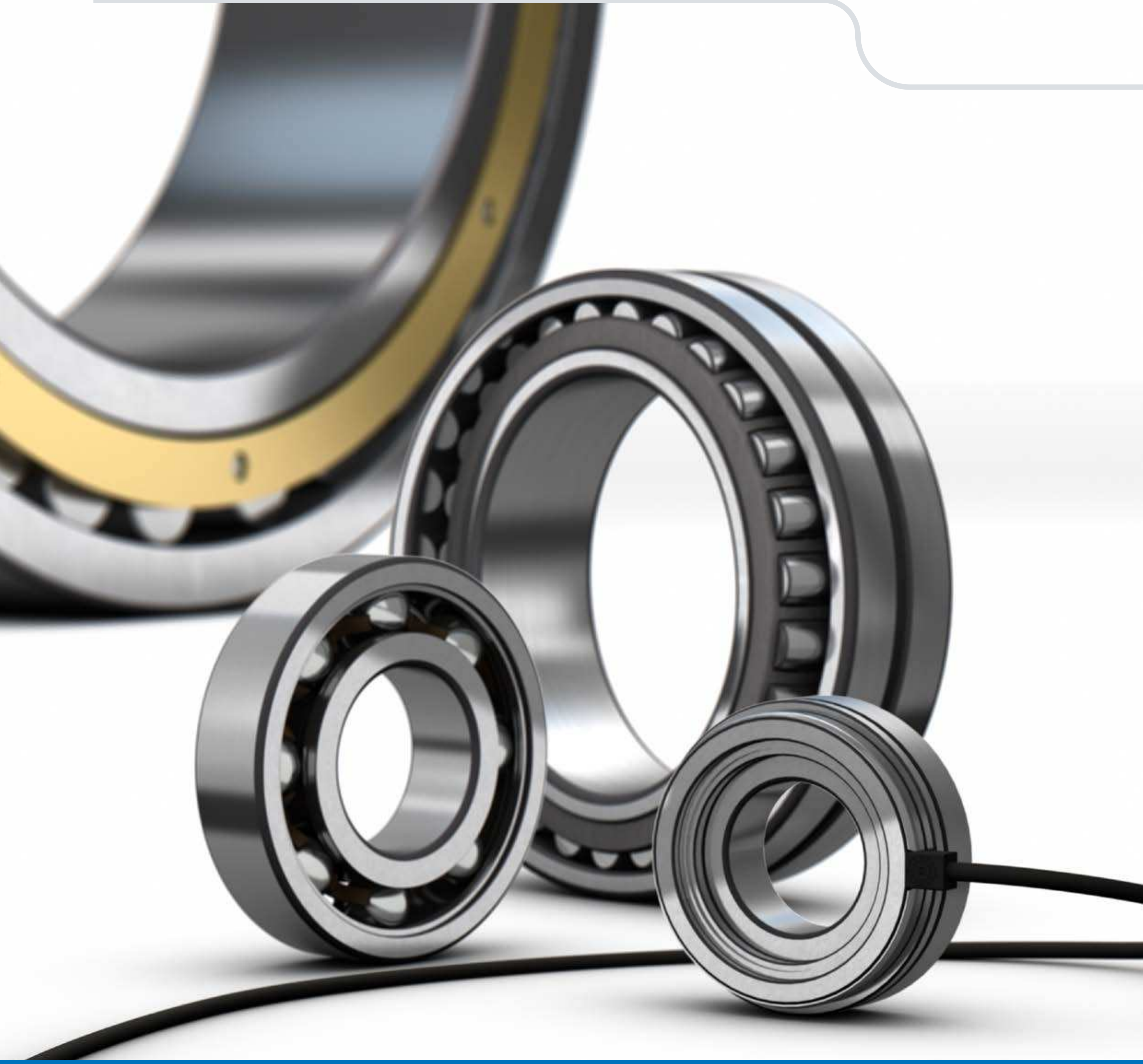
Rolling bearings



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.

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This publication supersedes publication 10000 EN.

Rolling bearings

Contents

Track rollers

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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

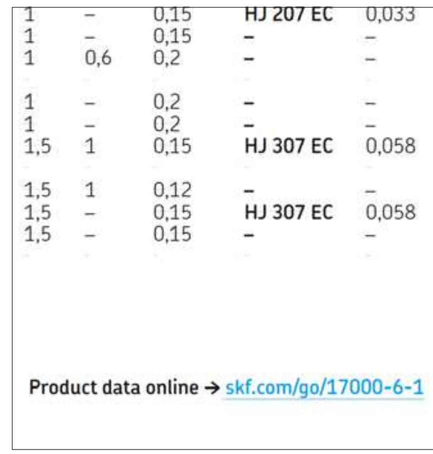
2. Popular items

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.

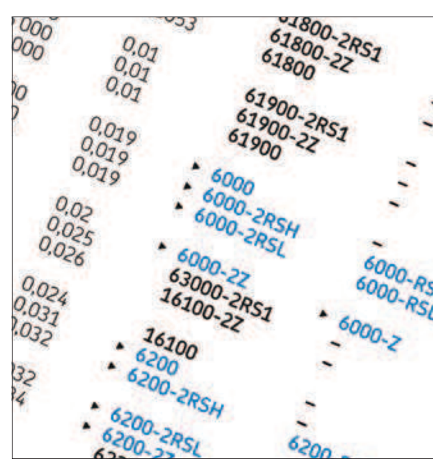
Short URLs in the product sections provide direct access to related online information.



1	–	0,15	HJ 207 EC	0,033
1	–	0,15	–	–
1	0,6	0,2	–	–
1	–	0,2	–	–
1	–	0,2	–	–
1,5	1	0,15	HJ 307 EC	0,058
1,5	1	0,12	–	–
1,5	–	0,15	HJ 307 EC	0,058
1,5	–	0,15	–	–

Product data online → skf.com/go/17000-6-1

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

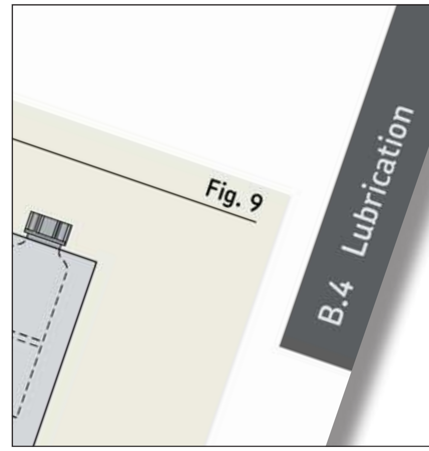
Spherical roller bearings for wind energy applications are designed explicitly for wind turbine main shafts. They have an optimized internal geometry with large diameter rollers and increased contact angle for increased axial load carrying capacity.

Catalogue information and how to use it

This catalogue is divided into three parts:

Principles of rolling bearing selection

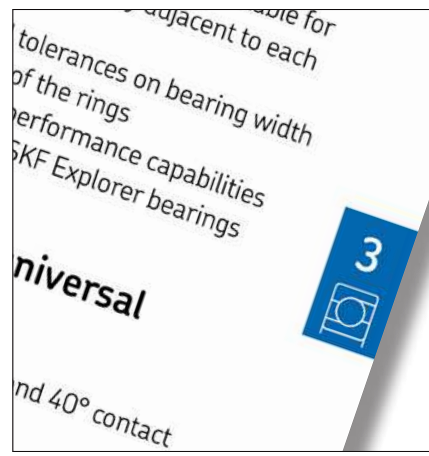
This part is marked by grey bars at the page edge. It provides general information about rolling bearings (section A), explains the bearing selection process (section B), and presents three examples on how to apply the bearing selection process for various applications (section C).



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

Product data

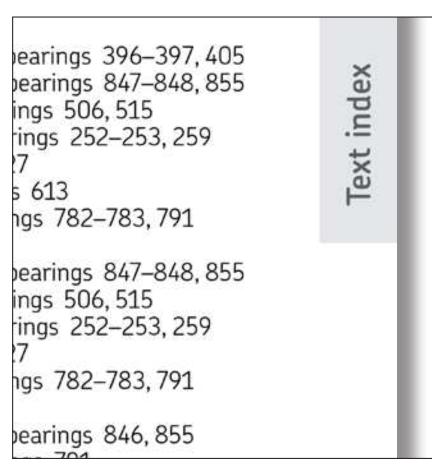
The part is divided into sections per bearing type. Each product section is marked by blue tabs containing the section number and a descriptive icon.



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

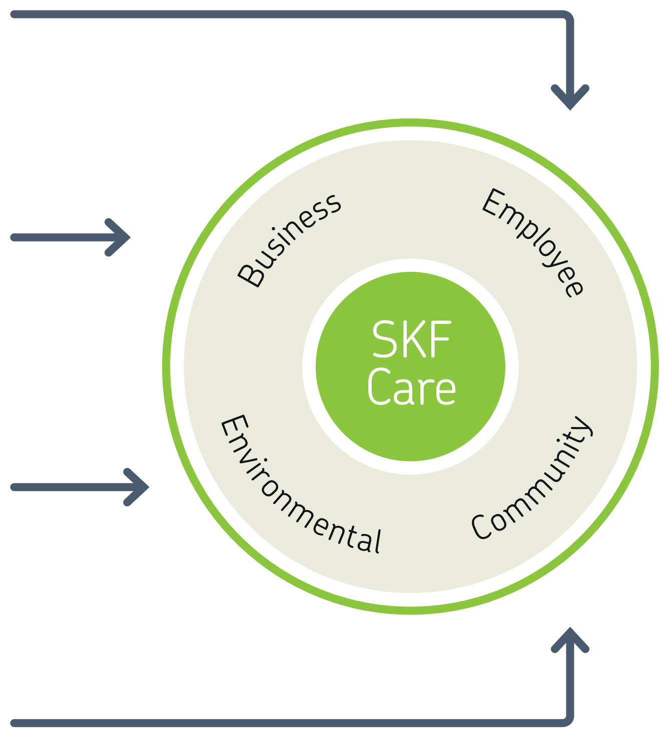
SKF Care is our definition of sustainability. The framework comprises four main perspectives that help us to create value for business partners, the environment, our employees, and the communities around us.

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

General bearing knowledge

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.

A.1

Bearing basics

A.1 Bearing basics

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. 2

Point contact

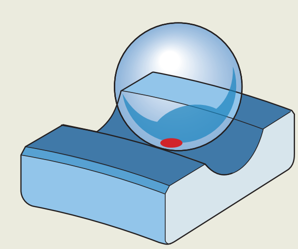


Fig. 1

Why rolling bearings?

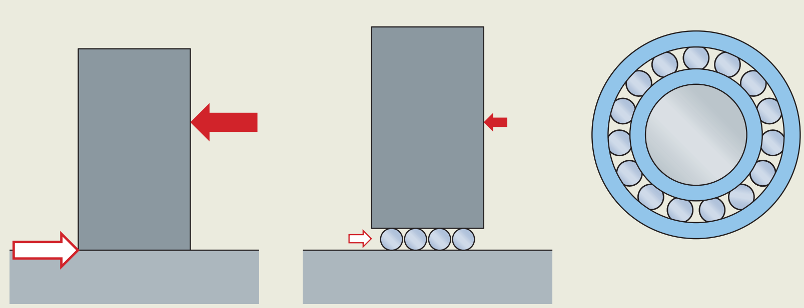
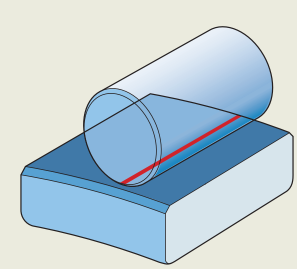


Fig. 3

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

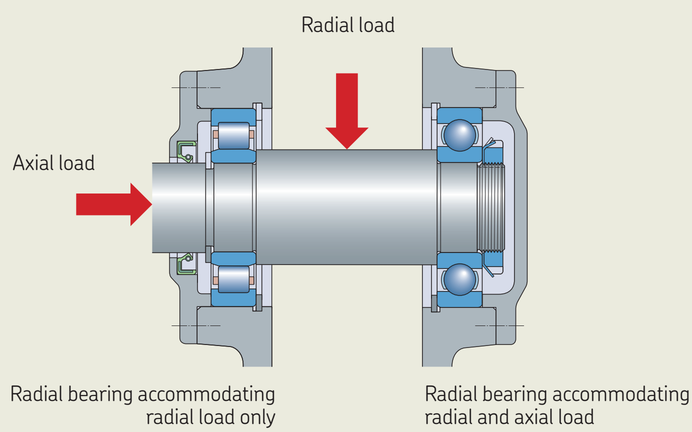


Fig. 5

Thrust bearing for pure axial load

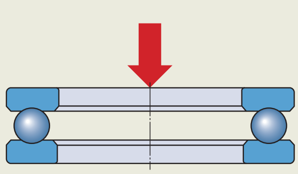


Fig. 6

Thrust bearing for combined load

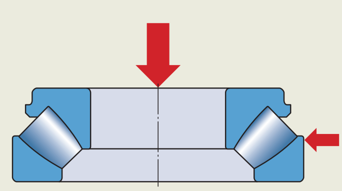
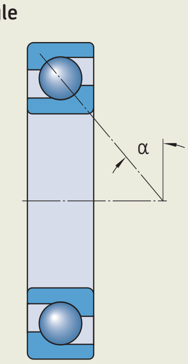


Fig. 7

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

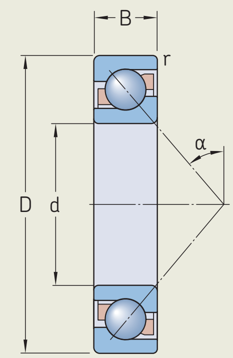
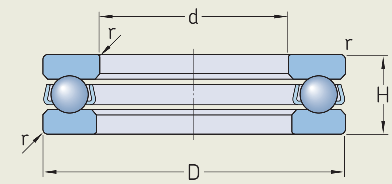


Fig. 9

Symbols for boundary dimensions – thrust bearings



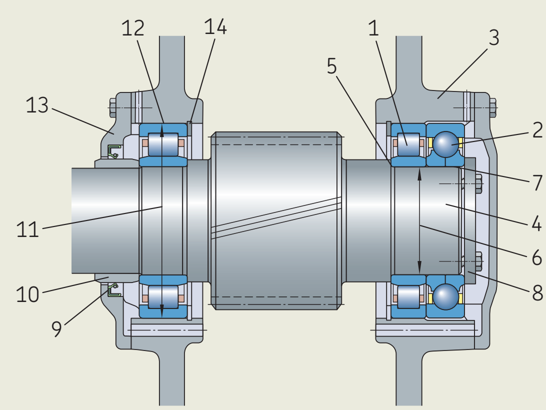
Shaft-bearing-housing system

(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

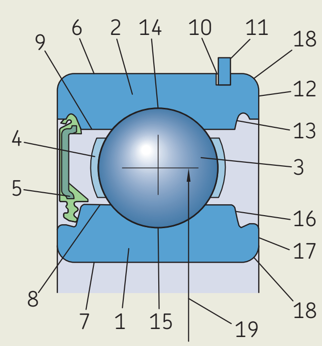


Fig. 12

Terminology – Radial bearing

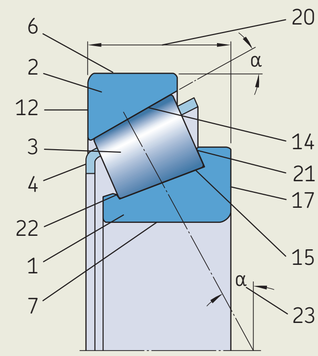
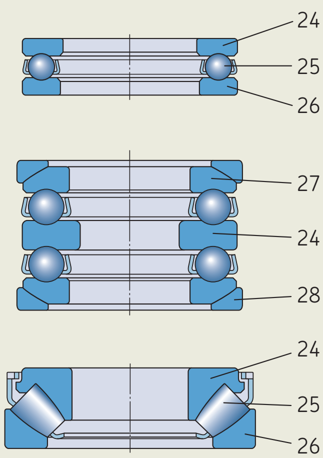


Fig. 13

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.

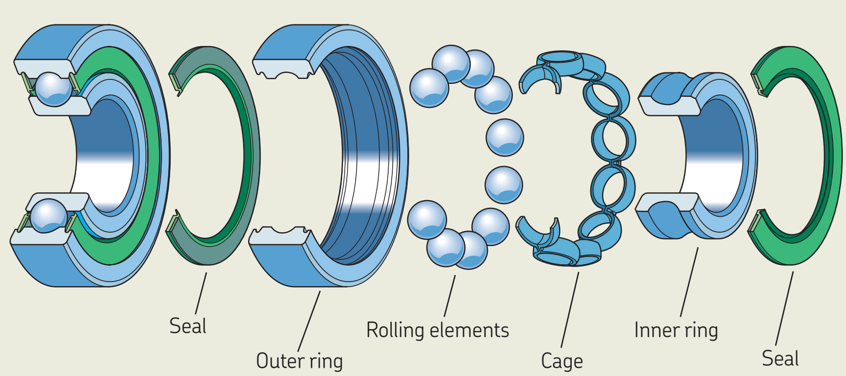
SKF bearing rings and washers are made of steel in accordance with SKF specifications. They cover all aspects that are relevant to providing a long service life for the bearing. Depending on specific requirements, SKF uses stainless steels or high-temperature steels.

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

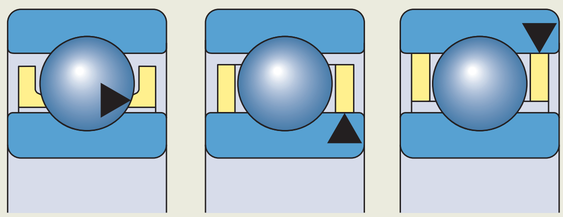


Fig. 16

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

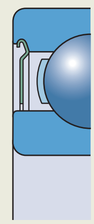


Fig. 21

Contact seal

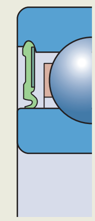


Fig. 22

Low-friction seal

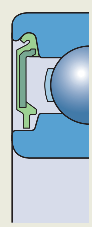
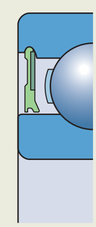


Fig. 23

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:

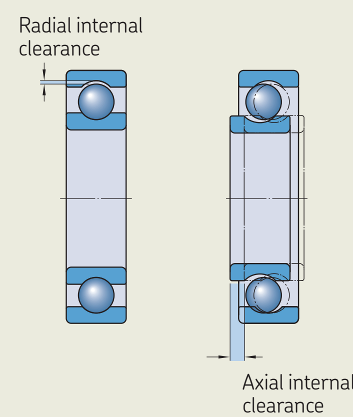
- Bearings are typically mounted with an interference fit on the shaft or in the housing. The expansion of the inner ring or the compression of the outer ring reduces the internal clearance.
- Bearings generate heat in operation. Differential thermal expansion of the bearing and mating components influences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

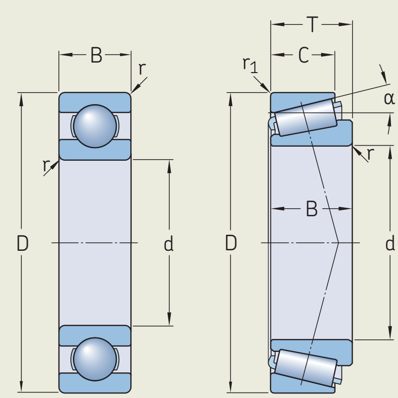
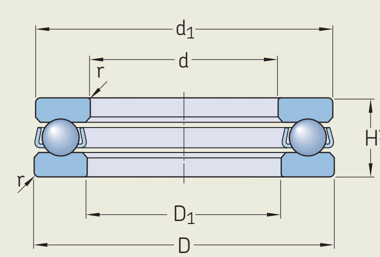


Fig. 26

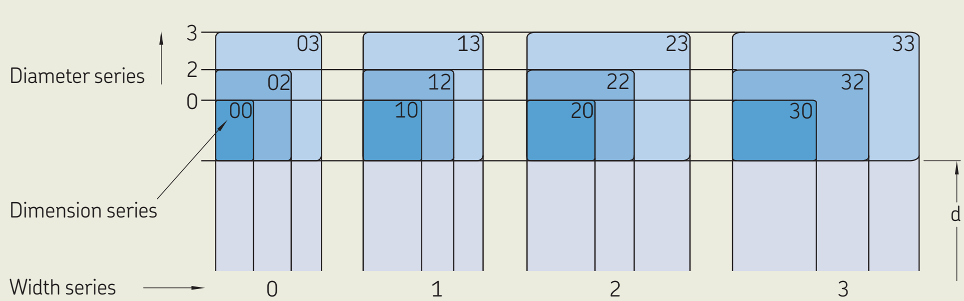
Boundary dimensions, thrust bearing



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

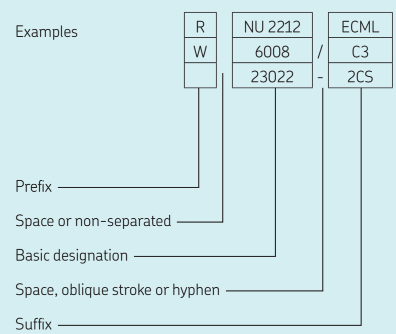


Table 3

Examples of boundary dimensions

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

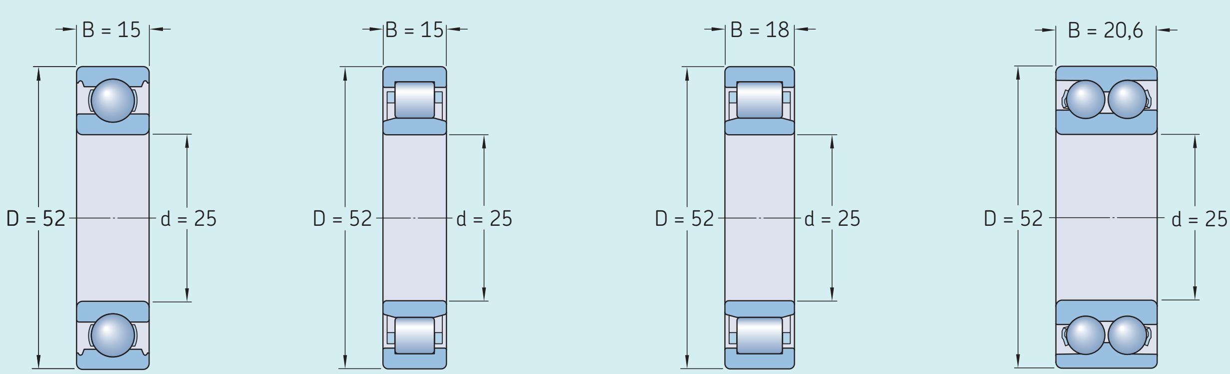
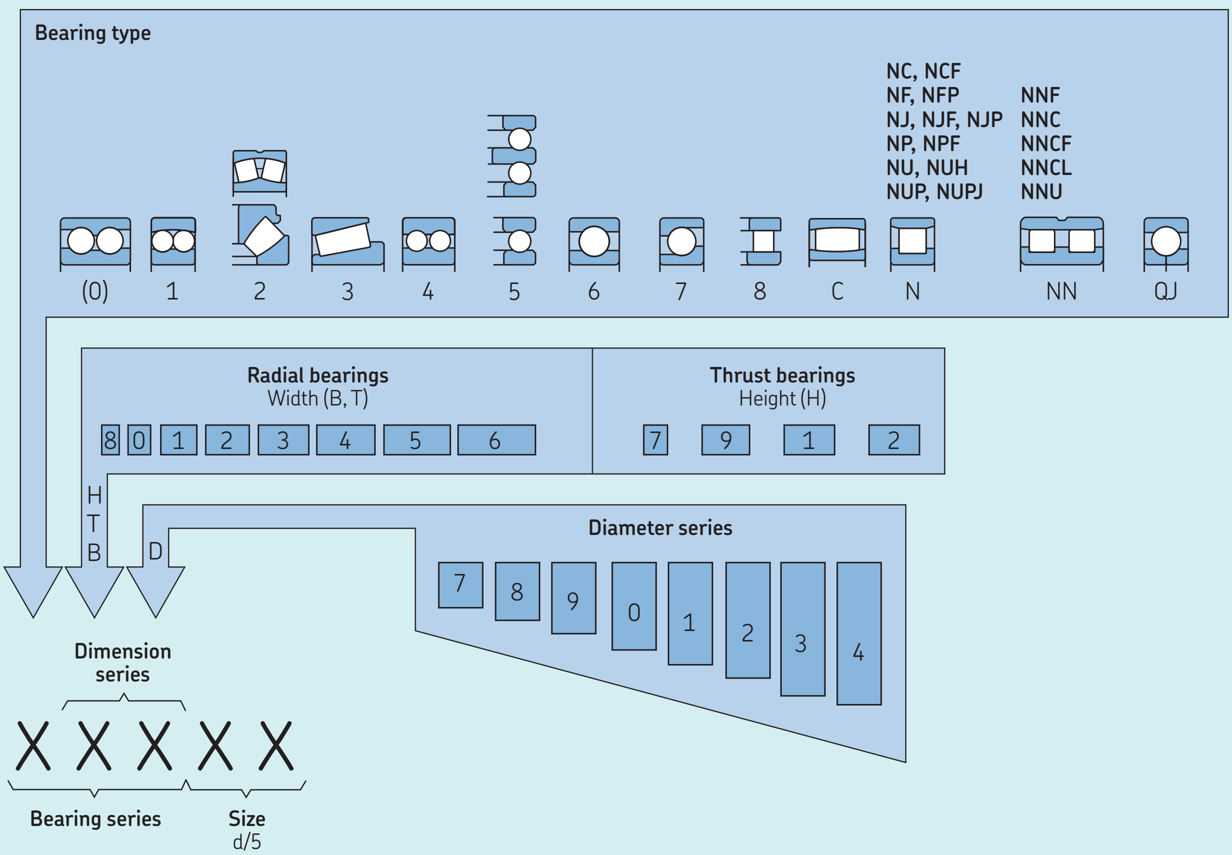


Table 4

Basic designation system for SKF standard metric ball and roller bearings

Bearing series

Bearing type	Bearing series
(0)	(0)33, (0)32
1	139, 130, (1)23, 1(0)3, (1)22, 1(0)2, 1(1)0
2	223, 213, 232, 222, 241, 231, 240, 230, 249, 239, 248, 238, 294, 293, 292
3	323, 313, 303, 332, 322, 302, 331, 330, 320, 329
4	4(2)3, 4(2)2
5	544, 524, 543, 523, 542, 522, 534, 514, 533, 513, 532, 512, 511, 510, 591, 590
6	6(0)4, 623, 6(0)3, 622, 6(0)2, 630, 6(1)0, 16(0)0, 639, 619, 609, 638, 628, 618, 608, 637, 627, 617
7	7(0)4, 7(0)3, 7(0)2, 7(1)0, 719, 718, 708
8	814, 894, 874, 813, 893, 812, 811
C	23, 32, 22, 41, 31, 60, 50, 40, 30, 69, 59, 49, 39
N	(0)4, 33, 23, (0)3, 22, 12, (0)2, 31, 30, 20, 10, 39, 29, 19, 38, 28, 18
NN	41, 31, 60, 50, 40, 30, 69, 49, 39, 48
QJ	23, (0)3, 12, (0)2, 10, 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

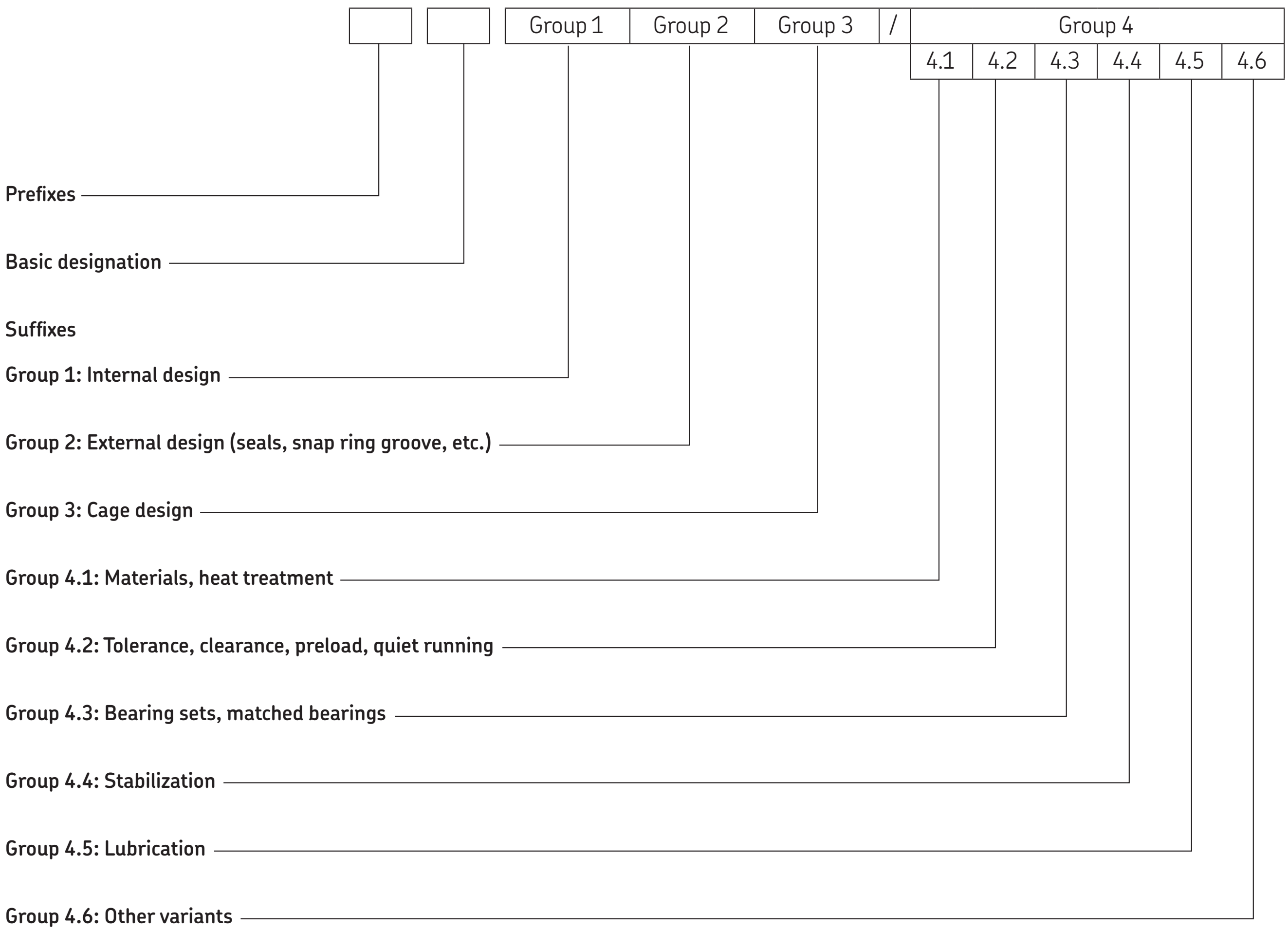
Bearings designed to meet a specific customer requirement are typically designated by a drawing number. The drawing number does not provide any information about the bearing.

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



A.2 Tolerances

A.2 Tolerances

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

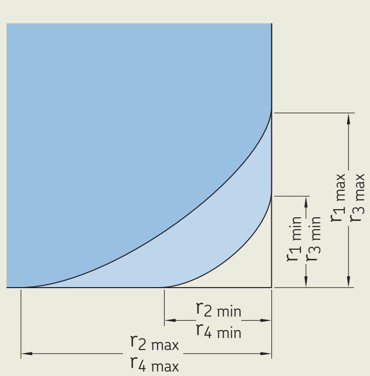
Minimum chamfer dimensions

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

Fig. 1

Minimum and maximum chamfer dimensions



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.

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		$t_{\Delta Ts}$		$t_{\Delta T1s}$		$t_{\Delta T2s}$	
>	≤	U	L			U	L	Normal	CL7C[1)]	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	
>	≤	U	L			U	L	Normal	CL7C[1)]
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

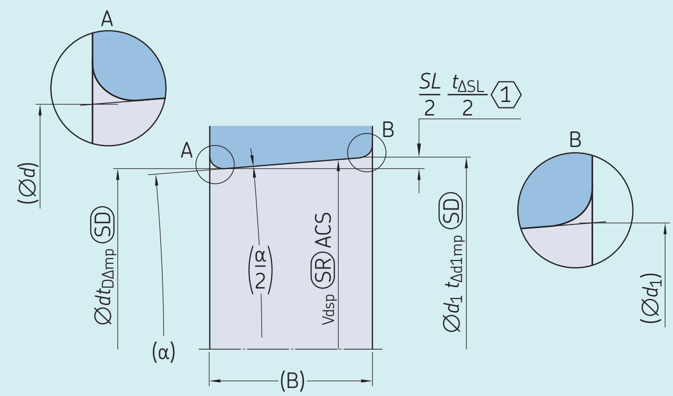
Nominal diameter d, d_2, D[1)]		**Shaft washer** $t_{\Delta dmp}, t_{\Delta d2mp}$ Tolerance classes Normal, P6, P5		t_{Vdsp}, t_{Vd2sp}	t_{Si}[2)3)] Tolerance classes Normal	t_{Si}[2)3)] P6	t_{Si}[2)3)] P5	**Housing washer** $t_{\Delta Dmp}$ Tolerance classes Normal, P6, P5		t_{VDsp}	t_{Se}[2)]
>	≤	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



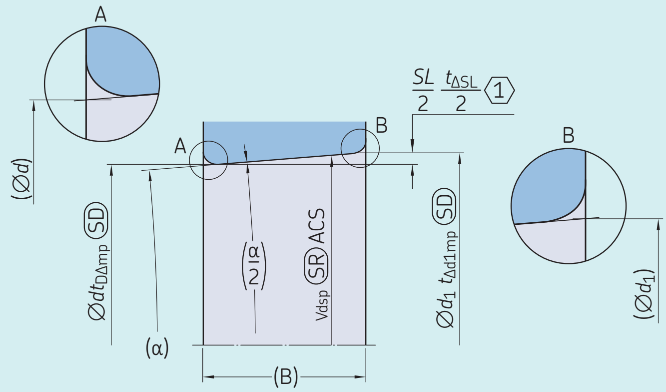
1 = *SL* is a calculated nominal size from *d* and d_1, i.e. $SL = (d_1 - d) = 2B \tan(\alpha/2)$;
ΔSL is a calculated characteristic, i.e. ΔSL = Δd1mp – Δdmp

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 **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 **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 Nomal, Modified[1)]	**1** Symmetrical rings: Deviation of a two-point size of inner ring width from its nominal size **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 **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 **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 **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 **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 **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 **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 **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 **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 **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 7, 8, 9	0, 1	2, 3, 4
Deep groove ball bearings[1)]	617, 618, 619 627, 628 637, 638, 639	60 160, 161 630	2, 3 42, 43 62, 63, 64, 622, 623
Angular contact ball bearings		70	32, 33 72, 73 QJ 2, QJ 3
Self-aligning ball bearings[2)]	139	10, 130	12, 13, 112 22, 23
Cylindrical roller bearings		NU 10, 20 NJ 10	NU 2, 3, 4, 12, 22, 23 NJ 2, 3, 4, 22, 23 NUP 2, 3, 22, 23 N 2, 3
Full complement cylindrical roller bearings	NCF 18, 19, 28, 29 NNC 48, 49 NNCF 48, 49 NNCL 48, 49	NCF 30 NNF 50 NNCF 50	NCF 22 NJG 23
Needle roller bearings	NA 48, 49, 69		
Spherical roller bearings	238, 239 248, 249	230, 231 240, 241	222, 232 213, 223
CARB toroidal roller bearings	C 39, 49, 59, 69	C 30, 31 C 40, 41	C 22, 23 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 >	≤	$r_{1,3}$	$r_{2,4}$	$r_{1,2,3,4}$
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 >	≤	$r_{1,3}$	$r_{2,4}$
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

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

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.

A.3 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

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

Level of complexity

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

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.

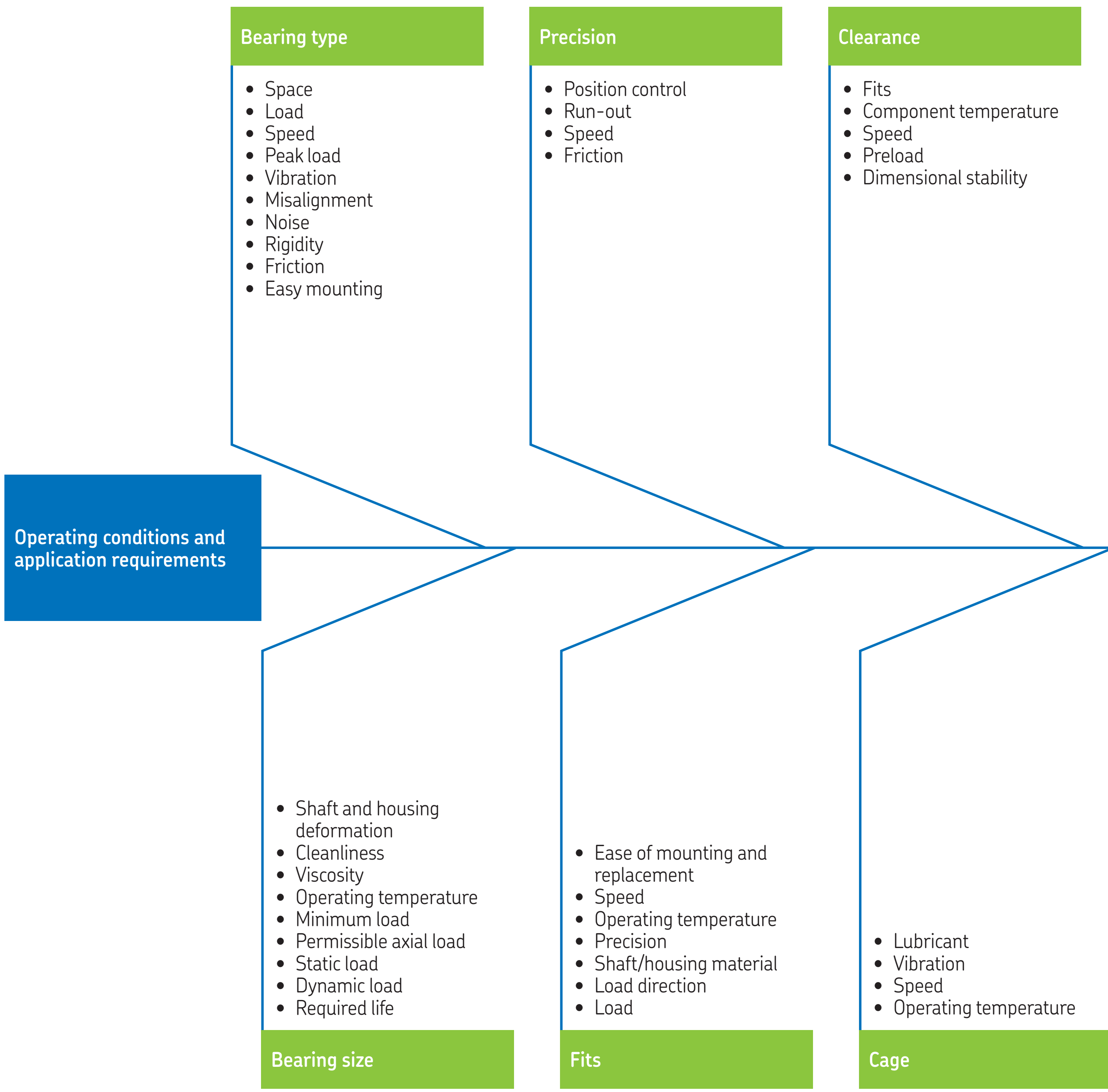
In order to optimize a design, you may need to loop through various steps of the bearing selection process. To minimize these, review and prioritize any application prerequisites, such as:

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

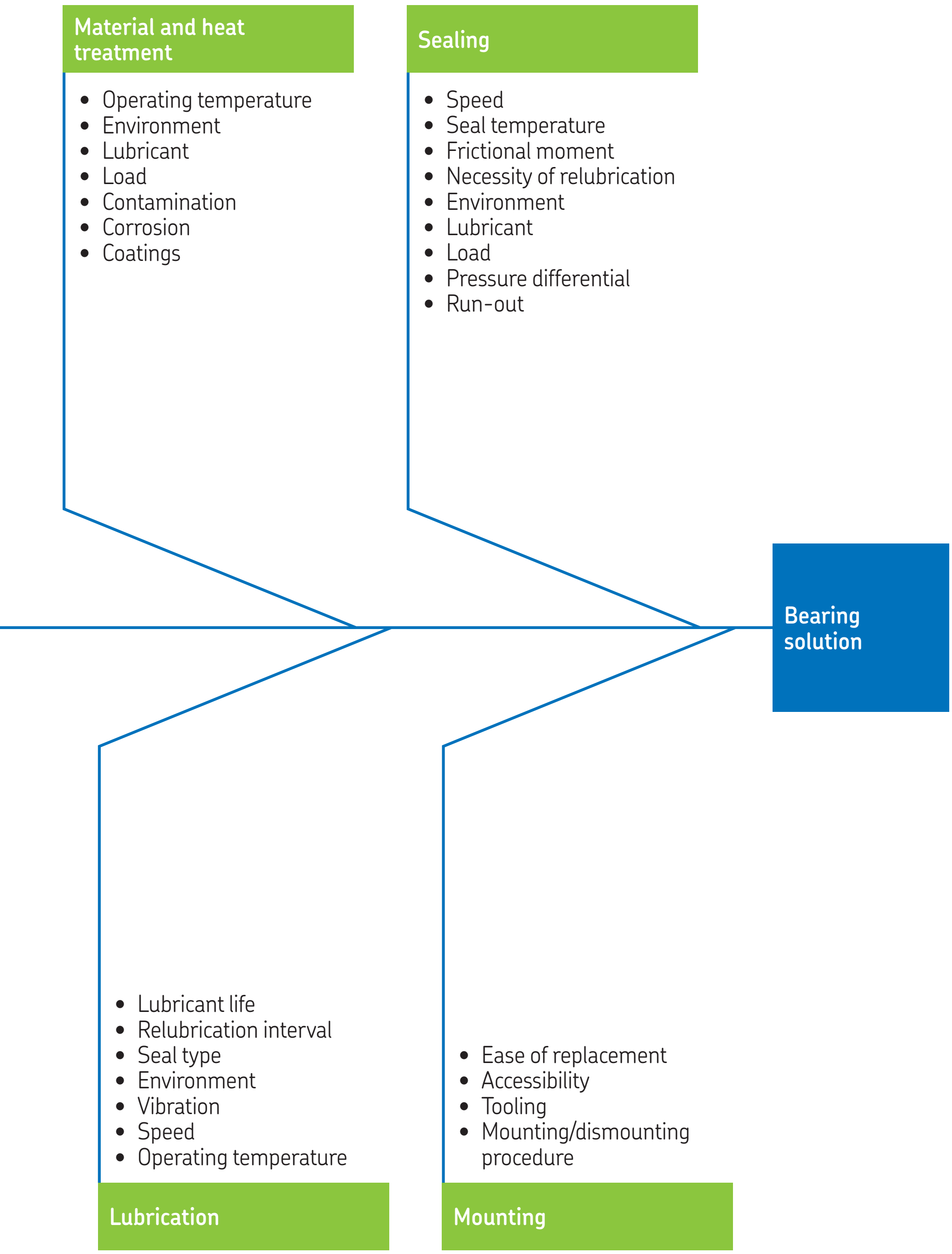
The relationship between principal operating conditions, application requirements and various aspects of a bearing arrangement's design are shown in *Factors to consider when translating operating conditions and application requirements into a bearing solution*, **page 66**. The lists are not comprehensive 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

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.

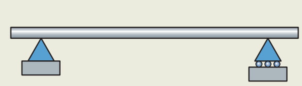
Locating/non-locating bearing arrangements

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.

Fig. 1

Locating/non-locating bearing arrangement



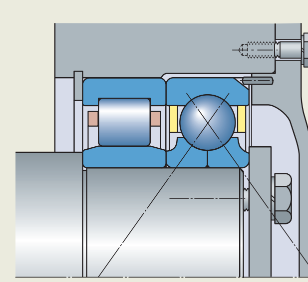
Bearings for the locating support

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. 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.

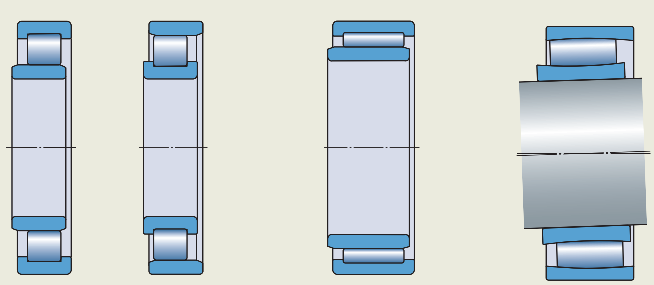
2 Use a loose fit between one bearing ring and its seat. Suitable bearing types include:
- deep groove ball bearings (**page 240**)
- self-aligning ball bearings (**page 438**)
- spherical roller bearings (**page 774**)
- pairs of angular contact ball bearings (**page 385**) or tapered roller bearings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

B.2 Bearing type and arrangement

Suitability of rolling bearings for industrial applications

Symbols

+++	excellent	⇔	double direction
++	good	←	single direction
+	fair	□	non-locating displacement on the seat
-	poor	■	non-locating displacement within the bearing
– –	unsuitable	✓	yes
		✗	no

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

SKF

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 +++ B ++	A +++ B +	A +++ B ++	+	+++	A ✓	✗	✗	✗
⇔	⇔	✗	✗	+++	++	A, B + C ++	+	++	✓	✗	✗	✓
✗	✗	✓	✗	++	++	+++	++	++	✓	✗	✗	✗
A, B ⇔ C ←	A, B □ C ✗	✗	✗	++	++	+++	++	++	✗	✗	✗	✗
↔	□	✗	✗	++	++	++	++	++	A ✓	B ✓	✗	✗
⇔1)	– –	– –	– –	+	+++	++	++	++	✗	✓	✗	✗
⇔	□	✗	✓	+++	++	++	+	+++	✓	✗	✓	✓
✗	■	✗	✗	++	+++	+++	++	+++	✗	✓	✗	✗
A, B ← C, D ⇔	A, B ■ ← C, D ✗	✗	A ✓ B, C, D ✗	++3)	+++	++	++	+++	✗	✓	✗	✗
←	A, B ←	✗	✓	–	+	+	+++	–	✗	A ✗ B ✓	✗	✗
B ← C, D ⇔	A ■ ⇔ B ■ ←	✗	✗	–	+	+	+++	–	D ✓	✗	✗	✗
✗	■ ⇔	✗	✗	++	++	+	++	+	A ✓	✓	✗	✗
A, B ✗ C ←	A, B ■ C ■ ←	✗	✗	++	++	+	++	+	B, C ✓	✓	✗	✗
←	✗	✓	✗	+	+	+	++	+	✗	✓	✗	✗
←	✗	✓	✗	+	++	+++	++	+	✗	✓	✗	✗
A, B ⇔ C ←	A, B □ C ✗	A, B ✗ C ✓	✗	+	+	++	+++	+	✗	✓	✗	✗
⇔	□	✗	✗	+	+	++	+++	+	✓	✓	B ✓	✗
⇔	□	✗	✓	+	++	+++	++	+	✓	✗	✓	✓
✗	■	✗	✗	+	++	+++	++	+	✗	✗	✓	✓
✗	■	✗	✗	–	+	+++	++	–	✓	✗	✓	✓
A ← B ⇔	✗	✗	✗	+	–	++	+	+	✗	✓	✗	✗
A ← 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

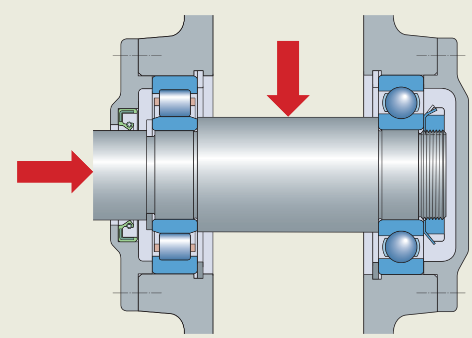


Fig. 5

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

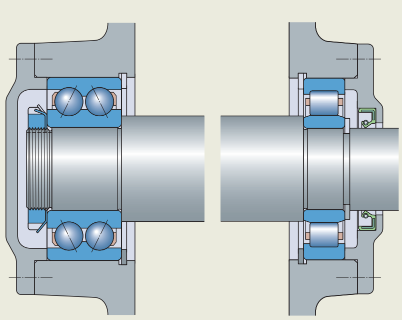


Fig. 6

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

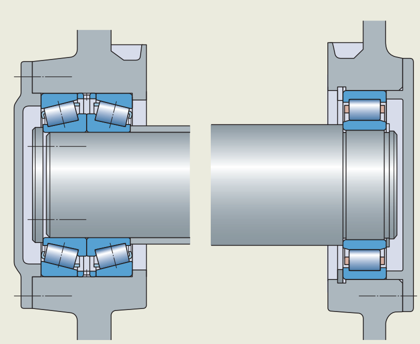


Fig. 7

NUP design cylindrical roller bearing / NU design cylindrical roller bearing

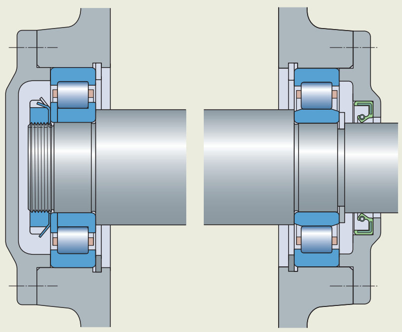


Fig. 8

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

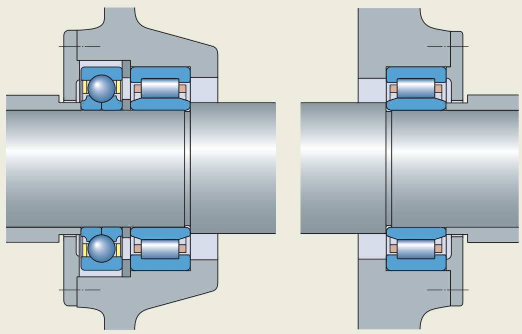


Fig. 9

Spherical roller bearing / CARB toroidal roller bearing

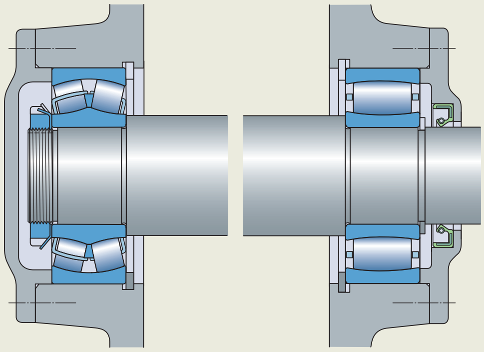


Fig. 10

Deep groove ball bearing / deep groove ball bearing

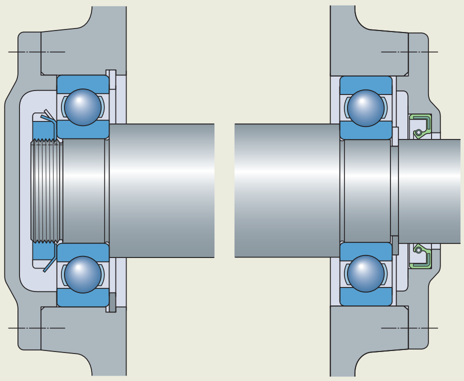


Fig. 11

Spherical roller bearing / spherical roller bearing

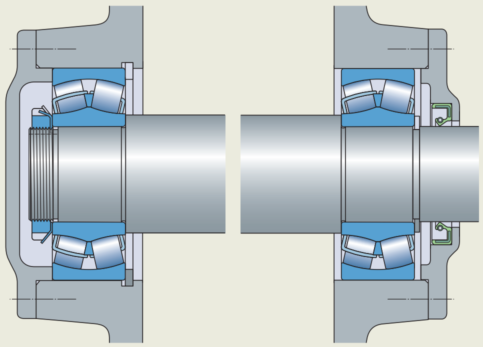
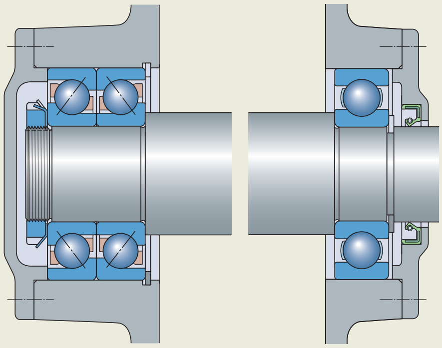


Fig. 12

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

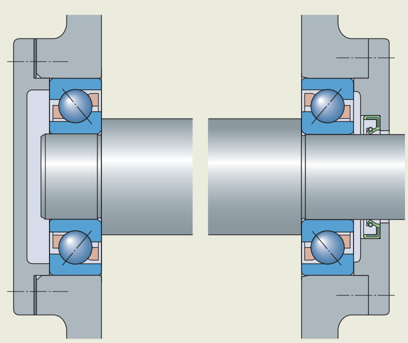


Fig. 14

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

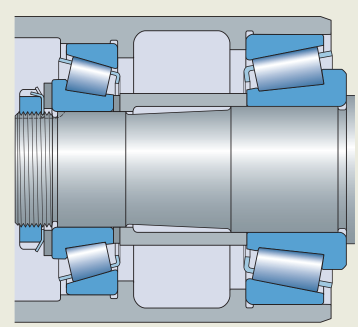


Fig. 15

Floating bearing arrangement, deep groove ball bearings

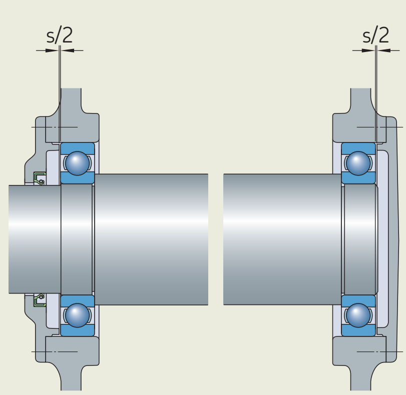
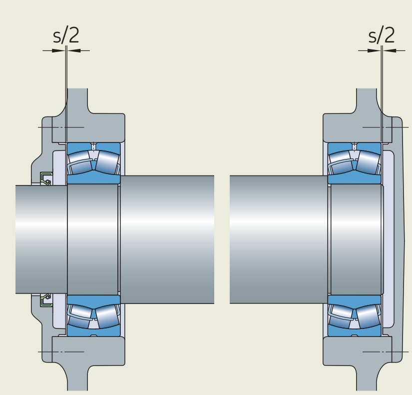


Fig. 16

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

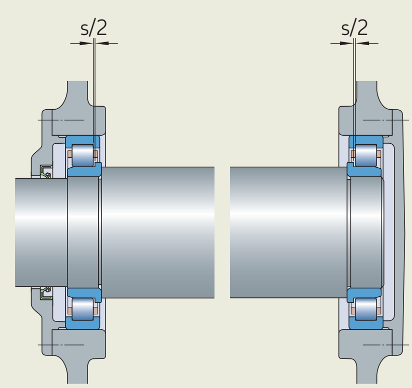
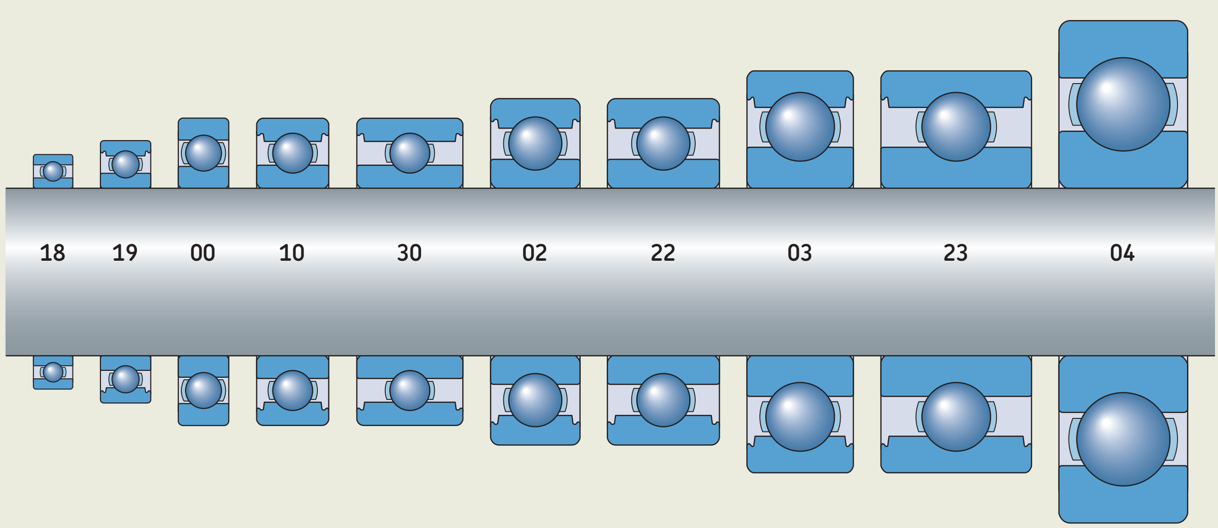


Fig. 18

ISO dimension series for the same bore diameter



B.2 Bearing type and arrangement

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.

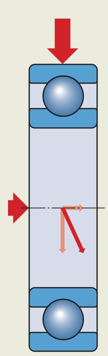
When combined loads have a large alternating axial load component, suitable solutions include:

- 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.

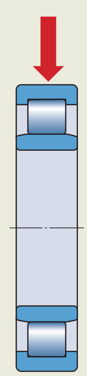
Fig. 19

Direction of load



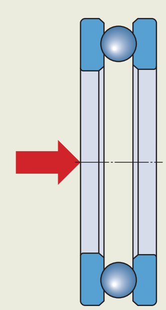
Combined load
The resulting load direction is determined by the ratio of radial to axial load.

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.

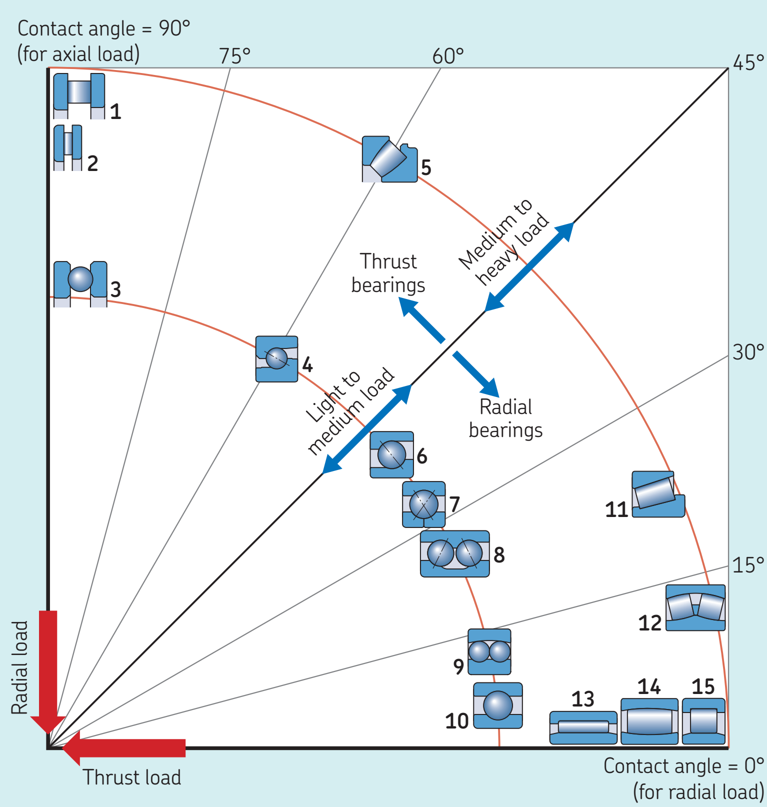
When selecting bearing type on the basis of operating speed, you should consider the following:

- 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.

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)

Table 1

Types of misalignment

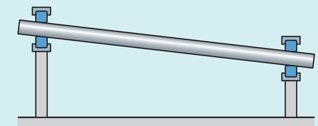
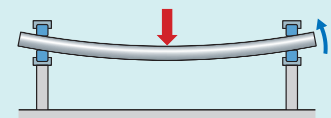
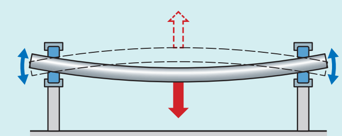
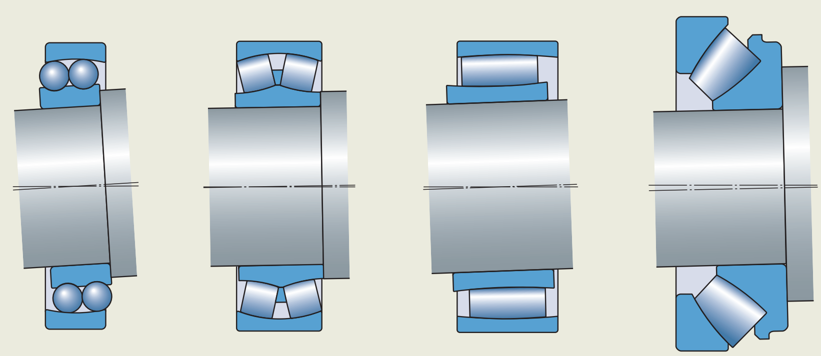
Static misalignment	There is an initial alignment error between the two supports of a shaft.	
	Shaft deflection creates misalignment between bearing inner and outer rings that is constant in magnitude and direction.	
Dynamic misalignment	Varying shaft deflection creates misalignment between bearing inner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

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

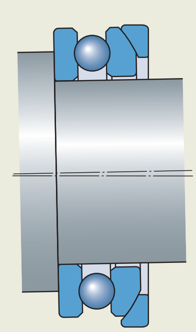
			Stabilized for temperatures ≤ 120 °C *(250 °F)*	≤ 150 °C *(300 °F)*	≤ 200 °C *(390 °F)*
Ball bearings	**Radial**	Deep groove ball bearings	•	–	–
		Angular contact ball bearings	•	•	–
		Four-point contact ball bearings	•	•	–
		Self-aligning ball bearings	•	○	–
	Thrust	Thrust ball bearings	•	• 1)	–
Roller 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.

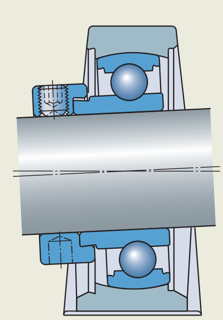
B.2 Bearing type and arrangement

Fig. 21

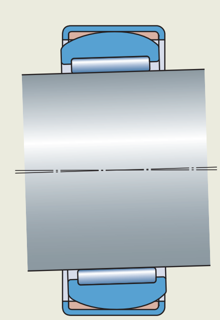
Alignment bearings



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

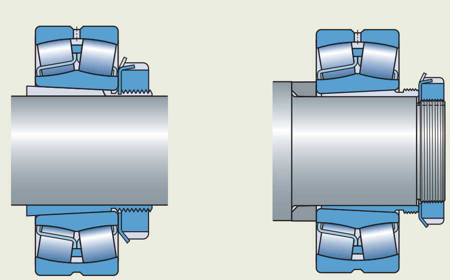
There are two reasons for sealing bearings or bearing arrangements:

- 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**.

Fig. 22

Bearings with tapered bore on sleeves



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 $D \geq 420$ 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**.

B.3 Bearing size

B.3 Bearing size

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:

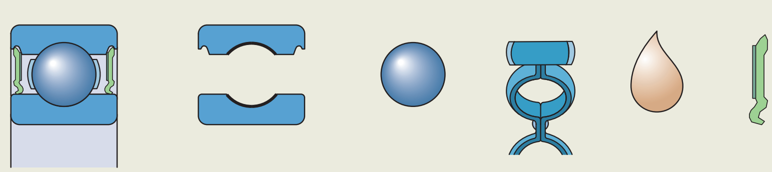
- **Size selection based on rating life,** **page 88**
  This is based on the required bearing life, taking into account the possible effects of rolling contact fatigue, and requires calculation of the basic rating life, L_{10}, or SKF rating life, L_{10m}, for the bearing.

- **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

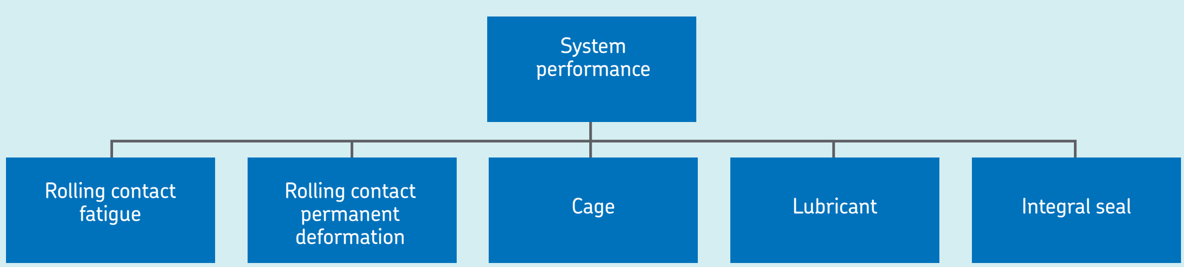
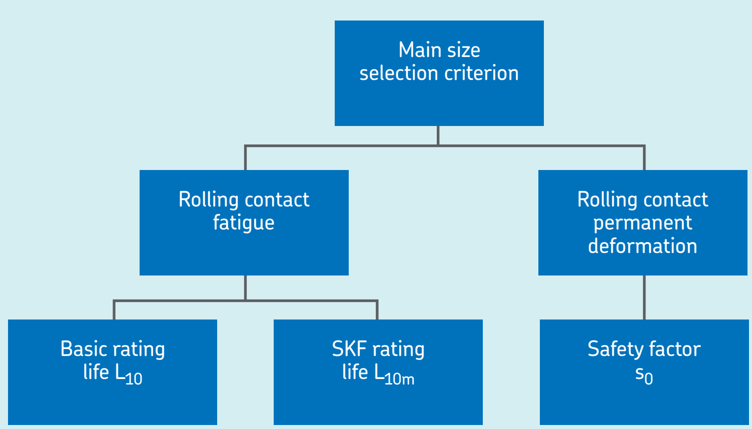


Diagram 2

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, κ*, page 102
- *Fatigue load limit, P_u*, page 104
- *Contamination factor, η_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** 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, κ*, **page 102**), the load level in relation to the bearing fatigue load limit, and a factor η_c for the contamination level (*Contamination factor, η_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** 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%.

B.3 Bearing size

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

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

where

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

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

$U_1, U_2, \ldots$ = 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.

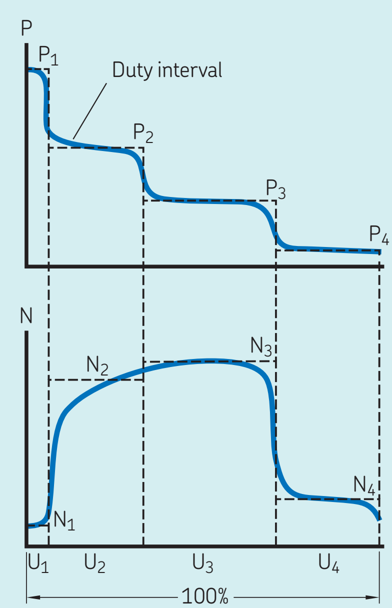
Table 3

Values for life adjustment factor a_1

Reliability	Failure probability n	SKF rating life L_{nm}	Factor 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

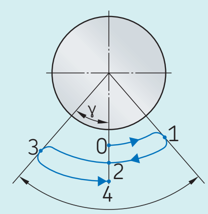
When calculating the bearing rating life, a value for equivalent dynamic bearing load is required for both basic bearing life and SKF bearing life equations.

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** 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

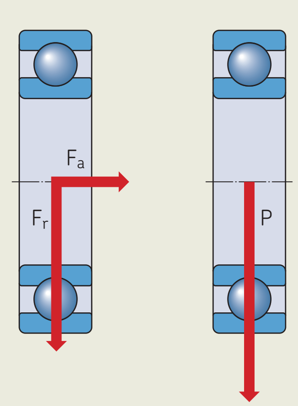


Diagram 4

Load averaging

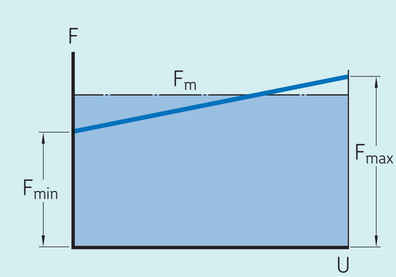
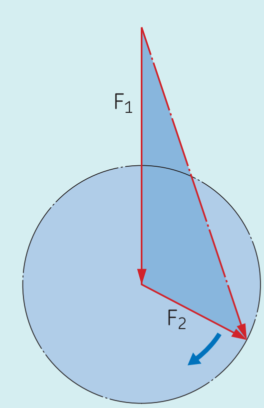


Diagram 5

Rotating load



Considerations when calculating equivalent dynamic bearing load

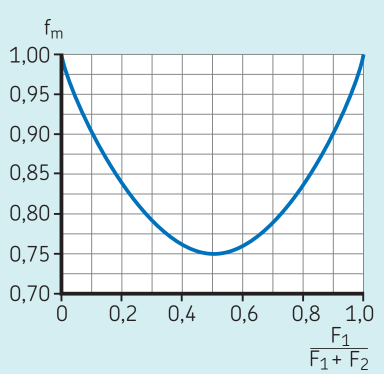
For the sake of simplification, when calculating the load components for bearings supporting a shaft, the shaft is considered as a statically determined beam resting on rigid, moment-free supports. Elastic deformations in the bearing, the housing or the machine frame are not considered, nor are the moments 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.

Diagram 6

Rotating load



Geared transmissions

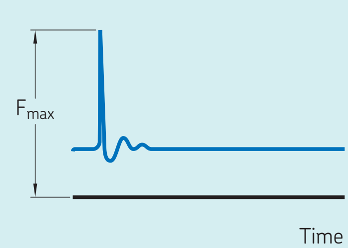
With geared transmissions, the theoretical tooth forces can be calculated from the power transmitted and the design characteristics of the gear teeth. However, there are additional dynamic forces, produced either by the gear, or by the input or output shaft. Additional dynamic forces from gears can be 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.

Diagram 7

Short time peak load



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

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 (η_c)
- the lubrication condition (viscosity ratio κ)

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, κ, 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 η_c
- cooling or using a lubricant with higher viscosity increases the viscosity ratio κ
- 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 η_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 κ:

- **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}

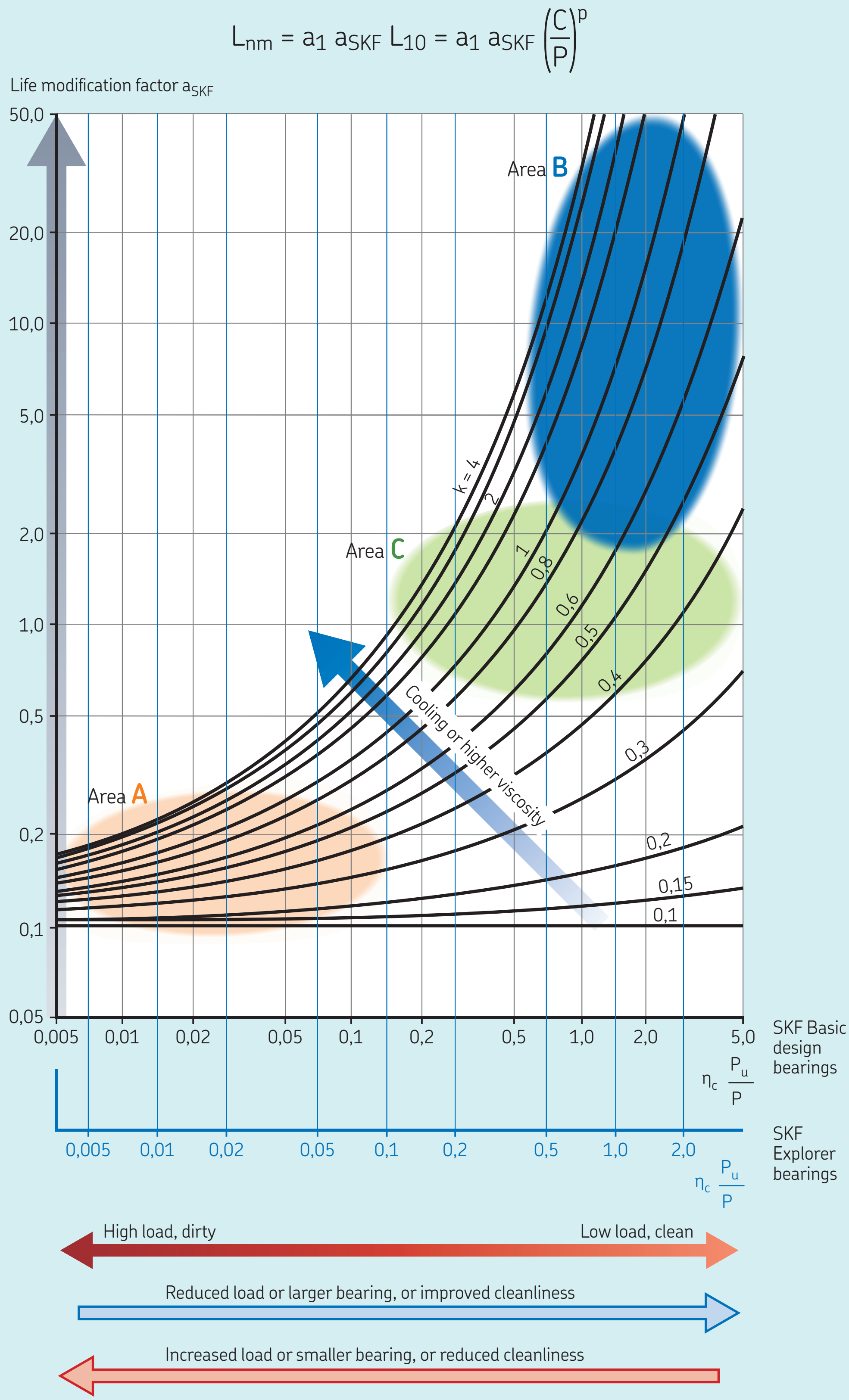


Diagram 9

Factor a_{SKF} for radial ball bearings

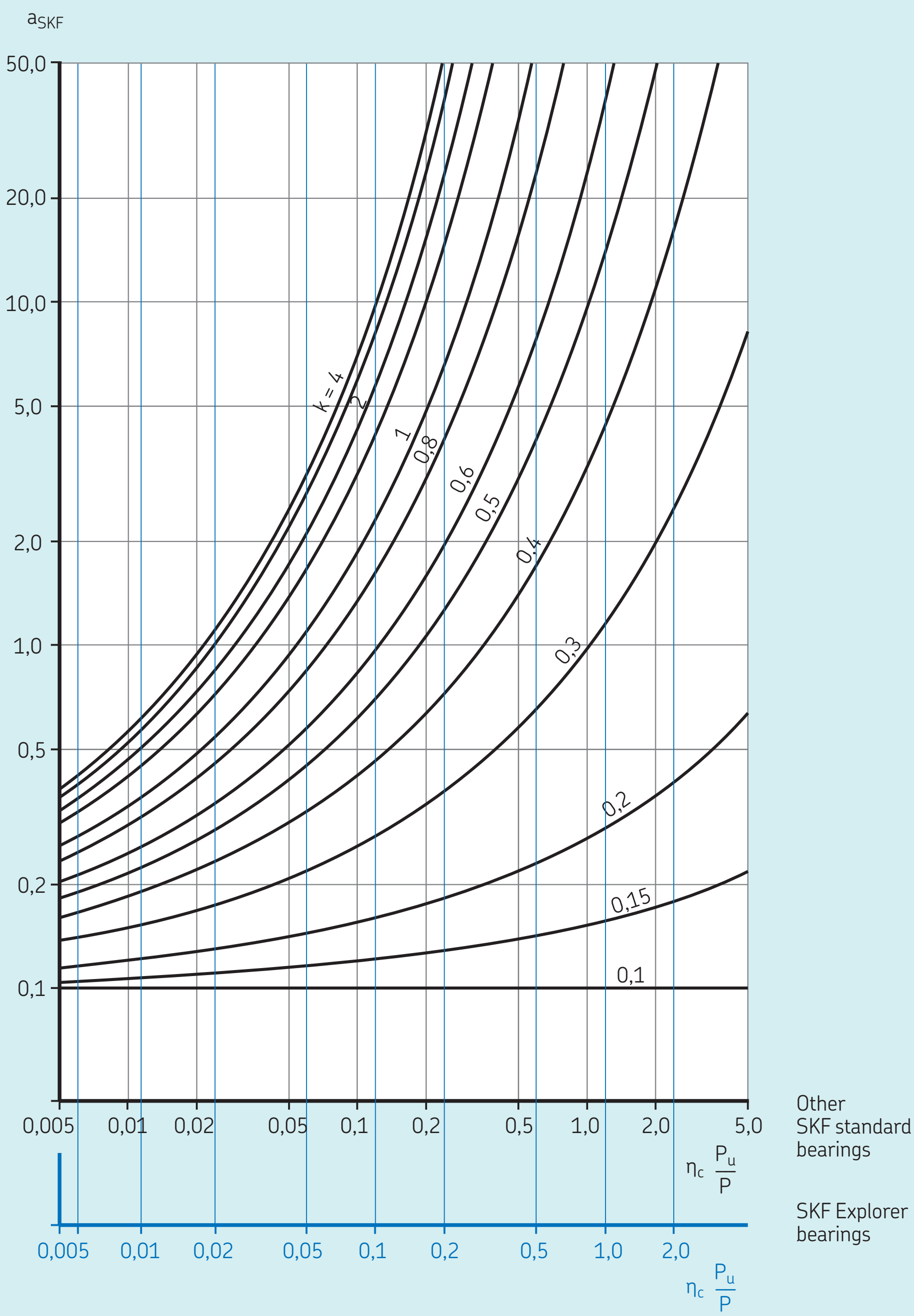


Diagram 10

Factor a_{SKF} for radial roller bearings

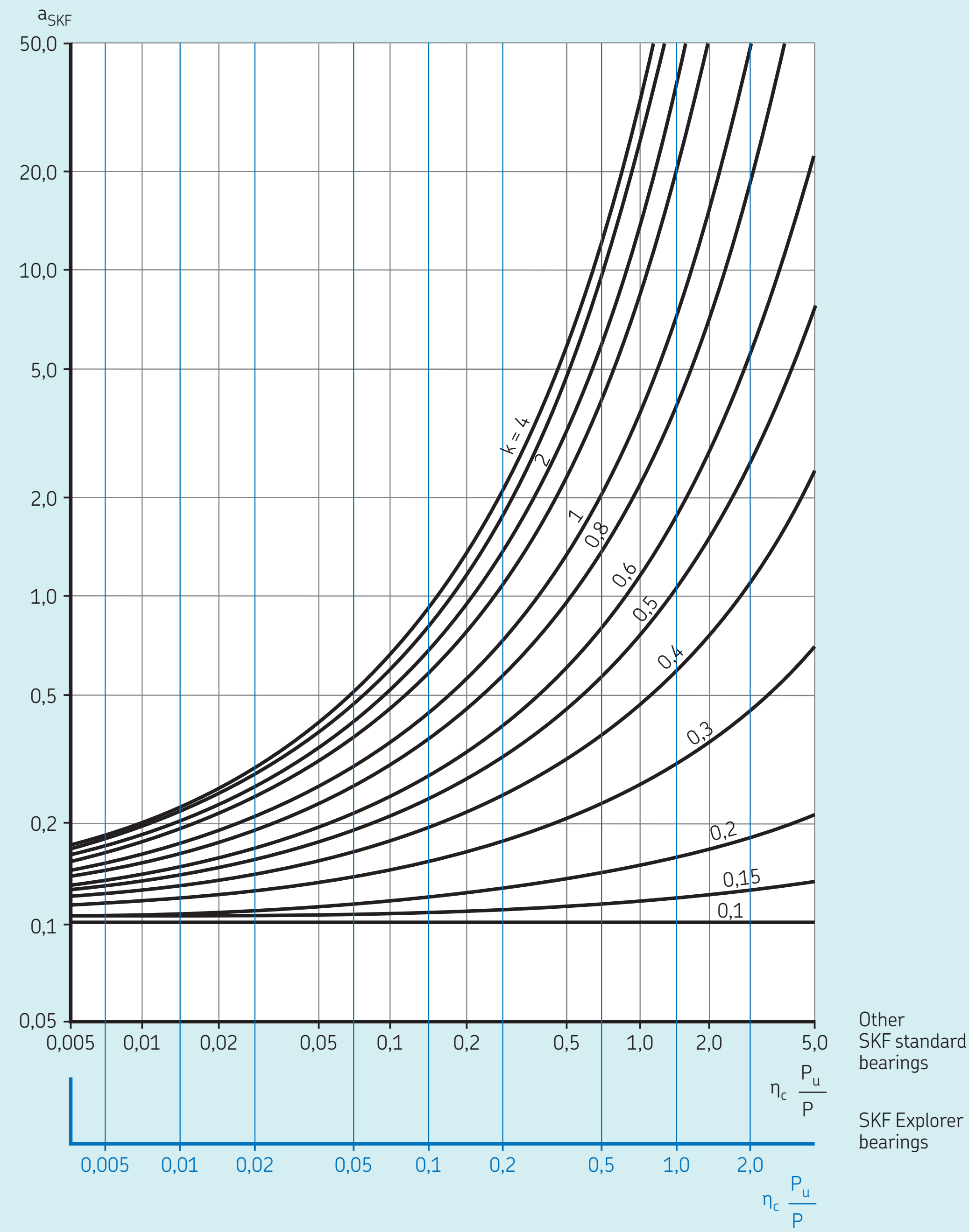


Diagram 11

Factor a_{SKF} for thrust ball bearings

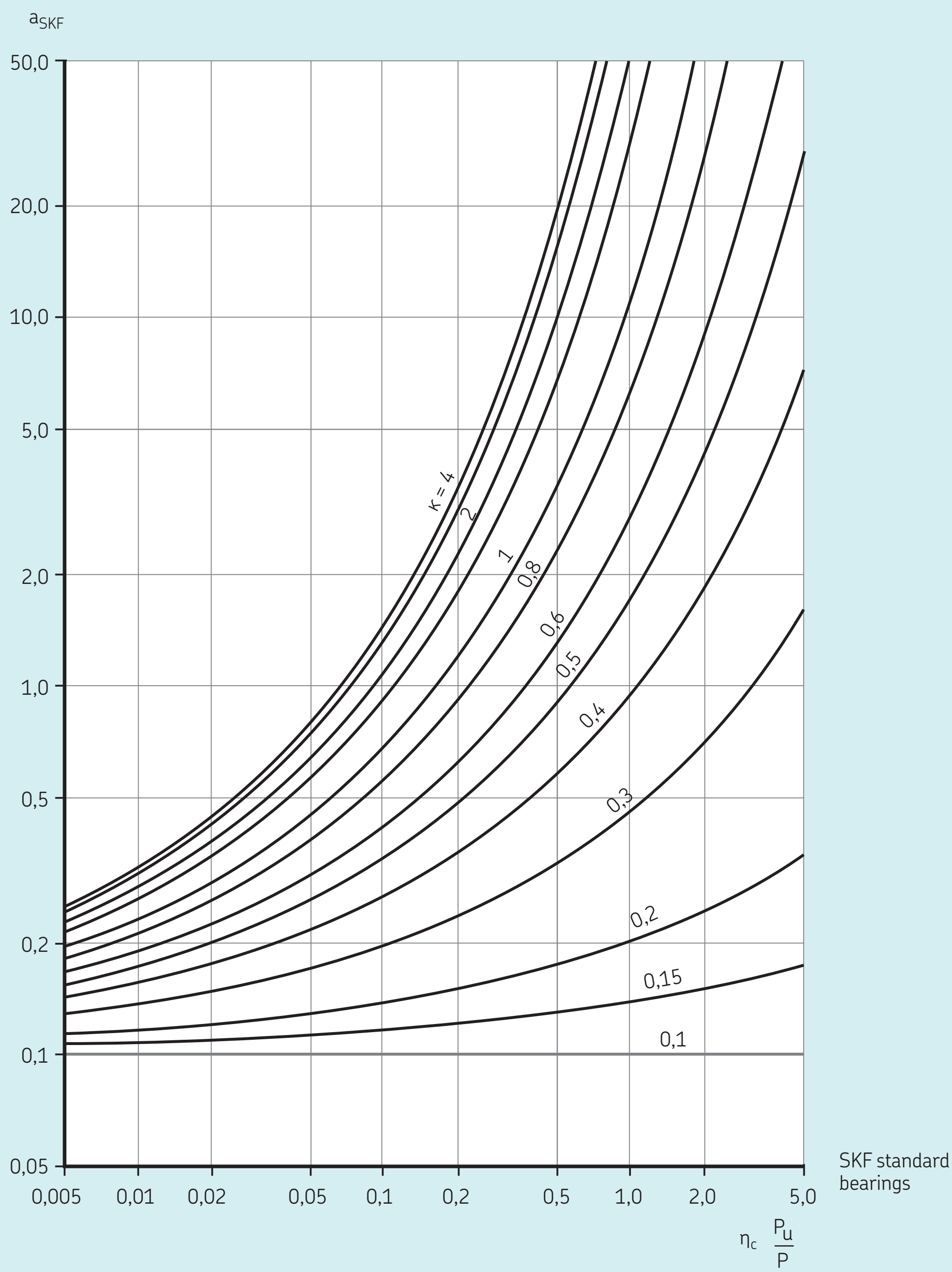


Diagram 12

Factor a_{SKF} for thrust roller bearings

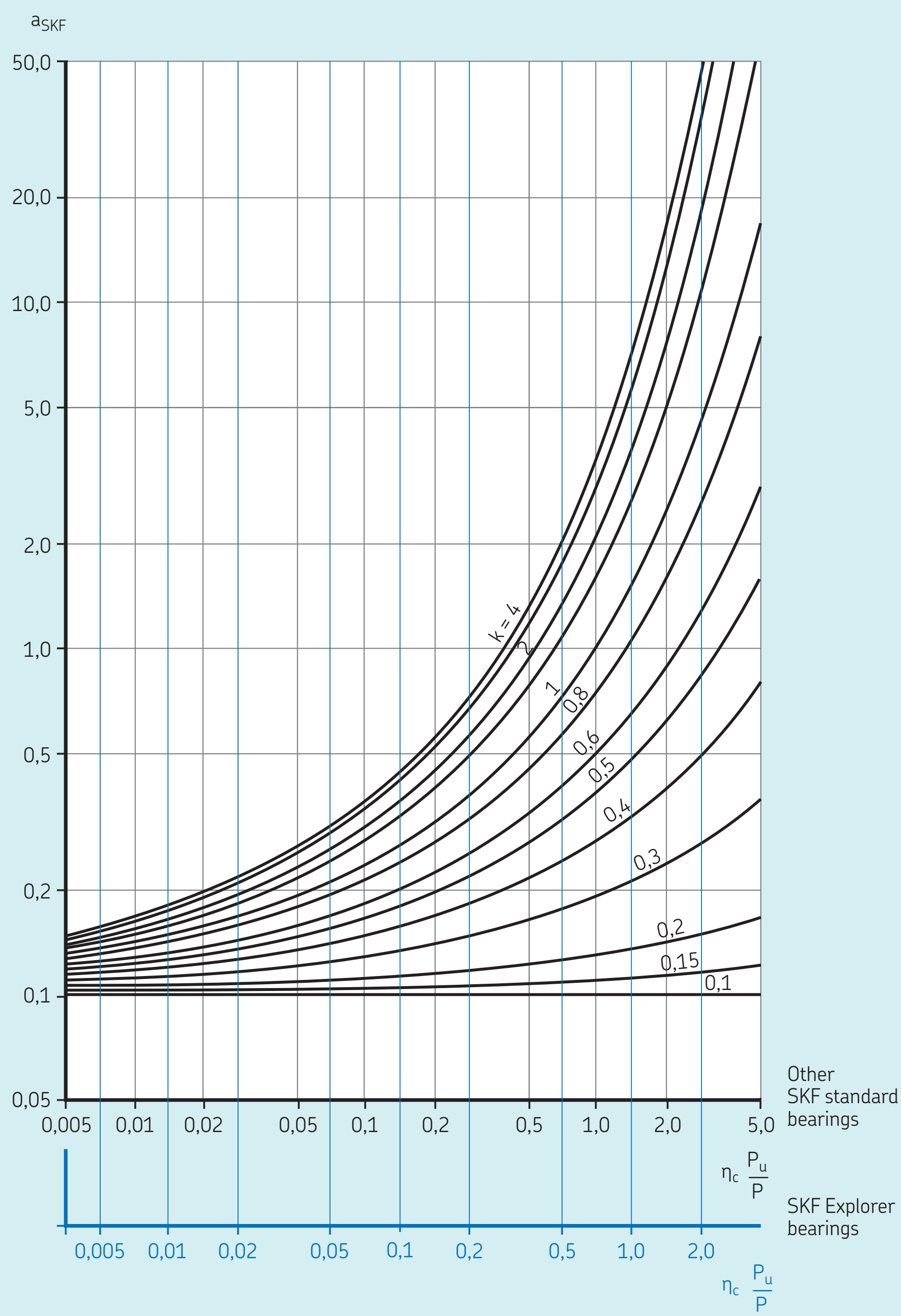


Diagram 13

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

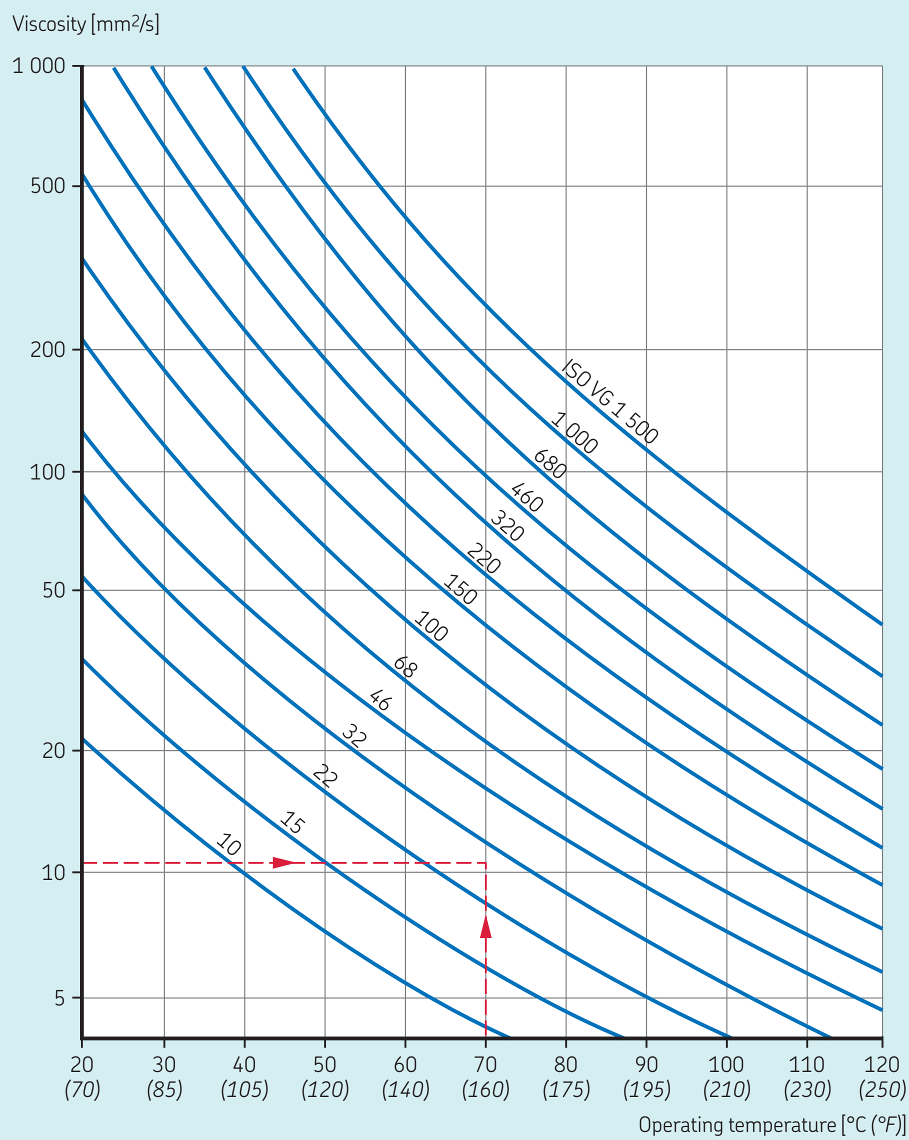
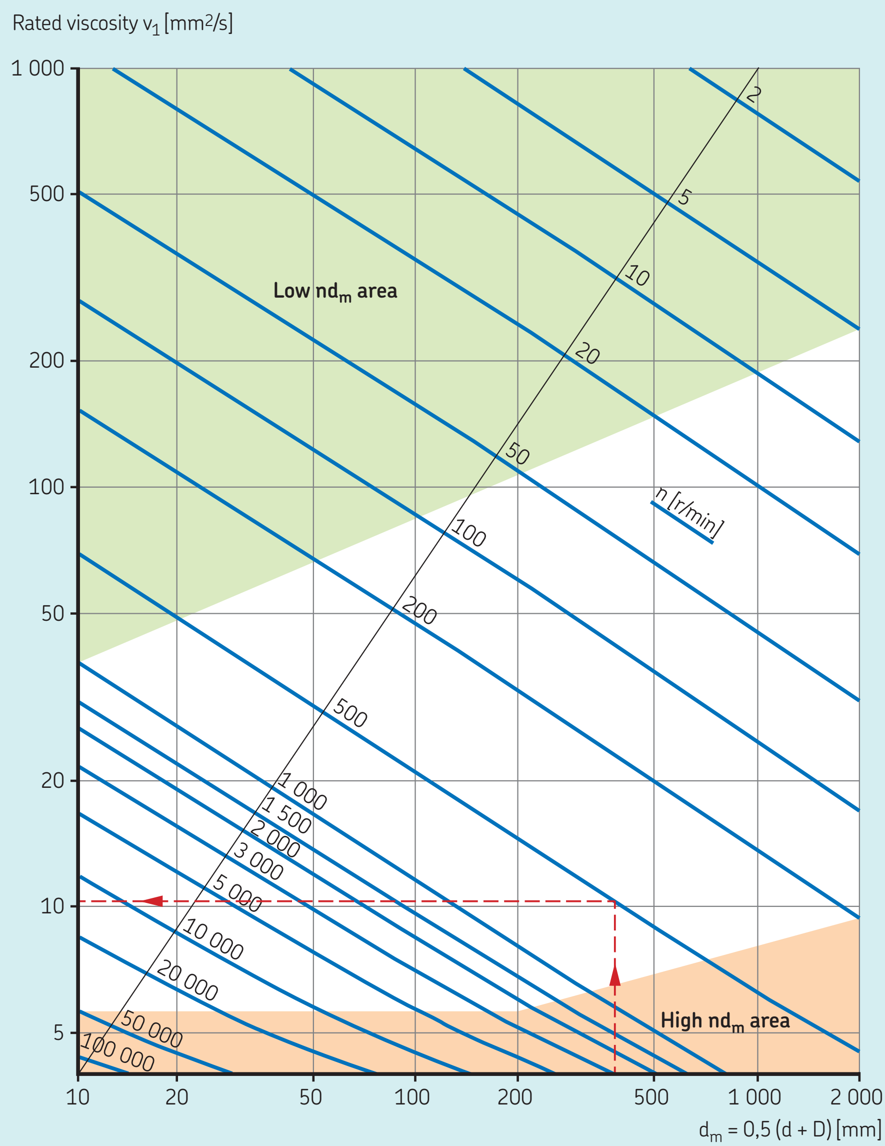


Diagram 14

Estimation of the rated viscosity ν_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
κ = lubrication condition of the bearing, i.e. viscosity ratio
ν = actual operating viscosity of the oil or the grease base oil [mm²/s]
ν_1 = rated viscosity, function of the mean bearing diameter and rotational speed [mm²/s]

The actual operating viscosity, ν, 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, ν_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.

- κ = 4 indicates a regimen for which the rolling contact load is carried by the lubricant film – i.e. full film lubrication.
- κ > 4 (i.e. better than full film lubrication) will not further increase the rating of the bearing. However, κ > 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.
- κ < 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 κ < 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 < κ < 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 κ < 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, η_c, is higher than 0,2 and the resulting a_{SKF} factor is lower than 3. Under those conditions, a value of κ_{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)*.

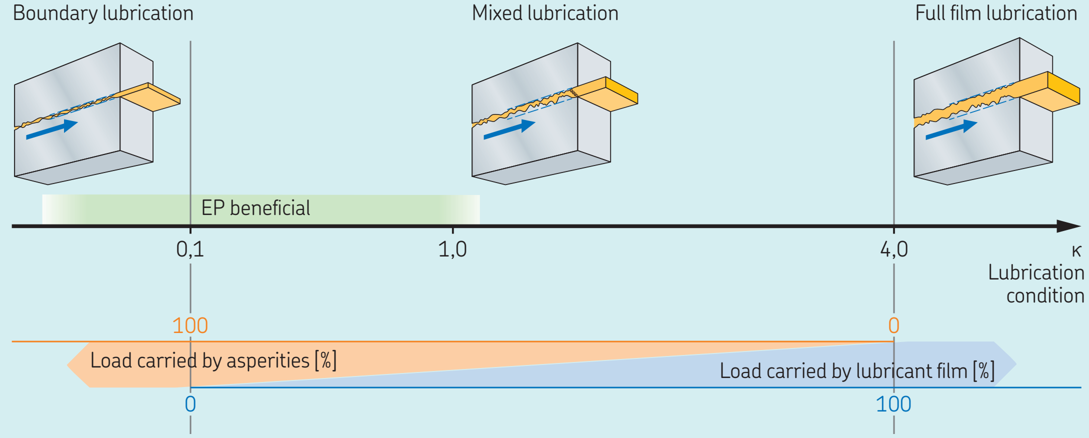
Table 5

Viscosity classification to ISO 3448

Viscosity grade	Kinematic viscosity limits at 40 °C (*105°F*) mean	min.	max.
–	mm²/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 Full asperity contact, wear without EP/AW additives, high friction	κ ≤ 0,1	static safety factor
Mixed lubrication Reducing asperity contact, wear and surface fatigue without EP/AW additives, friction reduced	0,1 < κ ≤ 4	SKF rating life and static safety factor[1)]
Full film lubrication No asperity contact, increasing viscous frictional moment	κ > 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, η_c

The contamination factor, η_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 η_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 η_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 η_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 η_c, use the *SKF Bearing Calculator* (skf.com/bearingcalculator).

A more detailed method for estimating the contamination factor η_c is described in a separate paper (*Method for estimating contamination factor, η_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

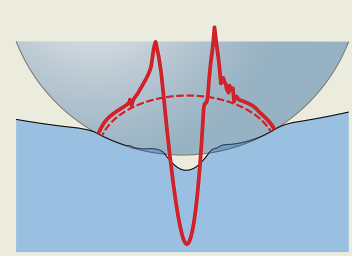
The basic static load rating C_0 is defined in ISO 76 as the load that results in a certain value of contact stress at the centre of contact of the most heavily loaded rolling element/raceway. The contact stress values are:

- 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

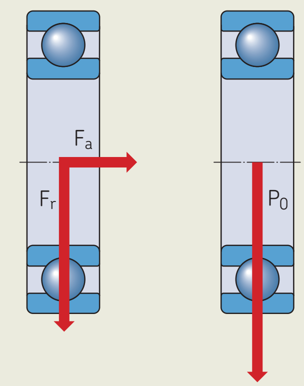


Table 6

Guideline values for factor η_c for different level of contamination

Conditions	Factor η_c[1] for bearings with diameter d_m < 100	d_m ≥ 100 mm
Extreme cleanliness • Particle size of the order of the lubricant film thickness • Laboratory conditions	1	1
High cleanliness • Oil filtered through an extremely fine filter • Typical conditions: sealed bearings that are greased for life	0,8 ... 0,6	0,9 ... 0,8
Normal cleanliness • Oil filtered through a fine filter • Typical conditions: shielded bearings that are greased for life	0,6 ... 0,5	0,8 ... 0,6
Slight contamination • 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 • Typical conditions: bearings without integral seals, coarse filtering, wear particles, and ingress from surroundings	0,3 ... 0,1	0,4 ... 0,2
Severe contamination • Typical conditions: high levels of contamination due to excessive wear and/or ineffective seals • Bearing arrangement with ineffective or damaged seals	0,1 ... 0	0,1 ... 0
Very severe contamination • 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 η_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 (η_c = 0), the useful life of the bearing can be significantly shorter than the rating life.

B.3 Bearing size

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** Permanent deformation acceptance Yes	Some	No	**Infrequent motion** Permanent deformation acceptance Yes
High certainty For example, gravity loading and no vibration	0,5	1	2	0,4
Low certainty For example, peak loading	≥ 1,5	≥ 1,5	≥ 2	≥ 1

SKF

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** Permanent deformation acceptance Yes	Some	No	**Infrequent motion** Permanent deformation acceptance Yes
High certainty For example, gravity loading and no vibration	1	1,5	3	0,8
Low certainty 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

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, κ, 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.

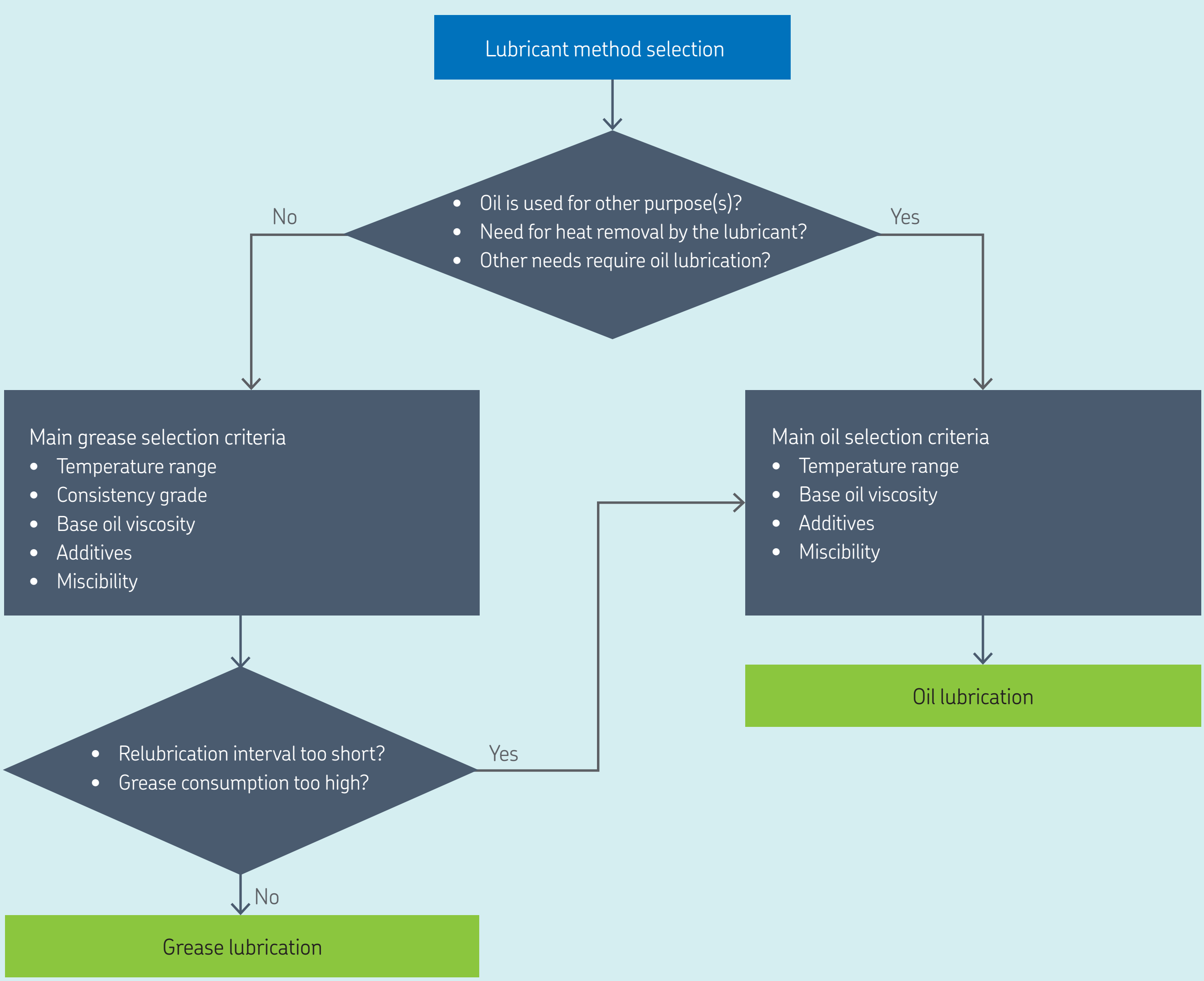
Relubrication should occur frequently enough to avoid grease deterioration having an adverse effect on the bearing life. Therefore, the SKF relubrication interval, t_f, is defined as the time period at the end of which there is only a 1% probability that the bearing will fail because of grease degradation. 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]

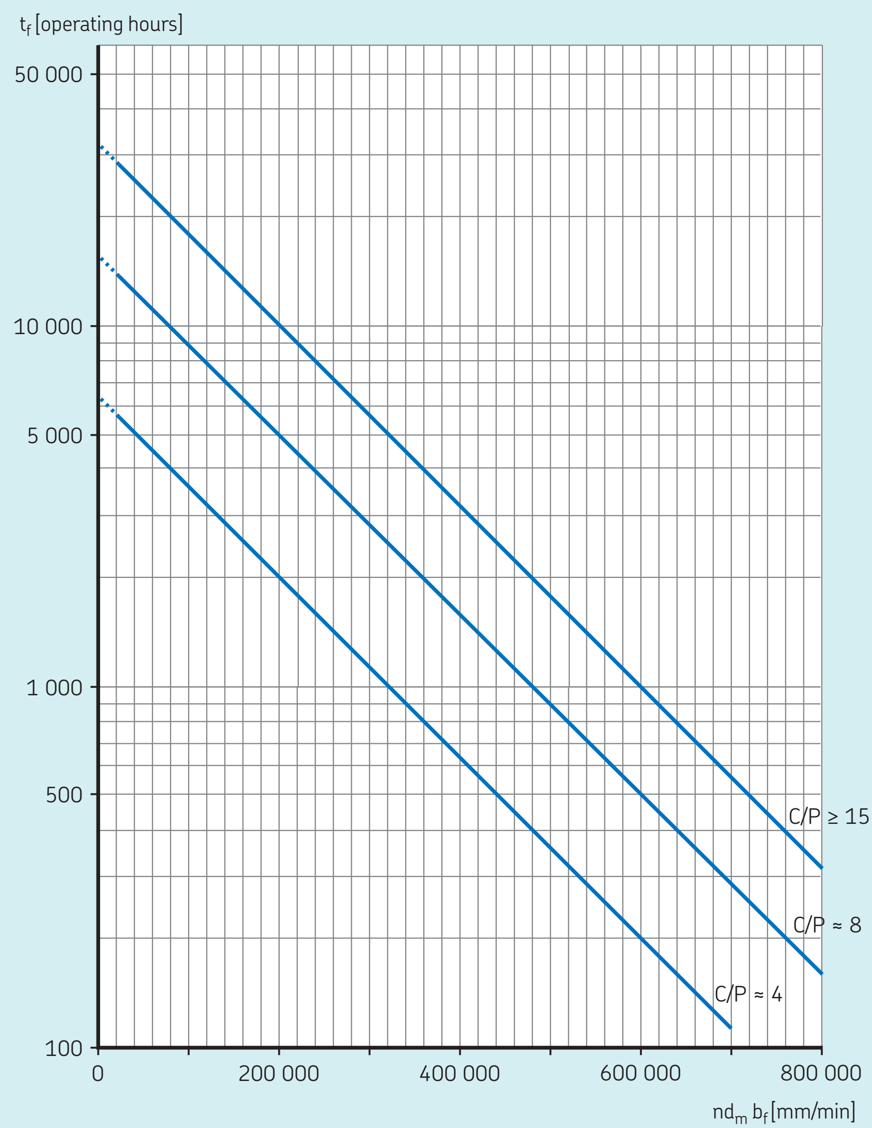
D = outside diameter [mm]

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.

B.4 Lubrication

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

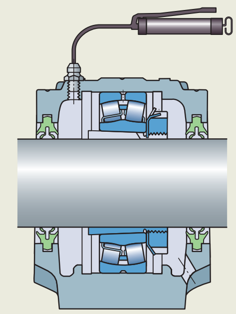


Fig. 2

Relubrication in the centre

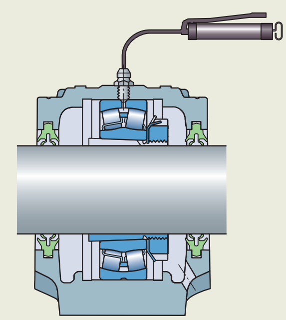
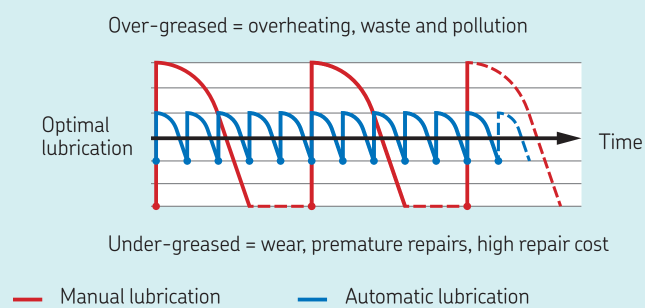


Diagram 3

Relubrication method and impact on performance



B.4 Lubrication

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: **Low** Relubrication intervals are given by grease life. It is assumed that there will be no or slight ingress of contamination entering the bearing. **Medium** Some contaminants may enter the bearing. Some additional relubrication is required to remove contaminants. **High** There is a clear risk that contaminants will enter the bearing. Relubrication is required to remove aged grease and to remove contaminants. **Severe** 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.

B.4 Lubrication

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 nd_m	Spherical roller, tapered roller, CARB toroidal roller bearings	Cylindrical roller bearings
–		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.

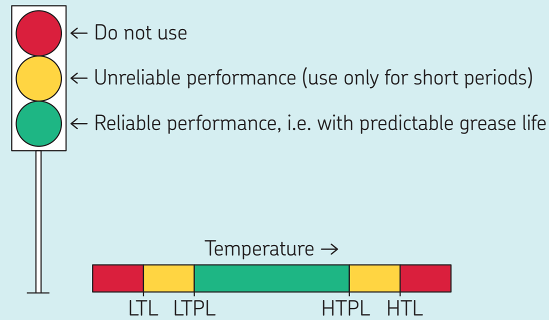
The SKF traffic light concept for grease temperature performance

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

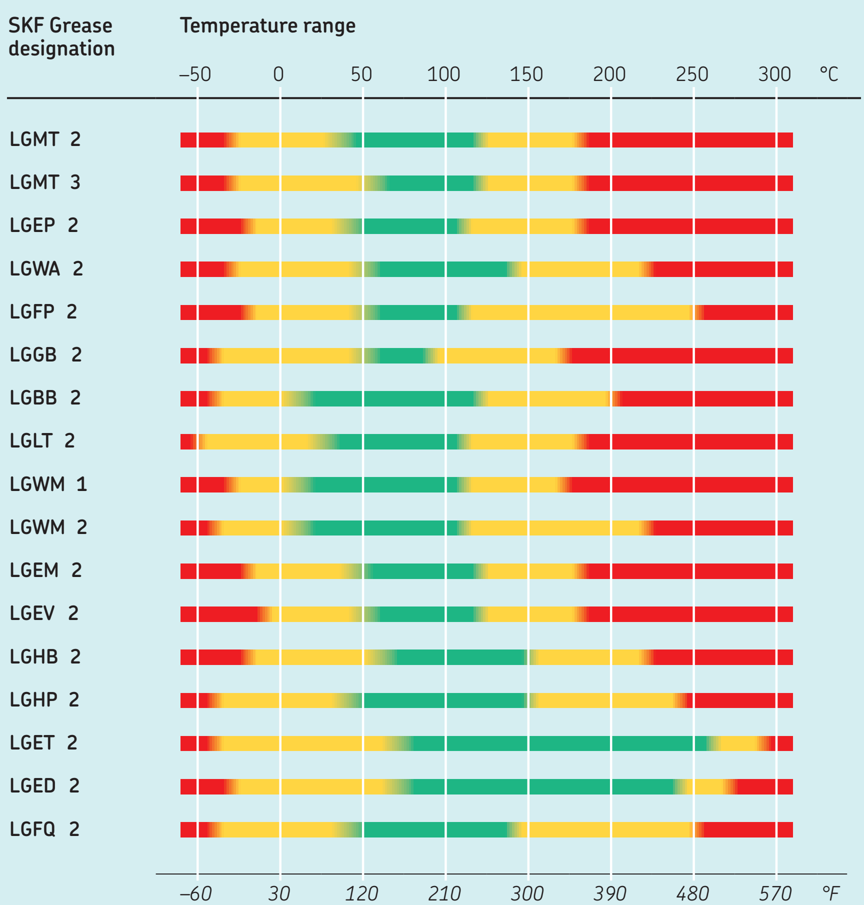
The SKF traffic light concept



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 κ, at the expected operating temperature, evaluated as described in *Lubrication condition – the viscosity ratio, κ*, **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.

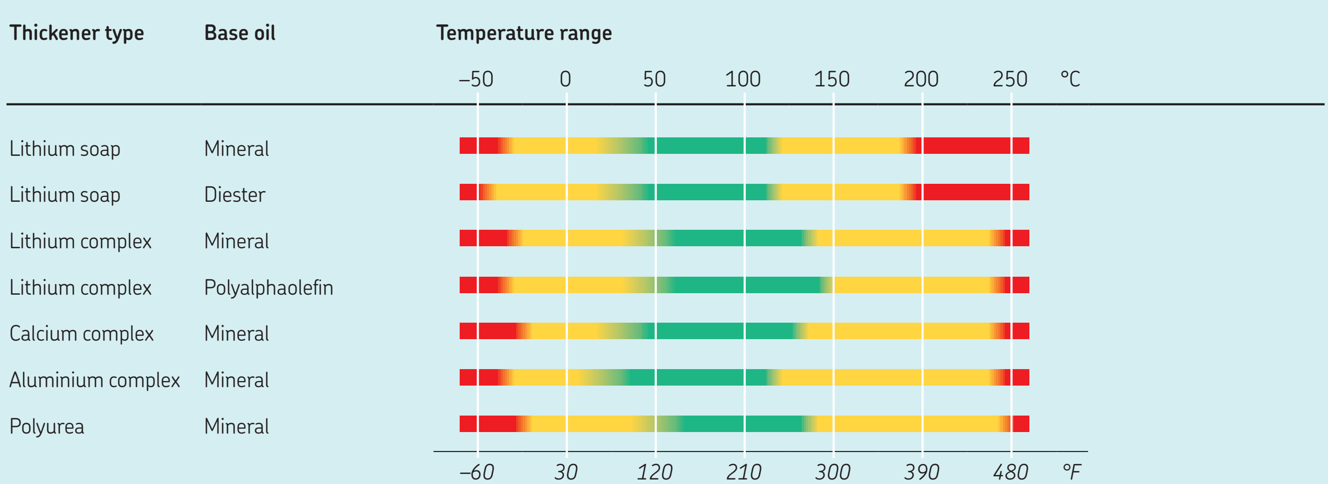
Regarding the lubrication condition for mineral and synthetic oils, the combined effect of the viscosity index and the pressure-viscosity coefficient normally cancel each other out.

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



B.4 Lubrication

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

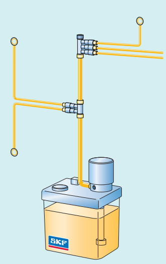
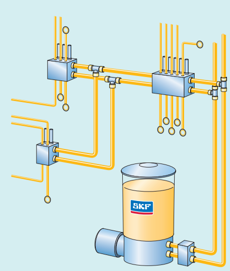
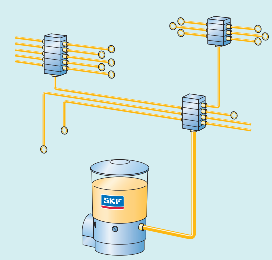
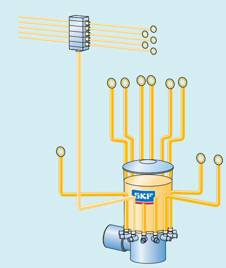
	SKF MonoFlex	**SKF DuoFlex**	**SKF ProFlex**	**SKF MultiFlex**
				
Type	Single-line	Dual-line	Progressive	Multi-line
Suitable lubricants	Oil Grease with NLGI grades from 000 to 2	Oil Grease with NLGI grades from 000 to 3	Oil Grease with NLGI grades from 000 to 2	Oil Grease with NLGI grades from 000 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** Mineral	PAO	Ester	PAG
Pour point	[°C] *[°F]*	–30 .. 0 *–20 .. 30*	–50 .. –40 *–60 .. –40*	–60 .. –40 *–75 .. –40*	approx. –30 *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

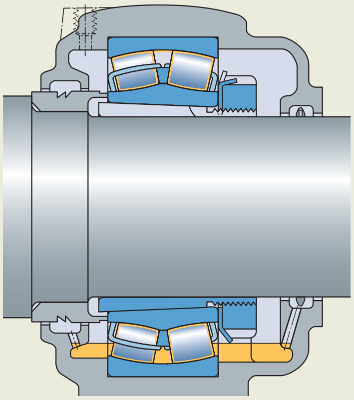


Fig. 4

Self-circulating oil by drain and ducts

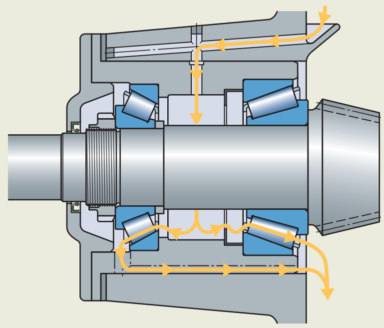


Fig. 5

Oil pick-up rings on SONL housing

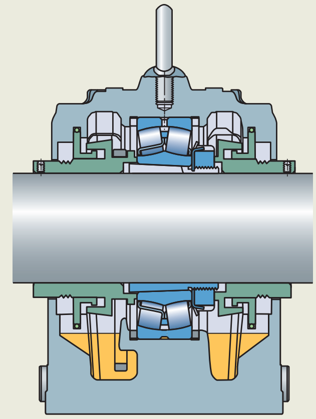


Fig. 6

Pumping effect in vertical shaft application

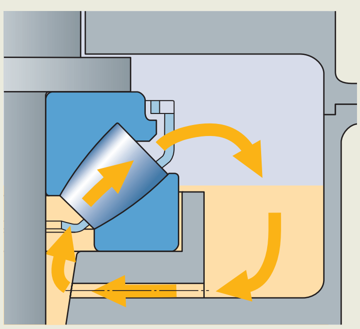


Fig. 8

Oil jet

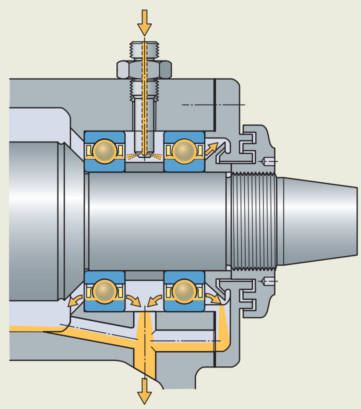


Fig. 7

Circulating oil

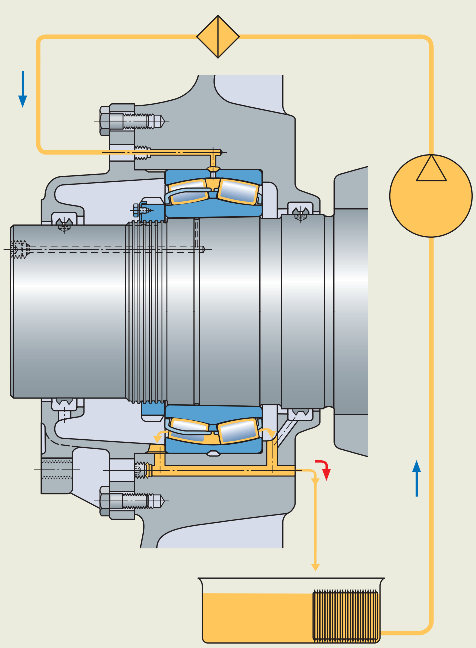
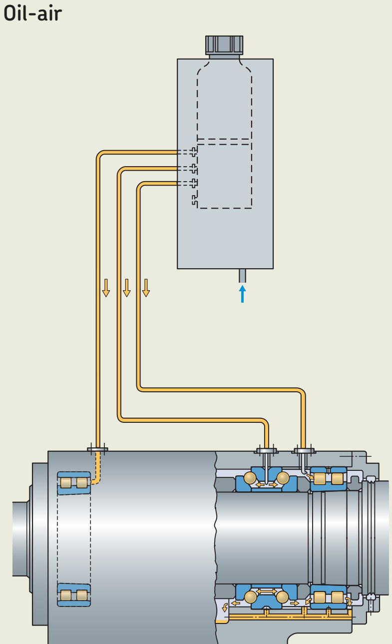


Fig. 9

Oil-air



SKF bearing grease selection chart

Grease	Description	Application example	Temperature range[1] LTL	HTPL	Temp.	Speed
LGMT 2	General purpose industrial and automotive	Automotive wheel bearings Conveyors and fans 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 Vertical shaft or outer bearing ring rotation 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 Work roll bearings in steel industry 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 Washing machines 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 Construction and earthmoving equipment 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 Wrapping machines Bottling machines	–20 °C *(–5 °F)*	110 °C *(230 °F)*	M	M
LGFQ 2	Food compatible High load	Pellet presses Mills 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 Small electric motors and robots 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 Centralised lubrication systems 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 Heavy duty off road or marine applications 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 Construction machinery Vibrating machinery	–20 °C *(–5 °F)*	120 °C *(250 °F)*	M	VL
LGEV 2	Extremely high viscosity with solid lubricants	Trunnion bearings Support and thrust rollers on rotary kilns and dryers 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 Dryer section of paper mills Work roll bearings and continuous casting in steel industry 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 Fans, even at high speed 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 Harsh environment	Bakery/brick oven equipment Glass industry Vacuum pumps	–30 °C *(–20 °F)*	240 °C *(465 °F)*	VH	L to M
LGET 2	Extreme temperature	Bakery equipment (ovens) Wafer baking machines 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	●			+		+
L to M	Lithium soap / mineral oil	3	125	+	●		+		●
H	Lithium soap / mineral oil	2	200	●		●	+	+	+
L to H	Lithium complex soap / mineral oil	2	185	●	●	●	●	+	+
M to H	Lithium-calcium soap / synthetic ester oil	2	110	●		+	+	+	●
L to M	Aluminium complex / medical white oil	2	150	●					+
L to VH	Complex calcium sulphonate/PAO	1–2	320	●	●	+	+	+	+
M to H	Lithium complex soap / synthetic PAO oil	2	68			+	+	+	+
L	Lithium soap / synthetic PAO oil	2	18	●				●	●
H	Lithium soap / mineral oil	1	200			+		+	+
L to h	Complex calcium sulphonate / synthetic PAO oil / mineral oil	1–2	80	●	●	+	+	+	+
H to VH	Lithium soap / mineral oil	2	500	●		+	+	+	+
H to VH	Lithium-calcium soap / mineral oil	2	1 020	●		+	+	+	+
L to VH	Complex calcium sulphonate / mineral oil	2	425	●	+	+	+	+	+
L to M	Di-urea / mineral oil	2–3	96	+			●	●	+
H to VH	PTFE / synthetic fluorinated polyether oil	2	460	●	●	+	●	●	●
H to VH	PTFE / synthetic fluorinated polyether oil	2	400	●	+	+	●	●	●

Wide application greases

Special requirements

Low temperature

High loads

High temperature

● = Suitable + = Recommended

B.4 Lubrication

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 *°F*	–30 to +120 *(–20 to +250)*	–30 to +120 *(–20 to +250)*	–20 to +110 *(–5 to +230)*	–30 to +140 *(–20 to +285)*	–40 to +90 *(–40 to +195)*	–20 to +110 *(–5 to +230)*	–40 to +140 *(–40 to +285)*
Dropping point DIN ISO 2176	°C *°F*	>180 *(>355)*	>180 *(>355)*	>180 *(>355)*	>250 *(>480)*	>170 *(>340)*	>250 *(>480)*	>300 *(>570)*
Base oil viscosity 40 °C *(105 °F)* 100 °C *(210 °F)*	 mm^2/s mm^2/s	 110 11	 125 12	 200 16	 185 15	 110 13	 150 15,3	 320 30
Penetration DIN ISO 2137 60 strokes 100 000 strokes	 10^{-1} mm 10^{-1} mm	 265–295 +50 max. (325 max.)	 220–250 280 max.	 265–295 +50 max. (325 max.)	 265–295 +50 max. (325 max.)	 265–295 +50 max. (325 max.)	 265–295 +30 max.	 280–310 +30 max.
Mechanical stability Roll stability, 50 h at 80 °C *(175 °F)* V2F test	 10^{-1} mm	 +50 max. "M"	 295 max. "M"	 +50 max. "M"	 +50 max. change "M"	 +70 max. (350 max.)		 –20 to +30 max.
Corrosion protection Emcor: – standard ISO 11007 – water washout test – salt water test (100% seawater)		 0–0 0–0 0–1 1)	 0–0 0–0	 0–0 0–0 1–1 1)	 0–0 0–0 1)	 0–0	 0–0 1)	 0–0 0–0
Water resistance 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 DIN 51 817, 7 days at 40 °C *(105 °F)*, static	%	1–6	1–3	2–5	1–5	0,8–3	1–5	3 max.
Lubrication ability R2F, running test B at 120 °C *(250 °F)* R2F, cold chamber test, –30 °C *(–20 °F)*, +20 °C *(+70 °F)*		 Pass	 Pass	 Pass	 Pass 100 °C *(210 °F)*	 Pass 100 °C *(210 °F)* 1)		 Pass
Copper corrosion DIN 51 811		2 max. 110 °C *(230 °F)*	2 max. 130 °C *(265 °F)*	2 max. 110 °C *(230°F)*	2 max. 100 °C *(210°F)*		1 max. 120 °C *(250 °F)*	1b max. 100 °C *(210°F)*
Rolling bearing grease life R0F test L_{50} life at 10 000 r/min	h		1 000 min., 130 °C *(265 °F)*			>300, 120 °C *(250 °F)*	1 000, 110 °C *(230 °F)* 1)	
EP performance Wear scar DIN 51350/5, 1 400 N 4–ball test, welding load DIN 51350/4	 mm N			 1,4 max. 2 800 min.	 1,6 max. 2 600 min.	 1,8 max. 2 600 min.	 1 100 min.	 1 max. >4 000
Fretting corrosion ASTM D4170 FAFNIR test at +25 °C *(75 °F)*	mg			5,7 1)				0,8 1)
Low temperature torque IP186, starting torque IP186, running torque	 Nmm 1) Nmm 1)	 98, –30 °C *(–20 °F)* 58, –30 °C *(–20 °F)*	 145, –30 °C *(–20 °F)* 95, –30 °C *(–20 °F)*	 70, –20 °C *(–5 °F)* 45, –20 °C *(–5 °F)*	 40, –30 °C *(–20 °F)* 30, –30 °C *(–20 °F)*		 137, –30 °C *(–20 °F)* 51, –30 °C *(–20 °F)*	 369, –40° C (–40°F) 223, –40 °C (–40°F)

Special requirements (LGGB 2, LGFP 2, LGFQ 2)

Wide applications greases (LGMT 2, LGMT 3, LGEP 2, LGWA 2, LGGB 2, LGFP 2)

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 (fluorinated polyether)	Synthetic (fluorinated 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 4,5	200 16	80 8,6	500 32	1 020 58	425 26,5	96 10,5	460 42	400 38
265–295 +50 max.	265–295 +50 max.	310–340 +50 max.	280–310 +30 max	265–295 325 max.	265–295 325 max.	265–295 –20 to +50 (325 max.)	245–275 365 max.	265–295 271 1)	265–295 –
+50 max.			+50 max.	345 max. "M"	+50 max. "M"	–20 to +50 "M"	365 max.		±30 max. 130 °C *(265 °F)*
0–0 0–1 1)	0–1	0–0 0–0	0–0 0–0 0–0 1)	0–0 0–0	0–0 0–0 1) 0–0 1)	0–0 0–0 0–0 1)	0–0 0–0 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, 60 °C *(140 °F)*	1–5 1)		13 max. 30 h 200 °C *(390 °F)*
			Pass, 140 °C *(285 °F)* Pass, Pass	Pass, 100 °C *(210 °F)*		Pass, 140 °C *(285 °F)*	Pass		
1 max. 120 °C *(250 °F)*	1 max. 100 °C *(210 °F)*	2 max. 90 °C *(>195 °F)*	2 max. 100 °C *(210 °F)*	2 max. 100 °C *(210 °F)*	1 max. 100 °C *(210 °F)*	2 max. 150 °C *(300 °F)*	1 max. 150 °C *(300 °F)*	1 max. 100 °C *(210 °F)* 1)	1 max. 150 °C *(300 °F)*
	>1 000, 20 000 r/min 100 °C *(210 °F)*		1 824 1), 110 °C *(230 °F)*			>1 000, 130 °C *(265 °F)*	1 000 min. 150 °C *(300 °F)*	>700 at 220 °C *(430 °F)*	>1 000 1) at 220 °C *(428 °F)*
0,4 1) 5 500 1)	2 000 min.	1,8 max. 3 200 min. 1)	1,5 max. 1) 4 000 min. 1)	1,4 max. 3 000 min.	1,2 max. 3 000 min.	0,86 1) 4 000 min.		8 000 min.	8 000 min.
0–1 1)		5,5 1)	5,2 / 1,1 at –20 °C *(–5 °F)* 1)			0 1)	7 1)		
313, –40 °C *(–40 °F)* 75, –40 °C *(–40 °F)*	32, –50 °C *(–60 °F)* 21, –50 °C *(–60 °F)*	178, 0 °C *(32 °F)* 103, 0 °C *(32 °F)*	249, –40 °C *(–40 °F)* 184, –40 °C *(–40 °F)*	160, –20 °C *(–5 °F)* 98, –20 °C *(–5 °F)*	96, –10 °C *(14 °F)* 66, –10 °C *(14 °F)*	250, –20 °C *(–5 °F)* 133, –20 °C *(–5 °F)*	1 000, –40 °C *(–40 °F)* 280, –40 °C *(–40 °F)*		

High loads

Low temperatures

High temperatures

B.5

Operating temperature and speed

B.5 Operating temperature and speed

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.

Diagram 1

Bearing operating temperature as equilibrium between generated heat and dissipated heat

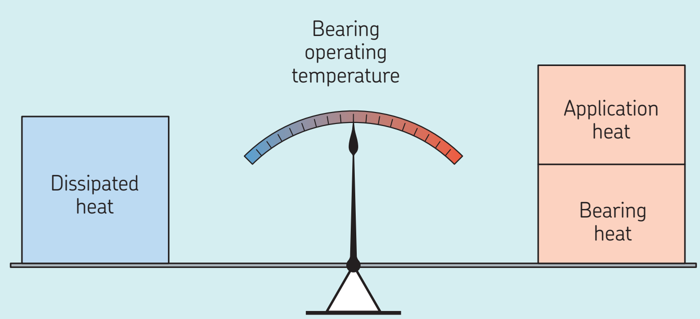
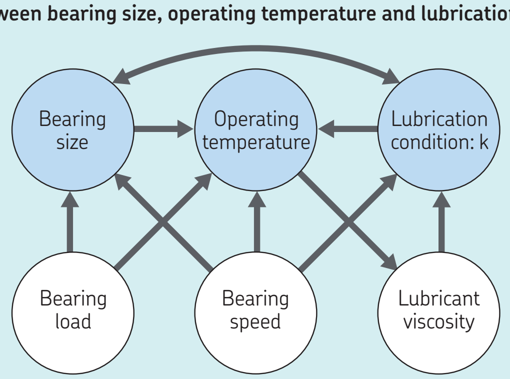


Diagram 2

Dependencies between bearing size, operating temperature and lubrication conditions



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.

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

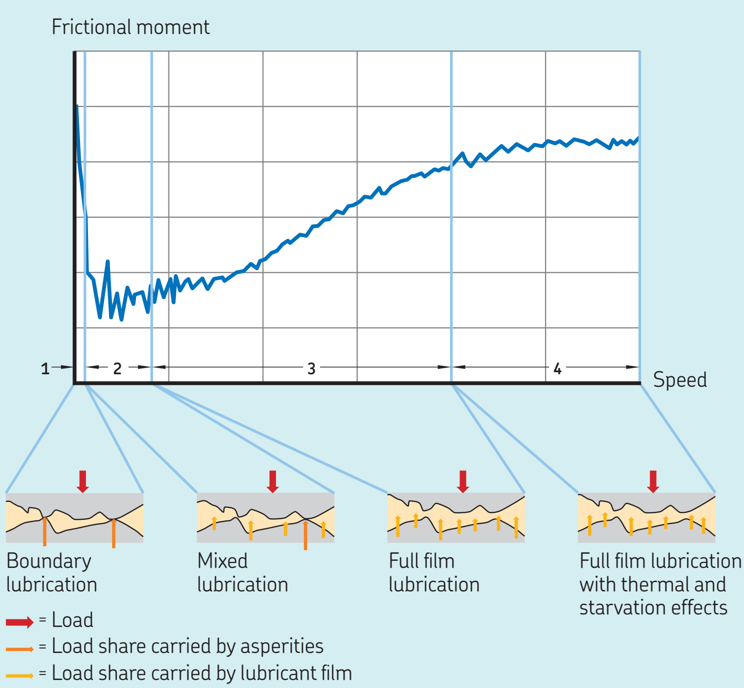
Bearing friction is not constant and depends on certain tribological phenomena that occur in the lubricant film between the rolling elements, raceways and cages.

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

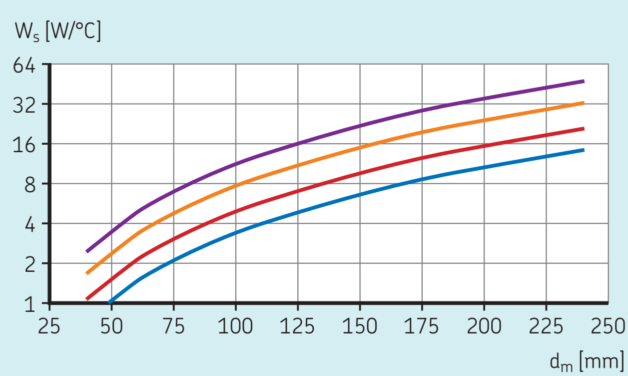
$$T_{bear} = (P_{loss} / W_s) + T_{amb}$$

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

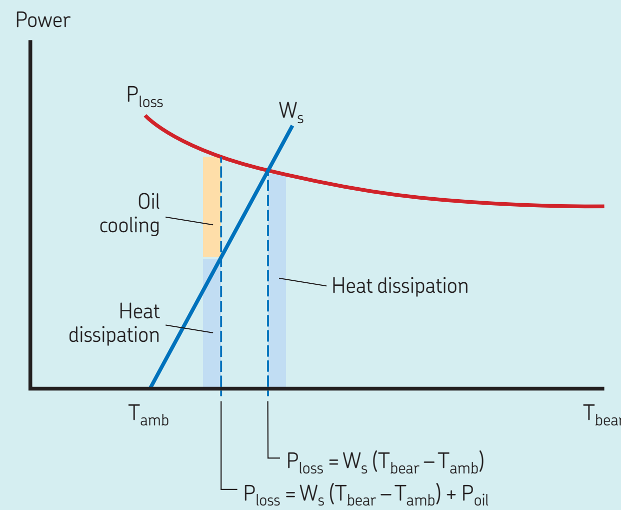
$$Q = P_{oil} / (27\,(T_{out} - T_{in}))$$

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

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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

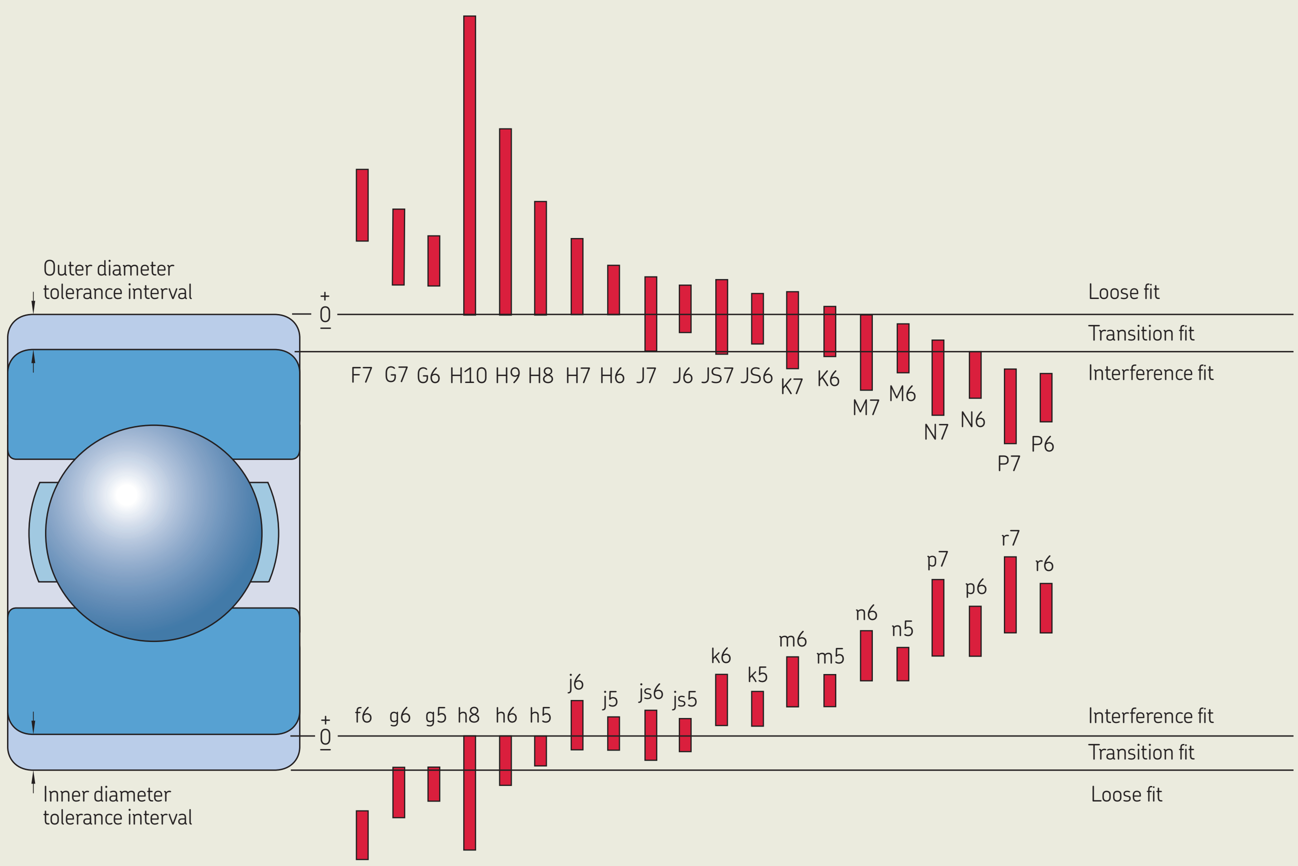
Fits for rolling bearings are typically specified with standard tolerance classes for holes and shafts as described in ISO 286-2. As bearings are typically manufactured to ISO tolerances (*Tolerances*, **page 36**), the selection of the tolerance class for the bearing seat determines the fit. The position 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



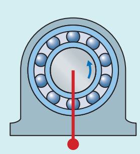
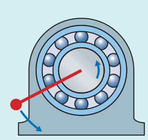
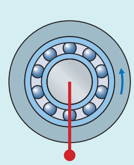
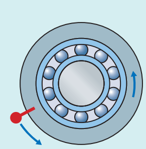
Conditions of rotation

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 Stationary outer ring Constant load direction		Rotating inner ring load Stationary outer ring load	Interference fit for the inner ring Loose fit for the outer ring possible
Rotating inner ring Stationary outer ring Load rotates with the inner ring		Stationary inner ring load Rotating outer ring load	Loose fit for the inner ring possible Interference fit for the outer ring
Stationary inner ring Rotating outer ring Constant load direction		Stationary inner ring load Rotating outer ring load	Loose fit for the inner ring possible Interference fit for the outer ring
Stationary inner ring Rotating outer ring Load rotates with outer ring		Rotating inner ring load Stationary outer ring load	Interference fit for the inner ring 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
Δ = 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

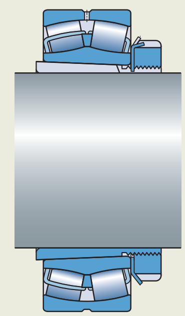
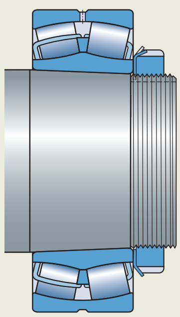


Fig. 3

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.

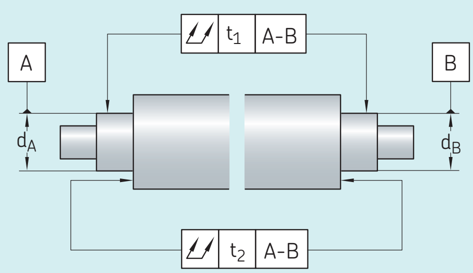
For seats of bearings mounted on withdrawal or adapter sleeves, wider diameter tolerances are permissible. The total run-out tolerances should be the same as for bearings on cylindrical seats.

Tolerance values for ISO tolerance grades are listed in **table 3**.

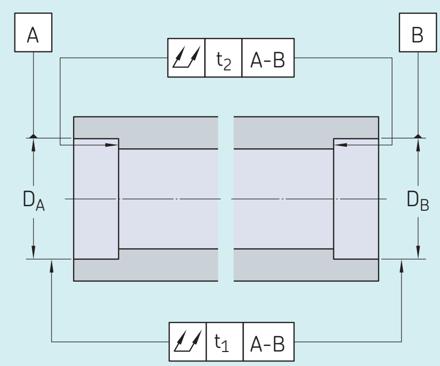
Table 2

Tolerance grades for bearing seats[1)]

Shaft seat



Housing seat



Application requirements	Shaft seat: Dimensional tolerance grade	Shaft seat: Geometrical tolerance grades – Radial run-out t_1	Shaft seat: Geometrical tolerance grades – Axial run-out t_2	Housing seat: Dimensional tolerance grade	Housing seat: Geometrical tolerance grades – Radial run-out t_1	Housing seat: Geometrical tolerance grades – 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).

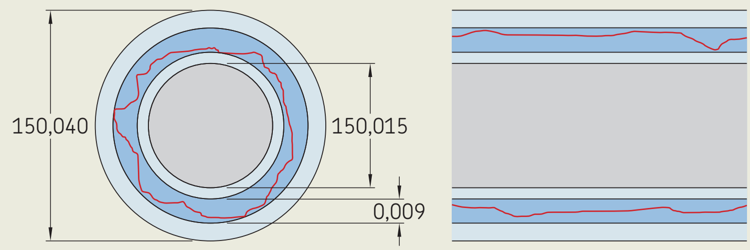
Example

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



Dimensional tolerance: 150 m6Ⓔ
Total radial run-out 9 µm
Actual dimensions of the shaft seat

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, Δ_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

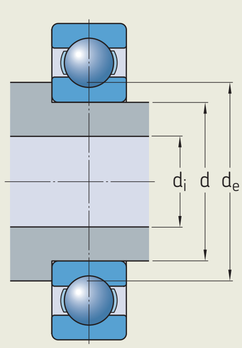
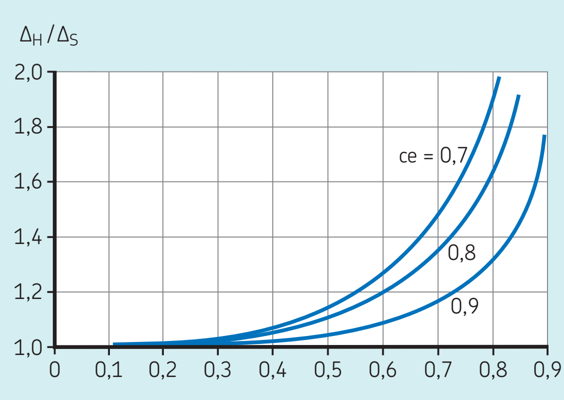


Diagram 1

Relationship of interference Δ_H, needed for a hollow steel shaft, to the known interference Δ_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
Δ_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

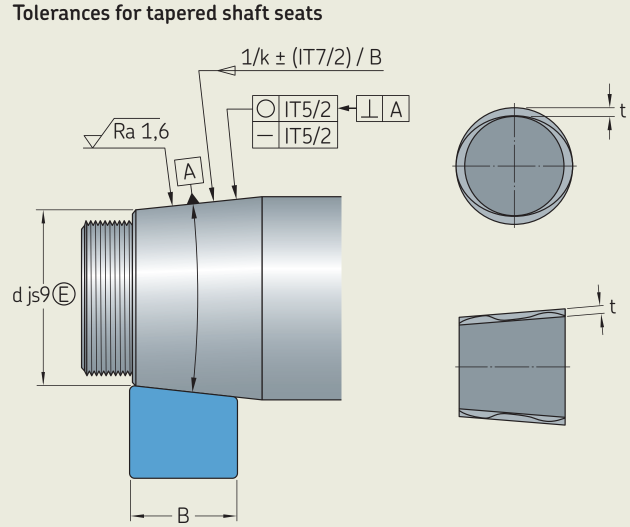
Surface roughness of bearing seats

Seat diameter d, D		**Ra** (guideline values for ground seats) 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).

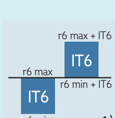
Suitable tolerances are listed in table 10, page 152. They are valid for moderate speeds and moderate precision requirements.

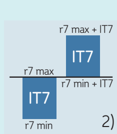
Table 6

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 d Nominal >	≤	Diameter tolerance h9Ⓔ U	L	Total radial run-out IT5/2 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

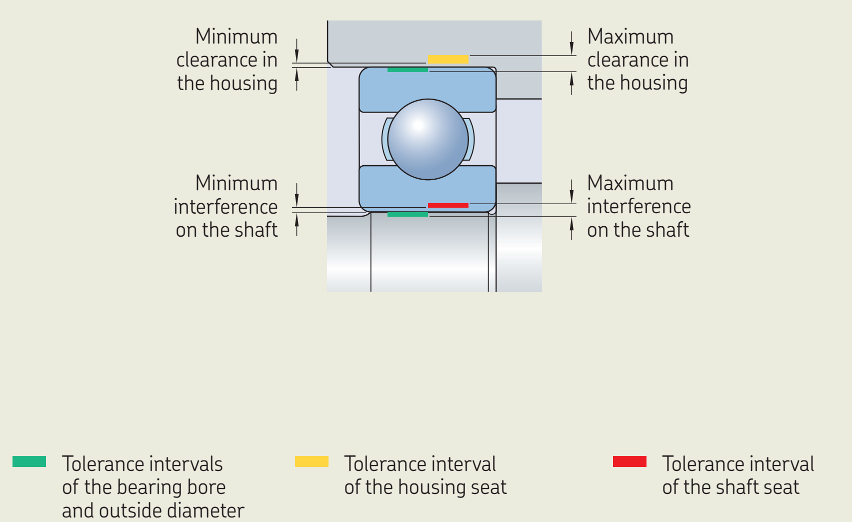
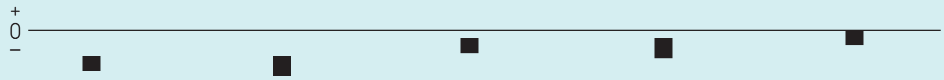


Table 11

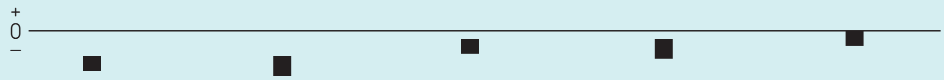
Shaft tolerances and resultant fits



Shaft Nominal diameter d		Bearing Bore diameter tolerance $t_{\Delta dmp}$		Shaft diameter deviations, resultant fits[1) Tolerance classes									
				f5Ⓔ		f6Ⓔ		g5Ⓔ		g6Ⓔ		h5Ⓔ	
over	incl.	low	high	Deviations (shaft diameter) / Theoretical interference (–) / Probable interference (–)									
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 (–) / Probable interference (–)									
over	incl.	low	high										
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.

B.6 Bearing interfaces

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									
				h6E		h8E		h9E		j5E		j6E	
>	≤	L	U	Deviations (shaft diameter) / Theoretical interference (–)/clearance (+) / 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

B.6 Bearing interfaces

Table 12

Shaft tolerances and resultant fits

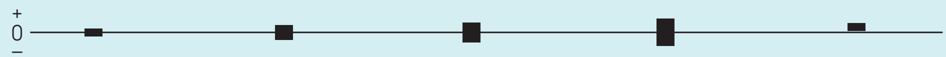
Shaft Nominal diameter d		**Bearing** Bore diameter tolerance $t_{\Delta dmp}$		**Shaft diameter deviations, resultant fits**[1] Tolerance classes									
				h6Ⓔ		h8Ⓔ		h9Ⓔ		j5Ⓔ		j6Ⓔ	
				Deviations (shaft diameter) / Theoretical interference (–)/clearance (+) / Probable interference (–)/clearance (+)									
>	≤	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**.

B.6 Bearing interfaces

Table 13

Shaft tolerances and resultant fits



Shaft Nominal diameter d over	incl.	Bearing Bore diameter tolerance $t_{\Delta dmp}$ low	high	Shaft diameter deviations, resultant fits[1)] Tolerance classes js4Ⓔ		js5Ⓔ		js6Ⓔ		js7Ⓔ		k4Ⓔ	
				Deviations (shaft diameter) / Theoretical interference (–)/clearance (+) / 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	–	–

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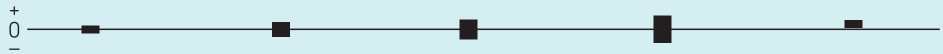
Table 13

Shaft tolerances and resultant fits



Shaft Nominal diameter d		**Bearing** Bore diameter tolerance $t_{\Delta dmp}$		**Shaft diameter deviations, resultant fits**[1] Tolerance classes									
				js4Ⓔ		js5Ⓔ		js6Ⓔ		js7Ⓔ		k4Ⓔ	
over	incl.	low	high	Deviations (shaft diameter) / Theoretical interference (–)/clearance (+) / Probable interference (–)/clearance (+)									
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.

B.6 Bearing interfaces

Table 14

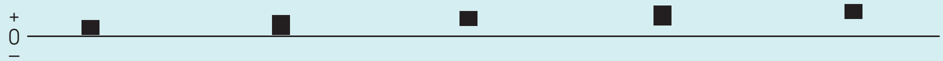
Shaft tolerances and resultant fits

Shaft Nominal diameter d		Bearing Bore diameter tolerance $t_{\Delta dmp}$		Shaft diameter deviations, resultant fits[1)] Tolerance classes									
				k5Ⓔ		k6Ⓔ		m5Ⓔ		m6Ⓔ		n5Ⓔ	
>	≤	L	U	Deviations (shaft diameter) Theoretical interference (–) Probable interference (–)									
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

SKF

Table 14

Shaft tolerances and resultant fits



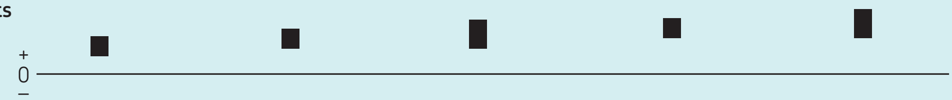
Shaft Nominal diameter d		Bearing Bore diameter tolerance $t_{\Delta dmp}$		Shaft diameter deviations, resultant fits[1)] Tolerance classes									
				k5Ⓔ		k6Ⓔ		m5Ⓔ		m6Ⓔ		n5Ⓔ	
				Deviations (shaft diameter) / Theoretical interference (–) / Probable interference (–)									
>	≤	L	U										
mm		µm		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.

B.6 Bearing interfaces

Table 15

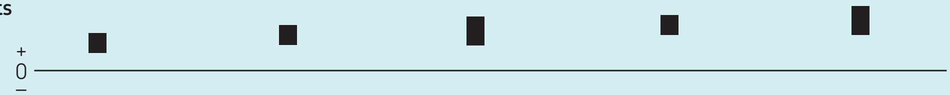
Shaft tolerances and resultant fits



Shaft Nominal diameter d over	incl.	Bearing Bore diameter tolerance $t_{\Delta dmp}$ low	high	Shaft diameter deviations, resultant fits[1)] Tolerance classes n6Ⓔ		p6Ⓔ		p7Ⓔ		r6Ⓔ		r7Ⓔ	
				Deviations (shaft diameter) / Theoretical interference (–) / 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 Nominal diameter d		Bearing Bore diameter tolerance $t_{\Delta dmp}$		Shaft diameter deviations, resultant fits[1) Tolerance classes									
				n6Ⓔ		p6Ⓔ		p7Ⓔ		r6Ⓔ		r7Ⓔ	
				Deviations (shaft diameter) / Theoretical interference (–) / Probable interference (–)									
over	incl.	low	high										
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.

B.6 Bearing interfaces

Table 16

Shaft tolerances and resultant fits

Shaft Nominal diameter d over	incl.	Bearing Bore diameter tolerance $t_{\Delta dmp}$ low	high	Shaft diameter deviations, resultant fits[1] Tolerance classes: Deviations (shaft diameter) / Theoretical interference (–) / Probable interference (–) r6+IT6		r7+IT7	
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

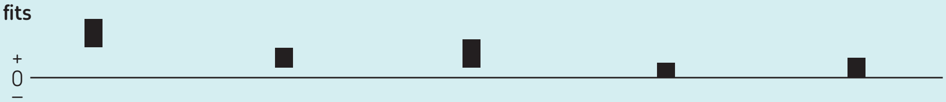
Shaft Nominal diameter d		Bearing Bore diameter tolerance $t_{\Delta dmp}$		Shaft diameter deviations, resultant fits[1)] Tolerance classes			
				r6+IT6		r7+IT7	
over	incl.	low	high	Deviations (shaft diameter) / Theoretical interference (–) / Probable interference (–)			
mm		µm		µm			
1 250	**1 400**	–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.

B.6 Bearing interfaces

Table 17

Housing tolerances and resultant fits

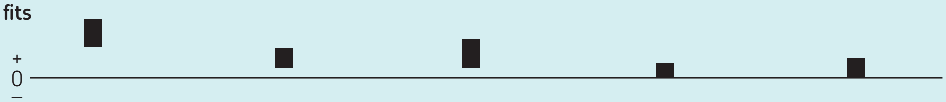


Housing Nominal bore diameter D		Bearing Outside diameter tolerance $t_{\Delta Dmp}$		Housing bore diameter deviations, resultant fits[1)] Tolerance classes									
				F7Ⓔ		G6Ⓔ		G7Ⓔ		H5Ⓔ		H6Ⓔ	
				Deviations (housing bore diameter)									
				Theoretical clearance (+)									
over	incl.	low	high	Probable clearance (+)									
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

SKF

Table 17

Housing tolerances and resultant fits



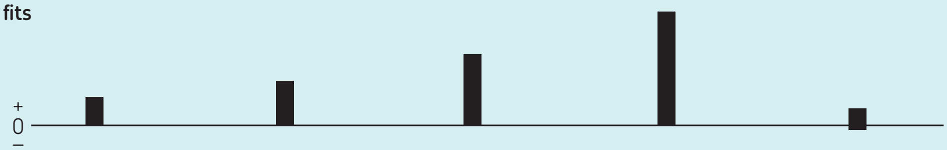
Housing Nominal bore diameter D		**Bearing** Outside diameter tolerance $t_{\Delta Dmp}$		**Housing bore diameter deviations, resultant fits**[1)] Tolerance classes									
				F7Ⓔ		G6Ⓔ		G7Ⓔ		H5Ⓔ		H6Ⓔ	
				Deviations (housing bore diameter) Theoretical clearance (+) Probable clearance (+)									
over	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**.

B.6 Bearing interfaces

Table 18

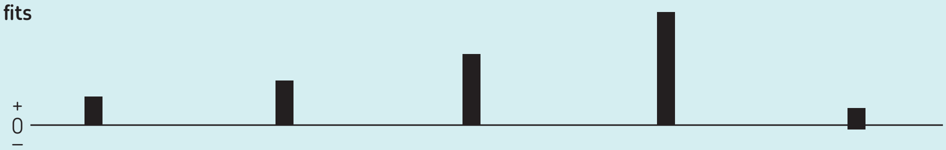
Housing tolerances and resultant fits



Housing Nominal bore diameter D over	incl.	Bearing Outside diameter tolerance $t_{\Delta Dmp}$ low	high	Housing bore diameter deviations, resultant fits[1] Tolerance classes H7Ⓔ		H8Ⓔ		H9Ⓔ		H10Ⓔ		J6Ⓔ	
				Deviations (housing bore diameter) / Theoretical interference (–)/clearance (+) / 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

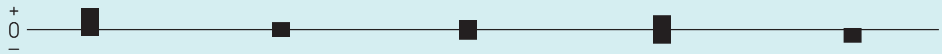


Housing Nominal bore diameter D		Bearing Outside diameter tolerance $t_{\Delta Dmp}$		Housing bore diameter deviations, resultant fits[1)] Tolerance classes									
				H7Ⓔ		H8Ⓔ		H9Ⓔ		H10Ⓔ		J6Ⓔ	
				Deviations (housing bore diameter) Theoretical interference (–)/clearance (+) Probable interference (–)/clearance (+)									
over	incl.	low	high										
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Ⓔ	
over	incl.	low	high	Deviations (housing bore diameter) Theoretical interference (–)/clearance (+) Probable interference (–)/clearance (+)									
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	–	–

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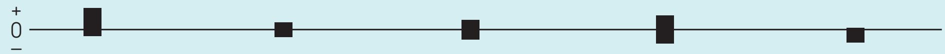
Table 19

Housing tolerances and resultant fits



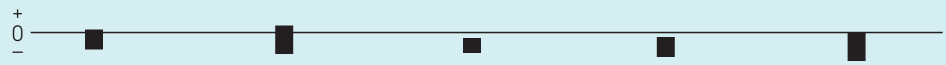
Housing Nominal bore diameter D		Bearing Outside diameter tolerance $t_{\Delta Dmp}$		Housing bore diameter deviations, resultant fits[1) Tolerance classes									
				J7Ⓔ		JS5Ⓔ		JS6Ⓔ		JS7Ⓔ		K5Ⓔ	
over	incl.	low	high	Deviations (housing bore diameter) / Theoretical interference (–)/clearance (+) / Probable 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.

B.6 Bearing interfaces

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

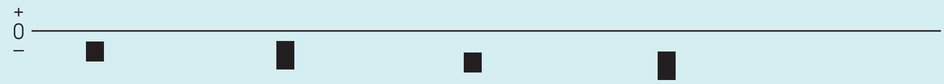
Housing Nominal bore diameter D		**Bearing** Outside diameter tolerance $t_{\Delta Dmp}$		**Housing bore diameter deviations, resultant fits**[1] Tolerance classes									
				K6Ⓔ		K7Ⓔ		M5Ⓔ		M6Ⓔ		M7Ⓔ	
				Deviations (housing bore diameter)									
				Theoretical interference (–)/clearance (+)									
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.

B.6 Bearing interfaces

Table 21

Housing tolerances and resultant fits

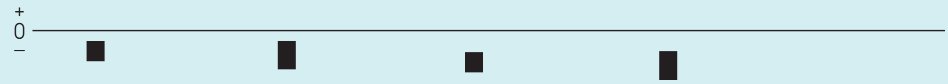


Housing Nominal bore diameter D		Bearing Outside diameter tolerance $t_{\Delta Dmp}$		Housing bore diameter deviations, resultant fits[1)] Tolerance classes							
				N6Ⓔ		N7Ⓔ		P6Ⓔ		P7Ⓔ	
				Deviations (housing bore diameter) / Theoretical interference (–)/clearance (+) / Probable interference (–)/clearance (+)							
ove	incl.	low	high								
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

B.6 Bearing interfaces

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Ⓔ	
over	incl.	low	high	Deviations (housing bore diameter) / Theoretical interference (–)/clearance (+) / 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

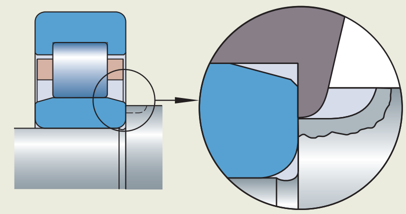


Fig. 9

Threaded holes in the housing to push bearing with bolts from its seat

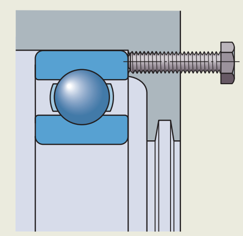


Fig. 10

Duct and groove for oil injection

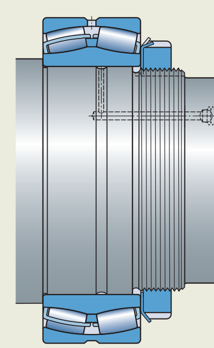
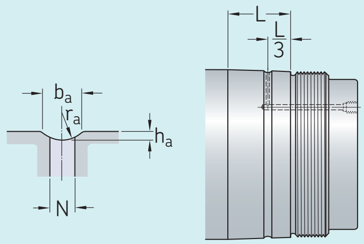


Table 22

Recommended dimensions for oil supply ducts and distribution grooves

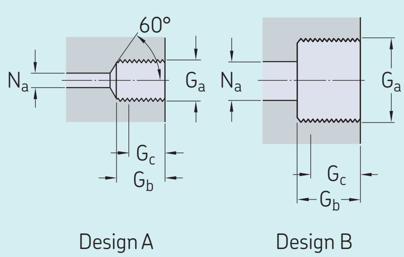


Seat diameter >	≤	Dimensions b_a	h_a	r_a	N
mm		mm			
–	**100**	3	0,5	2,5	2,5
100	**150**	4	0,8	3	3
150	**200**	4	0,8	3	3
200	**250**	5	1	4	4
250	**300**	5	1	4	4
300	**400**	6	1,25	4,5	5
400	**500**	7	1,5	5	5
500	**650**	8	1,5	6	6
650	**800**	10	2	7	7
800	**1 000**	12	2,5	8	8

L = width of bearing seat

Table 23

Design and recommended dimensions for threaded holes for connecting oil supply



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

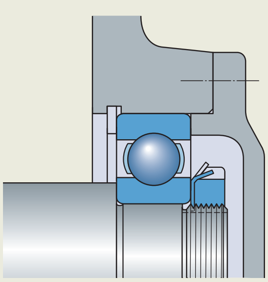


Fig. 12

Outer ring supported by a threaded ring

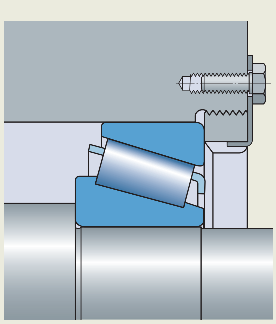


Fig. 13

Inner ring supported by an end plate and shaft shoulder

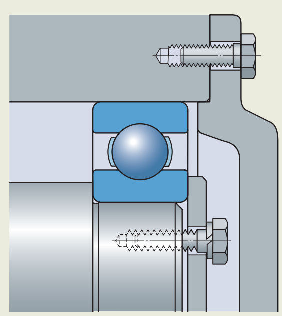


Fig. 14

Outer ring supported by housing cover and housing shoulder

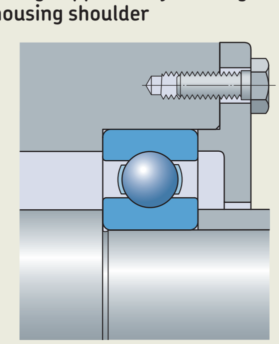


Fig. 15

Inner ring supported by a distance ring and lock nut

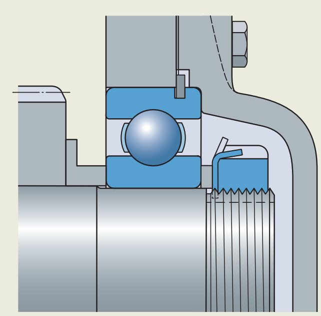
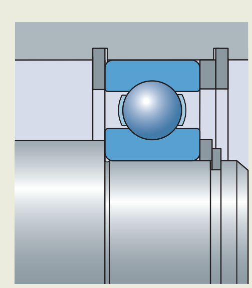


Fig. 16

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

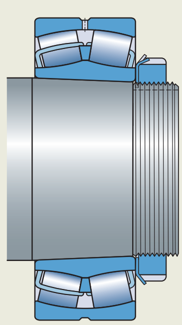


Fig. 18

Bearing on an adapter sleeve

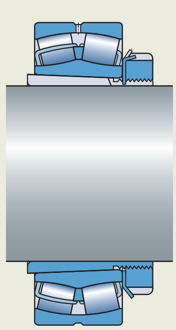


Fig. 19

Bearing on an adapter sleeve, positioned by a distance ring

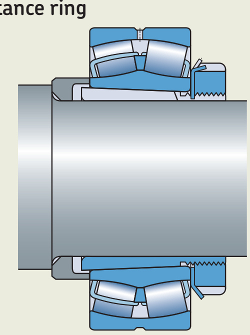


Fig. 20

Bearing on a withdrawal sleeve

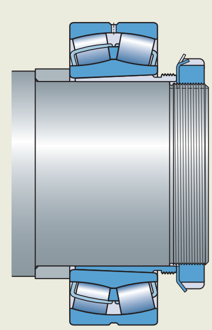


Fig. 21

Spacing collar designed not to contact the shaft fillet

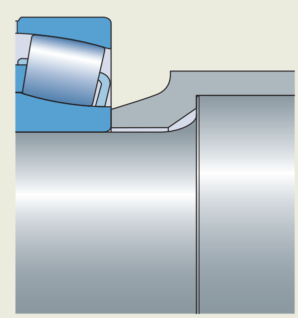
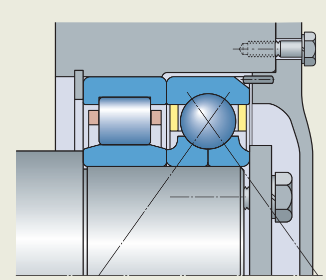


Fig. 22

Cylindrical roller bearing for radial load and four-point contact ball bearing for axial load



B.7 Bearing execution

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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**).

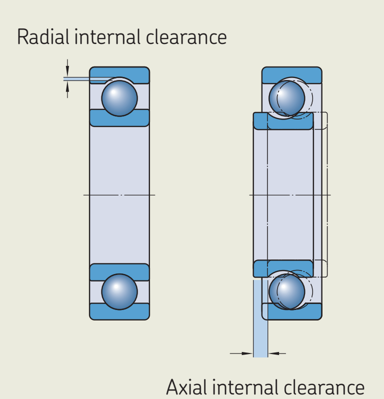
As a general rule:

- 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.

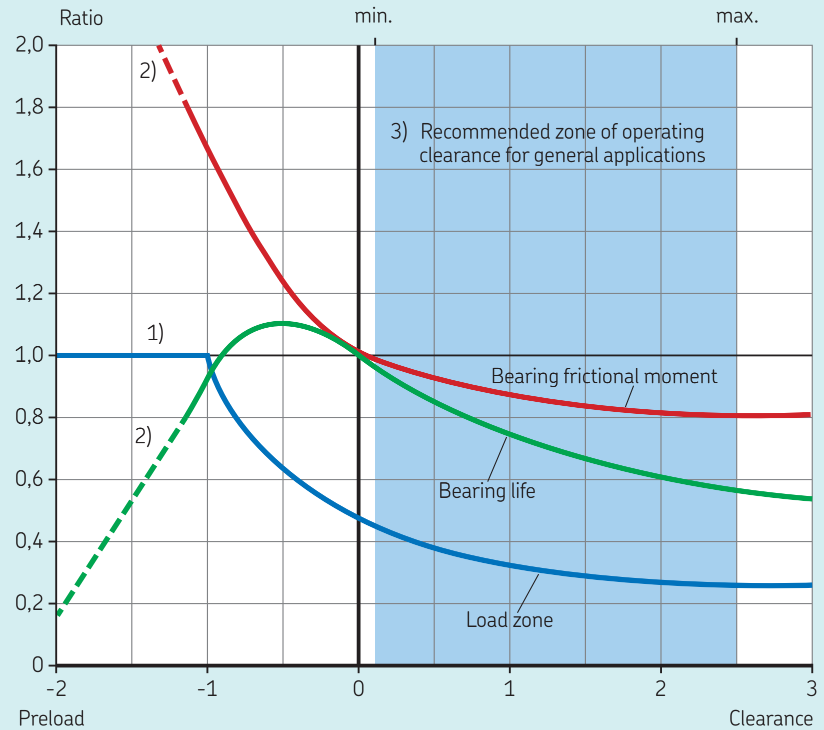
To achieve this, follow this procedure:

- 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

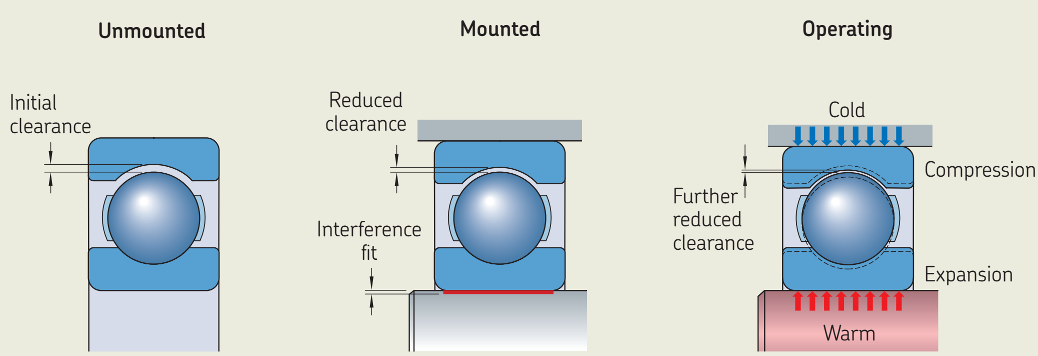
Operational clearance or preload versus main operational criteria



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



B.7 Bearing execution

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

Δr_{fit} = clearance reduction caused by the fit [µm]

f_1 = reduction factor for the inner ring

f_2 = reduction factor for the outer ring

Δ_1 = effective interference between the inner ring and shaft [µm]

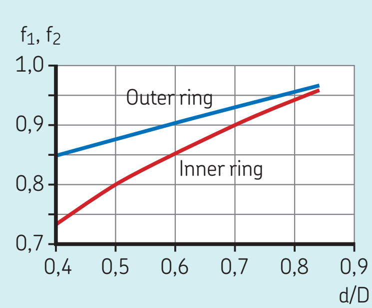
Δ_2 = effective interference between the outer ring and housing [µm]

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

Δr_{temp} = clearance reduction caused by temperature difference [µm]

ΔT = temperature difference between inner and outer ring [°C]

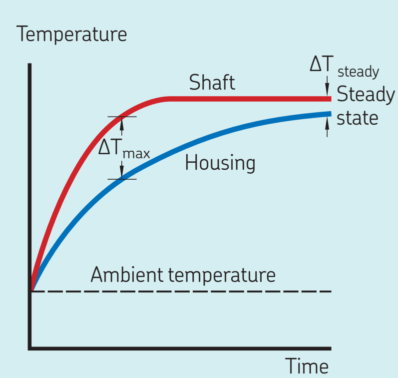
d_m = the bearing mean diameter [mm] = (d + D)/2

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 (ΔT_{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 (ΔT_{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]

Δr_{fit} = clearance change caused by the maximum expected fits [µm]

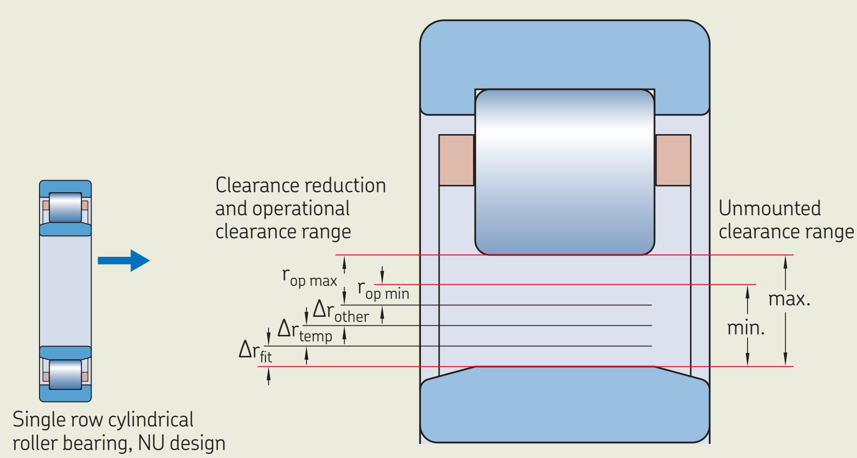
Δr_{temp} = maximum clearance change expected from the temperature difference during start-up or in steady state [µm]

Δr_{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

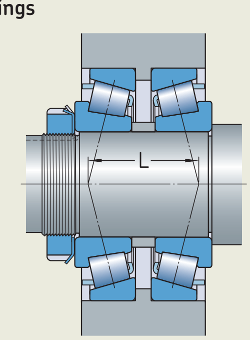


Fig. 5

Face-to-face arrangement, tapered roller bearings

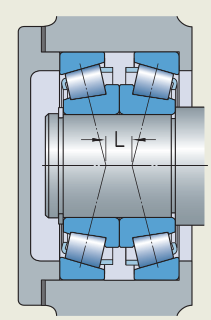
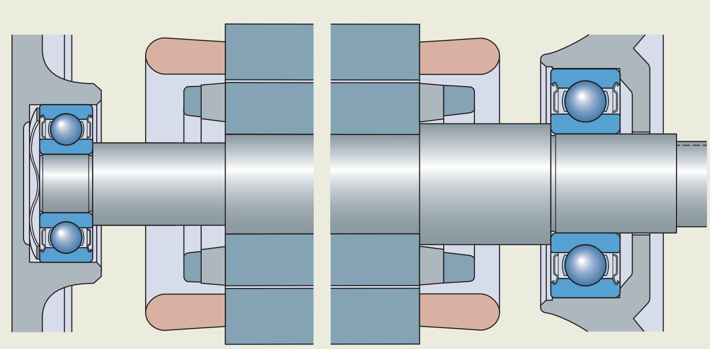


Fig. 6

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:

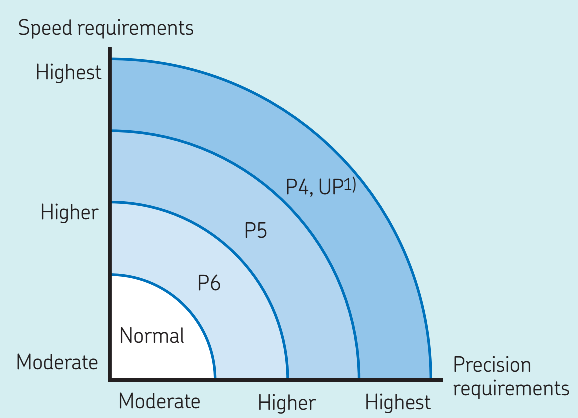
- some bearing types need either split or snap-type cages, because they are assembled after the rings and rolling elements have been sub-assembled
- other bearing types need roller-guided cages, to be self-containing
- bearings of a certain combination of size and series need ring-guided cages, to limit 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

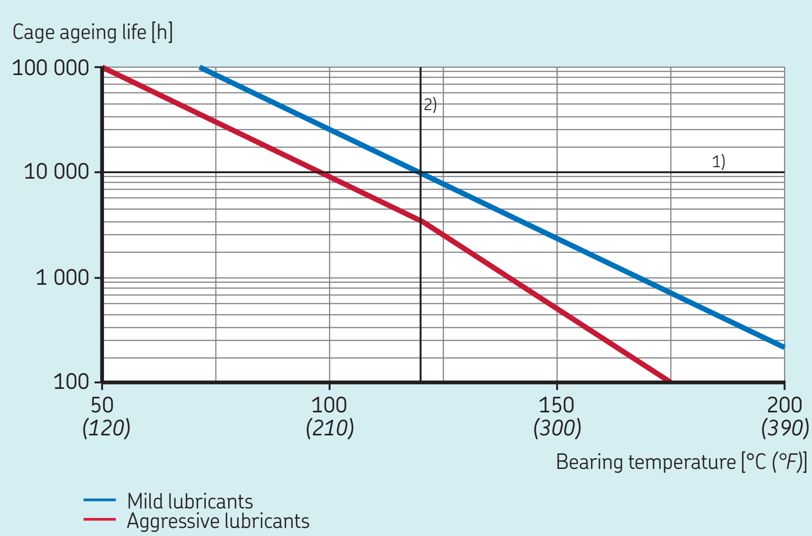
Glass fibre reinforced polyamide 46 (PA46) is the standard cage material for some small and medium-size CARB toroidal roller bearings. The permissible operating temperature is 15 °C *(25 °F)* higher than for glass fibre reinforced PA66.

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.

B.7 Bearing execution

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

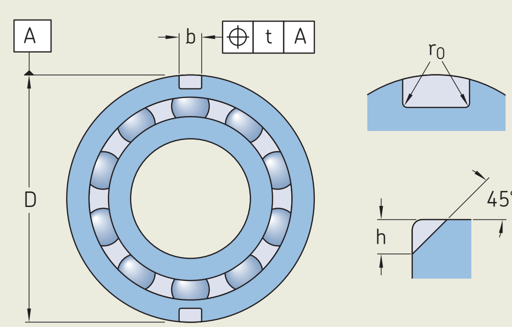


Fig. 9

Eye bolts in bearing ring to ease lifting

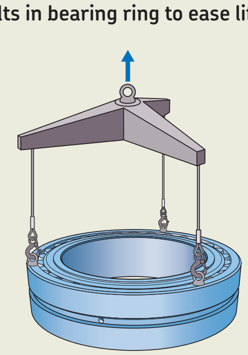


Fig. 10

Mounting with SKF SensorMount

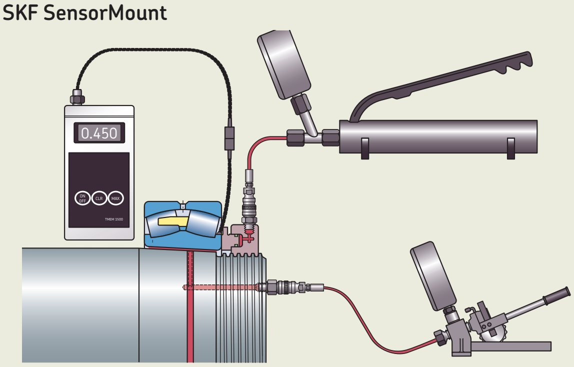
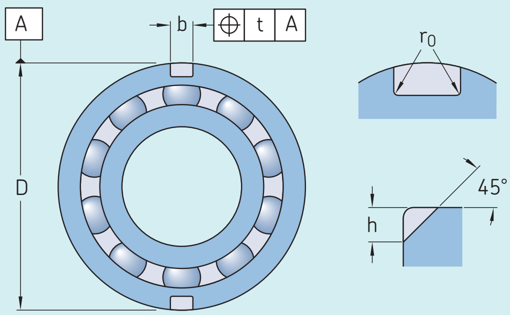


Table 2

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

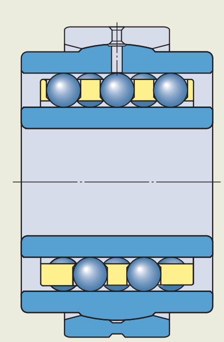


Fig.13

SKF Agri Hub for seeding disc

B.8

Sealing, mounting and dismounting

B.8 Sealing, mounting and dismounting

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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*, η_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

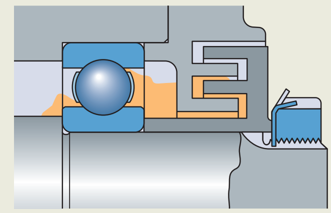


Fig. 2

Radial shaft seal

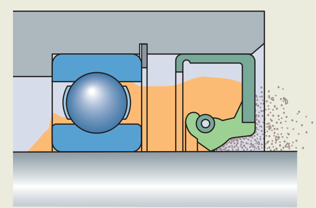


Fig. 3

Gasket

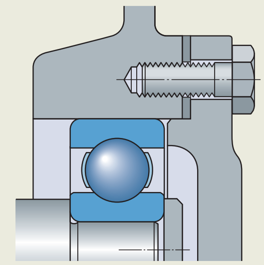
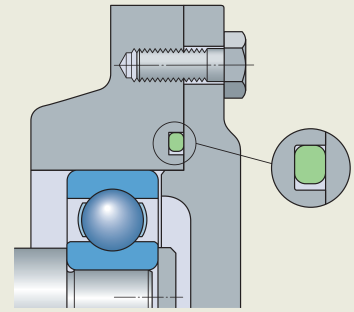


Fig. 4

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

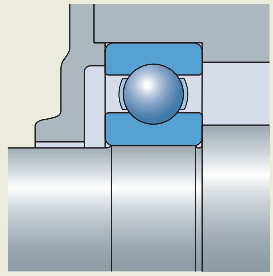


Fig. 6

External gap-type seal with concentric grooves

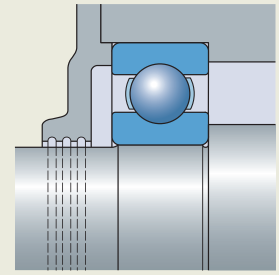


Fig. 7

External gap-type seal with helical grooves

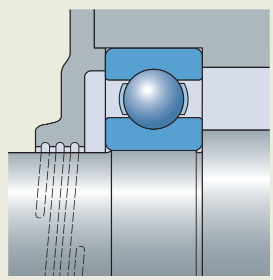


Fig. 8

External labyrinth seal, passages arranged axially

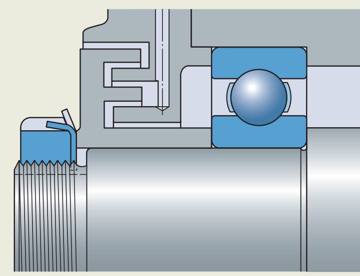


Fig. 9

External labyrinth seal, passages arranged radially

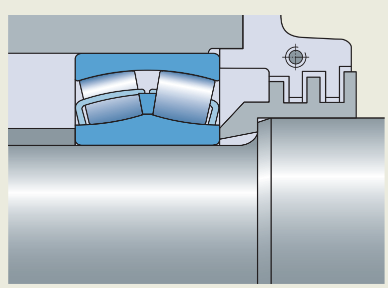


Fig. 10

External labyrinth seal, with inclined passages

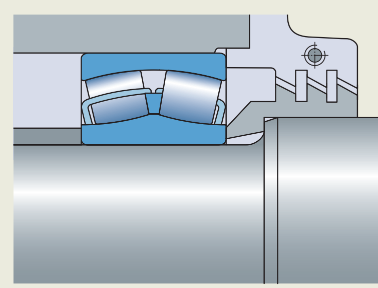


Fig. 11

Labyrinth seal consisting of multiple SKF sealing washers

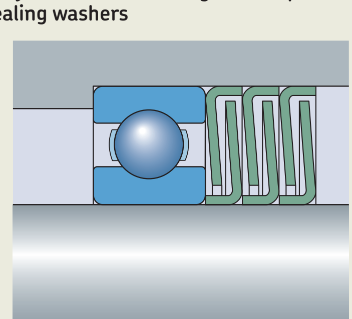
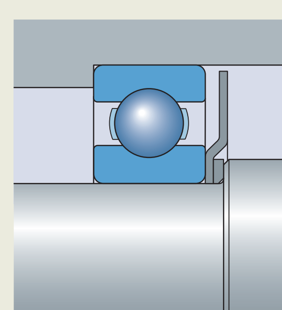


Fig. 12

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

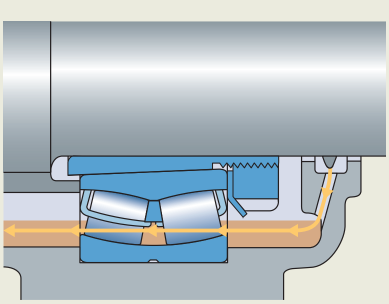


Fig. 14

Radial shaft seal, mounted for lubricant retention

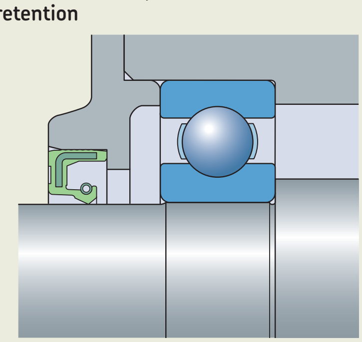
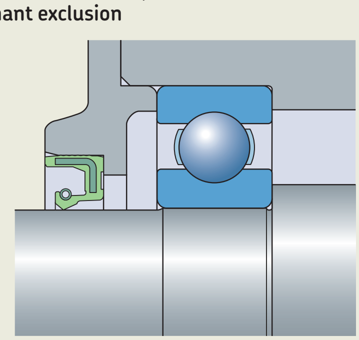


Fig. 15

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

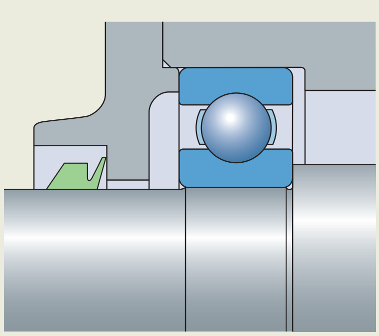


Fig. 17

MVR seal designs

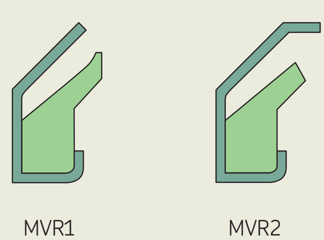
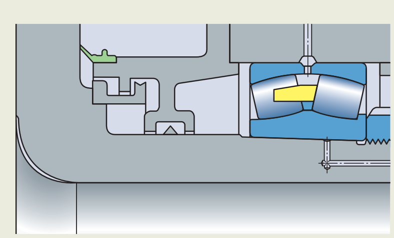


Fig. 18

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

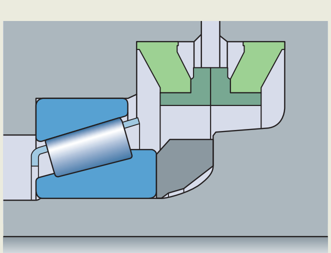


Fig. 20

Felt seal

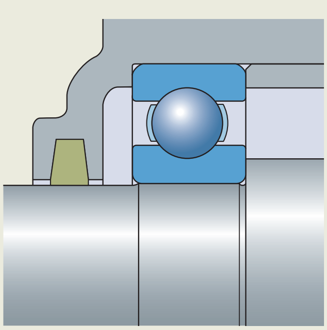
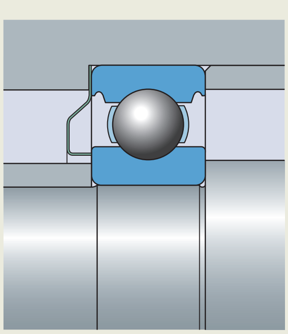


Fig. 21

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

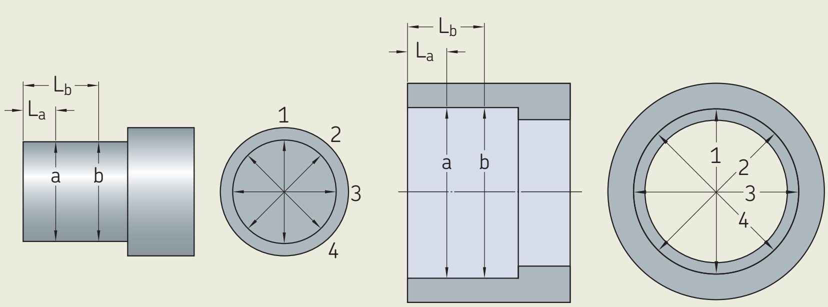


Fig. 23

Carrying tool

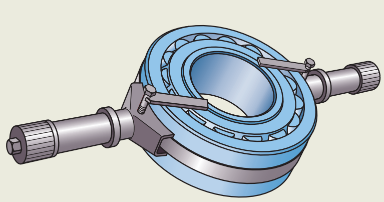


Fig. 24

Heat resistant glove

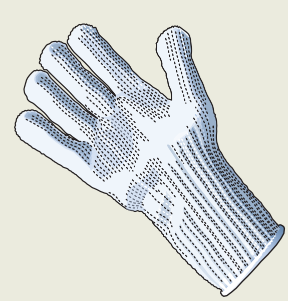
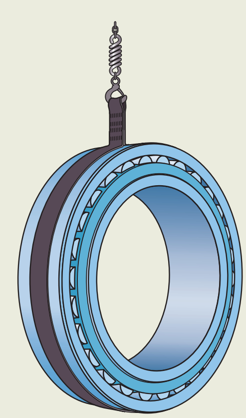


Fig. 25

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:

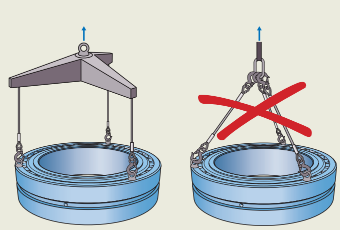
- small → d ≤ 80 mm
- medium-size → 80 mm < d < 200 mm
- large → d ≥ 200 mm

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.

Fig. 26

Loading of eye bolts only in direction of the shank axis



Mounting bearings with a cylindrical bore

Non-separable bearings

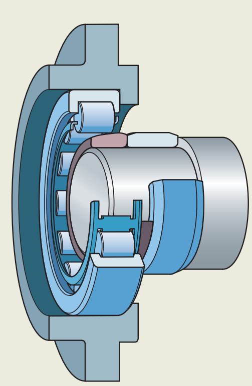
With non-separable bearings, the ring that requires the tighter fit is usually mounted first.

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.

Fig. 27

Use of a guiding sleeve for mounting of a cylindrical roller bearing



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. 28

Bearing fitting tool

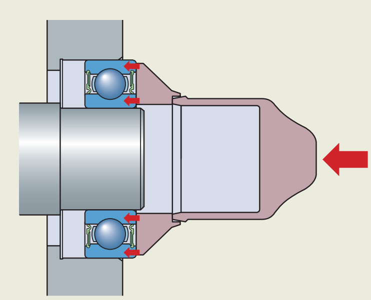


Fig. 29

Mounting a self-aligning ball bearing by use of an intermediate mounting ring

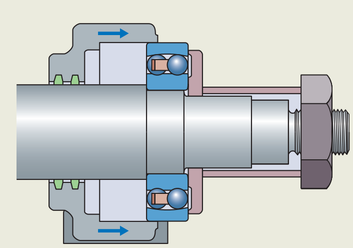
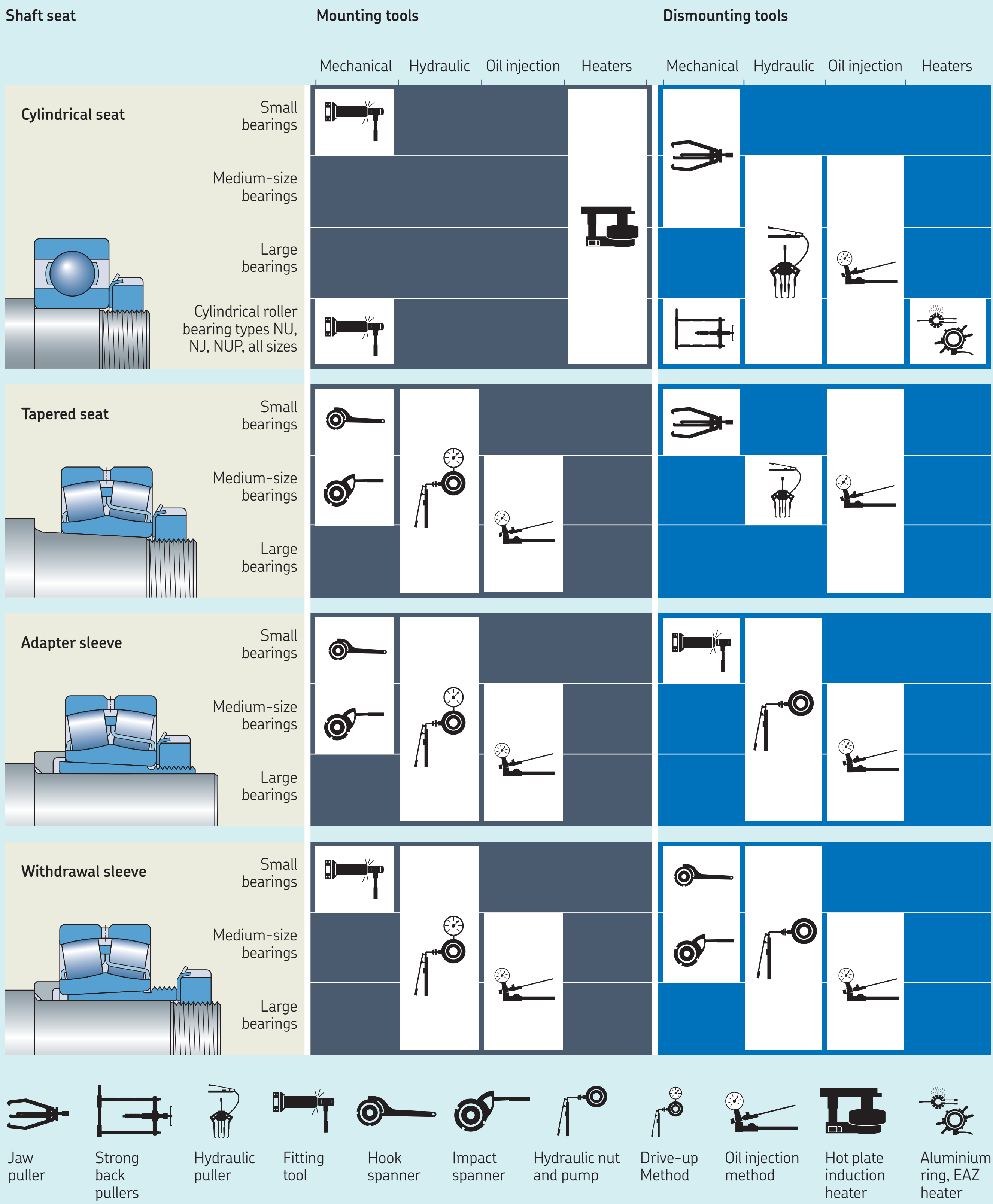


Table 2

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.

Fig. 30

SKF electric induction heater

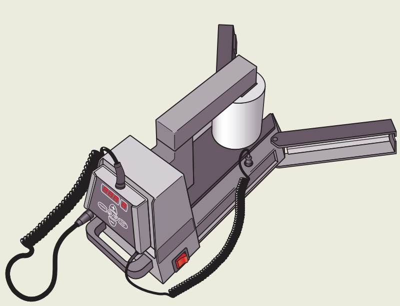
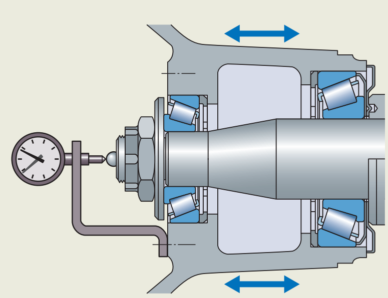


Fig. 31

Checking of axial clearance using a dial indicator



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.

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

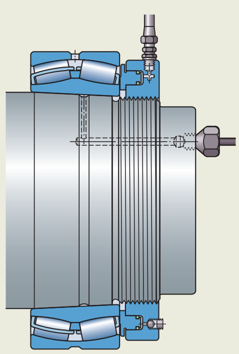


Fig. 33

Mounting on adapter sleeve with aid of a hydraulic nut

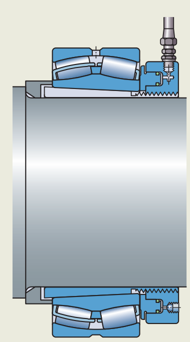


Fig. 34

Mounting on withdrawal sleeve with aid of a hydraulic nut

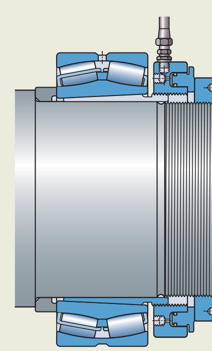


Fig. 35

Mounting on tapered seat with aid of oil injection

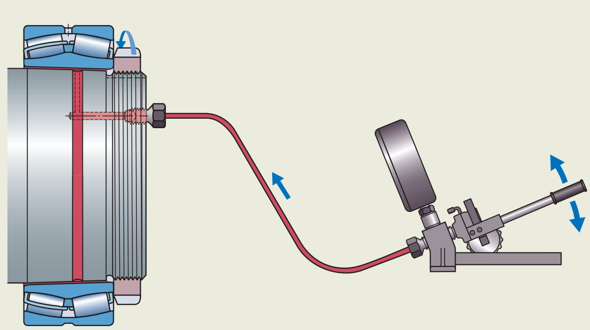
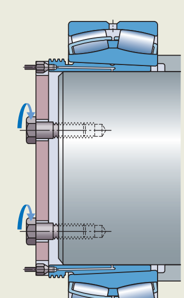


Fig. 36

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

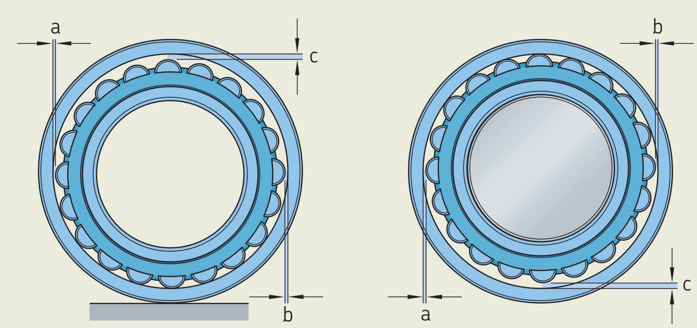


Fig. 37

Measuring of internal clearance before mounting

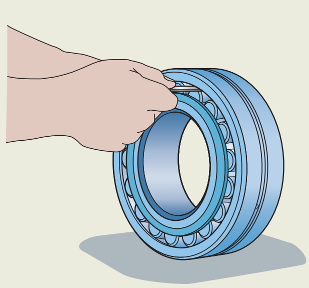


Fig. 38

Measuring of internal clearance during mounting

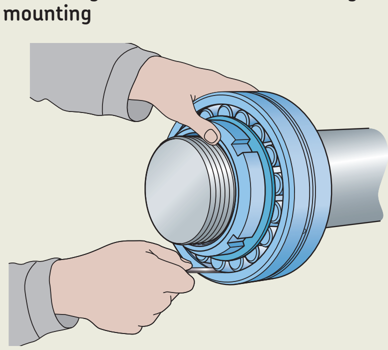
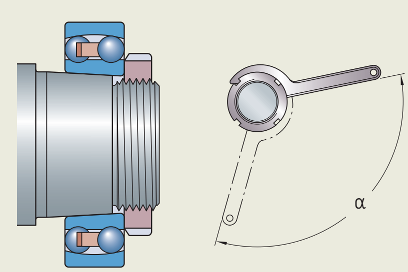


Fig. 40

Tightening angle α



B.8 Sealing, mounting and dismounting

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 ≥ 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 hand-held 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

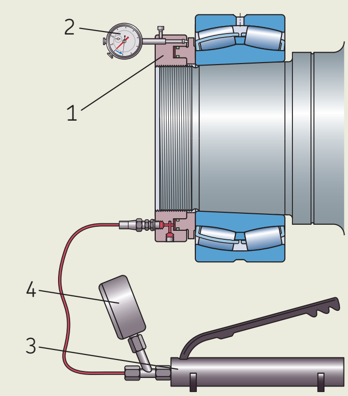


Fig. 42

Two-step mounting procedure for the SKF Drive-up Method

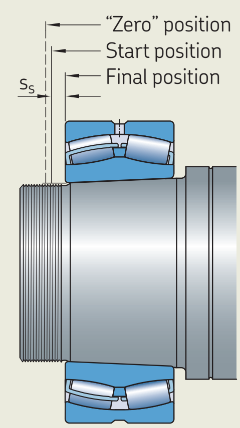
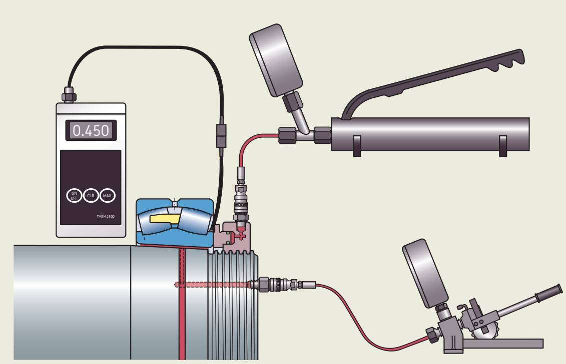


Fig. 43

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

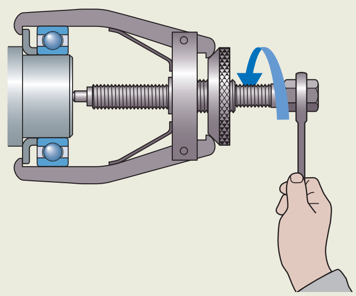


Fig. 45

Dismounting with aid of push-out bolts

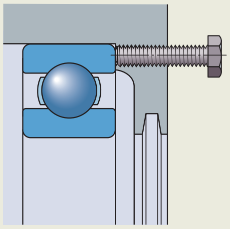
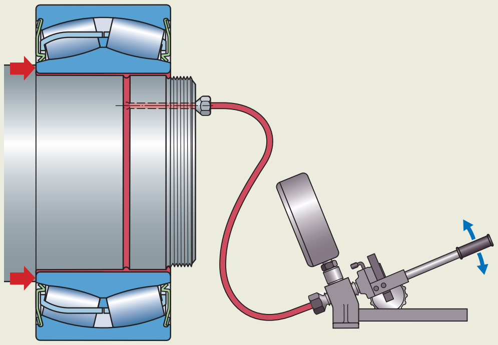


Fig. 46

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

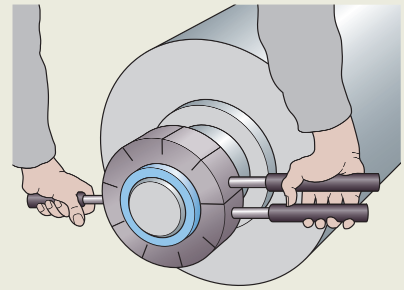


Fig. 48

Adjustable induction heater

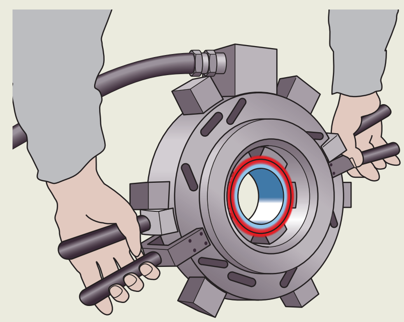


Fig. 49

Special fixed induction heater

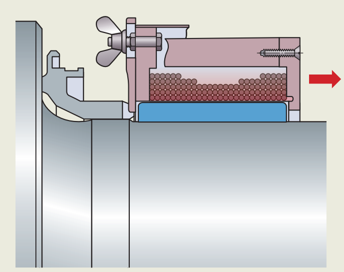


Fig. 50

Dismounting with aid of a puller

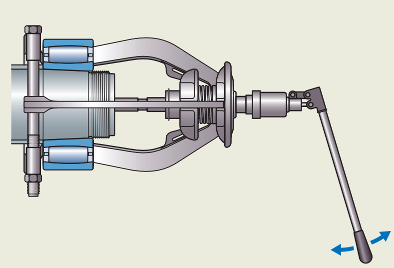
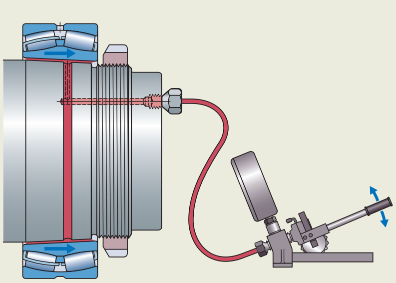


Fig. 51

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

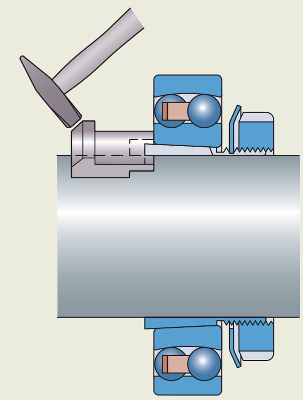


Fig. 53

Dismounting by a couple of sharp hammer blows applied to a bearing fitting tool abutting the sleeve lock nut

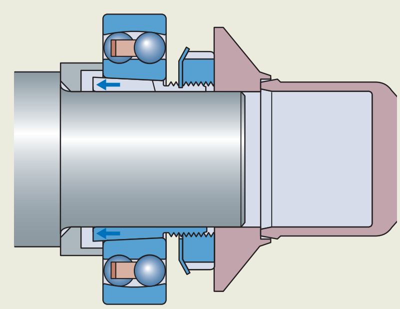
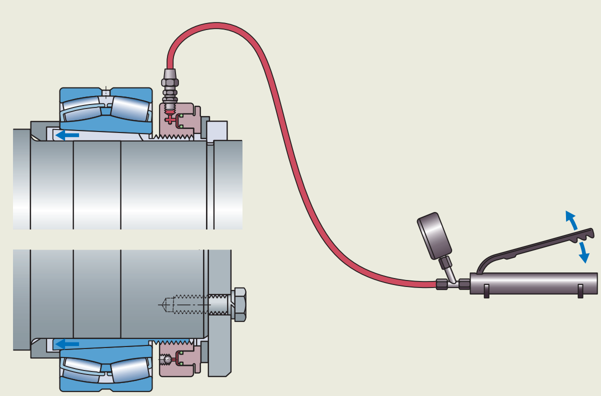


Fig. 54

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

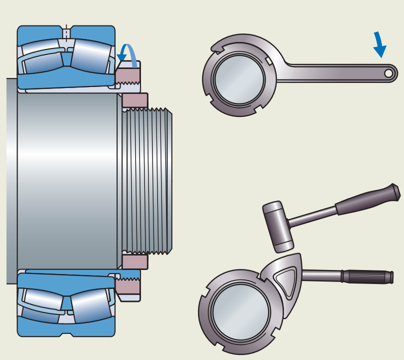


Fig. 56

Dismounting from withdrawal sleeve with oil injection

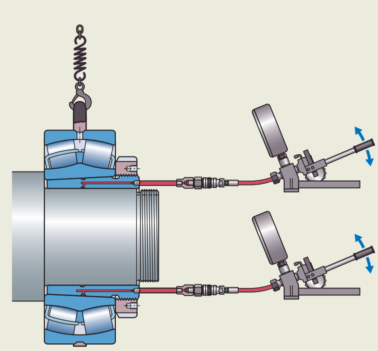
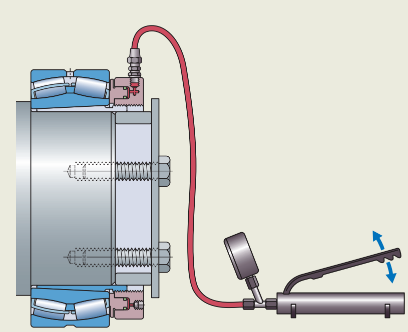


Fig. 57

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:

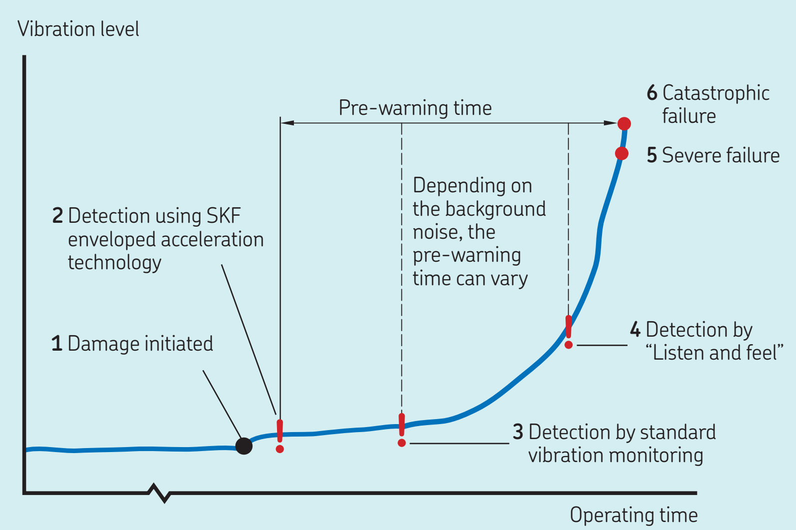
- All machines vibrate.
- The onset of a mechanical problem is generally accompanied by an increase in vibration levels.
- The nature of the fault can be determined by analyzing the vibration characteristics.

Fig. 58

Progress of damage

Diagram 1

The advantage of advanced condition monitoring



B.8 Sealing, mounting and dismounting

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

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

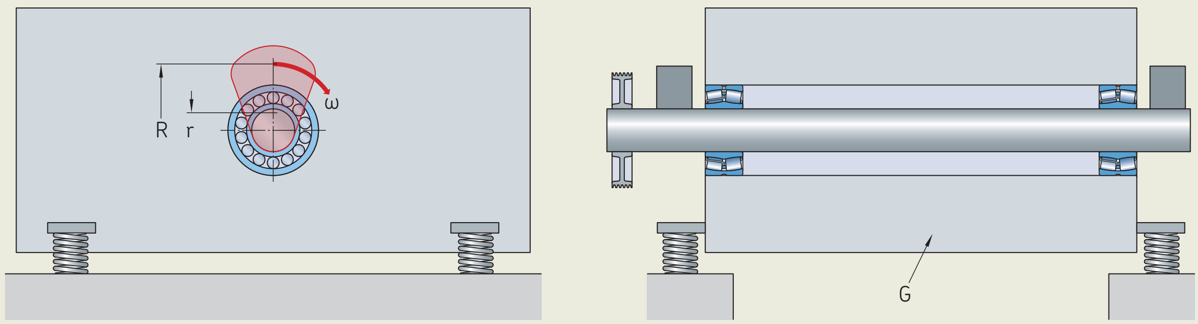
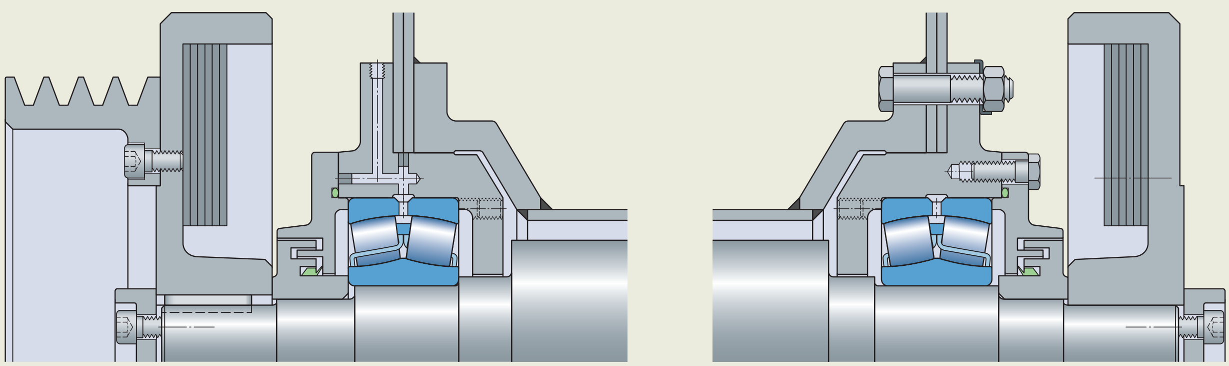


Fig. 2

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:

$$P = \left(\frac{1,2 \times G \times r \times \omega^2}{2}\right) = \left(\frac{1,2 \times 6\,100 \times 0,0081 \times 79,2^2}{2}\right)$$

$$= 186 \text{ kN}$$

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, η_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, $a_{SKF} = 1{,}3$

$$L_{10mh} = a_{SKF} \left(\frac{10^6}{60\, n}\right) \left(\frac{C}{P}\right)^{10/3}$$

$= 1{,}3 \times (10^6/(60 \times 756))\,(7{,}3)^{10/3} = 21\,500 \text{ h} > 20\,000 \text{ h}$

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:

- $\nu = 200$ mm²/s at 40 °C *(105 °F)*
- $\nu = 16$ mm²/s at 100 °C *(210 °F)*
- operating viscosity at 75 °C *(165 °F)* is around 40 mm²/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:

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

$V = 3{,}14/4 \times 102 \times (300^2 - 140^2) \times 10^{-3} - 36{,}5/0{,}0078 = 957 \text{ cm}^3$

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

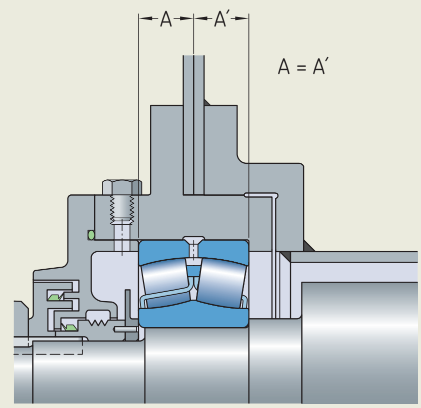
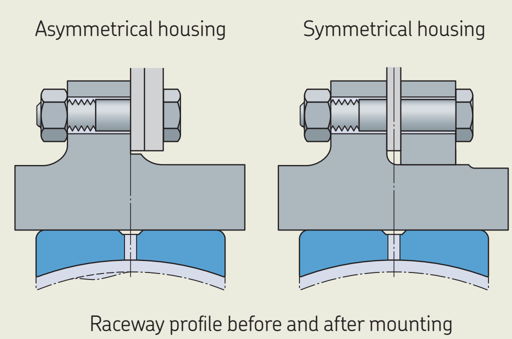


Fig. 4

Symmetrical housing prevents raceway deformation



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

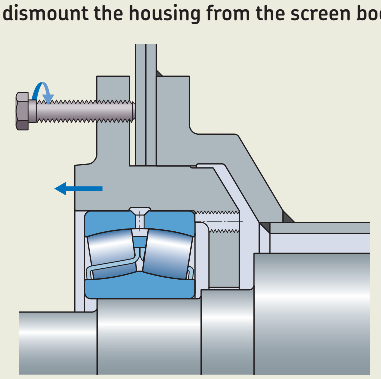
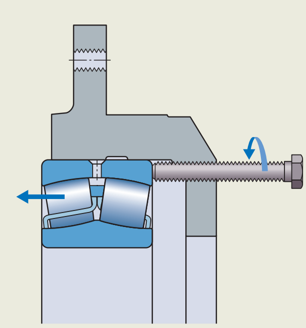


Fig. 6

Bolts used to dismount the bearing from the housing



C.2 Rope sheave

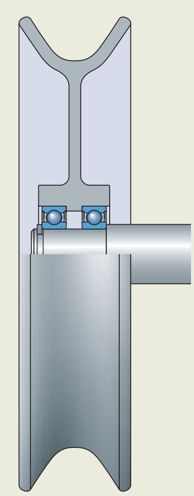
This example shows the bearing selection process applied to an application case in which bearings are to be selected for the rope sheaves on a new paper machine.

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
ν = 210 mm^2/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 mm^2/s ≈ ISO VG 68. Estimated from **diagram 13**, **page 100**, or calculated with the *SKF Bearing Calculator* (skf.com/bearingcalculator), for WT grease ν = 210 mm^2/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:

- ν_1 is determined from **diagram 14**, **page 101**
- with d_m = 53,5 and n = 2 450 r/min, ν_1 is close to 12 mm^2/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 mm^2/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
- η_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.

SKF

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, Δ_2 (**table 21**, **page 174**)

Results:

d/D		0,49
f_2		0,87
Δ_2	min./avg./max.	–29 / –17 / –5 µm
Δr_{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.

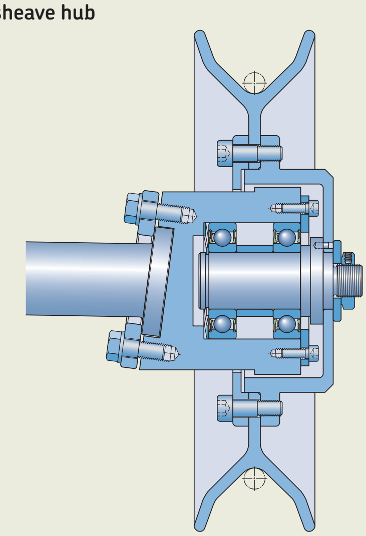
Overall conclusions

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.

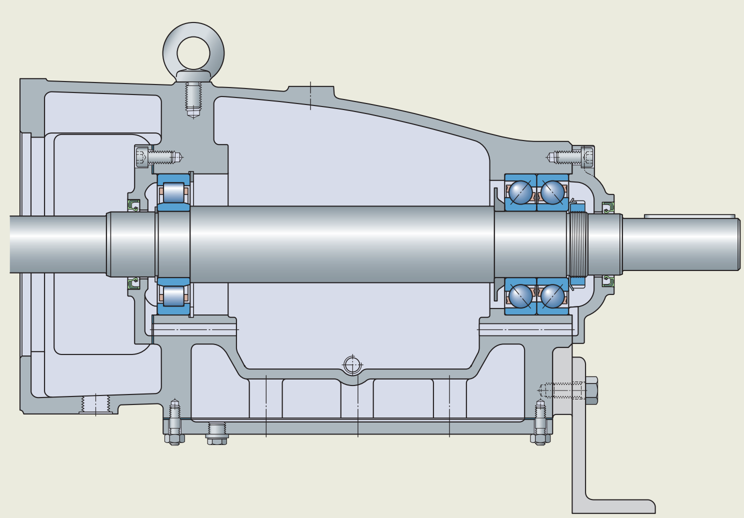
Performance and operating conditions

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: $F_r = 1{,}45$ kN
  - 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**, $\nu = 20$ 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, η_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 $L_{10mh} > 50 \times 1\,000\,000$ h
then $L_{10mh} \gg 1\,000\,000$ 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**:

$C = 1{,}62\, C_{\text{single bearing}} = 1{,}62 \times 104 = 168{,}5$ 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, κ

$\kappa = \nu/\nu_1$

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 κ = 2,5. But this would result in the NU 311 ECP bearing having κ > 4, which, during cold starts in particular, would give unwanted high κ values.

2. Contamination factor, η_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**, η_c = 0,2

Given:
P_u = 2 × 3,2 = 6,4 kN
P = 11,52 kN (*Basic rating life*)

then $\eta_c P_u/P$ = 0,2 × 6,4/11,52 = 0,11

3. Life modification factor a_{SKF}

Given:
κ = 1,8
η_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 × 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, κ 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**	**22 / 32 / 27 µm**
	Refer to *Bearing data*, page 504. Values obtained from table 3, page 506.	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, Δ_1 (table 14, page 160)
- probable fits for housings, Δ_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
Δ_1	min./avg./max.	–32 / –19 / –6 µm	–26 / –16 / –6 µm
Δ_2	min./avg./max.	–20 / 0 / 20 µm	–21 / 1 / 23 µm
Δr_{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
Δr_{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

C.3 Centrifugal pump

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.

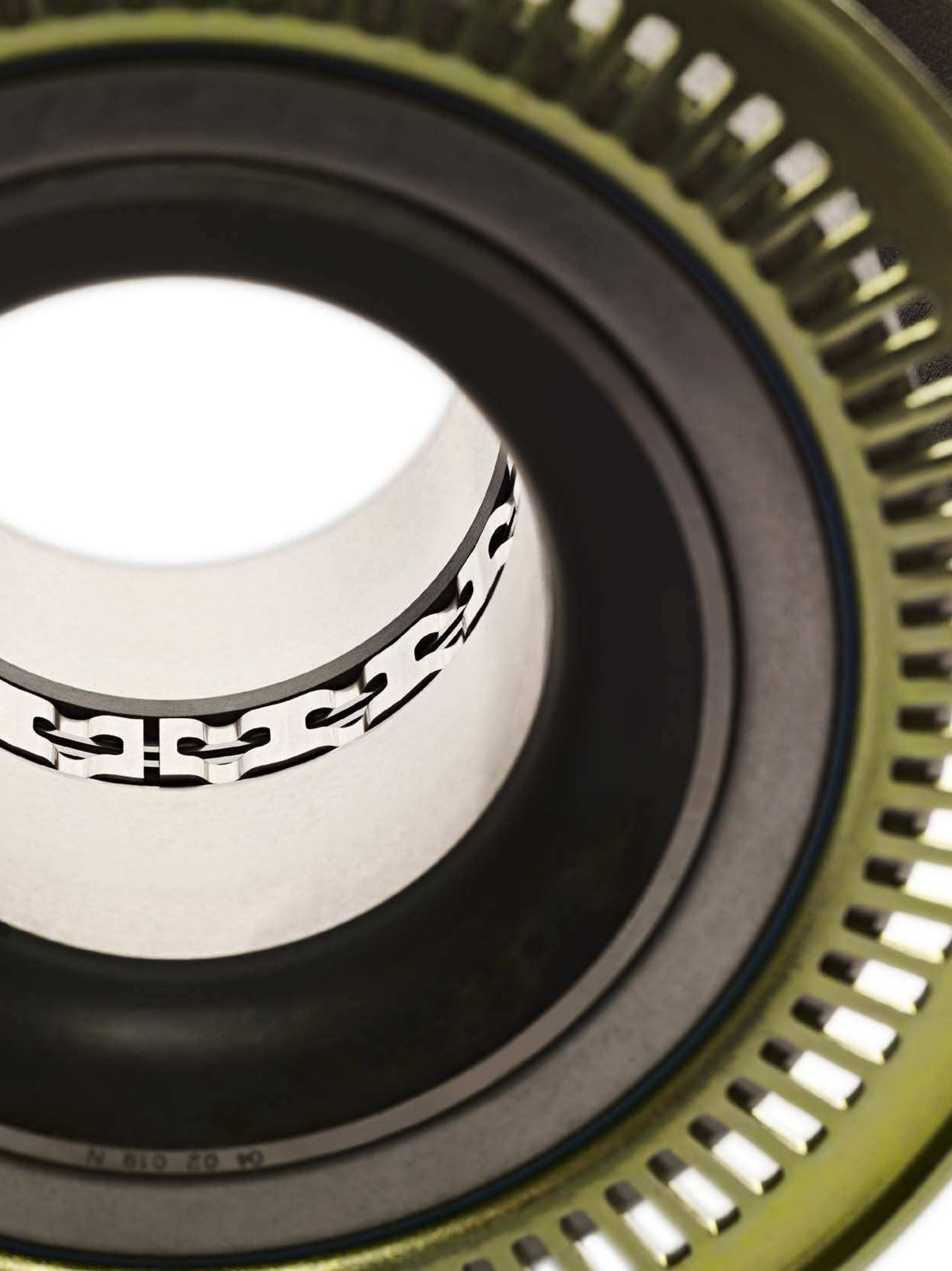
Shaft alignment

To maximize pump life, the pump and its electric motor need to be well aligned. SKF alignment tools can help.

Overall conclusions

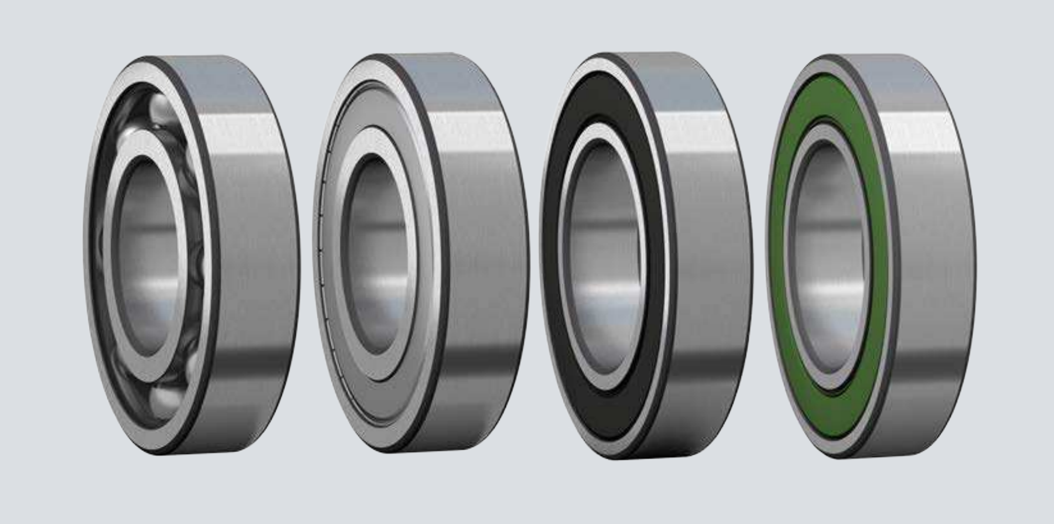
The existing bearings can be used in combination with the new impeller design.

Downsizing of the cylindrical roller bearing is recommended.



Product data

1 Deep groove ball bearings



1 Deep groove ball bearings

1 Deep groove ball bearings

More information

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

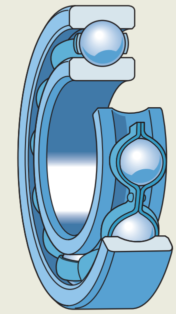


Fig. 2

Open designs

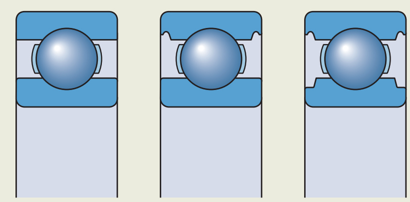


Fig. 3

Bearing with filling slots

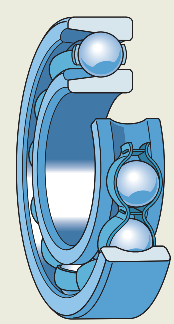
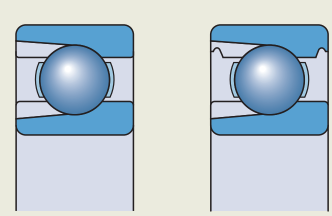


Fig. 4

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

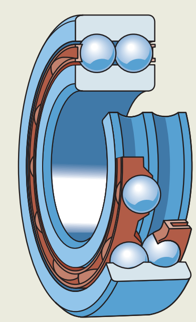


Table 1

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

SKF

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

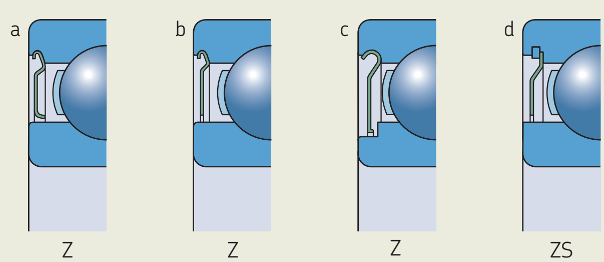


Fig. 7

Non-contact seal

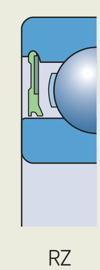


Fig. 8

Low-friction seals, RSL

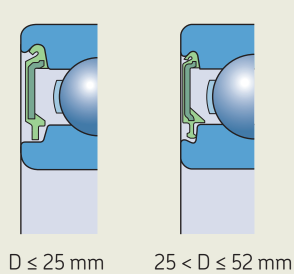
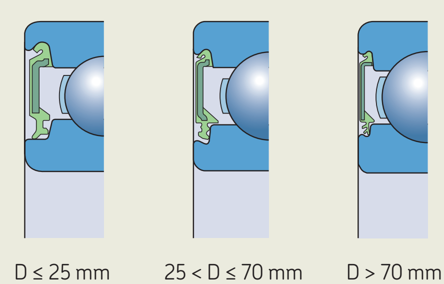


Fig. 9

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

* 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.

- 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)

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

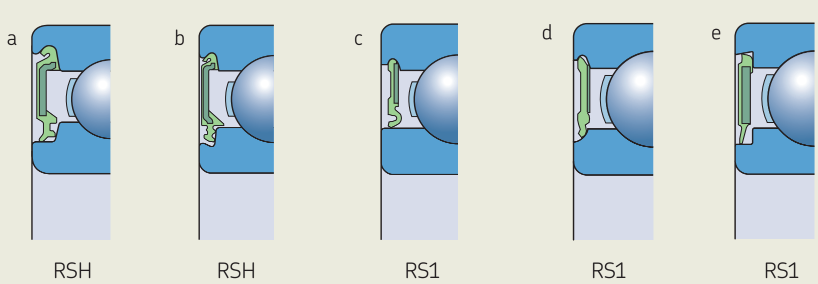


Fig. 11

ICOS oil sealed bearing unit

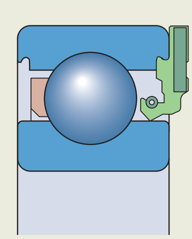


Table 2

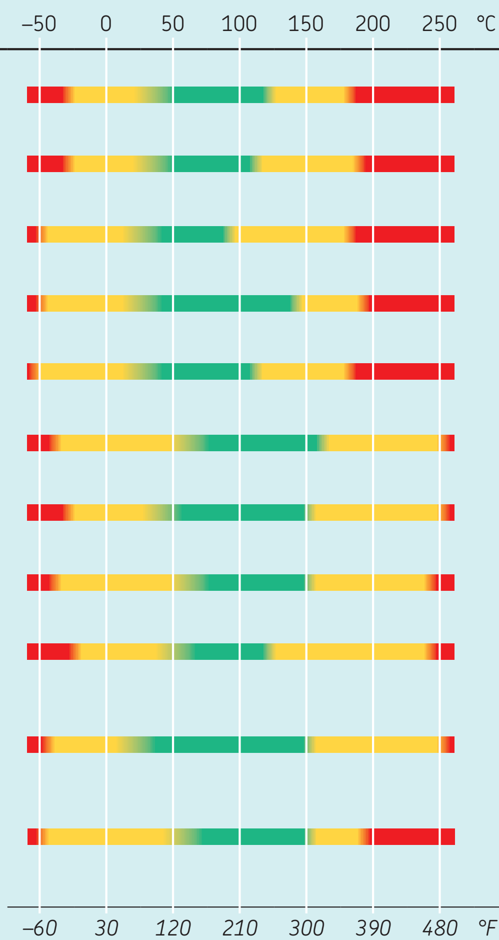
SKF standard greases for capped single row deep groove ball bearings made of carbon chromium steel

Bearings in diameter series	SKF standard greases in bearings with outside diameter			
	D ≤ 30 mm d < 10 mm	D ≤ 30 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)*	Base oil viscosity [mm²/s] 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.

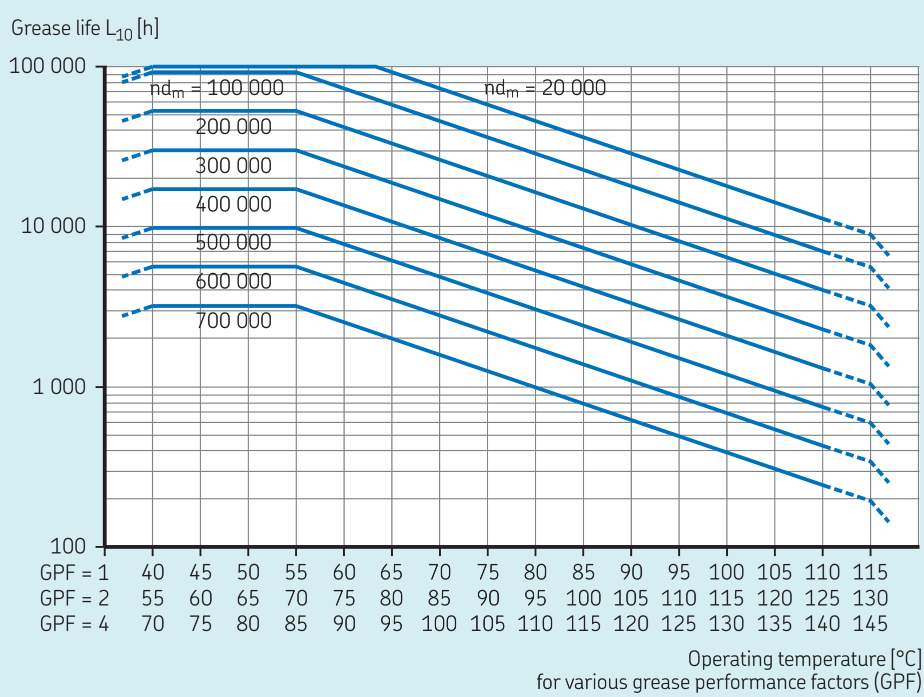
Table 4

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

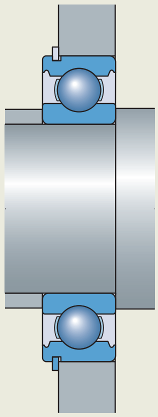


Fig. 14

Bearing with a flanged outer ring

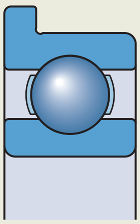
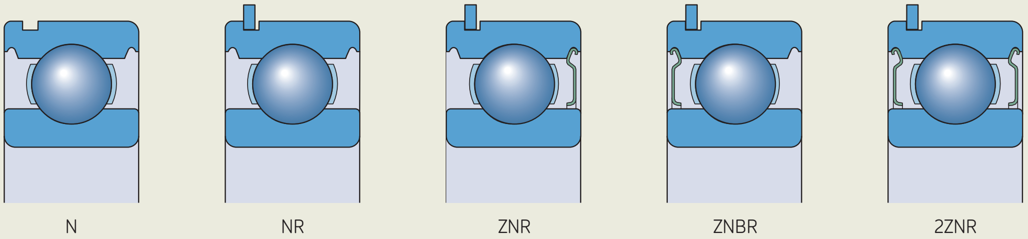


Fig. 13

Bearing variants with a snap ring groove



SKF Explorer bearings

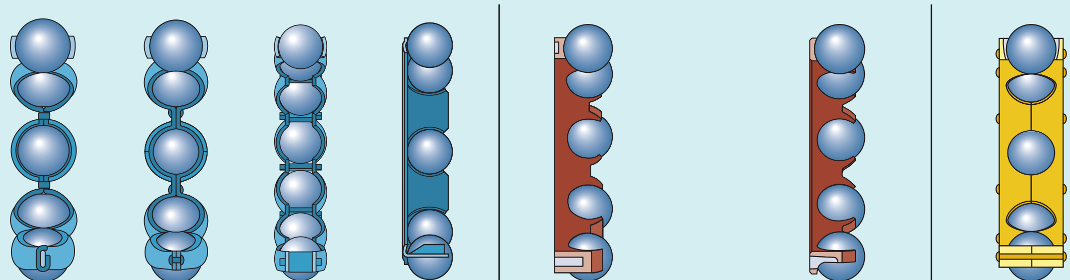
Single row deep groove ball bearings are also avilable as SKF Explorer bearings (page 7).

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 availability (not available for inch bearings)	Check availability (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

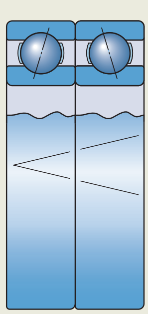
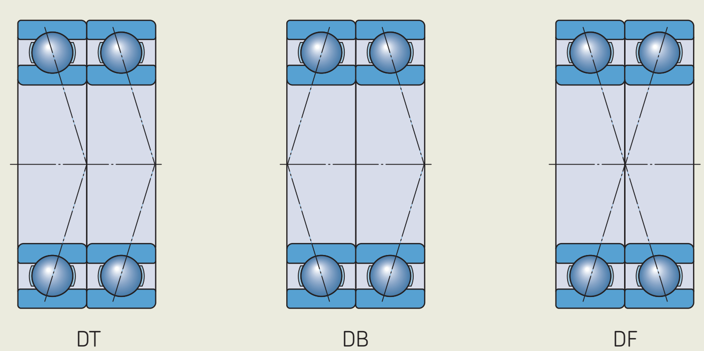


Fig. 16

Matched bearings in different arrangements



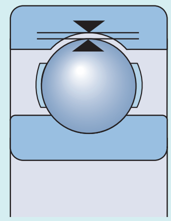
Bearing data

	Single row deep groove ball bearings
Dimension standards	Boundary dimensions: ISO 15 Snap rings and grooves: ISO 464
Tolerances For additional information → **page 35**	Normal P6 or P5 on request Except for: **SKF Explorer bearings** Dimensional tolerances to P6 and tighter width tolerance: D ≤ 110 mm → 0/ –60 µm D > 110 mm → 0/ –100 µm Geometrical tolerances: D ≤ 52 mm → P5 52 mm < D ≤ 110 mm → P6 D > 110 mm → Normal Values: ISO 492 (**table 2**, **page 38**, to **table 4**, **page 40**)
Internal clearance For additional information → **page 182**	**Single bearings** Normal Check availability of C2, C3, C4, C5, reduced ranges of standard clearance classes or partitions of adjacent classes. **Matched bearing pairs** Supplied either with clearance or preload: • CA – small axial internal clearance • GA – light preload 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) 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 Except for: • bearings with suffix X • bearings with prefix WBB1 • outer ring flange of flanged bearings: ISO 8443	Boundary dimensions: ISO 15 Snap rings and grooves: ISO 464	Boundary dimensions: ISO 15
Normal P6 or P5 on request	Normal	Normal
Normal Check availability of other clearance classes	Normal	Normal 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

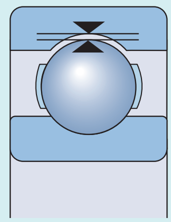
Radial internal clearance of deep groove ball bearings



Bore diameter d		Radial internal clearance 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 d		Radial internal clearance 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 d		Axial internal clearance CA		Preload GA Bearings of series 60	62	63
>	≤	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	–	–	–

1

Loads

	Single row deep groove ball bearings	Stainless steel deep groove ball bearings
Minimum load For additional information → page 106	$F_{rm} = k_r \left(\frac{\nu\, n}{1\,000}\right)^{2/3} \left(\frac{d_m}{100}\right)^2$ If minimum load cannot be reached, consider preloading.	
Axial load carrying capacity	Pure axial load → $F_a \leq 0{,}5\, C_0$ Small bearings[1] and light series bearings[2] → $F_a \leq 0{,}25\, C_0$ 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: • basic dynamic load rating $C = 1{,}62\, C_{single\ bearing}$ • basic static load rating $C_0 = 2\, C_{0\ single\ bearing}$ • fatigue load limit $P_u = 2\, P_{u\ single\ bearing}$	
Equivalent dynamic bearing load For additional information → page 91	**Single bearings and bearing pairs arranged in tandem:** $F_a/F_r \leq e \rightarrow P = F_r$ $F_a/F_r > e \rightarrow P = X\, F_r + Y\, F_a$ **Bearing pairs arranged back-to-back or face-to-face:** $F_a/F_r \leq e \rightarrow P = F_r + Y_1\, F_a$ $F_a/F_r > e \rightarrow P = 0{,}75\, F_r + Y_2\, F_a$	$F_a/F_r \leq e \rightarrow P = F_r$ $F_a/F_r > e \rightarrow P = X\, F_r + Y\, F_a$
Equivalent static bearing load For additional information → page 105	**Single bearings and bearing pairs arranged in tandem:** $P_0 = 0{,}6\, F_r + 0{,}5\, F_a$ $P_0 < F_r \rightarrow P_0 = F_r$ **Bearing pairs arranged back-to-back or face-to-face:** $P_0 = F_r + 1{,}7\, F_a$	$P_0 = 0{,}6\, F_r + 0{,}5\, F_a$ $P_0 < F_r \rightarrow P_0 = F_r$

1) $d \leq 12$ mm
2) Diameter series 8, 9, 0, and 1

SKF

	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 $P \leq 0{,}5\ C_0$ $\rightarrow P = F_r + F_a$	$F_a/F_r \leq e \rightarrow P = F_r$ $F_a/F_r > e \rightarrow P = X\ F_r + Y\ F_a$
	$F_a/F_r \leq 0{,}6 \rightarrow P_0 = F_r + 0{,}5\ F_a$	$P_0 = 0{,}6\ F_r + 0{,}5\ F_a$ $P_0 < F_r \rightarrow P_0 = F_r$

Symbols

C_0	basic static load rating [kN] • single bearings (**product tables**, **page 260**) • matched bearing pairs (*Load carrying capacity of matched bearing pairs*)
d_m	bearing mean diameter [mm] $= 0{,}5\ (d + D)$
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**)
ν	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 Normal clearance			Single row bearings 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 **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					
4.1	4.2	4.3	4.4	4.5	4.6

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	Grease suffixes (table 3, page 245)
GFJ	
GJN	
HT	
LHT23	
LT	
LT10	
MT33	
MT47	
VT378	
WT	

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

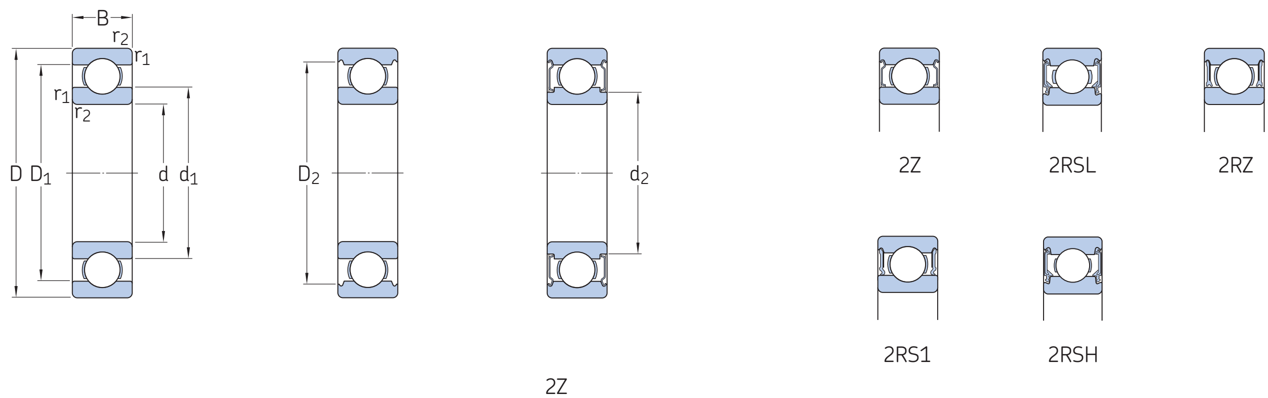
Group 4.2: Accuracy, clearance, preload, quiet running

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 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 P = Displaced clearance range comprising the upper half of the actual clearance range plus the lower half of the next larger clearance range 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

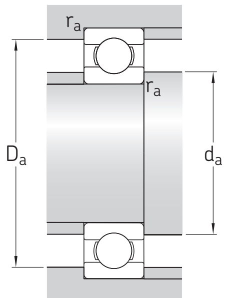
1.1 Single row deep groove ball bearings
d **3 – 6** mm

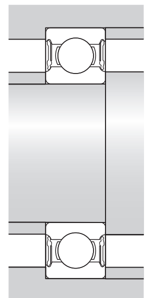


Principal dimensions			Basic load ratings dynamic	static	Fatigue load limit	Speed ratings Reference speed	Limiting speed[1]	Mass	Designations Bearing open or capped on both sides	capped on one side[1]
d	D	B	C	C_0	P_u					
mm			kN		kN	r/min		kg	–	
3	10	4	0,54	0,18	0,007	130 000	80 000	0,0015	▸ 623	–
	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

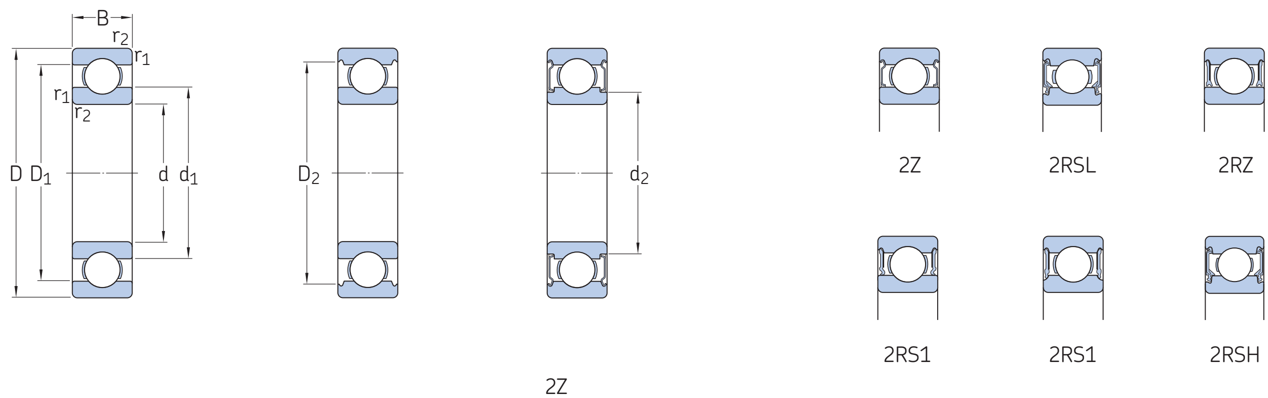
SKF Explorer bearing
▸ Popular item
[1] For bearings with only one shield or one non-contact seal (Z, RZ) the limiting speeds of the open bearings are valid.

SKF



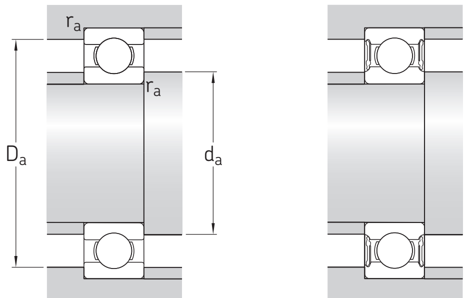


Dimensions						Abutment and fillet dimensions				Calculation factors	
d	d_1 ≈	d_2 ≈	D_1 ≈	D_2 ≈	$r_{1,2}$ min.	d_a min.	d_a max.	D_a max.	r_a max.	k_r	f_0
mm						mm				–	
3	5,2	–	–	8,2	0,15	4,2	–	8,8	0,1	0,025	7,5
	5,2	–	–	8,2	0,15	4,2	5,1	8,8	0,1	0,025	7,5
	5,2	–	–	8,2	0,15	4,2	5,1	8,8	0,1	0,025	7,5
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



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	–	
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	–

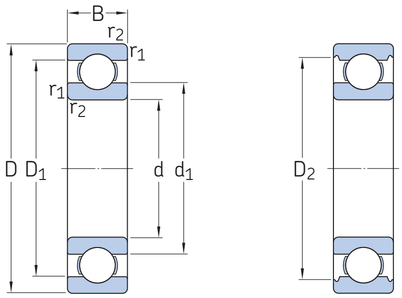
SKF Explorer bearing
▸ Popular item
1) For bearings with only one shield or one non-contact seal (Z, RZ) the limiting speeds of the open bearings are valid.

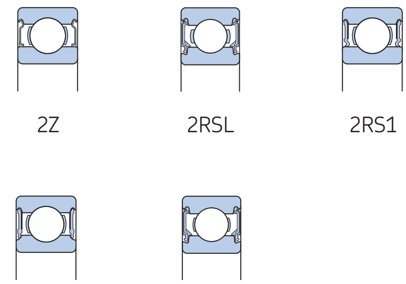


Dimensions						Abutment and fillet dimensions				Calculation factors	
d	d_1 ≈	d_2 ≈	D_1 ≈	D_2 ≈	$r_{1,2}$ min.	d_a min.	d_a max.	D_a max.	r_a max.	k_r	f_0
mm						mm				–	
7	9	–	12	–	0,15	7,8	–	13,2	0,1	0,015	7,2
	–	8,5	–	12,7	0,15	7,8	8	13,2	0,1	0,015	11
	10,4	–	–	14,3	0,3	9	9,7	15	0,3	0,02	7,3
	10,4	–	–	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





2Z 2RSL 2RS1

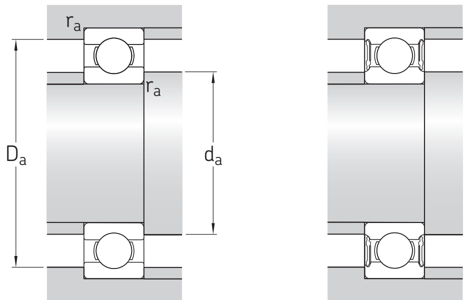
2RS1 2RSH

Principal dimensions			Basic load ratings dynamic	static	Fatigue load limit	Speed ratings Reference speed	Limiting speed1)	Mass	Designations Bearing open or capped on both sides	capped on one side1)
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**	–

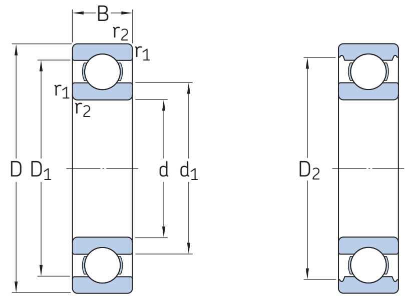
SKF Explorer bearing

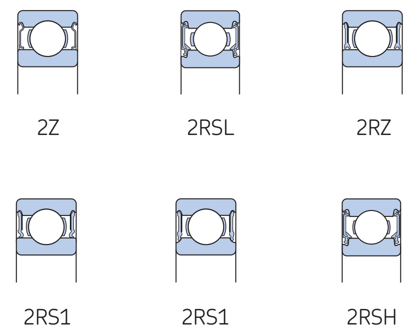
▸ Popular item

1) For bearings with only one shield or one non-contact seal (Z, RZ) the limiting speeds of the open bearings are valid.



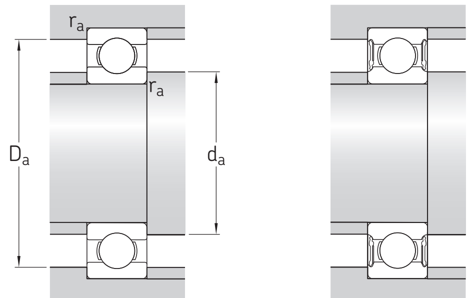
Dimensions						Abutment and fillet dimensions				Calculation factors	
d	d_1 ≈	d_2 ≈	D_1 ≈	D_2 ≈	$r_{1,2}$ min.	d_a min.	d_a max.	D_a max.	r_a max.	k_r	f_0
mm						mm				–	
9 cont.	–	12,8	–	21,2	0,3	11	12,5	22	0,3	0,025	13
	–	12,8	–	21,2	0,3	11	12,5	22	0,3	0,025	13
	14,4	–	–	21,2	0,3	11	14,3	22	0,3	0,025	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



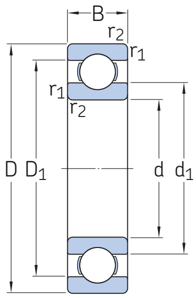


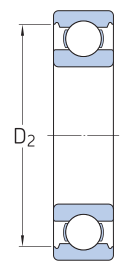
Principal dimensions			Basic load ratings dynamic	static	Fatigue load limit	Speed ratings Reference speed	Limiting speed[1]	Mass	Designations Bearing open or capped on both sides	capped on one side[1]
d	D	B	C	C_0	P_u					
mm			kN		kN	r/min		kg	–	
12	21	5	1,74	0,915	0,039	–	20 000	0,0063	▸ **61801-2RS1**	–
	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

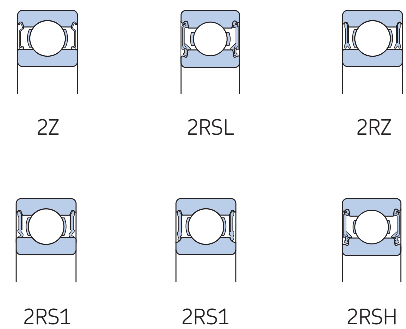
SKF Explorer bearing
▸ Popular item
1) For bearings with only one shield or one non-contact seal (Z, RZ) the limiting speeds of the open bearings are valid.



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

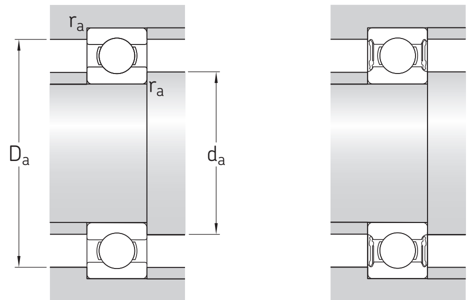






Principal dimensions			Basic load ratings		Fatigue load limit	Speed ratings		Mass	Designations	
			dynamic	static		Reference speed	Limiting speed[1]		Bearing open or capped on both sides	capped on one side[1]
d	D	B	C	C_0	P_u					
mm			kN		kN	r/min		kg	–	
15 cont.	32	9	5,85	2,85	0,12	50 000	26 000	0,032	▸ 6002-2Z	6002-Z
	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	–

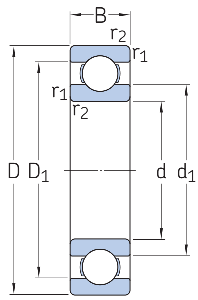
SKF Explorer bearing
▸ Popular item
[1] For bearings with only one shield or one non-contact seal (Z, RZ) the limiting speeds of the open bearings are valid.

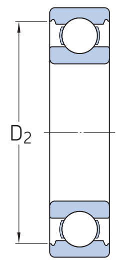


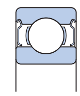
Dimensions						Abutment and fillet dimensions				Calculation factors	
d	d_1 ≈	d_2 ≈	D_1 ≈	D_2 ≈	$r_{1,2}$ min.	d_a min.	d_a max.	D_a max.	r_a max.	k_r	f_0
mm						mm				–	
15	20,5	–	–	28,2	0,3	17	20,4	30	0,3	0,025	14
cont.	20,5	–	–	28,2	0,3	17	20,4	30	0,3	0,025	14
	21,7	–	–	30,5	0,6	19,2	–	30,8	0,6	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

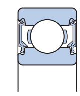
1.1 Single row deep groove ball bearings

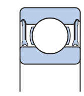
d **17 – 22** mm

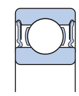


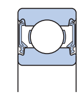



2Z


2RSL

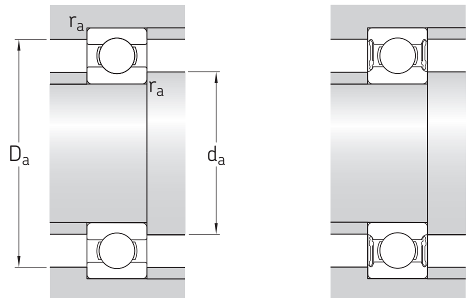

2RZ


2RS1


2RSH

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	–	
17 cont.	47	14	14,3	6,55	0,275	34 000	22 000	0,11	▸ 6303	–
	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	–

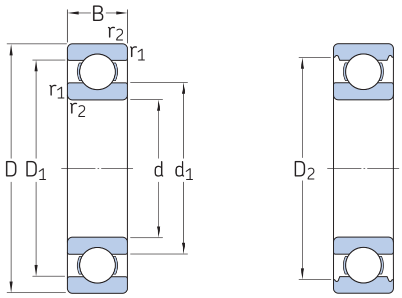
SKF Explorer bearing
▸ Popular item
1) For bearings with only one shield or one non-contact seal (Z, RZ) the limiting speeds of the open bearings are valid.

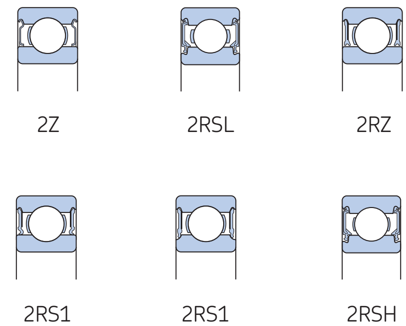


Dimensions						Abutment and fillet dimensions				Calculation factors	
d	d_1 ≈	d_2 ≈	D_1 ≈	D_2 ≈	$r_{1,2}$ min.	d_a min.	d_a max.	D_a max.	r_a max.	k_r	f_0
mm						mm				–	
17	26,5	–	–	39,6	1	22,6	–	41,4	1	0,03	12
cont.	–	23,4	–	39,6	1	22,6	23,5	41,4	1	0,03	12
	–	23,4	–	39,6	1	22,6	23,5	41,4	1	0,03	12
	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

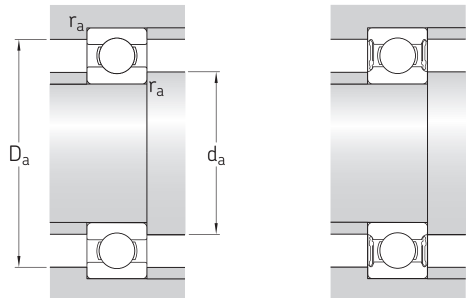
d **25 – 30** mm





Principal dimensions			Basic load ratings 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	–	
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	–

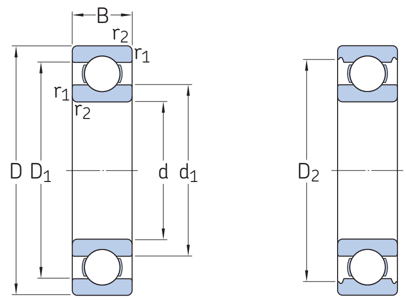
SKF Explorer bearing
▸ Popular item
1) For bearings with only one shield or one non-contact seal (Z, RZ) the limiting speeds of the open bearings are valid.

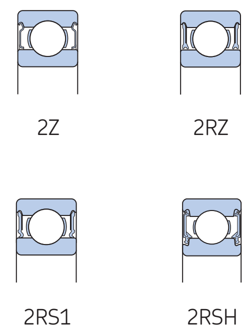


Dimensions						Abutment and fillet dimensions				Calculation factors	
d	d_1 ≈	d_2 ≈	D_1 ≈	D_2 ≈	$r_{1,2}$ min.	d_a min.	d_a max.	D_a max.	r_a max.	k_r	f_0
mm						mm				–	
25	–	27,4	–	34,2	0,6	27	27,3	35	0,3	0,015	14
	28,5	–	–	34,2	0,3	27	28,4	35	0,3	0,015	14
	28,5	–	33,2	–	0,6	27	–	35	0,3	0,015	14
	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

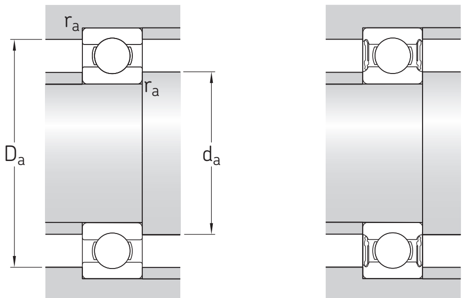
d **30 – 35** mm



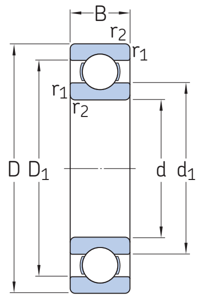


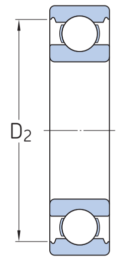
Principal dimensions			Basic load ratings		Fatigue load limit	Speed ratings		Mass	Designations	
			dynamic	static		Reference speed	Limiting speed1)		Bearing open or capped on both sides	capped on one side1)
d	D	B	C	C_0	P_u					
mm			kN		kN	r/min		kg	–	
30 cont.	55	9	11,9	7,35	0,31	28 000	17 000	0,089	▸ 16006	–
	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

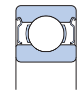
SKF Explorer bearing
▸ Popular item
1) For bearings with only one shield or one non-contact seal (Z, RZ) the limiting speeds of the open bearings are valid.

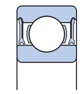


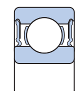
Dimensions						Abutment and fillet dimensions				Calculation factors	
d	d_1 ≈	d_2 ≈	D_1 ≈	D_2 ≈	$r_{1,2}$ min.	d_a min.	d_a max.	D_a max.	r_a max.	k_r	f_0
mm						mm				–	
30 cont.	37,7	–	47,3	–	0,3	32	–	53	0,3	0,02	15
	38,2	–	–	49	1	34,6	–	50	1	0,025	15
	38,2	–	–	49	1	34,6	38,1	50	1	0,025	15
	38,2	–	–	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

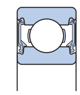





2Z

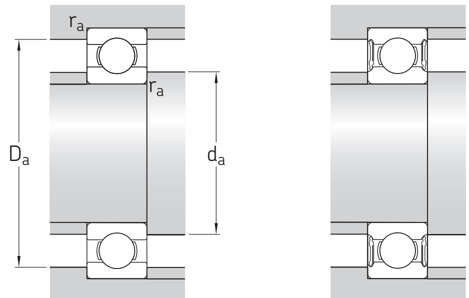

2RZ


2RS1

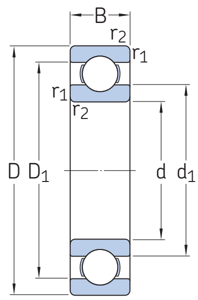

2RSH

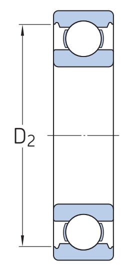
Principal dimensions			Basic load ratings dynamic	static	Fatigue load limit	Speed ratings Reference speed	Limiting speed[1)]	Mass	Designations Bearing open or capped on both sides	capped on one side[1)]
d	D	B	C	C_0	P_u					
mm			kN		kN	r/min		kg	–	
35 cont.	72	17	31,2	17,6	0,75	20 000	13 000	0,26	6207 ETN9	–
	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	–

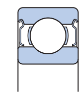
SKF Explorer bearing
▸ Popular item
1) For bearings with only one shield or one non-contact seal (Z, RZ) the limiting speeds of the open bearings are valid.

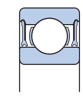


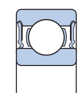
Dimensions						Abutment and fillet dimensions				Calculation factors	
d	d_1 ≈	d_2 ≈	D_1 ≈	D_2 ≈	$r_{1,2}$ min.	d_a min.	d_a max.	D_a max.	r_a max.	k_r	f_0
mm						mm				–	
35	46,1	–	61,7	–	1,1	42	–	65	1	0,025	13
cont.	46,9	–	–	62,7	1,1	42	46,8	65	1	0,025	14
	49,5	–	–	69,2	1,5	44	–	71	1,5	0,03	13
	49,5	–	–	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

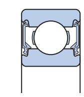





2Z

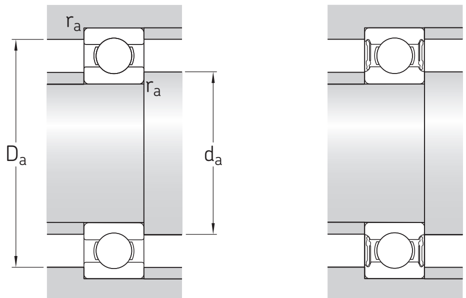

2RZ


2RS1

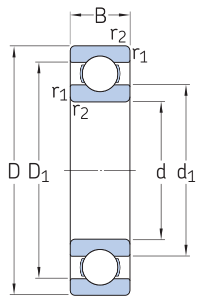

2RSH

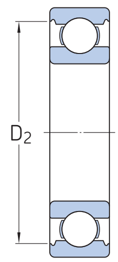
Principal dimensions			Basic load ratings dynamic	static	Fatigue load limit	Speed ratings Reference speed	Limiting speed1)	Mass	Designations Bearing open or capped on both sides	capped on one side1)
d	D	B	C	C_0	P_u					
mm			kN		kN	r/min		kg	–	
45	58	7	6,63	6,1	0,26	–	6 700	0,04	▸ **61809-2RS1**	–
	58	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**

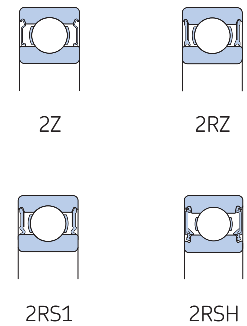
SKF Explorer bearing
▸ Popular item
1) For bearings with only one shield or one non-contact seal (Z, RZ) the limiting speeds of the open bearings are valid.



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
	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

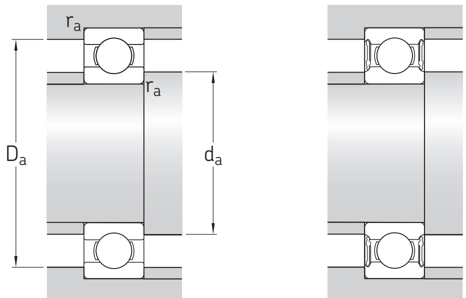






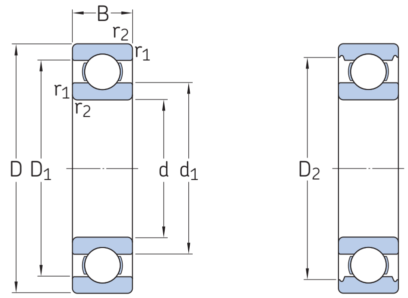
Principal dimensions			Basic load ratings		Fatigue load limit	Speed ratings		Mass	Designations	
			dynamic	static		Reference speed	Limiting speed[1)]		Bearing open or capped on both sides	capped on one side[1)]
d	D	B	C	C_0	P_u					
mm			kN		kN	r/min		kg	–	
50 cont.	90	20	37,1	23,2	0,98	15 000	8 000	0,47	▸ 6210-2Z	6210-Z
	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	–

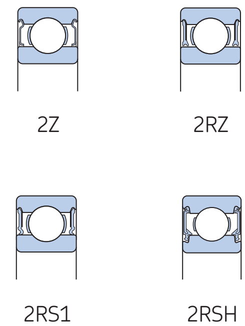
SKF Explorer bearing
▸ Popular item
1) For bearings with only one shield or one non-contact seal (Z, RZ) the limiting speeds of the open bearings are valid.



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

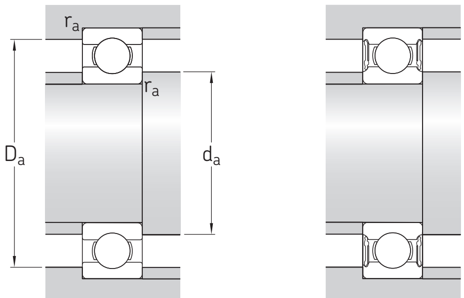




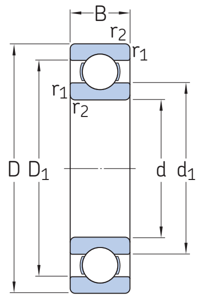
Principal dimensions			Basic load ratings dynamic	static	Fatigue load limit	Speed ratings Reference speed	Limiting speed[1)]	Mass	Designations Bearing open or capped on both sides	capped on one side[1)]
d	D	B	C	C_0	P_u					
mm			kN		kN	r/min		kg	–	
60	78	10	11,9	11,4	0,49	–	4 800	0,11	▸ 61812-2RS1	–
	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	–

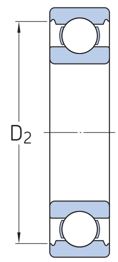
SKF Explorer bearing
▸ Popular item
1) For bearings with only one shield or one non-contact seal (Z, RZ) the limiting speeds of the open bearings are valid.

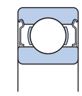
SKF

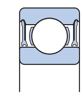


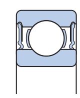
Dimensions						Abutment and fillet dimensions				Calculation factors	
d	d_1 ≈	d_2 ≈	D_1 ≈	D_2 ≈	$r_{1,2}$ min.	d_a min.	d_a max.	D_a max.	r_a max.	k_r	f_0
mm						mm				–	
60	65,4	–	–	74,5	0,3	62	65	76	0,3	0,015	17
	65,4	–	–	74,5	0,3	62	65	76	0,3	0,015	17
	65,4	–	72,9	–	0,3	62	–	76	0,3	0,015	17
	68,3	–	–	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





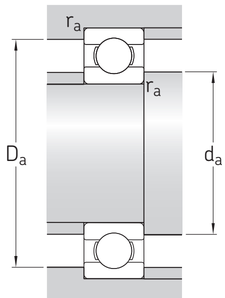

2Z

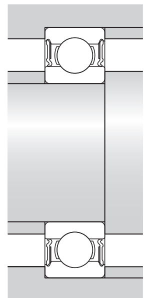

2RZ


2RS1

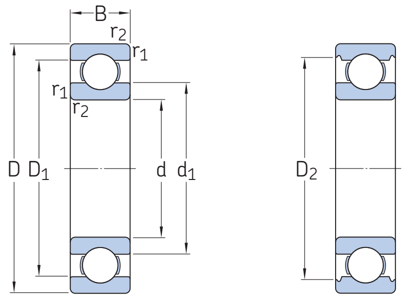
Principal dimensions			Basic load ratings		Fatigue load limit	Speed ratings		Mass	Designations	
			dynamic	static		Reference speed	Limiting speed[1)]		Bearing open or capped on both sides	capped on one side[1)]
d	D	B	C	C_0	P_u					
mm			kN		kN	r/min		kg	–	
65	120	23	58,5	40,5	1,73	12 000	7 500	1	▸ 6213	–
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	–

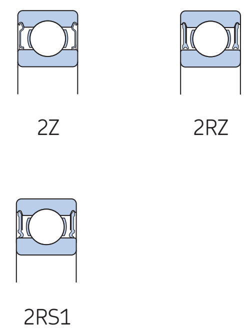
SKF Explorer bearing
▸ Popular item
1) For bearings with only one shield or one non-contact seal (Z, RZ) the limiting speeds of the open bearings are valid.





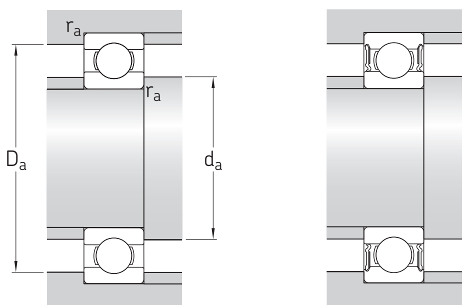
Dimensions						Abutment and fillet dimensions				Calculation factors	
d	d_1 ≈	d_2 ≈	D_1 ≈	D_2 ≈	$r_{1,2}$ min.	d_a min.	d_a max.	D_a max.	r_a max.	k_r	f_0
mm						mm				–	
65	83,3	–	–	106	1,5	74	–	111	1,5	0,025	15
cont.	83,3	–	–	106	1,5	74	83	111	1,5	0,025	15
	83,3	–	–	106	1,5	74	83	111	1,5	0,025	15
	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





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**

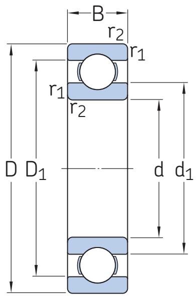
SKF Explorer bearing
▸ Popular item
1) For bearings with only one shield or one non-contact seal (Z, RZ) the limiting speeds of the open bearings are valid.

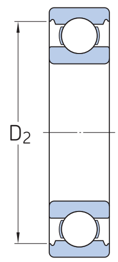


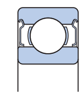
Dimensions						Abutment and fillet dimensions				Calculation factors	
d	d_1 ≈	d_2 ≈	D_1 ≈	D_2 ≈	$r_{1,2}$ min.	d_a min.	d_a max.	D_a max.	r_a max.	k_r	f_0
mm						mm				–	
75	81,7	–	–	90,7	1,3	79	81	91	0,6	0,015	13
	81,7	–	–	90,7	1,3	79	81	91	0,6	0,015	13
	81,7	–	–	90,7	1,3	79	–	91	0,6	0,015	13
	84,8	–	–	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

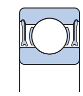
d **80 – 90** mm



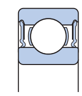




2Z



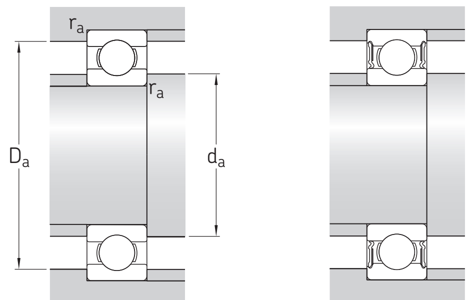
2RZ



2RS1

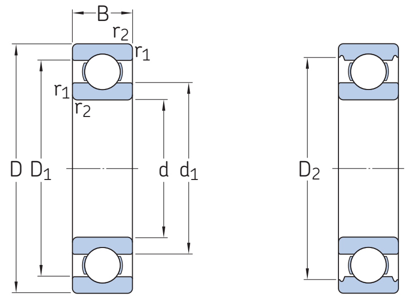
Principal dimensions			Basic load ratings dynamic	static	Fatigue load limit	Speed ratings Reference speed	Limiting speed1)	Mass	Designations Bearing open or capped on both sides	capped on one side1)
d	D	B	C	C_0	P_u					
mm			kN		kN	r/min		kg	–	
80 cont.	140	26	72,8	55	2,2	9 500	4 800	1,55	▸ 6216-2Z	6216-Z
	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

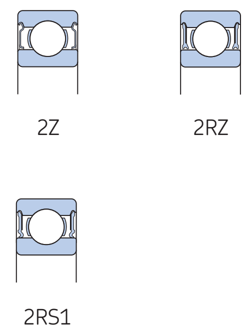
SKF Explorer bearing
▸ Popular item
1) For bearings with only one shield or one non-contact seal (Z, RZ) the limiting speeds of the open bearings are valid.



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	101	–	–	127	2	91	100	129	2	0,025	15
cont.	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

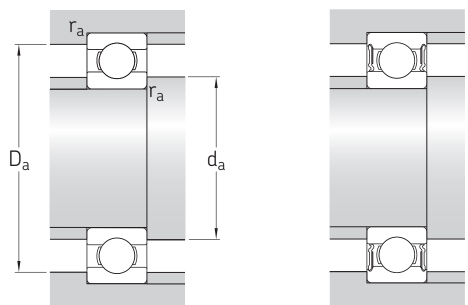
1.1 Single row deep groove ball bearings
d **90 – 100** mm





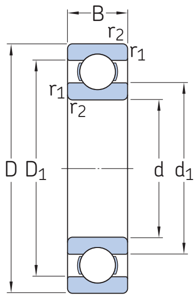
Principal dimensions			Basic load ratings dynamic	static	Fatigue load limit	Speed ratings Reference speed	Limiting speed[1)]	Mass	Designations Bearing open or capped on both sides	capped on one side[1)]
d	D	B	C	C_0	P_u					
mm			kN		kN	r/min		kg	–	
90 cont.	160	30	101	73,5	2,8	8 500	4 300	2,3	► 6218-2Z	6218-Z
	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

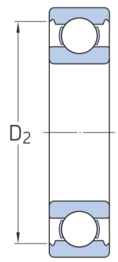
SKF Explorer bearing
► Popular item
1) For bearings with only one shield or one non-contact seal (Z, RZ) the limiting speeds of the open bearings are valid.

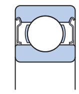


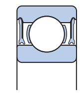
Dimensions						Abutment and fillet dimensions				Calculation factors	
d	d_1 ≈	d_2 ≈	D_1 ≈	D_2 ≈	$r_{1,2}$ min.	d_a min.	d_a max.	D_a max.	r_a max.	k_r	f_0
mm						mm				–	
90 cont.	112	–	–	143	2	101	112	149	2	0,025	15
	121	–	–	164	3	104	–	176	2,5	0,03	13
	121	–	–	164	3	104	–	176	2,5	0,03	13
	121	–	–	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

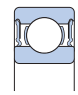
1.1 Single row deep groove ball bearings
d **100 – 110** mm






2Z

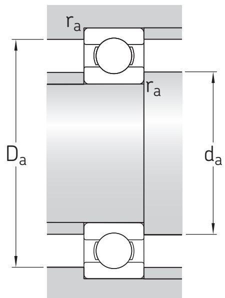

2RZ

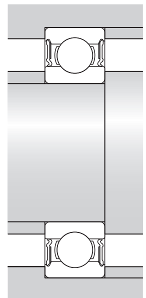

2RS1

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	–	
100 cont.	180	34	127	93	3,35	7 500	3 800	3,3	▸ 6220-2Z	6220-Z
	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**	–

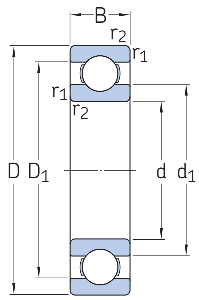
SKF Explorer bearing
▸ Popular item
1) For bearings with only one shield or one non-contact seal (Z, RZ) the limiting speeds of the open bearings are valid.

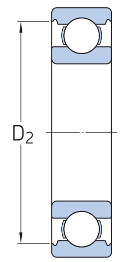
SKF

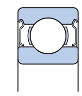


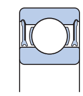


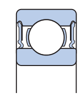
Dimensions						Abutment and fillet dimensions				Calculation factors	
d	d_1 ≈	d_2 ≈	D_1 ≈	D_2 ≈	$r_{1,2}$ min.	d_a min.	d_a max.	D_a max.	r_a max.	k_r	f_0
mm						mm				–	
100 cont.	124	–	–	160	2,1	112	124	168	2	0,025	14
	135	–	–	184	3	114	–	201	2,5	0,03	13
	135	–	–	184	3	114	–	201	2,5	0,03	13
	135	–	–	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





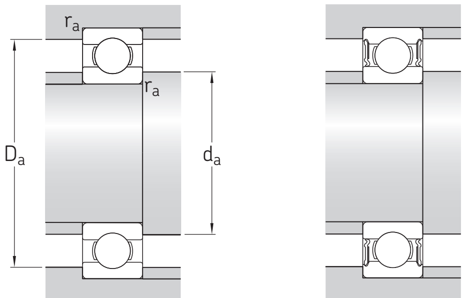

2Z


2RZ


2RS1

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		–	
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**	–

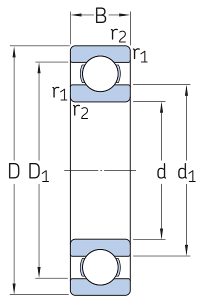
SKF Explorer bearing
▸ Popular item
1) For bearings with only one shield or one non-contact seal (Z, RZ) the limiting speeds of the open bearings are valid.

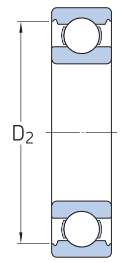


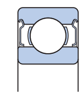
Dimensions						Abutment and fillet dimensions				Calculation factors	
d	d_1 ≈	d_2 ≈	D_1 ≈	D_2 ≈	$r_{1,2}$ min.	d_a min.	d_a max.	D_a max.	r_a max.	k_r	f_0
mm						mm				–	
120	128	–	–	145	1	125	128	145	1	0,015	14
	128	–	–	145	1	125	128	145	1	0,015	14
	128	–	–	145	1	125	–	145	1	0,015	14
	134	–	151	–	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

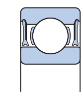
d **140 – 160** mm



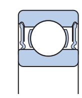




2Z



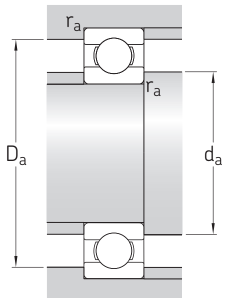
2RZ

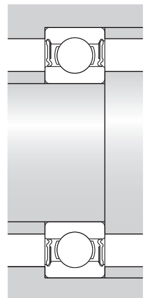


2RS1

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	–	
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.

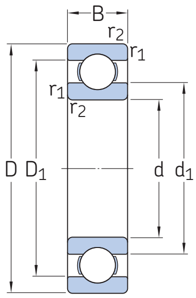




Dimensions						Abutment and fillet dimensions				Calculation factors	
d	d_1 ≈	d_2 ≈	D_1 ≈	D_2 ≈	$r_{1,2}$ min.	d_a min.	d_a max.	D_a max.	r_a max.	k_r	f_0
mm						mm				–	
140	150	–	–	167	1,1	146	150	169	1	0,015	16
	150	–	–	167	1,1	146	150	169	1	0,015	16
	150	–	–	167	2,5	146	–	169	1	0,015	16
	156	–	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

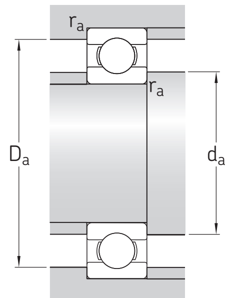
d **160 – 200** mm



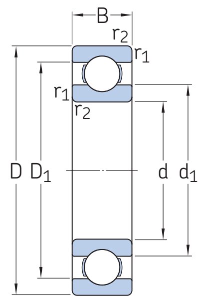
Principal dimensions			Basic load ratings		Fatigue load limit	Speed ratings		Mass	Designations	
			dynamic	static		Reference speed	Limiting speed[1)]		Bearing open or capped on both sides	capped on one side[1)]
d	D	B	C	C_0	P_u					
mm			kN		kN	r/min		kg	–	
160	290	48	186	186	5,3	4 500	4 300	14	▸ **6232 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.

SKF

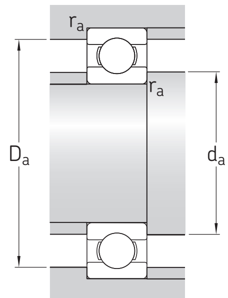


Dimensions						Abutment and fillet dimensions				Calculation factors	
d	d_1 ≈	d_2 ≈	D_1 ≈	D_2 ≈	$r_{1,2}$ min.	d_a min.	d_a max.	D_a max.	r_a max.	k_r	f_0
mm						mm				–	
160 cont.	205	–	243	–	3	174	–	276	2,5	0,025	15
	218	–	281	–	4	177	–	323	3	0,03	14
	218	–	281	–	4	177	–	323	3	0,03	14
170	184	–	202	–	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



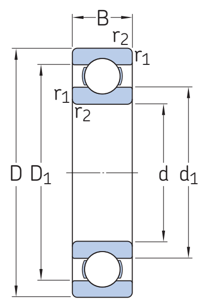
Principal dimensions			Basic load ratings		Fatigue load limit	Speed ratings		Mass	Designations	
			dynamic	static		Reference speed	Limiting speed[1)]		Bearing open or capped on both sides	capped on one side[1)]
d	D	B	C	C_0	P_u					
mm			kN		kN	r/min		kg	–	
200	310	34	168	190	5,1	4 300	2 800	8,8	▸ **16040**	–
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.



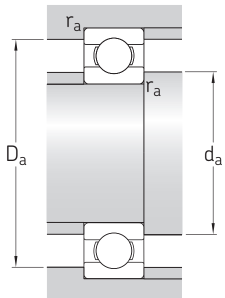
Dimensions						Abutment and fillet dimensions				Calculation factors	
d	d_1 ≈	d_2 ≈	D_1 ≈	D_2 ≈	$r_{1,2}$ min.	d_a min.	d_a max.	D_a max.	r_a max.	k_r	f_0
mm						mm				–	
200	237	–	273	–	2	209	–	301	2	0,02	16
cont.	235	–	275	–	2,1	210	–	300	2	0,025	16
	235	–	275	–	2,1	210	–	300	2	0,025	16
	254	–	303	–	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 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	–	
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**	–

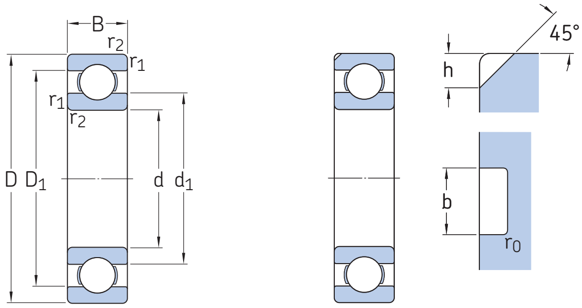
▸ Popular item
1) For bearings with only one shield or one non-contact seal (Z, RZ) the limiting speeds of the open bearings are valid.



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

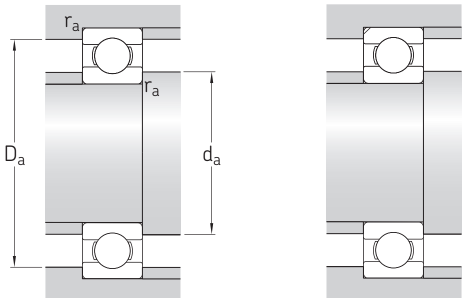
d **400 – 710** mm



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**	–

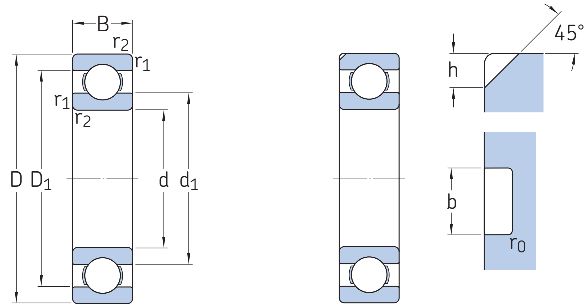
▸ Popular item
1) For bearings with only one shield or one non-contact seal (Z, RZ) the limiting speeds of the open bearings are valid.



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

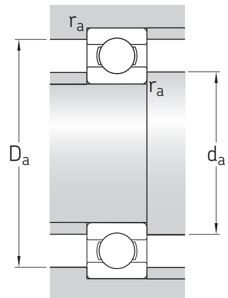
d **750 – 1 500** mm



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**	–

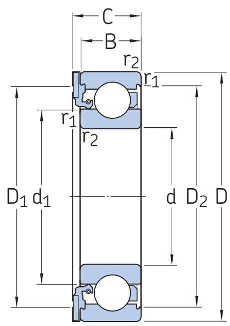
▸ Popular item
1) For bearings with only one shield or one non-contact seal (Z, RZ) the limiting speeds of the open bearings are valid.



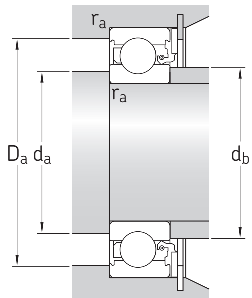
Dimensions						Abutment and fillet dimensions				Calculation factors	
d	d_1 ≈	d_2 ≈	D_1 ≈	D_2 ≈	$r_{1,2}$ min.	d_a min.	d_a max.	D_a max.	r_a max.	k_r	f_0
mm						mm				–	
750	804	–	866	–	5	768	–	902	4	0,015	17
	835	–	919	–	6	773	–	977	5	0,02	17
	862	–	978	–	7,5	778	–	1 062	6	0,025	16
800	857	–	922	–	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

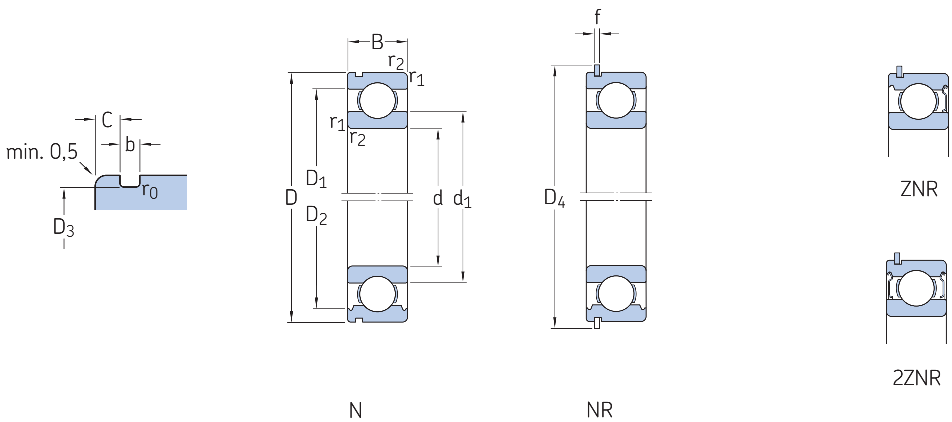


Dimensions					Abutment and fillet dimensions					Calculation factors	
d	d_1 ≈	D_1 ≈	D_2 ≈	$r_{1,2}$ min.	d_a, d_b min.	d_a max.	d_b max.	D_a max.	r_a max.	k_r	f_0
mm					mm					–	
12	18,4	–[1]	27,4	0,6	16,2	18,4	18	27,8	0,6	0,025	12
15	21,7	30,8	30,5	0,6	19,2	21,7	21,5	30,8	0,6	0,025	13
17	24,5	35,6	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

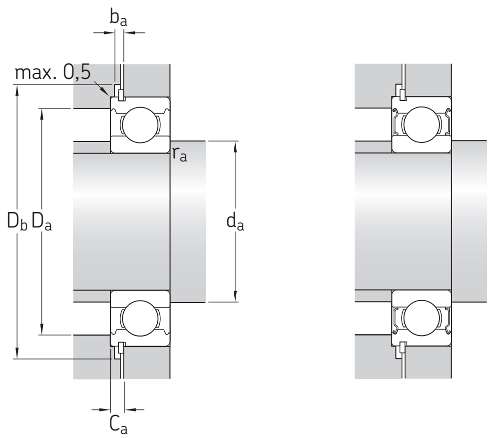
d **10 – 35** mm



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

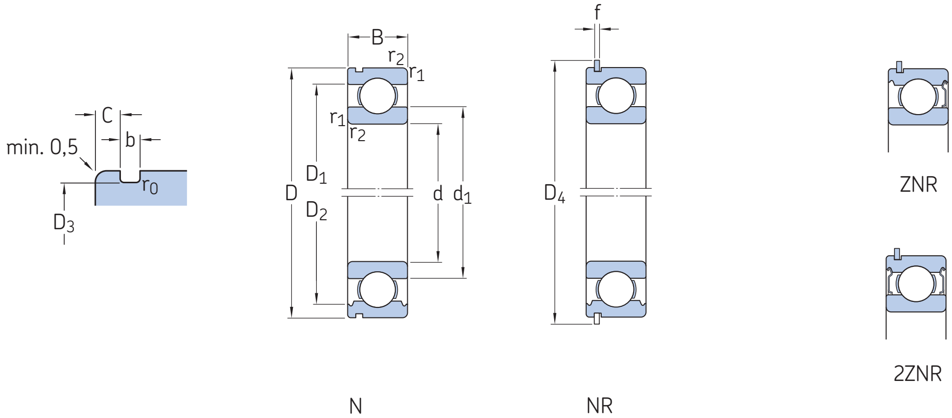
[1] For bearings with one shield (ZNR) the limiting speeds of the open bearings are valid.



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

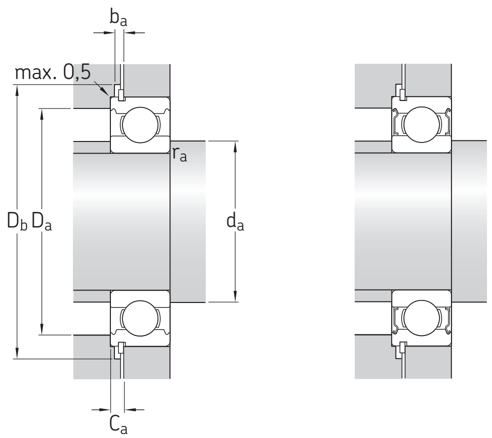
d **40 – 65** mm



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

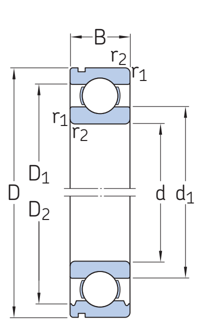
1) For bearings with one shield (ZNR) the limiting speeds of the open bearings are valid.



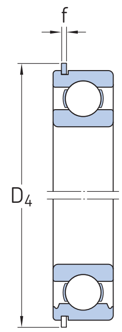
Dimensions											Abutment and fillet dimensions								Calculation factors	
d	d_1 ≈	D_1 ≈	D_2 ≈	D_3	D_4	b	f	C	$r_{1,2}$ min.	r_0 max.	d_a min.	d_a max.	D_a max.	D_b min.	b_a min.	C_a max.	r_a max.	k_r	f_0
mm											mm							–	
40	49,2	–	61,1	64,82	74,6	1,9	1,7	2,49	1	0,6	44,6	–	63	76	2,2	4,19	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

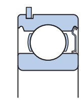
d **70 – 120** mm



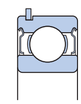
N



NR



ZNR

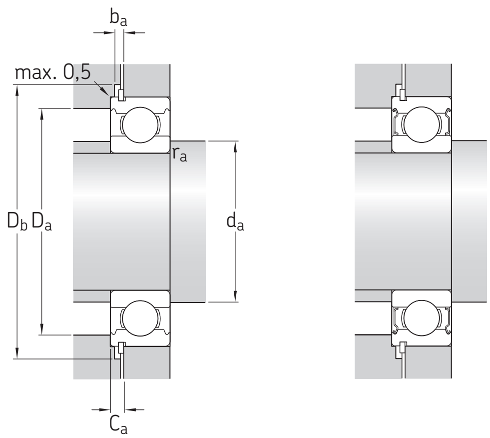


2ZNR

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

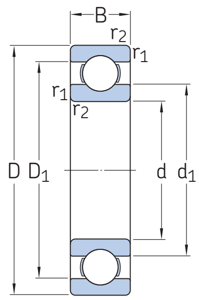
1) For bearings with one shield (ZNR) the limiting speeds of the open bearings are valid.

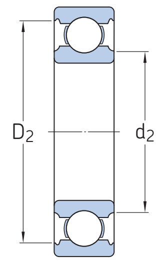


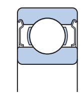
Dimensions											Abutment and fillet dimensions								Calculation factors	
d	d_1 ≈	D_1 ≈	D_2 ≈	D_3	D_4	b	f	C	$r_{1,2}$ min.	r_0 max.	d_a min.	d_a max.	D_a max.	D_b min.	b_a min.	C_a max.	r_a max.	k_r	f_0
mm											mm							–	
70	82,8	–	99,9	106,81	116,6	2,7	2,46	2,87	1,1	0,6	76	–	104	118	3	5,33	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

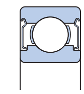
d **1 – 5** mm



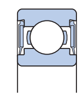




2Z



2Z

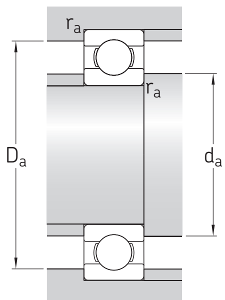


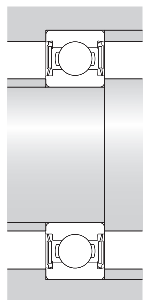
2RS1

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**

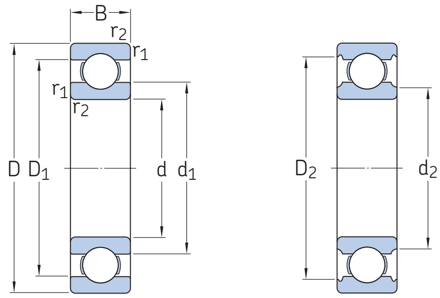
▸ Popular item

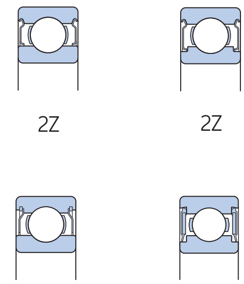
SKF





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





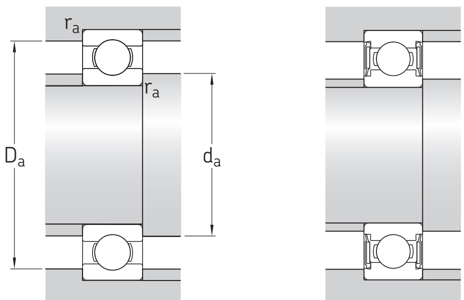
2Z 2Z

2ZS 2RS1

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**

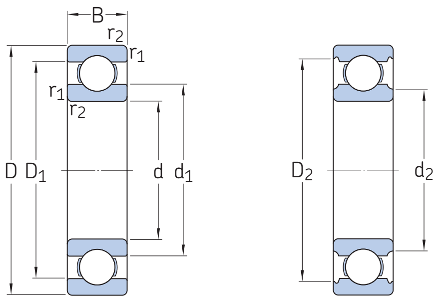
▸ Popular item

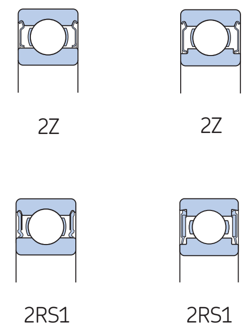
SKF



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

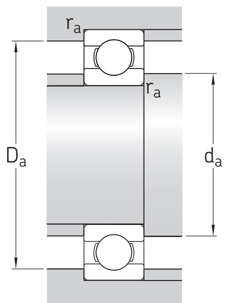
1.4 Stainless steel deep groove ball bearings
d **8 – 12** mm

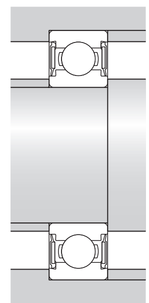




Principal dimensions			Basic load ratings dynamic	static	Fatigue load limit	Speed ratings Reference speed	Limiting speed	Mass	Designation
d	D	B	C	C_0	P_u				
mm			kN		kN	r/min		g	–
8 cont.	22	7	1,99	0,78	0,034	75 000	38 000	11,5	▸ **W 608-2Z**
	22	7	1,99	0,78	0,034	75 000	48 000	11	▸ **W 608**
	24	8	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

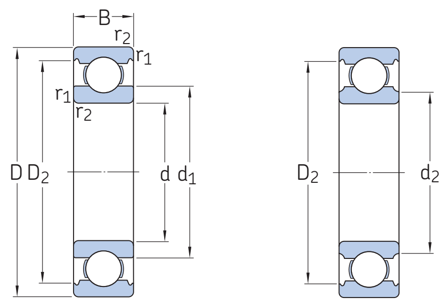


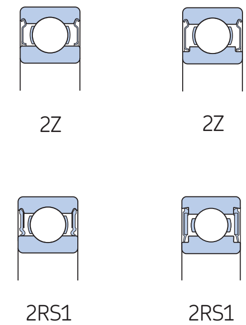


Dimensions						Abutment and fillet dimensions				Calculation factors	
d	d_1 ≈	d_2 ≈	D_1 ≈	D_2 ≈	$r_{1,2}$ min.	d_a min.	d_a max.	D_a max.	r_a max.	k_r	f_0
mm						mm				–	
8	–	10,5	–	19,1	0,3	10	10,4	20	0,3	0,03	7,2
cont.	–	10,5	–	19,1	0,3	10	–	20	0,3	0,03	7,2
	–	11,9	–	19,9	0,3	10	11,8	22	0,3	0,03	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

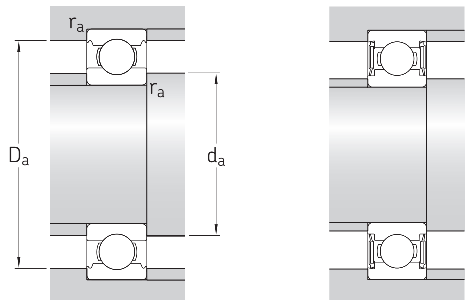
d **12 – 17** mm





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**

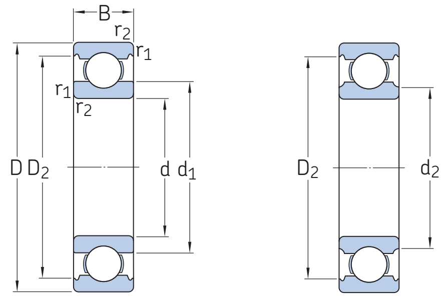
▸ Popular item

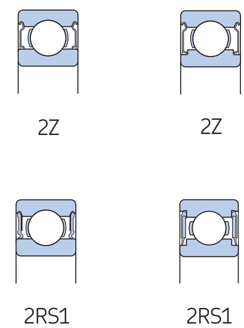


Dimensions						Abutment and fillet dimensions				Calculation factors	
d	d_1 ≈	d_2 ≈	D_1 ≈	D_2 ≈	$r_{1,2}$ min.	d_a min.	d_a max.	D_a max.	r_a max.	k_r	f_0
mm						mm				–	
12	–	16	–	25,2	0,3	14	15,5	26	0,3	0,03	13
cont.	–	16	–	25,2	0,3	14	–	26	0,3	0,03	13
	18,5	–	–	28	0,6	16	18	28,5	0,6	0,03	12
	18,5	–	–	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

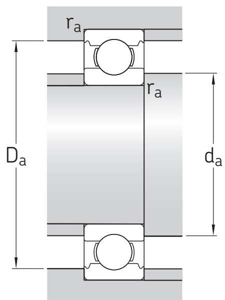
d **20 – 30** mm

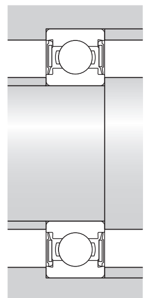




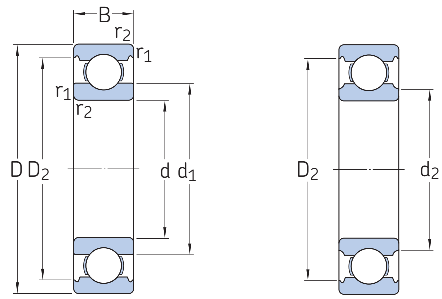
Principal dimensions			Basic load ratings dynamic	static	Fatigue load limit	Speed ratings Reference speed	Limiting speed	Mass	Designation
d	D	B	C	C_0	P_u				
mm			kN		kN	r/min		g	–
20	32	7	3,12	2,08	0,09	–	13 000	17	▸ **W 61804-2RS1**
	32	7	3,12	2,08	0,09	48 000	24 000	17	▸ **W 61804-2Z**
	37	9	5,53	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**

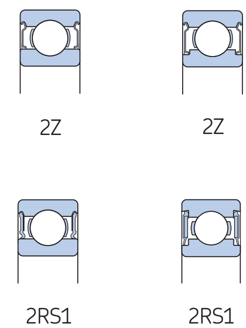
▸ Popular item





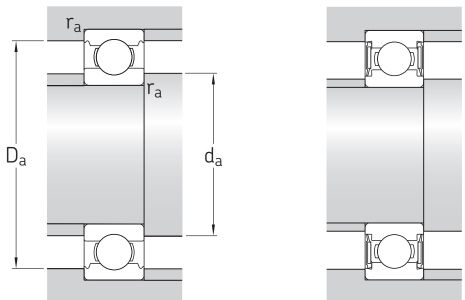
Dimensions						Abutment and fillet dimensions				Calculation factors	
d	d_1 ≈	d_2 ≈	D_1 ≈	D_2 ≈	$r_{1,2}$ min.	d_a min.	d_a max.	D_a max.	r_a max.	k_r	f_0
mm						mm				–	
20	–	22,6	–	29,6	0,3	22	22,5	30,5	0,3	0,02	13
	–	22,6	–	29,6	0,3	22	22,5	30,5	0,3	0,02	13
	–	23,6	–	33,5	0,3	22	23,5	35	0,3	0,025	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





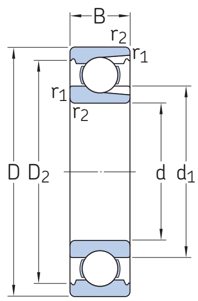
Principal dimensions			Basic load ratings dynamic	static	Fatigue load limit	Speed ratings Reference speed	Limiting speed	Mass	Designation
d	D	B	C	C_0	P_u				
mm			kN		kN	r/min		g	–
30 cont.	72	19	22,9	15	0,64	–	6 300	346	▸ W 6306-2RS1
	72	19	22,9	15	0,64	22 000	11 000	345	W 6306-2Z
	72	19	22,9	15	0,64	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

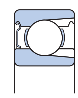
▸ Popular item



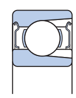
Dimensions						Abutment and fillet dimensions				Calculation factors	
d	d_1 ≈	d_2 ≈	D_1 ≈	D_2 ≈	$r_{1,2}$ min.	d_a min.	d_a max.	D_a max.	r_a max.	k_r	f_0
mm						mm				–	
30	44,9	–	–	62,4	1,1	36,5	44,5	65	1	0,035	13
cont.	44,9	–	–	62,4	1,1	36,5	44,5	65	1	0,035	13
	44,9	–	–	62,4	1,1	36,5	–	65	1	0,035	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

d **25 – 50** mm

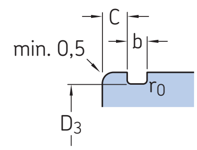


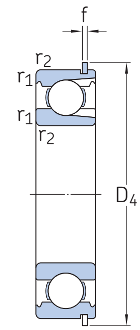


Z

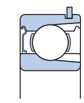


2Z

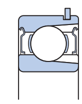




NR

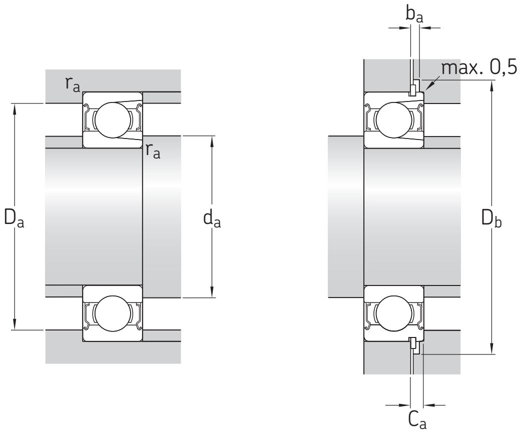


ZNR



2ZNR

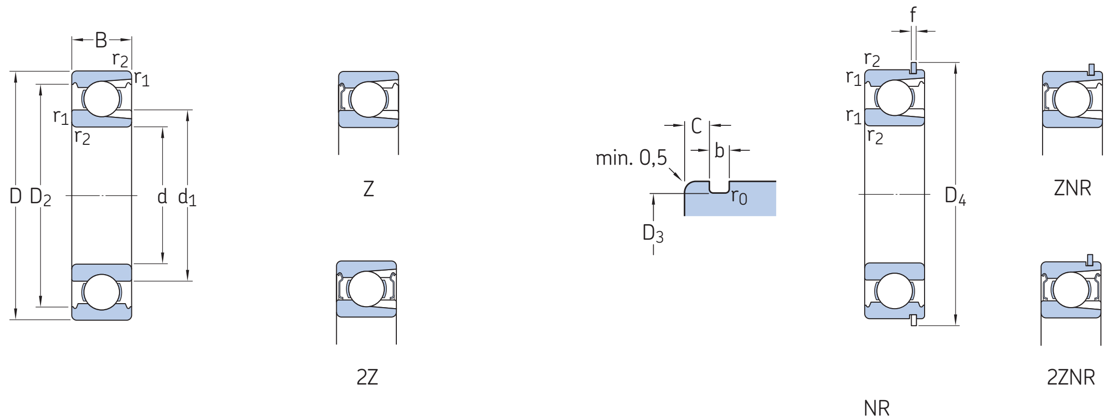
Principal dimensions			**Basic load ratings** dynamic	static	**Fatigue load limit**	**Speed ratings** Reference speed	Limiting speed	**Mass**	**Designations** Bearing without a snap ring	with a snap ring	Snap ring
d	D	B	C	C_0	P_u						
mm			kN		kN	r/min		kg	-		
25	62	17	22,9	15,6	0,67	20 000	13 000	0,24	**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



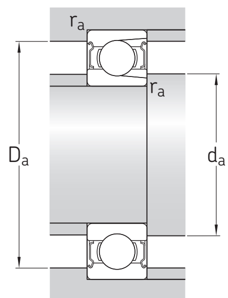
Dimensions										Abutment and fillet dimensions							Minimum load factor
d	d_1 ≈	D_2 ≈	D_3	D_4	b	f	C	$r_{1,2}$ min.	r_0 max.	d_a min.	d_a max.	D_a max.	D_b min.	b_a min.	C_a max.	r_a max.	k_r
mm										mm							–
25	36,6	52,7	59,61	67,7	1,9	1,7	3,28	1,1	0,6	32	–	55	69	2,2	4,98	1	0,05
	36,6	52,7	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

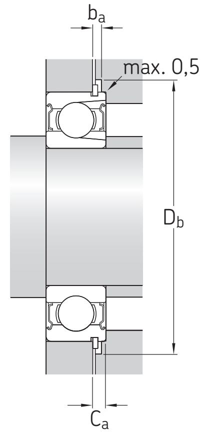
1.5 Single row deep groove ball bearings with filling slots

d **55 – 80** mm



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**	**–**	–

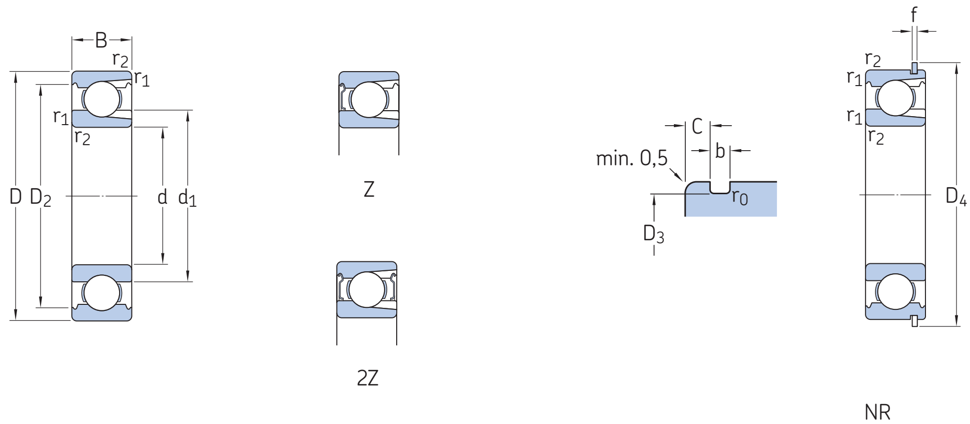




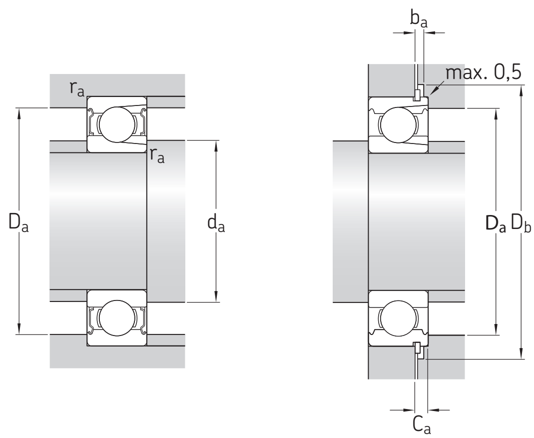
Dimensions										Abutment and fillet dimensions							Minimum load factor
d	d_1 ≈	D_2 ≈	D_3	D_4	b	f	C	$r_{1,2}$ min.	r_0 max.	d_a min.	d_a max.	D_a max.	D_b min.	b_a min.	C_a max.	r_a max.	k_r
mm										mm							–
55	69	89,4	96,8	106,5	2,7	2,46	3,28	1,5	0,6	64	–	91	108	3	5,74	1,5	0,04
	69	89,4	96,8	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

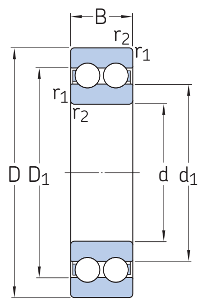


Principal dimensions			Basic load ratings dynamic	static	Fatigue load limit	Speed ratings Reference speed	Limiting speed	Mass	Designations Bearing without a snap ring	with a snap ring	Snap ring
d	D	B	C	C_0	P_u						
mm			kN		kN	r/min		kg	-		
85	150	28	96,8	100	3,9	7 500	4 800	1,95	**217**	**217 NR**	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**	**–**	–

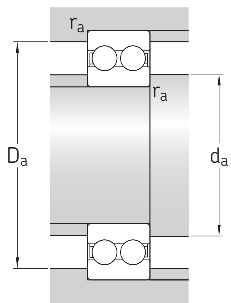


Dimensions										Abutment and fillet dimensions							Minimum load factor
d	d_1 ≈	D_2 ≈	D_3	D_4	b	f	C	$r_{1,2}$ min.	r_0 max.	d_a min.	d_a max.	D_a max.	D_b min.	b_a min.	C_a max.	r_a max.	k_r
mm										mm							–
85	104	134,3	145,24	159,7	3,1	2,82	4,9	2	0,6	96	–	139	162	3,5	7,72	2	0,04
	104	134,3	–	–	–	–	–	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

d **10 – 75** mm



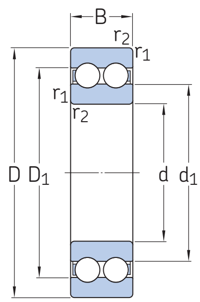
Principal dimensions			Basic load ratings dynamic	static	Fatigue load limit	Speed ratings Reference speed	Limiting speed	Mass	Designation
d	D	B	C	C_0	P_u				
mm			kN		kN	r/min		kg	–
10	30	14	9,23	5,2	0,224	40 000	22 000	0,049	**4200 ATN9**
12	32	14	10,6	6,2	0,26	36 000	20 000	0,052	**4201 ATN9**
	37	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**



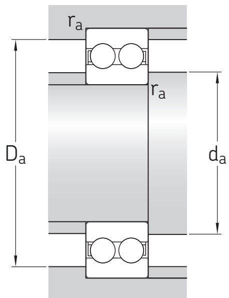
Dimensions				Abutment and fillet dimensions			Calculation factors	
d	d_1 ≈	D_1 ≈	$r_{1,2}$ min.	d_a min.	D_a max.	r_a max.	k_r	f_0
mm				mm			–	
10	16,7	23,3	0,6	14,2	25,8	0,6	0,05	12
12	18,3	25,7	0,6	16,2	27,8	0,6	0,05	12
	20,5	28,5	1	17,6	31,4	1	0,06	12
15	21,5	29	0,6	19,2	30,8	0,6	0,05	13
	24,5	32,5	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

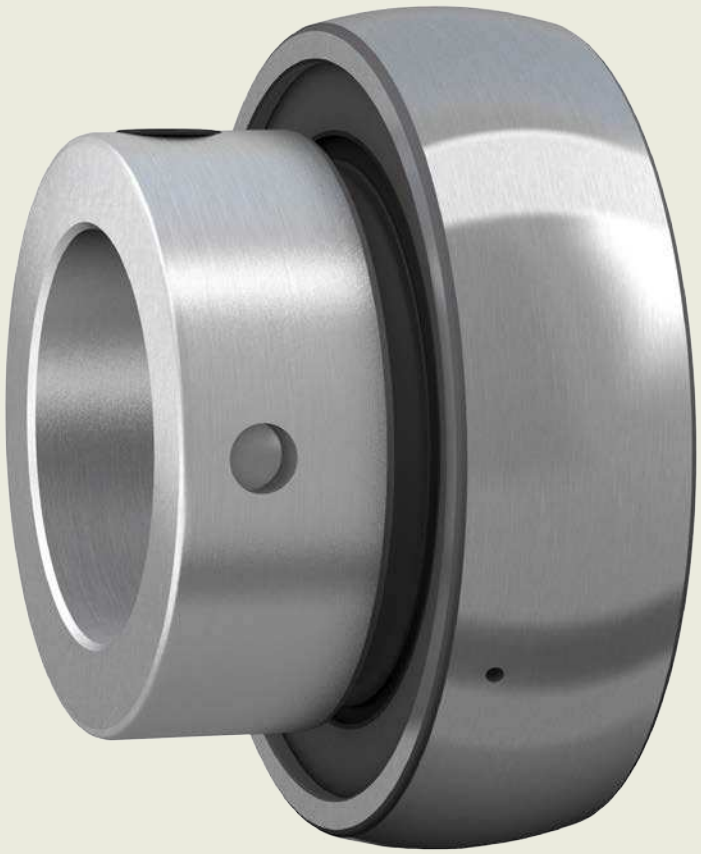
d **80 – 90** mm



Principal dimensions			Basic load ratings 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	–
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)

2 Insert bearings (Y-bearings)

More information

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.

Fig. 1

Insert bearing

Bearing features

- **Quick and easy to mount**
  The different locking methods enable quick and easy mounting of insert bearings onto the shaft.

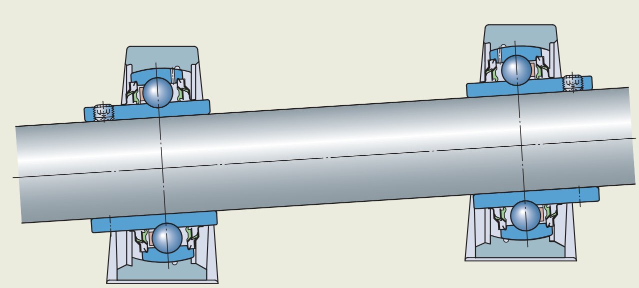
- **Accommodate initial misalignment**
  The spherically shaped outside surface enables initial misalignment by tilting in the housing (fig. 2).

- **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. 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

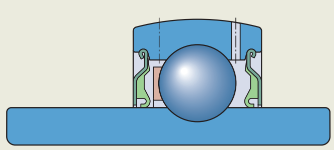


Fig. 4

Bearing locked with grub screws

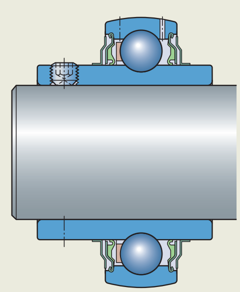


Fig. 5

Bearing locked with an eccentric locking collar

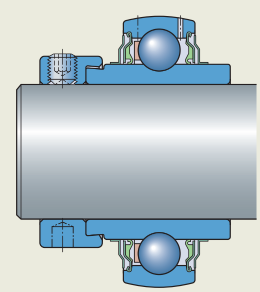


Fig. 6

Bearing locked with SKF ConCentra locking technology

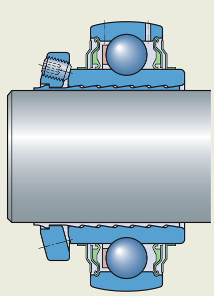


Fig. 7

Bearing locked with an adapter sleeve assembly

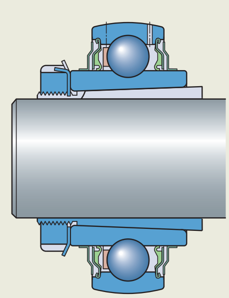
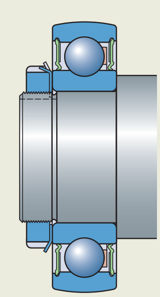


Fig. 8

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

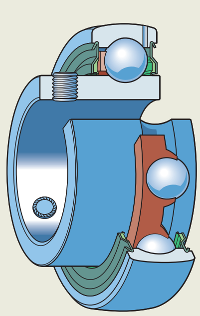


Fig. 10

Bearing in the YAR 2 series

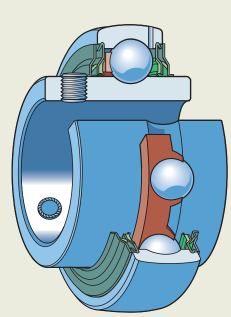
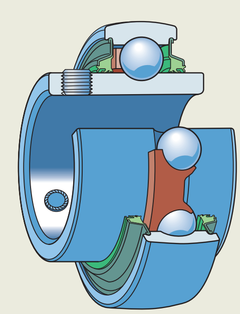


Fig. 11

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

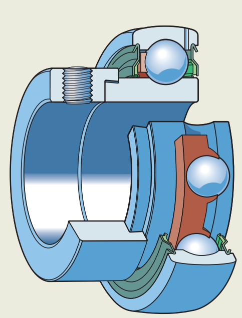


Fig. 13

Bearing in the YEL 2 series

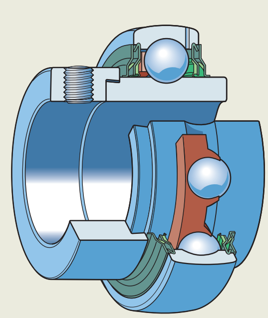
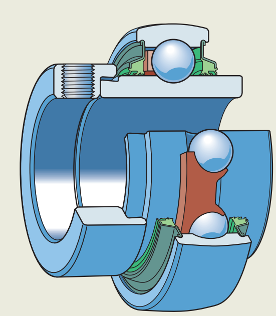


Fig. 14

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

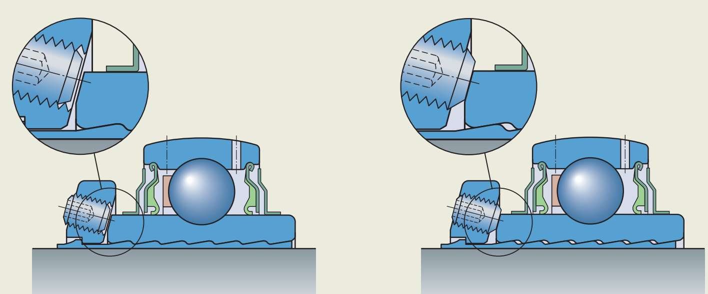
Insert bearings with a tapered bore

- 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

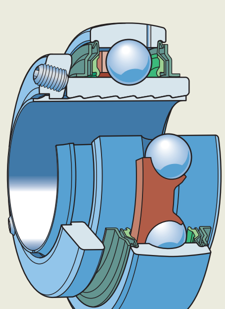


Fig. 17

Bearing in the YSPAG 2 series

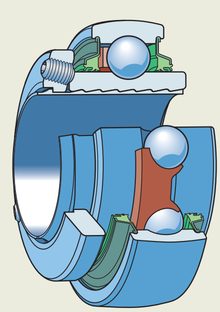
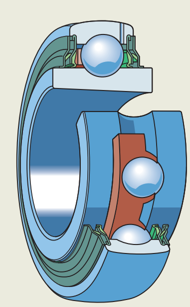


Fig. 18

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

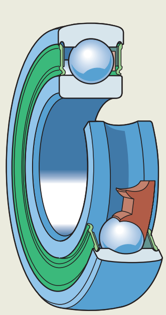


Fig. 20

Standard seals

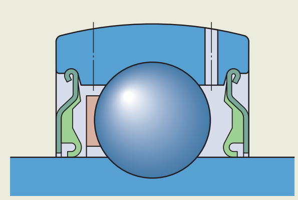
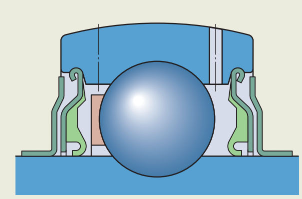


Fig. 21

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

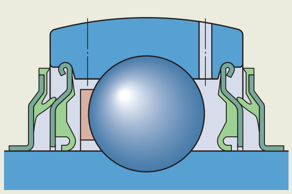


Fig. 23

5-lip seals

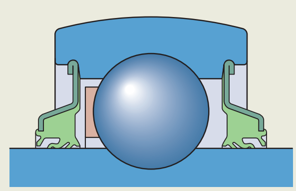


Fig. 24

RS1 seals

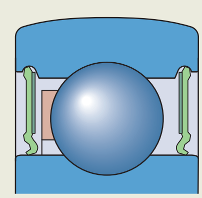


Fig. 25

Shields

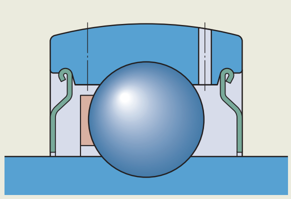


Fig. 26

Snap-type, glass fibre reinforced PA66 cage

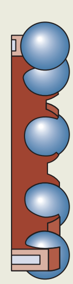


Fig. 27

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**.

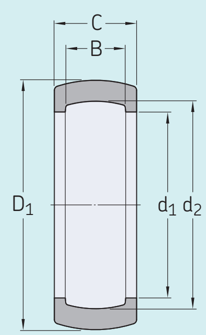
Rubber seating rings

- 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

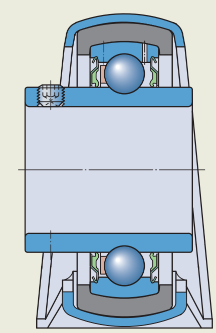
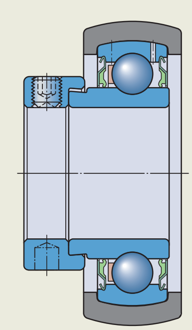


Fig. 29

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 ($P \leq 0,05$ 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:

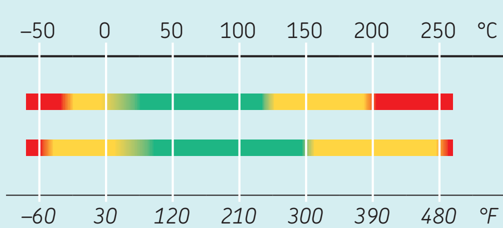
- The bearings are exposed to high humidity or severe contamination.
- The bearings accommodate normal or heavy loads.
- The bearings operate for extended periods at high speeds or at temperatures above 55 °C *(130 °F)*.
- The bearings are subjected to high vibration levels.

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)*
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

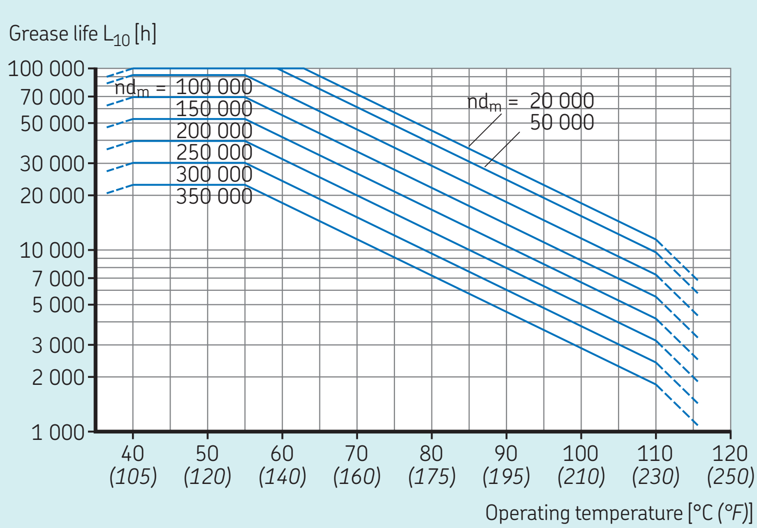
SKF insert bearings are designed to facilitate relubrication. They have two lubrication holes in the outer ring as standard, one on each side, positioned 120° apart. Bearings without lubrication holes can be supplied on request (designation suffix W).

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

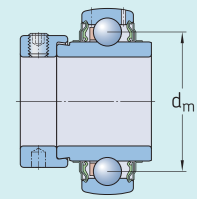
Grease life for insert bearings with VT307 or GFJ grease where P = 0,05 C



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 Except for: **Bearing series YAT 2** • not standardized • bore, outside diameter and outer ring width: ISO 9628 **Bearing series YSP 2, YSPAG 2** • not standardized • outside diameter and outer ring width: ISO 9628 **Bearing series YSA 2** • JIS B 1558 • ISO 2982-1 for H 23 series adapter sleeves • ANSI/ABMA Std. 8.2 for HA 23 and HE 23 series adapter sleeves **Bearing series 17262, 17263** • ISO 15 • outside diameter: ISO 9628
Tolerances For additional information → page 35	**Bearing series YAT 2, YAR 2, YARAG 2, YET 2, YEL 2, YELAG 2** • Bore and outside diameter: **table 5**, **page 352** • Bore and outside diameter tolerance values are slightly tighter than those listed in ISO 9628. **Bearing series YSP 2, YSPAG 2** • Outside diameter: **table 5** • Before mounting, the sleeve bore is larger than the nominal value to ease sliding on the shaft. **Bearing series YSA 2** • Outside diameter: **table 5** • The tapered bore fits H 23 series adapter sleeves for metric shafts and HA 23 and HE 23 series adapter sleeves for inch shafts. **Bearing series 17262, 17263** • Normal: Values (ISO 492, **table 2**, **page 38**) • Outside diameter: **table 5**
Radial internal clearance For additional information → page 182	Values: ISO 9628 – Group N (**table 6**, **page 352**) Except for: **Bearing series 17262, 17263** • Normal: Values (ISO 5753-1, **table 6**, **page 252**) Values are valid for unmounted bearings under zero measuring load.

Bearing data, continued

Permissible misalignment	**Static misalignment** Insert bearings can accommodate static initial misalignment by tilting in the housing (**fig. 2**, **page 340**). The permissible values are: • SKF housings – relubrication is not required: 5° – relubrication is required (where applicable): 2° • SKF pressed steel housings – Misalignment cannot be accommodated once the attachment bolts have been fully tightened, unless a rubber seating ring is used (**page 347**). **Dynamic misalignment** 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 d, D >	≤	Inner ring Bearing series YAT 2, YAR 2, YARAG 2, YET 2, YEL 2, YELAG 2 Δ_{dmp} U	L	Outer ring All bearings Δ_{Dmp} 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 YAT 2, YAR 2, YARAG 2, YET 2, YEL 2, YELAG 2 min.	max.	YSP 2, YSPAG 2, YSA 2 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 For additional information → **page 111**	$F_{rm} = 0{,}01\ C$ 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** C basic dynamic load rating [kN] (**product tables**, **page 366**) C_0 basic static load rating [kN] (**product tables**) e limiting value (**table 7**, **page 354**) f_0 calculation factor (**table 8**, **page 354**) 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] X radial load factor (**table 7**) Y axial load factor (**table 7**)
Axial load carrying capacity	$F_a \leq 0{,}25\ C_0$ The maximal permissible axial load of any locking mechanism is always > 0,25 C_0.	
Equivalent dynamic bearing load For additional information → **page 96**	$F_a/F_r \leq e \rightarrow P = F_r$ $F_a/F_r > e \rightarrow P = X\ F_r + Y\ F_a$	
Equivalent static bearing load For additional information → **page 110**	$P_0 = 0{,}6\ F_r + 0{,}5\ F_a$	

Table 7

Calculation factors

$f_0 F_a/C_0$	Bearing series YAT 2, YAR 2, YARAG 2, YET 2, YEL 2, YELAG, YSP 2, YSPAG 2, YSA 2			17262, 17263		
	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

2

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

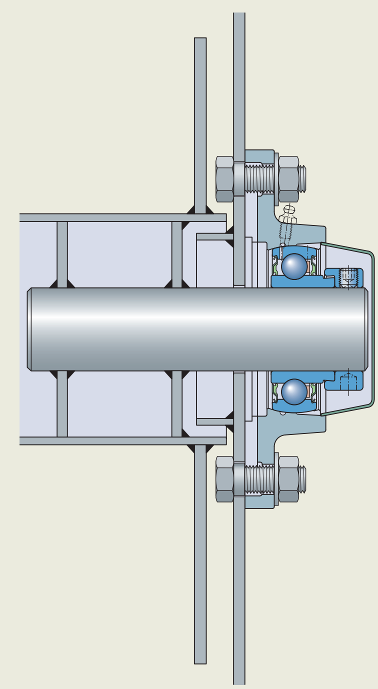


Fig. 31

Hexagon socket grub screw with a dog point secured by a nut and a star lock washer

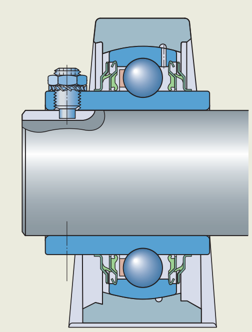
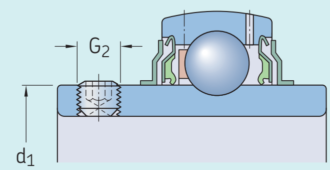


Table 10

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 12**, **page 156**, and **table 14**, **page 160**.

Table 11

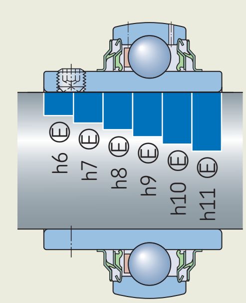
Recommended shaft seat tolerances

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*.

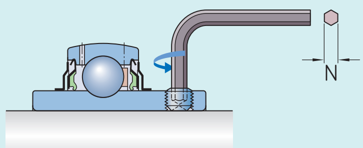
Table 12

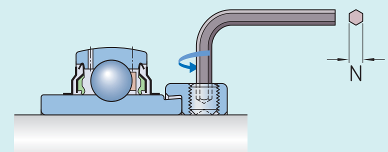
ISO shaft deviations for insert bearings, except for those with a standard inner ring

Shaft diameter d		**Shaft diameter deviations** Tolerance class h6Ⓔ Deviation		h7Ⓔ		h8Ⓔ		h9Ⓔ		h10Ⓔ		h11Ⓔ	
>	≤	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





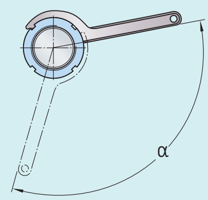
Bearing size[1]	Bearing with metric bore Hexagonal key size N	Bearing with metric bore Tightening torque	Bearing with inch bore Hexagonal key size N	Bearing with inch bore Tightening torque
–	mm	Nm	in.	Nm
Bearings in the YAR 2 or YARAG 2 series				
03	3	4	3/32	4
04	3	4	1/8	4
05	3	4	1/8	4
06	3	4	1/8	4
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 Hexagonal key size N	Bearing with metric bore Tightening torque	Bearing with inch bore Hexagonal key size N	Bearing with inch bore 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

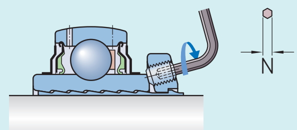


Designation Insert bearing + adapter sleeve	Shaft diameter d		Hook spanner	Lock nut tightening angle[1)] α
–	mm	in.	–	°
YSA 205-2FK + HE 2305	–	3/4	HN 5	90
YSA 205-2FK + H 2305	20	–	HN 5	90
YSA 206-2FK + HA 2306	–	15/16	HN 6	95
YSA 206-2FK + H 2306	25	–	HN 6	95
YSA 206-2FK + HE 2306	–	1	HN 6	95
YSA 207-2FK + 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 N	Tightening torque
–		–	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

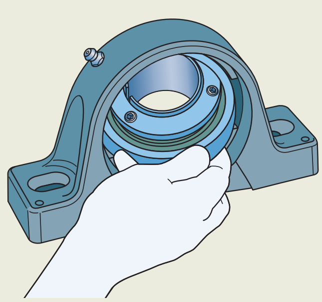
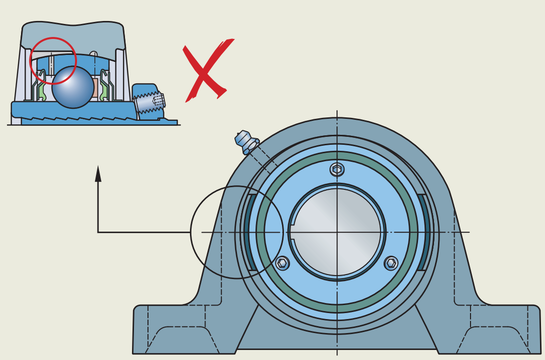


Fig. 34

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

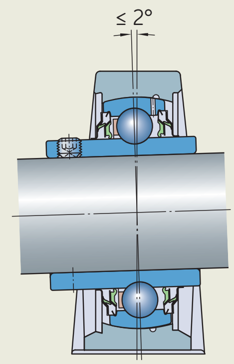
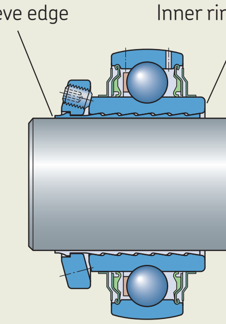


Fig. 36

Dismounting an SKF ConCentra insert bearing



Designation system

Group 1

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 2	Group 3	Group 4					
		4.1	4.2	4.3	4.4	4.5	4.6

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

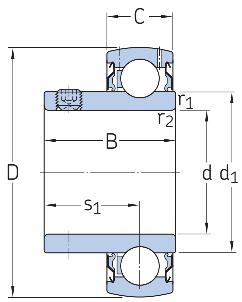
Group 3: Cage design

Group 2: External design (seals, snap ring groove, etc.)

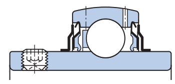
-2F	Contact seal, NBR, additional plain flinger, on both sides
-2RF	Contact seal, NBR, additional rubberized flinger, on both sides
-2RS1	Contact seal, NBR, on both sides
C	Cylindrical outside surface
G	Lubrication groove in the outside surface, located at the side opposite the locking device
GR	Lubrication 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

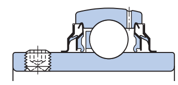
d **12 – 100** mm



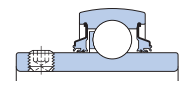
YAT



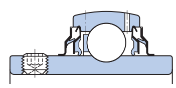
YAR ..-2F



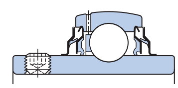
YAR ..-2RF/HV



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**

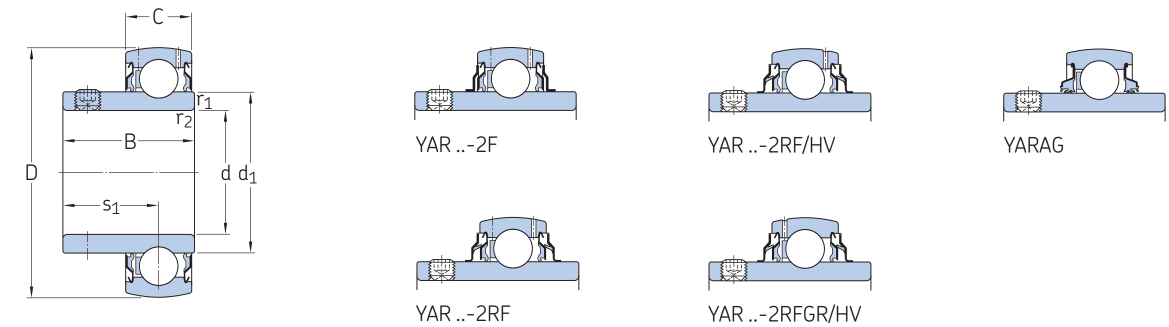
▸ Popular item

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

Dimensions							Basic load ratings		Fatigue load limit	Limiting speed	Mass	Designation
							dynamic	static		with shaft tolerance h6		
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

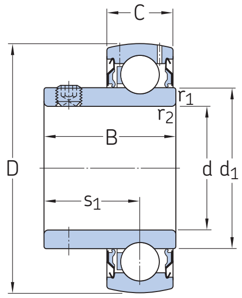
Dimensions							Basic load ratings dynamic	static	Fatigue load limit	Limiting speed with shaft tolerance h6	Mass	Designation
d	D	B	C	d_1 ≈	s_1	$r_{1,2}$ min.	C	C_0	P_u			
in./*mm*	mm						kN		kN	r/min	kg	–
1 1/4 *31,75*	62	30,2	18	39,7	21	0,6	19,5	11,2	0,475	6 300	0,24	**YAT 206-104**
	62	38,1	18	39,7	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 *33,338*	72	42,9	19	46,1	25,4	1	25,5	15,3	0,655	5 300	0,48	**YAR 207-105-2F**
1 3/8 *34,925*	72	42,9	19	46,1	25,4	1	21,6	15,3	0,655	3 200	0,45	**YAR 207-106-2RF/HV**
	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 *36,513*	72	33	19	46,1	23,3	1	25,5	15,3	0,655	5 300	0,36	**YAT 207-107**
	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 *38,1*	80	36	21	51,8	25,3	1	30,7	19	0,8	4 800	0,53	**YAT 208-108**
	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 *39,688*	80	49,2	21	51,8	30,2	1	30,7	19	0,8	4 800	0,61	**YAR 208-109-2F**
1 5/8 *41,275*	85	49,2	22	56,8	30,2	1	33,2	21,6	0,915	850	0,75	**YARAG 209-110**
	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 *42,863*	85	37	22	56,8	25,8	1	33,2	21,6	0,915	4 300	0,61	**YAT 209-111**
	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 *44,45*	85	37	22	56,8	25,8	1	33,2	21,6	0,915	4 300	0,58	**YAT 209-112**
	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

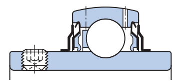
2.2 Insert bearings with grub screws, inch shafts

d **1 15/16 – 3** in.

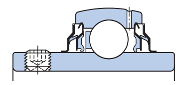
49,213 – 76,2 mm



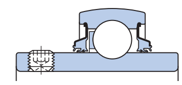
YAT



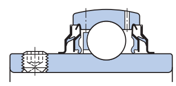
YAR ..-2F



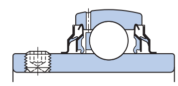
YAR ..-2RF/HV



YARAG



YAR ..-2RF



YAR ..-2RFGR/HV

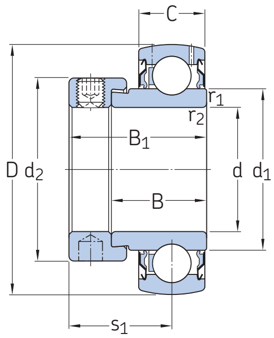
Dimensions							**Basic load ratings** dynamic	static	**Fatigue load limit**	**Limiting speed** with shaft tolerance h6	**Mass**	**Designation**
d	D	B	C	d_1 ≈	s_1	$r_{1,2}$ min.	C	C_0	P_u			
in./*mm*	mm						kN		kN	r/min	kg	–
1 15/16	90	38,8	22	62,5	27,6	1	35,1	23,2	0,98	4 000	0,65	**YAT 210-115**
49,213	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

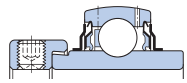
2.3 Insert bearings with an eccentric locking collar, metric shafts

d **15 – 60** mm

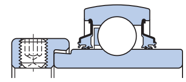
2.3



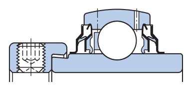
YET



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

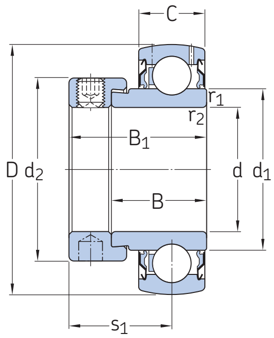
Dimensions									Basic load ratings dynamic	static	Fatigue load limit	Limiting speed with shaft tolerance h6	Mass	Designation
d	D	B	B_1	C	d_1 ≈	d_2	s_1	$r_{1,2}$ min.	C	C_0	P_u			
mm									kN		kN	r/min	kg	–
45	85	30,2	43,7	22	56,8	62	32,7	1	33,2	21,6	0,915	4 300	0,68	▸ **YET 209**
	85	42,8	56,3	22	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

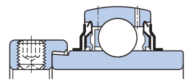
2.4 Insert bearings with an eccentric locking collar, inch shafts

d **1/2 – 2 7/16** in.

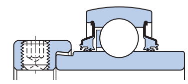
12,7 – 61,913 mm



YET



YEL ..-2F



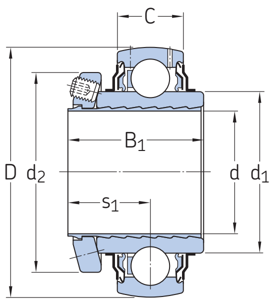
YEL AG

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 *12,7*	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**
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 *33,338*	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**
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**

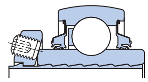
▸ Popular item

Dimensions									Basic load ratings		Fatigue load limit	Limiting speed	Mass	Designation
									dynamic	static		with shaft tolerance h6		
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 *50,8*	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**
2 3/16 *55,563*	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**
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**

d **25 – 60** mm



YSP .. SB-2F



YSPAG

Dimensions							Basic load ratings		Fatigue load limit	Limiting speed	Mass	Designation
							dynamic	static				
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).

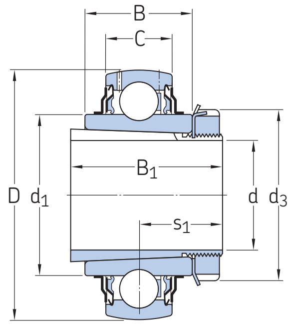
d **1 – 2 11/16** in.
25,4 – 68,263 mm

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	52	33,2	15	33,74	41,7	21,2	14	7,8	0,335	1 500	0,18	**YSPAG 205-100**
25,4	52	33,2	15	33,74	41,7	21,2	14	7,8	0,335	7 000	0,18	**YSP 205-100 SB-2F**
1 3/16	62	37,2	18	39,7	48	23,2	19,5	11,2	0,475	1 200	0,3	**YSPAG 206-103**
30,163	62	37,2	18	39,7	48	23,2	19,5	11,2	0,475	6 300	0,3	**YSP 206-103 SB-2F**
1 1/4	72	39,7	19	46,1	57	24,5	25,5	15,3	0,655	1 100	0,49	**YSPAG 207-104**
31,75	72	39,7	19	46,1	57	24,5	25,5	15,3	0,655	5 300	0,5	**YSP 207-104 SB-2F**
1 3/8	72	39,7	19	46,1	57	24,5	25,5	15,3	0,655	1 100	0,44	**YSPAG 207-106**
34,925	72	39,7	19	46,1	57	24,5	25,5	15,3	0,655	5 300	0,45	**YSP 207-106 SB-2F**
1 7/16	72	39,7	19	46,1	57	24,5	25,5	15,3	0,655	1 100	0,42	**YSPAG 207-107**
36,513	72	39,7	19	46,1	57	24,5	25,5	15,3	0,655	5 300	0,42	**YSP 207-107 SB-2F**
1 1/2	80	43,1	21	51,8	62	26,2	30,7	19	0,8	950	0,61	**YSPAG 208-108**
38,1	80	43,1	21	51,8	62	26,2	30,7	19	0,8	4 800	0,62	**YSP 208-108 SB-2F**
1 11/16	85	44,2	22	56,8	67	26,7	33,2	21,6	0,915	850	0,69	**YSPAG 209-111**
42,863	85	44,2	22	56,8	67	26,7	33,2	21,6	0,915	4 300	0,7	**YSP 209-111 SB-2F**
1 15/16	90	46,2	22	62,51	72	27,7	35,1	23,2	0,98	800	0,74	**YSPAG 210-115**
49,213	90	46,2	22	62,51	72	27,7	35,1	23,2	0,98	4 000	0,76	**YSP 210-115 SB-2F**
2 *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 *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 *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 *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 *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

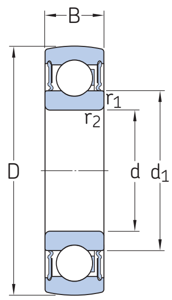
Dimensions								Basic load ratings dynamic	static	Fatigue load limit	Limiting speed	Mass Bearing + sleeve	Designations Bearing	Adapter sleeve
d	D	B	B_1	C	d_1 ≈	d_3	s_1[1] ≈	C	C_0	P_u				
in./*mm*	mm							kN			r/min	kg		
3/4 *19,05*	52	24	35	15	33,74	38	20,5	14	7,8	0,335	7 000	0,25	**YSA 205-2FK**	**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).

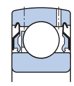
2.9 Insert bearings with a standard inner ring, metric shafts

d **17 – 60** mm

2.9



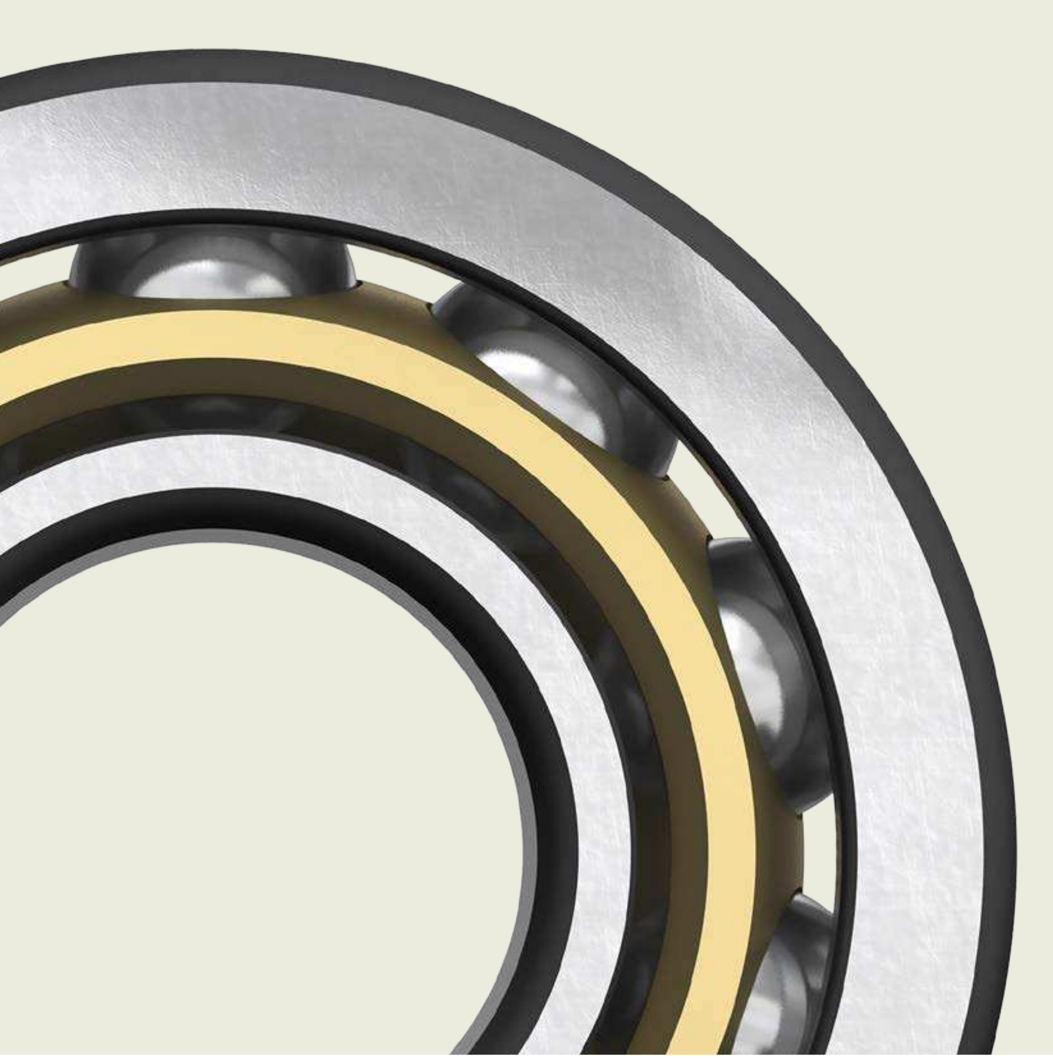
-2RS1



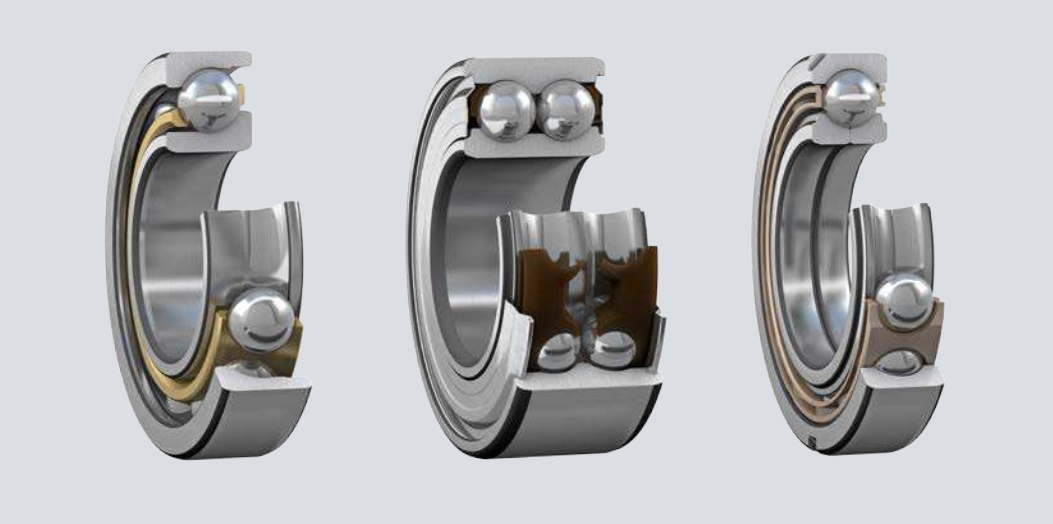
B-2RS1/VP274

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

3 Angular contact ball bearings

More information

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

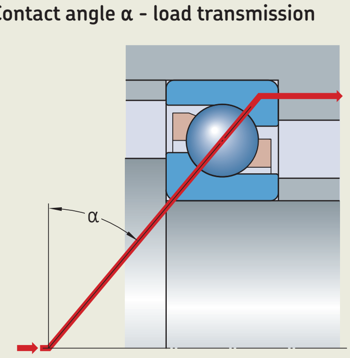
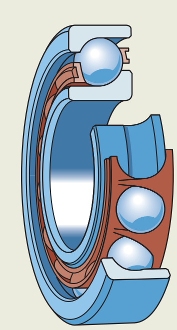


Fig. 2

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 ≤ d ≤ 55 mm)
  - in series 73 B(E) (12 ≤ d ≤ 50 mm)
- bearings in the 72 AC series with 25° contact angle (15 ≤ d ≤ 70 mm)
- bearings in the 73 AC series with 25° contact angle (17 ≤ d ≤ 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

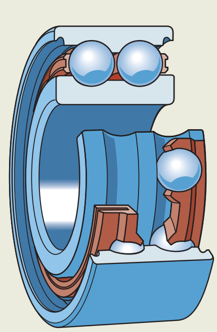
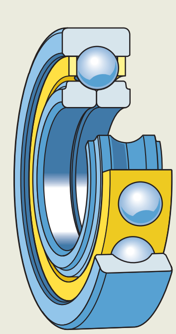


Fig. 4

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:

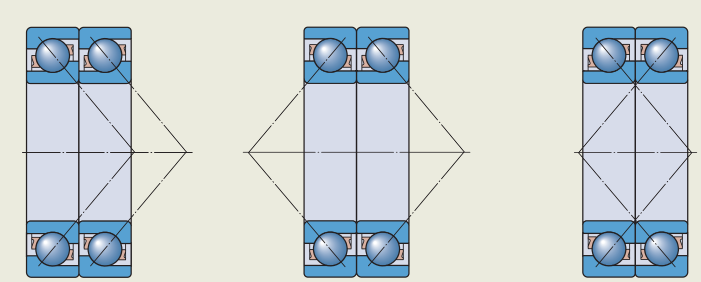
- 20% higher limiting speeds
- higher radial load carrying capacity (by trading off lower axial load carrying capacity)
- increased robustness when used as the backup bearing in sets that are predominantly loaded in one direction

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.

Fig. 5

Paired mounting



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

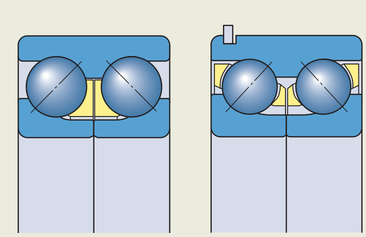
- have different tolerances and performance capabilities compared with SKF Explorer bearings

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. 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.

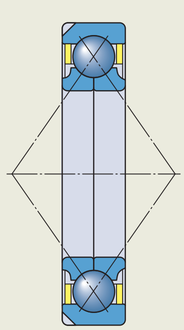
When four-point contact ball bearings are subjected to high clamping forces their inner ring deformation is limited.

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)

Fig. 7

Four-point contact bearing with locating slots



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

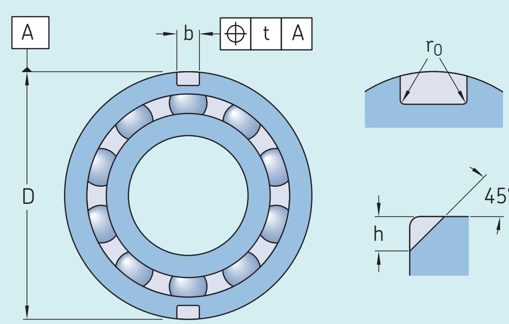
The dimensions and tolerances of the locating slots are in accordance with ISO 20515 and are listed in **table 1**.

SKF Explorer bearings

For information, refer to **page 7**

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

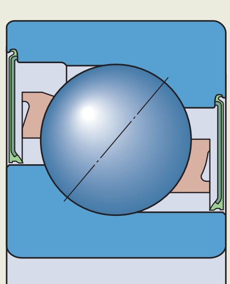


Fig. 9

Capped bearing – shields

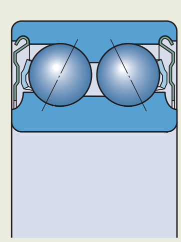
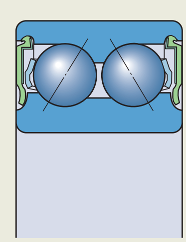


Fig. 10

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] at 40 °C *(105 °F)*	Base oil viscosity [mm²/s] at 100 °C *(210 °F)*	Grease performance factor (GPF)
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.

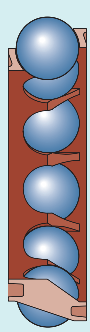
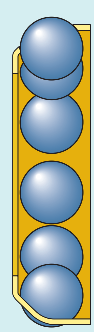
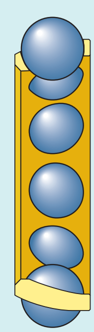
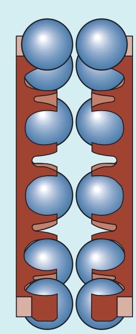
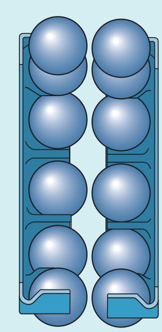
The standard cages of double row bearings are either made of PA66 or of stamped steel.

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

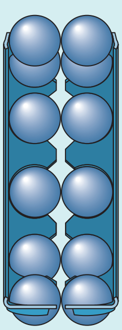
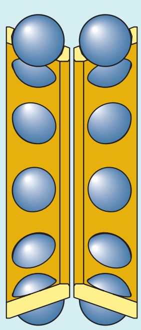
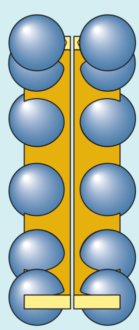
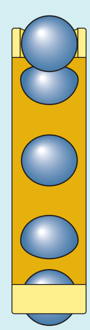
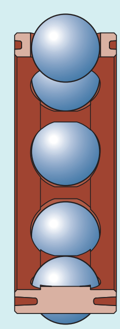
When used at high temperatures, some lubricants can have a detrimental effect on polyamide cages. For additional information about the suitability of cages, refer to *Cages*, page 187.

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, crown, ball centred	Window-type, ball centred	Prong-type, outer ring centred	Window-type, outer ring centred	Window-type, lubrication grooves in the guiding surface, outer ring centred
Stamped steel	Machined brass	Machined brass	Machined brass	PEEK, glass fibre reinforced
–	M	MA	MA	PHAS

Bearing data

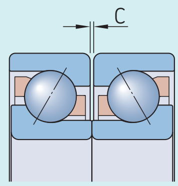
	Single row angular contact ball bearings
Dimension standards	Boundary dimensions: ISO 15 and ISO 12044
Tolerances For additional information → page 35	Normal Except for: • SKF Explorer bearings: – P6 dimensional tolerance – P5 geometrical tolerance • Bearings with D ≥ 400 mm: – P6 geometrical tolerance Values: ISO 492 (table 2, page 38, to table 4, page 40)
Contact angle	• suffix B: 40° • suffix AC: 25° For availability of bearings with 30° contact angle, contact SKF.
Internal clearance For additional information → page 182	**Single bearings** Obtained after mounting, depending on adjustment against a second bearing. **Pairs of universally matchable bearings** • CA – smaller than Normal axial clearance (table 4, page 394) • CB – Normal axial clearance (standard) (table 4) • CC – larger than Normal axial clearance (table 4) • G (standard for larger bearings) - Normal axial clearance (table 5, page 394) Values are valid for unmounted bearing sets, arranged back-to-back or face-to-face under zero measuring load.
Preload For additional information → page 182	**Single bearings** Obtained after mounting, depending on adjustment against a second bearing. **Pairs of universally matchable bearings** • GA – light preload (standard) • GB – moderate preload • GC – heavy preload 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 Face-to-face: ≈ 4 minutes of arc Misalignment increases bearing noise and reduces bearing service life, and when it exceeds ...

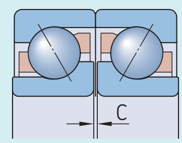
Double row angular contact ball bearings	Four-point contact ball bearings
Boundary dimensions: ISO 15 Except for: • bearing 3200 A: width = 14 mm instead of 14,3 mm • snap rings and grooves: ISO 464 (table 7, page 395)	Boundary dimensions: ISO 15 Except for: • Locating slots: ISO 20515 (table 1, page 387)
Normal Except for: • SKF Explorer bearings and 33 DNRCBM series: – P6	Normal P6 geometrical tolerance on request Except for: • SKF Explorer bearings: – P6 – width tolerance reduced to 0/–40 µm
• 32 A and 33 A series: 30° • 33 D series: 45° • 33 DNRCBM series: 40°	• 35°
Normal Check availability of C2, C3 or C4 clearance classes Values: (table 8, page 396)	Normal Check availability of C2, C3, C4 or reduced ranges of standard clearance classes 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

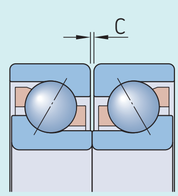


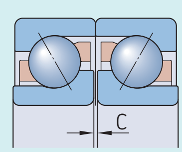


Bore diameter d >	≤	Axial internal clearance Class CA min.	max.	CB min.	max.	CC min.	max.
mm		µm					
–	18	5	13	15	23	24	32
18	30	7	15	18	26	32	40
30	50	9	17	22	30	40	48
50	80	11	23	26	38	48	60
80	120	14	26	32	44	55	67
120	160	17	29	35	47	62	74
160	180	17	29	35	47	62	74
180	250	21	37	45	61	74	90
250	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

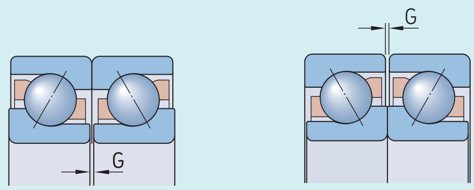




Bore diameter d >	≤	Axial internal clearance of bearings in the series 718 A min.	max.	719 A min.	max.	70 A min.	max.	70 B min.	max.	72 B min.	max.	73 B min.	max.	74 B min.	max.
mm		µm													
30	60	–	–	–	–	–	–	–	–	–	–	–	–	24	64
60	70	–	–	–	–	–	–	–	–	–	–	–	–	24	74
100	160	–	–	–	–	24	76	26	76	–	–	–	–	–	–
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

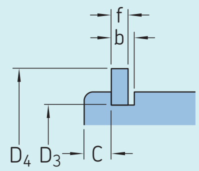
Preload of universally matchable single row angular contact ball bearings arranged back-to-back or face-to-face



Bore diameter d >	≤	Preload Class GA min.	max.	GB min.	max.	GC 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

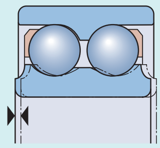
Dimensions of snap ring grooves and snap rings



Bearing Designation	**Dimensions** C	b	f	D_3	D_4	**Snap ring** Designation
–	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

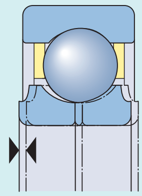
Axial internal clearance of double row angular contact ball bearings



Bore diameter d		Axial internal clearance of bearings in the series 32 A and 33 A								33 D		33 DNRCBM	
		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:** $F_{am} = A \left(\frac{n}{1\,000}\right)^2$	–
For additional information → page 106	**Minimum radial load for bearing pairs arranged back-to-back or face-to-face:** $F_{rm} = k_r \left(\frac{\nu\, n}{1\,000}\right)^{2/3} \left(\frac{d_m}{100}\right)^2$	**Minimum radial load:** $F_{rm} = k_r \left(\frac{\nu\, n}{1\,000}\right)^{2/3} \left(\frac{d_m}{100}\right)^2$
Equivalent dynamic bearing load For additional information → page 91	**Single bearings and bearing pairs arranged in tandem:** $F_a/F_r \leq e \rightarrow P = F_r$ $F_a/F_r > e \rightarrow P = X\,F_r + Y_2\,F_a$ When determining the axial load F_a, refer to *Calculating the axial load for bearings mounted singly or paired in tandem* page 400. **Bearing pairs arranged back-to-back or face-to-face:** $F_a/F_r \leq e \rightarrow P = F_r + Y_1\,F_a$ $F_a/F_r > e \rightarrow P = X\,F_r + Y_2\,F_a$	$F_a/F_r \leq e \rightarrow P = F_r + Y_1\,F_a$ $F_a/F_r > e \rightarrow P = X\,F_r + Y_2\,F_a$
Equivalent static bearing load For additional information → page 105	**Single bearings and bearing pairs arranged in tandem:** $P_0 = 0{,}5\,F_r + Y_0\,F_a$ $P_0 < F_r \rightarrow P_0 = F_r$ When determining the axial load F_a, refer to *Calculating the axial load for bearings mounted singly or paired in tandem*, page 400. **Bearing pairs arranged back-to-back or face-to-face:** $P_0 = F_r + Y_0\,F_a$	$P_0 = F_r + Y_0\,F_a$

SKF

Four-point contact ball bearings
Minimum axial load: $F_{am} = A \left(\frac{n}{1\,000}\right)^2$
–
Locating bearings to accommodate radial and axial load: $F_a/F_r \leq 0{,}95 \;\rightarrow\; P = F_r + 0{,}66\, F_a$ $F_a/F_r > 0{,}95 \;\rightarrow\; P = 0{,}6\, F_r + 1{,}07\, F_a$ For a proper functionality, SKF recommends $F_a \geq 1{,}27\, F_r$. Thrust bearings with radial clearance in the housing in combination with a radial bearing (**fig. 12**, **page 403**): $P = 1{,}07\, F_a$
$P_0 = F_r + 0{,}58\, F_a$

Symbols

A	minimum axial load factor (**product tables**) • Single row bearings, **page 406** • Four-point contact bearings, **page 430**
d_m	bearing mean diameter [mm] = 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**) • Single row bearings, **page 406** • 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**)
ν	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

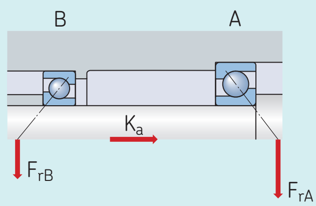
Calculation factors for single and double row angular contact ball bearings

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

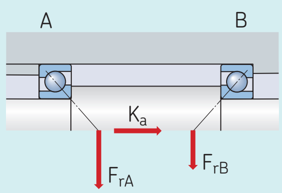
Table 11

Axial loading of bearing arrangements incorporating two single row angular contact ball bearings and/or bearing pairs in tandem

Back-to-back

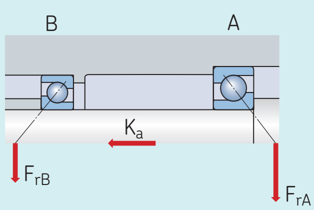


Face-to-face

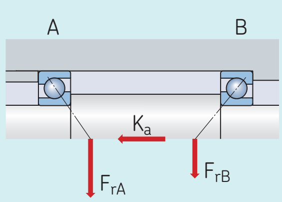


Bearing arrangement	Load case	Axial loads	
Back-to-back / Face-to-face	**Case 1a** $F_{rA} \geq F_{rB}$ $K_a \geq 0$	$F_{aA} = R\,F_{rA}$	$F_{aB} = F_{aA} + K_a$
	Case 1b $F_{rA} < F_{rB}$ $K_a \geq R\,(F_{rB} - F_{rA})$	$F_{aA} = R\,F_{rA}$	$F_{aB} = F_{aA} + K_a$
	Case 1c $F_{rA} < F_{rB}$ $K_a < R\,(F_{rB} - F_{rA})$	$F_{aA} = F_{aB} - K_a$	$F_{aB} = R\,F_{rB}$

Back-to-back



Face-to-face



Bearing arrangement	Load case	Axial loads	
Back-to-back / Face-to-face	**Case 2a** $F_{rA} \leq F_{rB}$ $K_a \geq 0$	$F_{aA} = F_{aB} + K_a$	$F_{aB} = R\,F_{rB}$
	Case 2b $F_{rA} > F_{rB}$ $K_a \geq R\,(F_{rA} - F_{rB})$	$F_{aA} = F_{aB} + K_a$	$F_{aB} = R\,F_{rB}$
	Case 2c $F_{rA} > F_{rB}$ $K_a < R\,(F_{rA} - F_{rB})$	$F_{aA} = R\,F_{rA}$	$F_{aB} = F_{aA} - K_a$

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 $n d_m$ value is limited to 250 000 mm/min.

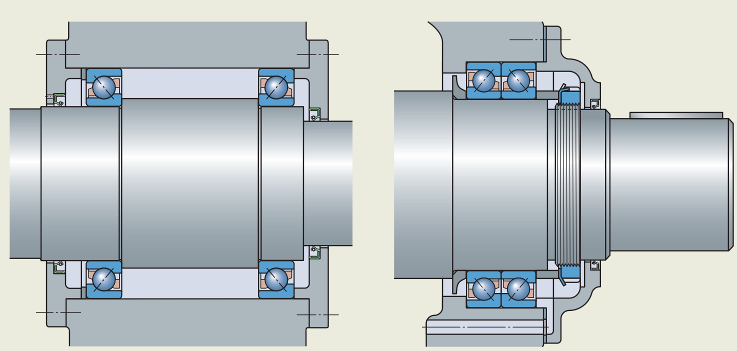
where
d_m = bearing mean diameter [mm]
= 0,5 (d + D)
n = rotational speed [r/min]

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

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.

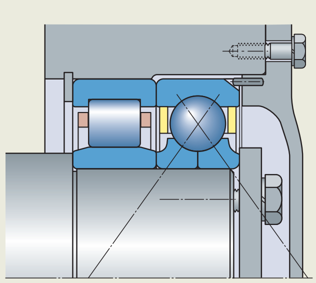
Load ratio

- 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.

Fig. 12

Bearing mounted with radial clearance in the housing



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

		Group 1	Group 2	Group 3	/

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					
4.1	4.2	4.3	4.4	4.5	4.6

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

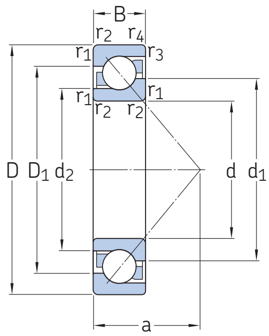
DB	Two bearings matched for mounting back-to-back
DF	Two bearings matched for mounting face-to-face
DT	Two bearings matched for mounting in tandem

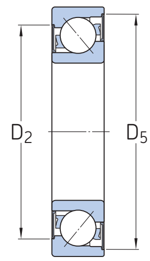
Group 4.2: Accuracy, clearance, preload, quiet running

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

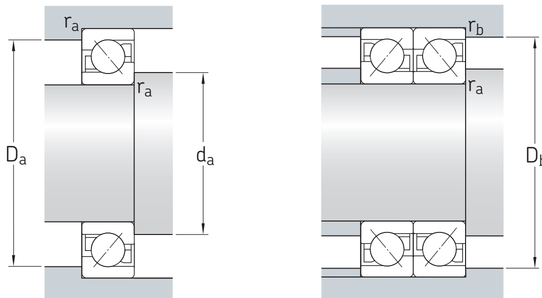




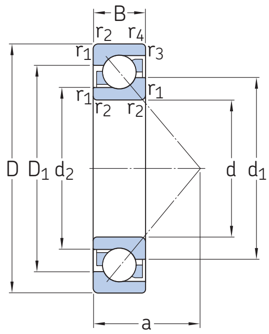
2RZ

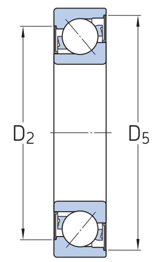
Principal dimensions			Basic load ratings dynamic	static	Fatigue load limit	Speed ratings Reference speed	Limiting speed	Mass	Designations Universally matchable bearing	Basic design / sealed bearing
d	D	B	C	C_0	P_u					
mm			kN		kN	r/min		kg	–	
10	30	9	7,02	3,35	0,14	30 000	30 000	0,03	▸ 7200 BECBP	▸ 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
	30,8	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	0,00191	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

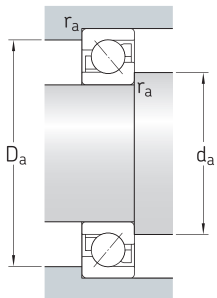


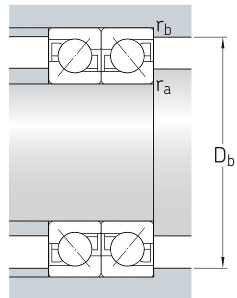


2RZ

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

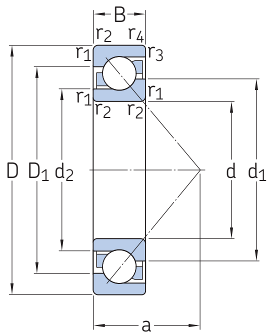


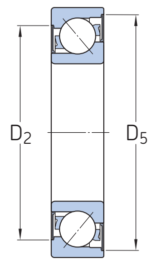


Dimensions								Abutment and fillet dimensions						Calculation factors	
d	d_1 ≈	d_2 ≈	D_1, D_2 ≈	D_5 ≈	$r_{1,2}$ min.	$r_{3,4}$ min.	a	d_a min.	d_a max.	D_a max.	D_b max.	r_a max.	r_b max.	A	k_r
mm								mm						–	
25	36,1	30,8	42,7	48	1	0,6	24	30,6	35,5	46,4	47,8	1	0,6	0,00159	0,095
	36,1	30,8	41,6	–	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

3.1 Single row angular contact ball bearings

d **35 – 40** mm

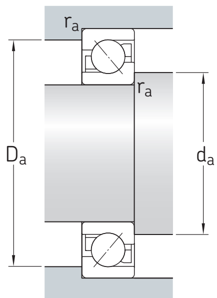


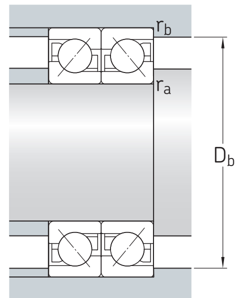


2RZ

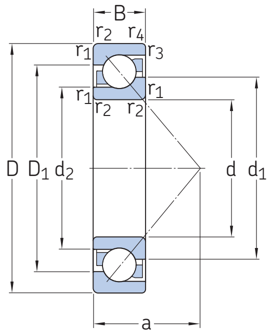
Principal dimensions			**Basic load ratings** dynamic	static	**Fatigue load limit**	**Speed ratings** Reference speed	Limiting speed	**Mass**	**Designations** Universally matchable bearing	Basic design / sealed bearing
d	D	B	C	C_0	P_u					
mm			kN		kN	r/min		kg	–	
35	72	17	29,1	19	0,815	11 000	9 000	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	–

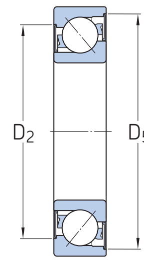
SKF Explorer bearing
▸ Popular item





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

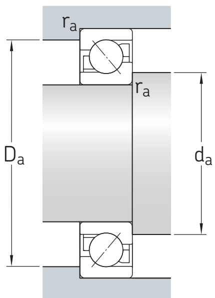


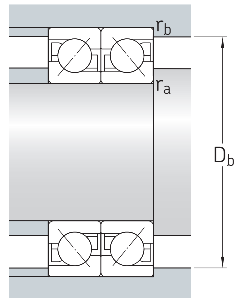


2RZ

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

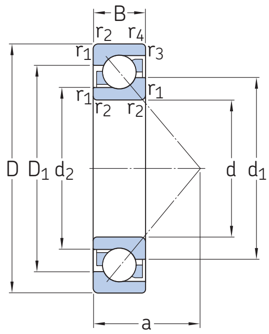


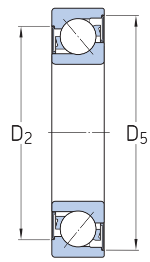


Dimensions								Abutment and fillet dimensions						Calculation factors	
d	d_1 ≈	d_2 ≈	D_1, D_2 ≈	D_5 ≈	$r_{1,2}$ min.	$r_{3,4}$ min.	a	d_a min.	d_a max.	D_a max.	D_b max.	r_a max.	r_b max.	A	k_r
mm								mm						–	
45	60,8	52,6	71,8	79,9	1,1	0,6	37	52	60	78	80	1	0,6	0,012	0,095
	60,8	52,6	70,2	–	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

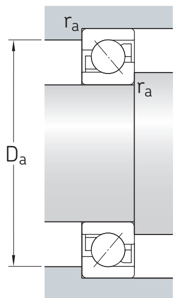


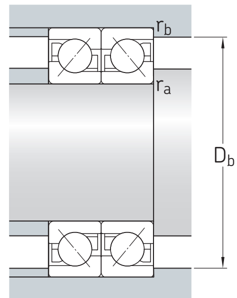


2RZ

Principal dimensions			Basic load ratings 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	–	
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

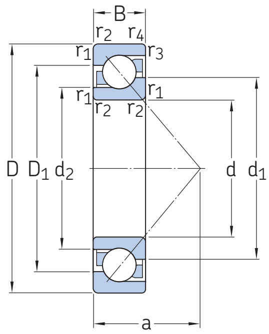




Dimensions								Abutment and fillet dimensions						Calculation factors	
d	d_1 ≈	d_2 ≈	D_1, D_2 ≈	D_5 ≈	$r_{1,2}$ min.	$r_{3,4}$ min.	a	d_a min.	d_a max.	D_a max.	D_b max.	r_a max.	r_b max.	A	k_r
mm								mm						–	
55	72,5	63,6	85,1	94,3	1,5	1	43	64	72	91	94	1,5	1	0,022	0,095
	72,5	63,6	83,7	–	1,5	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

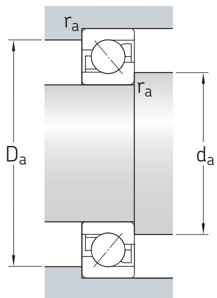
3.1 Single row angular contact ball bearings

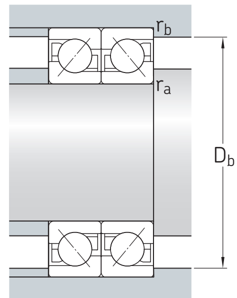
d **65 – 75** mm



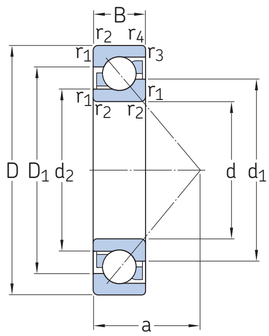
Principal dimensions			Basic load ratings dynamic	static	Fatigue load limit	Speed ratings Reference speed	Limiting speed	Mass	Designations Universally matchable bearing	Basic design / sealed bearing
d	D	B	C	C_0	P_u					
mm			kN		kN	r/min		kg	–	
65	120	23	66,3	54	2,28	6 700	6 300	1	–	▸ 7213 BEP
	120	23	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



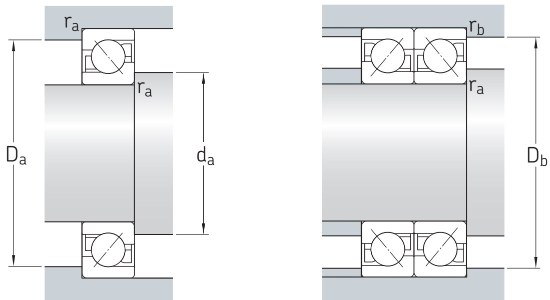


Dimensions								Abutment and fillet dimensions						Calculation factors	
d	d_1 ≈	d_2 ≈	D_1, D_2 ≈	D_5 ≈	$r_{1,2}$ min.	$r_{3,4}$ min.	a	d_a min.	d_a max.	D_a max.	D_b max.	r_a max.	r_b max.	A	k_r
mm								mm						–	
65	86,3	75,4	100	–	1,5	1	50	74	–	111	114	1,5	1	0,0478	0,095
	86,3	75,4	99,5	–	1,5	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
	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

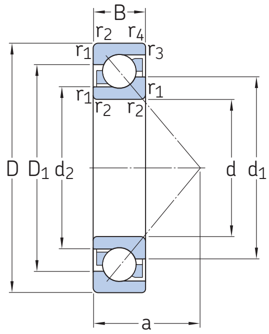


Dimensions								Abutment and fillet dimensions						Calculation factors	
d	d_1 ≈	d_2 ≈	D_1, D_2 ≈	D_5 ≈	$r_{1,2}$ min.	$r_{3,4}$ min.	a	d_a min.	d_a max.	D_a max.	D_b max.	r_a max.	r_b max.	A	k_r
mm								mm						–	
80	103	91,4	118	–	2	1	59	91	–	130	134	2	1	0,0801	0,095
	103	91,4	118	–	2	1	59	91	–	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

3.1 Single row angular contact ball bearings

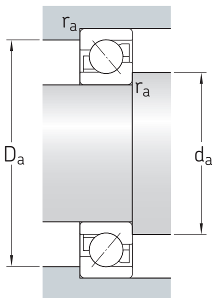
d **95 – 110** mm

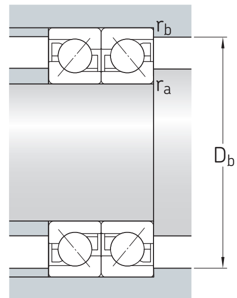
3.1



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	–

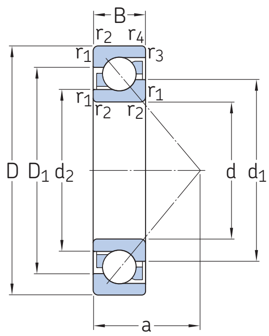
SKF Explorer bearing
▸ Popular item





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
	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

3.1 Single row angular contact ball bearings
d **120 – 300** mm



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

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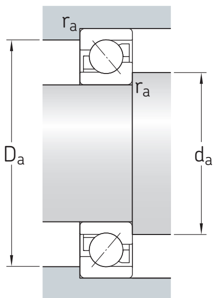
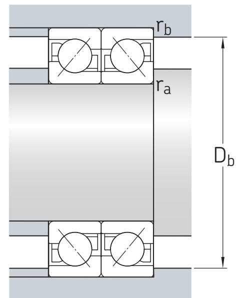
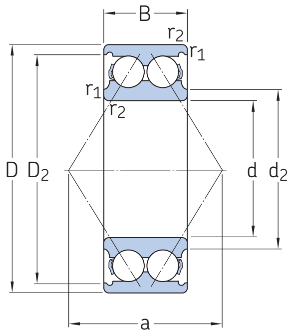


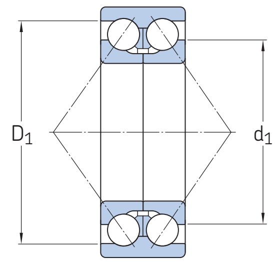


Dimensions								Abutment and fillet dimensions						Calculation factors	
d	d_1 ≈	d_2 ≈	D_1, D_2 ≈	D_5 ≈	$r_{1,2}$ min.	$r_{3,4}$ min.	a	d_a min.	d_a max.	D_a max.	D_b max.	r_a max.	r_b max.	A	k_r
mm								mm						–	
120	143	132	158	–	2	1	77	130	–	170	174	2	1	0,139	0,083
	157	138	180	–	2,1	1,1	90	132	–	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

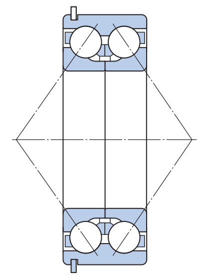
3.2



32 A, 33 A



33 D

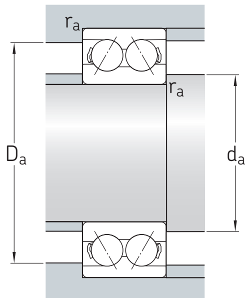


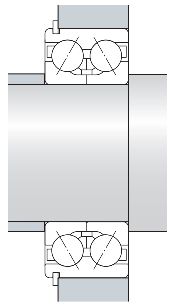
33 DNRCBM[1)]

Principal dimensions			Basic load ratings		Fatigue load limit	Speed ratings		Mass	Designations	
			dynamic	static		Reference speed	Limiting speed		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**	–

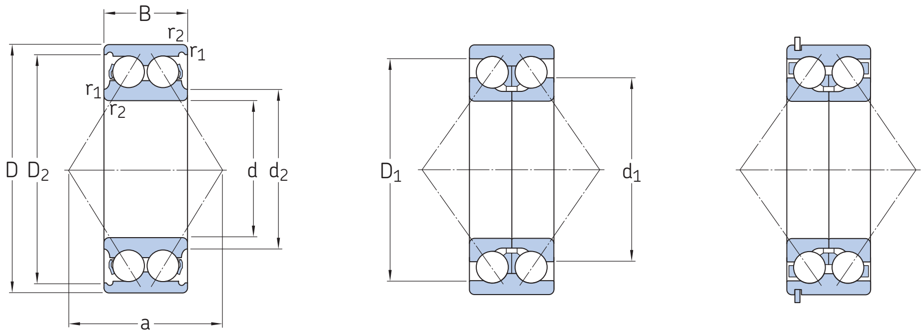
SKF Explorer bearing
▸ Popular item
1) For dimensions of snap ring groove and snap ring → table 7, page 395

SKF





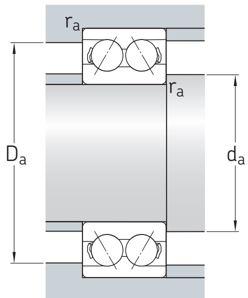
Dimensions							Abutment and fillet dimensions			Calculation factor
d	d_1 ≈	d_2 ≈	D_1 ≈	D_2 ≈	$r_{1,2}$ min.	a	d_a min.	D_a max.	r_a max.	k_r
mm							mm			–
10	–	15,8	–	25	0,6	16	14,4	25,6	0,6	0,06
12	–	17,2	–	27,7	0,6	19	16,4	27,6	0,6	0,06
15	–	20,2	–	30,7	0,6	21	19,4	30,6	0,6	0,06
	–	23,7	–	35,7	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

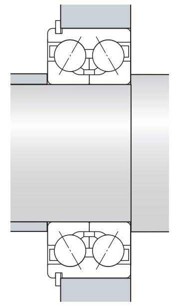


32 A, 33 A   33 D   33 DNRCBM[1)]

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	–

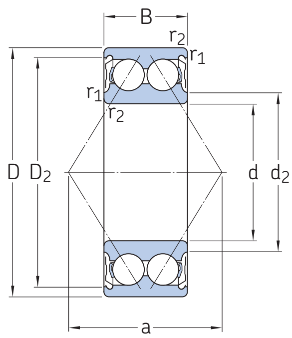
SKF Explorer bearing
▸ Popular item
1) For dimensions of snap ring groove and snap ring → table 7, page 395



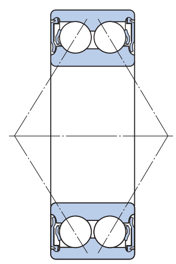


Dimensions							Abutment and fillet dimensions			Calculation factor
d	d_1 ≈	d_2 ≈	D_1 ≈	D_2 ≈	$r_{1,2}$ min.	a	d_a min.	D_a max.	r_a max.	k_r
mm							mm			–
55	–	63,2	–	92,3	1,5	57	63	91	1,5	0,06
	81,5	–	106	–	2	97	66	–	2	0,095
	81,4	–	105	–	2	114	66	109	2	0,095
	–	68,4	–	110	2	72	66	109	2	0,07
60	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



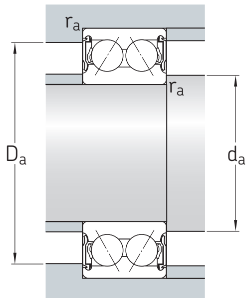
2Z



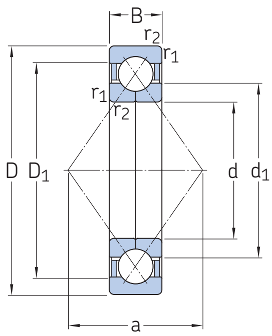
2RS1

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**	–

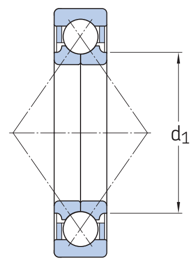
SKF Explorer bearing
▸ Popular item



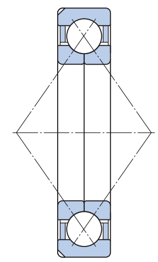
Dimensions					Abutment and fillet dimensions				Calculation factor
d	d_2 ≈	D_2 ≈	$r_{1,2}$ min.	a	d_a min.	d_a max.	D_a max.	r_a max.	k_r
mm					mm				–
10	15,8	25	0,6	16	14,4	15,5	25,6	0,6	0,06
12	17,2	27,7	0,6	19	16,4	17	27,6	0,6	0,06
15	20,2	30,7	0,6	21	19,4	20	30,6	0,6	0,06
	23,7	35,7	1	24	20,6	23,5	36,4	1	0,07
17	23,3	35	0,6	23	21,4	23	35,6	0,6	0,06
	25,7	40,2	1	28	22,6	25,5	41,4	1	0,07
20	27,7	40,9	1	28	25,6	27,5	41,4	1	0,06
	29,9	44	1,1	30	27	29,5	45	1	0,07
25	32,7	45,9	1	30	30,6	32,5	46,4	1	0,06
	35,7	53,4	1,1	36	32	35,5	55	1	0,07
30	38,7	55,2	1	36	35,6	38,5	56	1	0,06
	39,8	64,1	1,1	42	37	39,5	65	1	0,07
35	45,4	63,9	1,1	42	42	45	65	1	0,06
	44,6	70,5	1,5	47	44	44,5	71	1,5	0,07
40	47,8	72,1	1,1	46	47	48	73	1	0,06
	50,8	80,5	1,5	53	49	50	81	1,5	0,07
45	52,8	77,1	1,1	46	52	52	78	1	0,06
	55,6	90	1,5	58	54	91	91	1,5	0,07
50	57,8	82,1	1,1	52	57	57	83	1	0,06
	62	99,5	2	65	61	61	99	2	0,07
55	63,2	92,3	1,5	57	63	63	91	1,5	0,06
	68,4	110	2	72	66	68	109	2	0,07
60	68,8	101	1,5	63	69	68	101	1,5	0,06
	73,4	118	2,1	78	72	73	118	2	0,07
65	77,5	111	1,5	71	74	76	111	1,5	0,06
	79,2	128	2,1	84	77	78	128	2	0,07
70	82,5	116	1,5	74	79	82	116	1,5	0,06
	86,5	137	2,1	89	82	84	138	2	0,07
75	87,5	121	1,5	77	84	84	121	1,5	0,06
	95,4	147	2,1	97	87	88	148	2	0,07



Basic design



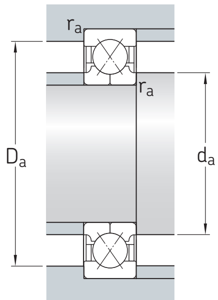
SKF Explorer bearing



Bearing with locating slots

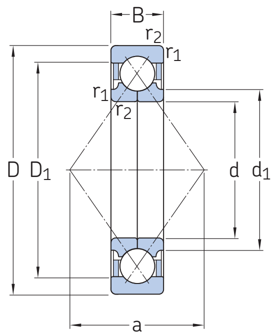
Principal dimensions			Basic load ratings dynamic	static	Fatigue load limit	Limiting speed	Mass	Designations Bearing with locating slots[1)]	without locating slots
d	D	B	C	C_0	P_u				
mm			kN		kN	r/min	kg	–	
15	35	11	12,7	8,3	0,355	36 000	0,062	QJ 202 N2MA	–
17	40	12	17	11,4	0,48	30 000	0,082	QJ 203 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

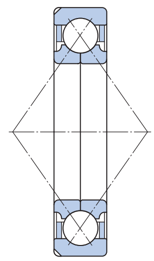
SKF Explorer bearing
▸ Popular item
1) For dimensions of locating slots → table 1, page 387



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

3.4 Four-point contact ball bearings
d **70 – 150** mm

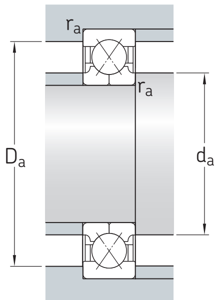




Bearing with locating slots

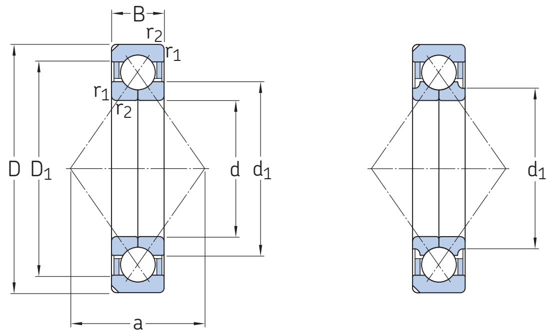
Principal dimensions			Basic load ratings dynamic	static	Fatigue load limit	Limiting speed	Mass	Designations Bearing with locating slots[1)]	without locating slots
d	D	B	C	C_0	P_u				
mm			kN		kN	r/min	kg	–	
70	125	24	120	122	5,2	9 000	1,3	▸ QJ 214 N2MA	QJ 214 MA
	125	24	120	122	5,2	9 000	1,3	QJ 214 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

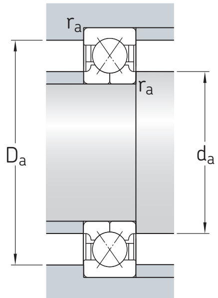
d **160 – 200** mm



SKF Explorer bearing

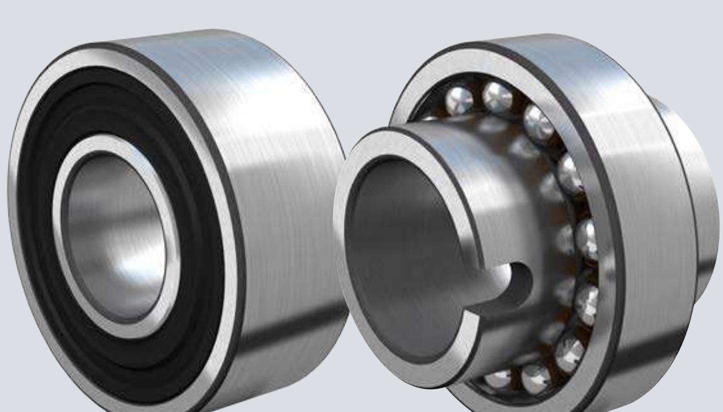
Principal dimensions			Basic load ratings dynamic	static	Fatigue load limit	Limiting speed	Mass	Designations Bearing with locating slots[1)]	without locating slots
d	D	B	C	C_0	P_u				
mm			kN		kN	r/min	kg	–	
160	290	48	450	670	19	3 800	15,5	▸ QJ 232 N2MA	–
	340	68	570	880	23,6	3 400	34,5	▸ QJ 332 N2MA	–
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

4 Self-aligning ball bearings

4

More information

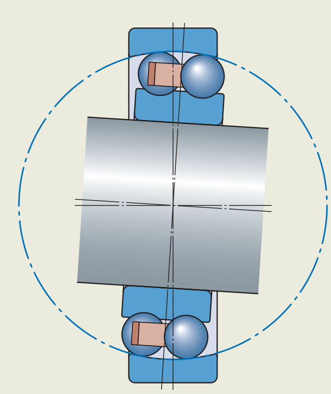
Self-aligning ball bearings have two rows of balls, a common sphered raceway in the outer ring and two deep uninterrupted raceway grooves in the inner ring. They are available open or sealed. The bearings are insensitive to angular misalignment of the shaft relative to the housing (**fig. 1**), which 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



SKF

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 ≤ d ≤ 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

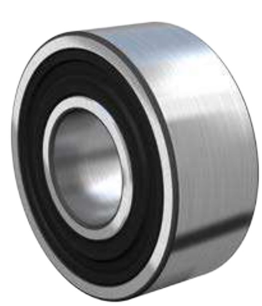
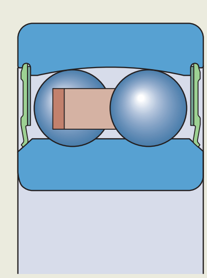


Fig. 6

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)

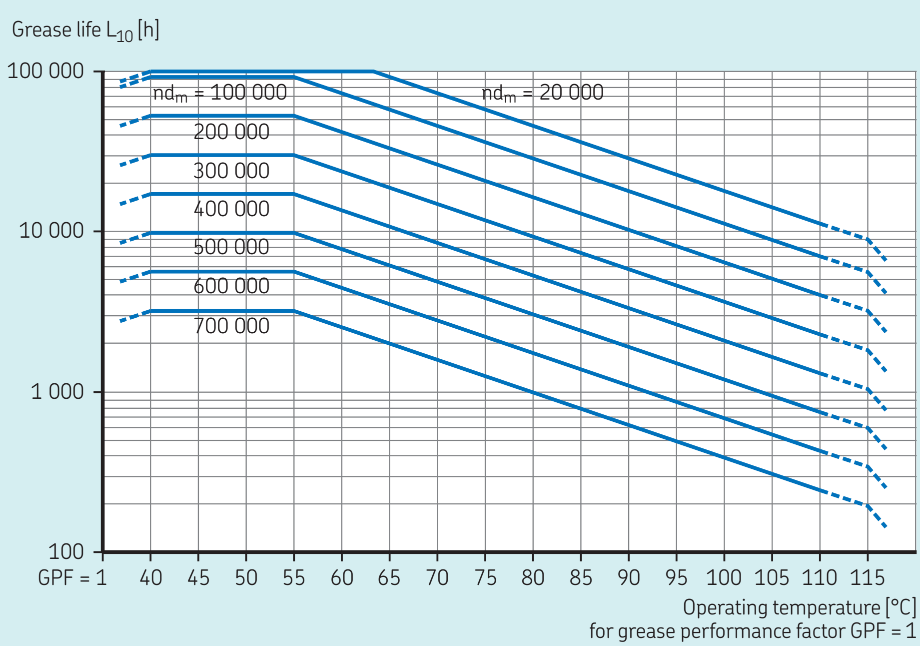
Bearings with an extended inner ring

- 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

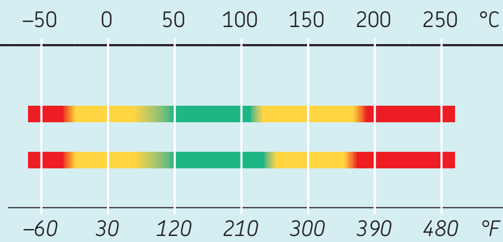


n = rotational speed [r/min]
d_m = bearing mean diameter [mm]
= 0,5 (d + D)

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)*	Base oil viscosity [mm²/s] at 100 °C *(210 °F)*
D ≤ 62	MT47	see chart	Lithium soap	Mineral	2	70	7,3
D > 62	MT33	see chart	Lithium soap	Mineral	3	100	10



[1] Refer to the SKF traffic light concept (page 117).

Fig. 7

Annular groove and lubrication holes

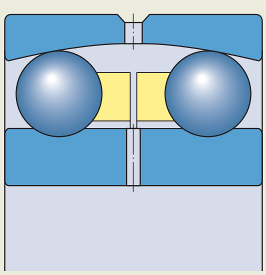


Table 2

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 >	Bore diameter d ≤	Tolerance class JS7 Deviation U	Tolerance class JS7 Deviation 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

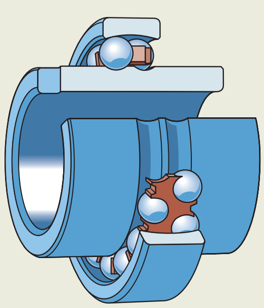


Fig. 9

Axial location of bearings with an extended inner ring

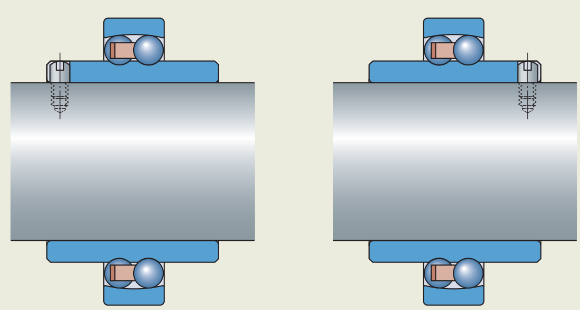
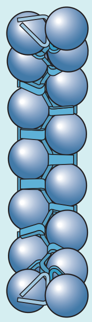
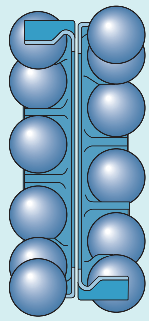
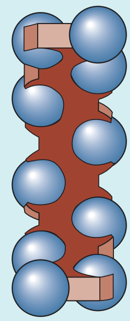
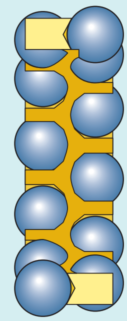
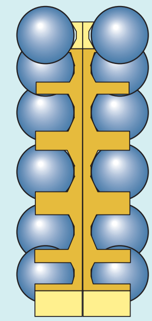


Table 4

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 (no designation suffix when d ≥ 150 mm)	M (no designation suffix when d ≥ 150 mm)

For bearings with non-standard cages, contact SKF.

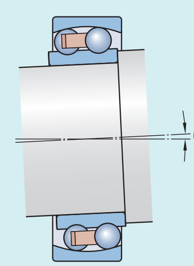
Cages

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



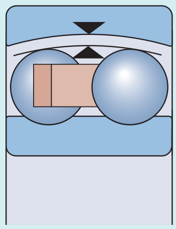
Bearings/series	**Misalignment** α
–	°
108, 126, 127, 129, 135	3
12 (E)	2,5
13 (E)	3
22 (E)	2,5
22 E-2RS1	1,5
23 (E)	3
23 E-2RS1	1,5
112 (E)	2,5
130, 139	3

Bearing data

Dimension standards	Boundary dimensions: ISO 15 Except for: • Bearings with an extended inner ring
Tolerances For additional information → page 35	Normal Except for: • Bearings with an extended inner ring: bore to tolerance class JS7 (**table 3**, **page 441**) in accordance with ISO 286-2 Values: ISO 492 (**table 2**, **page 38**)
Internal clearance For additional information → page 182	Normal, C3 Check availability of C2 (cylindrical bore only) Except for: • Bearings in the 130 and 139 series: C3 • Bearings with an extended inner ring: ranging from the minimum value of C2 to the maximum value of Normal Values: ISO 5753-1 (**table 6**, **page 444**) 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 min.	max.	Normal min.	max.	C3 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 min.	max.	Normal min.	max.	C3 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 For additional information → **page 106**	$F_{rm} = k_r \left(\frac{\nu\, n}{1\,000}\right)^{2/3} \left(\frac{d_m}{100}\right)^2$	**Symbols**
Axial load carrying capacity	Bearings mounted on an adapter sleeve on plain shafts without a fixed abutment: $F_{ap} = 0{,}003\, B\, d$ provided the bearings are correctly mounted.	
Equivalent dynamic bearing load For additional information → **page 91**	$F_a/F_r \leq e \rightarrow P = F_r + Y_1\, F_a$ $F_a/F_r > e \rightarrow P = 0{,}65\, F_r + Y_2\, F_a$	
Equivalent static bearing load For additional information → **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

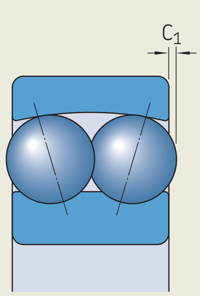
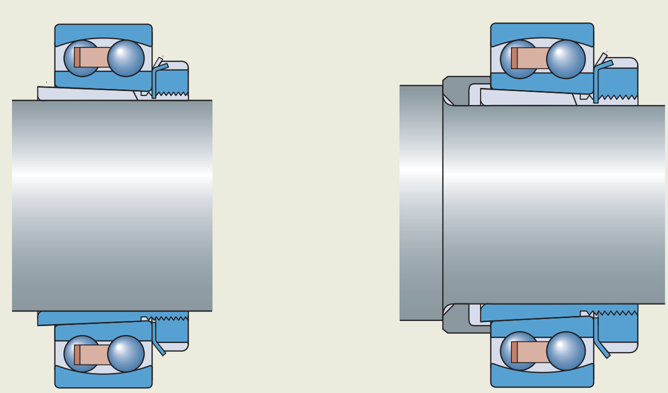


Fig. 11

Bearings with a tapered bore mounted with an adapter sleeve



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

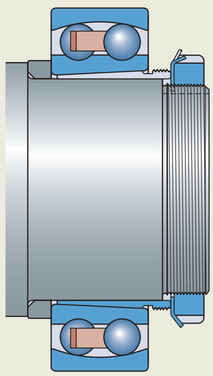


Fig. 13

Sealed bearing with a tapered bore mounted with an E design adapter sleeve

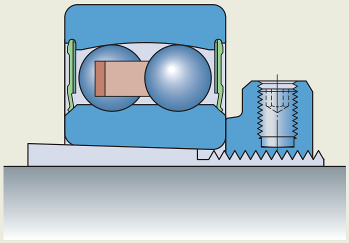


Fig. 14

Check clearance reduction

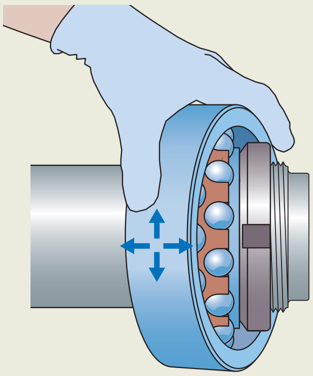
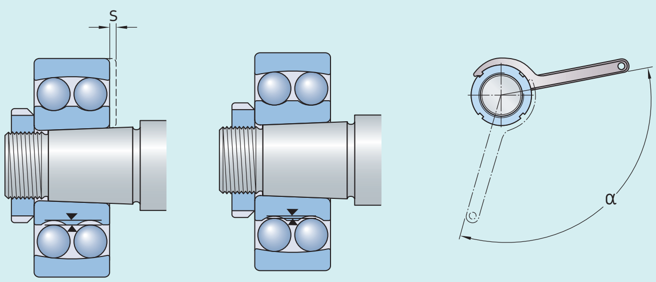


Table 7

Drive-up data for self-aligning ball bearings with a tapered bore



Bore diameter d	**Axial drive-up** s[1][2]	**Lock nut tightening angle** 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

		Group 1	Group 2	Group 3	/	Group 4					
						4.1	4.2	4.3	4.4	4.5	4.6

Prefixes

Basic designation

Listed in table 4, page 30

Suffixes

Group 1: Internal design

E Optimized internal design for increased load carrying capacity

Group 2: External design (seals, snap ring groove, etc.)

-2RS1 Contact seal, NBR, on both sides
K Tapered bore, taper 1:12

Group 3: Cage design

M Machined brass cage, ball centred
TN9 Glass fibre reinforced PA66 cage, ball centred

Group 4.1: Materials, heat treatment

Group 4.2: Accuracy, clearance, preload, quiet running

C2 Radial internal clearance smaller than Normal
C3 Radial internal clearance greater than Normal

Group 4.3: Bearing sets, matched bearings

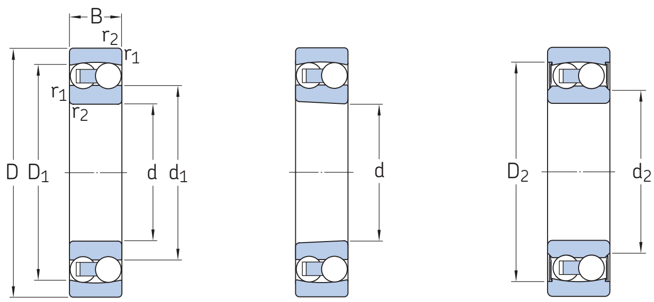
Group 4.4: Stabilization

Group 4.5: Lubrication

W64 Solid Oil

Group 4.6: Other variants

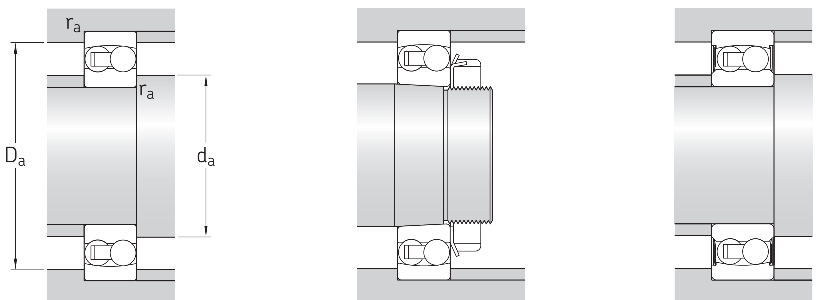
4.1 Self-aligning ball bearings
d **5 – 20** mm



Cylindrical bore | Tapered bore | Sealed

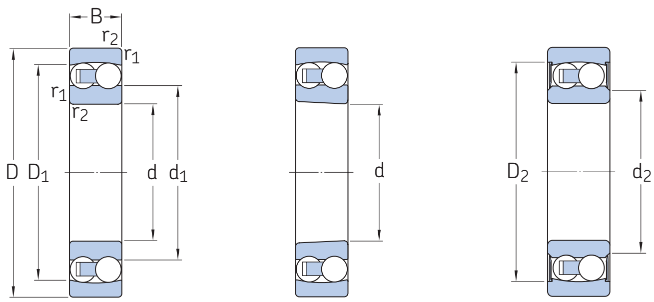
Principal dimensions			Basic load ratings dynamic	static	Fatique load limit	Speed ratings Reference speed	Limiting speed	Mass	Designations Bearing with cylindrical bore	tapered bore
d	D	B	C	C_0	P_u					
mm			kN		kN	r/min		kg	–	
5	19	6	2,51	0,48	0,025	63 000	45 000	0,009	▸ **135 TN9**	–
6	19	6	2,51	0,48	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

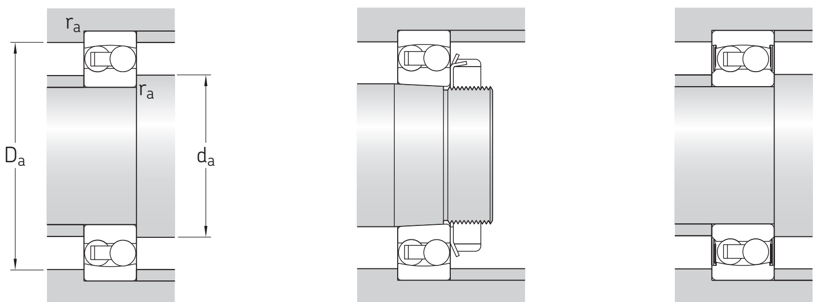
d **25 – 45** mm



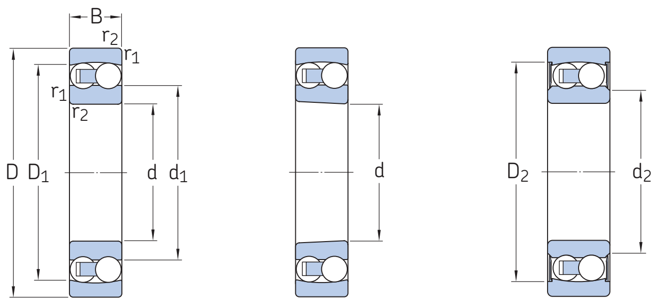
Cylindrical bore Tapered bore Sealed

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



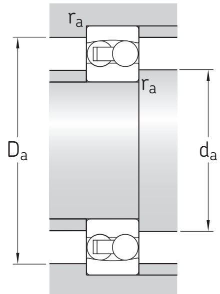
Dimensions							Abutment and fillet dimensions				Calculation factors				
d	d_1, d_2 ≈	D_1, D_2 ≈	C_1	b	K	$r_{1,2}$ min.	d_a min.	d_a max.	D_a max.	r_a max.	k_r	e	Y_1	Y_2	Y_0
mm							mm				–				
25	33,3	44,6	–	–	–	1	30,6	–	46,4	1	0,04	0,28	2,2	3,5	2,5
	31	46,3	–	–	–	1	30,6	31	46,4	1	0,045	0,28	2,2	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

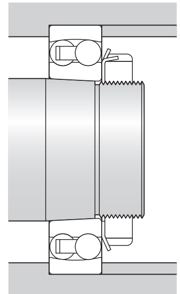


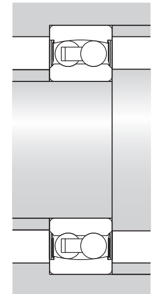
Cylindrical bore Tapered bore Sealed

Principal dimensions			Basic load ratings		Fatique 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	–	
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

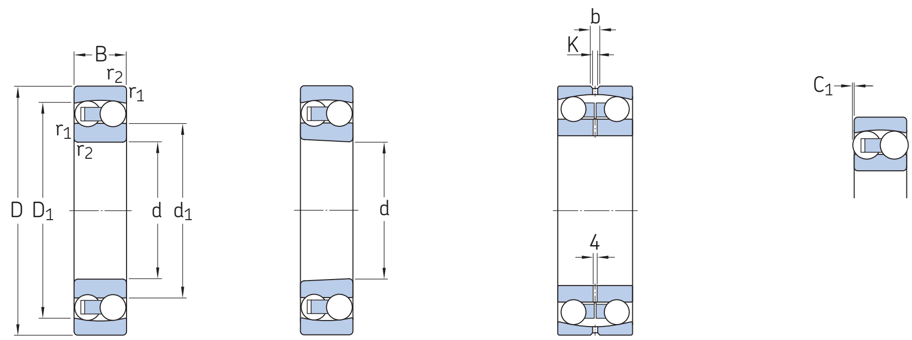






Dimensions							Abutment and fillet dimensions				Calculation factors				
d	d_1, d_2 ≈	D_1, D_2 ≈	C_1	b	K	$r_{1,2}$ min.	d_a min.	d_a max.	D_a max.	r_a max.	k_r	e	Y_1	Y_2	Y_0
mm							mm				–				
50	61,7	78,1	–	–	–	1,1	57	–	83	1,1	0,04	0,21	3	4,6	3,2
	57,7	79,4	–	–	–	1,1	57	58	83	1,1	0,045	0,2	3,2	4,9	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

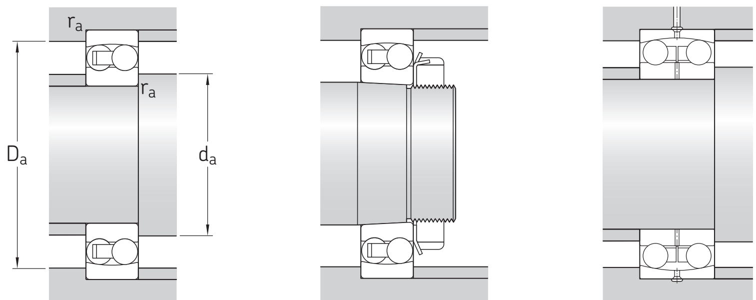
d **85 – 240** mm



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

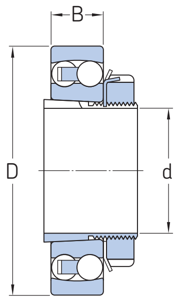


4.1

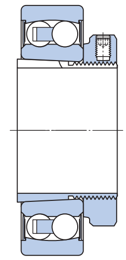
Dimensions							Abutment and fillet dimensions				Calculation factors				
d	d_1, d_2 ≈	D_1, D_2 ≈	C_1	b	K	$r_{1,2}$ min.	d_a min.	d_a max.	D_a max.	r_a max.	k_r	e	Y_1	Y_2	Y_0
mm							mm				–				
85	107	131	–	–	–	2	96	–	139	2	0,04	0,17	3,7	5,7	4
	106	131	–	–	–	2	96	–	139	2	0,04	0,25	2,5	3,9	2,5
	117	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

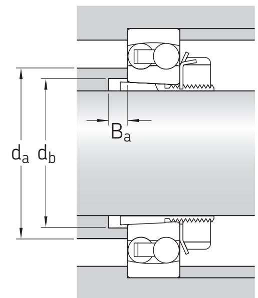
d **17 – 90** mm



Open bearing on
a standard sleeve



Sealed bearing on
an E design sleeve



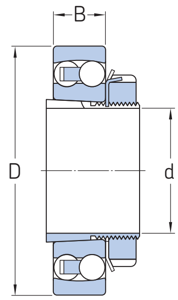
Principal dimensions			**Abutment and fillet dimensions**			**Mass** Bearing + sleeve	**Designations** Bearing[1)]	Sleeve[2)]
d	D	B	d_a max.	d_b min.	B_a min.			
mm			mm			kg	–	
17	47	14	28,5	23	5	0,16	1204 EKTN9	H 204
20	52	15	33	28	5	0,21	► 1205 EKTN9	H 205
	52	18	31	28	5	0,23	2205 E-2RS1KTN9	H 305 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

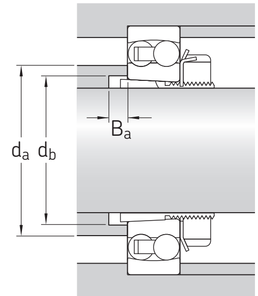
► Popular item
1) For additional bearing data → product table, page 450
2) For additional adapter sleeve data → product table, page 1072

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



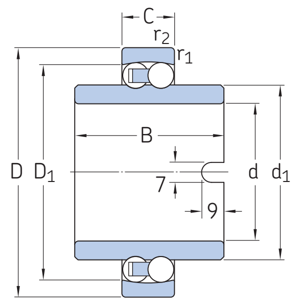


Principal dimensions			**Abutment and fillet dimensions**			**Mass** Bearing + sleeve	**Designations** Bearing[1)]	Sleeve[2)]
d	D	B	d_a max.	d_b min.	B_a min.			
mm			mm			kg	–	
100	200	38	140	116	8	6,8	▸ **1222 K**	**H 222**
	200	53	137	118	8	8,85	**2222 K**	**H 322**
	240	50	154	118	10	13,5	**1322 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**

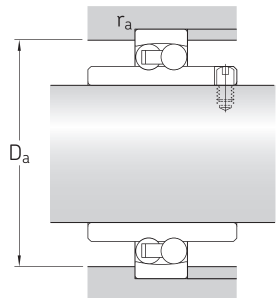
▸ Popular item
1) For additional bearing data → **product table, page 450**
2) For additional adapter sleeve data → **product table, page 1072**

4.2

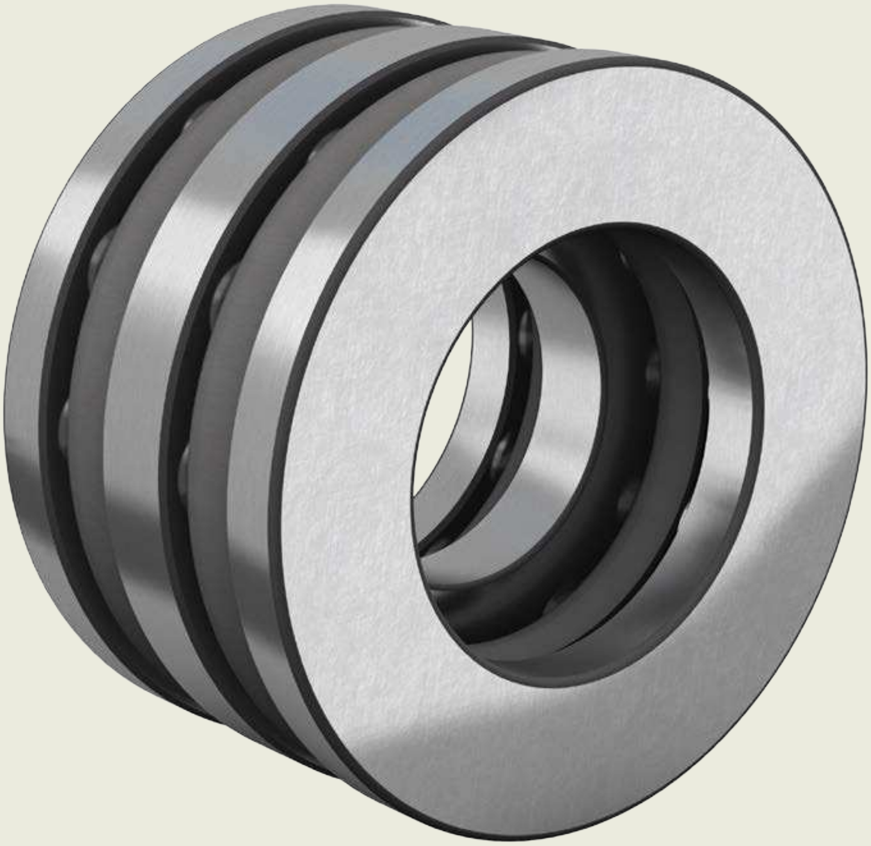
d **20 – 60** mm



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

5 Thrust ball bearings

More information

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

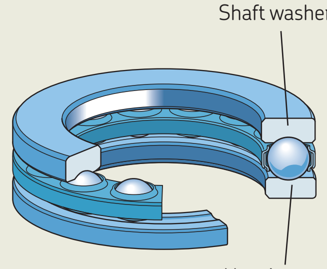
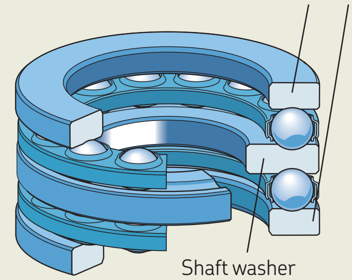


Fig. 5

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.

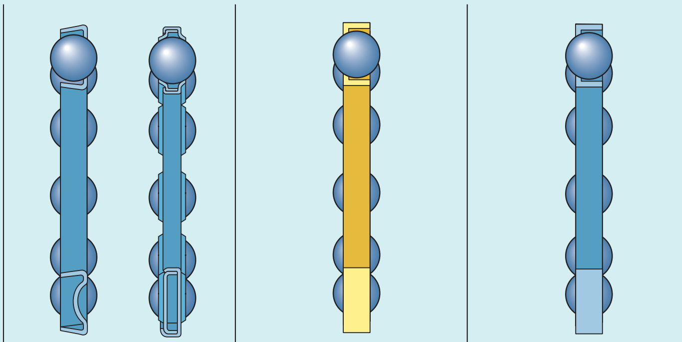
Cages

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

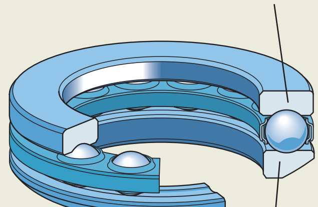
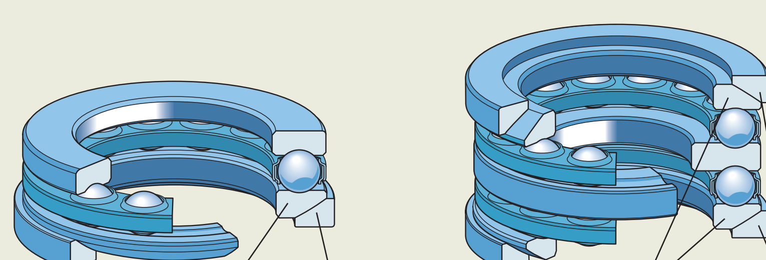


Fig. 7

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 Bearings in the BA series are not standardized.	ISO 20516
Tolerances	Normal P5 or P6 on request (single direction bearings only)	Normal
For additional information → page 35	Values: ISO 199 (table 10, page 46) Bearings in the BA series are not standardized.	
Permissible misalignment	Cannot tolerate any misalignment.	Accommodate only initial misalignment.

5

Loads

Minimum load For additional information → page 106	$F_{am} = A\left(\frac{n}{1\,000}\right)^2$	**Symbols**
Equivalent dynamic bearing load For additional information → page 91	$P = F_a$	
Equivalent static bearing load For additional information → page 105	$P_0 = F_a$	

Symbols

A minimum load factor (product tables, page 472)
F_a axial load [kN]
F_{am} minimum axial load [kN]
n rotational speed [r/min]
P equivalent dynamic bearing load [kN]
P_0 equivalent static bearing load [kN]

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

		Group 1	Group 2	Group 3	/	Group 4					
						4.1	4.2	4.3	4.4	4.5	4.6

Prefixes

Basic designation

Listed in table 4, page 30

BA . Thrust ball bearing, bore diameter d < 10 mm
The one-digit number after BA identifies the bore diameter.

Suffixes

Group 1: Internal design

Group 2: External design (seals, snap ring groove, etc.)

Group 3: Cage design

F Machined steel cage, ball centred
M Machined brass cage, ball centred

Group 4.1: Materials, heat treatment

Group 4.3: Bearing sets, matched bearings

Group 4.2: Accuracy, clearance, preload, quiet running

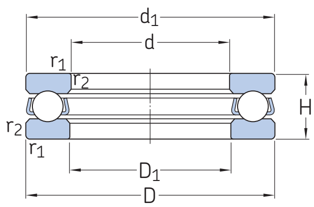
P5 Dimensional and geometrical tolerances to class P5
P6 Dimensional and geometrical tolerances to class P6

Group 4.4: Stabilization

Group 4.5: Lubrication

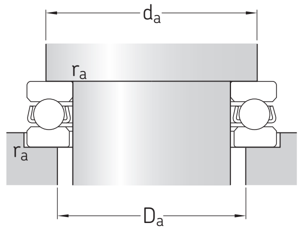
Group 4.6: Other variants

d **3 – 35** mm



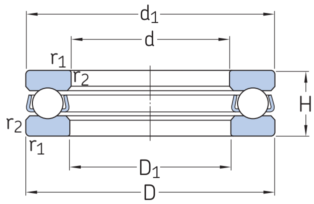
Principal dimensions			Basic load ratings dynamic	static	Fatique load limit	Minimum load factor	Speed ratings Reference speed	Limiting speed	Mass		Designation
d	D	H	C	C_0	P_u	A					
mm			kN		kN	–	r/min		kg		–
3	8	3,5	0,806	0,72	0,027	0,000 003	26 000	36 000	0,0009	▸	**BA 3**
4	10	4	0,761	0,72	0,027	0,000 003	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



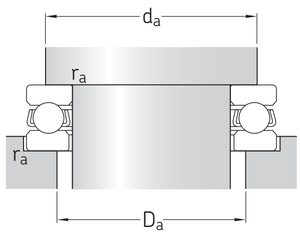
Dimensions				Abutment and fillet dimensions		
d	d_1 ≈	D_1 ≈	$r_{1,2}$ min.	d_a min.	D_a max.	r_a max.
mm				mm		
3	7,8	3,2	0,15	5,8	5	0,15
4	9,8	4,2	0,15	7,5	6,5	0,15
5	11,8	5,2	0,15	8	9	0,15
6	13,8	6,2	0,2	11	9,5	0,2
7	16,8	7,2	0,2	12,5	11	0,2
8	18,8	8,2	0,3	14,5	12,5	0,3
9	19,8	9,2	0,3	15,5	13,5	0,3
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

5.1

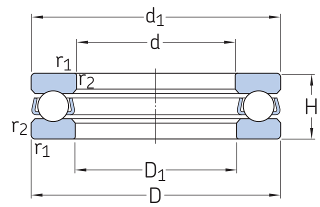


Principal dimensions			Basic load ratings		Fatique load limit	Minimum load factor	Speed ratings		Mass	Designation
			dynamic	static			Reference speed	Limiting speed		
d	D	H	C	C_0	P_u	A				
mm			kN		kN	–	r/min		kg	–
40	60	13	25,5	63	2,32	0,02	5 000	7 000	0,12	▸ **51108**
	68	19	44,2	96,5	3,6	0,058	3 800	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

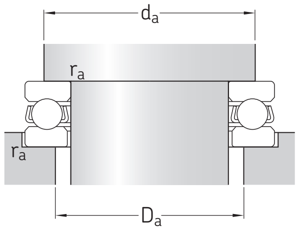


Dimensions				Abutment and fillet dimensions		
d	d_1 ≈	D_1 ≈	$r_{1,2}$ min.	d_a min.	D_a max.	r_a max.
mm				mm		
40	60	42	0,6	52	48	0,6
	68	42	1	57	51	1
	78	42	1	63	55	1
	90	42	1,1	70	60	1
45	65	47	0,6	57	53	0,6
	73	47	1	62	56	1
	85	47	1	69	61	1
	100	47	1,1	78	67	1
50	70	52	0,6	62	58	0,6
	78	52	1	67	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 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	–
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**

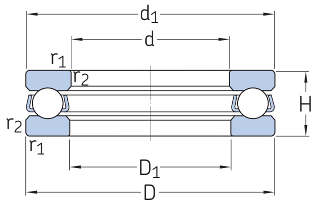
▸ Popular item



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

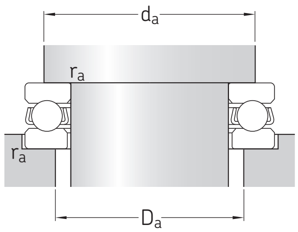
5.1 Single direction thrust ball bearings

d **150 – 340** mm

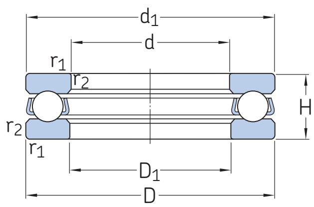


Principal dimensions			Basic load ratings dynamic	static	Fatigue load limit	Minimum load factor	Speed ratings Reference speed	Limiting speed	Mass	Designation
d	D	H	C	C_0	P_u	A				
mm			kN		kN	–	r/min		kg	–
150	190	31	111	440	12,5	1	1 700	2 400	2,2	▸ **51130 M**
	215	50	238	800	22	3,3	1 300	1 800	6,1	▸ **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**

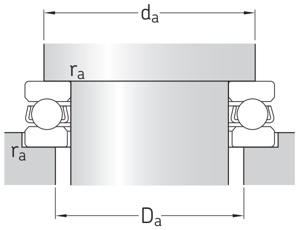
▸ Popular item



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

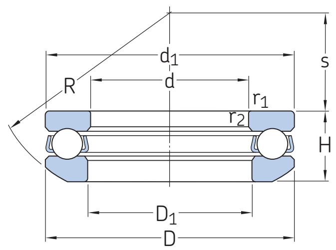


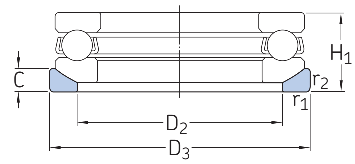
Principal dimensions			Basic load ratings		Fatique load limit	Minimum load factor	Speed ratings		Mass	Designation
			dynamic	static			Reference speed	Limiting speed		
d	D	H	C	C_0	P_u	A				
mm			kN		kN	–	r/min		kg	–
360	440	65	390	2 080	38	22	750	1 100	22	**51172 F**
	500	110	741	4 150	73,5	90	500	700	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	436 495	364 365	2 4	408 443	392 417	2 3
380	456 515	384 385	2 4	428 463	412 437	2 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	795 795	675 675	4 4	747 747	723 723	3 3

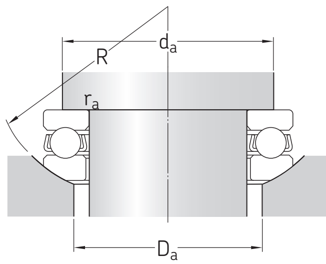
5.2 Single direction thrust ball bearings with a sphered housing washer
d **12 – 75** mm

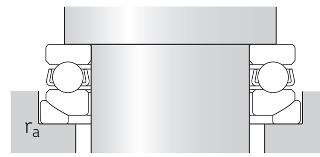




Principal dimensions			Basic load ratings dynamic	static	Fatigue load limit	Minimum load factor	Speed ratings Reference speed	Limiting speed	Mass Bearing + washer	Designations Bearing	Seat washer
d	D	H_1	C	C_0	P_u	A					
mm			kN		kN	–	r/min		kg	–	
12	28	13	13,3	20,8	0,765	0,0022	8 000	11 000	0,045	► **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

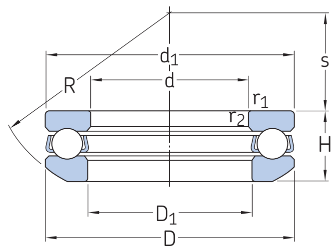


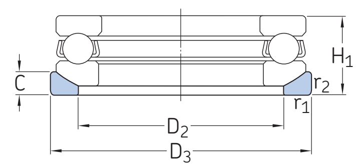


Dimensions										Abutment and fillet dimensions		
d	d_1 ≈	D_1 ≈	D_2	D_3	H	C	R	s	$r_{1,2}$ min.	d_a min.	D_a max.	r_a max.
mm										mm		
12	28	14	20	30	11,4	3,5	25	11,5	0,6	22	20	0,6
15	32	17	24	35	13,3	4	28	12	0,6	25	24	0,6
17	35	19	26	38	13,2	4	32	16	0,6	28	26	0,6
20	40	22	30	42	14,7	5	36	18	0,6	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**		**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	–	
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

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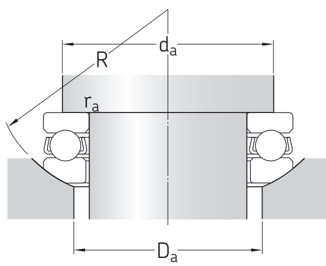
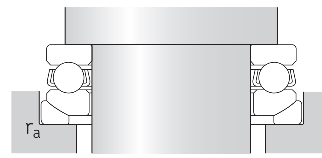
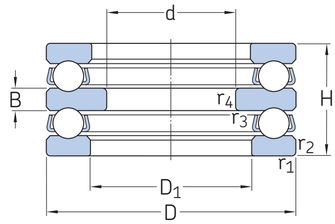


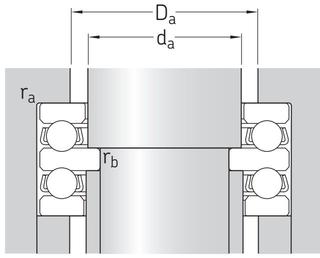


Dimensions										Abutment and fillet dimensions		
d	d_1 ≈	D_1 ≈	D_2	D_3	H	C	R	s	$r_{1,2}$ min.	d_a min.	D_a max.	r_a max.
mm										mm		
80	115	82	98	120	29,5	10	90	46	1	101	98	1
	140	82	110	145	47,6	15	112	50	1,5	116	110	1
85	125	88	105	130	33,1	11	100	52	1	109	105	1
	150	88	115	155	53,1	17,5	112	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

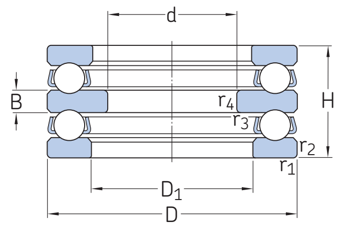


Principal dimensions			Basic load ratings dynamic	static	Fatique load limit	Minimum load factor	Speed ratings Reference speed	Limiting speed	Mass		Designation
d	D	H	C	C_0	P_u	A					
mm			kN		kN	–	r/min		kg		–
10	32	22	15,9	25	0,915	0,0038	5 300	7 500	0,081	▸	**52202**
15	40	26	21,2	37,5	1,4	0,0085	4 300	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

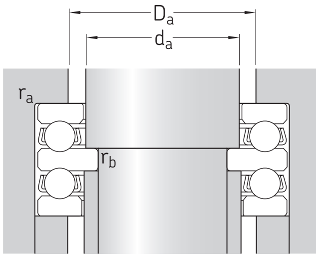


Dimensions					Abutment and fillet dimensions			
d	D_1 ≈	B	$r_{1,2}$ min.	$r_{3,4}$ min.	d_a	D_a max.	r_a max.	r_b max.
mm					mm			
10	17	5	0,6	0,3	15	22	0,6	0,3
15	22	6	0,6	0,3	20	28	0,6	0,3
20	27	7	0,6	0,3	25	34	0,6	0,3
	27	8	1	0,3	25	36	1	0,3
	32	12	1	0,6	30	46	1	0,6
25	30	7	0,6	0,3	30	39	0,6	0,3
	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



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**

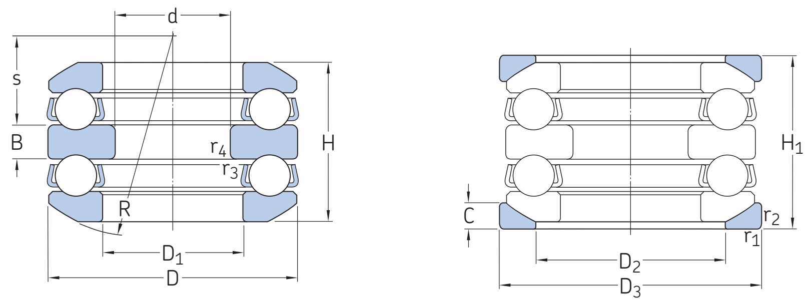
▸ Popular item



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	15	1,1	1	100	120	1	1
	103	21	1,5	1	100	128	1	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	21	1,5	1,1	170	198	1,5	1
	183	21	1,5	2	180	208	1,5	2

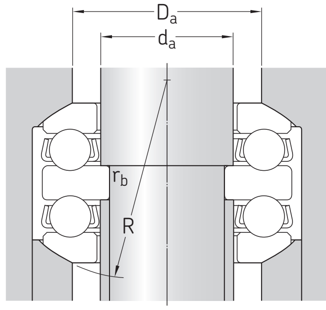
5.4 Double direction thrust ball bearings with sphered housing washers

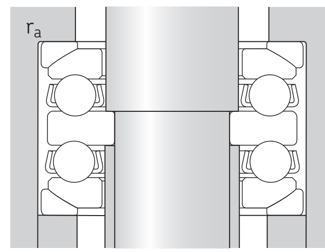
d **25 – 80** mm



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**

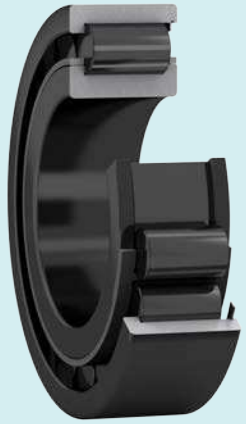
▸ Popular item





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

6

6 Cylindrical roller bearings

More information

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:

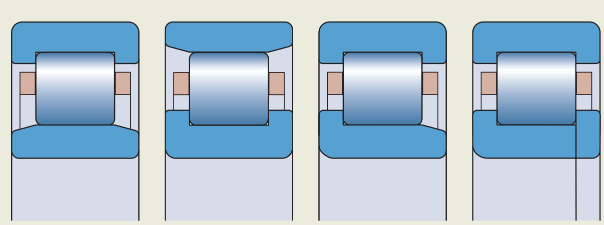
- the number of roller rows (one or two)
- the type of cage (with, without or special designs)
  - Bearings with a cage can accommodate heavy radial loads and peak loads, rapid accelerations and high speeds.
  - Full complement bearings (without cage) incorporate a maximum number of rollers and are therefore 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

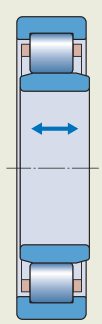


Fig. 4

Load distribution for the logarithmic roller profile

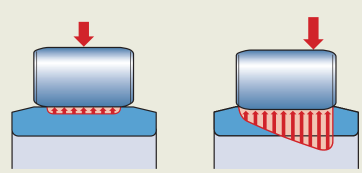


Fig. 3

Open flange design

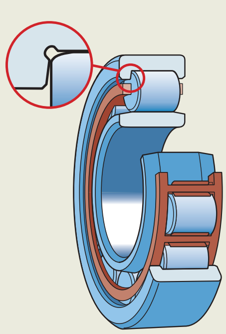
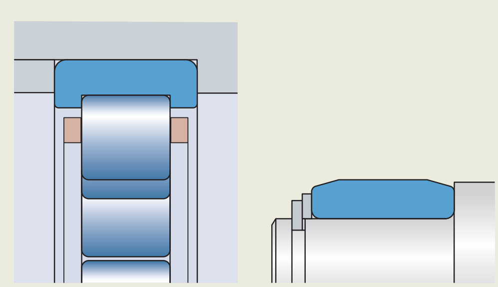


Fig. 5

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. 7

NU design bearing + HJ angle ring

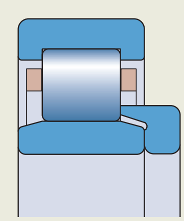
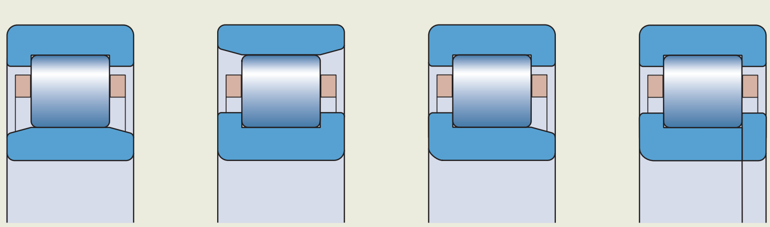


Fig. 6

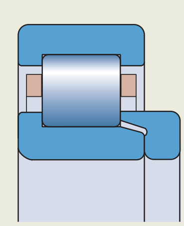
Common designs



NU N NJ NUP

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. 10

Bearing without inner ring, RNU

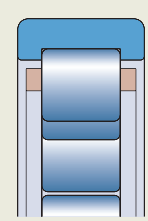
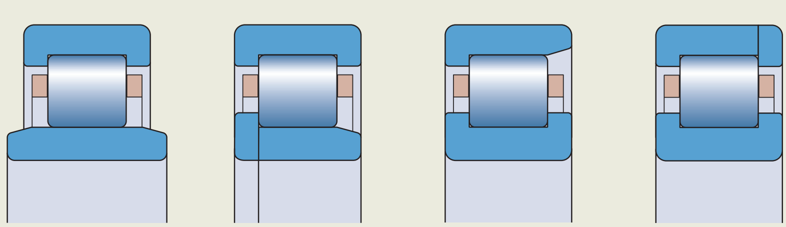


Fig. 9

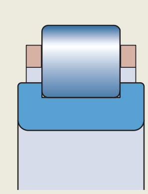
Other designs



NUB NJP NF NP

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

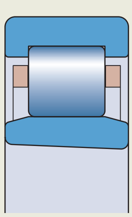


Fig. 14

Bearing with locating slot(s)

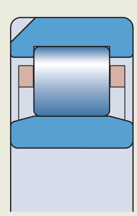


Fig. 15

High-capacity bearing

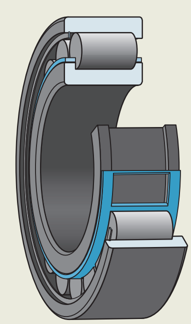


Fig. 13

Bearing with a snap ring groove

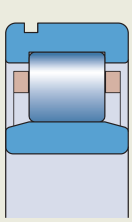
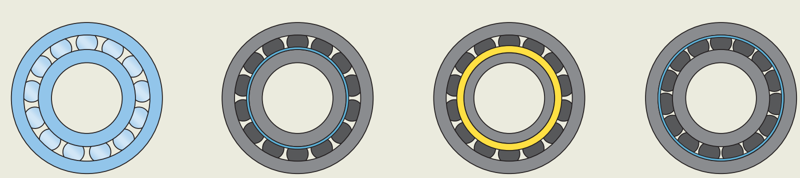


Fig. 16

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

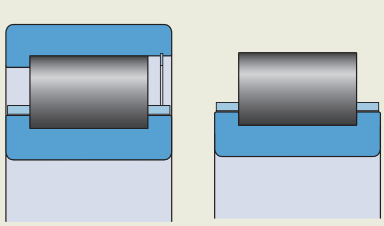
- are identified by the series designation NUH .. ECMH (**fig. 19**)
- can accommodate axial displacement of the shaft relative to the housing in both directions
- can be separated (outer ring with the roller and cage assembly from the inner ring), which simplifies mounting and dismounting, particularly where load conditions require both rings to have an interference fit

Double row bearings

- are available on request

Fig. 17

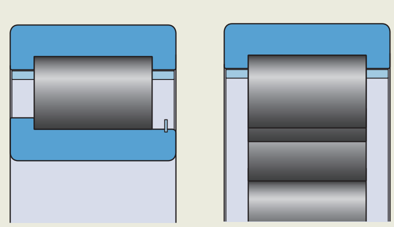
Bearings with an inner ring centred cage



NCF .. ECJB RN .. ECJB

Fig. 18

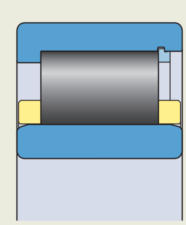
Bearings with an outer ring centred cage



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

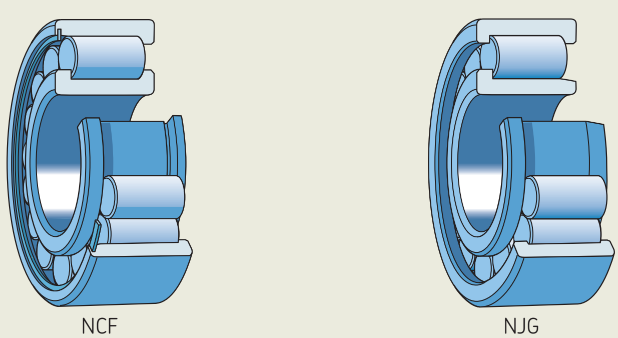


Fig. 21

Self-retaining roller complement

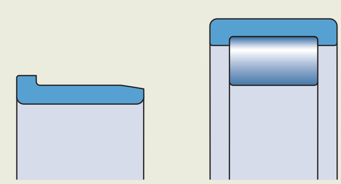
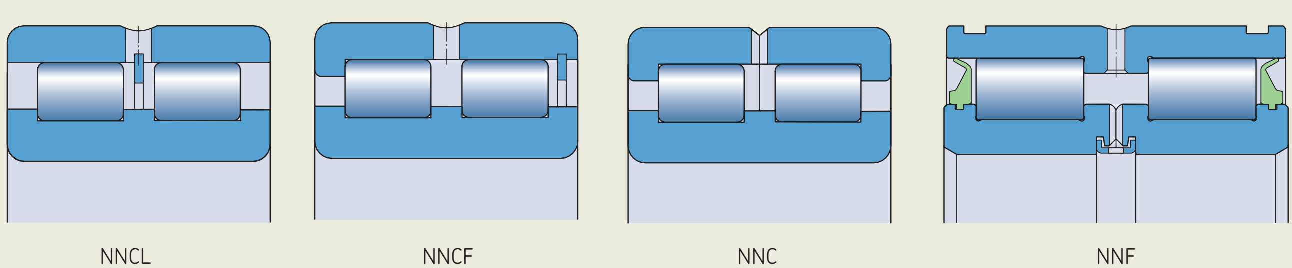


Fig. 22

Double row full complement bearings



NNCL design bearings

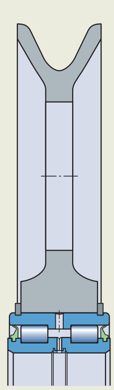
- have three integral flanges on the inner ring and no flanges on the outer ring
- have a retaining ring in the outer ring between the roller rows to hold the bearing together
  The retaining ring should not be loaded axially during operation.
- can accommodate axial displacement of the shaft relative 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

Fig. 23

NNF design sealed bearing in a rope sheave



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.

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)

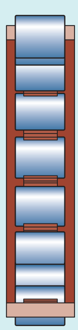
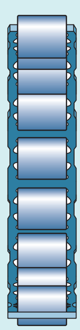
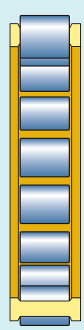
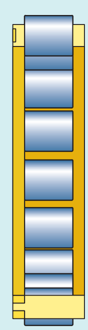
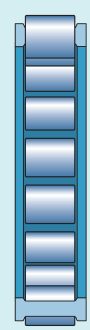
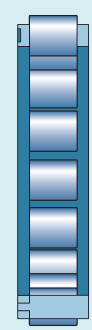
Cages

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.

6

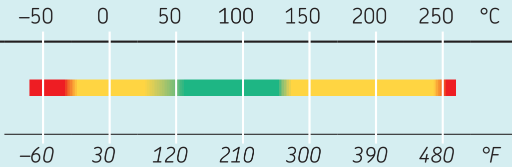
Cages for cylindrical roller bearings

	Single row bearings					
						
Cage type	Window-type • roller centred • outer ring centred	Window-type, roller centred	Window-type, inner or outer ring centred (depending on bearing design)	Riveted • roller centred • outer ring centred • inner ring centred	Window-type, inner or outer ring centred (depending on bearing design)	Riveted • roller centred • outer ring centred • inner ring centred
Material	• PA66, glass fibre reinforced • PEEK, glass fibre reinforced	Stamped steel	Machined brass	Machined brass	Machined light alloy	Machined light alloy
Suffix	• P or PH • PA or PHA	• – • J	• ML	• M • MA • MB	• LL	• L • LA • LB

SKF

Table 1

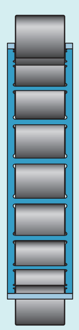
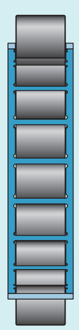
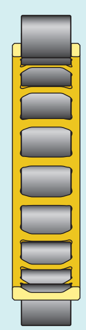
Technical specifications of SKF standard grease for sealed double row full complement cylindrical roller bearings

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)*
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 Except for: • HJ angle rings: ISO 246 • Snap rings and grooves: ISO 464 • Locating slots: ISO 20515	Boundary dimensions: ISO 15
Tolerances For additional information → page 35	Normal dimensional tolerance P6 geometrical tolerance Check availability of P5 or P6 tolerance class for bearings in the 10 series Values: ISO 492 (**table 2**, **page 38**, to **table 4**, **page 40**)	Normal dimensional tolerance P6 geometrical tolerance
Radial internal clearance For additional information → page 182	Normal, C3 Check availability of other clearance classes Values: ISO 5753-1 (**table 3**, **page 506**) Values are valid for unmounted bearings under zero measuring load.	
Axial internal clearance	Guideline values: • NUP design (**table 4**, **page 507**) • NJ design with an HJ angle ring (**table 5**, **page 508**) When measuring the axial internal clearance, the rollers may tilt, causing an enlargement of the measured axial clearance: • 10, 18, 19, 2, 3 and 4 series: ≈ the radial internal clearance • 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 • 20, 22, 23, 29 and 39 series: ≈ 3 minutes of arc The values are not valid for bearings of the NUP design or the NJ design with an HJ angle ring. 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,** **page 516** 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 Except for: • outer ring width of NNF 50 series bearings: C = 1 mm smaller than ISO standard • bearings in the 3194.. series: dimensions not standardized
Normal	
• 18 series: ≈ 4 minutes of arc • 22, 23, 28, 29 and 30 series: ≈ 3 minutes of arc	For information, contact the SKF application engineering service.

... when it exceeds the guideline values these effects become particularly noticeable.

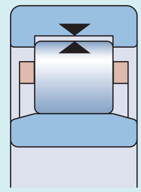
page 554	page 564

... relative to the housing occurs within these bearings. As a result, there is virtually no increase in friction.

6

Table 3

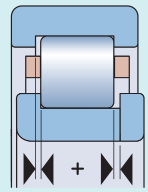
Radial internal clearance of cylindrical roller bearings with a cylindrical bore



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

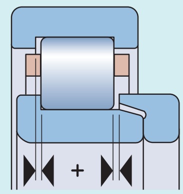
Axial internal clearance of NUP cylindrical roller bearings



Bearing Bore diameter	Size code	Axial internal clearance of bearings in the series NUP 2 min.	max.	NUP 3 min.	max.	NUP 22 min.	max.	NUP 23 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 min.	max.	NJ 3 + HJ 3 min.	max.	NJ 4 + HJ 4 min.	max.	NJ 22 + HJ 22 min.	max.	NJ 23 + HJ 23 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 For additional information → **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 For additional information → **page 91**	**Non-locating bearings** $P = F_r$ **Locating bearings** $F_a/F_r \leq e \rightarrow P = F_r$ $F_a/F_r > e \rightarrow P = 0{,}92\ F_r + Y\ F_a$ F_a must not exceed 0,5 F_r.	 $F_a/F_r \leq 0{,}15 \rightarrow P = F_r$ $F_a/F_r > 0{,}15 \rightarrow P = 0{,}92\ F_r + 0{,}4\ F_a$ F_a must not exceed 0,25 F_r.
Equivalent static bearing load For additional information → **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

6

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** $F_{ap\ max} \leq 0{,}0045\ D^{1,5}$ **Bearings in other series** $F_{ap\ max} \leq 0{,}0023\ D^{1,7}$ **High-capacity bearings** $F_{ap\ max} \leq 0{,}0035\ D^{1,7}$	**Circulating oil lubrication** $F_{ap\ oil} = F_{ap} + \dfrac{15 \times 10^4\ k_1\ \Delta T_s\ \dot{V}_s}{n\ (d + D)}$ **Other lubrication** • Reference surface A ≤ 50 000 mm² $F_{ap} = \dfrac{k_1\ C_0\ 10^4}{n\ (d + D)} - k_2\ F_r$ • Reference surface A > 50 000 mm² $F_{ap} = \dfrac{7{,}5\ k_1\ C_0^{2/3}\ 10^4}{n\ (d + D)} - k_2\ F_r$
Brief periods	$F_{ap\ brief} \leq 2\ (F_{ap}, F_{ap\ oil}, F_{ap\ max})$ • provided it does not increase the bearing operating temperature > 5 °C temporarily • "brief period" is the approximate time for 1 000 revolutions to take place	
Occasional peak loads	**High-capacity bearings** $F_{ap\ peak} \leq 0{,}0085\ D^{1,7}$ **Other bearings** $F_{ap\ peak} \leq 3\ (F_{ap}, F_{ap\ oil}, F_{ap\ max})$	

Symbols

A	reference surface [mm²] $= \pi$ 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]
ΔT_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 k_1	k_2	Grease lubrication 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

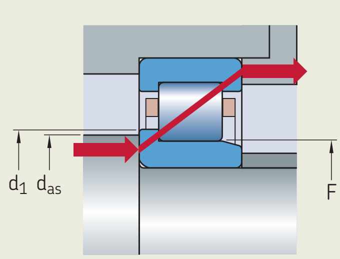


Fig. 25

Mounting sleeve

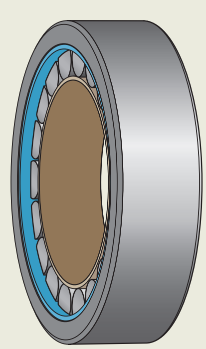
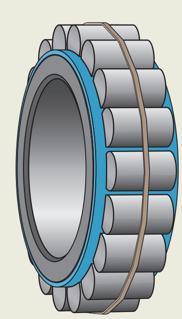


Fig. 26

Retaining strap



Designation system

		Group 1	Group 2	Group 3	/

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
- 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 middle half of the actual clearance range

The above letters are also used together with the clearance classes C2, C3, C4 and C5, e.g. C2H.

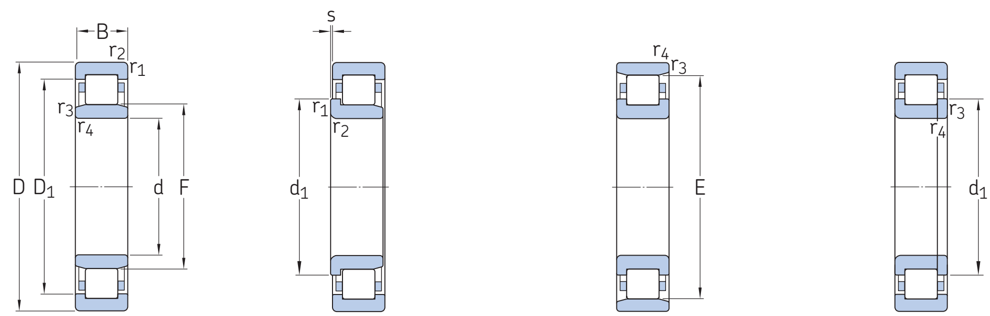
C2 Radial internal clearance smaller than Normal
C3 Radial internal clearance greater than Normal
C4 Radial internal clearance greater than C3
C5 Radial internal clearance greater than C4

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



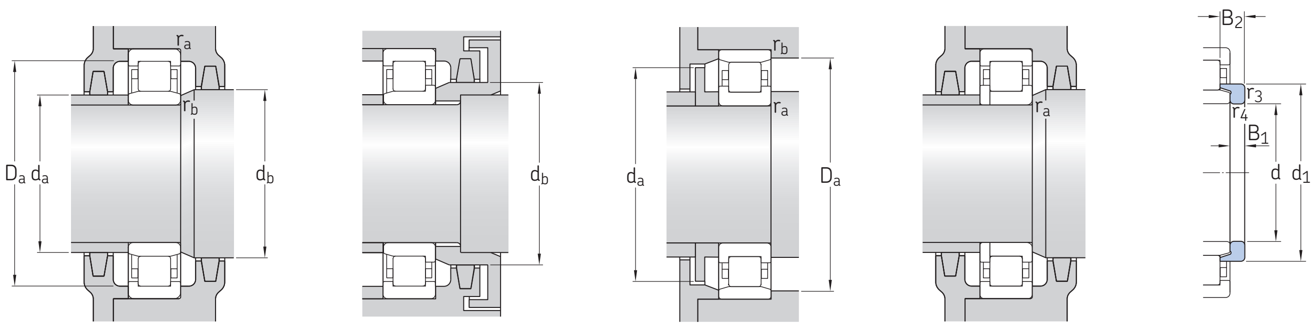
NU NJ N NUP

Principal dimensions			Basic load ratings		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	–	
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

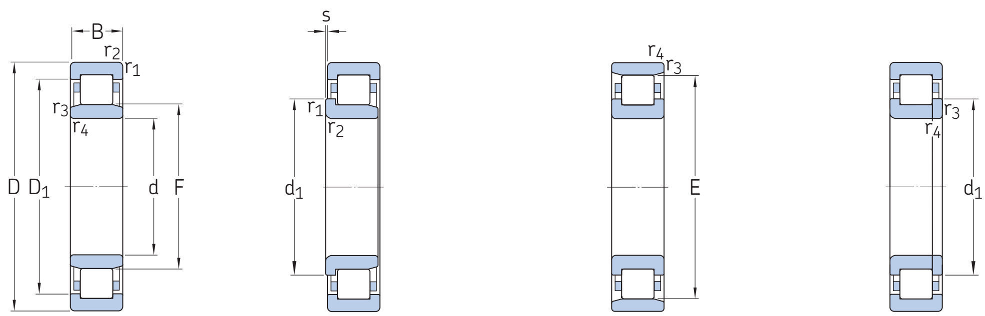
▸ Popular item

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

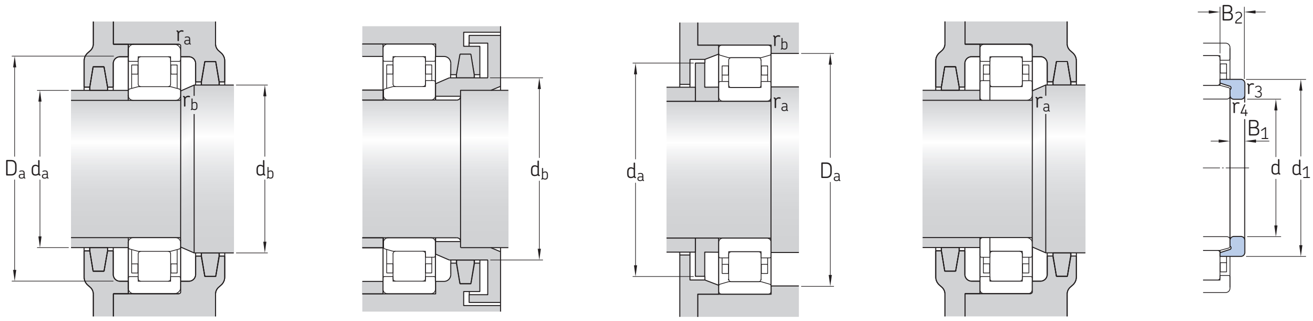
Dimensions							Abutment and fillet dimensions							Calculation factor	Angle ring Designation	Mass	Dimensions	
d	d_1 ≈	D_1 ≈	F, E	$r_{1,2}$ min.	$r_{3,4}$ min.	s max.	d_a min.	d_a max.	d_b, D_a min.	D_a max.	r_a max.	r_b max.	k_r			B_1	B_2
mm							mm							–	–	kg	mm	
15	–	27,7	19,3	0,6	0,3	1	17,4	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 cont.	62	17	46,5	36,5	4,55	12 000	15 000	0,23	▸ NU 305 ECP	J, ML
	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).

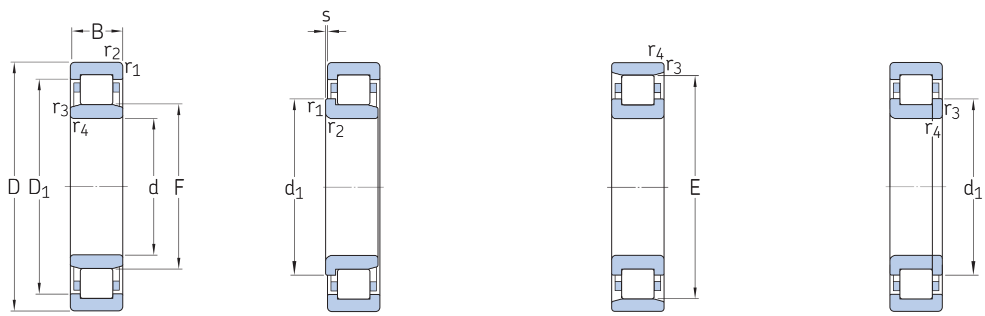


Angle ring

Dimensions							Abutment and fillet dimensions						Calcu-lation 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	**–**	–	–	–

6.1 Single row cylindrical roller bearings

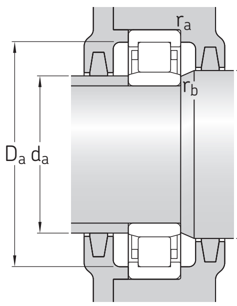
d **35 – 45** mm

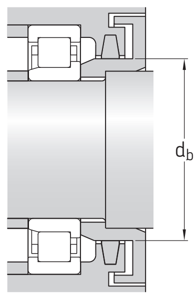


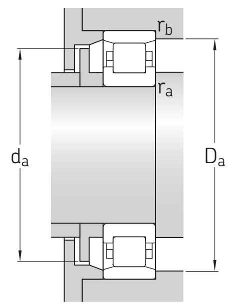
NU NJ N NUP

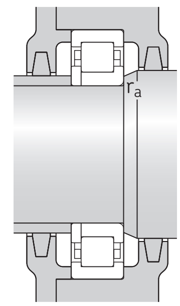
Principal dimensions			Basic load ratings		Fatigue load limit	Speed ratings		Mass	Designations	
			dynamic	static		Reference speed	Limiting speed		Bearing with standard cage	Alternative standard cage[1)]
d	D	B	C	C_0	P_u					
mm			kN		kN	r/min		kg	–	
35 cont.	80	31	106	98	12,7	9 500	11 000	0,72	▸ NU 2307 ECP	PH
	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

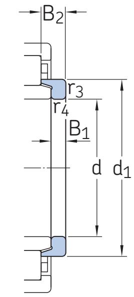
SKF Explorer bearing
▸ Popular item
1) When ordering bearings with an alternative standard cage the suffix of the standard cage has to be replaced by the suffix of the alternative cage. For example NU .. ECP becomes NU .. ECML (for permissible speed → page 511).





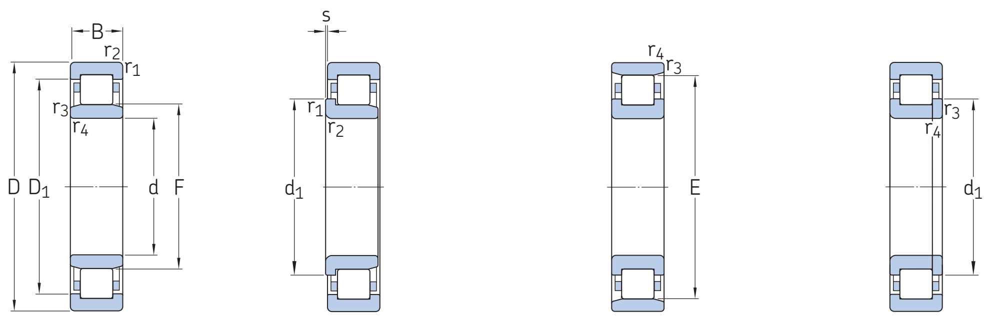






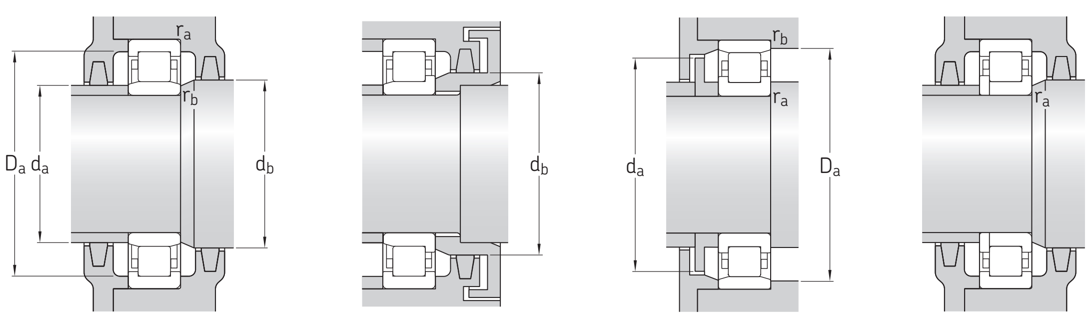
Angle ring

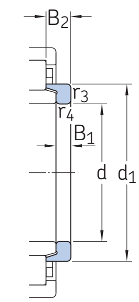
Dimensions							Abutment and fillet dimensions						Calcu-lation factor	Angle ring Designation	Mass	Dimensions	
d	d_1 ≈	D_1 ≈	F, E	$r_{1,2}$ min.	$r_{3,4}$ min.	s max.	d_a min.	d_a max.	d_b, D_a min.	D_a max.	r_a max.	r_b max.	k_r			B_1	B_2
mm							mm						–	–	kg	mm	
35	–	65,8	46,2	1,5	1,1	2,7	42	44	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



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 cont.	100	25	112	100	12,9	7 500	8 500	0,93	▸ NUP 309 ECP	J, M, ML, PH
	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

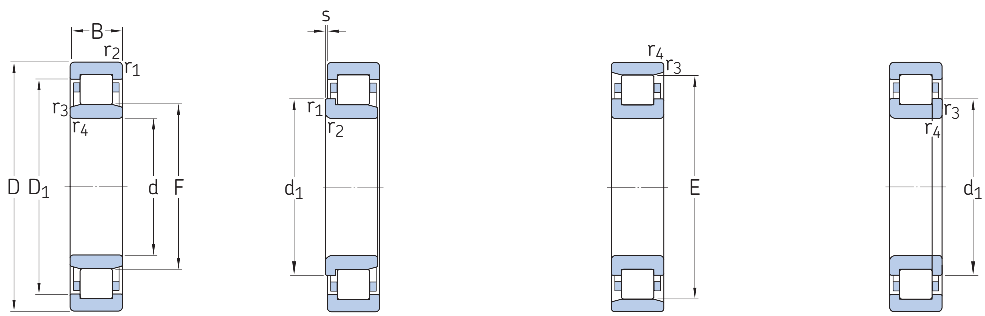
SKF Explorer bearing
▸ Popular item
1) When ordering bearings with an alternative standard cage the suffix of the standard cage has to be replaced by the suffix of the alternative cage.
For example NU .. ECP becomes NU .. ECML (for permissible speed → page 511).





Angle ring

Dimensions							Abutment and fillet dimensions							Calcu-lation 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

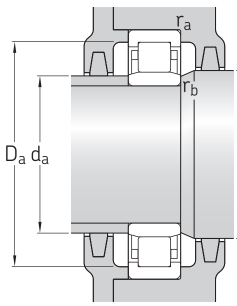


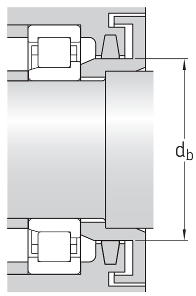
NU NJ N NUP

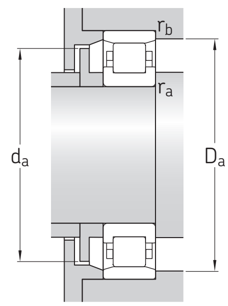
Principal dimensions			Basic load ratings dynamic	static	Fatigue load limit	Speed ratings Reference speed	Limiting speed	Mass	Designations Bearing with standard cage	Alternative standard cage[1)]
d	D	B	C	C_0	P_u					
mm			kN		kN	r/min		kg	–	
55 cont.	120	29	156	143	18,6	6 000	7 000	1,5	▸ **NUP 311 ECP**	**J, M, ML**
	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**

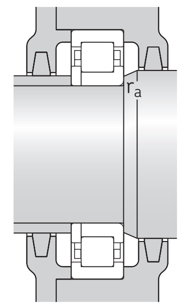
SKF Explorer bearing
▸ Popular item
1) When ordering bearings with an alternative standard cage the suffix of the standard cage has to be replaced by the suffix of the alternative cage.
For example NU .. ECP becomes NU .. ECML (for permissible speed → page 511).

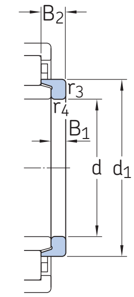
SKF











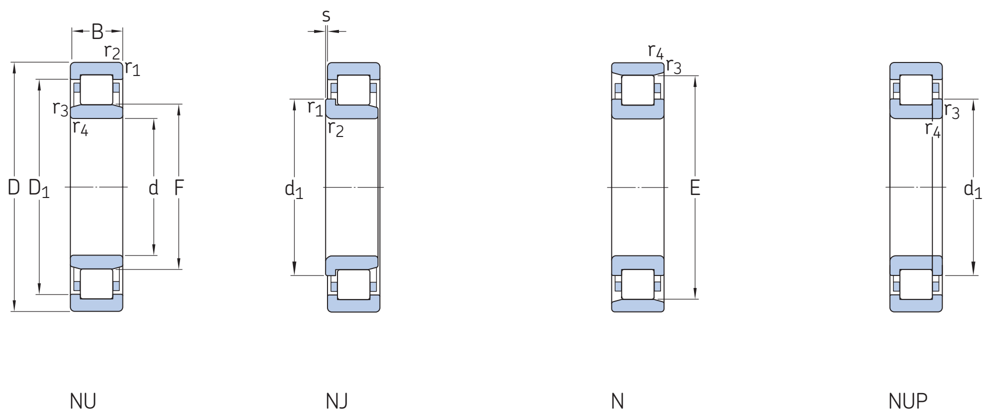
Angle ring

Dimensions							Abutment and fillet dimensions							Calcu-lation 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	

6.1

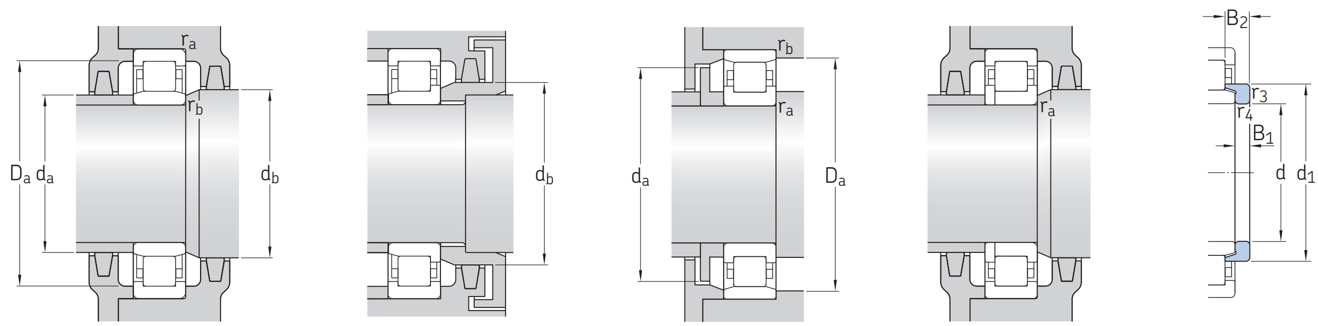
6.1 Single row cylindrical roller bearings

d **65 – 75** mm



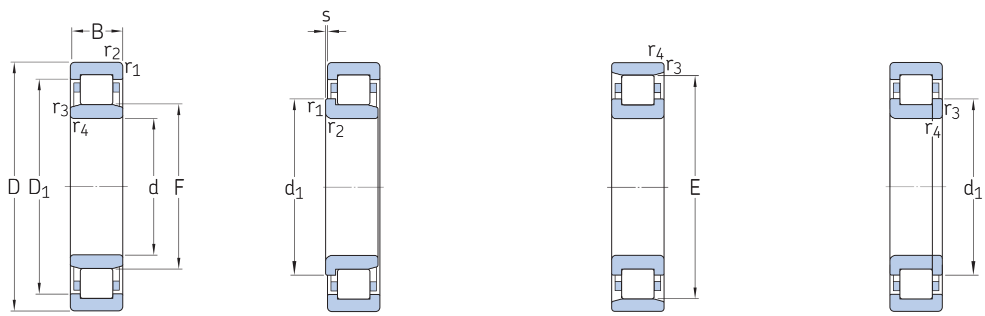
Principal dimensions			Basic load ratings dynamic	static	Fatigue load limit	Speed ratings Reference speed	Limiting speed	Mass	Designations Bearing with standard cage	Alternative standard cage[1)]
d	D	B	C	C_0	P_u					
mm			kN		kN	r/min		kg	–	
65 cont.	140	33	212	196	25,5	5 300	6 000	2,35	▸ NUP 313 ECP	J, M, ML, PH
	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

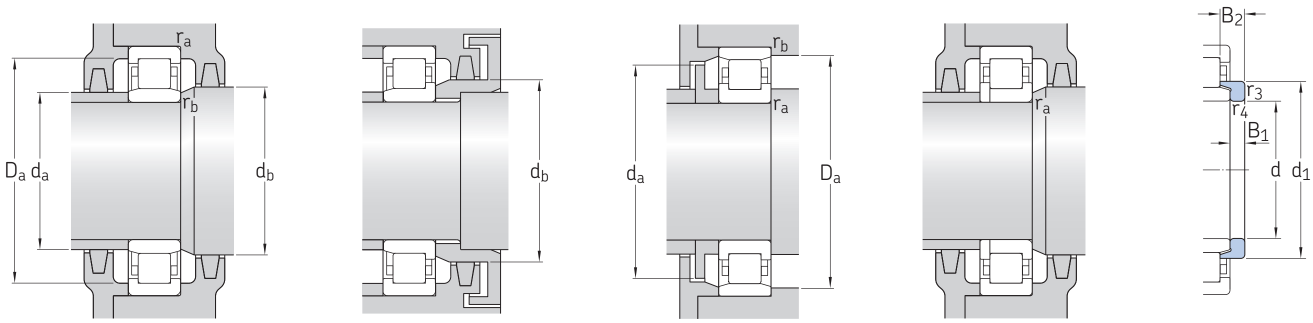
Dimensions							Abutment and fillet dimensions						Calcu-lation factor	Angle ring Designation	Mass	Dimensions	
d	d_1 ≈	D_1 ≈	F, E	$r_{1,2}$ min.	$r_{3,4}$ min.	s max.	d_a min.	d_a max.	d_b, D_a min.	D_a max.	r_a max.	r_b max.	k_r			B_1	B_2
mm							mm						–	–	kg	mm	
65 cont.	90,5	117,4	82,5	2,1	2,1	–	77	–	93	127,8	2	–	0,15	**–**	–	–	–
	–	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

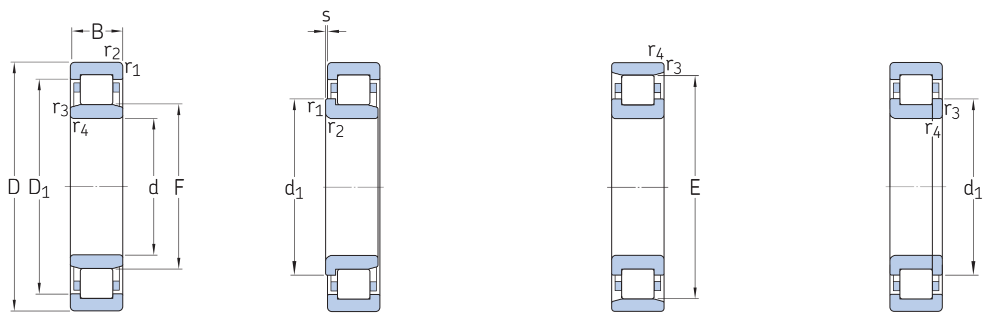
Principal dimensions			Basic load ratings dynamic	static	Fatigue load limit	Speed ratings Reference speed	Limiting speed	Mass	Designations Bearing with standard cage	Alternative standard cage[1]
d	D	B	C	C_0	P_u					
mm			kN		kN	r/min		kg	–	
75 cont.	160	37	280	265	33,5	4 500	5 300	3,3	▸ NU 315 ECP	J, M, ML, PH
	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

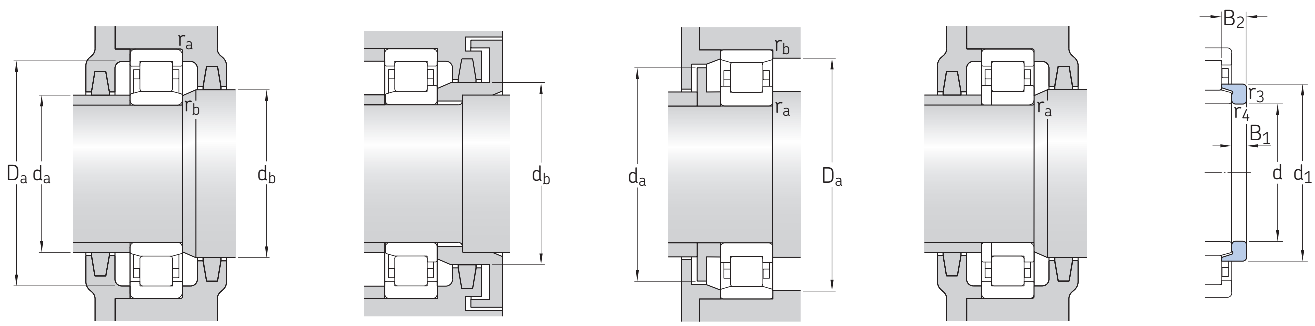
Dimensions							Abutment and fillet dimensions						Calcu-lation factor	Angle ring Designation	Mass	Dimensions	
d	d_1 ≈	D_1 ≈	F, E	$r_{1,2}$ min.	$r_{3,4}$ min.	s max.	d_a min.	d_a max.	d_b, D_a min.	D_a max.	r_a max.	r_b max.	k_r			B_1	B_2
mm							mm						–	–	kg	mm	
75 cont.	–	135	95	2,1	2,1	1,8	87	92	97	148	2	2	0,15	**HJ 315 EC**	0,39	11	16,5
	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	**–**	–	–	–



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	–	
85 cont.	150	36	250	280	34,5	4 800	5 300	2,6	▸ NUP 2217 ECP	J, M, ML, PH
	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

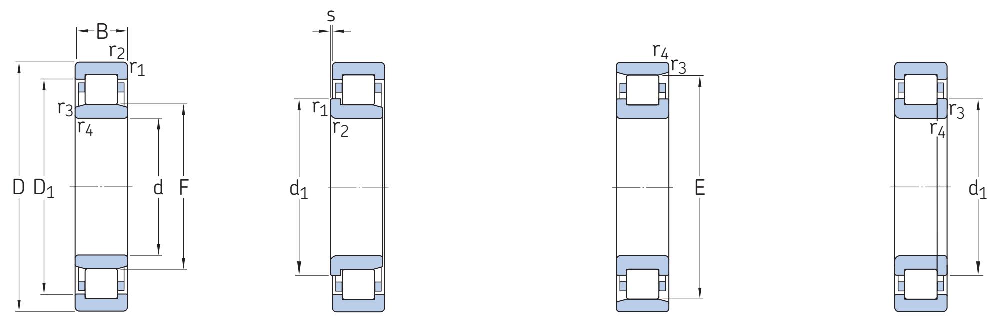
SKF Explorer bearing
▸ Popular item
1) When ordering bearings with an alternative standard cage the suffix of the standard cage has to be replaced by the suffix of the alternative cage.
For example NU .. ECP becomes NU .. ECML (for permissible speed → page 511).



Angle ring

Dimensions							Abutment and fillet dimensions							Calcu-lation 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

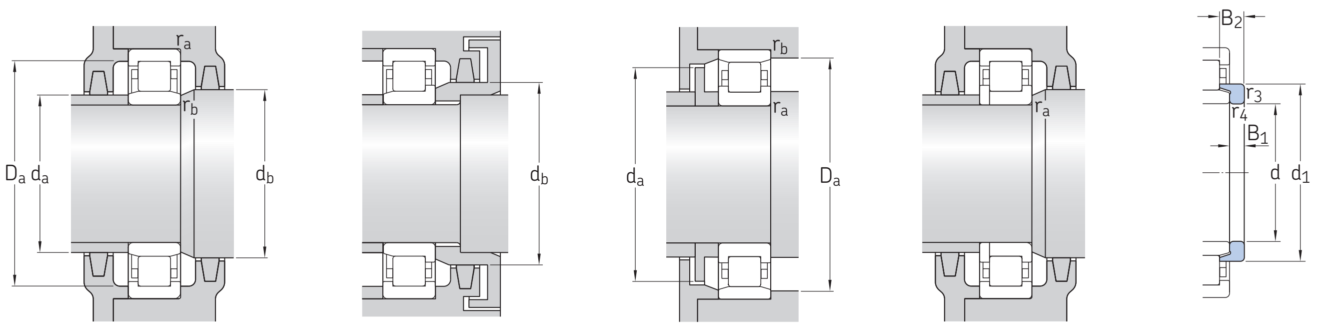


NU NJ N NUP

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	–	
95 cont.	200	45	390	390	46,5	3 600	4 300	6,2	▸ NU 319 ECP	J, M, ML
	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).

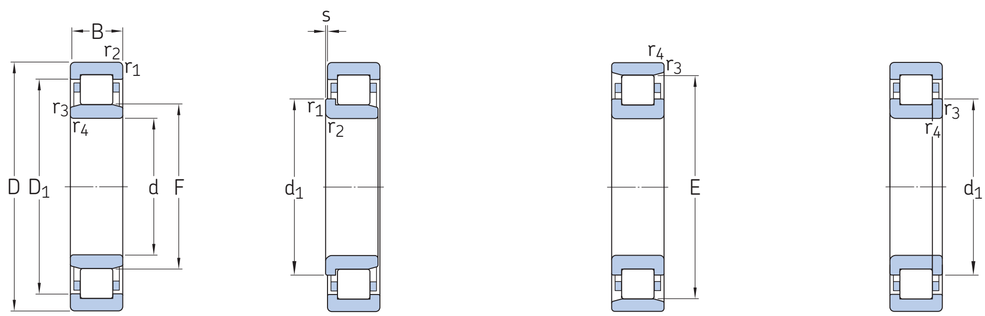
SKF



Angle ring

Dimensions							Abutment and fillet dimensions						Calcu-lation 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	**–**	–	–	–

6.1 Single row cylindrical roller bearings
d **110 – 120** mm

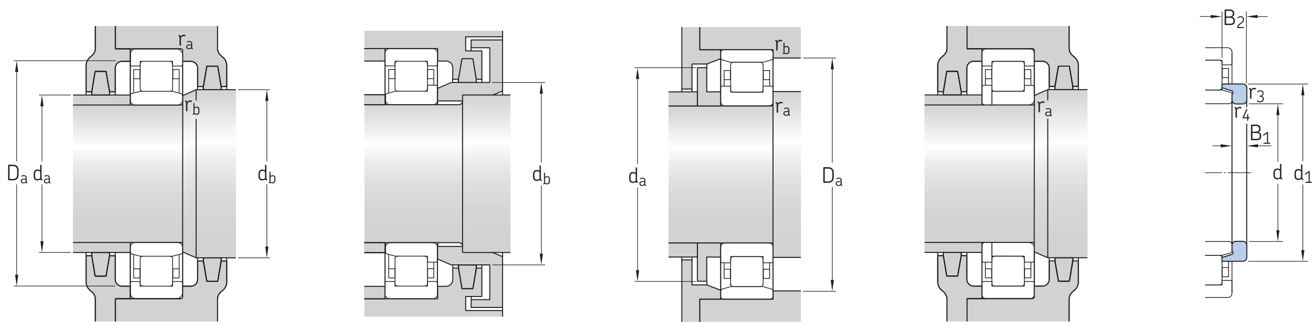


NU NJ N NUP

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	–	
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).

SKF

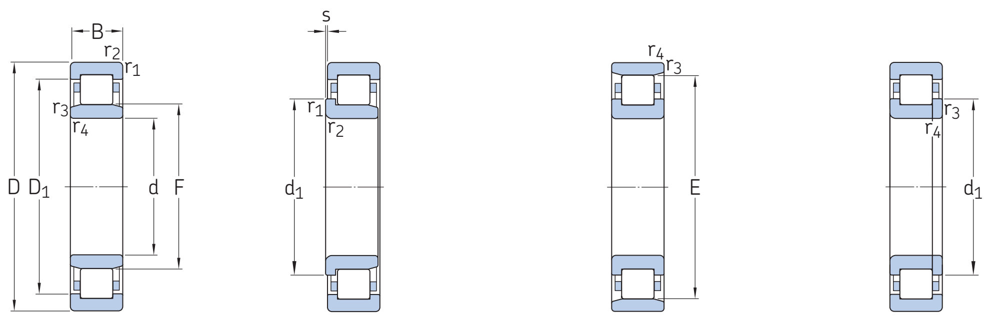


Angle ring

Dimensions							Abutment and fillet dimensions						Calcu-lation 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

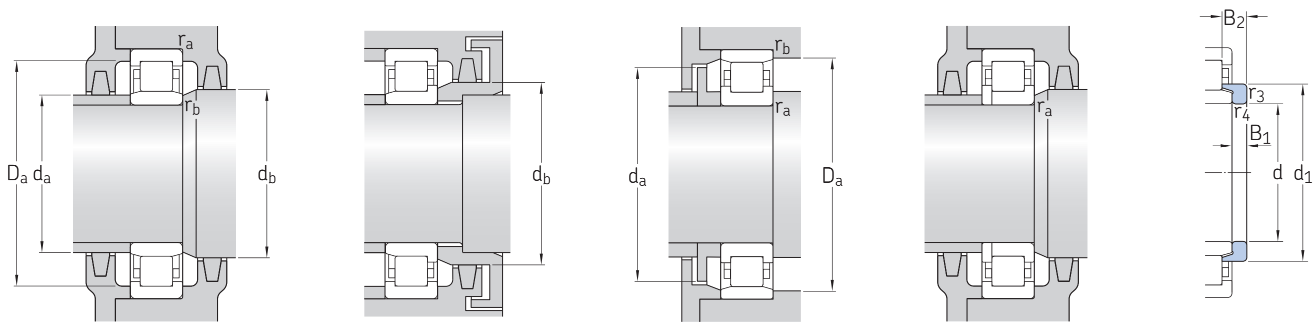
d **130 – 150** mm



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	–	
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

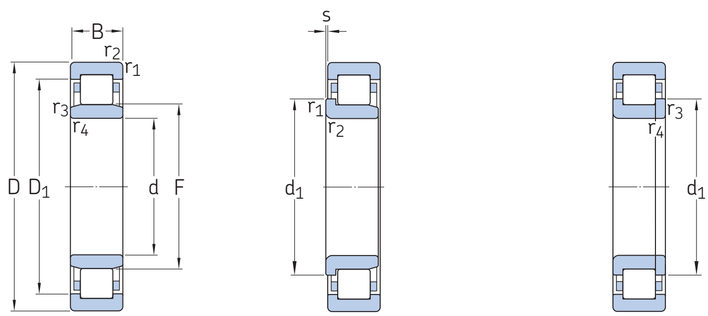
SKF Explorer bearing
▸ Popular item
1) When ordering bearings with an alternative standard cage the suffix of the standard cage has to be replaced by the suffix of the alternative cage. For example NU .. ECP becomes NU .. ECML (for permissible speed → page 511).



Angle ring

Dimensions							Abutment and fillet dimensions						Calcu-lation 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

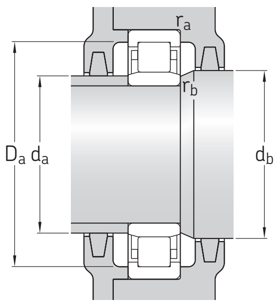
6.1

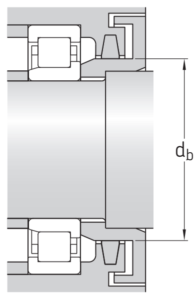


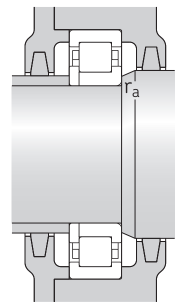
NU NJ NUP

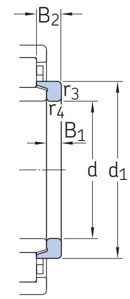
Principal dimensions			Basic load ratings dynamic	static	Fatigue load limit	Speed ratings Reference speed	Limiting speed	Mass	Designations Bearing with standard cage	Alternative standard cage[1]
d	D	B	C	C_0	P_u					
mm			kN		kN	r/min		kg	–	
150 cont.	270	45	510	600	64	2 600	2 800	12	▸ NJ 230 ECM	**J, ML**
	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).





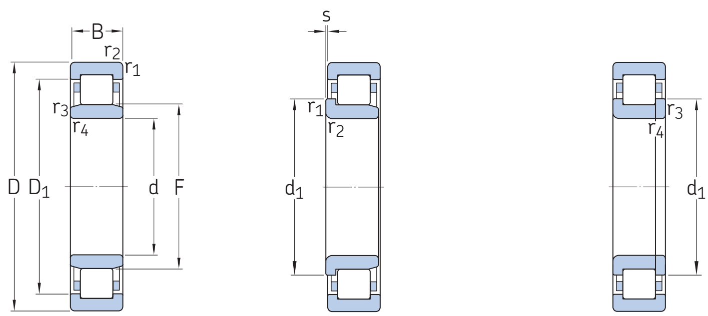




Angle ring

Dimensions							Abutment and fillet dimensions						Calcu-lation 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	
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

6.1

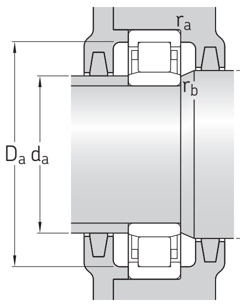


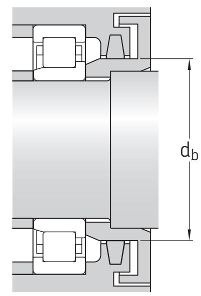
NU NJ NUP

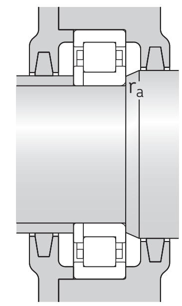
Principal dimensions			Basic load ratings dynamic	static	Fatigue load limit	Speed ratings Reference speed	Limiting speed	Mass	Designations Bearing with standard cage	Alternative standard cage[1]
d	D	B	C	C_0	P_u					
mm			kN		kN	r/min		kg	–	
180 cont.	380	75	1 020	1 290	125	1 600	2 200	42,5	▸ NU 336 ECM	–
	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	–

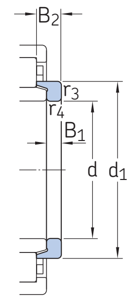
SKF Explorer bearing
▸ Popular item
1) When ordering bearings with an alternative standard cage the suffix of the standard cage has to be replaced by the suffix of the alternative cage.
For example NU .. ECP becomes NU .. ECML (for permissible speed → page 511).

SKF



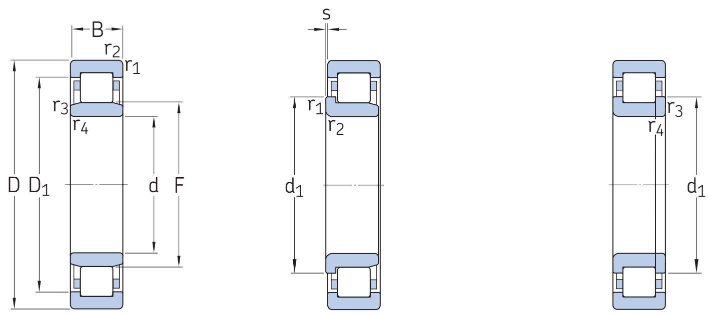






Angle ring

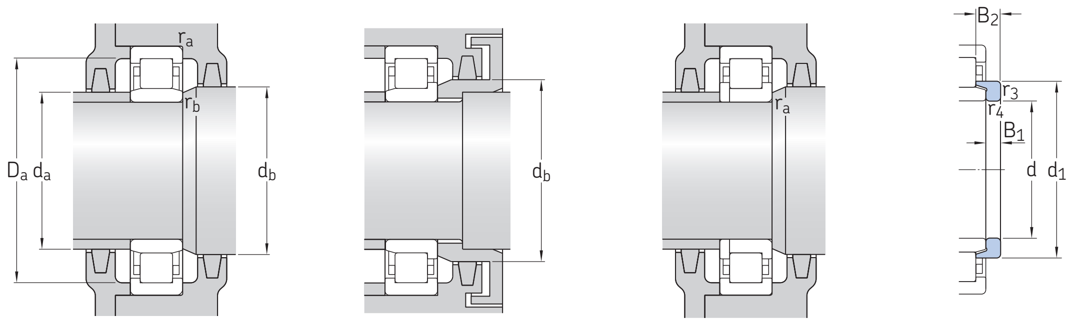
Dimensions							Abutment and fillet dimensions						Calculation factor	Angle ring Designation	Mass	Dimensions	
d	d_1 ≈	D_1 ≈	F, E	$r_{1,2}$ min.	$r_{3,4}$ min.	s max.	d_a min.	d_a max.	d_b, D_a min.	D_a max.	r_a max.	r_b max.	k_r			B_1	B_2
mm							mm						–	–	kg	mm	
180 cont.	–	318,6	231	4	4	4,2	197	226	234	361,3	3	3	0,15	**–**	–	–	–
	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).

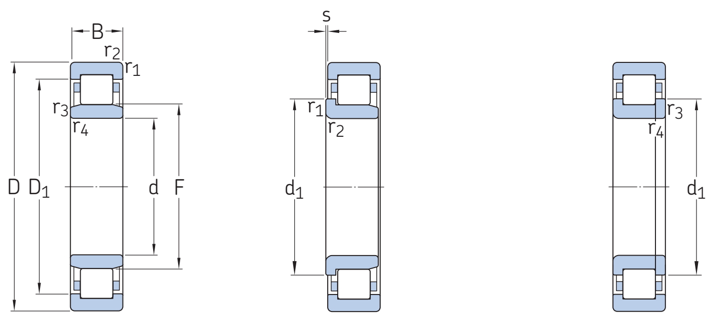


Angle ring

Dimensions							Abutment and fillet dimensions							Calcu-lation 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	
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	**–**	–	–	–

6.1

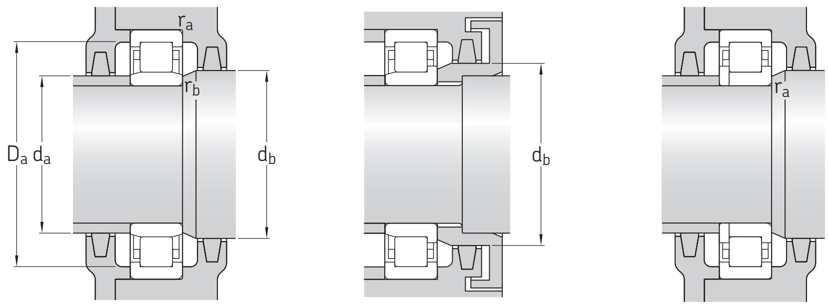
6.1 Single row cylindrical roller bearings
d **320 – 400** mm



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	–	
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**	–

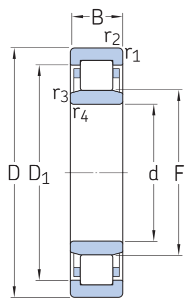
▸ Popular item
1) When ordering bearings with an alternative standard cage the suffix of the standard cage has to be replaced by the suffix of the alternative cage.
For example NU .. ECP becomes NU .. ECML (for permissible speed → page 511).



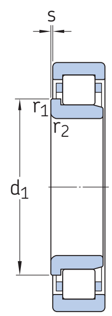
Dimensions							Abutment and fillet dimensions							Calcu-lation factor	Angle ring Designation	Mass	Dimensions	
d	d_1 ≈	D_1 ≈	F, E	$r_{1,2}$ min.	$r_{3,4}$ min.	s max.	d_a min.	d_a max.	d_b, D_a min.	D_a max.	r_a max.	r_b max.	k_r			B_1	B_2
mm							mm							–	–	kg	mm	
320	–	404	348	3	3	1,5	333	347	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	–	–	–	–

6.1

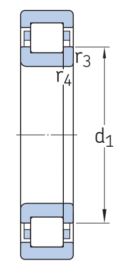
d **420 – 530** mm



NU



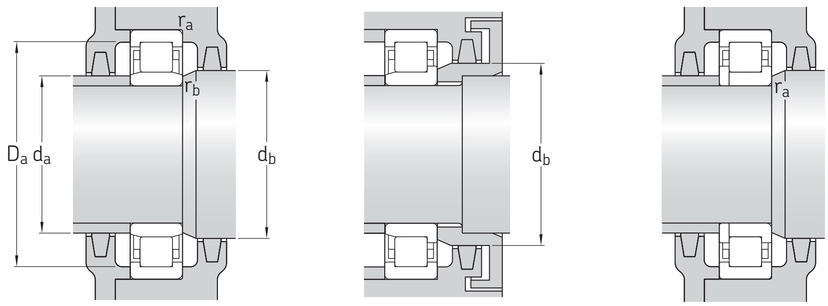
NJ



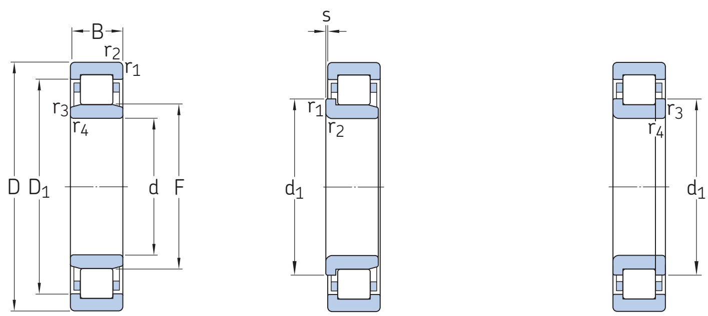
NUP

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	–	
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	–	–	–	–

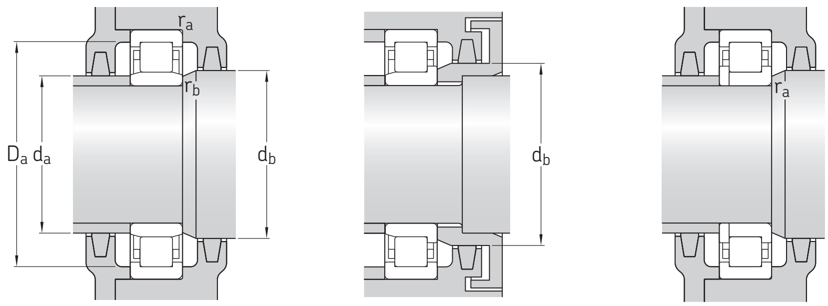


NU NJ NUP

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).

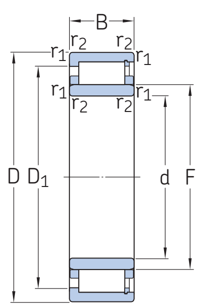
SKF



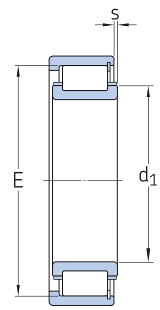
Dimensions							Abutment and fillet dimensions						Calcu-lation factor	Angle ring			
														Designation	Mass	Dimensions	
d	d_1 ≈	D_1 ≈	F, E	$r_{1,2}$ min.	$r_{3,4}$ min.	s max.	d_a min.	d_a max.	d_b, D_a min.	D_a max.	r_a max.	r_b max.	k_r			B_1	B_2
mm							mm						–	–	kg	mm	
560	–	693	608	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	–	–	–	–

6.1

6.2 High-capacity cylindrical roller bearings
d **100 – 170** mm



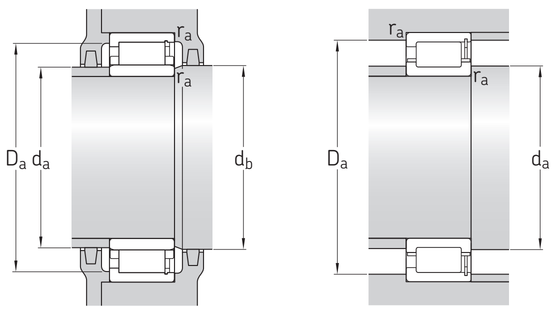
NUH .. ECMH



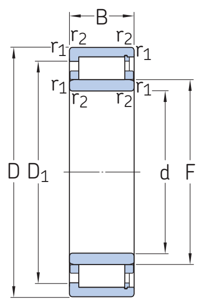
NCF .. ECJB

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

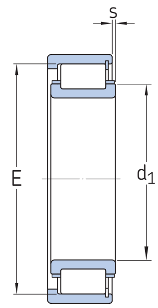
SKF Explorer bearing



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

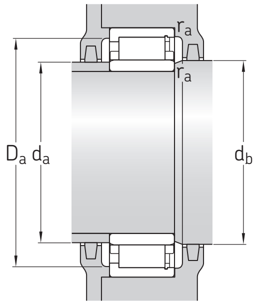


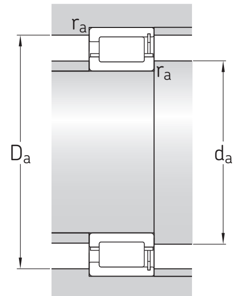
NUH .. ECMH



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**

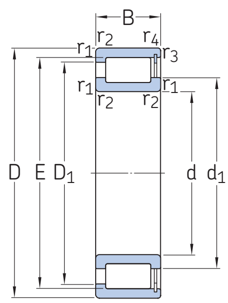




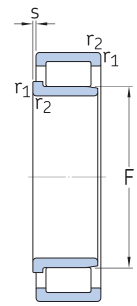
Dimensions						Abutment and fillet dimensions						Calculation factor
d	d_1 ≈	D_1 ≈	F, E	$r_{1,2}$ min.	s max.	d_a min.	d_a max.	d_b min.	D_a min.	D_a max.	r_a max.	k_r
mm						mm						–
180	–	279	215	4	2,4	197	211	218	285	302	3	0,16
	229	279	291	4	4,2	197	222	–	285	302	3	0,16
	–	322	227	4	3,7	196	222	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

6.2

d **20 – 85** mm



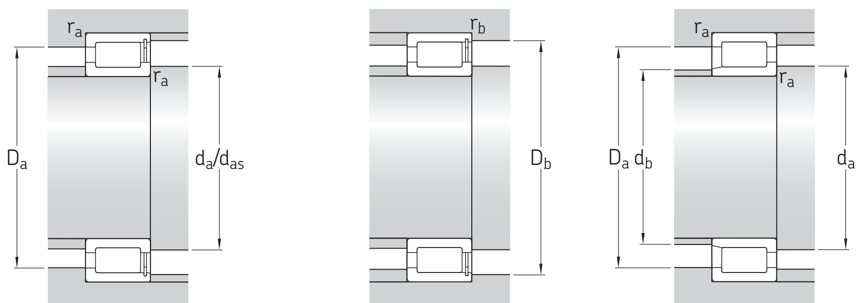
NCF



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	–
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**

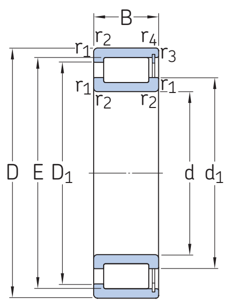
▸ Popular item



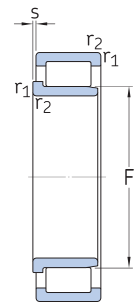
Dimensions							Abutment and fillet dimensions							Calculation factor
d	d_1 ≈	D_1 ≈	E, F	$r_{1,2}$ min.	$r_{3,4}$ min.	s max.	d_a min.	d_{as}[1)]	d_b max.	D_a max.	D_b max.	r_a max.	r_b max.	k_r
mm							mm							–
20	29	33	36,81	0,6	0,3[2)]	1,5	24	26,9	–	38	39	0,6	0,3	0,3
25	34	39	42,51	0,6	0,3	1,5	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



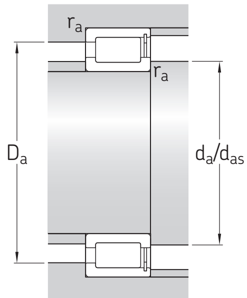
NCF

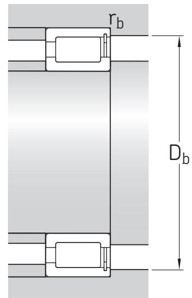


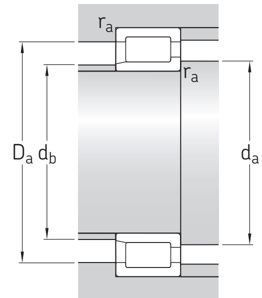
NJG

Principal dimensions			Basic load ratings 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	–
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





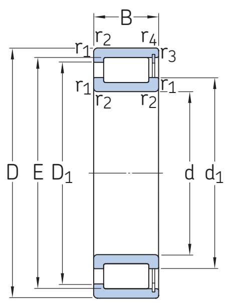


Dimensions							Abutment and fillet dimensions							Calculation factor
d	d_1 ≈	D_1 ≈	E, F	$r_{1,2}$ min.	$r_{3,4}$ min.	s max.	d_a min.	d_{as} 1)	d_b max.	D_a max.	D_b max.	r_a max.	r_b max.	k_r
mm							mm							–
90	102	111	115,6	1,1	1	1	96	99,8	–	119	119	1	1	0,2
	106	124	130,11	1,5	1	4	97	103	–	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



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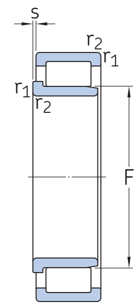
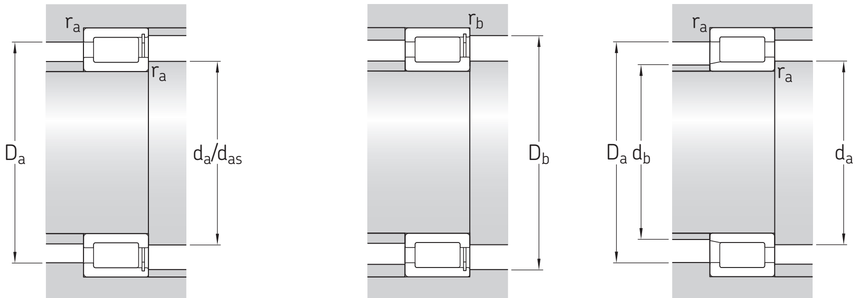


NJG

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

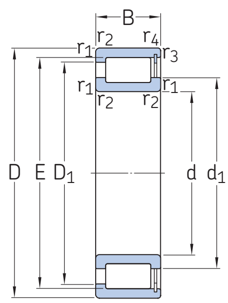


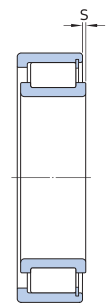
Dimensions							Abutment and fillet dimensions							Calculation factor
d	d_1 ≈	D_1 ≈	E, F	$r_{1,2}$ min.	$r_{3,4}$ min.	s max.	d_a min.	d_{as}[1)]	d_b max.	D_a max.	D_b max.	r_a max.	r_b max.	k_r
mm							mm							–
190	212	236	244	2	1,1	2	199	208	–	250	252	2	1	0,2
	222	258	269,76	2,1	2,1	8	202	216	–	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

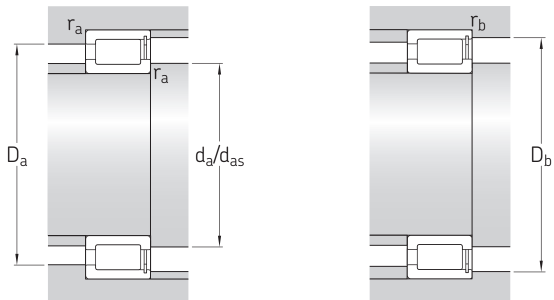
d **360 – 560** mm





Principal dimensions			Basic load ratings		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	–
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**

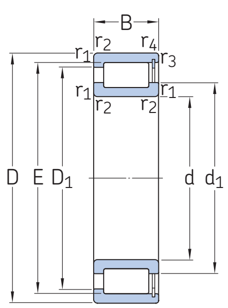
▸ Popular item

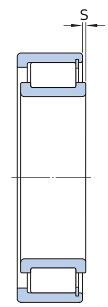


Dimensions							Abutment and fillet dimensions							Calculation factor
d	d_1 ≈	D_1 ≈	E, F	$r_{1,2}$ min.	$r_{3,4}$ min.	s max.	d_a min.	d_{as} 1)	d_b max.	D_a max.	D_b max.	r_a max.	r_b max.	k_r
mm							mm							–
360	388	413	418,9	2,1	2,1	3	371	384	–	429	433	2	2	0,1
	404	437	451,5	3	3	5	373	396	–	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

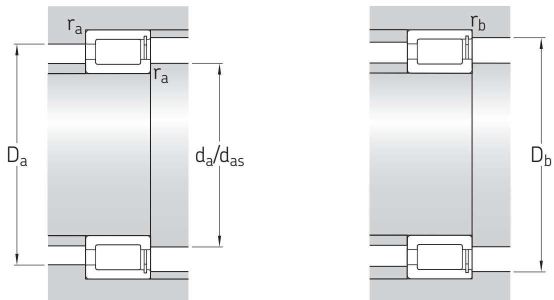
6.3 Single row full complement cylindrical roller bearings
d **600 – 1 120** mm





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

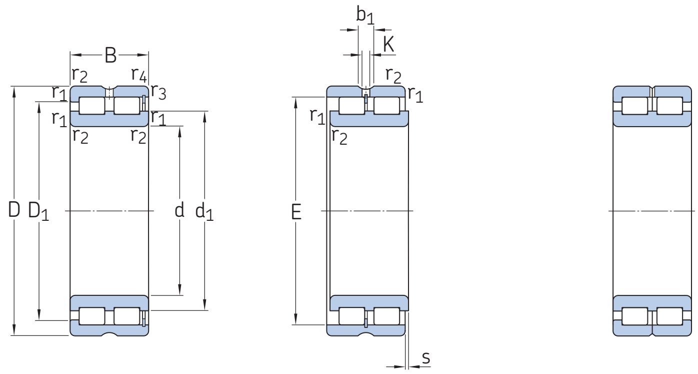


Dimensions							Abutment and fillet dimensions							Calculation factor
d	d_1 ≈	D_1 ≈	E, F	$r_{1,2}$ min.	$r_{3,4}$ min.	s max.	d_a min.	d_{as} [1]	d_b max.	D_a max.	D_b max.	r_a max.	r_b max.	k_r
mm							mm							–
600	644	684	696	3	3	7	613	638	–	717	717	2,5	2,5	0,1
	642	685	696	3	3	5,4	613	637	–	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

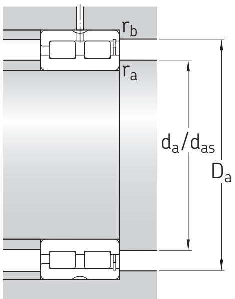
6.4 Double row full complement cylindrical roller bearings

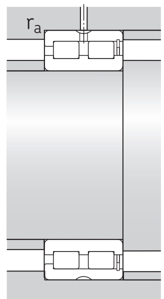
d **20 – 90** mm

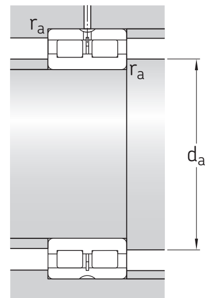


NNCF NNCL NNC

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**





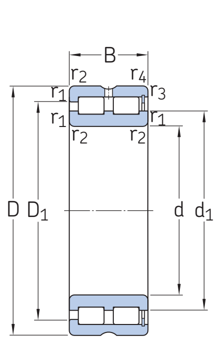


Dimensions									Abutment and fillet dimensions					Calculation factor
d	d_1 ≈	D_1 ≈	E	b_1	K	$r_{1,2}$ min.	$r_{3,4}$ min.	s max.	d_a min.	d_{as} [1]	D_a max.	r_a max.	r_b max.	k_r
mm									mm					
20	28,4	33,2	–	4,5	3	0,6	0,3 [2]	1	23,2	25,6	38,7	0,5	0,3	0,5
25	34,5	38,5	–	4,5	3	0,6	0,3 [2]	1	28,7	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

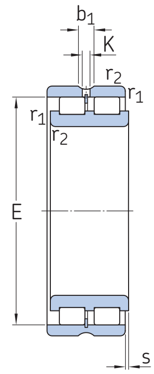
[1] Recommended shaft abutment diameter for axially loaded bearings → *Flange support*, page 512
[2] Parameter $r_{3,4}$ has either the value specified here or the same value as $r_{1,2}$.

6.4

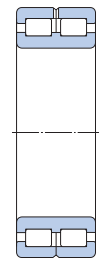
6.4 Double row full complement cylindrical roller bearings
d **100 – 150** mm



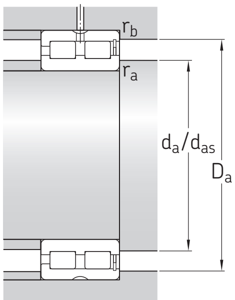
NNCF

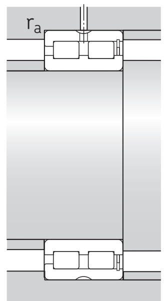


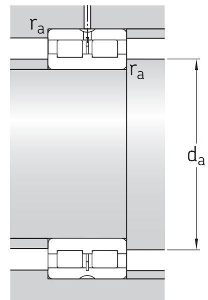
NNCL


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**



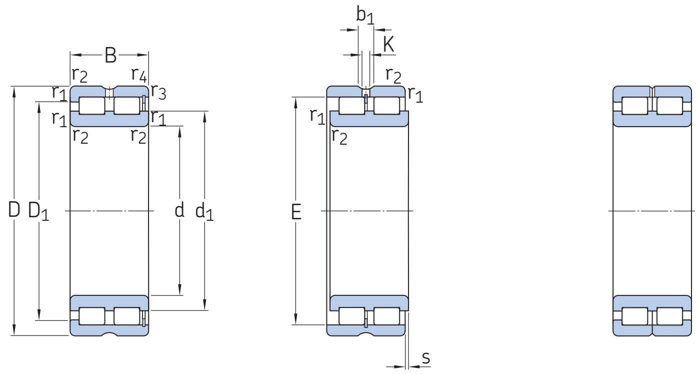




Dimensions									**Abutment and fillet dimensions**					**Calculation factor**
d	d_1 ≈	D_1 ≈	E	b_1	K	$r_{1,2}$ min.	$r_{3,4}$ min.	s max.	d_a min.	$d_{as}^{1)}$	D_a max.	r_a max.	r_b max.	k_r
mm									mm					
100	116	125	–	5	3,5	1,1	1,1	2	106	111	134	1	1	0,25
	116	–	129,6	5	3,5	1,1	–	2	106	–	134	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

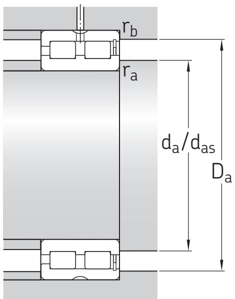
1) Recommended shaft abutment diameter for axially loaded bearings → *Flange support*, page 512
2) Parameter $r_{3,4}$ has either the value specified here or the same value as $r_{1,2}$.

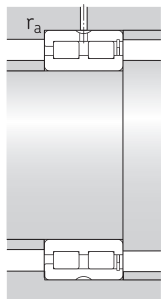
d **160 – 190** mm

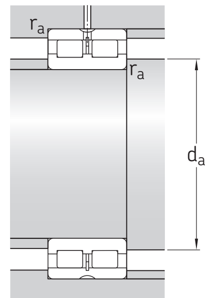


NNCF NNCL NNC

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**





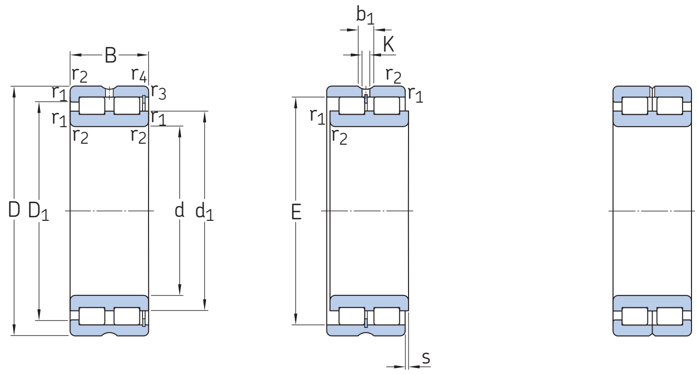


Dimensions									**Abutment and fillet dimensions**					**Calculation factor**
d	d_1 ≈	D_1 ≈	E	b_1	K	$r_{1,2}$ min.	$r_{3,4}$ min.	s max.	d_a min.	d_{as}[1)]	D_a max.	r_a max.	r_b max.	k_r
mm									mm					
160	174	182	–	7	4	1,1	1,1	2	166	170	194	1	1	0,2
	174	–	186,9	7	4	1,1	–	2	166	–	194	1	–	0,2
	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

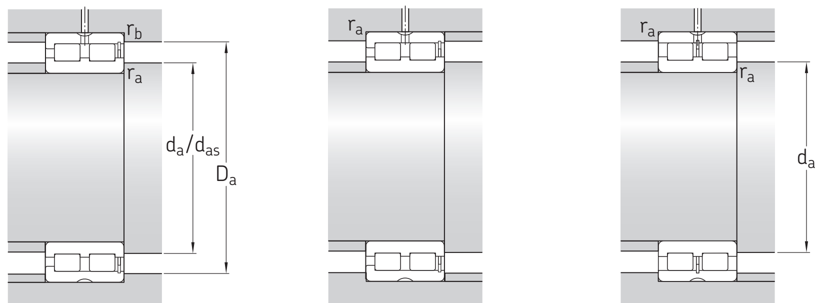
d **200 – 260** mm



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**

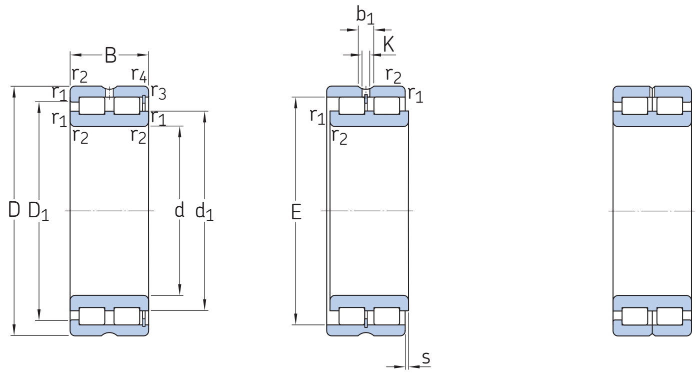
SKF



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

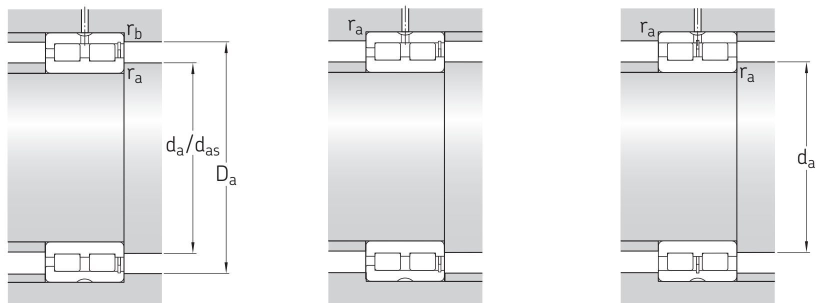
1) Recommended shaft abutment diameter for axially loaded bearings → *Flange support*, **page 512**

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**

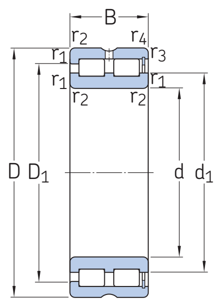


Dimensions									Abutment and fillet dimensions					Calculation factor
d	d_1 ≈	D_1 ≈	E	b_1	K	$r_{1,2}$ min.	$r_{3,4}$ min.	s max.	d_a min.	d_{as} [1]	D_a max.	r_a max.	r_b max.	k_r
mm									mm					
280	308	326	–	8	4	2	2	4	290	299	341	2	2	0,2
	308	–	332,4	8	4	2	–	4	290	–	341	2	–	0,2
	308	326	–	8	4	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

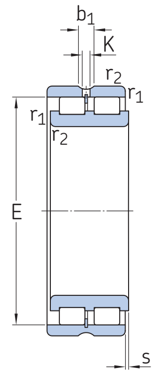
[1] Recommended shaft abutment diameter for axially loaded bearings → *Flange support*, **page 512**

6.4 Double row full complement cylindrical roller bearings

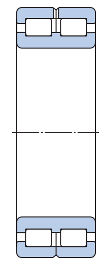
d **360 – 400** mm



NNCF

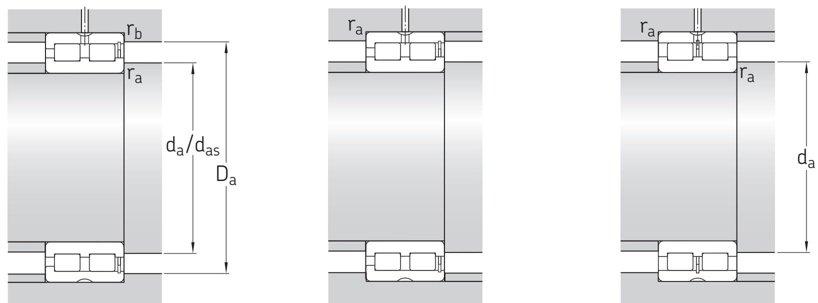


NNCL



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**



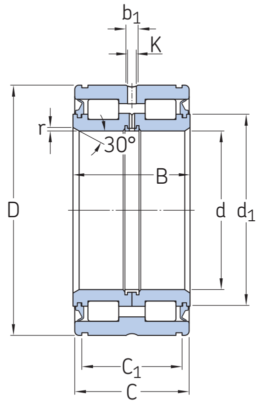
Dimensions									Abutment and fillet dimensions					Calculation factor
d	d_1 ≈	D_1 ≈	E	b_1	K	$r_{1,2}$ min.	$r_{3,4}$ min.	s max.	d_a min.	d_{as}[1]	D_a max.	r_a max.	r_b max.	k_r
mm									mm					
360	391	413	–	9,4	5	2,1	2,1	6	371	381	429	2	2	0,2
	391	–	419,8	9,4	5	2,1	–	6	371	–	429	2	–	0,2
	391	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

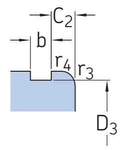
[1] Recommended shaft abutment diameter for axially loaded bearings → *Flange support*, page 512

6.4

6.5 Sealed double row full complement cylindrical roller bearings

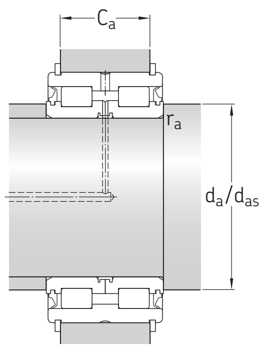
d **20 – 140** mm





Principal dimensions				Basic load ratings dynamic	static	Fatigue load limit	Limiting speed	Mass	Designation
d	D	B	C	C	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

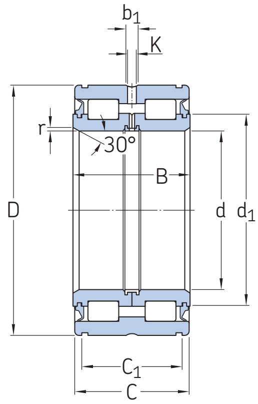


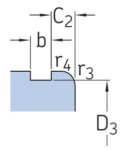
Dimensions										Abutment and fillet dimensions[1]					Calculation factor	Associated snap rings[2]	
d	d_1 ≈	D_3	C_1 +0.2	C_2	b	b_1	K	r min.	$r_{3,4}$ min.	d_a min.	d_{as}[3]	C_{a1} -0,2	C_{a2} -0,2	r_a max.	k_r	Seeger	DIN 471
mm										mm					–	–	
20	30,6	40,2	24,7	2,15	1,8	6,5	3,5	0,5	0,3	24	28,8	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	186	71,2	3,9	4,2	6	3,5	1,8	0,6	137	147	65	63	1,5	0,4	SW 190	190x4
	155	196	83,2	5,4	4,2	7	4	1,8	0,6	137	150	77	75	1,5	0,4	SW 200	200x4
140	160	196	71,2	3,9	4,2	7	4	1,8	0,6	147	156	65	63	1	0,4	SW 200	200x4
	167	206	83,2	5,4	5,2	7	4	1,8	0,6	147	162	77	73	1,5	0,4	SW 210	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

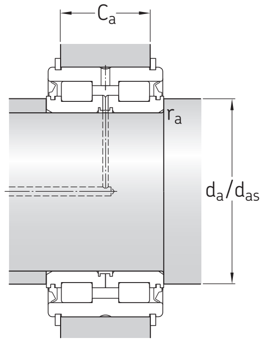




Principal dimensions				Basic load ratings dynamic	static	Fatigue load limit	Limiting speed	Mass	Designation
d	D	B	C	C	C_0	P_u			
mm				kN		kN	r/min	kg	–
150	210	80	79	484	915	100	600	8,4	**319430 B-2LS**
	225	100	99	748	1 290	143	560	13,5	▸ **NNF 5030 B-2LS**
160	220	80	79	501	1 000	106	530	8,8	**319432 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

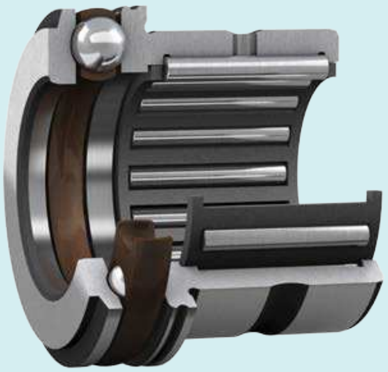
SKF



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

7 Needle roller bearings

More information

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

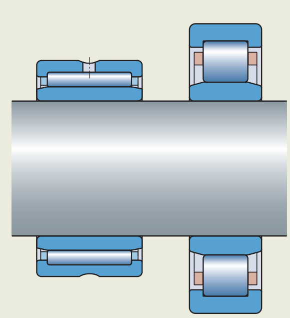
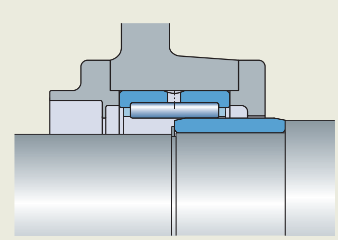


Fig. 2

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

7

Fig. 3

Axial displacement

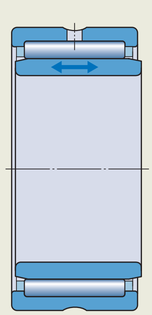
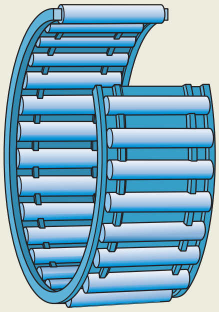
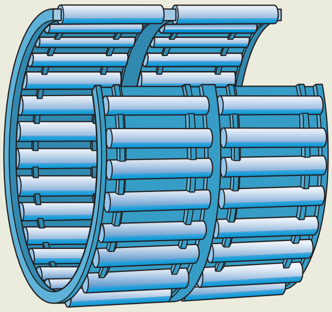


Fig. 4

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

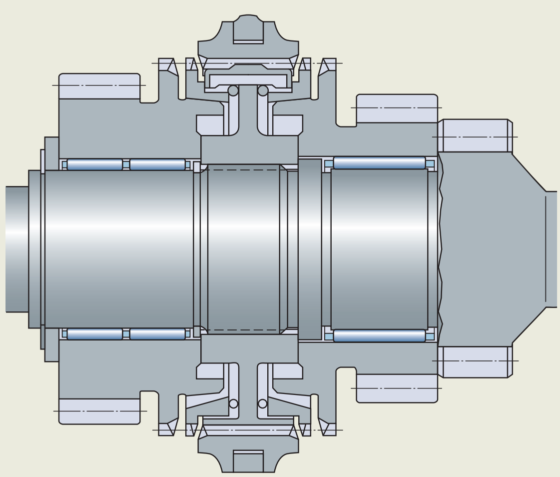


Fig. 6

Special needle roller and cage assembly for the gudgeon (wrist) pin

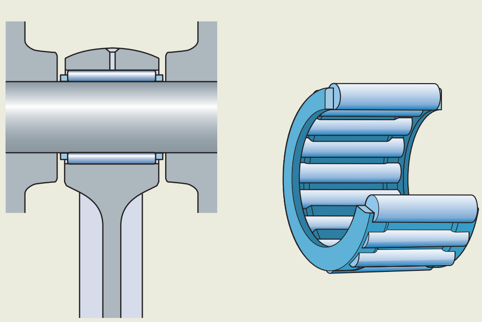
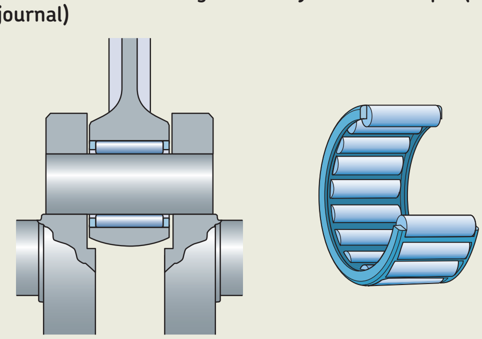


Fig. 7

Special needle roller and cage assembly for the crankpin (crankshaft journal)



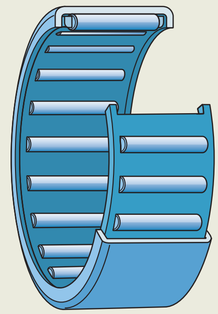
Basic design bearings

- **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

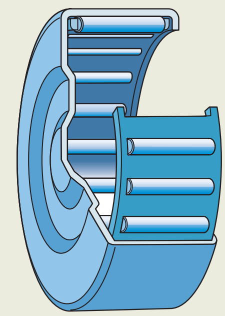
Drawn cup needle roller bearing with open ends



HK

Fig. 9

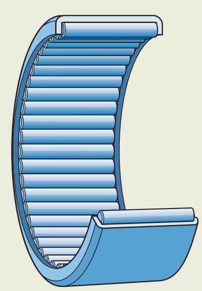
Drawn cup needle roller bearing with a closed end



BK

Fig. 10

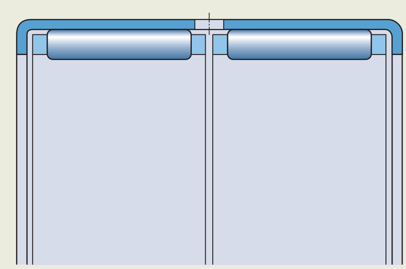
Full complement drawn cup needle roller bearing with open ends



HN

Fig. 11

Double row drawn cup needle roller bearing with open ends

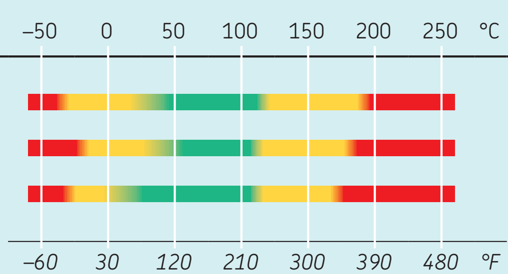


HK

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)*
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**)

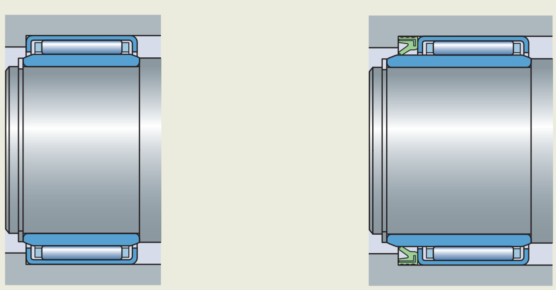
Needle roller bearings with a machined outer ring, without an inner ring

- 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

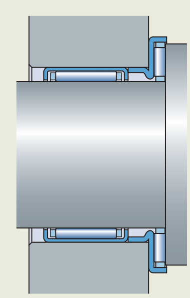


Fig. 14

Needle roller bearing with machined rings

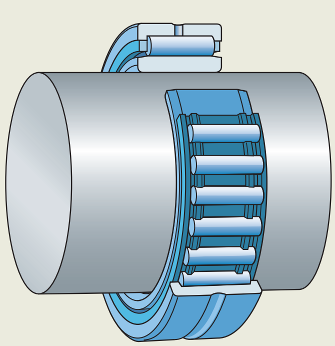


Fig. 15

Needle roller bearing with a machined outer ring

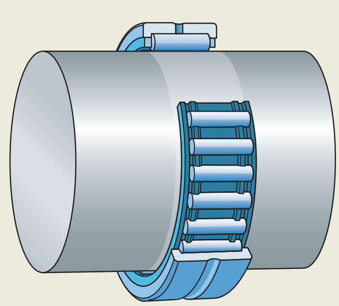
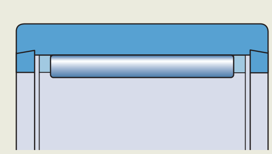


Fig. 16

Needle roller bearing with non-separable closure rings



NK ($F_w \leq 10$ mm)

7

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

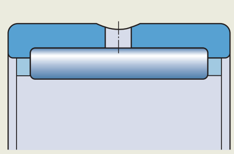
  However, wide sizes incorporate two needle roller and cage assemblies immediately adjacent to each other and have an annular groove and a lubrication hole in the outer ring (**fig. 20**).

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

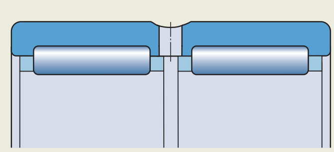
Needle roller bearing with integral flanges in the outer ring



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

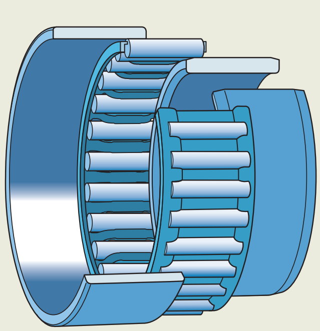


Fig. 20

Double row needle roller bearing without flanges

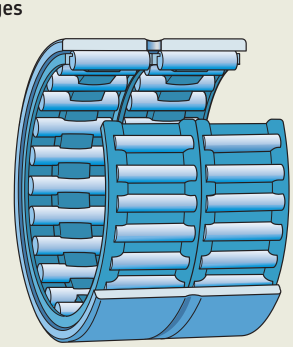
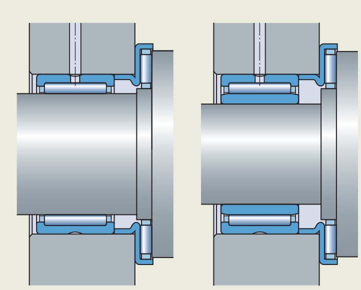


Fig. 21

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

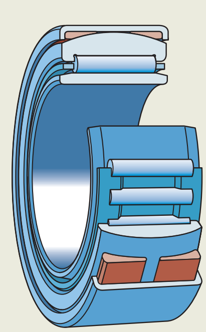
These combined bearings:

- 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

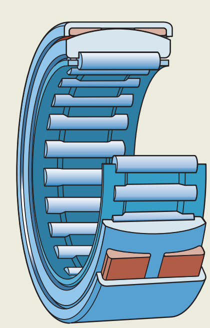
  In the case of grease lubrication, both the needle roller and angular contact ball bearings should be filled with the same lubricant prior to mounting.

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

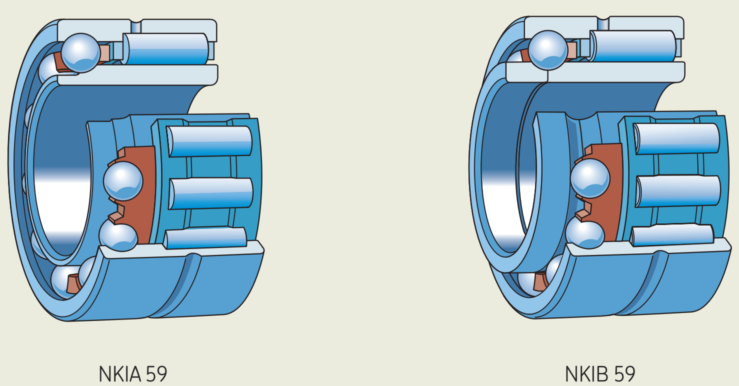
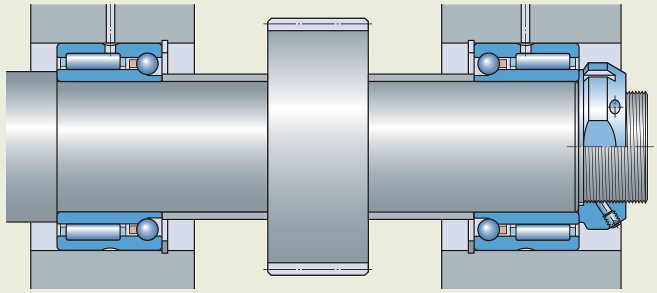


Fig. 24

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

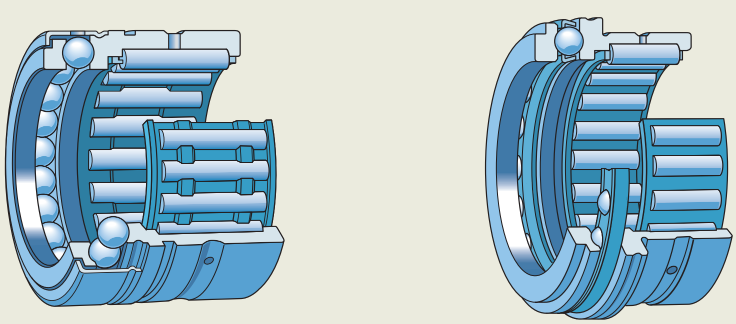
- consist of a radial needle roller bearing and a full complement thrust ball bearing (fig. 28)
- are suitable for applications where there are moderate radial loads and lighter, single direction axial loads
- have low cross-sectional height, which enables shaft centrelines to be positioned close together 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

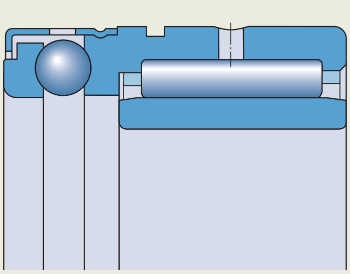
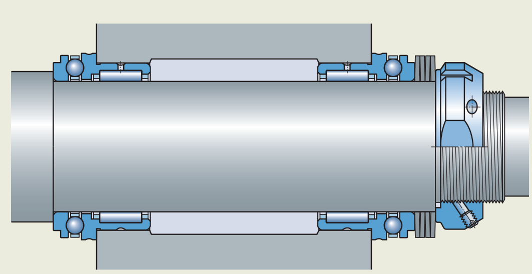


Fig. 27

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

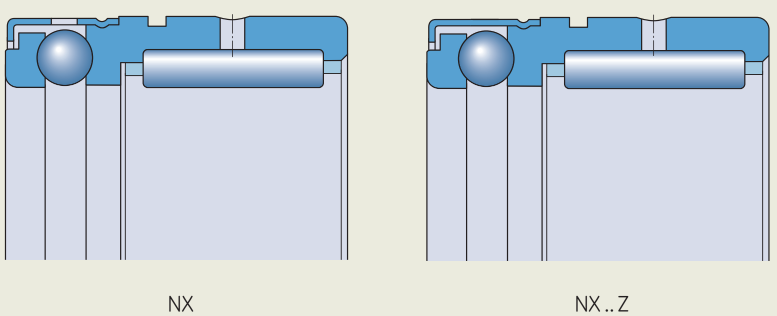


Fig. 29

NX series bearing mounted with a snap ring

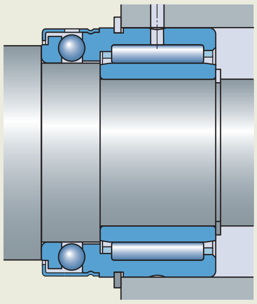
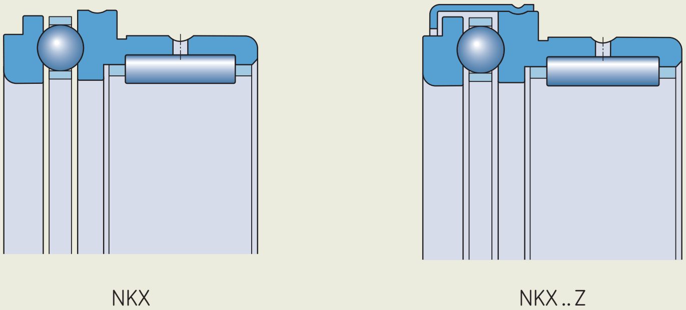


Fig. 30

Needle roller / thrust ball bearing with a cage



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

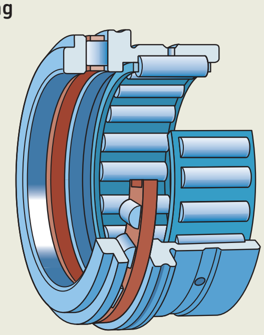


Fig. 32

NKXR .. Z bearing with an inner ring

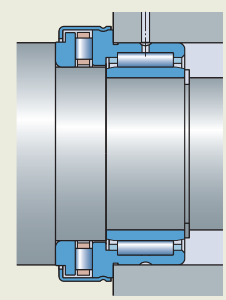


Fig. 33

NKXR series bearings arranged back-to-back, incorporating Belleville washers

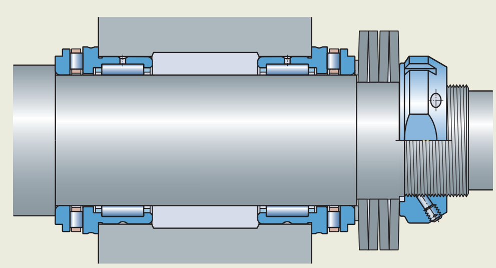
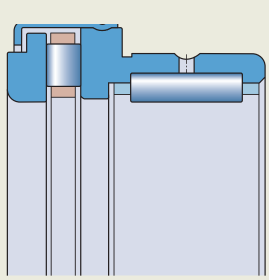


Fig. 34

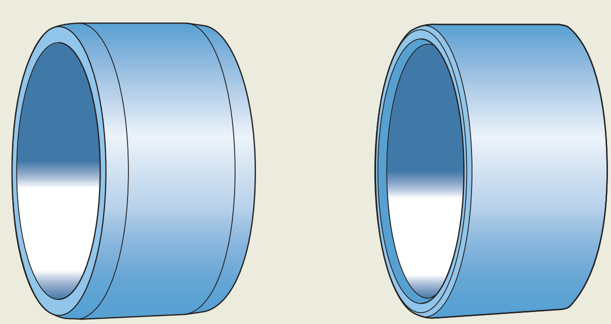
Needle roller / cylindrical roller thrust bearing



NKXR .. Z

Fig. 35

Inner rings



IR LR

7

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).

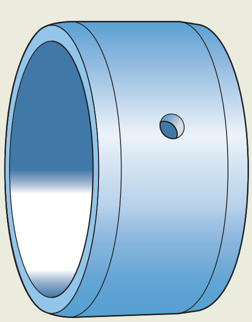
Needle rollers:

- 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 ≤ F_w ≤ 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 ≤ F_w ≤ 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.

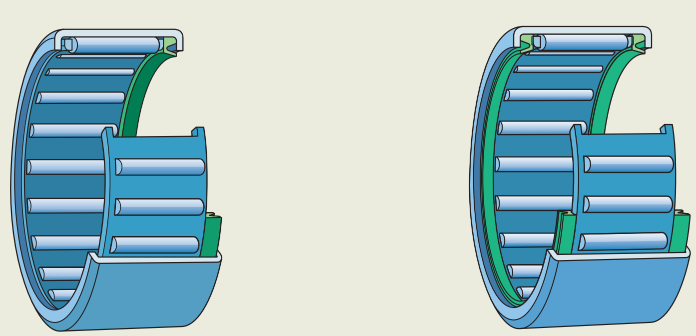
⚠ WARNING

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

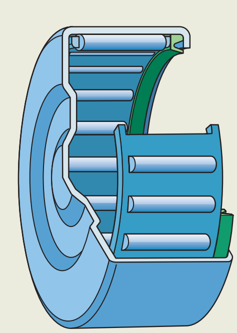


HK .. RS

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 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.

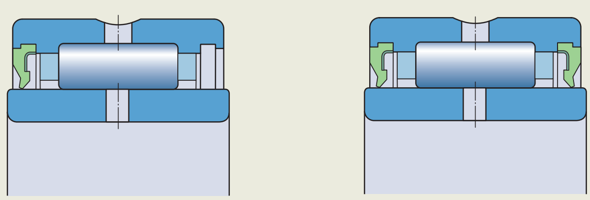
Drawn cup needle roller bearings

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

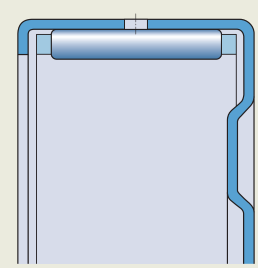


Table 3

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)*	Base oil viscosity [mm²/s] at 100 °C *(210 °F)*
Initial grease fill		Lithium complex soap	Mineral	2	160	15,5
LGWA 2		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

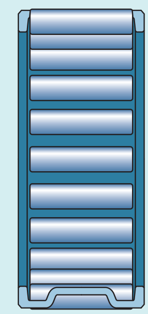
	Cages for radial bearings 
Cage type	Window-type
Material	Sheet steel or machined steel
Suffix	–
Bearing types	
Needle roller and cage assemblies	Standard
Drawn cup needle roller bearings	–
Needle roller bearings with machined rings	–
Alignment needle roller bearings	–
Needle roller / angular contact ball bearings	–
Needle roller / thrust ball bearings	–
Needle roller / cylindrical roller thrust bearings	–

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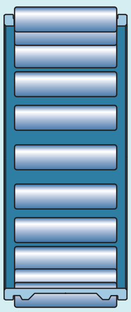
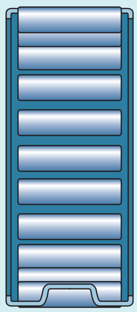
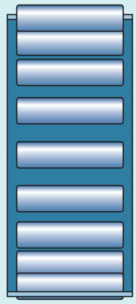
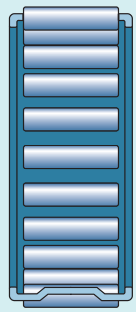
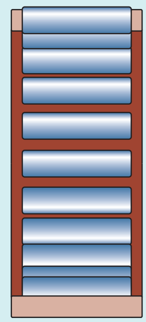
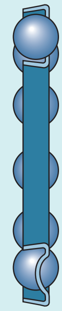
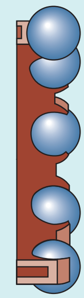
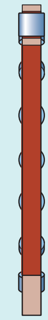
Table 4

						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 rein-forced PA66	Sheet steel	Glass fibre rein-forced PA66	Glass fibre rein-forced PA66
	–	–	–	–	TN	–	–	–
	–	Standard	–	–	Standard	–	–	–
	–	–	Standard	–	Standard	–	–	–
	Standard	–	–	Standard	Standard	–	–	–
	Standard	–	–	Standard	–	–	–	–
	Standard	–	–	Standard	–	–	Standard	–
	Standard	–	–	Standard	Standard	Standard	–	–
	Standard	–	–	Standard	–	–	–	Standard

7

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: ISO 3245, as far as standardized
Tolerances For additional information → page 35	• rollers: ISO 3096 Grade 2 (grade G2) – tolerance of each gauge 2 µm – standard gauges (**table 5**, **page 601**) – specific gauge to be stated when ordering • U: ISO 3030, as far as standardized (–0,2/–0,8 mm)	ISO 3245, as far as standardized • F_w ≈ within F8 (**table 8**, **page 602**) Measuring of F_w: – bearing must be pressed into a thick-walled ring gauge, bore diameter listed in **table 8** – check deviation of F_w with measuring mandrel • C: 0/–0,3 mm Dimensional tolerances can be checked only if bearings are mounted.
Operating clearance	Range of C2 to Normal if: • fitted with standard gauge rollers (**table 5**, **page 601**) • recommended raceway tolerances (**table 6**, **page 601**) applied • 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 Misalignment increases bearing noise and reduces bearing service life, ...	≈ 1 minute of arc

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	Needle roller bearings with machined rings	Alignment needle roller bearings
	Boundary dimensions: ISO 1206 for bearings in the (R)NA 48, (R)NA 49 and (R)NA 69 series	d, D: ISO 15 D ≤ 47 mm → diameter series 0 D ≥ 55 mm → diameter series 9
	Normal P6 or P5 on request • Fw: F6 (**table 9**, **page 603**) Values are valid for unmounted bearings when rollers are in contact with the outer ring raceway. 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). 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 • C of the external drawn sheet steel sleeve: ± 0,5 mm • F_w: F6 (**table 9**, **page 603**) Values are valid for unmounted bearings and when rollers are in contact with the outer ring raceway. Values: ISO 492 (**table 2**, **page 38**)
	Bearings without an inner ring Suitable ranges (**table 10**, **page 603**) where: • recommended shaft tolerance classes applied • housing bore tolerance not tighter than K7Ⓔ	**Bearings without an inner ring** Range of C2 to C3 if recommended tolerances (**table 17**, **page 610**) applied
	Normal (bearings with an inner ring) Check availability of C2, C3 or C4 clearance classes Values: ISO 5753-1 (**table 11**, **page 603**) Values are valid for unmounted bearings under zero measuring load.	
	≈ 1 minute of arc	≤ 3° static misalignment 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: ISO 15 – dimension series 59, except for following inner ring parameters in the NKIB 59 series: • extended width on one side • slightly larger bore diameter of the narrow part	Boundary dimensions: DIN 5429-1, except for NX and NX .. Z series bearings (not standardized)	Boundary dimensions: DIN 5429-1
Tolerances For additional information → page 35	Normal, except for width of the complete inner ring in the NKIB 59 series: 0/–0,3 mm Values: ISO 492 (table 2, page 38)	D: Normal F_w: F6 (table 9, page 603) d: E8 (table 9) C: 0/–0,25 mm C_1 (applicable to NKX(R) series only): 0/–0,2 mm Values: Radial bearings → ISO 492 (table 2, page 38) Thrust bearings → ISO 199 (table 10, page 46)	
Operating clearance	–	**Bearings without an inner ring** Range slightly less than Normal if recommended tolerances (table 17, page 610) applied	
Internal clearance	Normal (bearings with an inner ring) Check availability of C2, C3 or C4 clearance classes Values: ISO 5753-1 (table 11, page 603) 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.	

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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 For additional information → **page 35**	Normal Values: ISO 492 (**table 2**, **page 38**), except for raceway tolerances (**table 12**, **page 604**)	F: h6 B: h12 d: K6 Values: **table 13**, **page 604**	ISO 3096 Grade 2 for flat end needle rollers 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 –1/–3 –2/–4 –3/–5 –4/–6 –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 H6/h5	G6/h5 H6/g5	G6/g6 H6/f6
80	**120**	G6/h5	G6/g5	G6/f6
120	**–**	G6/h5 –	G6/g5 H6/f5	G6/f6 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 –4/–6	17–25	–2/–4	18–25
–6 to –8	–5/–7 –6/–8	18–25	–3/–5 –4/–6	17–24	–2/–4 –3/–5	18–25	0/–2 –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

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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 toler-ance	Gauge limits	Roundness (max. circularity devi-ation in accordance with ISO 3096)	**Length L_w** Tolerance class
U	L				
µm					–
0	–10	2	0/–2 –1/–3 –2/–4 –3/–5 –4/–6 –5/–7 –6/–8 –7/–9 –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.

SKF

Loads

	Needle rollers and cage assemblies	Drawn cup needle roller bearings	Needle roller bearings with machined rings	Alignment needle roller bearings
Minimum load For additional information → **page 106**	$F_{rm} = 0{,}02\ C$			
Equivalent dynamic bearing load For additional information → **page 91**	$P = F_r$			
Equivalent static bearing load For additional information → **page 105**	$P_0 = F_r$ 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

- A minimum load factor (**product tables**)
- C basic dynamic load rating [kN] (**product tables**)
- C_0 basic static load rating [kN] (**product tables**)
- d_m bearing mean diameter [mm] $= 0{,}5\ (d + D)$
- F_a axial load [kN]
- F_{am} minimum axial load [kN]
- F_r radial load [kN]
- F_{rm} minimum radial load [kN]
- n rotational speed [r/min]
- P equivalent dynamic bearing load [kN]
- P_0 equivalent static bearing load [kN]
- s_0 static safety factor

7

SKF

	Combined needle roller bearings Thrust part Angular contact ball bearing	Thrust ball bearing	Cylindrical roller thrust bearing
	$F_{am} = 0{,}25 \frac{C_0}{1\,000} \left(\frac{n\,d_m}{100\,000} \right)^2$	$F_{am} = A \left(\frac{n}{1\,000} \right)^2$	$F_{am} = 0{,}0005\ C_0 + A \left(\frac{n}{1\,000} \right)^2$
	$P = F_a$ F_a must not exceed $0{,}25\ F_r$.	$P = F_a$	$P = F_a$
	$P_0 = F_a$ 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

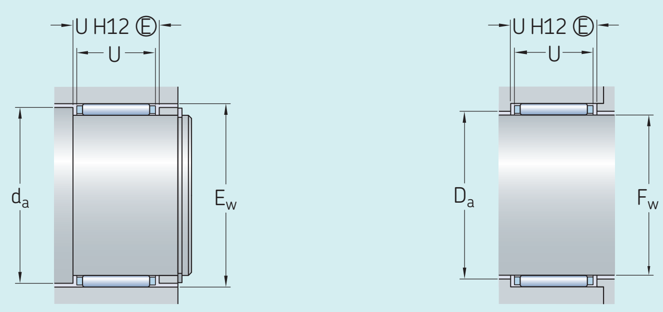
For less demanding applications, snap rings can be used. Otherwise, use an intermediate ring, e.g. a spring steel washer, between the snap ring and the cage assembly.

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

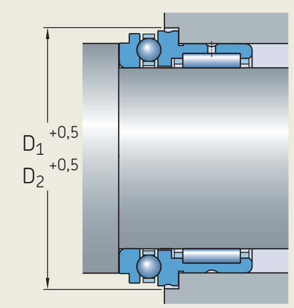
Abutment dimensions for needle roller and cage assemblies



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

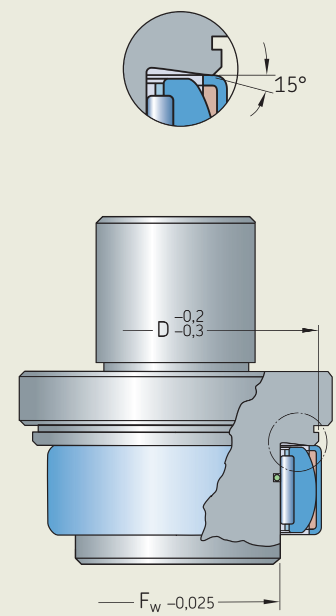


Table 18

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 (0,05 C < P ≤ 0,1 C)	≤ 25	k5	IT5/2	0,4
	> 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 (P > 0,1 C)	> 50 to 100	n6[3]	IT5/2	0,8
	> 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

		Group 1	Group 2	Group 3	/

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. 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 • NBR or FKM or PUR for a drawn cup needle roller bearing • 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

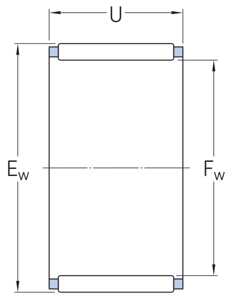
/SORT.. Tolerance grade of needle rollers of a needle roller and cage assembly, the numbers following identify the actual limits in µm, e.g. /SORT-2-4
CN Normal radial internal clearance; only used together with an additional letter that identifies a reduced or displaced clearance range
- H Reduced clearance 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

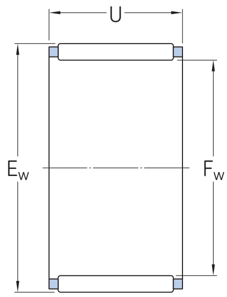
▸ Popular item
1) For additional information → skf.com/seals

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

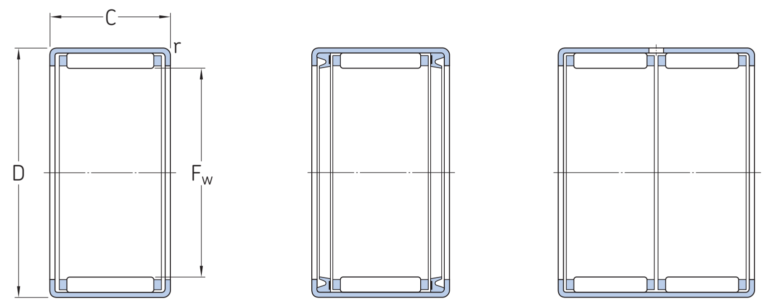
SKF

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

7.1

F_w **3 – 17** mm



HK HK ...2RS HK (double row)

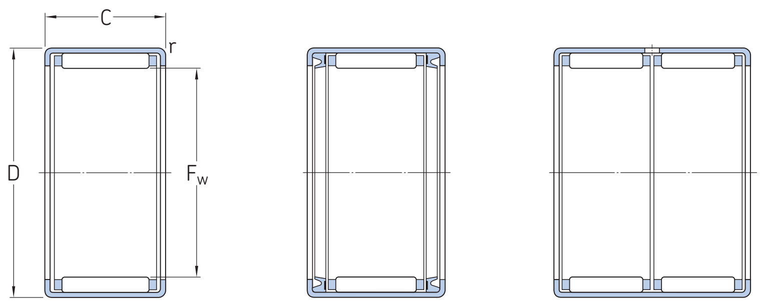
Principal dimensions			Basic load ratings dynamic	static	Fatigue load limit	Speed ratings Reference speed	Limiting speed	Mass		Designation
F_w	D	C	C	C_0	P_u					
mm			kN		kN	r/min		g		–
3	6,5	6	1,23	0,88	0,088	24 000	26 000	1	▸	**HK 0306 TN**
4	8	8	1,76	1,37	0,14	22 000	26 000	2	▸	**HK 0408**
5	9	9	2,38	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.

SKF

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



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]

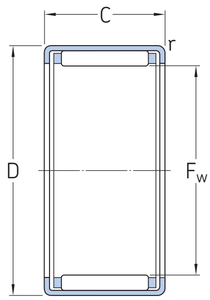
▸ Popular item
[1] Double row, outer ring with a lubrication hole.

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

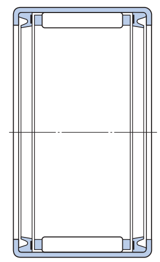
1) For additional information → *Needle roller bearing inner rings*, **page 593**
2) For additional information → skf.com/seals

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**

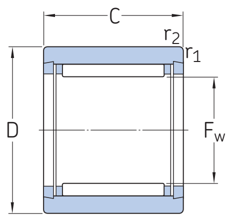
▸ Popular item

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	–	–	–	–

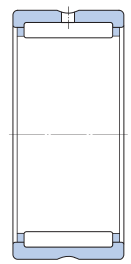
1) For additional information → *Needle roller bearing inner rings*, page 593
2) For additional information → skf.com/seals

7.3 Needle roller bearings with machined rings with flanges, without an inner ring

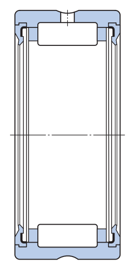
F_w **5 – 19** mm



NK ($F_w \leq 10$ mm)



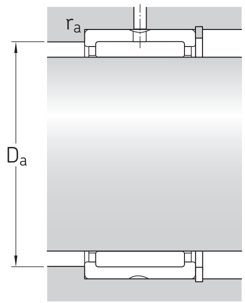
NK ($F_w \geq 12$ mm)
RNA 49
RNA 69

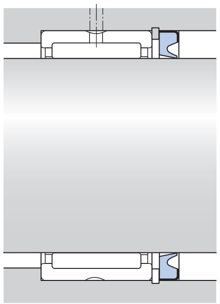


RNA 49 ...2RS

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



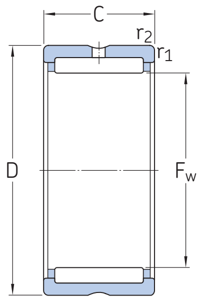


Dimensions		Abutment and fillet dimensions		Associated radial shaft seals[1)] Single lip	Double lip	Spring loaded lip
F_w	$r_{1,2}$ min.	D_a max.	r_a max.			
mm		mm		–		
5	0,15	8,8	0,1	G 5x10x2 S	–	–
	0,15	8,8	0,1	G 5x10x2 S	–	–
6	0,15	10,8	0,1	G 6x12x2 S	–	–
	0,15	10,8	0,1	G 6x12x2 S	–	–
7	0,3	12	0,3	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	–

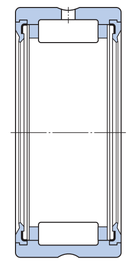
[1)] For additional information → skf.com/seals

7.3 Needle roller bearings with machined rings with flanges, without an inner ring

F_w **20 – 29** mm



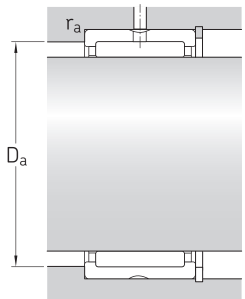
NK(S)
RNA 49
RNA 69

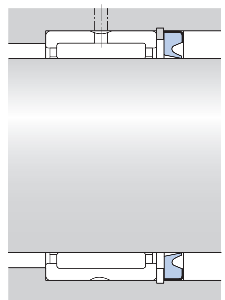


RNA 49 ...2RS

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



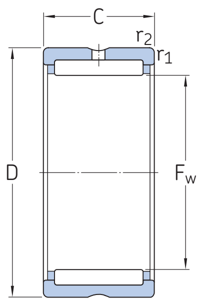


Dimensions		Abutment and fillet dimensions		Associated radial shaft seals[1) Single lip	Double lip	Spring loaded lip
F_w	$r_{1,2}$ min.	D_a max.	r_a max.			
mm		mm		–		
20	0,3	26	0,3	–	–	–
	0,3	26	0,3	G 20x28x4	SD 20x28x4	–
	0,3	26	0,3	G 20x28x4	SD 20x28x4	–
	0,3	26	0,3	G 20x28x4	SD 20x28x4	–
	0,3	26	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	–	–

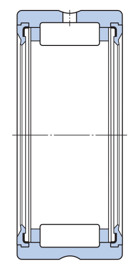
1) For additional information → skf.com/seals

7.3 Needle roller bearings with machined rings with flanges, without an inner ring

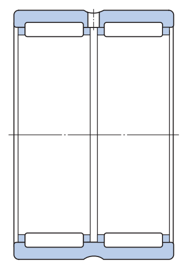
F_w **30 – 43** mm



NK(S)
RNA 49
RNA 69 ($F_w \leq 38$ mm)



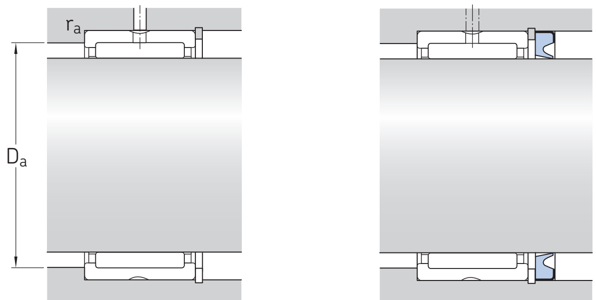
RNA 49 ...2RS



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



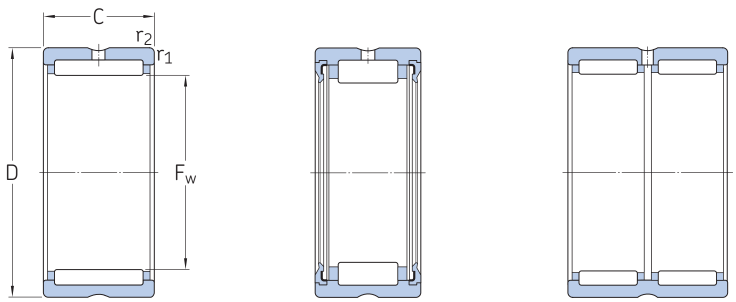
Dimensions		Abutment and fillet dimensions		Associated radial shaft seals[1)] Single lip	Double lip	Spring loaded lip
F_w	$r_{1,2}$ min.	D_a max.	r_a max.			
mm		mm		–		
30	0,3	38	0,3	G 30x40x4	SD 30x40x4	–
	0,3	38	0,3	G 30x40x4	SD 30x40x4	–
	0,3	40	0,3	–	–	–
	0,3	40	0,3	–	–	30x42x6 HMS5 RG
	0,3	40	0,3	–	–	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

7.3 Needle roller bearings with machined rings with flanges, without an inner ring

F_w **45 – 70** mm



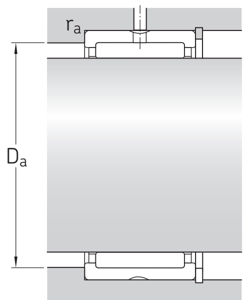
NK(S)
RNA 49

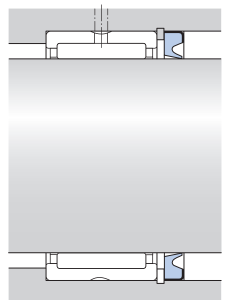
RNA 49 ...2RS

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

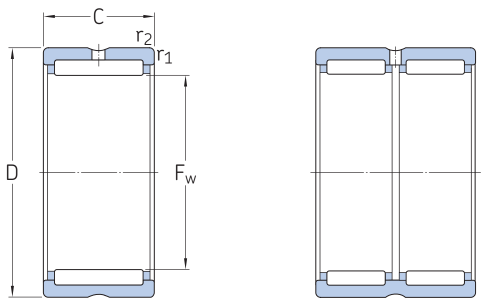




Dimensions		Abutment and fillet dimensions		Associated radial shaft seals[1)]		
				Single lip	Double lip	Spring loaded lip
F_w	$r_{1,2}$ min.	D_a max.	r_a max.			
mm		mm		–		
45	0,3	53	0,3	G 45x55x4	SD 45x55x4	–
	0,3	53	0,3	G 45x55x4	SD 45x55x4	–
	0,6	56	0,6	–	–	45x60x7 HMS5 RG
47	0,3	55	0,3	–	–	–
	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

F_w **72 – 105** mm

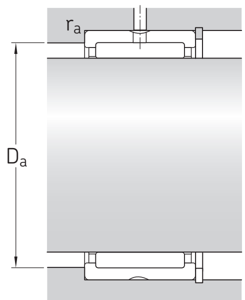


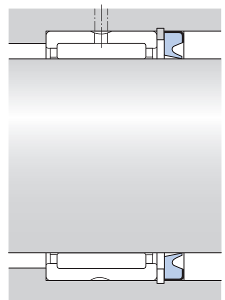
NK(S)
RNA 49

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



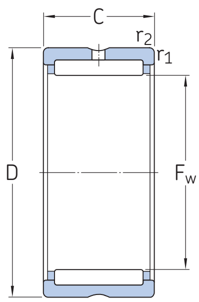


Dimensions		Abutment and fillet dimensions		Associated radial shaft seals[1)] Single lip	Double lip	Spring loaded lip
F_w	$r_{1,2}$ min.	D_a max.	r_a max.			
mm		mm		–		
72	1	85	1	–	–	72x90x10 HMS5 RG
	1	85	1	–	–	72x90x10 HMS5 RG
73	1	85	1	–	–	–
	1	85	1	–	–	–
75	1	87	1	–	–	73x92x11.1 CRWH1 R
	1	87	1	–	–	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

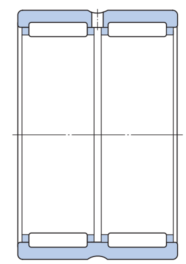
[1)] For additional information → skf.com/seals

7.3 Needle roller bearings with machined rings with flanges, without an inner ring

F_w **110 – 330** mm



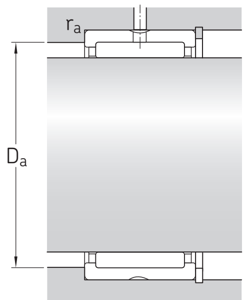
NK
RNA 48
RNA 49

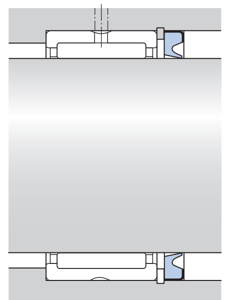


RNA 69

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



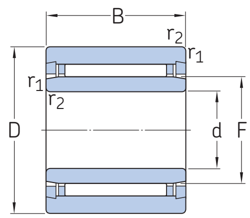


Dimensions		Abutment and fillet dimensions		Associated radial shaft seals[1] Single lip	Double lip	Spring loaded lip
F_w	$r_{1,2}$ min.	D_a max.	r_a max.			
mm		mm		–		
110	1,1	123,5	1	–	–	110x130x12 HMS5 RG
	1,1	123,5	1	–	–	110x130x12 HMS5 RG
	1,1	123,5	1	–	–	110x130x12 HMS5 RG
	1,1	123,5	1	–	–	110x130x12 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

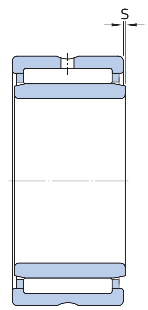
[1] For additional information → skf.com/seals

7.4 Needle roller bearings with machined rings with flanges, with an inner ring

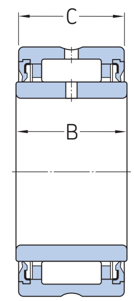
d **5 – 17** mm



NKI (d ≤ 7 mm)



NKI(S) (d ≥ 9 mm)
NA 49
NA 69

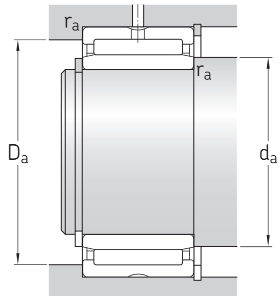


NA 49 ...2RS

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

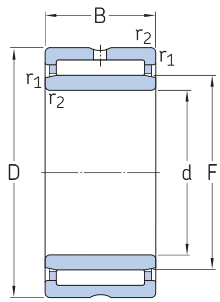
SKF



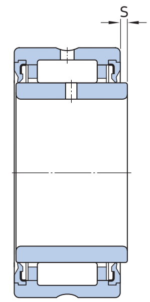
Dimensions				Abutment and fillet dimensions		
d	F	$r_{1,2}$ min.	s max.	d_a min.	D_a max.	r_a max.
mm				mm		
5	8	0,3	1,5	7	13	0,3
	8	0,3	2	7	13	0,3
6	9	0,3	1,5	8	14	0,3
	9	0,3	2	8	14	0,3
7	10	0,3	1,5	9	15	0,3
	10	0,3	2	9	15	0,3
9	12	0,3	1,5	11	17	0,3
	12	0,3	2	11	17	0,3
10	14	0,3	0,5	12	20	0,3
	14	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

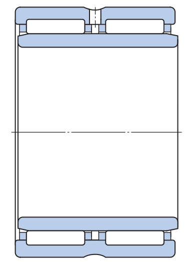
d **20 – 32** mm



NKI(S)
NA 49
NA 69 (d ≤ 30 mm)



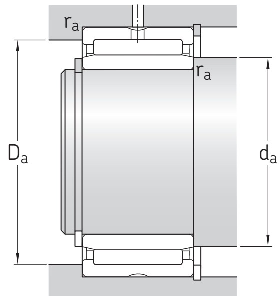
NA 49 ...2RS



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**

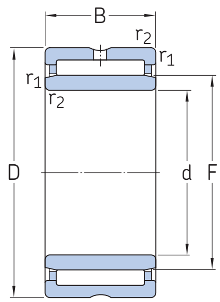
▸ Popular item



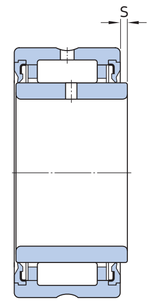
Dimensions				Abutment and fillet dimensions		
d	F	$r_{1,2}$ min.	s max.	d_a min.	D_a max.	r_a max.
mm				mm		
20	24	0,3	0,5	22	30	0,3
	24	0,3	0,5	22	30	0,3
	25	0,3	0,8	22	35	0,3
	25	0,3	0,5	22	35	0,3
	25	0,3	1	22	35	0,3
	28	0,6	0,5	24	38	0,6
22	26	0,3	0,5	24	32	0,3
	26	0,3	0,5	24	32	0,3
	28	0,3	0,8	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

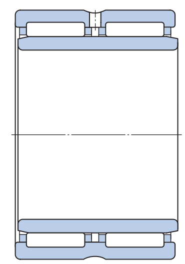
d **35 – 55** mm



NKI(S)
NA 49



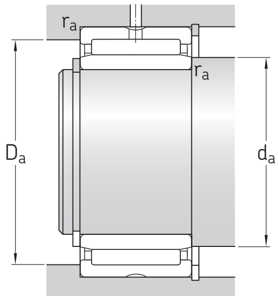
NA 49 ...2RS



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

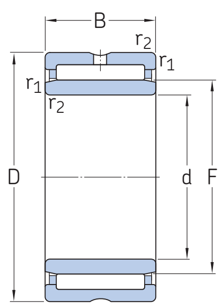


Dimensions				Abutment and fillet dimensions		
d	F	$r_{1,2}$ min.	s max.	d_a min.	D_a max.	r_a max.
mm				mm		
35	40	0,3	0,5	37	48	0,3
	40	0,3	1	37	48	0,3
	42	0,6	0,8	39	51	0,6
	42	0,6	0,5	39	51	0,6
	42	0,6	0,5	39	51	0,6
	43	0,6	0,5	39	53	0,6
38	43	0,3	0,5	40	51	0,3
	43	0,3	1	40	51	0,3
40	45	0,3	0,5	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

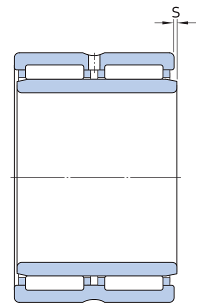
7.4

7.4 Needle roller bearings with machined rings with flanges, with an inner ring

d **60 – 90** mm



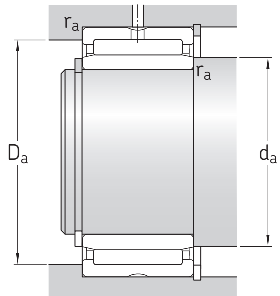
NKI(S)
NA 49



NA 69

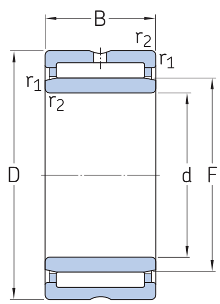
Principal dimensions				Basic load ratings dynamic	static	Fatigue load limit	Speed ratings Reference speed	Limiting speed	Mass	Designation
d	D	B	C	C	C_0	P_u				
mm				kN		kN	r/min		kg	–
60	82	25	–	44	95	11,8	6 000	6 700	0,39	▸ **NKI 60/25**
	82	35	–	60,5	146	18,3	6 000	6 700	0,55	▸ **NKI 60/35**
	85	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

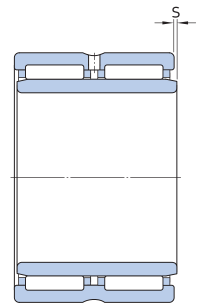


Dimensions				Abutment and fillet dimensions		
d	F	$r_{1,2}$ min.	s max.	d_a min.	D_a max.	r_a max.
mm				mm		
60	68	0,6	1	64	78	0,6
	68	0,6	1	64	78	0,6
	68	1	1,5	65	80	1
	68	1	1,5	65	80	1
	70	1,1	2	66,5	83,5	1
65	73	1	1	70	85	1
	72	1	1,5	70	85	1
	73	1	1	70	85	1
	72	1	1,5	70	85	1
	75	1,1	2	71,5	88,5	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

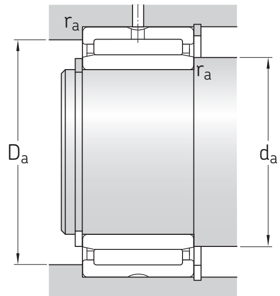


NA 69

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**

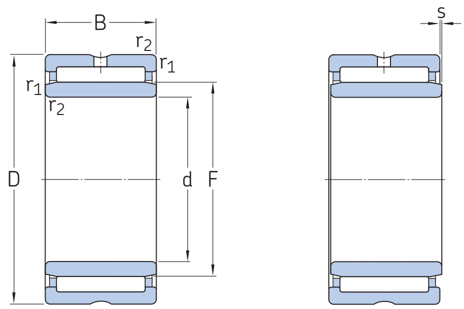
▸ Popular item

SKF

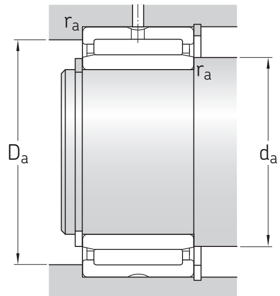


Dimensions				Abutment and fillet dimensions		
d	F	$r_{1,2}$ min.	s max.	d_a min.	D_a max.	r_a max.
mm				mm		
95	105	1	1,5	100	120	1
	105	1	1,5	100	120	1
	110	1,1	1	101,5	123,5	1
	110	1,1	1	101,5	123,5	1
100	110	1,1	1,5	106,5	123,5	1
	110	1,1	2	106,5	123,5	1
	115	1,1	2	106,5	133,5	1
110	120	1	0,8	115	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

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**

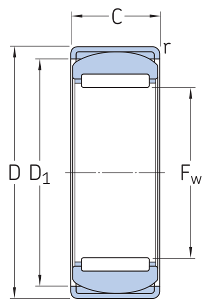


Dimensions				**Abutment and fillet dimensions**		
d	F	$r_{1,2}$ min.	s max.	d_a min.	D_a max.	r_a max.
mm				mm		
340	370	2,1	2	351	409	2
360	390	2,1	2	371	429	2
380	415	2,1	2	391	469	2

7.4

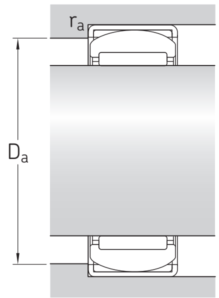
7.5 Alignment needle roller bearings, without an inner ring

F_w **15 – 45** mm



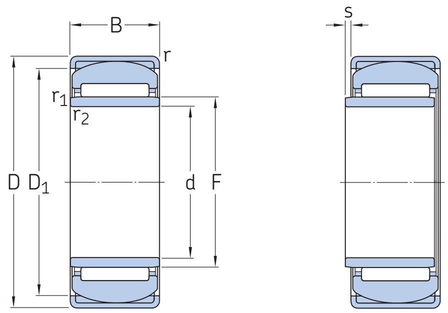
Principal dimensions			Basic load ratings dynamic	static	Fatigue load limit	Speed ratings Reference speed	Limiting speed	Mass	Designation
F_w	D	C	C	C_0	P_u				
mm			kN		kN	r/min		kg	–
15	28	12	7,37	9,15	1,08	24 000	28 000	0,032	**RPNA 15/28**
18	32	16	12,8	17,6	2,12	22 000	24 000	0,052	**RPNA 18/32**
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



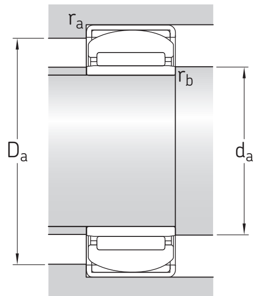
Dimensions			Abutment and fillet dimensions		
F_w	D_1	r min.	D_a min.	D_a max.	r_a max.
mm			mm		
15	24,5	0,8	23,5	24,5	0,8
18	27	0,8	26	27	0,8
20	30,5	0,8	29,5	30,5	0,8
25	36,5	0,8	35	37	0,8
30	42	0,8	41	42	0,8
35	47,5	0,8	46,5	47,5	0,8
40	50,5	0,8	49,5	50,5	0,8
45	58	0,8	57	58	0,8

d **12 – 40** 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	–
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**

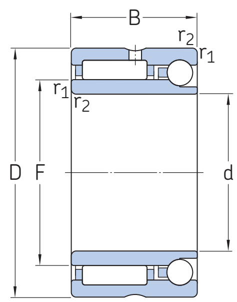
▸ Popular item



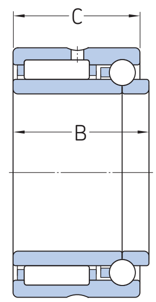
Dimensions						Abutment and fillet dimensions				
d	F	D_1	r min.	$r_{1,2}$ min.	s max.	d_a min.	D_a min.	D_a max.	r_a max.	r_b max.
mm						mm				
12	15	24,5	0,8	0,3	0,5	14	23,5	24,5	0,8	0,3
15	18	27	0,8	0,3	0,5	17	26	27	0,8	0,3
17	20	30,5	0,8	0,3	0,5	19	29,5	30,5	0,8	0,3
20	25	36,5	0,8	0,3	0,5	22	35	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



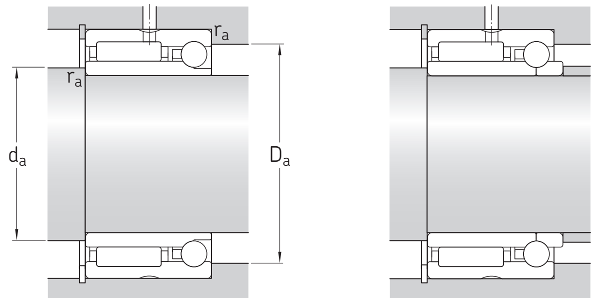
NKIA



NKIB

Principal dimensions				Basic load ratings				Fatigue load limit		Speed ratings		Mass	Designation
				radial dynamic	static	axial dynamic	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**

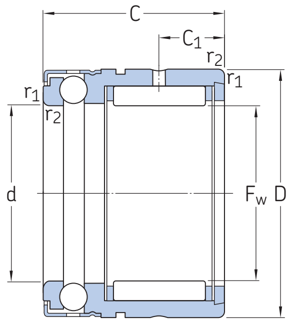
▸ Popular item



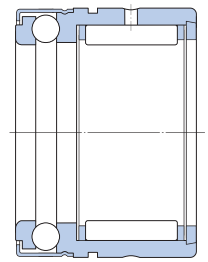
Dimensions			Abutment and fillet dimensions		
d	F	$r_{1,2}$ min.	d_a min.	D_a max.	r_a max.
mm			mm		
12	16	0,3	14	22	0,3
	16	0,3	14	22	0,3
15	20	0,3	17	26	0,3
	20	0,3	17	26	0,3
17	22	0,3	19	28	0,3
	22	0,3	19	28	0,3
20	25	0,3	22	35	0,3
	25	0,3	22	35	0,3
22	28	0,3	24	37	0,3
	28	0,3	24	37	0,3
25	30	0,3	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

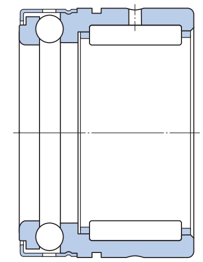
F_w **7 – 35** mm



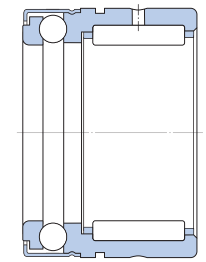
NX
(F_w = 7 mm)



NX .. Z
(F_w = 7 mm)



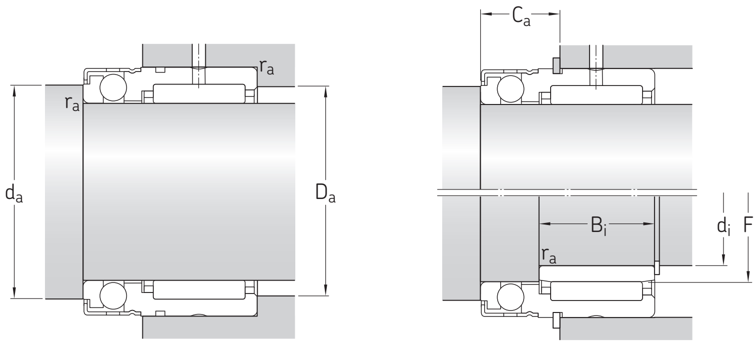
NX
($F_w \geq$ 10 mm)



NX .. Z
($F_w \geq$ 10 mm)

Principal dimensions			Basic load ratings radial dynamic	static	axial dynamic	static	Fatigue load limit radial	axial	Minimum load factor	Speed ratings Reference speed	Limiting speed	Mass	Designation
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

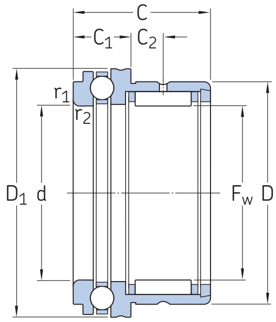


Dimensions				Abutment and fillet dimensions				Associated inner ring[1)] Dimensions			Designation	Associated snap ring[2)] Designation
F_w	C_1	d	$r_{1,2}$ min.	d_a min.	D_a max.	C_a	r_a max.	d_i	F	B_i		
mm				mm				mm			–	–
7	4,7	7	0,3	9,6	12	10	0,3	–	–	–	–	SW 14
	4,7	7	0,3	9,6	12	10	0,3	–	–	–	–	SW 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

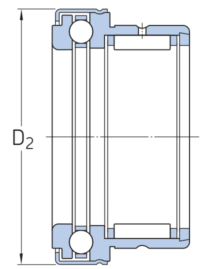
[1)] For additional information → *Needle roller bearing inner rings*, page 593
[2)] In accordance with DIN 471, not supplied by SKF.

7.9 Needle roller / thrust ball bearings, thrust bearing with a cage

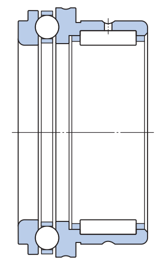
F_w **10 – 70** mm



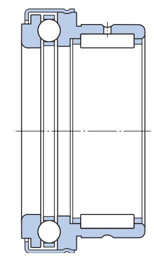
NKX
(F_w = 10 mm)



NKX .. Z
(F_w = 10 mm)



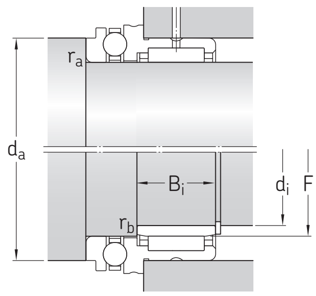
NKX
(F_w ≥ 12 mm)

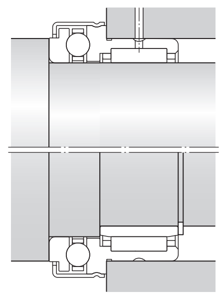


NKX .. Z
(F_w ≥ 12 mm)

Principal dimensions			**Basic load ratings** radial dynamic	static	axial dynamic	static	**Fatigue load limit** radial	axial	**Minimum load factor**	**Speed ratings** Reference speed	Limiting speed	**Mass**	**Designation**
F_w	D	C	C	C_0	C	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





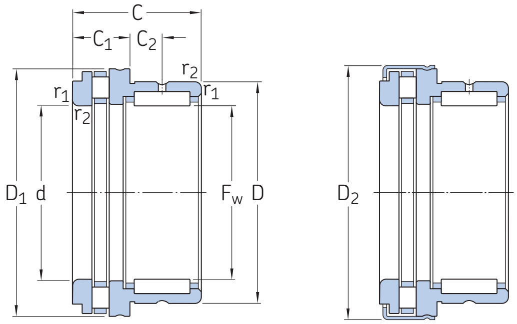
Dimensions							Abutment and fillet dimensions			Associated inner ring[1)] Dimensions			Designation
F_w	C_1	C_2	d	D_1	D_2	$r_{1,2}$ min.	d_a min.	r_a max.	r_b max.	d_i	F	B_i	
mm							mm			mm			–
10	9	6,5	10	–	25,2	0,3	19,7	0,3	0,3	7	10	16	IR 7x10x16
	9	6,5	10	24,1	–	0,3	19,7	0,3	0,3	7	10	16	IR 7x10x16
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

7.9

1) For additional information → *Needle roller bearing inner rings*, page 593

7.10 Needle roller / cylindrical roller thrust bearings

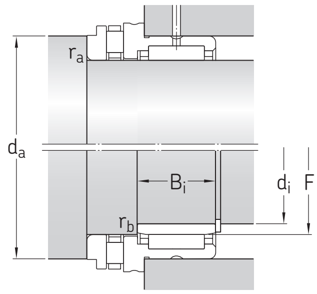
F_w **15 – 50** mm

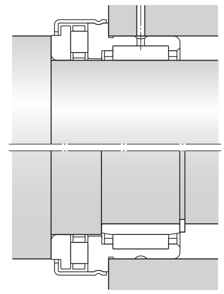


NKXR　　　NKXR .. Z

Principal dimensions			Basic load ratings radial		axial		Fatigue load limit radial	axial	Minimum load factor	Speed ratings Reference speed	Limiting speed	Mass	Designation
			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



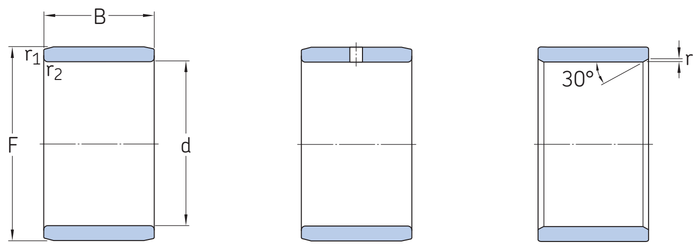


Dimensions							**Abutment and fillet dimensions**			**Associated inner ring**[1) Dimensions			Designation
F_w	C_1	C_2	d	D_1	D_2	$r_{1,2}$ min.	d_a min.	r_a max.	r_b max.	d_i	F	B_i	
mm							mm			mm			–
15	9	6,5	15	28,1	–	0,3	23,7	0,3	0,3	12	15	16	IR 12x15x16
	9	6,5	15	–	29,2	0,3	23,7	0,3	0,3	12	15	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 d	F	B	r, $r_{1,2}$ min.	Mass	Designation
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 d	F	B	r, $r_{1,2}$ min.	Mass	Designation
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

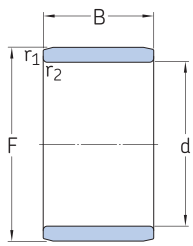
Dimensions				Mass	Designation
d	F	B	r, $r_{1,2}$ min.		
mm				kg	–
22	26	16	0,3	0,018	IR 22x26x16
	26	20	0,3	0,023	IR 22x26x20
	28	17	0,3	0,03	▸ IR 22x28x17
	28	20	0,3	0,035	IR 22x28x20
	28	20,5	0,3	0,036	IR 22x28x20.5
	28	30	0,3	0,054	IR 22x28x30
25	29	20	0,3	0,026	IR 25x29x20
	29	30	0,3	0,039	IR 25x29x30
	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

7.11 Needle roller bearing inner rings

d **80 – 240** mm



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**

Dimensions				Mass	Designation
d	F	B	$r, r_{1,2}$ min.		
mm				kg	–
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

7.11



8 Tapered roller bearings

8 Tapered roller bearings

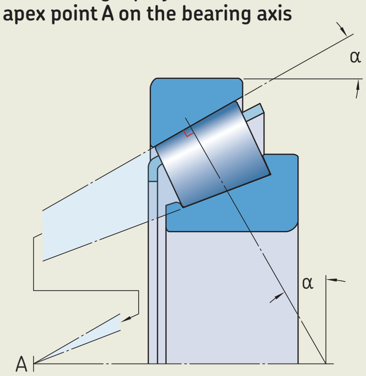
8 Tapered roller bearings

More information

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. 3

Load distribution and stress reduction

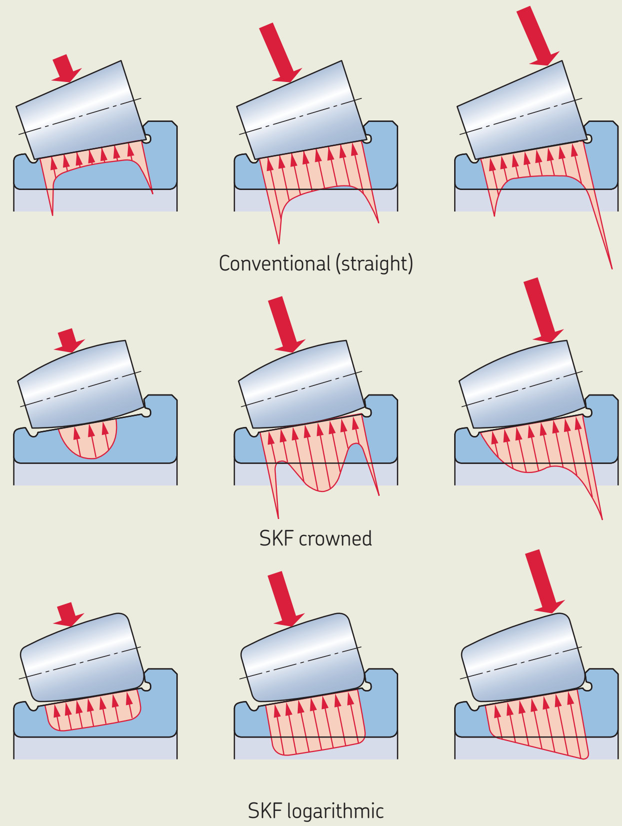


Fig. 4

Raceway profiles

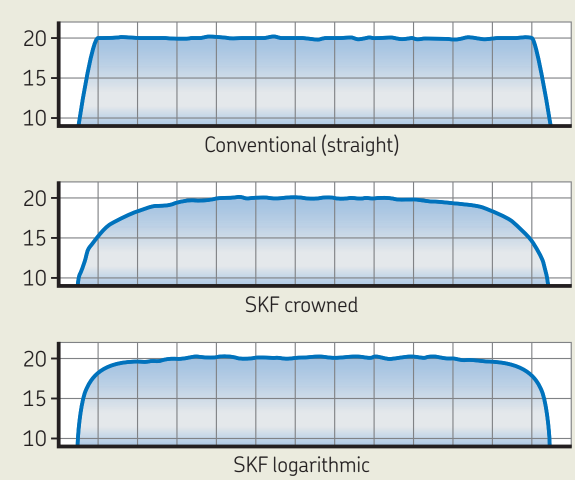
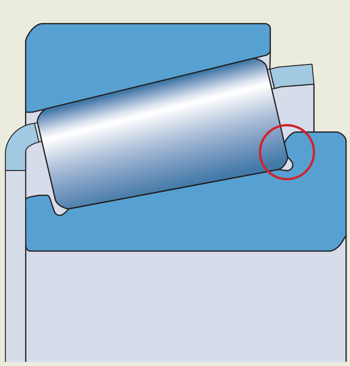


Fig. 2

Roller end / flange contact area



- **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

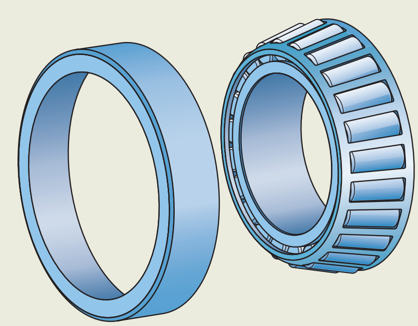
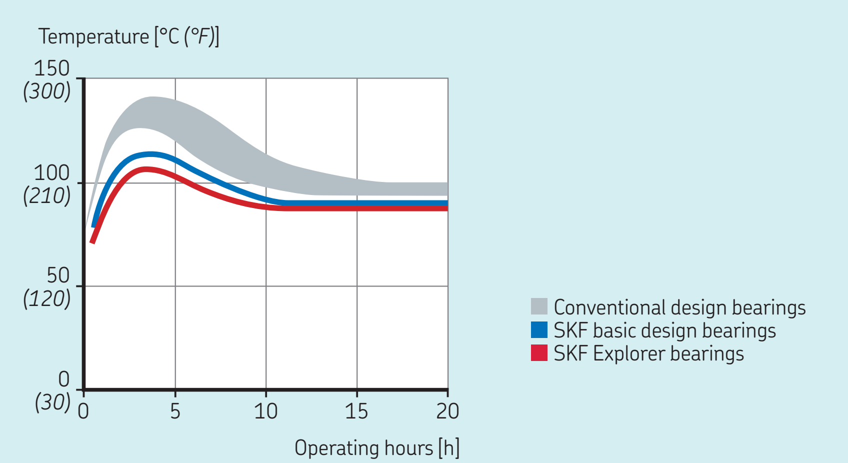


Diagram 1

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

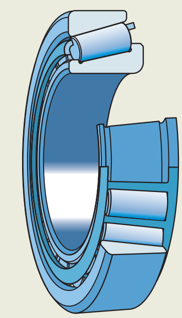


Fig. 7

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

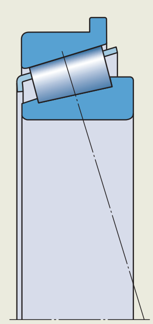


Fig. 9

Matched single row tapered roller bearings

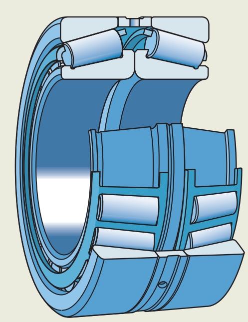


Fig. 10

Matched bearings arranged face-to-face

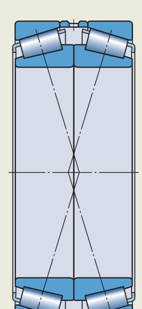
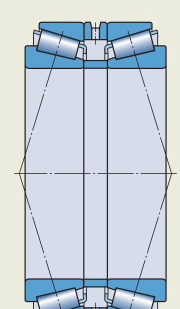


Fig. 11

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

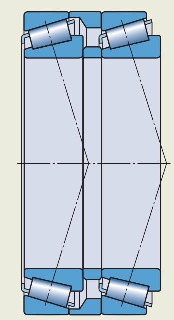


Fig. 13

TDO design

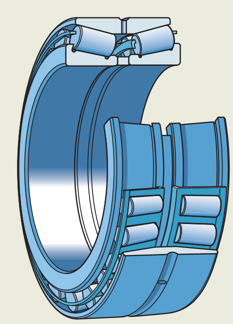
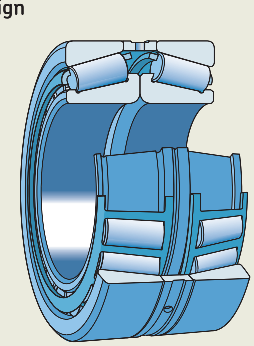


Fig. 14

TDI design



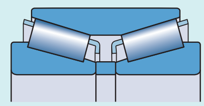
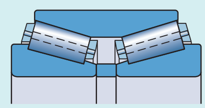
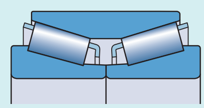
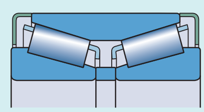
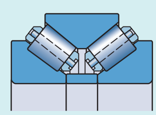
TDI design bearings

- 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 • steel window-type cages
TDO.1		• intermediate ring between two inner rings • steel pin-type cages (pierced rollers) for higher loads
TDON		• without intermediate ring • inner rings abut each other • steel window-type cages
TDO/Z		• intermediate ring between two inner rings • steel window-type cages • sheet steel shield on both sides
TDOS.1		• steep contact angle α • for applications where high axial loads or high tilting moments occur in combination with radial loads • intermediate ring between two inner rings • 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

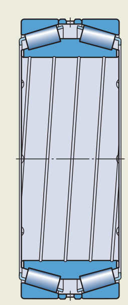
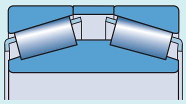
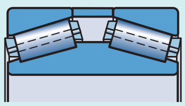
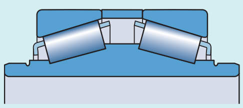
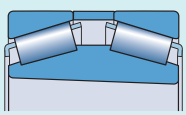
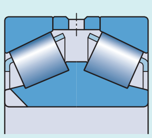
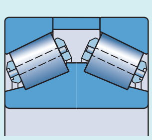
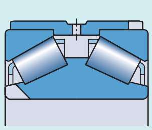


Table 2

TDI design variants and characteristics

Design variant		Characteristics
TDI		• intermediate ring between two outer rings • steel window-type cages
TDI.1		• intermediate ring between two outer rings • steel pin-type cages (pierced rollers) for higher loads
TDIE		• intermediate ring between two outer rings • steel window-type cages • inner ring extensions at both sides – extensions are ground as counterface for seal lips
TDIT		• intermediate ring between two outer rings • tapered bore, taper 1:12 • steel window-type cages
TDIS		• steep contact angle α • for applications where high axial loads in combination with radial loads occur • intermediate ring between two outer rings • steel window-type cages • used in rolling mill applications with a loose fit on the roll neck and only subjected to purely axial load • the inner ring has one or more locating slots (notches) in one or both side faces to prevent it from turning on its seat • depending on the application, the bearings can be supplied with or without an intermediate ring between the two outer rings
TDIS.1		• steep contact angle α • for applications where high axial loads in combination with radial loads occur • intermediate ring between two outer rings • steel pin-type cages (pierced rollers) for higher loads
TDIS.2		• self-retaining unit with a retention sleeve over the outer rings • the outer rings are pressed into the sleeve • the deformation of the outer rings normally resulting from heavy axial loads is considerably reduced – as a consequence, the stress distribution in the rolling contacts is more favourable and extends bearing service life • the axial internal clearance is determined by the sleeve • preloading by means of springs is unnecessary • steep contact angle α • for applications where high axial loads in combination with radial loads occur • 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

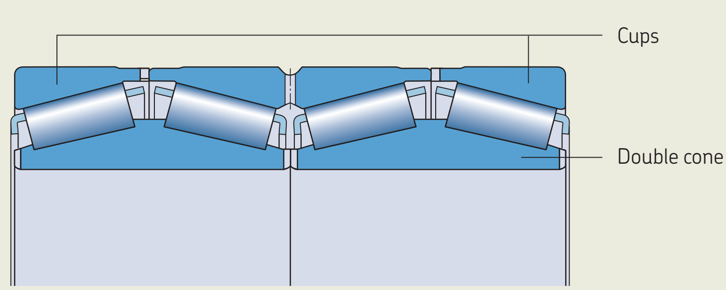
Features

(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)
DO 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

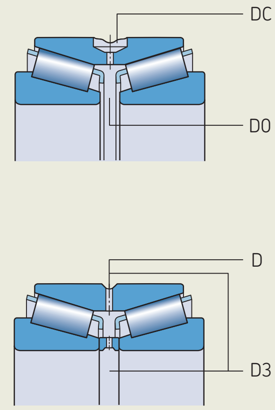


Fig. 18

Identification of variants/features, TDI design

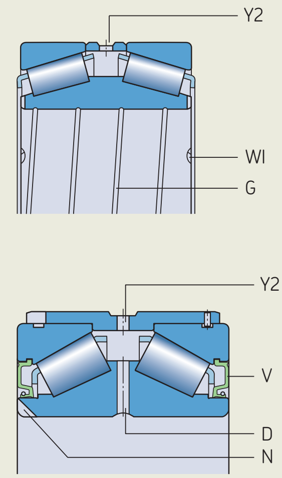
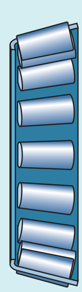
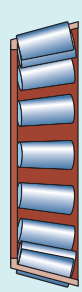
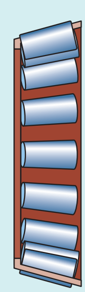
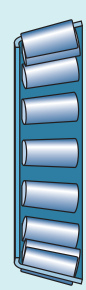
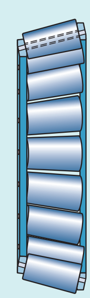
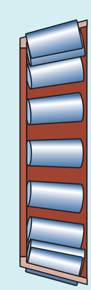


Table 3

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: ISO 355 Bearings with designation prefix J: ANSI/ABMA Standard 19.1	Boundary dimensions: AFBMA Standard 19 (ANSI B3.19) ANSI/ABMA Standard 19.2 has replaced the above standard, but does not include dimensions.
Tolerances For additional information → page 35	• Normal • tighter geometrical tolerances for bearings with designation suffix CL7C Bearings with designation prefix J: ANSI/ABMA Standard 19.1 Check availability of tighter width tolerance to 6 X tolerance class (designation suffix CLN) or P5 Values: ISO 492 (table 5, page 41 to table 7, page 43) 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.	Check availability of CL3, CL0 or tighter width tolerance Values: ANSI/ABMA Standard 19.2 (table 9, page 45) Deviating width tolerances for cups and cones are identified by a designation suffix (table 4, page 678).
Internal clearance For additional information → page 182	Obtained after mounting, depending on adjustment against a second bearing.	
Preload 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 Where misalignment cannot be avoided, SKF recommends using only SKF Explorer bearings. 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. 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 • inch bearings: cones and cups dimensions of many inch bearings → AFBMA Standard 19 (ANSI B3.19) ANSI/ABMA Standard 19.2 has replaced the above standard, but does not include dimensions.
	• Normal • tighter geometrical tolerances for bearings with designation suffix CL7C • check availability of P5 Values: ISO 492 (**table 5**, **page 41**, and **table 7**, **page 43**) Total width tolerances: not standardized (**table 5**, **page 678**)	• dimensional tolerances (except for width T): Normal • geometrical tolerances: P5 Values: ISO 492 (**table 5**, **page 41**, **table 7**, **page 43**, and **table 9**, **page 45**)
	Standard (**table 6**, **page 679**) 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. Values are valid for unmounted bearing sets under measuring loads of: • D ≤ 90 mm → 0,1 kN • 90 < D ≤ 240 mm → 0,3 kN • D > 240 mm → 0,5 kN	• bearings are ready-to-mount units with an axial internal clearance adapted for the actual application • bearing components should be arranged in the prescribed order and may not be interchanged with components of another bearing • 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. 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. 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

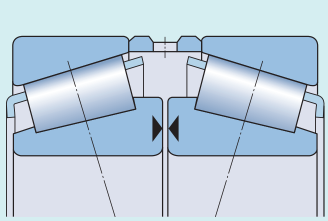
Total width tolerances of matched metric single row tapered roller bearings

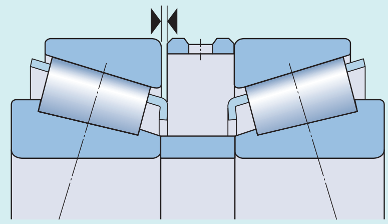
Bore diameter d		Total width tolerance Δ_{TsD} of matched bearings in the series 329 Δ_{TsD}		320 Δ_{TsD}		330 Δ_{TsD}		331 Δ_{TsD}		302, 322 Δ_{TsD}		332 Δ_{TsD}		303, 323 Δ_{TsD}		313 Δ_{TsD}	
>	≤	U	L	U	L	U	L	U	L	U	L	U	L	U	L	U	L
mm		µm															
–	30	–	–	+550	+50	–	–	–	–	+550	+100	+550	+100	+600	+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	–	–	–	–	–	–

Δ_{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	–	–	–	–	–	–

8

Loads

	Single row bearings	Matched bearings	Double row bearings
Minimum load For additional information → page 106	$F_{rm} = 0{,}02\ C$ Except for SKF Explorer bearings: $F_{rm} = 0{,}017\ C$		
Equivalent dynamic bearing load For additional information → page 91	$F_a/F_r \leq e \rightarrow P = F_r$ $F_a/F_r > e \rightarrow P = 0{,}4\ F_r + Y\ F_a$ 1)	**Face-to-face or back-to-back arrangement** $F_a/F_r \leq e \rightarrow P = F_r + Y_1\ F_a$ $F_a/F_r > e \rightarrow P = 0{,}67\ F_r + Y_2\ F_a$ **Tandem arrangement**1) $F_a/F_r \leq e \rightarrow P = F_r$ $F_a/F_r > e \rightarrow P = 0{,}4\ F_r + Y\ F_a$	$F_a/F_r \leq e \rightarrow P = F_r + Y_1\ F_a$ $F_a/F_r > e \rightarrow P = 0{,}67\ F_r + Y_2\ F_a$
Equivalent static bearing load For additional information → page 105	$P_0 = 0{,}5\ F_r + Y_0\ F_a$ 1) $P_0 < F_r \rightarrow P_0 = F_r$	**Face-to-face or back-to-back arrangement** $P_0 = F_r + Y_0\ F_a$ $P_0 < F_r \rightarrow P_0 = F_r$ **Tandem arrangement**1) $P_0 = 0{,}5\ F_r + Y_0\ F_a$	$P_0 = F_r + Y_0\ F_a$ $P_0 < F_r \rightarrow P_0 = F_r$

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:

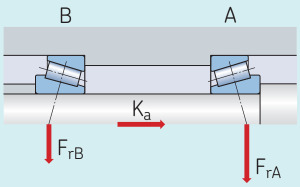
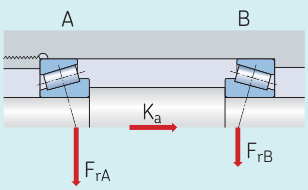
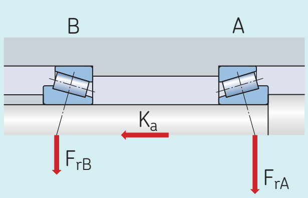
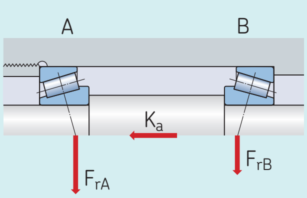
- the bearings are adjusted against each other to practically zero clearance, but without any preload
- bearing A is subjected to a radial load F_{rA} and bearing B to a radial load F_{rB}
- both F_{rA} and F_{rB} are always considered positive, even when they act in a direction opposite to that shown 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

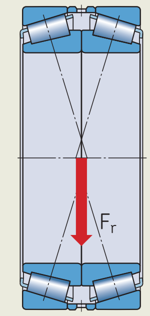
When matched tapered roller bearings, arranged face-to-face or back-to-back, are mounted together with a third bearing, the bearing arrangement is statically indeterminate. In these cases, the radial load F_r acting on the bearing pair must be calculated first.

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



8

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

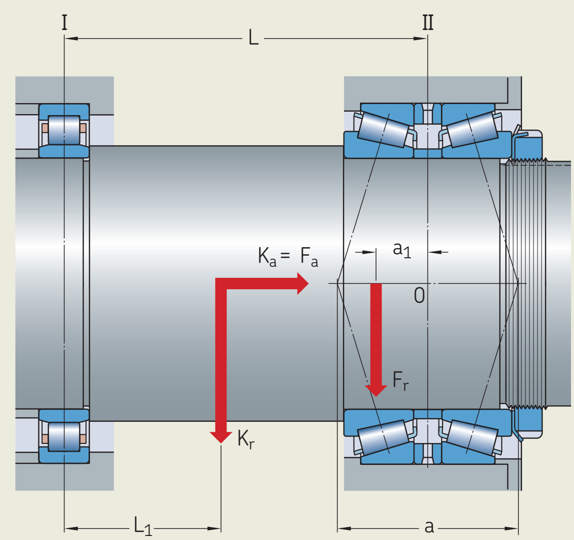
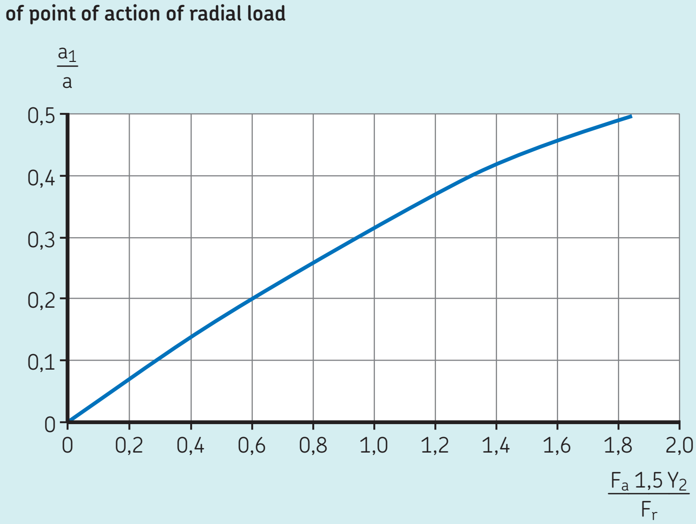


Diagram 2

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**).

8

Permissible speed

The speed ratings in the **product tables** indicate:

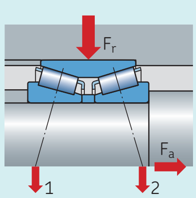
- the **reference speed**, which enables a quick assessment of the speed capabilities from a thermal frame of reference
- the **limiting speed**, which is a mechanical limit that should not be exceeded unless the bearing design and the application are adapted for higher speeds

For additional information, refer to *Operating temperature and speed*, page 130.

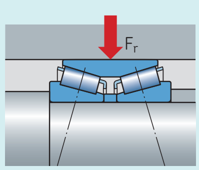
Table 8

Equivalent dynamic bearing load P_F for calculating comparative rating life

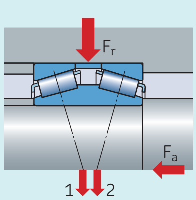
Bearing arrangement



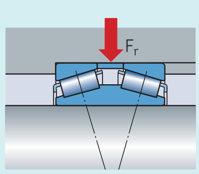
Locating



Non-locating



Locating



Non-locating

Load case		Comparative equivalent dynamic radial load
1a)	$F_a \leq 0{,}6\, F_{rL}/K_L$	$P_{FL1} = 0{,}5\, F_{rL} + 0{,}83\, K_L\, F_a$ $P_{FL2} = 0{,}5\, F_{rL} - 0{,}83\, K_L\, F_a$ $P_{FN} = F_{rN}$
1b)	$F_a > 0{,}6\, F_{rL}/K_L$	$P_{FL1} = 0{,}4\, F_{rL} + K_L\, F_a$ $P_{FL2} = 0$ $P_{FN} = F_{rN}$
1c)	$F_a = 0$	$P_{FL1} = F_{rL}$ $P_{FN} = F_{rN}$

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 ≤ 50 mm → m5Ⓔ
- 50 mm < d ≤ 140 mm → m6Ⓔ
- 140 mm < d ≤ 200 mm → n6Ⓔ
- d > 200 mm → p6Ⓔ

SKF recommends these shaft seat tolerance classes for rotating loads on the inner ring where P ≤ 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

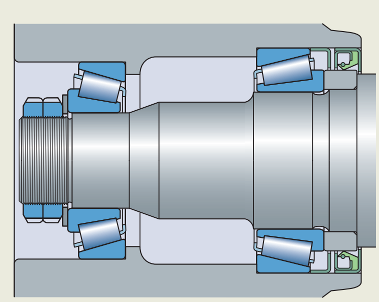


Table 9

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

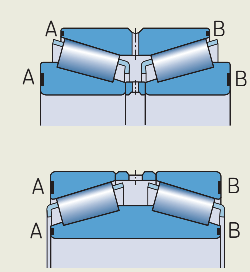
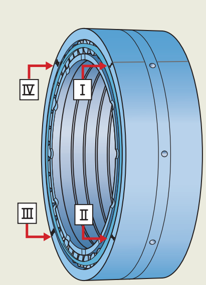


Fig. 23

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- **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 **/-1** to **/-3** **/4**	Deviating width tolerances of cups and cones for inch bearings (table 4, page 678)
C...	Axial internal clearance (only for double row bearings) 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.: U2 → +5/0 µm 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

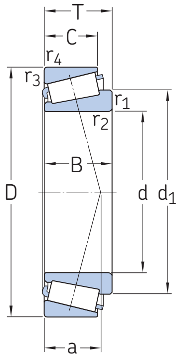
Group 4.3: Bearing sets, matched bearings

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
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).

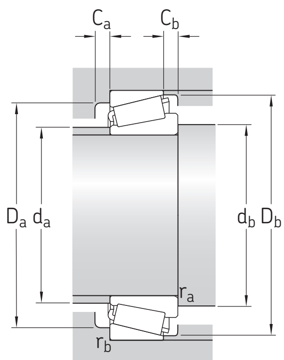
8.1 Metric single row tapered roller bearings

d **15 – 32** mm

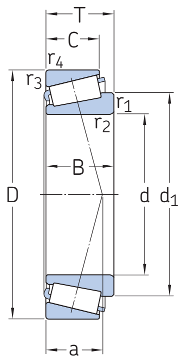


Principal dimensions			Basic load ratings		Fatigue load limit	Speed ratings		Mass	Designation	Dimension series to ISO 355 (ABMA)
			dynamic	static		Reference speed	Limiting speed			
d	D	T	C	C_0	P_u					
mm			kN		kN	r/min		kg	–	–
15	35	11,75	18,5	14,6	1,43	17 000	20 000	0,055	▸ 30202	2CC
	42	14,25	27,7	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



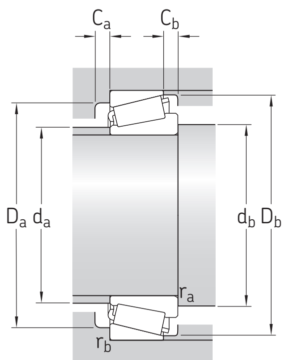
Dimensions							Abutment and fillet dimensions									Calculation factors		
d	d_1 ≈	B	C	$r_{1,2}$ min.	$r_{3,4}$ min.	a	d_a max.	d_b min.	D_a min.	D_a max.	D_b min.	C_a min.	C_b min.	r_a max.	r_b max.	e	Y	Y_0
mm							mm									–		
15	25,6	11	9,25	0,6	0,6	8	20	20,5	30	30,5	32	2	2,5	0,6	0,6	0,35	1,7	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



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

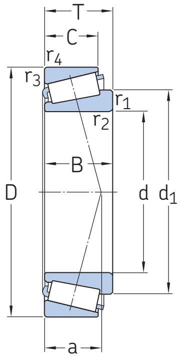
SKF



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

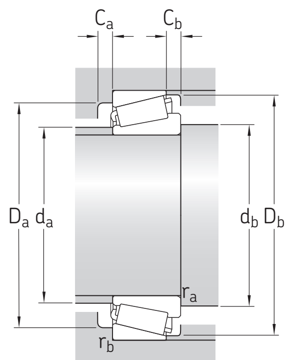
8.1 Metric single row tapered roller bearings

d **50 – 55** mm



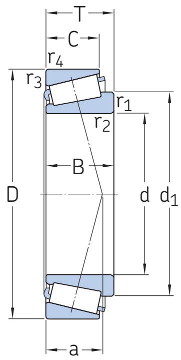
Principal dimensions			Basic load ratings dynamic	static	Fatigue load limit	Speed ratings Reference speed	Limiting speed	Mass	Designation	Dimension series to ISO 355 (ABMA)
d	D	T	C	C_0	P_u					
mm			kN		kN	r/min		kg	–	–
50	72	15	41,3	53	5,6	7 000	8 500	0,19	32910	2BC
	80	20	75,1	88	9,65	6 300	8 000	0,38	▸ 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



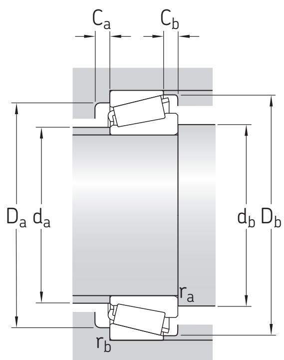
Dimensions							Abutment and fillet dimensions									Calculation factors		
d	d_1 ≈	B	C	$r_{1,2}$ min.	$r_{3,4}$ min.	a	d_a max.	d_b min.	D_a min.	D_a max.	D_b min.	C_a min.	C_b min.	r_a max.	r_b max.	e	Y	Y_0
mm							mm									–		
50	62,2	15	12	1	1	13	56	57,5	66	65	69	3	3	1	1	0,35	1,7	0,9
	65,9	20	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



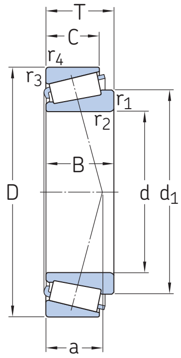
Principal dimensions			Basic load ratings dynamic	static	Fatigue load limit	Speed ratings Reference speed	Limiting speed	Mass	Designation	Dimension series to ISO 355 (ABMA)
d	D	T	C	C_0	P_u					
mm			kN		kN	r/min		kg	–	–
60	85	17	53,2	75	7,8	6 000	7 000	0,3	32912	2BC
	95	23	101	122	13,4	5 300	6 700	0,59	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



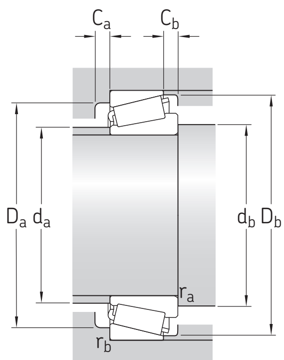
Dimensions							Abutment and fillet dimensions									Calculation factors		
d	d_1 ≈	B	C	$r_{1,2}$ min.	$r_{3,4}$ min.	a	d_a max.	d_b min.	D_a min.	D_a max.	D_b min.	C_a min.	C_b min.	r_a max.	r_b max.	e	Y	Y_0
mm							mm									–		
60	73,8	17	14	1	1	15	67	68	78	78	81	3	3	1	1	0,33	1,8	1
	77,8	23	17,5	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

d **70 – 75** 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	–	–
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

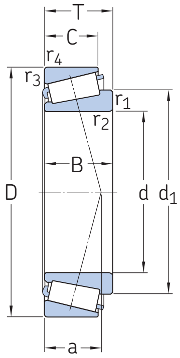
SKF Explorer bearing
▸ Popular item



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

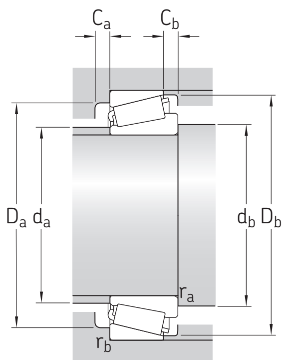
8.1 Metric single row tapered roller bearings

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

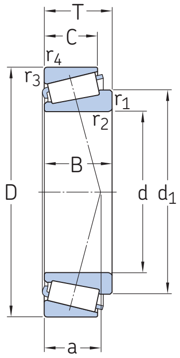
SKF Explorer bearing
▸ Popular item



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

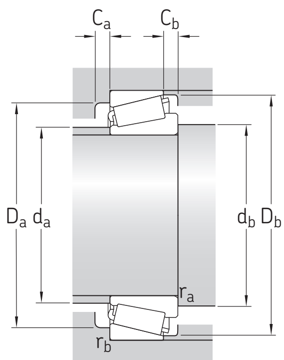
8.1 Metric single row tapered roller bearings

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

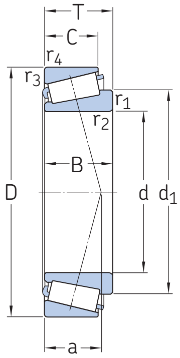
SKF Explorer bearing
▸ Popular item



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

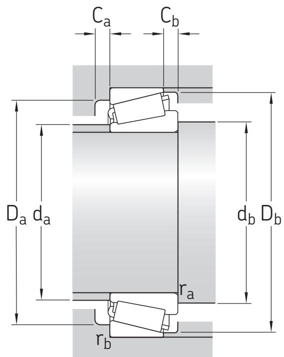
8.1 Metric single row tapered roller bearings

d **105 – 130** mm



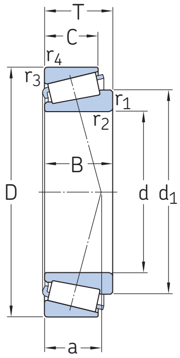
Principal dimensions			Basic load ratings dynamic	static	Fatigue load limit	Speed ratings Reference speed	Limiting speed	Mass	Designation	Dimension series to ISO 355 (ABMA)
d	D	T	C	C_0	P_u					
mm			kN		kN	r/min		kg	–	–
105	145	25	149	212	22,8	3 400	4 000	1,2	32921	2CC
	160	35	248	335	37,5	3 200	3 800	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



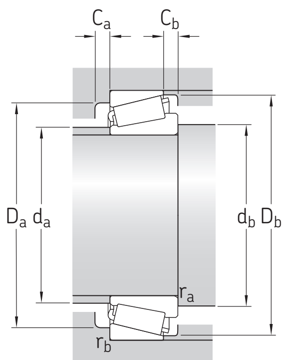
Dimensions							Abutment and fillet dimensions									Calculation factors		
d	d_1 ≈	B	C	$r_{1,2}$ min.	$r_{3,4}$ min.	a	d_a max.	d_b min.	D_a min.	D_a max.	D_b min.	C_a min.	C_b min.	r_a max.	r_b max.	e	Y	Y_0
mm							mm									–		
105	124	25	20	1,5	1,5	25	114	115	135	135	140	5	5	1,5	1,5	0,35	1,7	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	4	65	160	149	230	262	260	10	20,5	5	4	0,35	1,7	0,9

8.1 Metric single row tapered roller bearings
d **140 – 180** mm

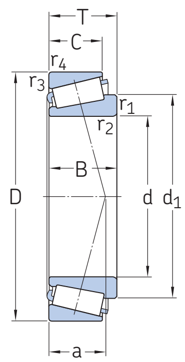


Principal dimensions			Basic load ratings dynamic	static	Fatigue load limit	Speed ratings Reference speed	Limiting speed	Mass	Designation	Dimension series to ISO 355 (ABMA)
d	D	T	C	C_0	P_u					
mm			kN		kN	r/min		kg	–	–
140	190	32	252	390	40	2 600	3 000	2,55	▸ 32928	2CC
	195	29	241	325	33,5	2 400	3 000	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

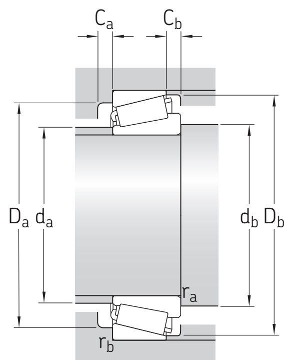


Dimensions							Abutment and fillet dimensions									Calculation factors		
d	d_1 ≈	B	C	$r_{1,2}$ min.	$r_{3,4}$ min.	a	d_a max.	d_b min.	D_a min.	D_a max.	D_b min.	C_a min.	C_b min.	r_a max.	r_b max.	e	Y	Y_0
mm							mm									–		
140	164	32	25	2	1,5	33	151	152	177	180	184	6	7	2	1,5	0,35	1,7	0,9
	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



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	–	–
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

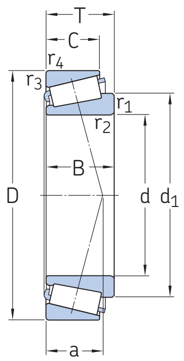
SKF Explorer bearing
▸ Popular item



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

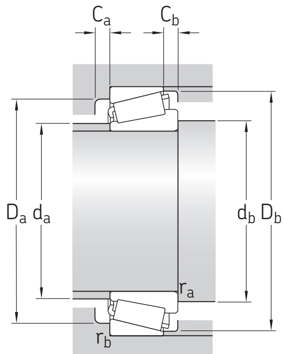
8.2 Inch single row tapered roller bearings

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 *0.5906*	34,988 *1.3775*	10,998 *0.433*	16,5	13,2	1,29	17 000	22 000	0,051	**A 4059/A 4138**	A 4000
15,875 *0.625*	42,862 *1.6875*	14,288 *0.5625*	21,5	17,6	1,8	13 000	17 000	0,1	**11590/11520**	11500
17,462 *0.6875*	39,878 *1.57*	13,843 *0.545*	26,1	20,8	2,12	15 000	18 000	0,082	▸ **LM 11749/710**	LM 11700
19,05 *0.75*	45,237 *1.781*	15,494 *0.61*	33,8	27,5	2,9	13 000	16 000	0,12	▸ **LM 11949/910**	LM 11900
21,43 *0.8437*	50,005 *1.9687*	17,526 *0.69*	45,4	38	4,15	12 000	15 000	0,17	**M 12649/610**	M 12600
22 *0.8661*	45,237 *1.781*	15,494 *0.61*	33,9	31	3,2	12 000	15 000	0,12	▸ **LM 12749/710**	LM 12700
	45,974 *1.81*	15,494 *0.61*	33,9	31	3,2	12 000	15 000	0,12	**LM 12749/711**	LM 12700
22,225 *0.875*	52,388 *2.0625*	19,368 *0.7625*	51,5	44	4,8	11 000	14 000	0,2	**1380/1328**	1300
25,4 *1*	50,292 *1.98*	14,224 *0.56*	32	30	3	11 000	13 000	0,13	▸ **L 44643/610**	L 44600
	57,15 *2.25*	17,462 *0.6875*	49,1	45,5	4,9	10 000	12 000	0,22	**15578/15520**	15500
	57,15 *2.25*	19,431 *0.765*	48,8	45	5	10 000	12 000	0,24	**M 84548/510**	M 84500
	62 *2.4409*	19,05 *0.75*	59,5	57	6,2	9 000	11 000	0,3	**15101/15245**	15000
26,162 *1.03*	61,912 *2.4375*	19,05 *0.75*	59,5	57	6,2	9 000	11 000	0,29	**15103 S/15243**	15000
	62 *2.4409*	19,05 *0.75*	59,5	57	6,2	9 000	11 000	0,29	**15103 S/15245**	15000
26,988 *1.0625*	50,292 *1.98*	14,224 *0.56*	32	30	3	11 000	13 000	0,12	▸ **L 44649/610**	L 44600
27,487 *1.0822*	57,159 *2.2504*	19,845 *0.7813*	55,6	51	5,6	10 000	12 000	0,23	**1982/1924 A**	1900

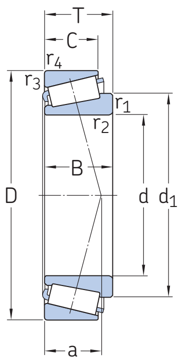
SKF Explorer bearing
▸ Popular item



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 *0.5906*	25,3	10,988 *0.436*	8,73 *0.3437*	0,8 *0.03*	1,3 *0.05*	8	20	20,5	28	29	31	2	2	0,8	1,3	0,46	1,3	0,7
15,875 *0.625*	31,1	14,288 *0.5625*	9,525 *0.375*	1,5 *0.06*	1,5 *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 *0.6875*	28,7	14,605 *0.575*	10,668 *0.42*	1,3 *0.05*	1,3 *0.05*	8	23	24,5	35	34	36	2	3	1,3	1,3	0,28	2,1	1,1
19,05 *0.75*	31,4	16,6373 *0.655*	12,065 *0.475*	1,3 *0.05*	1,3 *0.05*	9	26	26	38	39	41	3	3	1,3	1,3	0,3	2	1,1
21,43 *0.8437*	34,6	18,288 *0.72*	13,97 *0.55*	1,3 *0.05*	1,3 *0.05*	10	28	28,5	43	43,5	46	3	3,5	1,3	1,3	0,28	2,1	1,1
22 *0.8661*	34,8	16,637 *0.655*	12,065 *0.475*	1,3 *0.05*	1,3 *0.05*	10	28	29	39	39	42	3	3	1,3	1,3	0,31	1,9	1,1
	34,8	16,637 *0.655*	12,065 *0.475*	1,3 *0.05*	1,3 *0.05*	10	28	29	39	40	42	3	3	1,3	1,3	0,31	1,9	1,1
22,225 *0.875*	36	20,168 *0.794*	14,288 *0.5625*	1,5 *0.06*	1,5 *0.06*	11	29	30	45	45,5	48	4	5	1,5	1,5	0,3	2	1,1
25,4 *1*	39,6	14,732 *0.58*	10,668 *0.42*	1,3 *0.05*	1,3 *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 *0.6875*	13,495 *0.5313*	1,3 *0.05*	1,5 *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 *0.765*	14,732 *0.58*	1,5 *0.06*	1,5 *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 *0.8125*	14,288 *0.5625*	0,8 *0.03*	1,3 *0.05*	12	38	32	54	55	58	4	4,5	0,8	1,3	0,35	1,7	0,9
26,162 *1.03*	45,8	19,939 *0.785*	14,288 *0.5525*	0,8 *0.03*	2 *0.08*	12	38	33	54	54	58	4	4,5	0,8	2	0,35	1,7	0,9
	45,8	19,939 *0.785*	14,288 *0.5625*	0,8 *0.03*	1,3 *0.05*	12	38	33	54	55	58	4	4,5	0,8	1,3	0,35	1,7	0,9
26,988 *1.0625*	39,6	14,732 *0.58*	10,668 *0.42*	3,5 *0.14*	1,3 *0.05*	10	33	38,5	44	44	47	2	3,5	3,5	1,3	0,37	1,6	0,9
27,487 *1.0822*	42	19,355 *0.762*	15,875 *0.625*	2,5 *0.10*	0,8 *0.03*	13	35	37,5	49	51	54	3	3,5	2,5	0,8	0,33	1,8	1

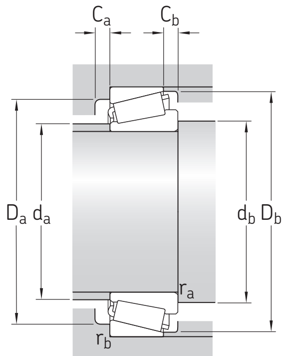
8.2 Inch single row tapered roller bearings

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 *1.125*	57,15 *2.25*	19,845 *0.7813*	58,2	55	6	10 000	12 000	0,23	**1985/1922**	1900
	57,15 *2.25*	19,845 *0.7813*	58,2	55	6	10 000	12 000	0,23	**1988/1922**	1900
	64,292 *2.5312*	21,433 *0.8438*	60,4	61	6,8	8 500	11 000	0,35	**M 86647/610**	M 86600
29 *1.1417*	50,292 *1.98*	14,224 *0.56*	31,8	32,5	3,35	11 000	13 000	0,11	▸ **L 45449/410**	L 45400
30,162 *1.1875*	64,292 *2.5312*	21,433 *0.8438*	60,4	61	6,8	8 500	11 000	0,34	**M 86649/610**	M 86600
	68,262 *2.6875*	22,225 *0.875*	67,1	69,5	7,8	8 000	10 000	0,41	**M 88043/010**	M 88000
31,75 *1.25*	59,131 *2.328*	15,875 *0.625*	42,8	41,5	4,4	9 500	11 000	0,18	**LM 67048/010**	LM 67000
	61,912 *2.4375*	18,161 *0.715*	59,5	57	6,2	9 000	11 000	0,24	**15123/15243**	15000
	62 *2.4409*	18,161 *0.715*	59,5	57	6,2	9 000	11 000	0,24	▸ **15123/15245**	15000
	73,025 *2.875*	29,37 *1.1563*	86,5	95	10,4	7 500	9 000	0,62	**HM 88542/510**	HM 88500
33,338 *1.3125*	68,262 *2.6875*	22,225 *0.875*	67,1	69,5	7,8	8 000	10 000	0,38	**M 88048/010**	M 88000
	69,012 *2.717*	19,845 *0.7813*	65,8	67	7,35	8 000	10 000	0,35	**14131/14276**	14000
34,925 *1.375*	65,088 *2.5625*	18,034 *0.71*	58	57	6,2	8 500	10 000	0,25	▸ **LM 48548/510**	LM 48500
	65,088 *2.5625*	18,034 *0.71*	58	57	6,2	8 500	10 000	0,26	▸ **LM 48548 A/510**	LM 48500
	69,012 *2.717*	19,845 *0.7831*	65,8	67	7,35	8 000	10 000	0,34	**14137 A/14276**	14000
	72,233 *2.8438*	25,4 *1*	83	90	10	7 500	9 000	0,5	**HM 88649 X/610**	HM 88600
	72,233 *2.8438*	25,4 *1*	83	90	10	7 500	9 000	0,5	**HM 88649/610**	HM 88600
	73,025 *2.875*	23,812 *0.9375*	89,1	88	9,8	8 000	9 500	0,48	**25877/25821**	25800
	73,025 *2.875*	26,988 *1.0625*	94,6	93	10,4	8 000	9 500	0,53	**23690/23620**	23600
	76,2 *3*	29,37 *1.1563*	95,2	106	11,8	7 000	8 500	0,66	**HM 89446/410**	HM 89400

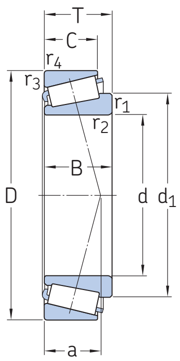
SKF Explorer bearing
▸ Popular item



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 *1.125*	42,1	19,355 *0.762*	15,875 *0.625*	0,8 *0.03*	1,5 *0.06*	13	35	35	49	50	54	3	3,5	0,8	1,5	0,33	1,8	1
	42	19,355 *0.762*	15,875 *0.625*	3,5 *0.04*	1,5 *0.06*	13	35	40,5	49	50	54	3	3,5	3,5	1,5	0,33	1,8	1
	50,1	21,433 *0.8438*	16,67 *0.6563*	1,5 *0.06*	1,5 *0.06*	17	38	36,5	51	57	60	3	4,5	1,5	1,5	0,54	1,1	0,6
29 *1.1417*	40,7	14,732 *0.58*	10,668 *0.42*	3,5 *0.14*	1,3 *0.05*	10	34	41	45	44	48	3	3,5	3,5	1,3	0,37	1,6	0,9
30,162 *1.1875*	50,1	21,433 *0.8438*	16,67 *0.6563*	1,5 *0.06*	1,5 *0.06*	17	38	38,5	51	57	60	3	4,5	1,5	1,5	0,54	1,1	0,6
	52,3	22,28 *0.8772*	17,462 *0.6875*	2,4 *0.09*	1,6 *0.06*	18	41	40	54	61	64	3	4,5	2,4	1,6	0,54	1,1	0,6
31,75 *1.25*	45,6	16,77 *0.6602*	11,811 *0.465*	3,6 *0.14*	1,3 *0.05*	12	38	44	51	52	55	3	4	3,6	1,3	0,4	1,5	0,8
	45,7	19,05 *0.75*	14,288 *0.5625*	3,6 *0.14*	2 *0.08*	12	38	44	54	54	58	4	3,5	3,6	2	0,35	1,7	0,9
	45,7	19,05 *0.75*	14,288 *0.5625*	3,6 *0.14*	1,3 *0.05*	12	38	44	54	55	58	4	3,5	3,6	1,3	0,35	1,7	0,9
	56,9	27,783 *1.0938*	23,02 *0.9063*	1,2 *0.05*	3,3 *0.13*	23	42	39,5	55	62	69	3	6	1,2	3,3	0,54	1,1	0,6
33,338 *1.3125*	52,3	22,28 *0.8872*	17,462 *0.6875*	0,8 *0.03*	1,6 *0.06*	18	41	40	54	61	64	3	4,5	0,8	1,6	0,54	1,1	0,6
	50,7	19,583 *0.771*	15,875 *0.625*	0,8 *0.03*	1,3 *0.05*	15	43	40	57	62	63	3	3,5	0,8	1,3	0,37	1,6	0,9
34,925 *1.375*	50	18,288 *0.72*	13,97 *0.55*	3,6 *0.14*	1,3 *0.05*	14	42	47,5	57	58	61	3	4	3,6	1,3	0,37	1,6	0,9
	50	18,288 *0.72*	13,97 *0.55*	0,8 *0.03*	1,3 *0.05*	14	42	41,5	57	58	61	3	4	0,8	1,3	0,37	1,6	0,9
	50,7	19,583 *0.771*	15,875 *0.625*	1,5 *0.06*	1,3 *0.05*	15	43	43	57	62	63	3	3,5	1,5	1,3	0,37	1,6	0,9
	56,6	25,4 *1*	19,842 *0.7812*	1 *0.04*	2,3 *0.09*	20	42	42,5	57	63	68	5	5,5	1	2,3	0,54	1,1	0,6
	56,6	25,4 *1*	19,842 *0.7812*	2,3 *0.09*	2,3 *0.09*	20	42	45	57	63	68	5	5,5	2,3	2,3	0,54	1,1	0,6
	52,5	24,608 *0.9688*	19,05 *0.75*	1,5 *0.06*	0,8 *0.03*	15	44	43	62	67	67	5	4,5	1,5	0,8	0,3	2	1,1
	52,3	26,975 *1.062*	22,225 *0.875*	3,5 *0.14*	1,5 *0.06*	18	42	47	59	65	67	3	4,5	3,5	1,5	0,37	1,6	0,9
	59,3	28,575 *1.125*	23,02 *0.9063*	3,5 *0.14*	3,3 *0.13*	23	44	47,5	58	65	72	3	6	3,5	3,3	0,54	1,1	0,6

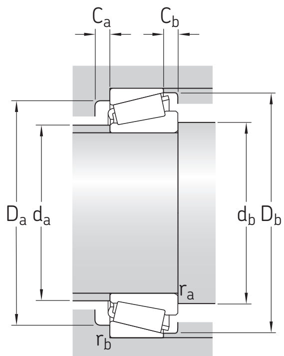
8.2 Inch single row tapered roller bearings

d **34,987 – 39,688** mm
1.3774 – 1.5625 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	–	–
34,987 *1.3774*	59,131 *2.328*	15,875 *0.625*	40,6	44	4,5	9 000	11 000	0,17	▸ **L 68149/110**	L 68100
	59,975 *2.3612*	15,875 *0.625*	40,6	44	4,5	9 000	11 000	0,18	▸ **L 68149/111**	L 68100
35,717 *1.4062*	72,233 *2.8438*	25,4 *1*	83	90	10	7 500	9 000	0,49	**HM 88648/610**	HM 88600
36,487 *1.4365*	73,025 *2.875*	23,812 *0.9375*	89,1	88	9,8	8 000	9 500	0,46	**25880/25820**	25800
36,512 *1.4375*	76,2 *3*	29,37 *1.1563*	95,2	106	11,8	7 000	8 500	0,64	**HM 89449/410**	HM 89400
38,1 *1.5*	65,088 *2.5625*	18,034 *0.71*	53	57	6,1	8 000	10 000	0,23	▸ **LM 29748/710**	LM 29700
	65,088 *2.5625*	18,034 *0.71*	53	57	6,1	8 000	10 000	0,24	▸ **LM 29749/710**	LM 29700
	65,088 *2.5625*	19,812 *0.78*	53	57	6,1	8 000	10 000	0,25	**LM 29749/711**	LM 29700
	72,238 *2.844*	20,638 *0.8125*	60,3	60	6,55	8 000	9 500	0,36	▸ **16150/16284**	16000
	72,238 *2.844*	23,813 *0.9375*	60,3	60	6,55	8 000	9 500	0,39	**16150/16283**	16000
	76,2 *3*	23,812 *0.9375*	92,1	93	10,4	7 500	9 000	0,5	**2788/2720**	2700
	79,375 *3.125*	29,37 *1.1563*	112	110	12,5	7 000	8 500	0,68	**3490/3420**	3400
	82,55 *3.25*	29,37 *1.1563*	106	118	13,4	6 700	8 000	0,77	**HM 801346 X/310**	HM 801300
	82,55 *3.25*	29,37 *1.1563*	106	118	13,4	6 700	8 000	0,78	▸ **HM 801346/310**	HM 801300
	82,931 *3.265*	23,812 *0.9375*	99,1	106	11,8	6 700	8 000	0,65	▸ **25572/25520**	25500
	88,5 *3.4843*	26,988 *1.0625*	123	114	13,2	6 700	8 500	0,83	**418/414**	415
39,688 *1.5625*	76,2 *3*	23,812 *0.9375*	92,1	93	10,4	7 500	9 000	0,48	**2789/2729**	2700

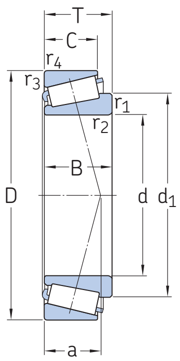
SKF Explorer bearing
▸ Popular item



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 *1.3774*	48,4	16,764 *0.66*	11,938 *0.47*	3,5 *0.14*	1,3 *0.05*	13	41	47	52	52	56	3	3,5	3,5	1,3	0,43	1,4	0,8
	48,4	16,764 *0.66*	11,938 *0.47*	3,5 *0.14*	1,3 *0.05*	13	41	47	52	53	56	3	3,5	3,5	1,3	0,43	1,4	0,8
35,717 *1.4062*	56,6	25,4 *1*	19,842 *0.7812*	3,5 *0.14*	2,3 *0.09*	20	42	48	57	63	68	5	5,5	3,5	2,3	0,54	1,1	0,6
36,487 *1.4365*	52,5	24,608 *0.9688*	19,05 *0.75*	1,5 *0.06*	2,3 *0.09*	15	44	45	62	64	67	5	4,5	1,5	2,3	0,3	2	1,1
36,512 *1.4375*	59,3	28,575 *1.125*	23,02 *0.9063*	3,5 *0.14*	3,3 *0.13*	23	44	49	58	65	72	3	6	3,5	3,3	0,54	1,1	0,6
38,1 *1.5*	52	18,288 *0.72*	13,97 *0.55*	3,6 *0.14*	1,3 *0.05*	13	44	51	58	58	61	3	4	3,6	1,3	0,33	1,8	1
	51,8	18,288 *0.72*	13,97 *0.55*	2,3 *0.09*	1,3 *0.05*	13	45	48	58	58	61	3	4	2,3	1,3	0,33	1,8	1
	51,8	18,288 *0.72*	15,748 *0.62*	2,3 *0.09*	1,3 *0.05*	15	45	48	57	58	61	2	4	2,3	1,3	0,33	1,8	1
	53,8	20,638 *0.8125*	15,875 *0.625*	3,5 *0.14*	1,3 *0.05*	16	45	51	60	65	66	3	4,5	3,5	1,3	0,4	1,5	0,8
	53,8	20,638 *0.8125*	19,05 *0.75*	3,5 *0.14*	2,3 *0.09*	19	45	51	58	63	66	3	4,5	3,5	2,3	0,4	1,5	0,8
	54,8	25,654 *1.01*	19,05 *0.75*	3,5 *0.14*	3,3 *0.13*	15	46	51	64	65	69	5	4,5	3,5	3,3	0,3	2	1,1
	57,3	29,771 *1.1721*	23,812 *0.9375*	3,5 *0.14*	3,3 *0.13*	20	46	51	65	68	73	4	5,5	3,5	3,3	0,37	1,6	0,9
	64,1	28,575 *1.125*	23,02 *0.9063*	2,3 *0.09*	3,3 *0.13*	24	49	48,5	64	71	78	4	6	2,3	3,3	0,54	1,1	0,6
	64,1	28,575 *1.125*	23,02 *0.9063*	0,8 *0.03*	3,3 *0.13*	24	49	45,5	64	71	78	4	6	0,8	3,3	0,54	1,1	0,6
	62,2	25,4 *1*	19,05 *0.75*	0,8 *0.03*	0,8 *0.03*	16	53	45,5	71	76	76	5	4,5	0,8	0,8	0,33	1,8	1
	58,8	29,083 *1.145*	22,225 *0.875*	3,5 *0.14*	1,5 *0.06*	16	49	51	73	81	78	5	4,5	3,5	1,5	0,26	2,3	1,3
39,688 *1.5625*	54,8	25,654 *1.01*	19,05 *0.75*	3,5 *0.14*	0,8 *0.03*	15	46	52	64	70	69	5	4,5	3,5	0,8	0,3	2	1,1

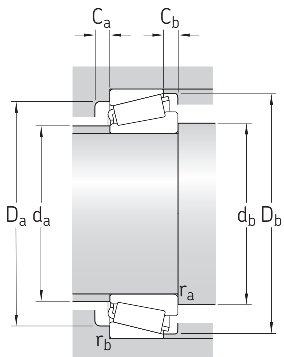
8.2 Inch single row tapered roller bearings

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 *1.5748*	80 *3.1496*	21 *0.8268*	87,6	80	9,15	7 000	8 500	0,47	344/332	335
	80 *3.1496*	21 *0.8268*	87,6	80	9,15	7 000	8 500	0,47	344/332 AA	335
	80 *3.1496*	21 *0.8268*	87,6	80	9,15	7 000	8 500	0,48	344 A/332	335
41 *1.6142*	68 *2.6772*	17,5 *0.689*	53,6	58,5	6,3	8 000	9 500	0,24	▸ LM 300849/811	LM 300800
41,275 *1.625*	73,025 *2.875*	16,667 *0.6562*	57,7	56	6,2	7 500	9 000	0,28	▸ 18590/18520	18500
	73,431 *2.891*	19,558 *0.77*	67,6	68	7,65	7 500	9 000	0,34	▸ LM 501349/310	LM 501300
	73,431 *2.891*	21,43 *0.8437*	67,6	68	7,65	7 500	9 000	0,36	▸ LM 501349/314	LM 501300
	76,2 *3*	18,009 *0.709*	55,7	56	6,1	7 000	9 000	0,34	11162/11300	11000
	76,2 *3*	18,009 *0.709*	55,7	56	6,1	7 000	9 000	0,34	11163/11300	11000
	76,2 *3*	22,225 *0.875*	84,2	86,5	9,65	7 000	9 000	0,44	▸ 24780/24720	24700
	82,55 *3.25*	26,543 *1.045*	91,2	91,5	10,6	6 700	8 000	0,62	M 802048/011	M 802000
	87,312 *3.4375*	30,162 *1.1875*	126	132	15	6 300	8 000	0,85	3585/3525	3500
	88,9 *3.5*	30,162 *1.1875*	116	127	14,6	6 000	7 500	0,91	HM 803146/110	HM 803100
	101,6 *4*	34,925 *1.375*	184	190	21,6	5 600	6 700	1,45	526/522	525
42,875 *1.688*	82,931 *3.265*	23,812 *0.9375*	99,1	106	11,8	6 700	8 000	0,59	▸ 25577/25520	25500
	82,931 *3.265*	26,988 *1.0625*	99,1	106	12	6 700	8 000	0,63	25577/25523	25500

SKF Explorer bearing
▸ Popular item



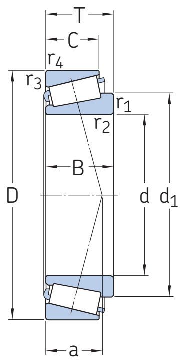
Dimensions							Abutment and fillet dimensions									Calculation factors		
d	d_1 ≈	B	C	$r_{1,2}$ min.	$r_{3,4}$ min.	a	d_a max.	d_b min.	D_a min.	D_a max.	D_b min.	C_a min.	C_b min.	r_a max.	r_b max.	e	Y	Y_0
mm/*in.*							mm									–		
40 *1.5748*	57,6	22,403 *0.882*	17,826 *0.7018*	3,5 *0.14*	1,3 *0.05*	14	50	53	72	73	75	4	3	3,5	1,3	0,27	2,2	1,3
	57,6	22,403 *0.882*	17,826 *0.7018*	3,5 *0.14*	0,8 *0.03*	14	50	53	72	74	75	4	3	3,5	0,8	0,27	2,2	1,3
	57,6	22,403 *0.882*	17,826 *0.7018*	0,8 *0.03*	1,3 *0.05*	14	50	47	72	73	75	4	3	0,8	1,3	0,27	2,2	1,3
41 *1.6142*	55,4	18 *0.7087*	13,5 *0.5315*	3,6 *0.14*	1,5 *0.06*	13	47	54	61	60	64	3	4	3,6	1,5	0,35	1,7	0,9
41,275 *1.625*	56,2	17,463 *0.6875*	12,7 *0.5*	3,5 *0.14*	1,5 *0.06*	13	50	54	66	65	68	3	3,5	3,5	1,5	0,35	1,7	0,9
	57,7	19,812 *0.78*	14,732 *0.58*	3,5 *0.14*	0,8 *0.03*	15	48	54	64	67	69	4	4,5	3,5	0,8	0,4	1,5	0,8
	57,7	19,812 *0.78*	16,604 *0.6537*	3,5 *0.14*	0,8 *0.03*	17	48	54	63	67	69	3	4,5	3,5	0,8	0,4	1,5	0,8
	58,2	17,384 *0.6844*	14,288 *0.5625*	1,5 *0.06*	1,5 *0.06*	16	50	49,5	65	68	71	3	3,5	1,5	1,5	0,48	1,25	0,7
	58,2	17,384 *0.6844*	14,288 *0.5625*	0,8 *0.03*	1,5 *0.06*	16	50	48,5	65	68	71	3	3,5	0,8	1,5	0,48	1,25	0,7
	57,7	23,02 *0.9063*	17,462 *0.6875*	3,5 *0.14*	0,8 *0.03*	17	49	54	65	70	71	4	4,5	3,5	0,8	0,4	1,5	0,8
	62,3	25,654 *1.01*	20,193 *0.795*	3,5 *0.14*	3,3 *0.13*	22	49	54	66	71	78	4	6	3,5	3,3	0,54	1,1	0,6
	63,1	30,886 *1.216*	23,812 *0.9375*	1,5 *0.06*	3,3 *0.13*	19	53	50	73	76	80	4	6	1,5	3,3	0,31	1,9	1,1
	69	29,37 *1.1563*	23,02 *0.9063*	3,5 *0.14*	3,3 *0.13*	25	53	54	70	77	84	4	7	3,5	3,3	0,54	1,1	0,6
	72,9	36,068 *1.42*	26,988 *1.0625*	3,5 *0.14*	3,3 *0.13*	21	61	55	87	90	94	6	7,5	3,5	3,3	0,28	2,1	1,1
42,875 *1.688*	62,2	25,4 *1*	19,05 *0.75*	3,5 *0.13*	0,8 *0.03*	16	53	56	71	76	76	5	4,5	3,5	0,8	0,33	1,8	1
	62,2	25,4 *1*	22,225 *0.875*	3,5 *0.14*	2,3 *0.09*	20	53	56	70	73	76	3	4,5	3,5	2,3	0,33	1,8	1

8.2

8.2 Inch single row tapered roller bearings

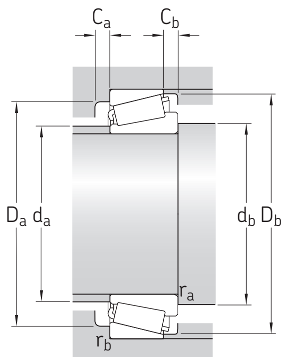
d **44,45 – 45,618** mm

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 *1.75*	82,931 *3.265*	23,812 *0.9375*	99,1	106	11,8	6 700	8 000	0,57	**25580/25520**	25500
	82,931 *3.265*	26,988 *1.0625*	99,1	106	11,8	6 700	8 000	0,61	**25580/25522**	25500
	82,931 *3.265*	26,988 *1.0625*	99,1	106	11,8	6 700	8 000	0,61	**25580/25523**	25500
	88,9 *3.5*	30,162 *1.1875*	116	127	14,6	6 000	7 500	0,86	**HM 803149/110**	HM 803000
	93,264 *3.6718*	30,163 *1.1875*	134	146	17	5 600	7 000	0,98	**3782/3720**	3700
	95,25 *3.75*	30,958 *1.2188*	108	96,5	11,4	5 300	7 000	0,93	▸ **53178/53377**	53000
	95,25 *3.75*	30,958 *1.2188*	124	122	14	5 300	7 000	1	**HM 903249/210**	HM 903200
	104,775 *4.125*	36,512 *1.4375*	180	204	22,4	5 000	6 300	1,65	**HM 807040/010**	HM-807000
	107,95 *4.25*	36,512 *1.4375*	183	190	21,6	5 300	6 300	1,7	▸ **535/532 X**	535
	111,125 *4.375*	38,1 *1.5*	183	190	21,6	5 300	6 300	1,85	▸ **535/532 A**	535
45 *1.7717*	85 *3.3465*	20,638 *0.8125*	87,3	81,5	9,3	6 700	8 000	0,5	**358 X/354 X**	355
45,237 *1.781*	87,312 *3.4375*	30,162 *1.1875*	126	132	15	6 300	8 000	0,78	**3586/3525**	3500
45,242 *1.7812*	73,431 *2.891*	19,558 *0.77*	66	75	8,15	7 000	8 500	0,31	▸ **LM 102949/910**	LM 102900
	77,788 *3.0625*	19,842 *0.7812*	66,8	69,5	7,65	7 000	8 500	0,37	**LM 603049/011**	LM 603000
	77,788 *3.0625*	19,842 *0.7812*	66,8	69,5	7,65	7 000	8 500	0,37	**LM 603049/011 AA**	LM 603000
	77,788 *3.0625*	21,43 *0.8437*	66,8	69,5	7,65	7 000	8 500	0,39	**LM 603049/012**	LM 603000
45,618 *1.796*	82,931 *3.265*	23,812 *0.9375*	99,1	106	11,8	6 700	8 000	0,55	**25590/25520**	25500
	82,931 *3.265*	26,988 *1.0625*	99,1	106	11,8	6 700	8 000	0,59	**25590/25523**	25500
	83,058 *3.27*	23,876 *0.94*	99,1	106	11,8	6 700	8 000	0,55	**25590/25522**	25500

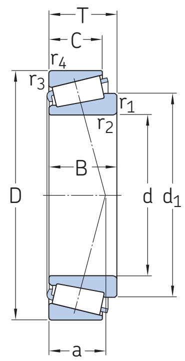
SKF Explorer bearing
▸ Popular item



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 *1.75*	62,2	25,4 *1*	19,05 *0.75*	3,5 *0.14*	0,8 *0.03*	16	53	57	71	76	76	5	4,5	3,5	0,8	0,33	1,8	1
	62,2	25,4 *1*	22,225 *0.875*	3,5 *0.14*	2,3 *0.09*	20	53	57	70	73	76	3	4,5	3,5	2,3	0,33	1,8	1
	62,2	25,4 *1*	22,225 *0.875*	3,5 *0.14*	2,3 *0.09*	20	53	57	70	73	76	3	4,5	3,5	2,3	0,33	1,8	1
	69	29,37 *1.1563*	23,02 *0.9063*	3,5 *0.14*	3,3 *0.13*	25	53	58	70	77	84	4	7	3,5	3,3	0,54	1,1	0,6
	71,2	30,302 *1.193*	23,812 *0.9375*	3,5 *0.14*	3,3 *0.13*	21	60	58	80	81	87	4	6	3,5	3,3	0,33	1,8	1
	69,3	28,3 *1.1142*	20,638 *0.8125*	2 *0.08*	2,3 *0.09*	30	53	55	72	86	89	4	10	2	2,3	0,75	0,8	0,45
	71,6	28,575 *1.125*	22,225 *0.875*	3,5 *0.14*	0,8 *0.03*	30	53	58	71	89	90	4	8,5	3,5	0,8	0,75	0,8	0,45
	81,5	36,512 *1.4375*	28,575 *1.125*	3,5 *0.14*	3,3 *0.13*	28	63	58	85	93	100	6	7,5	3,5	3,3	0,48	1,25	0,7
	76,5	36,957 *1.455*	28,575 *1.125*	3,5 *0.14*	3,3 *0.13*	23	64	58	90	96	97	5	7,5	3,5	3,3	0,3	2	1,1
	76,5	36,957 *1.455*	30,162 *1.1875*	3,5 *0.14*	3,3 *0.13*	25	64	58	89	99	97	4	7,5	3,5	3,3	0,3	2	1,1
45 *1.7717*	62,4	21,692 *0.854*	17,462 *0.6875*	2 *0.08*	1,5 *0.06*	15	55	55	76	77	80	3	3	2	1,5	0,31	1,9	1,1
45,237 *1.781*	63,1	30,886 *1.216*	23,812 *0.9375*	3,5 *0.14*	3,3 *0.13*	19	53	58	73	76	80	4	6	3,5	3,3	0,31	1,9	1,1
45,242 *1.7812*	59,4	19,812 *0.78*	15,748 *0.62*	3,5 *0.14*	0,8 *0.03*	14	52	58	66	67	70	3	3,5	3,5	0,8	0,3	2	1,1
	62	19,842 *0.7812*	15,08 *0.5937*	3,5 *0.14*	0,8 *0.03*	17	52	58	68	71	74	4	4,5	3,5	0,8	0,43	1,4	0,8
	62	19,842 *0.7812*	15,08 *0.5937*	3,5 *0.14*	0,3 *0.01*	17	52	58	68	72	74	4	4,5	3,5	0,3	0,43	1,4	0,8
	62	19,842 *0.7812*	16,667 *0.6562*	3,5 *0.14*	0,8 *0.03*	18	52	58	67	71	74	3	4,5	3,5	0,8	0,43	1,4	0,8
45,618 *1.796*	62,1	25,4 *1*	19,05 *0.75*	3,5 *0.14*	0,8 *0.03*	16	53	58	71	76	76	5	4,5	3,5	0,8	0,33	1,8	1
	62,1	25,4 *1*	22,225 *0.875*	3,5 *0.14*	2,3 *0.09*	20	53	58	70	73	76	3	4,5	3,5	2,3	0,33	1,8	1
	62,1	25,4 *1*	19,114 *0.7525*	3,5 *0.14*	2 *0.08*	17	53	58	71	74	76	5	4,5	3,5	2	0,33	1,8	1

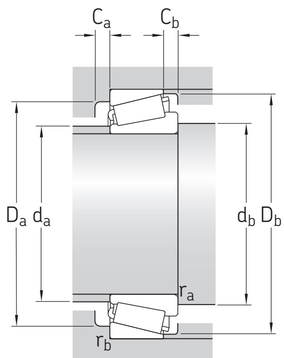
8.2 Inch single row tapered roller bearings

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 *1.811*	75 *2.9528*	18 *0.7087*	62,1	71	7,65	7 000	8 500	0,3	▸ LM 503349 A/310	LM 503300
	75 *2.9528*	18 *0.7087*	62,1	71	7,65	7 000	8 500	0,3	▸ LM 503349/310	LM 503300
46,038 *1.8125*	79,375 *3.125*	17,462 *0.6875*	61,1	62	6,8	7 000	8 500	0,33	▸ 18690/18620	18600
	85 *3.3465*	20,638 *0.8125*	87,3	81,5	9,3	6 700	8 000	0,49	359 S/354 X	355
47,625 *1.875*	88,9 *3.5*	20,638 *0.8125*	94	91,5	10,4	6 300	7 500	0,55	369 S/362 A	365
	95,25 *3.75*	30,162 *1.1875*	133	146	17,3	5 600	7 000	0,99	HM 804846/810	HM 804800
	101,6 *4*	34,925 *1.375*	184	190	21,6	5 600	6 700	1,3	528 R/522	525
49,212 *1.9375*	114,3 *4.5*	44,45 *1.75*	226	224	25	5 000	6 300	2,2	65390/65320	65300
50,8 *2*	82,55 *3.25*	21,59 *0.85*	88,9	100	11	6 300	8 000	0,43	LM 104949/911	LM 104900
	85 *3.3465*	17,462 *0.6875*	62,1	65,5	7,2	6 300	8 000	0,37	18790/18720	18700
	88,9 *3.5*	20,638 *0.8125*	94	91,5	10,4	6 300	7 500	0,5	368 A/362 A	365
	90 *3.5433*	25 *0.9843*	94	91,5	10,4	6 300	7 500	0,58	368 A/362 X	365
	93,264 *3.6718*	30,162 *1.1875*	134	146	17	5 600	7 000	0,87	3780/3720	3700
	104,775 *4.125*	36,512 *1.4375*	180	204	22,4	5 000	6 300	1,5	HM 807046/010	HM 807000
	104,775 *4.125*	39,688 *1.5625*	195	224	25	5 300	6 300	1,65	▸ 4580/4535	4500
	107,95 *4.25*	36,512 *1.4375*	183	190	21,6	5 300	6 300	1,55	▸ 537/532 X	535

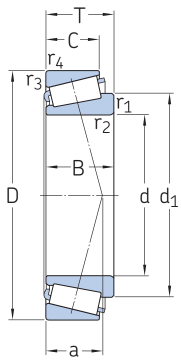
SKF Explorer bearing
▸ Popular item



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 *1.811*	61	18 *0.7087*	14 *0.5512*	3,6 *0.14*	1,6 *0.06*	15	53	59	67	67	71	3	4	3,6	1,6	0,4	1,5	0,8
	61	18 *0.7087*	14 *0.5512*	2,3 *0.09*	1,6 *0.06*	15	53	56	67	67	71	3	4	2,3	1,6	0,4	1,5	0,8
46,038 *1.8125*	60,2	17,462 *0.6875*	13,495 *0.5313*	2,8 *0.11*	1,5 *0.06*	14	53	57	69	71	73	3	3,5	2,8	1,5	0,37	1,6	0,9
	62,4	21,692 *0.854*	17,462 *0.6875*	2,3 *0.09*	1,5 *0.06*	15	55	57	76	77	80	3	3	2,3	1,5	0,31	1,9	1,1
47,625 *1.875*	66,2	22,225 *0.875*	16,513 *0.6501*	2,3 *0.09*	1,3 *0.05*	16	58	58	80	81	83	4	4	2,3	1,3	0,31	1,9	1,1
	73,6	29,37 *1.1563*	23,02 *0.9063*	3,5 *0.14*	3,3 *0.13*	25	57	61	76	84	90	5	7	3,5	3,3	0,54	1,1	0,6
	72,9	36,068 *1.42*	26,988 *1.0625*	8 *0.32*	3,3 *0.13*	21	61	70	87	90	94	6	7,5	8	3,3	0,28	2,1	1,1
49,212 *1.9375*	79,3	44,45 *1.75*	34,925 *1.375*	3,5 *0.14*	3,3 *0.13*	31	60	63	89	102	105	5	9,5	3,5	3,3	0,43	1,4	0,8
50,8 *2*	65,2	22,225 *0.875*	16,51 *0.65*	3,5 *0.13*	1,3 *0.05*	15	57	64	75	75	78	5	5	3,5	1,3	0,3	2	1,1
	66	17,462 *0.6875*	13,495 *0.5313*	3,5 *0.14*	1,5 *0.06*	16	59	64	75	77	79	3	3,5	3,5	1,5	0,4	1,5	0,8
	66,2	22,225 *0.875*	16,513 *0.6501*	3,5 *0.14*	1,3 *0.05*	16	58	64	80	81	83	4	4	3,5	1,3	0,31	1,9	1,1
	66,2	22,225 *0.875*	20 *0.7874*	3,5 *0.14*	2 *0.08*	20	58	64	78	81	83	3	5	3,5	2	0,31	1,9	1,1
	71,2	30,302 *1.193*	23,812 *0.9375*	3,5 *0.14*	3,3 *0.13*	21	60	64	80	81	87	4	6	3,5	3,3	0,33	1,8	1
	81,5	36,512 *1.4375*	28,575 *1.125*	3,5 *0.14*	3,3 *0.13*	28	63	64	85	93	100	6	7,5	3,5	3,3	0,48	1,25	0,7
	79,5	40,157 *1.581*	33,338 *1.3125*	3,5 *0.14*	3,3 *0.13*	27	65	64	87	93	98	5	6	3,5	3,3	0,33	1,8	1
	76,5	36,957 *1.455*	28,575 *1.125*	3,5 *0.14*	3,3 *0.13*	23	64	64	90	96	97	5	7,5	3,5	3,3	0,3	2	1,1

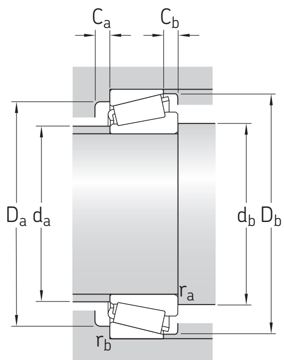
8.2 Inch single row tapered roller bearings

d **53,975 – 60,325** mm
2.125 – 2.375 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	–	–
53,975 *2.125*	88,9 *3.5*	19,05 *0.75*	71,5	78	9	6 000	7 000	0,44	**LM 806649/610**	LM 806600
	95,25 *3.75*	27,783 *1.0938*	129	137	16	5 600	7 000	0,81	**33895/33821**	33800
	95,25 *3.75*	27,783 *1.0938*	129	137	16	5 600	7 000	0,81	**33895/33822**	33800
	107,95 *4.25*	36,512 *1.4375*	183	190	21,6	5 300	6 300	1,45	▸ **539/532 X**	535
	111,125 *4.375*	38,1 *1.5*	183	190	21,6	5 300	6 300	1,65	▸ **539/532 A**	535
	123,825 *4.875*	36,512 *1.4375*	174	160	19,6	4 300	5 600	2	**72212/72487**	72000
57,15 *2.25*	96,838 *3.8125*	21 *0.8268*	99,9	102	11,6	5 600	6 700	0,59	**387 A/382 A**	385
	96,838 *3.8125*	21 *0.8268*	99,9	102	11,6	5 600	6 700	0,59	**387/382 A**	385
	96,838 *3.8125*	25,4 *1*	99,9	102	11,6	5 600	6 700	0,65	**387 A/382 S**	385
	98,425 *3.875*	21 *0.8268*	99,9	102	11,6	5 600	6 700	0,64	**387/382**	385
	104,775 *4.125*	30,162 *1.1875*	150	160	18,6	5 300	6 300	1,05	▸ **462/453 X**	455
	112,712 *4.4375*	30,162 *1.1875*	175	204	23,6	4 500	5 600	1,4	**39580/39520**	39500
	112,712 *4.4375*	30,162 *1.1875*	175	204	23,6	4 500	5 600	1,4	▸ **39581/39520**	39500
	119,985 *4.7238*	32,751 *1.2894*	175	204	23,6	4 500	5 600	1,75	**39580/39528**	39500
	119,985 *4.7238*	32,751 *1.2894*	175	204	23,6	4 500	5 600	1,75	**39581/39528**	39500
59,987 *2.3617*	130,175 *5.125*	34,099 *1.3425*	187	180	22	3 800	5 000	2,05	**HM 911244/210**	HM 911200
	135,755 *5.3447*	53,975 *2.125*	353	400	45,5	4 000	5 000	3,95	**6391/K-6320**	6300
60,325 *2.375*	130,175 *5.125*	36,512 *1.4375*	187	180	22,4	3 800	5 000	2,1	**HM 911245/210**	HM 911200

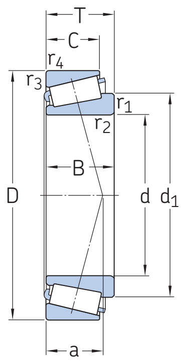
SKF Explorer bearing
▸ Popular item



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 *2.125*	72,1	19,05 *0.75*	13,492 *0.5312*	2,3 *0.09*	2 *0.08*	20	62	65	78	80	84	4	5,5	2,3	2	0,54	1,1	0,6
	72,5	28,575 *1.125*	22,225 *0.875*	1,5 *0.06*	2,3 *0.09*	20	61	63	83	85	90	6	5,5	1,5	2,3	0,33	1,8	1
	72,5	28,575 *1.125*	22,225 *0.875*	1,5 *0.06*	0,8 *0.03*	20	61	63	83	88	90	6	5,5	1,5	0,8	0,33	1,8	1
	76,5	36,957 *1.455*	28,575 *1.125*	3,5 *0.14*	3,3 *0.13*	23	64	67	90	96	97	5	7,5	3,5	3,3	0,3	2	1,1
	76,5	36,957 *1.455*	30,162 *1.1875*	3,5 *0.14*	3,3 *0.13*	25	64	67	89	99	97	4	7,5	3,5	3,3	0,3	2	1,1
	89,2	32,791 *1.291*	25,4 *1*	3,5 *0.14*	3,3 *0.13*	36	67	68	93	112	114	4	11	3,5	3,3	0,75	0,8	0,45
57,15 *2.25*	74,2	21,946 *0.864*	15,875 *0.625*	3,5 *0.14*	0,8 *0.03*	17	65	70	87	90	91	5	5	3,5	0,8	0,35	1,7	0,9
	74,1	21,946 *0.864*	15,875 *0.625*	2,3 *0.09*	0,8 *0.03*	17	65	68	87	90	91	5	5	2,3	0,8	0,35	1,7	0,9
	74,2	21,946 *0.864*	20,274 *0.7982*	3,5 *0.14*	2,3 *0.09*	21	65	70	85	87	91	3	5	3,5	2,3	0,35	1,7	0,9
	74,1	21,946 *0.864*	17,826 *0.7018*	2,3 *0.09*	0,8 *0.03*	17	65	68	87	91	92	5	3	2,3	0,8	0,35	1,7	0,9
	79	29,317 *1.52*	24,605 *0.9687*	2,3 *0.09*	3,3 *0.13*	23	68	68	91	93	98	4	5,5	2,3	3,3	0,33	1,8	1
	88,3	30,162 *1.1875*	23,812 *0.9375*	3,5 *0.14*	3,3 *0.13*	23	76	71	100	100	107	6	6	3,5	3,3	0,33	1,8	1
	88,3	30,162 *1.1875*	23,812 *0.9375*	8 *0.32*	3,3 *0.13*	23	76	80	100	100	107	6	6	8	3,3	0,33	1,8	1
	88,3	30,162 *1.1875*	26,949 *1.061*	3,5 *0.14*	0,8 *0.03*	25	76	71	99	113	107	4	5,5	3,5	0,8	0,33	1,8	1
	88,3	30,162 *1.1875*	26,949 *1.061*	8 *0.32*	0,8 *0.03*	25	76	80	99	113	107	4	5,5	8	0,8	0,33	1,8	1
59,987 *2.3617*	97,1	30,924 *1.2175*	23,812 *0.9375*	3,5 *0.14*	3,3 *0.13*	40	74	74	102	118	124	5	10	3,5	3,3	0,83	0,72	0,4
	97,5	56,007 *2.205*	44,45 *1.75*	3,5 *0.14*	3,3 *0.13*	34	78	74	110	123	125	7	9,5	3,5	3,3	0,33	1,8	1
60,325 *2.375*	97,2	33,39 *1.3146*	23,812 *0.9375*	5 *0.20*	3,3 *0.13*	40	74	77	102	118	124	5	12,5	5	3,3	0,83	0,72	0,4

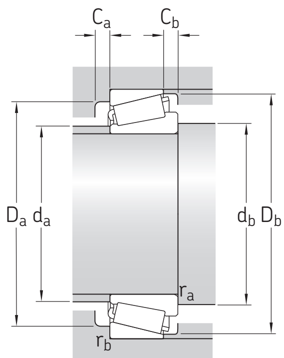
8.2 Inch single row tapered roller bearings

d **63,5 – 71,438** mm
2.5 – 2.8125 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	–	–
63,5 *2.5*	110 *4.3307*	22 *0.8661*	108	118	13,4	4 800	6 000	0,84	**395/394 A**	395
	112,712 *4.4375*	30,162 *1.1875*	175	204	23,6	4 500	5 600	1,25	**39585/39520**	39500
	112,712 *4.4375*	30,163 *1.1875*	152	183	21,2	4 800	5 600	1,25	**3982/3920**	3980
65,088 *2.5625*	135,755 *5.3447*	53,975 *2.125*	353	400	45,5	4 000	5 000	3,7	**6379/K-6320**	6300
66,675 *2.625*	110 *4.3307*	22 *0.8661*	108	118	13,4	4 800	6 000	0,78	**395 S/394 A**	395
	110 *4.3307*	22 *0.8661*	108	118	13,4	4 800	6 000	0,79	**395 A/394 A**	395
	112,712 *4.4375*	30,162 *1.1875*	152	183	21,2	4 800	5 600	1,15	**3984/3920**	3900
	112,712 *4.4375*	30,162 *1.1875*	175	204	23,6	4 500	5 600	1,2	**39590/39520**	39500
	119,985 *4.7238*	32,751 *1.2894*	175	204	23,6	4 500	5 600	1,55	**39590/39528**	39500
	122,238 *4.8125*	38,1 *1.5*	229	245	28	4 500	5 300	1,85	▸ **HM 212049/011**	HM 212000
	135,755 *5.3447*	53,975 *2.125*	353	400	45,5	4 000	5 000	3,65	**6386/K-6320**	6300
69,85 *2.75*	112,712 *4.4375*	25,4 *1*	121	156	17,6	4 500	5 300	0,97	**29675/29620**	29600
	120 *4.7244*	29,795 *1.173*	163	186	21,6	4 500	5 300	1,35	**482/472**	475
	120 *4.7244*	32,545 *1.2813*	188	228	26,5	4 300	5 300	1,5	▸ **47487/47420**	47400
	120 *4.7244*	32,545 *1.2813*	188	228	26,5	4 300	5 300	1,5	▸ **47487/47420 A**	47400
	127 *5*	36,512 *1.4375*	217	255	29	4 300	5 000	1,95	**566/563**	565
	152,4 *6*	41,275 *1.625*	270	320	35,5	3 600	4 300	3,65	**655/652**	655
71,438 *2.8125*	117,475 *4.625*	30,162 *1.1875*	152	190	21,6	4 500	5 300	1,25	**33281/33462**	33000
	136,525 *5.375*	46,038 *1.8125*	273	355	39	3 800	4 500	3,1	**H 715345/311**	H 715300

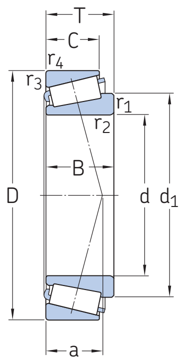
SKF Explorer bearing
▸ Popular item



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 *2.5*	86,5	21,996 *0.866*	18,824 *0.7411*	3,5 *0.14*	1,3 *0.05*	20	77	77	98	102	105	4	3	3,5	1,3	0,4	1,5	0,8
	88,4	30,162 *1.1875*	23,812 *0.9375*	3,5 *0.14*	3,3 *0.13*	23	76	77	100	100	107	6	6	3,5	3,3	0,33	1,8	1
	87,9	30,048 *1.183*	23,812 *0.9375*	3,5 *0.14*	3,3 *0.13*	25	75	77	96	101	105	4	6	3,5	3,3	0,4	1,5	0,8
65,088 *2.5625*	97,5	56,007 *2.205*	44,45 *1.75*	3,5 *0.14*	3,3 *0.13*	34	78	79	110	123	125	7	9,5	3,5	3,3	0,33	1,8	1
66,675 *2.625*	86,5	21,996 *0.866*	18,824 *0.7411*	3,5 *0.14*	1,3 *0.05*	20	77	80	98	102	105	4	3	3,5	1,3	0,4	1,5	0,8
	86,5	21,996 *0.866*	18,824 *0.7411*	0,8 *0.03*	1,3 *0.05*	20	77	75	98	102	105	4	3	0,8	1,3	0,4	1,5	0,8
	87,9	30,048 *1.183*	23,812 *0.9375*	3,5 *0.14*	3,3 *0.13*	25	75	80	96	101	105	4	6	3,5	3,3	0,4	1,5	0,8
	88,3	30,162 *1.1875*	23,812 *0.9375*	3,5 *0.14*	3,3 *0.13*	23	76	80	100	100	107	6	6	3,5	3,3	0,33	1,8	1
	88,3	30,162 *1.1875*	26,949 *1.061*	3,5 *0.14*	0,8 *0.32*	25	76	80	99	113	107	4	5,5	3,5	0,8	0,33	1,8	1
	90,9	38,354 *1.5*	29,718 *1.17*	3,5 *0.14*	3,3 *0.13*	26	76	80	106	110	115	7	8	3,5	3,3	0,33	1,8	1
	97,5	56,007 *2.205*	44,45 *1.75*	4,3 *0.17*	3,3 *0.13*	34	78	82	110	123	125	7	9,5	4,3	3,3	0,33	1,8	1
69,85 *2.75*	94,4	25,4 *1*	19,05 *0.75*	1,5 *0.06*	3,3 *0.13*	26	82	80	100	100	108	4	6	1,5	3,3	0,48	1,25	0,7
	92,5	29,007 *1.142*	24,237 *0.9542*	3,5 *0.14*	2 *0.08*	25	80	84	103	110	112	4	5,5	3,5	2	0,37	1,6	0,9
	94,3	32,545 *1.2813*	26,195 *1.0313*	3,5 *0.14*	3,3 *0.13*	25	81	84	105	108	113	6	6	3,5	3,3	0,35	1,7	0,9
	94,3	32,545 *1.2813*	26,195 *1.0313*	3,5 *0.14*	0,5 *0.02*	25	81	84	105	113	113	6	6	3,5	0,5	0,35	1,7	0,9
	97,6	36,17 *1.424*	28,575 *1.125*	3,5 *0.14*	3,3 *0.13*	28	83	84	109	115	119	5	7,5	3,5	3,3	0,37	1,6	0,9
	113	41,275 *1.625*	31,75 *1.25*	3,5 *0.14*	3,3 *0.13*	32	96	84	125	140	138	6	9,5	3,5	3,3	0,4	1,5	0,8
71,438 *2.8125*	94,1	30,162 *1.1875*	23,812 *0.9375*	3,5 *0.14*	3,3 *0.13*	26	81	85	101	105	111	5	6	3,5	3,3	0,44	1,35	0,8
	110	46,038 *1.8125*	36,513 *1.4375*	3,5 *0.14*	3,3 *0.13*	36	88	86	113	124	132	7	9,5	3,5	3,3	0,48	1,25	0,7

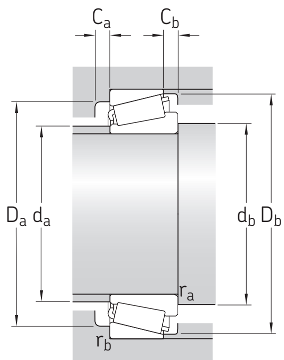
8.2 Inch single row tapered roller bearings

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 *2.875*	112,712 *4.4375*	25,4 *1*	121	156	17,6	4 500	5 300	0,89	**29685/29620**	29600
	117,475 *4.625*	30,162 *1.1875*	152	190	21,6	4 500	5 300	1,2	**33287/33462**	33000
	127 *5*	36,512 *1.4375*	217	255	29	4 300	5 000	1,85	**567/563**	565
76 *2.9921*	132 *5.1969*	39 *1.5354*	255	305	34,5	4 000	4 800	2,15	**HM 215249/210**	HM 215200
76,2 *3*	109,538 *4.3125*	19,05 *0.75*	72,1	102	11	4 500	5 600	0,57	▸ **L 814749/710**	L 814700
	127 *5*	30,162 *1.1875*	171	204	24	4 000	5 000	1,45	▸ **42687/42620**	42600
	133,35 *5.25*	33,338 *1.3125*	202	260	30	3 800	4 800	1,95	**47678/47620**	47600
	139,992 *5.5115*	36,512 *1.4375*	227	280	31	3 800	4 500	2,45	**575/572**	575
	161,925 *6.375*	49,212 *1.9375*	318	335	38	3 000	4 000	4,4	**9285/9220**	9200
77,788 *3.0625*	121,442 *4.7812*	24,608 *0.9688*	115	134	15,3	4 300	5 300	0,92	**34306/34478**	34000
	127 *5*	30,163 *1.1875*	171	204	24	4 000	5 000	1,4	▸ **42690/42620**	42600
82,55 *3.25*	139,992 *5.5115*	36,512 *1.4375*	227	280	31	3 800	4 500	2,2	**580/572**	575
	146,05 *5.75*	41,275 *1.625*	270	320	35,5	3 600	4 300	2,8	**663/653**	655
	150,089 *5.909*	44,45 *1.75*	351	405	46,5	3 600	4 300	3,4	**749 A/742**	745
85,725 *3.375*	133,35 *5.25*	30,163 *1.1875*	178	220	25,5	3 800	4 500	1,45	**497/492 A**	495
	146,05 *5.75*	41,275 *1.625*	270	320	35,5	3 600	4 300	2,65	**665/653**	655
88,9 *3.5*	152,4 *6*	39,688 *1.5625*	237	305	33,5	3 400	4 300	2,8	**593/592 A**	593
	152,4 *6*	39,688 *1.5625*	300	355	39	3 400	4 000	2,85	**HM 518445/410**	HM 518400
	161,925 *6.375*	53,975 *2.125*	404	510	56	3 200	4 000	4,8	**6580/6535**	6500

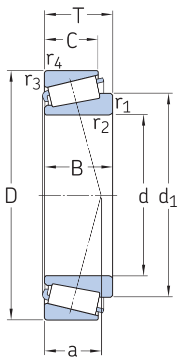
SKF Explorer bearing
▸ Popular item



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 *2.875*	94,4	25,4 *1*	19,05 *0.75*	3,5 *0.14*	3,3 *0.13*	26	82	87	100	100	108	4	6	3,5	3,3	0,48	1,25	0,7
	94,1	30,162 *1.1875*	23,812 *0.9375*	3,5 *0.14*	3,3 *0.13*	26	81	87	101	105	111	5	6	3,5	3,3	0,44	1,35	0,8
	97,6	36,17 *1.424*	28,575 *1.125*	3,5 *0.14*	3,3 *0.13*	28	83	87	109	115	119	5	7,5	3,5	3,3	0,37	1,6	0,9
76 *2.9921*	102	39 *1.5354*	32 *1.2598*	7 *0.28*	3,5 *0.14*	27	88	97	116	119	126	7	7	7	3,5	0,33	1,8	1
76,2 *3*	94,5	19,05 *0.75*	15,083 *0.5938*	1,5 *0.06*	1,5 *0.06*	23	85	86	98	101	105	3	3,5	1,5	1,5	0,5	1,2	0,7
	101	31 *1.2205*	22,225 *0.875*	3,5 *0.14*	3,3 *0.13*	26	88	90	112	114	120	5	7,5	3,5	3,3	0,43	1,4	0,8
	107	33,338 *1.3125*	26,195 *1.0313*	6,4 *0.25*	3,3 *0.13*	29	93	96	117	121	126	5	7	6,4	3,3	0,4	1,5	0,8
	109	36,098 *1.4212*	28,575 *1.125*	3,5 *0.14*	3,3 *0.13*	30	94	90	120	127	131	5	7,5	3,5	3,3	0,4	1,5	0,8
	121	46,038 *1.8125*	31,75 *1.25*	3,5 *0.14*	3,3 *0.13*	47	93	91	128	149	153	7	17	3,5	3,3	0,72	0,84	0,45
77,788 *3.0625*	97,8	23,012 *0.906*	17,462 *0.6875*	3,5 *0.14*	2 *0.08*	25	88	92	108	112	114	3	7	3,5	2	0,46	1,3	0,7
	101	31 *1.2205*	22,225 *0.875*	3,5 *0.14*	3,3 *0.13*	26	88	92	112	114	120	5	7,5	3,5	3,3	0,43	1,4	0,8
82,55 *3.25*	109	36,098 *1.4212*	28,575 *1.125*	3,5 *0.14*	3,3 *0.13*	30	94	97	120	127	131	5	7,5	3,5	3,3	0,4	1,5	0,8
	113	41,275 *1.625*	31,75 *1.25*	3,5 *0.14*	3,3 *0.13*	32	96	97	125	133	138	6	9,5	3,5	3,3	0,4	1,5	0,8
	113	46,672 *1.8375*	36,512 *1.4375*	3,5 *0.14*	3,3 *0.13*	31	95	97	130	137	142	8	7,5	3,5	3,3	0,33	1,8	1
85,725 *3.375*	108	29,769 *1.172*	22,225 *0.875*	3,5 *0.14*	3,3 *0.13*	29	95	100	119	121	128	5	7,5	3,5	3,3	0,44	1,35	0,8
	113	41,275 *1.625*	31,75 *1.25*	3,5 *0.14*	3,3 *0.13*	32	96	100	125	133	138	6	9,5	3,5	3,3	0,4	1,5	0,8
88,9 *3.5*	121	36,322 *1.43*	30,162 *1.1875*	3,5 *0.14*	3,3 *0.13*	36	104	103	128	139	141	4	9,5	3,5	3,3	0,44	1,35	0,8
	119	39,688 *1.5625*	30,162 *1.1875*	6,4 *0.25*	3,3 *0.13*	32	102	109	135	139	146	7	9,5	6,4	3,3	0,4	1,5	0,8
	125	55,1 *2.1693*	42,862 *1.6875*	3,5 *0.14*	3,3 *0.13*	39	102	103	134	149	153	8	11	3,5	3,3	0,4	1,5	0,8

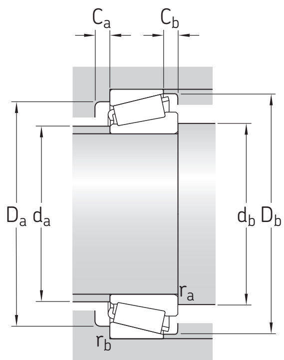
8.2 Inch single row tapered roller bearings

d **90 – 110** mm
3.5433 – 4.3307 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	–	–
90 *3.5433*	147 *5.7874*	40 *1.5748*	280	355	39	3 400	4 300	2,55	**HM 218248/210**	HM 218200
	161,925 *6.375*	53,975 *2.125*	404	510	56	3 200	4 000	4,75	**6581 X/6535**	6500
92,075 *3.625*	146,05 *5.75*	33,338 *1.3125*	209	280	31,5	3 400	4 300	2,1	**47890/47820**	47800
	152,4 *6*	39,688 *1.5625*	237	305	33,5	3 400	4 300	2,7	**598/592 A**	595
95,25 *3.75*	146,05 *5.75*	33,338 *1.3125*	209	280	31,5	3 400	4 300	1,95	**47896/47820**	47800
	152,4 *6*	39,688 *1.5625*	237	305	33,5	3 400	4 300	2,55	**594 A/592 A**	595
	152,4 *6*	39,688 *1.5625*	237	305	33,5	3 400	4 300	2,55	**594/592 A**	595
	168,275 *6.625*	41,275 *1.625*	288	365	39	3 000	3 800	3,75	**683/672**	675
96,838 *3.8125*	188,912 *7.4375*	50,8 *2*	348	375	41,5	2 600	3 400	5,75	**90381/90744**	90300
99,975 *3.936*	212,725 *8.375*	66,675 *2.625*	619	830	88	2 200	3 000	11,5	**HH 224334/310**	HH 224300
100 *3.937*	157 *6.1811*	42 *1.6535*	303	400	42,5	3 200	4 000	2,9	**HM 220149 A/110**	HM 220100
	157 *6.1811*	42 *1.6535*	303	400	42,5	3 200	4 000	2,9	▸ **HM 220149/110**	HM 220100
101,6 *4*	168,275 *6.625*	41,275 *1.625*	288	365	39	3 000	3 800	3,45	**687/672**	675
	190,5 *7.5*	57,15 *2.25*	537	630	68	2 800	3 400	7	**HH 221449/410**	HH 221400
	212,725 *8.375*	66,675 *2.625*	619	830	88	2 200	3 000	11	**HH 224335/310**	HH 224300
107,95 *4.25*	158,75 *6.25*	23,02 *0.9063*	124	163	18,3	3 200	3 800	1,4	**37425/37625**	37000
	165,1 *6.5*	36,512 *1.4375*	256	355	37,5	3 000	3 600	2,7	**56425/56650**	56000
110 *4.3307*	180 *7.0866*	41,275 *1.625*	307	415	42,5	2 800	3 400	3,95	**64432/64708**	64000

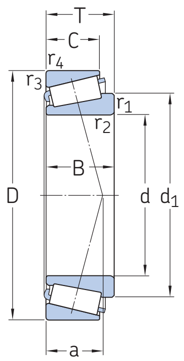
SKF Explorer bearing
▸ Popular item



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 *3.5433*	116	40 *1.5748*	32,5 *1.2795*	7 *0.28*	3,5 *0.14*	29	101	111	130	134	140	7	7,5	7	3,5	0,33	1,8	1
	125	55,1 *2.1693*	42,862 *1.6875*	3 *0.12*	3,3 *0.13*	39	102	104	134	149	153	8	11	3	3,3	0,4	1,5	0,8
92,075 *3.625*	120	34,925 *1.375*	26,195 *1.0313*	3,5 *0.14*	3,3 *0.13*	32	105	106	128	133	139	6	7	3,5	3,3	0,44	1,35	0,8
	121	36,322 *1.43*	30,162 *1.1875*	3,5 *0.14*	3,3 *0.13*	36	104	107	128	139	141	4	9,5	3,5	3,3	0,44	1,35	0,8
95,25 *3.75*	120	34,925 *1.375*	26,195 *1.0313*	3,5 *0.14*	3,3 *0.13*	32	105	110	128	133	139	6	7	3,5	3,3	0,44	1,35	0,8
	121	36,322 *1.43*	30,162 *1.1875*	5 *0.20*	3,3 *0.13*	36	104	113	128	139	141	4	9,5	5	3,3	0,44	1,35	0,8
	121	36,322 *1.43*	30,162 *1.1875*	3,5 *0.14*	3,3 *0.13*	36	104	110	128	139	141	4	9,5	3,5	3,3	0,44	1,35	0,8
	133	41,275 *1.625*	30,162 *1.1875*	3,5 *0.14*	3,3 *0.13*	38	114	110	143	155	157	6	11	3,5	3,3	0,48	1,25	0,7
96,838 *3.8125*	145	46,038 *1.8125*	31,75 *1.25*	3,5 *0.14*	3,3 *0.13*	61	114	112	148	176	179	6	19	3,5	3,3	0,88	0,68	0,4
99,975 *3.936*	158	66,675 *2.625*	53,975 *2.125*	3,5 *0.14*	3,3 *0.13*	46	132	115	184	199	202	10	12,5	3,5	3,3	0,33	1,8	1
100 *3.937*	127	42 *1.6535*	34 *1.3386*	5 *0.20*	3,5 *0.14*	31	111	118	140	143	151	7	8	5	3,5	0,33	1,8	1
	127	42 *1.6535*	34 *1.3386*	8 *0.32*	3,5 *0.14*	31	111	124	140	143	151	7	8	8	3,5	0,33	1,8	1
101,6 *4*	133	41,275 *1.625*	30,162 *1.1875*	3,5 *0.14*	3,3 *0.13*	38	114	116	143	155	157	6	11	3,5	3,3	0,48	1,25	0,7
	142	57,531 *2.265*	46,038 *1.8125*	8 *0.32*	3,3 *0.13*	40	119	126	163	177	179	9	11	8	3,3	0,33	1,8	1
	158	66,675 *2.625*	53,975 *2.125*	7 *0.28*	3,3 *0.13*	46	132	124	184	199	202	10	12,5	7	3,3	0,33	1,8	1
107,95 *4.25*	132	21,438 *0.844*	15,875 *0.625*	3,5 *0.14*	3,3 *0.13*	36	120	123	140	145	149	4	7	3,5	3,3	0,6	1	0,6
	137	36,512 *1.4375*	26,988 *1.0625*	3,5 *0.14*	3,3 *0.13*	37	119	123	145	152	158	6	9,5	3,5	3,3	0,5	1,2	0,7
110 *4.3307*	146	41,275 *1.625*	30,162 *1.1875*	3,5 *0.14*	3,3 *0.13*	41	126	125	155	167	171	6	11	3,5	3,3	0,52	1,15	0,6

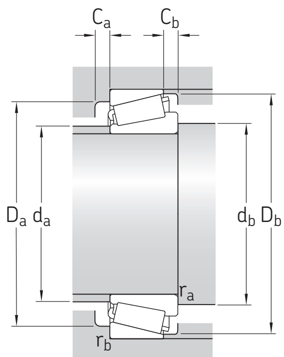
8.2 Inch single row tapered roller bearings

d **114,3 – 152,4** mm
4.5 – 6 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	–	–
114,3 *4.5*	177,8 *7*	41,275 *1.625*	307	415	42,5	2 800	3 400	3,6	64450/64700	64000
	180,975 *7.125*	34,925 *1.375*	227	280	30	2 800	3 400	2,95	68450/68712	68000
	212,725 *8.375*	66,675 *2.625*	619	830	88	2 200	3 000	10	**HH 224346/310**	HH 224300
	212,725 *8.375*	66,675 *2.625*	626	765	81,5	2 600	3 200	10	938/932	935
114,975 *4.5266*	212,725 *8.375*	66,675 *2.625*	619	830	88	2 200	3 000	10	**HH 224349/310**	HH 224300
120,65 *4.75*	190,5 *7.5*	46,038 *1.8125*	388	540	56	2 600	3 200	4,85	HM 624749/710	HM 624700
127 *5*	182,562 *7.1875*	39,688 *1.5625*	281	440	44	2 600	3 200	3,3	48290/48220	48200
	196,85 *7.75*	46,038 *1.8125*	395	585	60	2 400	3 000	5,2	67388/67322	67300
	206,375 *8.125*	47,625 *1.875*	424	585	61	2 400	3 000	6,1	798/792	795
133,35 *5.25*	177,008 *6.9688*	25,4 *1*	166	280	28	2 600	3 200	1,7	▸ L 327249/210	L 327200
	196,85 *7.75*	46,038 *1.8125*	395	585	60	2 400	3 000	4,65	67391/67322	67300
	234,95 *9.25*	63,5 *2.5*	683	900	91,5	2 200	2 800	11	95525/95925	95000
139,7 *5.5*	228,6 *9*	57,15 *2.25*	578	800	80	2 200	2 800	8,95	898/892	895
	236,538 *9.3125*	57,15 *2.25*	629	850	86,5	2 200	2 600	10	HM 231132/110	HM 231100
149,225 *5.875*	236,538 *9.3125*	57,15 *2.25*	629	850	86,5	2 200	2 600	9,05	HM 231148/110	HM 231100
152,4 *6*	203,2 *8*	41,275 *1.625*	251	480	45,5	2 400	2 800	3,7	LM 330448/410	LM 330400
	222,25 *8.75*	46,83 *1.8437*	400	630	62	2 200	2 600	5,85	M 231649/610	M 231600

SKF Explorer bearing
▸ Popular item



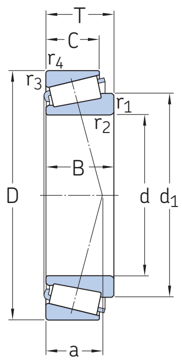
Dimensions							Abutment and fillet dimensions									Calculation factors		
d	d_1 ≈	B	C	$r_{1,2}$ min.	$r_{3,4}$ min.	a	d_a max.	d_b min.	D_a min.	D_a max.	D_b min.	C_a min.	C_b min.	r_a max.	r_b max.	e	Y	Y_0
mm/*in.*							mm									–		
114,3 *4.5*	146	41,275 *1.625*	30,162 *1.1875*	3,5 *0.14*	3,3 *0.13*	41	126	129	155	164	171	6	11	3,5	3,3	0,52	1,15	0,6
	144	31,75 *1.25*	25,4 *1*	3,5 *0.14*	3,3 *0.13*	39	129	129	158	167	170	4	9,5	3,5	3,3	0,5	1,2	0,7
	158	66,675 *2.625*	53,975 *2.125*	7 *0.28*	3,3 *0.13*	46	131	137	184	199	202	10	12,5	7	3,3	0,33	1,8	1
	154	66,675 *2.625*	53,975 *2.125*	7 *0.28*	3,3 *0.13*	46	130	137	175	199	193	8	12,5	7	3,3	0,33	1,8	1
114,975 *4.5266*	158	66,675 *2.625*	53,975 *2.125*	7 *0.28*	3,3 *0.13*	46	132	137	184	199	202	10	12,5	7	3,3	0,33	1,8	1
120,65 *4.75*	156	46,038 *1.8125*	34,925 *1.375*	3,5 *0.14*	1,5 *0.06*	41	135	136	167	180	182	8	11	3,5	1,5	0,43	1,4	0,8
127 *5*	154	38,1 *1.5*	33,338 *1.3125*	3,5 *0.14*	3,3 *0.13*	34	140	142	165	169	174	6	6	3,5	3,3	0,3	2	1,1
	164	46,038 *1.8125*	38,1 *1.5*	3,5 *0.14*	3,3 *0.13*	39	146	142	177	183	189	7	7,5	3,5	3,3	0,35	1,7	0,9
	167	50,013 *1.969*	34,925 *1.375*	3,3 *0.13*	3,3 *0.13*	45	144	142	178	192	195	8	12,5	3,3	3,3	0,46	1,3	0,7
133,35 *5.25*	155	26,195 *1.0313*	20,638 *0.8125*	1,5 *0.06*	1,5 *0.06*	28	145	144	165	167	170	5	4,5	1,5	1,5	0,35	1,7	0,9
	164	46,038 *1.8125*	38,1 *1.5*	8 *0.32*	3,3 *0.13*	39	146	158	177	183	189	7	7,5	8	3,3	0,35	1,7	0,9
	178	63,5 *2.5*	49,213 *1.9375*	9,7 *0.38*	3,3 *0.13*	48	152	161	198	221	217	10	14	9,7	3,3	0,37	1,6	0,9
139,7 *5.5*	181	57,15 *2.25*	44,45 *1.75*	3,5 *0.14*	3,3 *0.13*	49	155	155	195	214	215	8	12,5	3,5	3,3	0,43	1,4	0,8
	187	56,642 *2.23*	44,45 *1.75*	3,5 *0.14*	3,3 *0.13*	44	165	156	210	222	223	9	12,5	3,5	3,3	0,31	1,9	1,1
149,225 *5.875*	187	56,642 *2.23*	44,45 *1.75*	6,4 *0.25*	3,3 *0.13*	44	165	171	210	222	223	10	12,5	6,4	3,3	0,31	1,9	1,1
152,4 *6*	180	41,275 *1.625*	34,925 *1.375*	3,3 *0.13*	3,3 *0.13*	38	166	168	186	189	197	5	6	3,3	3,3	0,35	1,7	0,9
	185	46,83 *1.8437*	34,925 *1.375*	3,5 *0.14*	1,5 *0.06*	40	169	168	200	211	210	7	11,5	3,5	1,5	0,33	1,8	1

8.2

8.2 Inch single row tapered roller bearings

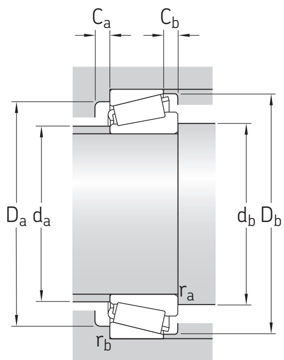
d **158,75 – 203,2** mm

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 *6.25*	205,583 *8.0938*	23,812 *0.9375*	168	280	27	2 200	2 800	1,9	▸ **L 432348/310**	L 432300
	205,583 *8.0938*	23,813 *0.9375*	168	280	27	2 200	2 800	1,95	▸ **L 432349/310**	L 432300
165,1 *6.5*	336,55 *13.25*	92,075 *3.625*	1 198	1 700	156	1 400	1 900	37	**HH 437549/510**	HH 437500
177,8 *7*	227,012 *8.9375*	30,162 *1.1875*	231	425	40	2 000	2 400	2,95	▸ **36990/36920**	36900
	288,925 *11.375*	63,5 *2.5*	774	1 140	108	1 700	2 000	16	**94700/94113**	94000
178,595 *7.0313*	265,112 *10.4375*	51,595 *2.0313*	532	880	85	1 800	2 200	9,55	**M 336948/912**	M 336900
179,934 *7.084*	265,112 *10.4375*	51,595 *2.0313*	532	880	85	1 800	2 200	9,4	**M 336949/912**	M 336900
187,325 *7.375*	282,575 *11.125*	50,8 *2*	427	695	67	1 700	2 000	9,9	**87737/87111**	87000
189,738 *7.47*	279,4 *11*	52,388 *2.0625*	643	980	93	1 700	2 000	11	**M 239447/410**	M 239400
190,5 *7.5*	282,575 *11.125*	50,8 *2*	427	695	67	1 700	2 000	9,55	**87750/87111**	87000
196,85 *7.75*	241,3 *9.5*	23,812 *0.9375*	189	315	29	1 900	2 400	2,1	▸ **LL 639249/210**	LL 639200
	257,175 *10.125*	39,688 *1.5625*	339	655	58,5	1 800	2 200	5,35	**LM 739749/710**	LM 739700
198,298 *7.807*	279,4 *11*	46,038 *1.8125*	465	830	76,5	1 600	2 000	9,2	**67981/67919**	67900
199,949 *7.872*	279,4 *11*	46,038 *1.8125*	465	830	76,5	1 600	2 000	9	**67982/67919**	67900
200,025 *7.875*	276,225 *10.875*	42,862 *1.6875*	478	780	72	1 700	2 000	7,7	**LM 241147/110**	LM 241100
203,2 *8*	282,575 *11.125*	46,038 *1.8125*	465	830	76,5	1 600	2 000	8,85	**67983/67920**	67900

SKF Explorer bearing
▸ Popular item

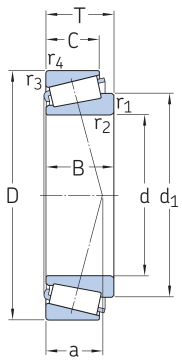


Dimensions							Abutment and fillet dimensions										Calculation factors		
d	d_1 ≈	B	C	$r_{1,2}$ min.	$r_{3,4}$ min.	a	d_a max.	d_b min.	D_a min.	D_a max.	D_b min.	C_a min.	C_b min.	r_a max.	r_b max.	e	Y	Y_0
mm/*in.*							mm										–		
158,75 *6.25*	181	23,812 *0.9375*	18,258 *0.7188*	4,8 *0.19*	1,5 *0.06*	32	172	177	194	195	197	5	5,5	4,8	1,5	0,37	1,6	0,9
	181	23,812 *0.9375*	18,258 *0.7188*	1,5 *0.06*	1,5 *0.06*	32	172	170	194	195	197	5	5,5	1,5	1,5	0,37	1,6	0,9
165,1 *6.5*	242	95,25 *3.75*	69,85 *2.75*	3,3 *0.13*	6,4 *0.25*	69	203	182	280	315	308	14	22	3,3	6,4	0,37	1,6	0,9
177,8 *7*	203	30,162 *1.1875*	23,02 *0.9063*	1,5 *0.13*	1,5 *0.13*	42	190	190	212	216	220	5	7	1,5	1,5	0,44	1,35	0,8
	232	63,5 *2.5*	47,625 *1.875*	7 *0.28*	3,3 *0.13*	62	201	201	247	274	270	10	15,5	7	3,3	0,46	1,3	0,7
178,595 *7.0313*	216	57,15 *2.25*	38,895 *1.5313*	3,3 *0.13*	3,3 *0.13*	46	196	195	240	250	251	9	12,5	3,3	3,3	0,33	1,8	1
179,934 *7.084*	216	57,15 *2.25*	38,895 *1.5313*	3,3 *0.13*	3,3 *0.13*	46	196	196	240	250	251	9	12,5	3,3	3,3	0,33	1,8	1
187,325 *7.375*	232	47,625 *1.875*	36,512 *1.4375*	3,5 *0.14*	3,3 *0.13*	54	213	204	253	267	267	6	14	3,5	3,3	0,43	1,4	0,8
189,738 *7.47*	232	57,15 *2.25*	41,275 *1.625*	3,3 *0.13*	3,3 *0.13*	48	211	206	254	264	266	9	11	3,3	3,3	0,33	1,8	1
190,5 *7.5*	232	47,625 *1.875*	36,512 *1.4375*	3,5 *0.14*	3,3 *0.13*	54	213	207	253	267	267	6	14	3,5	3,3	0,43	1,4	0,8
196,85 *7.75*	217	23,017 *0.9062*	17,462 *0.6875*	1,5 *0.06*	1,5 *0.06*	40	207	209	232	230	235	5	6	1,5	1,5	0,43	1,4	0,8
	229	39,688 *1.5625*	30,162 *1.1875*	3,5 *0.14*	3,3 *0.13*	50	210	213	236	242	247	8	9,5	3,5	3,3	0,44	1,35	0,8
198,298 *7.807*	246	49,212 *1.9375*	36,512 *1.4375*	3,5 *0.14*	3,3 *0.13*	60	223	215	254	264	272	8	9,5	3,5	3,3	0,5	1,2	0,7
199,949 *7.872*	246	49,212 *1.9375*	36,512 *1.4375*	3,5 *0.14*	3,3 *0.13*	60	223	217	254	264	272	8	9,5	3,5	3,3	0,5	1,2	0,7
200,025 *7.875*	236	46,038 *1.8125*	34,133 *1.3438*	3,5 *0.14*	3,3 *0.13*	44	220	217	257	261	265	7	8,5	3,5	3,3	0,31	1,9	1,1
203,2 *8*	246	46,038 *1.8125*	36,512 *1.4375*	3,5 *0.14*	3,3 *0.13*	60	222	220	254	267	272	8	9,5	3,5	3,3	0,5	1,2	0,7

8.2 Inch single row tapered roller bearings

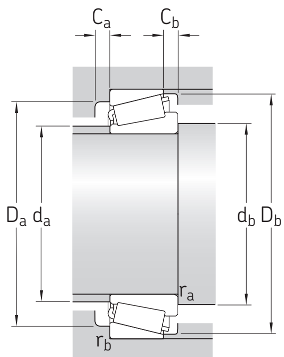
d **203,987 – 304,8** mm

8.031 – 12 in.



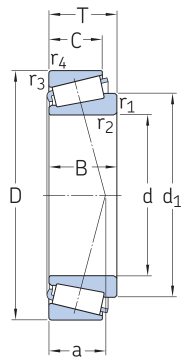
Principal dimensions			Basic load ratings		Fatigue load limit	Speed ratings		Mass	Designation	Series
			dynamic	static		Reference speed	Limiting speed			
d	D	T	C	C_0	P_u					
mm/*in.*			kN		kN	r/min		kg	–	–
203,987	276,225	42,862	478	780	72	1 700	2 000	7,2	**LM 241148/110**	LM 241100
8.031	*10.875*	*1.6875*								
206,375	282,575	46,038	465	830	76,5	1 600	2 000	8,45	**67985/67920**	67900
8.125	*11.125*	*1.8125*								
	336,55	98,425	1 230	2 160	190	1 300	1 800	34	**H 242649/610**	H 242600
	13.25	*3.875*								
216,408	285,75	46,038	466	850	76,5	1 600	2 000	7,9	**LM 742747/710**	LM 742700
8.52	*11.25*	*1.8125*								
220,662	314,325	61,912	784	1 320	118	1 500	1 800	15	**M 244249 A/210**	M 244200
8.6875	*12.375*	*2.4375*								
230,188	317,5	47,625	556	980	90	1 500	1 800	11	**LM 245846/810**	LM 245800
9.0625	*12.5*	*1.875*								
231,775	300,038	33,338	267	425	39	1 500	1 900	5,2	▸ **544091/544118**	544000
9.125	*11.8125*	*1.3125*								
	317,5	47,625	556	980	90	1 500	1 800	10,5	▸ **LM 245848/810**	LM 245800
	12.5	*1.875*								
234,848	314,325	49,212	608	1 000	91,5	1 500	1 800	10,5	▸ **LM 545848/810**	LM 545800
9.246	*12.375*	*1.9375*								
255,6	342,9	57,15	698	1 400	125	1 300	1 600	15	**M 349547/510**	M 349500
10.063	*13.5*	*2.25*								
257,175	342,9	57,15	698	1 400	125	1 300	1 600	14	**M 349549/510**	M 349500
10.125	*13.5*	*2.25*								
	358,775	71,438	1 030	1 760	156	1 300	1 600	21,5	**M 249747/710**	M 249700
	14.125	*2.8125*								
263,525	325,438	28,575	273	550	48	1 400	1 700	5,3	**38880/38820**	38800
10.375	*12.8125*	*1.125*								
	355,6	57,15	789	1 400	122	1 300	1 600	16	**LM 451345/310**	LM 451300
	14	*2.25*								
292,1	374,65	47,625	539	1 140	98	1 200	1 500	12,5	▸ **L 555249/210**	L 555200
11.5	*14.75*	*1.875*								
304,8	393,7	50,8	655	1 220	104	1 100	1 400	15	▸ **L 357049/010**	L 357000
12	*15.5*	*2*								
	406,4	63,5	775	1 700	143	1 100	1 300	22,5	**LM 757049/010**	LM 757000
	16	*2.5*								

SKF Explorer bearing
▸ Popular item

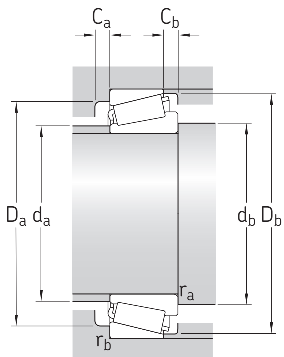


Dimensions							Abutment and fillet dimensions									Calculation factors		
d	d_1 ≈	B	C	$r_{1,2}$ min.	$r_{3,4}$ min.	a	d_a max.	d_b min.	D_a min.	D_a max.	D_b min.	C_a min.	C_b min.	r_a max.	r_b max.	e	Y	Y_0
mm/*in.*							mm									–		
203,987 *8.031*	236	46,038 *1.8125*	34,133 *1.3438*	3,5 *0.14*	3,3 *0.13*	44	220	221	257	261	265	7	8,5	3,5	3,3	0,31	1,9	1,1
206,375 *8.125*	246	46,038 *1.8125*	36,512 *1.4375*	3,5 *0.14*	3,3 *0.13*	60	222	223	254	267	272	8	9,5	3,5	3,3	0,5	1,2	0,7
	268	100,013 *3.9375*	77,788 *3.0625*	3,3 *0.13*	3,3 *0.13*	72	231	223	290	321	318	14	20,5	3,3	3,3	0,33	1,8	1
216,408 *8.52*	253	49,212 *1.9375*	34,925 *1.375*	3,5 *0.14*	3,3 *0.13*	60	230	233	261	270	277	7	11	3,5	3,3	0,48	1,25	0,7
220,662 *8.6875*	264	66,675 *2.625*	49,212 *1.9375*	1,5 *0.06*	3,3 *0.13*	56	241	234	284	299	300	9	12,5	1,5	3,3	0,33	1,8	1
230,188 *9.0625*	268	52,388 *2.0625*	36,512 *1.4375*	3,3 *0.13*	3,3 *0.13*	49	249	247	296	302	304	9	11	3,3	3,3	0,31	1,9	1,1
231,775 *9.125*	260	31,75 *1.25*	23,812 *0.9375*	3,5 *0.14*	3,3 *0.13*	49	247	249	278	284	284	5	9,5	3,5	3,3	0,4	1,5	0,8
	268	52,388 *2.0625*	36,512 *1.4375*	3,3 *0.13*	3,3 *0.13*	49	249	249	296	302	304	9	11	3,3	3,3	0,31	1,9	1,1
234,848 *9.246*	271	53,975 *2.125*	36,512 *1.4375*	3,5 *0.14*	3,3 *0.13*	57	250	252	291	299	304	9	12,5	3,5	3,3	0,4	1,5	0,8
255,6 *10.063*	296	63,5 *2.5*	44,45 *1.75*	1,5 *0.06*	3,3 *0.13*	59	273	269	318	327	331	9	12,5	1,5	3,3	0,35	1,7	0,9
257,175 *10.125*	296	57,15 *2.25*	44,45 *1.75*	6,4 *0.25*	3,3 *0.13*	59	273	281	318	327	331	9	12,5	6,4	3,3	0,35	1,7	0,9
	303	76,2 *3*	53,975 *2.125*	1,5 *0.06*	3,3 *0.13*	64	276	271	326	343	343	11	17	1,5	3,3	0,33	1,8	1
263,525 *10.375*	293	28,575 *1.125*	25,4 *1*	1,5 *0.06*	1,5 *0.06*	48	282	277	307	313	313	4	3	1,5	1,5	0,37	1,6	0,9
	309	57,15 *2.25*	44,45 *1.75*	3,5 *0.14*	3,3 *0.13*	61	285	281	329	339	343	10	12,5	3,5	3,3	0,35	1,7	0,9
292,1 *11.5*	330	47,625 *1.875*	34,925 *1.375*	3,5 *0.14*	3,3 *0.13*	64	310	310	350	358	361	9	12,5	3,5	3,3	0,4	1,5	0,8
304,8 *12*	347	50,8 *2*	38,1 *1.5*	6,4 *0.25*	3,3 *0.13*	64	327	329	368	377	379	7	12,5	6,4	3,3	0,35	1,7	0,9
	356	63,5 *2.5*	47,625 *1.875*	6,4 *0.25*	3,3 *0.13*	79	327	329	370	389	391	10	15,5	6,4	3,3	0,44	1,35	0,8

d **317,5 – 457,2** mm
12.5 – 18 in.



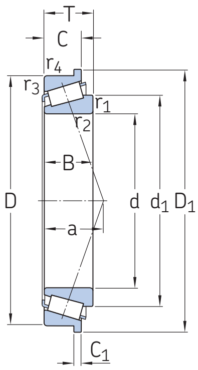
Principal dimensions			Basic load ratings		Fatigue load limit	Speed ratings		Mass	Designation	Series
			dynamic	static		Reference speed	Limiting speed			
d	D	T	C	C_0	P_u					
mm/*in.*			kN		kN	r/min		kg	–	–
317,5 *12.5*	447,675 *17.625*	85,725 *3.375*	1 363	2 700	220	900	1 200	41	**HM 259048/010/HA4**	HM 259000
333,375 *13.125*	469,9 *18.5*	90,488 *3.5625*	1 428	2 850	232	850	1 200	47	**HM 261049/010**	HM 261000
342,9 *13.5*	450,85 *17.75*	66,675 *2.625*	1 000	2 200	180	900	1 200	28	**LM 361649/610**	LM 361600
343,154 *13.51*	450,85 *17.75*	66,675 *2.625*	1 000	2 200	180	900	1 200	28	**LM 361649 A/610**	LM 361600
346,075 *13.625*	488,95 *19.25*	95,25 *3.75*	1 533	3 150	255	850	1 100	55	**HM 262749/710**	HM 262700
381 *15*	479,425 *18.875*	49,213 *1.9375*	638	1 500	120	800	1 100	20	**L 865547/512**	L 865500
406,4 *16*	549,275 *21.625*	85,725 *3.375*	1 467	3 050	236	700	950	53,5	**LM 567949/910/HA1**	LM 567900
431,8 *17*	571,5 *22.5*	74,612 *2.9375*	1 145	2 550	204	670	900	49	**LM 869448/410**	LM 869400
457,2 *18*	573,088 *22.5625*	74,612 *2.9375*	1 205	3 000	228	670	900	43,5	**L 570649/610**	L 570600



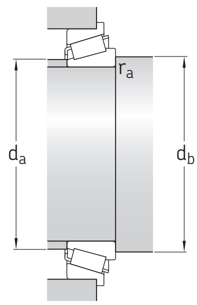
Dimensions							Abutment and fillet dimensions										Calculation factors		
d	d_1 ≈	B	C	$r_{1,2}$ min.	$r_{3,4}$ min.	a	d_a max.	d_b min.	D_a min.	D_a max.	D_b min.	C_a min.	C_b min.	r_a max.	r_b max.	e	Y	Y_0
mm/*in.*							mm									–		
317,5 *12.5*	376	85,725 *3.375*	68,262 *2.6875*	3,5 *0.14*	3,3 *0.13*	80	341	339	405	428	428	9	17	3,5	3,3	0,33	1,8	1
333,375 *13.125*	399	90,488 *3.5625*	71,438 *2.1825*	6,4 *0.25*	3,3 *0.13*	85	362	365	428	453	452	6	19	6	3,1	0,33	1,8	1
342,9 *13.5*	393	66,675 *2.625*	52,388 *2.0625*	8,5 *0.33*	3,5 *0.14*	75	365	385	417	433	434	9	14	7,5	3,3	0,35	1,7	0,9
343,154 *13.51*	393	66,675 *2.625*	52,388 *2.0625*	8,5 *0.33*	3,5 *0.14*	75	365	385	417	433	434	9	14	7,5	3,3	0,35	1,7	0,9
346,075 *13.625*	413	95,25 *3.75*	74,612 *2.9375*	6,4 *0.25*	3,3 *0.13*	88	379	378	442	472	467	8	21	6	3,1	0,33	1,8	1
381 *15*	430	47,625 *1.875*	34,925 *1.375*	6,4 *0.25*	3,3 *0.13*	92	406	413	448	462	463	6	14	6	3,1	0,5	1,2	0,7
406,4 *16*	473	84,138 *3.3125*	61,612 *2.4257*	6,4 *0.25*	3,3 *0.13*	100	434	438	502	532	526	9	23,5	6	3,1	0,4	1,5	0,8
431,8 *17*	500	74,612 *2.9375*	52,388 *2.0625*	3,3 *0.13*	3,3 *0.13*	120	462	455	520	550	549	8	22	3,3	3,3	0,54	1,1	0,6
457,2 *18*	516	74,612 *2.9375*	57,15 *2.25*	6,4 *0.25*	6,4 *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

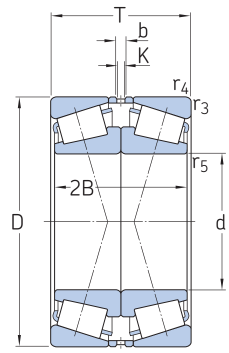
d **35 – 65** mm



Principal dimensions			Basic load ratings		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	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

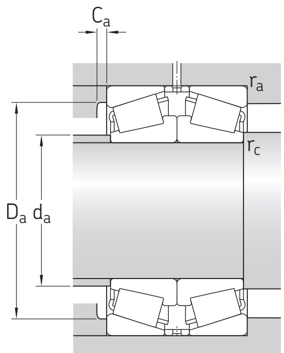


Dimensions									Abutment and fillet dimensions			Calculation factors		
d	d_1 ≈	D_1	B	C	C_1	$r_{1,2}$ min.	$r_{3,4}$ min.	a	d_a max.	d_b min.	r_a max.	e	Y	Y_0
mm									mm			–		
35	54,5	85	21	18	4,5	2	1,5	16	46	44,5	2	0,31	1,9	1,1
40	54,7	72	19	14,5	3,5	1	1	14	46	47,5	1	0,37	1,6	0,9
	57,5	85	18	16	4	1,5	1,5	16	49	48,5	1,5	0,37	1,6	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	116	34	26,5	5,5	1,5	1,5	25	74	75	1,5	0,4	1,5	0,8
	98,7	147	33	28	6	3	2,5	27	84	78	3	0,35	1,7	0,9



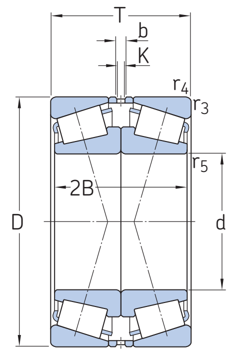
Principal dimensions			Basic load ratings		Fatigue load limit	Speed ratings		Mass	Designation
			dynamic	static		Reference speed	Limiting speed		
d	D	T	C	C_0	P_u				
mm			kN		kN	r/min		kg	–
25	62	36,5	79,9	80	8,65	6 700	11 000	0,55	▸ 31305/DF
30	62	34,5	85,7	88	9,65	7 500	11 000	0,48	30206/DF
	62	42,5	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

d **60 – 80** 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	–
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
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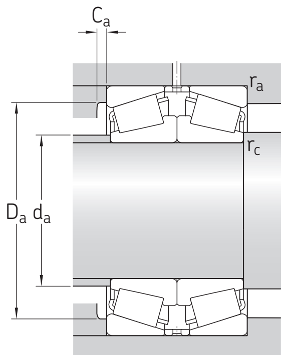
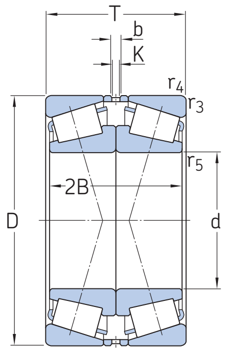


Dimensions						Abutment and fillet dimensions						Calculation factors			
d	2B	b	K	$r_{3,4}$ min.	r_5 min.	d_a max.	D_a min.	D_a max.	C_a min.	r_a max.	r_c max.	e	Y_1	Y_2	Y_0
mm						mm						–			
60	46	7	4,5	1,5	0,6	67	85	87	4	1,5	0,6	0,43	1,6	2,3	1,6
	44	4	3	1,5	0,6	70	96	101	3	1,5	0,6	0,4	1,7	2,5	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 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	–
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
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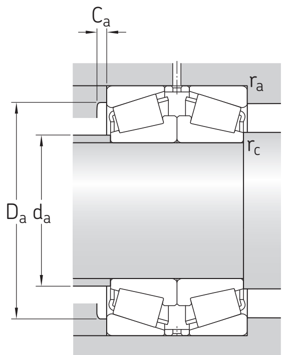
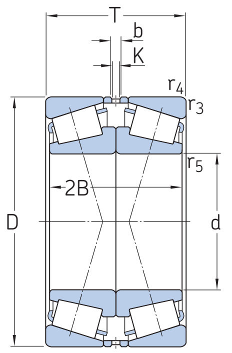


Dimensions						Abutment and fillet dimensions						Calculation factors			
d	2B	b	K	$r_{3,4}$ min.	r_5 min.	d_a max.	D_a min.	D_a max.	C_a min.	r_a max.	r_c max.	e	Y_1	Y_2	Y_0
mm						mm						–			
85	58	8	4,5	1,5	0,6	95	117	121	6	1,5	0,6	0,44	1,5	2,3	1,4
	72	6	4,5	1,5	0,6	95	118	121	6	1,5	0,6	0,3	2,3	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
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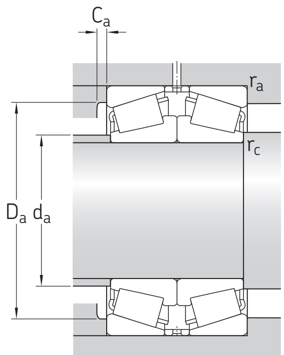
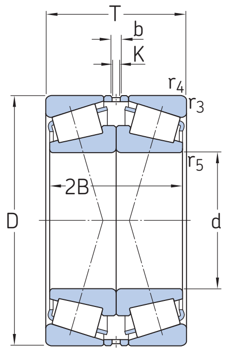
8.4



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

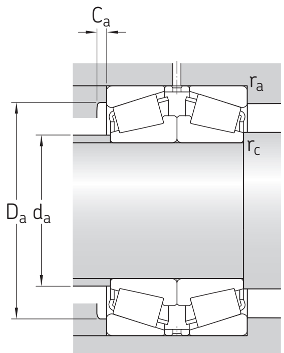
8.4 Matched bearings arranged face-to-face

d **190 – 360** mm



Principal dimensions			Basic load ratings		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	–
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**

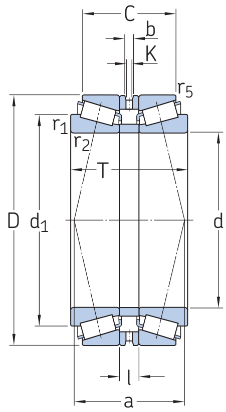
SKF Explorer bearing
▸ Popular item



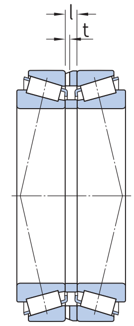
Dimensions						Abutment and fillet dimensions						Calculation factors			
d	2B	b	K	$r_{3,4}$ min.	r_5 min.	d_a max.	D_a min.	D_a max.	C_a min.	r_a max.	r_c max.	e	Y_1	Y_2	Y_0
mm						mm						–			
190	90	10	7,5	2	0,6	205	235	248	8	2	0,6	0,48	1,4	2,1	1,4
	128	15	10	2,5	1	210	257	276	10	2,5	1	0,44	1,5	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

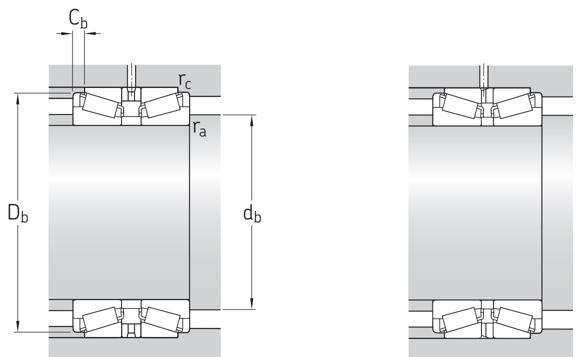


l ≥ 7 mm



l < 7 mm

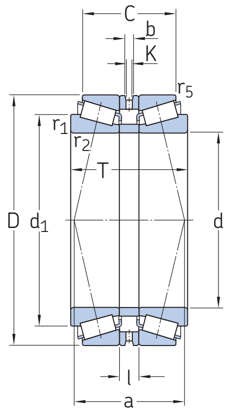
Principal dimensions			Basic load ratings dynamic	static	Fatigue load limit	Speed ratings Reference speed	Limiting speed	Mass	Designation
d	D	T	C	C_0	P_u				
mm			kN		kN	r/min		kg	–
35	72	64	178	212	23,6	6 300	9 500	1,15	**33207T64/DB**
40	68	41,5	111	143	15,3	6 300	9 500	0,58	**32008T41.5 X/DB**
	90	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**



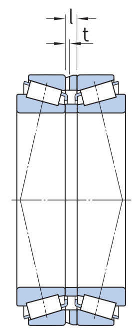
Dimensions										Abutment and fillet dimensions					Calculation factors			
d	d_1 ≈	C	l	b	K	t	$r_{1,2}$ min.	r_5 min.	a	d_b min.	D_b min.	C_b min.	r_a max.	r_c max.	e	Y_1	Y_2	Y_0
mm										mm					–			
35	53,4	52	8	4	1,5	–	1,5	0,6	44	43,5	68	6	1,5	0,6	0,35	1,9	2,9	1,8
40	54,7	32,5	3,5	–	–	1,5	1	0,3	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

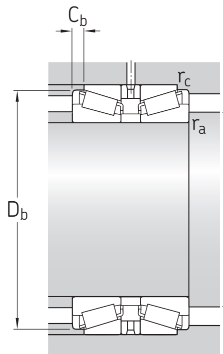


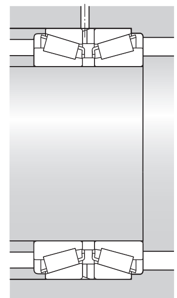
l ≥ 7 mm



l < 7 mm

Principal dimensions			**Basic load ratings** 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	–
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**

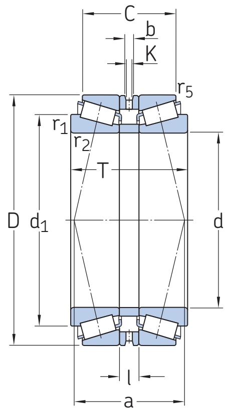




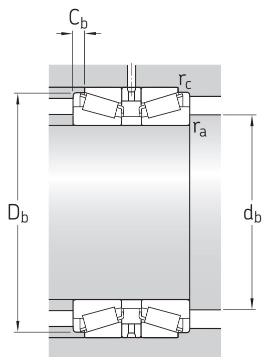
Dimensions										Abutment and fillet dimensions					Calculation factors			
d	d_1 ≈	C	l	b	K	t	$r_{1,2}$ min.	r_5 min.	a	d_b min.	D_b min.	C_b min.	r_a max.	r_c max.	e	Y_1	Y_2	Y_0
mm										mm					–			
95	128	88	14	4,5	3	–	3	1	91	109	161	8,5	3	1	0,43	1,6	2,3	1,6
100	122	75	10	6	3	–	2	0,6	68	111	143	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

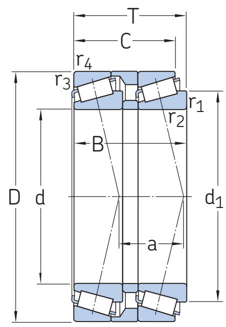


Principal dimensions			Basic load ratings		Fatigue load limit	Speed ratings		Mass	Designation
			dynamic	static		Reference speed	Limiting speed		
d	D	T	C	C_0	P_u				
mm			kN		kN	r/min		kg	–
170	310	194	1 843	3 250	300	1 200	2 000	60	**32234T194/DB**
180	250	103	746	1 460	137	1 500	2 200	14,5	**32936T103/DB**
	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**

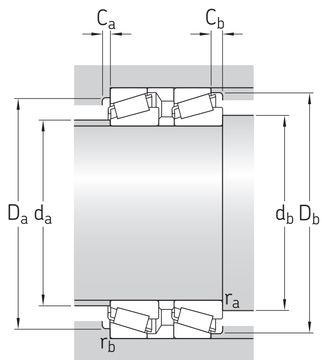


Dimensions										Abutment and fillet dimensions					Calculation factors			
d	d_1 ≈	C	l	b	K	t	$r_{1,2}$ min.	r_5 min.	a	d_b min.	D_b min.	C_b min.	r_a max.	r_c max.	e	Y_1	Y_2	Y_0
mm										mm					–			
170	238	154	12	6	4,5	–	5	1,5	162	190	294	20	5	1,5	0,43	1,6	2,3	1,6
180	216	81	13	7,5	5	–	2,5	0,6	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

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

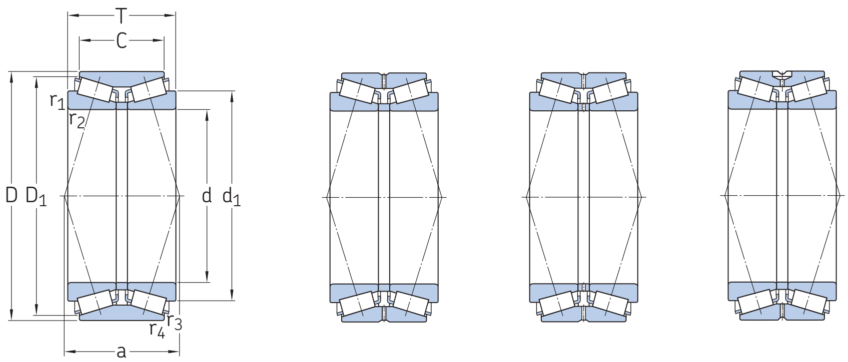


Dimensions							Abutment and fillet dimensions									Calculation factors		
d	d_1 ≈	B	C	$r_{1,2}$ min.	$r_{3,4}$ min.	a	d_a max.	d_b min.	D_a min.	D_a max.	D_b min.	C_a min.	C_b min.	r_a max.	r_b max.	e	Y	Y_0
mm							mm									–		
45	73,4	59,5	53	2,5	2,5	33	54	56	71	85	91	3	9	2,5	2,5	0,88	0,68	0,4
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 *4*	146,05 *5.75*	49,212 *1.9375*	38,94 *1.5331*	267	375	40,5	2,45	**BT2B 332767 A**	TDO/D
155 *6.1024*	200 *7.874*	66 *2.5984*	54 *2.126*	312	620	60	4,85	**BT2B 328957**	TDO/D
228,6 *9*	488,95 *19.25*	254 *10*	152,4 *6*	3 143	4 500	390	205	**331945**	TDO/D
254 *10*	422,275 *16.625*	173,038 *6.8125*	128,66 *5.0654*	2 393	4 050	355	87,5	**BT2B 328615**	TDO/D
	422,275 *16.625*	178,592 *7.0312*	139,7 *5.5*	2 393	4 050	355	97,5	**BT2B 331782**	TDO/D
260 *10.2362*	440 *17.3228*	144 *5.6693*	128 *5.0394*	1 994	3 450	305	86,5	**617479 B**	TDO/XDC
	480 *18.8976*	284 *11.1811*	220 *8.6614*	4 330	7 350	600	210	**BT2B 328130**	TDO
300 *11.811*	500 *19.6851*	203 *7.9921*	152 *5.9843*	2 992	5 100	425	140	**BT2B 328383/HA1**	TDO/D2
300,038 *11.8125*	422,275 *16.625*	174,625 *6.875*	136,525 *5.375*	2 177	4 750	400	71,5	**BT2B 332504/HA2**	TDO/XDC
317,5 *12.5*	447,675 *17.625*	180,975 *7.125*	146,05 *5.75*	2 521	5 400	440	84	**BT2B 332516 A/HA1**	TDO/XDC
330,2 *13*	482,6 *19*	177,8 *7*	127 *5*	1 293	5 000	415	100	**BT2B 332845/HA2**	TDO/D
333,375 *13.125*	469,9 *18.5*	190,5 *7.5*	152,4 *6*	2 642	5 700	465	98	**331775 B**	TDO/XDC
340 *13.3858*	460 *18.1102*	160 *6.2992*	128 *5.0394*	2 196	4 900	400	71	**BT2B 332830**	TDO/D
342,9 *13.5*	533,4 *21*	174,625 *6.875*	123,825 *4.875*	2 540	4 400	365	130	**BT2B 332802 A**	TDO/D
346,075 *13.625*	488,95 *19.25*	200,025 *7.875*	158,75 *6.25*	2 835	6 300	510	110	**331981**	TDO/D
355,6 *14*	444,5 *17.5*	136,525 *5.375*	111,125 *4.375*	1 353	3 650	300	46	**BT2B 332505/HA2**	TDO/XDC
	501,65 *19.75*	155,575 *6.125*	107,95 *4.25*	1 976	4 250	345	87	**BT2B 332506/HA2**	TDO/D

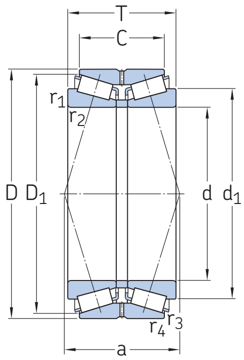
Dimensions						Calculation factors				Comparative data[1]		
										Load ratings		Thrust
										radial	axial	factor
d	d_1 ≈	D_1 ≈	$r_{1,2}$ min.	$r_{3,4}$ min.	a	e	Y_1	Y_2	Y_0	C_F	C_{Fa}	K
mm/*in.*	mm					–				kN		–
101,6 *4*	106	142	1,5	0,8	54	0,37	1,8	2,7	1,8	71	25,2	1,61
155 *6.1024*	161	189	1,5	0,6	75	0,35	1,9	2,9	1,8	83	28,9	1,66
228,6 *9*	400	456	6,4	1,5	326	0,94	0,72	1,07	0,7	780	726	0,62
254 *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 *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 *11.811*	387	465	5	1,5	205	0,4	1,7	2,5	1,6	735	297	1,43
300,038 *11.8125*	357	403	6,4	1,5	162	0,33	2	3	2	540	176	1,73
317,5 *12.5*	376	428	3,5	1,5	170	0,33	2	3	2	620	204	1,74
330,2 *13*	401	454	3,3	1,5	184	0,4	1,7	2,5	1,6	585	225	1,49
333,375 *13.125*	398	452	6,4	1,5	180	0,33	2	3	2	655	217	1,73
340 *13.3858*	394	442	3	1	161	0,31	2,2	3,3	2,2	540	167	1,86
342,9 *13.5*	422	496	4,8	1,5	180	0,33	2	3	2	620	202	1,76
346,075 *13.625*	413	467	6,4	1,5	186	0,33	2	3	2	695	230	1,74
355,6 *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

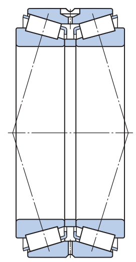
8.7 Double row tapered roller bearings, TDO design

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 *14.1732*	480 *18.8976*	160 *6.2992*	128 *5.0394*	2 211	5 000	405	73	**BT2B 332831**	TDO/D
368,249 *14.498*	523,875 *20.625*	214,312 *8.4375*	169,862 *6.6875*	3 380	7 500	585	140	**BT2B 332603/HA1**	TDO/D
368,3 *14.5*	596,9 *23.5*	203,2 *8*	133,35 *5.25*	3 270	5 850	465	188	**BT2B 332754**	TDO/XDC
371,475 *14.625*	501,65 *19.75*	155,575 *6.125*	107,95 *4.25*	1 976	4 250	345	76,5	**331606 A**	TDO/XDC
380 *14.9606*	520 *20.4725*	148 *5.8268*	112 *4.4095*	2 289	4 500	365	80	**BT2B 328020**	TDO/D
384,175 *15.125*	546,1 *21.5*	222,25 *8.75*	177,8 *7*	3 724	8 300	640	161	**331197 A**	TDO/D
406,4 *16*	539,75 *21.25*	142,875 *5.625*	101,6 *4*	1 817	4 400	345	82,5	**BT2B 328389**	TDO/XDC
415,925 *16.375*	590,55 *23.25*	244,475 *9.625*	193,675 *7.625*	4 175	9 650	720	205	**331656**	TDO/XDC
431,8 *17*	571,5 *22.5*	155,575 *6.125*	111,125 *4.375*	1 145	5 100	405	100	**BT2B 332604/HA1**	TDO/D
	571,5 *22.5*	192,088 *7.5625*	146,05 *5.75*	2 847	6 950	530	127	**BT2B 332237 A/HA1**	TDO/XDC

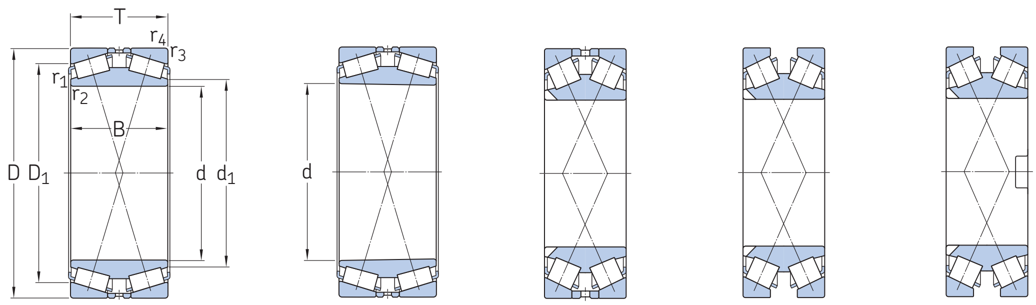
Dimensions						Calculation factors				Comparative data[1) Load ratings		Thrust factor
d	d_1 ≈	D_1 ≈	$r_{1,2}$ min.	$r_{3,4}$ min.	a	e	Y_1	Y_2	Y_0	radial C_F	axial C_{Fa}	K
mm/*in.*	mm					–				kN		–
360 *14.1732*	414	462	3	1	169	0,33	2	3	2	540	175	1,77
368,249 *14.498*	438	499	6,4	1,5	196	0,33	2	3	2	830	273	1,76
368,3 *14.5*	469	552	9,7	2,3	220	0,4	1,7	2,5	1,6	800	330	1,41
371,475 *14.625*	431	481	6,4	1,5	198	0,44	1,5	2,3	1,4	480	207	1,33
380 *14.9606*	438	497	4	1,5	162	0,3	2,3	3,4	2,2	560	167	1,92
384,175 *15.125*	457	521	6,4	0,6	205	0,33	2	3	2	915	301	1,76
406,4 *16*	473	516	6,4	1,5	215	0,48	1,4	2,1	1,4	440	207	1,23
415,925 *16.375*	497	563	6,4	1,5	225	0,33	2	3	2	1 040	332	1,76
431,8 *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

8.7

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

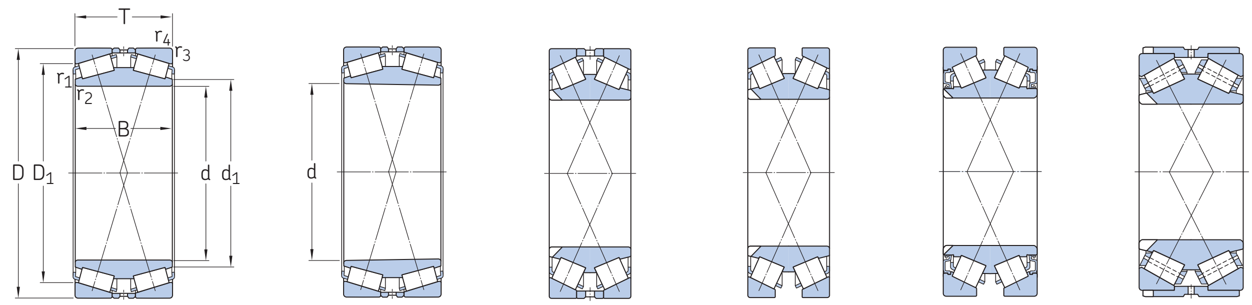
Principal dimensions				**Basic load ratings** dynamic	static	**Fatigue load limit**	**Mass**	**Designation**	**Design variant/ feature**
d	D	T	B	C	C_0	P_u			
mm/*in.*				kN		kN	kg	–	–
203,2 *8*	368,3 *14.5*	158,75 *6.25*	152,4 *6.25*	1 985	3 350	305	75	**BT2B 332683/HA1**	TDI/WIY2
240 *9.4488*	480 *18.8976*	220 *8.6614*	200 *7.874*	3 615	5 500	465	183	**BT2B 332931**	TDI/WIY2
254 *10*	438,15 *17.25*	165,1 *6.5*	165,1 *6.5*	2 685	4 250	365	100	**BT2B 332536/HA1**	TDI/WIY2
300 *11.811*	440 *17.3228*	105 *4.1339*	105 *4.1339*	1 076	2 040	180	48,5	**332168**	TDIS/NY
300,038 *11.8125*	422,275 *16.625*	150,812 *5.9375*	150,812 *5.9375*	2 177	4 750	400	70	**331951**	TDI/GWIY2
303,212 *11.9375*	495,3 *19.5*	263,525 *10.375*	263,525 *10.375*	4 919	9 800	750	212	**BT2B 332685/HA1**	TDIT/Y2
305,033 *12.0092*	560 *22.0473*	199,263 *7.874*	200 *7.874*	1 677	5 300	430	205	**BT2B 334087/HA3**	TDIS/N2Y
	560 *22.0473*	200 *7.845*	200 *7.874*	1 677	5 300	430	200	**332068**	TDIS/N2Y
305,07 *12.0106*	500 *19.6851*	200 *7.874*	200 *7.874*	2 734	5 200	425	150	**332169 A**	TDIS/N
	500 *22.0473*	200 *7.844*	200 *7.844*	2 734	5 200	425	150	**332169 AA**	TDIS/NY
	560 *19.6851*	199,237 *7.874*	199,237 *7.874*	3 102	5 300	430	200	**331617**	TDIS/N2Y
317,5 *12.5*	422,275 *16.625*	128,588 *5.0625*	128,588 *5.0625*	1 785	4 150	345	51,5	**BT2B 328699 G/HA1**	TDI/GWIY2
333,375 *13.125*	469,9 *18.5*	166,688 *6.5625*	166,688 *6.5625*	2 642	5 700	465	92,5	**BT2B 328695 A/HA1**	TDIT/Y2
342,9 *13.5*	533,4 *21*	139,7 *5.5*	146,05 *5.75*	1 373	4 400	365	115	**331713 A**	TDI/WIY2
	533,4 *21*	139,7 *5.5*	146,05 *5.75*	1 373	4 400	365	115	**331713 B**	TDI/GWIY2
343,052 *13.506*	457,098 *17.996*	122,238 *4.8125*	122,238 *4.8125*	1 610	3 400	280	54	**332240 A**	TDI/GWIY2

Dimensions					Calculation factors				Comparative data[1)]		
									Load ratings		Thrust
									radial	axial	factor
d	d_1 ≈	D_1 ≈	$r_{1,2}$ min.	$r_{3,4}$ min	e	Y_1	Y_2	Y_0	C_F	C_{Fa}	K
mm/*in.*	mm				–				kN		
203,2 *8*	237	310	3,3	3,3	0,4	1,7	2,5	1,6	490	193	1,45
240 *9.4488*	284	377	2,5	5	0,72	0,94	1,4	0,9	900	634	0,82
254 *10*	295	380	3,3	6,4	0,35	1,9	2,9	1,8	670	233	1,63
300 *11.811*	340	377	4	4	0,88	0,77	1,15	0,8	260	224	0,67
300,038 *11.8125*	327	375	3,3	3,3	0,33	2	3	2	540	176	1,73
303,212 *11.9375*	338	417	3,3	6,4	0,33	2	3	2	1 220	403	1,76
305,033 *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 *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 *12.5*	341	382	1,5	3,3	0,31	2,2	3,3	2,2	440	137	1,83
333,375 *13.125*	364	419	3,3	3,3	0,33	2	3	2	655	217	1,73
342,9 *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 *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.



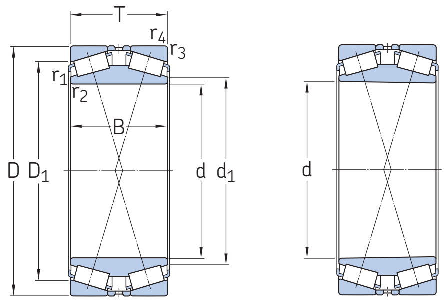
TDI/Y2 | TDIT/Y2 | TDIS/N | TDIS/NY | TDIS/NVY | TDIS.2/N

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 *13.625*	488,95 *19.25*	104,775 *4.125*	95,25 *3.75*	675	2 750	228	62	**BT2B 332913/HB1**	TDI/Y2
	488,95 *19.25*	174,625 *6.875*	174,625 *6.875*	2 835	6 300	510	110	**331527 C**	TDI/WIY2
	488,95 *19.25*	174,625 *6.875*	174,625 *6.875*	2 835	6 300	510	113	**BT2B 328410 C/HA1**	TDIT/Y2
360 *14.1732*	560 *22.0473*	160 *6.2992*	160 *6.2992*	2 556	4 650	390	140	**BT2-8000/HA3**	TDIS/N
368,3 *14.5*	523,875 *20.625*	185,738 *7.3125*	185,738 *7.3125*	3 380	7 500	585	133	**BT2B 331836**	TDI/Y2
	523,875 *20.625*	185,738 *7.3125*	185,738 *7.3125*	3 380	7 500	585	140	**BT2B 332468 A/HA1**	TDIT/Y2
380 *14.9606*	560 *22.0473*	200 *7.874*	200 *7.874*	1 617	6 550	520	165	**BT2-8009/HA3**	TDIS/NY
384,175 *15.125*	546,1 *21.5*	193,675 *7.625*	193,675 *7.625*	3 724	8 300	640	152	**331158 A**	TDI/GWIY2
	546,1 *21.5*	193,675 *7.625*	193,675 *7.625*	3 724	8 300	640	152	**BT2B 331837**	TDI/Y2
	546,1 *21.5*	193,675 *7.625*	193,675 *7.625*	3 724	8 300	640	166	**BT2B 328580/HA1**	TDIT/Y2
386 *15.1969*	574 *22.5984*	220 *8.6614*	220 *8.6614*	2 967	6 550	510	185	**BT2-8010/HA3VA901**	TDIS/NVY
390 *15.3543*	546,1 *22.441*	141,288 *7.874*	141,288 *7.874*	2 339	5 100	405	102	**BT2B 328705/HA1**	TDI/Y2
	570 *21.5*	200 *5.5625*	200 *5.5625*	2 967	6 550	510	170	**BT2B 328896/HA3**	TDIS/NY
	590 *23.2284*	200 *7.874*	200 *7.874*	2 967	6 550	510	200	**BT2B 328934/HA3**	TDIS.2/N
406,4 *16*	546,1 *21.5*	138,113 *5.4375*	138,113 *5.4375*	2 339	5 100	405	89	**BT2B 331840 C/HA1**	TDI/WIY2
408,4 *16.0787*	546,1 *21.5*	120 *4.7244*	98 *3.8583*	1 603	3 450	285	76,5	**BT2B 328874/HA1**	TDI/Y2
	546,1 *21.5*	150 *5.9055*	125 *4.9213*	1 963	4 750	375	99	**BT2B 328466/HA1**	TDI/Y2

Dimensions					Calculation factors				Comparative data[1]		
									Load ratings		Thrust
									radial	axial	factor
d	d_1 ≈	D_1 ≈	$r_{1,2}$ min.	$r_{3,4}$ min	e	Y_1	Y_2	Y_0	C_F	C_{Fa}	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

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 *16.125*	546,1 *21.5*	161,925 *6.375*	161,925 *6.375*	2 669	6 550	500	110	**331714 B**	TDI/GWIY2
415,925 *16.375*	590,55 *23.25*	209,55 *8.25*	209,55 *8.25*	4 175	9 650	720	192	**331445**	TDI/GWIY2
	590,55 *23.25*	209,55 *8.25*	209,55 *8.25*	4 175	9 650	720	192	**BT2B 328283/HA1**	TDIT/Y2
430 *16.9291*	535 *21.063*	84 *3.3071*	84 *3.3071*	1 080	3 000	240	44,5	**BT2B 334013/HA1**	TDI/Y2
450 *17.7165*	595 *23.4252*	178 *7.0079*	178 *7.0079*	3 169	8 150	610	140	**BT2B 328523/HA1**	TDI/WIY2

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		
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

8.8

[1] For additional information → *Comparative load ratings for double row tapered roller bearings*, page 685



9 Spherical roller bearings

9 Spherical roller bearings

9 Spherical roller bearings

More information

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

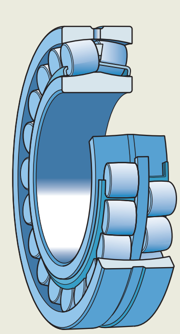
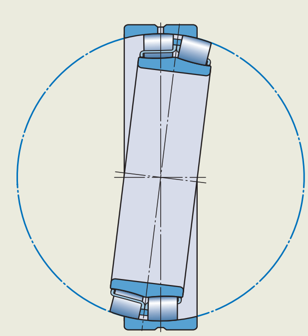


Fig. 2

Self-aligning property of the bearing



SKF

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

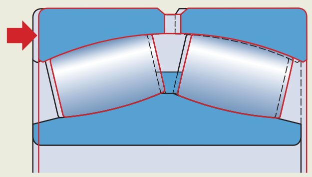


Fig. 4

Load distribution over the roller length

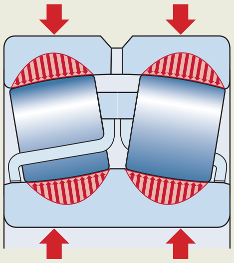


Fig. 5

Optimal roller guidance

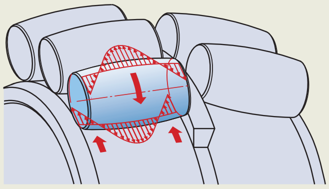
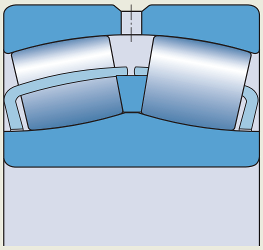
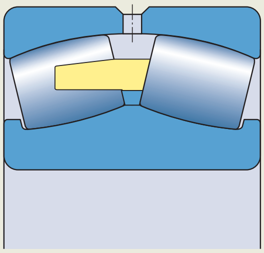


Fig. 6

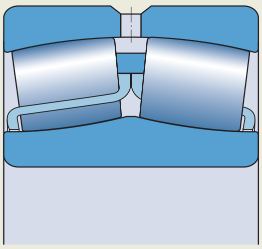
Basic design bearings



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

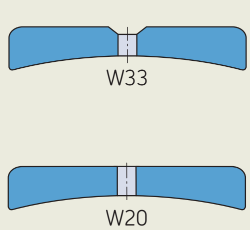


Fig. 8

Seals fitted in outer ring recess

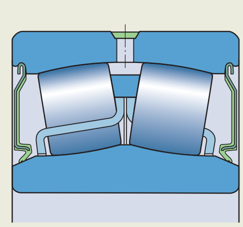
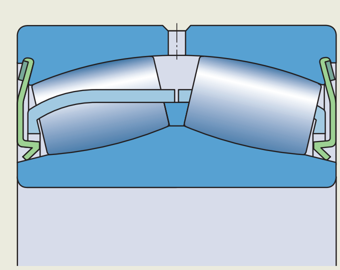


Fig. 9

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

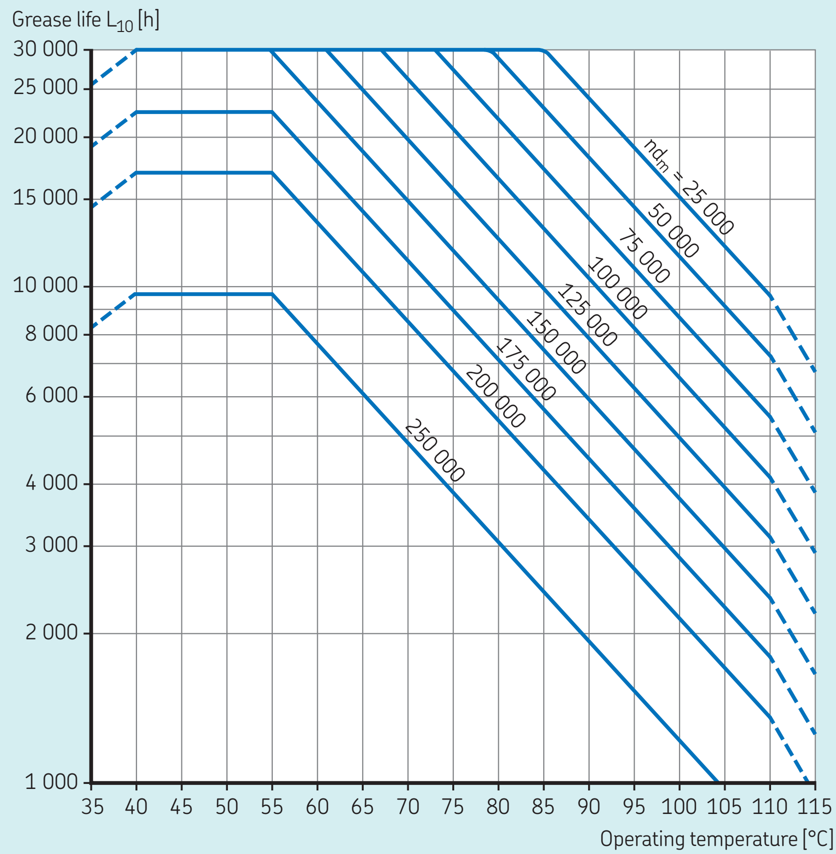
G_p = grease quantity [g]
D = bearing outside diameter [mm]
B = bearing width [mm]

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)] (−50 0 50 100 150 200 250 °C / −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)*
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

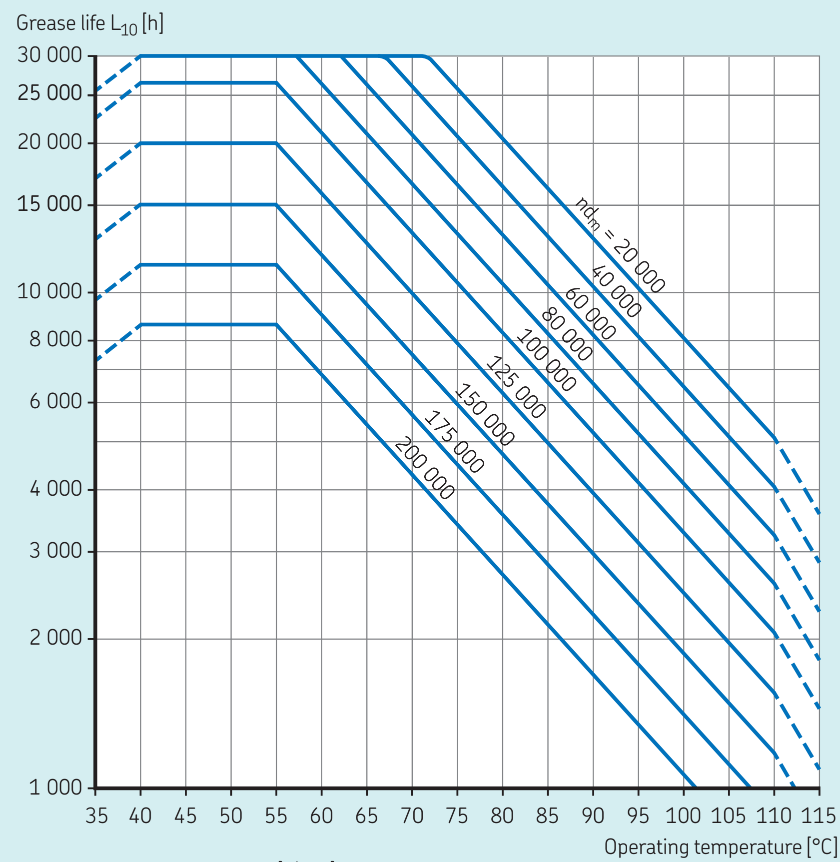
1) Refer to the SKF traffic light concept (page 117).

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 Light load (P ≤ 0,067 C)	 Normal load (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/s²).

⚠ 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.

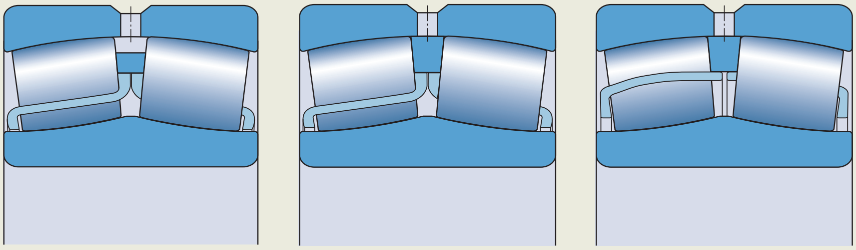
Read and follow the safety precautions on page 197.

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

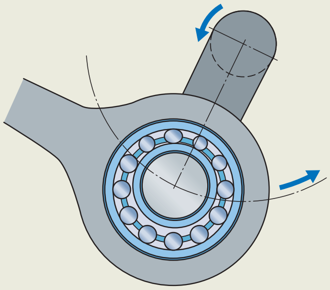
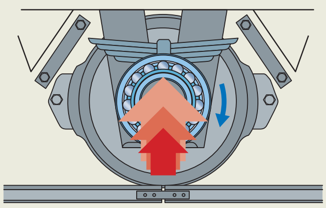


Fig. 12

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

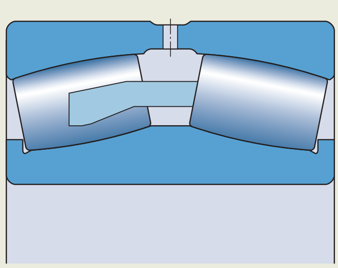


Fig. 14

Rotating shaft deflection

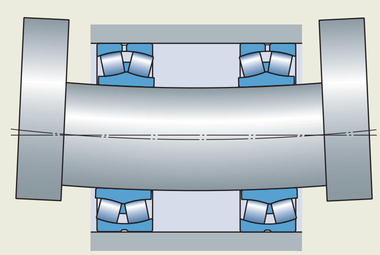


Table 3

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

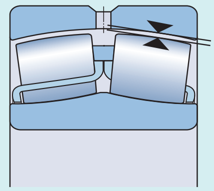
Bearing data

Dimension standards	Boundary dimensions: ISO 15, except for the width of sealed bearings with a BS2- designation prefix
Tolerances For additional information → page 35	Normal P5 geometrical tolerance on request (designation suffix C08) Except for: • **Bearings with d ≤ 300 mm:** – width tolerance at least 50% tighter than ISO standard (table 3) – P5 geometrical tolerance • **Bearings for vibratory applications:** – P5 bore diameter – P6 outside diameter Values: ISO 492, (table 2, page 38, to table 4, page 40)
Internal clearance For additional information → page 182	Normal, C3 Check availability of C2, C4 or C5 clearance classes **Bearings for vibratory applications:** C4 Values: • cylindrical bore (table 4, page 782) • tapered bore (table 5, page 783) 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 Whether these values can be fully exploited depends on the design of the bearing arrangement, the bearing abutments in the housing, etc. • 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: – vibrating screens with rotating imbalance and therefore rotating deflection of the shaft (fig. 14) – deflection-compensating rolls of paper machines where the stationary shaft is not straight • To avoid detrimental effects on sealing performance, misalignment for sealed bearings should not exceed 0,5°.

9

Table 4

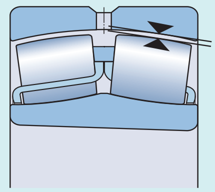
Radial internal clearance of spherical roller bearings with a cylindrical bore



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 For additional information → page 106	$P_m = 0{,}01\ C_0$ **Oil lubricated bearings:** $n/n_r \leq 0{,}3 \quad \rightarrow \quad P_m = 0{,}003\ C_0$ $0{,}3 < n/n_r \leq 2 \quad \rightarrow \quad P_m = 0{,}003\ C_0 \left(1 + 2\sqrt{\frac{n}{n_r} - 0{,}3}\right)$
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 For additional information → page 91	$F_a/F_r \leq e \quad \rightarrow \quad P = F_r + Y_1\ F_a$ $F_a/F_r > e \quad \rightarrow \quad P = 0{,}67\ F_r + Y_2\ F_a$
Equivalent static bearing load For additional information → page 105	$P_0 = F_r + Y_0\ F_a$

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

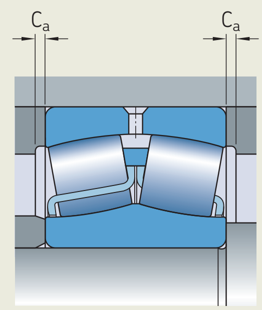


Fig. 16

Shaft abutment for a sealed bearing

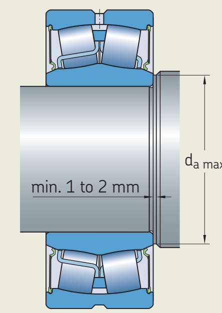


Fig. 17

Sealed bearing axially located by a KMFE lock nut

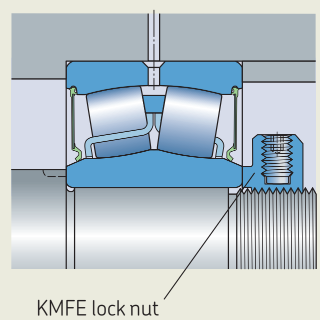
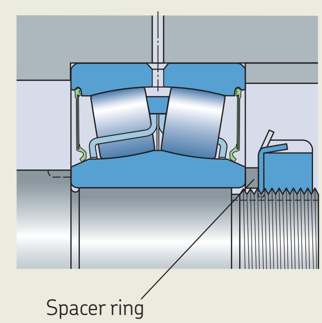


Fig. 18

Sealed bearing axially located by a KM(L) lock nut with inserted spacer ring between lock washer and bearing



Bearings on sleeves

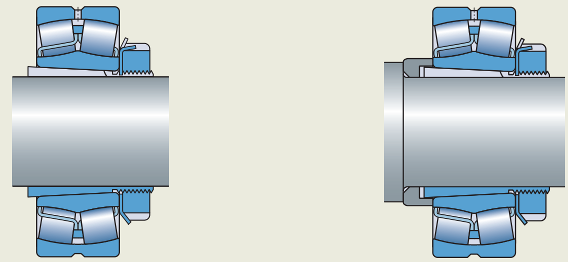
Spherical roller bearings with a tapered bore can be mounted with:

- 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

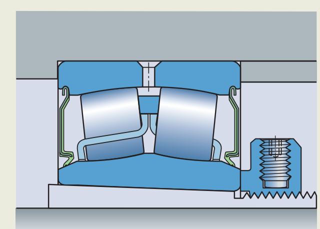
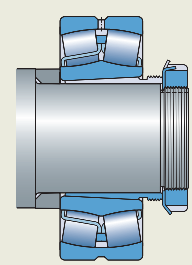


Fig. 21

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)**

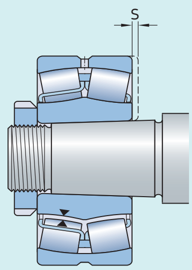
4 **Applying the SKF Drive-up Method**
For bearings with d > 100 mm, SKF recommends using the SKF Drive-up Method. This is a fast, reliable and safe method to achieve the appropriate interference fit. Additional information is available online at skf.com/drive-up.

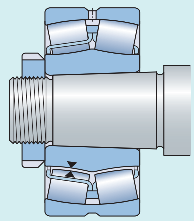
5 **Measuring the inner ring expansion**
Additional information is available online at skf.com/sensormount.

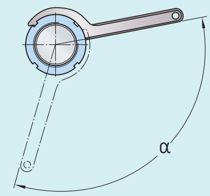
For additional information about these mounting methods, refer to *Mounting bearings with a tapered bore*, **page 203**, or the *SKF bearing maintenance handbook*.

Table 7

Drive-up data for spherical roller bearings with a tapered bore







Bore diameter d		Reduction of radial internal clearance		Axial drive-up[1) 2)] s				Lock nut tightening angle[2)] 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 213, 222 and 223 series: Flangeless inner ring and two stamped steel cages. Annular groove and three lubrication holes in the outer ring. d ≤ 65 mm: Guide ring centred on the inner ring 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					
4.1	4.2	4.3	4.4	4.5	4.6

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

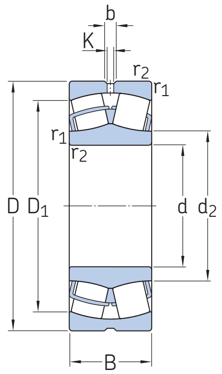
Group 4.3: Bearing sets, matched bearings

Group 4.2: Accuracy, clearance, preload, quiet running

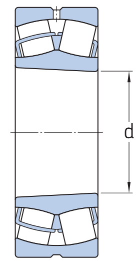
C08	Running accuracy to P5 tolerance class
C083	C08 + C3
C084	C08 + C4
C2	Radial internal clearance smaller than Normal
C3	Radial internal clearance greater than Normal
C4	Radial internal clearance greater than C3
C5	Radial internal clearance greater than C4
P5	Dimensional and running accuracy to P5 tolerance class
P6	Dimensional and running accuracy to P6 tolerance class
P62	P6 + C2

Group 4.1: Materials, heat treatment

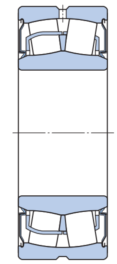
235220	Case-hardened inner ring with a helical groove in the bore
HA3	Case-hardened inner ring



Cylindrical bore

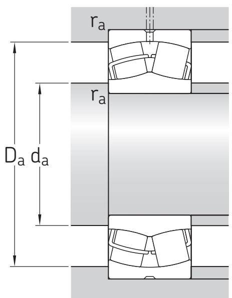


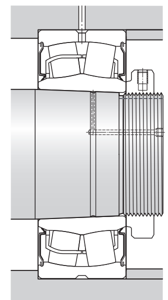
Tapered bore


Sealed (2RS)

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	–	
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	–

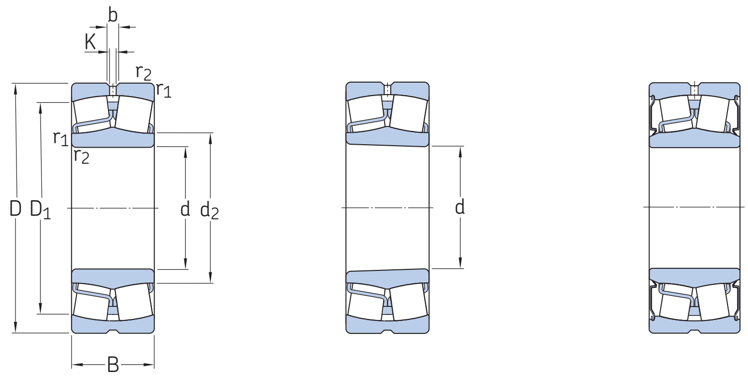
SKF Explorer bearing
▸ Popular item





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	–	–

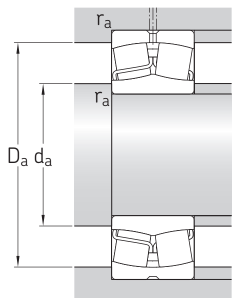
1) For details about permissible accelerations → page 779

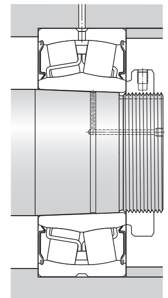


Cylindrical bore   Tapered bore   Sealed (2RS, 2RS5)

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	–

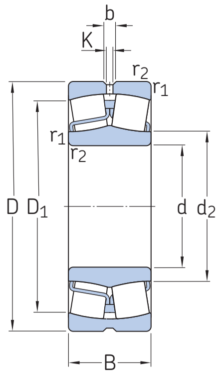
SKF Explorer bearing
► Popular item



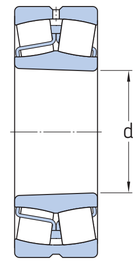


Dimensions						Abutment and fillet dimensions				Calculation factors				Permissible acceleration for oil lubrication[1)]	
d	d_2 ≈	D_1 ≈	b	K	$r_{1,2}$ min.	d_a min.	d_a max.	D_a max.	r_a max.	e	Y_1	Y_2	Y_0	rota-tional	linear
mm						mm				–				m/s^2	
60	72,7	96,5	6	3	1,5	69	–	101	1,5	0,24	2,8	4,2	2,8	–	–
	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	–	–

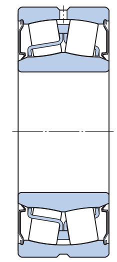
1) For details about permissible accelerations → page 779



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

9.1

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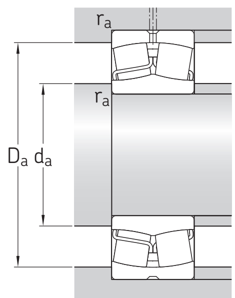
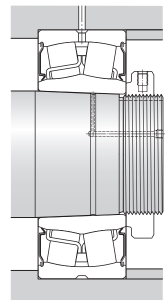
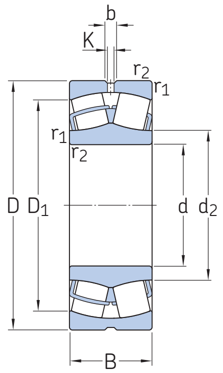


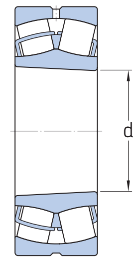


Dimensions						Abutment and fillet dimensions				Calculation factors				Permissible acceleration for oil lubrication[1]	
d	d_2 ≈	D_1 ≈	b	K	$r_{1,2}$ min.	d_a min.	d_a max.	D_a max.	r_a max.	e	Y_1	Y_2	Y_0	rota-tional	linear
mm						mm				–				m/s²	
85	101	133	6	3	2	96	–	139	2	0,22	3	4,6	2,8	–	–
	98,2	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

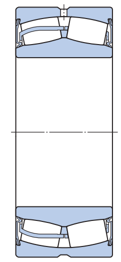
[1] For details about permissible accelerations → page 779



Cylindrical bore



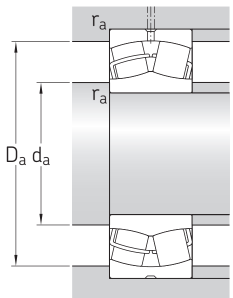
Tapered bore

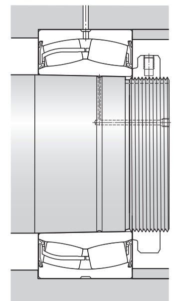


Sealed (2RS, 2RS5, 2CS5)

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	rota-tional	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	–	–

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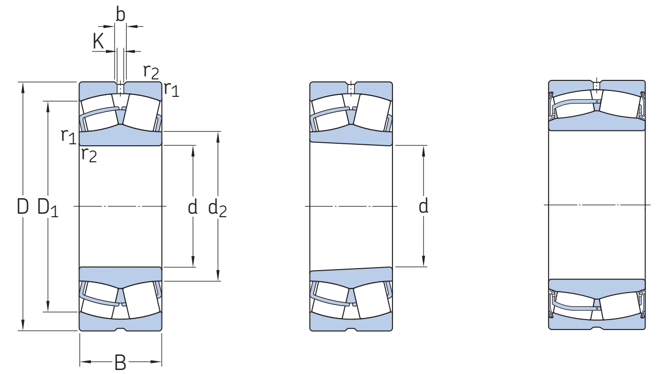
1) For details about permissible accelerations → page 779

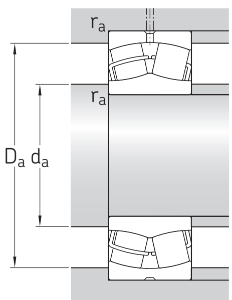
d **130 – 140** mm

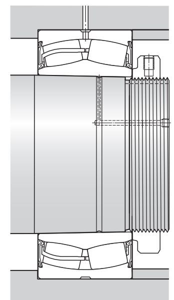


Cylindrical bore Tapered bore Sealed (2CS5)

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



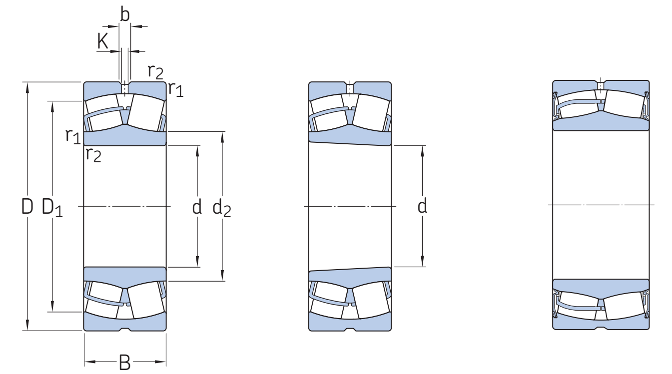


Dimensions						Abutment and fillet dimensions				Calculation factors				Permissible acceleration for oil lubrication[1)]	
d	d_2 ≈	D_1 ≈	b	K	$r_{1,2}$ min.	d_a min.	d_a max.	D_a max.	r_a max.	e	Y_1	Y_2	Y_0	rota-tional	linear
mm						mm				–				m/s²	
130	148	180	8,3	4,5	2	139	–	191	2	0,23	2,9	4,4	2,8	–	–
	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

9.1 Spherical roller bearings

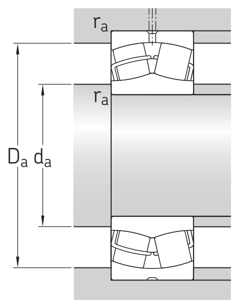
d **150 – 160** mm

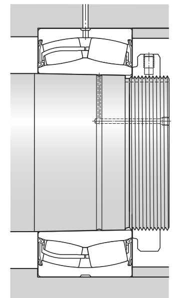


Cylindrical bore | Tapered bore | Sealed (2CS5)

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

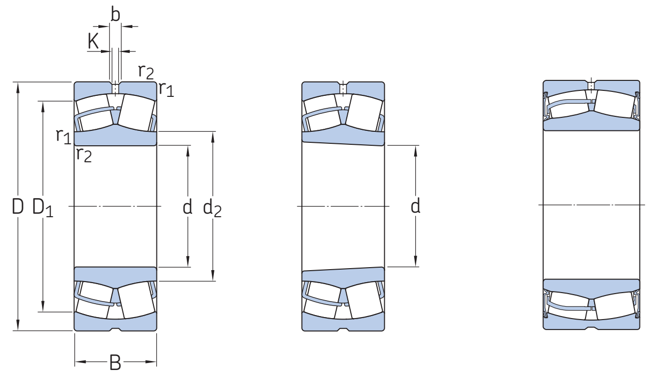




Dimensions						Abutment and fillet dimensions				Calculation factors				Permissible acceleration for oil lubrication[1]	
d	d_2 ≈	D_1 ≈	b	K	$r_{1,2}$ min.	d_a min.	d_a max.	D_a max.	r_a max.	e	Y_1	Y_2	Y_0	rota-tional	linear
mm						mm				–				m/s²	
150	169	203	8,3	4,5	2,1	161	–	214	2	0,22	3	4,6	2,8	–	–
	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

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
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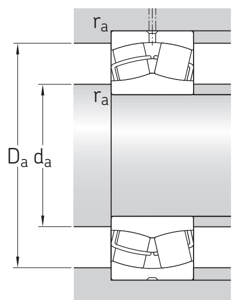
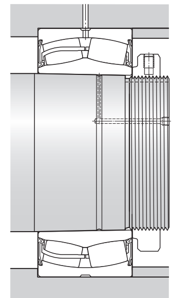
SKF

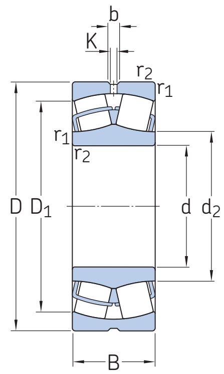




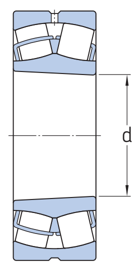
Dimensions						Abutment and fillet dimensions				Calculation factors				Permissible acceleration for oil lubrication[1)]	
d	d_2 ≈	D_1 ≈	b	K	$r_{1,2}$ min.	d_a min.	d_a max.	D_a max.	r_a max.	e	Y_1	Y_2	Y_0	rota-tional	linear
mm						mm				–				m/s²	
170	191	232	11,1	6	2,1	181	–	249	2	0,23	2,9	4,4	2,8	–	–
	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

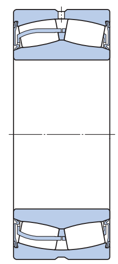
d **190 – 200** mm



Cylindrical bore



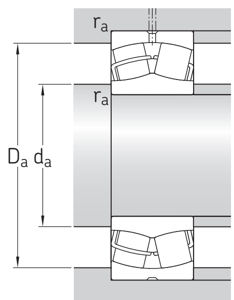
Tapered bore

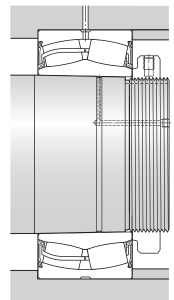


Sealed (2CS5)

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

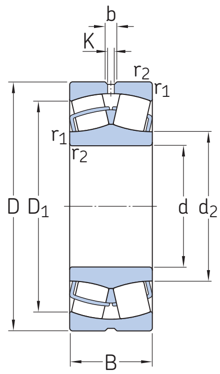




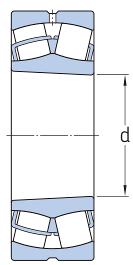
Dimensions						Abutment and fillet dimensions				Calculation factors				Permissible acceleration for oil lubrication[1)]	
d	d_2 ≈	D_1 ≈	b	K	$r_{1,2}$ min.	d_a min.	d_a max.	D_a max.	r_a max.	e	Y_1	Y_2	Y_0	rotational	linear
mm						mm				–				m/s^2	
190	209	240	6	3	2	199	–	251	2	0,16	4,2	6,3	4	–	–
	216	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

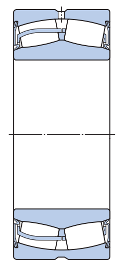
d **220 – 260** mm



Cylindrical bore



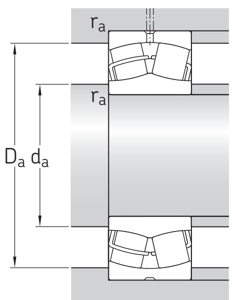
Tapered bore

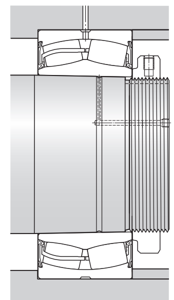


Sealed (2CS5)

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



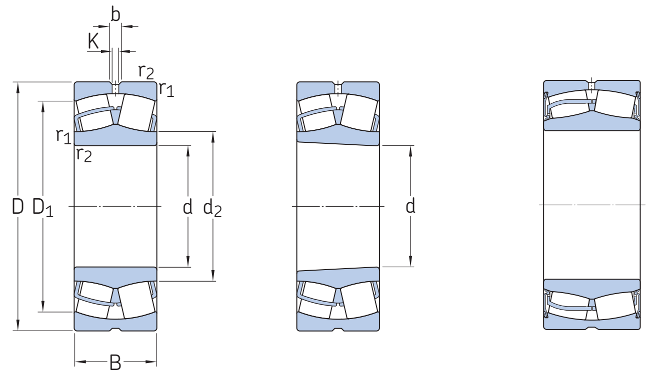


Dimensions						Abutment and fillet dimensions				Calculation factors				Permissible acceleration for oil lubrication[1]	
d	d_2 ≈	D_1 ≈	b	K	$r_{1,2}$ min.	d_a min.	d_a max.	D_a max.	r_a max.	e	Y_1	Y_2	Y_0	rota-tional	linear
mm						mm				–				m/s²	
220	241	278	8,3	4,5	2,1	231	–	289	2	0,16	4,2	6,3	4	–	–
	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

9.1 Spherical roller bearings

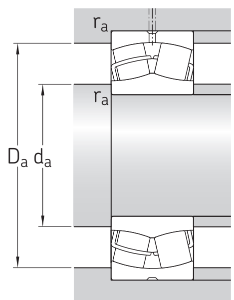
d **280 – 320** mm

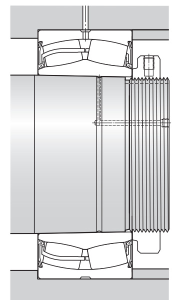


Cylindrical bore | Tapered bore | Sealed (2CS5)

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



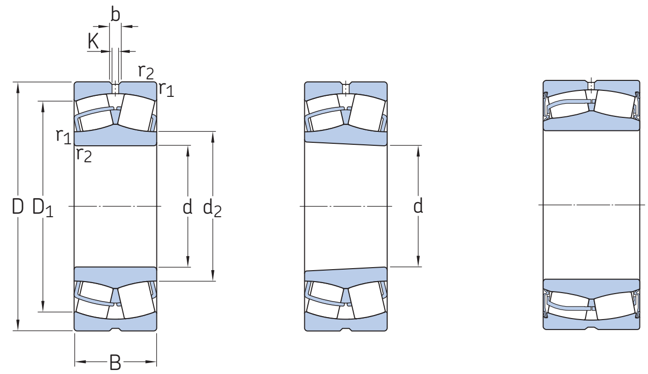


Dimensions						Abutment and fillet dimensions				Calculation factors				Permissible acceleration for oil lubrication[1]	
d	d_2 ≈	D_1 ≈	b	K	$r_{1,2}$ min.	d_a min.	d_a max.	D_a max.	r_a max.	e	Y_1	Y_2	Y_0	rota-tional	linear
mm						mm				–				m/s²	
280	308	352	11,1	6	2,1	291	–	369	2	0,16	4,2	6,3	4	–	–
	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

9.1 Spherical roller bearings

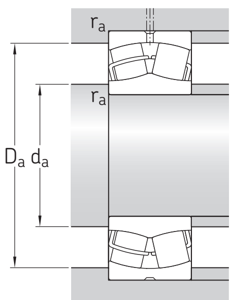
d **340 – 400** mm

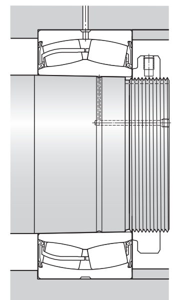


Cylindrical bore | Tapered bore | Sealed (2CS5)

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	–	
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



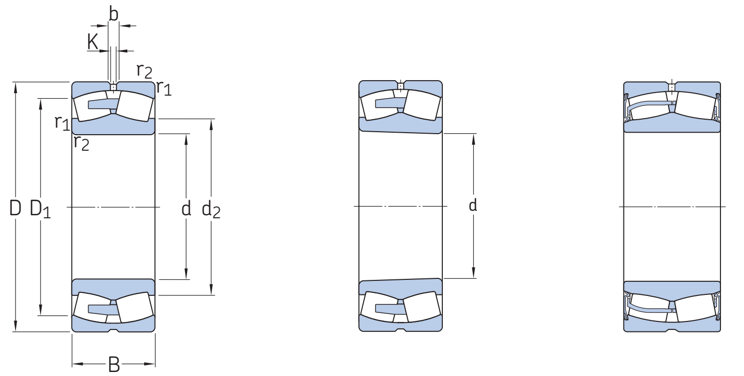


Dimensions						Abutment and fillet dimensions				Calculation factors				Permissible acceleration for oil lubrication[1)]	
d	d_2 ≈	D_1 ≈	b	K	$r_{1,2}$ min.	d_a min.	d_a max.	D_a max.	r_a max.	e	Y_1	Y_2	Y_0	rota-tional	linear
mm						mm				–				m/s²	
340	373	426	11,1	6	3	353	–	447	2,5	0,17	4	5,9	4	–	–
	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

9.1 Spherical roller bearings

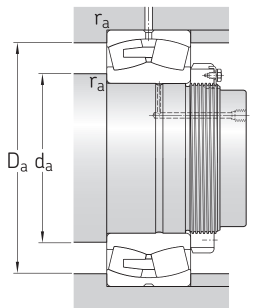
d **420 – 480** mm

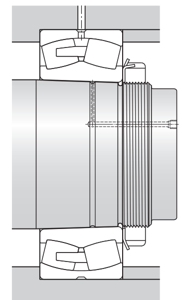


Cylindrical bore | Tapered bore | Sealed (2CS5)

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



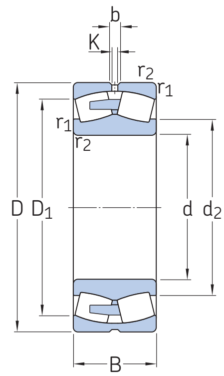


Dimensions						Abutment and fillet dimensions				Calculation factors				Permissible acceleration for oil lubrication[1]	
d	d_2 ≈	D_1 ≈	b	K	$r_{1,2}$ min.	d_a min.	d_a max.	D_a max.	r_a max.	e	Y_1	Y_2	Y_0	rota-tional	linear
mm						mm				–				m/s²	
420	459	520	16,7	9	4	435	–	545	3	0,16	4,2	6,3	4	–	–
	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	–	–

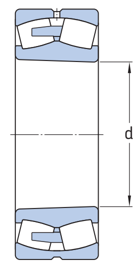
[1] For details about permissible accelerations → page 779

9.1

d **500 – 630** mm



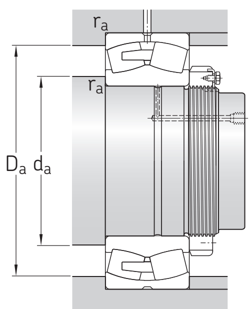
Cylindrical bore

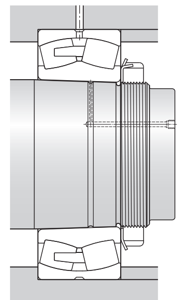


Tapered bore

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



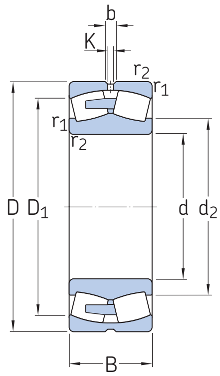


Dimensions						Abutment and fillet dimensions				Calculation factors				Permissible acceleration for oil lubrication[1]	
d	d_2 ≈	D_1 ≈	b	K	$r_{1,2}$ min.	d_a min.	d_a max.	D_a max.	r_a max.	e	Y_1	Y_2	Y_0	rota-tional	linear
mm						mm				–				m/s²	
500	561	622	22,3	12	5	518	–	652	4	0,17	4	5,9	4	–	–
	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	–	–

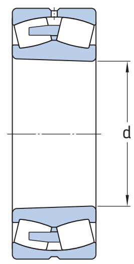
[1] For details about permissible accelerations → page 779

9.1

d **670 – 800** mm



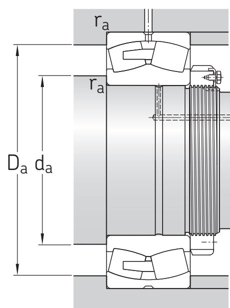
Cylindrical bore

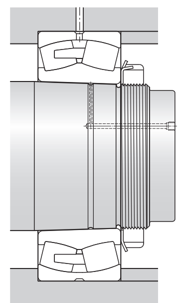


Tapered bore

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



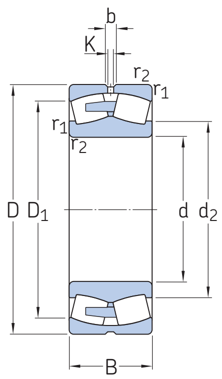


Dimensions						Abutment and fillet dimensions				Calculation factors				Permissible acceleration for oil lubrication[1]	
d	d_2 ≈	D_1 ≈	b	K	$r_{1,2}$ min.	d_a min.	d_a max.	D_a max.	r_a max.	e	Y_1	Y_2	Y_0	rota-tional	linear
mm						mm				–				m/s²	
670	724	778	–	9	4	685	–	805	3	0,11	6,1	9,1	6,3	–	–
	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	–	–

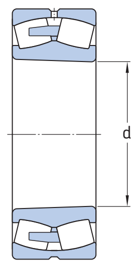
[1] For details about permissible accelerations → page 779

9.1 Spherical roller bearings

d **850 – 1 120** mm



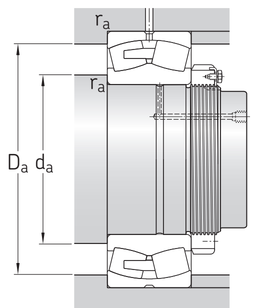
Cylindrical bore

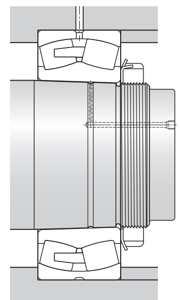


Tapered bore

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





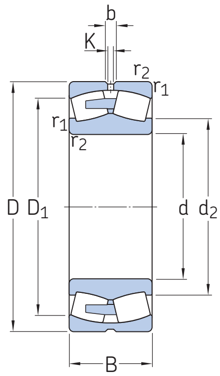
Dimensions						Abutment and fillet dimensions				Calculation factors				Permissible acceleration for oil lubrication[1)]	
d	d_2 ≈	D_1 ≈	b	K	$r_{1,2}$ min.	d_a min.	d_a max.	D_a max.	r_a max.	e	Y_1	Y_2	Y_0	rota-tional	linear
mm						mm				–				m/s²	
850	912	981	–	12	5	868	–	1 012	4	0,11	6,1	9,1	6,3	–	–
	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	–	–

9.1

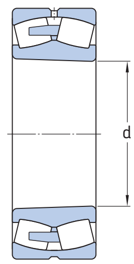
1) For details about permissible accelerations → page 779

9.1 Spherical roller bearings

d **1 180 – 1 800** mm



Cylindrical bore

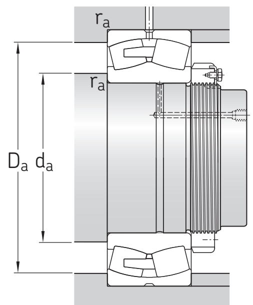


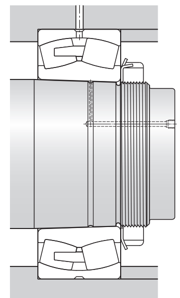
Tapered bore

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

9.1

SKF Explorer bearing





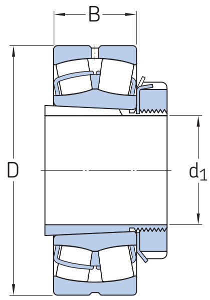
Dimensions						Abutment and fillet dimensions				Calculation factors				Permissible acceleration for oil lubrication[1)]	
d	d_2 ≈	D_1 ≈	b	K	$r_{1,2}$ min.	d_a min.	d_a max.	D_a max.	r_a max.	e	Y_1	Y_2	Y_0	rota-tional	linear
mm						mm				–				m/s^2	
1 180	1 264	1 355	–	12	6	1 203	–	1 397	5	0,11	6,1	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	–	–

9.1

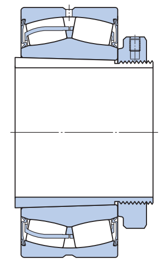
1) For details about permissible accelerations → page 779

9.2 Spherical roller bearings on an adapter sleeve

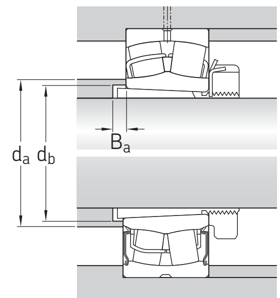
d_1 **20 – 100** mm



Bearing on an
H .. sleeve



Sealed bearing on
an H .. E sleeve



Principal dimensions			Abutment and fillet dimensions			Mass Bearing + sleeve	Designations 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**

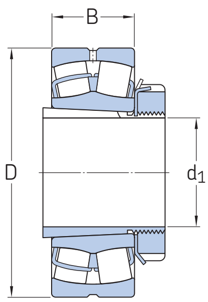
SKF Explorer bearing
▸ Popular item
1) For additional bearing data → product table, page 792
2) For additional adapter sleeve data → product table, page 1072

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

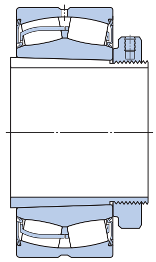
SKF Explorer bearing
▸ Popular item
1) For additional bearing data → product table, page 792
2) For additional adapter sleeve data → product table, page 1072

9.2 Spherical roller bearings on an adapter sleeve

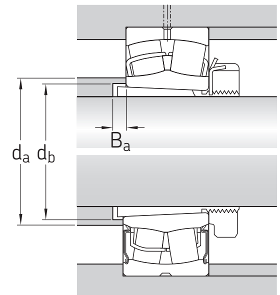
d_1 **110 – 170** mm



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**

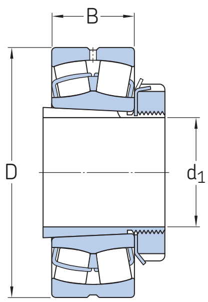
SKF

Principal dimensions			Abutment and fillet dimensions			Mass Bearing + sleeve	Designations Bearing1)	Sleeve2)
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

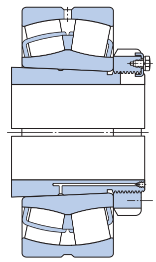
SKF Explorer bearing
▸ Popular item
1) For additional bearing data → product table, page 792
2) For additional adapter sleeve data → product table, page 1072

9.2 Spherical roller bearings on an adapter sleeve

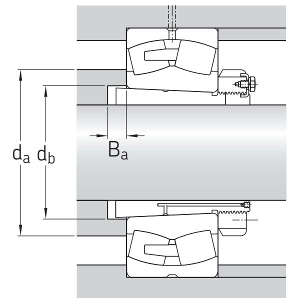
d_1 **180 – 380** mm



Bearing on an
H .. sleeve



Bearing on an
OH .. H sleeve



Principal dimensions			Abutment and fillet dimensions			Mass Bearing + sleeve	Designations 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

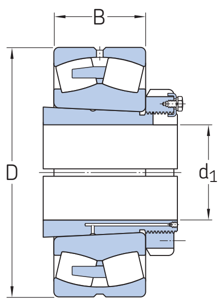
SKF Explorer bearing
▸ Popular item
1) For additional bearing data → product table, page 792
2) For additional adapter sleeve data → product table, page 1072

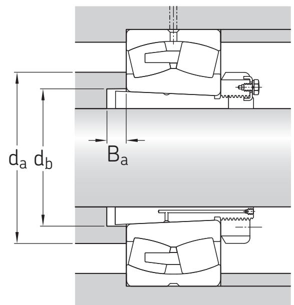
Principal dimensions			Abutment and fillet dimensions			Mass	Designations	
						Bearing + sleeve	Bearing[1]	Sleeve[2]
d_1	D	B	d_a max.	d_b min.	B_a min.			
mm			mm			kg	–	
240	360	75	287	270	12	35	23952 CCK/W33	OH 3952 H
	400	104	289	272	11	58	23052-2CS5K/VT143	OH 3052 HE
	400	104	295	272	11	60,5	▸ 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





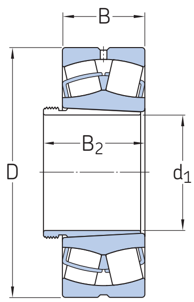
Principal dimensions			Abutment and fillet dimensions			Mass Bearing + sleeve	Designations Bearing1)	Sleeve2)
d_1	D	B	d_a max.	d_b min.	B_a min.			
mm			mm			kg	–	
400	560	106	459	433	15	105	23984 CCK/W33	OH 3984 H
	620	150	487	437	16	190	23084 CAK/W33	OH 3084 H
	700	224	483	443	16	410	▸ 23184 CKJ/W33	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



Principal dimensions				Mass	Designations	
				Bearing + sleeve	Bearing1)	Sleeve2)
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

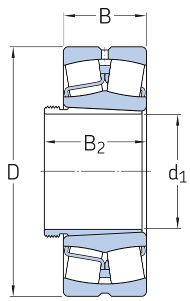
Principal dimensions				Mass	Designations	
				Bearing + sleeve	Bearing[1]	Sleeve[2]
d_1	D	B	B_2[3] ≈			
mm				kg	–	
90	170	43	61	4,6	▸ 22219 EK	AHX 319
	200	45	61	7,4	21319 EK	AHX 319
	200	67	89	11	▸ 22319 EK	AHX 2319
95	165	52	68	5	▸ 23120 CCK/W33	AHX 3120
	180	46	63	5,4	▸ 22220 EK	AHX 320
	180	60,3	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

9.3

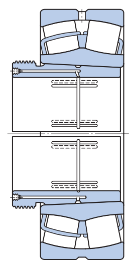
SKF Explorer bearing
▸ Popular item
1) For additional bearing data → **product table, page 792**
2) For additional withdrawal sleeve data → skf.com/go/17000-24-1
3) Width before the sleeve is driven into the bearing bore

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

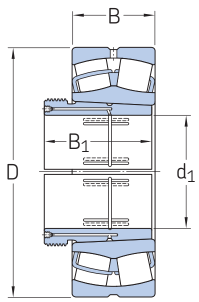
Principal dimensions				Mass	Designations	
				Bearing + sleeve	Bearing[1]	Sleeve[2]
d_1	D	B	B_2[3] ≈			
mm				kg	–	
190	310	82	108	26,5	▸ 23040 CCK/W33	AH 3040 G
	310	109	140	34,5	▸ 24040 CCK30/W33	AH 24040
	340	112	140	48,5	▸ 23140 CCK/W33	AH 3140
	340	140	171	57,5	▸ 24140 CCK30/W33	AH 24140
	360	128	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

9.3

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



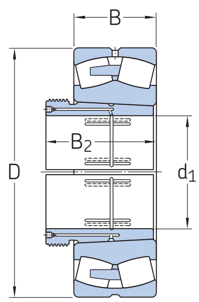
Principal dimensions				**Mass**	**Designations**	
				Bearing + sleeve	Bearing[1]	Sleeve[2]
d_1	D	B	B_2[3] ≈			
mm				kg	–	
320	520	133	171	120	▸ 23068 CCK/W33	AOH 3068 G
	520	180	225	160	▸ 24068 CCK30/W33	AOH 24068
	580	190	234	225	▸ 23168 CCK/W33	AOH 3168 G
	580	243	288	295	24168 ECCK30J/W33	AOH 24168
	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

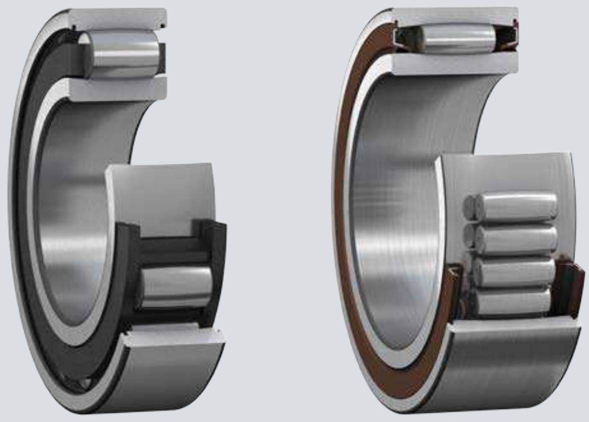
SKF Explorer bearing
1) For additional bearing data → product table, page 792
2) For additional withdrawal sleeve data → skf.com/go/17000-24-1
3) Width before the sleeve is driven into the bearing bore

9.3 Spherical roller bearings on a withdrawal sleeve
d_1 **710 – 1 000** mm



Principal dimensions				Mass	Designations	
				Bearing + sleeve	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

10 CARB toroidal roller bearings

More information

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Mounting instructions for individual bearings → skf.com/mount

SKF Drive-up Method → skf.com/drive-up

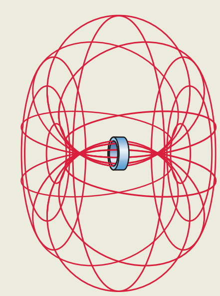
SKF bearing maintenance handbook ISBN 978-91-978966-4-1

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

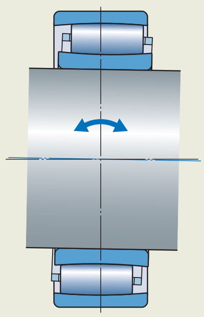


Fig. 5

Interchangeability

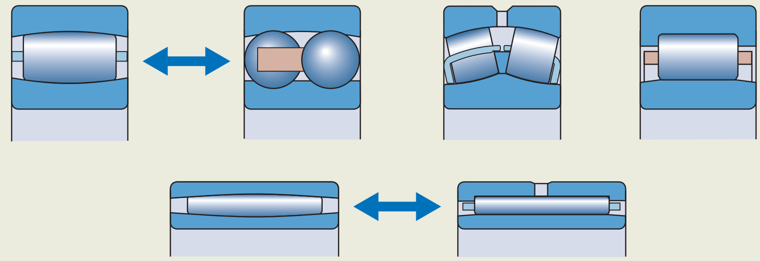


Fig. 4

Axial displacement

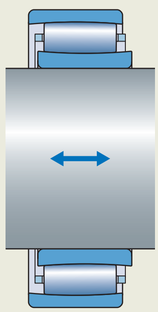


Fig. 6

Optimal stress distribution

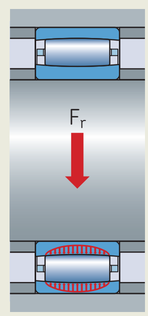
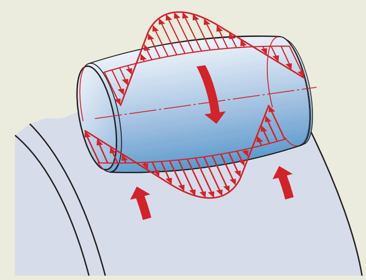


Fig. 7

Low friction and frictional heat



Long bearing system life

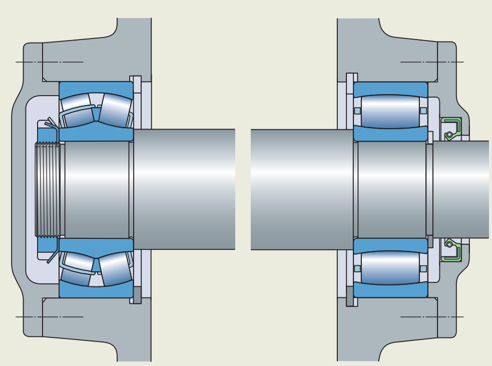
CARB bearings provide benefits in self-aligning bearing arrangements (**fig. 8**). With a CARB bearing in the non-locating position, there are no internally induced axial forces, which results in multiple benefits:

- 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.

Fig. 9

Basic designs

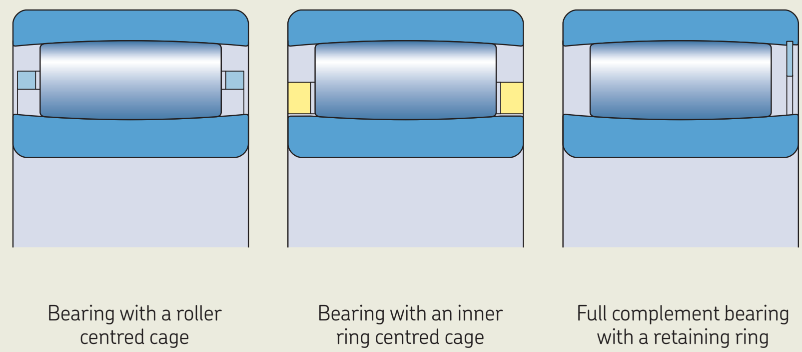
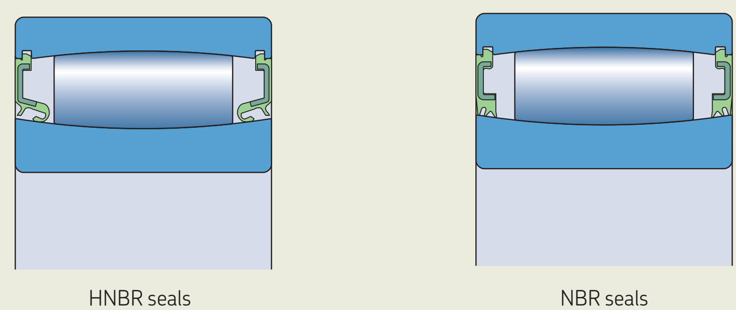


Fig. 10

Sealed bearings



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.

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

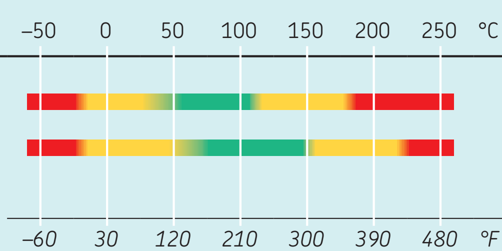
SKF can customize bearings to meet the needs of applications where the bearings are subjected to unique operating conditions. For example, bearings for:

- 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)*
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 For additional information → page 35	Normal **d ≤ 300 mm** • width tolerance at least 50% tighter than ISO standard (table 2) • P5 geometrical tolerances **d > 300 mm** • P5 geometrical tolerances on request (designation suffix C08) Values: ISO 492 (table 2, page 38, to table 4, page 40)
Internal clearance For additional information → page 182	Normal Check availability of C2, C3, C4 or C5 clearance classes Values: ISO 5753-1 • cylindrical bore (table 3) • tapered bore (table 4, page 848) 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. 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° 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) 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. Free space must be provided on both sides of the bearing (*Free space on both sides of the bearing*, page 852).

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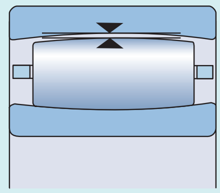
Table 2

Width tolerances for CARB bearings

Bore diameter d >	≤	Width tolerances $t_{\Delta Bs}$ U	L
mm		µm	
18	**50**	0	–40
50	**80**	0	–60
80	**250**	0	–80
250	**300**	0	–100

Table 3

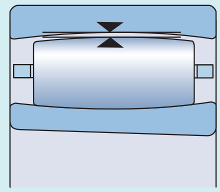
Radial internal clearance of CARB bearings with a cylindrical bore



Bore diameter d		Radial internal clearance 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 d		Radial internal clearance 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	$F_{rm} = 0{,}007\ C_0$	$F_{rm} = 0{,}01\ C_0$
	Oil lubricated bearings:	
	$n/n_r \leq 0{,}3 \rightarrow F_{rm} = 0{,}002\ C_0$	
	$0{,}3 < n/n_r \leq 2 \rightarrow F_{rm} = 0{,}002\ C_0 \left(1 + 2 \sqrt{\frac{n}{n_r} - 0{,}3}\ \right)$	
For additional information → page 106	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.	
Equivalent dynamic bearing load For additional information → page 91	$P = F_r$	
Equivalent static bearing load For additional information → page 105	$P_0 = F_r$	

Symbols

C_0 basic static load rating [kN] (product table, page 856)
F_r radial load [kN]
F_{rm} minimum radial load [kN]
P equivalent dynamic bearing load [kN]
P_0 equivalent static bearing load [kN]
n rotational speed [r/min]
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

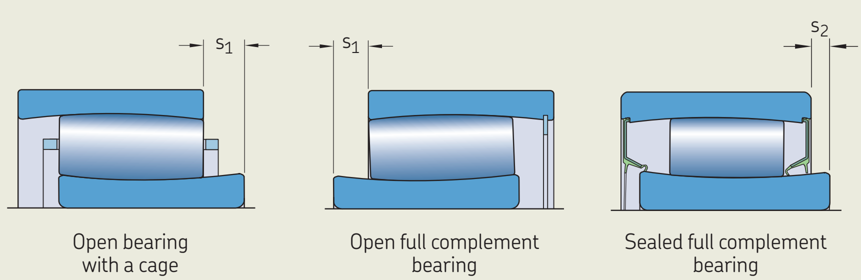
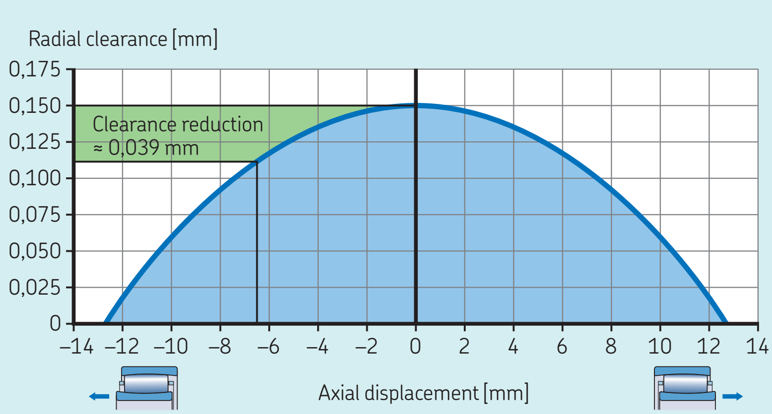


Diagram 1

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

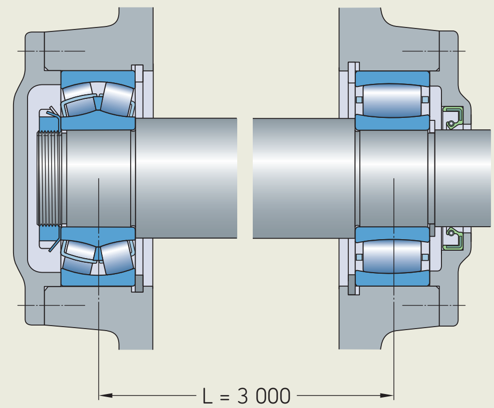
- Determine the clearance reduction caused by axial displacement.

$$C_{red} = \frac{k_2\, s_{req}^2}{B}$$

- 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

$$C_{areq} = C_a + 0,5\,(s + \beta\, k_1\, B)$$

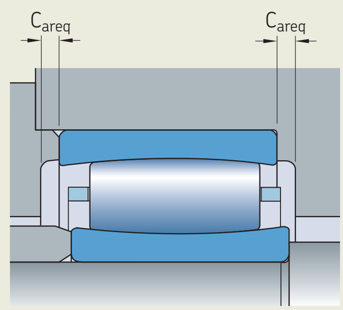
where
B = bearing width [mm]
C_a = minimum width of space required on both sides of the bearing [mm] (**product table**)
C_{areq} = width of space required on both sides of the bearing [mm]
k_1 = misalignment factor (**product table**)
s = relative axial displacement of rings, e.g. thermal shaft expansion [mm]
β = 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



Bearings on sleeves

CARB bearings with a tapered bore can be mounted with:

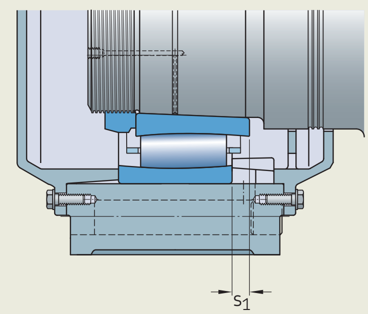
- an adapter sleeve on plain or stepped shafts (**fig. 15**):
  - Adapter sleeves are supplied complete with a locking device.
  - Use appropriate SKF adapter sleeve assemblies to prevent the locking device from interfering with the cage (**product table**, **page 868**).
- a withdrawal sleeve on stepped 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**.

Fig. 14

Bearing rings mounted offset to accommodate shaft expansion



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:

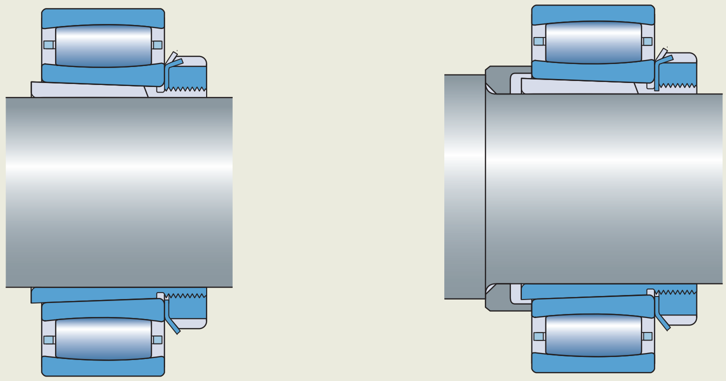
- CARB bearings with a tapered bore on an adapter sleeve and a plain shaft
- CARB bearings with a cylindrical bore on a stepped shaft

The comprehensive assortment of SKF bearing housings is provided online at skf.com/housings.

SKF

Fig. 15

Bearings with an adapter sleeve

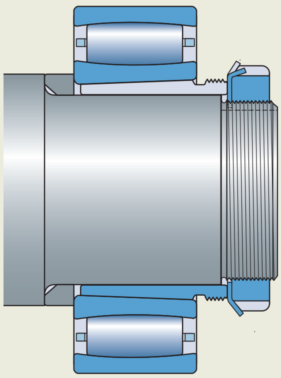


On a plain shaft

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)

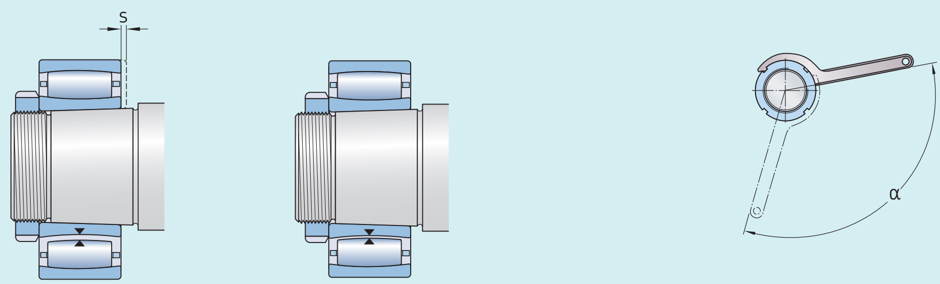
4 Applying the SKF Drive-up Method
For bearings with d > 100 mm, SKF recommends using the SKF Drive-up Method. This is a fast, reliable and safe method to achieve the appropriate interference fit. Additional information is available online at skf.com/drive-up.

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 Taper 1:12		Taper 1:30		α 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

		Group 1	Group 2	Group 3	/	Group 4					
						4.1	4.2	4.3	4.4	4.5	4.6

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

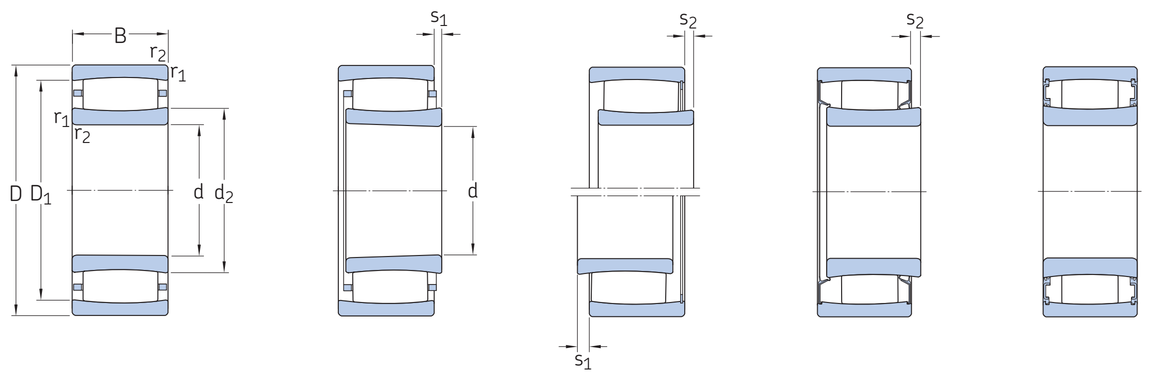
S3 Bearing rings heat stabilized for operating temperatures ≤ 300 °C *(570 °F)*

Group 4.5: Lubrication

GEM9 Filled to 70 – 100% with SKF LGHB 2 grease

Group 4.6: Other variants

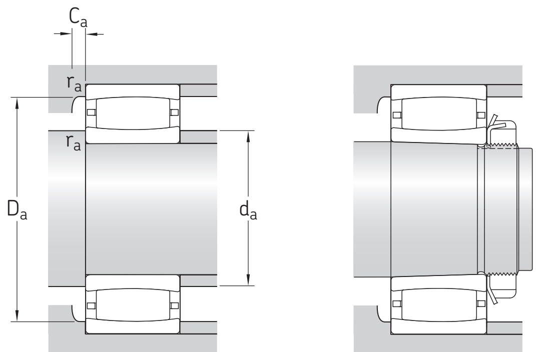
VE240	Bearing with shorter rollers
VG114	Surface-hardened stamped steel cage
VM118	Full complement bearing without retaining ring
VT143	Filled to 25 – 45% with SKF LGEP 2 grease



Cylindrical bore · Tapered bore · Full complement · Sealed (2CS5) · Sealed (2NS)

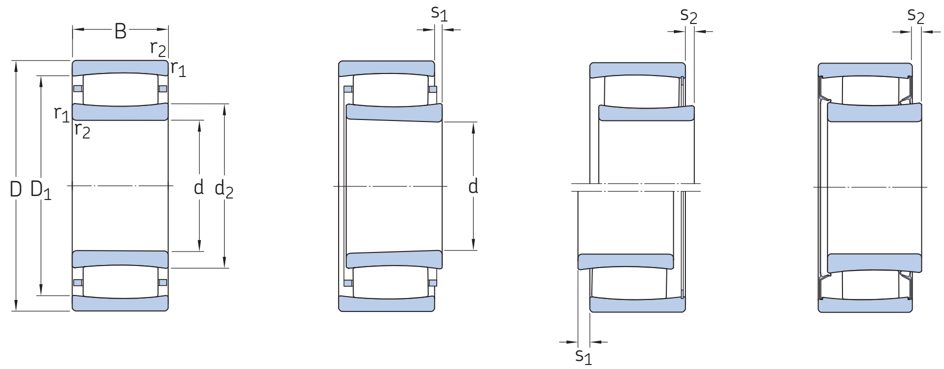
Principal dimensions			Basic load ratings dynamic	static	Fatique load limit	Speed ratings Reference speed	Limiting speed	Mass	Designations Bearing with cylindrical bore	tapered bore
d	D	B	C	C_0	P_u					
mm			kN		kN	r/min		kg	–	
30	55	45	134	180	21,2	–	3 200	0,49	► C 6006 V	–
	62	20	69,5	62	7,2	11 000	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
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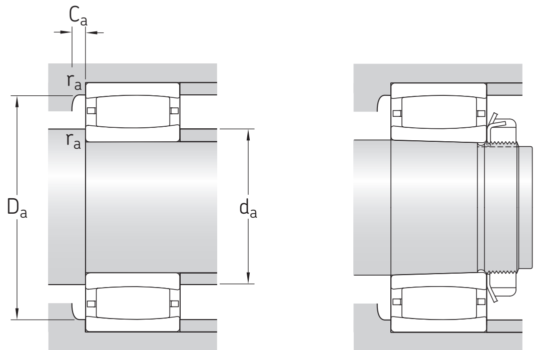
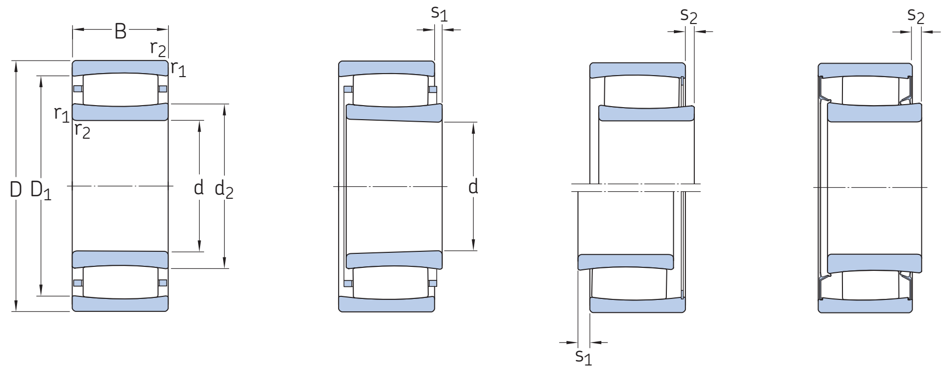


Dimensions						Abutment and fillet dimensions						Calculation factors	
d	d_2 ≈	D_1 ≈	$r_{1,2}$ min.	s_1[1] max.	s_2[1] max.	d_a min.	d_a max.	D_a min.	D_a max.	C_a[2] min.	r_a max.	k_1	k_2
mm						mm						–	
75	82,9	96,1	1	–	5	79,6	84,1	–	100	–	1	0,083	0,142
	83,6	95,5	1	9,4	6,2	79,6	89	–	100	–	1	0,098	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

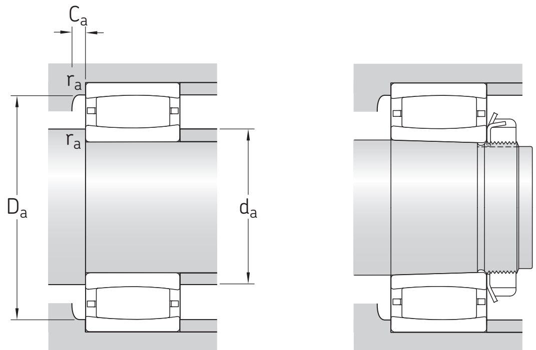
d **120 – 170** mm



Cylindrical bore | Tapered bore | Full complement | Sealed (2CS5)

Principal dimensions			Basic load ratings		Fatique 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	–	
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

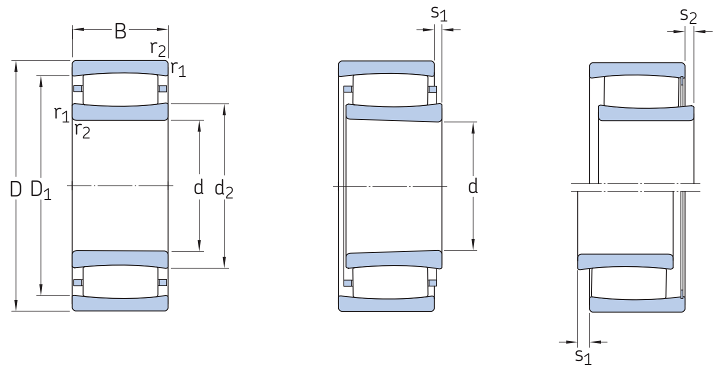


Dimensions						Abutment and fillet dimensions						Calculation factors	
d	d_2 ≈	D_1 ≈	$r_{1,2}$ min.	s_1[1] max.	s_2[1] max.	d_a min.	d_a max.	D_a min.	D_a max.	C_a[2] min.	r_a max.	k_1	k_2
mm						mm						–	
120	138	166	2	10,6	3,8	130	154	–	170	–	2	0,111	0,109
	140	164	2	–	7,5	129	139	–	171	–	2	0,085	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

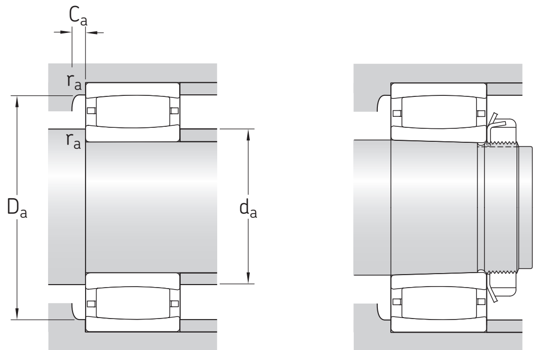
d **180 – 360** mm



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

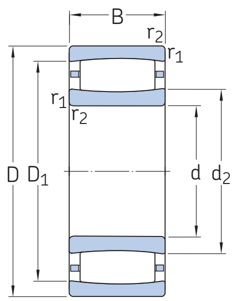
SKF Explorer bearing
▸ Popular item



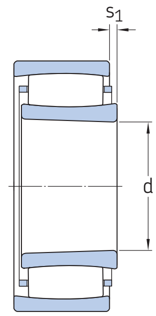
Dimensions						Abutment and fillet dimensions						Calculation factors	
d	d_2 ≈	D_1 ≈	$r_{1,2}$ min.	s_1[1] max.	s_2[1] max.	d_a min.	d_a max.	D_a min.	D_a max.	C_a[2] min.	r_a max.	k_1	k_2
mm						mm						–	
180	209	251	2,1	15,1	–	191	223	239	269	2	2	0,112	0,105
	203	247	2,1	20,1	10,2	191	229	–	269	–	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



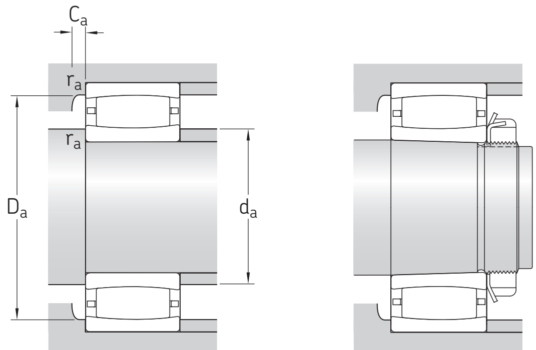
Cylindrical bore



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

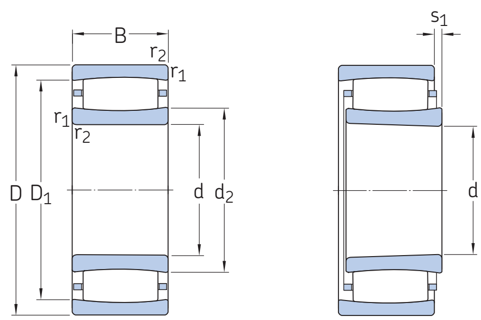


Dimensions						Abutment and fillet dimensions						Calculation factors	
d	d_2 ≈	D_1 ≈	$r_{1,2}$ min.	s_1[1] max.	s_2[1] max.	d_a min.	d_a max.	D_a min.	D_a max.	C_a[2] min.	r_a max.	k_1	k_2
mm						mm						–	
380	431	512	5	27	–	398	462	491	542	2	4	0,12	0,1
	446	551	5	25,4	–	400	445	526	600	7,3	4	0	0,106
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

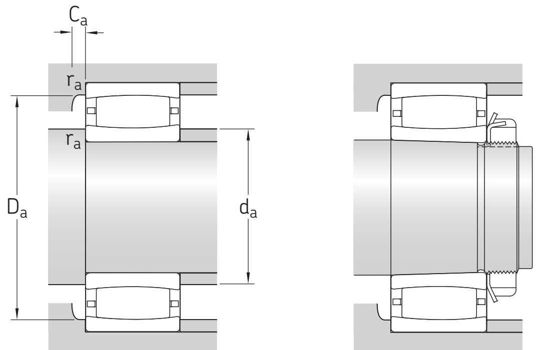
10.1 CARB toroidal roller bearings
d **670 – 1 700** mm



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	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

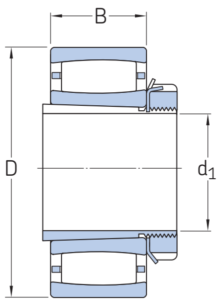


Dimensions						Abutment and fillet dimensions						Calculation factors	
d	d_2 ≈	D_1 ≈	$r_{1,2}$ min.	s_1[1] max.	s_2[1] max.	d_a min.	d_a max.	D_a min.	D_a max.	C_a[2] min.	r_a max.	k_1	k_2
mm						mm						–	
670	775	905	7,5	41,1	–	698	820	874	952	2,9	6	0,121	0,101
	792	964	7,5	41	–	702	791	922	1 058	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

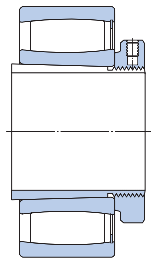
10.1

[1] → *Verification of axial displacement*, page 850
[2] → *Free space on both sides of the bearing*, page 852, negative values used only for calculation

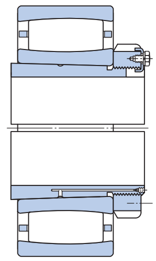
10.2 CARB toroidal roller bearings on an adapter sleeve
d_1 **25 – 410** mm



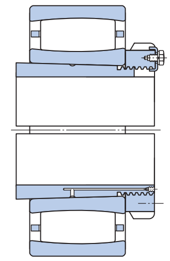
Bearing on an
H .. sleeve



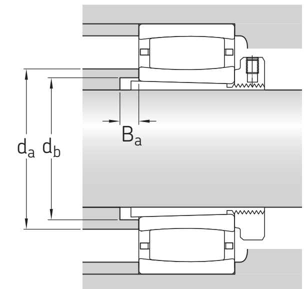
Bearing on an
H .. E sleeve



Bearing on an
OH .. H sleeve



Bearing on an
OH .. HE sleeve



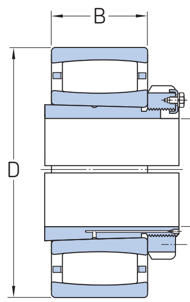
Principal dimensions			Abutment and fillet dimensions			Mass	Designations	
						Bearing + sleeve	Bearing[1]	Sleeve[2]
d_1	D	B	d_a max.	d_b min.	B_a min.			
mm			mm			kg	–	
25	62	20	37,4	33	5	0,37	C 2206 KTN9	**H 306 E**
30	72	23	44,8	39	5	0,59	C 2207 KTN9	**H 307 E**
35	80	23	52,4	44	5	0,69	C 2208 KTN9	**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

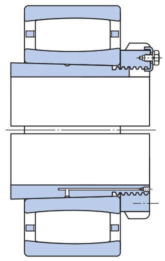
Principal dimensions			Abutment and fillet dimensions			Mass	Designations	
						Bearing + sleeve	Bearing1)	Sleeve2)
d_1	D	B	d_a max.	d_b min.	B_a min.			
mm			mm			kg	–	
115	230	64	171	138	8	14	C 2226 K	H 3126 L
	280	93	201	142	8	31,5	C 2326 K/VE240	H 2326
125	250	68	191	149	8	17,5	▸ C 2228 K	H 3128 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

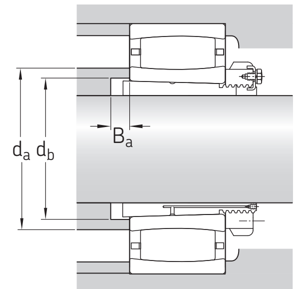
d_1 **430 – 1 000** mm



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

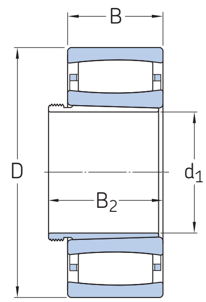
1) For additional bearing data → **product table**, page 856

2) For additional adapter sleeve data → **product table**, page 1072

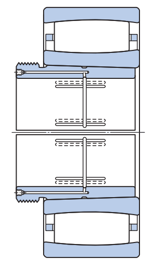
10.2

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**

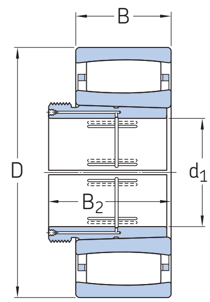
SKF Explorer bearing
▸ Popular item
1) For additional bearing data → **product table**, page 856
2) For additional withdrawal sleeve data → skf.com/go/17000-24-1
3) Width before the sleeve is driven into the bearing bore

Principal dimensions				Mass	Designations	
				Bearing + sleeve	Bearing1)	Sleeve2)
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



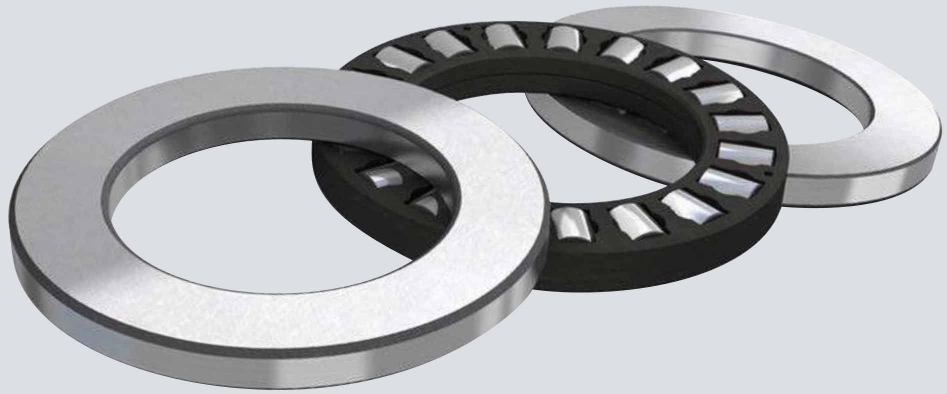
Principal dimensions				Mass	Designations	
d_1	D	B	B_2[3)] ≈	Bearing + sleeve	Bearing[1)]	Sleeve[2)]
mm				kg	–	
360	560	135	180	130	C 3076 KM	AOH 3076 G
	620	194	242	260	C 3176 KMB	AOH 3176 G
380	600	148	193	165	C 3080 KM	AOH 3080 G
	650	200	250	310	C 3180 KM	AOH 3180 G
400	620	150	196	175	C 3084 KM	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

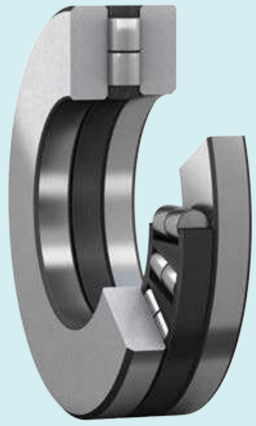
SKF Explorer bearing
1) For additional bearing data → **product table**, page 856
2) For additional withdrawal sleeve data → skf.com/go/17000-24-1
3) Width before the sleeve is driven into the bearing bore

Principal dimensions				Mass	Designations	
d_1	D	B	B_2 [3] ≈	Bearing + sleeve	Bearing[1]	Sleeve[2]
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**

10.3

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

11 Cylindrical roller thrust bearings

More information

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

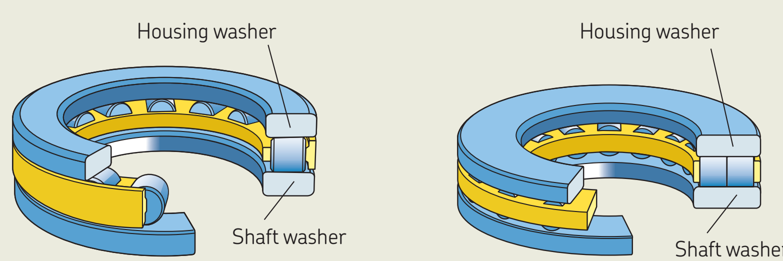
- can accommodate axial loads in both directions
- can be created by combining two cylindrical roller and cage thrust assemblies and two bearing washers with an intermediate washer
  Depending on the design, an intermediate washer can be shaft or housing centred (fig. 3).

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

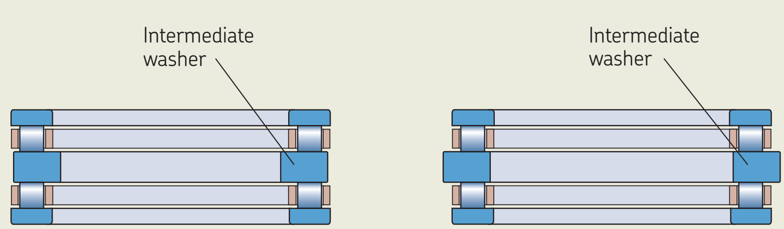


Single row, 811 and 812 series

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

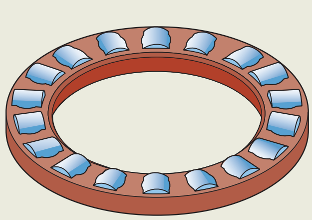
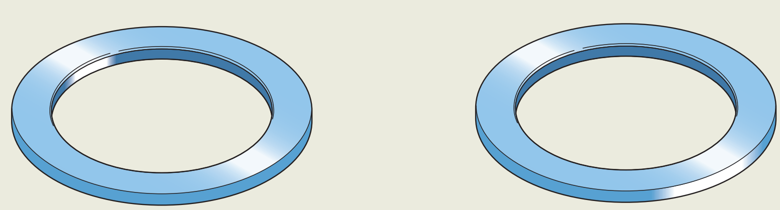


Fig. 5

Bearing washers



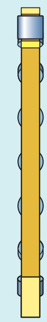
Cages

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

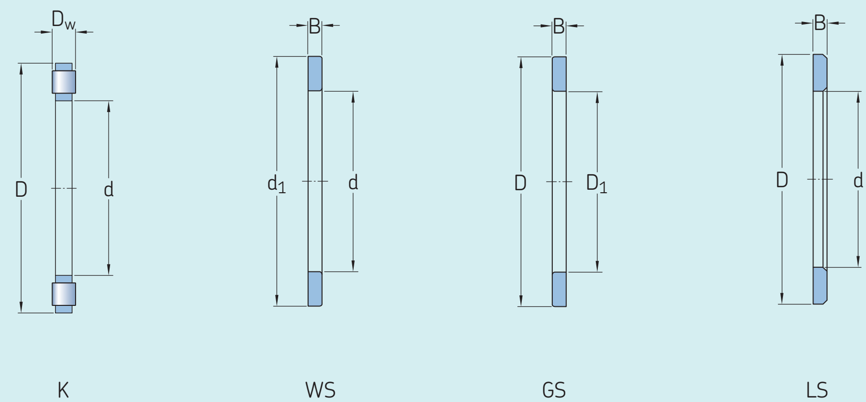
		
Materials	Glass fibre reinforced PA66	Machined brass
Suffix	TN	M

Bearing data

Dimension standards	Boundary dimensions: ISO 104
Tolerances	Normal Check availability of P5 tolerance class for larger bearings Values: ISO 199 (**table 10**, **page 46**)
For additional information → **page 35**	Except for components (**table 2**, **page 882**): • Values (**table 3**, **page 883**) • 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



Bearing component 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.

SKF

Table 3

ISO tolerance classes

Nominal dimension >	≤	a12Ⓔ Deviations U	L	a13Ⓔ Deviations U	L	E11Ⓔ Deviations U	L	E12Ⓔ Deviations U	L	h11Ⓔ Deviations 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 For additional information → page 106	$F_{am} = 0{,}0005\ C_0 + A\left(\frac{n}{1\,000}\right)^2$	**Symbols** A minimum load factor (page 888) C_0 basic static load rating [kN] (page 888) F_a axial load [kN] F_{am} minimum axial load [kN] n rotational speed [r/min] P equivalent dynamic bearing load [kN] P_0 equivalent static bearing load [kN]
Equivalent dynamic bearing load For additional information → page 91	$P = F_a$	
Equivalent static bearing load For additional information → 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

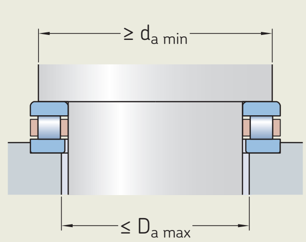
Abutment dimensions should fulfil the following:

- 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.

Fig. 6

Abutment diameters



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**.

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

		Group 1	Group 2	Group 3	/	Group 4					
						4.1	4.2	4.3	4.4	4.5	4.6

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

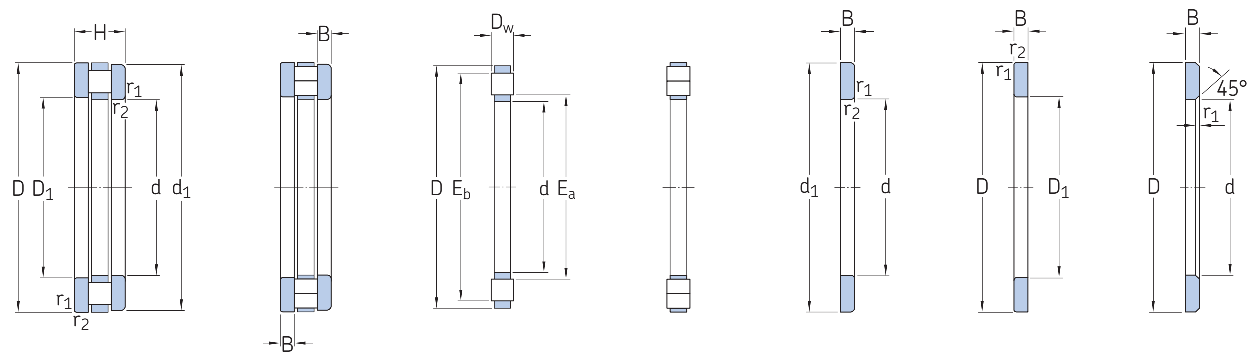
Group 4.4: Stabilization

Group 4.5: Lubrication

Group 4.6: Other variants

11.1 Cylindrical roller thrust bearings

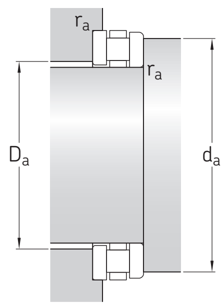
d **15 – 75** mm

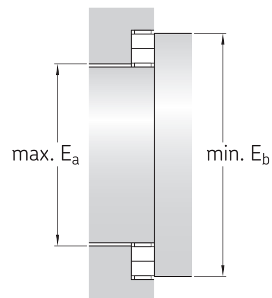


811, 812 | 893, 894 | K 811, K 812 | K 893, K 894 | WS | GS | LS

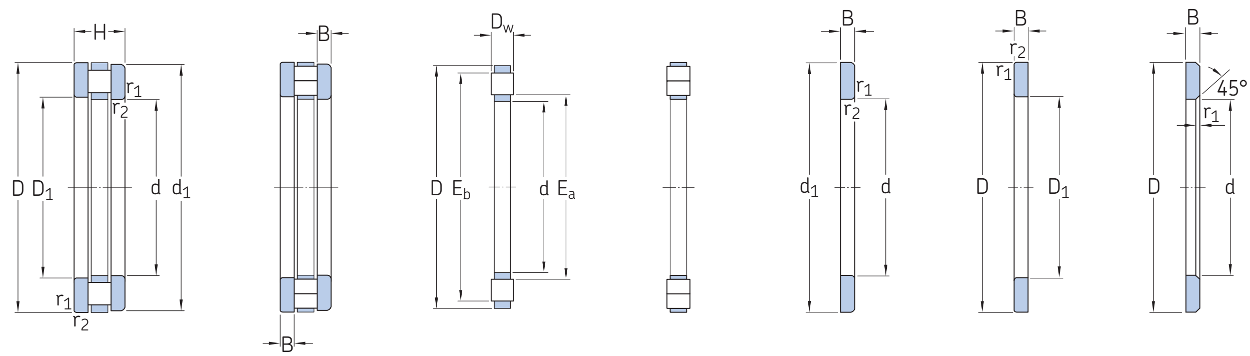
Principal dimensions					Basic load ratings dynamic	static	Fatigue load limit	Minimum load factor	Speed ratings Reference speed	Limiting speed	Mass	Designation
d	D	H	E_a	E_b	C	C_0	P_u	A				
mm					kN		kN	–	r/min		kg	–
15	28	9	16	27	11,2	27	2,45	0,000 058	4 300	8 500	0,024	▸ **81102 TN**
17	30	9	18	29	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





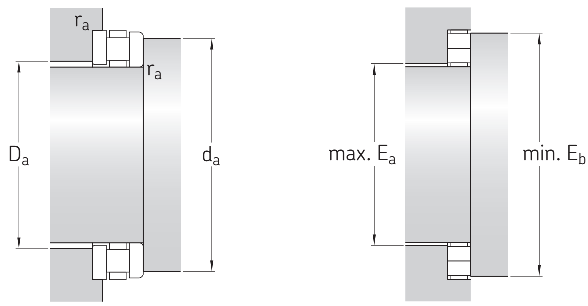
Dimensions						Abutment and fillet dimensions			Designation of components			
									Cylindrical roller and cage thrust assembly	Shaft washer	Housing washer	Universal washer
d	d_1 ≈	D_1 ≈	B	D_w	$r_{1,2}$ min.	d_a min.	D_a max.	r_a max.				
mm						mm			–			
15	28	16	2,75	3,5	0,3	27	16	0,3	**K 81102 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**

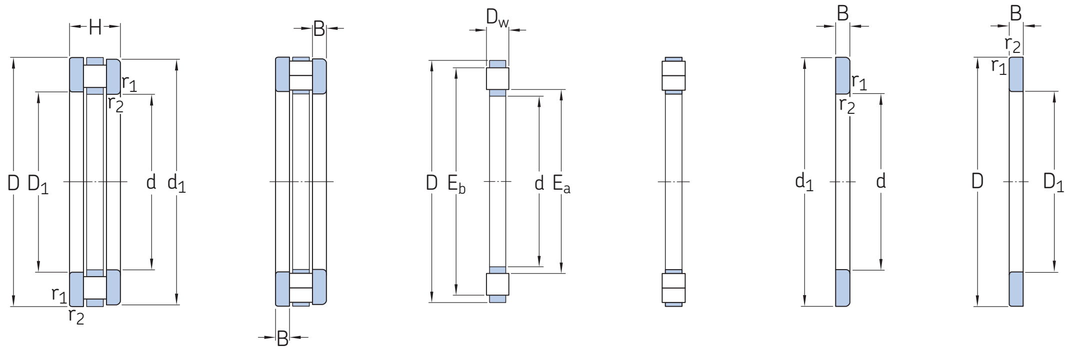
▸ Popular item



Dimensions						Abutment and fillet dimensions			Designation of components			
d	d_1 ≈	D_1 ≈	B	D_w	$r_{1,2}$ min.	d_a min.	D_a max.	r_a max.	Cylindrical roller and cage thrust assembly	Shaft washer	Housing washer	Universal washer
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**	–

11.1 Cylindrical roller thrust bearings

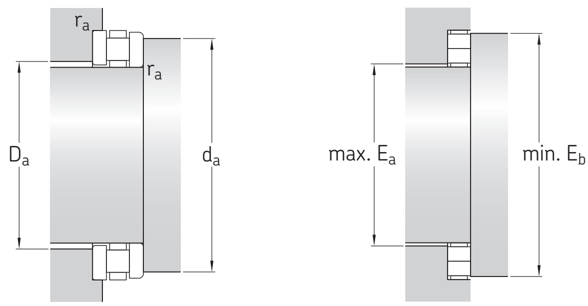
d **190 – 320** mm



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			
d	d_1 ≈	D_1 ≈	B	D_w	$r_{1,2}$ min.	d_a min.	D_a max.	r_a max.	Cylindrical roller and cage thrust assembly	Shaft washer	Housing washer	Universal washer
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

12

12 Needle roller thrust bearings

More information

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

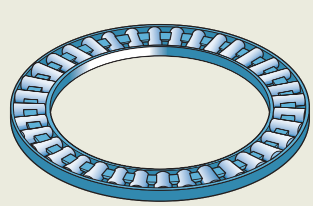
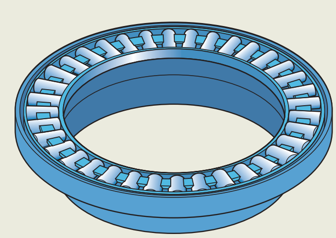


Fig. 2

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

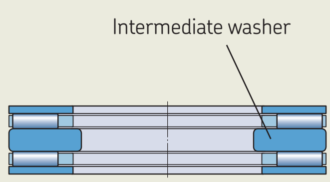


Fig. 4

Double direction bearing, housing centred

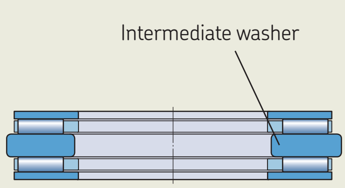


Fig. 5

AXW needle roller thrust bearing with a centring flange

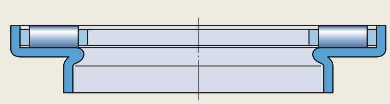


Fig. 6

AXW series bearing combined with a drawn cup needle roller bearing

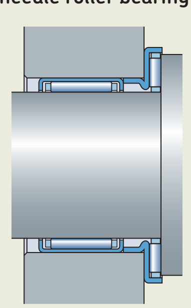
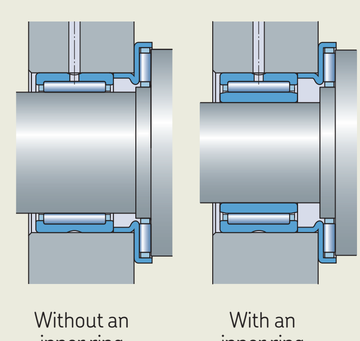


Fig. 7

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

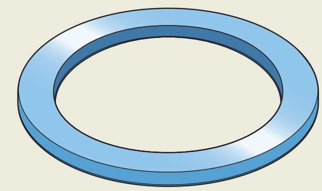
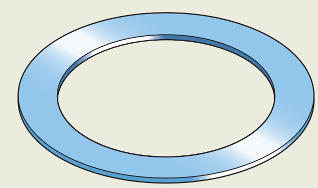


Fig. 9

AS series thin universal washer

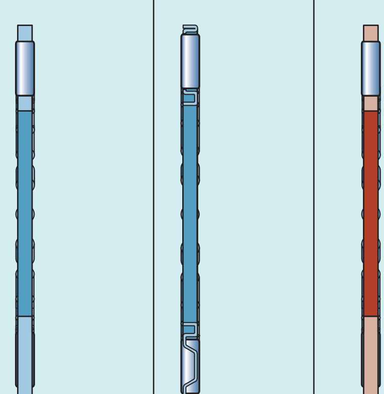


Bearing data

Dimension standards	Boundary dimensions: ISO 3031 (where standardized) Bearings in the AXW series are not standardized.
Tolerances For additional information → page 35	Tolerances, tolerance classes, standards (**table 2**, **page 900**) Values for tolerance classes (**table 3**, **page 901**) Variation of gauge lot diameter of the rollers: ISO 3096, Grade 2
Permissible misalignment	Cannot tolerate any misalignment.

Table 1

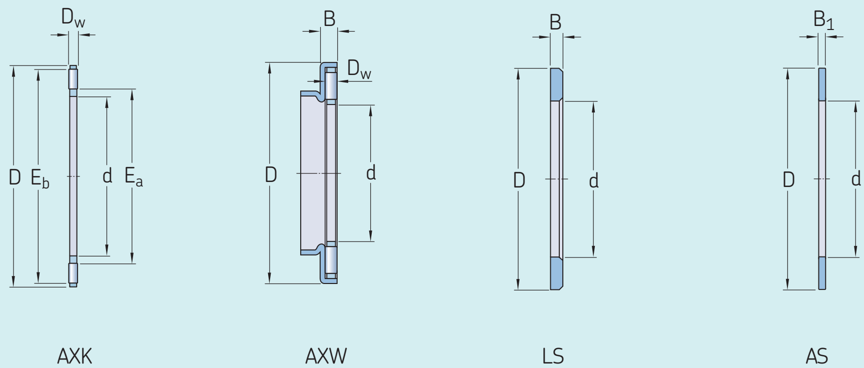
Cages for needle roller thrust bearings



Materials	Machined steel	Sheet steel	Glass fibre reinforced PA66
Suffix	–	–	TN

Table 2

Tolerances for needle roller thrust bearings



Bearing, component 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	
–	**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 For additional information → page 106	$F_{am} = 0{,}0005\ C_0$	**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]
Equivalent dynamic bearing load For additional information → page 91	$P = F_a$	
Equivalent static bearing load For additional information → page 105	$P_0 = F_a$	

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 radial space	radial space H9
Thin universal washers	AS	h8 radial space	radial space 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.

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Designation system

		Group 1	Group 2	Group 3	/		Group 4					
							4.1	4.2	4.3	4.4	4.5	4.6

Prefixes

GS Housing washer
WS Shaft washer

Basic designation

811 dimension series indicates the series and size for shaft and housing washers.

AS .. Thin universal washer, the number following identifies the bore and outside diameter
AXK .. Needle roller and cage thrust assembly, the number following identifies the bore and outside diameter
AXW .. Needle roller thrust bearing with a centring flange, the number following identifies the bore diameter
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

TN Glass fibre reinforced PA66 cage

Group 4.1: Materials, heat treatment

Group 4.2: Accuracy, clearance, preload, quiet running

Group 4.3: Bearing sets, matched bearings

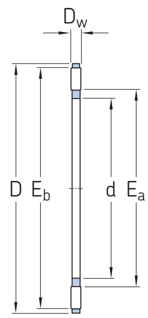
Group 4.4: Stabilization

Group 4.5: Lubrication

Group 4.6: Other variants

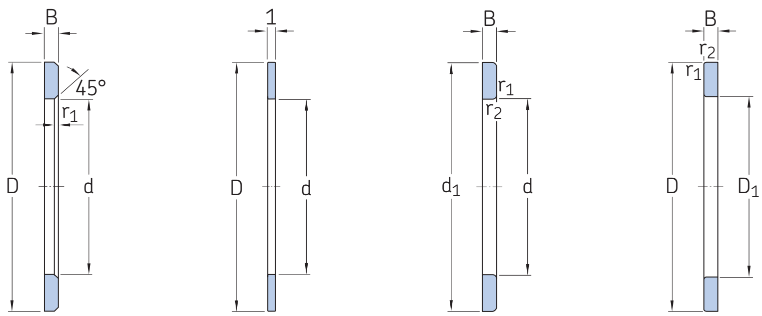
12.1 Needle roller and cage thrust assemblies

d **4 – 85** mm



Principal dimensions					Basic load ratings		Fatigue load limit	Speed ratings		Mass	Designation
					dynamic	static		Reference speed	Limiting speed		
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

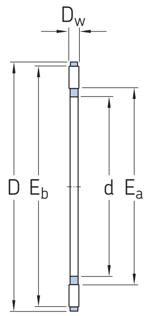


LS AS WS 811 GS 811

Dimensions						**Masses** Washers		**Designations** 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**

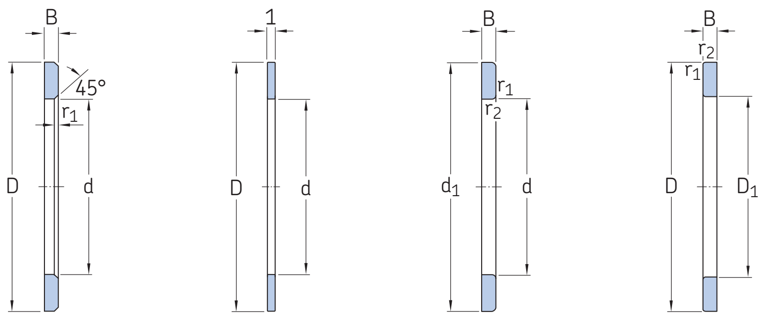
12.1 Needle roller and cage thrust assemblies

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

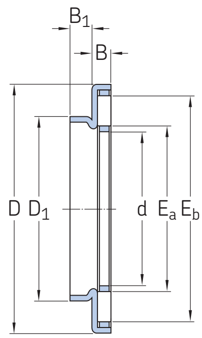


LS AS WS 811 GS 811

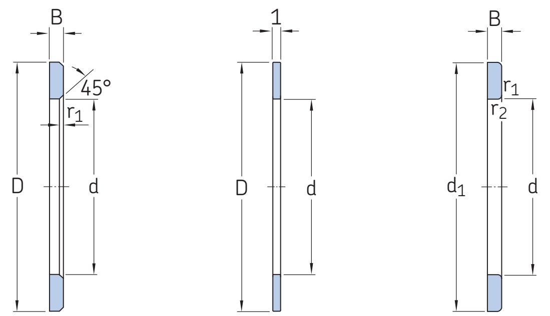
Dimensions						Masses Washers		Designations Universal washer	Thin universal washer	Shaft washer	Housing washer
d	d_1	D	D_1	B	$r_{1,2}$ min.	LS, WS, GS	AS				
mm						g		–			
90	120	120	92	6,5	1	234	39	**LS 90120**	**AS 90120**	**WS 81118**	**GS 81118**
100	135	135	102	7	1	350	50	**LS 100135**	**AS 100135**	**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**

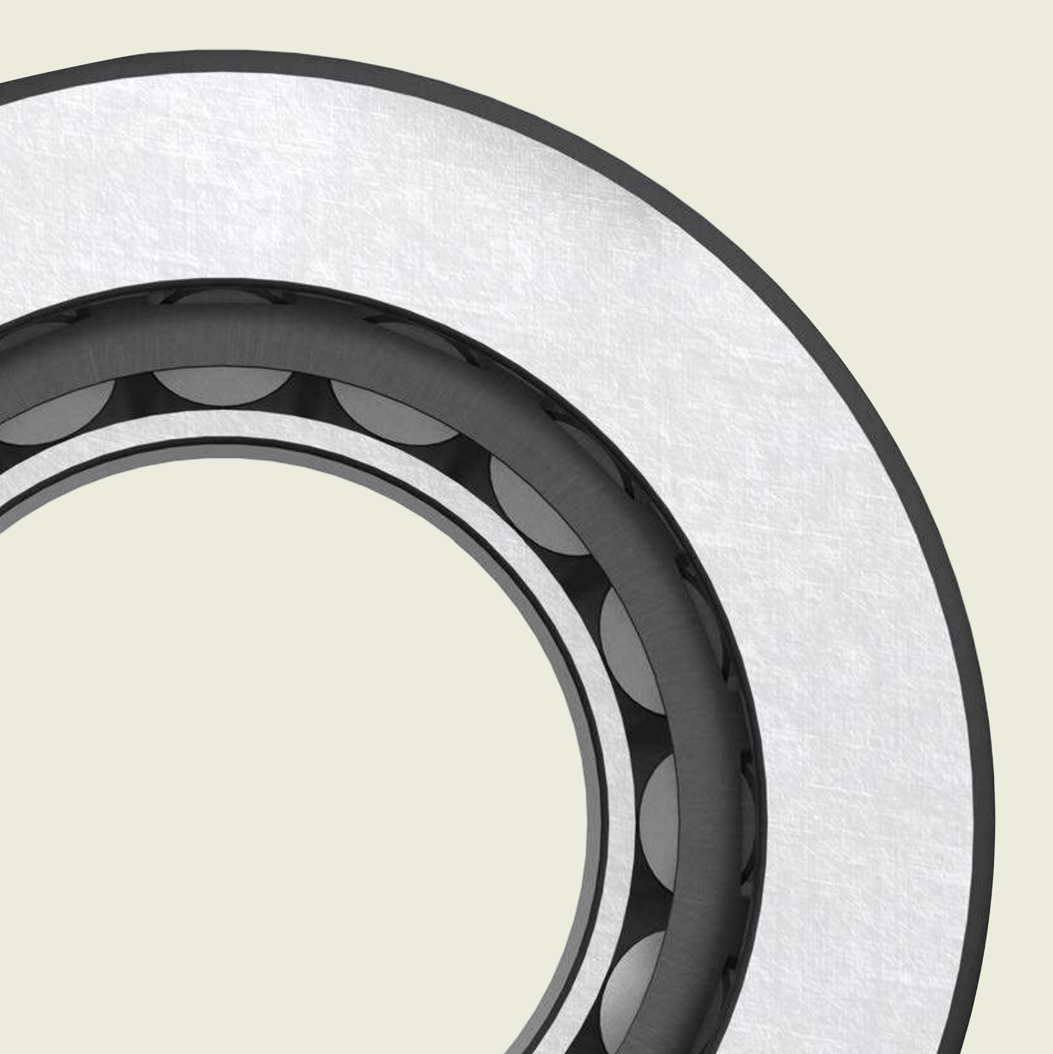


LS AS WS 811

Dimensions				Masses Washers		Designations		
d	d_1, D	B	$r_{1,2}$ min.	LS, WS	AS	Universal washer	Thin universal washer	Shaft washer
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

13 Spherical roller thrust bearings

More information

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

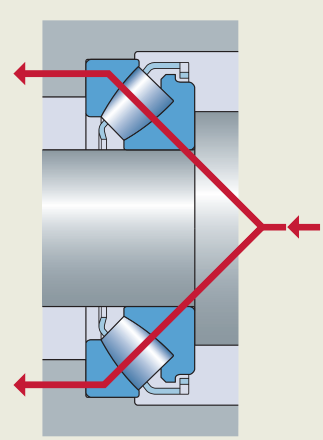
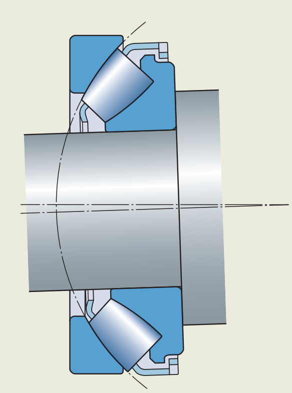


Fig. 2

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.

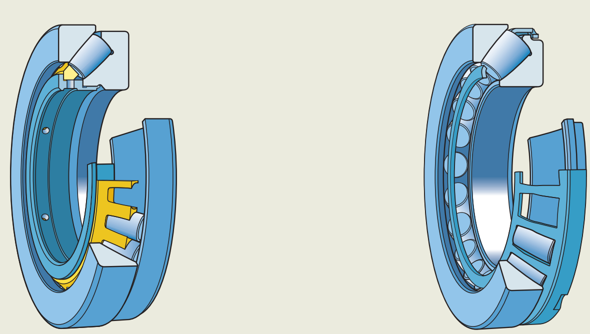
Cages

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	Normal Total height H: • for basic design bearings, tolerance at least 50% tighter than ISO standard • for SKF Explorer bearings, tolerance 75% tighter than ISO standard
For additional information → page 35	Values: ISO 199 (table 10, page 46)
Permissible misalignment	The permissible misalignment is reduced as the load increases. Guideline values for rotating shaft applications: table 1. Whether these values can be fully exploited depends on the design of the bearing arrangement, the external sealing design, etc. 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 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
ν	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

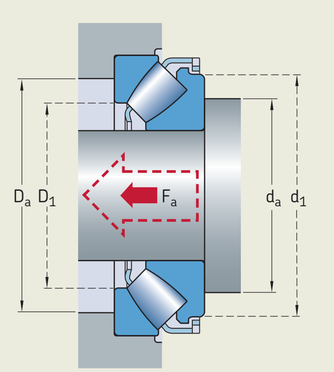
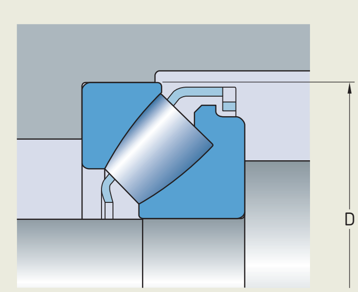


Fig. 5

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

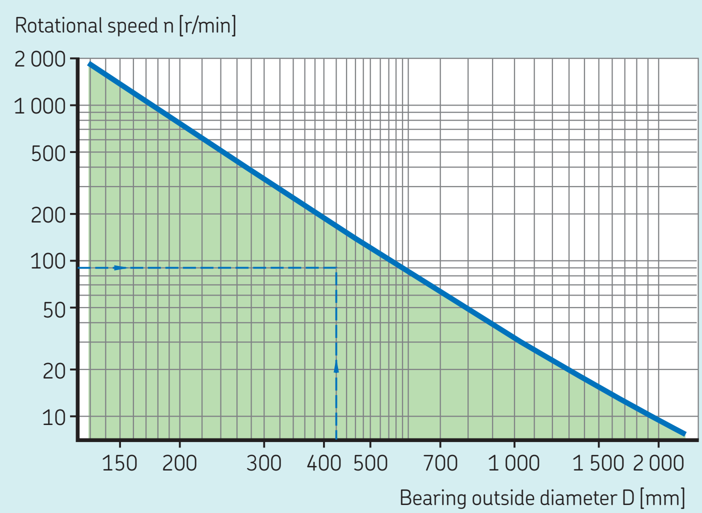
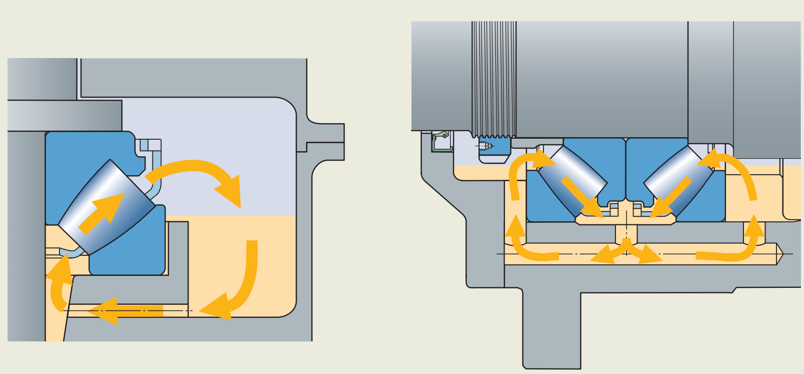


Fig. 6

Pumping effect

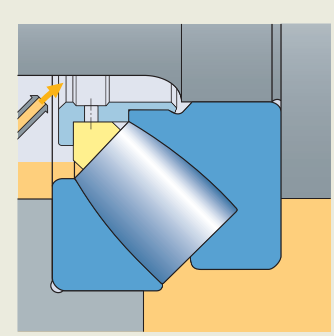


Vertical shaft application

Horizontal shaft application

Fig. 7

Oil injection lubrication method



13

Mounting

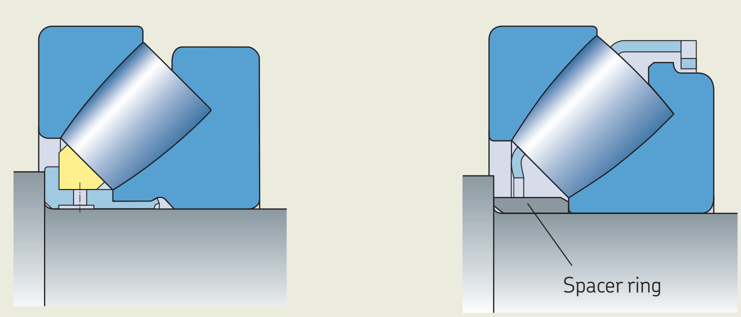
SKF spherical roller thrust bearings are separable, making it possible to mount and dismount the housing washer separately from the shaft washer and roller and cage assembly.

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

		Group 1	Group 2	Group 3	/	Group 4					
						4.1	4.2	4.3	4.4	4.5	4.6

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

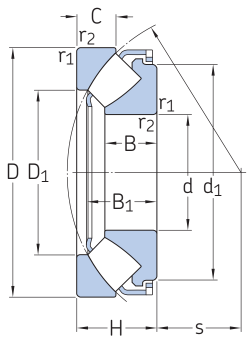
Group 4.5: Lubrication

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

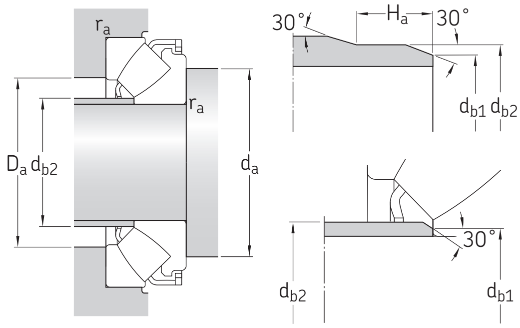
13.1 Spherical roller thrust bearings

d **60 – 180** mm



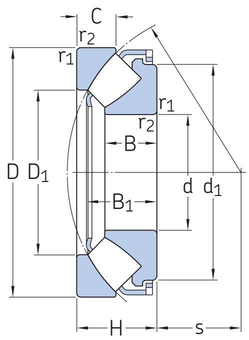
Principal dimensions			Basic load ratings dynamic	static	Fatigue load limit	Minimum load factor	Speed ratings Reference speed	Limiting speed	Mass	Designation
d	D	H	C	C_0	P_u	A				
mm			kN		kN	–	r/min		kg	–
60	130	42	390	915	114	0,08	2 800	5 000	2,6	► 29412 E
65	140	45	455	1 080	137	0,11	2 600	4 800	3,2	► 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

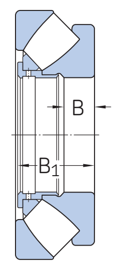
SKF Explorer bearing
► Popular item



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

d **190 – 380** mm

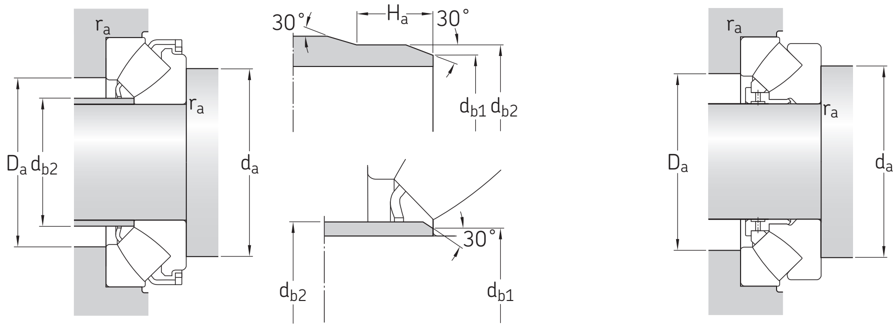




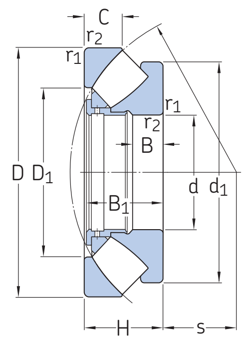
E design

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

SKF Explorer bearing
▸ Popular item

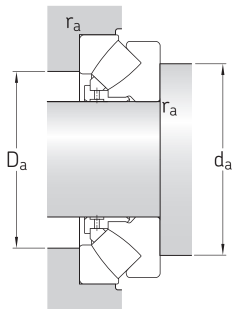


Dimensions								Abutment and fillet dimensions					
d	d_1 ≈	D_1 ≈	B	B_1	C	$r_{1,2}$ min.	s	d_a min.	d_{b1} max.	d_{b2} max.	H_a min.	D_a max.	r_a max.
mm								mm					
190	285	244	49	71,3	36	4	110	250	200	211	–	280	3
	332	265	73	101	55,5	5	117	280	207	223	–	321	4
200	260	233	30	43,4	24	2	108	235	206	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

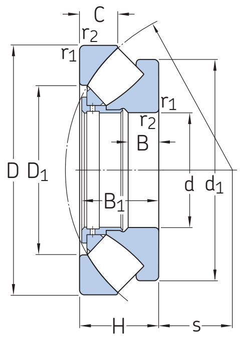


Principal dimensions			Basic load ratings		Fatigue load limit	Minimum load factor	Speed ratings		Mass	Designation
			dynamic	static			Reference speed	Limiting speed		
d	D	H	C	C_0	P_u	A				
mm			kN		kN	–	r/min		kg	–
400	540	85	1 610	8 000	695	6,1	700	1 100	55,5	**29280**
	620	132	3 450	14 600	1 200	20	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

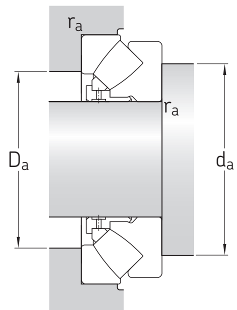


Dimensions								Abutment and fillet dimensions					
d	d_1 ≈	D_1 ≈	B	B_1	C	$r_{1,2}$ min.	s	d_a min.	d_{b1} max.	d_{b2} max.	H_a min.	D_a max.	r_a max.
mm								mm					
400	526	460	27	81	42,2	4	212	470	–	–	–	493	3
	596	494	43	127	64	6	225	510	–	–	–	550	5
	645	525	69	178	89,5	7,5	234	550	–	–	–	615	6
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

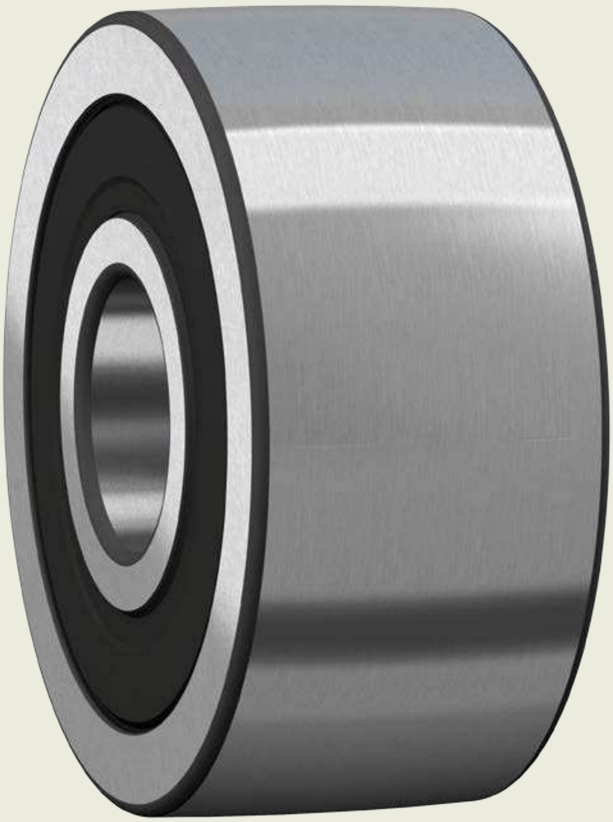


Principal dimensions			Basic load ratings dynamic	static	Fatigue load limit	Minimum load factor	Speed ratings Reference speed	Limiting speed	Mass	Designation
d	D	H	C	C_0	P_u	A				
mm			kN		kN	–	r/min		kg	–
800	1 060	155	6 560	34 500	2 550	110	320	530	380	**292/800 EM**
	1 180	230	11 300	55 000	3 900	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**

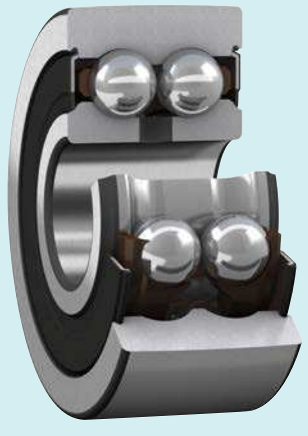
‣ Popular item



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

14 Cam rollers

More information

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)

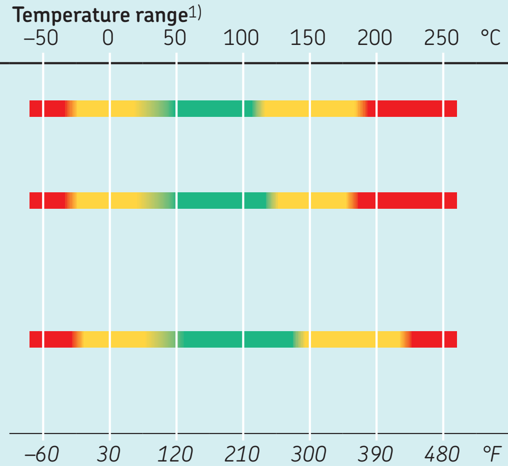
    These cam rollers are not listed in this catalogue, but can be found online at skf.com/go/17000-14-2.
- are greased for the life of the bearing under normal operating conditions (**table 1**)
- should be relubricated, if:
  - subjected to moisture or solid contaminants
  - they run for long periods at 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: 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)*	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.

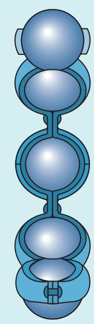
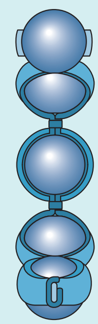
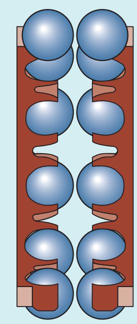
Cages

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** Radius = 400 mm • **3057.. C design** Cylindrical (flat)
Tolerances For additional information → **page 35**	Normal, except: • diameter of the crowned running surface: twice the Normal tolerance Values for Normal tolerance class: ISO 492 (**table 2**, **page 38**)	
Internal clearance	C3 Values: ISO 5753-1 (**table 6**, **page 252**)	Normal Values 32 A series: (**table 8**, **page 396**)
For additional information → **page 182**	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. 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. 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 For additional information → **page 106**	$F_{rm} = 0{,}0167\ C_0$
Equivalent dynamic bearing load For additional information → **page 91**	$P = F_r$
Equivalent static bearing load For additional information → **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Ⓔ:

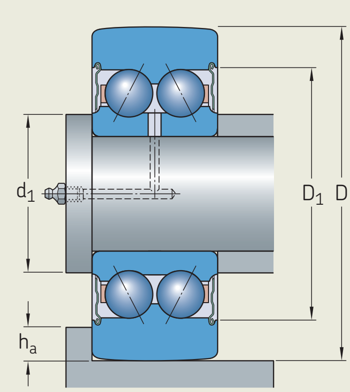
- for normal operating conditions, such as stationary inner ring load
- where easy displacement of the inner ring is required

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

		Group 1	Group 2	Group 3	/	Group 4					
						4.1	4.2	4.3	4.4	4.5	4.6

Prefixes

Basic designation

3612.. R   Single row cam roller with an NBR contact seal on both sides
3057.. C   Double row cam roller with a cylindrical (flat) outer ring running surface
3058.. C   Double row cam roller with a crowned outer ring running surface

Suffixes

Group 1: Internal design

Group 2: External design (seals, snap ring groove, etc.)

-2RS1   NBR contact seal on both sides
-2Z   Sheet steel shield on both sides

Group 3: Cage design

Group 4.1: Materials, heat treatment

Group 4.2: Accuracy, clearance, preload, quiet running

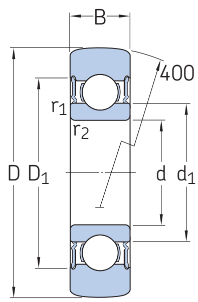
Group 4.3: Bearing sets, matched bearing

Group 4.4: Stabilization

Group 4.5: Lubrication

Group 4.6: Other variants

14.1 Single row cam rollers
D **32 – 80** mm



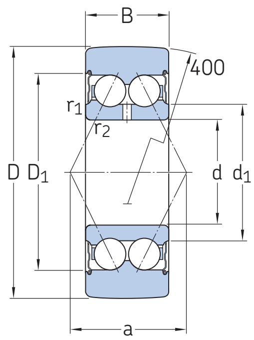
Principal dimensions			Basic load ratings dynamic	static	Fatigue load limit	Maximum radial loads dynamic	static	Limiting speed	Mass	Designation
D	d	B	C	C_0	P_u	F_r max.	F_{0r} max.			
mm			kN		kN	kN		r/min	kg	–
32	10	9	4,68	2,04	0,085	3,45	5	12 000	0,04	► **361200 R**
35	12	10	6,24	2,6	0,11	3,35	4,75	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

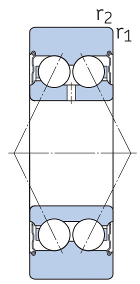
Dimensions				Calculation factor
d	d_1 ≈	D_1 ≈	$r_{1,2}$ min.	f_0
mm				–
32	17	24,8	0,6	13
35	18,4	27,4	0,6	12
40	21,7	30,4	0,6	13
47	24,5	35	0,6	13
52	28,8	40,6	1	13
62	34,3	46,3	1	14
72	40,3	54,1	1	14
80	46,9	62,7	1,1	14

14.2 Double row cam rollers

D **32 – 80** mm



3058.. C-2Z



3057.. C-2Z

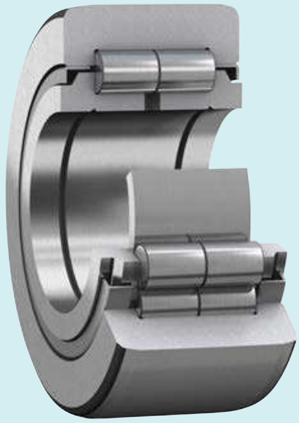
Principal dimensions			**Basic load ratings**		**Fatigue load limit**	**Maximum radial loads**		**Limiting speed**	**Mass**	**Designations**	
			dynamic	static		dynamic	static			Cam roller with crowned running surface	cylindrical running surface
D	d	B	C	C_0	P_u	F_r max.	F_{0r} max.				
mm			kN		kN	kN		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

15 Support rollers

More information

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

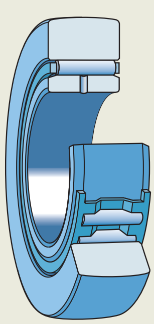
- are available (**fig. 4**):
  - with an inner ring that can be mounted separately from the outer ring and roller and cage assembly, which must always be kept together as supplied
  - without an inner ring (prefix R)
  - only open (without seals)

(R)NA 22...2RS design support rollers

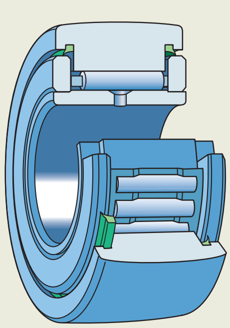
- are available (**fig. 5**):
  - with an inner ring that can be mounted separately from the outer ring and roller and cage assembly
  - without an inner ring (prefix R)
  - greased and capped with a sheet steel reinforced NBR contact seal on both sides
- have the needle roller and cage assembly axially 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

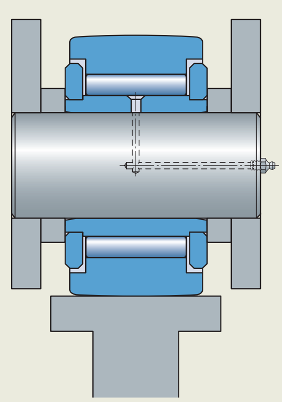
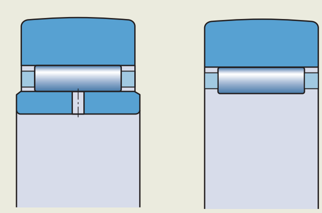
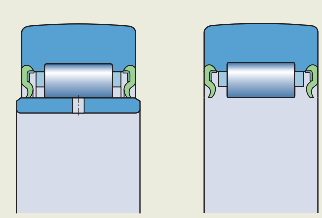


Fig. 4



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)
- accommode 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
- 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

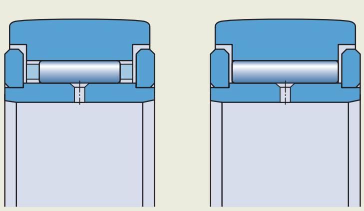
NUTR .. A design support rollers

- 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

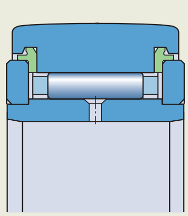
- are based on double row full complement cylindrical roller bearings (fig. 9)
- have an outer ring with three integral flanges, which guide the roller sets axially
- have an inner ring with two loose flange rings, which guide the outer ring axially via the roller sets
- have a relatively large grease 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. 6



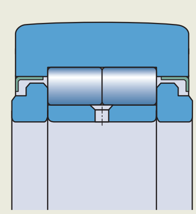
NATR NATV

Fig. 7



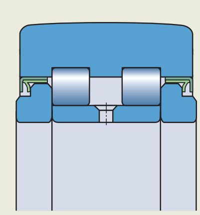
NATR .. PPA

Fig. 8



NUTR .. A

Fig. 9



PWTR ...2RS

NNTR ...2ZL design support rollers

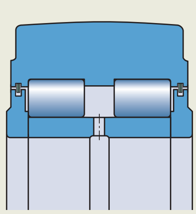
- are based on double row full complement cylindrical roller bearings (fig. 10)
- have an outer ring with three integral flanges, which guide the roller sets axially
- have an inner ring with two loose flange rings, which guide the outer ring axially via the roller sets
- have a relatively large grease 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.

Fig. 10



NNTR ...2ZL

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

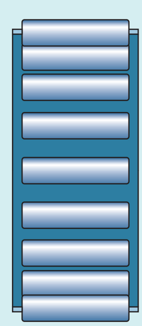
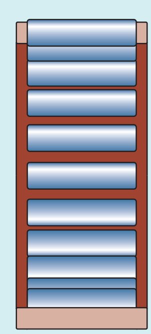
The inner rings of SKF support rollers have one lubrication hole, except:

- 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.

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** ISO 15, dimension series 22, except for the outer ring width • **NATR, NATV, NUTR .. A, PWTR designs** ISO 7063 and ANSI/ABMA Standard 18.1 (where standardized) • **(R)STO designs** Not standardized
Profile of the outer ring running surface	• **(R)STO, (R)NA 22, NATR, NATV designs** Radius = 500 mm • **NNTR design** D ≤ 260 mm → Radius = 10 000 mm D ≥ 290 mm → Radius = 15 000 mm • **NATR .. PPA, NATV .. PPA, NUTR .. A, PWTR designs** Improved crowned profile for better load distribution, higher stiffness and reduced wear
Tolerances For additional information → **page 35**	Normal, except: • diameter of the crowned running surface: – NNTR design → h10 – other designs → 0/–0,05 mm • width B: – NNTR design → 0/–0,5 mm – NATR, NATV, NUTR .. A, PWTR designs → h12 • inside diameter F_w: – RSTO, RNA 22 designs → F6 Values for Normal tolerance class: ISO 492 (**table 2**, **page 38**) Values for ISO tolerance classes: h10, h12 and F6 (**table 2**, **page 950**)
Internal clearance For additional information → **page 182**	• **STO and NA 22 designs** Normal • **Other designs** Between C2 and Normal Values: ISO 5753-1 (**table 11**, **page 603**) 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. 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.	**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]
Static loads	Permissible static load is the lower value of $F_{0r\,max}$ or C_0 (**product tables**). 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 For additional information → **page 106**	$F_{rm} = 0{,}0167\ C_0$	
Equivalent dynamic bearing load For additional information → **page 91**	$P = F_r$	
Equivalent static bearing load For additional information → **page 105**	$P_0 = F_r$	

15

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 U	L	**h9Ⓔ** Deviations U	L	**h10Ⓔ** Deviations U	L	**h12Ⓔ** Deviations U	L	**F6Ⓔ** Deviations 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

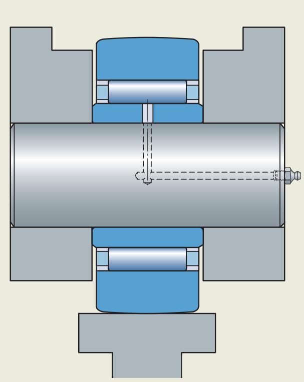


Fig. 12

Support roller with flange rings – support surface design

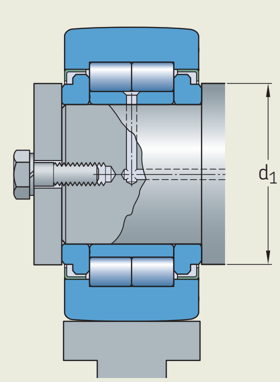
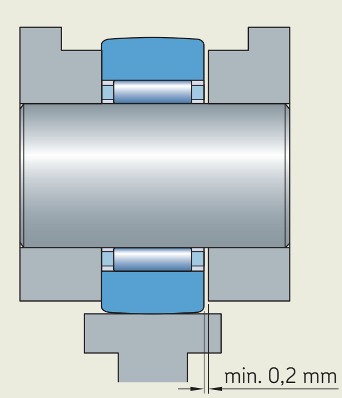


Fig. 13

Support roller without an inner ring – axial gap



Designation system

		Group 1	Group 2	Group 3	/

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

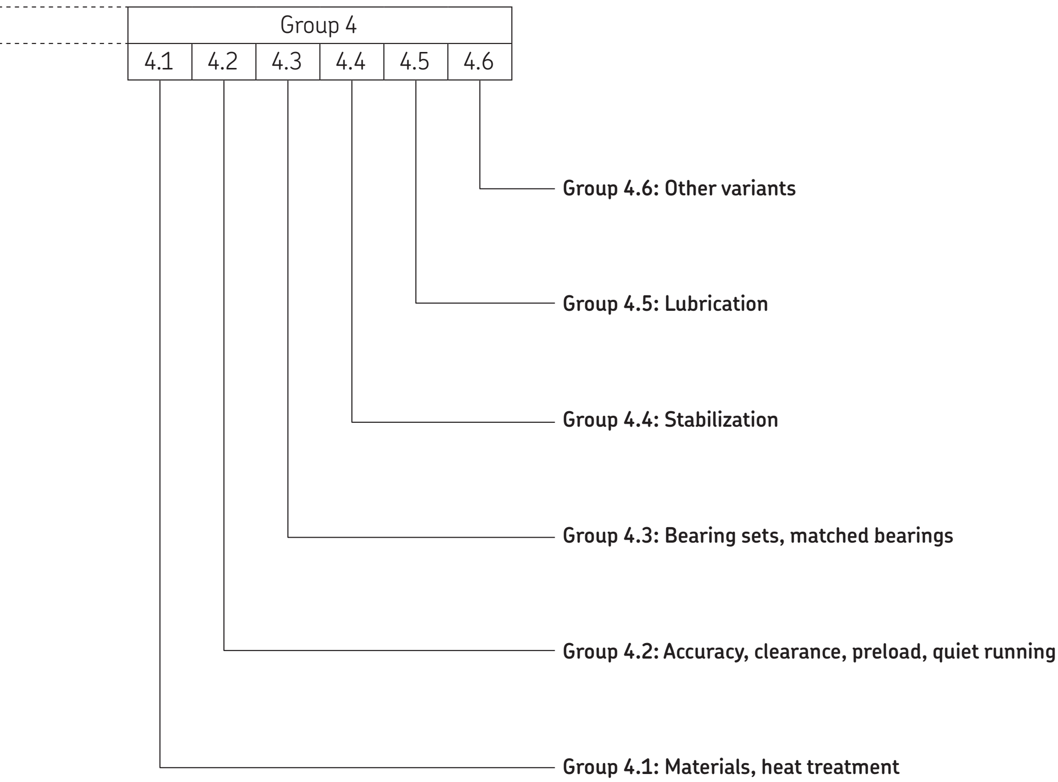
Group 1: Internal design

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

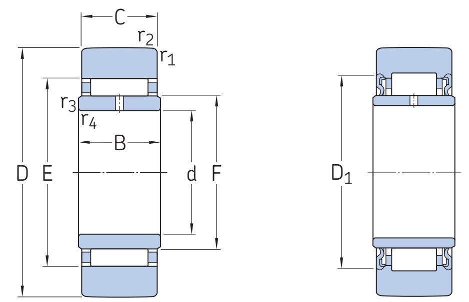
Group 3: Cage design

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



STO 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	▸ **STO 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	**STO 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	▸ **STO 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	▸ **STO 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	**STO 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	**STO 17**
47	20	15,8	16	16,1	21,2	2,5	18,6	26,5	4 000	0,15	**STO 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	**STO 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	**STO 30**
72	35	19,8	20	24,6	39	4,8	36	51	2 200	0,44	**STO 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	**STO 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**

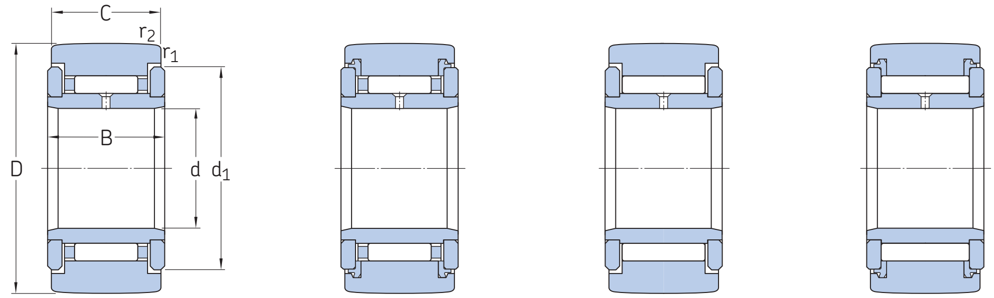
▸ Popular item

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

15.2 Support rollers with flange rings, with an inner ring

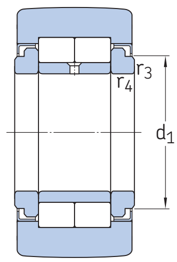
D **16 – 40** mm



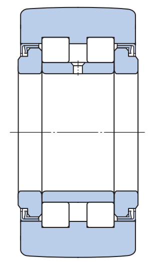
NATR NATR .. PPA NATV NATV .. PPA

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	–
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



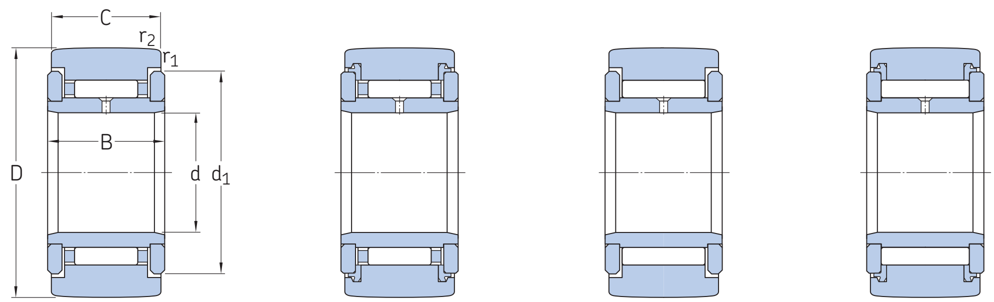
PWTR ...2RS

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

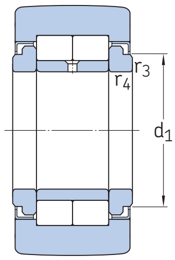
D **42 – 72** mm



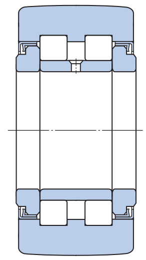
NATR NATR .. PPA NATV NATV .. PPA

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



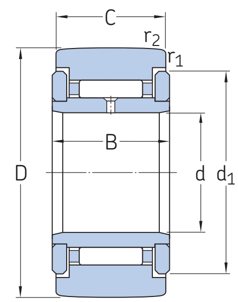
PWTR ...2RS

Dimensions

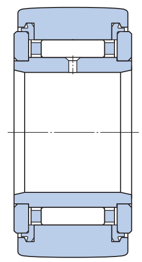
D	d_1	$r_{1,2}$ min.	$r_{3,4}$ min.
mm			
42	20	0,6	0,3
	20	0,6	0,3
47	22	1	0,5
	22	1	0,5
	36,5	1	–
	36,5	1	–
	36,5	1	–
	36,5	1	–
	27	1	0,5
	27	1	0,5
52	27	1	0,5
	27	1	0,5
	41,5	1	–
	41,5	1	–
	41,5	1	–
	41,5	1	–
	31	1	0,5
	31	1	0,5
62	31	1	0,5
	31	1	0,5
	51	1	–
	51	1	–
	51	1	–
	51	1	–
	38	1	0,5
	38	1	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

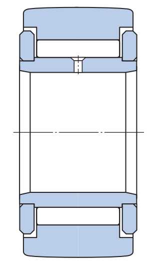
D **80 – 110** mm



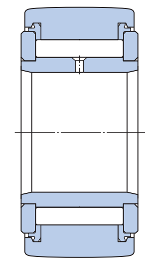
NATR



NATR .. PPA



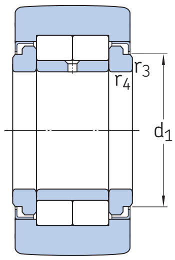
NATV



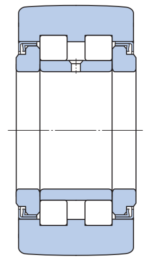
NATV .. PPA

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

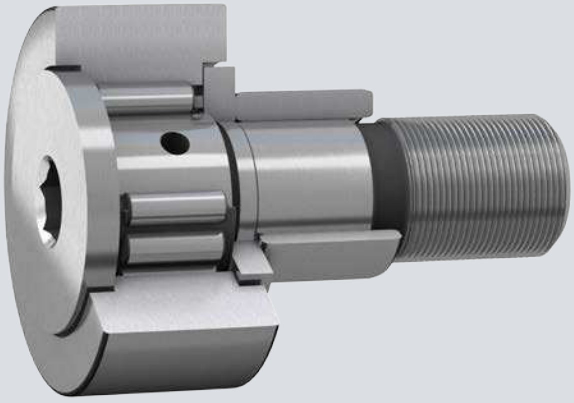

PWTR ...2RS

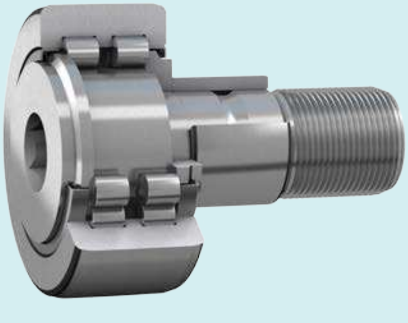
Dimensions

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

16 Cam followers

More information

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

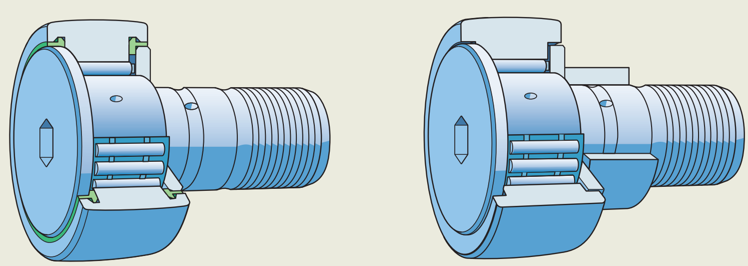
All three designs have the same main dimensions. They are available in different stud designs (**fig. 3**):

- 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**.

Fig. 3

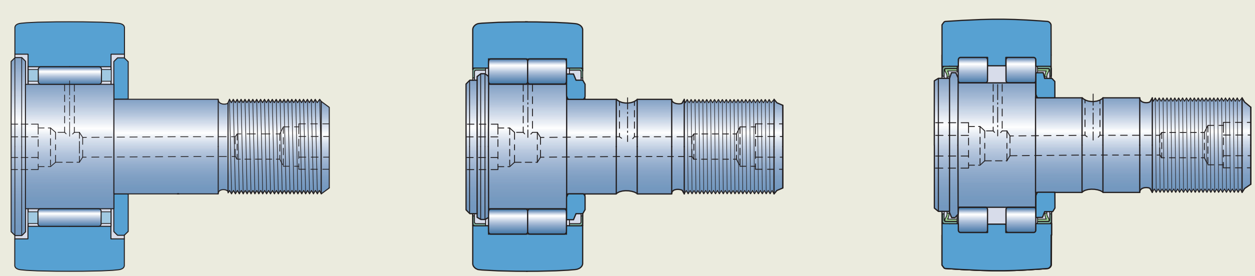
Stud designs



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

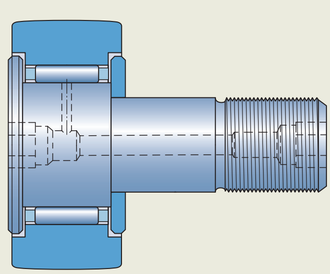


Fig. 5

KRV .. PPA design, sizes ≥ 30

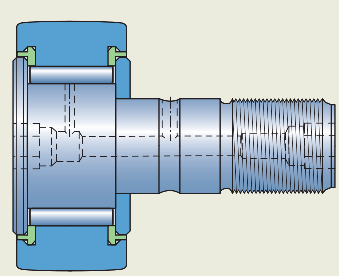
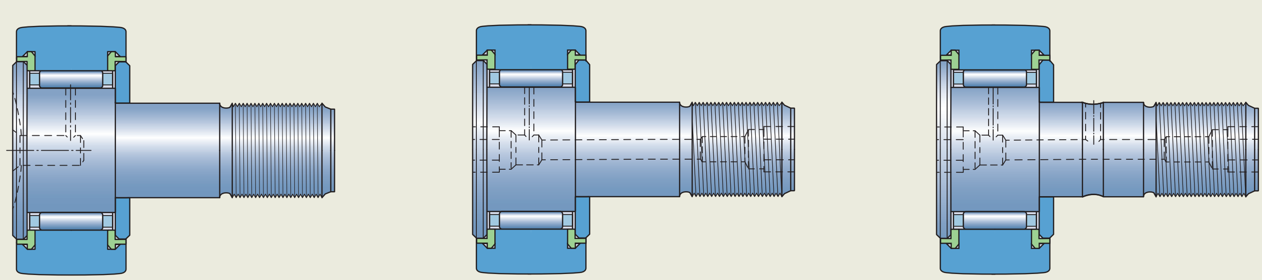


Fig. 6

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

16

Fig. 7

KR .. PPSKA design

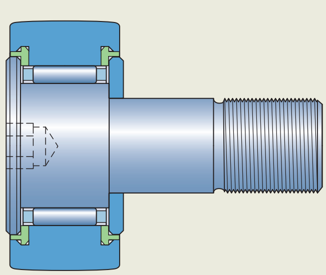


Fig. 8

NUKR .. A design

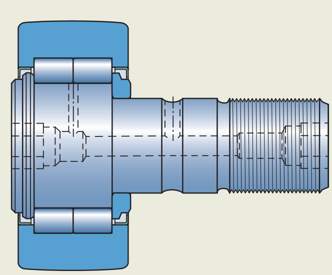
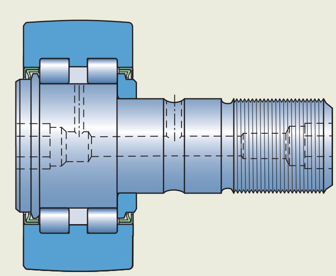


Fig. 9

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

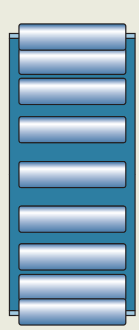


Fig. 11

Adapter for connection to centralized lubrication system

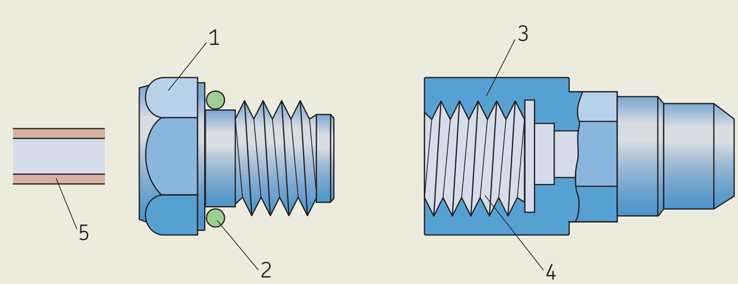
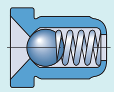
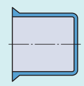
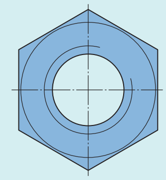


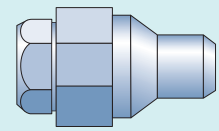
Table 1

Accessories for cam followers


Grease fitting


Plug

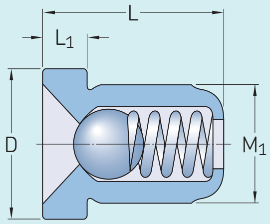

Hexagonal nut


Adapter

Cam follower			**Supplied with the cam follower**		**To be ordered separately**	
Design	Size without seals	with seals	Grease fitting	Hexagonal nut	Plug	Adapter
KR KRE 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 NUKRE .. A PWKR ...2RS 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

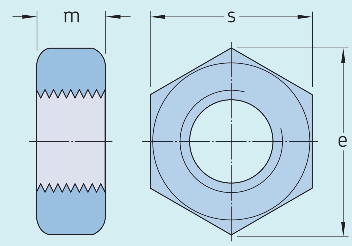
Grease fittings



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

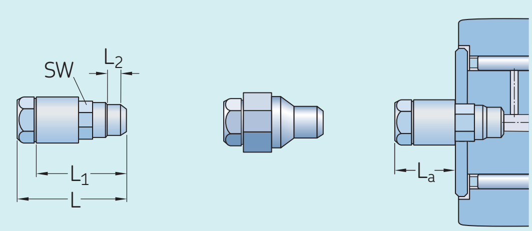


Size	Dimensions m	e	s	Tightening torque	Standard[1]
–	mm			Nm	–
M 6x1	5,2	11	10	3	1
M 8x1,25	6,8	14,4	13	8	1
M 10x1	8,4	17,8	16	15	2
M 12x1,5	10,8	20	18	22	2
M 16x1,5	14,8	26,8	24	58	2
M 18x1,5	15,8	29,6	27	87	2
M 20x1,5	18	33	30	120	2
M 24x1,5	21,5	39,5	36	220	2
M 30x1,5	25,6	50,9	46	450	2

[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.

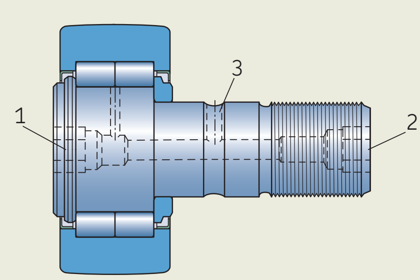
Relubrication features

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



16

Bearing data

Dimension standards	ISO 7063 and ANSI/ABMA Standard 18.1 (where standardized)
Profile of the outer ring running surface	• **KR .. (B) designs** Radius = 500 mm • **Other designs** Improved crowned profile for better load distribution, higher stiffness and reduced wear
Tolerances For additional information → **page 35**	Normal, except: • KR, KRE, KRV designs: ISO 7063 • diameter of the crowned running surface: 0/–0,05 mm • stud shank diameter: h7 • eccentric collar diameter: h9 Values for Normal tolerance class: ISO 492 (**table 2**, **page 38**) Values for ISO tolerance classes: h7 and h9 (**table 2**, **page 970**)
Internal clearance For additional information → **page 182**	Between C2 and Normal Values: ISO 5753-1 (**table 11**, **page 603**) 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. 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**). 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 For additional information → **page 106**	$F_{rm} = 0{,}0167\ C_0$	
Equivalent dynamic bearing load For additional information → **page 91**	$P = F_r$	
Equivalent static bearing load 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]

16

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°.

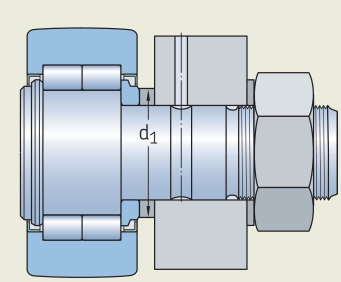
Support surfaces

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

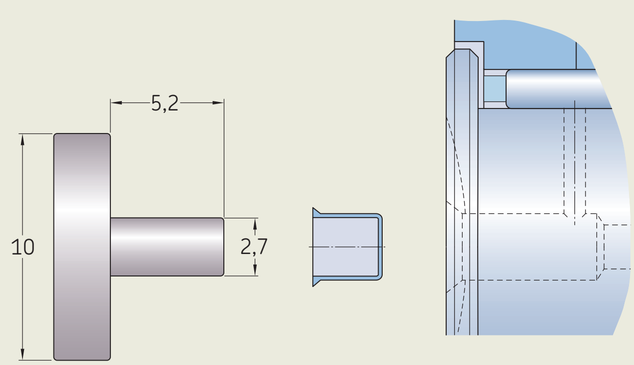
Cam followers can be attached to associated components (fig. 13) using the hexagonal nut (table 3, page 970) supplied with the cam follower. Spring washers, which are not supplied by SKF, serve to secure the nuts.

- 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



16

Designation system

		Group 1	Group 2	Group 3	/

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

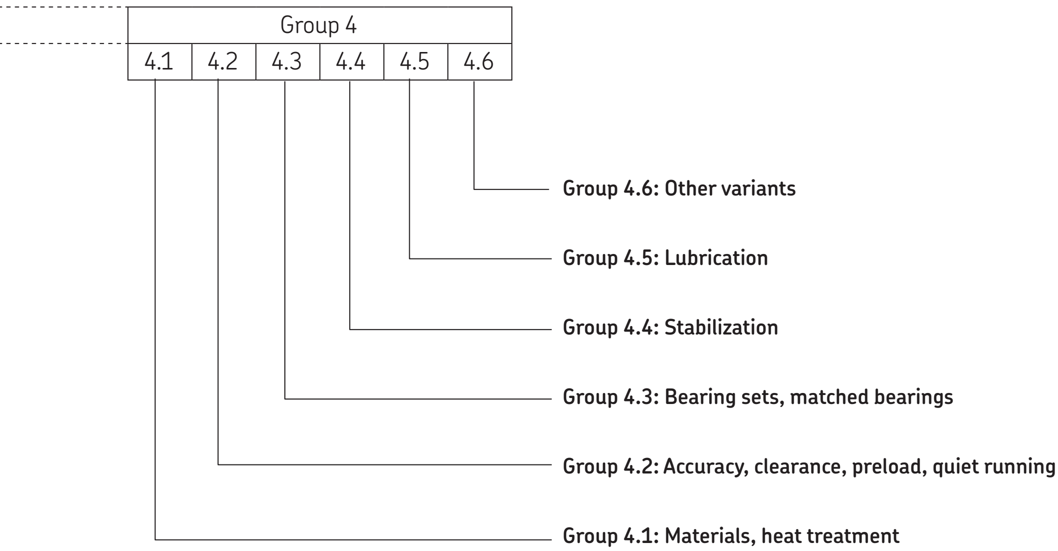
Group 1: Internal design

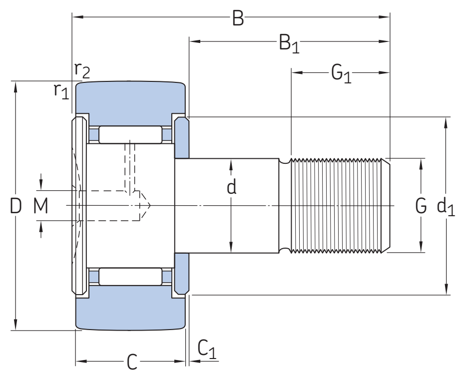
Group 2: External design (seals, snap ring groove, etc.)

.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
- Sizes 16 and 19 have one slot in the head of the stud as standard.
- Sizes ≥ 22 have a hexagonal recess on both ends.

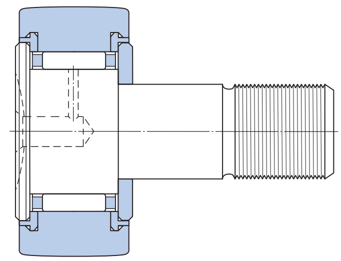
PPSKA KR design, sizes 16 and 19, with a PA66 axial sliding and sealing ring on both sides, improved crowned profile of the outer ring running surface and a hexagonal recess in the head of the stud, no relubrication features
PPXA PPA features except for the outer ring running surface, which has a cylindrical 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

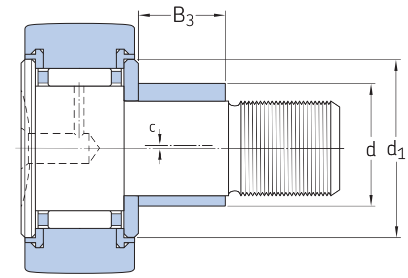

Group 4
4.1
4.2
4.3
4.4
4.5
4.6
Group 4.6: Other variants
Group 4.5: Lubrication
Group 4.4: Stabilization
Group 4.3: Bearing sets, matched bearings
Group 4.2: Accuracy, clearance, preload, quiet running
Group 4.1: Materials, heat treatment



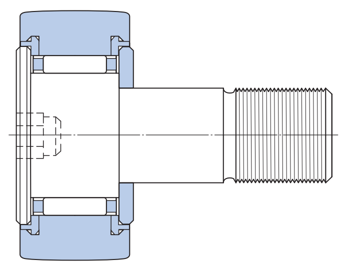
KR
(D ≤ 19 mm)



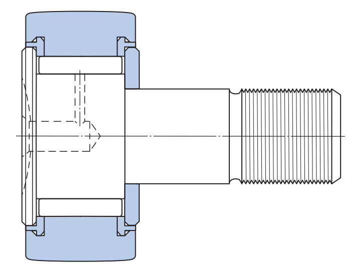
KR .. PPA
(D ≤ 19 mm)



KRE .. PPA
(D ≤ 19 mm)



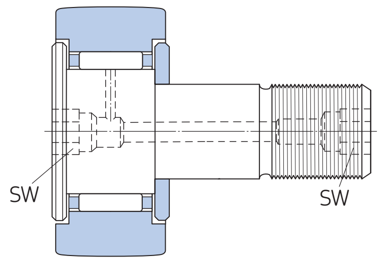
KR .. PPSKA
(D ≤ 19 mm)



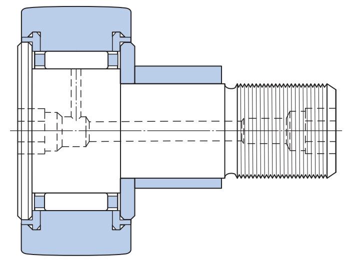
KRV .. PPA
(D ≤ 19 mm)

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**

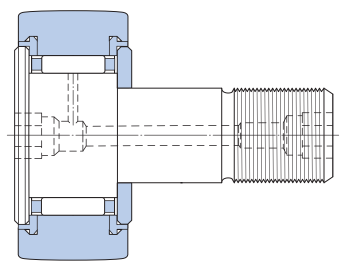
▸ Popular item



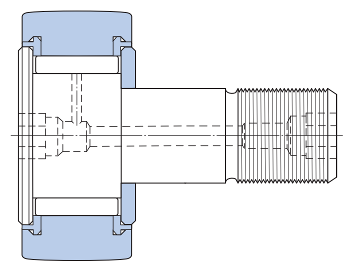
KR .. B
(22 ≤ D ≤ 26 mm)



KRE .. PPA
(22 ≤ D ≤ 26 mm)



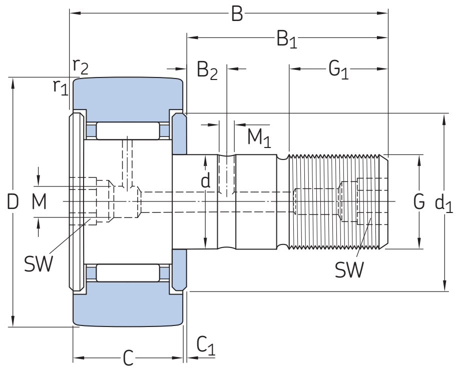
KR .. PPA
(22 ≤ D ≤ 26 mm)



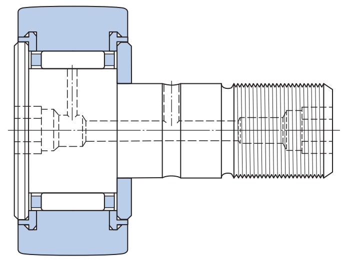
KRV .. PPA
(22 ≤ D ≤ 26 mm)

Dimensions

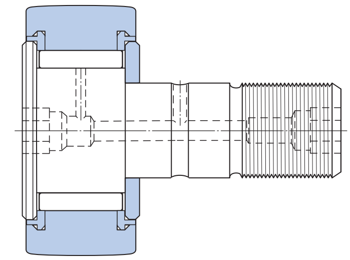
d	B_1	B_2	B_3	C_1	d_1	G	G_1	M	M_1	SW	c	$r_{1,2}$ min.
mm												
16	16	–	–	0,6	12,5	M 6	8	4	–	–	–	0,15
	16	–	–	0,6	12,5	M 6	8	4	–	–	–	0,15
	16	–	–	0,6	12,5	M 6	8	–	–	4	–	0,15
	16	–	–	0,6	12,5	M 6	8	4	–	–	–	0,15
	16	–	7	0,6	12,5	M 6	8	4	–	–	0,5	0,15
19	20	–	–	0,6	15	M 8	10	4	–	–	–	0,15
	20	–	–	0,6	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



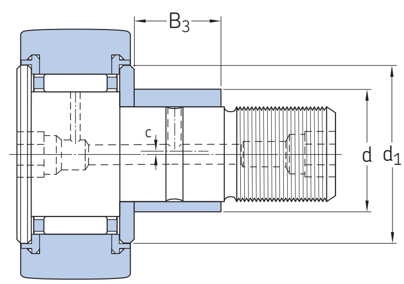
KR .. B



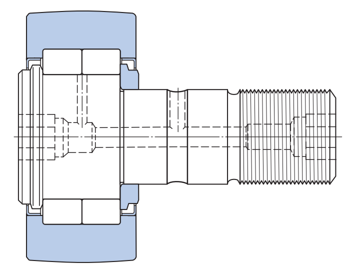
KR .. PPA



KRV .. PPA



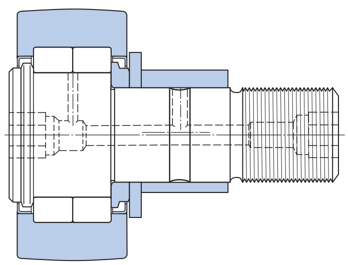
KRE .. PPA



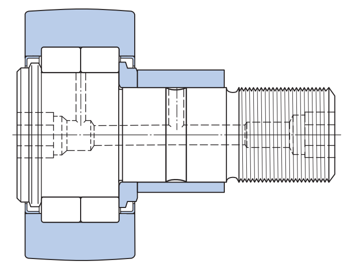
NUKR .. A

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**

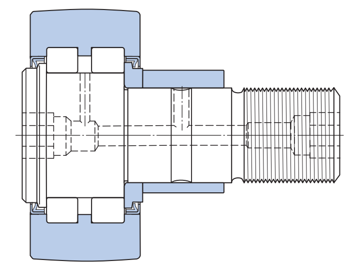
► Popular item



NUKRE .. A
(35 ≤ D ≤ 40 mm)



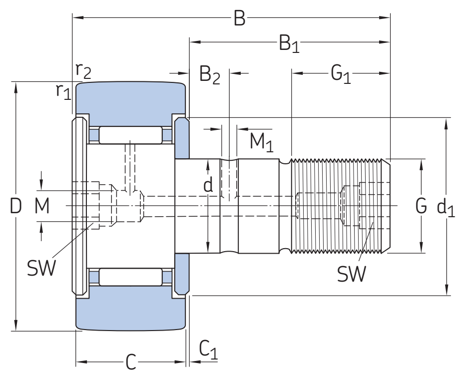
NUKRE .. A
(D ≥ 47 mm)



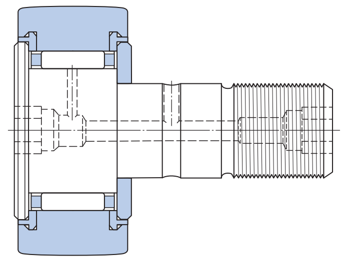
PWKR ...2RS

Dimensions

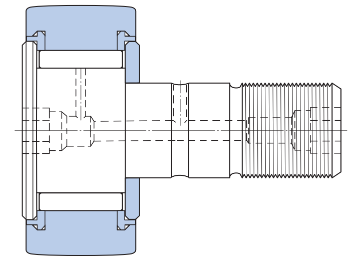
d	B_1	B_2	B_3	C_1	d_1	G	G_1	M	M_1	SW	c	$r_{1,2}$ min.
mm												
30	25	6	–	0,6	23	M 12x1,5	13	4	3	6	–	0,6
	25	6	–	0,6	23	M 12x1,5	13	4	3	6	–	0,6
	25	6	–	0,6	23	M 12x1,5	13	4	3	6	–	0,6
	25	6	11	0,6	23	M 12x1,5	13	4	3	6	0,5	0,6
32	25	6	–	0,6	23	M 12x1,5	13	4	3	6	–	0,6
	25	6	–	0,6	23	M 12x1,5	13	4	3	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



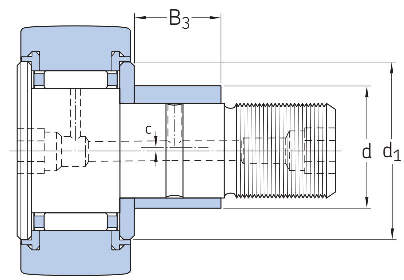
KR .. B



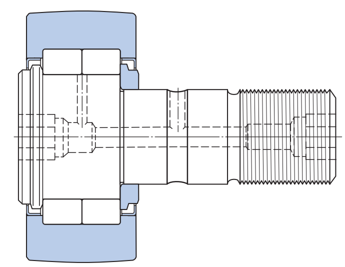
KR .. PPA



KRV .. PPA



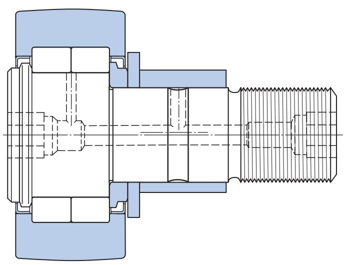
KRE .. PPA



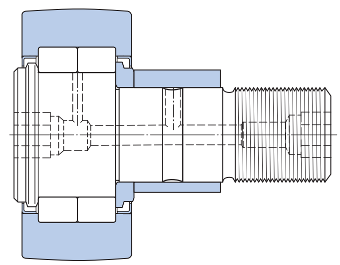
NUKR .. A

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**

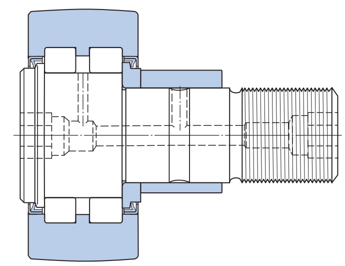
▸ Popular item



NUKRE .. A
(35 ≤ D ≤ 40 mm)



NUKRE .. A
(D ≥ 47 mm)



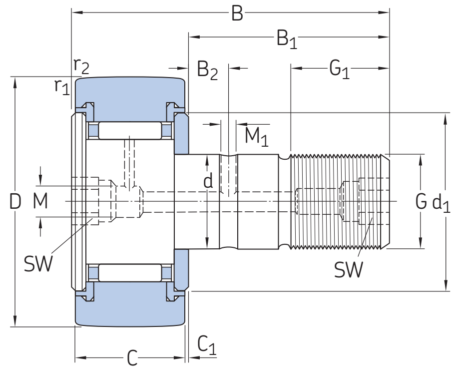
PWKR ...2RS

Dimensions

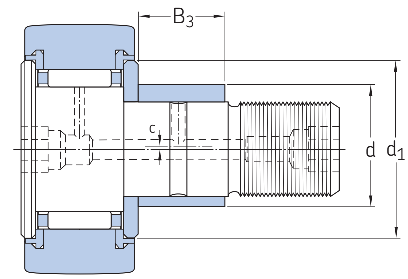
d	B_1	B_2	B_3	C_1	d_1	G	G_1	M	M_1	SW	c	$r_{1,2}$ min.
mm												
40	36,5	8	–	0,8	31,5	M 18x1,5	19	6	3	8	–	1
	36,5	8	–	0,8	31,5	M 18x1,5	19	6	3	8	–	1
	36,5	8	–	0,8	31,5	M 18x1,5	19	6	3	8	–	1
	36,5	8	–	0,8	22	M 18x1,5	19	6	3	8	–	1
	36,5	8	–	0,8	22	M 18x1,5	19	6	3	8	–	1
	36,5	8	16	0,8	31,5	M 18x1,5	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

16.1 Cam followers

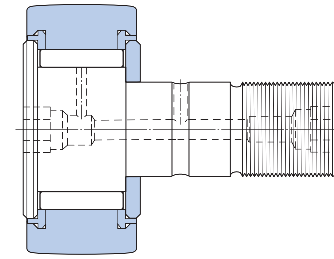
D **52 – 90** mm



KR .. PPA



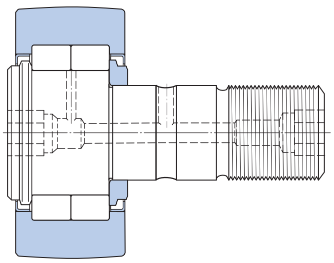
KRE .. PPA



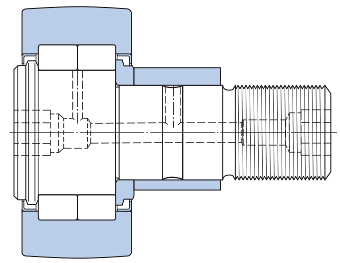
KRV .. PPA

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**

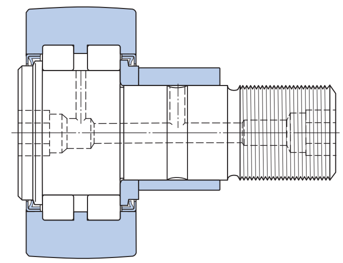
▸ Popular item



NUKR .. A



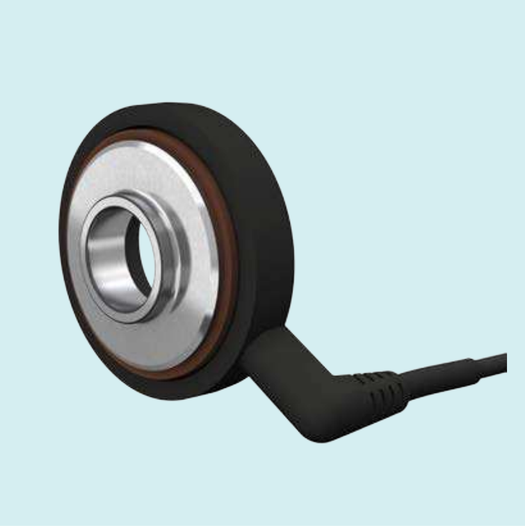
NUKRE .. A



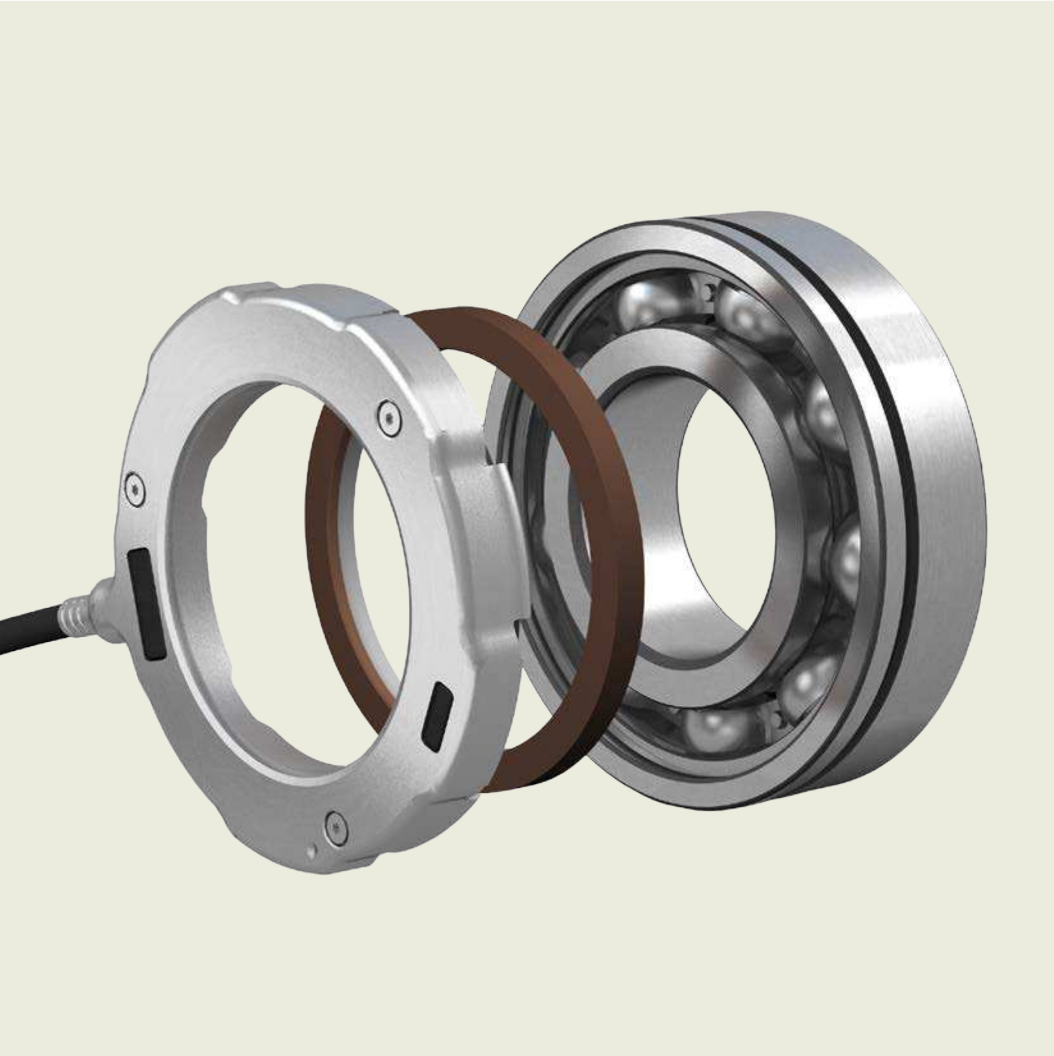
PWKR ...2RS

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

17 Sensor bearing units

17

More information

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

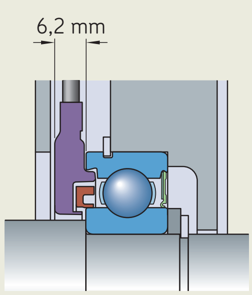


Fig. 3

Motor encoder unit

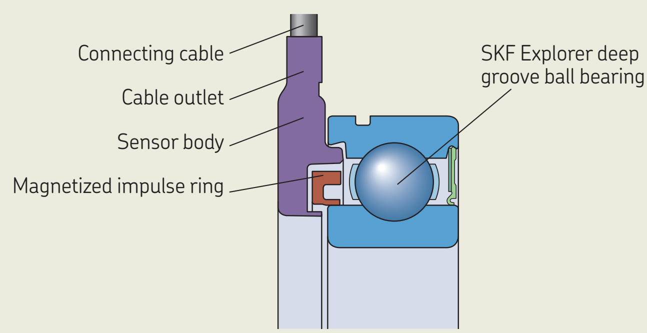
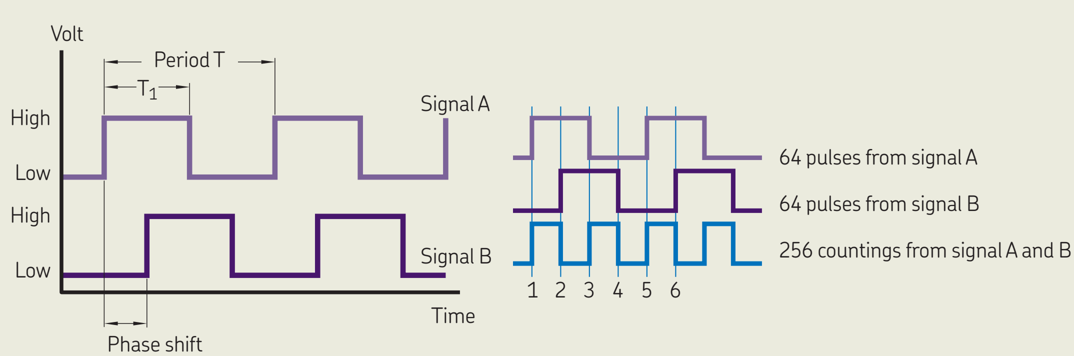


Fig. 4

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)

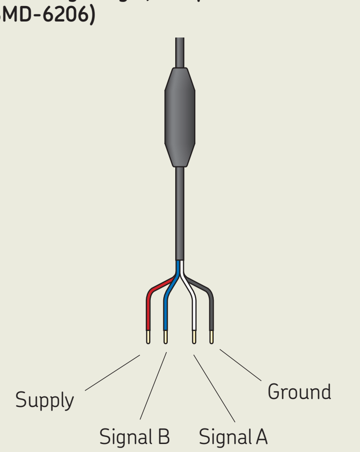
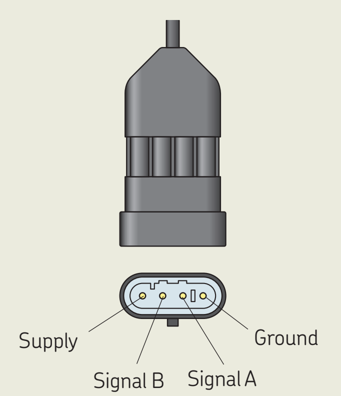


Fig. 6

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

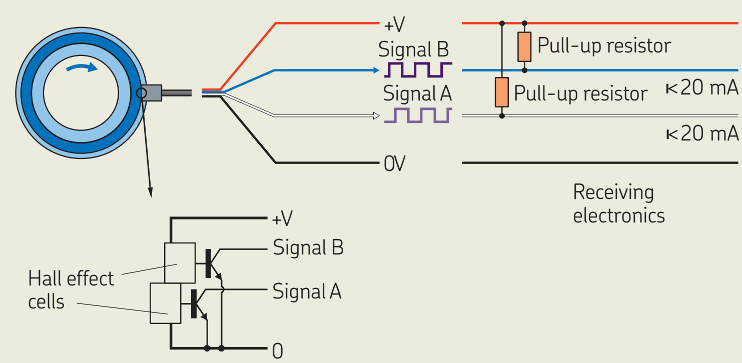


Table 1

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 However, the width of the complete unit is 6,2 mm wider.
Tolerances For additional information → page 35	d ≤ 25 mm: P5 d ≥ 30 mm: P6 Values: ISO 492 (table 3, page 39, and fig. 4, page 989)
Internal clearance For additional information → page 182	C3 Values: ISO 5753-1 (fig. 6, page 990) 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

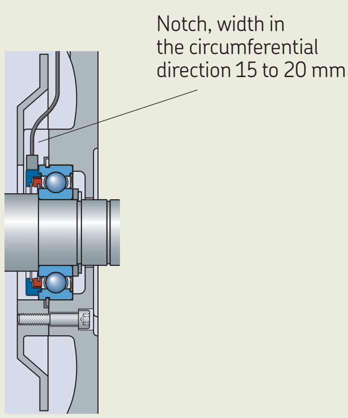


Fig. 9

Motor encoder unit in the non-locating bearing position

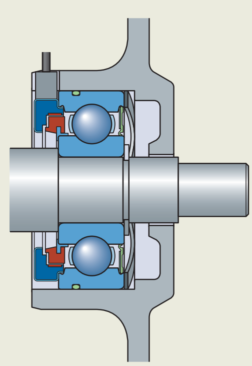
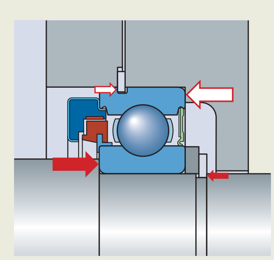


Fig. 10

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

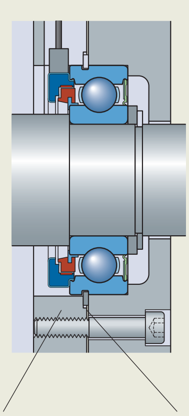


Fig. 12

Axial location with a spacer sleeve and a snap ring in the housing

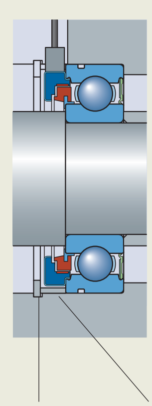
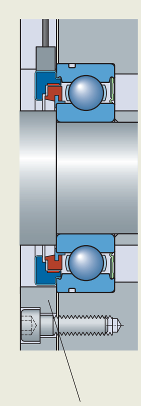


Fig. 13

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

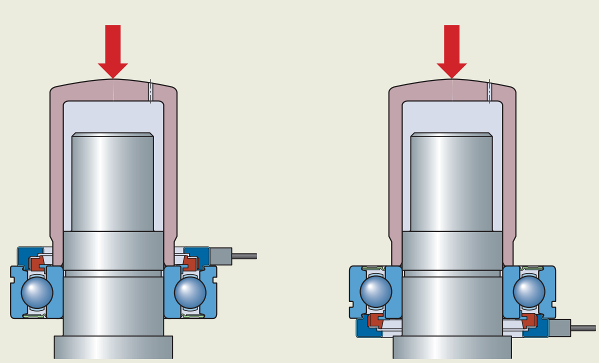
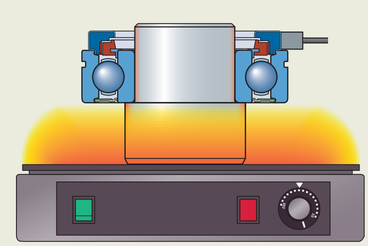


Fig. 15

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

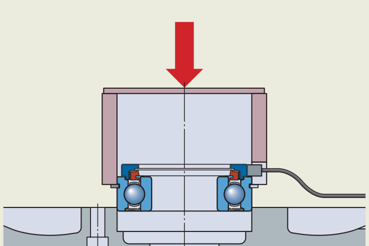
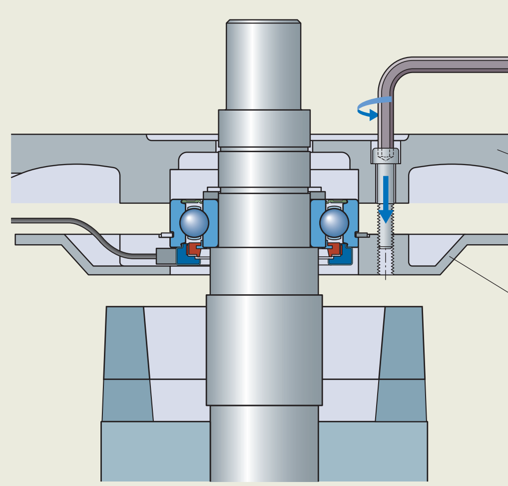


Fig. 17

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

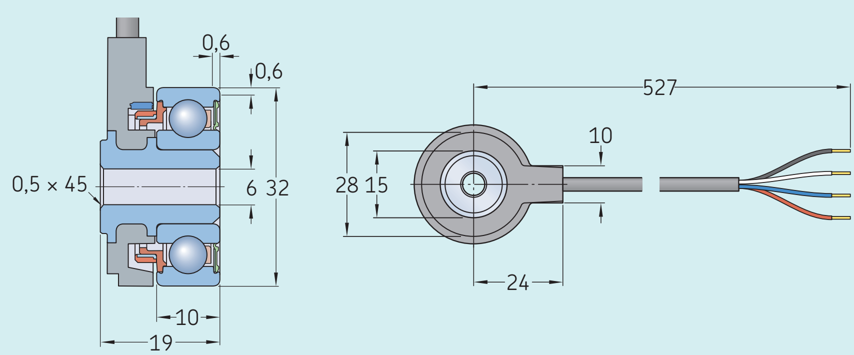
SKF roller encoder units use similar sensors as SKF motor encoder units (page 988). They provide two signals, which can be used to determine relative position, speed, acceleration and direction of movement. The requirements for the receiving interface are the same as for SKF motor encoder units.

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:

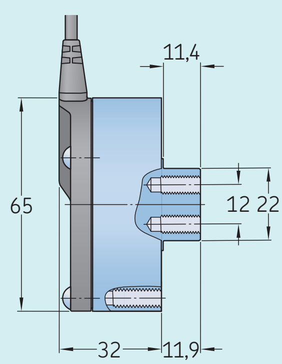
- do not require any adjustment
- do not require relubrication during their expected service life and are virtually maintenance-free
- are supplied ready-to-mount (connection to a steer-by-wire system is achieved by plugs)

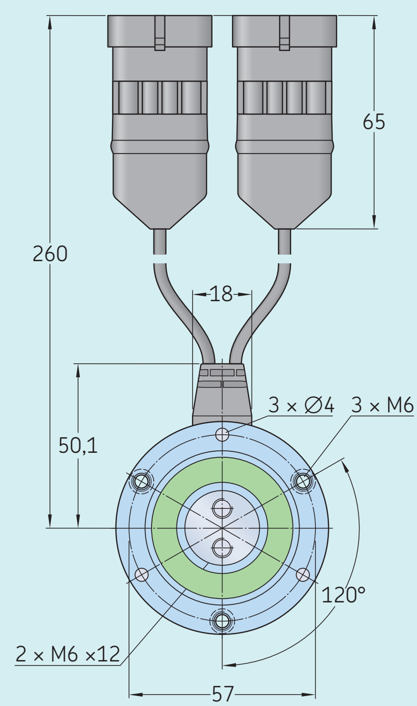
Fig. 19

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

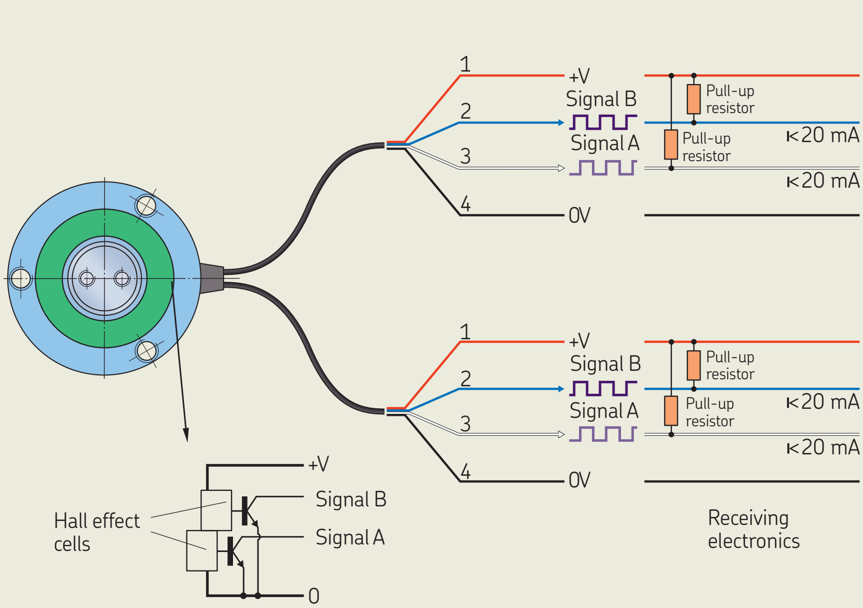
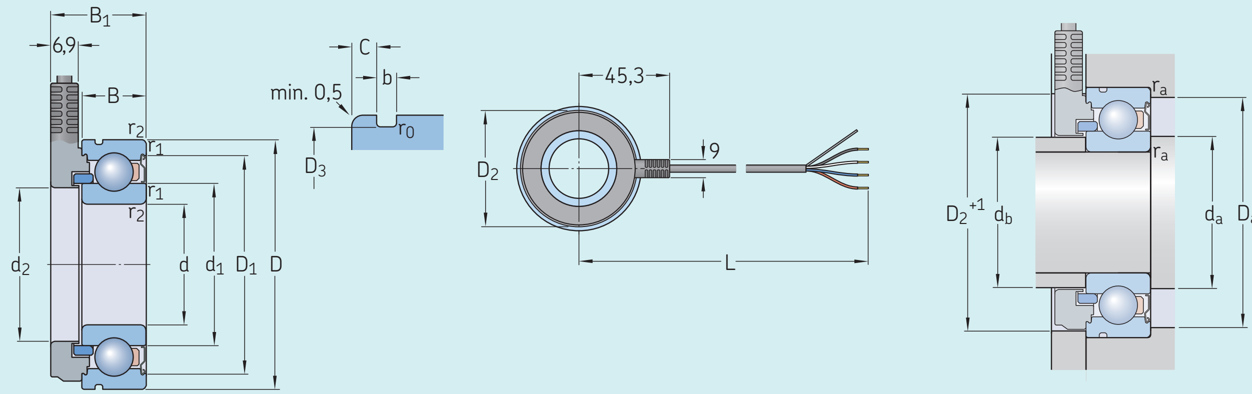


Fig. 21

Rotor positioning sensor bearing unit

Table 5

Rotor positioning sensor bearing unit



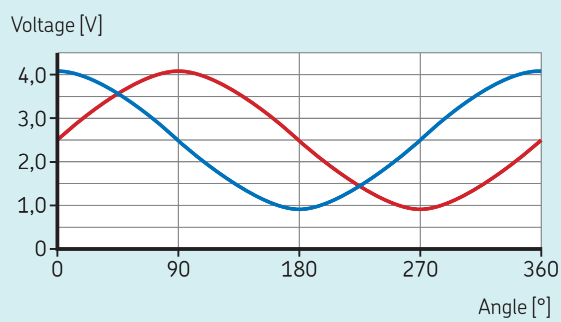
Bore diameter of end cover ≥ D_2 + 1 mm

Dimensions d	D	B_1	B	d_1 ≈	d_2	D_1 ≈	D_2	D_3	C	b	r_0	$r_{1,2}$ min.	L	**Abutment dimensions** 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

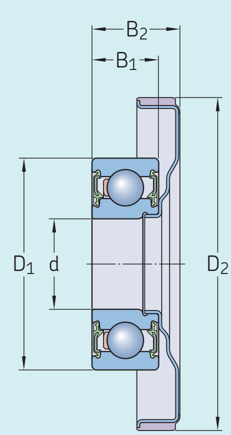
- absolute angular position information for electric motor control in, for example:
  - belt-driven starter generators
  - traction motors
  - e-superchargers and e-turbochargers
- shaft speed detection or low-resolution angular position in, for example:
  - crankshafts
  - transmission shafts

Fig. 22

Rotor positioning bearing

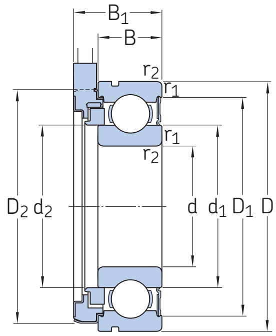
Table 6

Rotor positioning bearings

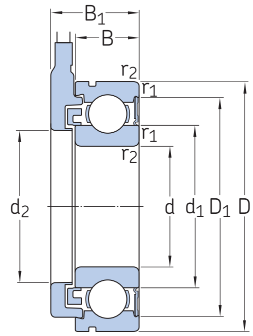


Designation	Bearing size	Principal dimensions					Number of pairs of poles	Limiting speed	Operating temperatures
		d	D_1	D_2	B_1	B_2			
–	–	mm					–	–	°C (*°F*)
BMD-0123/ZJ6	6202	15	35	55	11	14,5	6	22 000	–40 to 150 (*–40 to 300*)
BMD-0123/ZJ8	6202	15	35	55	11	14,5	8	22 000	–40 to 150 (*–40 to 300*)

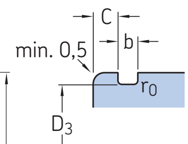
d **15 – 45** mm

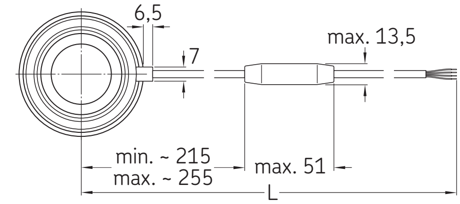


BMB
BMO

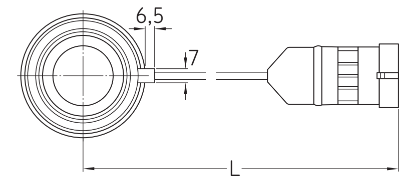


BMD



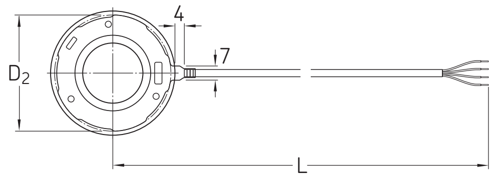


BMB ... 008A (Free cable end)
BMO ... 008A (Free cable end)

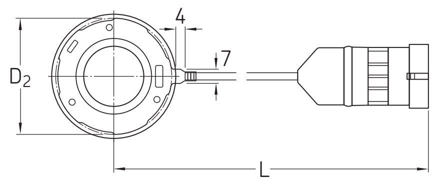


BMB ... 108A (Superseal™)
BMO ... 108A (Superseal™)

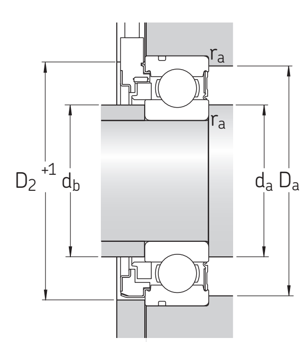
Bearing Principal dimensions			Basic load ratings		Fatigue load limit	Limiting speed	**Sensor unit** No. of pulses	Period accur-acy	Phase shift output signal	Cable length	**Mass**	**Designation**
d	D	B	dynamic C	static C_0	P_u		N			L ±10		
mm			kN		kN	r/min	–	%	°	mm	kg	–
15	35	11	7,8	3,75	0,16	13 000	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**



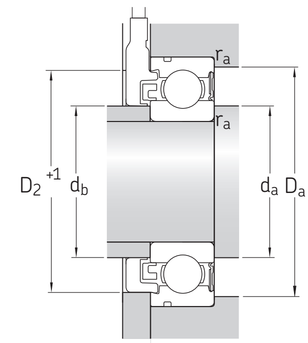
BMD ... 008A (Free cable end)



BMD ... 108A (Superseal™)

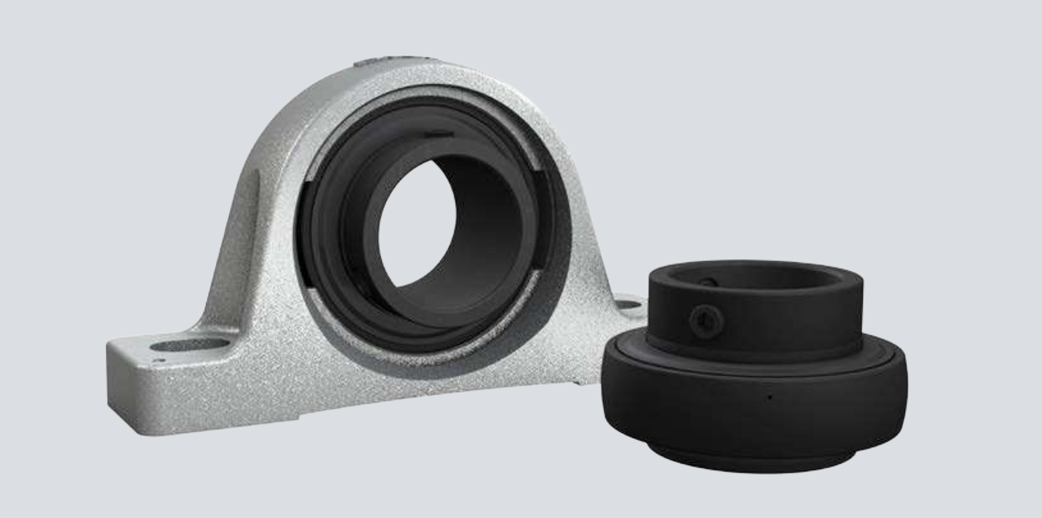


BMB
BMO
Bore diameter of end cover
$\geq D_2 + 1$ mm



BMD
Bore diameter of end cover
$\geq D_2 + 1$ 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

18 High temperature bearings

More information

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

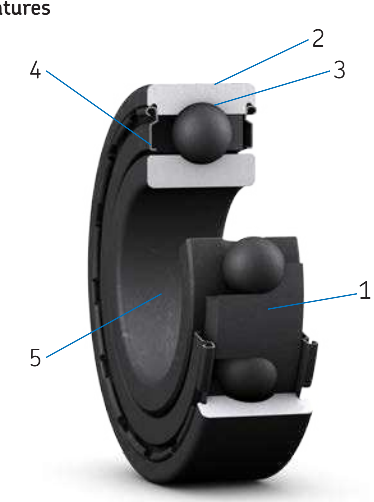
- **Reduced total operating cost**
  The bearings are designed to maintain the radial clearance needed for high temperature operation and so will not seize, even when they cool rapidly, and therefore provide a long service life.
- **Excellent performance under severe conditions:**
  – hot conditions
  – 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

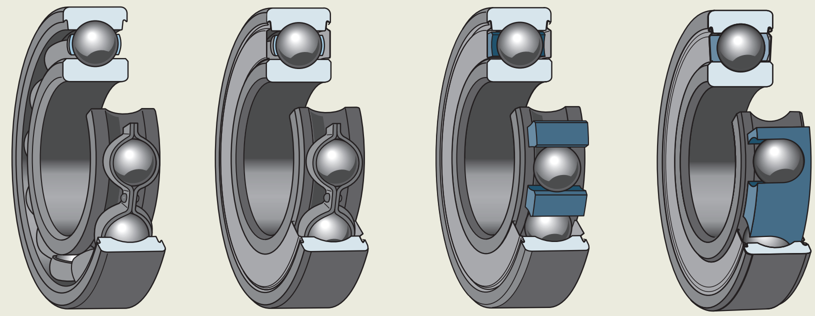
⚠ WARNING

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 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	✔	✔
Maximimum 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

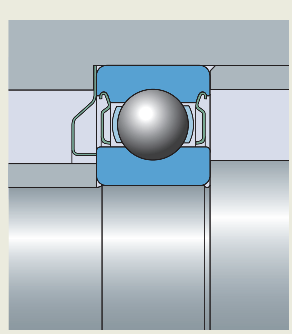
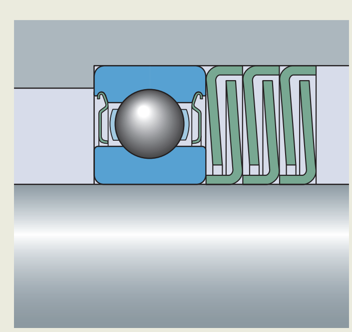


Fig. 8

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

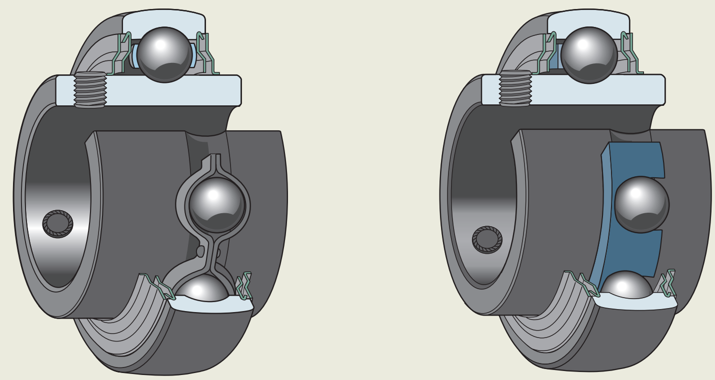


Table 2

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	✔	✔
Maximimum 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

<table>
<tr><th></th><th>Deep groove ball bearings</th><th>Insert bearings (Y-bearings)</th></tr>
<tr><td>Dimension standards</td><td>Boundary dimensions: ISO 15
Series 10, 02, 03</td><td>Boundary dimensions: ISO 9628</td></tr>
<tr><td>Tolerances</td><td>Normal</td><td>Normal, except the bore and outside diameter (table 3, page 1012)</td></tr>
<tr><td>For additional information
→ page 35</td><td colspan="2">Values: ISO 492 (table 2, page 1010)
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.</td></tr>
<tr><td>Radial internal clearance</td><td colspan="2">Multiples of C5
Values (table 4, page 1012) are valid for unmounted bearings under zero measuring load.</td></tr>
<tr><td>Permissible misalignment</td><td colspan="2">≈ 20 to 30 minutes of arc

Accommodate misalignment only when the bearings rotate slowly.
Misalignment increases bearing noise and reduces bearing service life, and when it exceeds the guideline values, these effects become particularly noticeable.</td></tr>
<tr><td>Stabilization</td><td>120 °C (250 °F)</td><td>150 °C (300 °F)</td></tr>
<tr><td></td><td colspan="2">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.</td></tr>
</table>

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:

- $F_a < 0,8\ F_r$
- $F_a < 0,15\ C_0$

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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.

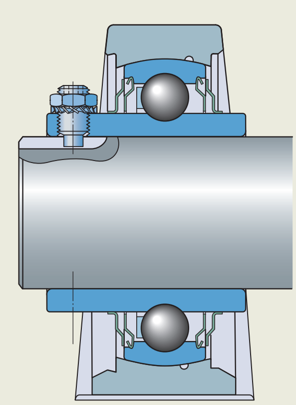
Table 4

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

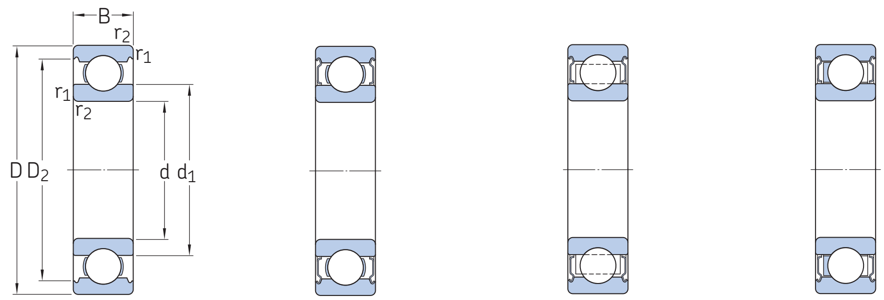
VA208 Bearing for high temperature applications, with a segmented cage made of graphite, manganese phosphate coated rings and rolling elements, and radial clearance of multiples of C5

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**

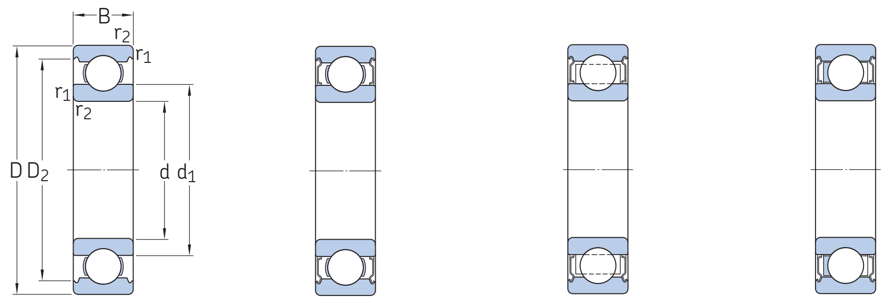
▸ Popular item

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**

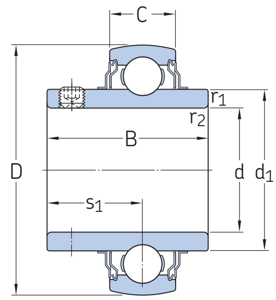
► Popular item

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**

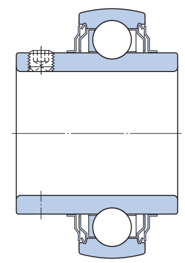
▸ Popular item

18.2 Insert bearings for high temperature applications, metric shafts

d **20 – 60** mm



VA201



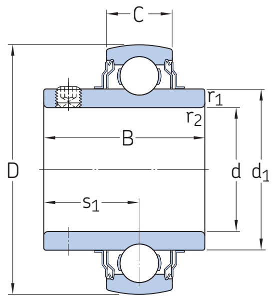
VA228

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**

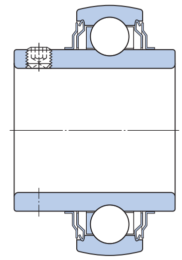
▸ Popular item

18.3 Insert bearings for high temperature applications, inch shafts

d **3/4 – 2 15/16** in.
19,05 – 74,613 mm



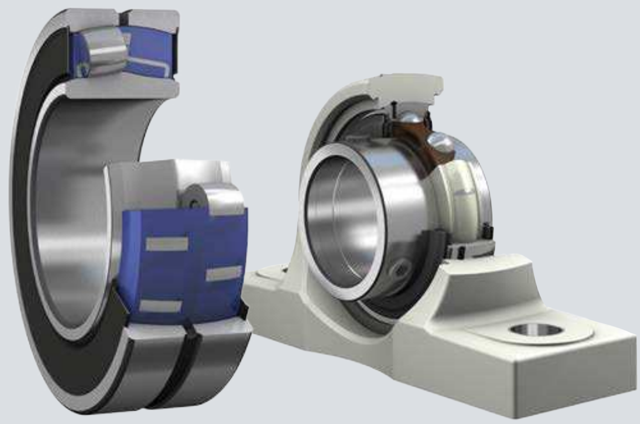
VA201

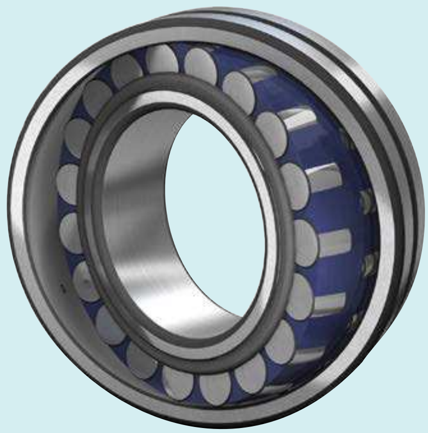


VA228

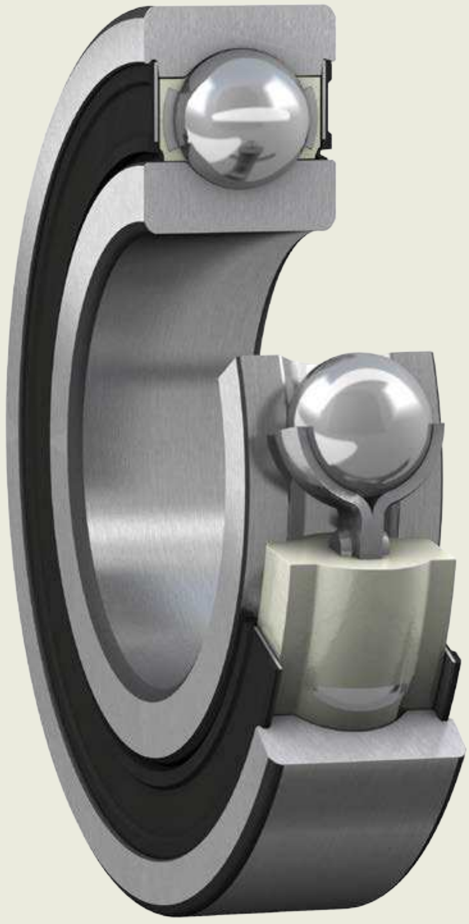
Dimensions							Basic load ratings dynamic	static	Limiting speed	Limiting temperature	Mass	Designation
d	D	B	C	d_1 ≈	s_1	$r_{1,2}$ min.	C	C_0		T max.		
in./*mm*	mm						kN		r/min	°C	kg	–
3/4	47	31	14	28,2	18,3	0,6	12,7	6,55	130	250	0,17	**YAR 204-012-2FW/VA201**
19,05	47	31	14	28,2	18,3	0,6	12,7	6,55	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

19 Bearings with Solid Oil

More information

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.

19

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 mm^2/s	220 mm^2/s
at 100 °C *(210 °F)*	20 mm^2/s	25 mm^2/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.

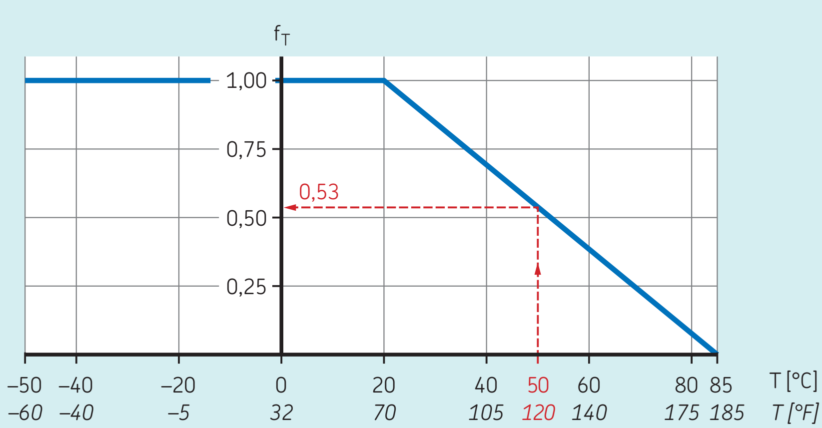
The designation suffixes used to identify bearings with Solid Oil are:

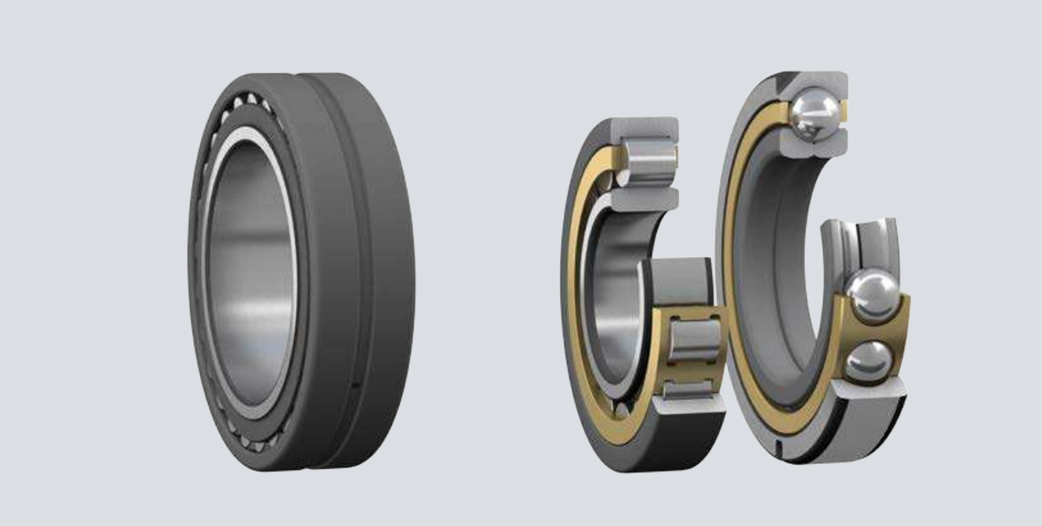
W64 Synthetic base oil type, standard variant

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

20 INSOCOAT bearings

More information

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

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:

- four-point contact ball bearings
- flanged tapered roller bearings
- tapered roller bearing units (TBU)
- traction motor bearing units

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 Designation suffix	**Breakdown voltage (DC)**	**Minimum electrical resistance**
–	V	MΩ
Standard layer VL0241, VL2071	3 000	200
Advanced layer VL0246, VL2076	3 000	400

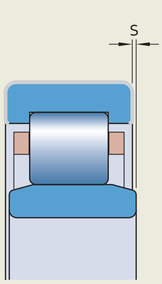
Valid if:
- Temperature T ≤ 40 °C (*105 °F*)
- Relative humidity rH ≤ 60%

Bearing data

	Deep groove ball bearings	Cylindrical roller bearings
Dimension standards	Boundary dimensions: ISO 15	
Tolerances	Normal Tighter tolerances (up to P5) for some bearings on request	Normal
For additional information → **page 35**	Values: ISO 492 (**table 2**, **page 38**, to **table 4**, **page 40**) The aluminium oxide layer on the external surfaces of either the inner or the outer ring does not affect accuracy.	
Internal clearance	C3	C3 Check availability of other clearance classes
For additional information → **page 26**	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 → **page 250**	→ **page 504**
Permissible axial displacement	–	s_{max} → **product tables**, **page 1036** 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 $\geq D_{a\,min}$
- Bearings with a coated inner ring (designation suffix VL2071 or VL2076): shaft abutment diameter $\leq d_{a\,max}$

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:

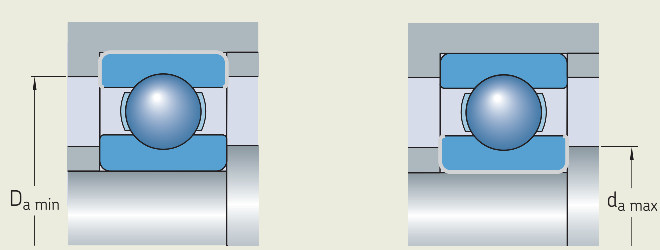
- deep groove ball bearings, **page 258**
- cylindrical roller bearings, **page 514**

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.

Fig. 5

Abutment dimensions

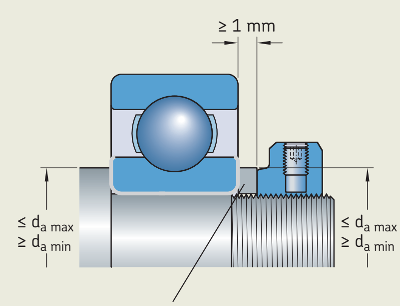


Coated outer ring

Coated inner ring

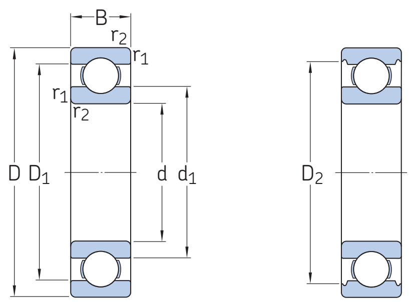
Fig. 6

Bearing axially clamped by a lock nut



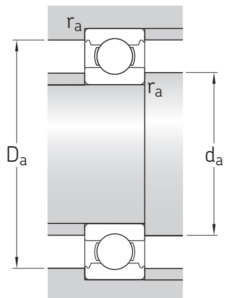
Steel spacer ring

20.1 INSOCOAT deep groove ball bearings
d **70 – 150** mm



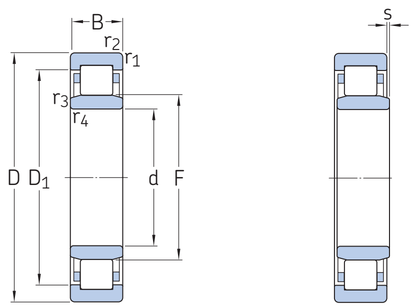
Principal dimensions			Basic load ratings dynamic	static	Fatique load limit	Speed ratings Reference speed	Limiting speed	Mass	Designation
d	D	B	C	C_0	P_u				
mm			kN		kN	r/min		kg	–
70	150	35	104	68	2,75	9 500	6 300	2,5	▸ **6314/C3VL0241**
75	130	25	68,9	49	2,04	10 000	6 700	1,2	▸ **6215/C3VL0241**
	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



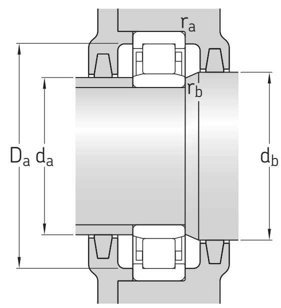
Dimensions					Abutment and fillet dimensions					Calculation factors	
d	d_1 ≈	D_1 ≈	D_2 ≈	$r_{1,2}$ min.	d_a min.	d_a max.	D_a min.	D_a max.	r_a max.	k_r	f_0
mm					mm					–	
70	94,9	–	132	2,1	82	–	136	138	2	0,03	13
75	92	–	118	1,5	84	–	121	121	1,5	0,03	15
	101	–	141	2,1	87	–	146	148	2	0,03	13
80	101	–	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

20.2 INSOCOAT cylindrical roller bearings
d **50 – 95** mm



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**

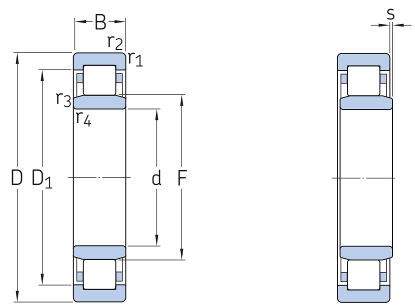
▸ Popular item



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

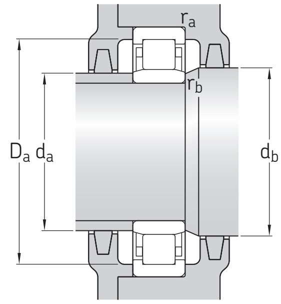
20.2 INSOCOAT cylindrical roller bearings

d **100 – 150** mm

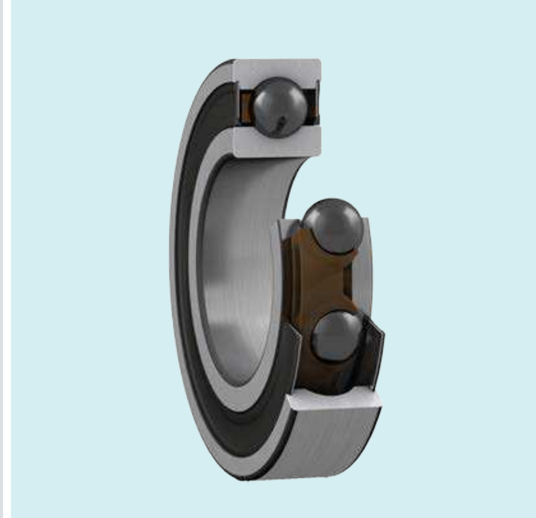


Principal dimensions			Basic load ratings dynamic	static	Fatique load limit	Speed ratings Reference speed	Limiting speed	Mass	Designation
d	D	B	C	C_0	P_u				
mm			kN		kN	r/min		kg	–
100	150	24	89,7	122	15	5 000	5 000	1,45	**NU 1020 M/C3VL0241**
	180	34	251	310	38	3 800	4 500	4	▸ **NU 220 ECM/C3VL0241**
	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**

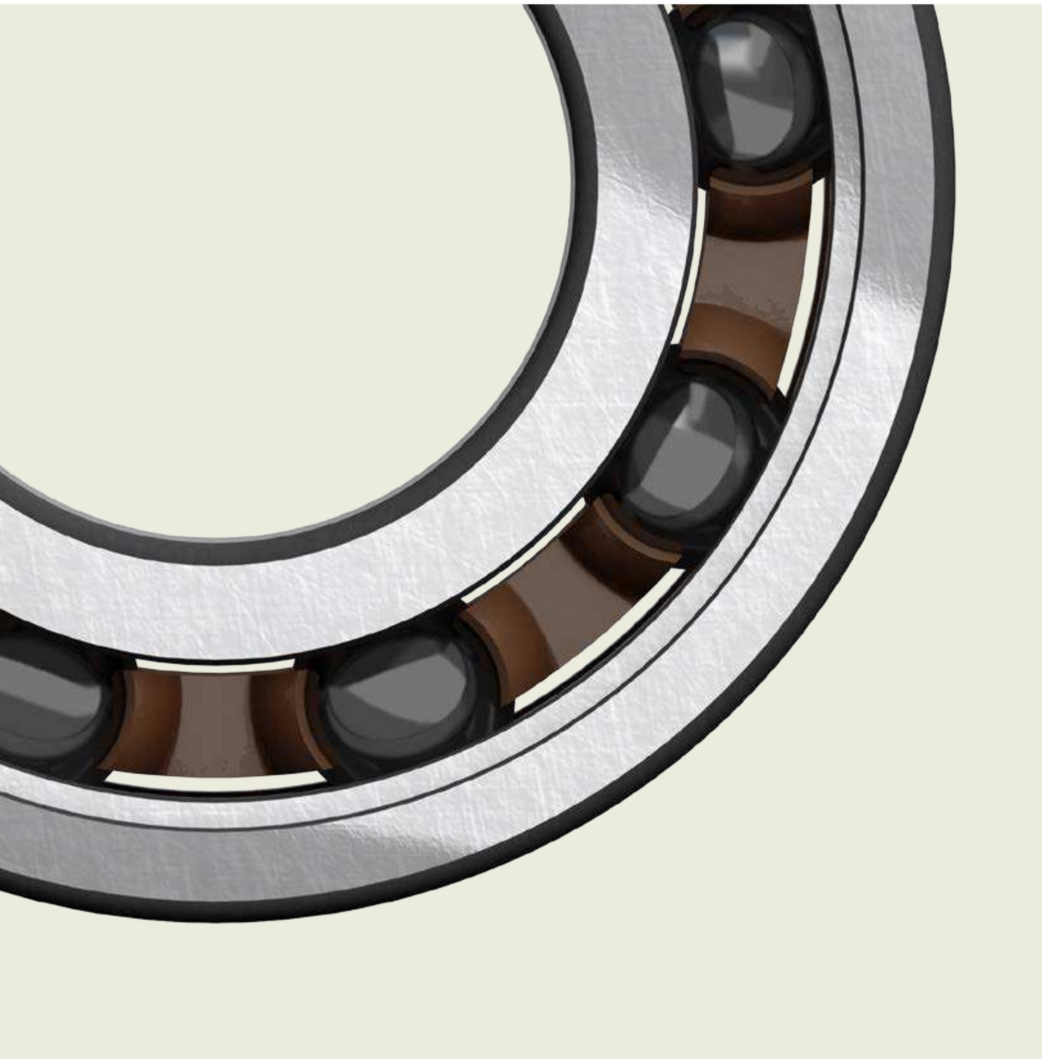
▸ Popular item



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

21 Hybrid bearings

More information

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, κ, **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

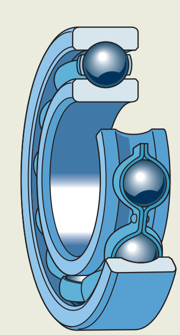
Hybrid bearings

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:

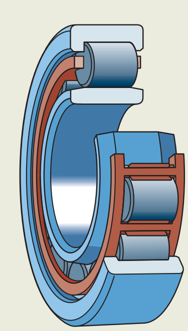
- a glass fibre reinforced PA66 cage, window-type, roller centred (designation suffix P)
- a glass fibre reinforced PEEK cage, window-type, roller centred (designation suffix PH)
- a machined brass cage, riveted, roller centred (designation suffix M)
- a machined brass cage, window-type, inner or outer 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

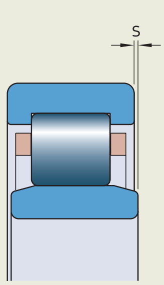


Bearing data

	Deep groove ball bearings	Cylindrical roller bearings
Dimension standards	Boundary dimensions: ISO 15	
Tolerances	Normal	Normal P6 geometrical tolerance
For additional information → **page 35**	ISO 492 (**table 2**, **page 38**, and **table 3**, **page 39**)	
Internal clearance	C3 Check availability of other clearance classes	
For additional information → **page 182**	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 → **page 250**	Identical to standard bearings → **page 504**
Permissible axial displacement	–	s_{max} → **product table**, **page 1056** 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 • High impedance, even for very high frequencies, providing good protection against high frequency current and voltage peaks • 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



21

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

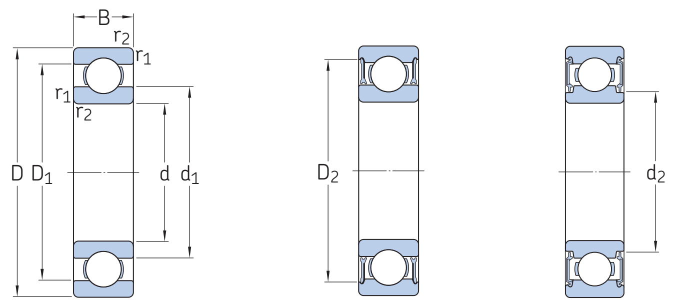
Refer to *Designation system* of the relevant standard bearing:

- 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

21.1 Hybrid deep groove ball bearings
d **5 – 25** mm

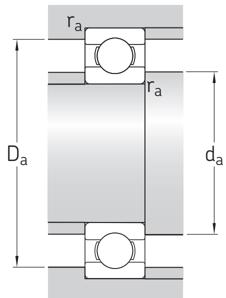


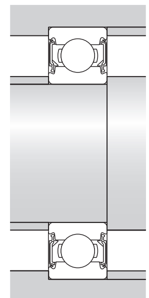
Sealed (2RZ)

Sealed (2RSL)

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	–
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

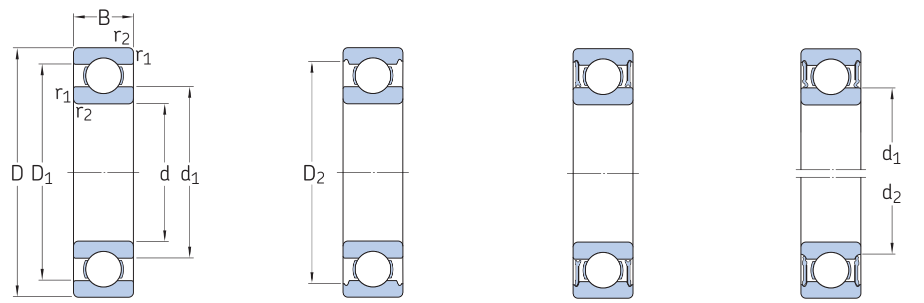




Dimensions						Abutment and fillet dimensions				Calculation factors	
d	d_1 ≈	d_2 ≈	D_1 ≈	D_2 ≈	$r_{1,2}$ min.	d_a min.	d_a max.	D_a max.	r_a max.	k_r	f_0
mm						mm				–	
5	8,4	–	–	13,3	0,3	7,4	8,3	13,6	0,3	0,025	8,4
6	–	9,5	–	16,5	0,3	7,4	9,4	16,6	0,3	0,025	13
7	–	9,5	–	16,5	0,3	9	9,4	17	0,3	0,025	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

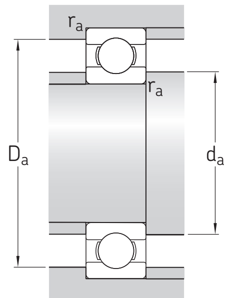
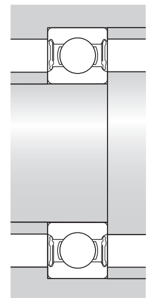
d **30 – 65** mm



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**

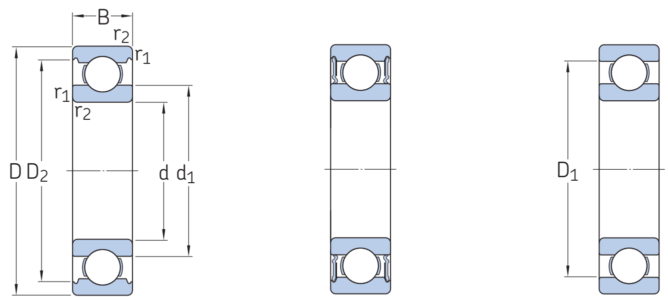
▸ Popular item

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

21.1 Hybrid deep groove ball bearings

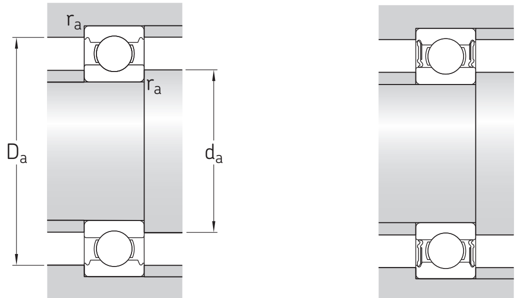
d **70 – 180** mm



Sealed (2RS1) VA970

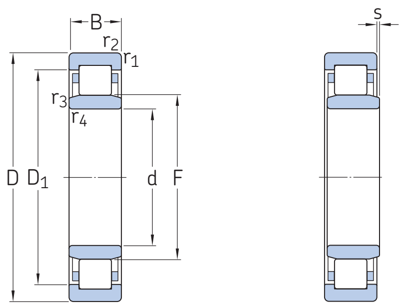
Principal dimensions			Basic load ratings dynamic	static	Fatique load limit	Speed ratings Reference speed	Limiting speed	Mass	Designation
d	D	B	C	C_0	P_u				
mm			kN		kN	r/min		kg	–
70	125	24	63,7	45	1,9	–	3 400	1	▸ **6214-2RS1/HC5C3WT**
	125	24	63,7	45	1,9	13 000	8 500	1,1	**6214/HC5C3**
	150	35	111	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



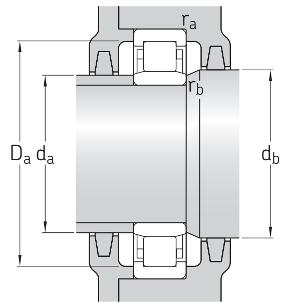
Dimensions						Abutment and fillet dimensions				Calculation factors	
d	d_1 ≈	d_2 ≈	D_1 ≈	D_2 ≈	$r_{1,2}$ min.	d_a min.	d_a max.	D_a max.	r_a max.	k_r	f_0
mm						mm				–	
70	87	–	–	111	1,5	79	87	116	1,5	0,025	15
	87	–	–	111	1,5	79	–	116	1,5	0,025	15
	94,9	–	–	130	2,1	82	–	138	2	0,025	13
75	92	–	–	117	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

d **40 – 100** mm



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	–
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**

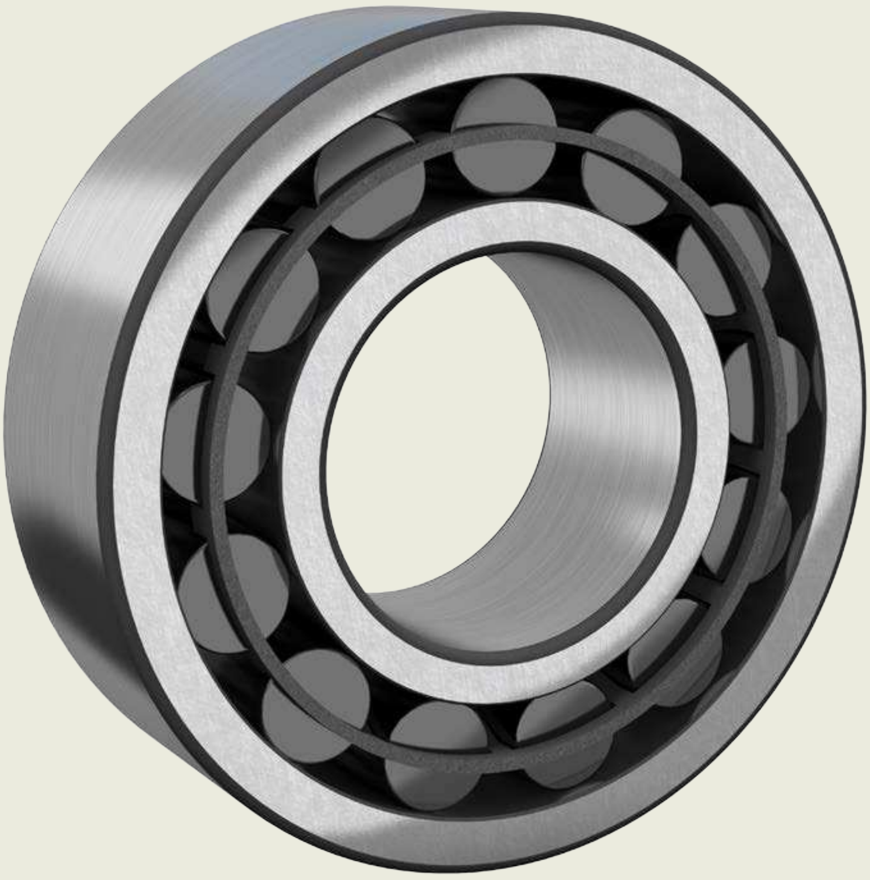
▸ Popular item



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

22 NoWear coated bearings

More information

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.

Fig. 1

NoWear coated bearing

L5DA

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

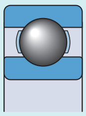
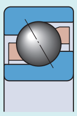
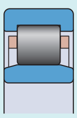
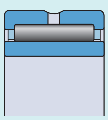
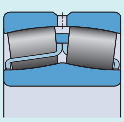
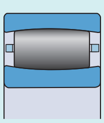
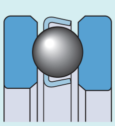
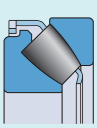
NoWear coated bearings may provide new possibilities for existing applications operating under severe conditions. They can provide new design possibilities while requiring no major design changes. Typical applications where NoWear coated bearings are used include:

- 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.

Table 1

NoWear coated bearings – standard assortment

Bearing type Symbol	Range	**Available variants**	
	**Deep groove ball bearings** d = 15 to 140 mm	L5DA	L7DA
	**Angular contact ball bearings** d = 15 to 140 mm	L5DA	L7DA
	**Cylindrical roller bearings** d = 15 to 220 mm	L5DA	L7DA
	d > 220 mm	L5DA	–
	**Needle roller bearings** d = 15 to 220 mm	L5DA	L7DA
	d > 220 mm	L5DA	–
	**Spherical roller bearings** d = 15 to 220 mm	L5DA	L7DA
	d > 220 mm	L5DA	–
	**CARB toroidal roller bearings** d = 15 to 220 mm	L5DA	L7DA
	d > 220 mm	L5DA	–
	**Thrust ball bearings** d = 15 to 110 mm	L5DA	–
	**Spherical roller thrust bearings** 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

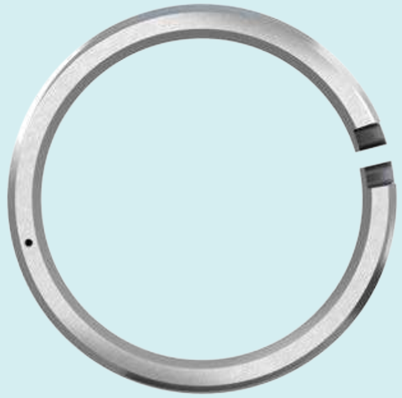
Refer to *Designation system* in the relevant product section of the standard bearing.

The designation suffixes used to identify NoWear coated bearings are:

L5DA Coated rolling elements
L7DA Coated rolling elements and inner ring raceway(s)

22

23 Adapter sleeves



23 Adapter sleeves

23

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**):

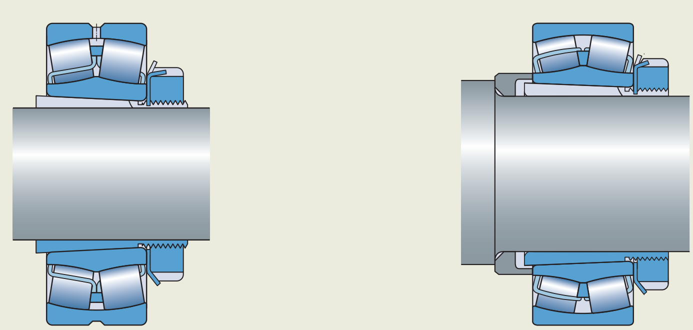
- plain shafts
- stepped shafts

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:

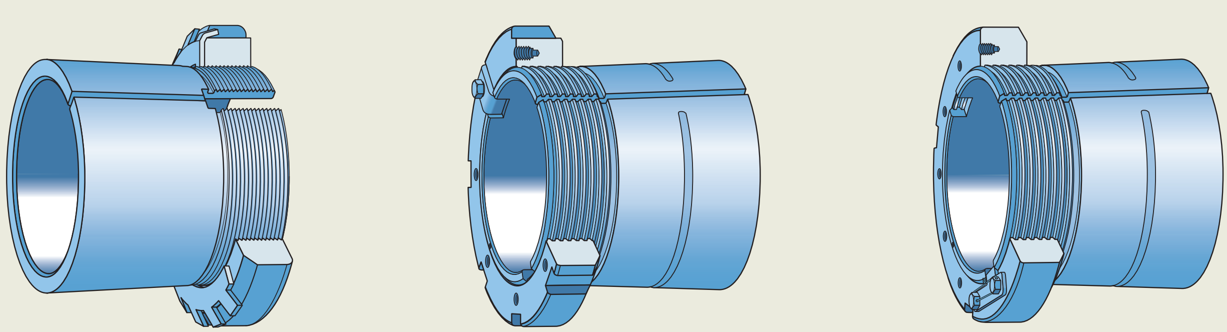
- with a bore diameter ≤ 180 mm (size ≤ 40) are phosphated
- with a bore diameter > 180 mm are coated with a solventless rust inhibitor

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

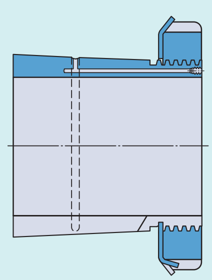
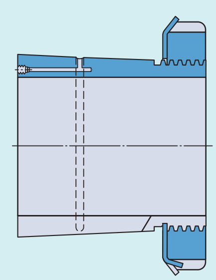
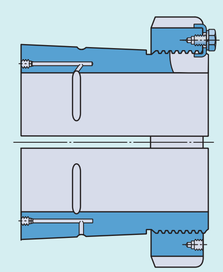
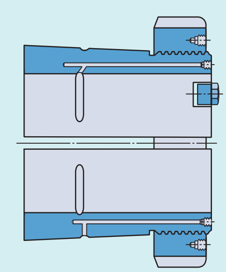
- enable use of the oil injection method to mount and dismount bearings
- are equipped with the necessary oil supply ducts and distribution grooves
  - as standard for metric sleeves with a bore diameter ≥ 200 mm (size ≥ 44)
  - on request for metric sleeves with a bore diameter ≥ 140 mm to < 200 mm
  - 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

	 OH .. H OSNW .. H OSNP .. H	 OH .. OSNW .. OSNP ..	 OH .. B OSNW .. B OSNP .. B	 OH .. HB OSNW .. HB 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)

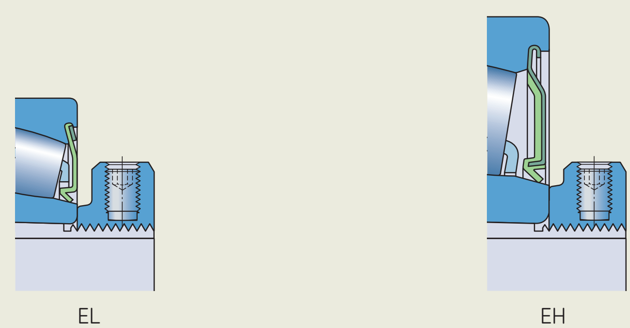
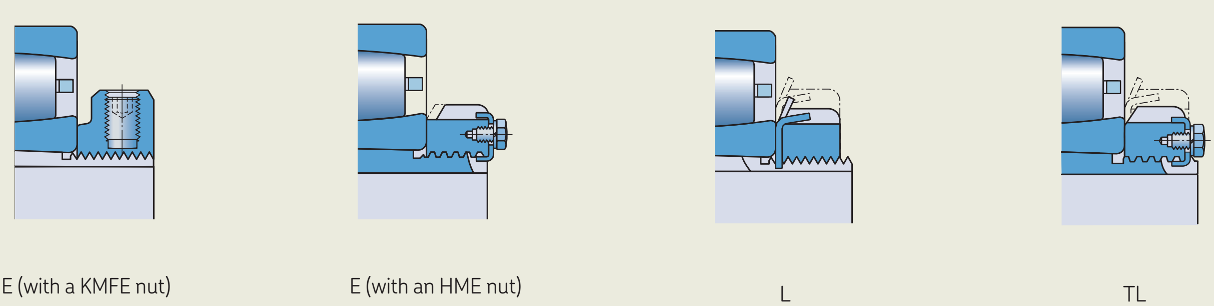


Fig. 3

Adapter sleeve assemblies for CARB toroidal roller bearings



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 Width: h15	
External taper	1:12 as standard 1:30 as standard in the 40 and 41 dimension series	
Thread	**Bore diameter < 200 mm (size ≤ 40):** metric thread in accordance with ISO 965-3, matching the included SKF lock nut **Bore diameter ≥ 200 mm (size ≥ 44):** metric trapezoidal thread in accordance with ISO 2903, matching the included SKF lock nut	**Bore diameter ≤ 12 in. (size ≤ 64):** Unified Special Form ANSI/ASME B1.1 **Bore diameter ≥ 12 7/16 in. (size ≥ 68):** ACME thread class 3G
Shaft tolerances	h9Ⓔ Total radial run-out: IT5/2 – ISO 1101 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

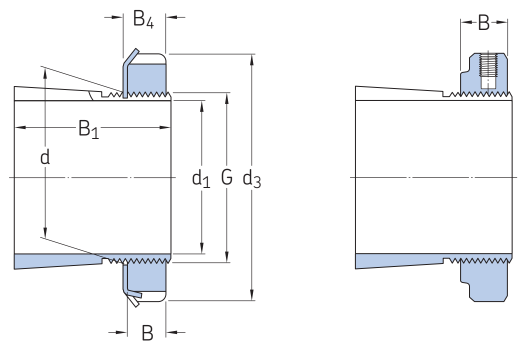
Listed in the **product tables**, **page 1072**

Suffixes

B	For adapter sleeves for oil injection: One or two oil supply ducts at the end opposite the threaded section 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

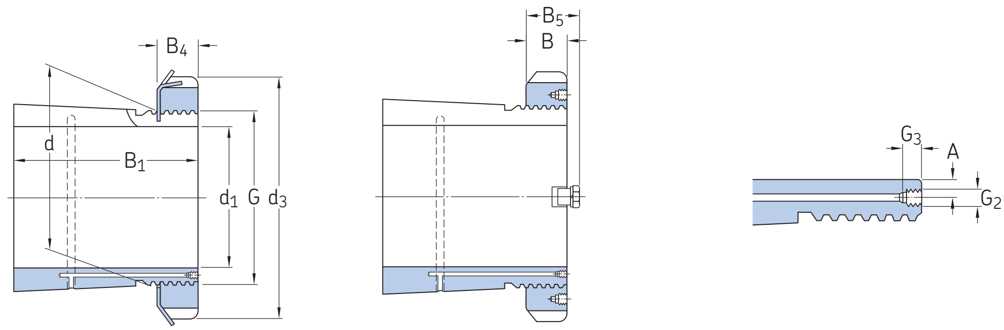
▸ Popular item

Principal dimensions											Mass	Designations			
												Adapter sleeve assembly	Included products 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	–			
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



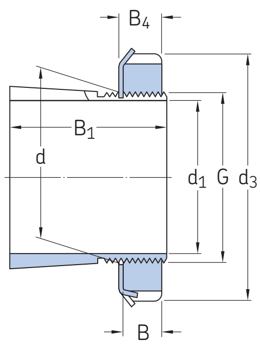
Principal dimensions											Mass	Designations			
												Adapter sleeve assembly	Included products lock nut	locking device	Associated hydraulic nut
d_1	d	d_3	B_1	B	B_4	B_5	G	G_2	G_3	A					
mm											kg	–			
200	220	260	126	30	–	41	Tr 220x4	M 6	9	6,5	9,9	▸ **OH 3044 H**	HM 3044	MS 3044	HMV 44E
	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 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	–			
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		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	–			
3/4 *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 *23,813*	30	1,755	1,343	0,416	0,456	–	1,173	18	0,14	▸ **SNW 6x15/16**	N 06	W 06	–
1 *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 *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 *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 *31,75*	35 40	2,068 2,255	1,449 1,494	0,448 0,448	0,488 0,496	– –	1,376 0,496	18 18	0,16 0,19	**SNW 7x1.1/4** ▸ **SNW 8x1.1/4**	N 07 N 08	W 07 W 08	– –
1 5/16 *33,338*	40 45	2,255 2,536	1,494 1,574	0,448 0,448	0,496 0,496	– –	1,563 1,767	18 18	0,19 0,28	**SNW 8x1.5/16** ▸ **SNW 9x1.5/16**	N 08 N 09	W 08 W 09	– –
1 3/8 *34,925*	40 45	2,255 2,536	1,494 1,574	0,448 0,448	0,496 0,496	– –	1,563 1,767	18 18	0,19 0,28	▸ **SNW 8x1.3/8** ▸ **SNW 9x1.3/8**	N 08 N 09	W 08 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 *36,513*	45 45	2,536 2,536	1,574 1,574	0,448 0,448	0,496 0,496	– –	1,767 1,767	18 18	0,28 0,32	▸ **SNW 9x1.7/16** ▸ **SNW 109x1.7/16**	N 09 N 09	W 09 W 09	– –
1 1/2 *38,1*	45 45 50	2,536 2,536 2,536	1,574 2,123 1,755	0,448 0,448 0,448	0,496 0,496 0,558	– – –	1,767 1,767 1,967	18 18 18	0,28 0,32 0,33	**SNW 9x1.1/2** ▸ **SNW 109x1.1/2** **SNW 10x1.1/2**	N 09 N 09 N 09	W 09 W 09 W 10	– – HMVC 10E
1 5/8 *41,275*	50 55	2,693 2,693	1,755 2,384	0,51 0,51	0,558 0,558	– –	1,967 1,967	18 18	0,33 0,39	▸ **SNW 10x1.5/8** **SNW 110x1.5/8**	N 10 N 10	W 10 W 10	HMVC 10E HMVC 10E
1 11/16 *42,863*	50 50	2,693 2,693	1,755 2,384	0,51 0,51	0,558 0,558	– –	1,967 1,967	18 18	0,33 0,39	▸ **SNW 10x1.11/16** ▸ **SNW 110x1.11/16**	N 10 N 10	W 10 W 10	HMVC 10E HMVC 10E
1 3/4 *44,45*	50 55 55	2,693 2,693 2,974	1,755 2,384 1,835	0,51 0,51 0,51	0,558 0,558 0,563	– – –	1,967 1,967 2,157	18 18 18	0,33 0,39 0,36	**SNW 10x1.3/4** ▸ **SNW 110x1.3/4** ▸ **SNW 11x1.3/4**	N 10 N 10 N 11	W 10 W 10 W 11	HMVC 10E HMVC 10E HMVC 11E
1 13/16 *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

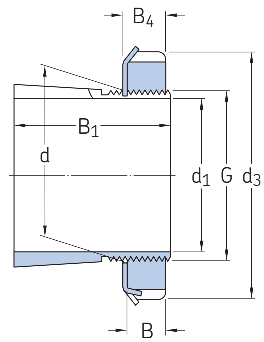
▸ Popular item

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		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	–			
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

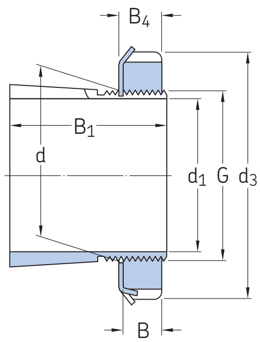
Principal dimensions							Thread		Mass	Designations			
								Threads per inch		Adapter sleeve assembly	Included products		Associated hydraulic nut
d_1	d	d_3 max.	B_1	B	B_4	B_5	G				lock nut	locking device	
in./*mm*	mm	in.					in.	–	kg	–			
4 3/16	120	5,693	2,937	0,823	0,938	–	4,716	12	2,8	▸ **SNW 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		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	–			
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

SKF

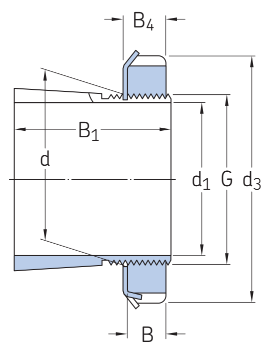
Principal dimensions							Thread		Mass	Designations			
								Threads per inch		Adapter sleeve assembly	Included products		Associated hydraulic nut
d_1	d	d_3 max.	B_1	B	B_4	B_5	G				lock nut	locking device	
in./*mm*	mm	in.					in.	–	kg	–			
6 3/8	180	8,255	4,327	1,104	1,219	–	7,066	8	6,8	**SNW 3036x6.3/8**	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

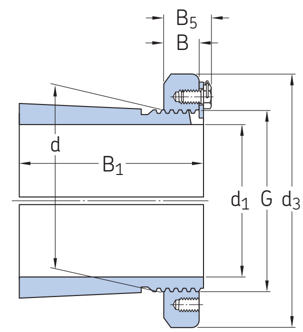
23.2 Adapter sleeves with inch dimensions

d_1 **7 7/8 – 16 1/2** in.

200,025 – 419,1 mm



SNW



SNP

Principal dimensions							**Thread**		**Mass**	**Designations**			
d_1	d	d_3 max.	B_1	B	B_4	B_5	G	Threads per inch		Adapter sleeve assembly	Included products lock nut	locking device	Associated hydraulic nut
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

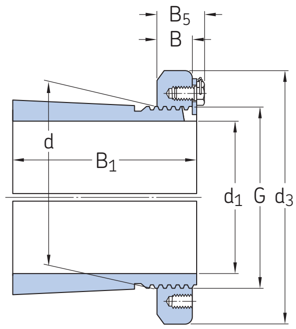
▸ Popular item

Principal dimensions							Thread		Mass	Designations			
								Threads per inch		Adapter sleeve assembly	Included products		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	–			
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

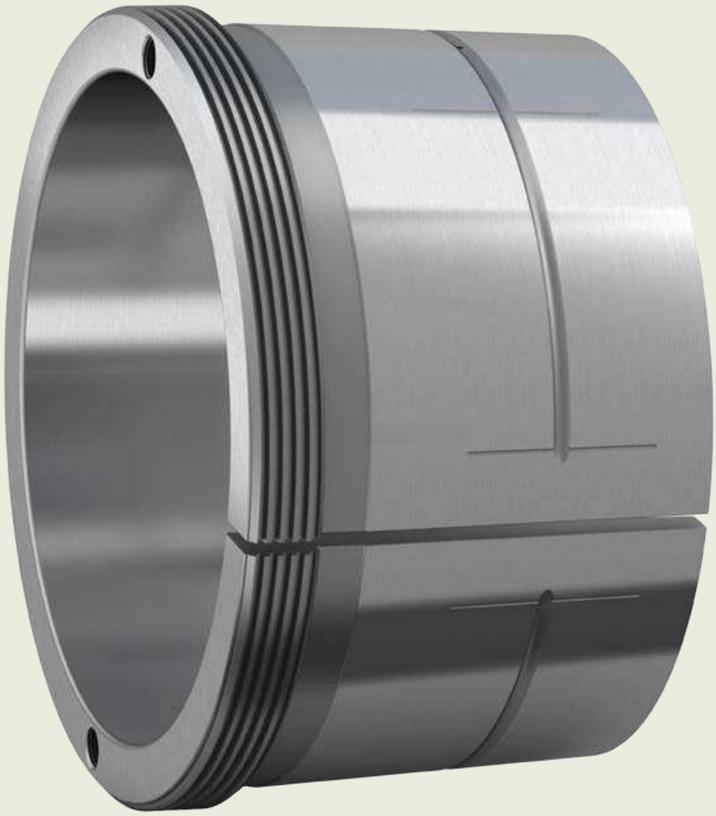
23.2 Adapter sleeves with inch dimensions

d_1 **17 – 19 1/2** in.
431,8 – 495,3 mm

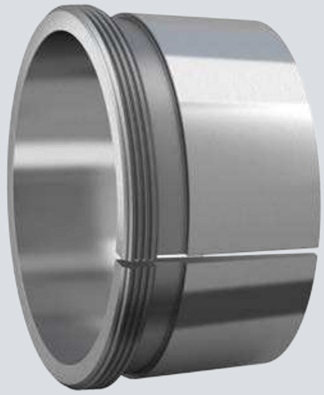


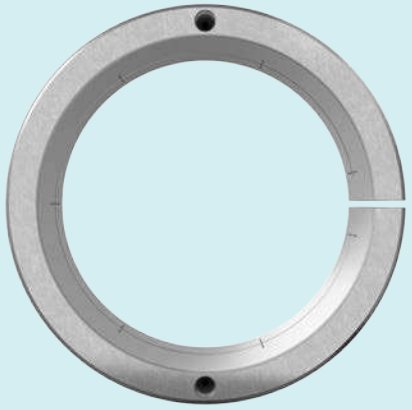
Principal dimensions							Thread		Mass	Designations			
								Threads per inch		Adapter sleeve assembly	Included products lock nut	locking device	Associated hydraulic nut
d_1	d	d_3 max.	B_1	B	B_4	B_5	G						
in./*mm*	mm	in.					in.	–	kg	–			
17	460	21,255	9,336	2,385	–	2,906	18,071	5	71,5	▸ **SNP 3092x17**	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	500	22,818	9,838	2,703	–	3,25	19,646	5	91	▸ **SNP 30/500x18.1/2**	N 500	PL 500	HMVC 100E
469,9													
19 1/2	530	24,818	10,579	2,703	–	3,25	20,827	4	120	▸ **SNP 30/530x19.1/2**	N 530	PL 530	HMVC 106E
495,3													

▸ 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

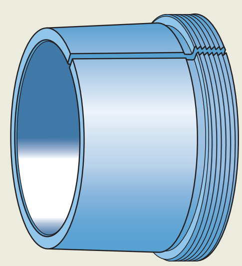


Fig. 2

Withdrawal sleeve on a stepped shaft

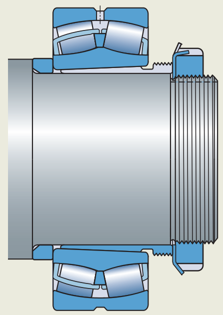
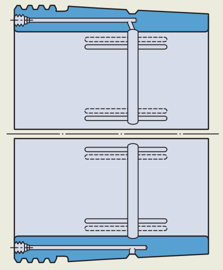


Fig. 3

Withdrawal sleeve for oil injection



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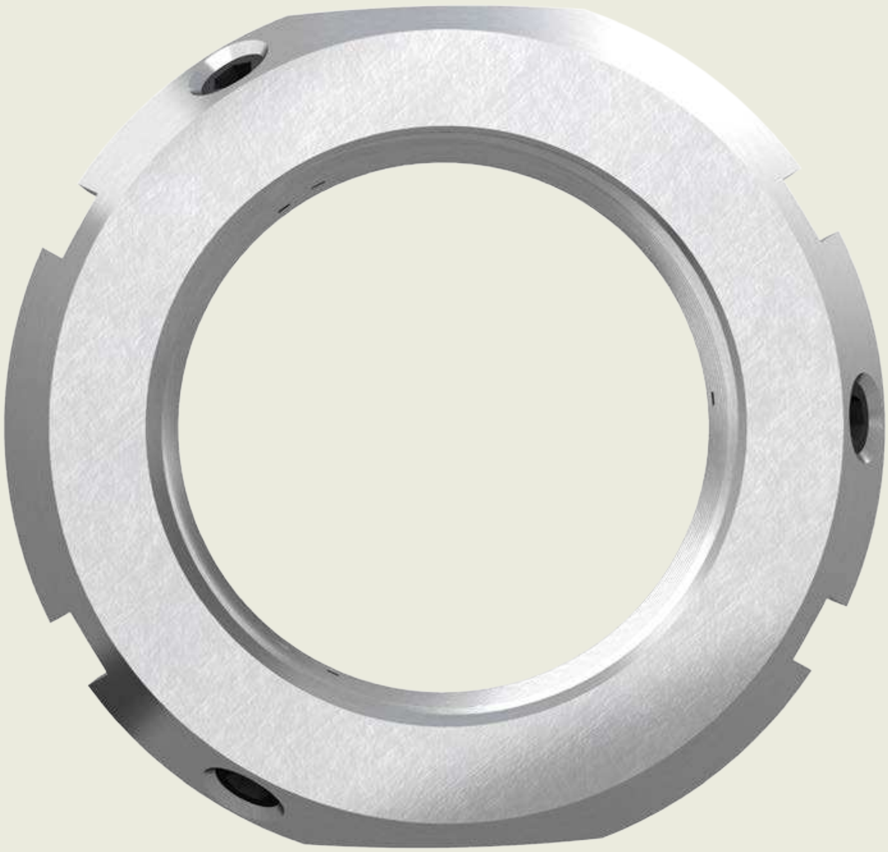
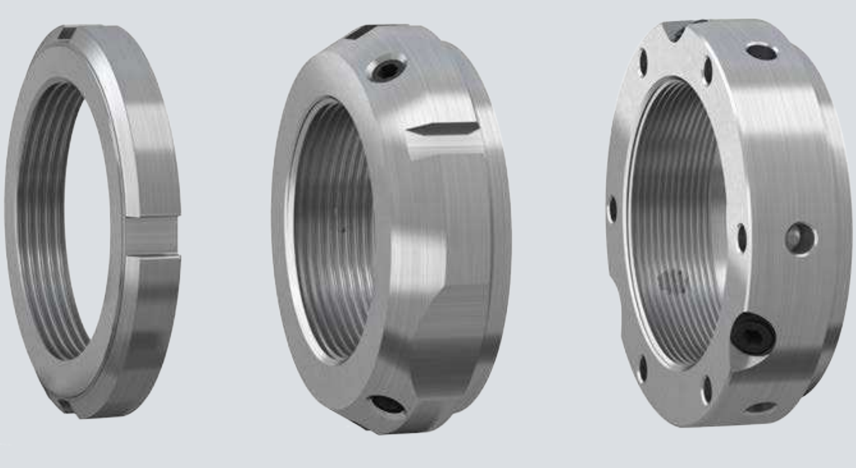
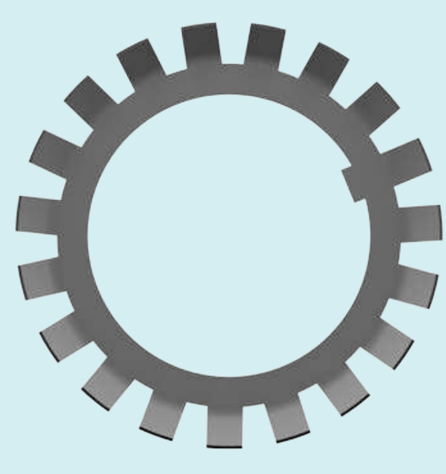


25 Lock nuts





25 Lock nuts

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.

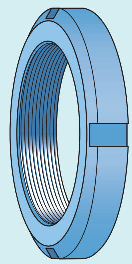
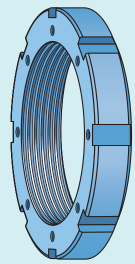
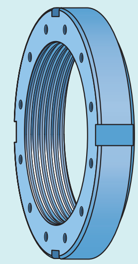
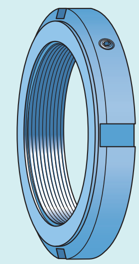
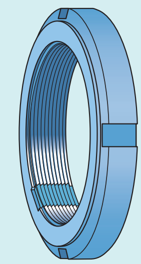
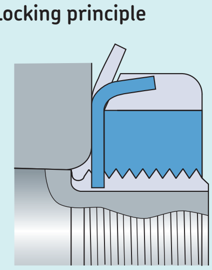
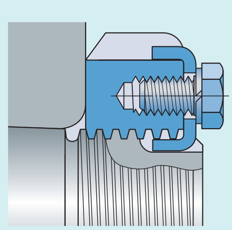
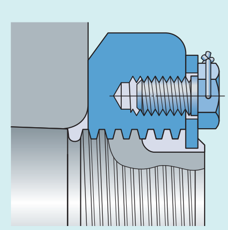
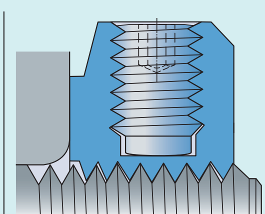
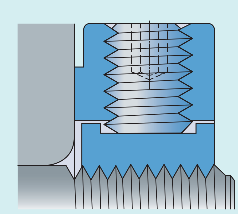
The following tables provide an overview over the basic SKF assortment:

- **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

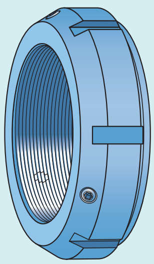
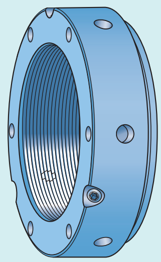
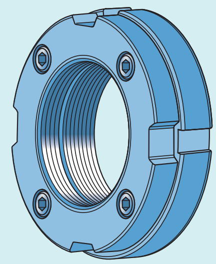
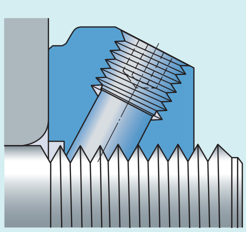
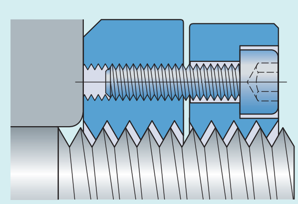
SKF industrial lock nuts

				
KM, KML, HM .. T, AN and N Lock nuts with a lock washer	**HM and HME** Lock nuts with a locking clip	**N** Lock nuts with a locking plate	**KMFE** Lock nuts with an integral locking screw	**KMK** Lock nuts with an integral locking device
KM and KML: thread 10 to 200 mm (sizes 0 to 40) **HM .. T:** thread 210 to 280 mm (sizes 42 to 56) **AN and N:** thread 0.391 to 8.628 in. (sizes: N 00 to N 14, AN 15 to AN 40 and N 022 to N 044) 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 (sizes 44 to /1120) 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. (sizes 056 to 950) 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 (sizes 4 to 40)	thread 10 to 100 mm (sizes 0 to 20) 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

25

Table 2

SKF precision lock nuts

		
KMT Precision lock nuts with locking pins	**KMTA**	**KMD** Precision lock nuts with axial locking screws
thread 10 to 200 mm (sizes 0 to 40) Larger sizes on request	thread 25 to 200 mm (sizes 5 to 40)	thread 20 to 105 mm (sizes 4 to21) 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

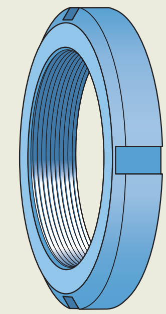


Fig. 2

KM, KML, HM .. T, AN and N (size ≤ 44) lock nut

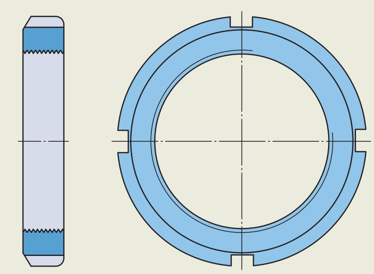


Fig. 3

MB or W lock washer

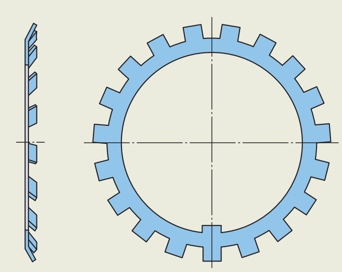
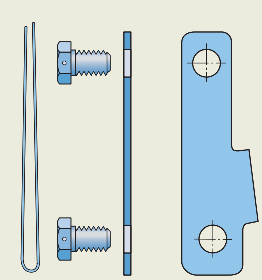


Fig. 4

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

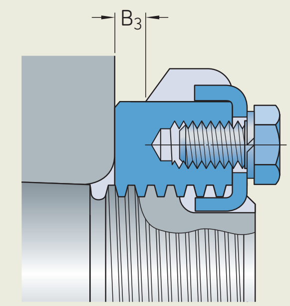


Fig. 5

HM and HME lock nut

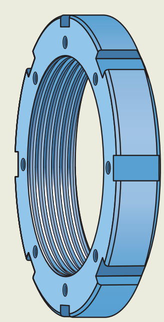


Fig. 9

Locking with a washer

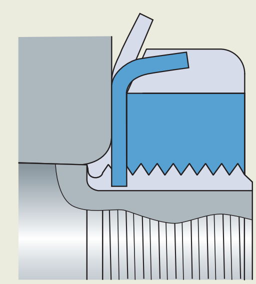


Fig. 6

HM and HME lock nut

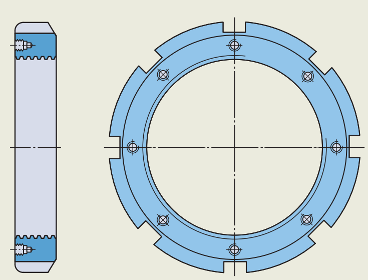


Fig. 10

Locking with a plate

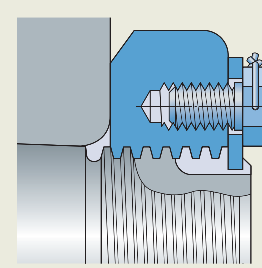


Fig. 7

MS locking clip

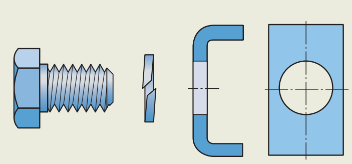
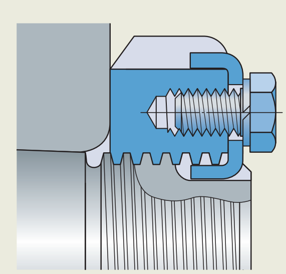


Fig. 11

Locking with a clip



SKF

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

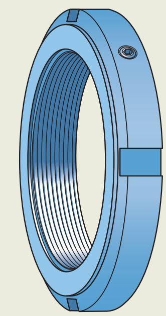


Fig. 13

KMK lock nut

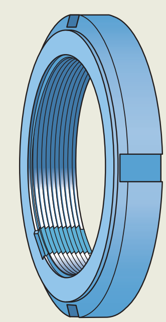


Fig. 14

Locking with a locking screw – KMFE

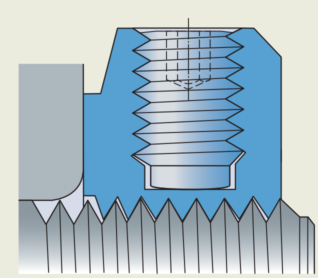
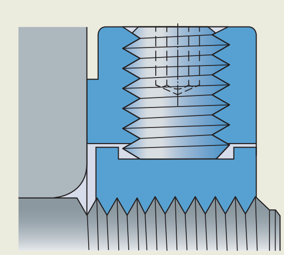


Fig. 15

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

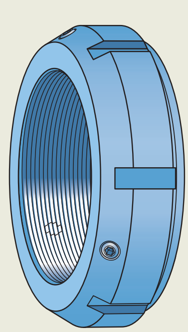


Fig. 17

KMTA precision lock nut

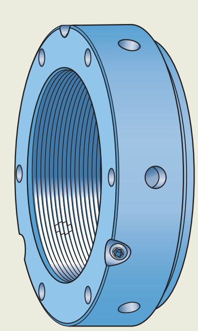
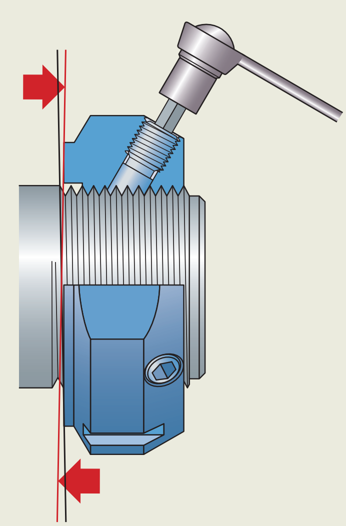


Fig. 18

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

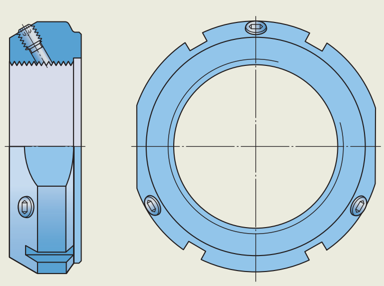


Fig. 20

KMT lock nut with six slots and no flats

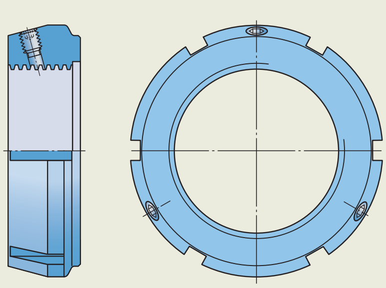


Fig. 21

KMTA lock nuts with holes around their circumference and in one side face

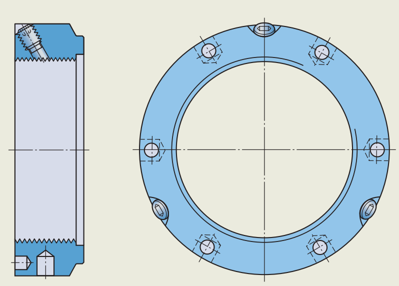


Fig. 22

Locking with locking pins

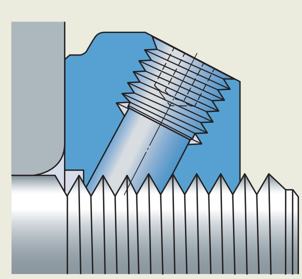


Fig. 23

KMD precision lock nut

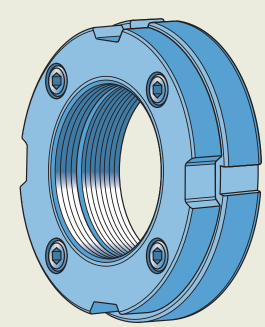
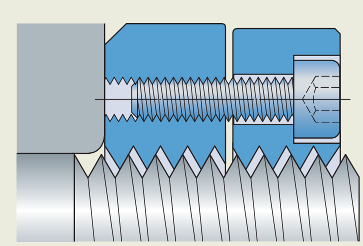


Fig. 24

Locking with axial locking screws



Product data

	Lock nuts requiring a keyway KM, KML, HM .. T, HM and HME	Lock nuts with integral locking 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 Grub screws: • KMFE → ISO 4028, material class 45H • KMK → ISO 4026, material class 45H
Tolerances	**KM and KML** Metric thread, 5H: ISO 965-3 Maximum axial run-out locating face/thread: 0,02 to 0,06 mm, depending on the lock nut size Mounting slots according to DIN 981 **HM, HME and HM .. T** Metric trapezoidal thread, 7H: ISO 2903 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** Metric thread, 6g: ISO 965-3 **HM, HME and HM .. T** 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. KMFE and KMK lock nuts provide sufficient locking for intended bearing applications.

Precision lock nuts with locking pins KMT and KMTA
Metric thread: ISO 965-3
Metric thread, 5H: ISO 965-3 Maximum axial run-out locating face/thread (sizes ≤ 40): 0,005 mm
Metric thread, 6g: ISO 965-3 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. 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

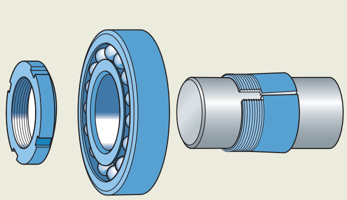


Fig. 26

Tighten the nut with a hook or impact spanner

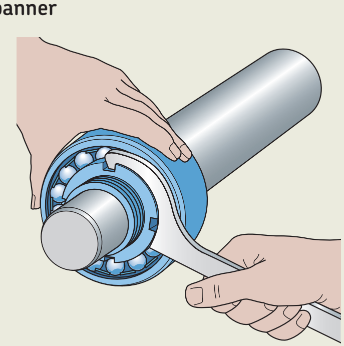
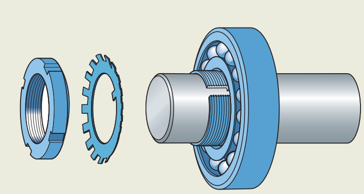


Fig. 27

Slide the lock washer onto the the thread and screw the lock nut into place



25

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

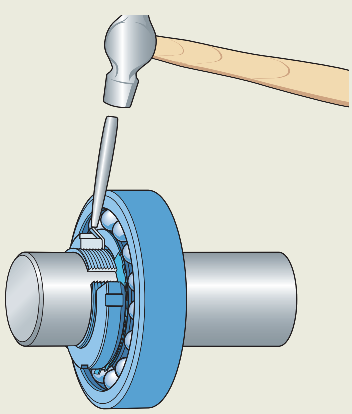


Fig. 29

Tighten the nut against the bearing or component with an impact spanner

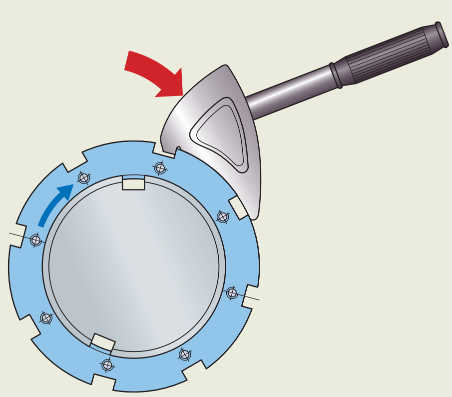
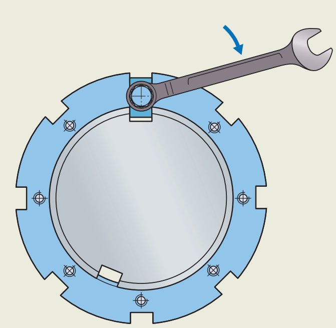


Fig. 30

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

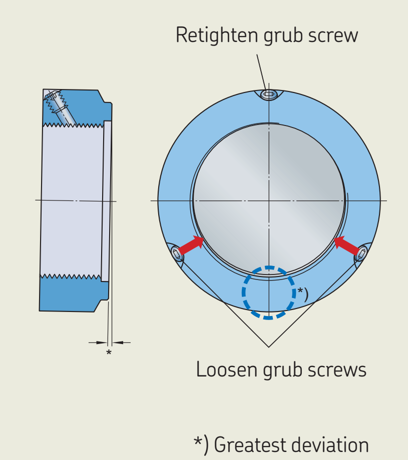
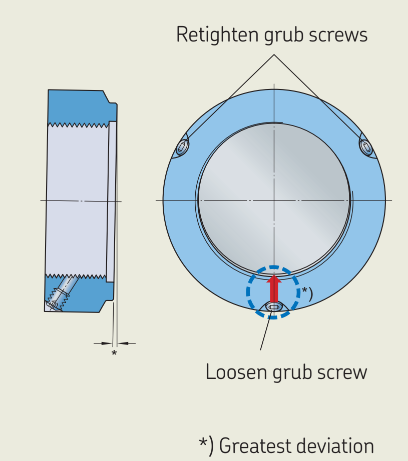


Fig. 32

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 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 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

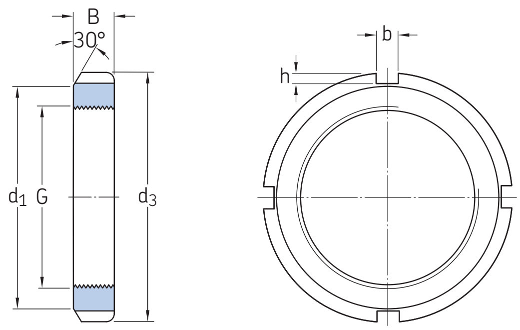
0	0.391 in. thread diameter
1	0.469 in. thread diameter
2	0.586 in. thread diameter
3	0.664 in. thread diameter
4	0.781 in. thread diameter
to	to
96	18.894 in. thread diameter
500	19.682 in. thread diameter
to	to
950	37.410 in. thread diameter

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



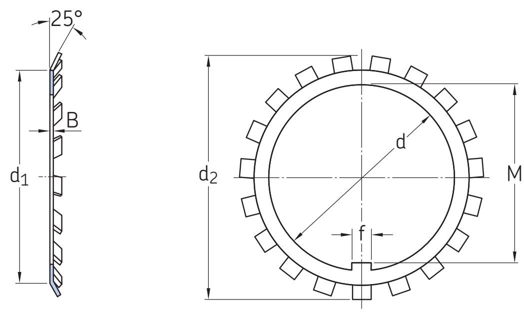
Dimensions						Axial load carrying capacity	Mass	Designations		
G	d_1	d_3	B	b	h	static		Lock nut	Associated lock washer	spanner
mm						kN	kg	–		
M 10x0,75	13,5	18	4	3	2	9,8	0,004	▸ **KM 0**	MB 0	HN 0
M 12x1	17	22	4	3	2	11,8	0,006	▸ **KM 1**	MB 1	HN 1
M 15x1	21	25	5	4	2	14,6	0,009	▸ **KM 2**	MB 2	HN 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 static	Mass	Designations Lock nut	Associated lock washer	spanner
G	d_1	d_3	B	b	h					
mm						kN	kg	–		
M 115x2	137	150	19	12	5	315	0,91	▸ **KM 23**	MB 23	TMFN 23-30
M 120x2	135 138	145 155	20 20	12 12	5 5	265 340	0,69 0,97	▸ **KML 24** ▸ **KM 24**	MBL 24 MB 24	HN 21-22 TMFN 23-30
M 125x2	148	160	21	12	5	360	1,1	▸ **KM 25**	MB 25	TMFN 23-30
M 130x2	145 149	155 165	21 21	12 12	5 5	285 365	0,8 1,1	▸ **KML 26** ▸ **KM 26**	MBL 26 MB 26	TMFN 23-30 TMFN 23-30
M 135x2	160	175	22	14	6	430	1,4	▸ **KM 27**	MB 27	TMFN 23-30
M 140x2	155 160	165 180	22 22	12 14	5 6	305 430	0,92 1,4	▸ **KML 28** ▸ **KM 28**	MBL 28 MB 28	TMFN 23-30 TMFN 23-30
M 145x2	171	190	24	14	6	520	1,8	▸ **KM 29**	MB 29	TMFN 23-30
M 150x2	170 171	180 195	24 24	14 14	5 6	390 530	1,25 1,9	▸ **KML 30** ▸ **KM 30**	MBL 30 MB 30	TMFN 23-30 TMFN 23-30
M 155x3	182	200	25	16	7	540	2,1	▸ **KM 31**	MB 31	TMFN 30-40
M 160x3	180 182	190 210	25 25	14 16	5 7	405 585	1,4 2,3	▸ **KML 32** ▸ **KM 32**	MBL 32 MB 32	TMFN 23-30 TMFN 30-40
M 165x3	193	210	26	16	7	570	2,3	▸ **KM 33**	MB 33	TMFN 30-40
M 170x3	190 193	200 220	26 26	16 16	5 7	430 620	1,55 2,35	▸ **KML 34** ▸ **KM 34**	MBL 34 MB 34	TMFN 30-40 TMFN 30-40
M 180x3	200 203	210 230	27 27	16 18	5 8	450 670	1,8 2,8	▸ **KML 36** ▸ **KM 36**	MBL 36 MB 36	TMFN 30-40 TMFN 30-40
M 190x3	210 214	220 240	28 28	16 18	5 8	475 695	1,85 3,05	▸ **KML 38** ▸ **KM 38**	MBL 38 MB 38	TMFN 30-40 TMFN 30-40
M 200x3	222 226	240 250	29 29	18 18	8 8	625 735	2,6 3,35	▸ **KML 40** ▸ **KM 40**	MBL 40 MB 40	TMFN 30-40 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.

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

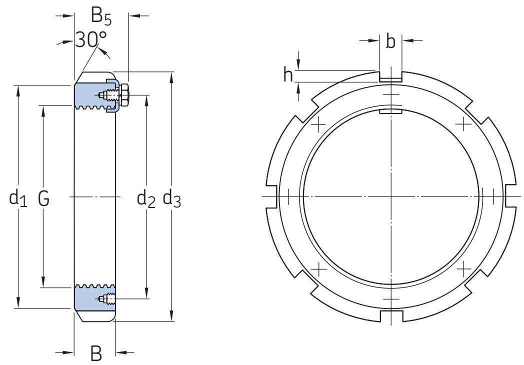
▸ Popular item

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



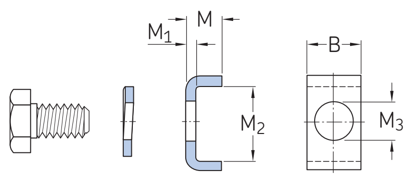
Dimensions								Mass	Designations Lock nut	Associated locking clip	spanner	eye bolt
G	d_1	d_2	d_3	B	B_5	b	h					
mm								kg	–			
Tr 280x4	310	293	330	38	50	24	10	5,75	▸ **HM 3056**	MS 3056	TMFN 52-64	–
Tr 300x4	336	316	360	42	54	24	12	8,35	▸ **HM 3060**	MS 3060	TMFN 52-64	–
	340	326	380	40	53	24	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

MS 3044 – MS 31/1000



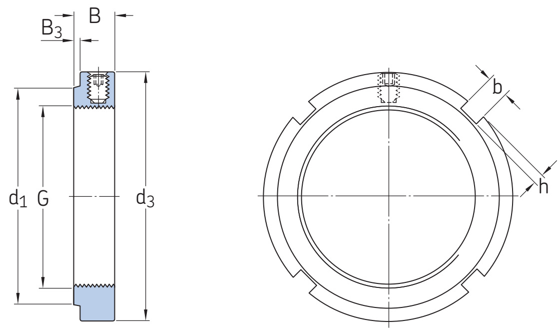
Designations Locking clip	Included hexagonal head bolt	spring washer in accordance with DIN 128	Dimensions B	M	M_1	M_2	M_3	Mass
–			mm					kg
▸ MS 3044	M 6x12	A 6	20	12	4	13,5	7	0,022
▸ MS 3052-48	M 8x16	A 8	20	12	4	17,5	9	0,024
▸ MS 3056	M 8x16	A 8	24	12	4	17,5	9	0,03
▸ MS 3060	M 8x16	A 8	24	12	4	20,5	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 Locking clip	Included hexagonal head bolt	spring washer in accordance with DIN 128	**Dimensions** 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

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

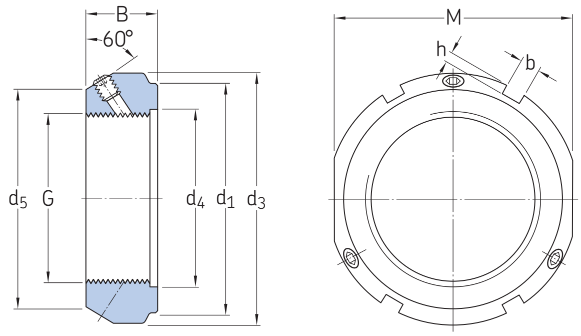
▸ Popular item

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 static	Mass	Designations Lock nut	Associated spanner	Grub (set) screw Size	Recommended tightening torque
G	d_1	d_3	d_4	d_5	B	M	b	h						
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

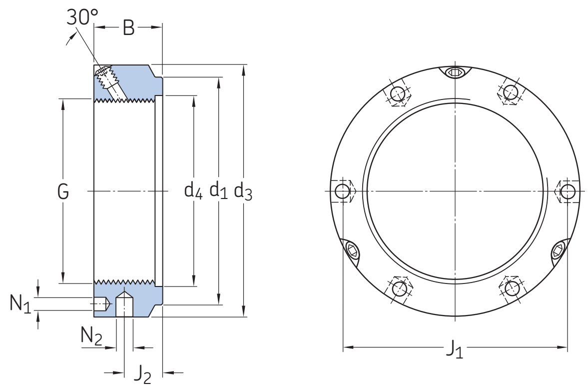
▸ Popular item

Dimensions									**Axial load carrying capacity** static	**Mass**	**Designations** Lock nut	Associated spanner	**Grub (set) screw** Size	Recommended tightening torque
G	d_1	d_3	d_4	d_5	B	M	b	h						
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	
G	d_1	d_3	d_4	B	J_1	J_2	N_1	N_2	static		Lock nut	Associated spanner	Size	Recommended tightening torque
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 static	Mass	Designations Lock nut	Associated spanner	Grub (set) screw Size	Recommended tightening torque
G	d_1	d_3	d_4	B	J_1	J_2	N_1	N_2						
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

A

Designation prefixes and suffixes are shown in **bold**.

B

C

Designation prefixes and suffixes are shown in **bold**.

Designation prefixes and suffixes are shown in **bold**.

D

Designation prefixes and suffixes are shown in **bold**.

E

F

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G

H

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L

M

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N

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O

P

Q

R

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S

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T

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SKF

U

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Text index

Designation prefixes and suffixes are shown in **bold**.

X

Y

Z

Designation prefixes and suffixes are shown in **bold**.

Designation prefixes and suffixes are shown in **bold**.

Product index

* Starting page of the product table.

SKF

* Starting page of the product table.

* Starting page of the product table.

* Starting page of the product table.

* Starting page of the product table.

* Starting page of the product table.

* Starting page of the product table.

* 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

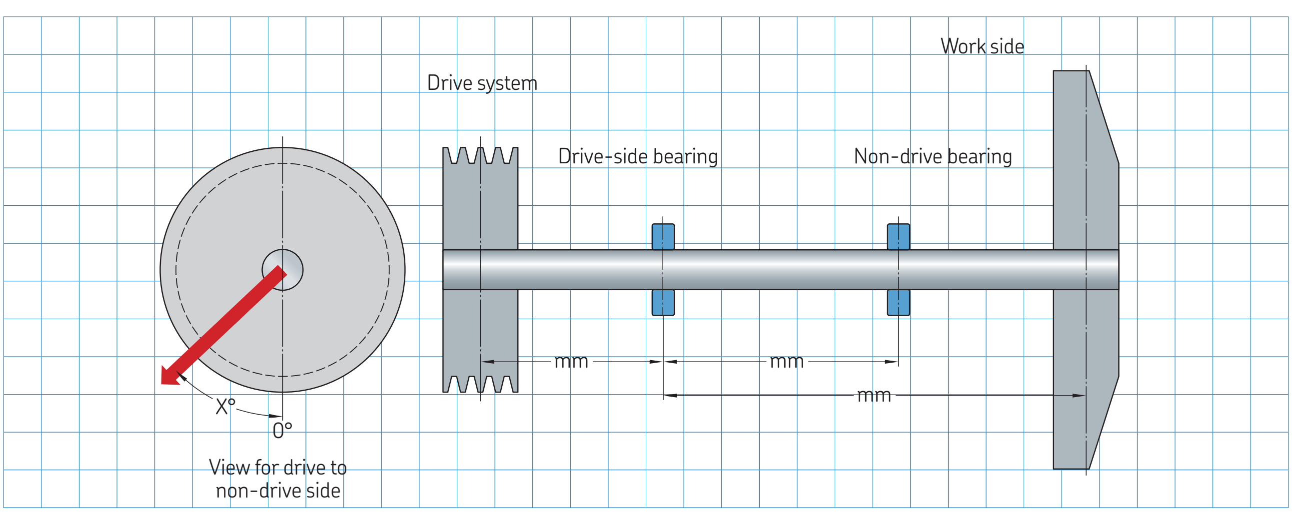
○ Other

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:

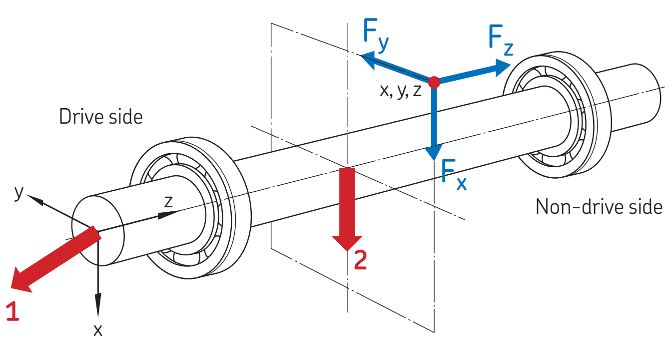
Radial load kN

Axial load kN

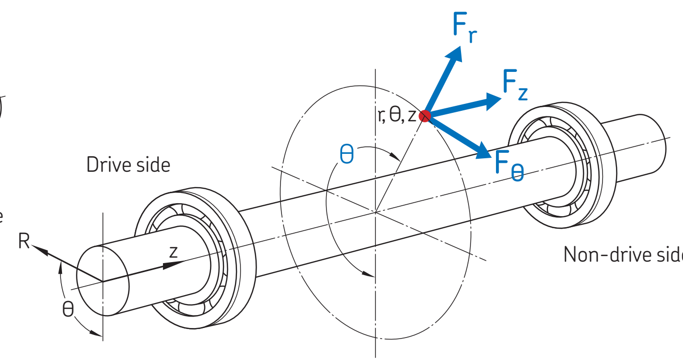
For a shaft and bearings:

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 αn ______ °

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

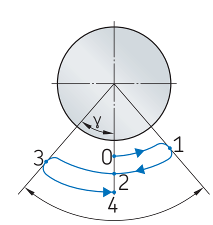
Rotation ○ clockwise ○ counter-clockwise

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

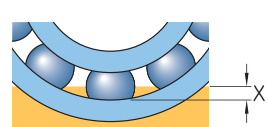
☐ Oil lubrication

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	