

SKF spherical roller bearings – profit from our leadership



**Now with the new
EXPLORER bearings!**

Made by SKF® stands for excellence. It symbolises our consistent endeavour to achieve total quality in everything we do. For those who use our products. “Made by SKF” implies three main benefits.

Reliability – thanks to modern, efficient products, based on our worldwide application know-how, optimised materials, forward-looking designs and the most advanced production techniques.

Cost effectiveness – resulting from the favourable ratio between our product quality plus service facilities, and the purchase price of the product.

Market lead – which you can achieve by taking advantage of our products and services. Increased operating time and reduced down-time, as well as improved output and product quality are the key to a successful partnership.



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Cost saving and reliable

Why spherical roller bearings?

Spherical roller bearings are favoured because of their attractive combination of features

- **Self-alignment**

Misalignment between shaft and housing can be accommodated without increase of friction and without reduction of bearing life.

- **Very high load carrying capacity**

Optimum use of available cross-section provides maximum radial and axial load carrying capacity.

- **Robust**

Insensitive to errors of alignment of shafts or housings.

- **Easily fitted for loads in all directions**

The bearings are non-separable. This facilitates mounting and dismounting.

These benefits make SKF spherical roller bearings the very foundation of trouble-free operation. The natural choice in your quest for total quality!

Why SKF spherical roller bearings?

Total quality is a prerequisite in modern industry. The SKF philosophy has always been to satisfy customer needs and total quality is a natural part of SKF bearing design. This means that SKF today has the most comprehensive range of spherical roller bearings in terms of

- **low life-cycle cost**
- **long and now even longer service life**
- **high reliability**
- **minimised maintenance**
- **downsizing opportunities**



Unrivalled range

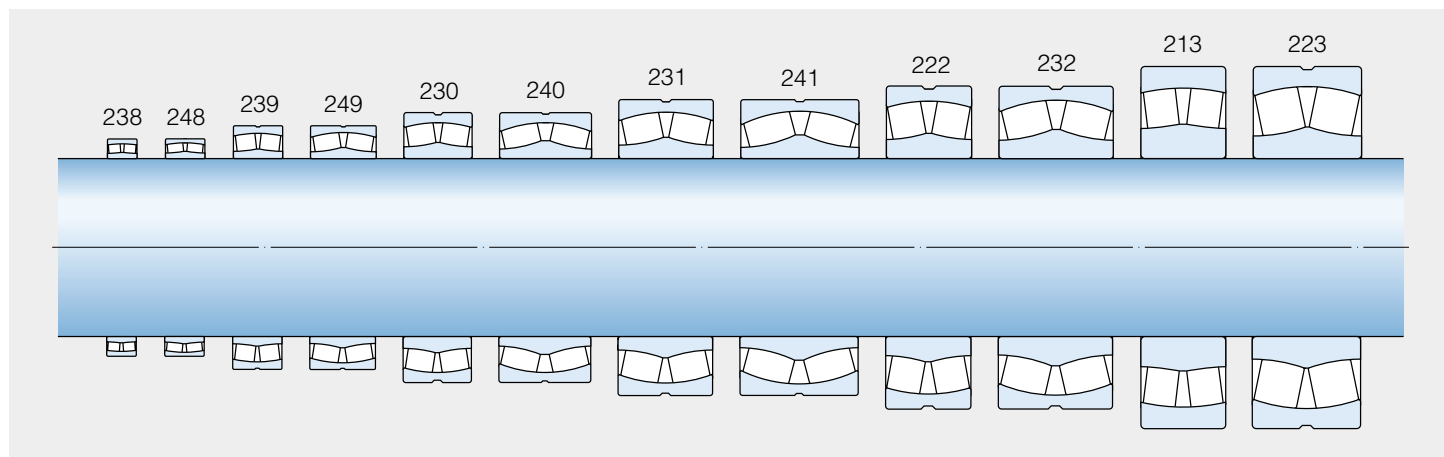
The range of SKF spherical roller bearings covers all series currently in demand, in sizes from 20 to 1 800 mm bore diameter. Taking availability into account, this constitutes the most complete range in the market.

All bearings are available with cylindrical and tapered bore to suit all types of mounting method. To facilitate efficient lubrication the bearings are also provided with an annular groove and three lubrication holes in the outer ring.

Bearings are available in a wide range of series designed to satisfy the following selection criteria:

- **load carrying capacity**
- **combination of radial and axial loads**
- **rotational speed**
- **space in the application**

In addition to a standard range of sealed spherical roller bearings, SKF also supplies different special purpose bearings, e.g. bearings for vibrating screens, bearings for rolling mills or railway axlebox bearings.



Bearing series

General rule

Narrow low-section bearings have favourable speed, space and weight characteristics. Wide high-section bearings have high load carrying capacity.



Smallest bearing

*Bore diameter 20 mm
Outside diameter 52 mm
Mass 0,16 kg*

Largest bearing

*Bore diameter 1 800 mm
Outside diameter 2 180 mm
Mass 2 900 kg*



Product range

- ✓ Unchallenged
- ✓ Local availability
- ✓ Reliable delivery
- ✓ Global presence

SKF standard bearings – better by design

The spherical roller bearing was invented by SKF in 1919 and we have been the worldwide technological leader ever since. The best proof of the total quality of our spherical roller bearings is their dominating position in the market – our sales are twice as large as those of our closest competitor.

Unique combination

All SKF spherical roller bearings have features in common which are unique in the market:

- floating guide ring
- symmetrical rollers
- self-guiding rollers – an SKF patent
- special roller profile
- metallic cages
- tough and dimensionally stable components

Standard SKF spherical roller bearings are basically made to three different designs, depending on size and series. To facilitate efficient bearing lubrication SKF standard spherical roller bearings are provided with an annular groove and three lubrication holes in the outer ring.

... and in spite of all this – improvements are still possible

SKF material specialists have made the bearing steel even cleaner and it can be more accurately machined.

And, as if this were not enough, SKF product specialists have used sophisticated computer programs to learn even more about the rolling process in spherical roller bearings.

All these developments have been put together to produce an even better bearing – the SKF EXPLORER. This represents a new class of performance.

EXPLORER bearings give more performance for the same size: they can carry more load for longer, or they can carry the same load as before even more reliably for much, much longer.

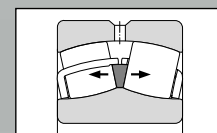
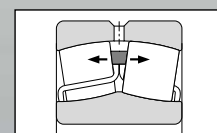
To learn more about the revolutionary EXPLORER bearings, just read on.



E design
Small sizes



CC design
Medium sizes



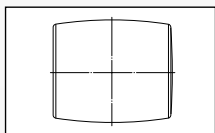
Contributes to minimum friction and reliable operation

The floating guide ring controls unloaded rollers. This gives minimum friction and ensures reliable operation.

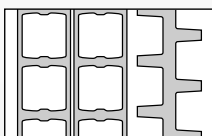
Unique design

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**Very high load carrying capacity**

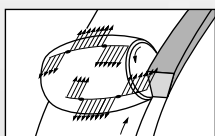
The symmetrical rollers self-adjust, providing an even load distribution along the roller length. This gives very high load carrying capacity under all load combinations.

**Tolerate high temperatures and all lubricants**

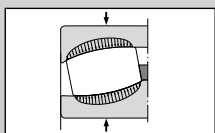
Steel and brass cages are strong, as well as tolerant to high temperatures and all lubricants. Small and medium size bearings have window-type steel cages; larger sizes have machined double pronged brass or steel cages.

Minimum risk of ring fracture and excellent performance at very high temperatures

Tough and dimensionally stable components mean minimal risk of ring fracture and excellent bearing performance even at very high temperatures. The bearings are dimensionally stable up to +200 °C (+392 °F).

**Reduced friction and minimum heat generation**

Self-guiding rollers – an SKF patent – mean reduced friction and minimum heat generation.

**No edge stresses**

Special roller profile minimises the risk of edge stresses.

Standard bearings

- ✓ Low life-cycle cost
- ✓ Long service life
- ✓ High reliability
- ✓ Minimised maintenance
- ✓ Downsizing opportunities



CAC design
Large sizes

SKF EXPLORER – the new performance class for spherical roller bearings

As rolling bearing market leader, particularly where spherical roller bearings are concerned, SKF feels a compulsion to continuously improve bearing performance. This is done using increasingly sophisticated design and modelling software, as well as by delving ever deeper into the material sciences. The new SKF spherical roller bearings, known as “EXPLORER”, are the latest proof of this endeavour.

SKF metallurgists have produced ever cleaner steels, SKF process engineers have further improved manufacturing quality – enabling very tight tolerances to be adhered to and, last but not least, SKF designers have put the computer to good use to understand the behaviour of the rolling elements in the bearing.

The result is one to be proud of – the EXPLORER spherical roller bearing, which embodies state-of-the-art technology in all respects.

The new material

Developments in steel production have meant that the steel used for SKF bearings is extremely clean and homogenous with an absolute minimum of inclusions. In fact, the cleanliness is far better than the best grades covered by present classification methods, so that SKF experts are looking at new methods for classifying cleanliness with a view to standardisation.

New heat treatment procedures have been devised. Together with the exceptional cleanliness of the steel, the new heat treatment has appreciably improved the wear resistance of EXPLORER bearings compared with the traditional SKF spherical roller bearings. All this whilst retaining the good temperature resistance and toughness of the bearings.

The material is just one of the factors contributing to the measured extended life of EXPLORER bearings. Using present life calculation methods, it has been impossible to obtain the long lives demonstrated in endurance testing. To enable users to predict bearing life more accurately, therefore, SKF has introduced

- increased basic dynamic load ratings and
- an additional factor to be considered when calculating life using the SKF Life Method.

More information will be found on **page 14**.

The new manufacturing process

Many small improvements have been incorporated in the manufacturing process to enhance product quality. It has become possible to tighten manufacturing tolerances for all the components of the EXPLORER bearings.

Process capabilities have been heightened and the refined surface finishes called for by the bearing designers have been realised.

All this means that bearing performance is much improved so that more compact machines which are more reliable and run more smoothly can be designed using the EXPLORER bearings than ever before, provided the components surrounding the bearing can be produced with corresponding accuracy.



The new bearing knowledge

Sophisticated in-house software has enabled SKF design engineers to study internal bearing dynamics to an extent not possible previously. Modelling techniques have pointed to design refinements. These have been implemented in the EXPLORER bearings providing enhanced roller self-guidance among other benefits.

Availability

The most popular spherical roller bearings, which are the small sizes (with a few exceptions) of series 213, 222 and 223 are available immediately as EXPLORER bearings. By the middle of the year 2000 almost all sizes of series 222 and 223 up to and including 220 mm bore diameter will have become available as well as the most popular sizes of series 230 and 231.

All EXPLORER bearings are shown in blue in the bearing tables.

Product designations

The EXPLORER bearings retain the designations of the earlier standard bearings, e.g. 22218 E or 23032 CC/W33. However, each bearing and its box is marked with the name EXPLORER so that there can be no confusion.

Life extension for existing machines

Where machine performance is unchanged, same size EXPLORER bearings will provide

- several times the service life previously achieved,
- more machine uptime,
- an appreciable reduction in machine cycle costs

and, therefore, added value.

Same power density with new machines

New designs with equal power can be made

- more compact,
 - can operate at higher speeds,
 - will run more smoothly and quietly and require less lubricant,
- and will have added value.

Upgrading of existing machines

Existing designs can be upgraded by using same size EXPLORER bearings with

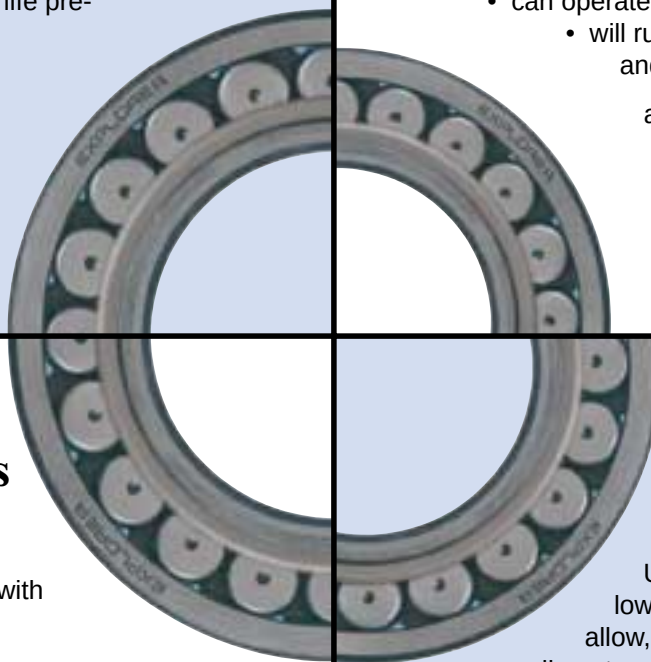
- no loss of service life,
- no loss of machine uptime,
- no loss of value, or even added value,

and no costly redesign work is needed.

Increased power density with new machines

Using EXPLORER bearings with lower cross-sectional height will allow, for the same bearing outside diameter,

- a stronger, or even a hollow shaft to be used,
 - a stiffer but also cheaper total design,
 - operation at the same or even at higher speeds,
- as well as a marked reduction in machine cycle costs.



Specialities for special purposes

Their robust design and high reliability make SKF standard and EXPLORER spherical roller bearings suitable for the majority of applications. However, extraordinary demands call for bearings with extraordinary features. Therefore, the SKF standard range also includes, among other bearings:

- sealed bearings,
- bearings for vibrating applications, and
- rolling mill bearings.

Sealed bearings

Sealed SKF spherical roller bearings permit cost-favourable bearing arrangements to be produced for arduous conditions, giving long service life and high operational reliability and requiring minimum maintenance.

The bearings have the same basic design as the open bearings: E or CC. Those based on CC bearings generally have the same boundary dimensions as the open (unsealed) bearings. The E-type bearings may be slightly wider.

The rubbing seals have been specially developed for self-aligning bearings and are available in two different materials: one for normal temperatures

Detailed information will be found in the brochure 4404.

and the other for hot environments. Both variants efficiently prevent contaminants from penetrating

to the rolling contact. This is true not only in operation, but also before and during mounting.

Two high-quality greases are also used: SKF grease LGEP 2 for normal temperatures and a special high-temperature grease to match the high-temperature seals.

In the bearing tables, starting on **page 26**, all bearings which are available in a sealed as well as the open version are marked with an asterisk.

Bearings for vibrating applications

These are SKF spherical roller bearings of series 223 which have been modified to cope with the conditions

More information will be supplied on request.

of "rotating shaft bending" encountered in vibrating applications. They differ from the standard bearings

in that they have surface hardened window-type cages pressed from highly wear-resistant steel. Other characteristics include the floating guide ring centred in the outer ring, which guides the cages, and a special clearance.



Rolling mill bearings

Rolling mill bearings must meet very varying demands. For cold tube mills (Pilger mills), for example, the bearings

See also SKF catalogue 4003.

must be able to withstand high acceleration forces, whereas for finishing trains or wire mills, they

must be able to be mounted and dismounted with ease. SKF has the appropriate spherical roller bearings for such tasks.

Mounted bearing units

SKF Pop Release units are plummer blocks complete with bearing which are greased, sealed and ready to install as delivered.

See also brochure 4406.

A robust one-piece grey cast iron plummer block houses the bearing and pro-

tects it from mechanical damage from outside. The EXPLORER bearings of series 222 used in these units have a special inner ring which is easily fitted to the shaft with its saw-tooth profiled adapter sleeve.

Accessories for optimum performance

Any system is only as strong as its weakest member. Therefore, SKF offers not only a wide range of spherical roller bearings, but also an appropriate range of quality bearing accessories to go with them.

Adapter and withdrawal sleeves

Adapter and withdrawal sleeves are used to locate bearings with tapered bore on smooth or stepped shafts. They facilitate bearing mounting and dismounting and in many cases simplify bearing arrangement

See also SKF catalogue 3766/I.

design. Consequently several series of quality sleeves are included in the SKF product range.

Lock nuts

To lock bearings in position on shaft ends, SKF can supply various types of lock or shaft nuts. The main types are lock nuts of series KM(L) and HM

See also SKF catalogue 3766/I.

which have a locking washer or a locking clip which engages in a groove in the

shaft, and lock nuts of series KMF, KMK, KMT and KMTA, which are locked on the shaft by means of grub screws or locking pins.

Bearing housings

Bearing housings must be suited to the various demands placed on the bearings which they house, e.g. load, accuracy, type of lubrication and lubricant, sealing etc.

See also SKF catalogue 4005.

Therefore, SKF offers a comprehensive range of

high-quality standard and special housings. These, together with the appropriate SKF spherical roller bearings, form economic and interchangeable bearing units which meet all the performance demands of a bearing application.



Efficient in all industrial segments

Long service life, high reliability, minimised need of maintenance and scope for downsizing have made SKF spherical roller bearings indispensable in all industrial segments. The key segments with their typical requirements are listed below.

In addition to these key segments SKF spherical roller bearings are also frequently used in bridges, dam gates, electric motors, generators, plastic

calenders, textile machines, extruders, printing presses, robots etc. And new application areas are added continuously.

One of the main reasons for SKF's dominant market position for spherical roller bearings is the customers' ever increasing awareness about what higher bearing quality means to their machine life cycle cost

See also SKF application handbooks 4200 "Bearings in paper-making machines" or 4560 "Bearings in industrial gearboxes". These are also available on diskettes or CD-ROM, respectively.

Segments

- Pulp & paper
- Metalworking
- Mining & construction
- Fluid machinery
- Materials handling
- Industrial gearboxes
- Railways



Requirements

- Long service life
- Segment-adapted performance
- Minimum maintenance
- No unplanned stops
- High availability
- Technical support



Solution



1 Product information

2 Recommendations

3 Product data

Application examples

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Selection of bearing size

The life-extending improvements embodied in the SKF EXPLORER spherical roller bearings can best be dealt with using the SKF Life Method. This method constitutes an extension of the fatigue life theory developed by Lundberg and Palmgren and is better able to predict bearing lives. The Life Method was first presented as the SKF New Life Theory in the SKF General Catalogue 4000 in 1989. For roller bearings

$$L_{naa} = a_1 a_{SKF} L_{10}$$

or

$$L_{naa} = a_1 a_{SKF} \left(\frac{C}{P} \right)^{10/3}$$

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

$$L_{naa} = a_1 a_{SKF} \frac{1\,000\,000}{60\,n} \left(\frac{C}{P} \right)^{10/3}$$

where

L_{naa} = the adjusted rating life according to the SKF Life Method, million revolutions

L_{naah} = the adjusted rating life according to the SKF Life Method, operating hours

L_{10} = basic rating life, million revolutions

a_1 = life adjustment factor for reliability (→ **Table 1**)

a_{SKF} = life adjustment factor based on SKF Life Theory (→ **Diagram 1**)

C = basic dynamic load rating, kN

P = equivalent dynamic bearing load, kN

n = speed, r/min

a_{SKF} factor

The a_{SKF} factor represents a very complex relationship between various influencing factors including contamination and lubrication conditions. The lubrication conditions are expressed by the viscosity ratio κ . Values of a_{SKF} can be obtained from **Diagram 1** for different values of $\eta_c (P_u/P)$ and κ .

For the standard spherical roller bearings, the values in black on the x axis should be used and for EXPLORER bearings the values in blue on the x axis. In fact, for EXPLORER spherical roller bearings it has been found appropriate to multiply $\eta_c (P_u/P)$ by 1,4 as an expression of the life extending refinements of these bearings, and the blue values correspond to this.

Diagram 1 has been drawn up for a safety factor commonly used in fatigue life considerations and is valid for lubricants not containing EP additives. If a lubricant containing such additives is used, reference should be made to the SKF General Catalogue 4000 or the SKF Interactive Engineering Catalogue on CD-ROM 4700 or the Internet (www.skf.com).

Equivalent dynamic bearing load

The equivalent dynamic bearing load for spherical roller bearings can be obtained from

$$P = F_r + Y_1 F_a \quad \text{when } F_a/F_r \leq e$$

$$P = 0,67 F_r + Y_2 F_a \quad \text{when } F_a/F_r > e$$

where

P = equivalent dynamic bearing load, kN

F_r = actual radial bearing load, kN

F_a = actual axial bearing load, kN

Y_1, Y_2 = axial load factors for the bearings

e = calculation factor

Appropriate values of the factors e , Y_1 and Y_2 will be found in the bearing tables for each individual bearing.

Equivalent static bearing load

The equivalent static bearing load for spherical roller bearings can be obtained from

$$P_0 = F_r + Y_0 F_a$$

where

P_0 = equivalent static bearing load, kN

F_r = actual radial bearing load, kN

F_a = actual axial bearing load, kN

Y_0 = axial load factor for the bearings

Appropriate value of the factor Y_0 will be found in the bearing tables for each individual bearing.

Life adjustment factor a_1

Table 1

Reliability %	Factor a_1
90	1
95	0,62
96	0,53
97	0,44
98	0,33
99	0,21

Old and new – a comparison

The performance enhancements incorporated into the SKF EXPLORER spherical roller bearings can best be demonstrated by a life calculation comparison for the bearing 22218 E in its earlier standard and its new EXPLORER executions.

For the same operating conditions the life of

- the previous standard 22218 E with
 - a basic dynamic load rating $C = 282 \text{ kN}$, and
 - a fatigue load limit $P_u = 39 \text{ kN}$, and
 - the EXPLORER bearing 22218 E with
 - a basic dynamic load rating $C = 325 \text{ kN}$, and
 - a fatigue load limit $P_u = 39 \text{ kN}$
- are calculated.

The operating conditions are assumed to be an equivalent dynamic bearing load $P = 28,2 \text{ kN}$, a viscosity ratio $\kappa = 2$, and a contamination factor $\eta_c = 0,4$.

The lives of the two bearings are then calculated.

Earlier standard bearing

For $\eta_c (P_u/P) = 0,4 \times 39/28,2 = 0,55$ using the black values on the x axis in **Diagram 1** and $\kappa = 2$

$$a_{SKF} = 3,7$$

so that the life becomes

$$L_{10aa} = a_{SKF} (C/P)^{10/3} = 3,7 \times (282/28,2)^{10/3}$$

$$L_{10aa} = 7\,970 \text{ million revolutions.}$$

EXPLORER bearing

For $\eta_c (P_u/P) = 0,4 \times 39/28,2 = 0,55$ using the blue values on the x axis in **Diagram 1** and $\kappa = 2$

$$a_{SKF} = 7,1$$

so that the life becomes

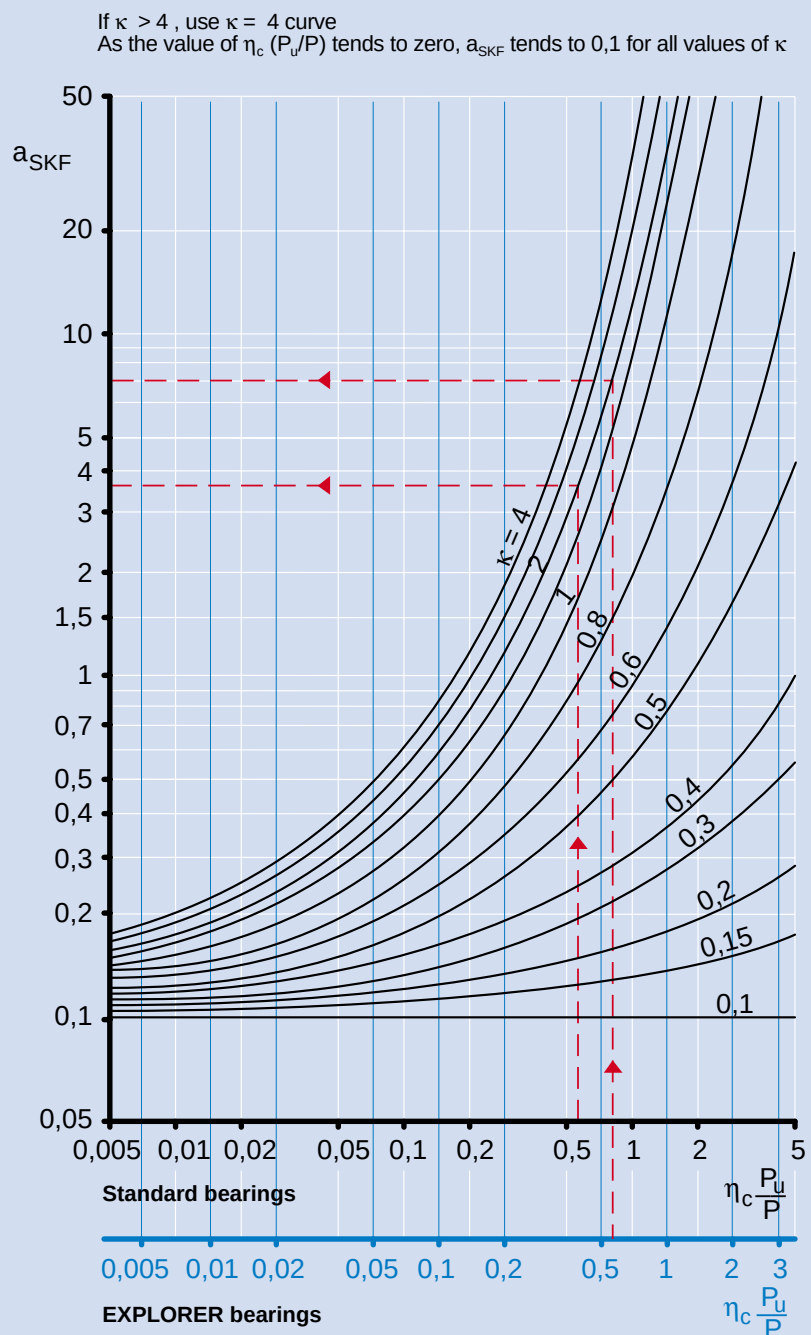
$$L_{10aa} = a_{SKF} (C/P)^{10/3} = 7,1 \times (325/28,2)^{10/3}$$

$$L_{10aa} = 24\,500 \text{ million revolutions.}$$

In this case, the EXPLORER bearing has a life compared with that of the previous standard bearing which is $24\,500/7\,970 = 3,07$ or just over three times longer.

Factor a_{SKF} for radial roller bearings

Diagram 1



Application of bearings

Radial location of bearings

If the load carrying ability of a bearing is to be fully utilised, its rings must be supported around their complete circumference and across the whole width of the raceway. The support must be firm and even and can be provided by a cylindrical or tapered seating. This means that the seatings must be made with adequate accuracy.

For bearings made with normal tolerances, the dimensional accuracy of the cylindrical seatings on the shaft should be at least to grade 6 and in the housing to at least grade 7. For bearings with higher accuracy, correspondingly better grades should be used.

The cylindricity tolerance as defined in ISO 1101:1983 should be 1 to 2 IT grades better than the prescribed dimensional tolerance, depending on requirements. For example, if a bearing

seating on a shaft has been machined to tolerance m6, then the accuracy of form should be to IT5 or IT4.

A rule of thumb with regard to vibration behaviour: the higher the operating speed, the more accurate all components should be – particularly those that rotate.

Axial locating of bearings

An interference fit alone is generally inadequate for the axial location of a bearing ring. As a rule, therefore, some suitable means of axially securing the ring is needed.

Both rings of locating bearings should be axially secured at both sides. For non-locating bearings, on the other hand it is sufficient if the ring having the tighter fit – usually the inner ring – is axially secured; the other ring must

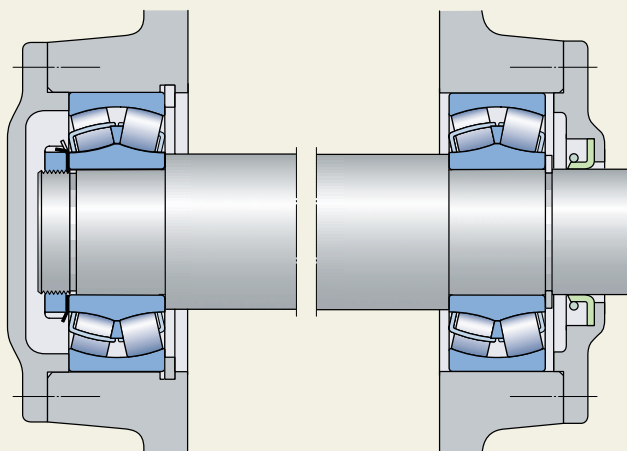
be free to move axially with respect to its seating (→ **fig 1**).

Bearing rings having an interference fit are generally mounted so that the ring abuts a shoulder on the shaft or in the housing at one side. At the opposite side, inner rings are normally secured using a snap ring, shaft nut or by an end plate attached to the shaft end. Outer rings are usually retained by the housing end cover (→ **fig 1**).

The dimensions of the shaft and housing shoulders adjacent to the bearing must be such that sufficient support is provided for the bearing rings but there must be no contact between the rotating parts of the bearing and a stationary component.

Appropriate abutment dimensions are quoted for each individual bearing listed in the product table. The values assure a sufficiently large support surface and the max. and min. limits should be respected.

Fig 1



Bearing arrangement with two spherical roller bearings, one serving as a locating bearing and the other as a non-locating bearing

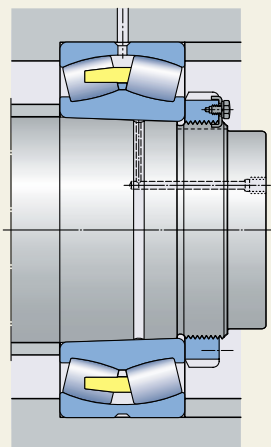
Design of associated components with respect to mounting

For bearing arrangements with large spherical roller bearings it is often necessary to make provisions in the design to enable the bearings to be mounted or to simplify mounting. For example, withdrawal tools can be applied to dismount bearings if appropriate slots are machined in shaft and housing shoulders, or if threaded holes are provided in the housing shoulders.

If the oil injection method is to be used to mount and dismount bearings on tapered journals (→ **fig 2**) or to dismount bearings from cylindrical seatings (→ **fig 3**) it is necessary to provide oil supply ducts in the journal and grooves in the seating. Recommended dimensions for the ducts, grooves and threads to take the oil supply connection are given in the CD-ROM 4700 “SKF Interactive Engineering Catalogue” or in the SKF catalogue 4003 “Large bearings”.

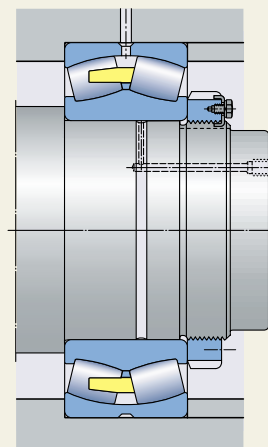
Spherical roller bearing of CAK design on a tapered journal with oil supply ducts and grooves

Fig 2



Spherical roller bearing of CA design on a cylindrical seating with oil supply ducts and grooves

Fig 3



Mounting and dismounting

Mounting

Bearings with cylindrical bore

Bearings with cylindrical bore are mounted with clearance or interference fits on the shaft and in the housing. A satisfactory radial location and an adequate support can generally only be obtained when one of the rings (depending on loading situation) is mounted with an appropriate degree of interference.

When mounting bearings with cylindrical bore the ring which is to have the tighter interference fit is generally mounted first.

The force to mount a bearing increases considerably with increasing bearing size. Therefore, it is not generally possible to press large bearings on to a cylindrical shaft or into a housing in the cold state. In this case – depending on whether the interference is between bearing and shaft or bearing and housing – the bearing or the housing should be heated before mounting.

To mount with an interference fit on a shaft the bearing should be heated to about 80 to 90 °C (176 to 194° F) above the temperature of the shaft. This can preferably be done by means of an SKF induction heater (→ fig 1).

Mounting bearings by cooling the shaft is not recommended. The risk of condensation causing corrosion is evident.

Bearings with tapered bore

Bearings with tapered bore are always mounted with an interference fit on the shaft. They can be mounted on adapter sleeves, withdrawal sleeves or direct on to tapered journals.

When dimensioning a tapered journal the dimension B_a should be used as a basis (→ fig 2). This dimension is the distance from the centre of the bearing, as finally mounted, to a reference face on the journal. When this dimension is established it is advisable to continue the dimensioning of the journal following the detailed information given in catalogue 4003 "Large bearings".

The use of adapter sleeves or withdrawal sleeves generally facilitates mounting and dismounting of bearings and they often simplify the application. However, mounting on sleeves implies a smaller journal seating diameter compared with direct mounting. This can be a decisive disadvantage in some cases.

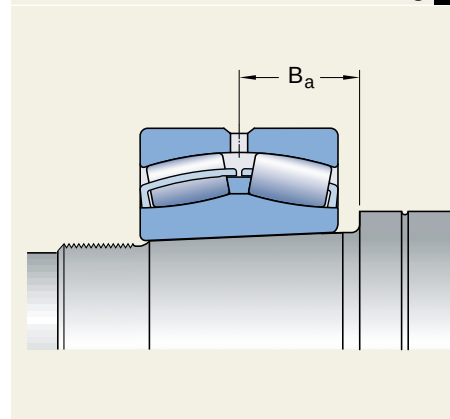
Spherical roller bearings up to 200 mm bore diameter may be driven up on to a tapered journal or a with-

drawal sleeve using a shaft nut and on to an adapter sleeve using the sleeve nut and a spanner (→ fig 3).

The drive-up force for larger bearings is so heavy that it necessitates the use of SKF hydraulic nuts. If the oil injection method is used in addition to a hydraulic nut the mounting force is further reduced (→ fig 4). This necessitates the provision of oil supply ducts in the journals and oil distribution grooves in the seating.

For bearings which are to be hot mounted, the final axial position on the

Fig 2



Dimensioning of tapered journals

Drive-up of medium size bearing

Fig 3



SKF induction heater



Fig 1

seating has to be predetermined by means of, for instance, a tailor-made spacer ring (→ **fig 5**). When cooled, the bearing will gain its correct interference fit.

The reduction in radial internal clearance or the axial displacement of the inner ring on its tapered seating is used as a measure of the degree of interference (→ **fig 6**).

It is much easier and more reliable to mount bearings with tapered bore using the recently developed SKF drive-up procedure.

This involves the use of a modified HMV hydraulic nut which can be equipped with a gauge. A pressure gauge appropriate to the procedure allows accurate measurement.

The new procedure is characterised by the bearing being driven up on its tapered seating from an undefined zero position to a defined starting position

For further information see catalogue MP200

(→ **fig 7**) by a given pressure in the hydraulic nut (corresponding to a certain drive-up force). In this way, part of the desired radial internal clearance reduction is achieved. The bearing is then driven up to its final position. The drive-up distance s can be carefully checked using the pressure gauge mounted on the hydraulic nut.

Drive-up of large size bearing

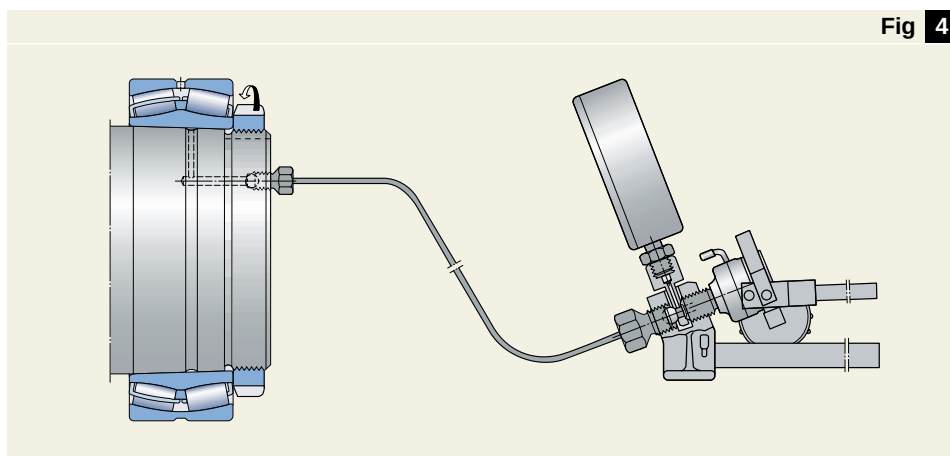


Fig 4

Tailor-made spacer ring used to position the bearing axially

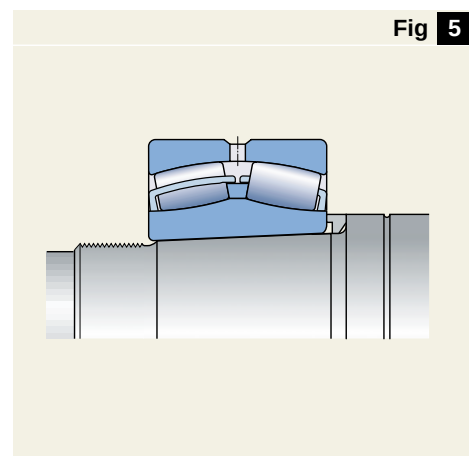


Fig 5

Desired interference obtained by measuring clearance reduction or axial drive-up

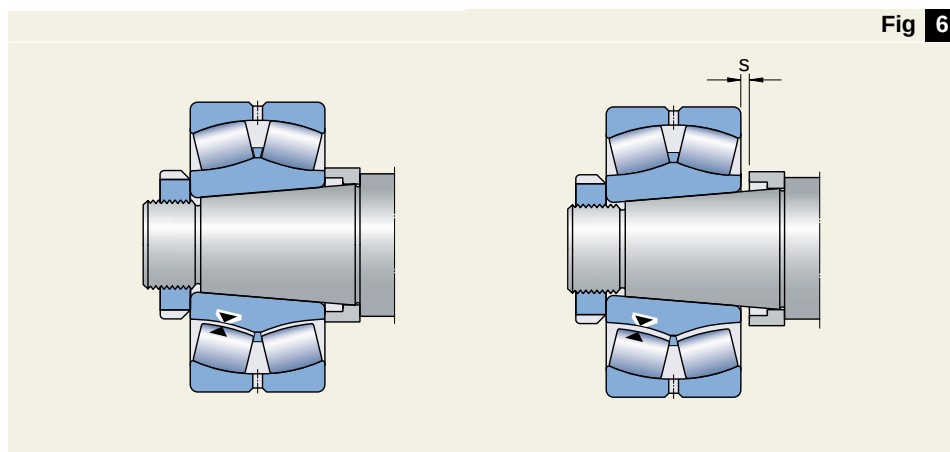


Fig 6

Measuring drive-up distance using SKF drive-up method

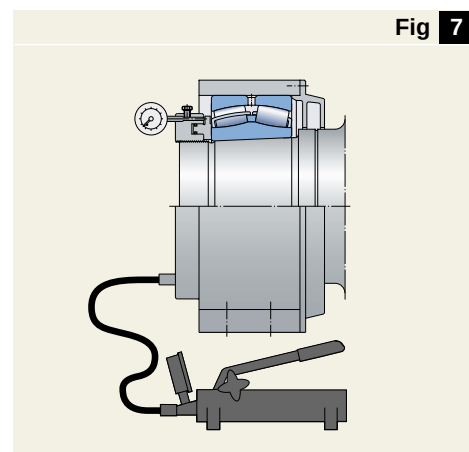


Fig 7

Dismounting

The force required to remove a bearing is generally greater than the mounting force, particularly if, after a long period of service, fretting corrosion is present. If bearings are to be re-used after removal, the force used to dismount them must on no account be applied through the rolling elements.

Bearings with cylindrical bore

Spherical roller bearings of small and medium size can be removed using mechanical or hydraulic withdrawal tools or a press. For large bearings, the oil injection method is usually used in combination with a mechanical withdrawal tool (→ **fig 8**).

Bearings with tapered bore

To remove spherical roller bearings from tapered seatings it is recommended to use the oil injection method (→ **fig 9**). The pressurised oil between the two fitting surfaces reduces the contact friction to a negligible level and this makes the bearing slide off easily. The lock nut stops the bearing from sliding longer than necessary thus preventing damage or accident.

Bearings mounted on adapter or withdrawal sleeves are most easily removed using a hydraulic nut (→ **fig 10**). By using sleeves with oil ducts and oil distribution grooves, the oil injection method facilitates the removal of large bearing considerably (→ **fig 11**).

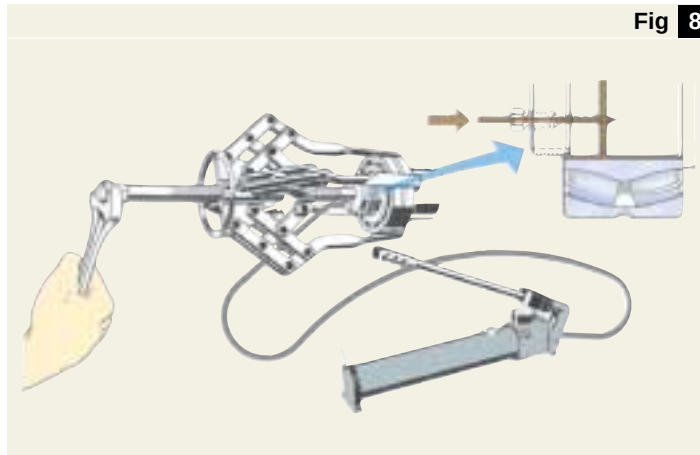


Fig 8

Dismounting of large size bearing on cylindrical seating

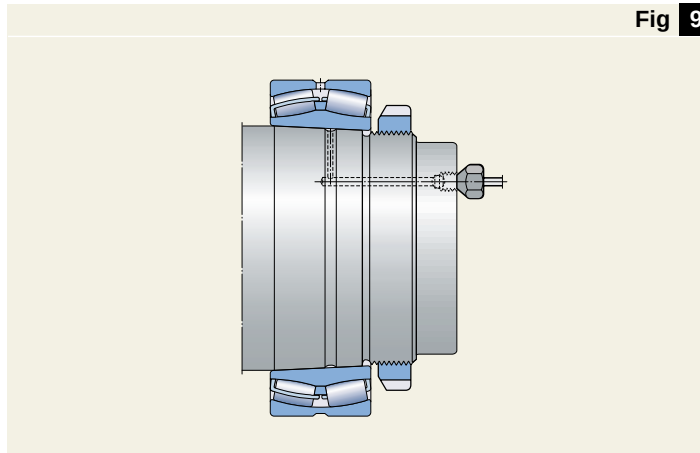


Fig 9

Dismounting of bearing on tapered seating

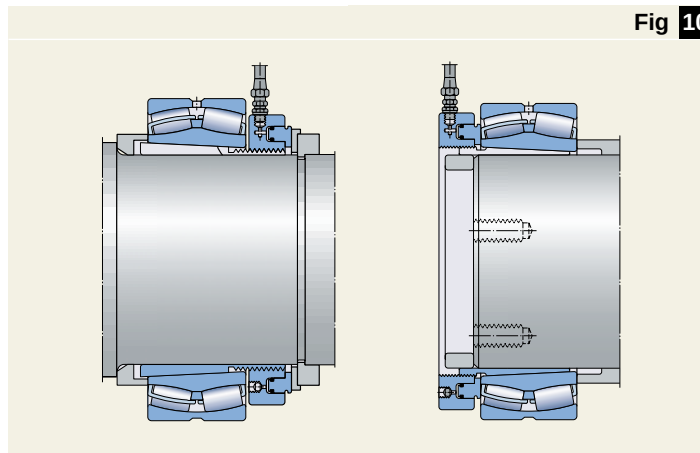


Fig 10

Dismounting of bearings on withdrawal and adapter sleeves

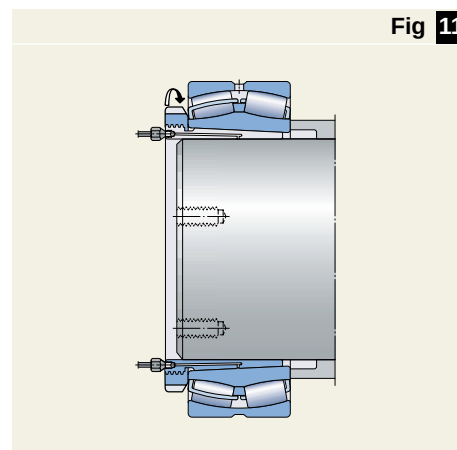


Fig 11

Dismounting of large size bearing on withdrawal sleeve



SKF products for mounting and dismantling, maintenance and condition monitoring

SKF tools for mounting and dismantling bearings

SKF has very many years of experience with spherical roller bearings and is thus qualified to advise how they should best be mounted and dismantled to achieve their maximum performance potential.

The SKF range of tools and equipment for mounting and dismantling bearings is extremely comprehensive and includes

- mechanical tools,
- heaters,
- hydraulic equipment, and
- pullers and withdrawal tools for all sizes of bearings.

SKF lubricating greases

Spherical roller bearings operate under the most varying conditions of load, speed, temperature and environmental conditions. Therefore, they require the high-quality lubricating greases, which SKF greases represent.

SKF greases have been specially developed for rolling bearings in their typical applications. The SKF range comprises thirteen standard and special greases and covers practically all application requirements. The greases

have proven quality and are environmentally friendly.

The range is complemented by a selection of lubrication accessories including

- automatic lubricators,
- grease guns,
- lubricant metering devices and
- a wide range of manually and pneumatically operated grease pumps.

Condition monitoring equipment

SKF offers a complete range of condition monitoring for bearings and machines: from lightweight, handheld vibration sensors to complex monitoring systems for fixed installation for continuous monitoring.

One example is the Machine Reliability Inspection System MARLIN™, which is at the leading edge of technology and allows storage of up to 2 000 measuring points. It can be used to diagnose machines and individual bearings and is backed by tailored software for the evaluation of the readings including enveloping vibration acceleration curves.

See also brochure MP201.

Detailed information on the latest SKF condition monitoring equipment can be obtained from your nearest SKF office or authorised distributor.

Trouble-Free Operation – the SKF concept for cost saving

The bearings in a machine can be likened to the heart of a living being. When the bearing comes to a standstill, the machine does too.

And just as a doctor will listen to the heart of a patient, so it is possible to listen to the bearings in order to judge the condition of the machine. It is possible to determine whether the bearing is in danger of failing prematurely because of faulty mounting, poor lubrication or other causes.

If the importance of the bearings is neglected this will inevitably lead to high costs, unnecessary stoppages and, in the worst case, to damage to other components of the machine. However, if the bearings are given the attention they deserve, not only will

productivity be increased, but costs for maintenance, purchasing and storage will be reduced.

Why is SKF so certain of this? Because, SKF bearings, given ideal operating conditions, can almost live for ever.

All that is needed is a partnership with SKF for Trouble-Free Operation (TFO®). This involves a ten-stage programme which implies:

- defining problems in partnership,
- releasing tied-up capital,
- reducing operating costs,
- choosing the right bearings,
- caring for the bearings,
- monitoring the machine condition,

- having the correct tools and lubricants on hand,
- customer-specific training, and
- a repair service.

Obviously it is possible to accept the whole programme or to select only parts of it. Whatever the choice, you will win.

More information can be obtained from the nearest SKF office or your authorised SKF dealer.



General bearing data

Designs

SKF spherical roller bearings are made to one of the designs described in the following, depending on size and series.

E design

These bearings have symmetrical rollers, a flangeless inner ring and a guide ring between the two rows of rollers which is positioned towards the outer ring and centred on the two pressed steel window-type cages.

C, CC and EC designs

These bearings have symmetrical rollers, a flangeless inner ring and a pressed steel cage for each roller row. The guide ring is centred on the inner ring between the two rows of rollers.

EC design bearings incorporate reinforced roller sets for increased load carrying capacity.

CA, CAC, ECA and ECAC designs

These designs are used for the larger sizes of SKF spherical roller bearings. The rollers are symmetrical and the inner ring has retaining flanges. The guide ring is centred on the inner ring between the two rows of rollers and

the cage is a one-piece, double pronged machined cage of brass or steel.

ECA and ECAC design bearings incorporate reinforced roller sets for increased load carrying capacity.

Cylindrical or tapered bore

The spherical roller bearings are available with cylindrical bore and tapered bore. The tapered bore of bearings of series 240, 241, 248 and 249 has a taper of 1:30 whereas the bore of all other bearings has a taper of 1:12. The suffixes used to identify the different tapered bores are:

K Tapered bore, taper 1:12

K30 Tapered bore, taper 1:30

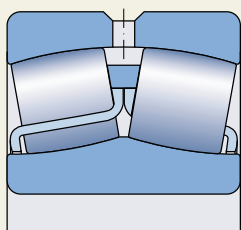
Annular groove and lubrication holes

To facilitate efficient bearing lubrication, the majority of SKF spherical roller bearings are provided with an annular groove and/or lubrication holes in the outer ring. These bearings are identified by one of the following suffixes.

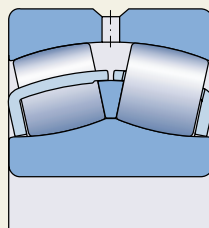
A suffix is not used with the E-design bearings as the annular groove and three lubrication holes in the outer ring are integral parts of the standard E design.

W20 Outer ring with three lubrication holes

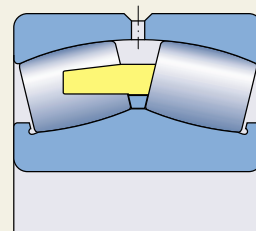
W33 Outer ring with lubrication groove and three holes



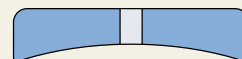
E design



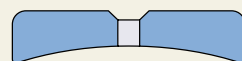
C, CC and EC design



CA, CAC, ECA and ECAC design



W20



W33

Dimensions

The boundary dimensions of the bearings listed in the product table conform to ISO 15-1998.

Tolerances

SKF spherical roller bearings with cylindrical and tapered bores are produced as standard with normal tolerances corresponding to ISO 492:1994.

Running accuracy

In high-speed bearing arrangements the demands on running accuracy are often higher than usual. For such bearing arrangements it is recommended that SKF spherical roller bearings of the C08 execution are used. These have running accuracy to ISO tolerance class 5 specifications. The values for the running accuracy are in accordance with ISO 492:1994. Availability of bearings to the C08 specification should be checked before ordering.

Misalignment

Spherical roller bearings are self-aligning, i.e. misalignment between the outer ring and inner ring can be accommodated with minimal effect on the bearing. Under normal loads and operating conditions, and when the inner ring rotates under constant misalignment, the guideline values of

misalignment given in **Table 1** are permitted. Whether these values can be fully exploited or not depends on the design of the bearing arrangement, the type of seals used etc.

Internal clearance

SKF spherical roller bearings are manufactured as standard with Normal radial internal clearance. Nearly all the bearings are also available with the larger C3 internal clearance and some can be supplied with the even larger C4 clearance. Some sizes can be delivered with C2 internal clearance which is smaller than Normal. The availability of bearings with radial internal clearances other than Normal should be checked before ordering. The various radial internal clearances are in accordance with ISO 5753:1991 and shown in **Tables 2** and **3**. They are valid for zero measuring load and before mounting.

Influence of operating temperature on bearing material

SKF spherical roller bearings are subjected to a special heat treatment as standard so they can operate at high temperatures. They are dimensionally stable at +200 °C (+390 °F) for up to 2 500 hours, or for brief periods at even higher temperatures. If provision is made to accommodate slight changes of fits and clearance then even higher temperatures or longer times can be accepted.

Axial load carrying capacity

Because of their special internal design, SKF spherical roller bearings not only have lower friction than other spherical roller bearings, but they are also able to accommodate appreciably heavier axial loads. However, if $F_a/F_r > e$ (→ bearing tables) it is recommended that the bearings be more frequently relubricated than usual.

**Guideline values
for permissible
angular misalign-
ment**

Minimum load

In order to guarantee the satisfactory performance of spherical roller bearings, they must always be subjected to a given minimum load, especially if they are to operate at high speeds or are subjected to high accelerations or rapid changes in the direction of load. Under such conditions the inertia forces of the rollers and cage, and the friction in the lubricant, can have a detrimental influence on rolling conditions in the bearing and may cause damaging sliding movements to occur between the rollers and raceways.

The requisite minimum load to be applied to spherical roller bearings in such cases can be estimated from

$$F_{rm} = 0,02 C - Y_0 F_a$$

and for EXPLORER bearings from

$$F_{rm} = 0,017 C - Y_0 F_a$$

where

F_{rm} = minimum radial load, kN

C = basic dynamic load rating, kN

F_a = actual axial bearing load, kN

Y_0 = calculation factor

The values for C and Y_0 will be found in the bearing tables for each individual bearing.

When starting up at low temperatures or when the lubricant is highly viscous even greater loads may be required. The weights of the components supported by the bearing, together with the external forces, often exceed the requisite minimum load. If this is not the case, the bearing must be subjected to an additional radial load.

Table 1

Bearing series	Permissible angular misalignment
—	degrees
213	1
222	1,5
223	2
230	1,5
231	1,5
232	2,5
238	1
239	1,5
240	2
241	2,5
248	1,5
249	1,5

Table 2

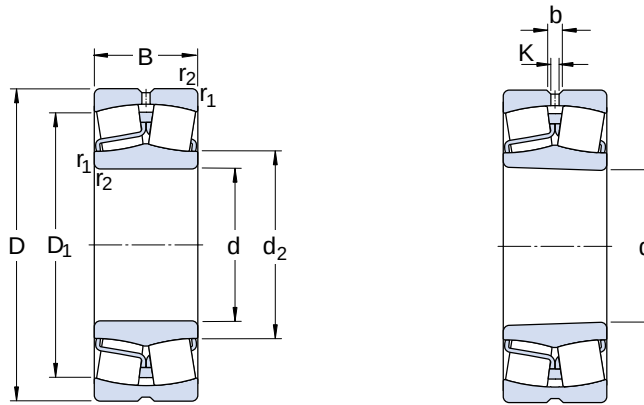
Radial internal clearance of spherical roller bearings with cylindrical bore

Bore diameter		Radial internal clearance		Normal		C3		C4		C5		
d	over	incl.	C2	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	120		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 3

Radial internal clearance of spherical roller bearings with tapered bore

Bore diameter		Radial internal clearance		Normal		C3		C4		C5		
d	over	incl.	C2	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

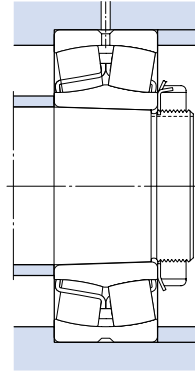
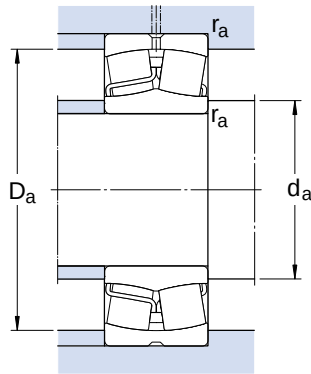


Principal dimensions			Basic load ratings		Fatigue load limit	Speed ratings		Mass	Designations	
d	D	B	dynamic C	static C ₀	P _u	Lubrication grease	oil		Bearings with cylindrical bore	tapered bore
mm			kN		kN	r/min		kg	–	
20	52	15	30,5	30,5	3,4	8 000	10 000	0,17	21304 CC	–
25	52	18	49,0	44	4,75	8 500	11 000	0,19	22205 E	22205 EK
	62	17	41,4	41,5	4,55	6 700	8 500	0,28	21305 CC	–
30	62	20	57,0	52	5,4	7 500	9 500	0,30	22206 CC/W33	22206 CCK/W33
	72	19	55,2	61	6,8	6 000	7 500	0,41	21306 CC	–
35	72	23	76,5	73,5	8	6 300	8 000	0,46	22207 CC/W33	22207 CCK/W33
	80	21	65,6	72	8,15	5 300	6 700	0,55	21307 CC	–
40	80	23	102	98	10,6	6 000	7 500	0,52	** 22208 E	22208 EK
	90	23	82,8	98	11	4 500	5 600	0,76	21308 CC	21308 CCK
	90	33	150	137	14,6	4 500	5 600	1,10	22308 E	22308 EK
45	85	23	90,0	88	9,5	5 300	6 700	0,60	** 22209 CC/W33	22209 CCK/W33
	100	25	134	137	15	4 500	5 600	1,00	21309 E	21309 E
	100	36	183	183	19,3	3 800	4 800	1,45	22309 E	22309 EK
50	90	23	96,5	100	11	5 000	6 300	0,65	** 22210 CC/W33	22210 CCK/W33
	110	27	163	173	19	4 300	5 300	1,30	21310 E	21310 EK
	110	40	220	224	24	3 400	4 300	1,95	22310 E	22310 EK
55	100	25	134	137	15	4 500	5 600	0,82	** 22211 E	22211 EK
	120	29	163	216	24	3 800	4 800	1,65	21311 E	21311 EK
	120	43	270	280	30	3 200	4 000	2,45	22311 E	22311 EK
60	110	28	163	173	19	4 300	5 300	1,15	** 22212 E	22212 EK
	130	31	212	240	26,5	3 400	4 300	2,10	21312 E	21312 EK
	130	46	310	335	36,5	2 800	3 600	3,10	22312 E	22312 EK
65	120	31	193	216	24	3 800	4 800	1,50	** 22213 E	22213 EK
	140	33	236	270	29	3 200	4 000	2,55	21313 E	21313 EK
	140	48	340	360	38	2 600	4 000	3,75	22313 E	22313 EK
70	125	31	208	228	25,5	3 600	4 500	1,55	** 22214 E	22214 EK
	150	35	285	325	34,5	2 800	3 600	3,10	21314 E	21314 EK
	150	51	400	430	45	2 200	3 000	4,55	22314 E	22314 EK
75	115	40	152	232	28,5	2 600	3 400	1,55	* 24015 CC/W33	–
	130	31	212	240	26,5	3 400	4 300	1,70	** 22215 E	22215 EK
	160	37	285	325	34,5	2 800	3 600	3,75	21315 E	21315 EK
	160	55	440	475	48	2 200	3 000	5,55	22315 E	22314 EK
80	140	33	236	270	29	3 200	4 000	2,10	** 22216 E	22216 EK
	170	39	325	375	39	2 600	3 400	4,45	21316 E	21316 EK
	170	58	490	540	54	2 000	2 800	6,60	22316 E	22316 EK

The designations of EXPLORER bearings are printed in blue

* Also available with seals on both sides

** Also available with seals on both sides, but with larger width

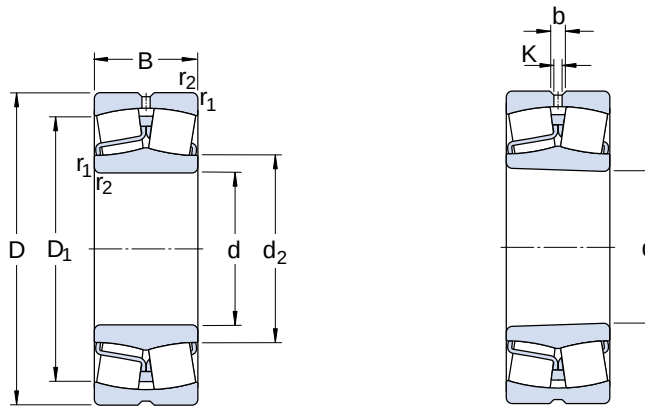


Dimensions

Abutment and
fillet dimensions

Calculation factors

d	d ₂	D ₁	b	K	r _{1,2} min	d _a min	D _a max	r _a max	e	Y ₁	Y ₂	Y ₀
mm						mm			—			
20	30,4	42	—	—	1,1	27	45	1	0,30	2,3	3,4	2,2
25	31,3 35,7	44,2 50,7	3,7 —	2 —	1 1,1	31 32	46 55	1 1	0,35 0,30	1,9 2,3	2,9 3,4	1,8 2,2
30	37,7 43,3	52,4 58,82	3,7 —	2 —	1 1,1	36 37	56 65	1 1	0,33 0,27	2 2,5	3 3,7	2 2,5
35	44,5 47,2	60,9 65,6	5,5 —	3 —	1,1 1,5	42 44	65 71	1 1,5	0,31 0,28	2,2 2,4	3,3 3,6	2,2 2,5
40	49,1 55,6 49,9	69,4 74,3 74,3	5,5 — 5,5	3 — 3	1,1 1,5 1,5	47 49 49	73 81 81	1 1,5 1,5	0,28 0,26 0,37	2,4 2,6 1,8	3,6 3,9 2,7	2,5 2,5 1,8
45	54,9 65,3 57,6	73,6 88 83,1	5,5 5,5 5,5	3 3 3	1,1 1,5 1,5	52 54 54	78 91 91	1 1,5 1,5	0,26 0,24 0,37	2,6 2,8 1,8	3,9 4,2 2,7	2,5 2,8 1,8
50	60,1 71,6 63,9	78,8 96,8 91,9	5,5 5,5 5,5	3 3 3	1,1 2 2	57 61 61	83 99 99	1 2 2	0,24 0,24 0,37	2,8 2,8 1,8	4,2 4,2 2,7	2,8 2,8 1,8
55	65,3 71,6 70,1	88 96,8 102	5,5 5,5 5,5	3 3 3	1,5 2 2	64 66 66	91 109 109	1,5 2 2	0,24 0,25 0,35	2,8 2,7 1,9	4,2 4 2,9	2,8 2,5 1,8
60	71,6 87,8 77,9	96,5 115 110	5,5 5,5 5,5	3 3 3	1,5 2,1 2,1	69 72 72	101 118 118	1,5 2 2	0,24 0,22 0,35	2,8 3 1,9	4,2 4,6 2,9	2,8 2,8 1,8
65	80 94,7 81,6	106 124 118	5,5 5,5 8,3	3 3 4,5	1,5 2,1 2,1	74 77 77	111 128 128	1,5 2 2	0,24 0,22 0,35	2,8 3 1,9	4,2 4,6 2,9	2,8 2,8 1,8
70	83 101 90,3	111 133 128	5,5 5,5 8,3	3 3 4,5	1,5 2,1 2,1	79 82 82	116 138 138	1,5 2 2	0,22 0,22 0,33	3 3 2	4,6 4,6 3	2,8 2,8 2
75	84,1 87,8 101 92,8	100 115 133 135	5,5 5,5 5,5 8,3	3 3 3 4,5	1,1 1,5 2,1 2,1	81 84 87 87	109 121 148 148	1 1,5 2 2	0,28 0,22 0,22 0,35	2,4 3 3 1,9	3,6 4,6 4,6 2,9	2,5 2,8 2,8 1,8
80	94,7 106 98,3	127 141 143	5,5 5,5 8,3	3 3 4,5	2 2,1 2,1	91 92 92	129 158 158	2 2 2	0,22 0,24 0,35	3 2,8 1,9	4,6 4,2 2,9	2,8 2,8 1,8

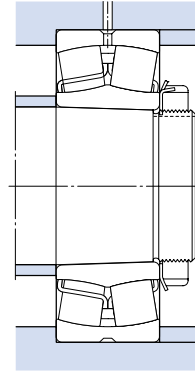
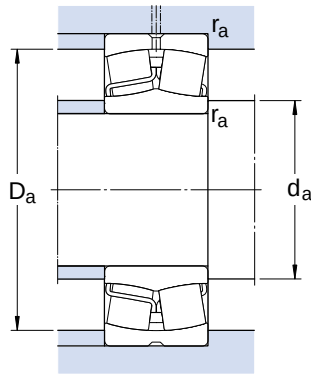


Principal dimensions			Basic load ratings		Fatigue load limit	Speed ratings		Mass	Designations	
d	D	B	dynamic C	static C ₀	P _u	Lubrication grease	oil		Bearings with cylindrical bore	tapered bore
mm			kN		kN	r/min		kg	–	
85	150	36	285	325	34,5	2 800	3 600	2,65	** 22217 E	22217 EK
	180	41	325	375	39	2 600	3 400	5,20	21317 E	21317 EK
	180	60	550	620	61	1 900	2 600	7,65	22317 E	22317 EK
90	160	40	325	375	39	2 600	3 400	3,40	** 22218 E	22218 EK
	160	52,4	311	440	48	1 900	2 600	4,65	23218 CC/W33	23218 CCK/W33
	190	43	380	450	46,5	2 400	3 200	6,10	21318 E	21318 EK
	190	64	610	695	67	1 800	2 400	9,05	22318 E	22318 EK
95	170	43	380	450	46,5	2 400	3 200	4,15	22219 E	22219 EK
	200	45	425	490	49	2 200	3 000	7,05	21319 E	21319 EK
	200	67	670	765	73,5	1 800	2 400	10,5	22319 E	22319 EK
100	150	50	248	415	45,5	1 900	2 600	3,15	* 24020 CDC/W33	–
	165	52	322	490	53	2 000	2 800	4,55	* 23120 CC/W33	23120 CCK/W33
	165	65	397	640	68	1 700	2 200	5,65	24120 CC/W33	–
	180	46	425	490	49	2 200	3 000	4,90	** 22220 E	22220 EK
	180	60,3	414	600	63	1 700	2 200	6,85	* 23220 CC/W33	23220 CCK/W33
	215	47	425	490	49	2 200	3 000	8,60	21320 E	21320 EK
110	215	73	815	950	88	1 700	2 200	13,5	22320 E	22320 EK
	170	45	267	440	46,5	2 200	3 000	3,80	* 23022 CC/W33	23022 CCK/W33
	180	56	374	585	61	1 900	2 600	5,75	* 23122 CC/W33	23122 CCK/W33
	180	69	460	750	78	1 600	2 000	7,10	* 24122 CC/W33	24122 CCK30/W33
	200	53	560	640	63	2 000	2 800	7,00	22222 E	22222 EK
	200	69,8	518	765	76,5	1 600	2 000	9,85	23222 CC/W33	23222 CCK/W33
	240	80	950	1 120	100	1 500	1 900	18,4	22322 E	22322 EK
120	180	46	305	510	53	2 000	2 800	4,20	* 23024 CC/W33	23024 CCK/W33
	180	60	374	670	68	1 600	2 000	5,45	* 24024 CC/W33	24024 CCK30/W33
	200	62	449	695	71	1 800	2 400	8,00	23124 CC/W33	23124 CCK/W33
	200	80	575	950	95	1 400	1 800	10,3	* 24124 CC/W33	24124 CCK30/W33
	215	58	630	765	73,5	1 900	2 600	8,70	22224 E	22224 EK
	215	76	610	930	93	1 500	1 900	12,0	23224 CC/W33	23224 CCK/W33
	260	86	965	1 120	100	1 400	1 800	23,0	22324 CC/W33	22324 CCK/W33
130	200	52	374	610	61	1 900	2 600	6,00	* 23026 CC/W33	23026 CCK/W33
	200	69	477	815	81,5	1 500	1 900	8,05	* 24026 CC/W33	24026 CCK30/W33
	210	64	489	780	78	1 700	2 200	8,80	23126 CC/W33	23126 CCK/W33
	210	80	587	1 000	100	1 300	1 700	11,0	* 24126 CC/W33	24126 CCK30/W33
	230	64	735	930	88	1 800	2 400	11,0	22226 E	22226 EK
	230	80	690	1 060	104	1 300	1 700	14,5	23226 CC/W33	23226 CCK/W33
	280	93	1 120	1 320	114	1 300	1 700	29,0	22326 CC/W33	22326 CCK/W33

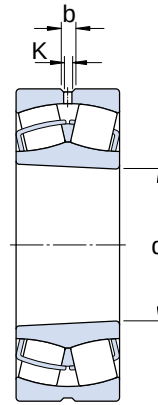
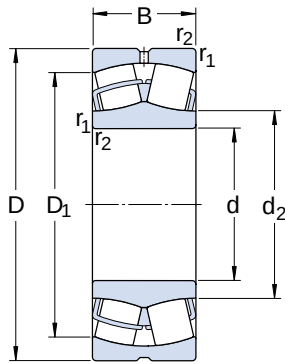
The designations of EXPLORER bearings are printed in blue

* Also available with seals on both sides

** Also available with seals on both sides, but with larger width



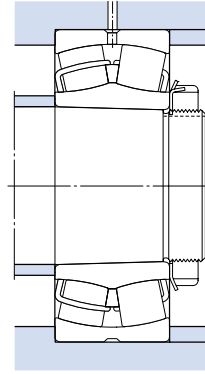
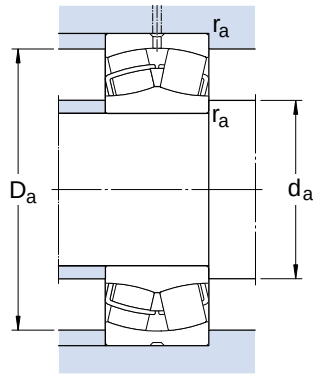
Dimensions						Abutment and fillet dimensions			Calculation factors			
d	d ₂	D ₁	b	K	r _{1,2} min	d _a min	D _a max	r _a max	e	Y ₁	Y ₂	Y ₀
mm						mm			—			
85	101	133	5,5	3	2	96	139	2	0,22	3	4,6	2,8
	106	141	5,5	3	3	99	166	2,5	0,24	2,8	4,2	2,8
	108	154	8,3	4,5	3	99	166	2,5	0,33	2	3	2
90	106	141	5,5	3	2	101	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
95	112	150	8,3	4,5	2,1	107	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
100	111	132	5,5	3	1,5	107	143	1,5	0,28	2,4	3,6	2,5
	115	144	5,5	3	2	111	154	2	0,30	2,3	3,4	2,2
	113	141	5,5	3	2	111	154	2	0,37	1,8	2,7	1,8
	118	159	8,3	4,5	2,1	112	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
	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
	125	151	5,5	3	2	120	160	2	0,23	2,9	4,4	2,8
	126	157	8,3	4,5	2	121	169	2	0,30	2,3	3,4	2,2
	123	153	5,5	3	2	121	169	2	0,37	1,8	2,7	1,8
110	130	178	8,3	4,5	2,1	122	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
	143	204	13,9	7,5	3	124	226	2,5	0,33	2	3	2
	135	163	5,5	3	2	130	170	2	0,22	3	4,6	2,8
	132	159	5,5	3	2	130	170	2	0,30	2,3	3,4	2,2
	139	174	8,3	4,5	2	131	189	2	0,28	2,4	3,6	2,5
120	135	168	5,5	3	2	131	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
	141	182	8,3	4,5	2,1	132	203	2	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
	148	180	8,3	4,5	2	140	190	2	0,23	2,9	4,4	2,8
	145	175	5,5	3	2	140	190	2	0,31	2,2	3,3	2,2
130	148	184	8,3	4,5	2	141	199	2	0,28	2,4	3,6	2,5
	146	180	5,5	3	2	141	199	2	0,35	1,9	2,9	1,8
	152	201	11,1	6	3	144	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
	164	233	16,7	9	4	148	262	3	0,35	1,9	2,9	1,8
	148	180	8,3	4,5	2	140	190	2	0,23	2,9	4,4	2,8
	145	175	5,5	3	2	140	190	2	0,31	2,2	3,3	2,2
	148	184	8,3	4,5	2	141	199	2	0,28	2,4	3,6	2,5



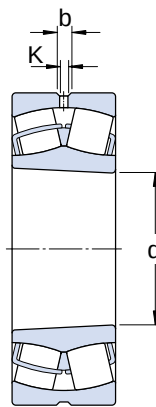
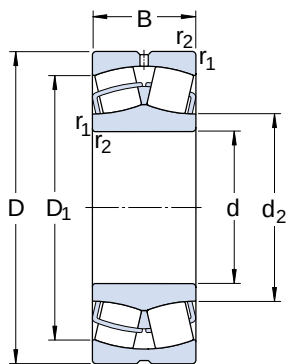
Principal dimensions			Basic load ratings		Fatigue load limit	Speed ratings		Mass	Designations	
d	D	B	dynamic C	static C ₀	P _u	Lubrication grease	oil		Bearings with cylindrical bore	tapered bore
mm			kN		kN	r/min		kg	–	
140	210	53	397	680	68	1 800	2 400	6,55	23028 CC/W33	23028 CCK/W33
	210	69	495	900	68	1 400	1 800	8,55	* 24028 CC/W33	24028 CCK30/W33
	225	68	546	900	88	1 600	2 000	10,5	23128 CC/W33	23128 CCK/W33
	225	85	673	1 160	112	1 100	1 500	13,5	* 24128 CC/W33	24128 CCK30/W33
	250	68	710	900	86,5	1 700	2 200	14,0	22228 CC/W33	22228 CCK/W33
	250	88	799	1 250	120	1 200	1 600	19,0	23228 CC/W33	23228 CCK/W33
	300	102	1 290	1 560	132	1 100	1 500	36,5	22328 CC/W33	22328 CCK/W33
150	225	56	437	750	73,5	1 700	2 200	7,95	23030 CC/W33	23030 CCK/W33
	225	75	564	1 040	100	1 300	1 700	10,5	* 24030 CC/W33	24030 CCK30/W33
	250	80	725	1 200	114	1 400	1 800	16,0	23130 CC/W33	23130 CCK/W33
	250	100	897	1 530	146	1 000	1 400	20,0	* 24130 CC/W33	24130 CCK30/W33
	270	73	850	1 080	102	1 600	2 000	18,0	22230 CC/W33	22230 CCK/W33
	270	96	937	1 460	137	1 100	1 500	24,5	23230 CC/W33	23230 CCK/W33
	320	108	1 460	1 760	146	1 000	1 400	43,5	22330 CC/W33	22330 CCK/W33
160	240	60	585	880	83	1 700	2 200	9,70	23032 CC/W33	23032 CCK/W33
	240	80	656	1 200	114	1 100	1 500	13,0	* 24032 CC/W33	24032 CCK30/W33
	270	86	845	1 370	129	1 300	1 700	20,5	* 23132 CC/W33	23132 CCK/W33
	270	109	1 040	1 760	163	950	1 300	25,0	24132 CC/W33	24132 CCK30/W33
	290	80	1 000	1 290	118	1 500	1 900	22,5	22232 CC/W33	22232 CCK/W33
	290	104	1 070	1 660	153	1 000	1 400	31,0	23232 CC/W33	23232 CCK/W33
	340	114	1 600	1 960	160	950	1 300	52,0	22332 CC/W33	22332 CCK/W33
170	260	67	710	1 060	100	1 600	2 000	13,0	23034 CC/W33	23034 CCK/W33
	260	90	799	1 460	137	1 000	1 400	17,5	24034 CC/W33	24034 CCK30/W33
	280	88	897	1 500	137	1 200	1 600	22,0	23134 CC/W33	23134 CCK/W33
	280	109	1 070	1 860	170	900	1 200	27,5	* 24134 CC/W33	24134 CCK30/W33
	310	86	978	1 460	132	1 300	1 700	28,5	22234 CC/W33	22234 CCK/W33
	310	110	1 220	1 930	173	950	1 300	37,5	23234 CC/W33	23234 CCK/W33
	360	120	1 760	2 160	176	950	1 300	61,0	22334 CC/W33	22334 CCK/W33
180	250	52	431	830	76,5	1 700	2 200	7,90	23936 CC/W33	–
	280	74	850	1 250	114	1 400	1 800	17,0	23036 CC/W33	23036 CCK/W33
	280	100	937	1 730	156	950	1 300	23,0	* 24036 CC/W33	24036 CCK30/W33
	300	96	1 050	1 760	160	1 100	1 500	28,0	23136 CC/W33	23136 CCK/W33
	300	118	1 220	2 160	196	900	1 200	34,5	24136 CC/W33	24136 CCK30/W33
	320	86	1 180	1 560	140	1 300	1 700	29,5	22236 CC/W33	22236 CCK/W33
	320	112	1 290	2 120	186	900	1 200	39,5	23236 CC/W33	23236 CCK/W33
	380	126	1 730	2 450	193	900	1 200	71,5	22336 CC/W33	22336 CCK/W33

The designations of EXPLORER bearings are printed in blue

* Also available with seals on both sides



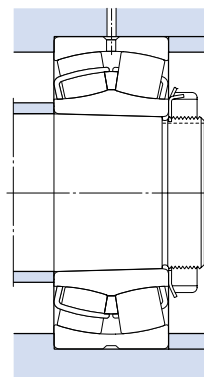
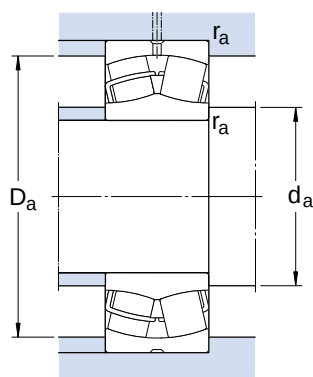
Dimensions						Abutment and fillet dimensions			Calculation factors			
d	d ₂	D ₁	b	K	r _{1,2} min	d _a min	D _a max	r _a max	e	Y ₁	Y ₂	Y ₀
mm						mm			—			
140	158	190	8,3	4,5	2	150	200	2	0,22	3	4,6	2,8
	155	185	5,5	3	2	150	200	2	0,30	2,3	3,4	2,2
	159	197	8,3	4,5	2,1	152	213	2	0,28	2,4	3,6	2,5
	156	193	8,3	4,5	2,1	152	213	2	0,35	1,9	2,9	1,8
	166	216	11,1	6	3	154	236	2,5	0,26	2,6	3,9	2,5
	165	212	11,1	6	3	154	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
	169	203	8,3	4,5	2,1	161	214	2	0,22	3	4,6	2,8
	165	197	5,5	3	2,1	161	214	2	0,30	2,3	3,4	2,2
	172	216	11,1	6	2,1	162	238	2	0,30	2,3	3,4	2,2
150	169	211	8,3	4,5	2,1	162	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
	175	228	11,1	6	3	164	256	2,5	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
	180	217	11,1	6	2,1	171	229	2	0,22	3	4,6	2,8
	176	211	8,3	4,5	2,1	171	229	2	0,30	2,3	3,4	2,2
	184	234	13,9	7,5	2,1	172	258	2	0,30	2,3	3,4	2,2
	181	228	8,3	4,5	2,1	172	258	2	0,40	1,7	2,5	1,6
	191	250	13,9	7,5	3	174	276	2,5	0,26	2,6	3,9	2,5
	188	244	13,9	7,5	3	174	276	2,5	0,35	1,9	2,9	1,8
160	200	282	16,7	9	4	177	323	3	0,35	1,9	2,9	1,8
	191	232	11,1	6	2,1	181	249	2	0,23	2,9	4,4	2,8
	188	226	8,3	4,5	2,1	181	249	2	0,33	2	3	2
	195	244	13,9	7,5	2,1	182	268	2	0,30	2,3	3,4	2,2
	190	237	8,3	4,5	2,1	182	268	2	0,37	1,8	2,7	1,8
	203	267	16,7	9	4	187	293	3	0,27	2,5	3,7	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
	199	231	5,5	3	2	190	240	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
170	201	243	8,3	4,5	2,1	191	269	2	0,33	2	3	2
	207	259	13,9	7,5	3	194	286	2,5	0,30	2,3	3,4	2,2
	203	253	11,1	6	3	194	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
	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



Principal dimensions			Basic load ratings		Fatigue load limit	Speed ratings		Mass	Designations	
d	D	B	dynamic C	static C ₀	P _u	Lubrication grease	oil		Bearings with cylindrical bore	tapered bore
mm			kN		kN	r/min		kg	–	
190	260	52	414	800	76,5	1 700	2 200	8,30	23938 CC/W33	–
	290	75	880	1 340	122	1 300	1 700	18,0	23038 CC/W33	23038 CCK/W33
	290	100	978	1 800	163	950	1 300	24,5	24038 CC/W33	24038 CCK30/W33
	320	104	1 400	2 080	183	1 000	1 400	35,0	23138 CC/W33	23138 CCK/W33
	320	128	1 400	2 500	212	850	1 100	43,0	* 24138 CC/W33	24138 CCK30/W33
	340	92	1 110	1 700	150	1 200	1 600	36,5	22238 CC/W33	22238 CCK/W33
	340	120	1 460	2 400	208	850	1 100	48,0	23238 CC/W33	23238 CCK/W33
	400	132	1 870	2 650	208	850	1 100	82,5	22338 CC/W33	22338 CCK/W33
	280	60	546	1 040	93	1 600	2 000	11,5	23940 CC/W33	–
	310	82	880	1 530	137	1 200	1 600	23,3	23040 CC/W33	23040 CCK/W33
200	310	109	1 130	2 120	186	900	1 200	31,0	24040 CC/W33	24040 CCK30/W33
	340	112	1 600	2 360	204	950	1 300	43,0	23140 CC/W33	23140 CCK/W33
	340	140	1 580	2 800	232	800	1 000	53,5	* 24140 CC/W33	24140 CCK30/W33
	360	98	1 460	1 930	166	1 100	1 500	43,5	22240 CC/W33	22240 CCK/W33
	360	128	1 610	2 700	228	850	1 100	58,0	* 23240 CC/W33	23240 CCK/W33
	420	138	2 020	2 900	224	850	1 100	95,0	22340 CC/W33	22340 CCK/W33
	300	60	546	1 080	93	1 500	1 900	12,5	* 23944 CC/W33	–
	340	90	1 050	1 860	163	1 100	1 500	30,5	23044 CC/W33	23044 CCK/W33
	340	118	1 360	2 600	212	850	1 100	40,0	24044 CC/W33	24044 CCK30/W33
	370	120	1 800	2 750	232	900	1 200	53,5	23144 CC/W33	23144 CCK/W33
220	370	150	1 840	3 350	285	750	950	67,0	24144 CC/W33	24144 CCK30/W33
	400	108	1 760	2 360	196	950	1 300	60,5	22244 CC/W33	22244 CCK/W33
	400	144	2 070	3 450	285	750	950	81,5	23244 CC/W33	23244 CCK/W33
	460	145	2 350	3 450	260	750	950	120	22344 CC/W33	22344 CCK/W33
	320	60	564	1 160	98	1 300	1 700	13,5	23948 CC/W33	–
	360	92	1 290	2 080	176	1 000	1 400	33,5	23048 CC/W33	23048 CCK/W33
	360	118	1 380	2 700	228	800	1 000	43,0	24048 CC/W33	24048 CCK30/W33
	400	128	2 080	3 200	255	850	1 100	66,5	23148 CC/W33	23148 CCK/W33
	400	160	2 100	3 900	325	670	850	83,0	24148 CC/W33	24148 CCK30/W33
	440	120	1 910	3 000	245	900	1 200	83,0	22248 CC/W33	22248 CCK/W33
240	440	160	2 530	4 300	345	670	850	110	23248 CC/W33	23248 CCK/W33
	500	155	2 670	4 000	290	670	850	155	22348 CC/W33	22348 CCK/W33
	360	75	880	1 800	156	1 100	1 500	23,5	23952 CC/W33	–
	400	104	1 600	2 550	212	900	1 200	48,5	23052 CC/W33	23052 CCK/W33
	400	140	1 760	3 450	285	700	900	65,5	24052 CC/W33	24052 CCK30/W33
	440	144	2 550	3 900	290	800	1 000	90,5	23152 CC/W33	23152 CCK/W33
	440	180	2 620	4 800	390	600	750	110	24152 CC/W33	24152 CCK30/W33
	480	130	2 300	3 550	285	850	1 100	110	22252 CAC/W33	22252 CACK/W33
	480	174	2 820	4 750	360	630	800	140	23252 CAC/W33	23252 CACK/W33
	540	165	3 050	4 550	325	630	800	190	22352 CC/W33	22352 CCK/W33

The designations of EXPLORER bearings are printed in blue

* Also available with seals on both sides

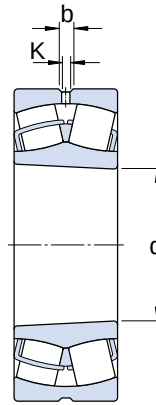
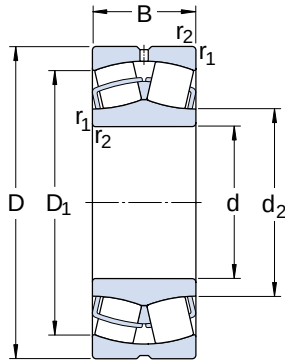


Dimensions

Abutment and
fillet dimensions

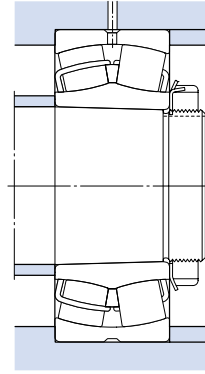
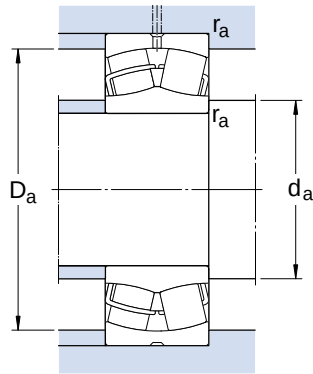
Calculation factors

d	d ₂	D ₁	b	K	r _{1,2} min	d _a min	D _a max	r _a max	e	Y ₁	Y ₂	Y ₀
mm						mm			—			
190	209	240	5,5	3	2	200	250	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	276	13,9	7,5	3	204	306	2,5	0,31	2,2	3,3	2,2
	215	268	11,1	6	3	204	306	2,5	0,40	1,7	2,5	1,6
	225	294	16,7	9	4	207	323	3	0,26	2,6	3,9	2,5
	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
	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
200	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
	226	284	11,1	6	3	214	326	2,5	0,40	1,7	2,5	1,6
	238	313	16,7	9	4	217	343	3	0,26	2,6	3,9	2,5
	235	304	16,7	9	4	217	343	3	0,35	1,9	2,9	1,8
	249	351	22,3	12	5	220	400	4	0,33	2	3	2
	241	278	8,3	4,5	2,1	231	289	2	0,16	4,2	6,3	4
	250	306	13,9	7,5	3	233	327	2,5	0,24	2,8	4,2	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	0,30	2,3	3,4	2,2
220	248	310	11,1	6	4	237	353	3	0,40	1,7	2,5	1,6
	263	346	16,7	9	4	237	383	3	0,27	2,5	3,7	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
	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	316	11,1	6	3	253	347	2,5	0,30	2,3	3,4	2,2
	277	348	16,7	9	4	257	383	3	0,30	2,3	3,4	2,2
	271	336	11,1	6	4	257	383	3	0,40	1,7	2,5	1,6
	290	683	22,3	12	4	257	423	3	0,27	2,5	3,7	2,5
240	287	374	22,3	12	4	257	423	3	0,35	1,9	2,9	1,8
	304	422	22,3	12	5	260	480	4	0,31	2,2	3,3	2,2
	287	331	8,3	4,5	2,1	271	348	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	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
	294	368	13,9	7,5	4	277	423	3	0,40	1,7	2,5	1,6
	328	420	22,3	12	5	280	460	4	0,27	2,5	3,7	2,5
	328	408	22,3	12	5	280	460	4	0,35	1,9	2,9	1,8
	329	457	22,3	12	6	286	514	5	0,31	2,2	3,3	2,2



Principal dimensions			Basic load ratings		Fatigue load limit	Speed ratings		Mass	Designations	
d	D	B	dynamic C	static C ₀	P _u	Lubrication grease	oil		Bearings with cylindrical bore	tapered bore
mm			kN		kN	r/min		kg	–	
280	380	75	845	1 760	143	1 000	1 400	25,0	23956 CC/W33	–
	420	106	1 730	2 850	224	850	1 100	52,5	23056 CC/W33	23056 CCK/W33
	420	140	1 870	3 800	285	670	850	69,5	24056 CC/W33	24056 CCK30/W33
	460	146	2 650	4 250	335	750	950	97,0	23156 CC/W33	23156 CCK/W33
	460	180	2 670	5 100	415	560	700	120	24156 CC/W33	24156 CCK30/W33
	500	130	2 350	3 750	300	800	1 000	115	22256 CAC/W33	22256 CACK/W33
	500	176	2 820	4 900	365	600	750	150	23256 CAC/W33	23256 CACK/W33
	580	175	3 450	5 200	365	600	750	235	22356 CC/W33	22356 CCK/W33
	420	90	1 200	2 500	200	950	1 300	39,5	23960 CC/W33	23960 CCK/W33
	460	118	2 120	3 450	265	800	1 000	71,5	23060 CC/W33	23060 CCK/W33
300	460	160	2 350	4 750	355	600	750	97,0	24060 CC/W33	24060 CCK30/W33
	500	160	3 200	5 100	380	670	850	125	23160 CC/W33	23160 CCK/W33
	500	200	3 280	6 300	465	530	670	160	24160 CC/W33	24160 CCK30/W33
	540	140	2 760	4 250	325	750	950	145	22260 CAC/W33	22260 CACK/W33
	540	192	3 340	5 850	425	530	670	190	23260 CAC/W33	23260 CACK/W33
	400	60	673	1 660	140	950	1 300	17,5	23864 CACMA	23864 CACKMA
	440	90	1 240	2 700	212	900	1 200	42,0	23964 CAC/W33	23964 CACK/W33
	480	121	2 240	3 800	285	800	1 000	78,0	23064 CC/W33	23064 CCK/W33
	480	160	2 480	5 100	400	560	700	100	24064 CC/W33	24064 CCK30/W33
	540	176	3 750	6 000	440	630	800	165	23164 CC/W33	23164 CCK/W33
320	540	218	3 740	7 100	510	480	600	210	24164 CC/W33	24164 CCK30/W33
	580	150	3 160	4 900	375	670	850	175	22264 CAC/W33	22264 CACK/W33
	580	208	3 850	6 700	475	500	630	240	23264 CAC/W33	23264 CACK/W33
	420	60	690	1 730	143	630	800	18,5	23868 CACMA/W20	–
	460	90	1 270	2 800	216	900	1 200	45,5	23968 CC/W33	23968 CCK/W33
	520	133	2 700	4 550	335	700	900	105	23068 CC/W33	23068 CCK/W33
	520	180	2 990	6 200	475	530	670	140	24068 CC/W33	24068 CCK30/W33
	580	190	4 250	6 800	480	600	750	210	23168 CC/W33	23168 CCK/W33
	580	243	4 660	8 650	635	450	560	280	24168 ECAC/W33	24168 ECACK30/W33
	620	224	4 660	8 300	570	430	530	295	23268 CA/W33	23268 CAK/W33
360	480	90	1 220	2 750	212	850	1 100	43,0	23972 CC/W33	23972 CCK/W33
	540	134	2 750	4 800	345	670	850	110	23072 CC/W33	23072 CCK/W33
	540	180	3 110	6 550	490	500	630	145	24072 CC/W33	24072 CCK30/W33
	600	192	4 300	6 950	490	560	700	220	23172 CAC/W33	23172 CACK/W33
	600	243	4 890	9 300	670	430	530	270	24172 ECCJ/W33	24172 ECCK30J/W33
	650	170	3 740	6 200	440	600	750	255	22272 CA/W33	22272 CAK/W33
	650	232	4 660	8 300	570	400	500	335	23272 CA/W33	23272 CAK/W33

The designations of EXPLORER bearings are printed in blue

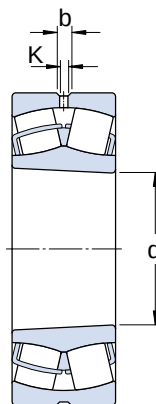
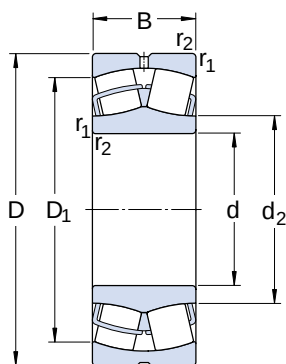


Dimensions

Abutment and fillet dimensions

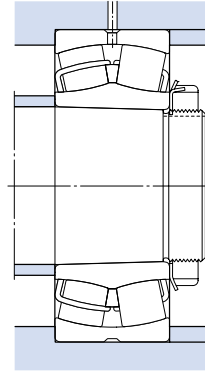
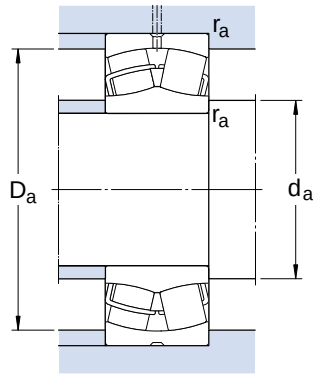
Calculation factors

d	d ₂	D ₁	b	K	r _{1,2} min	d _a min	D _a max	r _a max	e	Y ₁	Y ₂	Y ₀
mm						mm			—			
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	400	16,7	9	5	300	440	4	0,30	2,3	3,4	2,2
	315	390	13,9	7,5	5	300	440	4	0,40	1,7	2,5	1,6
	350	441	22,3	12	5	300	480	4	0,26	2,6	3,9	2,5
	349	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	0,30	2,3	3,4	2,2
	333	385	11,1	6	3	313	407	2,5	0,19	3,6	5,3	3,6
	340	413	16,7	9	4	315	445	3	0,23	2,9	4,4	2,8
	331	400	13,9	7,5	4	315	445	3	0,33	2	3	2
	345	434	16,7	9	5	320	480	4	0,30	2,3	3,4	2,2
300	339	422	13,9	7,5	5	320	480	4	0,40	1,7	2,5	1,6
	371	478	22,3	12	5	320	520	4	0,26	2,6	3,9	2,5
	373	461	22,3	12	5	320	520	4	0,35	1,9	2,9	1,8
	347	377	—	—	2,1	331	389	2	0,12	5,6	8,4	5,6
	360	405	11,1	6	3	333	427	2,5	0,18	3,8	5,6	3,6
	360	433	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
	364	455	16,7	9	5	340	520	4	0,40	1,7	2,5	1,6
	399	513	22,3	12	5	340	560	4	0,26	2,6	3,9	2,5
	400	494	22,3	12	5	340	560	4	0,35	1,9	2,9	1,8
	367	398	—	4,5	2,1	351	409	2	0,12	5,6	8,4	5,6
320	374	426	11,1	6	3	353	447	2,5	0,17	4	5,9	4
	385	467	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
	403	491	16,7	9	5	360	560	4	0,40	1,7	2,5	1,6
	426	528	22,3	12	6	366	594	5	0,35	1,9	2,9	1,8
	394	447	11,1	6	3	373	467	2,5	0,15	4,5	6,7	4,5
	404	482	22,3	12	5	378	522	4	0,23	2,9	4,4	2,8
	398	474	16,7	9	5	378	522	4	0,31	2,2	3,3	2,2
	435	524	22,3	12	5	380	580	4	0,30	2,3	3,4	2,2
	406	506	16,7	9	5	380	580	4	0,37	1,8	2,7	1,8
	453	566	22,3	12	6	386	624	5	0,26	2,6	3,9	2,5
340	447	552	22,3	12	6	386	624	5	0,35	1,9	2,9	1,8



Principal dimensions			Basic load ratings		Fatigue load limit	Speed ratings		Mass	Designations	
d	D	B	dynamic C	static C ₀	P _u	Lubrication grease	oil		Bearings with cylindrical bore	tapered bore
mm			kN		kN		r/min	kg	–	
380	520	106	1 730	3 800	285	800	1 000	69,0	23976 CC/W33	23976 CCK/W33
	560	135	2 850	5 000	360	630	800	115	23076 CC/W33	23076 CCK/W33
	560	180	3 160	6 800	475	480	600	150	24076 CC/W33	24076 CCK30/W33
	620	194	3 740	7 100	500	400	500	230	23176 CA/W33	23176 CAK/W33
	620	243	5 060	9 800	710	340	430	300	24176 ECA/W33	24176 ECAK30/W33
	680	240	5 060	9 150	620	380	480	375	23276 CA/W33	23276 CAK/W33
400	540	106	1 730	3 900	290	750	950	71,0	23980 CAC/W33	23980 CACK/W33
	600	148	3 250	5 700	400	600	750	150	23080 CAC/W33	23080 CACK/W33
	600	200	3 740	8 000	560	450	560	205	24080 ECAC/W33	24080 ECACK30/W33
	650	200	4 080	7 650	530	380	480	265	23180 CA/W33	23180 CAK/W33
	650	250	5 350	10 600	735	320	400	340	24180 ECA/W33	24180 ECAK30/W33
	720	256	5 750	10 400	680	340	430	450	23280 CA/W33	23280 CAK/W33
420	820	243	6 560	10 400	670	360	450	650	22380 CA/W33	22380 CAK/W33
	560	106	1 760	4 150	300	700	900	74,5	23984 CAC/W33	23984 CACK/W33
	620	150	2 990	6 000	415	450	560	155	23084 CA/W33	23084 CAK/W33
	620	200	3 850	8 300	585	380	480	210	24084 ECA/W33	24084 ECAK30/W33
	700	224	4 890	9 300	620	360	450	350	23184 CJ/W33	23184 CKJ/W33
	700	280	6 330	12 600	850	300	380	445	24184 ECA/W33	24184 ECAK30/W33
440	760	272	6 330	11 600	765	320	400	535	23284 CA/W33	23284 CAK/W33
	600	118	2 100	4 900	345	670	850	99,5	23988 CAC/W33	23988 CACK/W33
	650	157	3 220	6 550	450	430	530	180	23088 CA/W33	23088 CAK/W33
	650	212	4 140	9 150	630	360	450	245	24088 ECA/W33	24088 ECAK30/W33
	720	226	5 180	10 000	670	340	430	360	23188 CA/W33	23188 CAK/W33
	720	280	6 560	13 200	900	280	360	460	24188 ECA/W33	24188 ECAK30/W33
460	790	280	6 730	12 500	800	320	400	590	23288 CA/W33	23288 CAK/W33
	580	118	1 790	4 900	345	450	560	75,5	24892 CAMA/W20	24892 CAK30MA/W20
	620	118	2 190	5 000	355	430	530	105	23992 CA/W33	23992 CAK/W33
	680	163	3 450	6 950	465	400	500	205	23092 CA/W33	23092 CAK/W33
	680	218	4 490	10 000	670	340	430	275	24092 ECA/W33	24092 ECAK30/W33
	760	240	5 640	10 800	680	320	400	440	23192 CA/W33	23192 CAK/W33
480	760	300	7 250	14 600	1 000	260	340	560	24192 ECA/W33	24192 ECAK30/W33
	830	296	7 360	13 700	880	300	380	695	23292 CA/W33	23292 CAK/W33
	600	90	1 440	3 750	280	430	530	61,0	23896 CAMA/W20	23896 CAKMA/W20
	650	128	2 530	5 700	405	400	500	125	23996 CA/W33	23996 CAK/W33
	700	165	3 340	6 800	450	380	480	215	23096 CA/W33	23096 CAK/W33
	700	218	4 600	10 400	695	340	430	285	24096 ECA/W33	24096 ECAK30/W33
480	790	248	6 100	12 000	780	300	380	485	23196 CA/W33	23196 CAK/W33
	790	308	7 710	15 600	1 040	240	320	605	24196 ECA/W33	24196 ECAK30/W33
	870	310	8 170	15 000	950	260	340	800	23296 CA/W33	23296 CAK/W33

The designations of EXPLORER bearings are printed in blue

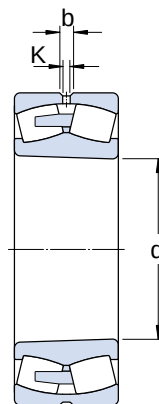
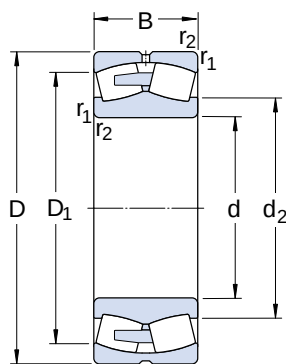


Dimensions

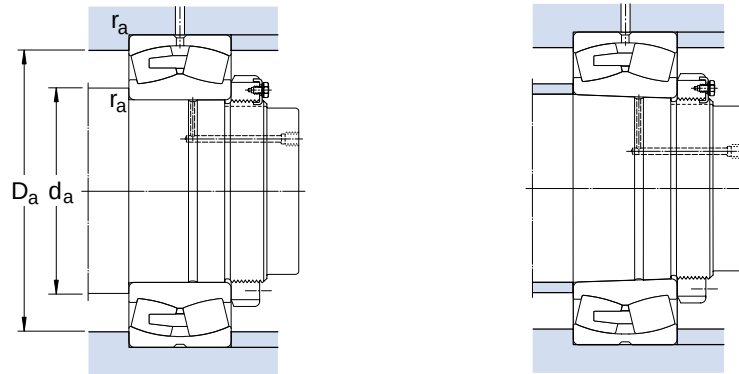
Abutment and
fillet dimensions

Calculation factors

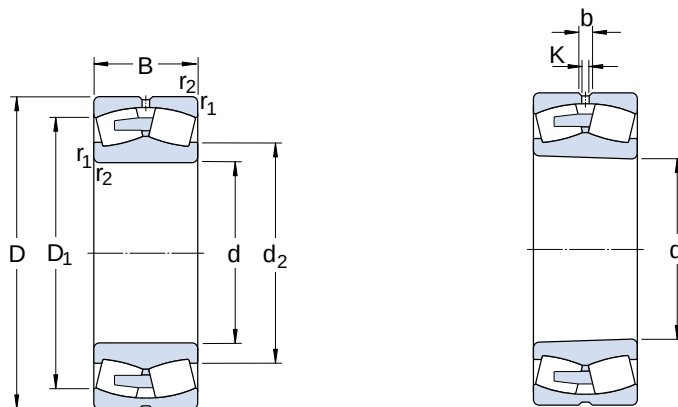
d	d ₂	D ₁	b	K	r _{1,2} min	d _a min	D _a max	r _a max	e	Y ₁	Y ₂	Y ₀
mm						mm			—			
380	420	481	13,9	7,5	4	395	505	3	0,17	4	5,9	4
	425	508	22,3	12	5	398	542	4	0,22	3	4,6	2,8
	420	496	16,7	9	5	398	542	4	0,30	2,3	3,4	2,2
	452	541	22,3	12	5	400	600	4	0,30	2,3	3,4	2,2
	446	529	16,7	9	5	400	600	4	0,37	1,8	2,7	1,8
	471	581	22,3	12	6	406	654	5	0,35	1,9	2,9	1,8
400	446	500	13,9	7,5	4	415	525	3	0,17	4	5,9	4
	465	541	22,3	12	5	418	582	4	0,23	2,9	4,4	2,8
	456	526	22,3	12	5	418	582	4	0,30	2,3	3,4	2,2
	474	566	22,3	12	6	426	624	5	0,28	2,4	3,6	2,5
	468	554	22,3	12	6	426	624	5	0,37	1,8	2,7	1,8
	499	615	22,3	12	6	426	694	5	0,35	1,9	2,9	1,8
420	534	697	22,3	12	7,5	432	788	6	0,30	2,3	3,4	2,2
	466	519	16,7	9	4	435	545	3	0,16	4,2	6,3	4
	485	562	22,3	12	5	438	602	4	0,22	3	4,6	2,8
	476	547	22,3	12	5	438	602	4	0,30	2,3	3,4	2,2
	483	607	22,3	12	6	446	674	5	0,30	2,3	3,4	2,2
	496	590	22,3	12	6	446	674	5	0,37	1,8	2,7	1,8
440	525	649	22,3	12	7,5	452	728	6	0,35	1,9	2,9	1,8
	492	552	16,7	9	4	455	585	3	0,17	4	5,9	4
	509	589	22,3	12	6	463	627	5	0,22	3	4,6	2,8
	498	572	22,3	12	6	463	627	5	0,30	2,3	3,4	2,2
	528	632	22,3	12	6	466	694	5	0,30	2,3	3,4	2,2
	516	610	22,3	12	6	466	694	5	0,37	1,8	2,7	1,8
460	547	676	22,3	12	7,5	472	758	6	0,35	1,9	2,9	1,8
	505	541	—	6	3	473	567	2,5	0,17	4	5,9	3,7
	512	573	16,7	9	4	475	605	3	0,16	4,2	6,3	4
	531	616	22,3	12	6	483	657	5	0,22	3	4,6	2,8
	523	601	22,3	12	6	483	657	5	0,28	2,4	3,6	2,5
	553	665	22,3	12	7,5	492	728	6	0,30	2,3	3,4	2,2
480	544	649	22,3	12	7,5	492	728	6	0,37	1,8	2,7	1,8
	572	706	22,3	12	7,5	492	798	6	0,35	1,9	2,9	1,8
	521	566	—	7,5	3	493	587	2,5	0,13	5,2	7,7	5
	532	601	16,7	9	5	498	632	4	0,18	3,8	5,6	3,6
	547	632	22,3	12	6	503	677	5	0,21	3,2	4,8	3,2
	541	619	22,3	12	6	503	677	5	0,28	2,4	3,6	2,5
	577	692	22,3	12	7,5	512	758	6	0,30	2,3	3,4	2,2
	564	678	22,3	12	7,5	512	758	6	0,37	1,8	2,7	1,8
	600	741	22,3	12	7,5	512	838	6	0,35	1,9	2,9	1,8



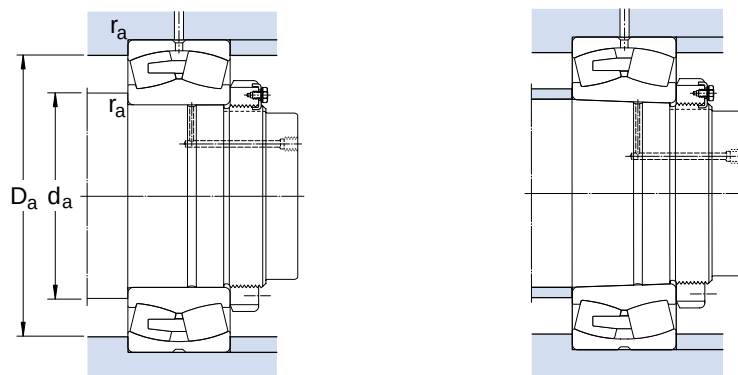
Principal dimensions			Basic load ratings		Fatigue load limit	Speed ratings		Mass	Designations	
d	D	B	dynamic C	static C ₀	P _u	Lubrication grease	oil		Bearings with cylindrical bore	tapered bore
mm			kN		kN		r/min	kg	–	
500	620	90	1 480	4 000	290	430	530	62,0	238/500 CAMA/W20	238/500 CAKMA/W20
	670	128	2 530	6 000	415	400	500	130	239/500 CA/W33	239/500 CAK/W33
	720	167	3 680	7 800	510	380	480	225	230/500 CA/W33	230/500 CAK/W33
	720	218	4 770	11 000	735	320	400	295	240/500 ECA/W33	240/500 ECAK30/W33
	830	264	6 730	12 900	830	280	360	580	231/500 CA/W33	231/500 CAK/W33
	830	325	8 630	17 000	1 120	220	300	745	241/500 ECA/W33	241/500 ECAK30/W33
	920	336	9 370	17 300	1 120	240	320	985	232/500 CA/W33	232/500 CAK/W33
	870	272	7 130	14 000	915	260	340	645	231/530 CA/W33	231/530 CAK/W33
	870	335	9 200	19 000	1 220	200	280	830	241/530 ECA/W33	241/530 ECAK30/W33
	980	355	11 100	20 400	1 220	220	300	1 200	232/530 CA/W33	232/530 CAK/W33
530	650	118	1 840	5 300	380	380	480	86,0	248/530 CAMA/W20	248/530 CAK30MA/W20
	710	136	2 820	6 700	480	360	450	155	239/530 CA/W33	239/530 CAK/W33
	780	185	4 370	9 300	630	340	430	310	230/530 CA/W33	230/530 CAK/W33
	780	250	5 750	13 200	830	280	360	410	240/530 ECA/W33	240/530 ECAK30/W33
	870	272	7 130	14 000	915	260	340	645	231/530 CA/W33	231/530 CAK/W33
	870	335	9 200	19 000	1 220	200	280	830	241/530 ECA/W33	241/530 ECAK30/W33
	980	355	11 100	20 400	1 220	220	300	1 200	232/530 CA/W33	232/530 CAK/W33
	820	195	4 890	10 200	680	320	400	355	230/560 CA/W33	230/560 CAK/W33
	820	258	6 330	14 600	960	260	340	465	240/560 ECA/W33	240/560 ECAK30/W33
	920	280	7 990	16 000	980	240	320	740	231/560 CA/W33	231/560 CAK/W33
560	920	355	10 500	21 600	1 340	190	260	985	241/560 ECJ/W33	241/560 ECK30J/W33
	1 030	365	11 500	22 000	1 400	200	280	1 350	232/560 CA/W33	232/560 CAK/W33
	800	150	3 450	8 300	585	320	400	220	239/600 CA/W33	239/600 CAK/W33
	870	200	5 230	11 400	750	300	380	405	230/600 CA/W33	230/600 CAK/W33
	870	272	7 130	17 000	1 100	240	320	520	240/600 ECA/W33	240/600 ECAK30/W33
	980	300	8 970	18 000	1 140	200	280	895	231/600 CA/W33	231/600 CAK/W33
	980	375	11 500	23 600	1 460	180	240	1 200	241/600 ECA/W33	241/600 ECAK30/W33
	1 090	388	13 100	25 500	1 560	190	260	1 600	232/600 CA/W33	232/600 CAK/W33
	780	112	2 190	6 100	415	320	400	120	238/630 CAMA/W20	238/630 CAKMA/W20
	850	165	3 970	9 800	640	280	360	280	239/630 CA/W33	239/630 CAK/W33
600	920	212	5 750	12 500	800	260	340	485	230/630 CA/W33	230/630 CAK/W33
	920	290	7 710	18 000	1 140	220	300	645	240/630 ECJ/W33	240/630 ECK30J/W33
	1 030	315	10 500	20 800	1 220	190	260	1 050	231/630 CA/W33	231/630 CAK/W33
	1 030	400	12 700	27 000	1 630	170	220	1 400	241/630 ECA/W33	241/630 ECAK30/W33
	820	112	2 250	6 400	440	280	360	130	238/670 CAMA/W20	238/670/ CAKMA/W20
	820	150	3 110	9 500	655	280	360	172	248/670 CAMA/W20	–
	900	170	4 370	10 800	695	260	340	315	239/670 CA/W33	239/670 CAK/W33
	980	230	6 560	14 600	915	240	320	600	230/670 CA/W33	230/670 CAK/W33
	980	308	8 630	20 400	1 320	200	280	790	240/670 ECA/W33	240/670 ECAK30/W33
	1 090	336	10 900	22 400	1 370	180	240	1 250	231/670 CA/W33	231/670 CAK/W33
670	1 090	412	13 800	29 000	1 760	160	200	1 600	241/670 ECA/W33	241/670 ECAK30/W33
	1 220	438	15 400	30 500	1 700	170	220	2 270	232/670 CA/W33	232/670 CAK/W33



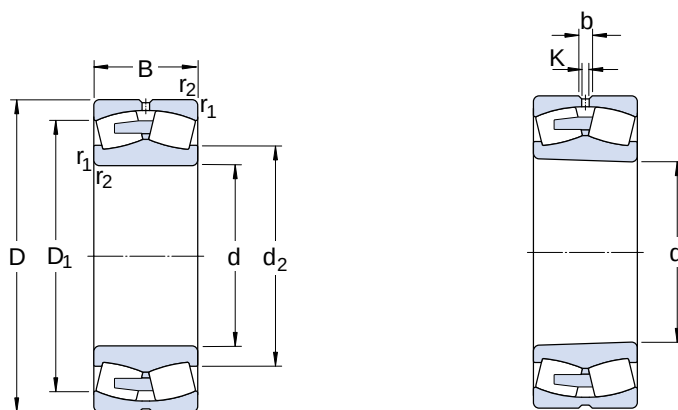
Dimensions						Abutment and fillet dimensions			Calculation factors			
d	d ₂	D ₁	b	K	r _{1,2} min	d _a min	D _a max	r _a max	e	Y ₁	Y ₂	Y ₀
mm						mm			—			
500	543	587	—	7,5	3	513	607	2,5	0,12	5,6	8,4	5,6
	557	621	22,3	12	5	518	652	4	0,17	4	5,9	4
	571	656	22,3	12	6	523	697	5	0,21	3,2	4,8	3,2
	565	643	22,3	12	6	523	697	5	0,26	2,6	3,9	2,5
	603	726	22,3	12	7,5	532	798	6	0,30	2,3	3,4	2,2
	589	713	22,3	12	7,5	532	798	6	0,37	1,8	2,7	1,8
	631	779	22,3	12	7,5	532	888	6	0,35	1,9	2,9	1,8
	573	612	—	7,5	3	543	637	2,5	0,15	4,5	6,7	4,5
	589	659	22,3	12	5	548	692	4	0,17	4	5,9	4
	611	708	22,3	12	6	553	757	5	0,22	3	4,6	2,8
530	600	687	22,3	12	6	553	757	5	0,28	2,4	3,6	2,5
	636	763	22,3	12	7,5	562	838	6	0,30	2,3	3,4	2,2
	623	748	22,3	12	7,5	562	838	6	0,37	1,8	2,7	1,8
	668	836	22,3	12	9,5	570	940	8	0,35	1,9	2,9	1,8
	625	695	22,3	12	5	578	732	4	0,16	4,2	6,3	4
560	644	745	22,3	12	6	583	797	5	0,22	3	4,6	2,8
	635	728	22,3	12	6	583	797	5	0,28	2,4	3,6	2,5
	673	808	22,3	12	7,5	592	888	6	0,30	2,3	3,4	2,2
	634	796	22,3	12	7,5	592	888	6	0,37	1,8	2,7	1,8
	704	877	22,3	12	9,5	600	990	8	0,35	1,9	2,9	1,8
	668	742	22,3	12	5	618	782	4	0,17	4	5,9	4
600	683	786	22,3	12	6	623	847	5	0,22	3	4,6	2,8
	675	774	22,3	12	6	623	847	5	0,30	2,3	3,4	2,2
	720	862	22,3	12	7,5	632	948	6	0,30	2,3	3,4	2,2
	702	845	22,3	12	7,5	632	948	6	0,35	1,9	2,9	1,8
	752	928	22,3	12	9,5	640	1 050	8	0,37	1,8	2,7	1,8
	681	738	—	9	4	645	765	3	0,12	5,6	8,4	5,6
630	705	786	22,3	12	6	653	827	5	0,17	4	5,9	4
	725	837	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
	757	908	22,3	12	7,5	662	998	6	0,30	2,3	3,4	2,2
	738	885	22,3	12	7,5	662	998	6	0,37	1,8	2,7	1,8
	720	778	—	9	4	685	805	3	0,11	6,1	9,1	6,3
670	718	786	—	9	4	685	805	3	0,16	4,2	6,3	4
	749	834	22,3	12	6	693	877	5	0,17	4	5,9	4
	770	890	22,3	12	7,5	698	952	6	0,21	3,2	4,8	3,2
	756	866	22,3	12	7,5	698	952	6	0,28	2,4	3,6	2,5
	802	958	22,3	12	7,5	702	1 058	6	0,30	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
	830	1 027	22,3	12	12	718	1 172	10	0,35	1,9	2,9	1,8
	802	958	22,3	12	7,5	702	1 058	6	0,30	2,3	3,4	2,2



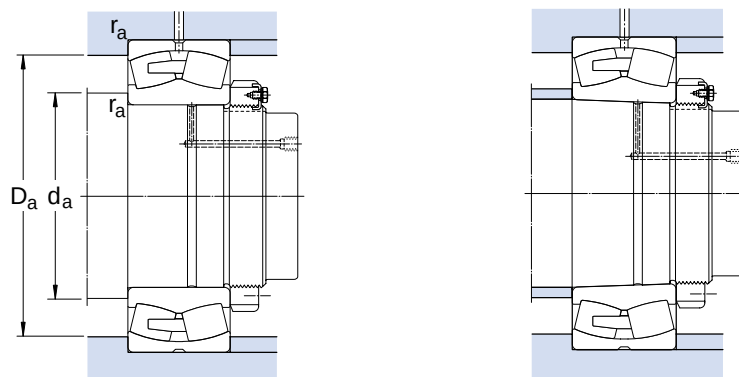
Principal dimensions			Basic load ratings		Fatigue load limit	Speed ratings		Mass	Designations	
d	D	B	dynamic C	static C ₀	P _u	Lubrication grease	oil		Bearings with cylindrical bore	tapered bore
mm			kN		kN		r/min	kg	–	
710	870	118	2 580	7 500	500	260	340	153	238/710 CAMA/W20	–
	950	180	4 770	12 000	765	240	320	365	239/710 CA/W33	239/710 CAK/W33
	950	243	5 870	15 600	930	200	280	495	249/710 CA/W33	249/710 CAK30/W33
	1 030	236	7 250	16 300	1 000	220	300	670	230/710 CA/W33	230/710 CAK/W33
	1 030	315	9 370	22 800	1 370	190	260	895	240/710 ECA/W33	240/710 ECAK30/W33
	1 150	345	12 200	26 000	1 530	180	240	1 450	231/710 CA/W33	231/710 CAK/W33
	1 150	438	15 200	32 500	1 900	150	190	1 900	241/710 ECA/W33	241/710 ECAK30/W33
	1 280	450	17 600	34 500	2 000	160	200	1 450	232/710 CA/W33	232/710 CAK/W33
	920	128	2 930	8 500	550	240	320	135	238/750 CAMA/W20	238/750 CAKMA/W20
	1 000	185	5 180	13 200	815	220	300	420	239/750 CA/W33	239/750 CAK/W33
750	1 000	250	6 560	18 000	1 100	190	260	560	249/750 CA/W33	249/750 CAK30/W33
	1 090	250	8 450	18 600	1 100	200	280	795	230/750 CA/W33	230/750 CAK/W33
	1 090	335	10 100	25 000	1 460	180	240	1 065	240/750 ECA/W33	240/750 ECAK30/W33
	1 220	365	13 600	29 000	1 660	170	220	1 700	231/750 CA/W33	231/750 CAK/W33
	1 220	475	17 300	37 500	2 160	140	180	2 100	241/750 ECA/W33	241/750 ECAK30/W33
	1 360	475	18 700	36 500	2 120	150	190	3 050	232/750 CAF/W33	232/750 CAKF/W33
	980	180	4 140	12 900	830	180	240	300	248/800 CAMA/W20	248/800 CAK30MA/W20
	1 060	195	5 640	14 300	880	200	280	470	239/800 CA/W33	239/800 CAK/W33
	1 060	258	7 020	19 300	1 060	180	240	640	249/800 CA/W33	249/800 CAK30/W33
	1 150	258	8 630	20 000	1 160	190	260	895	230/800 CA/W33	230/800 CAK/W33
800	1 150	345	11 100	28 500	1 730	170	220	1 200	240/800 ECA/W33	240/800 ECAK30/W33
	1 280	375	14 800	31 500	1 800	160	200	1 920	231/800 CA/W33	231/800 CAK/W33
	1 280	475	18 400	40 500	2 320	130	170	2 300	241/800 ECA/W33	241/800 ECAK30/W33
	1 030	136	3 340	10 000	640	190	260	240	238/850 CAMA/W20	238/850 CAKMA/W20
	1 120	200	5 980	15 600	930	190	260	560	239/850 CA/W33	239/850 CAK/W33
	1 120	272	8 170	22 800	1 370	170	220	740	249/850 CA/W33	249/850 CAK30/W33
	1 220	272	9 370	21 600	1 270	180	240	1 050	230/850 CA/W33	230/850 CAK/W33
	1 220	365	12 000	30 000	1 830	160	200	1 410	240/850 ECA/W33	240/850 ECAK30/W33
	1 360	400	16 100	34 500	2 000	140	180	2 200	231/850 CA/W33	231/850 CAK/W33
	1 360	400	20 200	45 000	2 550	110	150	2 710	241/850 ECA/W33	241/850 ECAK30/W33
850	1 090	190	4 660	15 300	950	170	220	370	248/900 CAMA/W20	248/900 CAK30MA/W20
	1 180	206	6 440	17 000	1 020	180	240	605	239/900 CA/W33	239/900 CAK/W33
	1 280	280	10 100	23 200	1 340	170	220	1 200	230/900 CA/W33	230/900 CAK/W33
	1 280	375	13 600	34 500	2 040	150	190	1 570	240/900 ECA/W33	240/900 ECAK30/W33
	1 420	515	21 400	49 000	2 700	100	140	3 350	241/900 ECAF/W33	241/900 ECAK30F/W33
	1 250	224	7 250	19 600	1 120	170	220	755	239/950 CA/W33	239/950 CAK/W33
950	1 250	300	9 200	26 000	1 500	140	180	1 015	249/950 CA/W33	249/950 CAK30/W33
	1 360	300	12 000	28 500	1 600	160	200	1 450	230/950 CA/W33	230/950 CAK/W33
	1 360	412	14 800	39 000	2 320	130	170	1 990	240/950 CAF/W33	240/950 CAK30F/W33
	1 500	545	23 900	55 000	3 000	95	130	3 535	241/950 ECAF/W33	241/950 ECAK30F/W33



Dimensions						Abutment and fillet dimensions			Calculation factors			
d	d ₂	D ₁	b	K	r _{1,2} min	d _a min	D _a max	r _a max	e	Y ₁	Y ₂	Y ₀
mm						mm			—			
710	762	834	—	12	4	725	855	3	0,11	6,1	9,1	6,3
	788	881	22,3	12	6	732	927	5	0,17	4	5,9	4
	792	868	22,3	12	6	732	927	5	0,22	3	4,6	2,8
	814	939	22,3	12	7,5	738	1 002	6	0,21	3,2	4,8	3,2
	807	917	22,3	12	7,5	738	1 002	6	0,27	2,5	3,7	2,5
	850	1 017	22,3	12	9,5	750	1 110	8	0,28	2,4	3,6	2,5
	838	982	22,3	12	9,5	750	1 110	8	0,37	1,8	2,7	1,8
	851	1 017	22,3	12	12	758	1 232	10	0,35	1,9	2,9	1,8
	807	873	—	12	5	768	902	4	0,11	6,1	9,1	6,3
	832	929	22,3	12	6	773	977	5	0,16	4,2	6,3	4
750	830	916	22,3	12	6	773	977	5	0,22	3	4,6	3,2
	860	996	22,3	12	7,5	778	1 062	6	0,21	3,2	4,8	3,2
	853	969	22,3	12	7,5	778	1 062	6	0,28	2,4	3,6	2,5
	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
	938	1 163	22,3	12	15	808	1 302	12	0,35	1,9	2,9	1,8
	865	921	—	12	5	818	962	4	0,15	4,5	6,7	4,5
	885	984	22,3	12	6	823	1 037	5	0,16	4,2	6,3	4
	883	973	22,3	12	6	823	1 037	5	0,21	3,2	4,8	3,2
	915	1 051	22,3	12	7,5	828	1 122	6	0,20	3,4	5	3,2
800	908	1 027	22,3	12	7,5	828	1 122	6	0,27	2,5	3,7	2,5
	950	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
	910	981	—	12	5	868	1 012	4	0,11	6,1	9,1	6,3
	940	1 043	22,3	12	6	873	1 097	5	0,16	4,2	6,3	4
	948	1 028	22,3	12	6	873	1 097	5	0,22	3	4,6	2,8
	969	1 114	22,3	12	7,5	878	1 192	6	0,20	3,4	5	3,2
	954	1 087	22,3	12	7,5	878	1 192	6	0,27	2,5	3,7	2,5
	1 010	1 203	22,3	12	12	898	1 312	10	0,28	2,4	3,6	2,5
	988	1 182	22,3	12	12	898	1 312	10	0,35	1,9	2,9	1,8
850	910	981	—	12	5	868	1 012	4	0,11	6,1	9,1	6,3
	940	1 043	22,3	12	6	873	1 097	5	0,16	4,2	6,3	4
	948	1 028	22,3	12	6	873	1 097	5	0,22	3	4,6	2,8
	969	1 114	22,3	12	7,5	878	1 192	6	0,20	3,4	5	3,2
	954	1 087	22,3	12	7,5	878	1 192	6	0,27	2,5	3,7	2,5
	1 010	1 203	22,3	12	12	898	1 312	10	0,28	2,4	3,6	2,5
	988	1 182	22,3	12	12	898	1 312	10	0,35	1,9	2,9	1,8
900	969	1 029	—	12	5	918	1 072	4	0,14	4,8	7,2	4,5
	989	1 100	22,3	12	6	923	1 157	5	0,15	4,5	6,7	4,5
	1 023	1 177	22,3	12	7,5	928	1 252	6	0,20	3,4	5	3,2
	1 012	1 147	22,3	12	7,5	928	1 252	6	0,26	2,6	3,9	2,5
	1 043	1 235	22,3	12	12	948	1 372	10	0,35	1,9	2,9	1,8
	969	1 029	—	12	5	918	1 072	4	0,14	4,8	7,2	4,5
950	989	1 100	22,3	12	6	923	1 157	5	0,15	4,5	6,7	4,5
	1 023	1 177	22,3	12	7,5	928	1 252	6	0,20	3,4	5	3,2
	1 012	1 147	22,3	12	7,5	928	1 252	6	0,26	2,6	3,9	2,5
	1 043	1 235	22,3	12	12	948	1 372	10	0,35	1,9	2,9	1,8
	1 049	1 161	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
950	1 083	1 242	22,3	12	7,5	978	1 332	6	0,20	3,4	5	3,2
	1 074	1 212	22,3	12	7,5	978	1 332	6	0,27	2,5	3,7	2,5
	1 102	1 305	22,3	12	12	998	1 452	10	0,35	1,9	2,9	1,8
	1 049	1 161	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



Principal dimensions			Basic load ratings		Fatigue load limit	Speed ratings		Mass	Designations	
d	D	B	dynamic C	static C ₀	P _u	Lubrication grease	oil		Bearings with cylindrical bore	tapered bore
mm			kN		kN		r/min	kg	–	
1 000	1 220	165	4 660	14 300	865	170	220	410	238/1000 CAMA/W20	238/1000 CAKMA/W20
	1 320	315	10 400	29 000	1 500	130	170	1 200	249/1000 CA/W33	249/1000 CAK30/W33
	1 420	308	12 700	30 500	1 700	140	180	1 600	230/1000 CA/W33	230/1000 CAK/W33
	1 420	412	15 400	40 500	2 240	120	160	2 140	240/1000 CAF/W33	240/1000 CAK30F/W33
	1 580	462	21 400	48 000	2 550	100	140	3 500	231/1000 CAF/W33	231/1000 CAKF/W33
	1 580	580	26 700	62 000	3 350	90	120	4 300	241/1000 ECAF/W33	241/1000 ECAK30F/W33
1 060	1 280	165	4 770	15 000	800	160	200	435	238/1060 CAMA/W20	238/1060 CAKMA/W20
	1 280	218	6 100	20 000	1 200	130	170	570	248/1060 CAMA/W20	248/1060 CAK30MA/W20
	1 400	250	9 550	26 000	1 460	140	180	1 100	239/1060 CAF/W33	239/1060 CAKF/W33
	1 400	335	11 500	32 500	1 860	120	160	1 400	249/1060 CAF/W33	249/1060 CAK30F/W33
	1 500	325	13 800	34 000	1 830	130	170	2 250	230/1060 CAF/W33	230/1060 CAKF/W33
	1 500	438	17 300	45 500	2 500	110	150	2 515	240/1060 CAF/W33	240/1060 CAK30F/W33
1 120	1 360	243	7 250	24 000	1 400	110	150	735	248/1120 CAFA/W20	248/1120 CAK30FA/W20
	1 460	335	11 700	34 500	1 830	100	140	1 500	249/1120 CAF/W33	249/1120 CAK30F/W33
	1 580	462	18 700	50 000	2 850	95	130	2 925	240/1120 CAF/W33	240/1120 CAK30F/W33
1 180	1 420	180	5 870	18 600	1 080	130	170	575	238/1180 CAFA/W20	238/1180 CAKFA/W20
	1 420	243	7 710	27 000	1 560	130	170	770	248/1180 CAFA/W20	248/1180 CAK30FA/W20
	1 540	272	13 300	39 000	1 700	110	150	1 400	239/1180 CAF/W33	239/1180 CAKF/W33
	1 540	355	14 600	45 000	2 450	95	130	1 800	249/1180 CAF/W33	249/1180 CAK30F/W33
1 250	1 750	375	17 900	45 000	2 400	95	130	2 840	230/1250 CAF/W33	230/1250 CAKF/W33
1 320	1 600	280	9 780	33 500	1 860	90	120	1 160	248/1320 CAFA/W20	248/1320 CAK30FA/W20
	1 720	400	16 100	49 000	2 550	85	110	2 500	249/1320 CAF/W33	249/1320 CAK30F/W33
1 500	1 820	315	12 700	45 000	2 400	85	110	1 710	248/1500 CAFA/W20	248/1500 CAK30FA/W20
	1 950	450	20 700	63 000	3 150	67	85	3 550	249/1500 CAFB/W33	249/1500 CAK30FB/W33
1 800	2 180	375	17 600	63 000	3 050	60	75	2 900	248/1800 CAFA/W20	248/1800 CAK30FA/W20



Dimensions

Abutment and
fillet dimensions

Calculation factors

d	d ₂	D ₁	b	K	r _{1,2} min	d _a min	D _a max	r _a max	e	Y ₁	Y ₂	Y ₀
mm						mm			—			
1 000	1 077	1 161	—	12	6	1 023	1 197	5	0,12	5,6	8,4	5,6
	1 106	1 209	22,3	12	7,5	1 028	1 292	6	0,21	3,2	4,8	3,2
	1 139	1 305	22,3	12	7,5	1 028	1 392	6	0,19	3,6	5,3	3,6
	1 133	1 275	22,3	12	7,5	1 028	1 392	6	0,26	2,6	3,9	2,5
	1 182	1 399	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	1 135	1 219	—	12	6	1 083	1 257	5	0,11	6,1	9,1	6,3
	1 159	1 210	—	12	6	1 083	1 257	5	0,14	4,8	7,2	4,5
	1 171	1 303	22,3	12	7,5	1 088	1 392	6	0,16	4,2	6,3	4
	1 165	1 282	22,3	12	7,5	1 088	1 392	6	0,21	3,2	4,8	3,2
	1 202	1 373	22,3	12	9,5	1 094	1 466	8	0,19	3,6	5,3	3,6
	1 196	1 347	22,3	12	9,5	1 094	1 466	8	0,26	2,6	3,9	2,5
1 120	1 207	1 282	—	12	6	1 143	1 337	5	0,15	4,5	6,7	4,5
	1 230	1 349	22,3	12	7,5	1 148	1 432	6	0,20	3,4	5	3,2
	1 266	1 422	22,3	12	9,5	1 154	1 546	8	0,26	2,6	3,9	2,5
1 180	1 261	1 355	—	12	6	1 203	1 397	5	0,11	6,1	9,1	6,3
	1 280	1 343	—	12	6	1 203	1 397	5	0,14	4,8	7,2	4,5
	1 298	1 435	22,3	12	7,5	1 208	1 512	6	0,16	4,2	6,3	4
	1 293	1 417	22,3	12	7,5	1 208	1 512	6	0,20	3,4	5	3,2
1 250	1 411	1 607	22,3	12	9,5	1 284	1 716	8	0,19	3,6	5,3	3,6
1 320	1 422	1 511	—	12	6	1 343	1 577	5	0,15	4,5	6,7	4,5
	1 445	1 584	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
	1 644	1 794	22,3	12	9,5	1 534	1 916	8	0,20	3,4	5	3,2
1 800	1 932	2 060	—	12	9,5	1 834	2 146	8	0,15	4,5	6,7	4,5

The SKF Group – a worldwide corporation

SKF is an international industrial Group operating in some 130 countries and is world leader in bearings.

The company was founded in 1907 following the invention of the self-aligning ball bearing by Sven Wingquist and, after only a few years, SKF began to expand all over the world.

Today, SKF has some 43 000 employees and around 80 manufacturing facilities spread throughout the world. An international sales network includes a large number of sales companies and some 20 000 distributors and retailers. Worldwide availability of SKF products is supported by a comprehensive technical advisory service.

The key to success has been a consistent emphasis on maintaining the highest quality of its products and services. Continuous investment in research and

development has also played a vital role, resulting in many examples of epoch-making innovations.

The business of the Group consists of bearings, seals, special steel and a comprehensive range of other high-tech industrial components. The experience gained in these various fields provides SKF with the essential knowledge and expertise required in order to provide the customers with the most advanced engineering products and efficient service.





The SKF Group is the first major bearing manufacturer to have been granted approval according to ISO 14001, the international standard for environmental management systems. The certificate is the most comprehensive of its kind and covers more than 60 SKF production units in 17 countries.



The SKF Engineering & Research Centre is situated just outside Utrecht in The Netherlands. In an area of 17 000 square metres (185 000 sq.ft) some 150 scientists, engineers and support staff are engaged in the further improvement of bearing performance. They are developing technologies aimed at achieving better materials, better designs, better lubricants and better seals – together leading to an even better understanding of the operation of a bearing in its application. This is also where the SKF Life Theory was evolved, enabling the design of bearings which are even more compact and offer even longer operational life.



SKF has developed the Channel concept in factories all over the world. This drastically reduces the lead time from raw material to end product as well as work in progress and finished goods in stock. The concept enables faster and smoother information flow, eliminates bottlenecks and bypasses unnecessary steps in production. The Channel team members have the knowledge and commitment needed to share the responsibility for fulfilling objectives in areas such as quality, delivery time, production flow etc.



SKF manufactures ball bearings, roller bearings and plain bearings. The smallest are just a few millimetres (a fraction of an inch) in diameter, the largest several metres. SKF also manufactures bearing and oil seals which prevent dirt from entering and lubricant from leaking out. SKF's subsidiaries CR and RFT S.p.A. are among the world's largest producers of seals.

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