13 400 | 33 500 | 1 800 | 220 | 300 | 1 400 | ▸ C 39/1180 MB | – |
| **1 500** | 1 950 | 335 | 19 600 | 48 000 | 2 400 | 140 | 200 | 2 710 | ▸ C 39/1500 MB | – |
| **1 700** | 2 180 | 355 | 24 000 | 62 000 | 3 000 | 110 | 150 | 3 510 | C 39/1700 MB | – |



**SKF Explorer bearing**
▸ Popular item

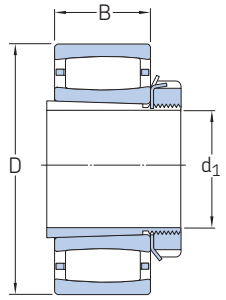



| Dimensions | | | | | | Abutment and fillet dimensions | | | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_2$ ≈ | $D_1$ ≈ | $r_{1,2}$ min. | $s_1$[1] max. | $s_2$[1] max. | $d_a$ min. | $d_a$ max. | $D_a$ min. | $D_a$ max. | $C_a$[2] min. | $r_a$ max. | $k_1$ | $k_2$ |
| mm | | | | | | mm | | | | | | – | |
| **670** | 775 | 905 | 7,5 | 41,1 | – | 698 | 820 | 874 | 952 | 2,9 | 6 | 0,121 | 0,101 |
| | 792 | 964 | 7,5 | 41 | – | 702 | 791 | 922 | 1 058 | 11,4 | 6 | 0 | 0,109 |
| | 779 | 967 | 7,5 | 37,2 | – | 702 | 778 | 920 | 1 058 | 16,7 | 6 | 0 | 0,097 |
| **710** | 772 | 877 | 6 | 30,7 | – | 733 | 797 | 847 | 927 | 2,7 | 5 | 0,131 | 0,098 |
| | 806 | 946 | 7,5 | 47,3 | – | 738 | 853 | 908 | 1 002 | 3,2 | 6 | 0,119 | 0,104 |
| | 803 | 935 | 7,5 | 51,2 | – | 738 | 843 | 911 | 1 002 | 4,4 | 6 | 0,113 | 0,101 |
| | 842 | 1 013 | 9,5 | 47,8 | – | 750 | 841 | 973 | 1 110 | 11,1 | 8 | 0 | 0,111 |
| **750** | 830 | 934 | 6 | 35,7 | – | 773 | 856 | 908 | 977 | 2,7 | 5 | 0,131 | 0,101 |
| | 854 | 993 | 7,5 | 28,6 | – | 778 | 852 | 961 | 1 062 | 7,4 | 6 | 0 | 0,11 |
| | 884 | 1 077 | 9,5 | 33 | – | 790 | 883 | 1 025 | 1 180 | 9,3 | 8 | 0 | 0,094 |
| **800** | 888 | 990 | 6 | 45,7 | – | 823 | 917 | 967 | 1 037 | 2,9 | 5 | 0,126 | 0,106 |
| | 908 | 1 048 | 7,5 | 45,9 | – | 828 | 905 | 1 020 | 1 122 | 7,2 | 6 | 0 | 0,114 |
| **850** | 940 | 1 053 | 6 | 35,9 | – | 873 | 963 | 1 025 | 1 097 | 2,9 | 5 | 0,135 | 0,098 |
| | 964 | 1 113 | 7,5 | 24 | – | 878 | 963 | 1 077 | 1 192 | 7,7 | 6 | 0 | 0,097 |
| **900** | 1 005 | 1 173 | 7,5 | 24,8 | – | 928 | 1 003 | 1 126 | 1 252 | 9 | 6 | 0 | 0,1 |
| **950** | 1 075 | 1 241 | 7,5 | 37,8 | – | 978 | 1 073 | 1 204 | 1 332 | 8,7 | 6 | 0 | 0,107 |
| **1 000** | 1 130 | 1 295 | 7,5 | 44,9 | – | 1 028 | 1 128 | 1 260 | 1 392 | 8,5 | 6 | 0 | 0,11 |
| | 1 191 | 1 372 | 12 | 70,1 | – | 1 048 | 1 189 | 1 338 | 1 532 | 15 | 10 | 0 | 0,108 |
| **1 060** | 1 168 | 1 308 | 7,5 | 38,4 | – | 1 088 | 1 164 | 1 282 | 1 372 | 6 | 6 | 0 | 0,11 |
| **1 120** | 1 225 | 1 362 | 7,5 | 76,1 | – | 1 148 | 1 220 | 1 344 | 1 432 | 47,6 | 6 | 0 | 0,12 |
| **1 180** | 1 291 | 1 439 | 7,5 | 19,6 | – | 1 208 | 1 289 | 1 405 | 1 512 | 6,2 | 6 | 0 | 0,097 |
| **1 500** | 1 636 | 1 831 | 9,5 | 35 | – | 1 534 | 1 633 | 1 788 | 1 916 | 9,3 | 8 | 0 | 0,096 |
| **1 700** | 1 841 | 2 053 | 9,5 | 40,6 | – | 1 734 | 1 837 | 2 008 | 2 146 | 8,4 | 8 | 0 | 0,103 |

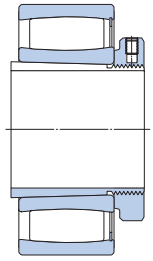
[1] → *Verification of axial displacement*, page 850
[2] → *Free space on both sides of the bearing*, page 852, negative values used only for calculation

## 10.2 CARB toroidal roller bearings on an adapter sleeve

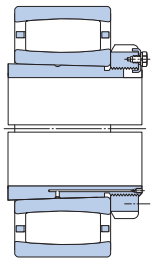
$d_1$ **25 – 410** mm



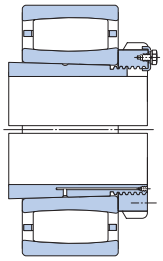

Bearing on an H .. sleeve



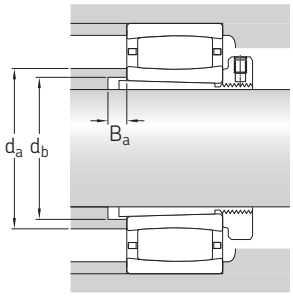
Bearing on an H .. E sleeve



Bearing on an OH .. H sleeve



Bearing on an OH .. HE sleeve




| Principal dimensions | | | Abutment and fillet dimensions | | | Mass | Designations | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Bearing + sleeve | Bearing[1] | Sleeve[2] |
| $d_1$ | D | B | $d_a$ max. | $d_b$ min. | $B_a$ min. | | | |
| mm | | | mm | | | kg | – | |
| **25** | 62 | 20 | 37,4 | 33 | 5 | 0,37 | C 2206 KTN9 | H 306 E |
| **30** | 72 | 23 | 44,8 | 39 | 5 | 0,59 | C 2207 KTN9 | H 307 E |
| **35** | 80 | 23 | 52,4 | 44 | 5 | 0,69 | C 2208 KTN9 | H 308 E |
| **40** | 85 | 23 | 55,6 | 50 | 7 | 0,76 | ▸ C 2209 KTN9 | H 309 E |
| **45** | 90 | 23 | 61,9 | 55 | 9 | 0,85 | ▸ C 2210 KTN9 | H 310 E |
| **50** | 100 | 25 | 65,8 | 60 | 10 | 1,1 | ▸ C 2211 KTN9 | H 311 E |
| | 100 | 25 | 80 | 60 | 10 | 1,15 | C 2211 KV | H 311 E |
| **55** | 110 | 28 | 77,1 | 65 | 9 | 1,45 | ▸ C 2212 KTN9 | H 312 E |
| | 110 | 28 | 91 | 65 | 9 | 1,5 | C 2212 KV | H 312 |
| **60** | 120 | 31 | 79 | 70 | 8 | 1,8 | ▸ C 2213 KTN9 | H 313 E |
| | 120 | 31 | 97 | 70 | 8 | 1,9 | C 2213 KV | H 313 |
| | 125 | 31 | 83,7 | 75 | 9 | 2,1 | C 2214 KTN9 | H 314 E |
| | 150 | 51 | 106 | 76 | 6 | 5,1 | C 2314 K | H 2314 |
| **65** | 130 | 31 | 98,3 | 80 | 12 | 2,3 | ▸ C 2215 K | H 315 E |
| | 130 | 31 | 107 | 80 | 12 | 2,4 | C 2215 KV | H 315 |
| | 160 | 55 | 113 | 82 | 6 | 6,2 | ▸ C 2315 K | H 2315 |
| **70** | 140 | 33 | 107 | 85 | 12 | 2,9 | ▸ C 2216 K | H 316 E |
| | 140 | 33 | 116 | 85 | 12 | 3 | C 2216 KV | H 316 |
| | 170 | 58 | 119 | 88 | 6 | 7,4 | ▸ C 2316 K | H 2316 |
| **75** | 150 | 36 | 114 | 91 | 12 | 3,7 | ▸ C 2217 K | H 317 E |
| | 180 | 60 | 126 | 94 | 7 | 8,5 | ▸ C 2317 K | H 2317 |
| **80** | 160 | 40 | 124 | 96 | 10 | 4,5 | ▸ C 2218 K | H 318 E |
| | 190 | 64 | 138 | 100 | 7 | 10 | C 2318 K | H 2318 |
| **85** | 200 | 67 | 138 | 105 | 7 | 11,5 | C 2319 K | H 2319 |
| **90** | 180 | 46 | 134 | 108 | 8 | 6,3 | ▸ C 2220 K | H 320 E |
| | 215 | 73 | 150 | 110 | 7 | 14,5 | ▸ C 2320 K | H 2320 |
| **100** | 200 | 53 | 150 | 118 | 6 | 8,8 | ▸ C 2222 K | H 322 E |
| **110** | 215 | 76 | 162 | 131 | 17 | 14 | ▸ C 3224 K | H 2324 L |

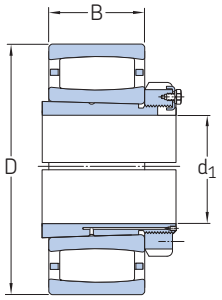
**SKF Explorer bearing**
▸ Popular item
[1] For additional bearing data → **product table**, page 856
[2] For additional adapter sleeve data → **product table**, page 1072

| Principal dimensions | | | Abutment and fillet dimensions | | | Mass | Designations | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Bearing + sleeve | Bearing[1] | Sleeve[2] |
| $d_1$ | D | B | $d_a$ max. | $d_b$ min. | $B_a$ min. | | | |
| mm | | | mm | | | kg | – | |
| **115** | 230 | 64 | 171 | 138 | 8 | 14 | C 2226 K | H 3126 L |
| | 280 | 93 | 201 | 142 | 8 | 31,5 | C 2326 K/VE240 | H 2326 |
| **125** | 250 | 68 | 191 | 149 | 8 | 17,5 | ▸ C 2228 K | H 3128 L |
| **135** | 225 | 56 | 190 | 158 | 8 | 11,5 | C 3030 KV | H 3030 |
| | 250 | 80 | 196 | 160 | 8 | 20 | C 3130 K | H 3130 L |
| | 270 | 73 | 202 | 160 | 15 | 23 | C 2230 K | H 3130 L |
| **140** | 270 | 86 | 208 | 170 | 8 | 27 | C 3132 K | H 3132 L |
| | 290 | 104 | 218 | 174 | 18 | 36,5 | C 3232 K | H 2332 L |
| **150** | 310 | 86 | 233 | 180 | 10 | 35 | C 2234 K | H 3134 L |
| **160** | 280 | 74 | 223 | 189 | 9 | 23 | C 3036 K | H 3036 |
| | 300 | 96 | 231 | 191 | 8 | 34 | C 3136 K | H 3136 L |
| | 320 | 112 | 249 | 195 | 22 | 47 | C 3236 K | H 2336 |
| **170** | 290 | 75 | 238 | 199 | 10 | 24 | C 3038 K | H 3038 |
| | 320 | 104 | 267 | 202 | 9 | 45 | C 3138 KV | H 3138 |
| | 340 | 92 | 254 | 202 | 21 | 43 | C 2238 K | H 3138 |
| **180** | 310 | 82 | 250 | 210 | 10 | 30 | C 3040 K | H 3040 |
| | 340 | 112 | 264 | 212 | 9 | 50,5 | ▸ C 3140 K | H 3140 |
| **200** | 340 | 90 | 274 | 231 | 10 | 37 | ▸ C 3044 K | OH 3044 H |
| | 370 | 120 | 290 | 233 | 10 | 64 | C 3144 K | OH 3144 HTL |
| | 400 | 108 | 298 | 233 | 22 | 69 | C 2244 K | OH 3144 H |
| **220** | 360 | 92 | 293 | 251 | 11 | 42,5 | C 3048 K | OH 3048 H |
| | 400 | 128 | 309 | 254 | 11 | 77 | C 3148 K | OH 3148 HTL |
| **240** | 400 | 104 | 326 | 272 | 11 | 59 | C 3052 K | OH 3052 H |
| | 440 | 144 | 341 | 276 | 11 | 105 | ▸ C 3152 K | OH 3152 HTL |
| **260** | 420 | 106 | 352 | 292 | 12 | 65 | C 3056 K | OH 3056 H |
| | 460 | 146 | 363 | 296 | 12 | 115 | C 3156 K | OH 3156 HTL |
| **280** | 460 | 118 | 376 | 313 | 12 | 91 | C 3060 KM | OH 3060 H |
| | 500 | 160 | 392 | 318 | 12 | 150 | C 3160 K | OH 3160 H |
| **300** | 480 | 121 | 398 | 334 | 13 | 95 | C 3064 KM | OH 3064 H |
| | 540 | 176 | 411 | 338 | 13 | 190 | C 3164 KM | OH 3164 H |
| **320** | 520 | 133 | 425 | 355 | 14 | 125 | C 3068 KM | OH 3068 H |
| | 580 | 190 | 446 | 360 | 14 | 235 | C 3168 KM | OH 3168 H |
| **340** | 480 | 90 | 409 | 372 | 14 | 73 | C 3972 KM | OH 3972 HE |
| | 540 | 134 | 448 | 375 | 14 | 135 | C 3072 KM | OH 3072 H |
| | 600 | 192 | 464 | 380 | 14 | 250 | C 3172 KM | OH 3172 H |
| **360** | 560 | 135 | 462 | 396 | 15 | 145 | C 3076 KM | OH 3076 H |
| | 620 | 194 | 445 | 401 | 15 | 290 | C 3176 KMB | OH 3176 HE |
| **380** | 540 | 106 | 461 | 413 | 15 | 105 | C 3980 KM | OH 3980 HE |
| | 600 | 148 | 486 | 417 | 15 | 175 | C 3080 KM | OH 3080 H |
| | 650 | 200 | 525 | 421 | 15 | 345 | C 3180 KM | OH 3180 H |
| **400** | 560 | 106 | 484 | 433 | 15 | 106 | C 3984 KM | OH 3984 HE |
| | 620 | 150 | 513 | 437 | 16 | 180 | C 3084 KM | OH 3084 H |
| | 700 | 224 | 544 | 443 | 16 | 395 | C 3184 KM | OH 3184 H |
| **410** | 650 | 157 | 489 | 458 | 17 | 250 | C 3088 KMB | OH 3088 HE |
| | 720 | 226 | 521 | 463 | 17 | 475 | C 3188 KMB | OH 3188 HE |

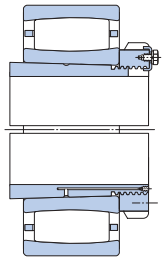
**SKF Explorer bearing**
▸ Popular item
[1] For additional bearing data → **product table**, page 856
[2] For additional adapter sleeve data → **product table**, page 1072

## 10.2 CARB toroidal roller bearings on an adapter sleeve

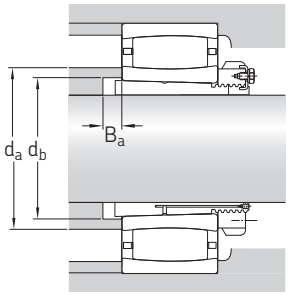
$d_1$ **430 – 1 000** mm




Bearing on an
OH .. H sleeve



Bearing on an
OH .. HE sleeve



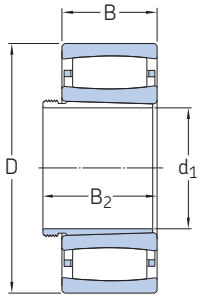

| Principal dimensions | | | Abutment and fillet dimensions | | | Mass | Designations | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Bearing + sleeve | Bearing[1] | Sleeve[2] |
| $d_1$ | D | B | $d_a$ max. | $d_b$ min. | $B_a$ min. | | | |
| mm | | | mm | | | kg | – | |
| **430** | 680 | 163 | 570 | 478 | 17 | 270 | C 3092 KM | OH 3092 H |
| | 760 | 240 | 603 | 484 | 17 | 540 | C 3192 KM | OH 3192 H |
| **450** | 700 | 165 | 586 | 499 | 18 | 275 | C 3096 KM | OH 3096 H |
| | 790 | 248 | 577 | 505 | 18 | 620 | C 3196 KMB | OH 3196 HE |
| **470** | 670 | 128 | 580 | 516 | 18 | 195 | C 39/500 KM | OH 39/500 HE |
| | 830 | 264 | 654 | 527 | 18 | 690 | C 31/500 KM | OH 31/500 H |
| **500** | 780 | 185 | 638 | 551 | 20 | 390 | C 30/530 KM | OH 30/530 H |
| | 870 | 272 | 685 | 558 | 20 | 770 | C 31/530 KM | OH 31/530 H |
| **530** | 750 | 140 | 648 | 577 | 20 | 260 | C 39/560 KM | OH 39/560 HE |
| | 820 | 195 | 696 | 582 | 20 | 440 | C 30/560 KM | OH 30/560 H |
| | 980 | 300 | 704 | 629 | 22 | 1 100 | C 31/600 KMB | OH 31/600 HE |
| **560** | 870 | 200 | 728 | 623 | 22 | 520 | C 30/600 KM | OH 30/600 H |
| **600** | 850 | 165 | 723 | 650 | 22 | 420 | C 39/630 KM | OH 39/630 HE |
| | 920 | 212 | 759 | 654 | 22 | 635 | C 30/630 KM | OH 30/630 H |
| | 1 030 | 315 | 740 | 663 | 22 | 1 280 | C 31/630 KMB | OH 31/630 HE |
| **630** | 980 | 230 | 820 | 696 | 22 | 750 | C 30/670 KM | OH 30/670 H |
| | 1 090 | 336 | 791 | 705 | 22 | 1 550 | C 31/670 KMB | OH 31/670 HE |
| **670** | 950 | 180 | 797 | 732 | 26 | 520 | C 39/710 KM | OH 39/710 HE |
| | 1 030 | 236 | 853 | 736 | 26 | 865 | C 30/710 KM | OH 30/710 H |
| | 1 150 | 345 | 841 | 745 | 26 | 1 800 | C 31/710 KMB | OH 31/710 HE |
| **710** | 1 000 | 185 | 856 | 772 | 26 | 590 | C 39/750 KM | OH 39/750 HE |
| | 1 090 | 250 | 852 | 778 | 26 | 1 000 | C 30/750 KMB | OH 30/750 HE |
| | 1 220 | 365 | 883 | 787 | 26 | 2 150 | C 31/750 KMB | OH 31/750 HE |
| **750** | 1 150 | 258 | 905 | 829 | 28 | 1 150 | C 30/800 KMB | OH 30/800 HE |
| **800** | 1 120 | 200 | 963 | 872 | 28 | 785 | C 39/850 KM | OH 39/850 HE |
| | 1 220 | 272 | 963 | 880 | 28 | 1 050 | C 30/850 KMB | OH 30/850 HE |
| **850** | 1 280 | 280 | 1 003 | 931 | 30 | 1 520 | C 30/900 KMB | OH 30/900 HE |
| **950** | 1 580 | 462 | 1 189 | 1 047 | 33 | 4 300 | C 31/1000 KMB | OH 31/1000 HE |
| **1 000** | 1 400 | 250 | 1 164 | 1 087 | 33 | 1 610 | C 39/1060 KMB | OH 39/1060 HE |



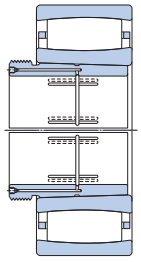
SKF Explorer bearing
[1] For additional bearing data → **product table**, page 856
[2] For additional adapter sleeve data → **product table**, page 1072

## 10.3 CARB toroidal roller bearings on a withdrawal sleeve

$d_1$ **35 – 340** mm




Bearing on an AH sleeve



Bearing on an AOH sleeve

| Principal dimensions | | | | Mass | Designations | |
|---|---|---|---|---|---|---|
| | | | | Bearing + sleeve | Bearing[1] | Sleeve[2] |
| $d_1$ | D | B | $B_2$[3] ≈ | | | |
| mm | | | | kg | – | |
| **35** | 80 | 23 | 32 | 0,59 | C 2208 KTN9 | AH 308 |
| **40** | 85 | 23 | 34 | 0,67 | ▸ C 2209 KTN9 | AH 309 |
| **45** | 90 | 23 | 38 | 0,72 | ▸ C 2210 KTN9 | AHX 310 |
| **50** | 100 | 25 | 40 | 0,95 | ▸ C 2211 KTN9 | AHX 311 |
| | 100 | 25 | 40 | 0,97 | C 2211 KV | AHX 311 |
| **55** | 110 | 28 | 43 | 1,3 | ▸ C 2212 KTN9 | AHX 312 |
| | 110 | 28 | 43 | 1,35 | C 2212 KV | AHX 312 |
| **60** | 120 | 31 | 45 | 1,6 | ▸ C 2213 KTN9 | AH 313 G |
| | 120 | 31 | 45 | 1,7 | C 2213 KV | AH 313 G |
| **65** | 125 | 31 | 47 | 1,7 | C 2214 KTN9 | AH 314 G |
| | 150 | 51 | 68 | 4,65 | C 2314 K | AHX 2314 G |
| **70** | 130 | 31 | 49 | 1,9 | ▸ C 2215 K | AH 315 G |
| | 130 | 31 | 49 | 1,95 | C 2215 KV | AH 315 G |
| | 160 | 55 | 72 | 5,65 | ▸ C 2315 K | AHX 2315 G |
| **75** | 140 | 33 | 52 | 2,35 | ▸ C 2216 K | AH 316 |
| | 140 | 33 | 52 | 2,45 | C 2216 KV | AH 316 |
| | 170 | 58 | 75 | 6,75 | ▸ C 2316 K | AHX 2316 |
| **80** | 150 | 36 | 56 | 3 | ▸ C 2217 K | AHX 317 |
| | 180 | 60 | 78 | 7,9 | ▸ C 2317 K | AHX 2317 |
| **85** | 160 | 40 | 57 | 3,75 | ▸ C 2218 K | AHX 318 |
| | 190 | 64 | 83 | 9 | C 2318 K | AHX 2318 |
| **90** | 200 | 67 | 89 | 11 | C 2319 K | AHX 2319 |
| **95** | 180 | 46 | 63 | 5,3 | ▸ C 2220 K | AHX 320 |
| | 215 | 73 | 94 | 13,5 | ▸ C 2320 K | AHX 2320 |
| **105** | 200 | 53 | 72 | 7,65 | ▸ C 2222 K | AHX 3122 |
| **115** | 180 | 60 | 82 | 5,65 | C 4024 K30V/VE240 | AH 24024 |
| | 180 | 60 | 82 | 6,2 | C 4024 K30V | AH 24024 |
| | 215 | 76 | 94 | 13 | ▸ C 3224 K | AHX 3224 G |

**SKF Explorer bearing**

▸ Popular item

1) For additional bearing data → **product table**, page 856

2) For additional withdrawal sleeve data → skf.com/go/17000-24-1

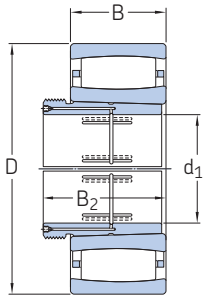
3) Width before the sleeve is driven into the bearing bore

| Principal dimensions | | | | Mass | Designations | |
|---|---|---|---|---|---|---|
| | | | | Bearing + sleeve | Bearing[1] | Sleeve[2] |
| $d_1$ | D | B | $B_2$[3] ≈ | | | |
| mm | | | | kg | – | |
| **125** | 200 | 69 | 93 | 8,7 | C 4026 K30 | AH 24026 |
| | 200 | 69 | 93 | 8,9 | C 4026 K30V | AH 24026 |
| | 230 | 64 | 82 | 12 | ▸ C 2226 K | AHX 3126 |
| | 280 | 93 | 119 | 29 | C 2326 K/VE240 | AHX 2326 G |
| **135** | 210 | 69 | 93 | 9,5 | C 4028 K30V | AH 24028 |
| | 250 | 68 | 88 | 15,5 | ▸ C 2228 K | AHX 3128 |
| **145** | 225 | 56 | 77 | 8,9 | C 3030 KV | AHX 3030 |
| | 225 | 75 | 101 | 11,5 | C 4030 K30V | AH 24030 |
| | 250 | 80 | 101 | 16,5 | C 3130 K | AHX 3130 G |
| | 270 | 73 | 101 | 19 | C 2230 K | AHX 3130 G |
| **150** | 240 | 80 | 106 | 14,5 | C 4032 K30 | AH 24032 |
| | 240 | 80 | 106 | 15 | C 4032 K30V | AH 24032 |
| | 270 | 86 | 108 | 23 | C 3132 K | AH 3132 G |
| | 290 | 104 | 130 | 31 | C 3232 K | AH 3232 G |
| **160** | 260 | 90 | 117 | 20 | C 4034 K30V | AH 24034 |
| | 310 | 86 | 109 | 31 | C 2234 K | AH 3134 G |
| **170** | 280 | 74 | 98 | 19 | C 3036 K | AH 3036 |
| | 300 | 96 | 122 | 30 | ▸ C 3136 K | AH 3136 G |
| | 320 | 112 | 146 | 41,5 | C 3236 K | AH 3236 G |
| **180** | 290 | 75 | 102 | 20,5 | C 3038 K | AH 3038 G |
| | 320 | 104 | 131 | 39 | C 3138 KV | AH 3138 G |
| | 340 | 92 | 117 | 38 | C 2238 K | AH 2238 G |
| **190** | 310 | 82 | 108 | 25,5 | C 3040 K | AH 3040 G |
| | 340 | 112 | 140 | 45,5 | ▸ C 3140 K | AH 3140 |
| **200** | 340 | 90 | 117 | 36 | ▸ C 3044 K | AOH 3044 G |
| | 340 | 118 | 152 | 48 | C 4044 K30V | AOH 24044 |
| | 370 | 120 | 151 | 60 | ▸ C 3144 K | AOH 3144 |
| | 400 | 108 | 136 | 65,5 | C 2244 K | AOH 2244 |
| **220** | 360 | 92 | 123 | 39,5 | C 3048 K | AOH 3048 |
| | 400 | 128 | 161 | 75 | ▸ C 3148 K | AOH 3148 |
| **240** | 400 | 104 | 135 | 55,5 | C 3052 K | AOH 3052 |
| | 440 | 144 | 179 | 102 | ▸ C 3152 K | AOH 3152 G |
| **260** | 420 | 106 | 139 | 61 | C 3056 K | AOH 3056 |
| | 460 | 146 | 183 | 110 | C 3156 K | AOH 3156 G |
| **280** | 460 | 118 | 153 | 84 | C 3060 KM | AOH 3060 |
| | 460 | 160 | 202 | 110 | C 4060 K30M | AOH 24060 G |
| | 500 | 160 | 200 | 140 | C 3160 K | AOH 3160 G |
| **300** | 480 | 121 | 157 | 93 | C 3064 KM | AOH 3064 G |
| | 540 | 176 | 217 | 185 | C 3164 KM | AOH 3164 G |
| **320** | 520 | 133 | 171 | 120 | C 3068 KM | AOH 3068 G |
| | 580 | 190 | 234 | 230 | C 3168 KM | AOH 3168 G |
| **340** | 540 | 134 | 176 | 125 | C 3072 KM | AOH 3072 G |
| | 600 | 192 | 238 | 245 | C 3172 KM | AOH 3172 G |

**SKF Explorer bearing**
▸ Popular item
1) For additional bearing data → **product table**, page 856
2) For additional withdrawal sleeve data → skf.com/go/17000-24-1
3) Width before the sleeve is driven into the bearing bore

## 10.3 CARB toroidal roller bearings on a withdrawal sleeve

$d_1$ **360 – 950** mm




| Principal dimensions | | | | Mass | Designations | |
|---|---|---|---|---|---|---|
| | | | | Bearing + sleeve | Bearing[1] | Sleeve[2] |
| $d_1$ | D | B | $B_2$[3] ≈ | | | |
| mm | | | | kg | – | |
| **360** | 560 | 135 | 180 | 130 | C 3076 KM | AOH 3076 G |
| | 620 | 194 | 242 | 260 | C 3176 KMB | AOH 3176 G |
| **380** | 600 | 148 | 193 | 165 | C 3080 KM | AOH 3080 G |
| | 650 | 200 | 250 | 310 | C 3180 KM | AOH 3180 G |
| **400** | 620 | 150 | 196 | 175 | C 3084 KM | AOH 3084 G |
| | 700 | 224 | 276 | 380 | C 3184 KM | AOH 3184 G |
| **420** | 650 | 157 | 205 | 215 | C 3088 KMB | AOHX 3088 G |
| | 720 | 226 | 281 | 405 | C 3188 KMB | AOHX 3188 G |
| | 720 | 280 | 332 | 510 | C 4188 K30MB | AOH 24188 |
| **440** | 680 | 163 | 213 | 230 | C 3092 KM | AOHX 3092 G |
| | 760 | 240 | 296 | 480 | C 3192 KM | AOHX 3192 G |
| | 760 | 300 | 355 | 621 | C 4192 K30MB | AOH 24192 |
| **460** | 700 | 165 | 217 | 245 | C 3096 KM | AOHX 3096 G |
| | 790 | 248 | 307 | 545 | C 3196 KMB | AOHX 3196 G |
| **480** | 830 | 264 | 325 | 615 | C 31/500 KM | AOHX 31/500 G |
| **500** | 780 | 185 | 242 | 355 | C 30/530 KM | AOH 30/530 |
| | 870 | 272 | 337 | 720 | C 31/530 KM | AOH 31/530 |
| **530** | 820 | 195 | 252 | 415 | C 30/560 KM | AOHX 30/560 |
| | 920 | 355 | 417 | 989 | C 41/560 K30MB | AOH 241/560 G |
| **570** | 870 | 200 | 259 | 460 | C 30/600 KM | AOHX 30/600 |
| | 980 | 300 | 369 | 990 | C 31/600 KMB | AOHX 31/600 |
| | 980 | 375 | 439 | 1 270 | C 41/600 K30MB | AOHX 241/600 |
| **600** | 920 | 212 | 272 | 555 | C 30/630 KM | AOH 30/630 |
| | 1 030 | 315 | 389 | 1 180 | C 31/630 KMB | AOH 31/630 |
| **630** | 980 | 230 | 294 | 705 | C 30/670 KM | AOH 30/670 |
| | 1 090 | 336 | 409 | 1 410 | C 31/670 KMB | AOHX 31/670 |
| **670** | 1 030 | 236 | 302 | 780 | C 30/710 KM | AOHX 30/710 |
| | 1 030 | 315 | 386 | 1 010 | C 40/710 K30M | AOH 240/710 G |
| | 1 150 | 345 | 421 | 1 600 | C 31/710 KMB | AOHX 31/710 |
| **710** | 1 090 | 250 | 316 | 920 | C 30/750 KMB | AOH 30/750 |
| | 1 220 | 365 | 441 | 1 930 | C 31/750 KMB | AOH 31/750 |

**SKF Explorer bearing**

[1] For additional bearing data → **product table**, page 856

[2] For additional withdrawal sleeve data → skf.com/go/17000-24-1

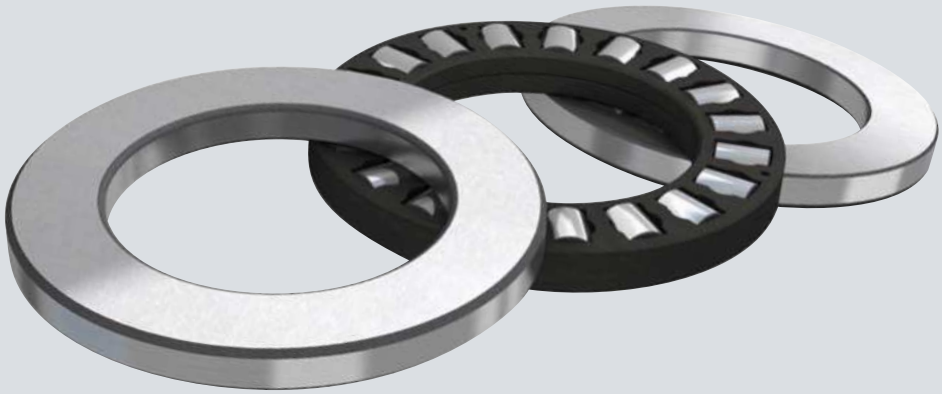
[3] Width before the sleeve is driven into the bearing bore

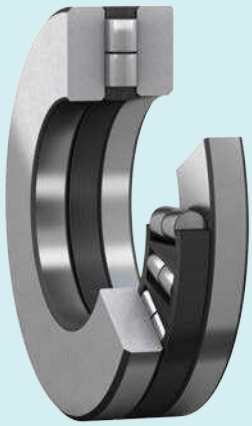
| Principal dimensions | | | | Mass | Designations | |
|---|---|---|---|---|---|---|
| | | | | Bearing + sleeve | Bearing[1] | Sleeve[2] |
| $d_1$ | D | B | $B_2$[3] ≈ | | | |
| mm | | | | kg | – | |
| **750** | 1 150 | 258 | 326 | 1 060 | C 30/800 KMB | AOH 30/800 |
| **800** | 1 220 | 272 | 343 | 1 280 | C 30/850 KMB | AOH 30/850 |
| **850** | 1 280 | 280 | 355 | 1 400 | C 30/900 KMB | AOH 30/900 |
| **950** | 1 580 | 462 | 547 | 3 950 | C 31/1000 KMB | AOH 31/1000 |



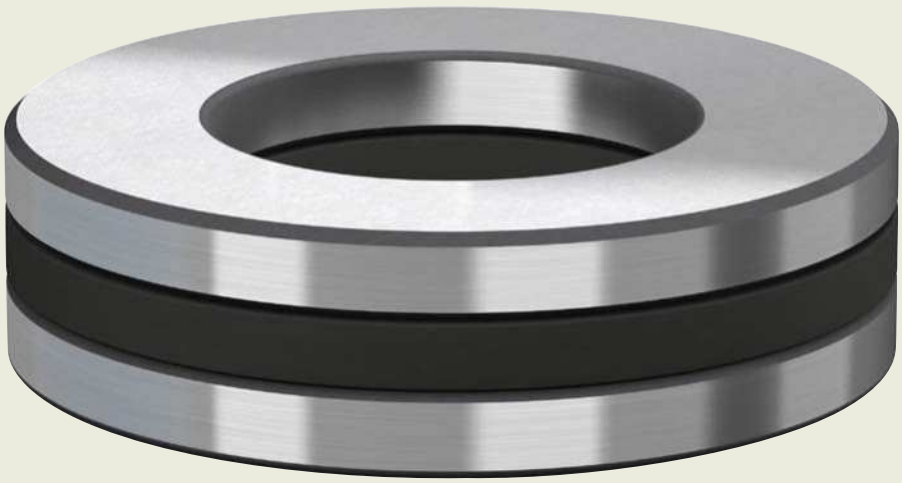
**SKF Explorer bearing**

1) For additional bearing data → **product table**, page 856
2) For additional withdrawal sleeve data → skf.com/go/17000-24-1
3) Width before the sleeve is driven into the bearing bore





# 11 Cylindrical roller thrust bearings



# 11 Cylindrical roller thrust bearings


**Designs and variants** . . . . . **879**
Single direction bearings . . . . . 879
Double direction bearings. . . . . 879
Cylindrical roller and cage thrust assemblies . . . . . 880
Bearing washers . . . . . 880
Cages. . . . . 881

**Bearing data** . . . . . **881**
(Dimension standards, tolerances, permissible misalignment)

**Loads** . . . . . **884**
(Minimum load, equivalent dynamic bearing load, equivalent static bearing load)

**Temperature limits** . . . . . **884**

**Permissible speed** . . . . . **884**

**Design considerations** . . . . . **885**
Abutment dimensions . . . . . 885
Raceways on shafts and in housings . . . . . 885

**Designation system** . . . . . **886**

**Product table**
**11.1** Cylindrical roller thrust bearings . . . . . 888

# 11 Cylindrical roller thrust bearings

## More information


**General bearing knowledge** . . . . **17**

**Bearing selection process** . . . . . **59**
Lubrication . . . . . 109
Bearing interfaces. . . . . 139
Sealing, mounting and dismounting . . . . . 193



*SKF bearing maintenance handbook* ISBN 978-91-978966-4-1


SKF cylindrical roller thrust bearings (fig. 1) are designed to accommodate heavy axial loads and impact loads. They must not be subjected to any radial load. The bearings are very stiff and require little axial space.

## Bearing features

- **Separable design**
  Shaft washer, housing washer, cylindrical roller and cage thrust assembly can be mounted separately.

- **Extended bearing service life**
  To prevent stress peaks, the roller ends are relieved slightly to modify the line contact between the raceway and rollers.

**Fig. 1**

**Cylindrical roller thrust bearing**

# Designs and variants

SKF supplies cylindrical roller thrust bearings in different series (fig. 2):

- 811 and 812 series bearings with one row of rollers
  They are mainly used in applications where thrust ball bearings do not have sufficient load carrying capacity.
- 893 and 894 series bearings with two rows of rollers

## Single direction bearings

As standard, cylindrical roller thrust bearings are available as single direction bearings (fig. 2) and can accommodate axial loads in one direction only.

## Double direction bearings

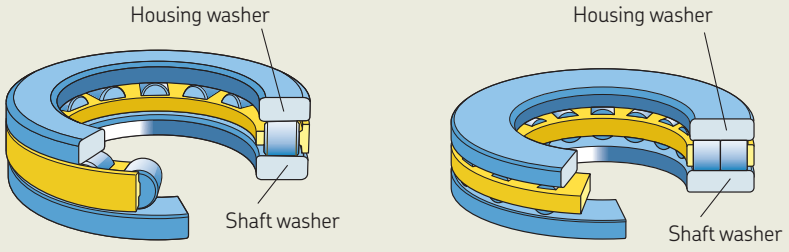
- can accommodate axial loads in both directions
- can be created by combining two cylindrical roller and cage thrust assemblies and two bearing washers with an intermediate washer
  Depending on the design, an intermediate washer can be shaft or housing centred (fig. 3).

Intermediate washers must have the same surface finish and hardness as bearing washers. SKF does not supply intermediate washers, but provides material specifications and dimensional data on request.

For additional information, refer to *Design considerations*, page 885.

**Fig. 2**

**Single direction bearings**

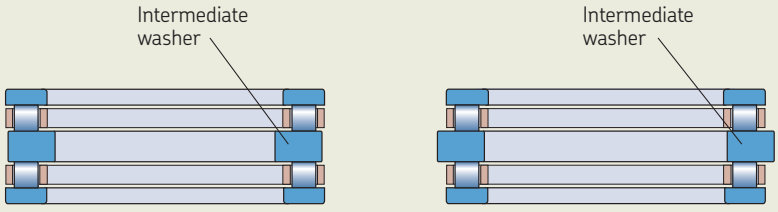



Single row, 811 and 812 series

Double row, 893 and 894 series

**Fig. 3**

**Double direction bearings**




Shaft centred

Housing centred

# Cylindrical roller and cage thrust assemblies

- are identified by the prefix K (**fig. 4**)
- can accommodate axial loads in one direction only
- can be combined with washers in the WS, GS and LS series (*Bearing washers*)
- can be used without washers in applications where:
  - adjacent components can serve as raceways
  - bearing arrangements with a low axial section height are required

# Bearing washers

SKF can also supply the components of cylindrical roller thrust bearings also separately. Additional to cylindrical roller and cage thrust assemblies the included bearing washers (**fig. 5**) are listed in the **product table**, **page 888**).

## Shaft washers

- are identified by the prefix WS
- are made of hardened carbon chromium bearing steel
- have a precision-ground raceway surface
- have a ground bore

## Housing washers

- are identified by the prefix GS
- are made of hardened carbon chromium bearing steel
- have a precision-ground raceway surface
- have a ground outside surface

SKF recommends using both of these washers in high-speed applications where accurate centring of the bearing washers is required.

## LS series universal washers

- can be used as both shaft or housing washers for bearings in the 811 series
- are used for applications where accurate centring of the bearing washers is not necessary
- are used where low speeds are involved

For additional information about LS series washers, refer to *Needle roller thrust bearings*, **page 895**.

**Fig. 4**

**Cylindrical roller and cage thrust assembly**

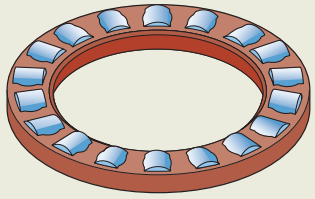
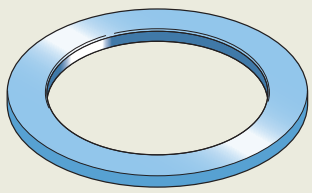
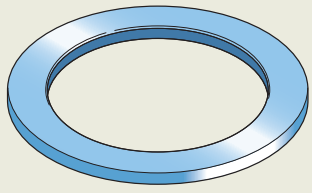


**Fig. 5**

**Bearing washers**



Shaft washer



Housing washer

# Cages

SKF cylindrical roller thrust bearings are fitted with one of the cages shown in table 1.

When used at high temperatures, some lubricants can have a detrimental effect on polyamide cages. For additional information about the suitability of cages, refer to *Cages*, page 187.

**Table 1**

**Cages for cylindrical roller thrust bearings**

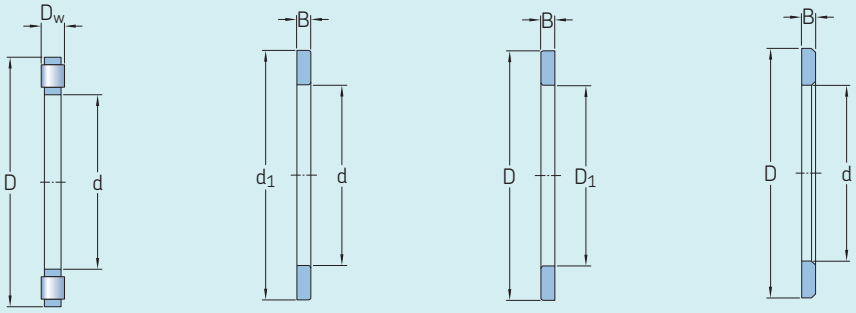
| | | |
|---|---|---|
| | | |
| **Materials** | Glass fibre reinforced PA66 | Machined brass |
| **Suffix** | TN | M |

# Bearing data

| | |
|---|---|
| **Dimension standards** | Boundary dimensions: ISO 104 |
| **Tolerances** | Normal<br>Check availability of P5 tolerance class for larger bearings<br>Values: ISO 199 (table 10, page 46) |
| For additional information<br>→ page 35 | Except for components (table 2, page 882):<br>• Values (table 3, page 883)<br>• Variation of gauge lot diameter of the rollers: ISO 12297 |
| **Permissible misalignment** | Cannot tolerate any misalignment. |

Table 2

**Tolerances for cylindrical roller thrust bearing components**




K WS GS LS

| Bearing component<br>Dimensions | | Tolerance, tolerance class[1], standard |
|---|---|---|
| **Cylindrical roller and cage thrust assemblies, K** | | |
| Bore diameter | d | E11 |
| Outside diameter | D | a13 |
| Roller diameter | $D_w$ | ISO 12297 |
| **Shaft washers, WS** | | |
| Bore diameter | d | Normal, ISO 199 |
| Outside diameter | $d_1$ | – |
| Thickness | B | h11 |
| Axial run-out | $s_i$ | Normal, ISO 199 |
| **Housing washers, GS** | | |
| Outside diameter | D | Normal, ISO 199 |
| Bore diameter | $D_1$ | – |
| Thickness | B | h11 |
| Axial run-out | $s_e$ | Normal, ISO 199 |
| **Universal washers, LS** | | |
| Bore diameter | d | E12 |
| Outside diameter | D | a12 |
| Thickness | B | h11 |
| Axial run-out | $s_i$ | Normal, ISO 199 |

[1] The envelope requirement (symbol Ⓔ from ISO 14405-1) is not shown but applies to all tolerance classes.

Table 3

**ISO tolerance classes**

| **Nominal dimension** | | **a12**Ⓔ Deviations | | **a13**Ⓔ Deviations | | **E11**Ⓔ Deviations | | **E12**Ⓔ Deviations | | **h11**Ⓔ Deviations | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| > | ≤ | U | L | U | L | U | L | U | L | U | L |
| mm | | µm | | µm | | µm | | µm | | µm | |
| **–** | **3** | – | – | – | – | – | – | – | – | 0 | –60 |
| **3** | **6** | – | – | – | – | – | – | – | – | 0 | –75 |
| **6** | **10** | – | – | – | – | – | – | – | – | 0 | –90 |
| **10** | **18** | – | – | – | – | +142 | +32 | +212 | +32 | 0 | –110 |
| **18** | **30** | –300 | –510 | –300 | –630 | +170 | +40 | +250 | +40 | 0 | –130 |
| **30** | **40** | –310 | –560 | –310 | –700 | +210 | +50 | +300 | +50 | – | – |
| **40** | **50** | –320 | –570 | –320 | –710 | +210 | +50 | +300 | +50 | – | – |
| **50** | **65** | –340 | –640 | –340 | –800 | +250 | +60 | +360 | +60 | – | – |
| **65** | **80** | –360 | –660 | –360 | –820 | +250 | +60 | +360 | +60 | – | – |
| **80** | **100** | –380 | –730 | –380 | –920 | +292 | +72 | +422 | +72 | – | – |
| **100** | **120** | –410 | –760 | –410 | –950 | +292 | +72 | +422 | +72 | – | – |
| **120** | **140** | –460 | –860 | –460 | –1 090 | +335 | +85 | +485 | +85 | | |
| **140** | **160** | –520 | –920 | –520 | –1 150 | +335 | +85 | +485 | +85 | – | – |
| **160** | **180** | –580 | –980 | –580 | –1 210 | +335 | +85 | – | – | – | – |
| **180** | **200** | –660 | –1 120 | –660 | –1 380 | +390 | +100 | – | – | – | – |
| **200** | **225** | – | – | –740 | –1 460 | +390 | +100 | – | – | – | – |
| **225** | **250** | – | – | –820 | –1 540 | +390 | +100 | – | – | – | – |
| **250** | **280** | – | – | –920 | –1 730 | +430 | +110 | – | – | – | – |
| **280** | **315** | – | – | –1 050 | –1 860 | +430 | +110 | – | – | – | – |
| **315** | **355** | – | – | –1 200 | –2 090 | +485 | +125 | – | – | – | – |
| **355** | **400** | – | – | –1 350 | –2 240 | +485 | +125 | – | – | – | – |
| **400** | **450** | – | – | –1 500 | –2 470 | +535 | +135 | – | – | – | – |
| **450** | **500** | – | – | –1 650 | –2 620 | +535 | +135 | – | – | – | – |
| **500** | **630** | – | – | –1 900 | –3 000 | +585 | +145 | – | – | – | – |
| **630** | **800** | – | – | –2 100 | –3 350 | – | – | – | – | – | – |

# Loads

| | | |
|---|---|---|
| **Minimum load**<br><br>For additional information<br>→ page 106 | $F_{am} = 0{,}0005\ C_0 + A\left(\frac{n}{1\,000}\right)^2$ | **Symbols**<br><br>A minimum load factor (page 888)<br>$C_0$ basic static load rating [kN] (page 888)<br>$F_a$ axial load [kN]<br>$F_{am}$ minimum axial load [kN]<br>n rotational speed [r/min]<br>P equivalent dynamic bearing load [kN]<br>$P_0$ equivalent static bearing load [kN] |
| **Equivalent dynamic bearing load**<br><br>For additional information<br>→ page 91 | $P = F_a$ | |
| **Equivalent static bearing load**<br><br>For additional information<br>→ page 105 | $P_0 = F_a$ | |

# Temperature limits

The permissible operating temperature for cylindrical roller thrust bearings can be limited by:

- the dimensional stability of the bearing washers and rollers
- the cage
- the lubricant

Where temperatures outside the permissible range are expected, contact SKF.

## Bearing washers and rollers

The bearings are heat stabilized up to at least 120 °C (*250 °F*).

## Cages

Brass cages can be used at the same operating temperatures as the bearing washers and rollers. For temperature limits of polymer cages, refer to *Polymer cages*, page 188.

## Lubricants

For temperature limits of SKF greases, refer to *Selecting a suitable SKF grease*, page 116.

When using lubricants not supplied by SKF, temperature limits should be evaluated according to the SKF traffic light concept, page 117.

# Permissible speed

The speed ratings in the product table, page 888 indicate:

- the **reference speed**, which enables a quick assessment of the speed capabilities from a thermal frame of reference
- the **limiting speed**, which is a mechanical limit that should not be exceeded unless the bearing design and the application are adapted for higher speeds

For additional information, refer to *Operating temperature and speed*, page 130.

# Design considerations

## Abutment dimensions

Abutment dimensions should fulfil the following:

- Support surfaces in housings and on shafts should be at right angles to the shaft axis and provide uninterrupted support over the entire washer face.
- The abutment diameter on the shaft should be ≥ $d_{a\ min}$ and in the housing ≤ $D_{a\ max}$ (**fig. 6**). Values for $d_{a\ min}$ and $D_{a\ max}$ are listed in the **product table**, **page 888**
- Shafts and housings should be manufactured to suitable tolerance classes (**table 4**) to provide satisfactory radial guidance for the individual thrust bearing components.
  - Housing centred washers require a radial gap between the shaft and washer bore.
  - Shaft centred washers require a radial gap between the washer and the housing bore.

Cylindrical roller and cage thrust assemblies are generally centred radially by the shaft to reduce the circumferential speed at which the cage slides against the guiding surface. This is particularly important for higher-speed applications. The guiding surface should be ground.

## Raceways on shafts and in housings

- should have the same hardness, surface finish and axial run-out as a bearing washer, if the load carrying capacity of a cylindrical roller and cage thrust assembly is to be fully exploited
- should be designed using the dimensions $E_a$ and $E_b$ (**product table**, **page 888**), which take radial displacement of the roller set into consideration

For additional information, refer to *Raceways on shafts and in housings*, **page 179**.

**Fig. 6**

**Abutment diameters**

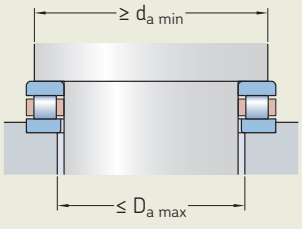


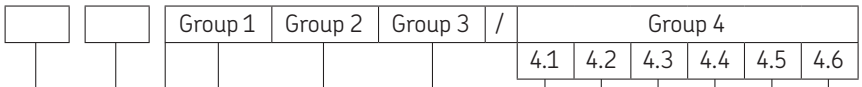

**Table 4**

**Shaft and housing tolerance classes**

| Bearing component | Prefix | Tolerance class[1] Shaft centred | Housing centred |
|---|---|---|---|
| **Cylindrical roller and cage thrust assemblies** | K | h8 | – |
| **Shaft washers** | WS | h8 | – |
| **Housing washers** | GS | – | H9 |

[1] The envelope requirement (symbol Ⓔ from ISO 14405-1) is not shown but applies to all tolerance classes.

# Designation system




**Prefixes**

**GS** Housing washer
**K** Cylindrical roller and cage thrust assembly
**WS** Shaft washer

**Basic designation**

Listed in table 4, page 30

**LS..** Universal washer, the number following identifies the bore and outside diameter

**Suffixes**

**Group 1: Internal design**

**Group 2: External design (seals, snap ring groove, etc.)**

**Group 3: Cage design**

**M** Machined brass cage
**TN** Glass fibre reinforced PA66 cage

**Group 4.1: Materials, heat treatment**

**HA1** Case-hardened shaft and housing washers
**HB1** Bainite-hardened shaft and housing washers

**Group 4.2: Accuracy, clearance, preload, quiet running**

**P5** Dimensional and geometrical tolerances to class P5

**Group 4.3: Bearing sets, matched bearings**

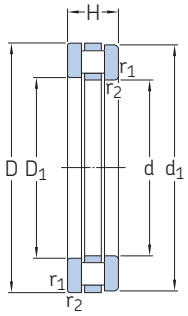
**Group 4.4: Stabilization**

**Group 4.5: Lubrication**

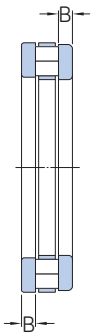
**Group 4.6: Other variants**

# 11.1 Cylindrical roller thrust bearings

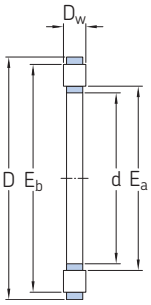
d **15 – 75** mm




811, 812

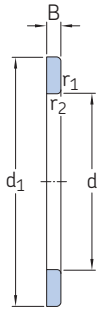



893, 894

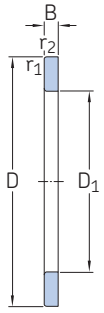



K 811, K 812

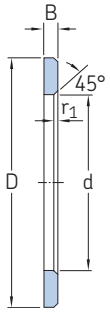
K 893, K 894




WS



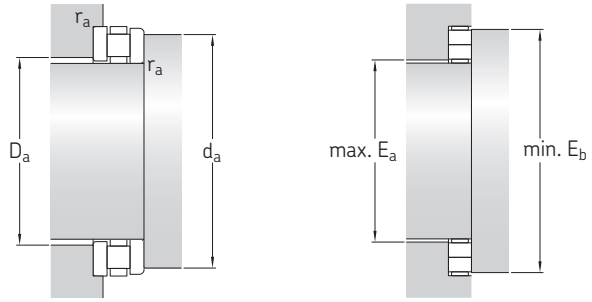

GS



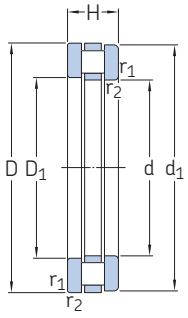

LS

| Principal dimensions | | | | | Basic load ratings dynamic | static | Fatigue load limit | Minimum load factor | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | D | H | $E_a$ | $E_b$ | C | $C_0$ | $P_u$ | A | | | | |
| mm | | | | | kN | | kN | – | r/min | | kg | – |
| **15** | 28 | 9 | 16 | 27 | 11,2 | 27 | 2,45 | 0,000 058 | 4 300 | 8 500 | 0,024 | ▸ **81102 TN** |
| **17** | 30 | 9 | 18 | 29 | 12,2 | 31,5 | 2,85 | 0,000 079 | 4 300 | 8 500 | 0,027 | ▸ **81103 TN** |
| **20** | 35 | 10 | 21 | 34 | 18,6 | 48 | 4,65 | 0,00018 | 3 800 | 7 500 | 0,037 | ▸ **81104 TN** |
| **25** | 42 | 11 | 26 | 41 | 25 | 69,5 | 6,8 | 0,00039 | 3 200 | 6 300 | 0,053 | ▸ **81105 TN** |
| **30** | 47 | 11 | 31 | 46 | 27 | 78 | 7,65 | 0,00049 | 3 000 | 6 000 | 0,057 | ▸ **81106 TN** |
| | 52 | 16 | 31 | 50 | 50 | 134 | 13,4 | 0,0014 | 2 400 | 4 800 | 0,12 | ▸ **81206 TN** |
| **35** | 52 | 12 | 36 | 51 | 29 | 93 | 9,15 | 0,00069 | 2 800 | 5 600 | 0,073 | ▸ **81107 TN** |
| | 62 | 18 | 39 | 58 | 62 | 190 | 19,3 | 0,0029 | 2 000 | 4 000 | 0,21 | ▸ **81207 TN** |
| **40** | 60 | 13 | 42 | 58 | 43 | 137 | 13,7 | 0,0015 | 2 400 | 5 000 | 0,11 | ▸ **81108 TN** |
| | 68 | 19 | 43 | 66 | 83 | 255 | 26,5 | 0,0052 | 1 900 | 3 800 | 0,25 | ▸ **81208 TN** |
| | 78 | 22 | 44 | 77 | 95 | 365 | 36,5 | 0,011 | 2 000 | 4 000 | 0,48 | **89308 TN** |
| **45** | 65 | 14 | 47 | 63 | 45 | 153 | 15,3 | 0,0019 | 2 200 | 4 500 | 0,13 | ▸ **81109 TN** |
| | 73 | 20 | 48 | 70 | 83 | 255 | 26,5 | 0,0052 | 1 800 | 3 600 | 0,29 | ▸ **81209 TN** |
| **50** | 70 | 14 | 52 | 68 | 47,5 | 166 | 16,6 | 0,0022 | 2 200 | 4 300 | 0,14 | ▸ **81110 TN** |
| | 78 | 22 | 53 | 75 | 91,5 | 300 | 31 | 0,0072 | 1 700 | 3 400 | 0,36 | ▸ **81210 TN** |
| **55** | 78 | 16 | 57 | 77 | 69,5 | 285 | 29 | 0,0065 | 1 900 | 3 800 | 0,23 | ▸ **81111 TN** |
| | 90 | 25 | 59 | 85 | 122 | 390 | 40 | 0,012 | 1 400 | 2 800 | 0,57 | ▸ **81211 TN** |
| **60** | 85 | 17 | 62 | 82 | 80 | 300 | 30,5 | 0,0072 | 1 800 | 3 600 | 0,27 | ▸ **81112 TN** |
| | 95 | 26 | 64 | 91 | 137 | 465 | 47,5 | 0,017 | 1 400 | 2 800 | 0,65 | ▸ **81212 TN** |
| | 110 | 30 | 66 | 108 | 153 | 640 | 65,5 | 0,033 | 1 400 | 2 800 | 1,25 | **89312 TN** |
| **65** | 90 | 18 | 67 | 87 | 83 | 320 | 32,5 | 0,0082 | 1 700 | 3 400 | 0,31 | ▸ **81113 TN** |
| | 100 | 27 | 69 | 96 | 140 | 490 | 50 | 0,019 | 1 300 | 2 600 | 0,72 | ▸ **81213 TN** |
| | 115 | 30 | 71 | 113 | 153 | 640 | 65,5 | 0,033 | 1 400 | 2 800 | 1,35 | **89313 TN** |
| **70** | 95 | 18 | 72 | 92 | 86,5 | 345 | 34,5 | 0,0095 | 1 700 | 3 400 | 0,33 | ▸ **81114 TN** |
| | 105 | 27 | 74 | 102 | 146 | 530 | 55 | 0,022 | 1 300 | 2 600 | 0,77 | ▸ **81214 TN** |
| | 125 | 34 | 76 | 123 | 186 | 800 | 81,5 | 0,05 | 1 300 | 2 600 | 1,8 | **89314 TN** |
| **75** | 100 | 19 | 78 | 97 | 83 | 335 | 34 | 0,009 | 1 600 | 3 200 | 0,39 | ▸ **81115 TN** |
| | 110 | 27 | 79 | 106 | 137 | 490 | 50 | 0,019 | 1 200 | 2 400 | 0,8 | ▸ **81215 TN** |

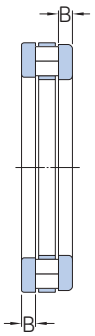
▸ Popular item



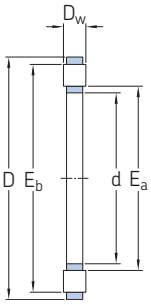

| Dimensions | | | | | | Abutment and fillet dimensions | | | Designation of components | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Cylindrical roller and cage thrust assembly | Shaft washer | Housing washer | Universal washer |
| d | $d_1$ ≈ | $D_1$ ≈ | B | $D_w$ | $r_{1,2}$ min. | $d_a$ min. | $D_a$ max. | $r_a$ max. | | | | |
| mm | | | | | | mm | | | – | | | |
| **15** | 28 | 16 | 2,75 | 3,5 | 0,3 | 27 | 16 | 0,3 | **K 81102 TN** | **WS 81102** | **GS 81102** | **LS 1528** |
| **17** | 30 | 18 | 2,75 | 3,5 | 0,3 | 29 | 18 | 0,3 | **K 81103 TN** | **WS 81103** | **GS 81103** | **LS 1730** |
| **20** | 35 | 21 | 2,75 | 4,5 | 0,3 | 34 | 21 | 0,3 | **K 81104 TN** | **WS 81104** | **GS 81104** | **LS 2035** |
| **25** | 42 | 26 | 3 | 5 | 0,6 | 41 | 26 | 0,6 | **K 81105 TN** | **WS 81105** | **GS 81105** | **LS 2542** |
| **30** | 47 | 32 | 3 | 5 | 0,6 | 46 | 31 | 0,6 | **K 81106 TN** | **WS 81106** | **GS 81106** | **LS 3047** |
| | 52 | 32 | 4,25 | 7,5 | 0,6 | 50 | 31 | 0,6 | **K 81206 TN** | **WS 81206** | **GS 81206** | – |
| **35** | 52 | 37 | 3,5 | 5 | 0,6 | 51 | 36 | 0,6 | **K 81107 TN** | **WS 81107** | **GS 81107** | **LS 3552** |
| | 62 | 37 | 5,25 | 7,5 | 1 | 58 | 39 | 1 | **K 81207 TN** | **WS 81207** | **GS 81207** | – |
| **40** | 60 | 42 | 3,5 | 6 | 0,6 | 58 | 42 | 0,6 | **K 81108 TN** | **WS 81108** | **GS 81108** | **LS 4060** |
| | 68 | 42 | 5 | 9 | 1 | 66 | 43 | 1 | **K 81208 TN** | **WS 81208** | **GS 81208** | – |
| | 78 | 42 | 7,5 | 7 | 1 | 77 | 44 | 1 | **K 89308 TN** | **WS 89308** | **GS 89308** | – |
| **45** | 65 | 47 | 4 | 6 | 0,6 | 63 | 47 | 0,6 | **K 81109 TN** | **WS 81109** | **GS 81109** | **LS 4565** |
| | 73 | 47 | 5,5 | 9 | 1 | 70 | 48 | 1 | **K 81209 TN** | **WS 81209** | **GS 81209** | – |
| **50** | 70 | 52 | 4 | 6 | 0,6 | 68 | 52 | 0,6 | **K 81110 TN** | **WS 81110** | **GS 81110** | **LS 5070** |
| | 78 | 52 | 6,5 | 9 | 1 | 75 | 53 | 1 | **K 81210 TN** | **WS 81210** | **GS 81210** | – |
| **55** | 78 | 57 | 5 | 6 | 0,6 | 77 | 56 | 0,6 | **K 81111 TN** | **WS 81111** | **GS 81111** | **LS 5578** |
| | 90 | 57 | 7 | 11 | 1 | 85 | 59 | 1 | **K 81211 TN** | **WS 81211** | **GS 81211** | – |
| **60** | 85 | 62 | 4,75 | 7,5 | 1 | 82 | 62 | 1 | **K 81112 TN** | **WS 81112** | **GS 81112** | **LS 6085** |
| | 95 | 62 | 7,5 | 11 | 1 | 91 | 64 | 1 | **K 81212 TN** | **WS 81212** | **GS 81212** | – |
| | 110 | 62 | 10,5 | 9 | 1,1 | 108 | 67 | 1,1 | **K 89312 TN** | **WS 89312** | **GS 89312** | – |
| **65** | 90 | 67 | 5,25 | 7,5 | 1 | 87 | 67 | 1 | **K 81113 TN** | **WS 81113** | **GS 81113** | **LS 6590** |
| | 100 | 67 | 8 | 11 | 1 | 96 | 69 | 1 | **K 81213 TN** | **WS 81213** | **GS 81213** | – |
| | 115 | 67 | 10,5 | 9 | 1,1 | 113 | 72 | 1,1 | **K 89313 TN** | **WS 89313** | **GS 89313** | – |
| **70** | 95 | 72 | 5,25 | 7,5 | 1 | 92 | 72 | 1 | **K 81114 TN** | **WS 81114** | **GS 81114** | **LS 7095** |
| | 105 | 72 | 8 | 11 | 1 | 102 | 74 | 1 | **K 81214 TN** | **WS 81214** | **GS 81214** | – |
| | 125 | 72 | 12 | 10 | 1,1 | 123 | 78 | 1,1 | **K 89314 TN** | **WS 89314** | **GS 89314** | – |
| **75** | 100 | 77 | 5,75 | 7,5 | 1 | 97 | 78 | 1 | **K 81115 TN** | **WS 81115** | **GS 81115** | **LS 75100** |
| | 110 | 77 | 8 | 11 | 1 | 106 | 79 | 1 | **K 81215 TN** | **WS 81215** | **GS 81215** | – |




811, 812

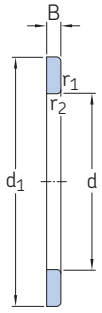



893, 894

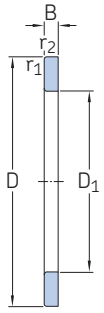



K 811, K 812

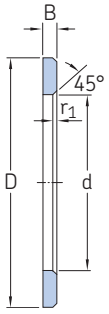
K 893, K 894




WS




GS

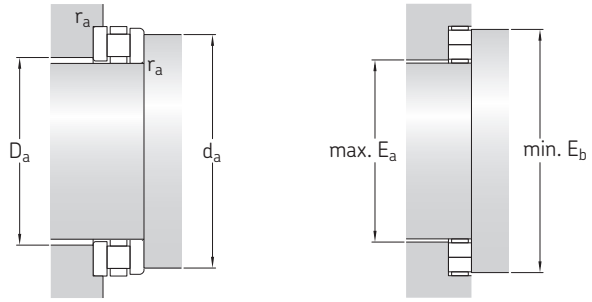



LS

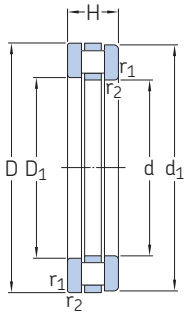
| Principal dimensions | | | | | Basic load ratings dynamic | static | Fatigue load limit | Minimum load factor | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | D | H | $E_a$ | $E_b$ | C | $C_0$ | $P_u$ | A | | | | |
| mm | | | | | kN | | kN | – | r/min | | kg | – |
| **80** | 105 | 19 | 83 | 102 | 81,5 | 335 | 34 | 0,009 | 1 500 | 3 000 | 0,4 | ▸ **81116 TN** |
| | 115 | 28 | 84 | 112 | 160 | 610 | 63 | 0,03 | 1 200 | 2 400 | 0,9 | ▸ **81216 TN** |
| | 140 | 36 | 86 | 137 | 240 | 1 060 | 108 | 0,09 | 1 200 | 2 400 | 2,35 | **89316 TN** |
| | 170 | 54 | 88 | 165 | 440 | 1 730 | 173 | 0,24 | 900 | 1 800 | 7,05 | **89416 M** |
| **85** | 110 | 19 | 87 | 108 | 88 | 365 | 37,5 | 0,011 | 1 500 | 3 000 | 0,42 | ▸ **81117 TN** |
| | 125 | 31 | 90 | 119 | 170 | 640 | 67 | 0,033 | 1 100 | 2 200 | 1,2 | ▸ **81217 TN** |
| **90** | 120 | 22 | 93 | 117 | 110 | 450 | 45,5 | 0,016 | 1 300 | 2 600 | 0,62 | ▸ **81118 TN** |
| | 135 | 35 | 95 | 129 | 232 | 865 | 90 | 0,06 | 1 000 | 2 000 | 1,75 | ▸ **81218 TN** |
| **100** | 135 | 25 | 104 | 131 | 156 | 630 | 62 | 0,032 | 1 200 | 2 400 | 0,95 | ▸ **81120 TN** |
| | 150 | 38 | 107 | 142 | 270 | 1 060 | 104 | 0,09 | 900 | 1 800 | 2,2 | ▸ **81220 TN** |
| | 170 | 42 | 109 | 166 | 300 | 1 370 | 132 | 0,15 | 950 | 1 900 | 4,55 | **89320 M** |
| **110** | 145 | 25 | 114 | 141 | 163 | 680 | 65,5 | 0,037 | 1 100 | 2 200 | 1,05 | **81122 TN** |
| | 160 | 38 | 117 | 152 | 260 | 1 000 | 98 | 0,08 | 850 | 1 700 | 2,3 | ▸ **81222 TN** |
| | 190 | 48 | 120 | 185 | 400 | 1 830 | 173 | 0,27 | 850 | 1 700 | 6,7 | **89322 M** |
| **120** | 155 | 25 | 124 | 151 | 170 | 735 | 68 | 0,043 | 1 100 | 2 200 | 1,1 | ▸ **81124 TN** |
| | 170 | 39 | 127 | 162 | 255 | 1 000 | 96,5 | 0,08 | 800 | 1 600 | 2,55 | ▸ **81224 TN** |
| | 210 | 54 | 132 | 205 | 510 | 2 360 | 216 | 0,45 | 750 | 1 500 | 9,45 | **89324 M** |
| **130** | 170 | 30 | 135 | 165 | 200 | 880 | 81,5 | 0,062 | 950 | 1 900 | 1,65 | **81126 TN** |
| | 190 | 45 | 137 | 181 | 380 | 1 460 | 137 | 0,17 | 700 | 1 400 | 4 | ▸ **81226 TN** |
| **140** | 180 | 31 | 145 | 175 | 208 | 930 | 85 | 0,069 | 900 | 1 800 | 1,9 | ▸ **81128 TN** |
| | 200 | 46 | 150 | 191 | 360 | 1 400 | 129 | 0,16 | 700 | 1 400 | 5,05 | **81228 M** |
| **150** | 190 | 31 | 155 | 185 | 212 | 1 000 | 88 | 0,08 | 850 | 1 700 | 2,2 | ▸ **81130 TN** |
| | 215 | 50 | 162 | 210 | 465 | 1 900 | 170 | 0,29 | 630 | 1 300 | 7,2 | ▸ **81230 M** |
| **160** | 200 | 31 | 165 | 195 | 216 | 1 020 | 90 | 0,083 | 850 | 1 700 | 2,1 | ▸ **81132 TN** |
| | 225 | 51 | 171 | 219 | 480 | 2 000 | 176 | 0,32 | 600 | 1 200 | 7,6 | ▸ **81232 M** |
| | 320 | 95 | 179 | 313 | 1 430 | 6 400 | 540 | 3,3 | 480 | 950 | 42 | **89432 M** |
| **170** | 215 | 34 | 176 | 209 | 285 | 1 340 | 118 | 0,14 | 800 | 1 600 | 2,4 | ▸ **81134 TN** |
| | 240 | 55 | 184 | 233 | 540 | 2 280 | 200 | 0,42 | 560 | 1 100 | 9,3 | ▸ **81234 M** |
| | 340 | 103 | 191 | 333 | 1 600 | 7 200 | 600 | 4,15 | 430 | 850 | 52 | **89434 M** |
| **180** | 225 | 34 | 185 | 219 | 270 | 1 270 | 110 | 0,13 | 750 | 1 500 | 3,7 | ▸ **81136 M** |
| | 250 | 56 | 194 | 243 | 550 | 2 400 | 204 | 0,46 | 560 | 1 100 | 9,95 | **81236 M** |
| | 360 | 109 | 200 | 351 | 1 760 | 8 000 | 655 | 5,1 | 400 | 800 | 60 | **89436 M** |



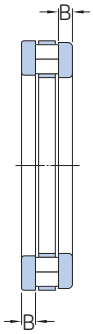
▸ Popular item



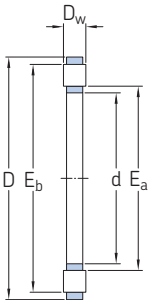

| Dimensions | | | | | | Abutment and fillet dimensions | | | Designation of components | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Cylindrical roller and cage thrust assembly | Shaft washer | Housing washer | Universal washer |
| d | $d_1$ ≈ | $D_1$ ≈ | B | $D_w$ | $r_{1,2}$ min. | $d_a$ min. | $D_a$ max. | $r_a$ max. | | | | |
| mm | | | | | | mm | | | – | | | |
| **80** | 105 | 82 | 5,75 | 7,5 | 1 | 102 | 83 | 1 | **K 81116 TN** | **WS 81116** | **GS 81116** | **LS 80105** |
| | 115 | 82 | 8,5 | 11 | 1 | 112 | 84 | 1 | **K 81216 TN** | **WS 81216** | **GS 81216** | – |
| | 140 | 82 | 12,5 | 11 | 1,5 | 137 | 88 | 1,5 | **K 89316 TN** | **WS 89316** | **GS 89316** | – |
| | 170 | 83 | 18 | 18 | 2,1 | 166 | 89 | 2,1 | **K 89416 M** | **WS 89416** | **GS 89416** | – |
| **85** | 110 | 87 | 5,75 | 7,5 | 1 | 108 | 87 | 1 | **K 81117 TN** | **WS 81117** | **GS 81117** | **LS 85110** |
| | 125 | 88 | 9,5 | 12 | 1 | 119 | 90 | 1 | **K 81217 TN** | **WS 81217** | **GS 81217** | – |
| **90** | 120 | 92 | 6,5 | 9 | 1 | 117 | 93 | 1 | **K 81118 TN** | **WS 81118** | **GS 81118** | **LS 90120** |
| | 135 | 93 | 10,5 | 14 | 1,1 | 129 | 95 | 1,1 | **K 81218 TN** | **WS 81218** | **GS 81218** | – |
| **100** | 135 | 102 | 7 | 11 | 1 | 131 | 104 | 1 | **K 81120 TN** | **WS 81120** | **GS 81120** | **LS 100135** |
| | 150 | 103 | 11,5 | 15 | 1,1 | 142 | 107 | 1,1 | **K 81220 TN** | **WS 81220** | **GS 81220** | – |
| | 170 | 103 | 14,5 | 13 | 1,5 | 167 | 109 | 1,5 | **K 89320 M** | **WS 89320** | **GS 89320** | – |
| **110** | 145 | 112 | 7 | 11 | 1 | 141 | 114 | 1 | **K 81122 TN** | **WS 81122** | **GS 81122** | **LS 110145** |
| | 160 | 113 | 11,5 | 15 | 1,1 | 152 | 117 | 1,1 | **K 81222 TN** | **WS 81222** | **GS 81222** | – |
| | 190 | 113 | 16,5 | 15 | 2 | 186 | 120 | 2 | **K 89322 M** | **WS 89322** | **GS 89322** | – |
| **120** | 155 | 122 | 7 | 11 | 1 | 151 | 124 | 1 | **K 81124 TN** | **WS 81124** | **GS 81124** | **LS 120155** |
| | 170 | 123 | 12 | 15 | 1,1 | 162 | 127 | 1,1 | **K 81224 TN** | **WS 81224** | **GS 81224** | – |
| | 210 | 123 | 18,5 | 17 | 2,1 | 206 | 130 | 2,1 | **K 89324 M** | **WS 89324** | **GS 89324** | – |
| **130** | 170 | 132 | 9 | 12 | 1 | 165 | 135 | 1 | **K 81126 TN** | **WS 81126** | **GS 81126** | **LS 130170** |
| | 187 | 133 | 13 | 19 | 1,5 | 181 | 137 | 1,5 | **K 81226 TN** | **WS 81226** | **GS 81226** | – |
| **140** | 178 | 142 | 9,5 | 12 | 1 | 175 | 145 | 1 | **K 81128 TN** | **WS 81128** | **GS 81128** | **LS 140180** |
| | 197 | 143 | 13,5 | 19 | 1,5 | 191 | 147 | 1,5 | **K 81228 M** | **WS 81228** | **GS 81228** | – |
| **150** | 188 | 152 | 9,5 | 12 | 1 | 185 | 155 | 1 | **K 81130 TN** | **WS 81130** | **GS 81130** | **LS 150190** |
| | 212 | 153 | 14,5 | 21 | 1,5 | 211 | 158 | 1,5 | **K 81230 M** | **WS 81230** | **GS 81230** | – |
| **160** | 198 | 162 | 9,5 | 12 | 1 | 195 | 165 | 1 | **K 81132 TN** | **WS 81132** | **GS 81132** | **LS 160200** |
| | 222 | 163 | 15 | 21 | 1,5 | 220 | 168 | 1,5 | **K 81232 M** | **WS 81232** | **GS 81232** | – |
| | 320 | 164 | 31,5 | 32 | 5 | 315 | 179 | 5 | **K 89432 M** | **WS 89432** | **GS 89432** | – |
| **170** | 213 | 172 | 10 | 14 | 1,1 | 209 | 176 | 1,1 | **K 81134 TN** | **WS 81134** | **GS 81134** | – |
| | 237 | 173 | 16,5 | 22 | 1,5 | 235 | 180 | 1,5 | **K 81234 M** | **WS 81234** | **GS 81234** | – |
| | 340 | 174 | 34,5 | 34 | 5 | 335 | 191 | 5 | **K 89434 M** | **WS 89434** | **GS 89434** | – |
| **180** | 222 | 183 | 10 | 14 | 1,1 | 219 | 185 | 1,1 | **K 81136 M** | **WS 81136** | **GS 81136** | – |
| | 247 | 183 | 17 | 22 | 1,5 | 245 | 190 | 1,5 | **K 81236 M** | **WS 81236** | **GS 81236** | – |
| | 360 | 184 | 36,5 | 36 | 5 | 353 | 203 | 5 | **K 89436 M** | **WS 89436** | **GS 89436** | – |




811, 812

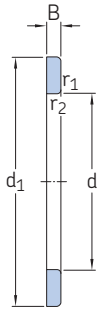



893, 894

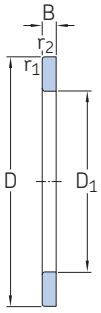



K 811, K 812

K 893, K 894



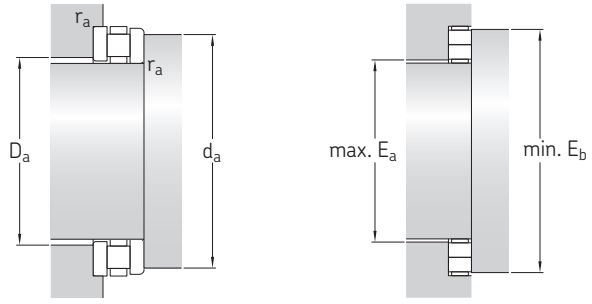

WS




GS

| Principal dimensions | | | | | Basic load ratings dynamic | static | Fatigue load limit | Minimum load factor | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | D | H | $E_a$ | $E_b$ | C | $C_0$ | $P_u$ | A | | | | |
| mm | | | | | kN | | kN | – | r/min | | kg | – |
| **190** | 240 | 37 | 197 | 233 | 310 | 1 460 | 125 | 0,17 | 700 | 1 400 | 4,75 | ▸ **81138 M** |
| | 270 | 62 | 205 | 263 | 695 | 2 900 | 250 | 0,67 | 500 | 1 000 | 12 | **81238 M** |
| | 380 | 115 | 212 | 371 | 1 960 | 9 000 | 720 | 6,5 | 380 | 750 | 65,5 | **89438 M** |
| **200** | 250 | 37 | 206 | 243 | 310 | 1 500 | 125 | 0,18 | 700 | 1 400 | 4,95 | ▸ **81140 M** |
| | 280 | 62 | 215 | 273 | 720 | 3 100 | 255 | 0,77 | 500 | 1 000 | 13,5 | **81240 M** |
| | 400 | 122 | 224 | 391 | 2 160 | 10 000 | 800 | 8 | 360 | 700 | 75 | **89440 M** |
| **220** | 270 | 37 | 226 | 263 | 335 | 1 700 | 137 | 0,23 | 670 | 1 300 | 5,2 | ▸ **81144 M** |
| | 300 | 63 | 236 | 294 | 750 | 3 350 | 275 | 0,9 | 480 | 950 | 15 | ▸ **81244 M** |
| | 420 | 122 | 244 | 411 | 2 320 | 11 200 | 880 | 10 | 340 | 700 | 84,5 | **89444 M** |
| **240** | 300 | 45 | 248 | 296 | 475 | 2 450 | 196 | 0,48 | 560 | 1 100 | 8,45 | ▸ **81148 M** |
| | 340 | 78 | 263 | 333 | 1 100 | 4 900 | 390 | 1,92 | 400 | 800 | 22 | ▸ **81248 M** |
| **260** | 320 | 45 | 268 | 316 | 490 | 2 600 | 200 | 0,54 | 530 | 1 100 | 9,1 | ▸ **81152 M** |
| | 360 | 79 | 281 | 351 | 1 140 | 5 300 | 415 | 2,25 | 380 | 750 | 27 | **81252 M** |
| **280** | 350 | 53 | 288 | 346 | 680 | 3 550 | 275 | 1 | 480 | 950 | 12,5 | **81156 M** |
| **300** | 380 | 62 | 315 | 373 | 850 | 4 400 | 335 | 1,55 | 430 | 850 | 19,5 | **81160 M** |
| | 420 | 95 | 329 | 412 | 1 530 | 7 200 | 540 | 4,1 | 320 | 630 | 43 | **81260 M** |
| **320** | 400 | 63 | 334 | 394 | 880 | 4 650 | 345 | 1,73 | 400 | 800 | 20,5 | **81164 M** |

▸ Popular item




| Dimensions | | | | | | Abutment and fillet dimensions | | | Designation of components | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Cylindrical roller and cage thrust assembly | Shaft washer | Housing washer | Universal washer |
| d | $d_1$ ≈ | $D_1$ ≈ | B | $D_w$ | $r_{1,2}$ min. | $d_a$ min. | $D_a$ max. | $r_a$ max. | | | | |
| mm | | | | | | mm | | | – | | | |
| **190** | 237 | 193 | 11 | 15 | 1,1 | 233 | 197 | 1,1 | **K 81138 M** | **WS 81138** | **GS 81138** | **–** |
| | 267 | 194 | 18 | 26 | 2 | 265 | 200 | 2 | **K 81238 M** | **WS 81238** | **GS 81238** | **–** |
| | 380 | 195 | 38,5 | 38 | 5 | 373 | 214 | 5 | **K 89438 M** | **WS 89438** | **GS 89438** | **–** |
| **200** | 247 | 203 | 11 | 15 | 1,1 | 243 | 206 | 1,1 | **K 81140 M** | **WS 81140** | **GS 81140** | **–** |
| | 277 | 204 | 18 | 26 | 2 | 275 | 210 | 2 | **K 81240 M** | **WS 81240** | **GS 81240** | **–** |
| | 400 | 205 | 41 | 40 | 5 | 393 | 226 | 5 | **K 89440 M** | **WS 89440** | **GS 89440** | **–** |
| **220** | 267 | 223 | 11 | 15 | 1,1 | 263 | 226 | 1,1 | **K 81144 M** | **WS 81144** | **GS 81144** | **–** |
| | 297 | 224 | 18,5 | 26 | 2 | 296 | 230 | 2 | **K 81244 M** | **WS 81244** | **GS 81244** | **–** |
| | 420 | 225 | 41 | 40 | 6 | 413 | 246 | 6 | **K 89444 M** | **WS 89444** | **GS 89444** | **–** |
| **240** | 297 | 243 | 13,5 | 18 | 1,5 | 296 | 248 | 1,5 | **K 81148 M** | **WS 81148** | **GS 81148** | **–** |
| | 335 | 244 | 23 | 32 | 2,1 | 335 | 261 | 2,1 | **K 81248 M** | **WS 81248** | **GS 81248** | **–** |
| **260** | 317 | 263 | 13,5 | 18 | 1,5 | 316 | 268 | 1,5 | **K 81152 M** | **WS 81152** | **GS 81152** | **–** |
| | 355 | 264 | 23,5 | 32 | 2,1 | 353 | 280 | 2,1 | **K 81252 M** | **WS 81252** | **GS 81252** | **–** |
| **280** | 347 | 283 | 15,5 | 22 | 1,5 | 346 | 288 | 1,5 | **K 81156 M** | **WS 81156** | **GS 81156** | **–** |
| **300** | 376 | 304 | 18,5 | 25 | 2 | 373 | 315 | 2 | **K 81160 M** | **WS 81160** | **GS 81160** | **–** |
| | 415 | 304 | 28,5 | 38 | 3 | 413 | 328 | 3 | **K 81260 M** | **WS 81260** | **GS 81260** | **–** |
| **320** | 396 | 324 | 19 | 25 | 2 | 394 | 334 | 2 | **K 81164 M** | **WS 81164** | **GS 81164** | **–** |

# 12 Needle roller thrust bearings

# 12 Needle roller thrust bearings


**Designs and variants** . . . . . **896**
Needle roller and cage thrust assemblies . . . . . 897
Double direction bearings. . . . . 897
Needle roller thrust bearings with a centring flange . . . . . 897
Combined needle roller bearing arrangements . . . . . 897
Bearing washers . . . . . 898

**Cages** . . . . . **898**

**Bearing data** . . . . . **899**
(Dimension standards, tolerances, permissible misalignment)

**Loads** . . . . . **902**
(Minimum load, equivalent dynamic bearing load, equivalent static bearing load)

**Temperature limits** . . . . . **902**

**Permissible speed** . . . . . **902**

**Design considerations** . . . . . **903**
Abutment dimensions . . . . . 903
Raceways on shafts and in housings . . . . . 903

**Designation system** . . . . . **904**

**Product tables**
12.1 Needle roller and cage thrust assemblies . . . . . 906
12.2 Needle roller thrust bearings with a centring flange . . . . . 910

# 12 Needle roller thrust bearings

## More information


**General bearing knowledge** . . . . **17**

**Bearing selection process** . . . . . **59**
Lubrication . . . . . 109
Bearing interfaces. . . . . 139
Sealing, mounting and dismounting . . . . . 193



*SKF bearing maintenance handbook* ISBN 978-91-978966-4-1


SKF needle roller thrust bearings are fitted with a form-stable cage to reliably retain and guide a large number of needle rollers. Needle roller thrust bearings provide a high degree of stiffness within a minimum axial space. In applications where the faces of adjacent machine components can serve as raceways, needle roller thrust bearings take up no more space than a conventional thrust washer.

### Bearing features

- **Accommodate heavy axial loads and peak loads**
  The very small diameter deviation of the rollers within one assembly enables these bearings to accommodate heavy axial loads and peak loads.
- **Extended bearing service life**
  To prevent stress peaks, the roller ends are relieved slightly to modify the line contact between the raceway and rollers.

## Designs and variants

SKF supplies needle roller thrust bearings in two designs:

- needle roller and cage thrust assemblies, AXK series (fig. 1)
- needle roller thrust bearings with a centring flange, AXW series (fig. 2)

In applications where adjacent components cannot serve as raceways, the assemblies can be combined with bearing washers in different series (*Bearing washers*, page 898).

Fig. 1

**AXK needle roller and cage thrust assembly**

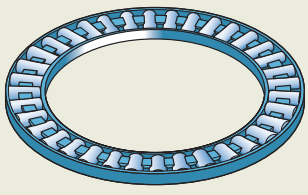
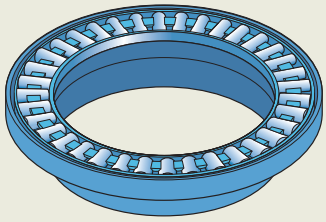


Fig. 2

**AXW needle roller thrust bearing with a centring flange**



# Needle roller and cage thrust assemblies

AXK series needle roller and cage thrust assemblies (**fig. 1**):

- are available for 4 ≤ d ≤ 160 mm
- can accommodate axial loads in one direction only
- can be combined with washers in the LS, AS, GS 811 or WS 811 series (*Bearing washers*, **page 898**) in applications where adjacent components cannot serve as raceways

# Double direction bearings

Double direction bearings:

- can accommodate axial loads in both directions
- can be created by combining two needle roller and cage thrust assemblies and two bearing washers with an intermediate washer

  Depending on the design, an intermediate washer can be shaft or housing centred (**fig. 3** and **fig. 4**).

Intermediate washers must have the same hardness and surface finish as bearing washers. SKF does not supply intermediate washers, but provides material specifications and dimensional data on request.

For additional information, refer to *Design considerations*, **page 903**.

# Needle roller thrust bearings with a centring flange

AXW series needle roller thrust bearings with a centring flange (**fig. 2** and **fig. 5**):

- are available for 10 ≤ d ≤ 50 mm
- accommodate axial loads in one direction only
- consist of a needle roller and cage thrust assembly and a thrust washer with a centring flange

  The flange facilitates mounting and accurately centres the housing washer radially (**fig. 6** and **fig. 7**).

## Combined needle roller bearing arrangements

To accommodate combined radial and axial loads, needle roller thrust bearings in the AXW series can be combined with the following radial needle roller bearings:

- drawn cup needle roller bearings with a closed end or with open ends (**fig. 6**)
- needle roller bearings with machined rings (**fig. 7**)

These arrangements provide a cost-effective and compact solution for combined loads.

**Fig. 3**

**Double direction bearing, shaft centred**

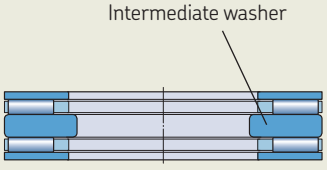



**Fig. 4**

**Double direction bearing, housing centred**

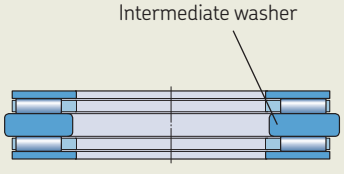



**Fig. 5**

**AXW needle roller thrust bearing with a centring flange**

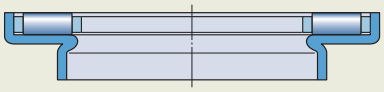


**Fig. 6**

**AXW series bearing combined with a drawn cup needle roller bearing**

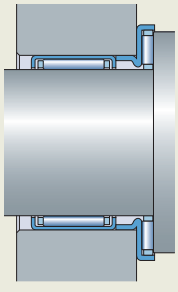
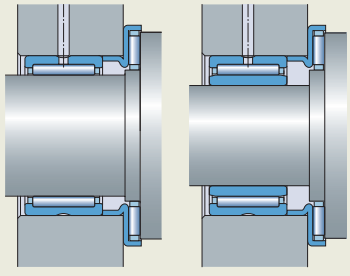


**Fig. 7**

**AXW series bearing combined with a needle roller bearing with machined rings**



# Bearing washers

Bearing washers are required in applications where adjacent machine components cannot serve as raceways.

Appropriate washers are listed in the **product tables**, **page 906** and must be ordered separately, because of the number of possible combinations.

The following series can be combined with needle roller thrust bearings:

## LS series universal washers

(**fig. 8**)

- are made of hardened carbon chromium bearing steel
- can be used as shaft or housing washers for needle roller thrust bearings in the AXK series
- can be used as shaft washers for bearings in the AXW series
- are available for 6 ≤ d ≤ 160 mm
- raceway surface is ground, while all other surfaces are turned
- are used for applications where accurate centring of the washers is not necessary or where low speeds are involved
- washer face opposite the side with the chamfers is the raceway surface and should face the rollers

## AS series thin universal washers

(**fig. 9**)

- are 1 mm thick
- are made of spring steel and hardened
- can be used as shaft or housing washers for needle roller thrust bearings in the AXK series
- can be used as shaft washers for bearings in the AXW series
- are available for 4 ≤ d ≤ 160 mm
- can be used to provide a cost-effective bearing solution, if adjacent machine components are not hardened, but have adequate stiffness and the requirements to geometrical tolerances are moderate

Both faces of the washers are polished and can be used as raceways.

## 811 series shaft (prefix WS) and housing washers (prefix GS)

- are used primarily with cylindrical roller and cage thrust assemblies
- can also be combined with needle roller and cage thrust assemblies
- can be used in high-speed applications where accurate centring of the bearing washers is required

For additional information about 811 series washers, refer to *Cylindrical roller thrust bearings*, **page 877**.

# Cages

SKF needle roller thrust bearings are fitted with one of the cages shown in **table 1**. Bearings in the AXW series are fitted exclusively with steel cages.

When used at high temperatures, some lubricants can have a detrimental effect on polyamide cages. For additional information about the suitability of cages, refer to *Cages*, **page 187**.

Fig. 8

**LS series universal washer**

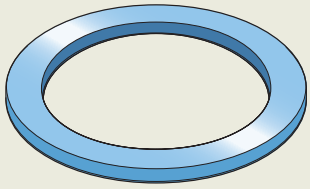
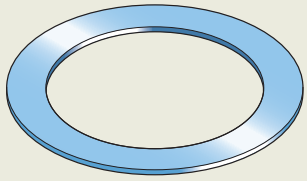


Fig. 9

**AS series thin universal washer**



# Bearing data

| | |
|---|---|
| **Dimension standards** | Boundary dimensions: ISO 3031 (where standardized)<br>Bearings in the AXW series are not standardized. |
| **Tolerances**<br><br>For additional information<br>→ page 35 | Tolerances, tolerance classes, standards (table 2, page 900)<br><br>Values for tolerance classes (table 3, page 901)<br><br>Variation of gauge lot diameter of the rollers: ISO 3096, Grade 2 |
| **Permissible misalignment** | Cannot tolerate any misalignment. |

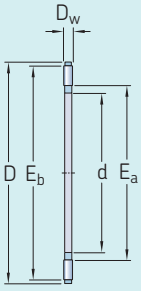
**Table 1**

**Cages for needle roller thrust bearings**

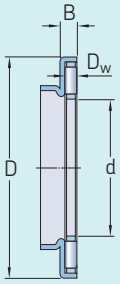
| | | | |
|---|---|---|---|
| | | | |
| **Materials** | Machined steel | Sheet steel | Glass fibre reinforced PA66 |
| **Suffix** | – | – | TN |

Table 2

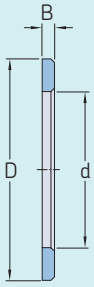
## Tolerances for needle roller thrust bearings



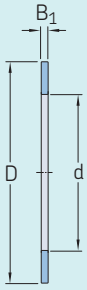

AXK




AXW




LS




AS

| **Bearing, component**<br>Dimensions | | **Tolerance, tolerance class**[1], **standard** |
|---|---|---|
| **Needle roller and cage thrust assemblies, AXK** | | |
| Bore diameter | d | E12 |
| Outside diameter | D | c13 |
| Roller diameter | $D_w$ | Grade 2, ISO 3096 |
| **Needle roller thrust bearings with a centring flange, AXW** | | |
| Bore diameter | d | E12 |
| Outside diameter | D | – |
| Thickness | B | 0/–0,2 mm |
| Roller diameter | $D_w$ | Grade 2, ISO 3096 |
| **Universal washers, LS** | | |
| Bore diameter | d | E12 |
| Outside diameter | D | a12 |
| Thickness | B | h11 |
| Axial run-out | $s_i$ | Normal, ISO 199 |
| **Thin universal washers, AS** | | |
| Bore diameter | d | E13 |
| Outside diameter | D | e13 |
| Thickness (1 mm) | $B_1$ | ±0,05 mm |

[1] The envelope requirement (symbol Ⓔ from ISO 14405-1) is not shown but applies to all tolerance classes.

Table 3

**ISO tolerance classes**

| **Nominal diameter** | | **a12**Ⓔ Deviations | | **c13**Ⓔ Deviations | | **e13**Ⓔ Deviations | | **h11**Ⓔ Deviations | | **E12**Ⓔ Deviations | | **E13**Ⓔ Deviations | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| > | ≤ | U | L | U | L | U | L | U | L | U | L | U | L |
| mm | µm | µm | | µm | | µm | | µm | | µm | | µm | |
| **–** | **3** | – | – | – | – | – | – | 0 | -60 | – | – | – | – |
| **3** | **6** | – | – | – | – | – | – | 0 | -75 | +140 | +20 | +200 | +20 |
| **6** | **10** | – | – | – | – | – | – | 0 | -90 | +175 | +25 | +245 | +25 |
| **10** | **18** | – | – | –95 | –365 | –32 | –302 | – | – | +212 | +32 | +302 | +32 |
| **18** | **30** | –300 | –510 | –110 | –440 | –40 | –370 | – | – | +250 | +40 | +370 | +40 |
| **30** | **40** | –310 | –560 | –120 | –510 | –50 | –440 | – | – | +300 | +50 | +440 | +50 |
| **40** | **50** | –320 | –570 | –130 | –520 | –50 | –440 | – | – | +300 | +50 | +440 | +50 |
| **50** | **65** | –340 | –640 | –140 | –600 | –60 | –520 | – | – | +360 | +60 | +520 | +60 |
| **65** | **80** | –360 | –660 | –150 | –610 | –60 | –520 | – | – | +360 | +60 | +520 | +60 |
| **80** | **100** | –380 | –730 | –170 | –710 | –72 | –612 | – | – | +422 | +72 | +612 | +72 |
| **100** | **120** | –410 | –760 | –180 | –720 | –72 | –612 | – | – | +422 | +72 | +612 | +72 |
| **120** | **140** | –460 | –860 | –200 | –830 | –85 | –715 | – | – | +485 | +85 | +715 | +85 |
| **140** | **160** | –520 | –920 | –210 | –840 | –85 | –715 | – | – | +485 | +85 | +715 | +85 |
| **160** | **180** | –580 | –980 | –230 | –860 | –85 | –715 | – | – | – | – | – | – |
| **180** | **200** | –660 | –1 120 | –240 | –960 | –100 | –820 | – | – | – | – | – | – |

# Loads

| | |
|---|---|
| **Minimum load**<br><br>For additional information<br>→ page 106 | $F_{am} = 0{,}0005\ C_0$ |
| **Equivalent dynamic bearing load**<br><br>For additional information<br>→ page 91 | $P = F_a$ |
| **Equivalent static bearing load**<br><br>For additional information<br>→ page 105 | $P_0 = F_a$ |

**Symbols**

- $C_0$ basic static load rating [kN] (product tables, page 906)
- $F_a$ axial load [kN]
- $F_{am}$ minimum axial load [kN]
- $P$ equivalent dynamic bearing load [kN]
- $P_0$ equivalent static bearing load [kN]

# Temperature limits

The permissible operating temperature for needle roller thrust bearings can be limited by:

- the dimensional stability of the bearing washers and rollers
- the cage
- the lubricant

Where temperatures outside the permissible range are expected, contact SKF.

## Bearing washers and rollers

The bearings are heat stabilized up to at least 120 °C *(250 °F)*.

## Cages

Steel cages can be used at the same operating temperatures as the bearing washers and rollers. For temperature limits of polymer cages, refer to *Polymer cages*, page 188.

## Lubricants

For temperature limits of SKF greases, refer to *Selecting a suitable SKF grease*, page 116.

When using lubricants not supplied by SKF, temperature limits should be evaluated according to the SKF traffic light concept (page 117).

# Permissible speed

The speed ratings in the product tables, page 906 indicate:

- the **reference speed**, which enables a quick assessment of the speed capabilities from a thermal frame of reference
- the **limiting speed**, which is a mechanical limit that should not be exceeded unless the bearing design and the application are adapted for higher speeds

For additional information, refer to *Operating temperature and speed*, page 130.

# Design considerations

## Abutment dimensions

Abutment dimensions should fulfil the following:

- Support surfaces on shafts and in housings should be at right angles to the shaft or housing axis and should provide uninterrupted support over the entire washer face.
- The abutment diameter on the shaft should be ≤ $E_a$ and in the housing ≥ $E_b$.
  Values for $E_a$ and $E_b$ (**product tables**, **page 906**) take the movement and position of the roller set into consideration.
- Shafts and housings should be manufactured to suitable tolerance classes (**table 4**) to provide satisfactory radial guidance for the individual thrust bearing components:
  - Housing centred washers → radial space between the shaft and washer bore required
  - Shaft centred washers → radial space between the washer and the housing bore required

Needle roller and cage thrust assemblies in the AXW series are generally combined with drawn cup needle roller bearings (**fig. 6**, **page 897**) or needle roller bearings with machined rings (**fig. 7**, **page 897**). The same housing tolerance must be selected for the centring flange as for the radial bearing.

Needle roller and cage thrust assemblies are generally shaft centred, to reduce the circumferential speed at which the cage slides against the guiding surface. This is particularly important for higher-speed applications. The guiding surface should be ground.

## Raceways on shafts and in housings

- should have the same hardness, surface finish and axial run-out as a bearing washer, if the load carrying capacity of a needle roller and cage thrust assembly is to be fully exploited
- should be designed using the dimensions $E_a$ and $E_b$ (**product tables**, **page 906**), which take radial displacement of the roller set into consideration

For additional information, refer to *Raceways on shafts and in housings*, **page 179**.

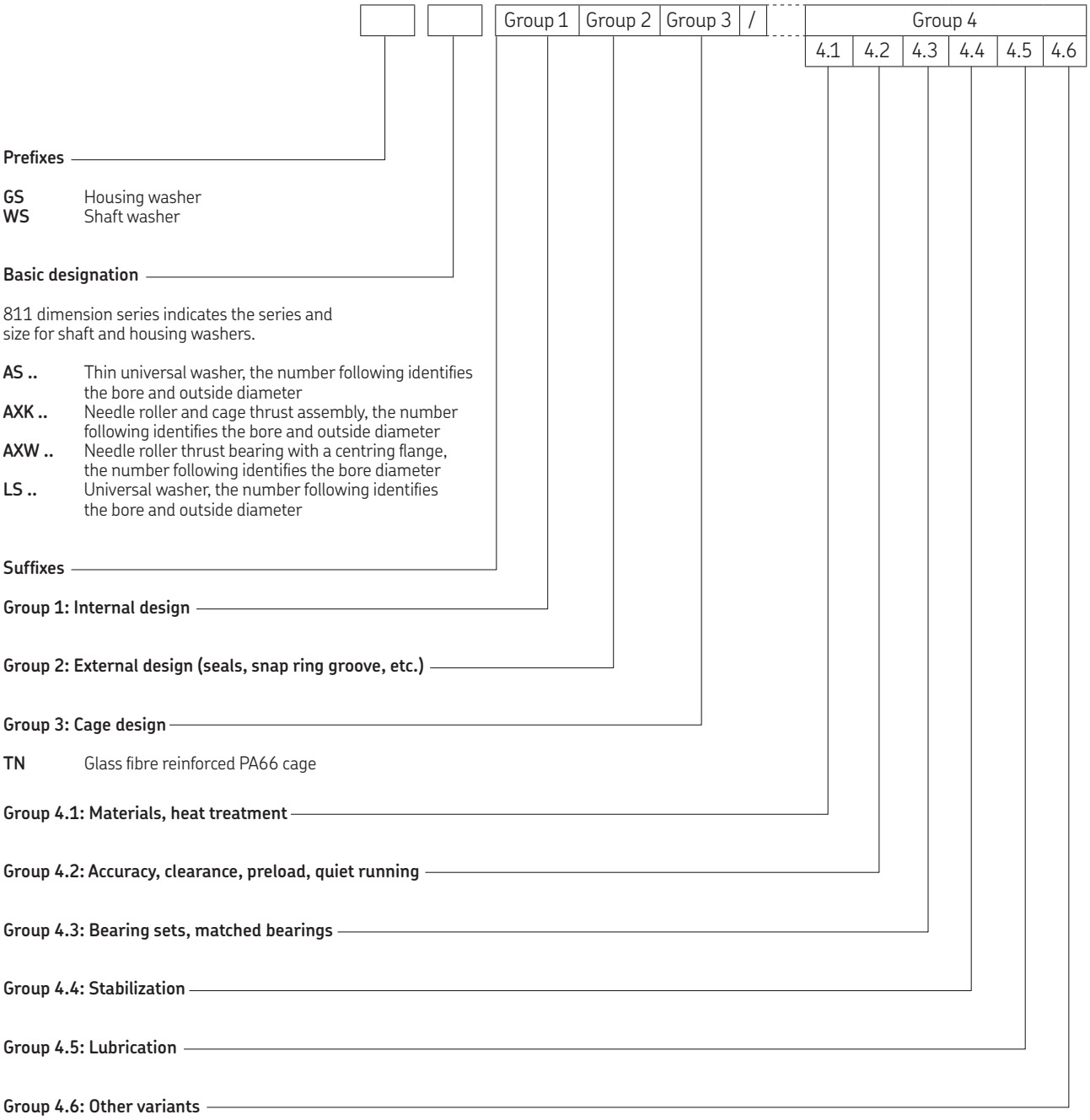
**Table 4**

**Shaft and housing tolerance classes**

| Bearing component | Series | Tolerance class[1] Shaft centred | Housing centred |
|---|---|---|---|
| **Needle roller and cage thrust assemblies** | AXK | h8 | – |
| **Universal washers** | LS | h8<br>radial space | radial space<br>H9 |
| **Thin universal washers** | AS | h8<br>radial space | radial space<br>H9 |
| **Shaft washers** | WS 811 | h8 | – |
| **Housing washers** | GS 811 | – | H9 |

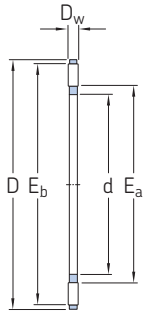
[1] The envelope requirement (symbol Ⓔ from ISO 14405-1) is not shown but applies to all tolerance classes.

# Designation system



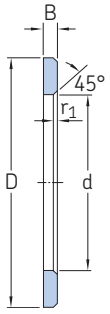
## 12.1 Needle roller and cage thrust assemblies

d **4 – 85** mm

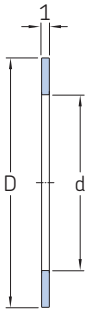



| Principal dimensions | | | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | D | $D_w$ | $E_a$ min. | $E_b$ max. | C | $C_0$ | $P_u$ | | | | |
| mm | | | | | kN | | kN | r/min | | g | – |
| **4** | 14 | 2 | 5 | 13 | 4,15 | 8,3 | 0,95 | 7 500 | 15 000 | 0,7 | **AXK 0414 TN** |
| **5** | 15 | 2 | 6 | 14 | 4,5 | 9,5 | 1,08 | 6 700 | 14 000 | 0,8 | ▸ **AXK 0515 TN** |
| **6** | 19 | 2 | 7 | 18 | 6,3 | 16 | 1,86 | 6 000 | 12 000 | 1 | **AXK 0619 TN** |
| **8** | 21 | 2 | 9 | 20 | 7,2 | 20 | 2,32 | 5 600 | 11 000 | 2 | ▸ **AXK 0821 TN** |
| **10** | 24 | 2 | 12 | 23 | 8,5 | 26 | 3 | 5 300 | 10 000 | 3 | ▸ **AXK 1024** |
| **12** | 26 | 2 | 14 | 25 | 9,15 | 30 | 3,45 | 5 000 | 10 000 | 3 | ▸ **AXK 1226** |
| **15** | 28 | 2 | 17 | 27 | 10,4 | 37,5 | 4,3 | 4 800 | 9 500 | 4 | ▸ **AXK 1528** |
| **17** | 30 | 2 | 19 | 29 | 11 | 40,5 | 4,75 | 4 500 | 9 500 | 3,65 | ▸ **AXK 1730** |
| **20** | 35 | 2 | 22 | 34 | 12 | 47,5 | 5,6 | 4 300 | 8 500 | 5 | ▸ **AXK 2035** |
| **25** | 42 | 2 | 29 | 41 | 13,4 | 60 | 6,95 | 3 800 | 7 500 | 7 | ▸ **AXK 2542** |
| **30** | 47 | 2 | 34 | 46 | 15 | 72 | 8,3 | 3 600 | 7 000 | 8 | ▸ **AXK 3047** |
| **35** | 52 | 2 | 39 | 51 | 16,6 | 83 | 9,8 | 3 200 | 6 300 | 10 | ▸ **AXK 3552** |
| **40** | 60 | 3 | 45 | 58 | 25 | 114 | 13,7 | 2 800 | 5 600 | 16 | ▸ **AXK 4060** |
| **45** | 65 | 3 | 50 | 63 | 27 | 127 | 15,3 | 2 600 | 5 300 | 18 | ▸ **AXK 4565** |
| **50** | 70 | 3 | 55 | 68 | 28,5 | 143 | 17 | 2 400 | 5 000 | 20 | ▸ **AXK 5070** |
| **55** | 78 | 3 | 60 | 76 | 34,5 | 186 | 22,4 | 2 200 | 4 300 | 28 | ▸ **AXK 5578** |
| **60** | 85 | 3 | 65 | 83 | 37,5 | 232 | 28,5 | 2 200 | 4 300 | 33 | ▸ **AXK 6085** |
| **65** | 90 | 3 | 70 | 88 | 39 | 255 | 31 | 2 000 | 4 000 | 35 | ▸ **AXK 6590** |
| **70** | 95 | 4 | 74 | 93 | 49 | 255 | 31 | 1 800 | 3 600 | 60 | ▸ **AXK 7095** |
| **75** | 100 | 4 | 79 | 98 | 50 | 265 | 32,5 | 1 700 | 3 400 | 61 | ▸ **AXK 75100** |
| **80** | 105 | 4 | 84 | 103 | 51 | 280 | 34 | 1 700 | 3 400 | 63 | ▸ **AXK 80105** |
| **85** | 110 | 4 | 89 | 108 | 52 | 290 | 35,5 | 1 700 | 3 400 | 67 | ▸ **AXK 85110** |

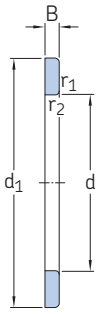
▸ Popular item



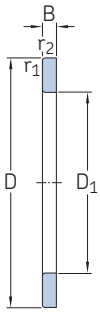

LS




AS




WS 811

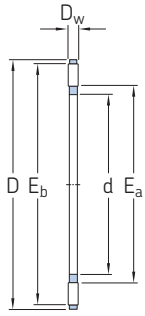



GS 811

| Dimensions | | | | | | Masses | | Designations | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Washers | | Universal washer | Thin universal washer | Shaft washer | Housing washer |
| d | $d_1$ | D | $D_1$ | B | $r_{1,2}$ min. | LS, WS, GS | AS | | | | |
| mm | | | | | | g | | – | | | |
| **4** | – | 14 | – | – | – | – | 1 | **–** | **AS 0414** | **–** | **–** |
| **5** | – | 15 | – | – | – | – | 1 | **–** | **AS 0515** | **–** | **–** |
| **6** | – | 19 | – | 2,75 | 0,3 | 6 | 2 | **LS 0619** | **AS 0619** | **–** | **–** |
| **8** | – | 21 | – | 2,75 | 0,3 | 6 | 2 | **LS 0821** | **AS 0821** | **–** | **–** |
| **10** | – | 24 | – | 2,75 | 0,3 | 8 | 3 | **LS 1024** | **AS 1024** | **–** | **–** |
| **12** | – | 26 | – | 2,75 | 0,3 | 9 | 3 | **LS 1226** | **AS 1226** | **–** | **–** |
| **15** | 28 | 28 | 16 | 2,75 | 0,3 | 9 | 3 | **LS 1528** | **AS 1528** | **WS 81102** | **GS 81102** |
| **17** | 30 | 30 | 18 | 2,75 | 0,3 | 9 | 4 | **LS 1730** | **AS 1730** | **WS 81103** | **GS 81103** |
| **20** | 35 | 35 | 21 | 2,75 | 0,3 | 13 | 5 | **LS 2035** | **AS 2035** | **WS 81104** | **GS 81104** |
| **25** | 42 | 42 | 26 | 3 | 0,6 | 19 | 7 | **LS 2542** | **AS 2542** | **WS 81105** | **GS 81105** |
| **30** | 47 | 47 | 32 | 3 | 0,6 | 22 | 8 | **LS 3047** | **AS 3047** | **WS 81106** | **GS 81106** |
| **35** | 52 | 52 | 37 | 3,5 | 0,6 | 29 | 9 | **LS 3552** | **AS 3552** | **WS 81107** | **GS 81107** |
| **40** | 60 | 60 | 42 | 3,5 | 0,6 | 40 | 12 | **LS 4060** | **AS 4060** | **WS 81108** | **GS 81108** |
| **45** | 65 | 65 | 47 | 4 | 0,6 | 50 | 13 | **LS 4565** | **AS 4565** | **WS 81109** | **GS 81109** |
| **50** | 70 | 70 | 52 | 4 | 0,6 | 55 | 14 | **LS 5070** | **AS 5070** | **WS 81110** | **GS 81110** |
| **55** | 78 | 78 | 57 | 5 | 0,6 | 88 | 18 | **LS 5578** | **AS 5578** | **WS 81111** | **GS 81111** |
| **60** | 85 | 85 | 62 | 4,75 | 1 | 97 | 22 | **LS 6085** | **AS 6085** | **WS 81112** | **GS 81112** |
| **65** | 90 | 90 | 67 | 5,25 | 1 | 115 | 24 | **LS 6590** | **AS 6590** | **WS 81113** | **GS 81113** |
| **70** | 95 | 95 | 72 | 5,25 | 1 | 123 | 25 | **LS 7095** | **AS 7095** | **WS 81114** | **GS 81114** |
| **75** | 100 | 100 | 77 | 5,75 | 1 | 142 | 27 | **LS 75100** | **AS 75100** | **WS 81115** | **GS 81115** |
| **80** | 105 | 105 | 82 | 5,75 | 1 | 151 | 28 | **LS 80105** | **AS 80105** | **WS 81116** | **GS 81116** |
| **85** | 110 | 110 | 87 | 5,75 | 1 | 159 | 29 | **LS 85110** | **AS 85110** | **WS 81117** | **GS 81117** |

## 12.1 Needle roller and cage thrust assemblies

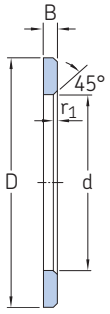
d **90 – 160** mm



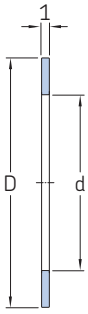

| Principal dimensions | | | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | D | $D_w$ | $E_a$ min. | $E_b$ max. | C | $C_0$ | $P_u$ | | | | |
| mm | | | | | kN | | kN | r/min | | g | – |
| **90** | 120 | 4 | 94 | 118 | 65,5 | 405 | 49 | 1 500 | 3 000 | 86 | ▸ **AXK 90120** |
| **100** | 135 | 4 | 105 | 133 | 76,5 | 560 | 65,5 | 1 400 | 2 800 | 104 | ▸ **AXK 100135** |
| **110** | 145 | 4 | 115 | 143 | 81,5 | 620 | 72 | 1 300 | 2 600 | 122 | ▸ **AXK 110145** |
| **120** | 155 | 4 | 125 | 153 | 86,5 | 680 | 76,5 | 1 300 | 2 600 | 131 | ▸ **AXK 120155** |
| **130** | 170 | 5 | 136 | 167 | 112 | 830 | 93 | 1 100 | 2 200 | 205 | **AXK 130170** |
| **140** | 180 | 5 | 146 | 177 | 116 | 900 | 96,5 | 1 000 | 2 000 | 219 | ▸ **AXK 140180** |
| **150** | 190 | 5 | 156 | 187 | 120 | 950 | 102 | 1 000 | 2 000 | 232 | **AXK 150190** |
| **160** | 200 | 5 | 166 | 197 | 125 | 1 000 | 106 | 950 | 1 900 | 246 | ▸ **AXK 160200** |



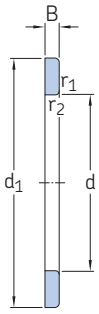
▸ Popular item



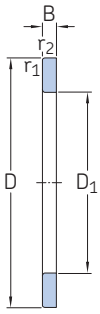

LS




AS




WS 811

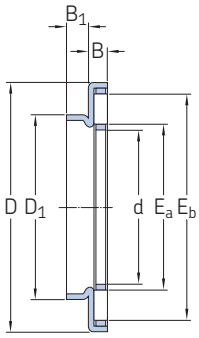



GS 811

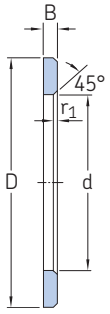
| Dimensions | | | | | | Masses Washers | | Designations | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ | D | $D_1$ | B | $r_{1,2}$ min. | LS, WS, GS | AS | Universal washer | Thin universal washer | Shaft washer | Housing washer |
| mm | | | | | | g | | – | | | |
| **90** | 120 | 120 | 92 | 6,5 | 1 | 234 | 39 | **LS 90120** | **AS 90120** | **WS 81118** | **GS 81118** |
| **100** | 135 | 135 | 102 | 7 | 1 | 350 | 50 | **LS 100135** | **AS 100135** | **WS 81120** | **GS 81120** |
| **110** | 145 | 145 | 112 | 7 | 1 | 385 | 55 | **LS 110145** | **AS 110145** | **WS 81122** | **GS 81122** |
| **120** | 155 | 155 | 122 | 7 | 1 | 415 | 59 | **LS 120155** | **AS 120155** | **WS 81124** | **GS 81124** |
| **130** | 170 | 170 | 132 | 9 | 1 | 663 | 65 | **LS 130170** | **AS 130170** | **WS 81126** | **GS 81126** |
| **140** | 178 | 180 | 142 | 9,5 | 1 | 749 | 79 | **LS 140180** | **AS 140180** | **WS 81128** | **GS 81128** |
| **150** | 188 | 190 | 152 | 9,5 | 1 | 796 | 84 | **LS 150190** | **AS 150190** | **WS 81130** | **GS 81130** |
| **160** | 198 | 200 | 162 | 9,5 | 1 | 842 | 89 | **LS 160200** | **AS 160200** | **WS 81132** | **GS 81132** |

## 12.2 Needle roller thrust bearings with a centring flange

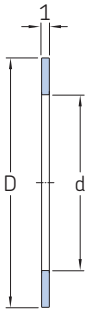
d **10 – 45** mm



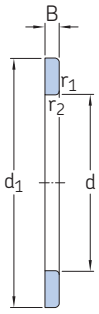

| Principal dimensions | | | | | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | D | $D_1$ | B | $B_1$ | $E_a$ min. | $E_b$ max. | C | $C_0$ | $P_u$ | | | | |
| mm | | | | | | | kN | | kN | r/min | | g | – |
| **10** | 27 | 14 | 3,2 | 3 | 12 | 23 | 8,5 | 26 | 3 | 5 300 | 10 000 | 8,3 | **AXW 10** |
| **12** | 29 | 16 | 3,2 | 3 | 14 | 25 | 9,15 | 30 | 3,45 | 5 000 | 10 000 | 9,1 | **AXW 12** |
| **15** | 31 | 21 | 3,2 | 3,5 | 17 | 27 | 10,4 | 37,5 | 4,3 | 4 800 | 9 500 | 10 | **AXW 15** |
| **20** | 38 | 26 | 3,2 | 3,5 | 22 | 34 | 12 | 47,5 | 5,6 | 4 300 | 8 500 | 14 | **AXW 20** |
| **25** | 45 | 32 | 3,2 | 4 | 29 | 41 | 13,4 | 60 | 6,95 | 3 800 | 7 500 | 20 | **AXW 25** |
| **30** | 50 | 37 | 3,2 | 4 | 34 | 46 | 15 | 72 | 8,3 | 3 600 | 7 000 | 22 | **AXW 30** |
| **35** | 55 | 42 | 3,2 | 4 | 39 | 51 | 16,6 | 83 | 9,8 | 3 200 | 6 300 | 27 | **AXW 35** |
| **40** | 63 | 47 | 4,2 | 4 | 45 | 58 | 25 | 114 | 13,7 | 2 800 | 5 600 | 39 | **AXW 40** |
| **45** | 68 | 52 | 4,2 | 4 | 50 | 63 | 27 | 127 | 15,3 | 2 600 | 5 300 | 43 | **AXW 45** |




LS



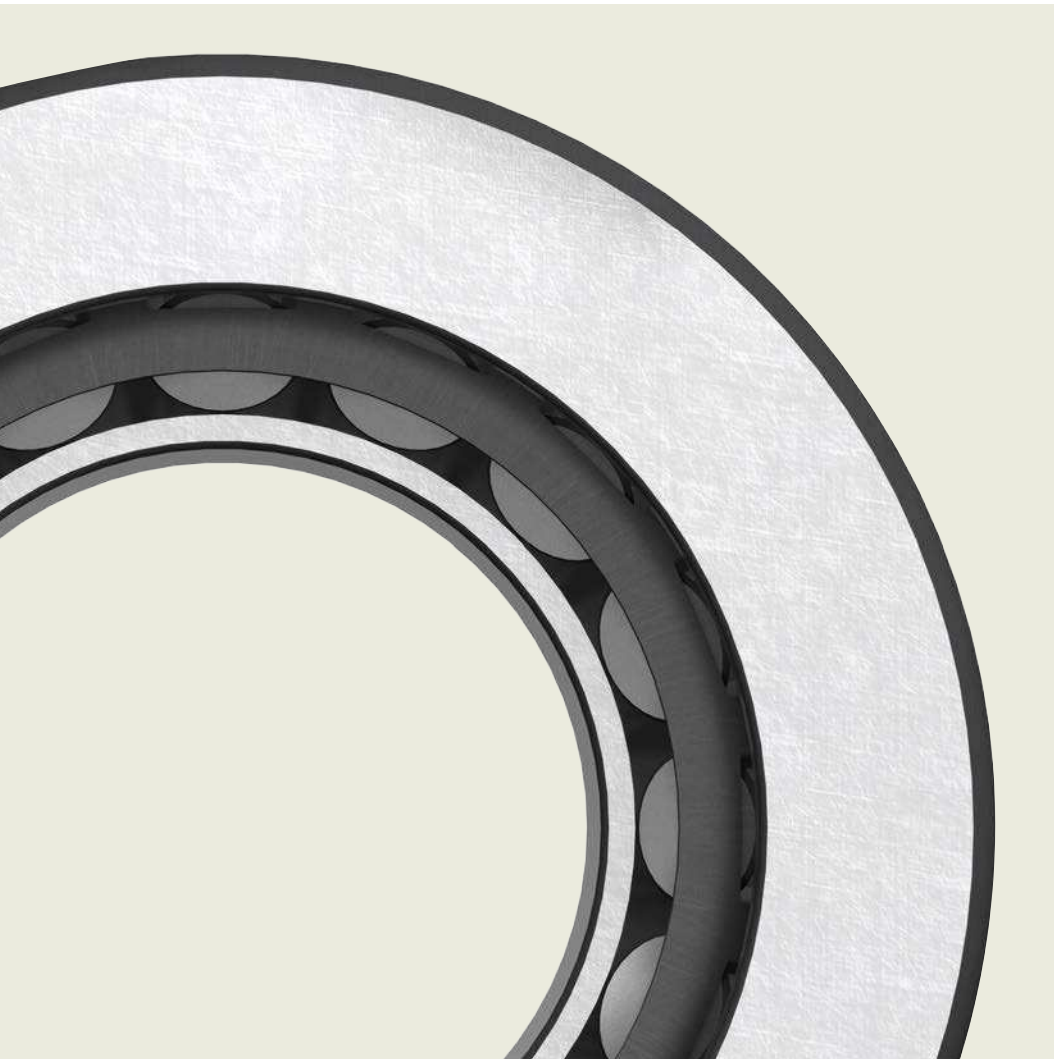

AS




WS 811

| Dimensions | | | | Masses Washers | | Designations | | |
|---|---|---|---|---|---|---|---|---|
| | | | | LS, WS | AS | Universal washer | Thin universal washer | Shaft washer |
| d | $d_1$, D | B | $r_{1,2}$ min. | | | | | |
| mm | | | | g | | – | | |
| **10** | 24 | 2,75 | 0,3 | 8 | 3 | **LS 1024** | **AS 1024** | **–** |
| **12** | 26 | 2,75 | 0,3 | 9 | 3 | **LS 1226** | **AS 1226** | **–** |
| **15** | 28 | 2,75 | 0,3 | 9 | 3 | **LS 1528** | **AS 1528** | **WS 81102** |
| **20** | 35 | 2,75 | 0,3 | 13 | 5 | **LS 2035** | **AS 2035** | **WS 81104** |
| **25** | 42 | 3 | 0,6 | 19 | 7 | **LS 2542** | **AS 2542** | **WS 81105** |
| **30** | 47 | 3 | 0,6 | 22 | 8 | **LS 3047** | **AS 3047** | **WS 81106** |
| **35** | 52 | 3,5 | 0,6 | 29 | 9 | **LS 3552** | **AS 3552** | **WS 81107** |
| **40** | 60 | 3,5 | 0,6 | 40 | 12 | **LS 4060** | **AS 4060** | **WS 81108** |
| **45** | 65 | 4 | 0,6 | 50 | 13 | **LS 4565** | **AS 4565** | **WS 81109** |

# 13 Spherical roller thrust bearings



# 13 Spherical roller thrust bearings


**Designs and variants** . . . . . **915**
Basic design bearings . . . . . 915
SKF Explorer bearings . . . . . 915
Cages . . . . . 915

**Bearing data** . . . . . **916**
(Dimension standards, tolerances, permissible misalignment, friction, starting torque, power loss)

**Loads** . . . . . **917**
(Minimum load, equivalent dynamic bearing load, equivalent static bearing load)

**Temperature limits** . . . . . **918**

**Permissible speed** . . . . . **918**

**Design considerations** . . . . . **918**
Abutment dimensions . . . . . 918
Recessed housing bore for bearings with a stamped steel cage . . . . . 918
Axial clearance in bearing arrangements . . . . . 918

**Lubrication** . . . . . **919**
Pumping effect in oil lubricated applications . . . . . 919

**Mounting** . . . . . **920**

**Designation system** . . . . . **921**

**Product table**
13.1 Spherical roller thrust bearings . . . . . 922

**Other spherical roller thrust bearings**
NoWear coated bearings . . . . . 1059

# 13 Spherical roller thrust bearings

## More information


**General bearing knowledge** . . . . **17**

**Bearing selection process** . . . . . **59**
Lubrication . . . . . 109
Bearing interfaces. . . . . 139
Seat tolerances for standard conditions . . . . . 148
Sealing, mounting and dismounting . . . . . 193


**Mounting instructions for individual bearings** → skf.com/mount


*SKF bearing maintenance handbook* ISBN 978-91-978966-4-1


SKF spherical roller thrust bearings have specially designed raceways and asymmetrical rollers. The bearings can accommodate axial loads acting in one direction and simultaneously acting radial loads. The load is transmitted between the raceways via the rollers at an angle to the bearing axis, while the flange guides the rollers (fig. 1).

## Bearing features

- **High load carrying capacity**
  The large number of rollers, which have an optimum conformity with the washer raceways, enables the bearings to accommodate heavy axial and simultaneously acting radial loads.
- **Accommodate misalignment**
  SKF spherical roller thrust bearings are self-aligning and can accommodate misalignment (fig. 2).
- **Separable design**
  SKF spherical roller thrust bearings are separable, making it possible to mount and dismount the housing washer separately from the shaft washer and roller and cage assembly. In addition this facilitates maintenance inspections.
- **High speed capability**
  The cage designs and the optimum conformity of the rollers with the washer raceways make the bearings suitable for relatively high speeds.
- **Long service life**
  The special roller profile reduces edge stresses at the roller/raceway contact.
- **Low friction**
  The optimized roller end / flange contact keeps frictional heat at low level, even at high speeds.

Fig. 1

**Load transmission**

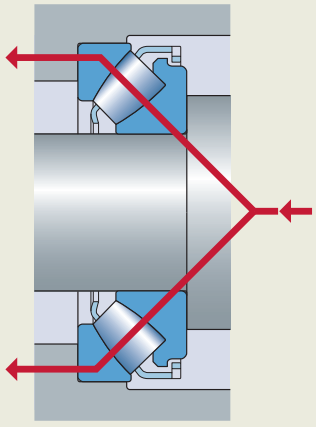
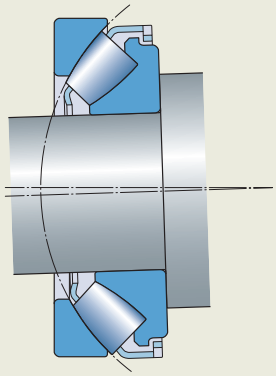


Fig. 2

**Misalignment**



# Designs and variants

## Basic design bearings

Depending on their series and size, SKF spherical roller thrust bearings are manufactured to two basic designs (fig. 3). Their cage forms a non-separable unit with the shaft washer and rollers.

### Bearings with no designation suffix (e.g. 29272)

- are fitted with a machined brass prong-type cage as standard

### E design bearings (designation suffix E)

- have larger rollers and an optimized internal design for increased load carrying capacity
- are fitted with one of the following cages, depending on bearing size:
  - size ≤ 68 → stamped steel window-type cage
  - size ≥ 72 → machined metal prong-type cage

## SKF Explorer bearings

For information, refer to page 7.

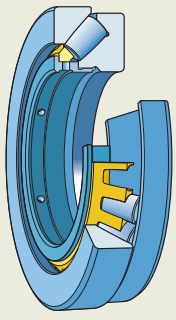
## Cages

Cages in SKF spherical roller thrust bearings are an integral part of the bearing internal design. All SKF spherical roller thrust bearings contain a strong metal cage. This enables them to tolerate high temperatures and operate with all lubricants.

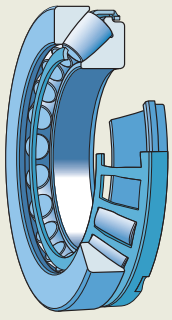
For additional information about the suitability of cages, refer to *Cages*, page 187.

**Fig. 3**

**Basic design bearings**



- No designation suffix
- E design (size ≥ 72)



E design (size ≤ 68)

# Bearing data

| | |
|---|---|
| **Dimension standards** | Boundary dimensions: ISO 104 |
| **Tolerances**<br><br>For additional information<br>→ page 35 | Normal<br>Total height H:<br>• for basic design bearings, tolerance at least 50% tighter than ISO standard<br>• for SKF Explorer bearings, tolerance 75% tighter than ISO standard |
| | Values: ISO 199 (table 10, page 46) |
| **Permissible misalignment** | The permissible misalignment is reduced as the load increases.<br>Guideline values for rotating shaft applications: table 1.<br>Whether these values can be fully exploited depends on the design of the bearing arrangement, the external sealing design, etc.<br>For applications with a rotating housing washer, or where the direction of misalignment is not constant relative to the housing washer, additional sliding may occur in the bearing and misalignment should be < 0,1°. |
| **Friction, starting torque, power loss** | → skf.com/bearingcalculator<br>For temperature and/or cooling requirement calculations for large bearings ($d_m$ > 400 mm)[1], vertical shafts and fully submerged conditions, contact the SKF application engineering service. |

[1] $d_m$ = bearing mean diameter [mm]
= 0,5 (d + D)

**Table 1**

**Permissible angular misalignment for rotating shafts**

| Bearing series | Permissible misalignment where bearing load $P_0$[1] | | |
|---|---|---|---|
| | < 0,05 $C_0$ | ≥ 0,05 $C_0$ | > 0,3 $C_0$ |
| – | ° | | |
| **292(E)** | 2 | 1,5 | 1 |
| **293(E)** | 2,5 | 1,5 | 0,3 |
| **294(E)** | 3 | 1,5 | 0,3 |

[1] Refer to *Equivalent static bearing load*.

# Loads

**Minimum load**

The minimum load requirements can be ignored for bearings operating at the relatively low speeds shown within the green area in **diagram 1**, **page 919**.

For operating speeds outside the green area use:

$$F_{am} = C_r F_r + A\left(\frac{n}{1\,000}\right)^2 + F_{lub}$$

$$\nu n \geq 2\,000 \rightarrow F_{lub} = \frac{2 \times 10^{-9} f_0 (\nu n)^{2/3} [0{,}5 (d + D)]^3}{d}$$

$$\nu n < 2\,000 \rightarrow F_{lub} = \frac{3{,}2 \times 10^{-7} f_0 [0{,}5 (d + D)]^3}{d}$$

For additional information → **page 106**

**Equivalent dynamic bearing load**

$F_r \leq 0{,}55\ F_a$ and:

- if run-out in the bearing arrangement does not affect the load distribution in the spherical roller thrust bearing
  → $P = 0{,}88 (F_a + X F_r)$
- if run-out in the bearing arrangement affects the load distribution in the spherical roller thrust bearing (e.g. the run-out of another bearing that induces radial forces)
  → $P = F_a + X F_r$

$F_r > 0{,}55\ F_a$ → Use an additional bearing, which accommodates the radial load.

For additional information → **page 91**

**Equivalent static bearing load**

$F_r \leq 0{,}55\ F_a$ → $P_0 = F_a + X_0 F_r$

$F_r > 0{,}55\ F_a$ → Use an additional bearing, which accommodates the radial load.

For additional information → **page 105**

**Symbols**

- $A$ minimum load factor (**product table**, **page 922**)
- $C_r$ load factor
  = 1,8 for 292 series
  = 2,0 for 293 series
  = 2,2 for 294 series
- $D$ bearing outside diameter [mm]
- $d$ bearing bore diameter [mm]
- $f_0$ factor for lubrication method
  For oil bath lubrication with a horizontal shaft and for grease lubrication:
  = 3 for 292 series
  = 3,5 for 293 series
  = 4 for 294 series
  For oil bath lubrication with a vertical shaft and for oil jet lubrication:
  = 6 for 292 series
  = 7 for 293 series
  = 8 for 294 series
- $F_{am}$ minimum axial load [kN]
- $F_{lub}$ axial load required to overcome lubricant drag [kN]
- $F_r$ radial load [kN]
- $n$ rotational speed [r/min]
- $P$ equivalent dynamic bearing load [kN]
- $P_0$ equivalent static bearing load [kN]
- $X$ calculation factor
  = 1,1 for 292 series
  = 1,2 for 293 series
  = 1,3 for 294 series
- $X_0$ calculation factor
  = 2,5 for 292 series
  = 2,7 for 293 series
  = 2,9 for 294 series
- $\nu$ actual operating viscosity of the lubricant [mm²/s]

# Temperature limits

The permissible operating temperature for spherical roller thrust bearings can be limited by:

- the dimensional stability of the bearing washers
- the lubricant

Where temperatures outside the permissible range are expected, contact SKF.

### Bearing washers

The washers of SKF spherical roller thrust bearings are heat stabilized up to 200 °C *(390 °F)*.

### Lubricants

For temperature limits of SKF greases, refer to *Selecting a suitable SKF grease*, page 116.

When using lubricants not supplied by SKF, temperature limits should be evaluated according to the SKF traffic light concept (page 117).

# Permissible speed

The speed ratings in the product table, page 922, indicate:

- the **reference speed**, which enables a quick assessment of the speed capabilities from a thermal frame of reference
- the **limiting speed**, which is a mechanical limit that should not be exceeded unless the bearing design and the application are adapted for higher speeds

For additional information, refer to *Operating temperature and speed*, page 130.

# Design considerations

## Abutment dimensions

The abutment dimensions $d_{a\ min}$ and $D_{a\ max}$ listed in the product table, page 922, apply for axial bearing loads $F_a \leq 0{,}1\ C_0$.

For heavier bearing loads, it may be necessary to support the shaft and housing washers over their entire side faces ($d_a = d_1$ and $D_a = D_1$).

For heavy loads, where $P > 0{,}1\ C_0$, the shaft washer bore must be fully supported by the shaft, preferably by an interference fit. Even the housing washer should be radially supported (fig. 4).

For additional information about dimensioning washer supports, contact the SKF application engineering service.

## Recessed housing bore for bearings with a stamped steel cage

For bearings fitted with a stamped steel window-type cage, the housing bore must be recessed (fig. 5) to prevent the cage from contacting the housing during possible misalignment. SKF recommends the following guideline values for the recess diameter:

- D + 15 mm for bearings with an outside diameter D ≤ 380 mm
- D + 20 mm for bearings with an outside diameter D > 380 mm

## Axial clearance in bearing arrangements

SKF spherical roller thrust bearings in face-to-face or back-to-back arrangements should be preloaded. However, at the relatively low speeds shown within the green area in diagram 1, the application can be designed to operate with a small axial clearance. For these applications, bearings with a modified shaft washer (designation suffix VU029) should be used. Small axial clearance enables simple and cost-effective bearing arrangements to be used, e.g. for horizontal shaft applications at relatively low speeds, as no external preload is necessary.

For additional information about bearing arrangements with axial clearance, contact the SKF application engineering service.

**Fig. 4**

**Abutment dimensions**

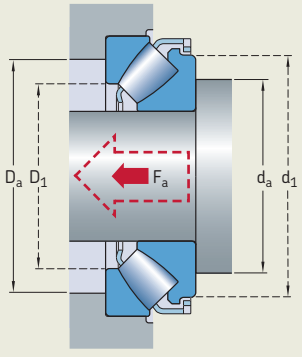
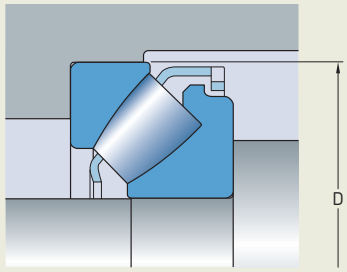



**Fig. 5**

**Recessed housing bore for bearings with a stamped steel cage**



# Lubrication

Generally, SKF spherical roller thrust bearings can be lubricated with oil or grease containing EP additives.

Where lubricating with grease, the roller end / flange contacts must be supplied with an adequate amount of grease. Make sure to use a grease with high oil bleeding, such as SKF LGWM 1, LGWM 2 or LGEP 2 (*Selecting a suitable SKF grease*, **page 116**).

## Pumping effect in oil lubricated applications

The internal design of spherical roller thrust bearings creates a pumping action, which produces a flow from the small to the large roller end face, that can be taken advantage of in oil lubricated applications. This pumping action occurs in applications where the shaft is vertical or horizontal (**fig. 6**) and should be considered when selecting the type of lubricant and sealing arrangement.

For bearings with a machined cage used in high-speed applications, SKF recommends the oil injection lubrication method (**fig. 7**).

For additional information about lubricating spherical roller thrust bearings, contact the SKF application engineering service.

**Diagram 1**

**Minimum load requirements for spherical roller thrust bearings**

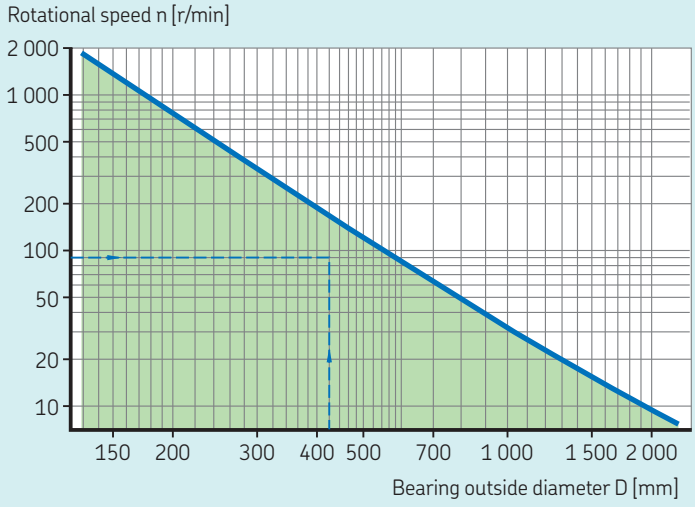
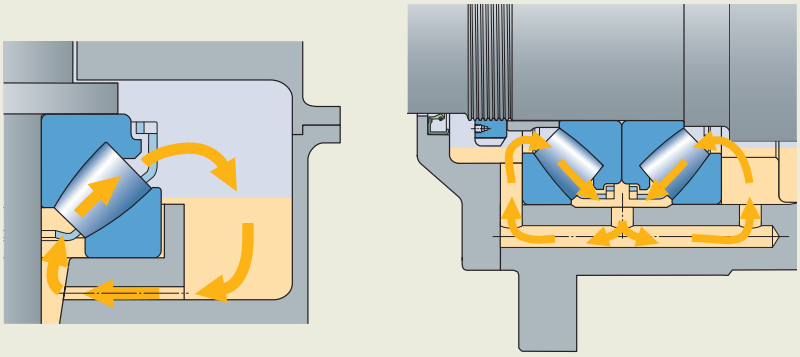



**Fig. 6**

**Pumping effect**

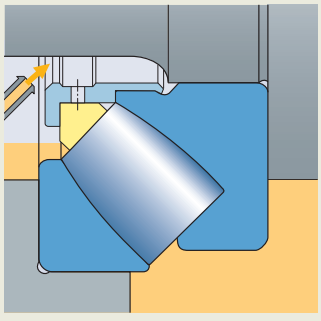


Vertical shaft application

Horizontal shaft application

**Fig. 7**

**Oil injection lubrication method**



# Mounting

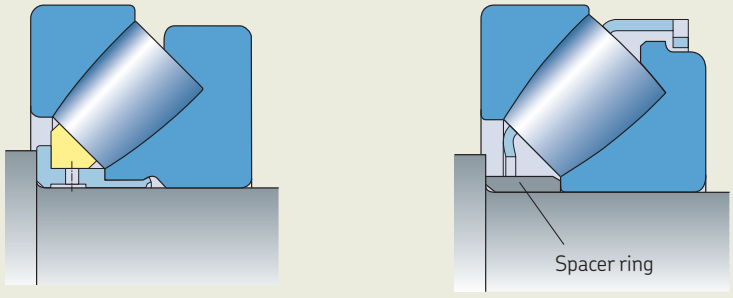
SKF spherical roller thrust bearings are separable, making it possible to mount and dismount the housing washer separately from the shaft washer and roller and cage assembly.

Where a spherical roller thrust bearing with a machined metal cage is to be replaced by an E design bearing with a stamped steel window-type cage, and axial forces are transmitted via the cage guiding sleeve, a spacer ring must be inserted between the shaft abutment and the shaft washer (fig. 8).

The spacer ring must be hardened and its side faces should be ground. Appropriate spacer ring dimensions for SKF spherical roller thrust bearings are listed in the product table, page 922.

**Fig. 8**

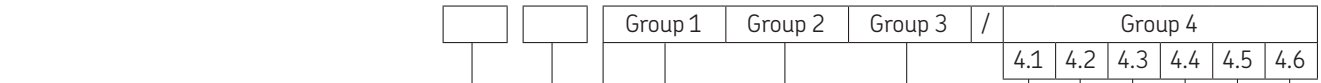
**Replacement consideration**




Bearing with a machined metal cage

E design bearing with a stamped steel cage

# Designation system




**Prefixes**

**Basic designation**

Listed in table 4, page 30

**Suffixes**

**Group 1: Internal design**

**E** Optimized internal design

**Group 2: External design (seals, snap ring groove, etc.)**

**N1** One locating slot in the housing washer
**N2** Two locating slots in the housing washer, 180° apart

**Group 3: Cage design**

**–**
- Stamped steel cage, roller centred, for E design bearings size ≤ 68
- Machined brass cage, shaft washer centred, for bearings without any designation suffix

**F** Machined steel cage, shaft washer centred
**F3** Machined spheroidal cast iron cage, shaft washer centred
**M** Machined brass cage, shaft washer centred

**Group 4.1: Materials, heat treatment**

**Group 4.2: Accuracy, clearance, preload, quiet running**

**Group 4.3: Bearing sets, matched bearings**

**Group 4.4: Stabilization**

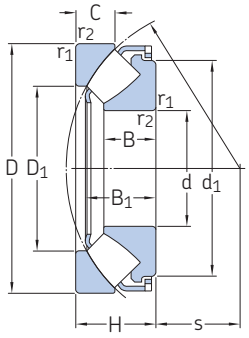
**Group 4.5: Lubrication**

**Group 4.6: Other variants**

**VE447(E)** Shaft washer with three equally-spaced threaded holes to accommodate hoisting tackle
The E indicates that appropriate eye bolts are supplied with the bearing.
**VE710(E)** Housing washer with three equally-spaced threaded holes to accommodate hoisting tackle
The E indicates that appropriate eye bolts are supplied with the bearing.
**VU029** Shaft washer modified for applications with small axial clearance

# 13.1 Spherical roller thrust bearings

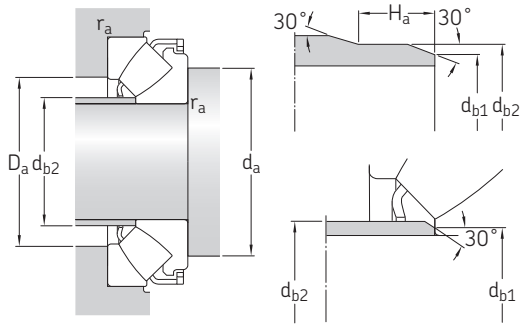
d **60 – 180** mm



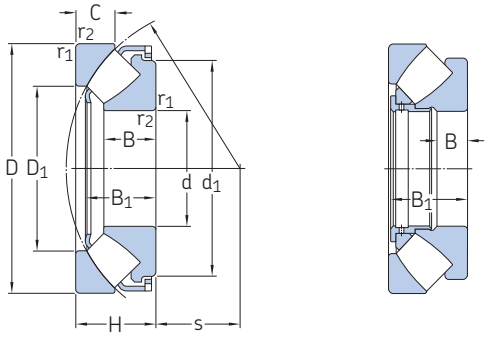

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Minimum load factor | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | H | C | $C_0$ | $P_u$ | A | | | | |
| mm | | | kN | | kN | – | r/min | | kg | – |
| **60** | 130 | 42 | 390 | 915 | 114 | 0,08 | 2 800 | 5 000 | 2,6 | ▸ **29412 E** |
| **65** | 140 | 45 | 455 | 1 080 | 137 | 0,11 | 2 600 | 4 800 | 3,2 | ▸ **29413 E** |
| **70** | 150 | 48 | 520 | 1 250 | 153 | 0,15 | 2 400 | 4 300 | 3,9 | ▸ **29414 E** |
| **75** | 160 | 51 | 600 | 1 430 | 173 | 0,19 | 2 400 | 4 000 | 4,7 | ▸ **29415 E** |
| **80** | 170 | 54 | 670 | 1 630 | 193 | 0,25 | 2 200 | 3 800 | 5,6 | ▸ **29416 E** |
| **85** | 150 | 39 | 380 | 1 060 | 129 | 0,11 | 2 400 | 4 000 | 2,75 | ▸ **29317 E** |
| | 180 | 58 | 735 | 1 800 | 212 | 0,31 | 2 000 | 3 600 | 6,75 | ▸ **29417 E** |
| **90** | 155 | 39 | 400 | 1 080 | 132 | 0,11 | 2 400 | 4 000 | 2,85 | ▸ **29318 E** |
| | 190 | 60 | 815 | 2 000 | 232 | 0,38 | 1 900 | 3 400 | 7,75 | ▸ **29418 E** |
| **100** | 170 | 42 | 465 | 1 290 | 156 | 0,16 | 2 200 | 3 600 | 3,65 | ▸ **29320 E** |
| | 210 | 67 | 980 | 2 500 | 275 | 0,59 | 1 700 | 3 000 | 10,5 | ▸ **29420 E** |
| **110** | 190 | 48 | 610 | 1 730 | 204 | 0,28 | 1 900 | 3 200 | 5,3 | ▸ **29322 E** |
| | 230 | 73 | 1 180 | 3 000 | 325 | 0,86 | 1 600 | 2 800 | 13,5 | ▸ **29422 E** |
| **120** | 210 | 54 | 765 | 2 120 | 245 | 0,43 | 1 700 | 2 800 | 7,35 | ▸ **29324 E** |
| | 250 | 78 | 1 370 | 3 450 | 375 | 1,1 | 1 500 | 2 600 | 17,5 | ▸ **29424 E** |
| **130** | 225 | 58 | 865 | 2 500 | 280 | 0,59 | 1 600 | 2 600 | 9 | ▸ **29326 E** |
| | 270 | 85 | 1 560 | 4 050 | 430 | 1,6 | 1 300 | 2 400 | 22 | ▸ **29426 E** |
| **140** | 240 | 60 | 980 | 2 850 | 315 | 0,77 | 1 500 | 2 600 | 10,5 | ▸ **29328 E** |
| | 280 | 85 | 1 630 | 4 300 | 455 | 1,8 | 1 300 | 2 400 | 23 | ▸ **29428 E** |
| **150** | 215 | 39 | 408 | 1 600 | 180 | 0,24 | 1 800 | 2 800 | 4,3 | ▸ **29230 E** |
| | 250 | 60 | 1 000 | 2 850 | 315 | 0,77 | 1 500 | 2 400 | 11 | ▸ **29330 E** |
| | 300 | 90 | 1 860 | 5 100 | 520 | 2,5 | 1 200 | 2 200 | 28 | ▸ **29430 E** |
| **160** | 270 | 67 | 1 180 | 3 450 | 375 | 1,1 | 1 300 | 2 200 | 14,5 | ▸ **29332 E** |
| | 320 | 95 | 2 080 | 5 600 | 570 | 3 | 1 100 | 2 000 | 32 | ▸ **29432 E** |
| **170** | 280 | 67 | 1 200 | 3 550 | 365 | 1,2 | 1 300 | 2 200 | 15 | ▸ **29334 E** |
| | 340 | 103 | 2 360 | 6 550 | 640 | 4,1 | 1 100 | 1 900 | 44,5 | ▸ **29434 E** |
| **180** | 250 | 42 | 495 | 2 040 | 212 | 0,4 | 1 600 | 2 600 | 5,8 | ▸ **29236 E** |
| | 300 | 73 | 1 430 | 4 300 | 440 | 1,8 | 1 200 | 2 000 | 19,5 | ▸ **29336 E** |
| | 360 | 109 | 2 600 | 7 350 | 710 | 5,1 | 1 000 | 1 800 | 52,5 | ▸ **29436 E** |



**SKF Explorer bearing**
▸ Popular item

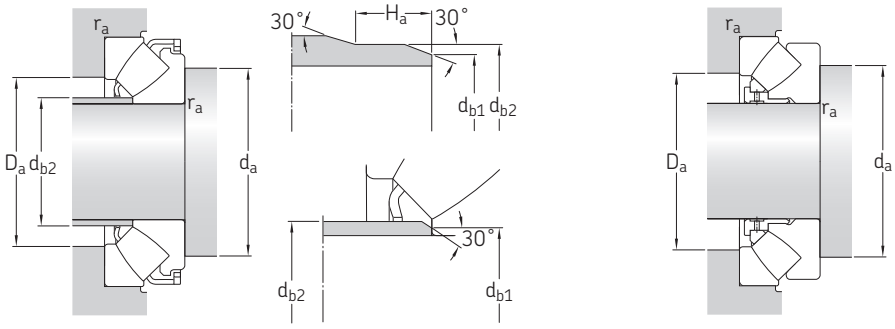



| Dimensions | | | | | | | | Abutment and fillet dimensions | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | B | $B_1$ | C | $r_{1,2}$ min. | s | $d_a$ min. | $d_{b1}$ max. | $d_{b2}$ max. | $H_a$ min. | $D_a$ max. | $r_a$ max. |
| mm | | | | | | | | mm | | | | | |
| **60** | 112 | 85,5 | 27 | 36,7 | 21 | 1,5 | 38 | 90 | 67 | 67 | – | 107 | 1,5 |
| **65** | 120 | 91,5 | 29,5 | 39,8 | 22 | 2 | 42 | 100 | 72 | 72 | – | 117 | 2 |
| **70** | 129 | 99 | 31 | 41 | 23,8 | 2 | 44,8 | 105 | 77 | 77 | – | 125 | 2 |
| **75** | 138 | 106 | 33,5 | 45,7 | 24,5 | 2 | 47 | 115 | 82 | 82 | – | 133 | 2 |
| **80** | 147 | 113 | 35 | 48,1 | 26,5 | 2,1 | 50 | 120 | 88 | 88 | – | 141 | 2 |
| **85** | 134 | 110 | 24,5 | 33,8 | 20 | 1,5 | 50 | 115 | 90 | 90 | – | 129 | 1,5 |
| | 155 | 121 | 37 | 51,1 | 28 | 2,1 | 54 | 130 | 94 | 94 | – | 151 | 2 |
| **90** | 138 | 115 | 24,5 | 34,5 | 19,5 | 1,5 | 53 | 120 | 95 | 95 | – | 134 | 1,5 |
| | 164 | 128 | 39 | 54 | 28,5 | 2,1 | 56 | 135 | 99 | 99 | – | 158 | 2 |
| **100** | 152 | 128 | 26,2 | 36,3 | 20,5 | 1,5 | 58 | 130 | 107 | 107 | – | 147 | 1,5 |
| | 182 | 142 | 43 | 57,3 | 32 | 3 | 62 | 150 | 110 | 110 | – | 175 | 2,5 |
| **110** | 171 | 140 | 30,3 | 41,7 | 24,8 | 2 | 63,8 | 145 | 117 | 117 | – | 164 | 2 |
| | 199 | 156 | 47 | 64,7 | 34,7 | 3 | 69 | 165 | 120 | 129 | – | 193 | 2,5 |
| **120** | 188 | 155 | 34 | 48,2 | 27 | 2,1 | 70 | 160 | 128 | 128 | – | 181 | 2 |
| | 216 | 171 | 50,5 | 70,3 | 36,5 | 4 | 74 | 180 | 132 | 142 | – | 209 | 3 |
| **130** | 203 | 166 | 36,7 | 50,6 | 30,1 | 2,1 | 75,6 | 175 | 138 | 143 | – | 194 | 2 |
| | 234 | 185 | 54 | 76 | 40,9 | 4 | 81 | 195 | 142 | 153 | – | 227 | 3 |
| **140** | 216 | 177 | 38,5 | 54 | 30 | 2,1 | 82 | 185 | 148 | 154 | – | 208 | 2 |
| | 245 | 195 | 54 | 75,6 | 41 | 4 | 86 | 205 | 153 | 162 | – | 236 | 3 |
| **150** | 200 | 176 | 24 | 34,3 | 20,5 | 1,5 | 82 | 180 | 154 | 154 | 14 | 193 | 1,5 |
| | 223 | 190 | 38 | 54,9 | 28 | 2,1 | 87 | 195 | 158 | 163 | – | 219 | 2 |
| | 262 | 208 | 58 | 80,8 | 43,4 | 4 | 92 | 220 | 163 | 175 | – | 253 | 3 |
| **160** | 243 | 203 | 42 | 60 | 33 | 3 | 92 | 210 | 169 | 176 | – | 235 | 2,5 |
| | 279 | 224 | 60,5 | 84,3 | 45,5 | 5 | 99 | 235 | 175 | 189 | – | 270 | 4 |
| **170** | 251 | 215 | 42,2 | 61,1 | 30,5 | 3 | 96 | 220 | 178 | 188 | – | 245 | 2,5 |
| | 297 | 236 | 65,5 | 91,2 | 50 | 5 | 104 | 250 | 185 | 199 | – | 286 | 4 |
| **180** | 234 | 208 | 26 | 36,9 | 22 | 1,5 | 97 | 210 | 187 | 187 | 14 | 226 | 1,5 |
| | 270 | 227 | 46 | 66,2 | 35,5 | 3 | 103 | 235 | 189 | 195 | – | 262 | 2,5 |
| | 315 | 250 | 69,5 | 96,4 | 53 | 5 | 110 | 265 | 196 | 210 | – | 304 | 4 |

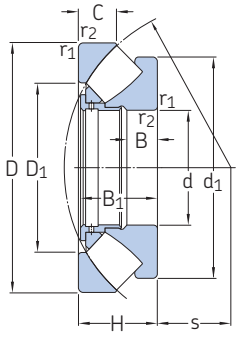



E design

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Minimum load factor | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | H | C | $C_0$ | $P_u$ | A | | | | |
| mm | | | kN | | kN | – | r/min | | kg | – |
| **190** | 320 | 78 | 1 630 | 4 750 | 490 | 2,1 | 1 100 | 1 900 | 23,5 | ▸ 29338 E |
| | 380 | 115 | 2 850 | 8 000 | 765 | 6,1 | 950 | 1 700 | 60,5 | ▸ 29438 E |
| **200** | 280 | 48 | 656 | 2 650 | 285 | 0,67 | 1 400 | 2 200 | 9,3 | ▸ 29240 E |
| | 340 | 85 | 1 860 | 5 500 | 550 | 2,9 | 1 000 | 1 700 | 28,5 | ▸ 29340 E |
| | 400 | 122 | 3 200 | 9 000 | 850 | 7,7 | 850 | 1 600 | 72 | ▸ 29440 E |
| **220** | 300 | 48 | 690 | 3 000 | 310 | 0,86 | 1 300 | 2 200 | 10 | ▸ 29244 E |
| | 360 | 85 | 2 000 | 6 300 | 610 | 3,8 | 1 000 | 1 700 | 31 | ▸ 29344 E |
| | 420 | 122 | 3 350 | 9 650 | 900 | 8,8 | 850 | 1 500 | 75 | ▸ 29444 E |
| **240** | 340 | 60 | 799 | 3 450 | 335 | 1,1 | 1 100 | 1 800 | 16,5 | ▸ 29248 |
| | 380 | 85 | 2 040 | 6 550 | 630 | 4,1 | 1 000 | 1 600 | 35,5 | ▸ 29348 E |
| | 440 | 122 | 3 400 | 10 200 | 930 | 9,9 | 850 | 1 500 | 80 | ▸ 29448 E |
| **260** | 360 | 60 | 817 | 3 650 | 345 | 1,3 | 1 100 | 1 700 | 18,5 | ▸ 29252 |
| | 420 | 95 | 2 550 | 8 300 | 780 | 6,5 | 850 | 1 400 | 49 | ▸ 29352 E |
| | 480 | 132 | 4 050 | 12 900 | 1 080 | 16 | 750 | 1 300 | 105 | ▸ 29452 E |
| **280** | 380 | 60 | 863 | 4 000 | 375 | 1,5 | 1 000 | 1 700 | 19,5 | ▸ 29256 |
| | 440 | 95 | 2 550 | 8 650 | 800 | 7,1 | 850 | 1 400 | 53 | ▸ 29356 E |
| | 520 | 145 | 4 900 | 15 300 | 1 320 | 22 | 670 | 1 200 | 135 | ▸ 29456 E |
| **300** | 420 | 73 | 1 070 | 4 800 | 465 | 2,2 | 900 | 1 400 | 30,5 | ▸ 29260 |
| | 480 | 109 | 3 100 | 10 600 | 930 | 11 | 750 | 1 200 | 75 | ▸ 29360 E |
| | 540 | 145 | 5 000 | 16 600 | 1 340 | 24 | 670 | 1 200 | 140 | ▸ 29460 E |
| **320** | 440 | 73 | 1 110 | 5 100 | 465 | 2,5 | 850 | 1 400 | 33 | 29264 |
| | 500 | 109 | 3 350 | 11 200 | 1 000 | 12 | 750 | 1 200 | 78 | ▸ 29364 E |
| | 580 | 155 | 5 700 | 19 000 | 1 530 | 32 | 600 | 1 100 | 175 | ▸ 29464 E |
| **340** | 460 | 73 | 1 130 | 5 400 | 480 | 2,8 | 850 | 1 300 | 33,5 | 29268 |
| | 540 | 122 | 2 710 | 11 000 | 950 | 11 | 600 | 1 100 | 105 | 29368 |
| | 620 | 170 | 6 700 | 22 400 | 1 760 | 46 | 560 | 1 000 | 220 | ▸ 29468 E |
| **360** | 500 | 85 | 1 460 | 6 800 | 585 | 4,4 | 750 | 1 200 | 52 | 29272 |
| | 560 | 122 | 2 760 | 11 600 | 980 | 13 | 600 | 1 100 | 110 | ▸ 29372 |
| | 640 | 170 | 6 200 | 21 200 | 1 630 | 41 | 560 | 950 | 230 | ▸ 29472 EM |
| **380** | 520 | 85 | 1 580 | 7 650 | 655 | 5,6 | 700 | 1 100 | 53 | 29276 |
| | 600 | 132 | 3 340 | 14 000 | 1 160 | 19 | 530 | 1 000 | 140 | ▸ 29376 |
| | 670 | 175 | 6 800 | 24 000 | 1 860 | 53 | 530 | 900 | 260 | ▸ 29476 EM |



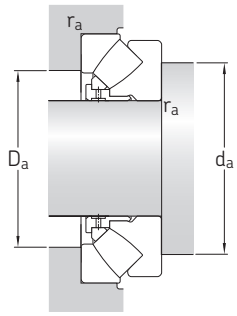

| Dimensions | | | | | | | | Abutment and fillet dimensions | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | B | $B_1$ | C | $r_{1,2}$ min. | s | $d_a$ min. | $d_{b1}$ max. | $d_{b2}$ max. | $H_a$ min. | $D_a$ max. | $r_a$ max. |
| mm | | | | | | | | mm | | | | | |
| **190** | 285 | 244 | 49 | 71,3 | 36 | 4 | 110 | 250 | 200 | 211 | – | 280 | 3 |
| | 332 | 265 | 73 | 101 | 55,5 | 5 | 117 | 280 | 207 | 223 | – | 321 | 4 |
| **200** | 260 | 233 | 30 | 43,4 | 24 | 2 | 108 | 235 | 206 | 207 | 17 | 253 | 2 |
| | 304 | 257 | 53,5 | 76,7 | 40 | 4 | 116 | 265 | 211 | 224 | – | 297 | 3 |
| | 350 | 278 | 77 | 107,1 | 59,4 | 5 | 122 | 295 | 217 | 234 | – | 337 | 4 |
| **220** | 280 | 252 | 30 | 43,4 | 24,5 | 2 | 117 | 255 | 224,5 | 227 | 17 | 271 | 2 |
| | 326 | 274 | 55 | 77,7 | 41 | 4 | 125 | 285 | 229 | 240 | – | 316 | 3 |
| | 371 | 300 | 77 | 107,4 | 58,5 | 6 | 132 | 315 | 238 | 254 | – | 358 | 5 |
| **240** | 330 | 283 | 19 | 57 | 30 | 2,1 | 130 | 290 | – | – | – | 308 | 2 |
| | 345 | 296 | 54 | 77,8 | 40,5 | 4 | 135 | 305 | 249 | 259 | – | 336 | 3 |
| | 391 | 322 | 76 | 107,1 | 59 | 6 | 142 | 335 | 258 | 276 | – | 378 | 5 |
| **260** | 350 | 302 | 19 | 57 | 30 | 2,1 | 139 | 310 | – | – | – | 326 | 2 |
| | 382 | 324 | 61 | 86,6 | 46 | 5 | 148 | 335 | 273 | 286 | – | 370 | 4 |
| | 427 | 346 | 86 | 119 | 63 | 6 | 154 | 365 | 278 | 296 | – | 412 | 5 |
| **280** | 370 | 323 | 19 | 57 | 30,5 | 2,1 | 150 | 325 | – | – | – | 347 | 2 |
| | 401 | 343 | 62 | 86,7 | 45,5 | 5 | 158 | 355 | 293 | 305 | – | 390 | 4 |
| | 464 | 372 | 95 | 129,9 | 70 | 6 | 166 | 395 | 300 | 320 | – | 446 | 5 |
| **300** | 405 | 353 | 21 | 69 | 38 | 3 | 162 | 360 | – | – | – | 380 | 2,5 |
| | 434 | 372 | 70 | 98,9 | 51 | 5 | 168 | 385 | 313 | 329 | – | 423 | 4 |
| | 485 | 392 | 95 | 130,3 | 70,5 | 6 | 175 | 415 | 319 | 340 | – | 465 | 5 |
| **320** | 430 | 372 | 21 | 69 | 38 | 3 | 172 | 380 | – | – | – | 400 | 2,5 |
| | 454 | 391 | 68 | 97,8 | 53 | 5 | 180 | 405 | 332 | 347 | – | 442 | 4 |
| | 520 | 422 | 102 | 139,4 | 74,5 | 7,5 | 191 | 450 | 344 | 367 | – | 500 | 6 |
| **340** | 445 | 395 | 21 | 69 | 37,5 | 3 | 183 | 400 | – | – | – | 422 | 2,5 |
| | 520 | 428 | 40,6 | 117 | 59,5 | 5 | 192 | 440 | – | – | – | 479 | 4 |
| | 557 | 445 | 112 | 151,4 | 84 | 7,5 | 201 | 475 | 363 | 386 | – | 530 | 6 |
| **360** | 485 | 423 | 25 | 81 | 44 | 4 | 195 | 430 | – | – | – | 453 | 3 |
| | 540 | 448 | 40,5 | 117 | 59,5 | 5 | 202 | 460 | – | – | – | 500 | 4 |
| | 580 | 474 | 63 | 164 | 83,5 | 7,5 | 210 | 495 | – | – | – | 550 | 6 |
| **380** | 505 | 441 | 27 | 81 | 42 | 4 | 202 | 450 | – | – | – | 473 | 3 |
| | 580 | 477 | 45 | 127 | 63,5 | 6 | 216 | 495 | – | – | – | 535 | 5 |
| | 610 | 494 | 67 | 168 | 87,5 | 7,5 | 222 | 525 | – | – | – | 580 | 6 |




| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Minimum load factor | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | H | C | $C_0$ | $P_u$ | A | | | | |
| mm | | | kN | | kN | – | r/min | | kg | – |
| **400** | 540 | 85 | 1 610 | 8 000 | 695 | 6,1 | 700 | 1 100 | 55,5 | **29280** |
| | 620 | 132 | 3 450 | 14 600 | 1 200 | 20 | 530 | 950 | 150 | **29380** |
| | 710 | 185 | 7 650 | 26 500 | 1 960 | 62 | 480 | 850 | 310 | ▸ 29480 EM |
| **420** | 580 | 95 | 1 990 | 9 800 | 815 | 9,1 | 630 | 1 000 | 75,5 | **29284** |
| | 650 | 140 | 3 740 | 16 000 | 1 290 | 24 | 500 | 900 | 170 | **29384** |
| | 730 | 185 | 7 800 | 27 500 | 2 080 | 69 | 480 | 850 | 325 | ▸ 29484 EM |
| **440** | 600 | 95 | 2 070 | 10 400 | 850 | 10 | 630 | 1 000 | 78 | **29288** |
| | 680 | 145 | 5 200 | 19 300 | 1 560 | 34 | 530 | 850 | 180 | 29388 EM |
| | 780 | 206 | 9 000 | 32 000 | 2 320 | 91 | 430 | 750 | 410 | ▸ 29488 EM |
| **460** | 620 | 95 | 2 070 | 10 600 | 865 | 11 | 600 | 950 | 81 | **29292** |
| | 710 | 150 | 4 310 | 19 000 | 1 500 | 34 | 450 | 800 | 215 | **29392** |
| | 800 | 206 | 9 300 | 33 500 | 2 450 | 100 | 430 | 750 | 425 | 29492 EM |
| **480** | 650 | 103 | 2 350 | 11 800 | 950 | 13 | 560 | 900 | 98 | **29296** |
| | 850 | 224 | 9 550 | 39 000 | 2 800 | 140 | 340 | 670 | 550 | ▸ **29496 EM** |
| **500** | 670 | 103 | 2 390 | 12 500 | 1 000 | 15 | 560 | 900 | 100 | **292/500** |
| | 750 | 150 | 4 490 | 20 400 | 1 560 | 40 | 430 | 800 | 235 | **293/500** |
| | 870 | 224 | 9 370 | 40 000 | 2 850 | 150 | 340 | 670 | 560 | ▸ **294/500 EM** |
| **530** | 710 | 109 | 3 110 | 15 300 | 1 220 | 22 | 530 | 850 | 115 | **292/530 EM** |
| | 800 | 160 | 5 870 | 26 500 | 2 080 | 67 | 400 | 750 | 265 | **293/530 EM** |
| | 920 | 236 | 10 500 | 44 000 | 3 100 | 180 | 320 | 630 | 650 | ▸ **294/530 EM** |
| **560** | 750 | 115 | 2 990 | 16 000 | 1 220 | 24 | 480 | 800 | 140 | **292/560** |
| | 980 | 250 | 12 000 | 51 000 | 3 550 | 250 | 300 | 560 | 810 | **294/560 EM** |
| **600** | 800 | 122 | 3 740 | 18 600 | 1 460 | 33 | 450 | 700 | 170 | **292/600 EM** |
| | 1 030 | 258 | 13 100 | 56 000 | 4 000 | 300 | 280 | 530 | 845 | **294/600 EM** |
| **630** | 850 | 132 | 4 770 | 23 600 | 1 800 | 53 | 400 | 670 | 210 | **292/630 EM** |
| | 950 | 190 | 8 450 | 38 000 | 2 900 | 140 | 320 | 600 | 485 | **293/630 EM** |
| | 1 090 | 280 | 14 400 | 62 000 | 4 150 | 370 | 260 | 500 | 1 040 | ▸ **294/630 EM** |
| **670** | 1 150 | 290 | 15 400 | 68 000 | 4 500 | 440 | 240 | 450 | 1 210 | ▸ **294/670 EM** |
| **710** | 1 060 | 212 | 9 950 | 45 500 | 3 400 | 200 | 280 | 500 | 610 | ▸ **293/710 EM** |
| | 1 220 | 308 | 17 600 | 76 500 | 5 000 | 560 | 220 | 430 | 1 500 | ▸ **294/710 EF** |
| **750** | 1 280 | 315 | 18 700 | 85 000 | 5 500 | 690 | 200 | 400 | 1 650 | ▸ **294/750 EF** |



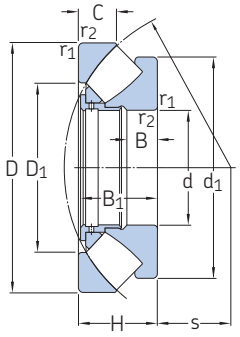
SKF Explorer bearing
▸ Popular item




| Dimensions | | | | | | | | Abutment and fillet dimensions | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | B | $B_1$ | C | $r_{1,2}$ min. | s | $d_a$ min. | $d_{b1}$ max. | $d_{b2}$ max. | $H_a$ min. | $D_a$ max. | $r_a$ max. |
| mm | | | | | | | | mm | | | | | |
| **400** | 526 | 460 | 27 | 81 | 42,2 | 4 | 212 | 470 | – | – | – | 493 | 3 |
| | 596 | 494 | 43 | 127 | 64 | 6 | 225 | 510 | – | – | – | 550 | 5 |
| | 645 | 525 | 69 | 178 | 89,5 | 7,5 | 234 | 550 | – | – | – | 615 | 6 |
| **420** | 564 | 489 | 30 | 91 | 46 | 5 | 225 | 500 | – | – | – | 525 | 4 |
| | 626 | 520 | 49 | 135 | 67,5 | 6 | 235 | 535 | – | – | – | 580 | 5 |
| | 665 | 545 | 70 | 178 | 90,5 | 7,5 | 244 | 575 | – | – | – | 635 | 6 |
| **440** | 585 | 508 | 30 | 91 | 46,5 | 5 | 235 | 520 | – | – | – | 545 | 4 |
| | 626 | 540 | 49 | 140 | 70,5 | 6 | 249 | 560 | – | – | – | 605 | 5 |
| | 710 | 577 | 77 | 199 | 101 | 9,5 | 257 | 605 | – | – | – | 675 | 8 |
| **460** | 605 | 530 | 30 | 91 | 46 | 5 | 245 | 540 | – | – | – | 565 | 4 |
| | 685 | 567 | 50 | 144 | 72,5 | 6 | 257 | 585 | – | – | – | 630 | 5 |
| | 730 | 596 | 77 | 199 | 101,5 | 9,5 | 268 | 630 | – | – | – | 695 | 8 |
| **480** | 635 | 556 | 33 | 99 | 53,5 | 5 | 259 | 570 | – | – | – | 595 | 4 |
| | 770 | 625 | 88 | 216 | 108 | 9,5 | 280 | 660 | – | – | – | 735 | 8 |
| **500** | 654 | 574 | 33 | 99 | 53,5 | 5 | 268 | 585 | – | – | – | 615 | 4 |
| | 725 | 611 | 50 | 144 | 74 | 6 | 280 | 630 | – | – | – | 675 | 5 |
| | 795 | 648 | 86 | 216 | 110 | 9,5 | 290 | 685 | – | – | – | 755 | 8 |
| **530** | 675 | 608 | 32 | 105 | 56 | 5 | 285 | 620 | – | – | – | 655 | 4 |
| | 741 | 641 | 55 | 154 | 81 | 7,5 | 295 | 665 | – | – | – | 715 | 6 |
| | 840 | 686 | 89 | 228 | 116 | 9,5 | 308 | 725 | – | – | – | 800 | 8 |
| **560** | 732 | 644 | 37 | 111 | 61 | 5 | 302 | 655 | – | – | – | 685 | 4 |
| | 890 | 727 | 99 | 241 | 122 | 12 | 328 | 770 | – | – | – | 850 | 10 |
| **600** | 760 | 688 | 39 | 117 | 60 | 5 | 321 | 700 | – | – | – | 735 | 4 |
| | 940 | 769 | 99 | 249 | 128 | 12 | 349 | 815 | – | – | – | 900 | 10 |
| **630** | 810 | 723 | 50 | 127 | 62 | 6 | 338 | 740 | – | – | – | 780 | 5 |
| | 880 | 761 | 68 | 183 | 92 | 9,5 | 359 | 795 | – | – | – | 860 | 8 |
| | 995 | 815 | 107 | 270 | 137 | 12 | 365 | 860 | – | – | – | 950 | 10 |
| **670** | 1 045 | 864 | 110 | 280 | 141 | 15 | 387 | 905 | – | – | – | 1 000 | 12 |
| **710** | 985 | 855 | 74 | 205 | 103 | 9,5 | 404 | 890 | – | – | – | 960 | 8 |
| | 1 110 | 917 | 117 | 298 | 149 | 15 | 415 | 965 | – | – | – | 1 070 | 12 |
| **750** | 1 170 | 964 | 121 | 305 | 153 | 15 | 436 | 1 015 | – | – | – | 1 120 | 12 |

## 13.1 Spherical roller thrust bearings

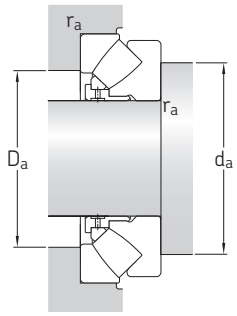
d **800 – 1 060** mm



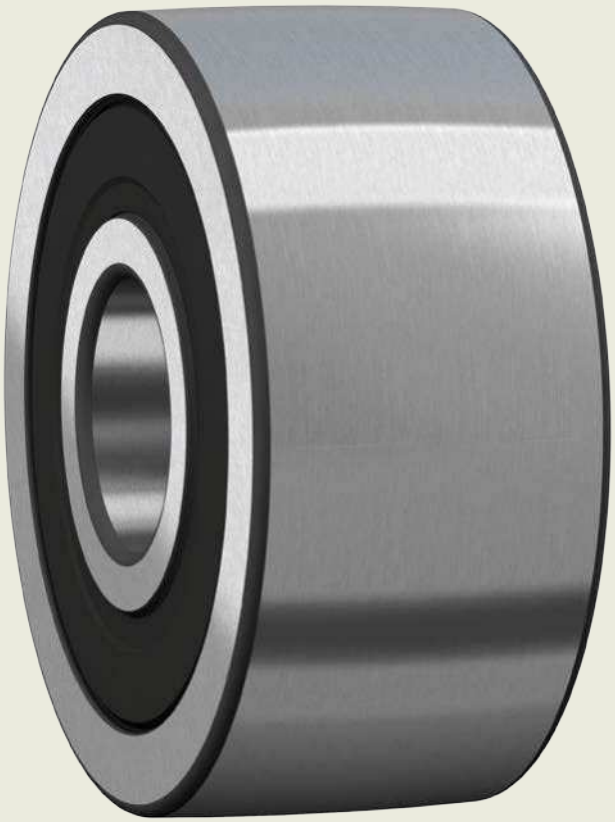

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Minimum load factor | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | H | C | $C_0$ | $P_u$ | A | | | | |
| mm | | | kN | | kN | – | r/min | | kg | – |
| **800** | 1 060 | 155 | 6 560 | 34 500 | 2 550 | 110 | 320 | 530 | 380 | **292/800 EM** |
| | 1 180 | 230 | 11 300 | 55 000 | 3 900 | 290 | 240 | 450 | 810 | **293/800 EM** |
| | 1 360 | 335 | 20 200 | 93 000 | 5 850 | 820 | 190 | 360 | 2 030 | ▸ **294/800 EF** |
| **850** | 1 440 | 354 | 23 900 | 108 000 | 7 100 | 1 100 | 170 | 340 | 2 390 | ▸ **294/850 EF** |
| **900** | 1 520 | 372 | 26 700 | 122 000 | 7 200 | 1 400 | 160 | 300 | 2 650 | ▸ **294/900 EF** |
| **950** | 1 600 | 390 | 28 200 | 132 000 | 7 800 | 1 700 | 140 | 280 | 3 070 | **294/950 EF** |
| **1 000** | 1 670 | 402 | 31 100 | 140 000 | 8 650 | 1 900 | 130 | 260 | 3 390 | ▸ **294/1000 EF** |
| **1 060** | 1 770 | 426 | 33 400 | 156 000 | 8 500 | 2 300 | 120 | 240 | 4 280 | **294/1060 EF** |



▸ Popular item




| Dimensions | | | | | | | | Abutment and fillet dimensions | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | B | $B_1$ | C | $r_{1,2}$ min. | s | $d_a$ min. | $d_{b1}$ max. | $d_{b2}$ max. | $H_a$ min. | $D_a$ max. | $r_a$ max. |
| mm | | | | | | | | mm | | | | | |
| **800** | 1 010 | 911 | 52 | 149 | 77 | 7,5 | 434 | 935 | – | – | – | 980 | 6 |
| | 1 099 | 958 | 78 | 222 | 117 | 9,5 | 440 | 985 | – | – | – | 1 060 | 8 |
| | 1 250 | 1 034 | 123 | 324 | 165 | 15 | 462 | 1 080 | – | – | – | 1 185 | 12 |
| **850** | 1 315 | 1 077 | 142 | 342 | 172 | 15 | 507 | 1 160 | – | – | – | 1 270 | 12 |
| **900** | 1 394 | 1 137 | 147 | 360 | 186 | 15 | 518 | 1 215 | – | – | – | 1 320 | 12 |
| **950** | 1 470 | 1 209 | 153 | 377 | 191 | 15 | 546 | 1 275 | – | – | – | 1 400 | 12 |
| **1 000** | 1 531 | 1 270 | 154,9 | 389 | 190 | 15 | 599 | 1 350 | – | – | – | 1 490 | 12 |
| **1 060** | 1 615 | 1 349 | 192 | 412 | 207 | 15 | 610 | 1 410 | – | – | – | 1 555 | 12 |



# 14 Cam rollers

# 14 Cam rollers



**Designs and variants** . . . . . **933**
Single row cam rollers . . . . . 933
Double row cam rollers. . . . . 933
Cages. . . . . 934

**Bearing data** . . . . . **934**
(Dimension standards, profile of the outer ring running surface, tolerances, internal clearance, defect frequencies)

**Loads** . . . . . **935**
(Dynamic loads, static loads, axial loads, minimum load, equivalent dynamic bearing load, equivalent static bearing load)

**Temperature limits** . . . . . **936**

**Speed limits** . . . . . **936**

**Design considerations** . . . . . **936**
Pins . . . . . 936
Support surfaces . . . . . 936
Guide flanges . . . . . 936

**Designation system** . . . . . **937**

**Product tables**
**14.1** Single row cam rollers . . . . . 938
**14.2** Double row cam rollers . . . . . 940

# 14 Cam rollers

## More information


**General bearing knowledge** . . . . **17**

**Bearing selection process** . . . . . **59**
Lubrication . . . . . 109
Bearing interfaces. . . . . 139
Sealing, mounting and dismounting . . . . . 193


SKF cam rollers (yoke-type track rollers based on ball bearings) are designed to run on all types of tracks and to be used in cam drives, conveyor systems, etc.

The outer ring running surface is crowned as standard. Double row cam rollers are also available with a cylindrical (flat) outer ring running surface.

SKF supplies cam rollers greased, sealed and ready-to-mount. They are available in two main designs and also as variants of these:

- single row cam rollers based on deep groove ball bearings in the 62 series (fig. 1)
- double row cam rollers based on double row angular contact ball bearings in the 32 dimension series (fig. 2)

## Cam roller features

- **Accommodate high radial loads**
  The thick-walled outer ring enables high radial loads, while reducing distortion and bending stresses.
- **Accommodate tilting moments**
  Double row cam rollers accommodate higher tilting moments than single row cam rollers.
- **Long service life**
  The crowned outer ring running surface is beneficial for applications where outer ring tilting relative to the track may occur or where edge stresses need to be minimized.
- **Relatively high speed capability**

Fig. 1

**Single row cam roller**

Fig. 2

**Double row cam roller**

# Designs and variants

## Single row cam rollers

- are based on deep groove ball bearings in the 62 series (**fig. 1**)
- have a thick-walled outer ring with its running surface crowned
- are capped with a sheet steel reinforced NBR contact seal on both sides
- are greased for the life of the bearing and cannot be relubricated (**table 1**)

When capped bearings must operate under certain conditions, such as very high speeds or high temperatures, some grease may leak. For bearing arrangements where this would be detrimental, appropriate actions should be taken.

## Double row cam rollers

- are based on double row angular contact ball bearings in the 32 dimension series (**fig. 2**)
- have a thick-walled outer ring with its running surface available in two designs:
  - crowned as standard (series designation 3058.. C)
  - cylindrical (flat) (series designation 3057.. C)
- have a 30° contact angle, enabling, together with the two ball sets, tilting moments to be accommodated
- are supplied capped in two variants:
  - with a sheet steel shield on both sides that extends into a recess on the inner ring (designation suffix -2Z)
  - with an NBR contact seal on both sides (designation suffix -2RS1)

  These cam rollers are not listed in this catalogue, but can be found online at skf.com/go/17000-14-2.
- are greased for the life of the bearing under normal operating conditions (**table 1**)
- should be relubricated, if:
  - subjected to moisture or solid contaminants
  - they run for long periods at temperatures above 70 °C *(160 °F)*
- have a lubrication hole in the inner ring
  - Where suitable ducts are provided in the pin, the bearings are easy to relubricate.
  - The grease should be applied slowly to avoid damaging the shields or seals.

When capped bearings must operate under certain conditions, such as very high speeds or high temperatures, grease may appear between the inner ring and capping device. For bearing arrangements where this would be detrimental, appropriate actions should be taken.

**Table 1**

**Technical specifications of SKF greases for track rollers**

| Bearing type | Specifications for the initial grease fill<br>Temperature range[1]<br>–50 0 50 100 150 200 250 °C<br>–60 30 120 210 300 390 480 °F | Thickener | Base oil type | NLGI grade | Base oil viscosity [mm²/s] at 40 °C *(105 °F)* | at 100 °C *(210 °F)* | Grease for relubrication |
|---|---|---|---|---|---|---|---|
| **Single row cam roller (D ≤ 62 mm)** | | Lithium soap | Mineral | 2 | 70 | 7,3 | – |
| **Single row cam roller (D > 62 mm), Double row cam roller** | | Lithuim soap | Mineral | 3 | 100 | 10 | LGMT 3[2] |
| **Support roller, Cam follower** | | Lithuim complex soap | Mineral | 2 | 160 | 15,5 | LGWA 2 |

1) Refer to the SKF traffic light concept (page 117).
2) Single row cam rollers cannot be relubricated.

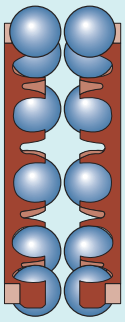
# Cages

SKF cam rollers are fitted with one of the cages shown in table 2. Double row cam rollers are equipped with two cages.

When used at high temperatures, some lubricants can have a detrimental effect on polyamide cages. For additional information about the suitability of cages, refer to *Cages*, page 187.

Table 2

**Cages for cam rollers**

| | Single row cam rollers | | Double row cam rollers |
|---|---|---|---|
| | | |  |
| **Cage type** | Riveted, ball centred | Ribbon-type, ball centred | Snap-type, ball centred |
| **Material** | Stamped steel | Stamped steel | PA66, glass fibre reinforced |
| **Suffix** | – | – | – |

# Bearing data

| | Single row cam rollers | Double row cam rollers |
|---|---|---|
| **Dimension standards** | ISO 15, dimension series 02, except for the outside diameter | ISO 15, dimension series 32, except for the outside diameter |
| **Profile of the outer ring running surface** | Radius = 400 mm | • **3058.. C design**<br>Radius = 400 mm<br>• **3057.. C design**<br>Cylindrical (flat) |
| **Tolerances**<br><br>For additional information<br>→ page 35 | Normal, except:<br>• diameter of the crowned running surface: twice the Normal tolerance<br><br>Values for Normal tolerance class: ISO 492 (table 2, page 38) | |
| **Internal clearance**<br><br>For additional information<br>→ page 182 | C3<br>Values: ISO 5753-1 (table 6, page 252) | Normal<br>Values 32 A series: (table 8, page 396) |
| | Values are valid for unmounted bearings under zero measuring load. | |
| **Defect frequencies** | → skf.com/bearingcalculator | |

# Loads

| | |
|---|---|
| **Dynamic loads** | As track rollers are not supported in a housing, the outer rings deform, leading to an altered load distribution and bending stresses in the outer ring.<br>The basic load ratings listed in the **product tables**, **page 938**, take into account the altered load distribution, while the maximum radial loads $F_{r\,max}$ (**product tables**) are based on the bending stresses. |
| **Static loads** | Permissible static load is the lower value of $F_{0r\,max}$ or $C_0$ (**product tables**). |
| **Axial loads** | Cam rollers are intended for predominantly radial loads. However, axial loads can occur because of skew or tilting or when the outer ring runs against flanges for brief periods.<br>Axial loads acting continuously on the outer ring may reduce the cam roller service life. To evaluate these influences, contact the SKF application engineering service. |
| **Minimum load**<br><br>For additional information<br>→ **page 106** | $F_{rm} = 0{,}0167\ C_0$ |
| **Equivalent dynamic bearing load**<br><br>For additional information<br>→ **page 91** | $P = F_r$ |
| **Equivalent static bearing load**<br><br>For additional information<br>→ **page 105** | $P_0 = F_r$ |

**Symbols**

| | |
|---|---|
| $C_0$ | basic static load rating [kN] (**product tables**, **page 938**) |
| $F_r$ | radial load [kN] |
| $F_{r\,max}$ | maximum permissible dynamic radial load [kN] (**product tables**) |
| $F_{0r\,max}$ | maximum permissible static radial load [kN] (**product tables**) |
| $F_{rm}$ | minimum radial load [kN] |
| $P$ | equivalent dynamic bearing load [kN] |
| $P_0$ | equivalent static bearing load [kN] |

# Temperature limits

The permissible operating temperature for cam rollers can be limited by:

- the dimensional stability of the bearing rings and balls
- the cage
- the seals
- the lubricant

Where temperatures outside the permissible range are expected, contact SKF.

### Bearing rings and balls

SKF cam rollers are heat stabilized up to at least:

- 120 °C *(250 °F)* for single row cam rollers
- 150 °C *(300 °F)* for double row cam rollers

### Cages

Steel cages can be used at the same operating temperatures as the bearing rings and balls. For temperature limits of PA66 cages, refer to *Polymer cages*, page 188.

### Seals

The permissible operating temperature for NBR seals is –40 to +100 °C *(–40 to +210 °F)*. Temperatures up to 120 °C *(250 °F)* can be tolerated for brief periods.

Typically, temperature peaks are at the seal lip.

### Lubricants

Temperature limits for greases used in SKF cam rollers are provided in table 1, page 933. For temperature limits of other SKF greases, refer to *Selecting a suitable SKF grease*, page 116.

When using lubricants not supplied by SKF, temperature limits should be evaluated according to the SKF traffic light concept (page 117).

# Speed limits

The limiting speed listed in the **product tables** is a mechanical limit that should not be exceeded unless the bearing design and the application are adapted for higher speeds.

For additional information, refer to *Operating temperature and speed*, page 130.

# Design considerations

## Pins

Pins or shafts should be machined to tolerance class g6Ⓔ:

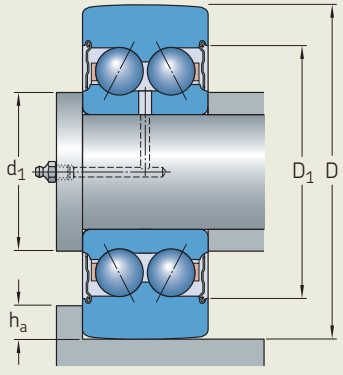
- for normal operating conditions, such as stationary inner ring load
- where easy displacement of the inner ring is required

## Support surfaces

Continuously axial loaded cam rollers should be supported over the entire inner ring side face (fig. 3) and the support surface should be dimensioned according to diameter $d_1$ (**product tables**, page 938).

**Fig. 3**

**Cam roller with supported inner ring or flange**



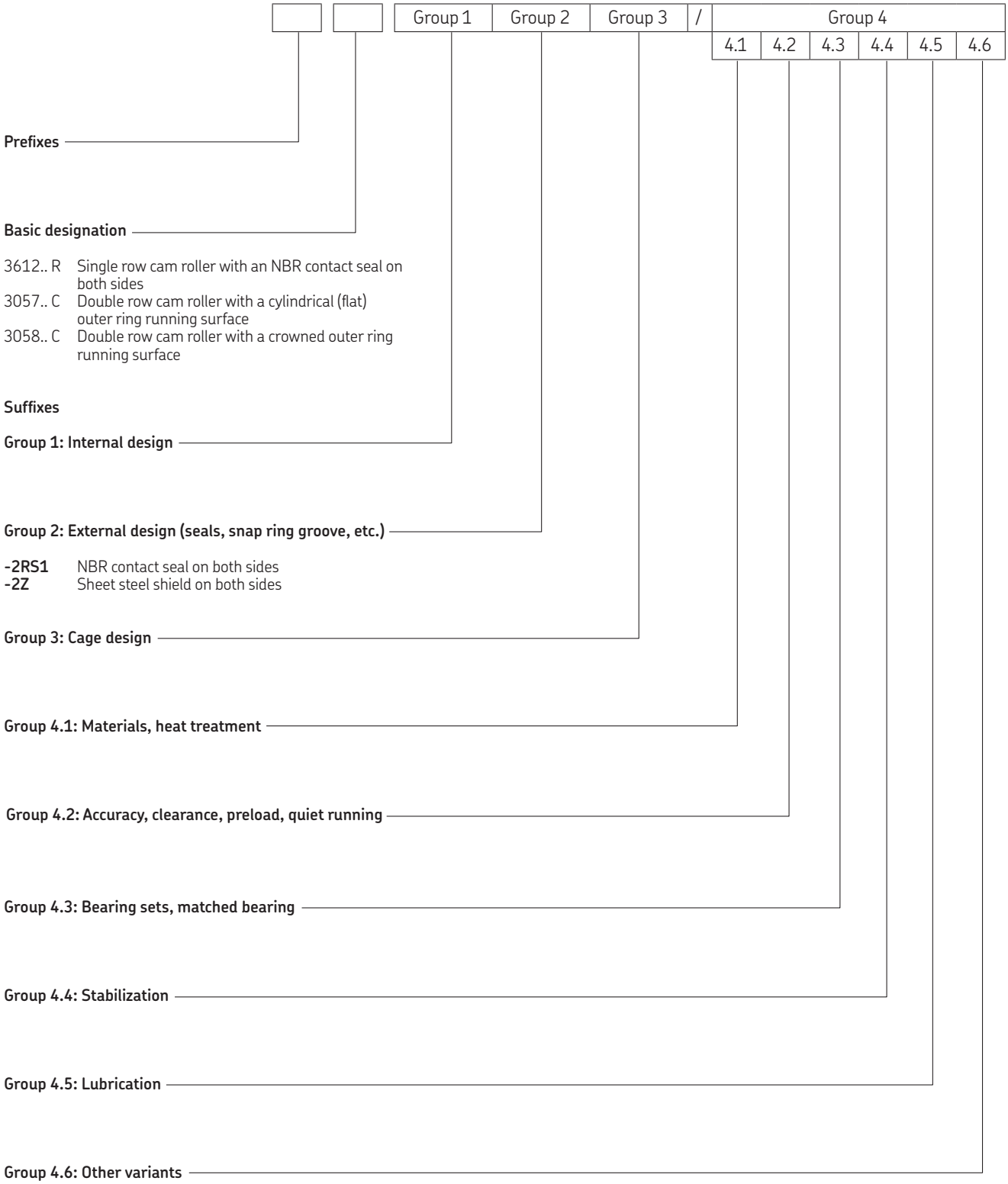

# Guide flanges

For rails or cams with guide flanges, the recommended flange height $h_a$ (fig. 3) should be:

$$h_a \leq 0{,}5\,(D - D_1)$$

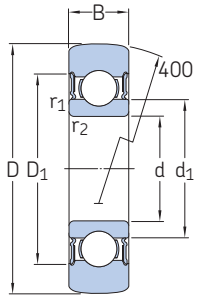
The values for the outer ring diameters D and $D_1$ are listed in the product tables.

# Designation system



## 14.1 Single row cam rollers

D **32 – 80** mm



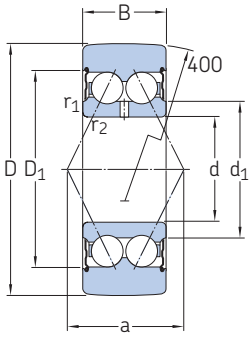

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Maximum radial loads dynamic | static | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|
| D | d | B | C | $C_0$ | $P_u$ | $F_r$ max. | $F_{0r}$ max. | | | |
| mm | | | kN | | kN | kN | | r/min | kg | – |
| **32** | 10 | 9 | 4,68 | 2,04 | 0,085 | 3,45 | 5 | 12 000 | 0,04 | ▸ **361200 R** |
| **35** | 12 | 10 | 6,24 | 2,6 | 0,11 | 3,35 | 4,75 | 11 000 | 0,051 | ▸ **361201 R** |
| **40** | 15 | 11 | 7,02 | 3,2 | 0,137 | 5,1 | 7,35 | 9 500 | 0,072 | ▸ **361202 R** |
| **47** | 17 | 12 | 8,84 | 4,25 | 0,18 | 8,15 | 11,6 | 8 500 | 0,11 | ▸ **361203 R** |
| **52** | 20 | 14 | 11,4 | 5,5 | 0,232 | 7,5 | 10,6 | 7 000 | 0,15 | ▸ **361204 R** |
| **62** | 25 | 15 | 13 | 6,8 | 0,29 | 12,9 | 18,6 | 6 300 | 0,24 | ▸ **361205 R** |
| **72** | 30 | 16 | 17,4 | 9,5 | 0,4 | 14,6 | 20,8 | 5 300 | 0,34 | ▸ **361206 R** |
| **80** | 35 | 17 | 22,1 | 11,8 | 0,5 | 12,9 | 18,3 | 4 500 | 0,42 | ▸ **361207 R** |

▸ Popular item

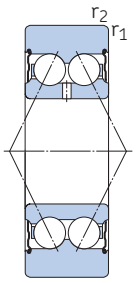
| Dimensions | | | | Calculation factor |
|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | $r_{1,2}$ min. | $f_0$ |
| mm | | | | – |
| **32** | 17 | 24,8 | 0,6 | 13 |
| **35** | 18,4 | 27,4 | 0,6 | 12 |
| **40** | 21,7 | 30,4 | 0,6 | 13 |
| **47** | 24,5 | 35 | 0,6 | 13 |
| **52** | 28,8 | 40,6 | 1 | 13 |
| **62** | 34,3 | 46,3 | 1 | 14 |
| **72** | 40,3 | 54,1 | 1 | 14 |
| **80** | 46,9 | 62,7 | 1,1 | 14 |

## 14.2 Double row cam rollers

D **32 – 80** mm




3058.. C-2Z




3057.. C-2Z

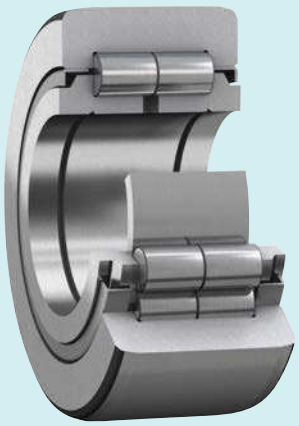
| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Maximum radial loads dynamic | static | Limiting speed | Mass | Designations Cam roller with crowned running surface | cylindrical running surface |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D | d | B | C | $C_0$ | $P_u$ | $F_r$ max. | $F_{0r}$ max. | | | | |
| mm | | | kN | | kN | kN | | r/min | kg | – | |
| **32** | 10 | 14 | 6,76 | 3,6 | 0,153 | 4,4 | 6,3 | 11 000 | 0,062 | ▸ **305800 C-2Z** | |
| **35** | 12 | 15,9 | 9,04 | 4,555 | 0,193 | 3,8 | 5,4 | 9 500 | 0,078 | ▸ **305801 C-2Z** | ▸ **305701 C-2Z** |
| **40** | 15 | 15,9 | 10,1 | 5,5 | 0,263 | 5,85 | 8,5 | 9 000 | 0,1 | ▸ **305802 C-2Z** | ▸ **305702 C-2Z** |
| **47** | 17 | 17,5 | 13 | 7,35 | 0,315 | 9,3 | 13,4 | 8 000 | 0,16 | ▸ **305803 C-2Z** | ▸ **305703 C-2Z** |
| **52** | 20 | 20,6 | 16,5 | 9,5 | 0,4 | 8,3 | 12 | 7 000 | 0,22 | ▸ **305804 C-2Z** | ▸ **305704 C-2Z** |
| **62** | 25 | 20,6 | 18,6 | 11,8 | 0,5 | 15,3 | 21,6 | 6 000 | 0,32 | ▸ **305805 C-2Z** | ▸ **305705 C-2Z** |
| **72** | 30 | 23,8 | 25,1 | 16,3 | 0,695 | 17 | 24 | 5 000 | 0,49 | ▸ **305806 C-2Z** | ▸ **305706 C-2Z** |
| **80** | 35 | 27 | 31,9 | 20,4 | 0,865 | 15,6 | 22,4 | 4 300 | 0,65 | ▸ **305807 C-2Z** | ▸ **305707 C-2Z** |

▸ Popular item

**Dimensions**

| d | $d_1$ ≈ | $D_1$ ≈ | $r_{1,2}$ min. | a |
|---|---|---|---|---|
| mm | | | | |
| **32** | 15,8 | 25 | 0,6 | 16,5 |
| **35** | 17,7 | 27,7 | 0,6 | 19 |
| **40** | 20,2 | 30,7 | 0,6 | 21 |
| **47** | 23,3 | 35 | 0,6 | 23 |
| **52** | 27,7 | 40,9 | 1 | 28 |
| **62** | 32,7 | 45,9 | 1 | 30 |
| **72** | 38,7 | 55,2 | 1 | 36 |
| **80** | 45,4 | 63,9 | 1,1 | 42 |

# 15 Support rollers



# 15 Support rollers



**Designs and variants** . . . . . **945**
Support rollers without flange rings. . . . . 945
(R)ST0 design support rollers . . . . . 945
(R)NA 22...2RS design support rollers . . . . . 945
Support rollers with flange rings . . . . . 946
NATR and NATV design support rollers . . . . . 946
NUTR .. A design support rollers . . . . . 946
PWTR ...2RS design support rollers. . . . . 946
NNTR ...2ZL design support rollers . . . . . 947
Cages. . . . . 947

**Lubrication**. . . . . **947**
Relubrication requirements . . . . . 947
Relubrication features . . . . . 947

**Bearing data** . . . . . **948**
(Dimension standards, profile of the outer ring running surface, tolerances, internal clearance, defect frequencies)

**Loads** . . . . . **949**
(Dynamic loads, static loads, axial loads, minimum load, equivalent dynamic bearing load, equivalent static bearing load)

**Temperature limits** . . . . . **950**

**Speed limits**. . . . . **950**

**Design considerations** . . . . . **950**
Pins . . . . . 950
Support surfaces . . . . . 951
Axial gap . . . . . 951

**Mounting** . . . . . **951**

**Designation system** . . . . . **952**

**Product tables**
15.1 Support rollers without flange rings, with an inner ring . . . . . 954
15.2 Support rollers with flange rings, with an inner ring . . . . . 956

# 15 Support rollers



## More information


**General bearing knowledge** . . . . **17**

**Bearing selection process** . . . . . **59**
Lubrication . . . . . 109
Bearing interfaces. . . . . 139
Sealing, mounting and dismounting . . . . . 193


SKF support rollers (yoke-type track rollers based on roller bearings) are designed to run on all types of tracks and to be used in cam drives, conveyor systems, etc.

SKF support rollers are based on needle or cylindrical roller bearings.

SKF supplies them ready-to-mount. To meet the requirements of different applications, they are available in several designs and variants (fig. 1):

- with or without a cage
- with or without flange rings
- with or without an inner ring
- with or without seals (sealed or open)
- with the outer ring running surface profile:
  - crowned as standard
  - cylindrical (flat)

## Support roller features

- **Accommodate high radial loads**
  The thick-walled outer ring enables high radial loads, while reducing distortion and bending stresses.

- **Long service life**
  The crowned outer ring running surface is beneficial for applications where outer ring tilting relative to the track may occur or where edge stresses need to be minimized.

**Fig. 1**

**Support rollers**

- based on needle roller bearings
- with a cage
- with flange rings
- with an inner ring

- based on cylindrical roller bearings
- without a cage
- with flange rings
- with an inner ring

- based on needle roller bearings
- with a cage
- without flange rings
- without an inner ring

# Designs and variants

SKF support rollers are available without or with flange rings (fig. 2). They have a thick-walled outer ring with its running surface crowned as standard. However, support rollers with a cylindrical (flat) running surface are also available (designation suffix X).

Support rollers without flange rings require adjacent components to guide the outer ring and cage axially.

Support rollers with flange rings do not need adjacent components to guide the outer ring and cage axially (fig. 3). Axial loads, which are induced when shafts are not horizontal or aligned properly, are accommodated by the flange rings.

## Support rollers without flange rings

- require adjacent components to guide the outer ring and cage axially
- are based on needle roller bearings
- are available:
  - with an inner ring, which is slightly wider than the outer ring to avoid axial clamping of the outer ring
  - without an inner ring (designation prefix R), intended for arrangements where the pin or shaft is hardened and ground

These support rollers are not listed in this catalogue, but can be found online at skf.com/go/17000-15-3.

## (R)STO design support rollers

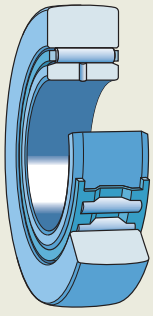
- are available (fig. 4):
  - with an inner ring that can be mounted separately from the outer ring and roller and cage assembly, which must always be kept together as supplied
  - without an inner ring (prefix R)
  - only open (without seals)

## (R)NA 22...2RS design support rollers

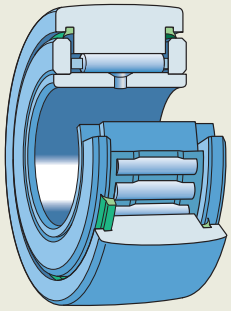
- are available (fig. 5):
  - with an inner ring that can be mounted separately from the outer ring and roller and cage assembly
  - without an inner ring (prefix R)
  - greased and capped with a sheet steel reinforced NBR contact seal on both sides
- have the needle roller and cage assembly axially guided between two integral flanges in the outer ring to form a non-separable unit

**Fig. 2**

**Support rollers**



without flange rings



with flange rings

**Fig. 3**

**Application of support roller with flange rings**

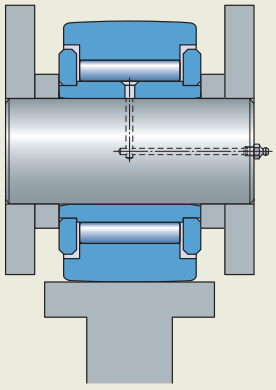
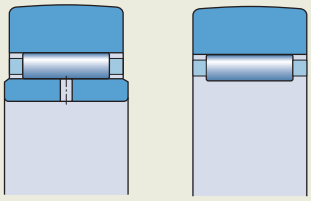
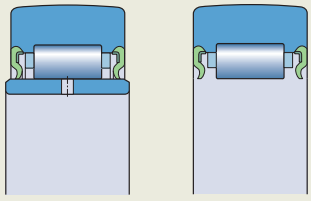


**Fig. 4**



STO RSTO

**Fig. 5**



NA 22...2RS RNA 22...2RS

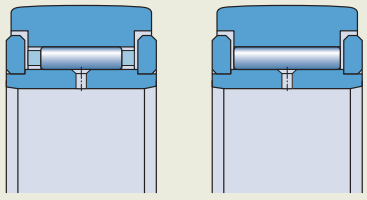
# Support rollers with flange rings

- do not need adjacent components to guide the outer ring and cage axially (fig. 3, page 945)
- are non-separable units
- have different flange designs:
  - pressed-on flange rings (NATR and NATV designs)
  - loose flange rings (NUTR, PWTR and NNTR designs)
- accommodate axial loads that can occur because of skew or tilting

## NATR and NATV design support rollers

- are based on (fig. 6):
  - a needle roller and cage assembly (NATR design)
  - a full complement of needle rollers (NATV design)
- have the outer ring axially guided by pressed-on flange rings, forming a gap-type seal

Fig. 6



NATR NATV

- are also available with an axial sliding ring on both sides (designation suffixes PPA, fig. 7, and PPXA):
  - made of PA66
  - forming narrow labyrinth seals with the outer ring in a radial direction, to protect against coarse contaminants
  - serving as contact seals in an axial direction to retain grease reliably in the bearing
  - improving lubrication conditions in the bearing, keeping friction and frictional heat low, and extending grease life

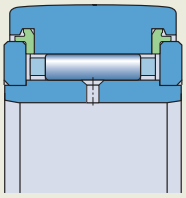
## NUTR .. A design support rollers

- are based on double row full complement cylindrical roller bearings without an integral flange between the two roller sets (fig. 8)
- have an outer ring with two integral flanges, which guide the roller sets axially
- have an inner ring with two loose flange rings, which guide the outer ring axially via the roller sets
- have a sheet metal angle ring pressed into the outer ring shoulder on both sides:
  - forming an effective labyrinth seal
  - extending over the flange rings, making the bearing non-separable
- accommodate relatively heavy axial loads that can occur because of skew or tilting
- can be supplied with a reinforced (thicker) outer ring to accommodate heavy peak loads (e.g. NUTR 50 A → NUTR 50110 A)

## PWTR ...2RS design support rollers

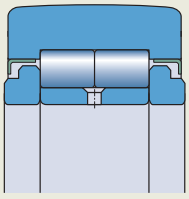
- are based on double row full complement cylindrical roller bearings (fig. 9)
- have an outer ring with three integral flanges, which guide the roller sets axially
- have an inner ring with two loose flange rings, which guide the outer ring axially via the roller sets
- have a relatively large grease quantity between the two roller sets
- are fitted on both sides with an NBR contact seal, being integral with a sheet metal angle ring that is pressed into the outer ring shoulder:
  - to press against the flange rings
  - extending over the flange rings, making the bearing non-separable
- accommodate relatively heavy axial loads that can occur because of skew or tilting
- can be supplied with a reinforced (thicker) outer ring to accommodate heavy peak loads (e.g. PWTR 50.2RS → PWTR 50110.2RS)

Fig. 7



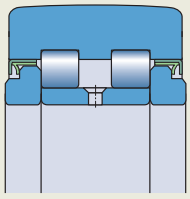
NATR .. PPA

Fig. 8



NUTR .. A

Fig. 9



PWTR ...2RS

## NNTR ...2ZL design support rollers

- are based on double row full complement cylindrical roller bearings (fig. 10)
- have an outer ring with three integral flanges, which guide the roller sets axially
- have an inner ring with two loose flange rings, which guide the outer ring axially via the roller sets
- have a relatively large grease quantity between the two roller sets
- are fitted with a lamellar seal on both sides, inserted into recesses in the shoulders of the flange rings and the outer ring, making the bearing non-separable
- accommodate very heavy radial loads and relatively heavy axial loads that can occur because of skew or tilting

# Cages

SKF support rollers, if not a full complement of rollers, are fitted with one of the cages shown in table 1. The standard cage is not identified in the bearing designation.

When used at high temperatures, some lubricants can have a detrimental effect on polyamide cages. For additional information about the suitability of cages, refer to *Cages*, page 187.

# Lubrication

SKF support rollers are supplied greased (table 1, page 933).

(R)STO design support rollers can be oil or grease lubricated. In applications where oil is used, SKF recommends thoroughly washing the initial grease fill from the bearing prior to operation.

For general information, refer to *Lubrication*, page 109.

# Relubrication requirements

Support rollers:

- should be relubricated regularly to achieve their full service life, even if the initial grease fill still has its full lubricating properties
- used in applications where there are light loads, relatively low speeds and clean surroundings can operate for long periods before relubrication is required
- that operate under contaminated and damp conditions at high speeds or at temperatures > 70 °C *(160 °F)* require more frequent relubrication
- without a cage (full complement of rollers) require more frequent relubrication

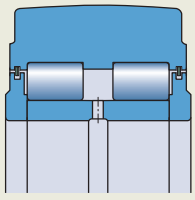
# Relubrication features

The inner rings of SKF support rollers have one lubrication hole, except:

- NNTR designs with d ≤ 90 mm → three lubrication holes
- NNTR designs with d ≥ 100 mm → six lubrication holes

If suitable ducts are provided in the pin, the bearings are easy to relubricate.

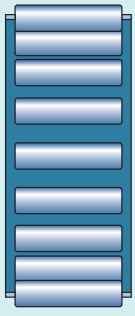
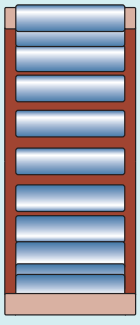
**Fig. 10**



NNTR ...2ZL

**Table 1**

**Cages for support rollers**

| | | |
|---|---|---|
| |  |  |
| **Cage type** | Window-type, centring depends on size and design | Window-type, outer raceway centred |
| **Material** | Sheet steel | PA66, glass fibre reinforced |
| **Suffix** | – | TN |

# Bearing data

| | |
|---|---|
| **Dimension standards** | • **(R)NA 22 designs**<br>ISO 15, dimension series 22, except for the outer ring width<br><br>• **NATR, NATV, NUTR .. A, PWTR designs**<br>ISO 7063 and ANSI/ABMA Standard 18.1 (where standardized)<br><br>• **(R)STO designs**<br>Not standardized |
| **Profile of the outer ring running surface** | • **(R)STO, (R)NA 22, NATR, NATV designs**<br>Radius = 500 mm<br><br>• **NNTR design**<br>D ≤ 260 mm → Radius = 10 000 mm<br>D ≥ 290 mm → Radius = 15 000 mm<br><br>• **NATR .. PPA, NATV .. PPA, NUTR .. A, PWTR designs**<br>Improved crowned profile for better load distribution, higher stiffness and reduced wear |
| **Tolerances**<br><br>For additional information<br>→ **page 35** | Normal, except:<br>• diameter of the crowned running surface:<br>– NNTR design → h10<br>– other designs → 0/–0,05 mm<br>• width B:<br>– NNTR design → 0/–0,5 mm<br>– NATR, NATV, NUTR .. A, PWTR designs → h12<br>• inside diameter $F_w$:<br>– RSTO, RNA 22 designs → F6<br><br>Values for Normal tolerance class: ISO 492 (**table 2**, **page 38**)<br>Values for ISO tolerance classes: h10, h12 and F6 (**table 2**, **page 950**) |
| **Internal clearance**<br><br>For additional information<br>→ **page 182** | • **STO and NA 22 designs**<br>Normal<br><br>• **Other designs**<br>Between C2 and Normal<br><br>Values: ISO 5753-1 (**table 11**, **page 603**)<br>Values are valid for unmounted bearings under zero measuring load. |
| **Defect frequencies** | → skf.com/bearingcalculator |

# Loads

| | |
|---|---|
| **Dynamic loads** | As track rollers are not supported in a housing, the outer rings deform, leading to an altered load distribution and bending stresses in the outer ring.<br>The basic load ratings listed in the **product tables**, **page 954** , take into account the altered load distribution, while the maximum radial loads $F_{r\,max}$ (**product tables**) are based on the bending stresses. |
| **Static loads** | Permissible static load is the lower value of $F_{0r\,max}$ or $C_0$ (**product tables**).<br>Where requirements for smooth running are below normal, the static load may exceed $C_0$, but should never exceed the maximum permissible static radial load $F_{0r\,max}$. |
| **Axial loads** | Support rollers are intended for radial loads. However, support rollers with flange rings can generally accommodate axial loads that can occur because of skew or tilting. The magnitude of permissible load depends on the internal design. |
| **Minimum load**<br><br>For additional information<br>→ **page 106** | $F_{rm} = 0{,}0167\ C_0$ |
| **Equivalent dynamic bearing load**<br><br>For additional information<br>→ **page 91** | $P = F_r$ |
| **Equivalent static bearing load**<br><br>For additional information<br>→ **page 105** | $P_0 = F_r$ |

**Symbols**

| | |
|---|---|
| $C_0$ | basic static load rating [kN] (**product tables**, **page 954**) |
| $F_r$ | radial load [kN] |
| $F_{r\,max}$ | maximum permissible dynamic radial load [kN] (**product tables**) |
| $F_{0r\,max}$ | maximum permissible static radial load [kN] (**product tables**) |
| $F_{rm}$ | minimum radial load [kN] |
| $P$ | equivalent dynamic bearing load [kN] |
| $P_0$ | equivalent static bearing load [kN] |

# Temperature limits

The permissible operating temperature for support rollers can be limited by:

- the dimensional stability of the bearing rings and rollers
- the cage
- the seals
- the lubricant

Where temperatures outside the permissible range are expected, contact SKF.

## Bearing rings and rollers

SKF support rollers are heat stabilized up to at least 140 °C *(280 °F)*.

## Cages

Steel cages can be used at the same operating temperatures as the bearing rings and rollers. For temperature limits of PA66 cages, refer to *Polymer cages*, **page 188**.

## Seals

The permissible operating temperature for seals depends on the seal material:

- NBR: –40 to +100 °C *(–40 to +210 °F)*
  Temperatures up to 120 °C *(250 °F)* can be tolerated for brief periods.
- PA66 sliding rings: –30 to +100 °C *(–20 to +210 °F)*

Typically, temperature peaks are at the seal lip.

## Lubricants

Temperature limits for greases used in SKF support rollers are provided in **table 1**, **page 947**. For temperature limits of other SKF greases, refer to *Selecting a suitable SKF grease*, **page 116**.

When using lubricants not supplied by SKF, temperature limits should be evaluated according to the SKF traffic light concept (**page 117**).

# Speed limits

The limiting speed listed in the **product tables** is a mechanical limit that should not be exceeded unless the bearing design and the application are adapted for higher speeds.

For additional information, refer to *Operating temperature and speed*, **page 130**.

# Design considerations

## Pins

For general information, refer to *Bearing interfaces*, **page 139**.

For support rollers with an inner ring, the pin/shaft should be machined to tolerance class g6Ⓔ under the following conditions:

- stationary inner ring load
- where easy displacement of the inner ring is required

**Table 2**

**ISO tolerance classes**

| Nominal dimension | | h7Ⓔ Deviations | | h9Ⓔ Deviations | | h10Ⓔ Deviations | | h12Ⓔ Deviations | | F6Ⓔ Deviations | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| > | ≤ | U | L | U | L | U | L | U | L | U | L |
| mm | | µm | | µm | | µm | | µm | | µm | |
| **3** | **6** | 0 | –12 | – | – | – | – | – | – | – | – |
| **6** | **10** | 0 | –15 | 0 | –36 | – | – | – | – | +22 | +13 |
| **10** | **18** | 0 | –18 | 0 | –43 | – | – | 0 | –180 | +27 | +16 |
| **18** | **30** | 0 | –21 | 0 | –52 | – | – | 0 | –210 | +33 | +20 |
| **30** | **50** | – | – | 0 | –62 | – | – | 0 | –250 | +41 | +25 |
| **50** | **80** | – | – | – | – | – | – | – | – | +49 | +30 |
| **120** | **180** | – | – | – | – | 0 | –160 | – | – | – | – |
| **180** | **250** | – | – | – | – | 0 | –185 | – | – | – | – |
| **250** | **315** | – | – | – | – | 0 | –210 | – | – | – | – |

To exploit the full load carrying capacity of support rollers without an inner ring, the pin/shaft should:

- be machined to tolerance class k5Ⓔ
- be machined to a surface finish similar to a bearing raceway
- have the same hardness as a bearing raceway

For additional information about raceways on shafts, refer to *Raceways on shafts and in housings*, page 179.

## Support surfaces

For support rollers without flange rings, the outer ring support surfaces:

- guide the outer ring and cage during operation
- must be fine turned
- must be free of burrs and clean
- should extend to at least half the outer ring side face (fig. 11), if unhardened – hardened surfaces may be smaller

Heavily loaded support rollers with flange rings should be axially supported:

- over the entire flange ring side faces (fig. 12)
- according to diameter $d_1$ (**product table**, page 956)

## Axial gap

The following support rollers must be located without any axial gap:

- support rollers without flange rings, with an inner ring (fig. 11)
- support rollers with flange rings (fig. 12)

Support rollers without an inner ring must have an axial gap ≥ 0,2 mm between the outer ring and the support surfaces (fig. 13).

## Mounting

SKF recommends positioning the lubrication hole in the unloaded zone of the inner ring. Positioning is not needed for PWTR and NNTR design support rollers, which have the lubrication holes in the empty space between the two roller sets.

Where mounting the outer ring assembly and inner ring separately, care must be taken not to damage the seal lips.

**Fig. 11**

**Support roller without flange rings – guiding surface design**

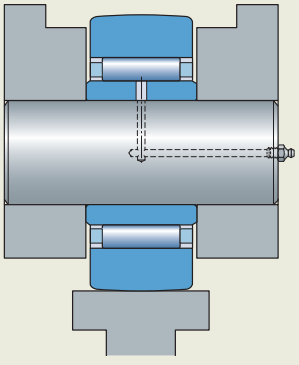


**Fig. 12**

**Support roller with flange rings – support surface design**

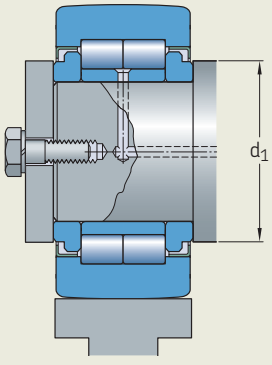
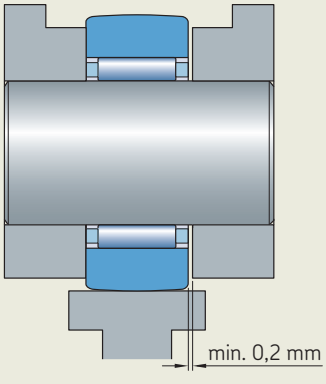



**Fig. 13**

**Support roller without an inner ring – axial gap**



# Designation system

**Prefixes**

**R** Support roller without an inner ring

**Basic designation**

**NA 22** Support roller without a flange ring, fitted with a needle roller and cage assembly
**STO** Support roller without a flange ring, fitted with a needle roller and cage assembly
**NATR** Support roller with two pressed-on flange rings, fitted with a needle roller and cage assembly
**NATV** Support roller with two pressed-on flange rings, fitted with a full complement of needle rollers
**NUTR** Support roller based on a double row full complement cylindrical roller bearing with two integral outer ring flanges and a loose flange ring on both sides of the inner ring
**NNTR** Support roller based on a double row full complement cylindrical roller bearing with three integral outer ring flanges and a loose flange ring on both sides of the inner ring
**PWTR** Support roller based on a double row full complement cylindrical roller bearing with three integral outer ring flanges and a loose flange ring on both sides of the inner ring

**Suffixes**

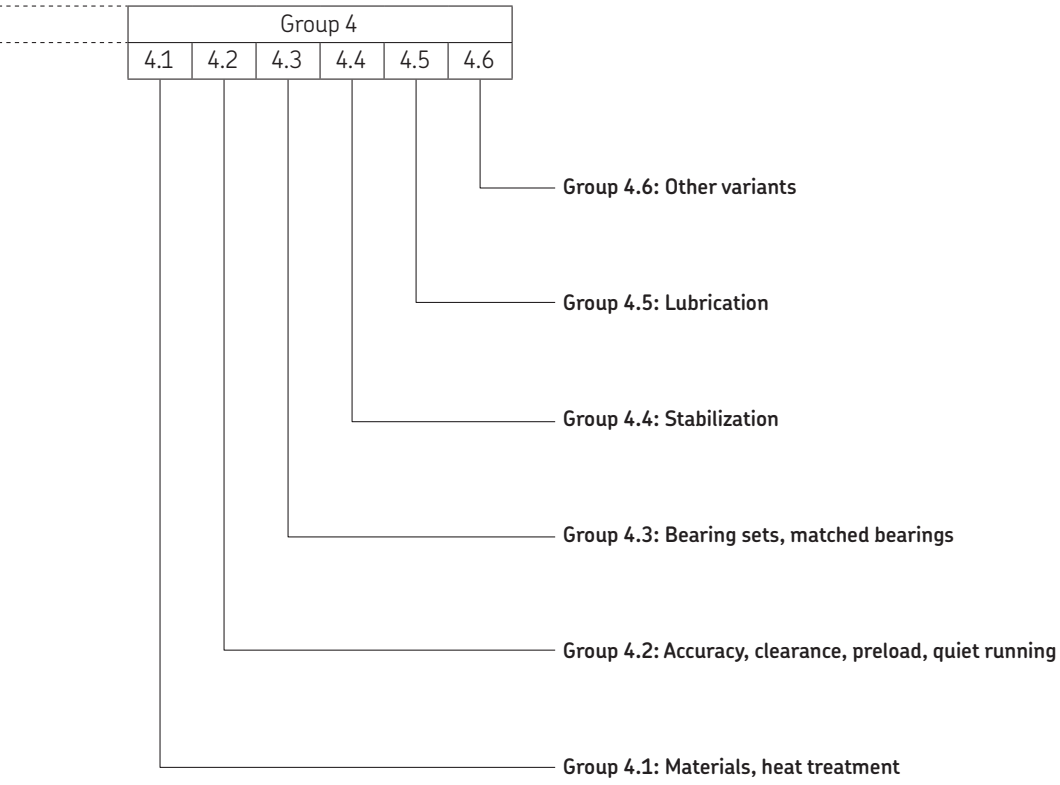
**Group 1: Internal design**

**Group 2: External design (seals, snap ring groove, etc.)**

**.2RS** NBR contact seal on both sides
**.2ZL** Lamellar seal on both sides
**A** Improved crowned profile of the outer ring running surface (NUTR design)
**PPA** PA66 axial sliding and sealing ring on both sides. Improved crowned profile of the outer ring running surface
**PPXA** PA66 axial sliding and sealing ring on both sides. Cylindrical (flat) profile of the outer ring running surface
**X** Cylindrical (flat) profile of the outer ring running surface

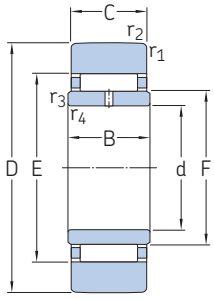
**Group 3: Cage design**

**TN** Glass fibre reinforced PA66 cage

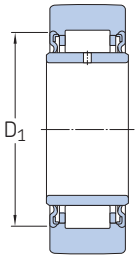

Group 4
4.1
4.2
4.3
4.4
4.5
4.6
Group 4.6: Other variants
Group 4.5: Lubrication
Group 4.4: Stabilization
Group 4.3: Bearing sets, matched bearings
Group 4.2: Accuracy, clearance, preload, quiet running
Group 4.1: Materials, heat treatment

## 15.1 Support rollers without flange rings, with an inner ring

D **19 – 90** mm




ST0



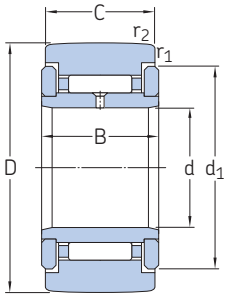

NA 22...2RS

| Principal dimensions | | | | Basic load ratings dynamic | static | Fatigue load limit | Maximum radial loads dynamic | static | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D | d | C | B | C | $C_0$ | $P_u$ | $F_r$ max. | $F_{0r}$ max. | | | |
| mm | | | | kN | | kN | kN | | r/min | kg | – |
| **19** | 6 | 9,8 | 10 | 3,74 | 4,5 | 0,5 | 4,25 | 6,1 | 7 000 | 0,017 | ▸ **ST0 6 TN** |
| | 6 | 11,8 | 12 | 4,02 | 3,65 | 0,425 | 2,55 | 3,6 | 7 000 | 0,022 | **NA 22/6.2RS** |
| **24** | 8 | 9,8 | 10 | 4,13 | 5,4 | 0,6 | 7,5 | 10,8 | 7 000 | 0,026 | **ST0 8 TN** |
| | 8 | 11,8 | 12 | 4,68 | 4,55 | 0,54 | 5,3 | 7,5 | 6 700 | 0,034 | ▸ **NA 22/8.2RS** |
| **30** | 10 | 11,8 | 12 | 8,25 | 8,8 | 1,04 | 8,5 | 12,2 | 6 000 | 0,049 | ▸ **ST0 10** |
| | 10 | 13,8 | 14 | 6,6 | 7,5 | 0,88 | 12 | 17,3 | 6 300 | 0,06 | ▸ **NA 2200.2RS** |
| **32** | 12 | 11,8 | 12 | 8,8 | 9,8 | 1,18 | 8,3 | 12 | 5 600 | 0,057 | ▸ **ST0 12** |
| | 12 | 13,8 | 14 | 7,04 | 8,5 | 1 | 11,6 | 16,6 | 6 000 | 0,067 | ▸ **NA 2201.2RS** |
| **35** | 15 | 11,8 | 12 | 9,13 | 10,6 | 1,27 | 7,1 | 10 | 5 000 | 0,063 | **ST0 15** |
| | 15 | 13,8 | 14 | 7,48 | 9,3 | 1,12 | 9,5 | 13,7 | 5 000 | 0,075 | ▸ **NA 2202.2RS** |
| **40** | 17 | 15,8 | 16 | 9,52 | 13,2 | 1,6 | 15,3 | 22 | 4 500 | 0,11 | ▸ **NA 2203.2RS** |
| | 17 | 15,8 | 16 | 14,2 | 17,6 | 2,08 | 12 | 17,3 | 4 500 | 0,11 | **ST0 17** |
| **47** | 20 | 15,8 | 16 | 16,1 | 21,2 | 2,5 | 18,6 | 26,5 | 4 000 | 0,15 | **ST0 20** |
| | 20 | 17,8 | 18 | 16,1 | 18 | 2,16 | 17,6 | 25,5 | 4 000 | 0,18 | ▸ **NA 2204.2RS** |
| **52** | 25 | 15,8 | 16 | 16,5 | 22,8 | 2,7 | 18 | 26 | 3 400 | 0,18 | **ST0 25** |
| | 25 | 17,8 | 18 | 16,8 | 20 | 2,4 | 17,3 | 24,5 | 3 400 | 0,21 | ▸ **NA 2205.2RS** |
| **62** | 30 | 19,8 | 20 | 17,9 | 25,5 | 3,05 | 28,5 | 40,5 | 2 800 | 0,32 | **NA 2206.2RS** |
| | 30 | 19,8 | 20 | 22,9 | 34,5 | 4,25 | 23,6 | 33,5 | 2 600 | 0,31 | **ST0 30** |
| **72** | 35 | 19,8 | 20 | 24,6 | 39 | 4,8 | 36 | 51 | 2 200 | 0,44 | **ST0 35** |
| | 35 | 22,7 | 23 | 22,4 | 35,5 | 4,3 | 38 | 54 | 2 200 | 0,51 | **NA 2207.2RS** |
| **80** | 40 | 19,8 | 20 | 23,8 | 39 | 4,75 | 34,5 | 49 | 1 900 | 0,53 | **ST0 40** |
| | 40 | 22,7 | 23 | 27,5 | 40,5 | 5 | 35,5 | 51 | 1 900 | 0,63 | ▸ **NA 2208.2RS** |
| **90** | 50 | 22,7 | 23 | 28,1 | 43 | 5,3 | 34,5 | 50 | 1 600 | 0,69 | **NA 2210.2RS** |

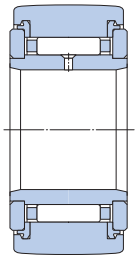
▸ Popular item

**Dimensions**

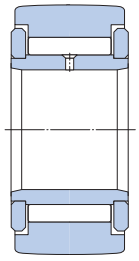
| D | $D_1$ | E | F | $r_{1,2}$ min. | $r_{3,4}$ min. |
|---|---|---|---|---|---|
| mm | | | | | |
| **19** | – | 13 | 10 | 0,3 | 0,3 |
| | 16 | – | 10 | 0,3 | 0,3 |
| **24** | – | 15 | 12 | 0,3 | 0,3 |
| | 18 | – | 12 | 0,3 | 0,3 |
| **30** | – | 20 | 14 | 0,3 | 0,3 |
| | 20 | – | 14 | 0,6 | 0,3 |
| **32** | – | 22 | 16 | 0,3 | 0,3 |
| | 22 | – | 16 | 0,6 | 0,3 |
| **35** | – | 26 | 20 | 0,3 | 0,3 |
| | 26 | – | 20 | 0,6 | 0,3 |
| **40** | 28 | – | 22 | 1 | 0,3 |
| | – | 29 | 22 | 0,3 | 0,3 |
| **47** | – | 32 | 25 | 0,3 | 0,3 |
| | 33 | – | 25 | 1 | 0,3 |
| **52** | – | 37 | 30 | 0,3 | 0,3 |
| | 38 | – | 30 | 1 | 0,3 |
| **62** | 43 | – | 35 | 1 | 0,3 |
| | – | 46 | 38 | 0,6 | 0,6 |
| **72** | – | 50 | 42 | 0,6 | 0,6 |
| | 50 | – | 42 | 1,1 | 0,6 |
| **80** | – | 58 | 50 | 1 | 1 |
| | 57 | – | 48 | 1,1 | 0,6 |
| **90** | 68 | – | 58 | 1,1 | 0,6 |



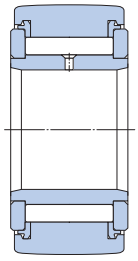

NATR



NATR .. PPA



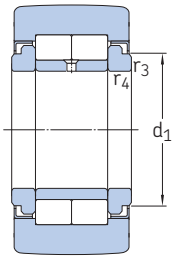
NATV



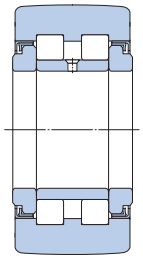
NATV .. PPA

| Principal dimensions | | | | Basic load ratings dynamic | static | Fatigue load limit | Maximum radial loads dynamic | static | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D | d | C | B | C | $C_0$ | $P_u$ | $F_r$ max. | $F_{0r}$ max. | | | |
| mm | | | | kN | | kN | kN | | r/min | kg | – |
| **16** | 5 | 11 | 12 | 3,14 | 3,2 | 0,345 | 2,9 | 4,15 | 6 000 | 0,014 | **NATR 5** |
| | 5 | 11 | 12 | 3,14 | 3,2 | 0,345 | 2,9 | 4,15 | 6 000 | 0,014 | ▸ **NATR 5 PPA** |
| | 5 | 11 | 12 | 4,73 | 6,55 | 0,72 | 4,05 | 5,7 | 4 300 | 0,015 | **NATV 5** |
| | 5 | 11 | 12 | 4,73 | 6,55 | 0,72 | 4,05 | 5,7 | 4 300 | 0,015 | ▸ **NATV 5 PPA** |
| **19** | 6 | 11 | 12 | 3,47 | 3,8 | 0,415 | 3,8 | 5,5 | 5 600 | 0,02 | ▸ **NATR 6** |
| | 6 | 11 | 12 | 3,47 | 3,8 | 0,415 | 3,8 | 5,5 | 5 600 | 0,019 | ▸ **NATR 6 PPA** |
| | 6 | 11 | 12 | 5,28 | 8 | 0,88 | 5,1 | 7,35 | 4 000 | 0,021 | **NATV 6** |
| | 6 | 11 | 12 | 5,28 | 8 | 0,88 | 5,1 | 7,35 | 4 000 | 0,021 | ▸ **NATV 6 PPA** |
| **24** | 8 | 14 | 15 | 5,28 | 6,1 | 0,695 | 5,2 | 7,35 | 5 000 | 0,038 | ▸ **NATR 8 PPA** |
| | 8 | 14 | 15 | 7,48 | 11,4 | 1,32 | 7,35 | 10,4 | 3 600 | 0,042 | **NATV 8** |
| | 8 | 14 | 15 | 7,48 | 11,4 | 1,32 | 7,35 | 10,4 | 3 600 | 0,041 | ▸ **NATV 8 PPA** |
| **30** | 10 | 14 | 15 | 6,44 | 8 | 0,88 | 7,8 | 11,2 | 4 800 | 0,064 | ▸ **NATR 10** |
| | 10 | 14 | 15 | 6,44 | 8 | 0,88 | 7,8 | 11,2 | 4 800 | 0,061 | ▸ **NATR 10 PPA** |
| | 10 | 14 | 15 | 8,97 | 14,6 | 1,66 | 11 | 15,6 | 3 200 | 0,065 | **NATV 10** |
| | 10 | 14 | 15 | 8,97 | 14,6 | 1,66 | 11 | 15,6 | 3 200 | 0,064 | ▸ **NATV 10 PPA** |
| **32** | 12 | 14 | 15 | 6,6 | 8,5 | 0,95 | 7,65 | 10,8 | 4 500 | 0,071 | **NATR 12** |
| | 12 | 14 | 15 | 6,6 | 8,5 | 0,95 | 7,65 | 10,8 | 4 500 | 0,066 | ▸ **NATR 12 PPA** |
| | 12 | 14 | 15 | 9,35 | 15,3 | 1,76 | 10,6 | 15 | 3 000 | 0,072 | ▸ **NATV 12** |
| | 12 | 14 | 15 | 9,35 | 15,3 | 1,76 | 10,6 | 15 | 3 000 | 0,069 | ▸ **NATV 12 PPA** |
| **35** | 15 | 18 | 19 | 9,52 | 13,7 | 1,56 | 11,4 | 16,3 | 4 000 | 0,1 | ▸ **NATR 15** |
| | 15 | 18 | 19 | 9,52 | 13,7 | 1,56 | 11,4 | 16,3 | 4 000 | 0,095 | ▸ **NATR 15 PPA** |
| | 15 | 18 | 19 | 12,3 | 23,2 | 2,7 | 14,6 | 20,8 | 2 600 | 0,11 | **NATV 15** |
| | 15 | 18 | 19 | 12,3 | 23,2 | 2,7 | 14,6 | 20,8 | 2 600 | 0,1 | ▸ **NATV 15 PPA** |
| | 15 | 18 | 19 | 16,8 | 17,6 | 2 | 8,65 | 12,2 | 5 000 | 0,099 | ▸ **NUTR 15 A** |
| | 15 | 18 | 19 | 11,9 | 11,4 | 1,2 | 8,65 | 12,5 | 5 000 | 0,099 | ▸ **PWTR 15.2RS** |
| **40** | 17 | 20 | 21 | 10,5 | 14,6 | 1,73 | 12,5 | 18 | 3 400 | 0,14 | ▸ **NATR 17** |
| | 17 | 20 | 21 | 10,5 | 14,6 | 1,73 | 12,5 | 18 | 3 400 | 0,14 | ▸ **NATR 17 PPA** |
| | 17 | 20 | 21 | 14,2 | 26,5 | 3,1 | 17 | 24,5 | 2 200 | 0,15 | **NATV 17** |
| | 17 | 20 | 21 | 14,2 | 26,5 | 3,1 | 17 | 24,5 | 2 200 | 0,15 | ▸ **NATV 17 PPA** |
| | 17 | 20 | 21 | 19 | 22 | 2,5 | 14 | 20 | 4 500 | 0,15 | ▸ **NUTR 17 A** |
| | 17 | 20 | 21 | 13,8 | 14,3 | 1,5 | 13,7 | 19,6 | 4 500 | 0,15 | ▸ **PWTR 17.2RS** |

▸ Popular item




NUTR .. A



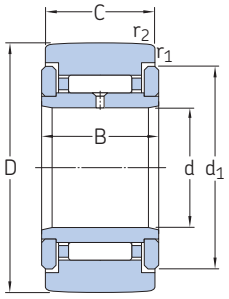
PWTR ...2RS

**Dimensions**

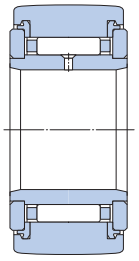
| D | $d_1$ | $r_{1,2}$ min. | $r_{3,4}$ min. |
|---|---|---|---|
| mm | | | |
| **16** | 12,5 | 0,15 | – |
| | 12,5 | 0,15 | – |
| | 12,5 | 0,15 | – |
| | 12,5 | 0,15 | – |
| **19** | 15 | 0,15 | – |
| | 15 | 0,15 | – |
| | 15 | 0,15 | – |
| | 15 | 0,15 | – |
| **24** | 19 | 0,3 | – |
| | 19 | 0,3 | – |
| | 19 | 0,3 | – |
| **30** | 23 | 0,6 | – |
| | 23 | 0,6 | – |
| | 23 | 0,6 | – |
| | 23 | 0,6 | – |
| **32** | 25 | 0,6 | – |
| | 25 | 0,6 | – |
| | 25 | 0,6 | – |
| | 25 | 0,6 | – |
| **35** | 27,6 | 0,6 | – |
| | 27,6 | 0,6 | – |
| | 27,6 | 0,6 | – |
| | 27,6 | 0,6 | – |
| | 20 | 0,6 | 0,3 |
| | 20 | 0,6 | 0,3 |
| **40** | 31,5 | 1 | – |
| | 31,5 | 1 | – |
| | 31,5 | 1 | – |
| | 31,5 | 1 | – |
| | 22 | 1 | 0,5 |
| | 22 | 1 | 0,5 |

## 15.2 Support rollers with flange rings, with an inner ring

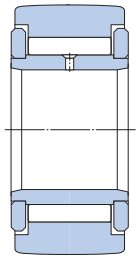
D **42 – 72** mm



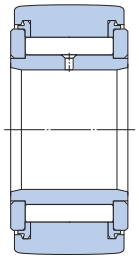

NATR



NATR .. PPA



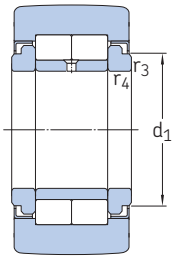
NATV



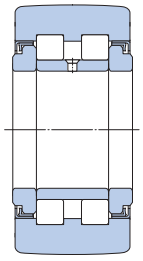
NATV .. PPA

| Principal dimensions | | | | Basic load ratings dynamic | static | Fatigue load limit | Maximum radial loads dynamic | static | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D | d | C | B | C | $C_0$ | $P_u$ | $F_r$ max. | $F_{0r}$ max. | | | |
| mm | | | | kN | | kN | kN | | r/min | kg | – |
| **42** | 15 | 18 | 19 | 20,1 | 23,2 | 2,65 | 21,6 | 31 | 5 000 | 0,16 | ▸ **NUTR 1542 A** |
| | 15 | 18 | 19 | 14,2 | 15 | 1,6 | 22 | 31,5 | 5 000 | 0,16 | **PWTR 1542.2RS** |
| **47** | 17 | 20 | 21 | 22 | 27 | 3,05 | 30 | 43 | 4 500 | 0,22 | ▸ **NUTR 1747 A** |
| | 17 | 20 | 21 | 15,7 | 17,6 | 1,86 | 30 | 42,5 | 4 500 | 0,22 | **PWTR 1747.2RS** |
| | 20 | 24 | 25 | 14,7 | 24,5 | 2,9 | 23,6 | 33,5 | 3 000 | 0,25 | ▸ **NATR 20** |
| | 20 | 24 | 25 | 14,7 | 24,5 | 2,9 | 23,6 | 33,5 | 3 000 | 0,24 | ▸ **NATR 20 PPA** |
| | 20 | 24 | 25 | 19,4 | 41,5 | 5 | 30,5 | 43 | 1 900 | 0,25 | **NATV 20** |
| | 20 | 24 | 25 | 19,4 | 41,5 | 5 | 30,5 | 43 | 1 900 | 0,25 | ▸ **NATV 20 PPA** |
| | 20 | 24 | 25 | 28,6 | 33,5 | 3,9 | 17,6 | 25 | 3 800 | 0,25 | ▸ **NUTR 20 A** |
| | 20 | 24 | 25 | 22,9 | 24,5 | 2,8 | 18,3 | 26 | 3 800 | 0,25 | **PWTR 20.2RS** |
| **52** | 20 | 24 | 25 | 31,9 | 39 | 4,55 | 30 | 42,5 | 3 800 | 0,32 | ▸ **NUTR 2052 A** |
| | 20 | 24 | 25 | 25,5 | 29 | 3,35 | 30,5 | 44 | 3 800 | 0,32 | ▸ **PWTR 2052.2RS** |
| | 25 | 24 | 25 | 14,7 | 25,5 | 3,1 | 21,6 | 31 | 2 400 | 0,28 | ▸ **NATR 25** |
| | 25 | 24 | 25 | 14,7 | 25,5 | 3,1 | 21,6 | 31 | 2 400 | 0,27 | ▸ **NATR 25 PPA** |
| | 25 | 24 | 25 | 19,8 | 44 | 5,3 | 28,5 | 40,5 | 1 600 | 0,29 | **NATV 25** |
| | 25 | 24 | 25 | 19,8 | 44 | 5,3 | 28,5 | 40,5 | 1 600 | 0,28 | ▸ **NATV 25 PPA** |
| | 25 | 24 | 25 | 29,7 | 36 | 4,25 | 18 | 25,5 | 3 200 | 0,28 | ▸ **NUTR 25 A** |
| | 25 | 24 | 25 | 23,8 | 26,5 | 3,05 | 18,6 | 26,5 | 3 200 | 0,28 | ▸ **PWTR 25.2RS** |
| **62** | 25 | 24 | 25 | 35,8 | 48 | 5,6 | 44 | 63 | 3 200 | 0,45 | ▸ **NUTR 2562 A** |
| | 25 | 24 | 25 | 29,2 | 36 | 4,05 | 45 | 64 | 3 200 | 0,45 | **PWTR 2562.2RS** |
| | 30 | 28 | 29 | 22,9 | 37,5 | 4,55 | 26,5 | 38 | 1 800 | 0,47 | ▸ **NATR 30** |
| | 30 | 28 | 29 | 22,9 | 37,5 | 4,55 | 26,5 | 38 | 1 800 | 0,44 | ▸ **NATR 30 PPA** |
| | 30 | 28 | 29 | 29,2 | 62 | 7,65 | 34,5 | 49 | 1 400 | 0,48 | **NATV 30** |
| | 30 | 28 | 29 | 29,2 | 62 | 7,65 | 34,5 | 49 | 1 400 | 0,47 | ▸ **NATV 30 PPA** |
| | 30 | 28 | 29 | 41,3 | 47,5 | 5,85 | 24 | 34,5 | 2 600 | 0,47 | ▸ **NUTR 30 A** |
| | 30 | 28 | 29 | 31,9 | 32,5 | 4,05 | 20,4 | 29 | 2 600 | 0,47 | **PWTR 30.2RS** |
| **72** | 30 | 28 | 29 | 48,4 | 61 | 7,5 | 53 | 76,5 | 2 600 | 0,7 | ▸ **NUTR 3072 A** |
| | 30 | 28 | 29 | 39,6 | 45 | 5,6 | 47,5 | 68 | 2 000 | 0,7 | **PWTR 3072.2RS** |
| | 35 | 28 | 29 | 24,6 | 43 | 5,3 | 33,5 | 48 | 1 600 | 0,55 | ▸ **NATR 35 PPA** |
| | 35 | 28 | 29 | 31,9 | 72 | 8,8 | 43 | 62 | 1 100 | 0,63 | ▸ **NATV 35 PPA** |
| | 35 | 28 | 29 | 45,7 | 57 | 6,95 | 33,5 | 47,5 | 2 000 | 0,63 | ▸ **NUTR 35 A** |
| | 35 | 28 | 29 | 35,8 | 40,5 | 5 | 28 | 40 | 2 000 | 0,63 | **PWTR 35.2RS** |

▸ Popular item




NUTR .. A



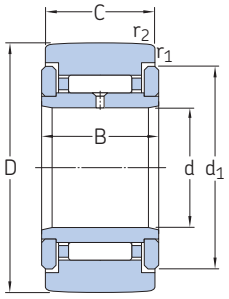
PWTR ...2RS

**Dimensions**

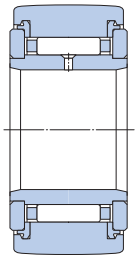
| D | $d_1$ | $r_{1,2}$ min. | $r_{3,4}$ min. |
|---|---|---|---|
| mm | | | |
| **42** | 20 | 0,6 | 0,3 |
| | 20 | 0,6 | 0,3 |
| **47** | 22 | 1 | 0,5 |
| | 22 | 1 | 0,5 |
| | 36,5 | 1 | – |
| | 36,5 | 1 | – |
| | 36,5 | 1 | – |
| | 36,5 | 1 | – |
| | 27 | 1 | 0,5 |
| | 27 | 1 | 0,5 |
| **52** | 27 | 1 | 0,5 |
| | 27 | 1 | 0,5 |
| | 41,5 | 1 | – |
| | 41,5 | 1 | – |
| | 41,5 | 1 | – |
| | 41,5 | 1 | – |
| | 31 | 1 | 0,5 |
| | 31 | 1 | 0,5 |
| **62** | 31 | 1 | 0,5 |
| | 31 | 1 | 0,5 |
| | 51 | 1 | – |
| | 51 | 1 | – |
| | 51 | 1 | – |
| | 51 | 1 | – |
| | 38 | 1 | 0,5 |
| | 38 | 1 | 0,5 |
| **72** | 38 | 1 | 0,5 |
| | 38 | 1 | 0,5 |
| | 58 | 1,1 | – |
| | 58 | 1,1 | – |
| | 44 | 1,1 | 0,6 |
| | 44 | 1,1 | 0,6 |

## 15.2 Support rollers with flange rings, with an inner ring

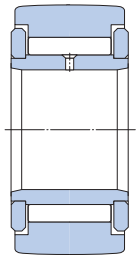
D **80 – 110** mm



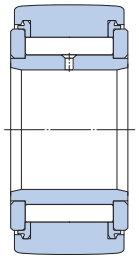

NATR



NATR .. PPA



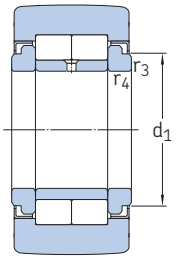
NATV



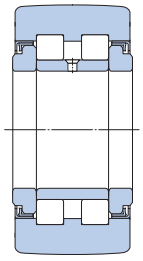
NATV .. PPA

| Principal dimensions | | | | Basic load ratings dynamic | static | Fatigue load limit | Maximum radial loads dynamic | static | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D | d | C | B | C | $C_0$ | $P_u$ | $F_r$ max. | $F_{0r}$ max. | | | |
| mm | | | | kN | | kN | kN | | r/min | kg | – |
| **80** | 35 | 28 | 29 | 51,2 | 68 | 8,3 | 57 | 81,5 | 2 000 | 0,84 | ▸ **NUTR 3580 A** |
| | 35 | 28 | 29 | 41,8 | 50 | 6,3 | 51 | 72 | 2 000 | 0,84 | ▸ **PWTR 3580.2RS** |
| | 40 | 30 | 32 | 31,9 | 57 | 7,1 | 41,5 | 58,5 | 1 500 | 0,8 | ▸ **NATR 40 PPA** |
| | 40 | 30 | 32 | 39,1 | 88 | 11 | 51 | 73,5 | 950 | 0,83 | ▸ **NATV 40 PPA** |
| | 40 | 30 | 32 | 57,2 | 72 | 9 | 32 | 45,5 | 1 800 | 0,82 | ▸ **NUTR 40 A** |
| | 40 | 30 | 32 | 41,8 | 49 | 6 | 33,5 | 48 | 1 800 | 0,82 | ▸ **PWTR 40.2RS** |
| **85** | 45 | 30 | 32 | 58,3 | 75 | 9,3 | 32,5 | 46,5 | 1 700 | 0,88 | ▸ **NUTR 45 A** |
| | 45 | 30 | 32 | 42,9 | 50 | 6,2 | 34 | 48 | 1 700 | 0,88 | **PWTR 45.2RS** |
| **90** | 40 | 30 | 32 | 68,2 | 91,5 | 11,4 | 63 | 90 | 1 800 | 1,15 | ▸ **NUTR 4090 A** |
| | 40 | 30 | 32 | 49,5 | 62 | 7,65 | 64 | 91,5 | 1 800 | 1,15 | ▸ **PWTR 4090.2RS** |
| | 50 | 30 | 32 | 30,8 | 58,5 | 7,2 | 40 | 57 | 1 200 | 0,87 | ▸ **NATR 50 PPA** |
| | 50 | 30 | 32 | 39,1 | 93 | 11,6 | 50 | 72 | 850 | 0,97 | ▸ **NATV 50 PPA** |
| | 50 | 30 | 32 | 58,3 | 78 | 9,65 | 32,5 | 47,5 | 1 600 | 0,95 | ▸ **NUTR 50 A** |
| | 50 | 30 | 32 | 42,9 | 52 | 6,55 | 34,5 | 49 | 1 600 | 0,95 | **PWTR 50.2RS** |
| **100** | 45 | 30 | 32 | 73,7 | 104 | 12,7 | 80 | 114 | 1 700 | 1,4 | ▸ **NUTR 45100 A** |
| | 45 | 30 | 32 | 53,9 | 69,5 | 8,65 | 81,5 | 116 | 1 700 | 1,4 | **PWTR 45100.2RS** |
| **110** | 50 | 30 | 32 | 78,1 | 116 | 14,3 | 98 | 140 | 1 600 | 1,7 | ▸ **NUTR 50110 A** |
| | 50 | 30 | 32 | 57,2 | 78 | 9,65 | 100 | 143 | 1 600 | 1,7 | ▸ **PWTR 50110.2RS** |

▸ Popular item




NUTR .. A

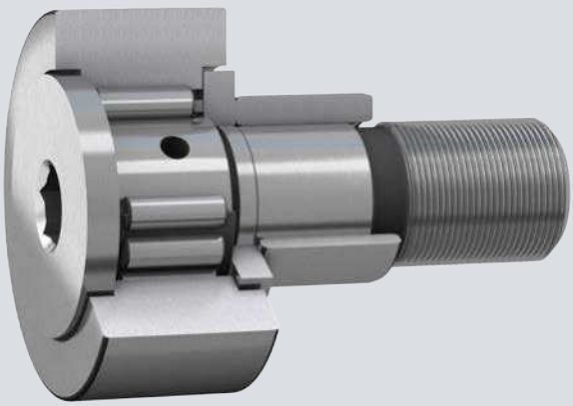


PWTR ...2RS

**Dimensions**

| D | $d_1$ | $r_{1,2}$ min. | $r_{3,4}$ min. |
|---|---|---|---|
| mm | | | |
| **80** | 44 | 1,1 | 0,6 |
| | 44 | 1,1 | 0,6 |
| | 66 | 1,1 | – |
| | 66 | 1,1 | – |
| | 50,5 | 1,1 | 0,6 |
| | 50,5 | 1,1 | 0,6 |
| **85** | 55,2 | 1,1 | 0,6 |
| | 55,2 | 1,1 | 0,6 |
| **90** | 50,5 | 1,1 | 0,6 |
| | 50,5 | 1,1 | 0,6 |
| | 76 | 1,1 | – |
| | 76 | 1,1 | – |
| | 59,8 | 1,1 | 0,6 |
| | 59,8 | 1,1 | 0,6 |
| **100** | 55,2 | 1,1 | 0,6 |
| | 55,2 | 1,1 | 0,6 |
| **110** | 59,8 | 1,1 | 0,6 |
| | 59,8 | 1,1 | 0,6 |

# 16 Cam followers



# 16 Cam followers



**Designs and variants** . . . . . **965**
KR design cam followers . . . . . 966
NUKR .. A design cam followers . . . . . 967
PWKR ...2RS design cam followers . . . . . 967
Cages . . . . . 968

**Accessories** . . . . . **968**
Grease fittings . . . . . 968
Hexagonal nuts . . . . . 968
VD1 plugs . . . . . 968
AP design adapters . . . . . 968

**Lubrication** . . . . . **971**

**Bearing data** . . . . . **972**
(Dimension standards, profile of the outer ring running surface, tolerances, internal clearance, defect frequencies)

**Loads** . . . . . **973**
(Dynamic loads, static loads, axial loads, minimum load, equivalent dynamic bearing load, equivalent static bearing load)

**Temperature limits** . . . . . **974**

**Speed limits** . . . . . **974**

**Design considerations** . . . . . **974**
Attachment holes for studs . . . . . 974
Support surfaces . . . . . 974

**Mounting** . . . . . **975**

**Designation system** . . . . . **976**

**Product table**
16.1 Cam followers . . . . . 978

# 16 Cam followers



## More information

**General bearing knowledge** . . . . **17**

**Bearing selection process** . . . . . **59**
Lubrication . . . . . 109
Bearing interfaces. . . . . 139
Sealing, mounting and dismounting . . . . . 193

SKF cam followers (stud-type track rollers) are designed to run on all types of tracks and to be used in cam drives, conveyor systems, etc.

SKF cam followers are based on either needle or cylindrical roller bearings. Instead of an inner ring, they have a threaded solid stud (pin).

SKF supplies them ready-to-mount. To meet the requirements of different applications, they are available in several designs and variants (fig. 1):

- with or without a cage
- with different stud designs:
  - a concentric seat
  - an eccentric collar
- with several sealing solutions
- with the outer ring running surface profile:
  - crowned as standard
  - cylindrical (flat)

In contrast to ball and roller bearings, where the bearing size refers to the bore diameter d, for cam followers the size refers to their outside diameter D.

**Fig. 1**

**Cam followers**

- based on needle roller bearings
- with a cage
- with an eccentric collar

- based on cylindrical roller bearings
- without a cage
- with an eccentric collar

## Cam follower features

- **Accommodate high radial loads**
  The thick-walled outer ring enables high radial loads, while reducing distortion and bending stresses.
- **Accommodate axial loads**
  The flange rings enable cam followers to accommodate axial loads that can occur because of skew or tilting.
- **Long service life**
  The crowned outer ring running surface is beneficial for applications where outer ring tilting relative to the track may occur or where edge stresses need to be minimized.
- **Easy to mount**
  The threaded solid stud (pin) of cam followers can be quickly and easily attached to appropriate machine components by means of a hexagonal nut.

# Designs and variants

SKF cam followers have a thick-walled outer ring with its running surface crowned as standard. However, cam followers with a cylindrical (flat) running surface are also available (designation suffix X).

SKF cam followers are available in three basic designs (fig. 2):

- KR design
- NUKR design
- PWKR design

All three designs have the same main dimensions. They are available in different stud designs (fig. 3):

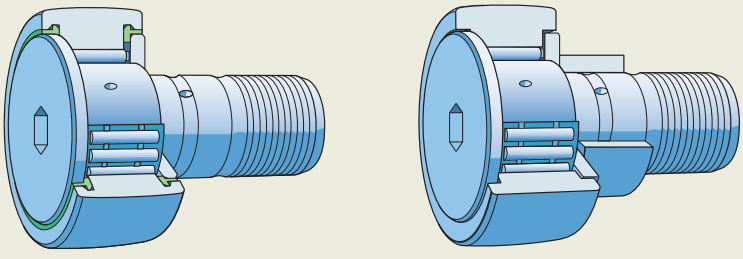
- a concentric seat
- an eccentric collar (E at the end of the basic designation) on the stud

The eccentric collar has a shrink-fit onto the stud, enabling less stringent positioning tolerances to be specified for associated components. The values of the adjustable eccentricity are listed in the **product table**, page 978.

16

**Fig. 3**

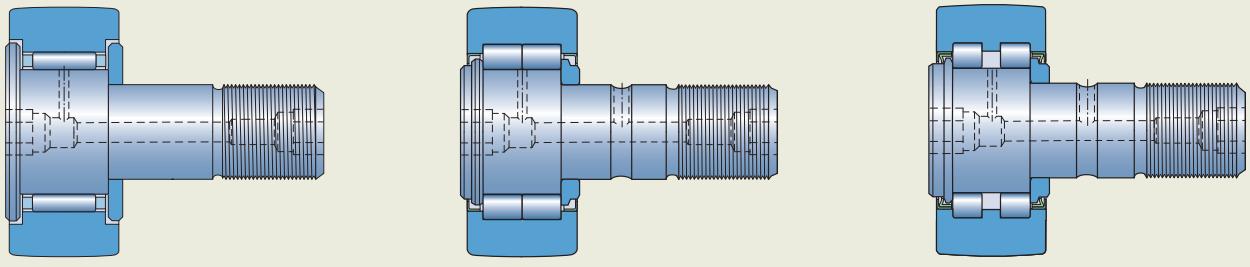
**Stud designs**



Concentric seat | Eccentric collar

**Fig. 2**

**Basic designs**



KR | NUKR .. A | PWKR ...2RS

# KR design cam followers

- are available based on:
  - a needle roller and cage assembly (fig. 4)
  - a full complement needle roller set (fig. 5, V in the basic designation)

    Cam followers based on a full complement of needle rollers accommodate higher loads than same-sized cam followers with a cage.
- have the outer ring axially guided by the pressed-on flange ring and the stud head (integral flange), forming a gap-type seal
- are also available with an axial sliding ring on both sides (designation suffixes PPA, fig. 6, or PPSKA, fig. 7, or PPXA):
  - made of PA66
  - forming narrow labyrinth seals with the outer ring in a radial direction, to protect against coarse contaminants
  - serving as contact seals in an axial direction to retain grease reliably in the bearing
  - improving lubrication conditions in the cam follower, keeping friction and frictional heat low, and extending grease life

## KR design cam followers, sizes 16 and 19

- without a designation suffix or with the designation suffix PPA (fig. 6)
  - have one slot in the head of the stud that enables the stud to be held in place by a screwdriver during mounting
  - have a relubrication hole for a press-in grease fitting or a plug if relubrication is not required in the centre of the slot (*Accessories*, page 968)
- with the designation suffix PPSKA (fig. 7)
  - have a hexagonal recess in the head of the stud that enables the stud to be held in place by a hexagonal key (Allen wrench) during mounting
  - have no relubrication features

## KR design cam followers, designation suffix B, sizes ≥ 22

- have a hexagonal recess at each end of the stud (fig. 4), enabling the cam follower to be held in place by a hexagonal key (Allen wrench) during mounting
- have a relubrication hole for a press-in grease fitting in the centre of each hexagonal recess
- can accommodate adapters from a centralized lubrication system for sizes ≥ 35 (*Accessories*, page 968)

Fig. 4

**KR .. B design, sizes 22 and 26**

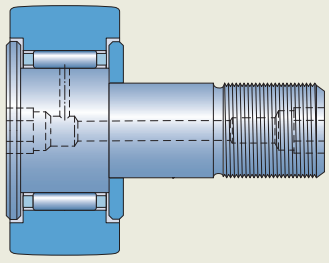


Fig. 5

**KRV .. PPA design, sizes ≥ 30**

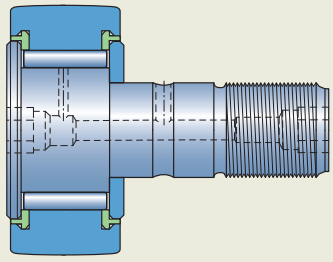
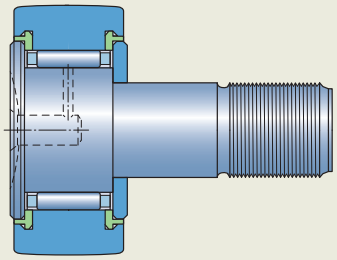
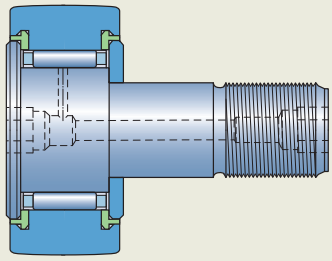


Fig. 6

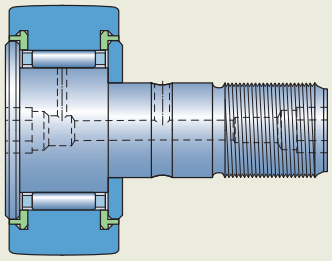
**KR .. PPA designs**



Sizes 16 and 19



Sizes 22 and 26



Sizes ≥ 30

## NUKR .. A design cam followers

- are based on double row full complement cylindrical roller bearings without an integral flange between the two roller sets (fig. 8)
- have the outer ring axially guided by the stud head and pressed-on flange ring via the roller sets
- have a sheet metal angle ring pressed into the outer ring shoulder on both sides, forming an effective labyrinth seal
- have a hexagonal recess at each end of the stud, enabling the cam follower to be held in place by a hexagonal key (Allen wrench) during mounting
- have a relubrication hole for a press-in grease fitting or an adapter from a centralized lubrication system in the centre of each hexagonal recess (*Accessories*, page 968)
- accommodate relatively heavy axial loads that can occur because of skew or tilting

## PWKR ...2RS design cam followers

- are based on double row full complement cylindrical roller bearings (fig. 9)
- have the outer ring axially guided by the stud head and pressed-on flange ring via the roller sets
- are fitted on both sides with an NBR contact seal, being integral with a sheet metal angle ring that is pressed into the outer ring shoulder, to press against the flange ring and the stud head
- have a hexagonal recess at each end of the stud, enabling the cam follower to be held in place by a hexagonal key (Allen wrench) during mounting
- have a relubrication hole for a press-in grease fitting or an adapter from a centralized lubrication system in the centre of each hexagonal recess (*Accessories*, page 968)
- accommodate relatively heavy axial loads that can occur because of skew or tilting

**Fig. 7**

**KR .. PPSKA design**

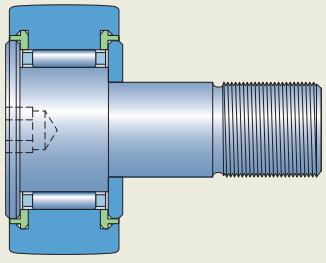


**Fig. 8**

**NUKR .. A design**

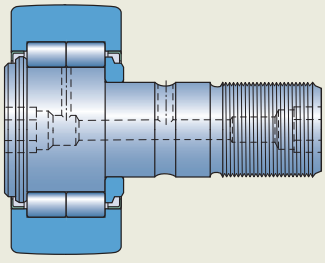
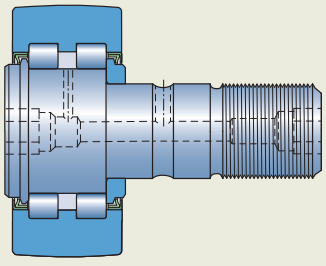


**Fig. 9**

**PWKR ...2RS design**



## Cages

Cam followers, if not a full complement of rollers, are fitted with a sheet steel window-type cage that is roller centred (fig. 10).

For information about the suitability of cages, refer to *Cages*, page 187.

# Accessories

SKF supplies accessories to enable reliable lubrication and location of SKF cam followers (table 1). Accessories, other than grease fittings and hexagonal nuts, must be ordered separately.

## Grease fittings

- are supplied with each cam follower as standard (table 1) and are the only ones to be used
- can be pressed into position
- are listed in table 2, page 970 with their dimensions
- have heads that protrude from the stud head end by 1,5 mm for KR design cam followers of sizes 16 and 19

## Hexagonal nuts

- are supplied with each cam follower as standard (table 1)
- are in accordance with ISO 4032 or ISO 8673
- are manufactured to strength class 8.8
- are zinc galvanized in accordance with ISO 4042
- are listed in table 3, page 970 with their dimensions and recommended tightening torques

## VD1 plugs

- are used to plug the relubrication hole end in the stud of KR design cam followers of sizes 16 and 19 without designation suffix PPSKA, where:
  - relubrication is not required
  - there is no space for the head of the grease fitting
- must be ordered separately (table 1)

## AP design adapters

- enable cam followers to be relubricated via a centralized lubrication system
- have a connection that accommodates, for example, 4 × 0,75 polyamide tubing in accordance with DIN 73378, as shown in fig. 11, in which:
  **1** Connection
  **2** O-ring
  **3** Adapter connection
  **4** Female thread M 10x1
  **5** Polyamide tube
- must be ordered separately (table 1)
- are listed in table 4, page 970 with their dimensions

**Fig. 10**

**Cage for cam follower**

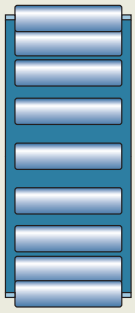


**Fig. 11**

**Adapter for connection to centralized lubrication system**

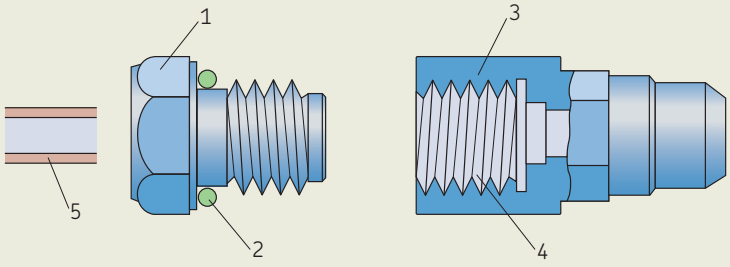
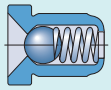


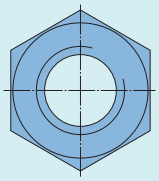
**Table 1**

**Accessories for cam followers**

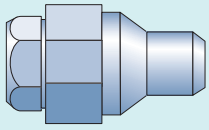


Grease fitting

Plug



Hexagonal nut

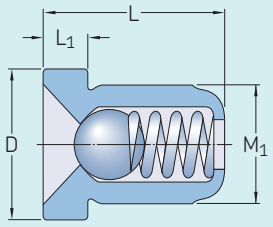


Adapter

| Cam follower Design | Size without seals | with seals | Supplied with the cam follower Grease fitting | Hexagonal nut | To be ordered separately Plug | Adapter |
|---|---|---|---|---|---|---|
| **KR**<br>**KRE**<br>**KRV** | | | | | | |
| | **16** | **16 PPA** | NIP A1 | M 6x1 | VD1 | – |
| | **–** | **16 PPSKA** | – | M 6x1 | – | – |
| | **19** | **19 PPA** | NIP A1 | M 8x1,25 | VD1 | – |
| | **–** | **19 PPSKA** | – | M 8x1,25 | – | – |
| | **22 B** | **22 PPA** | 2 x NIP A1x4,5 | M 10x1 | – | – |
| | **26 B** | **26 PPA** | 2 x NIP A1x4,5 | M 10x1 | – | – |
| | **30 B** | **30 PPA** | 2 x NIP A1x4,5 | M 12x1,5 | – | – |
| | **32 B** | **32 PPA** | 2 x NIP A1x4,5 | M 12x1,5 | – | – |
| | **35 B** | **35 PPA** | 2 x NIP A2x7,5 | M 16x1,5 | – | AP 8 |
| | **40 B** | **40 PPA** | 2 x NIP A2x7,5 | M 18x1,5 | – | AP 8 |
| | **–** | **47 PPA** | 2 x NIP A2x7,5 | M 20x1,5 | – | AP 10 |
| | **–** | **52 PPA** | 2 x NIP A2x7,5 | M 20x1,5 | – | AP 10 |
| | **–** | **62 PPA** | 2 x NIP A3x9,5 | M 24x1,5 | – | AP 14 |
| | **–** | **72 PPA** | 2 x NIP A3x9,5 | M 24x1,5 | – | AP 14 |
| | **–** | **80 PPA** | 2 x NIP A3x9,5 | M 30x1,5 | – | AP 14 |
| | **–** | **90 PPA** | 2 x NIP A3x9,5 | M 30x1,5 | – | AP 14 |
| **NUKR .. A**<br>**NUKRE .. A**<br>**PWKR ...2RS**<br>**PWKRE ...2RS** | | | | | | |
| | **–** | **35** | 2 x NIP A2x7,5 | M 16x1,5 | – | AP 8 |
| | **–** | **40** | 2 x NIP A2x7,5 | M 18x1,5 | – | AP 8 |
| | **–** | **47** | 2 x NIP A2x7,5 | M 20x1,5 | – | AP 10 |
| | **–** | **52** | 2 x NIP A2x7,5 | M 20x1,5 | – | AP 10 |
| | **–** | **62** | 2 x NIP A3x9,5 | M 24x1,5 | – | AP 14 |
| | **–** | **72** | 2 x NIP A3x9,5 | M 24x1,5 | – | AP 14 |
| | **–** | **80** | 2 x NIP A3x9,5 | M 30x1,5 | – | AP 14 |
| | **–** | **90** | 2 x NIP A3x9,5 | M 30x1,5 | – | AP 14 |

Table 2

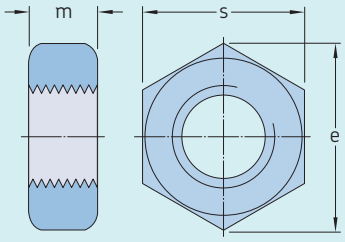
**Grease fittings**




| Designation | Dimensions | | | |
|---|---|---|---|---|
| | $M_1$ | D | L | $L_1$ |
| – | mm | | | |
| **NIP A1** | 4 | 6 | 6 | 1,5 |
| **NIP A1x4,5** | 4 | 4,7 | 4,5 | 1 |
| **NIP A2x7,5** | 6 | 7,5 | 7,5 | 2 |
| **NIP A3x9,5** | 8 | 10 | 9,5 | 3 |

Table 3

**Hexagonal nuts**

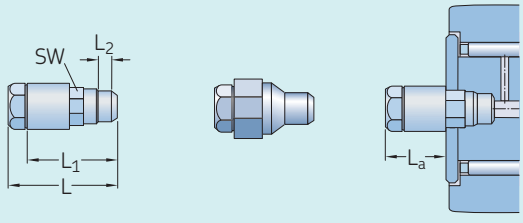



| Size | Dimensions | | | Tightening torque | Standard[1] |
|---|---|---|---|---|---|
| | m | e | s | | |
| – | mm | | | Nm | – |
| **M 6x1** | 5,2 | 11 | 10 | 3 | 1 |
| **M 8x1,25** | 6,8 | 14,4 | 13 | 8 | 1 |
| **M 10x1** | 8,4 | 17,8 | 16 | 15 | 2 |
| **M 12x1,5** | 10,8 | 20 | 18 | 22 | 2 |
| **M 16x1,5** | 14,8 | 26,8 | 24 | 58 | 2 |
| **M 18x1,5** | 15,8 | 29,6 | 27 | 87 | 2 |
| **M 20x1,5** | 18 | 33 | 30 | 120 | 2 |
| **M 24x1,5** | 21,5 | 39,5 | 36 | 220 | 2 |
| **M 30x1,5** | 25,6 | 50,9 | 46 | 450 | 2 |

[1] 1 = EN ISO 4032, ISO 4032
2 = EN ISO 8673, ISO 8673

Table 4

**Dimensions of adapters for connecting to a centralized lubrication system**




AP 8 and AP 10 AP 14

| Designation | Dimensions | | | | |
|---|---|---|---|---|---|
| | L | $L_1$ | $L_2$ | $L_a$ | SW |
| – | mm | | | | |
| **AP 8** | 27 | 22 | 4 | 16 | 8 |
| **AP 10** | 27 | 22 | 5 | 15 | 10 |
| **AP 14** | 25 | 20 | 6 | 8 | 14 |

# Lubrication

SKF cam followers are supplied greased (table 1, page 933).

For general information, refer to *Lubrication*, page 109.

## Relubrication requirements

Cam followers:

- should be relubricated regularly to achieve their full service life, even if the initial grease fill still has its full lubricating properties
- used in applications where there are light loads, relatively low speeds and clean surroundings can operate for long periods before relubrication is required
- that operate under contaminated and damp conditions at high speeds or at temperatures > 70 °C *(160 °F)* require more frequent relubrication
- without a cage (full complement of rollers) require more frequent relubrication

KR design cam followers of sizes 16 and 19 with designation suffix PPSKA cannot be relubricated.

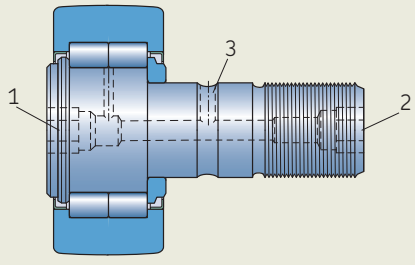
## Relubrication features

Cam followers can be relubricated via ducts inside the stud. Depending on series and size, there are up to three positions for relubrication (fig. 12):

- Positions 1 and 2 can be fitted with the grease fitting supplied with the cam follower.
- Position 3 should be used when relubricating via ducts in the adjacent components.
- For detailed information about the positions, refer to product tables, page 978.
- For cam followers, sizes ≥ 35, positions 1 and 2 can be connected to a centralized lubrication system (*Accessories*, page 968).
- Positions not used for relubrication should be closed by a grease fitting or a plug (*Accessories*).

**Fig. 12**

**Cam follower relubrication points**



# Bearing data

| | |
|---|---|
| **Dimension standards** | ISO 7063 and ANSI/ABMA Standard 18.1 (where standardized) |
| **Profile of the outer ring running surface** | • **KR .. (B) designs**<br>Radius = 500 mm<br><br>• **Other designs**<br>Improved crowned profile for better load distribution, higher stiffness and reduced wear |
| **Tolerances**<br><br>For additional information → **page 35** | Normal, except:<br>• KR, KRE, KRV designs: ISO 7063<br>• diameter of the crowned running surface: 0/–0,05 mm<br>• stud shank diameter: h7<br>• eccentric collar diameter: h9<br><br>Values for Normal tolerance class: ISO 492 (**table 2**, **page 38**)<br>Values for ISO tolerance classes: h7 and h9 (**table 2**, **page 970**) |
| **Internal clearance**<br><br>For additional information → **page 182** | Between C2 and Normal<br><br>Values: ISO 5753-1 (**table 11**, **page 603**)<br>Values are valid for unmounted bearings under zero measuring load. |
| **Defect frequencies** | → skf.com/bearingcalculator |

# Loads

| | |
|---|---|
| **Dynamic loads** | As track rollers are not supported in a housing, the outer rings deform, leading to an altered load distribution and bending stresses in the outer ring.<br>The basic load ratings listed in the **product table**, **page 978**, take into account the altered load distribution, while the maximum radial loads $F_{r\,max}$ (**product table**) are based on the bending stresses. |
| **Static loads** | Permissible static load is the lower value of $F_{0r\,max}$ or $C_0$ (**product table**).<br>Where requirements for smooth running are below normal, the static load may exceed $C_0$, but should never exceed the maximum permissible static radial load $F_{0r\,max}$. |
| **Axial loads** | Cam followers are intended for radial loads. However, their flange rings enable cam followers to accommodate axial loads that can occur because of skew or tilting. The magnitude of permissible load depends on the internal design. |
| **Minimum load**<br><br>For additional information → **page 106** | $F_{rm} = 0{,}0167\ C_0$ |
| **Equivalent dynamic bearing load**<br><br>For additional information → **page 91** | $P = F_r$ |
| **Equivalent static bearing load**<br><br>For additional information → **page 105** | $P_0 = F_r$ |

**Symbols**

| | |
|---|---|
| $C_0$ | basic static load rating [kN] (**product table**, **page 978**) |
| $F_r$ | radial load [kN] |
| $F_{r\,max}$ | maximum permissible dynamic radial load [kN] (**product table**) |
| $F_{0r\,max}$ | maximum permissible static radial load [kN] (**product table**) |
| $F_{rm}$ | minimum radial load [kN] |
| $P$ | equivalent dynamic bearing load [kN] |
| $P_0$ | equivalent static bearing load [kN] |

# Temperature limits

The permissible operating temperature for cam followers can be limited by:

- the dimensional stability of the bearing rings and rollers
- the cage
- the seals
- the lubricant

Where temperatures outside the permissible range are expected, contact SKF.

### Bearing rings and rollers

SKF cam followers are heat stabilized up to at least 140 °C *(280 °F)*.

### Cages

Steel cages can be used at the same operating temperatures as the bearing rings and rollers.

### Seals

The permissible operating temperature for seals depends on the seal material:

- NBR: –40 to +100 °C *(–40 to +210 °F)*
  Temperatures up to 120 °C *(250 °F)* can be tolerated for brief periods.
- PA66 sliding rings: –30 to +100 °C *(–20 to +210 °F)*

Typically, temperature peaks are at the seal lip.

### Lubricants

Temperature limits for greases used in SKF cam rollers are provided in **table 1**, **page 933**. For temperature limits of other SKF greases, refer to *Selecting a suitable SKF grease*, **page 116**.

When using lubricants not supplied by SKF, temperature limits should be evaluated according to the SKF traffic light concept (**page 117**).

# Speed limits

The limiting speed listed in the **product table** is a mechanical limit that should not be exceeded unless the bearing design and the application are adapted for higher speeds.

For additional information, refer to *Operating temperature and speed*, **page 130**.

# Design considerations

## Attachment holes for studs

The holes in the adjacent part of machinery that will accommodate the stud or eccentric collar of a cam follower should be machined to tolerance class H7Ⓔ.

If the requisite tightening torque for the hexagonal nut (**table 3**, **page 970**) cannot be achieved or the cam followers are subjected to peak loads, the stud or eccentric collar should be mounted with an interference fit. The lead-in chamfer of the holes should be ≤ 0,5 × 45°.

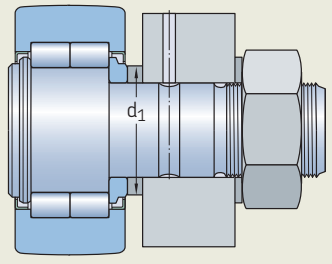
## Support surfaces

The flange ring that is pressed onto the stud shank should be axially supported:

- over its entire side face (**fig. 13**)
- according to diameter $d_1$ (**product table**, **page 978**)
- with material that has a sufficiently high strength to accommodate the tightening torque (**table 3**, **page 970**)

**Fig. 13**

**Supported flange ring**



# Mounting

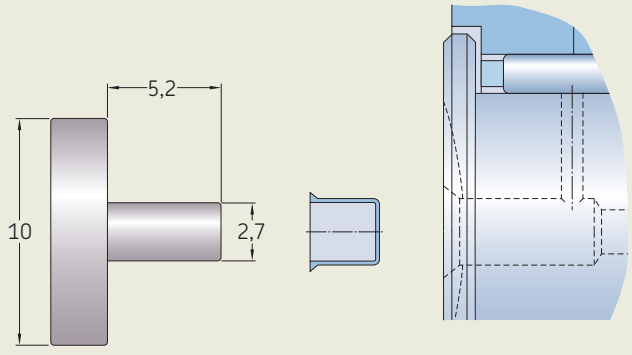
Cam followers can be attached to associated components (**fig. 13**) using the hexagonal nut (**table 3**, **page 970**) supplied with the cam follower. Spring washers, which are not supplied by SKF, serve to secure the nuts.

- To exploit the full load carrying capacity of cam followers, the nuts should be tightened to the recommended torque values (**table 3**).
- Where heavy vibrations occur, cam followers can be located using:
  - self-locking nuts in accordance with ISO 10511
  - special lock washers

  For self-locking nuts, a higher tightening torque must be applied. Follow the recommendations of the nut manufacturer.
- Cam followers, sizes ≥ 22, have a hexagonal recess in the stud head and can be held in place by a hexagonal key (Allen wrench) while the nut is being tightened.
- Some small cam follower designs (sizes 16 and 19) have a slot in the stud head instead and can be held in place by a screwdriver. For additional information, refer to the illustrations in the **product table**, **page 978**.
- Depending on the mounting conditions, cam followers with an eccentric collar can be adjusted to the required eccentricity via the slot or the hexagonal recess.
- Do not hit the head of the stud as damage to the cam follower may result.
- SKF recommends positioning the lubrication hole in the stud head in the unloaded zone of the cam follower. The position of this hole corresponds to the SKF trademark on the head end of the stud.
- The lubrication hole in position 3 that is parallel and in line with the lubrication hole in the stud head (**fig. 12**, **page 971**) may be used to incorporate a locking device to prevent the stud from turning.
- When inserting a plug, it should be pressed into place using a mandrel (**fig. 14**).

**Fig. 14**

**Inserting the VD1 plug with a mandrel**



# Designation system

**Prefixes**

**Basic designation**

| | |
|---|---|
| **KR** | Cam follower fitted with a needle roller and cage assembly |
| **KRE** | Cam follower fitted with a needle roller and cage assembly, with an eccentric collar pressed onto the stud |
| **KRV** | Cam follower fitted with a full complement of needle rollers |
| **KRVE** | Cam follower fitted with a full complement of needle rollers, with an eccentric collar pressed onto the stud |
| **NUKR** | Cam follower based on a double row full complement cylindrical roller bearing with two integral outer ring flanges |
| **NUKRE** | Cam follower based on a double row full complement cylindrical roller bearing with two integral outer ring flanges, with an eccentric collar pressed onto the stud |
| **PWKR** | Cam follower based on a double row full complement cylindrical roller bearing with three integral outer ring flanges |
| **PWKRE** | Cam follower based on a double row full complement cylindrical roller bearing with three integral outer ring flanges, with an eccentric collar pressed onto the stud |

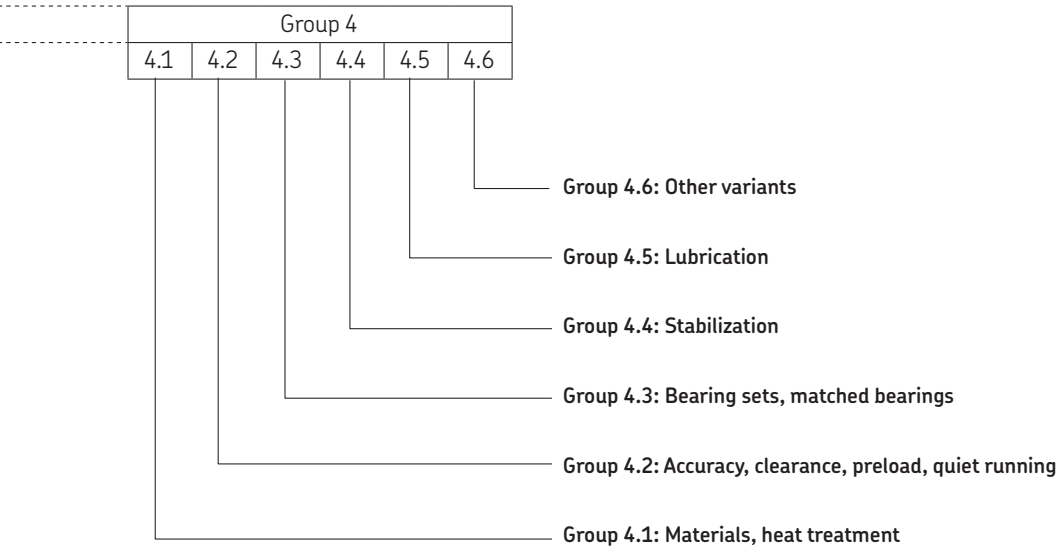
**Suffixes**

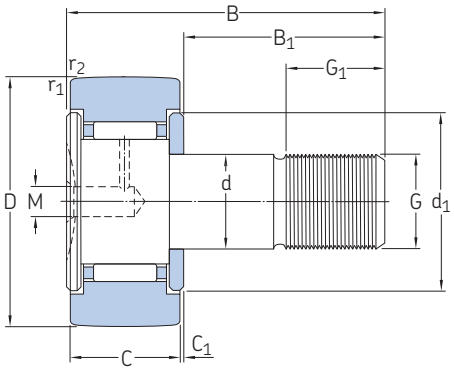
**Group 1: Internal design**

**Group 2: External design (seals, snap ring groove, etc.)**

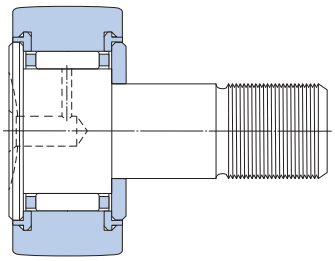
| | |
|---|---|
| **.2RS** | NBR contact seal on both sides. |
| **A** | Improved crowned profile of the outer ring running surface (NUTR design) |
| **B** | Hexagonal recess on both ends of the stud |
| **PPA** | KR design with a PA66 axial sliding and sealing ring on both sides; improved crowned profile of the outer ring running surface<br>• Sizes 16 and 19 have one slot in the head of the stud as standard.<br>• Sizes ≥ 22 have a hexagonal recess on both ends. |
| **PPSKA** | KR design, sizes 16 and 19, with a PA66 axial sliding and sealing ring on both sides, improved crowned profile of the outer ring running surface and a hexagonal recess in the head of the stud, no relubrication features |
| **PPXA** | PPA features except for the outer ring running surface, which has a cylindrical profile |
| **X** | Cylindrical (flat) profile of the outer ring running surface |
| **XA** | Cylindrical (flat) profile of the outer ring running surface (NUKR .. A or NUKRE .. A design) |
| **XB** | Cylindrical (flat) profile of the outer ring running surface and a hexagonal recess on both ends of the stud (NUKR design) |

**Group 3: Cage design**

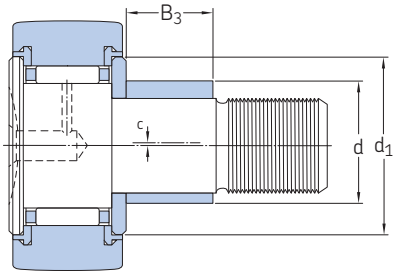

Group 4
4.1
4.2
4.3
4.4
4.5
4.6
Group 4.6: Other variants
Group 4.5: Lubrication
Group 4.4: Stabilization
Group 4.3: Bearing sets, matched bearings
Group 4.2: Accuracy, clearance, preload, quiet running
Group 4.1: Materials, heat treatment



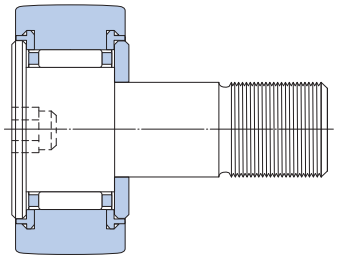

KR
(D ≤ 19 mm)



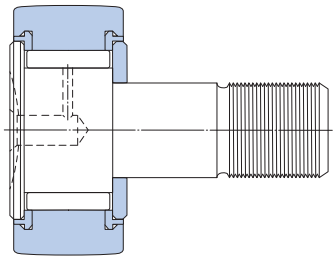
KR .. PPA
(D ≤ 19 mm)




KRE .. PPA
(D ≤ 19 mm)



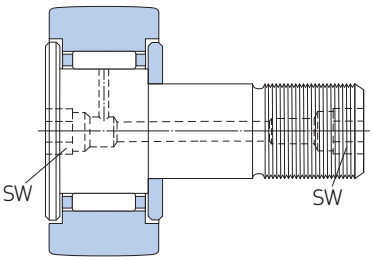
KR .. PPSKA
(D ≤ 19 mm)



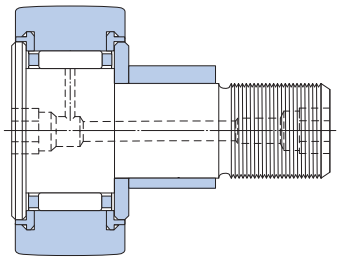
KRV .. PPA
(D ≤ 19 mm)

| Principal dimensions | | | | Basic load ratings dynamic | static | Fatigue load limit | Maximum radial loads dynamic | static | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D | d | B | C | C | $C_0$ | $P_u$ | $F_r$ max. | $F_{0r}$ max. | | | |
| mm | | | | kN | | kN | kN | | r/min | kg | – |
| **16** | 6 | 28 | 11 | 3,14 | 3,2 | 0,345 | 2,9 | 4,15 | 6 000 | 0,019 | ▸ **KR 16** |
| | 6 | 28 | 11 | 3,14 | 3,2 | 0,345 | 2,9 | 4,15 | 6 000 | 0,018 | **KR 16 PPA** |
| | 6 | 28 | 11 | 3,14 | 3,2 | 0,345 | 2,9 | 4,15 | 6 000 | 0,019 | ▸ **KR 16 PPSKA** |
| | 6 | 28 | 11 | 4,73 | 6,55 | 0,72 | 4,05 | 5,7 | 4 300 | 0,019 | ▸ **KRV 16 PPA** |
| | 9 | 28 | 11 | 3,14 | 3,2 | 0,345 | 2,9 | 4,15 | 6 000 | 0,02 | ▸ **KRE 16 PPA** |
| **19** | 8 | 32 | 11 | 3,47 | 3,8 | 0,415 | 3,8 | 5,5 | 5 600 | 0,029 | ▸ **KR 19** |
| | 8 | 32 | 11 | 3,47 | 3,8 | 0,415 | 3,8 | 5,5 | 5 600 | 0,029 | ▸ **KR 19 PPA** |
| | 8 | 32 | 11 | 3,47 | 3,8 | 0,415 | 3,8 | 5,5 | 5 600 | 0,029 | ▸ **KR 19 PPSKA** |
| | 8 | 32 | 11 | 5,28 | 8 | 0,88 | 5,1 | 7,35 | 4 000 | 0,031 | ▸ **KRV 19 PPA** |
| | 11 | 32 | 11 | 3,47 | 3,8 | 0,415 | 3,8 | 5,5 | 5 600 | 0,032 | ▸ **KRE 19 PPA** |
| **22** | 10 | 36 | 12 | 4,4 | 5 | 0,56 | 4,25 | 6 | 5 300 | 0,045 | ▸ **KR 22 B** |
| | 10 | 36 | 12 | 4,4 | 5 | 0,56 | 4,25 | 6 | 5 300 | 0,043 | ▸ **KR 22 PPA** |
| | 10 | 36 | 12 | 6,05 | 9,15 | 1,04 | 5,7 | 8,15 | 3 600 | 0,045 | ▸ **KRV 22 PPA** |
| | 13 | 36 | 12 | 4,4 | 5 | 0,56 | 4,25 | 6 | 5 300 | 0,047 | ▸ **KRE 22 PPA** |
| **26** | 10 | 36 | 12 | 4,84 | 6 | 0,655 | 9,3 | 13,2 | 5 300 | 0,059 | ▸ **KR 26 B** |
| | 10 | 36 | 12 | 4,84 | 6 | 0,655 | 9,3 | 13,2 | 5 300 | 0,057 | ▸ **KR 26 PPA** |
| | 10 | 36 | 12 | 6,82 | 11 | 1,25 | 11,4 | 16,3 | 3 600 | 0,059 | ▸ **KRV 26 PPA** |
| | 13 | 36 | 12 | 4,84 | 6 | 0,655 | 9,3 | 13,2 | 5 300 | 0,062 | ▸ **KRE 26 PPA** |

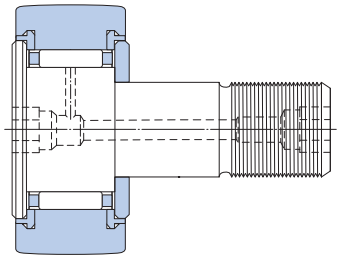
▸ Popular item



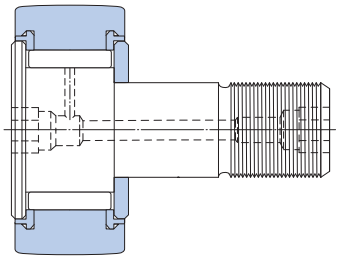

KR .. B
(22 ≤ D ≤ 26 mm)



KRE .. PPA
(22 ≤ D ≤ 26 mm)



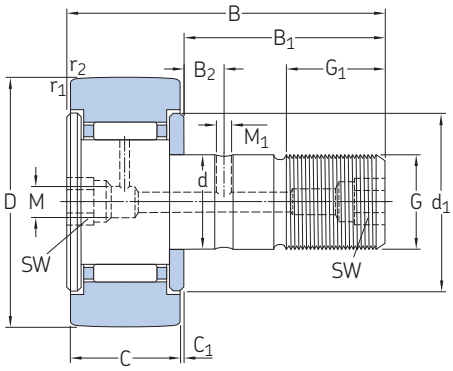
KR .. PPA
(22 ≤ D ≤ 26 mm)



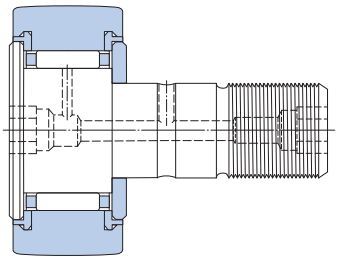
KRV .. PPA
(22 ≤ D ≤ 26 mm)

**Dimensions**

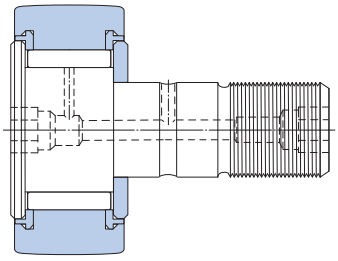
| d | $B_1$ | $B_2$ | $B_3$ | $C_1$ | $d_1$ | G | $G_1$ | M | $M_1$ | SW | c | $r_{1,2}$ min. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | | | | | | | | | | | | |
| **16** | 16 | – | – | 0,6 | 12,5 | M 6 | 8 | 4 | – | – | – | 0,15 |
| | 16 | – | – | 0,6 | 12,5 | M 6 | 8 | 4 | – | – | – | 0,15 |
| | 16 | – | – | 0,6 | 12,5 | M 6 | 8 | – | – | 4 | – | 0,15 |
| | 16 | – | – | 0,6 | 12,5 | M 6 | 8 | 4 | – | – | – | 0,15 |
| | 16 | – | 7 | 0,6 | 12,5 | M 6 | 8 | 4 | – | – | 0,5 | 0,15 |
| **19** | 20 | – | – | 0,6 | 15 | M 8 | 10 | 4 | – | – | – | 0,15 |
| | 20 | – | – | 0,6 | 15 | M 8 | 10 | 4 | – | – | – | 0,15 |
| | 20 | – | – | 0,6 | 15 | M 8 | 10 | – | – | 4 | – | 0,15 |
| | 20 | – | – | 0,6 | 15 | M 8 | 10 | 4 | – | – | – | 0,15 |
| | 20 | – | 9 | 0,6 | 15 | M 8 | 10 | 4 | – | – | 0,5 | 0,15 |
| **22** | 23 | – | – | 0,6 | 17,5 | M 10x1 | 12 | 4 | – | 5 | – | 0,3 |
| | 23 | – | – | 0,6 | 17,5 | M 10x1 | 12 | 4 | – | 5 | – | 0,3 |
| | 23 | – | – | 0,6 | 17,5 | M 10x1 | 12 | 4 | – | 5 | – | 0,3 |
| | 23 | – | 10 | 0,6 | 17,5 | M 10x1 | 12 | 4 | – | 5 | 0,5 | 0,3 |
| **26** | 23 | – | – | 0,6 | 17,5 | M 10x1 | 12 | 4 | – | 5 | – | 0,3 |
| | 23 | – | – | 0,6 | 17,5 | M 10x1 | 12 | 4 | – | 5 | – | 0,3 |
| | 23 | – | – | 0,6 | 17,5 | M 10x1 | 12 | 4 | – | 5 | – | 0,3 |
| | 23 | – | 10 | 0,6 | 17,5 | M 10x1 | 12 | 4 | – | 5 | 0,5 | 0,3 |



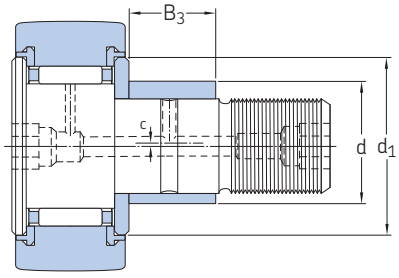

KR .. B



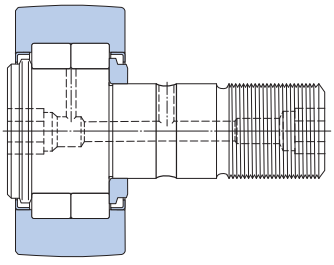
KR .. PPA



KRV .. PPA



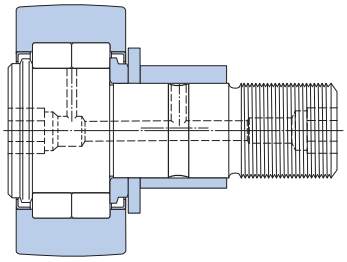

KRE .. PPA



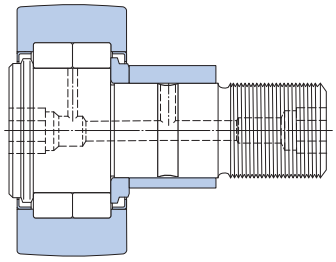
NUKR .. A

| Principal dimensions | | | | Basic load ratings dynamic | static | Fatigue load limit | Maximum radial loads dynamic | static | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D | d | B | C | C | $C_0$ | $P_u$ | $F_r$ max. | $F_{0r}$ max. | | | |
| mm | | | | kN | | kN | kN | | r/min | kg | – |
| **30** | 12 | 40 | 14 | 6,44 | 8 | 0,88 | 7,8 | 11,2 | 4 800 | 0,092 | ▸ **KR 30 B** |
| | 12 | 40 | 14 | 6,44 | 8 | 0,88 | 7,8 | 11,2 | 4 800 | 0,088 | ▸ **KR 30 PPA** |
| | 12 | 40 | 14 | 8,97 | 14,6 | 1,66 | 11 | 15,6 | 3 200 | 0,091 | ▸ **KRV 30 PPA** |
| | 15 | 40 | 14 | 6,44 | 8 | 0,88 | 7,8 | 11,2 | 4 800 | 0,093 | ▸ **KRE 30 PPA** |
| **32** | 12 | 40 | 14 | 6,71 | 8,5 | 0,95 | 10,6 | 15 | 4 800 | 0,1 | ▸ **KR 32 B** |
| | 12 | 40 | 14 | 6,71 | 8,5 | 0,95 | 10,6 | 15 | 4 800 | 0,098 | ▸ **KR 32 PPA** |
| | 12 | 40 | 14 | 9,35 | 15,3 | 1,76 | 14,3 | 20,4 | 3 200 | 0,1 | ▸ **KRV 32 PPA** |
| | 15 | 40 | 14 | 6,71 | 8,5 | 0,95 | 10,6 | 15 | 4 800 | 0,1 | ▸ **KRE 32 PPA** |
| **35** | 16 | 52 | 18 | 9,52 | 13,7 | 1,56 | 11,4 | 16,3 | 4 000 | 0,17 | ▸ **KR 35 B** |
| | 16 | 52 | 18 | 9,52 | 13,7 | 1,56 | 11,4 | 16,3 | 4 000 | 0,16 | ▸ **KR 35 PPA** |
| | 16 | 52 | 18 | 12,3 | 23,2 | 2,7 | 14,6 | 20,8 | 2 600 | 0,17 | ▸ **KRV 35 PPA** |
| | 16 | 52 | 18 | 16,8 | 17,6 | 2 | 8,65 | 12,2 | 5 000 | 0,16 | ▸ **NUKR 35 A** |
| | 16 | 52 | 18 | 11,9 | 11,4 | 1,2 | 8,65 | 12,5 | 5 000 | 0,16 | ▸ **PWKR 35.2RS** |
| | 20 | 52 | 18 | 9,52 | 13,7 | 1,56 | 11,4 | 16,3 | 4 000 | 0,18 | ▸ **KRE 35 PPA** |
| | 20 | 52 | 18 | 16,8 | 17,6 | 2 | 8,65 | 12,2 | 5 000 | 0,18 | ▸ **NUKRE 35 A** |

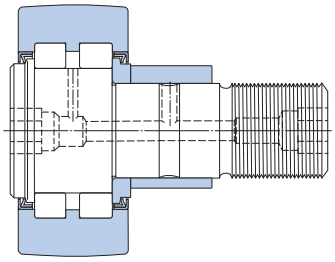
▸ Popular item



NUKRE .. A
(35 ≤ D ≤ 40 mm)



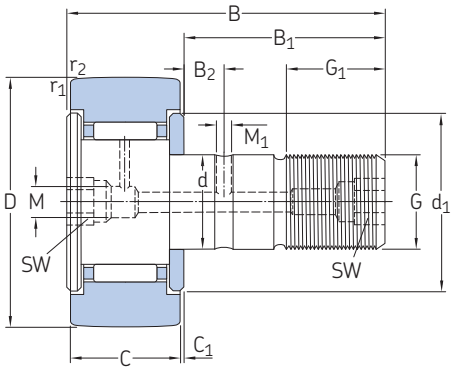
NUKRE .. A
(D ≥ 47 mm)



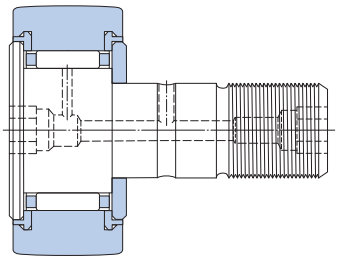
PWKR ...2RS

**Dimensions**

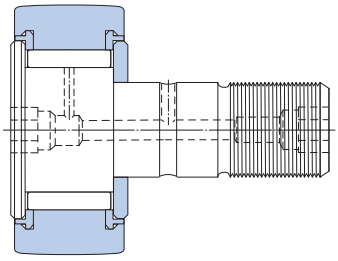
| d | $B_1$ | $B_2$ | $B_3$ | $C_1$ | $d_1$ | G | $G_1$ | M | $M_1$ | SW | c | $r_{1,2}$ min. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | | | | | | | | | | | | |
| **30** | 25 | 6 | – | 0,6 | 23 | M 12x1,5 | 13 | 4 | 3 | 6 | – | 0,6 |
| | 25 | 6 | – | 0,6 | 23 | M 12x1,5 | 13 | 4 | 3 | 6 | – | 0,6 |
| | 25 | 6 | – | 0,6 | 23 | M 12x1,5 | 13 | 4 | 3 | 6 | – | 0,6 |
| | 25 | 6 | 11 | 0,6 | 23 | M 12x1,5 | 13 | 4 | 3 | 6 | 0,5 | 0,6 |
| **32** | 25 | 6 | – | 0,6 | 23 | M 12x1,5 | 13 | 4 | 3 | 6 | – | 0,6 |
| | 25 | 6 | – | 0,6 | 23 | M 12x1,5 | 13 | 4 | 3 | 6 | – | 0,6 |
| | 25 | 6 | – | 0,6 | 23 | M 12x1,5 | 13 | 4 | 3 | 6 | – | 0,6 |
| | 25 | 6 | 11 | 0,6 | 23 | M 12x1,5 | 13 | 4 | 3 | 6 | 0,5 | 0,6 |
| **35** | 32,5 | 8 | – | 0,8 | 27,6 | M 16x1,5 | 17 | 6 | 3 | 8 | – | 0,6 |
| | 32,5 | 8 | – | 0,8 | 27,6 | M 16x1,5 | 17 | 6 | 3 | 8 | – | 0,6 |
| | 32,5 | 8 | – | 0,8 | 27,6 | M 16x1,5 | 17 | 6 | 3 | 8 | – | 0,6 |
| | 32,5 | 7,8 | – | 0,8 | 20 | M 16x1,5 | 17 | 6 | 3 | 8 | – | 0,6 |
| | 32,5 | 7,8 | – | 0,8 | 20 | M 16x1,5 | 17 | 6 | 3 | 8 | – | 0,6 |
| | 32,5 | 8 | 14 | 0,8 | 27,6 | M 16x1,5 | 17 | 6 | 3 | 8 | 1 | 0,6 |
| | 29,5 | 7,8 | 12 | 3,8 | 27,6 | M 16x1,5 | 17 | 6 | 3 | 8 | 1 | 0,6 |



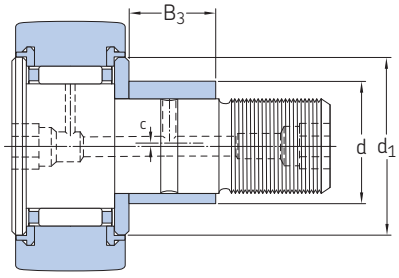

KR .. B



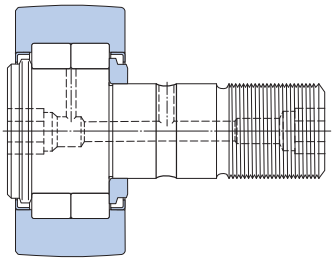
KR .. PPA



KRV .. PPA



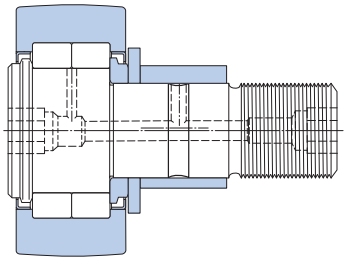

KRE .. PPA



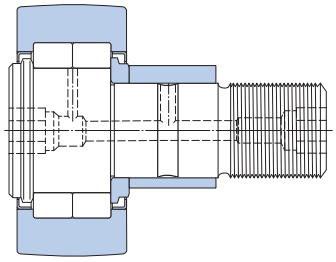
NUKR .. A

| Principal dimensions | | | | Basic load ratings dynamic | static | Fatigue load limit | Maximum radial loads dynamic | static | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D | d | B | C | C | $C_0$ | $P_u$ | $F_r$ max. | $F_{0r}$ max. | | | |
| mm | | | | kN | | kN | kN | | r/min | kg | – |
| **40** | 18 | 58 | 20 | 10,5 | 14,6 | 1,73 | 12,5 | 18 | 3 400 | 0,25 | ▸ **KR 40 B** |
| | 18 | 58 | 20 | 10,5 | 14,6 | 1,73 | 12,5 | 18 | 3 400 | 0,24 | ▸ **KR 40 PPA** |
| | 18 | 58 | 20 | 14,2 | 26,5 | 3,1 | 17 | 24,5 | 2 200 | 0,25 | ▸ **KRV 40 PPA** |
| | 18 | 58 | 20 | 19 | 22 | 2,5 | 14 | 20 | 4 500 | 0,24 | ▸ **NUKR 40 A** |
| | 18 | 58 | 20 | 13,8 | 14,3 | 1,5 | 13,7 | 19,6 | 4 500 | 0,24 | **PWKR 40.2RS** |
| | 22 | 58 | 20 | 10,5 | 14,6 | 1,73 | 12,5 | 18 | 3 400 | 0,26 | ▸ **KRE 40 PPA** |
| | 22 | 58 | 20 | 19 | 22 | 2,5 | 14 | 20 | 4 500 | 0,26 | ▸ **NUKRE 40 A** |
| **47** | 20 | 66 | 24 | 14,7 | 24,5 | 2,9 | 23,6 | 33,5 | 3 000 | 0,38 | ▸ **KR 47 PPA** |
| | 20 | 66 | 24 | 19,4 | 41,5 | 5 | 30,5 | 43 | 1 900 | 0,39 | ▸ **KRV 47 PPA** |
| | 20 | 66 | 24 | 28,6 | 33,5 | 3,9 | 17,6 | 25 | 3 800 | 0,38 | ▸ **NUKR 47 A** |
| | 20 | 66 | 24 | 22,9 | 24,5 | 2,8 | 18,3 | 26 | 3 800 | 0,38 | **PWKR 47.2RS** |
| | 24 | 66 | 24 | 14,7 | 24,5 | 2,9 | 23,6 | 33,5 | 3 000 | 0,4 | ▸ **KRE 47 PPA** |
| | 24 | 66 | 24 | 28,6 | 33,5 | 3,9 | 17,6 | 25 | 3 800 | 0,4 | ▸ **NUKRE 47 A** |

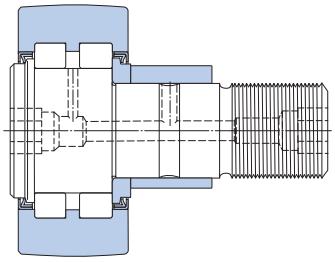
▸ Popular item



NUKRE .. A
(35 ≤ D ≤ 40 mm)



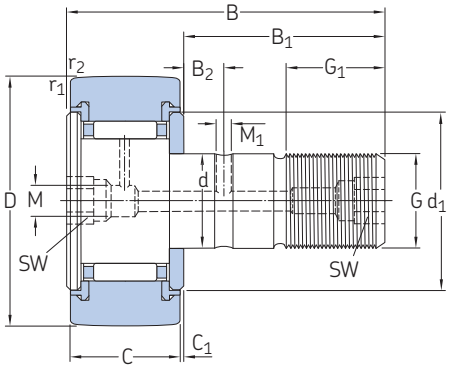
NUKRE .. A
(D ≥ 47 mm)



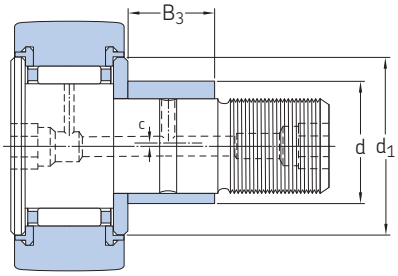
PWKR ...2RS

**Dimensions**

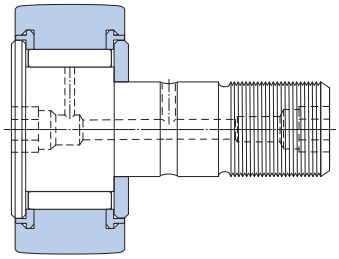
| d | $B_1$ | $B_2$ | $B_3$ | $C_1$ | $d_1$ | G | $G_1$ | M | $M_1$ | SW | c | $r_{1,2}$ min. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | | | | | | | | | | | | |
| **40** | 36,5 | 8 | – | 0,8 | 31,5 | M 18x1,5 | 19 | 6 | 3 | 8 | – | 1 |
| | 36,5 | 8 | – | 0,8 | 31,5 | M 18x1,5 | 19 | 6 | 3 | 8 | – | 1 |
| | 36,5 | 8 | – | 0,8 | 31,5 | M 18x1,5 | 19 | 6 | 3 | 8 | – | 1 |
| | 36,5 | 8 | – | 0,8 | 22 | M 18x1,5 | 19 | 6 | 3 | 8 | – | 1 |
| | 36,5 | 8 | – | 0,8 | 22 | M 18x1,5 | 19 | 6 | 3 | 8 | – | 1 |
| | 36,5 | 8 | 16 | 0,8 | 31,5 | M 18x1,5 | 19 | 6 | 3 | 8 | 1 | 1 |
| | 33,5 | 8 | 14 | 3,8 | 30 | M 18x1,5 | 19 | 6 | 3 | 8 | 1 | 1 |
| **47** | 40,5 | 9 | – | 0,8 | 36,5 | M 20x1,5 | 21 | 6 | 4 | 10 | – | 1 |
| | 40,5 | 9 | – | 0,8 | 36,5 | M 20x1,5 | 21 | 6 | 4 | 10 | – | 1 |
| | 40,5 | 9 | – | 0,8 | 27 | M 20x1,5 | 21 | 6 | 4 | 10 | – | 1 |
| | 40,5 | 9 | – | 0,8 | 27 | M 20x1,5 | 21 | 6 | 4 | 10 | – | 1 |
| | 40,5 | 9 | 18 | 0,8 | 36,5 | M 20x1,5 | 21 | 6 | 4 | 10 | 1 | 1 |
| | 40,5 | 9 | 18 | 0,8 | 27 | M 20x1,5 | 21 | 6 | 4 | 10 | 1 | 1 |




KR .. PPA



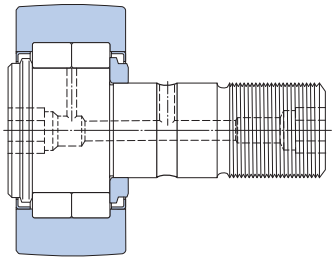

KRE .. PPA



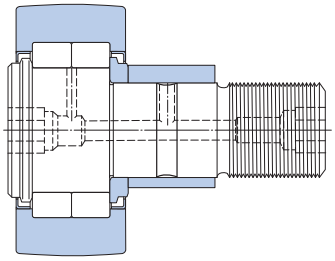
KRV .. PPA

| Principal dimensions | | | | Basic load ratings dynamic | static | Fatigue load limit | Maximum radial loads dynamic | static | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D | d | B | C | C | $C_0$ | $P_u$ | $F_r$ max. | $F_{0r}$ max. | | | |
| mm | | | | kN | | kN | kN | | r/min | kg | – |
| **52** | 20 | 66 | 24 | 15,7 | 27 | 3,2 | 36 | 51 | 3 000 | 0,45 | ▸ **KR 52 PPA** |
| | 20 | 66 | 24 | 20,9 | 46,5 | 5,6 | 45 | 64 | 1 900 | 0,46 | ▸ **KRV 52 PPA** |
| | 20 | 66 | 24 | 29,7 | 36 | 4,25 | 18 | 25,5 | 3 200 | 0,45 | ▸ **NUKR 52 A** |
| | 20 | 66 | 24 | 23,8 | 26,5 | 3,05 | 18,6 | 26,5 | 3 200 | 0,45 | ▸ **PWKR 52.2RS** |
| | 24 | 66 | 24 | 15,7 | 27 | 3,2 | 36 | 51 | 3 000 | 0,47 | ▸ **KRE 52 PPA** |
| | 24 | 66 | 24 | 29,7 | 36 | 4,25 | 18 | 25,5 | 3 200 | 0,47 | ▸ **NUKRE 52 A** |
| **62** | 24 | 80 | 29 | 24,6 | 44 | 5,5 | 58,5 | 85 | 2 400 | 0,77 | ▸ **KR 62 PPA** |
| | 24 | 80 | 29 | 31,4 | 72 | 9 | 72 | 102 | 1 700 | 0,79 | ▸ **KRV 62 PPA** |
| | 24 | 80 | 28 | 41,3 | 48 | 5,85 | 25 | 36 | 2 600 | 0,8 | ▸ **NUKR 62 A** |
| | 24 | 80 | 28 | 31,9 | 32,5 | 4,05 | 20,4 | 29 | 2 600 | 0,8 | ▸ **PWKR 62.2RS** |
| | 28 | 80 | 29 | 24,6 | 44 | 5,5 | 58,5 | 85 | 2 400 | 0,8 | ▸ **KRE 62 PPA** |
| | 28 | 80 | 28 | 41,3 | 48 | 5,85 | 25 | 36 | 2 600 | 0,82 | ▸ **NUKRE 62 A** |
| **72** | 24 | 80 | 29 | 26 | 48 | 6 | 100 | 143 | 2 400 | 1 | ▸ **KR 72 PPA** |
| | 24 | 80 | 29 | 33 | 80 | 9,8 | 118 | 170 | 1 700 | 1,05 | ▸ **KRV 72 PPA** |
| | 24 | 80 | 28 | 45,7 | 58,5 | 7,1 | 34,5 | 50 | 2 000 | 1 | ▸ **NUKR 72 A** |
| | 24 | 80 | 28 | 39,6 | 45 | 5,6 | 47,5 | 68 | 2 600 | 1 | ▸ **PWKR 72.2RS** |
| | 28 | 80 | 29 | 26 | 48 | 6 | 100 | 143 | 2 400 | 1,05 | ▸ **KRE 72 PPA** |
| | 28 | 80 | 28 | 45,7 | 58,5 | 7,1 | 34,5 | 50 | 2 000 | 1,05 | ▸ **NUKRE 72 A** |
| **80** | 30 | 100 | 35 | 36,9 | 72 | 9 | 106 | 150 | 1 800 | 1,6 | ▸ **KR 80 PPA** |
| | 30 | 100 | 35 | 45,7 | 114 | 14 | 122 | 176 | 1 400 | 1,65 | ▸ **KRV 80 PPA** |
| | 30 | 100 | 35 | 69,3 | 86,5 | 10,8 | 48 | 69,5 | 1 900 | 1,6 | ▸ **NUKR 80 A** |
| | 30 | 100 | 35 | 57,2 | 73,5 | 9,3 | 64 | 91,5 | 2 000 | 1,6 | ▸ **PWKR 80.2RS** |
| | 35 | 100 | 35 | 36,9 | 72 | 9 | 106 | 150 | 1 800 | 1,65 | ▸ **KRE 80 PPA** |
| | 35 | 100 | 35 | 69,3 | 86,5 | 10,8 | 48 | 69,5 | 1 900 | 1,65 | ▸ **NUKRE 80 A** |
| **90** | 30 | 100 | 35 | 38 | 76,5 | 9,5 | 160 | 228 | 1 800 | 2 | ▸ **KR 90 PPA** |
| | 30 | 100 | 35 | 47,3 | 122 | 15 | 183 | 260 | 1 400 | 2 | ▸ **KRV 90 PPA** |
| | 30 | 100 | 35 | 78,1 | 102 | 12,7 | 86,5 | 125 | 1 900 | 1,95 | ▸ **NUKR 90 A** |
| | 30 | 100 | 35 | 62,7 | 85 | 10,8 | 108 | 153 | 2 000 | 1,95 | ▸ **PWKR 90.2RS** |
| | 35 | 100 | 35 | 38 | 76,5 | 9,5 | 160 | 228 | 1 800 | 2,05 | **KRE 90 PPA** |
| | 35 | 100 | 35 | 78,1 | 102 | 12,7 | 86,5 | 125 | 1 900 | 2 | ▸ **NUKRE 90 A** |

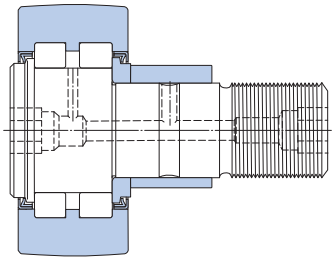
▸ Popular item



NUKR .. A



NUKRE .. A



PWKR ...2RS

**Dimensions**

| d | $B_1$ | $B_2$ | $B_3$ | $C_1$ | $d_1$ | G | $G_1$ | M | $M_1$ | SW | c | $r_{1,2}$ min. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | | | | | | | | | | | | |
| **52** | 40,5 | 9 | – | 0,8 | 36,5 | M 20x1,5 | 21 | 6 | 4 | 10 | – | 1 |
| | 40,5 | 9 | – | 0,8 | 36,5 | M 20x1,5 | 21 | 6 | 4 | 10 | – | 1 |
| | 40,5 | 9 | – | 0,8 | 31 | M 20x1,5 | 21 | 6 | 4 | 10 | – | 1 |
| | 40,5 | 9 | – | 0,8 | 31 | M 20x1,5 | 21 | 6 | 4 | 10 | – | 1 |
| | 40,5 | 9 | 18 | 0,8 | 36,5 | M 20x1,5 | 21 | 6 | 4 | 10 | 1 | 1 |
| | 40,5 | 9 | 18 | 0,8 | 31 | M 20x1,5 | 21 | 6 | 4 | 10 | 1 | 1 |
| **62** | 49,5 | 11 | – | 0,8 | 44 | M 24x1,5 | 25 | 8 | 4 | 14 | – | 1 |
| | 49,5 | 11 | – | 0,8 | 44 | M 24x1,5 | 25 | 8 | 4 | 14 | – | 1 |
| | 49,5 | 11 | – | 1,3 | 38 | M 24x1,5 | 25 | 8 | 4 | 14 | – | 1 |
| | 49,5 | 11 | – | 1,3 | 38 | M 24x1,5 | 25 | 8 | 4 | 14 | – | 1 |
| | 49,5 | 11 | 22 | 0,8 | 44 | M 24x1,5 | 25 | 8 | 4 | 14 | 1 | 1 |
| | 49,5 | 11 | 22 | 1,3 | 38 | M 24x1,5 | 25 | 8 | 4 | 14 | 1 | 1 |
| **72** | 49,5 | 11 | – | 0,8 | 44 | M 24x1,5 | 25 | 8 | 4 | 14 | – | 1,1 |
| | 49,5 | 11 | – | 0,8 | 44 | M 24x1,5 | 25 | 8 | 4 | 14 | – | 1,1 |
| | 49,5 | 11 | – | 1,3 | 44 | M 24x1,5 | 25 | 8 | 4 | 14 | – | 1,1 |
| | 49,5 | 11 | – | 1,3 | 44 | M 24x1,5 | 25 | 8 | 4 | 14 | – | 1,1 |
| | 49,5 | 11 | 22 | 0,8 | 44 | M 24x1,5 | 25 | 8 | 4 | 14 | 1 | 1,1 |
| | 49,5 | 11 | 22 | 1,3 | 44 | M 24x1,5 | 25 | 8 | 4 | 14 | 1 | 1,1 |
| **80** | 63 | 15 | – | 1 | 53 | M 30x1,5 | 32 | 8 | 4 | 14 | – | 1,1 |
| | 63 | 15 | – | 1 | 53 | M 30x1,5 | 32 | 8 | 4 | 14 | – | 1,1 |
| | 63 | 15 | – | 1 | 47 | M 30x1,5 | 32 | 8 | 4 | 14 | – | 1,1 |
| | 63 | 15 | – | 1 | 47 | M 30x1,5 | 32 | 8 | 4 | 14 | – | 1,1 |
| | 63 | 15 | 29 | 1 | 53 | M 30x1,5 | 32 | 8 | 4 | 14 | 1,5 | 1,1 |
| | 63 | 15 | 29 | 1 | 47 | M 30x1,5 | 32 | 8 | 4 | 14 | 1,5 | 1,1 |
| **90** | 63 | 15 | – | 1 | 53 | M 30x1,5 | 32 | 8 | 4 | 14 | – | 1,1 |
| | 63 | 15 | – | 1 | 53 | M 30x1,5 | 32 | 8 | 4 | 14 | – | 1,1 |
| | 63 | 15 | – | 1 | 47 | M 30x1,5 | 32 | 8 | 4 | 14 | – | 1,1 |
| | 63 | 15 | – | 1 | 47 | M 30x1,5 | 32 | 8 | 4 | 14 | – | 1,1 |
| | 63 | 15 | 29 | 1 | 53 | M 30x1,5 | 32 | 8 | 4 | 14 | 1,5 | 1,1 |
| | 63 | 15 | 29 | 1 | 47 | M 30x1,5 | 32 | 8 | 4 | 14 | 1,5 | 1,1 |

# 17 Sensor bearing units

# 17 Sensor bearing units


**Motor encoder units** . . . . . **988**
Designs and variants . . . . . 989
Sensor technology . . . . . 989
Cable connection. . . . . 990
Lubrication . . . . . 990
Motor encoder units for extreme operating conditions . 990
Product data . . . . . 991
Requirements for the receiving interface. . . . . 991
Electromagnetic compatibility . . . . . 991
High-performance filtering . . . . . 991
Bearing data . . . . . 992
(Dimension standards, tolerances, internal clearance)
Loads . . . . . 992
Temperature limits . . . . . 992
Permissible speed . . . . . 993
Design considerations . . . . . 993
Cable outlet. . . . . 993
Motor encoder units in the non-locating bearing position . . . . . 993
Motor encoder units in the locating bearing position . . 993
Motor encoder units in floating bearing arrangements. 993
Mounting . . . . . 994
Mounting a unit on a shaft . . . . . 994
Mounting a unit into a housing. . . . . 995
Cable connection. . . . . 995
Designation system . . . . . 995

**Roller encoder units** . . . . . **996**
Sensor technology . . . . . 996

**Steering encoder units**. . . . . **997**
Sensor technology and electrical data . . . . . 998
Units providing absolute position information. . . . . 998

**Rotor positioning sensor bearing units** . . . . . **998**
Units for sine wave or vector control . . . . . 998

**Rotor positioning bearings** . . . . . **1000**
Applications. . . . . 1000

**Product table**
**17.1** Motor encoder units. . . . . 1002

# 17 Sensor bearing units



## More information

**General bearing knowledge** . . . . **17**

**Bearing selection process** . . . . . **59**
Lubrication . . . . . 109
Bearing interfaces. . . . . 139
Seat tolerances for standard conditions . . . . . 148
Selecting internal clearance or preload . . . . . 182
Sealing, mounting and dismounting . . . . . 193

**Mounting instructions for individual bearings** → skf.com/mount

SKF sensor bearing units are used to monitor accurately the status of rotating or linear components and are:

- compact
- robust and reliable
- simple and ready-to-mount

Sensor-integrated solutions engineered by SKF have been well proven in a variety of industrial and automotive applications, such as electric motors, electric vehicles, road rollers, tractors, forklifts and conveyors. Typical uses include:

- motor management
- steering
- speed and position sensing
- measurement of angular position

## Motor encoder units

Monitoring the status of rotating components accurately is essential for many applications. This is particularly true for AC motors that require encoders to measure the speed and the direction of rotation continuously.

SKF motor encoder units (**fig. 1**) combine active sensor technology with an SKF Explorer deep groove ball bearing and are:

- able to provide a signal resolution ranging from 32 to 80 digital pulses per revolution
- compact only 6,2 mm wider than the corresponding standard deep groove ball bearing (**fig. 2**)
- ready-to-mount and can be mounted at either bearing position in an AC motor
- available for shaft diameters ranging from 15 to 45 mm

**Fig. 1**

**Motor encoder unit**

# Designs and variants

SKF motor encoder units are compact, integrated units consisting of (fig. 3):

- an SKF Explorer deep groove ball bearing in the 62 series with a snap ring groove in the outer ring and an RS1 contact seal (*Single row deep groove ball bearings*, page 241)
- an impulse ring
- a sensor body
- a connecting cable

The impulse ring, which attaches to the inner ring of the bearing, is a composite magnetized ring that contains between 32 and 80 north and south poles. The number of poles depends on the size of the bearing. The sensor body, which is attached to the outer ring, protects the patented SKF Hall effect cell. The multi-wire connecting cable extends in the radial direction.

The bearing is protected by a contact seal on one side. On the opposite side of the bearing, the impulse ring and sensor body create an effective labyrinth seal to keep lubricant in and solid contaminants out of the bearing.

## Sensor technology

SKF motor encoder units use a compact and robust sensor that produces an incremental encoder signal. The sensor is accurate down to zero revolutions per minute. An integrated active circuit (requiring an external voltage supply) in the sensor body contains two Hall effect cells that produce an output signal consisting of two square waves (fig. 4).

The signals can be interpreted by motor controllers in different ways:

- The direction of rotation can be determined from the phase shift, when the rising edge of a signal first appears.
- Low speeds can be determined by measuring the time between two electrical events, such events being the rising and falling edge on either square wave.
- High speeds can be measured by counting the number of electrical events within a given time period.

The two square waves are 90° out of phase with each other. This phase shift changes sign with the direction of rotation. fig. 4 shows the general specifications of the signal. The presence of two signals in quadrature enables a processing unit to multiply the number of angular position increments per revolution. For example, using a standard SKF sensor bearing with 64 pulses per revolution and a standard electronic interface that can detect the rising (Low/High) and falling (High/Low) times of each of the two

17

**Fig. 2**

**Extended width compared to a standard deep groove ball bearing**

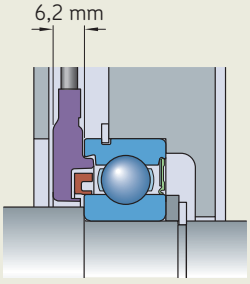



**Fig. 3**

**Motor encoder unit**

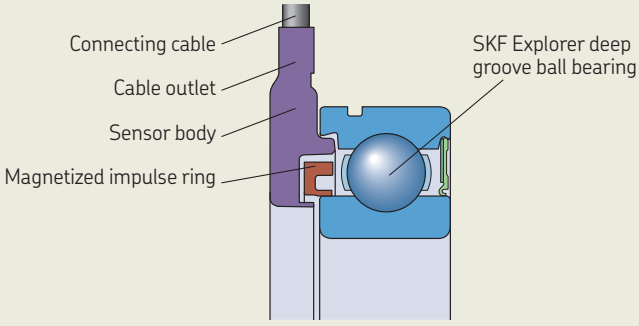
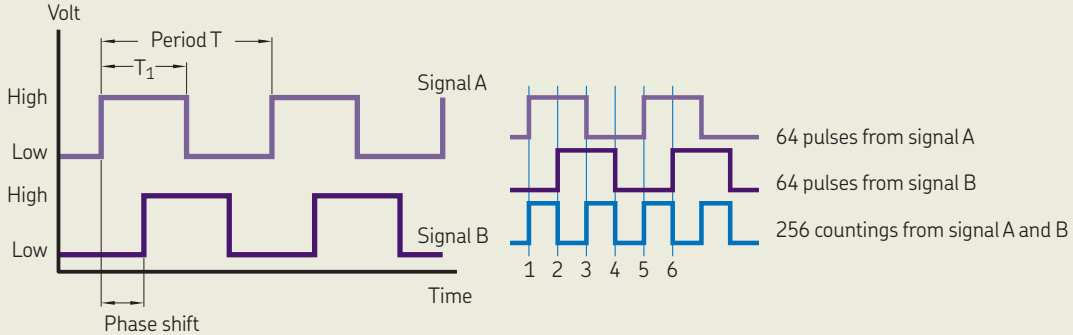



**Fig. 4**

**Sensor technology**




Phase shift = +90° when the inner ring rotates clockwise, viewed from the sensor side

N = number of pulses per revolution
Resolution: R = 360°/N
Period accuracy = (T – R)/R
Duty cycle = 100 $T_1$/T

signals, it is possible to obtain 256 electrical events per revolution, which translates to an angular resolution of 1,4° (fig. 4, page 989).

SKF motor encoder units provide accurate and reliable signals for effective motor control and are 100% tested for period accuracy, duty cycle and phase shift during manufacture.

## Cable connection

SKF motor encoder units are available as standard with one of the following:

- a free cable end with an output signal consisting of two square waves, designation suffix 008A (fig. 5)
- an AMP Superseal™ connector (AMP Nos. 282106-1 and 282404-1), designation suffix 108A (fig. 6)

Standard cable lengths are listed in the product table, page 1002. For alternative connectors or cable lengths, contact SKF.

## Lubrication

SKF motor encoder units are:

- filled, under clean conditions, with a high-quality grease (table 2, page 245) that is suitable for the most common operating conditions of electric motors
- virtually maintenance-free

The grease life in the bearing can be calculated according to the method described under *Grease life for capped bearings*, page 246.

## Motor encoder units for extreme operating conditions

Magnetic sensors have temperature and motor power limits. For applications where magnetic sensors are not practical, high-performance inductive technology can be used instead. Inductive sensors use coils to sense the rotation of a specially designed induction tooth ring. For additional information about motor encoder units for extreme operating conditions, contact SKF.

**Fig. 5**

**Free cable end, designation suffix 008A (including dongle, except for unit BMD-6206)**

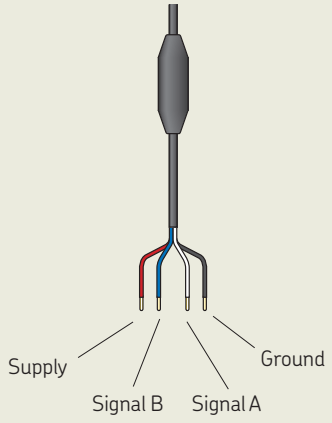
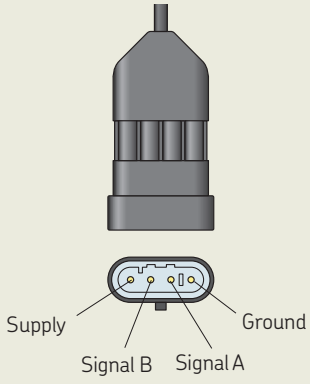



**Fig. 6**

**AMP Superseal™ connector, designation suffix 108A**



# Product data

## Requirements for the receiving interface

The receiving interface must be able to process the signals, which are provided via open collector circuits (fig. 7). Output signal features are listed in table 1. The phase shift is the delay between the two signals' rise events (fig. 4, page 989). It is 1/4 of the period, or 90 electric degrees. The duty cycle value is the high state of the signal compared to the full period (fig. 4). It is nominally 50%.

### Power supply

SKF motor encoder units require a regulated voltage supply, which can range from 5 to 18 V DC. For applications above 18 volts, contact SKF.

### Resistors

Pull-up resistors (table 2) should be placed between the voltage supply and the conductors for the output signals to limit the output current to 20 mA. The application load resistance between the ground line and the conductors for the output signals should be at least 10 times higher than the resistance of the pull-up resistor. This helps to keep the output signals readable.

### Detecting direction of rotation

A positive phase shift corresponds to signal B rising before signal A and indicates the inner ring rotating clockwise when viewed from the sensor side.

## Electromagnetic compatibility

SKF motor encoder units can be used in systems operating in very arduous electromagnetic environments as described in the international standard IEC 61000-6-2.

**Fig. 7**

**Typical schematic drawing of a receiving interface**

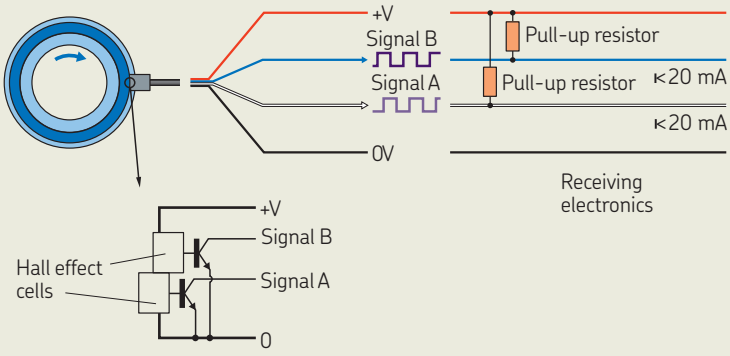



**Table 1**

**Output signal features**

| | |
|---|---|
| **Signal type** | Digital square |
| **Number of signals** | 2 |
| **Phase shift** | 90° |
| **Duty cycle** | 50% of a period |

**Table 2**

**Recommended pull-up resistors**

| Voltage supply | Resistance min. | Power |
|---|---|---|
| V DC | Ω | W |
| **5** | 270 | 0,25 |
| **9** | 470 | 0,25 |
| **12** | 680 | 0,25 |

## High-performance filtering

All standard SKF motor encoder units are protected with high-performance filtering so that they can adapt to the electric environment typically found in industrial and automotive applications:

- Units with a free cable end have the filter included in the overmoulding on the cable.
- Units with an AMP Superseal™ connector have the filter integrated in the connector.

## Bearing data

| | |
|---|---|
| **Dimension standards** | Boundary dimensions: ISO 15<br>However, the width of the complete unit is 6,2 mm wider. |
| **Tolerances**<br><br>For additional information<br>→ page 35 | d ≤ 25 mm: P5<br>d ≥ 30 mm: P6<br><br>Values: ISO 492 (table 3, page 39, and fig. 4, page 989) |
| **Internal clearance**<br><br>For additional information<br>→ page 182 | C3<br>Values: ISO 5753-1 (fig. 6, page 990)<br>Values are valid for unmounted bearings under zero measuring load. |

## Loads

For information about minimum load and equivalent bearing loads, refer to *Loads*, page 254.

The required minimum load factor $k_r$ and calculation factor $f_0$ are listed in the product table, page 1002.

## Temperature limits

SKF motor encoder units have been tested successfully under various speeds and loads:

- 500 hours at 125 °C *(255 °F)*, with intermittent peaks of up to 10 minutes at 150 °C *(300 °F)*
- 100 hours at –40 °C *(–40 °F)*

Where other temperatures are expected, contact SKF.

**Fig. 8**

**Radial notch in the housing**

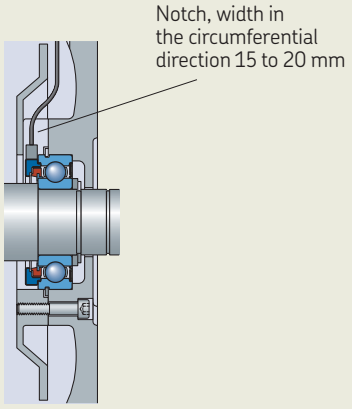



**Fig. 9**

**Motor encoder unit in the non-locating bearing position**

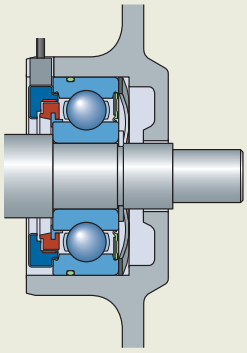
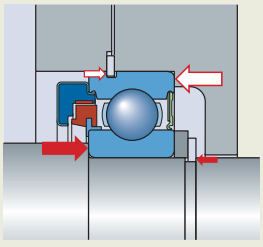


**Fig. 10**

**Recommended load transmission**



# Permissible speed

The permissible operating speed is limited by the contact seal in the bearing. The sensor can accurately detect speeds from zero revolutions per minute up to the limiting speed listed in the **product table**, **page 1002**.

# Design considerations

In principle, SKF motor encoder units can be incorporated in designs in the same way as SKF deep groove ball bearings. Some specific recommendations are described below. For additional information about electric motor applications, refer to the SKF handbook *Rolling bearings in electric motors and generators*.

## Cable outlet

The cable emerges radially from the motor encoder unit. A sufficiently dimensioned cable duct must be provided in the bearing housing or housing cover. The radial notch in the housing should have a width in the circumferential direction of 15 to 20 mm (**fig. 8**).

## Motor encoder units in the non-locating bearing position

SKF recommends using motor encoder units in the non-locating bearing position (**fig. 9**). However, there is a risk that the outer ring can spin in the housing bore, especially if vibration is a factor. Therefore, SKF recommends placing an O-ring in the snap ring groove to help prevent the outer ring from spinning, which could otherwise damage the cable.

## Motor encoder units in the locating bearing position

When using motor encoder units in the locating bearing position, the impulse ring, sensor body and connecting cable should not be subjected to any axial load, whenever possible. When the bearing is subjected to axial loads that act in both directions, the motor encoder unit should be mounted in such a way that the heavier axial load is transmitted to the bearing outer ring side face opposite the sensor (**fig. 10**).

Motor encoder units can be located axially in the housing in different ways:

- with a snap ring in the outer ring and a cover bolted to the housing (**fig. 11**)
- with a spacer sleeve and a snap ring in the housing (**fig. 12**)
- with a cover engaging the outer ring (**fig. 13**)

Motor encoder units with d ≤ 25 mm can only be located axially via a snap ring in the outer ring.

## Motor encoder units in floating bearing arrangements

When using motor encoder units in floating bearing arrangements (**page 76**), the outer ring should be prevented from spinning by placing an O-ring in the snap ring groove. The motor encoder unit should be mounted in such a way that the axial load acts on the bearing outer ring side face opposite the sensor.

**Fig. 11**

**Axial location with a snap ring in the outer ring and a cover bolted to the housing**

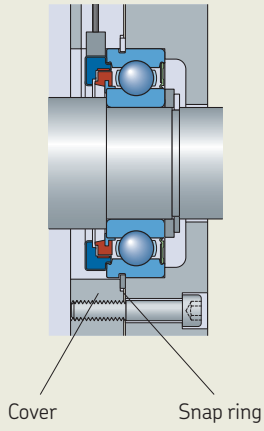



**Fig. 12**

**Axial location with a spacer sleeve and a snap ring in the housing**

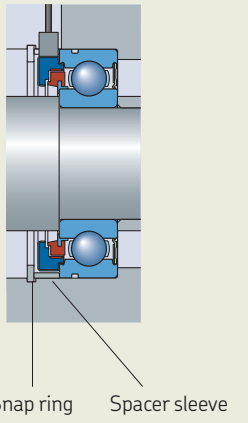
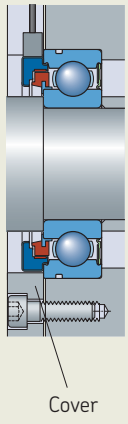



**Fig. 13**

**Axial location with a cover engaging the outer ring**



# Mounting

SKF motor encoder units must be handled with care to avoid damaging the bearing, sensor and connecting cable. Never apply any force on the cable, cable outlet, sensor body or impulse ring.

On request, SKF can provide assistance in optimizing the mounting and connecting processes.

## Mounting a unit on a shaft

Motor encoder units are typically mounted on a shaft with an interference fit. They can be pressed onto the shaft by applying a mounting force via a mounting sleeve or dolly abutting the inner ring side face (fig. 14). To facilitate mounting, the bearing inner ring can be heated:

- Use a temperature-controlled electric hotplate.
- Do not heat the unit above 80 °C *(175 °F)*.
- Place the bearing on a mandrel to heat the inner ring effectively (fig. 15).
- Position the bearing so that the seal is in the lower position to avoid grease leaking out of the bearing.
- Do not use induction heaters as damage to the electronic components may result.



Fig. 14

**Mounting force applied via a dolly abutting the inner ring side face**

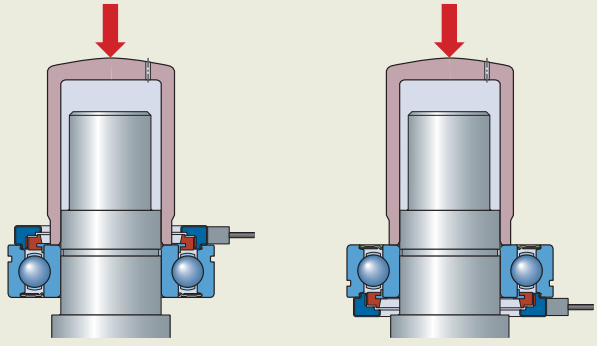
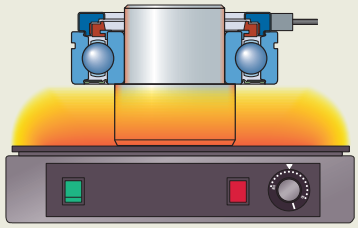


Fig. 15

**Bearing on a mandrel to heat the inner ring**



## Mounting a unit into a housing

When motor encoder units have to be mounted into a housing with an interference fit, they can be pressed into the housing or the housing should be heated. The mounting force should be applied via a mounting sleeve or dolly abutting the outer ring side face or via a snap ring fitted on the outer ring (fig. 16).

In typical electric motor applications, the bearing can be moved into position by using bolts to pull the motor shield and cover together (fig. 17).

## Cable connection

The cable should be protected by a duct to prevent it from making sharp turns, being pinched or making contact with any moving parts. To avoid any interference with the sensor signal, do not place the connector near other power cables or wires.

# Designation system

Refer to *Designation system*, page 258.

The designation prefixes and suffixes used to identify motor encoder units are explained in the following.

### Prefixes

**BMB-** Motor encoder unit BMB series
**BMD-** Motor encoder unit BMD series
**BMO-** Motor encoder unit BMO series

### Suffixes

**/032** 32 digital pulses per revolution
**/048** 48 digital pulses per revolution
**/064** 64 digital pulses per revolution
**/080** 80 digital pulses per revolution
**S2** Two signals
**/U** Sales area worldwide
**A** Bearing with a stamped steel cage, ball centred
**B** Bearing with a glass fibre reinforced PA66 cage, ball centred
**008A** Free cable end
**108A** AMP Superseal™ connector (AMP Nos. 282106-1 and 282404-1)

Fig. 16

**Mounting force applied via a snap ring fitted on the outer ring**

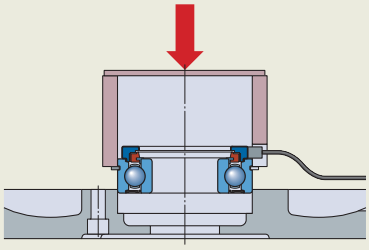
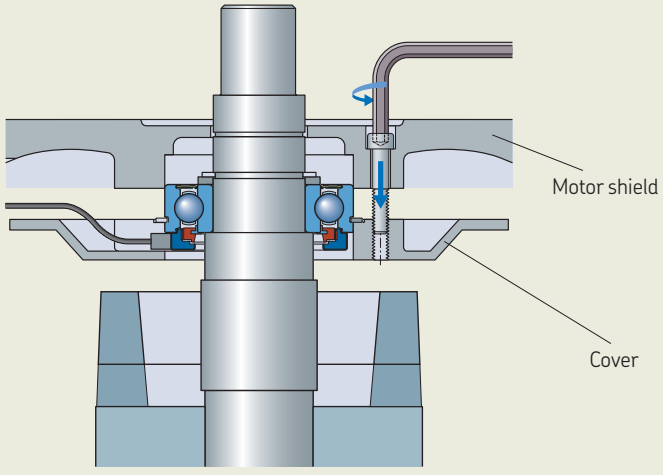


Fig. 17

**Bearing moved into position by using bolts to pull the motor shield and cover together**



# Roller encoder units

SKF roller encoder units (fig. 18, table 3) are plug-and-play sensor bearing units designed for applications with outer ring rotation.

The encoder units:

- incorporate a sealed 6201 SKF Explorer deep groove ball bearing, which is lubricated for the life of the bearing
- can be easily integrated into pulleys, cams, rollers, or wheels to provide a compact outer ring rotation encoder assembly
- can be supplied, on request, complete with customized gears, wheels or pulleys

## Sensor technology

SKF roller encoder units use similar sensors as SKF motor encoder units (page 988). They provide two signals, which can be used to determine relative position, speed, acceleration and direction of movement. The requirements for the receiving interface are the same as for SKF motor encoder units.

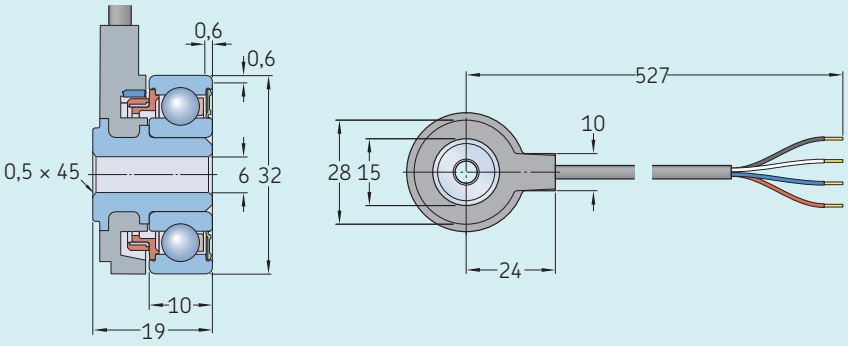


Fig. 18

**Roller encoder units**

Table 3

**Roller encoder unit**




| | |
|---|---|
| **Designation** | **AHE-5509A** |
| **Cable connector type** | Free cable end |
| **Number of pulses per revolution, N** | 32 |
| **Period accuracy** | ± 4% |
| **Phase shift output signal** | 90° |
| **Phase shift output signal tolerance** | ± 30° |
| **Duty cycle** | 50% |
| **Duty cycle tolerance** | ± 10% |
| **Limiting speed** | 5 000 r/min |
| **Mass** | 0,066 kg |

# Steering encoder units

SKF steering encoder units (fig. 19, table 4) are steering input devices for steer-by-wire systems that combine reliable encoder technology with the simplicity of plug-and-play component packaging.

The detailed design of the units is based on well-proven SKF technologies. The units consist of:

- a sealed SKF Explorer deep groove ball bearing for long service life and reliable performance
- bearing encoder technology for precise monitoring
- a friction torque device, which provides feedback to the operator by providing adequate resistance in the steering wheel
- a mechanical interface for mounting
- a shaft to connect the steering wheel

The units reliably fulfil the demands of industrial and off-highway vehicle steer-by-wire systems and:

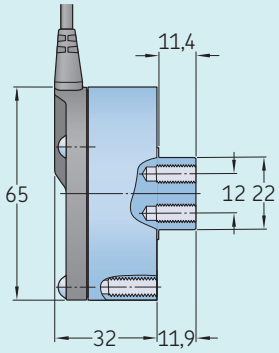
- do not require any adjustment
- do not require relubrication during their expected service life and are virtually maintenance-free
- are supplied ready-to-mount (connection to a steer-by-wire system is achieved by plugs)

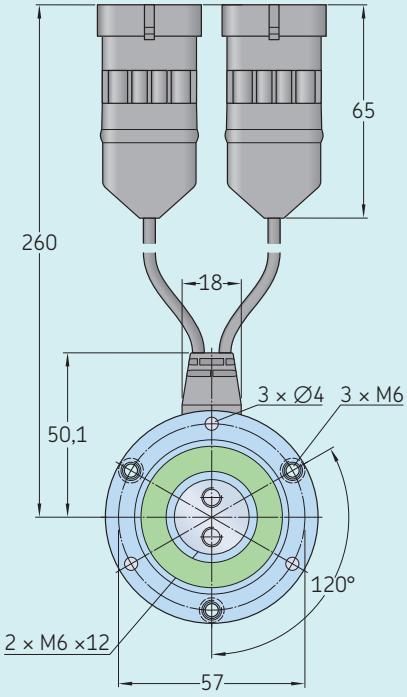
**Fig. 19**

**Steering encoder unit**

**Table 4**

**Steering encoder units**




| Designation | AHE-5401D™ | AHE-5701C™ |
|---|---|---|
| Cable connector type | AMP Superseal | AMP Superseal |
| Number of pulses per revolution, N | 64 | 256 |
| Period accuracy | ± 8% | ± 8% |
| Phase shift output signal | 90° | 90° |
| Phase shift output signal tolerance | ± 30° | ± 30° |
| Duty cycle | 50% | 50% |
| Duty cycle tolerance | ± 10% | ± 10% |
| Limiting speed | 300 r/min | 300 r/min |
| Mass | 0,57 kg | 0,57 kg |

## Sensor technology and electrical data

SKF steering encoder units use sensors to track the movement of a steering wheel. They contain two sets to provide redundancy. The sensors:

- are magnetic
- are non-contact and incremental
- do not wear
- are protected from external influences
- are designed to provide maximum service life

SKF steering encoder units comply with the safety requirements of safety-related control systems in accordance with ISO 13849.

SKF steering encoder units provide two independent sets of square wave signals (fig. 20) via open collector circuits. They require:

- a regulated voltage supply, which can range from 5 to 24 V DC
- pull-up resistors (table 2, page 991) that should be placed between the voltage supply and the conductors for the output signals to limit the output current to 20 mA

The application load resistance between the ground line and the conductors for the output signals should be at least 10 times higher than the resistance of the pull-up resistor. This keeps the output signals readable.

## Units providing absolute position information

SKF can provide customized steering units for applications where a combination of absolute position information, variable steering feel, and active end stops are required. For additional information, contact SKF.

# Rotor positioning sensor bearing units

Synchronous motors require a sensor that provides the position of the rotor with a high accuracy, to enable accurate motor torque control and to achieve maximum efficiency and dynamics. These motors use either direct drive or sine wave control. SKF rotor positioning sensor bearing units (fig. 21, table 5) can contribute to optimized motor efficiency for both systems.

## Units for sine wave or vector control

- provide the shaft angle position in real time throughout the entire motor speed range
- provide a signal (diagram 1) comparable to the one provided by a resolver and can therefore be used by the motor controller's software
- communicate the shaft angle position via a sine/cosine wave signal
- are more compact and cost-effective than inductive resolvers
- are easy to mount (*Mounting*, page 994)
- do not require special shaft or housing accuracy in comparison with inductive resolvers (*Design considerations*, page 993)

SKF can adapt the electronics to comply with the interface of the application.

Fig. 20

**Sensor technology and electrical data**

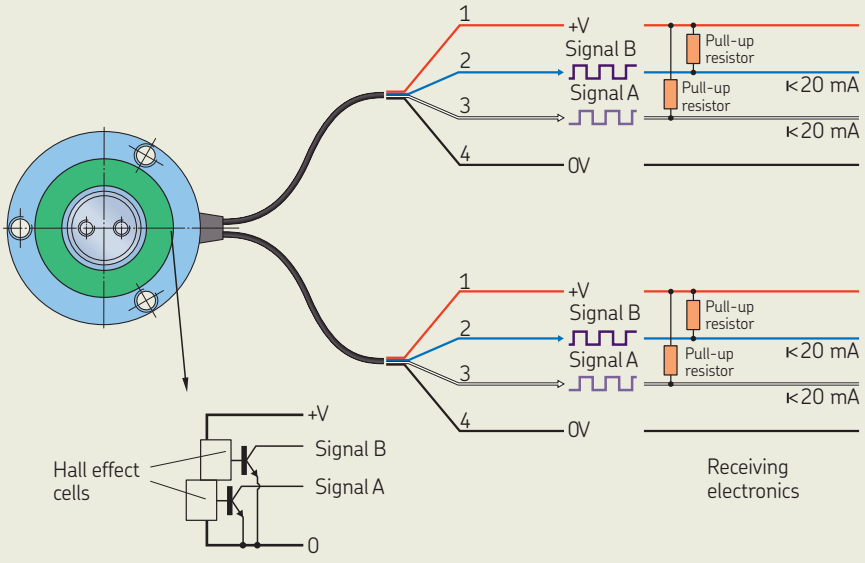
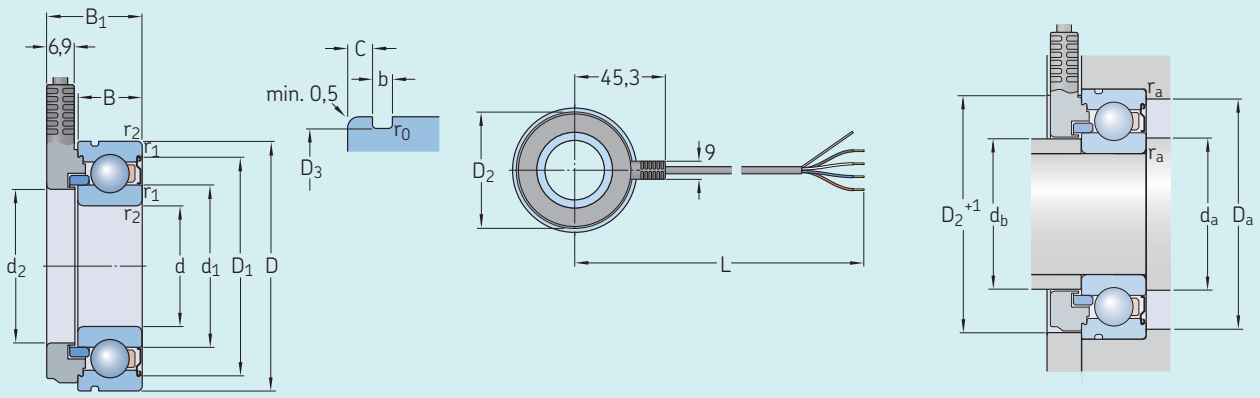



Fig. 21

**Rotor positioning sensor bearing unit**

**Table 5**

**Rotor positioning sensor bearing unit**



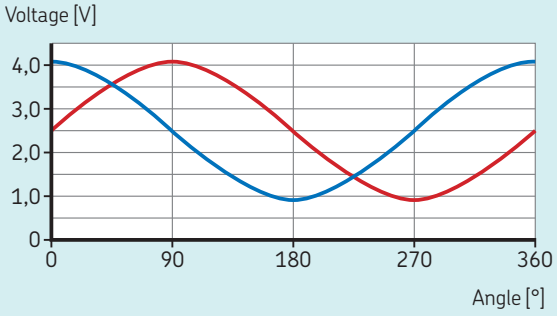

Bore diameter of end cover ≥ $D_2$ + 1 mm

| Dimensions | | | | | | | | | | | | | | Abutment dimensions | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | D | $B_1$ | B | $d_1$ ≈ | $d_2$ | $D_1$ ≈ | $D_2$ | $D_3$ | C | b | $r_0$ | $r_{1,2}$ min. | L | $d_a$ min. | $d_b$ min. | $d_b$ max. | $D_a$ max. | $r_a$ max. |
| mm | | | | | | | | | | | | | | mm | | | | |
| **30** | 62 | 24,6 | 16 | 40,36 | 38,1 | 54,1 | 57,96 | 59,61 | 3,28 | 1,9 | 0,6 | 1 | 515 ±10 | 35 | 35 | 37,5 | 57 | 1 |

| | |
|---|---|
| **Designation** | **BMB-7052A** |
| **Cable connector type** | Free cable end |
| **Number of pulses per revolution, N** | 1 |
| **Angle error** | ± 3.5° |
| **Phase shift** | 90° |
| **Phase shift tolerance** | ± 3° |
| **Basic dynamic load rating, C** | 0,0195 N |
| **Basic static load rating, $C_0$** | 0,0112 N |
| **Fatigue load limit, $P_u$** | 0,000475 N |
| **Limiting speed** | 12 000 r/min |
| **Calculation factor, $k_r$** | 0,025 |
| **Calculation factor, $f_0$** | 14 |
| **Mass** | 0,25 kg |
| **Associated snap ring** | SP 62 |

**Diagram 1**

**Analog signal output**



# Rotor positioning bearings

SKF Rotor positioning bearings (fig. 22, table 6) are customized units with optimized mechanical integration between a magnetic impulse ring and a bearing in an application. The integrated units:

- allow the use of nearly all bearing types
- allow high speeds and temperatures
- generate strong magnetic impulses that are related to the rotor angular position
- can deliver the magnetic field in the axial or radial direction, on a through shaft or at the end of a shaft
- are very robust under severe operating conditions as a result of their high magnetic field strength

## Applications

- absolute angular position information for electric motor control in, for example:
  - belt-driven starter generators
  - traction motors
  - e-superchargers and e-turbochargers
- shaft speed detection or low-resolution angular position in, for example:
  - crankshafts
  - transmission shafts

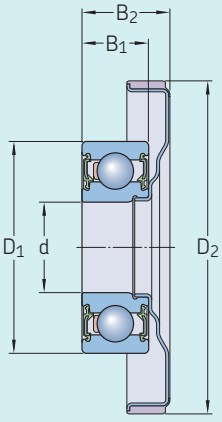


Fig. 22

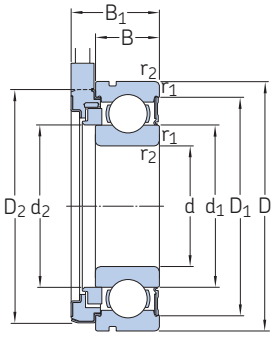
**Rotor positioning bearing**

Table 6

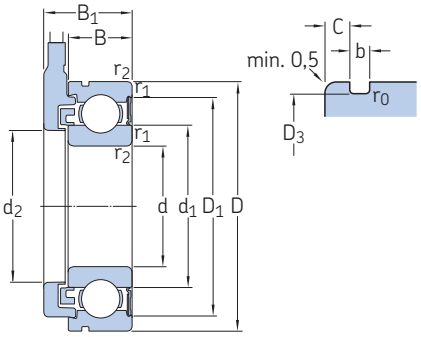
**Rotor positioning bearings**



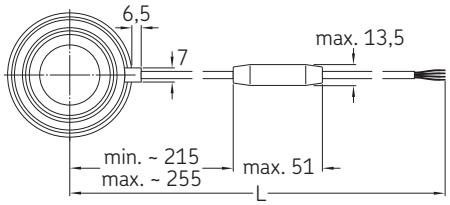

| Designation | Bearing size | Principal dimensions | | | | | Number of pairs of poles | Limiting speed | Operating temperatures |
|---|---|---|---|---|---|---|---|---|---|
| | | d | $D_1$ | $D_2$ | $B_1$ | $B_2$ | | | |
| – | – | mm | | | | | – | – | °C *(°F)* |
| **BMD-0123/ZJ6** | 6202 | 15 | 35 | 55 | 11 | 14,5 | 6 | 22 000 | –40 to 150 *(–40 to 300)* |
| **BMD-0123/ZJ8** | 6202 | 15 | 35 | 55 | 11 | 14,5 | 8 | 22 000 | –40 to 150 *(–40 to 300)* |



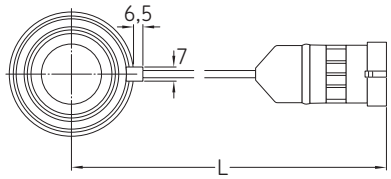

BMB
BMO




BMD

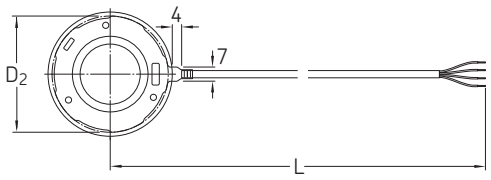



BMB ... 008A (Free cable end)
BMO ... 008A (Free cable end)

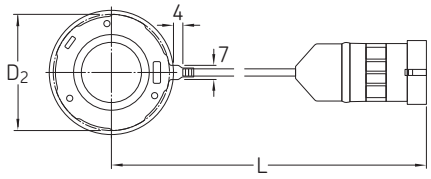



BMB ... 108A (Superseal™)
BMO ... 108A (Superseal™)

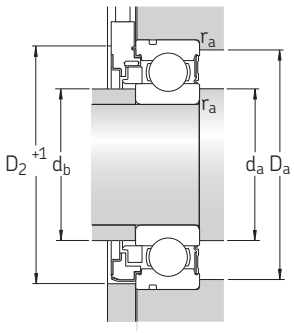
| Bearing | | | | | | | Sensor unit | | | | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Principal dimensions | | | Basic load ratings | | Fatigue load limit | Limiting speed | No. of pulses | Period accuracy | Phase shift output signal | Cable length | | |
| d | D | B | dynamic C | static $C_0$ | $P_u$ | | N | | | L ±10 | | |
| mm | | | kN | | kN | r/min | – | % | ° | mm | kg | – |
| **15** | 35 | 11 | 7,8 | 3,75 | 0,16 | 13 000 | 32 | ±3 | 90 ±30 | 525 | 0,062 | **BMB-6202/032S2/UB008A** |
| | 35 | 11 | 7,8 | 3,75 | 0,16 | 13 000 | 32 | ±3 | 90 ±30 | 550 | 0,07 | **BMB-6202/032S2/UB108A** |
| **20** | 47 | 14 | 12,7 | 6,55 | 0,28 | 10 000 | 48 | ±3 | 90 ±20 | 535 | 0,13 | **BMO-6204/048S2/UA008A** |
| | 47 | 14 | 12,7 | 6,55 | 0,28 | 10 000 | 48 | ±3 | 90 ±20 | 560 | 0,14 | **BMO-6204/048S2/UA108A** |
| **25** | 52 | 15 | 14 | 7,8 | 0,335 | 8 500 | 48 | ±3 | 90 ±30 | 535 | 0,16 | **BMO-6205/048S2/UA008A** |
| | 52 | 15 | 14 | 7,8 | 0,335 | 8 500 | 48 | ±3 | 90 ±30 | 560 | 0,17 | **BMO-6205/048S2/UA108A** |
| **30** | 62 | 16 | 19,5 | 11,2 | 0,475 | 7 500 | 64 | ±4 | 90 ±30 | 540 | 0,22 | **BMD-6206/064S2/UA008A** |
| | 62 | 16 | 19,5 | 11,2 | 0,475 | 7 500 | 64 | ±4 | 90 ±30 | 565 | 0,24 | **BMD-6206/064S2/UA108A** |
| **40** | 80 | 18 | 30,7 | 19 | 0,8 | 5 600 | 80 | ±5 | 90 ±30 | 545 | 0,45 | **BMB-6208/080S2/UB008A** |
| | 80 | 18 | 30,7 | 19 | 0,8 | 5 600 | 80 | ±5 | 90 ±30 | 570 | 0,46 | **BMB-6208/080S2/UB108A** |
| **45** | 85 | 19 | 33,2 | 21,6 | 0,915 | 5 000 | 80 | ±5 | 90 ±30 | 545 | 0,54 | **BMB-6209/080S2/UB008A** |
| | 85 | 19 | 33,2 | 21,6 | 0,915 | 5 000 | 80 | ±5 | 90 ±30 | 570 | 0,54 | **BMB-6209/080S2/UB108A** |



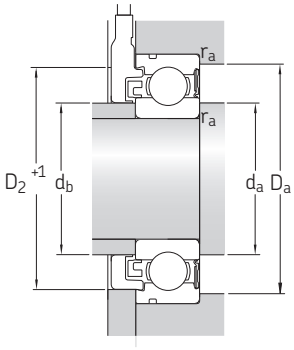

BMD ... 008A (Free cable end)




BMD ... 108A (Superseal™)



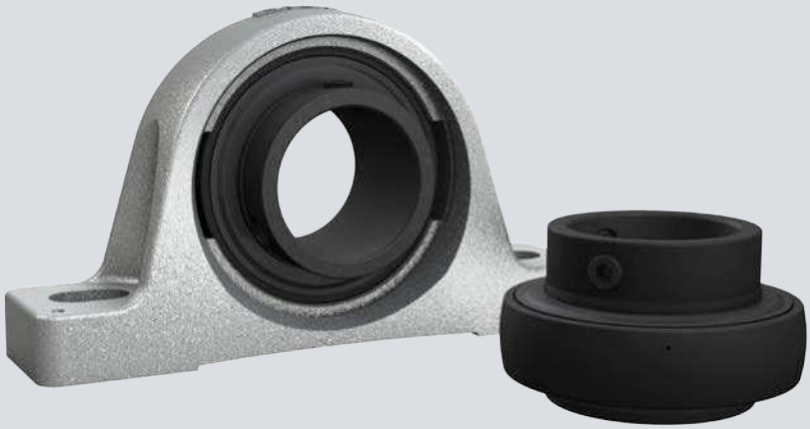

BMB
BMO
Bore diameter of end cover
≥ $D_2$ + 1 mm




BMD
Bore diameter of end cover
≥ $D_2$ + 1 mm



| Dimensions | | | | | | | | | | | Abutment and fillet dimensions | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $d_2$ | $D_1$ ≈ | $D_2$ | $D_3$ | $B_1$ | b | C | $r_0$ | $r_{1,2}$ min. | $d_a$, $d_b$ min. | $d_b$ max. | $D_a$ max. | $r_a$ max. | $k_r$ | $f_0$ |
| mm | | | | | | | | | | | mm | | | | – | |
| **15** | 21,7 | 19,5 | 30,4 | 34,46 | 33,17 | 17,2 | 1,35 | 2,06 | 0,4 | 0,6 | 19 | 19,4 | 31 | 0,6 | 0,025 | 13 |
| | 21,7 | 19,5 | 30,4 | 34,46 | 33,17 | 17,2 | 1,35 | 2,06 | 0,4 | 0,6 | 19 | 19,4 | 31 | 0,6 | 0,025 | 13 |
| **20** | 28,8 | 28,69 | 40,6 | 46,56 | 44,6 | 20,2 | 1,35 | 2,46 | 0,4 | 1 | 25 | 28,6 | 42 | 1 | 0,025 | 13 |
| | 28,8 | 28,69 | 40,6 | 46,56 | 44,6 | 20,2 | 1,35 | 2,46 | 0,4 | 1 | 25 | 28,6 | 42 | 1 | 0,025 | 13 |
| **25** | 34,3 | 31,6 | 46,3 | 51,46 | 49,73 | 21,2 | 1,35 | 2,46 | 0,4 | 1 | 30 | 31,3 | 47 | 1 | 0,025 | 14 |
| | 34,3 | 31,6 | 46,3 | 51,46 | 49,73 | 21,2 | 1,35 | 2,46 | 0,4 | 1 | 30 | 31,3 | 47 | 1 | 0,025 | 14 |
| **30** | 40,3 | 37,4 | 54,1 | 58,1 | 59,61 | 22,2 | 1,9 | 3,28 | 0,6 | 1 | 35 | 40 | 57 | 1 | 0,025 | 14 |
| | 40,3 | 37,4 | 54,1 | 58,1 | 59,61 | 22,2 | 1,9 | 3,28 | 0,6 | 1 | 35 | 40 | 57 | 1 | 0,025 | 14 |
| **40** | 52,6 | 48 | 69,8 | 75,06 | 76,81 | 24,2 | 1,9 | 3,28 | 0,6 | 1,1 | 46,5 | 47,4 | 73 | 1 | 0,025 | 14 |
| | 52,6 | 48 | 69,8 | 75,06 | 76,81 | 24,2 | 1,9 | 3,28 | 0,6 | 1,1 | 46,5 | 47,4 | 73 | 1 | 0,025 | 14 |
| **45** | 57,6 | 53 | 75,2 | 78,86 | 81,81 | 25,2 | 1,9 | 3,28 | 0,6 | 1,1 | 52 | 52 | 78 | 1 | 0,025 | 14 |
| | 57,6 | 53 | 75,2 | 78,86 | 81,81 | 25,2 | 1,9 | 3,28 | 0,6 | 1,1 | 52 | 52 | 78 | 1 | 0,025 | 14 |



# 18 High temperature bearings

# 18 High temperature bearings


**Deep groove ball bearings for high temperature applications** . . . . . **1008**
Designs and variants . . . . . 1008
Sealing solutions. . . . . 1008

**Insert bearings for high temperature applications**. . . . **1010**
Designs and variants . . . . . 1010
Sealing solutions. . . . . 1011

**Bearing data** . . . . . **1011**
(Dimension standards, tolerances, radial internal clearance, permissible misalignment, stabilization)

**Loads and selecting bearing size** . . . . . **1012**

**Design considerations** . . . . . **1013**
Location of bearings . . . . . 1013
Operating environment . . . . . 1013
Axial displacement . . . . . 1013

**Relubrication and running in**. . . . . **1014**

**Mounting** . . . . . **1014**

**Designation system** . . . . . **1014**

**Product tables**
18.1 Single row deep groove ball bearings for high temperature applications. . . . . 1016
18.2 Insert bearings for high temperature applications, metric shafts . . . . . 1020
18.3 Insert bearings for high temperature applications, inch shafts . . . . . 1021

# 18 High temperature bearings



## More information

**General bearing knowledge** . . . . **17**

**Bearing selection process** . . . . . **59**
Bearing interfaces. . . . . 139
Seat tolerances for standard conditions . . . . . 148
Sealing, mounting and dismounting . . . . . 193

**Mounting instructions for individual bearings** → skf.com/mount

*SKF bearing maintenance handbook* ISBN 978-91-978966-4-1

SKF high temperature bearings are designed to deliver increased reliability, reduced complexity and decreased environmental impact in operating temperatures up to 350 °C *(660 °F)*. Because SKF high temperature bearings correspond to the ISO dimensions of grease-lubricated bearings, production efficiencies and cost savings can be realized with a simple change to the SKF bearing solution.

The environmental benefits of SKF high temperature bearings are so significant in many applications that they are included in the "SKF Beyond Zero" product portfolio.

## Bearing benefits and features

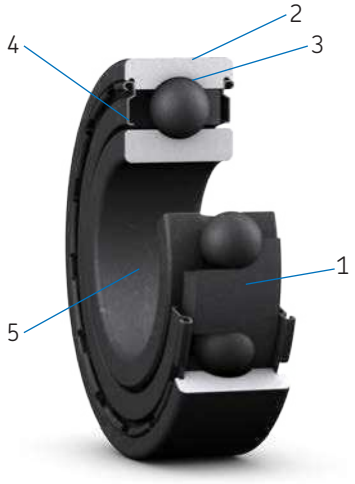
- **Reduced total operating cost**
  The bearings are designed to maintain the radial clearance needed for high temperature operation and so will not seize, even when they cool rapidly, and therefore provide a long service life.
- **Excellent performance under severe conditions:**
  – hot conditions
  – dry environments
  – low rotational speeds
- **Reduced environmental impact**
- **Reduced machine design complexity**

Additionally, the benefits and features of high temperature bearings include (**fig. 1**):

**1 No need for relubrication**
All variants, except open (without shields) VA201 deep groove ball bearings, are lubricated for the life of the bearing with graphite-based high temperature lubricants. Open VA201 bearings require relubrication (*Relubrication and running in*, **page 1014**).

**Fig. 1**

**Bearing benefits and features**



**2 Simple replacement**
The boundary dimensions are the same as those of standard bearings.

**3 Operating temperature up to 350 °C *(660 °F)***
The internal radial clearance and the lubricant are optimized for operation at high temperatures.

**4 Protection against solid contamination**
- Shields (designation suffix 2Z) protect the deep groove ball bearing.
- Shields and flingers (designation suffix 2F) protect the insert bearing.

**5 Improved running in**
The entire bearing surface is manganese phosphate coated.

## Lubrication solutions

SKF high temperature bearing designs and variants incorporate various graphite-based lubrication solutions, including:

- lubricating paste composed of a poly-alkylene glycol/graphite mixture
- graphite cages (segmented or coronet)

For an overview of lubricant types, and other characteristics, for high temperature deep groove ball bearings and insert bearings, refer to **table 1**, **page 1009**, and **table 2**, **page 1010**.

During operation, the graphite maintains a very thin film on the bearing's raceways and rolling elements to reduce wear significantly. Graphite ages at a much higher temperature than oil and grease, and therefore does not lose its lubricating properties at the high temperatures at which it is recommended for use, so the need for relubrication is eliminated.

With many variants, all surfaces of the bearing and, where applicable, shields and flingers are manganese phosphate coated to enhance adhesion of the lubricant to the metal and provide some protection against corrosion.

## Typical applications

- metals industry (cooling beds, roller tables, furnaces)
- food and beverage industry (continuous baking ovens, wafer baking ovens)
- automotive industry (paint lines, heat treatment ovens)
- glass industry (glass tableware or flat glass manufacturing processes)
- construction industry (tiles, mineral wool manufacturing)

## Assortment

The SKF standard assortment of high temperature bearings and bearing units corresponding to ISO standards includes:

- Deep groove ball bearings (**fig. 2**)
- Insert bearings (Y-bearings, **fig. 3**)
- Ball bearing units (**fig. 4**, skf.com/go/17000-18)
  - Zinc chromate plummer block units
  - Zinc chromate square flanged units
  - Zinc chromate oval flanged units

The assortment includes variants that contain food-grade lubricants registered by NSF as category H1 (lubricant acceptable with incidental food contact, for use in and around food processing areas). The NSF registration confirms the lubricant fulfils the requirements listed in the US Food and Drug Administration's guidelines under 21 CFR section 178.3570.

### Customized bearings

In addition to high temperature bearings corresponding to ISO standards, SKF offers an assortment of customized high temperature bearings (**fig. 5**, **page 1008**).

These bearings are customized for use in applications such as:

- automatic wafer baking ovens in the food and beverage industry
- industrial furnaces
- chains

For additional information, contact SKF.



**Fig. 2**
**Deep groove ball bearing**

**Fig. 3**
**Insert bearing**

**Fig. 4**
**Ball bearing unit**

# Deep groove ball bearings for high temperature applications

SKF deep groove ball bearings for high temperature applications correspond in design to standard single row deep groove ball bearings of the same size. They have no filling slots and can accommodate axial loads in addition to radial loads (*Loads and selecting bearing size*, page 1012).

The entire surface of the bearing and shields are manganese phosphate coated to enhance adhesion of the lubricant to the metal and improve the running-in properties of the bearing.

The radial internal clearance is a multiple of C5 to prevent the bearings from seizing, even when they cool rapidly.



## Designs and variants

The SKF assortment of deep groove ball bearings for high temperature applications (fig. 6) provides solutions for various combinations of operating temperature and speed.

The lubrication type, maximum operating temperature, limiting speed, maintenance requirements and all other primary characteristics of the variants within the assortment are listed in table 1.

## Sealing solutions

High temperature deep groove ball bearings can be protected from contamination by either integrated shields, external shields or a combination of both.

For high temperature bearings, metallic shields are the primary recommendation where a capping device with low complexity is required. The shields:

- prevent the ingress of solid contaminants into the bearing
- are non-contacting
- generate no friction
- do not wear
- are particularly well suited for high temperatures because of their material and design

### Integrated shields

High temperature deep groove ball bearings with designation suffix 2Z have integrated shields, but the VA201 variant is also available as an open bearing (fig. 6).

### External shields

In some cases, integrated shields are insufficient and additional external shields should be considered, such as:

- Nilos rings (fig. 7)
- SKF sealing washers (fig. 8)

For additional information about sealing solutions, refer to *External sealing*, page 194, and *Seals* (skf.com/seals).

**NOTE:** Because of the large radial clearance for high temperature deep groove ball bearings, special attention should be given to the design of the sealing arrangement.

### Custom-made seals

In cases where neither integrated nor external shields are applicable, SKF can provide custom-made seals for operating temperatures up to 250 °C *(480 °F)*. These seals are usually made of PTFE (polytetrafluoroethylene) thermoplastics.

To further improve sealing systems that incorporate custom-made seals, it is preferable to use a wear sleeve such as the *SKF Speedi-Sleeve* (skf.com/seals). This improves the seal counterface condition without the need for re-machining. For additional information, contact SKF.

Fig. 5

**Customized deep groove ball bearings**

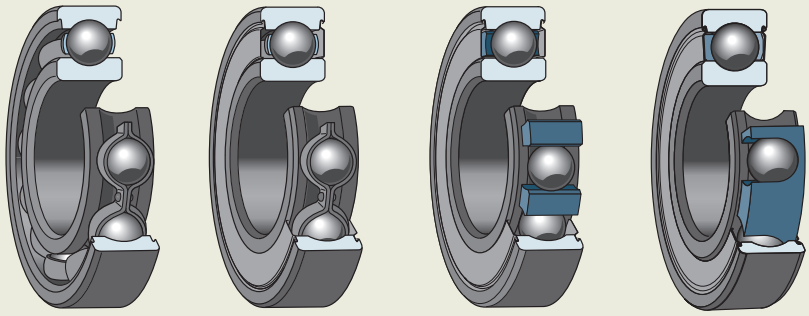
**⚠ WARNING**

PTFE seals exposed to an open flame or temperatures above 300 °C *(570 °F)* are a health and environmental hazard! They remain dangerous even after they have cooled.

Read and follow the safety precautions on page 197.

Fig. 6

**High temperature deep groove ball bearing variants**



VA201 | 2Z/VA201 | 2Z/VA208 | 2Z/VA228



Table 1

**Characteristics of high temperature variants for deep groove ball bearings**

| Characteristics | Variants<br>VA201, 2Z/VA201 | 2Z/VA208 | 2Z/VA228 |
|---|---|---|---|
| **Lubrication type** | Polyalkylene glycol/ graphite mixture | Segmented cage made of graphite | Coronet cage made of graphite |
| **Phosphated rings, rolling elements and cages** | ✔ | ✔ | ✔ |
| **NSF H1 food grade** | ✘ | ✔ | ✔ |
| **Shields** (suffix 2Z) | optional | ✔ | ✔ |
| **Relubrication-free** | 2Z variant | ✔ | ✔ |
| **Maximum operating temperature** | 250 °C *(480 °F)* | 350 °C *(660 °F)* | 350 °C *(660 °F)* |
| **Limiting speed** [r/min][1)] | 4 500 / $d_m$ | 4 500 / $d_m$ | 9 000 / $d_m$ |

[1)] $d_m$ = bearing mean diameter = 0,5 (d + D). For outer ring rotation, use $d_m$ = D.

Fig. 7

**Nilos ring**

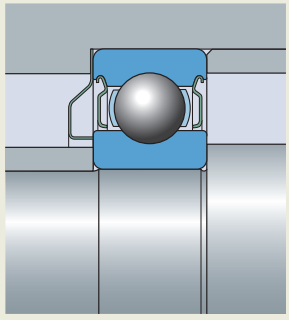
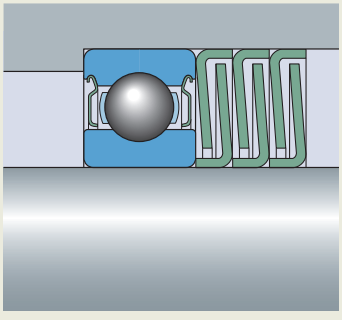


Fig. 8

**SKF sealing washers**



# Insert bearings for high temperature applications

Except for the cage and seals, SKF insert bearings (Y-bearings) for high temperature applications correspond in design to standard insert bearings with grub screws in the YAR 2-2F series (page 342).

The grub (set) screws in the inner ring enable quick and easy mounting/dismounting. The bearings have a shield and a flinger on both sides to prevent the ingress of solid contaminants into the bearing.

The entire surface of the bearing and the shields are manganese phosphated to enhance adhesion of the lubricant to the metal and improve the running-in properties of the bearing. The flingers are treated by pickling.

The radial internal clearance is a multiple of C5 to prevent the bearings from seizing, even when they cool rapidly.



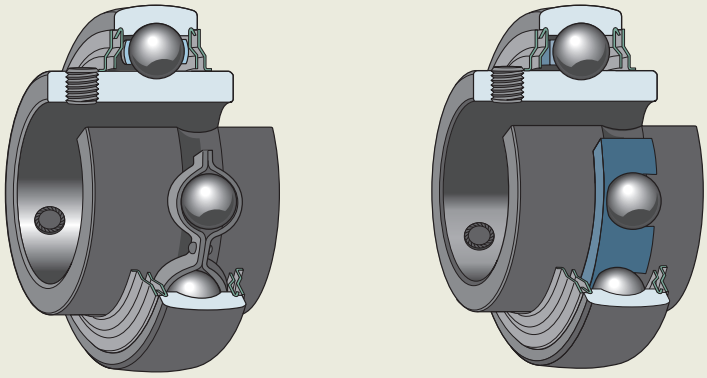
## Designs and variants

The SKF assortment of insert bearings for high temperature applications (fig. 9) provides solutions for various combinations of operating temperature and speed.

The lubrication type, maximum operating temperature, limiting speed, maintenance requirements and all other primary characteristics of the variants within the assortment are listed in table 2.

Fig. 9

**High temperature insert bearing variants**



VA201 VA228

Table 2

**Characteristics of high temperature variants for insert bearings**

| Characteristics | Variants VA201 | VA228 |
|---|---|---|
| **Lubrication type** | Polyalkylene glycol/ graphite mixture | Coronet cage made of graphite |
| **Phosphated rings, rolling elements and cages** | ✔ | ✔ |
| **NSF H1 food grade** | ✘ | ✔ |
| **Shields and flingers** (suffix 2F) | ✔ | ✔ |
| **Relubrication-free** | ✔ | ✔ |
| **Maximum operating temperature** | 250 °C *(480 °F)* | 350 °C *(660 °F)* |
| **Limiting speed** [r/min][1)] | 4 500 / $d_m$ | 9 000 / $d_m$ |

[1)] $d_m$ = bearing mean diameter = 0,5 (d + D). For outer ring rotation, use $d_m$ = D.

## Sealing solutions

SKF high temperature insert bearings are capped on both sides with a shield and a flinger that create a narrow gap-type labyrinth seal (designation suffix 2F).

For high temperature bearings, metallic shields are the primary recommendation where a capping device with low complexity is required. The shields:

- prevent the ingress of solid contaminants into the bearing
- are non-contacting
- generate no friction
- do not wear
- are particularly well suited for high temperatures because of their material and design

# Bearing data

| | Deep groove ball bearings | Insert bearings (Y-bearings) |
|---|---|---|
| **Dimension standards** | Boundary dimensions: ISO 15 Series 10, 02, 03 | Boundary dimensions: ISO 9628 |
| **Tolerances** | Normal | Normal, except the bore and outside diameter (table 3, page 1012) |
| For additional information → page 35 | Values: ISO 492 (table 2, page 1010)<br>Owing to the special surface treatment of the bearings, there may be slight deviations from the standard tolerances. These deviations do not affect mounting or bearing operation. | |
| **Radial internal clearance** | Multiples of C5<br>Values (table 4, page 1012) are valid for unmounted bearings under zero measuring load. | |
| **Permissible misalignment** | ≈ 20 to 30 minutes of arc<br><br>Accommodate misalignment only when the bearings rotate slowly.<br>Misalignment increases bearing noise and reduces bearing service life, and when it exceeds the guideline values, these effects become particularly noticeable. | |
| **Stabilization** | 120 °C *(250 °F)* | 150 °C *(300 °F)* |
| | The rings, rolling elements and cages of SKF high temperature bearings undergo the same heat stabilization process as the relevant standard bearing. As a result, for higher operating temperatures, a certain amount of dimensional change is to be expected. Greater clearances accommodate temperature differentials and material structural changes. | |

# Loads and selecting bearing size

The bearing size is selected based on the basic static load rating $C_0$ from the relevant product table.

For an equivalent static bearing load $P_0$, the selected bearing must have a $C_0$ value ≥ the value of the requisite basic static load rating $C_{0req}$ (**table 5**).

The values in **table 5** are valid only when $P_0 = F_r$. That is, when:

- $F_a < 0{,}8\ F_r$
- $F_a < 0{,}15\ C_0$



## Symbols

| | |
|---|---|
| $C_0$ | basic static load rating [kN] (**product tables**, **page 1016** and **page 1020**) |
| $C_{0req}$ | requisite basic static load rating [kN] |
| $F_a$ | axial load [kN] |
| $F_r$ | radial load [kN] |
| $P_0$ | equivalent static bearing load [kN] |

**Table 3**

**Tolerances of insert bearings for high temperature applications**

| Nominal diameter d, D | | Bore diameter[1] Deviation | | Outside diameter Deviation | |
|---|---|---|---|---|---|
| > | ≤ | U | L | U | L |
| mm | | µm | | µm | |
| **18** | **30** | +18 | 0 | – | – |
| **30** | **50** | +21 | 0 | 0 | –10 |
| **50** | **80** | +24 | 0 | 0 | –10 |
| **80** | **120** | +28 | 0 | 0 | –15 |

[1] Values in accordance with ISO 9628.

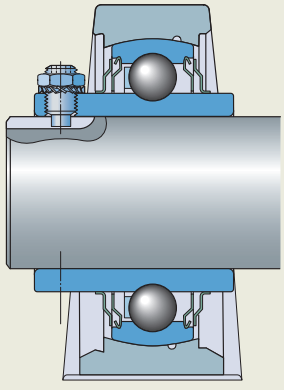
**Table 4**

**Radial internal clearance for high temperature bearings**

| Bore diameter d | | Radial internal clearance Deep groove ball bearings Multiples of C5 | | Insert bearings | |
|---|---|---|---|---|---|
| > | ≤ | min. | max. | min. | max. |
| mm | | µm | | | |
| – | **10** | 96 | 136 | – | – |
| **10** | **18** | 112 | 160 | – | – |
| **18** | **24** | 124 | 172 | 56 | 96 |
| **24** | **30** | 136 | 192 | 60 | 106 |
| **30** | **40** | 172 | 236 | 80 | 128 |
| **40** | **50** | 192 | 272 | 90 | 146 |
| **50** | **65** | 230 | 340 | 110 | 180 |
| **65** | **80** | 270 | 400 | – | – |
| **80** | **100** | 320 | 460 | – | – |
| **100** | **120** | 370 | 540 | – | – |

**Fig. 10**

**Grub screw secured by a nut and a star lock washer**



# Design considerations

## Location of bearings

### Deep groove ball bearings

The selection of shaft and housing fits depends on the bearing operating condition and bearing size. An appropriate fit is needed to locate the shaft, provide satisfactory support and allow for thermal expansion up to the stated maximum operating bearing temperature (**table 6**).

### Insert bearings

For moderate loads (0,035 C < P ≤ 0,05 C), the shaft seats should be machined to an h7Ⓔ tolerance. For light loads and low speeds, an h8Ⓔ shaft tolerance is sufficient.

#### Symbols

C basic dynamic load rating [kN] (**page 1012**)
P equivalent dynamic bearing load [kN] (*Loads* for standard insert bearings, **page 353**)

## Operating environment

SKF high temperature bearings are designed to provide solutions to common issues in high temperature applications. In addition to operations involving high temperatures and low rotational speeds, it is important to consider environmental conditions in the process area.

Since high temperature bearings are supplied without preservative oils and must be used without grease or oil lubrication, the anti-corrosion property of the bearings is limited. Therefore, the bearings should be used in a dry environment or with a proper sealing solution to keep the bearings dry.

## Axial displacement

To accommodate axial displacement, the shaft at the non-locating bearing position of high temperature insert bearings should be provided with one or two grooves, 120° apart, to engage a modified grub screw:

- Hexagon socket grub (set) screws with a dog point, in accordance with ISO 4028, but with a fine thread according to **table 10**, **page 357**. The grub screw should be secured by a nut and a spring or star lock washer (**fig. 10**).

The screws and groove(s) accommodate changes in shaft length and prevent the shaft from turning independently of the bearing. The sliding surfaces between the shaft and inner ring and those in the shaft grooves should be coated with a lubricant paste suitable for the operating temperature.

**Table 5**

**Requisite basic static load rating for applied equivalent static bearing load**

| Equivalent static bearing load $P_0$ | Requisite basic static load rating $C_{0req}$ for operating temperatures up to | |
|---|---|---|
| | 250 °C *(480 °F)* | 350 °C *(660 °F)* |
| kN | kN | |
| **2** | 6 | 9 |
| **4** | 11 | 18 |
| **6** | 16 | 27 |
| **8** | 22 | 36 |
| **10** | 27 | 45 |
| **15** | 40 | 67 |
| **20** | 54 | 90 |
| **25** | 67 | 120 |
| **30** | 80 | 140 |
| **40** | 110 | 180 |
| **50** | 140 | 230 |
| **60** | 160 | 270 |
| **70** | 190 | 320 |
| **80** | 220 | 360 |
| **90** | 240 | 400 |
| **100** | 270 | 450 |
| **125** | 340 | 560 |
| **150** | 400 | 670 |
| **200** | 540 | 890 |
| **300** | 800 | 1 400 |
| **400** | 1 100 | 1 800 |
| **500** | 1 400 | 2 300 |
| **600** | 1 600 | – |

**Table 6**

**Fits for high temperature deep groove ball bearings on solid steel shafts or in cast iron or steel housings**

| Conditions | Shaft diameter | Shaft tolerance | Housing tolerance |
|---|---|---|---|
| – | mm | – | – |
| **Rotating inner ring load** | all | k6 | F7 |
| **Stationary inner ring load** | all | g6 | J7 |

# Relubrication and running in

## Relubrication

All SKF high temperature bearings are lubricated for the life of the bearing, except open VA201 deep groove ball bearings, which require relubrication.

The general recommendation for an open VA201 bearing is to investigate the quality of the lubricating paste in the bearing every six months. If there is no longer a film of dry lubricant on the raceways, indicated by a bright metallic shiny track, remove residues of the old lubricant with a solvent and, when dried, replenish the bearing with lubricating paste.

## Running in

VA201 bearings operating at temperatures below 200 °C *(390 °F)* and at speeds below 25% of the limiting speed (**product tables**, **page 1016** and **page 1020**) require running in. Open VA201 deep groove ball bearings operating under these conditions also require running in after relubrication.

Running in requires the bearing to be operated at a temperature of at least 200 °C *(390 °F)* for a minimum of 48 hours.

# Mounting

SKF high temperature deep groove ball bearings should always be hot mounted to reduce the mounting force and the risk of breaking the graphite lubricant (VA208 and VA228 variants). An induction heater is the preferred choice to heat the bearing during mounting.

Submerging the bearing in hot oil is not recommended because the oil remaining in the bearing might carbonize later during operation.

Do not use impact mounting methods that could damage the bearing and prevent proper functionality.

# Designation system

Refer to the *Designation system* of the relevant standard bearing:

- deep groove ball bearings, **page 258**
- insert bearings, **page 364**

Designation suffixes used with SKF bearings for high temperature applications are explained in the following:

**-2F** Insert bearing for high temperature applications, with grub screw locking, shield and flinger on both sides

**-2Z** Deep groove ball bearing for high temperature applications, shield on both sides

**VA201** Bearing for high temperature applications, with a stamped steel cage, manganese phosphate coated rings and rolling elements, radial clearance of multiples of C5, and lubricated with a polyalkylene glycol/graphite mixture

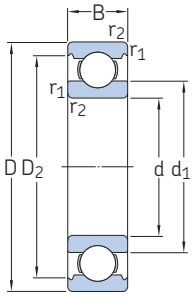
**VA208** Bearing for high temperature applications, with a segmented cage made of graphite, manganese phosphate coated rings and rolling elements, and radial clearance of multiples of C5

**VA228** Bearing for high temperature applications, with a coronet cage made of graphite, manganese phosphate coated rings and rolling elements, and radial clearance of multiples of C5

**W** Insert bearing for high temperature applications, without lubrication hole(s)

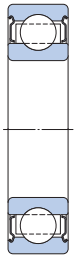
## 18.1 Single row deep groove ball bearings for high temperature applications

d **12 – 55** mm

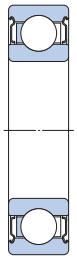



VA201

2Z/VA201



2Z/VA208



2Z/VA228

| Dimensions | | | | | | Basic static load rating | Limiting speed | Limiting temperature | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | $d_1$ ≈ | $D_2$ ≈ | $r_{1,2}$ min. | $C_0$ | | T max. | | |
| mm | | | | | | kN | r/min | °C | kg | – |
| **12** | 32 | 10 | 18,4 | 27,4 | 0,6 | 3,1 | 400 | 250 | 0,037 | **6201/VA201** |
| | 32 | 10 | 18,4 | 27,4 | 0,6 | 3,1 | 200 | 250 | 0,039 | ▸ **6201-2Z/VA201** |
| | 32 | 10 | 18,4 | 27,4 | 0,6 | 3,1 | 400 | 350 | 0,039 | ▸ **6201-2Z/VA228** |
| **15** | 35 | 11 | 21,7 | 30,4 | 0,6 | 3,75 | 360 | 250 | 0,045 | ▸ **6202/VA201** |
| | 35 | 11 | 21,7 | 30,4 | 0,6 | 3,75 | 180 | 250 | 0,048 | ▸ **6202-2Z/VA201** |
| | 35 | 11 | 21,7 | 30,4 | 0,6 | 3,75 | 360 | 350 | 0,048 | ▸ **6202-2Z/VA228** |
| **17** | 35 | 10 | 23 | 31,2 | 0,3 | 3,25 | 340 | 250 | 0,038 | **6003/VA201** |
| | 35 | 10 | 23 | 31,2 | 0,3 | 3,25 | 170 | 250 | 0,041 | **6003-2Z/VA201** |
| | 35 | 10 | 23 | 31,2 | 0,3 | 3,25 | 170 | 350 | 0,041 | **6003-2Z/VA208** |
| | 40 | 12 | 24,5 | 35 | 0,6 | 4,75 | 310 | 250 | 0,065 | **6203/VA201** |
| | 40 | 12 | 24,5 | 35 | 0,6 | 4,75 | 150 | 250 | 0,068 | **6203-2Z/VA201** |
| | 40 | 12 | 24,5 | 35 | 0,6 | 4,75 | 310 | 350 | 0,068 | ▸ **6203-2Z/VA228** |
| | 47 | 14 | 26,5 | 39,6 | 1 | 6,55 | 280 | 250 | 0,11 | **6303/VA201** |
| | 47 | 14 | 26,5 | 39,6 | 1 | 6,55 | 280 | 350 | 0,12 | **6303-2Z/VA228** |
| **20** | 42 | 12 | 27,2 | 37,2 | 0,6 | 5 | 290 | 250 | 0,067 | **6004/VA201** |
| | 42 | 12 | 27,2 | 37,2 | 0,6 | 5 | 140 | 250 | 0,071 | **6004-2Z/VA201** |
| | 42 | 12 | 27,2 | 37,2 | 0,6 | 5 | 140 | 350 | 0,071 | ▸ **6004-2Z/VA208** |
| | 47 | 14 | 28,8 | 40,6 | 1 | 6,55 | 260 | 250 | 0,031 | ▸ **6204/VA201** |
| | 47 | 14 | 28,8 | 40,6 | 1 | 6,55 | 130 | 250 | 0,11 | ▸ **6204-2Z/VA201** |
| | 47 | 14 | 28,8 | 40,6 | 1 | 6,55 | 260 | 350 | 0,11 | ▸ **6204-2Z/VA228** |
| | 52 | 15 | 30,3 | 44,8 | 1,1 | 7,8 | 250 | 250 | 0,14 | ▸ **6304/VA201** |
| | 52 | 15 | 30,3 | 44,8 | 1,1 | 7,8 | 120 | 250 | 0,15 | **6304-2Z/VA201** |
| | 52 | 15 | 30,3 | 44,8 | 1,1 | 7,8 | 120 | 350 | 0,15 | ▸ **6304-2Z/VA208** |
| | 52 | 15 | 30,3 | 44,8 | 1,1 | 7,8 | 250 | 350 | 0,15 | **6304-2Z/VA228** |
| **25** | 47 | 12 | 32 | 42,2 | 0,6 | 6,55 | 250 | 250 | 0,078 | **6005/VA201** |
| | 47 | 12 | 32 | 42,2 | 0,6 | 6,55 | 120 | 250 | 0,083 | ▸ **6005-2Z/VA201** |
| | 47 | 12 | 32 | 42,2 | 0,6 | 6,55 | 120 | 350 | 0,083 | ▸ **6005-2Z/VA208** |
| | 52 | 15 | 34,3 | 46,3 | 1 | 7,8 | 230 | 250 | 0,13 | ▸ **6205/VA201** |
| | 52 | 15 | 34,3 | 46,3 | 1 | 7,8 | 110 | 250 | 0,13 | ▸ **6205-2Z/VA201** |
| | 52 | 15 | 34,3 | 46,3 | 1 | 7,8 | 110 | 350 | 0,13 | **6205-2Z/VA208** |
| | 52 | 15 | 34,3 | 46,3 | 1 | 7,8 | 230 | 350 | 0,13 | ▸ **6205-2Z/VA228** |
| | 62 | 17 | 36,6 | 52,7 | 1,1 | 11,6 | 200 | 250 | 0,23 | **6305/VA201** |
| | 62 | 17 | 36,6 | 52,7 | 1,1 | 11,6 | 100 | 250 | 0,23 | **6305-2Z/VA201** |
| | 62 | 17 | 36,6 | 52,7 | 1,1 | 11,6 | 100 | 350 | 0,23 | ▸ **6305-2Z/VA208** |
| | 62 | 17 | 36,6 | 52,7 | 1,1 | 11,6 | 200 | 350 | 0,23 | ▸ **6305-2Z/VA228** |

▸ Popular item

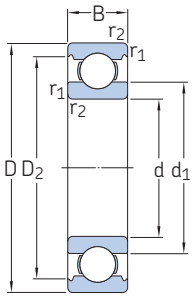
| Dimensions | | | | | | Basic static load rating | Limiting speed | Limiting temperature | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | $d_1$ ≈ | $D_2$ ≈ | $r_{1,2}$ min. | $C_0$ | | T max. | | |
| mm | | | | | | kN | r/min | °C | kg | – |
| **30** | 55 | 13 | 38,2 | 49 | 1 | 8,3 | 100 | 350 | 0,12 | ▸ **6006-2Z/VA208** |
| | 62 | 16 | 40,3 | 54,1 | 1 | 11,2 | 190 | 250 | 0,2 | ▸ **6206/VA201** |
| | 62 | 16 | 40,3 | 54,1 | 1 | 11,2 | 90 | 250 | 0,21 | ▸ **6206-2Z/VA201** |
| | 62 | 16 | 40,3 | 54,1 | 1 | 11,2 | 90 | 350 | 0,21 | ▸ **6206-2Z/VA208** |
| | 62 | 16 | 40,3 | 54,1 | 1 | 11,2 | 190 | 350 | 0,21 | ▸ **6206-2Z/VA228** |
| | 72 | 19 | 44,6 | 61,9 | 1,1 | 16 | 170 | 250 | 0,35 | **6306/VA201** |
| | 72 | 19 | 44,6 | 61,9 | 1,1 | 16 | 80 | 350 | 0,36 | ▸ **6306-2Z/VA208** |
| | 72 | 19 | 44,6 | 61,9 | 1,1 | 16 | 170 | 350 | 0,36 | **6306-2Z/VA228** |
| **35** | 72 | 17 | 46,9 | 62,7 | 1,1 | 15,3 | 160 | 250 | 0,29 | ▸ **6207/VA201** |
| | 72 | 17 | 46,9 | 62,7 | 1,1 | 15,3 | 80 | 250 | 0,3 | **6207-2Z/VA201** |
| | 72 | 17 | 46,9 | 62,7 | 1,1 | 15,3 | 80 | 350 | 0,3 | ▸ **6207-2Z/VA208** |
| | 72 | 17 | 46,9 | 62,7 | 1,1 | 15,3 | 160 | 350 | 0,3 | ▸ **6207-2Z/VA228** |
| | 80 | 21 | 49,5 | 69,2 | 1,5 | 19 | 150 | 250 | 0,46 | **6307/VA201** |
| | 80 | 21 | 49,5 | 69,2 | 1,5 | 19 | 70 | 350 | 0,48 | ▸ **6307-2Z/VA208** |
| **40** | 68 | 15 | 49,2 | 61,1 | 1 | 11 | 80 | 350 | 0,2 | ▸ **6008-2Z/VA208** |
| | 80 | 18 | 52,6 | 69,8 | 1,1 | 19 | 150 | 250 | 0,37 | ▸ **6208/VA201** |
| | 80 | 18 | 52,6 | 69,8 | 1,1 | 19 | 70 | 250 | 0,38 | ▸ **6208-2Z/VA201** |
| | 80 | 18 | 52,6 | 69,8 | 1,1 | 19 | 70 | 350 | 0,38 | ▸ **6208-2Z/VA208** |
| | 80 | 18 | 52,6 | 69,8 | 1,1 | 19 | 150 | 350 | 0,38 | ▸ **6208-2Z/VA228** |
| | 90 | 23 | 56,1 | 77,7 | 1,5 | 24 | 130 | 250 | 0,63 | **6308/VA201** |
| | 90 | 23 | 56,1 | 77,7 | 1,5 | 24 | 60 | 250 | 0,65 | **6308-2Z/VA201** |
| | 90 | 23 | 56,1 | 77,7 | 1,5 | 24 | 60 | 350 | 0,65 | ▸ **6308-2Z/VA208** |
| | 90 | 23 | 56,1 | 77,7 | 1,5 | 24 | 130 | 350 | 0,65 | **6308-2Z/VA228** |
| **45** | 85 | 19 | 57,6 | 75,2 | 1,1 | 21,6 | 130 | 250 | 0,42 | ▸ **6209/VA201** |
| | 85 | 19 | 57,6 | 75,2 | 1,1 | 21,6 | 60 | 250 | 0,43 | **6209-2Z/VA201** |
| | 85 | 19 | 57,6 | 75,2 | 1,1 | 21,6 | 60 | 350 | 0,43 | ▸ **6209-2Z/VA208** |
| | 85 | 19 | 57,6 | 75,2 | 1,1 | 21,6 | 130 | 350 | 0,43 | **6209-2Z/VA228** |
| | 100 | 25 | 62,1 | 86,7 | 1,5 | 31,5 | 120 | 250 | 0,84 | **6309/VA201** |
| | 100 | 25 | 62,1 | 86,7 | 1,5 | 31,5 | 60 | 350 | 0,87 | **6309-2Z/VA208** |
| **50** | 80 | 16 | 59,7 | 72,8 | 1 | 15,6 | 60 | 350 | 0,27 | **6010-2Z/VA208** |
| | 90 | 20 | 62,5 | 81,7 | 1,1 | 23,2 | 120 | 250 | 0,45 | ▸ **6210/VA201** |
| | 90 | 20 | 62,5 | 81,7 | 1,1 | 23,2 | 60 | 250 | 0,47 | **6210-2Z/VA201** |
| | 90 | 20 | 62,5 | 81,7 | 1,1 | 23,2 | 60 | 350 | 0,47 | ▸ **6210-2Z/VA208** |
| | 90 | 20 | 62,5 | 81,7 | 1,1 | 23,2 | 120 | 350 | 0,47 | ▸ **6210-2Z/VA228** |
| | 110 | 27 | 68,7 | 95,2 | 2 | 38 | 110 | 250 | 1,1 | **6310/VA201** |
| | 110 | 27 | 68,7 | 95,2 | 2 | 38 | 50 | 250 | 1,1 | **6310-2Z/VA201** |
| | 110 | 27 | 68,7 | 95,2 | 2 | 38 | 50 | 350 | 1,1 | ▸ **6310-2Z/VA208** |
| | 110 | 27 | 68,7 | 95,2 | 2 | 38 | 110 | 350 | 1,1 | **6310-2Z/VA228** |
| **55** | 90 | 18 | 66,3 | 81,5 | 1,1 | 21,2 | 60 | 350 | 0,4 | **6011-2Z/VA208** |
| | 100 | 21 | 69 | 89,4 | 1,5 | 29 | 110 | 250 | 0,61 | ▸ **6211/VA201** |
| | 100 | 21 | 69 | 89,4 | 1,5 | 29 | 50 | 250 | 0,64 | **6211-2Z/VA201** |
| | 100 | 21 | 69 | 89,4 | 1,5 | 29 | 50 | 350 | 0,64 | ▸ **6211-2Z/VA208** |
| | 100 | 21 | 69 | 89,4 | 1,5 | 29 | 110 | 350 | 0,64 | **6211-2Z/VA228** |
| | 120 | 29 | 75,3 | 104 | 2 | 45 | 100 | 250 | 1,35 | **6311/VA201** |
| | 120 | 29 | 75,3 | 104 | 2 | 45 | 50 | 250 | 1,4 | **6311-2Z/VA201** |
| | 120 | 29 | 75,3 | 104 | 2 | 45 | 50 | 350 | 1,4 | **6311-2Z/VA208** |
| | 120 | 29 | 75,3 | 104 | 2 | 45 | 100 | 350 | 1,4 | **6311-2Z/VA228** |



▸ Popular item

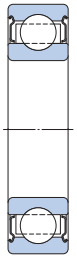
## 18.1 Single row deep groove ball bearings for high temperature applications

d **60 – 120** mm

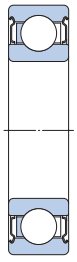



VA201

2Z/VA201



2Z/VA208



2Z/VA228

| Dimensions | | | | | | Basic static load rating | Limiting speed | Limiting temperature | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | $d_1$ ≈ | $D_2$ ≈ | $r_{1,2}$ min. | $C_0$ | | T max. | | |
| mm | | | | | | kN | r/min | °C | kg | – |
| **60** | 110 | 22 | 75,5 | 98 | 1,5 | 36 | 100 | 250 | 0,78 | ▸ **6212/VA201** |
| | 110 | 22 | 75,5 | 98 | 1,5 | 36 | 50 | 250 | 0,81 | **6212-2Z/VA201** |
| | 110 | 22 | 75,5 | 98 | 1,5 | 36 | 50 | 350 | 0,81 | ▸ **6212-2Z/VA208** |
| | 110 | 22 | 75,5 | 98 | 1,5 | 36 | 100 | 350 | 0,81 | **6212-2Z/VA228** |
| | 130 | 31 | 81,8 | 113 | 2,1 | 52 | 90 | 250 | 1,7 | **6312/VA201** |
| | 130 | 31 | 81,8 | 113 | 2,1 | 52 | 40 | 350 | 1,8 | **6312-2Z/VA208** |
| | 130 | 31 | 81,8 | 113 | 2,1 | 52 | 90 | 350 | 1,8 | **6312-2Z/VA228** |
| **65** | 120 | 23 | 83,3 | 106 | 1,5 | 40,5 | 90 | 250 | 1 | ▸ **6213/VA201** |
| | 120 | 23 | 83,3 | 106 | 1,5 | 40,5 | 40 | 250 | 1,05 | **6213-2Z/VA201** |
| | 120 | 23 | 83,3 | 106 | 1,5 | 40,5 | 40 | 350 | 1,05 | **6213-2Z/VA208** |
| | 120 | 23 | 83,3 | 106 | 1,5 | 40,5 | 90 | 350 | 1,05 | **6213-2Z/VA228** |
| | 140 | 33 | 88,3 | 122 | 2,1 | 60 | 80 | 250 | 2,1 | **6313/VA201** |
| | 140 | 33 | 88,3 | 122 | 2,1 | 60 | 40 | 250 | 2,2 | **6313-2Z/VA201** |
| | 140 | 33 | 88,3 | 122 | 2,1 | 60 | 40 | 350 | 2,2 | **6313-2Z/VA208** |
| | 140 | 33 | 88,3 | 122 | 2,1 | 60 | 80 | 350 | 2,2 | **6313-2Z/VA228** |
| **70** | 125 | 24 | 87 | 111 | 1,5 | 45 | 90 | 250 | 1,1 | **6214/VA201** |
| | 125 | 24 | 87 | 111 | 1,5 | 45 | 40 | 250 | 1,15 | **6214-2Z/VA201** |
| | 125 | 24 | 87 | 111 | 1,5 | 45 | 40 | 350 | 1,15 | ▸ **6214-2Z/VA208** |
| | 125 | 24 | 87 | 111 | 1,5 | 45 | 90 | 350 | 1,15 | **6214-2Z/VA228** |
| | 150 | 35 | 94,9 | 130 | 2,1 | 68 | 80 | 250 | 2,55 | **6314/VA201** |
| | 150 | 35 | 94,9 | 130 | 2,1 | 68 | 40 | 350 | 2,65 | **6314-2Z/VA208** |
| **75** | 130 | 25 | 92 | 117 | 1,5 | 49 | 80 | 250 | 1,2 | ▸ **6215/VA201** |
| | 130 | 25 | 92 | 117 | 1,5 | 49 | 40 | 250 | 1,25 | **6215-2Z/VA201** |
| | 130 | 25 | 92 | 117 | 1,5 | 49 | 40 | 350 | 1,25 | **6215-2Z/VA208** |
| | 130 | 25 | 92 | 117 | 1,5 | 49 | 80 | 350 | 1,25 | **6215-2Z/VA228** |
| | 160 | 37 | 101 | 139 | 2,1 | 76,5 | 70 | 250 | 3,05 | **6315/VA201** |
| | 160 | 37 | 101 | 139 | 2,1 | 76,5 | 30 | 350 | 3,15 | **6315-2Z/VA208** |
| **80** | 140 | 26 | 101 | 127 | 2 | 55 | 40 | 350 | 1,55 | **6216-2Z/VA208** |
| | 170 | 39 | 108 | 147 | 2,1 | 86,5 | 30 | 350 | 3,75 | **6316-2Z/VA208** |
| **85** | 150 | 28 | 106 | 135 | 2 | 64 | 70 | 250 | 1,8 | **6217/VA201** |
| | 150 | 28 | 106 | 135 | 2 | 64 | 30 | 350 | 1,9 | **6217-2Z/VA208** |
| **90** | 160 | 30 | 112 | 143 | 2 | 73,5 | 70 | 350 | 2,3 | **6218-2Z/VA228** |

▸ Popular item

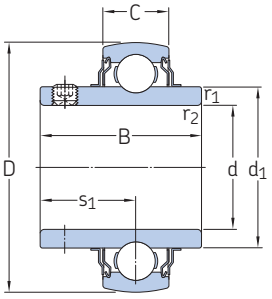
| Dimensions | | | | | | Basic static load rating | Limiting speed | Limiting temperature | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | $d_1$ ≈ | $D_2$ ≈ | $r_{1,2}$ min. | $C_0$ | | T max. | | |
| mm | | | | | | kN | r/min | °C | kg | – |
| **95** | 170 | 32 | 118 | 152 | 2,1 | 81,5 | 60 | 250 | 2,6 | ▸ **6219/VA201** |
| | 170 | 32 | 118 | 152 | 2,1 | 81,5 | 30 | 250 | 2,7 | ▸ **6219-2Z/VA201** |
| | 170 | 32 | 118 | 152 | 2,1 | 81,5 | 60 | 350 | 2,7 | ▸ **6219-2Z/VA228** |
| **100** | 150 | 24 | 115 | 139 | 1,5 | 54 | 30 | 350 | 1,35 | **6020-2Z/VA208** |
| | 180 | 34 | 124 | 160 | 2,1 | 93 | 60 | 250 | 3,15 | **6220/VA201** |
| | 180 | 34 | 124 | 160 | 2,1 | 93 | 30 | 350 | 3,25 | **6220-2Z/VA208** |
| | 180 | 34 | 124 | 160 | 2,1 | 93 | 60 | 350 | 3,25 | **6220-2Z/VA228** |
| **110** | 170 | 28 | 129 | 156 | 2 | 73,5 | 30 | 350 | 2,05 | **6022-2Z/VA208** |
| **120** | 180 | 28 | 139 | 166 | 2 | 80 | 30 | 350 | 2,2 | **6024-2Z/VA208** |



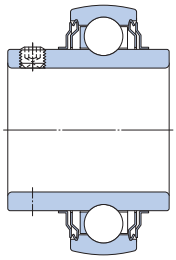
▸ Popular item

## 18.2 Insert bearings for high temperature applications, metric shafts

d **20 – 60** mm




VA201



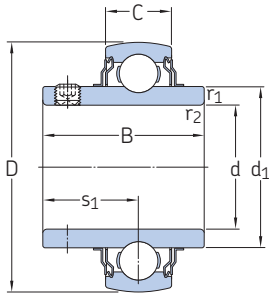
VA228

| Dimensions | | | | | | | Basic load ratings dynamic | static | Limiting speed | Limiting temperature | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $d_1$ ≈ | $s_1$ | $r_{1,2}$ min. | C | $C_0$ | | T max. | | |
| mm | | | | | | | kN | | r/min | °C | kg | – |
| **20** | 47 | 31 | 14 | 28,2 | 18,3 | 0,6 | 12,7 | 6,55 | 130 | 250 | 0,14 | **YAR 204-2FW/VA201** |
| | 47 | 31 | 14 | 28,2 | 18,3 | 0,6 | 12,7 | 6,55 | 260 | 350 | 0,14 | ▸ **YAR 204-2FW/VA228** |
| **25** | 52 | 34,1 | 15 | 33,7 | 19,8 | 0,6 | 14 | 7,8 | 110 | 250 | 0,17 | **YAR 205-2FW/VA201** |
| | 52 | 34,1 | 15 | 33,7 | 19,8 | 0,6 | 14 | 7,8 | 230 | 350 | 0,17 | **YAR 205-2FW/VA228** |
| **30** | 62 | 38,1 | 18 | 39,7 | 22,2 | 0,6 | 19,5 | 11,2 | 90 | 250 | 0,28 | **YAR 206-2FW/VA201** |
| | 62 | 38,1 | 18 | 39,7 | 22,2 | 0,6 | 19,5 | 11,2 | 190 | 350 | 0,28 | ▸ **YAR 206-2FW/VA228** |
| **35** | 72 | 42,9 | 19 | 46,1 | 25,4 | 1 | 25,5 | 15,3 | 80 | 250 | 0,41 | **YAR 207-2FW/VA201** |
| | 72 | 42,9 | 19 | 46,1 | 25,4 | 1 | 25,5 | 15,3 | 160 | 350 | 0,41 | **YAR 207-2FW/VA228** |
| **40** | 80 | 49,2 | 21 | 51,8 | 30,2 | 1 | 30,7 | 19 | 70 | 250 | 0,55 | **YAR 208-2FW/VA201** |
| | 80 | 49,2 | 21 | 51,8 | 30,2 | 1 | 30,7 | 19 | 150 | 350 | 0,55 | **YAR 208-2FW/VA228** |
| **45** | 85 | 49,2 | 22 | 56,8 | 30,2 | 1 | 33,2 | 21,6 | 60 | 250 | 0,6 | **YAR 209-2FW/VA201** |
| | 85 | 49,2 | 22 | 56,8 | 30,2 | 1 | 33,2 | 21,6 | 130 | 350 | 0,6 | **YAR 209-2FW/VA228** |
| **50** | 90 | 51,6 | 22 | 62,5 | 32,6 | 1 | 35,1 | 23,2 | 60 | 250 | 0,69 | **YAR 210-2FW/VA201** |
| | 90 | 51,6 | 22 | 62,5 | 32,6 | 1 | 35,1 | 23,2 | 120 | 350 | 0,69 | **YAR 210-2FW/VA228** |
| **55** | 100 | 55,6 | 25 | 69 | 33,4 | 1 | 43,6 | 29 | 50 | 250 | 0,94 | **YAR 211-2FW/VA201** |
| | 100 | 55,6 | 25 | 69 | 33,4 | 1 | 43,6 | 29 | 110 | 350 | 0,94 | **YAR 211-2FW/VA228** |
| **60** | 110 | 65,1 | 26 | 75,6 | 39,7 | 1,5 | 52,7 | 36 | 50 | 250 | 1,35 | **YAR 212-2FW/VA201** |
| | 110 | 65,1 | 26 | 75,6 | 39,7 | 1,5 | 52,7 | 36 | 100 | 350 | 1,35 | **YAR 212-2FW/VA228** |

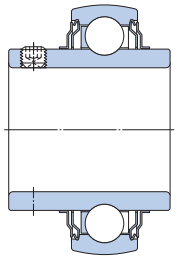
▸ Popular item

## 18.3 Insert bearings for high temperature applications, inch shafts

d **3/4 – 2 15/16** in.
*19,05 – 74,613 mm*




VA201

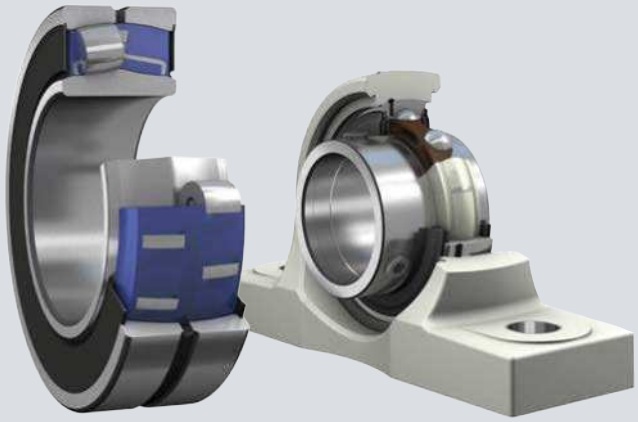


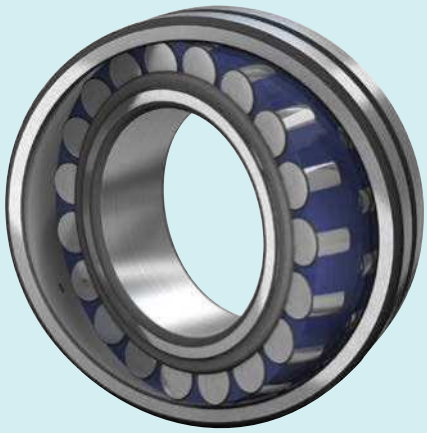
VA228

| Dimensions | | | | | | | Basic load ratings dynamic | static | Limiting speed | Limiting temperature | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $d_1$ ≈ | $s_1$ | $r_{1,2}$ min. | C | $C_0$ | | T max. | | |
| in./*mm* | mm | | | | | | kN | | r/min | °C | kg | – |
| **3/4** | 47 | 31 | 14 | 28,2 | 18,3 | 0,6 | 12,7 | 6,55 | 130 | 250 | 0,17 | **YAR 204-012-2FW/VA201** |
| *19,05* | 47 | 31 | 14 | 28,2 | 18,3 | 0,6 | 12,7 | 6,55 | 270 | 350 | 0,17 | ▸ **YAR 204-012-2FW/VA228** |
| **1** | 52 | 34,1 | 15 | 33,7 | 19,8 | 0,6 | 14 | 7,8 | 110 | 250 | 0,19 | **YAR 205-100-2FW/VA201** |
| *25,4* | 52 | 34,1 | 15 | 33,7 | 19,8 | 0,6 | 14 | 7,8 | 230 | 350 | 0,19 | ▸ **YAR 205-100-2FW/VA228** |
| **1 3/16** | 62 | 38,1 | 18 | 39,7 | 22,2 | 0,6 | 19,5 | 11,2 | 90 | 250 | 0,31 | **YAR 206-103-2FW/VA201** |
| *30,163* | 62 | 38,1 | 18 | 39,7 | 22,2 | 0,6 | 19,5 | 11,2 | 190 | 350 | 0,31 | ▸ **YAR 206-103-2FW/VA228** |
| **1 1/4** | 72 | 42,9 | 19 | 46,1 | 25,4 | 1 | 25,5 | 15,3 | 80 | 250 | 0,52 | **YAR 207-104-2FW/VA201** |
| *31,75* | 72 | 42,9 | 19 | 46,1 | 25,4 | 1 | 25,5 | 15,3 | 170 | 350 | 0,52 | **YAR 207-104-2FW/VA228** |
| **1 3/8** | 72 | 42,9 | 19 | 46,1 | 25,4 | 1 | 25,5 | 15,3 | 80 | 250 | 0,46 | **YAR 207-106-2FW/VA201** |
| *34,925* | 72 | 42,9 | 19 | 46,1 | 25,4 | 1 | 25,5 | 15,3 | 160 | 350 | 0,46 | **YAR 207-106-2FW/VA228** |
| **1 7/16** | 72 | 42,9 | 19 | 46,1 | 25,4 | 1 | 25,5 | 15,3 | 80 | 250 | 0,42 | **YAR 207-107-2FW/VA201** |
| *36,513* | 72 | 42,9 | 19 | 46,1 | 25,4 | 1 | 25,5 | 15,3 | 160 | 350 | 0,42 | ▸ **YAR 207-107-2FW/VA228** |
| **1 1/2** | 80 | 49,2 | 21 | 51,8 | 30,2 | 1 | 30,7 | 19 | 70 | 250 | 0,59 | **YAR 208-108-2FW/VA201** |
| *38,1* | 80 | 49,2 | 21 | 51,8 | 30,2 | 1 | 30,7 | 19 | 150 | 350 | 0,59 | ▸ **YAR 208-108-2FW/VA228** |
| **1 11/16** | 85 | 49,2 | 22 | 56,8 | 30,2 | 1 | 33,2 | 21,6 | 70 | 250 | 0,75 | **YAR 209-111-2FW/VA201** |
| *42,863* | 85 | 49,2 | 22 | 56,8 | 30,2 | 1 | 33,2 | 21,6 | 140 | 350 | 0,75 | **YAR 209-111-2FW/VA228** |
| **1 3/4** | 85 | 49,2 | 22 | 56,8 | 30,2 | 1 | 33,2 | 21,6 | 60 | 250 | 0,62 | **YAR 209-112-2FW/VA201** |
| *44,45* | 85 | 49,2 | 22 | 56,8 | 30,2 | 1 | 33,2 | 21,6 | 130 | 350 | 0,62 | ▸ **YAR 209-112-2FW/VA228** |
| **1 15/16** | 90 | 51,6 | 22 | 62,5 | 32,6 | 1 | 35,1 | 23,2 | 60 | 250 | 0,78 | **YAR 210-115-2FW/VA201** |
| *49,213* | 90 | 51,6 | 22 | 62,5 | 32,6 | 1 | 35,1 | 23,2 | 120 | 350 | 0,78 | **YAR 210-115-2FW/VA228** |
| **2** | 100 | 55,6 | 25 | 69 | 33,4 | 1 | 43,6 | 29 | 50 | 250 | 1,1 | **YAR 211-200-2FW/VA201** |
| *50,8* | 100 | 55,6 | 25 | 69 | 33,4 | 1 | 43,6 | 29 | 110 | 350 | 1,1 | **YAR 211-200-2FW/VA228** |
| **2 3/16** | 100 | 55,6 | 25 | 69 | 33,4 | 1 | 25 | 29 | 50 | 250 | 1,05 | **YAR 211-203-2FW/VA201** |
| *55,563* | 100 | 55,6 | 25 | 69 | 33,4 | 1 | 25 | 29 | 110 | 350 | 1,05 | **YAR 211-203-2FW/VA228** |
| **2 7/16** | 110 | 65,1 | 26 | 75,6 | 39,7 | 1,5 | 52,7 | 36 | 50 | 250 | 1,35 | **YAR 212-207-2FW/VA201** |
| *61,913* | 110 | 65,1 | 26 | 75,6 | 39,7 | 1,5 | 52,7 | 36 | 100 | 350 | 1,35 | **YAR 212-207-2FW/VA228** |
| **2 15/16** | 130 | 73,3 | 29 | 92 | 46,3 | 1,5 | 66,3 | 49 | 40 | 250 | 2,2 | **YAR 215-215-2FW/VA201** |
| *74,613* | 130 | 73,3 | 29 | 92 | 46,3 | 1,5 | 66,3 | 49 | 80 | 350 | 2,2 | **YAR 215-215-2FW/VA228** |



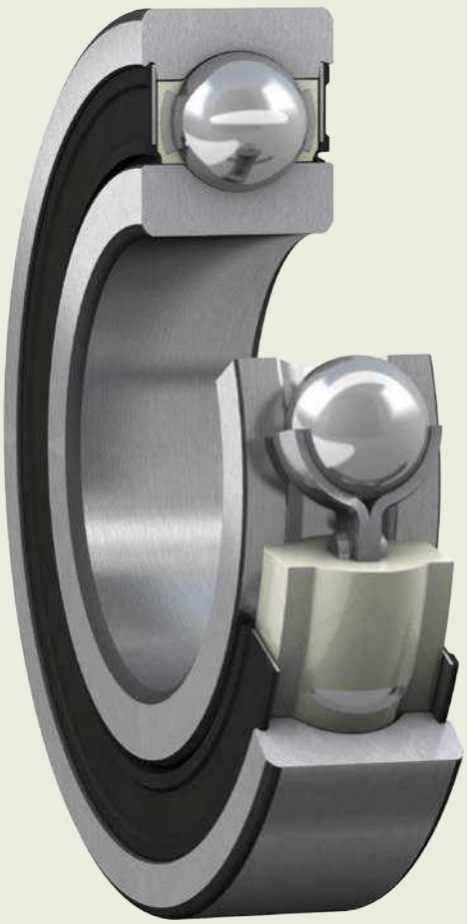
▸ Popular item





19

# Solid Oil bearings



# 19 Bearings with Solid Oil


**Designs and variants** . . . . . **1025**
Solid Oil variants . . . . . 1025
Sealed bearings . . . . . 1025

**Bearing data** . . . . . **1025**

**Loads** . . . . . **1026**
Load carrying capacity . . . . . 1026

**Temperature limits** . . . . . **1026**

**Speed limits** . . . . . **1026**

**Friction characteristics** . . . . . **1027**

**Mounting** . . . . . **1027**

**Designation system** . . . . . **1027**

# 19 Bearings with Solid Oil

## More information


**General bearing knowledge** . . . . **17**

**Bearing selection process** . . . . . **59**
Bearing interfaces. . . . . 139
Seat tolerances for standard conditions . . . . . 148
Selecting internal clearance or preload . . . . . 182
Sealing, mounting and dismounting . . . . . 193


**Mounting instructions for individual bearings** → skf.com/mount

SKF bearings with Solid Oil are designed for use in applications where high levels of moisture and incidental contact with water and other contaminants are real issues. Bearings with Solid Oil are lubricated for the life of the bearing and cannot be relubricated.

Solid Oil:

- is an oil saturated, polymer material
  - moulded into the bearing, forming very narrow gaps between the rolling elements, raceways and cage(s), enabling the bearing to rotate freely
  - having a porous structure, with millions of micro-pores that retain the lubricating oil by surface tension
- virtually fills all of the free space in the bearing
- releases oil into the narrow gaps, during operation, providing effective minimum quantity lubrication

## Bearing features

- **Long service life**
  - An increase in operating temperature pushes the oil toward the surface of the polymer material, supporting consistent lubricant supply. During shutdown, any excess oil is re-absorbed back into the polymer material.

- **Extended lubricant life**
  - With Solid Oil bearings, a large amount of oil is available (two to four times more compared to conventional grease fill).
  - The Solid Oil polymer structure eliminates lubricant churning.
  - Solid Oil is a high-quality synthetic oil that resists oxidation.

- **Resists washout**
  - Solid Oil cannot be washed out and virtually fills all free space, limiting the amount of wet contamination that can enter the bearing.
  - Water cannot mix with the oil or Solid Oil polymer.

- **Virtually eliminates lubricant leakage**
  - Solid Oil retains oil in the bearing.
  - Integral bearing seals further increase the oil retention.

- **Protects against the ingress of contaminants**
  - Close osculation between Solid Oil and the rolling elements and raceways significantly reduces the ingress of contaminants.
  - Solid Oil provides additional support for integral bearing seals.

# Designs and variants

The SKF standard assortment of bearings and bearing units with Solid Oil (fig. 1) includes:

- Deep groove ball bearings
- Spherical roller bearings
- Insert bearings and ball bearing units
- Tapered roller bearings
- Cylindrical roller bearings
- Self-aligning ball bearings

On request, SKF can supply other bearing types with Solid Oil to meet the needs of a particular application, except for CARB toroidal roller bearings which are unsuitable for use with Solid Oil. Bearings fitted with a large-volume c age are not suitable for Solid Oil because there is too little free space inside the bearing.

# Solid Oil variants

- Standard variant (designation suffix W64, table 1):
  - contains a high-quality synthetic oil
  - meets the needs of most applications
- Food-grade variant (designation suffix W64F, table 1):
  - contains an oil registered by NSF as category H1
  - meets the needs of food applications

# Sealed bearings

- with integral contact seals are strongly recommended in wet environments
- with Solid Oil increase the sealing effectiveness, as the Solid Oil supports the seals axially, preventing them from deflecting and opening under pressure

For information about sealing options, contact the SKF application engineering service.

Where carbon steel bearings are exposed to wet environments, additional external seals are recommended to protect the bearing's external surfaces from corrosion.

# Bearing data

## Dimension standards, tolerances, internal clearance

Refer to *Bearing data* in the relevant product section of the standard bearing.

**Fig. 1**

**Bearings and bearing units with Solid Oil**

**Table 1**

**Technical specifications for bearings and bearing units with Solid Oil**

| Characteristic | Standard variant | Food-grade variant |
|---|---|---|
| **Designation suffix** | W64 | W64F |
| **Base oil viscosity** | | |
| at 40 °C *(105 °F)* | 150 mm²/s | 220 mm²/s |
| at 100 °C *(210 °F)* | 20 mm²/s | 25 mm²/s |
| **NSF H1 food grade** | no | yes |
| **Operating temperature** | | |
| Minimum start-up temperature | –50 °C *(–60 °F)* | –25 °C *(–15 °F)* |
| Maximum continuous | 85 °C *(185 °F)* | 85 °C *(185 °F)* |
| Maximum intermittent | 95 °C *(205 °F)* | 95 °C *(205 °F)* |
| **Relubrication-free** | yes | yes |
| **Polymer colour** | blue | white |

# Loads

## Load carrying capacity

The basic dynamic and static load ratings for bearings with Solid Oil are the same as for corresponding SKF standard bearings.

# Temperature limits

The permissible operating temperature for bearings with Solid Oil can be limited by:

- the dimensional stability of the bearing rings and rolling elements
- the cage(s)
- the seals
- the Solid Oil

For limits of bearing rings, rolling elements, cage(s) and seals, refer to *Temperature limits* of the relevant product section of the standard bearing.

The relevant limits for Solid Oil are listed in table 1, page 1025.

Where temperatures outside the permissible range are expected, contact SKF.

# Speed limits

The recommended speed values for bearings and bearing units with Solid Oil (table 2), operating in an ambient temperature of 20 °C *(70 °F)*, are limited by the maximum continuous operating temperature of 85 °C *(185 °F)*. Ambient temperature is the temperature closest to the bearing position, not necessarily room temperature.

For bearing types or variants not listed in table 2, contact the SKF application engineering service.

For ambient temperatures above 20 °C *(70 °F)*, the speed limit should be reduced using the reduction factor $f_T$ (diagram 1).

## Calculation example

A deep groove ball bearing 6208/W64 is to operate at an ambient temperature of 50 °C *(120 °F)*. What is the reduced speed limit?

**1 Recommended speed limit for 20 °C *(70 °F)* ambient temperature**

– From table 2: speed value $nd_m$ = 300 000 mm/min (single row deep groove ball bearing with a stamped metal cage)

– Dimensions: d = 40 mm, D = 80 mm

$n = 300\,000 / d_m$

$= 300\,000 / (0{,}5\,(40 + 80))$

= 5 000 r/min

**2 Reduction for 50 °C *(120 °F)* ambient temperature**

– From diagram 1: speed reduction factor $f_T \approx 0{,}53$

$n_{reduced} = 5\,000\ f_T$

$= 5\,000 \times 0{,}53$

= 2 650 r/min

**Table 2**

**Recommended limits for the speed value of bearings and bearing units with Solid Oil**

| Bearing type | Speed value $nd_m$ |
|---|---|
| – | mm/min |
| **Deep groove ball bearings** | |
| – single row with a stamped metal cage | 300 000 |
| – single row with a polymer cage | 40 000 |
| – double row | 40 000 |
| **Angular contact ball bearings** | |
| – with a stamped metal cage | 150 000 |
| – with a polymer cage | 40 000 |
| **Self-aligning ball bearings** | |
| – with a stamped metal cage | 150 000 |
| – with a polymer cage | 40 000 |
| **Cylindrical roller bearings** | |
| – with a stamped metal cage | 150 000 |
| – with a polymer cage | 40 000 |
| **Tapered roller bearings** | 45 000 |
| **Spherical roller bearings** | |
| – E design | 42 500 |
| – CC design | 85 000 |
| **Insert bearings, ball bearing units** | 40 000 |

n = rotational speed [r/min]
$d_m$ = bearing mean diameter [mm]
= 0,5 (d + D)

For bearings with integral seals, use 80% of the quoted speed limits.

# Friction characteristics

The friction characteristics of a bearing with Solid Oil correspond to the relevant SKF standard bearing except that the Solid Oil polymer filling adds a fixed friction.

# Mounting

If a bearing with Solid Oil is to be hot mounted, it should be heated to a maximum of 120 °C *(250 °F)* by using an induction heater.

Heating plates or heated oil baths should not be used.

# Designation system

Refer to *Designation system* in the relevant product section of the standard bearing.

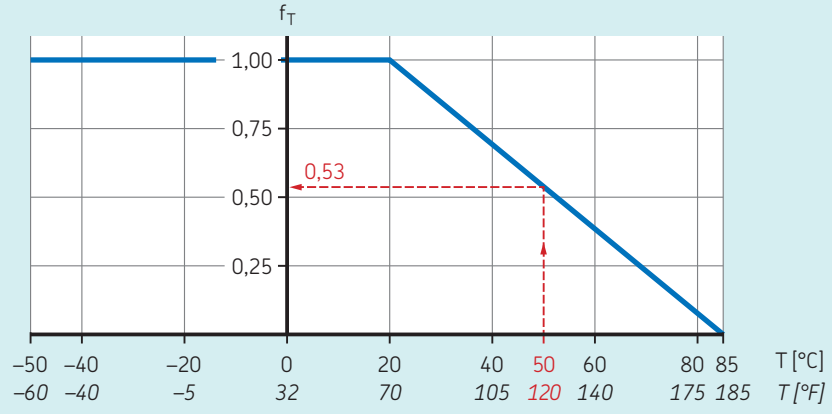
The designation suffixes used to identify bearings with Solid Oil are:

**W64** Synthetic base oil type, standard variant

**W64F** Synthetic base oil type, NSF H1 approved for food applications

**Diagram 1**

**Speed reduction factor as a function of ambient temperature**



# 20 INSOCOAT bearings

# 20 INSOCOAT bearings


**Designs and variants** . . . . . **1031**
INSOCOAT bearings with a coated outer ring . . . . . 1031
INSOCOAT bearings with a coated inner ring. . . . . 1032
Capped bearings . . . . . 1032
Cages. . . . . 1032

**Bearing data** . . . . . **1033**
(Dimension standards, tolerances, internal clearance, permissible misalignment, permissible axial displacement, electrical properties)

**Loads** . . . . . **1034**

**Temperature limits** . . . . . **1034**

**Permissible speed** . . . . . **1034**

**Design considerations** . . . . . **1035**
Abutment dimensions . . . . . 1035

**Mounting** . . . . . **1035**

**Designation system** . . . . . **1035**

**Product tables**
**20.1** INSOCOAT deep groove ball bearings . . . . . 1036
**20.2** INSOCOAT cylindrical roller bearings . . . . . 1038

# 20 INSOCOAT bearings

## More information


**General bearing knowledge** . . . . **17**

**Bearing selection process** . . . . . **59**
Lubrication . . . . . 109
Bearing interfaces. . . . . 139
Seat tolerances for standard conditions . . . . . 148
Selecting internal clearance or preload . . . . . 182
Sealing, mounting and dismounting . . . . . 193


**Mounting instructions for individual bearings** → skf.com/mount

Electric motors, generators and associated equipment are at risk when an electric current passes through their bearings. This can damage the contact surfaces of rolling elements and raceways in the bearings (electrical erosion) and rapidly degrade the grease. An additional risk in electric motors and generators comes from high frequency currents caused by the inherent stray capacitance. The risk of damage increases where the application uses a frequency converter.

INSOCOAT bearings:

- are designed to prevent electric current from passing through the bearing
- have the external surfaces of either their inner or outer ring coated with an insulating aluminium oxide layer, by applying a sophisticated plasma-spray process for an outstanding quality finish
- are a very cost-effective solution compared with other insulation methods

## Bearing features

- **Protection against electrical erosion**
  With insulating properties integrated into the bearing, INSOCOAT bearings can improve reliability and increase machine uptime by virtually eliminating the problem of electrical erosion.
- **High electrical resistance**
  The aluminium oxide coating provides a minimum electrical resistance of 200 MΩ and can withstand voltages up to 3 000 V DC.
- **Consistent electrical performance**
  Plasma-spray coatings are normally hygroscopic and, therefore, vulnerable to penetration caused by condensation. To protect against this effect, INSOCOAT bearings are treated with a unique sealant.

**Fig. 1**

**INSOCOAT bearings, outer ring coated**

Single row deep groove ball bearing

Single row cylindrical roller bearing

## Assortment

The standard assortment of INSOCOAT bearings (**fig. 1** and **fig. 2**) listed here constitutes the most commonly used sizes and variants of:

- single row deep groove ball bearings
- single row cylindrical roller bearings
- four-point contact ball bearings
- flanged tapered roller bearings
- tapered roller bearing units (TBU)
- traction motor bearing units

For bearing types and sizes not listed in the product tables, contact SKF.

For applications where smaller bearings than those listed are needed, SKF recommends using SKF Hybrid bearings (*Hybrid bearings*, **page 1043**).

In addition to the standard assortment, SKF can supply special INSOCOAT bearings and bearing units with complex ring geometries (**fig. 3**), such as:

For availability and detailed information, contact SKF.

# Designs and variants

## INSOCOAT bearings with a coated outer ring

INSOCOAT bearings typically have the external surfaces of the outer ring coated with aluminium oxide (**fig. 1**). These bearings are identified by the following designation suffixes:

- VL0241 – standard layer
- VL0246 – advanced layer for higher electrical resistance

For availability, contact SKF.

**Fig. 2**

**INSOCOAT bearings, inner ring coated**

Single row deep groove ball bearing

Single row cylindrical roller bearing

**Fig. 3**

**Special INSOCOAT bearings and bearng units**

Four-point contact ball bearing

Flanged tapered roller bearing

Tapered roller bearing unit

Traction motor bearing unit

# INSOCOAT bearings with a coated inner ring

INSOCOAT bearings that have the external surfaces of the inner ring coated with aluminium oxide (**fig. 2**, **page 1031**) provide enhanced protection against high frequency electric currents.These bearings are identified by the following designation suffixes:

- VL2071 – standard layer
- VL2076 – advanced layer for higher electrical resistance

For availability, contact SKF.

# Capped bearings

Some INSOCOAT deep groove ball bearings can be supplied capped (*Capped bearings*, **page 242**). For availability, contact SKF.

# Cages

SKF INSOCOAT deep groove ball bearings are fitted with one of the following cages:

- a stamped steel cage, riveted, ball centred (no designation suffix)
- a machined brass cage, riveted, ball centred (designation suffix M)

For additional information, refer to *Cages*, **page 249**.

SKF INSOCOAT cylindrical roller bearings are fitted with one of the following cages:

- a glass fibre reinforced PA66 cage, window-type, roller centred (designation suffix P)
- a machined brass cage, riveted, roller centred (designation suffix M)
- a machined brass cage, window-type, inner or outer ring centred (depending on bearing design) (designation suffix ML)

For additional information, refer to *Cages*, **page 502**.

When used at high temperatures, some lubricants can have a detrimental effect on polyamide cages. For additional information about the suitability of cages, refer to *Cages*, **page 187**.

**Table 1**

**Electrical properties**

| **Coating**<br>Designation suffix | **Breakdown voltage (DC)** | **Minimum electrical resistance** |
|---|---|---|
| – | V | MΩ |
| **Standard layer**<br>VL0241, VL2071 | 3 000 | 200 |
| **Advanced layer**<br>VL0246, VL2076 | 3 000 | 400 |

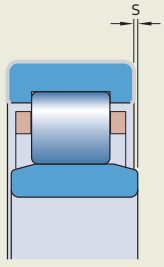
Valid if:
- Temperature T ≤ 40 °C *(105 °F)*
- Relative humidity rH ≤ 60%

# Bearing data

| | Deep groove ball bearings | Cylindrical roller bearings |
|---|---|---|
| **Dimension standards** | Boundary dimensions: ISO 15 | |
| **Tolerances**<br><br>For additional information<br>→ page 35 | Normal<br>Tighter tolerances (up to P5) for some bearings on request<br><br>Values: ISO 492 (table 2, page 38, to table 4, page 40)<br>The aluminium oxide layer on the external surfaces of either the inner or the outer ring does not affect accuracy. | Normal |
| **Internal clearance**<br><br>For additional information<br>→ page 26 | C3<br><br>Values: ISO 5753-1 (table 6, page 252)<br><br>Values are valid for unmounted bearings under zero measuring load. | C3<br>Check availability of other clearance classes<br><br>Values: ISO 5753-1 (table 3, page 506) |
| **Permissible misalignment** | Identical to standard bearings<br>→ page 250 | → page 504 |
| **Permissible axial displacement** | – | $s_{max}$ → product tables, page 1036<br>NU design INSOCOAT bearings can accommodate axial displacement (fig. 4). Displacement of the shaft relative to the housing occurs within these bearings. As a result, there is virtually no increase in friction. |
| **Electrical properties** | table 1 | |

**Fig. 4**

**Axial displacement**



# Loads

For recommendations about minimum load, axial load carrying capacity and equivalent bearing loads, refer to *Loads* of the relevant standard bearing:

- deep groove ball bearings, **page 254**
- cylindrical roller bearings, **page 509**

The required INSOCOAT bearing specific values and factors are listed in the relevant product tables:

- *INSOCOAT deep groove ball bearings*, **page 1036**
  - basic static load rating $C_0$
  - calculation factors $f_0$ and $k_r$
- *INSOCOAT cylindrical roller bearings*, **page 1038**
  - calculation factor $k_r$
  - reference speed

# Temperature limits

The permissible operating temperature for INSOCOAT bearings can be limited by:

- the dimensional stability of the bearing rings and rolling elements
- the cage
- the lubricant

Where temperatures outside the permissible range are expected, contact SKF.

## Bearing rings and rolling elements

SKF INSOCOAT bearings are heat stabilized up to at least 150 °C *(300 °F)*.

## Cages

Steel or brass cages can be used at the same operating temperatures as the bearing rings and rolling elements. For temperature limits of PA66 cages, refer to *Polymer cages*, **page 188**.

## Lubricants

For temperature limits of SKF greases, refer to *Selecting a suitable SKF grease*, **page 116**.

When using lubricants not supplied by SKF, temperature limits should be evaluated according to the SKF traffic light concept (**page 117**).

# Permissible speed

The speed ratings in the product tables (*INSOCOAT deep groove ball bearings*, **page 1036**, and *INSOCOAT cylindrical roller bearings*, **page 1038**) indicate:

- the **reference speed**, which enables a quick assessment of the speed capabilities from a thermal frame of reference
- the **limiting speed**, which is a mechanical limit that should not be exceeded unless the bearing design and the application are adapted for higher speeds

For additional information, refer to *Operating temperature and speed*, **page 129**.

SKF recommends oil lubrication for bearings with a ring centred cage (designation suffix ML). When these bearings are grease lubricated, the $nd_m$ value is limited to ≤ 250 000 mm/min.

where
$d_m$ = bearing mean diameter [mm]
= 0,5 (d + D)
n = rotational speed [r/min]

# Design considerations

## Abutment dimensions

To maximize the effectiveness of the insulation, SKF recommends the following guidelines for dimensioning the shaft and housing shoulders (fig. 5):

- Bearings with a coated outer ring (designation suffix VL0241 or VL0246): housing abutment diameter ≥ $D_{a\ min}$
- Bearings with a coated inner ring (designation suffix VL2071 or VL2076): shaft abutment diameter ≤ $d_{a\ max}$

The values for $D_{a\ min}$ and $d_{a\ max}$ can be obtained from the product tables:

- *INSOCOAT deep groove ball bearings*, page 1036
- *INSOCOAT cylindrical roller bearings*, page 1038

# Mounting

During mounting, INSOCOAT bearings should be handled in the same way as standard bearings.

When using an induction heater for bearings with a coated inner ring (designation suffix VL2071 or VL2076), use a protective sleeve or an additional plastic support block.

In cases where springs are used to apply preload to deep groove ball bearings or lock nuts are used for axial clamping, SKF recommends inserting a steel spacer ring between the bearing and the preload or locking device (fig. 6).

The values for $d_{a\ min}$ and $d_{a\ max}$ can be obtained from the product tables:

- *INSOCOAT deep groove ball bearings*, page 1036
- *INSOCOAT cylindrical roller bearings*, page 1038

# Designation system

Refer to *Designation system* of the relevant standard bearing:

- deep groove ball bearings, page 258
- cylindrical roller bearings, page 514

The designation suffixes used to identify INSOCOAT bearings are explained in the following.

**VL0241** External surfaces of the outer ring are coated – standard layer.
**VL0246** External surfaces of the outer ring are coated – advanced layer.
**VL2071** External surfaces of the inner ring are coated – standard layer.
**VL2076** External surfaces of the inner ring are coated – advanced layer.

20

**Fig. 5**

**Abutment dimensions**

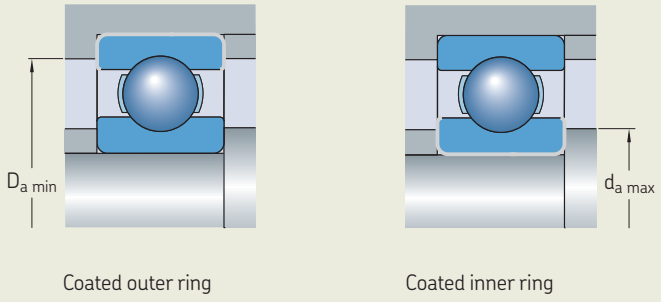
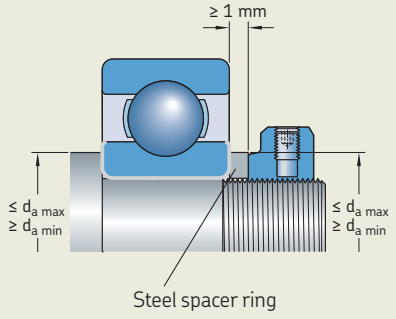


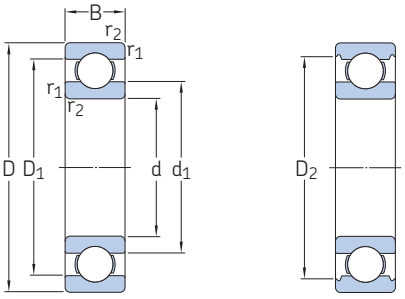

**Fig. 6**

**Bearing axially clamped by a lock nut**



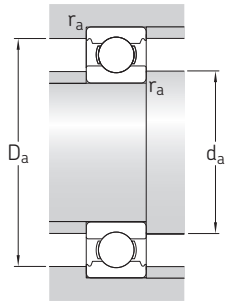
## 20.1 INSOCOAT deep groove ball bearings

d **70 – 150** mm

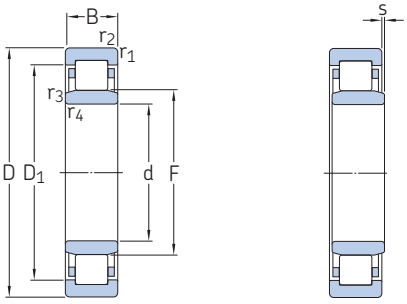



| Principal dimensions | | | Basic load ratings | | Fatique load limit | Speed ratings | | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| | | | dynamic | static | | Reference speed | Limiting speed | | |
| d | D | B | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | kg | – |
| **70** | 150 | 35 | 104 | 68 | 2,75 | 9 500 | 6 300 | 2,5 | ▸ **6314/C3VL0241** |
| **75** | 130 | 25 | 68,9 | 49 | 2,04 | 10 000 | 6 700 | 1,2 | ▸ **6215/C3VL0241** |
| | 160 | 37 | 114 | 76,5 | 3 | 9 000 | 5 600 | 3,05 | ▸ **6315/C3VL0241** |
| **80** | 140 | 26 | 72,8 | 55 | 2,2 | 9 500 | 6 000 | 1,4 | ▸ **6216/C3VL0241** |
| | 170 | 39 | 124 | 86,5 | 3,25 | 8 500 | 5 300 | 3,55 | ▸ **6316/C3VL0241** |
| **85** | 150 | 28 | 87,1 | 64 | 2,5 | 9 000 | 5 600 | 1,75 | ▸ **6217/C3VL0241** |
| | 180 | 41 | 133 | 96,5 | 3,55 | 8 000 | 5 000 | 4,1 | ▸ **6317/C3VL0241** |
| **90** | 160 | 30 | 101 | 73,5 | 2,8 | 8 500 | 5 300 | 2,4 | ▸ **6218/C3VL0241** |
| | 190 | 43 | 143 | 108 | 3,8 | 7 500 | 4 800 | 4,9 | ▸ **6318/C3VL0241** |
| **95** | 170 | 32 | 114 | 81,5 | 3 | 8 000 | 5 000 | 2,5 | ▸ **6219/C3VL0241** |
| | 200 | 45 | 153 | 118 | 4,15 | 7 000 | 4 500 | 5,65 | ▸ **6319/C3VL0241** |
| **100** | 180 | 34 | 127 | 93 | 3,35 | 7 500 | 4 800 | 3,15 | ▸ **6220/C3VL0241** |
| | 215 | 47 | 174 | 140 | 4,75 | 6 700 | 4 300 | 7 | ▸ **6320/C3VL0241** |
| **110** | 200 | 38 | 151 | 118 | 4 | 6 700 | 4 300 | 4,4 | ▸ **6222/C3VL0241** |
| | 240 | 50 | 203 | 180 | 5,7 | 6 000 | 3 800 | 9,65 | ▸ **6322/C3VL0241** |
| **120** | 215 | 40 | 146 | 118 | 3,9 | 6 300 | 4 000 | 5,2 | ▸ **6224/C3VL0241** |
| | 260 | 55 | 208 | 186 | 5,7 | 5 600 | 3 400 | 12,5 | ▸ **6324/C3VL2071** |
| **130** | 230 | 40 | 156 | 132 | 4,15 | 5 600 | 3 600 | 5,75 | **6226/C3VL2071** |
| | 280 | 58 | 229 | 216 | 6,3 | 5 000 | 3 200 | 15 | ▸ **6326/C3VL2071** |
| **140** | 300 | 62 | 251 | 245 | 7,1 | 4 800 | 3 000 | 18,5 | ▸ **6328/C3VL2071** |
| **150** | 270 | 45 | 174 | 166 | 4,9 | 5 000 | 3 200 | 9,8 | ▸ **6230/C3VL2071** |
| | 320 | 65 | 276 | 285 | 7,8 | 4 300 | 2 800 | 23 | ▸ **6330/C3VL2071** |

▸ Popular item

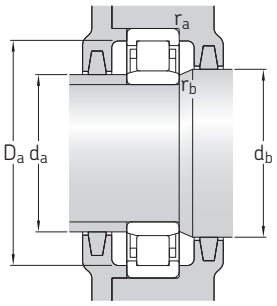



| Dimensions | | | | | Abutment and fillet dimensions | | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $D_1$ ≈ | $D_2$ ≈ | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ min. | $D_a$ max. | $r_a$ max. | $k_r$ | $f_0$ |
| mm | | | | | mm | | | | | – | |
| **70** | 94,9 | – | 132 | 2,1 | 82 | – | 136 | 138 | 2 | 0,03 | 13 |
| **75** | 92 | – | 118 | 1,5 | 84 | – | 121 | 121 | 1,5 | 0,03 | 15 |
| | 101 | – | 141 | 2,1 | 87 | – | 146 | 148 | 2 | 0,03 | 13 |
| **80** | 101 | – | 122 | 2 | 91 | – | 128 | 129 | 2 | 0,025 | 15 |
| | 108 | – | 149 | 2,1 | 92 | – | 154 | 158 | 2 | 0,03 | 13 |
| **85** | 106 | – | 134 | 2 | 96 | – | 139 | 139 | 2 | 0,025 | 15 |
| | 114 | – | 158 | 3 | 99 | – | 163 | 166 | 2,5 | 0,03 | 13 |
| **90** | 112 | – | 145 | 2 | 101 | – | 149 | 149 | 2 | 0,025 | 15 |
| | 121 | – | 166 | 3 | 104 | – | 171 | 176 | 2,5 | 0,03 | 13 |
| **95** | 118 | – | 151 | 2,1 | 107 | – | 156 | 158 | 2 | 0,025 | 14 |
| | 127 | – | 174 | 3 | 109 | – | 179 | 186 | 2,5 | 0,03 | 13 |
| **100** | 124 | – | 160 | 2,1 | 112 | – | 165 | 168 | 2 | 0,025 | 14 |
| | 135 | – | 186 | 3 | 114 | – | 191 | 201 | 2,5 | 0,03 | 13 |
| **110** | 138 | – | 179 | 2,1 | 122 | – | 184 | 188 | 2 | 0,025 | 14 |
| | 149 | – | 207 | 3 | 124 | – | 213 | 226 | 2,5 | 0,03 | 13 |
| **120** | 150 | – | 189 | 2,1 | 132 | – | 194 | 203 | 2 | 0,025 | 14 |
| | 164 | 215 | – | 3 | 134 | 158 | – | 246 | 2,5 | 0,03 | 14 |
| **130** | 160 | 198 | – | 3 | 144 | 154 | – | 216 | 2,5 | 0,025 | 15 |
| | 177 | 232 | – | 4 | 147 | 171 | – | 263 | 3 | 0,03 | 14 |
| **140** | 190 | 249 | – | 4 | 157 | 185 | – | 283 | 3 | 0,03 | 14 |
| **150** | 190 | 228 | – | 3 | 164 | 185 | – | 256 | 2,5 | 0,025 | 15 |
| | 205 | 264 | – | 4 | 167 | 200 | – | 303 | 3 | 0,03 | 14 |

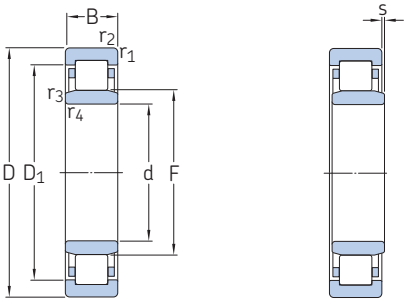



| Principal dimensions | | | Basic load ratings dynamic | static | Fatique load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | kg | – |
| **50** | 80 | 16 | 47,3 | 57 | 7,2 | 9 500 | 9 500 | 0,27 | **NU 1010 ECP/C3VL0241** |
| | 90 | 20 | 66 | 72 | 9,15 | 7 500 | 9 000 | 0,48 | **NU 210 ECM/C3VL0241** |
| | 110 | 27 | 112 | 116 | 15,3 | 6 000 | 8 000 | 1,35 | **NU 310 ECM/C3VL0241** |
| **55** | 90 | 18 | 57,2 | 69,5 | 9 | 8 500 | 13 000 | 0,4 | **NU 1011 ECP/C3VL0241** |
| | 90 | 18 | 57,2 | 69,5 | 9 | 8 500 | 13 000 | 0,45 | **NU 1011 ECML/C3VL0241** |
| | 100 | 21 | 85,8 | 100 | 12,9 | 7 000 | 8 000 | 0,78 | **NU 211 ECM/C3VL0241** |
| | 120 | 29 | 138 | 146 | 19 | 5 600 | 7 000 | 1,75 | **NU 311 ECM/C3VL0241** |
| **60** | 95 | 18 | 38 | 45,5 | 5,85 | 8 000 | 13 000 | 0,48 | **NU 1012 ML/C3VL0241** |
| | 95 | 18 | 58,3 | 73,5 | 8,8 | 8 000 | 8 000 | 0,48 | **NU 1012 ECP/C3VL0241** |
| | 110 | 22 | 96,8 | 106 | 14 | 6 300 | 7 500 | 0,97 | ▸ **NU 212 ECM/C3VL0241** |
| | 130 | 31 | 151 | 160 | 20,4 | 5 000 | 6 700 | 2,15 | **NU 312 ECM/C3VL0241** |
| **65** | 100 | 18 | 62,7 | 81,5 | 10,6 | 7 500 | 7 500 | 0,45 | **NU 1013 ECP/C3VL0241** |
| | 120 | 23 | 110 | 122 | 16 | 5 600 | 6 700 | 1,25 | **NU 213 ECM/C3VL0241** |
| | 140 | 33 | 183 | 196 | 25,5 | 4 800 | 6 000 | 2,65 | ▸ **NU 313 ECM/C3VL0241** |
| **70** | 110 | 20 | 70,4 | 85 | 10,8 | 7 000 | 7 000 | 0,69 | **NU 1014 ECM/C3VL0241** |
| | 110 | 20 | 76,5 | 93 | 12 | 7 000 | 7 000 | 0,62 | **NU 1014 ECP/C3VL0241** |
| | 125 | 24 | 121 | 140 | 18,6 | 5 300 | 6 300 | 1,35 | **NU 214 ECM/C3VL0241** |
| | 150 | 35 | 209 | 228 | 29 | 4 300 | 5 600 | 3,1 | ▸ **NU 314 ECM/C3VL0241** |
| **75** | 115 | 20 | 58,3 | 71 | 9,3 | 6 700 | 6 700 | 0,75 | **NU 1015 M/C3VL0241** |
| | 130 | 25 | 132 | 160 | 21,2 | 5 300 | 6 000 | 1,5 | **NU 215 ECM/C3VL0241** |
| | 160 | 37 | 242 | 270 | 34 | 4 000 | 5 300 | 3,9 | **NU 315 ECM/C3VL0241** |
| | 160 | 37 | 242 | 270 | 34 | 4 000 | 5 300 | 3,9 | ▸ **NU 315 ECP/VL0241** |
| **80** | 125 | 22 | 99 | 127 | 16,3 | 6 000 | 6 000 | 1,05 | **NU 1016 ECM/C3VL0241** |
| | 140 | 26 | 142 | 173 | 22 | 4 800 | 5 600 | 1,85 | **NU 216 ECM/C3VL0241** |
| | 170 | 39 | 264 | 290 | 36 | 3 800 | 5 000 | 4,6 | **NU 316 ECM/C3VL0241** |
| **85** | 130 | 22 | 72,1 | 91,5 | 11,6 | 6 000 | 6 000 | 1,1 | **NU 1017 M/C3VL0241** |
| | 150 | 28 | 168 | 200 | 25,5 | 4 500 | 5 300 | 2,25 | **NU 217 ECM/C3VL0241** |
| | 180 | 41 | 297 | 340 | 41,5 | 3 600 | 4 800 | 5,3 | ▸ **NU 317 ECM/C3VL0241** |
| **90** | 140 | 24 | 85,8 | 110 | 13,7 | 5 600 | 5 600 | 1,35 | **NU 1018 M/C3VL0241** |
| | 160 | 30 | 187 | 224 | 28 | 4 300 | 5 000 | 2,75 | **NU 218 ECM/C3VL0241** |
| | 190 | 43 | 319 | 360 | 44 | 3 400 | 4 500 | 6,25 | ▸ **NU 318 ECM/C3VL0241** |
| **95** | 145 | 24 | 88 | 116 | 14,3 | 5 300 | 5 300 | 1,4 | **NU 1019 ML/C3VL0241** |
| | 170 | 32 | 224 | 270 | 33,5 | 4 000 | 4 800 | 2,85 | **NU 219 ECM/C3VL0241** |
| | 200 | 45 | 341 | 390 | 46,5 | 3 200 | 4 300 | 7,25 | ▸ **NU 319 ECM/C3VL0241** |

▸ Popular item



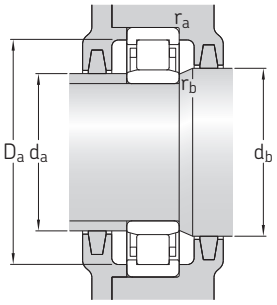

| Dimensions | | | | | | Abutment and fillet dimensions | | | | | | | Calculation factor |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $D_1$ ≈ | F | $r_{1,2}$ min. | $r_{3,4}$ min. | s max. | $d_a$ min. | $d_a$ max. | $d_b$ min. | $D_a$ min. | $D_a$ max. | $r_a$ max. | $r_b$ max. | $k_r$ |
| mm | | | | | | mm | | | | | | | – |
| **50** | 70 | 57,5 | 1,1 | 0,6 | 1 | 53,2 | 56 | 60 | 74 | 75,4 | 1 | 0,6 | 0,1 |
| | 78 | 59,5 | 1,1 | 1,1 | 1,5 | 57 | 57 | 62 | 83 | 83 | 1 | 1 | 0,15 |
| | 92,1 | 65 | 2 | 2 | 1,9 | 61 | 63 | 67 | 96 | 99 | 2 | 2 | 0,15 |
| **55** | 79 | 64,5 | 1,1 | 1 | 0,5 | 59,6 | 63 | 67 | 80 | 84 | 1 | 1 | 0,1 |
| | 79 | 64,5 | 1,1 | 1 | 0,5 | 59,6 | 63 | 67 | 80 | 84 | 1 | 1 | 0,1 |
| | 86,3 | 66 | 1,5 | 1,1 | 1 | 62 | 64 | 68 | 91 | 91 | 1,5 | 1 | 0,15 |
| | 101 | 70,5 | 2 | 2 | 2 | 66 | 68 | 73 | 106 | 109 | 2 | 2 | 0,15 |
| **60** | 81,6 | 69,5 | 1,1 | 1 | 2,9 | 64,6 | 68 | 72 | 85 | 89 | 1 | 1 | 0,1 |
| | 81,6 | 69,5 | 1,1 | 1 | 1,7 | 64,6 | 68 | 72 | 85 | 89 | 1 | 1 | 0,1 |
| | 95,7 | 72 | 1,5 | 1,5 | 1,4 | 69 | 70 | 74 | 101 | 101 | 1,5 | 1,5 | 0,15 |
| | 110 | 77 | 2,1 | 2,1 | 2,1 | 72 | 74 | 79 | 115 | 118 | 2 | 2 | 0,15 |
| **65** | 88,5 | 74 | 1,1 | 1 | 1 | 69,6 | 72 | 77 | 90 | 94 | 1 | 1 | 0,1 |
| | 104 | 78,5 | 1,5 | 1,5 | 1,4 | 74 | 76 | 81 | 109 | 111 | 1,5 | 1,5 | 0,15 |
| | 119 | 82,5 | 2,1 | 2,1 | 2,2 | 77 | 80 | 85 | 123 | 128 | 2 | 2 | 0,15 |
| **70** | 97,5 | 79,5 | 1,1 | 1 | 1,3 | 74,6 | 78 | 82 | 101 | 104 | 1 | 1 | 0,1 |
| | 97,5 | 79,5 | 1,1 | 1 | 1,3 | 74,6 | 78 | 82 | 101 | 104 | 1 | 1 | 0,1 |
| | 109 | 83,5 | 1,5 | 1,5 | 1,2 | 79 | 81 | 86 | 115 | 116 | 1,5 | 1,5 | 0,15 |
| | 127 | 89 | 2,1 | 2,1 | 1,8 | 82 | 86 | 91 | 131 | 138 | 2 | 2 | 0,15 |
| **75** | 101 | 85 | 1,1 | 1 | 3 | 79,6 | 83 | 87 | 106 | 109 | 1 | 1 | 0,1 |
| | 114 | 88,5 | 1,5 | 1,5 | 1,2 | 84 | 86 | 91 | 119 | 121 | 1,5 | 1,5 | 0,15 |
| | 136 | 95 | 2,1 | 2,1 | 1,8 | 87 | 92 | 97 | 141 | 148 | 2 | 2 | 0,15 |
| | 136 | 95 | 2,1 | 2,1 | 1,8 | 87 | 92 | 97 | 141 | 148 | 2 | 2 | 0,15 |
| **80** | 109 | 91,5 | 1,1 | 1 | 1,5 | 86 | 90 | 94 | 114 | 119 | 1 | 1 | 120 |
| | 123 | 95,3 | 2 | 2 | 1,4 | 91 | 93 | 98 | 128 | 129 | 2 | 2 | 0,15 |
| | 144 | 101 | 2,1 | 2,1 | 2,1 | 92 | 98 | 104 | 149 | 158 | 2 | 2 | 0,15 |
| **85** | 114 | 96,5 | 1,1 | 1 | 3,3 | 89,6 | 95 | 99 | 119 | 124 | 1 | 1 | 0,1 |
| | 131 | 100,5 | 2 | 2 | 1,5 | 96 | 98 | 103 | 136 | 139 | 2 | 2 | 0,15 |
| | 153 | 108 | 3 | 3 | 2,3 | 99 | 105 | 111 | 158 | 166 | 2,5 | 2,5 | 0,15 |
| **90** | 122 | 103 | 1,5 | 1,1 | 3,5 | 96 | 101 | 106 | 128 | 133 | 1,5 | 1 | 0,1 |
| | 140 | 107 | 2 | 2 | 1,8 | 101 | 104 | 110 | 144 | 149 | 2 | 2 | 0,15 |
| | 162 | 113,5 | 3 | 3 | 2,5 | 104 | 110 | 116 | 167 | 176 | 2,5 | 2,5 | 0,15 |
| **95** | 127 | 108 | 1,5 | 1,1 | 3,5 | 101 | 106 | 111 | 133 | 138 | 1,5 | 1 | 0,1 |
| | 149 | 112,5 | 2,1 | 2,1 | 1,7 | 107 | 110 | 115 | 154 | 158 | 2 | 2 | 0,15 |
| | 170 | 121,5 | 3 | 3 | 2,9 | 109 | 118 | 124 | 175 | 186 | 2,5 | 2,5 | 0,15 |



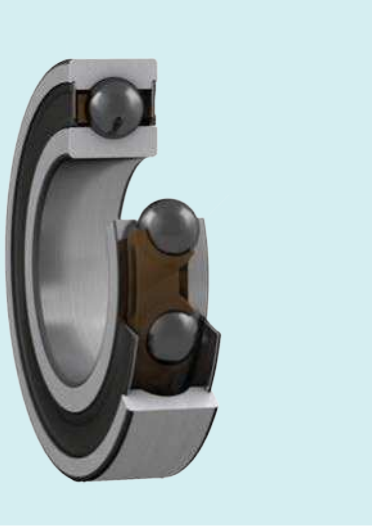

| Principal dimensions | | | Basic load ratings | | Fatique load limit | Speed ratings | | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| | | | dynamic | static | | Reference speed | Limiting speed | | |
| d | D | B | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | kg | – |
| **100** | 150 | 24 | 89,7 | 122 | 15 | 5 000 | 5 000 | 1,45 | **NU 1020 M/C3VL0241** |
| | 180 | 34 | 251 | 310 | 38 | 3 800 | 4 500 | 4 | ▸ **NU 220 ECM/C3VL0241** |
| | 215 | 47 | 391 | 440 | 51 | 3 000 | 3 800 | 8,65 | **NU 320 ECM/C3VL0241** |
| **110** | 170 | 28 | 130 | 173 | 20,8 | 4 500 | 4 500 | 2,3 | **NU 1022 M/C3VL0241** |
| | 200 | 38 | 297 | 375 | 44 | 3 400 | 4 000 | 5,6 | ▸ **NU 222 ECM/C3VL0241** |
| | 240 | 50 | 468 | 540 | 61 | 2 600 | 3 400 | 12 | ▸ **NU 322 ECM/C3VL0241** |
| **120** | 180 | 28 | 138 | 190 | 22,4 | 4 000 | 4 000 | 2,55 | **NU 1024 M/C3VL2071** |
| | 215 | 40 | 341 | 440 | 50 | 3 000 | 3 600 | 6,65 | **NU 224 ECM/C3VL0241** |
| | 260 | 55 | 539 | 620 | 69,5 | 2 400 | 3 200 | 15 | ▸ **NU 324 ECM/C3VL0241** |
| **130** | 200 | 33 | 168 | 232 | 27 | 3 800 | 5 600 | 3,85 | **NU 1026 M/C3VL2071** |
| | 230 | 40 | 369 | 465 | 52 | 2 800 | 3 400 | 7,6 | **NU 226 ECM/C3VL2071** |
| | 280 | 58 | 627 | 750 | 81,5 | 2 200 | 3 000 | 18,5 | **NU 326 ECM/C3VL2071** |
| **140** | 210 | 33 | 179 | 255 | 29 | 3 600 | 3 600 | 4,05 | **NU 1028 M/C3VL2071** |
| | 250 | 42 | 396 | 520 | 58,5 | 2 600 | 3 200 | 9 | **NU 228 ECM/C3VL2071** |
| | 300 | 62 | 682 | 830 | 88 | 2 200 | 2 800 | 25 | **NU 328 ECM/C3VL2071** |
| **150** | 225 | 35 | 194 | 275 | 18 | 3 200 | 3 200 | 4,9 | **NU 1030 M/C3VL2071** |
| | 270 | 45 | 457 | 610 | 65,5 | 2 400 | 2 800 | 12 | **NU 230 ECM/C3VL2071** |
| | 320 | 65 | 765 | 950 | 100 | 2 000 | 2 600 | 31 | **NU 330 ECM/C3VL2071** |



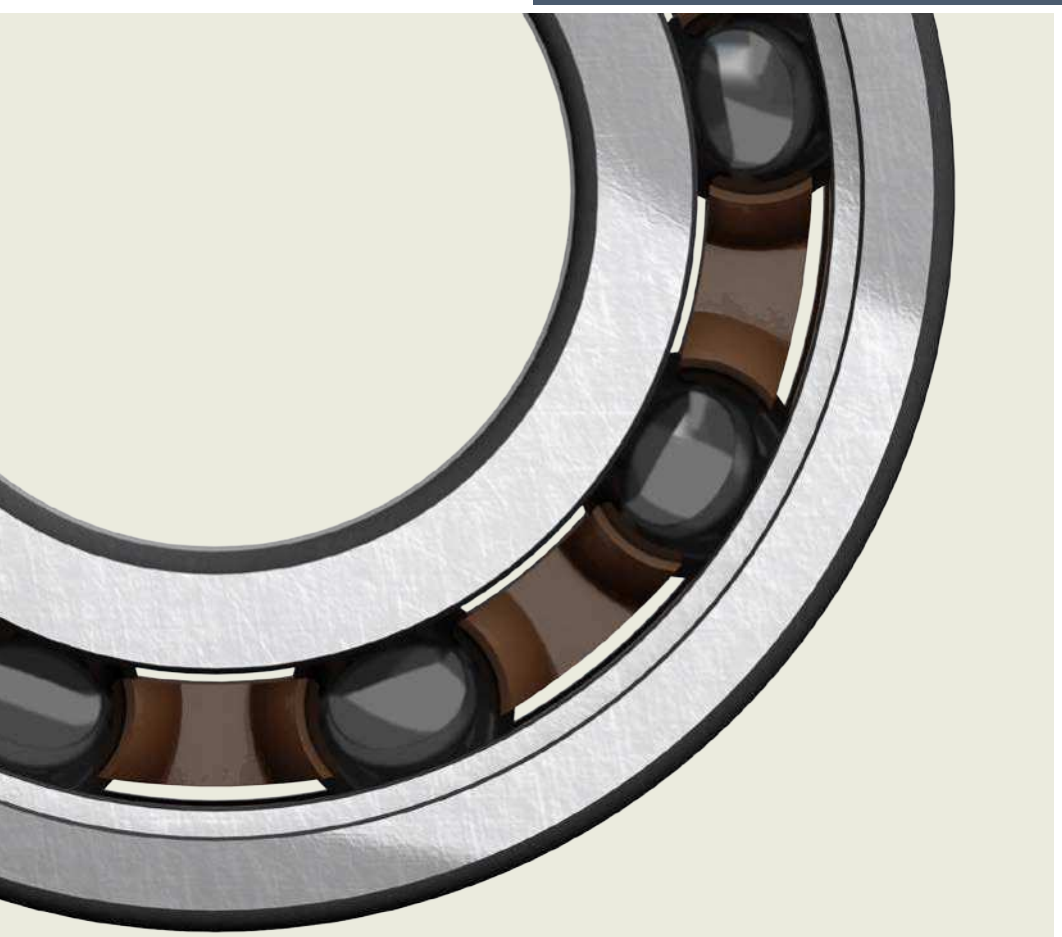
▸ Popular item




| Dimensions | | | | | | Abutment and fillet dimensions | | | | | | | Calculation factor |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $D_1$ ≈ | F | $r_{1,2}$ min. | $r_{3,4}$ min. | s max. | $d_a$ min. | $d_a$ max. | $d_b$ min. | $D_a$ min. | $D_a$ max. | $r_a$ max. | $r_b$ max. | $k_r$ |
| mm | | | | | | mm | | | | | | | – |
| **100** | 132 | 113 | 1,5 | 1,1 | 3,5 | 106 | 111 | 116 | 138 | 143 | 1,5 | 1 | 0,1 |
| | 157 | 119 | 2,1 | 2,1 | 1,7 | 112 | 116 | 122 | 162 | 168 | 2 | 2 | 0,15 |
| | 182 | 127,5 | 3 | 3 | 2,9 | 114 | 124 | 130 | 192 | 201 | 2,5 | 2,5 | 0,15 |
| **110** | 149 | 125 | 2 | 1,1 | 3,8 | 116 | 123 | 128 | 155 | 161 | 2 | 1 | 0,1 |
| | 174 | 132,5 | 2,1 | 2,1 | 2,1 | 122 | 130 | 135 | 179 | 188 | 2 | 2 | 0,15 |
| | 201 | 143 | 3 | 3 | 3 | 124 | 139 | 146 | 207 | 226 | 2,5 | 2,5 | 0,15 |
| **120** | 159 | 135 | 2 | 1,1 | 3,8 | 126 | 133 | 138 | – | 171 | 2 | 1 | 0,1 |
| | 188 | 143,5 | 2,1 | 2,1 | 1,9 | 132 | 140 | 146 | 193 | 203 | 2 | 2 | 0,15 |
| | 219 | 154 | 3 | 3 | 3,7 | 134 | 150 | 157 | 225 | 246 | 2,5 | 2,5 | 0,15 |
| **130** | 175 | 148 | 2 | 1,1 | 4,7 | 136 | 145 | 151 | – | 191 | 2 | 1 | 0,1 |
| | 202 | 153,5 | 3 | 3 | 2,1 | 144 | 145 | 156 | – | 216 | 2,5 | 2,5 | 0,15 |
| | 236 | 167 | 4 | 4 | 3,7 | 147 | 156 | 170 | – | 263 | 3 | 3 | 0,15 |
| **140** | 185 | 158 | 2 | 1,1 | 4,4 | 146 | 155 | 161 | – | 201 | 2 | 1 | 0,1 |
| | 217 | 169 | 3 | 3 | 2,5 | 154 | 160 | 172 | – | 236 | 2,5 | 2,5 | 0,15 |
| | 252 | 180 | 4 | 4 | 3,7 | 157 | 168 | 183 | – | 283 | 3 | 3 | 0,15 |
| **150** | 198 | 169,5 | 2,1 | 1,5 | 4,9 | 157 | 167 | 173 | – | 215 | 2 | 1,5 | 0,1 |
| | 234 | 182 | 3 | 3 | 2,5 | 163 | 172 | 185 | – | 256 | 2,5 | 2,5 | 0,15 |
| | 270 | 193 | 4 | 4 | 4 | 167 | 182 | 196 | – | 303 | 3 | 3 | 0,15 |



# 21 Hybrid bearings



# 21 Hybrid bearings


**Designs and variants** . . . . . **1045**
Hybrid deep groove ball bearings . . . . . 1045
Basic design bearings . . . . . 1045
Sealed bearings . . . . . 1045
XL hybrid bearings . . . . . 1046
Hybrid cylindrical roller bearings . . . . . 1046
Basic design bearings . . . . . 1046
Hybrid bearings with special steel rings and coatings . . . 1046
Cages . . . . . 1046

**Bearing data** . . . . . **1047**
(Dimension standards, tolerances, internal clearance, permissible misalignment, permissible axial displacement, electrical properties)

**Loads** . . . . . **1048**
Axial preload . . . . . 1048

**Temperature limits** . . . . . **1048**

**Permissible speed** . . . . . **1048**

**Designation system** . . . . . **1049**

**Product tables**
21.1 Hybrid deep groove ball bearings . . . . . 1050
21.2 Hybrid cylindrical roller bearings . . . . . 1056


**Other hybrid bearings**

| | |
|---|---|
| Hybrid super-precision bearings | → skf.com/super-precision |
| Hybrid angular contact ball bearings | → contact SKF |
| Hybrid stainless steel deep groove ball bearings | → contact SKF |
| Hybrid bearing units | → contact SKF |

# 21 Hybrid bearings

## More information


**General bearing knowledge** . . . . **17**

**Bearing selection process** . . . . . **59**
Lubrication . . . . . 109
Bearing interfaces. . . . . 139
Seat tolerances for standard conditions . . . . . 148
Selecting internal clearance or preload . . . . . 182
Sealing, mounting and dismounting . . . . . 193

**Mounting instructions for individual bearings** → skf.com/mount



*SKF bearing maintenance handbook* ISBN 978-91-978966-4-1


Hybrid bearings have rings made of bearing steel and rolling elements made of bearing grade silicon nitride ($Si_3N_4$), which make the bearings electrically insulating.

## Bearing features

Silicon nitride rolling elements can extend bearing service life by offering enhanced bearing performance, even under difficult operating conditions. When compared to same-sized bearings with steel rolling elements, the benefits of hybrid bearings include:

- **Protection from electric current damage**
  Hybrid bearings are non-conductive and therefore suitable for applications such as AC and DC motors and generators, where electric currents are present.

- **Higher speed capability**
  The density of a silicon nitride rolling element is 60% lower than a same-sized rolling element made of bearing steel. Lower weight and inertia translates into higher speed capability and superior behaviour during rapid starts and stops.

- **Long service life**
  The lower frictional heat generated in hybrid bearings, especially at high speeds, contributes to extended bearing service life and extended relubrication intervals.

- **High wear-resistance**
  Silicon nitride rolling elements have a higher degree of hardness making hybrid bearings suitable under difficult conditions and contaminated environments.

- **High bearing stiffness**
  With a high modulus of elasticity, hybrid bearings offer increased bearing stiffness.

- **Reduced risk of smearing**
  Even under inadequate lubrication conditions, such as high speeds and rapid accelerations, or where there is an insufficient hydrodynamic film, the risk of smearing is reduced between silicon nitride and steel surfaces. For conditions where $\kappa < 1$, it is common to apply $\kappa = 1$ for hybrid bearing life calculations (Lubrication condition – the viscosity ratio, $\kappa$, **page 102**).

- **Reduced risk of false brinelling**
  When subjected to vibration, hybrid bearings are significantly less susceptible to false brinelling (formation of shallow depressions in the raceways) between the silicon nitride and steel surfaces.

- **Less sensitivity to temperature gradients**
  Silicon nitride rolling elements have a lower coefficient of thermal expansion, which means they are more stable over temperature gradients within the bearing and provide more accurate preload/clearance control.

## Assortment

The standard assortment of SKF hybrid bearings (**fig. 1**) comprises popular sizes for electric motors and generators. It includes:

- single row deep groove ball bearings
  - basic design
  - sealed design
  - XL hybrid design
- single row cylindrical roller bearings

Hybrid bearings provided in this catalogue constitute the basic SKF assortment and are only part of the total assortment. Other hybrid bearings include:

- hybrid super-precision bearings (skf.com/super-precision)
  - hybrid super-precision angular contact ball bearings
  - hybrid super-precision cylindrical roller bearings
  - hybrid super-precision angular contact thrust ball bearings, single and double direction
- hybrid angular contact ball bearings
- hybrid stainless steel deep groove ball bearings
- bearing units incorporating hybrid bearings

For availability and detailed information, contact SKF.

# Designs and variants

## Hybrid deep groove ball bearings

Deep groove ball bearings are the most widely used bearing type, especially in electric motors. SKF hybrid deep groove ball bearings (**fig. 2**):

- are non-separable
- are suitable for high speeds
- accommodate radial loads and axial loads in both directions because their uninterrupted raceway grooves have a close osculation with the balls
- are manufactured to SKF Explorer bearing quality (**page 7**)
- are available with a bore diameter ranging from 5 to 180 mm
- with a bore diameter d ≤ 45 mm, are most suitable for electric motors in the power range 0,15 to 15 kW as well as for power tools and high-speed drives

  SKF hybrid deep groove ball bearings in this size range are the most cost-effective solution against electrical erosion.

### Basic design bearings

- are available with a bore diameter d ≥ 10 mm

**⚠ WARNING**

Seals made of FKM (fluoro rubber) exposed to an open flame or temperatures above 300 °C *(570 °F)* are a health and environmental hazard! They remain dangerous even after they have cooled.

Read and follow the safety precautions on **page 197**.

### Sealed bearings

- use the same seals as described under *Capped bearings*, **page 242**
- are lubricated for the life of the bearing and should not be washed or relubricated
- are virtually maintenance-free

When capped bearings must operate under certain conditions, such as very high speeds or high temperatures, grease may appear between the inner ring and capping device. For bearing arrangements where this would be detrimental, appropriate actions should be taken.

**Fig. 1**

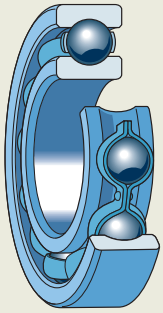
**Hybrid bearings**

Single row deep groove ball bearing

Single row cylindrical roller bearing

**Fig. 2**

**Hybrid deep groove ball bearing**



## Greases for sealed bearings

The standard grease, suitable for most common operating conditions of electric motors and generators, is indicated by the designation suffix WT (**table 3**, **page 245**).

For additional information about greases, refer to *Selecting a suitable grease*, **page 116**.

### Grease life

The estimated grease life is typically at least twice as long as for same-sized bearings with steel balls (*Grease life for capped bearings*, **page 246**).

## XL hybrid bearings

- are identified by the designation suffix VA970
- are designed to meet the application requirements for electric generators in larger wind turbines
- are available for the most commonly used generator sizes (**product table**, **page 1050**)

# Hybrid bearings with special steel rings and coatings

For specific application requirements, hybrid bearings can be customized:

- bearing rings stabilized for temperatures ≤ 300 °C (*570 °F*)
- bearing rings made of through-hardened stainless steel for enhanced corrosion and wear-resistance and with good high-temperature properties
- bearing rings made of through-hardened stainless steel for cryogenic temperatures
- bearing rings made of high-temperature tool steel
- ring coating with zinc chromate or thin dense chromium for corrosion protection
- ring coating based on molybdenum for low friction, especially in vacuum or gas applications

For availability and detailed information, contact SKF.

# Hybrid cylindrical roller bearings

- are separable
- are suitable for high speeds
- accommodate heavy radial loads
- accommodate axial displacement (**fig. 4**)
- are commonly used in electric motors, especially traction motors, and in applications running under severe operating conditions

## Basic design bearings

The NU design cylindrical roller bearing, which has two integral flanges on the outer ring and no flanges on the inner ring, is the standard basic design for hybrid cylindrical roller bearings (**fig. 3**).

# Cages

SKF hybrid deep groove ball bearings are fitted with one of the following cages:

- a stamped steel cage, riveted, ball centred (no designation suffix)
- a glass fibre reinforced PA66 cage, snap-type, ball centred (designation suffix TN9)
- a glass fibre reinforced PEEK cage, snap-type, ball centred (designation suffix TNH)
- a machined brass cage, riveted, ball centred (designation suffix M)

For additional information, refer to *Cages*, **page 249**.

SKF hybrid cylindrical roller bearings are fitted with one of the following cages:

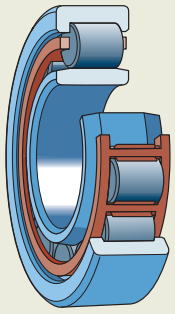
- a glass fibre reinforced PA66 cage, window-type, roller centred (designation suffix P)
- a glass fibre reinforced PEEK cage, window-type, roller centred (designation suffix PH)
- a machined brass cage, riveted, roller centred (designation suffix M)
- a machined brass cage, window-type, inner or outer ring centred (depending on bearing design) (designation suffix ML)

For additional information, refer to *Cages*, **page 502**.

When used at high temperatures, some lubricants can have a detrimental effect on polyamide cages. For additional information about the suitability of cages, refer to *Cages*, **page 187**.

Fig. 3

**Hybrid cylindrical roller bearing**

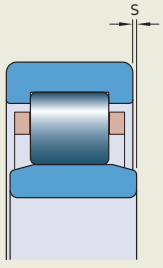


# Bearing data

| | Deep groove ball bearings | Cylindrical roller bearings |
|---|---|---|
| **Dimension standards** | Boundary dimensions: ISO 15 | |
| **Tolerances**<br><br>For additional information<br>→ page 35 | Normal | Normal<br>P6 geometrical tolerance |
| | ISO 492 (table 2, page 38, and table 3, page 39) | |
| **Internal clearance**<br><br>For additional information<br>→ page 182 | C3<br>Check availability of other clearance classes | |
| | Values: ISO 5753-1 (table 6, page 252) | Values: ISO 5753-1 (table 3, page 506) |
| | Values are valid for unmounted bearings under zero measuring load. | |
| **Permissible misalignment** | Identical to standard bearings<br>→ page 250 | Identical to standard bearings<br>→ page 504 |
| **Permissible axial displacement** | – | $s_{max}$ → product table, page 1056<br>NU design hybrid bearings can accommodate axial displacement (fig. 4). Displacement of the shaft relative to the housing occurs within these bearings. As a result, there is virtually no increase in friction. |
| **Electrical properties** | • Protection against AC and DC currents<br>• High impedance, even for very high frequencies, providing good protection against high frequency current and voltage peaks<br>• Voltage level before the first arcing occurs through the seal–bearing contact of small hybrid deep groove ball bearings (NBR contact seal): > 2,5 kV DC | |

**Fig. 4**

**Axial displacement**



# Loads

For recommendations about minimum load, axial load carrying capacity and equivalent bearing loads, refer to *Loads* of the relevant standard bearing:

- *Deep groove ball bearings*, **page 254**
- *Cylindrical roller bearings*, **page 509**

The required hybrid bearing specific values and factors are listed in the relevant product tables:

- *Hybrid deep groove ball bearings*, **page 1050**
  - basic static load rating $C_0$
  - calculation factors $f_0$ and $k_r$
- *Hybrid cylindrical roller bearings*, **page 1056**
  - calculation factor $k_r$
  - reference speed

# Axial preload

To provide low noise and high-speed operation, typically an axial preload to a bearing arrangement comprising two hybrid deep groove ball bearings is applied. Axial preload can be applied with spring washers, as described under *Preloading with springs*, **page 186**.

# Temperature limits

The permissible operating temperature for hybrid bearings can be limited by:

- the dimensional stability of the bearing rings
- the cage
- the seals
- the lubricant

Where temperatures outside the permissible range are expected, contact SKF.

## Bearing rings

The rings of SKF hybrid bearings are heat stabilized up to at least:

- 120 °C *(250 °F)* for basic design hybrid deep groove ball bearings
- 150 °C *(300 °F)* for hybrid cylindrical roller bearings and XL hybrid deep groove ball bearings

On request, SKF can supply hybrid bearings with rings stabilized for operating temperatures up to 300 °C *(570 °F)*.

## Cages

Steel, brass or PEEK cages can be used at the same operating temperatures as the bearing rings of standard hybrid bearings. For temperature limits of other polymer cages, refer to *Polymer cages*, **page 188**.

## Seals

The permissible operating temperature for seals depends on the seal material:

- NBR: –40 to +100 °C *(–40 to +210 °F)*
  Temperatures up to *120 °C (250 °F)* can be tolerated for brief periods.
- FKM: –30 to +200 °C *(–20 to +390 °F)*
  Temperatures up to 230 °C *(445 °F)* can be tolerated for brief periods.

Typically, temperature peaks are at the seal lip.

## Lubricants

Temperature limits for the grease used in sealed SKF hybrid deep groove ball bearings are provided in **table 3**, **page 116**. For temperature limits of other SKF greases, refer to *Selecting a suitable SKF grease*, **page 116**.

When using lubricants not supplied by SKF, temperature limits should be evaluated according to the SKF traffic light concept (**page 117**).

# Permissible speed

The speed ratings in the product tables (*Hybrid deep groove ball bearings*, **page 1050** and *Hybrid cylindrical roller bearings*, **page 1056**) indicate:

- the **reference speed**, which enables a quick assessment of the speed capabilities from a thermal frame of reference
- the **limiting speed**, which is a mechanical limit that should not be exceeded unless the bearing design and the application are adapted for higher speeds

For additional information, refer to *Operating temperature and speed*, **page 129**.

SKF recommends oil lubrication for bearings with a ring centred cage (designation suffix ML). When these bearings are grease lubricated, the $nd_m$ value is limited to ≤ 250 000 mm/min.

where
$d_m$ = bearing mean diameter [mm]
= 0,5 (d + D)
n = rotational speed [r/min]

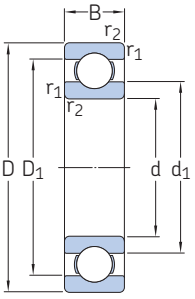
# Designation system

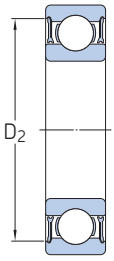
Refer to *Designation system* of the relevant standard bearing:

- single row deep groove ball bearings, **page 258**
- single row cylindrical roller bearings, **page 514**

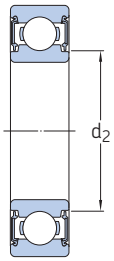
Additional designation suffixes used with SKF hybrid bearings are explained in the following.

**C3P** Displaced clearance range comprising the upper half of the C3 plus the lower half of the C4 clearance range
**F1** Grease fill 10–15% of the free space in the bearing
**HC5** Rolling elements made of silicon nitride
**S0** Bearing rings heat stabilized for operating temperatures ≤ 150 °C *(300 °F)*
**VA970** Special design deep groove ball bearing for wind turbine generators
**VC444** Bearing rings made of high nitrogen steel



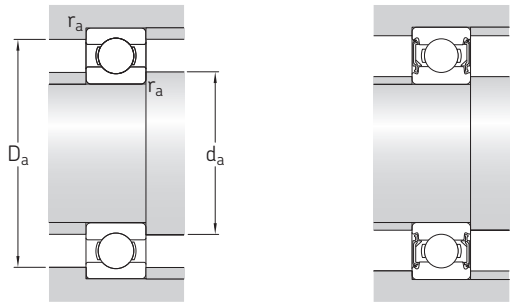

Sealed (2RZ)




Sealed (2RSL)

| Principal dimensions | | | Basic load ratings dynamic | static | Fatique load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | kg | – |
| **5** | 16 | 5 | 1,14 | 0,38 | 0,016 | 125 000 | 67 000 | 0,005 | ▸ **625-2RZTN9/HC5C3WTF1** |
| **6** | 19 | 6 | 2,34 | 0,95 | 0,04 | 100 000 | 45 000 | 0,008 | **626-2RSLTN9/HC5C3WTF1** |
| **7** | 19 | 6 | 2,34 | 0,95 | 0,04 | 100 000 | 45 000 | 0,007 | ▸ **607-2RSLTN9/HC5C3WTF1** |
| | 22 | 7 | 3,45 | 1,37 | 0,057 | 85 000 | 40 000 | 0,012 | ▸ **627-2RSLTN9/HC5C3WTF1** |
| **8** | 22 | 7 | 3,45 | 1,37 | 0,057 | 85 000 | 40 000 | 0,01 | ▸ **608-2RSLTN9/HC5C3WTF1** |
| **10** | 26 | 8 | 4,75 | 1,96 | 0,083 | 70 000 | 32 000 | 0,018 | ▸ **6000-2RSLTN9/HC5C3WT** |
| | 26 | 8 | 4,75 | 1,96 | 0,083 | 70 000 | 45 000 | 0,019 | **6000/HC5C3** |
| | 30 | 9 | 5,4 | 2,36 | 0,1 | 65 000 | 30 000 | 0,032 | ▸ **6200-2RSLTN9/HC5C3WT** |
| | 30 | 9 | 5,4 | 2,36 | 0,1 | 65 000 | 40 000 | 0,032 | **6200/HC5C3** |
| **12** | 28 | 8 | 5,4 | 2,36 | 0,1 | 65 000 | 30 000 | 0,022 | ▸ **6001-2RSLTN9/HC5C3WT** |
| | 28 | 8 | 5,4 | 2,36 | 0,1 | 65 000 | 40 000 | 0,021 | **6001/HC5C3** |
| | 32 | 10 | 7,28 | 3,1 | 0,132 | 60 000 | 26 000 | 0,037 | ▸ **6201-2RSLTN9/HC5C3WT** |
| | 32 | 10 | 7,28 | 3,1 | 0,132 | 60 000 | 36 000 | 0,037 | **6201/HC5C3** |
| **15** | 32 | 9 | 5,85 | 2,85 | 0,12 | 56 000 | 24 000 | 0,03 | ▸ **6002-2RSLTN9/HC5C3WT** |
| | 32 | 9 | 5,85 | 2,85 | 0,12 | 56 000 | 34 000 | 0,03 | **6002/HC5C3** |
| | 35 | 11 | 8,06 | 3,75 | 0,16 | 50 000 | 22 000 | 0,044 | ▸ **6202-2RSLTN9/HC5C3WT** |
| | 35 | 11 | 8,06 | 3,75 | 0,16 | 50 000 | 32 000 | 0,045 | **6202/HC5C3** |
| **17** | 35 | 10 | 6,37 | 3,25 | 0,137 | 50 000 | 22 000 | 0,038 | ▸ **6003-2RSLTN9/HC5C3WT** |
| | 35 | 10 | 6,37 | 3,25 | 0,137 | 50 000 | 30 000 | 0,038 | **6003/HC5C3** |
| | 40 | 12 | 9,95 | 4,75 | 0,2 | 45 000 | 20 000 | 0,059 | ▸ **6203-2RSLTN9/HC5C3WT** |
| | 40 | 12 | 9,95 | 4,75 | 0,2 | 45 000 | 28 000 | 0,065 | **6203/HC5C3** |
| **20** | 42 | 12 | 9,95 | 5 | 0,212 | 40 000 | 19 000 | 0,062 | ▸ **6004-2RSLTN9/HC5C3WT** |
| | 42 | 12 | 9,95 | 5 | 0,212 | 40 000 | 26 000 | 0,067 | **6004/HC5C3** |
| | 47 | 14 | 13,5 | 6,55 | 0,28 | 38 000 | 17 000 | 0,097 | ▸ **6204-2RSLTN9/HC5C3WT** |
| | 47 | 14 | 13,5 | 6,55 | 0,28 | 38 000 | 24 000 | 0,11 | **6204/HC5C3** |
| **25** | 47 | 12 | 11,9 | 6,55 | 0,275 | 36 000 | 16 000 | 0,073 | ▸ **6005-2RSLTN9/HC5C3WT** |
| | 47 | 12 | 11,9 | 6,55 | 0,275 | 36 000 | 22 000 | 0,078 | **6005/HC5C3** |
| | 52 | 15 | 14,8 | 7,8 | 0,335 | 32 000 | 15 000 | 0,13 | ▸ **6205-2RSLTN9/HC5C3WT** |
| | 52 | 15 | 14,8 | 7,8 | 0,335 | 32 000 | 20 000 | 0,13 | **6205/HC5C3** |

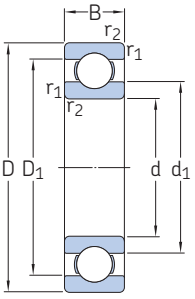
▸ Popular item

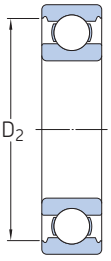


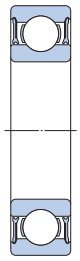

| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $d_2$ ≈ | $D_1$ ≈ | $D_2$ ≈ | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | $k_r$ | $f_0$ |
| mm | | | | | | mm | | | | – | |
| **5** | 8,4 | – | – | 13,3 | 0,3 | 7,4 | 8,3 | 13,6 | 0,3 | 0,025 | 8,4 |
| **6** | – | 9,5 | – | 16,5 | 0,3 | 7,4 | 9,4 | 16,6 | 0,3 | 0,025 | 13 |
| **7** | – | 9,5 | – | 16,5 | 0,3 | 9 | 9,4 | 17 | 0,3 | 0,025 | 13 |
| | – | 10,6 | – | 19,2 | 0,3 | 9,4 | 10,5 | 19,6 | 0,3 | 0,025 | 12 |
| **8** | – | 10,6 | – | 19,2 | 0,3 | 10 | 10,5 | 20 | 0,3 | 0,025 | 12 |
| **10** | – | 13 | – | 22,6 | 0,3 | 12 | 12,5 | 24 | 0,3 | 0,025 | 12 |
| | 14,8 | – | 21,2 | – | 0,3 | 12 | – | 24 | 0,3 | 0,025 | 12 |
| | – | 15,2 | – | 24,8 | 0,6 | 14,2 | 15 | 25,8 | 0,6 | 0,025 | 13 |
| | 17 | – | 23,2 | – | 0,6 | 14,2 | – | 25,8 | 0,6 | 0,025 | 13 |
| **12** | – | 15,2 | – | 24,8 | 0,3 | 14 | 15 | 26 | 0,3 | 0,025 | 13 |
| | 17 | – | 23,2 | – | 0,3 | 14 | – | 26 | 0,3 | 0,025 | 13 |
| | – | 16,6 | – | 27,4 | 0,6 | 16,2 | 16,5 | 27,8 | 0,6 | 0,025 | 12 |
| | 18,4 | – | 25,7 | – | 0,6 | 16,2 | – | 27,8 | 0,6 | 0,025 | 12 |
| **15** | – | 18,7 | – | 28,2 | 0,3 | 17 | 18,5 | 30 | 0,3 | 0,025 | 14 |
| | 20,5 | – | 26,7 | – | 0,3 | 17 | – | 30 | 0,3 | 0,025 | 14 |
| | – | 19,4 | – | 30,4 | 0,6 | 19,2 | 19,4 | 30,8 | 0,6 | 0,025 | 13 |
| | 21,7 | – | 29 | – | 0,6 | 19,2 | – | 30,8 | 0,6 | 0,025 | 13 |
| **17** | – | 20,7 | – | 31,4 | 0,3 | 19 | 20,5 | 33 | 0,3 | 0,025 | 14 |
| | 23 | – | 29,2 | – | 0,3 | 19 | – | 33 | 0,3 | 0,025 | 14 |
| | – | 22,2 | – | 35 | 0,6 | 21,2 | 22 | 35,8 | 0,6 | 0,025 | 13 |
| | 24,5 | – | 32,7 | – | 0,6 | 21,2 | – | 35,8 | 0,6 | 0,025 | 13 |
| **20** | – | 24,9 | – | 37,2 | 0,6 | 23,2 | 24,5 | 38,8 | 0,3 | 0,025 | 14 |
| | 27,2 | – | 34,8 | – | 0,6 | 23,2 | – | 38,8 | 0,3 | 0,025 | 14 |
| | – | 26,3 | – | 40,6 | 1 | 25,6 | 26 | 41,4 | 1 | 0,025 | 13 |
| | 28,8 | – | 38,5 | – | 1 | 25,6 | – | 41,4 | 1 | 0,025 | 13 |
| **25** | – | 29,7 | – | 42,2 | 0,6 | 28,2 | 29,5 | 43,8 | 0,3 | 0,025 | 14 |
| | 32 | – | 40 | – | 0,6 | 28,2 | – | 43,8 | 0,3 | 0,025 | 14 |
| | – | 31,8 | – | 46,3 | 1 | 30,6 | 31,5 | 46,4 | 1 | 0,025 | 14 |
| | 34,3 | – | 44 | – | 1 | 30,6 | – | 46,4 | 1 | 0,025 | 14 |

## 21.1 Hybrid deep groove ball bearings

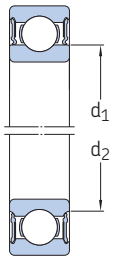
d **30 – 65** mm



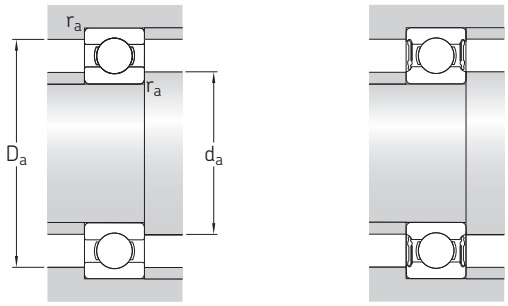
Sealed (2RZ)



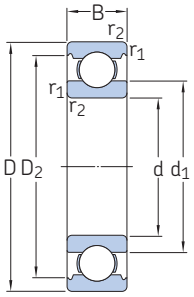

Sealed (2RS1)

| Principal dimensions | | | Basic load ratings dynamic | static | Fatique load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | kg | – |
| **30** | 55 | 13 | 13,8 | 8,3 | 0,355 | 30 000 | 16 000 | 0,11 | ▸ **6006-2RZTN9/HC5C3WT** |
| | 55 | 13 | 13,8 | 8,3 | 0,355 | 30 000 | 19 000 | 0,12 | **6006/HC5C3** |
| | 62 | 16 | 20,3 | 11,2 | 0,475 | 28 000 | 15 000 | 0,18 | ▸ **6206-2RZTN9/HC5C3WT** |
| **35** | 62 | 14 | 16,8 | 10,2 | 0,44 | 26 000 | 14 000 | 0,15 | ▸ **6007-2RZTN9/HC5C3WT** |
| | 62 | 14 | 16,8 | 10,2 | 0,44 | 26 000 | 17 000 | 0,15 | **6007/HC5C3** |
| | 72 | 17 | 27 | 15,3 | 0,655 | 24 000 | 13 000 | 0,26 | ▸ **6207-2RZTN9/HC5C3WT** |
| | 72 | 17 | 27 | 15,3 | 0,655 | 24 000 | 15 000 | 0,29 | **6207/HC5C3** |
| **40** | 68 | 15 | 17,8 | 11 | 0,49 | 24 000 | 12 000 | 0,19 | ▸ **6008-2RZTN9/HC5C3WT** |
| | 68 | 15 | 17,8 | 11 | 0,49 | 24 000 | 15 000 | 0,19 | **6008/HC5C3** |
| | 80 | 18 | 32,5 | 19 | 0,8 | 20 000 | 11 000 | 0,34 | ▸ **6208-2RZTN9/HC5C3WT** |
| | 80 | 18 | 32,5 | 19 | 0,8 | 20 000 | 13 000 | 0,37 | **6208/HC5C3** |
| **45** | 75 | 16 | 22,1 | 14,6 | 0,64 | 20 000 | 13 000 | 0,24 | **6009/HC5C3** |
| | 85 | 19 | 35,1 | 21,6 | 0,915 | 20 000 | 10 000 | 0,42 | ▸ **6209-2RZTN9/HC5C3WT** |
| | 85 | 19 | 35,1 | 21,6 | 0,915 | 20 000 | 12 000 | 0,37 | **6209/HC5C3** |
| | 100 | 25 | 55,3 | 31,5 | 1,34 | – | 4 500 | 0,15 | ▸ **6309-2RS1TN9/HC5C3WT** |
| **50** | 90 | 20 | 37,1 | 23,2 | 0,98 | – | 4 800 | 0,44 | ▸ **6210-2RS1/HC5C3WT** |
| | 90 | 20 | 37,1 | 23,2 | 0,98 | 18 000 | 11 000 | 0,45 | **6210/HC5C3** |
| | 110 | 27 | 65 | 38 | 1,6 | – | 4 300 | 0,99 | ▸ **6310-2RS1/HC5C3WT** |
| | 110 | 27 | 65 | 38 | 1,6 | 16 000 | 10 000 | 1,1 | **6310/HC5C3** |
| **55** | 100 | 21 | 46,2 | 29 | 1,25 | – | 4 300 | 0,59 | ▸ **6211-2RS1/HC5C3WT** |
| | 100 | 21 | 46,2 | 29 | 1,25 | 16 000 | 10 000 | 0,61 | **6211/HC5C3** |
| | 120 | 29 | 74,1 | 45 | 1,9 | – | 3 800 | 1,4 | ▸ **6311-2RS1/HC5C3WT** |
| | 120 | 29 | 74,1 | 45 | 1,9 | 14 000 | 9 000 | 1,35 | **6311/HC5C3** |
| **60** | 110 | 22 | 55,3 | 36 | 1,53 | – | 4 000 | 0,71 | ▸ **6212-2RS1/HC5C3WT** |
| | 110 | 22 | 55,3 | 36 | 1,53 | 15 000 | 9 500 | 0,78 | **6212/HC5C3** |
| | 130 | 31 | 81,9 | 52 | 2,2 | – | 3 400 | 1,75 | ▸ **6312-2RS1/HC5C3WT** |
| | 130 | 31 | 85,2 | 52 | 2,2 | 13 000 | 8 500 | 1,7 | **6312/HC5C3** |
| **65** | 120 | 23 | 58,5 | 40,5 | 1,73 | – | 3 600 | 0,92 | ▸ **6213-2RS1/HC5C3WT** |
| | 120 | 23 | 58,5 | 40,5 | 1,73 | 14 000 | 8 500 | 1 | **6213/HC5C3** |
| | 140 | 33 | 97,5 | 60 | 2,5 | – | 3 200 | 2,15 | ▸ **6313-2RS1/HC5C3WT** |

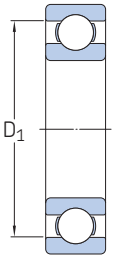
▸ Popular item




| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $d_2$ ≈ | $D_1$ ≈ | $D_2$ ≈ | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | $k_r$ | $f_0$ |
| mm | | | | | | mm | | | | – | |
| **30** | 38,2 | – | – | 49 | 1 | 34,6 | 38,1 | 50,4 | 0,3 | 0,025 | 15 |
| | 38,2 | – | 46,8 | – | 1 | 34,6 | – | 50,4 | 0,3 | 0,025 | 15 |
| | 40,3 | – | – | 54,1 | 1 | 35,6 | 40,3 | 56,4 | 1 | 0,025 | 14 |
| **35** | 43,7 | – | – | 55,6 | 1 | 39,6 | 43,7 | 57,4 | 0,3 | 0,025 | 15 |
| | 43,7 | – | 53,3 | – | 1 | 39,6 | – | 57,4 | 0,3 | 0,025 | 15 |
| | 46,9 | – | – | 62,7 | 1,1 | 42 | 46,8 | 65 | 1 | 0,025 | 14 |
| | 46,9 | – | 60 | – | 1,1 | 42 | – | 65 | 1 | 0,025 | 14 |
| **40** | 49,2 | – | – | 61,1 | 1 | 44,6 | 49,2 | 63,4 | 0,3 | 0,025 | 15 |
| | 49,2 | – | 58,8 | – | 1 | 44,6 | – | 63,4 | 0,3 | 0,025 | 15 |
| | 52,6 | – | – | 69,8 | 1,1 | 47 | 52,5 | 73 | 1 | 0,025 | 14 |
| | 52,6 | – | 67,4 | – | 1,1 | 47 | – | 73 | 1 | 0,025 | 14 |
| **45** | 54,7 | – | 65,3 | – | 1 | 50 | – | 70 | 0,3 | 0,025 | 15 |
| | 57,6 | – | – | 75,2 | 1,1 | 52 | 57,5 | 78 | 1 | 0,025 | 14 |
| | 56,6 | – | 72,4 | – | 1 | 52 | – | 78 | 1 | 0,025 | 14 |
| | – | 54 | – | 86,7 | 1,5 | 54 | 62,1 | 91 | 1,5 | 0,025 | 13 |
| **50** | 62,5 | – | – | 81,6 | 1,1 | 57 | 62,4 | 83 | 1 | 0,025 | 14 |
| | 62,5 | – | – | 81,6 | 1,1 | 57 | – | 83 | 1 | 0,025 | 14 |
| | 68,7 | – | – | 95,2 | 2 | 61 | – | 99 | 1,5 | 0,025 | 13 |
| | 68,7 | – | – | 95,2 | 2 | 61 | – | 99 | 2 | 0,025 | 13 |
| **55** | 69 | – | – | 89,4 | 1,5 | 64 | 69 | 91 | 1,5 | 0,025 | 14 |
| | 69 | – | – | 89,4 | 1,5 | 64 | – | 91 | 1,5 | 0,025 | 14 |
| | 75,3 | – | – | 104 | 2 | 66 | – | 109 | 2 | 0,025 | 13 |
| | 75,3 | – | – | 104 | 2 | 66 | – | 109 | 2 | 0,025 | 13 |
| **60** | 75,5 | – | – | 98 | 1,5 | 69 | 75,4 | 101 | 1,5 | 0,025 | 14 |
| | 75,5 | – | – | 98 | 1,5 | 69 | – | 101 | 1,5 | 0,025 | 14 |
| | 81,8 | – | – | 112 | 2,1 | 72 | – | 118 | 2 | 0,025 | 13 |
| | 81,8 | – | – | 112 | 2,1 | 72 | – | 118 | 2 | 0,025 | 13 |
| **65** | 83,3 | – | – | 106 | 1,5 | 74 | 83,2 | 111 | 1,5 | 0,025 | 15 |
| | 83,3 | – | – | 106 | 1,5 | 74 | – | 111 | 1,5 | 0,025 | 15 |
| | 88,3 | – | – | 121 | 2,1 | 77 | 88,3 | 128 | 2 | 0,025 | 13 |



Sealed (2RS1)

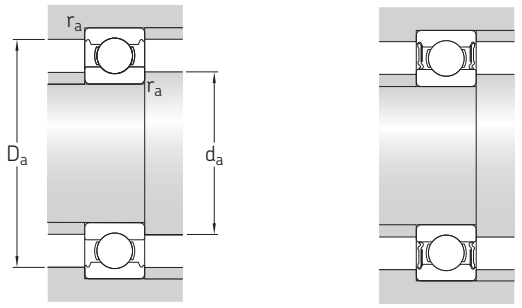



VA970

| Principal dimensions | | | Basic load ratings dynamic | static | Fatique load limit | Speed ratings Reference speed | Limiting speed | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| d | D | B | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | kg | – |
| **70** | 125 | 24 | 63,7 | 45 | 1,9 | – | 3 400 | 1 | ▸ **6214-2RS1/HC5C3WT** |
| | 125 | 24 | 63,7 | 45 | 1,9 | 13 000 | 8 500 | 1,1 | **6214/HC5C3** |
| | 150 | 35 | 111 | 68 | 2,75 | 11 000 | 7 000 | 2,55 | **6314/HC5C3** |
| **75** | 130 | 25 | 68,9 | 49 | 2,04 | – | 3 200 | 1,05 | ▸ **6215-2RS1/HC5C3WT** |
| | 130 | 25 | 68,9 | 49 | 2,04 | 12 000 | 8 000 | 1,2 | **6215/HC5C3** |
| | 160 | 37 | 119 | 76,5 | 3 | 11 000 | 7 000 | 3,05 | **6315/HC5C3** |
| **80** | 140 | 26 | 72,8 | 55 | 2,2 | 11 000 | 7 000 | 1,3 | **6216/HC5C3** |
| | 170 | 39 | 130 | 86,5 | 3,25 | 10 000 | 6 300 | 3,65 | **6316/HC5C3** |
| **85** | 150 | 28 | 87,1 | 64 | 2,5 | 11 000 | 70 000 | 1,8 | **6217/HC5C3** |
| | 180 | 41 | 140 | 96,5 | 3,55 | 9 500 | 6 000 | 4,25 | **6317/HC5C3** |
| **90** | 160 | 30 | 101 | 73,5 | 2,8 | 10 000 | 6 300 | 1,95 | **6218/HC5C3** |
| | 190 | 43 | 151 | 108 | 3,8 | 9 000 | 5 600 | 4,95 | **6318/HC5C3** |
| **95** | 170 | 32 | 114 | 81,5 | 3 | 9 500 | 6 000 | 2,65 | **6219/HC5C3** |
| | 200 | 45 | 159 | 118 | 4,15 | 8 500 | 5 600 | 5,75 | **6319/HC5C3** |
| **100** | 180 | 34 | 127 | 93 | 3,35 | 9 000 | 5 600 | 3,2 | **6220/HC5C3** |
| | 215 | 47 | 182 | 140 | 4,75 | 9 000 | 5 000 | 6,15 | **6320/HC5C3** |
| **110** | 240 | 50 | 197,291 | 175,334 | 4,15 | 8 000 | 4 300 | 9,1 | ▸ **6322/HC5C3S0VA970** |
| **120** | 260 | 55 | 210,618 | 199,897 | 4,55 | 7 000 | 4 000 | 12,5 | ▸ **6324/HC5C3S0VA970** |
| **130** | 280 | 58 | 223,245 | 223,442 | 4,9 | 6 700 | 3 800 | 15,5 | ▸ **6326/HC5C3S0VA970** |
| **140** | 300 | 62 | 279,21 | 265,927 | 7,1 | 6 300 | 3 600 | 15,5 | ▸ **6328/HC5C3S0VA970** |
| **150** | 320 | 65 | 303,174 | 306,454 | 7,8 | 6 000 | 3 200 | 20,5 | ▸ **6330/HC5C3S0VA970** |
| **160** | 340 | 68 | 347,528 | 391,111 | 7,65 | 5 300 | 2 800 | 24 | ▸ **6332/HC5C3S0VA970** |
| **170** | 360 | 72 | 347,528 | 391,111 | 7,65 | 5 300 | 2 800 | 30 | ▸ **6334/HC5C3S0VA970** |
| **180** | 380 | 75 | 330,979 | 391,111 | 7,65 | 5 300 | 2 800 | 36,5 | ▸ **6336/HC5C3PS0VA970** |



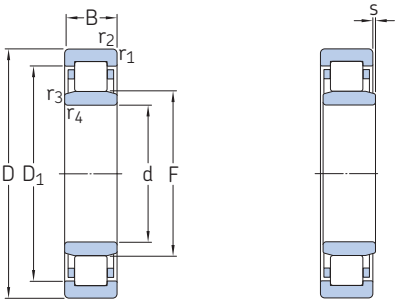
▸ Popular item




| Dimensions | | | | | | Abutment and fillet dimensions | | | | Calculation factors | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | $d_2$ ≈ | $D_1$ ≈ | $D_2$ ≈ | $r_{1,2}$ min. | $d_a$ min. | $d_a$ max. | $D_a$ max. | $r_a$ max. | $k_r$ | $f_0$ |
| mm | | | | | | mm | | | | – | |
| **70** | 87 | – | – | 111 | 1,5 | 79 | 87 | 116 | 1,5 | 0,025 | 15 |
| | 87 | – | – | 111 | 1,5 | 79 | – | 116 | 1,5 | 0,025 | 15 |
| | 94,9 | – | – | 130 | 2,1 | 82 | – | 138 | 2 | 0,025 | 13 |
| **75** | 92 | – | – | 117 | 1,5 | 84 | 92 | 121 | 1,5 | 0,025 | 15 |
| | 92 | – | – | 117 | 1,5 | 84 | – | 121 | 1,5 | 0,025 | 15 |
| | 101 | – | – | 138 | 2,1 | 87 | – | 148 | 2 | 0,025 | 13 |
| **80** | 101 | – | – | 127 | 2 | 91 | – | 129 | 2 | 0,025 | 15 |
| | 108 | – | – | 147 | 2,1 | 92 | – | 158 | 2 | 0,03 | 13 |
| **85** | 106 | – | – | 135 | 2 | 96 | – | 139 | 2 | 0,025 | 15 |
| | 114 | – | – | 155 | 3 | 99 | – | 166 | 2,5 | 0,03 | 13 |
| **90** | 112 | – | – | 143 | 2 | 101 | – | 149 | 2 | 0,025 | 15 |
| | 121 | – | – | 164 | 3 | 104 | – | 176 | 2,5 | 0,03 | 13 |
| **95** | 118 | – | – | 151 | 2,1 | 107 | – | 158 | 2 | 0,025 | 14 |
| | 127 | – | – | 172 | 3 | 109 | – | 186 | 2,5 | 0,03 | 13 |
| **100** | 124 | – | – | 160 | 2,1 | 112 | – | 168 | 2 | 0,025 | 14 |
| | 135 | – | – | 184 | 3 | 114 | – | 201 | 2,5 | 0,03 | 13 |
| **110** | 160 | – | 198 | – | 3 | 124 | – | 226 | 2,5 | 0,03 | 15 |
| **120** | 175 | – | 216 | – | 3 | 134 | – | 246 | 2,5 | 0,03 | 15 |
| **130** | 189 | – | 228 | – | 4 | 147 | – | 263 | 3 | 0,03 | 15 |
| **140** | 189 | – | 250 | – | 4 | 157 | – | 283 | 3 | 0,03 | 14 |
| **150** | 205 | – | 264 | – | 4 | 167 | – | 303 | 3 | 0,03 | 14 |
| **160** | 236 | – | 295 | – | 4 | 177 | – | 323 | 3 | 0,03 | 14 |
| **170** | 236 | – | 295 | – | 4 | 187 | – | 343 | 3 | 0,03 | 14 |
| **180** | 236 | – | 295 | – | 4 | 197 | – | 363 | 3 | 0,03 | 14 |

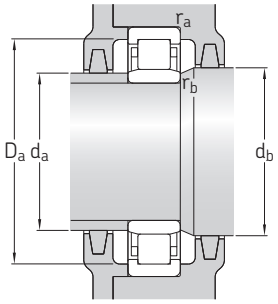
## 21.2 Hybrid cylindrical roller bearings

d **40 – 100** mm




| Principal dimensions | | | Basic load ratings | | Fatique load limit | Speed ratings | | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| | | | dynamic | static | | Reference speed | Limiting speed | | |
| d | D | B | C | $C_0$ | $P_u$ | | | | |
| mm | | | kN | | kN | r/min | | kg | – |
| **40** | 68 | 15 | 25,1 | 26 | 3 | 13 000 | 22 000 | 0,21 | ▸ **NU 1008 ML/HC5C3** |
| **45** | 75 | 16 | 44,6 | 52 | 6,3 | 12 000 | 13 000 | 0,19 | ▸ **NU 1009 ECP/HC5C3** |
| **50** | 80 | 16 | 46,8 | 56 | 6,7 | 11 000 | 12 000 | 0,23 | ▸ **NU 1010 ECP/HC5C3** |
| | 90 | 20 | 64,4 | 69,5 | 7,5 | 9 000 | 11 000 | 0,49 | ▸ **NU 210 ECM/HC5C3** |
| | 110 | 27 | 110 | 112 | 15 | 7 000 | 10 000 | 0,93 | ▸ **NU 310 ECM/HC5C3** |
| **55** | 90 | 18 | 57,2 | 69,5 | 8,3 | 10 000 | 11 000 | 0,4 | ▸ **NU 1011 ECM/HC5C3** |
| | 100 | 21 | 84,2 | 95 | 12,2 | 8 000 | 10 000 | 0,54 | ▸ **NU 211 ECM/HC5C3** |
| | 120 | 29 | 138 | 143 | 18,6 | 6 700 | 9 000 | 1,15 | ▸ **NU 311 ECM/HC5C3** |
| **60** | 95 | 18 | 37,4 | 44 | 5,3 | 9 500 | 10 000 | 0,44 | ▸ **NU 1012 M/HC5C3** |
| | 110 | 22 | 93,5 | 102 | 13,4 | 7 500 | 9 000 | 0,64 | ▸ **NU 212 ECM/HC5C3** |
| | 130 | 31 | 173 | 160 | 21,2 | 6 000 | 8 000 | 1,45 | ▸ **NU 312 ECM/HC5C3** |
| **65** | 100 | 18 | 62,7 | 81,5 | 9,8 | 9 000 | 9 500 | 0,38 | ▸ **NU 1013 ECP/HC5C3** |
| | 120 | 23 | 106 | 118 | 15,6 | 6 700 | 8 500 | 0,83 | ▸ **NU 213 ECM/HC5C3** |
| | 140 | 33 | 183 | 196 | 7,1 | 5 600 | 7 500 | 1,75 | ▸ **NU 313 ECM/HC5C3** |
| **70** | 110 | 20 | 76,5 | 93 | 12 | 8 000 | 8 500 | 0,53 | ▸ **NU 1014 ECP/HC5C3** |
| | 125 | 24 | 119 | 137 | 18 | 6 300 | 8 000 | 1,1 | ▸ **NU 214 ECM/HC5C3** |
| | 150 | 35 | 205 | 228 | 7,1 | 5 300 | 7 000 | 2,15 | ▸ **NU 314 ECM/HC5C3** |
| **75** | 115 | 20 | 58,3 | 71 | 8,5 | 7 500 | 8 500 | 0,61 | ▸ **NU 1015 M/HC5C3** |
| | 130 | 25 | 130 | 156 | 20,4 | 6 000 | 7 500 | 1,2 | **NU 215 ECM/HC5C3** |
| **80** | 125 | 22 | 99 | 127 | 16,3 | 7 000 | 7 500 | 0,88 | ▸ **NU 1016 ECM/HC5C3** |
| | 140 | 26 | 138 | 166 | 21,2 | 5 600 | 7 000 | 1,5 | ▸ **NU 216 ECM/HC5C3** |
| **85** | 130 | 22 | 68,2 | 86,5 | 10,8 | 6 700 | 7 500 | 0,95 | ▸ **NU 1017 M/HC5C3** |
| | 150 | 28 | 165 | 200 | 5,5 | 5 300 | 6 700 | 1,75 | ▸ **NU 217 ECM/HC5C3** |
| **90** | 140 | 24 | 80,9 | 104 | 12,7 | 6 300 | 7 000 | 1,2 | ▸ **NU 1018 M/HC5C3** |
| | 160 | 30 | 183 | 220 | 27 | 5 000 | 6 300 | 2,1 | ▸ **NU 218 ECM/HC5C3** |
| **95** | 145 | 24 | 84,2 | 110 | 13,2 | 6 000 | 10 000 | 1,3 | ▸ **NU 1019 ML/HC5C3** |
| **100** | 150 | 24 | 85,8 | 114 | 13,7 | 6 000 | 6 300 | 1,3 | ▸ **NU 1020 M/HC5C3** |

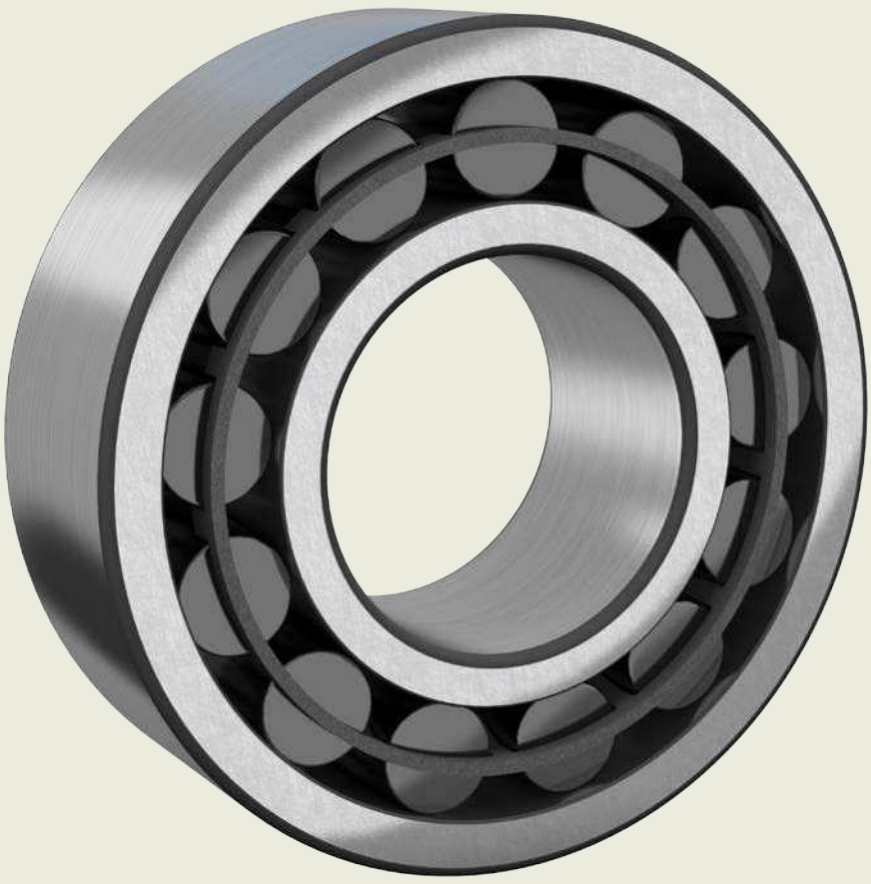
▸ Popular item




| Dimensions | | | | | | Abutment and fillet dimensions | | | | | | Calculation factor |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | $D_1$ ≈ | F | $r_{1,2}$ min. | $r_{3,4}$ min. | s max. | $d_a$ min. | $d_a$ max. | $d_b$ min. | $D_a$ max. | $r_a$ max. | $r_b$ max. | $k_r$ |
| mm | | | | | | mm | | | | | | – |
| **40** | 57,6 | 47 | 1 | 0,6 | 2,4 | 43,2 | 45 | 49 | 63 | 1 | 1 | 0,15 |
| **45** | 65,3 | 52,5 | 1 | 0,6 | 0,9 | 48,2 | 51 | 54 | 70 | 1 | 0,6 | 0,1 |
| **50** | 70 | 57,5 | 1 | 0,6 | 1 | 53,2 | 56 | 60 | 75 | 1 | 1 | 0,1 |
| | 78 | 59,5 | 1,1 | 1,1 | 1,5 | 57 | 57 | 62 | 83 | 1 | 1 | 0,15 |
| | 92,1 | 65 | 2 | 2 | 1,9 | 61 | 63 | 67 | 99 | 2 | 2 | 0,15 |
| **55** | 79 | 64,5 | 1,1 | 1 | 0,5 | 59,6 | 63 | 67 | 84 | 1 | 1 | 0,1 |
| | 86,3 | 66 | 1,5 | 1,1 | 1 | 62 | 64 | 68 | 91 | 1,5 | 1,5 | 0,15 |
| | 101 | 70,5 | 2 | 2 | 2 | 66 | 68 | 73 | 109 | 2 | 2 | 0,15 |
| **60** | 81,6 | 69,5 | 1,1 | 1 | 2,9 | 64,6 | 68 | 72 | 89 | 1 | 1 | 0,1 |
| | 95,7 | 72 | 1,5 | 1,5 | 1,4 | 69 | 70 | 74 | 101 | 1,5 | 1,5 | 0,15 |
| | 110 | 77 | 2,1 | 2,1 | 2,1 | 72 | 74 | 79 | 118 | 2 | 2 | 0,15 |
| **65** | 88,5 | 74 | 1,1 | 1 | 1 | 69,6 | 72 | 77 | 94 | 1 | 1 | 0,1 |
| | 104 | 78,5 | 1,5 | 1,5 | 1,4 | 74 | 76 | 81 | 111 | 1,5 | 1,5 | 0,15 |
| | 119 | 82,5 | 2,1 | 2,1 | 2,2 | 77 | 80 | 85 | 127 | 2 | 2 | 0,15 |
| **70** | 97,5 | 79,5 | 1,1 | 1 | 1,3 | 74,6 | 78 | 82 | 104 | 1 | 1 | 0,1 |
| | 109 | 83,5 | 1,5 | 1,5 | 1,2 | 79 | 81 | 86 | 116 | 1,5 | 1,5 | 0,15 |
| | 127 | 89 | 2,1 | 2,1 | 1,8 | 82 | 86 | 92 | 137 | 2 | 2 | 0,15 |
| **75** | 101 | 85 | 1,1 | 1 | 3 | 79,6 | 83 | 87 | 109 | 1 | 1 | 0,1 |
| | 114 | 88,5 | 1,5 | 1,5 | 1,2 | 84 | 86 | 91 | 121 | 1,5 | 1,5 | 0,15 |
| **80** | 109 | 91,5 | 1,1 | 1 | 3,3 | 86 | 90 | 94 | 119 | 1 | 1 | 0,1 |
| | 123 | 95,3 | 2 | 2 | 1,4 | 91 | 93 | 98 | 129 | 2 | 2 | 0,15 |
| **85** | 114 | 96,5 | 1,1 | 1 | 3,3 | 89,6 | 95 | 99 | 124 | 1 | 1 | 0,1 |
| | 131 | 100,5 | 2 | 2 | 1,5 | 96 | 98 | 103 | 139 | 2 | 2 | 0,15 |
| **90** | 122 | 103 | 1,5 | 1,1 | 3,5 | 96 | 101 | 106 | 133 | 1,5 | 1 | 0,1 |
| | 140 | 107 | 2 | 2 | 1,8 | 101 | 104 | 110 | 149 | 2 | 2 | 0,15 |
| **95** | 127 | 108 | 1,5 | 1,1 | 3,5 | 101 | 106 | 111 | 138 | 1,5 | 1 | 0,15 |
| **100** | 132 | 113 | 1,5 | 1,1 | 3,5 | 106 | 111 | 116 | 143 | 1,5 | 1 | 0,1 |

22

# NoWear coated bearings



# 22 NoWear coated bearings


**Designs and variants** . . . . . **1061**
Cages . . . . . 1061

**Bearing data** . . . . . **1062**

**Bearing service life** . . . . . **1062**

**Loads** . . . . . **1062**
Minimum load . . . . . 1062
Load carrying capacity, equivalent bearing loads . . . . . 1062

**Temperature limits** . . . . . **1062**

**Permissible speed** . . . . . **1062**

**Lubrication** . . . . . **1062**

**Designation system** . . . . . **1062**

# 22 NoWear coated bearings

## More information


**General bearing knowledge** . . . . **17**

**Bearing selection process** . . . . . **59**
Lubrication . . . . . 109
Bearing interfaces. . . . . 139
Seat tolerances for standard conditions . . . . . 148
Selecting internal clearance or preload . . . . . 182
Sealing, mounting and dismounting . . . . . 193


NoWear is a wear-resistant carbon coating that can be applied to the rolling elements and inner ring raceway(s) of a bearing (designation suffix L7DA) or only the rolling elements (designation suffix L5DA) (fig. 1).

A physical vapour deposition process applies the wear-resistant carbon coating. Thickness of the coating ranges from 1 to 3 µm, depending on the size of the bearing. The hardness of the coating is 1 200 HV10.

NoWear coated bearing surfaces retain the toughness of the underlying material while adopting the hardness, improved friction properties and wear-resistance of the coating.

During the running-in period, minute amounts of the coating material are transferred to the counter-surfaces. This coating reduces friction and improves resistance against wear and smearing, even in bearings where only the rolling elements are coated.

## Bearing features

- **Long service life**

- **Withstand severe operating conditions**
  - increased risk of smearing
  - insufficient lubricating film
  - sudden load variations
  - light loads
  - rapid speed changes
  - vibration and oscillations

## Applications

NoWear coated bearings may provide new possibilities for existing applications operating under severe conditions. They can provide new design possibilities while requiring no major design changes. Typical applications where NoWear coated bearings are used include:

- paper machines
- marine and offshore applications
- fans
- compressors
- hydraulic pumps
- gearboxes
- hydraulic motors

NoWear coated bearings are not intended for vacuum or other completely dry running applications. The coating does not act as a barrier against oxygen and is therefore not recommended as a corrosion inhibitor.

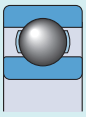
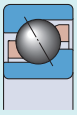
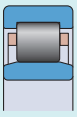
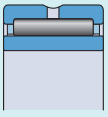
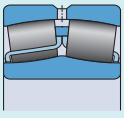
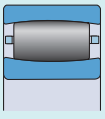
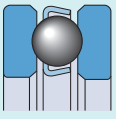
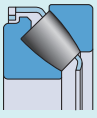
**Fig. 1**

**NoWear coated bearing**

L5DA

Table 1

**NoWear coated bearings – standard assortment**

| Bearing type<br>Symbol | Range | Available variants | |
|---|---|---|---|
|  | **Deep groove ball bearings**<br>d = 15 to 140 mm | L5DA | L7DA |
|  | **Angular contact ball bearings**<br>d = 15 to 140 mm | L5DA | L7DA |
|  | **Cylindrical roller bearings**<br>d = 15 to 220 mm<br>d > 220 mm | L5DA<br>L5DA | L7DA<br>– |
|  | **Needle roller bearings**<br>d = 15 to 220 mm<br>d > 220 mm | L5DA<br>L5DA | L7DA<br>– |
|  | **Spherical roller bearings**<br>d = 15 to 220 mm<br>d > 220 mm | L5DA<br>L5DA | L7DA<br>– |
|  | **CARB toroidal roller bearings**<br>d = 15 to 220 mm<br>d > 220 mm | L5DA<br>L5DA | L7DA<br>– |
|  | **Thrust ball bearings**<br>d = 15 to 110 mm | L5DA | – |
|  | **Spherical roller thrust bearings**<br>all sizes | L5DA | – |

The ranges are general guidelines only and may vary between the dimension series. For additional information, contact SKF.

# Designs and variants

The most commonly used NoWear coated bearings have a coating on only the rolling elements (designation suffix L5DA). They are recommended for applications where the bearing load is light to normal, or where vibration and oscillating movements occur.

NoWear coated bearings that have the inner ring raceway(s) and rolling elements coated (designation suffix L7DA) are recommended for any of the following operating conditions:

- abrasive contaminants that can cause premature wear
- heavy loads
- unusual lubrication conditions such as bearings lubricated by the process media

Most SKF rolling bearings can be supplied as NoWear coated bearings. For variants not listed in **table 1**, contact SKF.

## Cages

Refer to *Cages* in the relevant product section of the standard bearing.

# Bearing data

**Dimension standards, tolerances, internal clearance, permissible misalignment**

Refer to *Bearing data* in the relevant product section of the standard bearing.

# Bearing service life

The extended bearing service life that NoWear can provide in high-speed, lightly loaded applications is difficult to calculate and depends on a variety of factors. However, experience has shown a multifold improvement in bearing service life.

For greased bearings that operate at speeds near or above the permissible speed, or at high temperatures that shorten the grease life, using NoWear potentially extends relubrication intervals.

When operating under marginal lubrication conditions, NoWear can extend bearing service life.

# Loads

## Minimum load

Owing to the material combination of NoWear/steel in the contact area, the risk of smearing damage is reduced. NoWear coated bearings are recommended for applications with light loads in combination with high speeds, where smearing damage is an issue.

## Load carrying capacity, equivalent bearing loads

Refer to *Loads* in the relevant product section of the standard bearing.

# Temperature limits

For temperature limits of the bearing, refer to *Temperature limits* in the relevant product section of the standard bearing.

The NoWear coating withstands temperatures up to 350 °C *(660 °F)*.

# Permissible speed

Refer to *Permissible speed* in the relevant product section of the standard bearing.

# Lubrication

In general, the same lubrication guidelines are valid for NoWear coated bearings as for standard bearings (*Lubrication*, **page 110**). However, NoWear coated bearings can operate reliably even where adequate surface separation cannot be achieved. NoWear acts as a protective layer and may reduce the need for EP and AW additives in the lubricant.

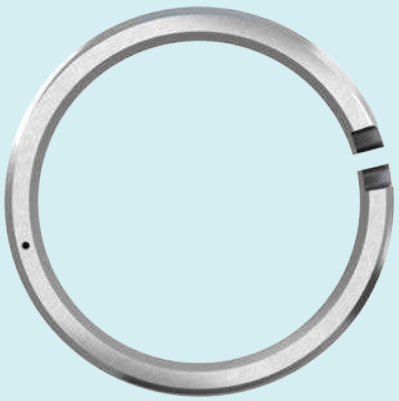
# Designation system

Refer to *Designation system* in the relevant product section of the standard bearing.

The designation suffixes used to identify NoWear coated bearings are:

**L5DA** Coated rolling elements
**L7DA** Coated rolling elements and inner ring raceway(s)

# 23 Adapter sleeves



# 23 Adapter sleeves


**Designs and variants** . . . . . **1067**
Sleeves for oil injection . . . . . 1068
Sleeves for CARB toroidal roller bearings . . . . . 1069
Sleeves for sealed bearings . . . . . 1069

**Product data** . . . . . **1070**
(Dimension standards, tolerances, external taper, thread, shaft tolerances)

**Designation system** . . . . . **1071**

**Product tables**
23.1 Adapter sleeves for metric shafts . . . . . 1072
23.2 Adapter sleeves with inch dimensions. . . . . 1076

# 23 Adapter sleeves

## More information

**SKF maintenance products** → skf.com/mapro

*SKF bearing maintenance handbook* ISBN 978-91-978966-4-1

Adapter sleeves are the most commonly used components for locating bearings with a tapered bore onto a cylindrical seat as they can be used on (**fig. 1**):

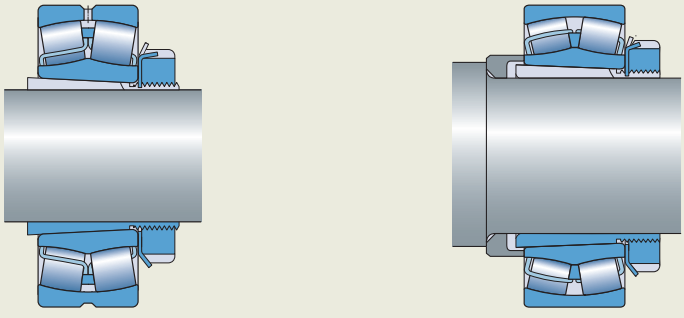
- plain shafts
- stepped shafts

They are easy to install and require no additional location on the shaft:

- When used on plain shafts, the bearing can be located at any position on the shaft.
- When used on stepped shafts together with an L-shaped spacer ring, the bearing can be accurately positioned axially, thereby facilitating bearing mounting and dismounting.

**Fig. 1**

**Adapter sleeve assemblies**



On a plain shaft

On a stepped shaft

# Designs and variants

SKF supplies:

- metric adapter sleeves
  - with a metric bore
  - with an inch bore

    These sleeves are not listed in this catalogue, but can be found online at skf.com/go/17000-23-3.
- inch adapter sleeves

The sleeves are slit and are supplied complete with a lock nut and locking device (**fig. 2**):

- Smaller sizes have a nut and a lock washer.
- Larger sizes have a nut and a locking clip or locking plate.

Metric sleeves:

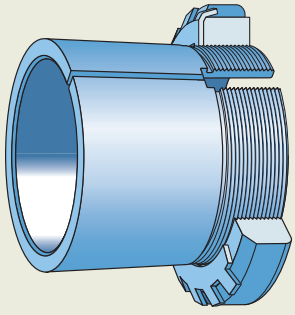
- with a bore diameter ≤ 180 mm (size ≤ 40) are phosphated
- with a bore diameter > 180 mm are coated with a solventless rust inhibitor

Inch sleeves are coated with a solventless rust inhibitor.

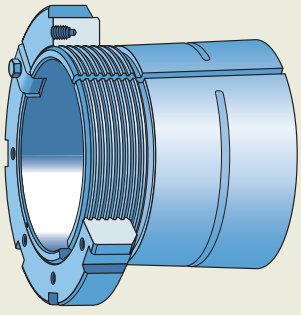
Adapter sleeves listed in the **product tables, page 1072**, constitute the standard SKF assortment and are only part of the complete assortment. For larger sizes (bore diameter ≥ 1 060 mm) and variants not listed, contact SKF.

**Fig. 2**

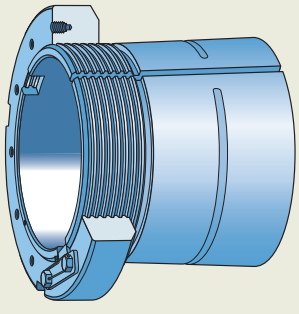
**Basic designs**



Sleeve with a nut and washer



Sleeve with a nut and clip



Sleeve with a nut and plate

# Sleeves for oil injection

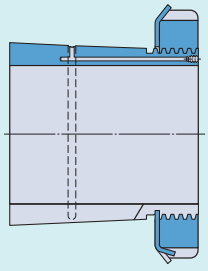
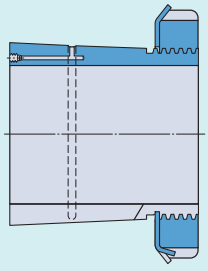
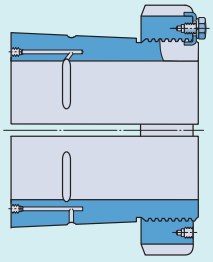
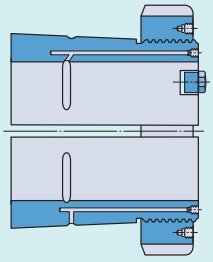
- enable use of the oil injection method to mount and dismount bearings
- are equipped with the necessary oil supply ducts and distribution grooves
  - as standard for metric sleeves with a bore diameter ≥ 200 mm (size ≥ 44)
  - on request for metric sleeves with a bore diameter ≥ 140 mm to < 200 mm
  - on request for inch sleeves with a bore diameter ≥ 4 5/16 inches (size ≥ 26)
- include OH (metric) series, and OSNW and OSNP (inch) series

Thread details for the oil supply ducts and the appropriate hydraulic nut designations are listed in the **product tables**, **page 1072**. For information about oil injection equipment, refer to the catalogue *SKF Maintenance and Lubrication Products* or online at skf.com/mapro.

SKF manufactures sleeves for oil injection in four variants (**table 1**). Those with a designation suffix H are the SKF standard.

**Table 1**

**Adapter sleeves for oil injection**

| |  <br>OH .. H<br>OSNW .. H<br>OSNP .. H |  <br>OH ..<br>OSNW ..<br>OSNP .. |  <br>OH .. B<br>OSNW .. B<br>OSNP .. B |  <br>OH .. HB<br>OSNW .. HB<br>OSNP .. HB |
|---|---|---|---|---|
| **Designation suffix** | H | None | B | HB |
| **No. of oil supply ducts**[1] **for:** | | | | |
| • all sleeves with a bore diameter < 200 mm | 1 | 1 | 1 | 1 |
| • metric sleeves with a bore diameter ≥ 200 mm | 1 | 1 | 2 | 2 |
| • inch sleeves with a bore diameter ≥ 4 5/16 inches (made to order) | 1 | 1 | 2 | 2 |
| **Position of oil supply duct(s)** | At the threaded end of the sleeve | At the end opposite the threaded section | At the end opposite the threaded section | At the threaded end of the sleeve |
| **Position of distribution groove(s)** | In the outside surface | In the outside surface | In the bore and in the outside surface | In the bore and in the outside surface |

[1] When sleeves have two supply ducts, each duct feeds one of the distribution grooves. An arrow on the sleeve side face, next to the duct inlet, indicates which groove the duct feeds.

# Sleeves for CARB toroidal roller bearings

- are specially designed to prevent the locking device from interfering with the cage

SKF manufactures sleeves for CARB toroidal roller bearings in three variants (fig. 3):

- **Sleeves with the designation suffix E**
  - are supplied with a KMFE lock nut in place of the standard KM lock nut and MB lock washer
  - are supplied with an HME lock nut in place of the standard HM 30 or HM 31 lock nut
- **Sleeves with the designation suffix L**
  - are supplied with a KML lock nut and MBL lock washer, both with low cross-sectional height, in place of the standard KM lock nut and MB lock washer
- **Sleeves with the designation suffix TL**
  - are supplied with an HM 30 lock nut and MS 30 locking clip, both with low cross-sectional height, in place of the standard HM .. T lock nut and MB lock washer

When using CARB bearings, check that there is sufficient space on both sides of the bearing to accommodate axial displacement.

# Sleeves for sealed bearings

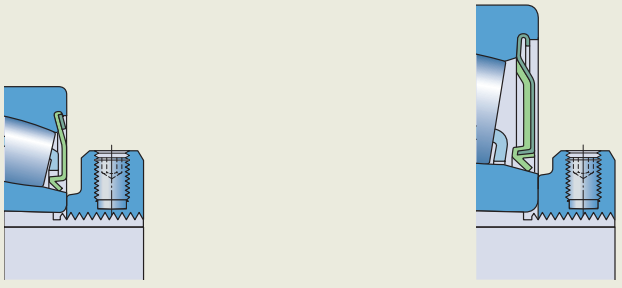
- are specially designed to prevent the locking device from interfering with the seals of sealed spherical roller bearings and sealed self-aligning ball bearings
- have the designation suffixes E, EL, EH, L, and TL (fig. 3 and fig. 4)

Adapter sleeve assemblies with the designation suffix EL or EH are supplied with one of the following, respectively:

- a KMFE .. L lock nut, which has a lower abutment diameter than the standard KMFE lock nut
- a KMFE .. H lock nut, which has a higher abutment diameter than the standard KMFE lock nut

**Fig. 4**

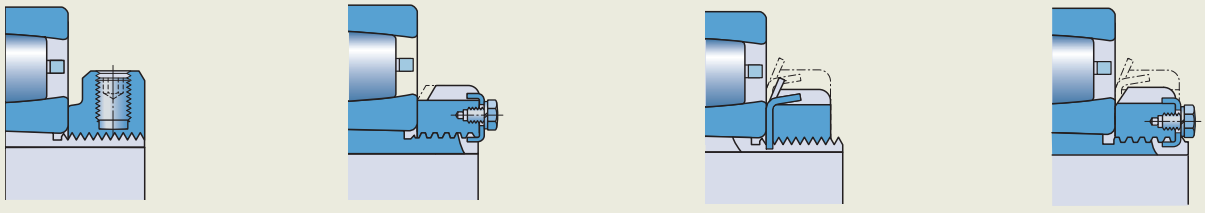
**Adapter sleeve assemblies for sealed bearings (with a KMFE lock nut)**



EL EH

**Fig. 3**

**Adapter sleeve assemblies for CARB toroidal roller bearings**

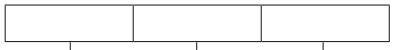


E (with a KMFE nut) E (with an HME nut) L TL

# Product data

| | Metric series | Inch series |
|---|---|---|
| **Dimension standards** | ISO 2982-1, except for the bore diameter of sleeves for inch shafts | ANSI/ABMA Std. 8.2 |
| **Tolerances** | Bore diameter: JS9<br>Width: h15 | |
| **External taper** | 1:12 as standard<br>1:30 as standard in the 40 and 41 dimension series | |
| **Thread** | **Bore diameter < 200 mm (size ≤ 40):**<br>metric thread in accordance with ISO 965-3, matching the included SKF lock nut<br><br>**Bore diameter ≥ 200 mm (size ≥ 44):**<br>metric trapezoidal thread in accordance with ISO 2903, matching the included SKF lock nut | **Bore diameter ≤ 12 in. (size ≤ 64):**<br>Unified Special Form ANSI/ASME B1.1<br><br>**Bore diameter ≥ 12 7/16 in. (size ≥ 68):**<br>ACME thread class 3G |
| **Shaft tolerances** | h9Ⓔ<br>Total radial run-out: IT5/2 – ISO 1101<br>Adapter sleeves adjust to the shaft diameter so that wider diameter tolerances can be permitted compared to the seat of a bearing with a cylindrical bore. However, the geometrical tolerances must be kept within narrow limits as they directly affect the shaft positioning and vibration. | |

# Designation system



**Product type**

| | |
|---|---|
| **H** | Adapter sleeve, dimensions in accordance with ISO standard, basic design |
| **HA** | Adapter sleeve, dimensions in accordance with ISO standard, except the bore, in 1/16 in. |
| **HE** | Adapter sleeve, dimensions in accordance with ISO standard, except the bore, in 1/4 in. |
| **HS** | Adapter sleeve, dimensions in accordance with ISO standard, except the bore, in 1/8 in. |
| **OH** | Adapter sleeve, dimensions in accordance with ISO standard, prepared for oil injection |
| **OSNP** | Adapter sleeve, dimensions in accordance with ANSI standard, prepared for oil injection, with a locking plate |
| **OSNW** | Adapter sleeve, dimensions in accordance with ANSI standard, prepared for oil injection, with a lock washer |
| **SNP** | Adapter sleeve, dimensions in accordance with ANSI standard, with a locking plate |
| **SNW** | Adapter sleeve, dimensions in accordance with ANSI standard, with a lock washer |
| **KH** | Unthreaded sleeve, basic design |
| **KOH** | Unthreaded sleeve, prepared for oil injection |

**Size identification**

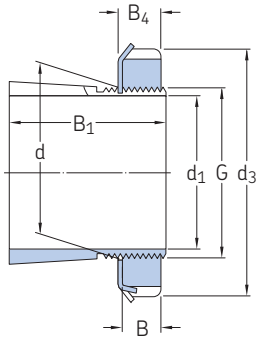
Listed in the **product tables**, **page 1072**

**Suffixes**

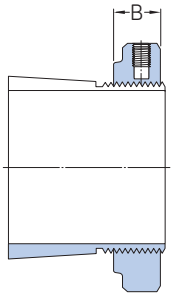
| | |
|---|---|
| **B** | For adapter sleeves for oil injection: One or two oil supply ducts at the end opposite the threaded section<br>For adapter sleeves for inch shafts: Whitworth thread |
| **D** | Sleeve split in two halves |
| **E** | Adapter sleeve without key slot, with a KMFE lock nut or standard adapter sleeve with an HME lock nut |
| **EH** | Adapter sleeve without key slot, with a KMFE .. H lock nut |
| **EL** | Adapter sleeve without key slot, with a KMFE .. L lock nut |
| **G** | Thread diameter changed according to revised ISO standard |
| **H** | One oil supply duct at the threaded end |
| **HB** | One or two oil supply ducts at the threaded end |
| **L** | Adapter sleeve with a lock nut with lower cross-sectional height |
| **TL** | Same as L, but with key slot positions for a locking clip |

# 23.1 Adapter sleeves for metric shafts

$d_1$ **17 – 180** mm




H




H .. E

| Principal dimensions | | | | | | | | | | | Mass | Designations | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Adapter sleeve assembly | Included products lock nut | locking device | Associated hydraulic nut |
| $d_1$ | d | $d_3$ | $B_1$ | B | $B_4$ | $B_5$ | G | $G_2$ | $G_3$ | A | | | | | |
| mm | | | | | | | | | | | kg | – | | | |
| **17** | 20 | 32 | 24 | 6 | 7 | – | M 20x1 | – | – | – | 0,036 | ▸ **H 204** | KM 4 | MB 4 | – |
| | 20 | 32 | 28 | 6 | 7 | – | M 20x1 | – | – | – | 0,04 | **H 304** | KM 4 | MB 4 | – |
| | 20 | 38 | 28 | 10,5 | – | – | M 20x1 | – | – | – | 0,047 | **H 304 E** | KMFE 4 | – | – |
| **20** | 25 | 38 | 26 | 7 | 8 | – | M 25x1,5 | – | – | – | 0,064 | ▸ **H 205** | KM 5 | MB 5 | – |
| | 25 | 38 | 29 | 7 | 8 | – | M 25x1,5 | – | – | – | 0,071 | ▸ **H 305** | KM 5 | MB 5 | – |
| | 25 | 38 | 29 | 10,5 | – | – | M 25x1,5 | – | – | – | 0,076 | **H 305 E** | KMFE 5 | – | – |
| **25** | 30 | 45 | 27 | 7 | 8 | – | M 30x1,5 | – | – | – | 0,086 | ▸ **H 206** | KM 6 | MB 6 | – |
| | 30 | 45 | 31 | 7 | 8 | – | M 30x1,5 | – | – | – | 0,095 | ▸ **H 306** | KM 6 | MB 6 | – |
| | 30 | 45 | 31 | 10,5 | – | – | M 30x1,5 | – | – | – | 0,11 | **H 306 E** | KMFE 6 | – | – |
| **30** | 35 | 52 | 29 | 8 | 9 | – | M 35x1,5 | – | – | – | 0,12 | ▸ **H 207** | KM 7 | MB 7 | – |
| | 35 | 52 | 35 | 8 | 9 | – | M 35x1,5 | – | – | – | 0,14 | ▸ **H 307** | KM 7 | MB 7 | – |
| | 35 | 52 | 35 | 11,5 | – | – | M 35x1,5 | – | – | – | 0,15 | **H 307 E** | KMFE 7 | – | – |
| **35** | 40 | 58 | 31 | 9 | 10 | – | M 40x1,5 | – | – | – | 0,16 | ▸ **H 208** | KM 8 | MB 8 | – |
| | 40 | 58 | 36 | 9 | 10 | – | M 40x1,5 | – | – | – | 0,17 | ▸ **H 308** | KM 8 | MB 8 | – |
| | 40 | 58 | 36 | 13 | – | – | M 40x1,5 | – | – | – | 0,19 | ▸ **H 308 E** | KMFE 8 | – | – |
| **40** | 45 | 65 | 33 | 10 | 11 | – | M 45x1,5 | – | – | – | 0,21 | ▸ **H 209** | KM 9 | MB 9 | – |
| | 45 | 65 | 39 | 10 | 11 | – | M 45x1,5 | – | – | – | 0,23 | ▸ **H 309** | KM 9 | MB 9 | – |
| | 45 | 65 | 39 | 13 | – | – | M 45x1,5 | – | – | – | 0,24 | ▸ **H 309 E** | KMFE 9 | – | – |
| **45** | 50 | 70 | 35 | 11 | 12 | – | M 50x1,5 | – | – | – | 0,24 | ▸ **H 210** | KM 10 | MB 10 | HMV 10E |
| | 50 | 70 | 42 | 11 | 12 | – | M 50x1,5 | – | – | – | 0,27 | ▸ **H 310** | KM 10 | MB 10 | HMV 10 E |
| | 50 | 70 | 42 | 14 | – | – | M 50x1,5 | – | – | – | 0,3 | ▸ **H 310 E** | KMFE 10 | – | HMV 10 E |
| **50** | 55 | 75 | 37 | 11 | 12,5 | – | M 55x2 | – | – | – | 0,28 | ▸ **H 211** | KM 11 | MB 11 | HMV 11E |
| | 55 | 75 | 45 | 11 | 12,5 | – | M 55x2 | – | – | – | 0,32 | ▸ **H 311** | KM 11 | MB 11 | HMV 11 E |
| | 55 | 75 | 45 | 14 | – | – | M 55x2 | – | – | – | 0,34 | ▸ **H 311 E** | KMFE 11 | – | HMV 11 E |
| **55** | 60 | 80 | 38 | 11 | 13 | – | M 60x2 | – | – | – | 0,31 | ▸ **H 212** | KM 12 | MB 12 | HMV 12E |
| | 60 | 80 | 47 | 11 | 13 | – | M 60x2 | – | – | – | 0,36 | ▸ **H 312** | KM 12 | MB 12 | HMV 12 E |
| | 60 | 80 | 47 | 14 | – | – | M 60x2 | – | – | – | 0,4 | ▸ **H 312 E** | KMFE 12 | – | HMV 12 E |
| **60** | 65 | 85 | 40 | 12 | 13,5 | – | M 65x2 | – | – | – | 0,36 | ▸ **H 213** | KM 13 | MB 13 | HMV 13E |
| | 65 | 85 | 50 | 12 | 13,5 | – | M 65x2 | – | – | – | 0,42 | ▸ **H 313** | KM 13 | MB 13 | HMV 13 E |
| | 65 | 85 | 50 | 15 | – | – | M 65x2 | – | – | – | 0,43 | ▸ **H 313 E** | KMFE 13 | – | HMV 13 E |
| | 65 | 85 | 65 | 15 | – | – | M 65x2 | – | – | – | 0,53 | **H 2313 E** | KMFE 13 | – | HMV 13 E |
| | 70 | 92 | 52 | 12 | 13,5 | – | M 70x2 | – | – | – | 0,67 | ▸ **H 314** | KM 14 | MB 14 | HMV 14 E |
| | 70 | 92 | 52 | 15 | – | – | M 70x2 | – | – | – | 0,67 | **H 314 E** | KMFE 14 | – | HMV 14 E |
| **65** | 75 | 98 | 43 | 13 | 14,5 | – | M 75x2 | – | – | – | 0,66 | ▸ **H 215** | KM 15 | MB 15 | HMV 15E |
| | 75 | 98 | 55 | 13 | 14,5 | – | M 75x2 | – | – | – | 0,78 | ▸ **H 315** | KM 15 | MB 15 | HMV 15 E |
| | 75 | 98 | 55 | 16 | – | – | M 75x2 | – | – | – | 0,82 | ▸ **H 315 E** | KMFE 15 | – | HMV 15 E |

▸ Popular item

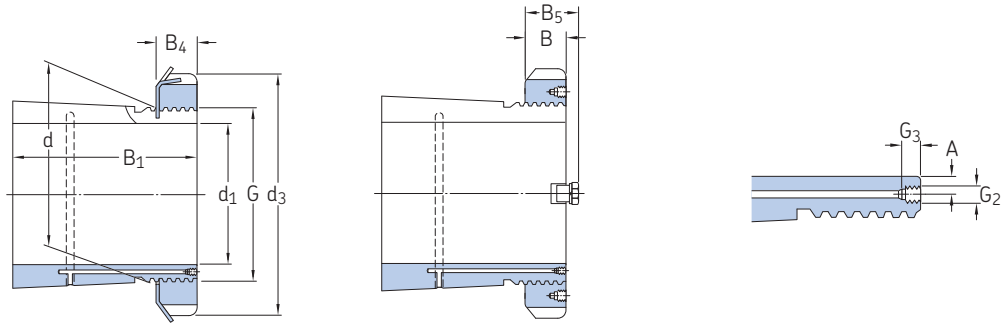
| Principal dimensions | | | | | | | | | | | Mass | Designations | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Adapter sleeve assembly | Included products | | Associated hydraulic nut |
| | | | | | | | | | | | | | lock nut | locking device | |
| $d_1$ | d | $d_3$ | $B_1$ | B | $B_4$ | $B_5$ | G | $G_2$ | $G_3$ | A | | | | | |
| mm | | | | | | | | | | | kg | – | | | |
| **70** | 80 | 105 | 46 | 15 | 17 | – | M 80x2 | – | – | – | 0,81 | ▸ **H 216** | KM 16 | MB 16 | HMV 16E |
| | 80 | 105 | 59 | 15 | 17 | – | M 80x2 | – | – | – | 0,95 | ▸ **H 316** | KM 16 | MB 16 | HMV 16 E |
| | 80 | 105 | 59 | 18 | – | – | M 80x2 | – | – | – | 1 | ▸ **H 316 E** | KMFE 16 | – | HMV 16 E |
| **75** | 85 | 110 | 50 | 16 | 18 | – | M 85x2 | – | – | – | 0,94 | ▸ **H 217** | KM 17 | MB 17 | HMV 17E |
| | 85 | 110 | 63 | 16 | 18 | – | M 85x2 | – | – | – | 1,1 | ▸ **H 317** | KM 17 | MB 17 | HMV 17 E |
| | 85 | 110 | 63 | 19 | – | – | M 85x2 | – | – | – | 1,15 | ▸ **H 317 E** | KMFE 17 | – | HMV 17 E |
| **80** | 90 | 120 | 52 | 16 | 18 | – | M 90x2 | – | – | – | 1,1 | ▸ **H 218** | KM 18 | MB 18 | HMV 18E |
| | 90 | 120 | 65 | 16 | 18 | – | M 90x2 | – | – | – | 1,3 | ▸ **H 318** | KM 18 | MB 18 | HMV 18 E |
| | 90 | 120 | 65 | 19 | – | – | M 90x2 | – | – | – | 1,45 | ▸ **H 318 E** | KMFE 18 | – | HMV 18 E |
| **85** | 95 | 125 | 55 | 17 | 19 | – | M 95x2 | – | – | – | 1,25 | ▸ **H 219** | KM 19 | MB 19 | HMV 19E |
| | 95 | 125 | 68 | 17 | 19 | – | M 95x2 | – | – | – | 1,4 | ▸ **H 319** | KM 19 | MB 19 | HMV 19 E |
| | 95 | 125 | 68 | 20 | – | – | M 95x2 | – | – | – | 1,45 | **H 319 E** | KMFE 19 | – | HMV 19 E |
| **90** | 100 | 130 | 58 | 18 | 20 | – | M 100x2 | – | – | – | 1,4 | ▸ **H 220** | KM 20 | MB 20 | HMV 20E |
| | 100 | 130 | 71 | 18 | 20 | – | M 100x2 | – | – | – | 1,6 | ▸ **H 320** | KM 20 | MB 20 | HMV 20 E |
| | 100 | 130 | 71 | 21 | – | – | M 100x2 | – | – | – | 1,7 | ▸ **H 320 E** | KMFE 20 | – | HMV 20 E |
| | 100 | 130 | 76 | 18 | 20 | – | M 100x2 | – | – | – | 1,8 | ▸ **H 3120** | KM 20 | MB 20 | HMV 20 E |
| | 100 | 130 | 76 | 21 | – | – | M 100x2 | – | – | – | 1,8 | **H 3120 E** | KMFE 20 | – | HMV 20 E |
| | 100 | 130 | 97 | 21 | – | – | M 100x2 | – | – | – | 2 | **H 2320 E** | KMFE 20 | – | HMV 20 E |
| **100** | 110 | 145 | 63 | 19 | 21 | – | M 110x2 | – | – | – | 1,8 | ▸ **H 222** | KM 22 | MB 22 | HMV 22E |
| | 110 | 145 | 77 | 19 | 21 | – | M 110x2 | – | – | – | 2,05 | ▸ **H 322** | KM 22 | MB 22 | HMV 22 E |
| | 110 | 145 | 77 | 21,5 | – | – | M 110x2 | – | – | – | 2,1 | ▸ **H 322 E** | KMFE 22 | – | HMV 22 E |
| | 110 | 145 | 81 | 19 | 21 | – | M 110x2 | – | – | – | 2,1 | ▸ **H 3122** | KM 22 | MB 22 | HMV 22 E |
| | 110 | 145 | 81 | 21,5 | – | – | M 110x2 | – | – | – | 2,15 | **H 3122 E** | KMFE 22 | – | HMV 22 E |
| | 110 | 145 | 105 | 21,5 | – | – | M 110x2 | – | – | – | 2,75 | **H 2322 E** | KMFE 22 | – | HMV 22 E |
| **110** | 120 | 155 | 72 | 26 | – | – | M 120x2 | – | – | – | 1,85 | **H 3024 E** | KMFE 24 | – | HMV 24 E |
| | 120 | 155 | 88 | 20 | 22 | – | M 120x2 | – | – | – | 2,5 | ▸ **H 3124** | KM 24 | MB 24 | HMV 24 E |
| | 120 | 155 | 112 | 26 | – | – | M 120x2 | – | – | – | 3,1 | **H 2324 E** | KMFE 24 | – | HMV 24 E |
| **115** | 130 | 165 | 80 | 28 | – | – | M 130x2 | – | – | – | 2,9 | **H 3026 E** | KMFE 26 | – | HMV 26 E |
| | 130 | 165 | 92 | 21 | 23 | – | M 130x2 | – | – | – | 3,45 | ▸ **H 3126** | KM 26 | MB 26 | HMV 26 E |
| **125** | 140 | 180 | 82 | 28 | – | – | M 140x2 | – | – | – | 3,05 | **H 3028 E** | KMFE 28 | – | HMV 28 E |
| | 140 | 180 | 97 | 22 | 24 | – | M 140x2 | – | – | – | 4,1 | ▸ **H 3128** | KM 28 | MB 28 | HMV 28 E |
| **135** | 150 | 195 | 87 | 30 | – | – | M 150x2 | – | – | – | 3,75 | **H 3030 E** | KMFE 30 | – | HMV 30 E |
| | 150 | 195 | 111 | 24 | 26 | – | M 150x2 | – | – | – | 5,25 | ▸ **H 3130** | KM 30 | MB 30 | HMV 30 E |
| | 150 | 195 | 111 | 30 | – | – | M 150x2 | – | – | – | 4,7 | **H 3130 E** | KMFE 30 | – | HMV 30 E |
| **140** | 160 | 210 | 93 | 32 | – | – | M 160x3 | – | – | – | 5,1 | **H 3032 E** | KMFE 32 | – | HMV 32 E |
| | 160 | 210 | 119 | 25 | 28 | – | M 160x3 | – | – | – | 7,25 | ▸ **H 3132** | KM 32 | MB 32 | HMV 32 E |
| | 160 | 210 | 119 | 32 | – | – | M 160x3 | – | – | – | 7,35 | **H 3132 E** | KMFE 32 | – | HMV 32 E |
| **150** | 170 | 220 | 101 | 33 | – | – | M 170x3 | – | – | – | 5,9 | **H 3034 E** | KMFE 34 | – | HMV 34 E |
| | 170 | 220 | 122 | 26 | 29 | – | M 170x3 | – | – | – | 8,1 | ▸ **H 3134** | KM 34 | MB 34 | HMV 34 E |
| | 170 | 220 | 122 | 33 | – | – | M 170x3 | – | – | – | 8,1 | **H 3134 E** | KMFE 34 | – | HMV 34 E |
| **160** | 180 | 230 | 109 | 34 | – | – | M 180x3 | – | – | – | 6,7 | **H 3036 E** | KMFE 36 | – | HMV 36 E |
| | 180 | 230 | 131 | 27 | 29,5 | – | M 180x3 | – | – | – | 9,15 | ▸ **H 3136** | KM 36 | MB 36 | HMV 36 E |
| **170** | 190 | 240 | 141 | 28 | 30,5 | – | M 190x3 | – | – | – | 10,5 | ▸ **H 3138** | KM 38 | MB 38 | HMV 38 E |
| **180** | 200 | 250 | 150 | 29 | 31,5 | – | M 200x3 | – | – | – | 12 | ▸ **H 3140** | KM 40 | MB 40 | HMV 40 E |



▸ Popular item

## 23.1 Adapter sleeves for metric shafts

$d_1$ **200 – 500** mm



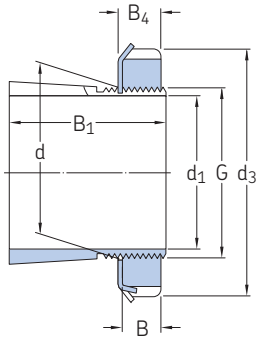

| Principal dimensions | | | | | | | | | | | Mass | Designations | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Adapter sleeve assembly | Included products lock nut | locking device | Associated hydraulic nut |
| $d_1$ | d | $d_3$ | $B_1$ | B | $B_4$ | $B_5$ | G | $G_2$ | $G_3$ | A | | | | | |
| mm | | | | | | | | | | | kg | – | | | |
| **200** | 220 | 260 | 126 | 30 | – | 41 | Tr 220x4 | M 6 | 9 | 6,5 | 9,9 | ▸ **OH 3044 H** | HM 3044 | MS 3044 | HMV 44E |
| | 220 | 280 | 161 | 32 | 35 | – | Tr 220x4 | M 6 | 9 | 4,2 | 15 | ▸ **OH 3144 H** | HM 44 T | MB 44 | HMV 44E |
| **220** | 240 | 290 | 133 | 34 | – | 46 | Tr 240x4 | M 6 | 9 | 4,2 | 12 | ▸ **OH 3048 H** | HM 3048 | MS 3052-48 | HMV 48E |
| | 240 | 300 | 172 | 34 | 37 | – | Tr 240x4 | M 6 | 9 | 4,2 | 16,5 | ▸ **OH 3148 H** | HM 48 T | MB 48 | HMV 48E |
| **240** | 260 | 310 | 145 | 34 | – | 46 | Tr 260x4 | M 6 | 9 | 4,2 | 13,5 | ▸ **OH 3052 H** | HM 3052 | MS 3052-48 | HMV 52E |
| | 260 | 330 | 190 | 36 | 39 | – | Tr 260x4 | M 6 | 9 | 4,2 | 21 | ▸ **OH 3152 H** | HM 52 T | MB 52 | HMV 52E |
| **260** | 280 | 330 | 152 | 38 | – | 50 | Tr 280x4 | M 6 | 9 | 6,5 | 16 | ▸ **OH 3056 H** | HM 3056 | MS 3056 | HMV 56E |
| | 280 | 350 | 195 | 38 | 41 | – | Tr 280x4 | M 6 | 9 | 4,2 | 23 | ▸ **OH 3156 H** | HM 56 T | MB 56 | HMV 56E |
| **280** | 300 | 360 | 168 | 42 | – | 54 | Tr 300x4 | M 6 | 9 | 6,5 | 20,5 | ▸ **OH 3060 H** | HM 3060 | MS 3060 | HMV 60E |
| | 300 | 380 | 208 | 40 | – | 53 | Tr 300x4 | M 6 | 9 | 4,2 | 29 | ▸ **OH 3160 H** | HM 3160 | MS 3160 | HMV 60E |
| | 300 | 380 | 240 | 40 | – | 53 | Tr 300x4 | M 6 | 9 | 4,2 | 32 | ▸ **OH 3260 H** | HM 3160 | MS 3160 | HMV 60E |
| **300** | 320 | 380 | 171 | 42 | – | 55 | Tr 320x5 | M 6 | 9 | 6,5 | 22 | ▸ **OH 3064 H** | HM 3064 | MS 3068-64 | HMV 64E |
| | 320 | 400 | 226 | 42 | – | 56 | Tr 320x5 | M 6 | 9 | 4 | 32 | ▸ **OH 3164 H** | HM 3164 | MS 3164 | HMV 64E |
| | 320 | 400 | 258 | 42 | – | 56 | Tr 320x5 | M 6 | 9 | 4 | 35 | **OH 3264 H** | HM 3164 | MS 3164 | HMV 64E |
| **320** | 340 | 400 | 187 | 45 | – | 58 | Tr 340x5 | M 6 | 9 | 6,5 | 27 | ▸ **OH 3068 H** | HM 3068 | MS 3068-64 | HMV 68E |
| | 340 | 440 | 254 | 55 | – | 72 | Tr 340x5 | M 6 | 9 | 4 | 50 | ▸ **OH 3168 H** | HM 3168 | MS 3172-68 | HMV 68E |
| | 340 | 440 | 288 | 55 | – | 72 | Tr 340x5 | M 6 | 9 | 4 | 51,5 | ▸ **OH 3268 H** | HM 3168 | MS 3172-68 | HMV 68E |
| **340** | 360 | 420 | 188 | 45 | – | 58 | Tr 360x5 | M 6 | 9 | 6,5 | 29 | ▸ **OH 3072 H** | HM 3072 | MS 3072 | HMV 72E |
| | 360 | 460 | 259 | 58 | – | 75 | Tr 360x5 | M 6 | 9 | 4 | 56 | ▸ **OH 3172 H** | HM 3172 | MS 3172-68 | HMV 72E |
| | 360 | 460 | 299 | 58 | – | 75 | Tr 360x5 | M 6 | 9 | 4 | 60,5 | **OH 3272 H** | HM 3172 | MS 3172-68 | HMV 72E |
| **360** | 380 | 450 | 193 | 48 | – | 62 | Tr 380x5 | M 6 | 9 | 6,5 | 35,5 | ▸ **OH 3076 H** | HM 3076 | MS 3080-76 | HMV 76E |
| | 380 | 490 | 264 | 60 | – | 77 | Tr 380x5 | M 6 | 9 | 4 | 61,5 | ▸ **OH 3176 H** | HM 3176 | MS 3176 | HMV 76E |
| | 380 | 490 | 310 | 60 | – | 77 | Tr 380x5 | M 6 | 9 | 4 | 69,5 | **OH 3276 H** | HM 3176 | MS 3176 | HMV 76E |
| **380** | 400 | 470 | 210 | 52 | – | 66 | Tr 400x5 | M 6 | 9 | 6,5 | 40 | **OH 3080 H** | HM 3080 | MS 3080-76 | HMV 80E |
| | 400 | 520 | 272 | 62 | – | 82 | Tr 400x5 | M 6 | 9 | 4 | 73 | ▸ **OH 3180 H** | HM 3180 | MS 3184-80 | HMV 80E |
| | 400 | 520 | 328 | 62 | – | 82 | Tr 400x5 | M 6 | 9 | 4 | 87 | **OH 3280 H** | HM 3180 | MS 3184-80 | HMV 80E |
| **400** | 420 | 490 | 212 | 52 | – | 66 | Tr 420x5 | M 6 | 9 | 6,5 | 47 | **OH 3084 H** | HM 3084 | MS 3084 | HMV 84E |
| | 420 | 540 | 304 | 70 | – | 90 | Tr 420x5 | M 6 | 9 | 4 | 80 | ▸ **OH 3184 H** | HM 3184 | MS 3184-80 | HMV 84E |
| | 420 | 540 | 352 | 70 | – | 90 | Tr 420x5 | M 6 | 9 | 4 | 96 | **OH 3284 H** | HM 3184 | MS 3184-80 | HMV 84E |
| **410** | 440 | 520 | 228 | 60 | – | 77 | Tr 440x5 | M 8 | 12 | 6,5 | 65 | **OH 3088 H** | HM 3088 | MS 3092-88 | HMV 88E |
| | 440 | 560 | 307 | 70 | – | 90 | Tr 440x5 | M 8 | 12 | 6,5 | 95 | **OH 3188 H** | HM 3188 | MS 3192-88 | HMV 88E |
| | 440 | 560 | 361 | 70 | – | 90 | Tr 440x5 | M 8 | 12 | 6,5 | 117 | **OH 3288 H** | HM 3188 | MS 3192-88 | HMV 88E |
| **430** | 460 | 540 | 234 | 60 | – | 77 | Tr 460x5 | M 8 | 12 | 6,5 | 71 | **OH 3092 H** | HM 3092 | MS 3092-88 | HMV 92E |
| | 460 | 580 | 326 | 75 | – | 95 | Tr 460x5 | M 8 | 12 | 6,5 | 119 | ▸ **OH 3192 H** | HM 3192 | MS 3192-88 | HMV 92E |

▸ Popular item

| Principal dimensions | | | | | | | | | | | Mass | Designations | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Adapter sleeve assembly | Included products | | Associated hydraulic nut |
| | | | | | | | | | | | | | lock nut | locking device | |
| $d_1$ | d | $d_3$ | $B_1$ | B | $B_4$ | $B_5$ | G | $G_2$ | $G_3$ | A | | | | | |
| mm | | | | | | | | | | | kg | – | | | |
| **450** | 480 | 560 | 237 | 60 | – | 77 | Tr 480x5 | M 8 | 12 | 6,5 | 75 | **OH 3096 H** | HM 3096 | MS 30/500-96 | HMV 96E |
| | 480 | 620 | 335 | 75 | – | 95 | Tr 480x5 | M 8 | 12 | 6,5 | 135 | **OH 3196 H** | HM 3196 | MS 3196 | HMV 96E |
| **500** | 530 | 630 | 265 | 68 | – | 90 | Tr 530x6 | M 8 | 12 | 6,5 | 105 | **OH 30/530 H** | HM 30/530 | MS 30/600-530 | HMV 106E |

## 23.2 Adapter sleeves with inch dimensions

$d_1$ **3/4 – 3 1/4** in.
*19,05 – 82,55 mm*




| Principal dimensions | | | | | | | Thread | Threads per inch | Mass | Designations Adapter sleeve assembly | Included products lock nut | Included products locking device | Associated hydraulic nut |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $d_1$ | d | $d_3$ max. | $B_1$ | B | $B_4$ | $B_5$ | G | | | | | | |
| in./*mm* | mm | in. | | | | | in. | – | kg | – | | | |
| **3/4**<br>*19,05* | 25 | 1,568 | 1,259 | 0,416 | 0,456 | – | 0,969 | 32 | 0,11 | ▸ **SNW 5x3/4** | N 05 | W 05 | – |
| **15/16**<br>*23,813* | 30 | 1,755 | 1,343 | 0,416 | 0,456 | – | 1,173 | 18 | 0,14 | ▸ **SNW 6x15/16** | N 06 | W 06 | – |
| **1**<br>*25,4* | 30 | 1,755 | 1,343 | 0,416 | 0,456 | – | 1,173 | 18 | 0,13 | ▸ **SNW 6x1** | N 06 | W 06 | – |
| **1 1/8**<br>*28,575* | 35 | 2,068 | 1,449 | 0,448 | 0,488 | – | 1,376 | 18 | 0,16 | ▸ **SNW 7x1.1/8** | N 07 | W 07 | – |
| **1 3/16**<br>*30,163* | 35 | 2,068 | 1,449 | 0,448 | 0,488 | – | 1,376 | 18 | 0,16 | ▸ **SNW 7x1.3/16** | N 07 | W 07 | – |
| **1 1/4** | 35 | 2,068 | 1,449 | 0,448 | 0,488 | – | 1,376 | 18 | 0,16 | **SNW 7x1.1/4** | N 07 | W 07 | – |
| *31,75* | 40 | 2,255 | 1,494 | 0,448 | 0,496 | – | 0,496 | 18 | 0,19 | ▸ **SNW 8x1.1/4** | N 08 | W 08 | – |
| **1 5/16** | 40 | 2,255 | 1,494 | 0,448 | 0,496 | – | 1,563 | 18 | 0,19 | **SNW 8x1.5/16** | N 08 | W 08 | – |
| *33,338* | 45 | 2,536 | 1,574 | 0,448 | 0,496 | – | 1,767 | 18 | 0,28 | ▸ **SNW 9x1.5/16** | N 09 | W 09 | – |
| **1 3/8** | 40 | 2,255 | 1,494 | 0,448 | 0,496 | – | 1,563 | 18 | 0,19 | ▸ **SNW 8x1.3/8** | N 08 | W 08 | – |
| *34,925* | 45 | 2,536 | 1,574 | 0,448 | 0,496 | – | 1,767 | 18 | 0,28 | ▸ **SNW 9x1.3/8** | N 09 | W 09 | – |
| | 45 | 2,536 | 2,123 | 0,448 | 0,496 | – | 1,767 | 18 | 0,32 | **SNW 109x1.3/8** | N 09 | W 09 | – |
| **1 7/16** | 45 | 2,536 | 1,574 | 0,448 | 0,496 | – | 1,767 | 18 | 0,28 | ▸ **SNW 9x1.7/16** | N 09 | W 09 | – |
| *36,513* | 45 | 2,536 | 1,574 | 0,448 | 0,496 | – | 1,767 | 18 | 0,32 | ▸ **SNW 109x1.7/16** | N 09 | W 09 | – |
| **1 1/2** | 45 | 2,536 | 1,574 | 0,448 | 0,496 | – | 1,767 | 18 | 0,28 | **SNW 9x1.1/2** | N 09 | W 09 | – |
| *38,1* | 45 | 2,536 | 2,123 | 0,448 | 0,496 | – | 1,767 | 18 | 0,32 | ▸ **SNW 109x1.1/2** | N 09 | W 09 | – |
| | 50 | 2,536 | 1,755 | 0,448 | 0,558 | – | 1,967 | 18 | 0,33 | **SNW 10x1.1/2** | N 09 | W 10 | HMVC 10E |
| **1 5/8** | 50 | 2,693 | 1,755 | 0,51 | 0,558 | – | 1,967 | 18 | 0,33 | ▸ **SNW 10x1.5/8** | N 10 | W 10 | HMVC 10E |
| *41,275* | 55 | 2,693 | 2,384 | 0,51 | 0,558 | – | 1,967 | 18 | 0,39 | **SNW 110x1.5/8** | N 10 | W 10 | HMVC 10E |
| **1 11/16** | 50 | 2,693 | 1,755 | 0,51 | 0,558 | – | 1,967 | 18 | 0,33 | ▸ **SNW 10x1.11/16** | N 10 | W 10 | HMVC 10E |
| *42,863* | 50 | 2,693 | 2,384 | 0,51 | 0,558 | – | 1,967 | 18 | 0,39 | ▸ **SNW 110x1.11/16** | N 10 | W 10 | HMVC 10E |
| **1 3/4** | 50 | 2,693 | 1,755 | 0,51 | 0,558 | – | 1,967 | 18 | 0,33 | **SNW 10x1.3/4** | N 10 | W 10 | HMVC 10E |
| *44,45* | 55 | 2,693 | 2,384 | 0,51 | 0,558 | – | 1,967 | 18 | 0,39 | ▸ **SNW 110x1.3/4** | N 10 | W 10 | HMVC 10E |
| | 55 | 2,974 | 1,835 | 0,51 | 0,563 | – | 2,157 | 18 | 0,36 | ▸ **SNW 11x1.3/4** | N 11 | W 11 | HMVC 11E |
| **1 13/16**<br>*46,038* | 55 | 2,974 | 1,835 | 0,51 | 0,563 | – | 2,157 | 18 | 0,36 | ▸ **SNW 11x1.13/16** | N 11 | W 11 | HMVC 11E |

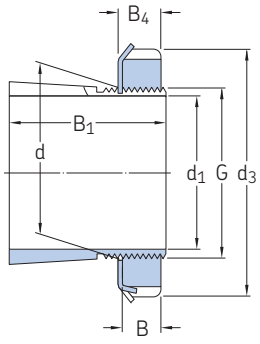
▸ Popular item

| Principal dimensions | | | | | | | Thread | | Mass | Designations | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Threads per inch | | Adapter sleeve assembly | Included products | | Associated hydraulic nut |
| $d_1$ | d | $d_3$ max. | $B_1$ | B | $B_4$ | $B_5$ | G | | | | lock nut | locking device | |
| in./*mm* | mm | in. | | | | | in. | – | kg | – | | | |
| **1 7/8** | 55 | 2,974 | 1,835 | 0,51 | 0,563 | – | 2,157 | 18 | 0,36 | ▸ **SNW 11x1.7/8** | N 11 | W 11 | HMVC 11E |
| *47,625* | 55 | 2,974 | 2,506 | 0,51 | 0,563 | – | 2,157 | 18 | 0,43 | **SNW 111x1.7/8** | N 11 | W 11 | HMVC 11E |
| **1 15/16** | 55 | 2,974 | 1,835 | 0,51 | 0,563 | – | 2,157 | 18 | 0,36 | ▸ **SNW 11x1.15/16** | N 11 | W 11 | HMVC 11E |
| *49,213* | 55 | 2,974 | 2,506 | 0,51 | 0,563 | – | 2,157 | 18 | 0,43 | ▸ **SNW 111x1.15/16** | N 11 | W 11 | HMVC 11E |
| **2** | 55 | 2,974 | 1,835 | 0,51 | 0,563 | – | 2,157 | 18 | 0,36 | ▸ **SNW 11x2** | N 11 | W 11 | HMVC 11E |
| *50,8* | 55 | 2,974 | 2,506 | 0,51 | 0,563 | – | 2,157 | 18 | 0,43 | **SNW 111x2** | N 11 | W 11 | HMVC 11E |
| | 65 | 3,38 | 2,09 | 0,573 | 0,573 | – | 2,548 | 18 | 0,64 | ▸ **SNW 13x2** | N 13 | W 13 | HMVC 13E |
| **2 1/16** | 60 | 3,161 | 2,649 | 0,541 | 0,594 | – | 2,36 | 18 | 0,73 | ▸ **SNW 112x2.1/16** | N 12 | W 12 | HMVC 12E |
| *52,388* | | | | | | | | | | | | | |
| **2 1/8** | 65 | 3,38 | 2,09 | 0,573 | 0,626 | – | 2,548 | 18 | 0,64 | **SNW 13x2.1/8** | N 13 | W 13 | HMVC 13E |
| *53,975* | 65 | 3,38 | 2,09 | 0,573 | 0,626 | – | 2,548 | 18 | 0,79 | **SNW 113x2.1/8** | N 13 | W 13 | HMVC 13E |
| **2 3/16** | 65 | 3,38 | 2,09 | 0,573 | 0,626 | – | 2,548 | 18 | 0,64 | ▸ **SNW 13x2.3/16** | N 13 | W 13 | HMVC 13E |
| *55,563* | 65 | 3,38 | 2,761 | 0,573 | 0,626 | – | 2,548 | 18 | 0,79 | ▸ **SNW 113x2.3/16** | N 13 | W 13 | HMVC 13E |
| **2 1/4** | 65 | 3,38 | 2,09 | 0,573 | 0,626 | – | 2,548 | 18 | 0,64 | ▸ **SNW 13x2.1/4** | N 13 | W 13 | HMVC 13E |
| *57,15* | 65 | 3,38 | 2,761 | 0,573 | 0,626 | – | 2,548 | 18 | 0,79 | ▸ **SNW 113x2.1/4** | N 13 | W 13 | HMVC 13E |
| **2 5/16** | 65 | 3,38 | 2,09 | 0,573 | 0,626 | – | 2,548 | 18 | 0,64 | ▸ **SNW 13x2.5/16** | N 13 | W 13 | HMVC 13E |
| *58,738* | | | | | | | | | | | | | |
| **2 3/8** | 75 | 3,88 | 2,286 | 0,604 | 0,666 | – | 2,933 | 12 | 1 | ▸ **SNW 15x2.3/8** | AN 15 | W 15 | HMVC 15E |
| *60,325* | 75 | 3,88 | 3,074 | 0,604 | 0,666 | – | 2,933 | 12 | 1,35 | **SNW 115x2.3/8** | AN 15 | W 15 | HMVC 15E |
| **2 7/16** | 75 | 3,88 | 2,286 | 0,604 | 0,666 | – | 2,933 | 12 | 1 | ▸ **SNW 15x2.7/16** | AN 15 | W 15 | HMVC 15E |
| *61,913* | 75 | 3,88 | 3,074 | 0,604 | 0,666 | – | 2,933 | 12 | 1,35 | ▸ **SNW 115x2.7/16** | AN 15 | W 15 | HMVC 15E |
| **2 1/2** | 75 | 3,88 | 2,286 | 0,604 | 0,666 | – | 2,933 | 12 | 1 | **SNW 15x2.1/2** | AN 15 | W 15 | HMVC 15E |
| *63,5* | 75 | 3,88 | 3,074 | 0,604 | 0,666 | – | 2,933 | 12 | 1,35 | **SNW 115x2.1/2** | AN 15 | W 15 | HMVC 15E |
| **2 5/8** | 80 | 4,161 | 2,366 | 0,604 | 0,666 | – | 3,137 | 12 | 1,1 | **SNW 16x2.5/8** | AN 16 | W 16 | HMVC 16E |
| *66,675* | 80 | 4,161 | 3,194 | 0,604 | 0,666 | – | 3,137 | 12 | 1,45 | **SNW 116x2.5/8** | AN 16 | W 16 | HMVC 16E |
| **2 11/16** | 80 | 4,161 | 2,366 | 0,604 | 0,666 | – | 3,137 | 12 | 1,1 | ▸ **SNW 16x2.11/16** | AN 16 | W 16 | HMVC 16E |
| *68,263* | 80 | 4,161 | 3,194 | 0,604 | 0,666 | – | 3,137 | 12 | 1,45 | ▸ **SNW 116x2.11/16** | AN 16 | W 16 | HMVC 16E |
| **2 3/4** | 80 | 4,161 | 2,366 | 0,604 | 0,666 | – | 3,137 | 12 | 1,1 | ▸ **SNW 16x2.3/4** | AN 16 | W 16 | HMVC 16E |
| *69,85* | 80 | 4,161 | 3,194 | 0,604 | 0,666 | – | 3,137 | 12 | 1,45 | **SNW 116x2.3/4** | AN 16 | W 16 | HMVC 16E |
| **2 13/16** | 85 | 4,411 | 2,476 | 0,635 | 0,697 | – | 3,34 | 12 | 1,3 | **SNW 17x2.13/16** | AN 17 | W 17 | HMVC 17E |
| *71,438* | 85 | 4,411 | 3,302 | 0,635 | 0,697 | – | 3,34 | 12 | 1,55 | **SNW 117x2.13/16** | AN 17 | W 17 | HMVC 17E |
| **2 7/8** | 85 | 4,411 | 2,476 | 0,635 | 0,697 | – | 3,34 | 12 | 1,3 | **SNW 17x2.7/8** | AN 17 | W 17 | HMVC 17E |
| *73,025* | 85 | 4,411 | 3,302 | 0,635 | 0,697 | – | 3,34 | 12 | 1,55 | **SNW 117x2.7/8** | AN 17 | W 17 | HMVC 17E |
| **2 15/16** | 85 | 4,411 | 2,476 | 0,635 | 0,697 | – | 3,34 | 12 | 1,3 | ▸ **SNW 17x2.15/16** | AN 17 | W 17 | HMVC 17E |
| *74,613* | 85 | 4,411 | 3,302 | 0,635 | 0,697 | – | 3,34 | 12 | 1,55 | ▸ **SNW 117x2.15/16** | AN 17 | W 17 | HMVC 17E |
| **3** | 85 | 4,411 | 2,476 | 0,635 | 0,697 | – | 3,34 | 12 | 1,3 | ▸ **SNW 17x3** | AN 17 | W 17 | HMVC 17E |
| *76,2* | 85 | 4,411 | 3,302 | 0,635 | 0,697 | – | 3,34 | 12 | 1,55 | ▸ **SNW 117x3** | AN 17 | W 17 | HMVC 17E |
| **3 1/16** | 90 | 4,661 | 2,636 | 0,698 | 0,782 | – | 3,527 | 12 | 1,4 | ▸ **SNW 18x3.1/16** | AN 18 | W 18 | HMVC 18E |
| *77,788* | 90 | 4,661 | 3,543 | 0,698 | 0,782 | – | 3,527 | 12 | 1,8 | **SNW 118x3.1/16** | AN 18 | W 18 | HMVC 18E |
| **3 1/8** | 90 | 4,661 | 2,636 | 0,698 | 0,782 | – | 3,527 | 12 | 1,4 | **SNW 18x3.1/8** | AN 18 | W 18 | HMVC 18E |
| *79,375* | 90 | 4,661 | 3,543 | 0,698 | 0,782 | – | 3,527 | 12 | 1,8 | **SNW 118x3.1/8** | AN 18 | W 18 | HMVC 18E |
| **3 3/16** | 90 | 4,661 | 2,636 | 0,698 | 0,782 | – | 3,527 | 12 | 1,4 | **SNW 18x3.3/16** | AN 18 | W 18 | HMVC 18E |
| *80,963* | 90 | 4,661 | 3,543 | 0,698 | 0,782 | – | 3,527 | 12 | 1,8 | ▸ **SNW 118x3.3/16** | AN 18 | W 18 | HMVC 18E |
| **3 1/4** | 90 | 4,661 | 2,636 | 0,698 | 0,782 | – | 3,527 | 12 | 1,4 | **SNW 18x3.1/4** | AN 18 | W 18 | HMVC 18E |
| *82,55* | 90 | 4,661 | 3,543 | 0,698 | 0,782 | – | 3,527 | 12 | 1,8 | **SNW 118x3.1/4** | AN 18 | W 18 | HMVC 18E |

▸ Popular item

## 23.2 Adapter sleeves with inch dimensions

$d_1$ **3 5/16 – 5 1/4** in.
*84,138 – 133,35 mm*




| Principal dimensions | | | | | | | Thread | Threads per inch | Mass | Designations Adapter sleeve assembly | Included products lock nut | Included products locking device | Associated hydraulic nut |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $d_1$ | d | $d_3$ max. | $B_1$ | B | $B_4$ | $B_5$ | G | | | | | | |
| in./*mm* | mm | in. | | | | | in. | – | kg | – | | | |
| **3 5/16** | 95 | 4,943 | 2,75 | 0,729 | 0,813 | – | 3,73 | 12 | 1,85 | ▸ **SNW 19x3.5/16** | AN 19 | W 19 | HMVC 19E |
| *84,138* | 95 | 4,943 | 3,692 | 0,729 | 0,813 | – | 3,73 | 12 | 1,85 | ▸ **SNW 119x3.5/16** | AN 19 | W 19 | HMVC 19E |
| | 100 | 5,193 | 2,859 | 0,76 | 0,844 | – | 3,918 | 12 | 2 | **SNW 20x3.5/16** | AN 20 | W 20 | HMVC 20E |
| | 100 | 3,918 | 3,961 | 0,76 | 0,844 | – | 3,918 | 12 | 2,85 | **SNW 120x3.5/16** | AN 20 | W 20 | HMVC 20E |
| **3 3/8** | 100 | 5,193 | 2,859 | 0,76 | 0,844 | – | 3,918 | 12 | 2 | **SNW 20x3.3/8** | AN 20 | W 20 | HMVC 20E |
| *85,725* | 100 | 5,193 | 3,961 | 0,76 | 0,844 | – | 3,918 | 12 | 2,85 | **SNW 120x3.3/8** | AN 20 | W 20 | HMVC 20E |
| **3 7/16** | 100 | 5,193 | 2,859 | 0,76 | 0,844 | – | 3,918 | 12 | 2 | ▸ **SNW 20x3.7/16** | AN 20 | W 20 | HMVC 20E |
| *87,313* | 100 | 5,193 | 3,961 | 0,76 | 0,844 | – | 3,918 | 12 | 2,85 | ▸ **SNW 120x3.7/16** | AN 20 | W 20 | HMVC 20E |
| **3 1/2** | 100 | 5,193 | 2,859 | 0,76 | 0,844 | – | 3,918 | 12 | 2 | ▸ **SNW 20x3.1/2** | AN 20 | W 20 | HMVC 20E |
| *88,9* | 100 | 5,193 | 3,961 | 0,76 | 0,844 | – | 3,918 | 12 | 2,85 | ▸ **SNW 120x3.1/2** | AN 20 | W 20 | HMVC 20E |
| **3 11/16** | 105 | 5,443 | 2,977 | 0,76 | 0,844 | – | 4,122 | 12 | 2,05 | ▸ **SNW 21x3.11/16** | AN 21 | W 21 | HMVC 21E |
| *93,663* | 105 | 5,443 | 4,157 | 0,76 | 0,844 | – | 4,122 | 12 | 2,25 | ▸ **SNW 121x3.11/16** | AN 21 | W 21 | HMVC 21E |
| | 110 | 5,724 | 3,196 | 0,791 | 0,906 | – | 4,325 | 12 | 2,25 | **SNW 22x3.11/16** | AN 22 | W 22 | HMVC 22E |
| | 110 | 5,724 | 4,338 | 0,791 | 3,693 | – | 4,325 | 6 | 3 | **SNW 122x3.11/16** | AN 22 | W 22 | HMVC 22E |
| **3 3/4** | 110 | 5,724 | 4,338 | 0,791 | 0,906 | – | 4,325 | 12 | 2,95 | **SNW 122x3.3/4** | AN 22 | W 22 | HMVC 22E |
| *95,25* | | | | | | | | | | | | | |
| **3 13/16** | 110 | 5,724 | 3,196 | 0,791 | 0,906 | – | 4,325 | 12 | 2,25 | **SNW 22x3.13/16** | AN 22 | W 22 | HMVC 22E |
| *96,838* | 110 | 5,724 | 4,338 | 0,791 | 0,906 | – | 4,325 | 12 | 2,95 | **SNW 122x3.13/16** | AN 22 | W 22 | HMVC 22E |
| **3 7/8** | 110 | 5,724 | 3,196 | 0,791 | 0,906 | – | 4,325 | 12 | 2,25 | **SNW 22x3.7/8** | AN 22 | W 22 | HMVC 22E |
| *98,425* | 4,338 | 5,724 | 4,338 | 0,791 | 0,906 | – | 4,325 | 12 | 2,95 | **SNW 122x3.7/8** | AN 22 | W 22 | HMVC 22E |
| **3 15/16** | 110 | 5,724 | 3,196 | 0,791 | 0,906 | – | 4,325 | 12 | 2,25 | ▸ **SNW 22x3.15/16** | AN 22 | W 22 | HMVC 22E |
| *100,013* | 110 | 5,724 | 4,338 | 0,791 | 0,906 | – | 4,325 | 12 | 2,95 | ▸ **SNW 122x3.15/16** | AN 22 | W 22 | HMVC 22E |
| **4** | 110 | 5,724 | 3,196 | 0,791 | 0,906 | – | 4,325 | 12 | 2,25 | ▸ **SNW 22x4** | AN 22 | W 22 | HMVC 22E |
| *101,6* | 110 | 5,724 | 4,338 | 0,791 | 0,906 | – | 4,325 | 12 | 2,95 | **SNW 122x4** | AN 22 | W 22 | HMVC 22E |
| | 120 | 6,13 | 2,937 | 0,823 | 0,938 | – | 4,716 | 12 | 2,8 | **SNW 3024x4** | AN 24 | W 24 | HMVC 24E |
| | 120 | 6,13 | 3,456 | 0,823 | 0,938 | – | 4,716 | 12 | 3 | **SNW 24x4** | AN 24 | W 24 | HMVC 24E |
| | 120 | 6,13 | 4,638 | 0,823 | 0,938 | – | 4,716 | 12 | 3,55 | **SNW 124x4** | AN 24 | W 24 | HMVC 24E |
| **4 1/16** | 120 | 5,693 | 2,937 | 0,823 | 0,938 | – | 4,716 | 12 | 2,8 | **SNW 3024x4.1/16** | N 024 | W 024 | HMVC 24E |
| *103,188* | 120 | 6,13 | 3,456 | 0,823 | 0,938 | – | 4,716 | 12 | 3 | **SNW 24x4.1/16** | AN 24 | W 24 | HMVC 24E |
| | 120 | 6,13 | 4,638 | 0,823 | 0,938 | – | 4,716 | 12 | 3,55 | **SNW 124x4.1/16** | AN 24 | W 24 | HMVC 24E |
| **4 1/8** | 120 | 5,693 | 2,937 | 0,823 | 0,938 | – | 4,716 | 12 | 2,8 | **SNW 3024x4.1/8** | N 024 | W 024 | HMVC 24E |
| *104,775* | 120 | 6,13 | 3,456 | 0,823 | 0,938 | – | 4,716 | 12 | 3 | **SNW 24x4.1/8** | AN 24 | W 24 | HMVC 24E |
| | 120 | 6,13 | 4,638 | 0,823 | 0,938 | – | 4,716 | 12 | 3,55 | **SNW 124x4.1/8** | AN 24 | W 24 | HMVC 24E |

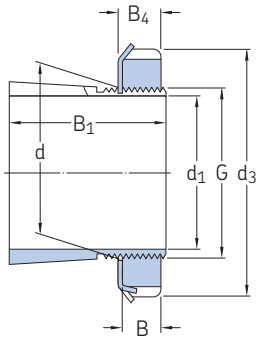
▸ Popular item

| Principal dimensions | | | | | | | Thread | | Mass | Designations | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Threads per inch | | Adapter sleeve assembly | Included products | | Associated hydraulic nut |
| $d_1$ | d | $d_3$ max. | $B_1$ | B | $B_4$ | $B_5$ | G | | | | lock nut | locking device | |
| in./*mm* | mm | in. | | | | | in. | – | kg | – | | | |
| **4 3/16** | 120 | 5,693 | 2,937 | 0,823 | 0,938 | – | 4,716 | 12 | 2,8 | ▸ **SNW 3024x4.3/16** | N 024 | W 024 | HMVC 24E |
| *106,363* | 120 | 5,693 | 3,456 | 0,823 | 0,938 | – | 4,716 | 12 | 2,65 | **SNW 3124x4.3/16** | N 024 | W 024 | HMVC 24E |
| | 120 | 6,13 | 3,456 | 0,823 | 0,938 | – | 4,716 | 12 | 3 | ▸ **SNW 24x4.3/16** | AN 24 | W 24 | HMVC 24E |
| | 120 | 6,13 | 4,638 | 0,823 | 0,938 | – | 4,716 | 12 | 3,55 | ▸ **SNW 124x4.3/16** | AN 24 | W 24 | HMVC 24E |
| **4 1/4** | 120 | 5,693 | 2,937 | 0,823 | 0,938 | – | 4,716 | 12 | 2,8 | **SNW 3024x4.1/4** | N 024 | W 024 | HMVC 24E |
| *107,95* | 120 | 5,693 | 3,456 | 0,823 | 0,938 | – | 4,716 | 12 | 2,65 | ▸ **SNW 3124x4.1/4** | N 024 | W 024 | HMVC 24E |
| | 120 | 6,13 | 3,456 | 0,823 | 0,938 | – | 4,716 | 12 | 3 | ▸ **SNW 24x4.1/4** | AN 24 | W 24 | HMVC 24E |
| | 120 | 6,13 | 4,638 | 0,823 | 0,938 | – | 4,716 | 12 | 3,55 | **SNW 124x4.1/4** | AN 24 | W 24 | HMVC 24E |
| **4 5/16** | 130 | 6,13 | 3,227 | 0,885 | 1 | – | 5,106 | 12 | 3,4 | **SNW 3026x4.5/16** | N 026 | W 026 | HMVC 26E |
| *109,538* | 130 | 6,755 | 3,752 | 0,885 | 1 | – | 5,106 | 12 | 4,4 | **SNW 26x4.5/16** | AN 26 | W 26 | HMVC 26E |
| | 130 | 6,755 | 4,972 | 0,885 | 1 | – | 5,106 | 12 | 5,65 | **SNW 126x4.5/16** | AN 26 | W 26 | HMVC 26E |
| **4 3/8** | 130 | 6,13 | 3,227 | 0,885 | 1 | – | 5,106 | 12 | 3,4 | **SNW 3026x4.3/8** | N 026 | W 026 | HMVC 26E |
| *111,125* | 130 | 6,755 | 3,752 | 0,885 | 1 | – | 5,106 | 12 | 4,4 | **SNW 26x4.3/8** | AN 26 | W 26 | HMVC 26E |
| | 130 | 6,755 | 4,972 | 0,885 | 1 | – | 5,106 | 12 | 5,65 | **SNW 126x4.3/8** | AN 26 | W 26 | HMVC 26E |
| **4 7/16** | 130 | 6,13 | 3,227 | 0,885 | 1 | – | 5,106 | 12 | 3,4 | ▸ **SNW 3026x4.7/16** | N 026 | W 026 | HMVC 26E |
| *112,713* | 130 | 6,13 | 3,752 | 0,885 | 1 | – | 5,106 | 12 | 3,8 | ▸ **SNW 3126x4.7/16** | N 026 | W 026 | HMVC 26E |
| | 130 | 6,755 | 3,752 | 0,885 | 1 | – | 5,106 | 12 | 4,4 | ▸ **SNW 26x4.7/16** | AN 26 | W 26 | HMVC 26E |
| | 130 | 6,755 | 4,972 | 0,885 | 1 | – | 5,106 | 12 | 5,65 | ▸ **SNW 126x4.7/16** | AN 26 | W 26 | HMVC 26E |
| | 140 | 7,099 | 5,313 | 0,948 | 1 | – | 5,497 | 12 | 5,9 | **SNW 128x4.7/16** | AN 28 | W 28 | HMVC 28E |
| **4 1/2** | 130 | 6,13 | 3,227 | 0,885 | 1 | – | 5,106 | 12 | 3,4 | ▸ **SNW 3026x4.1/2** | N 026 | W 026 | HMVC 26E |
| *114,3* | 130 | 6,13 | 3,752 | 0,885 | 1 | – | 5,106 | 12 | 3,8 | ▸ **SNW 3126x4.1/2** | N 026 | W 026 | HMVC 26E |
| | 130 | 6,755 | 3,752 | 0,885 | 1 | – | 5,106 | 12 | 4,4 | ▸ **SNW 26x4.1/2** | AN 26 | W 26 | HMVC 26E |
| | 130 | 6,755 | 4,972 | 0,885 | 1 | – | 5,106 | 12 | 5,65 | **SNW 126x4.1/2** | AN 26 | W 26 | HMVC 26E |
| **4 13/16** | 140 | 6,505 | 3,33 | 0,948 | 1,063 | – | 5,497 | 12 | 3,8 | **SNW 3028x4.13/16** | N 028 | W 028 | HMVC 28E |
| *122,238* | 140 | 7,099 | 3,971 | 0,948 | 1,063 | – | 5,497 | 12 | 4,75 | **SNW 28x4.13/16** | AN 28 | W 28 | HMVC 28E |
| | 140 | 7,099 | 5,313 | 0,948 | 1,063 | – | 5,497 | 12 | 5,9 | **SNW 128x4.13/16** | AN 28 | W 28 | HMVC 28E |
| **4 7/8** | 140 | 6,505 | 3,33 | 0,948 | 1,063 | – | 5,497 | 12 | 3,8 | **SNW 3028x4.7/8** | N 028 | W 028 | HMVC 28E |
| *123,825* | 140 | 7,099 | 3,971 | 0,948 | 1,063 | – | 5,497 | 12 | 4,75 | **SNW 28x4.7/8** | AN 28 | W 28 | HMVC 28E |
| | 140 | 7,099 | 5,313 | 0,948 | 0,906 | – | 5,497 | 12 | 5,9 | **SNW 128x4.7/8** | AN 28 | W 28 | HMVC 28E |
| **4 15/16** | 140 | 6,505 | 3,33 | 0,948 | 1,063 | – | 5,888 | 12 | 3,8 | ▸ **SNW 3028x4.15/16** | N 028 | W 028 | HMVC 28E |
| *125,413* | 140 | 6,505 | 3,971 | 0,948 | 1,063 | – | 5,497 | 12 | 4 | ▸ **SNW 3128x4.15/16** | N 028 | W 028 | HMVC 28E |
| | 140 | 7,099 | 3,971 | 0,948 | 1,063 | – | 5,497 | 12 | 4,75 | ▸ **SNW 28x4.15/16** | AN 28 | W 28 | HMVC 28E |
| | 140 | 7,099 | 5,313 | 0,948 | 1,063 | – | 5,497 | 12 | 5,9 | ▸ **SNW 128x4.15/16** | AN 28 | W 28 | HMVC 28E |
| **5** | 140 | 6,505 | 3,33 | 0,948 | 1,063 | – | 5,497 | 12 | 3,8 | ▸ **SNW 3028x5** | N 028 | W 028 | HMVC 28E |
| *127* | 140 | 6,505 | 3,971 | 0,948 | 1,063 | – | 5,497 | 12 | 4 | ▸ **SNW 3128x5** | N 028 | W 028 | HMVC 28E |
| | 140 | 7,099 | 3,971 | 0,948 | 1,063 | – | 5,497 | 12 | 4,75 | ▸ **SNW 28x5** | AN 28 | W 28 | HMVC 28E |
| | 140 | 7,099 | 5,313 | 0,948 | 0,906 | – | 5,497 | 12 | 5,9 | **SNW 128x5** | AN 28 | W 28 | HMVC 28E |
| **5 1/8** | 150 | 7,13 | 3,482 | 0,979 | 1,094 | – | 5,888 | 12 | 4,45 | **SNW 3030x5.1/8** | N 030 | W 030 | HMVC 30E |
| *130,175* | 150 | 7,693 | 4,231 | 0,979 | 1,125 | – | 5,888 | 12 | 7,25 | **SNW 30x5.1/8** | AN 30 | W 30 | HMVC 30E |
| | 150 | 7,693 | 5,611 | 0,979 | 1,125 | – | 5,888 | 12 | 8,15 | **SNW 130x5.1/8** | AN 30 | W 30 | HMVC 30E |
| **5 3/16** | 150 | 7,13 | 3,482 | 0,979 | 1,094 | – | 5,888 | 12 | 4,45 | ▸ **SNW 3030x5.3/16** | N 030 | W 030 | HMVC 30E |
| *131,763* | 150 | 7,13 | 4,231 | 0,979 | 1,094 | – | 5,888 | 12 | 6,2 | ▸ **SNW 3130x5.3/16** | N 030 | W 030 | HMVC 30E |
| | 150 | 7,693 | 4,231 | 0,979 | 1,125 | – | 5,888 | 12 | 7,25 | ▸ **SNW 30x5.3/16** | AN 30 | W 30 | HMVC 30E |
| | 150 | 7,693 | 5,611 | 0,979 | 1,125 | – | 5,888 | 12 | 8,15 | ▸ **SNW 130x5.3/16** | AN 30 | W 30 | HMVC 30E |
| **5 1/4** | 150 | 7,13 | 3,482 | 0,979 | 1,094 | – | 5,888 | 12 | 4,45 | **SNW 3030x5.1/4** | N 030 | W 030 | HMVC 30E |
| *133,35* | 150 | 7,693 | 4,231 | 0,979 | 1,125 | – | 5,888 | 12 | 7,25 | ▸ **SNW 30x5.1/4** | AN 30 | W 30 | HMVC 30E |
| | 150 | 7,693 | 5,611 | 0,979 | 1,125 | – | 5,888 | 12 | 8,15 | **SNW 130x5.1/4** | AN 30 | W 30 | HMVC 30E |

▸ Popular item

## 23.2 Adapter sleeves with inch dimensions

$d_1$ **5 5/16 – 7 13/16** in.
*134,938 – 198,438 mm*




| Principal dimensions | | | | | | | Thread | Threads per inch | Mass | Designations Adapter sleeve assembly | Included products lock nut | Included products locking device | Associated hydraulic nut |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $d_1$ | d | $d_3$ max. | $B_1$ | B | $B_4$ | $B_5$ | G | | | | | | |
| in./*mm* | mm | in. | | | | | in. | – | kg | – | | | |
| **5 5/16** | 150 | 7,693 | 4,231 | 0,979 | 1,125 | – | 5,888 | 12 | 7,25 | ▸ **SNW 30x5.5/16** | AN 30 | W 30 | HMVC 30E |
| *134,938* | 150 | 7,693 | 5,611 | 0,979 | 1,125 | – | 6,284 | 12 | 8,15 | **SNW 130x5.5/16** | AN 30 | W 30 | HMVC 30E |
| | 180 | 9,068 | 6,446 | 1,104 | 1,104 | – | 7,066 | 8 | 10 | **SNW 136x5.5/16** | AN 36 | W 36 | HMVC 36E |
| **5 3/8** | 150 | 7,693 | 4,231 | 0,979 | 1,125 | – | 5,888 | 12 | 7,25 | **SNW 30x5.3/8** | AN 30 | W 30 | HMVC 30E |
| *136,525* | 150 | 7,693 | 5,611 | 0,979 | 1,125 | – | 6,284 | 12 | 8,15 | **SNW 130x5.3/8** | AN 30 | W 30 | HMVC 30E |
| | 160 | 7,505 | 3,701 | 1,041 | 1,156 | – | 6,284 | 8 | 5,45 | **SNW 3032x5.3/8** | N 032 | W 032 | HMVC 32E |
| | 160 | 8,068 | 4,568 | 1,041 | 1,187 | – | 6,284 | 8 | 7,05 | **SNW 32x5.3/8** | AN 32 | W 32 | HMVC 32E |
| | 160 | 8,068 | 5,91 | 1,041 | 1,187 | – | 6,284 | 8 | 8,15 | **SNW 132x5.3/8** | AN 32 | W 32 | HMVC 32E |
| | 180 | 9,068 | 6,446 | 1,104 | 1,104 | – | 7,066 | 8 | 10 | **SNW 136x5.3/8** | AN 36 | W 36 | HMVC 36E |
| **5 7/16** | 160 | 7,505 | 3,701 | 1,041 | 1,156 | – | 6,284 | 8 | 5,45 | ▸ **SNW 3032x5.7/16** | N 032 | W 032 | HMVC 32E |
| *138,113* | 160 | 7,505 | 4,568 | 1,041 | 1,156 | – | 6,284 | 8 | 6,1 | ▸ **SNW 3132x5.7/16** | N 032 | W 032 | HMVC 32E |
| | 160 | 8,068 | 4,568 | 1,041 | 1,187 | – | 6,284 | 8 | 7,05 | ▸ **SNW 32x5.7/16** | AN 32 | W 32 | HMVC 32E |
| | 160 | 8,068 | 5,91 | 1,041 | 1,187 | – | 6,284 | 8 | 8,15 | ▸ **SNW 132x5.7/16** | AN 32 | W 32 | HMVC 32E |
| **5 1/2** | 160 | 7,505 | 3,701 | 1,041 | 1,156 | – | 6,284 | 8 | 5,45 | **SNW 3032x5.1/2** | N 032 | W 032 | HMVC 32E |
| *139,7* | 160 | 8,068 | 8,068 | 1,041 | 1,187 | – | 6,284 | 8 | 7,05 | **SNW 32x5.1/2** | AN 32 | W 32 | HMVC 32E |
| | 160 | 8,068 | 5,91 | 1,041 | 1,187 | – | 6,284 | 8 | 8,15 | **SNW 132x5.1/2** | AN 32 | W 32 | HMVC 32E |
| **5 3/4** *146,05* | 160 | 8,068 | 4,568 | 1,041 | 1,187 | – | 6,284 | 8 | 7,05 | ▸ **SNW 32x5.3/4** | AN 32 | W 32 | HMVC 32E |
| **5 13/16** | 170 | 7,88 | 4,009 | 1,073 | 1,188 | – | 6,659 | 8 | 6,1 | **SNW 3034x5.13/16** | N 034 | W 034 | HMVC 34E |
| *147,638* | 170 | 8,661 | 4,837 | 1,073 | 1,219 | – | 6,659 | 8 | 8,85 | **SNW 34x5.13/16** | AN 34 | W 34 | HMVC 34E |
| | 170 | 8,661 | 6,178 | 1,073 | 1,219 | – | 6,659 | 8 | 9,55 | **SNW 134x5.13/16** | AN 34 | W 34 | HMVC 34E |
| **5 7/8** | 170 | 7,88 | 4,009 | 1,073 | 1,188 | – | 6,659 | 8 | 6,1 | **SNW 3034x5.7/8** | N 034 | W 034 | HMVC 34E |
| *149,225* | 170 | 8,661 | 4,837 | 1,073 | 1,219 | – | 6,659 | 8 | 8,85 | **SNW 34x5.7/8** | AN 34 | W 34 | HMVC 34E |
| | 170 | 8,661 | 6,178 | 1,073 | 1,219 | – | 6,659 | 8 | 9,55 | **SNW 134x5.7/8** | AN 34 | W 34 | HMVC 34E |
| **5 15/16** | 170 | 7,88 | 4,009 | 1,073 | 1,188 | – | 6,659 | 8 | 6,1 | ▸ **SNW 3034x5.15/16** | N 034 | W 034 | HMVC 34E |
| *150,813* | 170 | 7,88 | 4,837 | 1,073 | 1,188 | – | 6,659 | 8 | 7,3 | ▸ **SNW 3134x5.15/16** | N 034 | W 034 | HMVC 34E |
| | 170 | 8,661 | 4,837 | 1,073 | 1,219 | – | 6,659 | 8 | 8,85 | ▸ **SNW 34x5.15/16** | AN 34 | W 34 | HMVC 34E |
| | 170 | 8,661 | 6,178 | 1,073 | 1,219 | – | 6,659 | 8 | 9,55 | ▸ **SNW 134x5.15/16** | AN 34 | W 34 | HMVC 34E |
| **6** | 170 | 7,88 | 4,009 | 1,073 | 1,188 | – | 6,659 | 8 | 6,1 | ▸ **SNW 3034x6** | N 034 | W 034 | HMVC 34E |
| *152,4* | 170 | 7,88 | 4,837 | 1,073 | 1,188 | – | 6,659 | 8 | 7,3 | ▸ **SNW 3134x6** | N 034 | W 034 | HMVC 34E |
| | 170 | 8,661 | 8,661 | 1,073 | 1,219 | – | 6,659 | 8 | 8,85 | ▸ **SNW 34x6** | AN 34 | W 34 | HMVC 34E |
| | 170 | 8,661 | 6,178 | 1,073 | 1,219 | – | 6,659 | 8 | 9,55 | ▸ **SNW 134x6** | AN 34 | W 34 | HMVC 34E |
| **6 5/16** | 180 | 8,255 | 4,327 | 1,104 | 1,219 | – | 7,066 | 8 | 6,8 | **SNW 3036x6.5/16** | N 036 | W 036 | HMVC 36E |
| *160,338* | 180 | 9,068 | 5,028 | 1,104 | 1,25 | – | 7,066 | 8 | 9,3 | **SNW 36x6.5/16** | AN 36 | W 36 | HMVC 36E |
| | 180 | 9,068 | 6,446 | 1,104 | 6,3175 | – | 7,066 | 8 | 8,5 | **SNW 136x6.5/16** | AN 36 | W 36 | HMVC 36E |

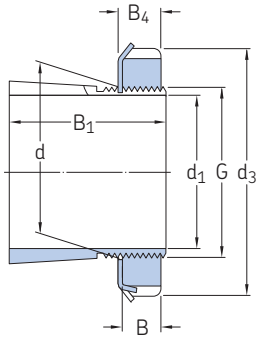
▸ Popular item

| Principal dimensions | | | | | | | Thread | | Mass | Designations | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Threads per inch | | Adapter sleeve assembly | Included products | | Associated hydraulic nut |
| $d_1$ | d | $d_3$ max. | $B_1$ | B | $B_4$ | $B_5$ | G | | | | lock nut | locking device | |
| in./*mm* | mm | in. | | | | | in. | – | kg | – | | | |
| **6 3/8** | 180 | 8,255 | 4,327 | 1,104 | 1,219 | – | 7,066 | 8 | 6,8 | **SNW 3036x6.3/8** | N 036 | W 036 | HMVC 36E |
| *161,925* | 180 | 9,068 | 5,028 | 1,104 | 1,25 | – | 7,066 | 8 | 9,3 | **SNW 36x6.3/8** | AN 36 | W 36 | HMVC 36E |
| | 180 | 9,068 | 6,446 | 1,104 | 1,104 | – | 7,066 | 8 | 10 | **SNW 136x6.3/8** | AN 36 | W 36 | HMVC 36E |
| **6 7/16** | 180 | 8,255 | 4,327 | 1,104 | 1,219 | – | 7,066 | 8 | 6,8 | ▸ **SNW 3036x6.7/16** | N 036 | W 036 | HMVC 36E |
| *163,513* | 180 | 8,255 | 5,028 | 1,104 | 1,219 | – | 7,066 | 8 | 7,75 | ▸ **SNW 3136x6.7/16** | N 036 | W 036 | HMVC 36E |
| | 180 | 9,068 | 5,028 | 1,104 | 1,25 | – | 7,066 | 8 | 9,3 | ▸ **SNW 36x6.7/16** | AN 36 | W 36 | HMVC 36E |
| | 180 | 9,068 | 6,446 | 1,104 | 1,25 | – | 7,066 | 8 | 10 | ▸ **SNW 136x6.7/16** | AN 36 | W 36 | HMVC 36E |
| **6 1/2** | 180 | 8,255 | 4,327 | 1,104 | 1,219 | – | 7,066 | 8 | 6,8 | **SNW 3036x6.1/2** | N 036 | W 036 | HMVC 36E |
| *165,1* | 180 | 8,255 | 5,028 | 1,104 | 1,219 | – | 7,066 | 8 | 7,75 | **SNW 3136x6.1/2** | N 036 | W 036 | HMVC 36E |
| | 180 | 9,068 | 5,028 | 1,104 | 1,25 | – | 7,066 | 8 | 9,3 | ▸ **SNW 36x6.1/2** | AN 36 | W 36 | HMVC 36E |
| | 180 | 9,068 | 6,446 | 1,104 | 1,104 | – | 7,066 | 8 | 10 | **SNW 136x6.1/2** | AN 36 | W 36 | HMVC 36E |
| **6 13/16** | 190 | 8,693 | 4,402 | 1,135 | 1,25 | – | 7,472 | 8 | 7,5 | **SNW 3038x6.13/16** | N 038 | W 038 | HMVC 38E |
| *173,038* | 190 | 9,474 | 5,251 | 1,135 | 1,281 | – | 7,472 | 8 | 10,5 | **SNW 38x6.13/16** | AN 38 | W 38 | HMVC 38E |
| | 190 | 9,474 | 6,748 | 1,135 | 1,281 | – | 7,472 | 8 | 12,5 | **SNW 138x6.13/16** | AN 38 | W 38 | HMVC 38E |
| **6 7/8** | 190 | 8,693 | 4,402 | 1,135 | 1,25 | – | 7,472 | 8 | 7,5 | **SNW 3038x6.7/8** | N 038 | W 038 | HMVC 38E |
| *174,625* | 190 | 9,474 | 5,251 | 1,135 | 1,281 | – | 7,472 | 8 | 10,5 | **SNW 38x6.7/8** | AN 38 | W 38 | HMVC 38E |
| | 190 | 9,474 | 6,748 | 1,135 | 1,281 | – | 7,472 | 8 | 12,5 | **SNW 138x6.7/8** | AN 38 | W 38 | HMVC 38E |
| **6 15/16** | 180 | 9,068 | 6,446 | 1,104 | 1,104 | – | 7,066 | 8 | 10 | **SNW 136x6.15/16** | AN 36 | W 36 | HMVC 36E |
| *176,213* | 190 | 8,693 | 4,402 | 1,135 | 1,25 | – | 7,472 | 8 | 7,5 | ▸ **SNW 3038x6.15/16** | N 038 | W 038 | HMVC 38E |
| | 190 | 8,693 | 5,251 | 1,135 | 1,25 | – | 7,472 | 8 | 8,95 | ▸ **SNW 3138x6.15/16** | N 038 | W 038 | HMVC 38E |
| | 190 | 9,474 | 5,251 | 1,135 | 1,281 | – | 7,472 | 8 | 10,5 | ▸ **SNW 38x6.15/16** | AN 38 | W 38 | HMVC 38E |
| | 190 | 9,474 | 6,748 | 1,135 | 1,281 | – | 7,472 | 8 | 12,5 | ▸ **SNW 138x6.15/16** | AN 38 | W 38 | HMVC 38E |
| **7** | 190 | 8,693 | 4,402 | 1,135 | 1,25 | – | 7,472 | 8 | 7,5 | ▸ **SNW 3038x7** | N 038 | W 038 | HMVC 38E |
| *177,8* | 190 | 8,693 | 5,251 | 1,135 | 1,25 | – | 7,472 | 8 | 8,95 | ▸ **SNW 3138x7** | N 038 | W 038 | HMVC 38E |
| | 190 | 9,474 | 5,251 | 1,135 | 1,281 | – | 7,472 | 8 | 10,5 | ▸ **SNW 38x7** | AN 38 | W 38 | HMVC 38E |
| | 190 | 9,474 | 6,748 | 1,135 | 1,281 | – | 7,472 | 8 | 12,5 | ▸ **SNW 138x7** | AN 38 | W 38 | HMVC 38E |
| **7 1/8** | 20 | 9,849 | 7,085 | 1,198 | 1,344 | – | 7,847 | 8 | 16 | **SNW 140x7.1/8** | AN 40 | W 40 | HMVC 40E |
| *180,975* | 200 | 9,443 | 4,74 | 1,198 | 1,313 | – | 7,847 | 8 | 8,85 | **SNW 3040x7.1/8** | N 040 | W 040 | HMVC 40E |
| | 200 | 9,849 | 5,474 | 1,198 | 1,344 | – | 7,847 | 8 | 14 | **SNW 40x7.1/8** | AN 40 | W 40 | HMVC 40E |
| **7 3/16** | 200 | 9,443 | 4,74 | 1,198 | 1,313 | – | 7,847 | 8 | 8,85 | ▸ **SNW 3040x7.3/16** | N 040 | W 040 | HMVC 40E |
| *182,563* | 200 | 9,443 | 5,474 | 1,198 | 1,313 | – | 7,847 | 8 | 13 | ▸ **SNW 3140x7.3/16** | N 040 | W 040 | HMVC 40E |
| | 200 | 9,849 | 5,474 | 1,198 | 1,344 | – | 7,847 | 8 | 14 | ▸ **SNW 40x7.3/16** | AN 40 | W 40 | HMVC 40E |
| | 200 | 9,849 | 7,085 | 1,198 | 1,344 | – | 7,847 | 8 | 16 | ▸ **SNW 140x7.3/16** | AN 40 | W 40 | HMVC 40E |
| | 220 | 11,005 | 7,227 | 1,26 | 1,406 | – | 8,628 | 8 | 21 | **SNW 144x7.3/16** | N 44 | W 44 | HMVC 44E |
| **7 1/4** | 20 | 9,849 | 7,085 | 1,198 | 1,344 | – | 7,847 | 8 | 16 | **SNW 140x7.1/4** | AN 40 | W 40 | HMVC 40E |
| *184,15* | 200 | 9,443 | 4,74 | 1,198 | 1,313 | – | 7,847 | 8 | 8,85 | **SNW 3040x7.1/4** | N 040 | W 040 | HMVC 40E |
| | 200 | 9,849 | 5,474 | 1,198 | 1,344 | – | 7,847 | 8 | 14 | **SNW 40x7.1/4** | AN 40 | W 40 | HMVC 40E |
| **7 7/16** | 200 | 9,443 | 4,74 | 1,198 | 1,313 | – | 7,847 | 8 | 8,85 | **SNW 3040x7.7/16** | N 040 | W 040 | HMVC 40E |
| *188,913* | | | | | | | | | | | | | |
| **7 1/2** | 220 | 11,005 | 5,891 | 1,26 | 1,406 | – | 8,628 | 8 | 14,5 | **SNW 44x7.1/2** | N 44 | W 44 | HMVC 44E |
| *190,5* | 220 | 11,005 | 7,227 | 1,26 | 1,406 | – | 8,628 | 8 | 21 | **SNW 144x7.1/2** | N 44 | W 44 | HMVC 44E |
| **7 13/16** | 200 | 9,849 | 7,085 | 1,198 | 1,344 | – | 7,847 | 8 | 16 | **SNW 140x7.13/16** | AN 40 | W 40 | HMVC 40E |
| *198,438* | 220 | 10,255 | 5,12 | 1,26 | 1,375 | – | 8,628 | 8 | 11 | **SNW 3044x7.13/16** | N 044 | W 044 | HMVC 44E |
| | 220 | 11,005 | 5,891 | 1,26 | 1,406 | – | 8,628 | 8 | 14,5 | **SNW 44x7.13/16** | N 44 | W 44 | HMVC 44E |
| | 220 | 11,005 | 7,227 | 1,26 | 1,406 | – | 8,628 | 8 | 21 | **SNW 144x7.13/16** | N 44 | W 44 | HMVC 44E |

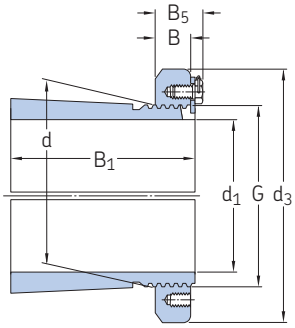
▸ Popular item

## 23.2 Adapter sleeves with inch dimensions

$d_1$ **7 7/8 – 16 1/2** in.
*200,025 – 419,1 mm*




SNW




SNP

| Principal dimensions | | | | | | | Thread | Threads per inch | Mass | Designations Adapter sleeve assembly | Included products lock nut | locking device | Associated hydraulic nut |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $d_1$ | d | $d_3$ max. | $B_1$ | B | $B_4$ | $B_5$ | G | | | | | | |
| in./*mm* | mm | in. | | | | | in. | – | kg | – | | | |
| **7 7/8** | 200 | 9,849 | 7,085 | 1,198 | 1,344 | – | 7,847 | 8 | 16 | **SNW 140x7.7/8** | AN 40 | W 40 | HMVC 40E |
| *200,025* | 220 | 10,255 | 5,12 | 1,26 | 1,375 | – | 8,628 | 8 | 11 | **SNW 3044x7.7/8** | N 044 | W 044 | HMVC 44E |
| | 220 | 11,005 | 5,891 | 1,26 | 1,406 | – | 8,628 | 8 | 14,5 | **SNW 44x7.7/8** | N 44 | W 44 | HMVC 44E |
| | 220 | 11,005 | 7,227 | 1,26 | 1,406 | – | 8,628 | 8 | 21 | **SNW 144x7.7/8** | N 44 | W 44 | HMVC 44E |
| **7 15/16** | 220 | 10,255 | 5,12 | 1,26 | 1,375 | – | 8,628 | 8 | 11 | ▸ **SNW 3044x7.15/16** | N 044 | W 044 | HMVC 44E |
| *201,613* | 220 | 10,255 | 5,891 | 1,26 | 1,375 | – | 8,628 | 8 | 13 | ▸ **SNW 3144x7.15/16** | N 044 | W 044 | HMVC 44E |
| | 220 | 11,005 | 5,891 | 1,26 | 1,406 | – | 8,628 | 8 | 14,5 | ▸ **SNW 44x7.15/16** | N 44 | W 44 | HMVC 44E |
| | 220 | 11,005 | 7,277 | 1,26 | 1,406 | – | 8,628 | 8 | 21 | ▸ **SNW 144x7.15/16** | N 44 | W 44 | HMVC 44E |
| **8** | 200 | 9,849 | 7,085 | 1,198 | 1,344 | – | 7,847 | 8 | 16 | **SNW 140x8** | AN 40 | W 40 | HMVC 40E |
| *203,2* | 220 | 10,255 | 5,12 | 1,26 | 1,375 | – | 8,628 | 8 | 11 | ▸ **SNW 3044x8** | N 044 | W 044 | HMVC 44E |
| | 220 | 10,255 | 5,891 | 1,26 | 1,375 | – | 8,628 | 8 | 13 | ▸ **SNW 3144x8** | N 044 | W 044 | HMVC 44E |
| | 220 | 11,005 | 5,891 | 1,26 | 1,406 | – | 8,628 | 8 | 14,5 | ▸ **SNW 44x8** | N 44 | W 44 | HMVC 44E |
| | 220 | 11,005 | 7,227 | 1,26 | 1,406 | – | 8,628 | 8 | 21 | **SNW 144x8** | N 44 | W 44 | HMVC 44E |
| **8 7/16** | 240 | 11,443 | 5,422 | 1,354 | – | 1,698 | 9,442 | 6 | 14,5 | **SNP 3048x8.7/16** | N 048 | PL 48 | HMVC 48E |
| *214,313* | | | | | | | | | | | | | |
| **8 1/2** | 240 | 11,443 | 5,422 | 1,354 | – | 1,698 | 9,442 | 6 | 14,5 | **SNP 3048x8.1/2** | N 048 | PL 48 | HMVC 48E |
| *215,9* | | | | | | | | | | | | | |
| **8 15/16** | 240 | 11,443 | 5,422 | 1,354 | – | 1,698 | 9,442 | 6 | 14,5 | ▸ **SNP 3048x8.15/16** | N 048 | PL 48 | HMVC 48E |
| *227,013* | 240 | 11,443 | 6,628 | 1,354 | – | 1,698 | 9,442 | 6 | 17 | ▸ **SNP 3148x8.15/16** | N 048 | PL 48 | HMVC 48E |
| | 240 | 11,443 | 8,099 | 1,354 | – | 1,698 | 9,442 | 6 | 22 | ▸ **SNP 148x8.15/16** | N 048 | PL 48 | HMVC 48E |
| **9** | 240 | 11,443 | 5,422 | 1,354 | – | 1,698 | 9,442 | 6 | 14,5 | **SNP 3048x9** | N 048 | PL 48 | HMVC 48E |
| *228,6* | 240 | 12,193 | 8,764 | 1,416 | – | 1,76 | 10,192 | 6 | 17 | ▸ **SNP 3152x9** | N 052 | PL 52 | HMVC 52E |
| | 260 | 12,193 | 8,764 | 1,416 | – | 1,76 | 10,192 | 6 | 25 | **SNP 152x9** | N 052 | PL 52 | HMVC 52E |
| **9 7/16** | 260 | 12,193 | 6,009 | 1,416 | – | 1,76 | 10,192 | 6 | 18,5 | ▸ **SNP 3052x9.7/16** | N 052 | PL 52 | HMVC 52E |
| *239,713* | 260 | 12,193 | 8,764 | 1,416 | – | 1,76 | 10,192 | 6 | 20 | ▸ **SNP 3152x9.7/16** | N 052 | PL 52 | HMVC 52E |
| | 260 | 12,193 | 8,764 | 1,416 | – | 1,76 | 10,192 | 6 | 25 | ▸ **SNP 152x9.7/16** | N 052 | PL 52 | HMVC 52E |
| **9 1/2** | 260 | 12,193 | 6,009 | 1,416 | – | 1,76 | 10,192 | 6 | 18,5 | ▸ **SNP 3052x9.1/2** | N 052 | PL 52 | HMVC 52E |
| *241,3* | 260 | 12,193 | 8,764 | 1,416 | – | 1,76 | 10,192 | 6 | 20 | ▸ **SNP 3152x9.1/2** | N 052 | PL 52 | HMVC 52E |

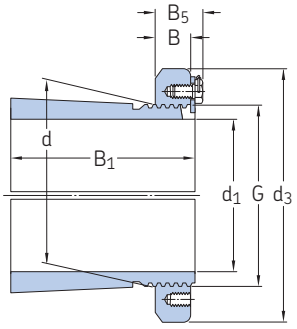
▸ Popular item

| Principal dimensions | | | | | | | Thread | | Mass | Designations | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Threads per inch | | Adapter sleeve assembly | Included products lock nut | locking device | Associated hydraulic nut |
| $d_1$ | d | $d_3$ max. | $B_1$ | B | $B_4$ | $B_5$ | G | | | | | | |
| in./*mm* | mm | in. | | | | | in. | – | kg | – | | | |
| **9 15/16** | 280 | 13,005 | 6,181 | 1,51 | – | 1,854 | 11,004 | 6 | 20,5 | ▸ **SNP 3056x9.15/16** | N 056 | PL 56 | HMVC 56E |
| *252,413* | 280 | 13,005 | 7,756 | 1,51 | – | 1,854 | 11,004 | 6 | 21 | **SNP 3156x9.15/16** | N 056 | PL 56 | HMVC 56E |
| **10** | 280 | 13,005 | 6,181 | 1,51 | – | 1,854 | 11,004 | 6 | 20,5 | ▸ **SNP 3056x10** | N 056 | PL 56 | HMVC 56E |
| *254* | 280 | 13,005 | 7,756 | 1,51 | – | 1,854 | 11,004 | 6 | 21 | ▸ **SNP 3156x10** | N 056 | PL 56 | HMVC 56E |
| **10 7/16** | 280 | 13,005 | 6,181 | 1,51 | – | 1,854 | 11,004 | 6 | 20,5 | ▸ **SNP 3056x10.7/16** | N 056 | PL 56 | HMVC 56E |
| *265,113* | 280 | 13,005 | 7,756 | 1,51 | – | 1,854 | 11,004 | 6 | 21 | **SNP 3156x10.7/16** | N 056 | PL 56 | HMVC 56E |
| | 280 | 13,005 | 8,937 | 1,51 | – | 1,854 | 11,004 | 6 | 27 | ▸ **SNP 3256x10.7/16** | N 056 | PL 56 | HMVC 56E |
| **10 1/2** | 280 | 13,005 | 6,181 | 1,51 | – | 1,854 | 11,004 | 6 | 20,5 | ▸ **SNP 3056x10.1/2** | N 056 | PL 56 | HMVC 56E |
| *266,7* | 280 | 13,005 | 7,756 | 1,51 | – | 1,854 | 11,004 | 6 | 21 | **SNP 3156x10.1/2** | N 056 | PL 56 | HMVC 56E |
| **10 15/16** | 300 | 14,193 | 6,717 | 1,573 | – | 1,948 | 11,785 | 6 | 31 | ▸ **SNP 3060x10.15/16** | N 060 | PL 60 | HMVC 60E |
| *277,813* | 300 | 14,193 | 8,37 | 1,573 | – | 1,948 | 11,785 | 6 | 27 | ▸ **SNP 3160x10.15/16** | N 060 | PL 60 | HMVC 60E |
| | 300 | 14,193 | 9,63 | 1,573 | – | 1,948 | 11,785 | 6 | 31 | ▸ **SNP 3260x10.15/16** | N 060 | PL 60 | HMVC 60E |
| **11** | 300 | 14,193 | 6,717 | 1,573 | – | 1,948 | 11,785 | 6 | 31 | ▸ **SNP 3060x11** | N 060 | PL 60 | HMVC 60E |
| *279,4* | 300 | 14,193 | 9,63 | 1,573 | – | 1,948 | 11,785 | 6 | 31 | ▸ **SNP 3260x11** | N 060 | PL 60 | HMVC 60E |
| **11 7/16** | 320 | 15,005 | 6,936 | 1,666 | – | 2,041 | 12,562 | 6 | 29,5 | **SNP 3064x11.7/16** | N 064 | PL 64 | HMVC 64E |
| *290,513* | | | | | | | | | | | | | |
| **11 1/2** | 320 | 15,005 | 6,936 | 1,666 | – | 2,041 | 12,562 | 6 | 29,5 | ▸ **SNP 3064x11.1/2** | N 064 | PL 64 | HMVC 64E |
| *292,1* | | | | | | | | | | | | | |
| **11 15/16** | 320 | 15,005 | 6,936 | 1,666 | – | 2,041 | 12,562 | 6 | 29,5 | ▸ **SNP 3064x11.15/16** | N 064 | PL 64 | HMVC 64E |
| *303,213* | 320 | 15,005 | 9,101 | 1,666 | – | 2,041 | 12,562 | 6 | 33,5 | **SNP 3164x11.15/16** | N 064 | PL 64 | HMVC 64E |
| | 320 | 15,005 | 10,361 | 1,666 | – | 2,041 | 12,562 | 6 | 44,5 | ▸ **SNP 3264x11.15/16** | N 064 | PL 64 | HMVC 64E |
| **12** | 320 | 15,005 | 6,936 | 1,666 | – | 2,041 | 12,562 | 6 | 29,5 | ▸ **SNP 3064x12** | N 064 | PL 64 | HMVC 64E |
| *304,8* | 320 | 15,005 | 9,101 | 1,666 | – | 2,041 | 12,562 | 6 | 33,5 | ▸ **SNP 3164x12** | N 064 | PL 64 | HMVC 64E |
| | 320 | 15,005 | 10,361 | 1,666 | – | 2,041 | 12,562 | 6 | 44,5 | ▸ **SNP 3264x12** | N 064 | PL 64 | HMVC 64E |
| **12 7/16** | 340 | 15,755 | 7,533 | 1,791 | – | 2,166 | 13,303 | 5 | 35,5 | ▸ **SNP 3068x12.7/16** | N 068 | PL 68 | HMVC 68E |
| *315,913* | 340 | 15,755 | 9,777 | 1,791 | – | 2,166 | 13,303 | 5 | 42,5 | ▸ **SNP 3168x12.7/16** | N 068 | PL 68 | HMVC 68E |
| | 340 | 15,755 | 11,116 | 1,791 | – | 2,166 | 13,303 | 5 | 47,5 | ▸ **SNP 3268x12.7/16** | N 068 | PL 68 | HMVC 68E |
| **13 7/16** | 360 | 16,505 | 7,569 | 1,791 | – | 2,166 | 14,17 | 5 | 39 | ▸ **SNP 3072x13.7/16** | N 072 | PL 72 | HMVC 72E |
| *341,313* | 360 | 16,505 | 9,852 | 1,791 | – | 2,166 | 14,17 | 5 | 54,5 | ▸ **SNP 3172x13.7/16** | N 072 | PL 72 | HMVC 72E |
| | 360 | 16,505 | 11,427 | 1,791 | – | 2,166 | 14,17 | 5 | 61,5 | ▸ **SNP 3272x13.7/16** | N 072 | PL 72 | HMVC 72E |
| **13 15/16** | 360 | 16,505 | 7,569 | 1,791 | – | 2,166 | 14,17 | 5 | 39 | **SNP 3072x13.15/16** | N 072 | PL 72 | HMVC 72E |
| *354,013* | 360 | 17,755 | 11,867 | 1,916 | – | 2,353 | 14,921 | 5 | 66 | ▸ **SNP 3276x13.15/16** | N 076 | PL 76 | HMVC 76E |
| | 380 | 17,755 | 7,733 | 1,916 | – | 2,353 | 14,921 | 5 | 43 | ▸ **SNP 3076x13.15/16** | N 076 | PL 76 | HMVC 76E |
| | 380 | 17,755 | 10,056 | 1,916 | – | 2,353 | 14,921 | 5 | 57 | ▸ **SNP 3176x13.15/16** | N 076 | PL 76 | HMVC 76E |
| **14** | 360 | 17,755 | 11,867 | 1,916 | – | 2,353 | 14,921 | 5 | 66 | ▸ **SNP 3276x14** | N 076 | PL 76 | HMVC 76E |
| *355,6* | 380 | 17,755 | 7,733 | 1,916 | – | 2,353 | 14,921 | 5 | 43 | ▸ **SNP 3076x14** | N 076 | PL 76 | HMVC 76E |
| | 380 | 17,755 | 10,056 | 1,916 | – | 2,353 | 14,921 | 5 | 57 | ▸ **SNP 3176x14** | N 076 | PL 76 | HMVC 76E |
| **14 15/16** | 400 | 18,505 | 10,449 | 2,073 | – | 2,5 | 15,709 | 5 | 63,5 | **SNP 3180x14.15/16** | N 080 | PL 80 | HMVC 80E |
| *379,413* | | | | | | | | | | | | | |
| **15** | 400 | 18,505 | 8,401 | 2,073 | – | 2,5 | 15,709 | 5 | 45,5 | ▸ **SNP 3080x15** | N 080 | PL 80 | HMVC 80E |
| *381* | 400 | 18,505 | 10,449 | 2,073 | – | 2,5 | 15,709 | 5 | 63,5 | ▸ **SNP 3180x15** | N 080 | PL 80 | HMVC 80E |
| | 400 | 18,505 | 12,654 | 2,073 | – | 2,5 | 15,709 | 5 | 75 | ▸ **SNP 3280x15** | N 080 | PL 80 | HMVC 80E |
| **15 3/4** | 420 | 19,318 | 8,488 | 2,073 | – | 2,5 | 16,496 | 5 | 47,5 | ▸ **SNP 3084x15.3/4** | N 084 | PL 84 | HMVC 84E |
| *400,05* | 420 | 19,318 | 11,402 | 2,073 | – | 2,5 | 16,496 | 5 | 66 | ▸ **SNP 3184x15.3/4** | N 084 | PL 84 | HMVC 84E |
| | 420 | 19,318 | 13,292 | 2,073 | – | 2,5 | 16,496 | 5 | 75 | ▸ **SNP 3284x15.3/4** | N 084 | PL 84 | HMVC 84E |
| **16 1/2** | 440 | 20,505 | 9,1 | 2,385 | – | 2,906 | 17,283 | 5 | 59,5 | ▸ **SNP 3088x16.1/2** | N 088 | PL 88 | HMVC 88E |
| *419,1* | 440 | 20,505 | 11,817 | 2,385 | – | 2,906 | 17,283 | 5 | 68,5 | ▸ **SNP 3188x16.1/2** | N 088 | PL 88 | HMVC 88E |
| | 440 | 20,505 | 13,943 | 2,385 | – | 2,906 | 17,283 | 5 | 86,5 | ▸ **SNP 3288x16.1/2** | N 088 | PL 88 | HMVC 88E |

▸ Popular item

## 23.2 Adapter sleeves with inch dimensions

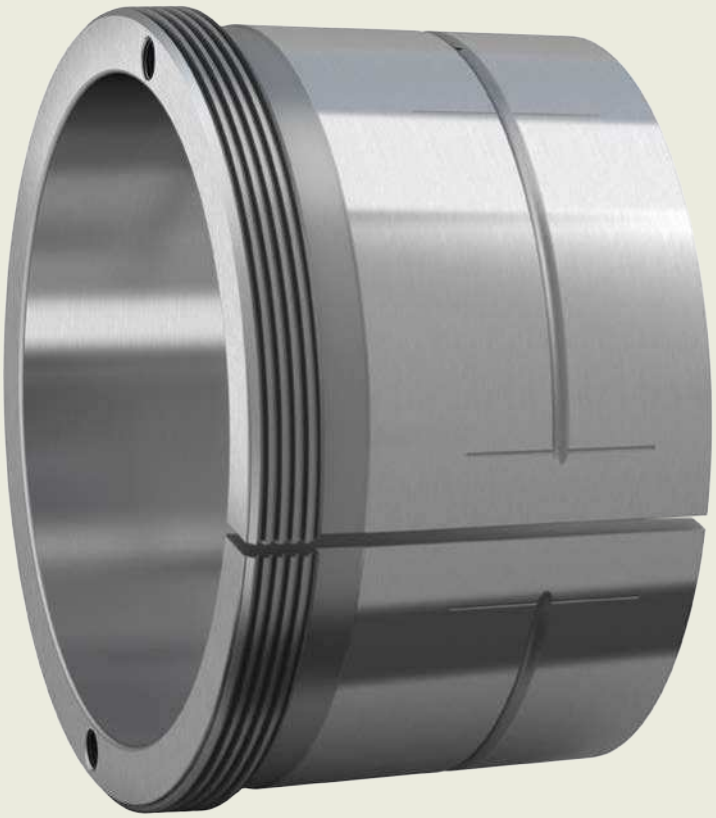
$d_1$ **17 – 19 1/2** in.
*431,8 – 495,3 mm*



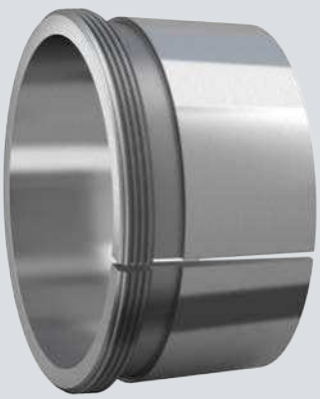

| Principal dimensions | | | | | | | Thread | Threads per inch | Mass | Designations Adapter sleeve assembly | Included products lock nut | locking device | Associated hydraulic nut |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $d_1$ | d | $d_3$ max. | $B_1$ | B | $B_4$ | $B_5$ | G | | | | | | |
| in./*mm* | mm | in. | | | | | in. | – | kg | – | | | |
| **17** | 460 | 21,255 | 9,336 | 2,385 | – | 2,906 | 18,071 | 5 | 71,5 | ▸ **SNP 3092x17** | N 092 | PL 92 | HMVC 92E |
| *431,8* | 460 | 21,255 | 12,368 | 2,385 | – | 2,906 | 18,071 | 5 | 95 | ▸ **SNP 3192x17** | N 092 | PL 92 | HMVC 92E |
| **18** | 480 | 22,068 | 12,714 | 2,385 | – | 2,937 | 18,858 | 5 | 75 | ▸ **SNP 3096x18** | N 096 | PL 96 | HMVC 96E |
| *457,2* | 480 | 22,068 | 12,714 | 2,385 | – | 2,937 | 18,858 | 5 | 91,5 | ▸ **SNP 3196x18** | N 096 | PL 96 | HMVC 96E |
| **18 1/2** *469,9* | 500 | 22,818 | 9,838 | 2,703 | – | 3,25 | 19,646 | 5 | 91 | ▸ **SNP 30/500x18.1/2** | N 500 | PL 500 | HMVC 100E |
| **19 1/2** *495,3* | 530 | 24,818 | 10,579 | 2,703 | – | 3,25 | 20,827 | 4 | 120 | ▸ **SNP 30/530x19.1/2** | N 530 | PL 530 | HMVC 106E |

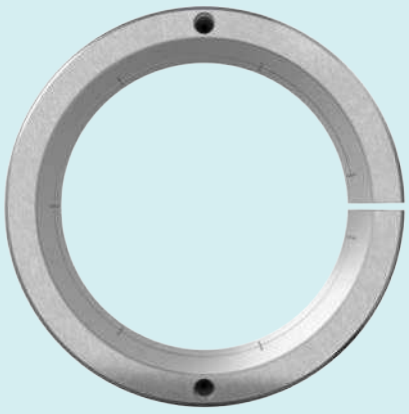


▸ Popular item



# 24 Withdrawal sleeves





# 24 Withdrawal sleeves

Withdrawal sleeves are slit tapered sleeves (**fig. 1**), which can be used to mount bearings with a tapered bore onto a cylindrical seat of stepped shafts (**fig. 2**). The sleeves are pressed into the bore of the bearing inner ring, which abuts a shaft shoulder or similar fixed component. They are located on the shaft by a nut or an end plate.

The standard assortment of SKF withdrawal sleeves is available online at skf.com/go/17000-24-1 and comprises:

- basic design sleeves (**fig. 1**)
- sleeves for oil injection (**fig. 3**)
- sleeves for shaft diameters up to 1 000 mm

Withdrawal sleeves are not listed in this catalogue. Comprehensive information about SKF withdrawal sleeves is available online at skf.com/go/17000-24.

**Fig. 1**

**Withdrawal sleeve, basic design**

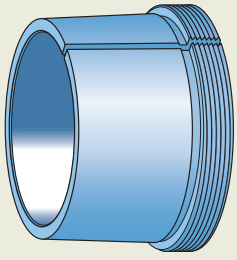


**Fig. 2**

**Withdrawal sleeve on a stepped shaft**

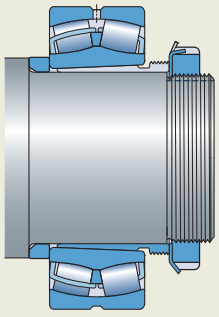
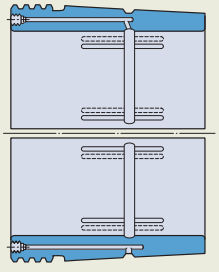
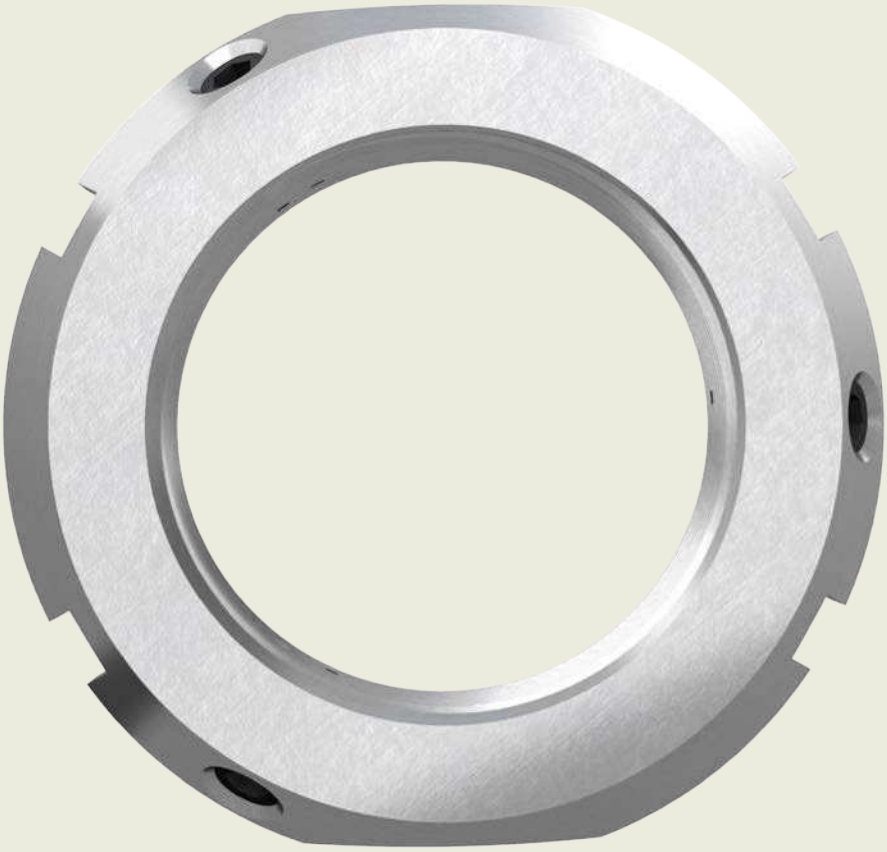


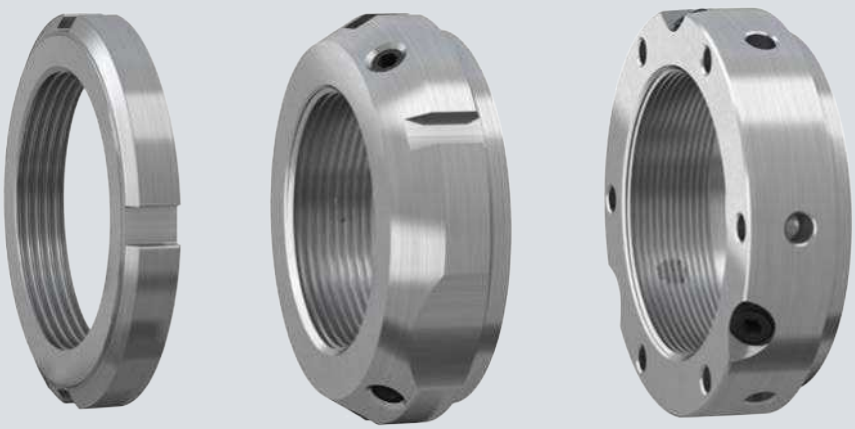
**Fig. 3**

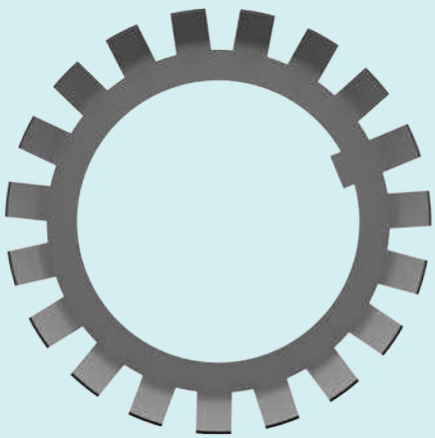
**Withdrawal sleeve for oil injection**





# 25 Lock nuts





# 25 Lock nuts


**Designs and variants** . . . . . **1090**
Lock nuts requiring a keyway . . . . . 1093
KM, KML and HM .. T metric lock nuts . . . . . 1093
N and AN inch lock nuts . . . . . 1093
HM and HME metric lock nuts . . . . . 1094
The locking principles . . . . . 1094
Lock nuts with integral locking . . . . . 1095
KMFE lock nuts . . . . . 1095
KMK lock nuts . . . . . 1095
The locking principle . . . . . 1095
Precision lock nuts with locking pins . . . . . 1096
The locking principle . . . . . 1097
Precision lock nuts with axial locking screws . . . . . 1097
The locking principle . . . . . 1097

**Product data** . . . . . **1098**
(Dimension standards, tolerances, mating shaft threads, loosening torque)

**Installation and removal** . . . . . **1100**
Lock nuts requiring a keyway . . . . . 1100
Using lock nuts with lock washer to lock a bearing . . . . 1100
Using lock nuts with locking clips to lock a bearing . . . . 1100
Lock nuts with integral locking . . . . . 1101
Mounting . . . . . 1101
Dismounting . . . . . 1101
Precision lock nuts with locking pins . . . . . 1102
Installation . . . . . 1102
Adjustment . . . . . 1102
Removal . . . . . 1102

**Designation system** . . . . . **1103**

**Product tables**
25.1 KM(L) and HM .. T lock nuts . . . . . 1104
25.2 MB(L) lock washers . . . . . 1106
25.3 HM lock nuts . . . . . 1108
25.4 MS locking clips . . . . . 1110
25.5 KMFE lock nuts with a locking screw . . . . . 1112
25.6 KMT precision lock nuts with locking pins . . . . . 1114
25.7 KMTA precision lock nuts with locking pins . . . . . 1116

# 25 Lock nuts

Lock nuts are used to locate bearings onto a shaft. Additionally, they can be used to mount bearings with a tapered bore onto tapered shaft seats and adapter sleeves, and to dismount bearings from withdrawal sleeves. Lock nuts are also frequently used to secure gears, belt pulleys and other machine components.

Lock nuts have to be secured to prevent unintentional loosening by:

- a locking device that engages a keyway in the shaft or key slot in the adapter sleeve, or
- a locking mechanism integrated in the nut

When choosing or replacing a lock nut, there are a number of factors that should be taken into consideration. They include, but are not limited to:

- Space – axial and radial
- Shaft rotation – one or both directions
- Axial loads
- Dynamic behaviour of the application
- Cost and downtime of machining keyways in shafts vs. other locking methods
- Ease and frequency of assembly and disassembly
- Precision

## Designs and variants

SKF lock nuts provide a variety of ways to secure the nut onto a shaft. The lock nuts listed here constitute the basic SKF assortment. Lock nuts with other locking methods can be supplied on request. For additional information, contact SKF.

The following tables provide an overview over the basic SKF assortment:

- **table 1** for SKF industrial lock nuts
- **table 2**, **page 1092** for SKF precision lock nuts

Lock nuts with integral locking reduce the cost of the shaft as no keyway is required. Installation is quicker and easier because no separate locking device is necessary. However, the loosening torque of these lock nuts requires more attention. For information on loosening torque, refer to *Product data*, **page 1098**.

**Table 1**

**SKF industrial lock nuts**

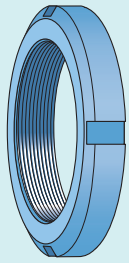
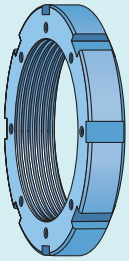
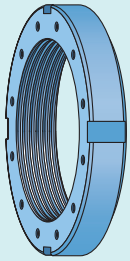
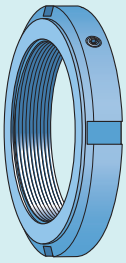
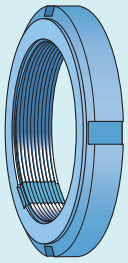
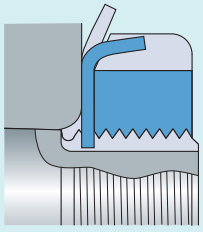
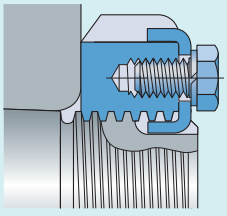
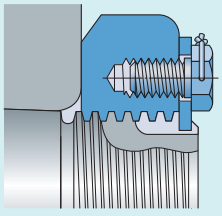
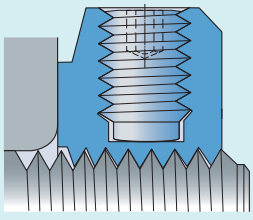
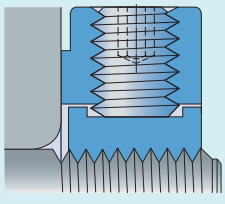
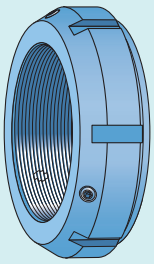
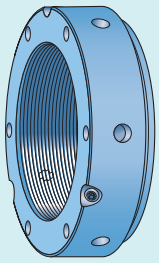
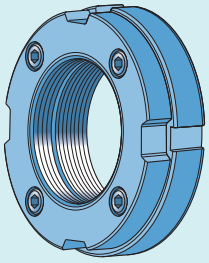
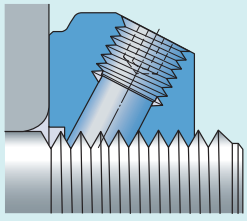
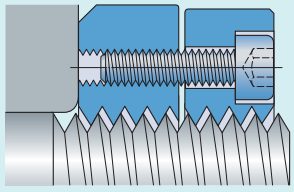
|  |  |  |  |  |
|---|---|---|---|---|
| **KM, KML, HM .. T, AN and N**<br>Lock nuts with a lock washer | **HM and HME**<br>Lock nuts with a locking clip | **N**<br>Lock nuts with a locking plate | **KMFE**<br>Lock nuts with an integral locking screw | **KMK**<br>Lock nuts with an integral locking device |
| **KM and KML:**<br>thread 10 to 200 mm<br>(sizes 0 to 40)<br><br>**HM .. T:**<br>thread 210 to 280 mm<br>(sizes 42 to 56)<br><br>**AN and N:**<br>thread 0.391 to 8.628 in.<br>(sizes: N 00 to N 14,<br>AN 15 to AN 40 and<br>N 022 to N 044)<br>These lock nuts are not listed in this catalogue, but can be found online at skf.com/go/17000-25-8. | thread 220 to 1 120 mm<br>(sizes 44 to /1120)<br><br>HME design lock nuts are not listed in this catalogue, but can be found online at skf.com/go/17000-25-3. | thread 9.442 to 37.410 in.<br>(sizes 056 to 950)<br><br>These lock nuts are not listed in this catalogue, but can be found online at skf.com/go/17000-25-8. | thread 20 to 200 mm<br>(sizes 4 to 40) | thread 10 to 100 mm<br>(sizes 0 to 20)<br><br>These lock nuts are not listed in this catalogue, but can be found online at skf.com/go/17000-25-5. |
| A simple, stable and reliable fastening element | A simple, stable and reliable fastening element | A simple, stable and reliable fastening element | Fastened with an integral locking screw and front face adapted for use with certain CARB and sealed bearings | Fastened with a threaded steel insert and a grub screw |
| Reusable with new locking device | Reusable with new locking device | Reusable with new locking device | Reusable | Reusable |
| Simple to install and remove | Simple to install and remove | Simple to install and remove | Simple to install and robust locking | Simple to install |
| Keyway in shaft thread required for lock washer | Keyway in shaft thread required for locking clip | Keyway in shaft thread required for locking plate | For shaft threads without keyways | For shaft threads without keyways |
| **Locking principle** | | | | |
|  |  |  |  |  |
| Locks with a separate lock washer engaged in a keyway in the shaft thread and having a tab that is bent over into one of the slots in the nut | Locks with a separate locking clip that is attached to the nut and engages with a keyway in the shaft thread and one of the slots in the nut | Locks with a locking plate that engages with a keyway in the shaft thread and is secured to the nut by two screws and locking wire | Locks by tightening the grub screw to press the lock nut thread against the shaft thread | Locks by tightening the grub screws to press a threaded steel insert in the lock nut against the shaft thread |

Table 2

**SKF precision lock nuts**

| | | |
|---|---|---|
|  |  |  |
| **KMT**<br>Precision lock nuts with locking pins | **KMTA** | **KMD**<br>Precision lock nuts with axial locking screws |
| thread 10 to 200 mm<br>(sizes 0 to 40)<br>Larger sizes on request | thread 25 to 200 mm<br>(sizes 5 to 40) | thread 20 to 105 mm (sizes 4 to21)<br>These lock nuts are not listed in this catalogue, but can be found online at skf.com/go/17000-25-6. |
| Maximum axial run-out between the locating face and thread: 0,005 mm | | Maximum axial run-out between the locating face and thread: 0,005 mm |
| Can be adjusted to compensate for slight angular deviations | | Effective axial locking, simple to position |
| Reusable | | Reusable |
| Simple to install and remove | | Simple to install and remove |
| For shaft threads without keyways | | For shaft threads without keyways |
| Designed for frequent installation and removal | | Designed for frequent installation and removal |
| High axial load capacity | | |

**Locking principle**

| | |
|---|---|
|  |  |
| Locks to the shaft thread by friction generated by tightening three radial locking pins with grub screws against its unloaded flanks | Locks to the shaft thread by friction generated by tightening four axial screws that press the rear part of the nut against the unloaded thread flanks |

# Lock nuts requiring a keyway

## KM, KML and HM .. T metric lock nuts

KM and KML lock nuts (fig. 1):

- have metric threads
- are designed to be used with lock washers
- have four equally-spaced slots located around their circumference to accommodate a hook or impact spanner (fig. 2)
- are also referred to as shaft or withdrawal nuts
- are available for thread M 10x0,75 to M 200x3 (sizes 0 to 40)
- can be locked with either the MB lock washer (fig. 3) or with a stronger, MB .. A lock washer

KML lock nuts have a lower cross-sectional height than KM lock nuts.

HM .. T lock nuts (fig. 1):

- have metric trapezoidal threads
- are also referred to as removal nuts
- are available for thread Tr 210x4 to Tr 280x4 (sizes 42 to 56)

  For some sizes, no lock washer is available because these nuts are intended to dismount bearings with a tapered bore from a withdrawal sleeve.

KM, KML and HM...T lock nuts can be reused, provided they are not damaged. A new lock washer should be used each time the corresponding lock nut is installed.

### Features and benefits

- Simple, stable and reliable fastening
- Wide range of sizes
- Easy to install and remove
- Thread diameters ranging from 10 to 280 mm

## N and AN inch lock nuts

N and AN inch lock nuts (fig. 1):

- using a W lock washer (fig. 3) are available up to and including size 44 (thread diameter 8.628 in.)
- using a locking plate (fig. 4) are low-profile-series lock nuts for nominal thread diameters ranging from 9.442 to 37.410 in. (sizes N 048 to N 950)
- have four, equally spaced slots around their circumference to accommodate a hook or impact spanner (fig. 2)
- are also referred to as shaft or withdrawal nuts
- N 00 to N 14, AN 15 to AN 40 and N 44 lock nuts are normal series lock nuts commonly used together with bearings in the 12, 13, 222, 223 and 232 series up to size 23244, mounted directly to the shaft or via an adapter sleeve.
- N 022 to N 044 lock nuts are low-profile-series lock nuts commonly used together with bearings in the 230 series. They can also be used to secure other bearing types and other machine components.
- N lock nuts with a locking plate are commonly used with bearings in the 230, 231 and 232 series (sizes ≥ 48), but can also be used to retain any suitable bearing or other machine component.

N and AN lock nuts can be reused, provided they are not damaged. A new lock washer or locking plate should be used each time the corresponding lock nut is installed.

### Features and benefits

- Simple, stable and reliable fastening element
- Wide range of sizes
- Easy to install and remove
- Lock washers available for thread 0.391 to 8.628 in. (sizes 00 to 44)
- Locking plates available for thread 9.442 to 18.894 in. (sizes 048 to 096) and for thread 19.682 to 37.410 in. (sizes 500 to 950)

These lock nuts are not listed in this catalogue, but can be found online at skf.com/go/17000-25-8.

Fig. 1

**KM, KML, HM .. T, AN and N (size ≤ 44) lock nut**

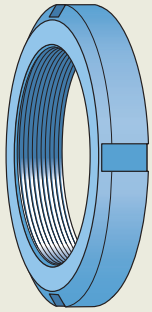


Fig. 2

**KM, KML, HM .. T, AN and N (size ≤ 44) lock nut**

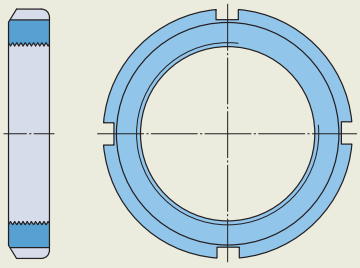


Fig. 3

**MB or W lock washer**

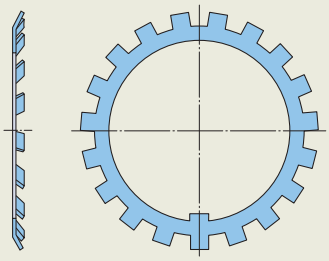
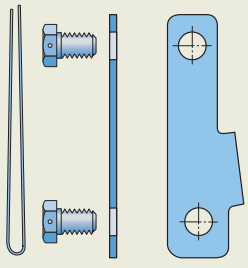


Fig. 4

**PL locking plate**



## HM and HME metric lock nuts

HM and HME lock nuts (fig. 5):

- have metric trapezoidal threads
- have eight equally-spaced slots located around their circumference to accommodate an impact spanner (fig. 6)
- are located on the shaft by MS locking clips (fig. 7)

When compared to HM lock nuts, HME lock nuts have a recessed side face to accommodate axial displacement of CARB toroidal roller bearings (fig. 8).

HM and HME lock nuts can be reused, provided they are not damaged. A new locking clip should be used each time the corresponding lock nut is reinstalled.

### Features and benefits

- Simple, stable and reliable fastening element
- Wide range of sizes
- Easy to install and remove
- Available for thread Tr 220x4 to Tr 1120x8 (sizes 44 to /1120)

## The locking principles

Lock washers, locking clips and locking plates are simple, stable and reliable fastening elements.

- Lock washers (fig. 3, page 1093) engage a keyway in a shaft, or adapter sleeve thread. The washer locks the nut in position when one of the washer tabs is bent into one of the slots on the nut's outside diameter (fig. 9).
- Locking plates (fig. 4, page 1093) engage a keyway in a shaft or adapter sleeve and are attached to the side face of the nut by two bolts secured with locking wire. A locking plate consists of a plate, two hexagonal head bolts with drilled heads and lock wire to secure them (fig. 10).
- Locking clips (fig. 7) engage a keyway in a shaft or adapter sleeve and one of the slots in the outside diameter of the lock nut. Locking clips are attached to the nut by a bolt (fig. 11).

Fig. 8

HME lock nut, with recessed side face

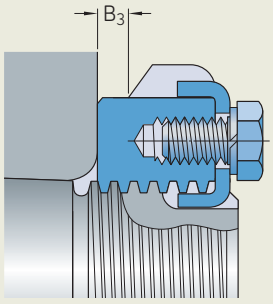



Fig. 5

HM and HME lock nut

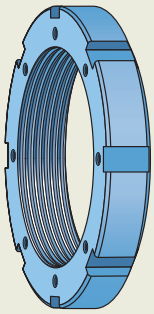


Fig. 9

Locking with a washer

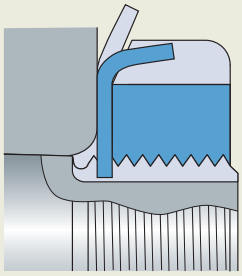


Fig. 6

HM and HME lock nut

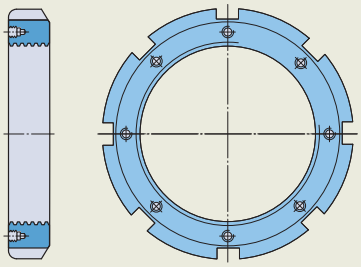


Fig. 10

Locking with a plate

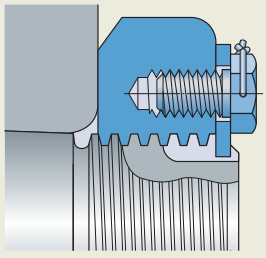


Fig. 7

MS locking clip

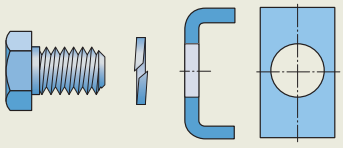
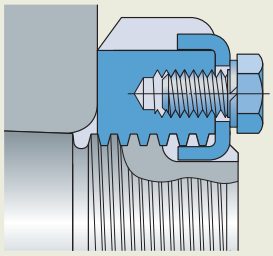


Fig. 11

Locking with a clip



# Lock nuts with integral locking

Lock nuts with integral locking reduce the cost of the shaft as no keyway is required. Installation is quicker and easier because no separate locking device is necessary.

## KMFE lock nuts

KMFE lock nuts (**fig. 12**):

- are designed to locate CARB toroidal roller bearings, sealed spherical roller bearings and sealed self-aligning ball bearings axially on a shaft
- have appropriate contact faces for the intended bearings
- are available for thread M 20x1 to M 200x3 (sizes 4 to 40)

KMFE lock nuts should not be used on shafts with a keyway. They should only be used with special adapter sleeves with a narrow slot. Damage to the nut can result if the grub screw aligns with a keyway or wide slot. KMFE lock nuts can be reused, provided they are not damaged.

### Features and benefits

- Maximum axial run-out between the locating face and thread: 0,02 to 0,03 mm
- No keyway required
- Simple to install
- Simple and robust locking
- Reusable
- Appropriate contact faces for intended bearings
- Equipped with visual marks for the use of tightening angles

## KMK lock nuts

KMK lock nuts (**fig. 13**):

- are intended to locate radial bearings in less demanding applications
- are available for thread M 10x0,75 to M 100x2 (sizes 0 to 20)

KMK lock nuts should not be used on shafts with keyways or adapter sleeves with key slots. Damage to the locking device can result if it aligns with a keyway or slot. KMK lock nuts can be reused, provided they are not damaged.

These lock nuts are not listed in this catalogue, but can be found online at skf.com/go/17000-25-5.

## The locking principle

Lock nuts with integral locking are locked by friction. The friction is sufficient to lock the nut in place.

KMFE lock nuts have an integral grub (set) screw, to lock the nut in place. When the grub screw is tightened, it causes the nut thread to deform and press against the shaft or sleeve thread (**fig. 14**).

KMK have a threaded steel insert in their bore. The threads on the insert match the lock nut threads. The insert acts as a pressure plate when a grub screw, which runs through the body of the lock nut, is tightened (**fig. 15**).

**Fig. 12**

**KMFE lock nut**

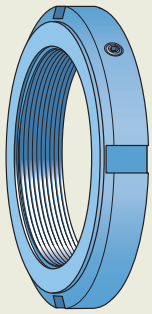


**Fig. 13**

**KMK lock nut**

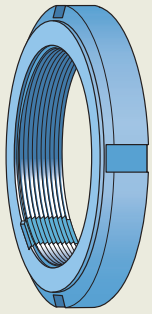


**Fig. 14**

**Locking with a locking screw – KMFE**

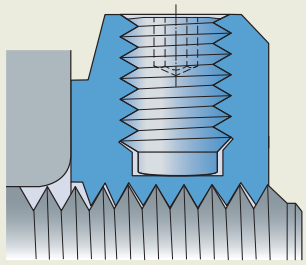
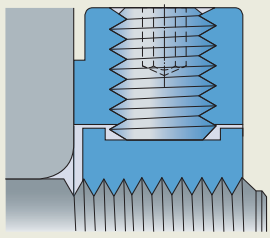


**Fig. 15**

**Locking with an integral locking device – KMK**



# Precision lock nuts with locking pins

KMT and KMTA lock nuts are intended for applications where high precision, simple assembly and reliable locking are required[1]. The three equally-spaced locking pins enable these lock nuts to be accurately positioned at right angles to the shaft. However, they can also be adjusted to compensate for slight angular deviations of adjacent components.

KMT lock nuts (fig. 16):

- are available for thread M 10x0,75 to M 200x3 (sizes 0 to 40)
- are available on request for thread Tr 220x4 to Tr 420x5 (sizes 44 to 84)

KMTA lock nuts (fig. 17):

- are available for thread M 25x1,5 to M 200x3 (sizes 5 to 40)
- have a cylindrical outside surface and, for some sizes, a different thread pitch than KMT lock nuts
- are intended primarily for applications where space is limited and the cylindrical outside surface can be used as an element of a gap-type seal

## Features and benefits

- Maximum axial run-out between the locating face and thread (sizes ≤ 40): 0,005 mm
- Adjustable to compensate for slight angular deviations (fig. 18)
- Fine thread pitch
- Withstands high axial loads
- Reliable, effective locking mechanism
- Simple installation and removal
- No keyway required[1]
- Reusable
- Designed for frequent installation and removal

[1] KMT and KMTA lock nuts should not be used on shafts with keyways in the thread or adapter sleeves. Damage to the locking pins can result if they align with either.

Fig. 16

**KMT precision lock nut**

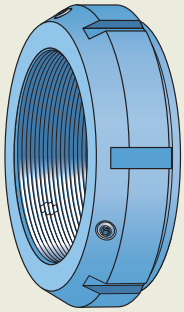


Fig. 17

**KMTA precision lock nut**

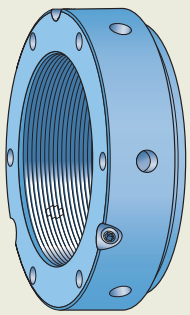
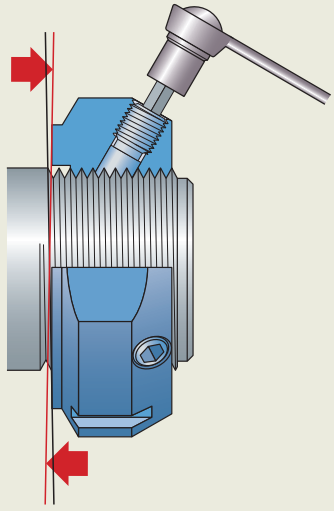


Fig. 18

**Adjustable to minimise axial run-out**



## The locking principle

KMT and KMTA series precision lock nuts have three locking pins equally spaced around their circumference (**fig. 19** to **fig. 21**) that can be tightened with grub screws to lock the nut onto the shaft. The end face of each pin is machined to match the shaft thread. The holes for the locking pins and grub screws are drilled with their axis parallel to the loaded flanks of the shaft thread (**fig. 22**). The locking screws, when tightened to the recommended torque, provide sufficient friction between the ends of the pins and the unloaded thread flanks to prevent the nut from loosening under normal operating conditions (*Loosening torque*, **page 1098**). Because the locking pins are tightened against the unloaded flanks of the shaft thread, they are not subjected to any application loads imposed on the nut.

# Precision lock nuts with axial locking screws

KMD lock nuts (**fig. 23**) were designed specifically for screw compressors but can be used in other applications where high precision, simple assembly and reliable locking are required. Once the four locking screws are tightened, the lock nut will be accurately positioned at right angles to the shaft thread. The locking screws, when tightened to the recommended tightening torque, preload the lock nut and shaft threads and generate sufficient friction to prevent the nut from loosening under normal operating conditions. The locking screws do not carry any part of the supported load in service.

KMD lock nuts are available for thread M 20x1 to M 105x2 (sizes 4 to 21).

### Features and benefits

- Maximum axial run-out between the locating face and thread: 0,005 mm
- Adjustable for precise axial positioning
- Effective locking prevents the nut from loosening under normal operating conditions
- Simple installation and removal
- No keyway required
- Reusable
- Designed for frequent installation and removal

These lock nuts are not listed in this catalogue, but can be found online at skf.com/go/17000-25-6.

## The locking principle

KMD lock nuts are locked with axial locking screws (**fig. 24**). The front of the lock nut locates the component on the shaft. The rear is tightened against the unloaded flanks of the shaft thread by axial locking screws, creating sufficient friction to prevent the lock nut from loosening under normal operating conditions.

**Fig. 19**

**KMT lock nut with two opposed flats**

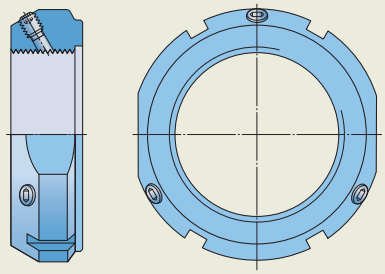


**Fig. 21**

**KMTA lock nuts with holes around their circumference and in one side face**

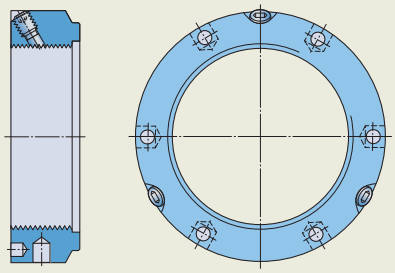


**Fig. 23**

**KMD precision lock nut**

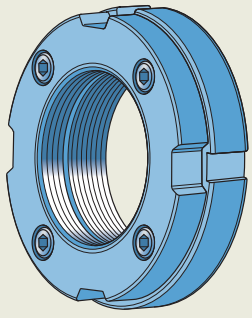


**Fig. 20**

**KMT lock nut with six slots and no flats**

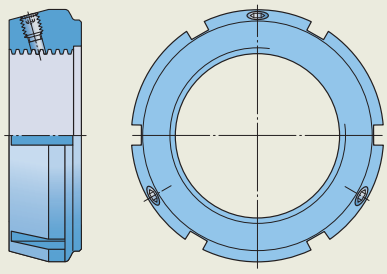


**Fig. 22**

**Locking with locking pins**

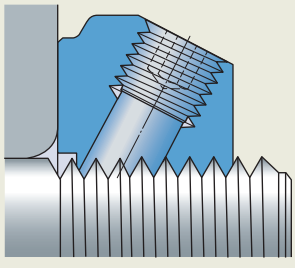
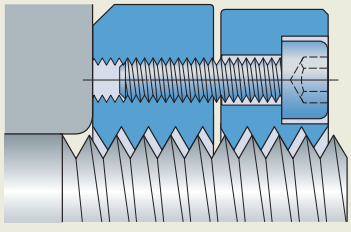


**Fig. 24**

**Locking with axial locking screws**



# Product data

| | **Lock nuts requiring a keyway**<br>KM, KML, HM .. T, HM and HME | **Lock nuts with integral locking**<br>KMFE and KMK |
|---|---|---|
| **Dimension standards** | ISO 2982-2 | ISO 2982-2, except for the lock nut width and the outside diameter of the clamp face<br><br>Grub screws:<br>• KMFE → ISO 4028, material class 45H<br>• KMK → ISO 4026, material class 45H |
| **Tolerances** | **KM and KML**<br>Metric thread, 5H: ISO 965-3<br>Maximum axial run-out locating face/thread: 0,02 to 0,06 mm, depending on the lock nut size<br>Mounting slots according to DIN 981<br><br>**HM, HME and HM .. T**<br>Metric trapezoidal thread, 7H: ISO 2903<br>Maximum axial run-out locating face/thread: 0,06 to 0,16 mm, depending on the lock nut size | Metric thread, 5H: ISO 965-3 |
| **Mating shaft threads** (recommendation) | **KM and KML**<br>Metric thread, 6g: ISO 965-3<br><br>**HM, HME and HM .. T**<br>Metric trapezoidal thread, 7e: ISO 2903 | Metric thread, 6g: ISO 965-3 |
| **Loosening torque** | – | KMFE and KMK lock nuts are locked on the shaft (sleeve) by friction. The friction, and therefore the loosening torque, varies as a result of the accuracy of the tightening torque of the grub (set) screw, the surface finish of the shaft (sleeve) thread, the amount of lubricant on the thread, etc. The lock nuts should be properly mounted to threads that are dry or only have a minimum amount of lubricant on them.<br>KMFE and KMK lock nuts provide sufficient locking for intended bearing applications. |

| | **Precision lock nuts with locking pins**<br>KMT and KMTA |
|---|---|
| | Metric thread: ISO 965-3 |
| | Metric thread, 5H: ISO 965-3<br>Maximum axial run-out locating face/thread (sizes ≤ 40): 0,005 mm |
| | Metric thread, 6g: ISO 965-3<br>Trapezoidal thread, 7e: ISO 2903 |
| | KMT and KMTA lock nuts are locked on the shaft (sleeve) by friction. The friction, and therefore the loosening torque, varies as a result of the accuracy of the tightening torque of the grub screw, the surface finish of the shaft thread, the amount of lubricant on the thread, etc. KMT and KMTA lock nuts should be properly mounted to threads that are dry or only have a minimum amount of lubricant on them.<br>Providing that they are properly mounted to a dry or minimally lubricated thread, experience has shown that SKF KMT and KMTA lock nuts have sufficient locking for typical super-precision and general rolling bearing applications. |

# Installation and removal

## Lock nuts requiring a keyway

Lock nuts requiring a keyway are easy to install. Each nut is provided with four equally-spaced slots around their circumference to accommodate a hook or impact spanner. The designations of the associated spanners are listed in the relevant product tables.

Lock nuts requiring a keyway can be reused, provided they are not damaged. A new lock washer, locking clip or locking plate should be used each time the corresponding lock nut is reinstalled.

### Using lock nuts with lock washer to lock a bearing

#### Mounting bearings and components on a cylindrical shaft

1 Put the bearing in place onto the cylindrical shaft.
2 Go ahead with step 5 below *Locking the bearing*.

#### Mounting bearings on an adapter sleeve or tapered seat

1 Slide the bearing onto the adapter sleeve or tapered seat.
2 With the chamfer facing the bearing, screw the nut (without the lock washer) onto the adapter sleeve or shaft thread (fig. 25).
3 Tighten the nut with a hook or impact spanner until the correct clearance in the bearing is obtained (fig. 26).
4 Remove the nut. Go to step 5.

#### Locking the bearing

5 Slide the lock washer onto the thread until it touches the bearing. With the chamfer facing the bearing, screw the lock nut into place (fig. 27).
6 Tighten the nut firmly against the lock washer and bearing with a hook or impact spanner, making sure to not over tighten the nut. For bearings on adapter sleeves or tapered shafts, make sure that the bearing is not driven up any further on its seat.
7 Lock the nut in place by bending one of the lock washer tabs down into one of the slots on the nut (fig. 28). Do not bend the tab to the bottom of the slot.

### Using lock nuts with locking clips to lock a bearing

1 With the bearing or component in position, screw the lock nut into place.
2 Tighten the nut against the bearing or component with an impact spanner (fig. 29), aligning one of the slots in its outside diameter with the keyway in the shaft thread and making sure to not over tighten it.
3 Place the spring washer and locking clip onto the attachment bolt.
4 Position the locking clip in the keyway in the shaft thread, and the slot in the nut outside diameter, and secure with the attachment bolt and spring washer. Align the bolt with one of the threaded holes on the side face of the lock nut.
5 Tighten the bolt with an appropriate wrench (fig. 30).

Fig. 25

**Screw the nut, without the lock washer, onto the adapter sleeve or shaft thread**

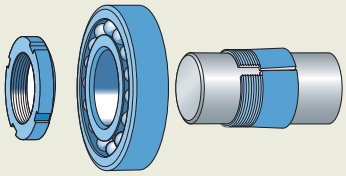


Fig. 26

**Tighten the nut with a hook or impact spanner**

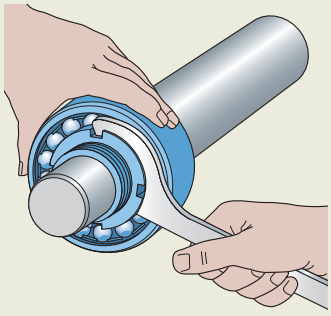
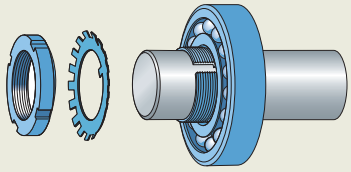


Fig. 27

**Slide the lock washer onto the the thread and screw the lock nut into place**



# Lock nuts with integral locking

Lock nuts with integral locking are easy to install. Each nut is provided with four equally spaced slots around its circumference to accommodate a hook spanner. The designations of the associated spanners are listed in the **product table**, **page 1112**.

Lock nuts with integral locking can be reused, provided they are not damaged.

## Mounting

### Mounting bearings on a tapered seat or special adapter sleeve

1 Slide the bearing onto its tapered seat.
2 With the contact face toward the bearing, screw the nut onto the shaft.
3 Tighten the nut with a hook or impact spanner, until the required internal clearance in the bearing is obtained.
4 Tighten the grub (set) screw to the torque value listed in the **product table**.

### Locking bearings on a cylindrical seat

1 With the bearing in position, screw the lock nut into place.
2 Tighten the nut against the bearing with a hook spanner, making sure to not over tighten it.
3 Tighten the grub (set) screw to the torque value listed in the **product table**.

## Dismounting

1 To remove the lock nut, loosen the grub screw. Even when the grub screw is removed, the lock nut will generate a limited locking torque.
2 In order to completely release the locking system and facilitate the reuse of the lock nut, tap the areas near the grub screw with a hammer and soft bar. Do not damage the threaded bores for the grub screw.
3 Unscrew the lock nut using a hook spanner.

Fig. 28

**Lock the nut in place by bending one of the lock washer tabs down into one of the slots on the nut**

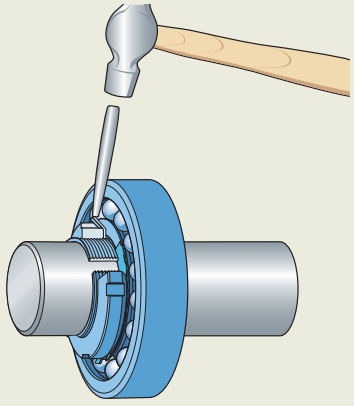


Fig. 29

**Tighten the nut against the bearing or component with an impact spanner**

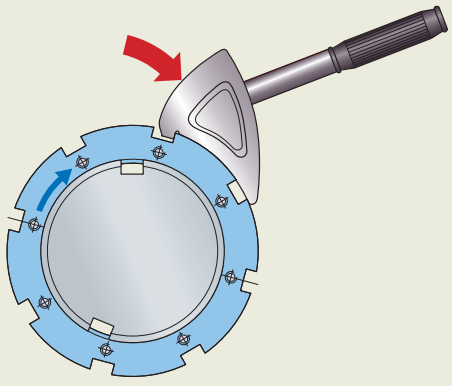
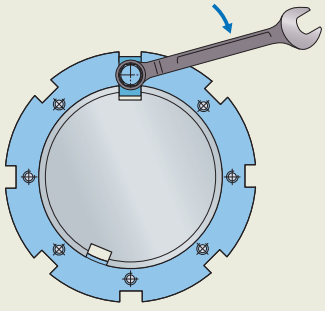


Fig. 30

**Tighten the bolt with an appropriate wrench**



# Precision lock nuts with locking pins

KMT precision lock nuts have slots around their circumference to accommodate a hook or impact spanner (fig. 19, page 1097, and fig. 20, page 1097). The designations of the associated spanners are listed in the product table, page 1114. KMT precision lock nuts with a thread ≤ 75 mm (sizes ≤ 15) have additionally to the slots two opposed flats to accommodate a spanner. Those lock nuts with a thread ≥ 80 mm (sizes ≥ 16) have six slots and no flats.

KMTA precision lock nuts have holes around their circumference and in one side face (fig. 21, page 1097). They can be tightened with a pin wrench or a pin-type face spanner. Associated spanners in accordance with DIN 1810 are listed in the product table, page 1116.

Precision lock nuts with locking pins are designed for frequent installation and removal, provided they are not damaged.

## Installation

1 With the bearing in position, screw the lock nut into place.
2 Tighten the nut with a hook or impact spanner making sure not to over tighten it.
3 Tighten the grub screws carefully until the locking pins engage the shaft thread.
4 Tighten the grub screws alternately with a torque wrench until the recommended torque value, listed in the product tables, is achieved.

Precision lock nuts with locking pins should not be used to drive a bearing up onto a tapered seat.

## Adjustment

Precision lock nuts with locking pins are adjustable. The three equally-spaced locking pins enable these lock nuts to be accurately positioned at right angles to the shaft. However, they can also be adjusted to compensate for slight angular deviations of adjacent components.

Adjustments can be made using the following procedure (fig. 31 and fig. 32):

1 Loosen the grub screw(s) at the position showing the greatest deviation.
2 Tighten the remaining screw(s) equally.
3 Retighten the screw(s) that were loosened.
4 Check that the alignment of the nut, relative to the shaft, is currently as required.
5 Repeat the procedure if necessary.

## Removal

When removing precision lock nuts with locking pins, the locking pins can still engage the shaft thread even after the grub screws have been loosened. Using a rubber hammer, tap the nut lightly in the vicinity of the pins to loosen them.

Fig. 31

**Example 1: Adjustment procedure for KMT and KMTA lock nuts**

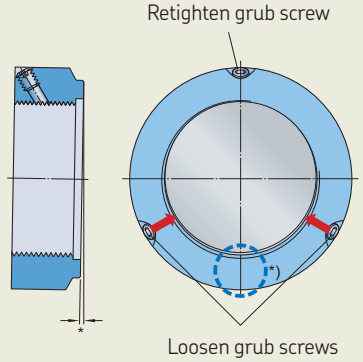
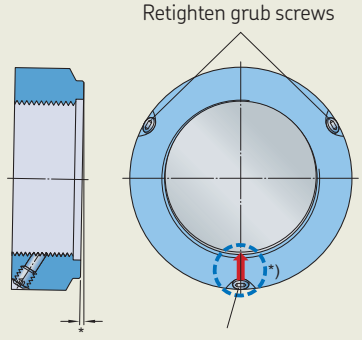
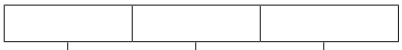



Fig. 32

**Example 2: Adjustment procedure for KMT and KMTA lock nuts**



# Designation system



**Product type**

| | |
|---|---|
| **AN** | Lock nut, dimensions in accordance with ANSI standard, normal series |
| **HM** | Lock nut with a trapezoidal thread |
| **HME** | HM lock nut with a recessed outside diameter |
| **HML** | HM lock nut, light series |
| **HMLL** | HML lock nut with a lower cross-sectional height |
| **KM** | Lock nut dimensions in accordance with ISO standard |
| **KMD** | Two-part precision lock nut with axial locking screws |
| **KMFE** | Lock nut with an integral locking screw, contact face designed for CARB toroidal roller bearings, sealed spherical roller bearings and sealed self-aligning ball bearings |
| **KMK** | Lock nut with an integral locking device |
| **KML** | Lock nut with a lower cross-sectional height |
| **KMT** | Precision lock nut with locking pins |
| **KMTA** | Precision lock nut with locking pins and with cylindrical outside surface (some with different thread pitch to KMT nuts) |
| **N** | Lock nut, dimensions in accordance with ANSI standard<br>N lock nuts are available in two series; N 00 normal series and N 000 low profile series |
| **MB** | Lock washer, dimensions in accordance with ISO standard for a KM lock nut |
| **MBL** | Lock washer, dimensions in accordance with ISO standard for a KML lock nut |
| **MS** | Locking clip, dimensions in accordance with ISO standard for an HM or HME lock nut |
| **PL** | Locking plate, dimensions in accordance with ANSI standard |
| **W** | Lock washer, dimensions in accordance with ANSI standard<br>W lock washers are available in two series; W 00 for lock nuts in normal series (AN and N) and W 000 for lock nuts in low profile series (N 0) without an axial tab |

**Size identification**

for metric dimensions

| | |
|---|---|
| **0** | 10 mm thread diameter |
| **1** | 12 mm thread diameter |
| **2** | 15 mm thread diameter |
| **3** | 17 mm thread diameter |
| **4** | (x5) 20 mm thread diameter |
| to | to |
| **96** | (x5) 480 mm thread diameter |
| **/500 to** | 500 mm thread diameter |
| to | to |
| **/1120** | 1 120 mm thread diameter |

for inch dimensions

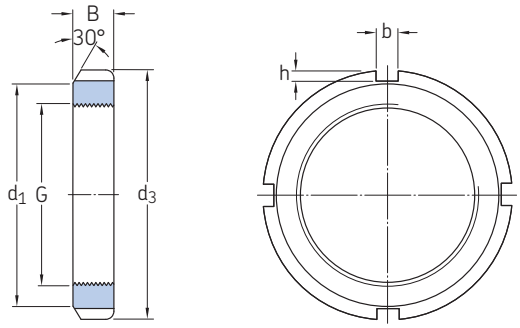
| | |
|---|---|
| **0** | 0.391 in. thread diameter |
| **1** | 0.469 in. thread diameter |
| **2** | 0.586 in. thread diameter |
| **3** | 0.664 in. thread diameter |
| **4** | 0.781 in. thread diameter |
| to | to |
| **96** | 18.894 in. thread diameter |
| **500** | 19.682 in. thread diameter |
| to | to |
| **950** | 37.410 in. thread diameter |

**Suffixes**

| | |
|---|---|
| **A** | Increased plate thickness for MB lock washers |
| **B** | Whitworth thread |
| **H** | Bigger contact diameter |
| **L** | Smaller contact diameter |
| **P** | Sintered material |
| **T** | Trapezoidal thread |

# 25.1 KM(L) and HM .. T lock nuts

## M 10x0,75 – M 200x3
## Tr 210x4 – Tr 280x4




| Dimensions | | | | | | Axial load carrying capacity | Mass | Designations | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Lock nut | Associated lock washer | spanner |
| G | $d_1$ | $d_3$ | B | b | h | static | | | | |
| mm | | | | | | kN | kg | – | | |
| **M 10x0,75** | 13,5 | 18 | 4 | 3 | 2 | 9,8 | 0,004 | ▸ **KM 0** | MB 0 | HN 0 |
| **M 12x1** | 17 | 22 | 4 | 3 | 2 | 11,8 | 0,006 | ▸ **KM 1** | MB 1 | HN 1 |
| **M 15x1** | 21 | 25 | 5 | 4 | 2 | 14,6 | 0,009 | ▸ **KM 2** | MB 2 | HN 2-3 |
| **M 17x1** | 24 | 28 | 5 | 4 | 2 | 19,6 | 0,012 | ▸ **KM 3** | MB 3 | HN 2-3 |
| **M 20x1** | 26 | 32 | 6 | 4 | 2 | 24 | 0,025 | ▸ **KM 4** | MB 4 | HN 4 |
| **M 25x1,5** | 32 | 38 | 7 | 5 | 2 | 31,5 | 0,028 | ▸ **KM 5** | MB 5 | HN 5-6 |
| **M 30x1,5** | 38 | 45 | 7 | 5 | 2 | 36,5 | 0,039 | ▸ **KM 6** | MB 6 | HN 5-6 |
| **M 35x1,5** | 44 | 52 | 8 | 5 | 2 | 50 | 0,059 | ▸ **KM 7** | MB 7 | HN 7 |
| **M 40x1,5** | 50 | 58 | 9 | 6 | 2,5 | 62 | 0,078 | ▸ **KM 8** | MB 8 | HN 8-9 |
| **M 45x1,5** | 56 | 65 | 10 | 6 | 2,5 | 78 | 0,11 | ▸ **KM 9** | MB 9 | HN 8-9 |
| **M 50x1,5** | 61 | 70 | 11 | 6 | 2,5 | 91,5 | 0,14 | ▸ **KM 10** | MB 10 | HN 10-11 |
| **M 55x2** | 67 | 75 | 11 | 7 | 3 | 91,5 | 0,15 | ▸ **KM 11** | MB 11 | HN 10-11 |
| **M 60x2** | 73 | 80 | 11 | 7 | 3 | 95 | 0,16 | ▸ **KM 12** | MB 12 | HN 12-13 |
| **M 65x2** | 79 | 85 | 12 | 7 | 3 | 108 | 0,19 | ▸ **KM 13** | MB 13 | HN 12-13 |
| **M 70x2** | 85 | 92 | 12 | 8 | 3,5 | 118 | 0,23 | ▸ **KM 14** | MB 14 | HN 14 |
| **M 75x2** | 90 | 98 | 13 | 8 | 3,5 | 134 | 0,27 | ▸ **KM 15** | MB 15 | HN 15 |
| **M 80x2** | 95 | 105 | 15 | 8 | 3,5 | 173 | 0,36 | ▸ **KM 16** | MB 16 | HN 16 |
| **M 85x2** | 102 | 110 | 16 | 8 | 3,5 | 190 | 0,41 | ▸ **KM 17** | MB 17 | HN 17 |
| **M 90x2** | 108 | 120 | 16 | 10 | 4 | 216 | 0,51 | ▸ **KM 18** | MB 18 | HN 18-20 |
| **M 95x2** | 113 | 125 | 17 | 10 | 4 | 236 | 0,55 | ▸ **KM 19** | MB 19 | HN 18-20 |
| **M 100x2** | 120 | 130 | 18 | 10 | 4 | 255 | 0,64 | ▸ **KM 20** | MB 20 | HN 18-20 |
| **M 105x2** | 126 | 140 | 18 | 12 | 5 | 290 | 0,79 | ▸ **KM 21** | MB 21 | HN 21-22 |
| **M 110x2** | 133 | 145 | 19 | 12 | 5 | 310 | 0,87 | ▸ **KM 22** | MB 22 | HN 21-22 |



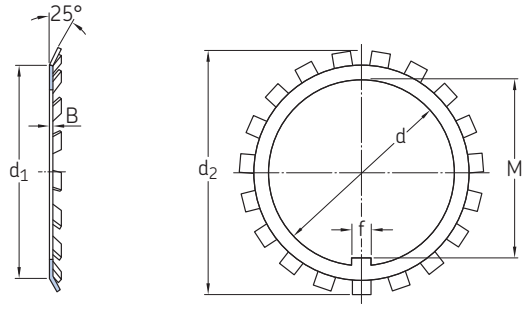
▸ Popular item

| Dimensions | | | | | | Axial load carrying capacity | Mass | Designations | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Lock nut | Associated lock washer | spanner |
| G | $d_1$ | $d_3$ | B | b | h | static | | | | |
| mm | | | | | | kN | kg | – | | |
| **M 115x2** | 137 | 150 | 19 | 12 | 5 | 315 | 0,91 | ▸ **KM 23** | MB 23 | TMFN 23-30 |
| **M 120x2** | 135 | 145 | 20 | 12 | 5 | 265 | 0,69 | ▸ **KML 24** | MBL 24 | HN 21-22 |
| | 138 | 155 | 20 | 12 | 5 | 340 | 0,97 | ▸ **KM 24** | MB 24 | TMFN 23-30 |
| **M 125x2** | 148 | 160 | 21 | 12 | 5 | 360 | 1,1 | ▸ **KM 25** | MB 25 | TMFN 23-30 |
| **M 130x2** | 145 | 155 | 21 | 12 | 5 | 285 | 0,8 | ▸ **KML 26** | MBL 26 | TMFN 23-30 |
| | 149 | 165 | 21 | 12 | 5 | 365 | 1,1 | ▸ **KM 26** | MB 26 | TMFN 23-30 |
| **M 135x2** | 160 | 175 | 22 | 14 | 6 | 430 | 1,4 | ▸ **KM 27** | MB 27 | TMFN 23-30 |
| **M 140x2** | 155 | 165 | 22 | 12 | 5 | 305 | 0,92 | ▸ **KML 28** | MBL 28 | TMFN 23-30 |
| | 160 | 180 | 22 | 14 | 6 | 430 | 1,4 | ▸ **KM 28** | MB 28 | TMFN 23-30 |
| **M 145x2** | 171 | 190 | 24 | 14 | 6 | 520 | 1,8 | ▸ **KM 29** | MB 29 | TMFN 23-30 |
| **M 150x2** | 170 | 180 | 24 | 14 | 5 | 390 | 1,25 | ▸ **KML 30** | MBL 30 | TMFN 23-30 |
| | 171 | 195 | 24 | 14 | 6 | 530 | 1,9 | ▸ **KM 30** | MB 30 | TMFN 23-30 |
| **M 155x3** | 182 | 200 | 25 | 16 | 7 | 540 | 2,1 | ▸ **KM 31** | MB 31 | TMFN 30-40 |
| **M 160x3** | 180 | 190 | 25 | 14 | 5 | 405 | 1,4 | ▸ **KML 32** | MBL 32 | TMFN 23-30 |
| | 182 | 210 | 25 | 16 | 7 | 585 | 2,3 | ▸ **KM 32** | MB 32 | TMFN 30-40 |
| **M 165x3** | 193 | 210 | 26 | 16 | 7 | 570 | 2,3 | ▸ **KM 33** | MB 33 | TMFN 30-40 |
| **M 170x3** | 190 | 200 | 26 | 16 | 5 | 430 | 1,55 | ▸ **KML 34** | MBL 34 | TMFN 30-40 |
| | 193 | 220 | 26 | 16 | 7 | 620 | 2,35 | ▸ **KM 34** | MB 34 | TMFN 30-40 |
| **M 180x3** | 200 | 210 | 27 | 16 | 5 | 450 | 1,8 | ▸ **KML 36** | MBL 36 | TMFN 30-40 |
| | 203 | 230 | 27 | 18 | 8 | 670 | 2,8 | ▸ **KM 36** | MB 36 | TMFN 30-40 |
| **M 190x3** | 210 | 220 | 28 | 16 | 5 | 475 | 1,85 | ▸ **KML 38** | MBL 38 | TMFN 30-40 |
| | 214 | 240 | 28 | 18 | 8 | 695 | 3,05 | ▸ **KM 38** | MB 38 | TMFN 30-40 |
| **M 200x3** | 222 | 240 | 29 | 18 | 8 | 625 | 2,6 | ▸ **KML 40** | MBL 40 | TMFN 30-40 |
| | 226 | 250 | 29 | 18 | 8 | 735 | 3,35 | ▸ **KM 40** | MB 40 | TMFN 30-40 |
| **Tr 210x4** | 238 | 270 | 30 | 20 | 10 | Contact SKF | 5,1 | ▸ **HM 42 T** | –[1] | TMFN 40-52 |
| **Tr 220x4** | 250 | 280 | 32 | 20 | 10 | Contact SKF | 4,75 | ▸ **HM 44 T** | MB 44 | TMFN 40-52 |
| **Tr 230x4** | 260 | 290 | 34 | 20 | 10 | Contact SKF | 5,45 | **HM 46 T** | –[1] | TMFN 40-52 |
| **Tr 240x4** | 270 | 300 | 34 | 20 | 10 | Contact SKF | 5,6 | ▸ **HM 48 T** | MB 48 | TMFN 40-52 |
| **Tr 250x4** | 290 | 320 | 36 | 20 | 10 | Contact SKF | 7,45 | **HM 50 T** | –[1] | TMFN 40-52 |
| **Tr 260x4** | 300 | 330 | 36 | 24 | 12 | Contact SKF | 7,55 | ▸ **HM 52 T** | MB 52 | TMFN 52-64 |
| **Tr 280x4** | 320 | 350 | 38 | 24 | 12 | Contact SKF | 8,65 | ▸ **HM 56 T** | MB 56 | TMFN 52-64 |

▸ Popular item
[1] HM .. T nuts having no associated lock washer are intended only for removal purposes.

## 25.2 MB(L) lock washers

### MB 0 – MB 56




| Designation | Dimensions | | | | | | Mass |
|---|---|---|---|---|---|---|---|
| | d | $d_1$ | $d_2$ | B | f | M | |
| – | mm | | | | | | kg |
| ▸ **MB 0** | 10 | 13,5 | 21 | 1 | 3 | 8,5 | 0,001 |
| ▸ **MB 1** | 12 | 17 | 25 | 1 | 3 | 10,5 | 0,002 |
| **MB 1 A** | | 17 | 25 | 1,2 | 3 | 10,5 | 0,0025 |
| ▸ **MB 2** | 15 | 21 | 28 | 1 | 4 | 13,5 | 0,003 |
| **MB 2 A** | | 21 | 28 | 1,2 | 4 | 13,5 | 0,0035 |
| ▸ **MB 3** | 17 | 24 | 32 | 1 | 4 | 15,5 | 0,003 |
| **MB 3 A** | | 24 | 32 | 1,2 | 4 | 15,5 | 0,0035 |
| ▸ **MB 4** | 20 | 26 | 36 | 1 | 4 | 18,5 | 0,004 |
| **MB 4 A** | | 26 | 36 | 1,2 | 4 | 18,5 | 0,005 |
| ▸ **MB 5** | 25 | 32 | 42 | 1,25 | 5 | 23 | 0,006 |
| **MB 5 A** | | 32 | 42 | 1,8 | 5 | 23 | 0,0085 |
| ▸ **MB 6** | 30 | 38 | 49 | 1,25 | 5 | 27,5 | 0,008 |
| **MB 6 A** | | 38 | 49 | 1,8 | 5 | 27,5 | 0,011 |
| ▸ **MB 7** | 35 | 44 | 57 | 1,25 | 6 | 32,5 | 0,011 |
| **MB 7 A** | | 44 | 57 | 1,8 | 6 | 32,5 | 0,016 |
| ▸ **MB 8** | 40 | 50 | 62 | 1,25 | 6 | 37,5 | 0,013 |
| **MB 8 A** | | 50 | 62 | 1,8 | 6 | 37,5 | 0,018 |
| ▸ **MB 9** | 45 | 56 | 69 | 1,25 | 6 | 42,5 | 0,015 |
| **MB 9 A** | | 56 | 69 | 1,8 | 6 | 42,5 | 0,021 |
| ▸ **MB 10** | 50 | 61 | 74 | 1,25 | 6 | 47,5 | 0,016 |
| **MB 10 A** | | 61 | 74 | 1,8 | 6 | 47,5 | 0,023 |
| ▸ **MB 11** | 55 | 67 | 81 | 1,5 | 8 | 52,5 | 0,022 |
| **MB 11 A** | | 67 | 81 | 2,5 | 8 | 52,5 | 0,037 |
| ▸ **MB 12** | 60 | 73 | 86 | 1,5 | 8 | 57,5 | 0,024 |
| **MB 12 A** | | 73 | 86 | 2,5 | 8 | 57,5 | 0,04 |
| ▸ **MB 13** | 65 | 79 | 92 | 1,5 | 8 | 62,5 | 0,03 |
| **MB 13 A** | | 79 | 92 | 2,5 | 8 | 62,5 | 0,05 |
| ▸ **MB 14** | 70 | 85 | 98 | 1,5 | 8 | 66,5 | 0,032 |
| **MB 14 A** | | 85 | 98 | 2,5 | 8 | 66,5 | 0,053 |
| ▸ **MB 15** | 75 | 90 | 104 | 1,5 | 8 | 71,5 | 0,035 |
| **MB 15 A** | | 90 | 104 | 2,5 | 8 | 71,5 | 0,058 |

| Designation | Dimensions | | | | | | Mass |
|---|---|---|---|---|---|---|---|
| | d | $d_1$ | $d_2$ | B | f | M | |
| – | mm | | | | | | kg |
| ▸ **MB 16** | 80 | 95 | 112 | 1,75 | 10 | 76,5 | 0,046 |
| **MB 16 A** | | 95 | 112 | 2,5 | 10 | 76,5 | 0,066 |
| ▸ **MB 17** | 85 | 102 | 119 | 1,75 | 10 | 81,5 | 0,053 |
| **MB 17 A** | | 102 | 119 | 2,5 | 10 | 81,5 | 0,076 |
| ▸ **MB 18** | 90 | 108 | 126 | 1,75 | 10 | 86,5 | 0,061 |
| **MB 18 A** | | 108 | 126 | 2,5 | 10 | 86,5 | 0,087 |
| ▸ **MB 19** | 95 | 113 | 133 | 1,75 | 10 | 91,5 | 0,066 |
| **MB 19 A** | | 113 | 133 | 2,5 | 10 | 91,5 | 0,094 |
| ▸ **MB 20** | 100 | 120 | 142 | 1,75 | 12 | 96,5 | 0,077 |
| **MB 20 A** | | 120 | 142 | 2,5 | 12 | 96,5 | 0,11 |
| ▸ **MB 21** | 105 | 126 | 145 | 1,75 | 12 | 100,5 | 0,083 |
| ▸ **MB 22** | 110 | 133 | 154 | 1,75 | 12 | 105,5 | 0,091 |
| ▸ **MB 23** | 115 | 137 | 159 | 2 | 12 | 110,5 | 0,11 |
| ▸ **MBL 24** | 120 | 135 | 152 | 2 | 14 | 115 | 0,07 |
| ▸ **MB 24** | | 138 | 164 | 2 | 14 | 115 | 0,11 |
| ▸ **MB 25** | 125 | 148 | 170 | 2 | 14 | 120 | 0,12 |
| **MBL 26** | 130 | 145 | 161 | 2 | 14 | 125 | 0,08 |
| ▸ **MB 26** | | 149 | 175 | 2 | 14 | 125 | 0,12 |
| ▸ **MB 27** | 135 | 160 | 185 | 2 | 14 | 130 | 0,14 |
| ▸ **MBL 28** | 140 | 155 | 172 | 2 | 16 | 135 | 0,09 |
| ▸ **MB 28** | | 160 | 192 | 2 | 16 | 135 | 0,14 |
| ▸ **MB 29** | 145 | 172 | 202 | 2 | 16 | 140 | 0,17 |
| ▸ **MBL 30** | 150 | 170 | 189 | 2 | 16 | 145 | 0,1 |
| ▸ **MB 30** | | 171 | 205 | 2 | 16 | 145 | 0,18 |
| ▸ **MB 31** | 155 | 182 | 212 | 2,5 | 16 | 147,5 | 0,2 |
| ▸ **MBL 32** | 160 | 180 | 199 | 2,5 | 18 | 154 | 0,14 |
| ▸ **MB 32** | | 182 | 217 | 2,5 | 18 | 154 | 0,22 |
| ▸ **MB 33** | 165 | 193 | 222 | 2,5 | 18 | 157,5 | 0,24 |

▸ Popular item

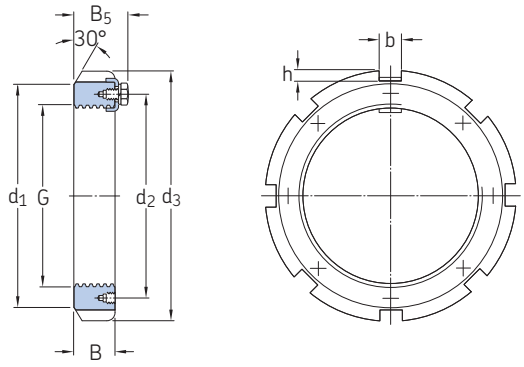
| Designation | Dimensions | | | | | | Mass |
|---|---|---|---|---|---|---|---|
| | d | $d_1$ | $d_2$ | B | f | M | |
| – | mm | | | | | | kg |
| ▸ **MBL 34** | 170 | 190 | 211 | 2,5 | 18 | 164 | 0,15 |
| ▸ **MB 34** | | 193 | 232 | 2,5 | 18 | 164 | 0,24 |
| ▸ **MBL 36** | 180 | 200 | 222 | 2,5 | 20 | 174 | 0,16 |
| ▸ **MB 36** | | 203 | 242 | 2,5 | 20 | 174 | 0,26 |
| **MBL 38** | 190 | 210 | 232 | 2,5 | 20 | 184 | 0,17 |
| ▸ **MB 38** | | 214 | 252 | 2,5 | 20 | 184 | 0,26 |
| **MBL 40** | 200 | 222 | 245 | 2,5 | 20 | 194 | 0,22 |
| ▸ **MB 40** | | 226 | 262 | 2,5 | 20 | 194 | 0,28 |
| ▸ **MB 44** | 220 | 250 | 292 | 3 | 24 | 213 | 0,35 |
| ▸ **MB 48** | 240 | 270 | 312 | 3 | 24 | 233 | 0,45 |
| ▸ **MB 52** | 260 | 300 | 342 | 3 | 28 | 253 | 0,65 |
| ▸ **MB 56** | 280 | 320 | 362 | 3 | 28 | 273 | 0,7 |



▸ Popular item

## 25.3 HM lock nuts

### Tr 280x4 – Tr 1120x8



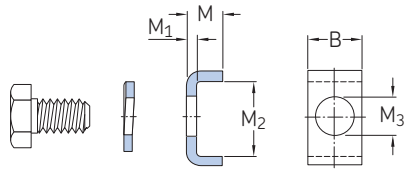

| Dimensions | | | | | | | | Mass | Designations | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Lock nut | Associated locking clip | spanner | eye bolt |
| G | $d_1$ | $d_2$ | $d_3$ | B | $B_5$ | b | h | | | | | |
| mm | | | | | | | | kg | – | | | |
| **Tr 280x4** | 310 | 293 | 330 | 38 | 50 | 24 | 10 | 5,75 | ▸ **HM 3056** | MS 3056 | TMFN 52-64 | – |
| **Tr 300x4** | 336 | 316 | 360 | 42 | 54 | 24 | 12 | 8,35 | ▸ **HM 3060** | MS 3060 | TMFN 52-64 | – |
| | 340 | 326 | 380 | 40 | 53 | 24 | 12 | 11,5 | ▸ **HM 3160** | MS 3160 | TMFN 52-64 | – |
| **Tr 320x5** | 356 | 336 | 380 | 42 | 55 | 24 | 12 | 9 | ▸ **HM 3064** | MS 3068-64 | TMFN 52-64 | – |
| | 360 | 346 | 400 | 42 | 56 | 24 | 12 | 13 | ▸ **HM 3164** | MS 3164 | TMFN 52-64 | – |
| **Tr 340x5** | 376 | 356 | 400 | 45 | 58 | 24 | 12 | 11 | ▸ **HM 3068** | MS 3068-64 | TMFN 52-64 | – |
| | 400 | 373 | 440 | 55 | 72 | 28 | 15 | 24 | ▸ **HM 3168** | MS 3172-68 | TMFN 64-80 | M 10 |
| **Tr 360x5** | 394 | 375 | 420 | 45 | 58 | 28 | 13 | 11,5 | ▸ **HM 3072** | MS 3072 | TMFN 64-80 | – |
| | 420 | 393 | 460 | 58 | 75 | 28 | 15 | 26,5 | ▸ **HM 3172** | MS 3172-68 | TMFN 64-80 | M 10 |
| **Tr 380x5** | 422 | 399 | 450 | 48 | 62 | 28 | 14 | 15 | ▸ **HM 3076** | MS 3080-76 | TMFN 64-80 | – |
| | 440 | 415 | 490 | 60 | 77 | 32 | 18 | 32 | ▸ **HM 3176** | MS 3176 | TMFN 64-80 | M 10 |
| **Tr 400x5** | 442 | 419 | 470 | 52 | 66 | 28 | 14 | 17 | ▸ **HM 3080** | MS 3080-76 | TMFN 64-80 | – |
| | 460 | 440 | 520 | 62 | 82 | 32 | 18 | 38 | ▸ **HM 3180** | MS 3184-80 | TMFN 64-80 | M 10 |
| **Tr 420x5** | 462 | 439 | 490 | 52 | 66 | 32 | 14 | 18,5 | ▸ **HM 3084** | MS 3084 | TMFN 64-80 | – |
| | 490 | 460 | 540 | 70 | 90 | 32 | 18 | 45 | ▸ **HM 3184** | MS 3184-80 | TMFN 80-500 | M 10 |
| **Tr 440x5** | 490 | 463 | 520 | 60 | 77 | 32 | 15 | 26 | ▸ **HM 3088** | MS 3092-88 | TMFN 64-80 | M 10 |
| | 510 | 478 | 560 | 70 | 90 | 36 | 20 | 46,5 | ▸ **HM 3188** | MS 3192-88 | TMFN 80-500 | M 10 |
| **Tr 460x5** | 510 | 483 | 540 | 60 | 77 | 32 | 15 | 27 | ▸ **HM 3092** | MS 3092-88 | TMFN 80-500 | M 10 |
| | 540 | 498 | 580 | 75 | 95 | 36 | 20 | 50,5 | **HM 3192** | MS 3192-88 | TMFN 80-500 | M 10 |
| **Tr 480x5** | 560 | 528 | 620 | 75 | 95 | 36 | 20 | 62 | **HM 3196** | MS 3196 | TMFN 80-500 | M 10 |
| **Tr 500x5** | 550 | 523 | 580 | 68 | 85 | 36 | 15 | 33,5 | ▸ **HM 30/500** | MS 30/500-96 | TMFN 500-600 | M 10 |
| **Tr 530x6** | 590 | 558 | 630 | 68 | 90 | 40 | 20 | 42,5 | ▸ **HM 30/530** | MS 30/600-530 | TMFN 500-600 | M 10 |
| **Tr 560x6** | 610 | 583 | 650 | 75 | 97 | 40 | 20 | 44,5 | ▸ **HM 30/560** | MS 30/560 | TMFN 500-600 | M 10 |
| **Tr 600x6** | 660 | 628 | 700 | 75 | 97 | 40 | 20 | 52,5 | ▸ **HM 30/600** | MS 30/600-530 | TMFN 500-600 | M 10 |
| **Tr 630x6** | 690 | 658 | 730 | 75 | 97 | 45 | 20 | 55 | ▸ **HM 30/630** | MS 30/630 | TMFN 500-600 | M 10 |
| **Tr 670x6** | 740 | 703 | 780 | 80 | 102 | 45 | 20 | 68,5 | ▸ **HM 30/670** | MS 30/670 | TMFN 600-750 | M 10 |
| **Tr 710x7** | 780 | 742 | 830 | 90 | 112 | 50 | 25 | 91,5 | ▸ **HM 30/710** | MS 30/710 | TMFN 600-750 | M 12 |
| **Tr 750x7** | 820 | 782 | 870 | 90 | 112 | 55 | 25 | 94 | ▸ **HM 30/750** | MS 30/800-750 | TMFN 600-750 | M 12 |

▸ Popular item

| Dimensions | | | | | | | | Mass | Designations | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Lock nut | Associated locking clip | spanner | eye bolt |
| G | $d_1$ | $d_2$ | $d_3$ | B | $B_5$ | b | h | | | | | |
| mm | | | | | | | | kg | – | | | |
| **Tr 800x7** | 870 | 832 | 920 | 90 | 112 | 55 | 25 | 99,5 | ▸ **HM 30/800** | MS 30/800-750 | TMFN 600-750 | M 12 |
| **Tr 850x7** | 925 | 887 | 980 | 90 | 115 | 60 | 25 | 115 | ▸ **HM 30/850** | MS 30/900-850 | – | M 12 |
| **Tr 900x7** | 975 | 937 | 1 030 | 100 | 125 | 60 | 25 | 131 | ▸ **HM 30/900** | MS 30/900-850 | – | M 16 |
| **Tr 950x8** | 1 025 | 985 | 1 080 | 100 | 125 | 60 | 25 | 139 | ▸ **HM 30/950** | MS 30/950 | – | M 16 |
| **Tr 1000x8** | 1 085 | 1 040 | 1 140 | 100 | 125 | 60 | 25 | 157 | ▸ **HM 30/1000** | MS 30/1000 | – | M 16 |
| **Tr 1060x8** | 1 145 | 1 100 | 1 200 | 100 | 125 | 60 | 25 | 166 | ▸ **HM 30/1060** | MS 30/1000 | – | M 16 |
| **Tr 1120x8** | 1 205 | 1 160 | 1 260 | 100 | 125 | 60 | 25 | 175 | ▸ **HM 30/1120** | MS 30/1000 | – | M 16 |



▸ Popular item




| Designations | | | Dimensions | | | | | Mass |
|---|---|---|---|---|---|---|---|---|
| Locking clip | Included hexagonal head bolt | spring washer in accordance with DIN 128 | B | M | $M_1$ | $M_2$ | $M_3$ | |
| – | | | mm | | | | | kg |
| ▸ **MS 3044** | M 6x12 | A 6 | 20 | 12 | 4 | 13,5 | 7 | 0,022 |
| ▸ **MS 3052-48** | M 8x16 | A 8 | 20 | 12 | 4 | 17,5 | 9 | 0,024 |
| ▸ **MS 3056** | M 8x16 | A 8 | 24 | 12 | 4 | 17,5 | 9 | 0,03 |
| ▸ **MS 3060** | M 8x16 | A 8 | 24 | 12 | 4 | 20,5 | 9 | 0,033 |
| ▸ **MS 3068-64** | M 8x16 | A 8 | 24 | 15 | 5 | 21 | 9 | 0,046 |
| ▸ **MS 3072** | M 8x16 | A 8 | 28 | 15 | 5 | 20 | 9 | 0,051 |
| ▸ **MS 3080-76** | M 10x20 | A 10 | 28 | 15 | 5 | 24 | 12 | 0,055 |
| ▸ **MS 3084** | M 10x20 | A 10 | 32 | 15 | 5 | 24 | 12 | 0,063 |
| ▸ **MS 3092-88** | M 12x25 | A 12 | 32 | 15 | 5 | 28 | 14 | 0,067 |
| ▸ **MS 30/500-96** | M 12x25 | A 12 | 36 | 15 | 5 | 28 | 14 | 0,076 |
| ▸ **MS 30/560** | M 16x30 | A 16 | 40 | 21 | 7 | 29 | 18 | 0,15 |
| ▸ **MS 30/600-530** | M 16x30 | A 16 | 40 | 21 | 7 | 34 | 18 | 0,14 |
| ▸ **MS 30/630** | M 16x30 | A 16 | 45 | 21 | 7 | 34 | 18 | 0,17 |
| **MS 30/670** | M 16x30 | A 16 | 45 | 21 | 7 | 39 | 18 | 0,19 |
| **MS 30/710** | M 16x30 | A 16 | 50 | 21 | 7 | 39 | 18 | 0,21 |
| **MS 30/800-750** | M 16x30 | A 16 | 55 | 21 | 7 | 39 | 18 | 0,23 |
| **MS 30/900-850** | M 20x40 | A 20 | 60 | 21 | 7 | 44 | 22 | 0,26 |
| **MS 30/950** | M 20x40 | A 20 | 60 | 21 | 7 | 46 | 22 | 0,26 |
| **MS 30/1000** | M 20x40 | A 20 | 60 | 21 | 7 | 51 | 22 | 0,28 |
| ▸ **MS 3160** | M 10x20 | A 10 | 24 | 12 | 4 | 30,5 | 12 | 0,04 |
| ▸ **MS 3164** | M 10x20 | A 10 | 24 | 15 | 5 | 31 | 12 | 0,055 |
| ▸ **MS 3172-68** | M 12x25 | A 12 | 28 | 15 | 5 | 38 | 14 | 0,069 |
| **MS 3176** | M 12x25 | A 12 | 32 | 15 | 5 | 40 | 14 | 0,083 |
| ▸ **MS 3184-80** | M 16x30 | A 16 | 32 | 15 | 5 | 45 | 18 | 0,089 |

▸ Popular item

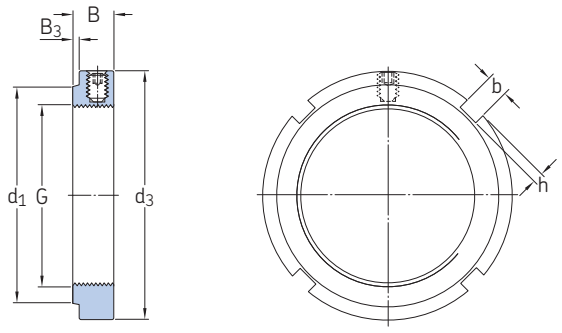
| Designations<br>Locking clip | Included<br>hexagonal head bolt | spring washer in accordance with DIN 128 | Dimensions<br>B | M | $M_1$ | $M_2$ | $M_3$ | Mass |
|---|---|---|---|---|---|---|---|---|
| – | | | mm | | | | | kg |
| ▸ **MS 3192-88** | M 16x30 | A 16 | 36 | 15 | 5 | 43 | 18 | 0,097 |
| **MS 3196** | M 16x30 | A 16 | 36 | 15 | 5 | 53 | 18 | 0,11 |
| **MS 31/500** | M 16x30 | A 16 | 40 | 15 | 5 | 45 | 18 | 0,11 |
| **MS 31/530** | M 20x40 | A 20 | 40 | 21 | 7 | 51 | 22 | 0,19 |
| **MS 31/600-560** | M 20x40 | A 20 | 45 | 21 | 7 | 54 | 22 | 0,22 |
| **MS 31/630** | M 20x40 | A 20 | 50 | 21 | 7 | 61 | 22 | 0,27 |
| **MS 31/670** | M 20x40 | A 20 | 50 | 21 | 7 | 66 | 22 | 0,28 |
| **MS 31/710** | M 24x50 | A 24 | 55 | 21 | 7 | 69 | 26 | 0,32 |
| **MS 31/800-750** | M 24x50 | A 24 | 60 | 21 | 7 | 70 | 26 | 0,35 |
| **MS 31/850** | M 24x50 | A 24 | 70 | 21 | 7 | 71 | 26 | 0,41 |
| **MS 31/900** | M 24x50 | A 24 | 70 | 21 | 7 | 76 | 26 | 0,41 |
| **MS 31/950** | M 24x50 | A 24 | 70 | 21 | 7 | 78 | 26 | 0,42 |
| **MS 31/1000** | M 24x50 | A 24 | 70 | 21 | 7 | 88 | 26 | 0,5 |



▸ Popular item

## 25.5 KMFE lock nuts with a locking screw

**M 20x1 – M 200x3**




| Dimensions | | | | | | | Axial load carrying capacity | Mass | Designations | | Grub (set) screw | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| G | $d_1$ | $d_3$ | B | $B_3$ | b | h | static | | Lock nut | Associated spanner | Size | Recommended tightening torque |
| mm | | | | | | | kN | kg | – | | – | Nm |
| **M 20x1** | 26 | 32 | 9,5 | 1 | 4 | 2 | 24 | 0,034 | ▸ **KMFE 4** | HN 4 | M5 | 4,5 |
| **M 25x1,5** | 31 | 38 | 10,5 | 2 | 5 | 2 | 31,5 | 0,049 | ▸ **KMFE 5** | HN 5-6 | M5 | 4,5 |
| **M 30x1,5** | 36 | 45 | 10,5 | 2 | 5 | 2 | 36,5 | 0,066 | ▸ **KMFE 6** | HN 5-6 | M5 | 4,5 |
| **M 35x1,5** | 42,5 | 52 | 11,5 | 3 | 5 | 2 | 50 | 0,092 | ▸ **KMFE 7** | HN 7 | M5 | 4,5 |
| **M 40x1,5** | 47 | 58 | 13 | 3 | 6 | 2,5 | 62 | 0,12 | ▸ **KMFE 8** | HN 8-9 | M6 | 8 |
| **M 45x1,5** | 53 | 65 | 13 | 3 | 6 | 2,5 | 78 | 0,15 | ▸ **KMFE 9** | HN 8-9 | M6 | 8 |
| **M 50x1,5** | 57,5 | 70 | 14 | 3 | 6 | 2,5 | 91,5 | 0,18 | ▸ **KMFE 10** | HN 10-11 | M6 | 8 |
| **M 55x2** | 64 | 75 | 14 | 3 | 7 | 3 | 91,5 | 0,21 | ▸ **KMFE 11** | HN 10-11 | M6 | 8 |
| **M 60x2** | 69 | 80 | 14 | 3 | 7 | 3 | 95 | 0,22 | ▸ **KMFE 12** | HN 12-13 | M6 | 8 |
| **M 65x2** | 76 | 85 | 15 | 3 | 7 | 3 | 108 | 0,26 | ▸ **KMFE 13** | HN 12-13 | M6 | 8 |
| **M 70x2** | 79 | 92 | 15 | 3 | 8 | 3,5 | 118 | 0,3 | ▸ **KMFE 14** | HN 14 | M6 | 8 |
| **M 75x2** | 84 | 98 | 16 | 3 | 8 | 3,5 | 134 | 0,36 | ▸ **KMFE 15** | HN 15 | M6 | 8 |
| **M 80x2** | 91,5 | 105 | 18 | 3 | 8 | 3,5 | 173 | 0,48 | ▸ **KMFE 16** | HN 16 | M8 | 18 |
| **M 85x2** | 98 | 110 | 19 | 4 | 8 | 3,5 | 190 | 0,53 | ▸ **KMFE 17** | HN 17 | M8 | 18 |
| **M 90x2** | 102 | 120 | 19 | 4 | 10 | 4 | 216 | 0,66 | ▸ **KMFE 18** | HN 18-20 | M8 | 18 |
| **M 95x2** | 110 | 125 | 20 | 4 | 10 | 4 | 236 | 0,75 | ▸ **KMFE 19** | HN 18-20 | M8 | 18 |
| **M 100x2** | 112 | 130 | 21 | 4 | 10 | 4 | 255 | 0,81 | ▸ **KMFE 20** | HN 18-20 | M8 | 18 |
| **M 110x2** | 121 | 145 | 21,5 | 4 | 12 | 5 | 310 | 1,05 | ▸ **KMFE 22** | HN 21-22 | M8 | 18 |
| **M 120x2** | 130 | 155 | 26 | 6 | 12 | 5 | 340 | 1,3 | ▸ **KMFE 24** | TMFN 23-30 | M10 | 35 |
| **M 130x2** | 141 | 165 | 28 | 7 | 12 | 5 | 365 | 1,5 | ▸ **KMFE 26** | TMFN 23-30 | M10 | 35 |
| **M 140x2** | 152 | 180 | 28 | 7 | 14 | 6 | 440 | 1,85 | ▸ **KMFE 28** | TMFN 23-30 | M10 | 35 |
| **M 150x2** | 162 | 195 | 30 | 9 | 14 | 6 | 495 | 2,25 | ▸ **KMFE 30** | TMFN 23-30 | M10 | 35 |
| **M 160x3** | 173 | 210 | 32 | 11 | 16 | 7 | 540 | 2,8 | ▸ **KMFE 32** | TMFN 30-40 | M10 | 35 |



▸ Popular item

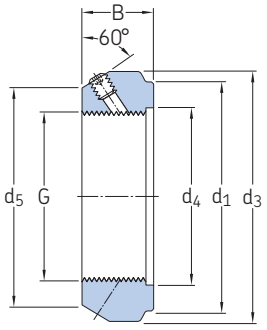
| Dimensions | | | | | | | Axial load carrying capacity | Mass | Designations | | Grub (set) screw | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Lock nut | Associated spanner | Size | Recommended tightening torque |
| G | $d_1$ | $d_3$ | B | $B_3$ | b | h | static | | | | | |
| mm | | | | | | | kN | kg | – | | – | Nm |
| **M 170x3** | 184 | 220 | 33 | 12 | 16 | 7 | 550 | 3 | ▸ **KMFE 34** | TMFN 30-40 | M10 | 35 |
| **M 180x3** | 194 | 230 | 34 | 12 | 18 | 8 | 590 | 3,3 | ▸ **KMFE 36** | TMFN 30-40 | M10 | 35 |
| **M 190x3** | 207 | 240 | 34 | 12 | 18 | 8 | 610 | 3,55 | ▸ **KMFE 38** | TMFN 30-40 | M10 | 35 |
| **M 200x3** | 217 | 250 | 34 | 12 | 18 | 8 | 625 | 3,7 | ▸ **KMFE 40** | TMFN 30-40 | M10 | 35 |

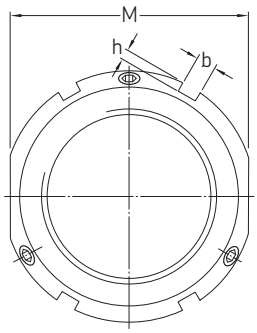


▸ Popular item

## 25.6 KMT precision lock nuts with locking pins

**M 10x0,75 – M 200x3**




| Dimensions | | | | | | | | | Axial load carrying capacity | Mass | Designations | | Grub (set) screw | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Lock nut | Associated spanner | Size | Recommended tightening torque |
| G | $d_1$ | $d_3$ | $d_4$ | $d_5$ | B | M | b | h | static | | | | | |
| mm | | | | | | | | | kN | kg | – | | – | Nm |
| **M 10x0,75** | 23 | 28 | 11 | 21 | 14 | 24 | 4 | 2 | 35 | 0,045 | ▸ **KMT 0** | HN 2-3 | M 5 | 4,5 |
| **M 12x1** | 25 | 30 | 13 | 23 | 14 | 27 | 4 | 2 | 40 | 0,05 | ▸ **KMT 1** | HN 4 | M 5 | 4,5 |
| **M 15x1** | 28 | 33 | 16 | 26 | 16 | 30 | 4 | 2 | 60 | 0,075 | ▸ **KMT 2** | HN 4 | M 5 | 4,5 |
| **M 17x1** | 33 | 37 | 18 | 29 | 18 | 34 | 5 | 2 | 80 | 0,1 | ▸ **KMT 3** | HN 5-6 | M 6 | 8 |
| **M 20x1** | 35 | 40 | 21 | 32 | 18 | 36 | 5 | 2 | 90 | 0,11 | ▸ **KMT 4** | HN 5-6 | M 6 | 8 |
| **M 25x1,5** | 39 | 44 | 26 | 36 | 20 | 41 | 5 | 2 | 130 | 0,13 | ▸ **KMT 5** | HN 5-6 | M 6 | 8 |
| **M 30x1,5** | 44 | 49 | 32 | 41 | 20 | 46 | 5 | 2 | 160 | 0,16 | ▸ **KMT 6** | HN 7 | M 6 | 8 |
| **M 35x1,5** | 49 | 54 | 38 | 46 | 22 | 50 | 5 | 2 | 190 | 0,19 | ▸ **KMT 7** | HN 7 | M 6 | 8 |
| **M 40x1,5** | 59 | 65 | 42 | 54 | 22 | 60 | 6 | 2,5 | 210 | 0,3 | ▸ **KMT 8** | HN 8-9 | M 8 | 18 |
| **M 45x1,5** | 64 | 70 | 48 | 60 | 22 | 65 | 6 | 2,5 | 240 | 0,33 | ▸ **KMT 9** | HN 10-11 | M 8 | 18 |
| **M 50x1,5** | 68 | 75 | 52 | 64 | 25 | 70 | 7 | 3 | 300 | 0,4 | ▸ **KMT 10** | HN 10-11 | M 8 | 18 |
| **M 55x2** | 78 | 85 | 58 | 74 | 25 | 80 | 7 | 3 | 340 | 0,54 | ▸ **KMT 11** | HN 12-13 | M 8 | 18 |
| **M 60x2** | 82 | 90 | 62 | 78 | 26 | 85 | 8 | 3,5 | 380 | 0,61 | ▸ **KMT 12** | HN 12-13 | M 8 | 18 |
| **M 65x2** | 87 | 95 | 68 | 83 | 28 | 90 | 8 | 3,5 | 460 | 0,71 | ▸ **KMT 13** | HN 15 | M 8 | 18 |
| **M 70x2** | 92 | 100 | 72 | 88 | 28 | 95 | 8 | 3,5 | 490 | 0,75 | ▸ **KMT 14** | HN 15 | M 8 | 18 |
| **M 75x2** | 97 | 105 | 77 | 93 | 28 | 100 | 8 | 3,5 | 520 | 0,8 | ▸ **KMT 15** | HN 16 | M 8 | 18 |
| **M 80x2** | 100 | 110 | 83 | 98 | 32 | – | 8 | 3,5 | 620 | 0,9 | ▸ **KMT 16** | HN 17 | M 8 | 18 |
| **M 85x2** | 110 | 120 | 88 | 107 | 32 | – | 10 | 4 | 650 | 1,15 | ▸ **KMT 17** | HN 18-20 | M 10 | 35 |
| **M 90x2** | 115 | 125 | 93 | 112 | 32 | – | 10 | 4 | 680 | 1,2 | ▸ **KMT 18** | HN 18-20 | M 10 | 35 |
| **M 95x2** | 120 | 130 | 98 | 117 | 32 | – | 10 | 4 | 710 | 1,25 | ▸ **KMT 19** | HN 18-20 | M 10 | 35 |
| **M 100x2** | 125 | 135 | 103 | 122 | 32 | – | 10 | 4 | 740 | 1,3 | ▸ **KMT 20** | HN 21-22 | M 10 | 35 |
| **M 110x2** | 134 | 145 | 112 | 132 | 32 | – | 10 | 4 | 800 | 1,45 | ▸ **KMT 22** | HN 21-22 | M 10 | 35 |



▸ Popular item

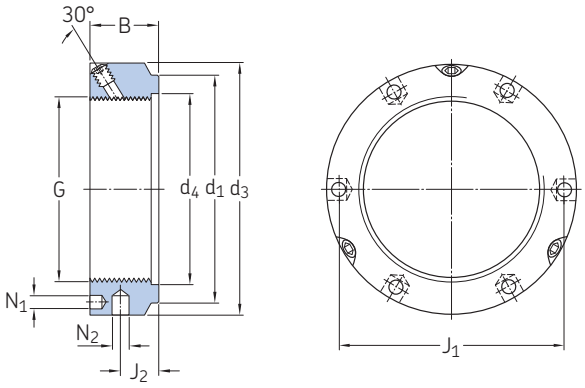
| Dimensions | | | | | | | | | Axial load carrying capacity | Mass | Designations | | Grub (set) screw | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| G | $d_1$ | $d_3$ | $d_4$ | $d_5$ | B | M | b | h | static | | Lock nut | Associated spanner | Size | Recommended tightening torque |
| mm | | | | | | | | | kN | kg | – | | – | Nm |
| **M 120x2** | 144 | 155 | 122 | 142 | 32 | – | 10 | 4 | 860 | 1,6 | ▸ **KMT 24** | HN 21-22 | M 10 | 35 |
| **M 130x2** | 154 | 165 | 132 | 152 | 32 | – | 12 | 5 | 920 | 1,7 | ▸ **KMT 26** | TMFN 23-30 | M 10 | 35 |
| **M 140x2** | 164 | 175 | 142 | 162 | 32 | – | 14 | 5 | 980 | 1,8 | ▸ **KMT 28** | TMFN 23-30 | M 10 | 35 |
| **M 150x2** | 174 | 185 | 152 | 172 | 32 | – | 14 | 5 | 1 040 | 1,95 | ▸ **KMT 30** | TMFN 23-30 | M 10 | 35 |
| **M 160x3** | 184 | 195 | 162 | 182 | 32 | – | 14 | 5 | 1 100 | 2,1 | ▸ **KMT 32** | TMFN 23-30 | M 10 | 35 |
| **M 170x3** | 192 | 205 | 172 | 192 | 32 | – | 14 | 5 | 1 160 | 2,2 | ▸ **KMT 34** | TMFN 30-40 | M 10 | 35 |
| **M 180x3** | 204 | 215 | 182 | 202 | 32 | – | 16 | 5 | 1 220 | 2,3 | ▸ **KMT 36** | TMFN 30-40 | M 10 | 35 |
| **M 190x3** | 214 | 225 | 192 | 212 | 32 | – | 16 | 5 | 1 280 | 2,4 | ▸ **KMT 38** | TMFN 30-40 | M 10 | 35 |
| **M 200x3** | 224 | 235 | 202 | 222 | 32 | – | 18 | 5 | 1 340 | 2,5 | ▸ **KMT 40** | TMFN 30-40 | M 10 | 35 |



▸ Popular item

## 25.7 KMTA precision lock nuts with locking pins

**M 25x1,5 – M 200x3**




| Dimensions | | | | | | | | | Axial load carrying capacity | Mass | Designations | | Grub (set) screw | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Lock nut | Associated spanner | Size | Recommended tightening torque |
| G | $d_1$ | $d_3$ | $d_4$ | B | $J_1$ | $J_2$ | $N_1$ | $N_2$ | static | | | | | |
| mm | | | | | | | | | kN | kg | – | | – | Nm |
| **M 25x1,5** | 35 | 42 | 26 | 20 | 32,5 | 11 | 4,3 | 4 | 130 | 0,13 | ▸ **KMTA 5** | B 40-42 | M 6 | 8 |
| **M 30x1,5** | 40 | 48 | 32 | 20 | 40,5 | 11 | 4,3 | 5 | 160 | 0,16 | ▸ **KMTA 6** | B 45-50 | M 6 | 8 |
| **M 35x1,5** | 47 | 53 | 38 | 20 | 45,5 | 11 | 4,3 | 5 | 190 | 0,19 | ▸ **KMTA 7** | B 52-55 | M 6 | 8 |
| **M 40x1,5** | 52 | 58 | 42 | 22 | 50,5 | 12 | 4,3 | 5 | 210 | 0,23 | ▸ **KMTA 8** | B 58-62 | M 6 | 8 |
| **M 45x1,5** | 58 | 68 | 48 | 22 | 58 | 12 | 4,3 | 6 | 240 | 0,33 | ▸ **KMTA 9** | B 68-75 | M 6 | 8 |
| **M 50x1,5** | 63 | 70 | 52 | 24 | 61,5 | 13 | 4,3 | 6 | 300 | 0,34 | ▸ **KMTA 10** | B 68-75 | M 6 | 8 |
| **M 55x1,5** | 70 | 75 | 58 | 24 | 66,5 | 13 | 4,3 | 6 | 340 | 0,37 | ▸ **KMTA 11** | B 68-75 | M 6 | 8 |
| **M 60x1,5** | 75 | 84 | 62 | 24 | 74,5 | 13 | 5,3 | 6 | 380 | 0,49 | ▸ **KMTA 12** | B 80-90 | M 8 | 18 |
| **M 65x1,5** | 80 | 88 | 68 | 25 | 78,5 | 13 | 5,3 | 6 | 460 | 0,52 | ▸ **KMTA 13** | B 80-90 | M 8 | 18 |
| **M 70x1,5** | 86 | 95 | 72 | 26 | 85 | 14 | 5,3 | 8 | 490 | 0,62 | ▸ **KMTA 14** | B 95-100 | M 8 | 18 |
| **M 75x1,5** | 91 | 100 | 77 | 26 | 88 | 13 | 6,4 | 8 | 520 | 0,66 | ▸ **KMTA 15** | B 95-100 | M 8 | 18 |
| **M 80x2** | 97 | 110 | 83 | 30 | 95 | 16 | 6,4 | 8 | 620 | 1 | ▸ **KMTA 16** | B 110-115 | M 8 | 18 |
| **M 85x2** | 102 | 115 | 88 | 32 | 100 | 17 | 6,4 | 8 | 650 | 1,15 | ▸ **KMTA 17** | B 110-115 | M 10 | 35 |
| **M 90x2** | 110 | 120 | 93 | 32 | 108 | 17 | 6,4 | 8 | 680 | 1,2 | ▸ **KMTA 18** | B 120-130 | M 10 | 35 |
| **M 95x2** | 114 | 125 | 98 | 32 | 113 | 17 | 6,4 | 8 | 710 | 1,25 | ▸ **KMTA 19** | B 120-130 | M 10 | 35 |
| **M 100x2** | 120 | 130 | 103 | 32 | 118 | 17 | 6,4 | 8 | 740 | 1,3 | ▸ **KMTA 20** | B 120-130 | M 10 | 35 |
| **M 110x2** | 132 | 140 | 112 | 32 | 128 | 17 | 6,4 | 8 | 800 | 1,45 | ▸ **KMTA 22** | B 135-145 | M 10 | 35 |
| **M 120x2** | 142 | 155 | 122 | 32 | 140 | 17 | 6,4 | 8 | 860 | 1,85 | ▸ **KMTA 24** | B 155-165 | M 10 | 35 |
| **M 130x3** | 156 | 165 | 132 | 32 | 153 | 17 | 6,4 | 8 | 920 | 2 | ▸ **KMTA 26** | B 155-165 | M 10 | 35 |
| **M 140x3** | 166 | 180 | 142 | 32 | 165 | 17 | 6,4 | 10 | 980 | 2,45 | ▸ **KMTA 28** | B 180-195 | M 10 | 35 |
| **M 150x3** | 180 | 190 | 152 | 32 | 175 | 17 | 6,4 | 10 | 1 040 | 2,6 | ▸ **KMTA 30** | B 180-195 | M 10 | 35 |
| **M 160x3** | 190 | 205 | 162 | 32 | 185 | 17 | 8,4 | 10 | 1 100 | 3,15 | ▸ **KMTA 32** | B 205-220 | M 10 | 35 |



▸ Popular item

| Dimensions | | | | | | | | | Axial load carrying capacity | Mass | Designations | | Grub (set) screw | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Lock nut | Associated spanner | Size | Recommended tightening torque |
| G | $d_1$ | $d_3$ | $d_4$ | B | $J_1$ | $J_2$ | $N_1$ | $N_2$ | static | | | | | |
| mm | | | | | | | | | kN | kg | – | | – | Nm |
| **M 170x3** | 205 | 215 | 172 | 32 | 195 | 17 | 8,4 | 10 | 1 160 | 3,3 | ▸ **KMTA 34** | B 205-220 | M 10 | 35 |
| **M 180x3** | 215 | 230 | 182 | 32 | 210 | 17 | 8,4 | 10 | 1 220 | 3,9 | ▸ **KMTA 36** | B 230-245 | M 10 | 35 |
| **M 190x3** | 225 | 240 | 192 | 32 | 224 | 17 | 8,4 | 10 | 1 280 | 4,1 | ▸ **KMTA 38** | B 230-245 | M 10 | 35 |
| **M 200x3** | 237 | 245 | 202 | 32 | 229 | 17 | 8,4 | 10 | 1 340 | 3,85 | ▸ **KMTA 40** | B 230-245 | M 10 | 35 |



▸ Popular item

# Index

**Text index** . . . . . 1120

**Product index** . . . . . 1136

# Text index

## A


**A**
angular contact ball bearings 404
cam followers 965, 967, 976
cylindrical roller bearings 514
deep groove ball bearings 258
lock nuts and locking devices 1093, 1103
motor encoder units 995
support rollers 946, 952
tapered roller bearings 692
**AA** 258
**AB** 404
abutments
accuracy requirements 144
design considerations 178
**AC** 386, 392, 404
accelerations
and minimum load 106
and spherical roller bearings 779
acceleration sensing 996
accessories
adapter sleeves 1065–1085
bearing selection chart 73–74
lock nuts and locking devices 1089–1117
AC current 1044, 1047
acids 118
AC motors 988
adapters 968–970
adapter sleeves 1065–1085
associated hydraulic nuts 1072–1085
bearing selection considerations 82
coatings 1067
designation system 1071
designs and variants 1067–1069
dimension standards 1070
dismounting methods and tools 202, 209
for axial location 178–179
for CARB toroidal roller bearings 852–853, 868–870, 1069
for inch shafts 1070–1071
for insert bearings 341, 344, 378–379
for metric shafts 1072–1077
for oil injection 1068
for sealed bearings 1069
for self-aligning ball bearings 439, 446–447, 458–461
for spherical roller bearings 784, 787, 824–831
locking devices 1067, 1069
lock nuts 1067, 1069
mounted with a spacer ring 1066
mounting methods and tools 202–204
product tables 1072–1085
shaft tolerances 152, 1070
tapers 1070
threads 1070
tolerances 1070
with inch dimensions 1067, 1076–1084
**ADB** 514
additives
in grease 117, 118
in oil 121
adjusted bearing arrangements
bearing selection chart 73–74
bearing selection considerations 76
adjusted reference speed 135
adjusting bearings
angular contact ball bearings 385–386, 392, 402–403
for operating clearance 203
tapered roller bearings 687
agricultural applications
and insert bearings 342–346
specification life 88
Agri Hub 191
**AH** 365
alignment bearings 80–81
alignment needle roller bearings
cages 597–598, 608
designs and variants 588
dimension standards 598–599
fits and tolerance classes 603
internal clearance 598–599
loads 606
misalignment 598–599
mounting 611
operating clearance 598–599
product tables 648–651
seating rings 588
temperature limits 608
tolerances 598–599
Allen wrenches. See hexagonal keys
alloys
cage types 25
effect on internal clearance 185
alternating loads 142
aluminium oxide coating
on cylindrical roller bearings 515
on INSOCOAT bearings 1030–1032, 1033
aluminium rings 202
ambient temperature
effect on bearing shelf life 57
heat dissipation/generation 132–134
ammonia 188
AMP Superseal™ 990, 991, 995, 997
angle rings 496–497
angular contact ball bearings 383–435
adjustment during mounting 203, 385–386, 402–403
assortment 385
bearing arrangements 70–76
bearing selection chart 73–74
cages 390–391, 402
combined with a needle roller bearing 588–589, 652–653
contact angle 79, 384, 385–386, 392–393
designation system 404–405
designs and variants 385–391
dimensional stability 81, 402
dimension standards 392
double row bearings 386, 424–429
fixed section bearings 384
for universal matching 385–386, 392–395, 403
four-point contact ball bearings 387, 430–435
internal clearance 392–397
loads 78–79, 384, 398–401, 403
lubrication 389, 402
matched bearings 405
misalignment 392–393
NoWear coated bearings 1061
preload 392, 395, 403
product tables 406–435
sealing solutions 388–389, 402
SKF Explorer bearings 385, 387
speeds 116, 402
temperature limits 389, 402
tolerances 392–393
with a two-piece inner ring 386–387
with locating slots 387, 403
with Solid Oil 1026
angular contact thrust ball bearings 79
angular misalignment. See misalignment
angular positioning 1000
annular grooves
in cylindrical roller bearings 500
in needle roller bearings 587, 596
in self-aligning ball bearings 440–441
in spherical roller bearings 776
in tapered roller bearings 674–675
ANSI standards 32
anti-fretting agents 201
anti-rotation pins 179
applications
bearing selection data sheet 1144
grease selection chart 125
requirements 65–67
specification life 88
**AS** 612
asperities 102, 132
**ASR** 612
associated components
abutments and fillets 178–179
accuracy measurements 200
and test running 206–207
for axial location 178–179
automatic lubricators 114, 120
automotive applications
and high temperature bearings 1007
and sensor bearing units 988
and tapered roller bearings 669
availability 82
AW additives
and NoWear coated bearings 1062


Designation prefixes and suffixes are shown in **bold**.

effect on viscosity ratio 102
in greases 118
in oils 121
axial clamping 185
axial clamp seals 198
axial displacement
bearing selection chart 73–74
considerations when selecting fits 143
in bearing arrangements 70–75
axial drive-up. See drive-up
axial internal clearance 26, 182–185
axial loads 21
radially free bearings 179
suitable bearing types 78–79
axial location 70–71, 178
axial run-out. See run-out
axleboxes
and cylindrical roller bearings 515
specification life 89


# B


**B**
adapter sleeves 1068
angular contact ball bearings 392, 404
cam followers 966, 976
cylindrical roller bearings 514
insert bearings 345, 364
lock nuts and locking devices 1103
sensor bearing units 995
tapered roller bearings 692
backing bearings 495
back-to-back arrangements
adjusting for preload 186
with angular contact ball bearings 386, 394–395, 402
with combined needle roller bearings 589, 590, 592
with deep groove ball bearings 249
with tapered roller bearings 76, 670, 687, 754–759
ball and cage assemblies
in angular contact ball bearings 386
in thrust ball bearings 467
ball bearings
compared to roller bearings 20, 78, 79
designation system 30
ball bearing units
for high temperature applications 1007
with insert bearings 341
with Solid Oil 1025, 1026
balls
bearing terminology 23
materials 24
raceway contact 20
base oils
compatibility chart 119
in oils 120–121
in SKF greases 124–125, 126–127
base oil viscosity 118, 125, 126–127
basic dynamic load rating 91
basic rating life 89–90
basic static load rating 104
**BC** 780, 790
bearing arrangements
adjusted (cross-located) 76
bearing selection chart 73–74
floating (cross-located) 76
locating/non-locating 70–75
bearing damage
electrical erosion 1030, 1045
false brinelling 207, 1044
metal fatigue 88
smearing 102, 106, 1044, 1060, 1062
spalling 211
time to failure 211
wear 211
bearing failure 88, 211
bearing fitting tools 201–202, 209
bearing height
series 28–31
terminology 22
bearing life
calculations 89–104
definitions 88
specification life per machine type 88–89
testing 107
under variable operating conditions 90
unit conversion table 91
bearing mean diameter 102
bearings
bore diameter tolerances 154–165
cleaning 200, 212
handling 200
outside diameter tolerances 166–175
popular items 82
selection chart 73–74
size categories 201, 207
storage and shelf life 57
terminology 22–23
types 20–32, 69–83
bearing seats
accuracy requirements 144–145
position and width of tolerance classes 140–141
resultant fits 153–175
surface roughness 147
tolerances for housing seats 151–152
tolerances for shaft seats 148–150
bearing selection
application data sheet 1144
centrifugal pump example 228–235
process 59–63
rope sheave example 222–227
vibrating screen example 216–221
bearing series 28–30
bearing size
and its dependencies 131
considerations 86–87
effect on relubrication interval 115
selection based on rating life 88–89
selection based on static load 104–106
bearing systems 86–87
bearing units. See ball bearing units
bearing washers
in cylindrical roller thrust bearings 878–880, 882, 884
in needle roller thrust bearings 898, 900, 903, 904
in spherical roller thrust bearings 914, 918
materials 24
bearing width
series 28–31
terminology 22
Belleville washers 198, 590, 592
belt drives 93
**BF** 612
black oxide coating
and other coatings 27, 189
on cylindrical roller bearings 498
on insert bearings 343
**BMB** 995
**BMD** 995
**BMO** 995
bore diameter 22, 28
boundary dimensions 28–29
boundary lubrication
effect on frictional moment 132
lubrication conditions 102–103
brass cages 25, 188
**BS2** 781, 790


# C


**C**
deep groove ball bearings 258
insert bearings 365
tapered roller bearings 674, 692, 693
**C1**
deep groove ball bearings 253, 259
ISO clearance class 27
**C2**
angular contact ball bearings 396–397, 405
CARB toroidal roller bearings 847–848, 855
cylindrical roller bearings 506, 515
deep groove ball bearings 252–253, 259
ISO clearance class 27
needle roller bearings 603, 613
self-aligning ball bearings 444, 449
spherical roller bearings 782–783, 791
**C2H** 405
**C2L** 405
**C3**
angular contact ball bearings 396–397, 405
CARB toroidal roller bearings 847–848, 855
cylindrical roller bearings 506, 515
deep groove ball bearings 252–253, 259
ISO clearance class 27
needle roller bearings 603, 613
self-aligning ball bearings 444, 449
spherical roller bearings 782–783, 791
**C3P** 1049
**C4**
angular contact ball bearings 396–397, 405
CARB toroidal roller bearings 847–848, 855
cylindrical roller bearings 506, 515
deep groove ball bearings 252–253, 259
ISO clearance class 27
needle roller bearings 613
spherical roller bearings 782–783, 791
**C5**
CARB toroidal roller bearings 847–848, 855
cylindrical roller bearings 506, 515
deep groove ball bearings 252–253, 259
ISO clearance class 27
spherical roller bearings 782–783, 791
**C08**
CARB toroidal roller bearings 846, 855
spherical roller bearings 791
**C083** 791
**C084** 791
**CA**
angular contact ball bearings 385, 392, 394, 404
deep groove ball bearings 250, 253, 259
spherical roller bearings 775, 790
**CAC** 790
cages
bearing terminology 23
effect of lubricants on PA66 188–189
lubrication considerations 112–113
types 25, 187–188
calculation tools 61–63
cam drives
and cam followers 964
and cam rollers 932
and support rollers 944
cam followers 963–985
attachment holes 974
cages 968, 974
designation system 976–977
designs and variants 965–968
dimensional stability 974
dimension standards 968, 972
grease fittings 966–967, 968–970, 971
hexagonal nuts and keys 968–970, 974, 975
internal clearance 972
loads 973
lubrication 933, 968, 970, 971, 974
mounting 966–967, 975


Designation prefixes and suffixes are shown in **bold**.

plugs 975
running surface 964, 965, 972, 976
sealing solutions 967, 974
speeds 974
spring washers 975
support surfaces 974
temperature limits 974
tolerances 972
with an axial sliding ring 966
cam rollers 931–941
cages 934, 936
designation system 937
designs and variants 933–934
dimensional stability 936
dimension standards 934
double row bearings 932–937, 940–941
guide flanges 936
internal clearance 934
loads 935
lubrication 933, 936
pins 936
product tables 938–941
running surface 932, 933, 934
sealing solutions 933, 936, 937
speeds 936
support surfaces 936
temperature limits 936
tolerances 934
capped bearings
bearing selection considerations 82
components 24
heating 203
storage and shelf life 57
washing 200
capping devices
bearing terminology 23
types 26
carbon coating 1060
CARB toroidal roller bearings 841–875
assortment 844
axial displacement 842–843, 846, 850–851
bearing arrangements 71–75
cages 844–845, 850
clearance reduction 205, 850, 854
contact angle 79
designation system 855
designs and variants 844–845
dimensional stability 81, 850
dimension standards 846
drive-up data 854
free space 852
full complement bearings 844–845, 849, 850
housings 852
internal clearance 846–848, 850
in vertical shaft arrangements 853
loads 79, 849
lock nut tightening angle 854
lubrication 845, 850
misalignment 842–843, 846, 851–852
mounting 205–206, 852, 853–854
NoWear coated bearings 1061
on an adapter sleeve 852–853, 868–871
on a withdrawal sleeve 852–853, 872–875
on start-up 849
preload 853
product tables 856–875
sealing solutions 844–845
SKF Explorer bearings 842, 844
speeds 116, 850
suitable adapter sleeves 1069
suitable lock nuts 1091, 1094, 1095
temperature limits 845, 850
tolerances 846
vibration 842–843
carrying tools 200
car wash systems 341
case-hardening 27
**CB** 385, 392, 394, 404
**CC** 385, 392, 394, 404
**CC(J)** 775, 790
**CCJA** 778, 790
centralized lubrication systems
and cam followers 968, 970, 971
types 120–121
centrifugal pumps 228–235
centrifuges 88
centring flanges
in needle roller bearings 586–587
in needle roller thrust bearings 897, 910–911
ceramics. See silicon nitride
chamfer dimensions 22, 28
chamfers
bearing terminology 23
dimension limits 53–54
dimension standards 37
special-shaped chamfers 190
chromium coating 1046
churning 132
circulating oil
effect on frictional power loss 134
overview 122–123
**CJ** 790
**CL00** 692
**CL0** 692
**CL7A** 693
**CL7C** 669, 693
clamping. See axial clamping
cleanliness. See contamination
clearance 153
clearance reduction
and selecting initial clearance 183
caused by interference fits 184
caused by temperature differences 184–185
measuring with a feeler gauge 205
values for CARB toroidal roller bearings 854
values for spherical roller bearings 789
**CLN** 693
**CN**
cylindrical roller bearings 515
deep groove ball bearings 259
needle roller bearings 613
**CNL** 405
coatings
aluminium oxide 1030, 1031–1032, 1033
black oxide 343, 498
chromium 1046
defining final variant 189
manganese phosphate 1007, 1008, 1014
molybdenum 1046
NoWear (carbon) 1060
overview 27
phosphate 1067
polytetrafluoroethylene (PTFE) 778
rust inhibitor 1067
zinc 341–343
zinc chromate 1046
cold dismounting 207
cold mounting 201
combined loads 21, 78–79
combined needle roller bearings
abutment dimensions 609
bearing selection chart 73–74
cages 597–598, 608
designs and variants 588–593
dimension standards 600
internal clearance 600, 603
loads 606–607
lubrication 596
misalignment 600
product tables 652–659
sealing solutions 594–595
tolerances 600
composite housings 362
compressors
and NoWear coated bearings 1060
specification life 88
suitable cage types 188
ConCentra insert bearings. See SKF ConCentra insert bearings
condensation
corrosion protection 117
storage and shelf life 57
condition monitoring 211
conditions of rotation 142
cones 669
connecting rods 142, 584
consistency
effect of mixing greases 118
effect of temperature changes 117
mechanical stability 117
NLGI grades 116
contact angle
bearing terminology 21, 22–23
effect on load carrying capability 79
in angular contact ball bearings 384, 385–386
in four-point contact ball bearings 392–393
in tapered roller bearings 666
contact seals
external sealing 197–198
integral sealing 26
contact stresses 104
contamination
and bearings with Solid Oil 1024
and NoWear coated bearings 1061
effect on initial grease fill 113
effect on oil change interval 121
effect on relubrication interval 115
levels of cleanliness 105
sealing solutions 195–198
contamination factor 104–105
continuous casters
and CARB toroidal roller bearings 845
and spherical roller bearings 780
continuous lubrication 114
conveyor systems
and cam followers 964
and cam rollers 932
and insert bearings 341
and sensor bearing units 988
and support rollers 944
specification life 88
cooling 134
copper corrosion test 126–127
coronet cages 1007, 1009, 1010, 1014
corrosion inhibitor 1060
corrosion protection
and bearing storage 57
of greases 117
of oils 120–121
technical specifications (SKF greases) 126–127
with hybrid bearings 1046
with initial grease fill 113
cranes 88
crankpins 584
crankshafts 1000
creep 142–143
crushers 88
cryogenic temperatures 1046
**CS** 776, 790
**CS2** 776, 790
**CS5**
CARB toroidal roller bearings 845, 855
spherical roller bearings 776, 790
cups 669
cup springs. See Belleville washers
customized bearings 32
**CV** 514
cylindrical roller and cage thrust assemblies 880, 885
cylindrical roller bearings 493–579
axial displacement 496–501, 504–505
bearing arrangements 70–77
bearing selection chart 73–74
cages 115, 502–503, 511
coatings 498


Designation prefixes and suffixes are shown in **bold**.

combined with a four-point contact ball bearing 403
contact angle 79
designation system 514–515
designs and variants 496–503
dimensional stability 81, 511
dimension standards 504–505
dismounting 202, 208
double row bearings 499, 500–502, 504–505
flanges 494–497, 500–501, 512
full complement bearings 500–502, 504–505, 554–579
high-capacity bearings 498–499, 502–503, 504, 550–553
hybrid bearings 1044–1049, 1056–1057
INSOCOAT bearings 1030–1035, 1038–1041
internal clearance 504–508
loads 78–79, 510
lubrication 115, 501–503, 511
matched bearings 502
misalignment 504–505
mounting 201–202, 512
NoWear coated bearings 1061
product tables 516–579
sealing solutions 501–503, 511, 576–579
SKF Explorer bearings 502
speeds 116, 511
temperature limits 511
tolerances 504–505
with an angle ring 496–497
with a retaining ring 500–501
with a snap ring groove 498
with locating slots 498
with Solid Oil 1025, 1026
cylindrical roller thrust bearings 877–893
abutment dimensions 885
bearing selection chart 73–74
cages 881, 884
combined with a needle roller bearing 592, 600, 658–659
contact angle 79
designation system 886
designs and variants 879–881
dimensional stability 81
dimension standards 881
double direction bearings 879
fits and tolerance classes 885
loads 79, 884
misalignment 881
product table 888–893
single direction bearings 879
speeds 884
temperature limits 884
tolerances 881–883
washers 879–880, 882, 884
with raceways on shafts and in housings 885
cylindrical seats 202


# D


**D**
adapter sleeves 1071
angular contact ball bearings 386, 404
deep groove ball bearings 258
needle roller bearings 612
tapered roller bearings 674, 692
**D2** 674
**D3** 674
**DA** 514
**DB**
angular contact ball bearings 386, 405
deep groove ball bearings 249, 259
tapered roller bearings 693
DC current 1044, 1047
deep groove ball bearings 239–337
bearing arrangements 70–75
bearing selection chart 73–74
cages 248–249, 256
contact angle 79
designation system 258–259
designs and variants 241–249
dimensional stability 81, 256
dimension standards 250–251
double row bearings 242, 334–337
for high temperature applications 1008–1009, 1016–1019
grease life 246
hybrid bearings 1044–1055
in ICOS oil sealed bearing units 244, 308–309
in insert bearings 340–381
in sensor bearing units 988–1003
INSOCOAT bearings 1030–1035, 1036–1037
internal clearance 250–253
loads 78–79, 254–255
lubrication 244–246, 256
matched bearings 249, 254–255
misalignment 250–251
NoWear coated bearings 1061
product tables 260–337, 1016–1019
sealing solutions 242–247, 256
SKF Explorer bearings 248
SKF Quiet running bearings 248
speeds 116, 256
stainless steel bearings 241, 243–257, 316–327
temperature limits 245, 256
tolerances 250–251
with a flanged outer ring 247
with a snap ring groove 247, 310–315
with filling slots 241, 328–333
with Solid Oil 1025, 1026
defect frequencies. See skf.com/bearingcalculator
designation systems 29–32
**DF**
angular contact ball bearings 386, 405
deep groove ball bearings 249, 259
tapered roller bearings 693
dial indicators 203, 206
diameter series 28–31, 37, 52
differentials 669
dimensional stability 27, 81
dimensional tolerances
accuracy measurements 200
for seats and abutments 144–145
dimension series 28–31
direct drive control 998
dismounting 207–210
bearing selection considerations 82
cold 207
considerations when selecting fits 143
design provisions 176–177
from a cylindrical shaft seat 207–208
from an adapter sleeve 209
from a tapered shaft seat 208
from a withdrawal sleeve 210
methods and tools 202
using heat 208
using the oil injection method 207–210
distance rings 178–179
distortion 143
**DO** 674–675
double direction bearings
cylindrical roller thrust bearings 879
needle roller thrust bearings 897
thrust ball bearings 466–468, 486–491
double row angular contact ball bearings
assortment 386
bearing selection chart 73–74
cages 390–391, 402
contact angle 79, 392–393
designation system 404–405
designs and variants 385, 386
dimensional stability 402
dimension standards 392–393
in hub bearing units 385
internal clearance 392–393, 396
loads 79, 398–399
lubrication 389, 402
misalignment 392–393
sealing solutions 388–389, 402, 428–429
SKF Explorer bearings 386, 387
speeds 402
temperature limits 389, 402
tolerances 392–393
double row cam rollers
cages 934, 936
designation system 937
designs and variants 933–934
dimensional stability 936
dimension standards 934
internal clearance 934
loads 935
lubrication 933, 936
product table 940–941
running surface 932, 933, 934
sealing solutions 936, 937
speeds 936
temperature limits 936
tolerances 934
double row cylindrical roller bearings 495
double row deep groove ball bearings
cages 248–249, 256
designation system 258–259
designs and variants 242
dimensional stability 256
dimension standards 250–251
internal clearance 250–252
loads 242, 254–255
misalignment 250–251
product table 334–337
speeds 256
temperature limits 256
tolerances 250–251
with Solid Oil 1026
double row needle roller bearings
drawn cup needle roller bearings 585, 596
needle roller and cage assemblies 583, 596
with machined rings 587, 596
double row tapered roller bearings 671–674
**DR** 502, 515
drag losses 132
drawn cup needle roller bearings
assortment 584
bearing selection chart 73–74
cages 597–598, 608
designs and variants 584–586
dimensional stability 608
dimension standards 598
double row bearings 585, 596
fits and tolerance classes 602
loads 606
lubrication 585, 595
misalignment 598
mounting 611
operating clearance 598
product table 618–623
sealing solutions 594
temperature limits 608
tolerances 598
drifts 207
drive-up
mounting bearings with a tapered bore 203, 206
values for CARB toroidal roller bearings 854
values for self-aligning ball bearings 448
values for spherical roller bearings 789
drive-up method. See SKF Drive-up Method
dropping point
high temperature limit 117
technical specifications (SKF greases) 126–127
drying cylinders
and CARB toroidal roller bearings 852
and heat generation 131


Designation prefixes and suffixes are shown in **bold**.

dry lubricant. See graphite
dry running 1060
**DS** 612
**DT**
  angular contact ball bearings 386, 405
  deep groove ball bearings 249, 259
  tapered roller bearings 693
dust 242
duty intervals 90–92
dynamic load rating. See basic dynamic load rating
dynamic misalignment 80

# E

**E**
  adapter sleeves 1069, 1071
  angular contact ball bearings 404
  deep groove ball bearings 258
  self-aligning ball bearings 446, 447, 449
  spherical roller bearings 775–776, 790
  spherical roller thrust bearings 915, 921
  tapered roller bearings 674, 692
**EC** 514
eccentric collars 964–965, 974, 975
eccentric locking collars 341, 343, 372–375
**EGS** 612
**EH** 1069, 1071
**EJA** 778, 790
**EL** 1069, 1071
elastic deformation 81
electrical erosion. See electrical insulation
electrical insulation
  with hybrid bearings 1044–1045, 1047
  with INSOCOAT bearings 1030–1032
electrical resistance. See electrical insulation
electric generators
  and deep groove ball bearings 248
  and hybrid bearings 1046
  and INSOCOAT bearings 1030
electric motors
  and hybrid bearings 1044, 1045, 1046
  and INSOCOAT bearings 1030
  and sensor bearing units 988, 993, 1000
  noise reduction 186
  protection during standstill 187
  shaft accuracy example 145
  specification life 88
electric vehicles 988
electromagnetic environments 991
encoder units
  motor encoder units 988–995, 1002–1003
  roller encoder units 996
  steering encoder units 997–998
end plates
  for axial location 178
  terminology 22
envelope requirement 148
EP additives
  and NoWear coated bearings 1062
  effect on polymer cages 189
  effect on viscosity ratio 102
  in greases 118, 125
  in oils 121
  technical specifications (SKF greases) 126–127
equivalent dynamic bearing load 91–92
equivalent mean load 92
equivalent static bearing load 105
escape holes. See grease escape holes
esters 120–121
e-turbo(super)chargers 1000
exciters 779
extended inner rings
  in insert bearings 341–346
  in self-aligning ball bearings 440–441, 446, 462–463
external forces 91, 93
external sealing 194–197
extreme pressure additives. See EP additives
extreme temperature bearings. See high temperature bearings
eye bolts
  for large bearings 190, 200–201
  in spherical roller bearings 791
  in spherical roller thrust bearings 921

# F

**F**
  angular contact ball bearings 390, 404
  high temperature bearings 1007, 1010–1011, 1014
  insert bearings 342–345, 365
  spherical roller bearings 790
  spherical roller thrust bearings 921
  thrust ball bearings 468, 471
**F1** 1049
**F3** 921
**FA**
  angular contact ball bearings 404
  spherical roller bearings 790
face-to-face arrangements
  adjusting for preload 186
  with angular contact ball bearings 76, 386, 394–395, 402
  with deep groove ball bearings 249
  with tapered roller bearings 670, 672, 683, 744–753
failure probability 88–90
false brinelling
  and machines on standby 207
  prevention with hybrid bearings 1044
fans
  and CARB toroidal roller bearings 842
  and insert bearings 341
  and NoWear coated bearings 1060
  and self-aligning ball bearings 438
  specification life 88
fatigue. See metal fatigue
fatigue life 88–89
fatigue load limit 104
faults 211
feeler gauges 205
felt seals 198–199
fillets 178–179
filling grade. See grease fills
filling slot bearings
  cages 248–249, 256
  designs and variants 241
  dimensional stability 256
  dimension standards 250–251
  internal clearance 250–252
  loads 241, 254–255
  misalignment 250–251
  product table 328–333
  sealing solutions 244
  speeds 256
  temperature limits 256
  tolerances 250–251
  with a snap ring groove 241
filtration 94
fits
  based on load and operating conditions 142
  for housings 143, 166–175
  for shafts 154–165
  position and width of tolerance classes 140–141
  selection criteria 140–143
fitting slots 362
five-lip (5-lip) seals 342–344, 346, 349, 355
fixed section bearings 384
flanged bearings
  angular contact ball bearings 385
  deep groove ball bearings 247
  tapered roller bearings 670, 742–743, 1031
flange rings
  in cam followers 965, 966–967, 973
  in support rollers 944, 945–947, 951
flanges
  in cylindrical roller bearings 494–497, 500–501, 512
  in needle roller bearings 612
  in spherical roller bearings 775
  in tapered roller bearings 667
flingers
  for oil lubrication 196–197
  in insert bearings 342–347
floating bearing arrangements
  bearing selection chart 73–74
  bearing selection considerations 76–77
fluctuating loads 90
fluoro rubber (FKM)
  in deep groove ball bearings 244
  in hybrid bearings 1045
  in needle roller bearings 594
  in spherical roller bearings 776
  in tapered roller bearings 672
  safety precautions 197
food and beverage industry
  and bearings with Solid Oil 1025
  and high temperature bearings 1007
  and insert bearings 341, 342, 362
food-grade lubricants
  for bearings with Solid Oil 1025
  for high temperature bearings 1007, 1009, 1010
  for insert bearings 342, 348
  grease selection chart (SKF greases) 124–125
forklifts 988
form tolerances. See geometrical tolerances
four-point contact ball bearings
  assortment 387
  bearing selection chart 73–74
  cages 390–391, 402
  contact angle 79
  design 385, 387
  designation system 404–405
  dimensional stability 81, 402
  dimension standards 392–393
  INSOCOAT bearings 1031
  internal clearance 392–393, 397
  loads 79, 398–399, 403
  locating slots 191
  misalignment 392–393
  product table 430–435
  SKF Explorer bearings 387
  speeds 402
  temperature limits 402
  tolerances 392–393
  used as a thrust bearing 403
  with locating slots 387, 403
four-row cylindrical roller bearings 495
four-row tapered roller bearings 668, 674
**FR** 514
frequency converters 1030
fretting corrosion
  and conditions of rotation 142
  and PTFE coatings 778
  technical specifications (SKF greases) 126–127
friction
  and its dependencies 132
  bearing selection chart 73–74
  bearing selection considerations 79
  in ball and roller bearings 20
  SKF model of bearing friction 132
frictional moment
  estimation 132
  starting torque 133

Designation prefixes and suffixes are shown in **bold**.

frictional power loss 132–134
full complement bearings
  bearing selection chart 73–74
  CARB toroidal roller bearings 844–845, 849, 850
  combined needle roller bearings 590, 595
  compared to bearings with a cage 78, 81
  cylindrical roller bearings 500–502, 504–505, 554–579
  drawn cup needle roller bearings 584–585
full film lubrication
  effect on frictional moment 132
  lubrication conditions 102–103
furnaces 88

# G

**G**
  adapter sleeves 1071
  angular contact ball bearings 385, 392, 394, 404
  insert bearings 365
  tapered roller bearings 674, 692
**G2** 598, 601, 604, 613
**GA**
  angular contact ball bearings 385, 392, 395, 404
  deep groove ball bearings 250, 253, 259
gap-type seals 196
gaskets 195
gauges
  feeler gauges 205
  for checking associated components 200
  for needle rollers 601, 611
  pressure gauges 206
  taper gauges 147, 200
**GB** 385, 392, 395, 404
**GC** 385, 392, 395, 404
**GE2**
  angular contact ball bearings 389, 405
  deep groove ball bearings 245, 259
gears
  and cylindrical roller bearings 498
  and NoWear coated bearings 1060
  and spherical roller bearings 779, 780
  and tapered roller bearings 671
  load conditions 93
  specification life 88
**GEM9**
  CARB toroidal roller bearings 845, 855
  spherical roller bearings 776, 791
general plans. See ISO, general plans
generators
  and hybrid bearings 1044, 1045–1046, 1049
  and sensor bearing units 1000
  specification life 88
Geometrical Product Specification (GPS) 36
geometrical tolerances
  accuracy measurements 200
  for seats and abutments 144–145
geometric centres 683–684
**GFJ**
  deep groove ball bearings 244–245, 259
  insert bearings 348
**GJN**
  angular contact ball bearings 389
  deep groove ball bearings 244–245, 259
glass fibre reinforced polymers 188
glass industry 1007
**GLE** 776, 791
gloves 197, 200
go-karts 341
**GR** 365
graphite
  as a solid lubricant additive 118
  in high temperature bearings 1007, 1009, 1010
gravitational forces 91
grease escape holes 114
grease fills
  initial fill 112–113
  replenishment 113, 114
grease fittings 966–967, 968–970
grease life
  and the SKF traffic light concept 118
  estimating the relubrication interval 111
  technical specfications (SKF greases) 126–127
grease lubrication
  initial fill 112–113
  relubrication 111–115
  running-in period 113
  selecting a suitable grease 116–119
  versus oil lubrication 110–111
grease performance factor 245–246
greases
  additives 117, 118
  base oil viscosity 125, 126–127
  consistency grades 116
  corrosion protection 117
  inspection and monitoring 212–213
  load carrying ability 118
  load ranges 116
  miscibility 118–119
  selection chart (SKF greases) 124–125
  SKF traffic light concept 117–118
  speed ranges 116
  technical specifications (SKF greases) 126–127
  temperature ranges 116
grinding spindles 187
grub screw locking
  with high temperature bearings 1010–1013
  with insert bearings 341–344, 356, 366–370
grub screws 360, 362
**GS**
  cylindrical roller thrust bearings 880, 882, 885, 886
  needle roller thrust bearings 898, 904
gudgeon pins 584
guide flanges 23, 936
guide rings 774–775
guiding sleeves 201
**GWF** 389, 405
**GXN** 389
gym equipment 341

# H

**H**
  adapter sleeves 1068, 1071
  lock nuts and locking devices 1103
  needle roller bearings 613
**HA1**
  cylindrical roller bearings 515
  cylindrical roller thrust bearings 886
  deep groove ball bearings 259
  tapered roller bearings 692
**HA2**
  cylindrical roller bearings 515
  tapered roller bearings 692
**HA3**
  CARB toroidal roller bearings 855
  cylindrical roller bearings 515
  spherical roller bearings 791
  tapered roller bearings 692
**HA4** 692
**HA5** 692
**HA6** 692
**HA7** 692
Hall effect cells 989, 991, 998
hammers 209
hardening 27
hardness
  of bearing rings 91
  of seal counterfaces 197
**HB** 1068, 1071
**HB1**
  cylindrical roller bearings 515
  cylindrical roller thrust bearings 886
  tapered roller bearings 692
**HB2** 692
**HB3** 515
**HC5** 1049
heat dissipation 132, 133
heaters 202
heat generation 131
heating rings 208
heat stabilization. See dimensional stability
heat treatment 27
hexagonal keys
  for cam followers 966–967, 975
  for insert bearings 360, 362
hexagonal nuts 968–969, 974
high-capacity bearings 498–499, 550–553
high temperature bearings 1005–1021
  applications 1006, 1007, 1013
  assortment 1007
  axial displacement 1013
  coatings 1007, 1008, 1014
  deep groove ball bearings 1008–1009, 1016–1019
  designation system 1014
  designs and variants 1008, 1010
  dimensional stability 1011
  dimension standards 1011
  fits and tolerance classes 1013
  insert bearings 1010–1011, 1020–1021
  internal clearance 1008, 1010, 1011–1012
  loads 1012–1013
  lubrication 1007, 1009, 1010, 1014
  misalignment 1011
  mounting 1014
  product tables 1016–1021
  running in 1007, 1014
  sealing solutions 1008–1009, 1010–1011
  speeds 1009, 1010, 1014
  temperature limits 1007, 1008–1011, 1013, 1014
  tolerances 1011–1012
**HN1** 515
**HN3** 692
hollow shafts 143, 146
hook spanners
  for dismounting bearings 210
  for insert bearings 361
  for mounting bearings 202–203
hot dismounting 208
hot mounting 203
hotplates 203
housing bore diameter 22
housing covers
  for axial location 178
  terminology 22
housings
  bearing selection chart 73–74
  considerations when selecting fits 143
  for CARB toroidal roller bearings 852
  for self-aligning ball bearings 447
  for spherical roller bearings 788
  terminology 22
housing seats
  accuracy requirements 144–145
  position and width of tolerance classes 141
  terminology 22
  tolerances and resultant fits 166–175
  tolerances for radial bearings 151
  tolerances for thrust bearings 152
housing washers

Designation prefixes and suffixes are shown in **bold**.

bearing terminology 23
in cylindrical roller thrust bearings 880, 882, 885
in needle roller thrust bearings 898, 903, 904
in spherical roller thrust bearings 914, 918, 920
in thrust ball bearings 467–468, 470
**HT** 244–245, 259
hub bearing units
with angular contact ball bearings 385
with tapered roller bearings 668
humidity
effect on bearing shelf life 57
effect on EP/AW additives 118
**HV** 342, 365
hybrid bearings 1043–1057
assortment 1045
axial displacement 1047
cages 1046, 1048
coatings 1046
compared to all-steel bearings 79, 81, 1044, 1046
customized bearings 1046
cylindrical roller bearings 1045–1046, 1056–1057
deep groove ball bearings 1045–1046, 1050–1055
designation system 1049
designs and variants 1045–1046
dimensional stability 1046, 1048
dimension standards 1047
electrical properties 1047
internal clearance 1047
loads 1048
lubrication 1045–1046, 1048
misalignment 1047
preload 1048
sealing solutions 1045–1046, 1048
SKF Explorer bearings 1045
speeds 1044–1045, 1048
temperature limits 1046, 1048
tolerances 1047
hydraulic motors 1060
hydraulic mounting tools 202
hydraulic nuts
for adapter sleeves 1072–1085
for dismounting bearings 202, 209–210
for mounting bearings 202, 203–204, 206
safety precautions 210
hydraulic pullers 202, 208
hydraulic pumps
and NoWear coated bearings 1060
for dismounting bearings 210
for mounting bearings 206
hydrodynamic films 120


# I


**ICOS** 258
ICOS oil sealed bearing units 244, 248, 308–309
impact loads 779
impact spanners 202, 203, 210
impulse rings 989, 993, 994, 1000
inch bearings
cylindrical roller bearings 496
deep groove ball bearings 241
tapered roller bearings 676–678, 687–689, 691, 714–741
inch lock nuts 1093
inch shafts
and adapter sleeves 1070–1071
and high temperature bearings 1021
and insert bearings 368–370, 374–375, 377, 379
inch sleeves 1067, 1076–1084
indentations 94
indexing roller units 493
induction-hardening 27
induction heaters
for dismounting bearings 202, 208
for motor encoder units 994
for mounting bearings 202–203
inductive sensors 990
inertial forces 91
initial clearance 182–185
initial grease fills 114
injection moulded cages 188
inlet shear heating 132
inner ring expansion 206
inner rings
bearing terminology 23
for needle roller bearings 592–593, 601, 660–662
materials 24
insert bearings 339–381
applications 341
assortment 341
axial displacement 344, 347, 356
bearing selection chart 73–74
cages 346–347, 355
designation system 364–365
designs and variants 341–347
dimensional stability 355
dimension standards 350
dismounting 359–362
fits and tolerance classes 358–359
for agricultural applications 342–345
for high temperature applications 1010–1011, 1020–1021
for inch shafts 368–370, 374–375, 377, 379
for the food and beverage industry 341, 342
housings 347, 351, 362
internal clearance 350, 352
key sizes 360, 362
loads 345, 348–349, 353–354
locking methods 341
lubrication 348–349, 355
misalignment 340, 351, 362–363
mounting 359–362
product tables 366–381
sealing solutions 345–346, 355
SKF ConCentra bearings 344, 358–359, 362–363, 376–377
speeds 355
temperature limits 347, 348, 355
tightening torques/angles 360–362
tolerances 350, 352
vibration 340, 344, 347
with an adapter sleeve 341, 344, 350, 358–361, 378–379
with an eccentric locking collar 341, 343, 355, 372–375
with an extended inner ring 341, 342–346
with an interference fit 341, 345
with a rubber seating ring 346–347, 351
with a standard inner ring 345, 349, 358, 380
with a tapered bore 344, 378–379
with grub screws 341, 342–344, 355, 356, 366–371
with Solid Oil 1025, 1026
with stainless steel components 342, 345, 348
with zinc-coated rings 342, 343, 348
insert bearing units. See ball bearing units
INSOCOAT bearings 1029–1041
abutment dimensions 1035
assortment 1031
axial displacement 1033
cages 1032, 1034
coatings 27, 1030–1032, 1033
cylindrical roller bearings 1030–1035, 1038–1041
deep groove ball bearings 1030–1035, 1036–1037
defining final variant 189
designation system 1035
designs and variants 1031–1032
dimension standards 1033
electrical properties 1032
four-point contact ball bearings 1031
internal clearance 1033
loads 1034
lubrication 1034
misalignment 1033
mounting 1035
sealing solutions 1032
speeds 1034
tapered roller bearings 1031
temperature limits 1034
tolerances 1033
inspection 211–212
insulation. See electrical insulation
integral sealing
bearing selection chart 73–74
bearing selection considerations 82
defining final variant 189
types 26
interference 153
interference fits
and clearance reduction 184
dismounting bearings 207
mounting bearings 201, 203
position and width of tolerance classes 141
intermediate rings
in needle roller bearings 609
in tapered roller bearings 672–673
intermediate washers
in cylindrical roller thrust bearings 879
in needle roller thrust bearings 897
internal clearance
selecting clearance or preload 182–185
types 26–27
internal gauges 200
**IS** 593, 612
ISO
clearance classes 27
dimension series 77
general plans 28
GPS 36
reference speed 135
tolerance classes 36
tolerance grades 145
tolerance system 140–141
viscosity grades 103
**ISR** 612


# J


**J**
angular contact ball bearings 390, 404
cylindrical roller bearings 502, 514
spherical roller bearings 790
tapered roller bearings 692
**J1** 390, 404
**JA**
cylindrical roller bearings 502–503, 511, 514
spherical roller bearings 790
jaw pullers 202
**JB** 502–503, 511, 514


# K


**K**
CARB toroidal roller bearings 844, 855
cylindrical roller bearings 498, 514


Designation prefixes and suffixes are shown in **bold**.

cylindrical roller thrust bearings 880, 882, 885, 886
insert bearings 365
self-aligning ball bearings 449
spherical roller bearings 775, 790
**K30**
CARB toroidal roller bearings 844, 855
spherical roller bearings 775, 790
keys. See hexagonal keys
key slots 1071, 1095
keyways 1091, 1093, 1095
kilns. See ovens
kinematic replenishment/starvation 132
kinematic viscosity. See viscosity


# L


**L**
adapter sleeves 1069, 1071
cylindrical roller bearings 502, 514
lock nuts and locking devices 1103
**L4B**
cylindrical roller bearings 498, 515
tapered roller bearings 692
**L5B** 515
**L5DA** 1060, 1061, 1062
**L7B** 515
**L7DA** 1060, 1061, 1062
**LA** 502, 511, 514
labyrinth seals 195, 196
large bearings
availability 82
dismounting 207–210
effect on relubrication interval 115
handling 200
mounting 202–204
size category 201
**LB** 502, 511, 514
**LHT23** 244–245, 259
life. See bearing life
life adjustment factor 89–90
life modification factor 94–99
lifting tackle 200
lifts 88
limiting speed 135
line contact 20
**LL** 502, 511, 514
load ratings
dynamic 91
static 104
loads
bearing selection chart 73–74
bearing selection considerations 78–79
conditions of rotation 142
effect on relubrication interval 118
external forces 91, 93
fluctuating 90
peak 92–93, 104, 106
ranges for greases 116
requisite minimum load 106
rotating 92–93
locating bearings 70–71
locating/non-locating bearing arrangements 70–75
locating slots
in cylindrical roller bearings 498
in deep groove ball bearings 258
in four-point contact ball bearings 190–191, 387, 403, 404
locking clips
designs 1094
for adapter sleeves 1067, 1069
installation and removal 1100–1101
locking principle 1094
product table 1110–1111
locking methods 341
locking pins 1114–1117
locking plates
designs 1093
for adapter sleeves 1067
locking principle 1094
lock nuts 1089–1117
designs and variants 1090–1094
dimension standards 1098
for axial location 178–179
for bearings mounted on sleeves 1067, 1069
for CARB toroidal roller bearings 1091, 1094, 1095
for sealed bearings 1091, 1095
for self-aligning ball bearings 1095
for spherical roller bearings 1095
installation and removal 1100–1102
keyways 1091, 1093, 1095
locking principles 1091–1092, 1094, 1097
loosening torque 1098
mating shaft threads 1098
precision lock nuts 1092, 1096–1097, 1096–1099
product tables 1104–1117
threads 1098–1099
tolerances 1098
with a locking clip 1091, 1094, 1108–1109
with a lock washer 1091, 1104–1105
with an integral locking device 1091, 1095
with an integral locking screw 1091, 1095, 1112–1113
with inch dimensions 1093
with locking pins 1114–1117
lock nut tightening angle
values for CARB toroidal roller bearings 854
values for insert bearings 361
values for self-aligning ball bearings 448
values for spherical roller bearings 789
verifying the interference fit 205
lock washers
designs 1093
for adapter sleeves 1067, 1069
installation and removal 1100
locking principle 1094
product tables 1106–1107
logarithmic profile
in cylindrical roller bearings 494–495
in tapered roller bearings 667
loose fits 141
low-friction bearings 669
low-friction seals
in deep groove ball bearings 242–243
integral seals 26
**LS** 514
**LT** 244–245, 259
**LT10** 245, 259
LubeSelect 116
lubricants
effect on cage materials 188–189
greases 116–119
inspection and monitoring 212–213
oils 120–121
Solid Oil 1024
lubricated for life
high temperature bearings 1006, 1014
insert bearings 349
lubrication 109–127
grease 116–120
grease selection chart (SKF greases) 124–125
in bearing life calculations 102–103
oil 120–123
selecting grease or oil 110–111
lubrication conditions
calculating the viscosity ratio 102–103
dependencies 131
effect on frictional moment 132


# M


**M**
angular contact ball bearings 390–391, 404
CARB toroidal roller bearings 845, 855
cylindrical roller bearings 502, 514
cylindrical roller thrust bearings 881, 886
deep groove ball bearings 248, 258
hybrid bearings 1046
INSOCOAT bearings 1032
self-aligning ball bearings 442, 449
spherical roller thrust bearings 921
thrust ball bearings 468, 471
**MA**
angular contact ball bearings 390–391, 402, 404
four-point contact ball bearings 390–391, 402, 404
spherical roller bearings 790
machined cages 25
machine maintenance. See inspection
machine tools
bearing selection considerations 81
specification life 88
magnetic sensors
for motor encoder units 990
for steering encoder units 998
maintenance-free
angular contact ball bearings 389
CARB toroidal roller bearings 845
deep groove ball bearings 244
hybrid bearings 1045
self-aligning ball bearings 440
spherical roller bearings 776
mandrels 975
manganese phosphate coating 1007, 1008, 1014
marginal lubrication 1062
marine applications
and NoWear coated bearings 1060
specification life 88
**MA(S)**
cylindrical roller bearings 502, 511, 514
deep groove ball bearings 248, 258
matched bearings
angular contact ball bearings 405
bearing selection chart 73–74
cylindrical roller bearings 502
deep groove ball bearings 249, 254–255
tapered roller bearings 670–671, 682–684, 687, 744–761
material handling applications 341
materials
of bearing components 24–25
of cages 25, 188–189
of shafts and housings 143
mating surfaces 201
**MB**
angular contact ball bearings 404
CARB toroidal roller bearings 845
cylindrical roller bearings 502, 511, 514
**MB(1)** 855
**MB(S)** 248, 258
mean loads 92
mechanical mounting tools 202
mechanical pullers 202, 207
mechanical seals 198–199
mechanical speed limit 135
medical applications 88
medium-size bearings
dismounting 202, 207–210
mounting 202–206
size category 201
metal fatigue 88
metal seals 198–199
metals industry 1007
**MH** 502–503, 511, 514
micrometers 200
mills 88


Designation prefixes and suffixes are shown in **bold**.

mineral oils
in greases 119
in oils 120–121
minimum load 106
mining applications
and cylindrical roller bearings 498
and tapered roller bearings 671
specification life 88
misalignment
bearing selection chart 73–74
bearing selection considerations 80
types 80
miscibility 118–119
mixed lubrication 103, 132
**ML**
cylindrical roller bearings 502, 511, 514
hybrid bearings 1046, 1048
INSOCOAT bearings 1032
**M../M..** 613
moisture 1024
molybdenum 1046
molybdenum disulfide 118
motor encoder units
axial location 993
bearing arrangements 993
bearings 989
cable connection 989–991, 993–995
cages 995
designation system 995
designs and variants 989–990
dimension standards 992
electromagnetic compatibility 991
filtering 991
for extreme operating conditions 990
internal clearance 992
loads 992
lubrication 990
mounting 993, 994–995
output signal features 991
power supply 991
product table 1002–1003
receiving interface requirements 991
sealing solutions 989, 993
sensor technology 989–990
speeds 993
temperature limits 992
tolerances 992
voltage supply 989, 991
mounted clearance 182
mounting 200–207
bearing selection chart 73–74
bearing selection considerations 82
bearings with a cylindrical bore 201–203
bearings with a tapered bore 203–206
cold 201
considerations when selecting fits 143
design provisions 176–177
measuring the axial drive-up 203, 206
measuring the clearance reduction 205
measuring the inner ring expansion 206
measuring the lock nut tightening angle 205
methods and tools 202
using heat 203
using the oil injection method 204
mounting dollys 611
mounting sleeves 512
**MP** 511, 514
**MR** 514
**MT33**
angular contact ball bearings 389, 405
deep groove ball bearings 259
**MT47** 259

# N

**N**
angular contact ball bearings 404
cylindrical roller bearings 498, 514
deep groove ball bearings 247, 258
tapered roller bearings 674
**N1**
angular contact ball bearings 404
cylindrical roller bearings 498, 514
deep groove ball bearings 258
spherical roller thrust bearings 921
tapered roller bearings 674
**N2**
angular contact ball bearings 387, 404
cylindrical roller bearings 498, 514
spherical roller thrust bearings 921
tapered roller bearings 674
needle roller and cage assemblies
abutment dimensions 609
bearing selection chart 73–74
cages 597–598, 608
designs and variants 583
dimensional stability 608
dimension standards 598
double row bearings 583, 596
fits and tolerance classes 601
loads 606
misalignment 598
mounting 611
operating clearance 598
product table 614–617
temperature limits 608
tolerances 598
needle roller and cage thrust assemblies
designation system 904
designs and variants 896–897
fits and tolerance classes 903
product table 906–909
tolerances 900
needle roller bearings 581–663
abutment dimensions 609
axial displacement 582–583, 586–595, 611
bearing selection chart 73–74
cages 597–598, 608
combined with a cylindrical roller thrust bearing 592, 600, 658–659
combined with an angular contact ball bearing 588–589, 600, 652–653
combined with a needle roller thrust bearing 586–587, 897
combined with a thrust ball bearing 590–591, 600, 654–657
contact angle 79
designation system 612–613
designs and variants 583–596
dimensional stability 81, 608
dimension standards 598–601
dismounting 208
features 582
gauges 598–599, 611
inner rings 592–593, 601, 660–662
internal clearance 598–601, 602–603, 603
loads 79, 606–607
lubrication 585, 595–596, 608
misalignment 598–601
mounting 201, 611
needle rollers 593, 601, 613
NoWear coated bearings 1061
product tables 614–663
sealing solutions 594–595, 608
shaft and housing raceway tolerances 610
speeds 608
temperature limits 608
tolerances 598–601
with machined rings 586–587, 595–596, 598–599, 624–647
needle rollers
in cam followers 966, 976
in needle roller bearings 593, 601, 604, 611
in support rollers 944, 945–946, 946
needle roller thrust bearings 895–911
abutment dimensions 903
bearing selection chart 73–74
cages 898–899, 902
combined with a needle roller bearing 586–587, 897
contact angle 79
designation system 904
designs and variants 896–898
dimensional stability 81, 902
dimension standards 899
double direction bearings 897
loads 79, 902
lubrication 902
misalignment 899
needle roller and cage thrust assemblies 896–897, 906–909
product tables 906–911
raceways on shafts and in housings 903
speeds 902
temperature limits 902
tolerances 899–901
washers 898, 900, 903, 904
with a centring flange 897, 900, 903, 904, 910–911
Nilos rings 1008–1009
nitrogen steel 1049
NLGI grades
consistency classification 116
grease selection chart (SKF greases) 124–125
technical specifications (SKF greases) 126–127
**N/M** 613
noise
and CARB toroidal roller bearings 842–843
and insert bearings 340, 344, 347, 355
and self-aligning ball bearings 438
and tapered roller bearings 667
monitoring 206, 211
reduction by spring loading 186, 1048
non-contact seals
external sealing 196
integral sealing 26
non-locating bearings
considerations when selecting fits 143
types 70–71
non-separable bearings
dismounting 207
mounting 201
notches. See locating slots
NoWear coated bearings 1059–1063
applications 1060, 1061, 1062
assortment 1061
cages 1061
designation system 1062
designs and variants 1061
dimension standards 1062
hardness 1060
internal clearance 1062
loads 1062
lubrication 1062
misalignment 1062
speed 1062
temperature limits 1062
tolerances 1062
NoWear coating 27, 189
**NR**
angular contact ball bearings 386, 404
cylindrical roller bearings 514
deep groove ball bearings 247, 258
**NS** 845, 855
NSF H1 food-grade lubricants
in bearings with Solid Oil 1025, 1027
in high temperature bearings 1007, 1009, 1010

Designation prefixes and suffixes are shown in **bold**.

# O


off-highway vehicles 997
offset mounting 852
offshore applications 1060
ohmic resistance. See electrical resistance
oil-air 122–123
oil bath 122–123
oil distribution grooves
  dimensions 177
  in adapter sleeves 1068
  oil injection method (dismounting) 207–210
  oil injection method (mounting) 204
oil films 132
oil flow rate 134
oil injection method
  dimensions for ducts, grooves, and holes 177
  for dismounting bearings 202, 207–210
  for mounting bearings 202, 203–204
  shaft surface roughness 176
  with adapter sleeves 204, 1068
  with withdrawal sleeves 204, 210, 1087
oil jet 122–123
oil lubrication
  for cooling 134
  methods 122–123
  oil change intervals 121–122
  oils 120–121
  versus grease lubrication 110–111
oil pick-up rings 122–123
oils 120–121
oil supply ducts
  dimensions 177
  in adapter sleeves 1068
  oil injection method (dismounting) 207
  oil injection method (mounting) 204
open bearings
  heating 203
  storage and shelf life 57
operating clearance 182–183
operating conditions 65–67
operating temperature 129–137
  and its dependencies 131
  effect on oil change interval 121
  effect on relubrication interval 115
  estimation 133
  heat dissipation 133
  thermal equilibrium 131
O-rings 195
oscillating movements
  and NoWear coated bearings 1060, 1061
  and static load 104
  definition 91
  grease selection chart (SKF greases) 124–125
  load conditions 142
outer ring rotation
  and roller encoder units 996
  effect on relubrication interval 115
  fits and tolerance classes 151
  load conditions 142
outer rings
  bearing terminology 23
  materials 24
outside diameter 22, 28
ovens 1007


# P


**P**
  angular contact ball bearings 390, 404
  cylindrical roller bearings 502, 514
  hybrid bearings 1046
  INSOCOAT bearings 1032
  lock nuts and locking devices 1103
**P5**
  angular contact ball bearings 405
  cylindrical roller thrust bearings 886
  deep groove ball bearings 250–251, 259
  ISO tolerance class 36
  needle roller bearings 613
  spherical roller bearings 791
  tapered roller bearings 692
  thrust ball bearings 471
**P6**
  angular contact ball bearings 405
  deep groove ball bearings 250–251, 259
  ISO tolerance class 36
  needle roller bearings 613
  spherical roller bearings 791
  thrust ball bearings 471
**P6CNL** 405
**P6CNR** 613
**P52** 259
**P62**
  angular contact ball bearings 405
  deep groove ball bearings 259
  needle roller bearings 613
  spherical roller bearings 791
**P63**
  angular contact ball bearings 405
  deep groove ball bearings 259
  needle roller bearings 613
**P64** 405
**PA** 502, 511, 514
PA46 (polyamide 46) 25, 188
PA66 (polyamide 66) 25, 188–189
paired mounting
  with angular contact ball bearings 386, 392, 400, 402
  with deep groove ball bearings 249, 250, 254–255
  with tapered roller bearings 670–671, 681–684, 744–761
paper machines
  and CARB toroidal roller bearings 842, 845, 852
  and customized bearings 191
  and NoWear coated bearings 1060
  and spherical roller bearings 780
  bearing selection example 222–227
peak loads 92–93, 104, 106
PEEK 188
performance 65–67
permanent deformation 86–87, 104, 106
**PEX**
  cylindrical roller bearings 515
  tapered roller bearings 675, 693
**PH**
  angular contact ball bearings 390, 404
  cylindrical roller bearings 502, 514
  hybrid bearings 1046
**PHA** 502, 511, 514
**PHAS** 390–391, 402, 404
phosphate coating 1067
pinion bearings 669
pins
  in cam followers 964–965
  in cam rollers 936
  in support rollers 950
pin-type cages 25
pitch circle diameter 23
plain shafts 1066
plug-and-play 996, 997
plugs 968–969, 975
plummer block housings
  fits and tolerance classes 143
  heat dissipation 133
point contact 20
polyalkylene glycol 1007, 1009, 1010
polyalphaolefins 120–121
polyetheretherketone (PEEK). See PEEK
polyglycols 120–121
polymer cages 25, 188–189
popular items 82
position sensing 996
pour point 120–121
power generation plants 88
power loss. See frictional power loss
**PPA**
  cam followers 966, 976
  support rollers 946, 952
**PPSK** 966–967
**PPSKA** 971, 976
**PPXA**
  cam followers 966, 976
  support rollers 946, 952
precision
  and tolerance classes 187
  bearing selection considerations 81
  considerations when selecting fits 143
precision lock nuts
  designs and variants 1092, 1096–1097
  dimension standards 1098–1099
  installation and removal 1102
  loosening torque 1098–1099
  mating shaft threads 1098–1099
  product table 1114–1117
  tolerances 1098–1099
preload
  selecting preload 182–187
  with springs 186–187
preservative oils 118, 200
pressure centres
  considerations for preload 186
  in angular contact ball bearings 400
  in tapered roller bearings 681, 683–684
pressure-viscosity coefficient 120–121
protruding balls 446
PTFE
  and high temperature bearings 1008
  safety precautions 197
PTFE coating 778–779
pullers 202, 207, 208
pulling plates 208
pull-up resistors 991, 998
pumps
  bearing selection example 228–235
  specification life 88
push-out bolts 207


# Q


**QR** 502, 515
quiet running 248


# R


**R**
  cylindrical roller bearings 514
  deep groove ball bearings 247, 258
  needle roller bearings 612
  support rollers 945, 952
  tapered roller bearings 692
**R505** 791
raceways
  bearing terminology 23
  for needle roller bearings 583–584, 586, 610
  on shafts and in housings 179, 903
radial internal clearance 182–185


Designation prefixes and suffixes are shown in **bold**.

radial loads 21, 78–79
radial run-out. See run-out
radial shaft seals 195, 197
railway applications
  and cylindrical roller bearings 493, 515
  and spherical roller bearings 779, 780
  specification life 89
rated viscosity 102
rating life 89
recesses 176
  in capped deep groove ball bearings 242–244
  in open deep groove ball bearings 241
reference speed 135
reliability 89–90
relubrication
  continuous lubrication 120
  intervals and adjustments 111–116
  replenishment 114
relubrication-free
  bearings with Solid Oil 1025
  cylindrical roller bearings 501
  high temperature bearings 1009–1010
replenishment
  calculations 113
  procedures 114
resultant fits 153
retaining rings
  in spherical roller bearings 776
  in cylindrical roller bearings 500–501
  in deep groove ball bearings 243
retaining straps 512
**RF** 342–343, 346, 365
rigid bearings 80
ring gauges
  for needle roller bearings 598, 602
  for tapered shaft seats 200
road rollers 779, 988
roller bearings
  compared to ball bearings 20, 78, 79
  designation system 30
roller encoder units 996
rollers 20
rolling contact fatigue 88–89
rolling contact permanent deformation. See permanent deformation
rolling frictional moment 132
rolling mills
  and tapered roller bearings 671, 690
  specification life 88
roll necks 780
rope sheaves
  and cylindrical roller bearings 501
  bearing selection example 222–227
rotating discs 196
rotating loads
  conditions of rotation 142
  equivalent mean load 92–93
rotating outer ring
  and spherical roller bearings 778–779
  housing tolerances 151
rotational speeds. See speeds
rotor positioning bearings 1000
rotor positioning sensor bearing units 998–999
rounding 55
roundness 147
**RS**
  cam followers 965, 967, 976
  needle roller bearings 594–595, 612
  spherical roller bearings 776, 790
  support rollers 945–946, 952
**RS1**
  angular contact ball bearings 388, 404
  cam rollers 933, 937
  deep groove ball bearings 242–244, 258
  insert bearings 346, 365
  self-aligning ball bearings 439, 449
**RS2** 244, 258
**RS5** 776, 790
**RSH** 242–244, 258
**RSH2** 244, 258
**RSL** 242–243, 258
**RST** 242–243, 258
rubber seating rings. See seating rings
running accuracy 144
running in
  of high temperature bearings 1014
  with grease lubrication 113
running surfaces
  in cam followers 964, 965, 972, 976
  in cam rollers 932, 933, 934
  in support rollers 944, 948, 952
run-out
  bearing selection chart 73–74
  of seats and abutments 144–145, 148–152
rust inhibitors
  in grease 117
  on adapter sleeves 1067
**RZ**
  angular contact ball bearings 388, 404
  deep groove ball bearings 242–243, 258

# S

**S**
  needle roller bearings 613
  tapered roller bearings 674
**S0**
  deep groove ball bearings 259
  hybrid bearings 1049
  needle roller bearings 613
**S1**
  angular contact ball bearings 405
  cylindrical roller bearings 515
  deep groove ball bearings 259
  needle roller bearings 613
**S2**
  cylindrical roller bearings 515
  needle roller bearings 613
  sensor bearing units 995
**S3**
  CARB toroidal roller bearings 855
  needle roller bearings 613
safety precautions
  for fluoro rubber (FKM) 197
  for PTFE 197
  when dismounting from a tapered seat 208
  when dismounting hydraulic nuts 210
  when handling bearings 200
salt water 126–127
**SB** 364
seal counterfaces
  accuracy requirements 197–198
  inspection 213
sealed bearings
  heating 203
  suitable adapter sleeves 1069
  suitable lock nuts 1091, 1095
  washing 200
  with Solid Oil 1025
sealing solutions
  bearing selection considerations 82
  counterfaces 197–198, 213
  external sealing 194–197
  integral sealing 26
  selection criteria 195
sealing washers 196, 1008–1009
seating rings
  for insert bearings 346–347, 351
  for needle roller bearings 588, 608
seat washers 467–468, 470
  bearing terminology 23
segmented cages 1007, 1009, 1014
self-aligning ball bearings 437–463
  bearing selection chart 73–74
  cages 442, 445
  clearance reduction 447
  contact angle 79
  designation system 449
  designs and variants 439–442
  dimensional stability 81, 445
  dimension standards 443
  drive-up data 448
  housings 447
  internal clearance 443–444
  loads 79, 445
  lock nut tightening angle 448
  lubrication 440–441, 445
  misalignment 438, 443
  mounting 201, 440, 446, 447–448
  on an adapter sleeve 439, 446–447, 458–461
  on a withdrawal sleeve 446–447
  product tables 450–463
  sealing solutions 439–441, 445
  speeds 116, 446
  suitable adapter sleeves 1069
  suitable lock nuts 1095
  temperature limits 445
  tolerances 441, 443
  with an extended inner ring 440–441, 446, 462–463
  with protruding balls 446
  with Solid Oil 1025, 1026
self-aligning bearings
  bearing selection considerations 80
  CARB toroidal roller bearings 841–875
  self-aligning ball bearings 437–463
  spherical roller bearings 773–839
  spherical roller thrust bearings 913–929
sensor bearing units 987–1003
  motor encoder units 988–995, 1002–1003
  product table 1002–1003
  roller encoder units 996
  rotor positioning bearings 1000
  rotor positioning sensor bearing units 998–999
  steering encoder units 997–998
SensorMount
  and CARB toroidal roller bearings 206, 855
  and spherical roller bearings 206, 790
separable bearings
  bearing selection chart 73–74
  bearing selection considerations 82
  dismounting 207
  mounting 201
  needle roller bearings 582, 587, 588, 591–592
  spherical roller thrust bearings 914
  support rollers 945
  tapered roller bearings 668
  thrust ball bearings 466
service life 89
set screws. See grub screws
shaft deflection 80
shafts
  hollow shafts 146
  terminology 22
shaft seats
  accuracy requirements 144–145
  hollow shafts 143
  mounting/dismounting methods and tools 202
  position and width of tolerance classes 141
  tapered shafts 147
  tolerances and resultant fits 154–165
  tolerances for radial bearings 148–149
  tolerances for sleeves 152
  tolerances for thrust bearings 150
shaft speed detection 1000
shaft washers
  in cylindrical roller thrust bearings 880, 882, 885
  in needle roller thrust bearings 898, 903, 904
  in spherical roller thrust bearings 914, 918, 920
  in thrust ball bearings 466, 467–468, 470

Designation prefixes and suffixes are shown in **bold**.

sheet metal cages 25, 188
shelf life 57
shields
heating 203
integral sealing 26
washing 200
shock loads. See impact loads
shoulder surfaces 23
silicon nitride 1044
sine bars 200
sine wave control 998
single direction bearings
cylindrical roller thrust bearings 879
thrust ball bearings 466, 467–468, 472–485
single row angular contact ball bearings. See angular contact ball bearings
single row cam rollers. See cam rollers
single row cylindrical roller bearings. See cylindrical roller bearings
single row deep groove ball bearings. See deep groove ball bearings
single row tapered roller bearings. See tapered roller bearings
SKF Bearing Calculator 63
SKF Bearing Select 63
SKF BEAST 62–63
SKF ConCentra insert bearings
designs and variants 344
fits and tolerance classes 358–359
mounting 362–363
product table 376–377
SKF Drive-up Method
for CARB toroidal roller bearings 853
for mounting bearings 202–203, 206
for self-aligning ball bearings 447
for spherical roller bearings 788
SKF enveloped acceleration technology 211
SKF Explorer bearings
angular contact ball bearings 387
CARB toroidal roller bearings 844
cylindrical roller bearings 502
deep groove ball bearings 248
hybrid bearings 1045
life calculations 91
overview 7
spherical roller bearings 775
spherical roller thrust bearings 915
tapered roller bearings 668, 675
SKF greases
selection chart 124–125
technical specifications 126–127
SKF LubeSelect 63
SKF Quiet running deep groove ball bearings 248
SKF rating life 89
SKF SensorMount 190
SKF SimPro Expert 62–63
SKF SimPro Quick 62–63
SKF traffic light concept 117–118
SKF WAVE seals 244
skidding 106
sleeve mounting
bearing seat tolerances 152
for axial location 178–179
sleeves
adapter sleeves 1065–1085
bearing selection considerations 82
for mounting cylindrical roller bearings 512
withdrawal sleeves 1087
sliding frictional moment 132
**SM** 613
small bearings
dismounting 207–210
mounting 201–203
size category 201
smearing
and EP/AW additives 102
and minimum load 106
and NoWear coated bearings 1060, 1062
prevention with hybrid bearings 1044
snap ring grooves
in angular contact ball bearings 386, 395, 404
in cylindrical roller bearings 498
in deep groove ball bearings 247, 310–315
snap rings
for axial location 178
in angular contact ball bearings 386, 395, 404
in deep groove ball bearings 247, 310–315
solid additives 118
Solid Oil 1024
Solid Oil bearings and units 1023–1027
assortment 1025
cages 1025, 1026
designation system 1027
designs and variants 1025
dimension standards 1025
features 1024
food-grade variant 1025
friction 1027
internal clearance 1025
loads 1026
lubrication 1024, 1025
mounting 1027
seals 1025
speeds 1026–1027
temperature limits 1026
tolerances 1025
with food-grade lubricant 1025
**SORT** 613
space 77
spacer rings 786, 1035, 1066
spacing collars 179
spalling
bearing life definition 88
time to failure 211
specification life 88–89
speed factor
calculating the viscosity ratio 102
limits for grease lubricated bearings 116
Speedi-Sleeve 1008
speeds
above the reference or limiting speed 136
adjusted reference speed 135
and tolerance classes 187
bearing selection chart 73–74
bearing selection considerations 79
effect on relubrication interval 112
limiting speed 135
ranges for grease lubricated bearings 116
reference speed 135
speed sensing 996
spherical roller bearings 773–839
abutment dimensions 786
assortment 775
axial location 786
bearing arrangements 70–75
bearing selection chart 73–74
cages 775–776
clearance reduction 205, 789
contact angle 79
designation system 790–791
designs and variants 775–779
dimensional stability 81, 785
dimension standards 781
drive-up data 789
for high-speed applications 780
for vibratory applications 778–779
for wind energy applications 780
free space 786
housings 788
internal clearance 781–783
in vertical shaft arrangements 788
loads 79, 774, 779, 784
lock nut tightening angle 789
lubrication 776–778, 785
misalignment 774, 780–781
mounting 204–206, 775, 787, 788–789
NoWear coated bearings 1061
on an adapter sleeve 784, 787, 824–831
on a withdrawal sleeve 787, 832–839
product tables 792–839
sealing solutions 776–778, 785, 786
SKF Explorer bearings 775
speeds 116, 785
suitable adapter sleeves 1069
suitable lock nuts 1095
temperature limits 777, 785
tolerances 780–781, 781
with a coated bore 778
with eye bolts 791
with Solid Oil 1025, 1026
spherical roller thrust bearings 913–929
abutment dimensions 918
axial clearance 918
bearing selection chart 73–74
cages 915, 918, 919, 920
contact angle 79
designation system 921
designs and variants 915
dimensional stability 81, 918
dimension standards 916
in vertical shaft arrangements 916, 917, 919
loads 79, 914, 917, 918, 919
lubrication 917, 918, 919
misalignment 914, 916, 918
mounting 920
NoWear coated bearings 1061
product table 922–929
pumping effect 919
SKF Explorer bearings 915
speeds 914, 918, 919
temperature limits 918
tolerances 916
washers 914, 918
with a recessed housing bore 918
with eye bolts 921
split cylindrical roller bearings 495
split housings 143, 151
split inner rings. See two-piece inner rings
spring loading 186–187
spring washers
for cam followers 975
for hybrid bearings 1048
stainless steel bearings
deep groove ball bearings 316–327
hybrid bearings 1046
insert bearings 342, 345, 348–349
stainless steel housings 362
standby 207
starting torque
calculations 133
technical specifications (SKF greases) 126–127
start-stop 102, 106
start-ups
and operating temperature 135, 184–185
effect on fits 143
grease selection chart (SKF greases) 124–125
monitoring temperature 206, 212
test running 206
starvation effects 132
static load rating. See basic static load rating
static misalignment 80
static safety factor 106–107
stationary bearings 104
stationary loads 142
steady state 184
steels
cage types 25, 188
for bearing components 24
steer-by-wire 997
steering encoder units 997–998
stepped shafts 1066
stepped sleeves 344, 363
stiffness
bearing selection chart 73–74

Designation prefixes and suffixes are shown in **bold**.

bearing selection considerations 81
of greases 116
storage 57
straightness 147
stray capacitance 1030
strong back pullers 202
studs. See cam followers
sulphur-phosphorus 102
super-precision bearings 81, 495
Superseal. See AMP Superseal™
support rollers 943–961
axial gap 951
cages 947, 950
designation system 952–953
designs and variants 945–947
dimensional stability 950
dimension standards 948
internal clearance 948
loads 949
lubrication 933, 950
mounting 951
pins 950
product tables 954–961
running surface 944, 948, 952
sealing solutions 945–947, 950, 952
speeds 950
support surfaces 951
temperature limits 950
tolerances 948
with flange rings 944, 945–947, 951
surface roughness
of bearing seats 147–152
of seal counterfaces 198
surface treatment 27
synchronous motors 998
synthetic oils
in bearings with Solid Oil 1024, 1025, 1027
in oils 120–121
SYSTEM 24 120
SYSTEM MultiPoint 120


# T


**T**
lock nuts and locking devices 1103
tapered roller bearings 674, 692
tandem arrangements
with angular contact ball bearings 386, 400
with deep groove ball bearings 249
with tapered roller bearings 671, 681–682, 760–761
tapered bores
bearing selection chart 73–74
bearing selection considerations 82
bearings mounted on a cylindrical seat 1066
fits and tolerance classes 149, 152
tapered roller bearings 665–771
adjustment during mounting 203, 687
bearing arrangements 70, 76
bearing selection chart 73–74
cages 673–674, 685
contact angle 79, 672–673, 672–674, 691
designation system 691, 692–693
designs and variants 669–675
dimensional stability 81, 685
dimension standards 676–677
double row bearings 671, 671–674
fits and tolerance classes 687–689
four-row bearings 674
friction 667–669
inch bearings 676–678, 687–689, 691, 714–741
INSOCOAT bearings 1031
intermediate rings 672–673
internal clearance 676, 679
loads 78–79, 666–668, 680–685
lubrication 685
markings 690
matched bearings 670–671, 682–684, 687, 744–761
misalignment 670, 676–677
mounting 690
preload 670–673, 676–677, 687
product tables 694–771
raceway profiles 667
running-in 668
sealing solutions 685
SKF Explorer bearings 668, 675
speeds 116, 686
temperature limits 685
tolerances 676–678
with a flanged outer ring 670, 742–743
with inch dimensions 714–740
with Solid Oil 1025, 1026
tapered roller bearing units 1031
tapered seats
bearing selection considerations 82
mounting/dismounting methods and tools 202
tolerances 147
taper gauges 147, 200
taper rate 147
temperature
and bearing storage 57
dimensional stability 81
limits for PA66 cages 189
monitoring 206, 212
operating temperature 130–135
ranges for greases 116
SKF traffic light concept 117–118
temperature differences
considerations when selecting fits 143
effect on clearance reduction 184
terminology 22–23
testing 107
test running 206–207
textile equipment 341
thermal equilibrium 131, 184
thermal expansion
calculation 850
in bearing arrangements 70, 76
with CARB toroidal roller bearings 842
thermal speed limit 135
thickeners
compatibility chart 119
grease selection chart (SKF greases) 124–125
selecting a suitable grease 116–119
threaded holes
for dismounting bearings 176
in bearing rings 190
threaded rings
adjustment during mounting 203
for axial location 178
threads
for lock nuts 1098–1099
on adapter sleeves 1070
through-hardening 27
thrust ball bearings 465–491
ball and cage assemblies 467
bearing selection chart 73–74
cages 468, 470
combined with a needle roller bearing 591–592, 596, 654–657
designation system 471
designs and variants 467–468
dimensional stability 81, 470
dimension standards 469
double direction bearings 466, 467–468, 486–491
fits 466
loads 79, 466, 469
lubrication 470
misalignment 469
mounting 470
NoWear coated bearings 1061
product tables 472–491
seat washers 467–468, 470
single direction bearings 466, 467–468, 472–485
speeds 116, 470
temperature limits 470
tolerances 469
with sphered housing washers 466–468, 482–485, 490–491
thrust collars. See angle rings
tilting moments
and angular contact ball bearings 386
and cam rollers 932–933
and cylindrical roller bearings 501
and deep groove ball bearings 249
and tapered roller bearings 670–672
**TL** 1069, 1071
**TN**
cylindrical roller thrust bearings 881, 886
deep groove ball bearings 258
needle roller bearings 597, 612
needle roller thrust bearings 899, 904
support rollers 947, 952
**TN9**
angular contact ball bearings 390, 404
CARB toroidal roller bearings 845, 855
deep groove ball bearings 248, 258
hybrid bearings 1046
self-aligning ball bearings 442, 449
tapered roller bearings 674, 675, 692
**TN9/VG1561** 248, 258
**TNH**
deep groove ball bearings 248, 258
hybrid bearings 1046
tapered roller bearings 675, 692
tolerance classes
for bearings 36
position and width 141
related to precision and speed 187
tolerance grades 144–145
tolerances 35–55
and resultant fits (housings) 166–175
and resultant fits (shafts) 154–165
for housing seats 151–152
for radial bearings 38–45
for shaft seats 148–150
for shafts (sleeve mounting) 152
for tapered bores 47–48
for tapered shaft seats 147
for thrust bearings 46
tolerance system 140–141
tolerance symbols 49–51
torque
running 126–127
starting 126–127, 133
torus 842
**TR** 502, 515
track rollers
cam followers 964–985
cam rollers 932–941
support rollers 943–961
track runner bearings. See cam rollers, support rollers and cam followers
traction motor bearing units 1031
traction motors
and hybrid bearings 1046
and sensor bearing units 1000
tractors 988
traffic light concept. See SKF traffic light concept
transition fits 141
transmission shafts 1000
troubleshooting 213
tunnelling machines 671
two-piece inner rings
in double row angular contact ball bearings 386, 404
in four-point contact ball bearings 387


Designation prefixes and suffixes are shown in **bold**.

# U


**U**
  insert bearings 365
  sensor bearing units 995
  tapered roller bearings 692
unbalanced loads 92, 142
unit conversion tables
  for bearing life calculations 91
  for general engineering 6
units. See ball bearing units
universally matchable bearings
  adjustment 403
  centrifugal pump example 228–235
  designation system 404–405
  designs and variants 385–386
  internal clearance 392, 394
  preload 392, 395
universal washers
  in cylindrical roller thrust bearings 880, 882
  in needle roller thrust bearings 898, 900, 903, 904


# V


**V**
  CARB toroidal roller bearings 855
  cylindrical roller bearings 514
  tapered roller bearings 674
**V001** 693
**VA201** 1006, 1008–1009, 1010, 1014
**VA208** 1009, 1014
**VA228** 1009, 1010, 1014
**VA301** 515
**VA305** 515
**VA321** 693
**VA350** 515
**VA380** 515
**VA405** 778–779, 791
**VA406** 778, 791
**VA606** 693
**VA607** 693
**VA901** 693
**VA902** 693
**VA903** 693
**VA919** 693
**VA941** 693
**VA970** 1046, 1049
**VA991** 780, 791
**VA3091** 515
vacuum applications
  and hybrid bearings 1046
  and NoWear coated bearings 1060
variable loads
  and spherical roller bearings 779
  calculating bearing life 90
  conditions of rotation 142
**VB022** 693
**VB026** 693
**VB061** 693
**VB134** 693
**VB406** 693
**VB481** 693
**VC025** 515
**VC027** 693
**VC068** 693
**VC444** 1049
**VE141** 693
**VE174** 693
**VE240** 855
**VE447(E)** 921
**VE495** 342, 365
**VE552(E)** 791
**VE553(E)** 791
**VE710(E)** 921
**VE901** 515
vector control 998
vertical shaft arrangements
  and oil lubrication 123
  effect on relubrication interval 115
  grease selection chart (SKF greases) 124–125
  with CARB toroidal roller bearings 853
  with spherical roller bearings 788
  with spherical roller thrust bearings 916, 917, 919
**VG052** 613
**VG114**
  CARB toroidal roller bearings 855
  spherical roller bearings 791
**VG1561**. See TN9/VG1561
**VGS** 593, 612
**VH** 514
vibrating screens
  and spherical roller bearings 779
  bearing selection example 216–221
vibration
  and bearing storage 57
  and CARB toroidal roller bearings 842–843
  and insert bearings 340, 344, 347
  and NoWear coated bearings 1060, 1061
  and spherical roller bearings 778–779
  effect on relubrication interval 115
  grease selection chart (SKF greases) 124–125
  monitoring 206, 211
  prevention with preloading 187
  protection with hybrid bearings 1044
  under various load conditions 143
viscosity
  calculating the viscosity ratio 102–103
  of oils 120
  of SKF greases 124–125, 126–127
viscosity grades
  ISO classification 103
  viscosity-temperature diagram 100
viscosity index 100, 120–121
viscosity ratio 94, 102
viscous losses 132
**VL065** 343, 365
**VL0241** 1031–1032, 1035
**VL0246** 1031–1032, 1035
**VL2071** 1032, 1035
**VL2076** 1032, 1035
**VM118** 855
**VP076** 346, 365
**VP274** 345, 365
**VP311** 244, 259
**VQ015** 515
**VQ051** 693
**VQ117** 693
**VQ267** 693
**VQ424** 791
**VQ492** 693
**VQ494** 693
**VQ495** 693
**VQ506** 693
**VQ507** 693
**VQ523** 693
**VQ601** 693
**VQ658** 248, 259
V-ring seals 198
**VT113** 389, 405
**VT143**
  CARB toroidal roller bearings 845, 855
  spherical roller bearings 776–777, 791
**VT143B** 791
**VT143C** 791
**VT307** 348
**VT378** 244, 259
**VU029** 918, 921


# W


**W**
  deep groove ball bearings 258
  high temperature bearings 1010, 1014
  insert bearings 342–344, 349, 365
  spherical roller bearings 776, 791
  tapered roller bearings 674, 692
**W20** 776, 791
**W26** 791
**W33**
  cylindrical roller bearings 515
  spherical roller bearings 776, 791
**W33X** 791
**W64**
  and bearings with Solid Oil 1025, 1027
  self-aligning ball bearings 449
  spherical roller bearings 791
**W64F** 1025, 1027
**W77** 791
**W513** 791
washers. See bearing washers
washing
  capped bearings 200
  new bearings 200
washout
  and bearings with Solid Oil 1024
  technical specifications (SKF greases) 126–127
water
  and deep groove ball bearings 242
  corrosion protection with grease 117
  effect on oils 120–121
  effect on Solid Oil 1024
  resistance test (SKF greases) 126–127
WAVE seals. See SKF WAVE seals
wave springs 186
**WBB1** 258
wear
  and hybrid bearings 1044, 1046
  and NoWear coated bearings 1060–1063
  technical specifications (SKF greases) 126–127
  time to failure 211
  under various load conditions 142
wet contamination 1024
white spirit 118
**WI** 674
wind energy applications
  and cylindrical roller bearings 498
  and spherical roller bearings 780
  and XL hybrid bearings 1046, 1049
  grease selection chart (SKF greases) 124–125
  specification life 88
withdrawal sleeves 1087
  bearing seat tolerances 152
  bearing selection considerations 82
  dismounting methods and tools 202, 210
  for axial location 178–179
  for CARB toroidal roller bearings 852–853, 872–875
  for self-aligning ball bearings 446–447
  for spherical roller bearings 787, 832–839
  mounting methods and tools 202–204
withdrawal tools 176
**WO** 674
woodworking machines 88
wrist pins. See gudgeon pins
**WS**
  cylindrical roller thrust bearings 880, 882, 886
  needle roller thrust bearings 898, 904
**WT**
  angular contact ball bearings 389, 405
  deep groove ball bearings 244–245, 259
  hybrid bearings 1046


Designation prefixes and suffixes are shown in **bold**.

# X

**X**
cam followers 965, 976
deep groove ball bearings 250, 258
support rollers 945, 952
tapered roller bearings 674, 692
**XA** 976
**XB** 976
**XD** 674
XL hybrid bearings 1046, 1048, 1054–1055

# Y

**Y**
angular contact ball bearings 390, 404
tapered roller bearings 674
**Y2** 674
Y-bearings. See insert bearings
Y-bearing units. See ball bearing units

# Z

**Z**
angular contact ball bearings 388, 404
cam rollers 933, 937
deep groove ball bearings 242–243, 258
high temperature bearings 1007, 1008–1009, 1014
needle roller bearings 590–592, 595, 596, 612
tapered roller bearings 674
**ZE**
CARB toroidal roller bearings 855
spherical roller bearings 790
zinc chromate coating
and other coatings 27
on ball bearing units 1007
on hybrid bearings 1046
zinc coating 342, 343, 348
**ZL** 947, 952
**ZNBR** 247, 258
**ZNR** 247, 258
**ZS** 242–243, 258
**ZW** 583, 612

Designation prefixes and suffixes are shown in **bold**.

Designation prefixes and suffixes are shown in **bold**.

# Product index


| Designation | Product | Product table No. | Page* |
|---|---|---|---|
| **10..** | Self-aligning ball bearings | 4.1 | **450** |
| **111..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **115..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **12..** | Self-aligning ball bearings | 4.1 | **450** |
| **13..** | Self-aligning ball bearings | 4.1 | **450** |
| **130..** | Self-aligning ball bearings | 4.1 | **450** |
| **1380..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **139..** | Self-aligning ball bearings | 4.1 | **450** |
| **141..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **151..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **155..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **160..** | Single row deep groove ball bearings | 1.1 | **260** |
| **16150/..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **17262..-2RS1** | Insert bearings with a standard inner ring, metric shafts | 2.9 | **380** |
| **17263..-2RS1** | Insert bearings with a standard inner ring, metric shafts | 2.9 | **380** |
| **185..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **186..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **187..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **198..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **2..** | Single row deep groove ball bearings with filling slots | 1.5 | **328** |
| **2.. NR** | Single row deep groove ball bearings with filling slots, a snap ring groove and a snap ring | 1.5 | **328** |
| **2..-2Z** | Shielded single row deep groove ball bearings with filling slots | 1.5 | **328** |
| **2..-2ZNR** | Shielded single row deep groove ball bearings with filling slots, a snap ring groove and a snap ring | 1.5 | **328** |
| **2..-Z** | Shielded single row deep groove ball bearings with filling slots | 1.5 | **328** |
| **2..-ZNR** | Shielded single row deep groove ball bearings with filling slots, a snap ring groove and a snap ring | 1.5 | **328** |
| **213..** | Spherical roller bearings | 9.1 | **792** |
| **22..** | Self-aligning ball bearings | 4.1 | **450** |
| **222..** | Spherical roller bearings | 9.1 | **792** |
| **223..** | Spherical roller bearings | 9.1 | **792** |
| **229750 J/C3R505** | Spherical roller bearings | 9.1 | **792** |
| **23..** | Self-aligning ball bearings | 4.1 | **450** |
| **230..** | Spherical roller bearings | 9.1 | **792** |
| **231..** | Spherical roller bearings | 9.1 | **792** |
| **232..** | Spherical roller bearings | 9.1 | **792** |
| **236..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **238..** | Spherical roller bearings | 9.1 | **792** |
| **239..** | Spherical roller bearings | 9.1 | **792** |
| **240..** | Spherical roller bearings | 9.1 | **792** |
| **241..** | Spherical roller bearings | 9.1 | **792** |
| **247..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **248..** | Spherical roller bearings | 9.1 | **792** |
| **249..** | Spherical roller bearings | 9.1 | **792** |
| **255..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **258..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **278..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **292..** | Spherical roller thrust bearings | 13.1 | **922** |
| **293..** | Spherical roller thrust bearings | 13.1 | **922** |
| **294..** | Spherical roller thrust bearings | 13.1 | **922** |
| **296..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **3..** | Single row deep groove ball bearings with filling slots | 1.5 | **328** |
| **3.. NR** | Single row deep groove ball bearings with filling slots, a snap ring groove and a snap ring | 1.5 | **328** |
| **3..-2Z** | Shielded single row deep groove ball bearings with filling slots | 1.5 | **328** |
| **3..-2ZNR** | Shielded single row deep groove ball bearings with filling slots, a snap ring groove and a snap ring | 1.5 | **328** |
| **3..-Z** | Shielded single row deep groove ball bearings with filling slots | 1.5 | **328** |
| **3..-ZNR** | Shielded single row deep groove ball bearings with filling slots, a snap ring groove and a snap ring | 1.5 | **328** |
| **302..** | Metric single row tapered roller bearings | 8.1 | **694** |
| **302../DB** | Matched tapered roller bearings arranged back-to-back | 8.5 | **754** |
| **302../DF** | Matched tapered roller bearings arranged face-to-face | 8.4 | **745** |
| **30208 R** | Single row tapered roller bearings with a flanged outer ring | 8.3 | **742** |
| **303..** | Metric single row tapered roller bearings | 8.1 | **694** |


* Starting page of the product table.

| Designation | Product | Product table No. | Page* |
|---|---|---|---|
| **303.. R** | Single row tapered roller bearings with a flanged outer ring | 8.3 | **742** |
| **303../DB** | Matched tapered roller bearings arranged back-to-back | 8.5 | **754** |
| **303../DF** | Matched tapered roller bearings arranged face-to-face | 8.4 | **745** |
| **3057.. C-2Z** | Double row cam rollers | 14.2 | **940** |
| **3058.. C-2Z** | Double row cam rollers | 14.2 | **940** |
| **313..** | Metric single row tapered roller bearings | 8.1 | **694** |
| **313.. X/DB** | Matched tapered roller bearings arranged back-to-back | 8.5 | **754** |
| **313../DB** | Matched tapered roller bearings arranged back-to-back | 8.5 | **754** |
| **313../DF** | Matched tapered roller bearings arranged face-to-face | 8.4 | **745** |
| **3194.. B-2LS** | Sealed double row full complement cylindrical roller bearings | 6.5 | **576** |
| **32.. A** | Double row angular contact ball bearings | 3.2 | **424** |
| **32.. A-2RS1** | Sealed double row angular contact ball bearings | 3.3 | **428** |
| **32.. A-2Z** | Shielded double row angular contact ball bearings | 3.3 | **428** |
| **320.. X/DB** | Matched tapered roller bearings arranged back-to-back | 8.5 | **754** |
| **320.. X/DF** | Matched tapered roller bearings arranged face-to-face | 8.4 | **745** |
| **32008 XR** | Single row tapered roller bearings with a flanged outer ring | 8.3 | **742** |
| **322..** | Metric single row tapered roller bearings | 8.1 | **694** |
| **322.. B** | Metric single row tapered roller bearings with a steep contact angle | 8.1 | **694** |
| **322../DB** | Matched tapered roller bearings arranged back-to-back | 8.5 | **754** |
| **322../DF** | Matched tapered roller bearings arranged face-to-face | 8.4 | **745** |
| **323..** | Metric single row tapered roller bearings | 8.1 | **694** |
| **323.. B** | Metric single row tapered roller bearings with a steep contact angle | 8.1 | **694** |
| **323.. BR** | Single row tapered roller bearings with a flanged outer ring | 8.3 | **742** |
| **323../DF** | Matched tapered roller bearings arranged face-to-face | 8.4 | **745** |
| **32311 BR** | Single row tapered roller bearings with a flanged outer ring | 8.3 | **742** |
| **32317T132/DB** | Matched tapered roller bearings arranged back-to-back | 8.5 | **754** |
| **329..** | Metric single row tapered roller bearings | 8.1 | **694** |
| **329../DB** | Matched tapered roller bearings arranged back-to-back | 8.5 | **754** |
| **329../DF** | Matched tapered roller bearings arranged face-to-face | 8.4 | **745** |
| **33.. A** | Double row angular contact ball bearings | 3.2 | **424** |
| **33.. A-2RS1** | Sealed double row angular contact ball bearings | 3.3 | **428** |
| **33.. A-2Z** | Shielded double row angular contact ball bearings | 3.3 | **428** |
| **33.. D** | Double row angular contact ball bearings with a two-piece inner ring | 3.2 | **424** |
| **33.. DNR** | Double row angular contact ball bearings with a two-piece inner ring, a snap ring groove and a snap ring in the outer ring | 3.2 | **424** |
| **330..** | Metric single row tapered roller bearings | 8.1 | **694** |
| **330../DB** | Matched tapered roller bearings arranged back-to-back | 8.5 | **754** |
| **330../DF** | Matched tapered roller bearings arranged face-to-face | 8.4 | **745** |
| **331..** | Metric single row tapered roller bearings | 8.1 | **694** |
| **331../DB** | Matched tapered roller bearings arranged back-to-back | 8.5 | **754** |
| **331../DF** | Matched tapered roller bearings arranged face-to-face | 8.4 | **745** |
| **33113 R** | Single row tapered roller bearings with a flanged outer ring | 8.3 | **742** |
| **331158 A** | Double row tapered roller bearings, TDI design | 8.8 | **766** |
| **331197 A** | Double row tapered roller bearings, TDO design | 8.7 | **762** |
| **331445** | Double row tapered roller bearings, TDI design | 8.8 | **766** |
| **331527 C** | Double row tapered roller bearings, TDI design | 8.8 | **766** |
| **331606 A** | Double row tapered roller bearings, TDO design | 8.7 | **762** |
| **331617** | Double row tapered roller bearings, TDI design | 8.8 | **766** |
| **331656** | Double row tapered roller bearings, TDO design | 8.7 | **762** |
| **331713 A** | Double row tapered roller bearings, TDI design | 8.8 | **766** |
| **331713 B** | Double row tapered roller bearings, TDI design | 8.8 | **766** |
| **331714 B** | Double row tapered roller bearings, TDI design | 8.8 | **766** |
| **331775 B** | Double row tapered roller bearings, TDO design | 8.7 | **762** |
| **331945** | Double row tapered roller bearings, TDO design | 8.7 | **762** |
| **331951** | Double row tapered roller bearings, TDI design | 8.8 | **766** |
| **331981** | Double row tapered roller bearings, TDO design | 8.7 | **762** |
| **332..** | Metric single row tapered roller bearings | 8.1 | **694** |
| **332../DB** | Matched tapered roller bearings arranged back-to-back | 8.5 | **754** |
| **332../DF** | Matched tapered roller bearings arranged face-to-face | 8.4 | **745** |
| **332068** | Double row tapered roller bearings, TDI design | 8.8 | **766** |
| **332168** | Double row tapered roller bearings, TDI design | 8.8 | **766** |
| **332169 A** | Double row tapered roller bearings, TDI design | 8.8 | **766** |
| **332169 AA** | Double row tapered roller bearings, TDI design | 8.8 | **766** |
| **332240 A** | Double row tapered roller bearings, TDI design | 8.8 | **766** |
| **33281/..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **33287/..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **338..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **34..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **358..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **359..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **3612.. R** | Single row cam rollers | 14.1 | **938** |
| **368..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **369..** | Inch single row tapered roller bearings | 8.2 | **714** |


* Starting page of the product table.

| Designation | Product | Product table No. | Page* |
|---|---|---|---|
| **37..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **38..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **39..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **418..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **42.. A** | Double row deep groove ball bearings | 1.6 | **334** |
| **426..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **43.. A** | Double row deep groove ball bearings | 1.6 | **334** |
| **458..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **462..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **47487/..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **47678/..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **4789..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **482..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **497/..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **511..** | Single direction thrust ball bearings | 5.1 | **472** |
| **512..** | Single direction thrust ball bearings | 5.1 | **472** |
| **513..** | Single direction thrust ball bearings | 5.1 | **472** |
| **514..** | Single direction thrust ball bearings | 5.1 | **472** |
| **522..** | Double direction thrust ball bearings | 5.3 | **486** |
| **523..** | Double direction thrust ball bearings | 5.3 | **486** |
| **524..** | Double direction thrust ball bearings | 5.3 | **486** |
| **526/..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **528 R/..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **53178/..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **532..** | Single direction thrust ball bearings with a sphered housing washer | 5.2 | **482** |
| **533..** | Single direction thrust ball bearings with a sphered housing washer | 5.2 | **482** |
| **534..** | Single direction thrust ball bearings with a sphered housing washer | 5.2 | **482** |
| **535/..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **537/..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **539/..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **542..** | Double direction thrust ball bearings with sphered housing washers | 5.4 | **490** |
| **543..** | Double direction thrust ball bearings with sphered housing washers | 5.4 | **490** |
| **544..** | Double direction thrust ball bearings with sphered housing washers | 5.4 | **490** |
| **544091/..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **56..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **575/..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **580/..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **59..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **60..** | Single row deep groove ball bearings | 1.1 | **260** |
| **60.. N** | Single row deep groove ball bearings with a snap ring groove | 1.3 | **310** |
| **60.. NR** | Single row deep groove ball bearings with a snap ring groove and a snap ring | 1.3 | **310** |
| **60../HC5** | Hybrid single row deep groove ball bearings | 21.1 | **1050** |
| **60../VA201** | Single row deep groove ball bearings for high temperature applications | 18.1 | **1016** |
| **60..-2RS1** | Sealed single row deep groove ball bearings | 1.1 | **260** |
| **60..-2RSH** | Sealed single row deep groove ball bearings | 1.1 | **260** |
| **60..-2RSL** | Sealed single row deep groove ball bearings | 1.1 | **260** |
| **60..-2RSL/HC5** | Sealed hybrid single row deep groove ball bearings | 21.1 | **1050** |
| **60..-2RZ** | Sealed single row deep groove ball bearings | 1.1 | **260** |
| **60..-2RZ/HC5** | Sealed hybrid single row deep groove ball bearings | 21.1 | **1050** |
| **60..-2Z** | Shielded single row deep groove ball bearings | 1.1 | **260** |
| **60..-2Z/VA201** | Shielded single row deep groove ball bearings for high temperature applications | 18.1 | **1016** |
| **60..-2Z/VA208** | Shielded single row deep groove ball bearings for high temperature applications | 18.1 | **1016** |
| **60..-2ZNR** | Shielded single row deep groove ball bearings with a snap ring groove and a snap ring | 1.3 | **310** |
| **60..-RS1** | Sealed single row deep groove ball bearings | 1.1 | **260** |
| **60..-RSH** | Sealed single row deep groove ball bearings | 1.1 | **260** |
| **60..-RSL** | Sealed single row deep groove ball bearings | 1.1 | **260** |
| **60..-RZ** | Sealed single row deep groove ball bearings | 1.1 | **260** |
| **60..-Z** | Shielded single row deep groove ball bearings | 1.1 | **260** |
| **60..-ZNR** | Shielded single row deep groove ball bearings with a snap ring groove and a snap ring | 1.3 | **310** |
| **617479 B** | Double row tapered roller bearings, TDO design | 8.7 | **762** |
| **618..** | Single row deep groove ball bearings | 1.1 | **260** |
| **619..** | Single row deep groove ball bearings | 1.1 | **260** |
| **62..** | Single row deep groove ball bearings | 1.1 | **260** |
| **62.. N** | Single row deep groove ball bearings with a snap ring groove | 1.3 | **310** |
| **62.. NR** | Single row deep groove ball bearings with a snap ring groove and a snap ring | 1.3 | **310** |
| **62../C3VL0241** | INSOCOAT single row deep groove ball bearings | 20.1 | **1036** |
| **62../C3VL2071** | INSOCOAT single row deep groove ball bearings | 20.1 | **1036** |
| **62../HC5** | Hybrid single row deep groove ball bearings | 21.1 | **1050** |
| **62../VA201** | Single row deep groove ball bearings for high temperature applications | 18.1 | **1016** |
| **62..-2RS1** | Sealed single row deep groove ball bearings | 1.1 | **260** |
| **62..-2RSH** | Sealed single row deep groove ball bearings | 1.1 | **260** |
| **62..-2RSL** | Sealed single row deep groove ball bearings | 1.1 | **260** |
| **62..-2RSL/HC5** | Sealed hybrid single row deep groove ball bearings | 21.1 | **1050** |
| **62..-2RZ/HC5** | Sealed hybrid single row deep groove ball bearings | 21.1 | **1050** |


* Starting page of the product table.

| Designation | Product | Product table No. | Page* |
|---|---|---|---|
| **62..-2Z** | Shielded single row deep groove ball bearings | 1.1 | **260** |
| **62..-2Z/VA201** | Shielded single row deep groove ball bearings for high temperature applications | 18.1 | **1016** |
| **62..-2Z/VA228** | Shielded single row deep groove ball bearings for high temperature applications | 18.1 | **1016** |
| **62..-2ZNR** | Shielded single row deep groove ball bearings with a snap ring groove and a snap ring | 1.3 | **310** |
| **62..-RSH** | Sealed single row deep groove ball bearings | 1.1 | **260** |
| **62..-RSL** | Sealed single row deep groove ball bearings | 1.1 | **260** |
| **62..-Z** | Shielded single row deep groove ball bearings | 1.1 | **260** |
| **62..-ZNR** | Shielded single row deep groove ball bearings with a snap ring groove and a snap ring | 1.3 | **310** |
| **63..** | Single row deep groove ball bearings | 1.1 | **260** |
| **63..** | Single row deep groove ball bearings | 1.1 | **260** |
| **63.. N** | Single row deep groove ball bearings with a snap ring groove | 1.3 | **310** |
| **63.. NR** | Single row deep groove ball bearings with a snap ring groove and a snap ring | 1.3 | **310** |
| **63../C3VL0241** | INSOCOAT single row deep groove ball bearings | 20.1 | **1036** |
| **63../C3VL2071** | INSOCOAT single row deep groove ball bearings | 20.1 | **1036** |
| **63../HC5** | Hybrid single row deep groove ball bearings | 21.1 | **1050** |
| **63../ HC5C3S0VA970** | XL hybrid single row deep groove ball bearings | 21.1 | **1050** |
| **63../VA201** | Single row deep groove ball bearings for high temperature applications | 18.1 | **1016** |
| **63..-2RS1** | Sealed single row deep groove ball bearings | 1.1 | **260** |
| **63..-2RSH** | Sealed single row deep groove ball bearings | 1.1 | **260** |
| **63..-2RSL** | Sealed single row deep groove ball bearings | 1.1 | **260** |
| **63..-2RSL/HC5** | Sealed hybrid single row deep groove ball bearings | 21.1 | **1050** |
| **63..-2RZ** | Sealed single row deep groove ball bearings | 1.1 | **260** |
| **63..-2Z** | Shielded single row deep groove ball bearings | 1.1 | **260** |
| **63..-2Z** | Shielded single row deep groove ball bearings | 1.1 | **260** |
| **63..-2Z/VA201** | Shielded single row deep groove ball bearings for high temperature applications | 18.1 | **1016** |
| **63..-2Z/VA208** | Shielded single row deep groove ball bearings for high temperature applications | 18.1 | **1016** |
| **63..-2Z/VA228** | Shielded single row deep groove ball bearings for high temperature applications | 18.1 | **1016** |
| **63..-2ZNR** | Shielded single row deep groove ball bearings with a snap ring groove and a snap ring | 1.3 | **310** |
| **63..-RSH** | Sealed single row deep groove ball bearings | 1.1 | **260** |
| **63..-RSL** | Sealed single row deep groove ball bearings | 1.1 | **260** |
| **63..-RZ** | Sealed single row deep groove ball bearings | 1.1 | **260** |
| **63..-Z** | Shielded single row deep groove ball bearings | 1.1 | **260** |

| Designation | Product | Product table No. | Page* |
|---|---|---|---|
| **63..-ZNR** | Shielded single row deep groove ball bearings with a snap ring groove and a snap ring | 1.3 | **310** |
| **6379/K-6320** | Inch single row tapered roller bearings | 8.2 | **714** |
| **6386/K-6320** | Inch single row tapered roller bearings | 8.2 | **714** |
| **6391/K-6320** | Inch single row tapered roller bearings | 8.2 | **714** |
| **64..** | Single row deep groove ball bearings | 1.1 | **260** |
| **64.. N** | Single row deep groove ball bearings with a snap ring groove | 1.3 | **310** |
| **64.. NR** | Single row deep groove ball bearings with a snap ring groove and a snap ring | 1.3 | **310** |
| **64432/64708** | Inch single row tapered roller bearings | 8.2 | **714** |
| **64450/64700** | Inch single row tapered roller bearings | 8.2 | **714** |
| **65..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **66..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **67..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **68..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **70.. B** | Single row angular contact ball bearings | 3.1 | **310** |
| **72.. AC** | Single row angular contact ball bearings | 3.1 | **310** |
| **72.. B** | Single row angular contact ball bearings | 3.1 | **310** |
| **72.. BE-2RZ** | Sealed single row angular contact ball bearings | 3.1 | **310** |
| **72212/..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **73.. AC** | Single row angular contact ball bearings | 3.1 | **310** |
| **73.. B** | Single row angular contact ball bearings | 3.1 | **310** |
| **73.. BE-2RZ** | Sealed single row angular contact ball bearings | 3.1 | **310** |
| **749 A/..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **798/..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **811..** | Cylindrical roller thrust bearings | 11.1 | **888** |
| **812..** | Cylindrical roller thrust bearings | 11.1 | **888** |
| **877..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **893..** | Cylindrical roller thrust bearings | 11.1 | **888** |
| **894..** | Cylindrical roller thrust bearings | 11.1 | **888** |
| **898/..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **90381/..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **9285/..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **938/..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **94700/..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **95525/..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **A 4059/..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **AS ..** | Thin universal washers for needle roller and cage thrust assemblies | 12.1 | **906** |
| **AS ..** | Thin universal washers for needle roller and cage thrust assemblies with a centring flange | 12.2 | **910** |

* Starting page of the product table.

| Designation | Product | Product table No. | Page* |
|---|---|---|---|
| **AXK ..** | Needle roller and cage thrust assemblies | 12.1 | **906** |
| **AXW ..** | Needle roller and cage thrust assemblies with a centring flange | 12.2 | **910** |
| **BA..** | Single direction thrust ball bearings | 5.1 | **472** |
| **BMB-62..** | Motor encoder units | 17.1 | **1002** |
| **BMD-62..** | Motor encoder units | 17.1 | **1002** |
| **BM0-62..** | Motor encoder units | 17.1 | **1002** |
| **BS2-22../VT143** | Sealed spherical roller bearings | 9.1 | **792** |
| **BS2-23../VT143** | Sealed spherical roller bearings | 9.1 | **792** |
| **BT2-8000/HA3** | Double row tapered roller bearings, TDI design | 8.8 | **766** |
| **BT2-8009/HA3** | Double row tapered roller bearings, TDI design | 8.8 | **766** |
| **BT2-8010/ HA3VA901** | Double row tapered roller bearings, TDI design | 8.8 | **766** |
| **BT2B ..** | Double row tapered roller bearings, TDO design | 8.7 | **762** |
| **BT2B 328130** | Double row tapered roller bearings, TDO design | 8.7 | **762** |
| **BT2B 328283/HA1** | Double row tapered roller bearings, TDI design | 8.8 | **766** |
| **BT2B 328383/HA1** | Double row tapered roller bearings, TDO design | 8.7 | **762** |
| **BT2B 328389** | Double row tapered roller bearings, TDO design | 8.7 | **762** |
| **BT2B 328410 C/HA1** | Double row tapered roller bearings, TDI design | 8.8 | **766** |
| **BT2B 328466/HA1** | Double row tapered roller bearings, TDI design | 8.8 | **766** |
| **BT2B 328523/HA1** | Double row tapered roller bearings, TDI design | 8.8 | **766** |
| **BT2B 328580/HA1** | Double row tapered roller bearings, TDI design | 8.8 | **766** |
| **BT2B 328615** | Double row tapered roller bearings, TDO design | 8.7 | **762** |
| **BT2B 328695 A/HA1** | Double row tapered roller bearings, TDI design | 8.8 | **766** |
| **BT2B 328699 G/HA1** | Double row tapered roller bearings, TDI design | 8.8 | **766** |
| **BT2B 328705/HA1** | Double row tapered roller bearings, TDI design | 8.8 | **766** |
| **BT2B 328874/HA1** | Double row tapered roller bearings, TDI design | 8.8 | **766** |
| **BT2B 328896/HA3** | Double row tapered roller bearings, TDI design | 8.8 | **766** |
| **BT2B 328934/HA3** | Double row tapered roller bearings, TDI design | 8.8 | **766** |
| **BT2B 328957** | Double row tapered roller bearings, TDO design | 8.7 | **762** |
| **BT2B 331782** | Double row tapered roller bearings, TDO design | 8.7 | **762** |
| **BT2B 331836** | Double row tapered roller bearings, TDI design | 8.8 | **766** |
| **BT2B 331837** | Double row tapered roller bearings, TDI design | 8.8 | **766** |
| **BT2B 331840 C/HA1** | Double row tapered roller bearings, TDI design | 8.8 | **766** |
| **BT2B 332237 A/HA1** | Double row tapered roller bearings, TDO design | 8.7 | **762** |
| **BT2B 332468 A/HA1** | Double row tapered roller bearings, TDI design | 8.8 | **766** |
| **BT2B 332504/HA2** | Double row tapered roller bearings, TDO design | 8.7 | **762** |
| **BT2B 332505/HA2** | Double row tapered roller bearings, TDO design | 8.7 | **762** |
| **BT2B 332506/HA2** | Double row tapered roller bearings, TDO design | 8.7 | **762** |
| **BT2B 332516 A/HA1** | Double row tapered roller bearings, TDO design | 8.7 | **762** |
| **BT2B 332536/HA1** | Double row tapered roller bearings, TDI design | 8.8 | **766** |
| **BT2B 332603/HA1** | Double row tapered roller bearings, TDO design | 8.7 | **762** |
| **BT2B 332604/HA1** | Double row tapered roller bearings, TDO design | 8.7 | **762** |
| **BT2B 332683/HA1** | Double row tapered roller bearings, TDI design | 8.8 | **766** |
| **BT2B 332685/HA1** | Double row tapered roller bearings, TDI design | 8.8 | **766** |
| **BT2B 332754** | Double row tapered roller bearings, TDO design | 8.7 | **762** |
| **BT2B 332767 A** | Double row tapered roller bearings, TDO design | 8.7 | **766** |
| **BT2B 332802 A** | Double row tapered roller bearings, TDO design | 8.7 | **762** |
| **BT2B 332830** | Double row tapered roller bearings, TDO design | 8.7 | **762** |
| **BT2B 332831** | Double row tapered roller bearings, TDO design | 8.7 | **762** |
| **BT2B 332845/HA2** | Double row tapered roller bearings, TDO design | 8.7 | **762** |
| **BT2B 332913/HB1** | Double row tapered roller bearings, TDI design | 8.8 | **766** |
| **BT2B 332931** | Double row tapered roller bearings, TDI design | 8.8 | **766** |
| **BT2B 334013/HA1** | Double row tapered roller bearings, TDI design | 8.8 | **766** |
| **BT2B 334087/HA3** | Double row tapered roller bearings, TDI design | 8.8 | **766** |
| **C 22..** | CARB toroidal roller bearings | 10.1 | **856** |
| **C 23..** | CARB toroidal roller bearings | 10.1 | **856** |
| **C 30..** | CARB toroidal roller bearings | 10.1 | **856** |
| **C 31..** | CARB toroidal roller bearings | 10.1 | **856** |
| **C 32..** | CARB toroidal roller bearings | 10.1 | **856** |
| **C 39..** | CARB toroidal roller bearings | 10.1 | **856** |
| **C 40..** | CARB toroidal roller bearings | 10.1 | **856** |
| **C 41..** | CARB toroidal roller bearings | 10.1 | **856** |
| **C 49..** | CARB toroidal roller bearings | 10.1 | **856** |
| **C 5020 V** | CARB toroidal roller bearings | 10.1 | **856** |
| **C 59..** | CARB toroidal roller bearings | 10.1 | **856** |
| **C 6006 V** | CARB toroidal roller bearings | 10.1 | **856** |
| **C 69.. V** | CARB toroidal roller bearings | 10.1 | **856** |
| **GS 811..** | Housing washers for cylindrical roller thrust bearings | 11.1 | **888** |
| **GS 811..** | Housing washers for needle roller and cage thrust assemblies | 12.1 | **906** |
| **GS 812..** | Housing washers for cylindrical roller thrust bearings | 11.1 | **888** |
| **GS 893..** | Housing washers for cylindrical roller thrust bearings | 11.1 | **888** |
| **GS 894..** | Housing washers for cylindrical roller thrust bearings | 11.1 | **888** |
| **H 2..** | Adapter sleeves, metric shafts | 23.1 | **1072** |
| **H 23..** | Adapter sleeves, metric shafts | 23.1 | **1072** |
| **H 242649/..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **H 3..** | Adapter sleeves, metric shafts | 23.1 | **1072** |
| **H 30..** | Adapter sleeves, metric shafts | 23.1 | **1072** |
| **H 31..** | Adapter sleeves, metric shafts | 23.1 | **1072** |
| **H 715345/..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **HH ..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **HJ 10..** | Angle rings for single row cylindrical roller bearings | 6.1 | **516** |
| **HJ 2..** | Angle rings for single row cylindrical roller bearings | 6.1 | **516** |
| **HJ 22..** | Angle rings for single row cylindrical roller bearings | 6.1 | **516** |
| **HJ 23..** | Angle rings for single row cylindrical roller bearings | 6.1 | **516** |
| **HJ 3..** | Angle rings for single row cylindrical roller bearings | 6.1 | **516** |


* Starting page of the product table.

| Designation | Product | Product table No. | Page* |
|---|---|---|---|
| **HJ 4..** | Angle rings for single row cylindrical roller bearings | 6.1 | **516** |
| **HK ...** | Drawn cup needle roller bearings with open ends | 7.2 | **618** |
| **HM ..** | Inc h single row tapered roller bearings | 8.2 | **714** |
| **HM .. T** | Lock nuts | 25.1 | **1104** |
| **HM 30..** | Lock nuts | 25.3 | **1108** |
| **HM 31..** | Lock nuts | 25.3 | **1108** |
| **ICOS-D1B..** | ICOS oil sealed bearing units | 1.2 | **293** |
| **IR ..** | Needle roller bearing inner rings | 7.11 | **660** |
| **JH 4156..** | Metric single row tapered roller bearings | 8.1 | **694** |
| **JL 267..** | Metric single row tapered roller bearings | 8.1 | **694** |
| **JL 693..** | Metric single row tapered roller bearings | 8.1 | **694** |
| **JLM 1049..** | Metric single row tapered roller bearings | 8.1 | **694** |
| **JLM 5087..** | Metric single row tapered roller bearings | 8.1 | **694** |
| **JLM 7109..** | Metric single row tapered roller bearings | 8.1 | **694** |
| **JM 2051..** | Metric single row tapered roller bearings | 8.1 | **694** |
| **JM 5119..** | Metric single row tapered roller bearings | 8.1 | **694** |
| **JM 7142..** | Metric single row tapered roller bearings | 8.1 | **694** |
| **JM 7166..** | Metric single row tapered roller bearings | 8.1 | **694** |
| **JM 7181..** | Metric single row tapered roller bearings | 8.1 | **694** |
| **JM 7382..** | Metric single row tapered roller bearings | 8.1 | **694** |
| **JM 8220..** | Metric single row tapered roller bearings | 8.1 | **694** |
| **K ..** | Needle roller and cage assemblies | 7.1 | **614** |
| **K 811..** | Cylindrical roller and cage thrust assembly | 11.1 | **888** |
| **K 812..** | Cylindrical roller and cage thrust assembly | 11.1 | **888** |
| **K 893..** | Cylindrical roller and cage thrust assembly | 11.1 | **888** |
| **K 894..** | Cylindrical roller and cage thrust assembly | 11.1 | **888** |
| **KM ..** | Lock nuts | 25.1 | **1104** |
| **KMFE ..** | Lock nuts with a locking screw | 25.5 | **1108** |
| **KML ..** | Lock nuts | 25.1 | **1104** |
| **KMT ..** | Precision lock nuts with locking pins | 25.6 | **1114** |
| **KMTA ..** | Precision lock nuts with locking pins | 25.7 | **1116** |
| **KR ..** | Cam followers | 16.1 | **978** |
| **KRE ..** | Cam followers with an eccentric collar | 16.1 | **978** |
| **KRV ..** | Cam followers with a full complement of needle rollers | 16.1 | **978** |
| **L 3..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **L 4..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **L 5..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **L 681..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **L 8..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **LL 639..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **LM ..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **LR ..** | Needle roller bearing inner rings | 7.11 | **660** |
| **LS ..** | Universal washers for cylindrical roller thrust bearings | 11.1 | **888** |
| **LS ..** | Universal washers for needle roller and cage thrust assemblies | 12.1 | **906** |
| **LS ..** | Universal washers for needle roller and cage thrust assemblies with a centring flange | 12.2 | **910** |
| **M 126..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **M 23..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **M 24..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **M 336..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **M 349..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **M 802..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **M 845..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **M 866..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **M 880..** | Inch single row tapered roller bearings | 8.2 | **714** |
| **MB ..** | Lock washers | 25.2 | **1106** |
| **MB .. A** | Lock washers | 25.2 | **1106** |
| **MBL ..** | Lock washers | 25.2 | **1106** |
| **MS 30..** | Locking clips | 25.4 | **1110** |
| **MS 31..** | Locking clips | 25.4 | **1110** |
| **N 2..** | Single row cylindrical roller bearings | 6.1 | **516** |
| **N 3..** | Single row cylindrical roller bearings | 6.1 | **516** |
| **NA 22...2RS** | Support rollers without flange rings, with an inner ring | 15.1 | **954** |
| **NA 48..** | Needle roller bearings with machined rings with flanges, with an inner ring | 7.4 | **636** |
| **NA 49..** | Needle roller bearings with machined rings with flanges, with an inner ring | 7.4 | **636** |
| **NA 69..** | Needle roller bearings with machined rings with flanges, with an inner ring | 7.4 | **636** |
| **NATR ..** | Support rollers with flange rings, with an inner ring | 15.2 | **956** |
| **NATV ..** | Support rollers with flange rings, with an inner ring and a full complement of needle rollers | 15.2 | **956** |
| **NCF 18.. V** | Single row full complement cylindrical roller bearings | 6.3 | **554** |
| **NCF 22.. ECJB** | High-capacity cylindrical roller bearings | 6.2 | **550** |
| **NCF 22.. V** | Single row full complement cylindrical roller bearings | 6.3 | **554** |
| **NCF 23.. ECJB** | High-capacity cylindrical roller bearings | 6.2 | **550** |
| **NCF 28.. V** | Single row full complement cylindrical roller bearings | 6.3 | **554** |
| **NCF 29.. CV** | Single row full complement cylindrical roller bearings | 6.3 | **554** |
| **NCF 29.. V** | Single row full complement cylindrical roller bearings | 6.3 | **554** |
| **NCF 30.. CV** | Single row full complement cylindrical roller bearings | 6.3 | **554** |
| **NCF 30.. V** | Single row full complement cylindrical roller bearings | 6.3 | **554** |
| **NJ 10..** | Single row cylindrical roller bearings | 6.1 | **516** |
| **NJ 18..** | Single row cylindrical roller bearings | 6.1 | **516** |
| **NJ 2..** | Single row cylindrical roller bearings | 6.1 | **516** |
| **NJ 22..** | Single row cylindrical roller bearings | 6.1 | **516** |
| **NJ 23..** | Single row cylindrical roller bearings | 6.1 | **516** |
| **NJ 28..** | Single row cylindrical roller bearings | 6.1 | **516** |
| **NJ 29..** | Single row cylindrical roller bearings | 6.1 | **516** |
| **NJ 3..** | Single row cylindrical roller bearings | 6.1 | **516** |
| **NJ 4..** | Single row cylindrical roller bearings | 6.1 | **516** |
| **NJG 23.. VH** | Single row full complement cylindrical roller bearings | 6.3 | **554** |


* Starting page of the product table.

| Designation | Product | Product table No. | Page* |
|---|---|---|---|
| **NJG 3.. VH** | Single row full complement cylindrical roller bearings | 6.3 | **554** |
| **NK ..** | Needle roller bearings with machined rings with flanges, without an inner ring | 7.3 | **624** |
| **NKI ..** | Needle roller bearings with machined rings with flanges, with an inner ring | 7.4 | **636** |
| **NKIA 59..** | Needle roller / angular contact ball bearings | 7.7 | **652** |
| **NKIB 59..** | Needle roller / angular contact ball bearings | 7.7 | **652** |
| **NKIS ..** | Needle roller bearings with machined rings with flanges, with an inner ring | 7.4 | **636** |
| **NKS ..** | Needle roller bearings with machined rings with flanges, without an inner ring | 7.3 | **624** |
| **NKX ..** | Needle roller / thrust ball bearings, thrust bearing with a cage | 7.9 | **656** |
| **NKXR ..** | Needle roller / cylindrical roller thrust bearings | 7.10 | **658** |
| **NNC 48.. CV** | Double row full complement cylindrical roller bearings | 6.4 | **564** |
| **NNC 49.. CV** | Double row full complement cylindrical roller bearings | 6.4 | **564** |
| **NNCF 48.. CV** | Double row full complement cylindrical roller bearings | 6.4 | **564** |
| **NNCF 49.. CV** | Double row full complement cylindrical roller bearings | 6.4 | **564** |
| **NNCF 50.. CV** | Double row full complement cylindrical roller bearings | 6.4 | **564** |
| **NNCL 48.. CV** | Double row full complement cylindrical roller bearings | 6.4 | **564** |
| **NNCL 49.. CV** | Double row full complement cylindrical roller bearings | 6.4 | **564** |
| **NNF 50.. ADB-2LSV** | Sealed double row full complement cylindrical roller bearings | 6.5 | **576** |
| **NNF 50.. B-2LS** | Sealed double row full complement cylindrical roller bearings | 6.5 | **576** |
| **NU 10..** | Single row cylindrical roller bearings | 6.1 | **516** |
| **NU 10../C3VL0241** | INSOCOAT single row cylindrical roller bearings | 20.2 | **1038** |
| **NU 10../C3VL2071** | INSOCOAT single row cylindrical roller bearings | 20.2 | **1038** |
| **NU 10../HC5** | Hybrid single row cylindrical roller bearings | 21.2 | **1056** |
| **NU 12..** | Single row cylindrical roller bearings | 6.1 | **516** |
| **NU 18..** | Single row cylindrical roller bearings | 6.1 | **516** |
| **NU 19..** | Single row cylindrical roller bearings | 6.1 | **516** |
| **NU 2..** | Single row cylindrical roller bearings | 6.1 | **516** |
| **NU 2../C3VL0241** | INSOCOAT single row cylindrical roller bearings | 20.2 | **1038** |
| **NU 2../C3VL2071** | INSOCOAT single row cylindrical roller bearings | 20.2 | **1038** |
| **NU 2../HC5** | Hybrid single row cylindrical roller bearings | 21.2 | **1056** |
| **NU 20..** | Single row cylindrical roller bearings | 6.1 | **516** |
| **NU 22..** | Single row cylindrical roller bearings | 6.1 | **516** |
| **NU 23..** | Single row cylindrical roller bearings | 6.1 | **516** |
| **NU 28..** | Single row cylindrical roller bearings | 6.1 | **516** |
| **NU 29..** | Single row cylindrical roller bearings | 6.1 | **516** |
| **NU 3..** | Single row cylindrical roller bearings | 6.1 | **516** |
| **NU 3../C3VL0241** | INSOCOAT single row cylindrical roller bearings | 20.2 | **1038** |
| **NU 3../C3VL2071** | INSOCOAT single row cylindrical roller bearings | 20.2 | **1038** |
| **NU 3../HC5** | Hybrid single row cylindrical roller bearings | 21.2 | **1056** |
| **NU 30..** | Single row cylindrical roller bearings | 6.1 | **516** |
| **NU 31..** | Single row cylindrical roller bearings | 6.1 | **516** |
| **NU 39..** | Single row cylindrical roller bearings | 6.1 | **516** |
| **NU 4..** | Single row cylindrical roller bearings | 6.1 | **516** |
| **NUH 22.. ECMH** | High-capacity cylindrical roller bearings | 6.2 | **550** |
| **NUH 23.. ECMH** | High-capacity cylindrical roller bearings | 6.2 | **550** |
| **NUKR ..** | Cam followers | 16.1 | **978** |
| **NUKRE ..** | Cam followers with an eccentric collar | 16.1 | **978** |
| **NUP 10..** | Single row cylindrical roller bearings | 6.1 | **516** |
| **NUP 18..** | Single row cylindrical roller bearings | 6.1 | **516** |
| **NUP 2..** | Single row cylindrical roller bearings | 6.1 | **516** |
| **NUP 22..** | Single row cylindrical roller bearings | 6.1 | **516** |
| **NUP 23..** | Single row cylindrical roller bearings | 6.1 | **516** |
| **NUP 29..** | Single row cylindrical roller bearings | 6.1 | **516** |
| **NUP 3..** | Single row cylindrical roller bearings | 6.1 | **516** |
| **NUP 39..** | Single row cylindrical roller bearings | 6.1 | **516** |
| **NUTR ..** | Support rollers with flange rings, with an inner ring | 15.2 | **956** |
| **NX ..** | Needle roller / thrust ball bearings, full complement thrust bearing | 7.8 | **654** |
| **OH 30..** | Adapter sleeves for oil injection, metric shafts | 23.1 | **1072** |
| **OH 31..** | Adapter sleeves for oil injection, metric shafts | 23.1 | **1072** |
| **OH 32..** | Adapter sleeves for oil injection, metric shafts | 23.1 | **1072** |
| **PNA ..** | Alignment needle roller bearings, with an inner ring | 7.6 | **650** |
| **PWKR ...2RS** | Sealed cam followers | 16.1 | **978** |
| **PWTR ...2RS** | Sealed support rollers with flange rings, with an inner ring | 15.2 | **956** |
| **QJ 2..** | Four-point contact ball bearings | 3.4 | **430** |
| **QJ 3..** | Four-point contact ball bearings | 3.4 | **430** |
| **RNA 48.** | Needle roller bearings with machined rings with flanges, without an inner ring | 7.3 | **624** |
| **RNA 49..** | Needle roller bearings with machined rings with flanges, without an inner ring | 7.3 | **624** |
| **RNA 69..** | Needle roller bearings with machined rings with flanges, without an inner ring | 7.3 | **624** |
| **RPNA ..** | Alignment needle roller bearings, without an inner ring | 7.5 | **648** |
| **SNP ..** | Adapter sleeves with inch dimensions | 23.2 | **1076** |
| **SNP 30..** | Adapter sleeves with inch dimensions | 23.2 | **1076** |
| **SNP 31..** | Adapter sleeves with inch dimensions | 23.2 | **1076** |
| **SNP 32..** | Adapter sleeves with inch dimensions | 23.2 | **1076** |
| **SNW ..** | Adapter sleeves with inch dimensions | 23.2 | **1076** |
| **SNW 30..** | Adapter sleeves with inch dimensions | 23.2 | **1076** |
| **SNW 31..** | Adapter sleeves with inch dimensions | 23.2 | **1076** |
| **ST0 ..** | Support rollers without flange rings, with an inner ring | 15.1 | **954** |
| **T2DC ..** | Metric single row tapered roller bearings | 8.1 | **694** |
| **T2DD ..** | Metric single row tapered roller bearings | 8.1 | **694** |
| **T2ED ..** | Metric single row tapered roller bearings | 8.1 | **694** |
| **T2EE ..** | Metric single row tapered roller bearings | 8.1 | **694** |
| **T3FE ..** | Metric single row tapered roller bearings | 8.1 | **694** |
| **T4CB ..** | Metric single row tapered roller bearings | 8.1 | **694** |
| **T4DB ..** | Metric single row tapered roller bearings | 8.1 | **694** |
| **T4EB ..** | Metric single row tapered roller bearings | 8.1 | **694** |
| **T4EE ..** | Metric single row tapered roller bearings | 8.1 | **694** |
| **T7FC ..** | Metric single row tapered roller bearings | 8.1 | **694** |


* Starting page of the product table.

| Designation | Product | Product table No. | Page* |
|---|---|---|---|
| **T7FC../DT** | Matched tapered roller bearings arranged in tandem | 8.6 | **760** |
| **W 60..** | Stainless steel deep groove ball bearings | 1.4 | **316** |
| **W 60..-2RS1** | Sealed stainless steel deep groove ball bearings | 1.4 | **316** |
| **W 60..-2Z** | Shielded stainless steel deep groove ball bearings | 1.4 | **316** |
| **W 61..** | Stainless steel deep groove ball bearings | 1.4 | **316** |
| **W 618..-2RS1** | Sealed stainless steel deep groove ball bearings | 1.4 | **316** |
| **W 618..-2Z** | Shielded stainless steel deep groove ball bearings | 1.4 | **316** |
| **W 619..-2RS1** | Sealed stainless steel deep groove ball bearings | 1.4 | **316** |
| **W 619..-2Z** | Shielded stainless steel deep groove ball bearings | 1.4 | **316** |
| **W 62..** | Stainless steel deep groove ball bearings | 1.4 | **316** |
| **W 62..-2RS1** | Sealed stainless steel deep groove ball bearings | 1.4 | **316** |
| **W 62..-2Z** | Shielded stainless steel deep groove ball bearings | 1.4 | **316** |
| **W 62..-2ZS** | Shielded stainless steel deep groove ball bearings | 1.4 | **316** |
| **W 63..** | Stainless steel deep groove ball bearings | 1.4 | **316** |
| **W 63..-2RS1** | Sealed stainless steel deep groove ball bearings | 1.4 | **316** |
| **W 63..-2Z** | Shielded stainless steel deep groove ball bearings | 1.4 | **316** |
| **WS 811..** | Shaft washers for cylindrical roller thrust bearings | 11.1 | **888** |
| **WS 811..** | Shaft washers for needle roller and cage thrust assemblies | 12.1 | **906** |
| **WS 811..** | Shaft washers for needle roller and cage thrust assemblies with a centring flange | 12.2 | **910** |
| **WS 812..** | Shaft washers for cylindrical roller thrust bearings | 11.1 | **888** |
| **WS 893..** | Shaft washers for cylindrical roller thrust bearings | 11.1 | **888** |
| **WS 894..** | Shaft washers for cylindrical roller thrust bearings | 11.1 | **888** |
| **YAR 2..-2F** | Insert bearings with grub screws, metric shafts | 2.1 | **366** |
| **YAR 2..-2F** | Insert bearings with grub screws, inch shafts | 2.2 | **368** |
| **YAR 2..-2FW/VA201** | Insert bearings for high temperature applications, metric shafts | 18.2 | **1020** |
| **YAR 2..-2FW/VA201** | Insert bearings for high temperature applications, inch shafts | 18.3 | **1021** |
| **YAR 2..-2FW/VA228** | Insert bearings for high temperature applications, metric shafts | 18.2 | **1020** |
| **YAR 2..-2FW/VA228** | Insert bearings for high temperature applications, inch shafts | 18.3 | **1021** |
| **YAR 2..-2RF** | Insert bearings with grub screws, metric shafts | 2.1 | **366** |
| **YAR 2..-2RF** | Insert bearings with grub screws, inch shafts | 2.2 | **368** |
| **YAR 2..-2RF/HV** | Stainess steel insert bearings with grub screws, metric shafts | 2.1 | **366** |
| **YAR 2..-2RF/HV** | Stainless steel insert bearings with grub screws, inch shafts | 2.2 | **368** |
| **YAR 2..-2RF/VE495** | Insert bearings with grub screws for the food industry, metric shafts | 2.1 | **366** |
| **YAR 2..-2RF/VE495** | Insert bearings with grub screws for the food industry, inch shafts | 2.2 | **368** |
| **YAR 2..-2RFGR/HV** | Stainless steel insert bearings with grub screws and a lubrication groove in the outside surface, metric shafts | 2.1 | **366** |
| **YAR 2..-2RFGR/HV** | Stainless steel insert bearings with grub screws and a lubrication groove in the outside surface, inch shafts | 2.2 | **368** |
| **YARAG 2..** | Insert bearings with grub screws for agricultural applications, metric shafts | 2.1 | **366** |
| **YARAG 2..** | Insert bearings with grub screws for agricultural applications, inch shafts | 2.2 | **368** |
| **YAT 2..** | Insert bearings with grub screws, metric shafts | 2.1 | **366** |
| **YAT 2..** | Insert bearings with grub screws, inch shafts | 2.2 | **368** |
| **YEL 2..-2F** | Insert bearings with an eccentric locking collar, metric shafts | 2.3 | **372** |
| **YEL 2..-2F** | Insert bearings with an eccentric locking collar, inch shafts | 2.4 | **374** |
| **YEL 2..-2RF** | Insert bearings with an eccentric locking collar, metric shafts | 2.3 | **372** |
| **YELAG 2..** | Insert bearings with an eccentric locking collar for agricultural applications, metric shafts | 2.3 | **372** |
| **YELAG 2..** | Insert bearings with an eccentric locking collar for agricultural applications, inch shafts | 2.4 | **374** |
| **YET 2..** | Insert bearings with an eccentric locking collar, metric shafts | 2.3 | **372** |
| **YET 2..** | Insert bearings with an eccentric locking collar, inch shafts | 2.4 | **374** |
| **YSA 2..-2FK** | Insert bearings with a tapered bore on an adapter sleeve, metric shafts | 2.7 | **378** |
| **YSA 2..-2FK** | Insert bearings with a tapered bore on an adapter sleeve, inch shafts | 2.8 | **378** |
| **YSP 2.. SB-2F** | SKF ConCentra insert bearings, metric shafts | 2.5 | **376** |
| **YSP 2.. SB-2F** | SKF ConCentra insert bearings, inch shafts | 2.6 | **377** |
| **YSPAG 2..** | SKF ConCentra insert bearings for agricultural applications, metric shafts | 2.5 | **376** |
| **YSPAG 2..** | SKF ConCentra insert bearings for agricultural applications, inch shafts | 2.6 | **377** |


* Starting page of the product table.

Use the Application data sheet (pdf) online to help with the bearing selection process or when contacting the SKF application engineering service.

# Application data sheet

## General information

| | |
|---|---|
| Company name | |
| Contact name | |
| Telephone number | |
| Subject / reference | |
| E-mail address | |
| Date | |

## Type of request

○ New development ○ Design verification ○ Problem solving

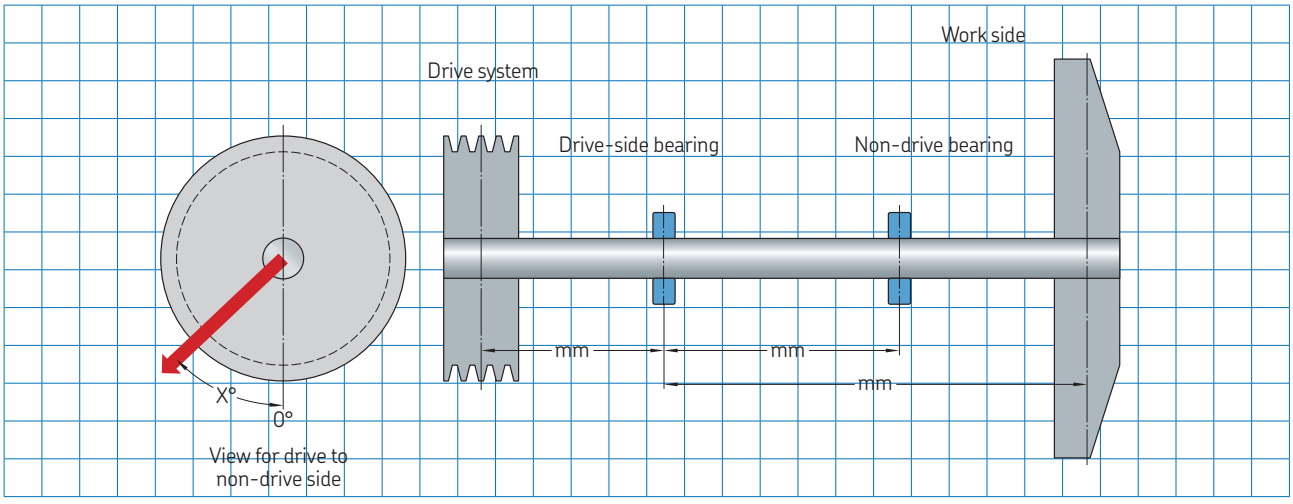
○ Other

## Application

Description

○ Continous ○ Not continous, hours a day h/day

**Sketch: For example, of an industrial bearing arrangement**




*For a different configuration, please add an assembly drawing with corresponding distance of the different components and orientation of the load.*

## Loads

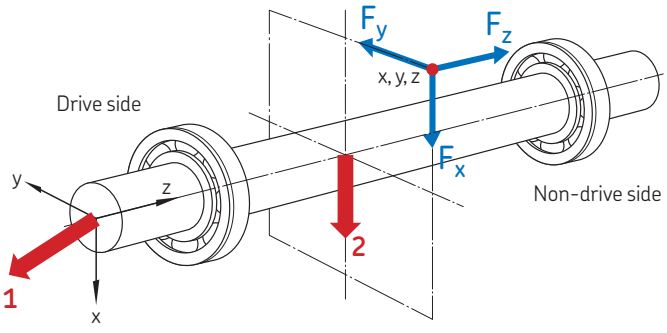
*For a single bearing only:*

| | | |
|---|---|---|
| Radial load | | kN |
| Axial load | | kN |

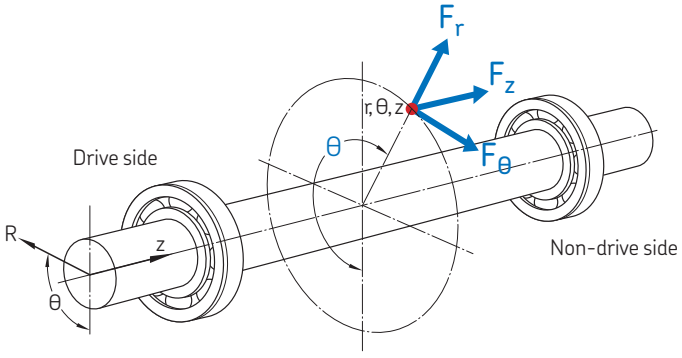
*For a shaft and bearings:*

*Select one of the coordinates system below the loads on the shaft.*

○ Cartesian coordinates ○ Polar coordinates




Gravity in X-direction




Gravity in direction of q = 0°

| Loads | Position | | | External loads | | |
|---|---|---|---|---|---|---|
| | X/r | Y/θ | Z | Fx/Fr | Fx/Fr | Fx/Fr |
| | mm | mm/° | mm | kN | kN | kN |
| 1 | | | | | | |
| 2 | | | | | | |

** Supply information for additional loads in a separate document.*

| | | |
|---|---|---|
| ☐ Peak load | | kN |
| ☐ Alternating load | | kN |
| ☐ Moment load | | kN |

*If load and/or speed change over time, provide details of the load/speed cycle.*

## Speed

## Drive system

| | | |
|---|---|---|
| Power | | kW |

☐ White coupling

| | | |
|---|---|---|
| Type of coupling | | |
| Weight of coupling | | N |

☐ With belt drive

| | | |
|---|---|---|
| Type of belt | | |
| Weight of pulley | | N |
| Pitch diameter of pulley | | mm |
| Direction of tension θ | | ° |

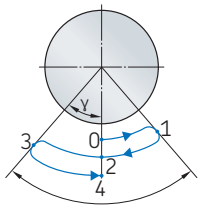
☐ With geards (spur or helical)

| | | |
|---|---|---|
| Nominal pressure angle $\alpha n$ | | ° |
| Helix angle β | | ° |
| Module $m_n$ | | mm |
| Number of teeth pinion $z_1$ | | ° |
| Number of teeth wheel $z_1$ | | |
| Centre distance pinion/wheel | | mm |

| | | | |
|---|---|---|---|
| Gear | ○ driving | ○ driven | |
| Helix hand | ○ none | ○ left-had | ○ right-hand |
| Rotation | ○ clockwise | ○ counter-clockwise | |

## Oscillating application

| | | |
|---|---|---|
| Oscillating angle β | | ° |
| Frequency f | | $min^{-1}$ |
| Period t | | seconds |




| | | |
|---|---|---|
| Alternating load direction | ☐ | |
| Alternating load freq | | $min^{-1}$ |

*If load and/or speed change over time, provide details of the load/speed cycle.*

| | | |
|---|---|---|
| Life requirement | | h |

## Bearing

*For a single bearing, provide details for the drive side only.*

| | Drive side | | | Non-drive side | | |
|---|---|---|---|---|---|---|
| Bearing part number | | | | | | |
| Locating bearing | ○ | | | ○ | | |
| Operating temperature | | / | °C | | / | °C |
| | *Inner ring* | *Outer ring* | | *Inner ring* | *Outer ring* | |
| Temperature range | min. | °C | | max. | °C | |

## Bearing interface

| | Drive side | Non-drive side |
|---|---|---|
| Shaft material | | |
| Housing material | | |
| Tolerance shaft | | |
| Tolerance housing | | |

## Lubrication

Lubrication system

☐ Grease lubrication

Grease type (part number)

Relubrication interval h

Relubrication quantity g

Shaft orientation ○ Horizontal ○ Vertical

Rotating ring ○ Inner ring ○ Outer ring

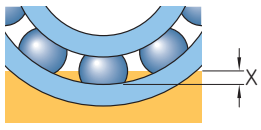
☐ Oil lubrication

Oil type (part number

☐ Oil bath

Oil bath temperature °C

Oil level at standstill (x) mm




☐ Oil circulation

Oil temperature at sump °C

Oil flow ○ l/mm

## Sealing

☐ Grease lubrication

☐ External sealing

| | | |
|---|---|---|
| Seal bore diameter | | mm |
| Seal outer diameter | | mm |
| Seal width | | mm |

| | | |
|---|---|---|
| Medium to be sealed | | |
| Internal | | |
| External | | |
| Pressure | | bar |

*Add any other requirements for seals.*

## Environment

| | |
|---|---|
| Ambient temperature | |

| Yes | No | | Comments |
|---|---|---|---|
| ○ | ○ | Dontaminaton | |
| ○ | ○ | Humidity/Moisture | |
| ○ | ○ | External heat source | |
| ○ | ○ | Cooling | |
| | | Other | |