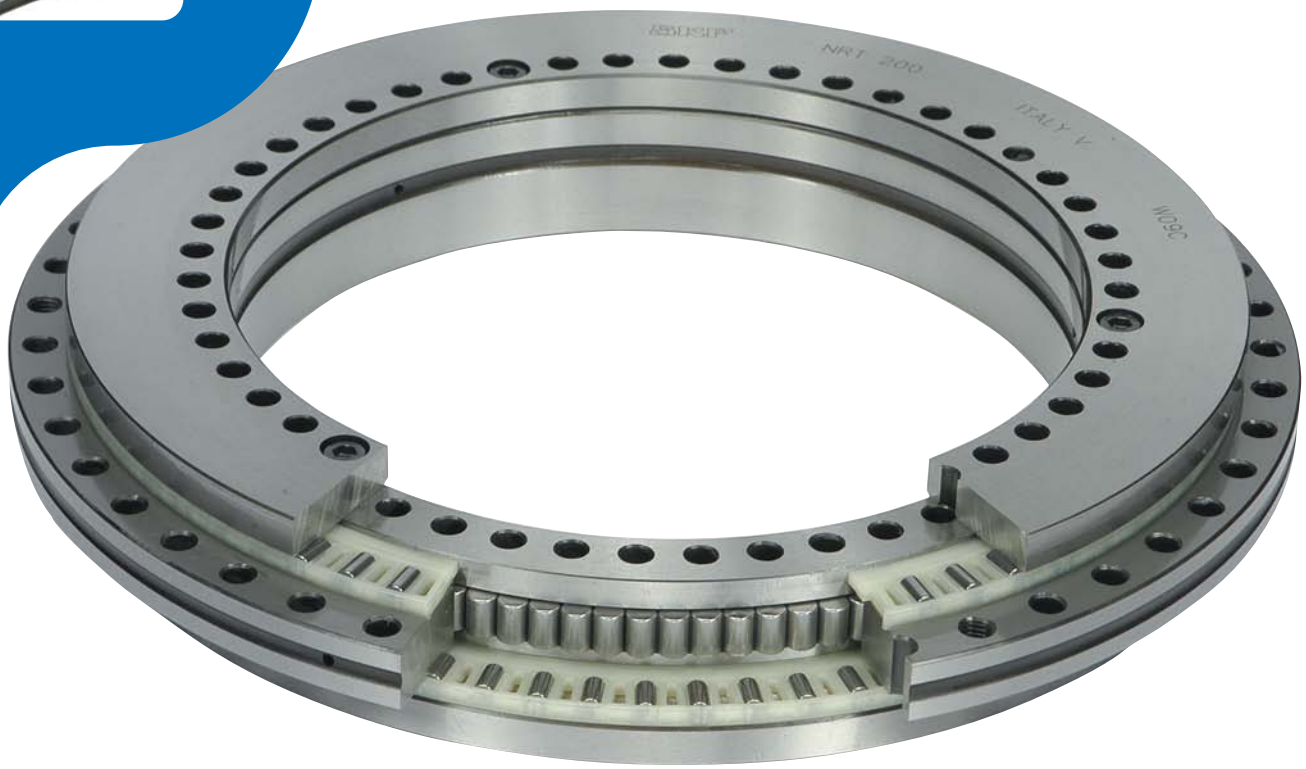
SKF axial-radial cylindrical roller bearings



Contents

The SKF brand now stands for more than ever before, and means more to you as a valued customer.

While SKF maintains its leadership as the hallmark of quality bearings throughout the world, new dimensions in technical advances, product support and services have evolved SKF into a truly solutions-oriented supplier, creating greater value for customers.

These solutions encompass ways to bring greater productivity to customers, not only with breakthrough application-specific products, but also through leading-edge design simulation tools and consultancy services, plant asset efficiency maintenance programmes, and the industry's most advanced supply management techniques.

The SKF brand still stands for the very best in rolling bearings, but it now stands for much more.

SKF – the knowledge engineering company

General

SKF for the machine tool industry

SKF is a worldwide supplier of bearings, seals, lubrication systems and condition monitoring devices for the machine tool industry.

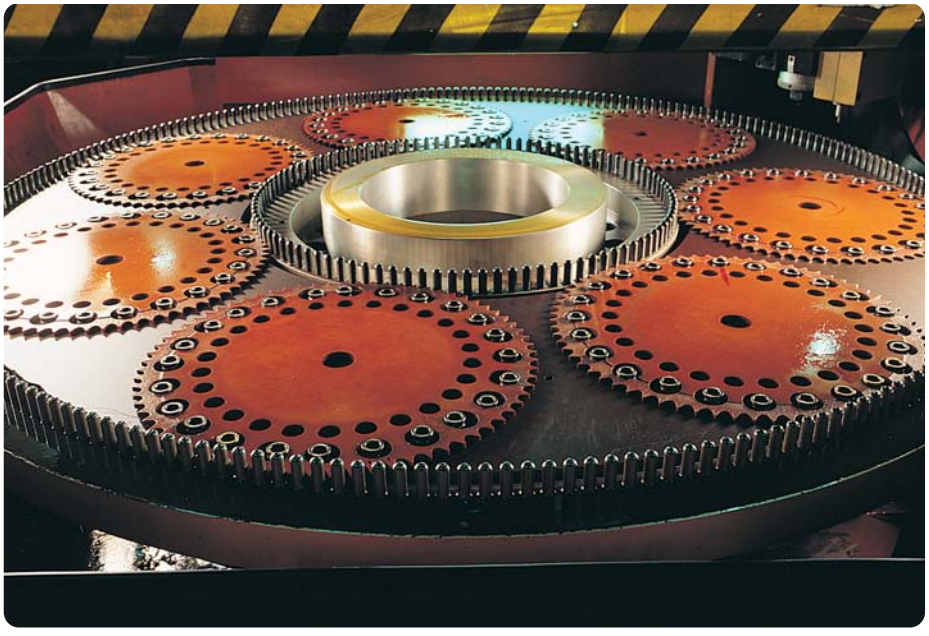
To support our full line of precision bearing products we can now provide axial/radial cylindrical roller bearings.

These bearings are commonly used to support rotating tables, indexing tables and milling heads.

Their particular internal design, together with the high level of accuracy they exhibit (running accuracy better than P4) provide a very precise positioning of the workpieces or of the working heads.

This brochure presents the range of this newest bearing series. The data in this catalogue are based on current production. However, design refinement aiming at continuous improvement in both manufacturing process and bearing performances may result in changes.

The units used in this brochure are in accordance with ISO (International Organization for Standardization) standard 1000: 1992, and SI (Système International d'Unités).



Face honing machine rotating table, typical application for axial-radial cylindrical roller bearings

A century of worldwide experience

Since 100 years SKF has a leading position in all major industrial fields where rolling bearings are used. Through the years, and by a constant partnership developed with the leading firms in every application community, SKF has gathered a wealth of experience with all types of bearing applications. SKF has thus an extensive knowledge in application engineering and in systems design. The more complex the problems, the more important it is to make use of SKF know-how.

A collection of SKF high precision bearings

Technical data

Selection

Basic design

SKF axial-radial cylindrical roller bearings are suitable for arrangements that have to accommodate simultaneously axial loads in one or the other direction, radial loads as well moment loads. They are thus an excellent bearing solution for applications such rotating tables and indexing mechanisms of milling or drilling machines.

The standard bearing consists of an "L" shaped inner ring integrated with a shaft washer, an outer ring, two thrust roller cage assemblies and a radial full complement roller row. (➔ **figs. 1 and 2** on **page 7**)

These bearings are available with or without grease.

- The standard bearing does not contain lubricant and must be adequately lubricated with either grease or oil, through the lubrication holes provided in the inner or outer ring.
- Bearings that are pregreased at the factory (suffix G), contain a grease that provides proper lubrication at high and low speeds.
  The grease fills 50% of the free-space within the bearing to reduce the chance of a temperature rise that could result from over-filling the bearing.

Tolerances

SKF axial-radial cylindrical roller bearings are produced to the tolerances provided in **table 1**. The symbols used in the tolerance table are explained hereafter.

Maximum and minimum values quoted represent the allowable deviation from the nominal dimensions listed in the product tables.

Symbols

d	Nominal bore diameter
Δ_{ds}	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_{dmp}	Mean bore diameter variation; difference between the largest and smallest mean bore diameters of one ring
D	Nominal outside diameter
Δ_{Ds}	Deviation of single outside diameter from the nominal
V_{Dp}	Outside diameter variation; difference between the largest and smallest single outside diameter in one plane
V_{Dmp}	Mean outside diameter variation; difference between the largest and smallest mean outside diameter of one ring
Δ_{Hs}	Deviation of single bearing height
Δ_{H1s}	Deviation of single cross section height
K_{ia},K_{ea}	Radial runout of assembled bearing inner ring and assembled bearing outer ring respectively
S_{ia}, S_{ea}	Sideface runout with reference to raceway of assembled bearing inner ring and assembled bearing outer ring respectively

Tolerances for axial-radial cylindrical roller bearings

Table 1

Inner ring

d		Δ_{ds}		V_{dp}	V_{dmp}	Δ_{HS}		Δ_{H1S}		K_{ia}	S_{ia}
over	incl	high	low	max	max	high	low	high	low	max	max
mm		µm		µm	µm	µm		µm		µm	µm
50	80	0	−9	5	3,5	0	−175	25	−25	3	3
80	120	0	−10	6	4	0	−175	25	−25	3	3
120	150	0	−13	8	5	0	−175	30	−30	3	3
150	180	0	−13	8	5	0	−175	30	−30	4	4
180	250	0	−15	9	6	0	−200	30	−30	4	4
250	315	0	−18	11	8	0	−400	40	−40	6	6
315	400	0	−23	14	10	0	−400	50	−50	6	6
400	500	0	−27	17	12	0	−450	60	−60	6	6

Outer ring

D		Δ_{ds}		V_{dp}	V_{dmp}	K_{ea}	S_{ea}
over	incl	high	low	max	max	max	max
mm		µm		µm	µm		
120	150	0	−11	7	5	Values are	
150	180	0	−13	8	5	identical to	
180	250	0	−15	8	6	those for	
250	315	0	−18	10	7	inner ring	
315	400	0	−20	11	8	of same	
400	500	0	−23	14	9	bearing	
500	630	0	−28	17	11		

Stiffness

Due to the large number of rollers and the line contact between them and the raceways, there is a minimal amount of elastic deformation. To provide additional stiffness, rollers are calibrated during assembly so that the appropriate preload will be achieved once installation is complete. Appropriate preload increases bearing service life, stiffness and rotating accuracy while reducing noise levels. When an axial load is applied to a bearing, the roller row that does not transmit the axial load will be subjected to a reduced preload as a consequence of bearing axial deflection. When the external axial load is large enough the roller row become axially unloaded.

As a result of the closely controlled preload, axial and radial loads and tilting moments can be considered approximately constant. Stiffness values are listed in **table 2** together with the preload values and the axial unloading force for each bearing size. Please note that stiffness values listed refer to two different conditions of bearing assembly, i.e. with (**➔ fig. 2**) or without (**➔ fig. 1**) a supported L-shaped ring. To obtain the highest rigidity values, the L-shaped ring should be supported by a backing ring.

Table 2

Bearing code	Min axial preload	Min axial unloading force	Axial rigidity		Radial rigidity	Tilting rigidity	
			K_{ax}	K_{ax1} [1)]		K_{Mr}	K_{Mr1} [1)]
	kN		kN/µm			kN/mrad	
NRT 80	3	6,6	1,8	1,9	2,4	1,6	1,7
NRT 100	6	13,2	2,3	2,4	2,0	3,3	3,7
NRT 120	11	24,2	3,0	3,2	2,6	6,5	7,6
NRT 150	16	35,2	3,7	4,0	3,3	10,9	12,5
NRT 180	24	52,8	5,4	5,6	3,9	18,6	21,4
NRT 200	25	55,0	4,9	5,5	2,9	24,3	27,6
NRT 260	28	61,6	8,1	8,3	5,7	48,4	51,5
NRT 325	32	70,4	9,2	9,5	6,0	81,3	88,5
NRT 395	52	114,4	11,5	13,1	5,9	148,5	158,1
NRT 460	55	121,0	13,6	16,0	6,3	209,1	218,5

1) Values refer to bearings mounted with supported L-shaped ring
Stiffness values refer to bearings mounted by using a tightening bolt of class 10.9

Axial-radial cylindrical roller bearings preload and stiffness

Figure 1

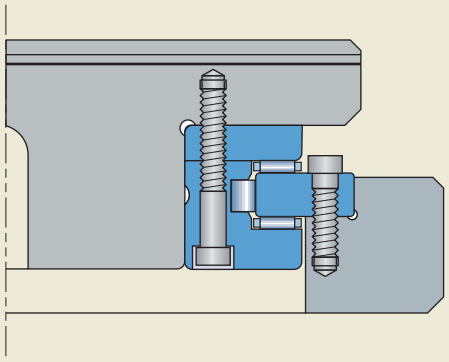
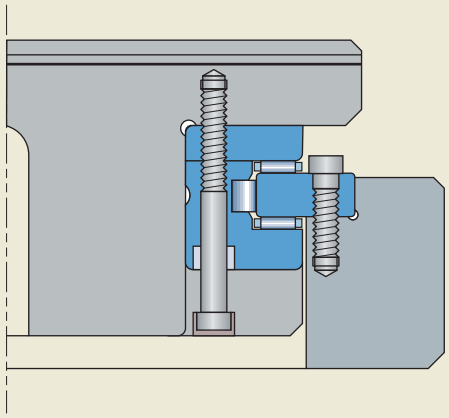


Figure 2



Bearing fitted with supported (fig. 2) or unsupported (fig. 1) L-shaped ring

Friction

The friction in axial-radial roller bearings, as with other bearings, depends on different factors, the most important ones being the loads acting on the bearing, the bearing type and size, the quantity and properties of the lubricant and the operating speed. For example, friction increases as the viscosity of the lubricant increases. Similarly, as loads increase, so does friction. Bearing preload which can be affected during the installation process, can substantially increase friction and reduce bearing service life if the attachment bolts are not torqued to the values suggested in the section "Mounting instructions".

Table 3 provides the value of the friction torque for each bearing measured in functional tests.

Those values are statistical and must be regarded as guidelines only. They have been measured under the following operating conditions:

- Bearings mounted with supported L-shaped inner ring
- Bearings lubricated with high speed grease kinematic viscosity 21 mm^2/s at 40 °C
- Rotational speed 5 rpm
- Ambient temperature + 30 to + 40 °C

Table 3

Bearing code	Friction torque* C_{RL}
	Nm
NRT 80	2
NRT 100	3
NRT 120	8
NRT 150	10
NRT 180	13
NRT 200	13
NRT 260	21
NRT 325	25
NRT 395	30
NRT 460	35

*Friction torque values are valid for bearings mounted with supported L-shaped ring, rotational speed of 5 rpm, class 10.9 attachment bolts, bearings lubricated with high speed grease, bearing temperature between 30 and 40 °C.
Friction torque values are statistical and should considered as a guideline only.

Friction torque values for axial-radial cylindrical roller bearings

Lubrication

Grease or oil can be used to lubricate axial-radial cylindrical roller bearings.

Oil bath or oil recirculating systems are typically used. The choice is usually based on the speed and operating temperature of the application. When speeds are low, grease can be used.

Grease or oil can be applied via the holes in the L shaped ring. Note however that if the bearing is over-lubricated, friction and consequently bearing temperature will increase.

Accuracy of mating parts

Maximum running accuracy and low operating temperatures can only be achieved if both the bearing and its adjacent components are made to similar levels of precision. **Figures 3 and 4** show the form accuracy for a shaft and housing respectively. **Tables 4 and 5** provide the tolerance recommendations for deviations from the nominal dimensions.

Figure 3

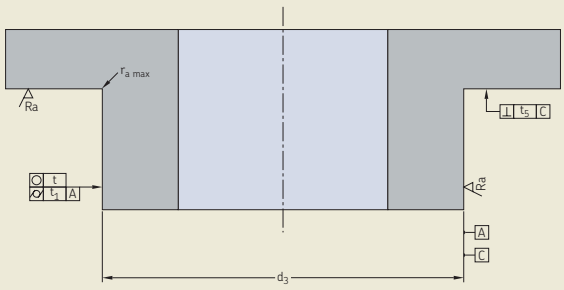
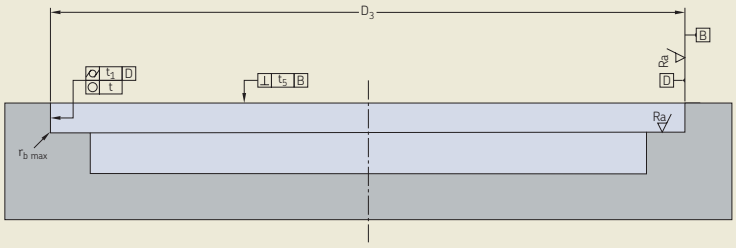


Figure 4



Shaft form accuracy

Table 4

d		d		Circularity t	Cylindricity t_1	Perpendicularity t_5	Roughness (Ra)	$r_{a\ max}$
over	incl	high	low	max	max	max	max	max
mm		µm		µm	µm	µm	µm	mm
50	80	0	-13	5	3	3	0,8	0,2
80	120	0	-15	6	4	4	0,8	0,3
120	150	0	-18	8	5	5	0,8	0,5
150	180	0	-18	8	5	5	0,8	0,5
180	250	0	-20	10	7	7	0,8	0,5
250	315	0	-23	12	8	8	0,8	0,7
315	400	0	-25	13	9	9	0,8	0,7
400	500	0	-27	15	10	10	0,8	0,7

Surface roughness Ra to DIN 7184

Housing form accuracy

Table 5

D		D		Circularity t	Cylindricity t_1	Perpendicularity t_5	Roughness (Ra)	$r_{b\ max}$
over	incl	high	low	max	max	max	max	max
mm		µm		µm	µm	µm	µm	mm
120	150	18	–7	8	5	5	0,8	0,2
150	180	18	–7	10	5	5	0,8	0,5
180	250	22	–7	10	7	7	0,8	0,5
250	315	25	–7	12	8	8	0,8	0,7
315	400	29	–7	13	9	9	0,8	0,7
400	500	33	–7	15	10	10	0,8	0,7
500	630	34	–10	16	11	11	0,8	1,0

Surface roughness Ra to DIN 7184

Load carrying capacity and life

Axial-radial cylindrical roller bearings can accommodate axial loads in either direction and radial loads simultaneously as well as moment loads. As the bearing is normally preloaded and has to support axial and radial loads working eccentrically relative to the bearing axis, the evaluation of the equivalent bearing loads using the following formula can only be approximate. Therefore, any bearing life calculations done with equivalent bearing loads will be approximate as well.

Static safety factor

As axial-radial cylindrical roller bearings are precision bearings and as such are fitted in machine tools and similar applications, it is of utmost importance to avoid permanent deformation of the rolling elements and in the contact between rollers and raceway. The maximum static 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, kN
C_0 = basic static bearing load, kN
s_0 = static safety factor

For axial-radial cylindrical roller bearings a static safety factor equal to 4 should be considered.

Equivalent bearing loads

For axial-radial cylindrical roller bearings
$P = F_r$ for the radial roller row
$P = F_a$ for the axial roller row
and
$P_0 = F_r$ for the radial roller row
$P_0 = F_a$ for the axial roller row

Local view of axial-radial cylindrical roller bearing internal geometry

Assembly procedure

Mounting instructions

Bearings should never be stored or transported on edge and should always be laying flat.

The assembly area should be clean and protected against dust, dirt,swarf and moisture. Even under these conditions, SKF recommends keeping the bearing in its original unopened package until it is ready to be mounted.

If the installation process is particularly complex, or if there are any interruptions in the assembly process, the bearing should be protected against any contaminants from entering into the free space of the bearing.

Before fitting the bearing, parts should be carefully cleaned and checked for dimensional accuracy.

In case a support ring is used for the L–shaped ring, it should support the ring fully and its height should be in the range of twice the height of the bearing shaft washer.

Once the seating surfaces have been cleaned and checked it is possible to proceed with the bearing assembly.

Before fitting the inner ring on the shaft, it is advisable to apply a light coat of thin oil to those parts that will come in contact with the bearing. For the fitting it is necessary to use a proper fitting tool. During installation care must be taken to avoid applying any force through the rolling elements and that all force is applied directly through the ring that is being mounted. To centre the inner ring, the retaining bolts used to secure the bearing during transport must be loosened. Once the inner ring is in position, insert the attachment bolts and tighten them “finger tight” while rotating the unlocated ring. This procedure helps to centre the inner ring. With the inner ring centered, gradually tighten each attachment bolt using a criss-cross pattern. SKF recommends using a

3-step tightening process, torquing all the bolts to 35% of the specified value then 70%, then 100%. After the bearing is fitted, the retaining bolts must either be fully retightened or completely removed.

The same procedure can be applied for locating the outer ring (i.e. lightly oil the seating surfaces with a thin oil, fitting the outer ring of the assembly bearing/shaft in to the housing (➔ **Fig. 2**), inserting the attachment bolts, fingertight them whilst rotating the bearing ring and than tightening in a crosswise manner in three steps, (➔ **Fig. 3**). **Table 1** provides the tightening torque for the attachment bolts of inner and outer rings.

After installation, running accuracy and friction need to be checked. In cases where friction is particularly high, there are 3 possible explanations:

- adjacent parts are not machined to specification
- attachment bolts were over-torqued
- too much grease in the bearing

To eliminate possible stresses that may have occured during installation, loosen all attachment bolts and re-tighten them in a criss-cross pattern using the 3-step torquing process.

Figure 1

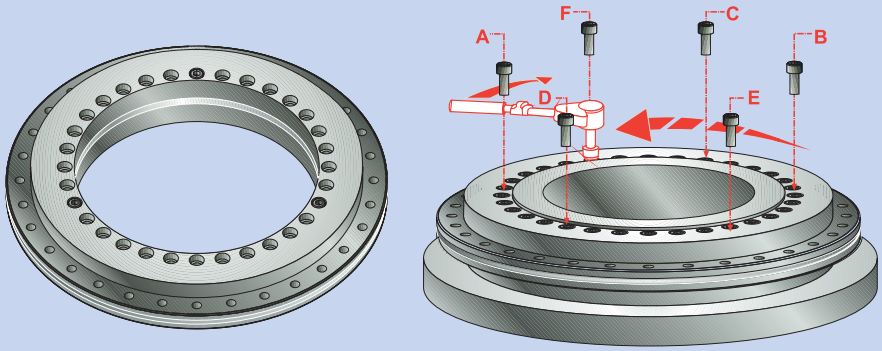
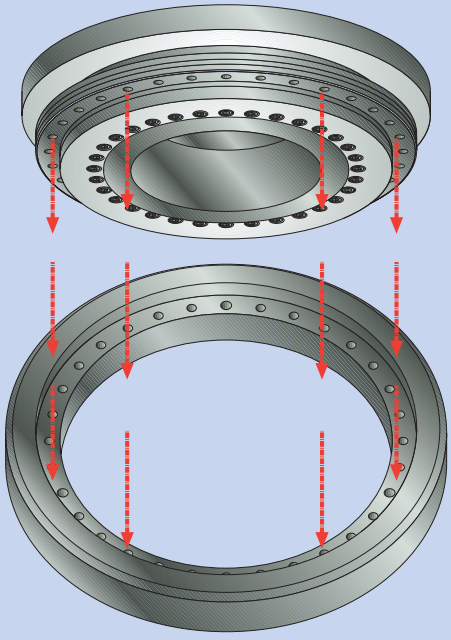


Figure 2



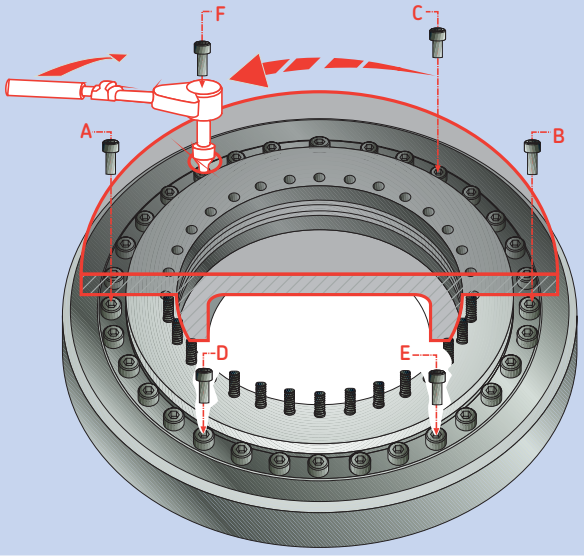
Bolt tightening torque

Table 1

Bearing type	Tightening torque Bolt quality	
	8,8	10,9
	Nm	
NRT 80	6,1	8,9
NRT 100	6,1	8,9
NRT 120	10,4	15,3
NRT 150	10,4	15,3
NRT 180	10,4	15,3
NRT 200	10,4	15,3
NRT 260	25,0	37,0
NRT 325	25,0	37,0
NRT 395	25,0	37,0
NRT 460	25,0	37,0

It is advisable not to use a higher torque value in order not to increase the bearing preload

Figure 3



Product tables

Designation system

NRT 260 / G

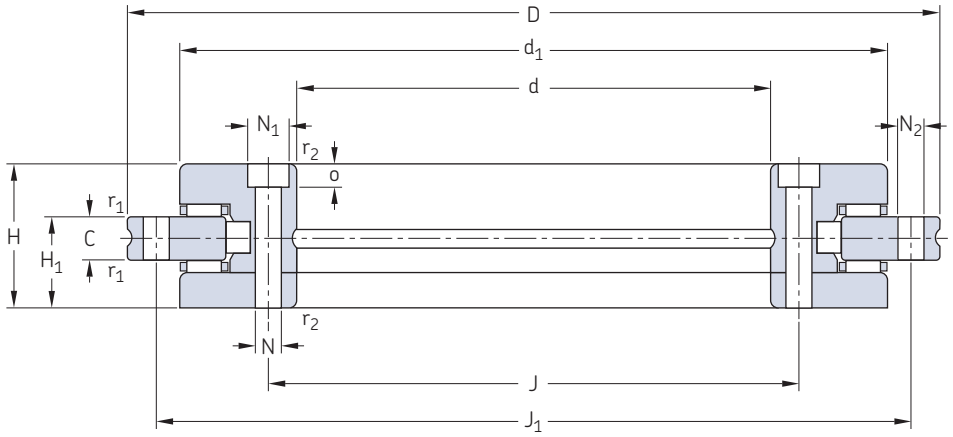
Type
NRT Axial-radial cylindrical roller bearings for rotary tables

Bore diameter [mm]
80 80 bore diameter
⋮
460 460 bore diameter

Special suffix:
G Grease lubricated bearing

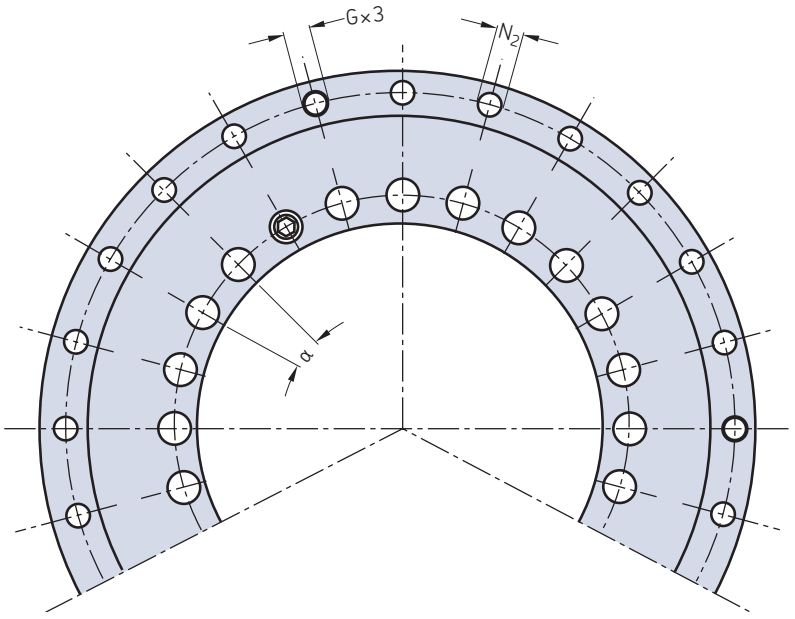
Example: **NRT 150 / G**

NRT - Axial-radial cylindrical roller bearings



Designation	Suitable table	Principal dimensions								Basic load rating				Limiting speed		Mass
		d	D	H	H_1	C	d_1	r_1 [1]	r_2 [2]	radial C	C_0	axial C	C_0	Lubrication grease	oil	
	mm									kN				rpm		kg
NRT 80 [6]	200	80	146	35	23,35	12	130	0,6	0,4	44,6	104	47,5	270	420	870	2,2
NRT 100 [6]	260	100	185	38	25,00	12	160	0,9	0,5	53,9	122	83	510	330	700	3,9
NRT 120	315	120	210	40	26,00	12	184	1,0	0,7	69,3	166	91,5	610	270	570	4,9
NRT 150	350	150	240	40	26,00	12	214	1,0	0,7	80,9	200	93	655	250	520	5,7
NRT 180	400	180	280	43	29,00	15	244	1,0	0,7	85,8	265	106	815	230	470	7,6
NRT 200 [6]	500	200	300	45	30,00	15	274	1,0	0,7	132,0	285	86,5	655	200	420	10,0
NRT 260	630	260	385	55	36,50	18	345	1,2	1,0	134,0	465	106	915	160	320	15,0
NRT 325	700	325	450	60	40,00	20	415	1,2	1,0	147,0	560	186	1760	130	270	24,8
NRT 395	800	395	525	65	42,50	20	486	1,2	1,0	172,0	680	200	2040	110	220	32,3
NRT 460	1000	460	600	70	46,00	22	560	1,5	1,0	205,0	780	220	2450	100	200	44,6

1) r1: Corner radius up to size 260. Chamfer from size 325 up to 460
2) Chamfer at 45 degrees
6) Bearings are equipped with polyamide cage



D

Designation	Attachment holes Inner ring						Outer ring					Pitch	Retaining bolt thread nominal diameter
	J	N	N_1	a	Attachment holes nr.	Retaining bolts nr.	J_1	N_2	Attachment holes nr.	Removal thread	Removal thread nr.	nr. × α°	
	mm				–	–	mm		–	G	–	–	
NRT 80 [6]	92	5,6	10	4,0	12	3 [5]	138	4,6	12			12×30	M5 [7]
NRT 100 [6]	112	5,6	10	5,4	15	3 [4]	170	5,6	15	M5	3	18×20	M5
NRT 120	135	7,0	11	6,2	22	2 [3]	195	7,0	21	M8	3	24×15	M6
NRT 150	165	7,0	11	6,2	34	2 [3]	225	7,0	33	M8	3	36×10	M6
NRT 180	194	7,0	11	6,2	46	2 [3]	260	7,0	45	M8	3	48×7,5	M6
NRT 200 [6]	215	7,0	11	6,2	46	2 [3]	285	7,0	45	M8	3	48×7,5	M6
NRT 260	280	9,3	15	8,2	34	2 [3]	365	9,3	33	M12	3	36×10	M8
NRT 325	342	9,3	15	8,2	34	2 [3]	430	9,3	33	M12	3	36×10	M8
NRT 395	415	9,3	15	8,2	46	2 [3]	505	9,3	45	M12	3	48×7,5	M8
NRT 460	482	9,3	15	8,2	46	2 [3]	580	9,3	45	M12	3	48×7,5	M8

3) Retaining bolts are screwed on the shaft washer
4) Future deliveries will have 2 retaining bolts
5) There are 3 separate holes for retaining bolts
6) Bearings are equipped with polyamide cage
7) M5 refers to inner ring only. M4 is used for the outer ring

Other SKF products and services

High-precision bearings

The bearings used in machine tool applications are required to run cool and quietly at extremely high speeds while providing a high degree of running accuracy and stiffness. The performance expectations are well beyond the capabilities of a standard bearing.

As a result, SKF produces a wide range of angular contact and angular contact thrust ball bearings as well as cylindrical roller bearings that conform to special high-precision specifications.

Publication 5002 "high-precision bearings".

Spindle service

SKF operates a worldwide network of spindle service centres where virtually any machine tool spindle can be professionally reconditioned or upgraded.

Service centres are presently located in Austria, France, Germany, India, Italy, Japan, Sweden, UK and the US.

Services range from very basic bearing replacements to complete rebuilds and upgrades.

Publication 5352 "SKF spindle service".

Machine tool precision bearing service centres

WIth service centres in Italy, USA and Japan, SKF can help you reduce downtime. These service centres, which specialize in matching and customizing bearing preloads on high precision angular contact and ball screw support bearings, can supply you with the exact bearing you need, when you need it.

Publication 4808 E "SKF precision bearing service centres".

SKF bearings for general applications

SKF manufactures a wide assortment of standard as well as specialized ball and roller bearings. For a complete listing of our standard products, contact your local SKF representative or visit us on line at www.skf.com

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

Linear motion products

SKF offers a wide range of rolled and ground ball screws, roller screws, precision shafting and rail guides, linear and rotary actuators as well as miniature and standard slides.

Publication 4664/4 "Product range", or online at www.linearmotion.SKF.com

Bearing greases, mounting tools and condition monitoring equipment

Rolling bearings are precision products, with dimension tolerances in the order of microns. They are reliable machine parts designed for a long service life, provided that mounting, lubrication and maintenance are carried out properly.

In order to ensure expert mounting and maintenance, SKF has developed a wide range of mounting and dismounting 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".

SKF – the knowledge engineering company

From the company that invented the self-aligning ball bearing 100 years ago, SKF has evolved into a knowledge engineering company that is able to draw on five platforms to create unique solutions for its customers. These platforms include bearings, bearing units and seals, of course, but extend to other areas including: lubricants and lubrication systems, critical for long bearing life in many applications; mechatronics that combine mechanical and electronics knowledge into systems for more effective linear motion and sensorized solutions; and a full range of services, from design and logistics support to conditioning monitoring and reliability systems.

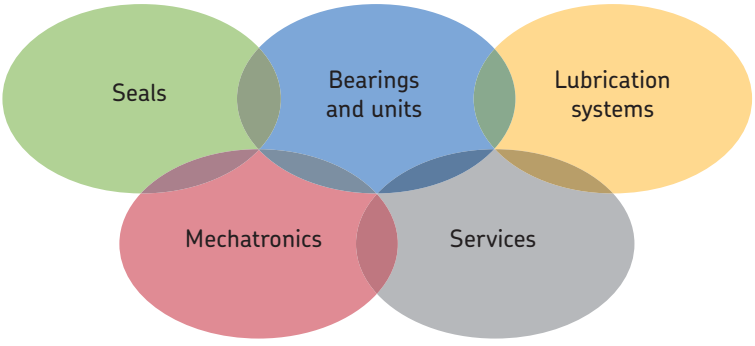
Though the scope has broadened, SKF continues to maintain the world's leadership in the design, manufacture and marketing of rolling bearings, as well as complementary products such as radial seals. SKF also holds an increasingly important position in the market for linear motion products, high-precision aerospace bearings, machine tool spindles and plant maintenance services.

The SKF Group is globally certified both to ISO 14001, the international standard for environmental management, as well as OHSAS 18001, the health and safety management standard. Individual divisions have been approved for quality certification in accordance with either ISO 9000 or QS 9000.

With some 100 manufacturing sites worldwide and sales companies in 70 countries, SKF is a truly international corporation. In addition, our distributors and dealers in some 15 000 locations around the world, an e-business marketplace and a global distribution system put SKF close to customers for the supply of both products and services. In essence, SKF solutions are available wherever and whenever customers need them. Overall, the SKF brand and the corporation are stronger than ever. As the knowledge engineering company, we stand ready to serve you with world-class product competencies, intellectual resources, and the vision to help you succeed.

Evolving by-wire technology
SKF has a unique expertise in fast-growing by-wire technology, from fly-by-wire, to drive-by-wire, to work-by-wire. SKF pioneered practical fly-by-wire technology and is a close working partner with all aerospace industry leaders. As an example, virtually all aircraft of the Airbus design use SKF by-wire systems for cockpit flight control.

SKF is also a leader in automotive by-wire technology, and has partnered with automotive engineers to develop two concept cars, which employ SKF mechatronics for steering and braking. Further by-wire development has led SKF to produce an all-electric forklift truck, which uses mechatronics rather than hydraulics for all controls.



Harnessing wind power
The growing industry of wind-generated electric power provides a source of clean, green electricity. SKF is working closely with global industry leaders to develop efficient and trouble-free turbines, providing a wide range of large, highly specialized bearings and condition monitoring systems to extend equipment life of wind farms located in even the most remote and inhospitable environments.

Working in extreme environments
In frigid winters, especially in northern countries, extreme sub-zero temperatures can cause bearings in railway axleboxes to seize due to lubrication starvation. SKF created a new family of synthetic lubricants formulated to retain their lubrication viscosity even at these extreme temperatures. SKF knowledge enables manufacturers and end user customers to overcome the performance issues resulting from extreme temperatures, whether hot or cold. For example, SKF products are at work in diverse environments such as baking ovens and instant freezing in food processing plants.

Developing a cleaner cleaner
The electric motor and its bearings are the heart of many household appliances. SKF works closely with appliance manufacturers to improve their products' performance, cut costs, reduce weight, and reduce energy consumption. A recent example of this cooperation is a new generation of vacuum cleaners with substantially more suction. SKF knowledge in the area of small bearing technology is also applied to manufacturers of power tools and office equipment.

Maintaining a 350 km/h R&D lab
In addition to SKF's renowned research and development facilities in Europe and the United States, Formula One car racing provides a unique environment for SKF to push the limits of bearing technology. For over 50 years, SKF products, engineering and knowledge have helped make Scuderia Ferrari a formidable force in F1 racing. (The average racing Ferrari utilizes more than 150 SKF components.) Lessons learned here are applied to the products we provide to automakers and the aftermarket worldwide.

Delivering Asset Efficiency Optimization
Through SKF Reliability Systems, SKF provides a comprehensive range of asset efficiency products and services, from condition monitoring hardware and software to maintenance strategies, engineering assistance and machine reliability programs. To optimize efficiency and boost productivity, some industrial facilities opt for an Integrated Maintenance Solution, in which SKF delivers all services under one fixed-fee, performance-based contract.

Planning for sustainable growth
By their very nature, bearings make a positive contribution to the natural environment, enabling machinery to operate more efficiently, consume less power, and require less lubrication. By raising the performance bar for our own products, SKF is enabling a new generation of high-efficiency products and equipment. With an eye to the future and the world we will leave to our children, the SKF Group policy on environment, health and safety, as well as the manufacturing techniques, are planned and implemented to help protect and preserve the earth's limited natural resources. We remain committed to sustainable, environmentally responsible growth.

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