General Data

Types of bearings

Definitions

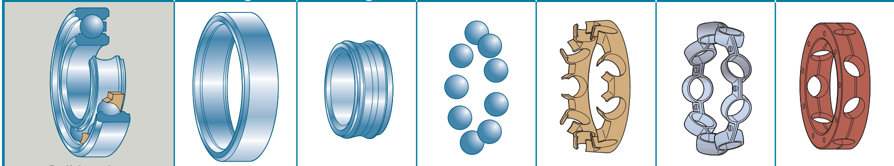
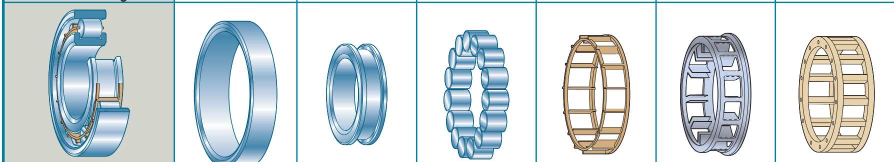
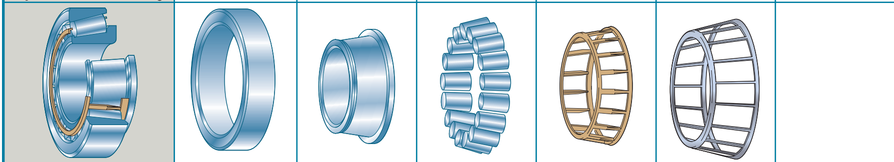
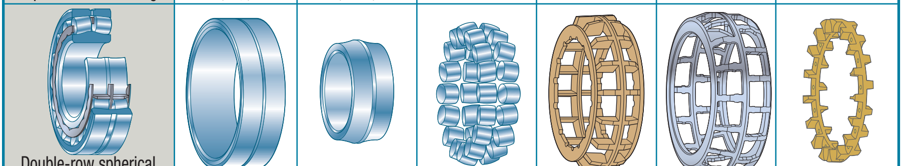
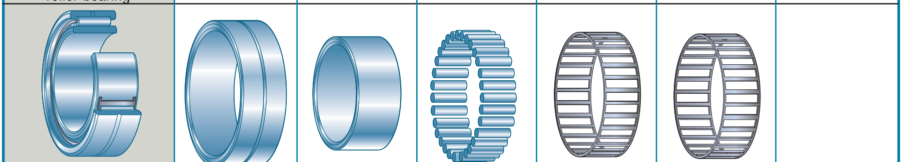
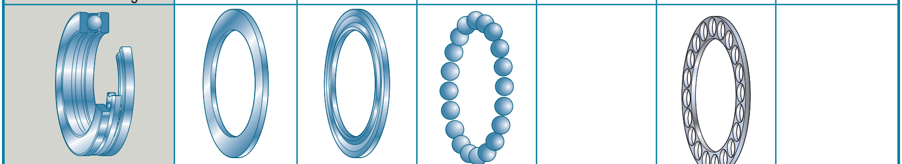
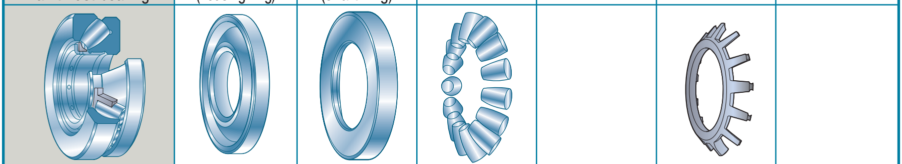
A bearing is a mechanical unit that provides a mobile link between two parts that rotate in relation to one another. Its function is to permit relative rotation of these parts, under load, with accuracy and minimum friction.

A bearing consists of:

- two rings, one associated with a fixed element, the other with the moving element and featuring raceways
- rolling elements allowing relative displacement of the two rings with minimum friction
- a cage separating the rolling elements

There are two large bearing families:

- ball bearings, allowing high speeds of rotation and where the ball-raceway interface is theoretically point contact
- roller bearings, where the ball-raceway interface is theoretically line contact. Roller bearings can withstand higher radial loads than ball bearings

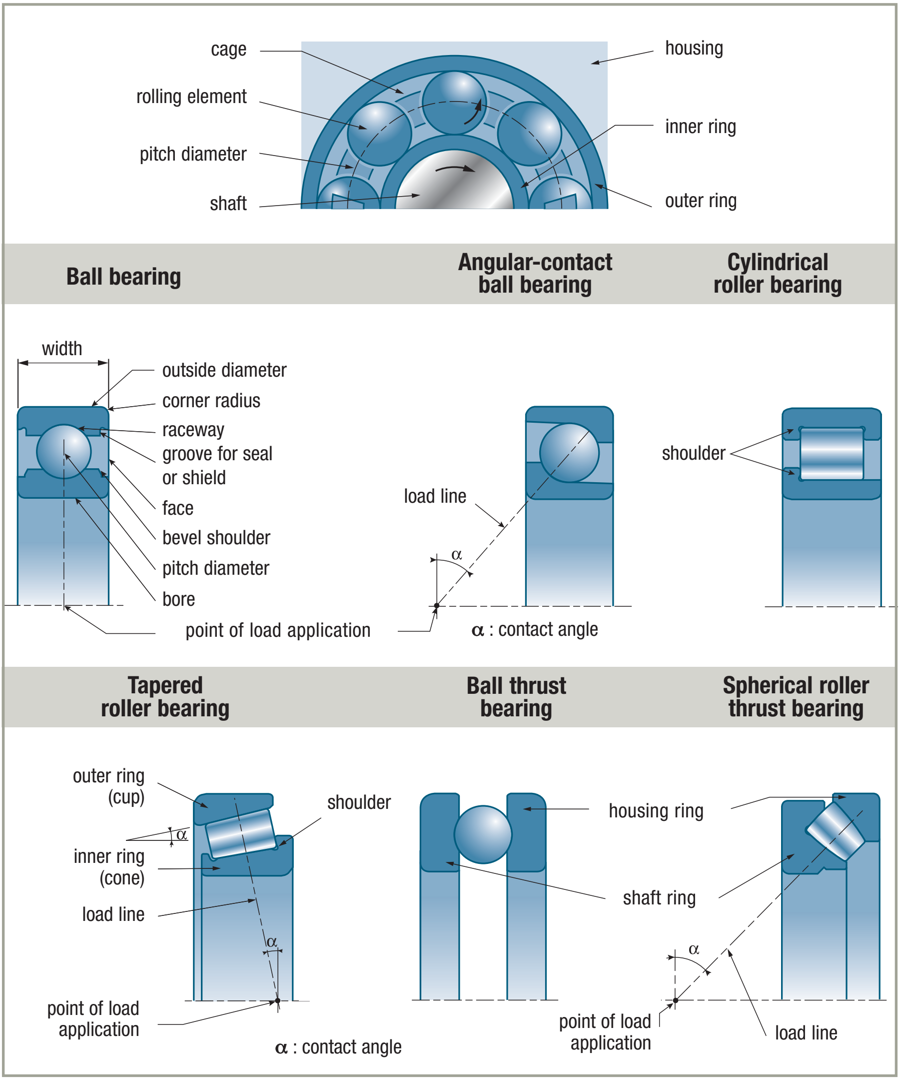
Type	Outer ring	Inner ring	Rolling elements	Synthetic material	Pressed steel	Integrally machined
 Ball bearing						
 Cylindrical roller bearing						
 Tapered roller bearing	(cup)	(cone)				
 Double-row spherical roller bearing						
 Needle bearing						
 Ball thrust bearing	(housing ring)	(shaft ring)				
 Spherical roller thrust bearing	(housing ring)	(shaft ring)				

Types of bearings *(continued)*

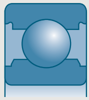
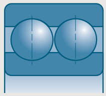
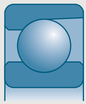
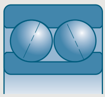
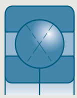
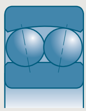
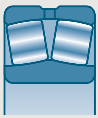
Vocabulary

Standard ISO 5593 has established a vocabulary of standard terms applicable to bearings and bearing technology.

The terms and definitions are given in a multilingual glossary.



Capabilities

General characteristics and capabilities		Application examples
Ball bearings		
Single- or double-row radial ball bearings Popular bearings due to their cost/performance compromise. Numerous variants (shielded, sealed etc.) and large selection of dimensions.	 	Electric motor Wheel of trailer Household electrical appliances Woodworking machine spindles Small reducing gear Gear box
Single-row angular-contact ball bearings Always mounted in opposition with another bearing of the same type. Give great assembly rigidity, especially when preloaded		Reduction gear box Machine-tool spindle
Double-row angular-contact ball bearings Withstand axial loads in both directions. Can be used alone as a double bearing.		Reducing gear Automobile wheels Agricultural machinery
4-point angular contact ball bearings Withstand axial loads in both directions. Often associated with a radial contact bearing.		Reducing gear
Double-row self-aligning ball or spherical roller bearings		
Double-row self-aligning ball bearings The spherical raceway of the outer ring permits angular displacement. A variant with a tapered bore simplifies fitting.		For long shaft with deflection
Spherical roller bearings The spherical raceway of the outer ring permits angular displacement A variant with a tapered bore simplifies fitting.		Roll stand Large reducing gear Large industrial fan Printing machine roller Quarry machine

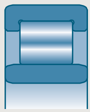
Types of bearings *(continued)*

General characteristics and capabilities | **Application examples**

Roller bearings

Cylindrical roller bearings

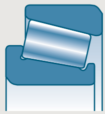
Excellent resistance to instantaneous over-loads and shocks.
Simplification of installation thanks to their detachable elements.
Certain types allow axial displacement; others allow a low axial load.



Heavy-duty electric motor
Wagon axle box
Pressure roller
Rolling machine roll

Single-row tapered roller bearings

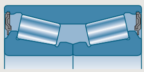
Always mounted in opposition with another bearing of the same type.
Give great assembly rigidity, especially when preloaded.



Reducing gear shaft
Truck wheel
Bevel gear transfer gearbox

Double-row tapered roller bearings (SNR TWINLINE)

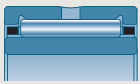
Accept axial loads in both directions.
Often used alone as a double bearing.



TGV high-speed train axle box
Automobile wheel

Needle bearings

Accept relatively high radial loads with small space requirement and high radial rigidity.

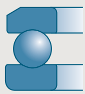


Thrust bearings

Thrust bearings are often used with other types of bearing.

Ball thrust bearings

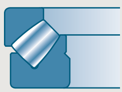
Withstand axial loads only.
If radial load is applied must be associated with a radial bearing.



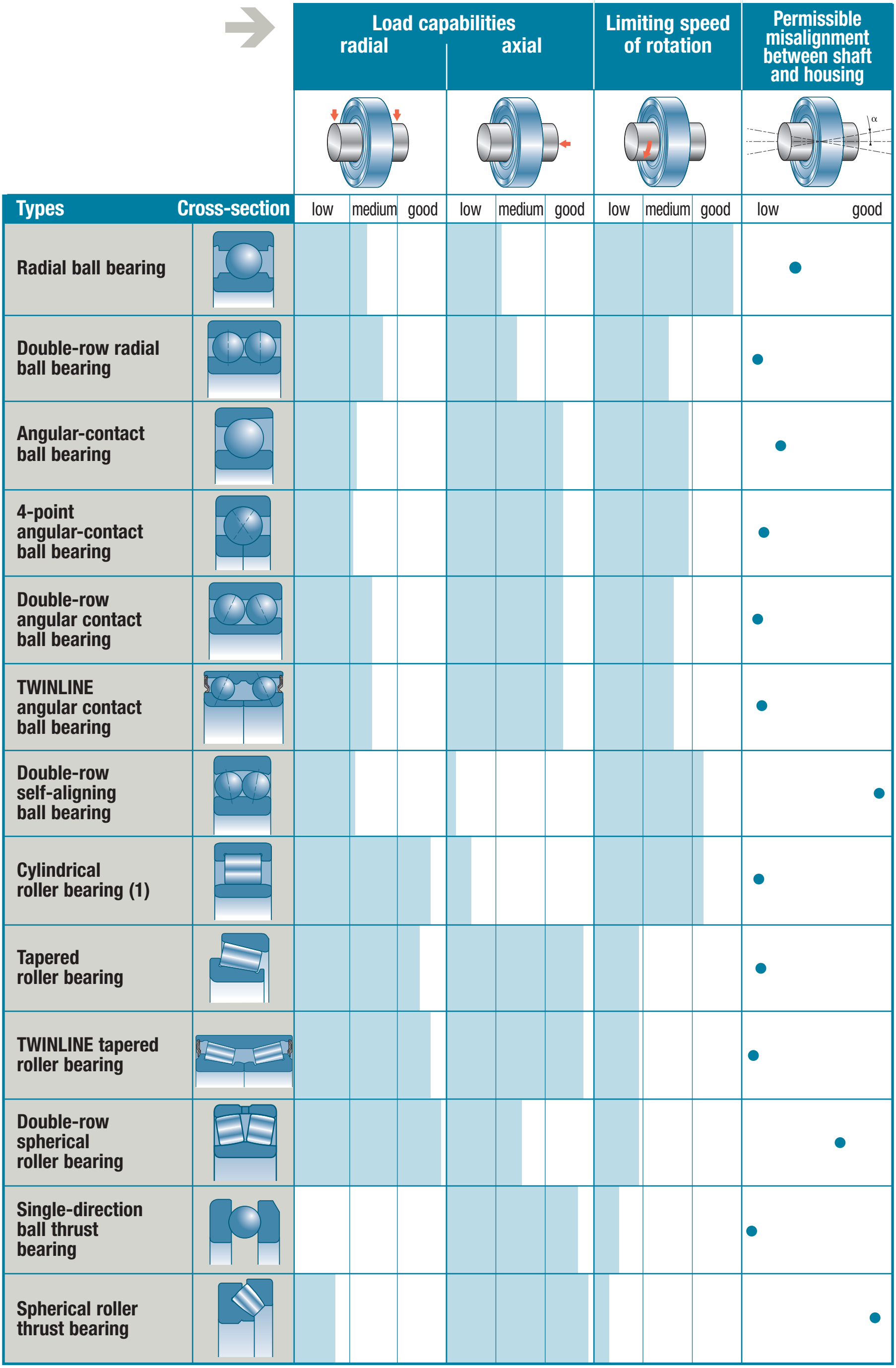
Vertical shaft
Tailstock
Plate pump

Spherical roller thrust bearings

Can withstand a radial and axial load while accepting misalignment.



Heavy-duty vertical shaft
Turbo-generator
Crane pivot
Plastic injection screw



(1) Types NJ and NUP accept low axial loads

Standardization and interchangeability

The standards

The mission of the International Standard Organisation (ISO) is to develop and coordinate standardization to facilitate the trade of products and services between nations. It encompasses the standards committees of 89 countries (AFNOR-France, DIN-Germany, UNI-Italy, BS-Great Britain, ANSI-United States, etc.).

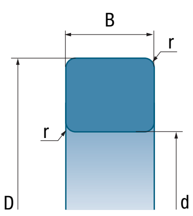
Bearing standardization is the responsibility of the ISO Technical Committee "TC 4" in which SNR plays an active part. The main standards used for bearings and thrust bearings are specified in the appendix page 147.

Interchangeability

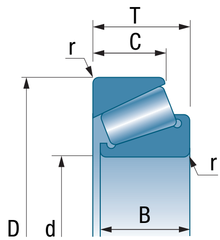
- **Dimensional interchangeability** is guaranteed by the values and tolerances on the bearing dimensions: d, D, B, C, r and T.

d Bore diameter
D Outside diameter
B Width of bearing or width of inner ring (cone)
C Width of bearing or width of outer ring (cup)
T Width or total height
r Corner radius

All types of bearings except tapered roller and thrust bearings



Tapered roller bearings



Strict application of the standards in the manufacture of the bearing enables one to obtain full interchangeability between bearings of the same part number, whoever the manufacturer, place or date of production.

Standardization of the bearing also allows dimensional interchangeability between bearings of different types, either total or partial. It is necessary to ensure the functional interchangeability.

Bearing series codes according to the different outside diameters and widths

For a given bore the standards provide for several diameter series (series 8, 9, 0, 1, 2, 3, 4 in ascending order).

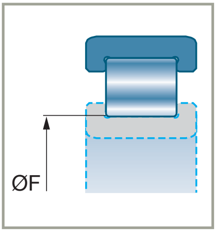
For each diameter series there are several width series (series 0, 1, 2, 3, 4 in ascending order).

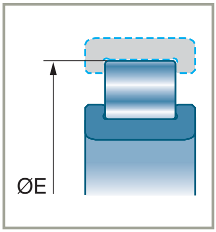
Interchangeability of detachable elements of cylindrical or tapered roller bearings

Cylindrical or tapered roller bearings can be separated into two parts: a ring that is joined to the cage and rollers and a bare ring.

Cylindrical roller bearings

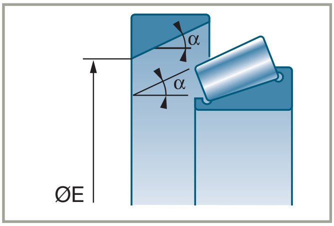
Interchangeability is ensured by the dimensions below the rollers **F** and above the rollers **E**.





Tapered roller bearings

The interchangeability of the internal sub-assemblies (fitted cones) and outer rings (cups) is ensured by standard ISO 355 which defines the contact angle α and the theoretical inside diameter of the cup **E**. One must check that the bearings are indeed identical (same suffix).



Caution : There is full interchangeability between SNR elements. ISO has standardized the values of the above dimensions without specifying their tolerances. Consequently, although the assembly of elements from different manufacturers presents no risk, it does not always give optimum performance and should therefore be avoided.

Dimensions and part numbers

General designations

ISO has established standards in the form of a general plan of dimensions corresponding to standards ISO 15, ISO 355 and ISO 104. These standards allow universal use of the different types of bearings.

- The general designation system taken from standards ISO 15 and ISO 104 applies to all types of standardized bearings
- Tapered roller bearings have specific designations taken from standard ISO 355

The special bearings have a specific numbering system.

Complete part number

Each bearing part number is comprised of the following components:

	60	10	ZZ
Prefix (optional)	**Series code**	**Bore code**	**Suffix** (optional)
	Basic part number		
Complete part number			

Examples:

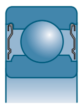
62 04 ZZ

No prefix

Series 62 code

Suffix ZZ double shielding

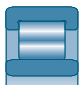
Bore code 04 x 5 = 20 mm bore



NU 314

Series NU3 : cylindrical roller bearings

14 x 5 = 70 mm bore



302 08

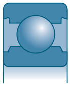
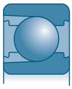
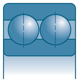
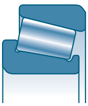
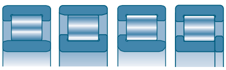
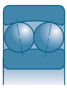
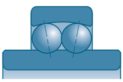
Series 302 tapered roller bearings

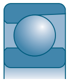
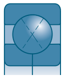
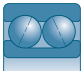
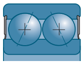
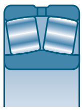
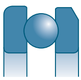
08 x 5 = 40 mm bore

The table on the following page specifies the different possibilities for the series codes and bore codes. The main suffixes and prefixes are specified in the chapter corresponding to each family.

➔ Basic part number

60 XX

Part number	Type of bearing
	Radial ball bearing
60 X 62 X 63 XX 64 XX 160 XX 618 XX 619 XX 622 XX 623 XX	 With 1 row of balls
2 XX 3 XX	 With a filling slot
42 XX 43 XX	 With 2 rows of balls
302 XX 303 XX 313 XX 320 XX 322 XX 323 XX 330 XX 331 XX 332 XX	Tapered roller bearing 
N..2 XX N..3 XX N..4 XX N..10 XX N..22 XX N..23 XX	Cylindrical roller bearing  NU N NJ NUP
12 XX 13 XX 22 XX 23 XX	Double-row self-aligning ball bearing 
112 XX 113 XX	 Wide inner ring

Part number	Type of bearing
	Angular-contact ball bearing
72 XX 73 XX 718 XX	 With 1 row of balls
QJ2 XX QJ3 XX	 With 4 points of contact
32 XX 33 XX	 With 2 rows of balls
52 XX 53 XX	 With 2 rows of balls ZZ or EE
213 XX 222 XX 223 XX 230 XX 231 XX 232 XX 240 XX 241 XX	Double-row spherical roller bearing 
511 XX 512 XX 513 XX 514 XX	Ball thrust bearing 
293 XX 294 XX	Spherical roller thrust bearing 

Bore code	Bore diameter mm
3	3
/4	4
4	4
5	5
6	6
/6	6
7	7
/7	7
8	8
/8	8
9	9
00	10
01	12
02	15
03	17
/22	22
/28	28
/32	32
04	04x5 = 20
05	05x5 = 25
06	06x5 = 30
07	07x5 = 35
08	08x5 = 40
09	…
10	…

SNR

Dimensions and part numbers *(continued)*

Designations of tapered roller bearings

Standard ISO 355 defines the series of dimensions of tapered roller bearings.

➔ The old part numbering system has been maintained in this catalog. The new designation is however mentioned for the bearings of the new series.

T **4** **C** **D** **075**

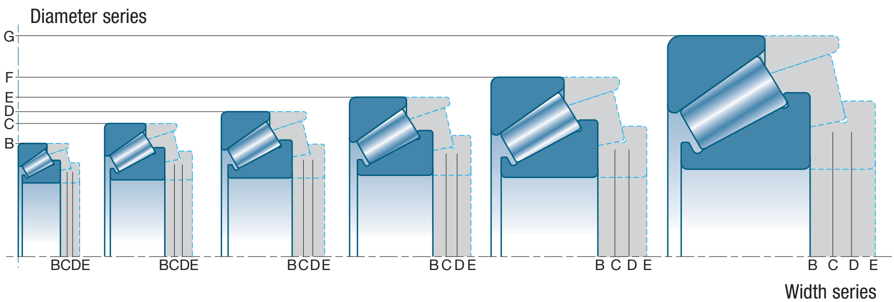
- T: Letter T for tapered roller bearings
- 4: Range of contact angles
- C: Diameter series
- D: Width series
- 075: Bearing bore

Range of contact angles	
Angle series	Contact angle
2	10° < α ≤ 13°52’
3	13°52’ < α ≤ 15°59’
4	15°59’ < α ≤ 18°55’
5	18°55’ < α ≤ 23°
6	23° < α ≤ 27°
7	27° < α ≤ 30°

Diameter series
B
C
D
E
F
G

Width series
B
C
D
E

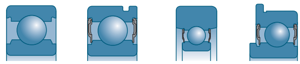
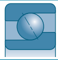
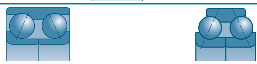
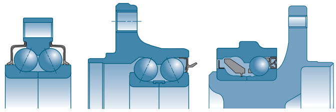
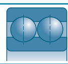
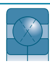
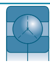
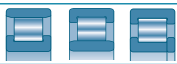
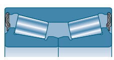
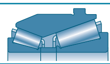
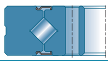
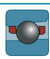
Width and diameter series



Designation of special bearings

The part numbers of special bearings is not standard and is specific to each manufacturer. The designation system defined by SNR is given below.

Y53	GB	40256	S01
Material modification or heat treatment (optional)	Type of bearing	**Sequence number in the following number ranges: 9000 to 13999; 40000 to 42999**	**Variant suffix**

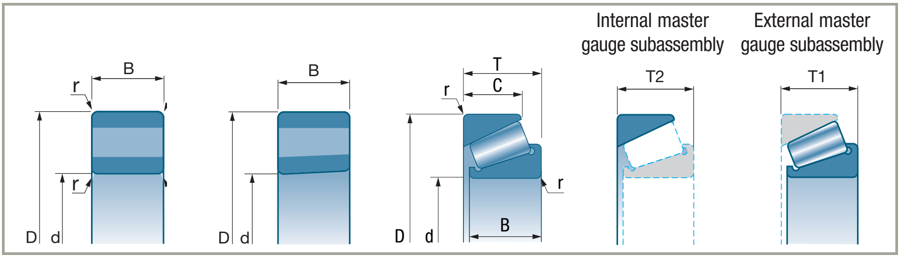
	Type of bearing	Examples
AB	Single-row radial contact ball bearing	
BB	Single-row angular contact ball bearing	
GB	Two-part double-row angular contact ball bearing	
TGB	Single-flange double-row angular contact ball bearing	
HGB	Two-flange double-row angular contact ball bearing	
DB	Double-row radial contact ball bearing	
AP	Ball thrust bearing	
QJ	4-point angular contact bearings	
TJ	3-point angular contact bearings	
N..	Cylindrical roller bearing: **N, NU, NUP**	
GNU	Cylindrical roller bearing	
EC	Single-row tapered roller bearing	
FC	Double-row tapered roller bearing	
TFC	Single-flange double-row tapered roller bearing	
QR	Crossed roller bearing	
X...	Sensor bearings **XGB, XTGB, XHGB, XFC, XTFC**	
CH	Ceramic Rolling Elements	

Bearing manufacturing precision

Standardization

■ Standard ISO 492 specifies the tolerances applicable to the dimensions and precision of rotation of metric series radial bearings.

The dimensional tolerances defined by this standard bear the following symbols:



■ Tolerance classes defined by standard ISO 492:

- The Normal class, which is that of all the standard bearings, and is not usually indicated in the bearing designation
- The High precision classes which are, in ascending order of precision: ISO 6, ISO 5, ISO 4, ISO 2

These classes are indicated in the suffix added to the bearing reference.

Example:

C3 P5

Clearance category 3 ISO precision class 5

Standard ISO 199 sets the tolerances on thrust bearing dimensions.

Standard ISO 582 sets the tolerances on bearing corner radii. The dimensions applicable to fillets and shoulders are indicated in the table of bearing characteristics.

Standard ISO 5753 defines the tolerances on the radial clearance of the bearings.

Tolerance definition

The tolerance classes fix several types of tolerances and characteristics given for a temperature of 20°C ± 1°C (68°F ±1.8).

Dimensional tolerances

Standard ISO 492 sets the tolerances for the three main dimensions of a bearing:

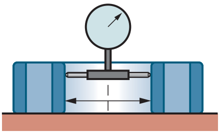
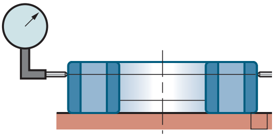
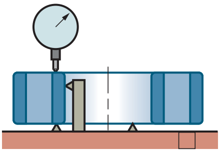
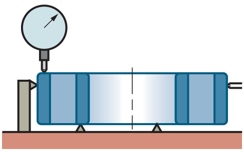
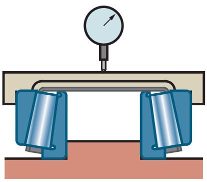
- the bore diameter d
- the outside diameter D
- the width of each ring B and C with, in addition, for tapered bearings, the total width T

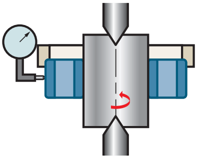
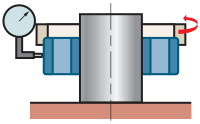
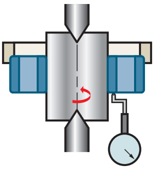
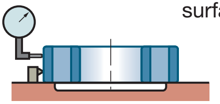
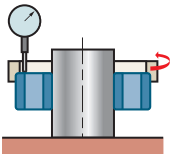
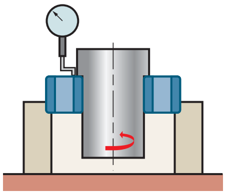
Functional tolerances

The standard also defines the precision of rotation of the bearings:

- the raceway radial runout of each ring. It is measured on the moving ring with respect to the fixed ring
- side face runout with reference to the bore of the inner ring
- outer ring side face runout with respect to the outer diameter
- side face runout with respect to the track

Bearing manufacturing precision *(continued)*

Dimensional tolerances	Deviations
d: nominal bore diameter 	**Δdmp** • Deviation of a mean bore diameter in an isolated plane (tolerance on the mean diameter) **Vdp** • Variation in the bore diameter in an isolated radial plane (ovality) **Vdmp** • Variation in the mean bore diameter (applies only to a supposedly cylindrical bore) in different planes
D: nominal outside diameter 	**ΔDmp** • Deviation of a mean outside diameter in an isolated plane (tolerance on the mean diameter) **VDp** • Variation in the outside diameter in an isolated radial plane (ovality) **VDmp** • Variation in the mean outside diameter in different planes
B: nominal width of ring 	**ΔBs** • Deviation of an isolated width of the inner ring (width tolerance) **VBs** • Variation in the width of the inner ring (face parallelism)
C: nominal width of ring 	**ΔCs** • Deviation of an isolated width of the outer ring (width tolerance) **VCs** • Variation in the width of the outer ring (face parallelism)
T : nominal width of tapered bearing **T1:** effective nominal width of the internal sub-assembly **T2:** effective nominal width of the external sub-assembly 	**ΔTs** • Deviation in the actual width of the bearing **ΔT1s** • Deviation in the effective actual width of the internal sub-assembly **ΔT2s** • Deviation in the effective actual width of the external sub-assembly

Functional tolerances	Deviations	
radial run-out  	**Kia** **Kea**	• Radial run-out of the inner ring on the assembled bearing • Radial run-out of the outer ring on the assembled bearing
run-out of the reference face  	**Sd** **SD**	• Axial run-out of the reference face (or large face if applicable) of the inner ring with respect to the bore (run-out of the face of the inner ring) • Perpendicularity error of the external surface with respect to the reference face (or large face) of the outer ring (external surface run-out)
bearing raceway run-out  	**Sea** **Sia**	• Axial run-out of the reference face (or large face) of the outer ring with respect to the bearing raceway, on the assembled bearing (run-out of outer ring raceway) • Axial run-out of the reference face (or large face) of the inner ring with respect to the bearing raceway on the assembled bearing (run-out of the inner ring raceway)

Consult SNR for the method of measurement.

Bearing manufacturing precision *(continued)*

Equivalence of bearing precision standards

	ISO tolerance class	AFNOR tolerance class	ABEC tolerance class	DIN tolerance class
Standard Precision	Normal	Normal	1	P0
High Precision	6 5 4 2	6 5 4 2	3 5 7 9	P6 P5 P4 P2

The values given by the various standards for certain characteristics are not rigorously identical.
The tolerance class, when indicated on the bearing, imposes compliance with all the tolerances in the said class.
Nevertheless, certain bearing applications require special tolerances on certain dimensions or characteristics.
To avoid using an excessively expensive high-precision bearing, SNR can supply bearings with reduced tolerances on certain dimensions or characteristics. For example, run-out of inner ring of high-speed bearings for wood-working machine spindles.

Consult SNR.

Bearing tolerances

■ **Radial bearings** — **Standard ISO 492**

- Normal tolerance class — page 23
- Tolerance class 6 — page 24
- Tolerance class 5 — page 25
- Tolerance class 4 — page 26
- Tolerance class 2 — page 27

■ **Tapered roller bearings** — **Standard ISO 492**

- Normal tolerance class — page 28
- Tolerance class 6X — page 29
- Tolerance class 5 — page 30

■ **Thrust bearings** — **Standard ISO 199**

- Normal tolerance class, 6 and 5 — page 31

■ **Tapered bores** — **Standard ISO 492**

- Bore with 1:12 and 1:30 taper — page 32

➔ Radial bearings - Normal tolerance classes

With the exception of tapered roller bearings and thrust bearings. Standard ISO 492.

Inner ring

Tolerances in micrometers

d mm	Δdmp		Vdp(1) Diameter series 9	0,1	2,3,4	Vdmp	Kia	ΔBs all	normal	modified(1)	VBs
	upper	lower	max	max	max	max	max	upper	lower	lower	max
0,6 ≤d≤ 2,5	0	-8	10	8	6	6	10	0	-40	–	12
2,5 <d≤ 10	0	-8	10	8	6	6	10	0	-120	-250	15
10 <d≤ 18	0	-8	10	8	6	6	10	0	-120	-250	20
18 <d≤ 30	0	-10	13	10	8	8	13	0	-120	-250	20
30 <d≤ 50	0	-12	15	12	9	9	15	0	-120	-250	20
50 <d≤ 80	0	-15	19	19	11	11	20	0	-150	-380	25
80 <d≤ 120	0	-20	25	25	15	15	25	0	-200	-380	25
120 <d≤ 180	0	-25	31	31	19	19	30	0	-250	-500	30
180 <d≤ 250	0	-30	38	38	23	23	40	0	-300	-500	30
250 <d≤ 315	0	-35	44	44	26	26	50	0	-350	-500	35
315 <d≤ 400	0	-40	50	50	30	30	60	0	-400	-630	40
400 <d≤ 500	0	-45	56	56	34	34	65	0	-450	–	50
500 <d≤ 630	0	-50	63	63	38	38	70	0	-500	–	60
630 <d≤ 800	0	-75	–	–	–	–	80	0	-750	–	70
800 <d≤1000	0	-100	–	–	–	–	90	0	-1000	–	80

(1) Relates to the rings of isolated bearings for installation in pairs or per unit.

Outer ring

Tolerances in micrometers

D mm	ΔDmp		VDp(1) Open bearings Diameter series 9	0,1	2,3,4	Shielded bearings 2,3,4	VDmp(1)	Kea	ΔCs ΔC1s(2)		VCs VC1s(2)
	upper	lower	max	max	max	max	max	max	upper	lower	max
2,5 ≤D≤ 6	0	-8	10	8	6	10	6	15			
6 <D≤ 18	0	-8	10	8	6	10	6	15			
18 <D≤ 30	0	-9	12	9	7	12	7	15			
30 <D≤ 50	0	-11	14	11	8	16	8	20	Identical to ΔBs and VBs of the inner ring of the same bearing		
50 <D≤ 80	0	-13	16	13	10	20	10	25			
80 <D≤ 120	0	-15	19	19	11	26	11	35			
120 <D≤ 150	0	-18	23	23	14	30	14	40			
150 <D≤ 180	0	-25	31	31	19	38	19	45			
180 <D≤ 250	0	-30	38	38	23	-	23	50			
250 <D≤ 315	0	-35	44	44	26	-	26	60			
315 <D≤ 400	0	-40	50	50	30	-	30	70			
400 <D≤ 500	0	-45	56	56	34	-	34	80			
500 <D≤ 630	0	-50	63	63	38	-	38	100			
630 <D≤ 800	0	-75	94	94	55	-	55	120			
800 <D≤1000	0	-100	125	125	75	-	75	140			

Note: The tolerances on the outside diameter, D1, of the flange on the outer ring are given in standard ISO 492.
(1) Taken before fitting and after removal of the inner or outer snap ring.
(2) Only applies to ball and grooved bearings.

Bearing manufacturing precision *(continued)*

High-precision radial bearings – Tolerance class 6

With the exception of tapered roller bearings and thrust bearings. Standard ISO 492.

Inner ring

Tolerances in micrometers

d mm	Δdmp		Vdp Diameter series 9	Vdp Diameter series 0,1	Vdp Diameter series 2,3,4	Vdmp	Kia	ΔBs all	ΔBs normal	ΔBs modified(1)	VBs
	upper	lower	max	max	max	max	max	upper	lower	lower	max
0,6 ≤d≤ 2,5	0	-7	9	7	5	5	5	0	-40	–	12
2,5 <d≤ 10	0	-7	9	7	5	5	6	0	-120	-250	15
10 <d≤ 18	0	-7	9	7	5	5	7	0	-120	-250	20
18 <d≤ 30	0	-8	10	8	6	6	8	0	-120	-250	20
30 <d≤ 50	0	-10	13	10	8	8	10	0	-120	-250	20
50 <d≤ 80	0	-12	15	15	9	9	10	0	-150	-380	25
80 <d≤ 120	0	-15	19	19	11	11	13	0	-200	-380	25
120 <d≤ 180	0	-18	23	23	14	14	18	0	-250	-500	30
180 <d≤ 250	0	-22	28	28	17	17	20	0	-300	-500	30
250 <d≤ 315	0	-25	31	31	19	19	25	0	-350	-500	35
315 <d≤ 400	0	-30	38	38	23	23	30	0	-400	-630	40
400 <d≤ 500	0	-35	44	44	26	26	35	0	-450	–	45
500 <d≤ 630	0	-40	50	50	30	30	40	0	-500	–	50

(1) Relates to the rings of isolated bearings for installation in pairs or per unit.

Outer ring

Tolerances in micrometers

D mm	ΔDmp		VDp(1) Open bearings Diameter series 9	VDp(1) Open bearings Diameter series 0,1	VDp(1) Open bearings Diameter series 2,3,4	VDp(1) Shielded bearings Diameter series 0,1,2,3,4	VDmp(1)	Kea	ΔCs ΔC1s(2)		VCs VC1s(2)
	upper	lower	max	max	max	max	max	max	upper	lower	max
2,5 ≤D≤ 6	0	-7	9	7	5	9	5	8			
6 <D≤ 18	0	-7	9	7	5	9	5	8			
18 <D≤ 30	0	-8	10	8	6	10	6	9			
30 <D≤ 50	0	-9	11	9	7	13	7	10	Identical to ΔBs and VBs of the inner ring of the same bearing		
50 <D≤ 80	0	-11	14	11	8	16	8	13			
80 <D≤ 120	0	-13	16	16	10	20	10	18			
120 <D≤ 150	0	-15	19	19	11	25	11	20			
150 <D≤ 180	0	-18	23	23	14	30	14	23			
180 <D≤ 250	0	-20	25	25	15	–	15	25			
250 <D≤ 315	0	-25	31	31	19	–	19	30			
315 <D≤ 400	0	-28	35	35	21	–	21	35			
400 <D≤ 500	0	-33	41	41	25	–	25	40			
500 <D≤ 630	0	-38	48	48	29	–	29	50			
630 <D≤ 800	0	-45	56	56	34	–	34	60			
800 <D≤1000	0	-60	75	75	45	–	45	75			

Note: The tolerances on the outside diameter, D1, of the flange on the outer ring are given in standard ISO 492.
(1) Taken before fitting and after removal of the inner or outer snap ring.
(2) Only applies to ball and grooved bearings.

➔ High-precision radial bearings – Tolerance class 5

With the exception of tapered roller bearings and thrust bearings. Standard ISO 492.

Inner ring

Tolerances in micrometers

d mm	Δdmp		Vdp Diameter series		Vdmp	Kia	Sd	Sia(1)	ΔBs			VBs
			9	0,1,2,3,4					all	normal	modified(2)	
	upper	lower	max		max	max	max	max	upper	lower		max
0,6 ≤d≤ 2,5	0	-5	5	4	3	4	7	7	0	-40	-250	5
2,5 <d≤ 10	0	-5	5	4	3	4	7	7	0	-40	-250	5
10 <d≤ 18	0	-5	5	4	3	4	7	7	0	-80	-250	5
18 <d≤ 30	0	-6	6	5	3	4	8	8	0	-120	-250	5
30 <d≤ 50	0	-8	8	6	4	5	8	8	0	-120	-250	5
50 <d≤ 80	0	-9	9	7	5	5	8	8	0	-150	-250	6
80 <d≤ 120	0	-10	10	8	5	6	9	9	0	-200	-380	7
120 <d≤ 180	0	-13	13	10	7	8	10	10	0	-250	-380	8
180 <d≤ 250	0	-15	15	12	8	10	11	13	0	-300	-500	10
250 <d≤ 315	0	-18	18	14	9	13	13	15	0	-350	-500	13
315 <d≤ 400	0	-23	23	18	12	15	15	20	0	-400	-630	15

(1) Only applies to ball and grooved bearings
(2) Relates to the rings of isolated bearings for installation in pairs or per unit.

Outer ring

Tolerances in micrometers

D mm	ΔDmp		VDp Diameter series		VDmp	Kea	SD(1) SD1(2)	Sea(1)(2)	Sea1(2)	ΔCs ΔC1s(2)		VCs VC1s(2)
			9	0,1,2,3,4								
	upper	lower	max		max	max	max	max	max	max	lower	max
2,5 ≤D≤ 6	0	-5	5	4	3	5	8	8	11	Identical to ΔBs of the inner ring of the same bearing		5
6 <D≤ 18	0	-5	5	4	3	5	8	8	11			5
18 <D≤ 30	0	-5	6	5	3	6	8	8	11			5
30 <D≤ 50	0	-7	7	5	4	7	8	8	11			5
50 <D≤ 80	0	-9	9	7	5	8	8	10	14			6
80 <D≤120	0	-10	10	8	5	10	9	11	16			8
120 <D≤ 150	0	-11	11	8	6	11	10	13	18			8
150 <D≤ 180	0	-13	13	10	7	13	10	14	20			8
180 <D≤ 250	0	-15	15	11	8	15	11	15	21			10
250 <D≤ 315	0	-18	18	14	9	18	13	18	25			11
315 <D≤ 400	0	-20	20	15	10	20	13	20	28			13
400 <D≤ 500	0	-23	23	17	12	23	15	23	33			15
500 <D≤ 630	0	-28	28	21	14	25	18	25	35			18
630 <D≤ 800	0	-35	35	26	18	30	20	30	42			20

Note: The tolerances on the outside diameter, D1, of the flange on the outer ring are given in standard ISO 492.
(1) Does not apply to bearings with a flange-type outer ring.
(2) Only applies to ball and grooved bearings.

Bearing manufacturing precision *(continued)*

High-precision radial bearings – Tolerance class 4

With the exception of tapered roller bearings and thrust bearings. Standard ISO 492.

Inner ring

Tolerances in micrometers

d mm	Δdmp		Δds[1]		Vdp Ø series 9	Vdp Ø series 0,1,2,3,4	Vdmp	Kia	Sd	Sia[2]	ΔBs all	ΔBs normal	ΔBs modified[2]	VBs
	upper	lower	upper	lower	max	max	max	max	max	max	upper	lower	lower	max
0,6 ≤d≤ 2,5	0	-4	0	-4	4	3	2	2,5	3	3	0	-40	-250	2,5
2,5 <d≤ 10	0	-4	0	-4	4	3	2	2,5	3	3	0	-40	-250	2,5
10 <d≤ 18	0	-4	0	-4	4	3	2	2,5	3	3	0	-80	-250	2,5
18 <d≤ 30	0	-5	0	-5	5	4	2,5	3	4	4	0	-120	-250	2,5
30 <d≤ 50	0	-6	0	-6	6	5	3	4	4	4	0	-120	-250	3
50 <d≤ 80	0	-7	0	-7	7	5	3,5	4	5	5	0	-150	-250	4
80 <d≤ 120	0	-8	0	-8	8	6	4	5	5	5	0	-200	-380	4
120 <d≤ 180	0	-10	0	-10	10	8	5	6	6	7	0	-250	-380	5
180 <d≤ 250	0	-12	0	-12	12	9	6	8	7	8	0	-300	-500	6

(1) These differences apply to diameter series 0, 1, 2, 3 and 4 only.
(2) Only applies to ball and grooved bearings
(3) Relates to the rings of isolated bearings for installation in pairs or per unit.

Outer ring

Tolerances in micrometers

D mm	ΔDmp		ΔDs[1]		VDp Ø series 9	VDp Ø series 0,1,2,3,4	VDmp	Kea	Sd[2] Sd1[3]	Sea[2][3]	Sea1[3]	ΔCs ΔC1s[3]		VCs VC1s[3]
	upper	lower	upper	lower	max	max	max	max	max	max	max	upper	lower	max
2,5 ≤D≤ 6	0	-4	0	-4	4	3	2	3	4	5	7	Identical to ΔBs of the inner ring of the same bearing		2,5
6 <D≤ 18	0	-4	0	-4	4	3	2	3	4	5	7			2,5
18 <D≤ 30	0	-5	0	-5	5	4	2,5	4	4	5	7			2,5
30 <D≤ 50	0	-6	0	-6	6	5	3	5	4	5	7			2,5
50 <D≤ 80	0	-7	0	-7	7	5	3,5	5	4	5	7			3
80 <D≤120	0	-8	0	-8	8	6	4	6	5	6	8			4
120 <D≤150	0	-9	0	-9	9	7	5	7	5	7	10			5
150 <D≤180	0	-10	0	-10	10	8	5	8	5	8	11			5
180 <D≤250	0	-11	0	-11	11	8	6	10	7	10	14			7
250 <D≤315	0	-13	0	-13	13	10	7	11	8	10	14			7
315 <D≤400	0	-15	0	-15	15	11	8	13	10	13	18			8

Note: The tolerances on the outside diameter, D1, of the flange on the outer ring are given in standard ISO 492.
(1) These differences apply to diameter series 0, 1, 2, 3 and 4 only.
(2) Only applies to ball and grooved bearings
(3) Relates to the rings of isolated bearings for installation in pairs or per unit.

➔ High-precision radial bearings – Tolerance class 2

With the exception of tapered roller bearings and thrust bearings. Standard ISO 492.

Inner ring

Tolerances in micrometers

d mm	Δdmp		Δds		Vdp(1)	Vdmp	Kia	Sd	Sia(2)	ΔBs all	ΔBs normal	ΔBs modified(2)	VBs
	upper	lower	upper	lower	max	max	max	max	max	upper	lower	lower	max
0,6 ≤d≤ 2,5	0	-2,5	0	-2,5	2,5	1,5	1,5	1,5	1,5	0	-40	-250	1,5
2,5 <d≤ 10	0	-2,5	0	-2,5	2,5	1,5	1,5	1,5	1,5	0	-40	-250	1,5
10 <d≤ 18	0	-2,5	0	-2,5	2,5	1,5	1,5	1,5	1,5	0	-80	-250	1,5
18 <d≤ 30	0	-2,5	0	-2,5	2,5	1,5	2,5	1,5	2,5	0	-120	-250	1,5
30 <d≤ 50	0	-2,5	0	-2,5	2,5	1,5	2,5	1,5	2,5	0	-120	-250	1,5
50 <d≤ 80	0	-4	0	-4	4	2	2,5	1,5	2,5	0	-150	-250	1,5
80 <d≤ 120	0	-5	0	-5	5	2,5	2,5	2,5	2,5	0	-200	-380	2,5
120 <d≤ 150	0	-7	0	-7	7	3,5	2,5	2,5	2,5	0	-250	-380	2,5
150 <d≤ 180	0	-7	0	-7	7	3,5	5	4	5	0	-250	-380	4
180 <d≤ 250	0	-8	0	-8	8	4	5	5	5	0	-300	-500	5

(1) These differences apply to diameter series 0, 1, 2, 3 and 4 only.
(2) Only applies to ball and grooved bearings
(3) Relates to the rings of isolated bearings for installation in pairs or per unit.

Outer ring

Tolerances in micrometers

D mm	ΔDmp		ΔDs		VDp(1)	VDp	Kea	Sd(2) Sd1(3)	Sia(2)(3)	Sia1(3)	ΔCs ΔC1s(3)		VCs VC1s(3)
	upper	lower	upper	lower	max	max	max	max	max	max	upper	lower	max
2,5 ≤D≤ 6	0	-2,5	0	-2,5	2,5	1,5	1,5	1,5	1,5	3	Identical to ΔBs of the inner ring of the same bearing		1,5
6 <D≤ 18	0	-2,5	0	-2,5	2,5	1,5	1,5	1,5	1,5	3			1,5
18 <D≤ 30	0	-4	0	-4	4	2	2,5	1,5	2,5	4			1,5
30 <D≤ 50	0	-4	0	-4	4	2	2,5	1,5	2,5	4			1,5
50 <D≤ 80	0	-4	0	-4	4	2	4	1,5	4	6			1,5
80 <D≤ 120	0	-5	0	-5	5	2,5	5	2,5	5	7			2,5
120 <D≤ 150	0	-5	0	-5	5	2,5	5	2,5	5	7			2,5
150 <D≤ 180	0	-7	0	-7	7	3,5	5	2,5	5	7			2,5
180 <D≤ 250	0	-8	0	-8	8	4	7	4	7	10			4
250 <D≤ 315	0	-8	0	-8	8	4	7	5	7	10			5
315 <D≤ 400	0	-10	0	-10	10	5	8	7	8	11			7

Note: The tolerances on the outside diameter, D1, of the flange on the outer ring are given in standard ISO 492.
(1) These differences apply to diameter series 0, 1, 2, 3 and 4 only.
(2) Only applies to ball and grooved bearings
(3) Relates to the rings of isolated bearings for installation in pairs or per unit.

Bearing manufacturing precision *(continued)*

➔ Tapered roller bearings - Normal tolerance class

With the exception of tapered roller bearings and thrust bearings. Standard ISO 492.

Diameter and radial run-out - Inner ring

Tolerances in micrometers

d mm	Δdmp		Vdp	Vdmp	Kia
	upper	lower	max	max	max
10 ≤d≤ 18	0	-12	12	9	15
18 <d≤ 30	0	-12	12	9	18
30 <d≤ 50	0	-12	12	9	20
50 <d≤ 80	0	-15	15	11	25
80 <d≤ 120	0	-20	20	15	30
120 <d≤ 180	0	-25	25	19	35
180 <d≤ 250	0	-30	30	23	50
250 <d≤ 315	0	-35	35	26	60
315 <d≤ 400	0	-40	40	30	70

Diameter and radial run-out - Outer ring

Tolerances in micrometers

D mm	ΔDmp		VDp	VDmp	Kea
	upper	lower	max	max	max
18 ≤D≤≤ 30	0	-12	12	9	18
30 <D≤ 50	0	-14	14	11	20
50 <D≤ 80	0	-16	16	12	25
80 <D≤ 120	0	-18	18	14	35
120 <D≤ 150	0	-20	20	15	40
150 <D≤ 180	0	-25	25	19	45
180 <D≤ 250	0	-30	30	23	50
250 <D≤ 315	0	-35	35	26	60
315 <D≤ 400	0	-40	40	30	70
400 <D≤ 500	0	-45	45	34	80
500 <D≤ 630	0	-50	50	38	100

Note: The tolerances on the outside diameter, D1, of the flange on the outer ring are given in standard ISO 492.

■ Width - Inner and outer rings, single-row bearings and single-row sub-assemblies

Tolerances in micrometers

d mm	ΔBs		ΔCs		ΔTs		ΔT1s		ΔT2s	
	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower
10 ≤d≤ 18	0	-120	0	-120	+200	0	+100	0	+100	0
18 <d≤ 30	0	-120	0	-120	+200	0	+100	0	+100	0
30 <d≤ 50	0	-120	0	-120	+200	0	+100	0	+100	0
50 <d≤ 80	0	-150	0	-150	+200	0	+100	0	+100	0
80 <d≤ 120	0	-200	0	-200	+200	-200	+100	-100	+100	-100
120 <d≤ 180	0	-250	0	-250	+350	-250	+150	-150	+200	-100
180 <d≤ 250	0	-300	0	-300	+350	-250	+150	-150	+200	-100
250 <d≤ 315	0	-350	0	-350	+350	-250	+150	-150	+200	-100
315 <d≤ 400	0	-400	0	-400	+400	-400	+200	-200	+200	-200

➔ High-precision tapered roller bearings – Tolerance class 6X

The diameter and radial run-out tolerances of inner rings (cones) and outer rings (cups) in this tolerance class are the same as those given in page 28 for the normal class. The width tolerances are given below.

■ Width - Inner and outer rings, single-row bearings and single-row sub-assemblies

Tolerances in micrometers

d mm	ΔBs		ΔCs		ΔTs		ΔT1s		ΔT2s	
	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower
10 ≤d≤ 18	0	-50	0	-100	+100	0	+50	0	+50	0
18 <d≤ 30	0	-50	0	-100	+100	0	+50	0	+50	0
30 <d≤ 50	0	-50	0	-100	+100	0	+50	0	+50	0
50 <d≤ 80	0	-50	0	-100	+100	0	+50	0	+50	0
80 <d≤ 120	0	-50	0	-100	+100	0	+50	0	+50	0
120 <d≤ 180	0	-50	0	-100	+150	0	+50	0	+100	0
180 <d≤ 250	0	-50	0	-100	+150	0	+50	0	+100	0
250 <d≤ 315	0	-50	0	-100	+200	0	+100	0	+100	0
315 <d≤ 400	0	-50	0	-100	+200	0	+100	0	+100	0

Bearing manufacturing precision *(continued)*

➔ High-precision tapered roller bearings - Tolerance class 5

Inner ring (cone) and width of single-row bearing

Tolerances in micrometers

d mm	Δdmp		Vdp	Vdmp	Kia	Sd	ΔBs		ΔTs	
	upper	lower	max	max	max	max	upper	lower	upper	lower
10 ≤d≤ 18	0	-7	5	5	5	7	0	-200	+200	-200
18 <d≤ 30	0	-8	6	5	5	8	0	-200	+200	-200
30 <d≤ 50	0	-10	8	5	6	8	0	-240	+200	-200
50 <d≤ 80	0	-12	9	6	7	8	0	-300	+200	-200
80 <d≤ 120	0	-15	11	8	8	9	0	-400	+200	-200
120 <d≤ 180	0	-18	14	9	11	10	0	-500	+350	-250
180 <d≤ 250	0	-22	17	11	13	11	0	-600	+350	-250

Outer ring (cup)

Tolerances in micrometers

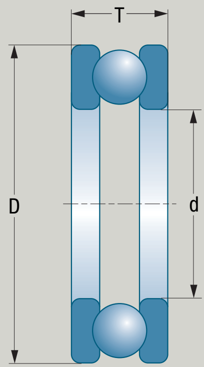
D mm	Δdmp		Vdp	Vdmp	Kea	Sd(1), SD1	ΔTs	
	upper	lower	max	max	max	max	upper	lower
18 <D≤ 30	0	-8	6	5	6	8	Identical to ΔBs of the inner ring of the same bearing	
30 <D≤ 50	0	-9	7	5	7	8		
50 <D≤ 80	0	-11	8	6	8	8		
80 <D≤ 120	0	-13	10	7	10	9		
120 <D≤ 150	0	-15	11	8	11	10		
150 <D≤ 180	0	-18	14	9	13	10		
180 <D≤ 250	0	-20	15	10	15	11		
250 <D≤ 315	0	-25	19	13	18	13		
315 <D≤ 400	0	-28	22	14	20	13		

Note: The tolerances on the outside diameter, D1, of the flange on the outer ring are given in standard ISO 492.
(1) Does not apply to bearings with a flanged outer ring.

Standard ISO 199

References

d	Nominal bore diameter of the shaft ring of a single-direction thrust bearing
Δdmp	Deviation in the mean bore diameter of the shaft ring of a single-direction thrust bearing, in an isolated plane
Vdp	Variation in the bore diameter of the shaft ring of a single-direction thrust bearing, in an isolated radial plane
D	Nominal outside diameter of the housing ring
ΔDmp	Deviation in the mean outside diameter of the housing ring in an isolated plane
VDp	Variation in the outside diameter of the housing ring in an isolated radial plane
Si	Variation in thickness between the bearing raceway and the contact face of the shaft ring
Se	Variation in thickness between the bearing raceway and the contact face of the housing ring
ΔTs	Variation in total height



Shaft ring and height of thrust bearing

Tolerances in micrometers

d mm		Δdmp		Vdp	Si	ΔTs	
>	≤	upper	lower	max	max	upper	lower
–	18	0	-8	6	10	+20	-250
18	30	0	-10	8	10	+20	-250
30	50	0	-12	9	10	+20	-250
50	80	0	-15	11	10	+20	-300
80	120	0	-20	15	15	+25	-300
120	180	0	-25	19	15	+25	-400
180	250	0	-30	23	20	+30	-400
250	315	0	-35	26	25	+40	-400
315	400	0	-40	30	30	+40	-500
400	500	0	-45	34	30	+50	-500

Bearing manufacturing precision *(continued)*

Housing ring

Tolerances in micrometers

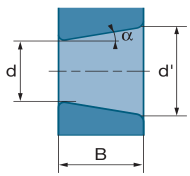
D mm		ΔDmp		VDp	Se
>	≤	upper	lower	max	max
10 18 30	18 30 50	0 0 0	-11 -13 -16	8 10 12	Identical to Si of the shaft ring of the same type
50 80 120	80 120 180	0 0 0	-19 -22 -25	14 17 19	
180 250 315	250 315 400	0 0 0	-30 -35 -40	23 26 30	
400 500	500 630	0 0	-45 -50	34 38	

Tapered bores: 1:12 and 1:30 taper

Standard ISO 492

- Nominal half-angle at apex of cone:

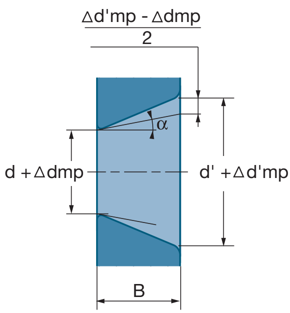
1/12 : α = 2° 23' 9.4" = 2.38594° = 0.041643 rad
1/30 : α = 0° 57' 17.4" = 0.95484° = 0.016665 rad



Theoretical tapered bore

- Nominal diameter at the largest theoretical width of the bore:

1/12 : d' = d + B / 12
1/30 : d' = d + B / 30



Tapered bore with mean diameters and deviations

- The tolerances on a tapered bore comprise:
- a tolerance on the mean diameter, given by the limits of the actual deviation of the mean diameter at the smallest theoretical width of the bore Δmp,
- a taper tolerance, given by the limits of the deviation between the mean diameter deviations at each end of the bore Δ'mp - Δmp,
- a tolerance on the diameter variation Vdp given by a maximum value applicable in any radial plane of the bore

Tapered bore, 1:12 taper

Tolerances in micrometers

d mm		Δdmp		Δd'mp - Δdmp		Vdp(1)(2)
		upper	lower	upper	lower	max
	d≤ 10	22	0	15	0	9
10	<d≤ 18	27	0	18	0	11
18	<d≤ 30	33	0	21	0	13
30	<d≤ 50	39	0	25	0	16
50	<d≤ 80	46	0	30	0	19
80	<d≤ 120	54	0	35	0	22
120	<d≤ 180	63	0	40	0	40
180	<d≤ 250	72	0	46	0	46
250	<d≤ 315	81	0	52	0	52
315	<d≤ 400	89	0	57	0	57
400	<d≤ 500	97	0	63	0	63
500	<d≤ 630	110	0	70	0	70
630	<d≤ 800	125	0	80	0	–
800	<d≤1000	140	0	90	0	–

(1) Applies to any isolated radial plane of the bore.
(2) Does not apply to diameter series 7 and 8.

Tapered bore, 1:30 taper

Tolerances in micrometers

d mm		Δdmp		Δd'mp - Δdmp		Vdp(1)(2)
		upper	lower	upper	lower	max
50	<d≤ 80	15	0	30	0	19
80	<d≤ 120	20	0	35	0	22
120	<d≤ 180	25	0	40	0	40
180	<d≤ 250	30	0	46	0	46
250	<d≤ 315	35	0	52	0	52
315	<d≤ 400	40	0	57	0	57
400	<d≤ 500	45	0	63	0	63
500	<d≤ 630	50	0	70	0	70

(1) Applies to any isolated radial plane of the bore.
(2) Does not apply to diameter series 7 and 8.

Bearings initial radial internal clearance

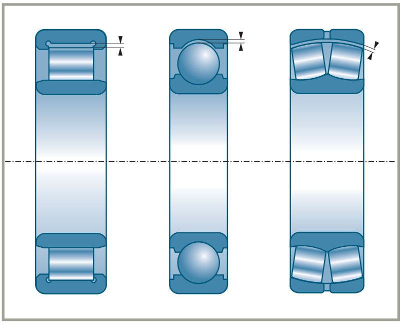
Radial clearance of radial contact bearings. Definition

The internal radial clearance is the load-free displacement of one ring with respect to the other in the radial direction.

Radial contact bearings to run correctly must have a slight radial clearance.

Radial contact bearings have a built in internal clearance. When the bearing is fitted, a residual clearance must remain.

This radial clearance leads to an axial clearance (except in the case of cylindrical roller bearings).



Internal radial clearance groups

The clearance tolerances of groups are standard (ISO 5753 standard).

The internal clearance group is chosen according to the application specifications and the residual clearance calculation.

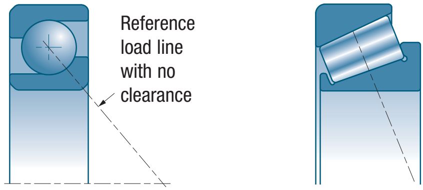
Radial clearance		Bearing designation	Other manufacturers
Type	Group	SNR suffix	
Normal clearance	N		Suitable for low or moderate loads, normal interference fit of only one of the two rings, normal temperatures.
Increased clearance	3 4 5	C3 C4 C5	Clearance frequently used in the following cases: - tight interference fit of one ring or slight on both rings - possible misalignment, bending of shaft - to increase the contact angle of highly-loaded radial contact ball bearings - high temperatures Clearance groups 4 and 5 are used in the above cases when group 3 is insufficient.
Reduced clearance	2	C2	This clearance group is used (rarely) when very good guidance with reduced clearance is required, and in applications with alternating loads and high impact levels. The use of this clearance group is highly particular because its aim is usually to cancel the bearing operating clearance. The study of the assembly (alignment), fits and operating conditions (temperature, speed) must be carried out with particular care. Consult SNR.

Axial clearance of angular contact bearings

Recommended axial clearance

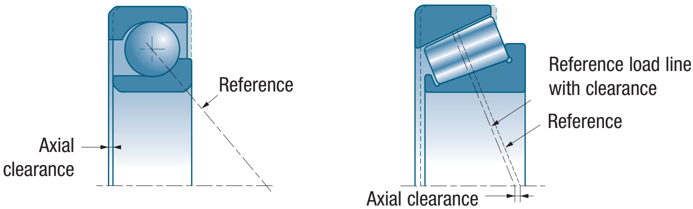
By construction, single-row angular contact ball bearings or tapered roller bearings have no internal clearance.

The bearing clearance is zero when its inner ring, rolling elements and outer ring are in contact without any load applied.



When the bearing is mounted it can be given a clearance or a preload with respect to this reference position.

The figure opposite shows the positions of the components when there is an axial clearance.



■ **Magnitude of the axial clearance of an assembly in operation**

The value of the initial clearance on fitting must take into account the operating conditions.

The relation between the axial clearance and radial clearance of a two-bearing assembly is indicated for each type of bearing in chapter corresponding to each family.

d = bearing bore	Ja = axial clearance
d < 20 mm	Ja = 0.03 up to 0.08 mm
20 < d ≤ 80 mm	Ja = 0.05 up to 0.15 mm
80 < d ≤ 120 mm	Ja = 0.05 up to 0.25 mm
d > 120 mm	Ja = 0.10 up to 0.30 mm

Bearing technology

Bearing characteristics

Bearing design

The continuous improvement in the performance of SNR bearings and their service life relies upon constant technological progress in three areas: design, materials and manufacture.

Standard bearing

The aim of the design is to determine the internal geometry of the bearing while adhering to a standard envelope. The bearing must meet the largest possible number of applications while achieving the best cost/performance compromise.

The optimization effort focuses on the bearing components: rolling elements (number, dimensions, profile), bearing raceways (profile), cage (material, design), and the seals, taking into account:

- the mechanical strength of the materials
- the manufacturing means
- the cost

Special bearing

When it is technically necessary and economically possible, the SNR bearing can provide a more comprehensive rotation function, either through a specially developed capability, or by integrating a set of functions associated with the rotation function: attachment, shielding, lubrication, power transmission, measurement, etc.

The adaptation of these bearings to the application brings substantial gains through technical and industrial optimization. It allows, among other things, an original design to be protected and more generally to increase the performance of your products. We advise you to contact your SNR representative to investigate this highly effective approach.

Materials and surface treatments

➔ Knowledge of materials and monitoring of their quality

SNR carries out in-depth research into the endurance of steels in collaboration with steel manufacturers. For each grade of steel we have defined extremely precise and stringent specifications that concern the following points:

- the method of steel production
- the chemical composition
- the hardness, quenching hardenability
- the macrostructure and macrographic soundness
- the microstructure and micro-cleanliness
- the endurance
- the product presentation
- the reception and inspection conditions

The verification of the material is performed by metallographic and spectrographic inspection, completed by bench tests.

This section details the most currently used materials and surface treatments. Your SNR contacts are at your disposal to study with you the solutions to meet your specifications.

➔ Materials and surface treatments

Applications standard

Requirements	Proposals
◗ Excellent resistance to fatigue and wear. ◗ Can achieve homogenous hardness throughout.	◗ 100Cr6 (AFNOR) high-carbon chromium steel This very commonly used steel displays many advantages: cleanliness (absence of inclusions), quenchability without carburization, heat treatment method flexibility. Our continuous quality monitoring of materials has enabled us to substantially increase the endurance of this type of steel.
	◗ Chemical composition C from 0.98 to 1.10 % Si from 0.15 to 0.35 % Mn from 0.25 to 0.45 % Cr from 1.30 to 1.60 %
	◗ Mechanical characteristics Coefficient of expansion : C1=12 x10-6 mm/mm/°C Modulus of elasticity : E = 205 000 N/mm² Poisson ratio : η = 0.3
	◗ 100 Cr6 vacuum re-melted when a gain in performance in a given envelope is absolutely necessary. ◗ XC68 for bearings produced from steel strip.

Bearing characteristics *(continued)*

Special applications

Requirements	Proposals
◗ High resistance to fatigue and wear. ◗ High impact strength at core.	◗ 100Cr6 steel with localized hardening of the bearing raceways and working surfaces (e.g. contact faces), while the core of the part remains in the initial metallurgical condition. ◗ Case-hardening steels.
◗ Resistant to high temperatures.	◗ 100Cr6 steel with stabilization heat treatment. For bearings made in limited quantities: ◗ E80DCV40 (AFNOR) or M50 (AISI) "tool" steel, produced and cast in vacuum when identical hardness at core and surface is necessary; ◗ High-temperature case-hardening steels; ◗ Nitriding steels if the bearings are subject to moderate loads.
◗ Improvement in the wear resistance of the bearing external surfaces.	◗ Anti-wear surface treatments such as phosphatizing, hard chrome plating, black oxidizing, or others, depending on specifications.
◗ Improvement in corrosion resistance.	◗ Surface treatments such as electrolytic zinc or others depending on specifications. ◗ Stainless steels.
◗ Improvement in fretting corrosion resistance between the shaft or housing and the bearing.	◗ Surface treatments such as copper or hard chrome plating on the external surfaces of the bearing.
◗ Lubrication in very low quantities or lubrication by the surrounding environment (petrol, diesel, etc.).	◗ Use of ceramic balls. ◗ Self-lubricating surface treatments such as silver + molybdenum bisulphide or others for lightly loaded bearings.
◗ Improvement in contamination resistance.	◗ The collaboration between SNR and the steel manufacturers came up with the development of a bearing steel that is less sensitive to contamination. This steel, which has a special chemical composition and microstructure, requires an appropriate heat treatment. This new material reconciles high surface hardness to resist wear with matrix ductility which reduces the risk of cracking, while maintaining good dimensional stability.

➔ Heat treatment

The principle of bearing steel heat treatment is to give a martensitic structure to get:
- the required hardness (62 HRc approx.),
- the fatigue resistance,
- and the dimensional stability,

necessary to cover the majority of applications.

It requires a pre-hardening austenilic phase at high temperature above the transformation point.

Types of treatments

SNR has defined several types of standard hardening of 100 Cr6 steel adapted to the requirements of the application.

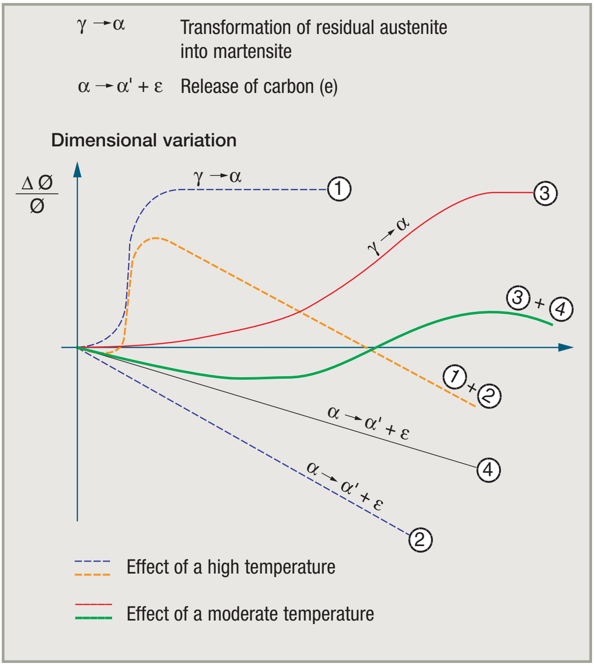
For example:

Deep martensitic hardening which, by means of judiciously chosen tempering operations, gives perfectly controlled compromises between the ability to withstand Hertz stresses and dimensional stability, and therefore maintaining the geometric precision of the bearings under the most general service conditions.

Surface hardening of the raceways and working surfaces (e.g. contact faces), while the core of the part remains in the initial metallurgical condition.

Deep bainitic hardening which gives a good hardness / toughness compromise in the mass and on the raceways.

Dimensional stability of the steel and influence on the bearing clearance



Hardened martensitic steel always contains a percentage of residual austenite that limits its use to a temperature range of approximately -20°C (-4°F) to +150°C (302°F).

At low temperature

- hardening continues and the residual austenite (γ) transforms into secondary martensite (α) and increases the specific volume of the steel.

At high temperature

- the transformation of residual austenite (γ-->α) brings an increase in the specific volume of the steel (1)
- the depletion of martensite through the release of carbon (ε) brings a reduction in the specific volume of the steel (2)

These two irreversible phenomena only compensate for one another to a very limited extent. The bearing undergoes a dimensional variation whose amplitude and speed depend on the holding time at its operating temperature, which leads to a modification in the shaft-bearing and bearing-housing fits and therefore the operating clearance.

Beyond the normal temperature of +150°C (+302°F), the dimensional variation of the steel is no longer considered negligible, and bearings used will have to undergo a special stabilization heat treatment that restores dimensional variations to a level compatible with the applications.

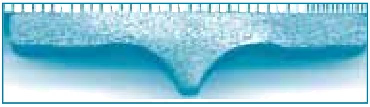
➔ Consult SNR.

Bearing characteristics *(continued)*

Bearing manufacture

SNR has developed an efficient production quality insurance system subtended by operator control and continuous process monitoring (SPC). This system ensures optimum quality of our products over time by mastering all the component process (means, methods, labor, environment and material).

➔ Shaping the bearing rings

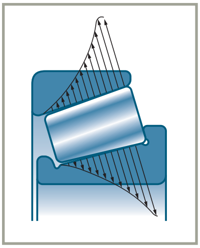


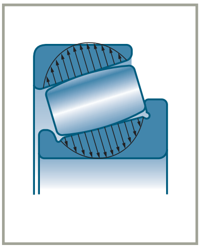
The bearing rings are shaped by:
- turning,
- deformation (drop forging, rolling, drawing).

The deformation of the metal produces a fiber orientation that is parallel to the raceway, increasing fatigue strength and therefore endurance. The development of deformation techniques is associated with the best cost-performance compromise.

➔ The bearing finish

The finishing operations determine the surface quality of the contacting elements, which is fundamental for stress resistance and lubrication.





Quality is monitored at three levels:

- **Geometry: shapes, micro-geometry of contact surfaces (curves, profiles, etc.)**

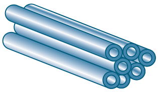
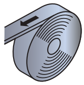
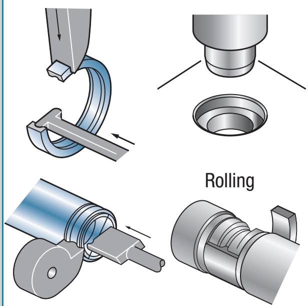
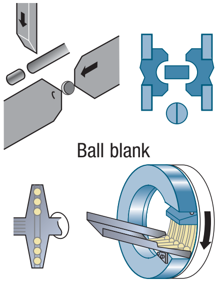
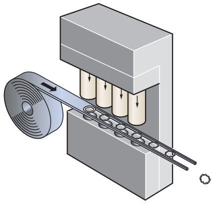
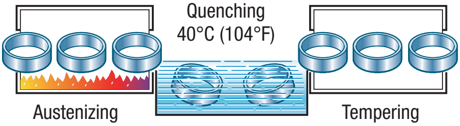
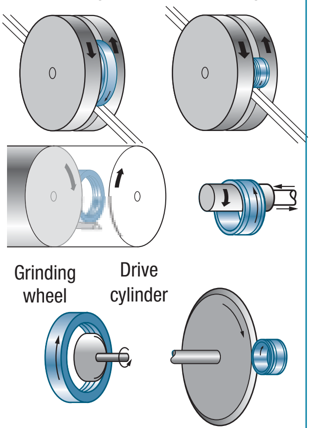
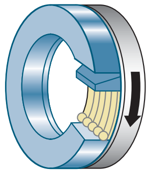
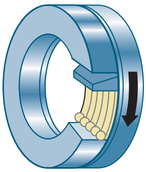
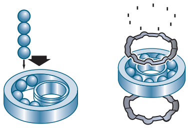
With roller bearings, the distribution of forces on the roller-ring interface is not uniform and depends upon:
- the applied loads,
- the misalignments imposed on the bearing,
- the contacting profiles.

The production of optimized profiles for roller bearings:
- improves load distribution on the roller contact line
- avoids having excess stresses at the roller edges.

With ball bearings, adapting the race curvatures to the operating conditions enables the bearing geometry to be optimized, bringing a reduction in the friction torque and an increase in service life.

- **Surface roughness**
- **Metallurgical condition: the machining method has to take in account the surface metallurgical qualities**

➔ Standard manufacturing process

Operation	Rings	Rolling elements	Cage
Material	Tubes, bars 	Wire	Coil strips 
Shaping	Turning, Forging, Rolling 	Cutting and cold heading, Ball blank 	Drawing steel cages  Molding of plastic cages Turning of solid metal cages
Heat treatment	Austenizing 830° (1,526°F), Quenching 40°C (104°F), Tempering 170° (338°F) 		
Finition	**Finishing** Outer ring, Inner ring, Grinding wheel, Drive cylinder  **Honing**	Grinding on grinding wheel  Lapping with abrasive paste between 2 plates 	
Assembly of the bearing	Washing, Marking, Final inspection, Packing		

Bearing component variants

Inner ring

This chapter describes the specific manufacturing characteristics than can modify the standard bearing or bearings designed for a specific application. Some of these modifications are standard, others can be carried out on request.

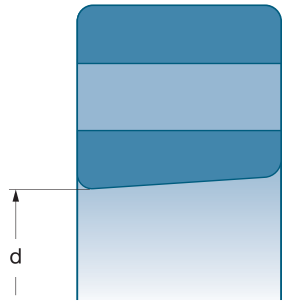
Tapered bore

■ Tapered bore is generally used if one wants to mount a bearing on a wide-tolerance shaft with a tapered adapter sleeve which usually has a taper of 1:12, or when the usage of a withdrawal sleeve is necessary.

In certain special applications (paper mill machines, rolling machines, etc.), the inner ring is mounted on a tapered seat of the shaft. This enables the clearance to be fixed very accurately by the displacement of the inner ring on the seat.

The normal 1:12 taper is designated by the suffix K.

The special 1:30 taper is designated by the suffix K30.



d = Minimum bore diameter

■ The 1:12 taper bore is produced in series on:

- Self-aligning ball bearings
- Spherical roller bearing.

However, in the 240xx and 241xx series, the 1:30 taper bore is used.

The dimensions of the tapered sleeves are indicated in the chapter ***Tapered sleeves and Accessories***.

It should be noted that when a bearing is installed with a tapered sleeve, the shaft diameter is 5 mm less than the nominal bearing diameter, or a multiple of 5, depending on the size of the bearing.

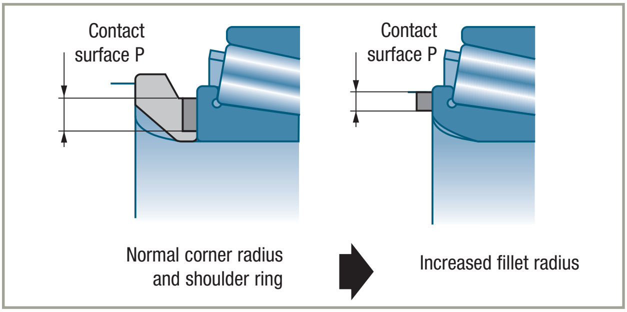
Special corners

In certain cases, a special corner radius can simplify and bring economies to the fitting process.

Increased corner fillet radius

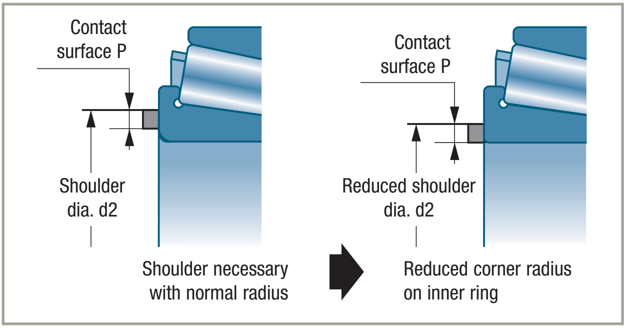
An increased corner radius makes it possible, by doing away with the bearing shoulder ring, to increase shaft stiffness, to reduce the length of the shaft and to avoid stress concentrations.

Example: installation of bearings on wheel pins.



Reduced corner fillet radius

It allows smaller shoulder diameters to be accepted while maintaining an adequate contact surface. It is also beneficial if the shoulder is provided by a snap ring.



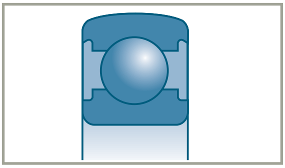
SNR

Bearing component variants *(continued)*

Definitions

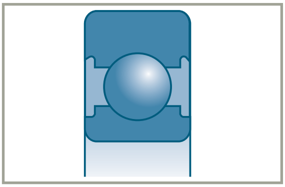
Spherical outside diameter

For bearings designed to be mounted in self-aligning bearing units (or flanges) (single row radial-contact ball bearings).



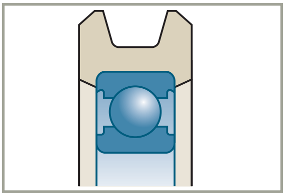
Increased thickness

This reinforcement enables the bearing to fulfill a roller function, with the outer ring rolling directly on a surface. The ring, with a straight or special profile, usually undergoes an appropriate heat treatment or surface treatment to reinforce its resistance to shocks and deformations.



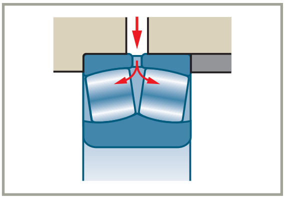
Special coatings

In certain applications (light loads, low speeds of rotation), over molding or the fitting of synthetic materials directly onto the outer ring allows the production of rollers of complex shape that function silently.

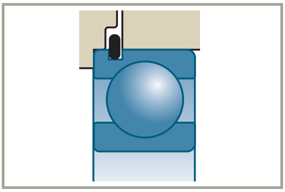


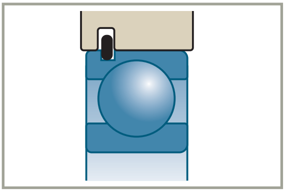
Lubrication groove and holes

This variant, designed to facilitate lubrication, is produced for the spherical roller bearings (suffix W33), with the exception of the 21300 series.



Snap ring groove

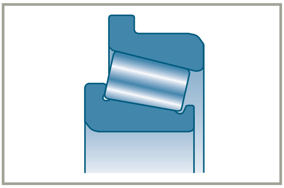




This groove is designed to accommodate a snap ring for axially positioning and locking the bearing.

The groove (suffix N) and the groove-snap ring system (suffix NR) are standard (ISO 464). The groove and installation dimensions are given in the "List of Standard Bearings". Snap rings are also available on double row shielded angular contact ball bearings.

Flanged outer ring



This substitutes for the groove - snap ring system when the bearing ring is too narrow to have a groove.

Reduced corner radius

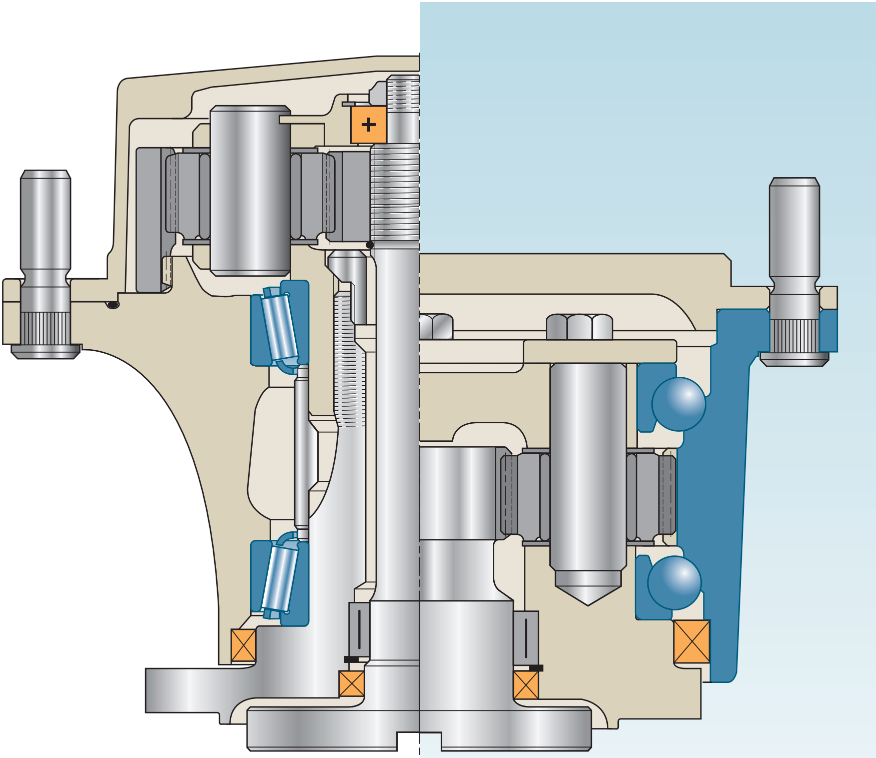
The outer rings can be made with reduced corner radii in the same way as the inner rings and for the same reasons.

Bearing component variants *(continued)*

Other ring variants

The flexibility of the SNR ROULEMENTS machining resources enables the design of the bearing to be associated with surrounding parts in order to simplify fitting, reduce the number of parts, increase performance with:

- flanges and collars with smooth or threaded attaching holes,
- gear teeth cut in the rings,
- ...



Standard bearings	Special bearings
	Reduced number of parts and assembly cost Simplified fitting Increased rigidity

Cage

The function of the cage is to separate the rolling elements and keep them equally spaced to minimize friction and heating.

It also fulfils important complementary functions:
• keep the rolling elements assembled with one ring in detachable component bearings such as tapered and cylindrical roller bearings, self-aligning ball bearings, spherical roller bearings,
• help guide the rolling elements,
• ...

Materials

The cages are produced from several materials using various manufacturing processes.

For each bearing there is a standard type of cage, which has always proved satisfactory in service, and is considered to be the best design for the majority of applications. The standard cage used for large bearings may differ from that for small bearings within the same series because of the different applications, manufacturing processes and costs. When a cage type becomes a standard cage, it is no longer identified by a specific suffix in the SNR bearing designation.

Molded synthetic material cages

The most commonly used material at present is polyamide 6.6 fiber glass reinforced.

These cages display interesting mechanical characteristics: low friction coefficient, elasticity, good impact and vibration resistance.

Furthermore, the molding process allows precise shapes that improve the guiding of the rolling elements. Due to the speed of changes in the world of synthetic materials, consult SNR for detailed information on the conditions of use of these cages.

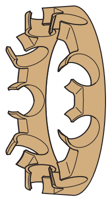
The SNR standard sealed or shielded bearings can be equipped with this type of cage and compatible grease.

Cages made of stamped mild steel or brass sheets

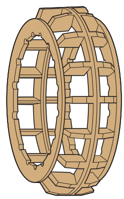
In one or two pieces, riveted, fold clamped or welded together. These cages can be given a surface treatment to improve the friction coefficient.

Machined cages: phenolic resin, copper base alloys, aluminium alloys

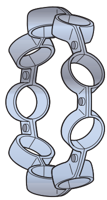
For large-sized cages produced in small quantities, the machined brass cage is often standard, and in this case the bearing reference is always followed by the cage suffix (M, MA, or MB).



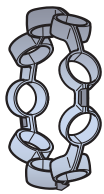
open molded cage (synthetic material)



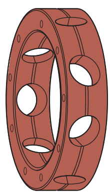
closed molded cage (synthetic material)



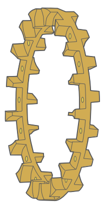
riveted or welded cage



fold clamped cage



machined cage



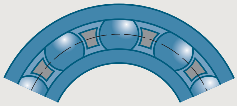
machined cage

Bearing component variants *(continued)*

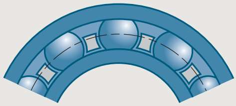
Cage centering

The cages can be centered:

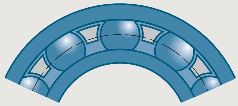
on the rolling elements (the majority of pressed steel and molded cages)



on the bearing inner ring



on the bearing outer ring



The centering choice depends on the bearing operating criteria: vibration, impacts, high speeds, speed variations,…

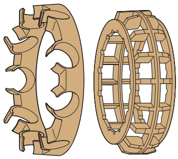
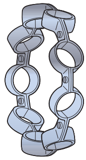
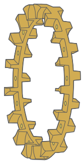
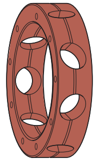
Choice of a special cage

The choice of a special cage will depend on the particular bearing operating criteria: Temperature, lubrication, vibration, sudden acceleration and deceleration, shaft-housing misalignment.

See the table on the opposite page.

In certain applications where a substantial increase in the dynamic loading capacity is needed (speed reducers, gearboxes, etc.) or static loading capacity (rollers, pulleys, etc.) special cageless bearings can be used.

It should be noted that the maximum speed for this type of bearing is lower than that of the corresponding standard bearing. Its lubrication demands a certain amount of attention due to the relative friction of the rolling elements.

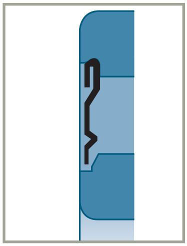
	Molded cage	Pressed steel or brass sheet cage	Machined brass cage	Machined phenolic resin cage
				
Maximum speed	◗ That of the bearing	◗ That of the bearing	◗ Enables the maximum speed of the bearing to be increased	◗ Usually centered on a ring, which enables the maximum speed of the bearing to be increased
Temperature	◗ Polyamide 6/6: +120°C/+248°F continuous service, +150°C/+302°F intermittently ◗ Other materials, consult SNR	◗ Does not limit the bearing operating temperature	◗ Does not limit the bearing operating temperature	◗ +110°C/+230°F max. in continuous service
Lubrication	◗ Good friction coefficient ◗ Good behaviour when lubrication is deficient	◗ Metal-to-metal contact, therefore lubrication is important	◗ Low brass-to-metal friction coefficient	◗ Excellent coefficient of friction ◗ Cage impregnated with oil, optimum bearing lubrication
Resistance to vibration	◗ Excellent behaviour - Lightness - Elasticity	◗ Restricted by: - mechanical strength - method of assembly - potential unbalance	◗ Excellent resistance ◗ Maintains despite the dynamic unbalance loads	◗ Good behaviour with cage centered on a ring ◗ Low inertia ◗ Good balance
Sudden acceleration and deceleration	◗ Excellent behaviour - Lightness - Elasticity	◗ Risk of cage failure	◗ High mechanical strength but: - Lack of flexibility - High inertia	◗ Excellent behaviour due to: - Low inertia - Good mechanical strength
Misalignment between shaft and housing	◗ Excellent behaviour - Elasticity	◗ Risk of cage failure	◗ Use not recommended	◗ Use not recommended
Remarks	◗ Cage replacing the steel cage for many types of bearings		◗ High cost ◗ Usually reserved for highspeed and/or highprecision bearings	◗ High cost ◗ Usually reserved or high speed and / or high precision bearings

Shielding and sealing

The active parts of the bearing: rolling elements, raceways, cage, must always remain absolutely clean and well lubricated. Shielding and sealing serve to ensure the permanence of these two factors that are vital for the bearing life, by preventing contaminating agents from entering the bearing and by retaining the grease.

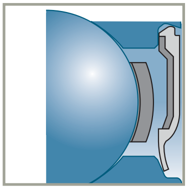
Two types of sealing devices are normally used with the bearings

Friction-free shields

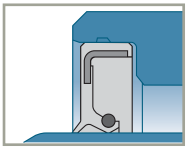


These devices are based on the effect produced by a narrow space between rotating parts and fixed elements. These shielding devices produce virtually no friction and no wear. They are particularly suited to high speeds of rotation and high temperatures. Their efficiency can be reinforced by injecting grease into the bearing through the narrow gap between shield and inner ring.

Friction seals (contact)

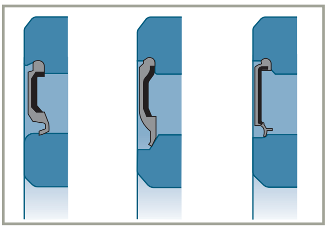


The seal exerts pressure on the conjugate surface, usually by means of a lip. This prevents the ingress of impurities and moisture and/or loss of lubricant.

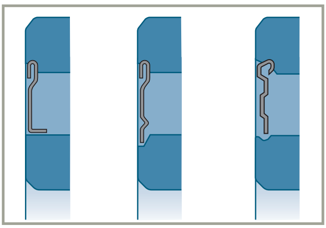


The pressure can be created:

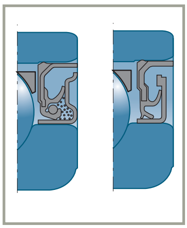
- either by the load exerted by a spring incorporated at the end of the seal,
- or by the elasticity of the seal material and appropriate fitting of the lip on its contact surface.



Standard seals



Shields

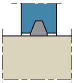
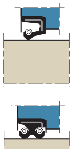
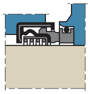
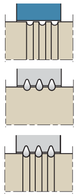
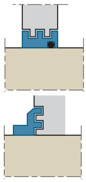
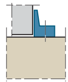


Special seals

SNR proposes a wide and diverse range of shields and seals, either fully integrated in the bearing or reinforced by a front lip. Depending on the applications, these devices can be replaced or reinforced by a protection mechanism that is independent of the bearing.

Shielding and sealing devices external to the bearing

The shielding or sealing devices integrated in the bearings can be replaced or reinforced by a protection independent of the bearing, depending on the applications. Protection devices that are independent of the bearing may be with or without friction. They may be combined for increased protection.

	Devices with friction				Devices without friction		
	Radial effect		Axial effect				
Type							
	Felt	**Metal-plastic seal**	**Mechanical seal**	**Front-lip seal**	**Grooves**	**Labyrinth seal**	**Shield**
Maximum linear speed (m/sec)	4	◗ Acrylic nitrile NBR: 15 ◗ Polyacrylate ACM: 18 ◗ Fluoroelastomer FKM: 20	16	7			
Maximum service temperature °C *(°F)*	-40 +110 *(-40) (+230)*	◗ Acrylic nitrile NBR -30 *(-22)* +110 *(230°)* ◗ Polyacrylate ACM -10 *(14)* +170 *(+338)* ◗ Fluoroelastomer FKM -40 *(-40)* +200 *(+392)*	-40 +150 *(-40) (+302)*	-40 +110 *(-40) (+230)*			
Maximum misalignment	0.01 rad 0.5°	0.01 rad 0.5°	0.01 rad 0.5°	0.02 rad 1°	0.001 rad 0.06°	0.001 rad 0.06°	0.001 rad 0.06°
Seal seat – **Hardness**	Min 30HRc or 300 HV	Min 40HRc or 450 HV	Seat integrated in seal				
Seal seat – **Surface condition (seating) (Ra max)**	3.2 µm	0.8 µm		3.2 µm	0.8 µm (shaft)	0.8 µm (shaft)	
Particular points	◗ Soak the felt in oil at 80°C (176°F) before fitting ◗ Standard grooves	◗ Provide a chamfer on the shaft to ease entry of the lips ◗ Grease seat and seals before fitting	◗ This seal can withstand relatively high pressures	◗ The use of fluoroelas-tomer seals increases the operating temperature capability and speed range	◗ 3 grooves minimum ◗ Clearance between shaft and housing of 0.3 to 0.5 mm for Ø < 50 0.8 to 1.2 mm for Ø > 50	◗ Diametral clearance of 0.3 to 0.5 mm for Ø < 50 0.8 à 1.2 mm for Ø > 50 ◗ Axial clearance of 1 to 2 mm for Ø < 50 2 to 4 mm for Ø > 50	
Applications	◗ Split pillow blocks	◗ General	◗ Fluid-tight	◗ Reinforced sealing against contami-nants	◗ Precision component ◗ High speed ◗ Poorly contami-nated envi-ronments	◗ Precision component ◗ High speed ◗ Poorly contami-nated envi-ronments	◗ Used to reinforce another type of sealing against contamination ◗ Acts by centrifuging
Recommended lubrication	◗ Grease	◗ Grease ◗ Oil	◗ Grease ◗ Oil	◗ Grease	◗ Grease ◗ Oil	◗ Grease ◗ Oil	

Shielding and sealing *(continued)*

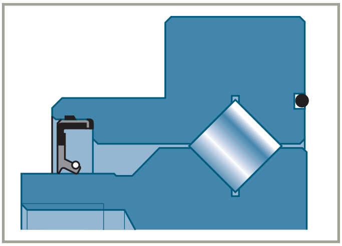
Other types of seals

Other types of sealing can be integrated in the bearing.

For many applications, integrating the seal saves space and weight, thereby reducing the cost of the sealing function.

Some examples:

Radial sealing ring with spring

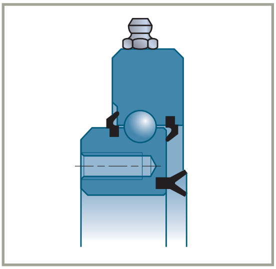


Sealing rings with radial lips equipped with a spring suit numerous industrial applications. They are particularly suited to those requiring oil sealing, but can also be used with greased bearings.

This type of seal can also be equipped with a lip protecting against dust and external dirt.

O-ring

O-rings can be integrated in the bearing to ensure static sealing against oil or grease.



Linear seal

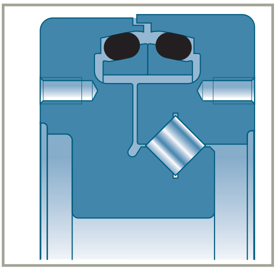
Seal formed by one or more lips in non-reinforced elastomer.

The seal is produced by the meter and can be adapted to bearings of different diameters.

This type of seal is well suited to greased bearings.

Used extensively in robotics applications.

Mirror seal



In all applications exposed to high wear stresses from mud, sand or dust, it is possible to integrate a mirror seal.

These seals are made by two rubbing metal rings mounted elastically with two O-rings.

This type of sealing is particularly suitable for civil engineering applications (caterpillar vehicles, sand preparation plants, etc.) and mine working machines.

Parameters influencing bearing life *(continued)*

Influence of an excessive load

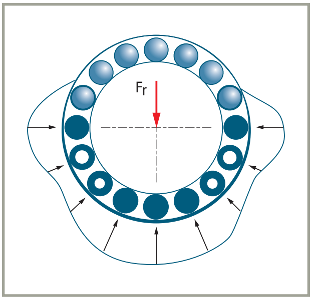
Under very high loads, corresponding approximately to values $P \geqq C / 2$, the stress level in standard steel is such that the formula no longer correctly represents the nominal life with 90% reliability. These high load applications deserve a specific study using our computing resources.

Influence of form and position defects

Shape defects

■ The bearing is a precision part and the calculation of its fatigue strength implies having a uniform and continuous distribution of the load between the rolling elements.

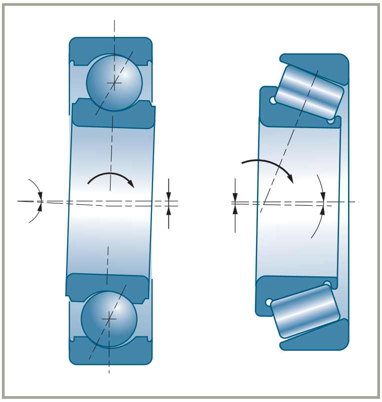
If the load distribution is not uniform, the stresses have to be calculated using the finite element method.



It is important for the bearing seats to be machined with a compatible level of precision. Seat shape defects (ovality, cylindricity defect, etc.) create local stresses that significantly reduce the service life of the bearings. Tables on page 108 give certain tolerance specifications for bearing contact surfaces and seats.

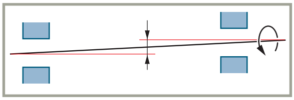
Misalignment

■ Misalignment of bearings (very bad for non self-aligning or spherical bearings) results in an angle between the centreline of the inner ring and that of the outer ring.



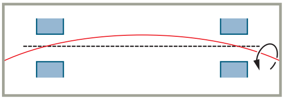
Such defects can arise from:

- a concentricity defect between the two contact surfaces of the shaft or the housings,

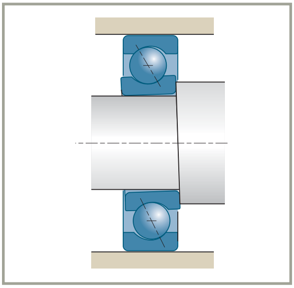


- misalignment between the centreline of the shaft and the centreline of the corresponding housing of a given bearing,

- a shaft linearity defect,

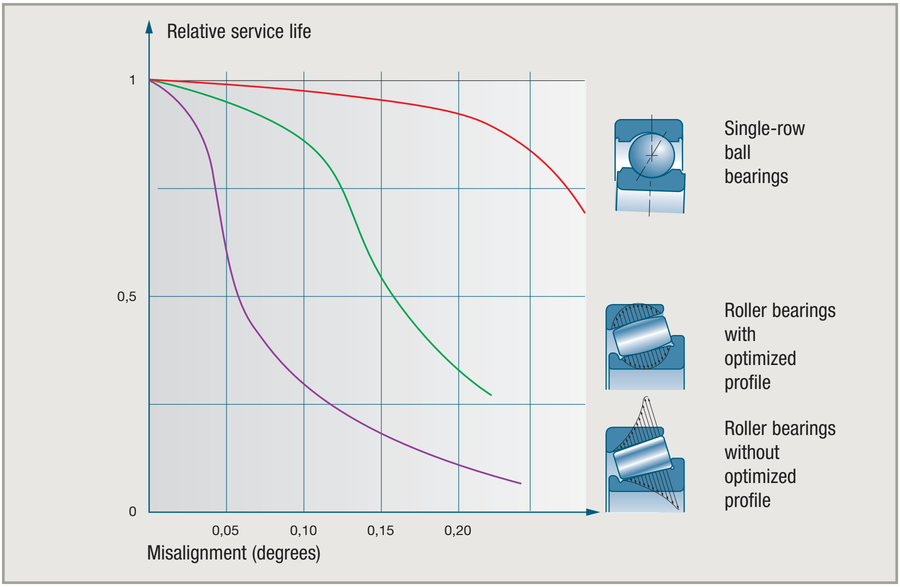


- a defect in perpendicularity between the shoulders and the seats.



The value of these alignment errors and the influence on bearing life is determined by calculation. The diagram below shows the results.

It shows that the drop in service life is very fast and that alignment errors must be kept within very narrow tolerances.



Parameters influencing bearing life *(continued)*

■ Maximum permissible misalignment value with normal operating clearance without significantly penalizing service life.

	$F_a/F_r < e$	$F_a/F_r > e$
Single-row ball bearing	0.17°	0.09°
Double-row rigid ball bearing, Cylindrical or tapered roller bearing	0.06°	0.06°

To reduce the influence of misalignment in single-row ball bearings one can use an increased clearance (category 3).

With cylindrical or tapered roller bearings, SNR makes convex tracks of the rollers which improves the stress distribution in the event of misalignment.

Friction and bearing speed

Friction

■ The friction and consequent heating of a bearing depend on various parameters: the applied load, friction of the cage, internal design of bearing, lubrication, etc.

For the majority of applications below the maximum speed and with non-excessive lubrication, the friction in the bearings can be calculated sufficiently using the following formula:

$$M_R = \mu \,.\, F \,.\, D_m / 2$$

$$P_R = M_R \,.\, n / 9550$$

M_R Moment of resistance (N.mm)

P_R Power consumption (W)

F Radial load for bearings, axial load for thrust bearings (N)

D_m Mean diameter of bearing

$D_m = (d + D) / 2$ (mm)

n Speed of rotation (min^{-1})

μ Friction coefficient

Bearings without seals:

Friction coefficient	μ
Radial ball bearings	0,0015
Self-aligning ball bearings	0,0010
Angular contact ball bearing • Single-row ball bearing • Double-row ball bearing	 0,0020 0,0024
Ball thrust bearing	0,0013
Cylindrical roller bearing	0,0050
Tapered roller bearing	0,0018
Spherical roller bearing	0,0018

Bearing speed

Theory of the Standard ISO 15312

ISO Standard 15312 introduces new concepts concerning bearing speeds:
- Thermal reference speed
- Max. admissible thermal speed
- Limit speed

Thermal reference speed. Definition

This is the rotating speed of the inner race for which thermal balance is reached between heat generated by friction in the bearing (Nr) and heat transferred through the bearing seats (shaft and housing) (Φ_r). This is valid only in the reference conditions below.

$$N_r = \Phi_r$$

Reference conditions determining heat generation by friction

Temperature

- Fixed outer ring temperature $\theta_{r.} = 70°C$
- Ambient temperature $\theta_{Ar} = 20°C$

Load

- Radial bearings: pure radial load corresponding to 5% of basic static radial load.
- Roller thrust bearings: axial load corresponding to 2% of basic static axial load.

Lubricant: mineral oil with extreme pressure additives offering, at $\theta_r = 70°$ C, the following kinematic viscosity:

- Radial bearings: $\nu_r = 12\ mm^2 / s$ (ISO VG 32)
- Roller thrust bearings: $\nu_r = 24\ mm^2 / s$ (ISO VG 68)

Lubrication method: oil bath with oil level up to and including the centre of the rolling body in the lowest position.

Others

- Bearing dimensions: up to and including a bore diameter of 1,000 mm
- Internal play: group "N"
- Seals: bearing without seals
- Bearing rotation axis: horizontal

(For cylindrical roller thrust bearings and needle thrust bearings, take the precaution to supply the upper rolling elements with oil)

- Outer race: fixed
- Preload adjustment in an angular contact bearing: no play in operation

Friction and bearing speed *(continued)*

Friction heat, N_r in a bearing operating at thermal reference speed in the reference conditions:

$$N_r = [(\pi \times n_{\theta r}) / (30 \times 10^3)] \times (M_{0r} + M_{1r})$$

M_{0r} : Friction moment, independent from the load

M_{1r} : Friction moment, dependant on the load

$$N_r = [(\pi \times n_{\theta r}) / (30 \times 10^3)] \times [10^{-7} \times f_{0r} \times (\nu_r \times n_{\theta r})^{2/3} \times d_m^{\,3} + f_{1r} \times P_{1r} \times d_m]$$

f_{0r} : Correction factor for friction moment **independent from the load but dependant** on speed in the reference conditions (values given for information in Appendix A of the Standard)

d_m : Mean bearing diameter $d_m = 0{,}5 \times (D + d)$

f_{1r} : Correction factor for friction moment **dependent on the load**

P_{1r} : Reference load

Reference conditions determining heat emission

Reference surface area, A_r: sum of contact surfaces between races and shaft and housing, through which the thermal flux is emitted.

Reference heat transfer Φr: heat generated by the bearing in operation and transmitted by thermal conduction through the reference surface area.

Heat transfer reference density q_r : quotient of reference heat transfer by reference surface area.

Heat transfer through seating surfaces

$$\Phi_r = q_r \times A_r$$

Max. admissible thermal speed. Definition

A bearing in operation can reach a max. admissible thermal speed which depends on the thermal reference speed. ISO standard 15312 indicates the computation method for this speed.

ISO 15312 limit speed. Definition

ISO standard 15312 defines the limit speed of a bearing as the speed which can no longer be sustained by the components.

A large majority of bearing applications correspond to speed conditions which are far from critical values. They do not require precise calculations; an indication as to the limit which should not be exceeded is fully sufficient. The definitions and calculation methods developed by the standard ISO 15312 are to be used by specialists who have powerful computing tools, whenever the speed conditions make this calculation indispensable.

This is why, SNR decided to maintain the well tested concept of limit speed in the bearing properties tables.

SNR limit speed. Definition

This is the maximum speed in normal operating conditions, for which internal heating in the bearing is deemed acceptable.

Said limit speed, defined according to standard concepts, is indicated in the product properties table with a differentiation provided for use with grease or with oil.

Friction and bearing speed *(continued)*

The following table compares the speed capabilities of the different types of bearings.

N.Dm with grease	Types of bearings	N.Dm with oil	
	Special bearings with appropriate lubrication		**Special bearings**
1 100 000	High-precision ball bearings without preload	+ 55%	
650 000	High-precision ball bearings without preload	+ 55%	
600 000			**Standard bearings**
550 000			
500 000	Single-row radial ball bearings	+ 25%	
450 000	Self-aligning ball bearings	+ 20%	
	Cylindrical roller bearings	+ 25%	
400 000	Single-row angular contact ball bearings	+ 30%	
350 000	Double-row angular contact ball bearings	+ 30%	
	Double-row angular contact ball bearings	+ 40%	
300 000	Spherical roller bearings	+ 35%	
	Tapered roller bearings	+ 35%	
250 000	Spherical roller thrust bearings (oil lubrication only)		
200 000		+ 40%	
150 000	Thrust ball bearings		

Bearing retention and clearances

SNR

Bearing retention

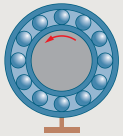
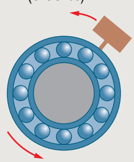
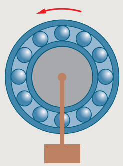
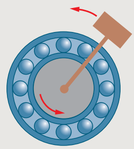
Radial retention

The bearing rings must be assembled with the mounting elements (shaft and housing) such that they become an integral part of them. The means of connection must prevent any relative movement of the rings on their seat under the radial and axial loads, while maintaining the precision of the bearing, its operating clearance, its limit loads, speed, temperature, etc.

Under the action of the radial load, one of the two rings of a rotating bearing is "rolled" between the rolling elements and its seat, and tends to turn on it. This relative displacement must be prevented to avoid wearing of the seat (bearing hardness: 62 HRC).

General rule

The ring that rotates with respect to the load direction must be press fitted on its seat.

	Analysis of rotation (cases frequency)		Retention principle
Load stationary with respect to the outer ring	Stationary housing and load (95 %)  Rotating inner ring	Rotating housing and load (0.05 %)  Stationary inner ring	Inner ring interference-fitted on shaft
Load stationary with respect to the inner ring	Stationary shaft and load (3 %)  Outer ring rotating	Rotating shaft and load (1.5 %)  Outer ring stationary	Outer ring interference-fitted in the housing

The bearing rings are usually retained with an interference fit. Other methods of retention do exist as: adapter sleeves (see page 139), eccentric locking collars or set screw on inner ring, gluing, etc. The seat fits are chosen from Standard ISO 286 according to the bearing operating criteria.

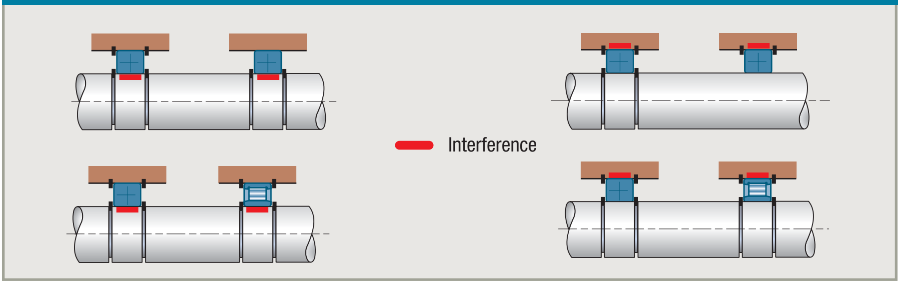
Axial retention

The bearings secure the axial positioning of the rotating part of a component with respect to the stationary part.

➔ Positioning of single bearing assemblies

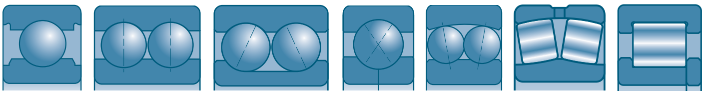
■ Retention of bearing assemblies requires one bearing to float axially to prevent stresses due to thermal expansion

Radial interference predominant on inner ring	Radial interference predominant on outer ring



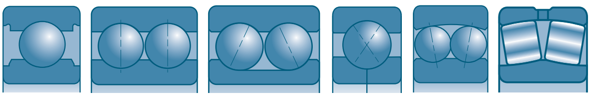
Stationary bearing F

- the bearing must be positioned by the axial retention of the inner ring and the outer ring
- possible bearing types



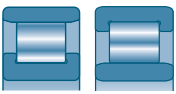
Floating bearing L

- only the tight fitted ring is axially held, the other is loose
- possible bearing types



Floating bearing L1

- with cylindrical roller bearings type N or NU, in which axial mobility is ensured by the bearing itself, the two bearing rings are retained
- possible bearing types



■ **Fixed assembly with two bearings**

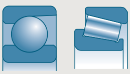
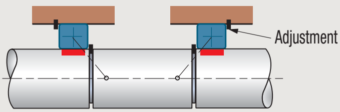
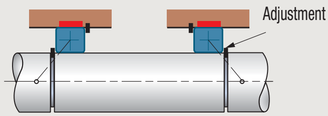
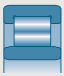
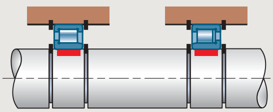
The fixed assembly may be made up of two associated bearings, depending on the assembly specifications.

Bearing retention *(continued)*

➔ Positioning of two bearing assemblies

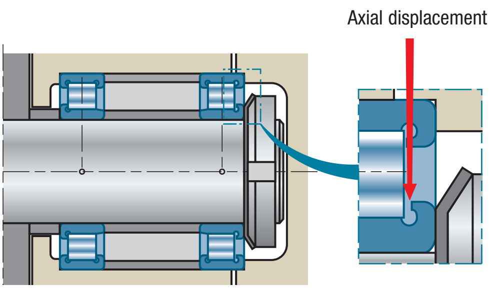
■ The principle of this assembly is to have one assembly limiting axial displacement of the shaft in one axial direction, while the other assembly limits it in the opposite direction.

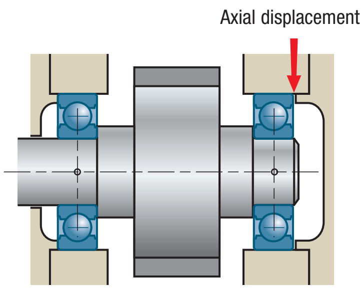
This implies that one of the bearing rings must be free to move axially on its seat to permit assembly. The operating axial displacement then depends on the axial adjustment of the relative position of the inner rings with respect to the outer rings.

Types of bearings	Predominant radial interference on inner ring	Predominant radial interference on outer ring
	 Example of an "X" assembly arrangement	 Example of an "O" assembly arrangement
		Interference

■ Radial contact bearings

This type of assembly can be used with the various types of radial contact bearings: ball bearings, cylindrical roller bearings, self-aligning and spherical bearings. A minimum axial displacement must apply, which varies according to the types of assembly.



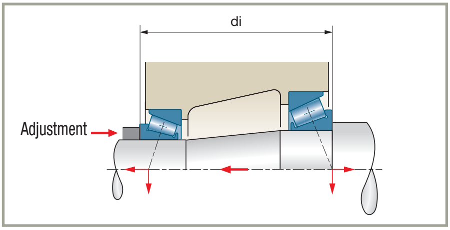


Angular contact bearings

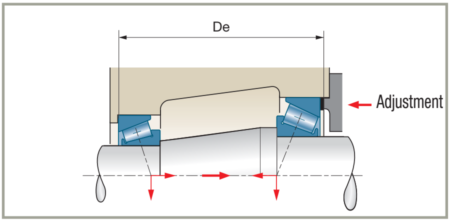
Angular contact bearings get their rigidity through their fitting. They have to be adjusted to secure the relative positioning and the operating clearance.

Two types of assembly are possible:

Face-to-face assembly (O): the points of load application are located outside the bearings.



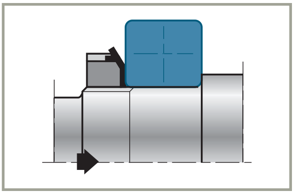
Back-to-back assembly (X): the points of load application are located between the bearings.



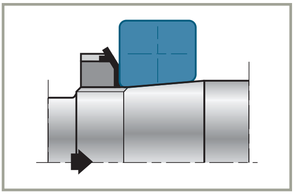
Axial retention processes

Inner ring

Nut and washer



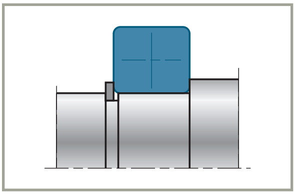
Cylindrical seat.
Tight fit against shoulder.



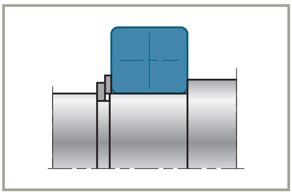
Tapered seat, therefore bearing with tapered bore.

Preferential direction of axial thrust (➔).

Snap ring



Easy and fast to fit, occupies little space.

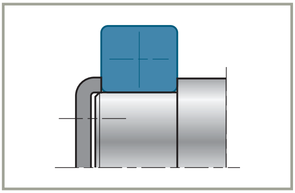


A thrust washer must be installed between the inner ring and the snap ring if axial load is high.

Bearing retention *(continued)*

Adjusting ring

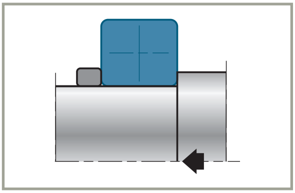
Reserved for shaft ends.



Press fit ring

Preferential direction of axial thrust (➔).

The ring has to be destroyed to remove the bearing.

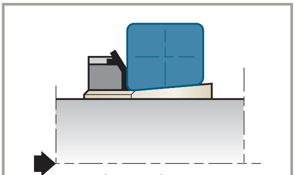


Sleeve

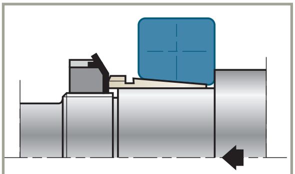
Preferential direction of axial thrust (➔).

Does not need precise machining of the shaft.

Above all used for spherical roller bearings.



adapter sleeve

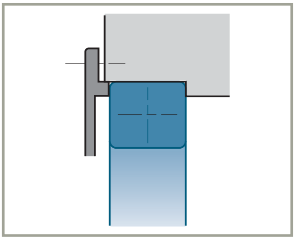


withdrawal sleeve

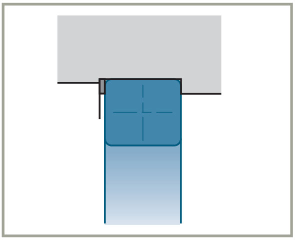
Outer ring

Cap

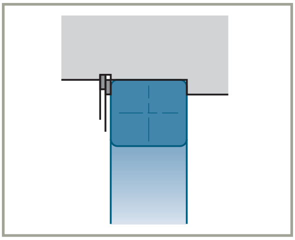
Necessary gap between cap and face of casing.



Snap ring



Easy and quick to mount, occupies little space.

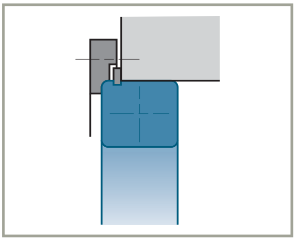


A thrust washer must be installed between the outer ring and the snap ring if axial load is high.

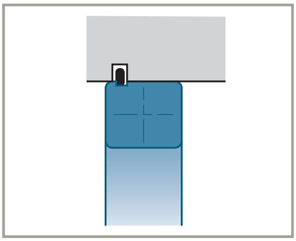
Note : the snap ring (with or without a thrust washer) can replace a shoulder.

Snap ring built in the bearing

(type NR bearing)



Necessary gap between the cap and the face of the housing.



In the particular case where the housing is in two parts, the ring can be installed between the two parts.

Bearing seats

Bearing tolerances

Under the action of the radial load, one of the two rings of a rotating bearing tends to turn. To avoid wearing the seat, this relative displacement must be prevented by having an appropriate fit. The fit of the other ring will allow axial displacement on the seat (adjustment, thermal expansion).

Standard precision bearing tolerances

Inner ring

Deviation with respect to the nominal bore

Bore d	All bearings except tapered roller bearings Δdmp (µm)		Tapered roller bearings Δdmp (µm)	
	max.	min.	max.	min.
2,5 <d≤ 10	0	-8		
10 <d≤ 18	0	-8	0	-12
18 <d≤ 30	0	-10	0	-12
30 <d≤ 50	0	-12	0	-12
50 <d≤ 80	0	-15	0	-15
80 <d≤ 120	0	-20	0	-20
120 <d≤ 180	0	-25	0	-25
180 <d≤ 250	0	-30	0	-30
250 <d≤ 315	0	-35	0	-35
315 <d≤ 400	0	-40	0	-40

Outer ring

Deviation with respect to the nominal diameter

Outside diameter D	All bearings except tapered roller bearings ΔDmp (µm)		Tapered roller bearings ΔDmp (µm)	
	max.	min.	max.	min.
6 <D≤ 18	0	-8		
18 <D≤ 30	0	-9	0	-12
30 <D≤ 50	0	-11	0	-14
50 <D≤ 80	0	-13	0	-16
80 <D≤ 120	0	-15	0	-18
120 <D≤ 150	0	-18	0	-20
150 <D≤ 180	0	-25	0	-25
180 <D≤ 250	0	-30	0	-30
250 <D≤ 315	0	-35	0	-35
315 <D≤ 400	0	-40	0	-40
400 <D≤ 500	0	-45	0	-45
500 <D≤ 630	0	-50	0	-50

Other precision classes, see page 23.

Shaft and housing seat tolerances

The shafts are generally machined in tolerances of quality 6 or sometimes 5. The housings, which are more difficult to machine, are usually in quality 7 or sometimes 6 tolerances.

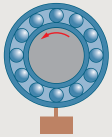
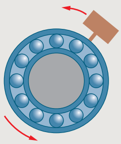
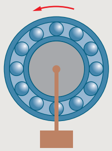
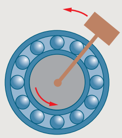
■ **Fundamental tolerance values (taken from Standard ISO 286).**

Diameter	Quality		
mm	5	6	7
>3 to 6	5	8	12
>6 to 10	6	9	15
>10 to 18	8	11	18
>18 to 30	9	13	21
>30 to 50	11	16	25
>50 to 80	13	19	30
>80 to 120	15	22	35
>120 to 180	18	25	40
>180 to 250	20	29	46
>250 to 315	23	32	52
>315 to 400	25	36	57
>400 to 500	27	40	63

In certain cases, the shape and taper defects in the chosen tolerance interval are unacceptable because they are detrimental to correct bearing operation. In such cases a smaller tolerance interval must be adopted.

Bearing seats *(continued)*

Recommended fits

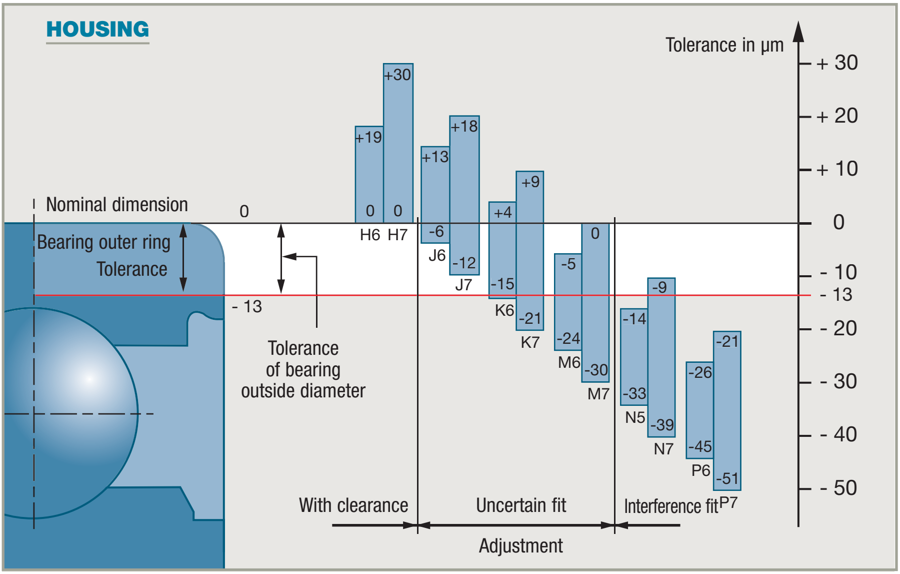
Analysis of rotation	Retention principle	Shaft			Housing		
		Applications	Recommended fits	Examples	Applications	Recommended fits	Examples
The load turns with respect to the outer ring  	Inner ring press fitted on shaft	Normal loads P < C / 5	j6 / k6	Electric motors Machine tool spindles Pumps Fans Speed reducers	General case	H7 / J7	Electric motors of moderate power Pulleys Machine-tool spindles Transmissions
		High loads P > C / 5	m6 / p6	Traction motors Large speed reducer, compressors	Ring floats on its seat	G7 / H7	Axial displacement required (expansion or adjustment)
					Cylindrical and tapered roller bearings	M7 / P7	
The load turns with respect to the inner ring  	Outer ring press fitted in housing	General case	g6 / h6	Idler pulleys Tensioners Wheels	Normal loads P < C / 5	M7 / N7	Idler pulleys Tensioners Wheels
		Ring floats on its seat	f6 / g6	Axial displacement required (expansion or adjustment)	Very high loads High loads with impacts P > C / 5	N7 / P7	Railway equipment Heavy-duty roller bearings
Other cases		Purely axial loads	h6 / j6	Bearings and thrust bearings	Purely axial loads	G7 / H7	Bearings and thrust bearings
		Adapter sleeves	h9	Transmissions Agricultural Equipment			

Different choices can be made to take into account various construction and operating factors: for example, if an assembly is subject to vibration and impact, tighter fits must be considered.

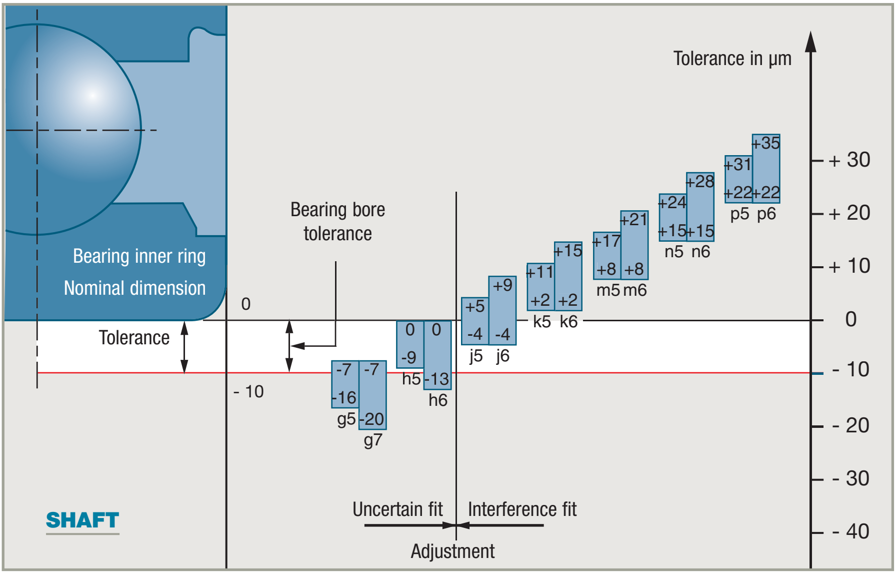
Moreover, the type of mounting and the installation procedure can demand different fits. For example, the fit adopted for light alloy housings is usually tighter than those normally specified, to compensate for the differential thermal expansion.

The following tables illustrate the fits used most frequently in the mounting of bearings.
Example for an SNR 6305 ball bearing (25x62x17)

Bearing/housing fit



Shaft/bearing fit



Bearing seats *(continued)*

Value of tolerances and fits

The tables on the following pages indicate:

- the tolerance (in µm) on the bore or outside diameter of the bearing (Standard ISO 492)

- the tolerance (in µm) on the seat diameter according to the chosen fit. (Standard ISO 286)

- the differences (in µm) between the respective diameters of the bearing and its seat:
  - Theoretical values calculated from the extreme bearing and seat tolerance values
  - Mean values
  - Probable values calculated using the Gauss distribution law. (with a probability of 99.7%) from the formula:

$$\text{Probable tol.} = [(\text{Bearing tol.})^2 + (\text{Seat tol.})^2]^{1/2}$$

These tables concern all types of bearings except tapered roller bearings. For tapered roller bearings, use the same calculation procedure but with their specific tolerances.

In practice, one generally only considers the probable tolerance (the risks of error being limited to 0.3%) to determine a realistic value for the probable clearance tolerance of a bearing after fitting.

Example

SNR 6305 bearing (25 mm bore).

Fit on shaft k5.

	Tolerance mini	Tolerance maxi	Mean value	Tolerance interval
Bearing bore	-10	0	-5	10
Shaft tolerance	+2	+11	+6.5	9

• theoretical mean interference	=	– (shaft mean val. – bearing mean val.) = – [6,5 – (–5)] = –11,5
• theoretical max. interference	=	– (shaft max. val. – bearing min. val.) = – [11– (–10)] = –21
• theoretical min. interference	=	– (shaft min. val. – bearing max. val.) = – (2-0) = –2
• probable tolerance	=	[(bearing tol. interval)^2 + (shaft tol. interval)^2]$^{1/2}$ = (10^2 + 9^2)$^{1/2}$ = 13
• probable max. interference	=	theoretical mean interference - probable tolerance /2
	=	–11,5 – 6,5 = –18
• probable min. interference	=	theoretical mean interference + probable tolerance /2
	=	–11,5 + 6,5 = –5

Bearing retention and clearances

Fits on shaft for normal class bearings (all bearings except tapered roller bearings)

SHAFT Nominal diameer of shaft (mm)	Bearing bore tolerance (µm)	Fits	f5	f6	g5	g6 ▼	h5	h6	j5	j6 ▼
3 <d≤ 6	-8 0	Shaft tolerances in µm	-15 -10	-18 -10	-9 -4	-12 -4	-5 0	-8 0	1 +4	-1 +7
		Mean	+8.5	+10	-2.5	+4	-1.5	0	-5.5	-7
		Probable d fference in diameters	+13 +4	+15.5 +4.5	+7 -2	+9.5 -1.5	+3 -6	+5.5 -5.5	-1 -10	-1.5 -12.5
6 <d≤ 10	-8 0	Shaft tolerances in µm	-19 -13	-22 -13	-11 -5	-14 -5	-6 0	-9 0	-2 +4	-2 +7
		Mean	+12	+13.5	+4	+5.5	-1	+0.5	-5	-6.5
		Probable difference in diameters	+17 +7	+19.5 +7.5	+9 -1	+11.5 -0.5	+4 -6	+6.5 -5.5	0 -10	-0.5 -12.5
10 <d≤ 18	-8 0	Shaft tolerances in µm	-24 -16	-27 -16	-14 -6	-17 -6	-8 0	-11 0	-3 +5	-3 +8
		Mean	+16	+17.5	+6	+7.5	0	+1.5	-5	-6.5
		Probable difference in diameters	+21.5 +10.5	+24.5 +10.5	+11.5 +0.5	+14.5 +0.5	+5.5 -5.5	+8.5 +5.5	+0.5 -10.5	+0.5 -13.5
18 <d≤ 30	-10 0	Shaft tolerances in µm	-29 -20	-33 -20	-16 -7	-20 -7	-9 0	-13 0	-4 +5	-4 +9
		Mean	+19.5	+21.5	+6.5	+8.5	-0.5	+1.5	-5.5	-7.5
		Probable difference in diameters	+26 +13	+30 +13	+13 0	+17 0	+6 -7	+10 -7	+1 -12	+1 -16
30 <d≤ 50	-12 0	Shaft tolerances in µm	-36 -25	-41 -25	-20 -9	-25 -9	-11 0	-16 0	-5 +6	-5 +11
		Mean	+24.5	+27	+8.5	+11	-0.5	+2	-6.5	-9
		Probable difference in diameters	+32.5 +16.5	+37 +17	+16.5 +0.5	+21 +1	+7.5 -8.5	+12 -8	+1.5 -14.5	+1 -19
50 <d≤ 65	-15 0	Shaft tolerances in µm	-43 -30	-49 -30	-23 -10	-29 -10	-13 0	-19 0	-7 +6	-7 +12
		Mean	+29	+32	+9	+12	-1	+2	-7	-10
		Probable difference in diameters	+39 +19	+44 +20	+19 -1	+24 0	+9 -11	+14 -10	+3 -17	+2 -22
65 <d≤ 80	-15 0	Shaft tolerances in µm	-43 -30	-49 -30	-23 -10	-29 -10	-13 0	-19 0	-7 +6	-7 +12
		Mean	+29	+32	+9	+12	-1	+2	-7	-10
		Probable difference in diameters	+39 +19	+44 +20	+19 -1	+24 0	+9 -11	+14 -10	+3 -17	+2 -22
80 <d≤ 100	-20 0	Shaft tolerances in µm	-51 -36	-58 -36	-27 -12	-34 -12	-15 0	-22 0	-9 +6	-9 +13
		Mean	+33.5	+37	+9.5	+13	-2.5	+1	-8.5	-12
		Probable difference in diameters	+46 +21	+52 +22	+22 -3	+28 -2	+10 -15	+16 -14	+4 -21	+3 -27
100 <d≤ 120	-20 0	Shaft tolerances in µm	-51 -36	-58 -36	-27 -12	-34 -12	-15 0	-22 0	-9 +6	-9 +13
		Mean	+33.5	+37	+9.5	+13	-2.5	+1	-8.5	-12
		Probable difference in diameters	+46 +21	+52 +22	+22 -3	+28 -2	+10 -15	+16 -14	+4 -21	+3 -27
120 <d≤ 140	-25 0	Shaft tolerances in µm	-61 -43	-68 -43	-32 -14	-39 -14	-18 0	-25 0	-11 +7	-11 +14
		Mean	+39.5	+43	+10.5	+14	-3.5	0	-10.5	-14
		Probable difference in diameters	+55 +24	+60.5 +25.5	+26 -5	+31.5 -3.5	+12 -19	+17.5 -17.5	+5 -26	+4 -32
140 <d≤ 160	-25 0	Shaft tolerances in µm	-61 -43	-68 -43	-32 -14	-39 -14	-18 0	-25 0	-11 +7	-11 +14
		Mean	+39.5	+43	+10.5	+14	-3.5	0	-10.5	-14
		Probable difference in diameters	+55 +24	+60.5 +25.5	+26 -5	+31.5 +3.5	+12 -19	+17.5 -17.5	+5 -26	+4 -32
160 <d≤ 180	-25 0	Shaft tolerances in µm	-61 -43	-68 -43	-32 -14	-39 -14	-18 0	-25 0	-11 +7	-11 +14
		Mean	+39.5	+43	+10.5	+14	-3.5	0	-10.5	-14
		Probable difference in diameters	+55 +24	+60.5 +25.5	+26 -5	+31.5 -3.5	+12 -19	+17.5 -17.5	+5 -26	+4 -32
180 <d≤ 200	-30 0	Shaft tolerances in µm	-70 -50	-79 -50	-35 -15	-44 -15	-20 0	-29 0	-13 +7	-13 +16
		Mean	+45	+49.5	+10	+14.5	-5	-0.5	-12	-16.5
		Probable difference in diameters	+63 +27	+70.5 +28.5	+28 -8	+35.5 -6.5	+13 -23	+20.5 -21.5	+6 -30	+4.5 -37.5
200 <d≤ 225	-30 0	Shaft tolerances in µm	-70 -50	-79 -50	-35 -15	-44 -15	-20 0	-29 0	-13 +7	-13 +16
		Mean	+45	+49.5	+10	+14.5	-5	-0.5	-12	-16.5
		Probable difference in diameters	+63 +27	+70.5 +28.5	+28 -8	+35.5 -6.5	+13 -23	+20.5 -21.5	+6 -30	+4.5 -37.5
225 <d≤ 250	-30 0	Shaft tolerances in µm	-70 -50	-79 -50	-35 -15	-44 -15	-20 0	-29 0	-13 +7	-13 +16
		Mean	+45	+49.5	+10	+14.5	-5	-0.5	-12	-16.5
		Probable d fference in diameters	+63 +27	+70.5 +28.5	+28 -8	+35.5 -6.5	+13 -23	+20.5 -21.5	+6 -30	+4.5 -37.5
250 <d≤ 280	-35 0	Shaft tolerances in µm	-79 -56	-88 -56	-40 -17	-49 -17	-23 0	-32 0	-16 +7	-16 +16
		Mean	+50	+54.5	+11	+15.5	-6	-1.5	-13	-17.5
		Probable difference in diameters	+71 +29	+78 +31	+32 -10	+39 -8	+15 -27	+22 -25	+8 -34	+6 -41
280 <d≤ 315	-35 0	Shaft tolerances in µm	-79 -56	-88 -56	-40 -17	-49 -17	-23 0	-32 0	-16 +7	-16 +16
		Mean	+50	+54.5	+11	+15.5	-6	-1.5	-13	-17.5
		Probable difference in diameters	+71 +29	+78 +31	+32 -10	+39 -8	+15 -27	+22 -25	+8 -34	+6 -41
315 <d≤ 400	-40 0	Shaft tolerances in µm	-87 -62	-98 -62	-43 -18	-54 -18	-25 0	-36 0	-18 +7	-18 +18
		Mean	+57	+62.5	+13	+18.5	-5	-0.5	-12	-17.5
		Probable difference in diameters	+79 +35	+88 +37	+35 -9	+44 -7	+17 -27	+26 -25	+10 -34	+8 -43
400 <d≤ 500	-45 0	Shaft tolerances in µm	-95 -68	-108 -68	-47 -20	-60 -20	-27 0	-40 0	-20 +7	-20 +20
		Mean	+64	+70.5	+16	+22.5	-4	+2.5	-11	-17.5
		Probable difference in diameters	+86 +42	+97 +44	+38 -6	+49 -4	+18 -26	+29 -24	+11 -33	+9 -44
500 <d≤ 630	-50 0	Shaft tolerances in µm		-120 -76		-66 -22	-32 0	-44 0		
		Mean		+80.5		+26.5	-1.5	+4.5		
		Probable difference in diameters		+109 +52		+55 -2	+22 -25	+33 -24		
630 <d≤ 800	-75 0	Shaft tolerances in µm		-130 -80		-74 -24	-36 0	-50 0		
		Mean		+87.5		+31.5	+0.5	+7.5		
		Probable difference in diameters		+118 +57		+62 +1	+26 -25	+38 -23		

1. A negative value denotes an interference fit and a positive value a loose fit
2. The probable fit values are calculated on the assumption that the statistical distribution of the dimensions within the tolerances follows a "normal" law (Gauss distribution law)
3. Bearing tolerances and fits: values in microns (µm)
4. ▼ The most common fits

Fits on shaft for normal class bearings (all bearings except tapered roller bearings)

SHAFT Nominal diameter of shaft (mm)	Bearing bore tolerance (µm)	Fits	k5	k6 ▼	m5	m6 ▼	n5	n6	p5	p6
3 <d≤ 6	-8 0	Shaft tolerances in µm	+1 +6	+1 +9	+4 +9	+4 +12	+8 +13	+8 +16	+12 +17	+12 +20
		Mean	-7.5	-9	-10.5	-12	-14.5	-16	-18.5	-20
		Probable difference in diameters	-3 -12	-3.5 -14.5	-6 -15	-6.5 -17.5	-10 -19	-10.5 -21.5	-14 -23	-14.5 -25.5
6 <d≤ 10	-8 0	Shaft tolerances in µm	+1 +7	+1 +10	+8 +12	+6 +15	+10 +16	+10 +19	+15 +21	+15 +24
		Mean	-8	-9.5	-13	-14.5	-17	-18.5	-22	-23.5
		Probable difference in diameters	-3 -13	-3.5 -15.5	-8 -18	-8.5 -20.5	-12 -22	-12.5 -24.5	-17 -27	-17.5 -29.5
10 <d≤ 18	-8 0	Shaft tolerances in µm	+1 +9	+1 +12	+7 +15	+7 +18	+12 +20	+12 +23	+18 +26	+18 +29
		Mean	-9	-10.5	-15	-16.5	-20	-21.5	-26	-27.5
		Probable difference in diameters	-3.5 -14.5	-3.5 -17.5	-9.5 -20.5	-9.5 -23.5	-14.5 -25.5	-14.5 -28.5	-20.5 -31.5	-20.5 -34.5
18 <d≤ 30	-10 0	Shaft tolerances in µm	+2 +11	+2 +15	+8 +17	+8 +21	+15 +24	+15 +28	+22 +31	+22 +35
		Mean	-11.5	-13.5	-17.5	-19.5	-24.5	-26.5	-31.5	-33.5
		Probable difference in diameters	-5 -18	-5 -22	-11 -24	-11 -28	-18 -31	-18 -35	-25 -38	-25 -42
30 <d≤ 50	-12 0	Shaft tolerances in µm	+2 +13	+2 +18	+9 +20	+9 +25	+17 +28	+17 +33	+26 +37	+26 +42
		Mean	-13.5	-16	-20.5	-23	-28.5	-31	-37.5	-40
		Probable difference in diameters	-5.5 -21.5	-6 -26	-12.5 -28.5	-13 -33	-20.5 -36.5	-21 -41	-29.5 -45.5	-30 -50
50 <d≤ 65	-15 0	Shaft tolerances in µm	+2 +15	+2 +21	+11 +24	+11 +30	+20 +33	+20 +39	+32 +45	+32 +51
		Mean	-16	-19	-25	-28	-34	-37	-46	-49
		Probable difference in diameters	-6 -26	-7 -31	-15 -35	-16 -40	-24 -44	-25 -49	-36 -56	-37 -61
65 <d≤ 80	-15 0	Shaft tolerances in µm	+2 +15	+2 +21	+11 +24	+11 +30	+20 +33	+20 +39	+32 +45	+32 +51
		Mean	-16	-19	-25	-28	-34	-37	-46	-49
		Probable difference in diameters	-6 -26	-7 -31	-15 -35	-16 -40	-24 -44	-25 -49	-36 -56	-37 -61
80 <d≤ 100	-20 0	Shaft tolerances in µm	+3 +18	+3 +25	+13 +28	+13 +35	+23 +38	+23 +45	+37 +52	+37 +59
		Mean	-20.5	-24	-30.5	-34	-40.5	-44	-54.5	-58
		Probable difference in diameters	-8 -33	-9 -39	-18 -43	-19 -49	-28 -53	-29 -59	-42 -67	-43 -73
100 <d≤ 120	-20 0	Shaft tolerances in µm	+3 +18	+3 +25	+13 +28	+13 +35	+23 +38	+23 +45	+37 +52	+37 +59
		Mean	-20.5	-24	-30.5	-34	-40.5	-44	-54.5	-58
		Probable difference in diameters	-8 -33	-9 -39	-18 -43	-19 -49	-28 -53	-29 -59	-42 -67	-43 -73
120 <d≤ 140	-25 0	Shaft tolerances in µm	+3 +21	+3 +28	+15 +33	+15 +40	+27 +45	+27 +52	+43 +61	+43 +68
		Mean	-24.5	-28	-36.5	-40	-48.5	-52	-64.5	-68
		Probable difference in diameters	-9 -40	-10.5 -45.5	-21 -52	-22.5 -57.5	-33 -64	-34.5 -69.5	-49 -80	-50.5 -85.5
140 <d≤ 160	-25 0	Shaft tolerances in µm	+3 +21	+3 +28	+15 +33	+15 +40	+27 +45	+27 +52	+43 +61	+43 +68
		Mean	-24.5	-28	-36.5	-40	-48.5	-52	-64.5	-68
		Probable d fference in diameters	-9 -40	-10.5 -45.5	-21 -52	-22.5 -57.5	-33 -64	-34.5 -69.5	-49 -80	-50.5 -85.5
160 <d≤ 180	-25 0	Shaft tolerances in µm	+3 +21	+3 +28	+15 +33	+15 +40	+27 +45	+27 +52	+43 +61	+43 +68
		Mean	-24.5	-28	-36.5	-40	-48.5	-52	-64.5	-68
		Probable difference in diameters	-9 -40	-10.5 -45.5	-21 -52	-22.5 -57.5	-33 -64	-34.5 -69.5	-49 -80	-50.5 -85.5
180 <d≤ 200	-30 0	Shaft tolerances in µm	+4 +24	+4 +33	+17 +37	+17 +46	+31 +51	+31 +60	+50 +70	+50 +79
		Mean	-29	-33.5	-42	-46.5	-56	-60.5	-75	-79.5
		Probable difference in diameters	-11 -47	-12.5 -54.5	-24 -60	-25.5 -67.5	-38 -74	-39.5 -81.5	-57 -93	-58.5 -100.5
200 <d≤ 225	-30 0	Shaft tolerances in µm	+4 +24	+4 +33	+17 +37	+17 +46	+31 +51	+31 +60	+50 +70	+50 +79
		Mean	-29	-33.5	-42	-46.5	-56	-60.5	-75	-79.5
		Probable difference in diameters	-11 -47	-12.5 -54.5	-24 -60	-25.5 -67.5	-38 -74	-39.5 -81.5	-57 -93	-58.5 -100.5
225 <d≤ 250	-30 0	Shaft tolerances in µm	+4 +24	+4 +33	+17 +37	+17 +46	+31 +51	+31 +60	+50 +70	+50 +79
		Mean	-29	-33.5	-42	-46.5	-56	-60.5	-75	-79.5
		Probable difference in diameters	-11 -47	-12.5 -54.5	-24 -60	-25.5 -67.5	-38 -74	-39.5 -81.5	-57 -93	-58.5 -100.5
250 <d≤ 280	-35 0	Shaft tolerances in µm	+4 +27	+4 +36	+20 +43	+20 +52	+34 +57	+34 +66	+56 +79	+56 +88
		Mean	-33	-37.5	-49	-53.5	-63	-67.5	-85	-89.5
		Probable difference in diameters	-12 -54	-14 -61	-28 -70	-30 -77	-42 -84	-44 -91	-64 -106	-66 -113
280 <d≤ 315	-35 0	Shaft tolerances in µm	+4 +27	+4 +36	+20 +43	+20 +52	+34 +57	+34 +66	+56 +79	+56 +88
		Mean	-33	-37.5	-49	-53.5	-63	-67.5	-85	-89.5
		Probable difference in diameters	-12 -54	-14 -61	-28 -70	-30 -77	-42 -84	-44 -91	-64 -106	-66 -113
315 <d≤ 400	-40 0	Shaft tolerances in µm	+4 +29	+4 +40	+21 +46	+21 +57	+37 +62	+37 +73	+62 +87	+62 +98
		Mean	-34	-39.5	-51	-56.5	-67	-72.5	-92	-97.5
		Probable difference in diameters	-12 -56	-14 -65	-29 -73	-31 -82	-45 -89	-47 -98	-70 -114	-72 -123
400 <d≤ 500	-45 0	Shaft tolerances in µm	+5 +32	+5 +45	+23 +50	+23 +63	+40 +67	+40 +80	+68 +95	+68 +108
		Mean	-36	-42.5	-54	-60.5	-71	-77.5	-99	-105.5
		Probable difference in diameters	-14 -58	-16 -69	-32 -76	-34 -87	-49 -93	-51 -104	-77 -121	-79 -132
500 <d≤ 630	-50 0	Shaft tolerances in µm		0 +44		+26 +70		+44 +88		+78 +122
		Mean		-39.5		-65.5		-83.5		-117.5
		Probable difference in diameters		-11 -68		-37 -94		-55 -112		-89 -146
630 <d≤ 800	-75 0	Shaft tolerances in µm		0 +50		+30 +80		+50 +100		+88 +138
		Mean		-42.5		-72.5		-92.5		-130.5
		Probable difference in diameters		-12 -73		-42 -103		-62 -123		-100 -161

1. A negative value denotes an interference fit and a positive value a loose fit
2. The probable fit values are calculated on the assumption that the statistical distribution of the dimensions within the tolerances follows a "normal" law (Gauss distribution law)
3. Bearing tolerances and fits: values in microns (µm)
4. ▼ The most common fits

Fits in the housings for normal class bearings (all bearings except tapered roller bearings)

HOUSING										
Nominal diameter of housing (mm)	Tolerance on outside diameter (µm)	Fits	G6	G7	H6	▼ H7	J6	▼ J7	K6	K7
10 < D ≤ 18	-8 0	Housing tolerance	+6 +17	+6 +24	0 +11	0 +18	-5 +6	-8 +10	-9 +2	-12 +6
		Mean	+15.5	+19	+9.5	+13	+4.5	+5	+0.5	+1
		Probable difference in diameters	+22.5 +8.5	+29 +9	+16.5 +2.5	+23 +3	+11.5 -2.5	+15 -5	+7.5 -6.5	+11 -9
18 < D ≤ 30	-9 0	Housing tolerance	+7 +20	+7 +28	0 +13	0 +21	-5 +8	-9 +12	-11 +2	-15 +6
		Mean	+18	+22	+11	+15	+6	+6	0	0
		Probable difference in diameters	+26 +10	+33.5 +10.5	+19 +3	+26.5 +3.5	+14 -2	+17.5 -5.5	+8 -8	+11.5 -11.5
30 < D ≤ 50	-11 0	Housing tolerance	+9 +25	+9 +34	0 +16	0 +25	-6 +10	-11 +14	-13 +3	-18 +7
		Mean	+22.5	+27	+13.5	+18	+7.5	+7	+0.5	0
		Probable difference in diameters	+32 +13	+40.5 +13.5	+23 +4	+31.5 +4.5	+17 -2	+20.5 -6.5	+10 -9	+13.5 -13.5
50 < D ≤ 65	-13 0	Housing tolerance	+10 +29	+10 +40	0 +19	0 +30	-6 +13	-12 +18	-15 +4	-21 +9
		Mean	+26	+31.5	+16	+21.5	+10	+9.5	+1	+0.5
		Probable difference in diameters	+37.5 +14.5	+48 +15	+27.5 +4.5	+38 +5	+21.5 -1.5	+26 -7	+12.5 -10.5	+17 -16
65 < D ≤ 80	-13 0	Housing tolerance	+10 +29	+10 +40	0 +19	0 +30	-6 +13	-12 +18	-15 +4	-21 +9
		Mean	+26	+31.5	+16	+21.5	+10	+9.5	+1	+0.5
		Probable difference in diameters	+37.5 +14.5	+48 +15	+27.5 +4.5	+38 +5	+21.5 -1.5	+26 -7	+12.5 -10.5	+17 -16
80 < D ≤ 100	-15 0	Housing tolerance	+12 +34	+12 +47	0 +22	0 +35	-6 +16	-13 +22	-18 +4	-25 +10
		Mean	+30.5	+37	+18.5	+25	+12.5	+12	+0.5	0
		Probable difference in diameters	+44 +17	+56 +18	+32 +5	+44 +6	+26 -1	+31 -7	+14 -13	+19 -19
100 < D ≤ 120	-15 0	Housing tolerance	+12 +34	+12 +47	0 +22	0 +35	-6 +16	-13 +22	-18 +4	-25 +10
		Mean	+30.5	+37	+18.5	+25	+12.5	+12	+0.5	0
		Probable difference in diameters	+44 +17	+56 +18	+32 +5	+44 +6	+26 -1	+31 -7	+14 -13	+19 -19
120 < D ≤ 140	-18 0	Housing tolerance	+14 +39	+14 +54	0 +25	0 +40	-7 +18	-14 +26	-21 +4	-28 +12
		Mean	+35.5	+43	+21.5	+29	+14.5	+15	+0.5	+1
		Probable difference in diameters	+51 +20	+65 +21	+37 +6	+51 +7	+30 -1	+37 -7	+16 -15	+23 -21
140 < D ≤ 150	-18 0	Housing tolerance	+14 +39	+14 +54	0 +25	0 +40	-7 +18	-14 +26	-21 +4	-28 +12
		Mean	+35.5	+43	+21.5	+29	+14.5	+15	+0.5	+1
		Probable difference in diameters	+51 +20	+65 +21	+37 +6	+51 +7	+30 -1	+37 -7	+16 -15	+23 -21
150 < D ≤ 160	-25 0	Housing tolerance	+14 +39	+14 +54	0 +25	0 +40	-7 +18	-14 +26	-21 +4	-28 +12
		Mean	+39	+46.5	+25	+32.5	+18	+18.5	+4	+4.5
		Probable difference in diameters	+56.5 +21.5	+70 +23	+42.5 +7.5	+56 +9	+35.5 +0.5	+42 -5	+21.5 -13.5	+28 -19
160 < D ≤ 180	-25 0	Housing tolerance	+14 +39	+14 +54	0 +25	0 +40	-7 +18	-14 +26	-21 +4	-28 +12
		Mean	+39	+46.5	+25	+32.5	+18	+18.5	+4	+4.5
		Probable difference in diameters	+56.5 +21.5	+70 +23	+42.5 +7.5	+56 +9	+35.5 +0.5	+42 -5	+21.5 -13.5	+28 -19
180 < D ≤ 200	-30 0	Housing tolerance	+15 +44	+15 +61	0 +29	0 +46	-7 +22	-16 +30	-24 +5	-33 +13
		Mean	+44.5	+53	+29.5	+38	+22.5	+22	+5.5	+5
		Probable difference in diameters	+65.5 +23.5	+80.5 +25.5	+50.5 +2.5	+65.5 +10.5	+43.5 -1.5	+49.5 -5.5	+26.5 -15.5	+32.5 -22.5
200 < D ≤ 225	-30 0	Housing tolerance	+15 +44	+15 +61	0 +29	0 +46	-7 +22	-16 +30	-24 +5	-33 +13
		Mean	+44.5	+53	+29.5	+38	+22.5	+22	+5.5	+5
		Probable difference in diameters	+65.5 +23.5	+80.5 +25.5	+50.5 +8.5	+65.5 +10.5	+43.5 +1.5	+49.5 -5.5	+26.5 -15.5	+32.5 -22.5
225 < D ≤ 250	-30 0	Housing tolerance	+15 +44	+15 +61	0 +29	0 +46	-7 +22	-16 +30	-24 +5	-33 +13
		Mean	+44.5	+53	+29.5	+38	+22.5	+22	+5.5	+5
		Probable difference in diameters	+65.5 +23.5	+80.5 +25.5	+50.5 +8.5	+65.5 +10.5	+43.5 +1.5	+49.5 -5.5	+26.5 -15.5	+32.5 -22.5
250 < D ≤ 280	-35 0	Housing tolerance	+17 +49	+17 +69	0 +32	0 +52	-7 +25	-16 +36	-27 +5	-36 +16
		Mean	+50.5	+60.5	+33.5	+43.5	+26.5	+27.5	+6.5	+7.5
		Probable difference in diameters	+74 +27	+92 +29	+57 +10	+75 +12	+50 +3	+59 -4	+30 -17	+39 -24
280 < D ≤ 315	-35 0	Housing tolerance	+17 +49	+17 +69	0 +32	0 +52	-7 +25	-16 +36	-27 +5	-36 +16
		Mean	+50.5	+60.5	+33.5	+43.5	+26.5	+27.5	+6.5	+7.5
		Probable difference in diameters	+74 +27	+92 +29	+57 +10	+75 +12	+50 +3	+59 -4	+30 -17	+39 -24
315 < D ≤ 400	-40 0	Housing tolerance	+18 +54	+18 +75	0 +36	0 +57	-7 +29	-18 +39	-29 +7	-40 +17
		Mean	+53.5	+64	+36.5	+46	+28.5	+28	+6.5	+6
		Probable difference in diameters	+79 +28	+97 +31	+61 +10	+79 +13	+54 +3	+61 -5	+32 -19	+39 -27
400 < D ≤ 500	-45 0	Housing tolerance	+20 +60	+20 +83	0 +40	0 +63	-7 +33	-20 -43	-32 +8	-45 +18
		Mean	+57.5	+69	+37.5	+49	+30.5	-14	+5.5	+4
		Probable difference in diameters	+84 +31	+105 +33	+64 +11	+85 +13	+57 +4	+7 -35	+32 -21	+40 -32
500 < D ≤ 630	-50 0	Housing tolerance	+22 +66	+22 +92	0 +44	0 +70			-44 0	-70 0
		Mean	+61.5	+74.5	+39.5	+52.5			-4.5	-17.5
		Probable difference in diameters	+90 +33	+114 +35	+68 +11	+92 +13			+24 -33	+22 -57
630 < D ≤ 800	-75 0	Housing tolerance	+24 +74	+24 +104	0 +50	0 +80			-50 0	-80 0
		Mean	+66.5	+81.5	+42.5	+57.5			-7.5	-22.5
		Probable difference in diameters	+97 +36	+125 +38	+73 +12	+101 +14			+23 -38	+21 -66
800 < D ≤ 1000	-100 0	Housing tolerance	+26 +82	+26 +116	0 +56	0 +90			-56 0	-90 0
		Mean	+71.5	+88.5	+45.5	+62.5			-10.5	-27.5
		Probable difference in diameters	+105 +38	+137 +40	+79 +12	+111 +14			+23 -44	+21 -76

1. A negative value denotes an interference fit and a positive value a loose fit
2. The probable fit values are calculated on the assumption that the statistical distribution of the dimensions within the tolerances follows a "normal" law (Gauss distribution law)
3. Bearing tolerances and fits: values in microns (µm)
4. ▼ The most common fits

Fits in the housings for normal class bearings (all bearings except tapered roller bearings)

HOUSING				▼				▼		
Nominal diameter of housing (mm)	Tolerance on outside diameter (µm)	Fits	M6	M7	N6	N7	P6	P7	R6	R7
10 < D ≤ 18	-8 0	Housing tolerance	-15 -4	-18 0	-20 -9	-23 -5	-26 -15	-29 -11	-31 -20	-34 -16
		Mean	-5.5	-5	-10.5	-10	-16.5	-16	-21.5	-21
		Probable d fference in diameters	+1.5 -12.5	+5 -15	-3.5 -17.5	0 -20	-9.5 -23.5	-6 -26	-14.5 -28.5	-11 -31
18 < D ≤ 30	-9 0	Housing tolerance	-17 -4	-21 0	-24 -11	-28 -7	-31 -18	-35 -14	-37 -24	-41 -20
		Mean	-6	-6	-13	-13	-20	-20	-26	-26
		Probable difference in diameters	+2 -14	+5.5 -17.5	-5 -21	-1.5 -24.5	-12 -28	-8.5 -31.5	-18 -34	-14.5 -37.5
30 < D ≤ 50	-11 0	Housing tolerance	-20 -4	-25 0	-28 -12	-33 -8	-37 -21	-42 -17	-45 -29	-50 -25
		Mean	-6.5	-7	-14.5	-15	-23.5	-24	-31.5	-32
		Probable difference in diameters	+3 -16	+6.5 -20.5	-5 -24	-1.5 -28.5	-14 -33	-10.5 -37.5	-22 -41	-18.5 -45.5
50 < D ≤ 65	-13 0	Housing tolerance	-24 -5	-30 0	-33 -14	-39 -9	-45 -26	-51 -21	-54 -35	-60 -30
		Mean	-8	-8.5	-17	-17.5	-29	-29.5	-38	-38.5
		Probable difference in diameters	+3.5 -19.5	+8 -25	-5.5 -28.5	-1 -34	-17.5 -40.5	-13 -46	-26.5 -49.5	-22 -55
65 < D ≤ 80	-13 0	Housing tolerance	-24 -5	-30 0	-33 -14	-39 -9	-45 -26	-51 -21	-56 -37	-62 -32
		Mean	-8	-8.5	-17	-17.5	-29	-29.5	-40	-40.5
		Probable difference in diameters	+3.5 -19.5	+8 -25	-5.5 -28.5	-1 -34	-17.5 -40.5	-13 -46	-28.5 -51.5	-24 -57
80 < D ≤ 100	-15 0	Housing tolerance	-28 -6	-35 0	-38 -16	-45 -10	-52 -30	-59 -24	-66 -44	-73 -38
		Mean	-9.5	-10	-19.5	-20	-33.5	-34	-47.5	-48
		Probable difference in diameters	+4 -23	+9 -29	-6 -33	-1 -39	-20 -47	-15 -53	-34 -61	-29 -67
100 < D ≤ 120	-15 0	Housing tolerance	-28 -6	-35 0	-38 -16	-45 -10	-52 -30	-59 -24	-66 -47	-76 -41
		Mean	-9.5	-10	-19.5	-20	-33.5	-34	-50.5	-51
		Probable difference in diameters	+4 -23	+9 -29	-6 -33	-1 -39	-20 -47	-15 -53	-37 -64	-32 -70
120 < D ≤ 140	-18 0	Housing tolerance	-33 -8	-40 0	-45 -20	-52 -12	-61 -36	-68 -28	-81 -56	-88 -48
		Mean	-11.5	-11	-23.5	-23	-39.5	-39	-59.5	-59
		Probable difference in diameters	+4 -27	+11 -33	-8 -39	-1 -45	-24 -55	-17 -61	-44 -75	-37 -81
140 < D ≤ 150	-18 0	Housing tolerance	-33 -8	-40 0	-45 -20	-52 -12	-61 -36	-68 -28	-83 -58	-90 -50
		Mean	-11.5	-11	-23.5	-23	-39.5	-39	-61.5	-61
		Probable difference in diameters	+4 -27	+11 -33	-8 -39	-1 -45	-24 -55	-17 -61	-46 -77	-39 -83
150 < D ≤ 160	-25 0	Housing tolerance	-33 -8	-40 0	-45 -20	-52 -12	-61 -36	-68 -28	-83 -58	-90 -50
		Mean	-8	-7.5	-20	-19.5	-36	-35.5	-58	-57.5
		Probable difference in diameters	+9.5 -25.5	+16 -31	-2.5 -37.5	+4 -43	-18.5 -53.5	-12 -59	-40.5 -75.5	-34 -81
160 < D ≤ 180	-25 0	Housing tolerance	-33 -8	-40 0	-45 -20	-52 -12	-61 -36	-68 -28	-86 -61	-93 -53
		Mean	-8	-7.5	-20	-19.5	-36	-35.5	-61	-60.5
		Probable difference in diameters	+9.5 -25.5	+16 -31	-2.5 -37.5	+4 -43	-18.5 -53.5	-12 -59	-43.5 -78.5	-37 -84
180 < D ≤ 200	-30 0	Housing tolerance	-37 -8	-46 0	-51 -22	-60 -14	-70 -41	-79 -33	-97 -68	-106 -60
		Mean	-7.5	-8	-21.5	-22	-40.5	-41	-67.5	-68
		Probable difference in diameters	+13.5 -28.5	+19.5 -35.5	-0.5 -42.5	+5.5 -49.5	-19.5 -61.5	-13.5 -68.5	-46.5 -88.5	-40.5 -95.5
200 < D ≤ 225	-30 0	Housing tolerance	-37 -8	-46 0	-51 -22	-60 -14	-70 -41	-79 -33	-100 -71	-109 -63
		Mean	-7.5	-8	-21.5	-22	-40.5	-41	-70.5	-71
		Probable difference in diameters	+13.5 -28.5	+19.5 -35.5	-0.5 -42.5	+5.5 -49.5	-19.5 -61.5	-13.5 -68.5	-49.5 -91.5	-43.5 -98.5
225 < D ≤ 250	-30 0	Housing tolerance	-37 -8	-46 0	-51 -22	-60 -14	-70 -41	-79 -33	-104 -75	-113 -67
		Mean	-7.5	-8	-21.5	-22	-40.5	-41	-74.5	-75
		Probable difference in diameters	+13.5 -28.5	+19.5 -35.5	-0.5 -42.5	+5.5 -49.5	-19.5 -61.5	-13.5 -68.5	-53.5 -95.5	-47.5 -102.5
250 < D ≤ 280	-35 0	Housing tolerance	-41 -9	-52 0	-57 -25	-66 -14	-79 -47	-88 -36	-117 -85	-126 -74
		Mean	-7.5	-8.5	-23.5	-22.5	-45.5	-44.5	-83.5	-82.5
		Probable d fference in diameters	+16 -31	+23 -40	0 -47	+9 -54	-22 -69	-13 -76	-60 -107	-51 -114
280 < D ≤ 315	-35 0	Housing tolerance	-41 -9	-52 0	-57 -25	-66 -14	-79 -47	-88 -36	-121 -89	-130 -78
		Mean	-7.5	-8.5	-23.5	-22.5	-45.5	-44.5	-87.5	-86.5
		Probable difference in diameters	+16 -31	+23 -40	0 -47	+9 -54	-22 -69	-13 -76	-64 -111	-55 -118
315 < D ≤ 400	-40 0	Housing tolerance	-46 -10	-57 0	-62 -26	-73 -16	-87 -51	-98 -41		
		Mean	-10.5	-11	-26.5	-27	-51.5	-52		
		Probable difference in diameters	+15 -36	+22 -44	-1 -52	+6 -60	-26 -77	-19 -85		
400 < D ≤ 500	-45 0	Housing tolerance	-50 -10	-63 0	-67 -27	-80 -17	-95 -55	-108 -45		
		Mean	-12.5	-14	-29.5	-31	-57.5	+25		
		Probable difference in diameters	+14 -39	+22 -50	-3 -56	+5 -67	-31 -84	-23 -95		
500 < D ≤ 630	-50 0	Housing tolerance	-70 -26	-96 -26	-88 -44	-114 -44	-122 -78	-148 -78		
		Mean	-30.5	-43.5	-48.5	-61.5	-82.5	-95.5		
		Probable difference in diameters	-2 -59	-4 -83	-20 -77	-22 -101	-54 -111	-56 -135		
630 < D ≤ 800	-75 0	Housing tolerance	-80 -30	-110 -30	-100 -50	-130 -50	-138 -88	-168 -88		
		Mean	-37.5	-52.5	-57.5	-72.5	-95.5	-110.5		
		Probable difference in diameters	-7 -68	-9 -96	-27 -88	-29 -116	-65 -126	-67 -154		
800 < D ≤ 1000	-100 0	Housing tolerance	-90 -34	-124 -34	-112 -56	-146 -56	-156 -100	-190 -100		
		Mean	-44.5	-61.5	-66.5	-83.5	-110.5	-127.5		
		Probable difference in diameters	-11 -78	-13 -110	-33 -100	-35 -132	-77 -144	-79 -176		

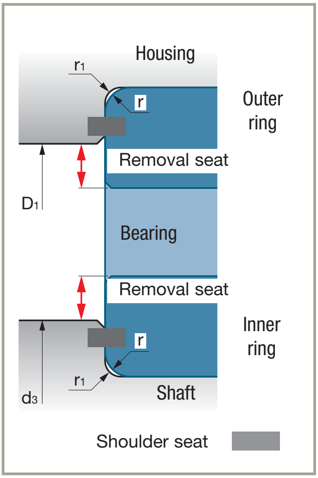
1. A negative value denotes an interference fit and a positive value a loose fit
2. The probable fit values are calculated on the assumption that the statistical distribution of the dimensions within the tolerances follows a "normal" law (Gauss distribution law)
3. Bearing tolerances and fits: values in microns (µm)
4. ▼ The most common fits

Bearing seats *(continued)*

Geometry and surface conditions of shaft and housing seats

Shoulder diameters and fillet radii

A contact surface is necessary between the ring and the shoulder to ensure good retention of the bearing.

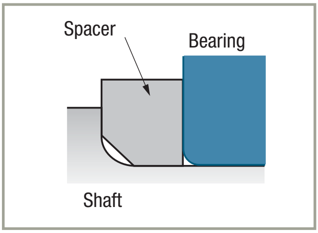


The sections in this catalog of Standard Bearings specifies:

- the shaft and housing shoulder diameters (D_1 and d_3)
- the shoulder fillet radii (r1)

If for construction reasons the shoulder seat dimension cannot be respected, provide an extra spacer between the bearing ring and the shoulder.

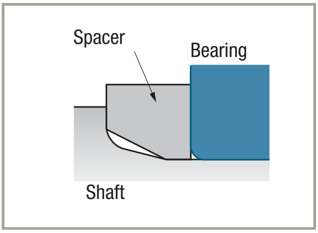
The fillet radii between the shoulders and the ring seats must be less than the corner radius of the corresponding ring. The values are indicated in the chapter corresponding to each family.



Fillet greater than the bearing corner radius

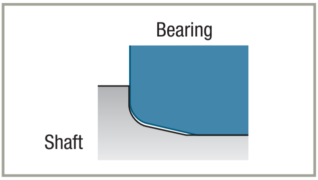
When a shaft is subjected to high bending stresses, the shoulder must be given a fillet radius that is greater than that of the bearing.

In this case, a chamfered spacer is placed between the shaft shoulder and the bearing ring to give a sufficiently large contact surface.



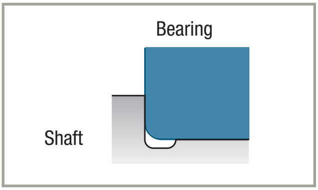
Special corner radius

If the bearing must be fixed close to the shoulder, a special corner radius can be machined on its inner ring.



Elimination of the fillet radius

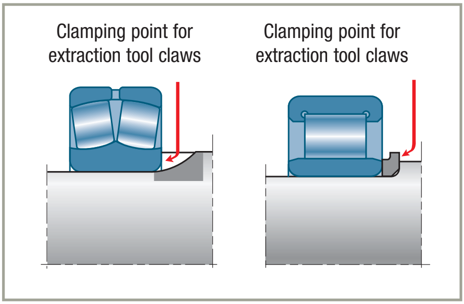
If there are no particular requirements for the shaft profile and strength, it is possible to make an undercut that facilitates grinding of the seats and ensures in all cases the best contact between the ring and the shoulder.



Removal seat

The bearing is usually removed using an extraction tool whose claws clamp on the part of the ring that protrudes beyond the shoulder. See page 140.

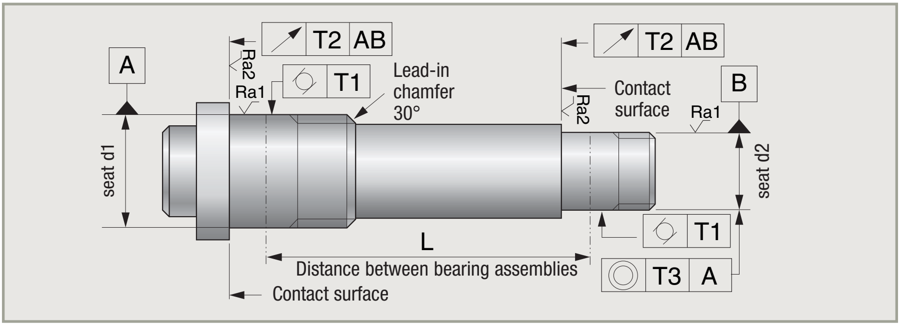
If the mounting configuration does not leave a sufficiently large removal seat, notches can be cut in the shoulder or a washer can be placed between the shoulder and the bearing inner ring.



Bearing seats *(continued)*

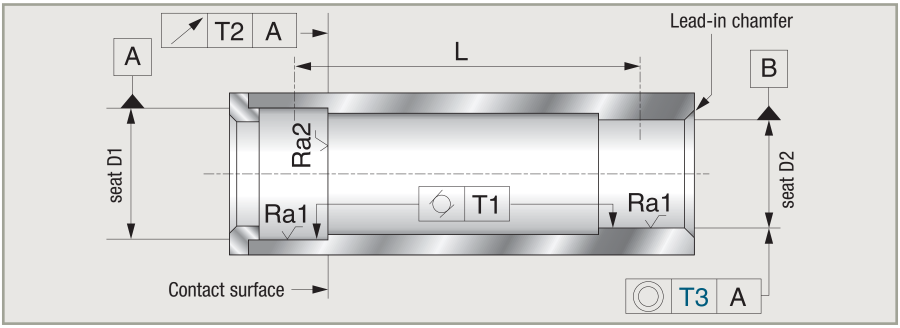
Tolerances and surface conditions of shaft and housing seats

Shaft



Nominal inside diameter of bearing d (mm)	Tolerances in µm				
	T1	T2	T3	Ra1	Ra2
10 <d≤ 18	3	11	1.5 L L in mm	≤1	≤2
18 <d≤ 30	4	13			
30 <d≤ 50	4	16			
50 <d≤ 80	5	19			
80 <d≤ 120	6	22			
120 <d	8	25			

Housing



Nominal inside diameter of bearing d (mm)	Tolerances in µm				
	T1	T2	T3	Ra1	Ra2
18 <D≤ 30	6	21	2 L L in mm	≤2	≤4
30 <D≤ 50	7	25			
50 <D≤ 80	8	30			
80 <D≤ 120	10	35			
120 <D	12	40			

Radial clearance of radial contact bearings

Residual radial clearance: definition, calculation

The residual radial clearance is the radial clearance of the bearing after installation or in operation. It depends on the internal radial clearance, the fits, the temperatures and the deformations.

The residual clearance must be sufficient to ensure satisfactory operating conditions.

To calculate the residual clearance, it is given an algebraic value. When this value is positive, there is a mechanical clearance, when it is negative there is a preload.

The operating residual clearance of the bearing has a direct influence on its service life and general performance (precision of rotation, noise, etc.). It must therefore be determined as accurately as possible.

➔ Ratio of interference effect on clearance

When two parts are assembled together with an interference fit, each part displays a change in diameter after assembly.

The ratio is:

$$t_i \textit{ or } t_e = \frac{\text{reduction of internal radial clearance}}{\text{interference on inner } \textit{or} \text{ outer ring}}$$

The ratio is calculated using the standard material strength formulae which introduce the cross-sectional dimensions of the parts concerned, the E modulus of elasticity and their respective Poisson ratios.

We propose the following approximate ratios for the most common cases:

Bearing element	Seat	Ratio
Inner ring	Solid shaft	$t_i \approx 0.8$
	Hollow shaft	$t_i \approx 0.6$
Outer ring	Steel or cast-iron housing	$t_e \approx 0.7$
	Light alloy housing	$t_e \approx 0.5$

SNR can provide a precise calculation of the clearance reduction.

Radial clearance of radial contact bearings *(continued)*

Residual clearance after fitting: J_{rm}

$$J_{rm} = J_o - t_i \cdot S_i - t_e \cdot S_e$$

J_o	Internal radial clearance
S_i	Interference of the inner ring on the shaft
t_i	Inner ring/shaft effect ratio
S_e	Interference of the outer ring in its housing
t_e	Outer ring/housing effect ratio

Required approximate mean residual clearance after fitting (in mm)

Ball bearings	$J_{rm} = 10^{3} d^{1/2}$
Cylindrical roller bearings	$J_{rm} = 4 \cdot 10^{3} d^{1/2}$
Self-aligning ball bearings	$J_{rm} = 2 \cdot 10^{3} d^{1/2}$
Spherical roller bearings	$J_{rm} = 5 \cdot 10^{3} d^{1/2}$

Example of calculation of residual clearance and its range using the fits tables of page 102.

Bearing 6305 - bore 25 mm - outside diameter 62 mm
- Solid steel shaft: tolerance k5
- Cast-iron housing: tolerance N6

Mean residual clearance

The fits tables give:

	min	mean	max
Shaft tolerances	+2		+11
Mean theoretical and probable value Si		-11.5	
Probable clearance (+) or interference (-)	-5		-18

	min	mean	max
Housing tolerances	-33		+14
Mean theoretical and probable value Si		-17	
Probable clearance (+) or interference (-)	-5.5		-28.5

Table in previous page gives the respective effect ratios of $t_i = 0.8$ (shaft) and $t_e = 0.7$ (housing).

The mean reduction in clearance is:

$R_{jm} = (t_i \cdot S_i) + (t_e \cdot S_e)$
(only valid if Si<0 and Se<0)

$R_{jm} = (0.8 \times -11.5) + (0.7 \times -17) = -21\mu m$

The minimum initial clearance value must be greater than the mean reduction in clearance R_{jm}

The table in page 156 of initial clearances for this type of bearing shows that a category 4 clearance is necessary (23 to 41µm: mean value 32 µm) to have a satisfactory residual clearance after fitting the bearing:

Mean residual clearance:	$J_{rm} = 32 - 21 = 11$ µm

The definition of the bearing will therefore be **6305 J40 (C4)**

Range of residual clearance after fitting

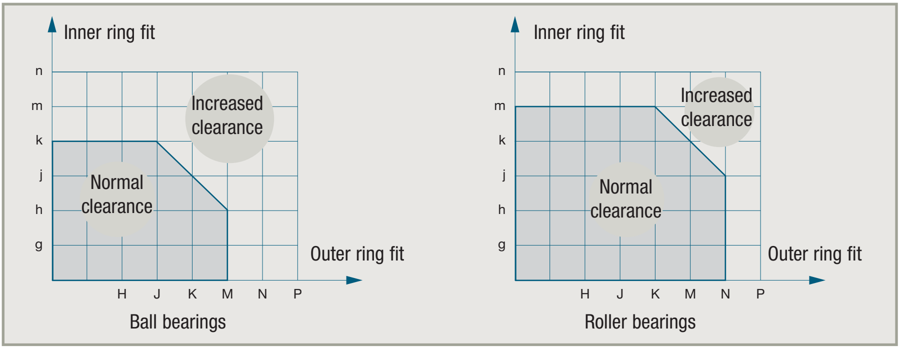
Probable range of interference on the shaft (difference between extreme values):	$D_{pa} = 13$ µm
Probable range of interference in the housing (difference between extreme values):	$D_{pl} = 23$ µm
Considering the previous effect ratios, the probable ranges on radial clearance are:	$D_{pci} = D_{pa} \cdot t_i =$ 13 µm x 0.8 = 10.5 µm for the inner ring $D_{pce} = D_{pl} \cdot t_e =$ 23 µm x 0.7 = 16 µm for the outer ring
Range of bearing internal clearance:	$D_{er} = 41\text{-}23 = 18$ µm
According to the laws of probabilities, the range of the residual clearance will be:	$\Delta\ Jr = (D_{pci}^2 + D_{pce}^2 + D_{er}^2)^{1/2}$ $= (10.5^2 + 16^2 + 18^2)^{1/2} = 26$ µm
The 6305 bearing with a category 4 clearance mounted with k5 and N6 fits has an operating clearance of:	$J_f = J_{rm} \pm D_{Jr}/2 = 11 \pm 13$ µm

Radial clearance of radial contact bearings *(continued)*

Choice of internal clearance as a function of shaft and housing fits

The example on the previous page shows that interference fits on shaft and housing require a bearing with increased clearance.

The table below defines the limit fits for the shaft and housing.



Calculation of the residual clearance in operation

The residual clearance in operation is a function of the residual clearance after mounting and the relative temperature differential between shaft and housing.

Materials with different coefficients of expansion

Bearing mounted in a light alloy housing.
The difference in the bearing and housing diameters resulting from differential expansion is:

$$\Delta D = (C_2 - C_1)\, D \,.\, \Delta t = 8 \,.\, 10^{6} \,.\, D \,.\, \Delta t$$

where:

- **Δt** Operating temperature 20°C (68°F)
- **D** Bearing outside diameter
- **C1** Expansion coefficient of steel = 12 x 10^{6} mm/mm/°C
- **C2** Expansion coefficient of the light alloy housing = 20 x 10^{6} mm/mm/°C

The different expansion of the materials will increase the clearance of the outer ring in its housing and can allow it to rotate. This differential expansion must be compensated for by having a tighter fit and using a bearing with increased clearance.

Example

Choice of housing fit for a 6305 bearing (D = 62 mm) mounted in light alloy with an operating temperature of 80°C (176°F).

$\Delta t = 60°C$
$\Delta D = 8 \,.\, 10^{6} \,.\, 62 \,.\, 60 = 0.030$ mm

With a J7 tolerance, the housing diameter is on average 10 µm larger than the bearing diameter.

See page 101.

At 80° C, it is 10 µm + ΔD = 40 µm

This value is too high to secure a good retention of the bearing in the housing. Therefore, choosing a P7 housing tolerance with a mean interference of 30 µm will compensate for the effect of differential expansion at 80°C (176°F).

Choosing a P7 tolerance for the outer ring will lead to a reduction in the radial clearance of the bearing equal to:

$t_e \,.\, S_e = 0{,}5 \,.\, 29.5 = 15$ µm

If the shaft with a k6 tolerance gives a mean interference of 13,5 µm on the inner ring, the reduction of the radial clearance due to the inner ring fit is:

$t_i \,.\, S_i = 0.8 \,.\, 13{,}5 = 11$ µm

The total reduction in the bearing clearance due to fitting is:

$R_{jm} = t_e \,.\, S_e + t_i \,.\, S_i = 15 + 11 = 26$ µm

One therefore chooses a 6305J40/C4 bearing (clearance category 4: mean radial clearance of 32 µm) to avoid cancelling the clearance during operation at 20°C (68°F) normal temperature.

Radial clearance of radial contact bearings *(continued)*

Temperature difference between shaft and housing

Both the shaft and housing are made of steel, but the temperature of the shaft is higher than that of the housing.

The differential expansion between the bearing inner ring and the outer ring will reduce the radial clearance by the value

$$\Delta J = C1 \times (D \,.\, \Delta tl - d \,.\, \Delta ta)$$

where:

C1 Expansion coefficient of the steel
D Bearing outside diameter
d Bearing bore
Δ ta Difference between the running temperature of the shaft and the room temperature (specified at 20°C or 68°F)
Δ tl Difference between the running temperature of the housing and the room temperature (specified at 20°C or 68°F)

Example

Let us assume that a 6305 bearing (25 x 62) has a residual clearance J_{rm} of 10 µm after fitting at 20°C (68°F).

In operation:

- the temperature of the shaft and the inner ring is 70°C (158°F)
- the temperature of the housing and the outer ring is 50°C (122°F)

The reduction in radial clearance of the bearing is:

$$\Delta J = 12 \,.\, 10^{6} \,.\, ((62 \,.\, 30) - (25 \,.\, 50)) = 7\ \mu m$$

The operating residual radial clearance is:

$$Jrf = Jrm - \Delta J = 10\ \mu m - 7\ \mu m = 3\ \mu m$$

In this case it is recommended to use a bearing from Group 3 increased clearance.

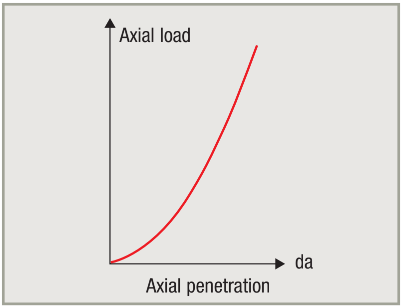
Axial clearance of angular contact bearings

Axial preload

A preload is a permanent axial force applied to the bearings when they are fitted. It is obtained by the penetration of the inner ring with respect to the outer ring of each bearing from the reference position.

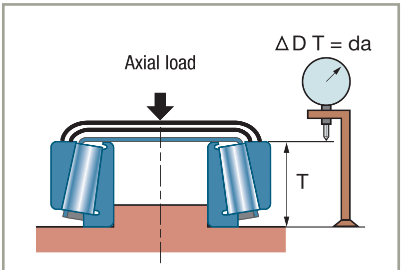
➔ Axial penetration and preload

Under load, the rolling element / raceway contact points undergo plastic deformation due to the very high Hertz pressures, giving an axial displacement of one ring in respect to the other. A curve gives the value of the relative displacement of the two rings according to the axial load.



In an assembly with two bearings mounted in opposition, the penetration of one bearing increases the clearance of the other.

In assemblies demanding very high guidance precision (machine-tool spindle, bevel gears, oscillating systems, etc.), a preload must be applied to get rid of the clearance and give optimum rigidity.



Measurement principle

Axial clearance of angular contact bearings *(continued)*

Determining the preload

The preload value P is chosen as a function of the mean axial load applied (Am)

P = Am / 3

The two preloaded bearings are studied using the diagram of associated penetration curves.

Without an external axial load, the meeting point (P) corresponds to the applied preload that creates on each bearing a penetration of (d1) and (d2) respectively, the total closing of the two bearings being p = d1+d2

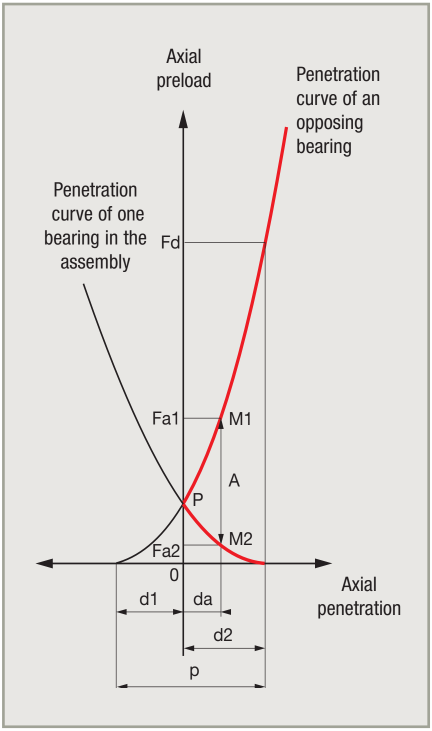
When an external axial load A is applied to the assembly, each bearing follows its penetration curve. One of the two bearings is subject to an additional penetration (da) which reduces the penetration of the opposite bearing by as much

To find the loads Fa1 and Fa2 applied to each bearing, the axial load A is positioned between the two curves (points MI and M2).

The axial equilibrium of the shaft is:

Fa1 - Fa2 = A

If A exceeds the value Fd (unseating axial load), the opposite bearing gets an operating axial clearance.



Remarks:

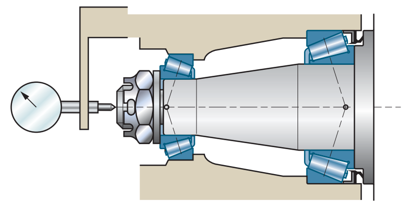
The diagram of associated penetration curves is modified by any radial loads applied to the bearings.

As any preload influences the resultant loads applied to the bearings, bearing performances must be calculated taking into account the preload value. Consult SNR for these calculations that bring into play the rigidity characteristics. A preloaded assembly has greater friction drag torque than an assembly with clearance. Its lubrication must therefore be studied with the utmost care.

Adjustment

The adjustment enables an assembly to be given the predetermined axial clearance or preload. This is done by sliding one ring (inner or outer) of one of the two bearings of the assembly. This ring must therefore be loose fitted on its seat.

If the assembly is to have an axial clearance j_a, it is checked using a dial comparator.



Checking the axial clearance

If the assembly is to have a preload value p, one starts with any axial clearance J_a and then the loose bearing ring is moved by the value $J_a + p$. This operation is usually achieved with the shaft nut or by adapting the thickness of the adjustment spacers in the housing. The allowed tolerance on a preloaded setting is tight (about half the one permitted for the axial clearance).

Influence of the temperature on the axial clearance of bearings

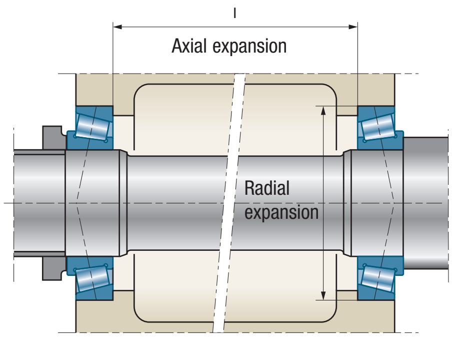
Modification of clearance on assembly

The axial clearance or preload of a shaft mounted on two angular-contact bearings (ball or tapered roller bearings) can be changed by the operating temperatures.

The assembly opposite schematically illustrates:

- a change in the axial clearance of the assembly due to the difference of axial expansion between the housing and the shaft
- a modification in the outer ring / housing interference that results in a variation of the radial clearance and therefore the axial clearance of the assembly

The total change of the axial clearance of the assembly is the algebraic sum of these two variations.



In an O assembly (case shown in the sketch), the two variations are in opposite directions and may cancel each other out. Conversely, in an X assembly the two variations are in the same direction.

Axial clearance of angular contact bearings *(continued)*

Theoretical calculation of the variation in the axial clearance of an assembly

Variation due to shaft and housing different axial expansion

$$\Delta\ Ja_1 = (l\ .\ C_2\ .\ \Delta\ t) - (l\ .\ C_1\ .\ \Delta\ t) = (C_2 - C_1)\ .\ l\ .\ \Delta\ t$$

where:

l	Distance between the bearings
C1	Expansion coefficient of the shaft
C2	Expansion coefficient of the housing
Δt	Difference between the operating temperature and the room temperature (specified at 20°C or 68°F)

Variation due to the modification of the outer ring/housing interference

	Bearing 1	Bearing 2
Temperature at which the outer ring/housing interference is cancelled by the expansion of the housing	$\Delta t0_1 = S_1 / ((C_2 - C_1)\ .\ D_1)$ D_1, D_2 Outside diameters of the bearings S_1, S_2 Diametral interference of the bearings	$\Delta t0_2 = S_2 / ((C_2 - C_1)\ .\ D_2)$
Variations of interference with temperature	If $\Delta t \leq \Delta t0_1$: $\Delta S_1 = (C_2 - C_1)\ .\ D_1\ .\ \Delta t$ If $\Delta t > \Delta t0_1$: $\Delta S_1 = S_1$	If $\Delta t \leq \Delta t0_2$: $\Delta S_2 = (C_2 - C_1)\ .\ D_2\ .\ \Delta t$ If $\Delta t > \Delta t0_1$: $\Delta S_2 = S_2$
Variation of axial clearance due to the modification of the outer ring/housing interference	$\Delta Ja_2 = (K_1\ .\ te_1\ .\ \Delta S_1) + (K_2\ .\ te_2\ .\ \Delta S_2)$ te_1, te_2: effect ratio of this interference on the radial clearance page 109 K_1, K_2: transformation coefficients of radial clearance into axial clearance $K_1 = Y_1 / 0.8$ Y_1, Y_2 see page 59	$K_2 = Y_2 / 0.8$

Total variation in the axial clearance of the assembly

Assembly in X arrangement	$\Delta\ Ja = \Delta\ Ja_2 + \Delta\ Ja_1$
Assembly in O arrangement	$\Delta\ Ja = \Delta\ Ja_2 - \Delta\ Ja_1$

These calculations enable the initial clearance to be fixed in order to get the desired clearance values in operation.

Example

Take an assembly of two 32 210 tapered roller bearings mounted in an O arrangement in an aluminium housing (P7 fit); operating temperature 80°C (176°F):

l = 240 mm
$D_1 = D_2$ = 90 mm
$C_2 - C_1$ = 8 x 10-6 mm/mm/°C
$Y_1 = Y_2$ = 1.43
$S_1 = S_2$ = 0.0335 mean value
Δt = 60°C (140°F)
$te_1 = te_2$ = 0.5 see page 109

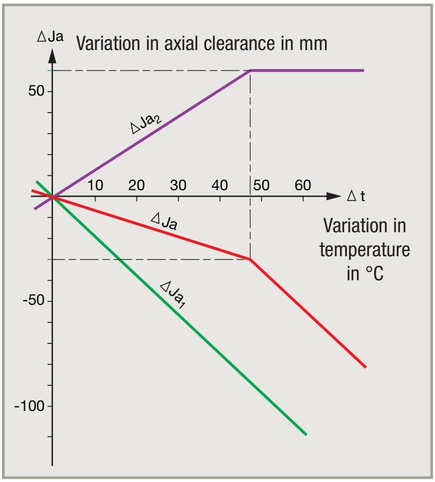
- Variation in axial clearance due to axial expansion ΔJa_1 — $\Delta Ja_1 = 8 . 10^{6} . 240 . 60 = 0.114$ mm
- Variation due to the modification in the outer ring/housing interference

	Bearing 1	Bearing 2
Temperature at which the outer ring/housing interference is cancelled by the expansion of the housing	$\Delta t0_1 = \Delta t0_2 = 0.0335 / (8 . 10\text{-}6 . 90) = 47°C$	
Variations of interference with temperature	$\Delta t > \Delta t0_1$ and $\Delta t0_2$ $\Delta S_1 = \Delta S_2 = 0.0335$	
Variation of axial clearance due to the modification in outer ring/housing interference	$\Delta Ja_2 = ((1.43 / 0.8) . 0.5 . 0.0335) + (1.78 . 0.5 . 0.0335) = 0.060$	

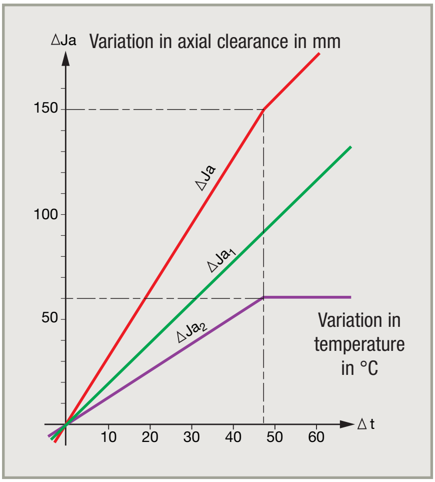
- Total variation in the axial clearance of the assembly — $\Delta Ja = + 0.060 - 0.114 = -0.054$

The following graphs illustrate the variation in axial clearance of the assembly according to the operating temperature in the X and O assembly arrangements.

Assembly in O arrangement



Assembly in X arrangement



Lubrication

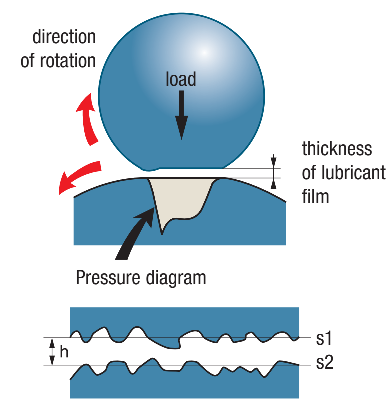
General principals of lubrication

Lubrication is essential for optimum bearing performance.

70% of bearing failures are due to lubrication problems.

The aim of lubrication is to provide a film of lubricant (oil film) between the rolling elements and the raceway of the bearing in order to prevent wear and seizure of the components in contact.

The lubricant also provides protection against oxidation and external contamination, and can have a cooling effect in the case of recirculating oil.



The service life of the bearing is directly related to the efficiency of the lubricant film, which depends on:

- the nature of the lubricant and its speed and temperature capabilities...
- the load and speed of rotation of the bearing

The influence of lubrication on the bearing life can be determined page 77.

Choosing the type of lubrication

	Oil lubrication	Grease lubrication
Advantages	◗ Good penetration in the bearing ◗ Good physical and chemical stability ◗ Cooling possibility ◗ Easy monitoring of the lubricant: condition and levels	◗ Cleanliness of the mechanism ◗ Sealing easier to secure ◗ Protection barrier ◗ Assembly simplicity ◗ Ease of manipulation ◗ Reduction or elimination of relubrication ◗ Possibility of using pre-greased bearings
Disadvantages	◗ Necessary to effectively seal the assembly ◗ Poor protection against oxidation and moisture in case of long stops ◗ Starting delay when circulation of oil is necessary prior to rotation	◗ Higher friction coefficient than for oil ◗ Poorer dissipation of heat ◗ Replacement (if necessary) requires dismounting and washing of the bearing ◗ No possibility of checking the level of grease, therefore it requires reliable grease retention or periodic addition to compensate for leaks, contamination or ageing

Grease lubrication

Characteristics of greases

Grease is a product whose consistency ranges from semi-fluid to solid and which is obtained by dispersing a thickening agent (soap) in a liquid lubricant (mineral or synthetic oil).

Additives can be included to bring certain specific properties.

The increasing use of grease-lubricated bearings combined with the development of the life-lubrication concept, has made grease an integral component of the bearing. The service life of the bearing and its behaviour in diverse environments are largely determined by the properties of the grease.

Physical and chemical characteristics:

Consistency

- NLGI (National Lubrication Grease Institute) grades correspond to a value of penetration in the kneaded grease (per test specification ASTM/D217).
- The consistency generally chosen for bearings is grade 2.

NLGI grades	Kneaded penetration	Consistency
0 1	385 - 355 340 - 310	Semi-fluid Very soft
2 3	295 - 265 250 - 220	Soft Moderate
4	205 - 175	Semi-hard

Viscosity of the basic oil: usually defined in cSt (mm2/s) at 40°C (104°F).

Density: 0.9 approx.

Drop point: temperature at which the first drop of a grease falls from a sample.

Approximate temperature: 180°C (356°F) to 260°C (500°F) depending on the constituents of the grease. The maximum service temperature of the grease is always far below the drop point.

Functional characteristics

The conditions under which the lubricant works (rolling, kneading) require special bearing greases that cannot be selected only on the basis of the physical and chemical characteristics.

The SNR Research and Test Centre constantly performs qualification tests on bearings that enables us to give advice on the recommended grease for the application.

The qualification specification concerns the following basic criteria:

- endurance in ball bearings
- endurance in roller bearings
- water resistance
- high and low temperature resistance
- adherence when exposed to centrifugal forces
- vibration resistance (false Brinell effect)
- high speed adequacy, etc.

These criteria may be met in order to satisfy the customer's goal. The selection for an application is a compromise between the required specifications and the available greases.

Grease lubrication *(continued)*

Greasing recommendations

Sealed and shielded bearings are fitted with grease before packing. With the other bearings, the grease must be added with great care in order not to reduce bearing performance.

Method to apply the grease

Cleanliness is essential

Any foreign body in the grease can cause the premature destruction of the bearing.

- Thoroughly clean the area around the bearing
- Protect the grease containers against contamination
- The use of a grease gun provides a guarantee of cleanliness

The grease must be applied as close as possible to the active parts of the bearing (raceways and rolling elements)

Insert the grease between the cage and the raceway of the inner ring, especially where angular-contact or spherical or self-aligning bearings are concerned.

For each assembly, record the date of past and future lubrications, and the type and weight of grease

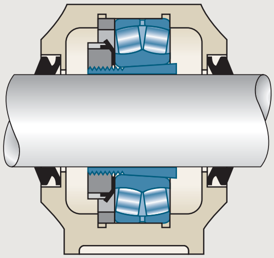
- Assemblies and bearings with lubrication devices
  - Clean the lubricator head
  - Get rid of all foreign particles
  - Check and clean the spout of the grease gun
  - Introduce the grease
  - Pay particular attention to the quantity introduced
  - Remove the old grease at every 4th or 5th relubrication
  - When relubrication is very frequent, provide a system for removing the old grease

- Assemblies and bearings without a greasing device

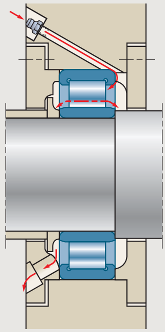
  Carefully clean the assembly before opening it
  - Remove the old grease with a non-metallic spatula
  - Introduce the grease between the rolling elements on both sides
  - Grease the shields and seals

Greasing devices

Manual packing



Lubrication with a grease gun
Grease fitting



SNR Automatic Lubricator

Choice of grease according to the application

The choice of grease is based on the knowledge of the operating conditions, which must be carefully considered: temperature, rotation speed, load, environment, vibration, application-specific constraints.

Ask your SNR ROULEMENTS contact for assistance in choosing the grease for your application.

The table on the following page will help to make an initial choice.

There are two types of operation

Normal operating conditions

SNR recommends two types of greases:

- SNR LUB MS: for assemblies on machines, agricultural machinery, electric motors, handling equipment, pumps
- SNR LUB EP: for heavily-loaded bearings (iron and steel industry, civil engineering)

Special operating conditions

The application specifications will be studied in close cooperation with SNR ROULEMENTS in the following cases:

- Continuous operating temperature above +100°C (212°F) or below –30°C (-22°F)
- Speed greater than 80% of the bearing maximum speed
- Moist environment
- Centrifugal forces (outer ring rotating) or vibration
- Low torque
- Presence of hydrocarbons
- Nuclear radiation, etc.

The viscosity of the base oil is of great importance for lubrication efficiency. The diagram on page 78 can be used to check lubrication efficiency for your application.

The majority of general-purpose greases can be mixed with one another. However, to obtain the best result avoid mixing greases (the mixing of certain special application greases is forbidden).

SNR can supply sealed and shielded bearing pre-greased with a type of grease that is appropriate for the application (see technical range bearings or check minimum order quantity).

Choice of grease according to the application

Predominant operating conditions	Service limits: Temp. °C *(°F)*	Service limits: Speed	General recommendation	Examples of applications	SNR LUB recommendation
Standard use	- 30 *(-22)* up to +120 *(+248)*	< max. speed of bearing	◗ Mineral oil ◗ Traditional soap (lithium, calcium…) ◗ Consistency: usually grade 2, grade 3 for large bearings or bearings with particular operating characteristics ◗ Drop in performance above 80°C (+176°F) in continuous operation, certain applications can require a better suited grease	◗ Automobiles ◗ Agricultural machinery ◗ Common mechanisms ◗ Handling equipment ◗ Electric tools	**LUB MS**
High load	-30 *(-22)* up to +110 *(+230)*	< 2/3 max. speed of bearing	◗ Similar to standard greases with extreme pressure additive	◗ Iron and steel industry ◗ Civil engineering equipment	**LUB EP**
High temperature	-30 *(-22)* up to +130 *(+266)* -20 *(-4)* up to +150 *(+302)*	< 2/3 max. speed of bearing	◗ Traditional soap with high-viscosity mineral-base or synthetic oil	◗ Class-E electric motors ◗ Class-F electric motors ◗ Alternators	**LUB HT**
	-20 *(-4)* up to +200 *(+428)*	≤ 1/3 max. speed of bearing	◗ Entirely synthetic greases ◗ Greases with silicone-base oil have reduced resistance to loads	◗ Furnace equipment ◗ Class-H electric motors ◗ Couplers	**LUB THT**
	-20 *(-4)* to +250 *(+482)*	< 1/5 max. speed of bearing	◗ Synthetic products in solid or paste form ◗ Poorly miscible products	◗ Furnace equipment ◗ Kiln cars	**Consult SNR**
Low temperature	up to - 50 (-58)	≤ 2/3 max. speed of bearing	◗ Basic oil of very low viscosity Marginal retention of grease if temperature above 80°C (+176°F)	◗ Aviation ◗ Special machines	**LUB GV+**
High speed	-20 *(-4)* up to +120 *(+248)*	≤ 4/3 max. speed of bearing	◗ Oil of very low viscosity	◗ Machine-tool spindles ◗ Wood-working machines ◗ Textile spindles	
Moisture	-30 *(-22)* up to +120 *(+248)*	≤ 2/3 max. speed of bearing	◗ Conventional grease heavily treated with anti-corrosion additives	◗ Washing machines	**LUB MS** **LUB EP**
Centrifugal forces/ Vibration/ Outer ring rotating	-20 *(-4)* up to +130 *(+266)*	≤ 2/3 v2/3 max. speed of bearing	◗ Grease with strong adherence consistency (grade 2)	◗ Alternators ◗ Civil engineering equipment ◗ Loose pulleys	**LUB VX**
Food industry	-30 *(-22)* up to +120 *(+248)*	≤ 2/3 max. speed of bearing	◗ Compatible with food processing applications	◗ Food-processing industry	**LUB AL1**
High load and low speed	-5*(+23)* up to +140 *(+284)*		◗ Suitable for very low speed operation under very high loads	◗ Heavy industry : Steel Industry, paper mill Industry, Quarries	**LUB FV**

Note : The grease must be chosen in collaboration with SNR.

Characteristics of the SNR LUB product range

	MS	EP	HT	GV^+	VX	THT	AL1	FV
Colour	Amber	Amber	Light brown	Light yellow	Blonde	White	Transparent yellowish	
Composition	Mineral oil Lithium soap	Mineral oil Extreme pressure Lithium soap	Synthetic oil Barium soap	Di-ester oil Lithium soap	Mineral paraffinic oil Lithium soap	Thickening perfluorin fluid Teflon	Mineral paraffinic oil Complex aluminium soap	Mineral oil Lithium + calcium
Viscosity of base oil	105	105	150	15	310	390	200	950
Consistance Grade NLGI	2	2	2	2	2	2	2	2
Service temperature °C *(°F)*	-30 *(-22)*, +120 *(+248)*	-30 *(-22)*, +110 *(+230)*	-30 *(-22)*, +150 *(+302)*	-50 *(-58)*, +120 *(+248)*	-20 *(-4)*, +130 *(+266)*	-20 +220 | -20 +250*	-30 *(-22)*, +120 *(+248)*	-5 *(-23)* +140 *(+284)*
Moderate loads P < C / 5	G	VG	G	G	G	VG	G	G
High load P > C / 5	NR	VG	NR	NR	VG	VG | NR	G	VG
Low speed N.Dm < 100000	G	G	NR	NR	VG	VG	G	VG
High speed N.Dm > 100000	G	G	G	VG	NR	G | G	G	NR
Moisture, Presence of water	VG	VG	G	VG	G	G	G	G
Low amplitude oscillations	G	G	VG	G	VG	VG	G	G
Vibration when stationary	NR	NR	NR	VG	NR	NR	NR	NR
Adherence	G	G	VG	G	VG	VG	G	VG
Low torque	G	G	G	VG	NR	NR	G	NR
Low Noise	G	G	G	VG	NR	NR	NR	NR
Anti-corrosion protection	VG	VG	G	VG	G	G	G	G
Resistance to chemical agents	NR	NR	NR	NR	NR	VG	NR	NR
Pump wise	VG	VG	VG	VG	VG	VG	VG	G
Remarks			Service life of grease is linked with working temperature	Pay special attention to: - quantity - shaft position - close active parts - grease retention			Approved by US Food and Drug Administration - as H1 class	

N.Dm : Product of the RPM times the mean diameter
VG : Very good performance – **G :** Good performance
NR : Not recommended

* Under low load, the THT grease sustains up to +250°C *(+482)*
Under higher load, thermal strength is limited to +220°C *(+428)*

Grease lubrication *(continued)*

Quantity

Initial greasing

The quantity of grease necessary for optimum operation of a bearing must be equal to 20 to 30% of its free internal volume.

Approximate amount of grease to be introduced into an open bearing	$G = 0.005 \ D \ . \ B$

G: Quantity of grease in g or cm^3
D: Outside diameter of bearing in mm
B: Bearing width in mm.

The quantity of grease may be increased by 20% for assemblies provided with a hole for drainage of the old grease.

A bearing that rotates at very low speed can be fully packed with grease, which favours its protection in highly contaminated environments (conveyor rollers, etc.)

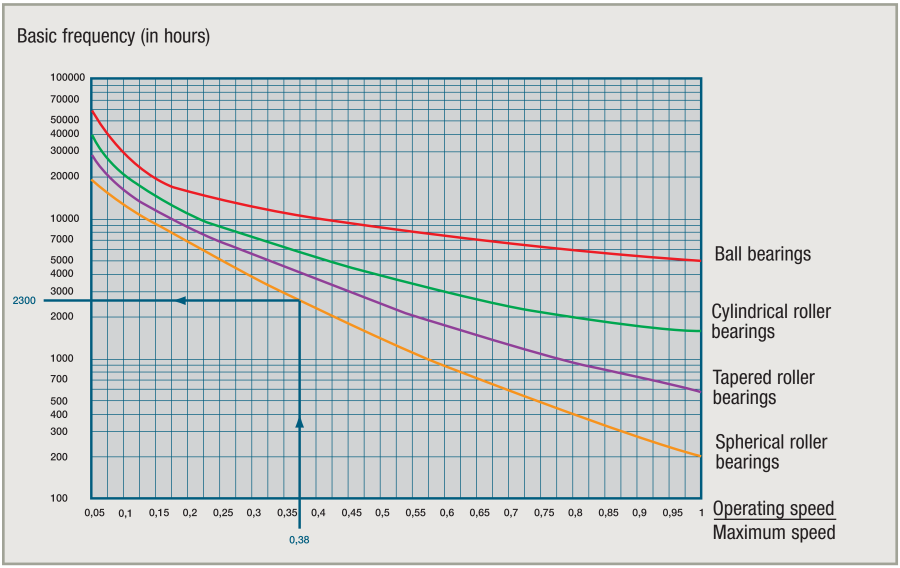
It is very important that this quantity should be maintained inside the bearing. Check that the adjacent parts (seals, shields) are capable of limiting the transfer of grease. If there is an adjacent free space, fill it to 50% with grease.

One can verify that the quantity of grease is adequate if the bearing temperature stays at a level of 10°C (50°F) to 30°C (86°F) above the room temperature, after a transient state of less than one hour during which the temperature has peaked at a higher level.

Relubrication

Relubrication frequency

The following table can be used to establish the basic frequency in hours according to the type of bearing and speed of rotation.



Correction of relubrication frequency

The basic frequency (Fb) must be corrected using factors taken from the table below, according to the particular operating conditions of the mechanism, using the relation:

Fc = Fb . Te . Ta . Tt

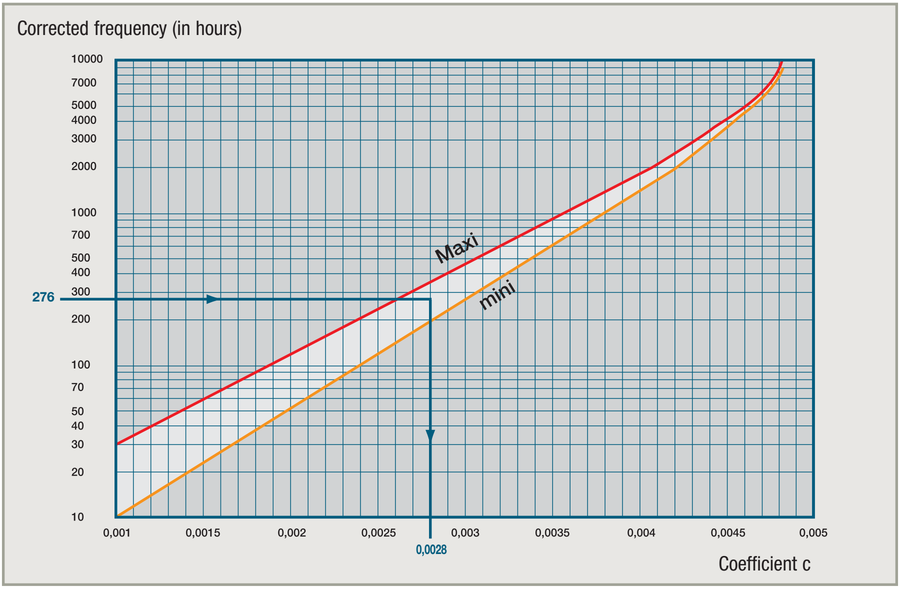
Factor	Conditions	Level	Value of factor	
Te	**Environment** - dust - humidity - condensation	- moderate - high - very high	0.8 0.5 0.3	
Ta	**Application** - with impacts - with vibration - with vertical shaft	- moderate - high - very high	0.8 0.5 0.3	
Tt	**Temperatures**	75°C 75° à 85°C 85° à 120°C 120° à 170°C	0.8 0.5 0.3 With standard grease	0.8 0.5 0.3 With high temperature grease

Grease lubrication *(continued)*

Weight of grease

The opposite table can be used to determine the factor c to be applied, depending on the corrected frequency in hours to obtain the weight of grease to be added from the relation.

P = D x B x c



Example

A 22212 EA bearing lubricated with a standard grease and rotating at 1,500 RPM in a dusty environment at 90°C (194°F) with no other application constraints:

22212 – Spherical roller bearing

Service speed/Maximum speed = 1,500 rpm / 3,900 rpm = 0.38

hence the basic frequency: Fb = 2,300 hours (see table of the preceding page)

Coefficients

Te = ⟶ 0.5 dust

Ta = ⟶ 0.8 normal

Tt = ⟶ 0.3 90°C (194°F)

c = 0,028

Diameter D = 110

Width B = 28

Weight of grease:

P = 110 . 28 . 0.0028 = 9 grams

Corrected frequency: Fc = Fb . Te . Ta . Tt = 2,300 . 0.5 . 0.8 . 0.3 = 276 hours

Oil lubrication

Oil lubrication is generally used when the bearing is adapted in a mechanism that is already lubricated (gear reducer, gearbox) or else when it can benefit from a central lubrication system where the oil is also used as a coolant.

Type of oil

Principal oil types used to lubricate bearings.

		Mineral oils	Synthetic oils ester	Synthetic oils perfluoroalkilether
Comments		**Standard use**	**Special use, usually at high or low temperature**	
Density		0,9	0,9	1,9
Viscosity	**Index**	80 - 100	130 - 180	60 - 130
	Variation with temperature	**high**	**low**	**low**
Freezing point		-40 up to -15°C *(-40 up to 5°F)*	-70 up to -30°C *(-94 up to -22 °F)*	-70 up to -30°C *(-94 up to -22 °F)*
Flash point		< 240° C *(464°F)*	200 up to 240°C *(392 up to 464°F)*	non inflammable
Resistance to oxidation		average	good	excellent
Thermal stability		average	good	excellent
Compatibility with elastomers		good	to be checked	good
Price level		1	3 - 10	500

Viscosity

The choice of the oil viscosity is very important for the efficiency of lubrication. The choice can be made using the diagram in page 78.

It can be seen from this diagram that life duration increases with the viscosity of the lubricant. This advantage is nevertheless limited because a more viscous lubricant raises the operating temperature of the bearing.

Additives

The most commonly used additives are the Extreme Pressure, anti-wear and anti-corrosion additives. Great care must be used in choosing an additive. One must check with the lubricant manufacturer to check the influence of the additive on the bearing performance.

Extreme pressure

- Protects metal surfaces against micro-welding
- Necessary when the bearing is highly loaded

P > C / 5

Oil lubrication *(continued)*

Anti-wear

Reduces the wear of the metal surfaces by forming a protective surface layer

Anti-corrosion

Protects metal surfaces against corrosive attacks

Contamination

The lubrication oil must be clean.

Special lubricants

In certain assemblies the bearing can be lubricated by the liquid carried in the assembly (hydraulic fluid, diesel fuel).

In such cases, and for all the lubrication problems mentioned here, check with SNR.

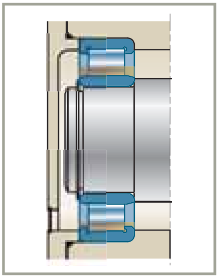
Lubrication systems

Oil bath

Used in closed and sealed mechanisms.

Oil level at the level of the lowest rolling element of the lowest bearing.

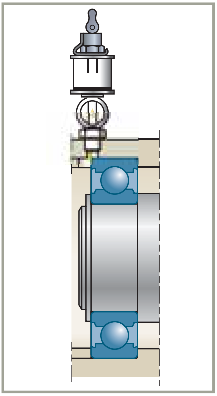
Moderate rotation speed as heat dissipation is limited.



One time usage oil

Shaft rotating at high speed.

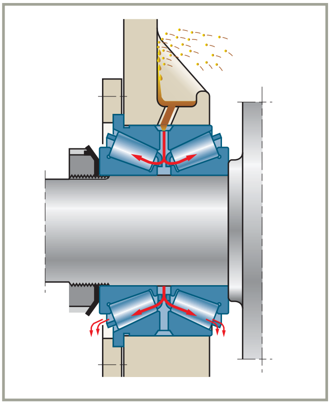
Necessary evacuation of the old oil.



Dripping and splashing

Oil usually thrown up by the gears.

The oil can be directed to the bearing by channels.

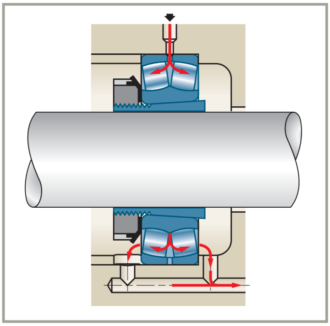


Oil circulation

A pump ensures a constant flow, a reserve compensates for the priming delay starting.

The oil can be filtered and cooled in a heat exchanger to give better performance.

Oil circulation can sometimes be intermittent.

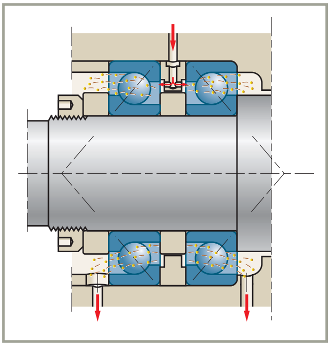


Oil spray

This is also a low-consumption method of one time usage lubrication. The oil under pressure spray reaches all parts of the bearing, prevents the entry of foreign bodies and acts as a coolant.

Used for high precision bearings rotating at very high speed.

Consult the SNR catalogue of high precision bearings for machine-tool spindles.

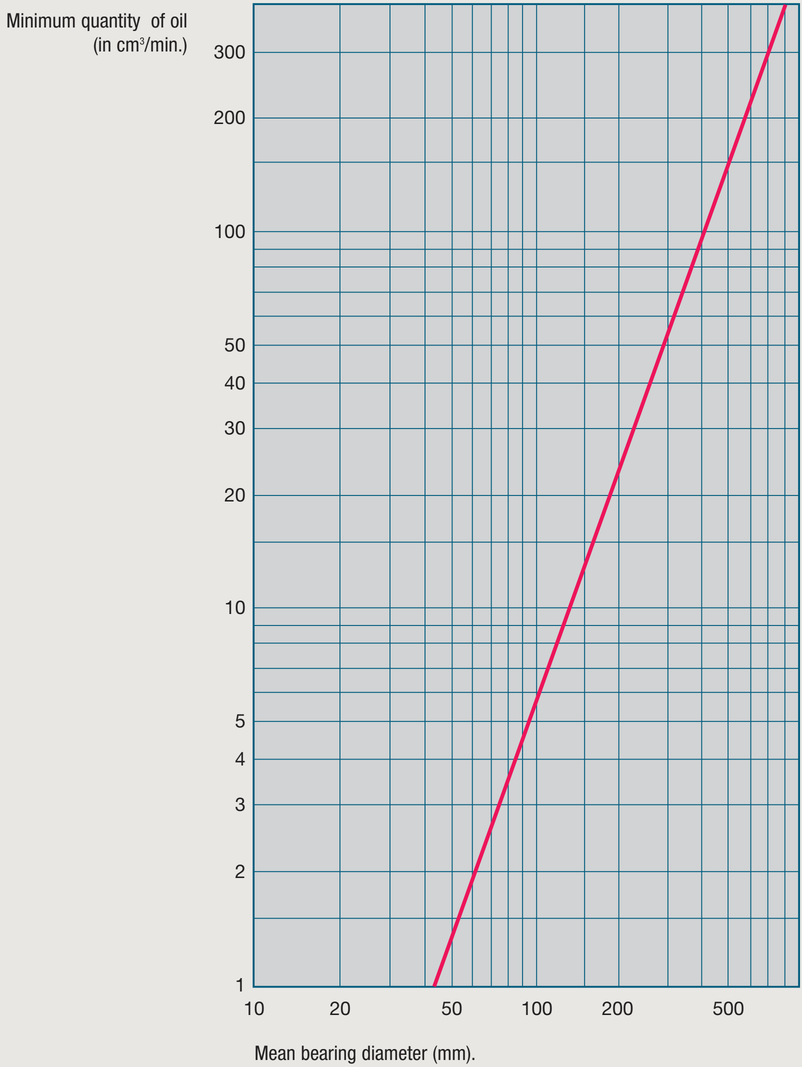


Important: Most oil lubrication systems do not secure an adequate film during the first few rotations of the bearing. It is therefore strongly recommended to oil new bearings after installation.

Oil lubrication *(continued)*

Quantity of oil

The diagram below gives an idea of the minimum safe flow rate under normal service conditions for bearings.



Appendices and terminology

Appendices

Bearing standards

Characteristics		Standards
Terminology		ISO 5593
Dimensions	Ball and roller bearings (except tapered roller and thrust bearings)	ISO 15
	Tapered roller bearings	ISO 355
	Self-aligning unit bearings	ISO 2264
	Thrust bearings	ISO 104
	Snap ring grooves	ISO 464
	Snap rings	ISO 464
	Eccentric locking collars	ISO 3145
	Tapered sleeves	ISO 113/1
	Nuts and lock-washers	ISO 2982
	Split pillow blocks	ISO 113/2
	Self-aligning bearing units	ISO 3228
	Corner radii	ISO 582
Precision	Definitions	ISO 1132
	All types of bearings	ISO 492
	Thrust bearings	ISO 199
Clearances	Radial internal clearance	ISO 5753
Basic dynamic load and bearing life		ISO 281/1
Basic static load (or basic static capacity)		ISO 76
Thermal reference speed		ISO 15312

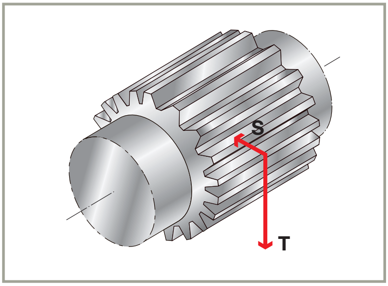
Gear tooth forces

T	Tangential force	
C	Transmitted torque	
Dp	Tooth pitch diameter	$T = 2C / Dp$

S	Separation forces
A	Axial forces

Straight-tooth cylindrical gear

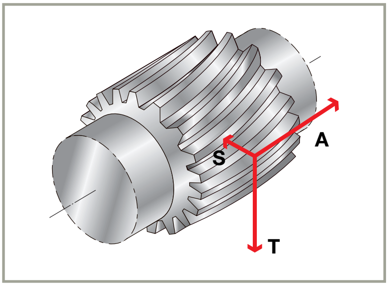
α = pressure angle — $S = T\, tg\alpha$



Helical-tooth cylindrical gear

α = pressure angle — $S = T\, tg\alpha / \cos\gamma$

γ = helix angle — $A = T\, tg\gamma$



Straight-tooth bevel gear

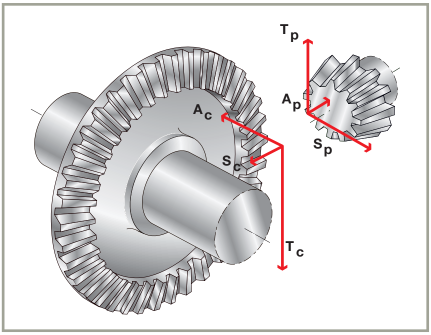
$T = Tp = Tc$

α = pressure angle

$Sp = -Ac = T\, tg\alpha \cos\theta$

θ = 1/2 angle at gear apex

$Ap = -Sc = T\, tg\alpha \sin\theta$

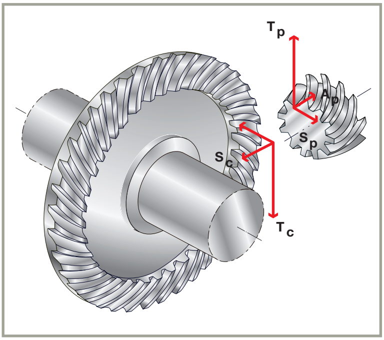


Appendices *(continued)*

Helical-tooth bevel gear

D_p = pitch diameter of the driving gear
D_c = pitch diameter of the driven gear
L = tooth length
D_p = mean diameter of the driving gear
D_c = mean diameter of the driven gear
T_p = tangential force of the driving gear
T_c = tangential force of the driven gear

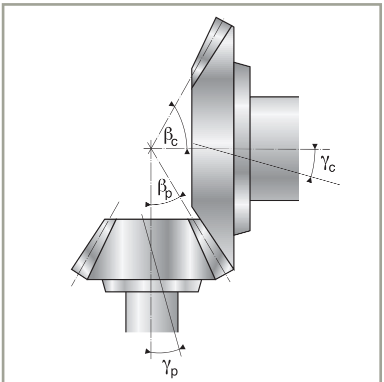
$$T_c = T_p = 2\ C / D_p$$



α = pressure angle
γ_p = helix angle of driving gear
γ_c = helix angle of the driven gear
($\gamma_p = \gamma_c$ for straight-tooth and helical-tooth bevel gear pairs)

β_p = 1/2 angle at apex of driving gear
β_c = 1/2 angle at apex of driven gear

Direction of gear rotation:
(for an observer standing on the large base of the cone and looking at the apex)
+ counter-clockwise
- clockwise



(example of a gear with left-hand helix direction)

Direction of the helix	Direction of gear rotation	Separation force	Axial force
right	-	Driving gear (moving away from driven gear) $S_p = \frac{T_p}{\cos\gamma_p} \cdot (\mathrm{tg}\alpha \cos\beta_p + \sin\gamma_p \sin\beta_p)$	Driving gear (moving away from driven gear) $A_p = \frac{T_p}{\cos\gamma_p} \cdot (\mathrm{tg}\alpha \sin\beta_p - \sin\gamma_p \cos\beta_p)$
or			
left	+	Driven gear (approaching driving gear) $S_c = \frac{T_c}{\cos\gamma_c} \cdot (\mathrm{tg}\alpha \cos\beta_c - \sin\gamma_c \sin\beta_c)$	Driven gear (approaching driving gear) $A_c = \frac{T_c}{\cos\gamma_c} \cdot (\mathrm{tg}\alpha \sin\beta_c + \sin\gamma_c \cos\beta_c)$
right	+	Driving gear (moving away from driven gear) $S_p = \frac{T_p}{\cos\gamma_p} \cdot (\mathrm{tg}\alpha \cos\beta_p - \sin\gamma_p \sin\beta_p)$	Driving gear (moving away from driven gear) $A_p = \frac{T_p}{\cos\gamma_p} \cdot (\mathrm{tg}\alpha \sin\beta_p + \sin\gamma_p \cos\beta_p)$
or			
left	-	Driven gear (approaching driving gear) $S_c = \frac{T_c}{\cos\gamma_c} \cdot (\mathrm{tg}\alpha \cos\beta_c + \sin\gamma_c \sin\beta_c)$	Driven gear (approaching driving gear) $A_c = \frac{T_c}{\cos\gamma_c} \cdot (\mathrm{tg}\alpha \sin\beta_c - \sin\gamma_c \cos\beta_c)$

Terminology

Vocabulary

Symbol	Description	Unit
α	nominal angle of contact	°
B	width of bearing inner ring	mm
C	width of bearing outer ring	mm
C	basic dynamic capacity of a bearing	N
C_0	basic static capacity of a bearing	N
C_e	equivalent basic dynamic capacity of an assembly	N
C_{0e}	equivalent basic static capacity of an assembly	N
D	outside diameter of the bearing	mm
D_w	mean diameter of the rolling element	mm
d	bearing bore diameter	mm
fc	factor for calculating the basic dynamic load	
f_s	safety factor	
F_a	total axial load on the bearing	N
F_r	total radial load on the bearing	N
J_a	theoretical axial clearance	mm
J_r	operating radial clearance	mm
i	number of rows of rolling elements	
l	effective length of the contact generating surface	mm
L_{10}	nominal service life	
N	speed of rotation	tr/mn
P	equivalent dynamic radial load of the bearing	N
P_0	equivalent static radial load of the bearing	N
T	nominal width of a tapered bearing	mm
X	radial factor of bearing	
X_0	static radial factor	
Y	axial factor of bearing	
Y_0	static axial factor	
Z	number of rolling elements	

Single-row radial ball bearings

Single-row radial ball bearings

Definition and capabilities

The single-row radial ball bearing is the most widely used type of bearings.

Definition

Cages for single-row ball bearings

The standard cage is in pressed steel or brass. Other cage types can be used: synthetic material, phenolic resin, machined brass.

Capabilities

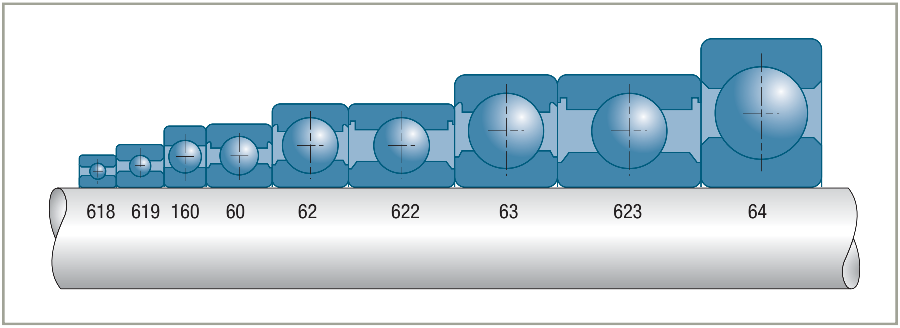
Loads and speeds

Designed to:
• withstand radial loads
• withstand axial loads in both directions
• accept high speeds of rotation

Misalignment

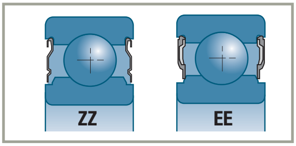
These bearings accept misalignment of between 0.10° and 0.23° depending on the residual clearance of the bearing after fitting, the bearing series and the magnitude of loads. Where misalignment is high, it is recommended to use a bearing with a synthetic material cage, as these cages display greater flexibility and good wear resistance.

Series



Variations

Standard protection and sealing



These bearings can be equipped with:
- shields (suffix ZZ)
- seals (suffix EE)

A given bearing can have a combination of types of protection and sealing, for example an E seal and a Z shield (suffix EZ).

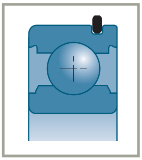
Bearing featuring
- one or two seals or two shields are supplied pre-lubricated with general-purpose grease
- unilateral protection by a single Z shield are not supplied pre-lubricated

Special sealing and protection

SNR proposes a range of seals for various applications:
- high speed of rotation and temperature
- reinforced sealing
- filter function for contaminated oil applications
- speed-sensing function

SNR can study jointly with the user special seals for mass production applications.

Groove for snap ring



Bearings are supplied with or without a snap ring.

Tolerances and clearances

Tolerances

Manufactured within the normal tolerance classes.

Single-row ball bearings can be supplied on request in tolerance classes ISO 6 and 5 for all or specific characteristics (e.g. bore or radial run-out in tolerance class 6).

Internal radial clearance

All standard production bearings are in the normal clearance group N. The other groups can be supplied on request.

For single-row radial ball bearings with a tapered bore, SNR ROULEMENTS has adopted group 3 (C3) as the standard

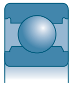
clearance to allow for a greater reduction in clearance resulting from fitting on a tapered seat.

The radial clearance leads to an axial clearance; a simple formula can be used to calculate the approximate size of the theoretical axial clearance J_a as a function of the operating radial clearance J_r.

$$J_a = (J_r (D-d) / 20)^{1/2}$$

Single-row radial ball bearings *(continued)*

- Series 60-62-63-64-160-618-619-622-623-42-43



Bore diameter	Group 2		Group N		Group 3		Group 4		Group 5	
d (mm)	min	max	min	max	min	max	min	max	min	max
2.5 <d≤ 6	0	7	2	13	8	23	–	–	–	–
6 <d≤ 10	0	7	2	13	8	23	14	29	20	37
10 <d≤ 18	0	9	3	18	11	25	18	33	25	45
18 <d≤ 24	0	10	5	20	13	28	20	36	28	48
24 <d≤ 30	1	11	5	20	13	28	23	41	30	53
30 <d≤ 40	1	11	6	20	15	33	28	46	40	64
40 <d≤ 50	1	11	6	23	18	36	30	51	45	73
50 <d≤ 65	1	15	8	28	23	43	38	61	55	90
65 <d≤ 80	1	15	10	30	25	51	46	71	65	105
80 <d≤ 100	1	18	12	36	30	58	53	84	75	120
100 <d≤ 120	2	20	15	41	36	66	61	97	90	140
120 <d≤ 140	2	23	18	48	41	81	71	114	105	160
140 <d≤ 160	2	23	18	53	46	91	81	130	120	180
160 <d≤ 180	2	25	20	61	53	102	91	147	135	200
180 <d≤ 200	2	30	25	71	63	117	107	163	150	230
200 <d≤ 225	2	35	25	85	75	140	125	195	175	265
225 <d≤ 250	2	40	30	95	85	160	145	225	205	300
250 <d≤ 280	2	45	35	105	90	170	155	245	225	340
280 <d≤ 315	2	55	40	115	100	190	175	270	245	370
315 <d≤ 355	3	60	45	125	110	210	195	300	275	410
355 <d≤ 400	3	70	55	145	130	240	225	340	315	460
400 <d≤ 450	3	80	60	170	150	270	250	380	350	510
450 <d≤ 500	3	90	70	190	170	300	280	420	390	570
500 <d≤ 560	10	100	80	210	190	330	310	470	440	630
560 <d≤ 630	10	110	90	230	210	360	340	520	490	690
630 <d≤ 710	20	130	110	260	240	400	380	570	540	760
710 <d≤ 800	20	140	120	290	270	450	430	630	600	840

Value in µm

Design criteria

- **Bearing life**

- **Residual radial clearance**

- **Bearings operating under heavy axial loads**

The performance of bearings operating under heavy axial loads can be improved by increasing the radial clearance in order to create a contact angle in operation. The axial load Fa must not exceed a mean value of 0.5 C0.

This type of operation has to be studied according to the loading conditions and dimensions of the bearings. Consult with SNR.

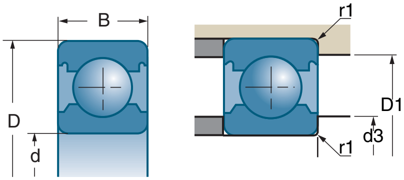
- **Unit made up by two side-by-side bearings**

Each pair of bearings is calculated like a single bearing.

Suffixes and prefixes

A	Increased capacity
C3	Radial clearance of the group ISO 3
C4	Radial clearance of the group ISO 4
D..	Special grease
E - EE	Sealing by nitrile seal
E3 -EE3	Sealing by high temperature seal
F...	Special function
G14 - G15	Polyamide cage
2RS	Two-side sealing for thin section ball bearings
2Z	Two-side protection for thin section ball bearings
Z -ZZ	Protection by metal shields

Single-row radial ball bearings *(continued)*

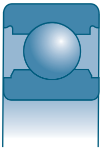


d	References	D	B	C	C_0	rpm*	rpm*
mm	References	mm	mm	10^3N	10^3N	rpm*	rpm*
3	623	10	4	0.64	0.23	70000	80000
4	624	13	5	1.30	0.49	54000	63000
	634	16	5	1.88	0.68	45000	53000
5	625	16	5	1.88	0.68	47000	55000
	635	19	6	2.46	1.05	34000	40000
6	626	19	6	2.46	1.05	35000	41000
7	607	19	6	2.46	1.05	37000	46000
	627	22	7	3.30	1.36	32000	37000
8	608	22	7	3.30	1.36	34000	42000
9	609	24	7	3.65	1.64	30000	37000
	629	26	8	4.60	1.97	26000	30000
10	61800	19	5	1.83	0.92	34000	42000
	61900	22	6	2.70	1.27	31000	38000
	6000	26	8	4.60	1.97	27000	34000
	6200	30	9	6.00	2.65	23000	27000
	6300	35	11	7.60	3.45	19000	24000
12	61801	21	5	1.92	1.04	30000	37000
	61901	24	6	2.90	1.46	27000	34000
	6001	28	8	5.10	2.37	25000	32000
	6201	32	10	6.80	3.05	21000	25000
	6301	37	12	9.70	4.20	18000	23000
15	61802	24	5	2.08	1.26	25000	31000
	61902	28	7	4.35	2.25	23000	28000
	16002	32	8	5.60	2.85	22000	26000
	6002	32	9	5.60	2.85	21000	26000
	6202	35	11	7.70	3.75	19000	22000
	6302	42	13	11.40	5.40	15000	19000
17	61803	26	5	2.23	1.46	23000	28000
	61903	30	7	4.60	2.55	21000	26000
	16003	35	8	6.00	3.25	20000	24000
	6003	35	10	6.00	3.25	19000	24000

* These are the speed limits according to the SNR concept (see pages 85 to 87).

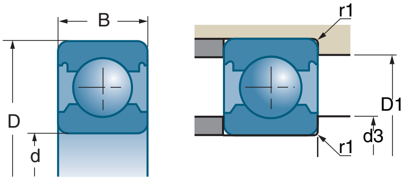
Characteristics

■ Open bearing



References	d3 min mm	D1 max mm	r1 max mm	kg
623	5.0	8.0	0.10	0.002
624 634	5.5 6.0	11.5 14.0	0.20 0.30	0.003 0.005
625 635	7.0 7.0	14.0 17.0	0.30 0.30	0.007 0.010
626	8.0	17.0	0.30	0.009
607 627	9.0 9.0	17.0 20.0	0.30 0.30	0.008 0.012
608	10.0	20.0	0.30	0.012
609 629	11.0 12.9	22.0 22.1	0.30 0.30	0.015 0.020
61800 61900 6000 6200 6300	12.0 12.0 12.0 14.0 14.0	17.0 20.0 24.0 26.0 31.0	0.30 0.30 0.30 0.60 0.60	0.005 0.013 0.019 0.033 0.055
61801 61901 6001 6201 6301	14.0 14.0 14.0 16.0 17.9	19.0 22.0 26.0 28.0 31.5	0.30 0.30 0.30 0.60 1.00	0.006 0.014 0.022 0.038 0.060
61802 61902 16002 6002 6202 6302	17.0 17.0 17.0 17.0 19.0 21.0	22.0 26.0 30.0 30.0 31.2 36.3	0.30 0.30 0.30 0.30 0.60 1.00	0.007 0.015 0.026 0.030 0.044 0.083
61803 61903 16003 6003	19.0 19.0 19.0 19.0	24.0 28.0 33.0 33.0	0.30 0.30 0.30 0.30	0.008 0.016 0.032 0.039

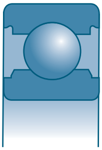
Single-row radial ball bearings *(continued)*



d		D	B	C	C_0		
mm	References	mm	mm	10^3N	10^3N	rpm*	rpm*
17	6203	40	12	9.60	4.80	16000	19000
	6303	47	14	13.60	6.60	14000	17000
	6403	62	17	22.70	10.80	12000	14000
20	61804	32	7	2.95	1.87	19500	23500
	61904	37	9	6.40	3.70	17500	20500
	16004	42	8	6.80	4.10	17000	20000
	6004	42	12	9.40	5.00	16000	20000
	6204	47	14	12.80	6.70	13000	16000
	6304	52	15	15.90	7.90	12000	15000
	6404	72	19	29.50	15.50	9600	12000
25	61805	37	7	4.30	2.95	17000	20000
	61905	42	9	7.00	4.55	15000	18000
	16005	47	8	10.10	5.90	14000	17000
	6005	47	12	10.10	5.90	13000	17000
	6205	52	15	14.00	7.90	12000	14000
	6305	62	17	22.40	11.50	10000	13000
	6405	80	21	36.00	19.30	8600	11000
30	61806	42	7	4.55	3.40	14500	17500
	61906	47	9	7.20	4.35	13500	16000
	16006	55	9	11.20	7.40	11000	14000
	6006	55	13	13.20	8.30	11000	14000
	6206	62	16	19.50	11.30	10000	12000
	6306	72	19	28.00	15.80	8900	10000
	6406	90	23	43.50	23.80	7600	9300
35	61807	47	7	4.75	3.80	13000	15500
	61907	55	10	9.60	5.90	11500	14000
	16007	62	9	12.10	8.80	10000	12000
	6007	62	14	16.00	10.30	10000	12000
	6207	72	17	25.50	15.30	8900	10000
	6307	80	21	33.50	19.20	8000	9800
	6407	100	25	55.00	31.00	6800	8300
40	61808	52	7	4.90	4.15	11500	14000
	61908	62	12	12.20	7.70	10000	12000
	16008	68	9	13.20	10.30	9800	11000
	6008	68	15	16.80	11.50	9200	11000
	6208	80	18	29.00	17.90	7800	9100
	6308	90	23	40.50	23.90	7000	8200
	6408	110	27	63.00	36.50	6200	7600

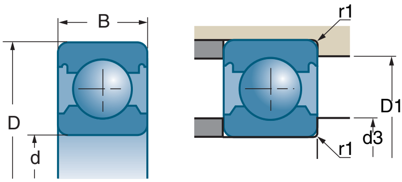
* These are the speed limits according to the SNR concept (see pages 85 to 87).

Open bearing *(continued)*



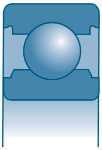
References	d3 min mm	D1 max mm	r1 max mm	kg
6203	21.0	36.0	0.60	0.067
6303	23.0	41.0	1.00	0.113
6403	25.0	54.0	1.10	0.272
61804	22.2	29.8	0.30	0.018
61904	22.2	34.8	0.30	0.036
16004	22.0	40.0	0.30	0.050
6004	24.0	38.0	0.60	0.068
6204	26.0	41.3	1.00	0.108
6304	27.0	45.0	1.10	0.140
6404	28.0	64.0	1.10	0.408
61805	27.2	34.8	0.30	0.022
61905	27.2	39.8	0.30	0.042
16005	27.0	45.0	0.30	0.056
6005	29.0	43.0	0.60	0.083
6205	31.0	46.5	1.00	0.128
6305	32.0	55.0	1.10	0.183
6405	35.0	70.0	1.50	0.534
61806	32.2	39.8	0.30	0.026
61906	32.3	44.8	0.30	0.048
16006	32.0	53.0	0.30	0.082
6006	37.5	50.0	1.00	0.111
6206	36.0	56.0	1.00	0.199
6306	37.0	65.0	1.10	0.346
6406	40.0	80.0	1.50	0.734
61807	37.2	44.8	0.30	0.029
61907	38.6	51.4	0.60	0.074
16007	37.0	60.0	0.30	0.105
6007	40.0	57.0	1.00	0.153
6207	42.0	65.0	1.10	0.285
6307	44.0	71.0	1.50	0.446
6407	45.0	90.0	1.50	0.962
61808	42.2	49.8	0.30	0.035
61908	43.6	58.4	0.60	0.110
16008	42.0	66.0	0.30	0.120
6008	45.0	63.0	1.00	0.192
6208	47.0	73.0	1.10	0.364
6308	49.0	81.0	1.50	0.612
6408	52.0	98.0	2.00	1.216

Single-row radial ball bearings *(continued)*



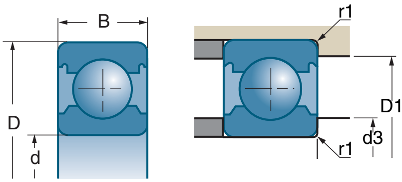
d		D	B	C	C_0		
mm	References	mm	mm	10^3N	10^3N	rpm*	rpm*
45	61809	58	7	6.60	5.90	9600	11000
	61909	68	12	14.10	10.90	9100	11000
	16009	75	10	15.90	11.90	9600	11000
	6009	75	16	21.00	15.20	8300	10000
	6209	85	19	31.50	20.70	7100	8300
	6309	100	25	53.00	31.50	6400	7900
	6409	120	29	77.00	45.00	5600	6900
50	61810	65	7	6.80	6.30	8600	10000
	61910	72	12	13.40	9.60	7900	9500
	16010	80	10	16.10	13.10	8100	9600
	6010	80	16	22.00	16.20	7600	9500
	6210	90	20	35.00	23.20	6800	8200
	6310	110	27	62.00	38.00	5600	6900
	6410	130	31	87.00	52.00	5200	6300
55	61811	72	9	9.10	8.50	7700	9600
	61911	80	13	16.60	14.10	7700	9200
	16011	90	11	19.40	16.20	7300	8600
	6011	90	18	30.50	22.00	6800	8500
	6211	100	21	43.50	29.00	6100	7400
	6311	120	29	71.00	44.50	5300	6500
	6411	140	33	100.00	62.00	4800	5800
60	61812	78	10	11.80	11.10	7100	8800
	61912	85	13	16.40	14.20	7200	8600
	16012	95	11	20.00	17.50	6800	8100
	6012	95	18	29.50	23.20	6400	8000
	6212	110	22	52.00	36.00	5500	6600
	6312	130	31	82.00	52.00	4800	5900
	6412	150	35	104.00	68.00	4200	5100
65	61813	85	10	12.30	12.00	6600	8100
	61913	90	13	17.40	16.00	6800	8100
	16013	100	11	21.70	18.90	6400	7600
	6013	100	18	30.50	25.00	6100	7500
	6213	120	23	57.00	40.00	5100	6200
	6313	140	33	93.00	60.00	4500	5500
	6413	160	37	113.00	77.00	4100	5000

* These are the speed limits according to the SNR concept (see pages 85 to 87).



References	d3 min mm	D1 max mm	r1 max mm	kg
61809	47.6	55.4	0.30	0.039
61909	49.2	63.8	0.60	0.130
16009	49.0	71.0	0.60	0.167
6009	50.0	70.0	1.00	0.243
6209	52.0	78.0	1.10	0.416
6309	54.0	91.0	1.50	0.825
6409	57.0	108.0	2.00	1.526
61810	52.6	62.4	0.30	0.052
61910	54.2	67.8	0.60	0.130
16010	54.0	76.0	0.60	0.181
6010	55.0	75.0	1.00	0.250
6210	57.0	83.0	1.10	0.453
6310	61.0	99.0	2.00	1.070
6410	64.0	116.0	2.10	1.880
61811	57.6	69.4	0.30	0.084
61911	60.4	74.6	1.00	0.180
16011	59.0	86.0	0.60	0.266
6011	61.0	84.0	1.10	0.362
6211	64.0	91.0	1.50	0.603
6311	66.0	109.0	2.00	1.347
6411	69.0	126.0	2.10	2.302
61812	62.6	75.4	0.30	0.105
61912	65.4	79.6	1.00	0.190
16012	64.0	91.0	0.60	0.283
6012	66.0	89.0	1.10	0.411
6212	69.0	101.0	1.50	0.785
6312	73.0	117.0	2.10	1.680
6412	74.0	136.0	2.10	2.870
61813	69.2	80.8	0.60	0.130
61913	70.4	84.6	1.00	0.200
16013	69.0	96.0	0.60	0.300
6013	71.0	94.0	1.10	0.444
6213	74.0	111.0	1.50	0.991
6313	78.0	127.0	2.10	2.077
6413	79.0	146.0	2.10	3.420

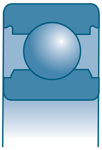
Single-row radial ball bearings *(continued)*



d		D	B	C	C_0		
mm	References	mm	mm	10^3N	10^3N	rpm*	rpm*
70	61814	90	10	12.40	12.40	6100	7600
	61914	100	16	23.70	18.30	6100	7300
	16014	110	13	28.00	25.00	5800	7000
	6014	110	20	38.00	31.00	5500	6800
	6214	125	24	62.00	44.00	4900	5800
	6314	150	35	104.00	68.00	4200	5100
	6414	180	42	143.00	103.00	3700	4500
75	61815	95	10	12.90	13.30	5800	7100
	61915	105	16	24.40	22.50	5800	7000
	16015	115	13	28.50	27.00	5500	6600
	6015	115	20	39.50	33.50	5200	6500
	6215	130	25	67.00	48.00	4600	5600
	6315	160	37	113.00	77.00	3900	4800
80	61816	100	10	13.00	13.80	5500	6700
	61916	110	16	25.00	23.90	5500	6600
	16016	125	14	32.00	31.00	5100	6000
	6016	125	22	47.50	39.50	4800	6000
	6216	140	26	73.00	53.00	4300	5200
	6316	170	39	123.00	86.00	3700	4500
	6416	200	48	163.00	125.00	3300	4000
85	61817	110	13	19.30	19.80	5000	6200
	16017	130	14	34.00	33.50	4900	5800
	6017	130	22	49.50	43.00	4600	5700
	6217	150	28	84.00	62.00	4000	4800
	6317	180	41	133.00	97.00	3500	4300
90	61818	115	13	19.50	20.50	4800	5900
	16018	140	16	41.50	39.50	4600	5400
	6018	140	24	58.00	49.50	4300	5300
	6218	160	30	96.00	71.00	3800	4600
	6318	190	43	143.00	107.00	3300	4000
95	61819	120	13	19.80	21.30	4600	5600
	6019	145	24	60.00	54.00	4000	5000
	6219	170	32	109.00	82.00	3600	4300
	6319	200	45	144.00	113.00	3100	3800

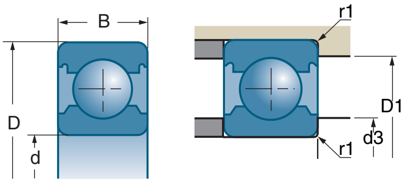
* These are the speed limits according to the SNR concept (see pages 85 to 87).

Open bearing *(continued)*



References	d3 min mm	D1 max mm	r1 max mm	kg
61814	74.2	85.8	0.60	0.140
61914	75.4	94.6	1.00	0.360
16014	74.0	106.0	0.60	0.438
6014	76.0	104.0	1.10	0.610
6214	79.0	116.0	1.50	1.055
6314	83.0	137.0	2.10	2.580
6414	86.0	164.0	3.00	5.090
61815	79.2	90.8	0.60	0.150
61915	80.4	99.6	1.00	0.360
16015	79.0	111.0	0.60	0.463
6015	81.0	109.0	1.10	0.640
6215	84.0	121.0	1.50	1.190
6315	88.0	147.0	2.10	3.031
61816	84.2	95.2	0.60	0.155
61916	85.4	104.6	1.00	0.380
16016	84.0	121.0	0.60	0.609
6016	86.0	119.0	1.10	0.870
6216	91.0	129.0	2.00	1.420
6316	93.0	157.0	2.10	3.605
6416	96.0	184.0	3.00	8.070
61817	90.4	104.6	1.00	0.270
16017	89.0	126.0	0.60	0.666
6017	91.0	124.0	1.10	0.900
6217	96.0	139.0	2.00	1.820
6317	99.0	166.0	3.00	4.210
61818	95.4	109.6	1.00	0.280
16018	95.0	135.0	1.00	0.866
6018	98.0	132.0	1.50	1.175
6218	101.0	149.0	2.00	2.180
6318	104.0	176.0	3.00	5.020
61819	100.4	114.6	1.00	0.295
6019	103.0	137.0	1.50	1.220
6219	108.0	157.0	2.10	2.800
6319	109.0	186.0	3.00	6.140

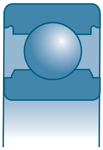
Single-row radial ball bearings *(continued)*



d	References	D	B	C	C_0	rpm*	rpm*
mm		mm	mm	10^3N	10^3N	rpm*	rpm*
100	61820	125	13	20.10	22.00	4400	5400
	16020	150	16	44.00	44.50	4200	5000
	6020	150	24	60.00	54.00	4000	4900
	6220	180	34	122.00	93.00	3400	4100
	6320	215	47	164.00	135.00	2900	3600
105	61821	130	13	20.80	23.60	4200	5100
	6021	160	26	72.00	66.00	3700	4600
	6221	190	36	133.00	104.00	3200	3900
110	61822	140	16	28.00	30.50	3900	4800
	16022	170	19	57.00	57.00	3700	4500
	6022	170	28	82.00	73.00	3500	4400
	6222	200	38	144.00	117.00	3100	3700
	6322	240	50	189.00	165.00	2600	3200
120	61824	150	16	29.00	33.00	3600	4500
	16024	180	19	61.00	64.00	3500	4200
	6024	180	28	85.00	79.00	3300	4100
	6224	215	40	145.00	123.00	2800	3400
	6324	260	55	212.00	190.00	2400	3000
130	61826	165	18	38.00	43.00	3600	4400
	16026	200	22	79.00	82.00	3200	3800
	6026	200	33	106.00	101.00	3000	3700
	6226	230	40	167.00	146.00	2600	3000
	6326	280	58	229.00	214.00	2200	2700
140	61828	175	18	39.00	46.00	3400	4100
	16028	210	22	81.00	87.00	3000	3600
	6028	210	33	109.00	107.00	2800	3500
	6228	250	42	177.00	165.00	2400	5400
	6328	300	62	255.00	246.00	2100	2600
150	61830	190	20	51.00	60.00	3100	3800
	6030	225	35	123.00	124.00	2600	3300
	6230	270	45	176.00	168.00	2200	2700
	6330	320	65	280.00	290.00	1900	2400
160	61832	200	20	52.00	62.00	3000	3600
	16032	240	25	102.00	113.00	2600	3100

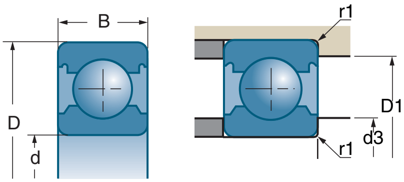
* These are the speed limits according to the SNR concept (see pages 85 to 87).

Open bearing *(continued)*



References	d3 min mm	D1 max mm	r1 max mm	kg
61820	105.4	119.6	1.00	0.310
16020	105.0	145.0	1.00	0.929
6020	108.0	142.0	1.50	1.260
6220	113.0	167.0	2.10	3.129
6320	114.0	201.0	3.00	7.560
61821	110.4	124.6	1.00	0.330
6021	114.0	151.0	2.00	1.590
6221	118.0	177.0	2.10	3.860
61822			1.00	0.500
16022	115.0	165.0	1.00	1.510
6022	119.0	161.0	2.00	1.490
6222	123.0	187.0	2.10	3.860
6322	124.0	226.0	3.00	10.300
61824	125.4	144.6	1.00	0.550
16024	125.0	175.0	1.00	1.600
6024	129.0	171.0	2.00	2.090
6224	133.0	202.0	2.10	5.600
6324	134.0	246.0	3.00	12.800
61826	137.6	157.4	1.10	0.780
16026	136.0	194.0	1.10	2.410
6026	138.8	191.2	2.00	3.270
6226	144.0	216.0	3.00	6.220
6326	148.0	262.0	4.00	18.200
61828	147.6	167.4	1.10	0.830
16028	146.0	204.0	1.00	2.530
6028	149.0	201.0	2.00	3.570
6228	154.0	236.0	3.00	7.470
6328	157.0	283.0	3.00	22.100
61830	157.6	182.4	1.10	1.350
6030	159.0	216.0	2.10	4.380
6230	164.0	256.0	2.50	10.300
6330	167.0	303.0	3.00	26.600
61832	167.6	192.4	1.10	1.400
16032	167.0	233.0	1.50	3.770

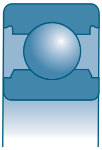
Single-row radial ball bearings *(continued)*



d		D	B	C	C0		
mm	References	mm	mm	10³N	10³N	rpm*	rpm*
160	6032	240	38	137.00	135.00	2500	3000
	6232	290	48	199.00	203.00	2100	2500
	6332	340	68	300.00	325.00	1800	2200
170	61834	215	22	61.00	73.00	2800	3300
	16034	260	28	123.00	136.00	2400	2900
	6034	260	42	168.00	172.00	2300	2800
	6234	310	52	212.00	224.00	2000	2400
180	61836	225	22	62.00	76.00	2700	3200
	16036	280	31	131.00	146.00	2300	2800
	6036	280	46	188.00	196.00	2100	2700
	6236	320	52	226.00	244.00	1900	2300
190	61838	240	24	69.00	85.00	2500	3000
	16038	290	31	149.00	167.00	2200	2600
	6038	290	46	195.00	213.00	2000	2500
	6238	340	55	255.00	280.00	1800	2100
200	61840	250	24	70.00	88.00	2400	2900
	16040	310	34	175.00	202.00	2000	2400
	6040	310	51	214.00	238.00	1900	2400
	6240	360	58	270.00	310.00	1700	2000
220	61844	270	24	73.00	97.00	2200	2600
240	61848	300	28	92.00	120.00	2000	2400
260	61852	320	28	94.00	128.00	1900	2200
280	61856	350	33	126.00	170.00	1700	2000
300	61860	380	38	148.00	198.00	1600	1900
320	61864	400	38	154.00	213.00	1500	1800
340	61868	420	38	155.00	219.00	1400	1700
360	61872	440	38	160.00	234.00	1350	1600

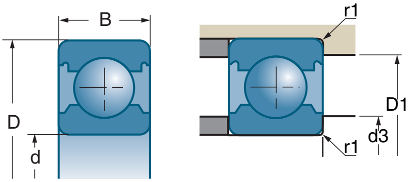
* These are the speed limits according to the SNR concept (see pages 85 to 87).

Open bearing *(continued)*



References	d3 min mm	D1 max mm	r1 max mm	kg
6032	170.0	230.0	2.10	6.120
6232	174.0	276.0	2.50	14.300
6332	177.0	323.0	3.00	31.500
61834	177.6	207.4	1.10	1.600
16034	177.0	253.0	1.50	5.130
6034	180.0	250.0	2.10	8.200
6234	187.0	293.0	3.00	17.700
61836	187.6	217.4	1.10	2.000
16036	189.0	271.0	2.00	6.920
6036	190.0	270.0	2.10	10.700
6236	197.0	303.0	3.00	18.300
61838	199.0	231.0	1.50	2.700
16038	199.0	281.0	2.00	7.090
6038	200.0	280.0	2.10	11.270
6238	207.0	323.0	3.00	22.200
61840	209.0	241.0	1.50	2.700
16040	219.0	301.0	2.00	9.110
6040	210.0	300.0	2.10	14.430
6240	217.0	343.0	3.00	26.500
61844	229.0	261.0	1.50	2.900
61848	251.0	289.0	2.00	4.500
61852	271.0	309.0	2.00	4.800
61856	291.0	339.0	2.00	7.300
61860	314.0	366.0	2.10	10.500
61864	334.0	386.0	2.10	11.000
61868	354.0	406.0	2.10	11.500
61872	374.0	426.0	2.10	12.000

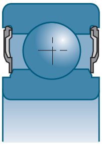
Single-row radial ball bearings *(continued)*

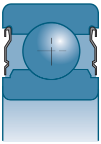


d mm	References	D mm	B mm	C 10^3N	C_0 10^3N	rpm EE/2RS*	rpm ZZ*
3	623 EE 623 ZZ	10	4	0.64	0.23	47000	70000
4	604 ZZ	12	4	0.71	0.27		60000
	624 EE 624 ZZ	13	5	1.3	0.5	36000	54000
	634 EE 634 ZZ	16	5	1.88	0.68	25000	46000
5	625 EE 625 ZZ	16	5	1.88	0.68	31000	47000
	635 ZZ	19	6	2.46	1.05		34000
6	626 EE 626 ZZ	19	6	2.46	1.05	23000	35000
7	607 EE 607 ZZ	19	6	2.46	1.05	25000	37000
	627 EE 627 ZZ	22	7	3.3	1.36	21000	32000
8	608 EE 608 ZZ	22	7	3.3	1.36	23000	34000
9	609 EE 609 ZZ	24	7	3.65	1.64	20000	30000
	629 EE 629 ZZ	26	8	4.6	1.97	17000	26000
10	61800 EE 61800 ZZ	19	5	1.83	0.92	22000	34000
	61900 EE 61900 ZZ	22	6	2.7	1.27	20000	31000
	6000 EE 6000 ZZ	26	8	4.6	1.97	18000	27000
	63000 EE	26	12	4.6	1.97	18000	
	6200 EE 6200 ZZ	30	9	6	2.65	15000	23000
	62200 EE 62200 ZZ	30	14	6	2.65	15000	18000
	6300 EE 6300 ZZ	35	11	7.6	3.45	13000	20000
	62300 EE	35	17	8.1	3.45	13000	
12	61801 EE 61801 ZZ	21	5	1.92	1.04	20000	30000
	61901 EE 61901 ZZ	24	6	2.9	1.46	18000	27000
	6001 EE 6001 ZZ	28	8	5.1	2.37	16000	25000
	63001 EE	28	12	5.1	2.37	16000	
	6201 EE 6201 ZZ	32	10	6.8	3.05	14000	21000
	62201 EE	32	14	6.9	3.1	14000	
	6301 EE 6301 ZZ	37	12	9.7	4.2	12000	18000
	62301 EE	37	17	9.7	4.2	12000	
15	61802 EE 61802 ZZ	24	5	2.08	1.26	17000	25000
	61902 EE 61902 ZZ	28	7	4.35	2.25	15000	23000
	6002 EE 6002 ZZ	32	9	5.6	2.85	14000	21000
	63002 EE	32	13	5.6	2.85	14000	

* These are the speed limits according to the SNR concept (see pages 85 to 87).

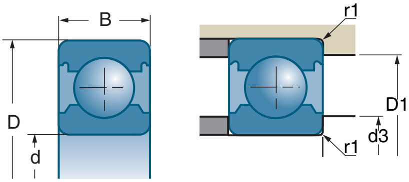
Sealed and shielded bearing





References		d3 min	D1 max	r1 max	
		mm	mm	mm	kg
623 EE	623 ZZ	5.0	8.0	0.10	0.0015
	604 ZZ	5.4	10.6	0.20	0.0021
624 EE	624 ZZ	5.5	11.5	0.20	0.0060
634 EE	634 ZZ	6.0	14.0	0.30	0.0050
625 EE	625 ZZ	7.0	14.0	0.30	0.0070
	635 ZZ	7.0	17.0	0.30	0.0100
626 EE	626 ZZ	8.0	17.0	0.30	0.0090
607 EE	607 ZZ	9.0	17.0	0.30	0.0120
627 EE	627 ZZ	9.0	20.0	0.30	0.0120
608 EE	608 ZZ	10.0	20.0	0.30	0.0120
609 EE	609 ZZ	11.0	22.0	0.30	0.0140
629 EE	629 ZZ	12.9	22.1	0.30	0.0200
61800 EE	61800 ZZ	12.0	17.0	0.30	0.0050
61900 EE	61900 ZZ	12.0	20.0	0.30	0.0130
6000 EE	6000 ZZ	12.0	24.0	0.30	0.0190
63000 EE		12.0	24.0	0.30	0.0280
6200 EE	6200 ZZ	14.0	26.0	0.60	0.0330
62200 EE	62200 ZZ	14.0	26.0	0.60	0.0480
6300 EE	6300 ZZ	14.0	31.0	0.60	0.0550
62300 EE		14.0	31.0	0.60	0.0790
61801 EE	61801 ZZ	14.0	19.0	0.30	0.0060
61901 EE	61901 ZZ	14.0	22.0	0.30	0.0140
6001 EE	6001 ZZ	14.0	26.0	0.30	0.0220
63001 EE		14.0	26.0	0.30	0.0290
6201 EE	6201 ZZ	16.0	28.0	0.60	0.0380
62201 EE		16.0	28.0	0.60	0.0490
6301 EE	6301 ZZ	17.9	31.5	1.00	0.0620
62301 EE		17.9	31.5	1.00	0.0700
61802 EE	61802 ZZ	17.0	22.0	0.30	0.0070
61902 EE	61902 ZZ	17.0	26.0	0.30	0.0150
6002 EE	6002 ZZ	17.0	30.0	0.30	0.0300
63002 EE		17.0	30.0	0.30	0.0440

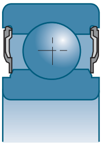
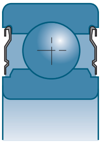
Single-row radial ball bearings *(continued)*



d	References	D	B	C	C_0		
mm	References	mm	mm	10^3N	10^3N	rpm EE/2RS*	rpm ZZ*
15	6202 EE 6202 ZZ	35	11	7.7	3.75	12000	19000
	62202 EE	35	14	7.7	3.75	12000	
	6302 EE 6302 ZZ	42	13	11.3	5.4	11000	16000
	62302 EE	42	17	11.3	5.4	11000	
17	61803 EE 61803 ZZ	26	5	2.23	1.46	15000	23000
	61903 EE 61903 ZZ	30	7	4.6	2.55	14000	21000
	6003 EE 6003 ZZ	35	10	6	3.25	12000	19000
	63003 EE	35	14	6	3.25	12000	
	6203 EE 6203 ZZ	40	12	9.5	4.75	10000	16000
	62203 EE	40	16	9.5	4.75	11000	
	6303 EE 6303 ZZ	47	14	13.6	6.6	9300	14000
	62303 EE	47	19	13.6	6.6	9400	
20	61804 2RS 61804 2Z	32	7	2.95	1.87	11500	19500
	61904 2RS 61904 2Z	37	9	6.4	3.7	11000	17500
	6004 EE 6004 ZZ	42	12	9.4	5	10000	16000
	63004 EE	42	16	9.4	5	10000	
	6204 EE 6204 ZZ	47	14	12.8	6.6	9300	14000
	62204 EE	47	18	12.8	6.6	9500	
	6304 EE 6304 ZZ	52	15	15.9	7.9	8600	12000
	62304 EE	52	21	15.9	7.9	8600	
25	61805 2RS 61805 2Z	37	7	4.3	2.95	9800	17000
	61905 2RS 61905 2Z	42	9	7	4.55	9800	15000
	6005 EE 6005 ZZ	47	12	10.1	5.8	9300	14000
	63005 EE	47	16	10.1	5.8	9300	
	6205 EE 6205 ZZ	52	15	14	7.9	8100	12000
	62205 EE	52	18	14	7.9	8100	
	6305 EE 6305 ZZ	62	17	23.6	12.1	7100	10000
	62305 EE	62	24	23.6	12.1	7100	
30	61806 2RS 61806 2Z	42	7	4.55	3.4	8400	14500
	61906 2RS 61906 2Z	47	9	7.2	5	8100	13500
	6006 EE 6006 ZZ	55	13	13.2	8.3	7800	11000
	63006 EE	55	19	13.2	8.3	7800	
	6206 EE 6206 ZZ	62	16	19.5	11.3	6800	10000
	62206 EE	62	20	19.5	11.3	6900	
	6306 EE 6306 ZZ	72	19	27	15.2	5800	8900
	62306 EE	72	27	28	15.8	6000	

* These are the speed limits according to the SNR concept (see pages 85 to 87).

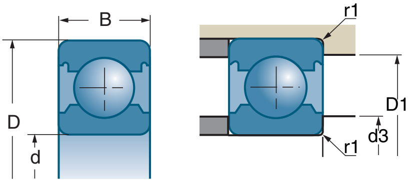
Sealed and shielded bearing *(continued)*

References		d3 min mm	D1 max mm	r1 max mm	kg
6202 EE	6202 ZZ	19.0	31.2	0.60	0.0460
62202 EE		19.0	31.2	0.60	0.0530
6302 EE	6302 ZZ	21.0	36.3	1.00	0.0830
62302 EE		21.0	36.3	1.00	0.1080
61803 EE	61803 ZZ	19.0	24.0	0.30	0.0080
61903 EE	61903 ZZ	19.0	28.0	0.30	0.0160
6003 EE	6003 ZZ	19.0	33.0	0.30	0.0390
63003 EE		19.0	33.0	0.30	0.0550
6203 EE	6203 ZZ	21.0	36.0	0.60	0.0677
62203 EE		21.0	36.0	0.60	0.0820
6303 EE	6303 ZZ	23.0	41.0	1.00	0.1130
62303 EE		23.0	41.0	1.00	0.1460
61804 2RS	61804 2Z	22.2	29.8	0.30	0.0180
61904 2RS	61904 2Z	22.2	34.8	0.30	0.0360
6004 EE	6004 ZZ	24.0	38.0	0.60	0.0680
63004 EE		24.0	38.0	0.60	0.0820
6204 EE	6204 ZZ	26.0	41.3	1.00	0.1000
62204 EE		26.0	41.3	1.00	0.1310
6304 EE	6304 ZZ	27.0	45.0	1.10	0.1470
62304 EE		27.0	45.0	1.10	0.1970
61805 2RS	61805 2Z	27.2	34.8	0.30	0.0220
61905 2RS	61905 2Z	27.2	39.8	0.30	0.0420
6005 EE	6005 ZZ	29.0	43.0	0.60	0.0800
63005 EE		29.0	43.0	0.60	0.1050
6205 EE	6205 ZZ	31.0	46.5	1.00	0.1270
62205 EE		31.0	46.5	1.00	0.1480
6305 EE	6305 ZZ	32.0	55.0	1.10	0.2250
62305 EE		32.0	55.0	1.10	0.3170
61806 2RS	61806 2Z	32.2	39.8	0.30	0.0260
61906 2RS	61906 2Z	32.3	44.8	0.30	0.0480
6006 EE	6006 ZZ	35.0	50.0	1.00	0.1160
63006 EE		35.0	50.0	1.00	0.1660
6206 EE	6206 ZZ	36.0	56.0	1.00	0.1990
62206 EE		36.0	56.0	1.00	0.2360
6306 EE	6306 ZZ	37.0	65.0	1.10	0.3500
62306 EE		37.0	65.0	1.10	0.4730

SNR

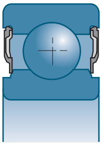
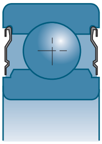
Single-row radial ball bearings *(continued)*



d	References	D	B	C	C0		
mm	References	mm	mm	10^3N	10^3N	rpm EE/2RS*	rpm ZZ*
35	61807 2RS 61807 2Z	47	7	4.75	3.8	7300	13000
	61907 2RS	55	10	9.6	5.9	8000	
	6007 EE 6007 ZZ	62	14	16	10.3	6800	10000
	63007 EE	62	20	16	10.3	6800	
	6207 EE 6207 ZZ	72	17	25.5	15.3	5900	8900
	62207 EE	72	23	25.5	15.3	5900	
	6307 EE 6307 ZZ	80	21	33.5	19.2	5300	8000
	62307 EE	80	31	33.5	19.2	5300	
40	61808 2RS 61808 2Z	52	7	4.9	4.15	6500	11500
	6008 EE 6008 ZZ	68	15	16.8	11.5	6100	9200
	63008 EE	68	21	16.8	11.5	6100	
	6208 EE 6208 ZZ	80	18	29.5	18.1	5200	7800
	62208 EE	80	23	29	17.9	5300	
	6308 EE 6308 ZZ	90	23	40.5	23.9	4700	7000
	62308 EE	90	33	40.5	23.9	4800	
45	61809 EE 61809 2ZY	58	7	6.6	5.9	6400	10500
	6009 EE 6009 ZZ	75	16	21	15.2	5500	8300
	6209 EE 6209 ZZ	85	19	32.5	20.5	4900	7300
	62209 EE	85	23	32.5	20.5	4900	
	6309 EE 6309 ZZ	100	25	53	31.5	4200	6200
50	61810 EE 61810 2ZY	65	7	6.8	6.3	5700	9300
	6010 EE 6010 ZZ	80	16	21.8	16.6	5000	7600
	6210 EE 6210 ZZ	90	20	35	23.2	4500	6800
	62210 EE	90	23	35	23.2	4500	
	6310 EE 6310 ZZ	110	27	62	38	3700	5600
55	61811 EE 61811 2ZY	72	9	9.1	8.5	5100	8400
	6011 EE 6011 ZZ	90	18	28.5	21.3	4500	6800
	6211 EE 6211 ZZ	100	21	43.5	29	4100	6100
	6311 EE 6311 ZZ	120	29	71	44.5	3500	5300
60	61812 EE 61812 2ZY	78	10	11.8	11.1	4700	7700
	6012 EE 6012 ZZ	95	18	29.5	23.2	4300	6400
	6212 EE 6212 ZZ	110	22	52	36	3600	5500
	6312 EE 6312 ZZ	130	31	82	52	3200	4800

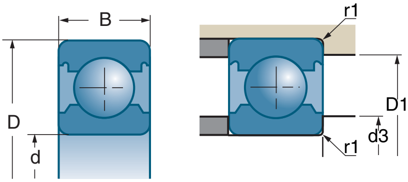
* These are the speed limits according to the SNR concept (see pages 85 to 87).

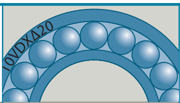
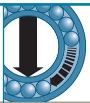
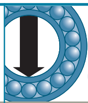
Sealed and shielded bearing *(continued)*

References		d3 min (mm)	D1 max (mm)	r1 max (mm)	kg
61807 2RS	61807 2Z	37.2	44.8	0.30	0.0290
61907 2RS		38.6	51.4	0.60	0.0740
6007 EE	6007 ZZ	40.0	57.0	1.00	0.1330
63007 EE		40.0	57.0	1.00	0.2140
6207 EE	6207 ZZ	42.0	65.0	1.10	0.2850
62207 EE		42.0	65.0	1.10	0.3750
6307 EE	6307 ZZ	44.0	71.0	1.50	0.4460
62307 EE		44.0	71.0	1.50	0.6580
61808 2RS	61808 2Z	42.2	49.8	0.30	0.0350
6008 EE	6008 ZZ	45.0	63.0	1.00	0.1920
63008 EE		45.0	63.0	1.00	0.2620
6208 EE	6208 ZZ	47.0	73.0	1.10	0.3670
62208 EE		47.0	73.0	1.10	0.4600
6308 EE	6308 ZZ	49.0	81.0	1.50	0.6120
62308 EE		49.0	81.0	1.50	0.8740
61809 EE	61809 2ZY	47.6	55.4	0.30	0.0390
6009 EE	6009 ZZ	50.0	70.0	1.00	0.2480
6209 EE	6209 ZZ	52.0	78.0	1.10	0.4040
62209 EE		52.0	78.0	1.10	0.4810
6309 EE	6309 ZZ	54.0	91.0	1.50	0.8250
61810 EE	61810 2ZY	52.6	62.4	0.30	0.0520
6010 EE	6010 ZZ	55.0	75.0	1.00	0.2654
6210 EE	6210 ZZ	57.0	83.0	1.10	0.4530
62210 EE		57.0	83.0	1.10	0.5140
6310 EE	6310 ZZ	61.0	99.0	2.00	1.0700
61811 EE	61811 2ZY	57.6	69.4	0.30	0.0840
6011 EE	6011 ZZ	61.0	84.0	1.10	0.3880
6211 EE	6211 ZZ	64.0	91.0	1.50	0.6030
6311 EE	6311 ZZ	66.0	109.0	2.00	1.3800
61812 EE	61812 2ZY	62.6	75.4	0.30	0.1050
6012 EE	6012 ZZ	66.0	89.0	1.10	0.4114
6212 EE	6212 ZZ	69.0	101.0	1.50	0.7850
6312 EE	6312 ZZ	73.0	117.0	2.10	1.7200

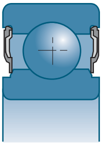
Single-row radial ball bearings *(continued)*

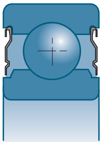


d		D	B	 C	 C_0		
mm	References	mm	mm	10^3N	10^3N	rpm EE/2RS*	rpm ZZ*
65	61813 EE 61813 2ZY	85	10	12.3	12	4400	7100
	6013 EE 6013 ZZ	100	18	30.5	25	4000	6100
	6213 EE 6213 ZZ	120	23	57	40	3400	5100
	6313 EE 6313 ZZ	140	33	93	60	3000	4500
70	61814 EE 61814 2ZY	90	10	12.4	12.4	4100	6700
	6014 EE 6014 ZZ	110	20	38	31	3700	5500
	6214 EE 6214 ZZ	125	24	62	44	3200	4900
	6314 EE 6314 ZZ	150	35	104	68	2800	4200
75	61815 EE 61815 2ZY	95	10	12.9	13.3	3800	6300
	6015 EE 6015 ZZ	115	20	39.5	33.5	3500	5200
	6215 EE 6215 ZZ	130	25	67	48	3100	4600
	6315 EE 6315 ZZ	160	37	113	77	2600	3900
80	61816 EE 61816 2ZY	100	10	13	13.8	3600	6000
	6016 EE 6016 ZZ	125	22	47.5	39.5	3200	4800
	6216 EE 6216 ZZ	140	26	73	53	2900	4300
	6316 EE 6316 ZZ	170	39	123	86	2400	3700
85	61817 EE 61817 2ZY	110	13	19.3	19.8	3300	5500
	6017 EE 6017 ZZ	130	22	49.5	43	3100	4600
	6217 EE 6217 ZZ	150	28	84	62	2700	4000
	6317 EE 6317 ZZ	180	41	133	97	2300	3500
90	61818 EE 61818 2ZY	115	13	19.5	20.5	3200	5200
	6018 EE 6018 ZZ	140	24	58	49.5	2800	4300
	6218 EE 6218 ZZ	160	30	96	71	2500	3800
	6318 EE 6318 ZZ	190	43	143	107	2200	3300
95	61819 EE 61819 2ZY	120	13	19.8	21.3	3000	5000
	6019 EE 6019 ZZ	145	24	60	54	2700	4000
	6219 EE 6219 ZZ	170	32	109	82	2400	3600
	6319 ZZ	170	32	109	82		3100
100	61820 EE 61820 2ZY	125	13	20.1	22	2900	4800
	6020 EE 6020 ZZ	150	24	60	54	2600	4000
	6220 EE 6220 ZZ	180	34	122	93	2300	3400
	6320 ZZ	180	34	122	93		2900

* These are the speed limits according to the SNR concept (see pages 85 to 87).

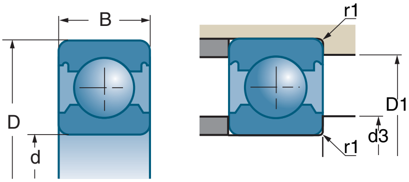
Sealed and shielded bearing *(continued)*





References		d3 min	D1 max	r1 max	
		mm	mm	mm	kg
61813 EE	61813 2ZY	69.2	80.8	0.60	0.1300
6013 EE	6013 ZZ	71.0	94.0	1.10	0.4540
6213 EE	6213 ZZ	74.0	111.0	1.50	0.9910
6313 EE	6313 ZZ	78.0	127.0	2.10	2.0770
61814 EE	61814 2ZY	74.2	85.8	0.60	0.1400
6014 EE	6014 ZZ	76.0	104.0	1.10	0.6100
6214 EE	6214 ZZ	79.0	116.0	1.50	1.0000
6314 EE	6314 ZZ	83.0	137.0	2.10	2.5660
61815 EE	61815 2ZY	79.2	90.8	0.60	0.1500
6015 EE	6015 ZZ	81.0	109.0	1.10	0.6400
6215 EE	6215 ZZ	84.0	121.0	1.50	1.1900
6315 EE	6315 ZZ	88.0	147.0	2.10	3.1200
61816 EE	61816 2ZY	84.2	95.2	0.60	0.1550
6016 EE	6016 ZZ	86.0	119.0	1.10	0.8700
6216 EE	6216 ZZ	91.0	129.0	2.00	1.4200
6316 EE	6316 ZZ	93.0	157.0	2.10	3.7000
61817 EE	61817 2ZY	90.4	104.6	1.00	0.2700
6017 EE	6017 ZZ	91.0	124.0	1.10	0.9000
6217 EE	6217 ZZ	96.0	139.0	2.00	1.8500
6317 EE	6317 ZZ	99.0	166.0	3.00	4.2100
61818 EE	61818 2ZY	95.4	109.6	1.00	0.2800
6018 EE	6018 ZZ	98.0	132.0	1.50	1.1750
6218 EE	6218 ZZ	101.0	149.0	2.00	2.2500
6318 EE	6318 ZZ	104.0	176.0	3.00	4.9730
61819 EE	61819 2ZY	100.4	114.6	1.00	0.2950
6019 EE	6019 ZZ	103.0	137.0	1.50	1.2200
6219 EE	6219 ZZ	108.0	157.0	2.10	2.8000
	6319 ZZ	108.0	157.0	2.10	2.6700
61820 EE	61820 2ZY	105.4	119.6	1.00	0.3100
6020 EE	6020 ZZ	108.0	142.0	1.50	1.2600
6220 EE	6220 ZZ	113.0	167.0	2.10	3.1200
	6320 ZZ	113.0	167.0	2.10	3.1870

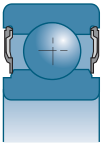
Single-row radial ball bearings *(continued)*

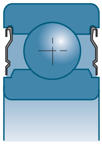


d	References	D	B	C	C_0		
mm	References	mm	mm	10^3N	10^3N	rpm EE/2RS*	rpm ZZ*
105	61821 EE 61821 2ZY 6021 EE	130 160	13 26	20.8 72	23.6 66	2800 2400	4600
110	61822 EE 61822 2ZY 6022 EE	140 170	16 28	28 82	30.5 73	2600 2300	4300
120	61824 EE 61824 2ZY 6024 EE	150 180	16 28	29 85	33 79	2400 2200	4000
130	61826 2RS 61826 2Z	165	18	38	43	2000	3600
140	61828 2RS 61828 2Z 6028 EE	175 210	18 33	39 109	46 107	1850 2800	3400
160	6032 EE	240	38	137	135	2500	

* These are the speed limits according to the SNR concept (see pages 85 to 87).

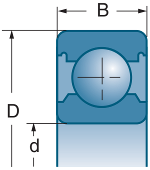
Sealed and shielded bearing *(continued)*

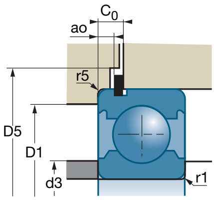




References	d3 min mm	D1 max mm	r1 max mm	kg
61821 EE 61821 2ZY 6021 EE	110.4 114.0	124.6 151.0	1.00 2.00	0.3300 1.5900
61822 EE 61822 2ZY 6022 EE	115.4 119.0	134.6 161.0	1.00 2.00	0.5000 1.4900
61824 EE 61824 2ZY 6024 EE	125.4 129.0	144.6 171.0	1.00 2.00	0.5500 2.1400
61826 2RS 61826 2Z	137.6	157.4	1.10	0.7800
61828 2RS 61828 2Z 6028 EE	147.6 149.0	167.4 201.0	1.10 2.00	0.8300 3.6500
6032 EE	170.0	230.0	2.10	6.3000

Single-row radial ball bearings *(continued)*

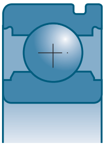


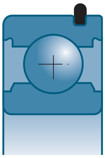


d mm	References		D mm	B mm	C 10^3N	C_0 10^3N	rpm*	rpm*	a0 min mm	a0 max mm
10	6200 N	6200 NR	30	9	6	2.65	23000	27000	1.9	2.06
12	6201 N	6201 NR	32	10	6.9	3.1	21000	25000	1.9	2.06
15	6002 N	6002 NR	32	9	5.6	2.85	21000	26000	1.9	2.06
	6202 N	6202 NR	35	11	7.7	3.75	19000	22000	1.9	2.06
17	6003 N	6003 NR	35	10	6	3.25	19000	23000	1.9	2.06
	6203 N	6203 NR	40	12	9.5	4.75	16000	19000	1.9	2.06
20	6004 N	6004 NR	42	12	9.4	5	16000	20000	1.9	2.06
	6204 N	6204 NR	47	14	12.8	6.6	14000	16000	2.31	2.46
	6304 N	6304 NR	52	15	15.9	7.9	12000	15000	2.31	2.46
25	6005 N	6005 NR	47	12	10.1	5.8	14000	18000	1.9	2.06
	6205 N	6205 NR	52	15	14	7.9	12000	14000	2.31	2.46
	6305 N	6305 NR	62	17	23.6	12.1	10000	13000	3.07	3.28
30	6006 N	6006 NR	55	13	13.2	8.3	12000	15000	1.88	2.08
	6206 N	6206 NR	62	16	19.5	11.3	10000	12000	3.07	3.28
	6306 N	6306 NR	72	19	28	15.8	8900	10000	3.07	3.28
35	6007 N	6007 NR	62	14	16	10.3	10000	12000	1.88	2.08
	6207 N	6207 NR	72	17	25.5	15.3	8700	10000	3.07	3.28
	6307 N	6307 NR	80	21	33.5	19.2	8000	9800	3.07	3.28
40	6008 N	6008 NR	68	15	16.8	11.5	9200	11000	2.29	2.49
	6208 N	6208 NR	80	18	29	17.9	7800	9100	3.07	3.28
	6308 N	6308 NR	90	23	40.5	23.9	7200	8800	3.07	3.28
	6408 N	6408 NR	110	27	63	36.5	6200	7600	3.07	3.28
45	6009 N	6009 NR	75	16	21	15.2	8300	10000	2.29	2.49
	6209 N	6209 NR	85	19	32.5	20.5	7300	8800	3.07	3.28
	6309 N	6309 NR	100	25	53	31.5	6400	7800	3.07	3.28
	6409 N	6409 NR	120	29	77	45	5600	6900	3.86	4.06
50	6010 N	6010 NR	80	16	21.8	16.6	7600	9400	2.29	2.49
	6210 N	6210 NR	90	20	35	23.2	6900	8200	3.07	3.28
	6310 N	6310 NR	110	27	62	38	5800	7100	3.07	3.28

* These are the speed limits according to the SNR concept (see pages 85 to 87).

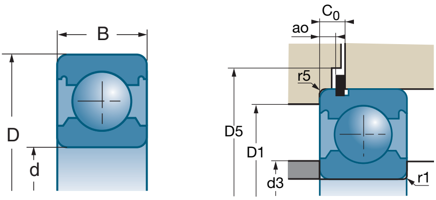
Bearing with groove or groove and snap ring





References		c0 min	c0 max	d3 min	D1 max	D5 min	r1 max	r5 max	snap ring	
		mm	mm	mm	mm	mm	mm	mm		kg
6200 N	6200 NR	2.92	3.18	14.0	26.0	36	0.6	0.6	R 30	0.033
6201 N	6201 NR	2.92	3.18	16.0	28.0	38	0.6	0.6	R 32	0.039
6002 N	6002 NR	2.92	3.18	17.0	30.0	38	0.3	0.3	R 32	0.030
6202 N	6202 NR	2.92	3.18	19.0	31.2	41	0.6	0.6	R 35	0.045
6003 N	6003 NR	2.92	3.18	19.0	33.0	41	0.3	0.3	R 35	0.039
6203 N	6203 NR	2.92	3.18	21.0	36.0	46	0.6	0.6	R 40	0.065
6004 N	6004 NR	2.92	3.18	24.0	38.0	47.5	0.6	0.5	R 42	0.068
6204 N	6204 NR	3.33	3.58	26.0	41.3	54	1	0.6	R 47	0.106
6304 N	6304 NR	3.33	3.58	27.0	45.0	59	1.1	0.6	R 52	0.145
6005 N	6005 NR	2.92	3.18	29.0	43.0	54	0.6	0.5	R 47	0.080
6205 N	6205 NR	3.33	3.58	31.0	46.5	59	1	0.5	R 52	0.126
6305 N	6305 NR	4.67	4.98	32.0	55.0	69	1.1	0.6	R 62	0.225
6006 N	6006 NR	2.9	3.2	35.0	50.0	62	1	0.5	R 55	0.116
6206 N	6206 NR	4.67	4.98	36.0	56.0	69	1	0.5	R 62	0.199
6306 N	6306 NR	4.67	4.98	37.0	65.0	80	1.1	0.6	R 72	0.346
6007 N	6007 NR	3.48	3.78	40.0	57.0	69	1	0.5	R 62	0.153
6207 N	6207 NR	4.67	4.98	42.0	65.0	80	1.1	0.5	R 72	0.285
6307 N	6307 NR	4.67	4.98	44.0	71.0	88	1.5	0.5	R 80	0.446
6008 N	6008 NR	3.89	4.19	45.0	63.0	76	1	0.6	R 68	0.192
6208 N	6208 NR	4.67	4.98	47.0	73.0	88	1.1	0.5	R 80	0.373
6308 N	6308 NR	5.43	5.74	49.0	81.0	97.5	1.5	0.6	R 90	0.625
6408 N	6408 NR	5.43	5.74	52.0	98.0	118	2	0.6	R 110	1.214
6009 N	6009 NR	3.89	4.19	50.0	70.0	83	1	0.6	R 75	0.244
6209 N	6209 NR	4.67	4.98	52.0	78.0	93	1.1	0.5	R 85	0.404
6309 N	6309 NR	5.43	5.74	54.0	91.0	108	1.5	0.5	R 100	0.825
6409 N	6409 NR	6.58	6.88	57.0	108.0	131	2	0.6	R 120	1.513
6010 N	6010 NR	3.89	4.19	55.0	75.0	88	1	0.5	R 80	0.267
6210 N	6210 NR	5.43	5.74	57.0	83.0	97.5	1.1	0.6	R 90	0.439
6310 N	6310 NR	5.43	5.74	61.0	99.0	118	2	0.6	R 110	1.070

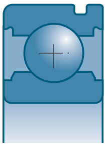
Single-row radial ball bearings *(continued)*

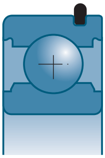


d			D	B	C	C_0			a0 min	a0 max
mm	References		mm	mm	10^3N	10^3N	rpm*	rpm*	mm	mm
55	6011 N	6011 NR	90	18	28.5	21.3	6800	8500	2.67	2.87
	6211 N	6211 NR	100	21	43.5	29	6200	7400	3.07	3.28
	6311 N	6311 NR	120	29	71	44.5	5200	6500	3.86	4.06
	6411 N	6411 NR	140	33	100	62	4800	5800	4.65	4.9
60	6212 N	6212 NR	110	22	52	36	5600	6800	3.07	3.28
	6312 N	6312 NR	130	31	82	52	4800	5900	3.86	4.06
65	6013 N	6013 NR	100	18	30.5	25	6100	7500	2.67	2.87
	6213 N	6213 NR	120	23	57	40	5100	6200	3.86	4.06
	6313 N	6313 NR	140	33	93	60	4500	5600	4.65	4.9
70	6014 N	6014 NR	110	20	38	31	5500	6800	2.67	2.87
85	6017 N	6017 NR	130	22	49.5	43	4700	5800	2.67	2.87
	6217 N	6217 NR	150	28	83	64	4100	4900	4.65	4.9
90	6018 N	6018 NR	140	24	58	49.5	4300	5300	3.45	3.71
100	6020 N	6020 NR	150	24	60	54	4000	4900	3.45	3.71
120	6024 N	6024 NR	180	28	85	79	3300	4100	3.45	3.71

* These are the speed limits according to the SNR concept (see pages 85 to 87).

■ Bearing with groove or groove and snap ring *(continued)*





References		c0 min mm	c0 max mm	d3 min mm	D1 max mm	D5 min mm	r1 max mm	r5 max mm	snap ring	kg
6011 N	6011 NR	5.03	5.33	61.0	84.0	97.5	1.1	0.6	R 90	0.388
6211 N	6211 NR	5.43	5.74	64.0	91.0	107.5	1.5	0.6	R 100	0.598
6311 N	6311 NR	6.58	6.88	66.0	109.0	131	2	0.5	R 120	1.380
6411 N	6411 NR	7.37	7.72	69.0	126.0	151	2.1	0.6	R 140	2.283
6212 N	6212 NR	5.43	5.74	69.0	101.0	118	1.5	0.6	R 110	0.763
6312 N	6312 NR	6.58	6.88	73.0	117.0	141	2.1	0.6	R 130	1.685
6013 N	6013 NR	5.03	5.33	71.0	94.0	107.5	1.1	0.6	R 100	0.432
6213 N	6213 NR	6.58	6.88	74.0	111.0	131	1.5	0.5	R 120	0.990
6313 N	6313 NR	7.37	7.72	78.0	127.0	151	2.1	0.6	R 140	2.060
6014 N	6014 NR	5.03	5.33	76.0	104.0	117.5	1.1	0.5	R 110	0.610
6017 N	6017 NR	5.39	5.69	91.0	124.0	141	1.1	0.6	R 130	0.879
6217 N	6217 NR	7.37	7.72	96.0	139.0	161	2	0.6	R 150	1.776
6018 N	6018 NR	6.17	6.53	98.0	132.0	151	1.5	0.6	R 140	1.175
6020 N	6020 NR	6.17	6.53	108.0	142.0	161	1.5	0.6	R 150	1.260
6024 N	6024 NR	6.45	6.81	129.0	171.0	194	2	0.6	R 180	2.100

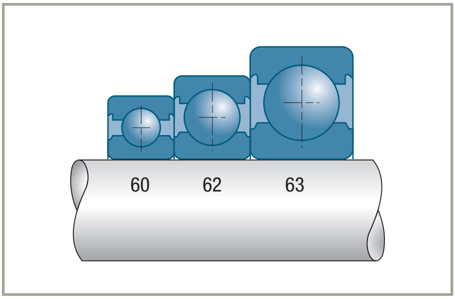
Stainless Steel ball bearings

Definition and capabilities

This bearing family combines high corrosion resistance and a load capacity which matches that of standard steel bearings: it is the ideal solution for machines operated in corrosive environments such as:

- Farming industry, pharmaceutical and chemical sector
- Others, such as paper mills, engines, pumps, naval application, etc.

Series



Variations

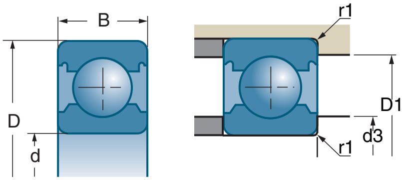
All SNR single-row ball bearings made of stainless steel display the prefix S (referring to the steel used) and the suffix 2RS (indicative of standard, dual seal version).

There are two variations for these series, depending on whether the bearings are lubricated with standard grease or with a food-compatible grease (suffix D136).

Suffixes

2RS	Two-side sealing
D136	Food grade grease

Stainless Steel ball bearings *(continued)*

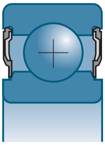


d	References		D	B		C	C_0
mm	References		mm	mm	rpm*	10^3N	10^3N
10	S6000 2RS	S6000 2RSD136	26	8	18000	4.55	1.96
	S6200 2RS	S6200 2RSD136	30	9	15000	5.10	2.39
	S6300 2RS	S6300 2RSD136	35	11	13000	8.10	3.45
12	S6001 2RS	S6001 2RSD136	28	8	16000	5.10	2.39
	S6201 2RS	S6201 2RSD136	32	10	14000	6.10	2.80
	S6301 2RS	S6301 2RSD136	37	12	12000	9.70	4.20
15	S6002 2RS	S6002 2RSD136	32	9	14000	5.60	2.85
	S6202 2RS	S6202 2RSD136	35	11	12000	7.60	3.70
	S6302 2RS	S6302 2RSD136	42	13	10000	11.40	5.40
17	S6003 2RS	S6003 2RSD136	35	10	12000	6.00	3.25
	S6203 2RS	S6203 2RSD136	40	12	11000	9.60	4.80
	S6303 2RS	S6303 2RSD136	47	14	9300	13.60	6.60
20	S6004 2RS	S6004 2RSD136	42	12	10000	9.40	5.10
	S6204 2RS	S6204 2RSD136	47	14	9200	12.80	6.70
	S6304 2RS	S6304 2RSD136	52	15	8600	15.90	7.90
25	S6005 2RS	S6005 2RSD136	47	12	9200	10.10	5.90
	S6205 2RS	S6205 2RSD136	52	15	8200	14.00	7.90
	S6305 2RS	S6305 2RSD136	62	17	6900	20.60	11.20
30	S6006 2RS	S6006 2RSD136	55	13	7800	13.20	8.30
	S6206 2RS	S6206 2RSD136	62	16	6800	19.50	11.30
35	S6007 2RS	S6007 2RSD136	62	14	6800	16.00	10.30
	S6207 2RS	S6207 2RSD136	72	17	5800	25.50	15.40
40	S6008 2RS	S6008 2RSD136	68	15	6100	16.80	11.50
	S6208 2RS	S6208 2RSD136	80	18	5300	29.00	17.90

* These are the speed limits according to the SNR concept (see pages 85 to 87).

Characteristics

Stainless steel ball bearings



References		d3 min mm	D1 max mm	r1 max mm	kg
S6000 2RS	S6000 2RSD136	12.0	24.0	0.3	0.019
S6200 2RS	S6200 2RSD136	14.0	26.0	0.6	0.032
S6300 2RS	S6300 2RSD136	14.0	31.0	0.6	0.053
S6001 2RS	S6001 2RSD136	14.0	26.0	0.3	0.022
S6201 2RS	S6201 2RSD136	16.0	28.0	0.6	0.032
S6301 2RS	S6301 2RSD136	17.9	31.5	1	0.060
S6002 2RS	S6002 2RSD136	17.0	30.0	0.3	0.030
S6202 2RS	S6202 2RSD136	19.0	31.2	0.6	0.045
S6302 2RS	S6302 2RSD136	21.0	36.3	1	0.082
S6003 2RS	S6003 2RSD136	19.0	33.0	0.3	0.039
S6203 2RS	S6203 2RSD136	21.0	36.0	0.6	0.065
S6303 2RS	S6303 2RSD136	23.0	41.0	1	0.115
S6004 2RS	S6004 2RSD136	24.0	38.0	0.6	0.069
S6204 2RS	S6204 2RSD136	26.0	41.3	1	0.106
S6304 2RS	S6304 2RSD136	27.0	45.0	1.1	0.144
S6005 2RS	S6005 2RSD136	29.0	43.0	0.6	0.080
S6205 2RS	S6205 2RSD136	31.0	46.5	1	0.128
S6305 2RS	S6305 2RSD136	32.0	55.0	1.1	0.232
S6006 2RS	S6006 2RSD136	35.0	50.0	1	0.116
S6206 2RS	S6206 2RSD136	36.0	56.0	1	0.199
S6007 2RS	S6007 2RSD136	40.0	57.0	1	0.155
S6207 2RS	S6207 2RSD136	42.0	65.0	1.1	0.275
S6008 2RS	S6008 2RSD136	45.0	63.0	1	0.191
S6208 2RS	S6208 2RSD136	47.0	73.0	1.1	0.366

Bearing for special applications

Definitions and capabilities

Amongst multiple industrial applications, in some tangible cases, bearings must operate in a particular environment, as is the case with kiln car wheels. However, certain conditions are often encountered, such as high or very high temperatures, low temperatures or high speeds. SNR is aware of the difficulty, for users, to procure single-row ball bearings capable of such conditions, and therefore created the TOPLINE Range. As standard, this range offers bearing designs which were previously considered as specific, therefore introducing significant delivery-time and costs-savings advantages.

Series

- **FT series:** for operation up to 150° C (300°F) peak (and up to 500 000 N.Dm) 6000, 6200, 6300 series

  • So-called « high temperature » (-40°C/ -40°F to +200C°/ +400°F) seals made of Viton for the FT 150 series, providing excellent resistance to chemical agents and permitting high speed rotation, highly effective against outside contamination.
  • Pressed-steel shields for the FT150 ZZ series, no bearing operating speed limitation.
  • J30: (C3) increased clearance (Category 3) to compensate for variations in temperatures.
  • Grease specifically tested and selected for high temperatures.
  • Pressed-steel cage, no limitations for bearing operating temperature.

- **HT series:** for operation up to 200° C (400°F) peak (and up to 150 000 N.Dm) 6200, 6300 series

  • Viton seals for the HT200 series (- 40° C to + 200° C).
  • Pressed-steel shields for the HT200 ZZ series.
  • Special heat treat providing metallurgical stability for operating temperatures up to + 200°C (400°F).
  • J40 (C4): increased internal clearance (Category 4) to compensate for variations in temperatures.
  • Pressed-steel cage.
  • Grease specifically tested and selected for very high temperatures.

- **LT series:** for operation up to -60° C (-75°F) (and up to 500 000 N.Dm) 6000, 6200 series

  • Nitrile rubber seal (- 40° C/ -40°F up to + 110° C/ +230°F) for the LT series.
  • Pressed-steel shields for the LT ZZ series.
  • Pressed-steel cage.
  • J30 (C3): increased internal clearance (Category3) to compensate for variations in temperature.
  • Grease specifically tested and selected for low temperatures and damp atmosphere.

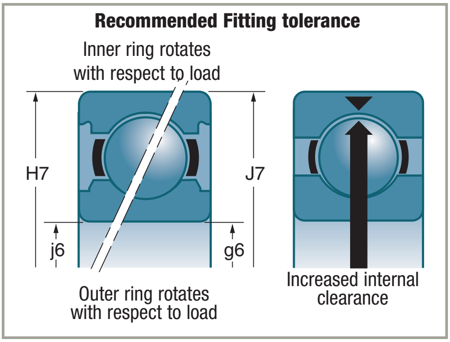
- **HV series:** for operation up to 700 000 N.Dm 6000, 6200 series
  - • High precision bearing that meet DIN P6 or ISO 6 standards for high accuracy.
  - • High precision balls: grade 10. Grade 10 is the 3rd most stringent grade in the classification of rolling elements (in the order: grade 3, 5, 10, 16, etc.). Very high surface finish quality.
  - • Improved internal geometry with tight tolerances.
  - • Glass-fiber reinforced polyamide cage provides accurate guidance of rolling elements for improved capabilities at high speed.
  - • Pressed-steel shields.
  - • Grease specifically tested and selected for very high speeds and low torque.

- **F600 series:** for operation up to 350° C (660°F) and below 50 rpm. 6000, 6200, 6300 series

• Large radial clearance

This clearance is sufficient to compensate for differential thermal expansion between the inner and outer rings of the bearing and for the expansion of surrounding parts.

• Heat treatment with stabilization tempering. Beyond 110-120° C (230°F -250°F), steel undergoes a structural change resulting in a decrease of its specific volume. To limit this phenomenon, SNR F600 bearings are subject to a special high-temperature tempering.



• Pressed steel cage

• Recessed markings on both rings: this marking process allows maintaining the proper identification of any bearings at all times regardless of operating conditions.

Variations

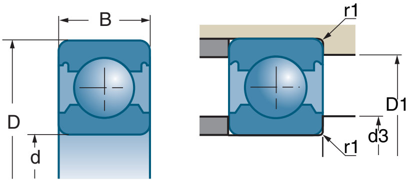
- **FT. HT and LT:** the basic design for each one of these families is the dual sealing. A dual protected variation is also available: ZZ.

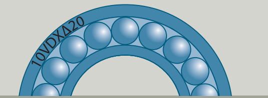
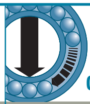
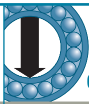
- **F600:** as basic design is open and with surface treatment by phosphating and molybdenum disulfide deposit, variations are available with 1 or 2 shields along with a high temperature lubrication paste.

Tolerances and clearances

- **FT. LT:** manufactured in normal tolerance class and increased clearance class C3.
- **HT:** manufactured in normal tolerance class and increased clearance class C4.
- **HV:** manufactured with high precision balls and in tolerance class that meets ISO 6 standards for high accuracy. Normal clearance class.
- **F600:** manufactured in special clearance class, up to C5 defined by the standards.

Bearing for special applications *(continued)*

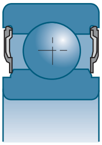
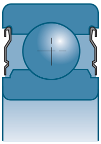


d			D	B			 C	 C_0
mm	References		mm	mm	rpm EE*	rpm ZZ*	10^3N	10^3N
8	608 FT150		22	7	22000		3.3	1.36
10	6000 FT150	6000 FT150ZZ	26	8	18000	27000	4.6	1.97
		6000 HVZZ	26	8		38800	4.6	1.97
	6000 LT	6000 LTZZ	26	8	19000	28000	4.6	1.97
		6200 FT150ZZ	30	9		24000	6	2.65
	6200 LT	6200 LTZZ	30	9	16000	23000	6	2.65
		6300 FT150ZZ	35	11		22000	8.1	3.45
12	6001 FT150	6001 FT150ZZ	28	8	16000	25000	5.1	2.37
		6001 HVZZ	28	8		35000	5.1	2.37
	6001 LT	6001 LTZZ	28	8	17000	25000	5.1	2.37
	6201 FT150	6201 FT150ZZ	32	10	15000	22000	6.9	3.1
		6201 HT200ZZ	32	10		6800	6.9	3.1
		6201 HVZZ	32	10		31800	6.9	3.1
	6201 LT	6201 LTZZ	32	10	15000	22000	6.9	3.1
		6301 FT150ZZ	37	12		20000	9.7	4.2
15	6002 FT150	6002 FT150ZZ	32	9	14000	21000	5.6	2.85
		6002 HVZZ	32	9		29700	5.6	2.85
	6002 LT	6002 LTZZ	32	9	14000	21000	5.6	2.85
	6202 FT150	6202 FT150ZZ	35	11	13000	19000	7.7	3.75
		6202 HT200ZZ	35	11		5900	7.7	3.75
		6202 HVZZ	35	11		28000	7.7	3.75
	6202 LT	6202 LTZZ	35	11	13000	19000	7.7	3.75
		6302 FT150ZZ	42	13		17000	11.3	5.4
17	6003 FT150	6003 FT150ZZ	35	10	12000	19000	6	3.25
		6003 HVZZ	35	10		26900	6	3.25
	6003 LT	6003 LTZZ	35	10	13000	19000	6	3.25
	6203 FT150	6203 FT150ZZ	40	12	11000	17000	9.5	4.75
		6203 HT200ZZ	40	12		5200	9.5	4.75
		6203 HVZZ	40	12		24500	9.5	4.75
	6203 LT	6203 LTZZ	40	12	11000	17000	9.5	4.75
	6303 FT150	6303 FT150ZZ	47	14	10000	15000	13.6	6.6

* These are the speed limits according to the SNR concept (see pages 85 to 87).

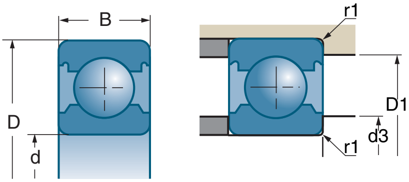
Characteristics

■ TOPLINE bearing for special applications

References		d3 min	D1 max	r1 max	
		mm	mm	mm	kg
608 FT150		10.0	20.0	0.3	0.012
6000 FT150	6000 FT150ZZ	12.0	24.0	0.3	0.019
	6000 HVZZ	12.0	24.0	0.3	0.019
6000 LT	6000 LTZZ	12.0	24.0	0.3	0.019
	6200 FT150ZZ	14.0	26.0	0.6	0.033
6200 LT	6200 LTZZ	14.0	26.0	0.6	0.033
	6300 FT150ZZ	14.0	31.0	0.6	0.053
6001 FT150	6001 FT150ZZ	14.0	26.0	0.3	0.022
	6001 HVZZ	14.0	26.0	0.3	0.022
6001 LT	6001 LTZZ	14.0	26.0	0.3	0.022
6201 FT150	6201 FT150ZZ	16.0	28.0	0.6	0.037
	6201 HT200ZZ	16.0	28.0	0.6	0.035
	6201 HVZZ	16.0	28.0	0.6	0.037
6201 LT	6201 LTZZ	16.0	28.0	0.6	0.037
	6301 FT150ZZ	17.9	31.5	1	0.060
6002 FT150	6002 FT150ZZ	17.0	30.0	0.3	0.030
	6002 HVZZ	17.0	30.0	0.3	0.030
6002 LT	6002 LTZZ	17.0	30.0	0.3	0.030
6202 FT150	6202 FT150ZZ	19.0	31.2	0.6	0.046
	6202 HT200ZZ	19.0	31.2	0.6	0.044
	6202 HVZZ	19.0	31.2	0.6	0.045
6202 LT	6202 LTZZ	19.0	31.2	0.6	0.045
	6302 FT150ZZ	21.0	36.3	1	0.083
6003 FT150	6003 FT150ZZ	19.0	33.0	0.3	0.039
	6003 HVZZ	19.0	33.0	0.3	0.039
6003 LT	6003 LTZZ	19.0	33.0	0.3	0.039
6203 FT150	6203 FT150ZZ	21.0	36.0	0.6	0.068
	6203 HT200ZZ	21.0	36.0	0.6	0.065
	6203 HVZZ	21.0	36.0	0.6	0.065
6203 LT	6203 LTZZ	21.0	36.0	0.6	0.065
6303 FT150	6303 FT150ZZ	23.0	41.0	1	0.113

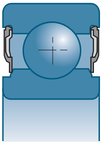
Bearing for special applications *(continued)*

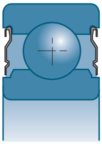


d	References		D	B			C	C_0
mm	References		mm	mm	rpm EE*	rpm ZZ*	10^3N	10^3N
20	6004 FT150	6004 FT150ZZ	42	12	10000	16000	9.4	5
	6004 HT200	6004 HVZZ	42	12	4800	22500	9.4	5
	6004 LT	6004 LTZZ	42	12	10000	16000	9.4	5
	6204 FT150	6204 FT150ZZ	47	14	9900	14000	12.8	6.6
	6204 HT200	6204 HT200ZZ	47	14	4400	4400	12.8	6.6
		6204 HVZZ	47	14		20800	12.8	6.6
	6204 LT	6204 LTZZ	47	14	9300	14000	12.8	6.6
	6304 FT150	6304 FT150ZZ	52	15	9200	13000	15.9	7.9
	6304 HT200	6304 HT200ZZ	52	15	4100	4100	15.9	7.9
		6304 LTZZ	52	15		12000	15.9	7.9
25	6005 FT150	6005 FT150ZZ	47	12	9300	14000	10.1	5.8
		6005 HVZZ	47	12		19400	10.1	5.8
	6005 LT	6005 LTZZ	47	12	9300	14000	10.1	5.8
	6205 FT150	6205 FT150ZZ	52	15	8500	12000	14	7.9
	6205 HT200	6205 HT200ZZ	52	15	3800	3800	14	7.9
		6205 HVZZ	52	15		18100	14	7.9
	6205 LT	6205 LTZZ	52	15	8200	12000	14	7.9
	6305 FT150	6305 FT150ZZ	62	17	7600	11000	23.6	12.1
	6305 HT200	6305 HT200ZZ	62	17	3400	3400	23.6	12.1
30	6006 FT150	6006 FT150ZZ	55	13	7800	11000	13.2	8.3
		6006 HVZZ	55	13		16400	13.2	8.3
	6006 LT	6006 LTZZ	55	13	7800	12000	13.2	8.3
	6206 FT150	6206 FT150ZZ	62	16	7200	10000	19.5	11.3
	6206 HT200	6206 HT200ZZ	62	16	3200	3200	19.5	11.3
		6206 HVZZ	62	16		15200	19.5	11.3
	6206 LT	6206 LTZZ	62	16	7000	10000	19.5	11.3
	6306 FT150	6306 FT150ZZ	72	19	6400	9600	28	15.8
	6306 HT200	6306 HT200ZZ	72	19	2900	2900	28	15.8
35	6007 FT150	6007 FT150ZZ	62	14	6800	10000	16	10.3
		6007 HVZZ	62	14		16400	16	10.3
		6007 LTZZ	62	14		10000	16	10.3
	6207 FT150	6207 FT150ZZ	72	17	6200	9300	25.5	15.3
	6207 HT200	6207 HT200ZZ	72	17	2800	2800	25.5	15.3
		6207 HVZZ	72	17		13000	25.5	15.3
	6307 FT150	6307 FT150ZZ	80	21	5700	8600	33.5	19.2
	6307 HT200	6307 HT200ZZ	80	21	5300	2600	33.5	19.1

* These are the speed limits according to the SNR concept (see pages 85 to 87).

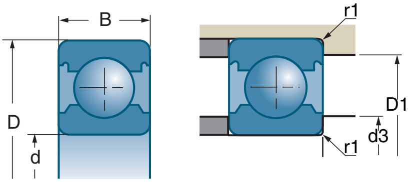
TOPLINE bearing for special applications *(continued)*





References		d3 min mm	D1 max mm	r1 max mm	kg
6004 FT150	6004 FT150ZZ	24.0	38.0	0.6	0.068
6004 HT200	6004 HVZZ	24.0	38.0	0.6	0.070
6004 LT	6004 LTZZ	24.0	38.0	0.6	0.068
6204 FT150	6204 FT150ZZ	26.0	41.3	1	0.107
6204 HT200	6204 HT200ZZ	26.0	41.3	1	0.107
	6204 HVZZ	26.0	41.3	1	0.107
6204 LT	6204 LTZZ	26.0	41.3	1	0.107
6304 FT150	6304 FT150ZZ	27.0	45.0	1.1	0.147
6304 HT200	6304 HT200ZZ	27.0	45.0	1.1	0.147
	6304 LTZZ	27.0	45.0	1.1	0.135
6005 FT150	6005 FT150ZZ	29.0	43.0	0.6	0.077
	6005 HVZZ	29.0	43.0	0.6	0.077
6005 LT	6005 LTZZ	29.0	43.0	0.6	0.077
6205 FT150	6205 FT150ZZ	31.0	47.0	1	0.128
6205 HT200	6205 HT200ZZ	31.0	47.0	1	0.128
	6205 HVZZ	31.0	47.0	1	0.128
6205 LT	6205 LTZZ	31.0	47.0	1	0.128
6305 FT150	6305 FT150ZZ	32.0	55.0	1.1	0.225
6305 HT200	6305 HT200ZZ	32.0	55.0	1.1	0.225
6006 FT150	6006 FT150ZZ	35.0	50.0	1	0.116
	6006 HVZZ	35.0	50.0	1	0.116
6006 LT	6006 LTZZ	35.0	50.0	1	0.116
6206 FT150	6206 FT150ZZ	36.0	56.0	1	0.199
6206 HT200	6206 HT200ZZ	36.0	56.0	1	0.199
	6206 HVZZ	36.0	56.0	1	0.199
6206 LT	6206 LTZZ	36.0	56.0	1	0.199
6306 FT150	6306 FT150ZZ	37.0	65.0	1.1	0.346
6306 HT200	6306 HT200ZZ	37.0	65.0	1.1	0.346
6007 FT150	6007 FT150ZZ	40.0	57.0	1	0.153
	6007 HVZZ	40.0	57.0	1	0.153
	6007 LTZZ	40.0	57.0	1	0.153
6207 FT150	6207 FT150ZZ	42.0	65.0	1.1	0.285
6207 HT200	6207 HT200ZZ	42.0	65.0	1.1	0.280
	6207 HVZZ	42.0	65.0	1.1	0.285
6307 FT150	6307 FT150ZZ	44.0	71.0	1.5	0.446
6307 HT200	6307 HT200ZZ	44.0	71.0	1.5	0.445

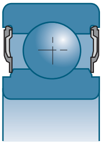
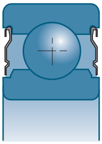
Bearing for special applications *(continued)*



d			D	B			C	C_0
mm	References		mm	mm	rpm EE*	rpm ZZ*	10^3N	10^3N
40	6008 FT150	6008 FT150ZZ	68	15	6100	9200	16.8	11.5
	6008 HT200		68	15	2700		16.8	11.5
		6008 HVZZ	68	15		12000	16.8	11.5
	6208 FT150	6208 FT150ZZ	80	18	5500	8300	29	17.9
	6208 HT200	6208 HT200ZZ	80	18	2500	2500	29	17.9
		6208 HVZZ	80	18		11600	29	17.9
	6308 FT150	6308 FT150ZZ	90	23	5100	7600	40.5	23.9
	6308 HT200	6308 HT200ZZ	90	23	2300	2300	40.5	23.9
		6308 HVZZ	90	23		10000	40.5	23.9
45	6009 FT150	6009 FT150ZZ	75	16	5500	8300	21	15.2
	6209 FT150	6209 FT150ZZ	85	19	5100	7600	32.5	20.5
	6209 HT200	6209 HT200ZZ	85	19	2300	2300	32.5	20.5
		6209 HVZZ	85	19		10000	32.5	20.5
	6309 FT150	6309 FT150ZZ	100	25	4200	6800	53	31.5
	6309 HT200	6309 HT200ZZ	100	25	2000	2000	53	31.5
50	6010 FT150	6010 FT150ZZ	80	16	5000	7600	21.8	16.6
	6210 FT150	6210 FT150ZZ	90	20	4500	7100	35	23.2
	6210 HT200	6210 HT200ZZ	90	20	2100	2000	35	23.2
		6210 HVZZ	90	20		10000	35	23.2
	6310 FT150	6310 FT150ZZ	110	27	4000	6000	62	38
	6310 HT200	6310 HT200ZZ	110	27	1800	1800	62	38
55		6011 HVZZ	90	18		9600	28.5	21.3
65	6013 FT150		100	18	4000		30.5	25
65	6213 FT150		120	23	3600		57	40

* These are the speed limits according to the SNR concept (see pages 85 to 87).

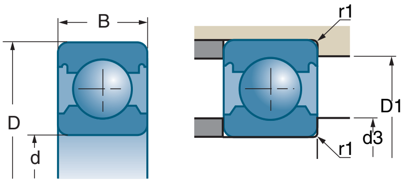
TOPLINE bearing for special applications *(continued)*

References		d3 min (mm)	D1 max (mm)	r1 max (mm)	kg
6008 FT150	6008 FT150ZZ	45.0	63.0	1	0.192
6008 HT200		45.0	63.0	1	0.192
	6008 HVZZ	45.0	63.0	1	0.192
6208 FT150	6208 FT150ZZ	47.0	73.0	1.1	0.373
6208 HT200	6208 HT200ZZ	47.0	73.0	1.1	0.370
	6208 HVZZ	47.0	73.0	1.1	0.364
6308 FT150	6308 FT150ZZ	49.0	81.0	1.5	0.612
6308 HT200	6308 HT200ZZ	49.0	81.0	1.5	0.640
	6308 HVZZ	49.0	81.0	1.5	0.612
6009 FT150	6009 FT150ZZ	50.0	70.0	1	0.243
6209 FT150	6209 FT150ZZ	52.0	78.0	1.1	0.404
6209 HT200	6209 HT200ZZ	52.0	78.0	1.1	0.404
	6209 HVZZ	52.0	78.0	1.1	0.404
6309 FT150	6309 FT150ZZ	54.0	91.0	1.5	0.825
6309 HT200	6309 HT200ZZ	54.0	91.0	1.5	0.850
6010 FT150	6010 FT150ZZ	55.0	75.0	1	0.267
6210 FT150	6210 FT150ZZ	57.0	83.0	1.1	0.453
6210 HT200	6210 HT200ZZ	57.0	83.0	1.1	0.465
	6210 HVZZ	57.0	83.0	1.1	0.453
6310 FT150	6310 FT150ZZ	61.0	99.0	2	1.070
6310 HT200	6310 HT200ZZ	61.0	99.0	2	1.070
	6011 HVZZ	61.0	84.0	1.1	0.387
6013 FT150		71.0	94.0	1.1	0.454
6213 FT150		74.0	111.0	1.5	0.990

SNR

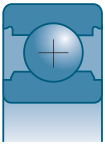
Bearing for special applications *(continued)*

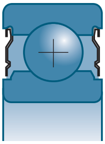


d	References			D	B	rpm max*	C	C_0
mm				mm	mm		10^3N	10^3N
20	6004 F600	6004 F604	6004 F605	42	12	50	9.40	5.00
	6204 F600	6204 F604	6204 F605	47	14	50	12.80	6.60
25	6205 F600	6205 F604	6205 F605	52	15	50	14.00	7.90
	6305 F600	6305 F604	6305 F605	62	17	50	23.70	12.20
30	6206 F600	6206 F604	6206 F605	62	16	50	19.50	11.30
	6306 F600	6306 F604	6306 F605	72	19	50	28.00	15.80
35	6007 F600	6007 F604	6007 F605	62	14	50	16.00	10.30
	6207 F600	6207 F604	620 7F605	72	17	50	25.50	15.30
40	6008 F600	6008 F604	6008 F605	68	15	50	17.40	11.50
	6208 F600	6208 F604	6208 F605	80	18	50	29.00	17.90
45	6209 F600	6209 F604	6209 F605	85	19	50	32.50	20.50
	6309 F600	6309 F604	6309 F605	100	25	50	53.00	31.50
50	6210 F600	6210 F604	6210 F605	90	20	50	35.00	23.20
	6310 F600		6310 F605	110	27	50	62.00	38.00
55	6211 F600	6211 F604	6211 F605	100	21	50	43.50	29.00
	6311 F600	6311 F604	6311 F605	120	29	50	71.00	44.50
60	6212 F600	6212 F604	6212 F605	110	22	50	52.00	36.00
65	6213 F600	6213 F604	6213 F605	120	23	50	57.00	40.00
70	6214 F600	6214 F604	6214 F605	125	24	50	62.00	44.00
85	6217 F600			150	28	50	83.00	64.00
100	6220 F600			180	34	50	122.00	93.00

* These are the speed limits according to the SNR concept (see pages 85 to 87).

Bearing for very high temperatures or for kiln cars





References			d3 min	D1 max	r1 max	
			mm	mm	mm	kg
6004 F600	6004 F604	6004 F605	25.1	37.1	0.6	0.070
6204 F600	6204 F604	6204 F605	26.2	41.1	1.0	0.104
6205 F600	6205 F604	6205 F605	31.4	47	1.0	0.126
6305 F600	6305 F604	6305 F605	33	54	1.1	0.235
6206 F600	6206 F604	6206 F605	37	56	1.0	0.194
6306 F600	6306 F604	6306 F605	41.7	63.5	1.1	0.346
6007 F600	6007 F604	6007 F605	41.2	56.2	1.0	0.151
6207 F600	6207 F604	6207 F605	43.8	63.7	1.1	0.270
6008 F600	6008 F604	6008 F605	46.5	61.9	1.0	0.185
6208 F600	6208 F604	6208 F605	49.8	70.7	1.1	0.352
6209 F600	6209 F604	6209 F605	54.4	76.1	1.1	0.393
6309 F600	6309 F604	6309 F605	59.2	86.7	1.5	0.831
6210 F600	6210 F604	6210 F605	59.4	81.1	1.1	0.441
6310 F600		6310 F605	65.8	95.1	2.0	1.070
6211 F600	6211 F604	6211 F605	65.9	89.6	1.5	0.583
6311 F600	6311 F604	6311 F605	72.1	103.4	2.0	1.352
6212 F600	6212 F604	6212 F605	71	103	1.5	0.731
6213 F600	6213 F604	6213 F605	78.1	106.7	1.5	0.944
6214 F600	6214 F604	6214 F605	84	111.8	1.5	1.028
6217 F600			102.6	137.9	2.0	1.794
6220 F600			121.8	158.7	2.1	3.127

Bearing-inserts

Single-row ball bearings with specific construction properties (outer and/or inner ring shape, attachment system ...)

Bearing – inserts of self-aligning bearings units

Definition and capabilities

Bearing inserts for self-aligning bearing units are essentially featured by their specific outside diameter profile which allows the bearing + bearing unit assembly to ensure self-alignment as required.

Series

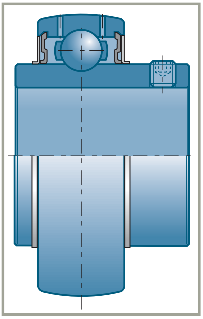
The internal design of bearing inserts correspond to the standard deep groove ball bearings of the 6200 and 6300 seires. However, they have extended inner rings for easier fixing on shafts or tapered bores for assembly with adapter sleeves.

All bearing inserts are sealed on both sides and are available with cylindrical or spherical outer rings.

UC200/UC300 series (spherical outer ring)

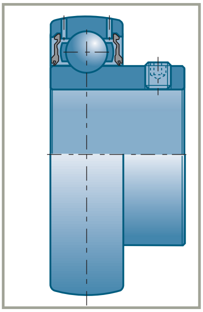
- Re-lubrication convenience
- Extended inner ring on both sides
- Fixing to shaft using set screws
- Optional design as floating bearing
- Seals on both sides with additional slingers
- Also available with triple seals

- SUC/MUC..FD series: like UC200/UC300 series, version in stainless steel + food grade grease



US200 series (spherical outer ring)

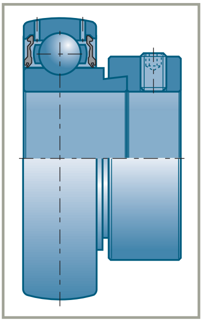
- Re-lubrication convenience
- Extended inner ring on one side
- Fixing to shaft using set screws
- Optional design as floating bearing
- Seals on both sides



ES200 series (spherical outer ring)

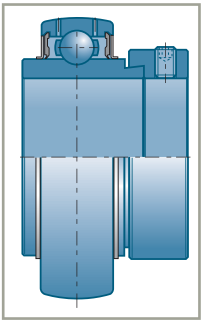
- Re-lubrication convenience
- Extended inner ring on one side
- Fixing to shaft using eccentric locking collar
- Seals on both sides

- SES series: like ES200 series,
  version in stainless steel + food grade grease



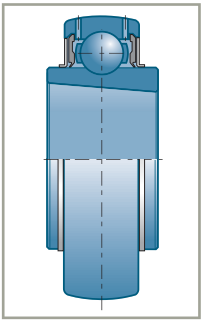
EX200/EX300 series (spherical outer ring)

- Re-lubrication convenience
- Extended inner ring on both sides
- Fixing to shaft using eccentric locking collar
- Seals on both sides with additional slingers
- Also available with triple seals



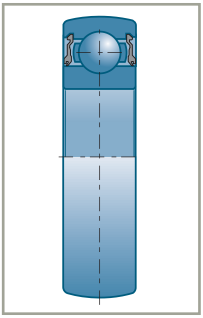
UK200/UK300 series (spherical outer ring)

- Re-lubrication convenience
- Inner ring with tapered bore for mounting of adapter sleeve
- Fixing to shaft using adapter sleeve
- Seals on both sides with additional slingers
- Also available with triple seals



6200SEE series (spherical outer ring)

- No re-lubrication possibility
- Dimensions and tolerances like deep groove ball bearings of 62..
- Fixing to shaft using fit adjustment
- Seals on both sides

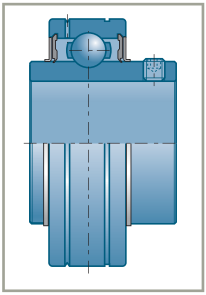


Bearing-inserts *(continued)*

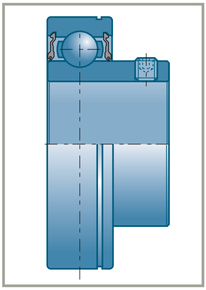
Bearing-inserts with cylindrical outside diameter

➔ Series

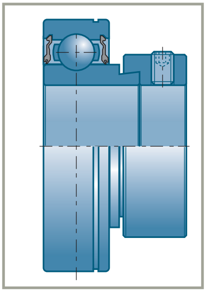
■ CU200 serie (cylindrical outer ring)
- Slot in outer ring for fixing within housing by retaining snap ring
- Groove in the outer ring with lubrication holes
- Otherwise, design like UC200



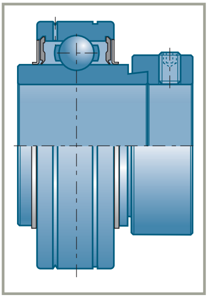
■ CUS200 series (cylindrical outer ring)
- No re-lubrication possibility
- Groove in the outer ring for fixing within housing using retaining snap ring
- Otherwise, design like US200



■ CES200 series (cylindrical outer ring)
- No re-lubrication possibility
- Groove in the outer ring for fixing within housing using retaining snap ring
- Otherwise, design like ES200



■ CEX200 series (cylindrical outer ring)
- Groove in outer ring with lubrication holes
- Otherwise, design like EX200



Tolerances and clearances

Manufactured in normal tolerance class and clearance class:
• C3 for standards bearings,
• C4 for bearings with adapter sleeves and with functions T04 or T20.

Suffixes and prefixes

Prefixes

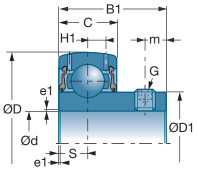
SUC	Bearing in stainless steel for stainless steel ball bearing units with tightening by set screws
SES	Bearing in stainless steel for stainless steel ball bearings units with tightening by eccentric locking collar
MUC	Bearing in stainless steel for ball bearings units in thermoplastic resin

Suffixes

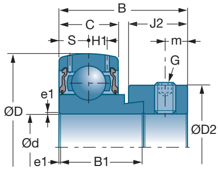
C3	Radial clearance of the group ISO 3
C4	Radial clearance of the group ISO 4
G2	Re-lubrication system
H	Bearing with adapter sleeves
L3	Triple lip seal for bearing-inserts
T04	Bearing inserts for operating temperatures down to -40° C (-40°F)
T20	Bearing inserts for operating temperatures up to +200° C (+400°F)

As components of self-aligning bearing units, bearing inserts are also listed by type just after the tables of self-aligning bearing units (from page 562).

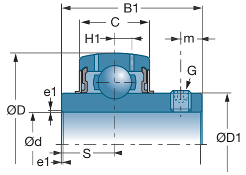
Bearing-inserts *(continued)*



US



ES - SES

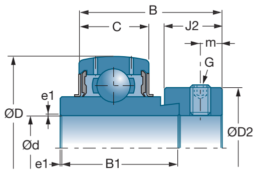


UC - SUC - MUC

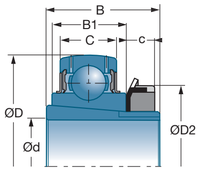
d		Sleeves	D	C	B	B1	c	J2	smax	D1	D2
mm	References		mm	mm	mm	mm	mm	mm	mm	mm	mm
12	US201		40.0	12.0	22.0	-	-	-	6.0	24.6	-
	ES201G2		40.0	12.0	28.6	19.1	-	13.5	6.5	-	28.6
	UC201G2		47.0	16.0	31.0	-	-	-	12.7	29.0	-
	EX201		47.0	16.0	43.5	34.0	-	13.5	17.0	-	33.3
	SUC201		47.0	17.0	31.0	-	-	-	12.7	-	-
	SES201		40.0	12.0	28.6	19.1	-	-	6.0	-	28.6
15	US202		40.0	12.0	22.0	-	-	-	6.0	24.6	-
	ES202		40.0	12.0	28.6	19.1	-	13.5	6.5	-	28.6
	UC202		47.0	16.0	31.0	-	-	-	12.7	29.0	-
	EX202		47.0	16.0	43.5	34.0	-	13.5	17.0	-	33.3
	SUC202		47.0	17.0	31.0	-	-	-	12.7	-	-
	SES202		40.0	12.0	28.6	19.1	-	-	6.0	-	28.6
17	US203		40.0	12.0	22.0	-	-	-	6.0	24.6	-
	ES203		40.0	12.0	28.6	19.1	-	13.5	6.5	-	28.6
	UC203		47.0	16.0	31.0	-	-	-	12.7	29.0	-
	EX203		47.0	16.0	43.5	34.0	-	13.5	17.0	-	33.3
	SUC203		47.0	17.0	31.0	-	-	-	12.7	-	-
	SES203		40.0	12.0	28.6	19.1	-	-	6.0	-	28.6
20	UC204		47.0	16.0	31.0	-	-	-	12.7	29.0	-
	US204		47.0	14.0	25.0	-	-	-	7.0	29.0	-
	ES204		47.0	14.0	30.9	21.4	-	13.5	7.5	-	33.3
	EX204		47.0	16.0	43.5	34.0	-	13.5	17.0	-	33.3
	UK205	+ H2305	52.0	17.0	35.0	21.0	8.0	-	-	34.0	38.0
	MUC204FD		47.0	17.0	31.0	-	-	-	12.7	29.0	-
	SUC204		47.0	17.0	31.0	-	-	-	12.7	-	-
	SES 204		47.0	14.0	31.0	21.5	-	-	7	-	33.3
	UK305	+ H2305	62.0	21.0	35.0	27.0	8.0	-	-	35.4	38.0
25	UC205		52.0	17.0	34.0	-	-	-	14.3	34.0	-
	US205		52.0	15.0	27.0	-	-	-	7.5	34.0	-
	ES205		52.0	15.0	30.9	21.4	-	13.5	7.5	-	38.1
	EX205		52.0	17.0	44.3	34.8	-	13.5	17.4	-	38.1
	MUC205FD		52.0	17.0	34.1	-	-	-	14.3	34.0	-
	SUC205		52.0	17.0	34.1	-	-	-	14.3	-	-
	SES205		52.0	15.0	31.0	21.5	-	-	7.5	-	38.1
	UK206	+ H2306	62.0	19.0	38.0	25.0	8.0	-	-	40.3	45.0
	UC305		62.0	21.0	38.0	-	-	-	15.0	35.4	-
	EX305		62.0	21.0	46.8	34.9	-	15.9	16.7	-	42.8
	UK306	+ H2306	72.0	24.0	38.0	30.0	8.0	-	-	44.6	45.0

Characteristics

Bearing-inserts for self-aligning bearings unit (mm)



EX

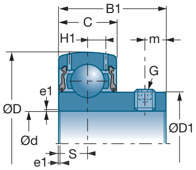


UK + H

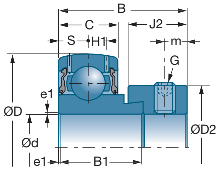
References	Sleeves	H1 mm	m mm	G	a* mm	e1 mm	C 10^3N	C_0 10^3N	kg
US201		3.6	4.0	M5x0.8	2.5	0.6	9.55	4.78	0.090
ES201		3.6	5.0	M6x1	3.0	0.6	9.55	4.78	0.140
UC201		4.4	4.7	M6x1	3.0	0.6	12.80	6.65	0.210
EX201		4.4	5.0	M6x1	3.0	0.6	12.80	6.65	0.290
SUC201		-	5.0	M6x1	-	0.5	10.10	6.80	0.210
SES201		-	5.0	M6x1	-	0.5	7.80	4.50	0.140
US202		3.6	4.0	M5x0.8	2.5	0.6	9.55	4.78	0.080
ES202		3.6	5.0	M6x1	3.0	0.6	9.55	4.78	0.130
UC202		4.4	4.7	M6x1	3.0	0.6	12.80	6.65	0.200
EX202		4.4	5.0	M6x1	3.0	0.6	12.80	6.65	0.270
SUC202		-	5.0	M6x1	-	0.5	10.10	6.80	0.190
SES202		-	5.0	M6x1	-	0.5	7.80	4.50	0.120
US203		3.6	4.0	M5x0.8	2.5	0.6	9.55	4.78	0.100
ES203		3.6	5.0	M6 1	3.0	0.6	9.55	4.78	0.130
UC203		4.4	4.7	M6x1	3.0	0.6	12.80	6.65	0.180
EX203		4.4	5.0	M6x1	3.0	0.6	12.80	6.65	0.250
SUC203		-	5.0	M6x1	-	0.5	10.10	6.80	0.180
SES203		-	5.0	M6x1	-	0.5	7.80	4.50	0.110
UC204		4.4	4.7	M6x1	3.0	0.6	12.80	6.65	0.170
US204		4.0	5.0	M6x1	3.0	0.6	12.80	6.65	0.130
ES204		4.0	5.0	M6x1	3.0	0.6	12.80	6.65	0.150
EX204		4.4	5.0	M6x1	3.0	0.6	12.80	6.65	0.220
UK205	+ H2305	4.3	-	-	-	0.6	14.00	7.88	0.240
MUC204FD		-	4.5	-	-	1.5	10.90	5.30	0.160
SUC204		-	5.0	M6x1	-	0.5	10.10	6.80	0.160
SES 204		-	5.0	M6x1	-	0.5	10.10	6.80	0.170
UK305	+ H2305	6.2	-	-	-	1.5	22.36	11.50	0.490
UC205		4.3	5.5	M6x1	3.0	0.6	14.00	7.88	0.210
US205		4.3	5.5	M6x1	3.0	0.6	14.00	7.88	0.170
ES205		4.3	5.0	M6x1	3.0	0.6	14.00	7.88	0.190
EX205		4.3	5.0	M6x1	3.0	0.6	14.00	7.88	0.250
MUC205FD		-	5.0	-	-	1.5	11.90	6.30	0.190
SUC205		-	5.0	M6x1	-	0.5	11.00	8.00	0.200
SES205		-	5.0	M6x1	-	0.5	11.00	8.00	0.200
UK206	+ H2306	5.0	-	-	-	0.6	19.50	11.20	0.380
UC305		6.2	6.0	M6x1	3.0	1.5	22.36	11.50	0.350
EX305		6.2	6.0	M8x1	4.0	1.5	22.36	11.50	0.430
UK306	+ H2306	6.5	-	-	-	1.5	27.00	15.20	0.586

* Hex set-screw

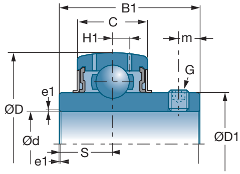
Bearing-inserts *(continued)*



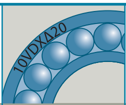
US



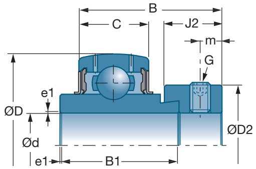
ES - SES



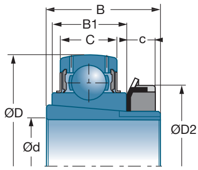
UC - SUC - MUC

d		Sleeves	D	C	B	B1	c	J2	smax	D1	D2
mm	References		mm	mm	mm	mm	mm	mm	mm	mm	mm
30	UC206		62.0	19.0	38.1	-	-	-	15.9	40.3	-
	US206		62.0	16.0	30.0	-	-	-	8.0	40.3	-
	ES206		62.0	16.0	35.7	23.8	-	15.9	9.0	-	44.5
	EX206		62.0	19.0	48.3	36.4	-	15.9	18.2	-	44.5
	MUC206FD		62.0	19.0	38.1	-	-	-	15.9	40.5	-
	SUC206		62.0	19.0	38.1	-	-	-	15.9	-	-
	SES206		62.0	16.0	35.7	23.8	-	-	8.0	-	44.5
	UK207	+ H2307	72.0	20.0	43.0	27.0	9.0	-	-	48.0	52.0
	UC306		72.0	24.0	43.0	-	-	-	17.0	44.6	-
	EX306		72.0	24.0	50.0	36.5	-	17.5	17.5	-	50.0
	UK307	+ H2307	80.0	25.0	43.0	33.0	9.0	-	-	48.9	52.0
35	UC207		72.0	20.0	42.9	-	-	-	17.5	48.0	-
	US207		72.0	17.0	32.0	-	-	-	8.5	48.0	-
	ES207		72.0	17.0	38.9	25.4	-	17.5	9.5	-	55.6
	EX207		72.0	20.0	51.1	37.6	-	17.5	18.8	-	55.6
	MUC207FD		72.0	20.0	42.9	-	-	-	17.5	48.0	-
	SUC207		72.0	20.0	42.9	-	-	-	17.5	-	-
	SES207		72.0	17.0	38.9	25.4	-	-	8.5	-	55.6
	UK208	+ H2308	80.0	21.0	46.0	29.0	10.0	-	-	53.0	58.0
	UC307		80.0	25.0	48.0	-	-	-	19.0	48.9	-
	EX307		80.0	25.0	51.6	38.1	-	17.5	18.3	-	55.0
	UK308	+ H2308	90.0	28.0	46.0	35.0	10.0	-	-	56.5	58.0
40	UC208		80.0	21.0	49.2	-	-	-	19.0	53.0	-
	US208		80.0	18.0	34.0	-	-	-	9.0	53.0	-
	ES208		80.0	18.0	43.7	30.2	-	18.3	11.0	-	60.3
	EX208		80.0	21.0	56.3	42.8	-	18.3	21.4	-	60.3
	MUC208FD		80.0	21.0	49.2	-	-	-	19.0	53.0	-
	SUC208		80.0	21.0	49.2	-	-	-	19.0	-	-
	SES208		80.0	18.0	43.7	30.2	-	-	9.0	-	60.3
	UK209	+ H2309	85.0	22.0	50.0	30.0	11.0	-	-	57.2	65.0
	UC308		90.0	28.0	52.0	-	-	-	19.0	56.5	-
	EX308		90.0	28.0	57.1	41.3	-	20.6	19.8	-	63.5
	UK309	+ H2309	100.0	30.0	50.0	38.0	11.0	-	-	61.8	65.0
45	UC209		85.0	22.0	49.2	-	-	-	19.0	57.2	-
	US209		85.0	19.0	41.2	-	-	-	10.2	57.2	-
	ES209		85.0	19.0	43.7	30.2	-	18.3	11.0	-	63.5
	EX209		85.0	22.0	56.3	42.8	-	18.3	21.4	-	63.5
	SUC209		85.0	22.0	49.2	-	-	-	19.0	-	-
	SES209		85.0	19.0	43.7	30.2	-	-	9.5	-	36.5
	UK210	+ H2310	90.0	23.0	55.0	31.0	12.0	-	-	61.8	70.0

Bearing-inserts for self-aligning bearings unit (mm) *(continued)*



EX



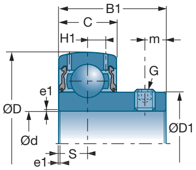
UK + H

References	Sleeves	H1 (mm)	m (mm)	G	a* (mm)	e1 (mm)	C (10^3N)	C_0 (10^3N)	kg
UC206		5.0	5.5	M6x1	3.0	0.6	19.50	11.20	0.320
US206		5.0	6.0	M6x1	3.0	0.6	19.50	11.20	0.270
ES206		5.0	6.0	M6x1	3.0	0.6	19.50	11.20	0.330
EX206		5.0	6.0	M6x1	3.0	0.6	19.50	11.20	0.410
MUC206FD		-	5.0	-	-	1.5	16.70	9.00	0.310
SUC206		-	5.0	M6x1	-	0.5	15.30	11.50	0.320
SES206		-	6.0	M8x1	-	0.5	15.30	11.50	0.320
UK207	+ H2307	5.8	-	-	-	1.1	25.70	15.20	0.535
UC306		6.5	6.0	M6x1	3.0	1.5	27.00	15.20	0.560
EX306		6.5	6.7	M8x1	4.0	1.5	27.00	15.20	0.680
UK307	+ H2307	7.2	-	-	-	2.0	33.50	19.20	0.915
UC207		5.8	6.5	M8x1	4.0	1.1	25.70	15.20	0.470
US207		5.7	6.5	M6x1	3.0	0.6	25.70	15.20	0.420
ES207		5.7	6.5	M8x1	4.0	1.1	25.70	15.20	0.500
EX207		5.8	6.5	M8x1	4.0	1.1	25.70	15.20	0.600
MUC207FD		-	6.0	-	-	2.0	16.70	9.00	0.480
SUC207		-	6.0	M8x1	-	1.0	20.10	15.60	0.470
SES207		-	6.5	M8x1	-	1.0	20.10	15.60	0.510
UK208	+ H2308	6.3	-	-	-	1.1	29.60	18.20	0.704
UC307		7.2	8.0	M8x1	4.0	2.0	33.50	19.20	0.710
EX307		7.2	6.7	M8x1	4.0	2.0	33.50	19.20	0.800
UK308	+ H2308	8.5	-	-	-	2.0	40.56	24.00	1.034
UC208		6.3	8.0	M8x1	4.0	1.1	29.60	18.20	0.640
US208		6.2	7.0	M8x1	4.0	1.1	29.60	18.20	0.600
ES208		6.2	6.5	M8x1	4.0	1.1	29.60	18.20	0.650
EX208		6.3	6.5	M8x1	4.0	1.1	29.60	18.20	0.780
MUC208FD		-	8.0	-	-	2.0	22.00	12.30	0.620
SUC208		-	8.0	M8x1	-	1.0	22.80	18.20	0.630
SES208		-	6.5	M8x1	-	1.0	22.80	18.20	0.640
UK209	+ H2309	6.8	5.0	-	-	1.1	31.85	20.80	0.810
UC308		8.5	10.0	M10x1.25	5.0	2.0	40.56	24.00	0.960
EX308		8.5	8.0	M10x1.25	5.0	2.0	40.56	24.00	1.080
UK309	+ H2309	9.0	-	-	-	2.0	53.00	31.80	1.470
UC209		6.8	8.0	M8x1	4.0	1.1	31.85	20.80	0.680
US209		6.5	8.2	M8x1	4.0	1.1	31.85	20.80	0.650
ES209		6.5	6.5	M8x1	4.0	1.1	31.85	20.80	0.690
EX209		6.8	6.5	M8x1	4.0	1.1	31.85	20.80	0.870
SUC209		-	8.0	M10x1.25	-	1.0	25.70	20.80	0.690
SES209		-	6.5	M8x1	-	1.0	25.70	20.80	0.670
UK210	+ H2310	6.5	-	-	-	1.1	35.10	23.20	0.952

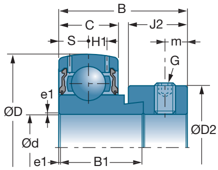
* Hex set-screw

SNR

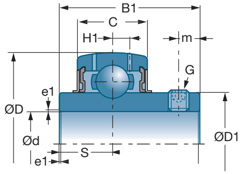
Bearing-inserts *(continued)*



US



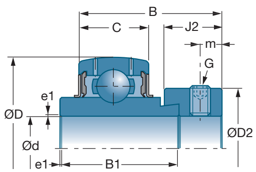
ES - SES



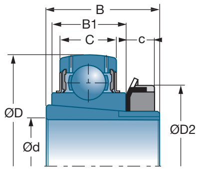
UC - SUC - MUC

d		Sleeves	D	C	B	B1	c	J2	smax	D1	D2
mm	References		mm	mm	mm	mm	mm	mm	mm	mm	mm
50	UC309		100.0	30.0	57.0	-	-	-	22.0	61.8	-
	EX309		100.0	30.0	58.7	42.9	-	20.6	19.8	-	70.0
	UK310	+ H2310	110.0	32.0	55.0	40.0	12.0	-	-	68.7	70.0
50	UC210		90.0	23.0	51.6	-	-	-	19.0	61.8	-
	US210		90.0	20.0	43.5	-	-	-	10.9	61.8	-
	ES210		90.0	20.0	43.7	30.2	-	18.3	11.0	-	69.9
	EX210		90.0	23.0	62.7	49.2	-	18.3	24.6	-	69.9
	SUC210		90.0	24.0	51.6	-	-	-	19.0	-	-
	SES210		90.0	20.0	43.7	30.2	-	-	10.0	-	69.9
	UK211	+ H2311	100.0	25.0	59.0	33.0	12.5	-	-	69.0	75.0
	UC310		110.0	32.0	61.0	-	-	-	22.0	68.7	-
	EX310		110.0	32.0	66.6	49.2	-	22.2	24.6	-	76.2
	UK311	+ H2311	120.0	34.0	59.0	43.0	12.5	-	-	74.9	75.0
55	UC211		100.0	25.0	55.6	-	-	-	22.2	69.0	-
	US211		100.0	23.0	45.3	-	-	-	11.8	69.0	-
	ES211		100.0	24.0	48.4	32.5	-	20.7	12.0	-	76.2
	EX211		100.0	25.0	71.3	55.4	-	20.7	27.7	-	76.2
	SUC211		100.0	25.0	55.6	-	-	-	22.2	-	-
	SES211		100.0	21.0	48.4	32.5	-	-	10.5	-	76.2
	UK212	+ H2312	110.0	27.0	62.0	36.0	13.0	-	-	74.9	80.0
	UC311		120.0	34.0	66.0	-	-	-	25.0	74.9	-
	EX311		120.0	34.0	73.0	55.6	-	22.2	27.8	-	83.0
	UK312	+ H2312	130.0	36.0	62.0	47.0	13.0	-	-	81.0	80.0
60	UC212		110.0	27.0	65.1	-	-	-	25.4	74.9	-
	US212		110.0	24.0	53.7	-	-	-	14.9	74.9	-
	ES212		110.0	24.0	49.3	33.4	-	22.3	12.0	-	84.2
	EX212		110.0	27.0	77.7	61.8	-	22.3	30.9	-	84.2
	SUC212		110.0	27.0	65.1	-	-	-	24.4	-	-
	SES212		110.0	22.0	53.1	37.1	-	-	11.0	-	84.2
	UK213	+ H2313	120.0	28.0	65.0	36.0	14.0	-	-	82.0	85.0
	UC312		130.0	36.0	71.0	-	-	-	26.0	81.0	-
	EX312		130.0	36.0	79.4	61.9	-	23.9	31.0	-	89.0
	UK313	+ H2313	140.0	38.0	65.0	49.0	14.0	-	-	87.5	85.0
65	UC213		120.0	28.0	65.1	-	-	-	25.4	82.0	-
	EX213		120.0	28.0	85.7	68.2	-	23.5	34.1	-	86.0
	UK215	+ H2315	130.0	30.0	73.0	41.0	15.0	-	-	91.5	98.0
	UC313		140.0	38.0	75.0	-	-	-	30.0	87.5	-
	EX313		140.0	38.0	85.7	65.1	-	27.0	32.5	-	97.0
	UK315	+ H2315	160.0	42.0	73.0	55.0	15.0	-	-	100.5	98.0

Bearing-inserts for self-aligning bearings unit (mm) *(continued)*



EX

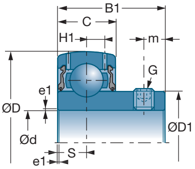


UK + H

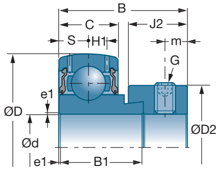
References	Sleeves	H1	m	G	a*	e1	C	C_0	
		mm	mm		mm	mm	10^3N	10^3N	kg
UC309		9.0	10.0	M10x1.25	5.0	2.0	53.00	31.80	1.280
EX309		9.0	8.0	M10x1.25	5.0	2.0	53.00	31.80	1.450
UK310	+ H2310	9.9	-	-	-	2.0	62.00	37.80	1.742
UC210		6.5	9.0	M10x1.25	5.0	1.1	35.10	23.20	0.800
US210		6.5	9.2	M8x1	4.0	1.1	35.10	23.20	0.760
ES210		6.5	6.5	M8x1	4.0	1.1	35.10	23.20	0.800
EX210		6.5	6.5	M8x1	4.0	1.1	35.10	23.20	1.010
SUC210		-	10.0	M10x1.25	-	1.0	27.50	23.70	0.770
SES210		-	6.5	M8x1	-	1.0	27.50	23.70	0.750
UK211	+ H2311	7.2	-	-	-	1.1	43.55	29.20	1.190
UC310		9.9	12.0	M12x1.25	6.0	2.0	62.00	37.80	1.650
EX310		9.9	8.7	M10x1.25	5.0	2.0	62.00	37.80	1.860
UK311	+ H2311	10.6	-	-	-	2.0	71.50	44.80	2.200
UC211		7.2	9.0	M10x1.25	5.0	1.1	43.55	29.20	1.120
US211		7.2	9.8	M10x1.25	5.0	1.1	43.55	29.20	1.070
ES211		7.2	8.0	M10x1.25	5.0	1.1	43.55	29.20	0.870
EX211		7.2	8.0	M10x1.25	5.0	1.5	43.55	29.20	1.390
SUC211		-	10.0	M10x1.25	-	1.0	34.00	25.50	1.060
SES211		-	8.0	M10x1.25	-	1.0	34.00	25.50	1.030
UK212	+ H2312	8.2	-	-	-	1.1	52.50	32.80	1.511
UC311		10.6	12.0	M12x1.25	6.0	2.0	71.50	44.80	1.900
EX311		10.6	9.0	M10x1.25	5.0	2.0	71.50	44.80	2.300
UK312	+ H2312	11.3	-	-	-	2.0	81.60	51.80	2.541
UC212		8.2	10.5	M10x1.25	5.0	1.1	52.50	32.80	1.530
US212		8.0	9.8	M10x1.25	5.0	1.1	52.50	32.80	1.300
ES212		8.0	8.0	M10x1.25	5.0	1.1	52.50	32.80	1.200
EX212		8.2	8.0	M10x1.25	5.0	1.5	52.50	32.80	1.870
SUC212		-	10.0	M10x1.25	-	1.0	41.00	31.50	1.470
SES212		-	8.0	M10x1.25	-	1.0	41.00	31.50	1.340
UK213	+ H2313	8.0	-	-	-	1.5	57.20	40.00	1.917
UC312		11.3	12.0	M12x1.25	6.0	2.0	81.60	51.80	2.600
EX312		11.3	9.0	M10x1.25	5.0	2.0	81.60	51.80	2.890
UK313	+ H2313	12.1	-	-	-	2.0	93.86	60.50	3.267
UC213		8.0	12.0	M12x1.25	6.0	1.5	57.20	40.00	1.860
EX213		8.0	8.5	M10x1.25	5.0	1.5	57.20	40.00	2.410
UK215	+ H2315	9.0	-	-	-	2.0	66.00	49.50	2.720
UC313		12.1	12.0	M12x1.25	6.0	2.0	93.86	60.50	3.250
EX313		12.1	11.5	M12x1.25	6.0	2.0	93.86	60.50	3.660
UK315	+ H2315	13.5	-	-	-	2.5	113.36	76.80	5.030

* Hex set-screw

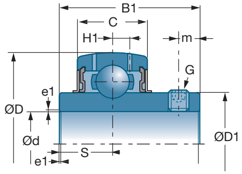
Bearing-inserts *(continued)*



US



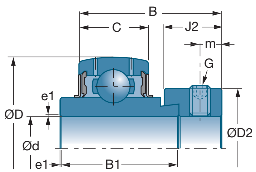
ES - SES



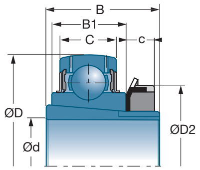
UC - SUC - MUC

d mm	References	Sleeves	D mm	C mm	B mm	B1 mm	c mm	J2 mm	smax mm	D1 mm	D2 mm
70	UC214		125.0	30.0	74.6	-	-	-	30.2	86.5	-
	EX214		125.0	30.0	85.7	68.2	-	23.5	34.1	-	96.8
	UK216	+ H2316	140.0	33.0	78.0	44.0	17.0	-	-	98.0	105.0
	UC314		150.0	40.0	78.0	-	-	-	31.0	94.0	-
	EX314		150.0	40.0	92.1	68.3	-	30.2	34.2	-	102.0
	UK316	+ H2316	170.0	44.0	78.0	55.0	17.0	-	-	107.9	105.0
75	UC215		130.0	30.0	77.8	-	-	-	33.3	91.5	-
	EX215		130.0	30.0	92.1	74.6	-	23.9	37.3	-	102.0
	UK217	+ H2317	150.0	35.0	82.0	44.0	18.0	-	-	105.1	110.0
	UC315		160.0	42.0	82.0	-	-	-	32.0	100.5	-
	EX315		160.0	42.0	100.0	74.6	-	31.8	37.3	-	113.0
	UK317	+ H2317	180.0	46.0	82.0	60.0	18.0	-	-	114.0	110.0
80	UC216		140.0	33.0	82.6	-	-	-	33.3	98.0	-
	EX216		140.0	33.0	95.2	74.6	-	27.0	37.3	-	110.0
	UK218	+ H2318	160.0	37.0	86.0	48.0	18.0	-	-	111.0	120.0
	UC316		170.0	44.0	86.0	-	-	-	34.0	107.9	-
	EX316		170.0	44.0	106.4	81.0	-	31.8	40.5	-	119.0
	UK318	+ H2318	190.0	48.0	86.0	60.0	18.0	-	-	120.0	120.0
85	UC217		150.0	35.0	85.7	-	-	-	34.1	105.1	-
	EX217		150.0	35.0	71.0	53.2	-	27.0	23.4	-	119.0
	UC317		180.0	46.0	96.0	-	-	-	40.0	114.0	-
	EX317		180.0	46.0	109.5	84.1	-	31.8	42.0	-	127.0
	UK319	+ H2319	200.0	50.0	90.0	66.0	19.0	-	-	126.5	125.0
90	UC218		160.0	37.0	96.0	-	-	-	39.7	111.0	-
	EX218		160.0	37.0	72.5	55.0	-	24.0	24.5	-	120.0
	UC318		190.0	48.0	96.0	-	-	-	40.0	120.0	-
	EX318		190.0	48.0	115.9	87.3	-	36.5	43.6	-	133.0
	UK320	+ H2320	215.0	54.0	97.0	68.0	20.0	-	-	134.5	130.0
95	UC319		200.0	50.0	103.0	-	-	-	41.0	126.5	-
	EX319		200.0	50.0	122.3	93.7	-	36.5	46.8	-	140.0
100	UC320		215.0	54.0	108.0	-	-	-	42.0	134.5	-
	EX320		215.0	54.0	128.6	100.0	-	36.5	50.0	-	146.0
	UK322	+ H2322	240.0	60.0	105.0	80.0	21.0	-	-	147.7	145.0
105	UC321		225.0	57.0	112.0	-	-	-	44.0	140.5	-
110	UC322		240.0	60.0	117.0	-	-	-	46.0	149.0	-
	UK324	+ H2324	260.0	64.0	112.0	86.0	22.0	-	-	162.1	155.0

Bearing-inserts for self-aligning bearings unit (mm) *(continued)*



EX

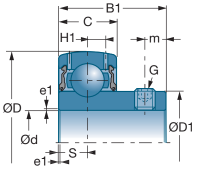


UK + H

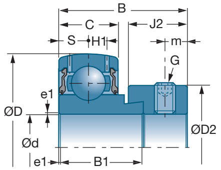
References	Sleeves	H1	m	G	a*	e1	C	C_0	
		mm	mm		mm	mm	10^3N	10^3N	kg
UC214		9.0	12.0	M12x1.25	6.0	2.0	62.00	45.00	2.050
EX214		9.0	8.5	M10x1.25	5.0	2.0	62.00	45.00	2.570
UK216	+ H2316	10.3	-	-	-	2.0	72.50	54.20	3.240
UC314		12.8	12.0	M12x1.25	6.0	2.5	104.26	68.00	3.950
EX314		12.8	12.0	M12x1.25	6.0	2.5	104.26	68.00	4.500
UK316	+ H2316	14.5	-	-	-	3.0	122.85	86.50	5.830
UC215		9.0	12.0	M12x1.25	6.0	2.0	66.00	49.50	2.210
EX215		9.0	8.5	M10x1.25	5.0	2.0	66.00	49.50	2.840
UK217	+ H2317	11.0	-	-	-	2.0	83.20	63.80	3.870
UC315		13.5	14.0	M14x1.5	6.0	2.5	113.36	76.80	4.330
EX315		13.5	13.0	M16x1.5	8.0	2.5	113.36	76.80	5.340
UK317	+ H2317	15.5	-	-	-	3.0	132.60	96.50	6.890
UC216		10.3	14.0	M12x1.25	6.0	2.0	72.50	54.20	2.790
EX216		10.3	10.3	M12x1.25	6.0	2.0	72.50	54.20	3.120
UK218	+ H2318	12.0	-	-	-	2.0	96.00	71.50	4.690
UC316		14.5	14.0	M14x1.5	6.0	3.0	122.85	86.50	5.570
EX316		14.5	13.0	M16x1.5	8.0	3.0	122.85	86.50	6.700
UK318	+ H2318	16.5	-	-	-	3.0	143.00	108.00	7.940
UC217		11.0	14.0	M12x1.25	6.0	2.0	83.20	63.80	3.380
EX217		11.0	10.0	M12x1.25	6.0	2.0	83.20	63.80	3.720
UC317		15.5	16.0	M16x1.5	8.0	3.0	132.60	96.50	6.840
EX317		15.5	13.0	M16x1.5	8.0	3.0	132.60	96.50	7.960
UK319	+ H2319	16.7	-	-	-	3.0	156.00	122.00	9.230
UC218		12.0	14.0	M12x1.25	6.0	2.0	96.00	71.50	4.450
EX218		12.0	9.5	M12x1.25	6.0	2.0	96.00	71.50	4.900
UC318		16.5	16.0	M16x1.5	8.0	3.5	143.00	108.00	7.870
EX318		16.5	14.5	M20x1.5	8.0	3.0	143.00	108.00	9.100
UK320	+ H2320	19.0	-	-	-	3.5	171.60	140.00	10.970
UC319		16.7	18.0	M16x1.5	8.0	3.0	156.00	122.00	8.910
EX319		16.7	14.5	M20x1.5	8.0	3.0	156.00	122.00	10.400
UC320		19.0	18.0	M18x1.5	9.0	3.5	171.60	140.00	11.200
EX320		19.0	14.5	M20x1.5	9.0	3.5	171.60	140.00	13.000
UK322	+ H2322	21.0	-	-	-	3.0	205.00	178.00	17.640
UC321		20.0	18.0	M18x1.5	9.0	3.0	182.00	155.00	12.200
UC322		21.0	18.0	M18x1.5	9.0	3.0	205.00	178.00	14.300
UK324	+ H2324	22.0	-	-	-	3.0	228.00	208.00	21.190

* Hex set-screw

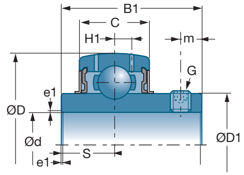
Bearing-inserts *(continued)*



US

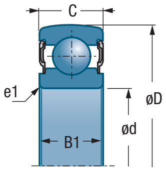


ES - SES



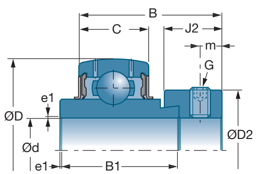
UC - SUC - MUC

d		Sleeves	D	C	B	B1	c	J2	smax	D1	D2
mm	References		mm	mm	mm	mm	mm	mm	mm	mm	mm
115	UK326	+ H2326	280.0	68.0	121.0	92.0	23.0	-	-	176.1	165.0
120	UC324		260.0	64.0	126.0	-	-	-	51.0	163.0	-
125	UK328	+ H2328	300.0	73.0	131.0	98.0	24.0	-	-	189.0	180.0
130	UC326		280.0	68.0	135.0	-	-	-	54.0	177.0	-
140	UC328		300.0	73.0	145.0	-	-	-	59.0	190.0	-

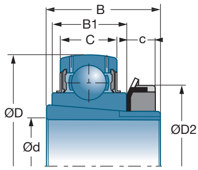


d		D	C	B1	e1	C	C_0	
mm	References	mm	mm	mm	mm	10^3N	10^3N	kg
17	6203 SEE	40.0	12.0	12.0	0.6	9.50	4.75	0.064
20	6204 SEE	47.0	14.0	14.0	1.0	12.80	6.60	0.110
25	6205 SEE	52.0	15.0	15.0	1.0	14.00	7.90	0.128
30	6206 SEE	62.0	16.0	16.0	1.0	19.50	11.30	0.193
35	6207 SEE	72.0	17.0	17.0	1.0	25.50	15.30	0.285
40	6208 SEE	80.0	18.0	18.0	1.0	29.00	17.90	0.373
	6308 SEE	90.0	23.0	23.0	1.5	40.50	23.90	0.612
45	6209 SEE	85.0	19.0	19.0	1.0	32.50	20.50	0.404
	6309 SEE	100.0	25.0	25.0	1.5	53.00	31.50	0.825
50	6210 SEE	90.0	20.0	20.0	1.1	35.00	23.20	0.453
60	6212 SEE	110.0	22.0	22.0	1.5	52.00	36.00	0.766

Bearing-inserts for self-aligning bearings unit (mm) *(continued)*



EX

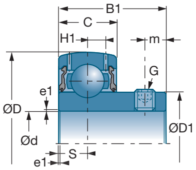


UK + H

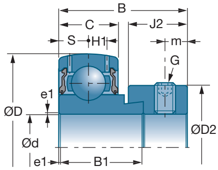
References	Sleeves	H1	m	G	a*	e1	C	C_0	
		mm	mm		mm	mm	10^3N	10^3N	kg
UK326	+ H2326	23.0	-	-	-	4.0	252.00	242.00	27.900
UC324		22.0	18.0	M18x1.5	9.0	3.0	228.00	208.00	18.500
UK328	+ H2328	25.0	-	-	-	4.0	275.00	272.00	34.450
UC326		23.0	20.0	M20x1.5	10.0	4.0	252.00	242.00	23.000
UC328		25.0	20.0	M20x1.5	10.0	4.0	275.00	272.00	28.500

* Hex set-screw

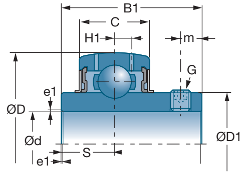
Bearing-inserts *(continued)*



US



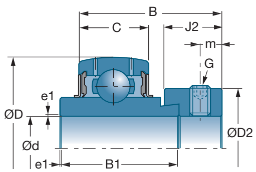
ES - SES



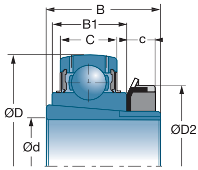
UC - SUC - MUC

d		Sleeves	D	C	B	B1	c	J2	smax	D1	D2
inch	References		mm	mm	mm	mm	mm	mm	mm	mm	mm
1/2	US201-08		40.0	12.0	22.0	-	-	-	6.0	24.6	-
	ES201-08		40.0	12.0	28.6	19.1	-	13.5	6.5	-	28.6
	UC201-08		47.0	16.0	31.0	-	-	-	12.7	29.0	-
	EX201-08		47.0	16.0	43.5	34.0	-	13.5	17.0	-	33.3
5/8	US202-10		40.0	12.0	22.0	-	-	-	6.0	24.6	-
	ES202-10		40.0	12.0	28.6	19.1	-	13.5	6.5	-	28.6
	UC202-10		47.0	16.0	31.0	-	-	-	12.7	29.0	-
	EX202-10		47.0	16.0	43.5	34.0	-	13.5	17.0	-	33.3
	MUC202-10FD		47.0	17.0	31.0	31.0	-	-	12.7	29.0	-
11/16	US203-11		40.0	12.0	22.0	-	-	-	6.0	24.6	-
	ES203-11		40.0	12.0	28.6	19.1	-	13.5	6.5	-	28.6
	UC203-11		47.0	16.0	31.0	-	-	-	12.7	29.0	-
	EX203-11		47.0	16.0	43.5	34.0	-	13.5	17.0	-	33.3
3/4	US204-12		47.0	14.0	25.0	-	-	-	7.0	29.0	-
	ES204-12		47.0	14.0	30.9	21.4	-	13.5	7.5	-	33.3
	UC204-12		47.0	16.0	31.0	-	-	-	12.7	29.0	-
	EX204-12		47.0	16.0	43.5	34.0	-	13.5	17.0	-	33.3
	MUC204-12FD		47.0	17.0	31.0	31.0	-	-	12.7	29.0	-
	SUC204-12		47.0	17.0	31.0	31.0	-	-	12.7	-	-
	SES204-12		47.0	14.0	31.0	21.5	-	-	7.0	-	33.3
	UK205	+ H2305-12	52.0	17.0	35.0	21.0	8.0	-	-	34.0	38.0
	UK305	+ H2305-12	62.0	21.0	35.0	27.0	8.0	-	-	35.4	38.0
7/8	US205-14		52.0	15.0	27.0	-	-	-	7.5	34.0	-
	ES205-14		52.0	15.0	30.9	21.4	-	13.5	7.5	-	38.1
	UC205-14		52.0	17.0	34.0	-	-	-	14.3	34.0	-
	EX205-14		52.0	17.0	44.3	34.8	-	13.5	17.4	-	38.1
	UK206	+ H2306-14	62.0	19.0	25.0	38.0	8.0	-	-	40.3	45.0
	UC305-14		62.0	21.0	38.0	-	-	-	15.0	35.4	-
	EX305-14		62.0	21.0	46.8	34.9	-	15.9	16.7	-	42.8
	UK306	+ H2306-14	72.0	24.0	30.0	38.0	8.0	-	-	44.6	45.0
15/16	US205-15		52.0	15.0	27.0	-	-	-	7.5	34.0	-
	ES205-15		52.0	15.0	30.9	21.4	-	13.5	7.5	-	38.1
	UC205-15		52.0	17.0	34.0	-	-	-	14.3	34.0	-
	EX205-15		52.0	17.0	44.3	34.8	-	13.5	17.4	-	38.1
	UK206	+ H2306-15	62.0	19.0	25.0	38.0	8.0	-	-	40.3	45.0
	UC305-15		62.0	21.0	38.0	-	-	-	15.0	35.4	-
	EX305-15		62.0	21.0	46.8	34.9	-	15.9	16.7	-	42.8
	UK306	+ H2306-15	72.0	24.0	30.0	38.0	8.0	-	-	44.6	45.0

Bearing-inserts for self-aligning bearings unit (inch)



EX



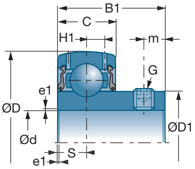
UK + H

References	Sleeves	H1 mm	m mm	G	a* mm	e1 mm	C 10^3N	C_0 10^3N	kg
US201-08		3.6	4.0	10-32UNF	2.5	0.6	9.55	4.78	0.090
ES201-08		3.6	5.0	1/4-28UNF	3.0	0.6	9.55	4.78	0.140
UC201-08		4.4	4.7	1/4-28UNF	3.0	0.6	12.80	6.65	0.210
EX201-08		4.4	5.0	1/4-28UNF	3.0	0.6	12.80	6.65	0.280
US202-10		3.6	4.0	10-32UNF	2.5	0.6	9.55	4.78	0.080
ES202-10		3.6	5.0	1/4-28UNF	3.0	0.6	9.55	4.78	0.130
UC202-10		4.4	4.7	1/4-28UNF	3.0	0.6	12.80	6.65	0.200
EX202-10		4.4	5.0	1/4-28UNF	3.0	0.6	12.80	6.65	0.260
MUC202-10FD		-	4.5	-		1.0	10.90	5.30	0.181
US203-11		3.6	4.0	10-32UNF	2.5	0.6	9.55	4.78	0.100
ES203-11		3.6	5.0	1/4-28UNF	3.0	0.6	9.55	4.78	0.130
UC203-11		4.4	4.7	1/4-28UNF	3.0	0.6	12.80	6.65	0.180
EX203-11		4.4	5.0	1/4-28UNF	3.0	0.6	12.80	6.65	0.240
US204-12		4.0	5.0	1/4-28UNF	3.0	0.6	12.80	6.65	0.130
ES204-12		4.0	5.0	1/4-28UNF	3.0	0.6	12.80	6.65	0.150
UC204-12		4.4	4.7	1/4-28UNF	3.0	0.6	12.80	6.65	0.170
EX204-12		4.4	5.0	1/4-28UNF	3.0	0.6	12.80	6.65	0.220
MUC204-12FD		-	4.5	-	-	1.5	10.90	5.30	0.181
SUC204-12		-	5.0	-	-	0.5	10.10	6.80	0.160
SES204-12		-	5.0	-	-	0.5	10.10	6.80	0.170
UK205	+ H2305-12	4.3	-	-	-	0.6	14.00	7.88	0.240
UK305	+ H2305-12	6.2	-	-	-	1.5	22.36	11.50	0.490
US205-14		4.3	5.5	1/4-28UNF	3.0	0.6	14.00	7.88	0.180
ES205-14		4.3	5.0	1/4-28UNF	3.0	0.6	14.00	7.88	0.190
UC205-14		4.3	5.5	1/4-28UNF	3.0	0.6	14.00	7.88	0.210
EX205-14		4.3	5.0	1/4-28UNF	3.0	0.6	14.00	7.88	0.250
UK206	+ H2306-14	5.0	-	-	-	0.6	19.50	11.20	0.400
UC305-14		6.2	6.0	1/4-28UNF	3.0	1.5	22.36	11.50	0.350
EX305-14		6.2	6.0	5/16-24UNF	4.0	1.5	22.36	11.50	0.430
UK306	+ H2306-14	6.5	-	-	-	1.5	27.00	15.20	0.610
US205-15		4.3	5.5	1/4-28UNF	3.0	0.6	14.00	7.88	0.180
ES205-15		4.3	5.0	1/4-28UNF	3.0	0.6	14.00	7.88	0.190
UC205-15		4.3	5.5	1/4-28UNF	3.0	0.6	14.00	7.88	0.210
EX205-15		4.3	5.0	1/4-28UNF	3.0	0.6	14.00	7.88	0.250
UK206	+ H2306-15	5.0	-	-	-	0.6	19.50	11.20	0.390
UC305-15		6.2	6.0	1/4-28UNF	3.0	1.5	22.36	11.50	0.350
EX305-15		6.2	6.0	5/16-24UNF	4.0	1.5	22.36	11.50	0.430
UK306	+ H2306-15	6.5	-	-	-	1.5	27.00	15.20	0.600

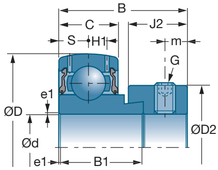
* Hex set-screw

SNR

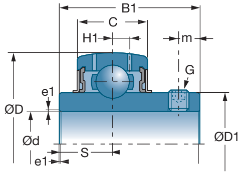
Bearing-inserts *(continued)*



US



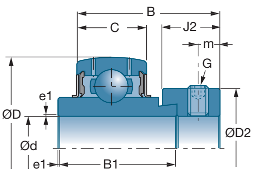
ES - SES



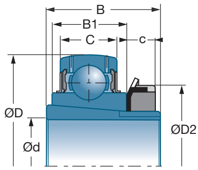
UC - SUC - MUC

d		Sleeves	D	C	B	B1	c	J2	smax	D1	D2
inch	References		mm	mm	mm	mm	mm	mm	mm	mm	mm
1	US205-16		52.0	15.0	27.0	-	-	-	7.5	34.0	-
	ES205-16		52.0	15.0	30.9	21.4	-	13.5	7.5	-	38.1
	UC205-16		52.0	17.0	34.0	-	-	-	14.3	34.0	-
	EX205-16		52.0	17.0	44.3	34.8	-	13.5	17.4	-	38.1
	MUC205-16FD		52.0	17.0	34.1	34.1	-	-	14.3	34.0	-
	SUC205-16		52.0	17.0	34.1	34.1	-	-	14.3	-	-
	SES205-16		52.0	15.0	31.0	21.5	-	-	7.5	-	38.1
	UK206	+ H2306-16	62.0	19.0	25.0	38.0	8.0	-	-	40.3	45.0
	UC305-16		62.0	21.0	38.0	-	-	-	15.0	35.4	-
	EX305-16		62.0	21.0	46.8	34.9	-	15.9	16.7	-	42.8
	UK306	+ H2306-16	72.0	24.0	30.0	38.0	8.0	-	-	44.6	45.0
1-1/8	US206-18		62.0	16.0	30.0	-	-	-	8.0	40.3	-
	ES206-18		62.0	16.0	35.7	23.8	-	15.9	9.0	-	44.5
	UC206-18		62.0	19.0	38.1	-	-	-	15.9	40.3	-
	EX206-18		62.0	19.0	48.3	36.4	-	15.9	18.2	-	44.5
	MUC206-18FD		62.0	19.0	38.1	38.1	-	-	15.9	40.5	-
	UK207	+ H2307-18	72.0	20.0	27.0	43.0	9.0	-	-	48.0	52.0
	UC306-18		72.0	24.0	43.0	-	-	-	17.0	44.6	-
	EX306-18		72.0	24.0	50.0	36.5	-	17.5	17.5	-	50.0
	UK307	+ H2307-18	80.0	25.0	33.0	43.0	9.0	-	-	48.9	52.0
1-3/16	US206-19		62.0	16.0	30.0	-	-	-	8.0	40.3	-
	ES206-19		62.0	16.0	35.7	23.8	-	15.9	9.0	-	44.5
	UC206-19		62.0	19.0	38.1	-	-	-	15.9	40.3	-
	EX206-19		62.0	19.0	48.3	36.4	-	15.9	18.2	-	44.5
	MUC206-19FD		62.0	19.0	38.1	38.1	-	-	15.9	40.5	-
	SUC206-19		62.0	19.0	38.1	38.1	-	-	15.9	-	-
	SES206-19		62.0	16.0	35.7	23.8	-	-	8.0	-	44.5
	UK207	+ H2307-19	72.0	20.0	27.0	43.0	9.0	-	-	48.0	52.0
	UC306-19		72.0	24.0	43.0	-	-	-	17.0	44.6	-
	EX306-19		72.0	24.0	50.0	36.5	-	17.5	17.5	-	50.0
	UK307	+ H2307-19	80.0	25.0	33.0	43.0	9.0	-	-	48.9	52.0
1-1/4	US206-20		62.0	16.0	30.0	-	-	-	8.0	40.3	-
	ES206-20		62.0	16.0	35.7	23.8	-	15.9	9.0	-	44.5
	UC206-20		62.0	19.0	38.1	-	-	-	15.9	40.3	-
	EX206-20		62.0	19.0	48.3	36.4	-	15.9	18.2	-	44.5
	MUC206-20FD		62.0	19.0	38.1	38.1	-	-	15.9	40.5	-
	MUC207-20FD		72.0	20.0	42.9	42.9	-	-	17.5	48.0	-
	SUC206-20		62.0	19.0	38.1	38.1	-	-	15.9	-	-
	SES206-20		62.0	16.0	35.7	23.8	-	-	8.0	-	44.5
	UK208	+ H2308-20	80.0	21.0	29.0	46.0	10.0	-	-	53.0	58.0
	UC307-20		80.0	25.0	48.0	-	-	-	19.0	48.9	-

Bearing-inserts for self-aligning bearings unit (inch) *(continued)*



EX

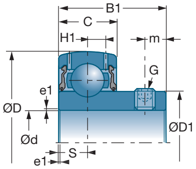


UK + H

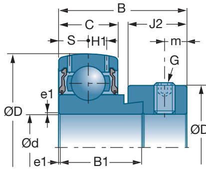
References	Sleeves	H1	m	G	a*	e1	C	C_0	
		mm	mm		mm	mm	10^3N	10^3N	kg
US205-16		4.3	5.5	1/4-28UNF	3.0	0.6	14.00	7.88	0.160
ES205-16		4.3	5.0	1/4-28UNF	3.0	0.6	14.00	7.88	0.180
UC205-16		4.3	5.5	1/4-28UNF	3.0	0.6	14.00	7.88	0.200
EX205-16		4.3	5.0	1/4-28UNF	3.0	0.6	14.00	7.88	0.240
MUC205-16FD		-	5.0	-	-	1.5	11.90	6.30	0.181
SUC205-16		-	5.0	-	-	15.3	11.00	8.00	0.200
SES205-16		-	5.0	-	-	0.5	11.00	8.00	0.200
UK206	+ H2306-16	5.0	-	-	-	0.6	19.50	11.20	0.360
UC305-16		6.2	6.0	1/4-28UNF	3.0	1.5	22.36	11.50	0.340
EX305-16		6.2	6.0	5/16-24UNF	4.0	1.5	22.36	11.50	0.430
UK306	+ H2306-16	6.5	-	-	-	1.5	27.00	15.20	0.570
US206-18		5.0	6.0	1/4-28UNF	3.0	0.6	19.50	11.20	0.280
ES206-18		5.0	6.0	5/16-24UNF	3.0	0.6	19.50	11.20	0.350
UC206-18		5.0	5.5	1/4-28UNF	3.0	0.6	19.50	11.20	0.340
EX206-18		5.0	6.0	5/16-24UNF	3.0	0.6	19.50	11.20	0.430
MUC206-18FD		-	5.0	-	-	1.5	16.70	9.00	0.308
UK207	+ H2307-18	5.8	-	-	-	1.1	25.70	15.20	0.550
UC306-18		6.5	6.0	1/4-28UNF	3.0	1.5	27.00	15.20	0.580
EX306-18		6.5	6.7	5/16-24UNF	4.0	1.5	27.00	15.20	0.710
UK307	+ H2307-18	7.2	-	-	-	2.0	33.50	19.20	0.930
US206-19		5.0	6.0	1/4-28UNF	3.0	0.6	19.50	11.20	0.250
ES206-19		5.0	6.0	5/16-24UNF	3.0	0.6	19.50	11.20	0.310
UC206-19		5.0	5.5	1/4-28UNF	3.0	0.6	19.50	11.20	0.310
EX206-19		5.0	6.0	5/16-24UNF	3.0	0.6	19.50	11.20	0.400
MUC206-19FD		-	5.0	-	-	1.5	16.70	9.00	0.308
SUC206-19		-	5.0	-	-	0.5	15.30	11.50	0.320
SES206-19		-	6.0	-	-	0.5	15.30	11.50	0.320
UK207	+ H2307-19	5.8	-	-	-	1.1	25.70	15.20	0.530
UC306-19		6.5	6.0	1/4-28UNF	3.0	1.5	27.00	15.20	0.560
EX306-19		6.5	6.7	5/16-24UNF	4.0	1.5	27.00	15.20	0.680
UK307	+ H2307-19	7.2	-	-	-	2.0	33.50	19.20	0.910
US206-20		5.0	6.0	1/4-28UNF	3.0	0.6	19.50	11.20	0.240
ES206-20		5.0	6.0	5/16-24UNF	3.0	0.6	19.50	11.20	0.280
UC206-20		5.0	5.5	1/4-28UNF	3.0	0.6	19.50	11.20	0.300
EX206-20		5.0	6.0	5/16-24UNF	3.0	0.6	19.50	11.20	0.380
MUC206-20FD		-	5.0	-	-	1.5	16.70	9.00	0.308
MUC207-20FD		-	6.0	-	-	2.0	22.00	12.30	0.480
SUC206-20		-	5.0	-	-	0.5	15.30	11.50	0.320
SES206-20		-	6.0	-	-	0.5	15.30	11.50	0.320
UK208	+ H2308-20	6.3	-	-	-	1.1	29.60	18.20	0.760
UC307-20		7.2	8.0	5/16-24UNF	4.0	2.0	33.50	19.20	0.770

* Hex set-screw

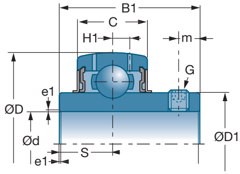
Bearing-inserts *(continued)*



US



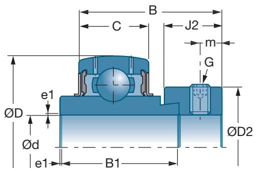
ES - SES



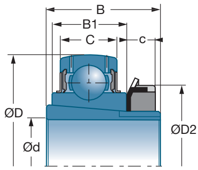
UC - SUC - MUC

d		Sleeves	D	C	B	B1	c	J2	smax	D1	D2
inch	References		mm	mm	mm	mm	mm	mm	mm	mm	mm
1-1/4	EX307-20		80.0	25.0	51.6	38.1	-	17.5	18.3	-	55.0
	UK308	+ H2308-20	90.0	28.0	35.0	46.0	10.0	-	-	56.5	58.0
1-3/8	US207-22		72.0	17.0	32.0	-	-	-	8.5	48.0	-
	ES207-22		72.0	17.0	38.9	25.4	-	17.5	9.5	-	55.6
	UC207-22		72.0	20.0	42.9	-	-	-	17.5	48.0-	
	EX207-22		72.0	20.0	51.1	37.6	-	17.5	18.8	-	55.6
	MUC207-22FD		72.0	20.0	42.9	42.9	-	-	17.5	48.0	-
	SUC207-22		72.0	20.0	42.9	42.9	-	-	17.5	-	-
	SES207-22		72.0	17.0	38.9	25.4	-	-	8.5	-	55.6
	UK208	+ H2308-22	80.0	21.0	29.0	46.0	10.0	-	-	53.0	58.0
	UC307-22		80.0	25.0	48.0	-	-	-	19.0	48.9	-
	EX307-22		80.0	25.0	51.6	38.1	-	17.5	18.3	-	55.0
	UK308	+ H2308-22	90.0	28.0	35.0	46.0	10.0	-	-	56.5	58.0
1-7/16	US207-23		72.0	17.0	32.0	-	-	-	8.5	48.0	-
	ES207-23		72.0	17.0	38.9	25.4	-	17.5	9.5	-	55.6
	UC207-23		72.0	20.0	42.9	-	-	-	17.5	48.0	-
	EX207-23		72.0	20.0	51.1	37.6	-	17.5	18.8	-	55.6
	MUC207-23FD		72.0	20.0	42.9	42.9	-	-	17.5	48.0	-
	SUC207-23		72.0	20.0	42.9	42.9	-	-	17.5	-	-
	SES207-23		72.0	17.0	38.9	25.4	-	-	8.5	-	55.6
	UK209	+ H2309-23	85.0	22.0	30.0	50.0	11.0	-	-	57.2	65.0
	UC307-23		80.0	25.0	48.0	-	-	-	19.0	48.9	-
	EX307-23		80.0	25.0	51.6	38.1	-	17.5	18.3	-	55.0
	UK309	+ H2309-23	100.0	30.0	38.0	50.0	11.0	-	-	61.8	65.0
1-1/2	US208-24		80.0	18.0	34.0	-	-	-	9.0	53.0	-
	ES208-24		80.0	18.0	43.7	30.2	-	18.3	11.0	-	60.3
	UC208-24		80.0	21.0	49.2	-	-	-	19.0	53.0	-
	EX208-24		80.0	21.0	56.3	42.8	-	18.3	21.4	-	60.3
	MUC208-24FD		80.0	21.0	19.2	49.2	-	-	19.0	53.0	-
	SUC208-24		80.0	21.0	49.2	49.2	-	-	19.0	-	-
	SES208-24		80.0	18.0	43.7	30.2	-	-	9.0	-	60.3
	UK209	+ H2309-24	85.0	22.0	30.0	50.0	11.0	-	-	57.2	65.0
	UC308-24		90.0	28.0	52.0	-	-	-	19.0	56.5	-
	EX308-24		90.0	28.0	57.1	41.3	-	20.6	19.8	-	63.5
	UK309	+ H2309-24	100.0	30.0	38.0	50.0	11.0	-	-	61.8	65.0
1-5/8	US209-26		85.0	19.0	41.2	-	-	-	10.2	57.2	-
	ES209-26		85.0	19.0	43.7	30.2	-	18.3	11.0	-	63.5
	UC209-26		85.0	22.0	49.2	-	-	-	19.0	57.2	-
	EX209-26		85.0	22.0	56.3	42.8	-	18.3	21.4	-	63.5
	UK210	+ H2310-26	90.0	23.0	31.0	55.0	12.0	-	-	61.8	70.0

Bearing-inserts for self-aligning bearings unit (inch) *(continued)*



EX

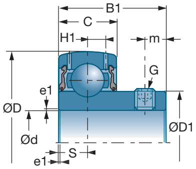


UK + H

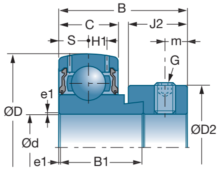
	Sleeves	H1	m	G	a*	e1	C	C_0	
References		mm	mm		mm	mm	10^3N	10^3N	kg
EX307-20		7.2	6.7	5/16-24UNF	4.0	2.0	33.50	19.20	0.860
UK308	+ H2308-20	8.5	-	-	-	2.0	40.56	24.00	1.090
US207-22		5.7	6.5	1/4-28UNF	3.0	0.6	25.70	15.20	0.380
ES207-22		5.7	6.5	5/16-24UNF	4.0	1.1	25.70	15.20	0.510
UC207-22		5.8	6.5	5/16-24UNF	4.0	1.1	25.70	15.20	0.480
EX207-22		5.8	6.5	5/16-24UNF	4.0	1.1	25.70	15.20	0.610
MUC207-22FD		-	6.0	-	-	2.0	22.00	12.30	0.480
SUC207-22		-	6.0	-	-	1.0	20.10	15.60	0.470
SES207-22		-	6.5	-	-	1.0	20.10	15.60	0.510
UK208	+ H2308-22	6.3	-	-	-	1.1	29.60	18.20	0.740
UC307-22		7.2	8.0	5/16-24UNF	4.0	2.0	33.50	19.20	0.710
EX307-22		7.2	6.7	5/16-24UNF	4.0	2.0	33.50	19.20	0.800
UK308	+ H2308-22	8.5	-	-	-	2.0	40.56	24.00	1.090
US207-23		5.7	6.5	1/4-28UNF	3.0	0.6	25.70	15.20	0.370
ES207-23		5.7	6.5	5/16-24UNF	4.0	1.1	25.70	15.20	0.480
UC207-23		5.8	6.5	5/16-24UNF	4.0	1.1	25.70	15.20	0.450
EX207-23		5.8	6.5	5/16-24UNF	4.0	1.1	25.70	15.20	0.580
MUC207-23FD		-	6.0	-	-	2.0	22.00	12.30	0.480
SUC207-23		-	6.0	-	-	1.0	20.10	15.60	0.470
SES207-23		-	6.5	-	-	1.0	20.10	15.60	0.510
UK209	+ H2309-23	6.8	-	-	-	1.1	31.85	20.80	0.800
UC307-23		7.2	8.0	5/16-24UNF	4.0	2.0	33.50	19.20	0.700
EX307-23		7.2	6.7	5/16-24UNF	4.0	2.0	33.50	19.20	0.780
UK309	+ H2309-23	9.0	-	-	-	2.0	53.00	31.80	1.460
US208-24		6.2	7.0	5/16-24UNF	4.0	1.1	29.60	18.20	0.600
ES208-24		6.2	6.5	5/16-24UNF	4.0	1.1	29.60	18.20	0.680
UC208-24		6.3	8.0	5/16-24UNF	4.0	1.1	29.60	18.20	0.680
EX208-24		6.3	6.5	5/16-24UNF	4.0	1.1	29.60	18.20	0.830
MUC208-24FD		-	6.0	-	-	2.0	24.90	14.30	0.621
SUC208-24		-	8.0	-	-	1.0	22.80	18.20	0.630
SES208-24		-	6.5	-	-	1.0	22.80	18.20	0.640
UK209	+ H2309-24	6.8	-	-	-	1.1	31.85	20.80	0.840
UC308-24		8.5	10.0	3/8-24UNF	5.0	2.0	40.56	24.00	1.000
EX308-24		8.5	8.0	3/8-24UNF	5.0	2.0	40.56	24.00	1.130
UK309	+ H2309-24	9.0	-	-	-	2.0	53.00	31.80	1.500
US209-26		6.5	8.2	5/16-24UNF	4.0	1.1	31.85	20.80	0.750
ES209-26		6.5	6.5	5/16-24UNF	4.0	1.1	31.85	20.80	0.820
UC209-26		6.8	8.0	5/16-24UNF	4.0	1.1	31.85	20.80	0.780
EX209-26		6.8	6.5	5/16-24UNF	4.0	1.1	31.85	20.80	0.960
UK210	+ H2310-26	6.5	-	-	-	1.1	35.10	23.20	1.000

* Hex set-screw

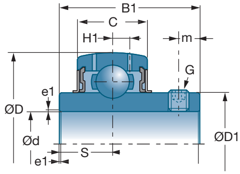
Bearing-inserts *(continued)*



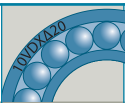
US

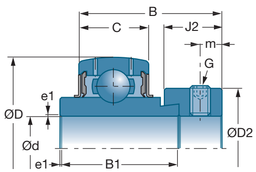


ES - SES

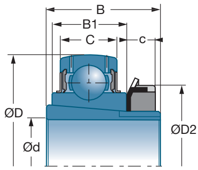


UC - SUC - MUC

d		Sleeves	D	C	B	B1	c	J2	smax	D1	D2
inch	References		mm	mm	mm	mm	mm	mm	mm	mm	mm
1-5/8	UC309-26		100.0	30.0	57.0	-	-	-	22.0	61.8	-
	EX309-26		100.0	30.0	58.7	42.9	-	20.6	19.8	-	70.0
	UK310	+ H2310-26	110.0	32.0	40.0	55.0	12.0	-	-	68.7	70.0
1-11/16	US209-27		85.0	19.0	41.2	-	-	-	10.2	57.2	-
	ES209-27		85.0	19.0	43.7	30.2	-	18.3	11.0	-	63.5
	UC209-27		85.0	22.0	49.2	-	-	-	19.0	57.2	-
	EX209-27		85.0	22.0	56.3	42.8	-	18.3	21.4	-	63.5
	UK210	+ H2310-27	90.0	23.0	31.0	55.0	12.0	-	-	61.8	70.0
	UC309-27		100.0	30.0	57.0	-	-	-	22.0	61.8	-
	EX309-27		100.0	30.0	58.7	42.9	-	20.6	19.8	-	70.0
	UK310	+ H2310-27	110.0	32.0	40.0	55.0	12.0	-	-	68.7	70.0
1-3/4	US209-28		85.0	19.0	41.2	-	-	-	10.2	57.2	-
	ES209-28		85.0	19.0	43.7	30.2	-	18.3	11.0	-	63.5
	UC209-28		85.0	22.0	49.2	-	-	-	19.0	57.2	-
	EX209-28		85.0	22.0	56.3	42.8	-	18.3	21.4	-	63.5
	SUC209-28		85.0	22.0	49.2	49.2	-	-	19.0	-	-
	SES209-28		85.0	19.0	43.7	30.2	-	-	9.5	-	63.5
	UK210	+ H2310-28	90.0	23.0	31.0	55.0	12.0	-	-	61.8	70.0
	UC309-28		100.0	30.0	57.0	-	-	-	22.0	61.8	-
	EX309-28		100.0	30.0	58.7	42.9	-	20.6	19.8	-	70.0
	UK310	+ H2310-28	110.0	32.0	40.0	55.0	12.0	-	-	68.7	70.0
1-7/8	US210-30		90.0	20.0	43.5	-	-	-	10.9	61.8	-
	ES210-30		90.0	20.0	43.7	30.2	-	18.3	11.0	-	69.9
	UC210-30		90.0	23.0	51.6	-	-	-	19.0	61.8	-
	EX210-30		90.0	23.0	62.7	49.2	-	18.3	24.6	-	69.9
	UK211	+ H2311-30	100.0	25.0	33.0	59.0	12.5	-	-	69.0	75.0
	UC310-30		110.0	32.0	61.0	-	-	-	22.0	68.7	-
	EX310-30		110.0	32.0	66.6	49.2	-	22.2	24.6	-	76.2
	UK311	+ H2311-30	120.0	34.0	43.0	59.0	12.5	-	-	74.9	75.0
1-15/16	US210-31		90.0	20.0	43.5	-	-	-	10.9	61.8	-
	ES210-31		90.0	20.0	43.7	30.2	-	18.3	11.0	-	69.9
	UC210-31		90.0	23.0	51.6	-	-	-	19.0	61.8	-
	EX210-31		90.0	23.0	62.7	49.2	-	18.3	24.6	-	69.9
	SUC210-31		90.0	24.0	51.6	51.6	-	-	19.0	-	-
	SES210-31		90.0	20.0	43.7	30.2	-	-	10.0	-	69.9
	UK211	+ H2311-31	100.0	25.0	33.0	59.0	12.5	-	-	69.0	75.0
	UC310-31		110.0	32.0	61.0	-	-	-	22.0	68.7	-
	EX310-31		110.0	32.0	66.6	49.2	-	22.2	24.6	-	76.2
	UK311	+ H2311-31	120.0	34.0	43.0	59.0	12.5	-	-	74.9	75.0



EX

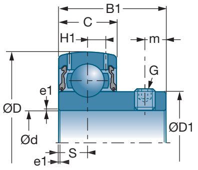


UK + H

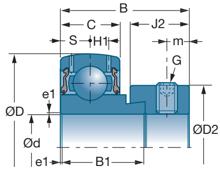
References	Sleeves	H1	m	G	a*	e1	C	C0	
		mm	mm		mm	mm	10³N	10³N	kg
UC309-26		9.0	10.0	3/8-24UNF	5.0	2.0	53.00	31.80	1.360
EX309-26		9.0	8.0	3/8-24UNF	5.0	2.0	53.00	31.80	1.570
UK310	+ H2310-26	9.9	-	-	-	2.0	62.00	37.80	1.680
US209-27		6.5	8.2	5/16-24UNF	4.0	1.1	31.85	20.80	0.720
ES209-27		6.5	6.5	5/16-24UNF	4.0	1.1	31.85	20.80	0.760
UC209-27		6.8	8.0	5/16-24UNF	4.0	1.1	31.85	20.80	0.740
EX209-27		6.8	6.5	5/16-24UNF	4.0	1.1	31.85	20.80	0.910
UK210	+ H2310-27	6.5	-	-	-	1.1	35.10	23.20	0.990
UC309-27		9.0	10.0	3/8-24UNF	5.0	2.0	53.00	31.80	1.330
EX309-27		9.0	8.0	3/8-24UNF	5.0	2.0	53.00	31.80	1.520
UK310	+ H2310-27	9.9	-	-	-	2.0	62.00	37.80	1.780
US209-28		6.5	8.2	5/16-24UNF	4.0	1.1	31.85	20.80	0.670
ES209-28		6.5	6.5	5/16-24UNF	4.0	1.1	31.85	20.80	0.730
UC209-28		6.8	8.0	5/16-24UNF	4.0	1.1	31.85	20.80	0.700
EX209-28		6.8	6.5	5/16-24UNF	4.0	1.1	31.85	20.80	0.870
SUC209-28		-	8.0	-	-	1.0	25.70	20.80	0.690
SES209-28		-	6.5	-	-	1.0	25.70	20.80	0.670
UK210	+ H2310-28	6.5	-	-	-	1.1	35.10	23.20	0.950
UC309-28		9.0	10.0	3/8-24UNF	5.0	2.0	53.00	31.80	1.300
EX309-28		9.0	8.0	3/8-24UNF	5.0	2.0	53.00	31.80	1.470
UK310	+ H2310-28	9.9	-	-	-	2.0	62.00	37.80	1.740
US210-30		6.5	9.2	5/16-24UNF	4.0	1.1	35.10	23.20	0.800
ES210-30		6.5	6.5	5/16-24UNF	4.0	1.1	35.10	23.20	0.850
UC210-30		6.5	9.0	3/8-24UNF	5.0	1.1	35.10	23.20	0.870
EX210-30		6.5	6.5	5/16-24UNF	4.0	1.1	35.10	23.20	1.100
UK211	+ H2311-30	7.2	-	-	-	1.1	43.55	29.20	1.200
UC310-30		9.9	12.0	7/16-20UNF	6.0	2.0	62.00	37.80	1.740
EX310-30		9.9	8.7	3/8-24UNF	5.0	2.0	62.00	37.80	1.930
UK311	+ H2311-30	10.6	-	-	-	2.0	71.50	44.80	2.210
US210-31		6.5	9.2	5/16-24UNF	4.0	1.1	35.10	23.20	0.780
ES210-31		6.5	6.5	5/16-24UNF	4.0	1.1	35.10	23.20	0.830
UC210-31		6.5	9.0	3/8-24UNF	5.0	1.1	35.10	23.20	0.820
EX210-31		6.5	6.5	5/16-24UNF	4.0	1.1	35.10	23.20	1.040
SUC210-31		-	10.0	-	-	1.0	27.50	23.70	0.770
SES210-31		-	6.5	-	-	1.0	27.50	23.70	0.750
UK211	+ H2311-31	7.2	-	-	-	1.1	43.55	29.20	1.190
UC310-31		9.9	12.0	7/16-20UNF	6.0	2.0	62.00	37.80	1.680
EX310-31		9.9	8.7	3/8-24UNF	5.0	2.0	62.00	37.80	1.880
UK311	+ H2311-31	10.6	-	-	-	2.0	71.50	44.80	2.200

* Hex set-screw

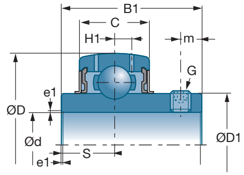
Bearing-inserts *(continued)*



US



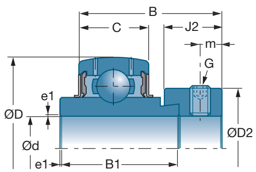
ES - SES



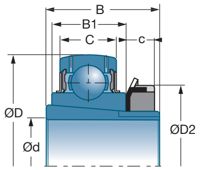
UC - SUC - MUC

d		Sleeves	D	C	B	B1	c	J2	smax	D1	D2
inch	References		mm	mm	mm	mm	mm	mm	mm	mm	mm
2	US211-32		100.0	23.0	45.3	-	-	-	11.8	69.0	-
	ES211-32		100.0	24.0	48.4	32.5	-	20.7	12.0	-	76.2
	UC211-32		100.0	25.0	55.6	-	-	-	22.2	69.0	-
	EX211-32		100.0	25.0	71.3	55.4	-	20.7	27.7	-	76.2
	SUC211-32		100.0	25.0	55.6	55.6	-	-	22.2	-	-
	SES211-32		100.0	21.0	48.4	32.5	-	-	10.5	-	76.2
	UK211	+ H2311-32	100.0	25.0	33.0	59.0	12.5	-	-	69.0	75.0
	UC311-32		120.0	34.0	66.0	-	-	-	25.0	74.9	-
	EX311-32		120.0	34.0	73.0	55.6	-	22.2	27.8	-	83.0
	UK311	+ H2311-32	120.0	34.0	43.0	59.0	12.5	-	-	74.9	75.0
2-3/16	US211-35		100.0	23.0	45.3	-	-	-	11.8	69.0	-
	ES211-35		100.0	24.0	48.4	32.5	-	20.7	12.0	-	76.2
	UC211-35		100.0	25.0	55.6	-	-	-	22.2	69.0	-
	EX211-35		100.0	25.0	71.3	55.4	-	20.7	27.7	-	76.2
	SUC211-35		100.0	25.0	55.6	55.6	-	-	22.2	-	-
	UK213	+ H2313-35	120.0	28.0	36.0	65.0	14.0	-	-	82.0	85.0
	UC311-35		120.0	34.0	66.0	-	-	-	25.0	74.9	-
	EX311-35		120.0	34.0	73.0	55.6	-	22.2	27.8	-	83.0
	UK313	+ H2313-35	140.0	38.0	49.0	65.0	14.0	-	-	87.5	85.0
2-1/4	ES212-36		110.0	24.0	49.3	33.4	-	22.3	12.0	-	84.2
	US212-36		110.0	24.0	53.7	-	-	-	14.9	74.9	-
	UC212-36		110.0	27.0	65.1	-	-	-	25.4	74.9	-
	EX212-36		110.0	27.0	77.7	61.8	-	22.3	30.9	-	84.2
	UK213	+ H2313-36	120.0	28.0	36.0	65.0	14.0	-	-	82.0	85.0
	UC312-36		130.0	36.0	71.0	-	-	-	26.0	81.0	-
	EX312-36		130.0	36.0	79.4	61.9	-	23.9	31.0	-	89.0
	UK313	+ H2313-36	140.0	38.0	49.0	65.0	14.0	-	-	87.5	85.0
2-7/16	ES212-39		110.0	24.0	49.3	33.4	-	22.3	12.0	-	84.2
	US212-39		110.0	24.0	53.7	-	-	-	14.9	74.9	-
	UC212-39		110.0	27.0	65.1	-	-	-	25.4	74.9	-
	EX212-39		110.0	27.0	77.7	61.8	-	22.3	30.9	-	84.2
	SUC212-39		110.0	27.0	65.1	65.1	-	-	25.4	-	-
	UK215	+ H2315-39	130.0	30.0	41.0	73.0	15.0	-	-	91.5	98.0
	UC312-39		130.0	36.0	71.0	-	-	-	26.0	81.0	-
	EX312-39		130.0	36.0	79.4	61.9	-	23.9	31.0	-	89.0
	UK315	+ H2315-39	160.0	42.0	55.0	73.0	15.0	-	-	100.5	98.0
2-1/2	UC213-40		120.0	28.0	65.1	-	-	-	25.4	82.0	-
	EX213-40		120.0	28.0	85.7	68.2	-	23.5	34.1	-	86.0
	UK215	+ H2315-40	130.0	30.0	41.0	73.0	15.0	-	-	91.5	98.0
	UC313-40		140.0	38.0	75.0	-	-	-	30.0	87.5	-

Bearing-inserts for self-aligning bearings unit (inch) *(continued)*



EX



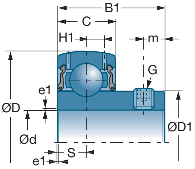
UK + H

	Sleeves	H1	m	G	a*	e1	C	C_0	
References		mm	mm		mm	mm	10^3N	10^3N	kg
US211-32		7.2	9.8	5/16-24UNF	5.0	1.1	43.55	29.20	1.100
ES211-32		7.2	8.0	3/8-24UNF	5.0	1.1	43.55	29.20	1.180
UC211-32		7.2	9.0	3/8-24UNF	5.0	1.1	43.55	29.20	1.270
EX211-32		7.2	8.0	3/8-24UNF	5.0	1.5	43.55	29.20	1.580
SUC211-32		-	10.0	-	-	1.0	34.00	25.50	1.060
SES211-32		-	8.0	-	-	1.0	34.00	25.50	1.030
UK211	+ H2311-32	7.2	-	-	-	1.1	43.55	29.20	1.130
UC311-32		10.6	12.0	7/16-20UNF	6.0	2.0	71.50	44.80	2.080
EX311-32		10.6	9.0	3/8-24UNF	5.0	2.0	71.50	44.80	2.490
UK311	+ H2311-32	10.6	-	-	-	2.0	71.50	44.80	2.140
US211-35		7.2	9.8	5/16-24UNF	5.0	1.1	43.55	29.20	1.050
ES211-35		7.2	8.0	3/8-24UNF	5.0	1.1	43.55	29.20	0.810
UC211-35		7.2	9.0	3/8-24UNF	5.0	1.1	43.55	29.20	1.100
EX211-35		7.2	8.0	3/8-24UNF	5.0	1.5	43.55	29.20	1.360
SUC211-35		-	10.0	-	-	1.0	34.00	25.50	1.060
UK213	+ H2313-35	8.0	-	-	-	1.5	57.20	40.00	2.110
UC311-35		10.6	12.0	7/16-20UNF	6.0	2.0	71.50	44.80	1.870
EX311-35		10.6	9.0	3/8-24UNF	5.0	2.0	71.50	44.80	2.240
UK313	+ H2313-35	12.1	-	-	-	2.0	93.86	60.50	3.460
ES212-36		8.0	8.0	3/8-24UNF	5.0	1.1	52.50	32.80	1.300
US212-36		8.0	9.8	3/8-24UNF	5.0	1.1	52.50	32.80	1.300
UC212-36		8.2	10.5	3/8-24UNF	5.0	1.1	52.50	32.80	1.670
EX212-36		8.2	8.0	3/8-24UNF	5.0	1.5	52.50	32.80	2.030
UK213	+ H2313-36	8.0	-	-	-	1.5	57.20	40.00	2.010
UC312-36		11.3	12.0	7/16-20UNF	6.0	2.0	81.60	51.80	2.650
EX312-36		11.3	9.0	3/8-24UNF	5.0	2.0	81.60	51.80	2.950
UK313	+ H2313-36	12.1	-	-	-	2.0	93.86	60.50	3.360
ES212-39		8.0	8.0	3/8-24UNF	5.0	1.1	52.50	32.80	1.090
US212-39		8.0	9.8	3/8-24UNF	5.0	1.1	52.50	32.80	1.220
UC212-39		8.2	10.5	3/8-24UNF	5.0	1.1	52.50	32.80	1.450
EX212-39		8.2	8.0	3/8-24UNF	5.0	1.5	52.50	32.80	1.760
SUC212-39		-	10.0	-	-	1.0	41.00	31.50	1.470
UK215	+ H2315-39	9.0	-	-	-	2.0	66.00	49.50	2.820
UC312-39		11.3	12.0	7/16-20UNF	6.0	2.0	81.60	51.80	2.500
EX312-39		11.3	9.0	3/8-24UNF	5.0	2.0	81.60	51.80	2.860
UK315	+ H2315-39	13.5	-	-	-	2.5	113.36	76.80	5.130
UC213-40		8.0	12.0	3/8-24UNF	6.0	1.5	57.20	40.00	1.940
EX213-40		8.0	8.5	3/8-24UNF	5.0	1.5	57.20	40.00	2.510
UK215	+ H2315-40	9.0	-	-	-	2.0	66.00	49.50	2.810
UC313-40		12.1	12.0	7/16-20UNF	6.0	2.0	93.86	60.50	3.300

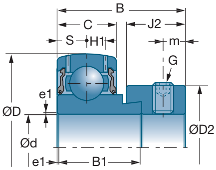
* Hex set-screw

SNR

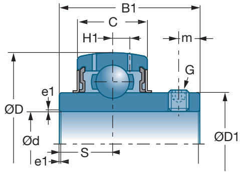
Bearing-inserts *(continued)*



US



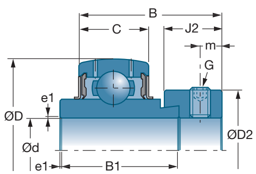
ES - SES



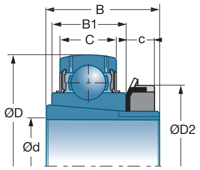
UC - SUC - MUC

d	References	Sleeves	D	C	B	B1	c	J2	smax	D1	D2
inch	References		mm	mm	mm	mm	mm	mm	mm	mm	mm
2-1/2	EX313-40		140.0	38.0	85.7	65.1	-	27.0	32.5	-	97.0
	UK315	+ H2315-40	160.0	42.0	55.0	73.0	15.0	-	-	100.5	98.0
2-11/16	UC214-43		125.0	30.0	74.6	-	-	-	30.2	86.5	-
	EX214-43		125.0	30.0	85.7	68.2	-	23.5	34.1	-	96.8
	UK216	+ H2316-43	140.0	33.0	44.0	78.0	17.0	-	-	98.0	105.0
	UC314-43		150.0	40.0	78.0	-	-	-	31.0	94.0	-
	EX314-43		150.0	40.0	92.1	68.3	-	30.2	34.2	-	102.0
	UK316	+ H2316-43	170.0	44.0	55.0	78.0	17.0	-	-	107.9	105.0
2-3/4	UC214-44		125.0	30.0	74.6	-	-	-	30.2	86.5	-
	EX214-44		125.0	30.0	85.7	68.2	-	23.5	34.1	-	96.8
	UK216	+ H2316-44	140.0	33.0	44.0	78.0	17.0	-	-	98.0	105.0
	UC314-44		150.0	40.0	78.0	-	-	-	31.0	94.0	-
	EX314-44		150.0	40.0	92.1	68.3	-	30.2	34.2	-	102.0
	UK316	+ H2316-44	170.0	44.0	55.0	78.0	17.0	-	-	107.9	105.0
2-15/16	UC215-47		130.0	30.0	77.8	-	-	-	33.3	91.5	-
	EX215-47		130.0	30.0	92.1	74.6	-	23.9	37.3	-	102.0
	UK217	+ H2317-47	150.0	35.0	44.0	82.0	18.0	-	-	105.1	110.0
	UC315-47		160.0	42.0	82.0	-	-	-	32.0	100.5	-
	EX315-47		160.0	42.0	100.0	74.6	-	31.8	37.3	-	113.0
	UK317	+ H2317-47	180.0	46.0	60.0	82.0	18.0	-	-	114.0	110.0
3	UC215-48		130.0	30.0	77.8	-	-	-	33.3	91.5	-
	EX215-48		130.0	30.0	92.1	74.6	-	23.9	37.3	-	102.0
	UK217	+ H2317-48	150.0	35.0	44.0	82.0	18.0	-	-	105.1	110.0
	UC315-48		160.0	42.0	82.0	-	-	-	32.0	100.5	-
	EX315-48		160.0	42.0	100.0	74.6	-	31.8	37.3	-	113.0
	UK317	+ H2317-48	180.0	46.0	60.0	82.0	18.0	-	-	114.0	110.0
3-1/4	EX217-52		150.0	35.0	71.0	53.2	-	27.0	23.4	-	119.0
	UC217-52		150.0	35.0	85.7	-	-	-	34.1	105.1	-
	UC317-52		180.0	46.0	96.0	-	-	-	40.0	114.0	-
	EX317-52		180.0	46.0	109.5	84.1	-	31.8	42.0	-	127.0
	UK319	+ H2319-55	200.0	50.0	66.0	90.0	19.0	-	-	126.5	125.0
3-1/2	EX218-56		160.0	37.0	72.5	55.0	-	24.0	24.5	-	120.0
	UC218-56		160.0	37.0	96.0	-	-	-	39.7	111.0	-
	UC318-56		190.0	48.0	96.0	-	-	-	40.0	120.0	-
	EX318-56		190.0	48.0	115.9	87.3	-	36.5	43.6	-	133.0
	UK320	+ H2320-56	215.0	54.0	68.0	97.0	20.0	-	-	134.5	130.0

Bearing-inserts for self-aligning bearings unit (inch) *(continued)*



EX



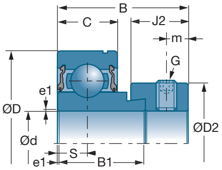
UK + H

References	Sleeves	H1 (mm)	m (mm)	G	a* (mm)	e1 (mm)	C (10^3N)	C_0 (10^3N)	kg
EX313-40		12.1	11.5	7/16-20UNF	6.0	2.0	93.86	60.50	3.850
UK315	+ H2315-40	13.5	-	-	-	2.5	113.36	76.80	5.100
UC214-43		9.0	12.0	3/8-24UNF	6.0	2.0	62.00	45.00	2.020
EX214-43		9.0	8.5	3/8-24UNF	5.0	2.0	62.00	45.00	2.620
UK216	+ H2316-43	10.3	-	-	-	2.0	72.50	54.20	3.260
UC314-43		12.8	12.0	7/16-20UNF	6.0	2.5	104.26	68.00	4.000
EX314-43		12.8	12.0	7/16-20UNF	6.0	2.5	104.26	68.00	4.450
UK316	+ H2316-43	14.5	-	-	-	3.0	122.85	86.50	5.850
UC214-44		9.0	12.0	7/16-20UNF	6.0	2.0	62.00	45.00	2.060
EX214-44		9.0	8.5	3/8-24UNF	5.0	2.0	62.00	45.00	2.580
UK216	+ H2316-44	10.3	-	-	-	2.0	72.50	54.20	3.160
UC314-44		12.8	12.0	7/16-20UNF	6.0	2.5	104.26	68.00	3.960
EX314-44		12.8	12.0	7/16-20UNF	6.0	2.5	104.26	68.00	4.400
UK316	+ H2316-44	14.5	-	-	-	3.0	122.85	86.50	5.750
UC215-47		9.0	12.0	7/16-20UNF	6.0	2.0	66.00	49.50	2.300
EX215-47		9.0	8.5	3/8-24UNF	5.0	2.0	66.00	49.50	2.800
UK217	+ H2317-47	11.0	-	-	-	2.0	83.20	63.80	3.820
UC315-47		13.5	14.0	1/2-20UNF	6.0	2.5	113.36	76.80	4.290
EX315-47		13.5	13.0	1/2-20UNF	8.0	2.5	113.36	76.80	5.400
UK317	+ H2317-47	15.5	-	-	-	3.0	132.60	96.50	6.840
UC215-48		9.0	12.0	7/16-20UNF	6.0	2.0	66.00	49.50	2.130
EX215-48		9.0	8.5	3/8-24UNF	5.0	2.0	66.00	49.50	2.740
UK217	+ H2317-48	11.0	-	-	-	2.0	83.20	63.80	3.720
UC315-48		13.5	14.0	1/2-20UNF	6.0	2.5	113.36	76.80	4.240
EX315-48		13.5	13.0	5/8-18UNF	8.0	2.5	113.36	76.80	5.280
UK317	+ H2317-48	15.5	-	-	-	3.0	132.60	96.50	6.740
EX217-52		11.0	10.0	7/16-20UNF	6.0	2.0	83.20	63.80	3.650
UC217-52		11.0	14.0	7/16-20UNF	6.0	2.0	83.20	63.80	3.320
UC317-52		15.5	16.0	5/8-18UNF	8.0	3.0	132.60	96.50	6.760
EX317-52		15.5	13.0	5/8-18UNF	8.0	3.0	132.60	96.50	7.880
UK319	+ H2319-55	16.7	-	-	-	3.0	156.00	122.00	9.660
EX218-56		12.0	9.5	7/16-20UNF	6.0	2.0	96.00	71.50	5.000
UC218-56		12.0	14.0	1/2-20UNF	6.0	2.0	96.00	71.50	4.560
UC318-56		16.5	16.0	5/8-18UNF	8.0	3.5	143.00	108.00	8.030
EX318-56		16.5	14.5	3/4-16UNF	8.0	3.0	143.00	108.00	9.200
UK320	+ H2320-56	19.0	-	-	-	3.5	171.60	140.00	10.620

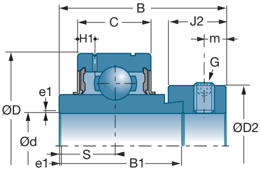
* Hex set-screw

SNR

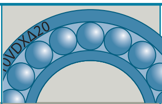
Bearing-inserts *(continued)*



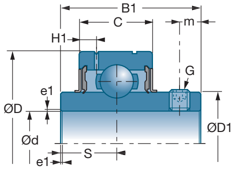
CES



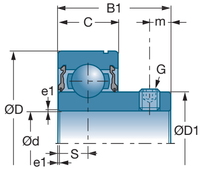
CEX

d		D	C	B	B1	J2	smax	D1	D2
mm	References	mm	mm	mm	mm	mm	mm	mm	mm
20	CES 204	47.0	14.0	31.0	21.5	13.5	7.0		33.3
	CEX 204	47.0	17.0	43.7	34.2	13.5	17.1		33.3
	CUC 204	47.0	17.0	31.0	31.0		12.7	29.0	
	CUS 204	47.0	14.0	25.0	25.0		7.0	28.3	
25	CES 205	52.0	15.0	31.0	21.5	13.5	7.5		38.1
	CEX 205	52.0	17.0	44.4	34.9	13.5	17.5		38.1
	CUC 205	52.0	17.0	34.0	34.0		14.3	34.0	
	CUS 205	52.0	15.0	27.0	27.0		7.5	34.0	
30	CES 206	62.0	16.0	35.7	23.8	15.9	8.0		44.5
	CEX 206	62.0	19.0	48.4	36.5	15.9	18.3		44.5
	CUC 206	62.0	19.0	38.1	38.1		15.9	40.3	
	CUS 206	62.0	16.0	30.0	30.0		8.0	40.0	
35	CES 207	72.0	17.0	38.9	25.4	17.5	8.5		55.6
	CEX 207	72.0	20.0	51.1	37.6	17.5	18.8		55.6
	CUC 207	72.0	20.0	42.9	42.9		17.5	48.0	
	CUS 207	72.0	17.0	32.0	32.0		8.5	46.9	
40	CES 208	80.0	18.0	43.7	30.2	18.3	9.0		60.3
	CEX 208	80.0	21.0	56.3	42.8	18.3	21.4		60.3
	CUC 208	80.0	21.0	49.2	49.2		19.0	53.0	
	CUS 208	80.0	18.0	34.0	34.0		9.0	52.6	
45	CES 209	85.0	19.0	43.7	30.2	18.3	9.5		63.5
	CEX 209	85.0	22.0	56.3	42.8	18.3	21.4		63.5
	CUC 209	85.0	22.0	49.2	49.2		19.0	57.2	
	CUS 209	85.0	19.0	41.2	41.2		9.5	57.6	
50	CES 210	90.0	20.0	43.7	30.2	18.3	10.0		69.9
	CEX 210	90.0	24.0	62.7	49.2	18.3	24.6		69.9
	CUC 210	90.0	23.0	51.6	51.6		19.0	61.8	
	CUS 210	90.0	20.0	43.5	43.5		10.0	63.2	

Bearing-inserts with cylindrical outside diameter (mm)



CUC

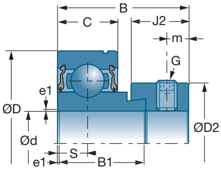


CUS

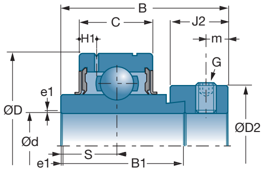
	H1	m	G	a*	e1	C	C_0	
References	mm	mm		mm	mm	10^3N	10^3N	kg
CES 204		5.0	M6X1	3	1.0	12.8	6.7	0.15
CEX 204	4.0	5.0	M6X1	3	1.0	12.8	6.7	0.22
CUC 204	4.0	4.5	M6X1	3	0.6	12.8	6.7	0.20
CUS 204		5.0	M6X1	3	1.0	12.8	6.7	0.13
CES 205		5.0	M6X1	3	1.0	14.0	7.9	0.19
CEX 205	4.1	5.0	M6X1	3	1.0	14.0	7.9	0.25
CUC 205	4.1	5.0	M6X1	3	0.6	14.0	7.9	0.21
CUS 205		5.0	M6X1	3	1.0	14.0	7.9	0.17
CES 206		6.0	M6X1	3	1.0	19.5	11.2	0.33
CEX 206	4.2	6.0	M6X1	3	1.0	19.5	11.2	0.41
CUC 206	4.2	5.5	M6X1	3	0.6	19.5	11.2	0.35
CUS 206		6.0	M6X1	3	1.0	19.5	11.2	0.27
CES 207		6.5	M8X1	4	1.5	25.7	15.2	0.50
CEX 207	5.0	6.5	M8X1	4	1.5	25.7	15.2	0.60
CUC 207	5.0	6.0	M8X1	4	1.1	25.7	15.2	0.47
CUS 207		6.0	M6X1	4	1.0	25.7	15.2	0.42
CES 208		6.5	M8X1	4	1.5	29.6	18.2	0.65
CEX 208	5.0	6.5	M8X1	4	1.5	29.6	18.2	0.78
CUC 208	5.0	8.0	M8X1	4	1.1	29.6	18.2	0.64
CUS 208		8.0	M8X1	4	1.0	31.9	20.8	0.48
CES 209		6.5	M8X1	4	1.5	31.9	20.8	0.69
CEX 209	5.1	6.5	M8X1	4	1.5	31.9	20.8	0.87
CUC 209	5.1	8.0	M8X1	4	1.1	31.9	20.8	0.68
CUS 209		8.0	M8X1	4	1.5	31.9	20.8	0.57
CES 210		6.5	M8X1	4	1.5	35.1	23.2	0.80
CEX 210	5.6	6.5	M8X1	4	1.5	35.1	23.2	1.01
CUC 210	5.6	9.0	M10X1.25	5	1.1	35.1	23.2	0.80
CUS 210		9.0	M8X1	4	1.5	35.1	23.2	0.66

* Hex set-screw

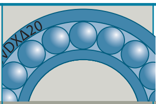
Bearing-inserts *(continued)*



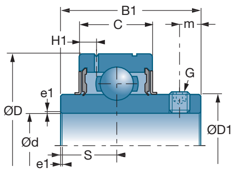
CES



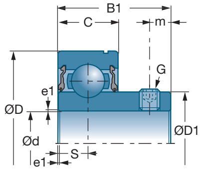
CEX

d		D	C	B	B1	J2	smax	D1	D2
inch	References	mm	mm	mm	mm	mm	mm	mm	mm
3/4	CES 204-12	47	14	31	21.5	13.5	7		33.3
	CEX 204-12	47	17	43.7	34.2	13.5	17.1		33.3
	CUC 204-12	47	17	31	31		12.7	29	
	CUS 204-12	47	14	25	25		7	28.3	
7/8	CES 205-14	52	15	31	21.5	13.5	7.5		38.1
	CEX 205-14	52	17	44.4	34.9	13.5	17.5		38.1
	CUC 205-14	52	17	34	34		14.3	34	
	CUS 205-14	52	15	27	27		7.5	34	
15/16	CES 205-15	52	15	31	21.5	13.5	7.5		38.1
	CEX 205-15	52	17	44.4	34.9	13.5	17.5		38.1
	CUC 205-15	52	17	34	34		14.3	34	
	CUS 205-15	52	15	27	27		7.5	34	
1	CES 205-16	52	15	31	21.5	13.5	7.5		38.1
	CEX 205-16	52	17	44.4	34.9	13.5	17.5		38.1
	CUC 205-16	52	17	34	34		14.3	34	
	CUS 205-16	52	15	27	27		7.5	34	
1-1/8	CES 206-18	62	16	35.7	23.8	15.9	8		44.5
	CEX 206-18	62	19	48.4	36.5	15.9	18.3		44.5
	CUC 206-18	62	19	38.1	38.1		15.9	40.3	
	CUS 206-18	62	16	30	30		8	40	
1-3/16	CES 206-19	62	16	35.7	23.8	15.9	8		44.5
	CEX 206-19	62	19	48.4	36.5	15.9	18.3		44.5
	CUC 206-19	62	19	38.1	38.1		15.9	40.3	
	CUS 206-19	62	16	30	30		8	40	
1-1/4	CES 206-20	62	16	35.7	23.8	15.9	8		44.5
	CEX 206-20	62	19	48.4	36.5	15.9	18.3		44.5
	CUC 206-20	62	19	38.1	38.1		15.9	40.3	
	CUS 206-20	62	16	30	30		8	40	
1-3/8	CES 207-22	72	17	38.9	25.4	17.5	8.5		55.6
	CEX 207-22	72	20	51.1	37.6	17.5	18.8		55.6
	CUC 207-22	72	20	42.9	42.9		17.5	48	
	CUS 207-22	72	17	32	32		8.5	46.9	

Bearing-inserts with cylindrical outside diameter (inch)



CUC



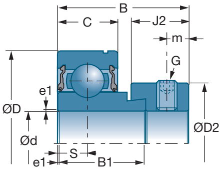
CUS

	H1	m	G	a*	e1	C	C_0	
References	mm	mm		inch	mm	10^3N	10^3N	kg
CES 204-12		5	1/4-28UNF	1/8	12.8	6.65	0.15	0.15
CEX 204-12	4	5	1/4-28UNF	1/8	12.8	6.65	0.22	0.22
CUC 204-12	4	4.5	1/4-28UNF	1/8	12.8	6.65	0.2	0.20
CUS 204-12		5	1/4-28UNF	1/8	12.8	6.65	0.13	0.13
CES 205-14		5	1/4-28UNF	1/8	14	7.88	0.19	0.19
CEX 205-14	4.1	5	1/4-28UNF	1/8	14	7.88	0.25	0.25
CUC 205-14	4.1	5	1/4-28UNF	1/8	14	7.88	0.21	0.21
CUS 205-14		5	1/4-28UNF	1/8	14	7.88	0.17	0.18
CES 205-15		5	1/4-28UNF	1/8	14	7.88	0.19	0.19
CEX 205-15	4.1	5	1/4-28UNF	1/8	14	7.88	0.25	0.25
CUC 205-15	4.1	5	1/4-28UNF	1/8	14	7.88	0.21	0.21
CUS 205-15		5	1/4-28UNF	1/8	14	7.88	0.17	0.18
CES 205-16		5	1/4-28UNF	1/8	14	7.88	0.19	0.18
CEX 205-16	4.1	5	1/4-28UNF	1/8	14	7.88	0.25	0.24
CUC 205-16	4.1	5	1/4-28UNF	1/8	14	7.88	0.21	0.21
CUS 205-16		5	1/4-28UNF	1/8	14	7.88	0.17	0.18
CES 206-18		6	5/16-24UNF	5/32	19.5	11.2	0.33	0.35
CEX 206-18	4.2	6	5/16-24UNF	5/32	19.5	11.2	0.41	0.43
CUC 206-18	4.2	5.5	1/4-28UNF	1/8	19.5	11.2	0.35	0.34
CUS 206-18		6	1/4-28UNF	1/8	19.5	11.2	0.27	0.28
CES 206-19		6	5/16-24UNF	5/32	19.5	11.2	0.33	0.31
CEX 206-19	4.2	6	5/16-24UNF	5/32	19.5	11.2	0.41	0.40
CUC 206-19	4.2	5.5	1/4-28UNF	1/8	19.5	11.2	0.35	0.31
CUS 206-19		6	1/4-28UNF	1/8	19.5	11.2	0.27	0.25
CES 206-20		6	5/16-24UNF	5/32	19.5	11.2	0.33	0.28
CEX 206-20	4.2	6	5/16-24UNF	5/32	19.5	11.2	0.41	0.38
CUC 206-20	4.2	5.5	1/4-28UNF	1/8	19.5	11.2	0.35	0.30
CUS 206-20		6	1/4-28UNF	1/8	19.5	11.2	0.27	0.24
CES 207-22		6.5	5/16-24UNF	5/32	25.7	15.2	0.5	0.51
CEX 207-22	5	6.5	5/16-24UNF	5/32	25.7	15.2	0.6	0.61
CUC 207-22	5	6	5/16-24UNF	5/32	25.7	15.2	0.47	0.48
CUS 207-22		6	1/4-28UNF	1/8	25.7	15.2	0.42	0.38

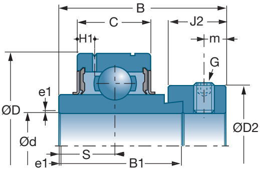
* Hex set-screw

SNR

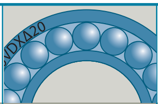
Bearing-inserts *(continued)*



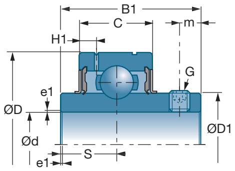
CES



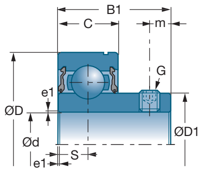
CEX

d		D	C	B	B1	J2	smax	D1	D2
inch	References	mm	mm	mm	mm	mm	mm	mm	mm
1-7/16	CES 207-23	72	17	38.9	25.4	17.5	8.5		55.6
	CEX 207-23	72	20	51.1	37.6	17.5	18.8		55.6
	CUC 207-23	72	20	42.9	42.9		17.5	48	
	CUS 207-23	72	17	32	32		8.5	46.9	
1-1/2	CES 208-24	80	18	43.7	30.2	18.3	9		60.3
	CEX 208-24	80	21	56.3	42.8	18.3	21.4		60.3
	CUC 208-24	80	21	49.2	49.2		19	53	
	CUS 208-24	80	18	34	34		9	52.6	
1-5/8	CES 209-26	85	19	43.7	30.2	18.3	9.5		63.5
	CEX 209-26	85	22	56.3	42.8	18.3	21.4		63.5
	CUC 209-26	85	22	49.2	49.2		19	57.2	
	CUS 209-26	85	19	41.2	41.2		9.5	57.6	
1-11/16	CES 209-27	85	19	43.7	30.2	18.3	9.5		63.5
	CEX 209-27	85	22	56.3	42.8	18.3	21.4		63.5
	CUC 209-27	85	22	49.2	49.2		19	57.2	
	CUS 209-27	85	19	41.2	41.2		9.5	57.6	
1-3/4	CES 209-28	85	19	43.7	30.2	18.3	9.5		63.5
	CEX 209-28	85	22	56.3	42.8	18.3	21.4		63.5
	CUC 209-28	85	22	49.2	49.2		19	57.2	
	CUS 209-28	85	19	41.2	41.2		9.5	57.6	
1-7/8	CES 210-30	90	20	43.7	30.2	18.3	10		69.9
	CEX 210-30	90	24	62.7	49.2	18.3	24.6		69.9
	CUC 210-30	90	23	51.6	51.6		19	61.8	
	CUS 210-30	90	20	43.5	43.5		10	63.2	
1-15/16	CES 210-31	90	20	43.7	30.2	18.3	10		69.9
	CEX 210-31	90	24	62.7	49.2	18.3	24.6		69.9
	CUC 210-31	90	23	51.6	51.6		19	61.8	
	CUS 210-31	90	20	43.5	43.5		10	63.2	

Bearing-inserts with cylindrical outside diameter (inch) *(continued)*



CUC



CUS

References	H1	m	G	a*	e1	C	C0	
	mm	mm		inch	mm	10^3N	10^3N	kg
CES 207-23		6.5	5/16-24UNF	5/32	25.7	15.2	0.5	0.48
CEX 207-23	5	6.5	5/16-24UNF	5/32	25.7	15.2	0.6	0.58
CUC 207-23	5	6	5/16-24UNF	5/32	25.7	15.2	0.47	0.45
CUS 207-23		6	1/4-28UNF	1/8	25.7	15.2	0.42	0.37
CES 208-24		6.5	5/16-24UNF	5/32	29.6	18.2	0.65	0.68
CEX 208-24	5	6.5	5/16-24UNF	5/32	29.6	18.2	0.78	0.83
CUC 208-24	5	8	5/16-24UNF	5/32	29.6	18.2	0.64	0.68
CUS 208-24		8	5/16-24UNF	5/32	31.85	20.8	0.48	0.60
CES 209-26		6.5	5/16-24UNF	5/32	31.85	20.8	0.69	0.82
CEX 209-26	5.1	6.5	5/16-24UNF	5/32	31.85	20.8	0.87	0.96
CUC 209-26	5.1	8	5/16-24UNF	5/32	31.85	20.8	0.68	0.78
CUS 209-26		8	5/16-24UNF	5/32	31.85	20.8	0.57	0.75
CES 209-27		6.5	5/16-24UNF	5/32	31.85	20.8	0.69	0.76
CEX 209-27	5.1	6.5	5/16-24UNF	5/32	31.85	20.8	0.87	0.91
CUC 209-27	5.1	8	5/16-24UNF	5/32	31.85	20.8	0.68	0.74
CUS 209-27		8	5/16-24UNF	5/32	31.85	20.8	0.57	0.72
CES 209-28		6.5	5/16-24UNF	5/32	31.85	20.8	0.69	0.73
CEX 209-28	5.1	6.5	5/16-24UNF	5/32	31.85	20.8	0.87	0.87
CUC 209-28	5.1	8	5/16-24UNF	5/32	31.85	20.8	0.68	0.70
CUS 209-28		8	5/16-24UNF	5/32	31.85	20.8	0.57	0.67
CES 210-30		6.5	5/16-24UNF	5/32	35.1	23.2	0.8	0.85
CEX 210-30	5.6	6.5	5/16-24UNF	5/32	35.1	23.2	1.01	1.10
CUC 210-30	5.6	9	3/8-24UNF	3/16	35.1	23.2	0.8	0.80
CUS 210-30		9	5/16-24UNF	5/32	35.1	23.2	0.66	0.80
CES 210-31		6.5	5/16-24UNF	5/32	35.1	23.2	0.8	0.83
CEX 210-31	5.6	6.5	5/16-24UNF	5/32	35.1	23.2	1.01	1.04
CUC 210-31	5.6	9	3/8-24UNF	3/17	35.1	23.2	0.8	0.82
CUS 210-31		9	5/16-24UNF	5/32	35.1	23.2	0.66	0.78

* Hex set-screw

SNR

Single-row angular-contact ball bearings

SNR

Single-row angular-contact ball bearings

Definition and capabilities

Always mounted in opposition to another bearing of same type, they offer high mounting stiffness, especially when preloaded.

Definition

Cage

Standard dimension bearings are equipped with either a metal cage or a synthetic material cage. In the latter case the maximum continuous operating temperature is 120°C or 248°F (150°C peak or 302°F peak).

Large-sized bearings are equipped with a machined brass cage.

Contact angle

Angular-contact ball bearings of normal precision have a contact angle of 40° (suffix B). Some bearings have a contact angle of 30°, in which case the bearing reference does not have the B suffix.

Capabilities

Load and speed

These bearings are designed to:

- withstand combined loads with a predominant axial component — $F_a / F_r \geq 1$
- withstand loads in one direction only (they must be mounted in opposition with bearings of the same type)
- accept relatively high speeds of rotation

Misalignment

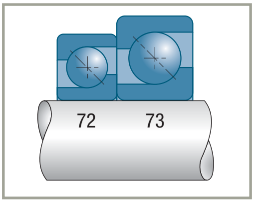
Assembly made up of a single bearing

Slight misalignment between the shaft and housing is acceptable. The value depends on the assembly clearance: from 0.10° to 0.15° if the assembly clearance is 0.06° in the case of a preloaded assembly.

Assembly made up of two bearings

In this case, the assembly is similar to a double-row ball bearing and the acceptable misalignment values are very low, in the range of 0.06°.

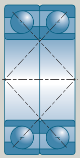
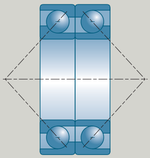
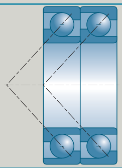
Series



Variants

Bearings for universal matching (suffix BG)

The bearings in the 72 ... BG, 73 ... BG series can be assembled in pairs to form a single pillow block. They are supplied individually and can be matched in either an X, O or Tandem arrangement.

Arrangement		Characteristics
Face-to-face or X arrangement (type DF)		This arrangement constitutes a single assembly. Another bearing is needed to form the second pillow block of the shaft.
Back-to-back or O arrangement (type DB)		Good rigidity under tilting torque. This assembly can in some cases ensure shaft retention on its own thanks to the distance between the load application point.
Tandem (type DT)		For very high axial loads but in one direction only. This arrangement constitutes a single assembly; another bearing must be mounted in the opposite direction to form the second assembly of the shaft.

Other variants can give assemblies with a greater or lesser amount of preload (suffix BGL or BGO); they requires usually a prior technical study.

On request these bearings are supplied with a maximum runout mark on the inner ring. When the two bearings are assembled, their respective markings must be aligned.

Single-row angular-contact ball bearings *(continued)*

Tolerances and clearances

Tolerances

Usually manufactured in the normal tolerance class.

Single-row ball bearings can be supplied on request with all or specified characteristics in tolerance classes 6 and 5 (e.g. bore or axial run-out in tolerance class 6).

Axial clearance on assembly with two separate bearings

These bearings are always assembled in opposition, and their internal clearance is determined by adjusting the axial clearance of the shaft at the time of assembly.

For information, the relationship between the axial clearance and the radial clearance is given by the formula:

$$J_r = 0.83\ J_a$$

These bearings can be installed preloaded if needed to increase the axial rigidity of an assembly. The maximum speed of rotation is then reduced, and depends on the value of the preload. Consult SNR.

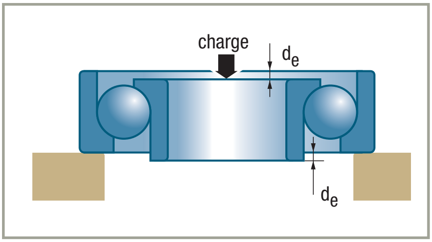
The aim of adjusting an assembly comprising two angular-contact ball bearings is to adjust the axial clearance, that is to say the initial relative position of the inner rings with respect to the outer rings, so that the bearings are positioned in the best possible operating conditions, while at the same time satisfying the specific assembly requirements (precision of rotation, rigidity, vibration, heating, etc.). The adjustment is defined either by an axial clearance or a preload.

The optimum preload of an assembly is determined according to the application specifications (rigidity, precision, temperature, vibration, etc.). Whatever the case, consult SNR.

The assembly and adjustment conditions affect the clearance of the assembly. Type BG bearings usually have reduced residual clearance after assembly.

Axial clearance of a BG assembly

The clearance of an assembly (X or O arrangement) is defined by the protrusion d_e of one ring with respect to the other.



Bearing bore from	Bearing bore to	Protusion value in µm
10	30	8 - 19
35	50	8 - 20
55	80	11 - 23
85	110	17 - 29
115	180	20 - 32

The axial clearance of the assembly is calculated as follows:

- mean theoretical axial clearance: $2\ d_e$
- radial reduction of clearance due to interference fits: $\Delta\ J_r$
- mean axial clearance of the assembly: $J_a = 2\ d_e - (\Delta\ J_r / 0.83)$

By applying this formula to the calculation of probable tolerances, one obtains a minimum clearance value close to zero with a conventional assembly (interference fit on shaft with a j6/k6 tolerance and clearance fit in the housing with an H7/J7 tolerance).

Single-row angular-contact ball bearings *(continued)*

Design criteria

Bearing life

Shaft mounted on two single bearings

Equivalent dynamic load

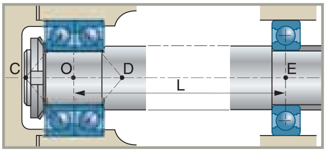
The axial equilibrium of the shaft depends not only on the external forces applied to it, but also on the forces induced by the radial loads applied to each bearing.

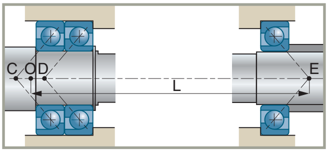
Equivalent static load

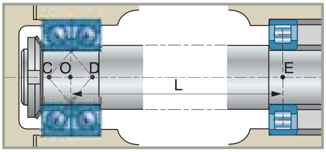
Its value P_0 is the greater of the two values obtained using the following formula:

$$P_0 = F_r$$
$$P_0 = 0.5\ F_r + 0.26\ F_a$$

Shaft with one of its two assemblies made up of two matched bearings in the 72...BG or 73...BG series







This assembly is considered as being made up of a single double-row ball bearing whose centre O is the midpoint of the distance CD between the load application points.

The arrangement of this type of assembly is hyperstatic. (3 seating points: E, C, D) and can only be likened approximately to an arrangement on two assemblies (seating points E and O) if the distance CD is less than L/5 and the rigidity of the assembly is satisfactory (misalignment < 0.06°).

In all other cases, consult SNR.

Equivalent dynamic load of the double assembly (ISO 281 Standard)

Arrangements assembled in an O or X	$P = F_r + 0.55\ F_a$	if	$F_a / F_r \le 1.14$
	$P = 0.57\ F_r + 0.93\ F_a$	if	$F_a / F_r > 1.14$
Tandem assemblies	$P = F_r$	if	$F_a / F_r \le 1.14$
	$P = 0.35\ F_r + 0.57\ F_a$	if	$F_a / F_r > 1.14$

Basic dynamic capacity of the double assembly

Basic dynamic capacity of an assembly of two identical matched bearings:

$$C_e = 1.625\ C$$

Equivalent static load of a double assembly

For an O or X assembly:

$$P_0 = F_r + 0.52\ F_a$$

For a tandem assembly, the value of P_0 is the greater of the two values obtained using the following formula:

$$P_0 = F_r$$
$$P_0 = 0.5\ F_r + 0.26\ F_a$$

Basic static capacity of the assemblies

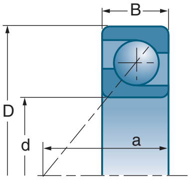
The static capacity of the assembly of two identical bearings is twice that of a single bearing.

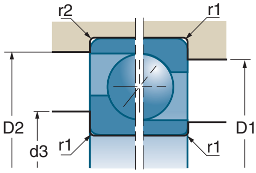
$$C_{0e} = 2\ C_0$$

Suffixes

A	Optimised internal design with polyamide cage
B	Contact angle of 40°
BG	Contact angle of 40° and non-preloaded universal pairing
M	Machined brass cage centred on the balls

Single-row angular-contact ball bearings *(continued)*



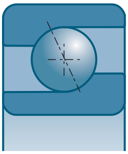


d		D	B	a	C	C_0		
mm	References	mm	mm	mm	10^3N	10^3N	rpm*	rpm*
15	7202 BA	35	11	16.0	8.0	4.4	16000	22000
17	7203 B	40	12	18.0	9.9	5.5	14000	20000
	7203 BGA	40	12	18.0	16.1	11.0	14000	19000
20	7204 BA	47	14	21.0	13.3	7.6	12000	17000
	7204 BGA	47	14	21.0	21.6	15.3	11000	16000
	7304 B	52	15	22.5	17.3	9.7	11000	16000
	7304 BGA	52	15	22.6	30.5	20.9	11000	15000
25	7205 BGA	52	15	24.0	15.8	9.4	10000	14000
	7305 BGA	62	17	26.8	42.5	30.0	9100	12000
30	7206 BGA	62	16	27.0	20.5	13.5	8700	12000
	7306 BGA	72	19	31.0	32.5	20.1	7800	10900
35	7207 BGA	72	17	31.0	27.0	18.4	7400	10400
	7307 BA	80	21	35.0	39.5	25.0	6900	9700
	7307 BGA	80	21	35.0	39.5	25.0	6900	9700
40	7208 BA	80	18	34.0	32.0	23.0	6600	9300
	7208 BGA	80	18	34.0	32.0	23.0	6600	9300
	7208 BGM	80	18	34.0	32.0	23.0	6600	9300
	7308 BA	90	23	39.0	49.5	32.5	6100	8600
	7308 BGA	90	23	39.0	49.5	32.5	6100	8600
	7308 BGM	90	23	39.0	46.5	29.5	6100	8600
45	7209 BA	85	19	37.0	36.0	26.5	6100	8600
	7209 BGA	85	19	37.0	36.0	26.5	6100	8600
	7209 BGM	85	19	37.0	34.5	24.4	6100	8600
	7309 BA	100	25	43.0	69.0	47.0	5500	7700
	7309 BGA	100	25	43.0	69.0	47.0	5500	7700
	7309 BGM	100	25	43.0	56.0	36.0	5500	7700
50	7210 BGA	90	20	39.0	37.5	28.5	5700	8000
	7210 BGM	90	20	39.0	35.5	26.5	5700	8000
	7310 BA	110	27	47.0	69.0	47.0	5000	7000
	7310 BGA	110	27	47.0	69.0	47.0	5000	7000
	7310 BGM	110	27	47.0	69.0	47.0	5000	7000

* These are the speed limits according to the SNR concept (see pages 85 to 87).

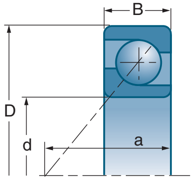
Characteristics

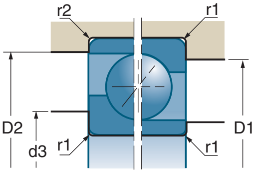
Single-row angular-contact ball bearings



References	d3 min mm	D1 max mm	D2 max mm	r1 max mm	r2 max mm	kg
7202 BA	19	31	32.0	0.6	0.3	0.045
7203 B	20.5	36.5	36.5	0.6	0.6	0.064
7203 BGA	20.5	36.5	36.5	0.6	0.3	0.065
7204 BA	26	41	43.0	1.0	0.6	0.107
7204 BGA	26	41	43.0	1.0	0.6	0.104
7304 B	26	46	48.5	1.0	0.6	0.150
7304 BGA	26	46	48.5	1.1	0.6	0.143
7205 BGA	31	46	48.0	1.0	0.6	0.131
7305 BGA	32	55	58.0	1.1	0.6	0.223
7206 BGA	36	56	58.0	1.0	0.6	0.210
7306 BGA	37	65	68.0	1.0	0.6	0.349
7207 BGA	42	65	68.0	1.0	0.6	0.287
7307 BA	44	71	75.0	1.5	1.0	0.457
7307 BGA	44	71	75.0	1.5	1.0	0.475
7208 BA	47	73	76.0	1.0	0.6	0.373
7208 BGA	47	73	76.0	1.0	0.6	0.373
7208 BGM	47	73	76.0	1.0	0.6	0.373
7308 BA	49	81	85.0	1.5	1.0	0.626
7308 BGA	49	81	85.0	1.5	1.0	0.626
7308 BGM	49	81	85.0	1.5	1.0	0.626
7209 BA	52	78	81.0	1.0	0.6	0.414
7209 BGA	52	78	81.0	1.0	0.6	0.414
7209 BGM	52	78	81.0	1.0	0.6	0.414
7309 BA	54	91	95.0	1.5	1.0	0.835
7309 BGA	54	91	95.0	1.5	1.0	0.835
7309 BGM	54	91	95.0	1.5	1.0	0.835
7210 BGA	57	83	86.0	1.0	0.6	0.466
7210 BGM	57	83	86.0	1.0	0.6	0.466
7310 BA	61	99	104.0	2.0	1.0	1.080
7310 BGA	61	99	104.0	2.0	1.0	1.080
7310 BGM	61	99	104.0	2.0	1.0	1.080

Single-row angular-contact ball bearings *(continued)*

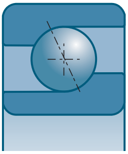




d	References	D	B	a	C	C_0		
mm		mm	mm	mm	10^3N	10^3N	rpm*	rpm*
55	7211 BA	100	21	43.0	46.5	36.0	5100	7200
	7211 BGA	100	21	43.0	46.5	36.0	5100	7200
	7211 BGM	100	21	43.0	44.0	33.5	5100	7200
	7311 BA	120	29	51.0	79.0	56.0	4500	6400
	7311 BGA	120	29	51.0	79.0	56.0	4500	6400
	7311 BGM	120	29	51.0	79.0	56.0	4500	6400
60	7212 BA	110	22	47.0	56.0	44.5	4700	6500
	7212 BGA	110	22	47.0	56.0	44.5	4700	6600
	7212 BGM	110	22	47.0	54.0	41.5	4700	6600
	7312 BA	130	31	55.0	90.0	65.0	4200	5900
	7312 BGA	130	31	55.0	90.0	65.0	4200	5800
	7312 BGM	130	31	55.0	85.0	60.0	4200	5800
65	7213 BA	120	23	50.5	64.0	53.0	4300	6000
	7213 BGA	120	23	50.5	64.0	53.0	4300	6000
	7213 BGM	120	23	50.5	61.0	49.5	4300	6000
	7213 BM	120	23	50.5	61.0	49.5	4300	6000
	7313 BGA	140	33	60.0	102.0	75.0	3900	5400
	7313 BGM	140	33	60.0	102.0	75.0	3900	5400
70	7214 BA	125	24	53.0	69.0	58.0	4100	5700
	7214 BGA	125	24	53.0	69.0	58.0	4100	5700
	7214 BGM	125	24	53.0	66.0	54.0	4100	5700
	7314 BGA	150	35	64.0	114.0	86.0	3600	5000
	7314 BGM	150	35	64.0	114.0	86.0	3600	5000
75	7215 BA	130	25	56.0	69.0	58.0	3900	5400
	7215 BGA	130	25	56.0	69.0	58.0	3900	5500
	7215 BGM	130	25	56.0	69.0	58.0	3900	5400
	7315 BGM	160	37	68.0	128.0	100.0	3400	4700
80	7216 BGM	140	26	59.0	80.0	69.0	3600	5000
	7316 BGM	170	39	72.0	140.0	114.0	3200	4400
85	7217 BGM	150	28	63.0	90.0	80.0	3400	4700
	7317 BGM	180	41	76.0	151.0	127.0	3000	4200
90	7218 BGM	160	30	67.0	107.0	94.0	3200	4400
	7318 BGM	190	43	80.0	162.0	140.0	2800	4000

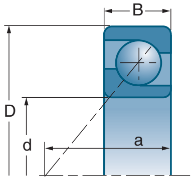
* These are the speed limits according to the SNR concept (see pages 85 to 87).

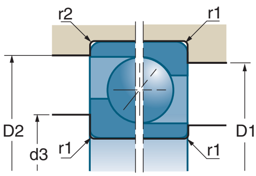
Single-row angular-contact ball bearings *(continued)*



References	d3 min mm	D1 max mm	D2 max mm	r1 max mm	r2 max mm	kg
7211 BA	64	91	95.0	1.5	1.0	0.633
7211 BGA	64	91	95.0	1.5	1.0	0.633
7211 BGM	64	91	95.0	1.5	1.0	0.633
7311 BA	66	109	114.0	2.0	1.0	1.410
7311 BGA	66	109	114.0	2.0	1.0	1.410
7311 BGM	66	109	114.0	2.0	1.0	1.410
7212 BA	69	101	105.0	1.5	1.0	0.798
7212 BGA	69	101	105.0	1.5	1.0	0.798
7212 BGM	69	101	105.0	1.5	1.0	0.798
7312 BA	72	118	123.0	2.1	1.0	1.810
7312 BGA	72	118	123.0	2.1	1.0	1.810
7312 BGM	72	118	123.0	2.1	1.0	1.810
7213 BA	74	111	115.0	1.5	1.0	1.030
7213 BGA	74	111	115.0	1.5	1.0	1.030
7213 BGM	74	111	115.0	1.5	1.0	1.100
7213 BM	72	113	115.0	1.5	1.0	1.100
7313 BGA	77	128	133.0	2.1	1.0	2.160
7313 BGM	77	128	133.0	2.1	1.0	2.324
7214 BA	79	116	120.0	1.5	1.0	1.140
7214 BGA	79	116	120.0	1.5	1.0	1.140
7214 BGM	79	116	120.0	1.5	1.0	1.185
7314 BGA	82	138	143.0	2.1	1.0	2.650
7314 BGM	82	138	143.0	2.1	1.0	2.800
7215 BA	84	121	125.0	1.5	1.0	1.190
7215 BGA	84	121	125.0	1.5	1.0	1.190
7215 BGM	84	121	125.0	1.5	1.0	1.291
7315 BGM	87	148	153.0	2.1	1.0	3.170
7216 BGM	91	129	134.0	2.0	1.0	1.460
7316 BGM	92	158	163.0	2.1	1.0	4.280
7217 BGM	96	139	144.0	2.0	1.0	1.920
7317 BGM	99	166	173.0	2.5	1.0	4.580
7218 BGM	101	149	154.0	2.0	1.0	2.350
7318 BGM	104	176	183.0	2.5	1.0	5.320

Single-row angular-contact ball bearings *(continued)*

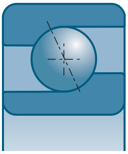




d		D	B	a	C	C_0		
mm	References	mm	mm	mm	10^3N	10^3N	rpm*	rpm*
95	7219 BGM	170	32	72.0	116.0	101.0	3000	4200
	7319 BGM	200	45	84.0	172.0	154.0	2700	3800
100	7220 BGM	180	34	76.0	130.0	114.0	2800	4000
	7320 BGM	215	47	90.0	194.0	181.0	2500	3500
105	7321 BGM	225	49	94.0	241.0	230.0	2400	3400
110	7222 BGM	200	38	84.0	154.0	144.0	2500	3600
	7322 BGM	240	50	98.0	226.0	225.0	2200	3200
120	7224 BGM	215	40	90.0	161.0	165.0	2400	3300
	7324 BGM	260	55	108.0	250.0	260.0	2100	2900
130	7226 BGM	230	40	96.0	177.0	180.0	2200	3100
	7326 BGM	280	58	115.0	275.0	300.0	1900	2700
140	7228 BGM	250	42	103.0	197.0	212.0	2100	2900
	7328 BGM	300	62	123.0	300.0	340.0	1800	2500
150	7230 BGM	270	45	111.0	225.0	255.0	1900	2600
	7330 BGM	320	65	131.0	330.0	390.0	1700	2300
160	7232 BGM	290	48	118.0	238.0	280.0	1700	2400
	7332 BGM	340	68	139.0	360.0	450.0	1600	2200
170	7234 BGM	310	52	127.0	265.0	325.0	1600	2300
	7334 BGM	360	72	147.0	390.0	510.0	1500	2100

* These are the speed limits according to the SNR concept (see pages 85 to 87).

Single-row angular-contact ball bearings *(continued)*



References	d3 min	D1 max	D2 max	r1 max	r2 max	
	mm	mm	mm	mm	mm	kg
7219 BGM	107	158	163.0	2.1	1.0	2.780
7319 BGM	109	186	193.0	2.5	1.0	6.180
7220 BGM	112	168	173.0	2.1	1.0	3.410
7320 BGM	114	201	208.0	2.5	1.0	7.650
7321 BGM	119	211	218.0	2.5	1.0	9.460
7222 BGM	122	188	193.0	2.1	1.0	4.720
7322 BGM	124	226	233.0	2.5	1.0	10.400
7224 BGM	132	203	208.0	2.1	1.0	6.210
7324 BGM	134	246	253.0	2.5	1.0	14.400
7226 BGM	144	216	223.0	2.5	1.0	6.920
7326 BGM	147	263	271.0	3.0	1.5	17.500
7228 BGM	154	236	243.0	2.5	1.0	8.910
7328 BGM	157	283	291.0	3.0	1.5	21.600
7230 BGM	164	256	263.0	2.5	1.0	11.600
7330 BGM	167	303	311.0	3.0	1.5	26.000
7232 BGM	174	276	283.0	2.5	1.0	28.000
7332 BGM	177	323	331.0	3.0	1.5	30.500
7234 BGM	187	293	301.0	3.0	1.5	35.000
7334 BGM	187	343	351.0	3.0	1.5	34.342

4-point angular-contact bearings

Definition and capabilities

4-point angular contact bearings accept axial loads in both directions. They are often associated with a radial contact bearing.

Definition

The design of this bearing results from the theoretical superposition of the two sections of matched angular-contact bearings in an X or O arrangement. The curvature of the raceways is consequently elliptical and displays two loading lines (contact angle 35°) which gives four points of contact on the balls.

The two-part inner ring can be filled with more balls than radial ball bearings.

Cage

The cage is usually made in machined brass centred on the inner or outer ring, joining the ring of balls to the outer ring.

Capabilities

Load and speed

These bearings are designed to:

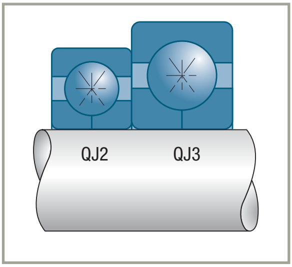
• withstand combined loads with a predominant axial component	$F_a / F_r \geq 1.25$

• withstand axial loads in both directions
• accept relatively high speeds of rotation

Misalignment

The construction of these bearings limits them to very small misalignment values, in the range of 0.06°.

Series



Tolerances and clearances

Tolerances

These bearings are supplied in normal tolerance classes.

Clearance

Axial clearance

The axial clearance is not standardised.
The values are communicated by SNR on request.

Radial clearance

The relation between the axial clearance J_a and the corresponding radial clearance J_r can be calculated using the following approximation formula

$$J_r = 0.7\ J_a$$

Design criteria

Bearing life

Equivalent dynamic load

$P = F_r + 0.66\ F_a$ if $F_a / F_r \leq 0.95$

$P = 0.6\ F_r + 1.07\ F_a$ if $F_a / F_r > 0.95$

Equivalent static load

$$P_0 = F_r + 0.58\ F_a$$

Installation/assembly criteria

The axial clearance of this bearing is determined for conventional mounting on a rotating shaft with an interference fit j6 or k6 type.

The fit of the housing must be loose (H7), hence the need to prevent the ring from rotating in certain applications (version suffix N2).

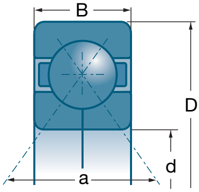
The two inner half-rings must be held tight axially against a shoulder.

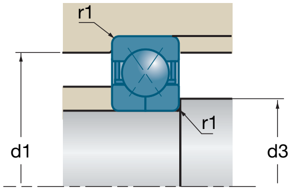
In most applications, this bearing is considered like a single assembly. It can sometimes be used like a double assembly playing the role of two bearings, thanks to the distance between the load application points.

Suffixes

MA	Machined brass cage centred on the outer ring
N2	Two retention slots on the outer ring

4-point angular-contact bearings *(continued)*



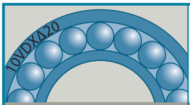
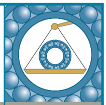


d		D	B	a	C	C_0		
mm	References	mm	mm	mm	10^3N	10^3N	rpm*	rpm*
30	QJ 306 MA	72	19	36	55.0	38.5	7900	11000
35	QJ 307 MA	80	21	41	59.0	46.5	7100	9500
40	QJ 308 MA	90	23	0	86.0	69.0	6300	8400
45	QJ 309 MA	100	25	0	95.0	75.0	5600	7500
50	QJ 310 MA	110	27	56	110.0	92.0	5100	6900
55	QJ 311 MA	120	29	61	127.0	109.0	4600	6200
60	QJ 312 MA	130	31	67	145.0	126.0	4300	5700
65	QJ 313 MA	140	33	72	164.0	145.0	4000	5300
70	QJ 314 MA	150	35	77	184.0	165.0	3700	5000
75	QJ 315N2 MA	160	37	82	212.0	204.0	3400	4600
80	QJ 316N2 MA	170	39	88	222.0	215.0	3200	4400
85	QJ 317N2 MA	180	41	93	246.0	255.0	3000	4100
90	QJ 318N2 MA	190	43	98	265.0	285.0	2900	3900

* These are the speed limits according to the SNR concept (see pages 85 to 87).

Characteristics

■ 4-points angular-contact bearings

	d3 min	d3 max	D1 min	D1 max	r1 max	
References	mm	mm	mm	mm	mm	kg
QJ 306 MA	37	45.5	62.3	65	1.1	0.406
QJ 307 MA	44	50.5	68.4	71	1.5	0.550
QJ 308 MA	49	52.9	77.6	81	1.5	0.696
QJ 309 MA	54	59.2	86.7	91	1.5	1.050
QJ 310 MA	61	69	95.1	99	2	1.330
QJ 311 MA	66	75	103.4	109	2	1.675
QJ 312 MA	70	81	110	120	2.1	2.200
QJ 313 MA	78	90.5	120.3	127	2.1	2.700
QJ 314 MA	83	96	128.7	137	2.1	3.150
QJ 315 N2 MA	85	102	135	149	2.1	3.960
QJ 316 N2MA	93	110	145.6	157	2.1	4.500
QJ 317 N2 MA	95	114	155	167	3	5.540
QJ 318 N2 MA	102	121	163	177	3	6.440

Angular-contact bearings high precision MachLine® Range SNR

Definition and capabilities

Current machining integrates a whole series of properties which result from constant technological evolution and progress: high speed machining, downtime reduction, higher stiffness, integral sealing, maintenance cost-savings, …

Machines provide increasingly higher performance levels in a context where productivity and environmental-friendliness must be paired.

The MachLine® range offers precise answers to all these issues.

Series and variations

High precision

• SNR 71900V and 7000V series, with excellent performance data to balance the need for speed, rigidity, capacity and precision.

• 7200G1 series, specially designed to meet specifications set by applications with large, predominantly axial loads.

• Variations according to contact angle (C for 15° and H for 25º) and preload (light, medium or heavy).

Hybrid, ceramic balls CH

• Possible variation for all ranges, all series and all dimensions with Silicon Nitride balls and steel rings, combining the best qualities of the two materials.

• Reduced operating temperature and increased top speed. Reduced lubrication requirements as compared to a « conventional steel » bearing.

• Increased rigidity and longer life.

High speed ML

• Family made up of series 71900 and 7000, designed and developed by SNR to meet the increasingly stringent requirements in high speed mechanization.

• Specally designed geometry: reduction in ball diameter, increase in number of balls and optimization of cage guidance on outer ring.

• Different variations according to contact angle (C for 17° and H for 25°) and preload.

High speed sealed bearing MLE

• When oil lubrication is not required and grease lubrication is sufficient, SNR has a technically appropriate solution which is also economically attractive – the MLE family of bearings, series 71900 and 7000.

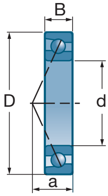
• With nitrile rubber seals on the outer ring, not in contact with the inner ring, the same top speed can be attained as with an open bearing lubricated with grease.

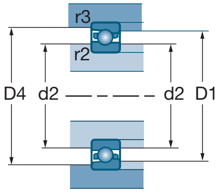
• Variations according to contact angle (C for 17° and H for 25°) and preload.

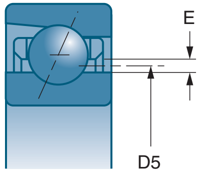
Design criteria

Consult our machine tools catalog MachLine®.

Angular-contact bearings high precision MachLine® Range SNR *(continued)*



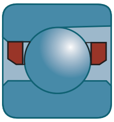




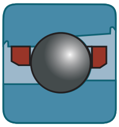
d	D	B			D1	d2	D4	r2	r3	D5	E	Balls Diameter	Balls Nb
mm	mm	mm	Kg	References	mm	mm	mm	mm	mm	mm	mm	mm	
10	22	6	0.010	71900	17.8	13.6	18.8	0.3	0.1	14.7	1.10	3.175	11
	26	8	0.018	7000	21.4	14.7	22.7	0.3	0.1	16.5	1.85	4.762	10
	30	9	0.030	7200	24.5	16.0	25.5	0.6	0.3	18.2	2.25	5.556	10
12	24	6	0.011	71901	19.6	15.4	20.6	0.3	0.1	16.5	1.30	3.175	13
	28	8	0.020	7001	23.4	16.7	24.7	0.3	0.1	18.5	1.65	4.762	11
	32	10	0.037	7201	26.0	18.3	27.9	0.6	0.3	20.5	1.85	5.953	10
15	28	7	0.015	71902	24.3	18.7	25.4	0.3	0.1	20.0	1.40	3.969	13
	32	9	0.028	7002	26.9	20.2	28.2	0.3	0.1	22.0	1.65	4.762	13
	35	11	0.044	7202	29.0	21.1	31.3	0.6	0.3	23.3	2.10	5.953	11
17	30	7	0.017	71903	26.6	21.0	27.7	0.3	0.1	23.0	1.45	3.969	14
	35	10	0.037	7003	29.4	22.7	30.7	0.3	0.1	24.4	1.75	4.762	14
	40	12	0.065	7203	33.0	24.1	35.2	0.6	0.3	26.5	2.45	6.747	11
20	37	9	0.036	71904	31.9	25.1	33.2	0.3	0.15	26.8	1.78	4.762	15
	42	12	0.063	7004	35.5	26.6	37.3	0.6	0.3	29.0	2.40	6.350	13
	47	14	0.105	7204	38.6	28.5	41.4	1.0	0.3	31.4	2.80	7.938	11
25	42	9	0.041	71905	37.4	30.6	38.7	0.3	0.15	32.3	1.75	4.762	17
	47	12	0.076	7005	40.1	32.2	42.3	0.6	0.3	34.2	2.05	6.350	15
	52	15	0.128	7205	44.5	34.0	46.9	1.0	0.3	36.8	2.80	7.938	13
30	47	9	0.047	71906	41.9	35.1	43.2	0.3	0.15	36.8	1.73	4.762	18
	55	13	0.112	7006	47.0	38.1	49.5	1.0	0.3	40.4	2.35	7.144	16
	62	16	0.200	7206	52.1	40.4	55.4	1.0	0.3	43.5	3.15	9.525	13
35	55	10	0.075	71907	48.6	41.4	50.4	0.6	0.15	43.2	1.85	5.556	18
	62	14	0.150	7007	53.1	43.2	56.3	1.0	0.3	46.0	2.85	7.938	16
	72	17	0.290	7207	61.0	47.4	64.5	1.1	0.3	50.9	3.50	11.112	13
40	62	12	0.110	71908	55.2	46.8	57.2	0.6	0.15	49.0	2.18	6.350	19
	68	15	0.185	7008	59.0	49.2	61.8	1.0	0.3	51.8	2.55	7.938	18
	80	18	0.370	7208	67.6	52.8	71.8	1.1	0.6	56.9	4.05	11.906	13
45	68	12	0.128	71909	60.7	52.3	62.7	0.6	0.3	54.5	2.15	6.350	20
	75	16	0.238	7009	65.0	54.7	68.6	1.0	0.3	57.5	2.85	8.731	18
	85	19	0.416	7209	72.5	57.4	77.5	1.1	0.6	61.7	4.30	12.700	14

Characteristics

MachLine, high precision standard bearing for machine tools



Standard



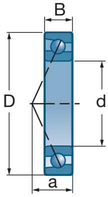
CH

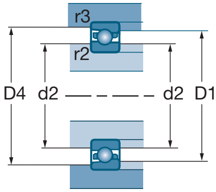
Serie C	a mm	C N	C0 N	rpm*	rpm*
71900 CV	5	3 050	1 520	71 000	108 000
7000 CV	6	5 700	2 750	60 000	95 000
7200 CG1	7	7 500	3 700	53 000	82 000
71901 CV	5	3 400	1 860	64 000	97 000
7001 CV	7	6 200	3 200	54 000	85 000
7201 CG1	8	8 600	4 300	48 000	74 000
71902 CV	6	5 100	2 850	52 000	79 000
7002 CV	8	7 000	4 000	46 000	72 000
7202 CG1	9	9 400	5 000	42 000	65 000
71903 CV	7	5 300	3 150	46 000	70 000
7003 CV	8	7 400	4 450	41 000	65 000
7203 CG1	10	11 600	6 400	37 000	58 000
71904 CV	8	7 700	4 900	39 000	60 000
7004 CV	10	11 800	7 100	35 000	55 000
7204 CG1	11	15 600	8 900	32 000	49 000
71905 CV	9	8 300	5 800	33 000	50 000
7005 CV	11	13 000	8 600	30 000	47 000
7205 CG1	13	17 600	11 100	27 000	42 000
71906 CV	10	8 400	6 300	29 000	44 000
7006 CV	12	16 700	11 700	25 000	40 000
7206 CG1	14	24 400	15 900	23 000	35 000
71907 CV	11	11 100	8 500	25 000	38 000
7007 CV	13	21 000	15 500	23 000	35 000
7207 CG1	16	32 500	21 700	20 000	31 000
71908 CV	13	14 700	11 800	21 000	33 000
7008 CV	15	21 600	16 800	21 000	33 000
7208 CG1	17	36 500	25 000	18 500	29 500
71909 CV	14	15 400	10 700	20 000	30 000
7009 CV	16	27 400	19 200	19 000	28 000
7209 CG1	18	45 900	29 900	16 500	26 000

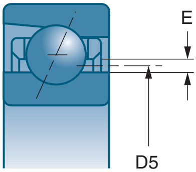
Serie H	a mm	C N	C0 N	rpm*	rpm*
71900 HV	7	2 900	1 450	67 000	103 000
7000 HV	8	5 500	2 650	53 000	82 000
7200 HG1	9	7 200	3 550	46 000	72 000
71901 HV	7	3 250	1 770	61 000	93 000
7001 HV	9	6 000	3 050	48 000	72 000
7201 HG1	10	8 300	4 200	42 000	65 000
71902 HV	9	4 850	2 750	49 000	75 000
7002 HV	10	6 700	3 850	42 000	62 000
7202 HG1	11	9 100	4 850	37 000	57 000
71903 HV	9	5 100	3 000	44 000	68 000
7003 HV	11	7 000	4 250	37 000	56 000
7203 HG1	13	11 200	6 200	32 000	50 000
71904 HV	11	7 300	4 650	37 000	57 000
7004 HV	13	11 300	6 800	31 000	47 000
7204 HG1	15	15 000	8 500	28 000	43 000
71905 HV	12	7 800	5 500	31 000	47 000
7005 HV	14	12 400	8 200	26 000	40 000
7205 HG1	16	16 900	10 600	24 000	37 000
71906 HV	13	8 000	5 900	27 000	42 000
7006 HV	16	15 900	11 200	22 000	34 000
7206 HG1	19	23 400	15 200	20 000	31 000
71907 HV	15	10 500	8 100	23 000	36 000
7007 HV	18	20 000	14 800	21 000	31 000
7207 HG1	21	31 000	20 700	17 000	27 000
71908 HV	18	13 900	11 100	20 000	31 000
7008 HV	20	20 500	16 000	20 000	30 000
7208 HG1	23	35 000	24 100	16 500	25 500
71909 HV	19	14 500	10 100	18 000	26 000
7009 HV	22	26 000	18 100	18 000	24 000
7209 HG1	25	43 800	28 500	15 000	22 500

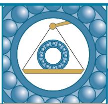
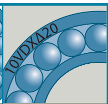
* These are the speed limits according to the SNR concept (see pages 85 to 87).

Angular-contact bearings high precision MachLine® Range SNR *(continued)*

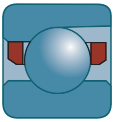




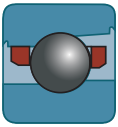


d	D	B			D1	d2	D4	r2	r3	D5	E	Balls Diameter	Balls Nb
mm	mm	mm	Kg	References	mm	mm	mm	mm	mm	mm	mm	mm	
50	72	12	0.129	71910	65.2	56.8	67.2	0.6	0.3	58.9	2.13	6.350	21
	80	16	0.256	7010	70.0	59.7	73.6	1.0	0.3	62.5	2.80	8.731	19
	90	20	0.486	7210	76.9	62.5	82.7	1.1	0.6	66.7	4.20	12.700	15
55	80	13	0.181	71911	72.5	62.1	75.8	1.0	0.3	65.4	2.25	7.144	21
	90	18	0.390	7011	80.0	65.0	84.0	1.1	0.6	69.0	2.00	9.525	19
	100	21	0.620	7211	87.0	68.0	92.5	1.5	0.6	72.5	2.10	14.288	14
60	85	13	0.195	71912	77.5	67.1	80.8	1.0	0.3	70.4	2.25	7.144	23
	95	18	0.420	7012	85.0	70.0	89.0	1.1	0.6	73.8	2.00	9.525	21
	110	22	0.810	7212	95.0	75.0	101.5	1.5	0.6	79.5	2.30	15.875	14
65	90	13	0.210	71913	82.5	72.5	86.0	1.0	0.3	74.5	1.25	7.144	27
	100	18	0.440	7013	90.0	75.0	94.0	1.1	0.6	78.8	2.00	9.525	22
	120	23	1.140	7213	104.0	81.0	109.0	1.5	0.6	87.0	2.30	15.875	15
70	100	16	0.340	71914	91.0	79.0	95.0	1.0	0.3	81.5	1.50	8.731	24
	110	20	0.610	7014	98.5	81.5	103.0	1.1	0.6	85.8	2.50	11.112	21
	125	24	1.100	7214	109.0	86.0	116.0	1.5	0.6	91.4	2.60	17.462	14
75	105	16	0.360	71915	96.0	84.0	100.0	1.0	0.3	86.3	1.50	8.731	26
	115	20	0.650	7015	103.5	86.5	108.0	1.1	0.6	90.7	2.50	11.112	22
	130	15	1.200	7215	114.0	91.0	121.0	1.5	0.6	96.4	2.60	17.462	15
80	110	16	0.380	71916	101.0	89.0	105.0	1.0	0.3	91.2	1.50	8.731	27
	125	22	0.850	7016	112.0	93.0	117.5	1.1	0.6	98.0	3.50	13.494	20
	140	26	1.470	7216	122.5	97.5	130.0	2.0	1.0	103.4	2.80	19.050	15
85	120	18	0.550	71917	110.0	95.0	114.0	1.1	0.6	98.6	1.80	9.525	27
	130	22	0.900	7017	117.0	98.0	122.5	1.1	0.6	102.8	3.50	13.494	21
	150	28	1.810	7217	131.0	104.0	140.0	2.0	1.0	110.3	3.10	20.638	15
90	125	18	0.580	71918	115.0	100.0	119.0	1.1	0.6	103.5	1.80	9.525	29
	140	24	1.160	7018	125.5	104.5	131.5	1.5	0.6	110.0	3.80	15.081	20
	160	30	2.240	7218	139.0	111.0	149.0	2.0	1.0	117.2	3.30	22.225	15
95	130	18	0.590	71919	120.0	105.0	124.0	1.1	0.6	108.3	2.00	10.319	28
	145	24	1.210	7019	130.5	109.5	136.5	1.5	0.6	114.8	3.80	15.081	21
100	140	20	0.820	71920	128.5	111.5	133.5	1.1	0.6	115.6	2.10	11.112	28
	150	24	1.270	7020	135.5	114.5	141.5	1.5	0.6	119.7	3.80	15.081	22
	180	34	3.230	7220	155.5	124.5	167.0	2.1	1.1	131.0	3.80	25.400	14

MachLine, high precision standard bearing for machine tools *(continued)*



Standard



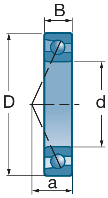
CH

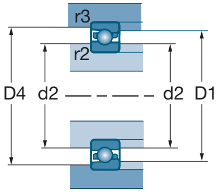
Serie C	a mm	C N	C_0 N	rpm*	rpm*
71910 CV	14	15 600	11 300	19 000	28 000
7010 CV	17	28 200	20 200	18 000	26 000
7210 CG1	19	48 000	32 600	15 500	24 500
71911 CV	16	18 700	13 700	16 500	25 000
7011 CV	19	30 500	26 000	16 000	24 000
7211 CG1	21	53 000	40 000	14 500	21 500
71912 CV	16	19 500	15 000	14 500	23 500
7012 CV	19	32 500	29 500	15 000	23 000
7212 CG1	22	65 000	49 000	12 500	19 500
71913 CV	17	21 700	21 900	14 500	22 000
7013 CV	20	33 000	31 000	14 000	21 000
7213 CG1	24	67 000	54 000	11 500	17 500
71914 CV	19	29 500	29 000	13 000	20 000
7014 CV	22	43 000	40 000	13 000	20 000
7214 CG1	25	77 000	60 000	11 000	16 500
71915 CV	20	30 500	31 500	12 500	19 000
7015 CV	23	44 000	42 000	12 000	19 000
7215 CG1	26	80 000	65 000	10 000	16 000
71916 CV	21	31 000	33 000	12 000	18 000
7016 CV	25	59 000	55 000	11 000	17 000
7216 CG1	28	94 000	78 000	9 400	15 000
71917 CV	23	36 500	39 000	11 000	17 000
7017 CV	25	61 000	59 000	10 500	16 000
7217 CG1	30	108 000	91 000	8 700	14 000
71918 CV	23	38 000	41 500	10 500	16 000
7018 CV	27	73 000	69 000	10 000	15 000
7218 CG1	32	124 000	105 000	8 100	12 500
71919 CV	24	43 000	47 500	9 900	15 000
7019 CV	28	74 000	73 000	9 700	14 500
71920 CV	26	49 000	55 000	9 500	14 500
7020 CV	29	76 000	77 000	9 300	14 000
7220 CG1	36	150 000	127 000	7 200	11 000

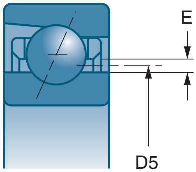
Serie H	a mm	C N	C_0 N	rpm*	rpm*
71910 HV	20	14 700	10 600	16 000	24 000
7010 HV	23	26 600	19 300	14 500	22 000
7210 HG1	26	45 700	30 800	13 500	20 500
71911 HV	22	17 600	12 900	13 500	21 500
7011 HV	26	29 000	24 900	14 000	22 000
7211 HG1	29	51 000	38 000	12 500	19 500
71912 HV	23	18 400	14 200	13 500	20 000
7012 HV	27	30 500	28 000	14 000	21 000
7212 HG1	31	62 000	47 000	11 000	17 500
71913 HV	25	20 400	20 400	14 000	21 000
7013 HV	28	31 500	29 500	13 000	19 000
7213 HG1	33	64 000	52 000	10 000	16 500
71914 HV	28	28 000	27 500	12 500	19 000
7014 HV	31	40 500	37 500	12 500	19 000
7214 HG1	35	73 000	57 000	9 700	15 000
71915 HV	29	29 000	29 500	12 000	18 000
7015 HV	32	41 500	40 000	11 000	17 000
7215 HG1	36	76 000	62 000	9 100	14 500
71916 HV	30	29 500	30 500	11 000	17 000
7016 HV	35	56 000	53 000	10 500	16 000
7216 HG1	39	89 000	74 000	8 500	13 000
71917 HV	33	34 500	36 500	9 900	15 000
7017 HV	36	58 000	56 000	9 900	15 000
7217 HG1	41	103 000	86 000	7 800	12 000
71918 HV	34	35 500	39 000	9 900	15 000
7018 HV	39	69 000	66 000	9 200	14 000
7218 HG1	44	118 000	100 000	7 300	11 000
71919 HV	35	40 500	44 000	9 200	14 000
7019 HV	40	71 000	69 000	8 900	13 500
71920 HV	38	46 000	51 000	8 600	13 000
7020 HV	41	72 000	73 000	8 600	13 000
7220 HG1	50	143 000	121 000	6 400	9 800

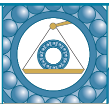
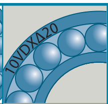
* These are the speed limits according to the SNR concept (see pages 85 to 87).

Angular-contact bearings high precision MachLine® Range SNR *(continued)*

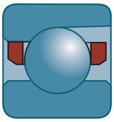




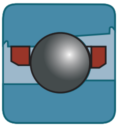


d	D	B			D1	d2	D4	r2	r3	D5	E	Balls Diameter	Balls Nb
mm	mm	mm	Kg	References	mm	mm	mm	mm	mm	mm	mm	mm	
105	145	20	0.860	71921	133.5	116.5	138.5	1.1	0.6	120.5	2.10	11.112	29
	160	26	1.610	7021	144.5	120.5	150.0	2.0	1.0	127.0	4.00	15.875	22
110	150	20	0.890	71922	138.5	121.5	143.5	1.1	0.6	125.5	2.10	11.112	30
	170	28	2.000	7022	153.0	127.0	160.0	2.0	1.0	134.0	4.50	17.462	21
	200	38	4.530	7222	172.5	137.5	185.5	2.1	1.1	145.0	4.30	28.575	14
120	165	22	1.190	71924	151.5	133.5	157.5	1.1	6.0	137.7	3.30	13.494	28
	180	28	2.150	7024	163.0	137.0	170.0	2.0	1.0	144.0	4.50	17.462	23
	215	40	5.600	7224	185.5	149.5	197.5	2.1	1.1	157.5	4.30	28.575	16
130	180	24	1.570	71926	165.0	145.0	172.0	1.5	0.6	149.8	3.70	15.081	27
	200	33	3.180	7026	179.5	150.5	189.0	2.0	1.0	158.0	5.30	20.638	21
140	190	24	1.680	71928	175.0	155.0	182.0	1.5	0.6	159.8	3.70	15.081	29
	210	33	3.420	7028	189.5	160.5	199.0	2.0	1.0	168.0	5.30	20.638	23
150	210	28	2.620	71930	192.5	167.5	199.0	2.0	1.0	174.0	4.10	16.669	29
	225	35	4.160	7030	203.0	172.0	213.0	2.1	1.0	180.0	5.70	22.225	23
160	220	28	2.760	71932	202.5	177.5	209.0	2.0	1.0	184.0	4.10	16.669	30
	240	38	5.130	7032	216.0	184.0	227.0	2.1	1.0	192.0	6.20	23.812	23
170	230	28	2.910	71934	212.5	187.5	219.0	2.0	1.0	194.0	4.10	16.669	32
	260	42	6.980	7034	232.5	197.5	246.0	2.1	1.1	206.4	6.60	25.400	23
180	250	33	4.260	71936	229.0	201.0	237.5	2.0	1.0	208.3	4.70	19.050	30
	280	46	9.000	7036	249.5	210.5	264.0	2.1	1.1	219.8	7.80	30.163	21
190	260	33	4.480	71938	239.0	211.0	247.5	2.0	1.0	218.3	4.70	19.050	32
	290	46	9.400	7038	259.5	220.5	274.0	2.1	1.1	229.8	7.80	30.163	22
200	280	38	6.160	71940	255.5	224.5	266.0	2.1	1.0	232.0	5.50	23.812	27
	310	51	12.150	7040	276.5	233.5	292.0	2.1	1.1	243.6	8.60	33.338	21
220	300	38	6.770	71944	275.5	244.5	286.0	2.1	1.0	252.0	5.50	22.225	31
	340	56	16.280	7044	304.0	256.0	321.0	3.0	1.1	268.6	8.60	33.338	23
240	320	38	7.270	71948	295.5	264.5	306.0	2.1	1.0	272.0	5.50	22.225	33

MachLine, high precision standard bearing for machine tools *(continued)*



Standard



CH

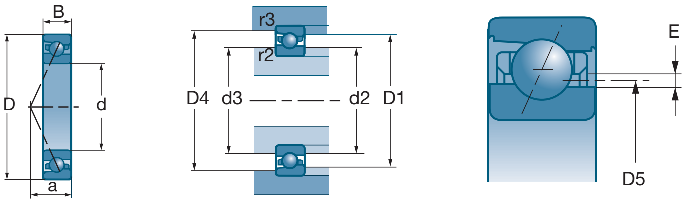
10VDXΔ20 Serie C	a mm	C N	C0 N	rpm*	rpm*
71921 CV	27	50 000	57 000	9 200	14 000
7021 CV	31	84 000	86 000	8 800	13 500
71922 CV	27	51 000	59 000	8 900	13 500
7022 CV	33	97 000	98 000	8 300	12 500
7222 CG1	40	177 000	160 000	6 300	9 700
71924 CV	30	70 000	81 000	8 200	12 500
7024 CV	34	102 000	109 000	7 700	11 500
7224 CG1	42	193 000	187 000	5 700	8 700
71926 CV	33	84 000	98 000	7 500	11 500
7026 CV	39	131 000	137 000	7 000	10 500
71928 CV	34	87 000	105 000	7 200	11 000
7028 CV	40	138 000	152 000	6 600	10 000
71930 CV	38	105 000	128 000	6 500	9 000
7030 CV	43	158 000	176 000	6 200	9 300
71932 CV	39	106 000	132 000	6 200	9 400
7032 CV	46	179 000	202 000	5 800	8 800
71934 CV	41	107 000	140 000	5 800	8 900
7034 CV	50	200 000	230 000	5 400	8 100
71936 CV	45	135 000	173 000	5 400	8 300
7036 CV	54	244 000	290 000	5 000	7 600
71938 CV	47	139 000	183 000	5 200	7 900
7038 CV	55	250 000	305 000	4 800	7 300
71940 CV	51	192 000	243 000	4 800	7 400
7040 CV	60	280 000	355 000	4 500	6 900
71944 CV	54	180 000	242 000	4 400	6 800
7044 CV	66	295 000	395 000	4 100	6 200
71948 CV	57	185 000	255 000	4 200	6 400

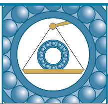
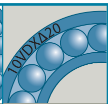
10VDXΔ20 Serie H	a mm	C N	C0 N	rpm*	rpm*
71921 HV	39	47 000	53 000	8 600	13 000
7021 HV	44	79 000	81 000	7 900	12 000
71922 HV	40	47 500	55 000	8 200	12 500
7022 HV	47	92 000	93 000	7 600	11 500
7222 HG1	55	169 000	153 000	5 600	8 700
71924 HV	44	66 000	76 000	7 500	11 500
7024 HV	49	96 000	103 000	6 900	10 500
7224 HG1	59	184 000	178 000	5 100	7 800
71926 HV	48	79 000	92 000	6 900	10 500
7026 HV	55	124 000	130 000	6 500	9 800
71928 HV	50	82 000	98 000	6 400	9 800
7028 HV	57	130 000	144 000	6 100	9 200
71930 HV	56	99 000	120 000	5 900	9 000
7030 HV	61	149 000	167 000	5 700	8 600
71932 HV	58	100 000	123 000	5 600	8 500
7032 HV	66	169 000	191 000	5 300	8 100
71934 HV	61	103 000	131 000	5 300	8 100
7034 HV	71	189 000	218 000	5 000	7 500
71936 HV	67	127 000	161 000	4 900	7 500
7036 HV	77	231 000	275 000	4 600	7 000
71938 HV	69	131 000	171 000	4 700	7 200
7038 HV	79	237 000	290 000	4 400	6 700
71940 HV	75	181 000	229 000	4 400	6 800
7040 HV	85	265 000	335 000	4 200	6 300
71944 HV	77	170 000	226 000	4 000	6 200
7044 HV	93	280 000	375 000	3 700	5 700
71948 HV	84	174 000	238 000	3 800	5 800

* These are the speed limits according to the SNR concept (see pages 85 to 87).

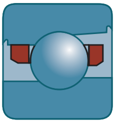
SNR

Angular-contact bearings high precision MachLine® Range SNR *(continued)*



d	D	B		 10VDX420	D1	D2	D3	D4	r2	r3	D5	E	Balls Diameter	Balls Nb
mm	mm	mm	Kg	References	mm	mm	mm	mm	mm	mm	mm	mm	mm	
10	22	6	0.010	ML 71900	17.2	13.3	13.6	17.8	0.3	0.1	14.4	1.05	2.381	14
	26	8	0.018	ML 7000	19.5	14.2	14.7	20.1	0.3	0.1	15.7	1.53	3.175	11
12	24	6	0.011	ML 71901	19.0	15.1	15.4	19.6	0.3	0.1	16.2	1.05	2.381	14
	28	8	0.020	ML 7001	21.5	16.2	16.7	22.1	0.3	0.1	17.7	1.58	3.175	13
15	28	7	0.015	ML 71902	23.3	18.3	18.7	23.7	0.3	0.1	19.7	1.35	2.778	16
	32	9	0.028	ML 7002	25.7	19.4	20.2	26.8	0.3	0.1	21.3	1.85	3.969	13
17	30	7	0.017	ML 71903	25.6	20.6	21.0	26.0	0.3	0.1	22.0	1.35	2.778	18
	35	10	0.037	ML 7003	28.4	22.0	22.7	29.5	0.3	0.1	23.9	1.85	3.969	15
20	37	9	0.036	ML 71904	30.7	24.5	25.1	31.8	0.3	0.2	26.3	1.75	3.969	16
	42	12	0.063	ML 7004	34.3	25.3	26.6	35.7	0.6	0.3	27.9	2.63	5.556	14
25	42	9	0.041	ML 71905	36.2	30.0	30.6	37.3	0.3	0.2	31.8	1.75	3.969	19
	47	12	0.076	ML 7005	39.9	30.9	32.2	41.3	0.6	0.3	33.5	2.63	5.556	17
30	47	9	0.047	ML 71906	40.7	34.5	35.1	41.8	0.3	0.2	36.2	1.73	3.969	22
	55	13	0.112	ML 7006	45.8	36.8	38.1	47.2	1.0	0.3	39.4	2.63	5.556	20
35	55	10	0.075	ML 71907	47.1	40.8	41.4	48.2	0.6	0.2	42.7	1.90	3.969	26
	62	14	0.149	ML 7007	51.5	41.5	43.2	53.6	1.0	0.3	44.6	3.10	6.350	20
40	62	12	0.109	ML 71908	53.1	45.3	46.8	54.4	0.6	0.2	47.6	2.25	4.762	25
	68	15	0.185	ML 7008	57.5	47.5	49.2	59.6	1.0	0.3	50.5	3.00	6.350	22
45	68	12	0.128	ML 71909	58.6	50.8	52.3	59.9	0.6	0.3	53.0	2.23	4.762	28
	75	16	0.238	ML 7009	63.0	53.0	54.7	65.0	1.0	0.3	56.1	3.05	6.350	22
50	72	12	0.129	ML 71910	63.1	55.3	56.8	64.4	0.6	0.3	57.5	2.23	4.762	30
	80	16	0.256	ML 7010	68.0	58.0	59.7	70.0	1.0	0.3	61.0	3.00	6.350	25
55	80	13	0.177	ML 71911	73.5	60.5	62.5	76.5	1.0	0.3	65.0	1.28	6.350	25
	90	18	0.396	ML 7011	79.5	65.5	66.5	83.5	1.1	0.6	69.5	1.70	7.938	22
60	85	13	0.190	ML 71912	78.5	65.5	67.5	81.5	1.0	0.3	70.0	1.28	6.350	27
	95	18	0.426	ML 7012	84.5	70.5	71.5	88.5	1.1	0.6	74.4	1.67	7.938	24
65	90	13	0.202	ML 71913	83.5	70.5	72.5	86.5	1.0	0.3	75.0	1.25	6.350	29
	100	18	0.445	ML 7013	89.5	74.0	76.5	93.5	1.1	0.6	79.4	1.67	7.938	26

MachLine, high speed and precision bearing for machine tools



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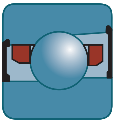
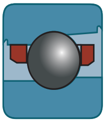
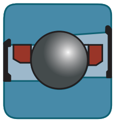


MLE



MLCH



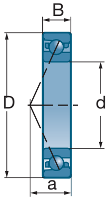
MLECH

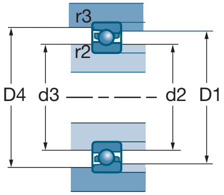
Serie C	a mm	C N	C_0 N	rpm*	rpm*
ML 71900 CV	5	1 430	680	101 500	135 000
ML 7000 CV	6	2 040	920	94 000	125 000
ML 71901 CV	5	1 490	705	90 000	120 000
ML 7001 CV	7	2 280	1 110	82 500	110 000
ML 71902 CV	6	2 030	1 030	75 000	100 000
ML 7002 CV	8	3 450	1 710	69 000	92 000
ML 71903 CV	7	2 170	1 180	67 500	90 000
ML 7003 CV	8	3 750	2 020	61 500	82 000
ML 71904 CV	8	3 900	2 080	56 500	75 000
ML 7004 CV	10	6 550	3 600	52 500	70 000
ML 71905 CV	9	4 300	2 550	47 500	63 000
ML 7005 CV	11	7 450	4 500	44 500	59 000
ML 71906 CV	10	4 650	3 000	41 500	55 000
ML 7006 CV	12	8 300	5 150	37 500	50 000
ML 71907 CV	11	5 100	3 600	35 500	47 000
ML 7007 CV	13	10 500	6 700	33 000	44 000
ML 71908 CV	13	6 950	4 950	31 500	42 000
ML 7008 CV	15	11 000	7 500	29 500	39 000
ML 71909 CV	14	7 350	5 550	28 500	38 000
ML 7009 CV	16	10 900	7 600	27 000	36 000
ML 71910 CV	14	7 600	6 000	26 500	35 000
ML 7010 CV	17	11 700	8 700	25 000	33 000
ML 71911 CV	16	16 400	16 100	23 000	34 000
ML 7011 CV	19	23 300	21 700	22 000	30 500
ML 71912 CV	16	17 000	17 200	20 000	32 500
ML 7012 CV	19	24 400	24 000	19 000	28 500
ML 71913 CV	17	17 600	18 400	19 000	30 500
ML 7013 CV	20	25 500	26 000	18 000	27 000

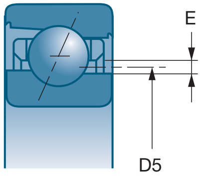
Serie H	a mm	C N	C_0 N	rpm*	rpm*
ML71900 HV	7	1 360	645	94 000	125 000
ML 7000 HV	8	1 950	870	82 500	110 000
ML71901 HV	7	1 410	670	82 500	110 000
ML 7001 HV	9	2 180	1 050	75 000	100 000
ML71902 HV	9	1 930	980	67 500	90 000
ML 7002 HV	10	3 300	1 630	62 500	83 000
ML71903 HV	9	2 060	1 110	61 500	82 000
ML 7003 HV	11	3 600	1 820	55 500	74 000
ML71904 HV	11	3 700	1 970	51 000	68 000
ML 7004 HV	13	6 300	3 400	47 500	63 000
ML71905 HV	12	4 100	2 400	43 000	57 000
ML 7005 HV	14	7 100	4 050	40 000	53 000
ML71906 HV	13	4 400	2 850	37 500	50 000
ML 7006 HV	16	7 800	4 900	34 500	46 000
ML71907 HV	15	4 800	3 400	32 500	43 000
ML 7007 HV	18	10 000	6 350	30 000	40 000
ML71908 HV	18	6 550	4 650	28 500	38 000
ML 7008 HV	20	10 500	7 100	27 000	36 000
ML71909 HV	19	6 950	5 250	25 500	34 000
ML 7009 HV	22	10 300	7 200	24 000	32 000
ML71910 HV	20	7 150	5 650	24 000	32 000
ML 7010 HV	23	11 100	8 200	22 500	30 000
ML71911 HV	22	15 500	15 000	20 800	30 000
ML 7011 HV	26	22 000	20 600	19 000	27 000
ML71912 HV	24	16 000	16 100	19 000	28 700
ML 7012 HV	27	23 000	22 600	17 000	25 500
ML71913 HV	25	16 600	17 200	17 500	26 000
ML 7013 HV	28	23 900	24 400	16 000	24 500

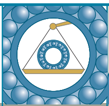
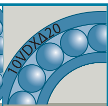
* These are the speed limits according to the SNR concept (see pages 85 to 87).

Angular-contact bearings high precision MachLine® Range SNR *(continued)*

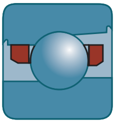






d	D	B			D1	D2	D3	D4	r2	r3	D5	E	Balls Diameter	Balls Nb
mm	mm	mm	Kg	References	mm	mm	mm	mm	mm	mm	mm	mm	mm	
70	100	16	0.330	ML 71914	92.0	76.5	79.0	95.5	1.0	0.3	81.9	1.63	7.938	26
	110	20	0.625	ML 7014	98.0	81.5	83.0	102.5	1.1	0.6	86.4	2.07	9.525	24
75	105	16	0.349	ML 71915	97.0	81.5	84.0	100.5	1.0	0.3	86.9	1.63	7.938	28
	115	20	0.658	ML 7015	103.0	86.5	88.0	107.5	1.1	0.6	91.4	2.07	9.525	25
80	110	16	0.370	ML 71916	102.0	86.5	89.0	105.5	1.0	0.3	91.9	1.63	7.938	30
	125	22	0.874	ML 7016	111.5	93.0	94.5	116.5	1.1	0.6	98.4	2.49	11.113	23
85	120	18	0.535	ML 71917	110.0	93.0	96.0	114.0	1.1	0.6	99.2	1.94	8.731	29
	130	22	0.927	ML 7017	116.5	98.5	99.5	121.5	1.1	0.6	103.4	2.49	11.113	25
90	125	18	0.562	ML 71918	115.0	98.5	101.0	119.0	1.1	0.6	104.2	1.94	8.731	31
	140	24	1.192	ML 7018	124.5	103.0	106.5	130.0	1.5	0.6	110.5	2.64	11.906	25
95	130	18	0.591	ML 71919	120.0	103.5	106.0	124.0	1.1	0.6	109.2	1.94	8.731	32
	145	24	1.263	ML 7019	129.5	109.5	111.5	135.0	1.5	0.6	115.5	2.64	11.906	26
100	140	20	0.796	ML 71920	128.5	109.5	112.5	133.0	1.1	0.6	115.9	2.02	10.319	29
	150	24	1.313	ML 7020	134.5	114.5	116.5	140.0	1.5	0.6	120.5	2.61	11.906	27
105	160	26	1.602	ML 7021	143.0	119.0	123.0	149.0	2.0	1.0	127.5	3.02	13.494	25
110	150	20	0.868	ML 71922	138.5	119.5	122.5	143.0	1.1	0.6	125.9	1.98	10.319	32
	170	28	2.019	ML 7022	150.5	126.0	130.0	149.0	2.0	1.0	134.7	3.23	14.288	25
120	165	22	1.204	ML 71924	151.5	131.0	134.5	156.5	1.1	6.0	138.1	2.18	11.113	33
	180	28	2.167	ML 7024	160.5	136.0	140.0	167.5	2.0	1.0	144.7	3.23	14.288	27
130	180	24	1.572	ML 71926	165.0	142.0	146.0	170.5	1.5	0.6	150.0	2.56	12.700	31
	200	33	3.306	ML 7026	177.0	148.5	154.0	185.0	2.0	1.0	158.9	3.84	16.669	26

MachLine, high speed and precision bearing for machine tools *(continued)*



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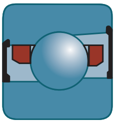

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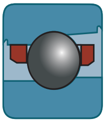

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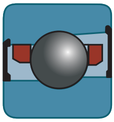


MLECH

Serie C	a mm	C N	C_0 N	rpm*	rpm*
ML 71914 CV	19	25 000	26 000	17 000	27 000
ML 7014 CV	22	34 000	34 500	16 500	25 000
ML 71915 CV	20	26 000	28 000	16 500	26 000
ML 7015 CV	23	34 500	36 000	15 500	23 750
ML 71916 CV	21	27 000	30 000	15 500	24 500
ML 7016 CV	25	44 000	44 500	14 000	21 500
ML 71917 CV	23	31 500	35 000	14 500	22 500
ML 7017 CV	26	46 000	49 000	13 500	20 500
ML 71918 CV	23	32 500	37 000	13 500	21 000
ML 7018 CV	28	52 000	56 000	12 500	19 100
ML 71919 CV	24	33 000	38 000	12 700	20 000
ML 7019 CV	28	53 000	59 000	12 000	18 400
ML 71920 CV	26	42 500	49 000	11 700	18 500
ML 7020 CV	29	54 000	61 000	11 500	18 000
ML 7021 CV	31	65 000	72 000	10 500	16 500
ML 71922 CV	28	44 500	53 000	10 500	17 000
ML 7022 CV	33	72 000	81 000	10 000	15 800
ML 71924 CV	30	52 000	64 000	9 500	15 500
ML 7024 CV	34	75 000	88 000	9 000	14 000
ML 71926 CV	33	64 000	79 000	8 500	14 000
ML 7026 CV	39	97 000	115 000	8 000	12 500

Serie H	a mm	C N	C_0 N	rpm*	rpm*
ML71914 HV	28	23 700	24 300	15 000	23 500
ML 7014 HV	31	32 000	32 500	15 000	21 800
ML71915 HV	29	24 600	26 000	14 000	21 700
ML 7015 HV	32	32 500	34 000	13 500	21 000
ML71916 HV	30	25 500	28 000	13 700	21 000
ML 7016 HV	35	41 500	42 500	12 500	19 000
ML71917 HV	33	29 500	32 500	12 500	20 000
ML 7017 HV	36	43 500	46 000	11 500	18 500
ML71918 HV	34	30 500	34 500	11 700	18 700
ML 7018 HV	39	49 000	53 000	10 500	17 200
ML71919 HV	35	31 000	35 500	11 000	17 700
ML 7019 HV	40	50 000	55 000	10 000	16 500
ML71920 HV	38	40 000	45 500	10 500	16 700
ML 7020 HV	41	51 000	57 000	9 500	15 900
ML 7021 HV	44	61 000	68 000	9 000	14 900
ML71922 HV	41	42 000	50 000	9 300	14 700
ML 7022 HV	47	68 000	76 000	8 500	13 900
ML71924 HV	44	49 000	60 000	8 600	13 500
ML 7024 HV	49	70 000	82 000	8 000	12 500
ML71926 HV	48	60 000	73 000	7 500	11 500
ML 7026 HV	55	92 000	108 000	7 000	10 500

* These are the speed limits according to the SNR concept (see pages 85 to 87).

Double-row ball bearings

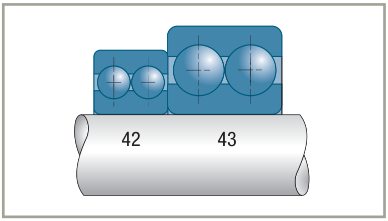
Radial double-row ball bearings

Definition and capabilities

Radial double-row ball bearings are designed to sustain higher radial loads than single-row bearings, as well as axial loads in both directions.

Practically, these bearings only admit very low misalignment between shaft and housing, to the order of 0.06°.

Series



Tolerances and clearances

Tolerances

Normally manufactured in the normal tolerance class.

Single-row ball bearings can be supplied on request in tolerance classes 6 and 5 for all or specific characteristics (e.g. bore or radial run-out in tolerance class 6).

Internal radial clearance

All standard production bearings are in the normal clearance group N. The other groups can be supplied on request.

For single-row radial ball bearings with a tapered bore, SNR has adopted group 3 (C3) as the standard clearance to allow for the greater reduction in clearance resulting from fitting on a tapered seat.

The radial clearance leads to an axial clearance; a simple formula can be used to calculate the approximate size of the theoretical axial clearance J_a as a function of the operating radial clearance J_r.

$$J_a = (J_r (D-d) / 20)^{1/2}$$

Design criteria

Bearing life

Residual radial clearance

Bearings operating under high axial loads

The performance of bearings operating under high axial loads can be improved by increasing the radial clearance in order to create a contact angle in operation. The axial load F_a must not exceed a mean value of 0,5 C0.

This type of operation has to be studied according to the loading conditions and dimensions of the bearings. Consult SNR.

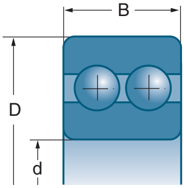
Assembly made up by two side-by-side bearings

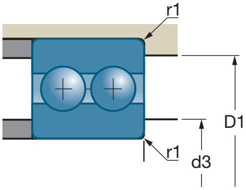
Each pair of bearings is calculated like a single bearing.

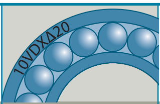
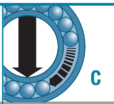
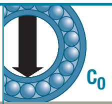
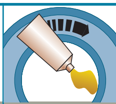
Suffixes

A	Bearing without filling slots with glass-fiber reinforced polyamide cage 6.6

Radial double-row ball bearings *(continued)*



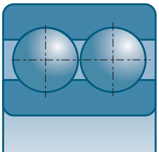


d mm	 References	D mm	B mm	 C 10³N	 C_0 10³N	 rpm*	 rpm*
10	4200 A	30	14	9.2	5.2	18000	22000
12	4201 A	32	14	9.4	5.5	16000	20000
15	4202 A	35	14	10.4	6.6	14000	18000
	4302 A	42	17	14.8	9.1	12000	16000
17	4203 A	40	16	14.7	9.5	13000	16000
	4303 A	47	19	19.7	13.2	11000	14000
20	4204 A	47	18	17.8	12.7	11000	13000
	4304 A	52	21	23.4	16	9400	12000
25	4205 A	52	18	19.2	14.7	9400	12000
	4305 A	62	24	31.5	22.4	7800	10000
30	4206 A	62	20	26	20.7	7800	9800
	4306 A	72	27	39.5	30.5	6700	8800
35	4207 A	72	23	32	26	6700	8400
	4307 A	80	31	51	38	5900	7800
40	4208 A	80	23	34	30	6000	7500
	4308 A	90	33	63	48	5200	6900
45	4209 A	85	23	36	33	5500	6900
	4309 A	100	36	72	60	4700	6200
50	4210 A	90	23	39.8	36.5	5100	6400
	4310 A	110	40	89	76	4200	5600
55	4211 A	100	25	43	43	4600	5800
	4311 A	120	43	104	90	3900	5100
60	4212 A	110	28	57	58	4200	5300
	4312 A	130	46	120	106	3600	4700
65	4213 A	120	31	67	67	3900	4900
	4313 A	140	48	129	113	3300	4400
70	4214 A	125	31	70	73	3700	4600
75	4215 A	130	31	73	80	3500	4400
80	4216 A	140	33	81	90	3300	4100
85	4217 A	150	36	94	106	3100	3800

* These are the speed limits according to the SNR concept (see pages 85 to 87).

Design criteria

Radial double-row ball bearings



References	d3 min mm	D1 max mm	r1 max mm	kg
4200 A	14	26	0.6	0.049
4201 A	16	28	0.6	0.055
4202 A	19	31	0.6	0.060
4302 A	21	36	1	0.120
4203 A	21	36	0.6	0.090
4303 A	23	41	1	0.160
4204 A	26	41	1	0.140
4304 A	27	45	1.1	0.210
4205 A	31	46	1	0.160
4305 A	32	55	1.1	0.340
4206 A	36	56	1	0.260
4306 A	37	65	1.1	0.541
4207 A	42	65	1.1	0.434
4307 A	44	71	1.5	0.732
4208A	47	73	1.1	0.531
4308A	49	81	1.5	1.006
4209 A	52	78	1.1	0.581
4309 A	54	91	1.5	1.348
4210 A	57	83	1.1	0.623
4310 A	61	99	2	1.800
4211 A	64	91	1.5	0.839
4311 A	66	109	2	2.275
4212 A	69	101	1.5	1.153
4312 A	73	117	2.1	2.890
4213 A	74	111	1.5	1.615
4313 A	78	127	2.1	3.460
4214 A	79	116	1.5	1.715
4215 A	84	121	1.5	1.810
4216 A	91	129	2	2.280
4217 A	96	139	2	2.500

Double-row angular-contact ball bearings

Definition and capabilities

Definition

Double-row angular-contact ball bearings accept axial loads in both directions and can be used singly, as dual bearing units.

Capabilities

Loads and speeds

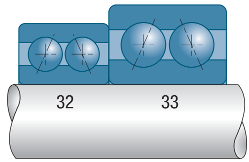
These bearings are designed to:

- withstand combined loads with a predominant axial component — $F_a / F_r \geq 1$
- withstand axial loads in both directions
- accept relatively high speeds of rotation

Misalignment

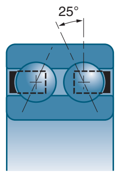
The construction of these bearings limits them to very small misalignment values, in the range of 0.06°.

Series



Series 32...A, 33...A

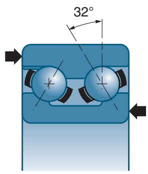
Contact angle 25°.
No filling slot.
Can accept axial loads in both directions.
These bearings have synthetic material cages.
They are supplied pre-lubricated with a standard application grease (maximum operating temperature 110°C or 230°F).



Type A

Series 32...B, 33...B

Contact angle 32°.
With filling slots.
Can accept axial loads (higher loads than Type A) in a predominant direction.
Cage in pressed steel, synthetic material or machined brass.

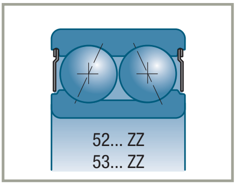


Type B

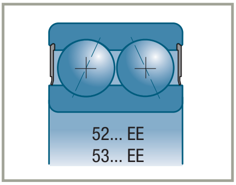
Variants

■ **Sealed or protected bearings**

Double-row angular-contact ball bearings also exist in variants fitted with shields or seals. In this case their reference becomes 52... ZZ, 53... ZZ or 52... EE, 53... EE.



The outer ring of bearings in the series with seals or shields can be fitted with a snap ring (reference 52...NRZZ, 53 ... NREE). The position dimensions of the snap ring are identical to those of the ball bearing with the same outside diameter.



Tolerances and clearances

➔ Tolerances

Manufactured in the normal tolerance class.

➔ Axial clearance

An axial clearance is defined for these bearings. This clearance is not standardised.

The values are communicated by SNR on request.

The relation between the radial clearance J_r of a bearing and the axial clearance J_a defined above can be approximated using the following formula:

Type A:	$J_r = 0.4\ J_a$
Type B:	$J_r = 0.5\ J_a$

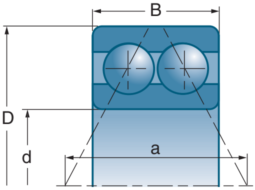
Installation/assembly criteria

In the majority of applications this bearing is considered a single assembly. It can sometimes be used like a double bearing playing the role of two bearings due to the distance between the load application points.

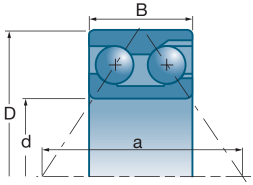
Suffixes

A	No filling slot with polyamide cage, angle 25°
B	With filling slots, angle 32°
G15	Glass-fiber reinforced polyamide cage

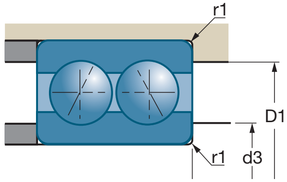
Double-row angular-contact ball bearings *(continued)*



version A



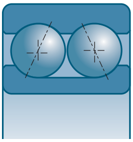
version B

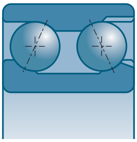


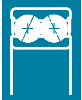
d		D	B	a	C	C_0		
mm	References	mm	mm	mm	10^3N	10^3N	rpm*	rpm*
10	3200 A	30	14	15.1	7.8	4.55	16000	21000
12	3201 A	32	15.9	16.6	10.7	5.9	15000	20000
15	3202 A 3302 A	35 42	15.9 19	18 21.5	11.8 16.2	7.1 10.1	13000 11000	18000 15000
17	3203 A 3303 A	40 47	17.5 22.2	20.4 24	14.6 20.9	9 12.4	12000 10000	15000 14000
20	3204 A 3304 B	47 52	20.6 22.2	24.2 34	19.6 20.8	12.5 18.3	9700 9000	13000 12000
25	3205 B 3305 B	52 62	20.6 25.4	35 40	18.9 29	18.2 26.5	8400 7500	11000 10000
30	3206 B 3306 B	62 72	23.8 30.2	40.6 47.3	27 38	27 36	7200 6400	9600 8600
35	3207 B 3307 B	72 80	27 34.9	47.2 54.1	37 48.5	37.5 47	6100 5600	8200 7500
40	3208 B 3308 B	80 90	30.2 36.5	52 59	42 60	44 59	5500 5100	7300 6800
45	3209 A 3309 A	85 100	30.2 39.7	43.2 50.1	48 68	37 51	5100 4600	6800 6100
50	3210 A 3310 A	90 110	30.2 44.4	45.5 55	51 81	42 62	4700 4200	6300 5600
55	3211 A 3311 A 3311 B	100 120 120	33.3 49.2 49.2	49.9 61.2 80.4	63 102 101	52 79 113	4300 3800 3800	5700 5100 5100
60	3212 A 3312 A	110 130	36.5 54	55.1 67.3	72 125	61 98	3900 3500	5200 4600
65	3213 A 3313 A	120 140	38.1 58.7	59.8 73.3	80 149	73 118	3500 3200	4700 4300
70	3214 A 3314 B	125 150	39.7 63.5	61.6 100.8	84 147	76 172	3400 3000	4600 4000
75	3215 A	130	41.3	65	77	84	3200	4200
80	3216 A	140	44.4	69	99	93	3000	4000

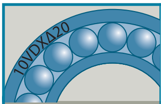
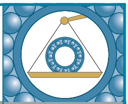
* These are the speed limits according to the SNR concept (see pages 85 to 87).

Double-row angular-contact ball bearings

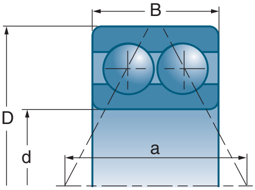


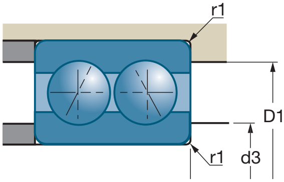




	d3 min	D1 max	r1 max	
	mm	mm	mm	kg
3200 A	15	25	0.6	0.043
3201 A	17	27	0.6	0.051
3202 A	20	30	0.6	0.058
3302 A	21	36	1	0.112
3203 A	22	35	0.6	0.085
3303 A	23	41	1	0.161
3204 A	26	41	1	0.139
3304 B	27	45	1	0.230
3205 B	31	46	1	0.190
3305 B	32	55	1	0.370
3206 B	36	56	1	0.310
3306 B	37	65	1	0.580
3207 B	42	65	1	0.480
3307 B	44	71	1.5	0.780
3208 B	47	73	1	0.650
3308 B	49	81	1.5	1.050
3209 A	52	78	1	0.583
3309 A	54	91	1.5	1.210
3210 A	57	83	1	0.760
3310 A	60	100	2	1.600
3211 A	64	91	1.5	0.876
3311 A	65	110	2	2.110
3311 B	65	110	2	2.530
3212 A	69	101	1.5	1.180
3312 A	73	118	2	2.700
3213 A	74	111	1.5	1.520
3313 A	78	128	2	3.390
3214 A	79	116	1.5	1.520
3314 B	83	138	2	5.050
3215 A	84	121	1.5	1.910
3216 A	91	129	2	2.450

Double-row angular-contact ball bearings *(continued)*



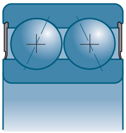
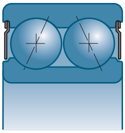


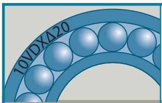
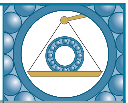
d		D	B	a	C	C_0		
mm	References	mm	mm	mm	10^3N	10^3N	rpm*	rpm*
12	5201 EE 5201 ZZ	32	15.9	16.6	10.7	5.9	15000	15000
15	5202 EE 5202 ZZ 5302 EE	35 42	15.9 19	18 21.5	11.8 16.2	7.1 10.1	13000 11000	13000
17	5203 EE 5203 ZZ 5303 EE 5303 ZZ	40 47	17.5 22.2	20.4 24	14.6 20.9	9 12.4	12000 10000	12000 10000
20	5204 EE 5204 ZZ 5304 EE 5304 ZZ	47 52	20.6 22.2	24.2 26.4	19.6 23.3	12.5 15.1	9700 8900	9700 8900
25	5205 EE 5205 ZZ 5305 EE 5305 ZZ	52 62	20.6 25.4	26.5 30.7	21.3 30	14.7 19.9	8400 7600	8400 7600
30	5206 EE 5206 ZZ 5306 EE 5306 ZZ	62 72	23.8 30.2	31.4 36.2	29.5 41.5	21.1 28.5	7100 6500	7100 6500
35	5207 EE 5207 ZZ 5307 EE 5307 ZZ	72 80	27 34.9	36.5 41.5	39 51	28.5 34.5	6200 5700	6200 5700
40	5208 EE 5208 ZZ 5308 EE 5308 ZZ	80 90	30.2 36.5	40.9 45.8	48 62	36.5 45	5500 5100	5500 5100
45	5209 EE 5209 ZZ 5309 EE 5309 ZZ	85 100	30.2 39.7	43.2 50.1	48 68	37 51	5100 4600	5100 4600
50	5210 EE 5210 ZZ 5310 EE 5310 ZZ	90 110	30.2 44.4	45.5 55	51 81	42 62	4700 4200	4700 4200
55	5211 EE 5211 ZZ 5311 ZZ	100 120	33.3 49.2	49.9 61.2	59 102	49.5 79	2800	4300 3800
60	5212 EE 5212 ZZ 5312 ZZ	110 130	36.5 54	55.1 67.3	72 125	61 98	2500	3900 3500
65	5213 EE 5213 ZZ 5313 ZZ	120 140	38.1 58.7	59.8 73.3	80 149	73 118	3500	3500 3200
70	5214 EE 5214 ZZ	125	39.7	61.6	84	76	2200	3400

* These are the speed limits according to the SNR concept (see pages 85 to 87).

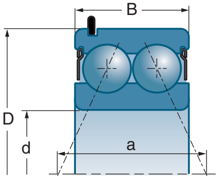
Characteristics

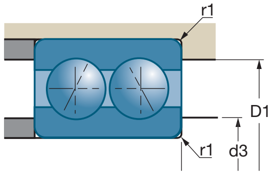
Double-row angular-contact ball bearings sealed and protected

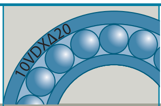
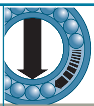
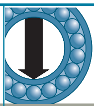
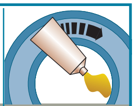
 

 References		d3 min mm	D1 max mm	r1 max mm	 kg
5201 EE	5201 ZZ	017.00	027.00	00.6	0.051
5202 EE	5202 ZZ	020.00	030.00	00.6	0.058
5302 EE		021.00	036.00	01.0	0.112
5203 EE	5203 ZZ	022.00	035.00	00.6	0.085
5303 EE	5303 ZZ	023.00	041.00	01.0	0.161
5204 EE	5204 ZZ	026.00	041.00	01.0	0.140
5304 EE	5304 ZZ	027.00	045.00	01.0	0.200
5205 EE	5205 ZZ	031.00	046.00	01.0	0.160
5305 EE	5305 ZZ	032.00	055.00	01.0	0.320
5206 EE	5206 ZZ	036.00	056.00	01.0	0.265
5306 EE	5306 ZZ	037.00	065.00	01.1	0.510
5207 EE	5207 ZZ	042.00	065.00	01.1	0.430
5307 EE	5307 ZZ	044.00	071.00	01.5	0.790
5208 EE	5208 ZZ	047.00	073.00	01.1	0.570
5308 EE	5308 ZZ	049.00	081.00	01.5	1.050
5209 EE	5209 ZZ	052.00	078.00	01.1	0.620
5309 EE	5309 ZZ	054.00	091.00	01.5	1.420
5210 EE	5210 ZZ	057.00	083.00	01.1	0.800
5310 EE	5310 ZZ	060.00	100.00	02.0	1.930
5211 EE	5211 ZZ	064.00	091.00	01.5	0.876
	5311 ZZ	065.00	110.00	02.0	2.110
5212 EE	5212 ZZ	069.00	101.00	01.5	1.180
	5312 ZZ	073.00	118.00	02.1	2.700
5213 EE	5213 ZZ	074.00	111.00	01.5	1.520
	5313 ZZ	078.00	128.00	02.1	3.390
5214 EE	5214 ZZ	079.00	116.00	01.5	1.640

Double-row angular-contact ball bearings *(continued)*

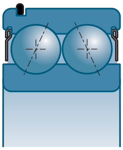




d		D	B	a	 C	 C_0	
mm	References	mm	mm	mm	10^3N	10^3N	rpm*
15	5202 NRZZ	35	15.9	18	11.8	7.1	13000
17	5203 NRZZ	40	17.5	20.4	14.6	9	12000
	5303 NRZZ	47	22.2	24	20.9	12.4	10000
20	5204 NRZZ	47	20.6	24.2	19.6	12.5	9700
	5304 NRZZ	52	22.2	26.4	23.3	15.1	8900
25	5205 NRZZ	52	20.6	26.5	21.3	14.7	8400
	5305 NRZZ	62	25.4	30.7	30	19.9	7600
30	5206 NRZZ	62	23.8	31.4	29.5	21.1	7100
	5306 NRZZ	72	30.2	36.2	41.5	28.5	6500
35	5207 NRZZ	72	27	36.5	39	28.5	6200
	5307 NRZZ	80	34.9	41.5	51	34.5	5700
40	5208 NRZZ	80	30.2	40.9	48	36.5	5500
	5308 NRZZ	90	36.5	45.8	62	45	5100
45	5209 NRZZ	85	30.2	43.2	48	37	5100
	5309 NRZZ	100	39.7	50.1	68	51	4600
50	5210 NRZZ	90	30.2	45.5	51	42	4700
	5310 NRZZ	110	44.4	55	81	62	4200
55	5211 NRZZ	100	33.3	49.9	59	49.5	4300
	5311 NRZZ	120	49.2	61.2	102	79	3800
60	5212 NRZZ	110	36.5	55.1	72	61	3900
	5312 NRZZ	130	54	67.3	125	98	3500
65	5213 NRZZ	120	38.1	59.8	80	73	3500
	5313 NRZZ	140	58.7	73.3	149	118	3200
70	5214 NRZZ	125	39.7	61.6	84	76	3400

* These are the speed limits according to the SNR concept (see pages 85 to 87).

Double-row angular-contact ball bearings protected with snap ring



References	d3 min	D1 max	r1 max	segment	kg
	mm	mm	mm		kg
5202 NRZZ	020.00	030.00	00.6	R35	0.058
5203 NRZZ	022.00	035.00	00.6	R40	0.100
5303 NRZZ	023.00	041.00	01.0	R47	0.190
5204 NRZZ	026.00	041.00	01.0	R47	0.140
5304 NRZZ	027.00	045.00	01.0	R52	0.200
5205 NRZZ	031.00	046.00	01.0	R52	0.160
5305 NRZZ	032.00	055.00	01.0	R62	0.320
5206 NRZZ	036.00	056.00	01.0	R62	0.265
5306 NRZZ	037.00	065.00	01.1	R72	0.590
5207 NRZZ	042.00	065.00	01.1	R72	0.480
5307 NRZZ	044.00	071.00	01.5	R80	0.820
5208 NRZZ	047.00	073.00	01.1	R80	0.650
5308 NRZZ	049.00	081.00	01.5	R90	1.050
5209 NRZZ	052.00	078.00	01.1	R85	0.710
5309 NRZZ	054.00	091.00	01.5	R100	1.340
5210 NRZZ	057.00	083.00	01.1	R90	0.760
5310 NRZZ	060.00	100.00	02.0	R11	1.720
5211 NRZZ	064.00	091.00	01.5	R100	0.876
5311 NRZZ	065.00	110.00	02.0	R120	2.110
5212 NRZZ	069.00	101.00	01.5	R110	1.180
5312 NRZZ	073.00	118.00	02.1	R130	2.700
5213 NRZZ	074.00	111.00	01.5	R120	1.520
5313 NRZZ	078.00	128.00	02.1	R140	3.390
5214 NRZZ	079.00	116.00	01.5	R125	1.640

Double-row self-aligning ball bearings

Definition and capabilities

Definition

The spherical race in the outer ring allows angular displacement.

The variant with taper bore makes assembly easier.

Cages

Standard dimension bearings are equipped with a synthetic material cage (maximum operating temperature: 120°C or 248°F, 150°C or 302°F peak). Large dimension bearings are equipped with a pressed steel or machined brass cage.

Capabilities

Loads and speeds

This type of bearing accepts relatively high speeds of rotation. It has good ability to withstand radial loads. Its design, however, means that it can only accept very low axial loads.

Misalignment

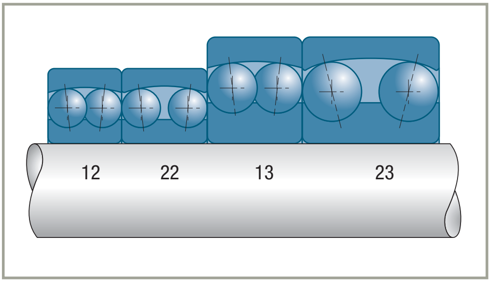
The outer ring of this type of bearing has a spherical raceway that allows angular travel rings. This means that it can accept high misalignment values, whether permanent (rotational bending of shaft) or not.

Double-row self-aligning ball bearings allow high misalignment values of the order of 2 to 4° without loss of performance.

The misalignment angle must nevertheless be limited in order to remain within values compatible with the sealing system used.

In sealed variants the permissible misalignment is limited to 0.5°.

Series



Variants

■ Bearings with tapered bore. Suffix K

Standardized 1:12 taper. They are usually fitted using a tapered adapter sleeve.

The tapered bore variant allows the use of as-rolled shafts, thanks to the characteristics of the tapered adapter sleeve. These bearings are often mounted in split pillow blocks.

■ Sealed bearings. Suffix EE. Series 22...EE - 23...EE

These bearings are pre-greased. Their seals limit angular travel possibilities to 1/20. Their basic loads are the same as the series 12 and 13 bearings of the same diameter, because they have the same internal design definition.

They therefore also have the same equivalent load factors.

■ Bearings with wide inner ring. Series 112, 113

Bearings whose inner ring extends beyond both sides of the outer ring. The inner ring has a slot for a drive screw. These bearings are mainly used in agricultural machinery.

Double-row self-aligning ball bearings *(continued)*

Tolerances and clearances

Tolerances

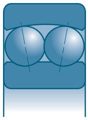
These bearings are supplied with tolerances in compliance with ISO 492 Standard, but in the normal tolerance class only.

Clearances

Internal radial clearance

This clearance is standardised (ISO 5753). The values are different for cylindrical bore and tapered bore bearings (suffix K). The latter have a significantly larger clearance to allow the reduction in clearance resulting from the adapter sleeve interference fit. The recommended residual clearance after fitting is of the range of:

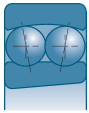
$$J_{rm} = 2\ d^{1/2}\ 10^{-3}$$



Double-row self-aligning ball bearings with cylindrical bore series 12-13-22-23-112-113

Bore diameter	Group 2		Group N		Group 3		Group 4		Group 5	
d (mm)	min	max	min	max	min	max	min	max	min	max
2,5 <d ≤ 6	1	8	5	15	10	20	15	25	21	33
6 <d≤ 10	2	9	6	17	12	25	19	33	27	42
10 <d≤ 18	2	10	6	19	13	26	21	35	30	48
14 <d≤ 18	3	12	8	21	15	28	23	37	32	50
18 <d≤ 24	4	14	10	23	17	30	25	39	34	52
24 <d≤ 30	5	16	11	24	19	35	29	46	40	58
30 <d≤ 40	6	18	13	29	23	40	34	53	46	66
40 <d≤ 50	6	19	14	31	25	44	37	57	50	71
50 <d≤ 65	7	21	16	36	30	50	45	69	62	88
65 <d≤ 80	8	24	18	40	35	60	54	83	76	108
80 <d≤ 100	9	27	22	48	42	70	64	96	89	124
100 <d≤ 120	10	31	25	56	50	83	75	114	105	145
120 <d≤ 140	10	38	30	68	60	100	90	135	125	175
140 <d≤ 160	15	44	35	80	70	120	110	161	150	210

Value in µm



Bearings with tapered bore series 12K-13K-22K-23K

Bore diameter	Group 2		Group N		Group 3		Group 4		Group 5	
d (mm)	min	max	min	max	min	max	min	max	min	max
18 <d≤ 24	7	17	13	26	20	33	28	42	37	55
24 <d≤ 30	9	20	15	28	23	39	33	50	44	62
30 <d≤ 40	12	24	19	35	29	46	40	59	52	72
40 <d≤ 50	14	27	22	39	33	52	45	65	58	79
50 <d≤ 65	18	32	27	47	41	61	56	80	73	99
65 <d≤ 80	23	39	35	57	50	75	69	98	91	123
80 <d≤ 100	29	47	42	68	62	90	84	116	109	144
100 <d≤ 120	35	56	50	81	75	108	100	139	130	170
120 <d≤ 140	40	68	60	98	90	130	120	165	155	205
140 <d≤ 160	45	74	65	110	100	150	140	191	180	240

Value in μm

Axial clearance

As the axial clearance J_a is a function of the radial clearance J_r, its value can be calculated using the following approximation formula:

$$J_a = 2.27\ Y_0 \cdot J_r$$

Fitting and adjustment

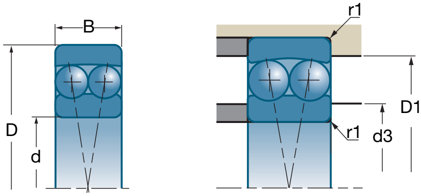
This type of bearing is very sensitive to any cancellation of clearance and the residual clearance must be checked after fitting swivelling by hand. It is particularly important to perform this check on bearings with a tapered bore.

Some self-aligning ball bearings protrude slightly with respect to the faces. Example: 1320.

Suffixes

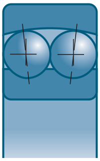
EE	Double sealing
G14, G15	Moulded polyamide cage
K	Tapered bore, 1:12 taper
M	Machined brass cage centred on the balls

Double-row self-aligning ball bearings *(continued)*



d		D	B	C	C_0	e	Y $\frac{Fa}{Fr} \leq e$	Y $\frac{Fa}{Fr} > e$	Yo
mm	References	mm	mm	10^3N	10^3N				
10	1200 G15	30	9	5.50	1.19	0.31	2.00	3.10	2.00
	2200 G14	30	14	7.30	1.58	0.31	2.00	3.10	2.00
12	1201 G15	32	10	5.60	1.26	0.31	2.00	3.10	2.00
	2201 G15	32	14	7.50	1.71	0.31	2.00	3.10	2.00
	1301 G14	37	12	9.40	2.14	0.33	1.90	2.90	1.90
15	1202 G15	35	11	7.50	1.75	0.31	2.00	3.10	2.00
	2202 G15	35	14	9.20	2.08	0.31	2.00	3.10	2.00
	1302 G14	42	13	9.50	2.28	0.33	1.90	2.90	1.90
	2302 G15	42	17	16.30	3.85	0.42	1.47	2.28	1.55
17	1203 G15	40	12	7.90	2.03	0.31	2.00	3.10	2.00
	2203 G15	40	16	11.50	2.75	0.46	1.40	2.10	1.40
	1303 G14	47	14	12.50	3.20	0.33	1.90	2.90	1.90
	2303 G14	47	19	14.40	3.55	0.50	1.20	2.00	1.20
20	1204	47	14	9.70	2.65	0.26	2.40	3.60	2.40
	2204 G15	47	18	14.30	3.50	0.43	1.50	2.30	1.50
	1304 G15	52	15	12.40	3.35	0.27	2.30	3.60	2.40
25	1205	52	15	11.90	3.30	0.27	2.30	3.60	2.40
	2205	52	18	12.20	3.45	0.42	1.50	2.40	1.60
	2205 G15	52	18	16.90	4.45	0.42	1.50	2.40	1.60
	1305 G15	62	17	18.00	5.00	0.27	2.30	3.60	2.40
	2305 G15	62	24	24.40	6.50	0.47	1.40	2.10	1.40
30	1206	62	16	15.40	4.70	0.24	2.60	4.00	2.70
	2206	62	20	15.00	4.60	0.36	1.80	2.70	1.80
	1306	72	19	20.90	6.30	0.24	2.60	4.00	2.70
	2306	72	27	30.50	8.70	0.43	1.40	2.30	1.50
35	1207	72	17	15.60	5.10	0.22	2.90	4.50	3.00
	2207	72	23	21.20	6.70	0.36	1.80	2.70	1.90
	1307 G15	80	21	25.00	7.90	0.24	2.60	4.00	2.70
	2307 G15	80	31	39.50	11.10	0.46	1.40	2.10	1.40
40	1208	80	18	19.00	6.50	0.21	2.90	4.60	3.10
	2208 G15	80	23	31.50	9.50	0.25	2.60	4.00	2.70
	1308	90	23	29.00	9.80	0.24	2.60	4.00	2.80
	2308 G15	90	33	45.00	13.40	0.44	1.50	2.20	1.50
45	1209	85	19	21.50	7.40	0.21	2.90	4.60	3.10
	2209	85	23	23.00	8.20	0.29	2.10	3.30	2.20
	1309	100	25	37.50	12.90	0.24	2.60	4.00	2.70
	2309 G15	100	36	54.00	16.40	0.44	1.50	2.20	1.50

Double-row self-aligning ball bearings with cylindrical bore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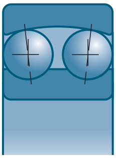
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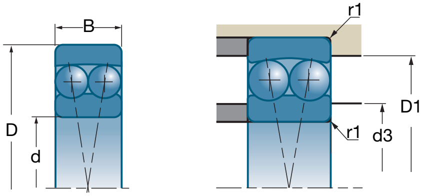
References	rpm*	rpm*	d3 min mm	D1 max mm	r1 max mm	kg
1200 G15	24000	29000	14.0	26.0	0.6	0.032
2200 G14	24000	29000	14.0	27.0	0.6	0.048
1201 G15	23000	27000	16.0	28.0	0.6	0.041
2201 G15	22000	26000	16.0	28.0	0.6	0.055
1301 G14	18000	22000	17.0	31.0	1.0	0.073
1202 G15	20000	23000	19.0	31.0	0.6	0.050
2202 G15	19000	23000	19.0	31.0	0.6	0.063
1302 G14	16000	19000	20.0	36.0	1.0	0.097
2302 G15	15000	17000	20.0	36.0	1.0	0.115
1203 G15	17000	21000	21.0	36.0	0.6	0.073
2203 G15	16000	19000	21.0	36.0	0.6	0.088
1303 G14	14000	17000	22.0	41.0	1.1	0.128
2303 G14	13000	16000	22.0	41.0	1.1	0.157
1204	14000	17000	25.0	42.0	1.0	0.118
2204 G15	14000	16000	25.0	42.0	1.0	0.140
1304 G15	12000	14000	26.5	47.0	1.1	0.160
1205	12000	15000	30.0	47.0	1.0	0.138
2205	12000	14000	30.0	46.0	1.0	0.163
2205 G15	12000	14000	30.0	47.0	1.0	0.160
1305 G15	10000	12000	31.5	55.0	1.1	0.280
2305 G15	9600	11000	31.5	55.0	1.1	0.340
1206	10000	12000	35.0	57.0	1.0	0.221
2206	10000	12000	35.0	56.0	1.0	0.260
1306	8500	10000	36.5	65.0	1.1	0.387
2306	8100	9000	36.5	65.0	1.1	0.500
1207	9000	10000	41.5	65.0	1.1	0.323
2207	8800	10000	41.5	65.0	1.1	0.403
1307 G15	7400	9000	43.0	72.0	1.5	0.510
2307 G15	7200	8600	43.0	71.0	1.5	0.680
1208	7900	9400	46.5	73.0	1.1	0.417
2208 G15	7700	9200	46.5	73.0	1.1	0.550
1308	6600	8000	48.0	82.0	1.5	0.715
2308 G15	6400	7700	48.0	81.0	1.5	0.919
1209	7400	8800	51.5	78.0	1.1	0.465
2209	7200	8600	51.5	78.0	1.1	0.550
1309	6000	7000	53.0	92.0	1.5	0.957
2309 G15	5700	6800	53.0	91.0	1.5	1.229

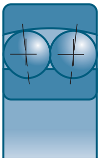
* These are the speed limits according to the SNR concept (see pages 85 to 87).

Double-row self-aligning ball bearings *(continued)*



d		D	B	C	C_0	e	Y $\frac{Fa}{Fr} \leq e$	Y $\frac{Fa}{Fr} > e$	Yo
mm	References	mm	mm	10^3N	10^3N				
50	1210	90	20	22.50	8.10	0.19	3.30	5.10	3.50
	2210	90	23	23.00	8.50	0.27	2.30	3.60	2.40
	1310 G15	110	27	41.50	14.30	0.24	2.60	4.10	2.80
	2310 G15	110	40	65.00	20.10	0.44	1.50	2.20	1.50
55	1211	100	21	26.50	10.00	0.19	3.40	5.20	3.50
	2211	100	25	26.50	9.90	0.27	2.30	3.60	2.30
	1311 G15	120	29	51.00	18.00	0.23	2.80	4.30	2.80
	2311 G15	120	43	75.00	23.80	0.44	1.50	2.20	1.50
60	1212 G15	110	22	30.00	11.60	0.18	3.60	5.50	3.60
	2212	110	28	34.00	12.50	0.27	2.30	3.60	2.30
	1312	130	31	57.00	20.70	0.23	2.80	4.30	2.80
	2312 G15	130	46	87.00	28.00	0.40	1.60	2.50	1.60
65	1213	120	23	31.00	12.40	0.18	3.60	5.50	3.60
	2213	120	31	43.50	16.40	0.27	2.30	3.60	2.30
	2313 G15	140	48	96.00	32.50	0.40	1.60	2.50	1.60
70	2214	125	31	44.00	17.00	0.27	2.30	3.60	2.30
	2314	150	51	109.00	37.50	0.40	1.60	2.50	1.60
75	1215	130	25	39.00	15.50	0.18	3.60	5.50	3.60
	2215	130	31	44.50	17.90	0.25	2.50	3.80	2.50
	1315	160	37	79.00	30.00	0.23	2.80	4.30	2.80
	2315	160	55	123.00	42.50	0.40	1.60	2.50	1.60
80	1216	140	26	40.00	16.90	0.18	3.60	5.50	3.60
	2216	140	33	49.00	20.00	0.25	2.50	3.80	2.50
85	1217	150	28	49.00	20.40	0.18	3.60	5.50	3.60
	1317	180	41	98.00	38.00	0.23	2.80	4.30	2.80
90	1218	160	30	57.00	23.50	0.18	3.60	5.50	3.60
	2218	160	40	69.00	28.50	0.27	2.40	3.70	2.50
	2318	190	64	149.00	58.00	0.37	1.70	2.60	1.80
95	1219	170	32	64.00	27.00	0.18	3.60	5.50	3.60
100	1220	180	34	69.00	29.50	0.18	3.60	5.50	3.60
	2220	180	46	96.00	40.50	0.26	2.40	3.60	2.50
	1320	215	47	143.00	58.00	0.23	2.80	4.30	2.80
110	1222	200	38	88.00	38.50	0.18	3.60	5.50	3.60

Double-row self-aligning ball bearings with cylindrical bore *(continued)*



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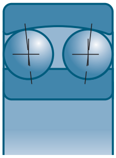

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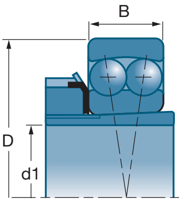
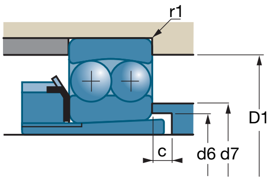
References	rpm* (grease)	rpm* (oil)	d3 min mm	D1 max mm	r1 max mm	kg
1210	6900	8200	56.5	83.0	1.1	0.525
2210	6700	8000	56.5	83.0	1.1	0.590
1310 G15	5400	6500	59.0	99.0	2.0	1.200
2310 G15	5200	6200	59.0	99.0	2.0	1.623
1211	6100	7300	63.0	92.0	1.5	0.697
2211	6100	7200	63.0	91.0	1.5	0.788
1311 G15	5000	6000	64.0	109.0	2.0	1.640
2311 G15	4700	5600	64.0	109.0	2.0	2.070
1212 G15	5700	6700	68.0	102.0	1.5	0.890
2212	5600	6600	68.0	101.0	1.5	1.079
1312	4600	5600	71.0	117.0	2.1	1.952
2312 G15	4300	5200	71.0	117.0	2.1	2.600
1213	5200	6200	73.0	111.0	1.5	1.133
2213	5100	6000	73.0	111.0	1.5	1.470
2313 G15	4000	4800	76.0	123.0	2.1	3.171
2214	4800	5700	78.0	116.0	1.5	1.550
2314	3700	4400	81.0	137.0	2.1	4.170
1215	4700	5600	83.0	121.0	1.5	1.341
2215	4600	5400	83.0	121.0	1.5	1.630
1315	3700	4400	86.0	147.0	2.1	3.680
2315	3500	4200	86.0	147.0	2.1	4.740
1216	4400	5200	89.0	129.0	2.0	1.646
2216	4200	5000	91.0	129.0	2.0	2.100
1217	4100	4800	94.0	139.0	2.0	2.160
1317	3300	4000	98.0	166.0	3.0	5.150
1218	3800	4500	99.0	149.0	2.0	2.500
2218	3700	4400	99.0	151.0	2.0	3.190
2318	2900	3500	103.0	177.0	3.0	7.840
1219	3600	4200	106.0	157.0	2.1	3.200
1220	3400	4000	111.0	167.0	2.1	3.700
2220	3300	4000	111.0	169.0	2.1	4.680
1320	2800	3400	113.0	201.0	3.0	8.700
1222	3100	3700	121.0	187.0	2.1	5.320

* These are the speed limits according to the SNR concept (see pages 85 to 87).

SNR

Double-row self-aligning ball bearings *(continued)*

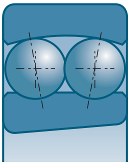




d1 mm	References	Sleeves References	d mm	D mm	B mm	C1 mm	C 10^3N	C_0 10^3N	rpm*	rpm*
20	1205 K	H205	25	52	15		11.90	3.30	12000	15000
	2205 K	H305	25	52	18		12.20	3.45	12000	14000
	1305 KG15	H305	25	62	17		18.00	5.00	10000	12000
	2305 KG15	H2305	25	62	24		24.40	6.50	9400	11000
25	1206 K	H206	30	62	16		15.40	4.70	10000	12000
	2206 K	H306	30	62	20		15.00	4.60	10000	12000
	1306 K	H306	30	72	19		21.30	6.30	8600	10000
	2306 K	H2306	30	72	27		30.50	8.70	8100	9000
30	1207 K	H207	35	72	17		15.60	5.10	9000	10000
	2207 K	H307	35	72	23		21.20	6.70	8800	10000
	1307 KG15	H307	35	80	21		25.00	7.90	7400	9000
	2307 KG15	H2307	35	80	31		39.50	11.10	7200	8600
35	1208 K	H208	40	80	18		19.00	6.50	7900	9400
	2208 KG15	H308	40	80	23		31.50	9.50	7700	9200
	1308 K	H308	40	90	23		29.00	9.80	6600	8000
	2308 K	H2308	40	90	33		45.00	13.40	6400	7700
40	1209 K	H209	45	85	19		21.50	7.40	7400	8800
	2209 K	H309	45	85	23		23.00	8.20	7200	8000
	1309 K	H309	45	100	25		37.50	12.90	6000	7000
	2309 K	H2309	45	100	36		54.00	16.40	5700	6800
45	1210 K	H210	50	90	20		22.50	8.10	6900	8200
	2210 K	H310	50	90	23		23.00	8.50	6700	8000
	1310 KG15	H310	50	110	27		41.50	14.30	5400	6500
	2310 K	H2310	50	110	40		65.00	20.10	5200	6200
50	1211 K	H211	55	100	21		26.50	10.00	6100	7300
	2211 K	H311	55	100	25		26.50	9.90	6100	7200
	1311 KG15	H311	55	120	29		51.00	18.00	5000	6000
	2311 K	H2311	55	120	43		75.00	23.80	4700	5600
55	1212 KG15	H212	60	110	22		30.00	11.60	5700	6700
	2212 K	H312	60	110	28		34.00	12.50	5500	6600
	1312 K	H312	60	130	31		57.00	20.70	4600	5600
	2312 K	H2312	60	130	46		87.00	28.00	4300	5200
60	1213 K	H213	65	120	23		31.00	12.40	5200	6200
	2213 K	H313	65	120	31		43.50	16.40	5100	6000
	2313 K	H2313	65	140	48		96.00	32.50	4000	4800

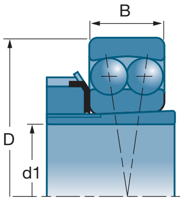
* These are the speed limits according to the SNR concept (see pages 85 to 87).

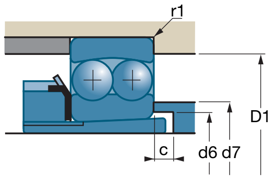
Double-row self-aligning ball bearings with tapered bore with adapter sleeve



References	Sleeves References	e	Y $\frac{Fa}{Fr} \leq e$	Y $\frac{Fa}{Fr} > e$	Yo	d7 max mm	d6 min mm	c mm	D1 max mm	r1 max mm	kg
1205 K	H205	0.27	2.3	3.6	2.4	32	28	5	47	1.0	0.139
2205 K	H305	0.42	1.5	2.4	1.6	33	28	5	46	1.0	0.164
1305 KG15	H305	0.27	2.3	3.6	2.4	37	28	6	55	1.1	0.280
2305 KG15	H2305	0.48	1.3	2.0	1.4	36	30	5	55	1.1	0.328
1206 K	H206	0.24	2.6	4.0	2.7	39	33	5	57	1.0	0.220
2206 K	H306	0.38	1.7	2.6	1.7	40	33	5	56	1.0	0.260
1306 K	H306	0.26	2.4	3.8	2.4	43	33	6	65	1.5	0.408
2306 K	H2306	0.43	1.4	2.3	1.5	43	35	5	65	1.1	0.500
1207 K	H207	0.22	2.9	4.5	3.0	46	38	5	65	1.1	0.322
2207 K	H307	0.36	1.8	2.7	1.9	47	39	5	65	1.1	0.401
1307 KG15	H307	0.24	2.6	4.0	2.7	51	39	8	72	1.5	0.510
2307 KG15	H2307	0.46	1.4	2.1	1.4	48	40	5	71	1.5	0.680
1208 K	H208	0.21	2.9	4.6	3.1	53	43	5	73	1.1	0.417
2208 KG15	H308	0.25	2.6	4.0	2.7	53	44	5	73	1.1	0.550
1308 K	H308	0.24	2.6	4.0	2.8	57	44	5	82	1.5	0.715
2308 K	H2308	0.44	1.5	2.2	1.5	55	45	5	81	1.5	0.930
1209 K	H209	0.21	2.9	4.6	3.1	57	48	5	78	1.1	0.465
2209 K	H309	0.29	2.1	3.3	2.2	58	50	8	78	1.1	0.550
1309 K	H309	0.24	2.6	4.0	2.7	63	50	5	92	1.5	0.959
2309 K	H2309	0.44	1.5	2.2	1.5	62	50	5	91	1.5	1.250
1210 K	H210	0.19	3.3	5.1	3.5	61	53	5	83	1.1	0.525
2210 K	H310	0.27	2.3	3.6	2.4	63	55	10	83	1.1	0.584
1310 KG15	H310	0.24	2.6	4.1	2.8	69	55	5	99	2.0	1.200
2310 K	H2310	0.44	1.5	2.2	1.5	67	56	5	99	2.0	1.650
1211 K	H211	0.19	3.4	5.2	3.5	68	60	6	92	1.5	0.697
2211 K	H311	0.27	2.3	3.6	2.3	70	60	10	91	1.5	0.773
1311 KG15	H311	0.23	2.8	4.3	2.8	76	60	6	109	2.0	1.550
2311 K	H2311	0.44	1.5	2.2	1.5	74	61	6	109	2.0	2.260
1212 KG15	H212	0.18	3.6	5.5	3.6	76	64	5	102	1.5	0.890
2212 K	H312	0.27	2.3	3.6	2.3	77	65	8	101	1.5	1.079
1312 K	H312	0.23	2.8	4.3	2.8	85	65	5	117	2.1	1.952
2312 K	H2312	0.4	1.6	2.5	1.6	75	66	5	117	2.1	2.600
1213 K	H213	0.18	3.6	5.5	3.6	84	70	5	111	1.5	1.124
2213 K	H313	0.27	2.3	3.6	2.3	83	70	8	111	1.5	1.419
2313 K	H2313	0.4	1.6	2.5	1.6	88	72	5	127	2.1	3.170

Double-row self-aligning ball bearings *(continued)*

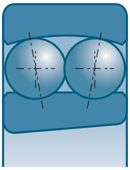




d1		Sleeves	d	D	B	C1	C	C_0		
mm	References	References	mm	mm	mm	mm	10^3N	10^3N	rpm*	rpm*
65	1215K	H215	75	130	25		39.00	15.50	4700	5600
	2215K	H315	75	130	31		44.50	17.90	4500	5400
	1315K	H315	75	160	37		79.00	30.00	3800	4500
	2315K	H2315	75	160	55		123.00	42.50	3500	4200
70	1216K	H216	80	140	26		40.00	16.90	4400	5200
	2216K	H316	80	140	33		49.00	20.00	4200	5100
75	1217K	H217	85	150	28		49.00	20.40	4100	4800
	1317K	H317	85	180	41		94.00	37.00	3300	4000
80	1218K	H218	90	160	30		57.00	23.50	3800	4600
	2218K	H318	90	160	40		69.00	28.50	3700	4000
	2318K	H2318	90	190	64		149.00	58.00	2900	3000
85	1219K	H219	95	170	32		64.00	27.00	3600	4300
90	1220K	H220	100	180	34		69.00	29.50	3400	4000
	2220K	H320	100	180	46		96.00	40.50	3300	4000
	1320K	H320	100	215	47	2.5	143.00	58.00	2800	3400
100	1222K	H222	110	200	38		88.00	38.50	3100	3700

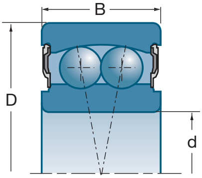
* These are the speed limits according to the SNR concept (see pages 85 to 87).

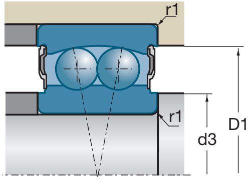
Double-row self-aligning ball bearings with tapered bore with adapter sleeve *(continued)*



References	Sleeves References	e	Y: Fa/Fr ≤ e	Y: Fa/Fr > e	Yo	d7 max (mm)	d6 min (mm)	c (mm)	D1 max (mm)	r1 max (mm)	kg
1215K	H215	0.18	3.6	5.5	3.6	92	80	5	121	1.5	1.324
2215K	H315	0.25	2.5	3.8	2.5	93	80	12	121	1.5	1.600
1315K	H315	0.23	2.8	4.3	2.8	102	80	5	147	2.1	3.690
2315K	H2315	0.4	1.6	2.5	1.6	101	82	5	147	2.1	4.700
1216K	H216	0.18	3.6	5.5	3.6	101	85	5	129	2.0	1.630
2216K	H316	0.25	2.5	3.8	2.5	100	85	12	129	2.0	2.100
1217K	H217	0.18	3.6	5.5	3.6	105	90	6	139	2.0	2.029
1317K	H317	0.23	2.8	4.3	2.8	115	91	6	166	3.0	5.150
1218K	H218	0.18	3.6	5.5	3.6	110	95	6	149	2.0	2.500
2218K	H318	0.27	2.4	3.7	2.5	112.3	96	10	151	2.0	3.190
2318K	H2318	0.37	1.7	2.6	1.8	112	100	7	177	3.0	7.840
1219K	H219	0.18	3.6	5.5	3.6	118	100	7	157	2.1	3.200
1220K	H220	0.18	3.6	5.5	3.6	125	106	7	167	2.1	3.790
2220K	H320	0.26	2.4	3.7	2.5	120	108	8	169	2.1	4.680
1320K	H320	0.23	2.8	4.3	2.8	135	108	7	201	3.0	8.300
1222K	H222	0.18	3.6	5.5	3.6	139	116	7	187	2.1	5.320

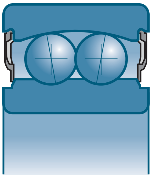
Double-row self-aligning ball bearings *(continued)*

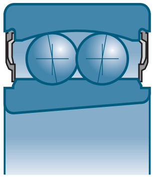




d	References	D	B	C	C_0	e	Y $\frac{Fa}{Fr} \le e$	Y $\frac{Fa}{Fr} > e$	Yo
mm	References	mm	mm	10^3N	10^3N				
12	2201 EEG15	32	14	5.6	1.26	0.31	2	3.1	2
15	2202 EEG15	35	14	7.5	1.75	0.31	2	3.1	2
17	2203 EEG15 2303 EEG14	40 47	16 19	7.9 12.5	2 3.2	0.33 0.32	1.9 1.9	3 3	2 2
20	2204 EEG15 2204 KEEG15 2304 EEG15	47 52	18 21	9.9 12.4	2.7 3.4	0.28 0.29	2.2 2.2	3.5 3.3	2.3 2.3
25	2205 EEG15 2205 KEEG15 2305 EEG15	52 62	18 24	12.1 18	3.3 5	0.27 0.28	2.4 2.3	3.7 3.5	2.5 2.4
30	2206 EEG15 2206 KEEG15 2306 EEG15	62 72	20 27	15.7 21.3	4.7 6.3	0.25 0.26	2.5 2.4	3.9 3.7	2.7 2.5
35	2207 EEG15 2207 KEEG15 2307 EEG15	72 80	23 31	15.8 25	5.2 7.9	0.22 0.26	2.8 2.5	4.3 3.8	2.9 2.6
40	2208 EEG15 2208 KEEG15 2308 EEG15	80 90	23 33	19.2 29.5	6.5 9.8	0.22 0.25	2.9 2.5	4.5 3.9	3 2.6
45	2209 EEG15 2209 KEEG15 2309 EEG15	85 100	23 36	21.8 38	7.4 12.9	0.21 0.25	3 2.5	4.7 3.9	3.2 2.6
50	2210 EEG15 2210 KEEG15 2310 EEG15	90 110	23 40	22.7 41.5	8.1 14.3	0.2 0.24	3.2 2.6	4.9 4	3.3 2.7
55	2211 EEG15 2211 KEEG15	100	25	27	10	0.27	2.3	3.6	2.3
60	2212 EEG15	110	28	30	11.6	0.18	3.5	5.4	3.6

Double-row self-aligning ball bearings sealed



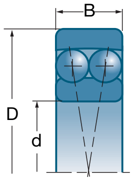


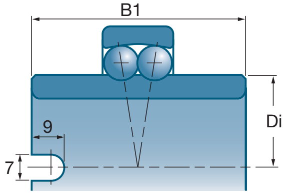
References	rpm*	d3 min mm	D1 max mm	r1 max mm	kg
2201 EEG15	17000	15	28.0	0.6	0.060
2202 EEG15	14000	19	31.0	0.6	0.070
2203 EEG15	12000	21	36.0	0.6	0.103
2303 EEG14	9800	22	42.0	1.0	0.179
2204 EEG15 2204 KEEG15	11000	25	42.0	1.0	0.157
2304 EEG15	8500	26	45.5	1.1	0.243
2205 EEG15 2205 KEEG15	9200	30	47.0	1.0	0.174
2305 EEG15	7100	31.5	55.5	1.1	0.385
2206 EEG15 2206 KEEG15	7700	35	57.0	1.0	0.282
2306 EEG15	6000	36.5	65.5	1.1	0.540
2207 EEG15 2207 KEEG15	6600	41.5	65.5	1.1	0.430
2307 EEG15	5300	43	71.0	1.5	0.730
2208 EEG15 2208 KEEG15	5900	46.5	73.5	1.1	0.545
2308 EEG15	4800	48	82.0	1.5	0.990
2209 EEG15 2209 KEEG15	5400	51.5	78.5	1.1	0.579
2309 EEG15	4300	53	92.0	1.5	1.400
2210 EEG15 2210 KEEG15	5000	56.5	83.5	1.1	0.630
2310 EEG15	3900	59	101.0	2.0	1.780
2211 EEG15 2211 KEEG15	6000	63	91.0	1.5	0.790
2212 EEG15	3600	68	101.0	1.5	1.160

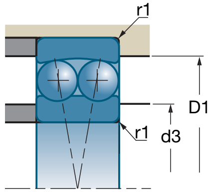
* These are the speed limits according to the SNR concept (see pages 85 to 87).

SNR

Double-row self-aligning ball bearings *(continued)*







d		D	B1	B	C	C0	e	Y Fa/Fr ≤ e	Y Fa/Fr > e	Yo
mm	References	mm	mm	mm	10^3N	10^3N				
20	11204 G15	47	40	14.0	9.9	2.7	0.28	2.2	3.4	2.2
25	11205 G15	52	44	15.0	12.1	3.3	0.28	2.2	3.4	2.2
	11305 G15	62	48	17.0	18.0	5.0	0.28	2.2	3.4	2.2
30	11206 G15	62	48	16.0	15.7	4.7	0.23	2.7	4.2	2.7
	11306 G15	72	52	19.0	21.3	6.3	0.26	2.4	3.8	2.4
35	11207 G15	72	52	17.0	15.8	5.2	0.23	2.7	4.2	2.7
40	11208 G15	80	56	18.0	19.2	6.5	0.21	2.9	4.5	2.9
	11308 G15	90	58	23.0	29.5	9.8	0.26	2.4	3.8	2.4
45	11209 G15	85	58	19.0	21.8	7.4	0.21	2.9	4.5	2.9
	11309	100	60	38.0	38.0	12.9	0.26	2.4	3.8	2.4
50	11210 G15	90	58	20.0	22.7	8.1	0.20	3.2	4.9	3.2
	11310	110	62	43.5	42.5	14.3	0.20	2.8	4.3	2.8
55	11211 G15	100	60	21.0	27.0	10.0	0.20	3.2	4.9	3.2
60	11212 G15	110	62	22.0	30.0	11.6	0.18	3.6	5.5	3.6

Double-row self-aligning ball bearings with wide inner ring

References	rpm*	rpm*	Di min mm	D1 max mm	r1 max mm	kg
11204 G15	9400	12000	29.2	42	1	0.180
11205 G15	8100	10000	33.3	47	1	0.220
11305 G15	6700	8300	38.0	55	1	0.410
11206 G15	6900	8600	40.1	57	1	0.350
11306 G15	5700	7000	45.0	65	1	0.610
11207 G15	5900	7400	47.7	65	1	0.540
11208 G15	5200	6500	54.0	73	1	0.720
11308 G15	4400	5500	57.7	82	1	1.080
11209 G15	4800	6100	57.7	78	1	0.770
11309	4000	4900	63.9	92	1	1.380
11210 G15	4500	5600	62.7	83	1	0.850
11310	3600	4500	70.3	99	1.1	1.720
11211 G15	4000	5000	70.3	92	1.5	1.130
11212 G15	3600	4500	78.0	102	1.5	1.500

* These are the speed limits according to the SNR concept (see pages 85 to 87).

Cylindrical roller bearings

SNR

Cylindrical roller bearings

Definition and capabilities

Definition

Cylindrical roller bearings offer excellent resistance to instantaneous overloads and shocks.

They simplify assembly thanks to their detachable elements and allow, for certain types, axial displacement or low axial load, for other types.

Cages

The standard cage for these bearings is the polyamide cage (suffix GI5) which allows bearing operating temperatures of 120°C or 248°F (150° or 302°F peak).

The standard cage for series 4 is in pressed steel.

The machined brass cage is available on option. Large-dimension bearings are equipped with a machined brass cage (suffix M). For special applications in which the synthetic material cage is unacceptable, a metal cage can be provided on request.

Capabilities

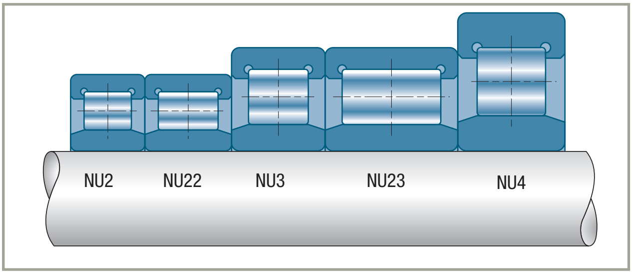
Loads and speeds

Cylindrical roller bearings are designed to:
- withstand radial loads
- withstand moderate axial loads if the position of the shoulders on the rings allows them
- accept high speeds of rotation

Misalignment

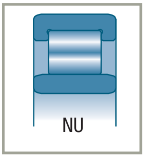
Cylindrical roller bearings accept misalignment of about 0.06° thanks to the correction on the roller surface profiles.

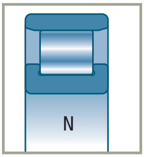
Series

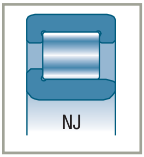


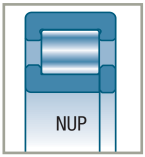
Variants

Types of bearings









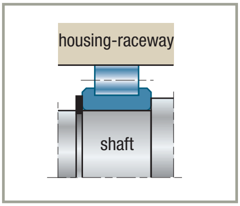
Groove for snap ring

These bearings can be supplied on request with a groove in the outer ring (N) and snap ring (NR) per ISO 464 standard.

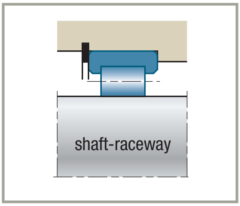
The dimensions of the grooves and rings are therefore the same as those defined for the ball bearings of the same dimension series.

Incomplete bearings

Type RN: type N bearing without outer ring.



Type RNU: type NU bearing without inner ring.



In both cases, the raceway corresponding to the absent ring is integrally machined in the mechanism. The geometry, surface condition and hardness of the part forming the raceway must meet precise specifications. Consult SNR.

Cylindrical roller bearings *(continued)*

Tolerances and clearances

Tolerances

These bearings are supplied in standard precision with tolerances in compliance with ISO 492 Standard.

SNR can supply bearings with tightened tolerances on one or several characteristics on request (bore, outer diameter, precision of rotation).

Clearances

Internal radial clearance

The bearing is supplied matched (in conformity with ISO 5753 Standard), that is to say that the detachable elements

(outer ring and inner ring) are associated so that the clearance is in the "matched" bearing category.

If one of the detachable elements is replaced by the complementary element of another bearing, the clearance enters the "interchangeable" bearing category, with a higher tolerance.

Order of size of recommended residual clearance after fitting:	$J_{rm} = 4\ d^{1/2}\ 10^{-3}$

Series N..2-N..3-N..4-N..22-N..23

Bore diameter	Group 2		Group N		Group 3		Group 4		Group 5	
d (mm)	min	max	min	max	min	max	min	max	min	max
d≤ 10	0	25	20	45	35	60	50	75	–	–
10 <d≤ 24	0	25	20	45	35	60	50	75	65	90
24 <d≤ 30	0	25	20	45	35	60	50	75	70	95
30 <d≤ 40	5	30	25	50	45	70	60	85	80	105
40 <d≤ 50	5	35	30	60	50	80	70	100	95	125
50 <d≤ 65	10	40	40	70	60	90	80	110	110	140
65 <d≤ 80	10	45	40	75	65	100	90	125	130	165
80 <d≤ 100	15	50	50	85	75	110	105	140	155	190
100 <d≤ 120	15	55	50	90	85	125	125	165	180	220
120 <d≤ 140	15	60	60	105	100	145	145	190	200	245
140 <d≤ 160	20	70	70	120	115	165	165	215	225	275
160 <d≤ 180	25	75	75	125	120	170	170	220	250	300
180 <d≤ 200	35	90	90	145	140	195	195	250	275	330
200 <d≤ 225	45	105	105	165	160	220	220	280	305	365
225 <d≤ 250	45	110	110	175	170	235	235	300	330	395
250 <d≤ 280	55	125	125	195	190	260	260	330	370	440
280 <d≤ 315	55	130	130	205	200	275	275	350	410	485
315 <d≤ 355	65	145	145	225	225	305	305	385	455	535
355 <d≤ 400	100	190	190	280	280	370	370	460	510	600
400 <d≤ 450	110	210	210	310	310	410	410	510	565	665
450 <d≤ 500	110	220	220	330	330	440	440	550	625	735

Value in µm

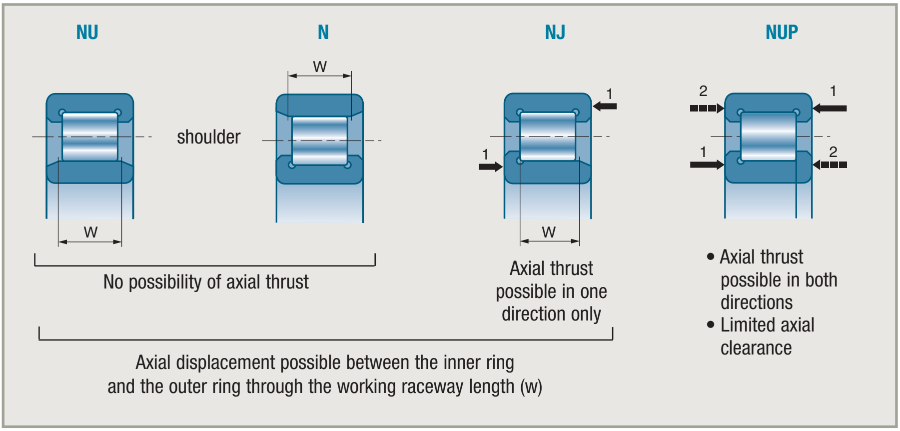
Cylindrical roller bearings *(continued)*

Axial clearance

The axial clearance of cylindrical roller bearings is only specified for type NUP bearings. It is limited by the 4 internal shoulders. It is in the range of 0.1 mm.

Bearings of types N, NU or NJ allow axial displacement between the inner ring and the outer ring. It is defined by the difference between the working length (W) of the ring raceways and the effective length of the rollers.

For types N or NU, it is in the range of 2 mm for bearings with bore diameters below 80 mm in series 2, and below 50 mm in series 3. For the largest bearings it is of the order of 3 mm. For all type NJ bearings the possible axial displacement is half the values indicated above.



Design criteria

Bearing life

Cylindrical roller bearings are only designed to withstand radial loads F_r.

However, these bearings can accept an axial load F_a if their inner and outer rings are shouldered.

If the ratio F_a/F_r is less than 0.1, only the radial load is taken into consideration.

If the ratio F_a/F_r is greater than 0.1, the friction energy generated on the shoulders by the axial load and the wear that can result from this may be so high that bearing performance is drastically modified.

Consult SNR to evaluate the ratio according to the operating conditions (speed, lubrication, etc.).

Maximum static radial capacity

This is given by the basic static capacity C_0.

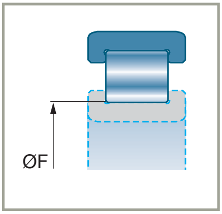
Installation/assembly criteria

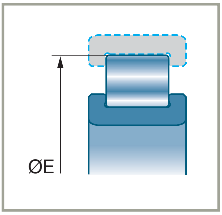
As the rings of cylindrical roller bearings are separable, they are totally interchangeable within the clearance tolerance limits.

They can also be interchanged with bearings of the same reference from other manufacturers. The dimension above the rollers (E) or below the rollers (F) and the tolerances are indicated in the "Tables of Product Characteristics" in conformity with DIN 5412 Standard.

However, since the raceway profile corrections, quality of steel and surface conditions are specific to each manufacturer, the performance of such assemblies may be significantly changed in a replacement, therefore they should be avoided.

Caution: dimensions E and F of the new generation of cylindrical roller bearings (suffix E) differ from those of the previous generation.

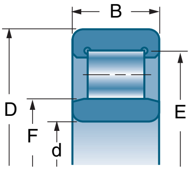


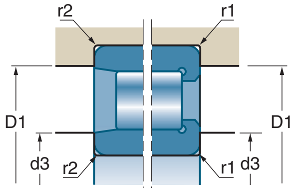


Suffixes

E	Optimised capacity bearing
G15	Polyamide cage
J	Clearance. The first figure designates the ISO clearance category, the second designates the normal precision class (0). Equivalence: J20 = C2, J30 = C3, J40 = C4, J50 = C5
M	Machined brass cage centred on the rollers
N	Outer ring with groove for snap ring
NR	Outer ring with groove and snap ring fitted

Cylindrical roller bearings *(continued)*

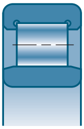




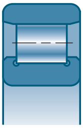
d		D	B	F	E	C	C_0
mm	References	mm	mm	mm	mm	10^3N	10^3N
15	NJ 202 EG15	35	11	19.3	30.3	13.20	10.8
	NU 202 EG15	35	11	19.3	30.3	13.2	10.8
17	NJ 203 EG15	40	12	22.1	35.1	18	15.1
	NU 203 EG15	40	12	22.1	35.1	18	15.1
	NJ 2203 EG15	40	16	22.1	35.1	24.5	22.4
	NU 2203 EG15	40	16	22.1	35.1	24.5	22.4
	NJ 303 EG15	47	14	24.2	40.2	25.5	21.2
	NU 303 EG15	47	14	24.2	40.2	25.5	21.2
20	N 204 EG15	47	14	26.5	41.5	28	25.5
	NJ 204 EG15	47	14	26.5	41.5	28	25.5
	NU 204 EG15	47	14	26.5	41.5	28	25.5
	NUP 204 EG15	47	14	26.5	41.5	28	25.5
	NJ 2204 EG15	47	18	26.5	41.5	33	31.5
	NU 2204 EG15	47	18	26.5	41.5	33	31.5
	N 304 EG15	52	15	27.5	45.5	31.5	27
	NJ 304 EG15	52	15	27.5	45.5	31.5	27
	NU 304 EG15	52	15	27.5	45.5	31.5	27
	NJ 2304 EG15	52	21	27.5	45.5	42	39
	NU 2304 EG15	52	21	27.5	45.5	42	39
25	N 205 EG15	52	15	31.5	46.5	30	28.5
	NJ 205 EG15	52	15	31.5	46.5	30	28.5
	NU 205 EG15	52	15	31.5	46.5	30	28.5
	NUP 205 EG15	52	15	31.5	46.5	30	28.5
	NJ 2205 EG15	52	18	31.5	46.5	36.5	35.5
	NU 2205 EG15	52	18	31.5	46.5	36.5	35.5
	NUP 2205 EG15	52	18	31.5	46.5	36.5	35.5
	N 305 EG15	62	17	34.0	54.0	42.5	37.5
	NJ 305 EG15	62	17	34.0	54.0	41.5	37.5
	NU 305 EG15	62	17	34.0	54.0	41.5	37.5
	NUP 305 EG15	62	17	34.0	54.0	41.5	37.5
	NJ 2305 EG15	62	24	34.0	54.0	57	56
	NU 2305 EG15	62	24	34.0	54.0	58	56
30	N 206 EG15	62	16	37.5	55.5	39	37.5
	NJ 206 EG15	62	16	37.5	55.5	39	37.5
	NU 206 EG15	62	16	37.5	55.5	39	37.5
	NUP 206 EG15	62	16	37.5	55.5	39	37.5
	NJ 2206 EG15	62	20	37.5	55.5	50	50
	NU 2206 EG15	62	20	37.5	55.5	49	50

Characteristics

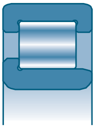
Single-row cylindrical roller bearings



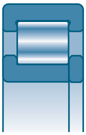
NU



N



NJ

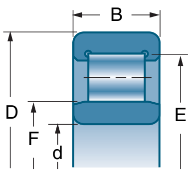


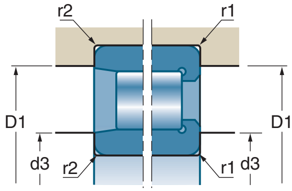
NUP

References	rpm*	rpm*	d3 max mm	D1 min mm	r1 max mm	r2 max mm	kg
NJ 202 EG15	17000	21000	17	30.8	0.6	0.3	0.049
NU 202 EG15	17000	21000	18	30.8	0.6	0.3	0.050
NJ 203 EG15	15000	18000	20.7	34.1	0.6	0.3	0.070
NU 203 EG15	15000	18000	20.7	34.1	0.6	0.3	0.069
NJ 2203 EG15	15000	18000	20	35	0.6	0.3	0.053
NU 2203 EG15	15000	18000	19	34	0.6	0.3	0.051
NJ 303 EG15	13000	15000	22	41	1	0.6	0.125
NU 303 EG15	13000	15000	21	39	1	0.6	0.122
N 204 EG15	12000	15000	24.2	41.4	1	0.6	0.110
NJ 204 EG15	12000	15000	24.2	41.4	1	0.6	0.117
NU 204 EG15	12000	15000	24.2	41.4	1	0.6	0.114
NUP 204 EG15	12000	15000	24.2	41.4	1	0.6	0.119
NJ 2204 EG15	12000	15000	24.2	41.4	1	0.6	0.150
NU 2204 EG15	12000	15000	24.2	41.4	1	0.6	0.146
N 304 EG15	11000	13000	24.2	45	1.1	0.6	0.151
NJ 304 EG15	11000	13000	24.2	45	1.1	0.6	0.156
NU 304 EG15	11000	13000	24.2	45	1.1	0.6	0.140
NJ 2304 EG15	10000	13000	24.2	45	1.1	0.6	0.220
NU 2304 EG15	10000	13000	24.2	45	1.1	0.6	0.215
N 205 EG15	11000	13000	29.2	46.4	1	0.6	0.135
NJ 205 EG15	11000	13000	29.2	46.4	1	0.6	0.140
NU 205 EG15	11000	13000	29.2	46.4	1	0.6	0.137
NUP 205 EG15	11000	13000	29.2	46.4	1	0.6	0.145
NJ 2205 EG15	11000	13000	29.2	46.4	1	0.6	0.164
NU 2205 EG15	11000	13000	29.2	46.4	1	0.6	0.164
NUP 2205 EG15	11000	13000	29.2	46.4	1	0.6	0.174
N 305 EG15	9500	11000	32	55	1	1	0.242
NJ 305 EG15	9500	11000	32	55	1.1	1.1	0.250
NU 305 EG15	9500	11000	32	55	1.1	1.1	0.245
NUP 305 EG15	9500	11000	32	55	1.1	1.1	0.256
NJ 2305 EG15	9000	11000	30	55	1.1	1.1	0.347
NU 2305 EG15	9000	11000	32	55	1.1	1.1	0.349
N 206 EG15	9400	11000	34.2	57	1	0.6	0.210
NJ 206 EG15	9400	11000	34.2	56.4	1	0.6	0.213
NU 206 EG15	9400	11000	34.2	56.4	1	0.6	0.213
NUP 206 EG15	9400	11000	34.2	56.4	1	0.6	0.220
NJ 2206 EG15	9400	11000	34.2	56.4	1	0.6	0.261
NU 2206 EG15	9400	11000	34.2	56.4	1	0.6	0.355

* These are the speed limits according to the SNR concept (see pages 85 to 87).

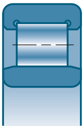
Cylindrical roller bearings *(continued)*



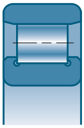


d		D	B	F	E	C	C_0
mm	References	mm	mm	mm	mm	10^3N	10^3N
30	NUP 2206 EG15	62	20	37.5	55.5	50	50
	N 306 EG15	72	19	40.5	62.5	55	50
	NJ 306 EG15	72	19	40.5	62.5	53	50
	NU 306 EG15	72	19	40.5	62.5	53	50
	NUP 306 EG15	72	19	40.5	62.5	53	50
	NJ 2306 EG15	72	27	40.5	62.5	77	78
	NU 2306 EG15	72	27	40.5	62.5	77	78
35	N 207 EG15	72	17	44.0	64.0	50	50
	NJ 207 EG15	72	17	44.0	64.0	50	50
	NU 207 EG15	72	17	44.0	64.0	50	50
	NUP 207 EG15	72	17	44.0	64.0	50	50
	NJ 2207 EG15	72	23	44.0	64.0	62	65
	NU 2207 EG15	72	23	44.0	64.0	62	65
	NUP 2207 EG15	72	23	44.0	64.0	62	65
	N 307 EG15	80	21	46.2	70.2	67	65
	NJ 307 EG15	80	21	46.2	70.2	68	65
	NU 307 EG15	80	21	46.2	70.2	67	65
	NUP 307 EG15	80	21	46.2	70.2	67	65
	NJ 2307 EG15	80	31	46.2	70.2	92	100
	NU 2307 EG15	80	31	46.2	70.2	96	101
	NJ 407	100	25	53.0	83.0	79	71
	NU 407	100	25	53.0	83.0	79	71
40	N 208 EG15	80	18	49.5	71.5	56	55
	NJ 208 EG15	80	18	49.5	71.5	56	55
	NU 208 EG15	80	18	49.5	71.5	56	55
	NUP 208 EG15	80	18	49.5	71.5	56	55
	NJ 2208 EG15	80	23	49.5	71.5	74	78
	NU 2208 EG15	80	23	49.5	71.5	72	78
	NUP 2208 EG15	80	23	49.5	71.5	72	78
	N 308 EG15	90	23	52.0	80.0	84	80
	NJ 308 EG15	90	23	52.0	80.0	82	80
	NU 308 EG15	90	23	52.0	80.0	84	80
	NUP 308 EG15	90	23	52.0	80.0	82	80
	NJ 2308 EG15	90	33	52.0	80.0	113	121
	NU 2308 EG15	90	33	52.0	80.0	113	121
	NJ 408	110	27	58.0	92.0	99	90
	NU 408	110	27	58.0	92.0	99	90
45	N 209 EG15	85	19	54.5	76.5	65	66
	NJ 209 EG15	85	19	54.5	76.5	65	66
	NU 209 EG15	85	19	54.5	76.5	63	66

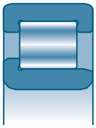
Single-row cylindrical roller bearings *(continued)*



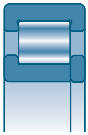
NU



N



NJ

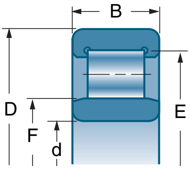


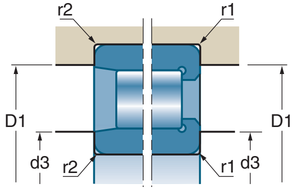
NUP

References	rpm*	rpm*	d3 max mm	D1 min mm	r1 max mm	r2 max mm	kg
NUP 2206 EG15	9500	11000	34.2	56.4	1	0.6	0.310
N 306 EG15	8100	9700	37	65	1	1	0.366
NJ 306 EG15	8100	9700	37	65	1.1	1.1	0.376
NU 306 EG15	8100	9700	37	65	1.1	1.1	0.368
NUP 306 EG15	8100	9700	37	65	1.1	1.1	0.385
NJ 2306 EG15	7700	9700	37	65	1.1	1.1	0.540
NU 2306 EG15	7700	9700	37	65	1.1	1.1	0.529
N 207 EG15	8100	9800	45.5	65.8	1.1	0.6	0.300
NJ 207 EG15	8100	9800	39.2	65	1.1	0.6	0.309
NU 207 EG15	8100	9800	39.2	65	1.1	0.6	0.303
NUP 207 EG15	8100	9800	39.2	65	1.1	0.6	0.317
NJ 2207 EG15	8100	9800	39.2	65	1.1	0.6	0.416
NU 2207 EG15	8100	9800	39.2	65	1.1	0.6	0.406
NUP 2207 EG15	8100	9800	39.2	65	1.1	0.6	0.427
N 307 EG15	7200	8500	44	71	1.5	1	0.486
NJ 307 EG15	7200	8500	44	71	1.5	1.1	0.496
NU 307 EG15	7200	8500	44	71	1.5	1.1	0.485
NUP 307 EG15	7200	8500	42	71	1.5	1.1	0.506
NJ 2307 EG15	6800	8500	42	71	1.5	1.1	0.736
NU 2307 EG15	6800	8500	42	71	1.5	1.1	0.723
NJ 407	6300	7600	46	89	1.5	1.5	1.030
NU 407	6300	7600	46	89	1.5	1.5	1.030
N 208 EG15	7200	8700	47	73	1	1	0.380
NJ 208 EG15	7200	8700	47	73	1.1	1.1	0.389
NU 208 EG15	7200	8700	47	73	1.1	1.1	0.379
NUP 208 EG15	7200	8700	47	73	1.1	1.1	0.399
NJ 2208 EG15	7200	8700	47	73	1.1	1.1	0.504
NU 2208 EG15	7200	8700	46	73	1.1	1.1	0.492
NUP 2208 EG15	7200	8700	47	73	1.1	1.1	0.518
N 308 EG15	6300	7500	49	81	1.5	1.5	0.660
NJ 308 EG15	6300	7500	49	81	1.5	1.5	0.674
NU 308 EG15	6300	7500	49	81	1.5	1.5	0.659
NUP 308 EG15	6300	7500	49	81	1.5	1.5	0.688
NJ 2308 EG15	6000	7500	47.5	81	1.5	1.5	0.978
NU 2308 EG15	6000	7500	49	81	1.5	1.5	0.958
NJ 408	5700	6900	53	97	2	2	1.310
NU 408	5700	6900	53	97	2	2	1.310
N 209 EG15	6700	8000	52	78	1	1	0.445
NJ 209 EG15	6700	8000	52	78	1.1	1.1	0.445
NU 209 EG15	6700	8000	52	78	1.1	1.1	0.445

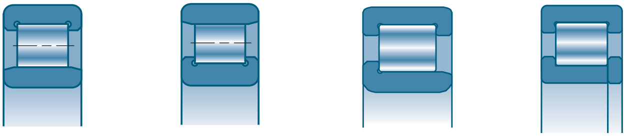
* These are the speed limits according to the SNR concept (see pages 85 to 87).

Cylindrical roller bearings *(continued)*





d		D	B	F	E	C	C_0
mm	References	mm	mm	mm	mm	10^3N	10^3N
45	NUP 209 EG15	85	19	54.5	76.5	63	66
	NJ 2209 EG15	85	23	54.5	76.5	76	85
	NU 2209 EG15	85	23	54.5	76.5	76	85
	NUP 2209 EG15	85	23	54.5	76.5	76	85
	N 309 EG15	100	25	58.5	88.5	102	101
	NJ 309 EG15	100	25	58.5	88.5	99	101
	NU 309 EG15	100	25	58.5	88.5	99	101
	NUP 309 EG15	100	25	58.5	88.5	99	101
	NJ 2309 EG15	100	36	58.5	88.5	139	156
	NU 2309 EG15	100	36	58.5	88.5	143	156
	NJ 409	120	29	64.5	100.5	111	103
	NU 409	120	29	64.5	100.5	111	103
50	N 210 EG15	90	20	59.5	81.5	68	72
	NJ 210 EG15	90	20	59.5	81.5	66	72
	NU 210 EG15	90	20	59.5	81.5	66	72
	NUP 210 EG15	90	20	59.5	81.5	68	72
	NJ 2210 EG15	90	23	59.5	81.5	80	92
	NU 2210 EG15	90	23	59.5	81.5	80	92
	NUP 2210 EG15	90	23	59.5	81.5	80	92
	N 310 EG15	110	27	65.0	97.0	112	116
	NJ 310 EG15	110	27	65.0	97.0	112	116
	NU 310 EG15	110	27	65.0	97.0	112	116
	NUP 310 EG15	110	27	65.0	97.0	112	116
	NJ 2310 EG15	110	40	65.0	97.0	169	189
	NU 2310 EG15	110	40	65.0	97.0	169	189
	NJ 410	130	31	70.8	110.8	136	128
	NU 410	130	31	70.8	110.8	132	128
55	N 211 EG15	100	21	66.0	90.0	89	99
	NJ 211 EG15	100	21	66.0	90.0	86	99
	NU 211 EG15	100	21	66.0	90.0	86	99
	NUP 211 EG15	100	21	66.0	90.0	86	99
	NJ 2211 EG15	100	25	66.0	90.0	104	122
	NU 2211 EG15	100	25	66.0	90.0	104	122
	NUP 2211 EG15	100	25	66.0	90.0	101	122
	N 311 EG15	120	29	70.5	106.5	142	144
	NJ 311 EG15	120	29	70.5	106.5	142	144
	NU 311 EG15	120	29	70.5	106.5	138	144
	NUP 311 EG15	120	29	70.5	106.5	142	144
	NJ 2311 EG15	120	43	70.5	106.5	207	235
	NU 2311 EG15	120	43	70.5	106.5	202	230

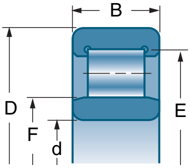


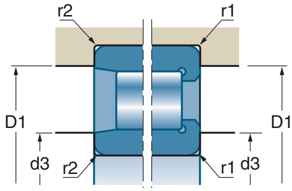
NU N NJ NUP

References	rpm*	rpm*	d3 max mm	D1 min mm	r1 max mm	r2 max mm	kg
NUP 209 EG15	6700	8000	52	78	1.1	1.1	0.457
NJ 2209 EG15	6700	8000	50	78	1.1	1.1	0.530
NU 2209 EG15	6700	8000	52	78	1.1	1.1	0.532
NUP 2209 EG15	6700	8000	52	78	1.1	1.1	0.559
N 309 EG15	5700	6800	54	91	1.5	1.5	0.895
NJ 309 EG15	5700	6800	54	91	1.5	1.5	0.913
NU 309 EG15	5700	6800	54	91	1.5	1.5	0.893
NUP 309 EG15	5700	6800	54	91	1.5	1.5	0.934
NJ 2309 EG15	5400	6800	54	91	1.5	1.5	1.330
NU 2309 EG15	5400	6800	54	91	1.5	1.5	1.290
NJ 409	5200	6300	58	107	2	2	1.660
NU 409	5200	6300	58	107	2	2	1.660
N 210 EG15	6200	7500	57	83	1	1	0.490
NJ 210 EG15	6200	7500	57	83	1.1	1.1	0.503
NU 210 EG15	6200	7500	57	83	1.1	1.1	0.490
NUP 210 EG15	6200	7500	57	83	1.1	1.1	0.517
NJ 2210 EG15	6200	7500	57	83	1.1	1.1	0.586
NU 2210 EG15	6200	7500	57	83	1.1	1.1	0.575
NUP 2210 EG15	6200	7500	57	83	1.1	1.1	0.600
N 310 EG15	5100	6100	67	100	2	2	1.160
NJ 310 EG15	5100	6100	61	99	2	2	1.190
NU 310 EG15	5100	6100	61	99	2	2	1.160
NUP 310 EG15	5100	6100	61	99	2	2	1.210
NJ 2310 EG15	4900	6100	61	99	2	2	1.740
NU 2310 EG15	4900	6100	61	99	2	2	1.740
NJ 410	4600	5500	64	116	2.1	2.1	2.080
NU 410	4700	5700	64	116	2.1	2.1	2.010
N 211 EG15	5600	6700	62	91	1.5	1	0.665
NJ 211 EG15	5600	6700	62	91	1.5	1.1	0.679
NU 211 EG15	5600	6700	62	91	1.5	1.1	0.665
NUP 211 EG15	5600	6700	62	91	1.5	1.1	0.693
NJ 2211 EG15	5600	6700	62	91	1.5	1.1	0.780
NU 2211 EG15	5600	6700	62	91	1.5	1.1	0.780
NUP 2211 EG15	5600	6700	62	91	1.5	1.1	0.828
N 311 EG15	4700	5600	66	109	2	2	1.410
NJ 311 EG15	4700	5600	66	109	2	2	1.470
NU 311 EG15	4700	5600	66	109	2	2	1.480
NUP 311 EG15	4700	5600	66	109	2	2	1.470
NJ 2311 EG15	4500	5600	66	109	2	2	2.230
NU 2311 EG15	4500	5600	66	109	2	2	2.230

* These are the speed limits according to the SNR concept (see pages 85 to 87).

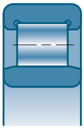
Cylindrical roller bearings *(continued)*





d	References	D	B	F	E	C	C_0
mm	References	mm	mm	mm	mm	10^3N	10^3N
60	N 212 EG15	110	22	72.0	100.0	99	106
	NJ 212 EG15	110	22	72.0	100.0	96	106
	NU 212 EG15	110	22	72.0	100.0	96	106
	NUP 212 EG15	110	22	72.0	100.0	96	106
	NJ 2212 EG15	110	28	72.0	100.0	130	155
	NU 2212 EG15	110	28	72.0	100.0	130	155
	NUP 2212 EG15	110	28	72.0	100.0	130	155
	N 312 EG15	130	31	77.0	115.0	157	162
	NJ 312 EG15	130	31	77.0	115.0	150	156
	NU 312 EG15	130	31	77.0	115.0	153	162
	NUP 312 EG15	130	31	77.0	115.0	153	162
	NJ 2312 EG15	130	46	77.0	115.0	226	265
	NU 2312 EG15	130	46	77.0	115.0	228	260
	NU 412	150	35	83.0	127.0	181	187
65	N 213 EG15	120	23	78.5	108.5	99	106
	NJ 213 EG15	120	23	78.5	108.5	110	122
	NU 213 EG15	120	23	78.5	108.5	110	122
	NUP 213 EG15	120	23	78.5	108.5	110	122
	NJ 2213 EG15	120	31	78.5	108.5	151	184
	NU 2213 EG15	120	31	78.5	108.5	151	184
	N 313 EG15	140	33	82.5	124.5	183	195
	NJ 313 EG15	140	33	82.5	124.5	183	195
	NU 313 EG15	140	33	82.5	124.5	188	195
	NJ 2313 EG15	140	48	82.5	124.5	250	290
	NU 2313 EG15	140	48	82.5	124.5	250	290
70	N 214 EG15	125	24	83.5	113.5	121	141
	NJ 214 EG15	125	24	83.5	113.5	121	141
	NU 214 EG15	125	24	83.5	113.5	121	141
	NUP 214 EG15	125	24	83.5	113.5	121	141
	NJ 2214 EG15	125	31	83.5	113.5	162	198
	NU 2214 EG15	125	31	83.5	113.5	162	198
	N 314 EG15	150	35	89.0	133.0	210	220
	NJ 314 EG15	150	35	89.0	133.0	207	226
	NU 314 EG15	150	35	89.0	133.0	207	226
	NJ 2314 EG15	150	51	89.0	133.0	275	325
	NU 2314 EG15	150	51	89.0	133.0	275	325
	NJ 414M	180	42	100.0	152.0	246	260
75	N 215 EG15	130	25	88.5	118.5	135	161
	NJ 215 EG15	130	25	88.5	118.5	133	161
	NU 215 EG15	130	25	88.5	118.5	133	161

Single-row cylindrical roller bearings *(continued)*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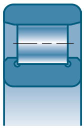
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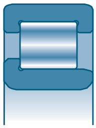
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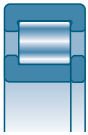
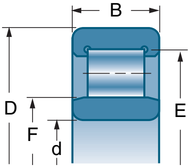
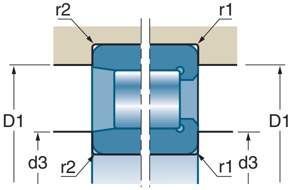

NUP

References	rpm*	rpm*	d3 max mm	D1 min mm	r1 max mm	r2 max mm	kg
N 212 EG15	5100	6100	69	101	1.5	1.5	0.825
NJ 212 EG15	5100	6100	69	101	1.5	1.5	0.845
NU 212 EG15	5100	6100	69	101	1.5	1.5	0.824
NUP 212 EG15	5100	6100	69	101	1.5	1.5	0.909
NJ 2212 EG15	5100	6100	69	101	1.5	1.5	1.100
NU 2212 EG15	5100	6100	69	101	1.5	1.5	1.080
NUP 2212 EG15	5100	6100	69	101	1.5	1.5	1.120
N 312 EG15	4300	5200	72	118	2	2	1.850
NJ 312 EG15	4400	5200	72	118	2.1	2.1	1.850
NU 312 EG15	4300	5200	72	118	2.1	2.1	1.850
NUP 312 EG15	4300	5200	72	118	2.1	2.1	1.930
NJ 2312 EG15	4100	5200	72	118	2.1	2.1	2.830
NU 2312 EG15	4300	5200	72	118	2	2	2.780
NU 412	4000	4900	74	136	2.1	2.1	3.000
N 213 EG15	5100	6100	74	111	1.5	1.5	1.050
NJ 213 EG15	4700	5600	74	111	1.5	1.5	1.050
NU 213 EG15	4700	5600	74	111	1.5	1.5	1.040
NUP 213 EG15	4700	5600	74	111	1.5	1.5	1.090
NJ 2213 EG15	4700	5600	74	111	1.5	1.5	1.460
NU 2213 EG15	4700	5600	74	111	1.5	1.5	1.430
N 313 EG15	4100	4800	77	128	2	2	2.240
NJ 313 EG15	4000	4800	77	128	2.1	2.1	2.320
NU 313 EG15	4000	4800	77	128	2.1	2.1	2.240
NJ 2313 EG15	3800	4800	77	128	2.1	2.1	3.380
NU 2313 EG15	3800	4800	77	128	2.1	2.1	3.320
N 214 EG15	4400	5300	79	116	1.5	1.5	1.159
NJ 214 EG15	4400	5300	79	116	1.5	1.5	1.180
NU 214 EG15	4400	5300	79	116	1.5	1.5	1.150
NUP 214 EG15	4400	5300	79	116	1.5	1.5	1.200
NJ 2214 EG15	4400	5300	79	116	1.5	1.5	1.520
NU 2214 EG15	4400	5300	79	116	1.5	1.5	1.520
N 314 EG15	3700	4500	82	138	2	2	2.800
NJ 314 EG15	3700	4500	82	138	2.1	2.1	2.840
NU 314 EG15	3700	4500	82	138	2.1	2.1	2.790
NJ 2314 EG15	3600	4500	82	138	2.1	2.1	4.090
NU 2314 EG15	3600	4500	82	138	2.1	2.1	4.020
NJ 414M	3400	4100	86	164	3	3	6.070
N 215 EG15	4200	5100	84	121	1.5	1.5	1.280
NJ 215 EG15	4200	5100	84	121	1.5	1.5	1.700
NU 215 EG15	4200	5100	84	121	1.5	1.5	1.270

* These are the speed limits according to the SNR concept (see pages 85 to 87).

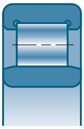
Cylindrical roller bearings *(continued)*





d		D	B	F	E	C	C_0
mm	References	mm	mm	mm	mm	10^3N	10^3N
75	NUP 215 EG15	130	25	88.5	118.5	133	161
	NJ 2215 EG15	130	31	88.5	118.5	164	211
	NU 2215 EG15	130	31	88.5	118.5	164	211
	N 315 EG15	160	37	95.0	143.0	250	265
	NJ 315 EG15	160	37	95.0	143.0	250	265
	NU 315 EG15	160	37	95.0	143.0	250	265
	NJ 2315 EG15	160	55	95.0	143.0	330	400
	NU 2315 EG15	160	55	95.0	143.0	330	400
80	N 216 EG15	140	26	95.3	127.3	146	171
	NJ 216 EG15	140	26	95.3	127.3	146	171
	NU 216 EG15	140	26	95.3	127.3	146	171
	NJ 2216 EG15	140	33	95.3	127.3	189	247
	NU 2216 EG15	140	33	95.3	127.3	189	247
	N 316 EG15	170	39	101.0	151.0	270	290
	NJ 316 EG15	170	39	101.0	151.0	270	290
	NU 316 EG15	170	39	101.0	151.0	260	290
	NUP 316 EG15	170	39	101.0	151.0	260	290
	NU 2316 EG15	170	58	101.0	151.0	360	440
85	N 217 EG15	150	28	100.5	136.5	173	201
	NJ 217 EG15	150	28	100.5	136.5	173	201
	NU 217 EG15	150	28	100.5	136.5	173	201
	NJ 2217 EG15	150	36	100.5	136.5	219	280
	NU 2217 EG15	150	36	100.5	136.5	219	280
	N 317 EM	180	41	108.0	160.0	295	325
	NJ 317 EG15	180	41	108.0	160.0	280	315
	NU 317 EG15	180	41	108.0	160.0	280	315
	NUP 317 EG15	180	41	108.0	160.0	280	315
	NU 2317 EG15	180	60	108.0	160.0	380	460
90	N 218 EG15	160	30	107.0	145.0	183	216
	NJ 218 EG15	160	30	107.0	145.0	186	224
	NU 218 EG15	160	30	107.0	145.0	191	224
	NJ 2218 EG15	160	40	107.0	145.0	246	320
	NU 2218 EG15	160	40	107.0	145.0	246	320
	N 318 EM	190	43	113.5	169.5	330	360
	NJ 318 EG15	190	43	113.5	169.5	330	360
	NU 318 EG15	190	43	113.5	169.5	330	360
	NJ 2318 EM	190	64	113.5	169.5	440	540
	NU 2318 EG15	190	64	113.5	169.5	440	540

Single-row cylindrical roller bearings *(continued)*



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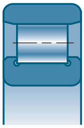

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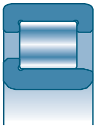
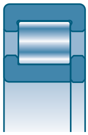


NJ

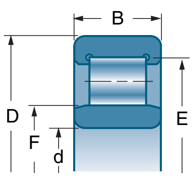


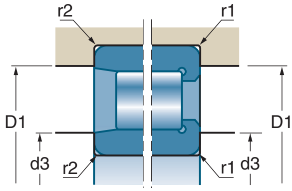
NUP

References	rpm*	rpm*	d3 max mm	D1 min mm	r1 max mm	r2 max mm	kg
NUP 215 EG15	4200	5100	84	121	1.5	1.5	1.330
NJ 2215 EG15	4200	5100	84	121	1.5	1.5	1.600
NU 2215 EG15	4200	5100	84	121	1.5	1.5	1.610
N 315 EG15	3500	4200	87	148	2	2	3.700
NJ 315 EG15	3500	4200	87	148	2	2	3.300
NU 315 EG15	3500	4200	87	148	2	2	3.300
NJ 2315 EG15	3300	4200	87	148	2.1	2.1	5.040
NU 2315 EG15	3300	4200	87	148	2.1	2.1	4.950
N 216 EG15	3900	4700	91	129	2	2	1.540
NJ 216 EG15	3900	4700	91	129	2	2	1.540
NU 216 EG15	3900	4700	91	129	2	2	1.540
NJ 2216 EG15	3900	4700	91	129	2	2	2.050
NU 2216 EG15	3900	4700	91	129	2	2	2.020
N 316 EG15	3300	3900	92	158	2	2	3.930
NJ 316 EG15	3300	3900	92	158	2.1	2.1	4.040
NU 316 EG15	3300	3900	92	158	2.1	2.1	3.960
NUP 316 EG15	3300	3900	92	158	2.1	2.1	4.110
NU 2316 EG15	3100	3900	92	155	2.1	2.1	5.890
N 217 EG15	3700	4400	96	139	2	2	1.890
NJ 217 EG15	3700	4400	96	139	2	2	1.890
NU 217 EG15	3700	4400	96	139	2	2	1.890
NJ 2217 EG15	3700	4400	96	139	2	2	2.550
NU 2217 EG15	3700	4400	96	139	2	2	2.500
N 317 EM	3100	3700	99	166	2.5	2.5	5.330
NJ 317 EG15	3100	3700	99	166	3	3	4.712
NU 317 EG15	3100	3700	99	166	3	3	4.620
NUP 317 EG15	3100	3700	99	166	3	3	5.200
NU 2317 EG15	2900	3700	99	162	3	3	6.710
N 218 EG15	3500	4200	101	149	2	2	2.360
NJ 218 EG15	3500	4200	101	149	2	2	2.410
NU 218 EG15	3400	4200	101	149	2	2	2.360
NJ 2218 EG15	3400	4200	101	149	2	2	3.230
NU 2218 EG15	3400	4200	101	149	2	2	3.170
N 318 EM	2900	3500	104	176	2.5	2.5	6.210
NJ 318 EG15	2900	3500	104	176	2.5	2.5	5.950
NU 318 EG15	2900	3500	104	176	2.5	2.5	5.420
NJ 2318 EM	2800	3500	104	172	3	3	9.100
NU 2318 EG15	2800	3500	104	172	3	3	8.040

* These are the speed limits according to the SNR concept (see pages 85 to 87).

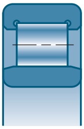
Cylindrical roller bearings *(continued)*



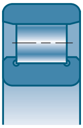


d	References	D	B	F	E	C	C_0
mm		mm	mm	mm	mm	10^3N	10^3N
95	N 219 EG15	170	32	112.5	154.5	238	285
	NJ 219 EG15	170	32	112.5	154.5	238	285
	NU 219 EG15	170	32	112.5	154.5	238	285
	NJ 2219 EG15	170	43	112.5	154.5	290	375
	NU 2219 EG15	170	43	112.5	154.5	290	375
	N 319 EM	200	45	121.5	177.5	345	390
	NJ 319 EG15	200	45	121.5	177.5	340	390
	NU 319 EG15	200	45	121.5	177.5	340	390
	NU 2319 EG15	200	67	121.5	177.5	465	590
100	N 220 EG15	180	34	119.0	163.0	260	310
	NJ 220 EG15	180	34	119.0	163.0	260	310
	NU 220 EG15	180	34	119.0	163.0	260	310
	NJ 2220 EG15	180	46	119.0	163.0	335	450
	NU 2220 EG15	180	46	119.0	163.0	335	450
	N 320 EM	215	47	127.5	191.5	390	440
	NJ 320 EG15	215	47	127.5	191.5	400	440
	NU 320 EG15	215	47	127.5	191.5	390	440
	NJ 2320 EM	215	73	127.5	191.5	580	730
	NU 2320 EG15	215	73	127.5	191.5	570	720
105	NJ 221 EG15	190	36	125.5	171.5	265	325
	NU 221 EG15	190	36	125.5	171.5	265	325
	NU 221 EM	190	36	125.5	171.5	265	325
	NU 321 EM	225	49	133.0	201.0	435	495
110	N 222 EM	200	38	132.5	180.5	300	360
	NJ 222 EG15	200	38	132.5	180.5	300	360
	NU 222 EG15	200	38	132.5	180.5	300	360
	NU 2222 EG15	200	53	132.5	180.5	385	520
	N 322 EM	240	50	143.0	211.0	475	540
	NJ 322 EG15	240	50	143.0	211.0	435	500
	NU 322 EG15	240	50	143.0	211.0	440	510
	NJ 2322 EM	240	80	143.0	211.0	680	890
	NU 2322 EM	240	80	143.0	211.0	680	900
120	NJ 224 EG15	215	40	143.5	195.5	350	435
	NU 224 EG15	215	40	143.5	195.5	350	435
	NU 2224 EG15	215	58	143.5	195.5	460	630
	N 324 EM	260	55	154.0	230.0	530	620
	NJ 324 EG15	260	55	154.0	230.0	530	620
	NU 324 EG15	260	55	154.0	230.0	550	620

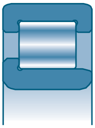
Single-row cylindrical roller bearings *(continued)*



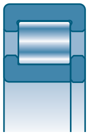
NU



N



NJ

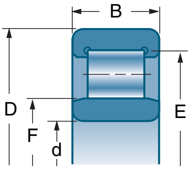


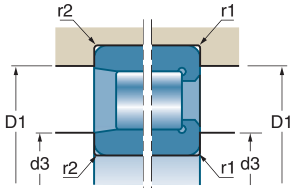
NUP

References	rpm*	rpm*	d3 max mm	D1 min mm	r1 max mm	r2 max mm	kg
N 219 EG15	3200	3900	107	158	2	2	2.830
NJ 219 EG15	3200	3900	107	158	2	2	2.830
NU 219 EG15	3200	3900	107	158	2	2	2.830
NJ 2219 EG15	3200	3900	107	158	2.1	2.1	3.900
NU 2219 EG15	3200	3900	107	158	2.1	2.1	3.900
N 319 EM	2800	3300	109	186	2.5	2.5	7.200
NJ 319 EG15	2800	3300	109	186	3	3	6.440
NU 319 EG15	2800	3300	109	186	3	3	6.320
NU 2319 EG15	2600	3300	109	186	3	3	9.400
N 220 EG15	3100	3700	112	168	2	2	3.440
NJ 220 EG15	3100	3700	112	168	2	2	3.440
NU 220 EG15	3100	3700	112	168	2	2	3.440
NJ 2220 EG15	3100	3700	112	168	2.1	2.1	4.850
NU 2220 EG15	3100	3700	112	168	2	2	4.800
N 320 EM	2600	3100	114	201	2.5	2.5	7.660
NJ 320 EG15	2600	3100	114	201	2.5	2.5	7.660
NU 320 EG15	2600	3100	124	202	2.5	2.5	7.660
NJ 2320 EM	2500	3100	118	195	3	3	13.500
NU 2320 EG15	2500	3100	118	195	3	3	12.100
NJ 221 EG15	2900	3500	178	117	2.1	2.1	4.083
NU 221 EG15	2900	3500	121	169	2.1	2.1	4.100
NU 221 EM	2900	3500	121	169	2.1	2.1	4.620
NU 321 EM	2500	2900	125	199	3	3	9.950
N 222 EM	2800	3400	122	188	2	2	5.500
NJ 222 EG15	2800	3300	122	188	2	2	4.850
NU 222 EG15	2800	3400	122	188	2	2	4.850
NU 2222 EG15	2800	3300	125	180	2.1	2.1	6.760
N 322 EM	2300	2800	124	226	2.5	2.5	10.600
NJ 322 EG15	2300	2800	124	226	3	3	10.330
NU 322 EG15	2400	2800	139	227	3	3	10.600
NJ 2322 EM	2200	2800	124	226	3	3	18.600
NU 2322 EM	2200	2800	124	226	3	3	18.300
NJ 224 EG15	2600	3100	132	203	2	2	5.740
NU 224 EG15	2600	3100	132	203	2	2	5.740
NU 2224 EG15	2500	3100	135	200	2.1	2.1	8.380
N 324 EM	2100	2600	134	246	3	3	15.110
NJ 324 EG15	2100	2600	134	246	3	3	13.540
NU 324 EG15	2100	2600	134	246	2.5	2.5	13.300

* These are the speed limits according to the SNR concept (see pages 85 to 87).

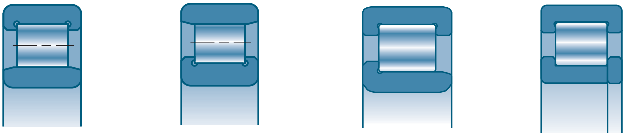
Cylindrical roller bearings *(continued)*





d		D	B	F	E	C	C_0
mm	References	mm	mm	mm	mm	10^3N	10^3N
120	NJ 2324 EM	260	86	154.0	230.0	800	1040
	NU 2324 EM	260	86	154.0	230.0	800	1040
130	NJ 226 EG15	230	40	153.5	209.5	375	460
	NU 226 EG15	230	40	153.5	209.5	375	460
	NU 2226 EG15	230	64	153.5	209.5	530	740
	N 326 EM	280	58	167.0	247.0	620	750
	NJ 326 EG15	280	58	167.0	247.0	590	690
	NU 326 EG15	280	58	167.0	247.0	610	690
	NJ 2326 EM	280	93	167.0	247.0	930	1240
	NU 2326 EM	280	93	167.0	247.0	930	1240
140	N 228 EM	250	42	169.0	225.0	400	510
	NJ 228 EM	250	42	169.0	225.0	400	510
	NU 228 EM	250	42	169.0	225.0	400	510
	N 328 EM	300	62	180.0	264.0	680	830
	NU 328 EM	300	62	180.0	264.0	680	800
	NU 2328 EM	300	102	180.0	264.0	1040	1420
150	NJ 230 EM	270	45	182.0	242.0	465	600
	NU 230 EM	270	45	182.0	242.0	465	600
	N 330 EM	320	65	193.0	283.0	770	940
	NU 330 EM	320	65	193.0	283.0	760	890
	NU 2330 EM	320	108	193.0	283.0	1170	1600
160	NJ 232 EM	290	48	195.0	259.0	530	690
	NU 232 EM	290	48	195.0	259.0	530	690
	NU 2332 EM	340	114	204.0	300.0	1330	1840
170	NU 234 EM	310	52	207.0	279.0	610	820
	N 334 EM	360	72	218.0	318.0	990	1260
180	NU 236 EM	320	52	217.0	289.0	630	870
190	NU 238 EM	340	55	230.0	306.0	720	970
	N 338 EM	400	78	245.0	353.0	1150	1490
200	N 340 EM	420	80	258.0	370.0	1230	1610

Single-row cylindrical roller bearings *(continued)*



NU N NJ NUP

References	rpm*	rpm*	d3 max mm	D1 min mm	r1 max mm	r2 max mm	kg
NJ 2324 EM	2000	2600	134	246	3	3	23.800
NU 2324 EM	2000	2600	134	246	3	3	23.200
NJ 226 EG15	2400	2900	144	216	2.5	2.5	6.500
NU 226 EG15	2400	2900	144	216	2.5	2.5	6.500
NU 2226 EG15	2400	2900	144	210	3	3	10.400
N 326 EM	2000	2400	180	253	4	4	18.440
NJ 326 EG15	2000	2400	147	263	3	3	16.500
NU 326 EG15	2000	2400	147	263	3	3	16.400
NJ 2326 EM	1900	2400	147	263	4	4	29.200
NU 2326 EM	1900	2400	147	263	4	4	28.800
N 228 EM	2200	2700	157	233	3	3	9.340
NJ 228 EM	2200	2700	157	233	3	3	9.650
NU 228 EM	2200	2700	157	233	3	3	9.340
N 328 EM	1800	2200	184	269	4	4	22.510
NU 328 EM	1900	2200	176	284	4	4	22.450
NU 2328 EM	1800	2200	165	270	4	4	36.000
NJ 230 EM	2000	2500	170.3	246.6	3	3	12.200
NU 230 EM	2000	2500	170.3	246.6	3	3	12.000
N 330 EM	1700	2100	189	304	4	4	26.800
NU 330 EM	1800	2100	189	304	5	5	27.300
NU 2330 EM	1600	2100	185	304	4	4	43.200
NJ 232 EM	1900	2300	206.5	264.9	3	3	15.100
NU 232 EM	1900	2300	206.5	264.6	3	3	14.600
NU 2332 EM	1500	1900	195	298	4	4	51.500
NU 234 EM	1800	2100	201	276	4	4	18.130
N 334 EM	1500	1800	220	328	4	4	37.900
NU 236 EM	1700	2000	210	286	4	4	18.910
NU 238 EM	1600	1900	226	324	5	5	22.700
N 338 EM	1400	1600	250	365	5	5	50.500
N 340 EM	1300	1500	260	385	5	5	57.000

* These are the speed limits according to the SNR concept (see pages 85 to 87).

Tapered roller bearings

SNR

Tapered roller bearings

Definition and capabilities

Definition

Tapered roller bearings with a single row of rollers are always mounted opposing another bearing of the same type to provide rigid assemblies, particularly when preloaded.

Cages

Tapered roller bearings are usually equipped with a pressed steel cage. In some cases with a synthetic material cage.

Contact angle

The rings of this bearing are detachable: the outer ring (cup) is not joined to the rest of the bearing which is made up of the inner ring (cone) and rollers held on the cone by the cage. A tapered roller bearing can accept axial loads in one direction only. It must be mounted in opposition with a bearing of the same type.

ISO 355 Standard defines the different series of tapered roller bearings with contact angles of 10 to 30°. For a given radial load, the greater the angle of the cup, the greater the axial load that the bearing can withstand. SNR has adopted designations in accordance with this standard for the new "intermediate" series and has kept the former designations for the other series.

Capabilities

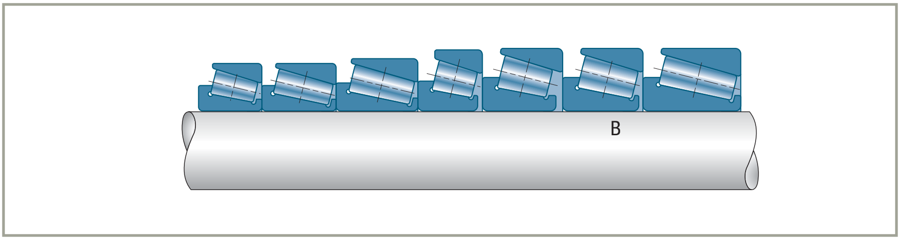
Loads and speeds

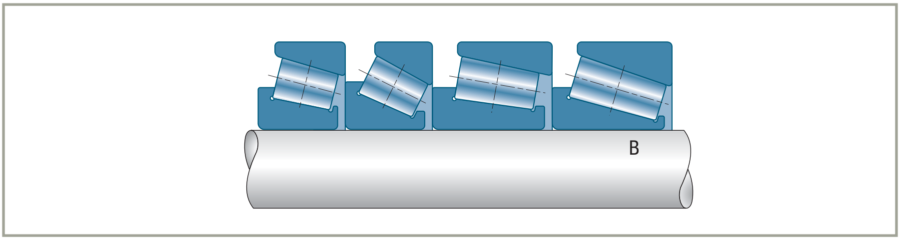
The tapered roller bearing is an angular contact bearing that can withstand high radial and axial loads.

Misalignment

The shape of the contacting profiles allows misalignment in the range of 0.06°.

Series

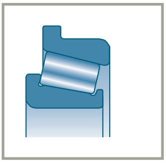




Variants

Special chamfer

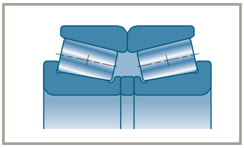
Special chamfer on the large face of the cone to adapt to the large fillet radius of the shoulders of shafts such as those of wheel axles.



Flange on cup

Matched bearings

They are made up of two bearings and usually two spacers to form a single assembly. The elements of a given matched assembly cannot be exchanged with those of another assembly.



Tapered roller bearings *(continued)*

Tolerances and clearance

Tolerances

These bearings are supplied in standard precision with tolerances in accordance with ISO 492 Standard. They can be supplied on request with specific tolerances on one or more dimensions or characteristics.

Clearances

Axial clearance

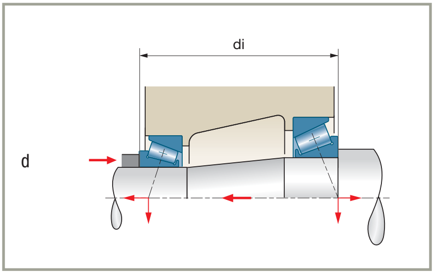
As these bearings are always mounted in opposition, the axial clearance is determined by the adjustment of the bearings at installation. That is to say by the adjustment of the relative initial position of the cones with respect to the cups. The adjustment determines a mechanical clearance (positive clearance) or a pre-load (negative clearance).

Types of assembly

Face-to-face assembly (O)

This arrangement is to be used in applications involving temperature variations, or when the points of load application of the two bearings need to be as far apart as possible. It more specifically enables the creation of compact assemblies with either pre-loading or clearance.

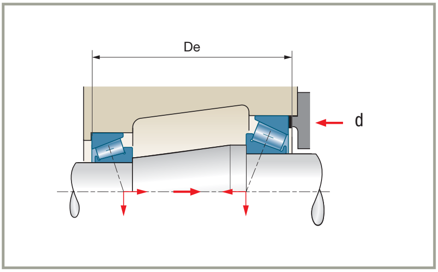
The adjustment is made on the distance di between the cones of the two bearings which is determined by either a spacer length or an adjustment nut.



Back-to-back assembly (X)

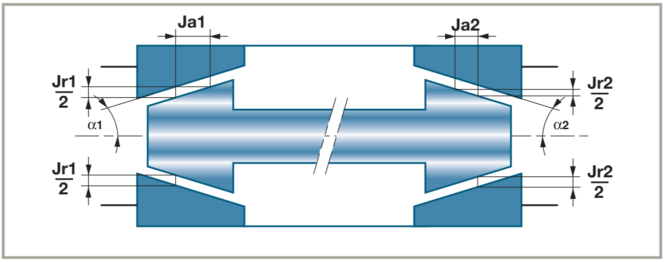
To install a shaft fully equipped with the bearings in a housing.

The adjustment is made on the distance De between the cups of the two bearings, and is determined by shims or an adjustment nut.



Relation between the axial clearance J_a and the radial clearance J_r of a bearing

$$J_a = 1.25\ Y\ .\ J_r$$

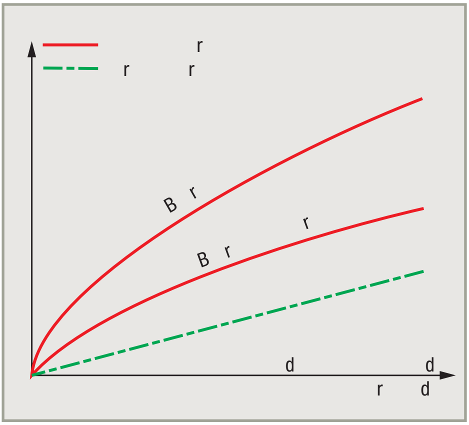


Pre-load

Tapered roller bearings are preloaded whenever one wants to ensure the axial stiffness of the assembly (bevel gear bearings. machine-tool spindle bearings. etc.). The nominal value of the pre-load is fixed for each application according to the loading conditions and the characteristics of the chosen bearings.

Consult SNR for the preparation of a preloaded bearing file.

SNR establishes two characteristic curves for each bearing reference:



- The axial penetration curve that characterises the bearing stiffness which depends on the contact angle, the number of rollers, and their effective length.
- The friction torque curve which enables to check that the pre-loading adjustment is correct using a torque gauge

Axial clearance on assembly for two separate bearings

As these bearings are always mounted in opposition. their internal clearance is determined by the adjustment on assembly that determines the axial clearance of the shaft.

For information. the relation between the axial clearance and the corresponding radial clearance is given by the formula:

$$J_r = 0.83\ J_a$$

These bearings can be mounted with a pre-load if necessary to secure an axial stiffness of an assembly. The maximum speed in this case is reduced and depends on the pre-load value.

Consult SNR.

Tapered roller bearings *(continued)*

Design criteria

Bearing life

Shaft mounted on two single bearings

Equivalent dynamic load

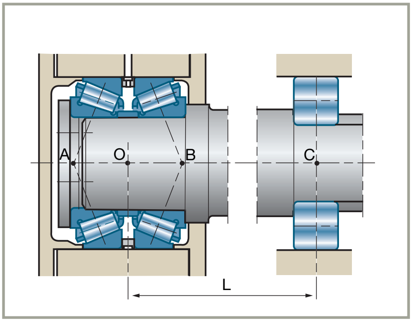
The axial balance of the shaft depends not only on the forces applied, but also on the forces induced by the radial loads applied on each bearing.

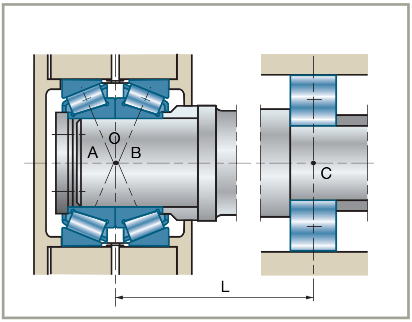
Equivalent static load

Its value Po is the greater of the two values obtained using the following formula:

$$P_0 = F_r$$
$$P_0 = 0.5\ F_r + Y_0 \cdot F_a$$

Shaft with one of its two assemblies made up by two matched non-preloaded bearings assembled in an O or X arrangement





This assembly is considered as a single double-row roller bearing which centre O is the mid-point of the distance AB between the load application points. The assembly of a shaft with this type of assembly is hyperstatic (3 seating points: A. B. C) and can only be likened approximately to an arrangement of two assemblies if the distance AB is less than L/5 and the stiffness of the assembly is satisfactory (misalignment < 0.06°). In all other cases, consult SNR.

Equivalent dynamic load of the double pillow block (ISO 281 Standard)

$$P = F_r + 1.1\ Y.\ F_a \quad \text{if} \quad F_a / F_r \leq e$$

$$P = 0.67\ F_r + 1.68\ Y.\ F_a \quad \text{if} \quad F_a / F_r > e$$

Basic dynamic capacity of the double bearing

The basic dynamic capacity of an assembly of two identical bearings is:

$$C_e = 1.715\ C$$

Equivalent static capacity of the double pillow block

$$P_0 = F_r + 1.1\ Y\ .\ F_a$$

Basic static capacity of the double pillow block

The static capacity of the assembly of two identical bearings is twice that of a single bearing.

$$C_{0e} = 2\ C_0$$

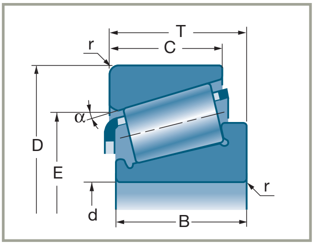
Calculation of preloaded bearings

The values of the induced forces involved in the axial equilibrium of two bearings depend on the applied pre-load and the bearing stiffness characteristics. Consequently, the calculation of the equivalent load on each bearing is complex and must be performed by the SNR Technical Service.

Tapered roller bearings *(continued)*

Installation/assembly criteria

Interchangeability of elements of the same reference



As the cones and cups of tapered roller bearings are separable, ISO has established:.

- the nominal dimensions of the small diameter of the cup raceway (E)
- the contact angle (α)

Interchangeability of SNR elements

The cones and cups of the same reference are totally interchangeable. with the total width of the bearing (dimension T) remaining within the standard tolerances (ISO 492).

Interchangeability of an SNR element with an element of another make

Interchangeability is possible if the non-SNR elements comply with ISO 355 Standard, particularly dimensions α and E. However, as the tolerances on these dimensions, the raceway profile shapes, the quality of steel and the surface conditions are specific to each manufacturer. The performance of such assemblies risks can be significantly reduced. Such assemblies should therefore be avoided.

Some SNR references in old designs are not interchangeable with other makes. They are identified in the "List of Standard Bearings".

Adjustment parameters

The assembly of standard bearings always requires an adjustment due to the fact that their elements can be separated.

The adjustment depends on the assembly dimensions and their tolerances, which are:

The functional dimensions of the bearing

- Bore d
- Outer diameter D
- The distance between the cone and cup faces of a given bearing: dimension T

The functional dimensions of the assembly

- The distance between the cup shoulders (De)
- The distance between the cone shoulders (di)
- The diameters of the shaft and housing seating surfaces

The generally accepted tolerance for a given clearance (positive or negative) makes it necessary to repeat the adjustment operation for each assembly, taking in consideration amplitude of standard bearing tolerances and the assembly dimensions.

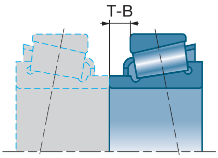
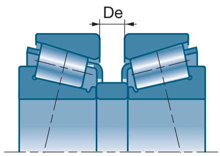
One then adjusts one of the shoulder distances (De) or (di) at each operation to compensate for the variations in the other dimensions of the assembly.

Adjustment is a relatively long and repetitive operation that has to be performed by specialised personnel capable of ensuring its precision and reliability.

Installation without adjustment

In many high volume production assembly operations, the dimensional tolerances have a reduced normal statistical distribution. In such cases, by using bearings which also have reduced tolerances, mountings will have a 99.73% probability that no further adjustment will be required, which is suitable for most applications.
Main applications: vehicle wheels and gear boxes.
The bearings are usually fitted close to each other in an O arrangement.

The two possibilities of adjustment-free assembly are:

Type of assembly	Pre-adjusted bearings	Matched assembly
Adjustment schematic		
Bearing characteristics	◗ d d r r r d T B ◗ r d ◗ C d d d d r r	◗ r d d r r d d r d r ◗ r r
Assembly characteristics	◗ r r rr ◗ T r d D d r	◗ r r d r ◗ T r d D d r
Axial clearance tolerances	◗ T r rd r r T r d r r r r	◗ T r rd r r T r d r r r r

Prefixes and suffixes

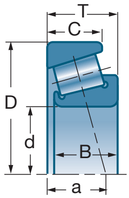
Prefixes

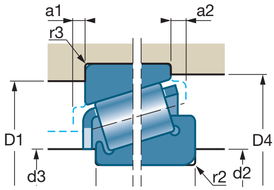
R	r r r r

Suffixes

B	r r d r d
A. C	r d d
T	r r
P6X	B r r d T r

Tapered roller bearings *(continued)*



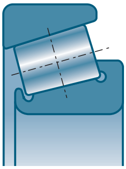


d	Ref.	D	B	C	T	a	C	C_0	e	Y	Yo		
mm	Ref.	mm	mm	mm	mm	mm	10^3N	10^3N				rpm*	rpm*
15													
17													
20													
25	B												
30	C												
	C												
35	C												
	C												
	B												
	B												
40	C												
	C												

T r d rd

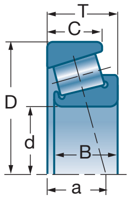
Characteristics

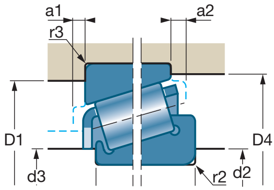
Single-row tapered roller bearings (mm)



10VDXA20	D1 max	D1 min	d2 max	d2 min	d3 max	d3 min	D4 min	a1 min	a2 min	r2 max	r3 max		ISO
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	kg	
													DB DD B
													DB B B D
B													CC CC CD D B B D
C C													CC DB DC D B B D
C C B B													CC DB DC DC D B B
C C													CD C DB DC D B B

Tapered roller bearings *(continued)*

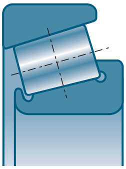




d		D	B	C	T	a	C	C_0	e	Y	Yo		
mm	Ref.	mm	mm	mm	mm	mm	10^3N	10^3N				rpm*	rpm*
40													
	B												
45													
	C												
	B												
	B												
50													
	C												
55													
	B												
60													

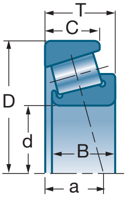
T r d rd

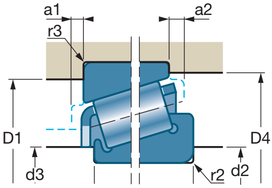
Single-row tapered roller bearings (mm) *(continued)*



	D1 max	D1 min	d2 max	d2 min	d3 max	d3 min	D4 min	a1 min	a2 min	r2 max	r3 max		ISO
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	kg	
B													D D
C B B													CC C DB DC DC D B B D D
C													CC C DB DC D B B D
B													CC C C DB DC D B B D D
													CC C C B C B B B

Tapered roller bearings *(continued)*

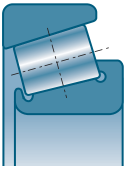




d		D	B	C	T	a	C	C_0	e	Y	Yo		
mm	Ref.	mm	mm	mm	mm	mm	10^3N	10^3N				rpm*	rpm*
65	B												
70	B												
75	B												
80	B												
85													

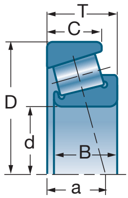
T r d rd

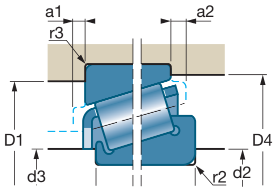
Single-row tapered roller bearings (mm) *(continued)*



	D1 max	D1 min	d2 max	d2 min	d3 max	d3 min	D4 min	a1 min	a2 min	r2 max	r3 max		ISO
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	kg	
B													CC C D B C B B D D
B													CC C B C B B D D
B													CC C D DB DC B D D
B													CC C D B C B D D
													CC C

Tapered roller bearings *(continued)*

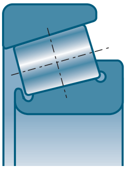




d	Ref.	D	B	C	T	a	C	C_0	e	Y	Yo	rpm*	rpm*
mm	Ref.	mm	mm	mm	mm	mm	10^3N	10^3N				rpm*	rpm*
85	B												
90													
95													
100	B												
105													
110													
120	T CB												
130	T CB												

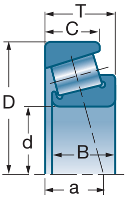
T r d rd

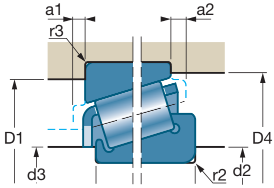
Single-row tapered roller bearings (mm) *(continued)*



	D1 max	D1 min	d2 max	d2 min	d3 max	d3 min	D4 min	a1 min	a2 min	r2 max	r3 max		ISO
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	kg	
B													D B C D D
													CC C D B C D
													CC C B C
B													CC C B C D
													DC D B C
													DC D B C
T CB													CB DC D B D
T CB													CB C

Tapered roller bearings *(continued)*

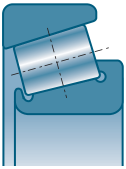




d		D	B	C	T	a	C	C_0	e	Y	Yo		
mm	Ref.	mm	mm	mm	mm	mm	10^3N	10^3N				rpm*	rpm*
130													
140	T CB												
150													
160	T DB												
170													
180													
190													
200													
240													
280													
320													

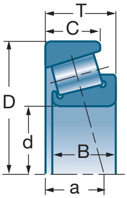
T r d rd

Single-row tapered roller bearings (mm) *(continued)*



	D1 max	D1 min	d2 max	d2 min	d3 max	d3 min	D4 min	a1 min	a2 min	r2 max	r3 max		ISO
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	kg	
													B D
T CB													CB DC B D
													C B D
T DB													DB C D
													C D
													D D
													D
													D
													D
													C
													D

Tapered roller bearings *(continued)*



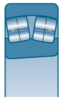
Single-row tapered roller bearings (inch)

d		D	B	C	T	a	C	C_0			
pouce	Réf.	mm	mm	mm	mm	mm	10^3N	10^3N	tr/mn*	tr/mn*	kg
75,987											
89,974											
88,900											
100,000											
50,000											
38,000											
80,000											
17,462											
19,050											
21,986											
21,986											
38,100											
34,925											
41,275											
45,987											
45,987											
45,242											
31,750											
26,988											
29,000											
196,850											
34,988											

T r d rd

Double-row spherical roller bearings *(continued)*

Spherical double-row rollers with tapered bore



Series 213K-222K-223K-230K-231K-232K-240K-241K

Bore diameter	Group 2		Group N		Group 3		Group 4		Group 5	
d (mm)	min	max	min	max	min	max	min	max	min	max
18 <d≤ 24	15	25	25	35	35	45	45	60	60	75
24 <d≤ 30	20	30	30	40	40	55	55	75	75	95
30 <d≤ 40	25	35	35	50	50	65	65	85	85	105
40 <d≤ 50	30	45	45	60	60	80	80	100	100	130
50 <d≤ 65	40	55	55	75	75	95	95	120	120	160
65 <d≤ 80	50	70	70	95	95	120	120	150	150	200
80 <d≤ 100	55	80	80	110	110	140	140	180	180	230
100 <d≤ 120	65	100	100	135	135	170	170	220	220	280
120 <d≤ 140	80	120	120	160	160	200	200	260	260	330
140 <d≤ 160	90	130	130	1870	180	230	230	300	300	380
160 <d≤ 180	100	140	140	200	200	260	260	340	340	430
180 <d≤ 200	110	160	160	220	220	290	290	370	370	470
200 <d≤ 225	120	180	180	250	250	320	320	410	410	520
225 <d≤ 250	140	200	200	270	270	350	350	450	450	570
250 <d≤ 280	150	220	220	300	300	390	390	490	490	620
280 <d≤ 315	170	240	240	330	330	430	430	540	540	680
315 <d≤ 355	190	270	270	360	360	470	470	590	590	740
355 <d≤ 400	210	300	300	400	400	520	520	650	650	820
400 <d≤ 450	230	330	330	440	440	570	570	720	720	910
450 <d≤ 500	260	370	370	490	490	630	630	790	790	1000
500 <d≤ 560	290	410	410	540	540	680	680	870	870	1100
560 <d≤ 630	320	460	460	600	600	760	760	980	980	1230
630 <d≤ 710	350	510	510	670	670	850	850	1090	1090	1360

Value in μm

Axial clearance

As the axial clearance J_a depends on the radial clearance J_r it can be approximated using the following formula:

$$J_a = 2{,}27\ Y_0 \cdot J_r$$

Control of fitting and clearance

During the fitting of the bearing on the sleeve the inner ring is expanded reducing he internal radial clearance of the bearing.

This clearance reduction allows one to estimate the fit. It is most important to monitor this characteristic to ensure that the final clearance is adequate to allow proper bearing operation.

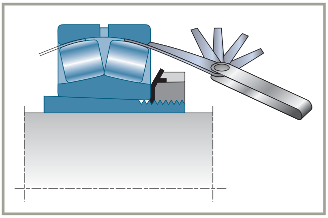
Double-row self-aligning bal bearings

Swivel the bearing outer ring by hand. The rotation must be smooth and oscillation easy.

Spherical roller bearings

• Principle of measurement

The clearance is measured by sliding a feeler gauge between the outer ring and the rollers. With large bearings do not use feeler gauges over 0.150 mm thick since they are too stiff to take the curve of the outer ring raceway. Stack up a combination of thinner gauges instead.



• Practical measurement

Place the bearing upright, the rings must be parallel. Manually rotate the inner ring to ensure that the rollers are properly seated. Find in the column 2 of the table below, the minimum value of the standardized clearance that corresponds to the bore and clearance class of the bearing. Choose a feeler gauge slightly smaller than this value.

Slide the gauge at an angle between the unloaded rollers and the outer ring race.

Progressively increase the gauge thickness. The clearance value will be situated between the last « pass » gauge and the next one that failed to « pass ».

Monitoring of fitting and clearance

• Radially

Drive up the bearing until the clearance has been reduced to the indicated limits. Check that the final residual clearance is no smaller than the value stated for the particular clearance class (column 3)

• Axially (shaft with tapered seat)

The axial movement corresponding to the tightening must be within the indicated limits (column 4). Check that the final residual clearance is no smaller than the value stated for the particular clearance class.

Double-row spherical roller bearings *(continued)*

Measurement of radial clearance during fitting

Bearing bore (mm)		Prior to mounting (2)						After mounting (3)						Axial drive-up			
		C0		C3		C4		C0		C3		C4		mm			
		According ISO 5753 (in mm)		According ISO 5753 (in mm)		According ISO 5753 (in mm)		Feeler gauge*		Feeler gauge*		Feeler gauge*		Taper 1:12		Taper 1:30	
from	including	Mini	Maxi	Mini	Maxi	Mini	Maxi	yes	no	yes	no	yes	no	Mini	Maxi	Mini	Maxi
30	40	0,035	0.050	0.050	0.065	0.065	0.085	2	3	3	4	4	5	0.350	0.400	–	–
40	50	0.045	0.060	0.060	0.080	0.080	0.100	3	4	3	5	4	6	0.400	0.450	–	–
50	65	0.055	0.075	0.075	0.095	0.095	0.120	3	5	4	6	5	7	0.450	0.600	–	–
65	80	0.070	0.095	0.095	0.120	0.120	0.150	4	6	5	7	6	8	0.600	0.750	–	–
80	100	0.080	0.110	0.110	0.140	0.140	0.180	4	6	6	8	7	10	0.700	0.900	1.700	2.200
100	120	0.100	0.135	0.135	0.170	0.170	0.220	5	7	7	9	9	12	0.750	1.100	1.900	2.700
120	140	0.120	0.160	0.160	0.200	0.200	0.260	8	11	10	13	12	17	1.100	1.400	2.700	3.500
140	160	0.130	0.180	0.180	0.230	0.230	0.300	8	12	11	15	14	19	1.200	1.600	3.000	4.000
160	180	0.140	0.200	0.200	0.260	0.260	0.340	9	13	12	17	16	21	1.300	1.700	3.200	4.200
180	200	0.160	0.220	0.220	0.290	0.290	0.370	11	16	15	20	20	26	1.400	2.000	3.500	5.000
200	225	0.180	0.250	0.250	0.320	0.320	0.410	12	17	17	22	22	28	1.600	2.200	4.000	5.500
225	250	0.200	0.270	0.270	0.350	0.350	0.450	14	19	18	24	24	31	1.700	2.400	4.200	6.700
250	280	0.220	0.300	0.300	0.390	0.390	0.490	15	21	20	27	26	33	1.900	2.700	4.700	6.700
280	315	0.240	0.330	0.330	0.430	0.430	0.540	16	23	22	29	29	37	2.000	3.000	5.000	7.500
315	355	0.270	0.360	0.360	0.470	0.470	0.590	18	25	24	32	32	40	2.400	3.300	6.000	8.200
355	400	0.300	0.400	0.400	0.520	0.520	0.650	20	27	27	36	35	44	2.600	3.600	6.500	9.000
400	450	0.330	0.440	0.440	0.570	0.570	0.720	22	30	29	39	38	49	3.100	4.000	7.700	10.000
450	500	0.370	0.490	0.490	0.630	0.630	0.790	25	33	33	43	42	54	3.300	4.400	8.200	11.000
500	600	0.410	0.540	0.540	0.680	0.680	0.870	28	37	36	46	46	59	3.700	5.000	9.200	12.500

* Practical measurement of clearance to within 1/100the of an mm by means thickness shims. For values smaller than 4/100the of an mm, use peel shims.

Design criteria

Bearing life

Axial load

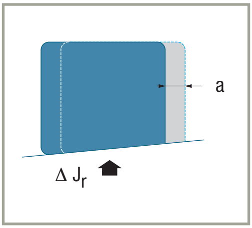
Double-row spherical roller bearings can withstand axial loads.

It is nevertheless recommended not to exceed a value of $F_a / F_r = 0,6$

Installation/assembly criteria

The residual clearance of the bearing must be checked after fitting. This check is vital for bearings with a tapered bore.

Relation between the axial displacement (a) of a tapered bore bearing and the corresponding reduction in its radial clearance ΔJ_r:



taper 1:12	$a = 12 \ \Delta J_r / t_i$
taper 1:30	$a = 30 \ \Delta J_r / t_i$

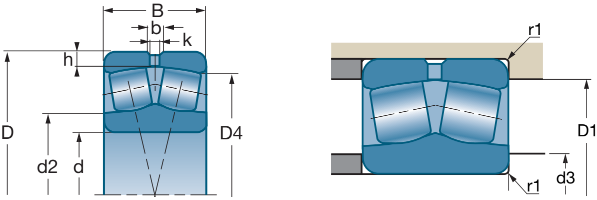
a (axial displacement)
ΔJ_r: reduction in radial clearance
t_i: repercussion factor for the interference fit of the inner ring:

- t_i = 0.75 if the bearing is mounted directly on a tapered seat of a solid shaft
- t_i = 0.7 if the bearing is mounted on a tapered adapter sleeve

Suffixes

C2	ISO radial clearance category 2
C3	ISO radial clearance category 3
C4	ISO radial clearance category 4
C5	ISO radial clearance category 5
EA	Bearing of the range “Premier” with pressed steel cage
EG15	Bearing of the range “Premier” with polyamide 6/6 cage
EM	Bearing of the range “Premier” with Machined brass cage
EF800	Bearing of the range “Premier” for vibrations applications
K	Tapered bore, 1:12 taper
K30	Tapered bore, 1:30 taper
V	Internal design index
W33	Groove and lubrication holes in outer ring

Double-row spherical roller bearings *(continued)*

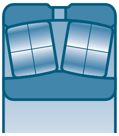
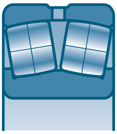
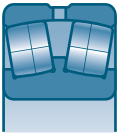


d		D	B	b	k	h	C	C_0	e
mm	References	mm	mm	mm	mm	mm	10^3N	10^3N	
25	* 22205 E	52	18	3	1.5	2.8	54.4	46.1	0.34
	21305 V	62	17			3.5	48.5	37.5	0.29
30	* 22206 E	62	20	4.4	2	2.8	72	64.5	0.31
	21306 V	72	19			3.5	63	50	0.28
35	* 22207 E	72	23	4.9	2	3.5	95.4	92	0.31
	21307 V	80	21			4.5	79	66	0.27
40	* 22208 E	80	23	5.4	2.5	3.5	110	105	0.27
	21308 V	90	23			4.5	96	84	0.26
	* 22308 E	90	33	5.9	3	4.5	161	152	0.36
45	* 22209 E	85	23	5.8	2.5	3.5	115	113	0.26
	21309 V	100	25			4.5	119	106	0.26
	* 22309 E	100	36	6.4	3	4.5	196	187	0.36
50	* 22210 E	90	23	5.8	2.5	3.5	124	124	0.24
	21310 V	110	27			5.5	137	128	0.25
	* 22310 E	110	40	7.4	3.5	5.5	237	232	0.36
55	* 22211 E	100	25	6.3	3	4.5	147	148	0.23
	21311 V	120	29			5.5	167	158	0.24
	* 22311 E	120	43	7.8	3.5	5.5	282	274	0.36
60	* 22212 E	110	28	6.9	3	4.5	178	181	0.24
	21312 V	130	31			6	186	179	0.24
	* 22312 E	130	46	8.7	4	6	323	319	0.35
65	* 22213 E	120	31	7.8	3.5	4.5	215	224	0.24
	21313 V	140	33			6	224	215	0.23
	* 22313 E	140	48	9.2	4	6	351	343	0.33
70	* 22214 E	125	31	7.4	3.5	4.5	224	240	0.22
	21314 V	150	35			6	246	240	0.23
	* 22314 E	150	51	10.4	5	6	400	396	0.34
75	* 22215 E	130	31	7.4	3.5	4.5	232	249	0.22
	21315 V	160	37			6	280	275	0.23
	* 22315 E	160	55	10.3	5	6	467	467	0.34
80	* 22216 E	140	33	7.9	3.5	5.5	265	287	0.22
	21316 V	170	39			6	305	305	0.23
	* 22316 E	170	58	10.4	5	6	515	522	0.34

* indicate bearings of the range SNR PREMIER

Characteristics

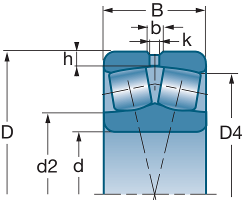
■ Spherical double-row rollers with cylindrical bore

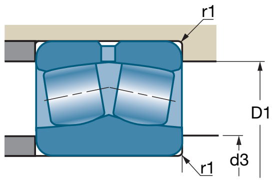
  

References	Y: Fa/Fr ≤ e	Y: Fa/Fr > e	Yo	rpm**	rpm**	d2 ≈ mm	d3 min mm	D1 max mm	D4 ≈ mm	r1 max mm	kg
* 22205 E	2	2.98	1.96	8600	11000	30	30	47	46	1	0.170
21305 V	2.33	3.47	2.28	6800	9100	34	32	55	52	1.1	0.257
* 22206 E	2.15	3.2	2.1	7200	9300	37	36	57	55	1	0.272
21306 V	2.45	3.64	2.39	5800	7700	40	37	65	60	1.1	0.394
* 22207 E	2.21	3.29	2.16	6100	7900	45	42	66	63	1.1	0.440
21307 V	2.48	3.69	2.42	5200	6900	46	44	71	68	1.5	0.513
* 22208 E	2.47	3.67	2.41	5500	7100	50	47	74	71	1.1	0.515
21308 V	2.55	3.8	2.5	4500	6100	53	49	81	76	1.5	0.715
* 22308 E	1.87	2.79	1.83	4100	5300	52	49	83	78	1.5	1.006
* 22209 E	2.64	3.93	2.58	5100	6600	54	52	79	76	1.1	0.565
21309 V	2.64	3.93	2.58	4100	5400	59	54	91	85	1.5	0.949
* 22309 E	1.9	2.83	1.86	3700	4800	58	54	93	87	1.5	1.352
* 22210 E	2.84	4.23	2.78	4800	6200	59	57	84	81	1.1	0.603
21310 V	2.71	4.04	2.65	3700	4900	66	61	99	93	2	1.251
* 22310 E	1.87	2.79	1.83	3400	4400	63	61	101	95	2	1.810
* 22211 E	2.95	4.4	2.89	4300	5500	66	64	93	90	1.5	0.823
21311 V	2.82	4.2	2.76	3300	4500	73	66	109	102	2	1.537
* 22311 E	1.87	2.79	1.83	3100	4000	68	66	111	104	2	2.290
* 22212 E	2.84	4.23	2.78	3900	5100	71	69	103	99	1.5	1.134
21312 V	2.81	4.19	2.75	3100	4100	79	72	118	110	2.1	1.986
* 22312 E	1.95	2.9	1.91	2900	3700	75	72	120	113	2.1	2.804
* 22213 E	2.79	4.15	2.73	3600	4700	78	74	113	107	1.5	1.512
21313 V	2.91	4.33	2.84	2900	3800	85	77	128	120	2.1	2.410
* 22313 E	2.06	3.06	2.01	2700	3400	81	77	130	122	2.1	3.413
* 22214 E	3.01	4.48	2.94	3400	4400	84	79	118	113	1.5	1.586
21314 V	2.9	4.31	2.83	2700	3600	91	82	138	127	2.1	2.990
* 22314 E	2	2.98	1.96	2500	3200	85	82	140	131	2.1	4.176
* 22215 E	3.14	4.67	3.07	3200	4200	88	84	123	118	1.5	1.644
21315 V	2.94	4.37	2.87	2500	3400	97	87	148	137	2.1	3.590
* 22315 E	2	2.98	1.96	2300	3000	91	87	150	139	2.1	5.083
* 22216 E	3.14	4.67	3.07	3000	3900	94	91	131	127	2	2.071
21316 V	2.95	4.4	2.89	2400	3200	104	92	158	145	2.1	4.260
* 22316 E	2	2.98	1.96	2200	2800	98	92	160	148	2.1	6.030

** These are the speed limits according to the SNR concept (see pages 85 to 87).

Double-row spherical roller bearings *(continued)*

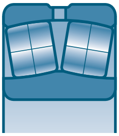
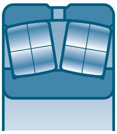
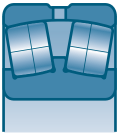




d	10VDXA20	D	B	b	k	h	C	C_0	e
mm	References	mm	mm	mm	mm	mm	10^3N	10^3N	
85	* 22217 E	150	36	7.9	3.5	5.5	308	330	0.22
	21317 V	180	41			7	355	365	0.23
	* 22317 E	180	60	11	5	7	570	604	0.32
90	* 22218 E	160	40	10.2	4.5	5.5	366	398	0.23
	* 23218 E	160	52.4	8.86	4	5.5	445	513	0.3
	21318 V	190	43			7	385	400	0.23
	* 22318 E	190	64	11.56	5	7	636	652	0.33
95	* 22219 E	170	43	9.93	4.5	6	395	417	0.23
	* 22319 E	200	67	12.15	6	7	696	751	0.32
100	* 24020 E	150	50	6.4	3.5	3.5	325	425	0.3
	* 23120 E	165	52	8.4	4	5.5	448	575	0.28
	* 22220 E	180	46	11.2	5	6	449	495	0.24
	* 23220 E	180	60.3	9.44	6	6	558	661	0.31
	* 22320 E	215	73	13.3	6	7	787	844	0.34
110	* 23022 E	170	45	7.83	3.5	4.4	397	517	0.23
	* 24022 E	170	60	6.8	3.5	4.4	465	615	0.33
	* 23122 E	180	56	8.86	4	5.5	521	669	0.28
	* 24122 E	180	69	8.4	4	5.5	530	675	0.36
	* 22222 E	200	53	12.2	6	6	573	643	0.25
	* 23222 E	200	69.8	10.52	5	6	716	869	0.32
	* 22322 E	240	80	15.6	7	7	928	972	0.31
120	* 23024 E	180	46	7.83	3.5	4.4	424	577	0.22
	* 24024 E	180	60	7.34	3.5	4.4	465	640	0.3
	* 23124 E	200	62	10.04	4.5	5.5	630	820	0.28
	* 24124 E	200	80	10.05	4.5	5.5	695	925	0.39
	* 22224 E	215	58	12.16	6	6	654	753	0.25
	* 23224 E	215	76	11	5	6	815	998	0.32
	* 22324 E	260	86	18	8	7	1110	1280	0.32
130	* 23026 E	200	52	8.91	4	4.4	538	721	0.22
	* 24026 E	200	69	8.4	4	4.4	590	795	0.32
	* 23126 E	210	64	10.04	4.5	5.5	675	906	0.27
	* 24126 E	210	80	9.48	4.5	5.5	720	965	0.35
	* 22226 E	230	64	13.21	6	7	768	898	0.25
	* 23226 E	230	80	11.56	5	7	912	1130	0.32
	* 22326 E	280	93	18.9	9	8.5	1260	1400	0.33

* indicate bearings of the range SNR PREMIER

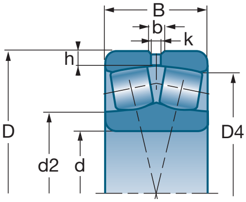
Spherical double-row rollers with cylindrical bore *(continued)*

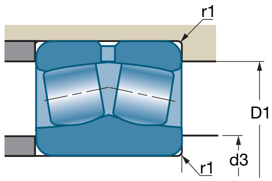
  

References	Y: Fa/Fr ≤ e	Y: Fa/Fr > e	Yo	rpm** (grease)	rpm** (oil)	d2 ≈ mm	d3 min mm	D1 max mm	D4 ≈ mm	r1 max mm	kg
* 22217 E	3.07	4.57	3	2800	3600	100	96	141	137	2	2.560
21317 V	2.99	4.46	2.93	2200	3000	111	99	166	154	3	5.230
* 22317 E	2.09	3.11	2.04	2000	2600	107	99	166	157	3	7.061
* 22218 E	2.9	4.31	2.83	2700	3500	105	101	151	144	2	3.283
* 23218 E	2.25	3.34	2.2	2200	2900	104	101	149	141	2	4.430
21318 V	3	4.47	2.93	2100	2800	117	104	176	162	3	6.110
* 22318 E	2.06	3.06	2.01	1900	2500	110	104	176	166	3	8.285
* 22219 E	2.95	4.4	2.89	2500	3200	110	107	158	153	2.1	3.950
* 22319 E	2.09	3.11	2.04	1800	2300	120	109	186	174	3	9.890
* 24020 E	2.25	3.34	2.2	1900	2500	108	107	143	136	1.5	2.690
* 23120 E	2.39	3.56	2.34	2200	2900	114	111	154	147	2	4.400
* 22220 E	2.84	4.23	2.78	2400	3100	118	112	170	161	2.1	4.900
* 23220 E	2.18	3.24	2.13	1900	2600	127	114	168	187	2.1	6.380
* 22320 E	1.98	2.94	1.93	1700	2200	127	114	201	187	3	12.470
* 23022 E	2.95	4.4	2.89	2300	3000	123	119	161	155	2	3.550
* 24022 E	2.03	3.02	1.98	1700	2200	122	120	161	152	2	4.960
* 23122 E	2.43	3.61	2.37	2000	2700	125	121	169	161	2	5.480
* 24122 E	1.85	2.76	1.81	1000	1300	121	121	169	158	2	6.850
* 22222 E	2.69	4	2.63	2200	2800	130	122	190	179	2.1	6.929
* 23222 E	2.12	3.15	2.07	1700	2300	130	122	188	176	2.1	9.250
* 22322 E	2.09	3.11	2.04	1600	2000	139	124	226	209	3	16.870
* 23024 E	3.14	4.67	3.07	2200	2900	134	129	171	165	2	3.990
* 24024 E	2.25	3.34	2.2	1700	2100	131	129	171	165	2	5.200
* 23124 E	2.43	3.61	2.37	1800	2400	138	131	189	179	2	7.670
* 24124 E	1.74	2.59	1.7	950	1200	133	131	189	172	2	10.000
* 22224 E	2.74	4.08	2.68	1900	2500	141	132	203	193	2.1	8.693
* 23224 E	2.09	3.11	2.04	1600	2100	139	132	203	190	2.1	11.275
* 22324 E	2.09	3.11	2.04	1400	1800	156	134	246	225	3	22.170
* 23026 E	3.01	4.48	2.94	2000	2600	145	139	191	183	2	5.810
* 24026 E	2.09	3.11	2.04	1500	1900	141	139	191	179	2	7.740
* 23126 E	2.51	3.74	2.45	1700	2300	148	141	199	189	2	8.400
* 24126 E	1.92	2.86	1.88	850	1200	144	141	199	184	2	11.800
* 22226 E	2.69	4	2.63	1800	2400	151	144	216	206	3	10.771
* 23226 E	2.12	3.15	2.07	1500	2000	150	144	216	204	3	13.550
* 22326 E	2.06	3.06	2.01	1300	1700	164	144	263	243	4	26.917

** These are the speed limits according to the SNR concept (see pages 85 to 87).

Double-row spherical roller bearings *(continued)*

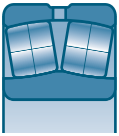
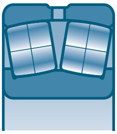
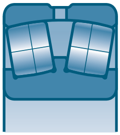




d		D	B	b	k	h	C	C_0	e
mm	References	mm	mm	mm	mm	mm	10^3N	10^3N	
140	* 23028 E	210	53	8.91	4	4.4	568	783	0.22
	* 24028 E	210	69	9.9	4.5	4.4	625	900	0.31
	* 23128 E	225	68	10.54	5	6	763	1030	0.26
	* 24128 E	225	85	10.7	4.5	6	830	1120	0.36
	* 22228 E	250	68	14.18	7	7	867	1010	0.25
	* 23228 E	250	88	12.6	6	7	1090	1370	0.33
	* 22328 E	300	102	18.9	9	8.5	1470	1720	0.33
150	* 23030 E	225	56	9.96	4.5	5.1	628	893	0.21
	* 24030 E	225	75	9.3	4	5.1	715	1000	0.31
	* 23130 E	250	80	12.63	6	6	1010	1350	0.29
	* 24130 E	250	100	10.4	5	6	1070	1400	0.38
	* 22230 E	270	73	15.33	7	7	1020	1220	0.25
	* 23230 E	270	96	13.7	6	7	1280	1620	0.33
	* 22330 E	320	108	19.9	9	8.5	1660	1890	0.34
160	* 23032 E	240	60	10.52	5	5.1	711	1000	0.21
	* 24032 E	240	80	9.4	4.5	5.1	785	1090	0.3
	* 23132 E	270	86	13.7	6	6	1160	1580	0.29
	* 24132 E	270	109	11.7	5	6	1260	1740	0.38
	* 22232 E	290	80	16.94	8	7	1160	1390	0.25
	* 23232 E	290	104	14.85	7	7	1470	1890	0.33
	* 22332 E	340	114	20.3	10	8.5	1850	2210	0.33
170	* 23034 E	260	67	11.59	5	5.1	869	1240	0.22
	* 24034 E	260	90	10.5	5	5.1	1010	1430	0.32
	* 23134 E	280	88	13.7	6	6	1200	1700	0.28
	* 24134 E	280	109	13.2	6	6	1310	1840	0.37
	* 22234 E	310	86	17.98	8	8.5	1330	1610	0.26
	23234 V	310	110	13.9	7.5	8.5	1210	1830	0.32
	* 22334 E	360	120	20.25	10	8.5	2100	2630	0.32
180	* 23036 E	280	74	13.24	6	5.1	1020	1450	0.23
	* 24036 E	280	100	11.7	5	5.1	1170	1700	0.33
	* 23136 E	300	96	14.85	7	7	1420	1960	0.29
	* 24136 E	300	118	14.1	6	7	1470	2050	0.38
	* 22236 E	320	86	18	8	8.5	1380	1660	0.25
	23236 V	320	112	13.9	7.5	8.5	1290	2050	0.31
	22336 V	380	126	23.1	12	8.5	1580	2190	0.31
190	* 23038 E	290	75	13.24	6	5.1	1080	1570	0.22
	* 24038 E	290	100	11.59	5	5.1	1240	1800	0.31
	23138 V	320	104	20	7.5	7	1180	1950	0.29

* indicate bearings of the range SNR PREMIER

Spherical double-row rollers with cylindrical bore *(continued)*

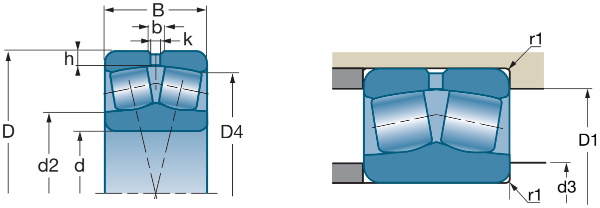




References	Y: Fa/Fr ≤ e	Y: Fa/Fr > e	Yo	rpm**	rpm**	d2 ≈ mm	d3 min mm	D1 max mm	D4 ≈ mm	r1 max mm	kg
* 23028 E	3.14	4.67	3.07	1900	2500	155	149	201	193	2	6.330
* 24028 E	2.21	3.29	2.16	1400	1800	153	149	201	189	2	9.090
* 23128 E	2.55	3.8	2.5	1600	2100	159	152	213	203	2.1	10.900
* 24128 E	1.9	2.83	1.86	800	1100	154	152	213	198	2.1	13.000
* 22228 E	2.74	4.08	2.68	1700	2200	163	154	236	224	3	14.200
* 23228 E	2.06	3.06	2.01	1400	1800	162	154	236	220	3	18.400
* 22328 E	2.03	3.02	1.98	1200	1600	181	157	283	261	4	34.130
* 23030 E	3.2	4.77	3.13	1800	2300	167	161	214	207	2.1	7.620
* 24030 E	2.18	3.24	2.13	1300	1600	162	161	215	205	2.1	10.200
* 23130 E	2.35	3.5	2.3	1400	1900	171	162	238	223	2.1	15.720
* 24130 E	1.78	2.65	1.74	850	1100	165	162	240	219	2.1	19.900
* 22230 E	2.74	4.08	2.68	1500	2000	177	164	256	242	3	17.800
* 23230 E	2.03	3.02	1.98	1300	1700	174	164	256	237	2.1	23.520
* 22330 E	2	2.98	1.96	1200	1500	188	167	303	279	4	41.960
* 23032 E	3.2	4.77	3.13	1700	2200	177	172	229	221	2.1	9.150
* 24032 E	2.28	3.39	2.23	1200	1500	173	172	230	217	2.1	12.300
* 23132 E	2.35	3.5	2.3	1300	1800	185	172	258	240	2.1	20.120
* 24132 E	1.76	2.62	1.72	800	1000	180	172	260	236	2.1	25.600
* 22232 E	2.69	4	2.63	1400	1900	190	174	276	260	3	23.000
* 23232 E	2.03	3.02	1.98	1200	1600	186	174	276	259	3	29.580
* 22332 E	2.03	3.02	1.98	1100	1400	205	177	323	296	4	50.700
* 23034 E	3.07	4.57	3	1600	2000	190	181	249	238	2.1	13.000
* 24034 E	2.12	3.15	2.07	1100	1400	184	181	250	233	2.1	17.800
* 23134 E	2.39	3.56	2.34	1300	1700	195	182	268	250	2.1	21.550
* 24134 E	1.82	2.72	1.79	650	850	189	182	270	245	2.1	26.600
* 22234 E	2.6	3.87	2.54	1300	1700	201	187	293	277	4	28.177
23234 V	2.13	3.17	2.08	1000	1300	199	187	293	264	4	37.000
* 22334 E	2.09	3.11	2.04	1000	1200	223	187	343	313	4	59.000
* 23036 E	2.95	4.4	2.89	1400	1900	201	191	270	255	2.1	16.900
* 24036 E	2.03	3.02	1.98	1000	1300	198	191	270	250	2.1	22.900
* 23136 E	2.32	3.45	2.26	1200	1600	205	194	286	267	3	27.210
* 24136 E	1.78	2.65	1.74	600	800	200	194	286	261	3	33.900
* 22236 E	2.74	4.08	2.68	1300	1700	209	197	303	287	4	28.941
23236 V	2.17	3.23	2.12	1000	1300	210	197	303	274	4	39.800
22336 V	2.15	3.2	2.1	850	1100	223	197	363	313	4	67.300
* 23038 E	3.01	4.48	2.94	1400	1800	213	201	279	266	2.1	17.470
* 24038 E	2.15	3.2	2.1	1000	1300	206	201	279	261	2.1	22.530
23138 V	2.33	3.47	2.28	1000	1300	218	204	306	278	3	34.500

** These are the speed limits according to the SNR concept (see pages 85 to 87).

SNR

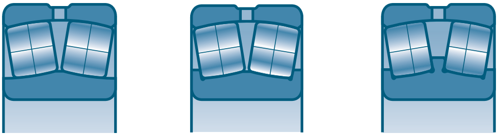
Double-row spherical roller bearings *(continued)*



d		D	B	b	k	h	C	C_0	e
mm	References	mm	mm	mm	mm	mm	10^3N	10^3N	
190	* 24138 E	320	128	14.2	6	7	1760	2480	0.38
	* 22238 E	340	92	19.6	9	8.5	1540	1870	0.25
	23238 V	340	120	16.7	9	8.5	1480	2370	0.32
	22338 V	400	132	22.3	12	10	1830	2650	0.36
200	23940 V	280	60	12.2	6.3		620	1000	0.2
	* 23040 E	310	82	14.28	7	5.1	1250	1790	0.23
	* 24040 E	310	109	12.67	6	5.1	1440	2120	0.33
	23140 V	340	112	16.7	9	7	1290	2120	0.3
	* 24140 E	340	140	16.98	8	7	2030	2930	0.39
	* 22240 E	360	98	20	10	8.5	1720	2100	0.25
	23240 V	360	128	16.7	9	8.5	1630	2700	0.32
	22340 V	420	138	22.3	12	10	1830	2650	0.31
220	* 23944 E	300	60	13.7	6.3		665	1120	0.18
	* 23044 E	340	90	15.37	7	6.2	1450	2110	0.23
	24044 V	340	118	12.2	6.3	6.2	1400	2700	0.34
	23144 V	370	120	20.7	9	8.5	1540	2600	0.29
	24144 V	370	150	11.1	6.3	8.5	2340	3660	0.38
	* 22244 E	400	108	20.6	11	8.5	2100	2690	0.25
	* 23244 E	400	144	20.02	10	8.5	2750	3830	0.34
	22344 V	460	145	22.3	12	10	2110	3150	0.3
240	23048 V	360	92	13.9	7.5	6.2	1090	2050	0.24
	24048 V	360	118	12.2	6.3	6.2	1500	2900	0.32
	23148 V	400	128	16.7	9	8.5	1720	2950	0.29
	24148 V	400	160	11.1	6.3	8.5	2270	4240	0.38
	22248 V	440	120	22.3	12	8.5	1170	1950	0.29
	23248 V	440	160	22.3	12	8.5	2420	3950	0.33
	22348 V	500	155	22.3	12	10	2450	3700	0.29
260	23052 V	400	104	16.7	9	7.3	1490	2430	0.25
	24052 V	400	140	12.2	6.3	7.3	1900	3800	0.35
	23152 V	440	144	16.7	9	8.5	2140	3750	0.29
	24152 V	440	180	13.9	6.3	8.5	2770	5290	0.39
	23252 V	480	174	22.3	12	13	2700	4450	0.33
280	23056 V	420	106	16.7	9	7.3	1500	2850	0.23
	24056 V	420	140	12.2	6.3	7.3	2000	4000	0.25
	23156 V	460	146	16.7	9	10	2240	4050	0.28
	24156 V	460	180	12.2	6.3	10	2700	5200	0.39
	23256 V	500	176	22.3	12	10	2900	4900	0.32
	22356 V	580	175	22.3	12	13	3429	5182	0.31

* indicate bearings of the range SNR PREMIER

Spherical double-row rollers with cylindrical bore *(continued)*

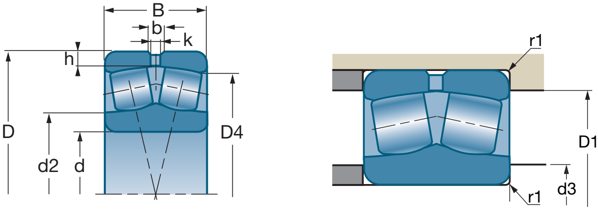


References	Y: Fa/Fr ≤ e	Y: Fa/Fr > e	Yo	rpm**	rpm**	d2 ≈ mm	d3 min mm	D1 max mm	D4 ≈ mm	r1 max mm	kg
* 24138 E	1.76	2.62	1.72	550	750	213	204	308	289	3	42.100
* 22238 E	2.74	4.08	2.68	1200	1600	222	207	323	305	4	35.314
23238 V	2.13	3.17	2.08	950	1200	223	207	323	290	4	48.500
22338 V	1.88	2.8	1.84	800	1100	240	210	380	332	5	76.400
23940 V	3.42	5.09	3.34	1300	1700	217	210	269	263	2.1	12.200
* 23040 E	2.95	4.4	2.89	1300	1700	223	211	300	283	2.1	22.560
* 24040 E	2.06	3.06	2.01	950	1200	219	211	299	278	2.1	29.200
23140 V	2.28	3.39	2.23	950	1200	230	214	326	294	3	42.500
* 24140 E	1.74	2.59	1.7	550	700	225	214	326	292	3	51.300
* 22240 E	2.74	4.08	2.68	1100	1500	234	217	343	323	4	42.528
23240 V	2.12	3.16	2.08	900	1200	238	217	343	307	4	58.400
22340 V	2.17	3.24	2.12	750	1000	302	220	400	346	5	99.000
* 23944 E	3.76	5.59	3.67	950	1200	237	230	287	284	4	12.300
* 23044 E	2.95	4.4	2.89	1200	1500	246	233	327	310	3	31.800
24044 V	1.96	2.92	1.92	850	1100	246	233	328	302	3	39.500
23144 V	2.31	3.44	2.26	900	1100	253	237	353	321	4	53.000
24144 V	1.77	2.63	0.73	500	670	253	237	353	316	4	65.600
* 22244 E	2.74	4.08	2.68	1000	1300	264	237	383	358	4	59.474
* 23244 E	2	2.98	1.96	850	1100	261	237	383	350	4	79.428
22344 V	2.23	3.32	2.18	700	950	332	240	440	380	5	125.000
23048 V	2.84	4.23	2.78	1000	1300	270	253	348	324	3	33.900
24048 V	2.1	3.13	2.06	800	1000	264	253	347	319	3	43.600
23148 V	2.35	3.5	2.3	800	1000	276	257	381	348	4	67.200
24148 V	1.79	2.67	1.75	460	620	270	257	383	342	4	81.300
22248 V	2.74	4.08	2.68	730	950	333	257	423	377	4	85.000
23248 V	2.07	3.07	2.02	750	950	285	257	423	372	4	113.180
22348 V	2.29	3.42	2.24	660	850	362	260	480	414	5	159.000
23052 V	2.73	4.07	2.67	950	1200	284	275	385	364	4	47.700
24052 V	1.94	2.88	1.89	750	950	291	275	385	354	4	67.200
23152 V	2.29	3.42	2.24	750	950	302	277	423	380	4	93.400
24152 V	1.75	2.6	1.71	420	560	294	277	423	373	4	113.000
23252 V	2.06	3.07	2.02	690	850	364	280	460	405	5	147.000
23056 V	3	4.46	2.93	900	1100	311	295	405	379	4	54.950
24056 V	2.74	4.08	2.68	700	900	318	295	405	375	4	70.500
23156 V	2.37	3.53	2.32	700	900	322	300	414	401	5	100.000
24156 V	1.71	2.54	1.67	400	530	315	300	440	396	5	119.000
23256 V	2.12	3.16	2.08	650	800	327	300	480	426	5	157.200
22356 V	2.17	3.24	2.12	600	750	437	306	554	493	6	232.000

** These are the speed limits according to the SNR concept (see pages 85 to 87).

SNR

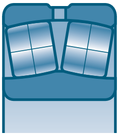
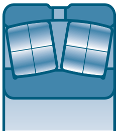
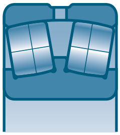
Double-row spherical roller bearings *(continued)*



d		D	B	b	k	h	C	C_0	e
mm	References	mm	mm	mm	mm	mm	10^3N	10^3N	
300	23060 V	460	118	16.7	9	7.3	1820	3350	0.23
	24060 V	460	160	12.2	6.3	7.3	2500	5200	0.35
	23160 V	500	160	22.4	9	10	2632	4645	0.29
	24160 V	500	200	12.2	6.3	10	3250	6300	0.4
	23260 V	540	192	22.3	12	13	3350	5600	0.32
320	23064 V	480	121	16.7	9	7.3	1920	3600	0.22
	23164 V	540	176	22.3	12	10	3050	5500	0.29
340	23068 V	520	133	22.3	12	8	2270	4200	0.23
	23168 V	580	190	22.3	12	10	3500	6100	0.29
	24168 V	580	243	15	8	10	4400	8500	0.43
360	23072 V	540	134	22.3	12	9	2390	4550	0.22
	23172 V	600	192	22.3	12	10	3681	6683	0.29
380	23076 V	560	135	22.3	12	9	2420	4700	0.21
400	23080 V	600	148	22.3	12	10	2926	5648	0.22

* indicate bearings of the range SNR PREMIER

Spherical double-row rollers with cylindrical bore *(continued)*

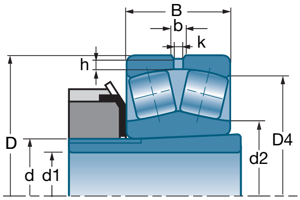




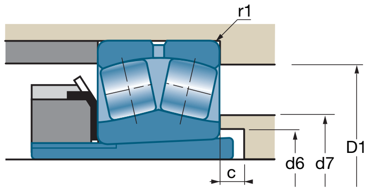
References	Y: Fa/Fr ≤ e	Y: Fa/Fr > e	Yo	rpm**	rpm**	d2 ≈ mm	d3 min mm	D1 max mm	D4 ≈ mm	r1 max mm	kg
23060 V	2.95	4.4	2.89	800	1000	376	315	445	414	4	75.270
24060 V	1.95	2.9	1.91	650	800	343	315	445	407	4	102.000
23160 V	2.32	3.45	2.26	660	850	346	320	480	435	5	134.000
24160 V	1.67	2.49	1.63	370	490	340	320	480	429	5	159.000
23260 V	2.12	3.15	2.07	610	750	415	320	520	459	5	200.000
23064 V	3.01	4.49	2.95	750	1000	355	335	465	433	4	79.500
23164 V	2.31	3.44	2.26	620	800	363	340	520	468	5	171.000
23068 V	2.98	4.43	2.91	700	950	426	358	502	468	5	109.000
23168 V	2.29	3.42	2.24	580	750	455	360	560	501	5	208.600
24168 V	1.56	2.32	1.53	320	430	383	360	560	485	5	266.000
23072 V	3.07	4.56	3	700	900	400	378	522	488	5	114.500
23172 V	2.36	3.51	2.31	560	700	475	380	580	522	5	231.600
23076 V	3.16	4.71	3.09	670	850	466	398	542	508	5	119.800
23080 V	3.08	4.59	3.02	600	750	497	418	582	542	5	156.000

** These are the speed limits according to the SNR concept (see pages 85 to 87).

SNR

Double-row spherical roller bearings *(continued)*

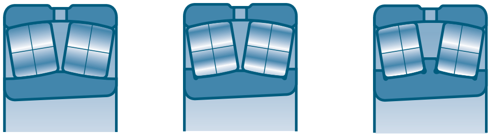




d1		Sleeves	d	D	B	b	k	h	C	C_0	e
mm	References		mm	mm	mm	mm	mm	mm	10^3N	10^3N	
20	* 22205 EK	H305	25	52	18	3.0	1.5	2.8	54.4	46.1	0.34
	21305 VK	H305	25	62	17			3.5	48.5	37.5	0.29
25	* 22206 EK	H306	30	62	20	4.4	2.0	2.8	72	64.5	0.31
	21306 VK	H306	30	72	19			3.5	63	50	0.28
30	* 22207 EK	H307	35	72	23	4.9	2.0	3.5	95.4	92	0.31
	21307 VK	H307	35	80	21			4.5	79	66	0.27
35	* 22208 EK	H308	40	80	23	5.4	2.5	3.5	110	105	0.27
	21308 VK	H308	40	90	23			4.5	96	84	0.26
	* 22308 EK	H2308	40	90	33	5.9	3.0	4.5	161	152	0.36
40	* 22209 EK	H309	45	85	23	5.8	2.5	3.5	115	113	0.26
	21309 VK	H309	45	100	25			4.5	119	106	0.26
	* 22309 EK	H2309	45	100	36	6.4	3.0	4.5	196	187	0.36
45	* 22210 EK	H310	50	90	23	5.8	2.5	3.5	124	124	0.24
	21310 VK	H310	50	110	27			5.5	137	128	0.25
	* 22310 EK	H2310	50	110	40	7.4	3.5	5.5	237	232	0.36
50	* 22211 EK	H311	55	100	25	6.3	3.0	4.5	147	148	0.23
	21311 VK	H311	55	120	29			5.5	167	158	0.24
	* 22311 EK	H2311	55	120	43	7.8	3.5	5.5	282	274	0.36
55	* 22212 EK	H312	60	110	28	6.9	3.0	4.5	178	181	0.24
	21312 VK	H312	60	130	31			6.0	186	179	0.24
	* 22312 EK	H2312	60	130	46	8.7	4.0	6.0	323	319	0.35
60	* 22213 EK	H313	65	120	31	7.8	3.5	4.5	215	224	0.24
	21313 VK	H313	65	140	33			6.0	224	215	0.23
	* 22313 EK	H2313	65	140	48	9.2	4.0	6.0	351	343	0.33
60	* 22214 EK	H314	70	125	31	7.4	3.5	4.5	224	240	0.22
	21314 VK	H314	70	150	35			6.0	246	240	0.23
	* 22314 EK	H2314	70	150	51	10.4	5.0	6.0	400	396	0.34
65	* 22215 EK	H315	75	130	31	7.4	3.5	4.5	232	249	0.22
	21315 VK	H315	75	160	37			6.0	280	275	0.23
	* 22315 EK	H2315	75	160	55	10.3	5.0	6.0	467	467	0.34

* indicate bearings of the range SNR PREMIER

Spherical double-row rollers with tapered bore and adapter sleeves

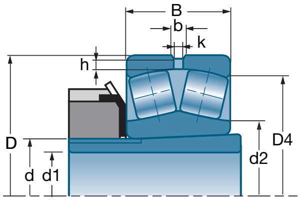


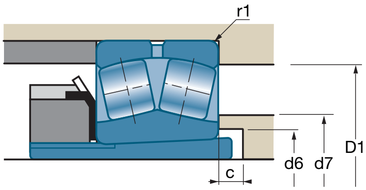
References	Sleeves	Y: Fa/Fr ≤ e	Y: Fa/Fr > e	Yo	rpm**	rpm**	c (mm)	d6 min (mm)	d7 max (mm)	d2 ≈ (mm)	D1 max (mm)	D4 ≈ (mm)	r1 max (mm)	kg
* 22205 EK	H305	2	2.98	1.96	8600	11000	5	28	30	30	47	46	1	0.160
21305 VK	H305	2.33	3.47	2.28	6800	9100	5	31	33	34	55	52	1.1	0.254
* 22206 EK	H306	2.15	3.2	2.1	7200	9300	5	33	37	37	57	55	1	0.260
21306 VK	H306	2.45	3.64	2.39	5800	7700	5	36	39	40	65	60	1.1	0.384
* 22207 EK	H307	2.21	3.29	2.16	6100	7900	5	39	43	45	66	63	1.1	0.420
21307 VK	H307	2.48	3.69	2.42	5200	6900	7	39	44	46	71	68	1.5	0.505
* 22208 EK	H308	2.47	3.67	2.41	5500	7100	5	44	49	50	74	71	1.1	0.500
21308 VK	H308	2.55	3.8	2.5	4500	6100	5	44	51	53	81	76	1.5	0.705
* 22308 EK	H2308	1.87	2.79	1.83	4100	5300	5	45	50	52	83	78	1.5	1.000
* 22209 EK	H309	2.64	3.93	2.58	5100	6600	7	50	53	54	79	76	1.1	0.545
21309 VK	H309	2.64	3.93	2.58	4100	5400	5	50	57	59	91	85	1.5	0.935
* 22309 EK	H2309	1.9	2.83	1.86	3700	4800	5	50	56	58	93	87	1.5	1.340
* 22210 EK	H310	2.84	4.23	2.78	4800	6200	9	55	57	59	84	81	1.1	0.577
21310 VK	H310	2.71	4.04	2.65	3700	4900	5	55	63	66	99	93	2	1.226
* 22310 EK	H2310	1.87	2.79	1.83	3400	4400	5	56	61	63	101	95	2	1.800
* 22211 EK	H311	2.95	4.4	2.89	4300	5500	10	60	64	66	93	90	1.5	0.766
21311 VK	H311	2.82	4.2	2.76	3300	4500	6	60	70	73	109	102	2	1.520
* 22311 EK	H2311	1.87	2.79	1.83	3100	4000	6	61	66	68	111	104	2	2.270
* 22212 EK	H312	2.84	4.23	2.78	3900	5100	9	65	70	71	103	99	1.5	1.070
21312 VK	H312	2.81	4.19	2.75	3100	4100	6	65	76	79	118	110	2.1	1.961
* 22312 EK	H2312	1.95	2.9	1.91	2900	3700	6	66	72	75	120	113	2.1	2.780
* 22213 EK	H313	2.79	4.15	2.73	3600	4700	8	70	76	78	113	107	1.5	1.450
21313 VK	H313	2.91	4.33	2.84	2900	3800	6	70	81	85	128	120	2.1	2.380
* 22313 EK	H2313	2.06	3.06	2.01	2700	3400	6	72	78	81	130	122	2.1	3.370
* 22214 EK	H314	3.01	4.48	2.94	3400	4400	11	75	81	84	118	113	1.5	1.520
21314 VK	H314	2.9	4.31	2.83	2700	3600	6	75	87	91	138	127	2.1	2.950
* 22314 EK	H2314	2	2.98	1.96	2500	3200	6	77	83	85	140	131	2.1	4.100
* 22215 EK	H315	3.14	4.67	3.07	3200	4200	12	80	86	88	123	118	1.5	1.560
21315 VK	H315	2.94	4.37	2.87	2500	3400	6	80	93	97	148	137	2.1	3.550
* 22315 EK	H2315	2	2.98	1.96	2300	3000	6	82	89	91	150	139	2.1	5.000

** These are the speed limits according to the SNR concept (see pages 85 to 87).

SNR

Double-row spherical roller bearings *(continued)*

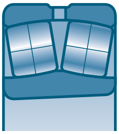
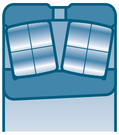
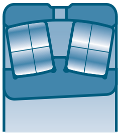




d1	References	Sleeves	d	D	B	b	k	h	C	C_0	e
mm			mm	mm	mm	mm	mm	mm	10^3N	10^3N	
70	* 22216 EK	H316	80	140	33	7.9	3.5	5.5	265	287	0.22
	21316 VK	H316	80	170	39			6.0	305	305	0.23
	* 22316 EK	H2316	80	170	58	10.4	5.0	6.0	515	522	0.34
75	* 22217 EK	H317	85	150	36	7.9	3.5	5.5	308	330	0.22
	21317 VK	H317	85	180	41			7.0	355	365	0.23
	* 22317 EK	H2317	85	180	60	11.0	5.0	7.0	570	604	0.32
80	* 22218 EK	H318	90	160	40	10.2	4.5	5.5	366	398	0.23
	* 23218 EK	H2318	90	160	52.4	8.9	4.0	5.5	445	513	0.3
	21318 VK	H318	90	190	43			7.0	385	400	0.23
	* 22318 EK	H2318	90	190	64	11.6	5.0	7.0	636	652	0.33
85	* 22219 EK	H319	95	170	43	9.9	4.5	6.0	395	417	0.23
	* 22319 EK	H2319	95	200	67	12.2	6.0	7.0	696	751	0.32
90	* 23120 EK	H3120	100	165	52	8.4	4.0	5.5	448	575	0.28
	* 22220 EK	H320	100	180	46	11.2	5.0	6.0	449	495	0.24
	* 23220 EK	H2320	100	180	60.3	9.4	4.5	6.0	558	661	0.31
	* 22320 EK	H2320	100	215	73	13.3	6.0	7.0	787	844	0.34
100	* 23022 EK	H322	110	170	45	7.8	3.5	4.4	397	517	0.23
	* 23122 EK	H3122	110	180	56	8.9	4.0	5.5	521	669	0.28
	* 22222 EK	H322	110	200	53	12.2	6.0	6.0	573	643	0.25
	* 23222 EK	H2322	110	200	69.8	10.5	5.0	6.0	716	869	0.32
	* 22322 EK	H2322	110	240	80	15.6	7.0	7.0	928	972	0.31
110	* 23024 EK	H3024	120	180	46	7.8	3.5	4.4	424	577	0.22
	* 23124 EK	H3124	120	200	62	10.0	4.5	5.5	630	820	0.28
	* 22224 EK	H3124	120	215	58	12.2	6.0	6.0	654	753	0.25
	* 23224 EK	H2324	120	215	76	11.0	5.0	6.0	815	998	0.32
	* 22324 EK	H2324	120	260	86	18.0	8.0	7.0	1110	1280	0.32
115	* 23026 EK	H3026	130	200	52	8.9	4.0	4.4	538	721	0.22
	* 23126 EK	H3126	130	210	64	10.0	4.5	5.5	675	906	0.27
	* 22226 EK	H3126	130	230	64	13.2	6.0	7.0	768	898	0.25
	* 23226 EK	H2326	130	230	80	11.6	5.0	7.0	912	1130	0.32
	* 22326 EK	H2326	130	280	93	18.9	9.0	8.5	1260	1400	0.33
125	* 23028 EK	H3028	140	210	53	8.9	4.0	4.4	568	783	0.22
	* 23128 EK	H3128	140	225	68	10.5	5.0	6.0	763	1030	0.26

* indicate bearings of the range SNR PREMIER

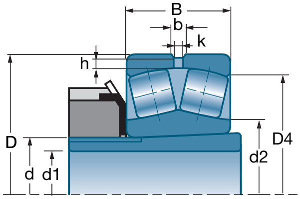
Spherical double-row rollers with tapered bore and adapter sleeves *(continued)*

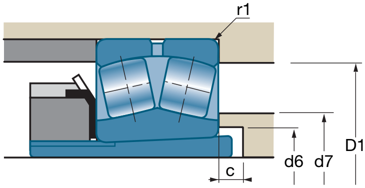




References	Sleeves	Y: Fa/Fr ≤ e	Y: Fa/Fr > e	Yo	rpm**	rpm**	c mm	d6 min mm	d7 max mm	d2 ≈ mm	D1 max mm	D4 ≈ mm	r1 max mm	kg
* 22216 EK	H316	3.14	4.67	3.07	3000	3900	12	85	92	94	131	127	2	2.041
21316 VK	H316	2.95	4.4	2.89	2400	3200	6	85	99	104	158	145	2.1	4.210
* 22316 EK	H2316	2	2.98	1.96	2200	2800	6	88	95	98	160	148	2.1	5.930
* 22217 EK	H317	3.07	4.57	3	2800	3600	12	91	98	100	141	137	2	2.520
21317 VK	H317	2.99	4.46	2.93	2200	3000	7	91	105	111	166	154	3	5.160
* 22317 EK	H2317	2.09	3.11	2.04	2000	2600	7	94	103	107	166	157	3	6.961
* 22218 EK	H318	2.9	4.31	2.83	2700	3500	10	96	102	105	151	144	2	3.240
* 23218 EK	H2318	2.25	3.34	2.2	2200	2900	18	100	108	104	149	141	2	4.210
21318 VK	H318	3	4.47	2.93	2100	2800	7	96	112	117	176	162	3	6.030
* 22318 EK	H2318	2.06	3.06	2.01	1900	2500	7	100	114	110	176	166	3	8.160
* 22219 EK	H319	2.95	4.4	2.89	2500	3200	9	102	114	110	158	153	2.1	3.850
* 22319 EK	H2319	2.09	3.11	2.04	1800	2300	7	105	122	122	186	174	3	9.610
* 23120 EK	H3120	2.39	3.56	2.34	2200	2900	7	107	112	114	154	147	2	4.400
* 22220 EK	H320	2.84	4.23	2.78	2400	3100	8	108	114	118	170	161	2.1	4.720
* 23220 EK	H2320	2.18	3.24	2.13	1900	2600	19	110	117	117	168	159	2.1	6.220
* 22320 EK	H2320	1.98	2.94	1.93	1700	2200	7	110	129	127	201	187	3	12.188
* 23022 EK	H322	2.95	4.4	2.89	2300	3000	14	118	125	125	161	155	2	3.450
* 23122 EK	H3122	2.43	3.61	2.37	2000	2700	7	118	128	126	169	161	2	5.310
* 22222 EK	H322	2.69	4	2.63	2200	2800	6	118	126	130	190	179	2.1	6.879
* 23222 EK	H2322	2.12	3.15	2.07	1700	2300	17	121	130	130	188	176	2.1	8.990
* 22322 EK	H2322	2.09	3.11	2.04	1600	2000	7	121	133	139	226	209	3	16.514
* 23024 EK	H3024	3.14	4.67	3.07	2200	2900	7	127	135	134	171	165	2	3.870
* 23124 EK	H3124	2.43	3.61	2.37	1800	2400	7	128	140	138	189	179	2	7.440
* 22224 EK	H3124	2.74	4.08	2.68	1900	2500	11	128	144	141	203	193	2.1	8.580
* 23224 EK	H2324	2.09	3.11	2.04	1600	2100	17	131	141	141	203	190	2.1	11.275
* 22324 EK	H2324	2.09	3.11	2.04	1400	1800	7	131	157	156	246	225	3	21.72
* 23026 EK	H3026	3.01	4.48	2.94	2000	2600	8	137	148	145	191	183	2	5.640
* 23126 EK	H3126	2.51	3.74	2.45	1700	2300	8	138	150	148	199	189	2	8.300
* 22226 EK	H3126	2.69	4	2.63	1800	2400	8	138	154	152	216	206	3	10.600
* 23226 EK	H2326	2.12	3.15	2.07	1500	2000	21	142	151	151	216	204	3	13.550
* 22326 EK	H2326	2.06	3.06	2.01	1300	1700	8	142	167	164	263	243	4	26.354
* 23028 EK	H3028	3.14	4.67	3.07	1900	2500	8	147	158	155	201	193	2	6.130
* 23128 EK	H3128	2.55	3.8	2.5	1600	2100	8	149	162	159	213	203	2.1	10.770

** These are the speed limits according to the SNR concept (see pages 85 to 87).

Double-row spherical roller bearings *(continued)*

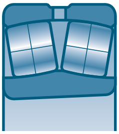
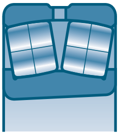
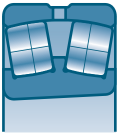




d1	10VDXΔ20	Sleeves	d	D	B	b	k	h	C	C0	e
mm	References		mm	mm	mm	mm	mm	mm	10^3N	10^3N	
125	* 22228 EK	H3128	140	250	68	14.2	7.0	7.0	867	1010	0.25
	* 23228 EK	H2328	140	250	88	12.6	6.0	7.0	1090	1370	0.33
	* 22328 EK	H2328	140	300	102	18.9	9.0	8.5	1470	1720	0.33
135	* 23030 EK	H3030	150	225	56	10.0	4.5	5.1	628	893	0.21
	* 23130 EK	H3130	150	250	80	12.6	6.0	6.0	1010	1350	0.29
	* 22230 EK	H3130	150	270	73	15.3	7.0	7.0	1020	1220	0.25
	* 23230 EK	H2330	150	270	96	13.7	6.0	7.0	1280	1620	0.33
	* 22330 EK	H2330	150	320	108	19.9	9.0	8.5	1660	1890	0.34
140	* 23032 EK	H3032	160	240	60	10.5	5.0	5.1	711	1000	0.21
	* 23132 EK	H3132	160	270	86	13.7	6.0	6.0	1160	1580	0.29
	* 22232 EK	H3132	160	290	80	16.9	8.0	7.0	1160	1390	0.25
	* 23232 EK	H2332	160	290	104	14.9	7.0	7.0	1470	1890	0.33
	* 22332 EK	H2332	160	340	114	20.3	10.0	8.5	1850	2210	0.33
150	* 23034 EK	H3034	170	260	67	11.6	5.0	5.1	869	1240	0.22
	* 23134 EK	H3134	170	280	88	13.7	6.0	6.0	1200	1700	0.28
	* 22234 EK	H3134	170	310	86	18.0	8.0	8.5	1330	1610	0.26
	23234 VK	H2334	170	310	110	13.9	7.5	8.5	1210	1830	0.32
	* 22334 EK	H2334	170	360	120	20.3	10.0	8.5	2100	2630	0.32
160	* 23036 EK	H3036	180	280	74	13.2	6.0	5.1	1020	1450	0.23
	* 23136 EK	H3136	180	300	96	14.9	7.0	7.0	1420	1960	0.29
	* 22236 EK	H3136	180	320	86	18.0	8.0	8.5	1380	1660	0.25
	23236 VK	H2336	180	320	112	13.9	7.5	8.5	1290	2050	0.31
	22336 VK	H2336	180	380	126	23.1	12.0	8.5	1580	2190	0.31
170	* 23038 EK	H3038	190	290	75	13.2	6.0	5.1	1080	1570	0.22
	23138 VK	H3138	190	320	104	20.0	7.5	7.0	1180	1950	0.29
	* 22238 EK	H3138	190	340	92	19.6	9.0	8.5	1540	1870	0.25
	23238 VK	H2338	190	340	120	16.7	9.0	8.5	1480	2370	0.32
	22338 VK	H2338	190	400	132	22.3	9.0	10.0	1830	2650	0.33
180	* 23040 EK	H3040	200	310	82	14.3	7.0	5.1	1250	1790	0.23
	23140 VK	H3140	200	340	112	16.7	9.0	7.0	1290	2120	0.3
	* 22240 EK	H3140	200	360	98	20.0	10.0	8.5	1720	2100	0.25
	23240 VK	H2340	200	360	128	16.7	9.0	8.5	1630	2700	0.32
	22340 VK	H2340	200	420	138	22.3	12.0	10.0	1830	2650	0.31

* indicate bearings of the range SNR PREMIER

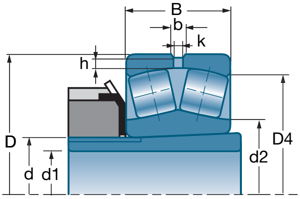
Spherical double-row rollers with tapered bore and adapter sleeves *(continued)*

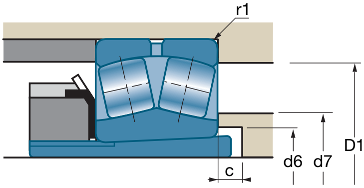
  

References	Sleeves	Y Fa/Fr ≤ e	Y Fa/Fr > e	Yo	rpm**	rpm**	c	d6 min	d7 max	d2 ≈	D1 max	D4 ≈	r1 max	
					rpm**	rpm**	mm	mm	mm	mm	mm	mm	mm	kg
* 22228 EK	H3128	2.74	4.08	2.68	1700	2200	8	149	166	163	236	224	3	14.000
* 23228 EK	H2328	2.06	3.06	2.01	1400	1800	22	152	165	162	236	220	3	18.400
* 22328 EK	H2328	2.03	3.02	1.98	1200	1600	8	152	175	181	283	261	4	33.390
* 23030 EK	H3030	3.2	4.77	3.13	1800	2300	8	158	169	167	214	207	2.1	7.750
* 23130 EK	H3130	2.35	3.5	2.3	1400	1900	8	160	176	171	238	223	2.1	15.720
* 22230 EK	H3130	2.74	4.08	2.68	1500	2000	15	160	180	177	256	242	3	17.600
* 23230 EK	H2330	2.03	3.02	1.98	1300	1700	20	163	177	174	256	237	2.1	22.800
* 22330 EK	H2330	2	2.98	1.96	1200	1500	8	163	192	188	303	279	4	41.200
* 23032 EK	H3032	3.2	4.77	3.13	1700	2200	8	168	180	177	229	221	2.1	9.380
* 23132 EK	H3132	2.35	3.5	2.3	1300	1800	8	170	185	185	258	240	2.1	20.120
* 22232 EK	H3132	2.69	4	2.63	1400	1900	14	170	191	190	276	260	3	22.800
* 23232 EK	H2332	2.03	3.02	1.98	1200	1600	18	174	189	186	276	259	3	28.710
* 22332 EK	H2332	2.03	3.02	1.98	1100	1400	8	174	207	205	323	296	4	50.000
* 23034 EK	H3034	3.07	4.57	3	1600	2000	8	179	194	190	249	238	2.1	13.000
* 23134 EK	H3134	2.39	3.56	2.34	1300	1700	8	180	204	195	268	250	2.1	21.550
* 22234 EK	H3134	2.6	3.87	2.54	1300	1700	10	180	204	201	293	277	4	28.000
23234 VK	H2334	2.13	3.17	2.08	1000	1300	18	185	203	199	293	264	4	36.100
* 22334 EK	H2334	2.09	3.11	2.04	1000	1200	8	185	214	223	343	313	4	59.000
* 23036 EK	H3036	2.95	4.4	2.89	1400	1900	8	189	207	201	270	255	2.1	16.900
* 23136 EK	H3136	2.32	3.45	2.26	1200	1600	8	191	208	205	286	267	3	27.210
* 22236 EK	H3136	2.74	4.08	2.68	1300	1700	18	191	203	209	303	287	4	28.700
23236 VK	H2336	2.17	3.23	2.12	1000	1300	22	195	213	210	303	274	4	39.600
22336 VK	H2336	2.15	3.2	2.1	850	1100	8	195	226	223	363	313	4	66.300
* 23038 EK	H3038	3.01	4.48	2.94	1400	1800	9	199	214	213	279	266	2.1	17.200
23138 VK	H3138	2.33	3.47	2.28	1000	1300	9	202	221	218	306	278	3	33.500
* 22238 EK	H3138	2.74	4.08	2.68	1200	1600	21	202	215	222	323	305	4	35.000
23238 VK	H2338	2.13	3.17	2.08	950	1200	21	206	225	223	323	290	4	47.400
22338 VK	H2338	1.88	2.8	1.84	800	1100	9	206	241	240	380	332	5	75.000
* 23040 EK	H3040	2.95	4.4	2.89	1300	1700	9	210	227	223	300	283	2.1	22.560
23140 VK	H3140	2.28	3.39	2.23	950	1200	9	212	233	230	326	294	3	41.400
* 22240 EK	H3140	2.74	4.08	2.68	1100	1500	23	212	227	234	343	323	4	42.000
23240 VK	H2340	2.12	3.16	2.08	900	1100	19	216	237	238	343	307	4	58.100
22340 VK	H2340	2.17	3.24	2.12	750	1000	9	216	247	302	400	346	5	97.000

** These are the speed limits according to the SNR concept (see pages 85 to 87).

Double-row spherical roller bearings *(continued)*

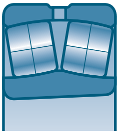
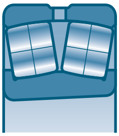
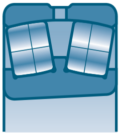




d1		Sleeves	d	D	B	b	k	h	C	C_0	e
mm	References		mm	mm	mm	mm	mm	mm	10^3N	10^3N	
200	* 23044 EK	H3044H	220	340	90	15.4	7.0	6.2	1450	2110	0.23
	23144 VK	H3144H	220	370	120	20.7	9.0	8.5	1540	2600	0.29
	* 22244 EK	H3144H	220	400	108	20.6	11.0	8.5	2100	2690	0.25
	* 23244 EK	H2344H	220	400	144	20.0	10.0	8.5	2750	3830	0.34
	22344 VK	H2344H	220	460	145	22.3	12.0	10.0	2110	3150	0.3
220	23048 VK	H3048H	240	360	92	13.9	7.5	6.2	1090	2050	0.24
	23148 VK	H3148H	240	400	128	16.7	9.0	8.5	1720	2950	0.29
	22248 VK	H3148H	240	440	120	22.3	12.0	8.5	1920	2470	0.29
	23248 VK	H2348H	240	440	160	22.3	12.0	8.5	2420	3950	0.33
	22348 VK	H2348H	240	500	155	22.3	12.0	10.0	2450	3700	0.29
240	23052 VK	H3052H	260	400	104	16.7	9.0	7.3	1490	2430	0.25
	23152 VK	H3152H	260	440	144	16.7	9.0	8.5	2140	3750	0.29
	23252 VK	H2352H	260	480	174	22.3	12.0	13.0	2700	4450	0.33
260	23056 VK	H3056H	280	420	106	16.7	9.0	7.3	1500	2850	0.23
	23156 VK	H3156H	280	460	146	16.7	9.0	10.0	2240	4050	0.28
	23256 VK	H2356H	280	500	176	22.3	12.0	10.0	2900	4900	0.32
	22356 VK	H2356H	280	580	175	22.3	12.0	13.0	3429	5182	0.32
280	23060 VK	H3060H	300	460	118	16.7	9.0	7.3	1820	3350	0.23
	23160 VK	H3160H	300	500	160	16.7	9.0	10.0	2632	4645	0.32
	23260 VK	H3260H	300	540	192	22.3	12.0	13.0	3350	5600	0.32
300	23064 VK	H3064H	320	480	121	16.7	9.0	7.3	1920	3600	0.22
	23164 VK	H3164H	320	540	176	22.3	12.0	10.0	3050	5500	0.29
320	23068 VK	H3068H	340	520	133	22.3	12.0	8.0	2270	4200	0.23
	23168 VK	H3168H	340	580	190	22.3	12.0	10.0	3500	6100	0.29
340	23072 VK	H3072H	360	540	134	22.3	12.0	9.0	2390	4550	0.22
	23172 VK	H3172H	360	600	192	22.3	12.0	10.0	3681	6683	0.29
360	23076 VK	H3076H	380	560	135	22.3	12.0	9.0	2420	4700	0.21
380	23080 VK	H3080H	400	600	148	22.3	12.0	10.0	2926	5648	0.22

* indicate bearings of the range SNR PREMIER

Spherical double-row rollers with tapered bore and adapter sleeves *(continued)*

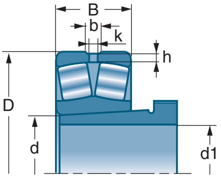




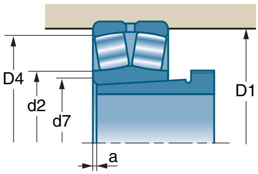
References	Sleeves	Y: Fa/Fr ≤ e	Y: Fa/Fr > e	Yo	rpm**	rpm**	c mm	d6 min mm	d7 max mm	d2 ≈ mm	D1 max mm	D4 ≈ mm	r1 max mm	kg
* 23044 EK	H3044H	2.95	4.4	2.89	1200	1500	9	231	249	246	327	310	3	31.450
23144 VK	H3144H	2.31	3.44	2.26	900	1100	9	233	256	253	353	321	0.4	53.000
* 22244 EK	H3144H	2.74	4.08	2.68	1000	1300	21	233	254	264	383	358	4	59.000
* 23244 EK	H2344H	2	2.98	1.96	850	1100	10	236	259	261	383	350	4	74.800
22344 VK	H2344H	2.23	3.32	2.18	700	950	9	236	273	332	440	380	5	122.000
23048 VK	H3048H	2.84	4.23	2.78	1000	1300	11	251	267	270	348	324	3	32.700
23148 VK	H3148H	2.35	3.5	2.3	800	1000	11	254	277	276	381	348	4	65.500
22248 VK	H3148H	2.3	3.42	2.25	730	950	19	254	284	333	423	377	4	85.000
23248 VK	H2348H	2.07	3.07	2.02	750	950	6	257	281	285	423	372	4	112.000
22348 VK	H2348H	2.29	3.42	2.24	660	850	11	257	297	362	480	414	5	156.000
23052 VK	H3052H	2.73	4.07	2.67	950	1200	11	272	292	284	385	364	4	45.800
23152 VK	H3152H	2.29	3.42	2.24	750	950	11	276	302	302	420	380	4	91.600
23252 VK	H2352H	2.06	3.07	2.02	690	850	2	278	312	364	460	405	5	142.000
23056 VK	H3056H	3	4.46	2.93	900	1100	12	292	315	311	405	379	4	53.310
23156 VK	H3156H	2.37	3.53	2.32	700	900	12	296	314	322	414	401	5	98.000
23256 VK	H2356H	2.12	3.16	2.08	650	800	11	299	239	327	480	426	5	152.000
22356 VK	H2356H	2.13	3.17	2.08	950	670	12	299	345	437	554	493	6	232.000
23060 VK	H3060H	2.95	4.4	2.89	800	1000	12	313	336	376	445	414	4	73.100
23160 VK	H3160H	2.1	3	2	670	850	12	318	245	346	480	435	5	129.700
23260 VK	H3260H	2.12	3.15	2.07	610	750	12	321	356	415	520	459	5	195.000
23064 VK	H3064H	3.01	4.49	2.95	750	1000	12	334	357	355	465	433	4	79.100
23164 VK	H3164H	2.31	3.44	2.26	620	800	12	338	373	369	520	468	5	168.500
23068 VK	H3068H	2.98	4.43	2.91	700	950	14	355	385	426	502	468	5	105.000
23168 VK	H3168H	2.29	3.42	2.24	580	750	14	360	394	455	560	501	5	202.200
23072 VK	H3072H	3.07	4.56	3	700	900	14	375	403	400	522	488	5	110.700
23172 VK	H3172H	2.36	3.51	2.31	560	700	14	380	418	475	580	522	5	223.800
23076 VK	H3076H	3.16	4.71	3.09	670	850	15	396	425	466	542	508	5	116.200
23080 VK	H3080H	3.08	4.59	3.02	600	750	15	417	450	497	582	542	5	155.000

** These are the speed limits according to the SNR concept (see pages 85 to 87).

SNR

Double-row spherical roller bearings *(continued)*

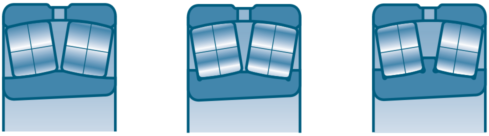




d1		Sleeves	d	D	B	b	k	h	C	C_0	e
mm	References		mm	mm	mm	mm	mm	mm	10^3N	10^3N	
20	* 22205 EK		25	52	18	3.0	1.5	2.8	54.40	46.10	0.34
	21305 VK		25	62	17			3.5	48.50	37.50	0.29
25	* 22206 EK		30	62	20	4.4	2.0	2.8	72.00	64.50	0.31
	21306 VK		30	72	19			3.5	63.00	50.00	0.28
30	* 22207 EK		35	72	23	4.9	2.0	3.5	95.40	92.00	0.31
	21307 VK		35	80	21			4.5	79.00	66.00	0.27
35	* 22208 EK	AH308	40	80	23	5.4	2.5	3.5	110.00	105.00	0.27
	21308 VK	AH308	40	90	23			4.5	96.00	84.00	0.26
	* 22308 EK	AH2308	40	90	33	5.9	3.0	4.5	161.00	152.00	0.36
40	* 22209 EK	AH309	45	85	23	5.8	2.5	3.5	115.00	113.00	0.26
	21309 VK	AH309	45	100	25			4.5	119.00	106.00	0.26
	* 22309 EK	AH2309	45	100	36	6.4	3.0	4.5	196.00	187.00	0.36
45	* 22210 EK	AHX310	50	90	23	5.8	2.5	3.5	124.00	124.00	0.24
	21310 VK	AHX310	50	110	27			5.5	137.00	128.00	0.25
	* 22310 EK	AHX2310	50	110	40	7.4	3.5	5.5	237.00	232.00	0.36
50	* 22211 EK	AHX311	55	100	25	6.3	3.0	4.5	147.00	148.00	0.23
	21311 VK	AHX311	55	120	29			5.5	167.00	158.00	0.24
	* 22311 EK	AHX2311	55	120	43	7.8	3.5	5.5	282.00	274.00	0.36
55	* 22212 EK	AHX312	60	110	28	6.9	3.0	4.5	178.00	181.00	0.24
	21312 VK	AHX312	60	130	31			6.0	186.00	179.00	0.24
	* 22312 EK	AHX2312	60	130	46	8.7	4.0	6.0	323.00	319.00	0.35
60	* 22213 EK	AH313G	65	120	31	7.8	3.5	4.5	215.00	224.00	0.24
	21313 VK	AH313G	65	140	33			6.0	224.00	215.00	0.23
	* 22313 EK	AH2313G	65	140	48	9.2	4.0	6.0	351.00	343.00	0.33
65	* 22214 EK	AH314G	70	125	31	7.4	3.5	4.5	224.00	240.00	0.22
	21314 VK	AH314G	70	150	35			6.0	246.00	240.00	0.23
	* 22314 EK	AHX2314G	70	150	51	10.4	5.0	6.0	400.00	396.00	0.34
70	* 22215 EK	AH315	75	130	31	7.4	3.5	4.5	232.00	249.00	0.22
	21315 VK	AH315	75	160	37			6.0	280.00	275.00	0.23
	* 22315 EK	AHX2315G	75	160	55	10.3	5.0	6.0	467.00	467.00	0.34

* indicate bearings of the range SNR PREMIER

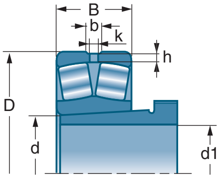
Spherical double-row rollers with tapered bore and withdrawal sleeves

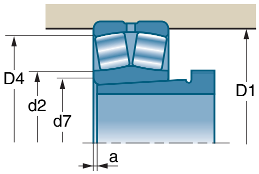


References	Sleeves	Y: Fa/Fr ≤ e	Y: Fa/Fr > e	Yo	rpm**	rpm**	d7 max mm	a ≈ mm	d2 ≈ mm	D1 max mm	D4 ≈ mm	r1 max mm	kg
* 22205 EK		2.00	2.98	1.96	8600	11000	30		30	47	46	1.0	0.160
21 305 VK		2.33	3.47	2.28	6800	9100	33		34	55	52	1.1	0.254
* 22206 EK		2.15	3.20	2.10	7200	9300	37		37	57	55	1.0	0.260
21306 VK		2.45	3.64	2.39	5800	7700	39		40	65	60	1.1	0.384
* 22207 EK		2.21	3.29	2.16	6100	7900	43		45	66	63	1.1	0.420
21307 VK		2.48	3.69	2.42	5200	6900	44		46	71	68	1.5	0.505
* 22208 EK	AH308	2.47	3.67	2.41	5500	7100	49	3	50	74	71	1.1	0.500
21308 VK	AH308	2.55	3.80	2.50	4500	6100	51	3	53	81	76	1.5	0.705
* 22308 EK	AH2308	1.87	2.79	1.83	4100	5300	50	3	52	83	78	1.5	1.000
* 22209 EK	AH309	2.64	3.93	2.58	5100	6600	53	3	54	79	76	1.1	0.545
21309 VK	AH309	2.64	3.93	2.58	4100	5400	57	3	59	91	85	1.5	0.935
* 22309 EK	AH2309	1.90	2.83	1.86	3700	4800	56	3	58	93	87	1.5	1.340
* 22210 EK	AHX310	2.84	4.23	2.78	4800	6200	57	3	59	84	81	1.1	0.577
21310 VK	AHX310	2.71	4.04	2.65	3700	4900	63	3	66	99	93	2.0	1.226
* 22310 EK	AHX2310	1.87	2.79	1.83	3400	4400	61	3	63	101	95	2.0	1.800
* 22211 EK	AHX311	2.95	4.40	2.89	4300	5500	64	3	66	93	90	1.5	0.766
21311 VK	AHX311	2.82	4.20	2.76	3300	4500	70	3	73	109	102	2.0	1.520
* 22311 EK	AHX2311	1.87	2.79	1.83	3100	4000	66	3	68	111	104	2.0	2.270
* 22212 EK	AHX312	2.84	4.23	2.78	3900	5100	70	3	71	103	99	1.5	1.070
21312 VK	AHX312	2.81	4.19	2.75	3100	4100	76	3	79	118	110	2.1	1.961
* 22312 EK	AHX2312	1.95	2.90	1.91	2900	3700	72	3	75	120	113	2.1	2.780
* 22213 EK	AH313G	2.79	4.15	2.73	3600	4700	76	3	78	113	107	1.5	1.450
21313 VK	AH313G	2.91	4.33	2.84	2900	3800	81	3	85	128	120	2.1	2.380
* 22313 EK	AH2313G	2.06	3.06	2.01	2700	3400	78	3	81	130	122	2.1	3.370
* 22214 EK	AH314G	3.01	4.48	2.94	3400	4400	81	4	84	118	113	1.5	1.520
21314 VK	AH314G	2.90	4.31	2.83	2700	3600	87	4	91	138	127	2.1	2.950
* 22314 EK	AHX2314G	2.00	2.98	1.96	2500	3200	83	4	85	140	131	2.1	4.100
* 22215 EK	AH315	3.14	4.67	3.07	3200	4200	86	4	88	123	118	1.5	1.560
21315 VK	AH315	2.94	4.37	2.87	2500	3400	93	4	97	148	137	2.1	3.550
* 22315 EK	AHX2315G	2.00	2.98	1.96	2300	3000	89	4	91	150	139	2.1	5.000

** These are the speed limits according to the SNR concept (see pages 85 to 87).

Double-row spherical roller bearings *(continued)*

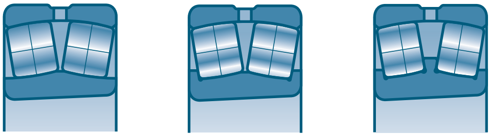




d1		Sleeves	d	D	B	b	k	h	C	C_0	e
mm	References		mm	mm	mm	mm	mm	mm	10^3N	10^3N	
75	* 22216 EK	AH316	80	140	33	7.9	3.5	5.5	265.00	287.00	0.22
	21316 VK	AH316	80	170	39			6.0	305.00	305.00	0.23
	* 22316 EK	AHX2316	80	170	58	10.4	5.0	6.0	515.00	522.00	0.34
80	* 22217 EK	AHX317	85	150	36	7.9	3.5	5.5	308.00	330.00	0.22
	21317 VK	AHX317	85	180	41			7.0	355.00	365.00	0.23
	* 22317 EK	AHX2317	85	180	60	11.0	5.0	7.0	570.00	604.00	0.32
85	* 22218 EK	AHX318	90	160	40	10.2	4.5	5.5	366.00	398.00	0.23
	* 23218 EK	AHX3218	90	160	52.4	8.9	4.0	5.5	445.00	513.00	0.30
	21318 VK	AHX318	90	190	43			7.0	385.00	400.00	0.23
	* 22318 EK	AHX2318	90	190	64	11.6	5.0	7.0	636.00	652.00	0.33
90	* 22219 EK	AHX319	95	170	43	9.9	4.5	6.0	395.00	417.00	0.23
	* 22319 EK	AHX2319	95	200	67	12.2	6.0	7.0	696.00	751.00	0.32
95	* 23120 EK	AHX3120	100	165	52	8.4	4.0	5.5	448.00	575.00	0.28
	* 22220 EK	AHX320	100	180	46	11.2	5.0	6.0	449.00	495.00	0.24
	* 23220 EK	AHX3220	100	180	60.3	9.4	4.5	6.0	558.00	661.00	0.31
	* 22320 EK	AHX2320	100	215	73	13.3	6.0	7.0	787.00	844.00	0.34
105	* 23022 EK	AHX3121	110	170	45	7.8	3.5	4.4	397.00	517.00	0.23
	* 23122 EK	AHX3122	110	180	56	8.9	4.0	5.5	521.00	669.00	0.28
	* 24122 EK	AH24122	110	180	69	8.4	4.0	5.5	530.00	675.00	0.36
	* 22222 EK	AHX3122	110	200	53	12.2	6.0	6.0	573.00	643.00	0.25
	* 23222 EK	AHX3222G	110	200	69.8	10.5	5.0	6.0	716.00	869.00	0.32
	* 22322 EK	AHX2322G	110	240	80	15.6	7.0	7.0	928.00	972.00	0.31
115	* 23024 EK	AHX3024	120	180	46	7.8	3.5	4.4	424.00	577.00	0.22
	* 24024 EK30	AH24024	120	180	60	7.3	3.5	4.4	465.00	640.00	0.30
	* 23124 EK	AHX3124	120	200	62	10.0	4.5	5.5	630.00	820.00	0.28
	* 24124 EK30	AH24124	120	200	80	10.1	4.5	5.5	695.00	925.00	0.39
	* 22224 EK	AHX3124	120	215	58	12.2	6.0	6.0	654.00	753.00	0.25
	* 23224 EK	AHX3224G	120	215	76	11.0	5.0	6.0	815.00	998.00	0.32
	* 22324 EK	AHX2324G	120	260	86	18.0	8.0	7.0	1110.00	1280.00	0.32
125	* 23026 EK	AHX3026	130	200	52	8.9	4.0	4.4	538.00	721.00	0.22
	* 24026 EK30	AH24026	130	200	69	8.4	4.0	4.4	590.00	795.00	0.32
	* 23126 EK	AHX3126	130	210	64	10.0	4.5	5.5	675.00	906.00	0.27
	* 24126 EK30	AH24126	130	210	80	9.5	4.5	5.5	720.00	965.00	0.35
	* 22226 EK	AHX3126	130	230	64	13.2	6.0	7.0	768.00	898.00	0.25

* indicate bearings of the range SNR PREMIER

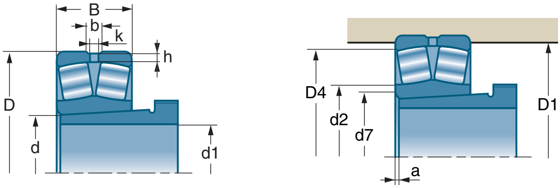
Spherical double-row rollers with tapered bore and withdrawal sleeves *(continued)*



References	Sleeves	Y $\frac{Fa}{Fr} \leq e$	Y $\frac{Fa}{Fr} > e$	Yo	rpm**	rpm**	d7 max mm	a ≈ mm	d2 ≈ mm	D1 max mm	D4 ≈ mm	r1 max mm	kg
* 22216 EK	AH316	3.14	4.67	3.07	3000	3900	92	4	94	131	127	2.0	2.041
21316 VK	AH316	2.95	4.40	2.89	2400	3200	99	4	104	158	145	2.1	4.210
* 22316 EK	AHX2316	2.00	2.98	1.96	2200	2800	95	4	98	160	148	2.1	5.930
* 22217 EK	AHX317	3.07	4.57	3.00	2800	3600	98	4	100	141	137	2.0	2.520
21317 VK	AHX317	2.99	4.46	2.93	2200	3000	105	4	111	166	154	3.0	5.160
* 22317 EK	AHX2317	2.09	3.11	2.04	2000	2600	103	4	107	166	157	3.0	6.961
* 22218 EK	AHX318	2.90	4.31	2.83	2700	3500	102	4	105	151	144	2.0	3.240
* 23218 EK	AHX3218	2.25	3.34	2.20	2200	2900	108	4	104	149	141	2.0	4.210
21318 VK	AHX318	3.00	4.47	2.93	2100	2800	112	4	117	176	162	3.0	6.030
* 22318 EK	AHX2318	2.06	3.06	2.01	1900	2500	114	4	110	176	166	3.0	8.160
* 22219 EK	AHX319	2.95	4.40	2.89	2500	3200	114	4	110	158	153	2.1	3.850
* 22319 EK	AHX2319	2.09	3.11	2.04	1800	2300	122	4	122	186	174	3.0	9.610
* 23120 EK	AHX3120	2.39	3.56	2.34	2200	2900	112	4	114	154	147	2.0	4.400
* 22220 EK	AHX320	2.84	4.23	2.78	2400	3100	114	4	118	170	161	2.1	4.720
* 23220 EK	AHX3220	2.18	3.24	2.13	1900	2600	119	4	118	168	159	2.1	6.220
* 22320 EK	AHX2320	1.98	2.94	1.93	1700	2200	129	4	127	201	187	3.0	12.188
* 23022 EK	AHX3121	2.95	4.40	2.89	2300	3000	125	4	123	161	155	2.0	3.450
* 23122 EK	AHX3122	2.43	3.61	2.37	2000	2700	128	4	125	169	161	2.0	5.310
* 24122 EK	AH24122	1.85	2.76	1.81	1000	1300	128	9	121	169	158	2.0	6.750
* 22222 EK	AHX3122	2.69	4.00	2.63	2200	2800	126	4	130	190	179	2.1	6.879
* 23222 EK	AHX3222G	2.12	3.15	2.07	1700	2300	133	4	130	188	176	2.1	8.990
* 22322 EK	AHX2322G	2.09	3.11	2.04	1600	2000	133	4	139	226	209	3.0	16.514
* 23024 EK	AHX3024	3.14	4.67	3.07	2200	2900	135	4	134	171	165	2.0	3.870
* 24024 EK30	AH24024	2.25	3.34	2.20	1700	2100	129	9	131	171	165	2.0	5.000
* 23124 EK	AHX3124	2.43	3.61	2.37	1800	2400	140	4	138	189	179	2.0	7.440
* 24124 EK30	AH24124	1.74	2.59	1.70	950	1200	131	9	133	189	172	2.0	9.700
* 22224 EK	AHX3124	2.74	4.08	2.68	1900	2500	144	4	141	203	193	2.1	8.580
* 23224 EK	AHX3224G	2.09	3.11	2.04	1600	2100	143	4	139	203	190	2.1	11.275
* 22324 EK	AHX2324G	2.09	3.11	2.04	1400	1800	157	4	156	246	225	3.0	21.720
* 23026 EK	AHX3026	3.01	4.48	2.94	2000	2600	148	4	145	191	183	2.0	5.640
* 24026 EK30	AH24026	2.09	3.11	2.04	1500	1900	139	10	141	191	179	2.0	7.500
* 23126 EK	AHX3126	2.51	3.74	2.45	1700	2300	150	4	148	199	189	2.0	8.300
* 24126 EK30	AH24126	1.92	2.86	1.88	850	1200	142	10	144	199	184	2.0	11.400
* 22226 EK	AHX3126	2.69	4.00	2.63	1800	2400	154	4	151	216	206	3.0	10.600

** These are the speed limits according to the SNR concept (see pages 85 to 87).

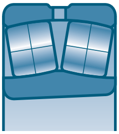
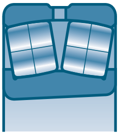
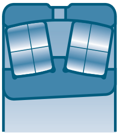
Double-row spherical roller bearings *(continued)*



d1	10VDXΔ20	Sleeves	d	D	B	b	k	h	C	C0	e
mm	References		mm	mm	mm	mm	mm	mm	10^3N	10^3N	
125	* 23226 EK	AHX3226G	130	230	80	11.6	5.0	7.0	912.00	1130.00	0.32
	* 22326 EK	AHX2326G	130	280	93	18.9	9.0	8.5	1260.00	1400.00	0.33
135	* 23028 EK	AHX3028	140	210	53	8.9	4.0	4.4	568.00	783.00	0.22
	* 24028 EK30	AH24028	140	210	69	9.9	4.5	4.4	625.00	900.00	0.31
	* 23128 EK	AHX3128	140	225	68	10.5	5.0	6.0	763.00	1030.00	0.26
	* 24128 EK30	AH24128	140	225	85	10.7	4.5	6.0	830.00	1120.00	0.36
	* 22228 EK	AHX3128	140	250	68	14.2	7.0	7.0	867.00	1010.00	0.25
	* 23228 EK	AHX3228G	140	250	88	12.6	6.0	7.0	1090.00	1370.00	0.33
	* 22328 EK	AHX2328G	140	300	102	18.9	9.0	8.5	1470.00	1720.00	0.33
145	* 23030 EK	AHX3030	150	225	56	10.0	4.5	5.1	628.00	893.00	0.21
	* 24030 EK30	AH24030	150	225	75	9.3	4.5	5.1	715.00	1000.00	0.31
	* 23130 EK	AHX3130G	150	250	80	12.6	6.0	6.0	1010.00	1350.00	0.29
	* 24130 EK30	AH24130	150	250	100	10.4	5.0	6.0	1070.00	1400.00	0.38
	* 22230 EK	AHX3130G	150	270	73	15.3	7.0	7.0	1020.00	1220.00	0.25
	* 23230 EK	AHX3230G	150	270	96	13.7	6.0	7.0	1280.00	1620.00	0.33
	* 22330 EK	AHX2330G	150	320	108	19.9	9.0	8.5	1660.00	1890.00	0.34
150	* 23032 EK	AH3032	160	240	60	10.5	5.0	5.1	711.00	1000.00	0.21
	* 24032 EK30	AH24032	160	240	80	9.4	4.5	5.1	785.00	1090.00	0.30
	* 23132 EK	AH3132G	160	270	86	13.7	6.0	6.0	1160.00	1580.00	0.29
	* 24132 EK30	AH24132	160	270	109	11.7	5.0	6.0	1260.00	1740.00	0.38
	* 22232 EK	AH3132G	160	290	80	16.9	8.0	7.0	1160.00	1390.00	0.25
	* 23232 EK	AH3232G	160	290	104	14.9	7.0	7.0	1470.00	1890.00	0.33
	* 22332 EK	AH2332G	160	340	114	20.3	10.0	8.5	1850.00	2210.00	0.33
160	* 23034 EK	AH3034	170	260	67	11.6	5.0	5.1	869.00	1240.00	0.22
	* 24034 EK30	AH34034	170	260	90	10.5	5.0	5.1	1010.00	1430.00	0.32
	* 23134 EK	AH3134G	170	280	88	13.7	6.0	6.0	1200.00	1700.00	0.28
	* 24134 EK30	AH24134	170	280	109	13.2	6.0	6.0	1310.00	1840.00	0.37
	* 22234 EK	AH3134G	170	310	86	18.0	8.0	8.5	1330.00	1610.00	0.26
	23234 VK	AH3234G	170	310	110	13.9	7.5	8.5	1210.00	1830.00	0.32
	* 22334 EK	AH2334G	170	360	120	20.3	10.0	8.5	2100.00	2630.00	0.32
170	* 23036 EK	AH3036	180	280	74	13.2	6.0	5.1	1020.00	1450.00	0.23
	* 24036 EK30	AH24036	180	280	100	11.7	5.0	5.1	1170.00	1700.00	0.33
	* 23136 EK	AH3136G	180	300	96	14.9	7.0	7.0	1420.00	1960.00	0.29
	* 24136 EK30	AH24136	180	300	118	14.1	6.0	7.0	1470.00	2050.00	0.38
	* 22236 EK	AH2236G	180	320	86	18.0	8.0	8.5	1380.00	1660.00	0.25
	23236 VK	AH3236G	180	320	112	13.9	7.5	8.5	1290.00	2050.00	0.31
	22336 VK	AH2336G	180	380	126	23.1	12.0	8.5	1580.00	2190.00	0.31

* indicate bearings of the range SNR PREMIER

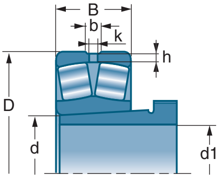
Spherical double-row rollers with tapered bore and withdrawal sleeves *(continued)*

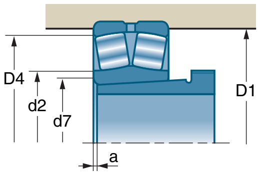
  

References	Sleeves	Y $\frac{Fa}{Fr} \le e$	Y $\frac{Fa}{Fr} > e$	Yo	rpm**	rpm**	d7 max mm	a ≈ mm	d2 ≈ mm	D1 max mm	D4 ≈ mm	r1 max mm	kg
* 23226 EK	AHX3226G	2.12	3.15	2.07	1500	2000	152	4	150	216	204	3.0	13.550
* 22326 EK	AHX2326G	2.06	3.06	2.01	1300	1700	167	4	164	263	243	4.0	26.354
* 23028 EK	AHX3028	3.14	4.67	3.07	1900	2500	158	5	155	201	193	2.0	6.130
* 24028 EK30	AH24028	2.21	3.29	2.16	1400	1800	151	10	153	201	189	2.0	8.800
* 23128 EK	AHX3128	2.55	3.80	2.50	1600	2100	162	5	159	213	203	2.1	10.770
* 24128 EK30	AH24128	1.90	2.83	1.86	800	1100	151	10	154	213	198	2.1	12.500
* 22228 EK	AHX3128	2.74	4.08	2.68	1700	2200	166	5	163	236	224	3.0	14.000
* 23228 EK	AHX3228G	2.06	3.06	2.01	1400	1800	166	5	162	236	220	3.0	18.400
* 22328 EK	AHX2328G	2.03	3.02	1.98	1200	1600	175	5	181	283	261	4.0	33.390
* 23030 EK	AHX3030	3.20	4.77	3.13	1800	2300	169	5	167	214	207	2.1	7.750
* 24030 EK30	AH24030	2.18	3.24	2.13	1300	1600	161	11	162	215	205	2.1	9.350
* 23130 EK	AHX3130G	2.35	3.50	2.30	1400	1900	176	5	171	238	223	2.1	15.720
* 24130 EK30	AH24130	1.78	2.65	1.74	850	1100	162	11	165	240	219	2.1	19.600
* 22230 EK	AHX3130G	2.74	4.08	2.68	1500	2000	180	5	177	256	242	3.0	17.600
* 23230 EK	AHX3230G	2.03	3.02	1.98	1300	1700	177	5	174	256	237	2.1	22.800
* 22330 EK	AHX2330G	2.00	2.98	1.96	1200	1500	192	5	188	303	279	4.0	41.200
* 23032 EK	AH3032	3.20	4.77	3.13	1700	2200	180	5	177	229	221	2.1	9.380
* 24032 EK30	AH24032	2.28	3.39	2.23	1200	1500	171	11	173	230	217	2.1	12.000
* 23132 EK	AH3132G	2.35	3.50	2.30	1300	1800	185	5	185	258	240	2.1	20.120
* 24132 EK30	AH24132	1.76	2.62	1.72	800	1000	171	11	180	260	236	2.1	25.000
* 22232 EK	AH3132G	2.69	4.00	2.63	1400	1900	191	5	190	276	260	3.0	22.800
* 23232 EK	AH3232G	2.03	3.02	1.98	1200	1600	189	6	186	276	259	3.0	28.710
* 22332 EK	AH2332G	2.03	3.02	1.98	1100	1400	207	6	205	323	296	4.0	50.000
* 23034 EK	AH3034	3.07	4.57	3.00	1600	2000	194	5	190	249	238	2.1	13.000
* 24034 EK30	AH34034	2.12	3.15	2.07	1100	1400		11	184	250	233	2.1	17.400
* 23134 EK	AH3134G	2.39	3.56	2.34	1300	1700	204	5	195	268	250	2.1	21.550
* 24134 EK30	AH24134	1.82	2.72	1.79	650	850	196	11	189	270	245	2.1	25.900
* 22234 EK	AH3134G	2.60	3.87	2.54	1300	1700	204	5	201	293	277	4.0	28.000
23234 VK	AH3234G	2.13	3.17	2.08	1000	1300	203	6	199	293	264	4.0	36.100
* 22334 EK	AH2334G	2.09	3.11	2.04	1000	1200	214	6	223	343	313	4.0	59.000
* 23036 EK	AH3036	2.95	4.40	2.89	1400	1900	207	6	201	270	255	2.1	16.900
* 24036 EK30	AH24036	2.03	3.02	1.98	1000	1300	195	11	198	270	250	2.1	22.000
* 23136 EK	AH3136G	2.32	3.45	2.26	1200	1600	208	6	205	286	267	3.0	27.210
* 24136 EK30	AH24136	1.78	2.65	1.74	600	800		11	200	286	261	3.0	33.000
* 22236 EK	AH2236G	2.74	4.08	2.68	1300	1700	203	6	209	303	287	4.0	28.700
23236 VK	AH3236G	2.17	3.23	2.12	1000	1300	213	6	210	303	274	4.0	39.600
22336 VK	AH2336G	2.15	3.20	2.10	850	1100	226	6	223	363	313	4.0	66.300

** These are the speed limits according to the SNR concept (see pages 85 to 87).

Double-row spherical roller bearings *(continued)*

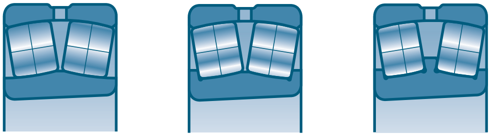




d1	10VDXΔ20	Sleeves	d	D	B	b	k	h	C	C_0	e
mm	References		mm	mm	mm	mm	mm	mm	10^3N	10^3N	
180	* 23038 EK	AH3038G	190	290	75	13.2	6.0	5.1	1080.00	1570.00	0.22
	* 24038 EK30	AH24038	190	290	100	11.6	5.0	5.1	1240.00	1800.00	0.31
	23138 VK	AH3138G	190	320	104	20.0	7.5	7.0	1180.00	1950.00	0.29
	* 24138 EK30	AH24138	190	320	128	14.2	6.0	7.0	1760.00	2480.00	0.38
	* 22238 EK	AH2238G	190	340	92	19.6	9.0	8.5	1540.00	1870.00	0.25
	23238 VK	AH3238G	190	340	120	16.7	9.0	8.5	1480.00	2370.00	0.32
	22338 VK	AH2338G	190	400	132	22.3	9.0	10.0	1830.00	2650.00	0.33
190	* 23040 EK	AH3040G	200	310	82	0.0	7.0	5.1	1250.00	1790.00	0.23
	* 24040 EK30	AH24040	200	310	109	12.7	6.0	5.1	1440.00	2120.00	0.33
	23140 VK	AH3140	200	340	112	16.7	9.0	7.0	1290.00	2120.00	0.30
	* 24140 EK30	AH24140	200	340	140	17.0	8.0	7.0	2030.00	2930.00	0.39
	* 22240 EK	AH2240	200	360	98	20.0	10.0	8.5	1720.00	2100.00	0.25
	23240 VK	AH3240	200	360	128	16.7	9.0	8.5	1630.00	2700.00	0.32
	22340 VK	AH2340	200	420	138	22.3	12.0	10.0	1830.00	2650.00	0.31
200	* 23044 EK	AOH3044G	220	340	90	15.4	7.0	6.2	1450.00	2110.00	0.23
	24044 VK30	AOH24044	220	340	118	12.2	6.3	6.2	1400.00	2700.00	0.34
	23144 VK	AOH3144	220	370	120	20.7	9.0	8.5	1540.00	2600.00	0.29
	24144 VK30	AOH24144	220	370	150	11.1	6.3	8.5	1980.00	3660.00	0.38
	* 22244 EK	AOH2244	220	400	108	20.6	11.0	8.5	2100.00	2690.00	0.25
	* 23244 EK	AOH2344	220	400	144	20.0	10.0	8.5	2750.00	3830.00	0.34
	22344 VK	AOH2344	220	460	145	22.3	12.0	10.0	2110.00	3150.00	0.30
220	23048 VK	AOH3048	240	360	92	13.9	7.5	6.2	1090.00	2050.00	0.24
	24048 VK30	AOH24048	240	360	118	12.2	6.3	6.2	1500.00	2900.00	0.32
	23148 VK	AOH3148	240	400	128	16.7	9.0	8.5	1720.00	2950.00	0.29
	24148 VK30	AOH24148	240	400	160	11.1	6.3	8.5	2270.00	4240.00	0.38
	22248 VK	AOH3148	240	440	120	22.3	12.0	8.5	1920.00	2470.00	0.29
	23248 VK	AOH2348	240	440	160	22.3	12.0	8.5	2420.00	3950.00	0.33
	22348 VK	AOH2348	240	500	155	22.3	12.0	10.0	2450.00	3700.00	0.29
240	23052 VK	AOH3052	260	400	104	16.7	9.0	7.3	1490.00	2430.00	0.25
	24052 VK30	AOH24052G	260	400	140	12.2	6.3	7.3	1900.00	3800.00	0.35
	23152 VK	AOH3152G	260	440	144	16.7	9.0	8.5	2140.00	3750.00	0.29
	24152 VK30	AOH24152	260	440	180	13.9	6.3	8.5	2770.00	5290.00	0.39
	23252 VK	AOH2352G	260	480	174	22.3	12.0	13.0	2700.00	4450.00	0.33
260	23056 VK	AOH3056G	280	420	106	16.7	9.0	7.3	1500.00	2850.00	0.23
	24056 VK30	AOH24056G	280	420	140	12.2	6.3	7.3	2000.00	4000.00	0.25
	23156 VK	AOH3156G	280	460	146	16.7	9.0	10.0	2240.00	4050.00	0.28

* indicate bearings of the range SNR PREMIER

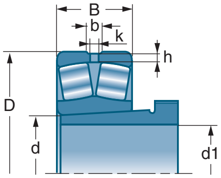
Spherical double-row rollers with tapered bore and withdrawal sleeves *(continued)*

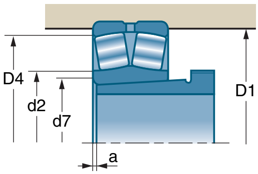


References	Sleeves	Y $\frac{Fa}{Fr} \leq e$	Y $\frac{Fa}{Fr} > e$	Yo	rpm**	rpm**	D7 max mm	a ≈ mm	d2 ≈ mm	D1 max mm	D4 ≈ mm	r1 max mm	kg
* 23038 EK	AH3038G	3.01	4.48	2.94	1400	1800	214	6	213	279	266	2.1	17.200
* 24038 EK30	AH24038	2.15	3.20	2.10	1000	1300		13	206	279	261	2.1	22.240
23138 VK	AH3138G	2.33	3.47	2.28	1000	1300	221	6	218	306	278	3.0	33.500
* 24138 EK30	AH24138	1.76	2.62	1.72	550	750	212	13	213	308	289	3.0	41.000
* 22238 EK	AH2238G	2.74	4.08	2.68	1200	1600	215	7	222	323	305	4.0	35.000
23238 VK	AH3238G	2.13	3.17	2.08	950	1200	225	7	223	323	290	4.0	47.400
22338 VK	AH2338G	1.88	2.80	1.84	800	1100	241	7	240	380	332	5.0	75.000
* 23040 EK	AH3040G	2.95	4.40	2.89	1300	1700	227	6	223	300	283	2.1	22.560
* 24040 EK30	AH24040	2.06	3.06	2.01	950	1200		13	219	299	278	2.1	29.710
23140 VK	AH3140	2.28	3.39	2.23	950	1200	233	6	230	326	294	3.0	41.400
* 24140 EK30	AH24140	1.74	2.59	1.70	550	700	228	13	225	326	292	3.0	52.600
* 22240 EK	AH2240	2.74	4.08	2.68	1100	1500	227	7	234	343	323	4.0	42.000
23240 VK	AH3240	2.12	3.16	2.08	900	1100	237	7	238	343	307	4.0	58.100
22340 VK	AH2340	2.17	3.24	2.12	750	1000	247	7	302	400	346	5.0	97.000
* 23044 EK	AOH3044G	2.95	4.40	2.89	1200	1500	249	6	246	327	310	3.0	31.450
24044 VK30	AOH24044	1.96	2.92	1.92	850	1100	245	14	246	328	302	3.0	38.200
23144 VK	AOH3144	2.31	3.44	2.26	900	1100	256	6	253	353	321	4.0	53.000
24144 VK30	AOH24144	1.77	2.63	1.73	500	670	250	14	253	353	316	4.0	66.100
* 22244 EK	AOH2244	2.74	4.08	2.68	1000	1300	254	8	264	383	358	4.0	59.000
* 23244 EK	AOH2344	2.00	2.98	1.96	850	1100	259	8	261	383	350	4.0	74.800
22344 VK	AOH2344	2.23	3.32	2.18	700	950	273	8	332	440	380	5.0	122.000
23048 VK	AOH3048	2.84	4.23	2.78	1000	1300	267	7	270	348	324	3.0	32.700
24048 VK30	AOH24048	2.10	3.13	2.06	800	1000	265	15	264	347	319	3.0	41.500
23148 VK	AOH3148	2.35	3.50	2.30	800	1000	277	7	276	381	348	4.0	65.500
24148 VK30	AOH24148	1.79	2.67	1.75	460	620	273	15	270	383	342	4.0	81.300
22248 VK	AOH3148	2.30	3.42	2.25	730	950	284	8	333	423	377	4.0	83.500
23248 VK	AOH2348	2.07	3.07	2.02	750	950	281	8	285	423	372	4.0	112.000
22348 VK	AOH2348	2.29	3.42	2.24	660	850	297	8	362	480	414	5.0	156.000
23052 VK	AOH3052	2.73	4.07	2.67	950	1200	292	7	284	385	364	4.0	45.800
24052 VK30	AOH24052G	1.94	2.88	1.89	750	950	293	16	291	385	354	4.0	66.500
23152 VK	AOH3152G	2.29	3.42	2.24	750	950	302	7	302	420	380	4.0	91.600
24152 VK30	AOH24152	1.75	2.60	1.71	420	560	295	16	294	423	373	4.0	113.000
23252 VK	AOH2352G	2.06	3.07	2.02	690	850	460	8	364	460	405	5.0	142.000
23056 VK	AOH3056G	3.00	4.46	2.93	900	1100	310	7	311	405	379	4.0	53.310
24056 VK30	AOH24056G	2.74	4.08	2.68	700	900	310	17	318	405	375	4.0	70.500
23156 VK	AOH3156G	2.37	3.53	2.32	700	900	314	8	322	414	401	5.0	98.000

** These are the speed limits according to the SNR concept (see pages 85 to 87).

Double-row spherical roller bearings *(continued)*

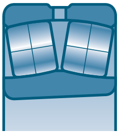
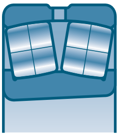
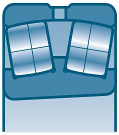




d1	10VDXΔ20	Sleeves	d	D	B	b	k	h	C	C_0	e
mm	References		mm	mm	mm	mm	mm	mm	10^3N	10^3N	
260	24156 VK30	AOH24156	280	460	180	13.9	6.3	10.0	3390.00	5600.00	0.37
	23256 VK	AOH2356G	280	500	176	22.3	12.0	10.0	2900.00	4900.00	0.32
	22356 VK	AOH2356G	280	580	175	22.3	12.0	13.0	3429.00	5182.00	0.31
280	23060 VK	AOH3060	300	460	118	16.7	9.0	7.3	1820.00	3350.00	0.23
	24060 VK30	AOH24060	300	460	160	12.2	6.3	7.3	2500.00	5200.00	0.35
	23160 VK	AOH3160G	300	500	160	16.7	9.0	10.0	2632.00	4645.00	0.32
	24160 VK30	AOH24160	300	500	200	12.2	6.3	10.0	4070.00	6840.00	0.40
	23260 VK	AOH3260G	300	540	192	22.3	12.0	13.0	3350.00	5600.00	0.32
300	23064 VK	AOH3064G	320	480	121	16.7	9.0	7.3	1920.00	3600.00	0.22
	23164 VK	AOH3164G	320	540	176	22.3	12.0	10.0	3050.00	5500.00	0.29
320	23068 VK	AOH3068G	340	520	133	22.3	12.0	8.0	2270.00	4200.00	0.23
	23168 VK	AOH3168G	340	580	190	22.3	12.0	10.0	3500.00	6100.00	0.29
340	23072 VK	AOH3072G	360	540	134	22.3	12.0	9.0	2390.00	4550.00	0.22
	23172 VK	AOH3172	360	600	192	22.3	12.0	10.0	3681.00	6683.00	0.29
360	23076 VK	AOH3076G	380	560	135	22.3	12.0	9.0	2420.00	4700.00	0.21
380	23080 VK	AOH3080G	400	600	148	22.3	12.0	10.0	2926.00	5648.00	0.22

* indicate bearings of the range SNR PREMIER

Spherical double-row rollers with tapered bore and withdrawal sleeves *(continued)*

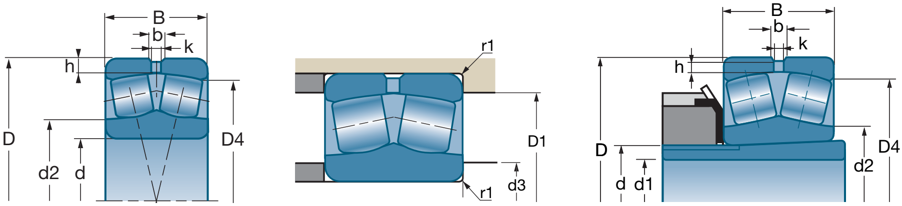




References	Sleeves	Y Fa/Fr ≤ e	Y Fa/Fr > e	Yo	rpm**	rpm**	d7 max mm	a ≈ mm	d2 ≈ mm	D1 max mm	D4 ≈ mm	r1 max mm	kg
24156 VK30	AOH24156	1.85	2.75	1.80	400	530	310	17	315	440	396	5.0	121.000
23256 VK	AOH2356G	2.12	3.16	2.08	650	800	239	8	327	480	346	5.0	152.000
22356 VK	AOH2356G	2.17	3.24	2.12	950	670	345	8	437	554	493	6.0	230.000
23060 VK	AOH3060	2.95	4.40	2.89	800	1000	336	8	376	445	414	4.0	73.100
24060 VK30	AOH24060	1.95	2.90	1.91	650	800	337	18	343	445	407	4.0	99.400
23160 VK	AOH3160G	2.10	3.00	2.00	670	850	347	8	346	480	435	5.0	129.700
24160 VK30	AOH24160	1.67	2.49	1.63	370	490	346	18	340	480	429	5.0	160.000
23260 VK	AOH3260G	2.12	3.15	2.07	610	750	353	8	415	520	459	5.0	195.000
23064 VK	AOH3064G	3.01	4.49	2.95	750	1000	357	8	355	465	433	4.0	79.100
23164 VK	AOH3164G	2.31	3.44	2.26	620	800	373	8	363	520	468	5.0	168.500
23068 VK	AOH3068G	2.98	4.43	2.91	700	950	382	9	426	502	468	5.0	105.000
23168 VK	AOH3168G	2.29	3.42	2.24	580	750	395	9	455	560	501	5.0	202.200
23072 VK	AOH3072G	3.07	4.56	3.00	700	900	403	9	400	522	488	5.0	110.700
23172 VK	AOH3172	2.36	3.51	2.31	560	700	416	9	475	580	522	5.0	223.800
23076 VK	AOH3076G	3.16	4.71	3.09	670	850	422	10	466	542	508	5.0	116.200
23080 VK	AOH3080G	3.08	4.59	3.02	600	750	448	10	497	582	542	5.0	155.000

** These are the speed limits according to the SNR concept (see pages 85 to 87).

SNR

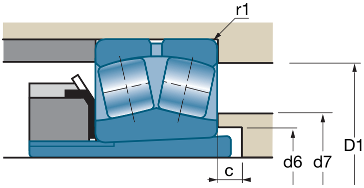
Double-row spherical roller bearings *(continued)*

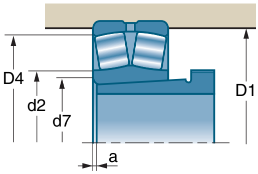


d	References	Sleeves H	Sleeves AH	D	B	b	k	h	C	C_0	e
mm	References			mm	mm	mm	mm	mm	10^3N	10^3N	
40	* 22308 E F800			90	33	5.9	3	4.5	161	152	0.36
	* 22308 EK F800	H2308	AH2308	90	33	5.9	3	4.5	161	152	0.36
45	* 22309 E F800			100	36	6.4	3	4.5	196	187	0.36
	* 22309 EK F800	H2309	AH2309	100	36	6.4	3	4.5	196	187	0.36
50	* 22310 E F800			110	40	7.4	3.5	5.5	237	232	0.36
	* 22310 EK F800	H2310	AHX2310	110	40	7.4	3.5	5.5	237	232	0.36
55	* 22311 E F800			120	43	7.8	3.5	5.5	282	274	0.36
	* 22311 EK F800	H2311	AHX2311	120	43	7.8	3.5	5.5	282	274	0.36
60	* 22312 E F800			130	46	8.7	4	6	323	319	0.35
	* 22312 EK F800	H2312	AHX2312	130	46	8.7	4	6	323	319	0.35
65	* 22313 E F800			140	48	9.2	4	6	351	343	0.33
	* 22313 EK F800	H2313	AH2313G	140	48	9.2	4	6	351	343	0.33
70	* 22314 E F800			150	51	10.4	5	6	400	396	0.34
	* 22314 EK F800	H2314	AHX2314G	150	51	10.4	5	6	400	396	0.34
75	* 22315 E F800			160	55	10.3	5	6	467	467	0.34
	* 22315 EK F800	H2315	AHX2315G	160	55	10.3	5	6	467	467	0.34
80	* 22316 E F800			170	58	10.4	5	6	515	522	0.34
	* 22316 EK F800	H2316	AHX2316	170	58	10.4	5	6	515	522	0.34
85	* 22317 E F800			180	60	11	5	7	570	604	0.32
	* 22317 EK F800	H2317	AHX2317	180	60	11	5	7	570	604	0.32
90	* 22318 E F800			190	64	11.56	5	7	636	652	0.33
	* 22318 EK F800	H2318	AHX2318	190	64	11.56	5	7	636	652	0.33
95	* 22319 E F800			200	67	12.15	6	7	696	751	0.32
	* 22319 EK F800	H2319	AHX2319	200	67	12.15	6	7	696	751	0.32
100	* 22320 E F800			215	73	13.3	6	7	787	844	0.34
	* 22320 EK F800	H2320	AHX2320	215	73	13.3	6	7	787	844	0.34
110	* 22322 E F800			240	80	15.6	7	7	928	972	0.31
	* 22322 EK F800	H2322	AHX2322G	240	80	15.6	7	7	928	972	0.31

* indicate bearings of the range SNR PREMIER

Spherical double-row rollers with tapered bore for high vibration applications

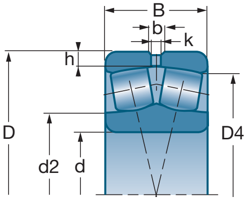


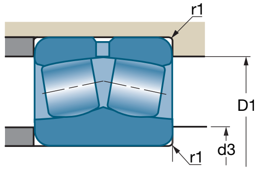


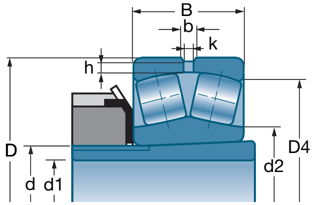
References	Y Fa/Fr ≤ e	Y Fa/Fr > e	Yo	rpm** (grease)	rpm** (oil)	c mm	d2 ≈ mm	d3 min mm	d6 min mm	d7 max mm	a ≈ mm	D1 max mm	D4 ≈ mm	r1 max mm	kg
* 22308 E F800	1.87	2.79	1.83	4100	5300		53	49				81	78	1.5	1.021
* 22308 EK F800	1.87	2.79	1.83	4100	5300	5	53		45	50	3	83		1.5	1.000
* 22309 E F800	1.9	2.83	1.86	3700	4800		59	54				91	87	1.5	1.369
* 22309 EK F800	1.9	2.83	1.86	3700	4800	5	59		50	56	3	93		1.5	1.380
* 22310 E F800	1.87	2.79	1.83	3400	4400		65	61				99	95	2	1.834
* 22310 EK F800	1.87	2.79	1.83	3400	4400	5	65		56	61	3	101		2	1.810
* 22311 E F800	1.87	2.79	1.83	3100	4000		71	66				109	104	2	2.340
* 22311 EK F800	1.87	2.79	1.83	3100	4000	6	71		61	66	3	111		2	2.310
* 22312 E F800	1.95	2.9	1.91	2900	3700		77	72				118	113	2.1	2.892
* 22312 EK F800	1.95	2.9	1.91	2900	3700	6	77		66	72	3	120		2.1	2.880
* 22313 E F800	2.06	3.06	2.01	2700	3400		83	77				128	122	2.1	3.493
* 22313 EK F800	2.06	3.06	2.01	2700	3400	6	83		72	78	3	130		2.1	3.480
* 22314 E F800	2	2.98	1.96	2500	3200		89	82				138	131	2.1	4.274
* 22314 EK F800	2	2.98	1.96	2500	3200	6	89		77	83	4	140		2.1	4.200
* 22315 E F800	2	2.98	1.96	2300	3000		95	87				148	139	2.1	5.210
* 22315 EK F800	2	2.98	1.96	2300	3000	6	95		82	89	4	150		2.1	5.100
* 22316 E F800	2	2.98	1.96	2200	2800		101	92				158	148	2.1	6.200
* 22316 EK F800	2	2.98	1.96	2200	2800	6	101		88	95	4	160		2.1	6.180
* 22317 E F800	2.09	3.11	2.04	2000	2600		110	99				166	157	3	7.160
* 22317 EK F800	2.09	3.11	2.04	2000	2600	7	110		94	103	4	166		3	7.160
* 22318 E F800	2.06	3.06	2.01	1900	2500		113	104					176	3	8.501
* 22318 EK F800	2.06	3.06	2.01	1900	2500	7	113		100	114	4	176		3	8.400
* 22319 E F800	2.09	3.11	2.04	1800	2300		122	111				186	174	3	10.000
* 22319 EK F800	2.09	3.11	2.04	1800	2300	7	122		105	122	4	186		3	10.000
* 22320 E F800	1.98	2.94	1.93	1700	2200		129	114				201	187	3	12.776
* 22320 EK F800	1.98	2.94	1.93	1700	2200	7	129		110	129	4	201		3	12.700
* 22322 E F800	2.09	3.11	2.04	1600	2000		142	124				226	209	3	17.406
* 22322 EK F800	2.09	3.11	2.04	1600	2000	7	142		121	133	4	226		3	17.850

** These are the speed limits according to the SNR concept (see pages 85 to 87).

Double-row spherical roller bearings *(continued)*



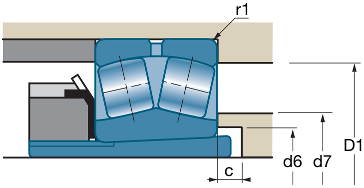


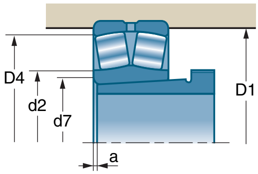


d	10VDXA20	Sleeves H	Sleeves AH	D	B	b	k	h	C	C_0	e
mm	References			mm	mm	mm	mm	mm	10^3N	10^3N	
120	* 22324 E F800			260	86	18	8	7	1110	1280	0.32
	* 22324 EK F800	H2324	AHX2324G	260	86	18	8	7	1110	1280	0.32
130	* 22326 E F800			280	93	18.9	9	8.5	1260	1400	0.33
	* 22326 EK F800	H2326	AHX2326G	280	93	18.9	9	8.5	1260	1400	0.33
140	* 22328 E F800			300	102	18.9	9	8.5	1470	1720	0.33
	* 22328 EK F800	H2328	AHX2328G	300	102	18.9	9	8.5	1470	1720	0.33
150	* 22330 E F800			320	108	19.9	9	8.5	1660	1890	0.34
	* 22330 EK F800	H2330	AHX2330G	320	108	19.9	9	8.5	1660	1890	0.34
160	* 22332 E F800			340	114	20.3	10	8.5	1850	2210	0.33
	* 22332 EK F800	H2332	AH2332G	340	114	20.3	10	8.5	1850	2210	0.33
170	* 22334 E F800			360	120	20.25	10	8.5	2100	2630	0.32
	* 22334 EK F800	H2334	AH2334G	360	120	20.25	10	8.5	2100	2630	0.32

* indicate bearings of the range SNR PREMIER

Spherical double-row rollers with tapered bore for high vibration applications *(continued)*



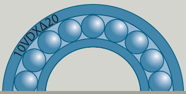


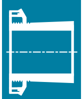
References	Y Fa/Fr ≤ e	Y Fa/Fr > e	Yo	rpm**	rpm**	c mm	d2 ≈ mm	d3 min mm	d6 min mm	d7 max mm	a ≈ mm	D1 max mm	D4 ≈ mm	r1 max mm	kg
* 22324 E F800	2.09	3.11	2.04	1400	1800		157	134				246	225	3	22.600
* 22324 EK F800	2.09	3.11	2.04	1400	1800	7	157		131	157	4	246		3	22.300
* 22326 E F800	2.06	3.06	2.01	1300	1700		167	147				263	243	4	27.900
* 22326 EK F800	2.06	3.06	2.01	1300	1700	8	167		142	167	4	263		4	27.600
* 22328 E F800	2.03	3.02	1.98	1200	1600		182	157				283	261	4	34.903
* 22328 EK F800	2.03	3.02	1.98	1200	1600	8	182		152	182	5	283		4	34.800
* 22330 E F800	2	2.98	1.96	1200	1500		192	167				303	279	4	41.960
* 22330 EK F800	2	2.98	1.96	1200	1500	8	192		163	192	5	303		4	42.300
* 22332 E F800	2.03	3.02	1.98	1100	1400		207	177				323	296	4	50.700
* 22332 EK F800	2.03	3.02	1.98	1100	1400	8	207		174	207	6	323		4	50.300
* 22334 E F800	2.09	3.11	2.04	1000	1200		223	187				343	313	4	59.000
* 22334 EK F800	2.09	3.11	2.04	1000	1200	8	223		185	214	6	343		4	57.500

** These are the speed limits according to the SNR concept (see pages 85 to 87).

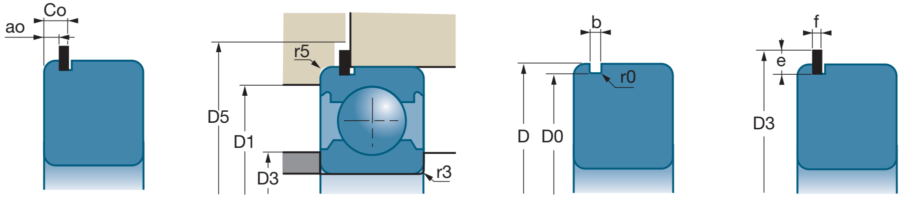
SNR

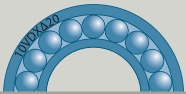
Snap ring

D	Ref.		b		r0	D3	e		f	
			min	max	min	max	min	max	min	max
mm	mm	Reference	mm	mm	mm	mm	mm	mm	mm	mm
30										
32										
35										
37										
40										
42										
47										
50										
52										
55										
62										
68										
72										
75										
80										
85										
90										

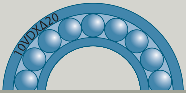


Snap ring *(continued)*

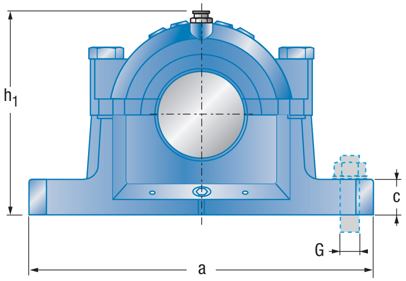


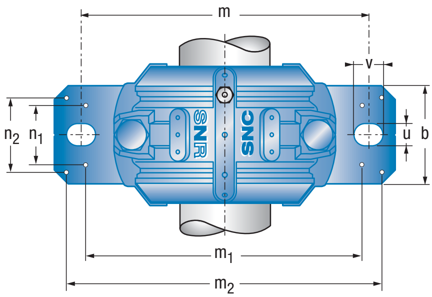
D	Ref.		a0		c0		D5	r5	d0	
			min	max	min	max	min	max	min	max
mm	mm	Reference	mm	mm	mm	mm	mm	mm	mm	mm
95										
100										
110										
115										
120										
125										
130										
140										
145										
150										
160										
170										
180										
190										
200										

Snap ring *(continued)*

D	Ref.		b		r0	D3	e		f	
			min	max	min	max	min	max	min	max
mm	mm	Reference	mm	mm	mm	mm	mm	mm	mm	mm
95										
100										
110										
115										
120										
125										
130										
140										
145										
150										
160										
170										
180										
190										
200										

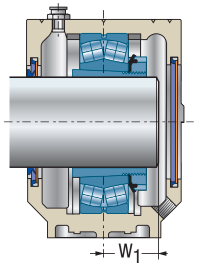
Pillow block housing for bearings with adapter sleeve mounting



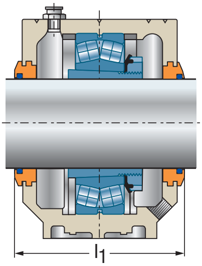


d	Type	Housing dimensions [mm]																	Weight [1]
		D	a	b	c	g	h	l	m	G	u	v	h_1	m_1	n_2	m_2	n_1	n_3	≃ [kg]
20	SNC505	52	165	46	19	25	40	67	130	M12	15	20	74	116	32	152	28	36	1.6
	SNC605	62	185	52	22	32	50	77	150	M12	15	20	89	130	38	172	25	44	2.3
25	SNC506	62	185	52	22	32	50	77	150	M12	15	20	89	130	38	172	25	44	2.3
	SNC606	72	185	52	22	34	50	82	150	M12	15	20	93	135	38	172	25	46	2.4
30	SNC507	72	185	52	22	34	50	82	150	M12	15	20	93	135	38	172	25	46	2.4
	SNC607	80	205	60	25	39	60	85	170	M12	15	20	107	160	44	188	34	50	3.2

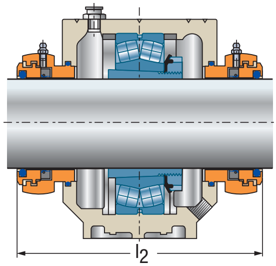
1. Pillow block housing



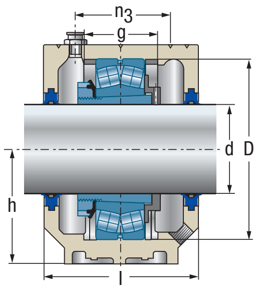
V-ring seal SC..SV + Cover SC..EC



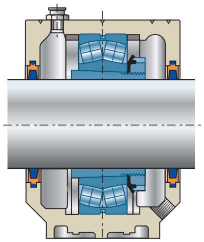
Labyrinth seal SC..LA



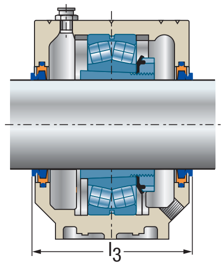
Taconite seal SC..TA



Double lip seal SC..DS + Regulation disc RDC



Felt strip seal SC..FS



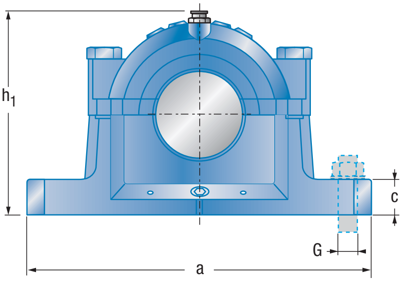
Felt strip seal SC..FS + V-ring seal V..A

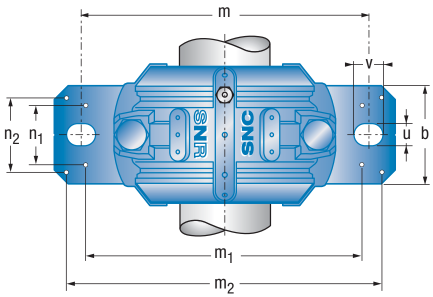
Housing	Seal [2]	V-ring seal [3]	Cover	w_1	l_1	l_2	l_3	Regulation disc	Bearing	Adapter sleeve	Locating ring
					mm						2 x per housing
	SC505DS			18.0					1205K	H205	FR52x5
	SC505FS	V20A		19.5					2205K	H305	FR52x3.5
SNC505	SC505SV		SC505EC	19.5	79	134	85	RDC505	22205K	H305	FR52x3.5
	SC505LA										
	SC505TA										
	SC605DS			19.0					1305K	H305	FR62x7.5
	SC605FS	V20A		22.5					2305K	H2305	FR62x4
SNC506-605	SC605SV		SC506-605EC	19.0	89	144	95	RDC605	21305K	H305	FR62x7.5
	SC605LA										
	SC605TA										
	SC506DS			18.5					1206K	H206	FR62x8
	SC506FS	V25A		20.5					2206K	H306	FR62x6
SNC506-605	SC506SV		SC506-605EC	20.5	89	144	95	RDC506	22206K	H306	FR62x6
	SC506LA										
	SC506TA										
	SC606DS			20.0					1306K	H306	FR72x7.5
	SC606FS	V25A		24.0					2306K	H2306	FR72x3.5
SNC507-606	SC606SV		SC507-606EC	20.0	94	148	100	RDC606	21306K	H306	FR72x7.5
	SC606LA										
	SC606TA										
	SC507DS			20.0					1207K	H207	FR72x8.5
	SC507FS	V30A		23.0					2207K	H307	FR72x5.5
SNC507-606	SC507SV		SC507-606EC	23.5	94	148	100	RDC507	22207K	H307	FR72x5.5
	SC507LA										
	SC507TA										
	SC607DS			22.0					1307K	H307	FR80x9
	SC607FS	V30A		27.0					2307K	H2307	FR80x4
SNC508-607	SC607SV		SC508-607EC	23.0	97	151	103	RDC607	21307K	H307	FR80x8
	SC607LA										
	SC607TA										

2.Seals must be ordered for each side of the housing.

3. Optional V-ring available for felt stip seal (FS).

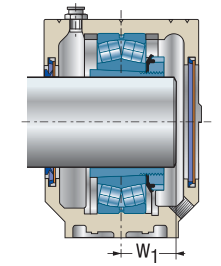
Pillow block housing for bearings with adapter sleeve mounting *(continued)*



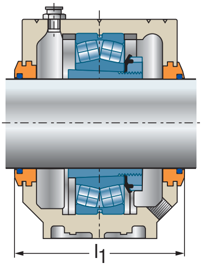


d	Type	D	a	b	c	g	h	l	m	G	u	v	h_1	m_1	n_2	m_2	n_1	n_3	Weight[1] ≃ [kg]
		Housing dimensions [mm]																	
35	SNC508	80	205	60	25	39	60	85	170	M12	15	20	107	160	44	188	34	50	3.2
	SNC608	90	205	60	25	41	60	90	170	M12	15	20	113	160	44	188	34	53	3.4
40	SNC509	85	205	60	25	30	60	85	170	M12	15	20	110	160	44	188	34	44	3.2
	SNC609	100	255	70	28	44	70	95	210	M16	18	24	127	200	49	234	40	56	5.1
45	SNC510	90	205	60	25	41	60	90	170	M12	15	20	113	160	44	188	34	53	3.4
	SNC610	110	255	70	30	48	70	105	210	M16	18	24	133	200	54	234	40	64	5.4

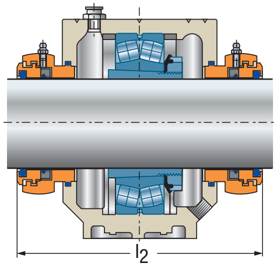
1. Pillow block housing



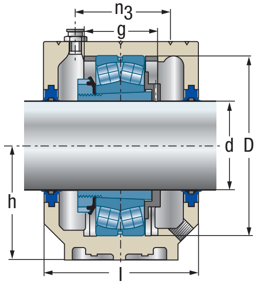
V-ring seal SC..SV + Cover SC..EC



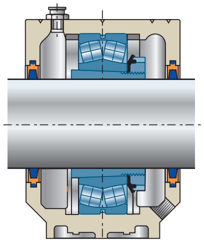
Labyrinth seal SC..LA



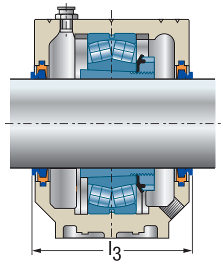
Taconite seal SC..TA



Double lip seal SC..DS + Regulation disc RDC



Felt strip seal SC..FS



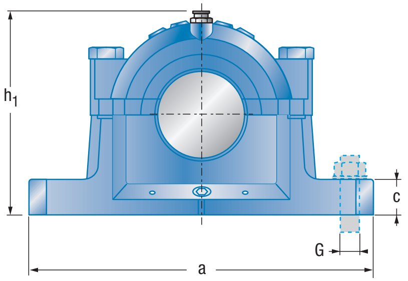
Felt strip seal SC..FS + V-ring seal V..A

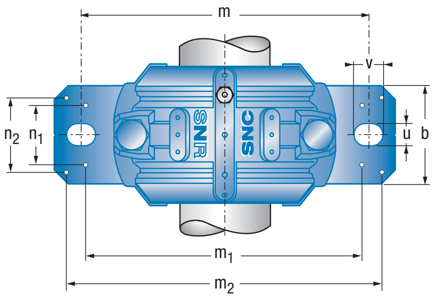
Housing	Seal [2]	V-ring seal [3]	Cover	w_1	l_1 mm	l_2	l_3	Regulation disc	Bearing	Adapter sleeve	Locating ring 2 x per housing
	SC508DS			21.5					1208K	H208	FR80x10.5
	SC508FS	V35A		24.0					2208K	H308	FR80x8
SNC508-607	SC508SV		SC508-607EC	24.0	97	151	103	RDC508	22208K	H308	FR80x8
	SC508LA										
	SC508TA										
	SC608DS			24.0					1308K	H308	FR90x9
	SC608FS	V35A		29.0					2308K	H2308	FR90x4
SNC510-608	SC608SV		SC510-608EC	24.0	102	154	108	RDC608	21308K	H308	FR90x9
	SC608LA			29.0					22308K	H2308	FR90x4
	SC608TA										
	SC509DS			23.0					1209K	H209	FR85x5.5
	SC509FS	V40A		25.0					2209K	H309	FR85x3.5
SNC509	SC509SV		SC509EC	25.0	97	149	107	RDC509	22209K	H309	FR85x3.5
	SC509LA										
	SC509TA										
	SC609DS			26.0					1309K	H309	FR100x9.5
	SC609FS	V40A		31.5					2309K	H2309	FR100x4
SNC511-609	SC609SV		SC511-609EC	26.0	107	158	117	RDC609	21309K	H309	FR100x9.5
	SC609LA			31.5					22309K	H2309	FR100x4
	SC609TA										
	SC510DS			24.5					1210K	H210	FR90x10.5
	SC510FS	V45A		26.0					2210K	H310	FR90x9
SNC510-608	SC510SV		SC510-608EC	26.0	102	154	112	RDC510	22210K	H310	FR90x9
	SC510LA										
	SC510TA										
	SC610DS			28.0					1310K	H310	FR110x10.5
	SC610FS	V45A		34.5					2310K	H2310	FR110x4
SNC512-610	SC610SV		SC512-610EC	28.0	117	168	127	RDC610	21310K	H310	FR110x10.5
	SC610LA			34.5					22310K	H2310	FR110x4
	SC610TA										

2.Seals must be ordered for each side of the housing.

3. Optional V-ring available for felt stip seal (FS).

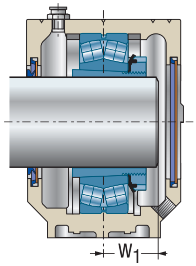
Pillow block housing for bearings with adapter sleeve mounting *(continued)*



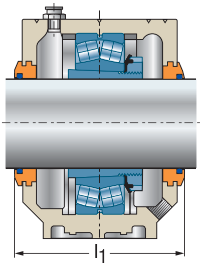


d	Type	D	a	b	c	g	h	l	m	G	u	v	h_1	m_1	n_2	m_2	n_1	n_3	Weight [1] ≃ [kg]
		Housing dimensions [mm]																	
50	SNC511	100	255	70	28	44	70	95	210	M16	18	24	127	200	49	234	40	56	5.1
	SNC611	120	275	80	30	51	80	110	230	M16	18	24	148	220	58	252	48	63	7.0
55	SNC512	110	255	70	30	48	70	105	210	M16	18	24	133	200	54	234	40	64	5.4
	SNC612	130	280	80	30	56	80	115	230	M16	18	24	155	220	58	257	48	72	7.3
60	SNC513	120	275	80	30	51	80	110	230	M16	18	24	148	220	58	252	48	63	7.0
	SNC613	140	315	90	32	58	95	120	260	M20	22	28	175	252	66	288	52	72	10.4

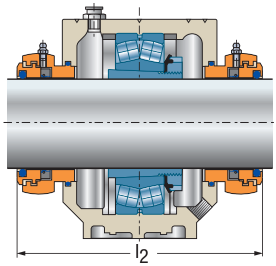
1. Pillow block housing



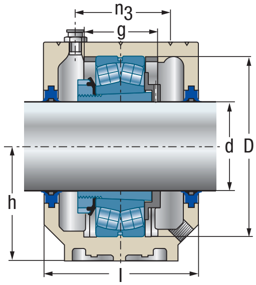
V-ring seal SC..SV + Cover SC..EC



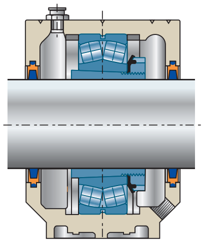
Labyrinth seal SC..LA



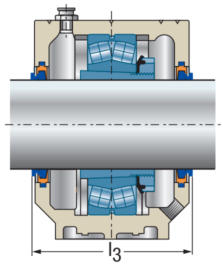
Taconite seal SC..TA



Double lip seal SC..DS + Regulation disc RDC



Felt strip seal SC..FS



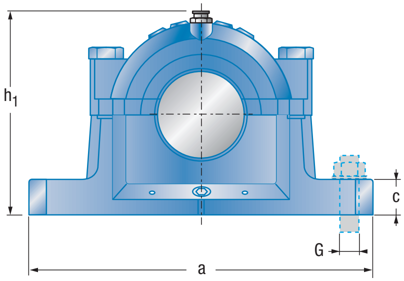
Felt strip seal SC..FS + V-ring seal V..A

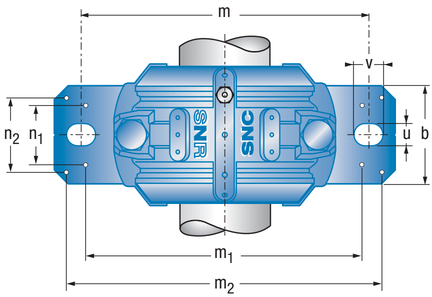
Housing	Seal [2]	V-ring seal [3]	Cover	w_1	l_1	l_2	l_3	Regulation disc	Bearing	Adapter sleeve	Locating ring
					mm						2 x per housing
	SC511DS			25.5					1211K	H211	FR100x11.5
	SC511FS	V50A		27.5					2211K	H311	FR100x9.5
SNC511-609	SC511SV		SC511-609EC	27.5	107	158	117	RDC511	22211K	H311	FR100x9.5
	SC511LA										
	SC511TA										
	SC611DS			29.5					1311K	H311	FR120x11
	SC611FS	V50A		36.5					2311K	H2311	FR120x4
SNC513-611	SC611SV		SC513-611EC	29.5	122	172	132	RDC611	21311K	H311	FR120x11
	SC611LA			36.5					22311K	H2311	FR120x4
	SC611TA										
	SC512DS			26.5					1212K	H212	FR110x13
	SC512FS	V55A		29.5					2212K	H312	FR110x10
SNC512-610	SC512SV		SC512-610EC	29.5	117	168	127	RDC512	22212K	H312	FR110x10
	SC512LA										
	SC512TA										
	SC612DS			31.0					1312K	H312	FR130x12.5
	SC612FS	V55A		38.5					2312K	H2312	FR130x5
SNC515-612	SC612SV		SC515-612EC	31.0	127	181	137	RDC612	21312K	H312	FR130x12.5
	SC612LA			38.5					22312K	H2312	FR130x5
	SC612TA										
	SC513DS			28.0					1213K	H213	FR120x14
	SC513FS	V60A		32.0					2213K	H313	FR120x10
SNC513-611	SC513SV		SC513-611EC	32.0	122	172	132	RDC513	22213K	H313	FR120x10
	SC513LA										
	SC513TA										
	SC613DS			33.0					1313K	H313	FR140x12.5
	SC613FS	V60A		40.5					2313K	H2313	FR140x5
SNC516-613	SC613SV		SC516-613EC	33.0	135	190	142	RDC613	21313K	H313	FR140x12.5
	SC613LA			40.5					22313K	H2313	FR140x5
	SC613TA										

2.Seals must be ordered for each side of the housing.

3. Optional V-ring available for felt stip seal (FS).

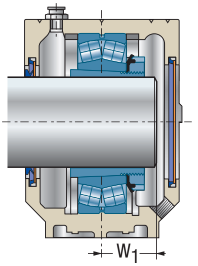
Pillow block housing for bearings with adapter sleeve mounting *(continued)*



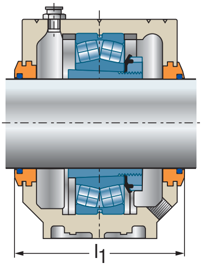


d	Type	D	a	b	c	g	h	l	m	G	u	v	h_1	m_1	n_2	m_2	n_1	n_3	Weight [1] ≃ [kg]
		Housing dimensions [mm]																	
65	SNC515	130	280	80	30	56	80	115	230	M16	18	24	155	220	58	257	48	72	7.3
	SNC615	160	345	100	35	65	100	140	290	M20	22	28	192	280	74	319	58	80	13.5
70	SNC516	140	315	90	32	58	95	120	260	M20	22	28	175	252	66	288	52	72	10.4
	SNC616	170	345	100	35	68	112	145	290	M20	22	28	212	280	70	317	58	88	15.6
75	SNC517	150	320	90	32	61	95	125	260	M20	22	28	183	252	66	292	52	76	10.2
	SNC617	180	380	110	40	70	112	160	320	M24	26	32	215	300	78	348	66	104	18.4

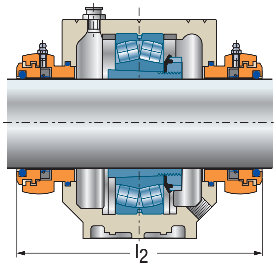
1. Pillow block housing



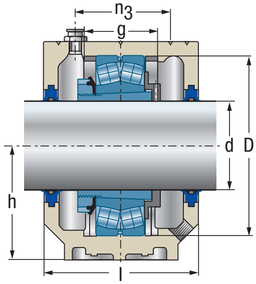
V-ring seal SC..SV + Cover SC..EC



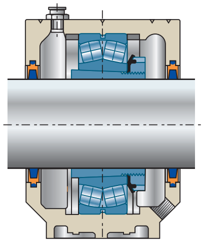
Labyrinth seal SC..LA



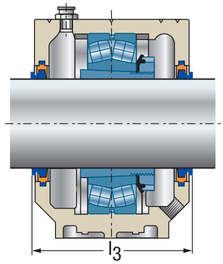
Taconite seal SC..TA



Double lip seal SC..DS + Regulation disc RDC



Felt strip seal SC..FS



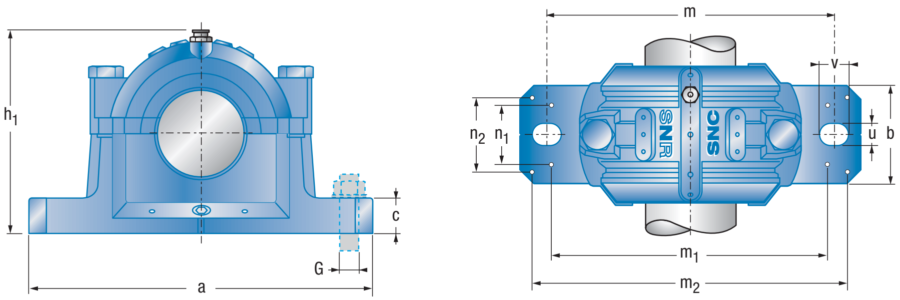
Felt strip seal SC..FS + V-ring seal V..A

Housing	Seal [2]	V-ring seal [3]	Cover	w_1	l_1 mm	l_2	l_3	Regulation disc	Bearing	Adapter sleeve	Locating ring 2 x per housing
	SC515DS			30.0					1215K	H215	FR130x15.5
	SC515FS	V65A		33.0					2215K	H315	FR130x12.5
SNC515-612	SC515SV		SC515-612EC	33.0	127	181	137	RDC515	22215K	H315	FR130x12.5
	SC515LA										
	SC515TA										
	SC615DS			36.0					1315K	H315	FR160x14
	SC615FS	V65A		45.0					2315K	H2315	FR160x5
SNC518-615	SC615SV		SC518-615EC	36.0	155	216	162	RDC615	21315K	H315	FR160x14
	SC615LA			45.0					22315K	H2315	FR160x5
	SC615TA										
	SC516DS			32.5					1216K	H216	FR140x16
	SC516FS	V70A		36.0					2216K	H316	FR140x12.5
SNC516-613	SC516SV		SC516-613EC	36.0	135	190	147	RDC516	22216K	H316	FR140x12.5
	SC516LA										
	SC516TA										
	SC616DS			39.0					1316K	H316	FR170x14.5
	SC616FS	V70A		48.5					2316K	H2316	FR170x5
SNC519-616	SC616SV		SC519-616EC	39.0	159	212	172	RDC616	21316K	H316	FR170x14.5
	SC616LA			48.5					22316K	H2316	FR170x5
	SC616TA										
	SC517DS			34.5					1217K	H217	FR150x16.5
	SC517FS	V75A		38.5					2217K	H317	FR150x12.5
SNC517	SC517SV		SC517EC	38.5	140	201	152	RDC517	22217K	H317	FR150x12.5
	SC517LA										
	SC517TA										
	SC617DS			41.0					1317K	H317	FR180x14.5
	SC617FS	V75A		50.5					2317K	H2317	FR180x5
SNC520-617	SC617SV		SC520-617EC	41.0	174	227	187	RDC617	21317K	H317	FR180x14.5
	SC617LA			50.5					22317K	H2317	FR180x5
	SC617TA										

2.Seals must be ordered for each side of the housing.

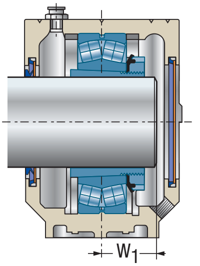
3. Optional V-ring available for felt stip seal (FS).

Pillow block housing for bearings with adapter sleeve mounting *(continued)*

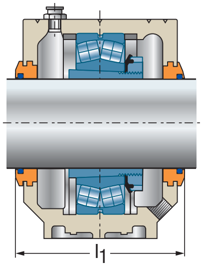


d	Type	D	a	b	c	g	h	l	m	G	u	v	h_1	m_1	n_2	m_2	n_1	n_3	Weight [1] ≃ [kg]
		Housing dimensions [mm]																	
80	SNC518	160	345	100	35	65	100	140	290	M20	22	28	192	280	74	319	58	80	13.5
	SNC618	190	380	110	40	74	112	160	320	M24	26	32	220	300	78	348	66	104	18.5
85	SNC519	170	345	100	35	68	112	145	290	M20	22	28	212	280	70	317	58	88	15.6
	SNC619	200	410	120	45	80	125	175	350	M24	26	32	242	320	88	378	74	110	24.7
90	SNC520	180	380	110	40	70	112	160	320	M24	26	32	215	300	78	348	66	104	18.4
	SNC620	215	410	120	45	86	140	185	350	M24	26	32	271	330	88	378	74	122	30.0

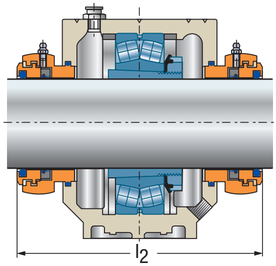
1. Pillow block housing



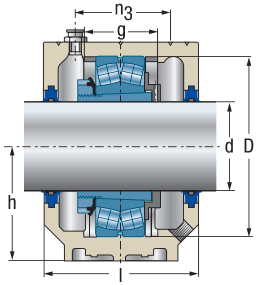
V-ring seal SC..SV + Cover SC..EC



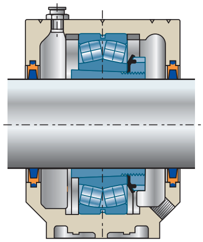
Labyrinth seal SC..LA



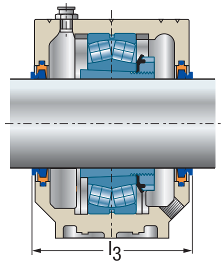
Taconite seal SC..TA



Double lip seal SC..DS + Regulation disc RDC



Felt strip seal SC..FS



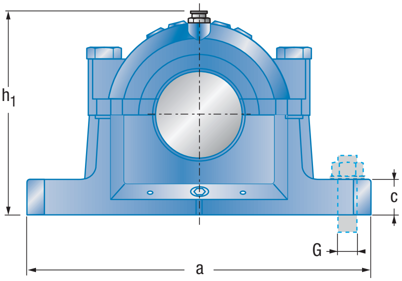
Felt strip seal SC..FS + V-ring seal V..A

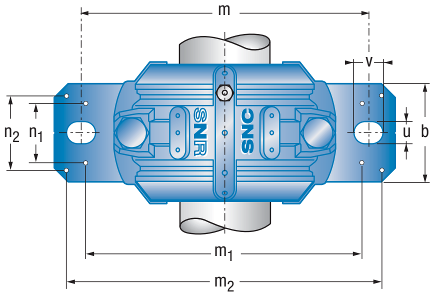
Housing	Seal [2]	V-ring seal [3]	Cover	w_1	l_1 (mm)	l_2	l_3	Regulation disc	Bearing	Adapter sleeve	Locating ring 2 x per housing
	SC518DS			35.5					1218K	H218	FR160x17.5
	SC518FS	V80A		40.5					2218K	H318	FR160x12.5
SNC518-615	SC518SV		SC518-615EC	40.5	155	216	167	RDC518	22218K	H318	FR160x12.5
	SC518LA			46.8					23218K	H2318	FR160x6.25
	SC518TA										
	SC618DS			42.0					1318K	H318	FR190x15.5
	SC618FS	V80A		52.5					2318K	H2318	FR190x5
SNC318-618	SC618SV		SC318-618EC	42.0	172	227	187	RDC618	21318K	H318	FR190x15.5
	SC618LA			52.5					22318K	H2318	FR190x5
	SC618TA										
	SC519DS			37.5					1219K	H219	FR170x18
	SC519FS	V85A		43.0					2219K	H319	FR170x12.5
SNC519-616	SC519SV		SC519-616EC	43.0	159	212	172	RDC519	22219K	H319	FR170x12.5
	SC519LA										
	SC519TA										
	SC619DS			44.0					1319K	H319	FR200x17.5
	SC619FS	V85A		55.0					2319K	H2319	FR200x6.5
SNC522-619	SC619SV		SC522-619EC	44.0	189	242	202	RDC619	21319K	H319	FR200x17.5
	SC619LA			55.0					22319K	H2319	FR200x6.5
	SC619TA										
	SC520DS			39.5					1220K	H220	FR180x18
	SC520FS	V90A		45.5					2220K	H320	FR180x12
SNC520-617	SC520SV		SC520-617EC	45.5	174	227	187	RDC520	22220K	H320	FR180x12
	SC520LA			52.7					23220K	H2320	FR180x4.85
	SC520TA										
	SC620DS			46.0					1320K	H320	FR215x19.5
	SC620FS	V90A		59.0					2320K	H2320	FR215x6.5
SNC524-620	SC620SV		SC524-620EC	46.0	199	249	212	RDC620	21320K	H320	FR215x19.5
	SC620LA			59.0					22320K	H2320	FR215x5
	SC620TA										

2.Seals must be ordered for each side of the housing.

3. Optional V-ring available for felt stip seal (FS).

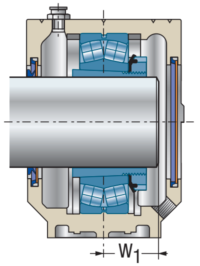
Pillow block housing for bearings with adapter sleeve mounting *(continued)*



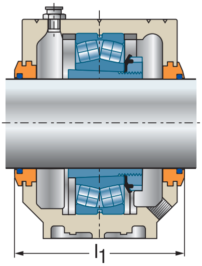


d	Type	D	a	b	c	g	h	l	m	G	u	v	h_1	m_1	n_2	m_2	n_1	n_3	Weight [1] ≃ [kg]
		Housing dimensions [mm]																	
100	SNC522	200	410	120	45	80	125	175	350	M24	26	32	242	320	88	378	74	110	24.7
110	SNC524	215	410	120	45	86	140	185	350	M24	26	32	271	330	88	378	74	122	30.0
115	SNC526	230	445	130	50	90	150	190	380	M24	28	35	290	370	92	414	80	122	36.6
125	SNC528	250	500	150	50	98	150	205	420	M30	35	42	302	400	108	458	92	128	42.6
135	SNC530	270	530	160	60	106	160	220	450	M30	35	42	323	430	116	486	100	140	55.2
140	SNC532	290	550	160	60	114	170	235	470	M30	35	42	344	450	116	506	100	155	63.0

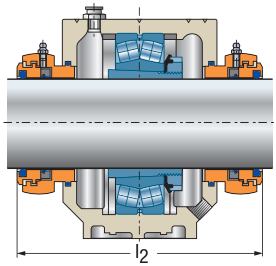
1. Pillow block housing



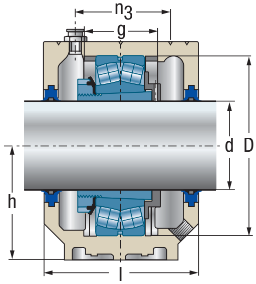
V-ring seal SC..SV + Cover SC..EC



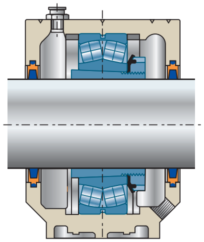
Labyrinth seal SC..LA



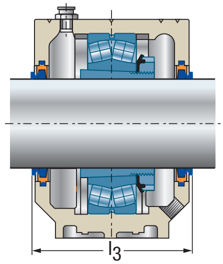
Taconite seal SC..TA



Double lip seal SC..DS + Regulation disc RDC



Felt strip seal SC..FS



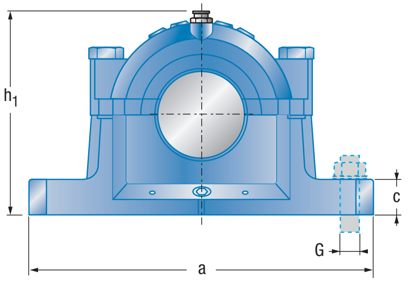
Felt strip seal SC..FS + V-ring seal V..A

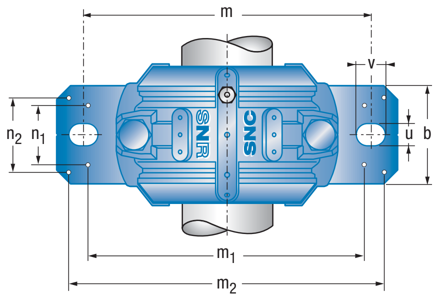
Housing	Seal [2]	V-ring seal [3]	Cover	w_1	l_1	l_2	l_3	Regulation disc	Bearing	Adapter sleeve	Locating ring 2 x per housing
					mm						
SNC522-619	SC522DS SC522FS SC522SV SC522LA SC522TA	V100A	SC522-619EC	42.5 50.0 50.0 58.4	189	242	202	RDC522	1222K 2222K 22222K 23222K	H222 H322 H322 H2322	FR200x21 FR200x13.5 FR200x13.5 FR200x5.1
SNC524-620	SC524DS SC524FS SC524SV SC524LA SC524TA	V110A	SC524-620EC	53.5 62.5	199	249	216	RDC524	22224K 23224K	H3124 H2324	FR215x14 FR215x5
SNC226-526	SC526DS SC526FS SC526SV SC526LA SC526TA	V120A	SC226-526EC	57.5 65.5	207	259	221	RDC526	22226K 23226K	H3126 H2326	FR230x13 FR230x5
SNC228-528	SC528DS SC528FS SC528SV SC528LA SC528TA	V130A	SC228-528EC	60.5 70.5	222	275	236	RDC528	22228K 23228K	H3128 H2328	FR250x15 FR250x5
SNC230-530	SC530DS SC530FS SC530SV SC530LA SC530TA	V140A	SC230-530EC	65.0 76.5	236	294	251	RDC530	22230K 23230K	H3130 H2330	FR270x16.5 FR270x5
SNC232-532	SC532DS SC532FS SC532SV SC532LA SC532TA	V140A	SC232-532EC	70.5 82.5	254	309	256	RDC532	22232K 23232K	H3132 H2332	FR290x17 FR290x5

2.Seals must be ordered for each side of the housing.

3. Optional V-ring available for felt stip seal (FS).

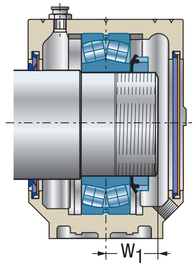
Pillow block housing for bearings with cylindrical bore



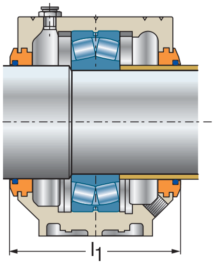


d	Type	Housing dimensions d_1	D	a	b	c	g	h	l	m	G	u	v	h_1	m_1	n_1	m_2	n_2	n_3	Weight[1] ≃ [kg]
		[mm]																		
25	SNC205	30	52	165	46	19	25	40	67	130	M12	15	20	74	116	32	152	28	36	1.5
	SNC305	30	62	185	52	22	32	50	77	150	M12	15	20	89	130	38	172	25	44	2.1
30	SNC206	35	62	185	52	22	32	50	77	150	M12	15	20	89	130	38	172	25	44	2.1
	SNC306	35	72	185	52	22	34	50	82	150	M12	15	20	93	135	38	172	25	46	2.3
35	SNC207	45	72	185	52	22	34	50	82	150	M12	15	20	93	135	38	172	25	46	2.3
	SNC307	45	80	205	60	25	39	60	85	170	M12	15	20	107	160	44	188	34	50	3.1

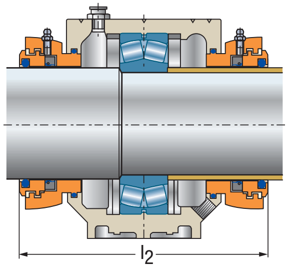
1. Pillow block housing



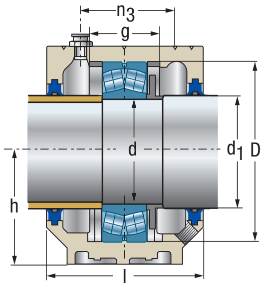
V-ring seal SC..SV + Cover SC..EC



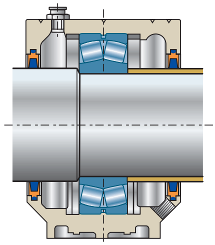
Labyrinth seal SC..LA



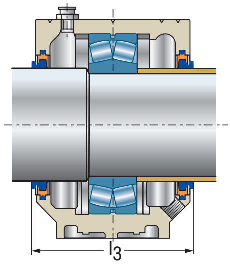
Taconite seal SC..TA



Double lip seal SC..DS + Regulation disc RDC



Felt strip seal SC..FS



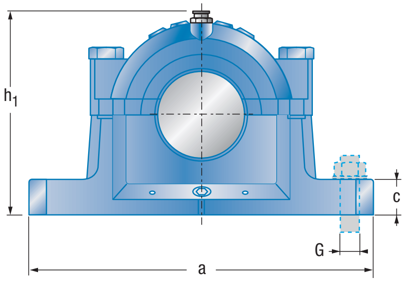
Felt strip seal SC..FS + V-ring seal V..A

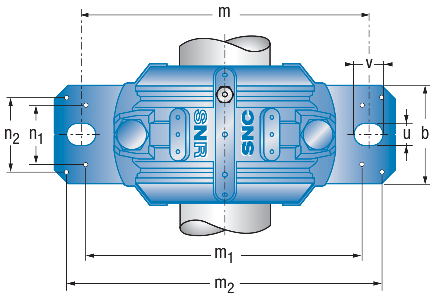
Housing	Seal [2]	V-ring seal [3]	Cover	w_1	l_1	l_2 [mm]	l_3	Regulation disc	Bearing	Locating ring 2 x per housing
	SC205DS			17					1205	FR52x5
	SC205FS	V30A		18.5					2205	FR52x3.5
SNC205	SC205SV		SC506-605EC	18.5	89	134	85	RDC205	22205	FR52x3.5
	SC205LA									
	SC205TA									
	SC305DS			18					1305	FR62x7.5
	SC305FS	V30A		21.5					2305	FR62x4
SNC206-305	SC305SV		SC507-606EC	18	89	144	95	RDC305	21305	FR62x7.5
	SC305LA									
	SC305TA									
	SC206DS			18.5					1206	FR62x8
	SC206FS	V35A		20.5					2206	FR62x6
SNC206-305	SC206SV		SC507-606EC	20.5	89	144	95	RDC206	22206	FR62x6
	SC206LA									
	SC206TA									
	SC306DS			20					1306	FR72x7.5
	SC306FS	V35A		24					2306	FR72x3.5
SNC207-306	SC306SV		SC509EC	20	94	148	100	RDC306	21306	FR72x7.5
	SC306LA									
	SC306TA									
	SC207DS			20					1207	FR72x8.5
	SC207FS	V45A		22					2207	FR72x5.5
SNC207-306	SC207SV		SC509EC	22.5	94	148	104	RDC207	22207	FR72x5.5
	SC207LA									
	SC207TA									
	SC307DS			21					1307	FR80x9
	SC307FS	V45A		26					2307	FR80x4
SNC208-307	SC307SV		SC510-608EC	21	94	151	107	RDC307	21307	FR80x9
	SC307LA									
	SC307TA									

2. Seals must be ordered for each side of the housing.

3. Optional V-ring available for felt stip seal (FS).

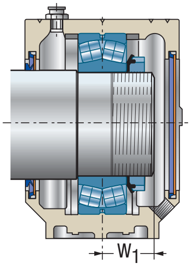
Pillow block housing for bearings with cylindrical bore *(continued)*



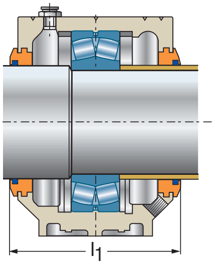


d	Type	d_1	D	a	b	c	g	h	l	m	G	u	v	h_1	m_1	n_1	m_2	n_2	n_3	Weight [1] ≃ [kg]
		Housing dimensions [mm]																		
40	SNC208	50	80	205	60	25	39	60	85	170	M12	15	20	107	160	44	188	34	50	3.1
	SNC308	50	90	205	60	25	41	60	90	170	M12	15	20	113	160	44	188	34	53	3.5
45	SNC209	55	85	205	60	25	30	60	85	170	M12	15	20	110	160	44	188	34	44	3.1
	SNC309	55	100	255	70	28	44	70	95	210	M16	18	24	127	200	49	234	40	56	5.0
50	SNC210	60	90	205	60	25	41	60	90	170	M12	15	20	113	160	44	188	34	53	3.5
	SNC310	60	110	255	70	30	48	70	105	210	M16	18	24	133	200	54	234	40	64	5.3

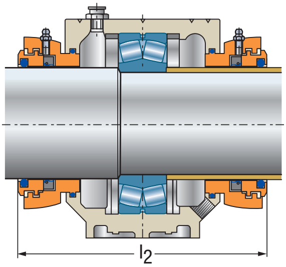
1. Pillow block housing



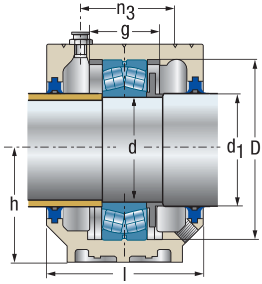
V-ring seal SC..SV + Cover SC..EC



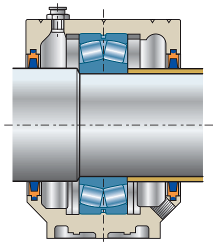
Labyrinth seal SC..LA



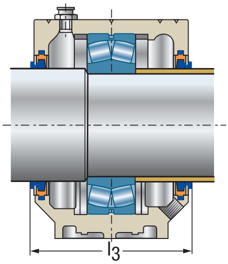
Taconite seal SC..TA



Double lip seal SC..DS + Regulation disc RDC



Felt strip seal SC..FS



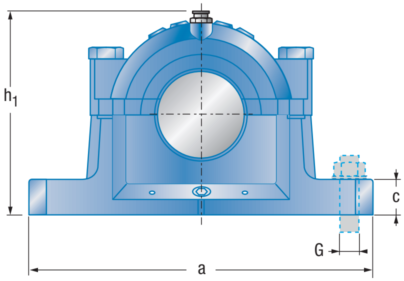
Felt strip seal SC..FS + V-ring seal V..A

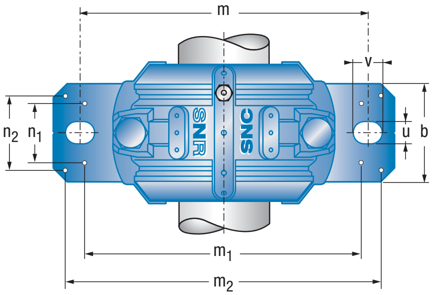
Housing	Seal [2]	V-ring seal [3]	Cover	w_1	l_1	l_2 [mm]	l_3	Regulation disc	Bearing	Locating ring 2 x per housing
SNC208-307	SC208DS SC208FS SC208SV SC208LA SC208TA	V50A	SC510-608EC	20.5 23 23	97	151	107	RDC208	1208 2208 22208	FR80x10.5 FR80x8 FR80x8
SNC210-308	SC308DS SC308FS SC308SV SC308LA SC308TA	V50A	SC512-610EC	23 28 23 28	102	154	112	RDC308	1308 2308 21308 22308	FR90x9 FR90x4 FR90x9 FR90x4
SNC209	SC209DS SC209FS SC209SV SC209LA SC209TA	V55A	SC511-609EC	22 24 24	97	149	107	RDC209	1209 2209 22209	FR85x5.5 FR85x3.5 FR85x3.5
SNC211-309	SC309DS SC309FS SC309SV SC309LA SC309TA	V55A	SC513-611EC	25 30.5 25 30.5	107	158	117	RDC309	1309 2309 21309 22309	FR100x9.5 FR100x4 FR100x9.5 FR100x4
SNC210-308	SC210DS SC210FS SC210SV SC210LA SC210TA	V60A	SC512-610EC	23.5 25 25	102	154	112	RDC210	1210 2210 22210	FR90x10.5 FR90x9 FR90x9
SNC212-310	SC310DS SC310FS SC310SV SC310LA SC310TA	V60A	SC515-612EC	27 23.5 27 33.5	117	168	127	RDC310	1310 2310 21310 22310	FR110x10.5 FR110x4 FR110x10.5 FR110x4

2. Seals must be ordered for each side of the housing.

3. Optional V-ring available for felt stip seal (FS).

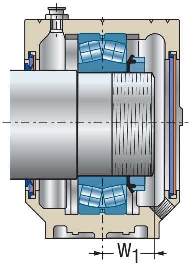
Pillow block housing for bearings with cylindrical bore *(continued)*



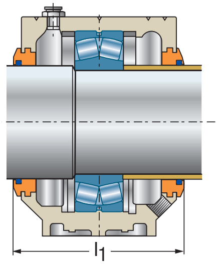


d	Type	d_1	D	a	b	c	g	h	l	m	G	u	v	h_1	m_1	n_1	m_2	n_2	n_3	Weight[1] ≃ [kg]
		Housing dimensions [mm]																		
55	SNC211	65	100	255	70	28	44	70	95	210	M16	18	24	127	200	49	234	40	56	5.0
	SNC311	65	120	275	80	30	51	80	110	230	M16	18	24	148	220	58	252	48	63	6.7
60	SNC212	70	110	255	70	30	48	70	105	210	M16	18	24	133	200	54	234	40	64	5.3
	SNC312	70	130	280	80	30	56	80	115	230	M16	18	24	155	220	58	257	48	72	7.0
65	SNC213	75	120	275	80	30	51	80	110	230	M16	18	24	148	220	58	252	48	63	6.7
	SNC313	75	140	315	90	32	58	95	120	260	M20	22	28	175	252	66	288	52	72	9.5

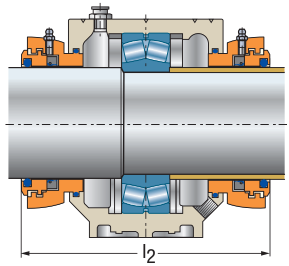
1. Pillow block housing



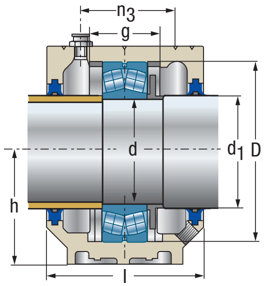
V-ring seal SC..SV + Cover SC..EC



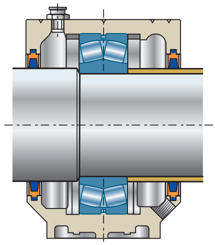
Labyrinth seal SC..LA



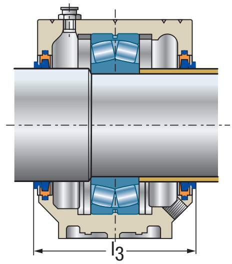
Taconite seal SC..TA



Double lip seal SC..DS + Regulation disc RDC



Felt strip seal SC..FS



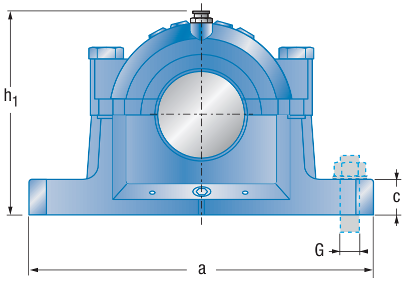
Felt strip seal SC..FS + V-ring seal V..A

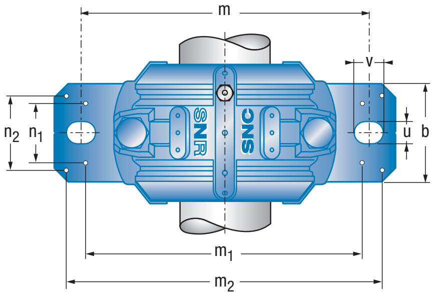
Housing	Seal [2]	V-ring seal [3]	Cover	w_1	l_1	l_2	l_3	Regulation disc	Bearing	Locating ring 2 x per housing
					[mm]					
	SC211DS			25					1211	FR100x11.5
	SC211FS	V65A		27					2211	FR100x9.5
SNC211-309	SC211SV		SC513-611EC	27	107	158	117	RDC211	22211	FR100x9.5
	SC211LA									
	SC211TA									
	SC311DS			29					1311	FR120x11
	SC311FS	V65A		36					2311	FR120x4
SNC213-311	SC311SV		SC516-613EC	29	122	172	132	RDC311	21311	FR120x11
	SC311LA			36					22311	FR120x4
	SC311TA									
	SC212DS			26					1212	FR110x13
	SC212FS	V70A		29					2212	FR110x10
SNC212-310	SC212SV		SC515-612EC	29	119	168	132	RDC212	22212	FR110x10
	SC212LA									
	SC212TA									
	SC312DS			30.5					1312	FR130x12.5
	SC312FS	V70A		38					2312	FR130x5
SNC215-312	SC312SV		SC518-615EC	30.5	130	181	142	RDC312	21312	FR130x12.5
	SC312LA			38					22312	FR130x5
	SC312TA									
	SC213DS			27					1213	FR120x14
	SC213FS	V80A		31					2213	FR120x10
SNC213-311	SC213SV		SC516-613EC	31	125	172	137	RDC213	22213	FR120x10
	SC213LA									
	SC213TA									
	SC313DS			32					1313	FR140x12.5
	SC313FS	V75A		39.5					2313	FR140x5
SNC216-313	SC313SV		SC216-313EC	32	137	190	147	RDC313	21313	FR140x12.5
	SC313LA			39.5					22313	FR140x5
	SC313TA									

2. Seals must be ordered for each side of the housing.

3. Optional V-ring available for felt stip seal (FS).

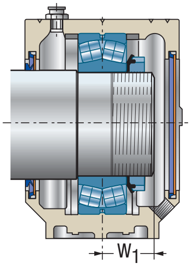
Pillow block housing for bearings with cylindrical bore *(continued)*



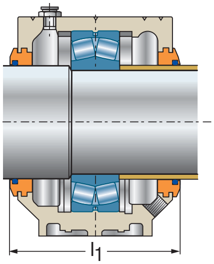


d	Type	Housing dimensions																		Weight [1]
		d_1	D	a	b	c	g	h	l	m	G	u	v	h_1	m_1	n_1	m_2	n_2	n_3	≃
		[mm]																		[kg]
70	SNC214	80	125	275	80	30	44	80	115	230	M16	18	23	154	220	58	252	48	66	7.6
	SNC314	80	150	320	90	32	61	95	125	260	M20	22	28	183	252	66	292	52	76	9.8
75	SNC215	85	130	280	80	30	56	80	115	230	M16	18	24	155	220	58	257	48	72	7.0
	SNC315	85	160	345	100	35	65	100	140	290	M20	22	28	192	280	74	319	58	80	12.4
80	SNC216	90	140	315	90	32	58	95	120	260	M20	22	28	175	252	66	288	52	72	9.5
	SNC316	90	170	345	100	35	68	112	145	290	M20	22	28	212	280	70	317	58	88	15.5

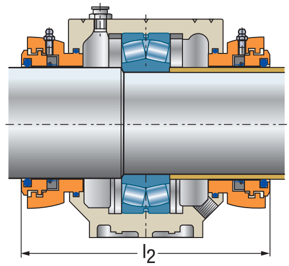
1. Pillow block housing



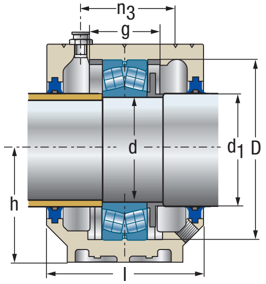
V-ring seal + Cover
SC..SV + SC..EC



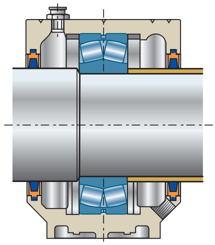
Labyrinth seal
SC..LA



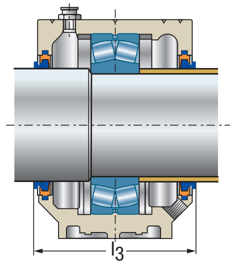
Taconite seal
SC..TA



Double lip seal + Regulation disc
SC..DS + RDC



Felt strip seal
SC..FS



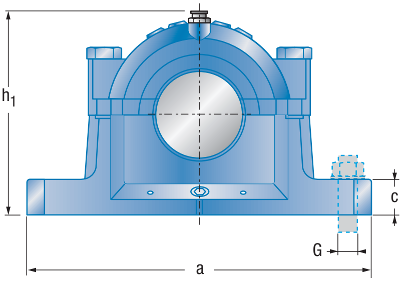
Felt strip seal + V-ring seal
SC..FS + V..A

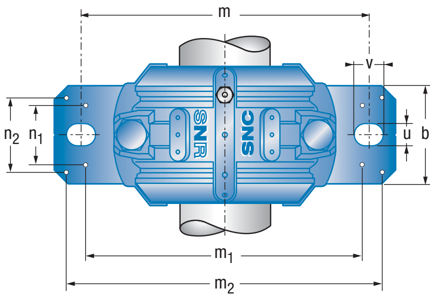
Housing	Seal [2]	V-ring seal [3]	Cover	w_1	l_1	l_2 [mm]	l_3	Regulation disc	Bearing	Locating ring 2 x per housing
	SC214DS			28.5					1214	FR125x10
	SC214FS	V80A		32					2214	FR125x6.5
SNC214	SC214SV		SC517EC	32	130	181	142	RDC214	22214	FR125x6.5
	SC214LA									
	SC214TA									
	SC314DS			34					1314	FR150x13
	SC314FS	V80A		42					2314	FR150x5
SNC217-314	SC314SV		SC217-314EC	34	140	201	152	RDC314	21314	FR150x13
	SC314LA			42					22314	FR150x5
	SC314TA									
	SC215DS			29					1215	FR130x15.5
	SC215FS	V85A		32					2215	FR130x12.5
SNC215-312	SC215SV		SC518-615EC	32	132	181	142	RDC215	22215	FR130x12.5
	SC215LA									
	SC215TA									
	SC315DS			35					1315	FR160x14
	SC315FS	V85A		44					2315	FR160x5
SNC218-315	SC315SV		SC218-315EC	35	157	216	167	RDC315	21315	FR160x14
	SC315LA			44					22315	FR160x5
	SC315TA									
	SC216DS			30.5					1216	FR140x16
	SC216FS	V90A		34					2216	FR140x12.5
SNC216-313	SC216SV		SC216-313EC	34	137	190	147	RDC216	22216	FR140x12.5
	SC216LA									
	SC216TA									
	SC316DS			37					1316	FR170x14.5
	SC316FS	V90A		46.5					2316	FR170x5
SNC219-316	SC316SV		SC519-616EC	37	159	212	172	RDC316	21316	FR170x14.5
	SC316LA			46.5					22316	FR170x5
	SC316TA									

2. Seals must be ordered for each side of the housing.

3. Optional V-ring available for felt stip seal (FS).

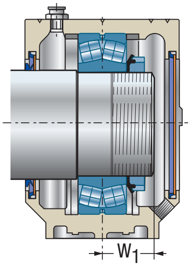
Pillow block housing for bearings with cylindrical bore *(continued)*



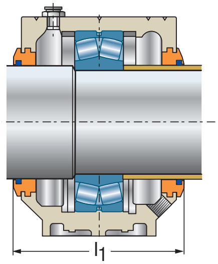


d	Type	d_1	D	a	b	c	g	h	l	m	G	u	v	h_1	m_1	n_1	m_2	n_2	n_3	Weight[1] ≃ [kg]
		Housing dimensions [mm]																		
85	SNC217	95	150	320	90	32	61	95	125	260	M20	22	28	183	252	66	292	52	76	9.8
	SNC317	95	180	380	110	40	70	112	160	320	M24	26	32	215	300	78	348	66	104	18.7
90	SNC218	100	160	345	100	35	65	100	140	290	M20	22	28	192	280	74	319	58	80	12.4
	SNC318	105	190	380	110	40	74	112	160	320	M24	26	32	220	300	78	348	66	104	18.5
95	SNC219	110	170	345	100	35	68	112	145	290	M20	22	28	212	280	70	317	58	88	15.5
	SNC319	110	200	410	120	45	80	125	175	350	M24	26	32	242	320	88	378	74	110	24.8

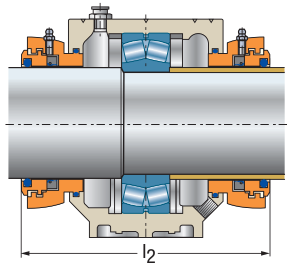
1. Pillow block housing



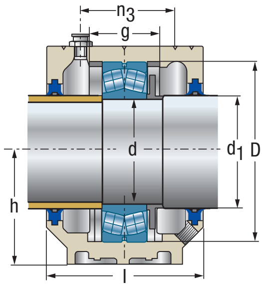
V-ring seal SC..SV + Cover SC..EC



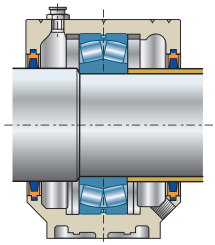
Labyrinth seal SC..LA



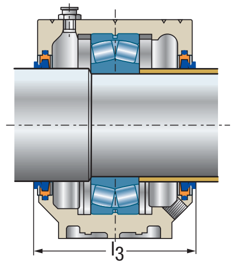
Taconite seal SC..TA



Double lip seal SC..DS + Regulation disc RDC



Felt strip seal SC..FS



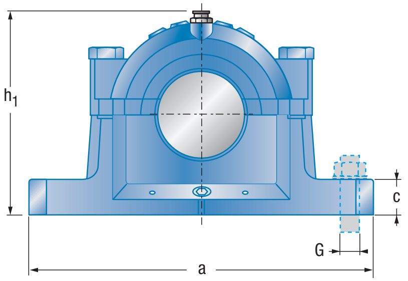
Felt strip seal SC..FS + V-ring seal V..A

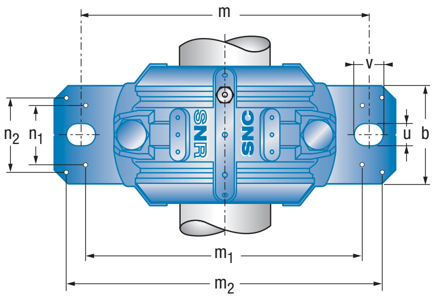
Housing	Seal [2]	V-ring seal [3]	Cover	w_1	l_1	l_2 [mm]	l_3	Regulation disc	Bearing	Locating ring 2 x per housing
SNC217-314	SC217DS SC217FS SC217SV SC217LA SC217TA	V95A	SC217-314EC	33.5 37.5 37.5	142	201	152	RDC217	1217 2217 22217	FR150x16.5 FR150x12.5 FR150x12.5
SNC220-317	SC317DS SC317FS SC317SV SC317LA SC317TA	V95A	SC520-617EC	40 49.5 40 49.5	174	227	187	RDC317	1317 2317 21317 22317	FR180x14.5 FR180x5 FR180x14.5 FR180x5
SNC218-315	SC218DS SC218FS SC218SV SC218LA SC218TA	V100A	SC218-315EC	35.5 40.5 40.5 46.8	157	216	167	RDC218	1218 2218 22218 23218	FR160x17.5 FR160x12.5 FR160x12.5 FR160x6.25
SNC318-618	SC318DS SC318FS SC318SV SC318LA SC318TA	V110A	SC318-618EC	42 52.5 42 52.5	174	227	191	RDC318	1318 2318 21318 22318	FR190x15.5 FR190x5 FR190x15.5 FR190x5
SNC219-316	SC219DS SC219FS SC219SV SC219LA SC219TA	V110A	SC519-616EC	36.5 42 42	159	212	176	RDC219	1219 2219 22219	FR170x18 FR170x12.5 FR170x12.5
SNC222-319	SC319DS SC319FS SC319SV SC319LA SC319TA	V110A	SC522-619EC	43 54 43 54	189	242	206	RDC319	1319 2319 21319 22319	FR200x17.5 FR200x6.5 FR200x17.5 FR200x6.5

2. Seals must be ordered for each side of the housing.

3. Optional V-ring available for felt stip seal (FS).

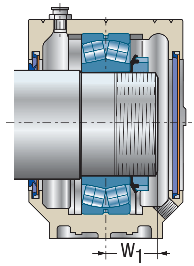
Pillow block housing for bearings with cylindrical bore *(continued)*



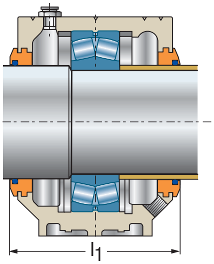


d	Type	d1	D	a	b	c	g	h	l	m	G	u	v	h1	m1	n1	m2	n2	n3	Weight[1] ≃ [kg]
		Housing dimensions [mm]																		
100	SNC220	115	180	380	110	40	70	112	160	320	M24	26	32	215	300	78	348	66	104	18.7
	SNC320	115	215	410	120	45	86	140	185	350	M24	26	32	271	330	88	378	74	122	30.4
110	SNC222	125	200	410	120	45	80	125	175	350	M24	26	32	242	320	88	378	74	110	24.8
120	SNC224	135	215	410	120	45	86	140	185	350	M24	26	32	271	330	88	378	74	122	30.4
130	SNC226	145	230	445	130	50	90	150	190	380	M24	28	35	290	370	92	414	80	122	36.6
140	SNC228	155	250	500	150	50	98	150	205	420	M30	35	42	302	400	108	458	92	128	42.5

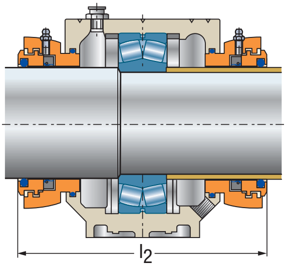
1. Pillow block housing



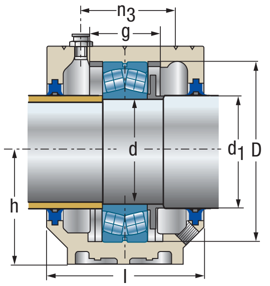
V-ring seal SC..SV + Cover SC..EC



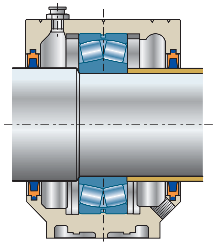
Labyrinth seal SC..LA



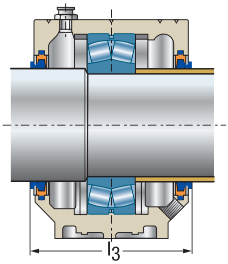
Taconite seal SC..TA



Double lip seal SC..DS + Regulation disc RDC



Felt strip seal SC..FS



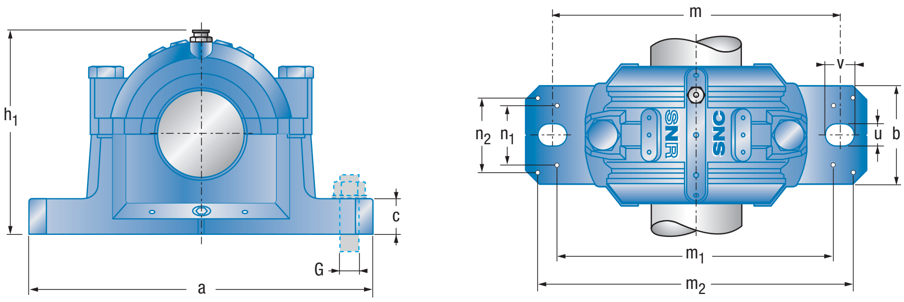
Felt strip seal SC..FS + V-ring seal V..A

Housing	Seal [2]	V-ring seal [3]	Cover	w_1	l_1	l_2 [mm]	l_3	Regulation disc	Bearing	Locating ring 2 x per housing
	SC220DS			38.5					1220	FR180x18
	SC220FS	V120A		44.5					2220	FR180x12
SNC220-317	SC220SV		SC520-617EC	44.5	177	227	191	RDC220	22220	FR180x12
	SC220LA			51.7					23220	FR180x4.85
	SC220TA									
	SC320DS			45.0					1320	FR215x19.5
	SC320FS	V120A		58.0					2320	FR215x6.5
SNC224-320	SC320SV		SC524-620EC	45.0	200	249	216	RDC320	21320	FR215x19.5
	SC320LA			58.0					22320	FR215x6.5
	SC320TA									
	SC222DS			41.5					1222	FR200x21
	SC222FS	V130A		49.0					2222	FR200x13.5
SNC222-319	SC222SV		SC522-619EC	49.0	193	242	206	RDC222	22222	FR200x13.5
	SC222LA			57.4					23222	FR200x5.1
	SC222TA									
	SC224DS			53.5					22224	FR215x14
	SC224FS	V140A		62.5					23224	FR215x5
SNC224-320	SC224SV		SC524-620EC		201	249	216	RDC224		
	SC224LA									
	SC224TA									
	SC226DS			57.5					22226	FR230x13
	SC226FS	V150A		65.5					23226	FR230x5
SNC226-526	SC226SV		SC226-526EC		201	259	221	RDC226		
	SC226LA									
	SC226TA									
	SC228DS			60.5					22228	FR250x15
	SC228FS	V160A		70.5					23228	FR250x5
SNC228-528	SC228SV		SC228-528EC		221	275	241	RDC228		
	SC228LA									
	SC228TA									

2. Seals must be ordered for each side of the housing.

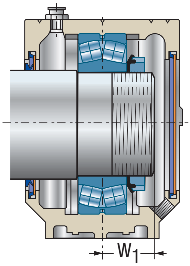
3. Optional V-ring available for felt stip seal (FS).

Pillow block housing for bearings with cylindrical bore *(continued)*

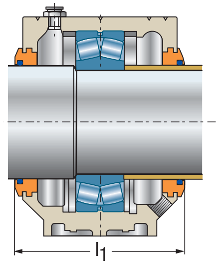


d	Type	d_1	D	a	b	c	g	h	l	m	G	u	v	h_1	m_1	n_1	m_2	n_2	n_3	Weight [1] ≃ [kg]
		Housing dimensions [mm]																		
150	SNC230	165	270	530	160	60	106	160	220	450	M30	35	42	323	430	116	486	10	140	55.2
160	SNC232	175	290	550	160	60	114	170	235	470	M30	35	42	344	450	116	506	100	155	63.0

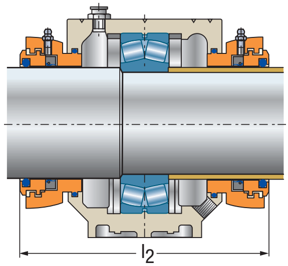
1. Pillow block housing



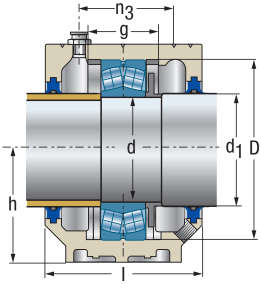
V-ring seal SC..SV + Cover SC..EC



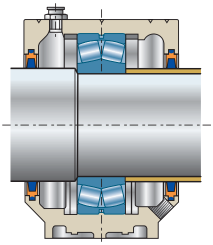
Labyrinth seal SC..LA



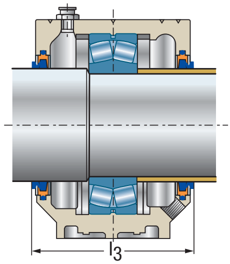
Taconite seal SC..TA



Double lip seal SC..DS + Regulation disc RDC



Felt strip seal SC..FS



Felt strip seal SC..FS + V-ring seal V..A

Housing	Seal [2]	V-ring seal [3]	Cover	w_1	l_1	l_2	l_3	Regulation disc	Bearing	Locating ring 2 x per housing
				[mm]						
SNC230-530	SC230DS SC230FS SC230SV SC230LA SC230TA	V170A	SC230-530EC	65.0 76.5	236	294	256	RDC230	22230 23230	FR270x16.5 FR270x5
SNC232-532	SC232DS SC232FS SC232SV SC232LA SC232TA	V180A	SC232-532EC	70.5 82.5	251	309	271	RDC232	22232 23232	FR290x17 FR290x5

2. Seals must be ordered for each side of the housing.

3. Optional V-ring available for felt stip seal (FS).

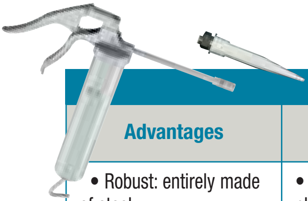
Maintenance

Maintenance products

Products that meet your expectations

SNR LUB greases			
Advantages	**Description**	**Operating conditions**	**Applications**
• Reliable : devoloped by a bearing manufacturer and approved petroleum suppliers. • Adapted to the needs: - different types as per applications - packaging method adapted to the types of grease.	• NLGI 2 grade for all greases. • Operating temperature between -50°C (-122°F) to +250°C (+482°F) according to type. • Very good resistance to water and corrosion.	Range adapted to following applications: • Multiservice MS, • Extreme pressure EP, • High speed GV+, • high viscosity FV, • Low speed, extreme pressure VX, • High temperature HT, • Very high temperature THT, • Food compatible grease AL1.	• All types of bearings, pillow blocks and mounted units as per load and environmental requirements.

SNR automatic lubricator			
Advantages	**Description**	**Operating conditions**	**Applications**
• Safe: inert gas produced within a sealed chamber. • Cerchar and Ineris approvals: electrical equipment usable in an explosive atmosphere. • Reliable lubrication: not readily accessible or dangerous areas. • Automatic: less frequent monitoring. • Flowrate adjustment: one product for all applications. • Sealed: operation possible when immersed.	• Flowrate programmable via switches. • Can be stopped during operation (ON/OFF). • Pressure: 3 bar (43 psi) maximum. • Volume: 125 cm^3 (4,2 ozfl). • Different types of grease can be used.	• Direct installation on the component to be lubricaed. • Remote installation (1m or 3 ft away) in case of excessive temperature, uneasy access or vibration. • Range of lubricators: AL1 EP HT MS VX	• All types of machines regardless of the environment.



Grease gun for bearings

Advantages	Description	Operating conditions	Applications
• Robust: entirely made of steel. • Practical use: knurled body for an excellent grip, the pump can be actuated with one hand. • Precise: especially designed SNR union combined to a special profile greasing nozzle to inject the grease at the right point. • Clean: clean for the environment and the use.	• Material: heavy steel plate. • Weight: 2-1/2 pounds with steep section and clip. • Content: 500 cm^3. • Operating pressure: 180 bars. • Maximum pressure: 360 bars. • Flow rate: 0.80 cm^3. • Greasing accessories supplied with the gun.	• Maintenance operations (greasing, regreasing).	• For all bearings.

Induction heaters (Fast Therm 20/35/150/300/600/1000)

Advantages	Description	Operating conditions	Applications
• Easy to use: pivot arm, operator's safety, cleanliness. • Heating control and safety: temperature control. • Efficiency: turbo-boost technology that heats the part twice as rapidly.	• 6 devices range. • Automatic demagnetizing on completion of the cycle.	• All circular parts with a maximum bore diameter from 215 to 1150 mm.	• Steel ring bearings, gear etc. with interferance fit on the shaft.

Heat-inslating gloves

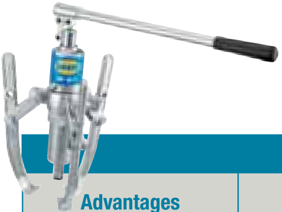
Advantages	Description	Operating conditions	Applications
• Non-flammable, resistance to temperatures up to: +350°C / 660°F. • High protection: arm + hand (glove length: 35 cm / 14 inches. • Very high resistance to cuts, tears and abrasion.	• Made of Kevlar®. • Certified for EN388 mechanical and EN407 thermal risks.	–	• Handling of oily and hot bearings.

Maintenance products *(continued)*

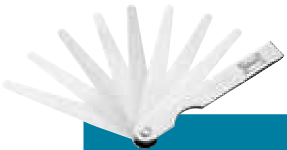
Installation kit			
Advantages	**Description**	**Operating conditions**	**Applications**
• Do not damage the bearings during installation. • Complete kit. • Practical, thorough tranportable kit.	• 3 impact tubes. • 1 set of 33 impact rings. • 1 special hammer, anti-bounce, shot-loaded, to ensure maximum impact.	–	• Bearings (bore diameter from 10 to 55 mm), spacer rings, pulleys and seals installation

Spanner wrenche			
Advantages	**Description**	**Operating conditions**	**Applications**
• Solid, safe, simple to use. • 5 sizes to cover all needs. • Capacity: 15 to 180 mm. • Pins are heat-treated to 40HRc rockwell hardness.	• 2 types of wrenches to tighten drilled nuts (e.g. precision nuts) and castellated wrenches to tighten nuts with straight slots (or castellated nuts).	• 5 sizes: 15-35 mm; 35-50 mm; 50-80 mm; 80-120 mm; 120-180 mm.	• Tightening and removal operations for standard and precision nuts.

Fitting compound			
Advantages	**Description**	**Operating conditions**	**Applications**
• Contact corrosion reduction. • Extended shaft and bearing housing life. • Water and washout resistant. • Stick-slip reduction.	• Composition: lithium soap, synthetic oil, solid organic lubricants. • Operating temperature: -45°C (110°F) to +150°C (302°F), • NLGI grade: 1.	–	• Installation or removal by fitting (bearings, wheels, flanges,…).



Hydraulic extractor			
Advantages	**Description**	**Operating conditions**	**Applications**
• Simple thanks to its integrated hydraulic pump. • Solid, robust. • No energy loss.	• 2 or 3 interchangeable jaws. • Light weight. • Extraction force: 10 tons.	• Always position the protection cover over the jaws when using the extractor.	• Removal of bearing assemblies. • Removal of bearings either by the bore or by the outer diameter, by reversing the jaws.



Calibrated feeler gauges			
Advantages	**Description**	**Operating conditions**	**Applications**
• High precision measurement. • Set of gauges protected by a steel frame.	• Set of 18 gauges, round tip. • Calibrated to 1/100th. • 2 lengths available: 90x10 mm to 150x10 mm.	• Control of bearings fit. • 2 sets available (+1 in inch).	• Internal radial clearance measurement in spherical and cylindrical roller bearings.

Laser-targeting thermometer			
Advantages	**Description**	**Operating conditions**	**Applications**
• Simple to use. • Precise.	• Non-contact infrared measurement. • Emissivity adjustment 0.20 to 1.00. • °C/°F switching.	• Functional monitoring.	• Bearings, plain bearings, lubrication systems, surface temperature, live components…

SNR Industry services

➔ Expertise

If the bearing is damaged or operates incorrectly, our experts are at your disposal to analyse the failed bearing. They can visit your site upon request.

In case of premature bearing damage, the bearing state will provide significant information.

Just send the bearing, without cleaning it along with an analysis request sheet, duly completed (available from your SNR contact or distributor).

Please provide maximum information concerning the bearing operation and environment.

➔ Installation / Removal

Our experts can intervene on-site, everywhere in the world and on short notice.

Their mission consists of providing suitable consulting advice for bearing installation and removal to ensure optimum service life.

Therefore, this service is effective at all collaboration stages between SNR and its clients, before and after sales, and also during the bearing service life. If you do not possess suitable means, or if you lack the time or availability, SNR is there to help you.

Shaft alignment

Misalignment causes stress loading and vibrations that give rise to premature deterioration of bearings, and also coupling, packing and sealing, etc.

Abnormal stress loading associated with misalignment also causes increased energy consumption. Misalignment has a direct impact on maintenance costs and the availability of your production tool.

By entrusting your shaft alignment operations to the teams of SNR experts, you will guarantee the precision of alignment and will ensure the quality of your rotating machines elements.

Vibration analysis

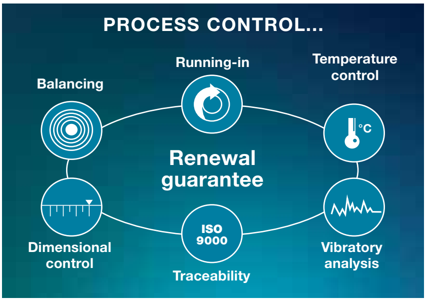
Vibration analysis is the most commonly used on-site condition monitoring method for rotating machines, which are essential elements at the heart of the manufacturing process. Measurements on operating machines are easy to implement and the process allows early detection of most faults encountered on production machines.

Many anomalies such as shaft line unbalance play, misalignment of coupled machines, coupling deterioration, clearances, bearing wear, or even electrical faults can be detected with sufficient anticipation to plan an intervention before failure.

SNR has developed a whole range of measuring and monitoring instruments in order to accurately analyse all environmental constraints likely to affect correct operation of your facilities and, notably, your bearings.

In order to detect weak points in your equipment and facilities and solve them, we also propose a range of products and services, suitable for vibration monitoring of the rotating machines, together with our partner, 01dB, a renowned expert in this field.

Spindle renewal for machine-tools*



Based on its extensive experience in the field of machine-tool bearings and in the machine-tool spindle renewal activity for the maintenance of its own machine fleet, SNR proposes a machine-tool spindle renewal service to its French clients.

This renewal service is proposed for all types of spindles (either mechanical or electro-mechanical), all activity sectors (mechanics, plasturgy, wood industry, etc.) and all bearing makes or brands.

* Service available in France only.

Other products

Linear motion

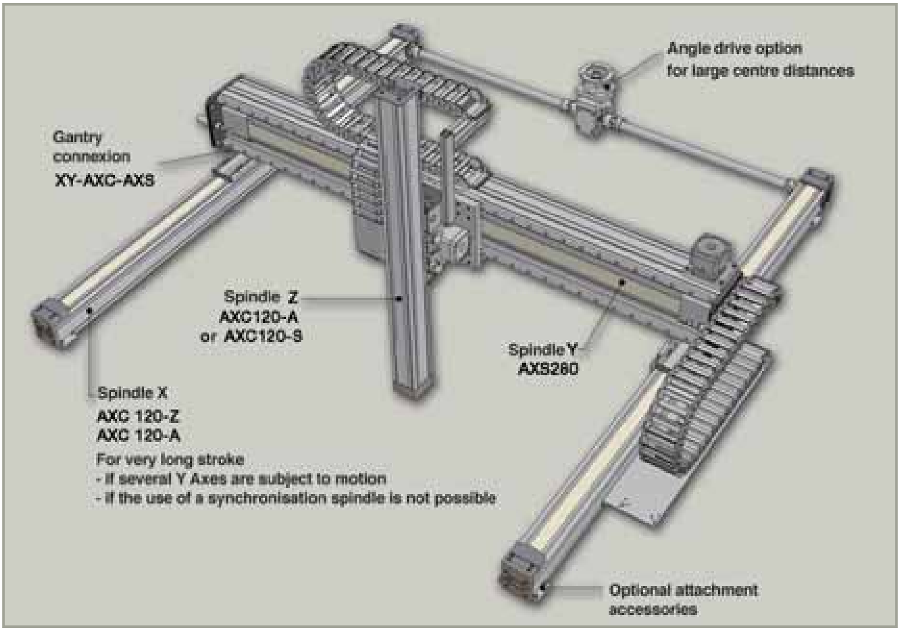
The range of SNR linear modules and tables offers many solutions for production automation, notably in assembly, measurement or handling sectors.

■ The modular, flexible design allows us to propose a type of drive and guidance function perfectly tailored to each application, with extensive specific adaptation capabilities. High quality components guarantee optimum service lives and reliability. Finally, low product footprint facilitates installation in all types of mechanical systems.

The SNR technicians at our design offices provide technical support during solution-finding and recommendation phases.

All SNR linear motion units are developed, manufactured and tested in our Bielefeld workshop (Germany). Linear module production has been certified since January 2000 to DIN EN ISO standard 9001:2000. If application requires, modules can be assembled under protected environment, in a clean room.

SNR linear modules address the most diversified application in various industrial sectors: automation, machine-tools, electrotechnology, electronics, motor industry, printing, special machine construction, white rooms in semi-conductor and food industries.



■ **The linear motion range breaks down into three complementary families:**

- **AXC compact modules:** based on open sections integrating guiding and driving functions for general applications.
- **AXLT linear tables:** for applications requiring accuracy and stiffness.
- **AXS system modules:** based on close sections, tailored to heavy load handling applications.

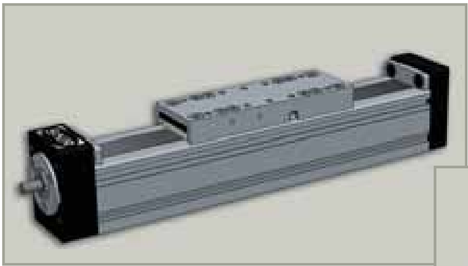
AXC compact modules

The range of AXC compact modules is built on 40, 60, 80 and 120 mm aluminium sections. These products feature versatility and compactness. They can be used either singly or interconnected thanks to a range of interconnection components allowing multi-axis assembly creation.

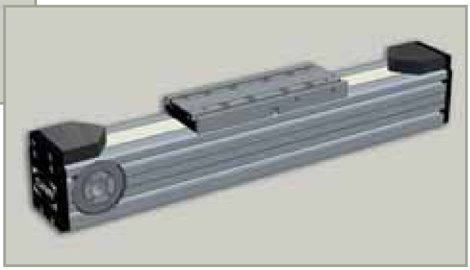
■ **Various guide / drive variants are proposed to adapt the mechanical solution to each application:**

- Roller drive or various types of rails / boltage cursors
- Ball screw or notched belt drive

r dr



T d dr



■ **Various suitable optional items are proposed:**

Protection strip, pre-tensioning, clamps and coupling for motor mount, integral reduction gears, limit switches, ...

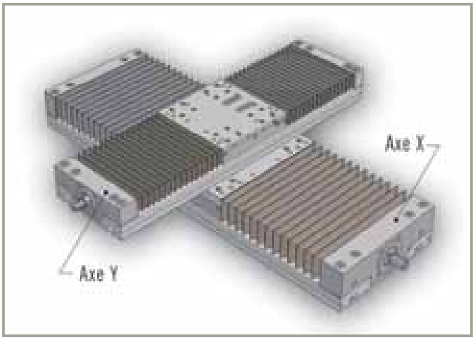
Linear motion *(suite)*

AXLT linear tables

■ AXLT series linear tables are tailored to high load applications requiring good accuracy. The standard range is built on 155, 225, 325 and 455 mm wide aluminium support plates. For applications where the table plays a structural role, the base plates can be delivered in steel construction.

Carriage drive is ensured by ball screws or trapezoidal thread screws. Loads are sustained by encaged ball guides. These mechanical components are protected from outside environment by boots.

■ **Optional items are available:** sensors, motor coupling and flanges, belt angle drive,…

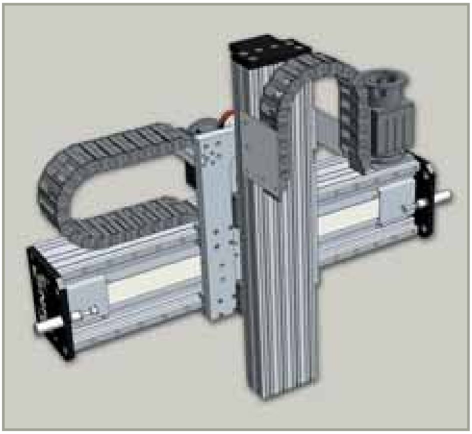


AXS system modules

■ AXS modules are required to handle heavy loads. The range breaks down into horizontal gantries, vertical lifting modules and telescopic modules.

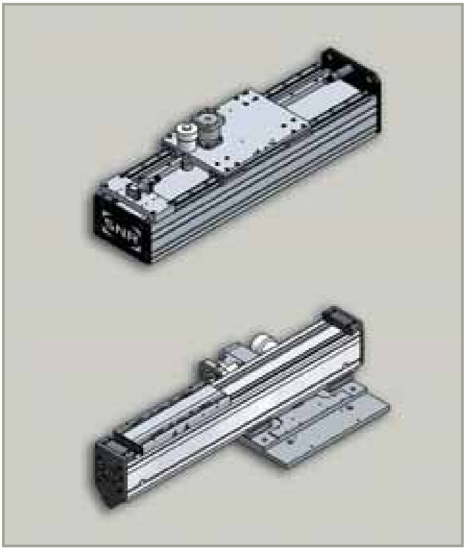
Horizontal modules are based on large-section closed aluminium beams with high capacity ball-type guide pads and a belt or rack drive system. These modules can move loads up to 6,000 Kg with cantilever lengths (overhang) up to 10 m.

For vertical motion, lifting modules can displace loads up to 1,000 Kg thanks to reinforced gear-rack systems. Design allows use of these modules on long spans, with various moving carriages, independent from one another.



Finally, telescopic modules can be used for vertical or horizontal displacements requiring low footprint. Design allows very high travelling rates (up to 10 m/s).

All AXS range modules can easily be combined to compose full-featured assemblies by integrating various optional items (position sensors, pods, cable carrier chains, ...)



Specific solutions

■ In addition to the standard range, SNR proposes solutions addressing high technology applications which require specific technical solutions.

Notably, the standard range can be adapted to address particular environmental requirements, such as in white rooms or in agri-food systems. When standard solutions are not suitable, the SNR design office is at your disposal for designing specific solutions tailored to your own needs.

Special bearings

Description and capabilities

■ The design office engineers and technicians are trying constantly to improve the technical and economic performance of their products by expanding their limits.

SNR has found that the synergy obtained by working hand-in-hand with our customers results in original and innovative approaches to rotational functions that can remove some of the constraints limiting their products.

A fruitful collaboration must be tangible at all levels : technical creativity, lasting economic competitiveness and industrial responsiveness. SNR has dedicated the necessary human and material resources to meet the design, production and commercial requirements of such collaborations:

- All developments follow our ISO 9001 certified procedures

- Prototypes and pre-production models can be rapidly produced to validate calculated performance. If necessary, a test centre is available to test variants of your products.

- An indutrialization and production unit, which is specialized for small and medium quantities, can devote the necessary attention to the particular details of your product.

• Field service augmented by powerful technical support groups facilitate product integration into its application.

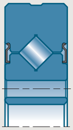
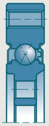
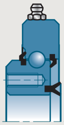
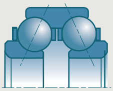
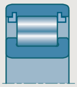
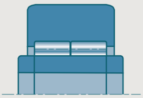
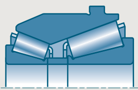
• Product and service quality require reciprocal commitments. For this purpose, SNR proposes a cooperation agreement which details these commitments and provides an additional guarantee of success.

■ The agreement is grounded on a program based on previous issues, whatever the industry or branches where special SNR bearings are used. The special products developed by SNR directly benefit from State-of-the-Art innovations from our research & development plan.

Special bearings *(continued)*

Series

■ Comparative table of different bearing types

Product		Market	Capabilities	
Type		Examples of applications	Radial load	Axial load
QR		r d r r r r r r r r		
QJ		r r d r r r r d r r r r		
AB		Tr r r r r r d r d r r d d r r d r d rr r		
GB		T r r r r d d r r d r d r r		
N		Tr r r r r r d d r r r r		
GNU		r d d r d d r r d r r r r		
FC		Tr r r r d d r r r r r d		

r r d r rr r

QR : crossed roller bearings
QJ : ball bearings with 4 contact points
AB : single-row ball bearings
GB : double-row angular contact ball bearings TWINLINE
N : cylindrical roller bearing
GNU : single or double-row cylindrical roller bearing with a large outer ring
FC : double tapered bearings

Capabilities			Additional Characteristics				
Speed of rotation	Canting moment	Friction moment	Lubrication	Protection	Adjustment	Connection	Transmission

d r r

Special bearings *(continued)*

Customized solutions

Self-aligning bearings

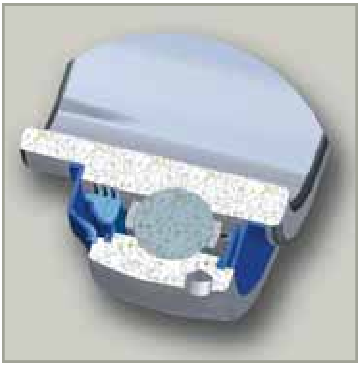
In addition to a very extensive range of standard self-aligning bearings, SNR can propose solutions tailored to your requirements and help you face the challenges in terms of bearing applications.

Together with highly diversified raw material choices such as grey iron, modular iron, cast steel, steel sheet or plate, or thermoplastic resin, SNR can also propose tailor-made designs.

Efficient sealing systems which ensure suitable bearing operation were specially developed for our clients.

Bearing and insert surface protection is ensured thanks to high performance processes such as nickel plating or galvanising.

SNR bearings can be painted, coated by spraying process or finished following innovative methods.



Split housing units

Special applications require special concepts.

For example, SNR proposes base plate bearing units for high load requirements such as mining, or industrial fan bearings in cement mills. Through its extensive technological knowledge of bearings and long experience in this sector, SNR has become the ideal partner.

In addition to standard designs, we can propose customized solutions designed to enhance our clients' machine performance and service life.

We have integrated many environment criteria and optimised, amongst others, the bearing sealing systems. We have also equipped the bearings with oil circulation or vapour lubrication devices.

As for self-aligning bearings, pillow block housings can be manufactured on demand, from modular iron or steel casting.

We develop and manufacture tailored bearing variants allowing perfect integration into your applications.

We also propose particularly attractive and competitive turnkey solutions comprising tailor-made bearing-bearing unit-shaft assemblies to be installed directly.

Complete systems

One of SNR's main assets is its capacity to develop system solutions in cases where standard solutions are not applicable.

Beyond the bearing's main function, we take into account mechanical interfaces, thereby simplifying integration into the existing system. This cost-saving approach also reduces commissioning times and incorrect assembly errors.

Your single source: SNR.

Aerospace

Aerospace: SNR on board means comfort

Today, SNR bearings are chosen in the major aerospace programmes: Airbus, Boeing, Dassault, Ariane 5 European launcher… they all use engines equipped with SNR bearings. Likewise, helicopter manufacturers are proud to rely on the European leader of helicopter transmission bearings.

The significant resources assigned to R&D and tests by SNR and a good comprehension of specifications have enabled the company to meet the increasing requirements of its clients for more than 50 years.

Quality, reliability and efficient organisation have positioned SNR amongst the major leaders of the Aerospace sector worldwide.

Production methods and means, high training and qualification have enabled our Aerospace division to obtain quality certificates from the major Aeronautics manufacturers.

Aerospace requires the highest performance bearings with highest reliability. Turbojet and turboshaft engines expose the bearing to high speeds, high temperatures, while requiring weight savings. In helicopter transmissions, bearings are subject to high loads, vibrations and structural deformation.

As a complement to OEM activity, SNR aerospace has obtained the required approvals delivered by civil aviation authorities (JAA, FAA, CAAC) to propose to engine and aircraft operators and after-sales facilities a wide range of services broken down into two main categories:

- aerospace bearing maintenance.

  The "SNR MRO Services" offer, exhaustively addresses the requirements of engine maintenance facilities, either affiliated with airlines, OEM's, or independant contractors.

- aftermarket spares.

Automotive

Automotive: the European reference

In the world of motor car and OEM manufacturers, the conventional "supplier" was replaced by a concept of "cooperating company", leading the suppliers and their clients to jointly work and develop common technologies and synergies. SNR is one of the major cooperating companies in the automotive sector and this cooperation process is deeply rooted in its culture. With bearings present in 8 of the 10 best selling cars in Europe, SNR clearly identifies itself as the European leader of wheel bearings.

SNR follows the worldwide market evolution and acts as a privileged contact for the leading motorcar and OEM manufacturers, covering the whole range of motor and bearing applications:

- Wheel bearings, 1st, 2nd and 3rd generations
- Chassis
- Gearbox
- Transmission shafts
- Steering column
- Engines and accessories

SNR created ASB® (Active Sensor Bearing), an instrumented bearing which has become a worldwide standard, illustrating the company's involvement in automotive sector progress and development. The ASB® technology has now been adopted by all the world leaders in the bearings sector in Europe and Japan.

This technology is a decisive contribution to design and implementation of State-of-the-Art technologies referred to as "mechatronics", which currently change the conventional vehicle concepts and provide the driver with a leading-edge advantage in terms of safety and performance.

Our technical competence and know-how are also at your disposal for the Aftermarket, which directly benefits from SNR's prevailing position in the OEM sector as well as its genuine product offer.

Rail

SNR solutions : the future on rails

SNR solutions : the future on rails

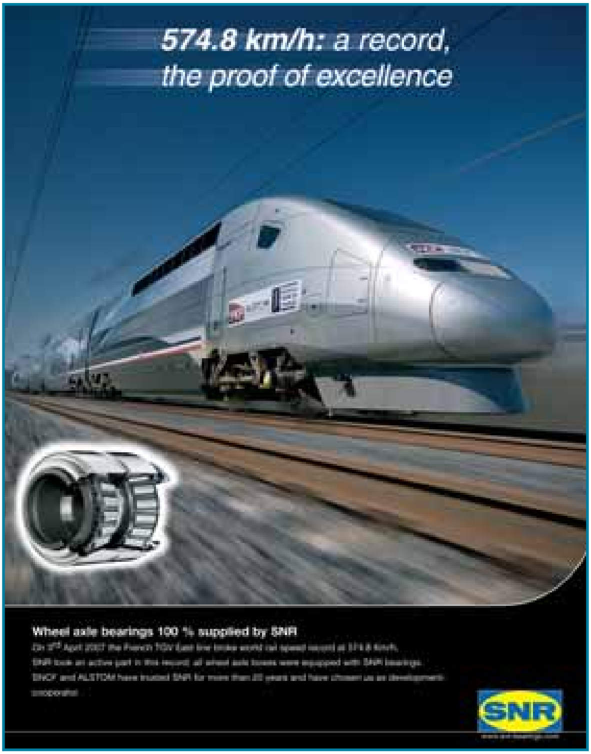
SNR, at the very heart of big European rail projects for more than 40 years. Its cutting edge technological know-how has made it the indespensable partner of the main international players in OEM and AFT (aftermarket).

After giving our contribution to the TGV's world speed record at 574.8 km/hr with our bearings in all TGV components (bearing axle boxes, transmissions and electrical drive motors), SNR is the first bearing manufacturer officially approved at 350 km/hr for axle bearings.

To efficiently meet the strong expectations from our clients, taking into account extreme conditions incurred by the bearings, SNR implements best technical solutions (materials, design, and also develops innovative processes for surface treatments such as phosphating, copper plating or nitriding.

SNR also allows you to benefit from its reliable maintenance analysis tools.

To optimize solution integration and to ensure the excellence and responsiveness of its maintenance services: fitting advice and assistance on site, assembly of series solutions on site, bearing training, axle blocks bearings maintenance and reconditioning…



For more information, ask for our brochure dedicated to this sector.

Other applications

Our capacity to design bearings which integrate complementary, innovative functions (instrumentation, solid lubrication, ...) and our dedication to work in cooperation with our clients to pool our competences are the reasons for our presence in the major industrial markets and in higher diversified applications. From textile to rail and including film drawing machines, paper mills, iron & steel, agri-food, or even farming and bobbin-winding machinery..., SNR is present everywhere.

SNR and quarries - mines

The SNR career in quarries… The most severe applications

The work done in a quarry is more than just the extraction of the ore. A complete mechanical process is required to obtain a product with a specific granularity: crushing, grinding, screening process.

Heavy radial load, contamination, shocks, unbalanced load, vibration, high temperatures that can exceed 100°C (212°F), low rotating speed, misalignments: these are environmental contraints of a quarry.

SNR offers an extensive line of product, particularly PREMIER spherical roller bearings in steel cage or machined brass cage (or in special shaker screen, EF800 series) to withstand difficult operating conditions.

For each step in the ore process, SNR has just the right bearing.

For more information, ask for our brochure dedicated to this sector.

SNR and paper mill industry

SNR bearings: the sense of the fiber…

The transformation of a tree trunk into spotless paper requires a large number of operations. Working and treating the fibrous mass resulting from the wood involves the use of numerous machines, in which bearings are key components.

The paper environment is particularly difficult : presence of water and hot steam, high speeds of rotation and heavy loads, need for rotational accuracy, high temperature, aggressive chemical products particularly during the blanching process, dust...

To face the numerous constraints in this sector, SNR proposes a range of bearings addressing the needs of paper mills, the Premier spherical roller bearings.

For accessory application (pumps, motors,…), our range of standard bearings is perfectly adapted.

SNR offers the paper mill Industry the appropriate solution for each step of the papermaking process.

For more information, ask for our brochure dedicated to this sector.

SNR and steel Industry

SNR bearings: as strong as iron & steel

Steel Industry process consists in transforming rough ore into value added steel, which have precise characteristics.

Due to high temperatures and loads, this sector imposes unmatched requirements on bearings.

The application conditions supported by the bearings are variable but always very difficult: very high pressures (rolling), high temperatures and heavy loads, humidity (water projection cooled the high temperature parts), vibration and shocks.

SNR develops products interchangeable with those in your machines :

- either standard bearings with performance optimized by shields or seals and appropriate clearance and grease;
- or, our special bearings designed to meet your specific needs, with identical dimensions to those of the bearings currently in place: no modifications are required.

The EF800 Premier spherical roller bearings for conveyors, shaker screen applications. The pillow block housing SNC bearings and the SNR carrier rollers and drive rollers are also major assets for your iron and steel equipment.

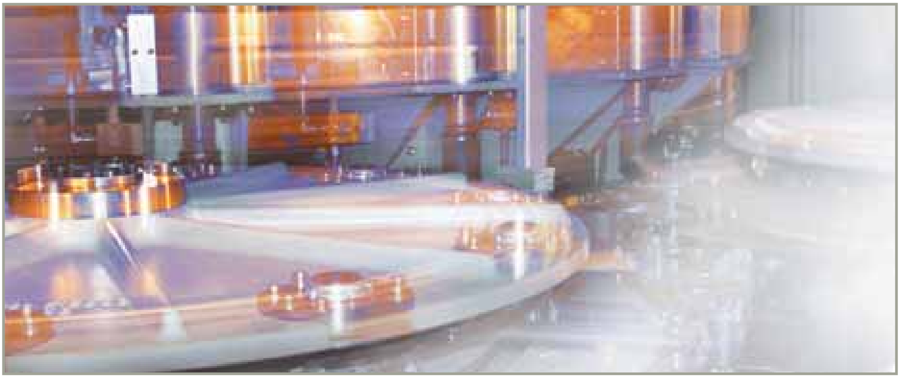
For more information, ask for our brochure dedicated to this sector.

SNR and agri-food industry

SNR bearings: the indispensable ingredient in the agri-food process

New ingredients, new modes of consumption, new preservation processes, the food industry is a fast-changing market. The industrial facilities must maintain high performance and reliability to guarantee sustained productivity.

In the agri-food industry, bearings must perform in: high and low temperatures, wet areas and water splashing, vibrations, misalignment…



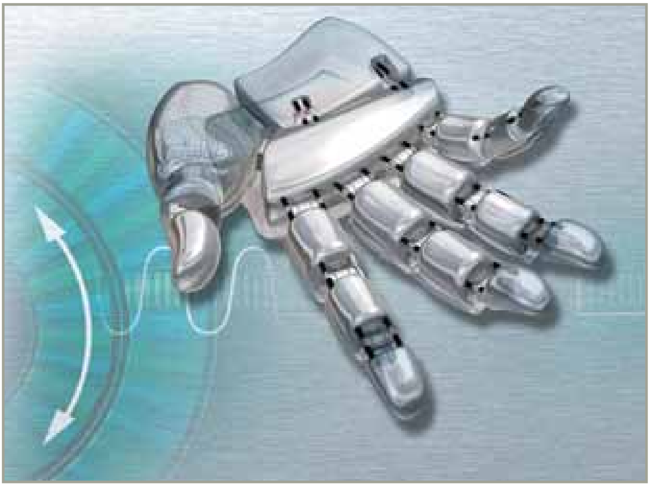
SNR has been present for years in many agri-food systems. Each trade has its own particulars requiring specific solutions in regards to bearings. Therefore, all SNR products have mechanical, thermal and chemical properties which address these requirements. Our TOPLINE range, our stainless steel bearings and bearing units meet all your expectations.

For more information, ask for our brochure dedicated to this sector.

Mechatronics

SNR

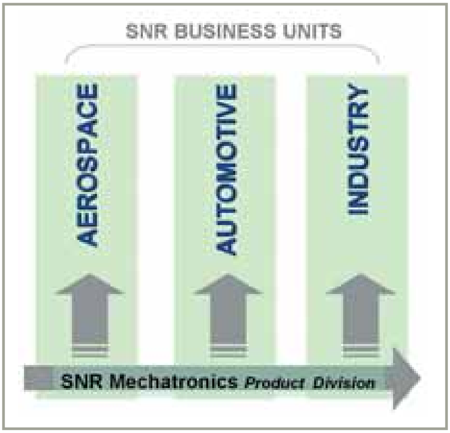
SNR Mechatronics – Customized Motion Sensing



■ SNR Mechatronics was created in 2002 to develop the SNR group's mechatronic activities. The division is seen as a pioneer in sensor bearings.

SNR Mechatronics proposes solutions, either integrated or not for bearings involved in speed or position sensing.

We were the first to introduce a sensor bearing for motorcar wheels integrating a magnetic encoder and an active sensor. ASB is a major innovation which has now become a standard nearly adopted by all automotive manufacturers in Europe and Japan.



Thanks to our experience in high-precision applications, we have developed and manufactured mechatronic products for more than 15 years. This know-how, together with high professionalism in Automotive, Aerospace and Industrial sectors lead us to offer "tailor-made" products for full satisfaction of our clients.

Today, our ambition is to propose specific solutions for each demand in our activity sectors.

Development and Production

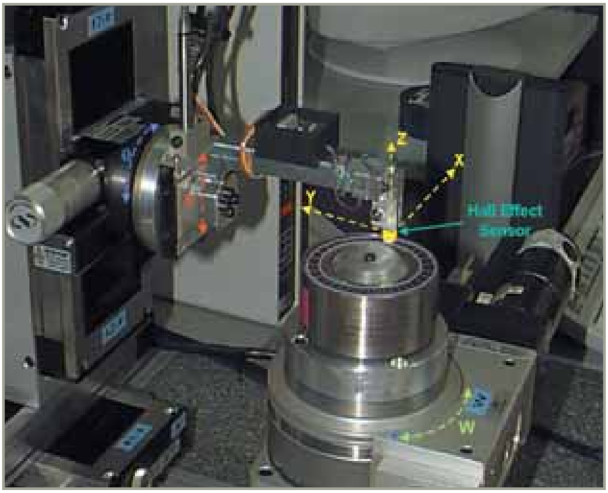
SNR Mechatronics is based on a unique magnetising process (magnetic encoder) and perfectly adapted magnetic sensing technologies (magneto-resistors, Hall-effect elements, SNR-proprietary ASIC, "Application-Specific Integrated Circuit") to develop specific applications. We can deliver high resolution signals for speed measurement, angle or direction sensing, and reference pulse generation for short-distance rotation or linear measurements.

Most of the new developments are specific and require fine studies which involve our basic technology. SNR Mechatronics possesses all resources required for designing these solutions: design and simulation tools, test laboratories and prototype processes.

Our specialists in each one of the Automotive, Industrial or Aerospace domains are fully liable for the management of the mechatronics projects from pre-design studies to serial-production. By combining SNR Mechatronics's expertise with the know-how of all SNR divisions, we ensure reliable, strict and economical studies for you.

Production

The SNR production sites integrate sophisticated production lines and test and monitoring equipment for our mechatronics products. SNR uses electronic components from the market leaders.



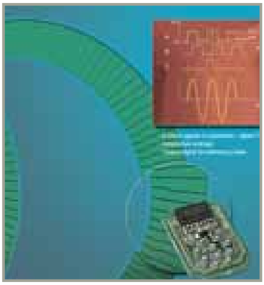
Engineering

■ We have a deep experience and strong know-how in displacement/motion sensors, magnetism, microelectronics, software and mechanical integration. Based on our clients' needs and activity field, our experts from the various company's sectors control the project from the beginning to the end.

We develop high competence in magnetic sensing: writing and reading magnetic data from an angular or linear encoder is the basic technology of our solutions.

This technology delivers a high resolution output signal for angular rotation rate and direction, and reference pulse generation.

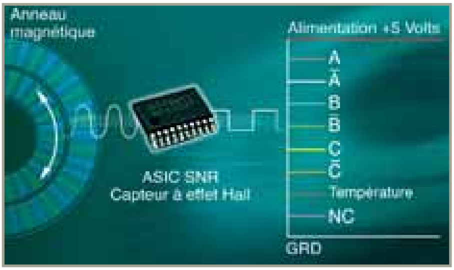
Magnetic encoders



■ The use of magnetic data supports built from elastomer base magnetic materials lead us to develop a unique know-how in simulation, materials and system design, as well as writing and final inspection processes.

Magnetic encoding is ensured either in single track mode, as in the ASB product, or in bi-track which then integrates a much richer information base, whenever the SNR-proprietary ASIC reading head MPS40S is used.

Sensing elements



■ The SNR-proprietary Hall effect ASIC, MPS40S, is designed for simultaneous reading of 2 encoded magnetic tracks. It controls two quadratic signals on one of the tracks and one or more reference pulses on the other. Its main property lies in its capacity to interpolate up to 40 times the excitation magnetic encoding resolution. Therefore, a multipolar target with 32 pairs of poles can generate up to 1,280 pulses/revolution (5,120 fronts). Temperature compensation (-40/+125°C) is integrated, as well as automatic gap variation compensation between ASIC and magnetic target during utilisation.

ASB® - Active Sensor Bearing

■ ASB® is an SNR registered trademark pertaining to the innovative wheel speed sensor bearing technology, an application which has been in high volume automobile production since 1997.

ASB® is a wheel bearing incorporating a rotating magnetic encoder seal, able to activate a tiny active sensor located close by.

The multipole magnetic encoder is made up of an elastomer-based anisotropic magnetic material, saturated by means of a specific magnetisation process. The active sensor which integrates a Hall effect sensor and a magneto-resistant element is attached to the bearing by a clip or more conventionally screwed to the Knuckle.

Any type of modern wheel bearing may be fitted with ASB technology

With the quality of signals provided (zero speed, rotation direction, etc.) through ASB®, SNR has opened up new possibilities for automobile designers.

An example of the type of products SNR Mechatronics is able to design for you is SLE.

SLE – Sensorline Encoder

■ **Sensor Line Encoder:** a high resolution increment encoder integrated in a bearing.

By integrating a by-track magnetic encoder and an SNR-proprietary ASIC, MPX32X (first generation SNR ASIC) in a bearing, the Sensor Line Encoder provides reliable measurements in a very compact envelope. It operates as a bearing, easily integrated into a mechanical environment, and benefits from SNR's experience in bearing instrumentation.

Our company's experience also guarantees bearing precision and durability: two vital conditions for reliable measurements.

Radial sensor

■ SNR developed a high resolution radial speed sensor with rotating direction indication (Power supply in 5V or in 8-30V. Interfaces: Push/pull 15mA (Standard) and optionally RS422, Push/Pull 50mA, or Open Drain).

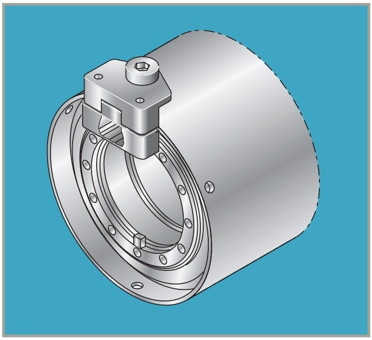
These sensors operate with radial magnetic encoders available in-house at SNR, in various diameters.

On request, SNR Mechatronics can develop specific encoders tailored to the application, either in specific diameters or in terms of the number of pairs of poles.

For an encoder with 48 pairs of poles, the sensor can deliver the following information: 48, 96, 192, 384, 768, 1,536 periods/channel/revolution.

Depending on the operating electronic circuitry, you can obtain information on rotational speed, relative displacement and rotating direction.

Motorcar racing: Pescarolo Sport



■ The flexibility of our technology enabled Pescarolo Sport to equip its Le Mans racing cars with high resolution wheel speed sensors: a vital information for measurement of the car behaviour during the race, and for timely intervention as required. As is often the case, technologies developed for racing will then be applied to daily industrial designs.

Brushless motor

The by-track magnetic encoding technology associated with the SNR-proprietary ASIC, MPS40S, allows efficient control of brushless DC motors (DLDC). In fact, the track which generated the reference pulses will ensure switching control whereas the "high resolution" track allows torque variation control (torque ripple).

The SNR technology is highly reputed for compact design. In fact, the optimised magnetic encoder is preferably integrated to a bearing, without changing its external dimensions.

ASIC integrates signal processing functions which appreciably reduce the sensor's footprint.