

SKF

**SKF sealed high precision
angular contact ball bearings
for enhanced performance
and extended service life**



Contents

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 downtime, as well as improved output and product quality are the key to a successful partnership.



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Selection of bearing type

Why use SKF sealed high-precision angular contact ball bearings?

Today's machine tools must be designed for long service, high reliability and extremely high cutting speeds to meet the stringent demands for increased productivity from end users. Bearings, although hidden from view, play a critical role in the performance of machine tool spindles, the heart of the machine.

Bearing systems may fail for many reasons (‘ diagram 1). Field analysis has shown that 15% of premature loss of performance is due to contamination from particles and fibers entering the area where rolling contact takes place. Another 15% of bearings fail prematurely because of lubrication problems,

such as loss of lubricant, polluted lubricant, incorrect type of lubricant or quantity.

The balance of premature failures can be attributed to mechanical problems, such as mounting errors, misalignment, excessive loading and corrosion.

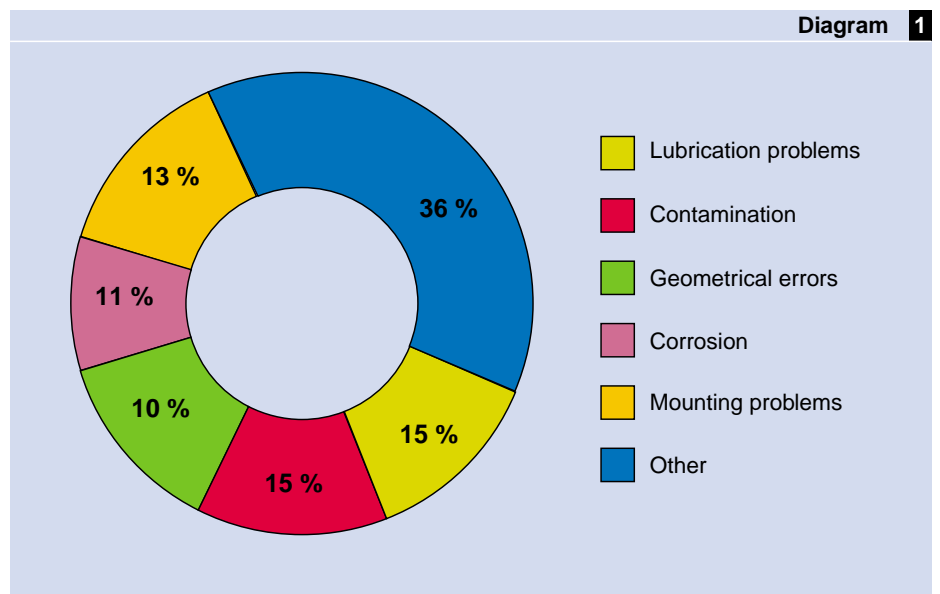
Bearing contamination can also be caused by spindle exposure to pollution from high-pressure cutting fluid spray near the spindle nose in metal cutting machines or by fine dust spreading around the machine in woodworking applications.

Although spindles are generally designed with sealing systems, sometimes these systems might not be sufficient to avoid bearing contamination. With today's high production requirements, unplanned downtime is extremely expensive,

so products that can contribute to machine uptime offer a big advantage.

SKF's new sealed high-precision angular contact ball bearings are the answer for all high-precision application areas where contamination and/or grease retention problems prevent achieving optimum machining performance.

Major causes of bearing failure.



Advantages and benefits

SKF's range of sealed ball bearings offer a number of advantages and benefits. Sealed bearings can operate in contaminated environments like woodworking shops and prevent undesired particles from getting inside the bearings. In vertical spindle applications, sealed bearings can improve grease retention, drastically reducing lubrication problems. Sealed bearings are ready-to-mount units, so assembly time is reduced. The most important advantages of using sealed high-precision angular contact ball bearings are summarised in table 1.

Seal design

Having worked with all types of spindle and bearing applications worldwide, SKF has unrivalled experience when it comes to designing and manufacturing sealed bearings. After listening to customer needs, SKF developed this new series of sealed high-precision angular contact ball bearings. The new seal design has high-speed capability, ensures efficient sealing and grease retention, and has the lowest possible temperature rise.

To achieve optimum performance, a low-friction seal made of oil and wear-resistant NBR (nitrile rubber) with sheet steel reinforcement was designed.

Table 2 shows a comparison of performance among three basic sealing solutions: non-contacting shields, low-friction seals and contacting seals. Low-friction seals used in SKF high-precision angular contact ball bearings provide excellent speed capability, good grease retention and good dust exclusion.

Although contacting seals provide the best results in terms of preventing contamination, they are not suitable for tangential speeds the seals would encounter in machine tool spindle applications.

For more demanding applications, high-precision angular contact ball bearings fitted with fluoro rubber (FPM) seals can be supplied on request.

Please, consult SKF for technical details and availability.

Table 1

Design concept	Advantages	Benefits
Low friction seal design on both side of the bearing	High rotational speed (up to $1,6 \times 10^6 \text{ n} \times d_m$) and low temperature rise	High performance and good thermal stability
	Grease retention, preventing lubrication problems	Longer service life
	Efficient sealing against contaminants	Longer service life
Improved cage design	Optimum grease distribution	Short running-in
Pre-greased for life	Precise grease quantity	High speed
	Eliminate risk of incompatibility between greases and washing fluids	Longer service life
	Avoid possible contamination during spindle mounting	Longer service life
	Do not need re-greasing	Reduced maintenance
	Ready-to-mount unit	Reduced mounting time
Specific high speed grease	High rotational speed	Higher productivity

Diagram 2 shows the results of extensive laboratory and field tests carried out on sealed high-precision angular contact ball bearings.

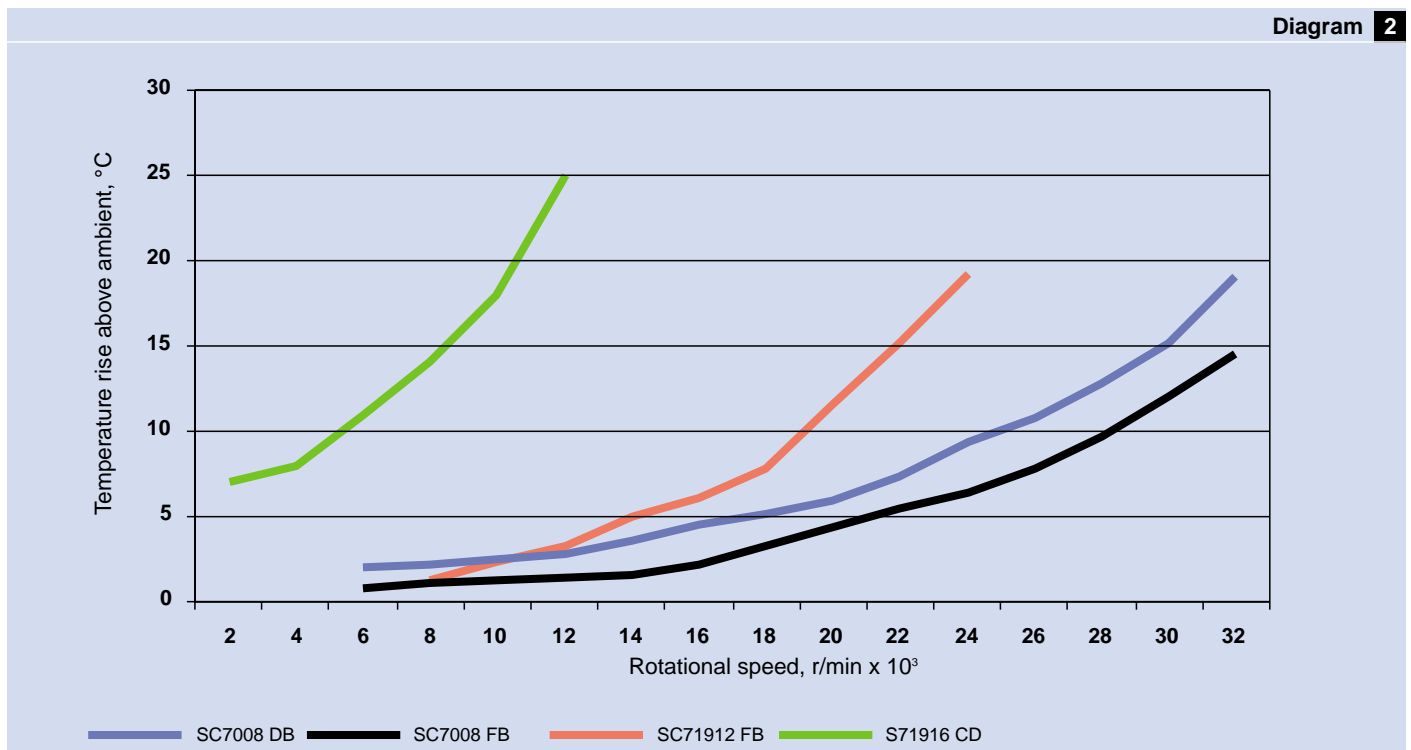
Comparison of performance for different seal designs.

Table 2

Design	Speed capability	Low friction torque	Grease retention	Dust exclusion	Static water exclusion	Dynamic water exclusion
Shields	oooo	oooo	o	oo	o	o
Low friction seals	oooo	oooo	oooo	oooo	oo	o
Contacting seals	oo	o	oooo	oooo	oooo	ooo

oooo excellent oooo very good ooo good oo acceptable o not recommended

Temperature rise for different bearing designs - Grease lubrication.



A wide assortment

Five different designs

SKF sealed high-precision angular contact ball bearings are available in two dimension series (' fig 1): bearing series 719 and 70 with a contact angle of 15° (designation suffix CD and CB), 18° (designation suffix FB), 25° (designation suffix ACD and DB) (' fig 2). Bearings of series 719 CB and 70 CB are supplied on request. Please contact SKF for availability.

Bearings with the greater contact angle are recommended for applications where high axial stiffness and high axial load carrying capacity are required.

Clearly the space requirements are different and arrangements can be more or less radially compact. For higher speeds or where little radial space is available, bearings of series 719 should be chosen.

For higher loads, bearings of series 70 are more appropriate.

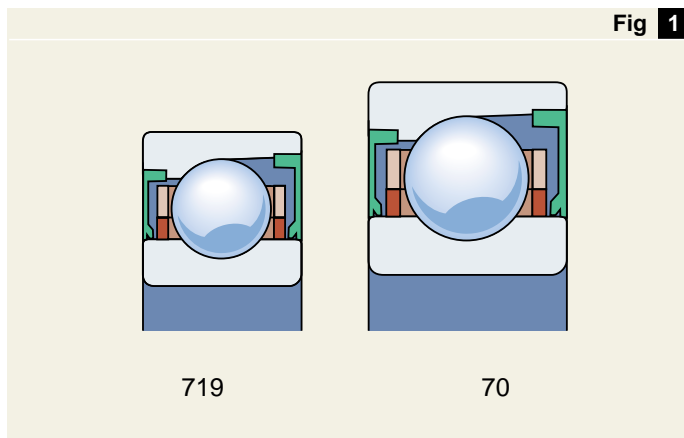
Standard sealed high-precision angular contact ball bearings

SKF's standard sealed high-precision angular contact bearings represent the best solution in terms of load-carrying capacity, rigidity and speed. These sealed high-precision angular contact ball bearings have one reduced height flange on the outer ring to allow for the introduction of a large number of balls by using a one-piece cage and an optimized internal design.

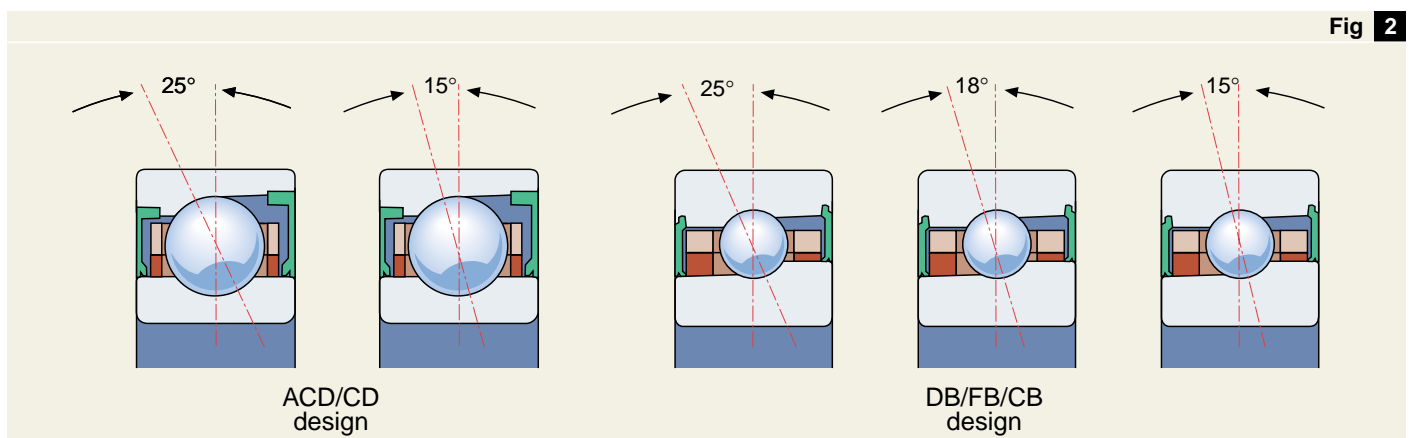
The bearings are manufactured according to both the 719 and 70 series with a choice of two different contact angles: 15° (designation suffix CD) or 25° (designation suffix ACD). Two low-friction seals are mounted on both sides.

Dimensions and technical data are given in the relevant product tables. The designation scheme of SKF sealed high-precision angular contact ball bearings is shown in table 6 page 23.

Cross section of the two series



Different designs of SKF sealed high-precision angular contact ball bearings



High-speed sealed high-precision angular contact ball bearings

In addition to its standard series of sealed high-precision angular contact ball bearings, SKF also offers a range of bearings to meet the highest demands for speed and running accuracy.

The high-speed sealed high-precision angular contact ball bearing design (designation suffix FB, CB and DB) have a larger number of smaller diameter balls compared with the standard CD and ACD design. Centrifugal force from contact between the balls and the outer-ring raceway is therefore further reduced, as is contact pressure. Because of their smaller diameter, balls of the high-speed design bearings occupy less of the bearing cross-section, so the rings are correspondingly thicker. This means that any dimensional errors of a shaft or

housing bore have less influence on the roundness of the bearing rings, so as a result, running accuracy is enhanced.

The bearings belonging to series 719 FB (CB, DB) and 70 FB (CB, DB) are characterized by the following features:

- smaller balls
- contact angle of 18°, 15° or 25°
- both outer-ring and inner-ring shoulders of reduced height for better lubrication conditions
- outer-ring centered cage
- optimum internal design for enhanced speed capability
- extremely high running accuracy.

Technical data and dimensions are in corresponding product tables.

The designation scheme of SKF sealed high-speed high-precision angular contact ball bearings is in table 6 page 23.

Hybrid sealed high-precision angular contact ball bearings

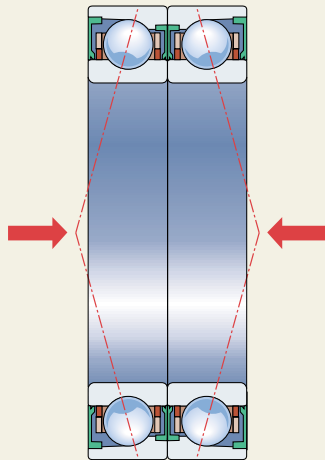
Hybrid sealed high-precision angular contact ball bearings are offered in the same specifications as all-steel sealed high-precision angular contact ball bearing series 719 CD (ACD) and 70 CD (ACD).

Hybrid bearings are identified by the suffix HC in designations, e.g., S7014 CDGA/HCP4A.

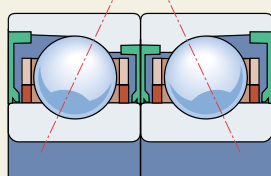
Hybrid high-speed high-precision angular contact ball bearings

For even more demanding applications, SKF offers hybrid high-speed sealed high-precision angular contact ball bearings. The series, 719 FB (CB, DB) and 70 FB (CB, DB), under proper lubrication conditions and with moderate loading, can reach rotational speeds up to 1,6 million $n \times d_m$. Hybrid high-speed bearings are identified by the prefix C, e.g., SC7014 FBGA/P7.

Fig 3

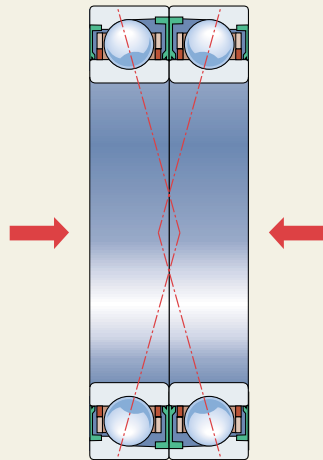


Back-to-back arrangement for axial load in both directions

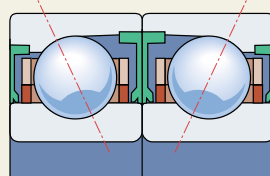


Back-to-back arrangement Designation suffix DB

Fig 4

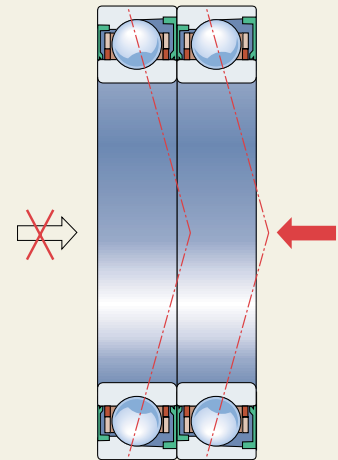


Face-to-face arrangement for axial load in both directions

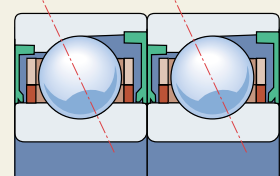


Face-to-face arrangement Designation suffix DF

Fig 5



Tandem arrangement for axial load in one direction



Tandem arrangement Designation suffix DT

The Range

SKF's standard range of sealed high-precision angular contact ball bearings is available in bore diameters from 30 to 120 mm for CB, FB and DB designs and in bore diameters from 30 to 150 mm for CD and ACD designs.

Sealed high-precision angular contact ball bearings can be supplied as single bearings or for paired mounting in sets.

Details concerning technical data and availability of other sizes will be supplied upon request.

Universally matchable bearings

A special type of bearing for paired mounting is available from SKF. These are "universal bearings" specially matched during manufacture to be mounted against each other in any arrangement depending on the application (e.g., back-to-back, face-to-face or tandem in groups of two or more bearings). The designations for single universally matchable bearings are explained in table 3.

Basic features such as accuracy, preload class, speed capability, etc. are

the same as those of the pre-matched sets. Universal bearings can be supplied in two basic types: single universal bearings for mounting in any combination, or duplex sets with matched bore and outside diameter.

Customers need to order the same number of single universal bearings as the number of bearings in a set. For example, to replace a set of S7014 CD/P4ATBTA, three bearings S7014 CDGA/P4A are required.

Likewise, two universal bearings are needed to replace a duplex set. Duplex universal bearings can either be used as sets, or each bearing used to form other groups of bearings, the only limitation being the contact angle and the preload class. Universal bearings with a given preload must not be paired against bearings with a different contact angle or preload class. For such special cases, please consult the SKF application engineering service.

Universally matchable bearings may be useful in reducing stock levels and improving availability. Several specific matched sets may be obtained by stocking the correct universal bearings.

Matched bearing sets

SKF sealed high-precision angular contact ball bearings are also available as complete sets of two, three or four bearings. They are matched in manufacturing so that when the bearings are mounted immediately next to each other, the predetermined value of the preload will be obtained, or the load will be evenly distributed. The bore and outside diameters will not differ by more than one-third of the permissible diameter tolerance.

Back-to-back arrangement DB

The load lines of bearings arranged back-to-back diverge toward the bearing axis (' fig 3 page 7). Axial loads can be accommodated in both directions, although only by one bearing, or bearings in tandem, at a time. The back-to-back arrangement is relatively stiff and can also take up tilting moments.

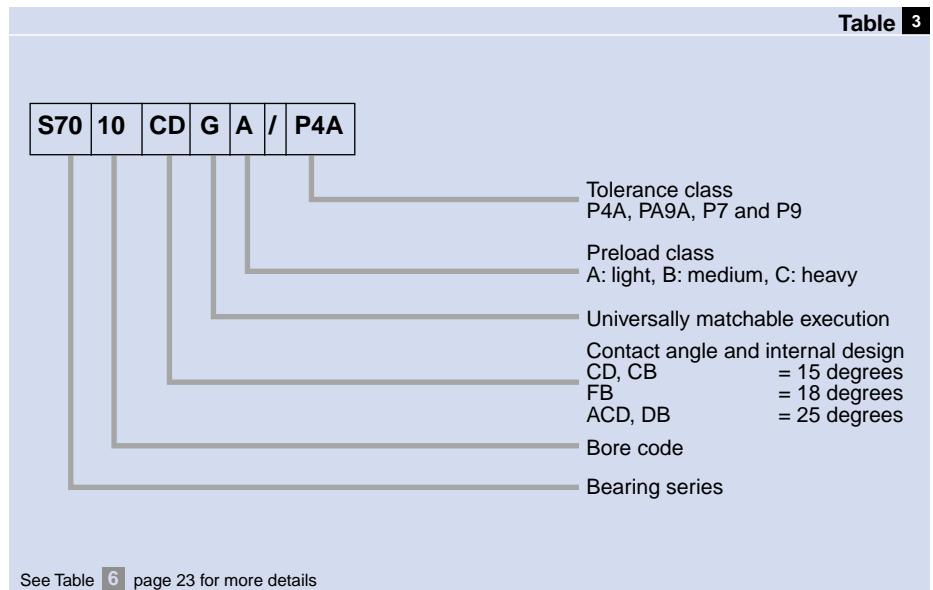
Face-to-face arrangement DF

The load lines of bearings arranged face-to-face converge towards the bearing axis (' fig 4 page 7).

Axial loads can be accommodated in both directions, although only by one

Designation of single universal sealed high-precision angular contact ball bearings

Table 3



bearing (or bearings in tandem) at a time. The arrangement is not so stiff as the back-to-back arrangement and is less suitable for tilting moments.

Tandem arrangement DT

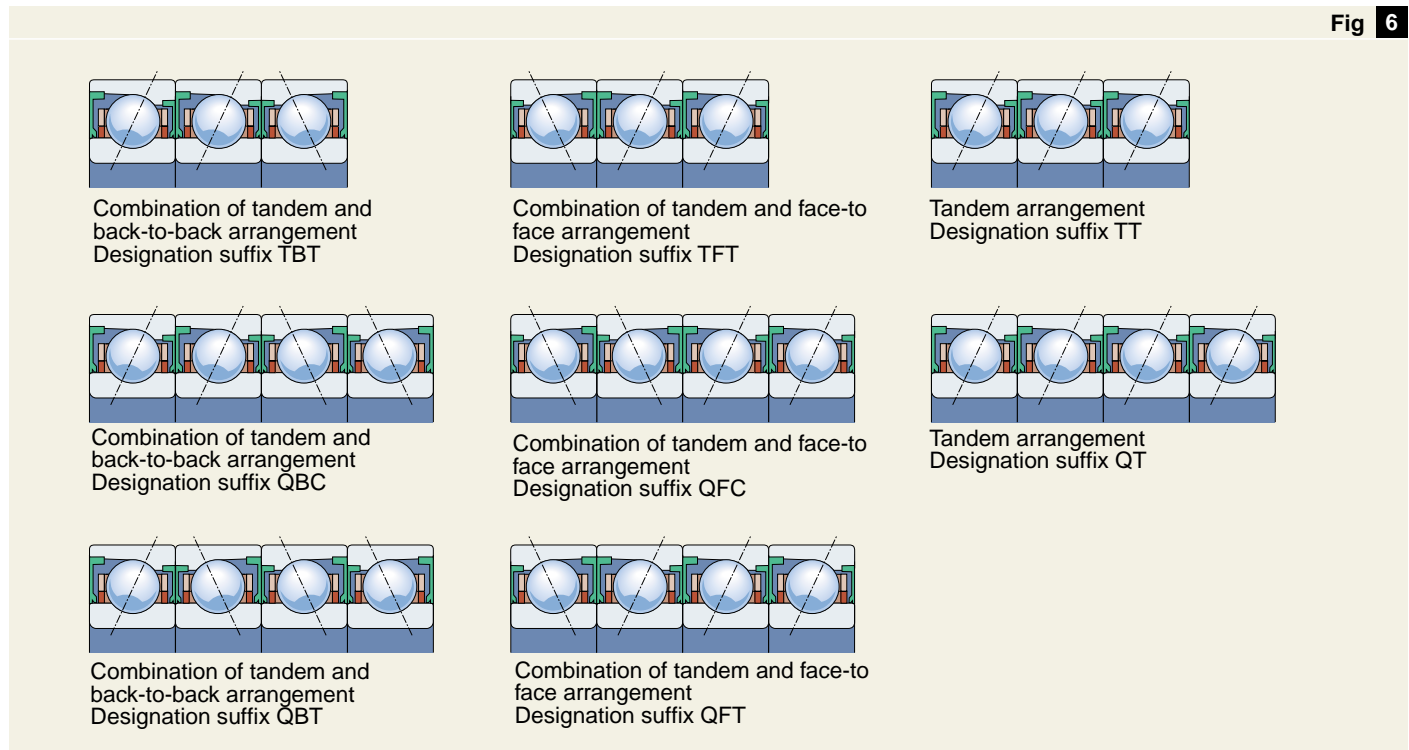
In a tandem arrangement (fig 5 page 7), the load lines of the bearings are parallel. Radial and axial loads are equally distributed over the bearings, but axial loads can only be carried in one direction.

A set of bearings in a tandem arrangement is therefore generally adjusted against another bearing that can take the axial loads acting in the opposite direction.

Other bearing arrangements

The various bearing combinations shown are those most commonly used (fig 6). However, SKF can also provide combinations of more bearings upon request.

Combinations of tandem and back-to-back or tandem and face-to-face are normally used when the design calls for enhanced performance in terms of load capacity or rigidity.



Selection of bearing size

General

All general information on life, basic load rating, and life equations described in the SKF General Catalogue or the SKF Interactive Engineering Catalogue also applies to sealed high-precision angular contact ball bearings.

In general-machinery applications, the size of bearing to be used is initially selected on the basis of its load carrying capacity in relation to the loads to be carried, and the requirements regarding life and reliability.

For machine tool spindles, bearing size is nearly always determined by criteria such as stiffness of the system, fixed dimensions for the tool holder, or

the spindle bore. The bearings selected according to such criteria give arrangements that are often required to have a very long life.

For sealed high-precision angular contact ball bearings, determining the load to which a bearing will be subjected is particularly complex as it involves many influencing factors. SKF has therefore developed special computer programs for the calculation of indeterminate spindle bearing systems. Contact SKF for assistance in determining the bearing loads and in designing an optimum bearing arrangement.



Bearing life

For calculation of simple bearing systems, the classic ISO equation for basic rating life can be used:

$$L_{10} = (C/P)^p$$

where

L_{10} = basic rating life, millions of revolutions

C = basic dynamic load rating, N

P = equivalent dynamic bearing load, N

p = exponent of the life equation (3 for ball bearings)

As there are many other factors influencing bearing life besides load, ISO introduced an adjusted life equation

$$L_{na} = a_1 a_2 a_3 (C/P)^p$$

$$\text{or simply } L_{na} = a_1 a_2 a_3 L_{10}$$

where

L_{na} = adjusted rating life millions of revolutions (the index n represents the difference between the requisite reliability and 100%)

a_1 = life adjustment factor for reliability

a_2 = life adjustment factor for material

a_3 = life adjustment factor for operating conditions

Practical experience and modern research have shown that, under special conditions, SKF bearings attain a much longer life than predicted by standardised life calculation methods, particularly when loads are light. These special conditions apply when the rolling surfaces (raceways and rolling

elements) are effectively separated by a lubricant film, and where the risk of the surfaces becoming damaged by contaminants are largely non-existent. In fact, under ideal conditions it is possible to speak of infinite life.

The SKF Life Theory introduces the concept of a fatigue load limit P_u analogous to that used when calculating other machinery components. This fatigue load limit represents the load below which fatigue will not occur in the bearing under ideal conditions. Due to the complexity, a detailed description of the theory is beyond the scope of this publication. For further details, please consult SKF application engineering services.

Values of the P_u limit for sealed high-precision angular contact ball bearings are given in the bearing tables. The adjusted life equation according to the SKF Life Theory is:

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

where:

L_{naa} = adjusted rating life to SKF Life Theory, millions of revolutions

L_{10} = basic rating life, millions of revolutions

a_1 = life adjustment factor for reliability

a_{SKF} = life adjustment factor based on SKF Life Theory

For details on the a_{SKF} life adjustment factor, please consult the SKF General Catalogue or the SKF Interactive Engineering Catalogue.

When using hybrid bearings, the effect of the different rolling element

material should also be taken into account.

Under the same external load, the stress in the contact area between a hybrid bearing ball and each raceway will be higher than in an all-steel bearing. This is due to the greater hardness and stiffness of the ceramic material compared with steel.

As ISO does not provide guidelines for calculating basic load ratings for hybrid bearings, SKF quotes the same load rating values for hybrid bearings as for all-steel bearings.

By introducing a factor a_{HC} into the life equations, the higher contact stress is taken into consideration.

$$L_{10} (\text{hybrid}) = a_{HC} (C/P)^p$$

$$L_{na} (\text{hybrid}) = a_1 a_{23} a_{HC} (C/P)^p$$

$$L_{naa} (\text{hybrid}) = a_1 a_{SKF} a_{HC} (C/P)^p$$

Recent results from practical experience and extensive laboratory testing indicate that the factor a_{HC} can be considered equal to 1 for hybrid ball bearings.

In general, experience shows that the service life of hybrid bearings is significantly longer than that of all-steel bearings under the conditions normally encountered in machine tool operations. Hybrid bearings are much less susceptible to wear, and lubrication conditions are generally superior to those in an all-steel bearing.

Equivalent bearing load

Equivalent dynamic bearing load

For bearings arranged singly or paired in tandem:

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

$$P = X F_r + Y F_a \quad \text{when } F_a/F_r > e$$

Factor values are given in **table 1**. When calculating bearing pairs, F_r and F_a represent the forces acting on the bearing pair.

For bearings paired back-to-back or face-to-face:

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

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

Factor values are given in **table 2**. When calculating bearing pairs, F_r and F_a represent the forces acting on the bearing pair.

Equivalent static bearing load

For bearings arranged singly or paired in tandem:

$$P_0 = 0,5 F_r + Y_0 F_a$$

when $P_0 < F_r$, $P_0 = F_r$ should be used.

For bearings paired back-to-back or face-to-face:

$$P_0 = F_r + Y_0 F_a$$

The value of factor Y_0 depends on the contact angle and can be obtained from **table 1** and **table 2**. When calculating bearing pairs, F_r and F_a are the forces acting on the bearing pair.

For hybrid bearings, the same basic static load ratings as for all-steel bearings are valid if compensated for by the different values of the static safety factor s_0 , where $s_0 = C_0/P_0$.

Vibration from other machinery, traffic or shipping might cause damage to bearings. In such cases, bearing life is not limited by the material fatigue but by the permanent deformation pro-

duced in the contact between balls and raceways. A ball might be driven into the surface of the rings by the applied load. The same might happen for bearings sustaining heavy shock loads during a fraction of a revolution.

For long life and high performance, permanent deformation of the bearing parts should be avoided at all costs. The maximum load should therefore not exceed the equivalent static load obtained from the equation:

$$P_0 = C_0/s_0$$

where:

P_0 = equivalent static bearing load, N
 C_0 = basic static load rating, N
 s_0 = static safety factor

For all-steel sealed high-precision angular contact ball bearings, a minimum safety factor s_0 of 3 is recommended. For hybrid bearings a safety factor s_0 of 3,4 can be used.

Calculation factors for single bearings and bearings paired in tandem

Table 1				
$f_0 F_a/C_0^{(1)}$	e	X	Y	Y_0
Contact angle 15/18 degrees (suffix CD, CB and FB)				
< 0.178	0.38	0.44	1.47	0.46
0.357	0.4	0.44	1.40	0.46
0.714	0.43	0.44	1.30	0.46
1.07	0.46	0.44	1.23	0.46
1.43	0.47	0.44	1.19	0.46
2.14	0.5	0.44	1.12	0.46
3.57	0.55	0.44	1.02	0.46
5.35	0.56	0.44	1.00	0.46
> 7.14	0.56	0.44	1.00	0.46
Contact angle 25 degrees (suffix ACD, DB)				
—	0.68	0.41	0.87	0.38

¹⁾ Values of f_0 are given in the bearing tables

Calculation factors for bearings paired back-to-back or face-to-face

Table 2					
$2f_0 F_a/C_0^{(1)}$	e	X	Y_1	Y_2	Y_0
Contact angle 15/18 degrees (suffix CD, CB and FB)					
< 0.178	0.38	0.72	1.65	2.39	0.92
0.357	0.4	0.72	1.57	2.28	0.92
0.714	0.43	0.72	1.46	2.11	0.92
1.07	0.46	0.72	1.38	2.00	0.92
1.43	0.47	0.72	1.34	1.93	0.92
2.14	0.5	0.72	1.26	1.82	0.92
3.57	0.55	0.72	1.14	1.66	0.92
5.35	0.56	0.72	1.12	1.63	0.92
> 7.14	0.56	0.72	1.12	1.63	0.92
Contact angle 25 degrees (suffix ACD, DB)					
—	0.68	0.67	0.92	1.41	0.76

¹⁾ Values of f_0 are given in the bearing tables

Service for a lasting partnership

Under the proper conditions, bearings can run for an almost unlimited time. For them to run at least as long as they should, operating conditions must be optimised. At SKF we know our bearings and you know your operating conditions. Together, as partners SKF can work with you during the design stage and continue to work with you right through to installation and maintenance to keep your machines in peak operating condition.

SKF concepts for creating customer value

Why not take advantage of SKF competencies for creating customer value? Decades of troubleshooting experience in virtually every industrial sector

enables SKF to provide solutions that improve machine performance and productivity. With our Total Shaft Solutions™ concept you can take full advantage of our in-depth competence comprising

- Root cause failure analysis and elimination
- Rotating equipment engineering
- Products, services and systems
- Machine monitoring

Another SKF concept that embraces a broader view of customer-focused technologies and competencies is called Asset Efficiency Optimization™, or AEO for short. As the name implies, AEO recognizes the importance of

treating machinery and equipment as plant assets. SKF programs that take a systems approach to optimizing these customer assets include

- Predictive Maintenance,
- Pro-active Reliability Maintenance
- Operator-driven Reliability, and
- Integrated Maintenance Solutions, an all-inclusive contractual program.

For more information about SKF competencies and services, contact your local SKF representative.

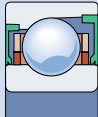
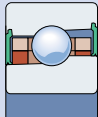



Applications

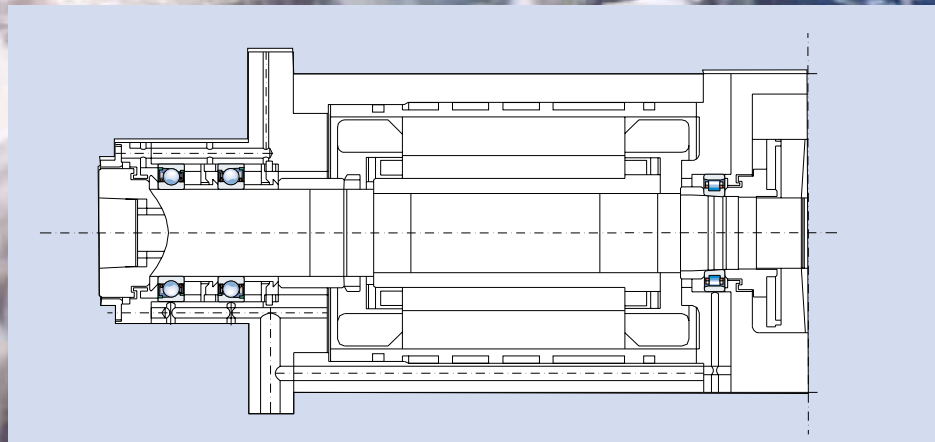
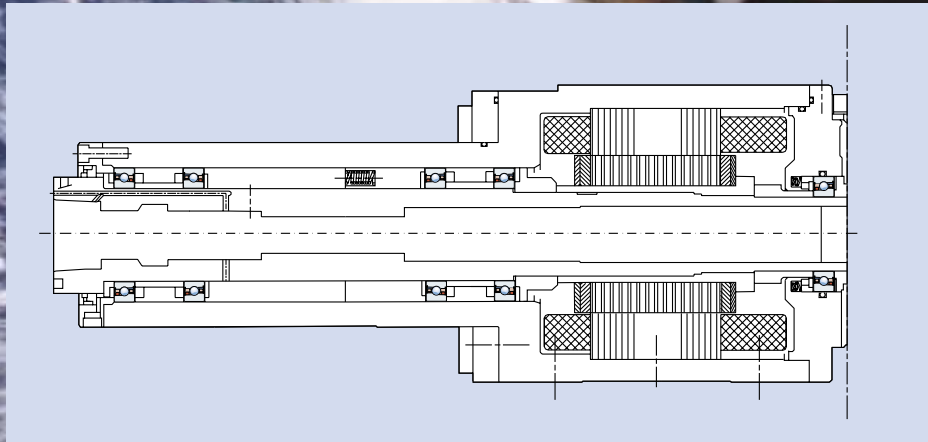
Sealed high-precision angular contact ball bearings are used primarily in the machine tool industry, both in metal cutting and in woodworking spindles.

Other applications may call for high-precision bearings when high accuracy and very high speed are required.

Selecting sealed high-precision angular contact ball bearings based on application requirements

Table 3

Application	CD/ACD design	CB/FB/DB design	Working conditions		
					
 High speed woodworking spindles	OOO	OOOOO	Very high speed, light to moderate working loads. Constant load preloading.		
 High speed metal cutting spindles (machining centres, high speed milling)	OOO	OOOOO	Very high speed, light to moderate working loads. Constant load preloading.		
 CNC lathes and conventional milling machines	OOOOO	OO	High speed, moderate to heavy loads, high rigidity, constant position preloading.		
	oooo excellent	ooo very good	oo good	o acceptable	o not recommended



General bearing data

Dimensions

SKF sealed high-precision angular contact ball bearings boundary dimensions conform to ISO 15:1998, Diameter Series 9 and 0.

Tolerances

SKF sealed high-precision angular contact ball bearings series CD/ACD are manufactured to the P4A tolerance class as standard. Upon request, bearings can be made according to class PA9A or other specifications. Sealed bearings series CB, FB and DB are made to the P7 tolerance class as standard. Upon request they can be manufactured to tolerance class P9.

The values for P4A, P7, PA9A and P9 tolerances are given in **table 1** and **table 2 page 18**. Hybrid bearings are made to the same tolerances as the corresponding all-steel bearings.

Tolerance symbols

Following are explanations for the symbols used in the tolerance tables:

Symbol	Definition		
d	Nominal bore diameter		
d_{mp}	Mean bore diameter; arithmetical mean of the largest and smallest single bore diameters in one plane	$\Delta_{B_s}, \Delta_{C_s}$	B_s, C_s Single width of inner ring and outer ring, respectively
d_s	Single diameter of bore	$\Delta_{B_{1s}}, \Delta_{C_{1s}}$	B_{1s}, C_{1s} Single width of inner ring and outer ring, respectively, of bearings made for paired mounting
Δ_{dmp}	Deviation of the mean bore diameter from the nominal		
Δ_{d_s}	Deviation of a single bore diameter from the nominal		
V_{dp}	Bore diameter variation; difference between the largest and smallest single bore diameters in one plane	V_{Bs}, V_{Cs}	B_s, C_s Ring width variation; difference between the largest and smallest single width of inner ring and outer ring, respectively
V_{dmp}	Mean bore diameter variation; difference between the largest and smallest mean bore diameters of one ring	K_{ia}, K_{ea}	K_{ia}, K_{ea} Radial runout of assembled bearing inner ring and assembled bearing outer ring, respectively
D	Nominal outside diameter	S_d	S_d Side face runout with reference to bore (of inner ring)
D_{mp}	Mean outside diameter; arithmetical mean of the largest and smallest single outside diameters in one plane	S_D	S_D Outside inclination variation; variation in inclination of outside cylindrical surface to outer ring side face
D_s	Single diameter of outside cylindrical surface	S_{ia}, S_{ea}	S_{ia}, S_{ea} Side face runout with reference to raceway of assembled bearing inner ring and assembled bearing outer ring, respectively
Δ_{Dmp}	Deviation of the mean outside diameter from the nominal		
Δ_{D_s}	Deviation of single outside diameter from the nominal		
V_{Dp}	Outside diameter variation; difference between the largest and smallest single outside diameters in one plane		
V_{Dmp}	Mean outside diameter variation; difference between the largest and smallest mean outside diameters of one ring		

Class P4A and P7 tolerances

Table 1																
Inner ring																
d		Δ_{dmp}		Δ_{ds}		V_{dp}	V_{dmp}	Δ_{Bs}		Δ_{B1s}		V_{Bs}	K_{ia}	S_d	S_{ia}	
over	incl.	high	low	high	low	max	max	high	low	high	low	max	max	max	max	
mm		μm		μm		μm	μm	μm		μm		μm	μm	μm	μm	
2.5	10	0	-4	0	-4	1.3	1	0	-40	0	-250	1.3	1.3	1.3	1.3	
10	18	0	-4	0	-4	1.3	1	0	-80	0	-250	1.3	1.3	1.3	1.3	
18	30	0	-5	0	-5	1.3	1	0	-120	0	-250	1.3	2.5	1.3	2.5	
30	50	0	-6	0	-6	1.3	1	0	-120	0	-250	1.3	2.5	1.3	2.5	
50	80	0	-7	0	-7	2	1.3	0	-150	0	-250	1.3	2.5	1.3	2.5	
80	120	0	-8	0	-8	2.5	1.5	0	-200	0	-250	2.5	2.5	2.5	2.5	
120	150	0	-10	0	-10	6	3	0	-250	0	-350	4	4	4	4	
Outer ring																
D		Δ_{Dmp}		Δ_{Ds}		V_{Dp}	V_{Dmp}	Δ_{Cs}	Δ_{C1s}	V_{Cs}	K_{ea}	S_D	S_{ea}			
over	incl.	high	low	high	low	max	max			max	max	max	max			
mm		μm		μm		μm	μm			μm	μm	μm	μm			
18	30	0	-5	0	-5	2	1.3	Values are identical to those for inner ring of same bearings		1.3	2.5	1.3	2.5			
30	50	0	-6	0	-6	2	1.3		1.3	2.5	1.3	2.5				
50	80	0	-7	0	-7	2	1.3		1.3	4	1.3	4				
80	120	0	-8	0	-8	2.5	1.3		2.5	5	2.5	5				
120	150	0	-9	0	-9	2.5	1.5		2.5	5	2.5	5				
150	180	0	-10	0	-10	6	3	6	4	4	6					
180	250	0	-11	0	-11	6	4	8	5	8	5	8				

Class PA9A and P9 tolerances for radial bearings

Table 2

Inner ring													
d		Δ_{ds}		V_{dp}	V_{dmp}	Δ_{Bs}		v_{B1s}		V_{Bs}	K_{ja}	S_d	S_{ia}
over	incl.	high	low	max	max	high	low	high	low	max	max	max	max
mm		μm		μm	μm	μm		μm		μm	μm	μm	μm
2.5	10	0	-2.5	1.3	1	0	-25	0	-250	1.3	1.3	1.3	1.3
10	18	0	-2.5	1.3	1	0	-80	0	-250	1.3	1.3	1.3	1.3
18	30	0	-2.5	1.3	1	0	-120	0	-250	1.3	2.5	1.3	2.5
30	50	0	-2.5	1.3	1,3	0	-120	0	-250	1.3	2.5	1.3	2.5
50	80	0	-4	2	1.3	0	-150	0	-250	1.3	2.5	1.3	2.5
80	120	0	-5	2.5	1.5	0	-200	0	-250	2.5	2.5	2.5	2.5
120	150	0	-6.5	3	2	0	-250	0	-350	2.5	2.5	2.5	2.5
Outer ring													
D		Δ_{Ds}		V_{Dp}	V_{Dmp}	Δ_{Cs}	Δ_{C1s}	V_{Cs}	K_{ea}	S_D	S_{ea}		
over	incl.	high	low	max	max			max	max	max	max		
mm		μm		μm	μm			μm	μm	μm	μm		
18	30	0	-4	2	1.3	Values are identical to		1.3	2.5	1.3	2.5		
30	50	0	-4	2	1.3			1.3	2.5	1.3	2.5		
50	80	0	-4	2	1.3	those for inner ring		1.3	4	1.3	4		
80	120	0	-5	2.5	1.3			2.5	5	2.5	5		
120	150	0	-5	2.5	1.5	of same bearings		2.5	5	2.5	5		
150	180	0	-6.5	3	2			4	5	2.5	5		
180	250	0	-7.5	4	2.5			4	6.5	4	6.5		

Preload

To meet varying customer needs in terms of speed, heat generation and rigidity, SKF offers angular contact ball bearings matched back-to-back or face-to-face in groups of two or more bearings per set with three different preload classes as standard:

Class A: light preload
Class B: medium preload
Class C: heavy preload

The degree of preload depends on the contact angle, the internal design, the material and a series of factors related to the application. Sets of three or more bearings have a higher preload than sets of two bearings. The preload value for sets incorporating three or more bearings can be calculated by multiplying the preload values of pairs reported in the tables by the following factors:

1.35 for TBT and TFT sets
1.60 for QBT and QFT sets
2.00 for QBC and QFC sets

To calculate preload for sets of bearings involving more than four bearings or for sets incorporating bearings of different designs, sizes and contact angles, please contact SKF application engineering.

The **table 3** and **table 4** **page 20** show preload values for bearing pairs arranged either back-to-back or face-to-face prior to mounting.

Series 70

Preload in bearings for universal pairing and bearing sets arranged back to back or face to face

Table 3

Bearing		Series S70 ACD, and S70 ACD/HC			Series S70 CD and S70 CD/HC			Axial preload Series S70 DB and SC70 DB			Series S70 CB,FB and SC70 CB,FB		
Bore diameter	Size	Class			Class			Class			Class		
		A	B	C ¹⁾	A	B	C ¹⁾	A	B	C ¹⁾	A	B	C ¹⁾
mm	N												
30	06	90	180	360	50	100	200	38	76	155	24	48	96
35	07	90	180	360	60	120	240	40	80	160	26	52	105
40	08	100	200	400	60	120	240	43	85	170	28	56	110
45	09	170	340	680	110	220	440	57	115	230	35	70	140
50	10	180	360	720	110	220	440	60	120	240	37	74	145
55	11	230	460	920	150	300	600	83	165	330	52	105	210
60	12	240	480	960	150	300	600	85	170	340	54	110	220
65	13	240	480	960	160	320	640	92	185	370	57	115	230
70	14	300	600	1200	200	400	800	115	230	460	70	140	280
75	15	310	620	1240	200	400	800	120	240	480	75	150	300
80	16	390	780	1560	240	480	960	160	315	630	98	195	390
85	17	400	800	1600	250	500	1000	160	315	630	100	200	400
90	18	460	920	1840	300	600	1200	170	340	680	105	215	430
95	19	480	960	1920	310	620	1240	175	345	690	110	220	440
100	20	500	1000	2000	310	620	1240	175	350	700	110	220	440
110	22	650	1300	2600	420	840	1680	220	440	880	135	270	540
120	24	690	1380	2760	430	860	1720	230	460	920	140	280	560
130	26	900	1800	3600	560	1120	2240	—	—	—	—	—	—
140	28	900	1800	3600	570	1140	2280	—	—	—	—	—	—
150	30	1000	2000	4000	650	1300	2600	—	—	—	—	—	—

1) All-steel bearings only

Series 719**Preload in bearings for universal pairing and bearing sets arranged back to back or face to face****Table 4**

Bearing		Series S719 ACD, and S719 ACD/HC			Series S719 CD and S719 CD/HC			Series S719 DB and SC719 DB			Series S719 CB,FB and SC719 CB,FB		
Bore diameter	Size	Class A	B	C ¹⁾	Class A	B	C ¹⁾	Class A	B	C ¹⁾	Class A	B	C ¹⁾
mm		N											
30	06	40	80	160	25	50	100	29	58	115	18	36	72
35	07	60	120	240	35	70	140	30	60	120	19	38	76
40	08	70	140	280	45	90	180	32	64	125	20	40	80
45	09	80	160	320	50	100	200	44	88	175	28	56	110
50	10	80	160	320	50	100	200	46	92	185	29	58	115
55	11	120	240	480	70	140	280	58	115	230	37	75	150
60	12	120	240	480	70	140	280	60	120	240	38	76	150
65	13	120	240	480	80	160	320	63	125	250	40	80	160
70	14	200	400	800	130	260	520	80	160	320	50	100	200
75	15	210	420	840	130	260	520	83	165	330	52	105	210
80	16	220	440	880	140	280	560	93	185	370	60	120	240
85	17	270	540	1080	170	340	680	100	200	400	63	125	250
90	18	280	560	1120	180	360	720	105	210	420	65	130	260
95	19	290	580	1160	190	380	760	110	220	440	70	140	280
100	20	360	720	1440	230	460	920	140	280	560	90	180	360
110	22	370	740	1480	230	460	920	150	300	600	95	190	380
120	24	450	900	1800	290	580	1160	170	340	680	105	210	420
130	26	540	1080	2160	350	700	1400	—	—	—	—	—	—
140	28	560	1120	2240	360	720	1440	—	—	—	—	—	—
150	30	740	1480	2960	470	940	1880	—	—	—	—	—	—

1) All-steel bearings only

Materials

Bearings operate under rolling contact fatigue stress with various additional stresses or environmental conditions imposed, so for the best performance and reliability, the bearing steel and hardening heat treatment aspects are of critical importance.

The standard SKF bearing steel that is also used for sealed high-precision angular contact ball bearings has "high carbon" content according to the accepted classification parameters (more than 0.5%). Additional alloying elements like Chromium, Manganese and Molybdenum are included in the steel composition to obtain the necessary properties in the finished components.

Cages

Sealed high-precision angular contact ball bearings are as standard equipped with outer ring land riding fabric-reinforced phenolic resin cages. The cages are lightweight and designed to minimize the centrifugal force while ensuring an optimum lubricant flow throughout the ball-raceway contact. Cages are not identified in the bearing designation.

Speed

The speed ratings quoted in the product tables are guideline values and are valid provided that the bearings are lightly loaded ($P < 0.06 C$), lightly preloaded by means of springs, and the conduction of heat away from the bearing is good.

The values under oil spot lubrication are maximum values and should be reduced for certain other methods of oil lubrication. The values under grease lubrication are maximum values that can be attained using a good quality grease of soft consistency.

If single angular contact ball bearings have to be adjusted against each other to a greater degree – e.g., to increase spindle stiffness, or if matched sets of two, three or four bearings are to be used and bearings are rigidly preloaded – the speed rating values given in the tables must be reduced (→ tables 5)

Greases

Sealed high-precision angular contact ball bearings are, as standard, filled in with high quality low consistency lithium complex grease with synthetic base oil.

The standard filling grade for sealed high-precision angular contact ball bearings is 25 ÷ 35%.

Speed reduction factors for preloaded sets of sealed high-precision angular contact ball bearings.

Bearing arrangement	Preload		
	A	B	C
Set of 2 bearings paired in tandem	0.90	0.80	0.65
Set of 2 bearings paired back to back or face to face	0.80	0.70	0.55
Set of 3 bearings	0.70	0.55	0.35
Set of 4 bearings	0.65	0.45	0.25

Note: values apply both to all-steel and hybrid bearings

Designation systems

The complete designation of a single bearing identifies the series, bore diameter, contact angle and design as well as the suffix indicating the tolerance class.

The designation of bearing sets also includes suffixes indicating the number of bearings in the set, their arrangement and preload. Additional digits can be added to identify bearings incorporating special features such as greases and special tolerances. Please contact SKF for specific information.

The designation scheme of SKF sealed high-precision angular contact ball bearings is shown in **table 6**.



Table 6

EXAMPLE

S	719	10	AC	D	/	HC	P4A	Q	BC	A
SC	719	10	F	B	/		P9	Q	BC	A

Features

- S Sealed bearing
- C Ceramic rolling elements (B internal design only)

Bearing series

- 719 Single row angular contact ball bearing, ISO Dimension Series 19
- 70 Single row angular contact ball bearing, ISO Dimension Series 10

Bore diameter

- 06 (x5) 30 mm bore diameter
- I 30 (x5) 150 mm bore diameter

Contact angle

- C 15°
- F 18°
- AC or D 25°

Internal design

- D Standard design
- B High speed design

Cage design and material

- Outer ring land riding, fabric reinforced phenolic resin

Rolling element material

- Steel
- HC Ceramic rolling elements (D internal design only)

Tolerance class

- P4A, P7 Dimensional accuracy to ISO class 4, running accuracy better than ISO class 4
- PA9A, P9 Accuracy to ABMA class ABEC 9

Number of bearings in set

- D 2 bearings in matched set
- T 3 bearings in matched set
- Q 4 bearings in matched set

Bearing arrangement in matched set

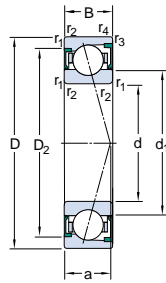
- B Back-to-back
- F Face-to-face
- T Tandem
- BT Back-to-back/tandem
- FT Face-to-face/tandem
- BC Back-to-back of pairs in tandem
- FC Face-to-face of pairs in tandem
- G For universal pairing

Preload

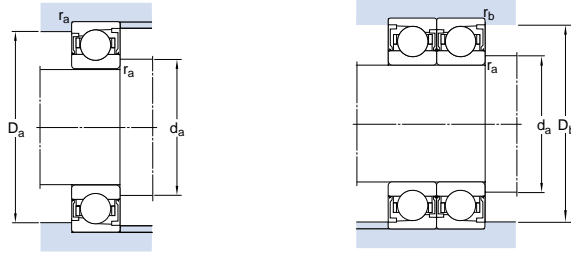
- A Light preload
- B Medium preload
- C Heavy preload
- G.. Special preload, value in daN, e.g. G240

3

Sealed high-precision angular contact ball bearings
d 30-80 mm



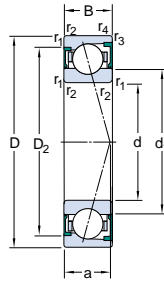
Principal dimensions			Load dynam.	Rating stat			Reference speed		Mass	Designation
d	D	B	C	C ₀	P _U	f ₀	Lubrication grease	oil-air	kg	-
mm	mm	mm	N	N	N		r/min	r/min		
30	47	9	7150	4550	193	10	30000	45000	0.051	S71906 CD
	47	9	6760	4300	183	-	26000	40000	0.051	S71906 ACD
	55	13	14300	8000	345	9.4	28000	43000	0.11	S7006 CD
	55	13	13800	7650	325	-	24000	38000	0.11	S7006 ACD
35	55	10	9750	6550	275	10	26000	40000	0.078	S71907 CD
	55	10	9230	6200	260	-	22000	36000	0.078	S71907 ACD
	62	14	15600	9500	400	9.7	22000	36000	0.15	S7007 CD
	62	14	14800	9000	380	-	19000	32000	0.15	S7007 ACD
40	62	12	12400	8500	360	10	20000	34000	0.12	S71908 CD
	62	12	11700	8000	340	-	18000	30000	0.12	S71908 ACD
	68	15	16800	11000	465	10	19000	32000	0.19	S7008 CD
	68	15	15900	10400	440	-	18000	30000	0.19	S7008 ACD
45	68	12	13000	9500	400	11	19000	32000	0.14	S71909 CD
	68	12	12400	9000	380	-	17000	28000	0.14	S71909 ACD
	75	16	28600	22400	950	15	18000	30000	0.24	S7009 CD
	75	16	27600	21600	900	-	16000	26000	0.24	S7009 ACD
50	72	12	13500	10400	440	11	17000	28000	0.14	S71910 CD
	72	12	12700	9800	415	-	16000	26000	0.14	S71910 ACD
	80	16	29600	24000	1020	15	17000	28000	0.26	S7010 CD
	80	16	28100	23200	980	-	15000	24000	0.26	S7010 ACD
55	80	13	19500	14600	620	10	16000	26000	0.18	S71911 CD
	80	13	18200	13700	585	-	15000	24000	0.18	S71911 ACD
	90	18	39700	32500	1370	15	15000	24000	0.38	S7011 CD
	90	18	37100	31000	1320	-	14000	22000	0.38	S7011 ACD
60	85	13	19900	15300	655	11	15000	24000	0.19	S71912 CD
	85	13	18600	14600	620	-	14000	22000	0.19	S71912 ACD
	95	18	40300	34500	1500	15	14000	22000	0.41	S7012 CD
	95	18	39000	33500	1400	-	13000	20000	0.41	S7012 ACD
65	90	13	20800	17000	710	11	14000	22000	0.21	S71913 CD
	90	13	19500	16000	680	-	13000	20000	0.21	S71913 ACD
	100	18	41600	37500	1600	16	14000	22000	0.43	S7013 CD
	100	18	39000	35500	1500	-	12000	19000	0.43	S7013 ACD
70	100	16	34500	34000	1430	16	13000	20000	0.34	S71914 CD
	100	16	32500	32500	1370	-	11000	18000	0.34	S71914 ACD
	110	20	52000	45500	1930	15	12000	19000	0.60	S7014 CD
	110	20	48800	44000	1860	-	10000	17000	0.60	S7014 ACD
75	105	16	35800	37500	1560	16	12000	19000	0.36	S71915 CD
	105	16	33800	35500	1500	-	10000	17000	0.36	S71915 ACD
	115	20	52700	49000	2080	16	11000	18000	0.63	S7015 CD
	115	20	49400	46500	1960	-	9500	16000	0.63	S7015 ACD
80	110	16	36400	39000	1660	16	11000	18000	0.38	S71916 CD
	110	16	34500	36500	1560	-	9500	16000	0.38	S71916 ACD
	125	22	65000	61000	2550	16	10000	17000	0.86	S7016 CD
	125	22	62400	58500	2450	-	9000	15000	0.86	S7016 ACD



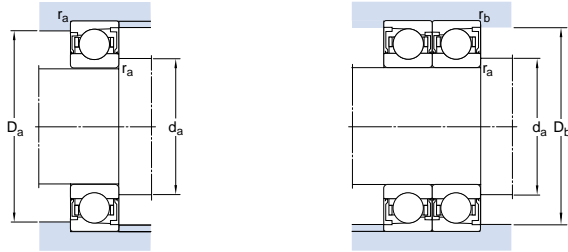
d	Dimensions					Abutment and fillet dimensions				
	d ₁	D ₂	r _{1,2} min	r _{3,4} min	a	d _a min	D _a max	D _b max	r _a max	r _b max
mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
30	35.4	41.6	0.3	0.15	10	32	45	45.8	0.3	0.1
	35.4	41.6	0.3	0.15	14	32	45	45.8	0.3	0.1
	38.1	46.9	1	0.3	12	36	49	53	1	0.3
	38.1	46.9	1	0.3	17	36	49	53	1	0.3
35	41.2	48.8	0.6	0.15	11	40	50	53.8	0.6	0.1
	41.2	48.8	0.6	0.15	16	40	50	53.8	0.6	0.1
	43.7	53.3	1	0.3	14	41	56	60	1	0.3
	43.7	53.3	1	0.3	19	41	56	60	1	0.3
40	46.7	55.3	0.6	0.15	13	45	57	60.8	0.6	0.1
	46.7	55.3	0.6	0.15	18	45	57	60.8	0.6	0.1
	49.2	58.8	1	0.3	15	46	62	66	1	0.3
	49.2	58.8	1	0.3	20	46	62	66	1	0.3
45	52.2	60.8	0.6	0.15	14	50	63	66.8	0.6	0.1
	52.2	60.8	0.6	0.15	19	50	63	66.8	0.6	0.1
	54.7	65.3	1	0.3	16	51	69	73	1	0.3
	54.7	65.3	1	0.3	22	51	69	73	1	0.3
50	56.7	65.3	0.6	0.15	14	55	67	70.8	0.6	0.1
	56.7	65.3	0.6	0.15	20	55	67	70.8	0.6	0.1
	59.7	70.3	1	0.3	17	56	74	78	1	0.3
	59.7	70.3	1	0.3	17	56	74	78	1	0.3
55	62.7	72.3	1	0.3	16	61	74	78	1	0.3
	62.7	72.3	1	0.3	22	61	74	78	1	0.3
	66.3	78.7	1.1	0.6	19	62	83	86	1	0.6
	66.3	78.7	1.1	0.6	26	62	83	86	1	0.6
60	67.7	77.3	1	0.3	16	66	79	83	1	0.3
	67.7	77.3	1	0.3	23	66	79	83	1	0.3
	71.3	83.7	1.1	0.6	20	67	88	91	1	0.6
	71.3	83.7	1.1	0.6	27	67	88	91	1	0.6
65	72.7	82.3	1	0.3	17	71	84	88	1	0.3
	72.7	82.3	1	0.3	25	71	84	88	1	0.3
	76.3	88.7	1.1	0.6	20	72	93	96	1	0.6
	76.3	88.7	1.1	0.6	28	72	93	96	1	0.6
70	79.3	90.7	1	0.3	19	76	94	98	1	0.3
	79.3	90.7	1	0.3	28	76	94	98	1	0.3
	82.9	97.1	1.1	0.6	22	77	103	106	1	0.6
	82.9	97.1	1.1	0.6	31	77	103	106	1	0.6
75	84.3	95.7	1	0.3	20	81	99	103	1	0.3
	84.3	95.7	1	0.3	29	81	99	103	1	0.3
	87.9	103	1.1	0.6	23	82	108	111	1	0.6
	87.9	103	1.1	0.6	32	82	108	111	1	0.6
80	89.3	101	1	0.3	21	86	104	108	1	0.3
	89.3	101	1	0.3	30	86	104	108	1	0.3
	94.4	111	1.1	0.6	25	87	118	121	1	0.6
	94.4	111	1.1	0.6	35	87	118	121	1	0.6

Sealed high-precision angular contact ball bearings

d 65-150 mm



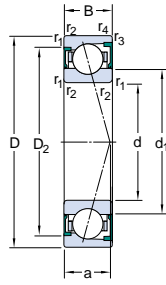
Principal dimensions			Load dynam. C	Rating stat		f ₀	Reference speed		Mass kg	Designation
d	D	B		C ₀	P _u		Lubrication grease	oil-air		
mm	mm	mm	N	N	N	r/min	r/min		-	
85	120	18	46200	48000	2040	16	10000	17000	0.54	S71917 CD
	120	18	43600	45500	1930	-	9000	15000	0.54	S71917 ACD
	130	22	67600	65500	2650	16	9500	16000	0.9	S7017 CD
	130	22	63700	62000	2500	-	8500	14000	0.9	S7017 ACD
90	125	18	47500	51000	2080	16	9500	16000	0.56	S71918 CD
	125	18	44200	48000	1960	-	8500	14000	0.56	S71918 ACD
	140	24	79300	76500	3000	16	9000	15000	1.17	S7018 CD
	140	24	74100	72000	2850	-	8000	13000	1.17	S7018 ACD
95	130	18	49400	55000	2200	16	9000	15000	0.59	S71919 CD
	130	18	46200	52000	2080	-	8500	14000	0.59	S71919 ACD
	145	24	81900	80000	3100	16	8500	14000	1.22	S7019 CD
	145	24	76100	76500	2900	-	8000	13000	1.22	S7019 ACD
100	140	20	60500	65500	2550	16	8500	14000	0.81	S71920 CD
	140	20	57200	63000	2400	-	8000	13000	0.81	S71920 ACD
	150	24	83200	85000	3200	16	8500	14000	1.26	S7020 CD
	150	24	79300	80000	3050	-	7500	12000	1.26	S7020 ACD
110	150	20	62400	72000	2700	17	8000	13000	0.87	S71922 CD
	150	20	58500	68000	2550	-	7500	12000	0.87	S71922 ACD
	170	28	111000	108000	3900	16	7500	12000	1.98	S7022 CD
	170	28	104000	104000	3750	-	7000	11000	1.98	S7022 ACD
120	165	22	78000	91500	3250	16	7500	12000	1.2	S71924 CD
	165	22	72800	86500	3050	-	7000	11000	1.2	S71924 ACD
	180	28	114000	122000	4250	16	7000	11000	2.14	S7024 CD
	180	28	111000	116000	4000	-	6700	10000	2.14	S7024 ACD
130	180	24	92300	108000	3650	16	7000	11000	1.58	S71926 CD
	180	24	87100	102000	3450	-	6700	10000	1.58	S71926 ACD
	200	33	148000	156000	5200	16	6700	10000	3.26	S7026 CD
	200	33	140000	150000	4900	-	6000	9000	3.26	S7026 ACD
140	190	24	95600	116000	3900	17	6700	10000	1.68	S71928 CD
	190	24	90400	110000	3650	-	6000	9000	1.68	S71928 ACD
	210	33	153000	166000	5300	16	6700	10000	3.44	S7028 CD
	210	33	146000	156000	5100	-	5600	8500	3.44	S7028 ACD
150	210	28	125000	146000	4750	16	6300	9500	2.57	S71930 CD
	210	28	119000	140000	4500	-	5000	8500	2.57	S71930 ACD
	225	35	172000	190000	5850	16	6000	9000	4.19	S7030 CD
	225	35	163000	180000	5600	-	5300	8000	4.19	S7030 ACD



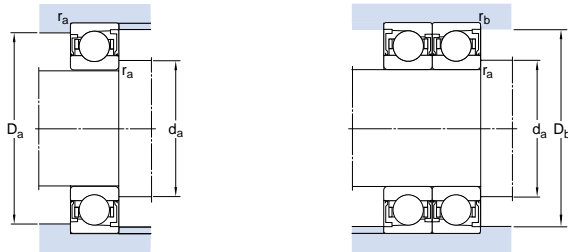
Dimensions					Abutment and fillet dimensions					
d	d ₁	D ₂	r _{1,2} min	r _{3,4} min	a	d _a min	D _a max	D _b max	r _a max	r _b max
mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
85	95.8	110	1.1	0.6	23	92	113	115	1	0.6
	95.8	110	1.1	0.6	23	92	113	115	1	0.6
	99.4	116	1.1	0.6	36	92	123	126	1	0.6
	106	130	2	1	30	95	140	144	2	1
90	100	115	1.1	0.6	23	97	118	120	1	0.6
	100	115	1.1	0.6	34	97	118	120	1	0.6
	106	124	1.5	0.6	39	99	131	135	1.5	0.6
	106	124	2	1	32	100	150	135	1.5	0.6
95	105	120	1.1	0.6	24	102	123	125	1	0.6
	105	120	1.1	0.6	35	102	123	125	1	0.6
	111	129	1.5	0.6	28	104	136	140	1.5	0.6
	111	129	1.5	0.6	40	104	136	140	1.5	0.6
100	112	128	1.1	0.6	26	107	133	135	1	0.6
	112	128	1.1	0.6	38	107	133	135	1	0.6
	116	134	1.5	0.6	29	109	141	145	1.5	0.6
	116	134	1.5	0.6	41	109	141	145	1.5	0.6
110	122	138	1.1	0.6	27	117	143	145	1	0.6
	122	138	1.1	0.6	40	117	143	145	1	0.6
	129	151	2	1	33	120	160	164	2	1
	129	151	2	1	47	120	160	164	2	1
120	133	152	1.1	0.6	30	127	158	160	1	0.6
	133	152	1.1	0.6	44	127	158	160	1	0.6
	139	161	2	1	34	130	170	174	2	1
	139	161	2	1	49	130	170	174	2	1
130	145	165	1.5	0.6	33	139	171	175	1.5	0.6
	145	165	1.5	0.6	48	139	171	175	1.5	0.6
	152	178	2	1	39	140	190	194	2	1
	152	178	2	1	55	140	190	194	2	1
140	155	175	1.5	0.6	34	149	181	185	1.5	0.6
	155	175	1.5	0.6	51	149	181	185	1.5	0.6
	162	188	2	1	40	150	200	204	2	1
	162	188	2	1	58	150	200	204	2	1
150	168	192	2	1	38	160	200	204	2	1
	168	192	2	1	56	160	200	204	2	1
	174	201	2.1	1	43	162	213	219	2	1
	174	201	2.1	1	62	162	213	219	2	1

Hybrid sealed high-precision angular contact ball bearings

d 30-80 mm



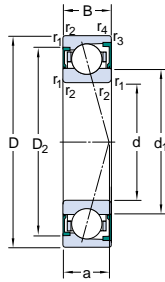
Principal dimensions			Load dynam.	Rating stat			Reference speed		Mass	Designation
d	D	B	C	C ₀	P _U	f ₀	Lubrication grease	oil-air	kg	-
mm	mm	mm	N	N	N		r/min	r/min		
30	47	9	7150	4550	193	10	38000	53000	0.046	S71906 CD/HC
	47	9	6760	4300	183	-	34000	48000	0.046	S71906 ACD/HC
	55	13	14300	8000	345	9.4	34000	48000	0.11	S7006 CD/HC
	55	13	13800	7650	325	-	32000	45000	0.11	S7006 ACD/HC
35	55	10	9750	6550	275	10	32000	45000	0.07	S71907 CD/HC
	55	10	9230	6200	260	-	30000	43000	0.07	S71907 ACD/HC
	62	14	15600	9500	400	9.7	30000	43000	0.15	S7007 CD/HC
	62	14	14800	9000	380	-	26000	38000	0.15	S7007 ACD/HC
40	62	12	12400	8500	360	10	28000	40000	0.11	S71908 CD/HC
	62	12	11700	8000	340	-	24000	36000	0.11	S71908 ACD/HC
	68	15	16800	11000	465	10	26000	38000	0.19	S7008 CD/HC
	68	15	15900	10400	440	-	22000	34000	0.19	S7008 ACD/HC
45	68	12	13000	9500	400	11	24000	36000	0.12	S71909 CD/HC
	68	12	12400	9000	380	-	22000	34000	0.12	S71909 ACD/HC
	75	16	28600	22400	950	15	22000	34000	0.23	S7009 CD/HC
	75	16	27600	21600	900	-	20000	32000	0.23	S7009 ACD/HC
50	72	12	13500	10400	440	11	22000	34000	0.12	S71910 CD/HC
	72	12	12700	9800	415	-	19000	30000	0.12	S71910 ACD/HC
	80	16	29600	24000	1020	15	20000	32000	0.25	S7010 CD/HC
	80	16	28100	23200	980	-	18000	28000	0.25	S7010 ACD/HC
55	80	13	19500	14600	620	10	19000	30000	0.15	S71911 CD/HC
	80	13	18200	13700	585	-	18000	28000	0.15	S71911 ACD/HC
	90	18	39700	32500	1370	15	18000	28000	0.37	S7011 CD/HC
	90	18	37100	31000	1320	-	17000	26000	0.37	S7011 ACD/HC
60	85	13	19900	15300	655	11	18000	28000	0.16	S71912 CD/HC
	85	13	18600	14600	620	-	17000	26000	0.16	S71912 ACD/HC
	95	18	40300	34500	1500	15	17000	26000	0.4	S7012 CD/HC
	95	18	39000	33500	1400	-	16000	24000	0.4	S7012 ACD/HC
65	90	13	20800	17000	710	11	17000	26000	0.18	S71913 CD/HC
	90	13	19500	16000	680	-	16000	24000	0.18	S71913 ACD/HC
	100	18	41600	37500	1600	16	16000	24000	0.42	S7013 CD/HC
	100	18	39000	35500	1500	-	15000	22000	0.42	S7013 ACD/HC
70	100	16	34500	34000	1430	16	16000	24000	0.29	S71914 CD/HC
	100	16	32500	32500	1370	-	15000	22000	0.29	S71914 ACD/HC
	110	20	52000	45500	1930	15	15000	22000	0.59	S7014 CD/HC
	110	20	48800	44000	1860	-	14000	20000	0.59	S7014 ACD/HC
75	105	16	35800	37500	1560	16	15000	22000	0.31	S71915 CD/HC
	105	16	33800	35500	1500	-	14000	20000	0.31	S71915 ACD/HC
	115	20	52700	49000	2080	16	15000	22000	0.62	S7015 CD/HC
	115	20	49400	46500	1960	-	13000	19000	0.62	S7015 ACD/HC
80	110	16	36400	39000	1660	16	15000	22000	0.32	S71916 CD/HC
	110	16	34500	36500	1560	-	13000	19000	0.32	S71916 ACD/HC
	125	22	65000	61000	2550	16	14000	20000	0.84	S7016 CD/HC
	125	22	62400	58500	2450	-	12000	18000	0.84	S7016 ACD/HC



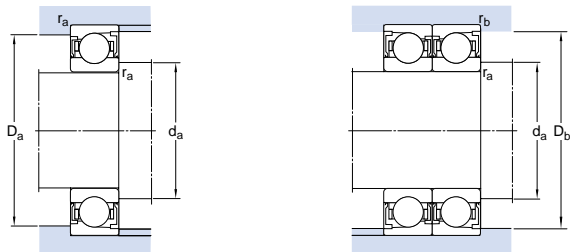
d	Dimensions					Abutment and fillet dimensions				
	d ₁	D ₂	r _{1,2} min	r _{3,4} min	a	d _a min	D _a max	D _b max	r _a max	r _b max
mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
30	35.4	41.6	0.3	0.15	10	32	45	45.8	0.3	0.1
	35.4	41.6	0.3	0.15	14	32	45	45.8	0.3	0.1
	38.1	46.9	1	0.3	12	36	49	53	1	0.3
	38.1	46.9	1	0.3	17	36	49	53	1	0.3
35	41.2	48.8	0.6	0.15	11	40	50	53.8	0.6	0.1
	41.2	48.8	0.6	0.15	16	40	50	53.8	0.6	0.1
	43.7	53.3	1	0.3	14	41	56	60	1	0.3
	43.7	53.3	1	0.3	19	41	56	60	1	0.3
40	46.7	55.3	0.6	0.15	13	45	57	60.8	0.6	0.1
	46.7	55.3	0.6	0.15	18	45	57	60.8	0.6	0.1
	49.2	58.8	1	0.3	15	46	62	66	1	0.3
	49.2	58.8	1	0.3	20	46	62	66	1	0.3
45	52.2	60.8	0.6	0.15	14	50	63	66.8	0.6	0.1
	52.2	60.8	0.6	0.15	19	50	63	66.8	0.6	0.1
	54.7	65.3	1	0.3	16	51	69	73	1	0.3
	54.7	65.3	1	0.3	22	51	69	73	1	0.3
50	56.7	65.3	0.6	0.15	14	55	67	70.8	0.6	0.1
	56.7	65.3	0.6	0.15	20	55	67	70.8	0.6	0.1
	59.7	70.3	1	0.3	17	56	74	78	1	0.3
	59.7	70.3	1	0.3	17	56	74	78	1	0.3
55	62.7	72.3	1	0.3	16	61	74	78	1	0.3
	62.7	72.3	1	0.3	22	61	74	78	1	0.3
	66.3	78.7	1.1	0.6	19	62	83	86	1	0.6
	66.3	78.7	1.1	0.6	26	62	83	86	1	0.6
60	67.7	77.3	1	0.3	16	66	79	83	1	0.3
	67.7	77.3	1	0.3	23	66	79	83	1	0.3
	71.3	83.7	1.1	0.6	20	67	88	91	1	0.6
	71.3	83.7	1.1	0.6	27	67	88	91	1	0.6
65	72.7	82.3	1	0.3	17	71	84	88	1	0.3
	72.7	82.3	1	0.3	25	71	84	88	1	0.3
	76.3	88.7	1.1	0.6	20	72	93	96	1	0.6
	76.3	88.7	1.1	0.6	28	72	93	96	1	0.6
70	79.3	90.7	1	0.3	19	76	94	98	1	0.3
	79.3	90.7	1	0.3	28	76	94	98	1	0.3
	82.9	97.1	1.1	0.6	22	77	103	106	1	0.6
	82.9	97.1	1.1	0.6	31	77	103	106	1	0.6
75	84.3	95.7	1	0.3	20	81	99	103	1	0.3
	84.3	95.7	1	0.3	29	81	99	103	1	0.3
	87.9	103	1.1	0.6	23	82	108	111	1	0.6
	87.9	103	1.1	0.6	32	82	108	111	1	0.6
80	89.3	101	1	0.3	21	86	104	108	1	0.3
	89.3	101	1	0.3	30	86	104	108	1	0.3
	94.4	111	1.1	0.6	25	87	118	121	1	0.6
	94.4	111	1.1	0.6	35	87	118	121	1	0.6

Hybrid sealed high-precision angular contact ball bearings

d 65-140 mm

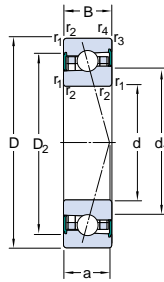


Principal dimensions			Load dynam.	Rating stat				Reference speed		Mass	Designation
d	D	B	C	C ₀	P _u	f ₀	Lubrication				
mm	mm	mm	N	N	N		grease	oil-air	kg	-	
							r/min	r/min			
85	120	18	46200	48000	2040	16	14000	20000	0.46	S71917 CD/HC	
	120	18	43600	45500	1930	-	12000	18000	0.46	S71917 ACD/HC	
	130	22	67600	65500	2650	16	13000	19000	0.88	S7017 CD/HC	
	130	22	63700	62000	2500	-	11000	17000	0.88	S7017 ACD/HC	
90	125	18	47500	51000	2080	16	13000	19000	0.48	S71918 CD/HC	
	125	18	44200	48000	1960	-	11000	17000	0.48	S71918 ACD/HC	
	140	24	79300	76500	3000	16	12000	18000	1.14	S7018 CD/HC	
	140	24	74100	72000	2850	-	10000	16000	1.14	S7018 ACD/HC	
95	130	18	49400	55000	2200	16	12000	18000	0.5	S71919 CD/HC	
	130	18	46200	52000	2080	-	10000	16000	0.5	S71919 ACD/HC	
	145	24	81900	80000	3100	16	11000	17000	1.19	S7019 CD/HC	
	145	24	76100	76500	2900	-	9500	15000	1.19	S7019 ACD/HC	
100	140	20	60500	65500	2550	16	11000	17000	0.68	S71920 CD/HC	
	140	20	57200	63000	2400	-	9500	15000	0.68	S71920 ACD/HC	
	150	24	83200	85000	3200	16	10000	16000	1.23	S7020 CD/HC	
	150	24	79300	80000	3050	-	9500	15000	1.23	S7020 ACD/HC	
110	150	20	62400	72000	2700	17	10000	16000	0.74	S71922 CD/HC	
	150	20	58500	68000	2550	-	9000	14000	0.74	S71922 ACD/HC	
120	165	22	78000	91500	3250	16	9000	14000	1.01	S71924 CD/HC	
	165	22	72800	86500	3050	-	8500	17000	1.01	S71924 ACD/HC	
130	180	24	92300	108000	3650	16	8500	13000	1.32	S71926 CD/HC	
	180	24	87100	102000	3450	-	8000	12000	1.32	S71926 ACD/HC	
140	190	24	95600	116000	3900	17	8000	12000	1.41	S71928 CD/HC	
	190	24	90400	110000	3650	-	7500	11000	1.41	S71928 ACD/HC	

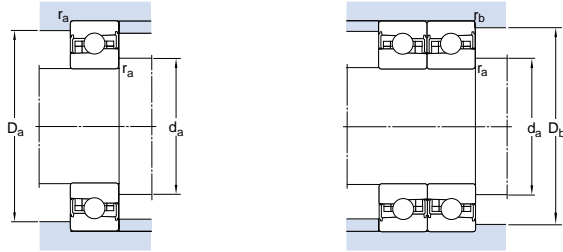


d	Dimensions					Abutment and fillet dimensions				
	d ₁	D ₂	r _{1,2} min	r _{3,4} min	a	d _a min	D _a max	D _b max	r _a max	r _b max
mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
85	95.8	110	1.1	0.6	23	92	113	115	1	0.6
	95.8	110	1.1	0.6	23	92	113	115	1	0.6
	99.4	116	1.1	0.6	36	92	123	126	1	0.6
	106	130	2	1	30	95	140	144	2	1
90	100	115	1.1	0.6	23	97	118	120	1	0.6
	100	115	1.1	0.6	34	97	118	120	1	0.6
	106	124	1.5	0.6	39	99	131	135	1.5	0.6
	106	124	2	1	32	100	150	135	1.5	0.6
95	105	120	1.1	0.6	24	102	123	125	1	0.6
	105	120	1.1	0.6	35	102	123	125	1	0.6
	111	129	1.5	0.6	28	104	136	140	1.5	0.6
	111	129	1.5	0.6	40	104	136	140	1.5	0.6
100	112	128	1.1	0.6	26	107	133	135	1	0.6
	112	128	1.1	0.6	38	107	133	135	1	0.6
	116	134	1.5	0.6	29	109	141	145	1.5	0.6
	116	134	1.5	0.6	41	109	141	145	1.5	0.6
110	122	138	1.1	0.6	27	117	143	145	1	0.6
	122	138	1.1	0.6	40	117	143	145	1	0.6
120	133	152	1.1	0.6	30	127	158	160	1	0.6
	133	152	1.1	0.6	44	127	158	160	1	0.6
130	145	165	1.5	0.6	33	139	171	175	1.5	0.6
	145	165	1.5	0.6	48	139	171	175	1.5	0.6
140	155	175	1.5	0.6	34	149	181	185	1.5	0.6
	155	175	1.5	0.6	51	149	181	185	1.5	0.6

Sealed high-precision high speed angular contact ball bearings
d 30-80 mm



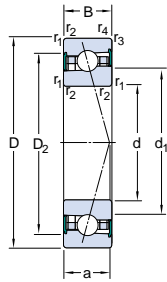
Principal dimensions			Load dynam.	Rating stat			Reference speed		Mass	Designation
d	D	B	C	C ₀	P _U	f ₀	Lubrication grease	oil-air		
mm	mm	mm	N	N	N		r/min	r/min	kg	-
30	47	9	6370	5200	132	9.4	36000	56000	0.045	S71906 FB
	47	9	6050	4900	127	-	32000	50000	0.045	S71906 DB
	55	13	8840	7100	173	9.5	32000	50000	0.12	S7006 FB
	55	13	8320	6700	166	-	30000	46000	0.12	S7006 DB
35	55	10	6890	6200	153	9.6	32000	48000	0.075	S71907 FB
	55	10	6500	5850	146	-	28000	43000	0.075	S71907 DB
	62	14	9360	8300	204	9.6	28000	45000	0.17	S7007 FB
	62	14	8840	7800	193	-	26000	40000	0.17	S7007 DB
40	62	12	7150	6950	173	9.8	28000	43000	0.12	S71908 FB
	62	12	6760	6400	166	-	24000	38000	0.12	S71908 DB
	68	15	9950	9300	232	9.8	26000	40000	0.21	S7008 FB
	68	15	9360	8650	224	-	24000	36000	0.21	S7008 DB
45	68	12	9950	9650	245	9.8	24000	38000	0.13	S71909 FB
	68	12	9560	9000	232	-	22000	36000	0.13	S71909 DB
	75	16	13000	12200	300	9.6	24000	38000	0.26	S7009 FB
	75	16	12100	11400	285	-	20000	34000	0.26	S7009 DB
50	72	12	10400	10200	265	9.9	22000	36000	0.14	S71910 FB
	72	12	9750	9650	250	-	20000	34000	0.14	S71910 DB
	80	16	13300	13200	325	9.7	22000	34000	0.28	S7010 FB
	80	16	12500	12200	310	-	19000	30000	0.28	S7010 DB
55	80	13	13300	13700	340	9.7	20000	34000	0.18	S71911 FB
	80	13	12700	12700	325	-	19000	30000	0.18	S71911 DB
	90	18	18600	19000	465	9.7	19000	32000	0.4	S7011 FB
	90	18	17400	17600	440	-	17000	28000	0.4	S7011 DB
60	85	13	14000	14600	365	9.8	19000	32000	0.20	S71912 FB
	85	13	13300	13400	355	-	17000	28000	0.20	S71912 DB
	95	18	19500	20000	500	9.8	18000	30000	0.44	S7012 FB
	95	18	18200	19000	480	-	16000	26000	0.44	S7012 DB
65	90	13	14300	15300	405	9.9	18000	30000	0.2	S71913 FB
	90	13	13300	14300	390	-	16000	26000	0.2	S71913 DB
	100	18	19900	21600	540	9.7	17000	28000	0.45	S7013 FB
	100	18	19000	20000	520	-	15000	24000	0.45	S7013 DB
70	100	16	18200	20000	520	10	16000	26000	0.35	S71914 FB
	100	16	17200	18600	500	-	15000	24000	0.35	S71914 DB
	110	20	26000	28000	680	9.6	16000	26000	0.64	S7014 FB
	110	20	24700	26000	655	-	14000	22000	0.64	S7014 DB
75	105	16	19000	21200	550	10	16000	26000	0.35	S71915 FB
	105	16	17400	20000	530	-	14000	22000	0.35	S71915 DB
	115	20	26500	29000	735	9.7	15000	24000	0.68	S7015 FB
	115	20	25100	27000	710	-	13000	20000	0.68	S7015 DB
80	110	16	21200	24000	620	10	15000	24000	0.38	S71916 FB
	110	16	19500	22400	600	-	13000	20000	0.38	S71916 DB
	125	22	31200	34500	930	9.6	14000	22000	0.89	S7016 FB
	125	22	30200	32500	900	-	12000	19000	0.89	S7016 DB



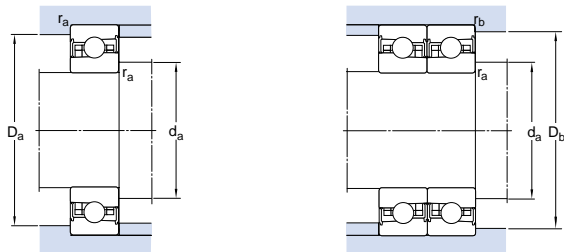
d	Dimensions					Abutment and fillet dimensions				
	d ₁	D ₂	r _{1,2} min	r _{3,4} min	a	d _a min	D _a max	D _b max	r _a max	r _b max
mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
30	36.0	41.2	0.3	0.3	11	32	45	45.8	0.3	0.3
	36.0	41.2	0.3	0.3	14	32	45	45.8	0.3	0.3
	39.5	45.5	1	1	13	35	50	52.8	1	1
	39.5	45.5	1	1	16	35	50	52.8	1	1
35	42.5	47.7	0.6	0.6	12	40	50	53.8	0.6	0.6
	42.5	47.7	0.6	0.6	16	40	50	53.8	0.6	0.6
	45.5	51.7	1	1	15	41	56	59.5	1	1
	45.5	51.7	1	1	18	41	56	59.5	1	1
40	48.5	53.7	0.6	0.6	14	45	57	60.8	0.6	0.6
	48.5	53.7	0.6	0.6	18	45	57	60.8	0.6	0.6
	51.0	57.2	1	1	16	46	62	65.3	1	1
	51.0	57.2	1	1	20	46	62	65.3	1	1
45	53.5	59.7	0.6	0.6	15	50	63	66.8	0.6	0.6
	53.5	59.7	0.6	0.6	19	50	63	66.8	0.6	0.6
	56.4	63.8	1	1	18	51	69	72	1	1
	56.4	63.8	1	1	22	51	69	72	1	1
50	58.0	64.2	0.6	0.6	16	55	67	70.8	0.6	0.6
	58.0	64.2	0.6	0.6	20	55	67	70.8	0.6	0.6
	61.4	68.4	1	1	19	55	74	76.8	1	1
	61.4	68.4	1	1	23	55	74	76.8	1	1
55	63.9	71.3	1	1	18	61	74	78	1	1
	63.9	71.3	1	1	22	61	74	78	1	1
	68.2	77.1	1.1	1.1	21	62	82	86.4	1	1
	68.2	77.1	1.1	1.1	26	62	82	86.4	1	1
60	68.9	76.3	1	1	18	66	79	83	1	1
	68.9	76.3	1	1	24	66	79	83	1	1
	73.2	82.1	1.1	1.1	22	67	88	91	1	1
	73.2	82.1	1.1	1.1	27	67	88	91	1	1
65	74.0	81.3	1	1	19	71	84	88	1	1
	74.0	81.3	1	1	25	71	84	88	1	1
	78.0	87.4	1.1	1.1	23	72	93	96	1	1
	78.0	87.4	1.1	1.1	28	72	93	96	1	1
70	80.9	89.3	1	1	22	76	94	98	1	1
	80.9	89.3	1	1	28	76	94	98	1	1
	85.0	95.4	1.1	1.1	25	77	103	106	1	1
	85.0	95.4	1.1	1.1	31	77	103	106	1	1
75	86.0	94.3	1	1	23	81	99	103	1	1
	86.0	94.3	1	1	29	81	99	103	1	1
	90.0	100.4	1.1	1.1	26	82	108	111	1	1
	90.0	100.4	1.1	1.1	32	82	108	111	1	1
80	90.7	99.6	1	1	24	86	104	108	1	1
	90.7	99.6	1	1	30	86	104	108	1	1
	96.7	109.0	1.1	1.1	28	87	118	121	1	1
	96.7	109.0	1.1	1.1	35	87	118	121	1	1

Sealed high-precision high speed angular contact ball bearings

d 85-120 mm



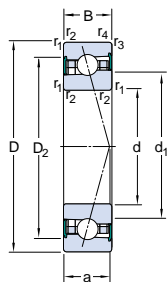
Principal dimensions			Load dynam.	Rating stat				Reference speed		Mass	Designation
d	D	B	C	C ₀	P _U	f ₀	Lubrication grease	oil-air			
mm	mm	mm	N	N	N		r/min	r/min	kg	-	
85	120	18	22100	26000	670	9.9	14000	22000	0.54		S71917 FB
	120	18	20300	24500	640	-	12000	19000	0.54		S71917 DB
	130	22	31900	36000	950	9.6	13000	20000	0.9		S7017 FB
	130	22	30200	33500	915	-	12000	18000	0.9		S7017 DB
90	125	18	23400	28500	710	10	13000	20000	0.57		S71918 FB
	125	18	22500	26500	680	-	12000	18000	0.57		S71918 DB
	140	24	37700	43000	965	9.7	12000	19000	1.21		S7018 FB
	140	24	35800	40000	930	-	11000	17000	1.21		S7018 DB
95	130	18	24700	30000	765	10	13000	19000	0.6		S71919 FB
	130	18	22900	28000	720	-	11000	17000	0.6		S71919 DB
	145	24	37700	44000	1000	9.8	12000	18000	1.23		S7019 FB
	145	24	35800	41500	950	-	10000	16000	1.23		S7019 DB
100	140	20	29100	36000	880	9.9	12000	18000	0.79		S71920 FB
	140	20	27600	33500	850	-	10000	16000	0.79		S71920 DB
	150	24	37700	45500	1020	9.8	11000	18000	1.28		S7020 FB
	150	24	35800	42500	980	-	10000	15000	1.28		S7020 DB
110	150	20	34500	44000	965	10	11000	17000	0.85		S71922 FB
	150	20	32500	40500	930	-	9500	15000	0.85		S71922 DB
	170	28	43400	60000	1270	9.8	10000	16000	1.98		S7022 FB
	170	28	46200	56000	1220	-	9000	14000	1.98		S7022 DB
120	165	22	36400	48000	1040	9.9	10000	15000	1.17		S71924 FB
	165	22	33800	45000	1000	-	9000	14000	1.17		S71924 DB
	180	28	50700	63000	1370	9.9	9000	14000	2.13		S7024 FB
	180	28	47500	58500	1290	-	8500	13000	2.13		S7024 DB



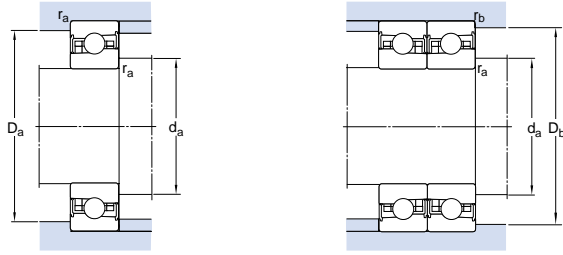
d	Dimensions					Abutment and fillet dimensions				
	d ₁	D ₂	r _{1,2} min	r _{3,4} min	a	d _a min	D _a max	D _b max	r _a max	r _b max
mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
85	98.0	107.4	1.1	1.1	26	92	113	115	1	1
	98.0	107.4	1.1	1.1	33	92	113	115	1	1
	101.7	114.0	1.1	1.1	29	92	123	126	1	1
	101.7	114.0	1.1	1.1	36	92	123	126	1	1
90	103.0	112.4	1.1	1.1	27	97	118	120	1	1
	103.0	112.4	1.1	1.1	34	97	118	120	1	1
	108.7	122.0	1.5	1.5	31	99	131	135	1.5	1.5
	108.7	122.0	1.5	1.5	39	99	131	135	1.5	1.5
95	108.0	117.4	1.1	1.1	27	102	123	125	1	1
	108.0	117.4	1.1	1.1	35	102	123	125	1	1
	113.7	127.0	1.5	1.5	32	104	136	140	1.5	1.5
	113.7	127.0	1.5	1.5	40	104	136	140	1.5	1.5
100	114.5	125.9	1.1	1.1	30	107	133	135	1	1
	114.5	125.9	1.1	1.1	38	107	133	135	1	1
	118.7	132.0	1.5	1.5	32	109	141	145	1.5	1.5
	118.7	132.0	1.5	1.5	41	109	141	145	1.5	1.5
110	124.5	135.9	1.1	1.1	31	117	143	145	1	1
	124.5	135.9	1.1	1.1	40	117	143	145	1	1
	133.2	147.5	1.5	1.5	37	125	155	161	1.5	1.5
	133.2	147.5	1.5	1.5	47	125	155	161	1.5	1.5
120	136.5	149.0	1.1	1.1	34	127	158	160	1	1
	136.5	149.0	1.1	1.1	44	127	158	160	1	1
	143.2	157.5	1.5	1.5	39	135	165	172	1.5	1.5
	143.2	157.5	1.5	1.5	49	135	165	172	1.5	1.5

Hybrid sealed high-precision high speed angular contact ball bearings

d 30-80 mm



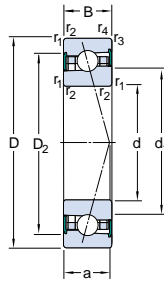
Principal dimensions			Load dynam.	Rating stat			Reference speed		Mass	Designation
d	D	B	C	C ₀	P _U	f ₀	Lubrication grease	oil-air	kg	-
mm	mm	mm	N	N	N		r/min	r/min		
30	47	9	6370	5200	132	9.4	43000	67000	0.042	SC71906 FB
	47	9	6050	4900	127	-	38000	60000	0.042	SC71906 DB
	55	13	8840	7100	173	9.5	38000	60000	0.12	SC7006 FB
	55	13	8320	6700	166	-	34000	56000	0.12	SC7006 DB
35	55	10	6890	6200	153	9.6	36000	56000	0.071	SC71907 FB
	55	10	6500	5850	146	-	32000	53000	0.071	SC71907 DB
	62	14	9360	8300	204	9.6	34000	53000	0.16	SC7007 FB
	62	14	8840	7800	193	-	30000	48000	0.16	SC7007 DB
40	62	12	7150	6950	173	9.8	32000	50000	0.12	SC71908 FB
	62	12	6760	6400	166	-	28000	45000	0.12	SC71908 DB
	68	15	9950	9300	232	9.8	30000	48000	0.2	SC7008 FB
	68	15	9360	8650	224	-	26000	43000	0.2	SC7008 DB
45	68	12	9950	9650	245	9.8	28000	45000	0.12	SC71909 FB
	68	12	9560	9000	232	-	26000	40000	0.12	SC71909 DB
	75	16	13000	12200	300	9.6	26000	43000	0.25	SC7009 FB
	75	16	12100	11400	285	-	24000	38000	0.25	SC7009 DB
50	72	12	10400	10200	265	9.9	26000	43000	0.13	SC71910 FB
	72	12	9750	9650	250	-	24000	38000	0.13	SC71910 DB
	80	16	13300	13200	325	9.7	24000	40000	0.27	SC7010 FB
	80	16	12500	12200	310	-	22000	36000	0.27	SC7010 DB
55	80	13	13300	13700	340	9.7	24000	38000	0.17	SC71911 FB
	80	13	12700	12700	325	-	22000	34000	0.17	SC71911 DB
	90	18	18600	19000	465	9.7	22000	36000	0.38	SC7011 FB
	90	18	17400	17600	440	-	20000	32000	0.38	SC7011 DB
60	85	13	14000	14600	365	9.8	22000	36000	0.18	SC71912 FB
	85	13	13300	13400	355	-	20000	32000	0.18	SC71912 DB
	95	18	19500	20000	500	9.8	20000	34000	0.42	SC7012 FB
	95	18	18200	19000	480	-	18000	30000	0.42	SC7012 DB
65	90	13	14300	15300	405	9.9	20000	34000	0.19	SC71913 FB
	90	13	13300	14300	390	-	19000	30000	0.19	SC71913 DB
	100	18	19900	21600	540	9.7	20000	32000	0.43	SC7013 FB
	100	18	19000	20000	520	-	17000	28000	0.43	SC7013 DB
70	100	16	18200	20000	520	10	19000	32000	0.33	SC71914 FB
	100	16	17200	18600	500	-	17000	28000	0.33	SC71914 DB
	110	20	26000	28000	680	9.6	18000	30000	0.61	SC7014 FB
	110	20	24700	26000	655	-	16000	26000	0.61	SC7014 DB
75	105	16	19000	21200	550	10	18000	30000	0.33	SC71915 FB
	105	16	17400	20000	530	-	16000	26000	0.33	SC71915 DB
	115	20	26500	29000	735	9.7	17000	28000	0.65	SC7015 FB
	115	20	25100	27000	710	-	15000	24000	0.65	SC7015 DB
80	110	16	21200	24000	620	10	17000	28000	0.36	SC71916 FB
	110	16	19500	22400	600	-	15000	24000	0.36	SC71916 DB
	125	22	31200	34500	930	9.6	16000	26000	0.84	SC7016 FB
	125	22	30200	32500	900	-	14000	22000	0.84	SC7016 DB



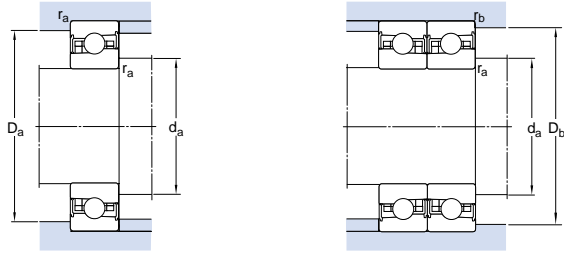
d	Dimensions					Abutment and fillet dimensions				
	d ₁	D ₂	r _{1,2} min	r _{3,4} min	a	d _a min	D _a max	D _b max	r _a max	r _b max
mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
30	36.0	41.2	0.3	0.3	11	32	45	45.8	0.3	0.3
	36.0	41.2	0.3	0.3	14	32	45	45.8	0.3	0.3
	39.5	45.5	1	1	13	35	50	52.8	1	1
	39.5	45.5	1	1	16	35	50	52.8	1	1
35	42.5	47.7	0.6	0.6	12	40	50	53.8	0.6	0.6
	42.5	47.7	0.6	0.6	16	40	50	53.8	0.6	0.6
	45.5	51.7	1	1	15	41	56	59.5	1	1
	45.5	51.7	1	1	18	41	56	59.5	1	1
40	48.5	53.7	0.6	0.6	14	45	57	60.8	0.6	0.6
	48.5	53.7	0.6	0.6	18	45	57	60.8	0.6	0.6
	51.0	57.2	1	1	16	46	62	65.3	1	1
	51.0	57.2	1	1	20	46	62	65.3	1	1
45	53.5	59.7	0.6	0.6	15	50	63	66.8	0.6	0.6
	53.5	59.7	0.6	0.6	19	50	63	66.8	0.6	0.6
	56.4	63.8	1	1	18	51	69	72	1	1
	56.4	63.8	1	1	22	51	69	72	1	1
50	58.0	64.2	0.6	0.6	16	55	67	70.8	0.6	0.6
	58.0	64.2	0.6	0.6	20	55	67	70.8	0.6	0.6
	61.4	68.4	1	1	19	55	74	76.8	1	1
	61.4	68.4	1	1	23	55	74	76.8	1	1
55	63.9	71.3	1	1	18	61	74	78	1	1
	63.9	71.3	1	1	22	61	74	78	1	1
	68.2	77.1	1.1	1.1	21	62	82	86.4	1	1
	68.2	77.1	1.1	1.1	26	62	82	86.4	1	1
60	68.9	76.3	1	1	18	66	79	83	1	1
	68.9	76.3	1	1	24	66	79	83	1	1
	73.2	82.1	1.1	1.1	22	67	88	91	1	1
	73.2	82.1	1.1	1.1	27	67	88	91	1	1
65	74.0	81.3	1	1	19	71	84	88	1	1
	74.0	81.3	1	1	25	71	84	88	1	1
	78.0	87.4	1.1	1.1	23	72	93	96	1	1
	78.0	87.4	1.1	1.1	28	72	93	96	1	1
70	80.9	89.3	1	1	22	76	94	98	1	1
	80.9	89.3	1	1	28	76	94	98	1	1
	85.0	95.4	1.1	1.1	25	77	103	106	1	1
	85.0	95.4	1.1	1.1	31	77	103	106	1	1
75	86.0	94.3	1	1	23	81	99	103	1	1
	86.0	94.3	1	1	29	81	99	103	1	1
	90.0	100.4	1.1	1.1	26	82	108	111	1	1
	90.0	100.4	1.1	1.1	32	82	108	111	1	1
80	90.7	99.6	1	1	24	86	104	108	1	1
	90.7	99.6	1	1	30	86	104	108	1	1
	96.7	109.0	1.1	1.1	28	87	118	121	1	1
	96.7	109.0	1.1	1.1	35	87	118	121	1	1

Hybrid sealed high-precision high speed angular contact ball bearings

d 85-120 mm



Principal dimensions			Load dynam.	Rating stat			Reference speed		Mass	Designation
d	D	B	C	C ₀	P _U	f ₀	Lubrication grease	oil-air		
mm	mm	mm	N	N	N		r/min	r/min	kg	-
85	120	18	22100	26000	670	9.9	16000	26000	0.51	SC71917 FB
	120	18	20300	24500	640	-	14000	22000	0.51	SC71917 DB
	130	22	31900	36000	950	9.6	15000	24000	0.85	SC7017 FB
	130	22	30200	33500	915	-	13000	22000	0.85	SC7017 DB
90	125	18	23400	28500	710	10	15000	24000	0.54	SC71918 FB
	125	18	22500	26500	680	-	13000	22000	0.54	SC71918 DB
	140	24	37700	43000	965	9.7	14000	22000	1.15	SC7018 FB
	140	24	35800	40000	930	-	12000	20000	1.15	SC7018 DB
95	130	18	24700	30000	765	10	14000	24000	0.56	SC71919 FB
	130	18	22900	28000	720	-	13000	20000	0.56	SC71919 DB
	145	24	37700	44000	1000	9.8	13000	20000	1.16	SC7019 FB
	145	24	35800	41500	950	-	12000	20000	1.16	SC7019 DB
100	140	20	29100	36000	880	9.9	13000	22000	0.75	SC71920 FB
	140	20	27600	33500	850	-	12000	19000	0.75	SC71920 DB
	150	24	37700	45500	1020	9.8	13000	20000	1.21	SC7020 FB
	150	24	35800	42500	980	-	11000	19000	1.21	SC7020 DB
110	150	20	34500	44000	965	10	12000	20000	0.81	SC71922 FB
	150	20	32500	40500	930	-	11000	18000	0.81	SC71922 DB
	170	28	43400	60000	1270	9.8	11000	18000	1.88	SC7022 FB
	170	28	46200	56000	1220	-	10000	17000	1.88	SC7022 DB
120	165	22	36400	48000	1040	9.9	11000	18000	1.1	SC71924 FB
	165	22	33800	45000	1000	-	10000	16000	1.1	SC71924 DB
	180	28	50700	63000	1370	9.9	10000	17000	2.02	SC7024 FB
	180	28	47500	58500	1290	-	9500	16000	2.02	SC7024 DB



d	Dimensions					Abutment and fillet dimensions				
	d ₁	D ₂	r _{1,2} min	r _{3,4} min	a	d _a min	D _a max	D _b max	r _a max	r _b max
mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
85	98.0	107.4	1.1	1.1	26	92	113	115	1	1
	98.0	107.4	1.1	1.1	33	92	113	115	1	1
	101.7	114.0	1.1	1.1	29	92	123	126	1	1
	101.7	114.0	1.1	1.1	36	92	123	126	1	1
90	103.0	112.4	1.1	1.1	27	97	118	120	1	1
	103.0	112.4	1.1	1.1	34	97	118	120	1	1
	108.7	122.0	1.5	1.5	31	99	131	135	1.5	1.5
	108.7	122.0	1.5	1.5	39	99	131	135	1.5	1.5
95	108.0	117.4	1.1	1.1	27	102	123	125	1	1
	108.0	117.4	1.1	1.1	35	102	123	125	1	1
	113.7	127.0	1.5	1.5	32	104	136	140	1.5	1.5
	113.7	127.0	1.5	1.5	40	104	136	140	1.5	1.5
100	114.5	125.9	1.1	1.1	30	107	133	135	1	1
	114.5	125.9	1.1	1.1	38	107	133	135	1	1
	118.7	132.0	1.5	1.5	32	109	141	145	1.5	1.5
	118.7	132.0	1.5	1.5	41	109	141	145	1.5	1.5
110	124.5	135.9	1.1	1.1	31	117	143	145	1	1
	124.5	135.9	1.1	1.1	40	117	143	145	1	1
	133.2	147.5	1.5	1.5	37	125	155	161	1.5	1.5
	133.2	147.5	1.5	1.5	47	125	155	161	1.5	1.5
120	136.5	149.0	1.1	1.1	34	127	158	160	1	1
	136.5	149.0	1.1	1.1	44	127	158	160	1	1
	143.2	157.5	1.5	1.5	39	135	165	172	1.5	1.5
	143.2	157.5	1.5	1.5	49	135	165	172	1.5	1.5

Other SKF products and services

High precision bearings

Machine tool applications require superior performance from the bearings used to support spindles and precision ball screws. They must exhibit this in terms of speed capability, system temperature stability, rigidity, accuracy and noise level; such characteristics are rarely met by bearings for general-purpose applications. Therefore, SKF produces special high-precision angular contact, angular contact thrust ball bearings and cylindrical roller bearings designed to satisfy the most demanding requirements in the machine tool environment.

Publication 5002 "High precision bearings"

Precision spindles

With design and production in Italy, Gamfior; Germany, SKF Spindles; USA, Russel T. Gilman; and Japan, PSC Chino, SKF is a worldwide supplier of a complete range of spindles from externally driven to high speed motorised units. SKF spindles are mainly used in the metal cutting machine tool and woodworking industries, but applications are also found in printing, medical and factory automation.

Publications 4990 "Grinding solutions"; 5346 "Compact spindle for milling"; 5348 "Woodworking spindle"

Spindle service

SKF is operating a worldwide network of Spindle Service Centres, where professional reconditioning of almost any machine tools spindle are handled. Service centres are presently located in Austria, France, Germany, India, Italy, Japan, Sweden, UK and the US. Services offered include from complete reconditioning, bearing replacement, shaft and nose restoration to performance upgrade and root cause analysis.

Publication 5352 "SKF spindle service".

Machine tool precision bearing service centres

SKF can help you in reducing downtime with three service centres located at Villar Perosa, Italy; Bethlehem, Pennsylvania (USA); Chino, Japan, to meet your precision machine tool bearings needs. These service centres provide custom preloaded and matched sets of high precision bearings, with very short turn-around. This translates into quicker deliveries, shorter lead times and reduced inventories.

Publication 4808 E "SKF precision bearing service centres".



SKF Bearings for general engineering applications

Deep groove ball bearings, angular contact ball bearings, cylindrical roller bearings, taper roller bearings, etc.

SKF General Catalogue; also SKF Interactive Engineering Catalogue available on CD-ROM or on-line under www.skf.com

Linear motion products

SKF offers a wide range of rolled and ground ball screws for precision linear positioning systems and linear guides.

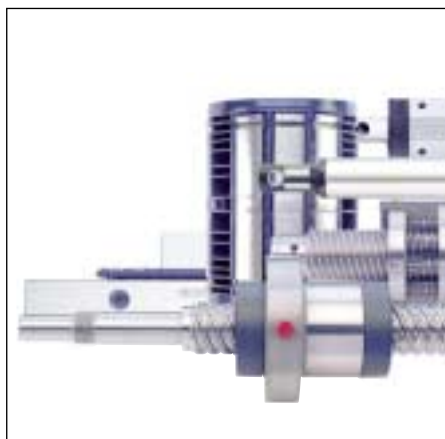
Publication 4664/4 "Product range", or on-line under www.linearmotion.SKF.com

Bearing greases, mounting tools and condition monitoring equipment

Rolling bearings are precision products, with dimensions in the order of microns (1/1000 of a millimetre) are of importance. Furthermore, they are reliable machine parts having a long service life, provided that mounting and maintenance are carried out properly. In order to ensure expert mounting and maintenance, SKF has developed a wide range of mounting and dismantling tools, measuring instruments, lubricating greases and auxiliary products. In special seminars, the users are made familiar with the necessary expert knowledge and receive training. The range includes: mechanical tools, heaters, hydraulic equipment, instruments, bearing lubricants and lubricators.

Condition monitoring solutions for measuring: temperature, speed and noise, oil cleanliness, vibration and bearing condition are also available.

Publication MP3000 "SKF maintenance and lubrication products".



The SKF Group — a worldwide corporation

SKF is an international industrial group operating in more than 130 countries and is a 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 about 40,000 employees and around 80 manufacturing facilities throughout the world. An international sales network includes a large number of sales companies and approximately 7,000 distributors. 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 products and services. Continuous investment in research and development has also played a vital role, resulting in a number of revolutionary 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 to provide customers with the most advanced engineering products and efficient service.

A stylized graphic of a blue flag with the letters 'SKF' in white, waving against a background of a globe. The flag is the central focus, with the letters 'SKF' prominently displayed in a bold, white, sans-serif font. The flag's edges are frayed and it appears to be blowing in the wind. The background shows a portion of the Earth from space, with the blue and white of the planet visible against the black of space.



The SKF group is the first major bearing manufacturer 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 Center is located just outside Utrecht in The Netherlands. In an area of 17,000 square meters (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 the place where the SKF “Life Theory” evolved, enabling the design of bearings that are even more compact and offer even longer operational life.



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



SKF manufactures ball bearings, roller bearings and plain bearings in a variety of sizes ranging from just a few millimeters in diameter to those measuring several meters. SKF also manufactures bearing and oil seals that 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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