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综合样本/General Catalogue

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JAPAN FACTORY UNION LTD



Deep Groove Ball Bearings	005	
Angular Contact Ball Bearings	073	
Self-Aligning Ball Bearings	113	
Cylindrical Roller Bearings	135	
Tapered Roller Bearings	189	
Spherical Roller Bearings	263	
Thrust Ball Bearings	301	
Thrust Spherical Roller Bearings	319	
Plummer Blocks	329	
Accessories for Rolling Bearings	345	Sleeves 







Deep Groove Ball Bearings

DESIGN, TYPES, AND FEATURES

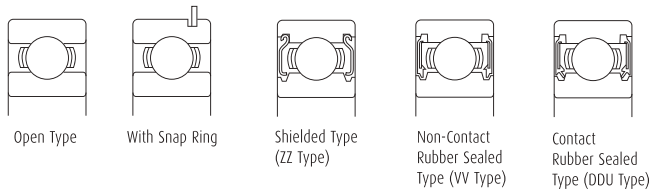
SINGLE-ROW DEEP GROOVE BALL BEARINGS

Single-Row Deep Groove Ball Bearings are classified into the types shown below.
The proper amount of good quality grease is packed in shielded and sealed ball bearings. A comparison of the features of each type is shown in Table 1.

Table 1 Features of Sealed Ball Bearings

Type	Shielded Type (ZZ Type)	Non-Contact Rubber Sealed Type (VV Type)	Contact Rubber Sealed Type (DDU Type)
Torque	Low	Low	Higher than ZZ, VV types due to contact seal
Speed capability	Good	Good	Limited by contact seals
Grease sealing effectiveness	Good	Better than ZZ type	A little better than VV type
Dust resistance	Good	Better than ZZ type (usable in moderately dusty environment)	Best (usable even in very dusty environment)
Water resistance	Not suitable	Not suitable	Good (usable even if fluid is splashed on bearing)
Operating temperature (°)	-10 to +110°C	-10 to +110°C	-10 to +100°C

Note (°) The above temperature range applies to standard bearings. By using cold or heat resistant grease and changing the type of rubber, the operating temperature range can be extended. For such applications, please contact ITJ.



For deep groove ball bearings, pressed cages are usually used. For big bearings, machined brass cages are used. (Refer to Table 2). Machined cages are also used for high speed applications.

Table 2 Standard Cages for Deep Groove Ball Bearings

Series	Pressed Steel Cages	Machined Brass Cages
68	6800 - 6838	6840 - 68/800
69	6900 - 6936	6938 - 69/800
160	16001 - 16026	16028 - 16064
60	6000 - 6040	6044 - 60/670
62	6200 - 6240	6244 - 6272
63	6300 - 6332	6334 - 6356

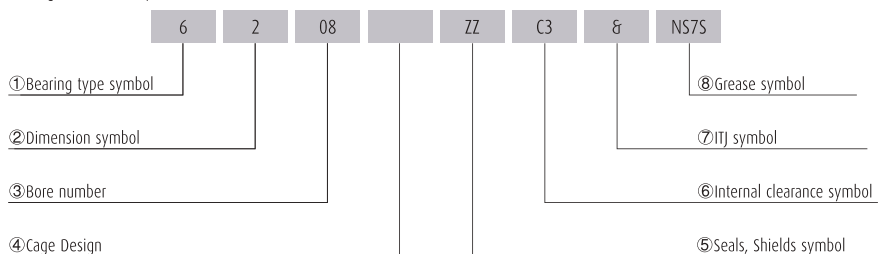
Table 3 Standard Cages for Double Row Deep Groove Ball Bearings

Series	Polyamid Cages
42xxB	4200B - 4218B
43xxB	4302B - 4315B

□ Formulation of Bearing Numbers

Single-Row Deep Groove Ball Bearings

Bearing number example:



- | | |
|-----------------------------|---|
| ① Bearing type symbol | 6 : Single-Row Deep Groove Ball Bearings : 4 Double Row Deep Groove Ball Bearing |
| ② Dimension symbol | 2 : 02 Series, 3 : 03 Series, 9 : 19 Series, 0 : 10 Series |
| ③ Bore number | Less than 03, Bearing bore 00 : 10mm, 01 : 12mm, 02 : 15mm, 03 : 17mm
Over 04, Bearing bore Bore number X 5 (mm) |
| ④ Cage Design | Blank: Steel, T/T1X: Plastic, M: Brass |
| ⑤ Seals, Shields symbol | ZZ : Shield on Both Side , DDU : Contact Rubber Seal on Both Side, VV: Non-Contact Rubber Sealed on Both Side |
| ⑥ Internal clearance symbol | Omitted : CN clearance ^{*1} , C3 : Clearance greater than CN, C4 : Clearance greater than C3, CM : For Electric Motors ^{*1} |
| ⑦ ITJ symbol | & : ITJ Bearings |
| ⑧ Grease symbol | NS7 : NS HI-LUBE |

^{*1} The CM clearance can be used in substitute of the CN clearance. (The opposite is not available.)

Deep Groove Ball Bearings

Creep-Free Bearings

Creep-Free Bearings, which come with two O-rings mounted in the outer ring, help to prevent the occurrence of creep by restricting the amount of clearance between the outer ring and housing.

No special machining is required; bearings can be used with the same housing as standard bearings.

In creep limit load tests, the more housing clearance is reduced, the greater the improvement in creep prevention, due to the tension of the O-ring mounted in the outer ring.



Features

› Prevents creep

O-rings help prevent creep.

› Reusable housing

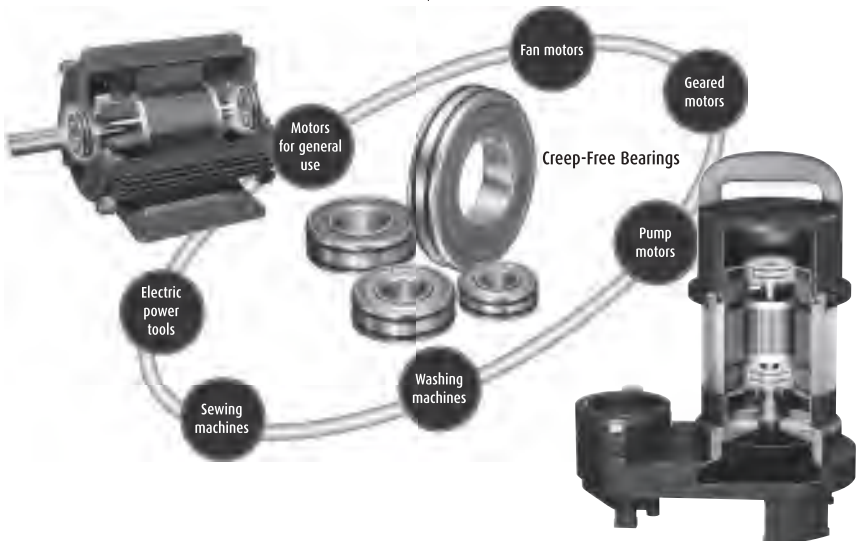
Very little abrasion occurs on the bore surface of the housing, making reuse possible.

› Easy to assemble

Assembly is easy since bearings can be fitted with a loose tolerance.

› No special machining of the housing is required

Bearings can be replaced since boundary dimensions are identical to standard bearings. No reworking of the housing is required.



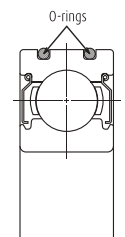


Fig. 1 Structure of Creep-Free Bearings

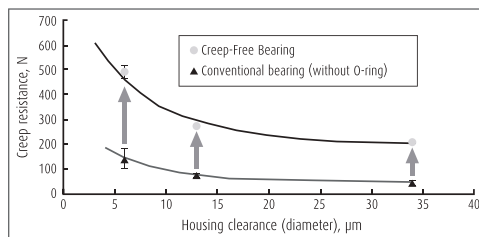


Fig. 2 Creep limit load test (example: 6204)

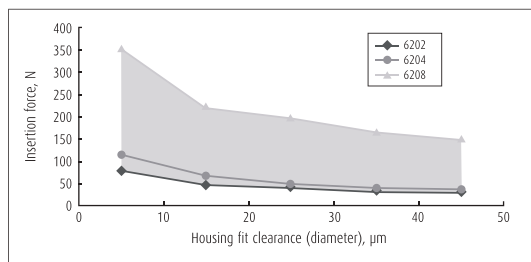


Fig. 3 Fit and insertion force

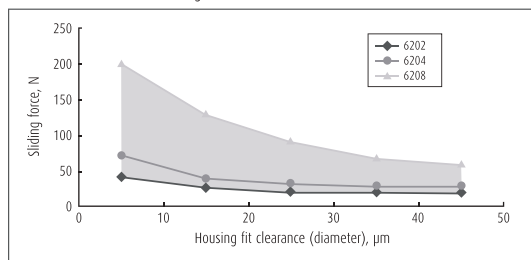


Fig. 4 Fit and sliding force



Note on mounting Creep-Free Bearings

- When oil or grease is applied to the outer diameter of the bearing, use a mineral oil or a synthetic hydrocarbon oil (IJT's EA2, etc.).
- O-ring material is nitrile rubber (operating temperature range: -30 to 120°C) as a standard specification. Please contact IJT for use under special environments such as high temperatures.

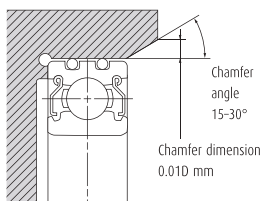
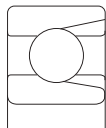


Fig. 5 Housing shape and dimension

Note on the product name "Creep-Free Bearings": The term "free" should not be construed to mean that creep is nonexistent.

Deep Groove Ball Bearings



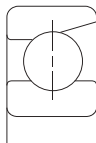
MAXIMUM TYPE BALL BEARINGS

Maximum Type Ball Bearings contain a larger number of balls than normal deep groove ball bearings because of filling slots in the inner and outer rings. Because of their filling slots, they are not suitable for applications with high axial loads.

BL2 and BL3 types of bearings have boundary dimensions equal to those of single-row deep groove ball bearings of Series 62 and 63 respectively. Besides the open type, ZZ type shielded bearings are also available.

When using these bearings, it is important for the filling slot in the outer ring to be outside of the loaded zone as much as possible.

Their cages are pressed steel.



MAGNETO BEARINGS

The groove in the inner ring is a little shallower than that of deep groove ball bearings and one side of the outer ring is relieved. Consequently, the outer ring is separable, which makes it convenient for mounting.

Pressed cages are standard, but for high speed applications, machined synthetic resin cages are used.

PRECAUTIONS FOR USE OF DEEP GROOVE BALL BEARINGS

For deep groove ball bearings, if the bearing load is too small during operation, slippage occurs between the balls and raceways, which may result in smearing. The higher the weight of balls and cage, the higher this tendency becomes, especially for large bearings. If very small bearing loads are expected, please contact ITJ for selection of an appropriate bearing.



Deep Groove Ball Bearings

TECHNICAL DATA

Radial and Axial Internal Clearances and Contact Angles for Single Row Deep Groove Ball Bearings

(1) Radial and Axial Internal Clearances

The internal clearance in single row bearings has been specified as the radial internal clearance. The bearing internal clearance is the amount of relative displacement possible between the bearing rings when one ring is fixed and the other ring does not bear a load. The amount of movement along the direction of the bearing radius is called the radial clearance, and the amount along the direction of the axis is called the axial clearance.

The geometric relation between the radial and axial clearance is shown in Fig. 1.

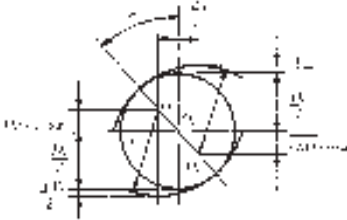


Fig. 1 Relationship Between Δr and Δa

Symbols used in Fig. 1

O_b :	Ball center
O_e :	Center of groove curvature, outer ring
O_i :	Center of groove curvature, inner ring
D_w :	Ball diameter (mm)
r_e :	Radius of outer ring groove (mm)
r_i :	Radius of inner ring groove (mm)
a :	Contact angle ($^\circ$)
Δr :	Radial clearance (mm)
Δa :	Axial clearance (mm)

It is apparent from Fig. 1 that $\Delta r = \Delta r_e + \Delta r_i$.

From geometric relationships, various equations for clearance, contact angle, etc. can be derived.

$$\Delta r = 2 (1 - \cos a) (r_e + r_i - D_w) \dots \dots \dots (1)$$

$$\Delta a = 2 \sin a (r_e + r_i - D_w) \dots \dots \dots (2)$$

$$\frac{\Delta a}{\Delta r} = \cot \frac{a}{2} \dots \dots \dots (3)$$

$$\Delta \doteq 2 (r_e + r_i - D_w)^{1/2} \Delta r^{1/2} \dots \dots \dots (4)$$

$$a = \cos^{-1} \left(\frac{r_e + r_i - D_w - \frac{\Delta r}{2}}{r_e + r_i - D_w} \right) \dots \dots \dots (5)$$

$$a = \sin^{-1} \left(\frac{\Delta a / 2}{r_e + r_i - D_w} \right) \dots \dots \dots (6)$$

Because $(r_e + r_i - D_w)$ is a constant, it is apparent why fixed relationships between Δr , Δa and a exist for all the various bearing types.

As was previously mentioned, the clearances for deep groove ball bearings are given as radial clearances, but there are specific applications where it is desirable to have an axial clearance as well. The relationship between deep groove ball bearing radial clearance Δr and axial clearance Δa is given in Equation (4).

To simplify,

$$\Delta a \doteq K \Delta r^{1/2} \dots \dots \dots (7)$$

where K: Constant depending on bearing design

$$K = 2 (r_e + r_i - D_w)^{1/2}$$

Fig. 2 shows one example. The various values for K are presented by bearing size in Table 1 below.

Example

Assume a 6312 bearing, for a sample calculation, which has a radial clearance of 0.017 mm. From Table 1, $K=2.09$.

Therefore, the axial clearance Δa is:

$$\Delta a = 2.09 \times \sqrt{0.017} = 2.09 \times 0.13 = 0.27 \text{ (mm)}$$

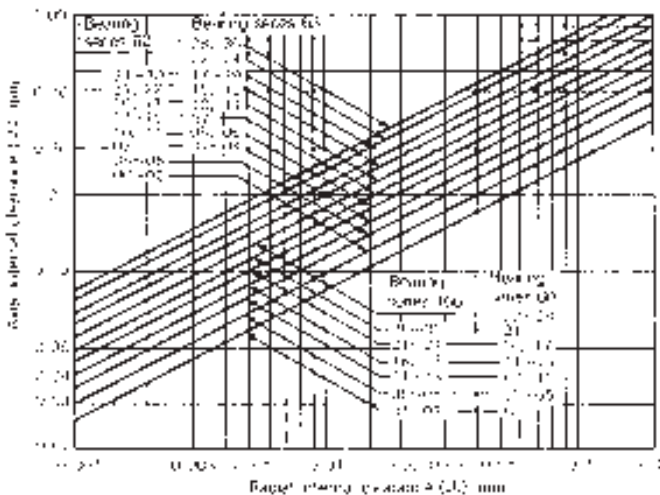


Fig. 2 Radial Clearance, Δ_r and Axial Clearance, Δ_a of Deep Groove Ball Bearings

Table 1 Constant Values of K for Radial and Axial Clearance Conversion

Bearing bore No.	K			
	Series 160	Series 60	Series 62	Series 63
00	-	-	0.93	1.14
01	0.80	0.80	0.93	1.06
02	0.80	0.93	0.93	1.06
03	0.80	0.93	0.99	1.11
04	0.90	0.96	1.06	1.07
05	0.90	0.96	1.06	1.20
06	0.96	1.01	1.07	1.19
07	0.96	1.06	1.25	1.37
08	0.96	1.06	1.29	1.45
09	1.01	1.11	1.29	1.57
10	1.01	1.11	1.33	1.64
11	1.06	1.20	1.40	1.70
12	1.06	1.20	1.50	2.09
13	1.06	1.20	1.54	1.82
14	1.16	1.29	1.57	1.88
15	1.16	1.29	1.57	1.95
16	1.20	1.37	1.64	2.01
17	1.20	1.37	1.70	2.06
18	1.29	1.44	1.76	2.11
19	1.29	1.44	1.82	2.16
20	1.29	1.44	1.88	2.25
21	1.37	1.54	1.95	2.32
22	1.40	1.64	2.01	2.40
24	1.40	1.64	2.06	2.40
26	1.54	1.70	2.11	2.49
28	1.54	1.70	2.11	2.59
30	1.54	1.76	2.11	2.59

Deep Groove Ball Bearings

(2) Relation between Radial Clearance and Contact Angle

Single-row deep groove ball bearings are sometimes used as thrust bearings. In such applications, it is recommended to make the contact angle as large as possible.

The contact angle for ball bearings is determined by the geometric relationship between the radial clearance and the radii of the inner and outer grooves. Using Equations (1) to (6), Fig. 3 shows the particular relationship between the radial clearance and contact angle of 62 and 63 series bearings. The initial contact angle, α_0 , is the initial contact angle when the axial load is zero. Application of any load to the bearing will change this contact angle.

If the initial contact angle α_0 exceeds 20° , it is necessary to check whether or not the contact area of the ball and raceway touch the edge of raceway shoulder. (Refer to Section 8.1.2)

For applications when an axial load alone is applied, the radial clearance for deep groove ball bearings is normally greater than the normal clearance in order to ensure that the contact angle is relatively large. The initial contact angles for C3 and C4 clearances are given for selected bearing sizes in Table 2 below.

Table 2 Initial Contact Angle, α_0 , with C3 and C4 Clearances

Bearing No.	α_0 with C3	α_0 with C4
6205	12.5° to 18°	16.5° to 22°
6210	11.5° to 16.5°	13.5° to 19.5°
6215	11.5° to 16°	15.5° to 19.5°
6220	10.5° to 14.5°	14° to 17.5°
6305	11° to 16°	14.5° to 19.5°
6310	9.5° to 13.5°	12° to 16°
6315	9.5° to 13.5°	12.5° to 15.5°
6320	9° to 12.5°	12° to 15°

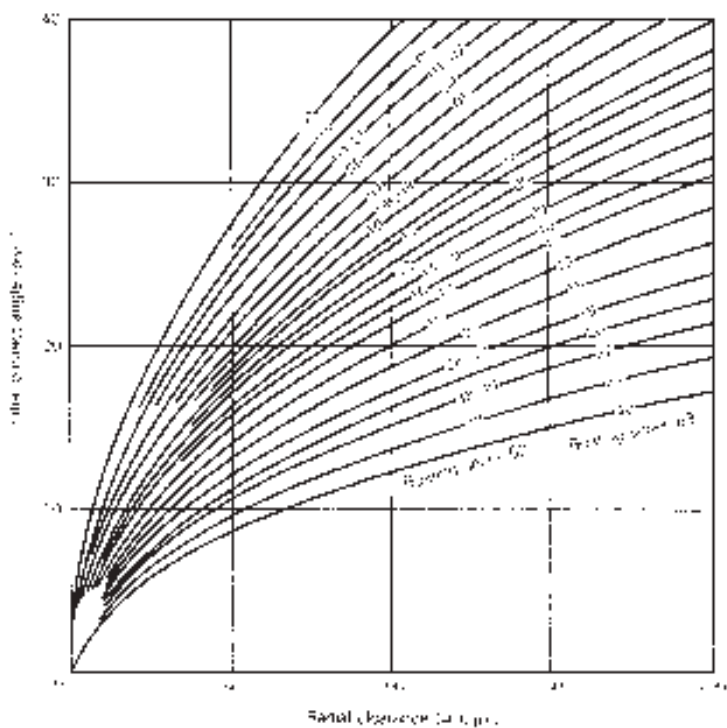


Fig. 3 Radial Clearance and Contact Angle

Deep Groove Ball Bearings

Features and Operating Temperature Range of Ball Bearing Seal Material

The sealed ball bearing is a ball bearing with seals as shown in Figs. 1 and 2. There are two seal types: non-contact seal type and contact seal type. For rubber seal material, nitrile rubber is used for general purpose and poly-acrylic rubber, silicon rubber, and fluoric rubber are used depending on temperature conditions.

These rubbers have their own unique nature and appropriate rubber must be selected by considering the particular application environment and running conditions.

Table 1 shows principal features of each rubber material and the operating temperature range of the bearing seal. The operating temperature range of Table 1 is a guideline for continuous operation. Thermal aging of rubber is related to the temperature and time. Rubber may be used in a much wider range of operating temperatures depending on the operating time and frequency.

In the non-contact seal, heat generation due to friction on the lip can be ignored. And thermal factors, which cause aging of the rubber, are physical changes due to atmospheric and bearing temperatures. Accordingly, increased hardness or loss of elasticity due to thermal aging exerts only a negligible effect on the seal performance. A rubber non-contact seal can thus be used in an expanded range of operating temperatures greater than that for a contact seal.

But there are some disadvantages. The contact seal has a problem with wear occurring at the seal lip due to friction, thermal plastic deformation, and hardening. When friction or plastic deformation occurs, the contact pressure between the lip and slide surface decreases, resulting in a clearance. This clearance is minimum and does not cause excessive degradation of sealing performance (for instance, it does not allow dust entry or grease leakage). In most cases, this minor plastic deformation or slightly increased hardness presents no practical problems.

However, in external environments with dust and water in large quantity, the bearing seal is used as an auxiliary seal and a principal seal should be provided separately. As so far described, the operating temperature range of rubber material is only a guideline for selection. Since heat resistant rubber is expensive, it is important to understand the temperature conditions so that an economical selection can be made. Due attention should also be paid not only to heat resistance, but also to the distinctive features of each rubber.



non-contact
rubber seal (NCR)

Fig. 1



contact
rubber seal (CR)

Fig. 2

Table 1 Features and Operating Temperature Range of Rubber Materials

Material		Nitrile rubber	Polyacrylic rubber	Silicon rubber	Fluorine rubber
Key features		○Most popular seal material ○Superior in oil and wear resistances and mechanical properties ○Readily ages under direct sunrays ○Less expensive than other rubbers	○Superior in heat and oil resistances ○Large compression causes permanent deformation ○Inferior in cold resistance ○One of the less expensive materials among the high temperature materials ○Attention is necessary because it swells the ester oil based grease	○High heat and cold resistances ○Inferior in mechanical properties other than permanent deformation by compression. Pay attention to tear strength ○Pay attention so as to avoid swell caused by low aniline point mineral oil, silicone grease, and silicone oil	○High heat resistance ○Superior in oil and chemical resistances ○Cold resistance similar to nitrile rubber ○Attention is necessary because it deteriorates the urea grease
Operating temperature range ⁽¹⁾ (°C)	Non-contact seal	-50 to +130	-30 to +170	-100 to +250	-50 to +220
	Contact seal	-30 to +110	-15 to +150	-70 to +200	-30 to +200

Note ⁽¹⁾ This operating temperature is the temperature of seal rubber materials.

Notes ⁽⁴⁾ Snap ring groove dimensions and snap ring dimensions are not conformed to ISO15.

Remarks 1. Diameter Series 7 (extra thin section bearings) are also available, please contact ITJ.

2. When using bearings with rotating outer rings, contact ITJ if they are sealed, shielded, or have snap rings.

Deep Groove Ball Bearings

Free Space and Grease Filling Amount for Deep Groove Ball Bearings

Grease lubrication can simplify the bearing's peripheral construction. In place of oil lubrication, grease lubrication is now employed along with enhancement of the grease quality for applications in many fields. It is important to select a grease appropriate to the operating conditions. Due care is also necessary as to the filling amount, since too much or too little grease greatly affects the temperature rise and torque. The amount of grease needed depends on such factors as housing construction, free space, grease brand, and environment. A general guideline is described next.

First, the bearing is filled with an appropriate amount of grease. In this case, it is essential to push grease onto the cage guide surface. Then, the free space, which excludes the spindle and bearing inside the housing, is filled with an amount of grease as shown next:

1/2 to 2/3..... when the bearing speed is 50% or less of the allowable speed specified in the catalog.

1/3 to 1/2..... when the bearing speed is 50% or more.

Roughly, low speeds require more grease while high speeds require less grease. Depending on the particular application, the filling amount may have to be reduced further to reduce the torque and to prevent heat generation. When the bearing speed is extremely low, on the other hand, grease may be packed almost full to prevent dust and water entry.

Accordingly, it is necessary to know the extent of the housing's free space for the specific bearing to determine the correct filling amount. As a reference, the volume of free space is shown in Table 1 for an open type deep groove ball bearing.

Note that the free space of the open type deep groove ball bearing is the volume obtained by subtracting the volume of the balls and cage from the space formed between inner and outer rings.

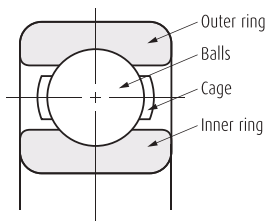


Table 1 Free Space of Open Type Deep Groove Ball Bearing

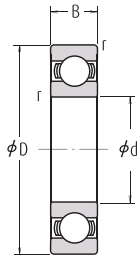
Units : cm³

Bearing bore No.	Bearing free space			Bearing bore No.	Bearing free space		
	Bearing series				Bearing series		
	60	62	63		60	62	63
00	1.2	1.5	2.9	14	34	61	148
01	1.2	2.1	3.5	15	35	67	180
02	1.6	2.7	4.8	16	47	84	213
03	2.0	3.7	6.4	17	48	104	253
04	4.0	6.0	7.9	18	63	127	297
05	4.6	7.7	12	19	66	155	345
06	6.5	11	19	20	68	184	425
07	9.2	15	25	21	88	216	475
08	11	20	35	22	114	224	555
09	14	23	49	24	122	310	675
10	15	28	64	26	172	355	830
11	22	34	79	28	180	415	1 030
12	23	45	98	30	220	485	1 140
13	24	54	122	32	285	545	1 410

Remark The table above shows the free space of a bearing using a pressed steel cage. The free space of a bearing using a high-tension brass machined cage is about 50 to 60% of the value in the table.

Single-Row Deep Groove Ball Bearings

Bore Diameter 10 – 17 mm



Open Type



Shielded Type
ZZ



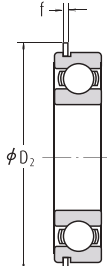
Non-Contact
Sealed Type
VV



Contact
Sealed Type
DD · DDU

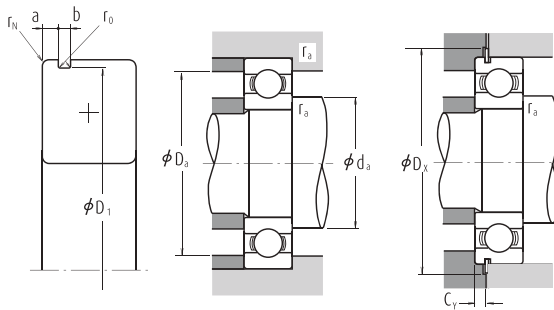


With Snap
Ring Groove
N



With
Snap Ring
NR

Boundary Dimensions (mm)				Basic Load Ratings (N)		Factor	Limiting Speeds (min ⁻¹)			Bearing Numbers			
d	D	B	r min.	C _r	C _{or}	f ₀	Grease		Oil				
							Open Z · ZZ V · VV	DU DDU	Open Z	Open	Shielded	Sealed	
10	19	5	0.3	1 720	840	14.8	34 000	24 000	40 000	6800	ZZ	VV	DD
	22	6	0.3	2 700	1 270	14.0	32 000	22 000	38 000	6900	ZZ	VV	DD
	26	8	0.3	4 550	1 970	12.4	30 000	22 000	36 000	6000	ZZ	VV	DDU
	30	9	0.6	5 100	2 390	13.2	24 000	18 000	30 000	6200	ZZ	VV	DDU
	30	9	0.6	5 350	2 390	13.2	28 000	18 000	34 000	6200 ⁺	ZZ	VV	DDU
	35	11	0.6	8 100	3 450	11.2	22 000	17 000	26 000	6300	ZZ	VV	DDU
	35	11	0.6	8 500	3 450	11.2	26 000	17 000	30 000	6300 ⁺	ZZ	VV	DDU
	21	5	0.3	1 920	1 040	15.3	32 000	20 000	38 000	6801	ZZ	VV	DD
12	24	6	0.3	2 890	1 460	14.5	30 000	20 000	36 000	6901	ZZ	VV	DD
	28	7	0.3	5 100	2 370	13.0	28 000	—	32 000	16001	—	—	—
	28	8	0.3	5 100	2 370	13.0	28 000	18 000	32 000	6001	ZZ	VV	DDU
	28	8	0.3	5 350	2 370	13.0	32 000	18 000	38 000	6001 ⁺	ZZ	VV	DDU
	32	10	0.6	6 800	3 050	12.3	22 000	17 000	28 000	6201	ZZ	VV	DDU
	32	10	0.6	7 150	3 050	12.3	26 000	17 000	32 000	6201 ⁺	ZZ	VV	DDU
	37	12	1	9 700	4 200	11.1	20 000	16 000	24 000	6301	ZZ	VV	DDU
	37	12	1.0	10 200	4 200	11.1	24 000	16 000	28 000	6301 ⁺	ZZ	VV	DDU
	24	5	0.3	2 070	1 260	15.8	28 000	17 000	34 000	6802	ZZ	VV	DD
	28	7	0.3	4 350	2 260	14.3	26 000	17 000	30 000	6902	ZZ	VV	DD
15	32	8	0.3	5 600	2 830	13.9	24 000	—	28 000	16002	—	—	—
	32	9	0.3	5 600	2 830	13.9	24 000	15 000	28 000	6002	ZZ	VV	DDU
	32	9	0.3	5 850	2 830	13.9	26 000	15 000	32 000	6002 ⁺	ZZ	VV	DDU
	35	11	0.6	7 650	3 750	13.2	20 000	14 000	24 000	6202	ZZ	VV	DDU
	35	11	0.6	8 000	3 750	13.2	22 000	14 000	28 000	6202 ⁺	ZZ	VV	DDU
	42	13	1	11 400	5 450	12.3	17 000	13 000	20 000	6302	ZZ	VV	DDU
	42	13	1.0	12 000	5 450	12.3	19 000	13 000	24 000	6302 ⁺	ZZ	VV	DDU
	26	5	0.3	2 630	1 570	15.7	26 000	15 000	30 000	6803	ZZ	VV	DD
	30	7	0.3	4 600	2 550	14.7	24 000	15 000	28 000	6903	ZZ	VV	DDU
	35	8	0.3	6 000	3 250	14.4	22 000	—	26 000	16003	—	—	—
17	35	10	0.3	6 000	3 250	14.4	22 000	13 000	26 000	6003	ZZ	VV	DDU
	35	10	0.3	6 300	3 250	14.4	24 000	13 000	28 000	6003 ⁺	ZZ	VV	DDU
	40	12	0.6	9 550	4 800	13.2	17 000	12 000	20 000	6203	ZZ	VV	DDU
	40	12	0.6	10 100	4 800	13.2	20 000	12 000	24 000	6203 ⁺	ZZ	VV	DDU
	47	14	1	13 600	6 650	12.4	15 000	11 000	18 000	6303	ZZ	VV	DDU
	47	14	1.0	14 300	6 650	12.4	17 000	11 000	20 000	6303 ⁺	ZZ	VV	DDU



Dynamic Equivalent Load $P = X F_r + Y F_a$

$\frac{f_a F_a}{F_r}$	e	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
		X	Y	X	Y
0.172	0.19	1	0	0.56	2.30
0.345	0.22	1	0	0.56	1.99
0.689	0.26	1	0	0.56	1.71
1.03	0.28	1	0	0.56	1.55
1.38	0.30	1	0	0.56	1.45
2.07	0.34	1	0	0.56	1.31
3.45	0.38	1	0	0.56	1.15
5.17	0.42	1	0	0.56	1.04
6.89	0.44	1	0	0.56	1.00

Static Equivalent Load

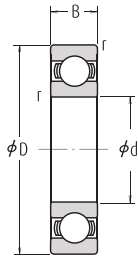
$$\frac{F_a}{F_r} > 0.8, P_0 = 0.6 F_r + 0.5 F_a$$

$$\frac{F_a}{F_r} \leq 0.8, P_0 = F_r$$

With Snap Ring Groove	With Snap Ring	Snap Ring Groove Dimensions (1) (mm)					Snap Ring (1) Dimensions (mm)		Abutment and Fillet Dimensions (mm)					Mass (kg) approx.
		a max.	b min.	D ₁ max.	r ₀ max.	r _N min.	D ₂ max.	f max.	d ₄ (1) min.	d ₄ (2) max.	r _a max.	D _x min.	C ₁ max.	
—	—	—	—	—	—	—	—	—	12	12	17	0.3	—	0.005
N(3)	NR(3)	1.05	0.80	26.80	0.20	0.2	24.8	0.70	12	12.5	20	0.3	25.5	0.009
N(4)	NR(4)	1.35	0.87	24.50	0.20	0.3	28.7	0.84	12	13	24	0.3	29.4	0.018
N	NR	2.06	1.35	28.17	0.40	0.5	34.7	1.12	14	16	26	0.6	35.5	0.032
—	—	—	—	—	—	—	—	—	14	16	26	0.6	—	0.032
N	NR	2.06	1.35	33.17	0.40	0.5	39.7	1.12	14	16.5	31	0.6	40.5	0.052
—	—	—	—	—	—	—	—	—	14	16.5	31	0.6	—	0.052
—	—	—	—	—	—	—	—	—	14	14	19	0.3	—	0.006
N(3)	NR(3)	1.05	0.80	22.80	0.20	0.2	26.8	0.70	14	14.5	22	0.3	27.5	0.010
—	—	—	—	—	—	—	—	—	14	—	26	0.3	—	0.019
N(4)	NR(4)	1.35	0.87	26.50	0.20	0.3	30.7	0.84	14	15.5	26	0.3	31.4	0.022
—	—	—	—	—	—	—	—	—	14	15.5	26	0.3	—	0.022
N	NR	2.06	1.35	30.15	0.40	0.5	36.7	1.12	16	17	28	0.6	37.5	0.037
—	—	—	—	—	—	—	—	—	16	17	28	0.6	—	0.037
N	NR	2.06	1.35	34.77	0.40	0.5	41.3	1.12	17	18	32	1	42	0.060
—	—	—	—	—	—	—	—	—	—	—	—	42	2.9	0.060
—	—	—	—	—	—	—	—	—	17	17	22	0.3	—	0.007
N(3)	NR(3)	1.30	0.95	26.70	0.25	0.3	30.8	0.85	17	17	26	0.3	31.5	0.015
—	—	—	—	—	—	—	—	—	17	—	30	0.3	—	0.027
N	NR	2.06	1.35	30.15	0.40	0.3	36.7	1.12	17	19	30	0.3	37.5	0.031
—	—	—	—	—	—	—	—	—	17	19	30	0.3	—	0.031
N	NR	2.06	1.35	33.17	0.40	0.5	39.7	1.12	19	20.5	31	0.6	40.5	0.045
—	—	—	—	—	—	—	—	—	19	20.5	31	0.6	—	0.045
N	NR	2.06	1.35	39.75	0.40	0.5	46.3	1.12	20	22.5	37	1	47	0.083
—	—	—	—	—	—	—	—	—	20	22.5	37	1	—	0.083
—	—	—	—	—	—	—	—	—	19	19	24	0.3	—	0.007
N(3)	NR(3)	1.30	0.95	28.70	0.25	0.3	32.8	0.85	19	19.5	28	0.3	33.5	0.017
—	—	—	—	—	—	—	—	—	19	—	33	0.3	—	0.033
N	NR	2.06	1.35	33.17	0.40	0.3	39.7	1.12	19	21.5	33	0.3	40.5	0.041
—	—	—	—	—	—	—	—	—	19	21.5	33	0.3	—	0.041
N	NR	2.06	1.35	38.10	0.40	0.5	44.6	1.12	21	23.5	36	0.6	45.5	0.067
—	—	—	—	—	—	—	—	—	21	23.5	36	0.6	—	0.067
N	NR	2.46	1.35	44.60	0.40	0.5	52.7	1.12	22	25.5	42	1	53.5	0.113
—	—	—	—	—	—	—	—	—	22	25.5	42	1	—	0.113

Single-Row Deep Groove Ball Bearings

Bore Diameter 20 – 30 mm



Open Type



Shielded Type
ZZ



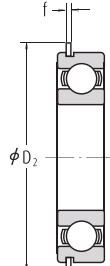
Non-Contact
Sealed Type
VV



Contact
Sealed Type
DD · DDU

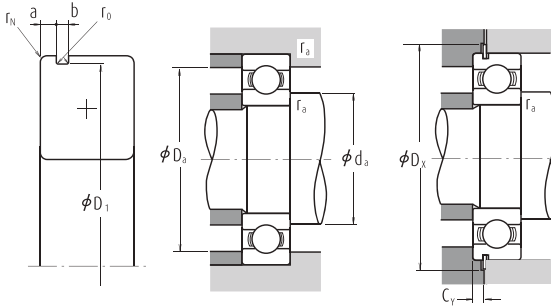


With Snap
Ring Groove
N



With
Snap Ring
NR

Boundary Dimensions (mm)				Basic Load Ratings (N)		Factor	Limiting Speeds (min ⁻¹)			Bearing Numbers			
d	D	B	r min.	C _r	C _{or}	f ₀	Grease		Oil				
							Open Z · ZZ V · VV	DU DDU	Open Z	Open	Shielded	Sealed	
20	32	7	0.3	4 000	2 470	15.5	22 000	13 000	26 000	6804	ZZ	VV	DD
	37	9	0.3	6 400	3 700	14.7	19 000	12 000	22 000	6904	ZZ	VV	DDU
	42	8	0.3	7 900	4 450	14.5	18 000	—	20 000	16004	—	—	—
	42	12	0.6	9 400	5 000	13.8	18 000	11 000	20 000	6004	ZZ	VV	DDU
	42	12	0.6	9 850	5 000	13.8	20 000	11 000	24 000	6004 ⁺	ZZ	VV	DDU
	47	14	1	12 800	6 600	13.1	15 000	11 000	18 000	6204	ZZ	VV	DDU
	47	14	1.0	13 400	6 600	13.1	17 000	11 000	20 000	6204 ⁺	ZZ	VV	DDU
	52	15	1.1	15 900	7 900	12.4	14 000	10 000	17 000	6304	ZZ	VV	DDU
	52	15	1.1	16 700	7 900	12.4	16 000	10 000	19 000	6304 ⁺	ZZ	VV	DDU
	52	15	1.1	16 700	7 900	12.4	16 000	10 000	19 000	6304 ⁺	ZZ	VV	DDU
22	44	12	0.6	9 400	5 050	14.0	17 000	11 000	20 000	60/22	ZZ	VV	DDU
	50	14	1	12 900	6 800	13.5	14 000	9 500	16 000	62/22	ZZ	VV	DDU
	56	16	1.1	18 400	9 250	12.4	13 000	9 500	16 000	63/22	ZZ	VV	DDU
	37	7	0.3	4 500	3 150	16.1	18 000	10 000	22 000	6805	ZZ	VV	DD
	42	9	0.3	7 050	4 550	15.4	16 000	10 000	19 000	6905	ZZ	VV	DDU
	47	8	0.3	8 850	5 600	15.1	15 000	—	18 000	16005	—	—	—
25	47	12	0.6	10 100	5 850	14.5	15 000	9 500	18 000	6005	ZZ	VV	DDU
	47	12	0.6	10 600	5 850	14.5	18 000	9 500	22 000	6005 ⁺	ZZ	VV	DDU
	52	15	1	14 000	7 850	13.9	13 000	9 000	15 000	6205	ZZ	VV	DDU
	52	15	1.0	14 700	7 850	13.9	15 000	9 000	18 000	6205 ⁺	ZZ	VV	DDU
	62	17	1.1	20 600	11 200	13.2	11 000	8 000	13 000	6305	ZZ	VV	DDU
	62	17	1.1	21 600	11 200	13.2	13 000	8 000	16 000	6305 ⁺	ZZ	VV	DDU
	52	12	0.6	12 500	7 400	14.5	14 000	8 500	16 000	60/28	ZZ	VV	DDU
	58	16	1	16 600	9 500	13.9	12 000	8 000	14 000	62/28	ZZ	VV	DDU
	68	18	1.1	26 700	14 000	12.4	10 000	7 500	13 000	63/28	ZZ	VV	DDU
	42	7	0.3	4 700	3 650	16.4	15 000	9 000	18 000	6806	ZZ	VV	DD
30	47	9	0.3	7 250	5 000	15.8	14 000	8 500	17 000	6906	ZZ	VV	DDU
	55	9	0.3	11 200	7 350	15.2	13 000	—	15 000	16006	—	—	—
	55	13	1	13 200	8 300	14.7	13 000	8 000	15 000	6006	ZZ	VV	DDU
	55	13	1.0	13 900	8 300	14.7	15 000	8 000	18 000	6006 ⁺	ZZ	VV	DDU
	62	16	1	19 500	11 300	13.8	11 000	7 500	13 000	6206	ZZ	VV	DDU
	62	16	1.0	20 400	11 300	13.8	12 000	7 500	15 000	6206 ⁺	ZZ	VV	DDU
	72	19	1.1	26 700	15 000	13.3	9 500	6 700	12 000	6306	ZZ	VV	DDU
	72	19	1.1	28 000	15 000	13.3	11 000	6 700	13 000	6306 ⁺	ZZ	VV	DDU



Dynamic Equivalent Load $P = X F_r + Y F_a$

$\frac{f_a F_a}{F_r}$ C_{or}	e	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
		X	Y	X	Y
0.172	0.19	1	0	0.56	2.30
0.345	0.22	1	0	0.56	1.99
0.689	0.26	1	0	0.56	1.71
1.03	0.28	1	0	0.56	1.55
1.38	0.30	1	0	0.56	1.45
2.07	0.34	1	0	0.56	1.31
3.45	0.38	1	0	0.56	1.15
5.17	0.42	1	0	0.56	1.04
6.89	0.44	1	0	0.56	1.00

Static Equivalent Load

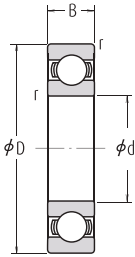
$$\frac{F_a}{F_r} > 0.8, P_0 = 0.6 F_r + 0.5 F_a$$

$$\frac{F_a}{F_r} \leq 0.8, P_0 = F_r$$

With Snap Ring Groove	With Snap Ring	Snap Ring Groove Dimensions (°) (mm)					Snap Ring (°) Dimensions (mm)		Abutment and Fillet Dimensions (mm)						Mass (kg)
		a	b	D ₁	r ₀	r _N	D ₂	f	d _a (°)		D _a (°)	r _a	D _x	C _y	approx.
		max.	min.	max.	max.	min.	max.	max.	min.	max.	max.	max.	min.	max.	
N	NR	1.30	0.95	30.70	0.25	0.3	34.8	0.85	22	22	30	0.3	35.5	1.8	0.017
N	NR	1.70	0.95	35.70	0.25	0.3	39.8	0.85	22	24	35	0.3	40.5	2.3	0.037
—	—	—	—	—	—	—	—	—	22	—	40	0.3	—	—	0.048
N	NR	2.06	1.35	39.75	0.40	0.5	46.3	1.12	24	25.5	38	0.6	47	2.9	0.068
—	—	—	—	—	—	—	—	—	24	25.5	38	0.6	—	—	0.068
N	NR	2.46	1.35	44.60	0.40	0.5	52.7	1.12	25	26.5	42	1	53.5	3.3	0.107
—	—	—	—	—	—	—	—	—	25	26.5	42	1	—	—	0.107
N	NR	2.46	1.35	49.73	0.40	0.5	57.9	1.12	26.5	28	45.5	1	58.5	3.3	0.145
—	—	—	—	—	—	—	—	—	26.5	28	45.5	1	—	—	0.145
N	NR	2.06	1.35	41.75	0.40	0.5	48.3	1.12	26	26.5	40	0.6	49	2.9	0.074
N	NR	2.46	1.35	47.60	0.40	0.5	55.7	1.12	27	29.5	45	1	56.5	3.3	0.119
N	NR	2.46	1.35	53.60	0.40	0.5	61.7	1.12	28.5	30.5	49.5	1	62.5	3.3	0.179
N	NR	1.30	0.95	35.70	0.25	0.3	39.8	0.85	27	27	35	0.3	40.5	1.8	0.021
N(°)	NR(°)	1.70	0.95	40.70	0.25	0.3	44.8	0.85	27	28.5	40	0.3	45.5	2.3	0.042
—	—	—	—	—	—	—	—	—	27	—	45	0.3	—	—	0.059
N	NR	2.06	1.35	44.60	0.40	0.5	52.7	1.12	29	30	43	0.6	53.5	2.9	0.079
—	—	—	—	—	—	—	—	—	29	30	43	0.6	—	—	0.079
N	NR	2.46	1.35	49.73	0.40	0.5	57.9	1.12	30	32	47	1	58.5	3.3	0.129
—	—	—	—	—	—	—	—	—	30	32	47	1	—	—	0.129
N	NR	3.28	1.90	59.61	0.60	0.5	67.7	1.70	31.5	36	55.5	1	68.5	4.6	0.235
—	—	—	—	—	—	—	—	—	31.5	36	55.5	1	—	—	0.235
N	NR	2.06	1.35	49.73	0.40	0.5	57.9	1.12	32	34	48	0.6	58.5	2.9	0.096
N	NR	2.46	1.35	55.60	0.40	0.5	63.7	1.12	33	35.5	53	1	64.5	3.3	0.175
N	NR	3.28	1.90	64.82	0.60	0.5	74.6	1.70	34.5	38	61.5	1	76	4.6	0.287
N	NR	1.30	0.95	40.70	0.25	0.3	44.8	0.85	32	32	40	0.3	45.5	1.8	0.024
N	NR	1.70	0.95	45.70	0.25	0.3	49.8	0.85	32	34	45	0.3	50.5	2.3	0.052
—	—	—	—	—	—	—	—	—	32	—	53	0.3	—	—	0.087
N	NR	2.08	1.35	52.60	0.40	0.5	60.7	1.12	35	36.5	50	1	61.5	2.9	0.116
—	—	—	—	—	—	—	—	—	35	36.5	50	1	—	—	0.116
N	NR	3.28	1.90	59.61	0.60	0.5	67.7	1.70	35	38.5	57	1	68.5	4.6	0.199
—	—	—	—	—	—	—	—	—	35	38.5	57	1	—	—	0.199
N	NR	3.28	1.90	68.81	0.60	0.5	78.6	1.70	36.5	42.5	65.5	1	80	4.6	0.345
—	—	—	—	—	—	—	—	—	36.5	42.5	65.5	1	—	—	0.345

Single-Row Deep Groove Ball Bearings

Bore Diameter 32 – 45 mm



Open Type



Shielded Type
ZZ



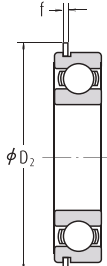
Non-Contact
Sealed Type
VV



Contact
Sealed Type
DD · DDU

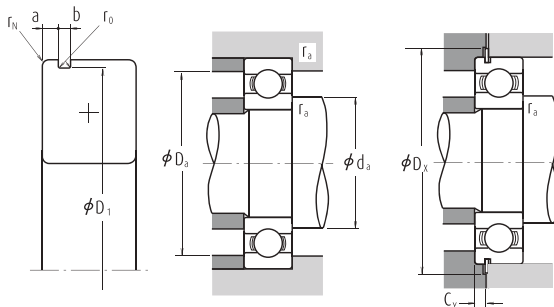


With Snap
Ring Groove
N



With
Snap Ring
NR

Boundary Dimensions (mm)				Basic Load Ratings (N)		Factor	Limiting Speeds (min ⁻¹)			Bearing Numbers			
d	D	B	r min.	C _r	C _{or}	f ₀	Grease		Oil				
							Open Z · ZZ V · VV	DU DDU	Open Z	Open	Shielded	Sealed	
32	58	13	1	15 100	9 150	14.5	12 000	7 500	14 000	60/32	ZZ	VV	DDU
	65	17	1	20 700	11 600	13.6	10 000	7 100	12 000	62/32	ZZ	VV	DDU
	75	20	1.1	29 900	17 000	13.2	9 000	6 300	11 000	63/32	ZZ	VV	DDU
	47	7	0.3	4 900	4 100	16.7	14 000	7 500	16 000	6807	ZZ	VV	DD
	55	10	0.6	10 600	7 250	15.5	12 000	7 500	15 000	6907	ZZ	VV	DDU
35	62	9	0.3	11 700	8 200	15.6	11 000	—	13 000	16007	—	—	—
	62	14	1	16 000	10 300	14.8	11 000	6 700	13 000	6007	ZZ	VV	DDU
	62	14	1.0	16 800	10 300	14.8	13 000	6 700	15 000	6007 ⁺	ZZ	VV	DDU
	72	17	1.1	25 700	15 300	13.8	9 500	6 300	11 000	6207	ZZ	VV	DDU
	72	17	1.1	27 000	15 300	13.8	11 000	6 300	13 000	6207 ⁺	ZZ	VV	DDU
	80	21	1.5	33 500	19 200	13.2	8 500	6 000	10 000	6307	ZZ	VV	DDU
	80	21	1.5	35 000	19 200	13.2	10 000	6 000	12 000	6307 ⁺	ZZ	VV	DDU
	52	7	0.3	6 350	5 550	17.0	12 000	6 700	14 000	6808	ZZ	VV	DD
	62	12	0.6	13 700	10 000	15.7	11 000	6 300	13 000	6908	ZZ	VV	DDU
	68	9	0.3	12 600	9 650	16.0	10 000	—	12 000	16008	—	—	—
40	68	15	1	16 800	11 500	15.3	10 000	6 000	12 000	6008	ZZ	VV	DDU
	68	15	1.0	17 600	11 500	15.3	12 000	6 000	14 000	6008 ⁺	ZZ	VV	DDU
	80	18	1.1	29 100	17 900	14.0	8 500	5 600	10 000	6208	ZZ	VV	DDU
	80	18	1.1	30 500	17 900	14.0	9 500	5 600	12 000	6208 ⁺	ZZ	VV	DDU
	90	23	1.5	40 500	24 000	13.2	7 500	5 300	9 000	6308	ZZ	VV	DDU
	90	23	1.5	43 000	24 000	13.2	9 000	5 300	11 000	6308 ⁺	ZZ	VV	DDU
	58	7	0.3	6 600	6 150	17.2	11 000	6 000	13 000	6809	ZZ	VV	DD
	68	12	0.6	14 100	10 900	15.9	9 500	5 600	12 000	6909	ZZ	VV	DDU
	75	10	0.6	14 900	11 400	15.9	9 000	—	11 000	16009	—	—	—
	75	16	1	20 900	15 200	15.3	9 000	5 300	11 000	6009	ZZ	VV	DDU
45	75	16	1.0	22 000	15 200	15.3	10 000	5 300	12 000	6009 ⁺	ZZ	VV	DDU
	85	19	1.1	31 500	20 400	14.4	7 500	5 300	9 000	6209	ZZ	VV	DDU
	85	19	1.1	33 000	20 400	14.4	9 000	5 300	11 000	6209 ⁺	ZZ	VV	DDU
	100	25	1.5	53 000	32 000	13.1	6 700	4 800	8 000	6309	ZZ	VV	DDU
	100	25	1.5	55 500	32 000	13.1	7 500	4 800	9 500	6309 ⁺	ZZ	VV	DDU



Dynamic Equivalent Load $P = X F_r + Y F_a$

$\frac{f_a F_a}{F_r}$	e	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
		X	Y	X	Y
0.172	0.19	1	0	0.56	2.30
0.345	0.22	1	0	0.56	1.99
0.689	0.26	1	0	0.56	1.71
1.03	0.28	1	0	0.56	1.55
1.38	0.30	1	0	0.56	1.45
2.07	0.34	1	0	0.56	1.31
3.45	0.38	1	0	0.56	1.15
5.17	0.42	1	0	0.56	1.04
6.89	0.44	1	0	0.56	1.00

Static Equivalent Load

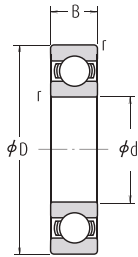
$$\frac{F_a}{F_r} > 0.8, P_0 = 0.6 F_r + 0.5 F_a$$

$$\frac{F_a}{F_r} \leq 0.8, P_0 = F_r$$

With Snap Ring Groove	With Snap Ring	Snap Ring Groove Dimensions (°) (mm)					Snap Ring (°) Dimensions (mm)		Abutment and Fillet Dimensions (mm)					Mass (kg)
		a max.	b min.	D ₁ max.	r ₀ max.	r _N min.	D ₂ max.	f max.	d ₁ (°) min.	d ₂ (°) max.	r _a max.	D _x min.	C ₁ max.	
N	NR	2.08	1.35	55.60	0.40	0.5	63.7	1.12	37	38.5	53	1	64.5	0.122
N	NR	3.28	1.90	62.60	0.60	0.5	70.7	1.70	37	40	60	1	71.5	0.225
N	NR	3.28	1.90	71.83	0.60	0.5	81.6	1.70	38.5	44.5	68.5	1	83	0.389
N	NR	1.30	0.95	45.70	0.25	0.3	49.8	0.85	37	37	45	0.3	50.5	0.027
N	NR	1.70	0.95	53.70	0.25	0.5	57.8	0.85	39	39	51	0.6	58.5	0.23
—	—	—	—	—	—	—	—	—	37	—	60	0.3	—	0.107
N	NR	2.08	1.90	59.61	0.60	0.5	67.7	1.70	40	41.5	57	1	68.5	0.151
N	—	—	—	—	—	—	—	—	40	41.5	57	1	—	0.151
N	NR	3.28	1.90	68.81	0.60	0.5	78.6	1.70	41.5	44.5	65.5	1	80	0.284
—	—	—	—	—	—	—	—	—	41.5	44.5	65.5	1	—	0.284
N	NR	3.28	1.90	76.81	0.60	0.5	86.6	1.70	43	47	72	1.5	88	0.464
—	—	—	—	—	—	—	—	—	43	47	72	1.5	—	0.464
N	NR	1.30	0.95	50.70	0.25	0.3	54.8	0.85	42	42	50	0.3	55.5	0.031
N	NR	1.70	0.95	60.70	0.25	0.5	64.8	0.85	44	46	58	0.6	65.5	0.112
—	—	—	—	—	—	—	—	—	42	—	66	0.3	—	0.13
N	NR	2.49	1.90	64.82	0.60	0.5	74.6	1.70	45	47.5	63	1	76	0.19
—	—	—	—	—	—	—	—	—	45	47.5	63	1	—	0.19
N	NR	3.28	1.90	76.81	0.60	0.5	86.6	1.70	46.5	50.5	73.5	1	88	0.366
—	—	—	—	—	—	—	—	—	46.5	50.5	73.5	1	—	0.366
N	NR	3.28	2.70	86.79	0.60	0.5	96.5	2.46	48	53	82	1.5	98	0.636
—	—	—	—	—	—	—	—	—	48	53	82	1.5	—	0.636
N	NR	1.30	0.95	56.70	0.25	0.3	60.8	0.85	47	47.5	56	0.3	61.5	0.038
N	NR	1.70	0.95	66.70	0.25	0.3	70.8	0.85	49	50	64	0.6	72	0.126
—	—	—	—	—	—	—	—	—	49	—	71	0.6	—	0.167
N	NR	2.49	1.90	71.83	0.60	0.5	81.6	1.70	50	53.5	70	1	83	0.241
—	—	—	—	—	—	—	—	—	50	53.5	70	1	—	0.241
N	NR	3.28	1.90	81.81	0.60	0.5	91.6	1.70	51.5	55.5	78.5	1	93	0.42
—	—	—	—	—	—	—	—	—	51.5	55.5	78.5	1	—	0.42
N	NR	3.28	2.70	96.80	0.60	0.5	106.50	2.46	53	61.5	92	1.5	108	0.829
—	—	—	—	—	—	—	—	—	53	61.5	92	1.5	—	0.829

Single-Row Deep Groove Ball Bearings

Bore Diameter 50 – 60 mm



Open Type



Shielded Type
ZZ



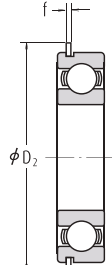
Non-Contact
Sealed Type
VV



Contact
Sealed Type
DD · DDU

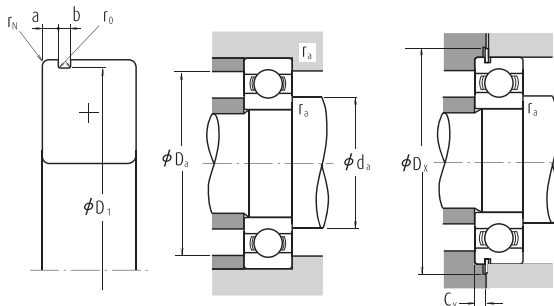


With Snap
Ring Groove
N



With
Snap Ring
NR

Boundary Dimensions (mm)				Basic Load Ratings (N)		Factor	Limiting Speeds (min ⁻¹)			Bearing Numbers			
d	D	B	r min.	C _r	C _{or}	f ₀	Grease		Oil				
							Open Z · ZZ V · VV	DU DDU	Open Z	Open	Shielded	Sealed	
50	65	7	0.3	6 400	6 200	17.2	9 500	5 300	11 000	6810	ZZ	VV	DDU
	72	12	0.6	14 500	11 700	16.1	9 000	5 300	11 000	6910	ZZ	VV	DDU
	80	10	0.6	15 400	12 400	16.1	8 500	—	10 000	16010	—	—	—
	80	16	1	21 800	16 600	15.6	8 500	4 800	10 000	6010	ZZ	VV	DDU
	80	16	1.0	22 900	16 600	15.6	9 500	4 800	11 000	6010 ⁺	ZZ	VV	DDU
	90	20	1.1	35 000	23 200	14.4	7 100	4 800	8 500	6210	ZZ	VV	DDU
	90	20	1.1	37 000	23 200	14.4	8 500	4 800	10 000	6210 ⁺	ZZ	VV	DDU
	110	27	2	62 000	38 500	13.2	6 000	4 300	7 500	6310	ZZ	VV	DDU
55	110	27	2.0	65 000	38 500	13.2	7 100	4 300	8 500	6310 ⁺	ZZ	VV	DDU
	72	9	0.3	8 800	8 500	17.0	8 500	4 800	10 000	6811	ZZ	VV	DDU
	80	13	1	16 000	13 300	16.2	8 000	4 500	9 500	6911	ZZ	VV	DDU
	90	11	0.6	19 400	16 300	16.2	7 500	—	9 000	16011	—	—	—
	90	18	1.1	28 300	21 200	15.3	7 500	4 500	9 000	6011	ZZ	VV	DDU
	90	18	1.1	29 700	21 200	15.3	8 500	4 500	10 000	6011 ⁺	ZZ	VV	DDU
	100	21	1.5	43 500	29 300	14.3	6 300	4 300	7 500	6211	ZZ	VV	DDU
	100	21	1.5	45 500	29 300	14.3	7 500	4 300	9 000	6211 ⁺	ZZ	VV	DDU
60	120	29	2	71 500	44 500	13.1	5 600	4 000	6 700	6311	ZZ	VV	DDU
	120	29	2.0	75 000	44 500	13.1	6 700	4 000	8 000	6311 ⁺	ZZ	VV	DDU
	78	10	0.3	11 500	10 900	16.9	8 000	4 500	9 500	6812	ZZ	VV	DD
	85	13	1	19 400	16 300	16.2	7 500	4 300	9 000	6912	ZZ	VV	DDU
	95	11	0.6	20 000	17 500	16.3	7 100	—	8 500	16012	—	—	—
	95	18	1.1	29 500	23 200	15.6	7 100	4 000	8 500	6012	ZZ	VV	DDU
	95	18	1.1	31 000	23 200	15.6	8 000	4 000	9 500	6012 ⁺	ZZ	VV	DDU
	110	22	1.5	52 500	36 000	14.3	5 600	3 800	7 100	6212	ZZ	VV	DDU
	110	22	1.5	55 000	36 000	14.3	6 700	3 800	8 000	6212 ⁺	ZZ	VV	DDU
	130	31	2.1	82 000	52 000	13.1	5 300	3 600	6 300	6312	ZZ	VV	DDU
	130	31	2.1	86 000	52 000	13.1	6 000	3 600	7 100	6312 ⁺	ZZ	VV	DDU



Dynamic Equivalent Load $P = X F_r + Y F_a$

$\frac{F_a F_a}{C_{or}}$	e	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
		X	Y	X	Y
0.172	0.19	1	0	0.56	2.30
0.345	0.22	1	0	0.56	1.99
0.689	0.26	1	0	0.56	1.71
1.03	0.28	1	0	0.56	1.55
1.38	0.30	1	0	0.56	1.45
2.07	0.34	1	0	0.56	1.31
3.45	0.38	1	0	0.56	1.15
5.17	0.42	1	0	0.56	1.04
6.89	0.44	1	0	0.56	1.00

Static Equivalent Load

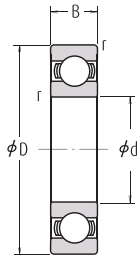
$$\frac{F_a}{F_r} > 0.8, P_0 = 0.6 F_r + 0.5 F_a$$

$$\frac{F_a}{F_r} \leq 0.8, P_0 = F_r$$

With Snap Ring Groove	With Snap Ring	Snap Ring Groove Dimensions (1°) (mm)					Snap Ring (1°) Dimensions (mm)		Abutment and Fillet Dimensions (mm)						Mass (kg)
		a	b	D ₁	r ₀	r _N	D ₂	f	d _a (2°)		D _a (2°)	r _a	D _x	C _y	approx.
		max.	min.	max.	max.	min.	max.	max.	min.	max.	max.	max.	min.	max.	
N	NR	1.30	0.95	63.7	0.25	0.3	67.8	0.85	52	52.5	63	0.3	68.5	1.8	0.050
N	NR	1.70	0.95	70.7	0.25	0.5	74.8	0.85	54	55	68	0.6	76	2.3	0.135
—	—	—	—	—	—	—	—	—	54	—	76	0.6	—	—	0.175
N	NR	2.49	1.90	76.81	0.60	0.5	86.6	1.70	55	58.5	75	1	88	3.8	0.261
—	—	—	—	—	—	—	—	—	55	58.5	75	1	—	—	0.261
N	NR	3.28	2.70	86.79	0.60	0.5	96.5	2.46	56.5	60	83.5	1	98	5.4	0.459
—	—	—	—	—	—	—	—	—	56.5	60	83.5	1	—	—	0.459
N	NR	3.28	2.70	106.81	0.60	0.5	116.6	2.46	59	68	101	2	118	5.4	1.06
—	—	—	—	—	—	—	—	—	59	68	101	2	—	—	1.06
N	NR	1.70	0.95	70.7	0.25	0.3	74.8	0.85	57	59	70	0.3	76	2.3	0.081
N	NR	2.10	1.30	77.9	0.40	0.5	84.4	1.12	60	61.5	75	1	86	2.9	0.189
—	—	—	—	—	—	—	—	—	59	—	86	0.6	—	—	0.257
N	NR	2.87	2.70	86.79	0.60	0.5	96.5	2.46	61.5	64	83.5	1	98	5.0	0.381
—	—	—	—	—	—	—	—	—	61.5	64	83.5	1	—	—	0.381
N	NR	3.28	2.70	96.8	0.60	0.5	106.5	2.46	63	66.5	92	1.5	108	5.4	0.619
—	—	—	—	—	—	—	—	—	63	66.5	92	1.5	—	—	0.619
N	NR	4.06	3.10	115.21	0.60	0.5	129.7	2.82	64	72.5	111	2	131.5	6.5	1.37
—	—	—	—	—	—	—	—	—	64	72.5	111	2	—	—	1.37
N	NR	1.70	1.30	76.2	0.40	0.3	82.7	1.12	62	64	76	0.3	84	2.5	0.103
N	NR	2.10	1.30	82.9	0.40	0.5	89.4	1.12	65	66	80	1	91	2.9	0.192
—	—	—	—	—	—	—	—	—	64	—	91	0.6	—	—	0.281
N	NR	2.87	2.70	91.82	0.60	0.5	101.6	2.46	66.5	69	88.5	1	103	5.0	0.412
—	—	—	—	—	—	—	—	—	66.5	69	88.5	1	—	—	0.412
N	NR	3.28	2.70	106.81	0.60	0.5	116.6	2.46	68	74.5	102	1.5	118	5.4	0.783
—	—	—	—	—	—	—	—	—	68	74.5	102	1.5	—	—	0.783
N	NR	4.06	3.10	125.22	0.60	0.5	139.7	2.82	71	79	119	2	141.5	6.5	1.72
—	—	—	—	—	—	—	—	—	71	79	119	2	—	—	1.72

Single-Row Deep Groove Ball Bearings

Bore Diameter 65 – 75 mm



Open Type



Shielded Type
ZZ



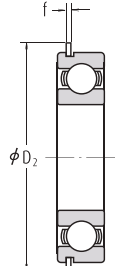
Non-Contact
Sealed Type
VV



Contact
Sealed Type
DD · DDU

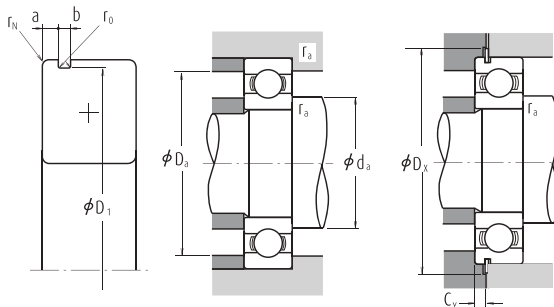


With Snap
Ring Groove
N



With
Snap Ring
NR

Boundary Dimensions (mm)				Basic Load Ratings (N)		Factor f_0	Limiting Speeds (min ⁻¹)			Bearing Numbers			
d	D	B	r min.	C_r	C_{or}		Grease			Open	Shielded	Sealed	
							Open Z · ZZ V · VV	DU DDU	Oil Open Z				
65	85	10	0.6	11 900	12 100	17.0	7 500	4 000	8 500	6813	ZZ	VV	DD
	90	13	1	17 400	16 100	16.6	7 100	4 000	8 500	6913	ZZ	VV	DDU
	100	11	0.6	20 500	18 700	16.5	6 700	—	8 000	16013	—	—	—
	100	18	1.1	30 500	25 200	15.8	6 700	4 000	8 000	6013	ZZ	VV	DDU
	100	18	1.1	32 000	25 200	15.8	7 500	4 000	9 000	6013 ⁺	ZZ	VV	DDU
	120	23	1.5	57 500	40 000	14.4	5 300	3 600	6 300	6213	ZZ	VV	DDU
	120	23	1.5	60 000	40 000	14.4	6 300	3 600	7 500	6213 ⁺	ZZ	VV	DDU
	140	33	2.1	92 500	60 000	13.2	4 800	3 400	6 000	6313	ZZ	VV	DDU
	140	33	2.1	97 500	60 000	13.2	5 600	3 400	6 700	6313 ⁺	ZZ	VV	DDU
	90	10	0.6	12 100	12 700	17.2	6 700	3 800	8 000	6814	ZZ	VV	DD
70	100	16	1	23 700	21 200	16.3	6 300	3 600	7 500	6914	ZZ	VV	DDU
	110	13	0.6	26 800	23 600	16.3	6 000	—	7 100	16014	—	—	—
	110	20	1.1	38 000	31 000	15.6	6 000	3 600	7 100	6014	ZZ	VV	DDU
	110	20	1.1	40 000	31 000	15.6	7 100	3 600	8 500	6014 ⁺	ZZ	VV	DDU
	125	24	1.5	62 000	44 000	14.5	5 000	3 400	6 300	6214	ZZ	VV	DDU
	125	24	1.5	65 500	44 000	14.5	6 000	3 400	7 100	6214 ⁺	ZZ	VV	DDU
	150	35	2.1	104 000	68 000	13.2	4 500	3 200	5 300	6314	ZZ	VV	DDU
	150	35	2.1	109 000	68 000	13.2	5 300	3 200	6 300	6314 ⁺	ZZ	VV	DDU
	95	10	0.6	12 500	13 900	17.3	6 300	3 600	7 500	6815	ZZ	VV	DDU
	105	16	1	24 400	22 600	16.5	6 000	3 400	7 100	6915	ZZ	VV	DDU
75	115	13	0.6	27 600	25 300	16.4	5 600	—	6 700	16015	—	—	—
	115	20	1.1	39 500	33 500	15.8	5 600	3 400	6 700	6015	ZZ	VV	DDU
	115	20	1.1	41 500	33 500	15.8	6 700	3 400	8 000	6015 ⁺	ZZ	VV	DDU
	130	25	1.5	66 000	49 500	14.7	4 800	3 200	5 600	6215	ZZ	VV	DDU
	130	25	1.5	69 500	49 500	14.7	5 600	3 200	6 700	6215 ⁺	ZZ	VV	DDU
	160	37	2.1	113 000	77 000	13.2	4 300	2 800	5 000	6315	ZZ	VV	DDU
	160	37	2.1	119 000	77 000	13.2	4 800	2 800	6 000	6315 ⁺	ZZ	VV	DDU



Dynamic Equivalent Load $P = X F_r + Y F_a$

$\frac{F_a F_a}{C_{or}}$	e	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
		X	Y	X	Y
0.172	0.19	1	0	0.56	2.30
0.345	0.22	1	0	0.56	1.99
0.689	0.26	1	0	0.56	1.71
1.03	0.28	1	0	0.56	1.55
1.38	0.30	1	0	0.56	1.45
2.07	0.34	1	0	0.56	1.31
3.45	0.38	1	0	0.56	1.15
5.17	0.42	1	0	0.56	1.04
6.89	0.44	1	0	0.56	1.00

Static Equivalent Load

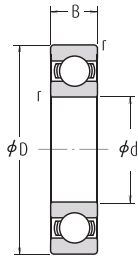
$$\frac{F_a}{F_r} > 0.8, P_0 = 0.6 F_r + 0.5 F_a$$

$$\frac{F_a}{F_r} \leq 0.8, P_0 = F_r$$

With Snap Ring Groove	With Snap Ring	Snap Ring Groove Dimensions (1) (mm)					Snap Ring (1) Dimensions (mm)		Abutment and Fillet Dimensions (mm)						Mass (kg)
		a max.	b min.	D ₁ max.	r ₀ max.	r _N min.	D ₂ max.	f max.	d _s (1) min.	d _s (1) max.	D _s (2) max.	r _s max.	D _x min.	C _y max.	
N	NR	1.70	1.30	82.9	0.40	0.5	89.4	1.12	69	69	81	0.6	91	2.5	0.128
N	NR	2.10	1.30	87.9	0.40	0.5	94.4	1.12	70	71.5	85	1	96	2.9	0.218
—	—	—	—	—	—	—	—	—	69	—	96	0.6	—	—	0.30
N	NR	2.87	2.70	96.8	0.60	0.5	106.5	2.46	71.5	73	93.5	1	108	5.0	0.439
—	—	—	—	—	—	—	—	—	71.5	73	93.5	1	—	—	0.439
N	NR	4.06	3.10	115.21	0.60	0.5	129.7	2.82	73	80	112	1.5	131.5	6.5	1.0
—	—	—	—	—	—	—	—	—	73	80	112	1.5	—	—	1.0
N	NR	4.90	3.10	135.23	0.60	0.5	149.7	2.82	76	85.5	129	2	152	7.3	2.11
—	—	—	—	—	—	—	—	—	76	85.5	129	2	—	—	2.11
N	NR	1.70	1.30	87.9	0.40	0.5	94.4	1.12	74	74.5	86	0.6	96	2.5	0.134
N	NR	2.50	1.30	97.9	0.40	0.5	104.4	1.12	75	77.5	95	1	106	3.3	0.349
—	—	—	—	—	—	—	—	—	74	—	106	0.6	—	—	0.441
N	NR	2.87	2.70	106.81	0.60	0.5	116.6	2.46	76.5	80.5	103.5	1	118	5.0	0.608
—	—	—	—	—	—	—	—	—	76.5	80.5	103.5	1	—	—	0.608
N	NR	4.06	3.10	120.22	0.60	0.5	134.7	2.82	78	84	117	1.5	136.5	6.5	1.09
—	—	—	—	—	—	—	—	—	78	84	117	1.5	—	—	1.09
N	NR	4.90	3.10	145.24	0.60	0.5	159.7	2.82	81	92	139	2	162	7.3	2.57
—	—	—	—	—	—	—	—	—	81	92	139	2	—	—	2.57
N	NR	1.70	1.30	92.9	0.40	0.5	99.4	1.12	79	79.5	91	0.6	101	2.5	0.149
N	NR	2.50	1.30	102.60	0.40	0.5	110.7	1.12	80	82	100	1	112	3.3	0.364
—	—	—	—	—	—	—	—	—	79	—	111	0.6	—	—	0.463
N	NR	2.87	2.70	111.81	0.60	0.5	121.6	2.46	81.5	85.5	108.5	1	123	5.0	0.649
—	—	—	—	—	—	—	—	—	81.5	85.5	108.5	1	—	—	0.649
N	NR	4.06	3.10	125.22	0.60	0.5	139.7	2.82	83	90	122	1.5	141.5	6.5	1.19
—	—	—	—	—	—	—	—	—	83	90	122	1.5	—	—	1.19
N	NR	4.90	3.10	155.22	0.60	0.5	169.7	2.82	86	98.5	149	2	172	7.3	3.08
—	—	—	—	—	—	—	—	—	86	98.5	149	2	—	—	3.08

Single-Row Deep Groove Ball Bearings

Bore Diameter 80 – 90 mm



Open Type



Shielded Type
ZZ



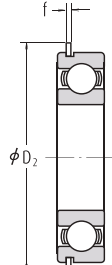
Non-Contact
Sealed Type
VV



Contact
Sealed Type
DD · DDU

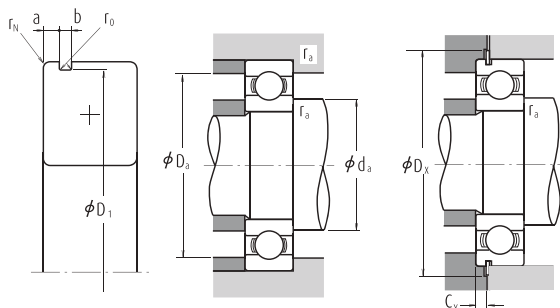


With Snap
Ring Groove
N



With
Snap Ring
NR

Boundary Dimensions (mm)				Basic Load Ratings (N)		Factor	Limiting Speeds (min ⁻¹)			Bearing Numbers			
d	D	B	r min.	C _r	C _{or}	f ₀	Grease		Oil				
							Open Z · ZZ V · VV	DU DDU	Open Z	Open	Shielded	Sealed	
80	100	10	0.6	12 700	14 500	17.4	6 000	3 400	7 100	6816	ZZ	VV	DDU
	110	16	1	25 000	24 000	16.6	5 600	3 200	6 700	6916	ZZ	VV	DDU
	125	14	0.6	32 000	29 600	16.4	5 300	—	6 300	16016	—	—	—
	125	22	1.1	47 500	40 000	15.6	5 300	3 200	6 300	6016	ZZ	VV	DDU
	125	22	1.1	50 000	40 000	15.6	6 300	3 200	7 100	6016 ^e	ZZ	VV	DDU
	140	26	2	72 500	53 000	14.6	4 500	3 000	5 300	6216	ZZ	VV	DDU
	140	26	2.0	76 500	53 000	14.6	5 300	3 000	6 300	6216 ^e	ZZ	VV	DDU
	170	39	2.1	123 000	86 500	13.3	4 000	2 800	4 800	6316	ZZ	VV	DDU
	170	39	2.1	129 000	86 500	13.3	4 500	2 800	5 600	6316 ^e	ZZ	VV	DDU
	110	13	1	18 700	20 000	17.1	5 600	3 200	6 700	6817	ZZ	VV	DDU
85	120	18	1.1	32 000	29 600	16.4	5 300	3 000	6 300	6917	ZZ	VV	DDU
	130	14	0.6	33 000	31 500	16.5	5 000	—	6 000	16017	—	—	—
	130	22	1.1	49 500	43 000	15.8	5 000	3 000	6 000	6017	ZZ	VV	DDU
	130	22	1.1	52 000	43 000	15.8	6 000	3 000	7 100	6017 ^e	ZZ	VV	DDU
	150	28	2	84 000	62 000	14.5	4 300	2 800	5 000	6217	ZZ	VV	DDU
	150	28	2.0	88 000	62 000	14.5	4 800	2 800	6 000	6217 ^e	ZZ	VV	DDU
	180	41	3	133 000	97 000	13.3	3 800	2 600	4 500	6317	ZZ	VV	DDU
	180	41	3.0	139 000	97 000	13.3	4 300	2 600	5 000	6317 ^e	ZZ	VV	DDU
	115	13	1	19 000	21 000	17.2	5 300	3 000	6 300	6818	ZZ	VV	DDU
	125	18	1.1	33 000	31 500	16.5	5 000	2 800	6 000	6918	ZZ	VV	DDU
90	140	16	1	41 500	39 500	16.3	4 800	—	5 600	16018	—	—	—
	140	24	1.5	58 000	50 000	15.6	4 800	2 800	5 600	6018	ZZ	VV	DDU
	140	24	1.5	61 000	50 000	15.6	5 600	2 800	6 300	6018 ^e	ZZ	VV	DDU
	160	30	2	96 000	71 500	14.5	4 000	2 600	4 800	6218	ZZ	VV	DDU
	160	30	2.0	101 000	71 500	14.5	4 500	2 600	5 600	6218 ^e	ZZ	VV	DDU
	190	43	3	143 000	107 000	13.3	3 600	2 400	4 300	6318	ZZ	VV	DDU
	190	43	3.0	150 000	107 000	13.3	4 000	2 400	4 800	6318 ^e	ZZ	VV	DDU



Dynamic Equivalent Load $P=XF_r+YF_a$

$\frac{F_a F_a}{F_r}$	e	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
		X	Y	X	Y
0.172	0.19	1	0	0.56	2.30
0.345	0.22	1	0	0.56	1.99
0.689	0.26	1	0	0.56	1.71
1.03	0.28	1	0	0.56	1.55
1.38	0.30	1	0	0.56	1.45
2.07	0.34	1	0	0.56	1.31
3.45	0.38	1	0	0.56	1.15
5.17	0.42	1	0	0.56	1.04
6.89	0.44	1	0	0.56	1.00

Static Equivalent Load

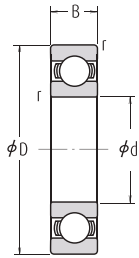
$$\frac{F_a}{F_r} > 0.8, P_0 = 0.6F_r + 0.5F_a$$

$$\frac{F_a}{F_r} \leq 0.8, P_0 = F_r$$

With Snap Ring Groove	With Snap Ring	Snap Ring Groove Dimensions (°) (mm)					Snap Ring (°) Dimensions (mm)		Abutment and Fillet Dimensions (mm)						Mass (kg)
		a max.	b min.	D ₁ max.	r ₀ max.	r _N min.	D ₂ max.	f max.	d ₄ (°) min.	d ₄ (°) max.	D ₃ (°) max.	r ₃ max.	D _x min.	C _y max.	approx.
N	NR	1.70	1.3	97.9	0.4	0.5	104.4	1.12	84	84.5	96	0.6	106	2.5	0.151
N	NR	2.50	1.3	107.60	0.4	0.5	115.7	1.12	85	87.5	105	1	117	3.3	0.391
—	—	—	—	—	—	—	—	—	84	—	121	0.6	—	—	0.621
N	NR	2.87	3.1	120.22	0.6	0.5	134.7	2.82	86.5	91	118.5	1	136.5	5.3	0.872
—	—	—	—	—	—	—	—	—	86.5	91	118.5	1	—	—	0.872
N	NR	4.90	3.1	135.23	0.6	0.5	149.7	2.82	89	95.5	131	2	152	7.3	1.42
—	—	—	—	—	—	—	—	—	89	95.5	131	2	—	—	1.42
N	NR	5.69	3.5	163.65	0.6	0.5	182.9	3.10	91	104.5	159	2	185	8.4	3.67
—	—	—	—	—	—	—	—	—	91	104.5	159	2	—	—	3.67
N	NR	2.10	1.3	107.60	0.4	0.5	115.7	1.12	90	90.5	105	1	117	2.9	0.263
N	NR	3.30	1.3	117.60	0.4	0.5	125.7	1.12	91.5	94.5	113.5	1	127	4.1	0.55
—	—	—	—	—	—	—	—	—	89	—	126	0.6	—	—	0.652
N	NR	2.87	3.1	125.22	0.6	0.5	139.7	2.82	91.5	96	123.5	1	141.5	5.3	0.918
—	—	—	—	—	—	—	—	—	91.5	96	123.5	1	—	—	0.918
N	NR	4.90	3.1	145.24	0.6	0.5	159.7	2.82	94	102	141	2	162	7.3	1.76
—	—	—	—	—	—	—	—	—	94	102	141	2	—	—	1.76
N	NR	5.69	3.5	173.66	0.6	0.5	192.9	3.10	98	110.5	167	2.5	195	8.4	4.28
—	—	—	—	—	—	—	—	—	98	110.5	167	2.5	—	—	4.28
N	NR	2.10	1.3	112.60	0.4	0.5	120.7	1.12	95	95.5	110	1	122	2.9	0.276
N	NR	3.30	1.3	122.60	0.4	0.5	130.7	1.12	96.5	98.5	118.5	1	132	4.1	0.585
—	—	—	—	—	—	—	—	—	95	—	135	1	—	—	0.873
N	NR	3.71	3.1	135.23	0.6	0.5	149.7	2.82	98	103	132	1.5	152	6.1	1.19
—	—	—	—	—	—	—	—	—	98	103	132	1.5	—	—	1.19
N	NR	4.90	3.1	155.22	0.6	0.5	169.7	2.82	99	107.5	151	2	172	7.3	2.18
—	—	—	—	—	—	—	—	—	99	107.5	151	2	—	—	2.18
N	NR	5.69	3.5	183.64	0.6	0.5	202.9	3.10	103	117	177	2.5	205	8.4	4.98
—	—	—	—	—	—	—	—	—	103	117	177	2.5	—	—	4.98

Single-Row Deep Groove Ball Bearings

Bore Diameter 95 – 105 mm



Open Type



Shielded Type
ZZ · ZZS



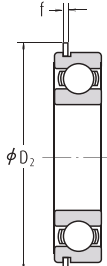
Non-Contact
Sealed Type
VV



Contact
Sealed Type
DD · DDU

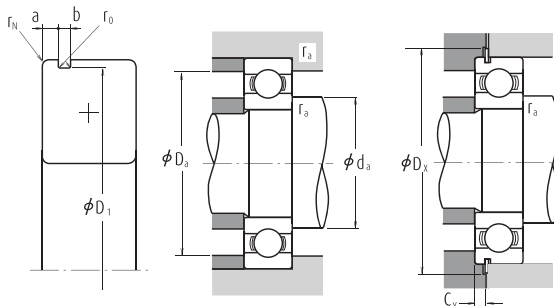


With Snap
Ring Groove
N



With
Snap Ring
NR

Boundary Dimensions (mm)				Basic Load Ratings (N)		Factor	Limiting Speeds (min ⁻¹)			Bearing Numbers			
d	D	B	r min.	C _r	C _{or}	f ₀	Grease		Oil				
							Open Z · ZZ V · VV	DU DDU	Open Z	Open	Shielded	Sealed	
95	120	13	1	19 300	22 000	17.2	5 000	2 800	6 000	6819	ZZ	VV	DD
	130	18	1.1	33 500	33 500	16.6	4 800	2 800	5 600	6919	ZZ	VV	DDU
	145	16	1	43 000	42 000	16.4	4 500	—	5 300	16019	—	—	—
	145	24	1.5	60 500	54 000	15.8	4 500	2 600	5 300	6019	ZZ	VV	DDU
	145	24	1.5	63 500	54 000	15.8	5 300	2 600	6 000	6019 ⁺	ZZ	VV	DDU
	170	32	2.1	109 000	82 000	14.4	3 800	2 600	4 500	6219	ZZ	VV	DDU
	170	32	2.1	114 000	82 000	14.4	4 300	2 600	5 000	6219 ⁺	ZZ	VV	DDU
	200	45	3	153 000	119 000	13.3	3 000	2 400	3 600	6319	ZZ	VV	DDU
100	200	45	3.0	160 000	119 000	13.3	3 400	2 400	4 300	6319 ⁺	ZZ	VV	DDU
	125	13	1	19 600	23 000	17.3	4 800	2 800	5 600	6820	ZZ	VV	DD
	140	20	1.1	43 000	42 000	16.4	4 500	2 600	5 300	6920	ZZ	VV	DDU
	150	16	1	42 500	42 000	16.5	4 300	—	5 300	16020	—	—	—
	150	24	1.5	60 000	54 000	15.9	4 300	2 600	5 300	6020	ZZ	VV	DDU
	150	24	1.5	63 000	54 000	15.9	5 000	2 600	6 000	6020 ⁺	ZZ	VV	DDU
	180	34	2.1	122 000	93 000	14.4	3 600	2 400	4 300	6220	ZZ	VV	DDU
	180	34	2.1	128 000	93 000	14.4	4 000	2 400	4 800	6220 ⁺	ZZ	VV	DDU
105	215	47	3	173 000	141 000	13.2	2 800	2 200	3 400	6320	ZZ	VV	DDU
	130	13	1	19 800	23 900	17.4	4 800	2 600	5 600	6821	ZZ	VV	DDU
	145	20	1.1	42 500	42 000	16.5	4 300	—	5 300	6921	ZZ	VV	—
	160	18	1	52 000	50 500	16.3	4 000	—	4 800	16021	—	—	—
	160	26	2	72 500	66 000	15.8	4 000	2 400	4 800	6021	ZZ	VV	DDU
	160	26	2.0	76 000	66 000	15.8	4 500	2 400	5 600	6021 ⁺	ZZ	VV	DDU
	190	36	2.1	133 000	105 000	14.4	3 400	2 200	4 000	6221	ZZ	VV	DDU
	190	36	2.1	140 000	105 000	14.4	3 800	2 200	4 500	6221 ⁺	ZZ	VV	DDU
	225	49	3	184 000	154 000	13.2	2 600	2 000	3 200	6321	ZZ	—	DDU



Dynamic Equivalent Load $P = X F_r + Y F_a$

$\frac{f_a F_a}{C_{or}}$	e	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
		X	Y	X	Y
0.172	0.19	1	0	0.56	2.30
0.345	0.22	1	0	0.56	1.99
0.689	0.26	1	0	0.56	1.71
1.03	0.28	1	0	0.56	1.55
1.38	0.30	1	0	0.56	1.45
2.07	0.34	1	0	0.56	1.31
3.45	0.38	1	0	0.56	1.15
5.17	0.42	1	0	0.56	1.04
6.89	0.44	1	0	0.56	1.00

Static Equivalent Load

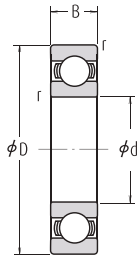
$$\frac{F_a}{F_r} > 0.8, P_0 = 0.6 F_r + 0.5 F_a$$

$$\frac{F_a}{F_r} \leq 0.8, P_0 = F_r$$

With Snap Ring Groove	With Snap Ring	Snap Ring Groove Dimensions (1) (mm)					Snap Ring (1) Dimensions (mm)		Abutment and Fillet Dimensions (mm)						Mass (kg)
		a max.	b min.	D ₁ max.	r ₀ max.	r _N min.	D ₂ max.	f max.	d ₀ (2) min.	d ₀ (2) max.	r _a max.	D _x min.	C _f max.	approx.	
N	NR	2.10	1.3	117.60	0.4	0.5	125.7	1.12	100	101.5	115	1	127	2.9	0.297
N	NR	3.30	1.3	127.60	0.4	0.5	135.7	1.12	101.5	103.5	123.5	1	137	4.1	0.601
—	—	—	—	—	—	—	—	—	100	—	140	1	—	—	0.904
N	NR	3.71	3.1	140.23	0.6	0.5	154.7	2.82	103	108.5	137	1.5	157	6.1	1.23
—	—	—	—	—	—	—	—	—	103	108.5	137	1.5	—	—	1.23
N	NR	5.69	3.5	163.65	0.6	0.5	182.9	3.10	106	114	159	2	185	8.4	2.64
—	—	—	—	—	—	—	—	—	106	114	159	2	—	—	2.64
N	NR	5.69	3.5	193.65	0.6	0.5	212.9	3.10	108	123.5	187	2.5	215	8.4	5.76
—	—	—	—	—	—	—	—	—	108	123.5	187	2.5	—	—	5.76
N	NR	2.10	1.3	122.60	0.4	0.5	130.7	1.12	105	105.5	120	1	132	2.9	0.31
N	NR	3.30	1.9	137.60	0.6	0.5	145.7	1.70	106.5	111	133.5	1	147	4.7	0.828
—	—	—	—	—	—	—	—	—	105	—	145	1	—	—	0.945
N	NR	3.71	3.1	145.24	0.6	0.5	159.7	2.82	108	112.5	142	1.5	162	6.1	1.29
—	—	—	—	—	—	—	—	—	108	112.5	142	1.5	—	—	1.29
N	NR	5.69	3.5	173.66	0.6	0.5	192.9	3.10	111	121.5	169	2	195	8.4	3.17
—	—	—	—	—	—	—	—	—	111	121.5	169	2	—	—	3.17
—	—	—	—	—	—	—	—	—	113	133	202	2.5	—	—	7.04
N	NR	2.10	1.3	127.60	0.4	0.5	135.7	1.12	110	110.5	125	1	137	2.9	0.324
N	NR	3.30	1.9	142.60	0.6	0.5	150.7	1.70	111.5	116	138.5	1	152	4.7	0.856
—	—	—	—	—	—	—	—	—	110	—	155	1	—	—	1.24
N	NR	3.71	3.1	155.22	0.6	0.5	169.7	2.82	114	120	151	2	172	6.1	1.58
—	—	—	—	—	—	—	—	—	114	120	151	2	—	—	1.58
N	NR	5.69	3.5	183.64	0.6	0.5	202.9	3.10	116	127.5	179	2	205	8.4	3.79
—	—	—	—	—	—	—	—	—	116	127.5	179	2	—	—	3.79
—	—	—	—	—	—	—	—	—	118	138	212	2.5	—	—	8.09

Single-Row Deep Groove Ball Bearings

Bore Diameter 110 – 150 mm



Open Type



Shielded Type
ZZ · ZTS



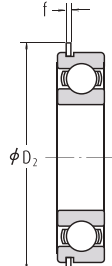
Non-Contact
Sealed Type
VV



Contact
Sealed Type
DD · DDU

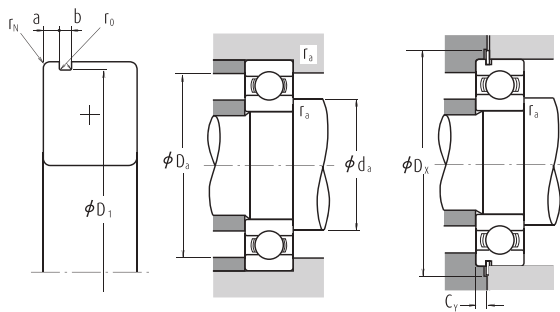


With Snap
Ring Groove
N



With Snap Ring
NR

Boundary Dimensions (mm)				Basic Load Ratings (N)		Factor	Limiting Speeds (min ⁻¹)			Bearing Numbers			
d	D	B	r min.	C _r	C _{or}	f ₀	Grease		Oil				
							Open Z · ZZ V · VV	DU DDU	Open Z	Open	Shielded	Sealed	
110	140	16	1	28 100	32 500	17.1	4 300	2 400	5 300	6822	ZZ	VV	DDU
	150	20	1.1	43 500	44 500	16.6	4 300	2 400	5 000	6922	ZZ	VV	DDU
	170	19	1	57 500	56 500	16.3	3 800	—	4 500	16022	—	—	—
	170	28	2	85 000	73 000	15.5	3 800	2 200	4 500	6022	ZZ	VV	DDU
	170	28	2.0	89 000	73 000	15.5	4 500	2 200	5 300	6022⁺	ZZ	VV	DDU
	200	38	2.1	144 000	117 000	14.3	2 800	2 200	3 400	6222	ZZ	VV	DDU
	240	50	3	205 000	179 000	13.2	2 400	—	3 000	6322	ZZ	—	—
120	150	16	1	28 900	35 500	17.3	4 000	2 200	4 800	6824	ZZ	VV	DD
	165	22	1.1	53 000	54 000	16.5	3 800	—	4 500	6924	ZZ	—	—
	180	19	1	56 500	57 500	16.5	3 600	—	4 300	16024	—	—	—
	180	28	2	88 000	80 000	15.7	3 600	2 200	4 300	6024	ZZ	VV	DDU
	180	28	2.0	92 500	80 000	15.7	4 000	2 200	4 800	6024⁺	ZZ	VV	DDU
	215	40	2.1	155 000	131 000	14.4	2 600	2 000	3 200	6224	ZZ	VV	DDU
	260	55	3	207 000	185 000	13.5	2 200	1 800	2 800	6324	ZTS	—	DDU
130	165	18	1.1	37 000	44 000	17.1	3 600	2 000	4 300	6826	ZTS	VV	DD
	180	24	1.5	65 000	67 500	16.5	3 400	—	4 000	6926	ZZ	—	—
	200	22	1.1	75 500	77 500	16.4	3 000	—	3 600	16026	—	—	—
	200	33	2	106 000	101 000	15.8	3 000	1 900	3 600	6026	ZZ	—	DDU
	230	40	3	167 000	146 000	14.5	2 400	—	3 000	6226	ZZ	—	—
	280	58	4	229 000	214 000	13.6	2 200	—	2 600	6326	ZTS	—	—
	175	18	1.1	38 500	48 000	17.3	3 400	1 900	4 000	6828	ZZ	VV	DDU
140	190	24	1.5	66 500	72 000	16.6	3 200	—	3 800	6928	ZTS	VV	—
	210	22	1.1	77 500	82 500	16.5	2 800	—	3 400	16028	—	—	—
	210	33	2	110 000	109 000	16.0	2 800	1 800	3 400	6028	ZZ	—	DDU
	250	42	3	166 000	150 000	14.9	2 200	1 700	2 800	6228	ZTS	—	DDU
	300	62	4	253 000	246 000	13.6	2 000	—	2 400	6328	ZTS	—	—
	190	20	1.1	47 500	58 500	17.1	3 200	1 800	3 800	6830	ZZ	VV	DDU
	210	28	2	85 000	90 500	16.5	2 600	1 700	3 200	6930	ZTS	—	DDU
150	225	24	1.1	84 000	91 000	16.6	2 600	—	3 000	16030	—	—	—
	225	35	2.1	126 000	126 000	15.9	2 600	1 700	3 000	6030	ZZ	VV	DDU
	270	45	3	176 000	168 000	15.1	2 000	—	2 600	6230	ZTS	—	—
	320	65	4	274 000	284 000	13.9	1 800	—	2 200	6330	ZTS	—	—



Dynamic Equivalent Load $P = X F_r + Y F_a$

$\frac{f_a F_a}{C_r}$	e	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
		X	Y	X	Y
0.172	0.19	1	0	0.56	2.30
0.345	0.22	1	0	0.56	1.99
0.689	0.26	1	0	0.56	1.71
1.03	0.28	1	0	0.56	1.55
1.38	0.30	1	0	0.56	1.45
2.07	0.34	1	0	0.56	1.31
3.45	0.38	1	0	0.56	1.15
5.17	0.42	1	0	0.56	1.04
6.89	0.44	1	0	0.56	1.00

Static Equivalent Load

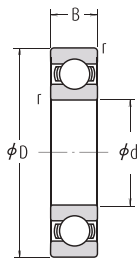
$$\frac{F_a}{F_r} > 0.8, P_0 = 0.6 F_r + 0.5 F_a$$

$$\frac{F_a}{F_r} \leq 0.8, P_0 = F_r$$

With Snap Ring Groove	With Snap Ring	Snap Ring Groove Dimensions (1) (mm)					Snap Ring (1) Dimensions (mm)		Abutment and Fillet Dimensions (mm)						Mass (kg)
		a max.	b min.	D ₁ max.	r ₀ max.	r _N min.	D ₂ max.	f max.	d ₃ (2) min.	d ₃ (2) max.	r ₃ max.	D _x min.	C _y max.	approx.	
N	NR	2.50	1.9	137.60	0.6	0.5	145.7	1.7	115	117	135	1	147	3.9	0.497
N	NR	3.30	1.9	147.60	0.6	0.5	155.7	1.7	116.5	121	143.5	1	157	4.7	0.893
—	—	—	—	—	—	—	—	—	115	—	165	1	—	—	1.51
N	NR	3.71	3.5	163.65	0.6	0.5	182.9	3.1	119	124.5	161	2	185	6.4	1.94
—	—	—	—	—	—	—	—	—	119	124.5	161	2	—	—	1.94
N	NR	5.69	3.5	193.65	0.6	0.5	212.9	3.1	121	134	189	2	215	8.4	4.45
—	—	—	—	—	—	—	—	—	123	147	227	2.5	—	—	9.51
N	NR	2.50	1.9	147.60	0.6	0.5	155.7	1.7	125	127	145	1	157	3.9	0.537
N	NR	3.70	1.9	161.80	0.6	0.5	171.5	1.7	126.5	132	158.5	1	173	5.1	1.21
—	—	—	—	—	—	—	—	—	125	—	175	1	—	—	1.6
N	NR	3.71	3.5	173.66	0.6	0.5	192.9	3.1	129	134.5	171	2	195	6.4	2.08
—	—	—	—	—	—	—	—	—	129	134.5	171	2	—	—	2.08
—	—	—	—	—	—	—	—	—	131	146	204	2	—	—	5.29
—	—	—	—	—	—	—	—	—	133	161	247	2.5	—	—	12.5
N	NR	3.30	1.9	161.80	0.6	0.5	171.5	1.7	136.5	138	158.5	1	173	4.7	0.758
N	NR	3.70	1.9	176.80	0.6	0.5	186.5	1.7	138	144	172	1.5	188	5.1	1.57
—	—	—	—	—	—	—	—	—	136.5	—	193.5	1	—	—	2.4
N	NR	5.69	3.5	193.65	0.6	0.5	212.9	3.1	139	148.5	191	2	215	8.4	3.26
—	—	—	—	—	—	—	—	—	143	157	217	2.5	—	—	5.96
—	—	—	—	—	—	—	—	—	146	175	264	3	—	—	15.2
N	NR	3.30	1.9	171.80	0.6	0.5	181.5	1.7	146.5	148.5	168.5	1	183	4.7	0.832
N	NR	3.70	1.9	186.80	0.6	0.5	196.5	1.7	148	153.5	182	1.5	198	5.1	1.67
—	—	—	—	—	—	—	—	—	146.5	—	203.5	1	—	—	2.84
—	—	—	—	—	—	—	—	—	149	158.5	201	2	—	—	3.48
—	—	—	—	—	—	—	—	—	153	171.5	237	2.5	—	—	7.68
—	—	—	—	—	—	—	—	—	156	187	284	3	—	—	18.5
N	NR	3.30	1.9	186.80	0.6	0.5	196.5	1.7	156.5	160	183.5	1	198	4.7	1.15
—	—	—	—	—	—	—	—	—	159	166	201	2	—	—	3.01
—	—	—	—	—	—	—	—	—	156.5	—	218.5	1	—	—	3.62
—	—	—	—	—	—	—	—	—	161	170	214	2	—	—	4.24
—	—	—	—	—	—	—	—	—	163	186	257	2.5	—	—	10
—	—	—	—	—	—	—	—	—	166	203	304	3	—	—	22.7

Single-Row Deep Groove Ball Bearings

Bore Diameter 160 mm



Open Type



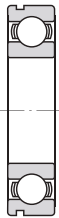
Shielded Type
ZZ · ZTS



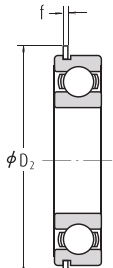
Non-Contact
Sealed Type
VV



Contact
Sealed Type
DD · DDU

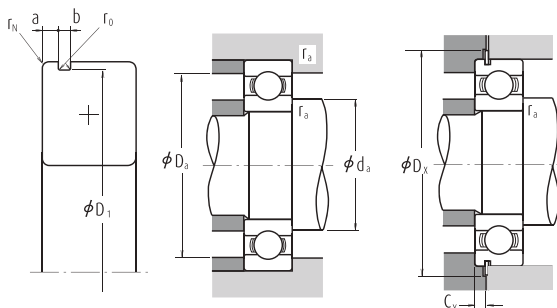


With Snap
Ring Groove
N



With
Snap Ring
NR

Boundary Dimensions (mm)				Basic Load Ratings (N)		Factor	Limiting Speeds (min ⁻¹)			Bearing Numbers			
d	D	B	r min.	C _r	C _{or}	f ₀	Grease		Oil	Open	Shielded	Sealed	
							Open Z · ZZ V · VV	DU DDU	Open Z				
160	200	20	1.1	48 500	61 000	17.2	2 600	1 700	3 200	6832	ZZS	VV	DDU
	220	28	2	87 000	96 000	16.6	2 600	1 600	3 000	6932	ZZS	—	DDU
	240	25	1.5	99 000	108 000	16.5	2 400	—	2 800	16032	—	—	—
	240	38	2.1	137 000	135 000	15.9	2 400	1 600	2 800	6032	ZZ	—	DDU
	290	48	3	185 000	186 000	15.4	1 900	—	2 400	6232	ZZS	—	—
	340	68	4	278 000	287 000	13.9	1 700	—	2 000	6332	ZZS	—	—



Dynamic Equivalent Load $P=XF_r+YF_a$

$\frac{F_a F_a}{C_{or}}$	e	$\frac{F_a}{F_r} < e$		$\frac{F_a}{F_r} > e$	
		X	Y	X	Y
0.172	0.19	1	0	0.56	2.30
0.345	0.22	1	0	0.56	1.99
0.689	0.26	1	0	0.56	1.71
1.03	0.28	1	0	0.56	1.55
1.38	0.30	1	0	0.56	1.45
2.07	0.34	1	0	0.56	1.31
3.45	0.38	1	0	0.56	1.15
5.17	0.42	1	0	0.56	1.04
6.89	0.44	1	0	0.56	1.00

Static Equivalent Load

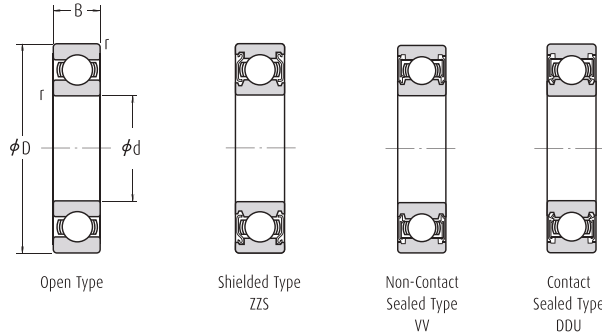
$$\frac{F_a}{F_r} > 0.8, P_0 = 0.6F_r + 0.5F_a$$

$$\frac{F_a}{F_r} \leq 0.8, P_0 = F_r$$

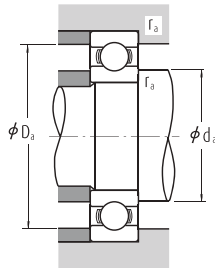
With Snap Ring Groove	With Snap Ring	Snap Ring Groove Dimensions (°) (mm)					Snap Ring (°) Dimensions (mm)		Abutment and Fillet Dimensions (mm)						Mass (kg)
		a max.	b min.	D ₁ max.	r ₀ max.	r _N min.	D ₂ max.	f max.	d ₀ (°) min.	d ₀ (°) max.	D ₃ (°) max.	r ₃ max.	D _x min.	C _γ max.	approx.
N	NR	3.30	1.9	196.80	0.6	0.5	206.5	1.7	166.5	170.5	193.5	1	208	4.7	1.23
—	—	—	—	—	—	—	—	—	169	176	211	2	—	—	2.71
—	—	—	—	—	—	—	—	—	168	—	232	1.5	—	—	4.2
—	—	—	—	—	—	—	—	—	171	181.5	229	2	—	—	5.15
—	—	—	—	—	—	—	—	—	173	202	277	2.5	—	—	12.8
—	—	—	—	—	—	—	—	—	176	215.5	324	3	—	—	26.2

Single-Row Deep Groove Ball Bearings

Bore Diameter 170 – 240 mm



Boundary Dimensions (mm)				Basic Load Ratings (N)		Factor	Limiting Speeds (min ⁻¹)			Bearing Numbers			
d	D	B	r min.	C _r	C _{0r}	f ₀	Grease		Oil				
							Open Z · ZZ V · VV	DU DDU	Open Z	Open	Shielded	Sealed	
170	215	22	1.1	60 000	75 000	17.1	2 600	1 600	3 000	6834	ZZS	VV	DDU
	230	28	2	86 000	97 000	16.7	2 400	—	2 800	6934	ZZS	—	—
	260	28	1.5	114 000	126 000	16.5	2 200	—	2 600	16034	—	—	—
	260	42	2.1	161 000	161 000	15.8	2 200	—	2 600	6034	ZZS	VV	—
	310	52	4	212 000	224 000	15.3	1 800	—	2 200	6234	ZZS	—	—
	360	72	4	325 000	355 000	13.6	1 600	—	2 000	6334	—	—	—
180	225	22	1.1	60 500	78 500	17.2	2 400	—	2 800	6836	—	VV	—
	250	33	2	119 000	128 000	16.4	2 200	—	2 600	6936	ZZS	—	—
	280	31	2	145 000	157 000	16.3	2 000	—	2 400	16036	—	—	—
	280	46	2.1	180 000	185 000	15.6	2 000	—	2 400	6036	ZZS	VV	—
	320	52	4	227 000	241 000	15.1	1 700	—	2 000	6236	ZZS	—	—
	380	75	4	355 000	405 000	13.9	1 500	—	1 800	6336	—	—	—
190	240	24	1.5	73 000	93 500	17.1	2 200	—	2 600	6838	—	VV	—
	260	33	2	113 000	127 000	16.6	2 200	—	2 600	6938	—	—	—
	290	31	2	149 000	168 000	16.4	2 000	—	2 400	16038	—	—	—
	290	46	2.1	188 000	201 000	15.8	2 000	—	2 400	6038	ZZS	—	—
	340	55	4	255 000	282 000	15.0	1 600	—	2 000	6238	ZZS	—	—
	400	78	5	355 000	415 000	14.1	1 400	—	1 700	6338	—	—	—
200	250	24	1.5	74 000	98 000	17.2	2 200	—	2 600	6840	—	—	—
	280	38	2.1	143 000	158 000	16.4	2 000	—	2 400	6940	ZZS	—	—
	310	34	2	161 000	180 000	16.4	1 900	—	2 200	16040	—	—	—
	310	51	2.1	207 000	226 000	15.6	1 900	—	2 200	6040	ZZS	—	—
	360	58	4	269 000	310 000	15.2	1 500	—	1 800	6240	ZZS	—	—
	420	80	5	380 000	445 000	13.8	1 300	—	1 600	6340	—	—	—
220	270	24	1.5	76 500	107 000	17.4	1 900	—	2 400	6844	ZZS	—	—
	300	38	2.1	146 000	169 000	16.6	1 800	—	2 200	6944	ZZS	—	—
	340	37	2.1	180 000	217 000	16.5	1 600	—	2 000	16044	—	—	—
	340	56	3	235 000	271 000	15.6	1 700	—	2 000	6044	ZZS	—	—
	400	65	4	310 000	375 000	15.1	1 300	—	1 600	6244	—	—	—
	460	88	5	410 000	520 000	14.3	1 200	—	1 500	6344	—	—	—
240	300	28	2	98 500	137 000	17.3	1 700	—	2 000	6848	—	—	—
	320	38	2.1	154 000	190 000	16.8	1 700	—	2 000	6948	ZZS	—	—
	360	37	2.1	196 000	243 000	16.5	1 500	—	1 900	16048	—	—	—
	360	56	3	244 000	296 000	15.9	1 500	—	1 900	6048	—	—	—
	440	72	4	340 000	430 000	15.2	1 200	—	1 500	6248	—	—	—
	500	95	5	470 000	625 000	14.2	1 100	—	1 300	6348	—	—	—



Dynamic Equivalent Load $P = X F_r + Y F_a$

$\frac{F_a F_a}{C_{or}}$	e	$\frac{F_a}{F_r} < e$		$\frac{F_a}{F_r} > e$	
		X	Y	X	Y
0.172	0.19	1	0	0.56	2.30
0.345	0.22	1	0	0.56	1.99
0.689	0.26	1	0	0.56	1.71
1.03	0.28	1	0	0.56	1.55
1.38	0.30	1	0	0.56	1.45
2.07	0.34	1	0	0.56	1.31
3.45	0.38	1	0	0.56	1.15
5.17	0.42	1	0	0.56	1.04
6.89	0.44	1	0	0.56	1.00

Static Equivalent Load

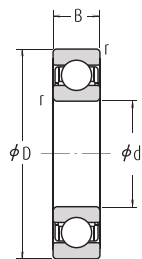
$$\frac{F_a}{F_r} > 0.8, P_0 = 0.6 F_r + 0.5 F_a$$

$$\frac{F_a}{F_r} \leq 0.8, P_0 = F_r$$

Abutment and Fillet Dimensions (mm)				Mass (kg)
min.	d_a (l) max.	D_a (l) max.	r_a max.	approx.
176.5	182.0	208.5	1	1.86
179	186.0	221	2	3.34
178	—	252	1.5	5.71
181	194.5	249	2	6.89
186	215.0	294	3	15.8
186	—	344	3	36.6
186.5	192.0	218.5	1	1.98
189	198.5	241	2	4.16
189	—	271	2	7.5
191	208.0	269	2	8.88
196	223.0	304	3	15.9
196	—	364	3	43.1
198	202.5	232	1.5	2.53
199	—	251	2	5.18
199	—	281	2	7.78
201	218.0	279	2	9.39
206	236.0	324	3	22.3
210	—	380	4	49.7
208	—	242	1.5	2.67
211	222.0	269	2	7.28
209	—	301	2	10
211	231.5	299	2	12
216	252.0	344	3	26.7
220	—	400	4	55.3
228	233.5	262	1.5	2.9
231	242.0	289	2	7.88
231	—	329	2	13.1
233	254.5	327	2.5	18.6
236	—	384	3	37.4
240	—	440	4	73.9
249	—	291	2	4.48
251	262.0	309	2	8.49
251	—	349	2	13.9
253	—	347	2.5	19.9
256	—	424	3	50.5
260	—	480	4	94.4

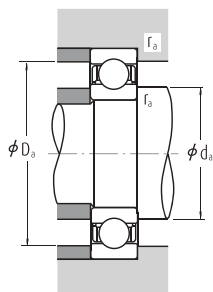
Single-Row Deep Groove Ball Bearings

Bore Diameter 260 – 360 mm



Open Type

Boundary Dimensions (mm)				Basic Load Ratings (N)		Factor	Limiting Speeds (min ⁻¹)		Bearing Numbers
d	D	B	r min.	C _r	C _{0r}	f ₀	Grease	Oil	Open
260	320	28	2	101 000	148 000	17.4	1 600	1 900	6852
	360	46	2.1	204 000	255 000	16.5	1 500	1 800	6952
	400	44	3	237 000	310 000	16.4	1 400	1 700	16052
	400	65	4	291 000	375 000	15.8	1 400	1 700	6052
	480	80	5	400 000	540 000	15.1	1 100	1 300	6252
280	540	102	6	505 000	710 000	14.6	1 000	1 200	6352
	350	33	2	133 000	191 000	17.3	1 500	1 700	6856
	380	46	2.1	209 000	272 000	16.6	1 400	1 700	6956
	420	44	3	243 000	330 000	16.5	1 300	1 600	16056
	420	65	4	300 000	410 000	16.0	1 300	1 600	6056
300	500	80	5	400 000	550 000	15.2	1 000	1 300	6256
	580	108	6	570 000	840 000	14.5	900	1 100	6356
	380	38	2.1	166 000	233 000	17.1	1 300	1 600	6860
	420	56	3	269 000	370 000	16.4	1 300	1 500	6960
	460	50	4	285 000	405 000	16.4	1 200	1 400	16060
320	460	74	4	355 000	500 000	15.8	1 200	1 400	6060
	540	85	5	465 000	670 000	15.1	950	1 200	6260
	400	38	2.1	168 000	244 000	17.2	1 300	1 500	6864
	440	56	3	266 000	375 000	16.5	1 200	1 400	6964
	480	50	4	293 000	430 000	16.5	1 100	1 300	16064
340	480	74	4	390 000	570 000	15.7	1 100	1 300	6064
	580	92	5	530 000	805 000	15.0	850	1 100	6264
	420	38	2.1	175 000	265 000	17.3	1 200	1 400	6868
	460	56	3	273 000	400 000	16.6	1 100	1 300	6968
	520	82	5	440 000	660 000	15.6	1 000	1 200	6068
360	620	92	6	530 000	820 000	15.3	800	1 000	6268
	440	38	2.1	192 000	290 000	17.3	1 100	1 300	6872
	480	56	3	280 000	425 000	16.7	1 100	1 300	6972
	540	82	5	460 000	720 000	15.7	950	1 200	6072
	650	95	6	555 000	905 000	15.4	750	950	6272



Dynamic Equivalent Load $P = X F_r + Y F_a$

$\frac{F_a F_a}{C_{or}}$	e	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
		X	Y	X	Y
0.172	0.19	1	0	0.56	2.30
0.345	0.22	1	0	0.56	1.99
0.689	0.26	1	0	0.56	1.71
1.03	0.28	1	0	0.56	1.55
1.38	0.30	1	0	0.56	1.45
2.07	0.34	1	0	0.56	1.31
3.45	0.38	1	0	0.56	1.15
5.17	0.42	1	0	0.56	1.04
6.89	0.44	1	0	0.56	1.00

Static Equivalent Load

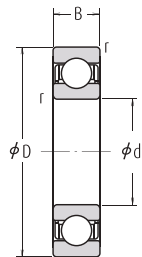
$$\frac{F_a}{F_r} > 0.8, P_0 = 0.6 F_r + 0.5 F_a$$

$$\frac{F_a}{F_r} \leq 0.8, P_0 = F_r$$

Abutment and Fillet Dimensions (mm)			Mass (kg)
d_a ($\varnothing$) min.	D_a ($\varnothing$) max.	r_a max.	approx.
269	311	2	4.84
271	349	2	14
273	387	2.5	21.1
276	384	3	29.4
280	460	4	67
286	514	5	118
289	341	2	7.2
291	369	2	15.1
293	407	2.5	22.7
296	404	3	31.2
300	480	4	70.4
306	554	5	144
311	369	2	10.3
313	407	2.5	23.9
316	444	3	31.5
316	444	3	44.2
320	520	4	87.8
331	389	2	10.8
333	427	2.5	25.3
336	464	3	33.2
336	464	3	46.5
340	560	4	111
351	409	2	11.5
353	447	2.5	26.6
360	500	4	62.3
366	594	5	129
371	429	2	11.8
373	467	2.5	27.9
380	520	4	65.3
386	624	5	145

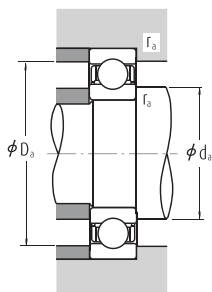
Single-Row Deep Groove Ball Bearings

Bore Diameter 380 – 600 mm



Open Type

Boundary Dimensions (mm)				Basic Load Ratings (N)		Factor	Limiting Speeds (min ⁻¹)		Bearing Numbers
d	D	B	r min.	C _r	C _{0r}	f ₀	Grease	Oil	Open
380	480	46	2.1	238 000	375 000	17.1	1 000	1 200	6876
	520	65	4	325 000	510 000	16.6	950	1 200	6976
	560	82	5	455 000	725 000	15.9	900	1 100	6076
400	500	46	2.1	241 000	390 000	17.2	950	1 200	6880
	540	65	4	335 000	540 000	16.7	900	1 100	6980
	600	90	5	510 000	825 000	15.7	850	1 000	6080
420	520	46	2.1	245 000	410 000	17.3	900	1 100	6884
	560	65	4	340 000	570 000	16.8	900	1 100	6984
	620	90	5	530 000	895 000	15.8	800	1 000	6084
440	540	46	2.1	248 000	425 000	17.4	900	1 100	6888
	600	74	4	395 000	680 000	16.6	800	1 000	6988
	650	94	6	550 000	965 000	16.0	750	900	6088
460	580	56	3	310 000	550 000	17.1	800	1 000	6892
	620	74	4	405 000	720 000	16.7	800	950	6992
	680	100	6	605 000	1 080 000	15.8	710	850	6092
480	600	56	3	315 000	575 000	17.2	800	950	6896
	650	78	5	450 000	815 000	16.6	750	900	6996
	700	100	6	605 000	1 090 000	15.9	710	850	6096
500	620	56	3	320 000	600 000	17.3	750	900	68/500
	670	78	5	460 000	865 000	16.7	710	850	69/500
	720	100	6	630 000	1 170 000	16.0	670	800	60/500
530	650	56	3	325 000	625 000	17.4	710	850	68/530
	710	82	5	455 000	870 000	16.8	670	800	69/530
	780	112	6	680 000	1 300 000	16.0	600	750	60/530
560	680	56	3	330 000	650 000	17.4	670	800	68/560
	750	85	5	525 000	1 040 000	16.7	600	750	69/560
	820	115	6	735 000	1 500 000	16.2	560	670	60/560
600	730	60	3	355 000	735 000	17.5	600	710	68/600
	800	90	5	550 000	1 160 000	16.9	560	670	69/600
	870	118	6	790 000	1 640 000	16.1	530	630	60/600



Dynamic Equivalent Load $P = X F_r + Y F_a$

$\frac{F_a F_a}{C_{or}}$	e	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
		X	Y	X	Y
0.172	0.19	1	0	0.56	2.30
0.345	0.22	1	0	0.56	1.99
0.689	0.26	1	0	0.56	1.71
1.03	0.28	1	0	0.56	1.55
1.38	0.30	1	0	0.56	1.45
2.07	0.34	1	0	0.56	1.31
3.45	0.38	1	0	0.56	1.15
5.17	0.42	1	0	0.56	1.04
6.89	0.44	1	0	0.56	1.00

Static Equivalent Load

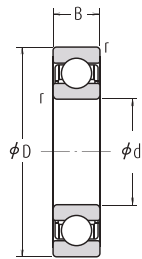
$$\frac{F_a}{F_r} > 0.8, P_0 = 0.6 F_r + 0.5 F_a$$

$$\frac{F_a}{F_r} \leq 0.8, P_0 = F_r$$

Abutment and Fillet Dimensions (mm)			Mass (kg)
d_a ($\varnothing$) min.	D_a ($\varnothing$) max.	r_a max.	approx.
391	469	2	19.5
396	504	3	40
400	540	4	68
411	489	2	20.5
416	524	3	42
420	580	4	88.4
431	509	2	21.4
436	544	3	43.6
440	600	4	92.2
451	529	2	22.3
456	584	3	60.2
466	624	5	106
473	567	2.5	34.3
476	604	3	62.6
486	654	5	123
493	587	2.5	35.4
500	630	4	73.5
506	674	5	127
513	607	2.5	37.2
520	650	4	82
526	694	5	131
543	637	2.5	39.8
550	690	4	89.8
556	754	5	184
573	667	2.5	41.5
580	730	4	105
586	793.5	5	203
613	717	2.5	50.9
620	780	4	120
626	844	5	236

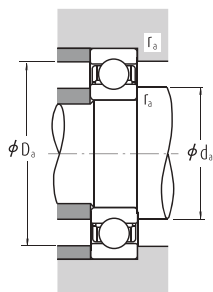
Single-Row Deep Groove Ball Bearings

Bore Diameter 630 – 800 mm



Open Type

Boundary Dimensions (mm)				Basic Load Ratings (N)		Factor	Limiting Speeds (min ⁻¹)		Bearing Numbers
d	D	B	r min.	C _r	C _{0r}	f ₀	Grease	Oil	Open
630	780	69	4	420 000	890 000	17.3	560	670	68/630
	850	100	6	625 000	1 350 000	16.7	530	630	69/630
	920	128	7.5	750 000	1 620 000	16.4	480	600	60/630
670	820	69	4	435 000	965 000	17.4	500	630	68/670
	900	103	6	675 000	1 460 000	16.7	480	560	69/670
	980	136	7.5	765 000	1 730 000	16.6	450	530	60/670
710	870	74	4	480 000	1 100 000	17.4	480	560	68/710
	950	106	6	715 000	1 640 000	16.8	450	530	69/710
750	920	78	5	525 000	1 260 000	17.4	430	530	68/750
	1 000	112	6	785 000	1 840 000	16.7	400	500	69/750
800	980	82	5	530 000	1 310 000	17.5	400	480	68/800
	1 060	115	6	825 000	2 050 000	16.8	380	450	69/800



Dynamic Equivalent Load $P = X F_r + Y F_a$

$\frac{F_a F_a}{C_{or}}$	e	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
		X	Y	X	Y
0.172	0.19	1	0	0.56	2.30
0.345	0.22	1	0	0.56	1.99
0.689	0.26	1	0	0.56	1.71
1.03	0.28	1	0	0.56	1.55
1.38	0.30	1	0	0.56	1.45
2.07	0.34	1	0	0.56	1.31
3.45	0.38	1	0	0.56	1.15
5.17	0.42	1	0	0.56	1.04
6.89	0.44	1	0	0.56	1.00

Static Equivalent Load

$$\frac{F_a}{F_r} > 0.8, P_0 = 0.6 F_r + 0.5 F_a$$

$$\frac{F_a}{F_r} \leq 0.8, P_0 = F_r$$

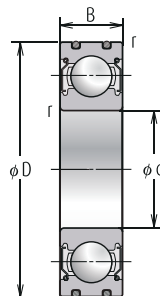
Abutment and Fillet Dimensions (mm)			Mass (kg)
d_a (ϕ) min.	D_o (ϕ) max.	r_a max.	approx.
646	764	3	71.3
656	824	5	163
662	888	6	285
686	804	3	75.4
696	874	5	181
702	948	6	351
726	854	3	92.6
736	924	5	208
770	900	4	110
776	974	5	245
820	960	4	132
826	1034	5	275

Creep-Free Bearings

Bore Diameter 10 – 100 mm

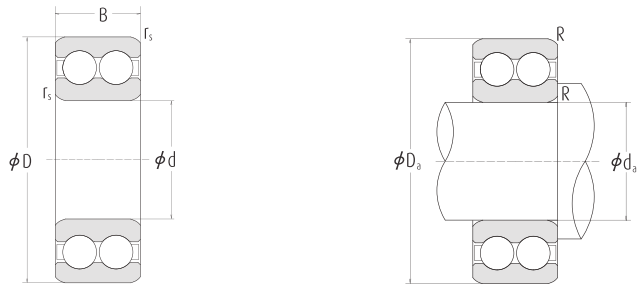
Bearing bore diameter d (mm)	Bearing outer diameter D (mm)	Bearing width B (mm)	Basic load ratings		Recommended fits (1)
			Cr(N)	Ca(N)	
10	26	8	4 550	1 970	H7 or G6
	30	9	5 100	2 390	
	35	11	8 100	3 450	
12	28	8	5 100	2 370	
	32	10	6 800	3 050	
	37	12	9 700	4 200	
15	32	9	5 600	2 830	
	35	11	7 650	3 750	
	42	13	11 400	5 450	
17	35	10	6 000	3 250	
	40	12	9 550	4 800	
	47	14	13 600	6 650	
20	42	12	9 400	5 000	
	47	14	12 800	6 600	
	52	15	15 900	7 900	
25	47	12	10 100	5 850	
	52	15	14 000	7 850	
	62	17	20 600	11 200	
30	55	13	13 200	8 300	
	62	16	19 500	11 300	
	72	19	26 700	15 000	
35	62	14	16 000	10 300	
	72	17	25 700	15 300	
	80	21	33 500	19 200	
40	68	15	16 800	11 500	
	80	18	29 100	17 900	
	90	23	40 500	24 000	
45	75	16	20 900	15 200	
	85	19	31 500	20 400	
	100	25	53 000	32 000	
50	80	16	21 800	16 600	
	90	20	35 000	23 200	
	110	27	62 000	38 500	
55	90	18	28 300	21 200	
	100	21	43 500	29 300	
	120	29	71 500	44 500	
60	95	18	29 500	23 200	
	110	22	52 500	36 000	
	130	31	82 000	52 000	
65	100	18	30 500	25 200	
	120	23	57 500	40 000	
	140	33	92 500	60 000	
70	110	20	38 000	31 000	
	125	24	62 000	44 000	
	150	35	104 000	68 000	
75	115	20	39 500	33 500	
	130	25	66 000	49 500	
80	125	22	47 500	40 000	
	140	26	72 500	53 000	
85	130	22	49 500	43 000	
	150	28	84 000	62 000	
90	140	24	58 000	50 000	
95	145	24	60 500	54 000	
100	150	24	60 000	54 000	

Bearing number			
Basic number(Open type)	Shield type	Contact seal type (2)	Non-contact seal type
6000 6200 6300	ZZ	DDU	VV
6001 6201 6301	ZZ	DDU	VV
6002 6202 6302	ZZ	DDU	VV
6003 6203 6303	ZZ	DDU	VV
6004 6204 6304	ZZ	DDU	VV
6005 6205 6305	ZZ	DDU	VV
6006 6206 6306	ZZ	DDU	VV
6007 6207 6307	ZZ	DDU	VV
6008 6208 6308	ZZ	DDU	VV
6009 6209 6309	ZZ	DDU	VV
6010 6210 6310	ZZ	DDU	VV
6011 6211 6311	ZZ	DDU	VV
6012 6212 6312	ZZ	DDU	VV
6013 6213 6313	ZZ	DDU	VV
6014 6214 6314	ZZ	DDU	VV
6015 6215	ZZ	DDU	VV
6016 6216	ZZ	DDU	VV
6017 6217	ZZ	DDU	VV
6018	ZZ	DDU	VV
6019	ZZ	DDU	VV
6020	ZZ	DDU	VV



Deep Groove Ball Bearings

Double Row | Bore 10 - 90 mm

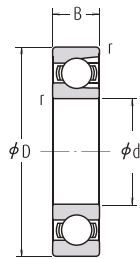


Dimensions				Abbreviation	Load ratings	
d	D	B	r _s min		dyn. C	stat. C ₀
mm					kN	
10	30	14	0.6	4200BTNG	9.15	5.2
12	32	14	0.6	4201BTNG	9.30	5.5
15	35	14	0.6	4202BTNG	10.4	6.7
	42	17	1.0	4302BTNG	14.6	9.2
17	40	16	0.6	4203BTNG	14.6	9.5
	47	19	1.0	4303BTNG	19.6	13.2
20	47	18	1.0	4204BTNG	18.0	12.7
	52	21	1.1	4304BTNG	23.2	16.0
25	52	18	1.0	4205BTNG	19.3	14.6
	62	24	1.1	4305BTNG	31.5	22.4
30	62	20	1.0	4206BTNG	26.0	20.8
	72	27	1.1	4306BTNG	40.0	30.5
35	72	23	1.1	4207BTNG	32.0	26.0
	80	31	1.5	4307BTNG	51.0	38.0
40	80	23	1.1	4208BTNG	34.0	30.0
	90	33	1.5	4308BTNG	63.0	48.0
45	85	23	1.1	4209BTNG	36.0	33.5
	100	36	1.5	4309BTNG	72.0	60.0
50	90	23	1.1	4210BTNG	37.5	36.5
	110	40	2.0	4310BTNG	90.0	75.0
55	100	25	1.5	4211BTNG	43.0	43.0
	120	43	2.0	4311BTNG	104.0	90.0
60	110	28	1.5	4212BTNG	57.0	58.5
	130	46	2.1	4312BTNG	120.0	106.0
65	120	31	1.5	4213BTNG	67.0	67.0
	140	48	2.1	4313BTNG	129.0	98.0
70	125	31	1.5	4214BTNG	69.5	73.5
	150	51	2.1	4314BTNG	146.0	114.0
75	130	31	1.5	4215BTNG	73.5	80.0
	160	55	2.1	4315BTNG	170.0	134.0
80	140	33	2.0	4216BTNG	80.0	90.0
85	150	36	2.0	4217BTNG	93.0	106.0
90	160	40	2.0	4218BTNG	112.0	122.0

Speed limits		Abutment dimensions			Weight
Grease	Oil	d _a min	D _a max	R min	kg
min ⁻¹					
18 000	24 000	14.0	26.0	0.6	0.049
16 000	20 000	16.0	28.0	0.6	0.053
14 000	18 000	19.0	31.0	0.6	0.059
13 000	17 000	20.0	37.0	1.0	0.120
13 000	18 000	21.0	36.0	1.0	0.090
11 000	17 000	22.0	42.0	1.0	0.160
10 000	14 000	25.0	42.0	1.0	0.140
9 500	13 000	26.5	45.5	1.0	0.210
9 000	12 000	30.0	47.0	1.0	0.160
8 000	10 000	31.5	55.5	1.0	0.340
7 500	9 500	35.0	57.0	1.0	0.260
6 700	8 500	36.5	65.5	1.0	0.500
6 700	8 500	41.5	65.5	1.0	0.400
6 300	8 000	43.0	72.0	1.5	0.690
6 000	7 500	46.5	73.5	1.0	0.500
5 600	7 000	48.0	82.0	1.5	0.950
5 600	7 000	51.5	78.5	1.0	0.540
4 800	6 000	53.0	92.0	1.5	1.250
5 000	6 300	56.5	83.5	1.0	0.580
4 300	5 300	59.0	101.0	2.0	1.700
4 500	5 600	63.0	92.0	1.5	0.800
4 000	5 000	64.0	111.0	2.0	2.150
4 000	5 000	68.0	102.0	1.5	1.100
3 600	4 500	71.0	119.0	2.0	2.650
3 800	4 800	73.0	112.0	1.5	1.450
3 600	4 500	76.0	129.0	2.0	3.250
3 600	4 500	78.0	117.0	1.5	1.500
3 200	4 000	81.0	139.0	2.0	3.950
3 400	4 300	83.0	122.0	1.5	1.600
3 000	3 800	86.0	149.0	2.0	5.380
3 200	4 000	89.0	131.0	2.0	2.000
3 000	3 800	94.0	141.0	2.0	2.550
2 800	3 600	99.0	151.0	2.0	3.200

Maximum Type Ball Bearings

Bore Diameter 25 – 110 mm



Open Type

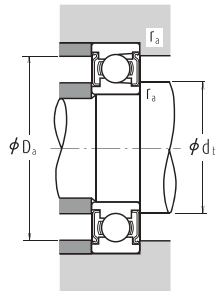
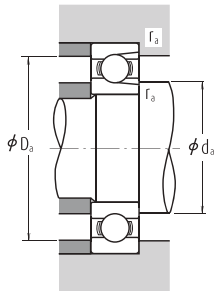


Shielded Type
(One Shield) Z



Shielded Type
(Two Shields) ZZ

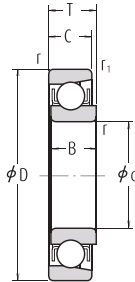
Boundary Dimensions (mm)				Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		
d	D	B	r min.	C _r	C _{0r}	Grease Open Z · ZZ	Oil Open Z	
25	52	15	1	14 400	10 500	12 000	15 000	BL 205
	62	17	1.1	21 500	15 500	11 000	13 000	BL 305
30	62	16	1	21 000	16 300	10 000	12 000	BL 206
	72	19	1.1	27 900	20 700	9 000	11 000	BL 306
35	72	17	1.1	27 800	22 100	9 000	11 000	BL 207
	80	21	1.5	37 000	29 100	8 000	9 500	BL 307
40	80	18	1.1	35 500	28 800	8 000	9 500	BL 208
	90	23	1.5	46 500	36 000	7 500	9 000	BL 308
45	85	19	1.1	37 000	32 000	7 500	9 000	BL 209
	100	25	1.5	55 500	44 000	6 300	8 000	BL 309
50	90	20	1.1	39 000	35 000	6 700	8 500	BL 210
	110	27	2	65 000	52 500	6 000	7 100	BL 310
55	100	21	1.5	48 000	44 000	6 300	7 500	BL 211
	120	29	2	75 000	61 500	5 600	6 700	BL 311
60	110	22	1.5	58 000	54 000	5 600	6 700	BL 212
	130	31	2.1	85 500	71 500	5 000	6 000	BL 312
65	120	23	1.5	63 500	60 000	5 300	6 300	BL 213
	140	33	2.1	103 000	89 500	4 800	5 600	BL 313
70	125	24	1.5	69 000	66 000	5 000	6 000	BL 214
	150	35	2.1	115 000	102 000	4 300	5 300	BL 314
75	130	25	1.5	72 000	72 000	4 500	5 600	BL 215
	160	37	2.1	126 000	116 000	4 000	5 000	BL 315
80	140	26	2	84 000	85 000	4 300	5 300	BL 216
	170	39	2.1	136 000	130 000	3 800	4 500	BL 316
85	150	28	2	93 000	93 000	4 000	5 000	BL 217
	180	41	3	147 000	145 000	3 600	4 300	BL 317
90	160	30	2	107 000	107 000	3 800	4 500	BL 218
	190	43	3	158 000	161 000	3 400	4 000	BL 318
95	170	32	2.1	121 000	123 000	3 600	4 300	BL 219
	200	45	3	169 000	178 000	2 800	3 600	BL 319
100	180	34	2.1	136 000	140 000	3 400	4 000	BL 220
105	190	36	2.1	148 000	157 000	3 200	3 800	BL 221
110	200	38	2.1	160 000	176 000	2 800	3 400	BL 222



Bearing Numbers		Abutment and Fillet Dimensions (mm)				Mass (kg)
With One Shielded	With Two Shields	d_a min.	d_b max.	D_a max.	r_a max.	approx.
BL 205 Z	BL 205 ZZ	30	32	47	1	0.133
BL 305 Z	BL 305 ZZ	31.5	36	55.5	1	0.246
BL 206 Z	BL 206 ZZ	35	38.5	57	1	0.215
BL 306 Z	BL 306 ZZ	36.5	42	65.5	1	0.364
BL 207 Z	BL 207 ZZ	41.5	44.5	65.5	1	0.307
BL 307 Z	BL 307 ZZ	43	44.5	72	1.5	0.486
BL 208 Z	BL 208 ZZ	46.5	50	73.5	1	0.394
BL 308 Z	BL 308 ZZ	48	52.5	82	1.5	0.685
BL 209 Z	BL 209 ZZ	51.5	55.5	78.5	1	0.449
BL 309 Z	BL 309 ZZ	53	61.5	92	1.5	0.883
BL 210 Z	BL 210 ZZ	56.5	60	83.5	1	0.504
BL 310 Z	BL 310 ZZ	59	68	101	2	1.16
BL 211 Z	BL 211 ZZ	63	66.5	92	1.5	0.667
BL 311 Z	BL 311 ZZ	64	72.5	111	2	1.49
BL 212 Z	BL 212 ZZ	68	74.5	102	1.5	0.856
BL 312 Z	BL 312 ZZ	71	79	119	2	1.88
BL 213 Z	BL 213 ZZ	73	80	112	1.5	1.09
BL 313 Z	BL 313 ZZ	76	85.5	129	2	2.36
BL 214 Z	BL 214 ZZ	78	84	117	1.5	1.19
BL 314 Z	BL 314 ZZ	81	92	139	2	2.87
BL 215 Z	BL 215 ZZ	83	90	122	1.5	1.29
BL 315 Z	BL 315 ZZ	86	98.5	149	2	3.43
BL 216 Z	BL 216 ZZ	89	95.5	131	2	1.61
BL 316 Z	BL 316 ZZ	91	104.5	159	2	4.08
BL 217 Z	BL 217 ZZ	94	102	141	2	1.97
BL 317 Z	BL 317 ZZ	98	110.5	167	2.5	4.77
BL 218 Z	BL 218 ZZ	99	107.5	151	2	2.43
BL 318 Z	BL 318 ZZ	103	117	177	2.5	5.45
BL 219 Z	BL 219 ZZ	106	114	159	2	2.95
BL 319 Z	BL 319 ZZ	108	124	187	2.5	6.4
BL 220 Z	BL 220 ZZ	111	121.5	169	2	3.54
BL 221 Z	BL 221 ZZ	116	127.5	179	2	4.23
—	—	121	—	189	2	4.84

Magneto Bearings

Bore Diameter 4 – 20 mm



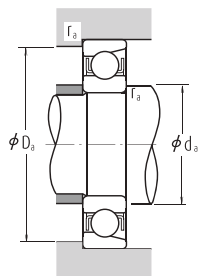
Outside Diameter Tolerance (Class N) Units: µm

Nominal Outside Diameter D (mm)		Single Plane Mean Outside Diameter ΔD_{mp}			
		E Series		EN Series	
Over	Incl.	High	Low	High	Low
—	10	+8	0	0	-8
10	18	+8	0	0	-8
18	30	+9	0	0	-9
30	50	+11	0	0	-11

Boundary Dimensions (mm)					Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		Bearing Numbers	
d	D	B, C, T	r min.	r ₁ min.	C _r	C _{0r}	Grease	Oil	E Series	EN Series
4	16	5	0.15	0.1	1 650	288	34 000	40 000	E 4	EN 4
5	16	5	0.15	0.1	1 650	288	34 000	40 000	E 5	EN 5
6	21	7	0.3	0.15	2 490	445	30 000	36 000	E 6	EN 6
7	22	7	0.3	0.15	2 490	445	30 000	36 000	E 7	EN 7
8	24	7	0.3	0.15	3 450	650	28 000	34 000	E 8	EN 8
9	28	8	0.3	0.15	4 550	880	24 000	30 000	E 9	EN 9
10	28	8	0.3	0.15	4 550	880	24 000	30 000	E 10	EN 10
11	32	7	0.3	0.15	4 400	845	22 000	26 000	E 11	EN 11
12	32	7	0.3	0.15	4 400	845	22 000	26 000	E 12	EN 12
13	30	7	0.3	0.15	4 400	845	22 000	26 000	E 13	EN 13
14	35	8	0.3	0.15	5 800	1 150	19 000	22 000	—	EN 14
15	35	8	0.3	0.15	5 800	1 150	19 000	22 000	E 15	EN 15
16	40	10	0.6	0.3	7 400	1 500	17 000	20 000	BO 15	—
17	38	10	0.6	0.2	6 900	1 380	17 000	22 000	—	EN 16
18	40	10	0.6	0.3	7 400	1 500	17 000	20 000	L 17	—
19	44	11	0.6	0.3	7 350	1 500	16 000	19 000	—	EN 17
20	44	11	0.6	0.3	7 350	1 500	16 000	19 000	BO 17	—
18	40	9	0.6	0.2	5 050	1 030	17 000	20 000	—	EN 18
19	40	9	0.6	0.2	5 050	1 030	17 000	20 000	E 19	EN 19
20	47	12	1	0.6	11 000	2 380	14 000	17 000	E 20	EN 20
20	47	14	1	0.6	11 000	2 380	14 000	17 000	L 20	—

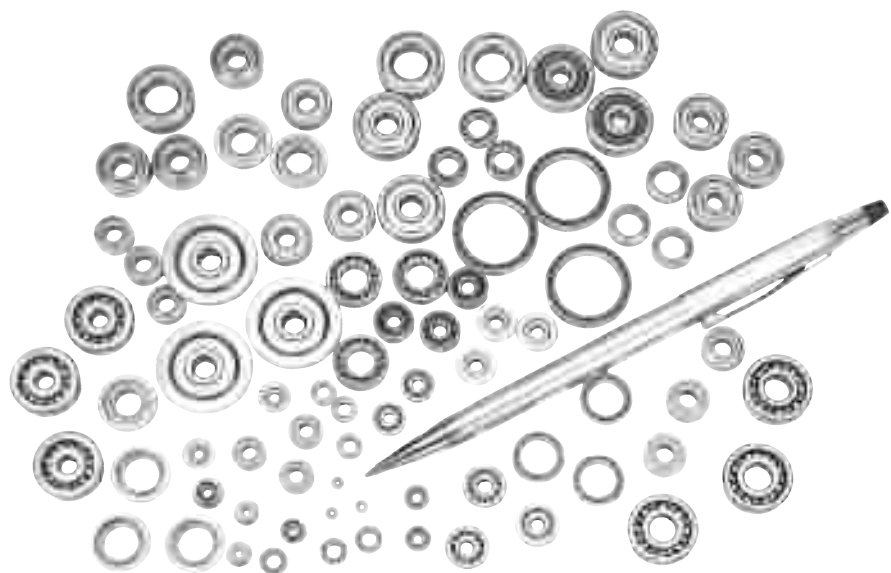
Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$		e
X	Y	X	Y	
1	0	0.5	2.5	0.2



Abutment and Fillet Dimensions (mm)			Mass (kg)
d_a min.	D_a max.	r_a max.	approx.
5.2	14.8	0.15	0.005
6.2	14.8	0.15	0.004
8	19	0.3	0.011
9	20	0.3	0.013
10	22	0.3	0.014
11	26	0.3	0.022
12	26	0.3	0.021
13	30	0.3	0.029
14	30	0.3	0.028
15	28	0.3	0.021
16	33	0.3	0.035
17	33	0.3	0.034
19	36	0.6	0.055
20	34	0.6	0.049
21	36	0.6	0.051
21	40	0.6	0.080
21	40	0.6	0.080
22	36	0.6	0.051
23	36	0.6	0.049
25	42	1	0.089
25	42	1	0.101





Extra Small Ball Bearings and Miniature Ball Bearings

DESIGN AND TYPES

The size ranges of extra small and miniature ball bearings are shown in Table 1. The design, types, and type symbols are shown in Table 2. Those types among them that are listed in the bearing tables are indicated by the shading in Table 2.

Table 1 Size Ranges of Bearings

Units : mm

Design	Extra Small Ball Bearings	Miniature Ball Bearings
Metric	Outside diameter $D \geq 9$ Bore diameter $d < 10$	Outside diameter $D < 9$
Inch	Outside diameter $D \geq 9.525$ Bore diameter $d < 10$	Outside diameter $D < 9.525$

Please refer to ITJ Miniature Ball Bearings (CAT. No. E126) for details.



ZZ



ZZS



DD



VV

Table 2 Design, Types, and Type Symbols

Design · Types		Type Symbols				Remarks
		Metric	Inch	Special		
				Metric	Inch	
Single-Row Deep Groove Ball Bearings		6 ○ ○	R	MR	—	Shielded · sealed bearings are available.
	 Thin section	—	—	SMT	—	
	 With flange	F6 ○ ○	FR	MF	—	Shielded · sealed bearings are available.
	 Extended inner ring	—	—	—	RW	Shielded bearings are available.
	 With flange and extended inner ring	—	—	—	FRW	Shielded bearings are available.
	 For synchro motors	—	—	—	SR00X00	Shielded bearings are available.
Pivot Ball Bearings		—	—	BCF	—	
Thrust Ball Bearings		—	—	F	—	



Extra Small Ball Bearings and Miniature Ball Bearings

Table 3 Flange Tolerances for Metric Flanged Bearings

(1) Tolerances of Flange Outside Diameter

Units : μm

Nominal Flange Outside Diameter $D_f(\text{mm})$		Deviation of Flange Outside Diameter ΔD_{15}			
		①		②	
over	incl.	high	low	high	low
	10	+220	−36	0	−36
10	18	+270	−43	0	−43
18	30	+330	−52	0	−52

Remark ② is applied when the flange outside diameter is used for positioning.

(2) Flange Width Tolerances and Running Accuracies Related to Flange

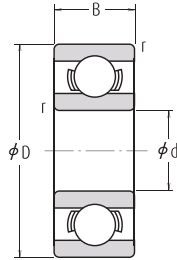
Units : μm

Nominal Bearing Outside Diameter D (mm)		Deviation of Flange Width Δ_{C15}		Variation of Flange Width Δ_{C15} VC ₁₅				Variation of Bearing Outside Surface Generatrix Inclination with Flange Backface S _{D1}			Flange Backface Runout with Raceway S _{Ea1}			
		Normal and Classes 6,5,4,2		Normal and class 6	Class 5	Class 4	Class 2	Class 5	Class 4	Class 2	Class 5	Class 4	Class 2	
over	incl.	high	low	max.				max.			max.			
2.5(1)	6	Use the Δ_{B5} tolerance for d of the same bearing of the same class		Use the Δ_{VB5} tolerance for d of the same bearing of the same class		5	2.5	1.5	8	4	1.5	11	7	3
6	18					5	2.5	1.5	8	4	1.5	11	7	3
18	30					5	2.5	1.5	8	4	1.5	11	7	3

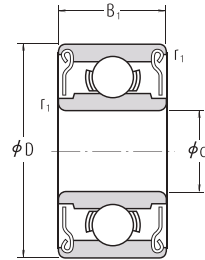


Extra Small Ball Bearings · Miniature Ball Bearings

Metric Design Bore Diameter 1 – 4 mm



Open Type

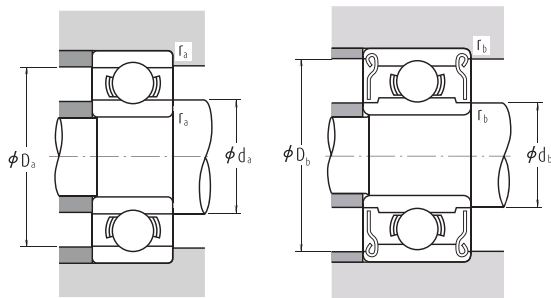


Shielded Type
ZZ · ZZ1

Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		Open
d	D	B	B ₁	r ⁽¹⁾ min.	r ₁ ⁽¹⁾ min.	C _r	C _{0r}	Grease Open Z · ZZ	Oil Open Z	
1	3	1	—	0.05	—	80	23	130 000	150 000	681
	3	1.5	—	0.05	—	80	23	130 000	150 000	MR 31
	4	1.6	—	0.1	—	138	35	100 000	120 000	691
1.2	4	1.8	2.5	0.1	0.1	138	35	110 000	130 000	MR 41 X
1.5	4	1.2	2	0.05	0.05	112	33	100 000	120 000	681 X
	5	2	2.6	0.15	0.15	237	69	85 000	100 000	691 X
	6	2.5	3	0.15	0.15	330	98	75 000	90 000	601 X
2	5	1.5	2.3	0.08	0.08	169	50	85 000	100 000	682
	5	2	2.5	0.1	0.1	187	58	85 000	100 000	MR 52 B
	6	2.3	3	0.15	0.15	330	98	75 000	90 000	692
	6	2.5	2.5	0.15	0.15	330	98	75 000	90 000	MR 62
	7	2.5	3	0.15	0.15	385	127	63 000	75 000	MR 72
	7	2.8	3.5	0.15	0.15	385	127	63 000	75 000	602
2.5	6	1.8	2.6	0.08	0.08	208	74	71 000	80 000	682 X
	7	2.5	3.5	0.15	0.15	385	127	63 000	75 000	692 X
	8	2.5	—	0.2	—	560	179	60 000	67 000	MR 82 X
	8	2.8	4	0.15	0.15	550	175	60 000	71 000	602 X
	6	2	2.5	0.1	0.1	208	74	71 000	80 000	MR 63
	7	2	3	0.1	0.1	390	130	63 000	75 000	683 A
	8	2.5	—	0.15	—	560	179	60 000	67 000	MR 83
	8	3	4	0.15	0.15	560	179	60 000	67 000	693
	9	2.5	4	0.2	0.15	570	187	56 000	67 000	MR 93
	9	3	5	0.15	0.15	570	187	56 000	67 000	603
	10	4	4	0.15	0.15	630	218	50 000	60 000	623
	13	5	5	0.2	0.2	1 300	485	40 000	48 000	633
	7	2	—	0.1	—	310	115	60 000	67 000	MR 74
4	7	—	2.5	—	0.1	255	107	60 000	71 000	—
	8	2	3	0.15	0.1	395	139	56 000	67 000	MR 84
	9	2.5	4	(0.15)	(0.15)	640	225	53 000	63 000	684 A
	10	3	4	0.2	0.15	710	270	50 000	60 000	MR 104 B
	11	4	4	0.15	0.15	960	345	48 000	56 000	694
	12	4	4	0.2	0.2	960	345	48 000	56 000	604
	13	5	5	0.2	0.2	1 300	485	40 000	48 000	624
	16	5	5	0.3	0.3	1 730	670	36 000	43 000	634

Radial and axial load factors

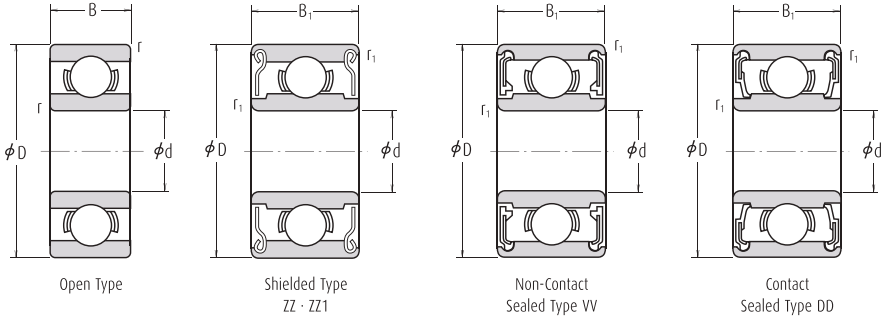
C_{or}/F_a	$F_a/F_r \leq e$		$F_a/F_r > e$		e
	X	Y	X	Y	
5	1	0	0.56	1.26	0.35
10	1	0	0.56	1.49	0.29
15	1	0	0.56	1.64	0.27
20	1	0	0.56	1.76	0.25
25	1	0	0.56	1.85	0.24
30	1	0	0.56	1.92	0.23
50	1	0	0.56	2.13	0.20



Bearing Numbers			Abutment and Fillet Dimensions (mm)						Mass (g)	
Shielded	Sealed		d_a min.	d_b max.	D_a max.	D_b min.	r_a max.	r_b max.	approx.	
									Open	Shielded
—	—	—	1.4	—	2.6	—	0.05	—	0.03	—
—	—	—	1.4	—	2.6	—	0.05	—	0.04	—
—	—	—	1.8	—	3.2	—	0.1	—	0.09	—
MR 41 XZZ	—	—	2.0	1.9	3.2	3.5	0.1	0.1	0.10	0.14
681 XZZ	—	—	1.9	2.1	3.6	3.6	0.05	0.05	0.07	0.11
691 XZZ	—	—	2.7	2.5	3.8	4.3	0.15	0.15	0.17	0.20
601 XZZ	—	—	2.7	3.0	4.8	5.4	0.15	0.15	0.33	0.38
682 ZZ	—	—	2.6	2.7	4.4	4.2	0.08	0.08	0.12	0.17
MR 52 BZZ	—	—	2.8	2.7	4.2	4.4	0.1	0.1	0.16	0.23
692 ZZ	—	—	3.2	3.0	4.8	5.4	0.15	0.15	0.28	0.38
MR 62 ZZ	—	—	3.2	3.0	4.8	5.2	0.15	0.15	0.30	0.29
MR 72 ZZ	—	—	3.2	3.8	5.8	6.2	0.15	0.15	0.45	0.49
602 ZZ	—	—	3.2	3.8	5.8	6.2	0.15	0.15	0.51	0.58
682 XZZ	—	—	3.1	3.7	5.4	5.4	0.08	0.08	0.23	0.29
692 XZZ	—	—	3.7	3.8	5.8	6.2	0.15	0.15	0.41	0.55
—	—	—	4.1	—	6.4	—	0.2	—	0.56	—
602 XZZ	—	—	3.7	4.1	6.8	7.0	0.15	0.15	0.63	0.83
MR 63 ZZ	—	—	3.8	3.7	5.2	5.4	0.1	0.1	0.20	0.27
683 XZZ	—	—	3.8	4.0	6.2	6.4	0.1	0.1	0.32	0.45
—	—	—	4.2	—	6.8	—	0.15	—	0.54	—
693 ZZ	—	—	4.2	4.3	6.8	7.3	0.15	0.15	0.61	0.83
MR 93 ZZ	—	—	4.6	4.3	7.4	7.9	0.2	0.15	0.73	1.18
603 ZZ	—	—	4.2	4.3	7.8	7.9	0.15	0.15	0.87	1.45
623 ZZ	—	—	4.2	4.3	8.8	8.0	0.15	0.15	1.65	1.66
633 ZZ	—	—	4.6	6.0	11.4	11.3	0.2	0.2	3.38	3.33
—	—	—	4.8	—	6.2	—	0.1	—	0.22	—
MR 74 ZZ	—	—	—	4.8	—	6.3	—	0.1	—	0.29
MR 84 ZZ	—	—	5.2	5.0	6.8	7.4	0.15	0.1	0.36	0.56
684 AZZ	—	—	4.8	5.2	8.2	8.1	0.1	0.1	0.63	1.01
MR 104 BZZ	—	—	5.6	5.9	8.4	8.8	0.2	0.15	1.04	1.42
694 ZZ	—	—	5.2	5.6	9.8	9.9	0.15	0.15	1.7	1.75
604 ZZ	—	—	5.6	5.6	10.4	9.9	0.2	0.2	2.25	2.29
624 ZZ	—	—	5.6	6.0	11.4	11.3	0.2	0.2	3.03	3.04
634 ZZ1	—	—	6.0	7.5	14.0	13.8	0.3	0.3	5.24	5.21

Extra Small Ball Bearings · Miniature Ball Bearings

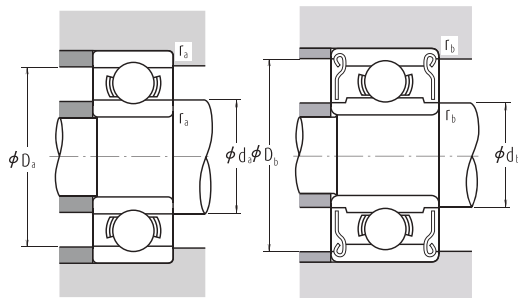
Metric Design Bore Diameter 5 – 9 mm



Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)			
d	D	B	B ₁	r ⁽¹⁾ min.	r ₁ ⁽¹⁾ min.	C _r	C _{0r}	Grease		Oil	
								Open Z · ZZ V · VV	D · DD	Open Z	Open
5	8	2	—	0.1	—	310	120	53 000	—	63 000	MR 85
	8	—	2.5	—	0.1	278	131	53 000	—	63 000	—
	9	2.5	3	0.15	0.15	430	168	50 000	—	60 000	MR 95
	10	3	4	0.15	0.15	430	168	50 000	—	60 000	MR 105
	11	—	4	—	0.15	715	276	48 000	—	56 000	—
	11	3	5	0.15	0.15	715	281	45 000	—	53 000	685
6	13	4	4	0.2	0.2	1 080	430	43 000	40 000	50 000	695
	14	5	5	0.2	0.2	1 330	505	40 000	38 000	50 000	605
	16	5	5	0.3	0.3	1 730	670	36 000	32 000	43 000	625
	19	6	6	0.3	0.3	2 340	885	32 000	30 000	40 000	635
	10	2.5	3	0.15	0.1	495	218	45 000	—	53 000	MR 106
	12	3	4	0.2	0.15	715	292	43 000	40 000	50 000	MR 126
	13	3.5	5	0.15	0.15	1 080	440	40 000	38 000	50 000	686 A
	15	5	5	0.2	0.2	1 730	670	40 000	36 000	45 000	696
	17	6	6	0.3	0.3	2 260	835	38 000	34 000	45 000	606
	19	6	6	0.3	0.3	2 340	885	32 000	30 000	40 000	626
7	22	7	7	0.3	0.3	3 300	1 370	30 000	28 000	36 000	636
	11	2.5	3	0.15	0.1	455	201	43 000	—	50 000	MR 117
	13	3	4	0.2	0.15	540	276	40 000	—	48 000	MR 137
	14	3.5	5	0.15	0.15	1 170	510	40 000	34 000	45 000	687
	17	5	5	0.3	0.3	1 610	710	36 000	28 000	43 000	697
	19	6	6	0.3	0.3	2 340	885	36 000	32 000	43 000	607
8	22	7	7	0.3	0.3	3 300	1 370	30 000	28 000	36 000	627
	26	9	9	0.3	0.3	4 550	1 970	28 000	22 000	34 000	637
	12	2.5	3.5	0.15	0.1	545	274	40 000	—	48 000	MR 128
	14	3.5	4	0.2	0.15	820	385	38 000	32 000	45 000	MR 148
	16	4	5	0.2	0.2	1 610	710	36 000	28 000	43 000	688 A
	19	6	6	0.3	0.3	2 240	910	36 000	28 000	43 000	698
9	22	7	7	0.3	0.3	3 300	1 370	34 000	28 000	40 000	608
	24	8	8	0.3	0.3	3 350	1 430	28 000	24 000	34 000	628
	28	9	9	0.3	0.3	4 550	1 970	28 000	22 000	34 000	638
	17	4	5	0.2	0.2	1 330	665	36 000	24 000	43 000	689
	20	6	6	0.3	0.3	1 720	840	34 000	24 000	40 000	699
	24	7	7	0.3	0.3	3 350	1 430	32 000	24 000	38 000	609
10	26	8	8	(0.6)	(0.6)	4 550	1 970	28 000	22 000	34 000	629
	30	10	10	0.6	0.6	5 100	2 390	24 000	—	30 000	639

Radial and axial load factors

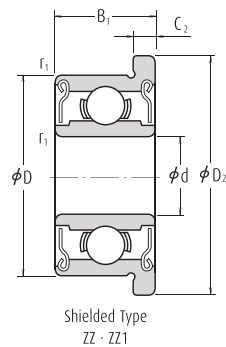
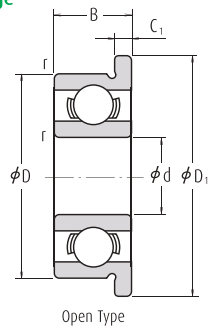
C_{or}/F_a	$F_a/F_r \leq e$		$F_a/F_r > e$		e
	X	Y	X	Y	
5	1	0	0.56	1.26	0.35
10	1	0	0.56	1.49	0.29
15	1	0	0.56	1.64	0.27
20	1	0	0.56	1.76	0.25
25	1	0	0.56	1.85	0.24
30	1	0	0.56	1.92	0.23
50	1	0	0.56	2.13	0.20



Bearing Numbers			Abutment and Fillet Dimensions (mm)						Mass (g)	
Shielded	Sealed		d_a min.	d_b max.	D_a max.	D_b min.	r_a max.	r_b max.	approx. Open	Shielded
—	—	—	5.8	—	7.2	—	0.1	—	0.26	—
MR 85 ZZ	—	—	—	5.8	—	7.4	—	0.1	—	0.34
MR 95 ZZ1	—	—	6.2	6.0	7.8	8.2	0.15	0.15	0.50	0.58
MR 105 ZZ	—	—	6.2	6.0	8.8	8.4	0.15	0.15	0.95	1.29
MR 115 ZZ	VV	—	—	6.3	—	9.8	—	0.15	—	1.49
685 ZZ	—	—	6.2	6.2	9.8	9.9	0.15	0.15	1.2	1.96
695 ZZ	VV	DD	6.6	6.6	11.4	11.2	0.2	0.2	2.45	2.5
605 ZZ	—	DD	6.6	6.9	12.4	12.2	0.2	0.2	3.54	3.48
625 ZZ1	VV	DD	7.0	7.5	14.0	13.8	0.3	0.3	4.95	4.86
635 ZZ1	VV	DD	7.0	8.5	17.0	16.5	0.3	0.3	8.56	8.34
MR 106 ZZ1	—	—	7.2	7.0	8.8	9.3	0.15	0.1	0.56	0.68
MR 126 ZZ	—	DD	7.6	7.2	10.4	10.9	0.2	0.15	1.27	1.74
686 AZZ	VV	DD	7.2	7.4	11.8	11.7	0.15	0.15	1.91	2.69
696 ZZ1	VV	DD	7.6	7.9	13.4	13.3	0.2	0.2	3.88	3.72
606 ZZ	VV	DD	8.0	8.2	15.0	14.8	0.3	0.3	5.97	6.08
626 ZZ1	VV	DD	8.0	8.5	17.0	16.5	0.3	0.3	8.15	7.94
636 ZZ	VV	DD	8.0	10.5	20.0	19.0	0.3	0.3	14	14
MR 117 ZZ	—	—	8.2	8.0	9.8	10.5	0.15	0.1	0.62	0.72
MR 137 ZZ	—	—	8.6	9.0	11.4	11.6	0.2	0.15	1.58	2.02
687 ZZ1	VV	DD	8.2	8.5	12.8	12.7	0.15	0.15	2.13	2.97
697 ZZ1	VV	DD	9.0	10.2	15.0	14.8	0.3	0.3	5.26	5.12
607 ZZ1	VV	DD	9.0	9.1	17.0	16.5	0.3	0.3	7.67	7.51
627 ZZ	VV	DD	9.0	10.5	20.0	19.0	0.3	0.3	12.7	12.9
637 ZZ1	VV	DD	9.0	12.8	24.0	22.8	0.3	0.3	24	25
MR 128 ZZ1	—	—	9.2	9.0	10.8	11.3	0.15	0.1	0.71	0.97
MR 148 ZZ	VV	DD	9.6	9.2	12.4	12.8	0.2	0.15	1.86	2.16
688 AZZ1	VV	DD	9.6	10.2	14.4	14.2	0.2	0.2	3.12	4.02
698 ZZ	VV	DD	10.0	10.0	17.0	16.5	0.3	0.3	7.23	7.18
608 ZZ	VV	DD	10.0	10.5	20.0	19.0	0.3	0.3	12.1	12.2
628 ZZ	VV	DD	10.0	12.0	22.0	20.5	0.3	0.3	17.2	17.4
638 ZZ1	VV	DD	10.0	12.8	26.0	22.8	0.3	0.3	28.3	28.6
689 ZZ1	VV	DD	10.6	11.5	15.4	15.2	0.2	0.2	3.53	4.43
699 ZZ1	VV	DD	11.0	12.0	18.0	17.2	0.3	0.3	8.45	8.33
609 ZZ	VV	DD	11.0	12.0	22.8	20.5	0.3	0.3	14.5	14.7
629 ZZ	VV	DD	11.0	12.8	24.0	22.8	0.3	0.3	19.5	19.3
639 ZZ	VV	—	13.0	16.1	26.0	25.6	0.6	0.6	36.5	36

Extra Small Ball Bearings · Miniature Ball Bearings

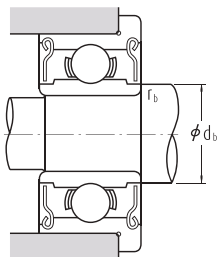
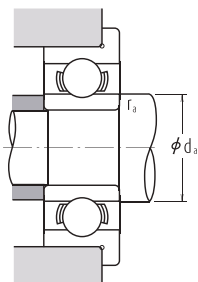
Metric Design With Flange Bore Diameter 1 – 4 mm



Boundary Dimensions (mm)										Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)	
d	D	D ₁	D ₂	B	B ₁	C ₁	C ₂	r ⁽¹⁾ min.	r ₁ ⁽¹⁾ min.	C _r	C _{0r}	Grease Open Z · ZZ	Oil Open Z
1	3	3.8	—	1	—	0.3	—	0.05	—	80	23	130 000	150 000
	4	5	—	1.6	—	0.5	—	0.1	—	140	36	100 000	120 000
1.2	4	4.8	—	1.8	—	0.4	—	0.1	—	138	35	110 000	130 000
1.5	4	5	5	1.2	2	0.4	0.6	0.05	0.05	112	33	100 000	120 000
	5	6.5	6.5	2	2.6	0.6	0.8	0.15	0.15	237	69	85 000	100 000
2	6	7.5	7.5	2.5	3	0.6	0.8	0.15	0.15	330	98	75 000	90 000
	5	6.1	6.1	1.5	2.3	0.5	0.6	0.08	0.08	169	50	85 000	100 000
	5	6.2	6.2	2	2.5	0.6	0.6	0.1	0.1	187	58	85 000	100 000
	6	7.5	7.5	2.3	3	0.6	0.8	0.15	0.15	330	98	75 000	90 000
	6	7.2	—	2.5	—	0.6	—	0.15	—	330	98	75 000	90 000
	7	8.2	8.2	2.5	3	0.6	0.6	0.15	0.15	385	127	63 000	75 000
2.5	7	8.5	8.5	2.8	3.5	0.7	0.9	0.15	0.15	385	127	63 000	75 000
	6	7.1	7.1	1.8	2.6	0.5	0.8	0.08	0.08	208	74	71 000	80 000
	7	8.5	8.5	2.5	3.5	0.7	0.9	0.15	0.15	385	127	63 000	75 000
	8	9.2	—	2.5	—	0.6	—	0.2	—	560	179	60 000	67 000
	8	9.5	9.5	2.8	4	0.7	0.9	0.15	0.15	550	175	60 000	71 000
	6	7.2	7.2	2	2.5	0.6	0.6	0.1	0.1	208	74	71 000	80 000
3	7	8.1	8.1	2	3	0.5	0.8	0.1	0.1	390	130	63 000	75 000
	8	9.2	—	2.5	—	0.6	—	0.15	—	560	179	60 000	67 000
	8	9.5	9.5	3	4	0.7	0.9	0.15	0.15	560	179	60 000	67 000
	9	10.2	10.6	2.5	4	0.6	0.8	0.2	0.15	570	187	56 000	67 000
	9	10.5	10.5	3	5	0.7	1	0.15	0.15	570	187	56 000	67 000
	10	11.5	11.5	4	4	1	1	0.15	0.15	630	218	50 000	60 000
4	13	15	15	5	5	1	1	0.2	0.2	1 300	485	36 000	43 000
	7	8.2	—	2	—	0.6	—	0.1	—	310	115	60 000	67 000
	8	9.2	9.2	2	3	0.6	0.6	0.15	0.1	255	107	60 000	71 000
	9	10.3	10.3	2.5	4	0.6	1	(0.15)	(0.15)	395	139	56 000	67 000
	10	11.2	11.6	3	4	0.6	0.8	0.2	0.15	640	225	53 000	63 000
	11	12.5	12.5	4	4	1	1	0.15	0.15	710	270	50 000	60 000
11	12.5	12.5	4	4	1	1	1	0.2	0.2	960	345	48 000	56 000
	12	13.5	13.5	4	4	1	1	0.2	0.2	960	345	48 000	56 000
	13	15	15	5	5	1	1	0.2	0.2	1 300	485	40 000	48 000
	16	18	18	5	5	1	1	0.3	0.3	1 730	670	36 000	43 000

Radial and axial load factors

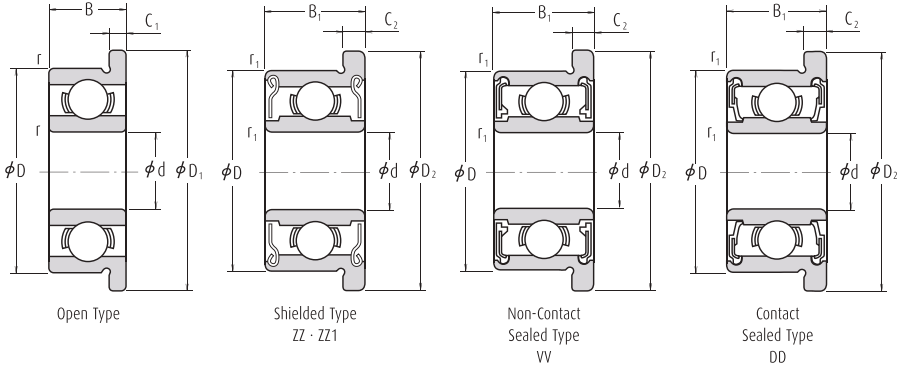
C_{or}/F_a	$F_a/F_r \leq e$		$F_a/F_r > e$		e
	X	Y	X	Y	
5	1	0	0.56	1.26	0.35
10	1	0	0.56	1.49	0.29
15	1	0	0.56	1.64	0.27
20	1	0	0.56	1.76	0.25
25	1	0	0.56	1.85	0.24
30	1	0	0.56	1.92	0.23
50	1	0	0.56	2.13	0.20



Bearing Numbers			Abutment and Fillet Dimensions (mm)				Mass (g)	
Open	Shielded	Sealed	d_a min.	d_b max.	r_a max.	r_b max.	approx.	
F 681	—	—	1.4	—	0.05	—	0.04	—
F 691	—	—	1.8	—	0.1	—	0.14	—
MF 41 X	—	—	2.0	—	0.1	—	0.12	—
F 681 X	F 681 XZZ	—	1.9	2.1	0.05	0.05	0.09	0.14
F 691 X	F 691 XZZ	—	2.7	2.5	0.15	0.15	0.23	0.28
F 601 X	F 601 XZZ	—	2.7	3.0	0.15	0.15	0.42	0.52
F 682	F 682 ZZ	—	2.6	2.7	0.08	0.08	0.16	0.22
MF 52 B	MF 52 BZZ	—	2.8	2.7	0.1	0.1	0.21	0.27
F 692	F 692 ZZ	—	3.2	3.0	0.15	0.15	0.35	0.48
MF 62	—	—	3.2	—	0.15	—	0.36	—
MF 72	MF 72 ZZ	—	3.2	3.8	0.15	0.15	0.52	0.56
F 602	F 602 ZZ	—	3.2	3.1	0.15	0.15	0.60	0.71
F 682 X	F 682 XZZ	—	3.1	3.7	0.08	0.08	0.25	0.36
F 692 X	F 692 XZZ	—	3.7	3.8	0.15	0.15	0.51	0.68
MF 82 X	—	—	4.1	—	0.2	—	0.62	—
F 602 X	F 602 XZZ	—	3.7	3.5	0.15	0.15	0.74	0.98
MF 63	MF 63 ZZ	—	3.8	3.7	0.1	0.1	0.27	0.33
F 683 A	F 683 AZZ	—	3.8	4.0	0.1	0.1	0.37	0.53
MF 83	—	—	4.2	—	0.15	—	0.56	—
F 693	F 693 ZZ	—	4.2	4.3	0.15	0.15	0.70	0.97
MF 93	MF 93 ZZ	—	4.6	4.3	0.2	0.15	0.81	1.34
F 603	F 603 ZZ	—	4.2	4.3	0.15	0.15	1.0	1.63
F 623	F 623 ZZ	—	4.2	4.3	0.15	0.15	1.85	1.86
F 633	F 633 ZZ	—	4.6	6.0	0.2	0.2	3.73	3.59
MF 74	—	—	4.8	—	0.1	—	0.29	—
—	MF 74 ZZ	—	—	4.8	—	0.1	—	0.35
MF 84	MF 84 ZZ	—	5.2	5.0	0.15	0.1	0.44	0.63
F 684	F 684 ZZ	—	4.8	5.2	0.1	0.1	0.70	1.14
MF 104 B	MF 104 BZZ	—	5.6	5.9	0.2	0.15	1.13	1.59
F 694	F 694 ZZ	—	5.2	5.6	0.15	0.15	1.91	1.96
F 604	F 604 ZZ	—	5.6	5.6	0.2	0.2	2.53	2.53
F 624	F 624 ZZ	—	5.6	6.0	0.2	0.2	3.38	3.53
F 634	F 634 ZZ1	—	6.0	7.5	0.3	0.3	5.73	5.62

Extra Small Ball Bearings · Miniature Ball Bearings

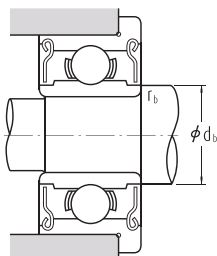
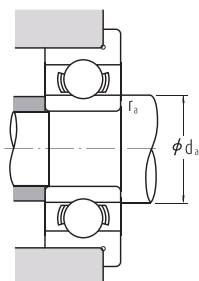
Metric Design With Flange Bore Diameter 5 – 9 mm



Boundary Dimensions (mm)										Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)			
d	D	D ₁	D ₂	B	B ₁	C ₁	C ₂	r min.	r ₁ min.	C _r	C _{0r}	Grease	Oil		
												Open Z · ZZ V · VV	D · DD	Open Z	
5	8	9.2	—	2	—	0.6	—	0.1	—	310	120	53 000	—	63 000	
	8	—	9.2	—	2.5	—	0.6	—	0.1	278	131	53 000	—	63 000	
	9	10.2	10.2	2.5	3	0.6	0.6	0.15	0.15	430	168	50 000	—	60 000	
	10	11.2	11.6	3	4	0.6	0.8	0.15	0.15	430	168	50 000	—	60 000	
	11	12.5	12.5	3	5	0.8	1	0.15	0.15	715	281	45 000	—	53 000	
	13	15	15	4	4	1	1	0.2	0.2	1 080	430	43 000	40 000	50 000	
	14	16	16	5	5	1	1	0.2	0.2	1 330	505	40 000	38 000	50 000	
	16	18	18	5	5	1	1	0.3	0.3	1 730	670	36 000	32 000	43 000	
	19	22	22	6	6	1.5	1.5	0.3	0.3	2 340	885	32 000	30 000	40 000	
	10	11.2	11.2	2.5	3	0.6	0.6	0.15	0.1	495	218	45 000	—	53 000	
6	12	13.2	13.6	3	4	0.6	0.8	0.2	0.15	715	292	43 000	40 000	50 000	
	13	15	15	3.5	5	1	1.1	0.15	0.15	1 080	440	40 000	38 000	50 000	
	15	17	17	5	5	1.2	1.2	0.2	0.2	1 730	670	40 000	36 000	45 000	
	17	19	19	6	6	1.2	1.2	0.3	0.3	2 260	835	38 000	34 000	45 000	
	19	22	22	6	6	1.5	1.5	0.3	0.3	2 340	885	32 000	30 000	40 000	
	22	25	25	7	7	1.5	1.5	0.3	0.3	3 300	1 370	30 000	28 000	36 000	
	7	11	12.2	12.2	2.5	3	0.6	0.6	0.15	0.1	455	201	43 000	—	50 000
		13	14.2	14.6	3	4	0.6	0.8	0.2	0.15	540	276	40 000	—	48 000
		14	16	16	3.5	5	1	1.1	0.15	0.15	1 170	510	40 000	34 000	45 000
		17	19	19	5	5	1.2	1.2	0.3	0.3	1 610	715	36 000	28 000	43 000
19		22	22	6	6	1.5	1.5	0.3	0.3	2 340	885	36 000	32 000	43 000	
8	22	25	25	7	7	1.5	1.5	0.3	0.3	3 300	1 370	30 000	28 000	36 000	
	12	13.2	13.6	2.5	3.5	0.6	0.8	0.15	0.1	545	274	40 000	—	48 000	
	14	15.6	15.6	3.5	4	0.8	0.8	0.2	0.15	820	385	38 000	32 000	45 000	
	16	18	18	4	5	1	1.1	0.2	0.2	1 610	710	36 000	30 000	43 000	
	19	22	22	6	6	1.5	1.5	0.3	0.3	2 240	910	36 000	28 000	43 000	
9	22	25	25	7	7	1.5	1.5	0.3	0.3	3 300	1 370	34 000	28 000	40 000	
	17	19	19	4	5	1	1.1	0.2	0.2	1 330	665	36 000	24 000	43 000	
	20	23	23	6	6	1.5	1.5	0.3	0.3	1 720	840	34 000	24 000	40 000	

Radial and axial load factors

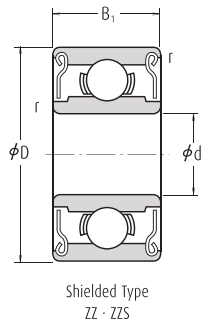
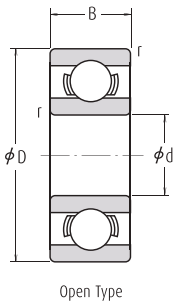
C_{or}/F_a	$F_a/F_r \leq e$		$F_a/F_r > e$		e
	X	Y	X	Y	
5	1	0	0.56	1.26	0.35
10	1	0	0.56	1.49	0.29
15	1	0	0.56	1.64	0.27
20	1	0	0.56	1.76	0.25
25	1	0	0.56	1.85	0.24
30	1	0	0.56	1.92	0.23
50	1	0	0.56	2.13	0.20



Bearing Numbers				Abutment and Fillet Dimensions (mm)				Mass (g) approx.	
Open	Shielded	Sealed		d_a min.	d_b max.	r_a max.	r_b max.	Open	Shielded
MF 85	—	—	—	5.8	—	0.1	—	0.33	—
—	MF 85 ZZ	—	—	—	5.8	—	0.1	—	0.41
MF 95	MF 95 ZZ1	—	—	6.2	6.0	0.15	0.15	0.59	0.66
MF 105	MF 105 ZZ	—	—	6.2	6.0	0.15	0.15	1.05	1.46
F 685	F 685 ZZ	—	—	6.2	6.2	0.15	0.15	1.37	2.18
F 695	F 695 ZZ	VV	DD	6.6	6.6	0.2	0.2	2.79	2.84
F 605	F 605 ZZ	—	DD	6.6	6.9	0.2	0.2	3.9	3.85
F 625	F 625 ZZ1	VV	DD	7.0	7.5	0.3	0.3	5.37	5.27
F 635	F 635 ZZ1	VV	DD	7.0	8.5	0.3	0.3	9.49	9.49
MF 106	MF 106 ZZ1	—	—	7.2	7.0	0.15	0.1	0.65	0.77
MF 126	MF 126 ZZ	—	DD	7.6	7.2	0.2	0.15	1.38	1.94
F 686 A	F 686 AZZ	VV	DD	7.2	7.4	0.15	0.15	2.25	3.04
F 696	F 696 ZZ1	VV	DD	7.6	7.9	0.2	0.2	4.34	4.26
F 606	F 606 ZZ	VV	DD	8.0	8.2	0.3	0.3	6.58	6.61
F 626	F 626 ZZ1	VV	DD	8.0	8.5	0.3	0.3	9.09	9.09
F 636	F 636 ZZ	VV	DD	8.0	10.5	0.3	0.3	14.6	14.7
MF 117	MF 117 ZZ	—	—	8.2	8.0	0.15	0.1	0.72	0.82
MF 137	MF 137 ZZ	—	—	8.6	9.0	0.2	0.15	1.7	2.23
F 687	F 687 ZZ1	VV	DD	8.2	8.5	0.15	0.15	2.48	3.37
F 697	F 697 ZZ1	VV	DD	9.0	10.2	0.3	0.3	5.65	5.65
F 607	F 607 ZZ1	VV	DD	9.0	9.1	0.3	0.3	8.66	8.66
F 627	F 627 ZZ	VV	DD	9.0	10.5	0.3	0.3	14.2	14.2
MF 128	MF 128 ZZ1	—	—	9.2	9.0	0.15	0.1	0.82	1.15
MF 148	MF 148 ZZ	VV	DD	9.6	9.2	0.2	0.15	2.09	2.39
F 688 A	F 688 AZZ	VV	DD	9.6	10.2	0.2	0.2	3.54	4.47
F 698	F 698 ZZ	VV	DD	10.0	10.0	0.3	0.3	8.35	8.3
F 608	F 608 ZZ	VV	DD	10.0	10.5	0.3	0.3	13.4	13.5
F 689	F 689 ZZ1	VV	DD	10.6	11.5	0.2	0.2	3.97	4.91
F 699	F 699 ZZ1	VV	DD	11.0	12.0	0.3	0.3	9.51	9.51

Extra Small Ball Bearings · Miniature Ball Bearings

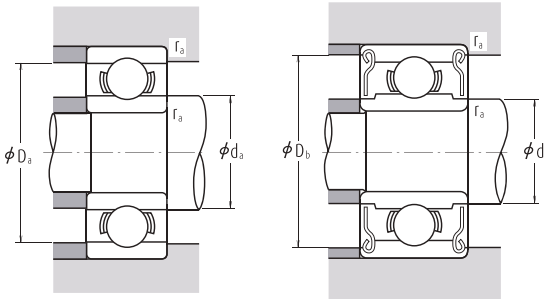
Inch Design
Bore Diameter 1.016 – 9.525 mm



Boundary Dimensions (mm)					Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		Bearing
d	D	B	B ₁	r min.	C _r	C _{0r}	Grease Open Z · ZZ	Oil Open Z	Open
1.016	3.175	1.191	—	0.1	80	23	130 000	150 000	R 09
1.191	3.967	1.588	2.380	0.1	138	35	110 000	130 000	R 0
1.397	4.762	1.984	2.779	0.1	231	66	90 000	110 000	R 1
1.984	6.350	2.380	3.571	0.1	310	108	67 000	80 000	R 1-4
2.380	4.762	1.588	—	0.1	188	60	80 000	95 000	R 133
	4.762	—	2.380	0.1	143	52	80 000	95 000	—
	7.938	2.779	3.571	0.15	550	175	60 000	71 000	R 1-5
3.175	6.350	2.380	2.779	0.1	283	95	67 000	80 000	R 144
	7.938	2.779	3.571	0.1	560	179	60 000	67 000	R 2-5
	9.525	2.779	3.571	0.15	640	225	53 000	63 000	R 2-6
	9.525	3.967	3.967	0.3	630	218	56 000	67 000	R 2
	12.700	4.366	4.366	0.3	640	225	53 000	63 000	R 2A
3.967	7.938	2.779	3.175	0.1	360	149	53 000	63 000	R 155
4.762	7.938	2.779	3.175	0.1	360	149	53 000	63 000	R 156
	9.525	3.175	3.175	0.1	710	270	50 000	60 000	R 166
	12.700	3.967	4.978	0.3	1 300	485	43 000	53 000	R 3
6.350	9.525	3.175	3.175	0.1	420	204	48 000	56 000	R 168B
	12.700	3.175	4.762	0.15	1 080	440	40 000	50 000	R 188
	15.875	4.978	4.978	0.3	1 610	660	38 000	45 000	R 4B
	19.050	5.558	7.142	0.4	2 620	1 060	36 000	43 000	R 4AA
7.938	12.700	3.967	3.967	0.15	540	276	40 000	48 000	R 1810
9.525	22.225	5.558	7.142	0.4	3 350	1 410	32 000	38 000	R 6

Radial and axial load factors

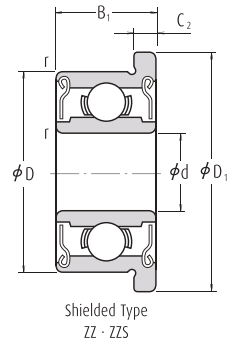
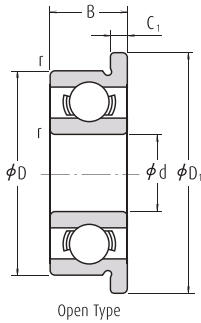
C_{or}/F_a	$F_a/F_r \leq e$		$F_a/F_r > e$		e
	X	Y	X	Y	
5	1	0	0.56	1.26	0.35
10	1	0	0.56	1.49	0.29
15	1	0	0.56	1.64	0.27
20	1	0	0.56	1.76	0.25
25	1	0	0.56	1.85	0.24
30	1	0	0.56	1.92	0.23
50	1	0	0.56	2.13	0.20



Numbers	Abutment and Fillet Dimensions (mm)					Mass (g)	
	d_a min.	d_b max.	D_a max.	D_b min.	r_a max.	Open	Shielded
—	1.9	—	2.3	—	0.1	0.04	—
R 0 ZZ	2.0	1.9	3.1	3.5	0.1	0.09	0.11
R 1 ZZ	2.2	2.3	3.9	4.1	0.1	0.15	0.19
R 1-4 ZZ	2.8	3.9	5.5	5.9	0.1	0.35	0.50
—	3.2	—	3.9	—	0.1	0.10	—
R 133 ZLS	—	3.0	—	4.2	0.1	—	0.13
R 1-5 ZZ	3.6	4.1	6.7	7.0	0.15	0.60	0.72
R 144 ZZ	4.0	3.9	5.5	5.9	0.1	0.25	0.27
R 2-5 ZZ	4.0	4.3	7.1	7.3	0.1	0.55	0.72
R 2-6 ZLS	4.4	4.6	8.3	8.2	0.15	0.96	1.13
R 2 ZZ	5.2	4.8	7.5	8.0	0.3	1.36	1.39
R 2A ZZ	5.2	4.6	10.7	8.2	0.3	3.3	3.23
R 155 ZLS	4.8	5.5	7.1	7.3	0.1	0.51	0.56
R 156 ZLS	5.6	5.5	7.1	7.3	0.1	0.39	0.42
R 166 ZZ	5.6	5.9	8.7	8.8	0.1	0.81	0.85
R 3 ZZ	6.8	6.5	10.7	11.2	0.3	2.21	2.79
R 168 BZZ	7.2	7.0	8.7	8.9	0.1	0.58	0.62
R 188 ZZ	7.6	7.4	11.5	11.6	0.15	1.53	2.21
R 4B ZZ	8.4	8.4	13.8	13.8	0.3	4.5	4.43
R 4AA ZZ	9.4	9.0	16.0	16.6	0.4	7.48	9.17
R 1810 ZZ	9.2	9.0	11.5	11.6	0.15	1.56	1.48
R 6 ZZ	12.6	11.9	19.2	20.0	0.4	9.02	11

Extra Small Ball Bearings · Miniature Ball Bearings

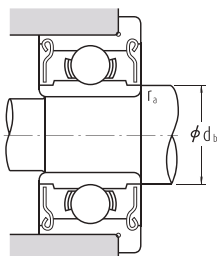
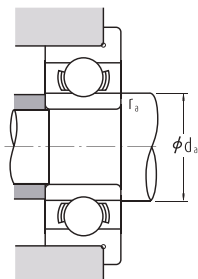
Inch Design With Flange Bore Diameter 1.191 – 9.525 mm



Boundary Dimensions (mm)								Basic Load Ratings (N)	
d	D	D ₁	B	B ₁	C ₁	C ₂	r min.	C _r	C _{0r}
1.191	3.967	5.156	1.588	2.380	0.330	0.790	0.1	138	35
1.397	4.762	5.944	1.984	2.779	0.580	0.790	0.1	231	66
1.984	6.350	7.518	2.380	3.571	0.580	0.790	0.1	310	108
2.380	4.762	5.944	1.588	—	0.460	—	0.1	188	60
3.175	4.762	5.944	—	2.380	—	0.790	0.1	143	52
	7.938	9.119	2.779	3.571	0.580	0.790	0.15	550	175
	6.350	7.518	2.380	2.779	0.580	0.790	0.1	283	95
3.967	7.938	9.119	2.779	3.571	0.580	0.790	0.1	560	179
	9.525	10.719	2.779	3.571	0.580	0.790	0.15	640	225
	9.525	11.176	3.967	3.967	0.760	0.760	0.3	630	218
4.762	7.938	9.119	2.779	3.175	0.580	0.910	0.1	360	149
	7.938	9.119	2.779	3.175	0.580	0.910	0.1	360	149
	9.525	10.719	3.175	3.175	0.580	0.790	0.1	710	270
6.350	12.700	14.351	4.978	4.978	1.070	1.070	0.3	1 300	485
	9.525	10.719	3.175	3.175	0.580	0.910	0.1	420	204
	12.700	13.894	3.175	4.762	0.580	1.140	0.15	1 080	440
7.938	15.875	17.526	4.978	4.978	1.070	1.070	0.3	1 610	660
	12.700	13.894	3.967	3.967	0.790	0.790	0.15	540	276
9.525	22.225	24.613	7.142	7.142	1.570	1.570	0.4	3 350	1 410

Radial and axial load factors

C_{or}/F_a	$F_a/F_r \leq e$		$F_a/F_r > e$		e
	X	Y	X	Y	
5	1	0	0.56	1.26	0.35
10	1	0	0.56	1.49	0.29
15	1	0	0.56	1.64	0.27
20	1	0	0.56	1.76	0.25
25	1	0	0.56	1.85	0.24
30	1	0	0.56	1.92	0.23
50	1	0	0.56	2.13	0.20



Limiting Speeds (min ⁻¹)		Bearing Numbers		Abutment and Fillet Dimensions (mm)			Mass (g)	
Grease	Oil	Open	Shielded	d_a min.	d_b max.	r_a max.	approx.	
Open Z · ZZ	Open Z						Open	Shielded
110 000	130 000	FR 0	FR 0 ZZ	2.0	1.9	0.1	0.11	0.16
90 000	110 000	FR 1	FR 1 ZZ	2.2	2.3	0.1	0.20	0.25
67 000	80 000	FR 1-4	FR 1-4 ZZ	2.8	3.9	0.1	0.41	0.58
80 000	95 000	FR 133	—	3.2	—	0.1	0.13	—
80 000	95 000	—	FR 133 ZZS	—	3.0	0.1	—	0.19
60 000	71 000	FR 1-5	FR 1-5 ZZ	3.6	4.1	0.15	0.68	0.82
67 000	80 000	FR 144	FR 144 ZZ	4.0	3.9	0.1	0.31	0.35
60 000	67 000	FR 2-5	FR 2-5 ZZ	4.0	4.3	0.1	0.62	0.81
53 000	63 000	FR 2-6	FR 2-6 ZZS	4.4	4.6	0.15	1.04	1.25
56 000	67 000	FR 2	FR 2 ZZ	5.2	4.8	0.3	1.51	1.55
53 000	63 000	FR 155	FR 155 ZZS	4.8	5.5	0.1	0.59	0.67
53 000	63 000	FR 156	FR 156 ZZS	5.6	5.5	0.1	0.47	0.53
50 000	60 000	FR 166	FR 166 ZZ	5.6	5.9	0.1	0.90	0.98
43 000	53 000	FR 3	FR 3 ZZ	6.8	6.5	0.3	2.97	3.09
48 000	56 000	FR 168B	FR 168 BZZ	7.2	7.0	0.1	0.66	0.75
40 000	50 000	FR 188	FR 188 ZZ	7.6	7.4	0.15	1.64	2.49
38 000	45 000	FR 4B	FR 4B ZZ	8.4	8.4	0.3	4.78	4.78
40 000	48 000	FR 1810	FR 1810 ZZ	9.2	9.0	0.15	1.71	1.63
32 000	38 000	FR 6	FR 6 ZZ	12.6	11.9	0.4	10.1	12.1





Angular Contact Ball Bearings

Table 1 Features of Single-Row Angular Contact Ball Bearings

Cage Spec.	Material	Steel	Nylon 46		L-PPS resin	Brass	
	Method	pressed	Molded		Molded	machined	
	Symbols	W	TYN	T85	T7	Omitted	MR
Features	High Load Capacity						
	High-Speed						
	High-Temperature						
	Vibration						

In addition, for bearings with the same serial number, if the type of cages are different, the number of balls may also be different. In such a case, the load rating will differ from the one listed in the bearing tables.

Angular Contact Ball Bearings with contact angles of 15° (Symbol **C**) and 25° (Symbol **A5**) are primarily for high precision or high speed applications, and molded polyamide cages (Symbol TYN) or machined brass cages or synthetic resin cages (Symbol T) are used.

The maximum operating temperature of molded polyamide cages is 150°C.

MATCHED ANGULAR CONTACT BALL BEARINGS

The types and features of matched angular contact ball bearings are shown in Table 2.

Table 2 Types and Features of Matched Angular Contact Ball Bearings

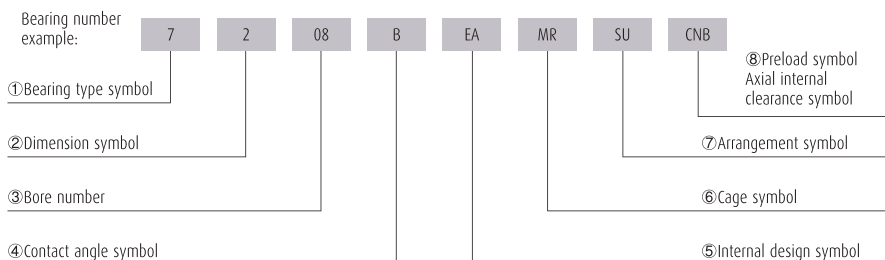
Figure	Arrangement	Features
	Back-to-back (DB) (Example) 7208 A DB	Radial loads and axial loads in both directions can be sustained. Since the distance between the effective load centers a_0 is big, this type is suitable if moments are applied.
	Face-to-face (DF) (Example) 7208 B DF	Radial loads and axial loads in both directions can be sustained. Compared with the DB Type, the distance between the effective load centers is small, so the capacity to sustain moments is inferior to the DB Type.
	Tandem (DT) (Example) 7208 A DT	Radial loads and axial loads in one direction can be sustained. Since two bearings share the axial load, this arrangement is used when the load in one direction is heavy.

ITJ ANGULAR CONTACT BALL BEARINGS

In comparison with standard angular contact ball bearings, these bearings have high capacity, high limiting speed, and highly accurate universal matching as the features. The molded polyamide cages are standard specification for the HPS type.

□ Formulation of Bearing Numbers

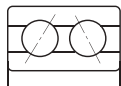
Single-Row Angular Contact Ball Bearings Matched Angular Contact Ball Bearings



① Bearing type symbol	7 : Single-Row Angular Contact Ball Bearings, Matched Angular Contact Ball Bearings
② Dimension symbol	2 : 02 Series, 3 : 03 Series, 9 : 19 Series, 0 : 10 Series
③ Bore number	Less than 03, Bearing bore 00 : 10mm, 01 : 12mm, 02 : 15mm, 03 : 17mm Over 04, Bearing bore Bore number x5 (mm)
④ Contact angle symbol	C : 15°, A5 : 25°, A : 30°, B : 40°
⑤ Internal design symbol	EA : High Load Capacity
⑥ Cage symbol	W : Pressed Steel Cage, MR : Machined Brass Cage (Ball guided), No symbol : Machined Brass Cage (Outer Ring guided), TYN : Polyamide Resin Cage, T85 : Polyamide 46 Resin Cage, T7 : L-PPS Resin Cage
⑦ Arrangement symbol	SU : Universal arrangement (Single row), DU : Universal arrangement (Double row), DB : Back-to-back arrangement, DF : Face-to-face arrangement, DT : Tandem arrangement
⑧ Preload symbol Axial internal clearance symbol	EL : Extra light preload, L : Light preload, M : Medium preload, H : Heavy preload Omitted : CN clearance, C3 : Clearance greater than CN, C4 : Clearance greater than C3, CNB : CN Clearance equivalent (Universal arrangement)

a_0

DOUBLE-ROW ANGULAR CONTACT BALL BEARINGS



This is basically a back-to-back mounting of two single-row angular contact ball bearings, but their inner and outer rings are each integrated into one. Axial loads in both directions can be sustained, and the capacity to sustain moments is good. This type is used as fixed-end bearings.

Their cages are pressed steel.

Angular Contact Ball Bearings

Formulation of Bearing Numbers

Double-Row Angular Contact Ball Bearings

Bearing number example:

LZ

3

2

01

B-

2RSR

TNG

①Pulley type symbol
LZ = Cylindrical Outerring
LB = Spherical Outerring

②Bearing type symbol

③Dimension symbol

④Bore number

⑦Cage symbol

⑥Seals

⑤Contact angle

①Pulley type symbol

②Bearing type symbol

③Dimension symbol

④Bore number

⑤Contact angle

⑥Seals

⑦Cage symbol

5 : Double-Row Angular Contact Ball Bearings

2 : 02 Series

Less than 03, Bearing bore 00 : 10mm, 01 : 12mm,
02 : 15mm, 03 : 17mm
Over 04, Bearing bore Bore number ×5 (mm)

B = 25°

2RSR = Seals; 2ZR = Shields

TNG Polyamid Cage Nylon 66

FOUR-POINT CONTACT BALL BEARINGS



The inner ring is split radially into two pieces. Their design allows one bearing to sustain significant axial loads in either direction.

The contact angle is 35°, so the axial load capacity is high. This type is suitable for carrying pure axial loads or combined loads where the axial loads are high.

The cages are made of machined brass.

Formulation of Bearing Numbers

Four-Point Contact Ball Bearings

Bearing number example:

QJ

2

16

M

C3

①Bearing type symbol

②Dimension symbol

③Bore number

⑤Internal clearance symbol

④Cage symbol

①Bearing type symbol

②Dimension symbol

③Bore number

④Cage symbol

⑤Internal clearance symbol

QJ : Four-Point Contact Ball Bearings

10 : 10 Series, 2 : 02 Series, 3 : 03 Series

Less than 03, Bearing bore 00 : 10mm, 01 : 12mm, 02 : 15mm, 03 : 17mm
Over 04, Bearing bore Bore number ×5 (mm)

M : Machined Brass Cage

C2 : Clearance less than CN, Omitted : CN clearance,
C3 : Clearance greater than CN, C4 : Clearance greater than C3

PRECAUTIONS FOR USE OF ANGULAR CONTACT BALL BEARINGS

Under severe operating conditions where the speed and temperature are close to their limits, lubrication is marginal, vibration and moment loads are heavy, they may not be suitable, particularly for certain types of cages. In such a case, please consult with ITJ beforehand.

And if the load on angular contact ball bearings becomes too small, or if the ratio of the axial and radial loads for matched bearings exceeds 'e' (e is listed in the bearings tables) during operation, slippage occurs between the balls and raceways, which may result in smearing. Especially with large bearings since the weight of the balls and cage is high. If such load conditions are expected, please consult with ITJ for selection of the bearings.



ITJ Angular Contact Ball Bearings

Axial Internal Clearance (Measured Clearance) Units : μm

Nominal Bore Diameter d (mm)		Axial Internal Clearance			
		CNB		GA	
over	incl.	min.	max.	min.	max.
12	18	17	25		
18	30	20	28	-2	6
30	50	24	32		
50	80	29	41	-3	9

LIMITING SPEEDS (Grease/Oil)

In cases of single-row and matched angular contact ball bearings, The limiting speeds (grease) and limiting speeds (oil) listed in the bearing table are for bearings with standard cage. For those with option cages, limiting speeds (grease/oil) may differ depending on cages. Please consult with ITJ. For example, limiting speeds (grease/oil) of machined cage (No symbol) is 1.25 times higher than pressed cage. The limiting speeds of bearings with contact angles of 15° (Symbol C) and 25° (Symbol A5) are for bearings with precision of P5 and better (with machined synthetic-resin cages (T) or molded polyamide cages (TYN)). The limiting speeds listed in the bearing tables should be adjusted depending on the bearing load conditions. Also, higher speeds are attainable by making changes in the lubrication method, cage design, etc.

Angular Contact Ball Bearings

TECHNICAL DATA

Free Space of Angular Contact Ball Bearings

Angular contact ball bearings are used in various components, such as spindles of machine tools, vertical pump motors, and worm gear reducers. This kind of bearing is used mostly with grease lubrication. But such grease lubrication may affect the bearing in terms of temperature rise or durability. To allow a bearing to demonstrate its full performance, it is essential to fill the bearing with the proper amount of a suitable grease. A prerequisite for this job is a knowledge of the bearing's free space.

The angular ball bearing is available in various kinds which are independent of the combinations of bearing series, contact angle, and cage type. The free space of the bearings used most frequently is described below. Table 1 shows the free space of a bearing with a pressed cage for general use and Table 2 shows that of a bearing with a high-tension brass machined cage.

The contact angle symbols A, B, and C in each table refer to the nominal contact angles of 30°, 40°, and 15° of each bearing.

**Table 1 Free Space of Angular Contact Ball Bearing (1)
(With Pressed Steel Cage)**

Units: cm³

Bearing bore No.	Bearing free space			
	Bearing series - Contact angle symbol			
	72-A	72-B	73-A	73-B
00	1.5	1.4	2.9	2.8
01	2.1	2.0	3.7	3.5
02	2.8	2.7	4.8	4.6
03	3.7	3.6	6.2	5.9
04	6.2	5.9	8.4	8.0
05	7.8	7.4	13	12
06	12	11	20	19
07	16	15	26	24
08	20	19	36	34
09	25	24	48	45
10	28	27	63	60

**Table 2 Free Space of Angular Contact Ball Bearing (2)
(With High-Tension Brass Machined Cage)**

Units: cm³

Bearing bore No.	Bearing free space				
	Bearing series - Contact angle symbol				
	70-C	72-A 72-C	72-B	73-A 73-C	73-B
00	0.9	1.0	1.0	2.2	2.1
01	0.9	1.6	1.6	2.5	2.5
02	1.2	1.9	1.9	3.4	3.3
03	1.6	2.7	2.7	4.6	4.4
04	3.0	4.7	4.2	6.1	5.9
05	3.5	6.0	5.3	9.2	9.0
06	4.3	8.5	8.1	14	13
07	6.5	12	11	18	17
08	8.3	14	14	25	24
09	10	18	17	34	33
10	11	20	20	45	44
11	16	26	25	57	55
12	17	33	31	71	69
13	18	38	37	87	83
14	24	43	42	107	103
15	24	47	45	129	123
16	34	58	57	152	146
17	37	71	70	179	172
18	44	88	85	207	201
19	44	105	105	261	244
20	47	127	127	282	278



Angular Contact Ball Bearings

Dynamic Equivalent Load of Triplex Angular Contact Ball Bearings

Three separate single-row bearings may be used side by side as shown in the figure when angular contact ball bearings are to be used to carry a large axial load. There are three patterns of combination, which are expressed by combination symbols of DBD, DFD, and DTD.

As in the case of single-row and double-row bearings, the dynamic equivalent load, which is determined from the radial and axial loads acting on a bearing, is used to calculate the fatigue life for these combined bearings.

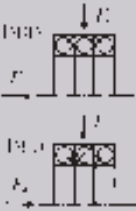
Assuming the dynamic equivalent radial load as P_r , the radial load as F_r , and axial load as F_a , the relationship between the dynamic equivalent radial load and bearing load may be approximated as follows:

$$P_r = X F_r + Y F_a \dots\dots\dots (1)$$

where, X : Radial load factor } See Table 1
 Y : Axial load factor }

The axial load factor varies with the contact angle. In an angular contact ball bearing, whose contact angle is small, the contact angle varies substantially when the axial load increases.

A change in the contact angle can be expressed by the ratio between the basic static load rating C_0 , and axial load F_a . Accordingly, for the angular contact ball bearing with a contact angle of 15°, the axial load factor at a contact angle corresponding to this ratio is shown. If the angular contact ball bearings have contact angles of 25°, 30° and 40°, the effect of change in the contact angle on the axial load factor may be ignored and thus the axial load factor is assumed as constant.

Arrangement	Load direction
3 row matched stack, axial load is supported by 2 rows. (Symbol DBD or DFD)	
3 row matched stack, axial load is supported by 1 row. (Symbol DBD or DFD)	
3 row tandem matched stack (Symbol DTD)	

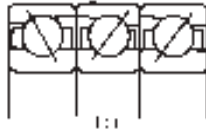
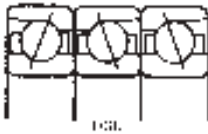
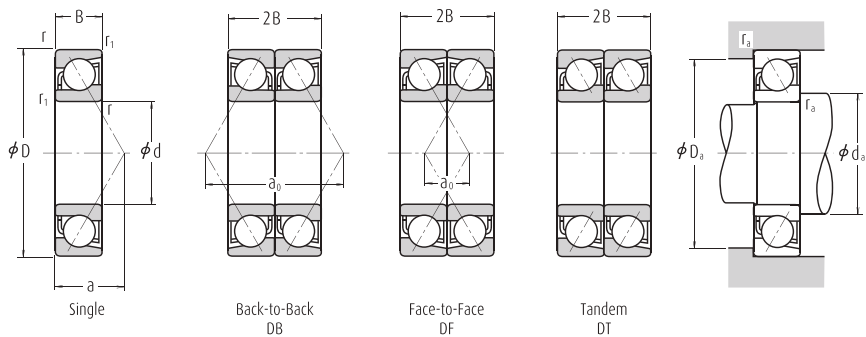


Table 1 Factors X and Y of Triplex Angular Contact Ball Bearing

Contact angle α	j	$\frac{C_{0r}}{jF_a}$	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F} > e$		e	Basic load rating of 3 row ball bearings	
			X	Y	X	Y		C_r	C_{0r}
15°	1.5	5	1	0.64	0.58	1.46	0.51	2.16 times of single bearing	3 times of single bearing
15°	1.5	10	1	0.70	0.58	1.61	0.47		
15°	1.5	15	1	0.74	0.58	1.70	0.44		
15°	1.5	20	1	0.76	0.58	1.75	0.42		
15°	1.5	25	1	0.78	0.58	1.81	0.41		
15°	1.5	30	1	0.80	0.58	1.83	0.40		
15°	1.5	50	1	0.83	0.58	1.91	0.39		
25°	—	—	1	0.48	0.54	1.16	0.68		
30°	—	—	1	0.41	0.52	1.01	0.80	2.16 times of single bearing	3 times of single bearing
40°	—	—	1	0.29	0.46	0.76	1.14		
15°	3	5	1	2.28	0.95	2.37	0.51		
15°	3	10	1	2.51	0.95	2.61	0.47		
15°	3	15	1	2.64	0.95	2.76	0.44		
15°	3	20	1	2.73	0.95	2.85	0.42		
15°	3	25	1	2.80	0.95	2.93	0.41		
15°	3	30	1	2.85	0.95	2.98	0.40		
15°	3	50	1	2.98	0.95	3.11	0.39		
25°	—	—	1	1.70	0.88	1.88	0.68	2.16 times of single bearing	3 times of single bearing
30°	—	—	1	1.45	0.84	1.64	0.80		
40°	—	—	1	1.02	0.76	1.23	1.14		
15°	1	5	1	0	0.44	1.10	0.51		
15°	1	10	1	0	0.44	1.21	0.47		
15°	1	15	1	0	0.44	1.28	0.44		
15°	1	20	1	0	0.44	1.32	0.42		
15°	1	25	1	0	0.44	1.36	0.41		
15°	1	30	1	0	0.44	1.38	0.40	2.16 times of single bearing	3 times of single bearing
15°	1	50	1	0	0.44	1.44	0.39		
25°	—	—	1	0	0.41	0.87	0.68		
30°	—	—	1	0	0.39	0.76	0.80		
40°	—	—	1	0	0.35	0.57	1.14		

Angular Contact Ball Bearings

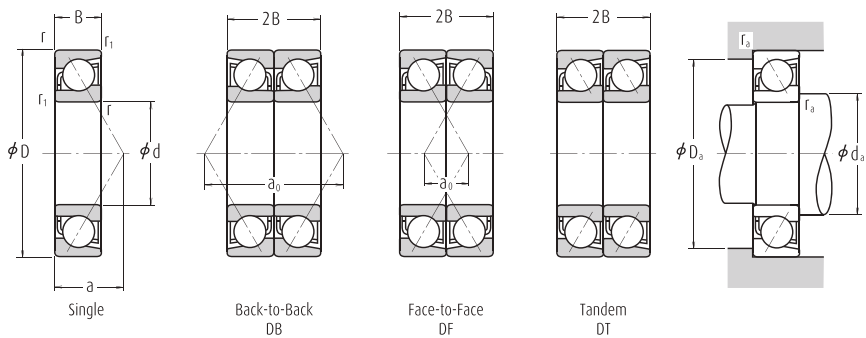
Single/matched mountings
Bore Diameter 10 – 15 mm



Boundary Dimensions	Basic Load Ratings (Single)	Factor	Limiting	Eff.Load	Abutment and Fillet	Mass
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Angular Contact Ball Bearings

Single/matched mountings
Bore Diameter 17 – 25 mm



Boundary Dimensions (mm)					Basic Load Ratings (Single) (N)		Factor	Limiting Speeds (r/min)		Eff.Load Centers (mm)	Abutment and Fillet Dimensions (mm)			Mass (kg)
d	D	B	r min.	r ₁ min.	C _r	C _{0r}	f ₀	Grease	Oil	a	d _s min.	D _s max.	r _s max.	approx.
17	30	7	0.3	0.15	5 000	2 800	—	42 600	63 900	9.0	19.5	27.5	0.3	0.017
	30	7	0.3	0.15	5 250	2 940	14.8	49 000	74 500	6.6	19.5	27.5	0.3	0.017
	35	10	0.3	0.15	6 400	3 500	—	22 900	30 500	12.5	19.5	32.5	0.3	0.040
	35	10	0.3	0.15	6 950	3 800	14.5	44 300	67 400	8.5	19.5	32.5	0.3	0.044
	40	12	0.6	0.3	10 700	5 450	—	26 400	35 100	14.2	22	35	0.6	0.067
	40	12	0.6	0.3	9 950	5 500	—	14 000	19 000	18.0	22	35	0.6	0.068
18	40	12	0.6	0.3	11 600	6 100	—	16 000	22 000	18.2	22	35	0.6	0.065
	45	15	0.6	0.3	14 000	7 200	12.2	10 400	14 500	16.0	25	40	0.6	0.075
	50	18	0.6	0.3	16 000	8 000	12.2	10 400	14 500	16.0	25	40	0.6	0.075

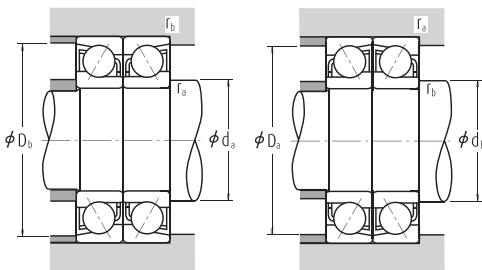
Dynamic Equivalent Load $P = X F_r + Y F_a$

Contact Angle	$H_F F_r^*$ C_{or}	e	Single, DT				DB or DF			
			$F_a/F_r \leq e$		$F_a/F_r > e$		$F_a/F_r \leq e$		$F_a/F_r > e$	
			X	Y	X	Y	X	Y	X	Y
15°	0.178	0.38	1	0	0.44	1.47	1	1.65	0.72	2.39
	0.357	0.40	1	0	0.44	1.40	1	1.57	0.72	2.28
	0.714	0.43	1	0	0.44	1.30	1	1.46	0.72	2.11
	1.07	0.46	1	0	0.44	1.23	1	1.38	0.72	2.00
	1.43	0.47	1	0	0.44	1.19	1	1.34	0.72	1.93
	2.14	0.50	1	0	0.44	1.12	1	1.26	0.72	1.82
	3.57	0.55	1	0	0.44	1.02	1	1.14	0.72	1.66
	5.35	0.56	1	0	0.44	1.00	1	1.12	0.72	1.63
	—	0.68	1	0	0.41	0.87	1	0.92	0.67	1.41
	—	0.80	1	0	0.39	0.76	1	0.78	0.63	1.24
25°	—	1.14	1	0	0.35	0.57	1	0.55	0.57	0.93
30°	—	—	—	—	—	—	—	—	—	—
40°	—	—	—	—	—	—	—	—	—	—

*For i, use 2 for DB, DF and 1 for DT

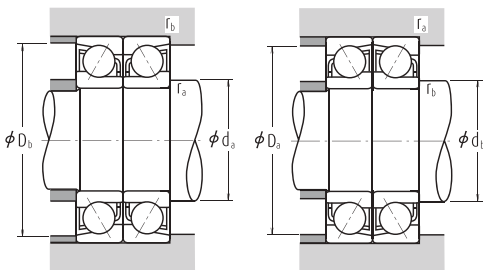
Static Equivalent Load $P_0 = X_0 F_r + Y_0 F_a$

Contact Angle	Single, DT		DB or DF		Single or DT mounting When $F_r > 0.5 F_r + Y_0 F_a$ use $P_0 = F_r$
	X_0	Y_0	X_0	Y_0	
15°	0.5	0.46	1	0.92	
25°	0.5	0.38	1	0.76	
30°	0.5	0.33	1	0.66	
40°	0.5	0.26	1	0.52	



Bearing Numbers (2) Cage Symbol (4)				Basic Load Ratings (Matched) (N)		Limiting Speeds (1) (Matched) (min-1)		Load Center Spacings (mm)		Abutment and Fillet Dimensions (mm)		
Single	Standard	Option	Duplex	C _r	C _{0r}	Grease	Oil	a ₀	DF	d _b (3) min.	D _b max.	r _b (3) max.
7900 A5°	TYN	(M)	DB DF DT	4 700	2 900	32 000	43 000	13.5	1.5	—	20.8	0.15
7900 C°	TYN	(M),T	DB DF DT	4 900	3 050	38 000	53 000	10.3	1.7	—	20.8	0.15
7000 A°	W	(M), T, TYN	DB DF DT	8 750	5 200	24 000	34 000	18.4	2.4	11.2	24.8	0.15
7000 C°	TYN	W,(M),T	DB DF DT	8 650	5 000	36 000	50 000	12.8	3.2	—	24.8	0.15
7200 A°	W	(M), TYN	DB DF DT	8 800	5 400	22 000	30 000	20.5	2.5	12.5	27.5	0.3
7200 B	W	(M), T	DB DF DT	8 100	5 000	16 000	22 000	25.8	7.8	12.5	27.5	0.3
7200 C°	TYN	W,(M),T	DB DF DT	8 800	5 200	32 000	45 000	14.4	3.6	—	27.5	0.3
7300 A	W	(M), T	DB DF DT	15 100	8 600	16 000	22 000	24.0	2.0	12.5	32.5	0.3
7300 B	W	(M), T	DB DF DT	14 200	8 100	14 000	20 000	29.9	7.9	12.5	32.5	0.3
7901 A5°	TYN	(M),T	DB DF DT	5 200	3 550	30 000	43 000	14.4	2.4	—	22.8	0.15
7901 C°	TYN	(M),T	DB DF DT	5 450	3 700	36 000	50 000	10.8	1.2	—	22.8	0.15
7001 A°	W	(M), T, TYN	DB DF DT	9 400	5 950	22 000	30 000	19.5	3.5	13.2	26.8	0.15
7001 C°	TYN	W,(M),T	DB DF DT	9 400	5 800	32 000	45 000	13.4	2.6	—	26.8	0.15
7201 A°	W	(M), T, TYN	DB DF DT	13 000	8 050	20 000	28 000	22.7	2.7	14.5	29.5	0.3
7201 B	W	(M),T	DB DF DT	12 100	7 500	15 000	20 000	28.5	8.5	14.5	29.5	0.3
7201 BEA°	T85	—	— — —	—	—	16 000	24 000	28.5	8.5	14.5	29.5	0.3
7201 C°	TYN	W,(M),T	DB DF DT	12 800	7 700	30 000	40 000	15.9	4.1	—	29.5	0.3
7301 A	W	(M), T	DB DF DT	15 400	9 000	15 000	20 000	26.1	2.1	17	32	0.6
7301 B	W	(M), T	DB DF DT	14 400	8 400	13 000	18 000	32.6	8.6	17	32	0.6
7301 BEA°	T85	—	— — —	—	—	15 000	22 000	32.6	8.6	17	32	0.6
7902 A5°	TYN	(M),T	DB DF DT	7 400	5 050	26 000	34 000	17.0	3.0	—	26.8	0.15
7902 C°	TYN	(M), T, TYN	DB DF DT	7 750	5 300	30 000	43 000	12.8	1.2	—	26.8	0.15
7002 A°	W	(M), T, TYN	DB DF DT	9 950	6 850	19 000	26 000	22.6	4.6	16.2	30.8	0.15
7002 C°	TYN	W, (M),T	DB DF DT	10 100	6 750	28 000	38 000	15.3	2.7	—	30.8	0.15
7202 A°	W	(M), T, TYN	DB DF DT	14 000	9 300	18 000	24 000	25.4	3.4	17.5	32.5	0.3
7202 B	W	(M),T	DB DF DT	12 900	8 600	13 000	18 000	32.0	10.0	17.5	32.5	0.3
7202 BEA°	T85	—	— — —	—	—	14 000	20 000	32.0	10.0	17.5	32.5	0.3
7202 C°	TYN	W,(M),T	DB DF DT	14 100	9 050	26 000	36 000	17.7	4.3	—	32.5	0.3
7302 A	W	(M), T	DB DF DT	21 800	14 200	13 000	17 000	29.5	3.5	20	37	0.6
7302 B	W	(M), T	DB DF DT	20 200	13 200	11 000	15 000	36.9	10.9	20	37	0.6
7302 BEA°	T85	—	— — —	—	—	13 000	18 000	36.9	10.9	20	37	0.6





Dynamic Equivalent Load $P = X F_r + Y F_a$

Contact Angle	$H_F F_a^*$ C_{or}	e	Single, DT				DB or DF			
			$F_a/F_r \leq e$		$F_a/F_r > e$		$F_a/F_r \leq e$		$F_a/F_r > e$	
			X	Y	X	Y	X	Y	X	Y
15°	0.178	0.38	1	0	0.44	1.47	1	1.65	0.72	2.39
	0.357	0.40	1	0	0.44	1.40	1	1.57	0.72	2.28
	0.714	0.43	1	0	0.44	1.30	1	1.46	0.72	2.21
	1.07	0.46	1	0	0.44	1.23	1	1.38	0.72	2.00
	1.43	0.47	1	0	0.44	1.19	1	1.34	0.72	1.93
	2.14	0.50	1	0	0.44	1.12	1	1.26	0.72	1.82
	3.57	0.55	1	0	0.44	1.02	1	1.14	0.72	1.66
	5.35	0.56	1	0	0.44	1.00	1	1.12	0.72	1.63
25°	—	0.68	1	0	0.41	0.87	1	0.92	0.67	1.41
30°	—	0.80	1	0	0.39	0.76	1	0.78	0.63	1.24
40°	—	1.14	1	0	0.35	0.57	1	0.55	0.57	0.93

*For i, use 2 for DB, DF and 1 for DT

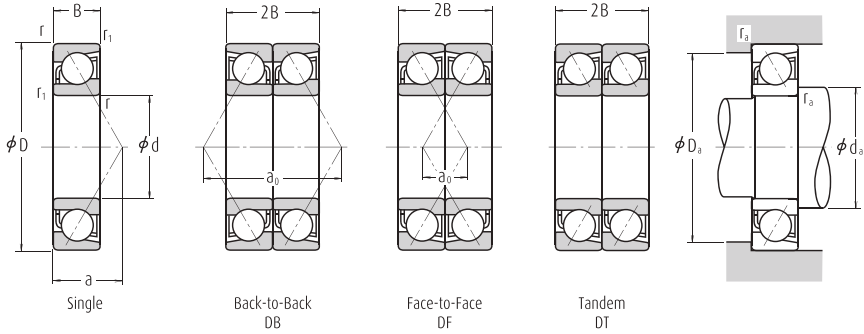
Static Equivalent Load $P_0 = X_0 F_r + Y_0 F_a$

Contact Angle	Single, DT		DB or DF		Single or DT mounting When $F_r > 0.5 F_r + Y_0 F_a$ use $P_0 = F_r$
	X_0	Y_0	X_0	Y_0	
15°	0.5	0.46	1	0.92	
25°	0.5	0.38	1	0.76	
30°	0.5	0.33	1	0.66	
40°	0.5	0.26	1	0.52	

Bearing Numbers (°) Cage Symbol (°)				Basic Load Ratings (Matched) (N)		Limiting Speeds (°) (Matched) (min ⁻¹)		Load Center Spacings (mm)		Abutment and Fillet Dimensions (mm)			
Single	Standard	Option	Duplex	C _r	C _{0r}	Grease	Oil	DB	a ₀	DF	d _b (°) min.	D _b max.	r _b (°) max.
7903 A5°	TYN	(M),T	DB DF DT	7 750	5 600	24 000	32 000	18.0	4.0	—	—	28.8	0.15
7903 C°	TYN	(M),T	DB DF DT	8 150	5 850	28 000	38 000	13.3	0.7	—	—	28.8	0.15
7003 A°	W	(M), T, TYN	DB DF DT	10 400	7 650	17 000	24 000	25.0	5.0	18.2	—	33.8	0.15
7003 C°	TYN	W, (M), T	DB DF DT	10 700	7 600	26 000	34 000	17.0	3.0	—	—	33.8	0.15
7203 A°	W	(M), T, TYN	DB DF DT	17 600	12 000	16 000	22 000	28.5	4.5	19.5	—	37.5	0.3
7203 B	W	(M),T	DB DF DT	16 100	11 000	11 000	15 000	35.9	11.9	19.5	—	37.5	0.3
7203 BEA°	T85	T7	— — —	—	—	13 000	18 000	36.3	12.3	19.5	—	37.5	0.3
7203 C°	TYN	W, (M), T	DB DF DT	17 600	11 700	22 000	32 000	19.6	4.4	—	—	37.5	0.3
7303 A	W	(M), T	DB DF DT	25 900	17 300	11 000	15 000	32.5	4.5	22	—	42	0.6
7303 B	W	(M), T	DB DF DT	24 000	16 000	10 000	14 000	40.9	12.9	22	—	42	0.6
7303 BEA°	T85	—	— — —	—	—	11 000	16 000	40.9	12.9	22	—	42	0.6
7904 A5°	TYN	(M),T	DB DF DT	10 700	8 100	19 000	26 000	22.3	4.3	—	—	35.8	0.15
7904 C°	TYN	(M),T	DB DF DT	11 300	8 500	22 000	32 000	16.6	1.4	—	—	35.8	0.15
7004 A°	W	(M), T, TYN	DB DF DT	17 600	13 200	15 000	20 000	29.9	5.9	22.5	—	39.5	0.3
7004 C°	TYN	W, (M), T	DB DF DT	18 000	13 100	20 000	30 000	20.3	3.7	—	—	39.5	0.3
7204 A°	W	(M), T, TYN	DB DF DT	23 500	16 600	13 000	19 000	33.3	5.3	25	—	42	0.6
7204 B	W	(M),T	DB DF DT	21 600	15 300	9 500	13 000	42.1	14.1	25	—	42	0.6
7204 BEA°	T85	T7	— — —	—	—	11 000	16 000	42.1	14.1	25	—	42	0.6
7204 C°	TYN	W, (M), T	DB DF DT	23 600	16 100	19 000	26 000	23.0	5.0	—	—	42	0.6
7304 A	W	(M), T	DB DF DT	30 500	20 800	10 000	13 000	35.8	5.8	25	—	47	0.6
7304 B	W	(M), T	DB DF DT	28 200	19 300	9 000	12 000	45.2	15.2	25	—	47	0.6
7304 BEA°	T85	MR, T7	— — —	—	—	10 000	14 000	45.2	15.2	25	—	47	0.6
7905 A5°	TYN	(M),T	DB DF DT	12 100	10 300	16 000	22 000	24.6	6.6	—	—	40.8	0.15
7905 C°	TYN	(M),T	DB DF DT	12 700	10 800	19 000	26 000	18.0	0.0	—	—	40.8	0.15
7005 A°	W	(M), T, TYN	DB DF DT	18 300	14 800	13 000	17 000	32.8	8.8	27.5	—	44.5	0.3
7005 C°	TYN	W, (M), T	DB DF DT	19 000	14 800	18 000	26 000	21.6	2.4	—	—	44.5	0.3
7205 A°	W	(M), T, TYN	DB DF DT	26 300	20 500	12 000	16 000	37.2	7.2	30	—	47	0.6
7205 B	W	(M),T	DB DF DT	24 000	18 800	8 500	11 000	47.3	17.3	30	—	47	0.6
7205 BEA°	T85	T7	— — —	—	—	9 500	14 000	47.3	17.3	30	—	47	0.6
7205 C°	TYN	W, (M), T	DB DF DT	27 000	20 400	17 000	24 000	25.3	4.7	—	—	47	0.6
7305 A	W	(M), T	DB DF DT	43 000	31 500	8 500	11 000	42.1	8.1	30	—	57	0.6

Angular Contact Ball Bearings

Single/matched mountings Bore Diameter 25 – 40 mm



Boundary Dimensions (mm)					Basic Load Ratings (Single) (N)		Factor	Limiting Speeds (1) (min ⁻¹)		Eff. Load Centers (mm)	Abutment and Fillet Dimensions (mm)			Mass (kg)
d	D	B	r min.	r ₁ min.	C _r	C _{0r}	f ₀	Grease	Oil	a	d _a min.	D _a max.	r _a max.	approx.
25	62	17	1.1	0.6	24 400	14 600	—	9 000	13 000	26.7	32	55	1	0.241
	62	17	1.1	0.6	27 200	14 900	—	10 000	15 000	26.8	32	55	1	0.229
	47	9	0.3	0.15	8 250	5 950	—	26 000	39 000	13.5	32.5	44.5	0.3	0.049
	47	9	0.3	0.15	8 700	6 250	15.9	29 900	45 500	9.7	32.5	44.5	0.3	0.049
30	55	13	1	0.6	14 600	9 450	—	17 700	23 600	18.8	36	49	1	0.116
	55	13	1	0.6	15 900	10 300	14.9	27 100	41 200	12.2	36	49	1	0.134
	62	16	1	0.6	22 400	13 600	—	16 400	21 800	21.3	36	56	1	0.197
	62	16	1	0.6	20 500	13 500	—	8 500	12 000	27.3	36	56	1	0.202
	62	16	1	0.6	23 700	14 300	—	10 000	14 000	27.3	36	56	1	0.194
	62	16	1	0.6	24 200	14 700	13.9	25 000	38 100	14.2	36	56	1	0.222
	72	19	1.1	0.6	33 500	20 900	—	9 000	12 000	24.2	37	65	1	0.346
	72	19	1.1	0.6	31 000	19 300	—	8 000	11 000	30.9	37	65	1	0.354
	72	19	1.1	0.6	36 500	20 600	—	9 000	13 000	30.9	37	65	1	0.336
	55	10	0.6	0.3	12 000	8 700	—	22 300	33 400	15.5	40	50	0.6	0.074
	55	10	0.6	0.3	12 700	9 150	15.7	25 600	38 900	11.0	40	50	0.6	0.074
	62	14	1	0.6	18 400	12 600	—	15 500	20 700	21.0	41	56	1	0.153
35	62	14	1	0.6	20 100	13 700	15.0	23 800	36 100	13.5	41	56	1	0.173
	72	17	1.1	0.6	29 600	18 500	—	14 100	18 700	23.9	42	65	1	0.287
	72	17	1.1	0.6	27 100	18 400	—	7 500	10 000	30.9	42	65	1	0.294
	72	17	1.1	0.6	32 500	19 600	—	8 500	12 000	30.9	42	65	1	0.271
	72	17	1.1	0.6	32 000	19 900	13.9	21 500	32 800	15.7	42	65	1	0.32
	80	21	1.5	1	40 000	26 300	—	8 000	10 000	27.1	44	71	1.5	0.469
	80	21	1.5	1	40 500	24 400	—	5 600	7 500	34.6	44	71	1.5	0.474
	80	21	1.5	1	40 500	24 400	—	8 000	11 000	34.6	44	71	1.5	0.451
	62	12	0.6	0.3	14 300	11 200	—	14 000	18 000	17.9	45	57	0.6	0.11
	62	12	0.6	0.3	15 900	11 700	15.7	22 600	34 400	12.8	45	57	0.6	0.109
	68	15	1	0.6	19 700	14 600	—	13 900	18 600	23.1	46	62	1	0.19
	68	15	1	0.6	21 600	15 900	15.4	21 300	32 500	14.7	46	62	1	0.213
40	80	18	1.1	0.6	35 500	23 300	—	12 500	16 700	26.3	47	73	1	0.375
	80	18	1.1	0.6	32 000	23 000	—	6 700	9 000	34.2	47	73	1	0.383

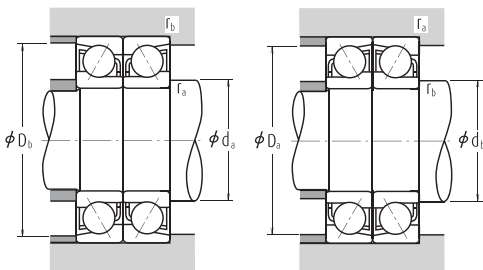
Dynamic Equivalent Load $P = X F_r + Y F_a$

Contact Angle	H_{F_r} F_{or}	e	Single, DT				DB or DF			
			$F_a/F_r \leq e$		$F_a/F_r > e$		$F_a/F_r \leq e$		$F_a/F_r > e$	
			X	Y	X	Y	X	Y	X	Y
15°	0.178	0.38	1	0	0.44	1.47	1	1.65	0.72	2.39
	0.357	0.40	1	0	0.44	1.40	1	1.57	0.72	2.28
	0.714	0.43	1	0	0.44	1.30	1	1.46	0.72	2.11
	1.07	0.46	1	0	0.44	1.23	1	1.38	0.72	2.00
	1.43	0.47	1	0	0.44	1.19	1	1.34	0.72	1.93
	2.14	0.50	1	0	0.44	1.12	1	1.26	0.72	1.82
	3.57	0.55	1	0	0.44	1.02	1	1.14	0.72	1.66
	5.35	0.56	1	0	0.44	1.00	1	1.12	0.72	1.63
	—	0.68	1	0	0.41	0.87	1	0.92	0.67	1.41
	—	0.80	1	0	0.39	0.76	1	0.78	0.63	1.24
25°	—	1.14	1	0	0.35	0.57	1	0.55	0.57	0.93
30°	—	—	—	—	—	—	—	—	—	—
40°	—	—	—	—	—	—	—	—	—	—

*For i, use 2 for DB, DF and 1 for DT

Static Equivalent Load $P_0 = X_0 F_r + Y_0 F_a$

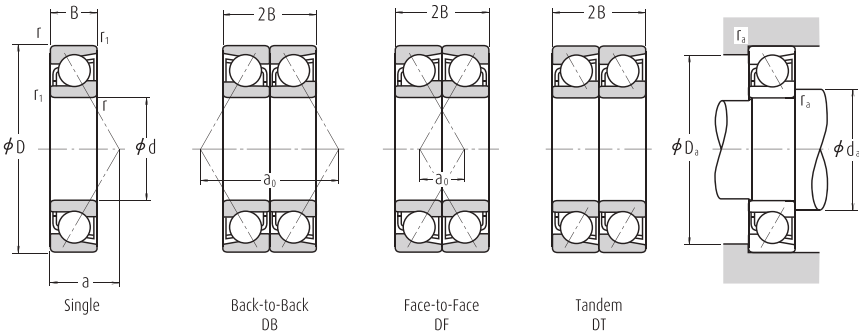
Contact Angle	Single, DT		DB or DF		Single or DT mounting When $F_r > 0.5 F_r + Y_r F_a$ use $P_0 = F_r$
	X_0	Y_0	X_0	Y_0	
15°	0.5	0.46	1	0.92	
25°	0.5	0.38	1	0.76	
30°	0.5	0.33	1	0.66	
40°	0.5	0.26	1	0.52	



Bearing Numbers (2) Cage Symbol (4)				Basic Load Ratings (Matched) (N)		Limiting Speeds (1) (Matched) (min ⁻¹)		Load Center Spacings (mm)		Abutment and Fillet Dimensions (mm)		
Single	Standard	Option	Duplex	C_r	C_{or}	Grease	Oil	DB	a ₀ DF	d _b (3) min.	D _b max.	f _b (3) max.
7305 B	W	(M), T	DB DF DT	39 500	29 300	7 500	10 000	53.5	19.5	30	57	0.6
7305 BEA [®]	T8S	MR, T7	—	—	—	8 500	12 000	53.5	19.5	30	57	0.6
7906 A5 [®]	TYN	(M), T	DB DF DT	12 800	11 900	14 000	19 000	27.0	9.0	—	45.8	0.15
7906 C [®]	TYN	(M), T	DB DF DT	13 500	12 500	17 000	24 000	19.3	1.3	—	45.8	0.15
7006 A [®]	W	(M), T, TYN	DB DF DT	23 600	20 200	17 000	15 000	37.5	11.5	35	50	0.6
7006 C [®]	TYN	W, (M), T	DB DF DT	24 600	20 500	15 000	22 000	24.4	1.6	—	50	0.6
7206 A [®]	W	(M), T, TYN	DB DF DT	36 500	29 500	10 000	13 000	42.6	10.6	35	57	0.6
7206 B	W	(M), T	DB DF DT	33 500	27 000	7 100	9 500	54.6	22.6	35	57	0.6
7206 BEA [®]	T8S	MR, T7	—	—	—	8 000	11 000	54.6	22.6	35	57	0.6
7206 C [®]	TYN	W, (M), T	DB DF DT	37 500	29 300	14 000	20 000	28.3	3.7	—	57	0.6
7306 A	W	(M), T	DB DF DT	54 500	41 500	7 100	9 500	48.4	10.4	35	67	0.6
7306 B	W	(M), T	DB DF DT	50 500	38 500	6 300	8 500	61.8	23.8	35	67	0.6
7306 BEA [®]	T8S	MR, T7	—	—	—	7 100	10 000	61.8	23.8	35	67	0.6
7907 A5 [®]	TYN	(M), T	DB DF DT	18 600	17 400	12 000	17 000	31.0	11.0	—	52.5	0.3
7907 C [®]	TYN	(M), T	DB DF DT	19 600	18 300	14 000	20 000	22.1	2.1	—	52.5	0.3
7007 A [®]	W	(M), T, TYN	DB DF DT	29 700	26 800	9 500	13 000	42.0	14.0	40	57	0.6
7007 C [®]	TYN	W, (M), T	DB DF DT	31 000	27 300	13 000	19 000	27.0	1.0	—	57	0.6
7207 A [®]	W	(M), T, TYN	DB DF DT	48 500	40 000	8 500	12 000	47.9	13.9	40	67	0.6
7207 BEA	W	MR, T7	DB DF DT	65 500	49 000	4 500	6 000	69.2	27.2	41	74	1
7207 BEA [®]	T8S	MR, T7	—	—	—	6 700	9 500	61.9	27.9	40	67	0.6
7207 C [®]	(M)	W, T, TYN	DB DF DT	49 500	40 000	12 000	17 000	31.3	2.7	—	67	0.6
7307 A	W	(M), T	DB DF DT	65 000	52 500	6 300	8 500	54.2	12.2	41	74	1
7307 B	W	(M), T	DB DF DT	59 500	48 500	5 600	7 500	69.2	27.2	41	74	1
7307 BEA [®]	T8S	MR, T7	—	—	—	6 300	9 000	69.2	27.2	41	74	1
7908 A5	TYN	(M), T	DB DF DT	23 300	22 300	11 000	15 000	35.8	11.8	—	59.5	0.3
7908 C [®]	TYN	(M), T	DB DF DT	24 600	23 500	13 000	18 000	25.7	1.7	—	59.5	0.3
7008 A [®]	W	(M), T, TYN	DB DF DT	31 500	31 000	8 500	11 000	46.2	16.2	45	63	0.6
7008 C [®]	(M)	W, T, TYN	DB DF DT	33 500	32 000	12 000	17 000	29.5	0.5	—	63	0.6
7208 A [®]	W	(M), T, TYN	DB DF DT	57 500	50 500	7 500	10 000	52.6	16.6	45	75	0.6
7208 B	W	(M), T	DB DF DT	52 000	46 000	5 300	7 500	68.3	32.3	45	75	0.6

Angular Contact Ball Bearings

Single/matched mountings Bore Diameter 40 – 55 mm



Boundary Dimensions (mm)					Basic Load Ratings (Single) (N)		Factor	Limiting Speeds (1) (min ⁻¹)		Eff. Load Centers (mm)	Abutment and Fillet Dimensions (mm)			Mass (kg)
d	D	B	r min.	r ₁ min.	C _r	C _{0r}	f ₀	Grease	Oil	a	d _a min.	D _a max.	r _a max.	approx.
40	80	18	1.1	0.6	38 500	24 500	—	7 500	11 000	34.2	47	73	1	0.357
	80	18	1.1	0.6	38 000	25 200	14.1	19 200	29 200	17.0	47	73	1	0.418
	90	23	1.5	1	49 000	33 000	—	7 100	9 000	30.3	49	81	1.5	0.633
	90	23	1.5	1	53 000	33 000	—	5 000	6 700	38.8	49	81	1.5	0.644
	90	23	1.5	1	53 000	33 000	—	7 100	10 000	38.8	49	81	1.5	0.619
45	68	12	0.6	0.3	15 900	12 700	—	17 700	26 600	19.2	50	63	0.6	0.13
	68	12	0.6	0.3	16 800	13 400	16.0	20 400	31 000	13.6	50	63	0.6	0.129
	75	16	1	0.6	23 400	17 700	—	12 500	16 700	25.3	51	69	1	0.25
	75	16	1	0.6	25 600	19 300	15.4	19 200	29 200	16.0	51	69	1	0.274
	85	19	1.1	0.6	39 500	26 700	—	11 600	15 400	28.3	52	78	1	0.411
	85	19	1.1	0.6	36 000	26 200	—	6 300	8 500	36.8	52	78	1	0.421
	85	19	1.1	0.6	40 500	27 100	—	7 100	10 000	36.8	52	78	1	0.40
	85	19	1.1	0.6	43 000	28 800	14.2	17 700	27 000	18.2	52	78	1	0.468
	100	25	1.5	1	63 500	43 500	—	6 300	8 500	33.4	54	91	1.5	0.848
	100	25	1.5	1	62 500	39 500	—	4 500	6 000	42.9	54	91	1.5	0.860
50	100	25	1.5	1	62 500	39 500	—	6 300	9 000	42.9	54	91	1.5	0.823
	72	12	0.6	0.3	16 700	14 200	—	16 400	24 600	20.2	55	67	0.6	0.132
	72	12	0.6	0.3	17 700	15 000	16.2	18 900	28 700	14.2	55	67	0.6	0.13
	80	16	1	0.6	24 900	21 100	—	11 600	15 400	26.8	56	74	1	0.263
	80	16	1	0.6	27 300	21 900	15.7	17 700	27 000	16.7	56	74	1	0.293
	90	20	1.1	0.6	41 500	29 300	—	10 800	14 300	30.2	57	83	1	0.466
	90	20	1.1	0.6	37 500	28 600	—	5 600	8 000	39.4	57	83	1	0.477
	90	20	1.1	0.6	42 000	29 700	—	6 300	9 500	39.4	57	83	1	0.453
	90	20	1.1	0.6	45 000	31 500	14.5	16 500	25 000	19.4	57	83	1	0.528
	110	27	2	1	74 000	52 000	—	5 600	7 500	36.6	60	100	2	1.1
55	110	27	2	1	78 000	50 500	—	4 000	5 600	47.1	60	100	2	1.11
	110	27	2	1	78 000	50 500	—	5 600	8 000	47.1	60	100	2	1.07
	80	13	1	0.6	19 000	16 800	—	14 900	22 300	22.2	61	74	1	0.184
	80	13	1	0.6	20 100	17 700	16.3	17 100	26 000	15.5	61	74	1	0.182
	90	18	1.1	0.6	32 500	26 300	—	10 400	13 800	29.9	62	83	1	0.391

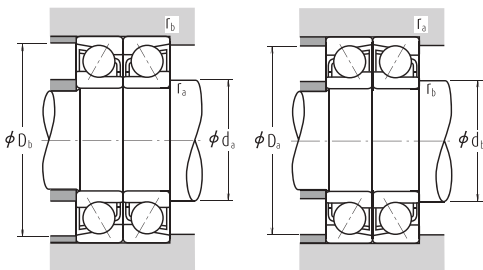
Dynamic Equivalent Load $P = X F_r + Y F_a$

Contact Angle	$H_F F_r^*$ C_{or}	e	Single, DT				DB or DF			
			$F_a/F_r \leq e$		$F_a/F_r > e$		$F_a/F_r \leq e$		$F_a/F_r > e$	
			X	Y	X	Y	X	Y	X	Y
15°	0.178	0.38	1	0	0.44	1.47	1	1.65	0.72	2.39
	0.357	0.40	1	0	0.44	1.40	1	1.57	0.72	2.28
	0.714	0.43	1	0	0.44	1.30	1	1.46	0.72	2.11
	1.07	0.46	1	0	0.44	1.23	1	1.38	0.72	2.00
	1.43	0.47	1	0	0.44	1.19	1	1.34	0.72	1.93
	2.14	0.50	1	0	0.44	1.12	1	1.26	0.72	1.82
	3.57	0.55	1	0	0.44	1.02	1	1.14	0.72	1.66
	5.35	0.56	1	0	0.44	1.00	1	1.12	0.72	1.63
	—	0.68	1	0	0.41	0.87	1	0.92	0.67	1.41
	—	0.80	1	0	0.39	0.76	1	0.78	0.63	1.24
25°	—	1.14	1	0	0.35	0.57	1	0.55	0.57	0.93
30°	—	—	—	—	—	—	—	—	—	—
40°	—	—	—	—	—	—	—	—	—	—

*For i, use 2 for DB, DF and 1 for DT

Static Equivalent Load $P_0 = X_0 F_r + Y_0 F_a$

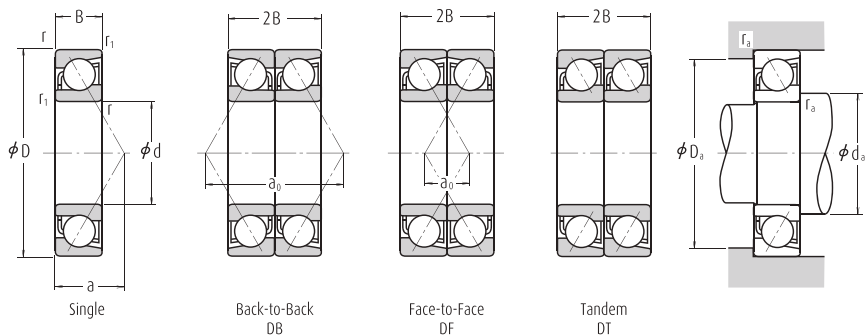
Contact Angle	Single, DT		DB or DF		Single or DT mounting When $F_r > 0.5 F_r + Y_0 F_a$ use $P_0 = F_r$
	X_0	Y_0	X_0	Y_0	
15°	0.5	0.46	1	0.92	
25°	0.5	0.38	1	0.76	
30°	0.5	0.33	1	0.66	
40°	0.5	0.26	1	0.52	



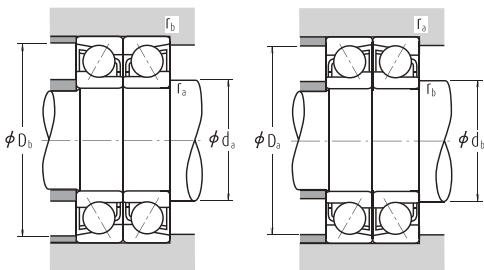
Bearing Numbers (2) Cage Symbol (4)				Basic Load Ratings (Matched) (N)		Limiting Speeds (1) (Matched) (min ⁻¹)		Load Center Spacings (mm)		Abutment and Fillet Dimensions (mm)		
Single	Standard	Option	Duplex	C_r	C_{or}	Grease	Oil	DB	a_0 DF	d_b (3) min.	D_b max.	f_b (3) max.
7208 BEA ^o	T85	MR, T7	—	—	—	6 000	8 500	68.3	32.3	45	75	0.6
7208 C ^o	(M)	W, T, TYN	DB DF DT	59 000	50 500	11 000	15 000	34.1	1.9	—	75	0.6
7308 A ^o	W	(M), T	DB DF DT	79 500	66 000	5 600	7 500	60.5	14.5	46	84	1
7308 BEA	W	MR, T7	DB DF DT	68 500	65 500	4 000	5 300	85.8	35.8	51	94	1
7308 BEA ^o	T85	MR, T7	—	—	—	5 600	8 000	77.5	31.5	46	84	1
7909 A5 ^o	(M)	T, TYN	DB DF DT	24 600	25 400	9 500	13 000	38.4	14.4	—	65.5	0.3
7909 C ^o	(M)	T, TYN	DB DF DT	26 000	26 800	12 000	16 000	27.1	3.1	—	65.5	0.3
7009 A ^o	W	(M), TYN	DB DF DT	37 500	37 500	7 500	10 000	50.6	18.6	50	70	0.6
7009 C ^o	(M)	W, TYN	DB DF DT	39 500	38 500	11 000	15 000	32.1	0.1	—	70	0.6
7209 A ^o	W	(M), T, TYN	DB DF DT	64 500	57 500	7 100	9 500	56.5	18.5	50	80	0.6
7209 B	W	(M), T	DB DF DT	58 500	52 500	5 000	6 700	73.5	35.5	50	80	0.6
7209 BEA ^o	T85	MR, T7	—	—	—	5 600	8 000	73.5	35.5	50	80	0.6
7209 C ^o	(M)	W, T, TYN	DB DF DT	66 500	57 500	10 000	14 000	36.4	1.6	—	80	0.6
7309 A	W	(M), T	DB DF DT	103 000	87 000	5 000	6 700	66.9	16.9	51	94	1
7309 BEA	W	MR, T7	DB DF DT	102 000	79 500	3 600	4 800	85.8	35.8	51	94	1
7309 BEA ^o	T85	MR, T7	—	—	—	5 000	7 100	85.8	35.8	51	94	1
7910 A5 ^o	(M)	T, TYN	DB DF DT	25 900	28 400	9 000	12 000	40.5	16.5	—	69.5	0.3
7910 C ^o	(M)	T, TYN	DB DF DT	27 400	30 000	11 000	15 000	28.3	4.3	—	69.5	0.3
7010 A ^o	W	(M), T, TYN	DB DF DT	40 000	42 000	7 100	9 500	53.5	21.5	55	75	0.6
7010 C ^o	(M)	W, T, TYN	DB DF DT	42 000	44 000	10 000	14 000	33.4	1.4	—	75	0.6
7210 A ^o	W	(M), T, TYN	DB DF DT	67 000	63 000	6 300	9 000	60.4	20.4	55	85	0.6
7210 B	W	(M), T	DB DF DT	60 500	57 000	4 500	6 300	78.7	38.7	55	85	0.6
7210 BEA ^o	T85	MR, T7	—	—	—	5 000	7 500	78.7	38.7	55	85	0.6
7210 C ^o	(M)	W, T, TYN	DB DF DT	69 500	63 500	9 500	13 000	38.7	1.3	—	85	0.6
7310 A	W	(M), T	DB DF DT	121 000	104 000	4 500	6 000	73.2	19.2	56	104	1
7310 BEA	W	MR, T7	DB DF DT	127 000	101 000	3 200	4 500	94.1	40.1	56	104	1
7310 BEA ^o	T85	MR, T7	—	—	—	4 500	6 700	94.1	40.1	56	104	1
7911 A5 ^o	(M)	T, TYN	DB DF DT	29 300	33 500	8 000	11 000	44.5	18.5	—	75	0.6
7911 C ^o	(M)	T, TYN	DB DF DT	31 000	35 500	9 500	13 000	31.1	5.1	—	75	0.6
7011 A ^o	W	(M), T, TYN	DB DF DT	52 500	55 500	6 300	8 500	59.9	23.9	60	85	0.6

Angular Contact Ball Bearings

Single/matched mountings Bore Diameter 55 – 65 mm



Boundary Dimensions (mm)					Basic Load Ratings (Single) (N)		Factor	Limiting Speeds (1) (min ⁻¹)		Eff. Load Centers (mm)	Abutment and Fillet Dimensions (mm)			Mass (kg)
d	D	B	r min.	r ₁ min.	C _r	C _{0r}	f ₀	Grease	Oil	a	d _s min.	D _s max.	r _s max.	approx.
55	90	18	1.1	0.6	36 000	28 600	15.5	15 900	24 200	18.7	62	83	1	0.43
	100	21	1.5	1	51 000	37 000	—	9 700	13 000	32.9	64	91	1.5	0.613
	100	21	1.5	1	46 500	36 000	—	5 300	7 100	43.0	64	91	1.5	0.627
	100	21	1.5	1	51 500	37 000	—	6 000	8 500	43.0	64	91	1.5	0.596
	100	21	1.5	1	55 500	40 000	14.5	14 900	22 600	20.9	64	91	1.5	0.688
	120	29	2	1	86 000	61 500	—	5 000	6 700	39.8	65	110	2	1.41
	120	29	2	1	89 000	58 500	—	3 600	5 000	51.2	65	110	2	1.42
	120	29	2	1	89 000	58 500	—	5 000	7 500	51.2	65	110	2	1.36
	85	13	1	0.6	19 200	17 700	—	13 800	20 700	23.4	66	79	1	0.197
	85	13	1	0.6	20 400	18 700	16.5	15 900	24 200	16.2	66	79	1	0.194
60	95	18	1.1	0.6	33 500	28 100	—	9 700	13 000	31.4	67	88	1	0.417
	95	18	1.1	0.6	37 000	30 500	15.7	14 900	22 600	19.4	67	88	1	0.46
	110	22	1.5	1	62 000	45 500	—	8 900	11 800	35.5	69	101	1.5	0.798
	110	22	1.5	1	56 000	44 500	—	4 800	6 300	46.7	69	101	1.5	0.815
	110	22	1.5	1	61 500	45 000	—	5 300	7 500	46.7	69	101	1.5	0.791
	110	22	1.5	1	67 500	49 000	14.4	13 600	20 600	22.4	69	101	1.5	0.889
	130	31	2.1	1.1	98 000	71 500	—	4 800	6 300	42.9	72	118	2	1.74
	130	31	2.1	1.1	102 000	68 500	—	3 400	4 500	55.4	72	118	2	1.77
	130	31	2.1	1.1	102 000	68 500	—	4 800	6 700	55.4	72	118	2	1.7
	90	13	1	0.6	20 000	19 400	—	13 000	19 400	24.6	71	84	1	0.211
65	90	13	1	0.6	21 200	20 500	16.7	14 900	22 600	16.9	71	84	1	0.208
	100	18	1.1	0.6	33 500	31 500	—	9 100	12 200	32.8	72	93	1	0.455
	100	18	1.1	0.6	39 000	34 500	15.9	14 000	21 300	20.0	72	93	1	0.493
	120	23	1.5	1	70 500	54 000	—	8 200	10 900	38.2	74	111	1.5	1.03
	120	23	1.5	1	63 500	52 500	—	4 300	6 000	50.3	74	111	1.5	1.05
	120	23	1.5	1	70 000	53 500	—	4 800	7 100	50.3	74	111	1.5	1.01
	120	23	1.5	1	77 000	58 500	14.6	12 500	19 000	23.9	74	111	1.5	1.14
	140	33	2.1	1.1	111 000	82 000	—	4 300	6 000	46.1	77	128	2	2.12
	140	33	2.1	1.1	114 000	77 000	—	3 200	4 300	59.5	77	128	2	2.17
	140	33	2.1	1.1	114 000	77 000	—	4 300	6 300	59.5	77	128	2	2.09



Dynamic Equivalent Load $P = X F_r + Y F_a$

Contact Angle	$H_F F_r$ C_{or}	e	Single, DT				DB or DF			
			$F_a/F_r \leq e$		$F_a/F_r > e$		$F_a/F_r \leq e$		$F_a/F_r > e$	
			X	Y	X	Y	X	Y	X	Y
15°	0.178	0.38	1	0	0.44	1.47	1	1.65	0.72	2.39
	0.357	0.40	1	0	0.44	1.40	1	1.57	0.72	2.28
	0.714	0.43	1	0	0.44	1.30	1	1.46	0.72	2.11
	1.07	0.46	1	0	0.44	1.23	1	1.38	0.72	2.00
	1.43	0.47	1	0	0.44	1.19	1	1.34	0.72	1.93
	2.14	0.50	1	0	0.44	1.12	1	1.26	0.72	1.82
	3.57	0.55	1	0	0.44	1.02	1	1.14	0.72	1.66
	5.35	0.56	1	0	0.44	1.00	1	1.12	0.72	1.63
25°	—	0.68	1	0	0.41	0.87	1	0.92	0.67	1.41
30°	—	0.80	1	0	0.39	0.76	1	0.78	0.63	1.24
40°	—	1.14	1	0	0.35	0.57	1	0.55	0.57	0.93

*For i, use 2 for DB, DF and 1 for DT

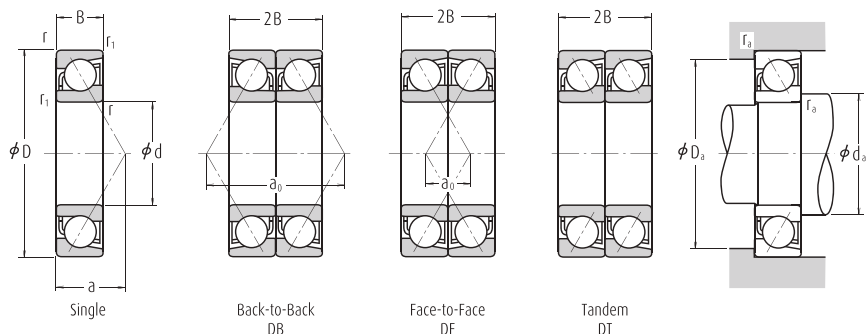
Static Equivalent Load $P_0 = X_0 F_r + Y_0 F_a$

Contact Angle	Single, DT		DB or DF		Single or DT mounting When $F_r > 0.5 F_r + Y_0 F_a$ use $P_0 = F_r$
	X_0	Y_0	X_0	Y_0	
15°	0.5	0.46	1	0.92	
25°	0.5	0.38	1	0.76	
30°	0.5	0.33	1	0.66	
40°	0.5	0.26	1	0.52	

Bearing Numbers (2) Cage Symbol (4)				Basic Load Ratings (Matched) (N)		Limiting Speeds (1) (Matched) (min ⁻¹)		Load Center Spacings (mm)		Abutment and Fillet Dimensions (mm)		
Single	Standard	Option	Duplex	C_r	C_{or}	Grease	Oil	DB	a ₀ DF	d _b (3) min.	D _b max.	r _b (3) max.
7011 C°	(M)	W, T, TYN	DB DF DT	55 500	57 500	9 000	12 000	37.4	1.4	—	85	0.6
7211 A°	W	(M), T, TYN	DB DF DT	83 000	79 000	6 000	8 000	65.7	23.7	61	94	1
7211 B	W	(M), T	DB DF DT	75 000	72 000	4 000	5 600	86.0	44.0	61	94	1
7211 BEA°	T85	MR, T7	—	—	—	4 500	6 700	86.0	44.0	61	94	1
7211 C°	(M)	W, T, TYN	DB DF DT	86 000	80 000	8 500	12 000	41.7	0.3	—	94	1
7311 A	W	(M), T	DB DF DT	139 000	123 000	4 000	5 600	79.5	21.5	61	114	1
7311 BEA	W	MR, T7	DB DF DT	145 000	117 000	3 000	4 000	102.4	44.4	61	114	1
7311 BEA°	T85	MR, T7	—	—	—	4 000	6 000	102.4	44.4	61	114	1
7912 A5°	(M)	T, TYN	DB DF DT	29 800	35 500	7 500	10 000	46.8	20.8	—	80	0.6
7912 C°	(M)	T, TYN	DB DF DT	31 500	37 500	9 000	12 000	32.4	6.4	—	80	0.6
7012 A°	W	(M), T, TYN	DB DF DT	53 500	59 000	6 000	8 000	62.7	26.7	65	90	0.6
7012 C°	(M)	W, T, TYN	DB DF DT	57 000	61 500	8 500	12 000	38.8	2.8	—	90	0.6
7212 A°	W	(M), T, TYN	DB DF DT	100 000	97 500	5 300	7 100	71.1	27.1	66	104	1
7212 B	W	(M), T	DB DF DT	91 000	89 000	3 800	5 300	93.3	49.3	66	104	1
7212 BEA°	T85	MR, T7	—	—	—	4 300	6 000	93.3	49.3	66	104	1
7212 C°	(M)	W, T, TYN	DB DF DT	104 000	98 500	7 500	11 000	44.8	0.8	—	104	1
7312 A	W	(M), T	DB DF DT	159 000	143 000	3 800	5 000	85.9	23.9	67	123	1
7312 BEA	W	MR, T7	DB DF DT	166 000	137 000	2 600	3 800	110.7	48.7	67	123	1
7312 BEA°	T85	MR, T7	—	—	—	3 800	5 600	110.7	48.7	67	123	1
7913 A5°	(M)	T, TYN	DB DF DT	31 000	39 000	7 100	9 500	49.1	23.1	—	85	0.6
7913 C°	(M)	T, TYN	DB DF DT	33 000	41 000	8 500	12 000	33.8	7.8	—	85	0.6
7013 A°	W	(M), T, TYN	DB DF DT	56 500	65 500	5 600	7 500	65.6	29.6	70	95	0.6
7013 C°	(M)	W, T, TYN	DB DF DT	60 500	68 500	8 000	11 000	40.1	4.1	—	95	0.6
7213 A°	W	(M), T, TYN	DB DF DT	114 000	116 000	4 800	6 700	76.4	30.4	71	114	1
7213 B	W	(M), T	DB DF DT	103 000	105 000	3 400	4 800	100.6	54.6	71	114	1
7213 BEA°	T85	MR, T7	—	—	—	3 800	5 600	100.6	54.6	71	114	1
7213 C°	(M)	W, T, TYN	DB DF DT	119 000	117 000	7 100	9 500	47.8	1.8	—	114	1
7313 A	W	(M), T	DB DF DT	180 000	164 000	3 600	4 800	92.2	26.2	72	133	1
7313 BEA	W	MR, T7	DB DF DT	184 000	154 000	2 400	3 400	119.0	53.0	72	133	1
7313 BEA°	T85	MR, T7	—	—	—	3 600	5 000	119.0	53.0	72	133	1

Angular Contact Ball Bearings

Single/matched mountings Bore Diameter 70 – 80 mm



Boundary Dimensions (mm)					Basic Load Ratings (Single) (N)		Factor	Limiting Speeds (1) (min ⁻¹)		Eff. Load Centers (mm)	Abutment and Fillet Dimensions (mm)			Mass (kg)
d	D	B	r min.	r ₁ min.	C _r	C _{0r}	f ₀	Grease	Oil	a	d _a min.	D _a max.	r _a max.	approx.
70	100	16	1	0.6	27 900	26 300	—	11 800	17 700	27.8	76	94	1	0.341
	100	16	1	0.6	29 500	27 800	16.4	13 600	20 600	19.4	76	94	1	0.338
	110	20	1.1	0.6	45 000	39 500	—	8 400	11 200	36.0	77	103	1	0.625
	110	20	1.1	0.6	49 000	43 000	15.7	12 800	19 500	22.1	77	103	1	0.698
	125	24	1.5	1	77 000	59 500	—	7 700	10 300	40.1	79	116	1.5	1.11
	125	24	1.5	1	69 000	58 000	—	4 000	5 600	52.9	79	116	1.5	1.14
	125	24	1.5	1	75 500	58 500	—	4 500	6 700	52.9	79	116	1.5	1.08
	125	24	1.5	1	83 500	64 500	14.6	11 800	18 000	25.1	79	116	1.5	1.24
	150	35	2.1	1.1	125 000	93 500	—	4 000	5 300	49.3	82	138	2	2.6
	150	35	2.1	1.1	124 000	87 500	—	2 800	4 000	63.6	82	138	2	2.62
	150	35	2.1	1.1	124 000	87 500	—	4 000	6 000	63.7	82	138	2	2.53
	150	35	2.1	1.1	124 000	87 500	—	4 000	6 000	63.7	82	138	2	2.53
75	105	16	1	0.6	28 300	27 700	—	11 200	16 700	29.0	81	99	1	0.355
	105	16	1	0.6	30 000	29 300	16.6	12 800	19 500	20.1	81	99	1	0.357
	115	20	1.1	0.6	46 000	41 500	—	7 900	10 600	37.4	82	108	1	0.661
	115	20	1.1	0.6	50 500	45 500	15.9	12 200	18 500	22.7	82	108	1	0.748
	130	25	1.5	1	80 000	64 500	—	7 400	9 800	42.1	84	121	1.5	1.19
	130	25	1.5	1	68 500	58 500	—	3 800	5 300	55.5	84	121	1.5	1.22
	130	25	1.5	1	78 500	63 500	—	4 300	6 300	55.5	84	121	1.5	1.18
	130	25	1.5	1	87 000	70 000	14.8	11 300	17 100	26.2	84	121	1.5	1.36
	160	37	2.1	1.1	136 000	106 000	—	3 800	5 000	52.4	87	148	2	3.13
	160	37	2.1	1.1	134 000	98 500	—	2 800	3 800	67.8	87	148	2	3.13
	160	37	2.1	1.1	134 000	98 500	—	3 800	5 600	—	—	—	—	—
	160	37	2.1	1.1	134 000	98 500	—	3 800	5 600	—	—	—	—	—
80	110	16	1	0.6	28 700	29 000	—	10 600	15 800	30.2	86	104	1	0.38
	110	16	1	0.6	30 500	30 500	16.7	12 200	18 500	20.7	86	104	1	0.376
	125	22	1.1	0.6	56 000	50 500	—	7 400	9 800	40.6	87	118	1	0.88
	125	22	1.1	0.6	61 500	55 500	15.7	11 300	17 100	24.7	87	118	1	0.966
	140	26	2	1	89 500	71 500	—	6 900	9 100	44.8	90	130	2	1.46
	140	26	2	1	80 500	69 500	—	3 600	5 000	59.1	90	130	2	1.49
	140	26	2	1	87 500	70 000	—	4 000	6 000	59.2	87	148	2	1.42
	140	26	2	1	97 500	77 500	14.7	10 500	16 000	27.7	90	130	2	1.63
	170	39	2.1	1.1	147 000	119 000	—	3 600	4 800	55.6	92	158	2	3.71
	170	39	2.1	1.1	144 000	110 000	—	2 600	3 400	71.9	92	158	2	3.84
	170	39	2.1	1.1	144 000	110 000	—	3 600	5 300	—	—	—	—	—
	170	39	2.1	1.1	144 000	110 000	—	3 600	5 300	—	—	—	—	—

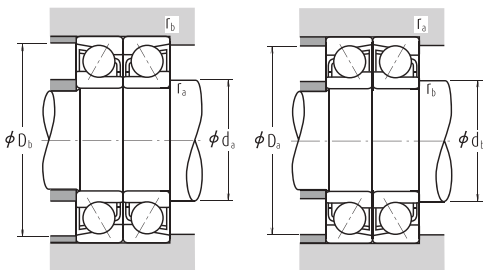
Dynamic Equivalent Load $P = X F_r + Y F_a$

Contact Angle	$H_F \cdot F_r$ Cor	e	Single, DT				DB or DF			
			$F_a/F_r \leq e$		$F_a/F_r > e$		$F_a/F_r \leq e$		$F_a/F_r > e$	
			X	Y	X	Y	X	Y	X	Y
15°	0.178	0.38	1	0	0.44	1.47	1	1.65	0.72	2.39
	0.357	0.40	1	0	0.44	1.40	1	1.57	0.72	2.28
	0.714	0.43	1	0	0.44	1.30	1	1.46	0.72	2.11
	1.07	0.46	1	0	0.44	1.23	1	1.38	0.72	2.00
	1.43	0.47	1	0	0.44	1.19	1	1.34	0.72	1.93
	2.14	0.50	1	0	0.44	1.12	1	1.26	0.72	1.82
	3.57	0.55	1	0	0.44	1.02	1	1.14	0.72	1.66
	5.35	0.56	1	0	0.44	1.00	1	1.12	0.72	1.63
25°	—	0.68	1	0	0.41	0.87	1	0.92	0.67	1.41
30°	—	0.80	1	0	0.39	0.76	1	0.78	0.63	1.24
40°	—	1.14	1	0	0.35	0.57	1	0.55	0.57	0.93

*For i, use 2 for DB, DF and 1 for DT

Static Equivalent Load $P_0 = X_0 F_r + Y_0 F_a$

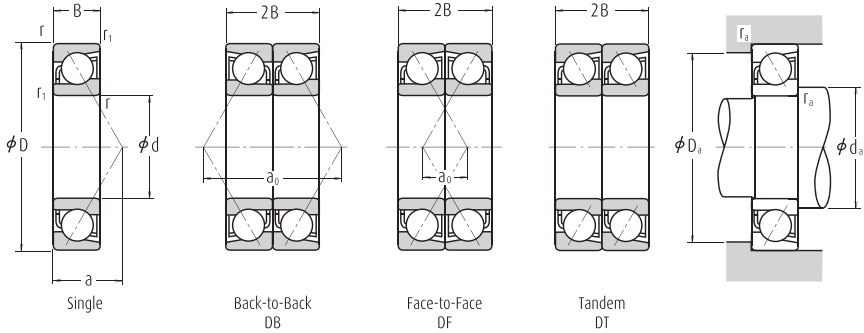
Contact Angle	Single, DT		DB or DF		Single or DT mounting When $F_r > 0.5 F_r + Y_0 F_a$ use $P_0 = F_r$
	X_0	Y_0	X_0	Y_0	
15°	0.5	0.46	1	0.92	
25°	0.5	0.38	1	0.76	
30°	0.5	0.33	1	0.66	
40°	0.5	0.26	1	0.52	



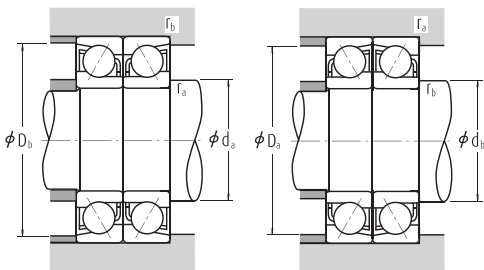
Bearing Numbers (2) Cage Symbol (4)				Basic Load Ratings (Matched) (N)		Limiting Speeds (1) (Matched) (min ⁻¹)		Load Center Spacings (mm)		Abutment and Fillet Dimensions (mm)		
Single	Standard	Option	Duplex	C_r	C_{or}	Grease	Oil	DB	a_0 DF	d_b (3) min.	D_b max.	r_b (3) max.
7914 A5°	(M)	T, TYN	DB DF DT	43 000	52 500	6 300	9 000	55.6	23.6	—	95	0.6
7914 C°	(M)	T, TYN, T85	DB DF DT	45 500	55 500	7 500	11 000	38.8	6.8	—	95	0.6
7014 A°	W	(M), T, TYN	DB DF DT	71 500	82 500	5 000	6 700	72.0	32.0	75	105	0.6
7014 C°	(M)	W, T, TYN	DB DF DT	76 000	86 000	7 100	10 000	44.1	4.1	—	105	0.6
7214 A°	W	(M), T, TYN	DB DF DT	124 000	127 000	4 500	6 300	80.3	32.3	76	119	1
7214 B	W	(M), T	DB DF DT	112 000	116 000	3 200	4 500	105.8	57.8	76	119	1
7214 BEA°	T85	MR, T7	— — —	—	—	3 600	5 300	105.8	57.8	76	119	1
7214 C°	(M)	W, T, TYN, T7	DB DF DT	129 000	129 000	6 700	9 000	50.1	2.1	—	119	1
7314 A	W	(M), T	DB DF DT	203 000	187 000	3 200	4 300	98.5	28.5	77	143	1
7314 BEA	W	MR, T7	DB DF DT	201 000	175 000	2 400	3 200	127.3	57.3	77	143	1
7314 BEA°	T85	MR, T7	— — —	—	—	3 200	4 800	127.3	57.3	77	143	1
7915 A5°	(M)	TYN	DB DF DT	44 000	55 500	6 000	8 500	58.0	26.0	—	100	0.6
7915 C°	(M)	T, TYN	DB DF DT	46 500	58 500	7 100	10 000	40.1	8.1	—	100	0.6
7015 A°	W	(M), T, TYN	DB DF DT	73 000	87 500	4 800	6 700	74.8	34.8	80	110	0.6
7015 C°	(M)	W, T, TYN	DB DF DT	78 000	91 500	6 700	9 500	45.4	5.4	—	110	0.6
7215 A°	W	(M), T, TYN	DB DF DT	123 000	129 000	4 300	6 000	84.2	34.2	81	124	1
7215 B	W	(M), T	DB DF DT	112 000	117 000	3 200	4 300	111.0	61.0	81	124	1
7215 BEA°	T85	MR	— — —	—	—	3 600	5 000	111.0	61.0	81	124	1
7215 C°	(M)	W, T, TYN, T7	DB DF DT	134 000	140 000	6 300	9 000	52.4	2.4	—	124	1
7315 A	W	(M), T	DB DF DT	221 000	212 000	3 000	4 000	104.8	30.8	82	153	1
7315 BEA	W	MR, T7	DB DF DT	217 000	197 000	2 200	3 000	135.6	61.6	82	153	1
7315 BEA°	T85	MR	— — —	—	—	3 800	5 600	—	—	—	—	—
7916 A5°	(M)	T, TYN	DB DF DT	44 500	58 000	5 600	8 000	60.3	28.3	—	105	0.6
7916 C°	(M)	T, TYN	DB DF DT	47 000	61 500	6 700	9 500	41.5	9.5	—	105	0.6
7016 A°	W	(M), T, TYN	DB DF DT	89 500	106 000	4 300	6 000	81.2	37.2	85	120	0.6
7016 C°	(M)	W, T, TYN	DB DF DT	95 500	111 000	6 300	9 000	49.4	5.4	—	120	0.6
7216 A°	W	(M), T, TYN	DB DF DT	145 000	152 000	4 000	5 600	89.5	37.5	86	134	1
7216 B	W	(M), T	DB DF DT	131 000	139 000	2 800	4 000	118.3	66.3	86	134	1
7216 BEA°	T85	MR, T7	— — —	—	—	3 200	4 800	118.3	66.3	82	153	1
7216 C°	(M)	W, T, TYN	DB DF DT	151 000	155 000	6 000	8 000	55.5	3.5	—	134	1
7316 A	W	(M), T	DB DF DT	239 000	238 000	2 800	3 800	111.2	33.2	87	163	1
7316 BEA	W	MR, T7	DB DF DT	235 000	220 000	2 000	2 800	143.9	65.9	87	163	1
7316 BEA°	T85	MR, T7, W	— — —	—	—	3 600	5 300	—	—	—	—	—

Angular Contact Ball Bearings

Single/matched mountings Bore Diameter 85 – 100 mm



Boundary Dimensions (mm)					Basic Load Ratings (Single) (N)		Factor	Limiting Speeds (1/min)		Eff. Load Centers (mm)	Abutment and Fillet Dimensions (mm)			Mass (kg)
d	D	B	r min.	r ₁ min.	C _r	C _{0r}	f ₀	Grease	Oil	a	d _a min.	D _a max.	r _a max.	approx.
85	120	18	1.1	0.6	38 500	38 500	—	9 800	14 700	32.9	92	113	1	0.541
	120	18	1.1	0.6	41 000	40 500	16.5	11 300	17 100	22.7	92	113	1	0.534
	130	22	1.1	0.6	57 500	53 500	—	7 000	9 400	42.0	92	123	1	0.913
	130	22	1.1	0.6	63 000	58 500	15.9	10 700	16 300	25.4	92	123	1	1.01
	150	28	2	1	104 000	83 500	—	6 400	8 600	47.9	95	140	2	1.83
	150	28	2	1	93 000	81 000	—	3 400	4 800	63.3	95	140	2	1.87
	150	28	2	1	113 000	90 500	14.7	9 800	14 900	29.7	95	140	2	2.04
	180	41	3	1.1	159 000	133 000	—	3 400	4 500	58.8	99	166	2.5	4.33
	180	41	3	1.1	146 000	122 000	—	3 000	4 000	76.1	99	166	2.5	4.42
	125	18	1.1	0.6	31 000	43 500	—	9 400	14 000	34.1	97	118	1	0.56
90	125	18	1.1	0.6	44 000	46 000	16.6	10 700	16 300	23.4	97	118	1	0.563
	140	24	1.5	1	68 500	63 500	—	6 600	8 700	45.2	99	131	1.5	1.19
	140	24	1.5	1	75 500	69 000	15.7	10 000	15 300	27.4	99	131	1.5	1.34
	160	30	2	1	118 000	96 500	—	6 000	8 000	51.1	100	150	2	2.25
	160	30	2	1	107 000	94 000	—	3 200	4 300	67.4	100	150	2	2.29
	160	30	2	1	129 000	105 000	14.6	9 200	14 000	31.7	100	150	2	2.51
	190	43	3	1.1	171 000	147 000	—	3 200	4 300	61.9	104	176	2.5	5.06
	190	43	3	1.1	156 000	135 000	—	2 800	3 800	80.2	104	176	2.5	5.17
	130	18	1.1	0.6	42 000	45 500	—	8 900	13 400	35.2	102	123	1	0.597
	130	18	1.1	0.6	44 500	48 000	16.7	10 300	15 600	24.1	102	123	1	0.591
95	145	24	1.5	1	70 000	67 000	—	6 300	8 400	46.6	104	136	1.5	1.43
	145	24	1.5	1	77 000	73 000	15.9	9 600	14 600	28.1	104	136	1.5	1.42
	170	32	2.1	1.1	128 000	103 000	—	5 700	7 600	54.2	107	158	2	2.68
	170	32	2.1	1.1	116 000	101 000	—	3 000	4 000	71.6	107	158	2	2.74
	170	32	2.1	1.1	139 000	112 000	14.6	8 700	13 300	33.7	107	158	2	3.05
	200	45	3	1.1	183 000	162 000	—	3 000	4 000	65.1	109	186	2.5	5.83
	200	45	3	1.1	167 000	149 000	—	2 600	3 600	84.3	109	186	2.5	5.98
	140	20	1.1	0.6	49 500	51 500	—	8 400	12 500	38.0	107	133	1	0.804
	140	20	1.1	0.6	52 500	54 000	16.5	9 600	14 600	26.1	107	133	1	0.794
	150	24	1.5	1	72 000	70 500	—	6 000	8 000	48.1	109	141	1.5	1.48



Dynamic Equivalent Load $P = X F_r + Y F_a$

Contact Angle	H_{F_r} C_{or}	e	Single, DT				DB or DF			
			$F_a/F_r \leq e$		$F_a/F_r > e$		$F_a/F_r \leq e$		$F_a/F_r > e$	
			X	Y	X	Y	X	Y	X	Y
15°	0.178	0.38	1	0	0.44	1.47	1	1.65	0.72	2.39
	0.357	0.40	1	0	0.44	1.40	1	1.57	0.72	2.28
	0.714	0.43	1	0	0.44	1.30	1	1.46	0.72	2.11
	1.07	0.46	1	0	0.44	1.23	1	1.38	0.72	2.00
	1.43	0.47	1	0	0.44	1.19	1	1.34	0.72	1.93
	2.14	0.50	1	0	0.44	1.12	1	1.26	0.72	1.82
	3.57	0.55	1	0	0.44	1.02	1	1.14	0.72	1.66
	5.35	0.56	1	0	0.44	1.00	1	1.12	0.72	1.63
25°	—	0.68	1	0	0.41	0.87	1	0.92	0.67	1.41
30°	—	0.80	1	0	0.39	0.76	1	0.78	0.63	1.24
40°	—	1.14	1	0	0.35	0.57	1	0.55	0.57	0.93

*For i, use 2 for DB, DF and 1 for DT

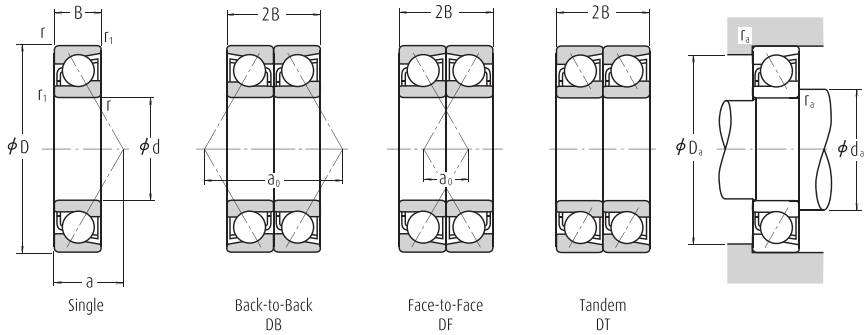
Static Equivalent Load $P_0 = X_0 F_r + Y_0 F_a$

Contact Angle	Single, DT		DB or DF		Single or DT mounting When $F_r > 0.5 F_r + Y_r F_a$ use $P_0 = F_r$
	X_0	Y_0	X_0	Y_0	
15°	0.5	0.46	1	0.92	
25°	0.5	0.38	1	0.76	
30°	0.5	0.33	1	0.66	
40°	0.5	0.26	1	0.52	

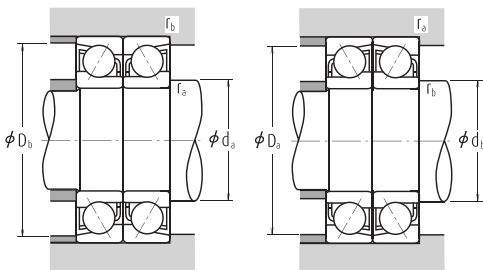
Bearing Numbers (2) Cage Symbol (4)				Basic Load Ratings (Matched) (N)		Limiting Speeds (1) (Matched) (min ⁻¹)		Load Center Spacings (mm)		Abutment and Fillet Dimensions (mm)		
Single	Standard	Option	Duplex	C_r	C_{or}	Grease	Oil	DB	a_0 DF	d_b (3) min.	D_b max.	r_b (3) max.
7917 A5°	(M)	T, TYN	DB DF DT	59 500	77 000	5 300	7 500	65.8	29.8	—	115	0.6
7917 C°	(M)	T, TYN	DB DF DT	63 000	81 500	6 300	9 000	45.5	9.5	—	115	0.6
7017 A°	W	(M), T, TYN	DB DF DT	91 500	112 000	4 300	5 600	84.1	40.1	90	125	0.6
7017 C°	(M)	W, T, TYN	DB DF DT	98 000	117 000	6 000	8 500	50.8	6.8	—	125	0.6
7217 A°	W	(M), T, TYN	DB DF DT	167 000	178 000	3 800	5 300	95.8	39.8	91	144	1
7217 B	W	(M), T	DB DF DT	151 000	162 000	2 800	3 800	126.6	70.6	91	144	1
7217 C°	T85	—	—	174 000	181 000	5 600	7 500	59.5	3.5	—	144	1
7317 A	(M)	W, T, TYN	DB DF DT	258 000	265 000	2 600	3 600	117.5	35.5	92	173	1
7317 B	W	(M), T	DB DF DT	236 000	244 000	2 400	3 200	152.2	70.2	92	173	1
7918 A5°	W	(M), T	DB DF DT	64 000	87 000	5 000	7 100	68.1	32.1	—	120	0.6
7918 C°	T85	MR, T7	—	67 500	92 000	6 000	8 500	46.8	10.8	—	120	0.6
7018 A°	(M)	T, TYN	DB DF DT	109 000	133 000	3 800	5 300	90.4	42.4	96	134	1
7018 C°	(M)	T, TYN	DB DF DT	116 000	138 000	5 600	8 000	54.8	6.8	—	134	1
7218 A°	W	(M), T, TYN	DB DF DT	191 000	206 000	3 600	5 000	102.2	42.2	96	154	1
7218 B	(M)	W, T, TYN	DB DF DT	173 000	188 000	2 600	3 400	134.9	74.9	96	154	1
7218 C°	W	(M), T, TYN	DB DF DT	199 000	209 000	5 300	7 100	63.5	3.5	—	154	1
7318 A	W	(M), T	DB DF DT	277 000	294 000	2 600	3 400	123.8	37.8	97	183	1
7318 B	T85	MR	—	254 000	270 000	2 200	3 000	160.5	74.5	97	183	1
7919 A5°	(M)	W, T, TYN	DB DF DT	64 500	91 000	4 800	6 700	70.5	34.5	—	125	0.6
7919 C°	(M)	(M), T	DB DF DT	68 500	96 000	5 600	8 000	48.1	12.1	—	125	0.6
7019 A°	W	(M), T	DB DF DT	109 000	134 000	3 800	5 000	93.3	45.3	—	139	1
7019 C°	T85	MR	—	119 000	146 000	5 300	7 500	56.1	8.1	—	139	1
7219 A°	(M)	T, TYN	DB DF DT	208 000	221 000	3 400	4 500	108.5	44.5	102	163	1
7219 B	(M)	T, TYN	DB DF DT	188 000	202 000	2 400	3 200	143.2	79.2	102	163	1
7219 C°	(M)	T, TYN	DB DF DT	216 000	224 000	4 800	6 700	67.5	3.5	—	163	1
7319 A	(M)	T, TYN	DB DF DT	297 000	325 000	2 400	3 200	130.2	40.2	102	193	1
7319 B	W	(M), T, TYN	DB DF DT	272 000	298 000	2 200	3 000	168.7	78.7	102	193	1
7920 A5°	W	(M), T	DB DF DT	77 000	103 000	4 500	6 300	76.0	36.0	—	135	0.6
7920 C°	T85	MR, T7	—	81 500	108 000	5 300	7 500	52.2	12.2	—	135	0.6
7020 A°	(M)	W, T, TYN	DB DF DT	111 000	141 000	3 600	5 000	96.2	48.2	—	144	1

Angular Contact Ball Bearings

Single/matched mountings Bore Diameter 100 – 120 mm



Boundary Dimensions (mm)					Basic Load Ratings (Single) (N)		Factor	Limiting Speeds (1) (min ⁻¹)		Eff. Load Centers (mm)	Abutment and Fillet Dimensions (mm)			Mass (kg)
d	D	B	r min.	r ₁ min.	C _r	C _{0r}	f ₀	Grease	Oil	a	d _a min.	D _a max.	r _a max.	approx.
100	150	24	1.5	1	79 000	77 000	16.0	9 200	14 000	28.7	109	141	1.5	1.46
	180	34	2.1	1.1	144 000	117 000	—	5 400	7 200	57.4	112	168	2	3.22
	180	34	2.1	1.1	130 000	114 000	—	2 800	3 800	75.7	112	168	2	3.28
	180	34	2.1	1.1	157 000	127 000	14.5	8 300	12 500	35.7	112	168	2	3.65
	215	47	3	1.1	207 000	193 000	—	2 800	3 800	69.0	114	201	2.5	7.29
	215	47	3	1.1	190 000	178 000	—	2 400	3 400	89.6	114	201	2.5	7.43
105	145	20	1.1	0.6	50 500	54 000	—	8 000	12 000	39.2	112	138	1	0.82
	145	20	1.1	0.6	53 500	57 000	16.6	9 200	14 000	26.7	112	138	1	0.826
	160	26	2	1	84 000	81 500	—	5 700	7 600	51.2	115	150	2	1.84
	160	26	2	1	92 500	89 500	15.9	8 700	13 300	30.7	115	150	2	1.82
	190	36	2.1	1.1	157 000	132 000	—	5 100	6 800	60.6	117	178	2	3.84
	190	36	2.1	1.1	142 000	129 000	—	2 600	3 600	79.9	117	178	2	3.92
110	190	36	2.1	1.1	171 000	143 000	14.5	7 800	11 900	37.7	117	178	2	4.33
	225	49	3	1.1	208 000	56 000	—	2 600	3 600	72.1	119	211	2.5	9.34
	225	49	3	1.1	191 000	59 500	—	2 400	3 200	93.7	119	211	2.5	9.43
	150	20	1.1	0.6	51 500	95 500	—	7 700	11 600	40.3	117	143	1	0.877
	150	20	1.1	0.6	54 500	104 000	16.7	8 900	13 500	27.4	117	143	1	0.867
	170	28	2	1	101 000	148 000	—	5 400	7 200	54.4	120	160	2	2.28
120	170	28	2	1	111 000	144 000	15.6	8 300	12 500	32.7	120	160	2	2.26
	200	38	2.1	1.1	170 000	160 000	—	4 900	6 500	63.7	122	188	2	4.49
	200	38	2.1	1.1	154 000	144 000	—	2 600	3 400	84.0	122	188	2	4.58
	200	38	2.1	1.1	185 000	160 000	14.5	7 500	11 300	39.8	122	188	2	5.1
	240	50	3	1.1	220 000	215 000	—	2 600	3 400	75.5	124	226	2.5	11.1
	240	50	3	1.1	201 000	197 000	—	2 200	3 000	98.4	124	226	2.5	11.2
120	165	22	1.1	0.6	71 000	77 000	—	7 100	10 600	44.2	127	158	1	1.15
	165	22	1.1	0.6	75 500	81 000	16.5	8 100	12 300	30.1	127	158	1	1.15
	180	28	2	1	107 000	107 000	—	5 000	6 700	57.3	130	170	2	2.45
	215	40	2.1	1.1	192 000	177 000	—	4 500	6 000	68.3	132	203	2	6.22
	215	40	2.1	1.1	165 000	162 000	—	2 400	3 200	90.3	132	203	2	6.26
	260	55	3	1.1	246 000	252 000	—	2 200	3 000	82.3	134	246	2.5	14.5
	260	55	3	1.1	225 000	231 000	—	2 000	2 800	107.2	134	246	2.5	14.4



Dynamic Equivalent Load $P = X F_r + Y F_a$

Contact Angle	H_{F_r} Cor	e	Single, DT				DB or DF			
			$F_a/F_r \leq e$		$F_a/F_r > e$		$F_a/F_r \leq e$		$F_a/F_r > e$	
			X	Y	X	Y	X	Y	X	Y
15°	0.178	0.38	1	0	0.44	1.47	1	1.65	0.72	2.39
	0.357	0.40	1	0	0.44	1.40	1	1.57	0.72	2.28
	0.714	0.43	1	0	0.44	1.30	1	1.46	0.72	2.11
	1.07	0.46	1	0	0.44	1.23	1	1.38	0.72	2.00
	1.43	0.47	1	0	0.44	1.19	1	1.34	0.72	1.93
	2.14	0.50	1	0	0.44	1.12	1	1.26	0.72	1.82
	3.57	0.55	1	0	0.44	1.02	1	1.14	0.72	1.66
	5.35	0.56	1	0	0.44	1.00	1	1.12	0.72	1.63
25°	—	0.68	1	0	0.41	0.87	1	0.92	0.67	1.41
30°	—	0.80	1	0	0.39	0.76	1	0.78	0.63	1.24
40°	—	1.14	1	0	0.35	0.57	1	0.55	0.57	0.93

*For i, use 2 for DB, DF and 1 for DT

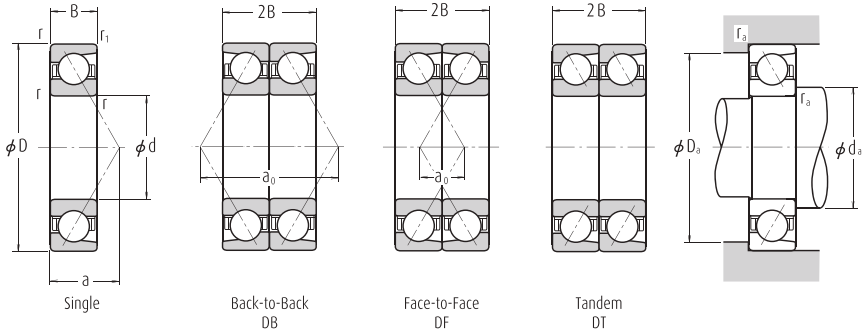
Static Equivalent Load $P_0 = X_0 F_r + Y_0 F_a$

Contact Angle	Single, DT		DB or DF		Single or DT mounting When $F_r > 0.5 F_r + Y_0 F_a$ use $P_0 = F_r$
	X_0	Y_0	X_0	Y_0	
15°	0.5	0.46	1	0.92	
25°	0.5	0.38	1	0.76	
30°	0.5	0.33	1	0.66	
40°	0.5	0.26	1	0.52	

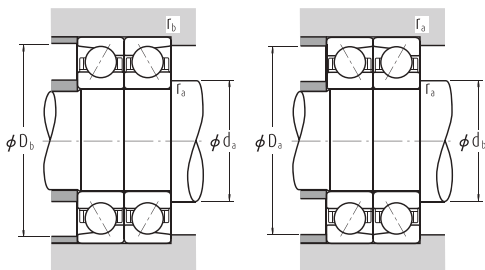
Bearing Numbers (2) Cage Symbol (4)				Basic Load Ratings (Matched) (N)		Limiting Speeds (1) (Matched) (min-1)		Load Center Spacings (mm)		Abutment and Fillet Dimensions (mm)		
Single	Standard	Option	Duplex	C _r	C _{or}	Grease	Oil	DB	a ₀ DF	d _b (3) min.	D _b max.	r _b (3) max.
7020 C*	(M)	T, TYN	DB DF DT	122 000	154 000	5 300	7 100	57.5	9.5	—	144	1
7220 A*	W	(M), T, TYN	DB DF DT	233 000	251 000	3 200	4 300	114.8	46.8	107	173	1
7220 B	W	(M), T	DB DF DT	212 000	229 000	2 200	3 000	151.5	83.5	107	173	1
7220 C*	T85	MR	— — —	242 000	254 000	4 500	6 300	71.5	3.5	—	173	1
7320 A	(M)	W, T, TYN	DB DF DT	335 000	385 000	2 200	3 000	137.9	43.9	107	208	1
7320 B	W	(M), T	DB DF DT	310 000	355 000	2 000	2 800	179.2	85.2	107	208	1
7921 A5*	W	(M), T	DB DF DT	78 500	108 000	4 300	6 000	78.3	38.3	—	140	0.6
7921 C*	T85	MR, T7	— — —	83 000	114 000	5 300	7 100	53.5	13.5	—	140	0.6
7021 A*	(M)	T, TYN	DB DF DT	130 000	163 000	3 400	4 500	102.5	50.5	—	154	1
7021 C*	(M)	T, TYN	DB DF DT	143 000	179 000	4 800	6 700	61.5	9.5	—	154	1
7221 A*	(M)	T, TYN	DB DF DT	254 000	283 000	3 000	4 000	121.2	49.2	112	183	1
7221 B	(M)	T, TYN	DB DF DT	231 000	258 000	2 200	3 000	159.8	87.8	112	183	1
7221 C*	W	(M), T	DB DF DT	264 000	286 000	4 300	6 000	75.5	3.5	—	183	1
7321 A	W	(M), T	DB DF DT	335 000	385 000	2 200	2 800	144.3	46.3	—	218	1
7321 B	T85	—	— — —	310 000	355 000	1 900	2 600	187.4	89.4	—	218	1
7922 A5*	(M)	W, T, TYN	DB DF DT	79 500	112 000	4 300	5 600	80.6	40.6	—	145	0.6
7922 C*	(M)	T	DB DF DT	84 500	119 000	5 000	6 700	54.8	14.8	—	145	0.6
7022 A*	(M)	T	DB DF DT	157 000	191 000	3 200	4 300	108.8	52.8	—	164	1
7022 C*	T85	T7	— — —	172 000	208 000	4 500	6 300	65.5	9.5	—	164	1
7222 A*	(M)	T, TYN	DB DF DT	276 000	315 000	2 800	4 000	127.5	51.5	117	193	1
7222 B	(M)	T, TYN	DB DF DT	250 000	289 000	2 000	2 800	168.1	92.1	117	193	1
7222 C*	(M)	T, TYN	DB DF DT	286 000	320 000	4 000	5 600	79.5	3.5	—	193	1
7322 A	(M)	T, TYN	DB DF DT	360 000	430 000	2 000	2 600	151.0	51.0	—	233	1
7322 B	W	(M), T, TYN	DB DF DT	325 000	395 000	1 800	2 400	196.8	96.8	—	233	1
7924 A5*	W	(M), T	DB DF DT	110 000	154 000	3 800	5 300	88.5	44.5	—	160	0.6
7924 C*	T85	MR	— — —	117 000	162 000	4 500	6 300	60.2	16.2	—	160	0.6
7024 A*	(M)	W, T, TYN	DB DF DT	166 000	213 000	3 000	4 000	114.6	58.6	—	174	1
7224 A*	(M)	W, T	DB DF DT	297 000	355 000	2 600	3 600	136.7	56.7	—	208	1
7224 B	(M)	W, T	DB DF DT	269 000	325 000	1 900	2 600	180.5	100.5	—	208	1
7324 A	T85	MR	— — —	400 000	505 000	1 800	2 400	164.7	54.7	—	253	1
7324 B	(M)	T, TYN	DB DF DT	365 000	460 000	1 600	2 200	214.4	104.4	—	253	1

Angular Contact Ball Bearings

Single/matched mountings Bore Diameter 130 – 170 mm



Boundary Dimensions (mm)					Basic Load Ratings (Single) (N)		Factor	Limiting Speeds (1) (min ⁻¹)		Eff. Load Centers (mm)	Abutment and Fillet Dimensions (mm)			Mass (kg)
d	D	B	r min.	r ₁ min.	C _r	C _{0r}	f ₀	Grease	Oil	a	d _a min.	D _a max.	r _a max.	approx.
130	180	24	1.5	1	78 000	86 000	—	6 500	9 700	48.1	139	171	1.5	1.54
	180	24	1.5	1	82 500	91 000	16.5	7 500	11 300	32.8	139	171	1.5	1.5
	200	33	2	1	123 000	125 000	—	4 600	6 100	64.1	140	190	2	3.68
	230	40	3	1.1	199 000	193 000	—	4 200	5 600	72.0	144	216	2.5	7.06
	230	40	3	1.1	171 000	175 000	—	2 200	3 000	95.5	144	216	2.5	7.1
	280	58	4	1.5	273 000	293 000	—	2 200	2 800	88.2	148	262	3	17.5
	280	58	4	1.5	250 000	268 000	—	1 900	2 600	115.0	148	262	3	17.6
	190	24	1.5	1	78 500	90 000	—	6 100	9 100	50.5	149	181	1.5	1.63
140	190	24	1.5	1	83 500	95 500	16.7	7 000	10 700	34.1	149	181	1.5	1.63
	210	33	2	1	126 000	133 000	—	4 300	5 800	67.0	150	200	2	3.9
	250	42	3	1.1	229 000	234 000	—	3 900	5 200	77.3	154	236	2.5	8.92
	250	42	3	1.1	197 000	213 000	—	2 000	2 800	102.8	154	236	2.5	8.94
	300	62	4	1.5	300 000	335 000	—	2 000	2 600	94.5	158	282	3	21.4
	300	62	4	1.5	275 000	310 000	—	1 700	2 400	123.3	158	282	3	21.6
	210	28	2	1	101 000	115 000	—	5 600	8 400	56.0	160	200	2	2.97
	210	28	2	1	107 000	122 000	16.6	6 400	9 800	38.1	160	200	2	2.96
150	225	35	2.1	1.1	144 000	154 000	—	4 000	5 400	71.6	162	213	2	4.75
	270	45	3	1.1	261 000	280 000	—	3 600	4 800	83.1	164	256	2.5	11.2
	270	45	3	1.1	225 000	254 000	—	1 800	2 600	110.6	164	256	2.5	11.2
	320	65	4	1.5	315 000	370 000	—	1 800	2 400	100.3	168	302	3	26
	320	65	4	1.5	289 000	340 000	—	1 600	2 200	131.1	168	302	3	25.9
	220	28	2	1	112 000	133 000	16.7	3 600	4 800	39.4	170	210	2	3.1
	240	38	2.1	1.1	163 000	176 000	—	3 300	4 500	76.7	172	228	2	5.77
	290	48	3	1.1	263 000	305 000	—	1 900	2 600	89.0	174	276	2.5	14.1
160	290	48	3	1.1	238 000	279 000	—	1 700	2 400	118.4	174	276	2.5	14.2
	340	68	4	1.5	345 000	420 000	—	1 700	2 200	106.2	178	322	3	30.7
	340	68	4	1.5	315 000	385 000	—	1 500	2 000	138.9	178	322	3	30.8
	230	28	2	1	118 000	148 000	16.8	5 300	8 300	40.8	180	220	2	3.36
	260	42	2.1	1.1	195 000	214 000	—	3 100	4 200	83.1	182	248	2	7.9
	310	52	4	1.5	295 000	360 000	—	1 800	2 400	95.3	188	292	3	17.3
	310	52	4	1.5	266 000	325 000	—	1 600	2 200	126.7	188	292	3	17.6
	360	72	4	1.5	390 000	485 000	—	1 600	2 200	112.5	188	342	3	35.8
170	360	72	4	1.5	355 000	445 000	—	1 400	2 000	147.2	188	342	3	35.6



Dynamic Equivalent Load $P = X F_r + Y F_a$

Contact Angle	H_{F_r} C_{or}	e	Single, DT				DB or DF			
			$F_a/F_r \leq e$		$F_a/F_r > e$		$F_a/F_r \leq e$		$F_a/F_r > e$	
			X	Y	X	Y	X	Y	X	Y
15°	0.178	0.38	1	0	0.44	1.47	1	1.65	0.72	2.39
	0.357	0.40	1	0	0.44	1.40	1	1.57	0.72	2.28
	0.714	0.43	1	0	0.44	1.30	1	1.46	0.72	2.11
	1.07	0.46	1	0	0.44	1.23	1	1.38	0.72	2.00
	1.43	0.47	1	0	0.44	1.19	1	1.34	0.72	1.93
	2.14	0.50	1	0	0.44	1.12	1	1.26	0.72	1.82
	3.57	0.55	1	0	0.44	1.02	1	1.14	0.72	1.66
	5.35	0.56	1	0	0.44	1.00	1	1.12	0.72	1.63
	—	0.68	1	0	0.41	0.87	1	0.92	0.67	1.41
	—	0.80	1	0	0.39	0.76	1	0.78	0.63	1.24
25°	—	—	1	0	0.35	0.57	1	0.55	0.57	0.93
30°	—	—	1	0	0.35	0.57	1	0.55	0.57	0.93
40°	—	—	1	0	0.35	0.57	1	0.55	0.57	0.93

*For i, use 2 for DB, DF and 1 for DT

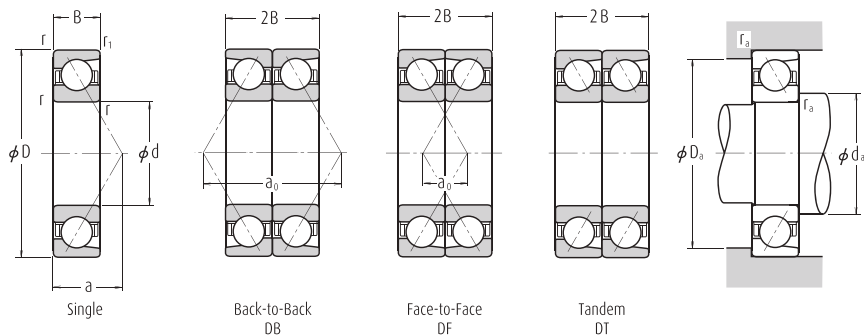
Static Equivalent Load $P_0 = X_0 F_r + Y_0 F_a$

Contact Angle	Single, DT		DB or DF		Single or DT mounting When $F_r > 0.5 F_r + Y_0 F_a$ use $P_0 = F_r$
	X_0	Y_0	X_0	Y_0	
15°	0.5	0.46	1	0.92	
25°	0.5	0.38	1	0.76	
30°	0.5	0.33	1	0.66	
40°	0.5	0.26	1	0.52	

Bearing Numbers (2) Cage Symbol (4)				Basic Load Ratings (Matched) (N)		Limiting Speeds (1) (Matched) (min ⁻¹)		Load Center Spacings (mm)		Abutment and Fillet Dimensions (mm)		
Single	Standard	Option	Duplex	C_r	C_{or}	Grease	Oil	DB	a_0 DF	d_b (3) min.	D_b max.	r_b (3) max.
7926 A5°	(M)	T, TYN	DB DF DT	120 000	172 000	3 400	4 800	96.3	48.3	—	174	1
7926 C°	(M)	T, TYN	DB DF DT	128 000	182 000	4 000	5 600	65.5	17.5	—	174	1
7026 A°	(M)	T, TYN	DB DF DT	191 000	251 000	2 600	3 600	128.3	62.3	—	194	1
7226 A°	(M)	T	DB DF DT	310 000	385 000	1 900	2 600	143.9	63.9	—	223	1
7226 B	(M)	T	DB DF DT	278 000	350 000	1 700	2 400	191.0	111.0	—	223	1
7326 A	(M)	T	DB DF DT	445 000	585 000	1 700	2 200	176.3	60.3	—	271	1.5
7326 B	(M)	T	DB DF DT	405 000	535 000	1 500	2 000	230.0	114.0	—	271	1.5
7928 A5°	(M)	T, TYN	DB DF DT	122 000	180 000	3 200	4 500	100.9	52.9	—	184	1
7928 C°	(M)	T, TYN	DB DF DT	129 000	191 000	3 800	5 300	68.2	20.2	—	184	1
7028 A°	(M)	T	DB DF DT	194 000	265 000	2 600	3 400	134.0	68.0	—	204	1
7228 A°	(M)	T	DB DF DT	355 000	470 000	1 800	2 400	154.6	70.6	—	243	1
7228 B	(M)	T	DB DF DT	320 000	425 000	1 600	2 200	205.6	121.6	—	243	1
7328 A	(M)	T	DB DF DT	490 000	670 000	1 600	2 000	189.0	65.0	—	291	1.5
7328 B	(M)	T	DB DF DT	445 000	615 000	1 400	1 900	246.6	122.6	—	291	1.5
7930 A5°	(M)	—	DB DF DT	157 000	231 000	3 000	4 000	112.0	56.0	—	204	1
7930 C°	(M)	—	DB DF DT	166 000	244 000	3 600	4 800	76.2	20.2	—	204	1
7030 A°	(M)	T	DB DF DT	222 000	305 000	1 900	2 400	143.3	73.3	—	218	1
7230 A°	(M)	—	DB DF DT	405 000	560 000	1 600	2 200	166.3	76.3	—	263	1
7230 B	(M)	T	DB DF DT	365 000	510 000	1 500	2 000	221.2	131.2	—	263	1
7330 A	(M)	—	DB DF DT	515 000	745 000	1 500	1 900	200.7	70.7	—	311	1.5
7330 B	(M)	T	DB DF DT	470 000	680 000	1 300	1 800	262.2	132.2	—	311	1.5
7932 C°	(M)	TYN	DB DF DT	173 000	265 000	3 000	4 000	78.9	22.9	—	214	1
7032 A°	(M)	T	DB DF DT	252 000	355 000	1 700	2 400	153.5	77.5	—	233	1
7232 A	(M)	T	DB DF DT	425 000	615 000	1 500	2 000	177.9	81.9	—	283	1
7232 B	(M)	—	DB DF DT	385 000	555 000	1 400	1 900	236.8	140.8	—	283	1
7332 A	(M)	T	DB DF DT	565 000	845 000	1 400	1 800	212.3	76.3	—	331	1.5
7332 B	(M)	T	DB DF DT	515 000	770 000	1 200	1 700	277.8	141.8	—	331	1.5
7934 C°	(M)	—	DB DF DT	183 000	297 000	2 800	3 800	81.6	25.6	—	224	1
7034 A°	(M)	—	DB DF DT	300 000	430 000	1 600	2 200	166.1	82.1	—	253	1
7234 A	(M)	—	DB DF DT	480 000	715 000	1 400	1 900	190.6	86.6	—	301	1.5
7234 B	(M)	—	DB DF DT	435 000	650 000	1 300	1 700	253.4	149.4	—	301	1.5
7334 A	(M)	—	DB DF DT	630 000	970 000	1 300	1 700	225.0	81.0	—	351	1.5
7334 B	(M)	T	DB DF DT	575 000	890 000	1 100	1 600	294.3	150.3	—	351	1.5

Angular Contact Ball Bearings

Single/matched mountings Bore Diameter 180 – 200 mm



Boundary Dimensions (mm)					Basic Load Ratings (Single) (N)		Factor	Limiting Speeds (') (min ⁻¹)		Eff. Load Centers (mm)	Abutment and Fillet Dimensions (mm)			Mass (kg)
d	D	B	r min.	r ₁ min.	C _r	C _{0r}	f ₀	Grease	Oil	a	d _a min.	D _a max.	r _a max.	approx.
180	250	33	2	1	152 000	184 000	16.6	4 900	7 700	45.3	190	240	2	4.9
	280	46	2.1	1.1	218 000	252 000	—	2 900	4 000	89.4	192	268	2	10.5
	320	52	4	1.5	305 000	385 000	—	1 700	2 200	98.2	198	302	3	18.1
	320	52	4	1.5	276 000	350 000	—	1 500	2 000	130.9	198	302	3	18.4
	380	75	4	1.5	410 000	535 000	—	1 500	2 000	118.3	198	362	3	42.1
190	380	75	4	1.5	375 000	490 000	—	1 300	1 800	155.0	198	362	3	42.6
	260	33	2	1	155 000	192 000	16.7	4 700	7 400	46.6	200	250	2	4.98
	290	46	2.1	1.1	235 000	280 000	—	2 800	3 800	92.3	202	278	2	11.3
	340	55	4	1.5	315 000	410 000	—	1 600	2 200	104.0	208	322	3	22.4
	340	55	4	1.5	284 000	375 000	—	1 400	2 000	138.7	208	322	3	22.5
200	400	78	5	2	450 000	600 000	—	1 400	1 900	124.2	212	378	4	47.5
	400	78	5	2	410 000	550 000	—	1 300	1 700	162.8	212	378	4	47.2
	280	38	2.1	1.1	199 000	244 000	16.5	4 400	6 900	51.2	212	268	2	6.85
	310	51	2.1	1.1	252 000	310 000	—	2 600	3 600	99.1	212	298	2	13.7
	360	58	4	1.5	335 000	450 000	—	1 500	2 000	109.8	218	342	3	26.5
	360	58	4	1.5	305 000	410 000	—	1 300	1 800	146.5	218	342	3	26.6
	420	80	5	2	475 000	660 000	—	1 300	1 800	129.5	222	398	4	54.4
	420	80	5	2	430 000	600 000	—	1 200	1 600	170.1	222	398	4	55.3

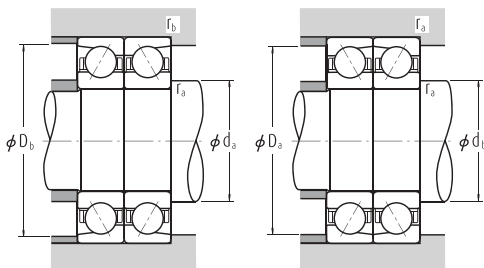
Dynamic Equivalent Load $P = X F_r + Y F_a$

Contact Angle	$H_a F_a^* / C_{or}$	e	Single, DT				DB or DF			
			$F_a/F_r \leq e$		$F_a/F_r > e$		$F_a/F_r \leq e$		$F_a/F_r > e$	
			X	Y	X	Y	X	Y	X	Y
15°	0.178	0.38	1	0	0.44	1.47	1	1.65	0.72	2.39
	0.357	0.40	1	0	0.44	1.40	1	1.57	0.72	2.28
	0.714	0.43	1	0	0.44	1.30	1	1.46	0.72	2.11
	1.07	0.46	1	0	0.44	1.23	1	1.38	0.72	2.00
	1.43	0.47	1	0	0.44	1.19	1	1.34	0.72	1.93
	2.14	0.50	1	0	0.44	1.12	1	1.26	0.72	1.82
	3.57	0.55	1	0	0.44	1.02	1	1.14	0.72	1.66
	5.35	0.56	1	0	0.44	1.00	1	1.12	0.72	1.63
25°	—	0.68	1	0	0.41	0.87	1	0.92	0.67	1.41
30°	—	0.80	1	0	0.39	0.76	1	0.78	0.63	1.24
40°	—	1.14	1	0	0.35	0.57	1	0.55	0.57	0.93

*For i, use 2 for DB, DF and 1 for DT

Static Equivalent Load $P_0 = X_0 F_r + Y_0 F_a$

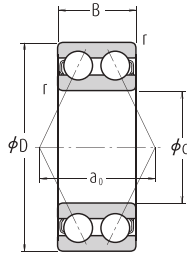
Contact Angle	Single, DT		DB or DF		Single or DT mounting When $F_r > 0.5 F_r + Y_0 F_a$ use $P_0 = F_r$
	X_0	Y_0	X_0	Y_0	
15°	0.5	0.46	1	0.92	
25°	0.5	0.38	1	0.76	
30°	0.5	0.33	1	0.66	
40°	0.5	0.26	1	0.52	



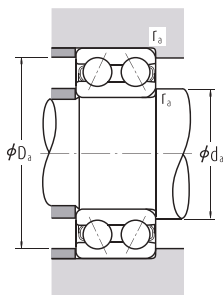
Bearing Numbers ⁽²⁾ Cage Symbol ⁽⁴⁾				Basic Load Ratings (Matched) (N)		Limiting Speeds ⁽¹⁾ (Matched) (min ⁻¹)		Load Center Spacings (mm)		Abutment and Fillet Dimensions (mm)		
Single	Standard	Option	Duplex	C_r	C_{or}	Grease	Oil	DB	DF	d_b ⁽³⁾ min.	D_b max.	r_b ⁽³⁾ max.
7936 C [®]	(M)	—	DB DF DT	236 000	370 000	2 600	3 600	90.6	24.6	—	244	1
7036 A [®]	(M)	—	DB DF DT	335 000	505 000	1 500	2 000	178.8	86.8	—	273	1
7236 A	(M)	—	DB DF DT	495 000	770 000	1 400	1 800	196.3	92.3	—	311	1.5
7236 B	(M)	—	DB DF DT	450 000	700 000	1 200	1 700	261.8	157.8	—	311	1.5
7336 A	(M)	—	DB DF DT	665 000	1 070 000	1 200	1 600	236.6	86.6	—	371	1.5
7336 B	(M)	—	DB DF DT	605 000	975 000	1 100	1 500	309.9	159.9	—	371	1.5
7938 C [®]	(M)	TYN	DB DF DT	239 000	385 000	2 400	3 400	93.3	27.3	—	254	1
7038 A [®]	(M)	—	DB DF DT	365 000	560 000	1 400	1 900	184.6	92.6	—	283	1
7238 A	(M)	—	DB DF DT	510 000	825 000	1 300	1 700	208.0	98.0	—	331	1.5
7238 B	(M)	—	DB DF DT	460 000	750 000	1 100	1 600	277.3	167.3	—	331	1.5
7338 A	(M)	T	DB DF DT	730 000	1 200 000	1 100	1 500	248.3	92.3	—	390	2
7338 B	(M)	—	DB DF DT	670 000	1 100 000	1 000	1 400	325.5	169.5	—	390	2
7940 C [®]	(M)	—	DB DF DT	305 000	490 000	2 200	3 200	102.3	26.3	—	273	1
7040 A [®]	(M)	T	DB DF DT	390 000	620 000	1 300	1 800	198.2	96.2	—	303	1
7240 A	(M)	—	DB DF DT	550 000	900 000	1 200	1 600	219.6	103.6	—	351	1.5
7240 B	(M)	—	DB DF DT	495 000	815 000	1 100	1 500	292.9	176.9	—	351	1.5
7340 A	(M)	T	DB DF DT	770 000	1 320 000	1 100	1 400	259.0	99.0	—	410	2
7340 B	(M)	—	DB DF DT	700 000	1 200 000	950	1 300	340.1	180.1	—	410	2

Double-Row Angular Contact Ball Bearings

Bore Diameter 10 – 85 mm



Boundary Dimensions (mm)				Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		
d	D	B	r min.	C _r	C _{0r}	Grease		Oil
						Open ZZ	DDU	Open
10	30	14,3	0,6	7 150	3 900	17 000	—	22 000
	30	14,3	0,6	7 150	3 900	17 000	15 000	—
12	32	15,9	0,6	10 500	5 800	15 000	—	20 000
	32	15,9	0,6	8 500	5 300	15 000	12 000	—
15	35	15,9	0,6	11 700	7 050	13 000	—	17 000
	35	15,9	0,6	8 500	5 300	13 000	12 000	—
	42	19	1	17 600	10 200	11 000	—	15 000
	42	19	1	14 700	9 100	11 000	10 000	—
17	40	17,5	0,6	14 600	9 050	11 000	—	15 000
	40	17,5	0,6	12 700	8 300	11 000	10 000	—
	47	22,2	1	21 000	12 600	10 000	—	13 000
	47	22,2	1	19 600	12 400	10 000	9 500	—
20	47	20,6	1	19 600	12 400	10 000	—	13 000
	47	20,6	1	15 900	10 700	10 000	9 000	—
	52	22,2	1,1	24 600	15 000	9 000	—	12 000
	52	22,2	1,1	19 700	12 800	9 000	8 500	—
25	52	20,6	1	21 300	14 700	8 500	—	11 000
	52	20,6	1	16 900	12 300	8 500	7 500	—
	62	25,4	1,1	32 500	20 700	7 500	—	10 000
	62	25,4	1,1	25 200	18 200	7 500	6 300	—
30	62	23,8	1	29 600	21 100	7 100	—	9 500
	62	23,8	1	25 200	18 200	7 100	6 300	—
	72	30,2	1,1	40 500	28 100	6 300	—	8 500
	72	30,2	1,1	39 000	28 700	6 300	5 300	—
35	72	27	1,1	39 000	28 700	6 300	—	8 000
	72	27	1,1	34 000	25 300	6 300	5 300	—
	80	34,9	1,5	51 000	36 000	5 600	—	7 500
	80	34,9	1,5	44 000	33 500	5 600	4 800	—
40	80	30,2	1,1	44 000	33 500	5 600	—	7 100
	80	30,2	1,1	36 500	29 000	5 600	4 800	—
	90	36,5	1,5	56 500	41 000	5 300	—	6 700
	90	36,5	1,5	49 500	38 000	5 300	4 500	—
45	85	30,2	1,1	49 500	38 000	5 000	—	6 700
	85	30,2	1,1	41 500	33 500	5 000	4 300	—
	100	39,7	1,5	68 500	51 000	4 500	—	6 000
50	90	30,2	1,1	53 000	43 500	4 800	—	6 000
	90	30,2	1,1	40 500	36 000	4 800	4 000	—
	110	44,4	2	81 500	61 500	4 300	—	5 600
55	100	33,3	1,5	56 000	49 000	4 300	—	5 600
	100	33,3	1,5	49 500	43 500	4 300	3 600	—
	120	49,2	2	95 000	73 000	3 800	—	5 000
60	110	36,5	1,5	62 000	62 000	3 800	—	5 000
	130	54	2,1	125 000	98 500	3 400	—	4 500
65	120	38,1	1,5	76 500	69 000	3 600	—	4 500
	140	58,7	2,1	142 000	113 000	3 200	—	4 300
70	125	39,7	1,5	94 000	82 000	3 400	—	4 500
	150	63,5	2,1	159 000	128 000	3 000	—	3 800
75	130	41,3	1,5	93 500	83 000	3 200	—	4 300
80	140	44,4	2	99 000	93 000	3 000	—	3 800
85	150	49,2	2	116 000	110 000	2 800	—	3 600



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$		e
X	Y	X	Y	
1	0.92	0.67	1.41	0.68

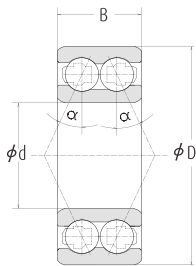
Static Equivalent Load $P_0 = F_r + 0.76 F_a$



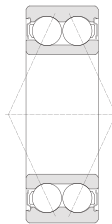
Bearing Designations			Load Center Spacings (mm)	Abutment and Fillet Dimensions (mm)			Mass (kg) approx.
Open	Shielded	Sealed	a_0	d_a min.	D_a max.	r_a max.	
5200	—	—	14,5	15	25	0,6	0,050
—	5200ZZ	5200DDU	14,5	14	26	0,6	0,050
5201	—	—	16,7	17	27	0,6	0,060
—	5201BZZ	5201BDDU	16,3	16	28	0,6	0,060
5202	—	—	18,3	20	30	0,6	0,070
—	5202BZZ	5202BDDU	16,3	19	31	0,6	0,070
5302	—	—	22	21	36	1	0,13
—	5302AZZ	5302ADDU	21	21	36	1	0,13
5203	—	—	20,8	22	35	0,6	0,10
—	5203AZZ	5203ADDU	20,1	21	36	0,6	0,10
5303	—	—	25	23	41	1	0,18
—	5303AZZ	5303ADDU	24,3	23	41	1	0,18
5204	—	—	24,3	26	41	1	0,16
—	5204AZZ	5204ADDU	23	26	41	1	0,16
5304	—	—	26,7	27	45	1	0,22
—	5304AZZ	5304ADDU	25,4	27	45	1	0,22
5205	—	—	26,8	31	46	1	0,18
—	5205BZZ	5205BDDU	25,4	31	46	1	0,18
5305	—	—	31,8	32	55	1	0,35
—	5305AZZ	5305ADDU	30,9	32	55	1	0,36
5206	—	—	31,6	36	56	1	0,30
—	5206BZZ	5206BDDU	30,9	36	56	1	0,30
5306	—	—	36,5	37	65	1	0,57
—	5306AZZ	5306ADDU	36,6	37	65	1	0,57
5207	—	—	36,6	42	65	1	0,46
—	5207AZZ	5207ADDU	36,3	42	65	1	0,46
5307	—	—	41,6	44	71	1,5	0,76
—	5307AZZ	5307ADDU	41,5	44	71	1,5	0,79
5208	—	—	41,5	47	73	1	0,62
—	5208AZZ	5208ADDU	39,4	47	73	1	0,63
5308	—	—	45,5	49	81	1,5	1,03
—	5308AZZ	5308ADDU	43,8	49	81	1,5	1,05
5209	—	—	43,4	52	78	1	0,67
—	5209A1ZZ	5209A1DDU	42,5	52	78	1	0,67
5309	—	—	50,6	54	91	1,5	1,37
5210	—	—	45,9	57	83	1	0,72
—	5210AZZ	5210ADDU	44	57	83	1	0,73
5310	—	—	55,6	60	100	2	1,84
5211	—	—	50,1	64	91	1,5	1,01
—	5211AZZ	5211ADDU	49,2	64	91	1,5	1,01
5311	—	—	60,6	65	110	2	2,40
5212	—	—	56,5	69	101	1,5	1,33
5312	—	—	69,2	72	118	2	2,92
5213	—	—	59,7	74	111	1,5	1,71
5313	—	—	72,8	77	128	2	3,67
5214	—	—	63,8	79	116	1,5	1,75
5314	—	—	78,3	82	138	2	4,55
5215	—	—	66,1	84	121	1,5	1,88
5216	—	—	69,6	90	130	2	2,51
5217	—	—	75,3	95	140	2	3,16

Angular Contact Ball Bearings

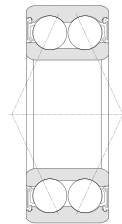
Double Row | Bore 10–90 mm



Open

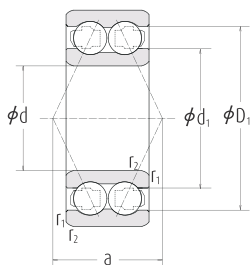


2ZR

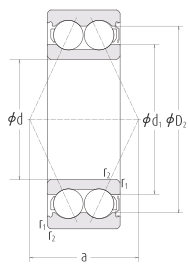


2RSR

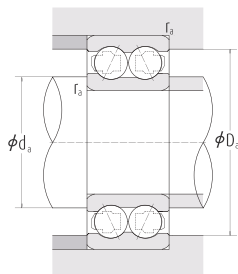
Dimensions				Abbreviation			Load ratings	
d	D	B	r _{1,2} min	Open	with shields 2ZR	with seals 2RSR	dyn. C	stat. C ₀
mm							kN	
10	30	14.0	0.6	3200BTNG	..B2ZRTNG	..B2RSRTNG	7.80	4.55
12	32	15.9	0.6	3201BTNG	..B2ZRTNG	..B2RSRTNG	10.60	5.85
	37	19.0	1.0	3301BTNG	..B2ZRTNG	..B2RSRTNG	14.50	8.20
15	35	15.9	0.6	3202BTNG	..B2ZRTNG	..B2RSRTNG	11.80	7.10
	42	19.0	1.0	3302BTNG	..B2ZRTNG	..B2RSRTNG	16.30	10.00
17	40	17.5	0.6	3203BTNG	..B2ZRTNG	..B2RSRTNG	14.60	9.00
	47	22.2	1.0	3303BTNG	..B2ZRTNG	..B2RSRTNG	20.80	12.50
20	47	20.6	1.0	3204BTNG	..B2ZRTNG	..B2RSRTNG	19.60	12.50
	52	22.2	1.1	3304BTNG	..B2ZRTNG	..B2RSRTNG	23.20	15.00
25	52	20.6	1.0	3205BTNG	..B2ZRTNG	..B2RSRTNG	21.20	14.60
	62	25.4	1.1	3305BTNG	..B2ZRTNG	..B2RSRTNG	30.00	20.00
30	62	23.8	1.0	3206BTNG	..B2ZRTNG	..B2RSRTNG	30.00	21.20
	72	30.2	1.1	3306BTNG	..B2ZRTNG	..B2RSRTNG	41.50	28.50
35	72	27.0	1.1	3207BTNG	..B2ZRTNG	..B2RSRTNG	39.00	28.50
	80	34.9	1.5	3307BTNG	..B2ZRTNG	..B2RSRTNG	51.00	34.50
40	80	30.2	1.1	3208BTNG	..B2ZRTNG	..B2RSRTNG	48.00	36.50
	90	36.5	1.5	3308BTNG	..B2ZRTNG	..B2RSRTNG	62.00	45.00
45	85	30.2	1.1	3209BTNG	..B2ZRTNG	..B2RSRTNG	48.00	37.50
	100	39.7	1.5	3309BTNG	..B2ZRTNG	..B2RSRTNG	68.00	51.00
50	90	30.2	1.1	3210BTNG	..B2ZRTNG	..B2RSRTNG	51.00	42.50
	110	44.4	2.0	3310BTNG	..B2ZRTNG	..B2RSRTNG	81.00	62.00
55	100	33.3	1.5	3211BTNG	..B2ZRTNG	..B2RSRTNG	58.50	49.00
	120	49.2	2.0	3311BTNG	..B2ZRTNG	..B2RSRTNG	102.00	78.00
60	110	36.5	1.5	3212BTNG	..B2ZRTNG	..B2RSRTNG	72.00	61.00
	130	54.0	2.1	3312BTNG	..B2ZRTNG	..B2RSRTNG	125.00	98.00
65	120	38.1	1.5	3213BTNG	..B2ZRTNG	..B2RSRTNG	80.00	73.50
	140	58.7	2.1	3313BTNG	..B2ZRTNG	..B2RSRTNG	150.00	118.00
70	125	39.7	1.5	3214BTNG	..B2ZRTNG	..B2RSRTNG	83.00	76.50
	150	63.5	2.1	3314BTNG	..B2ZRTNG	..B2RSRTNG	171.50	138.20
75	130	41.3	1.5	3215BTNG	..B2ZRTNG	..B2RSRTNG	91.50	85.00
	160	68.3	2.1	3315BTNG	..B2ZRTNG	..B2RSRTNG	173.40	145.30
80	140	44.4	2.0	3216BTNG	..B2ZRTNG	..B2RSRTNG	98.00	93.00
85	150	49.2	2.0	3217BTNG	..B2ZRTNG	..B2RSRTNG	116.00	110.00
90	160	52.4	2.0	3218BTNG	..B2ZRTNG	..B2RSRTNG	124.60	120.30



Open



ZR, RSR



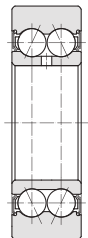
Speed limits		Dimensions (mm)			Abutment dimensions (mm)			Weight
Grease	Oil	d_1	D_1, D_2	a min	d_a max	D_a max	r_a max	kg
min^{-1}								
16,000	22,000	17.9	23.9	15.1	15	25.0	0.6	0.043
15,000	20,000	18.3	25.7	16.6	17	27.0	0.6	0.051
10,500	11,500	21.1	30.4	19.4	19	32.0	1.0	0.090
14,000	19,000	21.0	29.3	18.0	20	30.0	0.6	0.058
11,000	16,000	25.6	34.2	21.2	21	36.0	1.0	0.112
12,000	17,000	24.0	33.1	20.5	22	35.0	0.6	0.085
10,000	15,000	26.2	37.7	24.0	23	41.0	1.0	0.161
10,000	15,000	28.9	38.7	24.2	26	41.0	1.0	0.139
9,000	13,000	31.2	42.6	26.4	27	45.0	1.0	0.197
8,500	12,000	33.9	43.7	26.5	31	46.0	1.0	0.159
7,500	10,000	37.1	50.0	30.7	32	55.0	1.0	0.316
7,000	9,500	40.0	52.7	31.4	36	56.0	1.0	0.265
6,300	8,500	44.0	59.0	36.2	37	65.0	1.0	0.496
6,300	8,500	47.2	60.4	36.6	42	65.0	1.0	0.412
5,600	7,500	49.2	65.4	41.5	44	71.0	1.5	0.664
5,600	7,500	52.9	67.9	40.9	47	73.0	1.0	0.550
5,000	6,700	55.4	74.3	46.1	49	81.0	1.5	0.905
5,000	6,700	57.1	72.6	43.2	52	78.0	1.0	0.583
4,500	6,000	62.2	81.6	50.0	54	91.0	1.5	1.210
4,800	6,300	61.9	78.1	45.5	57	83.0	1.0	0.632
4,000	5,300	68.2	89.6	54.9	60	100.0	2.0	1.600
4,300	5,600	68.6	85.3	49.9	64	91.0	1.5	0.876
3,800	5,000	75.2	98.4	61.2	65	110.0	2.0	2.110
3,800	5,000	75.7	94.3	55.1	69	101.0	1.5	1.180
3,400	4,500	81.2	108.7	67.3	72	118.0	2.0	2.700
3,400	4,500	84.5	103.5	59.8	74	111.0	1.5	1.520
3,200	4,300	88.2	118.0	73.3	77	128.0	2.0	3.390
3,400	4,500	86.7	106.2	61.6	79	116.0	1.5	1.640
3,000	4,000	94.7	125.0	80.8	84	135.0	2.1	4.900
3,200	4,300	92.4	112.6	65.0	89	116.6	1.5	1.910
2,800	3,800	101.4	133.0	83.8	90	143.0	2.1	5.700
3,000	4,000	98.5	120.3	69.0	91	129.0	2.0	2.450
2,800	3,800	106.4	128.5	74.6	100	135.0	2.0	3.300
2,600	3,600	113.2	136.6	78.9	109	141.0	2.1	4.170

Pulleys

Bore 10–35 mm

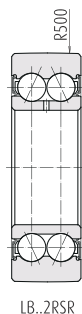
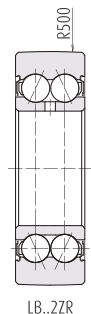


LZ...ZZR



LZ...ZRSR

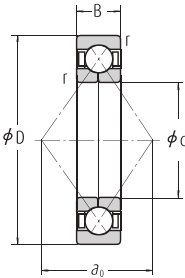
Dimensions				Abbreviation for	
d	D" mm	B mm	r, min	Shields	Seals
10	32	14.0	0.6	LZ3200BZZRSTNG	LZ3200BZRSRSTNG
	32	14.0	0.6	LB3200BZZRSTNG	LB3200BZRSRSTNG
12	35	15.9	0.6	LZ3201BZZRSTNG	LZ3201BZRSRSTNG
	35	15.9	0.6	LB3201BZZRSTNG	LB3201BZRSRSTNG
15	40	15.9	0.6	LZ3202BZZRSTNG	LZ3202BZRSRSTNG
	40	15.9	0.6	LB3202BZZRSTNG	LB3202BZRSRSTNG
17	47	17.5	0.6	LZ3203BZZRSTNG	LZ3203BZRSRSTNG
	47	17.5	0.6	LB3203BZZRSTNG	LB3203BZRSRSTNG
20	52	20.6	1.0	LZ3204BZZRSTNG	LZ3204BZRSRSTNG
	52	20.6	1.0	LB3204BZZRSTNG	LB3204BZRSRSTNG
25	62	20.6	1.0	LZ3205BZZRSTNG	LZ3205BZRSRSTNG
	62	20.6	1.0	LB3205BZZRSTNG	LB3205BZRSRSTNG
30	72	23.8	1.0	LZ3206BZZRSTNG	LZ3206BZRSRSTNG
	72	23.8	1.0	LB3206BZZRSTNG	LB3206BZRSRSTNG
35	80	27.0	1.0	LZ3207BZZRSTNG	LZ3207BZRSRSTNG
	80	27.0	1.0	LB3207BZZRSTNG	LB3207BZRSRSTNG



Load ratings [kN]				Speed limits	Weight
Bearing		Pulley			
dyn. C	stat. C ₀	dyn. C	stat. C ₀	min ⁻¹	kg
7.8	4.55	7.45	4.15	16 000	0.061
7.8	4.55	7.45	4.15	16 000	0.061
10.6	5.85	9.95	5.20	15 000	0.079
10.6	5.85	9.95	5.20	15 000	0.079
11.8	7.10	11.00	6.45	13 000	0.100
11.8	7.10	11.00	6.45	13 000	0.100
14.6	9.00	13.80	8.30	10 000	0.165
14.6	9.00	13.80	8.30	10 000	0.165
19.6	12.50	18.30	11.00	9 000	0.210
19.6	12.50	18.30	11.00	9 000	0.210
21.2	14.60	19.90	13.40	8 000	0.330
21.2	14.60	19.90	13.40	8 000	0.330
30.0	21.20	27.90	18.60	7 100	0.500
30.0	21.20	27.90	18.60	7 100	0.500
39.0	28.50	36.20	25.0	6 300	0.660
39.0	28.50	36.20	25.0	6 300	0.660

Four-Point Contact Ball Bearings

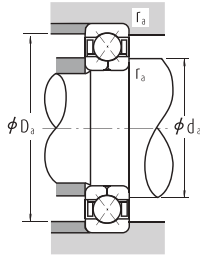
Bore Diameter 30 – 95 mm



Boundary Dimensions (mm)				Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)	
d	D	B	r min.	C _a	C _{0a}	Grease	Oil
30	62	16	1	31 000	45 000	8 500	12 000
	72	19	1.1	46 000	63 000	8 000	11 000
35	72	17	1.1	41 000	61 500	7 500	10 000
	80	21	1.5	55 000	80 000	7 100	9 500
40	80	18	1.1	49 000	77 500	6 700	9 000
	90	23	1.5	67 000	100 000	6 300	8 500
45	85	19	1.1	55 000	88 500	6 300	8 500
	100	25	1.5	87 500	133 000	5 600	7 500
50	90	20	1.1	57 000	97 000	5 600	8 000
	110	27	2	102 000	159 000	5 000	6 700
55	100	21	1.5	71 000	122 000	5 300	7 100
	120	29	2	118 000	187 000	4 500	6 300
60	110	22	1.5	85 500	150 000	4 800	6 300
	130	31	2.1	135 000	217 000	4 300	5 600
65	120	23	1.5	97 500	179 000	4 300	6 000
	140	33	2.1	153 000	250 000	3 800	5 300
70	125	24	1.5	106 000	197 000	4 000	5 600
	150	35	2.1	172 000	285 000	3 600	5 000
75	130	25	1.5	110 000	212 000	3 800	5 300
	160	37	2.1	187 000	320 000	3 400	4 800
80	125	22	1.1	77 000	167 000	3 800	5 300
	140	26	2	124 000	236 000	3 600	5 000
85	170	39	2.1	202 000	360 000	3 200	4 300
	130	22	1.1	79 000	176 000	3 800	5 000
90	150	28	2	143 000	276 000	3 400	4 800
	180	41	3	218 000	405 000	3 000	4 000
95	140	24	1.5	94 000	208 000	3 400	4 800
	160	30	2	164 000	320 000	3 200	4 300
95	190	43	3	235 000	450 000	2 800	3 800
	145	24	1.5	96 500	220 000	3 400	4 500
95	170	32	2.1	177 000	340 000	3 000	4 000
	200	45	3	251 000	495 000	2 600	3 600

Dynamic Equivalent Load $P_a = F_a$

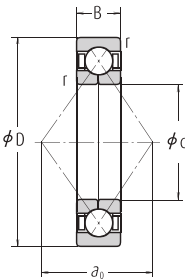
Static Equivalent Load $P_{0a} = F_a$



Bearing Numbers	Load Center Spacings (mm) a_0	Abutment and Fillet Dimensions (mm)			Mass (kg) approx.
		d_a min.	D_a max.	r_a max.	
QJ 206	32.2	36	56	1	0.24
QJ 306	35.7	37	65	1	0.42
QJ 207	37.5	42	65	1	0.35
QJ 307	40.3	44	71	1.5	0.57
QJ 208	42.0	47	73	1	0.45
QJ 308	45.5	49	81	1.5	0.78
QJ 209	45.5	52	78	1	0.52
QJ 309	50.8	54	91	1.5	1.05
QJ 210	49.0	57	83	1	0.59
QJ 310	56.0	60	100	2	1.35
QJ 211	54.3	64	91	1.5	0.77
QJ 311	61.3	65	110	2	1.75
QJ 212	59.5	69	101	1.5	0.98
QJ 312	66.5	72	118	2	2.15
QJ 213	64.8	74	111	1.5	1.2
QJ 313	71.8	77	128	2	2.7
QJ 214	68.3	79	116	1.5	1.3
QJ 314	77.0	82	138	2	3.18
QJ 215	71.8	84	121	1.5	1.5
QJ 315	82.3	87	148	2	3.9
QJ 1016	71.8	87	118	1	1.05
QJ 216	77.0	90	130	2	1.85
QJ 316	87.5	92	158	2	4.6
QJ 1017	75.3	92	123	1	1.1
QJ 217	82.3	95	140	2	2.2
QJ 317	92.8	99	166	2.5	5.34
QJ 1018	80.5	99	131	1.5	1.45
QJ 218	87.5	100	150	2	2.75
QJ 318	98.0	104	176	2.5	6.4
QJ 1019	84.0	104	136	1.5	1.5
QJ 219	92.8	107	158	2	3.35
QJ 319	103.3	109	186	2.5	7.4

Four-Point Contact Ball Bearings

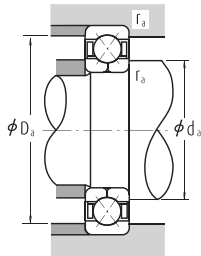
Bore Diameter 100 – 200 mm



Boundary Dimensions (mm)				Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)	
d	D	B	r min.	C _a	C _{0a}	Grease	Oil
100	150	24	1.5	98 500	232 000	3 200	4 300
	180	34	2.1	199 000	390 000	2 800	3 800
	215	47	3	300 000	640 000	2 400	3 400
105	160	26	2	115 000	269 000	3 000	4 000
	190	36	2.1	217 000	435 000	2 600	3 600
	225	49	3	305 000	640 000	2 400	3 200
110	170	28	2	139 000	315 000	2 800	3 800
	200	38	2.1	235 000	490 000	2 600	3 400
	240	50	3	320 000	710 000	2 200	3 000
120	180	28	2	147 000	350 000	2 600	3 600
	215	40	2.1	265 000	585 000	2 400	3 200
	260	55	3	360 000	835 000	2 000	2 800
130	200	33	2	169 000	415 000	2 400	3 200
	230	40	3	274 000	635 000	2 200	3 000
	280	58	4	400 000	970 000	1 900	2 600
140	210	33	2	172 000	435 000	2 200	3 000
	250	42	3	239 000	710 000	2 000	2 800
	300	62	4	440 000	1 110 000	1 700	2 400
150	225	35	2.1	197 000	505 000	2 000	2 800
	270	45	3	315 000	785 000	1 800	2 600
	320	65	4	460 000	1 230 000	1 600	2 200
160	240	38	2.1	224 000	580 000	1 900	2 600
	290	48	3	380 000	1 010 000	1 700	2 400
	340	68	4	505 000	1 400 000	1 500	2 000
170	260	42	2.1	268 000	705 000	1 800	2 400
	310	52	4	425 000	1 180 000	1 600	2 200
	360	72	4	565 000	1 610 000	1 400	2 000
180	280	46	2.1	299 000	830 000	1 700	2 200
	320	52	4	440 000	1 270 000	1 500	2 000
	380	75	4	595 000	1 770 000	1 300	1 800
190	290	46	2.1	325 000	925 000	1 600	2 200
	340	55	4	440 000	1 290 000	1 400	2 000
	400	78	5	655 000	1 980 000	1 300	1 700
200	310	51	2.1	345 000	1 020 000	1 500	2 000
	360	58	4	490 000	1 480 000	1 300	1 800
	420	80	5	690 000	2 180 000	1 200	1 600

Dynamic Equivalent Load $P_a = F_a$

Static Equivalent Load $P_{0a} = F_a$

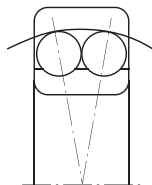


Bearing Numbers	Load Center Spacings (mm) a_0	Abutment and Fillet Dimensions (mm)			Mass (kg) approx.
		d_a min.	D_a max.	r_a max.	
QJ 1020	87.5	109	141	1.5	1.6
QJ 220	98.0	112	168	2	4.0
QJ 320	110.3	114	201	2.5	9.3
QJ 1021	92.8	115	150	2	2.0
QJ 221	103.3	117	178	2	4.7
QJ 321	115.5	119	211	2.5	10.5
QJ 1022	98.0	120	160	2	2.5
QJ 222	108.5	122	188	2	5.6
QJ 322	122.5	124	226	2.5	12.5
QJ 1024	105.0	130	170	2	2.65
QJ 224	117.3	132	203	2	6.9
QJ 324	133.0	134	246	2.5	15.4
QJ 1026	115.5	140	190	2	4.0
QJ 226	126.0	144	216	2.5	7.7
QJ 326	143.5	148	262	3	19
QJ 1028	122.5	150	200	2	4.3
QJ 228	136.5	154	236	2.5	9.8
QJ 328	154.0	158	282	3	24
QJ 1030	131.3	162	213	2	5.2
QJ 230	147.0	164	256	2.5	12
QJ 330	164.5	168	302	3	29
QJ 1032	140.0	172	228	2	6.4
QJ 232	157.5	174	276	2.5	15
QJ 332	175.1	178	322	3	31
QJ 1034	150.5	182	248	2	8.6
QJ 234	168.0	188	292	3	19.5
QJ 334	185.6	188	342	3	41
QJ 1036	161.0	192	268	2	11
QJ 236	175.1	198	302	3	20.5
QJ 336	196.1	198	362	3	48
QJ 1038	168.0	202	278	2	11.5
QJ 238	185.6	208	322	3	23
QJ 338	206.6	212	378	4	54.5
QJ 1040	178.6	212	298	2	15
QJ 240	196.1	218	342	3	27
QJ 340	217.1	222	398	4	61.5



Self-Aligning Ball Bearings

DESIGN, TYPES, AND FEATURES

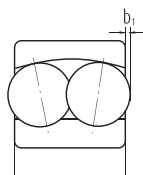


The outer ring has a spherical raceway and its center of curvature coincides with that of the bearing; therefore, the axis of the inner ring, balls and cage can deflect to some extent around the bearing center. This type is recommended when the alignment of the shaft and housing is difficult and when the shaft may bend. Since the contact angle is small, the axial load capacity is low.

Pressed steel cages are usually used.

PROTRUSION AMOUNT OF BALLS

Among self-aligning ball bearings, there are some in which the balls protrude from the side face as shown below. This protrusion amount b_1 is listed in the following table.



Bearing No.	b_1 (mm)
2222(K), 2316(K)	0.5
2319(K), 2320(K) 2321, 2322(K)	0.5
1318(K)	1.5
1319(K)	2
1320(K), 1321 1322(K)	3

PERMISSIBLE MISALIGNMENT

The permissible misalignment of self-aligning ball bearings is approximately 0.07 to 0.12 radian (4° to 7°) under normal loads. However, depending on the surrounding structure, such an angle may not be possible. Use care in the structural design.

CAGES

The cages of these bearings are made of pressed steel or glass-fibre reinforced Polyamid 66. Suffix

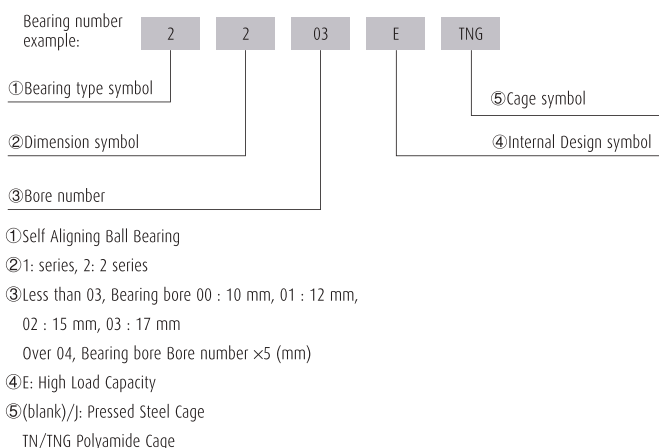
- (blank) - pressed steel
- J - pressed steel
- TN/TNG - Polyamide 66

SEALS

ITJ manufactures Series 22.. and 23.. Self Aligning Ball Bearings, not only as an open version but also with seals on both sides of the bearing. These seals are made of nitrile rubber and are reinforced with a steel disc embedded in the rubber. The seals are fixed in the outer ring and seal against the inner ring with a friction sealing lip. Sealed Self Aligning Ball Bearings are filled with enough grease at the factory to last the normal life span of the bearing. The bearings are therefore maintenance free. Note that sealed Self Aligning Bearings have a lower load-carrying capacity than open bearings of the same type. During installation, it is essential that they are not twisted, as otherwise the seals may be forced out of position.

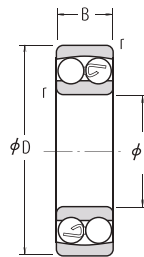
ANGLE ADJUSTMENT FACILITY

Self Aligning Bearings facilitate angle adjustment. The permitted angle of tilt from the central position for Series 12.. and 22.. open bearings is 2.5° and for Series 13.. and 23.. is 3°. With sealed bearings, the permitted angle of tilt is 1.5°.

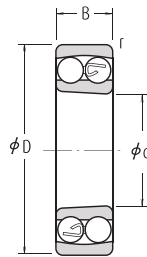


Self-Aligning Ball Bearings

Bore Diameter 5 – 17 mm

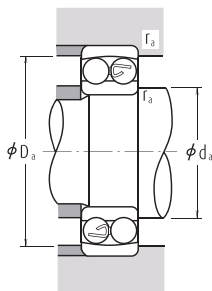


Cylindrical Bore



Tapered Bore

Boundary Dimensions (mm)				Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		Bearing
d	D	B	r min.	C _r	C _{0r}	Grease	Oil	Cylindrical Bore
5	19	6	0.3	2 530	475	30 000	36 000	135
6	19	6	0.3	2 530	475	30 000	36 000	126
7	22	7	0.3	2 750	600	26 000	32 000	127
8	22	7	0.3	2 750	600	26 000	32 000	108
9	26	8	0.6	4 150	895	26 000	30 000	129
10	30	9	0.6	5 550	1 190	22 000	28 000	1200
	30	9	0.6	5 500	1 530	24 000	30 000	1200TN
	30	14	0.6	7 450	1 590	24 000	28 000	2200
	30	14	0.6	7 200	2 040	24 000	30 000	2200TN
12	35	11	0.6	7 350	1 620	20 000	24 000	1300
	35	17	0.6	9 200	2 010	18 000	22 000	2300
	32	10	0.6	5 700	1 270	22 000	26 000	1201
	32	10	0.6	5 600	1 270	24 000	30 000	1201TNG
	32	14	0.6	7 750	1 730	22 000	26 000	2201
	32	14	0.6	9 000	1 960	20 000	26 000	2201ETNG
15	37	12	1.0	9 650	2 160	18 000	22 000	1301
	37	12	1.0	9 500	2 160	18 000	22 000	1301TN
	37	17	1.0	12 100	2 730	17 000	22 000	2301
	35	11	0.6	7 600	1 750	18 000	22 000	1202
	35	11	0.6	7 500	1 760	20 000	26 000	1202TNG
	35	14	0.6	7 800	1 850	18 000	22 000	2202
17	35	14	0.6	9 150	2 080	19 000	24 000	2202ETNG
	42	13	1.0	9 700	2 290	16 000	20 000	1302
	42	13	1.0	9 500	2 280	17 000	20 000	1302TN
	42	17	1.0	12 300	2 910	14 000	18 000	2302
	42	17	1.0	12 000	2 900	16 000	19 000	2302ETNG
	40	12	0.6	8 000	2 010	16 000	20 000	1203
	40	12	0.6	8 000	2 040	18 000	22 000	1203TNG
	40	16	0.6	9 950	2 420	16 000	20 000	2203
	40	16	0.6	11 400	2 750	16 000	19 000	2203ETNG
	47	14	1.0	12 700	3 200	14 000	17 000	1303
19	47	14	1.0	12 500	3 200	15 000	18 000	1303TN
	47	19	1.0	14 700	3 550	13 000	16 000	2303
	47	19	1.0	14 300	3 550	14 000	17 000	2303TN



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	Y_3	0.65	Y_2

Static Equivalent Load $P_0 = F_r + Y_0 F_a$

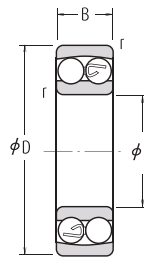
The values of e , Y_2 , Y_3 , and Y_0 are listed in the table below.



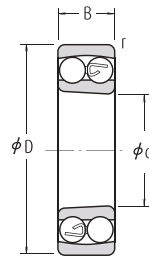
Numbers Tapered Bore(°)	Abutment and Fillet Dimensions (mm)			Constant e	Axial Load Factors			Mass (kg) approx.
	d_a min.	D_a max.	r_a max.		Y_2	Y_3	Y_0	
—	7.0	17.0	0.3	0.34	2.9	1.9	1.9	0.009
—	8.0	17.0	0.3	0.34	2.9	1.9	1.9	0.008
—	9.0	20.0	0.3	0.31	3.1	2.0	2.1	0.013
—	10.0	20.0	0.3	0.31	3.1	2.0	2.1	0.016
—	13.0	22.0	0.6	0.32	3.1	2.0	2.1	0.021
—	14.0	26.0	0.6	0.32	3.1	2.0	2.1	0.034
—	14.0	26.0	0.6	0.32	3.00	2.0	2.1	0.034
—	14.0	26.0	0.6	0.64	1.5	0.98	1.0	0.046
—	14.0	26.0	0.6	0.66	1.50	1.0	1.0	0.047
—	14.0	31.0	0.6	0.35	2.8	1.8	1.9	0.059
—	14.0	31.0	0.6	0.71	1.4	0.89	0.93	0.080
—	16.0	28.0	0.6	0.36	2.7	1.8	1.8	0.041
—	16.0	28.0	0.6	0.37	2.60	1.7	0.040	0.040
—	16.0	28.0	0.6	0.58	1.7	1.1	1.1	0.051
—	16.0	28.0	0.6	0.53	1.85	1.2	1.3	0.053
—	17.0	32.0	1.0	0.33	2.9	1.9	2.0	0.068
—	17.0	32.0	1.0	0.35	2.80	1.8	1.9	0.067
—	17.0	32.0	1.0	0.60	1.6	1.1	1.1	0.089
—	19.0	31.0	0.6	0.32	3.1	2.0	2.1	0.050
—	19.0	31.0	0.6	0.34	2.90	1.9	2.0	0.049
—	19.0	31.0	0.6	0.50	1.9	1.3	1.3	0.058
—	19.0	31.0	0.6	0.46	2.10	1.4	1.4	0.060
—	20.0	37.0	1.0	0.33	2.9	1.9	2.0	0.101
—	20.0	37.0	1.0	0.35	2.80	1.8	1.9	0.094
—	20.0	37.0	1.0	0.51	1.9	1.2	1.3	0.116
—	20.0	37.0	1.0	0.51	1.90	1.2	1.3	0.110
—	21.0	36.0	0.6	0.31	3.1	2.0	2.1	0.074
—	21.0	36.0	0.6	0.33	3.00	1.9	2.0	0.073
—	21.0	36.0	0.6	0.50	1.9	1.3	1.3	0.089
—	21.0	36.0	0.6	0.46	2.10	1.4	1.4	0.088
—	22.0	42.0	1.0	0.32	3.1	2.0	2.1	0.13
—	22.0	42.0	1.0	0.32	3.00	1.9	2.0	0.130
—	22.0	42.0	1.0	0.51	1.9	1.2	1.3	0.16
—	22.0	42.0	1.0	0.53	1.90	1.2	1.3	0.160

Self-Aligning Ball Bearings

Bore Diameter 20 – 35 mm

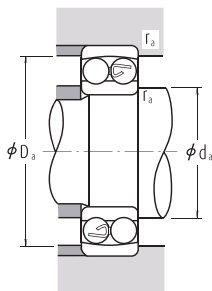


Cylindrical Bore



Tapered Bore

Boundary Dimensions (mm)				Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		Bearing
d	D	B	r min.	C _r	C _{0r}	Grease	Oil	Cylindrical Bore
20	47	14	1.0	10 000	2 610	14 000	17 000	1204
	47	14	1.0	10 000	2 650	15 000	18 000	1204TNG
	47	18	1.0	12 800	3 300	14 000	17 000	2204
	47	18	1.0	14 300	3 550	14 000	17 000	2204TNG
	52	15	1.1	12 600	3 350	12 000	15 000	1304
	52	15	1.1	12 500	3 350	13 000	16 000	1304TNG
	52	21	1.1	18 500	4 700	11 000	14 000	2304
	52	21	1.1	18 000	4 650	13 000	16 000	2304J
	52	15	1.0	12 200	3 300	12 000	14 000	1205
	52	15	1.0	12 200	3 350	13 000	16 000	1205TNG
25	52	18	1.0	12 400	3 450	12 000	14 000	2205
	52	18	1.0	17 000	4 400	12 000	15 000	2205TNG
	62	17	1.1	18 200	5 000	10 000	13 000	1305
	62	17	1.1	18 000	5 000	11 000	14 000	1305TNG
	62	24	1.1	24 900	6 600	9 500	12 000	2305
	62	24	1.1	24 500	6 550	10 000	13 000	2305TNG
	62	16	1.0	15 800	4 650	10 000	12 000	1206
	62	16	1.0	15 600	4 650	11 000	14 000	1206TNG
	62	20	1.0	15 300	4 550	10 000	12 000	2206
	62	20	1.0	25 500	6 950	9 500	12 000	2206TNG
30	72	19	1.1	21 400	6 300	8 500	11 000	1306
	72	19	1.1	21 200	6 300	9 000	11 000	1306TNG
	72	27	1.1	32 000	8 750	8 000	10 000	2306
	72	27	1.1	31 500	8 650	8 500	10 000	2306TNG
	72	17	1.1	15 900	5 100	8 500	10 000	1207
	72	17	1.1	16 000	5 200	9 500	12 000	1207TNG
	72	23	1.1	21 700	6 600	8 500	10 000	2207
	72	23	1.1	32 000	9 000	8 000	9 500	2207TNG
	80	21	1.5	25 300	7 850	7 500	9 500	1307
	80	21	1.5	25 000	8 000	8 000	9 500	1307TNG
35	80	31	1.5	40 000	11 300	7 100	9 000	2307
	80	31	1.5	39 000	11 200	7 500	9 000	2307TNG



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	Y_3	0.65	Y_2

Static Equivalent Load $P_0 = F_r + Y_0 F_a$

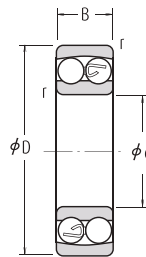
The values of e , Y_2 , Y_3 , and Y_0 are listed in the table below.



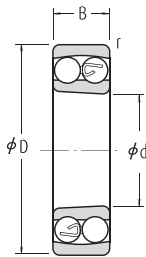
Numbers Tapered Bore(!)	Abutment and Fillet Dimensions (mm)			Constant e	Axial Load Factors			Mass (kg) approx.
	d_a min.	D_a max.	r_a max.		Y_2	Y_3	Y_0	
1204 K	25.0	42.0	1.0	0.29	3.4	2.2	2.3	0.12
1204KTNG	25.0	42.0	1.0	0.28	3.50	2.2	2.3	0.120
2204 K	25.0	42.0	1.0	0.47	2.1	1.3	1.4	0.142
2204EKTNG	25.0	42.0	1.0	0.44	2.20	1.5	1.5	0.140
1304 K	26.5	45.5	1.0	0.29	3.4	2.2	2.3	0.164
1304KTNG	26.5	45.5	1.0	0.29	3.30	2.2	2.3	0.160
2304 K	26.5	45.5	1.0	0.50	1.9	1.2	1.3	0.210
2304KJ	26.5	45.5	1.0	0.51	1.90	1.2	1.3	0.210
1205 K	30.0	47.0	1.0	0.28	3.5	2.3	2.4	0.14
1205KTNG	30.0	47.0	1.0	0.27	3.70	2.4	2.5	0.140
2205 K	30.0	47.0	1.0	0.41	2.4	1.5	1.6	0.16
2205EKTNG	30.0	47.0	1.0	0.35	2.80	1.8	1.9	0.160
1305 K	31.5	55.5	1.0	0.28	3.5	2.3	2.4	0.261
1305KTNG	31.5	55.5	1.0	0.28	3.50	2.3	2.4	0.260
2305 K	31.5	55.5	1.0	0.47	2.1	1.4	1.4	0.340
2305KTNG	31.5	55.5	1.0	0.48	2.00	1.3	1.4	0.340
1206 K	35.0	57.0	1.0	0.25	3.9	2.5	2.6	0.22
1206KTNG	35.0	57.0	1.0	0.25	3.90	2.5	2.7	0.220
2206 K	35.0	57.0	1.0	0.38	2.5	1.6	1.7	0.262
2206EKTNG	35.0	57.0	1.0	0.30	3.30	2.1	2.2	0.260
1306 K	36.5	65.5	1.0	0.26	3.7	2.4	2.5	0.391
1306KTNG	36.5	65.5	1.0	0.26	3.70	2.4	2.5	0.390
2306 K	36.5	65.5	1.0	0.44	2.2	1.4	1.5	0.51
2306KTNG	36.5	65.5	1.0	0.45	2.20	1.4	1.5	0.500
1207 K	41.5	65.5	1.0	0.23	4.2	2.7	2.8	0.33
1207KTNG	41.5	65.5	1.0	0.22	4.30	2.8	2.9	0.320
2207 K	41.5	65.5	1.0	0.37	2.6	1.7	1.8	0.403
2207EKTNG	41.5	65.5	1.0	0.30	3.30	2.1	2.2	0.400
1307 K	43.0	72.0	1.5	0.26	3.8	2.5	2.6	0.52
1307KTNG	43.0	72.0	1.5	0.26	3.80	2.5	2.6	0.510
2307 K	43.0	72.0	1.5	0.46	2.1	1.4	1.4	0.687
2307KTNG	43.0	72.0	1.5	0.47	2.10	1.4	1.4	0.680

Self-Aligning Ball Bearings

Bore Diameter 40 – 55 mm

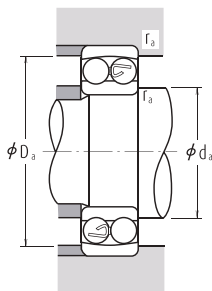


Cylindrical Bore



Tapered Bore

Boundary Dimensions (mm)				Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		Bearing
d	D	B	r min.	C _r	C _{0r}	Grease	Oil	Cylindrical Bore
40	80	18	1.1	19 300	6 500	7 500	9 000	1208
	80	18	1.1	19 300	6 550	8 500	10 000	1208TNG
	80	23	1.1	22 400	7 350	7 500	9 000	2208
	80	23	1.1	31 500	9 500	7 500	9 000	2208ETNG
	90	23	1.5	29 800	9 700	6 700	8 500	1308
	90	23	1.5	29 000	9 650	7 000	8 500	1308TNG
	90	33	1.5	45 500	13 500	6 300	8 000	2308
	90	33	1.5	45 000	13 400	6 700	8 000	2308TNG
	85	19	1.1	22 000	7 350	7 100	8 500	1209
45	85	19	1.1	22 000	7 350	7 500	9 000	1209TNG
	85	23	1.1	23 300	8 150	7 100	8 500	2209
	85	23	1.1	28 000	9 000	7 000	8 500	2209ETNG
	100	25	1.5	38 500	12 700	6 000	7 500	1309
	100	25	1.5	38 000	12 900	6 300	7 500	1309TNG
	100	36	1.5	55 000	16 700	5 600	7 100	2309
	100	36	1.5	54 000	16 300	6 000	7 000	2309TNG
	90	20	1.1	22 800	8 100	6 300	8 000	1210
	90	20	1.1	22 800	8 150	7 000	8 500	1210TNG
50	90	23	1.1	23 300	8 450	6 300	8 000	2210
	90	23	1.1	28 000	9 500	6 700	8 000	2210ETNG
	110	27	2.0	43 500	14 100	5 600	6 700	1310
	110	27	2.0	41 500	14 300	5 600	6 700	1310TNG
	110	40	2.0	65 000	20 200	5 000	6 300	2310
	110	40	2.0	64 000	20 000	5 300	6 300	2310TNG
	100	21	1.5	26 900	10 000	6 000	7 100	1211
	100	21	1.5	27 000	10 000	6 300	7 500	1211TNG
	100	25	1.5	26 700	9 900	6 000	7 100	2211
55	100	25	1.5	39 000	12 700	5 600	6 700	2211ETNG
	120	29	2.0	51 500	17 900	5 000	6 300	1311
	120	29	2.0	51 000	18 000	5 000	6 000	1311TNG
	120	43	2.0	76 500	24 000	4 800	6 000	2311
	120	43	2.0	75 000	23 600	4 800	5 600	2311TNG



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	Y_3	0.65	Y_2

Static Equivalent Load $P_0 = F_r + Y_0 F_a$

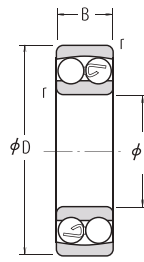
The values of e , Y_2 , Y_3 , and Y_0 are listed in the table below.



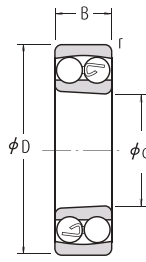
Numbers Tapered Bore(!)	Abutment and Fillet Dimensions (mm)			Constant e	Axial Load Factors			Mass (kg) approx.
	d_a min.	D_a max.	r_a max.		Y_2	Y_3	Y_0	
1208 K	46.5	73.5	1.0	0.22	4.3	2.8	2.9	0.42
1208KTNG	46.5	73.5	1.0	0.22	4.5	2.9	3.0	0.420
2208 K	46.5	73.5	1.0	0.33	3.0	1.9	2.0	0.506
2208EKTNG	46.5	73.5	1.0	0.26	3.8	2.4	2.5	0.510
1308 K	48.0	82.0	1.5	0.24	4.0	2.6	2.7	0.727
1308KTNG	48.0	82.0	1.5	0.25	3.9	2.5	2.6	0.720
2308 K	48.0	82.0	1.5	0.43	2.3	1.5	1.5	0.940
2308KTNG	48.0	82.0	1.5	0.43	2.3	1.5	1.5	0.93
1209 K	51.5	78.5	1.0	0.21	4.7	3.0	3.1	0.47
1209KTNG	51.5	78.5	1.0	0.21	4.7	3.0	3.2	0.47
2209 K	51.5	78.5	1.0	0.30	3.2	2.1	2.2	0.556
2209EKTNG	51.5	78.5	1.0	0.26	3.8	2.4	2.5	0.55
1309 K	53.0	92.0	1.5	0.25	4.0	2.6	2.7	0.971
1309KTNG	53.0	92.0	1.5	0.25	3.9	2.5	2.6	0.96
2309 K	53.0	92.0	1.5	0.41	2.4	1.5	1.6	1.3
2309KTNG	53.0	92.0	1.5	0.43	2.3	1.5	1.6	1.25
1210 K	56.5	83.5	1.0	0.21	4.7	3.1	3.2	0.535
1210KTNG	56.5	83.5	1.0	0.19	4.9	3.2	3.3	0.53
2210 K	56.5	83.5	1.0	0.28	3.4	2.2	2.3	0.598
2210EKTNG	56.5	83.5	1.0	0.22	4.1	2.6	2.7	0.59
1310 K	59.0	101.0	2.0	0.23	4.2	2.7	2.8	1.23
1310KTNG	59.0	101.0	2.0	0.24	4.0	2.6	2.7	1.20
2310 K	59.0	101.0	2.0	0.42	2.3	1.5	1.6	1.66
2310KTNG	59.0	101.0	2.0	0.43	2.3	1.5	1.5	1.65
1211 K	63.0	92.0	1.5	0.20	4.9	3.2	3.3	0.708
1211KTNG	63.0	92.0	1.5	0.19	5.1	3.3	3.5	0.71
2211 K	63.0	92.0	1.5	0.28	3.5	2.3	2.4	0.807
2211EKTNG	63.0	92.0	1.5	0.22	4.5	2.9	2.1	0.81
1311 K	64.0	111.0	2.0	0.23	4.2	2.7	2.8	1.6
1311KTNG	64.0	111.0	2.0	0.24	4.1	2.7	2.8	1.60
2311 K	64.0	111.0	2.0	0.41	2.4	1.5	1.6	2.12
2311KTNG	64.0	111.0	2.0	0.42	2.3	1.5	1.6	2.10

Self-Aligning Ball Bearings

Bore Diameter 60 – 75 mm

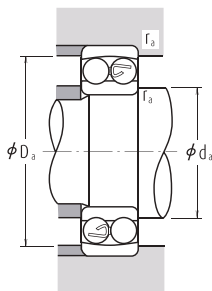


Cylindrical Bore



Tapered Bore

Boundary Dimensions (mm)				Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		Bearing
d	D	B	r min.	C _r	C _{0r}	Grease	Oil	Cylindrical Bore
60	110	22	1.5	30 500	11 500	5 300	6 300	1212
	110	22	1.5	30 000	11 600	5 600	6 700	1212TNG
	110	28	1.5	34 000	12 600	5 300	6 300	2212
	110	28	1.5	47 500	16 600	5 300	6 300	2212ETNG
	130	31	2.1	57 500	20 800	4 500	5 600	1312
	130	31	2.0	57 500	20 800	4 800	5 600	1312TNG
	130	46	2.1	88 500	28 300	4 300	5 300	2312
	130	46	2.0	88 500	28 300	4 300	5 300	2312TNG
	120	23	1.5	31 000	12 500	4 800	6 000	1213
65	120	23	1.5	31 000	12 500	5 300	6 300	1213TNG
	120	31	1.5	43 500	16 400	4 800	6 000	2213
	120	31	1.5	57 000	19 300	4 500	5 300	2213ETNG
	140	33	2.1	62 500	22 900	4 300	5 300	1313
	140	33	2.1	62 500	22 900	4 300	5 300	1313J
	140	48	2.1	97 000	32 500	3 800	4 800	2313
	140	48	2.1	96 500	32 500	4 000	4 800	2313J
	125	24	1.5	35 000	13 800	4 800	5 600	1214
	125	24	1.5	34 500	13 700	5 000	6 000	1214TNG
70	125	31	1.5	44 000	17 100	4 500	5 600	2214
	125	31	1.5	44 000	17 100	4 500	5 600	2214J
	150	35	2.1	75 000	27 700	4 000	5 000	1314
	150	35	2.1	67 500	25 100	4 000	5 000	1314J
	150	51	2.1	111 000	37 500	3 600	4 500	2314
	150	51	2.1	111 000	37 500	3 600	4 300	2314J
	130	25	1.5	39 000	15 700	4 300	5 300	1215
	130	25	1.5	39 000	15 600	4 800	5 600	1215TNG
	130	31	1.5	44 500	17 800	4 300	5 300	2215
75	130	31	1.5	44 500	17 800	4 300	5 300	2215J
	160	37	2.1	80 000	30 000	3 800	4 500	1315
	160	37	2.1	80 000	30 000	3 800	4 500	1315J
	160	55	2.1	125 000	43 000	3 400	4 300	2315
	160	55	2.1	125 000	43 000	3 400	4 300	2315J
	160	55	2.1	125 000	43 000	3 400	4 300	2315J



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a / F_r \leq e$		$F_a / F_r > e$	
X	Y	X	Y
1	Y_3	0.65	Y_2

Static Equivalent Load $P_0 = F_r + Y_0 F_a$

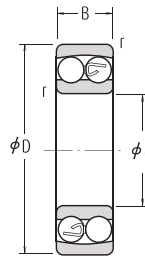
The values of e , Y_2 , Y_3 , and Y_0 are listed in the table below.



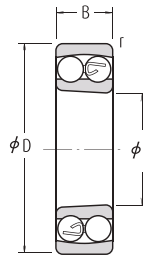
Numbers Tapered Bore(°)	Abutment and Fillet Dimensions (mm)			Constant e	Axial Load Factors			Mass (kg) approx.
	d_a min.	D_a max.	r_a max.		Y_2	Y_3	Y_0	
1212 K	68.0	102.0	1.5	0.18	5.3	3.4	3.6	0.91
1212KTNG	68.5	101.5	1.5	0.18	5.4	3.5	3.6	0.90
2212 K	68.0	102.0	1.5	0.28	3.5	2.3	2.4	1.1
2212EKTNG	68.5	101.5	1.5	0.23	4.2	2.7	2.8	1.10
1312 K	71.0	119.0	2.0	0.23	4.3	2.8	2.9	2.0
1312KJ	72.0	118.0	2.0	0.23	4.3	2.8	2.9	1.95
2312 K	71.0	119.0	2.0	0.40	2.4	1.6	1.6	2.63
2312KJ	72.0	118.0	2.0	0.40	2.4	1.6	1.7	2.60
1213 K	73.0	112.0	1.5	0.17	5.7	3.7	3.8	1.16
1213KTNG	73.0	112.0	1.5	0.18	5.5	3.6	3.7	1.15
2213 K	73.0	112.0	1.5	0.28	3.5	2.3	2.4	1.5
2213EKTNG	73.0	112.0	1.5	0.23	4.3	2.8	2.9	1.45
1313 K	76.0	129.0	2.0	0.23	4.2	2.7	2.9	2.47
1313KTNG	76.0	128.0	2.0	0.23	4.3	2.8	2.9	2.45
2313 K	76.0	129.0	2.0	0.39	2.5	1.6	1.7	3.3
2313KTNG	76.0	128.0	2.0	0.39	2.5	1.6	1.7	3.25
—	78.0	117.0	1.5	0.18	5.3	3.4	3.6	1.3
—	78.0	116.5	1.5	0.19	5.1	3.3	3.5	1.25
—	78.0	117.0	1.5	0.26	3.7	2.4	2.5	1.55
—	78.0	116.5	1.5	0.26	3.7	2.4	2.5	1.50
—	81.0	139.0	2.0	0.22	4.4	2.8	3.0	3.03
—	81.0	138.0	2.0	0.22	4.4	2.8	3.0	3.00
—	81.0	139.0	2.0	0.38	2.6	1.7	1.8	4.0
—	81.0	138.0	2.0	0.38	2.6	1.7	1.8	4.25
1215 K	83.0	122.0	1.5	0.17	5.6	3.6	3.8	1.36
1215KTNG	83.5	121.5	1.5	0.17	5.6	3.6	3.8	1.35
2215 K	83.0	122.0	1.5	0.25	3.9	2.5	2.6	1.6
2215KJ	83.5	121.5	1.5	0.25	3.9	2.5	2.6	1.60
1315 K	86.0	149.0	2.0	0.22	4.4	2.8	2.9	3.63
1315KJ	87.0	148.0	2.0	0.22	4.4	2.8	3.0	3.55
2315 K	86.0	149.0	2.0	0.38	2.5	1.6	1.7	4.84
2315KJ	87.0	148.0	2.0	0.38	2.6	1.6	1.7	5.15

Self-Aligning Ball Bearings

Bore Diameter 80 – 110 mm

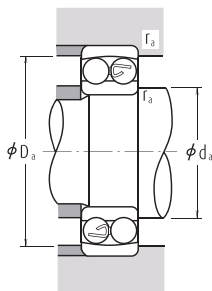


Cylindrical Bore



Tapered Bore

Boundary Dimensions (mm)				Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		Bearing
d	D	B	r min.	C _r	C _{0r}	Grease	Oil	Cylindrical Bore
80	140	26	2.0	40 000	17 000	4 000	5 000	1216
	140	33	2.0	49 000	19 900	4 000	5 000	2216
	170	39	2.1	89 000	33 000	3 600	4 300	1316
85	170	58	2.1	130 000	45 000	3 200	4 000	* 2316
	150	28	2.0	49 500	20 800	3 800	4 500	1217
	150	36	2.0	58 500	23 600	3 800	4 800	2217
90	180	41	3.0	98 500	38 000	3 400	4 000	1317
	180	60	3.0	142 000	51 500	3 000	3 800	2317
	160	30	2.0	57 500	23 500	3 600	4 300	1218
95	160	40	2.0	70 500	28 700	3 600	4 300	2218
	190	43	3.0	117 000	44 500	3 200	3 800	* 1318
	190	64	3.0	154 000	57 500	2 800	3 600	2318
100	170	32	2.1	64 000	27 100	3 400	4 000	1219
	170	43	2.1	84 000	34 500	3 400	4 000	2219
	200	45	3.0	129 000	51 000	3 000	3 600	* 1319
105	200	67	3.0	161 000	64 500	2 800	3 400	* 2319
	180	34	2.1	69 500	29 700	3 200	3 800	1220
	180	46	2.1	94 500	38 500	3 200	3 800	2220
110	215	47	3.0	140 000	57 500	2 800	3 400	* 1320
	215	73	3.0	187 000	79 000	2 400	3 200	* 2320
	190	36	2.1	75 000	32 500	3 000	3 600	1221
115	190	50	2.1	109 000	45 000	3 000	3 600	2221
	225	49	3.0	154 000	64 500	2 600	3 200	* 1321
	225	77	3.0	200 000	87 000	2 400	3 000	* 2321
120	200	38	2.1	87 000	38 500	2 800	3 400	1222
	200	53	2.1	122 000	51 500	2 800	3 400	* 2222
	240	50	3.0	161 000	72 000	2 400	3 000	* 1322
125	240	80	3.0	211 000	94 500	2 200	2 800	* 2322



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	Y_2	0.65	Y_2

Static Equivalent Load $P_0 = F_r + Y_0 F_a$

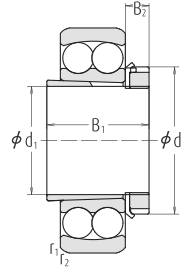
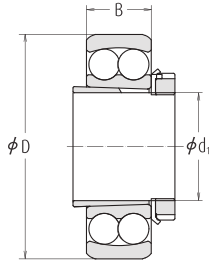
The values of e , Y_2 , Y_3 , and Y_0 are listed in the table below.



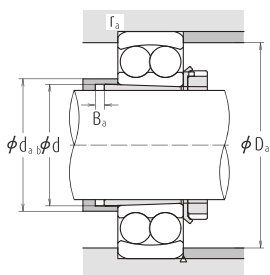
Numbers Tapered Bore(!)	Abutment and Fillet Dimensions (mm)			Constant e	Axial Load Factors			Mass (kg) approx.
	d_a min.	D_a max.	r_a max.		Y_2	Y_3	Y_0	
1216 K	89	131	2.0	0.16	6.0	3.9	4.1	1.68
2216 K	89	131	2.0	0.25	3.9	2.5	2.7	1.97
1316 K	91	159	2.0	0.22	4.5	2.9	3.1	4.24
* 2316 K	91	159	2.0	0.39	2.5	1.6	1.7	5.75
1217 K	94	141	2.0	0.17	5.7	3.7	3.8	2.1
2217 K	94	141	2.0	0.25	3.9	2.5	2.6	2.56
1317 K	98	167	2.5	0.21	4.6	2.9	3.1	5.03
2317 K	98	167	2.5	0.37	2.6	1.7	1.8	6.68
1218 K	99	151	2.0	0.17	5.8	3.8	3.9	2.56
2218 K	99	151	2.0	0.27	3.7	2.4	2.5	3.22
* 1318 K	103	177	2.5	0.22	4.3	2.8	2.9	5.83
2318 K	103	177	2.5	0.38	2.6	1.7	1.7	7.87
1219 K	106	159	2.0	0.17	5.8	3.7	3.9	3.12
2219 K	106	159	2.0	0.27	3.7	2.4	2.5	3.96
* 1319 K	108	187	2.5	0.23	4.3	2.8	2.9	6.79
* 2319 K	108	187	2.5	0.38	2.6	1.7	1.8	9.09
1220 K	111	169	2.0	0.17	5.6	3.6	3.8	3.82
2220 K	111	169	2.0	0.27	3.7	2.4	2.5	4.71
* 1320 K	113	202	2.5	0.24	4.1	2.7	2.8	8.4
* 2320 K	113	202	2.5	0.38	2.6	1.7	1.8	11.5
—	116	179	2.0	0.18	5.5	3.6	3.7	4.43
—	116	179	2.0	0.28	3.5	2.3	2.4	5.73
—	118	212	2.5	0.23	4.2	2.7	2.9	9.58
—	118	212	2.5	0.38	2.6	1.7	1.7	14.5
1222 K	121	189	2.0	0.17	5.7	3.7	3.9	5.21
* 2222 K	121	189	2.0	0.28	3.5	2.2	2.3	6.75
* 1322 K	123	227	2.5	0.22	4.4	2.8	3.0	11.5
* 2322 K	123	227	2.5	0.37	2.6	1.7	1.8	17.5

Self-Aligning Ball Bearings

With adapter sleeve | Shaft 17–65 mm



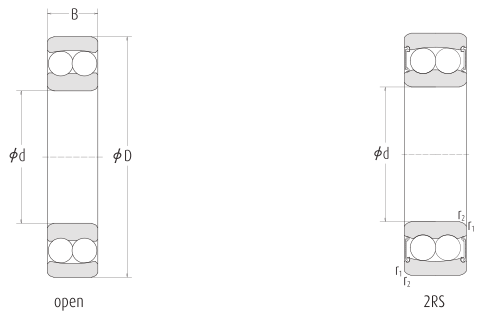
d ₁ Shaft	Dimensions			Load ratings		Speed limits		Abbreviation for	
	D	B	r _{1,2} min.	dyn. C	stat. C ₀	Grease	Oil	Bearing	Sleeve
	mm	mm		kN		(min ⁻¹)			
17	47	14	1.0	10.00	2.65	15 000	18 000	1204KTING	H204
	47	18	1.0	14.30	3.55	14 000	17 000	2204EKTING	H304
	52	15	1.1	12.50	3.35	13 000	16 000	1304KTING	H304
	52	21	1.1	18.00	4.65	13 000	16 000	2304KJ	H2304
20	52	15	1.0	12.20	3.35	13 000	16 000	1205KTING	H205
	52	18	1.0	17.00	4.40	12 000	15 000	2205EKTING	H305
	62	17	1.1	18.00	5.00	11 000	14 000	1305KTING	H305
	62	24	1.1	24.50	6.55	10 000	13 000	2305KTING	H2305
25	62	16	1.0	15.60	4.65	11 000	14 000	1206KTING	H206
	62	20	1.0	25.50	6.95	9 500	12 000	2206EKTING	H306
	72	19	1.1	21.20	6.30	9 000	11 000	1306KTING	H306
	72	27	1.1	31.50	8.65	8 500	10 000	2306KTING	H2306
30	72	17	1.1	16.00	5.20	9 500	12 000	1207KTING	H207
	72	23	1.1	32.00	9.00	8 000	9 500	2207EKTING	H307
	80	21	1.5	25.00	8.00	8 000	9 500	1307KTING	H307
	80	31	1.5	39.00	11.20	7 500	9 000	2307KTING	H2307
35	80	18	1.1	19.30	6.55	8 500	10 000	1208KTING	H208
	80	23	1.1	31.50	9.50	7 500	9 000	2208EKTING	H308
	90	23	1.5	29.00	9.65	7 000	8 500	1308KTING	H308
	90	33	1.5	45.00	13.40	6 700	8 000	2308KTING	H2308
40	85	19	1.1	22.00	7.35	7 500	9 000	1209KTING	H209
	85	23	1.1	28.00	9.00	7 000	8 500	2209EKTING	H309
	100	25	1.5	38.00	12.90	6 300	7 500	1309KTING	H309
	100	36	1.5	54.00	16.30	6 000	7 000	2309KTING	H2309
45	90	20	1.1	22.90	8.15	7 000	8 500	1210KTING	H210
	90	23	1.1	28.00	9.50	6 700	8 000	2210EKTING	H310
	110	27	2.0	41.50	14.30	5 600	6 700	1310KTING	H310
	110	40	2.0	64.00	20.00	5 300	6 300	2310KTING	H2310
50	100	21	1.5	27.00	10.00	6 300	7 500	1211KTING	H211
	100	25	1.5	39.00	12.70	5 600	6 700	2211EKTING	H311
	120	29	2.0	51.00	18.00	5 000	6 000	1311KTING	H311
	120	43	2.0	75.00	23.60	4 800	5 600	2311KTING	H2311
55	110	22	1.5	30.00	11.60	5 600	6 700	1212KTING	H212
	110	28	1.5	47.50	16.60	5 300	6 300	2212EKTING	H312
	130	31	2.0	57.50	20.80	4 800	5 600	1312KJ	H312
	130	46	2.0	88.50	28.30	4 300	5 300	2312KJ	H2312
60	120	23	1.5	31.00	12.50	5 300	6 300	1213KTING	H213
	120	31	1.5	57.00	19.30	4 500	5 300	2213EKTING	H313
	140	33	2.1	62.50	22.90	4 300	5 300	1313KJ	H313
	140	48	2.1	96.50	32.50	4 000	4 800	2313KJ	H2313
65	130	25	1.5	39.00	15.60	4 800	5 600	1215KTING	H215
	130	31	1.5	44.50	17.80	4 300	5 300	2215KJ	H315
	160	37	2.1	80.00	30.00	3 800	4 500	1315KJ	H315
	160	55	2.1	125.00	43.00	3 400	4 300	2315KJ	H2315



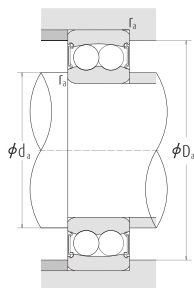
Dimensions (mm)			Abutment dimensions (mm)					Factors				Weight	
d_3	B_1	B_2	d_a max	d_b min	D_a max	B_a min	r_a max	e	Y_1 $F_a/r_1 \leq e$	Y_2 $F_a/r_1 > e$	Y_0	Bearing	Sleeve kg
32	24	7	27	23	42.0	5	1.0	0.28	2.2	3.5	2.3	0.12	0.041
32	28	7	27	23	42.0	5	1.0	0.44	1.5	2.2	1.5	0.14	0.045
32	28	7	30	23	45.5	8	1.0	0.29	2.2	3.3	2.3	0.16	0.045
32	31	7	28	24	45.5	5	1.0	0.51	1.2	1.9	1.3	0.21	0.049
38	26	8	32	28	47.0	5	1.0	0.27	2.4	3.7	2.5	0.14	0.070
38	29	8	32	28	47.0	5	1.0	0.35	1.8	2.8	1.9	0.16	0.075
38	29	8	35	28	55.5	6	1.0	0.28	2.3	3.5	2.4	0.26	0.075
38	35	8	34	30	55.5	5	1.0	0.48	1.3	2.0	1.4	0.34	0.087
45	27	8	38	33	57.0	5	1.0	0.25	2.5	3.9	2.7	0.22	0.100
45	31	8	39	33	57.0	5	1.0	0.30	2.1	3.3	2.2	0.24	0.110
45	31	8	42	33	65.5	6	1.0	0.26	2.4	3.7	2.5	0.38	0.110
45	38	8	40	35	65.5	5	1.0	0.45	1.4	2.2	1.5	0.49	0.130
52	29	9	45	38	65.5	5	1.0	0.22	2.8	4.3	2.9	0.32	0.130
52	35	9	44	39	65.5	5	1.0	0.30	2.1	3.3	2.2	0.40	0.140
52	35	9	49	39	72.0	7	1.5	0.26	2.5	3.8	2.6	0.50	0.140
52	43	9	45	40	72.0	5	1.5	0.47	1.4	2.1	1.4	0.66	0.170
58	31	10	52	43	73.5	6	1.0	0.22	2.9	4.5	3.0	0.41	0.170
58	36	10	50	44	73.5	6	1.0	0.26	2.4	3.8	2.5	0.49	0.190
58	36	10	55	44	82.0	6	1.5	0.25	2.5	3.9	2.6	0.70	0.190
58	46	10	51	45	82.0	6	1.5	0.43	1.5	2.3	1.5	0.90	0.220
65	33	11	57	48	78.5	6	1.0	0.21	3.0	4.7	3.2	0.46	0.230
65	39	11	56	50	78.5	8	1.0	0.26	2.4	3.8	2.5	0.53	0.250
65	39	11	61	50	92.0	6	1.5	0.25	2.5	3.9	2.6	0.94	0.250
65	50	11	57	50	92.0	6	1.5	0.43	1.5	2.3	1.6	1.20	0.280
70	35	12	62	53	83.5	6	1.0	0.20	3.2	4.9	3.3	0.52	0.270
70	42	12	61	55	83.5	10	1.0	0.24	2.6	4.1	2.7	0.58	0.300
70	42	12	68	55	101.0	6	2.0	0.24	2.6	4.0	2.7	1.20	0.300
70	55	12	63	56	101.0	6	2.0	0.43	1.5	2.3	1.5	1.60	0.360
75	37	12	69	60	92.0	7	1.5	0.19	3.3	5.1	3.5	0.69	0.310
75	45	12	68	60	92.0	11	1.5	0.22	2.9	4.5	2.1	0.79	0.390
75	45	12	74	60	111.0	7	2.0	0.24	2.7	4.1	2.8	1.55	0.390
75	59	12	69	61	111.0	7	2.0	0.42	1.5	2.3	1.6	2.05	0.420
80	38	13	75	64	102.0	7	1.5	0.18	3.5	5.4	3.6	0.90	0.350
80	47	13	73	65	102.0	9	1.5	0.23	2.7	4.2	2.8	1.10	0.390
80	47	13	83	65	119.0	7	2.0	0.23	2.8	4.3	2.9	1.95	0.390
80	62	13	74	66	119.0	7	2.0	0.40	1.6	2.4	1.7	2.60	0.490
85	40	14	83	70	112.0	7	1.5	0.18	3.6	5.5	3.7	1.15	0.400
85	50	14	79	70	112.0	9	1.5	0.23	2.8	4.3	2.9	1.45	0.460
85	50	14	89	70	129.0	7	2.0	0.23	2.8	4.3	2.9	2.45	0.460
85	65	14	82	72	129.0	7	2.0	0.39	1.6	2.5	1.7	3.25	0.550
98	43	15	92	80	122.0	7	1.5	0.17	3.6	5.6	3.8	1.35	0.710
98	55	15	90	80	122.0	13	1.5	0.25	2.5	3.9	2.6	1.60	0.830
98	55	15	100	80	149.0	7	2.0	0.22	2.8	4.4	3.0	3.55	0.830
98	73	15	94	82	149.0	7	2.0	0.38	1.6	2.6	1.7	5.15	1.050

Self-Aligning Ball Bearings

Sealed on both sides | Bore 12–65 mm



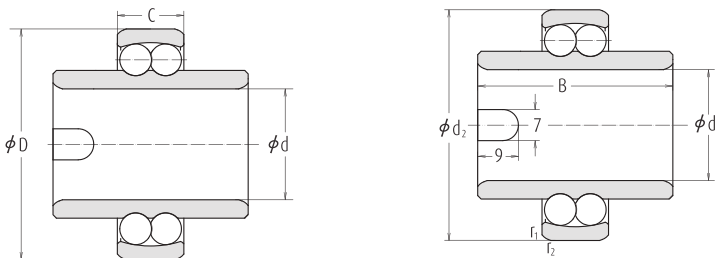
Dimensions				Load ratings		Speed limits	Abbreviation	
d	D	B	$r_{1,2} \text{ min}$	dyn. C	stat. C_0	Grease	Cylindrical bore	Tapered bore
mm				kN		min^{-1}		
12	32	14	0.6	5.60	1.27	16 000	2201-2RSTNG	—
15	35	14	0.6	7.50	1.76	15 000	2202-2RSTNG	—
	42	17	1.0	9.50	2.28	15 000	2302-2RSTN	—
17	40	16	0.6	8.00	2.04	14 000	2203-2RSTNG	—
	47	19	1.0	12.50	3.20	11 000	2303-2RSTN	—
20	47	18	1.0	10.00	2.65	11 000	2204-2RSTNG	2204K2RSTNG
	52	21	1.1	12.50	3.35	10 000	2304-2RSTNG	2304K2RSTNG
25	52	18	1.0	12.20	3.35	9 500	2205-2RSTNG	2205K2RSTNG
	62	24	1.1	18.00	5.00	8 000	2305-2RSTNG	2305K2RSTNG
30	62	20	1.0	15.60	4.65	8 000	2206-2RSTNG	2206K2RSTNG
	72	27	1.1	21.20	6.30	6 700	2306-2RSTNG	2306K2RSTNG
35	72	23	1.1	16.00	5.20	7 000	2207-2RSTNG	2207K2RSTNG
	80	31	1.5	25.00	8.00	6 000	2307-2RSTNG	2307K2RSTNG
40	80	23	1.1	19.30	6.55	6 300	2208-2RSTNG	2208K2RSTNG
	90	33	1.5	29.00	9.65	5 300	2308-2RSTNG	2308K2RSTNG
45	85	23	1.1	22.00	7.35	5 600	2209-2RSTNG	2209K2RSTNG
	100	36	1.5	38.00	12.90	4 800	2309-2RSTNG	2309K2RSTNG
50	90	23	1.1	22.80	8.15	5 300	2210-2RSTNG	2210K2RSTNG
	100	40	2.0	41.50	14.30	4 300	2310-2RSTNG	2310K2RSTNG
55	100	25	1.5	27.00	10.00	4 800	2211-2RSTNG	2211K2RSTNG
	120	43	2.0	51.00	18.00	3 800	2311-2RSTNG	2311K2RSTNG
60	110	28	1.5	30.00	11.60	4 300	2212-2RSTNG	2212K2RSTNG
65	120	31	1.5	31.00	12.40	4 000	2213-2RSTNG	2213K2RSTNG



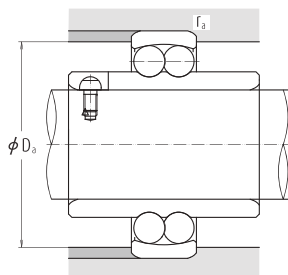
Abutment dimensions (mm)			Factors				Weight
d_s min	D_s max mm	r_s max	e	Y_1 $Fa/fr \leq e$	Y_2 $Fa/fr > e$	Y_0	kg
16.0	28.0	0.6	0.37	1.7	2.6	1.8	0.06
19.0	31.0	0.6	0.34	1.9	2.9	2.0	0.06
20.0	37.0	1.0	0.35	1.8	2.8	1.9	0.13
21.0	36.0	0.6	0.33	1.9	3.0	2.0	0.10
22.0	42.0	1.0	0.32	1.9	3.0	2.0	0.18
25.0	42.0	1.0	0.28	2.2	3.5	2.3	0.16
26.5	45.5	1.0	0.29	2.2	3.3	2.3	0.24
30.0	47.0	1.0	0.27	2.4	3.7	2.5	0.17
31.5	55.5	1.0	0.28	2.3	3.5	2.4	0.38
35.0	57.0	1.0	0.25	2.5	3.9	2.7	0.28
36.5	65.5	1.0	0.26	2.4	3.7	2.5	0.57
41.4	65.5	1.0	0.22	2.8	4.3	2.9	0.45
43.0	72.0	1.5	0.26	2.5	3.8	2.6	0.79
46.5	73.5	1.0	0.22	2.9	4.5	3.0	0.55
48.0	82.0	1.5	0.25	2.5	3.9	2.6	0.05
51.5	78.5	1.0	0.21	3.0	4.7	3.2	0.58
53.0	92.0	1.5	0.25	2.5	3.9	2.6	0.40
56.5	83.5	1.0	0.20	3.2	4.9	3.3	0.63
59.0	101.0	2.0	0.24	2.6	4.0	2.7	1.89
63.0	92.0	1.5	0.19	3.3	5.1	3.5	0.76
66.0	109.0	2.0	0.24	2.7	4.1	2.8	2.37
68.5	101.5	1.5	0.18	3.5	5.4	3.6	1.11
74.0	111.0	1.5	0.18	3.6	5.5	3.7	1.53

Self-Aligning Ball Bearings

With extended inner ring | Bore 20–60 mm



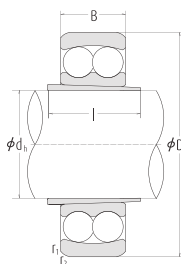
Dimensions				Load ratings		Speed limits Grease	Abbreviation
d	D	B	r _{1,2} min	dyn. C	stat. C ₀	min ⁻¹	
mm				kN			
20	47	14	1.0	10.0	2.65	9 000	11204TNG
	52	15	1.0	12.5	3.20	8 500	11304TNG
25	52	15	1.0	12.2	3.35	8 000	11205TNG
	62	17	1.0	18.0	5.00	6 700	11305TNG
30	62	16	1.0	15.6	4.65	6 700	11206TNG
	72	19	1.0	21.2	6.30	5 600	11306TNG
35	72	17	1.1	16.0	5.20	5 600	11207TNG
	80	21	1.1	25.0	8.00	5 000	11307TNG
40	80	18	1.1	19.3	6.55	5 000	11208TNG
	90	23	1.1	29.0	9.65	4 500	11308TNG
45	85	19	1.1	22.0	7.35	4 500	11209TNG
	100	25	1.1	38.0	12.90	3 800	11309TNG
50	90	20	1.1	22.8	8.15	4 300	11210TNG
	110	27	1.1	41.5	14.30	3 600	11310TNG
55	100	21	1.5	27.0	10.00	4 000	11211TNG
60	110	22	1.5	30.0	11.60	3 600	11212TNG



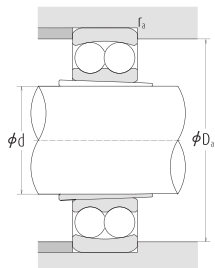
Dimensions		Abutment dimensions		Factors				Weight
d_2	B	D_3 max	r_3 max	e	Y_1 $Fa/Fr \leq e$	Y_2 $Fa/Fr > e$	Y_0	kg
29.2	40	42.0	1.0	0.28	2.2	3.5	2.3	0.18
31.5	44	45.5	1.0	0.29	2.2	3.3	2.3	0.28
33.3	44	47.0	1.0	0.27	2.4	3.7	2.5	0.22
38.0	48	55.5	1.0	0.28	2.3	3.5	2.4	0.43
40.1	48	57.0	1.0	0.25	2.5	3.9	2.7	0.35
45.0	52	65.5	1.0	0.26	2.4	3.7	2.5	0.64
47.7	52	65.5	1.0	0.22	2.8	4.3	2.9	0.54
51.7	56	72.0	1.0	0.26	2.5	3.8	2.6	0.85
54.0	56	73.5	1.0	0.22	2.9	4.5	3.0	0.72
57.7	58	82.0	1.0	0.25	2.5	3.9	2.6	1.12
57.7	58	78.5	1.0	0.21	3.0	4.7	3.2	0.77
63.9	60	92.0	1.0	0.25	2.5	3.9	2.6	1.43
62.7	58	83.5	1.0	0.20	3.2	4.9	3.3	0.85
70.3	62	83.5	1.0	0.24	2.6	4.0	2.7	1.82
70.3	60	92.0	1.5	0.19	3.3	5.1	3.5	1.17
78.0	62	102.0	1.5	0.18	3.5	5.4	3.6	1.50

Self-Aligning Ball Bearings

Sleeve | Shaft 20–50 mm



Dimensions						Load ratings		Abbreviation
d Shaft	d _h	D	B	l	r ₁₂ min	dyn. C	stat. C ₀	
mm						kN		
20	20	47	14	23	1.0	10.0	2.65	11504TNG
25	25	52	15	25	1.0	12.2	3.35	11505TNG
30	30	62	16	25	1.0	15.6	4.65	11506TNG
35	35	72	17	26	1.1	16.0	5.20	11507TNG
40	40	80	18	27	1.1	19.3	6.55	11508TNG
45	45	85	19	28	1.1	22.0	7.35	11509TNG
50	50	90	20	30	1.1	22.8	8.15	11510TNG



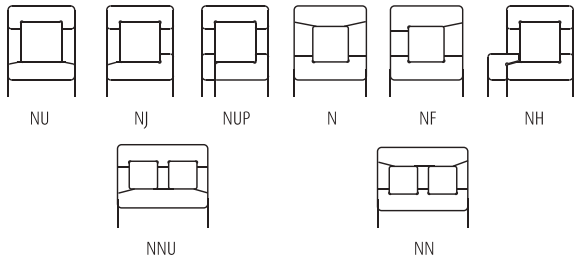
Speed limits		Abutment dimensions		Factors				Weight
Grease	Oil	D_o max	r_s max	e	γ_1 $Fa/fr \leq e$	γ_2 $Fa/fr > e$	γ_0	kg
min^{-1}		mm						
15 000	18 000	41.0	1.0	0.28	2.2	3.5	2.3	0.120
13 000	16 000	46.5	1.0	0.27	2.4	3.7	2.5	0.144
11 000	14 000	56.5	1.0	0.25	2.5	3.9	2.7	0.227
9 500	12 000	65.0	1.0	0.22	2.8	4.3	2.9	0.335
8 500	10 000	73.0	1.0	0.22	2.9	4.5	3.0	0.435
7 500	9 000	78.0	1.0	0.21	3.0	4.7	3.2	0.480
7 000	8 500	83.0	1.0	0.20	3.2	4.9	3.3	0.540



Cylindrical Roller Bearings

DESIGN, TYPES, AND FEATURES

Depending on the existence of ribs on their rings, Cylindrical Roller Bearings are classified into the following types.



Types NU, N, NNU, and NN are suitable as free-end bearings. Types NJ and NF can sustain limited axial loads in one direction. Types NH and NUP can be used as fixed-end bearings.

The inner ring loose rib of a NUP-type cylindrical roller bearing should be mounted so that the marked side is on the outside.

Features of Single-Row Cylindrical Roller Bearings

Cage Specification	Material	Steel	Steel	Polyamide 66 resin	L-PPS resin	Brass	
	Method	pressed		Molded		machined	
	Symbols	W	EW	ET	ET7	M	EM
Features	High Load Capacity	○	⊙	⊙	⊙	△	⊙
	High-Speed	△	○	○	○	○	⊙
	High-Temperature	○	○	△	○	○	○
	Vibration	×	×	×	×	△	○

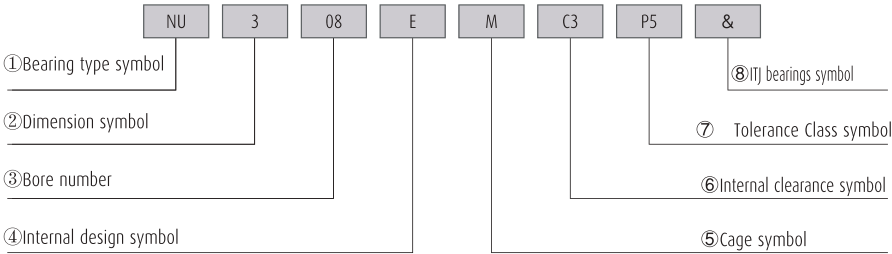
For a given bearing number, if the type of cage is not the standard one, the number of rollers may vary; in such a case, the load rating will differ from the one listed in the bearing tables.

Among the NN Type of double-row bearings, there are many of high precision that have tapered bores, and they are primarily used in the main spindles of machine tools. Their cages are either molded polyphenylenesulfide (PPS) or machined brass.

□ Formulation of Bearing Numbers

Single-Row Cylindrical Rollers

Bearing number example:



① Bearing type symbol	NU : Single-Row Cylindrical Roller Bearings (Outer ring with both ribs + Inner ring without ribs. 10 : 10 Series, 2: 02 Series, 22 : 22 Series, 3 : 03 Series, 23 : 23 Series, 4 : 04 Series, Less than 04, Bearing bore 01 : 12mm, 02 : 15mm, 03 : 17mm Over 03, Bearing bore Bore number × 5 (mm) E : High Load Capacity
② Dimension symbol	W : Pressed Steel Cage, M : Machined Brass Cage, No symbol : Machined Brass Cage
③ Bore number	(In case of 10 Series) T : Polyamide 66 Resin Cage, T7 : L-PPS Resin Cage For All Radial Brgs.
④ Internal design symbol	W : Pressed Steel Cage, M : Machined Brass Cage, No symbol : Machined Brass Cage
⑤ Cage symbol	(In case of 10 Series) T : Polyamide 66 Resin Cage, T7 : L-PPS Resin Cage For All Radial Brgs.
⑥ Radial Internal clearance symbol	Omitted : CN clearance, C3 : Clearance greater than CN, C4 : Clearance greater than C3, CT : Clearance for Electric Motors (for interchangeable bearings), CG : Special Clearance For Non-Interchangeable Cylindrical Roller Bearings CC : Normal Clearance, CC3 : Clearance greater than CC, CC4 : Clearance greater than CC3, CM : Clearance for Electric Motors (for non-interchangeable bearings), CCG : Special Clearance
⑦ Tolerance Class symbol	Omitted : ISO Normal, P6 : ISO Class 6, P5 : ISO Class 5, P4 : ISO Class 4
⑧ ITJ symbol	& : ITJ bearings symbol



PRECAUTIONS FOR USE OF CYLINDRICAL ROLLER BEARINGS

If the load on cylindrical roller bearings becomes too small during operation, slippage between the rollers and raceways occurs, which may result in smearing. Especially with large bearings since the weight of the roller and cage is high.

In case of strong shock loads or vibration, pressed-steel cages are sometimes inadequate.

If very small bearing load or strong shock loads or vibration are expected, please consult with ITJ for selection of the bearings.

Bearings with molded polyamide cages (ET type) can be used continuously at temperatures between -40 and 120°C.

If the bearings are used in gear oil, nonflammable hydraulic oil, or ester oil at a high temperature over 100°C, please contact ITJ beforehand.

Table 2 Tolerances for Roller Inscribed Circle Diameter F_w and Roller Circumscribed Circle Diameter E_w of Cylindrical Roller Bearings Having Interchangeable Rings

Units : μm

Nominal Bore Diameter d (mm)		Tolerances for F_w of types NU, NJ, NUP, NH, and NNU ΔF_w		Tolerances for E_w of types N, NF, and NN ΔE_w	
over	incl.	high	low	high	low
—	20	+10	0	0	-10
20	50	+15	0	0	-15
50	120	+20	0	0	-20
120	200	+25	0	0	-25
200	250	+30	0	0	-30
250	315	+35	0	0	-35
315	400	+40	0	0	-40
400	500	+45	0	—	—

Cylindrical Roller Bearings

TECHNICAL DATA

Free Space of Cylindrical Roller Bearings

Cylindrical roller bearings employ grease lubrication in many cases because it makes maintenance easier and simplifies the peripheral construction of the housing. It is essential to select a grease brand appropriate for the operating conditions while paying due attention to the filling amount and position of the bearing as well as its housing.

The cylindrical roller bearings can be divided into NU, NJ, N, NF, NH, and NUP types of construction according to the collar, collar ring, and position of the inner or outer ring ribs. Even if bearings belong to the same dimension series, they may have different amounts of free space. The free space also differs depending on whether the cage provided is

made from pressed steel or from machined high-tension brass. When determining the grease filling amount, please refer to Tables 1 and 2 which show the free space of NU type bearings. (By the way, the cylindrical roller bearing type is used most frequently).

For types other than the NU type, the free space can be determined from the free space ratio with the NU type. Table 3 shows the approximate free space ratio for each type of cylindrical roller bearing. For example, the free space of NJ310 with a pressed steel cage may be calculated approximately at 47 cm³. This result was calculated by multiplying the free space 52 cm³ of NU310 in Table 1 by the space ratio 0.90 for the NJ type (Table 3).

Table 1 Free Space of Cylindrical Roller Bearing (NU Type) (1) (with Pressed Cage)

Units: cm³

Bearing bore No.	Bearing free space			
	Bearing series			
	NU2	NU3	NU22	NU23
05	6.6	11	7.8	16
06	9.6	17	12	24
07	14	22	14	35
08	18	31	22	44
09	20	42	23	62
10	23	52	26	80
11	30	68	35	102
12	37	85	45	130
13	44	107	57	156
14	51	124	62	179
15	58	155	70	226
16	71	177	85	260
17	85	210	104	300
18	103	244	134	365
19	132	283	164	415
20	151	335	200	540

Table 2 Free Space of Cylindrical Roller Bearing (NU Type) (2)
(with High-Tension Brass Machined Cage)

Units: cm³

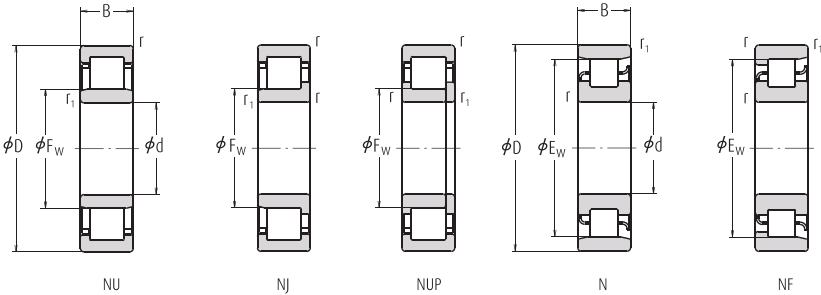
Bearing bore No.	Bearing free space			
	Bearing series			
	NU2	NU3	NU22	NU23
05	5.0	7.6	5.7	10
06	7.4	12	7.9	16
07	9.6	16	12	27
08	12	21	15	32
09	15	29	16	45
10	18	38	17	58
11	22	52	24	77
12	26	62	31	88
13	31	74	43	104
14	37	92	44	129
15	42	102	50	149
16	51	122	60	181
17	64	164	74	200
18	79	193	96	279
19	94	218	116	280
20	115	221	137	355

Table 3 Free Space Ratio of Each Type of Cylindrical Roller Bearing

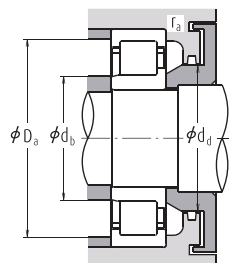
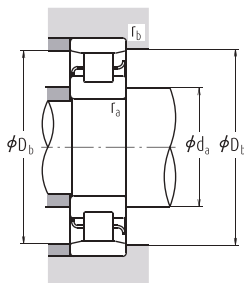
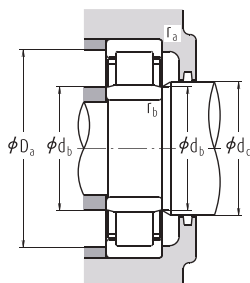
NU Type	NJ Type	N Type	NF Type
1	0.90	1.05	0.95

Single-Row Cylindrical Roller Bearings

Bore Diameter 20 – 30 mm



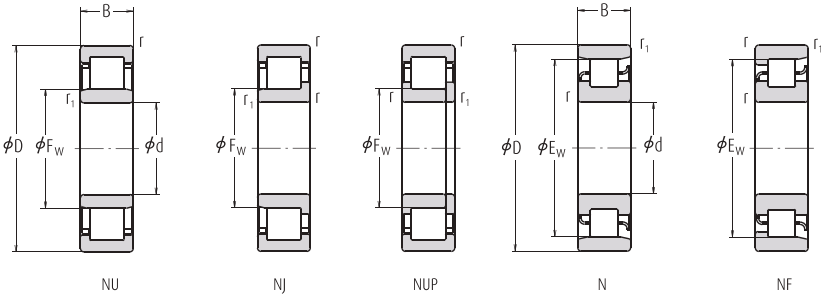
Boundary Dimensions (mm)							Basic Load Ratings (N)		Thermal Reference Speed	Speeds (min ⁻¹)	
d	D	B	r min.	r ₁ min.	F _W	E _W	C _r	C _{0r}		Mechanical (%)	Grease
20	47	14	1.0	0.6	—	40	15 400	12 700	15 400	—	12 000
	47	14	1.0	0.6	26.5	—	25 700	22 600	16 000	—	13 000
	47	18	1.0	0.6	27.0	—	20 700	18 400	19 000	—	11 000
	47	18	1.0	0.6	26.5	—	30 500	28 300	19 000	—	11 000
	52	15	1.1	0.6	—	44.5	21 400	17 300	14 000	—	10 000
	52	15	1.1	0.6	27.5	—	31 500	26 900	13 000	—	12 000
	52	21	1.1	0.6	28.5	—	30 500	27 200	14 000	—	11 000
	52	21	1.1	0.6	27.5	—	42 000	39 000	13 000	—	11 000
25	47	12	0.6	0.3	30.5	—	14 300	13 100	15 000	—	15 000
	52	15	1.0	0.6	—	45	17 700	15 700	17 700	—	10 000
	52	15	1.0	0.6	31.5	—	33 500	27 700	14 000	17 000	12 000
	52	15	1.0	0.6	31.5	—	29 300	27 700	14 000	17 000	12 000
	52	18	1.0	0.6	31.5	—	40 000	34 500	14 000	20 000	12 000
	52	18	1.0	0.6	31.5	—	35 000	34 500	14 000	20 000	12 000
	62	17	1.1	1.1	—	53	29 300	25 200	12 000	—	8 000
	62	17	1.1	1.1	34.0	—	48 000	37 500	11 000	15 000	10 000
	62	17	1.1	1.1	34.0	—	41 500	37 500	11 000	15 000	10 000
	62	24	1.1	1.1	34.0	—	65 500	56 000	11 000	18 000	9 000
	62	24	1.1	1.1	34.0	—	57 000	56 000	11 000	18 000	9 000
	80	21	1.5	1.5	38.8	62.8	46 500	40 000	9 500	—	7 100
30	55	13	1.0	0.6	36.5	48.5	19 700	19 600	13 000	—	12 000
	62	16	1.0	0.6	—	53.5	24 900	23 300	13 000	—	8 500
	62	16	1.0	0.6	37.5	—	45 000	37 500	12 000	14 000	9 500
	62	16	1.0	0.6	37.5	—	39 000	37 500	12 000	14 000	9 500
	62	20	1.0	0.6	37.5	—	56 500	50 000	12 000	17 000	9 500
	62	20	1.0	0.6	37.5	—	49 000	50 000	12 000	17 000	9 500
	72	19	1.1	1.1	—	62	38 500	35 000	10 000	—	7 100
	72	19	1.1	1.1	40.5	—	61 000	50 000	9 500	13 000	8 500
	72	19	1.1	1.1	40.5	—	53 000	50 000	9 500	13 000	8 500
	72	27	1.1	1.1	40.5	—	86 000	77 500	9 500	16 000	8 000
	72	27	1.1	1.1	40.5	—	74 500	77 500	9 500	16 000	8 000
	90	23	1.5	1.5	45.0	73	62 500	55 000	8 500	—	6 000



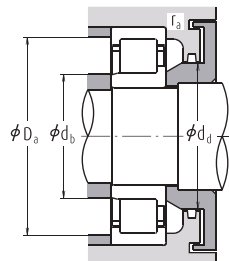
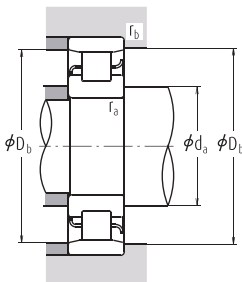
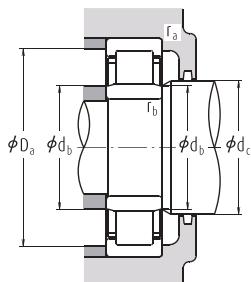
Bearing Numbers							Abutment and Fillet Dimensions (mm)												Mass (kg)
	Cage symbol (1) Standard option		(2) NJ	NUP	N	NF	d _a (3) min.	d _b min.	d _b (4) max.	d _c min.	d _d min.	D _a (2) max.	D _b max.	D _b min.	r _a max.	r _b max.	approx.		
N 204	W	—	—	—	N	NF	25	—	—	—	—	43	42	1	0.6		0.107		
NU 204 E	T	T7	NU	NJ	NUP	—	25	24	25	29	32	42	—	—	1	0.6	0.107		
NU 2204	W	M	NU	NJ	—	—	25	24	25	29	32	42	—	—	1	0.6	0.144		
NU 2204 ET	—	—	NU	NJ	NUP	—	25	24	25	29	32	42	—	—	1	0.6	0.138		
N 304	W	—	—	—	N	NF	26.5	—	—	—	—	48	46	1	0.6		0.148		
NU 304 E	T	T7	NU	NJ	NUP	—	26.5	24	26	30	33	45.5	—	—	1	0.6	0.145		
NU 2304	M	—	NU	NJ	NUP	—	26.5	24	27	30	33	45.5	—	—	1	0.6	0.217		
NU 2304 E	T7	—	NU	NJ	NUP	—	26.5	24	26	30	33	45.5	—	—	1	0.6	0.209		
NU 1005	(M)	—	NU	—	—	—	—	27	30	32	—	43	—	—	0.6	0.3	0.094		
N 205	W	M	—	—	N	NF	30	—	—	—	—	48	46	1	0.6		0.135		
NU 205 E°	W	M,T,17	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
NU 205 E	W	M,T,17	NU	NJ	NUP	—	30	29	30	34	37	47	—	—	1	0.6	0.136		
NU 2205 E°	M	T,17	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
NU 2205 E	M	T,17	NU	NJ	NUP	—	30	29	30	34	37	47	—	—	1	0.6	0.16		
N 305	W	M	—	—	N	NF	31.5	—	—	—	—	55.5	50	1	1		0.233		
NU 305 E°	W	M,T,17	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
NU 305 E	W	M,T,17	NU	NJ	NUP	—	31.5	31.5	32	37	40	55.5	—	—	1	1	0.269		
NU 2305 E°	M	T, 17	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
NU 2305 E	M	T, 17	NU	NJ	NUP	—	31.5	31.5	32	37	40	55.5	—	—	1	1	0.338		
NU 405	W	—	NU	NJ	—	N	NF	33	33	37	41	46	72	72	64	1.5	1.5	0.57	
NU 1006	(M)	—	NU	—	N	—	35	34	36	38	—	50	51	49	1	0.5	0.136		
N 206	W	M	—	—	N	NF	35	—	—	—	—	58	56	1	0.6		0.208		
NU 206 E°	W	M,T,17	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
NU 206 E	W	M,T,17	NU	NJ	NUP	—	35	34	36	40	44	57	—	—	1	0.6	0.205		
NU 2206 E°	M	T, 17	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
NU 2206 E	M	T, 17	NU	NJ	NUP	—	35	34	36	40	44	57	—	—	1	0.6	0.255		
N 306	W	M	—	—	N	NF	36.5	—	—	—	—	65.5	64	1	1		0.353		
NU 306 E°	W	M,T,17	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
NU 306 E	W	M,T,17	NU	NJ	NUP	—	36.5	36.5	39	44	48	65.5	—	—	1	1	0.409		
NU 2306 E°	M	T, 17	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
NU 2306 E	M	T, 17	NU	NJ	NUP	—	36.5	36.5	39	44	48	65.5	—	—	1	1	0.518		
NU 406	W	M	NU	NJ	—	N	NF	38	38	43	47	52	82	82	75	1.5	1.5	0.758	

Single-Row Cylindrical Roller Bearings

Bore Diameter 35 – 40 mm



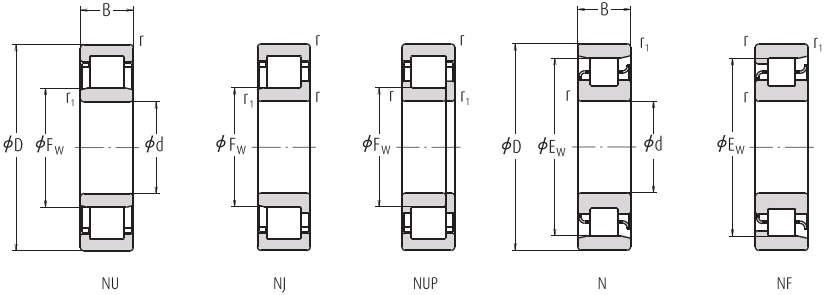
Boundary Dimensions (mm)							Basic Load Ratings (N)		Thermal Reference Speed	Speeds (min ⁻¹)	
d	D	B	r min.	r ₁ min.	F _W	E _W	C _r	C _{0R}		Limiting Speeds	
										Mechanical (%)	Grease
35	62	14	1.0	0.6	42.0	55	22 600	23 200	11 000	—	11 000
	72	17	1.1	0.6	—	61.8	35 500	34 000	11 000	—	7 500
	72	17	1.1	0.6	44.0	—	58 000	50 000	10 000	12 000	8 500
	72	17	1.1	0.6	44.0	—	50 500	50 000	10 000	12 000	8 500
	72	23	1.1	0.6	44.0	—	71 000	65 500	11 000	15 000	8 500
	72	23	1.1	0.6	44.0	—	61 500	65 500	11 000	15 000	8 500
	80	21	1.5	1.1	—	68.2	49 500	47 000	9 500	—	6 300
	80	21	1.5	1.1	46.2	—	76 500	65 500	8 500	11 000	7 500
	80	21	1.5	1.1	46.2	—	66 500	65 500	8 500	11 000	7 500
	80	31	1.5	1.1	46.2	—	107 000	101 000	9 000	14 000	6 700
40	80	31	1.5	1.1	46.2	—	93 000	101 000	9 000	14 000	6 700
	100	25	1.5	1.5	53.0	83	75 500	69 000	7 500	—	5 300
	68	15	1.0	0.6	47.0	61	27 300	29 000	10 000	—	10 000
	80	18	1.1	1.1	—	70	43 500	43 000	9 500	—	6 700
	80	18	1.1	1.1	49.5	—	64 000	55 500	9 000	11 000	7 500
	80	18	1.1	1.1	49.5	—	55 500	55 500	9 000	11 000	7 500
	80	23	1.1	1.1	49.5	—	83 000	77 500	9 000	13 000	7 500
	80	23	1.1	1.1	49.5	—	72 500	77 500	9 000	13 000	7 500
	90	23	1.5	1.5	—	77.5	58 500	57 000	8 500	—	5 600
	90	23	1.5	1.5	52.0	—	95 500	81 500	7 500	10 000	6 700
40	90	23	1.5	1.5	52.0	—	83 000	81 500	7 500	10 000	6 700
	90	33	1.5	1.5	52.0	—	131 000	122 000	8 000	12 000	6 000
	90	33	1.5	1.5	52.0	—	114 000	122 000	8 000	12 000	6 000
	110	27	2.0	2.0	58.0	92	95 500	89 000	6 700	—	4 800



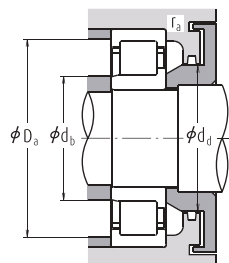
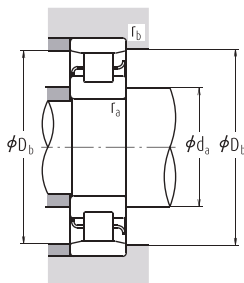
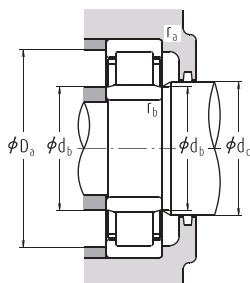
Bearing Numbers							Abutment and Fillet Dimensions (mm)											Mass (kg)
							$d_a^{(2)}$ min.	d_b min.	$d_b^{(4)}$ max.	d_c min.	d_d min.	$D_a^{(2)}$ max.	D_b max.	D_b min.	r_a max.	r_b max.	approx.	
NU 1007	(M)	—	NU	NJ	—	N	—	40	39	41	44	—	57	58	56	1	0.5	0.18
N 207	W	M	—	—	—	N	NF	41.5	—	—	—	—	—	68	64	1	0.6	0.301
NU 207 E°	W	M, T, T7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
NU 207 E	W	M, T, T7	NU	NJ	NUP	—	—	41.5	39	42	46	50	65.5	—	—	1	0.6	0.304
NU 2207 E°	M	T, T7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
NU 2207 E	M	T, T7	NU	NJ	NUP	—	—	41.5	39	42	46	50	65.5	—	—	1	0.6	0.40
N 307	W	M	—	—	—	N	NF	43	—	—	—	—	73.5	70	1.5	1	—	0.476
NU 307 E°	W	M, T, T7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
NU 307 E	W	M, T, T7	NU	NJ	NUP	—	—	41.5	41.5	44	48	53	72	—	—	1.5	1	0.545
NU 2307 E°	M	T, T7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
NU 2307 E	M	T, T7	NU	NJ	NUP	—	—	43	41.5	44	48	53	72	—	—	1.5	1	0.711
NU 407	W	—	NU	NJ	—	N	NF	43	43	51	55	61	92	92	85	1.5	1.5	1.01
NU 1008	(M)	—	NU	NJ	NUP	N	—	45	44	46	49	—	63	64	62	1	0.6	0.223
N 208	W	M	—	—	—	N	NF	46.5	—	—	—	—	73.5	72	1	1	—	0.375
NU 208 E°	W	M, T, T7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
NU 208 E	W	M, T, T7	NU	NJ	NUP	—	—	46.5	46.5	48	52	56	73.5	—	—	1	1	0.379
NU 2208 E°	M	T, T7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
NU 2208 E	M	T, T7	NU	NJ	NUP	—	—	46.5	46.5	48	52	56	73.5	—	—	1	1	0.480
N 308	W	M	—	—	—	N	NF	48	—	—	—	—	82	79	1.5	1.5	—	0.649
NU 308 E°	W	M, T, T7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
NU 308 E	W	M, T, T7	NU	NJ	NUP	—	—	48	48	50	55	60	82	—	—	1.5	1.5	0.747
NU 2308 E°	M	T, T7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
NU 2308 ET	M	T, T7	NU	NJ	NUP	—	—	48	48	50	55	60	82	—	—	1.5	1.5	0.933
NU 408	W	—	NU	NJ	NUP	N	NF	49	49	56	60	67	101	101	94	2	2	1.28

Single-Row Cylindrical Roller Bearings

Bore Diameter 45 – 50 mm



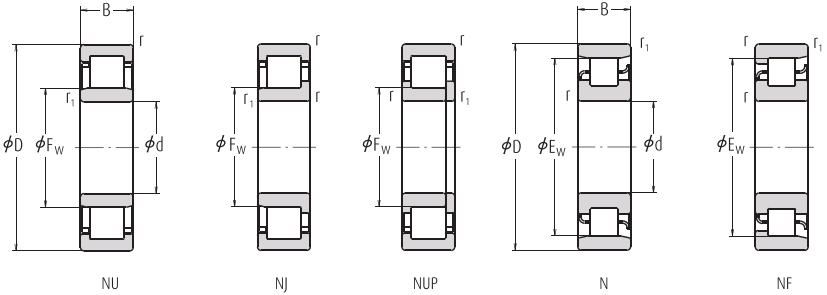
Boundary Dimensions (mm)							Basic Load Ratings (N)		Thermal Reference Speed	Speeds (min ⁻¹)	
d	D	B	r min.	r ₁ min.	F _w	E _w	C _r	C _{0r}		Limiting Speeds	
										Mechanical (%)	Grease
45	75	16	1.0	0.6	52.5	67.5	32 500	35 500	9 500	—	9 300
	85	19	1.1	1.1	—	75	46 000	47 000	9 500	—	6 300
	85	19	1.1	1.1	54.5	—	72 500	66 500	8 500	10 000	6 700
	85	19	1.1	1.1	54.5	—	63 000	66 500	8 500	10 000	6 700
	85	23	1.1	1.1	54.5	—	87 500	84 500	8 500	12 000	6 700
	85	23	1.1	1.1	54.5	—	76 000	84 500	8 500	12 000	6 700
	100	25	1.5	1.5	—	86.5	79 000	77 500	7 500	—	5 000
	100	25	1.5	1.5	58.5	—	112 000	98 500	7 100	9 000	6 000
	100	25	1.5	1.5	58.5	—	97 500	98 500	7 100	9 000	6 000
	100	36	1.5	1.5	58.5	—	158 000	153 000	7 100	11 000	5 300
	100	36	1.5	1.5	58.5	—	137 000	153 000	7 100	11 000	5 300
	120	29	2.0	2.0	64.5	100.5	107 000	102 000	6 300	—	4 300
50	80	16	1.0	0.6	57.5	72.5	32 000	36 000	8 500	—	8 000
	90	20	1.1	1.1	—	80.4	48 000	51 000	8 500	—	5 600
	90	20	1.1	1.1	59.5	—	79 500	76 500	8 000	9 000	6 300
	90	20	1.1	1.1	59.5	—	69 000	76 500	8 000	9 000	6 300
	90	23	1.1	1.1	59.5	—	96 000	97 000	7 500	11 000	6 300
	90	23	1.1	1.1	59.5	—	83 500	97 000	7 500	11 000	6 300
	110	27	2.0	2.0	—	95	87 000	86 000	7 100	—	4 500
	110	27	2.0	2.0	65.0	—	127 000	113 000	6 700	8 000	5 000
	110	27	2.0	2.0	65.0	—	110 000	113 000	6 700	8 000	5 000
	110	40	2.0	2.0	65.0	—	187 000	187 000	6 700	10 000	5 000
	110	40	2.0	2.0	65.0	—	163 000	187 000	6 700	10 000	5 000
	130	31	2.1	2.1	—	110.8	139 000	136 000	5 600	—	4 000
	130	31	2.1	2.1	70.8	110.8	129 000	124 000	5 600	—	4 000



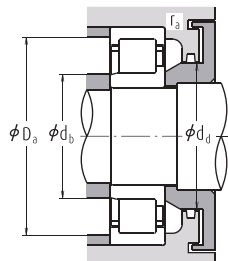
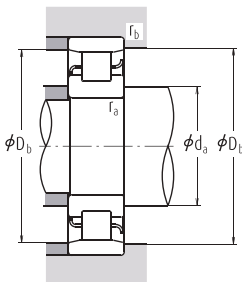
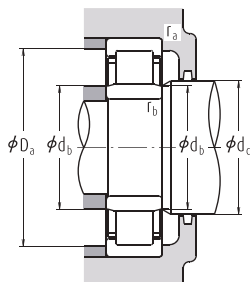
Bearing Numbers							Abutment and Fillet Dimensions (mm)											Mass (kg)
							$d_a^{(2)}$	d_b	$d_b^{(4)}$	d_c	d_d	$D_a^{(2)}$	D_b	D_b	r_a	r_b	approx.	
							min.	min.	max.	min.	min.	max.	max.	min.	max.	max.		
NU 1009	(M)	—	NU	—	—	N	NF	50	49	51	54	—	70	71	68	1	0.6	0.279
N 209	W	M	—	—	—	N	NF	51.5	—	—	—	—	78.5	77	1	1	0.429	
NU 209 E°	W	M, T, T7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
NU 209 E	W	M, T, T7	NU	NJ	NUP	—	—	—	—	—	—	—	—	—	1	1	0.438	
NU 2209 E°	M	T, T7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
NU 2209 E	M	T, T7	NU	NJ	NUP	—	—	—	—	—	—	—	—	—	1	1	0.521	
N 309	W	M	—	—	—	N	NF	53	—	—	—	—	92	77	1.5	1.5	0.869	
NU 309 E°	W	M, T, T7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
NU 309 E	W	M, T, T7	NU	NJ	NUP	—	—	—	—	—	—	—	—	—	1.5	1.5	1.01	
NU 2309 E°	M	T, T7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
NU 2309 E	M	T, T7	NU	NJ	NUP	—	—	—	—	—	—	—	—	—	1.5	1.5	1.28	
NU 409	W	—	NU	NJ	NUP	N	NF	54	54	62	66	74	111	111	103	2	2	1.62
NU 1010	(M)	—	NU	NJ	NUP	N	—	55	54	56	59	—	75	76	73	1	0.6	0.301
N 210	W	M	—	—	—	N	NF	56.5	—	—	—	—	83.5	82	1	1	0.483	
NU 210 E°	W	M, T, T7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
NU 210 E	W	M, T, T7	NU	NJ	NUP	—	—	—	—	—	—	—	—	—	1	1	0.50	
NU 2210 E°	M	T, T7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
NU 2210 E	M	T, T7	NU	NJ	NUP	—	—	—	—	—	—	—	—	—	1	1	0.562	
N 310	W	M	—	—	—	N	NF	59	—	—	—	—	101	97	2	2	1.11	
NU 310 E°	W	M, T, T7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
NU 310 E	W	M, T, T7	NU	NJ	NUP	—	—	—	—	—	—	—	—	—	2	2	1.3	
NU 2310 E°	M	T, T7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
NU 2310 E	M	T, T7	NU	NJ	NUP	—	—	—	—	—	—	—	—	—	2	2	1.7	
N 410	W	M	—	—	—	N	NF	65	—	—	—	—	117	113	2	2	2.0	
NU 410	W	M	NU	NJ	NUP	—	—	61	61	68	73	81	119	119	113.3	2	2	1.99

Single-Row Cylindrical Roller Bearings

Bore Diameter 55 – 60 mm



Boundary Dimensions (mm)							Basic Load Ratings (N)		Thermal Reference Speed	Speeds (min ⁻¹)	
d	D	B	r min.	r ₁ min.	F _W	E _W	C _r	C _{0R}		Mechanical (%)	Grease
55	90	18	1.1	1.0	64.5	80.5	37 500	44 000	8 000	—	7 500
	100	21	1.5	1.1	—	88.5	58 000	62 500	7 500	—	5 300
	100	21	1.5	1.1	66.0	—	99 000	98 500	6 700	8 500	5 600
	100	21	1.5	1.1	66.0	—	86 500	98 500	6 700	8 500	5 600
	100	25	1.5	1.1	66.0	—	117 000	122 000	6 700	10 000	5 600
	100	25	1.5	1.1	66.0	—	101 000	122 000	6 700	10 000	5 600
	120	29	2.0	2.0	—	104.5	111 000	111 000	6 300	—	4 000
	120	29	2.0	2.0	70.5	—	158 000	143 000	6 000	7 500	4 500
	120	29	2.0	2.0	70.5	—	137 000	143 000	6 000	7 500	4 500
	120	43	2.0	2.0	70.5	—	231 000	233 000	6 000	9 000	4 500
	120	43	2.0	2.0	70.5	—	201 000	233 000	6 000	9 000	4 500
	140	33	2.1	2.1	77.2	117.2	139 000	138 000	5 300	—	3 800
60	95	18	1.1	1.0	69.5	85.5	40 000	48 500	7 500	—	6 700
	110	22	1.5	1.5	—	97.5	68 500	75 000	7 100	—	4 800
	110	22	1.5	1.5	72.0	—	112 000	107 000	6 300	7 500	5 300
	110	22	1.5	1.5	72.0	—	97 500	107 000	6 300	7 500	5 300
	110	28	1.5	1.5	72.0	—	151 000	157 000	6 300	9 500	5 300
	110	28	1.5	1.5	72.0	—	131 000	157 000	6 300	9 500	5 300
	130	31	2.1	2.1	—	113	124 000	126 000	6 000	—	3 800
	130	31	2.1	2.1	77.0	—	124 000	126 000	6 000	—	3 800
	130	31	2.1	2.1	77.0	—	169 000	157 000	5 600	9 500	4 800
	130	31	2.1	2.1	77.0	—	150 000	157 000	5 600	9 500	4 800
	130	46	2.1	2.1	77.0	—	251 000	262 000	5 600	8 500	4 300
	130	46	2.1	2.1	77.0	—	222 000	262 000	5 600	8 500	4 300
	150	35	2.1	2.1	83.0	127	167 000	168 000	5 000	—	3 400

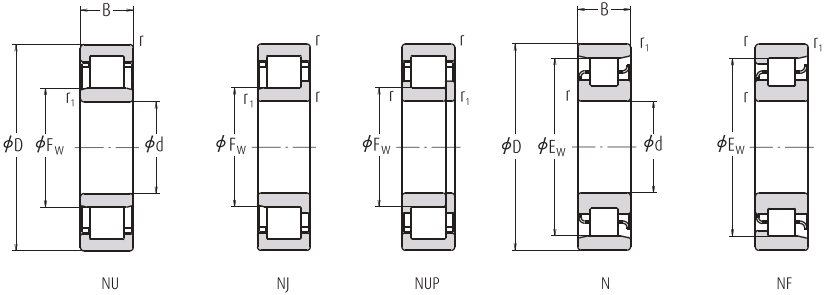


Bearing Numbers							Abutment and Fillet Dimensions (mm)											Mass (kg)
Cage symbol (1) Standard option		NU	(2) NJ	NUP	N	NF	d _a (2) min.	d _b min.	d _b (4) max.	d _c min.	d _d min.	D _a (3) max.	D _b max.	D _b min.	r _a max.	r _b max.	approx.	
NU 1011	(M) —	NU	NJ	—	N	—	61.5	60	63	66	—	83.5	85	82	1	1	0.445	
N 211	W M	—	—	—	N	NF	63	—	—	—	—	—	93.5	91	1.5	1	0.634	
NU 211 E*	W M, T, T7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
NU 211 E	W M, T, T7	NU	NJ	NUP	—	—	63	61.5	64	68	73	92	—	—	1.5	1	0.669	
NU 2211 E*	M T, T7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
NU 2211 ET	M T, T7	NU	NJ	NUP	—	—	63	61.5	64	68	73	92	—	—	1.5	1	0.783	
N 311	W M	—	—	—	N	NF	64	—	—	—	—	—	111	107	2	2	1.42	
NU 311 E*	W M, T, T7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
NU 311 E	W M, T, T7	NU	NJ	NUP	—	—	64	64	68	72	80	111	—	—	2	2	1.64	
NU 2311 E*	M T, T7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
NU 2311 E	M T, T7	NU	NJ	NUP	—	—	64	64	68	72	80	111	—	—	2	2	2.18	
NU 411	W —	NU	NJ	NUP	N	NF	66	66	75	79	87	129	129	119	2	2	2.5	
NU 1012	(M) —	NU	NJ	—	N	NF	66.5	65	68	71	—	88.5	90	87	1	1	0.474	
N 212	W M	—	—	—	N	NF	68	—	—	—	—	—	102	100	1.5	1.5	0.823	
NU 212 E*	W M, T, T7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
NU 212 E	W M, T, T7	NU	NJ	NUP	—	—	68	68	70	75	80	102	—	—	1.5	1.5	0.824	
NU 2212 E*	M T, T7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
NU 2212 E	M T, T7	NU	NJ	NUP	—	—	68	68	70	75	80	102	—	—	1.5	1.5	1.06	
N 312	W M	—	—	—	N	NF	71	—	—	—	—	—	119	115	2	2	1.78	
NU 312	W M	NU	NJ	NUP	—	—	71	71	75	79	86	119	—	—	2	2	1.82	
NU 312 E*	M T, T7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
NU 312 E	M T, T7	NU	NJ	NUP	—	—	71	71	75	79	86	119	—	—	2	2	2.06	
NU 2312 E*	M T, T7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
NU 2312 ET	M T, T7	NU	NJ	NUP	—	—	71	71	75	79	86	119	—	—	2	2	2.7	
NU 412	W M	NU	NJ	NUP	N	NF	71	71	80	85	94	139	139	130	2	2	3.04	

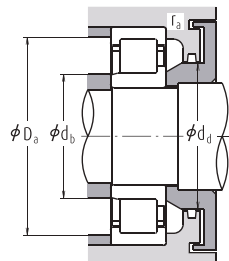
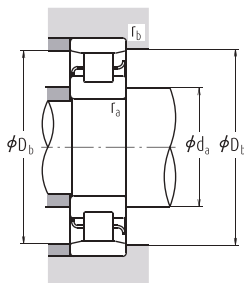
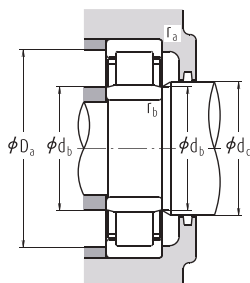


Single-Row Cylindrical Roller Bearings

Bore Diameter 65 – 70 mm



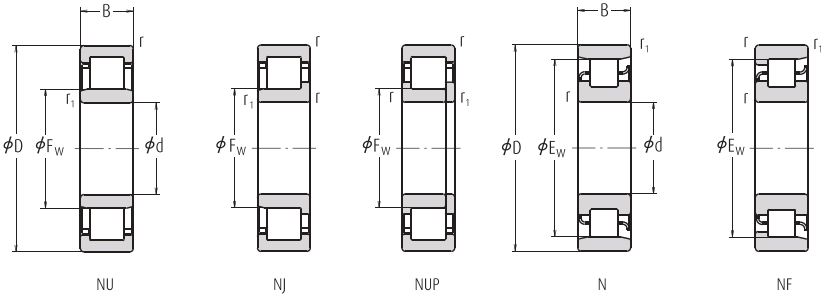
Boundary Dimensions (mm)							Basic Load Ratings (N)		Thermal Reference Speed	Speeds (min ⁻¹)	
d	D	B	r min.	r ₁ min.	F _w	E _w	C _r	C _{0r}		Limiting Speeds	
										Mechanical (%)	Grease
65	100	18	1.1	1.0	74.5	90.5	41 000	51 000	6 700	—	6 300
	120	23	1.5	1.5	—	105.6	84 000	94 500	6 300	—	4 300
	120	23	1.5	1.5	78.5	—	124 000	119 000	6 000	7 100	4 800
	120	23	1.5	1.5	78.5	—	108 000	119 000	6 000	7 100	4 800
	120	31	1.5	1.5	78.5	—	171 000	181 000	6 000	8 500	4 800
	120	31	1.5	1.5	78.5	—	149 000	181 000	6 000	8 500	4 800
	140	33	2.1	2.1	—	121.5	135 000	139 000	5 600	—	3 600
	140	33	2.1	2.1	83.5	—	135 000	139 000	5 600	—	3 600
	140	33	2.1	2.1	82.5	—	204 000	191 000	5 300	8 500	4 300
	140	33	2.1	2.1	82.5	—	181 000	191 000	5 300	8 500	4 300
	140	48	2.1	2.1	82.5	—	263 000	265 000	5 600	7 500	3 800
	140	48	2.1	2.1	82.5	—	233 000	265 000	5 600	7 500	3 800
	160	37	2.1	2.1	—	135.3	195 000	203 000	4 500	—	4 000
	160	37	2.1	2.1	89.3	—	182 000	186 000	4 800	—	3 200
	110	20	1.1	1.0	80.0	100	58 500	70 500	6 300	—	6 000
	125	24	1.5	1.5	—	110.5	83 500	95 000	6 300	—	4 000
70	125	24	1.5	1.5	83.5	—	136 000	137 000	5 600	9 000	5 000
	125	24	1.5	1.5	83.5	—	119 000	137 000	5 600	9 000	5 000
	125	31	1.5	1.5	83.5	—	179 000	194 000	5 600	8 000	4 500
	125	31	1.5	1.5	83.5	—	156 000	194 000	5 600	8 000	4 500
	150	35	2.1	2.1	—	130	149 000	156 000	5 600	—	3 200
	150	35	2.1	2.1	89.0	—	231 000	222 000	4 800	8 000	3 200
	150	35	2.1	2.1	90.0	—	231 000	222 000	4 800	8 000	4 000
	150	35	2.1	2.1	89.0	—	205 000	222 000	4 800	8 000	4 000
	150	51	2.1	2.1	89.0	—	310 000	325 000	5 000	7 100	3 600
	150	51	2.1	2.1	89.0	—	274 000	325 000	5 000	7 100	3 600
	180	42	3.0	3.0	100.0	152	228 000	236 000	4 500	—	2 800



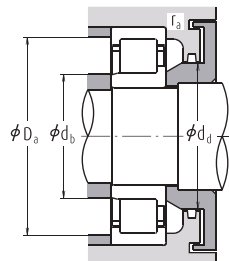
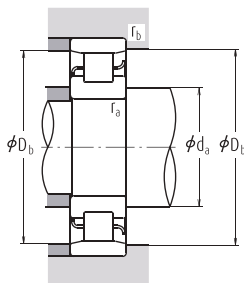
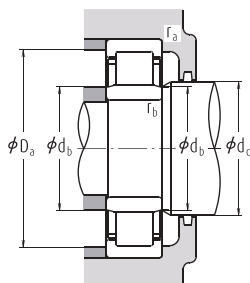
Bearing Numbers							Abutment and Fillet Dimensions (mm)												Mass (kg)
							$d_a^{(2)}$	d_b	$d_b^{(4)}$	d_c	d_d	$D_a^{(3)}$	D_b	D_b	r_a	r_b			
							min.	min.	max.	min.	min.	max.	max.	min.	max.	max.			approx.
NU 1013	(M)	—	NU	NJ	—	N	NF	71.5	70	73	76	—	93.5	95	92	1	1		0.504
N 213	W	M	—	—	—	N	NF	73	—	—	—	—	112	108	1.5	1.5			1.05
NU 213 E ⁺	W	M, T, T7	NU	NJ	NUP	—	—	73	73	76	81	87	112	—	—	1.5	1.5		1.05
NU 213 E	W	M, T, T7	NU	NJ	NUP	—	—	73	73	76	81	87	112	—	—	1.5	1.5		1.05
NU 2213 E ⁺	M	T, T7	NU	NJ	NUP	—	—	73	73	76	81	87	112	—	—	1.5	1.5		1.41
NU 2213 E	M	T, T7	NU	NJ	NUP	—	—	73	73	76	81	87	112	—	—	1.5	1.5		1.41
N 313	W	M	—	—	—	N	NF	76	—	—	—	—	129	125	2	2			2.17
NU 313	W	M	NU	NJ	NUP	—	—	76	76	81	85	93	129	—	—	2	2		2.23
NU 313 E ⁺	M	T, T7	NU	NJ	NUP	—	—	76	76	80	85	93	129	—	—	2	2		2.56
NU 313 E	M	T, T7	NU	NJ	NUP	—	—	76	76	80	85	93	129	—	—	2	2		2.56
NU 2313 E ⁺	M	T, T7	NU	NJ	NUP	—	—	76	76	80	85	93	129	—	—	2	2		3.16
NU 2313 E	M	T, T7	NU	NJ	NUP	—	—	76	76	80	85	93	129	—	—	2	2		3.16
N 413	M	—	—	—	—	N	NF	76	—	—	—	—	149	138.8	2	2			3.63
NU 413	W	M	NU	NJ	—	—	—	76	76	86	91	100	149	—	—	2	2		3.63
NU 1014	(M)	—	NU	NJ	NUP	N	NF	76.5	75	79	82	—	103.5	105	101	1	1		0.693
N 214	W	M	—	—	—	N	NF	78	—	—	—	—	117	113	1.5	1.5			1.14
NU 214 E ⁺	M	T, T7	NU	NJ	NUP	—	—	78	78	81	86	92	117	—	—	1.5	1.5		1.29
NU 214 E	M	T, T7	NU	NJ	NUP	—	—	78	78	81	86	92	117	—	—	1.5	1.5		1.29
NU 2214 E ⁺	M	T, T7	NU	NJ	NUP	—	—	78	78	81	86	92	117	—	—	1.5	1.5		1.49
NU 2214 E	M	T, T7	NU	NJ	NUP	—	—	78	78	81	86	92	117	—	—	1.5	1.5		1.49
N 314	W	M	—	—	—	N	NF	81	—	—	—	—	139	133.5	2	2			2.67
NU 314	W	M	NU	NJ	NUP	—	—	81	81	87	92	100	139	—	—	2	2		2.75
NU 314 E ⁺	M	T, T7	NU	NJ	NUP	—	—	81	81	87	92	100	139	—	—	2	2		3.09
NU 314 E	M	T, T7	NU	NJ	NUP	—	—	81	81	86	92	100	139	—	—	2	2		3.09
NU 2314 E ⁺	M	T, T7	NU	NJ	NUP	—	—	81	81	86	92	100	139	—	—	2	2		3.92
NU 2314 E	M	T, T7	NU	NJ	NUP	—	—	81	81	86	92	100	139	—	—	2	2		3.92
NU 414	W	M	NU	NJ	NUP	N	NF	83	83	97	102	112	167	167	155	2.5	2.5		5.28

Single-Row Cylindrical Roller Bearings

Bore Diameter 75 mm



Boundary Dimensions (mm)							Basic Load Ratings (N)		Speeds (min ⁻¹)		
d	D	B	r min.	r ₁ min.	F _W	E _W	C _r	C _{0r}	Thermal Reference Speed	Limiting Speeds	
										Mechanical (%)	Grease
75	115	20	1.1	1.0	85.0	105	60 000	74 500	6 000	—	5 600
	130	25	1.5	1.5	—	116.5	96 500	111 000	6 000	—	3 800
	130	25	1.5	1.5	88.5	—	150 000	156 000	5 300	8 500	4 800
	130	25	1.5	1.5	88.5	—	130 000	156 000	5 300	8 500	4 800
	130	31	1.5	1.5	88.5	—	186 000	207 000	5 300	7 500	4 300
	130	31	1.5	1.5	88.5	—	162 000	207 000	5 300	7 500	4 300
	160	37	2.1	2.1	—	139.5	179 000	189 000	5 000	—	3 000
	160	37	2.1	2.1	95.5	—	179 000	189 000	5 000	—	3 000
	160	37	2.1	2.1	95.0	—	271 000	263 000	4 500	7 500	3 800
	160	37	2.1	2.1	95.0	—	240 000	263 000	4 500	7 500	3 800
	160	55	2.1	2.1	95.0	—	370 000	395 000	4 800	6 700	3 400
	160	55	2.1	2.1	95.0	—	330 000	395 000	4 800	6 700	3 400
190	45	3.0	3.0	3.0	104.5	160.5	262 000	274 000	4 300	—	2 600

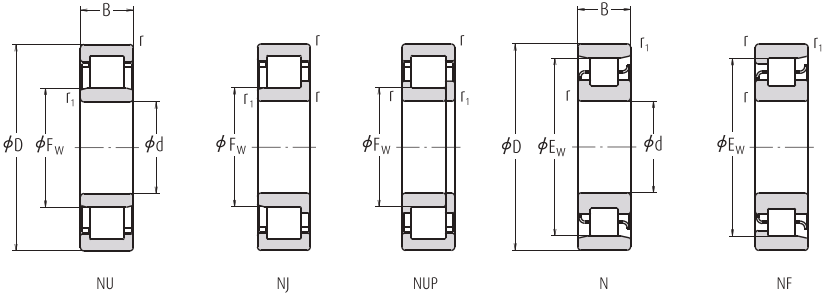


Bearing Numbers							Abutment and Fillet Dimensions (mm)										Mass (kg)	
Cage symbol (1) Standard option			NU	(2) NJ	NUP	N	NF	d _a (3) min.	d _b min.	d _b (4) max.	d _c min.	d _d min.	D _a (3) max.	D _b max.	D _b min.	r _a max.	r _b max.	approx.
NU 1015	(M)	—	NU	—	—	N	NF	81.5	80	83	87	—	108.5	110	106	1	1	0.731
N 215	W	M	—	—	—	N	NF	83	—	—	—	—	—	122	119	1.5	1.5	1.23
NU 215 E*	M	T, T7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
NU 215 E	M	T, T7	NU	NJ	NUP	—	—	83	83	86	90	96	122	—	—	1.5	1.5	1.44
NU 2215 E*	M	T, T7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
NU 2215 E	M	T, T7	NU	NJ	NUP	—	—	83	83	86	90	96	122	—	—	1.5	1.5	1.57
N 315	W	M	—	—	—	N	NF	86	—	—	—	—	—	149	143	2	2	3.2
NU 315	W	T, T7	NU	NJ	NUP	—	—	86	86	93	97	106	149	—	—	2	2	3.26
NU 315 E*	M	T, T7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
NU 315 E	M	T, T7	NU	NJ	NUP	—	—	86	86	92	97	106	149	—	—	2	2	3.73
NU 2315 E*	M	T, T7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
NU 2315 E	M	T, T7	NU	NJ	NUP	—	—	86	86	92	97	106	149	—	—	2	2	4.86
NU 415	W	M	NU	NJ	—	N	NF	88	88	102	107	118	177	177	164	2.5	2.5	6.2

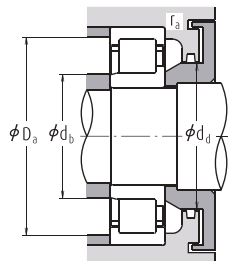
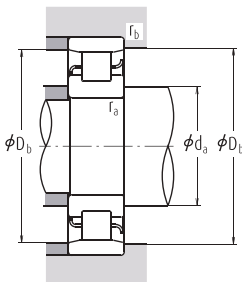
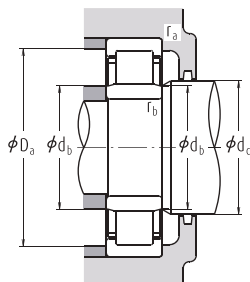


Single-Row Cylindrical Roller Bearings

Bore Diameter 80 – 90 mm



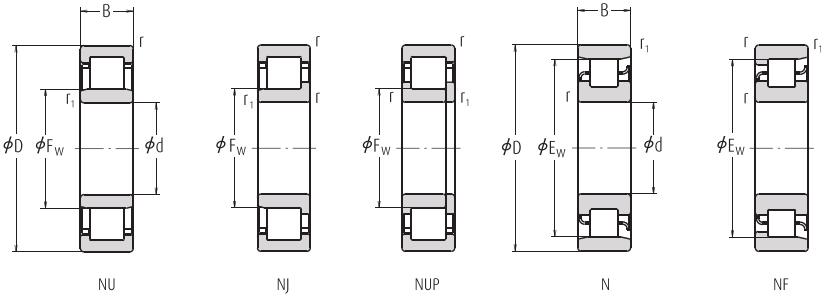
Boundary Dimensions (mm)							Basic Load Ratings (N)		Speeds (min ⁻¹)			
d	D	B	r min.	r ₁ min.	F _W	E _W	C _r	C _{0R}	Thermal Reference Speed	Limiting Speeds		
										Mechanical (%)	Grease	
80	125	22	1.1	1.0	91.5	113.5	72 500	90 500	6 000	—	5 300	
	140	26	2.0	2.0	—	125.3	106 000	122 000	5 600	—	3 600	
	140	26	2.0	2.0	95.3	—	160 000	167 000	5 000	8 000	4 500	
	140	26	2.0	2.0	95.3	—	139 000	167 000	5 000	8 000	4 500	
	140	33	2.0	2.0	95.3	—	214 000	243 000	5 000	7 100	4 000	
	140	33	2.0	2.0	95.3	—	186 000	243 000	5 000	7 100	4 000	
	170	39	2.1	2.1	—	147	190 000	207 000	4 800	—	2 800	
	170	39	2.1	2.1	101.0	—	289 000	282 000	4 300	7 100	3 600	
	170	39	2.1	2.1	101.0	—	256 000	282 000	4 300	7 100	3 600	
	170	58	2.1	2.1	101.0	—	400 000	430 000	4 500	6 300	3 200	
	170	58	2.1	2.1	101.0	—	355 000	430 000	4 500	6 300	3 200	
	200	48	3.0	3.0	110.0	170	299 000	315 000	4 000	—	2 600	
	85	130	22	1.1	1.0	96.5	118.5	74 500	95 500	5 600	—	5 000
		150	28	2.0	2.0	—	133.8	120 000	140 000	5 300	—	3 400
150		28	2.0	2.0	100.5	—	192 000	199 000	4 800	7 500	4 300	
150		28	2.0	2.0	100.5	—	167 000	199 000	4 800	7 500	4 300	
150		36	2.0	2.0	100.5	—	250 000	279 000	4 800	6 700	3 800	
150		36	2.0	2.0	100.5	—	217 000	279 000	4 800	6 700	3 800	
180		41	3.0	3.0	—	156	225 000	247 000	4 500	—	2 600	
180		41	3.0	3.0	108.0	—	212 000	228 000	4 800	—	2 600	
180		41	3.0	3.0	108.0	—	360 000	330 000	4 000	6 700	3 400	
180		60	3.0	3.0	108.0	—	485 000	485 000	4 300	6 000	3 000	
210		52	4.0	4.0	113.0	177	335 000	350 000	4 000	—	3 000	
90	140	24	1.5	1.1	103.0	127	88 000	114 000	5 300	—	4 500	
	160	30	2.0	2.0	—	143	152 000	178 000	5 000	—	3 200	
	160	30	2.0	2.0	107.0	—	205 000	217 000	4 800	7 100	4 000	
	160	30	2.0	2.0	107.0	—	182 000	217 000	4 800	7 100	4 000	
	160	40	2.0	2.0	107.0	—	274 000	315 000	4 800	6 300	3 600	
	160	40	2.0	2.0	107.0	—	242 000	315 000	4 800	6 300	3 600	
	190	43	3.0	3.0	—	165	240 000	265 000	4 500	—	2 600	
	190	43	3.0	3.0	115.0	—	240 000	265 000	4 500	—	2 600	
	190	43	3.0	3.0	113.5	—	390 000	355 000	4 000	6 300	3 200	
	190	64	3.0	3.0	113.5	—	535 000	535 000	4 000	5 600	2 800	
	225	54	4.0	4.0	123.5	191.5	375 000	400 000	3 600	—	2 800	



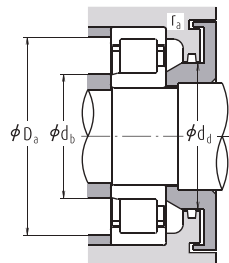
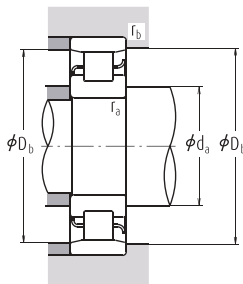
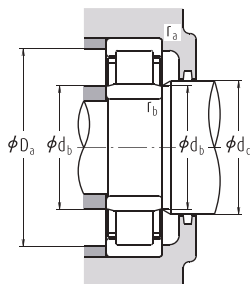
Bearing Numbers						Abutment and Fillet Dimensions (mm)											Mass (kg)
Cage symbol (1) Standard option	NU	(2) NJ	NUP	N	NF	d _a (3) min.	d _b min.	d _b (4) max.	d _c min.	d _d min.	D _a (3) max.	D _b max.	D _b min.	r _a max.	r _b max.	approx.	
NU 1016 (M)	—	NU	—	NUP	N	—	86.5	85	90	94	—	118.5	120	115	1	1	0.969
N 216 W	M	—	—	—	N	NF	89	—	—	—	—	—	131	128	2	2	1.47
NU 216 E*	M	T, T7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
NU 216 E	M	T, T7	NU	NJ	NUP	—	89	89	92	97	104	131	—	—	2	2	1.7
NU 2216 E*	M	T, T7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
NU 2216 E	M	T, T7	NU	NJ	NUP	—	89	89	92	97	104	131	—	—	2	2	1.96
N 316 W	M	—	—	—	N	NF	91	—	—	—	—	—	159	150	2	2	3.85
NU 316 E*	M	T, T7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
NU 316 E	M	T, T7	NU	NJ	NUP	—	91	91	98	105	114	159	—	—	2	2	4.45
NU 2316 E*	M	T, T7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
NU 2316 E	M	T, T7	NU	NJ	NUP	—	91	91	98	105	114	159	—	—	2	2	5.73
NU 416 W	M	NU	NJ	—	N	NF	93	93	107	112	124	187	187	173	2.5	2.5	7.36
NU 1017 (M)	—	NU	—	—	N	—	91.5	90	95	99	—	123.5	125	120	1	1	1.01
N 217 W	M	—	—	—	N	NF	94	—	—	—	—	—	141	137	2	2	1.87
NU 217 E*	M	T, T7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
NU 217 E	M	T, T7	NU	NJ	NUP	—	94	94	98	104	110	141	—	—	2	2	2.11
NU 2217 E*	M	T, T7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
NU 2217 E	M	T, T7	NU	NJ	NUP	—	94	94	98	104	110	141	—	—	2	2	2.44
N 317 W	M	—	—	—	N	NF	98	—	—	—	—	—	167	159	2.5	2.5	4.53
NU 317 W	N	NU	NJ	NUP	—	—	98	98	105	110	119	167	—	—	2.5	2.5	4.6
NU 317 E*	M	T, T7	NU	NJ	NUP	—	98	98	105	110	119	167	—	—	2.5	2.5	5.26
NU 2317 E*	M	T, T7	NU	NJ	NUP	—	98	98	105	110	119	167	—	—	2.5	2.5	6.77
NU 417 M	—	NU	NJ	—	N	NF	101	101	110	115	128	194	194	180	3	3	9.56
NU 1018 (M)	—	NU	—	NUP	N	—	98	96.5	101	106	—	132	133.5	129	1.5	1	1.35
N 218 W	M	—	—	—	N	NF	99	—	—	—	—	—	151	146	2	2	2.31
NU 218 E*	M	T, T7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
NU 218 E	M	T, T7	NU	NJ	NUP	—	99	99	104	109	116	151	—	—	2	2	2.6
NU 2218 E*	M	T, T7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
NU 2218 E	M	T, T7	NU	NJ	NUP	—	99	99	104	109	116	151	—	—	2	2	3.11
N 318 W	M	—	—	—	N	NF	103	—	—	—	—	—	177	168	2.5	2.5	5.31
NU 318 W	M	NU	NJ	NUP	—	—	103	103	112	117	127	177	—	—	2.5	2.5	5.38
NU 318 E*	M	T, T7	NU	NJ	NUP	—	103	103	111	117	127	177	—	—	2.5	2.5	6.1
NU 2318 E*	M	T, T7	NU	NJ	NUP	—	103	103	111	117	127	177	—	—	2.5	2.5	7.9
NU 418 M	—	NU	NJ	—	N	NF	106	106	120	125	139	209	209	196	3	3	11.5

Single-Row Cylindrical Roller Bearings

Bore Diameter 95 – 110 mm



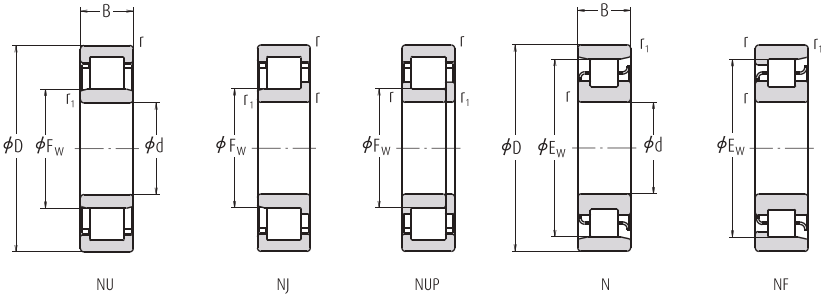
Boundary Dimensions (mm)							Basic Load Ratings (N)		Thermal Reference Speed	Speeds (min ⁻¹)	
d	D	B	r min.	r ₁ min.	F _w	E _w	C _r	C _{0r}		Limiting Speeds	
										Mechanical (%)	Grease
95	145	24	1.5	1.1	108.0	132	90 500	120 000	5 000	—	4 300
	170	32	2.1	2.1	—	151.5	166 000	196 000	4 800	—	3 000
	170	32	2.1	2.1	112.5	—	249 000	265 000	4 300	6 700	3 800
	170	32	2.1	2.1	112.5	—	220 000	265 000	4 300	6 700	3 800
	170	43	2.1	2.1	112.5	—	325 000	370 000	4 500	6 000	3 400
	170	43	2.1	2.1	112.5	—	286 000	370 000	4 500	6 000	3 400
	200	45	3.0	3.0	—	173.5	259 000	289 000	4 300	—	2 400
	200	45	3.0	3.0	121.5	—	259 000	289 000	4 300	—	2 400
	200	45	3.0	3.0	121.5	—	410 000	385 000	3 800	6 000	3 000
	200	67	3.0	3.0	121.5	—	565 000	585 000	3 800	5 300	2 600
100	240	55	4.0	4.0	133.5	201.5	400 000	445 000	3 200	—	2 600
	150	24	1.5	1.1	113	137	93 000	126 000	4 800	—	4 300
	180	34	2.1	2.1	—	160	183 000	217 000	4 500	—	2 800
	180	34	2.1	2.1	119	—	305 000	305 000	4 300	6 300	3 600
	180	46	2.1	2.1	119	—	410 000	445 000	4 300	5 600	3 200
	215	47	3.0	3.0	—	185.5	299 000	335 000	4 000	—	2 200
	215	47	3.0	3.0	129.5	—	299 000	335 000	4 000	—	2 200
	215	47	3.0	3.0	127.5	—	465 000	425 000	3 600	5 600	2 800
	215	73	3.0	3.0	127.5	—	700 000	715 000	3 400	5 600	2 400
	250	58	4.0	4.0	139	211	450 000	500 000	3 000	—	2 600
105	160	26	2.0	1.1	119.5	145.5	109 000	149 000	4 500	—	4 000
	190	36	2.1	2.1	—	168.8	201 000	241 000	4 500	—	2 600
	190	36	2.1	2.1	125	—	320 000	310 000	4 300	6 000	3 400
	225	49	3.0	3.0	—	195	340 000	390 000	3 800	—	2 200
	225	49	3.0	3.0	133	—	525 000	480 000	3 400	5 300	2 600
110	260	60	4.0	4.0	144.5	220.5	495 000	555 000	2 800	—	2 400
	170	28	2.0	1.1	125	155	131 000	174 000	4 500	—	3 800
	200	38	2.1	2.1	—	178.5	229 000	272 000	4 300	—	2 600
	200	38	2.1	2.1	132.5	—	360 000	365 000	4 000	5 600	3 200
	200	53	2.1	2.1	132.5	—	470 000	515 000	4 000	5 000	2 800
	240	50	3.0	3.0	—	207	380 000	435 000	3 400	—	2 000
	240	50	3.0	3.0	143	—	555 000	525 000	3 200	5 000	2 600
	240	80	3.0	3.0	143	—	830 000	880 000	3 000	4 500	2 200
	280	65	4.0	4.0	155	—	550 000	620 000	2 600	—	2 200



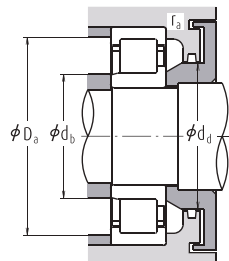
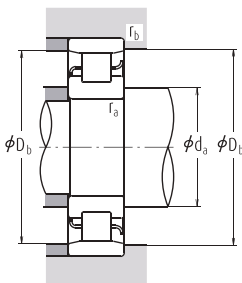
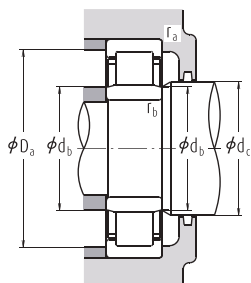
Bearing Numbers							Abutment and Fillet Dimensions (mm)											Mass (kg)
							$d_a^{(2)}$	d_b	$d_b^{(4)}$	d_c	d_d	$D_a^{(2)}$	D_b	D_b	r_a	r_b	approx.	
							min.	min.	max.	min.	min.	max.	max.	min.	max.	max.		
NU 1019	(M)	—	NU	NJ	—	N	—	103	101.5	106	111	—	137	138.5	134	1.5	1	1.41
N 219	W	M	—	—	—	N	NF	106	—	—	—	—	159	155	2	2	2.79	
NU 219 E°	M	T, T7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
NU 219 E	M	T, T7	NU	NJ	NUP	—	—	106	106	110	116	123	159	—	—	2	2	3.17
NU 2219 E°	M	T, T7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
NU 2219 E	M	T, T7	NU	NJ	NUP	—	—	106	106	110	116	123	159	—	—	2	2	3.81
N 319	W	M	—	—	—	N	NF	108	—	—	—	—	187	177	2.5	2.5	6.09	
NU 319	W	M	NU	NJ	NUP	—	—	108	108	118	124	134	187	—	—	2.5	2.5	6.23
NU 319 E°	M	T, T7	NU	NJ	NUP	—	—	108	108	118	124	134	187	—	—	2.5	2.5	7.13
NU 2319 E°	M	T, T7	NU	NJ	NUP	—	—	108	108	118	124	134	187	—	—	2.5	2.5	9.21
NU 419	M	—	NU	NJ	NUP	—	NF	111	111	130	136	149	224	224	206	3	3	13.6
NU 1020	(M)	—	NU	NJ	NUP	N	—	108	106.5	111	116	—	142	143.5	139	1.5	1	1.47
N 220	W	M	—	—	—	N	NF	111	—	—	—	—	169	163	2	2	3.36	
NU 220 E°	M	T, T7	NU	NJ	NUP	—	—	111	111	116	122	130	169	—	—	2	2	3.81
NU 2220 E°	M	T, T7	NU	NJ	NUP	—	—	111	111	116	122	130	169	—	—	2	2	4.69
N 320	W	M	—	—	—	N	NF	113	—	—	—	—	202	190	2.5	2.5	7.59	
NU 320	W	M	NU	NJ	NUP	—	—	113	113	126	132	143	202	—	—	2.5	2.5	7.69
NU 320 E°	M	T, T7	NU	NJ	NUP	—	—	113	113	124	132	143	202	—	—	2.5	2.5	8.63
NU 2320 E°	M	T, T7	NU	NJ	NUP	—	—	113	113	124	132	143	202	—	—	2.5	2.5	11.8
NU 420	M	—	NU	NJ	—	N	NF	116	116	135	141	156	234	234	215	3	3	15.5
NU 1021	(M)	—	NU	—	—	N	NF	114	111.5	118	122	—	151	153.5	147	2	1	1.83
N 221	W	M	—	—	—	N	NF	116	—	—	—	—	179	172	2	2	4.0	
NU 221 E°	M	—	NU	NJ	NUP	—	—	116	116	121	129	137	179	—	—	2	2	4.58
N 321	W	M	—	—	—	N	NF	118	—	—	—	—	212	199	2.5	2.5	8.69	
NU 321 E°	M	—	NU	NJ	NUP	—	—	118	118	131	137	149	212	—	—	2.5	2.5	9.84
NU 421	M	—	NU	NJ	—	N	NF	121	121	141	147	162	244	244	225	3	3	17.3
NU 1022	(M)	—	NU	NJ	—	N	NF	119	116.5	123	128	—	161	163.5	157	2	1	2.27
N 222	W	M	—	—	—	N	NF	121	—	—	—	—	189	182	2	2	4.64	
NU 222 E°	M	T, T7	NU	NJ	NUP	—	—	121	121	129	135	144	189	—	—	2	2	5.37
NU 2222 E°	M	—	NU	NJ	NUP	—	—	121	121	129	135	144	189	—	—	2	2	7.65
N 322	W	M	—	—	—	N	NF	123	—	—	—	—	227	211	2.5	2.5	10.3	
NU 322 E°	M	—	NU	NJ	NUP	—	—	123	123	139	145	158	227	—	—	2.5	2.5	11.8
NU 2322 E°	M	T, T7	NU	NJ	—	—	—	123	123	139	145	158	227	—	—	2.5	2.5	18.8
NU 422	M	—	NU	NJ	—	—	—	126	126	151	157	173	264	—	—	3	3	22.1

Single-Row Cylindrical Roller Bearings

Bore Diameter 120 – 150 mm



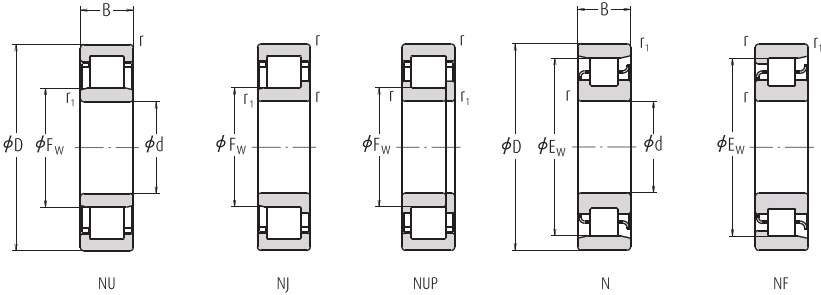
Boundary Dimensions (mm)							Basic Load Ratings (N)		Thermal Reference Speed	Speeds (min ⁻¹)	
d	D	B	r min.	r ₁ min.	F _W	E _W	C _r	C _{0R}		Mechanical (%)	Grease
120	180	28	2.0	1.1	135	165	139 000	191 000	4 000	—	3 400
	215	40	2.1	2.1	—	191.5	260 000	320 000	4 000	—	2 400
	215	40	2.1	2.1	143.5	—	410 000	420 000	3 600	5 300	3 000
	215	58	2.1	2.1	143.5	—	555 000	620 000	3 600	4 800	2 600
	260	55	3.0	3.0	—	226	450 000	510 000	3 000	—	1 800
	260	55	3.0	3.0	154	—	650 000	610 000	2 800	4 800	2 200
	260	86	3.0	3.0	154	—	975 000	1 030 000	2 600	4 300	2 000
	310	72	5.0	5.0	170	260	675 000	770 000	2 400	—	2 000
130	200	33	2.0	1.1	148	182	172 000	238 000	4 000	—	3 200
	230	40	3.0	3.0	—	204	270 000	340 000	3 800	—	2 200
	230	40	3.0	3.0	153.5	—	445 000	455 000	3 400	5 000	2 600
	230	64	3.0	3.0	153.5	—	650 000	735 000	3 400	4 500	2 400
	280	58	4.0	4.0	—	243	500 000	570 000	2 800	—	2 200
	280	58	4.0	4.0	167	—	760 000	735 000	2 600	4 300	2 200
	280	93	4.0	4.0	167	—	1 130 000	1 230 000	2 400	3 800	1 900
	340	78	5.0	5.0	185	285	825 000	955 000	2 000	—	1 800
140	210	33	2.0	1.1	158	192	176 000	250 000	3 800	—	3 000
	250	42	3.0	3.0	—	221	297 000	375 000	3 400	—	2 000
	250	42	3.0	3.0	169	—	485 000	515 000	3 200	4 500	2 400
	250	68	3.0	3.0	169	—	675 000	790 000	3 200	4 000	2 200
	300	62	4.0	4.0	—	260	550 000	640 000	2 600	—	2 000
	300	62	4.0	4.0	180	—	815 000	795 000	2 400	4 000	2 000
	300	102	4.0	4.0	180	—	1 250 000	1 380 000	2 200	2 600	1 700
	360	82	5.0	5.0	198	302	875 000	1 020 000	1 900	—	1 700
150	225	35	2.1	1.5	169.5	205.5	202 000	294 000	3 600	—	2 800
	270	45	3.0	3.0	—	238	360 000	465 000	3 000	—	1 800
	270	45	3.0	3.0	182	—	550 000	595 000	2 800	4 300	2 200
	270	73	3.0	3.0	182	—	780 000	930 000	2 800	3 800	2 000
	320	65	4.0	4.0	—	277	665 000	805 000	2 200	—	1 800
	320	65	4.0	4.0	193	—	930 000	920 000	2 200	3 800	1 800
	320	108	4.0	4.0	193	—	1 430 000	1 600 000	2 000	2 400	1 600
	380	85	5.0	5.0	213	—	930 000	1 120 000	1 700	—	1 600



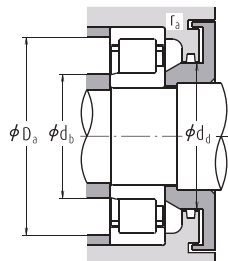
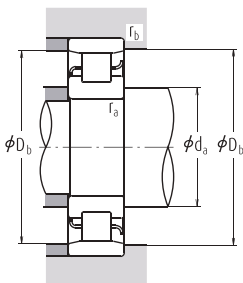
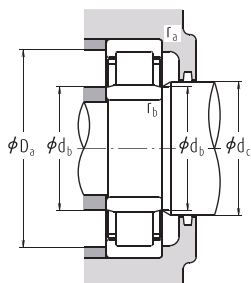
Bearing Numbers							Abutment and Fillet Dimensions (mm)											Mass (kg)
Cage symbol (1) Standard option		NU	(2) NJ	NUP	N	NF	d _a (3) min.	d _b min.	d _b (4) max.	d _c min.	d _d min.	D _a (3) max.	D _b max.	D _b min.	r _a max.	r _b max.	approx.	
NU 1024	(M)	—	NU	NJ	NUP	N	—	129	126.5	133	138	—	171	173.5	167	2	1	2.43
N 224	W	M	—	—	—	N	NF	131	—	—	—	—	204	196	2	2	5.63	
NU 224 E°	M	—	NU	NJ	NUP	—	—	131	131	140	146	156	204	—	—	2	2	6.43
NU 2224 E°	M	—	NU	NJ	NUP	—	—	131	131	140	146	156	204	—	—	2	2	9.51
N 324	W	M	—	—	—	N	NF	133	—	—	—	—	247	230	2.5	2.5	12.9	
NU 324 E°	M	—	NU	NJ	NUP	—	—	133	133	150	156	171	247	—	—	2.5	2.5	15
NU 2324 E°	M	—	NU	NJ	NUP	—	—	133	133	150	156	171	247	—	—	2.5	2.5	25
NU 424	M	—	NU	NJ	NUP	N	—	140	140	166	172	190	290	290	266	4	4	30.2
NU 1026	(M)	—	NU	NJ	—	N	NF	139	136.5	146	151	—	191	193.5	184	2	1	3.66
N 226	W	M	—	—	—	N	NF	143	—	—	—	—	217	208	2.5	2.5	6.48	
NU 226 E°	M	T, T7	NU	NJ	NUP	—	—	143	143	150	158	168	217	—	—	2.5	2.5	8.03
NU 2226 E°	M	—	NU	NJ	NUP	—	—	143	143	150	158	168	217	—	—	2.5	2.5	9.44
N 326	M	—	—	—	—	N	NF	146	—	—	—	—	264	247.5	3	3	17.7	
NU 326 E°	M	—	NU	NJ	NUP	—	—	146	146	163	169	184	264	—	—	3	3	18.7
NU 2326 E°	M	—	NU	NJ	NUP	—	—	146	146	163	169	184	264	—	—	3	3	30
NU 426	M	—	NU	NJ	—	—	NF	150	150	180	187	208	320	320	291	4	4	39.6
NU 1028	(M)	—	NU	NJ	NUP	N	—	149	146.5	156	161	—	201	203.5	194	2	1	3.87
N 228	W	M	—	—	—	N	NF	153	—	—	—	—	237	225	2.5	2.5	8.08	
NU 228 E°	M	—	NU	NJ	NUP	—	—	153	153	165	171	182	237	—	—	2.5	2.5	9.38
NU 2228 E°	M	—	NU	NJ	NUP	—	—	153	153	165	171	182	237	—	—	2.5	2.5	15.2
N 328	M	—	—	—	—	N	NF	156	—	—	—	—	284	266	3	3	21.7	
NU 328 E°	M	—	NU	NJ	NUP	—	—	156	156	176	182	198	284	—	—	3	3	22.8
NU 2328 E°	M	—	NU	NJ	NUP	—	—	156	156	176	182	198	284	—	—	3	3	37.7
NU 428	M	—	NU	NJ	—	N	—	160	160	193	200	222	340	340	308	4	4	46.4
NU 1030	(M)	—	NU	NJ	—	N	NF	161	158	167	173	—	214	217	208	2	1.5	4.77
N 230	W	M	—	—	—	N	NF	163	—	—	—	—	257	242	2.5	2.5	10.4	
NU 230 E°	M	—	NU	NJ	NUP	—	—	163	163	177	184	196	257	—	—	2.5	2.5	11.9
NU 2230 E°	M	—	NU	NJ	NUP	—	—	163	163	177	184	196	257	—	—	2.5	2.5	19.3
N 330	M	—	—	—	—	N	NF	166	—	—	—	—	304	283	3	3	25.8	
NU 330 E°	M	—	NU	NJ	NUP	—	—	166	166	188	195	213	304	—	—	3	3	27.1
NU 2330 E°	M	—	NU	NJ	NUP	—	—	166	166	188	195	213	304	—	—	3	3	45.1
NU 430	M	—	NU	NJ	—	—	—	170	170	208	216	237	360	—	—	4	4	55.8

Single-Row Cylindrical Roller Bearings

Bore Diameter 160 - 190 mm



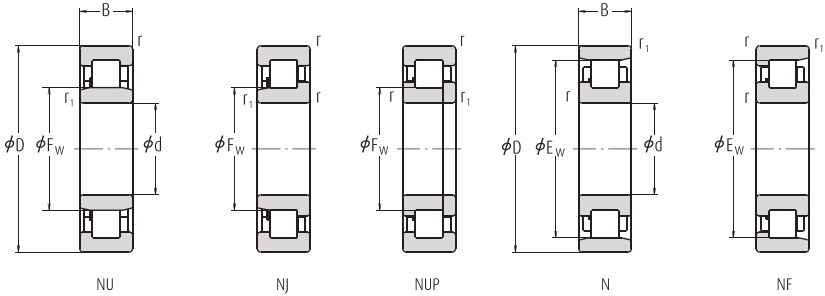
Boundary Dimensions (mm)							Basic Load Ratings (N)		Speeds (min ⁻¹)		
d	D	B	r min.	r ₁ min.	F _W	E _W	C _r	C _{0R}	Thermal Reference Speed	Limiting Speeds	
										Mechanical (%)	Grease
160	240	38	2.1	1.5	180	220	238 000	340 000	3 400	—	2 600
	290	48	3.0	3.0	—	255	430 000	570 000	2 800	—	2 200
	290	48	3.0	3.0	195	—	615 000	665 000	2 600	4 000	2 200
	290	80	3.0	3.0	193	—	995 000	1 190 000	2 400	3 600	1 900
	340	68	4.0	4.0	—	292	700 000	875 000	2 000	—	1 700
	340	68	4.0	4.0	204	—	1 060 000	1 050 000	1 900	3 600	1 700
	340	114	4.0	4.0	204	—	1 310 000	1 820 000	1 800	2 400	1 500
170	260	42	2.1	2.1	193	237	287 000	415 000	3 200	—	2 400
	310	52	4	4	—	272	475 000	635 000	2 600	—	2 000
	310	52	4	4	207	—	740 000	800 000	2 400	3 800	2 000
	310	86	4	4	205	—	1 140 000	1 330 000	2 200	3 200	1 800
	360	72	4	4	—	310	795 000	1 010 000	1 900	—	1 600
	360	72	4	4	218	—	930 000	1 150 000	1 800	3 400	1 600
	360	120	4	4	216	—	1 490 000	2 070 000	1 600	2 200	1 400
180	280	46	2.1	2.1	205	255	355 000	510 000	3 000	—	2 200
	320	52	4	4	—	282	495 000	675 000	2 400	—	1 900
	320	52	4	4	217	—	770 000	850 000	2 200	3 600	1 900
	320	86	4	4	215	—	1 240 000	1 510 000	2 000	3 200	1 700
	380	75	4	4	—	328	905 000	1 150 000	1 700	—	1 500
	380	75	4	4	231	—	985 000	1 230 000	1 700	2 800	1 500
	380	126	4	4	227	—	1 560 000	2 220 000	1 500	2 000	1 300
190	290	46	2.1	2.1	215	265	365 000	535 000	2 800	—	2 000
	340	55	4	4	—	299	555 000	770 000	2 200	—	1 800
	340	55	4	4	230	—	885 000	955 000	2 000	3 400	1 800
	340	92	4	4	228	—	1 360 000	1 670 000	1 900	3 000	1 600
	400	78	5	5	—	345	975 000	1 260 000	1 600	—	1 400
	400	78	5	5	245	—	1 060 000	1 340 000	1 600	2 600	1 400
	400	132	5	5	240	—	1 770 000	2 520 000	1 400	2 000	1 300



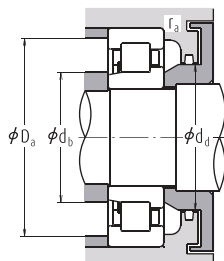
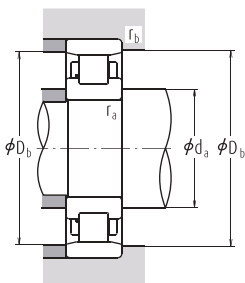
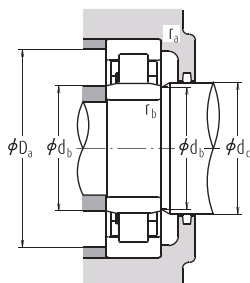
Bearing Numbers							Abutment and Fillet Dimensions (mm)											Mass (kg)
							$d_a^{(2)}$	d_b	$d_b^{(4)}$	d_c	d_d	$D_a^{(3)}$	D_b	D_b	r_a	r_b	approx.	
Cage symbol (1) Standard option							min.	min.	max.	min.	min.	max.	max.	min.	max.	max.		
NU 1032	(M)	—	NU	NJ	—	N	171	168	178	184	—	229	232	222	2	1.5	5.81	
N 232	M	—	—	—	—	N	173	—	—	—	—	277	261	2.5	2.5	—	14.1	
NU 232 E°	M	—	NU	NJ	NUP	—	173	173	190	197	210	277	—	—	2.5	2.5	14.7	
NU 2232 E°	M	—	NU	NJ	NUP	—	173	173	188	197	210	277	—	—	2.5	2.5	24.5	
N 332	M	—	—	—	—	N	176	—	—	—	—	324	298	3	3	—	30.8	
NU 332 E°	M	—	NU	NJ	NUP	—	176	176	199	211	228	324	—	—	3	3	32.1	
NU 2332 E	M	—	NU	NJ	NUP	—	176	176	199	211	228	324	—	—	3	3	53.9	
NU 1034	(M)	—	NU	NJ	—	N	181	181	190	197	—	249	249	239	2	2	7.91	
N 234	M	—	—	—	—	N	186	—	—	—	—	294	278	3	3	—	17.4	
NU 234 E°	M	—	NU	NJ	NUP	—	186	186	202	211	223	294	—	—	3	3	18.3	
NU 2234 E°	M	—	NU	NJ	NUP	—	186	186	200	211	223	294	—	—	3	3	29.9	
N 334	M	—	—	—	—	N	186	—	—	—	—	344	316	3	3	—	36.6	
NU 334 E	M	—	NU	NJ	NUP	—	186	186	213	223	241	344	—	—	3	3	37.9	
NU 2334 E	M	—	NU	NJ	NUP	—	186	186	210	223	241	344	—	—	3	3	63.4	
NU 1036	(M)	—	NU	NJ	—	N	191	191	202	209	—	269	269	258	2	2	10.2	
N 236	M	—	—	—	—	N	196	—	—	—	—	304	288	3	3	—	18.1	
NU 236 E°	M	—	NU	NJ	NUP	—	196	196	212	221	233	304	—	—	3	3	19	
NU 2236 E°	M	—	NU	NJ	NUP	—	196	196	210	221	233	304	—	—	3	3	31.4	
N 336	M	—	—	—	—	N	196	—	—	—	—	364	335	3	3	—	42.6	
NU 336 E	M	—	NU	NJ	NUP	—	196	196	226	235	255	364	—	—	3	3	44	
NU 2336 E	M	—	NU	NJ	NUP	—	196	196	222	235	255	364	—	—	3	3	74.6	
NU 1038	(M)	—	NU	NJ	—	N	201	201	212	219	—	279	279	268	2	2	10.7	
N 238	M	—	—	—	—	N	206	—	—	—	—	324	305	3	3	—	22	
NU 238 E°	M	—	NU	NJ	NUP	—	206	206	225	234	247	324	—	—	3	3	23	
NU 2238 E°	M	—	NU	NJ	NUP	—	206	206	223	234	247	324	—	—	3	3	38.3	
N 338	M	—	—	—	—	N	210	—	—	—	—	380	352	4	4	—	48.7	
NU 338 E	M	—	NU	NJ	NUP	—	210	210	240	248	268	380	—	—	4	4	50.6	
NU 2338 E	M	—	NU	NJ	NUP	—	210	210	235	248	268	380	—	—	4	4	86.2	

Single-Row Cylindrical Roller Bearings

Bore Diameter 200 – 320 mm



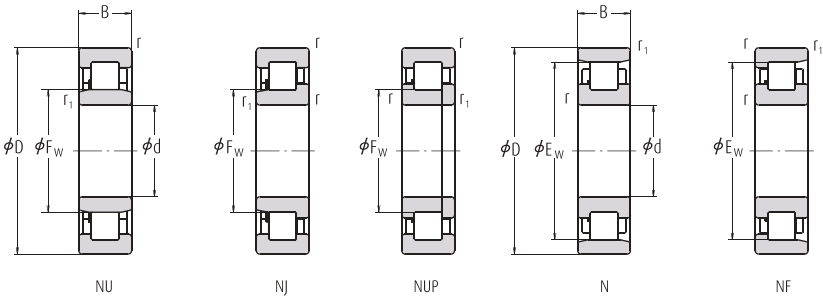
Boundary Dimensions (mm)							Basic Load Ratings (N)		Speeds (min ⁻¹)		
d	D	B	r min.	r ₁ min.	F _W	E _W	C _r	C _{0r}	Thermal Reference Speed	Limiting Speeds	
										Mechanical (%)	Grease
200	310	51	2.1	2.1	229	281	390 000	580 000	2 600	—	2 000
	360	58	4	4	—	316	620 000	865 000	2 000	—	1 700
	360	58	4	4	243	—	945 000	1 060 000	1 900	3 200	1 700
	360	98	4	4	241	—	1 500 000	1 870 000	1 800	2 200	1 500
	420	80	5	5	—	360	975 000	1 270 000	1 600	—	1 300
	420	80	5	5	258	—	1 140 000	1 450 000	1 500	2 600	1 200
220	420	138	5	5	253	—	1 910 000	2 760 000	1 300	1 900	1 200
	340	56	3	3	250	310	500 000	750 000	2 400	—	1 800
	400	65	4	4	—	350	760 000	1 080 000	1 800	—	1 500
	400	65	4	4	270	—	1 110 000	1 250 000	1 800	—	1 500
	400	108	4	4	270	—	1 140 000	1 810 000	1 700	—	1 300
	460	88	5	5	—	396	1 190 000	1 570 000	1 400	—	1 200
240	460	88	5	5	284	—	1 190 000	1 570 000	1 400	—	1 200
	360	56	3	3	270	330	530 000	820 000	2 200	—	1 600
	440	72	4	4	—	385	935 000	1 340 000	1 600	—	1 300
	440	72	4	4	295	—	935 000	1 340 000	1 600	—	1 300
	440	120	4	4	295	—	1 440 000	2 320 000	1 500	—	1 200
	500	95	5	5	—	430	1 360 000	1 820 000	1 200	—	1 100
260	500	95	5	5	310	—	1 360 000	1 820 000	1 200	—	1 100
	400	65	4	4	296	364	645 000	1 000 000	1 900	—	1 500
	480	80	5	5	—	420	1 100 000	1 580 000	1 500	—	1 200
	480	80	5	5	320	—	1 100 000	1 580 000	1 500	—	1 200
	480	130	5	5	320	—	1 710 000	2 770 000	1 300	—	1 100
	540	102	6	6	336	—	1 540 000	2 090 000	1 100	—	1 000
280	420	65	4	4	316	384	660 000	1 050 000	1 800	—	1 400
	500	80	5	5	—	440	1 140 000	1 680 000	1 300	—	1 100
	500	80	5	5	340	—	1 140 000	1 680 000	1 300	—	1 100
300	460	74	4	4	340	420	885 000	1 400 000	1 600	—	1 300
	540	85	5	5	364	—	1 400 000	2 070 000	1 200	—	1 100
320	480	74	4	4	360	440	905 000	1 470 000	1 500	—	1 200
	580	92	5	5	—	510	1 540 000	2 270 000	1 100	—	950
	580	92	5	5	390	—	1 540 000	2 270 000	1 100	—	950



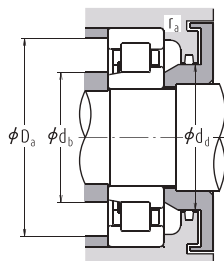
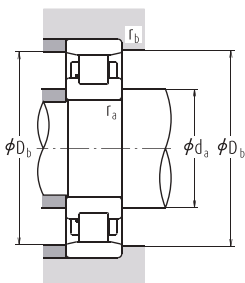
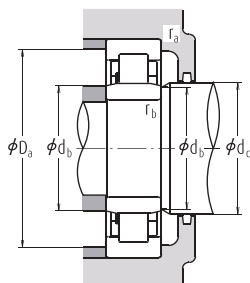
Bearing Numbers							Abutment and Fillet Dimensions (mm)											Mass (kg)
	Cage symbol (1)		(2)				d _a (3)	d _b	d _b (4)	d _c	d _d	D _a (3)	D _b	D _b	r _a	r _b		
	Standard option	NU	NJ	NUP	N	NF	min.	min.	max.	min.	min.	max.	max.	min.	max.	max.	max.	approx.
NU 1040	(M)	—	NU	NJ	—	N	NF	211	211	226	233	—	299	299	284	2	2	14
N 240	M	—	—	—	—	N	NF	216	—	—	—	—	344	323	3	3	26.2	
NU 240 E*	M	—	NU	NJ	NUP	—	—	216	216	238	247	261	344	—	—	3	3	27.4
NU 2240 E*	M	—	NU	NJ	NUP	—	—	216	216	235	247	261	344	—	—	3	3	46.1
N 340	M	—	—	—	—	N	NF	220	—	—	—	—	400	367	4	4	55.3	
NU 340 E	M	—	NU	NJ	NUP	—	—	220	220	252	263	283	400	—	—	4	4	57.1
NU 2340 E	M	—	NU	NJ	NUP	—	—	220	220	247	263	283	400	—	—	4	4	99.3
NU 1044	(M)	—	NU	NJ	—	N	—	233	233	247	254	—	327	327	313	2.5	2.5	18.2
N 244	M	—	—	—	—	N	NF	236	—	—	—	—	384	357	3	3	37	
NU 244 E*	M	—	NU	NJ	NUP	—	—	236	236	264	273	289	384	—	—	3	3	37.3
NU 2244	M	—	NU	—	—	—	—	—	236	264	273	289	384	—	—	3	3	61.8
N 344	M	—	—	—	—	N	—	240	—	—	—	—	440	403	4	4	72.8	
NU 344	M	—	NU	NJ	—	—	—	240	240	278	287	307	440	—	—	4	4	74.6
NU 1048	(M)	—	NU	NJ	—	N	—	253	253	266	275	—	347	347	333	2.5	2.5	19.5
N 248	M	—	—	—	—	N	NF	256	—	—	—	—	424	392	3	3	49.6	
NU 248	M	—	NU	NJ	NUP	—	—	256	256	289	298	316	424	—	—	3	3	50.4
NU 2248	M	—	NU	—	—	—	—	—	256	289	298	316	424	—	—	3	3	84.9
N 348	M	—	—	—	—	N	—	260	—	—	—	—	480	438	4	4	92.3	
NU 348	M	—	NU	NJ	—	—	—	260	260	304	313	333	480	—	—	4	4	94.6
NU 1052	(M)	—	NU	NJ	—	N	NF	276	276	292	300	—	384	384	367	3	3	29.1
N 252	M	—	—	—	—	N	—	280	—	—	—	—	460	428	4	4	66.2	
NU 252	M	—	NU	NJ	—	—	—	280	280	314	323	343	460	—	—	4	4	67.1
NU 2252	M	—	NU	—	NUP	—	—	280	280	314	323	343	460	—	—	4	4	111
NU 352	M	—	NU	NJ	—	—	—	286	286	330	339	359	514	—	—	5	5	118
NU 1056	(M)	—	NU	NJ	NUP	N	NF	296	296	312	320	—	404	404	387	3	3	30.8
N 256	M	—	—	—	—	N	NF	300	—	—	—	—	480	448	4	4	69.6	
NU 256	M	—	NU	NJ	—	—	—	300	300	334	344	364	480	—	—	4	4	70.7
NU 1060	(M)	—	NU	NJ	—	N	NF	316	316	336	344	—	444	444	424	3	3	43.7
NU 260	M	—	NU	NJ	—	—	—	320	320	358	368	391	520	—	—	4	4	89.2
NU 1064	(M)	—	NU	—	—	N	NF	336	336	356	365	—	464	464	444	3	3	46.1
N 264	M	—	—	—	—	N	—	340	—	—	—	—	560	519	4	4	110	
NU 264	M	—	NU	NJ	—	—	—	340	340	384	394	420	560	—	—	4	4	112

Single-Row Cylindrical Roller Bearings

Bore Diameter 340 – 500 mm



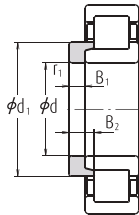
Boundary Dimensions (mm)							Basic Load Ratings (N)		Speeds (min ⁻¹)		
d	D	B	r min.	r ₁ min.	F _w	E _w	C _r	C _{0r}	Thermal Reference Speed	Limiting Speeds	
										Mechanical (%)	Grease
340	520	82	5	5	385	475	1 080 000	1 740 000	1 400	—	1 100
360	540	82	5	5	405	495	1 110 000	1 830 000	1 300	—	1 000
380	560	82	5	5	425	—	1 140 000	1 910 000	1 200	—	1 000
400	600	90	5	5	450	550	1 360 000	2 280 000	1 100	—	900
420	620	90	5	5	470	570	1 390 000	2 380 000	1 100	—	850
440	650	94	6	6	493	—	1 470 000	2 530 000	1 000	—	800
460	680	100	6	6	516	624	1 580 000	2 740 000	950	—	750
480	700	100	6	6	536	644	1 620 000	2 860 000	900	—	750
500	720	100	6	6	556	664	1 660 000	2 970 000	900	—	710



Bearing Numbers							Abutment and Fillet Dimensions (mm)										Mass (kg)
							$d_a^{(1)}$ min.	d_b min.	$d_b^{(1)}$ max.	d_c min.	d_d min.	$D_c^{(1)}$ max.	D_b max.	D_b min.	r_a max.	r_b max.	approx.
NU 1068	(M)	—	NU	NJ	—	N NF	360	360	381	390	—	500	500	479	4	4	61.8
NU 1072	(M)	—	NU	—	—	N NF	380	380	400	410	—	520	520	499	4	4	64.6
NU 1076	(M)	—	NU	—	—	—	—	400	420	430	—	540	—	—	4	4	67.5
NU 1080	(M)	—	NU	—	NUP	N —	420	420	445	455	—	580	580	554.5	4	4	88.2
NU 1084	(M)	—	NU	—	—	N —	440	440	465	475	—	600	600	574.5	4	4	91.7
NU 1088	(M)	—	NU	—	—	—	—	466	488	498	—	624	—	—	5	5	105
NU 1092	(M)	—	NU	—	NUP	N —	486	486	511	521	—	654	654	628.5	5	5	123
NU 1096	(M)	—	NU	NJ	—	N —	506	506	531	541	—	674	674	654	5	5	127
NU10/500	(M)	—	NU	—	—	N —	526	526	551	558	—	694	694	674	5	5	131

Cylindrical Roller Bearings

L-Shaped Thrust Collars Bore Diameter 20 – 85 mm



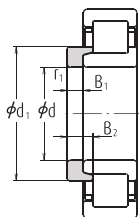
L-Shaped Thrust Collar

Boundary Dimensions (mm)					Thrust Collar Numbers	Mass (kg) approx.
d	d ₁	B ₁	B ₂	r ₁ min.		
20	30	3	6.75	0.6	HJ 204	0.012
	29.8	3	5.5	0.6	HJ 204 E	0.011
	30	3	7.5	0.6	HJ 2204	0.012
	29.8	3	6.5	0.6	HJ 2204 E	0.012
	31.7	4	7.5	0.6	HJ 304	0.017
	31.4	4	6.5	0.6	HJ 304 E	0.017
	31.8	4	8.5	0.6	HJ 2304	0.017
	31.4	4	7.5	0.6	HJ 2304 E	0.018
25	34.8	3	6	0.6	HJ 205 E	0.014
	34.8	3	6.5	0.6	HJ 2205 E	0.014
	38.2	4	7	1.1	HJ 305 E	0.025
	38.2	4	8	1.1	HJ 2305 E	0.026
	43.6	6	10.5	1.5	HJ 405	0.057
30	41.3	4	7	0.6	HJ 206 E	0.025
	41.4	4	7.5	0.6	HJ 2206 E	0.025
	45.1	5	8.5	1.1	HJ 306 E	0.042
	45.1	5	9.5	1.1	HJ 2306 E	0.043
	50.5	7	11.5	1.5	HJ 406	0.080
35	48.2	4	7	0.6	HJ 207 E	0.033
	48.2	4	8.5	0.6	HJ 2207 E	0.035
	51.1	6	9.5	1.1	HJ 307 E	0.060
	51.1	6	11	1.1	HJ 2307 E	0.062
	59	8	13	1.5	HJ 407	0.12
40	54.1	5	8.5	1.1	HJ 208 E	0.049
	54.1	5	9	1.1	HJ 2208 E	0.050
	57.6	7	11	1.5	HJ 308 E	0.088
	57.7	7	12.5	1.5	HJ 2308 E	0.091
	64.8	8	13	2	HJ 408	0.14
45	59.1	5	8.5	1.1	HJ 209 E	0.055
	59.1	5	9	1.1	HJ 2209 E	0.055
	64.5	7	11.5	1.5	HJ 309 E	0.11
	64.5	7	13	1.5	HJ 2309 E	0.113
	71.7	8	13.5	2	HJ 409	0.175
50	64.1	5	9	1.1	HJ 210 E	0.061
	64.1	5	9	1.1	HJ 2210 E	0.061
	71.4	8	13	2	HJ 310 E	0.151
	71.4	8	14.5	2	HJ 2310 E	0.155
	78.8	9	14.5	2.1	HJ 410	0.23

Boundary Dimensions (mm)					Thrust Collar Numbers	Mass (kg) approx.
d	d ₁	B ₁	B ₂	r ₁ min.		
55	70.9	6	9.5	1.1	HJ 211 E	0.087
	70.9	6	10	1.1	HJ 2211 E	0.088
	77.6	9	14	2	HJ 311 E	0.195
	77.6	9	15.5	2	HJ 2311 E	0.20
	85.2	10	16.5	2.1	HJ 411	0.29
60	77.7	6	10	1.5	HJ 212 E	0.108
	77.7	6	10	1.5	HJ 2212 E	0.108
	84.5	9	14.5	2.1	HJ 312 E	0.231
	84.5	9	16	2.1	HJ 2312 E	0.237
	91.8	10	16.5	2.1	HJ 412	0.34
65	84.5	6	10	1.5	HJ 213 E	0.129
	84.5	6	10.5	1.5	HJ 2213 E	0.131
	90.6	10	15.5	2.1	HJ 313 E	0.288
	90.6	10	18	2.1	HJ 2313 E	0.298
	98.5	11	18	2.1	HJ 413	0.42
70	89.5	7	11	1.5	HJ 214 E	0.157
	89.5	7	11.5	1.5	HJ 2214 E	0.158
	97.5	10	15.5	2.1	HJ 314 E	0.33
	97.5	10	18.5	2.1	HJ 2314 E	0.345
	110.5	12	20	3	HJ 414	0.605
75	94.5	7	11	1.5	HJ 215 E	0.166
	94.5	7	11.5	1.5	HJ 2215 E	0.167
	104.2	11	16.5	2.1	HJ 315 E	0.41
	104.2	11	19.5	2.1	HJ 2315 E	0.43
	116	13	21.5	3	HJ 415	0.71
80	101.6	8	12.5	2	HJ 216 E	0.222
	101.6	8	12.5	2	HJ 2216 E	0.222
	110.6	11	17	2.1	HJ 316 E	0.46
	110.6	11	20	2.1	HJ 2316 E	0.48
	122	13	22	3	HJ 416	0.78
85	107.6	8	12.5	2	HJ 217 E	0.25
	107.6	8	13	2	HJ 2217 E	0.252
	117.9	12	18.5	3	HJ 317 E	0.575
	117.9	12	22	3	HJ 2317 E	0.595
	126	14	24	4	HJ 417	0.88

L-Shaped Thrust Collars

Bore Diameter 90 – 320 mm



L-Shaped Thrust Collar

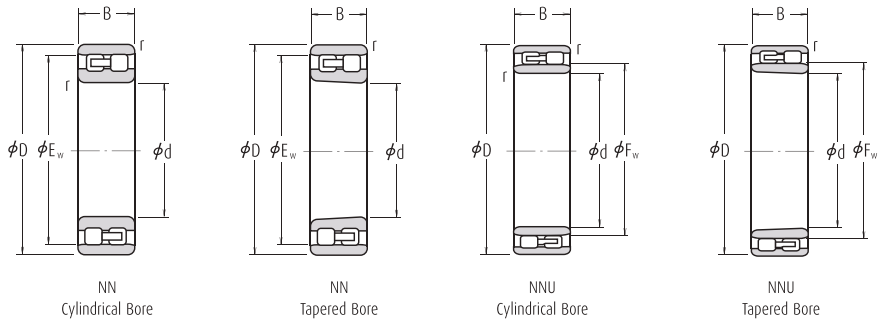


Boundary Dimensions (mm)					Thrust Collar Numbers	Mass (kg) approx.
d	d ₁	B ₁	B ₂	r ₁ min.		
90	114.3	9	14	2	HJ 218 E	0.32
	114.3	9	15	2	HJ 2218 E	0.325
	124.2	12	18.5	3	HJ 318 E	0.63
	124.2	12	22	3	HJ 2318 E	0.66
	137	14	24	4	HJ 418	1.05
95	120.6	9	14	2.1	HJ 219 E	0.355
	120.6	9	15.5	2.1	HJ 2219 E	0.365
	132.2	13	20.5	3	HJ 319 E	0.785
	132.2	13	24.5	3	HJ 2319 E	0.815
	147	15	25.5	4	HJ 419	1.3
100	127.5	10	15	2.1	HJ 220 E	0.44
	127.5	10	16	2.1	HJ 2220 E	0.45
	139.6	13	20.5	3	HJ 320 E	0.89
	139.6	13	23.5	3	HJ 2320 E	0.92
	153.5	16	27	4	HJ 420	1.5
105	145	13	20.5	3	HJ 321 E	0.97
	159.5	16	27	4	HJ 421	1.65
110	141.7	11	17	2.1	HJ 222 E	0.62
	141.7	11	19.5	2.1	HJ 2222 E	0.645
	155.8	14	22	3	HJ 322 E	1.21
	155.8	14	26.5	3	HJ 2322 E	1.27
	171	17	29.5	4	HJ 422	2.1
120	153.4	11	17	2.1	HJ 224 E	0.71
	153.4	11	20	2.1	HJ 2224 E	0.745
	168.6	14	22.5	3	HJ 324 E	1.41
	168.6	14	26	3	HJ 2324 E	1.46
	188	17	30.5	5	HJ 424	2.6
130	164.2	11	17	3	HJ 226 E	0.79
	164.2	11	21	3	HJ 2226 E	0.84
	182.3	14	23	4	HJ 326 E	1.65
	182.3	14	28	4	HJ 2326 E	1.73
	205	18	32	5	HJ 426	3.3
140	180	11	18	3	HJ 228 E	0.99
	180	11	23	3	HJ 2228 E	1.07
	196	15	25	4	HJ 328 E	2.04
	196	15	31	4	HJ 2328 E	2.14
	219	18	33	5	HJ 428	3.75

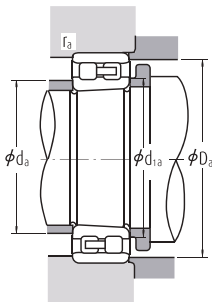
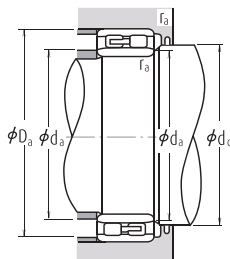
Boundary Dimensions (mm)					Thrust Collar Numbers	Mass (kg) approx.
d	d ₁	B ₁	B ₂	r ₁ min.		
150	193.7	12	19.5	3	HJ 230 E	1.26
	193.7	12	24.5	3	HJ 2230 E	1.35
	210	15	25	4	HJ 330 E	2.35
	210	15	31.5	4	HJ 2330 E	2.48
	234	20	36.5	5	HJ 430	4.7
160	207.3	12	20	3	HJ 232 E	1.48
	206.1	12	24.5	3	HJ 2232 E	1.55
	222	15	25	4	HJ 332 E	2.59
	222.1	15	32	4	HJ 2332 E	2.76
	220.8	12	20	4	HJ 234 E	1.7
170	219.5	12	24	4	HJ 2234 E	1.79
	238	16	33.5	4	HJ 334 E	3.25
180	230.8	12	20	4	HJ 236 E	1.79
	229.5	12	24	4	HJ 2236 E	1.88
	252	17	35	4	HJ 336 E	3.85
	244.5	13	21.5	4	HJ 238 E	2.19
	243.2	13	26.5	4	HJ 2238 E	2.31
200	260.6	18	36.5	5	HJ 338 E	4.45
	258.2	14	23	4	HJ 240 E	2.65
	258	14	34	4	HJ 2240	2.6
	256.9	14	28	4	HJ 2240 E	2.78
	280	18	30	5	HJ 340 E	5.0
220	286	15	27.5	4	HJ 244	3.55
	286	15	36.5	4	HJ 2244	3.55
	307	20	36	5	HJ 344	7.05
	313	16	29.5	4	HJ 248	4.65
	313	16	38.5	4	HJ 2248	4.65
260	334	22	39.5	5	HJ 348	8.2
	340	18	33	5	HJ 252	6.2
	340	18	40.5	5	HJ 2252	6.2
	362	24	43	6	HJ 352	11.4
	360	18	33	5	HJ 256	7.4
300	387	20	34.5	5	HJ 260	9.15
	415	21	37	5	HJ 264	11.3

Double-Row Cylindrical Roller Bearings

Bore Diameter 25 – 140 mm



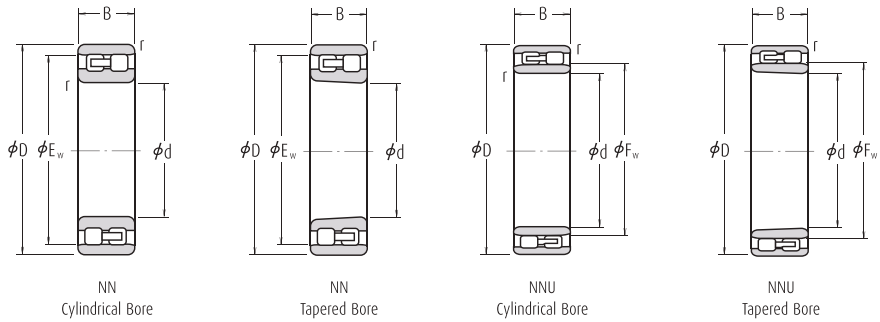
Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)	
d	D	B	r min.	F _w	E _w	C _r	C _{0r}	Grease	Oil
25	47	16	0.6	—	41.3	25 800	30 000	14 000	17 000
30	55	19	1	—	48.5	31 000	37 000	12 000	14 000
35	62	20	1	—	55	39 500	50 000	10 000	12 000
40	68	21	1	—	61	43 500	55 500	9 000	11 000
45	75	23	1	—	67.5	52 000	68 500	8 500	10 000
50	80	23	1	—	72.5	53 000	72 500	7 500	9 000
55	90	26	1.1	—	81	69 500	96 500	6 700	8 000
60	95	26	1.1	—	86.1	73 500	106 000	6 300	7 500
65	100	26	1.1	—	91	77 000	116 000	6 000	7 100
70	110	30	1.1	—	100	97 500	148 000	5 600	6 700
75	115	30	1.1	—	105	96 500	149 000	5 300	6 300
80	125	34	1.1	—	113	119 000	186 000	4 800	6 000
85	130	34	1.1	—	118	125 000	201 000	4 500	5 600
90	140	37	1.5	—	127	143 000	228 000	4 300	5 000
95	145	37	1.5	—	132	150 000	246 000	4 000	5 000
100	140	40	1.1	112	—	155 000	295 000	4 000	5 000
	150	37	1.5	—	137	157 000	265 000	4 000	4 800
105	145	40	1.1	117	—	161 000	315 000	3 800	4 800
	160	41	2	—	146	198 000	320 000	3 800	4 500
110	150	40	1.1	122	—	167 000	335 000	3 600	4 500
	170	45	2	—	155	229 000	375 000	3 400	4 300
120	165	45	1.1	133.5	—	183 000	360 000	3 200	4 000
	180	46	2	—	165	239 000	405 000	3 200	3 800
130	180	50	1.5	144	—	274 000	545 000	3 000	3 800
	200	52	2	—	182	284 000	475 000	3 000	3 600
140	190	50	1.5	154	—	283 000	585 000	2 800	3 600
	210	53	2	—	192	298 000	515 000	2 800	3 400



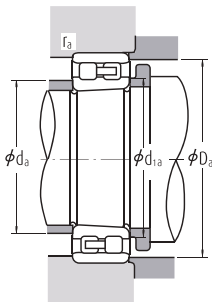
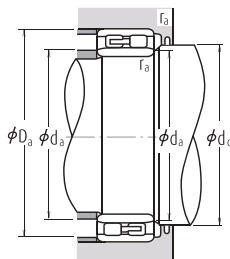
Bearing Numbers		Abutment and Fillet Dimensions (mm)							Mass (kg)
Cylindrical Bore	Tapered Bore (°)	$d_a(^{\circ})$		d_{1a}	d_c	D_a		r_a	approx.
		min.	max.	min.	min.	max.	min.	max.	
NN 3005	NN 3005 K	29	—	29	—	43	42	0.6	0.127
NN 3006	NN 3006 K	35	—	36	—	50	50	1	0.198
NN 3007	NN 3007 K	40	—	41	—	57	56	1	0.258
NN 3008	NN 3008 K	45	—	46	—	63	62	1	0.309
NN 3009	NN 3009 K	50	—	51	—	70	69	1	0.407
NN 3010	NN 3010 K	55	—	56	—	75	74	1	0.436
NN 3011	NN 3011 K	61.5	—	62	—	83.5	83	1	0.647
NN 3012	NN 3012 K	66.5	—	67	—	88.5	88	1	0.693
NN 3013	NN 3013 K	71.5	—	72	—	93.5	93	1	0.741
NN 3014	NN 3014 K	76.5	—	77	—	103.5	102	1	1.06
NN 3015	NN 3015 K	81.5	—	82	—	108.5	107	1	1.11
NN 3016	NN 3016 K	86.5	—	87	—	118.5	115	1	1.54
NN 3017	NN 3017 K	91.5	—	92	—	123.5	120	1	1.63
NN 3018	NN 3018 K	98	—	99	—	132	129	1.5	2.09
NN 3019	NN 3019 K	103	—	104	—	137	134	1.5	2.19
NNU 4920	NNU 4920 K	106.5	111	108	115	133.5	—	1	1.9
NN 3020	NN 3020 K	108	—	109	—	142	139	1.5	2.28
NNU 4921	NNU 4921 K	111.5	116	113	120	138.5	—	1	1.99
NN 3021	NN 3021 K	114	—	115	—	151	148	2	2.88
NNU 4922	NNU 4922 K	116.5	121	118	125	143.5	—	1	2.07
NN 3022	NN 3022 K	119	—	121	—	161	157	2	3.71
NNU 4924	NNU 4924 K	126.5	133	128	137	158.5	—	1	2.85
NN 3024	NN 3024 K	129	—	131	—	171	167	2	4.04
NNU 4926	NNU 4926 K	138	143	140	148	172	—	1.5	3.85
NN 3026	NN 3026 K	139	—	141	—	191	185	2	5.88
NNU 4928	NNU 4928 K	148	153	150	158	182	—	1.5	4.08
NN 3028	NN 3028 K	149	—	151	—	201	195	2	6.34

Double-Row Cylindrical Roller Bearings

Bore Diameter 150 – 360 mm



Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)	
d	D	B	r min.	F _W	E _W	C _r	C _{0r}	Grease	Oil
150	210	60	2	167	—	350 000	715 000	2 600	3 200
	225	56	2.1	—	206	335 000	585 000	2 600	3 000
160	220	60	2	177	—	365 000	760 000	2 400	3 000
	240	60	2.1	—	219	375 000	660 000	2 400	2 800
170	230	60	2	187	—	375 000	805 000	2 400	2 800
	260	67	2.1	—	236	450 000	805 000	2 200	2 600
180	250	69	2	200	—	480 000	1 020 000	2 200	2 600
	280	74	2.1	—	255	565 000	995 000	2 000	2 400
190	260	69	2	211.5	—	485 000	1 060 000	2 000	2 600
	290	75	2.1	—	265	595 000	1 080 000	2 000	2 400
200	280	80	2.1	223	—	570 000	1 220 000	1 900	2 400
	310	82	2.1	—	282	655 000	1 170 000	1 800	2 200
220	300	80	2.1	243	—	600 000	1 330 000	1 700	2 200
	340	90	3	—	310	815 000	1 480 000	1 700	2 000
240	320	80	2.1	263	—	625 000	1 450 000	1 600	2 000
	360	92	3	—	330	855 000	1 600 000	1 500	1 800
260	360	100	2.1	289	—	935 000	2 100 000	1 400	1 800
	400	104	4	—	364	1 030 000	1 920 000	1 400	1 700
280	380	100	2.1	309	—	960 000	2 230 000	1 300	1 700
	420	106	4	—	384	1 080 000	2 080 000	1 300	1 500
300	420	118	3	336	—	1 230 000	2 870 000	1 200	1 500
	460	118	4	—	418	1 290 000	2 460 000	1 200	1 400
320	440	118	3	356	—	1 260 000	3 050 000	1 100	1 400
	480	121	4	—	438	1 350 000	2 670 000	1 100	1 300
340	520	133	5	—	473	1 670 000	3 300 000	1 000	1 200
360	540	134	5	—	493	1 700 000	3 450 000	950	1 200



Bearing Numbers		Abutment and Fillet Dimensions (mm)							Mass (kg)
Cylindrical Bore	Tapered Bore (°)	d_a (°)		d_{1a}	d_c	D_a	r_a		approx.
		min.	max.	min.	min.	max.	min.	max.	
NNU 4930	NNU 4930 K	159	166	162	171	201	—	2	6.39
NN 3030	NN 3030 K	161	—	162	—	214	209	2	7.77
NNU 4932	NNU 4932 K	169	176	172	182	211	—	2	6.76
NN 3032	NN 3032 K	171	—	172	—	229	222	2	9.41
NNU 4934	NNU 4934 K	179	186	182	192	221	—	2	7.12
NN 3034	NN 3034 K	181	—	183	—	249	239	2	12.8
NNU 4936	NNU 4936 K	189	199	193	205	241	—	2	10.4
NN 3036	NN 3036 K	191	—	193	—	269	258	2	16.8
NNU 4938	NNU 4938 K	199	211	203	217	251	—	2	10.9
NN 3038	NN 3038 K	201	—	203	—	279	268	2	17.8
NNU 4940	NNU 4940 K	211	222	214	228	269	—	2	15.3
NN 3040	NN 3040 K	211	—	214	—	299	285	2	22.7
NNU 4944	NNU 4944 K	231	242	234	248	289	—	2	16.6
NN 3044	NN 3044 K	233	—	236	—	327	313	2.5	29.6
NNU 4948	NNU 4948 K	251	262	254	269	309	—	2	18
NN 3048	NN 3048 K	253	—	256	—	347	334	2.5	32.7
NNU 4952	NNU 4952 K	271	288	275	295	349	—	2	31.1
NN 3052	NN 3052 K	276	—	278	—	384	368	3	47.7
NNU 4956	NNU 4956 K	291	308	295	315	369	—	2	33
NN 3056	NN 3056 K	296	—	298	—	404	388	3	51.1
NNU 4960	NNU 4960 K	313	335	318	343	407	—	2.5	51.9
NN 3060	NN 3060 K	316	—	319	—	444	422	3	70.7
NNU 4964	NNU 4964 K	333	355	338	363	427	—	2.5	54.9
NN 3064	NN 3064 K	336	—	340	—	464	442	3	76.6
NN 3068	NN 3068 K	360	—	365	—	500	477	4	102
NN 3072	NN 3072 K	380	—	385	—	520	497	4	106

Table 2 Fits and Internal Clearances for Full-Complement Cylindrical Roller Bearings

Operating Conditions		Fitting between Inner Ring and Shaft	Fitting between Outer Ring and Housing Bore	Recommended Internal Clearance
Outer Ring Rotation	Thin walled housings and heavy loads	g6 or h6	P7	C3
	Normal to heavy loads	g6 or h6	N7	C3
	Light or fluctuating loads	g6 or h6	M7	CN

Permissible Misalignment

The permissible misalignment of full-complement single-row cylindrical roller bearings is generally 0.0006 radian (2') under normal load. For double-row bearings, nearly no misalignment is allowed.



Full-Complement Cylindrical Roller Bearings for Sheaves

FULL-COMPLEMENT CYLINDRICAL ROLLER BEARINGS FOR SHEAVES

DESIGN, TYPES, AND FEATURES

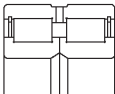
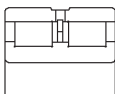
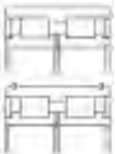
Cylindrical Roller Bearings for sheaves are specially designed thin-walled, broad-width, full-complement type double-row cylindrical roller bearings, but they are widely used also for general industrial machines running at low speed and under heavy loads. There are several series as shown in Table 1.

Table 1 Series of Cylindrical Roller Bearings for Sheaves

Bearing Type		Fixed-End	Free-End
Open Type	Without Snap Ring	RS-48E4 RS-49E4	RSF-48E4 RSF-49E4
Shielded Type	Without Snap Ring With Snap Ring	RS-50 RS-50NR	—

Since all are non-separable type bearings, the inner and outer rings cannot be separated, but the RSF type can be used as a free-end bearing. In this case, the permissible axial displacement is listed in the bearing tables. Since cylindrical roller bearings for sheaves are a double-row, full-complement type, they can withstand heavy shock loads and moments and have sufficient axial load capacity for use in sheaves. Since the shielded type is a kind of bearing unit, the number of parts surrounding the bearing can be reduced, so it allows for a simple compact design. The surface of these bearings is treated for rust prevention.

Table 1 Features of Various Types

Figure	Type	Design and Features
	RS-48E4 RS-49E4	Double-row outer ring with center rib, two single-row inner rings with ribs. The outer and inner rings and rollers are non-separable since there are two retaining snap rings at the sides of the outer ring. They can sustain an axial load in either direction so they can be used as fixed-end bearings. An oil groove and holes are provided at the center of the outer ring.
	RSF-48E4 RSF-49E4	Double-row outer ring without ribs, double-row inner ring with three ribs. The outer and inner rings and rollers are non-separable since there is a retaining snap ring at the middle of the outer ring. They can be used as free-end bearings. The permissible axial movement is listed in the dimensional tables. An oil groove and holes are provided at the center of the outer ring.
	RS-50 RS-50NR	Both sides shielded, double-row outer ring with center rib, two inner rings with ribs. They can sustain an axial load in either direction. They are prelubricated, but it is possible to replenish the grease through an oil groove and holes in parts mating with the inner rings. If there are snap rings at the outside of the outer ring, this type becomes RS-50NR. They are surface-treated for rust prevention.

RECOMMENDED FITS AND INTERNAL CLEARANCES

When used with outer ring rotation for sheaves or wheels, the fit and radial internal clearance should conform to Table 3.

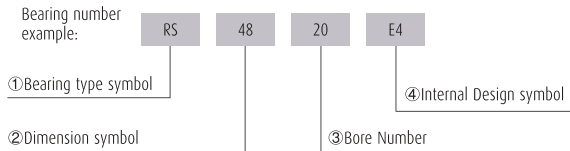
Table 3 Fits and Internal Clearances for Cylindrical Roller Bearings for Sheaves

Operating Conditions		Fitting between Inner Ring and Shaft	Fitting between Outer Ring and Housing Bore	Recommended Internal Clearance
Outer Ring Rotation	Thin walled housings and heavy loads	g6 or h6	P7	C3
	Normal to heavy loads	g6 or h6	N7	C3
	Light or fluctuating loads	g6 or h6	M7	CN

Table 4

Nominal Bore Dia. d (mm)		Clearances			
		CN		C3	
over	incl.	min.	max.	min.	max.
30	40	15	50	35	70
40	50	20	55	40	75
50	65	20	65	45	90
65	80	25	75	55	105
80	100	30	80	65	115
100	120	35	90	80	135
120	140	40	105	90	155
140	160	50	115	100	165
160	180	60	125	110	175
180	200	65	135	125	195
200	225	75	150	140	215
225	250	90	165	155	230
250	280	100	180	175	255
280	315	110	195	195	280
315	355	125	215	215	305
355	400	140	235	245	340
400	450	155	275	270	390
450	500	180	300	300	420

Bearing number example:



①Bearing type Symbol: RS: Fixed End Bearing

RSF: Free End Bearing

②Dimension Symbol: 48: 48 Series, 49: 49 Series, 40: 50 Series

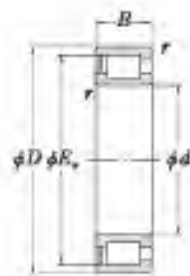
③Bore number: Less than 03, Bearing bore 00 : 10 mm, 01 : 12 mm, 02 : 15 mm, 03 : 17 mm

Over 04, Bearing bore Bore number ×5 (mm)

④Internal Design Symbol: E4: Lubrication grooves and holes in outerring

Full-Complement Cylindrical Roller Bearings

NCF Type, Single-Row
Bore Diameter 100 – 260 mm



Boundary Dimensions (mm)					Basic Load Ratings (kN)		Bearing Numbers
d	D	B	r min.	E _w	C _r	C _{0r}	
100	140	24	1.1	130.5	132	209	NCF2920V
	150	37	1.5	139.7	209	310	NCF3020V
110	150	24	1.1	141	138	229	NCF2922V
	170	45	2	156.3	278	405	NCF3022V
120	165	27	1.1	154	177	305	NCF2924V
	180	46	2	167.58	293	440	NCF3024V
130	180	30	1.5	166.5	210	370	NCF2926V
	200	52	2	183.81	415	615	NCF3026V
140	190	30	1.5	179.4	227	395	NCF2928V
	210	53	2	197.82	435	680	NCF3028V
150	210	36	2	195	289	505	NCF2930V
	225	56	2.1	206.82	460	710	NCF3030V
160	220	36	2	207	310	535	NCF2932V
	240	60	2.1	224.8	520	810	NCF3032V
170	215	22	1.5	203.5	149	272	NCF1834V
	230	36	2	218	320	570	NCF2934V
180	260	67	2.1	242.87	675	1 070	NCF3034V
	225	22	1.5	215	154	290	NCF1836V
	250	42	2	231.5	390	695	NCF2936V
	280	74	2.1	260.3	785	1 260	NCF3036V
190	240	24	1.5	228.7	178	335	NCF1838V
	260	42	2	243.6	435	785	NCF2938V
	290	75	2.1	269.9	805	1 320	NCF3038V
	250	24	1.5	237	182	350	NCF1840V
200	280	48	2.1	261	530	955	NCF2940V
	310	82	2.1	287.8	910	1 510	NCF3040V
220	270	24	2	257.7	191	385	NCF1844V
	300	48	2.1	282	555	1 050	NCF2944V
	340	90	3	312.3	1 100	1 820	NCF3044V
	300	28	2	283	236	470	NCF1848V
240	320	48	2.1	303	580	1 140	NCF2948V
	360	92	3	335.25	1 160	1 990	NCF3048V
260	320	28	2	307	247	510	NCF1852V
	360	60	2.1	333.2	750	1 460	NCF2952V
	400	104	4	376.1	1 570	2 600	NCF3052V

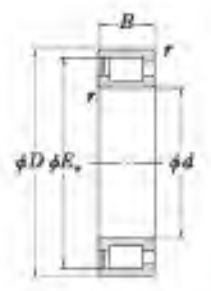


Abutment and Fillet Dimensions (mm)			Mass (kg)
d_3 min.	D_3 max.	r_3 max.	approx.
109	131	1	1.0
111	140	1.5	2.1
119	142	1	1.1
122	157	2	3.3
130	155	1	1.7
132	168	2	3.6
141	168	1.5	2.2
142	187	2	5.6
151	180	1.5	2.3
152	198	2	5.9
163	196	2	3.7
165	209	2	7.1
173	208	2	3.8
175	225	2	8.6
182	204	1.5	1.8
183	219	2	4.1
185	244	2	11.9
192	216	1.5	1.8
193	236	2	6.0
195	263	2	15.8
202	229	1.5	2.4
203	245	2	6.5
206	273	2	16.7
213	238	1.5	2.5
216	263	2	8.9
216	293	2	21.4
234	258	2	2.7
236	283	2	9.6
238	320	2.5	28.2
254	285	2	4.2
257	304	2	10.4
259	340	2.5	31.2
275	308	2	4.5
277	342	2	18.1
282	377	3	45.3



Full-Complement Cylindrical Roller Bearings

NCF Type, Single-Row
Bore Diameter 300 – 800 mm



Boundary Dimensions (mm)					Basic Load Ratings (kN)		Bearing Numbers
d	D	B	r min.	E _w	C _r	C _{0r}	
300	380	38	2.5	359	445	870	NCF1860V
	420	72	3	389.6	1 120	2 220	NCF2960V
	460	118	4	341.7	1 980	3 500	NCF3060V
320	400	38	2.1	380	460	925	NCF1864V
	440	72	3	410	1 150	2 340	NCF2964V
	480	121	4	449.6	2 170	3 900	NCF3064V
340	420	38	2.1	401	475	985	NCF1868V
	460	72	3	430.3	1 190	2 470	NCF2968V
	520	133	5	485.8	2 480	4 350	NCF3068V
360	440	38	2.5	422	490	1 040	NCF1872V
	480	72	3	450.7	1 220	2 610	NCF2972V
	540	134	5	503.6	2 550	4 600	NCF3072V
380	480	46	2.5	452.8	575	1 230	NCF1876V
	520	82	4	486.7	1 600	3 350	NCF2976V
	560	135	5	521.4	2 610	4 800	NCF3076V
400	500	46	2.5	475.7	590	1 300	NCF1880V
	540	82	4	511	1 650	3 550	NCF2980V
	600	148	5	558.7	3 050	5 750	NCF3080AV
420	520	46	2.1	491	600	1 340	NCF1884V
	560	82	4	523.2	1 680	3 650	NCF2984V
	620	150	5	577.7	3 000	5 650	NCF3084V
440	540	46	2.1	514	615	1 410	NCF1888V
	600	95	4	562	2 070	4 300	NCF2988V
	580	56	3	552.7	920	1 950	NCF1892V
460	620	95	4	576.5	2 100	4 450	NCF2992V
	600	56	3	573	940	2 040	NCF1896V
480	650	100	5	615	2 380	5 100	NCF2996V
	620	56	3	593.5	960	2 120	NCF18/500V
	670	100	5	630.2	2 420	5 250	NCF29/500V
530	650	56	3	624	990	2 240	NCF18/530V
560	680	56	3	654.7	1 020	2 360	NCF18/560V
	820	195	6	770	5 600	11 300	NCF30/560V
600	730	60	3	695.5	1 140	2 680	NCF18/600V
	800	118	5	752	3 050	7 300	NCF29/600V
630	780	69	4	742	1 470	3 400	NCF18/630V
670	820	69	4	780	1 520	3 550	NCF18/670V
710	870	74	4	832.5	1 650	3 900	NCF18/710V
750	920	78	4	882.3	1 930	4 600	NCF18/750V
800	980	82	5	936	2 110	5 100	NCF18/800V

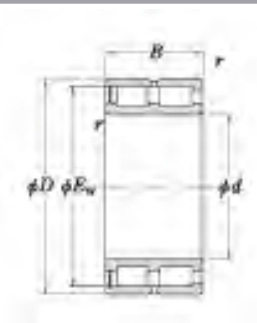


Abutment and Fillet Dimensions (mm)			Mass (kg)
d_a min.	D_a max.	r_a max.	approx.
319	360	2	9.7
320	398	2.5	30.7
323	435	3	67.6
338	381	2	10.3
340	418	2.5	33
343	454	3	73
359	402	2	10.7
361	438	2.5	34.1
368	490	4	97
380	423	2	11.5
381	457	2.5	36
388	509	4	102
400	458	2	18.6
404	493	3	52
408	529	4	108
421	478	2	19.5
425	513	3	53.4
429	568	4	139
440	498	2	20.5
445	533	3	55.7
449	588	4	147
461	518	2	21.3
466	572	3	78.2
483	555	2.5	32.5
486	591	3	81.2
503	575	2.5	33.8
510	617	4	95.1
524	594	2.5	35
531	637	4	98.4
554	625	2.5	36.9
585	655	2.5	39.3
598	778	5	332.5
626	702	2.5	48.9
633	764	4	164.9
659	748	3	68.8
700	787	3	72.7
741	836	3	87.6
786	883	4	103.3
832	950	4	123.1

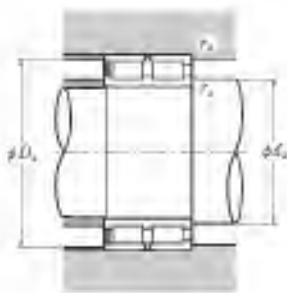


Full-Complement Cylindrical Roller Bearings

NNCF Type, Double-Row
Bore Diameter 100 – 260 mm



Boundary Dimensions (mm)					Basic Load Ratings (kN)		Bearing Numbers
d	D	B	r min.	E _W	C _r	C _{0r}	
100	140	40	1.1	129.8	194	400	NNCF4920V
	150	67	1.5	139.7	360	615	NNCF5020V
110	150	40	1.1	138.4	202	430	NNCF4922V
	170	80	2	156.3	490	840	NNCF5022V
120	165	45	1.1	153.8	226	480	NNCF4924V
	180	80	2	167.58	500	885	NNCF5024V
130	180	50	1.5	165.7	262	555	NNCF4926V
	200	95	2	183.81	710	1 230	NNCF5026V
140	190	50	1.5	176.2	272	595	NNCF4928V
	210	95	2	197.82	750	1 360	NNCF5028V
150	210	60	2	191.6	390	865	NNCF4930V
	225	100	2.1	206.82	785	1 420	NNCF5030V
160	220	60	2	204.1	410	930	NNCF4932V
	240	109	2.1	224.8	895	1 620	NNCF5032V
170	230	60	2	212.4	415	975	NNCF4934V
	260	122	2.1	242.87	1 160	2 140	NNCF5034V
180	250	69	2	230.5	550	1 230	NNCF4936V
	280	136	2.1	260.3	1 340	2 510	NNCF5036V
190	260	69	2	240.7	565	1 290	NNCF4938V
	290	136	2.1	269.9	1 380	2 630	NNCF5038V
200	250	50	1.5	235.9	320	825	NNCF4840V
	280	80	2.1	259.5	665	1 500	NNCF4940V
220	310	150	2.1	287.75	1 560	3 000	NNCF5040V
	270	50	1.5	256.9	340	905	NNCF4844V
240	300	80	2.1	277	695	1 620	NNCF4944V
	340	160	3	312.3	1 890	3 650	NNCF5044V
260	300	60	2	282.6	495	1 340	NNCF4848V
	320	80	2.1	300	725	1 770	NNCF4948V
260	360	160	3	335.25	1 990	4 000	NNCF5048V
	320	60	2	303.6	515	1 450	NNCF4852V
260	360	100	2.1	331.5	1 050	2 530	NNCF4952V
	400	190	4	376.1	2 690	5 200	NNCF5052V



Abutment and Fillet Dimensions (mm)			Mass (kg)
d_a min.	D_a max.	r_a max.	approx.
109	130	1	2.0
111	140	1.5	3.8
119	140	1	2.1
122	157	2	6.1
130	155	1	2.9
132	168	2	6.5
141	168	1.5	3.9
142	187	2	10.3
151	178	1.5	4.2
152	198	2	10.8
163	196	2	6.6
165	209	2	13
173	206	2	7.0
175	225	2	15.8
183	216	2	7.3
185	244	2	22.1
193	236	2	10.7
195	263	2	29.4
203	245	2	11.1
206	273	2	30.8
213	237	1.5	5.9
216	263	2	15.7
216	293	2	39.7
233	257	1.5	6.4
236	283	2	17
238	320	2.5	50.7
254	285	2	10.3
257	302	2	18.4
259	340	2.5	54.3
275	304	2	11
277	342	2	32
282	377	2	82.7

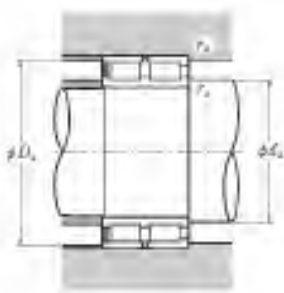


Full-Complement Cylindrical Roller Bearings

NNCF Type, Double-Row
Bore Diameter 280 – 500 mm



Boundary Dimensions (mm)					Basic Load Ratings (kN)		Bearing Numbers
d	D	B	r min.	E _w	C _r	C _{0r}	
280	350	69	2	332.5	685	1 860	NNCF4856V
	380	100	2.1	352.5	1 090	2 720	NNCF4956V
	420	190	4	390.5	2 770	5 450	NNCF5056V
300	380	80	2.1	357.2	805	2 160	NNCF4860V
	420	118	3	386.5	1 580	3 800	NNCF4960V
	460	218	4	431.7	3 400	7 000	NNCF5060V
320	400	80	2.1	380.2	835	2 310	NNCF4864V
	440	118	3	404.5	1 620	4 000	NNCF4964V
	480	218	4	446.9	3 500	7 350	NNCF5064V
340	420	80	2.1	397.4	855	2 430	NNCF4868V
	460	118	3	431	1 690	4 300	NNCF4968V
	520	243	5	485.8	4 250	8 750	NNCF5068V
360	440	80	2.1	420.4	885	2 580	NNCF4872V
	480	118	3	449	1 730	4 500	NNCF4972V
	540	243	5	503.6	4 350	9 150	NNCF5072V
380	480	100	2.1	450.6	1 260	3 600	NNCF4876V
	520	140	4	482.5	2 180	5 650	NNCF4976V
	560	243	5	521.4	4 500	9 600	NNCF5076V
400	500	100	2.1	471.7	1 290	3 750	NNCF4880V
	540	140	4	503	2 240	5 900	NNCF4980V
	600	272	5	558.7	5 050	10 900	NNCF5080V
420	520	100	2.1	492	1 320	3 950	NNCF4884V
	560	140	4	523	2 290	6 200	NNCF4984V
	620	272	5	577.7	5 150	11 300	NNCF5084V
440	540	100	2.1	513	1 350	4 150	NNCF4888V
	600	160	4	560.5	3 000	7 850	NNCF4988V
	660	272	5	614.7	6 750	14 000	NNCF5088V
460	580	118	3	549.2	1 730	5 150	NNCF4892V
	620	160	4	573	3 050	8 050	NNCF4992V
	680	272	5	627.5	6 900	14 500	NNCF5092V
480	600	118	3	565.8	1 760	5 300	NNCF4896V
	650	170	5	603	3 350	8 900	NNCF4996V
	700	272	5	657.5	7 500	16 000	NNCF5096V
500	620	118	3	590.7	1 810	5 600	NNCF48/500V
	670	170	5	629	3 400	9 350	NNCF49/500V

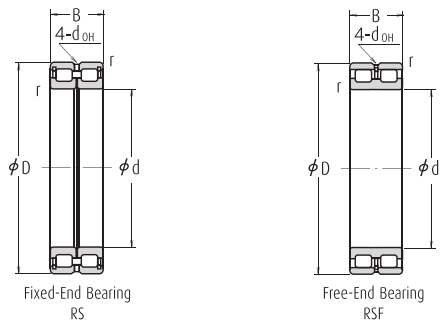


Abutment and Fillet Dimensions (mm)			Mass (kg)
d_a min.	D_a max.	r_a max.	approx.
295	334	2	16
297	361	2	34
302	395	3	87.7
318	361	2	23
320	398	2.5	52
323	435	3	125
338	381	2	24.3
340	418	2.5	55
343	454	3	131
359	400	2	25.6
361	438	2.5	58
368	490	4	177
379	421	2	27
381	457	2.5	61
388	509	4	186
399	459	2	45.5
404	493	3	90.5
408	529	4	194
420	479	2	47.5
425	513	3	94.5
429	568	4	256
440	498	2	49.5
445	533	3	98.5
449	588	4	267
461	518	2	51.5
466	572	3	136
483	555	2.5	77.5
486	591	3	142
503	575	2.5	80.5
510	617	4	167
524	594	2.5	83.5
531	637	4	173

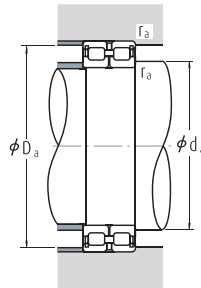


Full-Complement Cylindrical Roller Bearings for Sheaves

RS-48 · RS-49 Types
RSF-48 · RSF-49 Types
Bore Diameter 50 – 220 mm



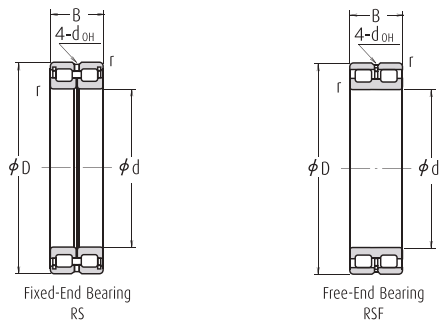
Boundary Dimensions (mm)				Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)	
d	D	B	r min.	C _r	C _{0r}	Grease	Oil
50	72	22	0.6	48 000	75 500	2 000	4 000
60	85	25	1	68 500	118 000	1 600	3 200
65	90	25	1	70 500	125 000	1 600	3 200
70	100	30	1	102 000	168 000	1 400	2 800
80	110	30	1	109 000	191 000	1 300	2 600
90	125	35	1.1	147 000	268 000	1 100	2 200
100	125	25	1	87 500	189 000	1 100	2 200
	140	40	1.1	194 000	400 000	1 000	2 000
105	130	25	1	89 000	196 000	1 000	2 000
	145	40	1.1	199 000	420 000	950	1 900
110	140	30	1	114 000	260 000	950	1 900
	150	40	1.1	202 000	430 000	900	1 800
120	150	30	1	119 000	283 000	900	1 800
	165	45	1.1	226 000	480 000	800	1 600
130	165	35	1.1	162 000	390 000	800	1 600
	180	50	1.5	262 000	555 000	750	1 500
140	175	35	1.1	167 000	415 000	710	1 400
	190	50	1.5	272 000	595 000	670	1 400
150	190	40	1.1	235 000	575 000	670	1 300
	210	60	2	390 000	865 000	630	1 300
160	200	40	1.1	243 000	615 000	600	1 200
	220	60	2	410 000	930 000	600	1 200
170	215	45	1.1	265 000	650 000	600	1 200
	230	60	2	415 000	975 000	600	1 200
180	225	45	1.1	272 000	685 000	560	1 100
	250	69	2	495 000	1 130 000	530	1 100
190	240	50	1.5	315 000	785 000	530	1 100
	260	69	2	510 000	1 180 000	500	1 000
200	250	50	1.5	320 000	825 000	500	1 000
	280	80	2.1	665 000	1 500 000	480	950
220	270	50	1.5	340 000	905 000	450	900
	300	80	2.1	695 000	1 620 000	430	850



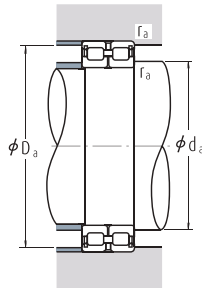
Bearing Numbers (°)		Dimensions (mm)		Abutment and Fillet Dimensions (mm)			Mass (kg)
Fixed-End Bearing	Free-End Bearing	$d_{aH}^{(2)}$	Axial Disp. (°)	d_a min.	D_a max.	r_a max.	approx.
RS-4910E4	RSF-4910E4	2.5	1.5	54	68	0.6	0.30
RS-4912E4	RSF-4912E4	2.5	1.5	65	80	1	0.46
RS-4913E4	RSF-4913E4	2.5	2	70	85	1	0.50
RS-4914E4	RSF-4914E4	3	2	75	95	1	0.79
RS-4916E4	RSF-4916E4	3	2	85	105	1	0.89
RS-4918E4	RSF-4918E4	3	2	96.5	118.5	1	1.35
RS-4820E4	RSF-4820E4	2.5	1.5	105	120	1	0.74
RS-4920E4	RSF-4920E4	3	2	106.5	133.5	1	1.97
RS-4821E4	RSF-4821E4	2.5	1.5	110	125	1	0.77
RS-4921E4	RSF-4921E4	3	2	111.5	138.5	1	2.05
RS-4822E4	RSF-4822E4	3	2	115	135	1	1.09
RS-4922E4	RSF-4922E4	3	2	116.5	143.5	1	2.15
RS-4824E4	RSF-4824E4	3	2	125	145	1	1.28
RS-4924E4	RSF-4924E4	4	3	126.5	158.5	1	2.95
RS-4826E4	RSF-4826E4	3	2	136.5	158.5	1	1.9
RS-4926E4	RSF-4926E4	5	3.5	138	172	1.5	3.95
RS-4828E4	RSF-4828E4	3	2	146.5	168.5	1	2.03
RS-4928E4	RSF-4928E4	5	3.5	148	182	1.5	4.25
RS-4830E4	RSF-4830E4	3	2	156.5	183.5	1	2.85
RS-4930E4	RSF-4930E4	5	3.5	159	201	2	6.65
RS-4832E4	RSF-4832E4	3	2	166.5	193.5	1	3.05
RS-4932E4	RSF-4932E4	5	3.5	169	211	2	7.0
RS-4834E4	RSF-4834E4	4	3	176.5	208.5	1	4.1
RS-4934E4	RSF-4934E4	4	3.5	179	221	2	7.35
RS-4836E4	RSF-4836E4	4	3	186.5	218.5	1	4.3
RS-4936E4	RSF-4936E4	6	4.5	189	241	2	10.7
RS-4838E4	RSF-4838E4	5	3.5	198	232	1.5	5.65
RS-4938E4	RSF-4938E4	6	4.5	199	251	2	11.1
RS-4840E4	RSF-4840E4	5	3.5	208	242	1.5	5.95
RS-4940E4	RSF-4940E4	7	5	211	269	2	15.7
RS-4844E4	RSF-4844E4	5	3.5	228	262	1.5	6.45
RS-4944E4	RSF-4944E4	7	5	231	289	2	17

Full-Complement Cylindrical Roller Bearings for Sheaves

RS-48 · RS-49 Types
RSF-48 · RSF-49 Types
Bore Diameter 240 – 560 mm



Boundary Dimensions (mm)				Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)	
d	D	B	r min.	C _r	C _{0H}	Grease	Oil
240	300	60	2	495 000	1 340 000	430	850
	320	80	2.1	725 000	1 770 000	400	800
260	320	60	2	515 000	1 450 000	380	750
	360	100	2.1	1 050 000	2 530 000	360	710
280	350	69	2	610 000	1 690 000	340	710
	380	100	2.1	1 090 000	2 720 000	340	670
300	380	80	2.1	805 000	2 160 000	320	630
	420	118	3	1 460 000	3 400 000	300	600
320	400	80	2.1	835 000	2 310 000	300	600
	440	118	3	1 500 000	3 600 000	280	560
340	420	80	2.1	855 000	2 430 000	280	560
	460	118	3	1 560 000	3 900 000	260	530
360	440	80	2.1	885 000	2 580 000	260	530
	480	118	3	1 600 000	4 050 000	260	500
380	480	100	2.1	1 260 000	3 600 000	240	500
	520	140	4	2 040 000	5 200 000	240	450
400	500	100	2.1	1 290 000	3 750 000	240	480
	540	140	4	2 100 000	5 450 000	220	450
420	520	100	2.1	1 320 000	3 950 000	220	450
	560	140	4	2 150 000	5 700 000	200	430
440	540	100	2.1	1 350 000	4 150 000	200	430
	600	160	4	2 840 000	7 350 000	190	380
460	580	118	3	1 730 000	5 150 000	190	380
	620	160	4	2 870 000	7 500 000	190	380
480	600	118	3	1 760 000	5 300 000	190	380
	650	170	5	3 200 000	8 500 000	180	360
500	620	118	3	1 810 000	5 600 000	180	360
	670	170	5	3 300 000	8 900 000	170	340
530	710	180	5	3 400 000	9 200 000	160	320
560	750	190	5	3 800 000	10 100 000	150	300

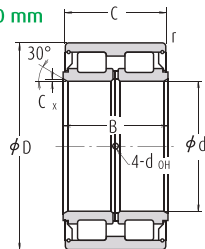


Bearing Numbers (°)		Dimensions (mm)		Abutment and Fillet Dimensions (mm)			Mass (kg)
Fixed-End Bearing	Free-End Bearing	$d_{on}(°)$	Axial Disp.(°)	d_a min.	D_a max.	r_a max.	approx.
RS-4848E4	RSF-4848E4	5	3.5	249	291	2	10.3
RS-4948E4	RSF-4948E4	7	5	251	309	2	18.4
RS-4852E4	RSF-4852E4	5	3.5	269	311	2	11
RS-4952E4	RSF-4952E4	8	6	271	349	2	32
RS-4856E4	RSF-4856E4	6	4.5	289	341	2	16
RS-4956E4	RSF-4956E4	8	6	291	369	2	34
RS-4860E4	RSF-4860E4	6	5	311	369	2	23
RS-4960E4	RSF-4960E4	9	7	313	407	2.5	52
RS-4864E4	RSF-4864E4	6	5	331	389	2	24.3
RS-4964E4	RSF-4964E4	9	7	333	427	2.5	55
RS-4868E4	RSF-4868E4	6	5	351	409	2	25.6
RS-4968E4	RSF-4968E4	9	7	353	447	2.5	58
RS-4872E4	RSF-4872E4	6	5	371	429	2	27
RS-4972E4	RSF-4972E4	9	7	373	467	2.5	61
RS-4876E4	RSF-4876E4	8	6	391	469	2	45.5
RS-4976E4	RSF-4976E4	11	8	396	504	3	90.5
RS-4880E4	RSF-4880E4	8	6	411	489	2	47.5
RS-4980E4	RSF-4980E4	11	8	416	524	3	94.5
RS-4884E4	RSF-4884E4	8	6	431	509	2	49.5
RS-4984E4	RSF-4984E4	11	8	436	544	3	98.5
RS-4888E4	RSF-4888E4	8	6	451	529	2	51.5
RS-4988E4	RSF-4988E4	11	8	456	584	3	136
RS-4892E4	RSF-4892E4	9	7	473	567	2.5	77.5
RS-4992E4	RSF-4992E4	11	8	476	604	3	142
RS-4896E4	RSF-4896E4	9	7	493	587	2.5	80.5
RS-4996E4	RSF-4996E4	12	9	500	630	4	167
RS-48/500E4	RSF-48/500E4	9	7	513	607	2.5	83.5
RS-49/500E4	RSF-49/500E4	12	9	520	650	4	173
RS-49/530E4	RSF-49/530E4	12	11	550	690	4	206
RS-49/560E4	RSF-49/560E4	12	11	580	730	4	231

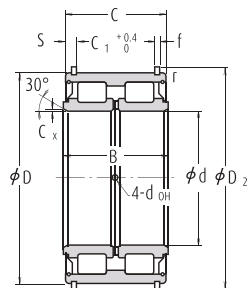
Full-Complement Cylindrical Roller Bearings for Sheaves

RS-50 Type (Prelubricated)

Bore Diameter 40 – 400 mm

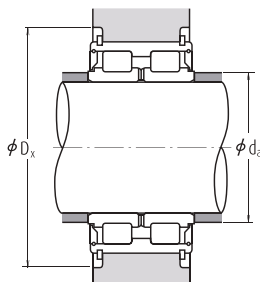


Without Locating Rings



With Locating Rings

Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)
d	D	B	C	C _R ⁽¹⁾ min.	r min.	C _r	C _{0r}	Grease
40	68	38	37	0.4	0.6	79 500	116 000	2 400
45	75	40	39	0.4	0.6	95 500	144 000	2 200
50	80	40	39	0.4	0.6	100 000	158 000	2 000
55	90	46	45	0.6	0.6	118 000	193 000	1 800
60	95	46	45	0.6	0.6	123 000	208 000	1 700
65	100	46	45	0.6	0.6	128 000	224 000	1 600
70	110	54	53	0.6	0.6	171 000	285 000	1 400
75	115	54	53	0.6	0.6	179 000	305 000	1 400
80	125	60	59	0.6	0.6	251 000	430 000	1 200
85	130	60	59	0.6	0.6	256 000	445 000	1 200
90	140	67	66	1	0.6	305 000	540 000	1 100
95	145	67	66	1	0.6	310 000	565 000	1 100
100	150	67	66	1	0.6	320 000	585 000	1 000
110	170	80	79	1.1	1	385 000	695 000	900
120	180	80	79	1.1	1	400 000	750 000	850
130	200	95	94	1.1	1	535 000	1 000 000	750
140	210	95	94	1.1	1	550 000	1 040 000	710
150	225	100	99	1.3	1	620 000	1 210 000	670
160	240	109	108	1.3	1.1	695 000	1 370 000	630
170	260	122	121	1.3	1.1	860 000	1 680 000	600
180	280	136	135	1.3	1.1	980 000	1 910 000	530
190	290	136	135	1.3	1.1	1 120 000	2 230 000	500
200	310	150	149	1.3	1.1	1 310 000	2 650 000	480
220	340	160	159	1.5	1.1	1 510 000	3 100 000	430
240	360	160	159	1.5	1.1	1 570 000	3 350 000	400
260	400	190	189	1.5	1.5	2 130 000	4 500 000	360
280	420	190	189	1.5	1.5	2 170 000	4 700 000	340
300	460	218	216	1.5	1.5	2 670 000	5 850 000	300
320	480	218	216	1.5	1.5	2 720 000	6 100 000	300
340	520	243	241	2	2	3 350 000	7 550 000	260
360	540	243	241	2	2	3 450 000	7 850 000	260
380	560	243	241	2	2	3 550 000	8 400 000	240
400	600	272	270	2	2	4 250 000	9 950 000	220

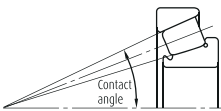


Bearing Numbers		Locating Ring Dimensions (mm)				Oil Holes (mm)	Abutment and Fillet Dimensions (mm)		Mass (kg)
Without Locating Rings	With Locating Rings	C_1	S	D_2	f	d_{OH}	d_a min.	D_x min.	approx.
RS-5008	RS-5008NR	28	4.5	71.8	2	2.5	43.5	77.5	0.56
RS-5009	RS-5009NR	30	4.5	78.8	2	2.5	48.5	84.5	0.70
RS-5010	RS-5010NR	30	4.5	83.8	2	2.5	53.5	89.5	0.76
RS-5011	RS-5011NR	34	5.5	94.8	2.5	3	60	101	1.17
RS-5012	RS-5012NR	34	5.5	99.8	2.5	3	65	106	1.25
RS-5013	RS-5013NR	34	5.5	104.8	2.5	3	70	111	1.32
RS-5014	RS-5014NR	42	5.5	114.5	2.5	3	75	121	1.87
RS-5015	RS-5015NR	42	5.5	119.5	2.5	3	80	126	2.0
RS-5016	RS-5016NR	48	5.5	129.5	2.5	3	85	136	2.65
RS-5017	RS-5017NR	48	5.5	134.5	2.5	3	90	141	2.75
RS-5018	RS-5018NR	54	6	145.4	2.5	4	96	153.5	3.75
RS-5019	RS-5019NR	54	6	150.4	2.5	4	101	158.5	3.95
RS-5020	RS-5020NR	54	6	155.4	2.5	4	106	163.5	4.05
RS-5022	RS-5022NR	65	7	175.4	2.5	5	116.5	183.5	6.1
RS-5024	RS-5024NR	65	7	188	3	5	126.5	197	7.0
RS-5026	RS-5026NR	77	8.5	207	3	5	136.5	217	10.6
RS-5028	RS-5028NR	77	8.5	217	3	5	146.5	227	11.3
RS-5030	RS-5030NR	81	9	232	3	6	157	242	13.7
RS-5032	RS-5032NR	89	9.5	247	3	6	167	257	16.8
RS-5034	RS-5034NR	99	11	270	4	6	177	285	22.2
RS-5036	RS-5036NR	110	12.5	294	5	6	187	318	30
RS-5038	RS-5038NR	110	12.5	304	5	6	197	328	32
RS-5040	RS-5040NR	120	14.5	324	5	6	207	352	41
RS-5044	RS-5044NR	130	14.5	356	6	7	228.5	382	53
RS-5048	RS-5048NR	130	14.5	376	6	7	248.5	402	57
RS-5052	RS-5052NR	154	17.5	416	7	8	270	444	86
RS-5056	RS-5056NR	154	17.5	436	7	8	290	472	92
RS-5060	RS-5060NR	178	19	476	7	8	310	512	130
RS-5064	—	—	—	—	—	8	330	—	135
RS-5068	—	—	—	—	—	10	352	—	185
RS-5072	—	—	—	—	—	10	372	—	192
RS-5076	—	—	—	—	—	10	392	—	196
RS-5080	—	—	—	—	—	10	412	—	280



Tapered Roller Bearings

DESIGN, TYPES AND FEATURES



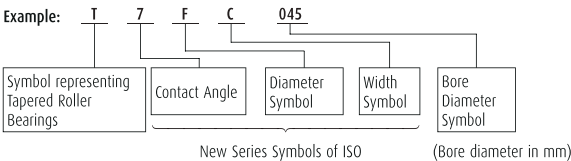
Tapered roller bearings are designed so the apices of the cones formed by the raceways of the cone and cup and the conical rollers all coincide at one point on the axis of the bearing. When a radial load is imposed, an axial force component occurs; therefore, it is necessary to use two bearings in opposition or some other multiple arrangement.

For metric-design medium-angle and steep-angle tapered roller bearings, the respective contact angle symbol C or D is added after the bore number. For normal-angle tapered roller bearings, no contact angle symbol is used.

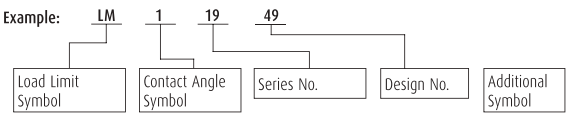
Medium-angle tapered roller bearings are primarily used for the pinion shafts of differential gears of automobiles.

Among those with high load capacity (HR series), some bearings have the basic number suffixed by J to conform to the specifications of ISO for the cup back face raceway diameter, cup width, and contact angle. Therefore, the cone assembly and cup of bearings with the same basic number suffixed by J are internationally interchangeable.

Among metric-design tapered roller bearings specified by ISO 355, there are those having new dimensions that are different from the dimension series 3XX used in the past. Part of them are listed in the bearing tables. They conform to the specifications of ISO for the smaller end diameter of the cup and contact angle. The cone and cup assemblies are internationally interchangeable. The bearing number formulation, which is different from that for past metric design, is as follows:



Besides metric design tapered roller bearings, there are also inch design bearings. For the cone assemblies and cups of inch design bearings, except four-row tapered roller bearings, the bearing numbers are approximately formulated as follows:



For tapered roller bearings, besides single-row bearings, there are also various combinations of bearings. The cages of tapered roller bearings are usually pressed steel.

Table 1 Design and Features of Combinations of Tapered Roller Bearings

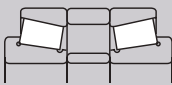
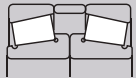
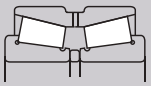
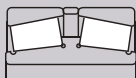
Figure	Arrangement	Examples of Bearing No.	Features
	Back-to-back	HR30210JB+KLR10	Two standard bearings are combined. The bearing clearance are adjusted by cone spacers or cup spacers. The cones and cups and spacers are marked with serial numbers and mating marks. Components with the same serial number can be assembled referring to the matching symbols.
	Face-to-face	HR30210JDF+KR	
	KBE Type	100KBE31+L	The KBE type is a back-to-back arrangement of bearings with the cup and spacer integrated, and the KH type is a face-to-face arrangement in which the cones are integrated. Since the bearing clearance is adjusted using spacers, it is necessary for components to have the same serial number for assembly with reference to matching symbols.
	KH Type	110KH31+K	



Table 2 Tolerances of Cones (CLASS K)

Units : μm

Nominal Bore Diameter d (mm)		Δ_{dmp}		V_{dp}	V_{dmp}	K_{ia}
over	incl.	high	low	max.	max.	max.
10	18	0	−12	12	9	15
18	30	0	−12	12	9	18
30	50	0	−12	12	9	20
50	80	0	−15	15	11	25
80	120	0	−20	20	15	30
120	180	0	−25	25	19	35
180	250	0	−30	30	23	50
250	315	0	−35	35	26	60
315	400	0	−40	40	30	70

Tapered Roller Bearings

Table 3 Tolerances of Cups (CLASS K)

Units : μm

Nominal Outside Diameter D (mm)		Δ_{Dmp}		V_{Dp}	V_{Dmp}	K_{ea}
over	incl.	high	low	max.	max.	max.
18	30	0	−12	12	9	18
30	50	0	−14	14	11	20
50	80	0	−16	16	12	25
80	120	0	−18	18	14	35
120	150	0	−20	20	15	40
150	180	0	−25	25	19	45
180	250	0	−30	30	23	50
250	315	0	−35	35	26	60
315	400	0	−40	40	30	70
400	500	0	−45	45	34	80

Table 4 Tolerances of Effective Widths of Cone Assemblies and Cups and Overall Width (CLASS K)

Units : μm

Nominal Bore Diameter d (mm)		Effective Width Deviation of Cone Assembly Δ_{T1s}		Effective Width Deviation of Cup Δ_{T2s}		Overall Width Deviation Δ_{T3}	
over	incl.	high	low	high	low	high	low
10	80	+100	0	+100	0	+200	0
80	120	+100	−100	+100	−100	+200	−200
120	315	+150	−150	+200	−100	+350	−250
315	400	+200	−200	+200	−200	+400	−400

2. Bearings for Front Axles of Automobiles (In the bearing tables, those preceded by t)

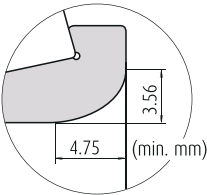
Table 5 Tolerances of Bore Diameter and Overall Width

Units : μm

Nominal Bore Diameter d			Bore Diameter Deviation Δ_{ds}		Overall Width Deviation Δ_{fs}		
over (mm)	1/25.4	incl. (mm)	1/25.4	high	low	high	low
—		76.200	3.0000	+20	0	+356	0

3. Special Chamfer Dimensions

For bearings marked “spec.” in the column of r in the bearing tables, the chamfer dimension of the cone back-face side is as shown on the following figure.



DIMENSIONS RELATED TO MOUNTING

The dimensions related to mounting tapered roller bearings are listed in the bearing tables. Since the cages protrude from the ring faces of tapered roller bearings, please use care when designing shafts and housings.

When heavy axial loads are imposed, the shaft shoulder dimensions and strength must be sufficient to support the cone rib.

PERMISSIBLE MISALIGNMENT

The permissible misalignment angle for tapered roller bearings is approximately 0.0009 radian (3').

PRECAUTIONS FOR USE OF TAPERED ROLLER BEARINGS

1. If the load on tapered roller bearings becomes too small, or if the ratio of the axial and radial loads for matched bearings exceeds 'e' (e is listed in the bearing tables) during operation, slippage between the rollers and raceways occurs, which may result in smearing. Especially with large bearings since the weight of the rollers and cage is high. If such load conditions are expected, please contact ITJ for selection of the bearings.
2. Confirm the dimension of "Abutment and Fillet Dimensions" of D_a , D_b , S_a , S_b at the time of the HR series adoption.



Tapered Roller Bearings

TECHNICAL DATA

Free Space of Tapered Roller Bearings

The tapered roller bearing can carry radial load and uni-direction axial loads. It offers high capacity. This type of bearing is used widely in machine systems with relatively severe loading conditions in various combinations by opposing or combining single-row bearings.

With a view towards easier maintenance and inspection, this kind of bearing is lubricated with grease in most cases. It is important to select a grease appropriate to the operating conditions and to use the proper amount of grease for the housing internal space. As a reference, the free space of a tapered roller bearing is shown in Table 6.

The free space of a tapered roller bearing is the space (shadowed portion) of the bearing outer volume less the inner and outer rings and cage, as shown in Fig. 1. The bearing is filled so that grease reaches the inner ring rib surface and pocket surface in sufficient amount.

Due attention must also be paid to the grease filling amount and state, especially if grease leakage occurs or maintenance of low running torque is important.

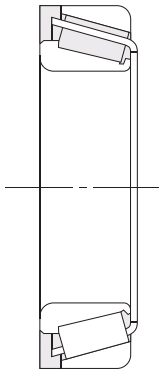


Fig. 1 Free Space of Tapered Roller Bearing

Table 6 Free Space of Tapered Roller Bearing

Bearing bore No.	Bearing free space	
	Bearing series	
	HR329-J	HR320-XJ
02	—	—
03	—	—
04	—	3.5
/22	—	3.6
05	—	3.7
/28	—	5.3
06	—	6.2
/32	—	6.6
07	4.0	7.5
08	5.8	9.1
09	—	11
10	—	12
11	8.8	19
12	9.0	20
13	—	21
14	17	29
15	—	30
16	—	40
17	—	43
18	28	58
19	29	60
20	37	64

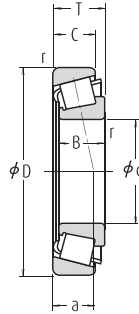
Units : cm³

Bearing free space							
Bearing series							
HR330-J	HR331-J	HR302-J	HR322-J	HR332-J	HR303-J	HR303-DJ	HR323-J
—	—	—	—	—	4.5	—	—
—	—	3.3	4.3	—	5.7	—	—
—	—	5.3	6.6	—	7.2	—	9.2
—	—	—	7.3	—	9.1	—	—
4.3	—	6.3	7.4	7.5	11	13	15
—	—	8.8	9.8	10	16	—	—
6.7	—	9.2	11	12	18	21	23
—	—	11	13	14	20	—	—
8.9	—	13	17	18	23	26	35
11	—	18	23	25	31	35	45
—	18	22	24	26	41	48	58
15	20	23	26	29	55	59	77
21	29	30	36	40	72	78	99
23	—	39	47	53	88	95	130
25	—	45	62	65	110	120	150
33	—	53	67	69	130	150	190
34	—	58	73	74	160	180	230
—	—	75	91	100	200	200	270
49	76	92	120	130	230	250	320
—	110	110	150	—	260	310	370
—	—	140	170	—	310	350	430
—	150	160	210	240	380	460	580

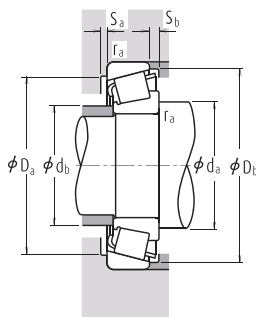


Single-Row Tapered Roller Bearings

Bore Diameter 15 – 28 mm



Boundary Dimensions (mm)							Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)	
d	D	T	B	C	Cone r min.	Cup	C _r	C _{0r}	Grease	Oil
15	35	11.75	11	10	0.6	0.6	14 800	13 200	11 000	15 000
	42	14.25	13	11	1	1	23 600	21 100	9 500	13 000
17	40	13.25	12	11	1	1	20 100	19 900	9 500	13 000
	40	17.25	16	14	1	1	27 100	28 000	9 500	13 000
	47	15.25	14	12	1	1	29 200	26 700	8 500	12 000
	47	15.25	14	10.5	1	1	22 000	20 300	8 000	11 000
20	47	20.25	19	16	1	1	37 500	36 500	8 500	11 000
	42	15	15	12	0.6	0.6	24 600	27 400	9 000	12 000
	47	15.25	14	12	1	1	27 900	28 500	8 000	11 000
	47	15.25	14	12	0.3	1	23 900	24 000	8 000	11 000
	47	19.25	18	15	1	1	35 500	37 500	8 500	11 000
	47	19.25	18	15	1	1	31 500	33 500	8 000	11 000
	52	16.25	15	13	1.5	1.5	35 000	33 500	7 500	10 000
	52	16.25	15	12	1.5	1.5	25 300	24 500	7 100	10 000
	52	22.25	21	18	1.5	1.5	45 500	47 500	8 000	11 000
	22	44	15	15	11.5	0.6	0.6	25 600	29 400	8 500
25	50	15.25	14	12	1	1	29 200	30 500	7 500	10 000
	50	15.25	14	12	1	1	27 200	29 500	7 500	10 000
	50	19.25	18	15	1	1	36 500	40 500	7 500	11 000
	50	19.25	18	15	1	1	33 500	39 500	7 500	10 000
	56	17.25	16	14	1.5	1.5	37 000	36 500	7 100	9 500
	56	17.25	16	13	1.5	1.5	34 500	34 000	6 700	9 500
	47	15	15	11.5	0.6	0.6	27 400	33 000	8 000	11 000
	47	17	17	14	0.6	0.6	31 000	38 000	8 000	11 000
	52	16.25	15	13	1	1	32 000	35 000	7 100	10 000
	52	16.25	15	12	1	1	28 100	31 500	9 700	9 500
28	52	19.25	18	16	1	1	40 000	45 000	7 100	10 000
	52	19.25	18	15	1	1	35 000	42 000	7 100	9 500
	52	22	22	18	1	1	47 500	56 500	7 500	10 000
	62	18.25	17	15	1.5	1.5	47 500	46 000	6 300	8 500
	62	18.25	17	14	1.5	1.5	42 000	45 000	6 000	8 500
	62	18.25	17	13	1.5	1.5	38 000	40 500	5 600	8 000
	62	18.25	17	13	1.5	1.5	38 000	40 500	5 600	8 000
	62	25.25	24	20	1.5	1.5	62 500	66 000	6 300	8 500
	52	16	16	12	1	1	32 000	39 000	7 100	9 500
	58	17.25	16	14	1	1	39 500	41 500	6 300	9 000
	58	17.25	16	12	1	1	34 000	38 500	6 300	8 500
	58	20.25	19	16	1	1	47 500	54 000	6 300	9 000
	58	20.25	19	16	1	1	42 000	49 500	6 300	9 000
	68	19.75	18	15	1.5	1.5	55 000	55 500	6 000	8 000
68	19.75	18	14	1.5	1.5	49 500	50 500	5 600	7 500	



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5 F_r + Y_0 F_a$$

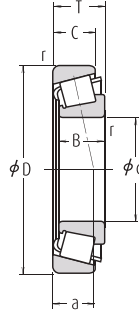
When $F_r > 0.5 F_r + Y_0 F_a$, use $P_0 = F_r$

The values of e , Y_1 and Y_0 are given in the table below.

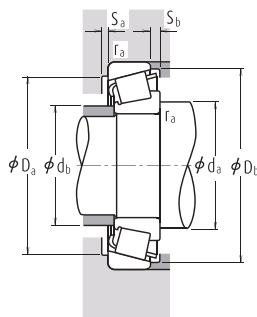
Bearing Numbers	ISO355 Dimension Series	Abutment and Fillet Dimensions (mm)										Eff. Load Centers (mm)	Constant	Axial Load Factors		Mass (kg)
		d_a min.	d_b max.	D_a max.	D_b min.	S_a min.	S_b min.	r_a max.	Cone	Cup	r_a max.			Y_1	Y_0	
30202	—	23	19	30	30	33	2	1.5	0.6	0.6	—	8.2	0.32	1.9	1.0	0.053
HR 30302 J	2FB	24	22	36	36	38.5	2	3	1	1	9.5	0.29	0.29	2.1	1.2	0.098
HR 30203 J	2DB	26	23	34	34	37.5	2	2	1	1	9.7	0.35	0.35	1.7	0.96	0.079
HR 32203 J	2DD	26	22	34	34	37	2	3	1	1	11.2	0.31	0.31	1.9	1.1	0.103
HR 30303 J	2FB	26	24	41	40	43	2	3	1	1	10.4	0.29	0.29	2.1	1.2	0.134
30303 D	—	29	23	41	34	44	2	4.5	1	1	15.4	0.81	0.81	0.74	0.41	0.129
HR 32303 J	2FD	28	23	41	39	43	2	4	1	1	12.5	0.29	0.29	2.1	1.2	0.178
HR 32004 XJ	3CC	28	24	37	35	40	3	3	0.6	0.6	10.6	0.37	0.37	1.6	0.88	0.097
HR 30204 J	2DB	29	27	41	40	44	2	3	1	1	11.0	0.35	0.35	1.7	0.96	0.127
HR 30204 C-A-	—	29	26	41	37	44	2	3	0.3	1	13.0	0.55	0.55	1.1	0.60	0.126
HR 32204 J	2DD	29	25	41	38	44.5	3	4	1	1	12.6	0.33	0.33	1.8	1.0	0.161
HR 32204 CJ	5DD	29	25	41	36	44	2	4	1	1	14.5	0.52	0.52	1.2	0.64	0.166
HR 30304 J	2FB	31	27	44	44	47.5	2	3	1.5	1.5	11.6	0.30	0.30	2.0	1.1	0.172
30304 D	—	34	26	43	37	49	2	4	1.5	1.5	16.7	0.81	0.81	0.74	0.41	0.168
HR 32304 J	2FD	33	26	43	42	48	3	4	1.5	1.5	13.9	0.30	0.30	2.0	1.1	0.241
HR 320/22 XJ	3CC	30	27	39	37	42	3	3.5	0.6	0.6	11.1	0.40	0.40	1.5	0.83	0.103
HR 302/22	—	31	29	44	42	47	2	3	1	1	11.6	0.37	0.37	1.6	0.90	0.139
HR 302/22 C	—	31	29	44	40	47	2	3	1	1	13.0	0.49	0.49	1.2	0.67	0.144
HR 322/22	—	31	28	44	41	47	2	4	1	1	13.5	0.37	0.37	1.6	0.89	0.18
HR 322/22 C	—	31	29	44	39	48	2	4	1	1	15.2	0.51	0.51	1.2	0.65	0.185
HR 303/22	—	33	30	47	46	50	2	3	1.5	1.5	12.4	0.32	0.32	1.9	1.0	0.208
HR 303/22 C	—	33	30	47	44	52.5	3	4	1.5	1.5	15.9	0.59	0.59	1.0	0.56	0.207
HR 32005 XJ	4CC	33	30	42	40	45	3	3.5	0.6	0.6	11.8	0.43	0.43	1.4	0.77	0.116
HR 33005 J	2CE	33	29	42	41	44	3	3	0.6	0.6	11.0	0.29	0.29	2.1	1.1	0.131
HR 30205 J	3CC	34	31	46	44	48.5	2	3	1	1	12.7	0.37	0.37	1.6	0.88	0.157
HR 30205 C	—	34	32	46	43	49.5	2	4	1	1	14.4	0.53	0.53	1.1	0.62	0.155
HR 32205 J	2CD	34	30	46	44	50	2	3	1	1	13.5	0.36	0.36	1.7	0.92	0.189
HR 32205 C	—	34	30	46	40	50	2	4	1	1	15.8	0.53	0.53	1.1	0.62	0.19
HR 33205 J	2DE	34	29	46	43	49.5	4	4	1	1	14.1	0.35	0.35	1.7	0.94	0.221
HR 30305 J	2FB	36	34	54	54	57	2	3	1.5	1.5	13.2	0.30	0.30	2.0	1.1	0.27
HR 30305 C	—	36	35	53	49	58.5	3	4	1.5	1.5	16.4	0.55	0.55	1.1	0.60	0.276
HR 30305 DJ	(7FB)	39	34	53	47	59	2	5	1.5	1.5	19.9	0.83	0.83	0.73	0.40	0.265
HR 31305 J	7FB	39	33	53	47	59	3	5	1.5	1.5	19.9	0.83	0.83	0.73	0.40	0.265
HR 32305 J	2FD	38	32	53	51	57	3	5	1.5	1.5	15.6	0.30	0.30	2.0	1.1	0.376
HR 320/28 XJ	4CC	37	33	46	44	50	3	4	1	1	12.8	0.43	0.43	1.4	0.77	0.146
HR 302/28	—	37	34	52	50	55	2	3	1	1	13.2	0.35	0.35	1.7	0.93	0.203
HR 302/28 C	—	37	34	52	48	54	2	5	1	1	16.9	0.64	0.64	0.94	0.52	0.198
HR 322/28	—	37	34	52	49	55	2	4	1	1	14.6	0.37	0.37	1.6	0.89	0.243
HR 322/28 CJ	5DD	37	33	52	45	55	2	4	1	1	16.8	0.56	0.56	1.1	0.59	0.251
HR 303/28	—	39	37	59	58	61	2	4.5	1.5	1.5	14.5	0.31	0.31	1.9	1.1	0.341
HR 303/28 C	—	39	38	59	57	63	3	5.5	1.5	1.5	17.4	0.52	0.52	1.2	0.64	0.335

Single-Row Tapered Roller Bearings

Bore Diameter 30 – 35 mm



Boundary Dimensions (mm)							Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)	
d	D	T	B	C	Cone	Cup	C _r	C _{0r}	Grease	Oil
					r min.					
30	47	12	12	9	0.3	0.3	17 600	24 400	7 500	10 000
	55	17	17	13	1	1	36 000	44 500	6 700	9 000
	55	20	20	16	1	1	42 000	54 000	6 700	9 000
	62	17.25	16	14	1	1	43 000	47 500	6 000	8 000
	62	17.25	16	12	1	1	35 500	37 000	5 600	7 500
	62	21.25	20	17	1	1	52 000	60 000	6 000	8 500
	62	21.25	20	16	1	1	48 000	56 000	6 000	8 000
	62	25	25	19.5	1	1	66 500	79 500	6 000	8 000
	72	20.75	19	16	1.5	1.5	59 500	60 000	5 300	7 500
	72	20.75	19	14	1.5	1.5	56 500	55 500	5 300	7 100
	72	20.75	19	14	1.5	1.5	49 000	52 500	4 800	6 700
	72	20.75	19	14	1.5	1.5	49 000	52 500	4 800	6 800
	72	28.75	27	23	1.5	1.5	80 000	88 500	5 600	7 500
	72	28.75	27	23	1.5	1.5	76 000	86 500	5 600	7 500
32	58	17	17	13	1	1	37 500	47 000	6 300	8 500
	58	21	20	16	1	1	41 000	50 000	6 300	8 500
	65	18.25	17	15	1	1	48 500	54 000	5 600	8 000
	65	18.25	17	14	1	1	45 500	52 500	5 600	7 500
	65	22.25	21	18	1	1	56 000	65 000	6 000	8 000
	65	22.25	21	17	1	1	49 500	60 000	5 600	7 500
	65	26	26	20.5	1	1	70 000	86 500	5 600	8 000
	75	21.75	20	17	1.5	1.5	56 000	56 000	5 300	7 100
35	55	14	14	11.5	0.6	0.6	27 400	39 000	6 300	8 500
	62	18	18	14	1	1	43 500	55 500	5 600	8 000
	62	21	21	17	1	1	49 000	65 000	5 600	8 000
	72	18.25	17	15	1.5	1.5	54 000	59 500	5 300	7 100
	72	18.25	17	13	1.5	1.5	47 000	54 500	5 000	6 700
	72	24.25	23	19	1.5	1.5	70 500	83 500	5 300	7 100
	72	24.25	23	18	1.5	1.5	60 500	71 500	5 000	7 100
	72	28	28	22	1.5	1.5	86 500	108 000	5 300	7 100
	80	22.75	21	18	2	1.5	76 000	79 000	4 800	6 700
	80	22.75	21	16	2	1.5	68 000	70 500	4 800	6 300
	80	22.75	21	15	2	1.5	62 000	68 000	4 300	6 000
	80	22.75	21	15	2	1.5	62 000	68 000	4 300	6 000
	80	32.75	31	25	2	1.5	99 000	111 000	5 000	6 700



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5 F_r + Y_0 F_a$$

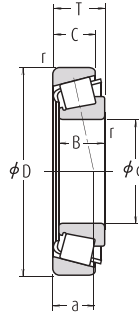
When $F_r > 0.5 F_r + Y_0 F_a$, use $P_0 = F_r$

The values of e , Y_1 and Y_0 are given in the table below.

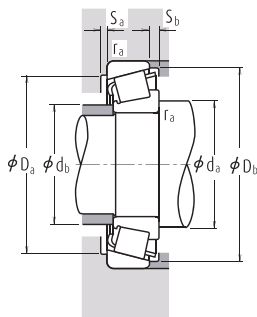
Bearing Numbers	ISO355 Dimension Series	Abutment and Fillet Dimensions (mm)								Eff. Load Centers (mm)	Constant	Axial Load Factors		Mass (kg)	
								Cone	Cup			Y ₁	Y ₀		
		d _a min.	d _b max.	D _a max.	D _b min.	S _a min.	S _b min.	r _a max.							
	approx.										e			approx.	
HR 32906 J	2BD	34	34	44	42	44	3	3	0.3	0.3	9.2	0.32	1.9	1.0	0.074
HR 32006 XJ	4CC	39	35	49	47	53	3	4	1	1	13.5	0.43	1.4	0.77	0.172
HR 33006 J	2CE	39	35	49	48	52	3	4	1	1	13.1	0.29	2.1	1.1	0.208
HR 30206 J	3DB	39	37	56	52	58	2	3	1	1	13.9	0.37	1.6	0.88	0.238
HR 30206 C	—	39	36	56	49	59	2	5	1	1	17.8	0.68	0.88	0.49	0.221
HR 32206 J	3DC	39	36	56	51	58.5	2	4	1	1	15.4	0.37	1.6	0.88	0.297
HR 32206 C	—	39	35	56	48	59	2	5	1	1	17.8	0.55	1.1	0.60	0.293
HR 33206 J	2DE	39	35	56	52	59.5	5	5.5	1	1	16.1	0.34	1.8	0.97	0.355
HR 30306 J	2FB	41	40	63	62	66	3	4.5	1.5	1.5	15.1	0.32	1.9	1.1	0.403
HR 30306 C	—	41	38	63	59	67	3	6.5	1.5	1.5	18.5	0.55	1.1	0.60	0.383
HR 30306 DJ	(7FB)	44	40	63	55	68	3	6.5	1.5	1.5	23.1	0.83	0.73	0.40	0.393
HR 31306 J	7FB	44	40	63	55	68	3	6.5	1.5	1.5	23.1	0.83	0.73	0.40	0.393
HR 32306 J	2FD	43	38	63	59	66	3	5.5	1.5	1.5	18.0	0.32	1.9	1.1	0.57
HR 32306 CJ	5FD	43	36	63	54	68	3	5.5	1.5	1.5	22.0	0.55	1.1	0.60	0.583
HR 320/32 XJ	4CC	41	37	52	49	55	3	4	1	1	14.2	0.45	1.3	0.73	0.191
330/32	—	41	37	52	50	55	2	4	1	1	13.8	0.31	1.9	1.1	0.225
HR 302/32	—	41	39	59	56	61	3	3	1	1	14.7	0.37	1.6	0.88	0.277
HR 302/32 C	—	41	39	59	54	62	3	4	1	1	16.9	0.55	1.1	0.60	0.273
HR 322/32	—	41	38	59	54	61	3	4	1	1	15.9	0.37	1.6	0.88	0.336
HR 322/32 C	—	41	39	59	51	62	3	5	1	1	20.2	0.59	1.0	0.56	0.335
HR 332/32 J	2DE	41	38	59	55	62	5	5.5	1	1	17.0	0.35	1.7	0.95	0.40
303/32	—	44	42	66	64	68	3	4.5	1.5	1.5	15.9	0.33	1.8	1.0	0.435
HR 32907 J	2BD	43	40	50	50	52.5	3	2.5	0.6	0.6	10.7	0.29	2.1	1.1	0.123
HR 32007 XJ	4CC	44	40	56	54	60	4	4	1	1	15.0	0.45	1.3	0.73	0.229
HR 33007 J	2CE	44	40	56	55	59	4	4	1	1	14.1	0.31	2.0	1.1	0.267
HR 30207 J	3DB	46	43	63	62	67	3	3	1.5	1.5	15.0	0.37	1.6	0.88	0.34
HR 30207 C	—	46	44	63	59	68	3	5	1.5	1.5	19.6	0.66	0.91	0.50	0.331
HR 32207 J	3DC	46	42	63	61	67.5	3	5	1.5	1.5	17.9	0.37	1.6	0.88	0.456
HR 32207 C	—	46	42	63	58	68.5	3	6	1.5	1.5	20.6	0.55	1.1	0.60	0.442
HR 33207 J	2DE	46	41	63	61	68	5	6	1.5	1.5	18.3	0.35	1.7	0.93	0.54
HR 30307 J	2FB	47	45	71	69	74	3	4.5	2	1.5	16.7	0.32	1.9	1.1	0.538
HR 30307 C	—	47	44	71	65	74	3	6.5	2	1.5	20.3	0.55	1.1	0.60	0.518
HR 30307 DJ	7FB	51	44	71	62	77	3	7.5	2	1.5	25.2	0.83	0.73	0.40	0.519
HR 31307 J	7FB	51	44	71	62	77	3	7.5	2	1.5	25.2	0.83	0.73	0.40	0.52
HR 32307 J	2FE	49	43	71	66	74	3	7.5	2	1.5	20.7	0.32	1.9	1.1	0.765

Single-Row Tapered Roller Bearings

Bore Diameter 40 – 50 mm



Boundary Dimensions (mm)							Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)	
d	D	T	B	C	Cone	Cup	C _r	C _{0r}	Grease	Oil
					r min.					
40	62	15	15	12	0.6	0.6	34 000	47 000	5 600	7 500
	68	19	19	14.5	1	1	53 000	71 000	5 300	7 100
	68	22	22	18	1	1	59 000	81 500	5 300	7 100
	75	26	26	20.5	1.5	1.5	78 500	101 000	4 800	6 700
	80	19.75	18	16	1.5	1.5	63 500	70 000	4 800	6 300
	80	24.75	23	19	1.5	1.5	77 000	90 500	4 800	6 300
	80	24.75	23	19	1.5	1.5	74 000	90 500	4 500	6 300
	80	32	32	25	1.5	1.5	107 000	137 000	4 800	6 300
	90	25.25	23	20	2	1.5	90 500	101 000	4 300	5 600
	90	25.25	23	18	2	1.5	84 500	93 500	4 300	5 600
	90	25.25	23	17	2	1.5	80 000	89 500	3 800	5 300
	90	25.25	23	17	2	1.5	80 000	89 500	3 800	5 300
	90	35.25	33	27	2	1.5	120 000	145 000	4 300	6 000
45	68	15	15	12	0.6	0.6	34 500	50 500	5 000	6 700
	75	20	20	15.5	1	1	60 000	83 000	4 500	6 300
	75	24	24	19	1	1	69 000	99 000	4 800	6 300
	80	26	26	20.5	1.5	1.5	84 000	113 000	4 500	6 000
	85	20.75	19	16	1.5	1.5	68 500	79 500	4 300	6 000
	85	24.75	23	19	1.5	1.5	83 000	102 000	4 300	6 000
	85	24.75	23	19	1.5	1.5	75 500	95 500	4 300	5 600
	85	32	32	25	1.5	1.5	111 000	147 000	4 300	6 000
	95	29	26.5	20	2.5	2.5	88 500	109 000	3 600	5 000
	95	36	35	30	2.5	2.5	139 000	174 000	4 000	5 300
	100	27.25	25	22	2	1.5	112 000	127 000	3 800	5 300
	100	27.25	25	18	2	1.5	95 500	109 000	3 400	4 800
	100	27.25	25	18	2	1.5	95 500	109 000	3 400	4 800
100	38.25	36	30	2	1.5	144 000	177 000	3 800	5 300	
50	100	36	35	30	2.5	2.5	144 000	185 000	3 800	5 000
	72	15	15	12	0.6	0.6	36 000	54 000	4 500	6 300
	80	20	20	15.5	1	1	61 000	87 000	4 300	6 000
	80	24	24	19	1	1	70 500	104 000	4 300	6 000
	85	26	26	20	1.5	1.5	89 000	126 000	4 300	5 600
	90	21.75	20	17	1.5	1.5	76 000	91 500	4 000	5 300
	90	24.75	23	19	1.5	1.5	87 500	109 000	4 000	5 300
	90	24.75	23	18	1.5	1.5	77 500	102 000	3 800	5 300
	90	32	32	24.5	1.5	1.5	118 000	165 000	4 000	5 300
	105	32	29	22	3	3	109 000	133 000	3 200	4 500
	110	29.25	27	23	2.5	2	130 000	148 000	3 400	4 800
	110	29.25	27	19	2.5	2	114 000	132 000	3 200	4 300
	110	29.25	27	19	2.5	2	114 000	132 000	3 200	4 300
110	42.25	40	33	2.5	2	176 000	220 000	3 600	4 800	
110	42.25	40	33	2.5	2	164 000	218 000	3 400	4 800	



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5 F_r + Y_0 F_a$$

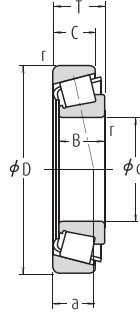
When $F_r > 0.5 F_r + Y_0 F_a$, use $P_0 = F_r$

The values of e , Y_1 and Y_0 are given in the table below.

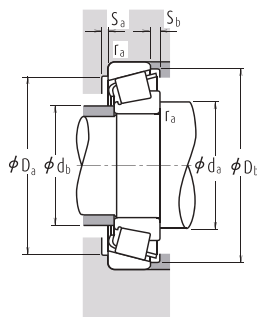
Bearing Numbers	ISO355 Dimension Series	Abutment and Fillet Dimensions (mm)										Eff. Load Centers (mm)	Constant	Axial Load Factors		Mass (kg)
										Cone	Cup			Y ₁	Y ₀	
		d _a min.	d _b max.	D _a max.	D _b min.	S _a min.	S _b min.	r _a max.								
	approx.										a	e			approx.	
HR 32908 J	2BC	48	44	57	57	59	3	3	0.6	0.6	11.5	0.29	2.1	1.1	0.161	
HR 32008 XJ	3CD	49	45	62	60	65.5	4	4.5	1	1	15.0	0.38	1.6	0.87	0.28	
HR 33008 J	2BE	49	45	62	61	65	4	4	1	1	14.6	0.28	2.1	1.2	0.322	
HR 33108 J	2CE	51	46	66	65	71	4	5.5	1.5	1.5	18.0	0.36	1.7	0.93	0.503	
HR 30208 J	3DB	51	48	71	69	75	3	3.5	1.5	1.5	16.6	0.37	1.6	0.88	0.437	
HR 32208 J	3DC	51	48	71	68	75	3	5.5	1.5	1.5	18.9	0.37	1.6	0.88	0.548	
HR 32208 CJ	5DC	51	47	71	65	76	3	5.5	1.5	1.5	21.9	0.55	1.1	0.60	0.558	
HR 33208 J	2DE	51	46	71	67	76	5	7	1.5	1.5	20.8	0.36	1.7	0.92	0.744	
HR 30308 J	2FB	52	52	81	76	82	3	5	2	1.5	19.5	0.35	1.7	0.96	0.758	
HR 30308 C	—	52	50	81	72	84	3	7	2	1.5	22.8	0.53	1.1	0.62	0.735	
HR 30308 DJ	7FB	56	50	81	70	87	3	8	2	1.5	28.7	0.83	0.73	0.40	0.728	
HR 31308 J	7FB	56	50	81	70	87	3	8	2	1.5	28.7	0.83	0.73	0.40	0.728	
HR 32308 J	2FD	54	50	81	73	82	3	8	2	1.5	23.4	0.35	1.7	0.96	1.05	
HR 32909 J	2BC	53	50	63	62	64	3	3	0.6	0.6	12.3	0.32	1.9	1.0	0.187	
HR 32009 XJ	3CC	54	51	69	67	72	4	4.5	1	1	16.6	0.39	1.5	0.84	0.354	
HR 33009 J	2CE	54	51	69	67	71	4	5	1	1	16.3	0.29	2.0	1.1	0.414	
HR 33109 J	3CE	56	51	71	69	77	4	5.5	1.5	1.5	19.1	0.38	1.6	0.86	0.552	
HR 30209 J	3DB	56	53	76	74	80	3	4.5	1.5	1.5	18.3	0.41	1.5	0.81	0.488	
HR 32209 J	3DC	56	53	76	73	81	3	5.5	1.5	1.5	20.1	0.41	1.5	0.81	0.602	
HR 32209 CJ	5DC	56	52	76	70	82	3	5.5	1.5	1.5	23.6	0.59	1.0	0.56	0.603	
HR 33209 J	3DE	56	51	76	72	81	5	7	1.5	1.5	22.0	0.39	1.6	0.86	0.817	
T7 FC045	7FC	60	53	83	71	91	3	9	2	2	32.1	0.87	0.69	0.38	0.918	
T2 ED045	2ED	60	54	83	79	89	5	6	2	2	23.5	0.32	1.9	1.02	1.22	
HR 30309 J	2FB	57	58	91	86	93	3	5	2	1.5	21.1	0.35	1.7	0.96	1.01	
HR 30309 DJ	7FB	61	57	91	79	96	3	9	2	1.5	31.5	0.83	0.73	0.40	0.957	
HR 31309 J	7FB	61	57	91	79	96	3	9	2	1.5	31.5	0.83	0.73	0.40	0.947	
HR 32309 J	2FD	59	56	91	82	93	3	8	2	1.5	25.0	0.35	1.7	0.96	1.42	
T2 ED050	2ED	65	59	88	83	94	6	6	2	2	24.2	0.34	1.8	0.96	1.3	
HR 32910 J	2BC	58	54	67	66	69	3	3	0.6	0.6	13.5	0.34	1.8	0.97	0.193	
HR 32010 XJ	3CC	59	56	74	71	77	4	4.5	1	1	17.9	0.42	1.4	0.78	0.38	
HR 33010 J	2CE	59	55	74	71	76	4	5	1	1	17.4	0.32	1.9	1.0	0.452	
HR 33110 J	3CE	61	56	76	74	82	4	6	1.5	1.5	20.3	0.41	1.5	0.8	0.597	
HR 30210 J	3DB	61	58	81	79	85	3	4.5	1.5	1.5	19.6	0.42	1.4	0.79	0.557	
HR 32210 J	3DC	61	57	81	78	86	3	5.5	1.5	1.5	21.0	0.42	1.4	0.79	0.642	
HR 32210 CJ	5DC	61	58	81	76	87	3	6.5	1.5	1.5	24.6	0.59	1.0	0.56	0.655	
HR 33210 J	3DE	61	56	81	76	87	5	7.5	1.5	1.5	23.2	0.41	1.5	0.80	0.867	
T7 FC050	7FC	74	59	91	78	100	5	10	2.5	2.5	36.4	0.87	0.69	0.38	1.22	
HR 30310 J	2FB	65	65	100	95	102	3	6	2	2	23.1	0.35	1.7	0.96	1.28	
HR 30310 DJ	7FB	70	62	100	87	105	3	10	2	2	34.3	0.83	0.73	0.40	1.26	
HR 31310 J	7FB	70	62	100	87	105	3	10	2	2	34.3	0.83	0.73	0.40	1.26	
HR 32310 J	2FD	68	62	100	91	102	3	9	2	2	28.0	0.35	1.7	0.96	1.88	
HR 32310 CJ	5FD	68	59	100	82	103	3	9	2	2	32.8	0.55	1.1	0.60	1.93	

Single-Row Tapered Roller Bearings

Bore Diameter 55 – 65 mm



Boundary Dimensions (mm)							Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)	
d	D	T	B	C	Cone	Cup	C _r	C _{0r}	Grease	Oil
					r min.					
55	80	17	17	14	1	1	45 500	74 500	4 300	5 600
	90	23	23	17.5	1.5	1.5	81 500	117 000	3 800	5 300
	90	27	27	21	1.5	1.5	91 500	138 000	3 800	5 300
	95	30	30	23	1.5	1.5	112 000	158 000	3 800	5 000
	100	22.75	21	18	2	1.5	94 500	113 000	3 600	5 000
	100	26.75	25	21	2	1.5	110 000	137 000	3 600	5 000
	100	35	35	27	2	1.5	141 000	193 000	3 600	5 000
	115	34	31	23.5	3	3	126 000	164 000	3 000	4 300
	120	31.5	29	25	2.5	2	150 000	171 000	3 200	4 300
	120	31.5	29	21	2.5	2	131 000	153 000	2 800	4 000
	120	31.5	29	21	2.5	2	131 000	153 000	2 800	4 000
	120	45.5	43	35	2.5	2	204 000	258 000	3 200	4 300
	120	45.5	43	35	2.5	2	195 000	262 000	3 200	4 300
	60	85	17	17	14	1	1	49 000	84 500	3 800
95		23	23	17.5	1.5	1.5	85 500	127 000	3 600	5 000
95		27	27	21	1.5	1.5	96 000	150 000	3 600	5 000
100		30	30	23	1.5	1.5	115 000	166 000	3 400	4 800
110		23.75	22	19	2	1.5	104 000	123 000	3 400	4 500
110		29.75	28	24	2	1.5	131 000	167 000	3 400	4 500
110		38	38	29	2	1.5	166 000	231 000	3 400	4 500
125		37	33.5	26	3	3	151 000	197 000	2 800	3 800
130		33.5	31	26	3	2.5	174 000	201 000	3 000	4 000
130		33.5	31	22	3	2.5	151 000	177 000	2 600	3 800
130		33.5	31	22	3	2.5	151 000	177 000	2 600	3 800
130		48.5	46	37	3	2.5	233 000	295 000	3 000	4 000
130		48.5	46	35	3	2.5	196 000	249 000	2 800	3 800
65		90	17	17	14	1	1	49 000	86 500	3 600
	100	23	23	17.5	1.5	1.5	86 500	132 000	3 400	4 500
	100	27	27	21	1.5	1.5	97 500	156 000	3 400	4 500
	110	34	34	26.5	1.5	1.5	148 000	218 000	3 200	4 300
	120	24.75	23	20	2	1.5	122 000	151 000	3 000	4 000
	120	32.75	31	27	2	1.5	157 000	202 000	3 000	4 000
	120	41	41	32	2	1.5	202 000	282 000	3 000	4 000
	140	36	33	28	3	2.5	200 000	233 000	2 600	3 600
	140	36	33	23	3	2.5	173 000	205 000	2 400	3 400
	140	36	33	23	3	2.5	173 000	205 000	2 400	3 400
	140	51	48	39	3	2.5	267 000	340 000	2 800	3 800



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5 F_r + Y_0 F_a$$

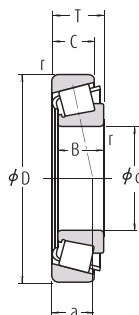
When $F_r > 0.5 F_r + Y_0 F_a$, use $P_0 = F_r$

The values of e , Y_1 and Y_0 are given in the table below.

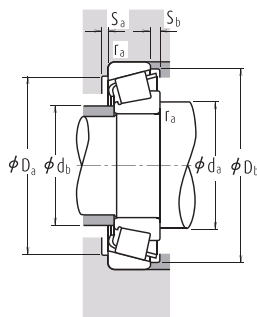
Bearing Numbers	ISO355 Dimension Series	Abutment and Fillet Dimensions (mm)										Eff. Load Centers (mm)	Constant	Axial Load Factors		Mass (kg)
										Cone	Cup			Y ₁	Y ₀	
		approx.	d _a min.	d _b max.	D _a max.	D _b min.	S _a min.	S _b min.	r _a max.							
HR 32911 J	2BC	64	60	74	73	76	4	3	1	1	14.6	0.31	1.9	1.1	0.282	
HR 32011 XJ	3CC	66	62	81	80	86	4	5.5	1.5	1.5	19.7	0.41	1.5	0.81	0.568	
HR 33011 J	2CE	66	62	81	80	86	5	6	1.5	1.5	19.2	0.31	1.9	1.1	0.657	
HR 33111 J	3CE	66	62	86	82	91	5	7	1.5	1.5	22.4	0.37	1.6	0.88	0.877	
HR 30211 J	3DB	67	64	91	89	94	4	4.5	2	1.5	20.9	0.41	1.5	0.81	0.736	
HR 32211 J	3DC	67	63	91	87	95	4	5.5	2	1.5	22.7	0.41	1.5	0.81	0.859	
HR 33211 J	3DE	67	62	91	86	96	6	8	2	1.5	25.2	0.40	1.5	0.83	1.18	
T7 FC055	7FC	73	66	101	86	109	4	10.5	2.5	2.5	39.0	0.87	0.69	0.38	1.58	
HR 30311 J	2FB	70	71	110	104	111	4	6.5	2	2	24.6	0.35	1.7	0.96	1.63	
HR 30311 DJ	7FB	75	67	110	94	114	4	10.5	2	2	37.0	0.83	0.73	0.40	1.58	
HR 31311 J	7FB	75	67	110	94	114	4	10.5	2	2	37.0	0.83	0.73	0.40	1.58	
HR 32311 J	2FD	73	67	110	99	111	4	10.5	2	2	29.9	0.35	1.7	0.96	2.39	
HR 32311 CJ	5FD	73	65	110	91	112	4	10.5	2	2	35.8	0.55	1.1	0.60	2.47	
HR 32912 J	2BC	69	65	79	78	81	4	3	1	1	15.5	0.33	1.8	1.0	0.306	
HR 32012 XJ	4CC	71	66	86	85	91	4	5.5	1.5	1.5	20.9	0.43	1.4	0.77	0.608	
HR 33012 J	2CE	71	66	86	85	90	5	6	1.5	1.5	20.0	0.33	1.8	1.0	0.713	
HR 33112 J	3CE	71	68	91	88	96	5	7	1.5	1.5	23.6	0.40	1.5	0.83	0.91	
HR 30212 J	3EB	72	69	101	96	103	4	4.5	2	1.5	22.0	0.41	1.5	0.81	0.930	
HR 32212 J	3EC	72	68	101	95	104	4	5.5	2	1.5	24.1	0.41	1.5	0.81	1.18	
HR 33212 J	3EE	72	68	101	94	105	6	9	2	1.5	27.6	0.40	1.5	0.82	1.56	
T7 FC060	7FC	78	72	111	94	119	4	11	2.5	2.5	41.4	0.82	0.73	0.40	2.03	
HR 30312 J	2FB	78	77	118	112	120	4	7.5	2.5	2	26.0	0.35	1.7	0.96	2.03	
HR 30312 DJ	7FB	84	74	118	103	125	4	11.5	2.5	2	40.3	0.83	0.73	0.40	1.98	
HR 31312 J	7FB	84	74	118	103	125	4	11.5	2.5	2	40.3	0.83	0.73	0.40	1.98	
HR 32312 J	2FD	81	74	118	107	120	4	11.5	2.5	2	31.4	0.35	1.7	0.96	2.96	
32312 C	—	81	74	116	102	125	4	13.5	2.5	2	39.9	0.58	1.0	0.57	2.86	
HR 32913 J	2BC	74	70	84	82	86	4	3	1	1	16.8	0.35	1.7	0.93	0.323	
HR 32013 XJ	4CC	76	71	91	90	97	4	5.5	1.5	1.5	22.4	0.46	1.3	0.72	0.646	
HR 33013 J	2CE	76	71	91	90	96	5	6	1.5	1.5	21.1	0.35	1.7	0.95	0.76	
HR 33113 J	3DE	76	73	101	96	106	6	7.5	1.5	1.5	26.0	0.39	1.5	0.85	1.32	
HR 30213 J	3EB	77	78	111	106	113	4	4.5	2	1.5	23.8	0.41	1.5	0.81	1.18	
HR 32213 J	3EC	77	75	111	104	115	4	5.5	2	1.5	27.1	0.41	1.5	0.81	1.55	
HR 33213 J	3EE	77	74	111	102	115	6	9	2	1.5	29.2	0.39	1.5	0.85	2.04	
HR 30313 J	2GB	83	83	128	121	130	4	8	2.5	2	27.9	0.35	1.7	0.96	2.51	
HR 30313 DJ	7GB	89	80	128	111	133	4	13	2.5	2	43.2	0.83	0.73	0.40	2.43	
HR 31313 J	7GB	89	80	128	111	133	4	13	2.5	2	43.2	0.83	0.73	0.40	2.43	
HR 32313 J	2GD	86	80	128	116	130	4	12	2.5	2	34.0	0.35	1.7	0.96	3.6	

Single-Row Tapered Roller Bearings

Bore Diameter 70 – 80 mm



Boundary Dimensions (mm)							Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		
					Cone	Cup					
d	D	T	B	C	r min.		C _r	C _{0r}	Grease	Oil	
70	100	20	20	16	1	1	70 000	113 000	3 200	4 500	
	110	25	25	19	1.5	1.5	104 000	158 000	3 200	4 300	
	110	31	31	25.5	1.5	1.5	127 000	204 000	3 000	4 300	
	120	37	37	29	2	1.5	177 000	262 000	3 000	4 000	
	125	26.25	24	21	2	1.5	132 000	163 000	2 800	4 000	
	125	33.25	31	27	2	1.5	157 000	205 000	2 800	4 000	
	125	41	41	32	2	1.5	209 000	299 000	2 800	4 000	
	140	39	35.5	27	3	3	178 000	235 000	2 400	3 400	
	150	38	35	30	3	2.5	227 000	268 000	2 400	3 400	
	150	38	35	25	3	2.5	192 000	229 000	2 200	3 200	
	150	38	35	25	3	2.5	192 000	229 000	2 200	3 200	
	150	54	51	42	3	2.5	300 000	390 000	2 600	3 400	
	150	54	51	42	3	2.5	280 000	390 000	2 400	3 400	
	75	105	20	20	16	1	1	72 500	120 000	3 200	4 300
115		25	25	19	1.5	1.5	109 000	171 000	3 000	4 000	
115		31	31	25.5	1.5	1.5	133 000	220 000	3 000	4 000	
125		37	37	29	2	2	182 000	275 000	2 800	3 800	
130		27.25	25	22	2	1.5	143 000	182 000	2 800	3 800	
130		33.25	31	27	2	1.5	165 000	219 000	2 800	3 800	
130		41	41	31	2	1.5	215 000	315 000	2 800	3 800	
160		40	37	31	3	2.5	253 000	300 000	2 400	3 200	
160		40	37	26	3	2.5	211 000	251 000	2 200	3 000	
160		40	37	26	3	2.5	211 000	251 000	2 200	3 000	
160		58	55	45	3	2.5	340 000	445 000	2 400	3 200	
160		58	55	43	3	2.5	310 000	420 000	2 200	3 200	
80		110	20	20	16	1	1	75 000	128 000	3 000	4 000
		125	29	29	22	1.5	1.5	140 000	222 000	2 800	3 600
	125	36	36	29.5	1.5	1.5	172 000	282 000	2 800	3 600	
	130	37	37	29	2	1.5	186 000	289 000	2 600	3 600	
	140	28.25	26	22	2.5	2	157 000	195 000	2 600	3 400	
	140	28.25	26	20	2.5	2	147 000	190 000	2 400	3 400	
	140	35.25	33	28	2.5	2	192 000	254 000	2 600	3 400	
	140	46	46	35	2.5	2	256 000	385 000	2 600	3 400	
	170	42.5	39	33	3	2.5	276 000	330 000	2 200	3 000	
	170	42.5	39	27	3	2.5	235 000	283 000	2 000	2 800	
	170	42.5	39	27	3	2.5	235 000	283 000	2 000	2 800	
	170	61.5	58	48	3	2.5	385 000	505 000	2 200	3 000	
	170	61.5	58	48	3	2.5	365 000	530 000	2 200	3 000	



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5 F_r + Y_0 F_a$$

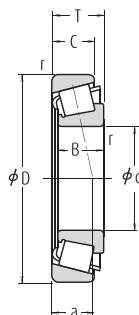
When $F_r > 0.5 F_r + Y_0 F_a$, use $P_0 = F_r$

The values of e , Y_1 and Y_0 are given in the table below.

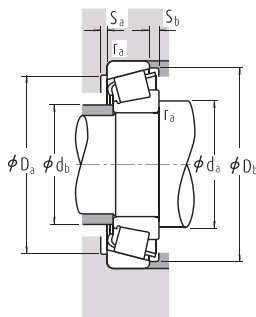
Bearing Numbers	ISO355 Dimension Series	Abutment and Fillet Dimensions (mm)										Eff. Load Centers (mm)	Constant	Axial Load Factors		Mass (kg)
		approx.	d _a min.	d _b max.	D _a min.	D _b min.	S _a min.	S _b min.	Cone r _a max.	Cup						
			a	e	Y ₁	Y ₀	approx.									
HR 32914 J	2BC	79	76	94	93	96	4	4	1	1	17.6	0.32	1.9	1.1	0.494	
HR 32014 XJ	4CC	81	77	101	98	105	5	6	1.5	1.5	23.7	0.43	1.4	0.76	0.869	
HR 33014 J	2CE	81	78	101	100	105	5	5.5	1.5	1.5	22.2	0.28	2.1	1.2	1.11	
HR 33114 J	3DE	82	79	111	104	115	6	8	2	1.5	27.9	0.38	1.6	0.87	1.71	
HR 30214 J	3EB	82	81	116	110	118	4	5	2	1.5	25.6	0.42	1.4	0.79	1.3	
HR 32214 J	3EC	82	80	116	108	119	4	6	2	1.5	28.6	0.42	1.4	0.79	1.66	
HR 32314 J	3EE	82	78	116	107	120	7	9	2	1.5	30.4	0.41	1.5	0.81	2.15	
T7 FC070	7FC	88	81	126	106	133	5	12	2.5	2.5	46.4	0.87	0.69	0.38	2.58	
HR 30314 J	2GB	88	89	138	132	140	4	8	2.5	2	29.7	0.35	1.7	0.96	3.03	
HR 30314 DJ	7GB	94	85	138	118	142	4	13	2.5	2	45.8	0.83	0.73	0.40	2.94	
HR 31314 J	7GB	94	85	138	118	142	4	13	2.5	2	45.8	0.83	0.73	0.40	2.94	
HR 32314 J	2GD	91	86	138	124	140	4	12	2.5	2	36.1	0.35	1.7	0.96	4.35	
HR 32314 CJ	5GD	91	84	138	115	141	4	12	2.5	2	43.3	0.55	1.1	0.60	4.47	
HR 32915 J	2BC	84	81	99	98	101	4	4	1	1	18.7	0.33	1.8	0.99	0.53	
HR 32015 XJ	4CC	86	82	106	103	110	5	6	1.5	1.5	25.1	0.46	1.3	0.72	0.925	
HR 33015 J	2CE	86	83	106	104	110	6	5.5	1.5	1.5	23.0	0.30	2.0	1.1	1.18	
HR 33115 J	3DE	87	83	115	109	120	6	8	2	2	29.2	0.40	1.5	0.83	1.8	
HR 30215 J	4DB	87	85	121	115	124	4	5	2	1.5	27.0	0.44	1.4	0.76	1.43	
HR 32215 J	4DC	87	84	121	113	125	4	6	2	1.5	29.8	0.44	1.4	0.76	1.72	
HR 32315 J	3EE	87	83	121	111	125	7	10	2	1.5	31.6	0.43	1.4	0.77	2.25	
HR 30315 J	2GB	93	95	148	141	149	4	9	2.5	2	31.8	0.35	1.7	0.96	3.63	
HR 30315 DJ	7GB	99	91	148	129	152	6	14	2.5	2	48.8	0.83	0.73	0.40	3.47	
HR 31315 J	7GB	99	91	148	129	152	6	14	2.5	2	48.8	0.83	0.73	0.40	3.47	
HR 32315 J	2GD	96	91	148	134	149	4	13	2.5	2	38.9	0.35	1.7	0.96	5.31	
32315 CA	—	96	90	148	124	153	4	15	2.5	2	47.7	0.58	1.0	0.57	5.3	
HR 32916 J	2BC	89	85	104	102	106	4	4	1	1	19.8	0.35	1.7	0.94	0.56	
HR 32016 XJ	3CC	91	89	116	112	120	6	7	1.5	1.5	26.9	0.42	1.4	0.78	1.32	
HR 33016 J	2CE	91	88	116	112	119	6	6.5	1.5	1.5	25.5	0.28	2.2	1.2	1.66	
HR 33116 J	3DE	92	88	121	113	126	6	8	2	1.5	30.4	0.42	1.4	0.79	1.88	
HR 30216 J	3EB	95	91	130	124	132	4	6	2	2	28.1	0.42	1.4	0.79	1.68	
30216 CA	—	95	92	130	122	133	4	8	2	2	33.8	0.58	1.0	0.57	1.66	
HR 32216 J	3EC	95	90	130	122	134	4	7	2	2	30.6	0.42	1.4	0.79	2.13	
HR 33216 J	3EE	95	89	130	119	135	7	11	2	2	34.8	0.43	1.4	0.78	2.93	
HR 30316 J	2GB	98	102	158	150	159	4	9.5	2.5	2	34.0	0.35	1.7	0.96	4.27	
HR 30316 DJ	7GB	104	97	158	136	159	6	15.5	2.5	2	51.8	0.83	0.73	0.40	4.07	
HR 31316 J	7GB	104	97	158	136	159	6	15.5	2.5	2	51.8	0.83	0.73	0.40	4.07	
HR 32316 J	2GD	101	98	158	143	159	4	13.5	2.5	2	41.4	0.35	1.7	0.96	6.35	
HR 32316 CJ	5GD	101	95	158	132	160	4	13.5	2.5	2	49.3	0.55	1.1	0.60	6.59	

Single-Row Tapered Roller Bearings

Bore Diameter 85 - 100 mm



Boundary Dimensions (mm)								Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)	
					Cone	Cup					
d	D	T	B	C	r min.			C _r	C _{0r}	Grease	Oil
85	120	23	23	18	1.5	1.5		93 500	157 000	2 800	3 800
	130	29	29	22	1.5	1.5		143 000	231 000	2 600	3 600
	130	36	36	29.5	1.5	1.5		180 000	305 000	2 600	3 600
	140	41	41	32	2.5	2		230 000	365 000	2 400	3 400
	150	30.5	28	24	2.5	2		184 000	233 000	2 400	3 200
	150	30.5	28	22	2.5	2		171 000	226 000	2 200	3 200
	150	38.5	36	30	2.5	2		210 000	277 000	2 200	3 200
	150	49	49	37	2.5	2		281 000	415 000	2 400	3 200
	180	44.5	41	34	4	3		310 000	375 000	2 000	2 800
	180	44.5	41	28	4	3		261 000	315 000	1 900	2 600
	180	44.5	41	28	4	3		261 000	315 000	1 900	2 600
	180	63.5	60	49	4	3		410 000	535 000	2 000	2 800
90	125	23	23	18	1.5	1.5		97 000	167 000	2 600	3 600
	140	32	32	24	2	1.5		170 000	273 000	2 400	3 200
	140	39	39	32.5	2	1.5		220 000	360 000	2 400	3 200
	150	45	45	35	2.5	2		259 000	405 000	2 400	3 200
	160	32.5	30	26	2.5	2		201 000	256 000	2 200	3 000
	160	42.5	40	34	2.5	2		256 000	350 000	2 200	3 000
	190	46.5	43	36	4	3		345 000	425 000	1 900	2 600
	190	46.5	43	30	4	3		264 000	315 000	1 800	2 400
	190	46.5	43	30	4	3		264 000	315 000	1 800	2 400
	190	67.5	64	53	4	3		450 000	590 000	2 000	2 600
	130	23	23	18	1.5	1.5		98 000	172 000	2 400	3 400
	145	32	32	24	2	1.5		173 000	283 000	2 400	3 200
95	145	39	39	32.5	2	1.5		231 000	390 000	2 400	3 200
	160	46	46	38	3	3		283 000	445 000	2 200	3 000
	170	34.5	32	27	3	2.5		223 000	286 000	2 200	2 800
	170	45.5	43	37	3	2.5		289 000	400 000	2 200	2 800
	200	49.5	45	38	4	3		370 000	455 000	1 900	2 600
	200	49.5	45	36	4	3		350 000	435 000	1 800	2 400
	200	49.5	45	32	4	3		310 000	375 000	1 700	2 400
	200	49.5	45	32	4	3		310 000	375 000	1 700	2 400
	200	71.5	67	55	4	3		525 000	710 000	1 900	2 600
	140	25	25	20	1.5	1.5		117 000	205 000	2 200	3 200
	145	24	22.5	17.5	3	3		113 000	163 000	2 200	3 000
	150	32	32	24	2	1.5		176 000	294 000	2 200	3 000
100	150	39	39	32.5	2	1.5		235 000	405 000	2 200	3 000
	165	52	52	40	2.5	2		315 000	515 000	2 000	2 800
	180	37	34	29	3	2.5		255 000	330 000	2 000	2 600
	180	49	46	39	3	2.5		325 000	450 000	2 000	2 600
	180	63	63	48	3	2.5		410 000	635 000	2 000	2 600
	215	51.5	47	39	4	3		425 000	525 000	1 700	2 400
	215	56.5	51	35	4	3		385 000	505 000	1 500	2 200
	215	77.5	73	60	4	3		565 000	755 000	1 700	2 400



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5 F_r + Y_0 F_a$$

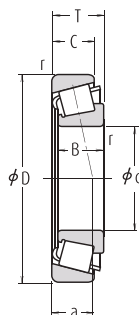
When $F_r > 0.5 F_r + Y_0 F_a$, use $P_0 = F_r$

The values of e , Y_1 and Y_0 are given in the table below.

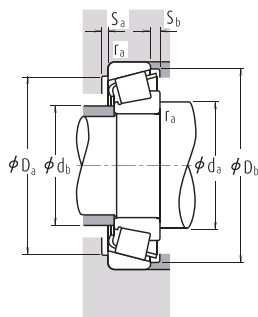
Bearing Numbers	ISO355 Dimension Series	Abutment and Fillet Dimensions (mm)									Eff. Load Centers (mm)	Constant	Axial Load Factors		Mass (kg)
		approx.	d _a min.	d _b max.	D _a max.	D _b min.	S _a min.	S _b min.	Cone Cup	r _a max.					
			a	e	Y ₁	Y ₀									
HR 32917 J	2BC	96	92	111	111	115	5	5	1.5	1.5	20.9	0.33	1.8	1.0	0.8
HR 32017 XJ	4CC	96	94	121	116	125	6	7	1.5	1.5	28.2	0.44	1.4	0.75	1.38
HR 33017 J	2CE	96	94	121	117	125	6	6.5	1.5	1.5	26.5	0.29	2.1	1.1	1.75
HR 33117 J	3DE	100	94	130	122	135	7	9	2	2	32.7	0.41	1.5	0.81	2.51
HR 30217 J	3EB	100	97	140	133	141	5	6.5	2	2	30.3	0.42	1.4	0.79	2.12
30217 CA	—	100	98	140	131	142	5	8.5	2	2	36.2	0.58	1.0	0.57	2.07
HR 32217 J	3EC	100	96	140	131	142	5	8.5	2	2	33.9	0.42	1.4	0.79	2.64
HR 33217 J	3EE	100	95	140	129	144	7	12	2	2	37.3	0.42	1.4	0.79	3.57
HR 30317 J	2GB	106	108	166	157	167	5	10.5	3	2.5	35.8	0.35	1.7	0.96	5.08
HR 30317 DJ	7GB	113	103	166	144	169	6	16.5	3	2.5	55.4	0.83	0.73	0.40	4.88
HR 31317 J	7GB	113	103	166	144	169	6	16.5	3	2.5	55.4	0.83	0.73	0.40	4.88
HR 32317 J	2GD	110	104	166	151	167	5	14.5	3	2.5	43.6	0.35	1.7	0.96	7.31
HR 32918 J	2BC	101	97	116	116	120	5	5	1.5	1.5	22.0	0.34	1.8	0.96	0.838
HR 32018 XJ	3CC	102	99	131	124	134	6	8	2	1.5	29.7	0.42	1.4	0.78	1.78
HR 33018 J	2CE	102	99	131	129	135	7	6.5	2	1.5	27.9	0.27	2.2	1.2	2.21
HR 33118 J	3DE	105	100	140	132	144	7	10	2	2	35.2	0.40	1.5	0.83	3.14
HR 30218 J	3FB	105	103	150	141	150	5	6.5	2	2	31.7	0.42	1.4	0.79	2.6
HR 32218 J	3FC	105	102	150	139	152	5	8.5	2	2	36.2	0.42	1.4	0.79	3.41
HR 30318 J	2GB	111	114	176	176	176	5	10.5	3	2.5	37.3	0.35	1.7	0.96	5.91
HR 30318 DJ	7GB	118	110	176	152	179	6	16.5	3	2.5	58.7	0.83	0.73	0.40	5.52
HR 31318 J	7GB	118	110	176	152	179	6	16.5	3	2.5	58.7	0.83	0.73	0.40	5.52
HR 32318 J	2GD	115	109	176	158	177	5	14.5	3	2.5	46.5	0.35	1.7	0.96	8.6
HR 32919 J	2BC	106	102	121	121	125	5	5	1.5	1.5	23.2	0.36	1.7	0.92	0.877
HR 32019 XJ	4CC	107	104	136	131	140	6	8	2	1.5	31.2	0.44	1.4	0.75	1.88
HR 33019 J	2CE	107	103	136	133	139	7	6.5	2	1.5	28.6	0.28	2.2	1.2	2.3
T2 E0095	2ED	113	108	146	141	152	6	8	2.5	2.5	34.5	0.34	1.8	0.97	3.74
HR 30219 J	3FB	113	110	158	150	159	5	7.5	2.5	2	33.7	0.42	1.4	0.79	3.13
HR 32219 J	3FC	113	108	158	147	161	5	8.5	2.5	2	39.3	0.42	1.4	0.79	4.22
HR 30319 J	2GB	116	119	186	172	184	5	11.5	3	2.5	38.6	0.35	1.7	0.96	6.92
30319 CA	—	116	119	186	168	188	5	13.5	3	2.5	48.6	0.54	1.1	0.61	6.71
HR 30319 DJ	7GB	123	115	186	158	187	6	17.5	3	2.5	61.9	0.83	0.73	0.40	6.64
HR 31319 J	7GB	123	115	186	158	187	6	17.5	3	2.5	61.9	0.83	0.73	0.40	6.64
HR 32319 J	2GD	120	115	186	167	186	5	16.5	3	2.5	48.6	0.35	1.7	0.96	10.4
HR 32920 J	2CC	111	109	132	132	134	5	5	1.5	1.5	24.2	0.33	1.8	1.0	1.18
T4 CB100	4CB	118	108	135	135	142	6	6.5	2.5	2.5	30.1	0.47	1.3	0.70	1.18
HR 32020 XJ	4CC	112	109	141	136	144	6	8	2	1.5	32.5	0.46	1.3	0.72	1.95
HR 33020 J	2CE	112	107	141	137	143	7	6.5	2	1.5	29.3	0.29	2.1	1.2	2.38
HR 31120 J	3EE	115	110	155	144	159	8	12	2	2	40.5	0.41	1.5	0.81	4.32
HR 30220 J	3FB	118	116	168	158	168	5	8	2.5	2	36.1	0.42	1.4	0.79	3.78
HR 32220 J	3FC	118	115	168	155	171	5	10	2.5	2	41.5	0.42	1.4	0.79	5.05
HR 33220 J	3FE	118	113	168	152	172	10	15	2.5	2	46.0	0.40	1.5	0.82	6.76
HR 30320 J	2GB	121	128	201	185	197	5	12.5	3	2.5	41.4	0.35	1.7	0.96	8.41
HR 31320 J	7GB	136	125	201	169	202	7	21.5	3	2.5	67.7	0.83	0.73	0.40	9.02
HR 32320 J	2GD	125	125	201	178	200	5	17.5	3	2.5	53.2	0.35	1.7	0.96	12.7

Single-Row Tapered Roller Bearings

Bore Diameter 105 – 130 mm



Boundary Dimensions (mm)							Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)	
d	D	T	B	C	Cone	Cup	C _r	C _{0r}	Grease	Oil
					r min.					
105	145	25	25	20	1.5	1.5	119 000	212 000	2 200	3 000
	160	35	35	26	2.5	2	204 000	340 000	2 000	2 800
	160	43	43	34	2.5	2	256 000	435 000	2 000	2 800
	190	39	36	30	3	2.5	280 000	365 000	1 900	2 600
	190	53	50	43	3	2.5	360 000	510 000	1 900	2 600
	225	53.5	49	41	4	3	455 000	565 000	1 600	2 200
	225	58	53	36	4	3	415 000	540 000	1 500	2 000
110	225	81.5	77	63	4	3	670 000	925 000	1 700	2 200
	150	25	25	20	1.5	1.5	123 000	224 000	2 200	2 800
	170	38	38	29	2.5	2	236 000	390 000	2 000	2 600
	170	47	47	37	2.5	2	294 000	515 000	2 000	2 600
	180	56	56	43	2.5	2	365 000	610 000	1 900	2 600
	200	41	38	32	3	2.5	315 000	420 000	1 800	2 400
	200	56	53	46	3	2.5	400 000	565 000	1 800	2 400
120	240	54.5	50	42	4	3	485 000	595 000	1 500	2 000
	240	63	57	38	4	3	470 000	605 000	1 400	1 900
	240	84.5	80	65	4	3	675 000	910 000	1 500	2 000
	165	29	29	23	1.5	1.5	161 000	291 000	1 900	2 600
	170	27	25	19.5	3	3	153 000	243 000	1 800	2 600
	180	38	38	29	2.5	2	242 000	405 000	1 800	2 400
	180	48	48	38	2.5	2	300 000	540 000	1 800	2 600
130	200	62	62	48	2.5	2	460 000	755 000	1 700	2 400
	215	43.5	40	34	3	2.5	335 000	450 000	1 600	2 200
	215	61.5	58	50	3	2.5	440 000	635 000	1 600	2 200
	260	59.5	55	46	4	3	535 000	655 000	1 400	1 900
	260	68	62	42	4	3	560 000	730 000	1 300	1 800
	260	90.5	86	69	4	3	770 000	1 060 000	1 400	1 900
	180	32	30	26	2	1.5	167 000	281 000	1 800	2 400
130	180	32	32	25	2	1.5	200 000	365 000	1 800	2 400
	185	29	27	21	3	3	183 000	296 000	1 700	2 400
	200	45	45	34	2.5	2	320 000	535 000	1 600	2 200
	200	55	55	43	2.5	2	395 000	715 000	1 700	2 200
	230	43.75	40	34	4	3	375 000	505 000	1 500	2 000
	230	67.75	64	54	4	3	530 000	790 000	1 500	2 000
	280	63.75	58	49	5	4	545 000	675 000	1 300	1 800
	280	63.75	58	49	5	4	650 000	820 000	1 300	1 800
	280	72	66	44	5	4	625 000	820 000	1 200	1 700
	280	98.75	93	78	5	4	830 000	1 150 000	1 300	1 800



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5 F_r + Y_0 F_a$$

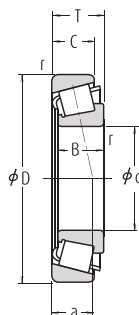
When $F_r > 0.5 F_r + Y_0 F_a$, use $P_0 = F_r$

The values of e , Y_1 and Y_0 are given in the table below.

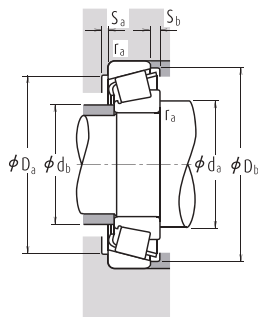
Bearing Numbers	ISO355 Dimension Series	Abutment and Fillet Dimensions (mm)								Eff. Load Centers (mm)	Constant	Axial Load Factors		Mass (kg)
		approx.	d_a min.	d_b max.	D_a min.	D_b min.	S_a min.	S_b min.	Cone Cup r_a max.			Y_1	Y_0	
HR 32921 J	2CC	116	114	137	137	140	5	5	1.5 1.5	25.3	0.34	1.8	0.96	1.23
HR 32021 XJ	4DC	120	115	150	144	154	6	9	2 2	34.3	0.44	1.4	0.74	2.48
HR 33021 J	2DE	120	115	150	146	153	7	9	2 2	30.9	0.28	2.1	1.2	3.03
HR 30221 J	3FB	123	123	178	166	177	6	9	2.5 2	38.1	0.42	1.4	0.79	4.51
HR 32221 J	3FC	123	120	178	162	180	5	10	2.5 2	44.8	0.42	1.4	0.79	6.25
HR 30321 J	2GB	126	133	211	195	206	6	12.5	3 2.5	43.3	0.35	1.7	0.96	9.52
HR 31321 J	7GB	141	130	211	177	211	7	22	3 2.5	70.2	0.83	0.73	0.40	10
HR 32321 J	2GO	130	129	211	186	209	6	18.5	3 2.5	55.2	0.35	1.7	0.96	14.9
HR 32922 J	2CC	121	119	142	142	145	5	5	1.5 1.5	26.5	0.36	1.7	0.93	1.29
HR 32022 XJ	4DC	125	121	160	153	163	7	9	2 2	35.9	0.43	1.4	0.77	3.09
HR 33022 J	2DE	125	121	160	153	161	7	10	2 2	33.7	0.29	2.1	1.2	3.84
HR 31122 J	3EE	125	121	170	156	174	9	13	2 2	44.1	0.42	1.4	0.79	5.54
HR 30222 J	3FB	128	129	188	175	187	6	9	2.5 2	40.2	0.42	1.4	0.79	5.28
HR 32222 J	3FC	128	127	188	171	190	5	10	2.5 2	47.2	0.42	1.4	0.79	7.35
HR 30322 J	2GB	131	143	226	208	220	6	12.5	3 2.5	45.1	0.35	1.7	0.96	11
HR 31322 J	7GB	146	136	226	191	224	7	25	3 2.5	74.8	0.83	0.73	0.40	12.3
HR 32322 J	2GO	135	139	226	201	222	6	19.5	3 2.5	58.6	0.35	1.7	0.96	17.1
HR 32924 J	2CC	131	129	156	155	160	6	6	1.5 1.5	29.2	0.35	1.7	0.95	1.8
T4 CB120	4CB	138	129	158	158	164	7	7.5	2.5 2.5	35.0	0.47	1.3	0.70	1.78
HR 32024 XJ	4DC	135	131	170	162	173	7	9	2 2	39.7	0.46	1.3	0.72	3.27
HR 33024 J	2DE	135	130	168	161	171	6	10	2 2	36.0	0.31	2.0	1.1	4.2
HR 31124 J	3FE	135	133	190	173	192	9	14	2 2	47.9	0.40	1.5	0.83	7.67
HR 30224 J	4FB	138	141	203	190	201	6	9.5	2.5 2	44.4	0.44	1.4	0.76	6.28
HR 32224 J	4FD	138	137	203	181	204	6	11.5	2.5 2	52.1	0.44	1.4	0.76	9.0
HR 30324 J	2GB	141	154	246	223	237	6	13.5	3 2.5	50.0	0.35	1.7	0.96	13.9
HR 31324 J	7GB	156	148	246	206	244	9	26	3 2.5	81.7	0.83	0.73	0.40	15.6
HR 32324 J	2GO	145	149	246	216	239	6	21.5	3 2.5	62.5	0.35	1.7	0.96	21.8
32926	—	142	141	171	168	175	6	6	2 1.5	34.7	0.36	1.7	0.92	2.25
HR 32926 J	2CC	142	140	170	168	173	6	7	2 1.5	31.4	0.34	1.8	0.97	2.46
T4 CB130	4CB	148	141	171	171	179	8	8	2.5 2.5	37.5	0.47	1.3	0.70	2.32
HR 32026 XJ	4EC	145	144	190	179	192	8	11	2 2	43.9	0.43	1.4	0.76	5.06
HR 33026 J	2EE	145	144	188	179	192	8	12	2 2	42.4	0.34	1.8	0.97	6.25
HR 30226 J	4FB	151	151	216	205	217	7	9.5	3 2.5	45.9	0.44	1.4	0.76	7.25
HR 32226 J	4FD	151	147	216	196	219	7	13.5	3 2.5	57.0	0.44	1.4	0.76	11.3
30326	—	157	168	262	239	255	8	14.5	4 3	53.9	0.36	1.7	0.92	16.6
HR 30326 J	2GB	157	166	262	241	255	8	14.5	4 3	52.8	0.35	1.7	0.96	17.2
HR 31326 J	7GB	174	159	262	220	261	9	28	4 3	87.1	0.83	0.73	0.40	18.8
32326	—	162	165	262	233	263	8	20.5	4 3	69.2	0.36	1.7	0.92	26.6

Single-Row Tapered Roller Bearings

Bore Diameter 140 – 170 mm



Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		
d	D	T	B	C	Cone	Cup	C _r	C _{0r}	Grease	Oil
					r min.					
140	190	32	32	25	2	1.5	206 000	390 000	1 700	2 200
	210	45	45	34	2.5	2	325 000	555 000	1 600	2 200
	210	56	56	44	2.5	2	410 000	770 000	1 600	2 200
	250	45.75	42	36	4	3	390 000	515 000	1 400	1 900
	250	71.75	68	58	4	3	610 000	915 000	1 400	1 900
	300	67.75	62	53	5	4	740 000	945 000	1 200	1 700
	300	77	70	47	5	4	695 000	955 000	1 100	1 500
	300	107.75	102	85	5	4	985 000	1 440 000	1 200	1 600
150	210	38	36	31	2.5	2	247 000	440 000	1 500	2 000
	210	38	38	30	2.5	2	281 000	520 000	1 500	2 000
	225	48	48	36	3	2.5	375 000	650 000	1 400	2 000
	225	59	59	46	3	2.5	435 000	805 000	1 400	2 000
	270	49	45	38	4	3	485 000	665 000	1 300	1 800
	270	77	73	60	4	3	705 000	1 080 000	1 300	1 800
	320	72	65	55	5	4	690 000	860 000	1 100	1 500
	320	72	65	55	5	4	825 000	1 060 000	1 100	1 600
	320	82	75	50	5	4	790 000	1 100 000	1 000	1 400
	320	114	108	90	5	4	1 120 000	1 700 000	1 100	1 500
160	220	38	38	30	2.5	2	296 000	570 000	1 400	1 900
	240	51	51	38	3	2.5	425 000	750 000	1 300	1 800
	290	52	48	40	4	3	530 000	730 000	1 200	1 600
	290	84	80	67	4	3	795 000	1 220 000	1 200	1 600
	340	75	68	58	5	4	765 000	960 000	1 000	1 400
	340	75	68	58	5	4	870 000	1 110 000	1 100	1 400
	340	75	68	48	5	4	675 000	875 000	950	1 300
	340	121	114	95	5	4	1 210 000	1 770 000	1 000	1 400
170	230	38	36	31	2.5	2.5	258 000	485 000	1 300	1 800
	230	38	38	30	2.5	2	294 000	560 000	1 400	1 800
	260	57	57	43	3	2.5	505 000	890 000	1 200	1 700
	310	57	52	43	5	4	630 000	885 000	1 100	1 500
	310	91	86	71	5	4	930 000	1 450 000	1 100	1 500
	360	80	72	62	5	4	845 000	1 080 000	950	1 300
	360	80	72	62	5	4	960 000	1 230 000	1 000	1 300
	360	80	72	50	5	4	760 000	1 040 000	900	1 200
360	127	120	100	5	4	1 370 000	2 050 000	1 000	1 300	



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5 F_r + Y_0 F_a$$

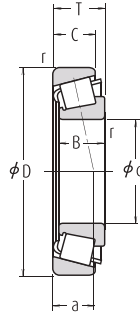
When $F_r > 0.5 F_r + Y_0 F_a$, use $P_0 = F_r$

The values of e , Y_1 and Y_0 are given in the table below.

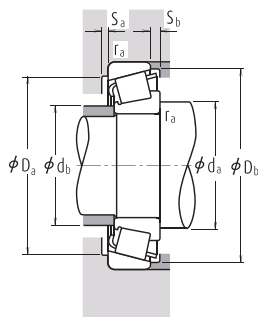
Bearing Numbers	ISO355 Dimension Series	Abutment and Fillet Dimensions (mm)									Eff. Load Centers (mm)	Constant	Axial Load Factors		Mass (kg)
								Cone	Cup	Y ₁			Y ₀		
		d _a min.	d _b max.	D _a max.	D _b min.	S _a min.	S _b min.	r _a max.							
approx.										a	e			approx.	
HR 32928 J	2CC	152	150	180	178	184	6	7	2	1.5	33.6	0.36	1.7	0.92	2.64
HR 32028 XJ	4DC	155	152	200	189	202	8	11	2	2	46.6	0.46	1.3	0.72	5.32
HR 33028 J	2DE	155	153	198	189	202	7	12	2	2	45.5	0.36	1.7	0.92	6.74
HR 30228 J	4FB	161	164	236	221	234	7	9.5	3	2.5	48.9	0.44	1.4	0.76	8.74
HR 32228 J	4FD	161	159	236	213	238	9	13.5	3	2.5	60.5	0.44	1.4	0.76	14.3
HR 30328 J	2GB	167	177	282	256	273	9	14.5	4	3	55.7	0.35	1.7	0.96	21.1
HR 31328 J	7GB	184	174	282	236	280	9	30	4	3	92.9	0.83	0.73	0.40	28.5
32328	—	172	177	282	246	281	9	22.5	4	3	76.4	0.37	1.6	0.88	33.9
32930	—	165	162	200	195	201	7	7	2	2	36.7	0.33	1.8	1.0	3.8
HR 32930 J	2DC	165	163	198	196	202	7	8	2	2	36.5	0.33	1.8	1.0	4.05
HR 32030 XJ	4EC	168	164	213	202	216	8	12	2.5	2	49.8	0.46	1.3	0.72	6.6
HR 33030 J	2EE	168	165	213	203	217	8	13	2.5	2	48.7	0.36	1.7	0.90	8.07
HR 30230 J	2GB	171	175	256	236	250	7	11	3	2.5	51.3	0.44	1.4	0.76	11.2
HR 32230 J	4GD	171	171	256	228	254	8	17	3	2.5	64.7	0.44	1.4	0.76	17.8
30330	—	177	193	302	275	292	8	17	4	3	61.4	0.36	1.7	0.92	24.2
HR 30330 J	2GB	177	190	302	276	292	8	17	4	3	60.0	0.35	1.7	0.96	25
HR 31330 J	7GB	194	187	302	253	300	9	32	4	3	99.3	0.83	0.73	0.40	28.5
32330	—	182	191	302	262	297	8	24	4	3	81.5	0.37	1.6	0.88	41.4
HR 32932 J	2DC	175	173	208	206	212	7	8	2	2	38.7	0.35	1.7	0.95	4.32
HR 32032 XJ	4EC	178	175	228	216	231	8	13	2.5	2	53.0	0.46	1.3	0.72	7.93
HR 30232 J	4GB	181	189	276	253	269	8	12	3	2.5	55.0	0.44	1.4	0.76	13.7
HR 32232 J	4GD	181	184	276	243	274	10	17	3	2.5	70.5	0.44	1.4	0.76	22.7
30332	—	187	205	322	293	311	10	17	4	3	64.6	0.36	1.7	0.92	28.4
HR 30332 J	2GB	187	201	322	293	310	10	17	4	3	62.9	0.35	1.7	0.96	29.2
30332 D	—	196	198	322	270	313	9	27	4	3	99.4	0.81	0.74	0.41	27.5
32332	—	192	202	322	281	319	10	26	4	3	87.1	0.37	1.6	0.88	48.3
32934	—	185	183	220	216	223	7	7	2	2	41.6	0.36	1.7	0.90	4.3
HR 32934 J	3DC	185	180	218	215	222	7	8	2	2	41.7	0.38	1.6	0.86	4.44
HR 32034 XJ	4EC	188	187	248	232	249	10	14	2.5	2	56.6	0.44	1.4	0.74	10.6
HR 30234 J	4GB	197	202	292	273	288	8	14	4	3	59.4	0.44	1.4	0.76	17.1
HR 32234 J	4GD	197	197	292	262	294	10	20	4	3	76.4	0.44	1.4	0.76	28
30334	—	197	221	342	312	332	10	18	4	3	70.1	0.37	1.6	0.90	33.5
HR 30334 J	2GB	197	214	342	310	329	10	18	4	3	67.3	0.35	1.7	0.96	34.5
30334 D	—	206	215	342	288	332	10	30	4	3	107.3	0.81	0.74	0.41	33.4
32334	—	202	213	342	297	337	10	27	4	3	91.3	0.37	1.6	0.88	57

Single-Row Tapered Roller Bearings

Bore Diameter 180 – 240 mm



Boundary Dimensions (mm)							Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)	
d	D	T	B	C	Cone	Cup	C _r	C _{0r}	Grease	Oil
					r min.					
180	250	45	45	34	2,5	2	350 000	685 000	1 300	1 700
	280	64	64	48	3	2,5	640 000	1 130 000	1 200	1 600
	320	57	52	43	5	4	650 000	930 000	1 100	1 400
	320	91	86	71	5	4	960 000	1 540 000	1 100	1 400
	380	83	75	64	5	4	935 000	1 230 000	900	1 300
	380	83	75	53	5	4	820 000	1 120 000	850	1 200
190	380	134	126	106	5	4	1 520 000	2 290 000	950	1 300
	260	45	45	34	2,5	2	365 000	715 000	1 200	1 600
	290	64	64	48	3	2,5	650 000	1 170 000	1 100	1 500
	340	60	55	46	5	4	715 000	1 020 000	1 000	1 300
	340	97	92	75	5	4	1 110 000	1 770 000	1 000	1 400
	400	86	78	65	6	5	1 010 000	1 340 000	850	1 200
200	400	140	132	109	6	5	1 660 000	2 580 000	850	1 200
	280	51	48	41	3	2,5	410 000	780 000	1 100	1 500
	280	51	51	39	3	2,5	480 000	935 000	1 100	1 500
	310	70	70	53	3	2,5	760 000	1 370 000	1 000	1 400
	360	64	58	48	5	4	795 000	1 120 000	950	1 300
	360	104	98	82	5	4	1 210 000	1 920 000	950	1 300
220	420	89	80	67	6	5	1 030 000	1 390 000	850	1 200
	420	89	80	56	6	5	965 000	1 330 000	750	1 000
	420	146	138	115	6	5	1 820 000	2 870 000	800	1 100
	300	51	51	39	3	2,5	490 000	990 000	1 000	1 400
	340	76	76	57	4	3	885 000	1 610 000	950	1 300
	400	72	65	54	5	4	810 000	1 150 000	850	1 100
240	400	114	108	90	5	4	1 340 000	2 210 000	850	1 100
	460	97	88	73	6	5	1 430 000	1 990 000	750	1 000
	460	154	145	122	6	5	2 020 000	3 200 000	750	1 000
	320	51	51	39	3	2,5	500 000	1 040 000	950	1 300
	360	76	76	57	4	3	920 000	1 730 000	850	1 200
	440	79	72	60	5	4	990 000	1 400 000	750	1 000
500	440	127	120	100	5	4	1 630 000	2 730 000	750	1 000
	500	105	95	80	6	5	1 660 000	2 340 000	670	950
	500	165	155	132	6	5	2 520 000	4 100 000	670	900



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5 F_r + Y_0 F_a$$

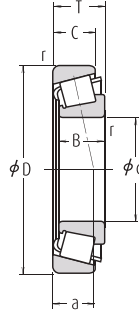
When $F_r > 0.5 F_r + Y_0 F_a$, use $P_0 = F_r$

The values of e , Y_1 and Y_0 are given in the table below.

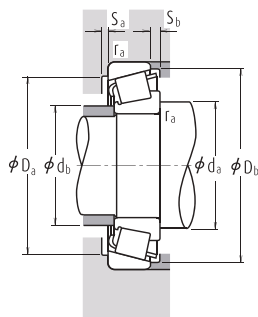
Bearing Numbers	ISO355 Dimension Series	Abutment and Fillet Dimensions (mm)									Eff. Load Centers (mm)	Constant	Axial Load Factors		Mass (kg)	
										Cone			Cup	Y ₁		Y ₀
		d _a min.	d _b max.	D _a max.	D _b min.	S _a min.	S _b min.	r _a max.								
approx.										a	e			approx.		
HR 32936 J	4DC	195	192	240	227	241	8	11	2	2	53.9	0.48	1.3	0.69	6.56	
HR 32036 XJ	3FD	198	199	268	248	267	10	16	2.5	2	60.4	0.42	1.4	0.78	14.3	
HR 30236 J	4GB	207	210	302	281	297	9	14	4	3	61.8	0.45	1.3	0.73	17.8	
HR 32236 J	4GD	207	205	302	270	303	10	20	4	3	78.9	0.45	1.3	0.73	29.8	
30336	—	207	233	362	324	345	10	19	4	3	72.5	0.36	1.7	0.92	39.3	
30336 D	—	216	229	362	304	352	10	30	4	3	113.1	0.81	0.74	0.41	38.5	
32336	—	212	225	362	310	353	10	28	4	3	96.6	0.37	1.6	0.88	66.8	
HR 32938 J	4DC	205	201	250	237	251	8	11	2	2	55.3	0.48	1.3	0.69	6.83	
HR 32038 XJ	4FD	208	209	278	258	279	10	16	2.5	2	63.4	0.44	1.4	0.75	14.9	
HR 30238 J	4GB	217	223	322	302	318	9	14	4	3	65.6	0.44	1.4	0.76	21.4	
HR 32238 J	4GD	217	216	322	290	323	10	22	4	3	80.5	0.44	1.4	0.76	35.2	
30338	—	223	248	378	346	366	11	21	5	4	76.1	0.36	1.7	0.92	46	
32338	—	229	243	378	332	375	11	31	5	4	102.7	0.37	1.6	0.88	78.9	
32940	—	218	217	268	256	269	9	10	2.5	2	53.4	0.37	1.6	0.88	9.26	
HR 32940 J	3EC	218	216	268	258	271	9	12	2.5	2	54.2	0.39	1.5	0.84	9.65	
HR 32040 XJ	4FD	218	221	298	277	297	11	17	2.5	2	67.4	0.43	1.4	0.77	18.9	
HR 30240 J	4GB	227	236	342	318	336	10	16	4	3	69.1	0.44	1.4	0.76	25.5	
HR 32240 J	3GD	227	230	342	305	340	11	22	4	3	85.1	0.41	1.5	0.81	42.6	
30340	—	233	253	398	346	368	11	22	5	4	81.4	0.37	1.6	0.88	52.3	
30340 D	—	244	253	398	336	385	11	33	5	4	122.9	0.81	0.74	0.41	49.6	
32340	—	239	253	398	346	392	11	31	5	4	106.7	0.37	1.6	0.88	90.9	
HR 32944 J	3EC	238	235	288	278	293	9	12	2.5	2	59.2	0.43	1.4	0.78	10.3	
HR 32044 XJ	4FD	241	244	326	303	326	12	19	3	2.5	73.6	0.43	1.4	0.77	24.4	
30244	—	247	267	382	350	367	11	18	4	3	74.7	0.40	1.5	0.82	33.6	
32244	—	247	260	382	340	377	12	24	4	3	93.0	0.40	1.5	0.82	57.4	
30344	—	253	283	438	390	414	12	24	5	4	85.4	0.36	1.7	0.92	72.4	
32344	—	259	274	438	372	421	12	32	5	4	114.9	0.37	1.6	0.88	114	
HR 32948 J	4EC	258	255	308	297	314	9	12	2.5	2	65.1	0.46	1.3	0.72	11.1	
HR 32048 XJ	4FD	261	262	346	321	346	12	19	3	2.5	79.1	0.46	1.3	0.72	26.2	
30248	—	267	288	422	384	408	11	19	4	3	85.1	0.44	1.4	0.74	45.2	
32248	—	267	285	422	374	416	12	27	4	3	102.5	0.40	1.5	0.82	78	
30348	—	273	308	478	422	447	12	25	5	4	92.8	0.36	1.7	0.92	92.6	
32348	—	279	301	478	410	464	12	33	5	4	123.2	0.37	1.6	0.88	145	

Single-Row Tapered Roller Bearings

Bore Diameter 260 – 440 mm



Boundary Dimensions (mm)							Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)	
d	D	T	B	C	Cone r min.	Cup	C _r	C _{0r}	Grease	Oil
260	360	63.5	63.5	48	3	2.5	730 000	1 450 000	850	1 100
	400	87	87	65	5	4	1 160 000	2 160 000	800	1 100
	480	89	80	67	6	5	1 190 000	1 700 000	670	900
	480	137	130	106	6	5	1 900 000	3 300 000	670	950
	540	113	102	85	6	6	1 870 000	2 640 000	630	850
280	540	176	165	136	6	6	2 910 000	4 800 000	630	850
	380	63.5	63.5	48	3	2.5	765 000	1 580 000	800	1 100
	420	87	87	65	5	4	1 180 000	2 240 000	710	1 000
	500	89	80	67	6	5	1 240 000	1 900 000	630	850
	500	137	130	106	6	5	1 950 000	3 450 000	630	850
300	580	187	175	145	6	6	3 300 000	5 400 000	560	800
	420	76	72	62	4	3	895 000	1 820 000	710	950
	420	76	76	57	4	3	1 010 000	2 100 000	710	950
	460	100	100	74	5	4	1 440 000	2 700 000	670	900
	540	96	85	71	6	5	1 440 000	2 100 000	600	800
320	540	149	140	115	6	5	2 220 000	3 700 000	600	800
	440	76	72	63	4	3	900 000	1 880 000	970	900
	440	76	76	57	4	3	1 040 000	2 220 000	670	900
	480	100	100	74	5	4	1 510 000	2 910 000	630	850
	580	104	92	75	6	5	1 640 000	2 420 000	530	750
340	580	159	150	125	6	5	2 860 000	5 050 000	530	750
	670	210	200	170	7.5	7.5	4 200 000	7 100 000	480	670
	460	76	72	63	4	3	910 000	1 940 000	630	850
	460	76	76	57	4	3	1 050 000	2 220 000	630	850
	520	112	106	92	6	5	1 650 000	3 400 000	560	750
360	480	76	72	62	4	3	945 000	2 100 000	600	800
	480	76	76	57	4	3	1 080 000	2 340 000	560	800
	540	112	106	92	6	5	1 680 000	3 500 000	530	750
380	520	87	82	71	5	4	1 210 000	2 550 000	560	750
400	540	87	82	71	5	4	1 250 000	2 700 000	530	710
	600	125	118	100	6	5	1 960 000	4 050 000	480	670
420	560	87	82	72	5	4	1 300 000	2 810 000	500	670
	620	125	118	100	6	5	2 000 000	4 200 000	450	630
440	650	130	122	104	6	6	2 230 000	4 600 000	430	600



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5 F_r + Y_0 F_a$$

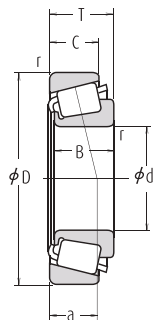
When $F_r > 0.5 F_r + Y_0 F_a$, use $P_0 = F_r$

The values of e , Y_1 and Y_0 are given in the table below.

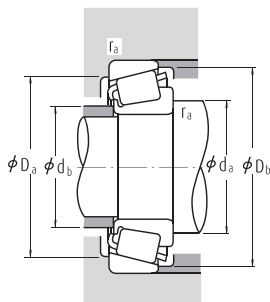
Bearing Numbers	ISO355 Dimension Series	Abutment and Fillet Dimensions (mm)										Eff. Load Centers (mm)	Constant	Axial Load Factors		Mass (kg)
										Cone	Cup			Y ₁	Y ₀	
		approx.	d _a min.	d _b max.	D _a max.	D _b min.	S _a min.	S _b min.	r _a max.							
HR 32952 J	3EC	278	278	348	333	347	11	15.5	2.5	2	69.8	0.41	1.5	0.81	18.6	
HR 32052 XJ	4FC	287	287	382	357	383	14	22	4	3	86.3	0.43	1.4	0.76	38.5	
30252	—	293	316	458	421	447	12	22	5	4	94.6	0.44	1.4	0.74	60.7	
32252	—	293	305	458	394	446	14	31	5	4	116.0	0.45	1.3	0.73	103	
30352	—	293	336	512	460	487	16	28	5	5	101.6	0.36	1.7	0.92	114	
32352	—	293	328	512	441	495	13	40	5	5	130.5	0.37	1.6	0.88	188	
HR 32956 J	4EC	298	297	368	352	368	12	15.5	2.5	2	75.3	0.43	1.4	0.76	20	
HR 32056 XJ	4FC	307	305	402	374	402	14	22	4	3	91.6	0.46	1.3	0.72	40.6	
30256	—	313	339	478	436	462	12	22	5	4	98.5	0.44	1.4	0.74	66.3	
32256	—	313	325	478	412	467	14	31	5	4	123.1	0.47	1.3	0.70	109	
32356	—	319	353	552	475	532	14	42	5	5	139.6	0.37	1.6	0.89	224	
32960	—	321	326	406	386	405	13	14	3	2.5	79.3	0.37	1.6	0.88	30.5	
HR 32960 J	3FD	321	324	406	387	405	13	19	3	2.5	79.9	0.39	1.5	0.84	31.4	
HR 32060 XJ	4GD	327	330	442	408	439	15	26	4	3	98.4	0.43	1.4	0.76	56.6	
30260	—	333	355	518	470	499	14	25	5	4	105.1	0.44	1.4	0.74	80.6	
32260	—	333	352	518	458	514	15	34	5	4	131.7	0.46	1.3	0.72	132	
32964	—	341	345	426	404	425	13	13	3	2.5	84.3	0.39	1.5	0.84	32	
HR 32964 J	3FD	341	344	426	406	426	13	19	3	2.5	85.0	0.42	1.4	0.79	33.3	
HR 32064 XJ	4GD	347	350	462	430	461	15	26	4	3	104.5	0.46	1.3	0.72	60	
30264	—	353	381	558	503	533	14	29	5	4	113.7	0.44	1.4	0.74	99.3	
32264	—	353	383	558	487	550	15	34	5	4	141.7	0.46	1.3	0.72	175	
32364	—	383	412	634	547	616	14	42	6	6	157.5	0.37	1.6	0.88	343	
32968	—	361	364	446	426	446	13	13	3	2.5	89.2	0.41	1.5	0.80	33.6	
HR 32968 J	4FD	361	362	446	427	446	13	19	3	2.5	91.0	0.44	1.4	0.75	34.3	
32068	—	373	386	498	464	496	3.5	22	5	4	104.5	0.37	1.6	0.89	83.7	
32972	—	381	386	466	445	465	14	14	3	2.5	91.4	0.40	1.5	0.82	35.8	
HR 32972 J	4FD	381	381	466	445	466	13	19	3	2.5	96.8	0.46	1.3	0.72	36.1	
32072	—	393	402	518	480	514	5.5	22	5	4	108.6	0.38	1.6	0.86	86.5	
32976	—	407	406	502	478	501	16	16	4	3	95.2	0.39	1.6	0.86	49.5	
32980	—	427	428	522	499	524	16	16	4	3	100.8	0.40	1.5	0.82	52.7	
32080	—	433	443	578	533	565	5	25	5	4	115.3	0.36	1.7	0.92	116	
32984	—	447	448	542	521	544	3.5	15	4	3	106.1	0.41	1.5	0.81	54.8	
32084	—	453	463	598	552	586	6.5	25	5	4	120.0	0.37	1.6	0.88	121	
32088	—	473	487	622	582	616	5	26	5	5	126.3	0.36	1.7	0.92	136	

Single-Row Tapered Roller Bearings (Inch Design)

Bore Diameter 12.000 – 22.225 mm



Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		
d	D	T	B	C	Cone	Cup	C _r	C _{0r}	Grease	Oil
					r min.					
12.000	31.991	10.008	10.785	7.938	0.8	1.3	10 300	8 900	13 000	18 000
12.700	34.988	10.998	10.988	8.730	1.3	1.3	11 700	10 900	12 000	16 000
15.000	34.988	10.998	10.988	8.730	0.8	1.3	11 700	10 900	12 000	16 000
15.875	34.988	10.998	10.998	8.712	1.3	1.3	13 800	13 400	11 000	15 000
	39.992	12.014	11.153	9.525	1.3	1.3	14 900	15 700	9 500	13 000
	41.275	14.288	14.681	11.112	1.3	2.0	21 300	19 900	10 000	13 000
	42.862	14.288	14.288	9.525	1.5	1.5	17 300	17 200	8 500	12 000
	42.862	16.670	16.670	13.495	1.5	1.5	26 900	26 300	9 500	13 000
	44.450	15.494	14.381	11.430	1.5	1.5	23 800	23 900	8 500	11 000
	49.225	19.845	21.539	14.288	0.8	1.3	37 500	37 000	8 500	11 000
16.000	47.000	21.000	21.000	16.000	1.0	2.0	35 000	36 500	9 000	12 000
16.993	39.992	12.014	11.153	9.525	0.8	1.3	14 900	15 700	9 500	13 000
17.455	36.525	11.112	11.112	7.938	1.5	1.5	11 600	11 000	10 000	14 000
17.462	39.878	13.843	14.605	10.668	1.3	1.3	22 500	22 500	10 000	13 000
	47.000	14.381	14.381	11.112	0.8	1.3	23 800	23 900	8 500	11 000
19.050	39.992	12.014	11.153	9.525	1.0	1.3	14 900	15 700	9 500	13 000
	45.237	15.494	16.637	12.065	1.3	1.3	28 500	28 900	9 000	12 000
	47.000	14.381	14.381	11.112	1.3	1.3	23 800	23 900	8 500	11 000
	49.225	18.034	19.050	14.288	1.3	1.3	37 500	37 000	8 500	11 000
	49.225	19.845	21.539	14.288	1.2	1.3	37 500	37 000	8 500	11 000
	49.225	21.209	19.050	17.462	1.3	1.5	37 500	37 000	8 500	11 000
	49.225	23.020	21.539	17.462	C1.5	3.5	37 500	37 000	8 500	11 000
	53.975	22.225	21.839	15.875	1.5	2.3	40 500	39 500	7 500	10 000
19.990	47.000	14.381	14.381	11.112	1.5	1.3	23 800	23 900	8 500	11 000
20.000	51.994	15.011	14.260	12.700	1.5	1.3	26 000	27 900	7 500	10 000
20.625	49.225	23.020	21.539	17.462	1.5	1.5	37 500	37 000	8 500	11 000
20.638	49.225	19.845	19.845	15.875	1.5	1.5	36 000	37 000	8 000	11 000
21.430	50.005	17.526	18.288	13.970	1.3	1.3	38 500	40 000	8 000	11 000
22.000	45.237	15.494	16.637	12.065	1.3	1.3	29 200	33 500	8 500	11 000
	45.975	15.494	16.637	12.065	1.3	1.3	29 200	33 500	8 500	11 000
22.225	50.005	13.495	14.260	9.525	1.3	1.0	26 000	27 900	7 500	10 000
	50.005	17.526	18.288	13.970	1.3	1.3	38 500	40 000	8 000	11 000
	52.388	19.368	20.168	14.288	1.5	1.5	40 500	43 000	7 500	10 000
	53.975	19.368	20.168	14.288	1.5	1.5	40 500	43 000	7 500	10 000
	56.896	19.368	19.837	15.875	1.3	1.3	38 000	40 500	7 100	9 500
	57.150	22.225	22.225	17.462	0.8	1.5	48 000	50 000	7 100	9 500



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5 F_r + Y_0 F_a$$

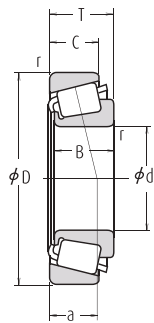
When $F_r > 0.5 F_r + Y_0 F_a$, use $P_0 = F_r$

The values of e , Y_1 and Y_0 are given in the table below.

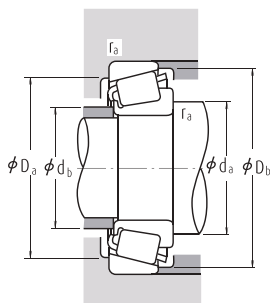
Bearing Numbers		Abutment and Fillet Dimensions (mm)						Eff. Load Centers (mm)	Constant	Axial Load Factors		Mass (kg)	
CONE	CUP	d_s	d_b	D_s	D_b	Cone Cup		a	e	Y_1	Y_0	approx.	
						r_a max.						CONE	CUP
*A 2047	A 2126	16.5	15.5	26	29	0.8	1.3	6.8	0.41	1.5	0.81	0.023	0.017
A 4050	A 4138	18.5	17	29	32	1.3	1.3	8.2	0.45	1.3	0.73	0.033	0.022
*A 4059	A 4138	19.5	19	29	32	0.8	1.3	8.2	0.45	1.3	0.73	0.029	0.022
L 21549	L 21511	21.5	19.5	29	32.5	1.3	1.3	7.7	0.32	1.9	1.0	0.031	0.018
A 6062	A 6157	22	20.5	34	37	1.3	1.3	10.3	0.53	1.1	0.63	0.044	0.031
03062	03162	21.5	20	34	37.5	1.3	2	9.1	0.31	1.9	1.1	0.061	0.035
11590	11520	24.5	22.5	34.5	39.5	1.5	1.5	13.0	0.70	0.85	0.47	0.061	0.040
17580	17520	23	21	36.5	39	1.5	1.5	10.6	0.33	1.8	1.0	0.075	0.048
05062	05175	23.5	21	38	42	1.5	1.5	11.2	0.36	1.7	0.93	0.081	0.039
09062	09195	22	21.5	42	44.5	0.8	1.3	10.7	0.27	2.3	1.2	0.139	0.065
*HM 81649	**HM 81610	27.5	23	37.5	43	1	2	14.9	0.55	1.1	0.60	0.115	0.082
A 6067	A 6157	22	21	34	37	0.8	1.3	10.3	0.53	1.1	0.63	0.042	0.031
A 5069	A 5144	23.5	21.5	30	33.5	1.5	1.5	8.9	0.49	1.2	0.68	0.030	0.020
† LM 11749	† LM 11710	23	21.5	34	37	1.3	1.3	8.7	0.29	2.1	1.2	0.055	0.028
05068	05185	23	22.5	40.5	42.5	0.8	1.3	10.1	0.36	1.7	0.93	0.082	0.047
A 6075	A 6157	24	23	34	37	1	1.3	10.3	0.53	1.1	0.63	0.037	0.031
† LM 11949	† LM 11910	25	23.5	39.5	41.5	1.3	1.3	9.5	0.30	2.0	1.1	0.081	0.044
05075	05185	25	23.5	40.5	42.5	1.3	1.3	10.1	0.36	1.7	0.93	0.077	0.047
09067	09195	25.5	24	42	44.5	1.3	1.3	10.7	0.27	2.3	1.2	0.115	0.065
09078	09195	25.5	24	42	44.5	1.2	1.3	10.7	0.27	2.3	1.2	0.124	0.065
09067	09196	25.5	24	41.5	44.5	1.3	1.5	13.8	0.27	2.3	1.2	0.115	0.085
09074	09194	26	24	39	44.5	1.5	3.5	13.8	0.27	2.3	1.2	0.124	0.082
21075	21212	31.5	26	43	50	1.5	2.3	16.3	0.59	1.0	0.56	0.156	0.097
05079	05185	26.5	24	40.5	42.5	1.5	1.3	10.1	0.36	1.7	0.93	0.073	0.047
07079	07204	27.5	27	45	48	1.5	1.3	12.1	0.40	1.5	0.82	0.105	0.061
09081	09196	27.5	25.5	41.5	44.5	1.5	1.5	13.8	0.27	2.3	1.2	0.115	0.085
12580	12520	28.5	26	42.5	45.5	1.5	1.5	12.9	0.32	1.9	1.0	0.114	0.067
† M 12649	† M 12610	27.5	25.5	44	46	1.3	1.3	10.9	0.28	2.2	1.2	0.115	0.059
*† LM 12749	† LM 12710	27.5	26	39.5	42.5	1.3	1.3	10.0	0.31	2.0	1.1	0.078	0.038
*† LM 12749	† LM 12711	27.5	26	40	42.5	1.3	1.3	10.0	0.31	2.0	1.1	0.078	0.043
07087	07196	28.5	27	44.5	47	1.3	1	10.6	0.40	1.5	0.82	0.097	0.035
† M 12648	† M 12610	28.5	26.5	44	46	1.3	1.3	10.9	0.28	2.2	1.2	0.111	0.059
1380	1328	29.5	27	45	48.5	1.5	1.5	11.3	0.29	2.1	1.1	0.137	0.067
1380	1329	29.5	27	46	49	1.5	1.5	11.3	0.29	2.1	1.1	0.137	0.082
1755	1729	29	27.5	49	51	1.3	1.3	12.2	0.31	2.0	1.1	0.152	0.102
1280	1220	29.5	29	49	52	0.8	1.5	15.1	0.35	1.7	0.95	0.183	0.106

Single-Row Tapered Roller Bearings (Inch Design)

Bore Diameter 22.606 – 28.575 mm



Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		
d	D	T	B	C	Cone Cup r min.	C _r	C _{0r}	Grease	Oil	
22.606	47.000	15.500	15.500	12.000	1.5	1.0	26 300	30 000	8 000	11 000
23.812	50.292	14.224	14.732	10.668	1.5	1.3	27 600	32 000	7 100	10 000
	56.896	19.368	19.837	15.875	0.8	1.3	38 000	40 500	7 100	9 500
24.000	55.000	25.000	25.000	21.000	2.0	2.0	49 500	55 000	7 100	9 500
24.981	51.994	15.011	14.260	12.700	1.5	1.3	26 000	27 900	7 500	10 000
	52.001	15.011	14.260	12.700	1.5	2.0	26 000	27 900	7 500	10 000
	62.000	16.002	16.566	14.288	1.5	1.5	37 000	39 500	6 300	8 500
	25.000	50.005	13.495	14.260	9.525	1.5	1.0	26 000	27 900	7 500
	51.994	15.011	14.260	12.700	1.5	1.3	26 000	27 900	7 500	10 000
	25.400	50.005	13.495	14.260	9.525	3.3	1.0	26 000	27 900	7 500
	50.005	13.495	14.260	9.525	1.0	1.0	26 000	27 900	7 500	10 000
	50.292	14.224	14.732	10.668	1.3	1.3	27 600	32 000	7 100	10 000
	57.150	17.462	17.462	13.495	1.3	1.5	39 500	45 500	6 700	9 000
	57.150	19.431	19.431	14.732	1.5	1.5	42 500	49 000	6 700	9 000
	59.530	23.368	23.114	18.288	0.8	1.5	50 000	58 000	6 300	9 000
	62.000	19.050	20.638	14.288	0.8	1.3	46 000	53 000	6 000	8 000
	63.500	20.638	20.638	15.875	3.5	1.5	46 000	53 000	6 000	8 000
	64.292	21.433	21.433	16.670	1.5	1.5	51 000	64 500	5 600	8 000
	65.088	22.225	21.463	15.875	1.5	1.5	45 000	47 500	5 600	8 000
	68.262	22.225	22.225	17.462	0.8	1.5	55 000	64 000	5 600	7 500
	72.233	25.400	25.400	19.842	0.8	2.3	63 500	83 500	5 000	7 100
	26.988	72.626	24.608	24.257	17.462	2.3	1.5	60 000	58 000	5 600
	50.292	14.224	14.732	10.668	3.5	1.3	27 600	32 000	7 100	10 000
	57.150	19.845	19.355	15.875	3.3	1.5	40 000	44 500	6 700	9 000
	60.325	19.842	17.462	15.875	3.5	1.5	39 500	45 500	6 700	9 000
	62.000	19.050	20.638	14.288	0.8	1.3	46 000	53 000	6 000	8 000
28.575	57.150	19.845	19.355	15.875	3.5	1.5	40 000	44 500	6 700	9 000
	59.131	15.875	16.764	11.811	spec.	1.3	34 500	41 500	6 300	8 500
	62.000	19.050	20.638	14.288	3.5	1.3	46 000	53 000	6 000	8 000
	62.000	19.050	20.638	14.288	0.8	1.3	46 000	53 000	6 000	8 000
	64.292	21.433	21.433	16.670	1.5	1.5	51 000	64 500	5 600	8 000
	68.262	22.225	22.225	17.462	0.8	1.5	55 000	64 000	5 600	7 500
	72.626	24.608	24.257	17.462	4.8	1.5	60 000	58 000	5 600	7 500
	72.626	24.608	24.257	17.462	1.5	1.5	60 000	58 000	5 600	7 500
	73.025	22.225	22.225	17.462	0.8	3.3	54 500	64 500	5 300	7 100



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5 F_r + Y_0 F_a$$

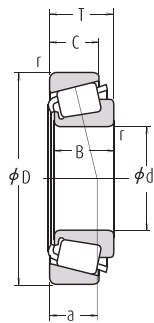
When $F_r > 0.5 F_r + Y_0 F_a$, use $P_0 = F_r$

The values of e , Y_1 and Y_0 are given in the table below.

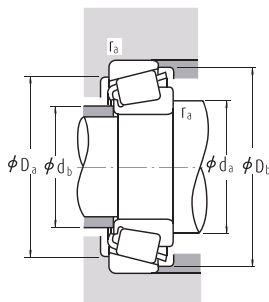
Bearing Numbers		Abutment and Fillet Dimensions (mm)						Eff. Load Centers (mm)	Constant	Axial Load Factors		Mass (kg)	
CONE	CUP	d_a	d_b	D_a	D_b	Cone Cup		a	e	Y_1	Y_0	approx.	
						f_a max.						CONE	CUP
LM 72849	LM 72810	29	27	40.5	44.5	1.5	1	12.2	0.47	1.3	0.70	0.086	0.046
† L 44640	† L 44610	30.5	28.5	44.5	47	1.5	1.3	10.9	0.37	1.6	0.88	0.097	0.039
1779	1729	29.5	28.5	49	51	0.8	1.3	12.2	0.31	2.0	1.1	0.143	0.102
▲ JHM 33449	▲ JHM 33410	35	30	47	52	2	2	15.8	0.35	1.7	0.93	0.181	0.107
07098	07204	31	29	45	48	1.5	1.3	12.1	0.40	1.5	0.82	0.085	0.061
07098	07205	31	29	44.5	48	1.5	2	12.1	0.40	1.5	0.82	0.085	0.061
17098	17244	33	30.5	54	57	1.5	1.5	12.8	0.38	1.6	0.86	0.165	0.091
07097	07196	31	29	44.5	47	1.5	1	10.6	0.40	1.5	0.82	0.085	0.035
07097	07204	31	29	45	48	1.5	1.3	12.1	0.40	1.5	0.82	0.085	0.061
07100 SA	07196	35	29.5	44.5	47	3.3	1	10.6	0.40	1.5	0.82	0.082	0.035
07100	07196	30.5	29.5	44.5	47	1	1	10.6	0.40	1.5	0.82	0.084	0.035
† L 44643	† L 44610	31.5	29.5	44.5	47	1.3	1.3	10.9	0.37	1.6	0.88	0.090	0.039
15578	15520	32.5	30.5	51	53	1.3	1.5	12.4	0.35	1.7	0.95	0.151	0.070
M 84548	M 84510	36	33	48.5	54	1.5	1.5	16.1	0.55	1.1	0.60	0.156	0.089
M 84249	M 84210	36	32.5	49.5	56	0.8	1.5	18.3	0.55	1.1	0.60	0.194	0.13
15101	15245	32.5	31.5	55	58	0.8	1.3	13.3	0.35	1.7	0.94	0.222	0.081
15100	15250 X	38	31.5	55	59	3.5	1.5	14.9	0.35	1.7	0.94	0.22	0.113
M 86643	M 86610	38	36.5	54	61	1.5	1.5	17.7	0.55	1.1	0.60	0.246	0.128
23100	23256	39	34.5	53	61	1.5	1.5	20.0	0.73	0.82	0.45	0.214	0.142
02473	02420	34.5	33.5	59	63	0.8	1.5	16.9	0.42	1.4	0.79	0.28	0.152
HM 88630	HM 88610	39.5	39.5	60	69	0.8	2.3	20.7	0.55	1.1	0.60	0.398	0.188
41100	41286	41	36.5	61	68	2.3	1.5	20.7	0.60	1.0	0.55	0.32	0.177
† L 44649	† L 44610	37.5	31	44.5	47	3.5	1.3	10.9	0.37	1.6	0.88	0.081	0.039
1997 X	1922	37.5	31.5	51	53.5	3.3	1.5	13.9	0.33	1.8	1.0	0.152	0.077
15580	15523	38.5	32	51	54	3.5	1.5	14.7	0.35	1.7	0.95	0.141	0.123
15106	15245	33.5	33	55	58	0.8	1.3	13.3	0.35	1.7	0.94	0.211	0.081
1988	1922	39.5	33.5	51	53.5	3.5	1.5	13.9	0.33	1.8	1.0	0.141	0.077
† LM 67043	† LM 67010	40	33.5	52	56	3.5	1.3	12.6	0.41	1.5	0.80	0.147	0.062
15112	15245	40	34	55	58	3.5	1.3	13.3	0.35	1.7	0.94	0.199	0.081
15113	15245	34.5	34	55	58	0.8	1.3	13.3	0.35	1.7	0.94	0.20	0.081
M 86647	M 86610	40	38	54	61	1.5	1.5	17.7	0.55	1.1	0.60	0.223	0.128
02474	02420	36.5	36	59	63	0.8	1.5	16.9	0.42	1.4	0.79	0.257	0.152
41125	41286	48	36.5	61	68	4.8	1.5	20.7	0.60	1.0	0.55	0.292	0.177
41126	41286	41.5	36.5	61	68	1.5	1.5	20.7	0.60	1.0	0.55	0.295	0.177
02872	02820	37.5	37	62	68	0.8	3.3	18.3	0.45	1.3	0.73	0.321	0.16

Single-Row Tapered Roller Bearings (Inch Design)

Bore Diameter 29.000 – 32.000 mm



Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)			
d	D	T	B	C	r min.	Cone	Cup	C _r	C _{0r}	Grease	Oil
29.000	50.292	14.224	14.732	10.668	3.5	1.3		26 800	34 000	7 100	9 500
29.367	66.421	23.812	25.433	19.050	3.5	1.3		65 000	73 000	6 000	8 000
30.000	62.000	16.002	16.566	14.288	1.5	1.5		37 000	39 500	6 300	8 500
	62.000	19.050	20.638	14.288	1.3	1.3		46 000	53 000	6 000	8 000
	63.500	20.638	20.638	15.875	1.3	1.3		46 000	53 000	6 000	8 000
	72.000	19.000	18.923	15.875	1.5	1.5		52 000	56 000	5 600	7 500
30.112	62.000	19.050	20.638	14.288	0.8	1.3		46 000	53 000	6 000	8 000
30.162	58.738	14.684	15.080	10.716	3.5	1.0		28 800	33 500	6 000	8 000
	64.292	21.433	21.433	16.670	1.5	1.5		51 000	64 500	5 600	8 000
	68.262	22.225	22.225	17.462	2.3	1.5		55 500	70 500	5 300	7 500
	69.850	23.812	25.357	19.050	2.3	1.3		71 000	84 000	5 600	7 500
	69.850	23.812	25.357	19.050	0.8	1.3		71 000	84 000	5 600	7 500
	76.200	24.608	24.074	16.670	1.5	C3.3		67 500	69 500	5 000	6 700
30.213	62.000	19.050	20.638	14.288	3.5	1.3		46 000	53 000	6 000	8 000
	62.000	19.050	20.638	14.288	0.8	1.3		46 000	53 000	6 000	8 000
	62.000	19.050	20.638	14.288	1.5	1.3		46 000	53 000	6 000	8 000
30.955	64.292	21.433	21.433	16.670	1.5	1.5		51 000	64 500	5 600	8 000
31.750	58.738	14.684	15.080	10.716	1.0	1.0		28 800	33 500	6 000	8 000
	59.131	15.875	16.764	11.811	spec.	1.3		34 500	41 500	6 300	8 500
	62.000	18.161	19.050	14.288	spec.	1.3		46 000	53 000	6 000	8 000
	62.000	19.050	20.638	14.288	0.8	1.3		46 000	53 000	6 000	8 000
	62.000	19.050	20.638	14.288	3.5	1.3		46 000	53 000	6 000	8 000
	63.500	20.638	20.638	15.875	0.8	1.3		46 000	53 000	6 000	8 000
	68.262	22.225	22.225	17.462	3.5	1.5		55 000	64 000	5 600	7 500
	68.262	22.225	22.225	17.462	1.5	1.5		55 500	70 500	5 300	7 500
	69.012	19.845	19.583	15.875	3.5	1.3		47 000	56 000	5 600	7 500
	69.012	26.982	26.721	15.875	4.3	3.3		47 000	56 000	5 600	7 500
	69.850	23.812	25.357	19.050	0.8	1.3		71 000	84 000	5 600	7 500
	69.850	23.812	25.357	19.050	3.5	1.3		71 000	84 000	5 600	7 500
	72.626	30.162	29.997	23.812	0.8	3.3		79 500	90 000	5 300	7 500
	73.025	29.370	27.783	23.020	1.3	3.3		74 000	100 000	5 000	7 100
	80.000	21.000	22.403	17.826	0.8	1.3		68 500	75 500	4 500	6 300
32.000	72.233	25.400	25.400	19.842	3.3	2.3		63 500	83 500	5 000	7 100



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5 F_r + Y_0 F_a$$

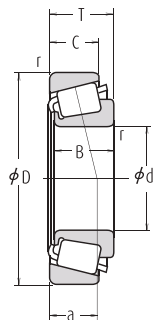
When $F_r > 0.5 F_r + Y_0 F_a$, use $P_0 = F_r$

The values of e , Y_1 and Y_0 are given in the table below.

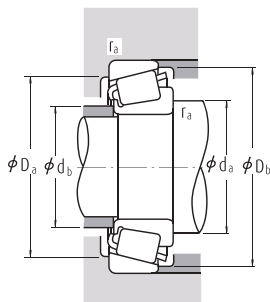
Bearing Numbers		Abutment and Fillet Dimensions (mm)						Eff. Load Centers (mm)	Constant	Axial Load Factors		Mass (kg)	
CONE	CUP	d_a	d_b	D_a	D_b	Cone Cup		a	e	Y_1	Y_0	approx.	
						f_a max.						CONE	CUP
† L 45449	† L 45410	39.5	33	44.5	48	3.5	1.3	10.8	0.37	1.6	0.89	0.079	0.036
2690	2631	41	35	58	60	3.5	1.3	14.3	0.25	2.4	1.3	0.242	0.165
* 17118	17244	37	34.5	54	57	1.5	1.5	12.8	0.38	1.6	0.86	0.136	0.091
* 15117	15245	36.5	35	55	58	1.3	1.3	13.3	0.35	1.7	0.94	0.189	0.081
* 15117	15250	36.5	35	56	59	1.3	1.3	14.9	0.35	1.7	0.94	0.189	0.113
* 26118	26283	38	36	62	65	1.5	1.5	14.8	0.36	1.7	0.92	0.225	0.163
15116	15245	36	35.5	55	58	0.8	1.3	13.3	0.35	1.7	0.94	0.189	0.081
08118	08231	41.5	35	52	55	3.5	1	13.3	0.47	1.3	0.70	0.12	0.057
M 86649	M 86610	41	38	54	61	1.5	1.5	17.7	0.55	1.1	0.60	0.211	0.128
M 88043	M 88010	43.5	39.5	58	65	2.3	1.5	19.1	0.55	1.1	0.60	0.263	0.146
2558	2523	40	36.5	61	64	2.3	1.3	14.5	0.27	2.2	1.2	0.297	0.169
2559	2523	37	36.5	61	64	0.8	1.3	14.5	0.27	2.2	1.2	0.298	0.169
43118	43300	45	42	64	73	1.5	3.3	22.9	0.67	0.90	0.49	0.383	0.146
15118	15245	41.5	35.5	55	58	3.5	1.3	13.3	0.35	1.7	0.94	0.186	0.081
15120	15245	36	35.5	55	58	0.8	1.3	13.3	0.35	1.7	0.94	0.188	0.081
15119	15245	37.5	35.5	55	58	1.5	1.3	13.3	0.35	1.7	0.94	0.188	0.081
M 86648 A	M 86610	42	38	54	61	1.5	1.5	17.7	0.55	1.1	0.60	0.205	0.128
08125	08231	37.5	36	52	55	1	1	13.3	0.47	1.3	0.70	0.113	0.057
† LM 67048	† LM 67010	42.5	36	52	56	3.5	1.3	12.6	0.41	1.5	0.80	0.127	0.062
15123	15245	42.5	36.5	55	58	3.5	1.3	13.3	0.35	1.7	0.94	0.165	0.081
15126	15245	37	36.5	55	58	0.8	1.3	13.3	0.35	1.7	0.94	0.176	0.081
15125	15245	42.5	36.5	55	58	3.5	1.3	13.3	0.35	1.7	0.94	0.174	0.081
15126	15250	37	36.5	56	59	0.8	1.3	14.9	0.35	1.7	0.94	0.176	0.113
02475	02420	44.5	38.5	59	63	3.5	1.5	16.9	0.42	1.4	0.79	0.229	0.152
M 88046	M 88010	43	40.5	58	65	1.5	1.5	19.1	0.55	1.1	0.60	0.25	0.146
14125 A	14276	44	37.5	60	63	3.5	1.3	15.3	0.38	1.6	0.86	0.219	0.135
14123 A	14274	41.5	37.5	59	63	4.3	3.3	15.1	0.38	1.6	0.87	0.289	0.132
2580	2523	38.5	37.5	61	64	0.8	1.3	14.5	0.27	2.2	1.2	0.282	0.169
2582	2523	44	37.5	61	64	3.5	1.3	14.5	0.27	2.2	1.2	0.28	0.169
3188	3120	39.5	39.5	61	67	0.8	3.3	19.6	0.33	1.8	0.99	0.368	0.225
HM 88542	HM 88510	45.5	42.5	59	70	1.3	3.3	23.5	0.55	1.1	0.60	0.379	0.242
346	332	40	39.5	73	75	0.8	1.3	14.6	0.27	2.2	1.2	0.419	0.146
*HM 88638	HM 88610	48.5	42.5	60	69	3.3	2.3	20.7	0.55	1.1	0.60	0.337	0.188

Single-Row Tapered Roller Bearings (Inch Design)

Bore Diameter 33.338 – 35.000 mm



Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		
						Cone	Cup			
d	D	T	B	C	r min.		C _r	C _{0r}	Grease	Oil
33.338	66.675	20.638	20.638	15.875	3.5	1.5	46 000	53 500	5 600	7 500
	68.262	22.225	22.225	17.462	0.8	1.5	55 500	70 500	5 300	7 500
	69.012	19.845	19.583	15.875	3.5	3.3	47 000	56 000	5 600	7 500
	69.012	19.845	19.583	15.875	0.8	1.3	47 000	56 000	5 600	7 500
	69.850	23.812	25.357	19.050	3.5	1.3	71 000	84 000	5 600	7 500
	72.000	19.000	18.923	15.875	3.5	1.5	52 000	56 000	5 600	7 500
	72.626	30.162	29.997	23.812	0.8	3.3	79 500	90 000	5 300	7 500
	73.025	29.370	27.783	23.020	0.8	3.3	74 000	100 000	5 000	7 100
	76.200	29.370	28.575	23.020	3.8	0.8	78 500	106 000	4 800	6 700
	76.200	29.370	28.575	23.020	0.8	3.3	78 500	106 000	4 800	6 700
34.925	79.375	25.400	24.074	17.462	3.5	1.5	67 500	69 500	5 000	6 700
	65.088	18.034	18.288	13.970	spec.	1.3	47 500	57 500	5 600	7 500
	65.088	20.320	18.288	16.256	spec.	1.3	47 500	57 500	5 600	7 500
	66.675	20.638	20.638	16.670	3.5	2.3	53 000	62 500	5 600	7 500
	69.012	19.845	19.583	15.875	3.5	1.3	47 000	56 000	5 600	7 500
	69.012	19.845	19.583	15.875	1.5	1.3	47 000	56 000	5 600	7 500
	72.233	25.400	25.400	19.842	2.3	2.3	63 500	83 500	5 000	7 100
	73.025	22.225	22.225	17.462	0.8	3.3	54 500	64 500	5 300	7 100
	73.025	22.225	23.812	17.462	3.5	3.3	63 500	77 000	5 300	7 100
	73.025	23.812	24.608	19.050	1.5	0.8	71 000	86 000	5 300	7 100
34.976	73.025	23.812	24.608	19.050	3.5	2.3	71 000	86 000	5 300	7 100
	76.200	29.370	28.575	23.020	0.8	0.8	78 500	106 000	4 800	6 700
	76.200	29.370	28.575	23.020	3.5	0.8	78 500	106 000	4 800	6 700
	76.200	29.370	28.575	23.020	3.5	3.3	78 500	106 000	4 800	6 700
	76.200	29.370	28.575	23.812	1.5	3.3	80 500	96 500	5 000	6 700
	79.375	29.370	29.771	23.812	3.5	3.3	88 000	106 000	4 800	6 700
	68.262	15.875	16.520	11.908	1.5	1.5	45 000	53 500	5 300	7 100
	72.085	22.385	19.583	18.415	1.3	2.3	47 000	56 000	5 600	7 500
	80.000	21.006	20.940	15.875	1.5	1.5	56 500	64 500	5 000	6 700
	59.131	15.875	16.764	11.938	spec.	1.3	35 000	47 000	6 000	8 000
35.000	59.975	15.875	16.764	11.938	spec.	1.3	35 000	47 000	6 000	8 000
	62.000	16.700	17.000	13.600	spec.	1.0	38 000	50 000	5 600	8 000
	62.000	16.700	17.000	13.600	spec.	1.5	38 000	50 000	5 600	8 000
	65.987	20.638	20.638	16.670	3.5	2.3	53 000	62 500	5 600	7 500
	73.025	26.988	26.975	22.225	3.5	0.8	75 500	88 500	5 300	7 500



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5 F_r + Y_0 F_a$$

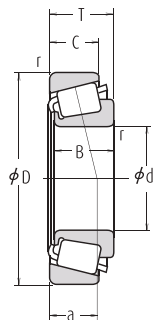
When $F_r > 0.5 F_r + Y_0 F_a$, use $P_0 = F_r$

The values of e , Y_1 and Y_0 are given in the table below.

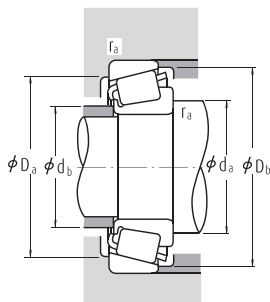
Bearing Numbers		Abutment and Fillet Dimensions (mm)						Eff. Load Centers (mm)	Constant	Axial Load Factors		Mass (kg)	
CONE	CUP	d_a	d_b	D_a	D_b	Cone Cup		a	e	Y_1	Y_0	approx.	
						f_a	max.					CONE	CUP
1680	1620	44.5	38.5	58	61	3.5	1.5	15.2	0.37	1.6	0.89	0.196	0.121
M 88048	M 88010	42.5	41	58	65	0.8	1.5	19.0	0.55	1.1	0.60	0.236	0.146
14130	14274	45	38.5	59	63	3.5	3.3	15.3	0.38	1.6	0.86	0.207	0.132
14131	14276	39.5	38.5	60	63	0.8	1.3	15.3	0.38	1.6	0.86	0.209	0.135
2585	2523	45	39	61	64	3.5	1.3	14.5	0.27	2.2	1.2	0.263	0.169
26131	26283	44.5	38.5	62	65	3.5	1.5	14.7	0.36	1.7	0.92	0.20	0.163
3197	3120	41.5	40.5	61	67	0.8	3.3	19.6	0.33	1.8	0.99	0.348	0.225
HM 88547	HM 88510	45.5	42.5	59	70	0.8	3.3	23.5	0.55	1.1	0.60	0.362	0.242
HM 89444	HM 89411	53	44.5	65	73	3.8	0.8	23.6	0.55	1.1	0.60	0.419	0.261
HM 89443	HM 89410	46.5	44.5	62	73	0.8	3.3	23.6	0.55	1.1	0.60	0.421	0.257
43131	43312	51	42	67	74	3.5	1.5	23.7	0.67	0.90	0.49	0.348	0.22
† LM 48548	† LM 48510	46	40	58	61	3.5	1.3	14.1	0.38	1.6	0.88	0.172	0.087
† LM 48548	† LM 48511	46	40	58	61	3.5	1.3	16.4	0.38	1.6	0.88	0.172	0.108
M 38549	M 38510	46.5	40	58	62	3.5	2.3	15.2	0.35	1.7	0.94	0.194	0.112
14138 A	14276	46	40	60	63	3.5	1.3	15.3	0.38	1.6	0.86	0.194	0.135
14137 A	14276	42	40	60	63	1.5	1.3	15.1	0.38	1.6	0.86	0.196	0.135
HM 88649	HM 88610	48.5	42.5	60	69	2.3	2.3	20.7	0.55	1.1	0.60	0.307	0.188
02878	02820	42.5	42	62	68	0.8	3.3	18.3	0.45	1.3	0.73	0.266	0.16
2877	2820	47	41.5	63	68	3.5	3.3	16.1	0.37	1.6	0.90	0.291	0.15
25877	25821	43	40.5	65	68	1.5	0.8	15.7	0.29	2.1	1.1	0.306	0.167
25878	25820	47	40.5	64	68	3.5	2.3	15.7	0.29	2.1	1.1	0.304	0.165
HM 89446 A	HM 89411	47.5	44.5	65	73	0.8	0.8	23.6	0.55	1.1	0.60	0.403	0.261
HM 89446	HM 89411	53	44.5	65	73	3.5	0.8	23.6	0.55	1.1	0.60	0.40	0.261
HM 89446	HM 89410	53	44.5	62	73	3.5	3.3	23.6	0.55	1.1	0.60	0.40	0.257
31594	31520	46	43.5	64	72	1.5	3.3	21.6	0.40	1.5	0.82	0.404	0.235
3478	3420	50	43.5	67	74	3.5	3.3	20.0	0.37	1.6	0.90	0.448	0.259
19138	19268	42.5	40.5	61	65	1.5	1.5	14.5	0.44	1.4	0.74	0.196	0.073
14139	14283	41.5	40	60	65	1.3	2.3	17.7	0.38	1.6	0.87	0.198	0.21
28138	28315	43.5	41	69	73	1.5	1.5	16.0	0.40	1.5	0.82	0.308	0.199
*† L 68149	† L 68110	45.5	39	52	56	3.5	1.3	13.2	0.42	1.4	0.79	0.117	0.056
*† L 68149	† L 68111	45.5	39	53	56	3.5	1.3	13.2	0.42	1.4	0.79	0.117	0.064
* LM 78349	** LM 78310	46	40	55	59	3.5	1	14.4	0.44	1.4	0.74	0.137	0.074
* LM 78349	** LM 78310 A	46	40	54	59	3.5	1.5	14.4	0.44	1.4	0.74	0.138	0.073
M 38547	M 38511	46	39.5	59	61	3.5	2.3	15.2	0.35	1.7	0.94	0.193	0.103
23691	23621	49	42	63	68	3.5	0.8	18.1	0.37	1.6	0.89	0.309	0.212

Single-Row Tapered Roller Bearings (Inch Design)

Bore Diameter 35.717 – 41.275 mm



Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		
d	D	T	B	C	Cone	Cup	C _r	C _{0r}	Grease	Oil
					r min.					
35.717	72.233	25.400	25.400	19.842	3.5	2.3	63 500	83 500	5 000	7 100
36.487	73.025	23.812	24.608	19.050	1.5	0.8	71 000	86 000	5 300	7 100
36.512	76.200	29.370	28.575	23.020	3.5	3.3	78 500	106 000	4 800	6 700
	79.375	29.370	29.771	23.812	0.8	3.3	88 000	106 000	4 800	6 700
	88.501	25.400	23.698	17.462	2.3	1.5	73 000	81 000	4 000	5 600
	93.662	31.750	31.750	26.195	1.5	3.3	110 000	142 000	4 000	5 600
38.000	63.000	17.000	17.000	13.500	spec.	1.3	38 500	52 000	5 600	7 500
38.100	63.500	12.700	11.908	9.525	1.5	0.8	24 100	30 500	5 300	7 100
	65.088	18.034	18.288	13.970	2.3	1.3	42 500	55 000	5 300	7 500
	65.088	18.034	18.288	13.970	spec.	1.3	42 500	55 000	5 300	7 500
	65.088	19.812	18.288	15.748	2.3	1.3	42 500	55 000	5 300	7 500
	68.262	15.875	16.520	11.908	1.5	1.5	45 000	53 500	5 300	7 100
	69.012	19.050	19.050	15.083	2.0	2.3	49 000	61 000	5 300	7 100
	69.012	19.050	19.050	15.083	3.5	0.8	49 000	61 000	5 300	7 100
	72.238	20.638	20.638	15.875	3.5	1.3	48 500	59 500	5 300	7 100
	73.025	23.812	25.654	19.050	3.5	0.8	73 500	91 000	5 000	6 700
	76.200	23.812	25.654	19.050	3.5	3.3	73 500	91 000	5 000	6 700
	76.200	23.812	25.654	19.050	3.5	0.8	73 500	91 000	5 000	6 700
	79.375	29.370	29.771	23.812	3.5	3.3	88 000	106 000	4 800	6 700
	80.035	24.608	23.698	18.512	0.8	1.5	69 000	84 500	4 500	6 300
	82.550	29.370	28.575	23.020	0.8	3.3	87 000	117 000	4 500	6 000
	88.501	25.400	23.698	17.462	2.3	1.5	73 000	81 000	4 000	5 600
	88.501	26.988	29.083	22.225	3.5	1.5	96 500	109 000	4 500	6 000
	95.250	30.958	28.301	20.638	1.5	0.8	87 500	97 000	3 600	5 300
39.688	73.025	25.654	22.098	21.336	0.8	2.3	62 500	80 000	5 000	6 700
	76.200	23.812	25.654	19.050	3.5	3.3	73 500	91 000	5 000	6 700
	80.167	29.370	30.391	23.812	0.8	3.3	92 500	108 000	4 800	6 300
40.000	80.000	21.000	22.403	17.826	3.5	1.3	68 500	75 500	4 500	6 300
	80.000	21.000	22.403	17.826	0.8	1.3	68 500	75 500	4 500	6 300
	88.501	25.400	23.698	17.462	2.3	1.5	73 000	81 000	4 000	5 600
41.000	68.000	17.500	18.000	13.500	spec.	1.5	43 500	58 000	5 300	7 100
41.275	73.025	16.667	17.462	12.700	3.5	1.5	44 500	54 000	4 800	6 700
	73.431	19.558	19.812	14.732	3.5	0.8	54 500	67 000	4 800	6 700
	73.431	21.430	19.812	16.604	3.5	0.8	54 500	67 000	4 800	6 700



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5 F_r + Y_0 F_a$$

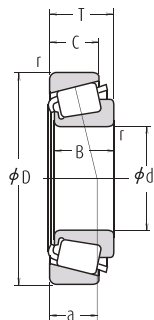
When $F_r > 0.5 F_r + Y_0 F_a$, use $P_0 = F_r$

The values of e , Y_1 and Y_0 are given in the table below.

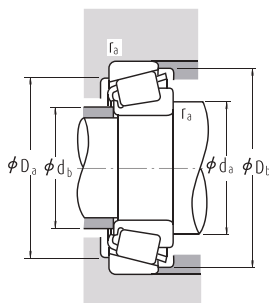
Bearing Numbers		Abutment and Fillet Dimensions (mm)						Eff. Load Centers (mm)	Constant	Axial Load Factors		Mass (kg)	
CONE	CUP	d_a	d_b	D_a	D_b	Cone Cup		a	e	Y_1	Y_0	approx.	
						f_a	max.					CONE	CUP
HM 88648	HM 88610	52	43	60	69	3.5	2.3	20.7	0.55	1.1	0.60	0.298	0.188
25880	25821	44	42	65	68	1.5	0.8	15.7	0.29	2.1	1.1	0.291	0.167
HM 89449	HM 89410	54	44.5	62	73	3.5	3.3	23.6	0.55	1.1	0.60	0.38	0.257
3479	3420	45.5	44.5	67	74	0.8	3.3	20.0	0.37	1.6	0.90	0.429	0.259
44143	44348	54	50	75	84	2.3	1.5	27.9	0.78	0.77	0.42	0.502	0.245
46143	46368	48.5	46.5	79	87	1.5	3.3	24.0	0.40	1.5	0.82	0.765	0.405
▲ JL 69349	▲ JL 69310	49	42.5	56	60	3.5	1.3	14.6	0.42	1.4	0.79	0.132	0.071
13889	13830	45	42.5	59	60	1.5	0.8	11.9	0.35	1.7	0.95	0.109	0.046
LM 29749	LM 29710	46	42.5	59	62	2.3	1.3	13.7	0.33	1.8	0.99	0.16	0.079
LM 29748	LM 29710	49	42.5	59	62	3.5	1.3	13.7	0.33	1.8	0.99	0.158	0.079
LM 29749	LM 29711	46	42.5	58	62	2.3	1.3	15.5	0.33	1.8	0.99	0.16	0.094
19150	19268	45	43	61	65	1.5	1.5	14.5	0.44	1.4	0.74	0.173	0.073
13687	13621	46.5	43	61	65	2	2.3	15.8	0.40	1.5	0.82	0.193	0.104
13685	13620	49.5	43	62	65	3.5	0.8	15.8	0.40	1.5	0.82	0.191	0.105
16150	16284	49.5	43	63	67	3.5	1.3	16.0	0.40	1.5	0.82	0.212	0.146
2788	2735 X	50	43.5	66	69	3.5	0.8	15.9	0.30	2.0	1.1	0.312	0.135
2788	2720	50	43.5	66	70	3.5	3.3	15.9	0.30	2.0	1.1	0.312	0.187
2788	2729	50	43.5	68	70	3.5	0.8	15.9	0.30	2.0	1.1	0.312	0.191
3490	3420	52	45.5	67	74	3.5	3.3	20.0	0.37	1.6	0.90	0.404	0.259
27880	27820	48	47	68	75	0.8	1.5	21.5	0.56	1.1	0.59	0.362	0.209
HM 801346	HM 801310	51	49	68	78	0.8	3.3	24.2	0.55	1.1	0.60	0.483	0.282
44150	44348	55	51	75	84	2.3	1.5	27.9	0.78	0.77	0.42	0.484	0.245
418	414	51	44.5	77	80	3.5	1.5	17.1	0.26	2.3	1.3	0.50	0.329
53150	53375	55	53	81	89	1.5	0.8	30.7	0.74	0.81	0.45	0.665	0.365
M 201047	M 201011	45.5	48	64	69	0.8	2.3	19.7	0.33	1.8	0.99	0.266	0.169
2789	2720	52	45	66	70	3.5	3.3	15.9	0.30	2.0	1.1	0.292	0.187
3386	3320	46.5	45.5	70	75	0.8	3.3	18.4	0.27	2.2	1.2	0.442	0.217
344	332	52	45.5	73	75	3.5	1.3	14.5	0.27	2.2	1.2	0.338	0.146
344 A	332	46	45.5	73	75	0.8	1.3	14.5	0.27	2.2	1.2	0.339	0.146
44157	44348	56	51	75	84	2.3	1.5	27.9	0.78	0.77	0.42	0.463	0.245
* LM 300849	** LM 300811	52	45	61	65	3.5	1.5	13.9	0.35	1.7	0.95	0.16	0.082
18590	18520	53	46	66	69	3.5	1.5	14.0	0.35	1.7	0.94	0.199	0.086
LM 501349	LM 501310	53	46.5	67	70	3.5	0.8	16.3	0.40	1.5	0.83	0.226	0.108
LM 501349	LM 501314	53	46.5	66	70	3.5	0.8	18.2	0.40	1.5	0.83	0.226	0.129

Single-Row Tapered Roller Bearings (Inch Design)

Bore Diameter 41.275 – 44.450 mm



Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		
d	D	T	B	C	Cone	Cup	C _r	C _{0r}	Grease	Oil
					r min.					
41.275	76.200	18.009	17.384	14.288	1.5	1.5	42 500	51 000	4 500	6 300
	76.200	22.225	23.020	17.462	3.5	0.8	66 000	82 000	4 800	6 700
	76.200	25.400	23.020	20.638	3.5	2.3	66 000	82 000	4 800	6 700
	79.375	23.812	25.400	19.050	3.5	0.8	77 000	98 500	4 800	6 300
	80.000	21.000	22.403	17.826	0.8	1.3	68 500	75 500	4 500	6 300
	80.000	21.000	22.403	17.826	3.5	1.3	68 500	75 500	4 500	6 300
	80.167	25.400	25.400	20.638	3.5	3.3	77 000	98 500	4 800	6 300
	82.550	26.543	25.654	20.193	3.5	3.3	78 500	102 000	4 300	6 000
	85.725	30.162	30.162	23.812	3.5	3.3	91 000	115 000	4 300	6 000
	87.312	30.162	30.886	23.812	0.8	3.3	96 000	120 000	4 300	6 000
	88.501	25.400	23.698	17.462	2.3	1.5	69 000	75 500	4 000	5 600
	88.900	30.162	29.370	23.020	3.5	3.3	96 500	129 000	4 000	5 600
	88.900	30.162	29.370	23.020	0.8	3.3	96 500	129 000	4 000	5 600
	90.488	39.688	40.386	33.338	3.5	3.3	139 000	180 000	4 300	5 600
	93.662	31.750	31.750	26.195	0.8	3.3	110 000	142 000	4 000	5 600
	95.250	30.162	29.370	23.020	3.5	3.3	106 000	143 000	3 800	5 300
42.862	98.425	30.958	28.301	20.638	1.5	0.8	87 500	97 000	3 600	5 300
	76.992	17.462	17.145	11.908	1.5	1.5	44 000	54 000	4 500	6 000
	82.550	19.842	19.837	15.080	2.3	1.5	58 500	69 000	4 500	6 300
	82.931	23.812	25.400	19.050	2.3	0.8	76 500	99 000	4 500	6 000
42.875	82.931	26.988	25.400	22.225	2.3	2.3	76 500	99 000	4 500	6 000
	76.200	25.400	25.400	20.638	3.5	1.5	77 000	98 500	4 800	6 300
	80.000	21.000	22.403	17.826	3.5	1.3	68 500	75 500	4 500	6 300
	82.931	26.988	25.400	22.225	3.5	2.3	76 500	99 000	4 500	6 000
	83.058	23.812	25.400	19.050	3.5	3.3	76 500	99 000	4 500	6 000
	74.988	19.368	19.837	14.288	1.5	1.3	52 500	68 000	4 800	6 300
43.000	80.962	19.050	17.462	14.288	0.3	1.5	45 000	57 000	4 300	6 000
	82.931	23.812	25.400	19.050	3.5	0.8	76 500	99 000	4 500	6 000
44.450	83.058	23.812	25.400	19.050	3.5	3.3	76 500	99 000	4 500	6 000
	87.312	30.162	30.886	23.812	3.5	3.3	96 000	120 000	4 300	6 000
	88.900	30.162	29.370	23.020	3.5	3.3	96 500	129 000	4 000	5 600
	93.264	30.162	30.302	23.812	3.5	3.2	103 000	136 000	3 800	5 300
	93.662	31.750	31.750	25.400	0.8	3.3	120 000	147 000	4 000	5 600
	93.662	31.750	31.750	25.400	3.5	3.3	120 000	147 000	4 000	5 600
	93.662	31.750	31.750	26.195	3.5	3.3	110 000	142 000	4 000	5 600
	95.250	27.783	29.901	22.225	3.5	2.3	106 000	126 000	4 300	5 600



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5 F_r + Y_0 F_a$$

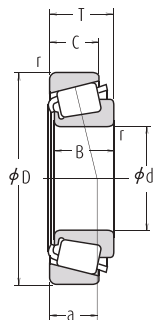
When $F_r > 0.5 F_r + Y_0 F_a$, use $P_0 = F_r$

The values of e , Y_1 and Y_0 are given in the table below.

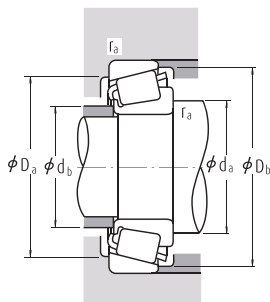
Bearing Numbers		Abutment and Fillet Dimensions (mm)						Eff. Load Centers (mm)	Constant	Axial Load Factors		Mass (kg)	
CONE	CUP	d_a	d_b	D_a	D_b	Cone Cup		a	e	Y_1	Y_0	approx.	
						f_a	max.					CONE	CUP
11162	11300	49	46.5	67	71	1.5	1.5	17.4	0.49	1.2	0.68	0.212	0.129
24780	24720	53	47.5	68	72	3.5	0.8	17.0	0.39	1.5	0.84	0.279	0.15
24780	24721	54	47	66	72	3.5	2.3	20.2	0.39	1.5	0.84	0.279	0.189
26882	26822	54	47	71	74	3.5	0.8	16.4	0.32	1.9	1.0	0.349	0.186
336	332	47	46	73	75	0.8	1.3	14.5	0.27	2.2	1.2	0.325	0.146
342	332	53	46	73	75	3.5	1.3	14.5	0.27	2.2	1.2	0.323	0.146
26882	26820	54	47	69	74	3.5	3.3	18.0	0.32	1.9	1.0	0.349	0.219
M 802048	M 802011	57	51	70	79	3.5	3.3	22.9	0.55	1.1	0.60	0.406	0.23
3877	3820	57	50	73	81	3.5	3.3	21.8	0.40	1.5	0.82	0.506	0.285
3576	3525	49	48	75	81	0.8	3.3	19.5	0.31	2.0	1.1	0.532	0.304
44162	44348	57	51	75	84	2.3	1.5	28.0	0.78	0.77	0.42	0.447	0.245
HM 803146	HM 803110	60	53	74	85	3.5	3.3	25.6	0.55	1.1	0.60	0.579	0.322
HM 803145	HM 803110	54	53	74	85	0.8	3.3	25.6	0.55	1.1	0.60	0.582	0.322
4388	4335	57	51	77	85	3.5	3.3	24.6	0.28	2.1	1.2	0.789	0.459
46162	46368	52	51	79	87	0.8	3.3	24.0	0.40	1.5	0.82	0.695	0.405
HM 804840	HM 804810	61	54	81	91	3.5	3.3	26.1	0.55	1.1	0.60	0.726	0.354
53162	53387	57	53	82	91	1.5	0.8	30.7	0.74	0.81	0.45	0.618	0.442
12168	12303	51	48.5	68	73	1.5	1.5	17.7	0.51	1.2	0.65	0.228	0.098
22168	22325	52	48.5	73	76	2.3	1.5	17.6	0.43	1.4	0.77	0.283	0.176
25578	25520	53	49.5	74	77	2.3	0.8	17.6	0.33	1.8	0.99	0.383	0.203
25578	25523	53	49.5	72	77	2.3	2.3	20.8	0.33	1.8	0.99	0.383	0.248
26884	26823	55	48.5	69	73	3.5	1.5	18.0	0.32	1.9	1.0	0.337	0.136
342 S	332	54	47.5	73	75	3.5	1.3	14.5	0.27	2.2	1.2	0.305	0.146
25577	25523	55	49	72	77	3.5	2.3	20.8	0.33	1.8	0.99	0.381	0.248
25577	25521	55	49	72	77	3.5	3.3	17.6	0.33	1.8	0.99	0.381	0.201
* 16986	16929	51	48.5	67	71	1.5	1.3	17.2	0.44	1.4	0.74	0.24	0.106
13175	13318	50	50	72	76	0.3	1.5	20.1	0.53	1.1	0.63	0.252	0.144
25580	25520	57	50	74	77	3.5	0.8	17.6	0.33	1.8	0.99	0.359	0.203
25580	25521	56	51	72	78	3.5	3.3	17.6	0.33	1.8	0.99	0.359	0.201
3578	3525	57	51	75	81	3.5	3.3	19.5	0.31	2.0	1.1	0.477	0.304
HM 803149	HM 803110	62	53	74	85	3.5	3.3	25.6	0.55	1.1	0.60	0.528	0.322
3782	3720	58	52	82	88	3.5	3.2	22.4	0.34	1.8	0.97	0.678	0.292
49176	49368	54	53	82	87	0.8	3.3	21.6	0.36	1.7	0.92	0.648	0.371
49175	49368	59	53	82	87	3.5	3.3	21.6	0.36	1.7	0.92	0.645	0.371
46176	46368	60	54	79	87	3.5	3.3	24.0	0.40	1.5	0.82	0.635	0.405
438	432	57	51	83	87	3.5	2.3	18.6	0.28	2.1	1.2	0.555	0.384

Single-Row Tapered Roller Bearings (Inch Design)

Bore Diameter 44.450 – 47.625 mm



Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)			
d	D	T	B	C	Cone r min.	Cup	C _r	C _{0r}	Grease	Oil	
44.450	95.250	30.162	29.370	23.020	3.5	3.3	106 000	143 000	3 800	5 300	
	95.250	30.958	28.301	20.638	3.5	0.8	87 500	97 000	3 600	5 300	
	95.250	30.958	28.301	20.638	1.3	0.8	87 500	97 000	3 600	5 300	
	95.250	30.958	28.301	20.638	2.0	0.8	87 500	97 000	3 600	5 300	
	95.250	30.958	28.301	22.225	1.3	0.8	100 000	122 000	3 600	5 000	
	95.250	30.958	28.575	22.225	3.5	0.8	100 000	122 000	3 600	5 000	
	98.425	30.958	28.301	20.638	3.5	0.8	87 500	97 000	3 600	5 300	
	103.188	43.658	44.475	36.512	1.3	3.3	178 000	238 000	3 800	5 000	
	104.775	36.512	36.512	28.575	3.5	3.3	139 000	192 000	3 400	4 800	
	107.950	27.783	29.317	22.225	3.5	0.8	116 000	149 000	3 400	4 800	
44.983	111.125	30.162	26.909	20.638	3.5	3.3	92 500	110 000	3 200	4 300	
	114.300	44.450	44.450	34.925	3.5	3.3	172 000	205 000	3 600	4 800	
	82.931	23.812	25.400	19.050	1.5	0.8	76 500	99 000	4 500	6 000	
	45.000	93.264	20.638	22.225	15.082	0.8	1.3	77 000	93 000	3 800	5 300
	45.230	79.985	19.842	20.638	15.080	2.0	1.3	62 000	78 500	4 500	6 000
	45.242	73.431	19.558	19.812	15.748	3.5	0.8	53 500	75 000	4 800	6 300
	77.788	19.842	19.842	15.080	3.5	0.8	56 000	71 000	4 500	6 300	
	77.788	21.430	19.842	16.667	3.5	0.8	56 000	71 000	4 500	6 300	
	45.618	82.931	23.812	25.400	19.050	3.5	0.8	76 500	99 000	4 500	6 000
	82.931	26.988	25.400	22.225	3.5	2.3	76 500	99 000	4 500	6 000	
46.000	75.000	18.000	18.000	14.000	2.3	1.5	51 000	71 500	4 500	6 300	
46.038	79.375	17.462	17.462	13.495	2.8	1.5	46 000	57 000	4 500	6 000	
47.625	80.962	19.050	17.462	14.288	0.8	1.5	45 000	57 000	4 300	6 000	
	85.000	20.638	21.692	17.462	2.3	1.3	71 500	81 500	4 300	6 000	
	85.000	25.400	25.608	20.638	3.5	1.3	79 500	105 000	4 300	6 000	
	95.250	27.783	29.901	22.225	3.5	0.8	106 000	126 000	4 300	5 600	
	88.900	20.638	22.225	16.513	3.5	1.3	73 000	85 000	4 000	5 600	
	88.900	25.400	25.400	19.050	3.5	3.3	86 000	107 000	4 000	5 600	
	95.250	30.162	29.370	23.020	3.5	3.3	106 000	143 000	3 800	5 300	
	101.600	34.925	36.068	26.988	3.5	3.3	137 000	169 000	3 800	5 000	
	111.125	30.162	26.909	20.638	3.5	3.3	92 500	110 000	3 200	4 300	
	112.712	30.162	26.909	20.638	3.5	3.3	92 500	110 000	3 200	4 300	
47.625	117.475	33.338	31.750	23.812	3.5	3.3	137 000	156 000	3 200	4 300	
	123.825	36.512	32.791	25.400	3.5	3.3	143 000	160 000	3 000	4 000	



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5 F_r + Y_0 F_a$$

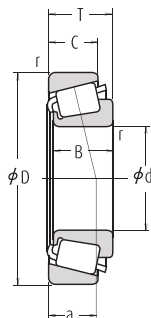
When $F_r > 0.5 F_r + Y_0 F_a$, use $P_0 = F_r$

The values of e , Y_1 and Y_0 are given in the table below.

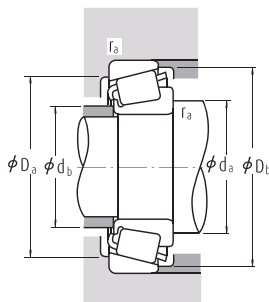
Bearing Numbers		Abutment and Fillet Dimensions (mm)						Eff. Load Centers (mm)	Constant	Axial Load Factors		Mass (kg)	
CONE	CUP	d_a	d_b	D_a	D_b	Cone Cup		a	e	Y_1	Y_0	approx.	
						r_a	max.					CONE	CUP
HM 804843	HM 804810	63	57	81	91	3.5	3.3	26.1	0.55	1.1	0.60	0.677	0.354
53177	53375	63	53	81	89	3.5	0.8	30.7	0.74	0.81	0.45	0.572	0.365
53176	53375	59	53	81	89	1.3	0.8	30.7	0.74	0.81	0.45	0.574	0.365
53178	53375	60	53	81	89	2	0.8	30.7	0.74	0.81	0.45	0.574	0.365
HM 903247	HM 903210	61	54	81	91	1.3	0.8	31.5	0.74	0.81	0.45	0.651	0.389
HM 903249	HM 903210	65	54	81	91	3.5	0.8	31.5	0.74	0.81	0.45	0.635	0.389
53177	53387	63	53	82	91	3.5	0.8	30.7	0.74	0.81	0.45	0.568	0.442
5356	5335	58	56	89	97	1.3	3.3	27.0	0.30	2.0	1.1	1.23	0.637
HM 807040	HM 807010	66	59	89	100	3.5	3.3	29.7	0.49	1.2	0.68	1.14	0.502
460	453 A	60	54	97	100	3.5	0.8	20.7	0.34	1.8	0.98	0.93	0.42
55175	55437	67	60	92	105	3.5	3.3	37.3	0.88	0.68	0.37	0.867	0.514
65385	65320	65	59	97	107	3.5	3.3	32.2	0.43	1.4	0.77	1.39	0.894
25584	25520	53	51	74	77	1.5	0.8	17.6	0.33	1.8	0.99	0.354	0.203
376	374	54	54	85	88	0.8	1.3	17.1	0.34	1.8	0.97	0.492	0.174
17887	17831	57	52	68	74	2	1.3	15.9	0.37	1.6	0.90	0.274	0.136
LM 102949	LM 102910	56	50	68	70	3.5	0.8	14.6	0.31	2.0	1.1	0.213	0.102
LM 603049	LM 603011	57	50	71	74	3.5	0.8	17.2	0.43	1.4	0.77	0.249	0.119
LM 603049	LM 603012	57	50	70	74	3.5	0.8	18.8	0.43	1.4	0.77	0.249	0.137
25590	25520	58	51	74	77	3.5	0.8	17.6	0.33	1.8	0.99	0.343	0.203
25590	25523	58	51	72	77	3.5	2.3	20.8	0.33	1.8	0.99	0.343	0.248
* LM 503349	** LM 503310	55	51	67	71	2.3	1.5	15.9	0.40	1.5	0.82	0.209	0.096
18690	18620	56	51	71	74	2.8	1.5	15.5	0.37	1.6	0.88	0.211	0.126
13181	13318	52	52	72	76	0.8	1.5	20.1	0.53	1.1	0.63	0.236	0.144
359 S	354 A	55	51	77	80	2.3	1.3	15.4	0.31	2.0	1.1	0.343	0.162
2984	2924	58	52	76	80	3.5	1.3	19.0	0.35	1.7	0.95	0.397	0.223
436	432 A	59	52	84	87	3.5	0.8	18.6	0.28	2.1	1.2	0.536	0.381
369 A	362 A	60	53	81	84	3.5	1.3	16.6	0.32	1.9	1.0	0.381	0.166
M 804049	M 804010	63	56	77	85	3.5	3.3	23.8	0.55	1.1	0.60	0.455	0.218
HM 804846	HM 804810	66	57	81	91	3.5	3.3	26.1	0.55	1.1	0.60	0.626	0.354
528	522	62	55	89	95	3.5	3.3	22.1	0.29	2.1	1.2	0.894	0.416
55187	55437	69	62	92	105	3.5	3.3	37.3	0.88	0.68	0.37	0.817	0.514
55187	55443	69	62	92	106	3.5	3.3	37.3	0.88	0.68	0.37	0.816	0.554
66187	66462	66	62	100	111	3.5	3.3	32.1	0.63	0.96	0.53	1.19	0.552
72187	72487	72	66	102	116	3.5	3.3	37.0	0.74	0.81	0.45	1.29	0.79

Single-Row Tapered Roller Bearings (Inch Design)

Bore Diameter 48.412 – 52.388 mm



Boundary Dimensions (mm)							Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)	
							Cone	Cup		
d	D	T	B	C	r min.		C _r	C _{0r}	Grease	Oil
48.412	95.250	30.162	29.370	23.020	3.5	3.3	106 000	143 000	3 800	5 300
	95.250	30.162	29.370	23.020	2.3	3.3	106 000	143 000	3 800	5 300
49.212	104.775	36.512	36.512	28.575	3.5	0.8	139 000	192 000	3 400	4 800
	114.300	44.450	44.450	36.068	3.5	3.3	196 000	243 000	3 400	4 800
50.000	82.000	21.500	21.500	17.000	3.0	0.5	71 000	96 000	4 300	5 600
	82.550	21.590	22.225	16.510	0.5	1.3	71 000	96 000	4 300	5 600
	88.900	20.638	22.225	16.513	2.3	1.3	73 000	85 000	4 000	5 600
	90.000	28.000	28.000	23.000	3.0	2.5	104 000	136 000	4 000	5 600
50.800	105.000	37.000	36.000	29.000	3.0	2.5	139 000	192 000	3 400	4 800
	80.962	18.258	18.258	14.288	1.5	1.5	53 000	81 000	4 300	5 600
	82.550	23.622	22.225	18.542	3.5	0.8	71 000	96 000	4 300	5 600
	82.931	21.590	22.225	16.510	3.5	1.3	71 000	96 000	4 300	5 600
	85.000	17.462	17.462	13.495	3.5	1.5	48 500	63 000	4 300	5 600
	85.725	19.050	18.263	12.700	1.5	1.5	42 500	54 000	4 000	5 300
	88.900	20.638	22.225	16.513	3.5	1.3	73 000	85 000	4 000	5 600
	88.900	20.638	22.225	16.513	1.5	1.3	73 000	85 000	4 000	5 600
	92.075	24.608	25.400	19.845	3.5	0.8	84 500	117 000	4 000	5 300
	93.264	30.162	30.302	23.812	0.8	0.8	103 000	136 000	3 800	5 300
	93.264	30.162	30.302	23.812	3.5	0.8	103 000	136 000	3 800	5 300
	95.250	27.783	28.575	22.225	3.5	2.3	110 000	144 000	3 800	5 300
	101.600	31.750	31.750	25.400	3.5	3.3	118 000	150 000	3 600	5 000
	101.600	34.925	36.068	26.988	0.8	3.3	137 000	169 000	3 800	5 000
	101.600	34.925	36.068	26.988	3.5	3.3	137 000	169 000	3 800	5 000
	104.775	36.512	36.512	28.575	3.5	0.8	139 000	192 000	3 400	4 800
	104.775	36.512	36.512	28.575	3.5	3.3	139 000	192 000	3 400	4 800
	108.966	34.925	36.512	26.988	3.5	3.3	145 000	181 000	3 600	4 800
	111.125	30.162	26.909	20.638	3.5	3.3	113 000	152 000	3 000	4 300
	111.125	30.162	26.909	20.638	3.5	3.3	92 500	110 000	3 200	4 300
	123.825	36.512	32.791	25.400	3.5	3.3	162 000	199 000	2 800	4 000
	123.825	36.512	32.791	25.400	3.5	3.3	143 000	160 000	3 000	4 000
	127.000	44.450	44.450	34.925	3.5	3.3	199 000	258 000	3 000	4 000
	127.000	50.800	52.388	41.275	3.5	3.3	236 000	300 000	3 200	4 300
52.388	92.075	24.608	25.400	19.845	3.5	0.8	84 500	117 000	4 000	5 300
	100.000	25.000	22.225	21.824	2.3	2.0	77 000	93 000	3 800	5 300
	111.125	30.162	26.909	20.638	3.5	3.3	92 500	110 000	3 200	4 300



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5 F_r + Y_0 F_a$$

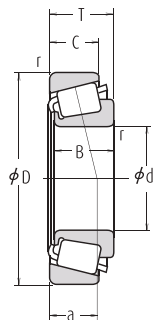
When $F_r > 0.5 F_r + Y_0 F_a$, use $P_0 = F_r$

The values of e , Y_1 and Y_0 are given in the table below.

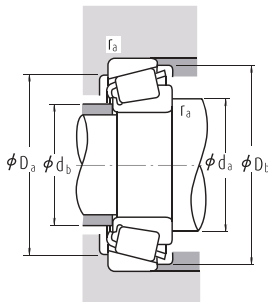
Bearing Numbers		Abutment and Fillet Dimensions (mm)						Eff. Load Centers (mm)	Constant	Axial Load Factors		Mass (kg)	
CONE	CUP	d_a	d_b	D_a	D_b	Cone Cup		a	e	Y_1	Y_0	approx.	
						r_a max.						CONE	CUP
HM 804849	HM 804810	66	57	81	91	3.5	3.3	26.1	0.55	1.1	0.60	0.61	0.354
HM 804848	HM 804810	63	57	81	91	2.3	3.3	26.1	0.55	1.1	0.60	0.614	0.354
HM 807044	HM 807011	69	63	91	100	3.5	0.8	29.7	0.49	1.2	0.68	1.03	0.508
HH 506348	HH 506310	71	61	97	107	3.5	3.3	30.8	0.40	1.5	0.82	1.43	0.837
▲ JLM 104948	▲ JLM 104910	60	55	76	78	3	0.5	16.1	0.31	2.0	1.1	0.306	0.129
* LM 104947 A	LM 104911	55	55	75	78	0.5	1.3	15.7	0.31	2.0	1.1	0.316	0.133
366	362 A	59	55	81	84	2.3	1.3	16.6	0.32	1.9	1.0	0.351	0.166
▲ JM 205149	▲ JM 205110	62	57	80	85	3	2.5	19.9	0.33	1.8	1.0	0.507	0.246
▲ JHM 807045	▲ JHM 807012	69	63	90	100	3	2.5	29.7	0.49	1.2	0.68	1.01	0.523
L 305649	L 305610	58	56	73	77	1.5	1.5	15.7	0.36	1.7	0.93	0.239	0.119
LM 104949	LM 104911 A	62	55	75	78	3.5	0.8	17.8	0.31	2.0	1.1	0.303	0.156
LM 104949	LM 104912	62	55	75	78	3.5	1.3	15.7	0.31	2.0	1.1	0.301	0.14
18790	18720	62	56	77	80	3.5	1.5	16.7	0.41	1.5	0.81	0.239	0.136
18200	18337	59	56	76	81	1.5	1.5	21.0	0.57	1.1	0.58	0.268	0.136
368 A	362 A	62	56	81	84	3.5	1.3	16.6	0.32	1.9	1.0	0.338	0.166
368	362 A	58	56	81	84	1.5	1.3	16.6	0.32	1.9	1.0	0.341	0.166
28580	28521	63	57	83	87	3.5	0.8	20.0	0.38	1.6	0.87	0.46	0.247
3775	3730	58	58	84	88	0.8	0.8	22.4	0.34	1.8	0.97	0.568	0.297
3780	3730	64	58	84	88	3.5	0.8	22.4	0.34	1.8	0.97	0.564	0.297
33889	33821	64	58	85	90	3.5	2.3	19.8	0.33	1.8	1.0	0.601	0.267
49585	49520	66	59	88	96	3.5	3.3	23.4	0.40	1.5	0.82	0.744	0.389
529	522	59	58	89	95	0.8	3.3	22.1	0.29	2.1	1.2	0.822	0.416
529 X	522	65	58	89	95	3.5	3.3	22.1	0.29	2.1	1.2	0.819	0.416
HM 807046	HM 807011	70	63	91	100	3.5	0.8	29.7	0.49	1.2	0.68	0.992	0.508
HM 807046	HM 807010	70	63	89	100	3.5	3.3	29.7	0.49	1.2	0.68	0.993	0.502
59200	59429	68	61	93	101	3.5	3.3	25.4	0.40	1.5	0.82	0.943	0.594
55200 C	55437	71	65	92	105	3.5	3.3	37.6	0.88	0.68	0.37	0.845	0.514
55200	55437	71	64	92	105	3.5	3.3	37.3	0.88	0.68	0.37	0.767	0.514
72200 C	72487	77	67	102	116	3.5	3.3	38.0	0.74	0.81	0.45	1.33	0.79
72200	72487	74	66	102	116	3.5	3.3	37.0	0.74	0.81	0.45	1.22	0.79
65200	65500	75	69	107	119	3.5	3.3	35.0	0.49	1.2	0.68	1.86	1.03
6279	6220	71	65	108	117	3.5	3.3	30.7	0.30	2.0	1.1	2.08	1.22
28584	28521	65	58	83	87	3.5	0.8	20.0	0.38	1.6	0.87	0.435	0.247
377	372	62	58	86	90	2.3	2	21.4	0.34	1.8	0.97	0.392	0.435
55206	55437	72	64	92	105	3.5	3.3	37.3	0.88	0.68	0.37	0.737	0.514

Single-Row Tapered Roller Bearings (Inch Design)

Bore Diameter 53.975 – 58.738 mm



Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		
d	D	T	B	C	Cone	Cup	C _r	C _{0r}	Grease	Oil
					r min.					
53.975	104.775	39.688	40.157	33.338	3.5	3.3	148 000	207 000	3 600	4 800
	107.950	36.512	36.957	28.575	3.5	3.3	144 000	182 000	3 600	4 800
	122.238	33.338	31.750	23.812	3.5	3.3	135 000	156 000	3 000	4 000
	123.825	36.512	32.791	25.400	3.5	3.3	143 000	160 000	3 000	4 000
	123.825	36.512	32.791	25.400	3.5	3.3	162 000	199 000	2 800	4 000
	123.825	38.100	36.678	30.162	3.5	3.3	161 000	221 000	3 000	4 000
	127.000	44.450	44.450	34.925	3.5	3.3	199 000	258 000	3 000	4 000
	127.000	50.800	52.388	41.275	3.5	3.3	236 000	300 000	3 200	4 300
55.000	130.175	36.512	33.338	23.812	3.5	3.3	133 000	154 000	2 600	3 600
	90.000	23.000	23.000	18.500	1.5	0.5	79 000	111 000	3 800	5 300
	95.000	29.000	29.000	23.500	1.5	2.5	111 000	152 000	3 800	5 000
	96.838	21.000	21.946	15.875	2.3	0.8	80 500	100 000	3 600	5 000
	110.000	39.000	39.000	32.000	3.0	2.5	177 000	225 000	3 400	4 500
55.562	115.000	41.021	41.275	31.496	3.0	3.0	172 000	214 000	3 200	4 500
	97.630	24.608	24.608	19.446	3.5	0.8	89 000	129 000	3 600	5 000
	122.238	43.658	43.764	36.512	1.3	3.3	198 000	292 000	3 000	4 000
	123.825	36.512	32.791	25.400	3.5	3.3	143 000	160 000	3 000	4 000
57.150	123.825	36.512	32.791	25.400	3.5	3.3	162 000	199 000	2 800	4 000
	96.838	21.000	21.946	15.875	3.5	0.8	80 500	100 000	3 600	5 000
	96.838	21.000	21.946	15.875	2.3	0.8	80 500	100 000	3 600	5 000
	96.838	25.400	21.946	20.275	3.5	2.3	80 500	100 000	3 600	5 000
	98.425	21.000	21.946	17.826	3.5	0.8	80 500	100 000	3 600	5 000
	104.775	30.162	29.317	24.605	3.5	3.3	116 000	149 000	3 400	4 800
	104.775	30.162	29.317	24.605	2.3	3.3	116 000	149 000	3 400	4 800
	104.775	30.162	30.958	23.812	0.8	3.3	130 000	170 000	3 400	4 800
	104.775	30.162	30.958	23.812	0.8	0.8	130 000	170 000	3 400	4 800
	122.238	33.338	31.750	23.812	3.5	3.3	135 000	156 000	3 000	4 000
	123.825	36.512	32.791	25.400	3.5	3.3	162 000	199 000	2 800	4 000
	123.825	38.100	36.678	30.162	3.5	3.3	161 000	221 000	3 000	4 000
57.531	140.030	36.512	33.236	23.520	3.5	2.3	152 000	183 000	2 600	3 600
	144.983	36.000	33.236	23.007	3.5	3.5	152 000	183 000	2 600	3 600
	149.225	53.975	54.229	44.450	3.5	3.3	287 000	410 000	2 600	3 400
	96.838	21.000	21.946	15.875	3.5	0.8	80 500	100 000	3 600	5 000
	58.738	112.712	33.338	30.048	26.988	3.5	3.3	120 000	173 000	3 200



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5 F_r + Y_0 F_a$$

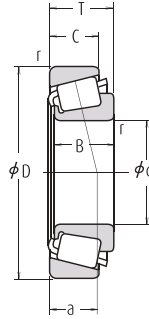
When $F_r > 0.5 F_r + Y_0 F_a$, use $P_0 = F_r$

The values of e , Y_1 and Y_0 are given in the table below.

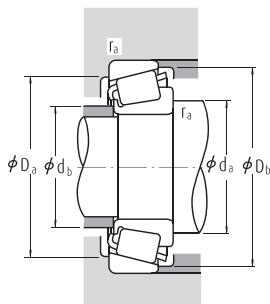
Bearing Numbers		Abutment and Fillet Dimensions (mm)						Eff. Load Centers (mm)	Constant	Axial Load Factors		Mass (kg)	
CONE	CUP	d_s	d_b	D_s	D_b	Cone Cup		a	e	Y_1	Y_0	approx.	
						f_a max.						CONE	CUP
4595	4535	70	63	90	99	3.5	3.3	27.4	0.34	1.79	0.98	0.989	0.589
539	532 X	68	61	94	100	3.5	3.3	24.3	0.30	2.0	1.1	0.88	0.57
66584	66520	75	68	105	116	3.5	3.3	34.3	0.67	0.90	0.50	1.2	0.558
72212	72487	77	66	102	116	3.5	3.3	37.0	0.74	0.81	0.45	1.16	0.79
72212 C	72487	79	67	102	116	3.5	3.3	38.0	0.74	0.81	0.45	1.27	0.79
557 S	552 A	71	65	109	116	3.5	3.3	28.8	0.35	1.7	0.95	1.49	0.764
65212	65500	77	71	107	119	3.5	3.3	35.0	0.49	1.2	0.68	1.76	1.03
6280	6220	74	67	108	117	3.5	3.3	30.7	0.30	2.0	1.1	1.97	1.22
HM911242	HM911210	79	74	109	124	3.5	3.3	42.2	0.82	0.73	0.40	1.45	0.725
▲ JLM506849	▲ JLM506810	63	61	82	86	1.5	0.5	19.7	0.40	1.5	0.82	0.378	0.186
▲ JM207049	▲ JM207010	64	62	85	91	1.5	2.5	21.3	0.33	1.8	0.99	0.59	0.26
385	382 A	65	61	89	92	2.3	0.8	17.6	0.35	1.7	0.93	0.455	0.179
▲ JH307749	▲ JH307710	71	64	97	104	3	2.5	27.2	0.35	1.7	0.95	1.13	0.567
622 X	614 X	70	64	101	108	3	3	26.6	0.31	1.9	1.1	1.3	0.597
28680	28622	68	62	88	92	3.5	0.8	21.3	0.40	1.5	0.82	0.499	0.27
5566	5535	70	68	106	116	1.3	3.3	29.9	0.36	1.7	0.92	1.76	0.815
72218	72487	78	66	102	116	3.5	3.3	37.0	0.74	0.81	0.45	1.12	0.79
72218 C	72487	80	67	102	116	3.5	3.3	38.0	0.74	0.81	0.45	1.23	0.79
387 A	382 A	69	62	89	92	3.5	0.8	17.6	0.35	1.7	0.93	0.42	0.179
387	382 A	66	62	89	92	2.3	0.8	17.6	0.35	1.7	0.93	0.423	0.179
387 A	382 S	69	62	87	91	3.5	2.3	22.0	0.35	1.7	0.93	0.42	0.249
387 A	382	69	62	90	92	3.5	0.8	17.6	0.35	1.7	0.93	0.42	0.226
469	453 X	70	63	92	98	3.5	3.3	23.1	0.34	1.8	0.98	0.692	0.376
462	453 X	67	63	92	98	2.3	3.3	23.1	0.34	1.8	0.98	0.694	0.376
45289	45220	65	65	93	99	0.8	3.3	21.9	0.33	1.8	0.99	0.752	0.347
45289	45221	65	65	95	99	0.8	0.8	21.9	0.33	1.8	0.99	0.76	0.35
66587	66520	77	71	105	116	3.5	3.3	34.3	0.67	0.90	0.50	1.14	0.558
72225 C	72487	81	67	102	116	3.5	3.3	38.0	0.74	0.81	0.45	1.19	0.79
555 S	552 A	83	68	109	116	3.5	3.3	28.8	0.35	1.7	0.95	1.41	0.764
78225	78551	83	77	117	132	3.5	2.3	44.2	0.87	0.69	0.38	1.67	0.926
78225	78571	83	77	118	132	3.5	3.5	43.6	0.87	0.69	0.38	1.68	1.08
6455	6420	81	75	129	140	3.5	3.3	39.0	0.36	1.7	0.91	3.49	1.63
388 A	382 A	69	63	89	92	3.5	0.8	17.6	0.35	1.7	0.93	0.416	0.179
3981	3926	73	67	98	106	3.5	3.3	28.7	0.40	1.5	0.82	0.899	0.541

Single-Row Tapered Roller Bearings (Inch Design)

Bore Diameter 60.000 – 64.963 mm



Boundary Dimensions (mm)							Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)	
d	D	T	B	C	Cone r min.	Cup	C _r	C _{0r}	Grease	Oil
60.000	95.000	24.000	24.000	19.000	5.0	2.5	86 500	125 000	3 600	5 000
	104.775	21.433	22.000	15.875	2.3	2.0	83 500	107 000	3 400	4 500
	110.000	22.000	21.996	18.824	0.8	1.3	85 500	113 000	3 200	4 300
60.325	122.238	33.338	31.750	23.812	3.5	3.3	135 000	156 000	3 000	4 000
	100.000	25.400	25.400	19.845	3.5	3.3	91 000	135 000	3 400	4 800
	101.600	25.400	25.400	19.845	3.5	3.3	91 000	135 000	3 400	4 800
	122.238	38.100	36.678	30.162	2.3	3.3	161 000	221 000	3 000	4 000
	122.238	38.100	38.354	29.718	8.0	1.5	188 000	245 000	3 000	4 000
	122.238	43.658	43.764	36.512	0.8	3.3	198 000	292 000	3 000	4 000
	127.000	44.450	44.450	34.925	3.5	3.3	199 000	258 000	3 000	4 000
	130.175	41.275	41.275	31.750	3.5	3.3	195 000	263 000	2 800	3 800
	135.755	53.975	56.007	44.450	3.5	3.3	264 000	355 000	2 800	3 800
61.912	136.525	46.038	46.038	36.512	3.5	3.3	233 000	370 000	2 600	3 400
	146.050	41.275	39.688	25.400	3.5	3.3	193 000	225 000	2 400	3 400
	152.400	47.625	46.038	31.750	3.5	3.3	237 000	267 000	2 400	3 400
63.500	94.458	19.050	19.050	15.083	1.5	1.5	59 000	100 000	3 600	4 800
	104.775	21.433	22.000	15.875	2.0	2.0	83 500	107 000	3 400	4 500
	107.950	25.400	25.400	19.050	1.5	3.3	90 000	138 000	3 200	4 300
	110.000	22.000	21.996	18.824	3.5	1.3	85 500	113 000	3 200	4 300
	110.000	22.000	21.996	18.824	1.5	1.3	85 500	113 000	3 200	4 300
	112.712	30.162	30.048	23.812	3.5	3.2	120 000	173 000	3 200	4 300
	112.712	30.162	30.162	23.812	3.5	3.3	142 000	202 000	3 200	4 300
	112.712	33.338	30.048	26.988	3.5	3.3	120 000	173 000	3 200	4 300
	122.238	38.100	38.354	29.718	7.0	3.3	188 000	245 000	3 000	4 000
	122.238	38.100	38.354	29.718	7.0	1.5	188 000	245 000	3 000	4 000
	122.238	38.100	38.354	29.718	3.5	1.5	188 000	245 000	3 000	4 000
	122.238	43.658	43.764	36.512	3.5	3.3	198 000	292 000	3 000	4 000
	123.825	38.100	36.678	30.162	3.5	3.3	161 000	221 000	3 000	4 000
	127.000	36.512	36.170	28.575	3.5	3.3	166 000	234 000	2 800	3 800
	130.175	41.275	41.275	31.750	3.5	3.3	195 000	263 000	2 800	3 800
	136.525	36.512	33.236	23.520	2.3	3.3	152 000	183 000	2 600	3 600
	136.525	41.275	41.275	31.750	3.5	3.3	195 000	263 000	2 800	3 800
64.963	140.030	36.512	33.236	23.520	2.3	2.3	152 000	183 000	2 600	3 600
	127.000	36.512	36.170	28.575	3.5	3.3	166 000	234 000	2 800	3 800



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5 F_r + Y_0 F_a$$

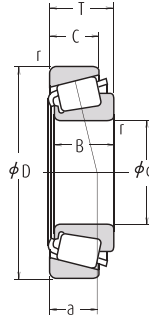
When $F_r > 0.5 F_r + Y_0 F_a$, use $P_0 = F_r$

The values of e , Y_1 and Y_0 are given in the table below.

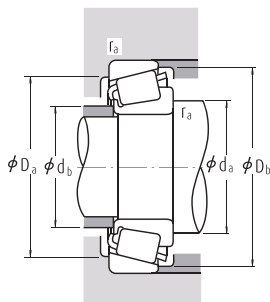
Bearing Numbers		Abutment and Fillet Dimensions (mm)						Eff. Load Centers (mm)	Constant	Axial Load Factors		Mass (kg)	
CONE	CUP	d_s	d_b	D_s	D_b	Cone Cup		a	e	Y_1	Y_0	approx.	
						f_a max.						CONE	CUP
▲ JLM 508748	▲ JLM 508710	75	66	85	91	5	2.5	21.6	0.40	1.5	0.82	0.43	0.20
* 39236	39412	71	67	96	100	2.3	2	20.0	0.39	1.5	0.85	0.559	0.186
397	394 A	69	68	101	104	0.8	1.3	20.9	0.40	1.5	0.82	0.642	0.263
66585	66520	79	73	105	116	3.5	3.3	34.3	0.67	0.90	0.50	1.07	0.558
28985	28921	73	67	89	96	3.5	3.3	22.9	0.43	1.4	0.78	0.538	0.232
28985	28920	73	67	90	97	3.5	3.3	22.9	0.43	1.4	0.78	0.538	0.272
558	553 X	73	69	108	115	2.3	3.3	28.8	0.35	1.7	0.95	1.33	0.692
HM 212044	HM 212010	85	70	110	116	8	1.5	27.0	0.34	1.8	0.98	1.43	0.604
5582	5535	73	72	106	116	0.8	3.3	29.9	0.36	1.7	0.92	1.61	0.815
65237	65500	82	71	107	119	3.5	3.3	35.0	0.49	1.2	0.68	1.56	1.03
637	633	78	72	116	124	3.5	3.3	29.9	0.36	1.7	0.91	1.87	0.712
6376	6320	81	74	117	126	3.5	3.3	35.0	0.32	1.8	1.0	2.45	1.39
H 715334	H 715311	84	78	119	132	3.5	3.3	37.1	0.47	1.3	0.70	2.51	0.961
H 913842	H 913810	90	82	124	138	3.5	3.3	44.4	0.78	0.77	0.42	2.2	0.898
9180	9121	90	81	130	145	3.5	3.3	44.3	0.66	0.92	0.50	2.77	1.21
L 610549	L 610510	71	69	86	91	1.5	1.5	19.6	0.42	1.4	0.78	0.306	0.154
39250	39412	73	69	96	100	2	2	20.0	0.39	1.5	0.85	0.501	0.186
29586	29520	73	71	96	103	1.5	3.3	24.0	0.46	1.3	0.72	0.661	0.281
395	394 A	77	70	101	104	3.5	1.3	20.9	0.40	1.5	0.82	0.58	0.263
390 A	394 A	73	70	101	104	1.5	1.3	20.9	0.40	1.5	0.82	0.583	0.263
3982	3920	77	71	99	106	3.5	3.2	25.5	0.40	1.5	0.82	0.789	0.454
39585	39520	77	71	101	107	3.5	3.3	23.5	0.34	1.8	0.97	0.899	0.359
3982	3926	78	71	98	106	3.5	3.3	28.7	0.40	1.5	0.82	0.789	0.541
HM 212047	HM 212011	87	73	108	116	7	3.3	26.9	0.34	1.8	0.98	1.34	0.598
HM 212047	HM 212010	87	73	110	116	7	1.5	26.9	0.34	1.8	0.98	1.34	0.604
HM 212046	HM 212010	80	73	110	116	3.5	1.5	26.9	0.34	1.8	0.98	1.35	0.604
5584	5535	81	75	106	116	3.5	3.3	29.9	0.36	1.7	0.92	1.5	0.815
559	522 A	78	73	109	116	3.5	3.3	28.8	0.35	1.7	0.95	1.23	0.764
565	563	80	73	112	120	3.5	3.3	28.3	0.36	1.6	0.91	1.46	0.655
639	633	81	74	116	124	3.5	3.3	29.9	0.36	1.7	0.91	1.77	0.712
78250	78537	85	79	115	130	2.3	3.3	44.2	0.87	0.69	0.38	1.51	0.782
639	632	79	76	119	125	3.5	3.3	29.9	0.36	1.7	0.91	1.77	1.04
78250	78551	85	79	117	132	2.3	2.3	44.2	0.87	0.69	0.38	1.51	0.926
569	563	81	74	112	120	3.5	3.3	28.3	0.36	1.6	0.91	1.41	0.655

Single-Row Tapered Roller Bearings (Inch Design)

Bore Diameter 65.000 – 69.850 mm



Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		
d	D	T	B	C	Cone r min.	Cup	C _r	C _{0r}	Grease	Oil
65.000	105.000	24.000	23.000	18.500	3.0	1.0	93 000	126 000	3 400	4 500
	110.000	28.000	28.000	22.500	3.0	2.5	120 000	173 000	3 200	4 300
	120.000	29.002	29.007	23.444	2.3	3.3	123 000	169 000	3 000	4 000
65.088	120.000	39.000	38.500	32.000	3.0	2.5	185 000	249 000	3 000	4 000
	135.755	53.975	56.007	44.450	3.5	3.3	264 000	355 000	2 800	3 800
	136.525	46.038	46.038	36.512	3.5	3.3	233 000	370 000	2 600	3 400
66.675	110.000	22.000	21.996	18.824	0.8	1.3	85 500	113 000	3 200	4 300
	110.000	22.000	21.996	18.824	3.5	1.3	85 500	113 000	3 200	4 300
	112.712	30.162	30.048	23.812	3.5	3.2	120 000	173 000	3 200	4 300
	112.712	30.162	30.048	23.812	5.5	3.2	120 000	173 000	3 200	4 300
	112.712	30.162	30.162	23.812	3.5	0.8	142 000	202 000	3 200	4 300
	112.712	30.162	30.162	23.812	3.5	3.3	142 000	202 000	3 200	4 300
	117.475	30.162	30.162	23.812	3.5	3.3	119 000	179 000	3 000	4 000
	122.238	38.100	36.678	30.162	3.5	3.3	161 000	221 000	3 000	4 000
	122.238	38.100	38.354	29.718	3.5	1.5	188 000	245 000	3 000	4 000
	122.238	38.100	38.354	29.718	3.5	3.3	188 000	245 000	3 000	4 000
	123.825	38.100	36.678	30.162	3.5	3.3	161 000	221 000	3 000	4 000
	136.525	46.038	46.038	36.512	3.5	3.3	233 000	370 000	2 600	3 400
68.262	110.000	22.000	21.996	18.824	2.3	1.3	85 500	113 000	3 200	4 300
	120.000	29.795	29.007	24.237	3.5	2.0	123 000	169 000	3 000	4 000
	122.238	38.100	36.678	30.162	3.5	3.3	161 000	221 000	3 000	4 000
	127.000	36.512	36.170	28.575	3.5	3.3	166 000	234 000	2 800	3 800
	136.525	41.275	41.275	31.750	3.5	3.3	229 000	297 000	2 600	3 600
	136.525	46.038	46.038	36.512	3.5	3.3	233 000	370 000	2 600	3 400
69.850	152.400	47.625	46.038	31.750	3.5	3.3	237 000	267 000	2 400	3 400
	112.712	22.225	21.996	15.875	1.5	0.8	85 000	113 000	3 000	4 000
	112.712	25.400	25.400	19.050	1.5	3.3	96 000	152 000	2 800	4 000
	117.475	30.162	30.162	23.812	3.5	3.3	119 000	179 000	3 000	4 000
	120.000	32.545	32.545	26.195	3.5	3.3	152 000	225 000	3 000	4 000
	120.650	25.400	25.400	19.050	1.5	3.3	96 000	152 000	2 800	4 000
	127.000	36.512	36.170	28.575	3.5	0.8	166 000	234 000	2 800	3 800
	130.175	41.275	41.275	31.750	3.5	3.3	195 000	263 000	2 800	3 800
	146.050	41.275	39.688	25.400	3.5	3.3	193 000	225 000	2 400	3 400
	146.050	41.275	41.275	31.750	3.5	3.3	207 000	296 000	2 400	3 200
	149.225	53.975	54.229	44.450	5.0	3.3	271 000	385 000	2 600	3 400
	150.089	44.450	46.672	36.512	3.5	3.3	265 000	370 000	2 400	3 200



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5 F_r + Y_0 F_a$$

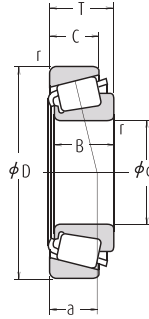
When $F_r > 0.5 F_r + Y_0 F_a$, use $P_0 = F_r$

The values of e , Y_1 and Y_0 are given in the table below.

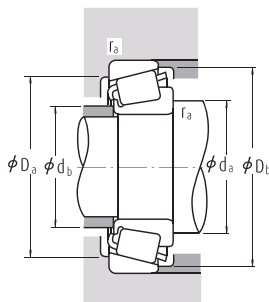
Bearing Numbers		Abutment and Fillet Dimensions (mm)						Eff. Load Centers (mm)	Constant	Axial Load Factors		Mass (kg)	
CONE	CUP	d _a	d _b	D _a	D _b	Cone	Cup	a	e	Y ₁	Y ₀	approx.	
						r _a max.						CONE	CUP
▲ JLM 710949	▲ JLM 710910	77	71	96	101	3	1	23.7	0.45	1.3	0.73	0.526	0.237
▲ JM 511946	▲ JM 511910	78	72	99	105	3	2.5	24.5	0.40	1.5	0.82	0.72	0.342
478	472 A	77	73	106	114	2.3	3.3	24.3	0.38	1.6	0.86	0.942	0.466
▲ JH 211749	▲ JH 211710	80	74	107	114	3	2.5	27.9	0.34	1.8	0.98	1.25	0.625
6379	6320	84	77	117	126	3.5	3.3	35.0	0.32	1.8	1.0	2.25	1.39
H 715340	H 715311	88	82	118	132	3.5	3.3	37.1	0.47	1.3	0.70	2.4	0.961
395 A	394 A	73	73	101	104	0.8	1.3	20.9	0.40	1.5	0.82	0.528	0.263
395 S	394 A	79	73	101	104	3.5	1.3	20.9	0.40	1.5	0.82	0.524	0.263
3984	3920	80	74	99	106	3.5	3.2	25.5	0.40	1.5	0.82	0.712	0.454
3994	3920	84	74	99	106	5.5	3.2	25.5	0.40	1.5	0.82	0.706	0.454
39590	39521	80	74	103	107	3.5	0.8	23.5	0.34	1.8	0.97	0.822	0.365
39590	39520	80	74	101	107	3.5	3.3	23.5	0.34	1.8	0.97	0.822	0.359
33262	33462	81	75	104	112	3.5	3.3	26.8	0.44	1.4	0.76	0.911	0.442
560	553 X	81	75	108	115	3.5	3.3	28.8	0.35	1.7	0.95	1.14	0.692
HM 212049	HM 212010	82	75	110	116	3.5	1.5	26.9	0.34	1.8	0.98	1.25	0.604
HM 212049	HM 212011	81	74	108	116	3.5	3.3	26.9	0.34	1.8	0.98	1.25	0.598
560	552 A	81	75	109	116	3.5	3.3	28.8	0.35	1.7	0.95	1.14	0.764
H 715341	H 715311	89	83	118	132	3.5	3.3	37.1	0.47	1.3	0.70	2.34	0.961
399 A	394 A	78	74	101	104	2.3	1.3	20.9	0.40	1.5	0.82	0.497	0.263
480	472	83	76	106	113	3.5	2	25.1	0.38	1.6	0.86	0.862	0.493
560 S	553 X	83	76	108	115	3.5	3.3	28.8	0.35	1.7	0.95	1.09	0.692
570	563	83	77	112	120	3.5	3.3	28.3	0.36	1.6	0.91	1.32	0.655
H 414245	H 414210	86	82	121	129	3.5	3.3	30.6	0.36	1.7	0.92	1.95	0.796
H 715343	H 715311	90	84	118	132	3.5	3.3	37.1	0.47	1.3	0.70	2.28	0.961
9185	9121	94	81	130	145	3.5	3.3	44.3	0.66	0.92	0.50	2.53	1.21
LM 613449	LM 613410	78	76	104	107	1.5	0.8	22.1	0.42	1.4	0.79	0.562	0.238
29675	29620	80	77	101	109	1.5	3.3	26.3	0.49	1.2	0.68	0.695	0.273
33275	33462	84	77	104	112	3.5	3.3	26.8	0.44	1.4	0.76	0.83	0.442
47487	47420	84	78	107	114	3.5	3.3	26.0	0.36	1.7	0.92	1.02	0.477
29675	29630	79	78	105	113	1.5	3.3	26.3	0.49	1.2	0.68	0.695	0.489
566	563 X	85	78	114	120	3.5	0.8	28.3	0.36	1.6	0.91	1.27	0.658
643	633	86	80	116	124	3.5	3.3	29.9	0.36	1.7	0.91	1.56	0.712
H 913849	H 913810	95	82	124	138	3.5	3.3	44.4	0.78	0.77	0.42	1.95	0.898
655	653	88	82	131	139	3.5	3.3	33.2	0.41	1.5	0.81	2.35	0.891
6454	6420	94	85	129	140	5	3.3	39.0	0.36	1.7	0.91	2.80	1.67
745 A	742	88	82	134	142	3.5	3.3	32.5	0.33	1.8	1.0	2.82	1.07

Single-Row Tapered Roller Bearings (Inch Design)

Bore Diameter 70.000 – 76.200 mm



Boundary Dimensions (mm)							Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)	
d	D	T	B	C	Cone	Cup	C _r	C _{0r}	Grease	Oil
					r min.					
70.000	110.000	26.000	25.000	20.500	1.0	2.5	98 500	152 000	3 000	4 000
	115.000	29.000	29.000	23.000	3.0	2.5	126 000	177 000	3 000	4 000
	120.000	29.795	29.007	24.237	2.0	2.0	123 000	169 000	3 000	4 000
71.438	117.475	30.162	30.162	23.812	3.5	3.3	119 000	179 000	3 000	4 000
	120.000	32.545	32.545	26.195	3.5	3.3	152 000	225 000	3 000	4 000
	127.000	36.512	36.170	28.575	6.4	3.3	166 000	234 000	2 800	3 800
	127.000	36.512	36.170	28.575	3.5	3.3	166 000	234 000	2 800	3 800
	130.175	41.275	41.275	31.750	6.4	3.3	195 000	263 000	2 800	3 800
	136.525	41.275	41.275	31.750	3.5	3.3	195 000	263 000	2 800	3 800
	136.525	41.275	41.275	31.750	3.5	3.3	229 000	297 000	2 600	3 600
73.025	136.525	46.038	46.038	36.512	3.5	3.3	233 000	370 000	2 600	3 400
	112.712	25.400	25.400	19.050	3.5	3.3	96 000	152 000	2 800	4 000
	117.475	30.162	30.162	23.812	3.5	3.3	119 000	179 000	3 000	4 000
	127.000	36.512	36.170	28.575	3.5	3.3	166 000	234 000	2 800	3 800
	146.050	41.275	41.275	31.750	3.5	3.3	207 000	296 000	2 400	3 200
	149.225	53.975	54.229	44.450	3.5	3.3	287 000	410 000	2 600	3 400
	127.000	36.512	36.170	28.575	0.8	3.3	166 000	234 000	2 800	3 800
73.817	150.000	41.275	41.275	31.750	3.5	3.0	207 000	296 000	2 400	3 200
74.612	115.000	25.000	25.000	19.000	3.0	2.5	101 000	150 000	3 000	4 000
	120.000	31.000	29.500	25.000	3.0	2.5	129 000	198 000	2 800	3 800
	145.000	51.000	51.000	42.000	3.0	2.5	283 000	410 000	2 600	3 400
	121.442	24.608	23.012	17.462	2.0	2.0	89 000	124 000	2 800	3 800
76.200	127.000	30.162	31.000	22.225	3.5	3.3	134 000	195 000	2 800	3 800
	127.000	30.162	31.001	22.225	6.4	3.3	134 000	195 000	2 800	3 800
	133.350	33.338	33.338	26.195	0.8	3.3	154 000	237 000	2 600	3 600
	135.733	44.450	46.101	34.925	3.5	3.3	216 000	340 000	2 600	3 600
	136.525	30.162	29.769	22.225	3.5	3.3	130 000	192 000	2 600	3 400
	136.525	30.162	29.769	22.225	6.4	3.3	130 000	192 000	2 600	3 400
	139.992	36.512	36.098	28.575	3.5	3.3	175 000	260 000	2 600	3 400
	149.225	53.975	54.229	44.450	3.5	3.3	287 000	410 000	2 600	3 400
	152.400	39.688	36.322	30.162	3.5	3.2	183 000	285 000	2 200	3 200
	152.400	41.275	41.275	31.750	3.5	3.3	207 000	296 000	2 400	3 200
	161.925	49.212	46.038	31.750	3.5	3.3	248 000	290 000	2 200	3 000
	161.925	53.975	55.100	42.862	3.5	3.3	325 000	480 000	2 200	3 000
	161.925	53.975	55.100	42.862	6.4	3.3	325 000	480 000	2 200	3 000
	161.925	53.975	55.100	42.862	6.4	0.8	325 000	480 000	2 200	3 000



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5 F_r + Y_0 F_a$$

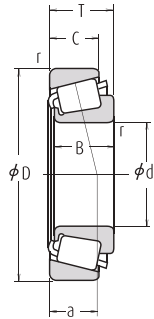
When $F_r > 0.5 F_r + Y_0 F_a$, use $P_0 = F_r$

The values of e , Y_1 and Y_0 are given in the table below.

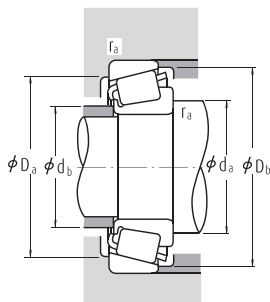
Bearing Numbers		Abutment and Fillet Dimensions (mm)						Eff. Load Centers (mm)	Constant	Axial Load Factors		Mass (kg)	
CONE	CUP	d_a	d_b	D_a	D_b	Cone Cup		a	e	Y_1	Y_0	approx.	
						f_a max.						CONE	CUP
▲ JLM 813049	▲ JLM 813010	78	77	98	105	1	2.5	26.2	0.49	1.2	0.68	0.604	0.304
▲ JM 612949	▲ JM 612910	83	77	103	110	3	2.5	26.4	0.43	1.4	0.77	0.800	0.362
484	472	80	78	106	113	2	2	25.1	0.38	1.6	0.86	0.822	0.493
33281	33462	85	79	104	112	3.5	3.3	26.8	0.44	1.4	0.76	0.789	0.442
47490	47420	86	79	107	114	3.5	3.3	26.0	0.36	1.7	0.92	0.983	0.477
567 S	563	92	80	112	120	6.4	3.3	28.3	0.36	1.6	0.91	1.21	0.655
567 A	563	86	80	112	120	3.5	3.3	28.3	0.36	1.6	0.91	1.23	0.655
645	633	93	81	116	124	6.4	3.3	29.9	0.36	1.7	0.91	1.49	0.712
644	632	87	81	118	125	3.5	3.3	29.9	0.36	1.7	0.91	1.5	1.04
H 414249	H 414210	89	83	121	129	3.5	3.3	30.6	0.36	1.7	0.92	1.83	0.796
H 715345	H 715311	92	84	119	132	3.5	3.3	37.1	0.47	1.3	0.70	2.15	0.961
29685	29620	86	80	101	109	3.5	3.3	26.3	0.49	1.2	0.68	0.62	0.273
33287	33462	87	80	104	112	3.5	3.3	26.8	0.44	1.4	0.76	0.746	0.442
567	563	88	81	112	120	3.5	3.3	28.3	0.36	1.6	0.91	1.17	0.655
657	653	91	85	131	139	3.5	3.3	33.2	0.41	1.5	0.81	2.24	0.891
6460	6420	93	87	129	140	3.5	3.3	39.0	0.36	1.7	0.91	2.8	1.63
568	563	83	82	112	120	0.8	3.3	28.3	0.36	1.6	0.91	1.15	0.655
658	653 X	92	86	133	141	3.5	3	33.2	0.41	1.5	0.81	2.37	0.932
▲ JLM 714149	▲ JLM 714110	87	81	104	110	3	2.5	25.3	0.46	1.3	0.72	0.638	0.272
▲ JM 714249	▲ JM 714210	88	83	108	115	3	2.5	28.8	0.44	1.4	0.74	0.863	0.436
▲ JH 415647	▲ JH 415610	94	89	129	139	3	2.5	36.7	0.36	1.7	0.91	2.64	1.19
34300	34478	86	84	111	116	2	2	26.3	0.45	1.3	0.73	0.65	0.316
42687	42620	90	84	114	121	3.5	3.3	27.3	0.42	1.4	0.79	1.03	0.438
42688	42620	94	84	114	121	6.4	3.3	27.3	0.42	1.4	0.79	1.01	0.438
47680	47620	86	85	119	128	0.8	3.3	29.0	0.40	1.5	0.82	1.39	0.577
5760	5735	94	88	119	130	3.5	3.3	32.9	0.41	1.5	0.81	1.86	0.887
495 A	493	92	86	122	130	3.5	3.3	28.7	0.44	1.4	0.74	1.27	0.55
495 AX	493	98	86	122	130	6.4	3.3	28.7	0.44	1.4	0.74	1.26	0.55
575	572	92	86	125	133	3.5	3.3	31.1	0.40	1.5	0.82	1.61	0.788
6461	6420	96	89	129	140	3.5	3.3	39.0	0.36	1.7	0.91	2.64	1.63
590 A	592 A	95	89	135	145	3.5	3.2	37.1	0.44	1.4	0.75	2.2	1.06
659	652	93	87	134	141	3.5	3.3	33.2	0.41	1.5	0.81	2.11	1.26
9285	9220	103	90	138	153	3.5	3.3	49.8	0.71	0.85	0.47	2.82	1.4
6576	6535	99	92	141	154	3.5	3.3	40.7	0.40	1.5	0.82	3.74	1.67
6575	6535	104	92	141	154	6.4	3.3	40.7	0.40	1.5	0.82	3.73	1.67
6575	6536	104	92	144	154	6.4	0.8	40.7	0.40	1.5	0.82	3.73	1.68

Single-Row Tapered Roller Bearings (Inch Design)

Bore Diameter 76.200 – 83.345 mm



Boundary Dimensions (mm)							Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)	
d	D	T	B	C	Cone r min.	Cup	C _r	C _{0r}	Grease	Oil
76.200	168.275	53.975	56.363	41.275	6.4	3.3	345 000	470 000	2 200	3 000
	168.275	53.975	56.363	41.275	0.8	3.3	345 000	470 000	2 200	3 000
	171.450	49.212	46.038	31.750	3.5	3.3	257 000	310 000	2 000	2 800
77.788	177.800	55.562	50.800	34.925	3.5	3.3	257 000	310 000	2 000	2 800
	121.442	24.608	23.012	17.462	3.5	2.0	89 000	124 000	2 800	3 800
	127.000	30.162	31.000	22.225	3.5	3.3	134 000	195 000	2 800	3 800
79.375	135.733	44.450	46.101	34.925	3.5	3.3	216 000	340 000	2 600	3 600
	146.050	41.275	41.275	31.750	3.5	3.3	207 000	296 000	2 400	3 200
	150.089	44.450	46.672	36.512	3.5	3.3	265 000	370 000	2 400	3 200
80.000	130.000	35.000	34.000	28.500	3.0	2.5	166 000	251 000	2 600	3 600
80.962	136.525	30.162	29.769	22.225	3.5	3.3	130 000	192 000	2 600	3 400
	139.700	36.512	36.098	28.575	3.5	3.3	175 000	260 000	2 600	3 400
	139.992	36.512	36.098	28.575	3.5	3.3	175 000	260 000	2 600	3 400
82.550	125.412	25.400	25.400	19.845	3.5	1.5	102 000	164 000	2 600	3 600
	133.350	30.162	29.769	22.225	3.5	3.3	130 000	192 000	2 600	3 400
	133.350	33.338	33.338	26.195	3.5	3.3	154 000	237 000	2 600	3 600
	133.350	33.338	33.338	26.195	0.8	3.3	154 000	237 000	2 600	3 600
	133.350	33.338	33.338	26.195	6.8	3.3	154 000	237 000	2 600	3 600
	133.350	39.688	39.688	32.545	6.8	3.3	179 000	310 000	2 600	3 600
	136.525	30.162	29.769	22.225	3.5	3.3	130 000	192 000	2 600	3 400
	139.700	36.512	36.098	28.575	3.5	3.3	175 000	260 000	2 600	3 400
	139.992	36.512	36.098	28.575	3.5	3.3	175 000	260 000	2 600	3 400
	139.992	36.512	36.098	28.575	6.8	3.3	175 000	260 000	2 600	3 400
	146.050	41.275	41.275	31.750	3.5	3.3	207 000	296 000	2 400	3 200
	150.000	44.455	46.672	35.000	3.5	3.3	265 000	370 000	2 400	3 200
	150.089	44.450	46.672	36.512	3.5	3.3	265 000	370 000	2 400	3 200
	152.400	41.275	41.275	31.750	3.5	3.3	207 000	296 000	2 400	3 200
	161.925	47.625	48.260	38.100	3.5	3.3	274 000	390 000	2 200	3 000
	161.925	53.975	55.100	42.862	3.5	3.3	325 000	480 000	2 200	3 000
	168.275	47.625	48.260	38.100	3.5	3.3	274 000	390 000	2 200	3 000
83.345	168.275	53.975	56.363	41.275	3.5	3.3	345 000	470 000	2 200	3 000
	125.412	25.400	25.400	19.845	3.5	1.5	102 000	164 000	2 600	3 600
	125.412	25.400	25.400	19.845	0.8	1.5	102 000	164 000	2 600	3 600



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5 F_r + Y_0 F_a$$

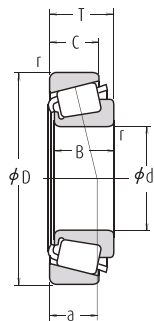
When $F_r > 0.5 F_r + Y_0 F_a$, use $P_0 = F_r$

The values of e , Y_1 and Y_0 are given in the table below.

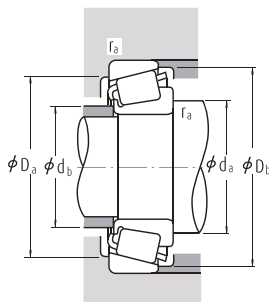
Bearing Numbers		Abutment and Fillet Dimensions (mm)						Eff. Load Centers (mm)	Constant	Axial Load Factors		Mass (kg)	
CONE	CUP	d_s	d_b	D_s	D_b	Cone f_a max.	Cup	a	e	Y_1	Y_0	approx.	
												CONE	CUP
843	832	101	89	149	155	6.4	3.3	35.2	0.30	2.0	1.1	4.11	1.74
837	832	90	89	149	155	0.8	3.3	35.2	0.30	2.0	1.1	4.13	1.74
9380	9321	105	98	147	164	3.5	3.3	54.1	0.76	0.79	0.43	3.47	1.51
9378	9320	105	98	148	164	3.5	3.3	57.3	0.76	0.79	0.43	3.71	2.24
34306	34478	90	84	110	116	3.5	2	26.3	0.45	1.3	0.73	0.612	0.316
42690	42620	91	85	114	121	3.5	3.3	27.3	0.42	1.4	0.79	0.976	0.438
5795	5735	96	89	119	130	3.5	3.3	32.9	0.41	1.5	0.81	1.79	0.887
661	653	96	90	131	139	3.5	3.3	33.2	0.41	1.5	0.81	1.99	0.891
750	742	96	90	134	142	3.5	3.3	32.5	0.33	1.8	1.0	2.42	1.07
▲ JM 515649	▲ JM 515610	94	88	117	125	3	2.5	29.9	0.39	1.5	0.85	1.18	0.583
496	493	95	89	122	130	3.5	3.3	28.7	0.44	1.4	0.74	1.13	0.55
581	572 X	96	90	125	133	3.5	3.3	31.1	0.40	1.5	0.82	1.44	0.774
581	572	96	90	125	133	3.5	3.3	31.1	0.40	1.5	0.82	1.44	0.788
27687	27620	96	89	115	120	3.5	1.5	25.7	0.42	1.4	0.79	0.747	0.348
495	492 A	97	90	120	128	3.5	3.3	28.7	0.44	1.4	0.74	1.08	0.434
47686	47620	97	90	119	128	3.5	3.3	29.0	0.40	1.5	0.82	1.18	0.577
47685	47620	90	90	119	128	0.8	3.3	29.0	0.40	1.5	0.82	1.18	0.577
47687	47620	103	90	119	128	6.8	3.3	29.0	0.40	1.5	0.82	1.16	0.577
HM 516448	HM 516410	105	92	118	128	6.8	3.3	32.4	0.40	1.5	0.82	1.35	0.767
495	493	97	90	122	130	3.5	3.3	28.7	0.44	1.4	0.74	1.08	0.55
580	572 X	98	91	125	133	3.5	3.3	31.1	0.40	1.5	0.82	1.39	0.774
580	572	98	91	125	133	3.5	3.3	31.1	0.40	1.5	0.82	1.39	0.788
582	572	104	91	125	133	6.8	3.3	31.1	0.40	1.5	0.82	1.37	0.788
663	653	99	92	131	139	3.5	3.3	33.2	0.41	1.5	0.81	1.85	0.891
749 A	743	99	93	134	142	3.5	3.3	32.5	0.33	1.8	1.0	2.26	1.04
749 A	742	98	93	135	143	3.5	3.3	32.5	0.33	1.8	1.0	2.26	1.07
663	652	99	92	134	141	3.5	3.3	33.2	0.41	1.5	0.81	1.85	1.26
757	752	100	94	144	150	3.5	3.3	35.6	0.34	1.8	0.97	2.79	1.61
6559	6535	104	98	141	154	3.5	3.3	40.7	0.40	1.5	0.82	3.4	1.67
757	753	100	94	147	150	3.5	3.3	35.6	0.34	1.8	0.97	2.79	2.1
842	832	101	94	149	155	3.5	3.3	35.2	0.30	2.0	1.1	3.76	1.74
27690	27620	96	90	115	120	3.5	1.5	25.7	0.42	1.4	0.79	0.727	0.348
27689	27620	90	90	115	120	0.8	1.5	25.7	0.42	1.4	0.79	0.732	0.348

Single-Row Tapered Roller Bearings (Inch Design)

Bore Diameter 84.138 – 90.488 mm



Boundary Dimensions (mm)							Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)	
d	D	T	B	C	Cone	Cup	C _r	C _{0r}	Grease	Oil
					r min.					
84.138	136.525	30.162	29.769	22.225	3.5	3.3	130 000	192 000	2 600	3 400
	146.050	41.275	41.275	31.750	3.5	3.3	207 000	296 000	2 400	3 200
	171.450	49.212	46.038	31.750	3.5	3.3	257 000	310 000	2 000	2 800
85.000	130.000	30.000	29.000	24.000	6.0	2.5	138 000	222 000	2 600	3 600
	130.000	30.000	29.000	24.000	3.0	2.5	138 000	222 000	2 600	3 600
	140.000	39.000	38.000	31.500	3.0	2.5	202 000	305 000	2 400	3 400
85.026	150.000	46.000	46.000	38.000	3.0	2.5	275 000	390 000	2 400	3 200
	150.089	44.450	46.672	36.512	3.5	3.3	265 000	370 000	2 400	3 200
	150.089	44.450	46.672	36.512	5.0	3.3	265 000	370 000	2 400	3 200
85.725	133.350	30.162	29.769	22.225	3.5	3.3	130 000	192 000	2 600	3 400
	136.525	30.162	29.769	22.225	3.5	3.3	130 000	192 000	2 600	3 400
	142.138	42.862	42.862	34.133	4.8	3.3	221 000	360 000	2 400	3 400
	146.050	41.275	41.275	31.750	6.4	3.3	207 000	296 000	2 400	3 200
	146.050	41.275	41.275	31.750	3.5	3.3	207 000	296 000	2 400	3 200
	152.400	39.688	36.322	30.162	3.5	3.2	183 000	285 000	2 200	3 200
	161.925	47.625	48.260	38.100	3.5	3.3	274 000	390 000	2 200	3 000
	168.275	41.275	41.275	30.162	3.5	3.3	223 000	345 000	2 000	2 800
	87.312	190.500	57.150	57.531	46.038	8.0	3.3	390 000	520 000	1 900
88.900	149.225	31.750	28.971	24.608	3.0	3.3	140 000	218 000	2 200	3 000
	152.400	39.688	36.322	30.162	3.5	3.2	183 000	285 000	2 200	3 200
	152.400	39.688	39.688	30.162	6.4	3.3	253 000	365 000	2 200	3 200
	161.925	47.625	48.260	38.100	3.5	3.3	274 000	390 000	2 200	3 000
	161.925	47.625	48.260	38.100	7.0	3.3	274 000	390 000	2 200	3 000
	161.925	53.975	55.100	42.862	3.5	3.3	325 000	480 000	2 200	3 000
	168.275	47.625	48.260	38.100	3.5	3.3	274 000	390 000	2 200	3 000
	168.275	53.975	56.363	41.275	3.5	3.3	345 000	470 000	2 200	3 000
	190.500	57.150	57.531	44.450	8.0	3.3	355 000	500 000	1 900	2 600
90.000	190.500	57.150	57.531	46.038	8.0	3.3	390 000	520 000	1 900	2 600
	145.000	35.000	34.000	27.000	3.0	2.5	190 000	285 000	2 400	3 200
	147.000	40.000	40.000	32.500	7.0	3.5	229 000	345 000	2 400	3 200
	155.000	44.000	44.000	35.500	3.0	2.5	274 000	390 000	2 200	3 000
	90.488	161.925	47.625	48.260	38.100	3.5	3.3	274 000	390 000	2 200



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5 F_r + Y_0 F_a$$

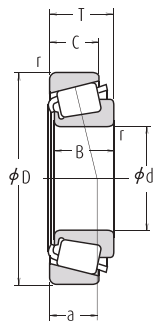
When $F_r > 0.5 F_r + Y_0 F_a$, use $P_0 = F_r$

The values of e , Y_1 and Y_0 are given in the table below.

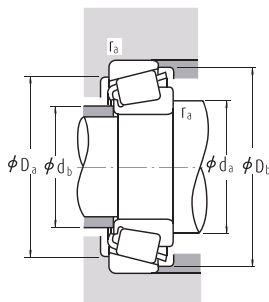
Bearing Numbers		Abutment and Fillet Dimensions (mm)						Eff. Load Centers (mm)	Constant	Axial Load Factors		Mass (kg)	
CONE	CUP	d_s	d_b	D_s	D_b	Cone Cup		a	e	Y_1	Y_0	approx.	
						r_a	max.					CONE	CUP
498	493	98	91	122	130	3.5	3.3	28.7	0.44	1.4	0.74	1.04	0.55
664	653	99	93	131	139	3.5	3.3	33.2	0.41	1.5	0.81	1.79	0.891
9385	9321	111	98	147	164	3.5	3.3	54.1	0.76	0.79	0.43	3.11	1.51
▲ JM 716648	▲ JM 716610	104	92	117	125	6	2.5	29.5	0.44	1.4	0.74	0.931	0.461
▲ JM 716649	▲ JM 716610	98	92	117	125	3	2.5	29.5	0.44	1.4	0.74	0.943	0.461
▲ JHM 516849	▲ JHM 516810	100	94	125	134	3	2.5	33.3	0.41	1.5	0.81	1.55	0.768
▲ JH 217249	▲ JH 217210	101	95	134	142	3	2.5	33.9	0.33	1.8	0.99	2.29	1.09
749	742	101	95	134	142	3.5	3.3	32.5	0.33	1.8	1.0	2.14	1.07
749 S	742	104	95	134	142	5	3.3	32.5	0.33	1.8	1.0	2.14	1.07
497	492 A	99	93	120	128	3.5	3.3	28.7	0.44	1.4	0.74	0.987	0.434
497	493	99	93	122	130	3.5	3.3	28.7	0.44	1.4	0.74	0.987	0.55
HM 617049	HM 617010	106	95	125	137	4.8	3.3	35.4	0.43	1.4	0.76	1.77	0.911
665 A	653	107	95	131	139	6.4	3.3	33.2	0.41	1.5	0.81	1.71	0.891
665	653	102	95	131	139	3.5	3.3	33.2	0.41	1.5	0.81	1.72	0.891
596	592 A	102	96	135	144	3.5	3.2	37.1	0.44	1.4	0.75	1.85	1.06
758	752	103	97	144	150	3.5	3.3	35.6	0.34	1.8	0.97	2.63	1.61
677	672	105	99	149	160	3.5	3.3	38.3	0.47	1.3	0.70	2.91	1.24
HH 221432	HH 221410	118	103	171	179	8	3.3	42.3	0.33	1.8	0.99	5.51	2.24
42350	42587	104	98	134	143	3	3.3	34.9	0.49	1.2	0.67	1.39	0.711
593	592 A	104	98	135	144	3.5	3.2	37.1	0.44	1.4	0.75	1.73	1.06
HM 518445	HM 518410	107	96	137	148	6.4	3.3	33.1	0.40	1.5	0.82	2.11	0.776
759	752	106	99	144	150	3.5	3.3	35.6	0.34	1.8	0.97	2.47	1.61
766	752	113	99	144	150	7	3.3	35.6	0.34	1.8	0.97	2.45	1.61
6580	6535	109	102	141	154	3.5	3.3	40.7	0.40	1.5	0.82	3.03	1.67
759	753	106	99	147	150	3.5	3.3	35.6	0.34	1.8	0.97	2.47	2.1
850	832	106	100	149	155	3.5	3.3	35.2	0.30	2.0	1.1	3.39	1.74
855	854	118	103	170	174	8	3.3	41.8	0.33	1.8	0.99	4.99	2.55
HH 221434	HH 221410	120	105	171	179	8	3.3	42.3	0.33	1.8	0.99	5.41	2.24
▲ JM 718149	▲ JM 718110	105	99	131	139	3	2.5	33.0	0.44	1.4	0.74	1.49	0.66
*HM 218248	**HM 218210	111	98	133	141	7	3.5	30.8	0.33	1.8	0.99	1.77	0.796
▲ JHM 318448	▲ JHM 318410	106	100	140	148	3	2.5	34.1	0.34	1.7	0.96	2.32	1.01
760	752	107	101	144	150	3.5	3.3	35.6	0.34	1.8	0.97	2.38	1.61

Single-Row Tapered Roller Bearings (Inch Design)

Bore Diameter 92.075 – 100.012 mm



Boundary Dimensions (mm)							Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)	
d	D	T	B	C	Cone	Cup	C _r	C _{0r}	Grease	Oil
					r min.					
92.075	146.050	33.338	34.925	26.195	3.5	3.3	169 000	280 000	2 400	3 200
	148.430	28.575	28.971	21.433	3.5	3.0	140 000	218 000	2 200	3 000
	152.400	39.688	36.322	30.162	3.5	3.2	183 000	285 000	2 200	3 200
	152.400	39.688	36.322	30.162	6.4	3.2	183 000	285 000	2 200	3 200
	168.275	41.275	41.275	30.162	3.5	3.3	223 000	345 000	2 000	2 800
93.662	190.500	57.150	57.531	44.450	8.0	3.3	355 000	500 000	1 900	2 600
	148.430	28.575	28.971	21.433	3.0	3.0	140 000	218 000	2 200	3 000
	149.225	31.750	28.971	24.608	3.0	3.3	140 000	218 000	2 200	3 000
	152.400	39.688	36.322	30.162	3.5	3.2	183 000	285 000	2 200	3 200
	150.000	35.000	34.000	27.000	3.0	2.5	183 000	285 000	2 200	3 200
95.000	146.050	33.338	34.925	26.195	3.5	3.3	169 000	280 000	2 400	3 200
	148.430	28.575	28.971	21.433	3.0	3.0	140 000	218 000	2 200	3 000
	149.225	31.750	28.971	24.608	3.5	3.3	140 000	218 000	2 200	3 000
	152.400	39.688	36.322	30.162	3.5	3.2	183 000	285 000	2 200	3 200
	152.400	39.688	36.322	33.338	3.5	3.3	183 000	285 000	2 200	3 200
95.250	168.275	41.275	41.275	30.162	3.5	3.3	223 000	345 000	2 000	2 800
	171.450	47.625	48.260	38.100	3.5	3.3	282 000	415 000	2 000	2 800
	180.975	47.625	48.006	38.100	3.5	3.3	258 000	375 000	2 000	2 600
	190.500	57.150	57.531	44.450	8.0	3.3	355 000	500 000	1 900	2 600
	190.500	57.150	57.531	46.038	8.0	3.3	390 000	520 000	1 900	2 600
	148.430	28.575	28.971	21.433	3.5	3.0	140 000	218 000	2 200	3 000
	149.225	31.750	28.971	24.606	3.5	3.3	140 000	218 000	2 200	3 000
	161.925	36.512	36.116	26.195	3.5	3.3	191 000	310 000	2 000	2 800
	168.275	41.275	41.275	30.162	3.5	3.3	223 000	345 000	2 000	2 800
	180.975	47.625	48.006	38.100	3.5	3.3	258 000	375 000	2 000	2 600
96.838	190.500	57.150	57.531	44.450	3.5	3.3	355 000	500 000	1 900	2 600
	190.500	57.150	57.531	46.038	3.5	3.3	390 000	520 000	1 900	2 600
	190.500	57.150	57.531	46.038	6.4	3.3	390 000	520 000	1 900	2 600
	150.000	32.000	30.000	26.000	2.3	2.3	146 000	235 000	2 200	3 000
	155.000	36.000	35.000	28.000	3.0	2.5	191 000	325 000	2 000	2 800
99.982	160.000	41.000	40.000	32.000	3.0	2.5	239 000	380 000	2 000	2 800
	157.162	36.512	36.116	26.195	3.5	3.3	191 000	310 000	2 000	2 800



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5 F_r + Y_0 F_a$$

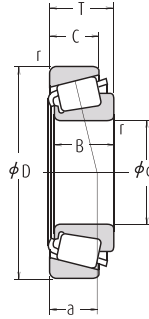
When $F_r > 0.5 F_r + Y_0 F_a$, use $P_0 = F_r$

The values of e , Y_1 and Y_0 are given in the table below.

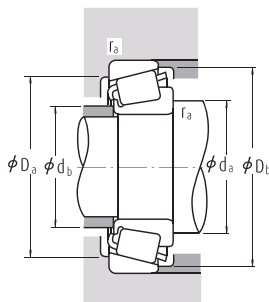
Bearing Numbers		Abutment and Fillet Dimensions (mm)						Eff. Load Centers (mm)	Constant	Axial Load Factors		Mass (kg)	
CONE	CUP	d_a	d_b	D_a	D_b	Cone Cup		a	e	Y_1	Y_0	approx.	
						f_a	f_b					CONE	CUP
47890	47820	107	101	131	140	3.5	3.3	32.3	0.45	1.3	0.74	1.46	0.664
42362	42584	107	101	134	142	3.5	3	31.8	0.49	1.2	0.67	1.29	0.553
598	592 A	107	101	135	144	3.5	3.2	37.1	0.44	1.4	0.75	1.6	1.06
598 A	592 A	113	101	135	144	6.4	3.2	37.1	0.44	1.4	0.75	1.59	1.06
681	672	110	104	149	160	3.5	3.3	38.3	0.47	1.3	0.70	2.62	1.24
857	854	121	106	170	174	8	3.3	41.8	0.33	1.8	0.99	4.78	2.55
42368	42584	107	102	134	142	3	3	31.8	0.49	1.2	0.67	1.24	0.553
42368	42587	107	102	134	143	3	3.3	34.9	0.49	1.2	0.67	1.24	0.711
597	592 A	109	102	135	144	3.5	3.2	37.1	0.44	1.4	0.75	1.54	1.06
▲ JM 719149	▲ JM 719113	109	104	135	143	3	2.5	33.4	0.44	1.4	0.75	1.46	0.765
47896	47820	110	103	131	140	3.5	3.3	32.3	0.45	1.3	0.74	1.33	0.664
42375	42584	108	103	134	142	3	3	31.8	0.49	1.2	0.67	1.18	0.553
42376	42587	109	103	134	143	3.5	3.3	34.9	0.49	1.2	0.67	1.18	0.711
594	592 A	110	104	135	144	3.5	3.2	37.1	0.44	1.4	0.75	1.47	1.06
594	592	109	103	135	145	3.5	3.3	37.1	0.44	1.4	0.75	1.47	1.12
683	672	113	106	149	160	3.5	3.3	38.3	0.47	1.3	0.70	2.47	1.24
77375	77675	117	105	152	159	3.5	3.3	37.8	0.37	1.6	0.90	2.91	1.67
776	772	114	107	161	168	3.5	3.3	39.1	0.39	1.6	0.86	3.25	1.99
864	854	123	108	170	174	8	3.3	41.8	0.33	1.8	0.99	4.57	2.55
HH 221440	HH 221410	125	110	171	179	8	3.3	42.3	0.33	1.8	0.99	5.0	2.24
42381	42584	110	104	134	142	3.5	3	31.8	0.49	1.2	0.67	1.13	0.553
42381	42587	111	105	135	143	3.5	3.3	34.9	0.49	1.2	0.67	1.13	0.711
52387	52637	114	108	144	154	3.5	3.3	36.1	0.47	1.3	0.69	1.89	0.942
685	672	116	109	149	160	3.5	3.3	38.3	0.47	1.3	0.70	2.32	1.24
779	772	116	110	161	168	3.5	3.3	39.1	0.39	1.6	0.86	3.06	1.99
866	854	118	111	170	174	3.5	3.3	41.8	0.33	1.8	0.99	4.38	2.55
HH 221442	HH 221410	119	113	171	179	3.5	3.3	42.3	0.33	1.8	0.99	4.81	2.24
HH 221447	HH 221410	126	114	171	179	6.4	3.3	42.3	0.33	1.8	0.99	4.68	2.24
▲ JLM 820048	▲ JLM 820012	111	107	135	144	2.3	2.3	36.8	0.50	1.2	0.66	1.27	0.616
▲ JM 720249	▲ JM 720210	115	109	140	149	3	2.5	36.8	0.47	1.3	0.70	1.68	0.772
▲ JHM 720249	▲ JHM 720210	117	109	143	154	3	2.5	38.2	0.47	1.3	0.70	2.09	0.974
52393	52618	116	109	142	152	3.5	3.3	36.1	0.47	1.3	0.69	1.81	0.702

Single-Row Tapered Roller Bearings (Inch Design)

Bore Diameter 101.600 – 117.475 mm



Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		
d	D	T	B	C	Cone r min.	Cup	C _r	C _{0r}	Grease	Oil
101.600	157.162	36.512	36.116	26.195	3.5	3.3	191 000	310 000	2 000	2 800
	161.925	36.512	36.116	26.195	3.5	3.3	191 000	310 000	2 000	2 800
	168.275	41.275	41.275	30.162	3.5	3.3	223 000	345 000	2 000	2 800
	180.975	47.625	48.006	38.100	3.5	3.3	258 000	375 000	2 000	2 600
	190.500	57.150	57.531	44.450	8.0	3.3	355 000	500 000	1 900	2 600
	190.500	57.150	57.531	46.038	8.0	3.3	390 000	520 000	1 900	2 600
104.775	212.725	66.675	66.675	53.975	7.0	3.3	570 000	810 000	1 700	2 200
	180.975	47.625	48.006	38.100	7.0	3.3	258 000	375 000	2 000	2 600
	180.975	47.625	48.006	38.100	3.5	3.3	258 000	375 000	2 000	2 600
106.362	190.500	47.625	49.212	34.925	3.5	3.3	296 000	465 000	1 800	2 400
	165.100	36.512	36.512	26.988	3.5	3.3	195 000	320 000	2 000	2 600
107.950	158.750	23.020	21.438	15.875	3.5	3.3	102 000	165 000	2 000	2 800
	159.987	34.925	34.925	26.988	3.5	3.3	164 000	315 000	2 000	2 800
	161.925	34.925	34.925	26.988	3.5	3.3	164 000	280 000	2 000	2 800
	165.100	36.512	36.512	26.988	3.5	3.3	195 000	320 000	2 000	2 600
	190.500	47.625	49.212	34.925	3.5	3.3	296 000	465 000	1 800	2 400
	212.725	66.675	66.675	53.975	8.0	3.3	570 000	810 000	1 700	2 200
109.987	159.987	34.925	34.925	26.988	3.5	3.3	164 000	315 000	2 000	2 800
	159.987	34.925	34.925	26.988	8.0	3.3	164 000	315 000	2 000	2 800
109.992	177.800	41.275	41.275	30.162	3.5	3.3	232 000	375 000	1 800	2 600
110.000	165.000	35.000	35.000	26.500	3.0	2.5	195 000	320 000	2 000	2 600
	180.000	47.000	46.000	38.000	3.0	2.5	310 000	490 000	1 900	2 600
111.125	190.500	47.625	49.212	34.925	3.5	3.3	296 000	465 000	1 800	2 400
114.300	152.400	21.433	21.433	16.670	1.5	1.5	89 500	178 000	2 000	2 800
	177.800	41.275	41.275	30.162	3.5	3.3	232 000	375 000	1 800	2 600
	180.000	34.925	31.750	25.400	3.5	0.8	174 000	254 000	1 800	2 400
	190.500	47.625	49.212	34.925	3.5	3.3	296 000	465 000	1 800	2 400
	212.725	66.675	66.675	53.975	7.0	3.3	475 000	700 000	1 700	2 400
	212.725	66.675	66.675	53.975	7.0	3.3	570 000	810 000	1 700	2 200
115.087	190.500	47.625	49.212	34.925	3.5	3.3	296 000	465 000	1 800	2 400
117.475	180.975	34.925	31.750	25.400	3.5	3.3	174 000	254 000	1 800	2 400



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5 F_r + Y_0 F_a$$

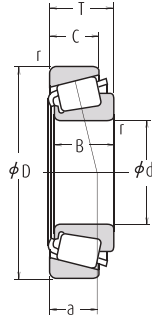
When $F_r > 0.5 F_r + Y_0 F_a$, use $P_0 = F_r$

The values of e , Y_1 and Y_0 are given in the table below.

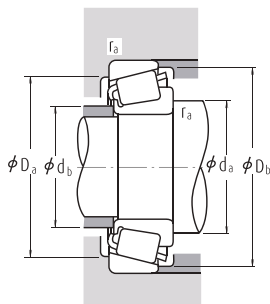
Bearing Numbers		Abutment and Fillet Dimensions (mm)						Eff. Load Centers (mm)	Constant	Axial Load Factors		Mass (kg)	
CONE	CUP	d_a	d_b	D_a	D_b	Cone Cup		a	e	Y_1	Y_0	approx.	
						f_a	f_b					CONE	CUP
52400	52618	117	111	142	152	3.5	3.3	36.1	0.47	1.3	0.69	1.75	0.702
52400	52637	117	111	144	154	3.5	3.3	36.1	0.47	1.3	0.69	1.75	0.942
687	672	118	112	149	160	3.5	3.3	38.3	0.47	1.3	0.70	2.15	1.24
780	772	119	113	161	168	3.5	3.3	39.1	0.39	1.6	0.86	2.88	1.99
861	854	129	114	170	174	8	3.3	41.8	0.33	1.8	0.99	4.13	2.55
HH 221449	HH 221410	131	116	171	179	8	3.3	42.3	0.33	1.8	0.99	4.55	2.24
HH 224335	HH 224310	132	121	192	202	7	3.3	47.3	0.33	1.8	1.0	8.14	3.06
787	772	129	116	161	168	7	3.3	39.1	0.39	1.6	0.86	2.66	1.99
782	772	122	116	161	168	3.5	3.3	39.1	0.39	1.6	0.86	2.68	1.99
71412	71750	124	118	171	181	3.5	3.3	40.1	0.42	1.4	0.79	4.0	1.71
56418	56650	122	116	149	159	3.5	3.3	38.6	0.50	1.2	0.66	1.87	0.861
37425	37625	122	115	143	152	3.5	3.3	37.0	0.61	0.99	0.54	0.886	0.488
LM 522546	LM 522510	122	116	146	154	3.5	3.3	33.7	0.40	1.5	0.82	1.65	0.784
48190	48120	122	116	146	156	3.5	3.3	38.7	0.51	1.2	0.65	1.59	0.83
56425	56650	123	117	149	159	3.5	3.3	38.6	0.50	1.2	0.66	1.8	0.861
71425	71750	126	120	171	181	3.5	3.3	40.1	0.42	1.4	0.79	3.79	1.71
HH 224340	HH 224310	139	126	192	202	8	3.3	47.3	0.33	1.8	1.0	7.58	3.06
LM 522549	LM 522510	124	118	146	154	3.5	3.3	33.7	0.40	1.5	0.82	1.55	0.784
LM 522548	LM 522510	133	118	146	154	8	3.3	33.7	0.40	1.5	0.82	1.53	0.784
64433	64700	128	121	160	172	3.5	3.3	42.4	0.52	1.2	0.64	2.64	1.11
▲ JM 822049	▲ JM 822010	124	119	149	159	3	2.5	38.3	0.50	1.2	0.66	1.64	0.842
▲ JHM 522649	▲ JHM 522610	127	122	162	172	3	2.5	40.9	0.41	1.5	0.81	3.12	1.51
71437	71750	129	123	171	181	3.5	3.3	40.1	0.42	1.4	0.79	3.58	1.71
L 623149	L 623110	123	121	143	148	1.5	1.5	27.4	0.41	1.5	0.80	0.725	0.344
64450	64700	131	125	160	172	3.5	3.3	42.4	0.52	1.2	0.64	2.39	1.11
68450	** 68709	130	123	165	172	3.5	0.8	40.0	0.50	1.2	0.66	1.95	1.0
71450	71750	132	125	171	181	3.5	3.3	40.1	0.42	1.4	0.79	3.37	1.71
938	932	141	128	187	193	7	3.3	46.9	0.33	1.8	1.0	6.01	4.11
HH 224346	HH 224310	143	131	192	202	7	3.3	47.3	0.33	1.8	1.0	7.01	3.06
71453	71750	133	126	171	181	3.5	3.3	40.1	0.42	1.4	0.79	3.31	1.71
68462	68712	132	125	163	172	3.5	3.3	40.0	0.50	1.2	0.66	1.73	1.05

Single-Row Tapered Roller Bearings (Inch Design)

Bore Diameter 120.000 – 165.100 mm



Boundary Dimensions (mm)							Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)	
d	D	T	B	C	Cone r min.	Cup	C _r	C _{0r}	Grease	Oil
120.000	170.000	25.400	25.400	19.050	3.3	3.3	130 000	219 000	1 900	2 600
	174.625	35.720	36.512	27.783	3.5	1.5	212 000	385 000	1 900	2 600
120.650	182.562	39.688	38.100	33.338	3.5	3.3	228 000	445 000	1 800	2 400
	206.375	47.625	47.625	34.925	3.3	3.3	320 000	530 000	1 600	2 200
123.825	182.562	39.688	38.100	33.338	3.5	3.3	228 000	445 000	1 800	2 400
125.000	175.000	25.400	25.400	18.288	3.3	3.3	134 000	232 000	1 800	2 400
127.000	165.895	18.258	17.462	13.495	1.5	1.5	84 500	149 000	1 900	2 600
	182.562	39.688	38.100	33.338	3.5	3.3	228 000	445 000	1 800	2 400
	196.850	46.038	46.038	38.100	3.5	3.3	315 000	560 000	1 700	2 200
	215.900	47.625	47.625	34.925	3.5	3.3	287 000	495 000	1 500	2 000
128.588	206.375	47.625	47.625	34.925	3.3	3.3	320 000	530 000	1 600	2 200
130.000	206.375	47.625	47.625	34.925	3.5	3.3	320 000	530 000	1 600	2 200
130.175	203.200	46.038	46.038	38.100	3.5	3.3	315 000	560 000	1 700	2 200
	206.375	47.625	47.625	34.925	3.5	3.3	320 000	530 000	1 600	2 200
133.350	177.008	25.400	26.195	20.638	1.5	1.5	124 000	258 000	1 800	2 400
	190.500	39.688	39.688	33.338	3.5	3.3	240 000	485 000	1 700	2 200
	196.850	46.038	46.038	38.100	3.5	3.3	315 000	560 000	1 700	2 200
	215.900	47.625	47.625	34.925	3.5	3.3	287 000	495 000	1 500	2 000
136.525	190.500	39.688	39.688	33.338	3.5	3.3	216 000	440 000	1 700	2 200
	217.488	47.625	47.625	34.925	3.5	3.3	287 000	495 000	1 500	2 000
139.700	187.325	28.575	29.370	23.020	1.5	1.5	153 000	305 000	1 700	2 200
	215.900	47.625	47.625	34.925	3.5	3.3	287 000	495 000	1 500	2 000
	254.000	66.675	66.675	47.625	7.0	3.3	515 000	830 000	1 300	1 800
	200.025	41.275	39.688	34.130	3.5	3.3	227 000	460 000	1 600	2 200
146.050	193.675	28.575	28.575	23.020	1.5	1.5	170 000	355 000	1 600	2 200
	236.538	57.150	56.642	44.450	3.5	3.3	455 000	720 000	1 400	1 900
	254.000	66.675	66.675	47.625	7.0	3.3	515 000	830 000	1 300	1 800
	254.000	66.675	66.675	47.625	7.0	3.3	515 000	830 000	1 300	1 800
152.400	254.000	66.675	66.675	47.625	7.0	3.3	515 000	830 000	1 300	1 800
158.750	225.425	41.275	39.688	33.338	3.5	3.3	240 000	540 000	1 400	1 900
165.100	247.650	47.625	47.625	38.100	3.5	3.3	345 000	705 000	1 300	1 700



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

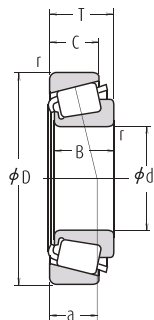
Static Equivalent Load

$P_0 = 0.5 F_r + Y_0 F_a$
 When $F_r > 0.5 F_r + Y_0 F_a$, use $P_0 = F_r$
 The values of e , Y_1 and Y_0 are given in the table below.

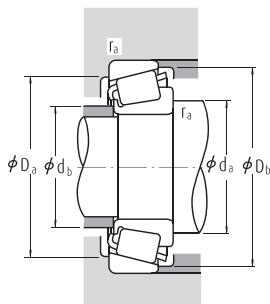
Bearing Numbers		Abutment and Fillet Dimensions (mm)						Eff. Load Centers (mm)	Constant	Axial Load Factors		Mass (kg)	
CONE	CUP	d _a	d _b	D _a	D _b	Cone	Cup			Y ₁	Y ₀	CONE	CUP
						r _a max.	approx.						
▲ JL 724348	▲ JL 724314	132	127	156	163	3.3	3.3	32.9	0.46	1.3	0.72	1.08	0.591
* M 224748	M 224710	135	129	163	168	3.5	1.5	32.2	0.33	1.8	0.99	1.9	0.866
48282	48220	136	133	168	176	3.5	3.3	34.2	0.31	2.0	1.1	2.56	1.14
795	792	139	134	186	198	3.3	3.3	45.7	0.46	1.3	0.72	4.44	1.9
48286	48220	139	133	168	176	3.5	3.3	34.2	0.31	2.0	1.1	2.37	1.14
▲ JL 725346	▲ JL 725316	138	133	161	168	3.3	3.3	34.3	0.48	1.3	0.69	1.19	0.573
LL 225749	LL 225710	135	132	158	160	1.5	1.5	24.2	0.33	1.8	0.99	0.647	0.288
48290	48220	141	135	168	176	3.5	3.3	34.2	0.31	2.0	1.1	2.19	1.14
67388	67322	144	138	180	189	3.5	3.3	39.7	0.34	1.7	0.96	3.74	1.46
74500	74850	148	141	196	208	3.5	3.3	48.4	0.49	1.2	0.68	4.92	1.99
799	792	146	140	186	198	3.3	3.3	45.7	0.46	1.3	0.72	3.86	1.9
797	792	148	141	186	198	3.5	3.3	45.7	0.46	1.3	0.72	3.76	1.9
67389	67320	146	141	183	191	3.5	3.3	39.7	0.34	1.7	0.96	3.51	2.06
799 A	792	148	142	186	198	3.5	3.3	45.7	0.46	1.3	0.72	3.74	1.9
L 327249	L 327210	143	141	167	171	1.5	1.5	29.5	0.35	1.7	0.95	1.18	0.55
48385	48320	148	142	177	184	3.5	3.3	35.9	0.32	1.9	1.0	2.58	1.16
67390	67322	149	143	180	189	3.5	3.3	39.7	0.34	1.7	0.96	3.27	1.46
74525	74850	152	146	196	208	3.5	3.3	48.4	0.49	1.2	0.68	4.44	1.99
48393	48320	151	144	177	184	3.5	3.3	35.9	0.32	1.9	1.0	2.31	1.16
74537	74856	155	148	197	210	3.5	3.3	48.4	0.49	1.2	0.68	4.19	2.13
LM 328448	LM 328410	149	147	176	182	1.5	1.5	31.7	0.36	1.7	0.93	1.59	0.67
74550	74850	158	151	196	208	3.5	3.3	48.4	0.49	1.2	0.68	3.93	1.99
99550	99100	170	156	227	238	7	3.3	55.3	0.41	1.5	0.81	9.99	3.83
48685	48620	158	151	185	193	3.5	3.3	37.6	0.34	1.8	0.98	2.63	1.19
36690	36620	155	154	182	188	1.5	1.5	33.5	0.37	1.6	0.90	1.64	0.725
HM 231140	HM 231110	164	160	217	224	3.5	3.3	45.9	0.32	1.9	1.0	6.07	2.93
99575	99100	175	162	227	238	7	3.3	55.3	0.41	1.5	0.81	9.24	3.83
99587	99100	178	165	227	238	7	3.3	55.3	0.41	1.5	0.81	8.86	3.83
99600	99100	181	167	227	238	7	3.3	55.3	0.41	1.5	0.81	8.46	3.83
46780	46720	176	169	209	218	3.5	3.3	44.3	0.38	1.6	0.86	3.69	1.66
67780	67720	185	179	229	240	3.5	3.3	52.4	0.44	1.4	0.75	5.83	2.33

Single-Row Tapered Roller Bearings (Inch Design)

Bore Diameter 170.000 – 206.375 mm



Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		
d	D	T	B	C	Cone r min.	Cup	C _r	C _{0r}	Grease	Oil
170.000	230.000	39.000	38.000	31.000	3.0	2.5	278 000	520 000	1 300	1 800
	240.000	46.000	44.500	37.000	3.0	2.5	380 000	720 000	1 300	1 800
174.625	247.650	47.625	47.625	38.100	3.5	3.3	345 000	705 000	1 300	1 700
177.800	227.012	30.162	30.162	23.020	1.5	1.5	181 000	415 000	1 300	1 800
	247.650	47.625	47.625	38.100	3.5	3.3	345 000	705 000	1 300	1 700
	260.350	53.975	53.975	41.275	3.5	3.3	455 000	835 000	1 200	1 700
190.000	260.000	46.000	44.000	36.500	3.0	2.5	370 000	730 000	1 100	1 600
190.500	266.700	47.625	46.833	38.100	3.5	3.3	345 000	720 000	1 100	1 500
200.000	300.000	65.000	62.000	51.000	3.5	2.5	615 000	1 130 000	1 000	1 400
203.200	282.575	46.038	46.038	36.512	3.5	3.3	365 000	800 000	1 000	1 400
206.375	282.575	46.038	46.038	36.512	3.5	3.3	365 000	800 000	1 000	1 400



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$$P_0 = 0.5 F_r + Y_0 F_a$$

When $F_r > 0.5 F_r + Y_0 F_a$, use $P_0 = F_r$

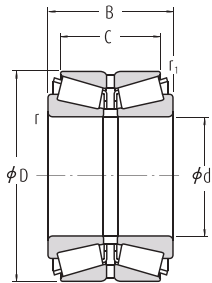
The values of e , Y_1 and Y_0 are given in the table below.

Bearing Numbers		Abutment and Fillet Dimensions (mm)						Eff. Load Centers (mm)	Constant	Axial Load Factors		Mass (kg)	
CONE	CUP	d_a	d_b	D_a	D_b	Cone f_a max.	Cup	a	e	Y_1	Y_0	approx. CONE	CUP
▲ JHM 534149	▲ JHM 534110	184	178	217	224	3	2.5	43.2	0.38	1.6	0.86	3.1	1.3
▲ JM 734449	▲ JM 734410	185	180	222	232	3	2.5	50.5	0.44	1.4	0.75	4.42	2.02
67787	67720	192	185	229	240	3.5	3.3	52.4	0.44	1.4	0.75	4.88	2.33
36990	36920	189	186	214	221	1.5	1.5	42.9	0.44	1.4	0.75	2.1	0.907
67790	67720	194	188	229	240	3.5	3.3	52.4	0.44	1.4	0.75	4.56	2.33
M 236849	M 236810	195	192	241	249	3.5	3.3	47.5	0.33	1.8	0.99	6.49	2.86
▲ JM 738249	▲ JM 738210	206	200	242	252	3	2.5	56.4	0.48	1.3	0.69	4.73	2.2
67885	67820	209	203	246	259	3.5	3.3	57.9	0.48	1.3	0.69	5.4	2.64
▲ JHM 840449	▲ JHM 840410	223	215	273	289	3.5	2.5	73.1	0.52	1.2	0.63	10.3	5.19
67983	67920	222	216	260	275	3.5	3.3	61.9	0.51	1.2	0.65	6.03	2.82
67985	67920	224	219	260	275	3.5	3.3	61.9	0.51	1.2	0.65	5.66	2.82



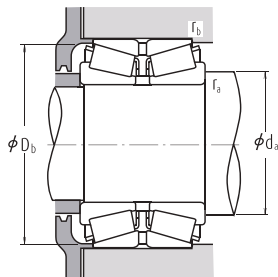
Double-Row Tapered Roller Bearings

Bore Diameter 40 – 90 mm



Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)	
d	D	B ₂	C	r min.	r ₁ min.	C _r	C _{0r}	Grease	Oil
40	80	45	37.5	1.5	0.6	109 000	140 000	3 700	5 100
45	85	47	37.5	1.5	0.6	117 000	159 000	3 400	4 700
	85	55	43.5	1.5	0.6	143 000	204 000	3 400	4 700
50	90	48	38.5	1.5	0.6	131 000	183 000	3 200	4 400
	90	49	39.5	1.5	0.6	131 000	183 000	3 200	4 400
	90	55	43.5	1.5	0.6	150 000	218 000	3 200	4 400
55	110	64	51.5	2.5	0.6	224 000	297 000	2 700	3 700
	100	51	41.5	2	0.6	162 000	226 000	2 900	3 900
	100	52	42.5	2	0.6	162 000	226 000	2 900	3 900
	100	60	48.5	2	0.6	188 000	274 000	2 900	3 900
60	120	70	57	2.5	0.6	256 000	342 000	2 500	3 400
	110	53	43.5	2	0.6	178 000	246 000	2 700	3 600
	110	66	54.5	2	0.6	225 000	335 000	2 700	3 600
65	130	74	59	3	1	298 000	405 000	2 300	3 200
	120	56	46.5	2	0.6	210 000	300 000	2 400	3 200
	120	57	47.5	2	0.6	210 000	300 000	2 400	3 200
65	120	73	61.5	2	0.6	269 000	405 000	2 400	3 300
	140	79	63	3	1	340 000	465 000	2 100	2 900
70	125	57	46.5	2	0.6	227 000	325 000	2 300	3 100
	125	59	48.5	2	0.6	227 000	325 000	2 300	3 100
	125	74	61.5	2	0.6	270 000	410 000	2 300	3 100
	150	83	67	3	1	390 000	535 000	2 000	2 700
75	130	62	51.5	2	0.6	245 000	365 000	2 200	3 000
	130	74	61.5	2	0.6	283 000	440 000	2 200	3 000
	160	87	69	3	1	435 000	600 000	1 900	2 500
80	140	61	49	2.5	0.6	269 000	390 000	2 000	2 800
	140	64	51.5	2.5	0.6	269 000	390 000	2 000	2 800
	140	78	63.5	2.5	0.6	330 000	505 000	2 000	2 800
85	170	92	73	3	1	475 000	655 000	1 700	2 400
	150	70	57	2.5	0.6	315 000	465 000	1 900	2 600
	150	86	69	2.5	0.6	360 000	555 000	1 900	2 600
90	180	98	77	4	1	530 000	745 000	1 600	2 200
	160	71	58	2.5	0.6	345 000	510 000	1 800	2 400
	160	74	61	2.5	0.6	345 000	510 000	1 800	2 400
	160	94	77	2.5	0.6	440 000	700 000	1 800	2 400

Remark For other double-row tapered roller bearings not listed above, please contact ITJ.



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	Y_3	0.67	Y_3

Static Equivalent Load

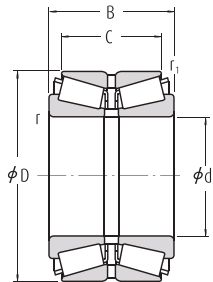
$$P_0 = F_r + Y_0 F_a$$

The values of e , Y_3 , Y_3 and Y_0 are given in the table below.

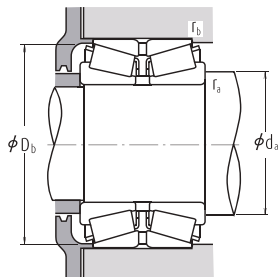
Bearing Numbers	Abutment and Fillet Dimensions (mm)				Constant e	Axial Load Factors			Mass (kg) approx.
	d_a min.	D_b min.	r_a max.	r_b max.		Y_2	Y_3	Y_0	
HR 40 KBE 42+L	51	75	1.5	0.6	0.37	2.7	1.8	1.8	0.97
HR 45 KBE 42+L	56	81	1.5	0.6	0.40	2.5	1.7	1.6	1.08
HR 45 KBE 52X+L	56	81	1.5	0.6	0.40	2.5	1.7	1.6	1.31
HR 50 KBE 042+L	61	87	1.5	0.6	0.42	2.4	1.6	1.6	1.20
HR 50 KBE 42+L	61	87	1.5	0.6	0.42	2.4	1.6	1.6	1.22
HR 50 KBE 52X+L	61	87	1.5	0.6	0.42	2.4	1.6	1.6	1.39
HR 50 KBE 043+L	65	104	2	0.6	0.35	2.9	2.0	1.9	2.77
HR 55 KBE 042+L	67	96	2	0.6	0.40	2.5	1.7	1.6	1.59
HR 55 KBE 1003+L	67	96	2	0.6	0.40	2.5	1.7	1.6	1.63
HR 55 KBE 52X+L	67	97	2	0.6	0.40	2.5	1.7	1.6	1.88
HR 55 KBE 43+L	70	113	2	0.6	0.35	2.9	2.0	1.9	3.52
HR 60 KBE 042+L	72	105	2	0.6	0.40	2.5	1.7	1.6	2.03
HR 60 KBE 52X+L	72	106	2	0.6	0.40	2.5	1.7	1.6	2.52
HR 60 KBE 43+L	78	122	2.5	1	0.35	2.9	2.0	1.9	4.40
HR 65 KBE 42+L	77	115	2	0.6	0.40	2.5	1.7	1.6	2.58
HR 65 KBE 1202+L	77	115	2	0.6	0.40	2.5	1.7	1.6	2.61
HR 65 KBE 52X+L	77	117	2	0.6	0.40	2.5	1.7	1.6	3.35
HR 65 KBE 43+L	83	132	2.5	1	0.35	2.9	2.0	1.9	5.42
HR 70 KBE 042+L	82	120	2	0.6	0.42	2.4	1.6	1.6	2.79
HR 70 KBE 42+L	82	120	2	0.6	0.42	2.4	1.6	1.6	2.85
HR 70 KBE 52X+L	82	121	2	0.6	0.42	2.4	1.6	1.6	3.58
HR 70 KBE 43+L	88	142	2.5	1	0.35	2.9	2.0	1.9	6.45
HR 75 KBE 42+L	87	126	2	0.6	0.44	2.3	1.6	1.5	3.15
HR 75 KBE 52X+L	87	127	2	0.6	0.44	2.3	1.6	1.5	3.73
HR 75 KBE 043+L	93	151	2.5	1	0.35	2.9	2.0	1.9	7.66
HR 80 KBE 042+L	95	134	2	0.6	0.42	2.4	1.6	1.6	3.70
HR 80 KBE 42+L	95	134	2	0.6	0.42	2.4	1.6	1.6	3.70
HR 80 KBE 52X+L	95	136	2	0.6	0.42	2.4	1.6	1.6	4.59
HR 80 KBE 043+L	98	161	2.5	1	0.35	2.9	2.0	1.9	9.02
HR 85 KBE 42+L	100	143	2	0.6	0.42	2.4	1.6	1.6	4.69
HR 85 KBE 52X+L	100	144	2	0.6	0.42	2.4	1.6	1.6	5.70
HR 85 KBE 043+L	106	169	3	1	0.35	2.9	2.0	1.9	10.8
HR 90 KBE 042+L	105	152	2	0.6	0.42	2.4	1.6	1.6	5.53
HR 90 KBE 42+L	105	152	2	0.6	0.42	2.4	1.6	1.6	5.71
HR 90 KBE 52X+L	105	154	2	0.6	0.42	2.4	1.6	1.6	7.26

Double-Row Tapered Roller Bearings

Bore Diameter 90 – 120 mm



Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)	
d	D	B ₂	C	r min.	r ₁ min.	C _r	C _{0r}	Grease	Oil
90	190	102	81	4	1	595 000	845 000	1 600	2 100
	190	144	115	4	1	770 000	1 180 000	1 600	2 200
95	170	78	63	3	1	385 000	570 000	1 700	2 300
	170	100	83	3	1	495 000	800 000	1 700	2 300
	200	108	85	4	1	640 000	910 000	1 500	2 000
100	165	52	46	2.5	0.6	222 000	340 000	1 700	2 300
	180	81	64	3	1	435 000	665 000	1 600	2 200
	180	81	65	3	1	435 000	665 000	1 600	2 200
	180	82	66	3	1	435 000	665 000	1 600	2 200
	180	83	67	3	1	435 000	665 000	1 600	2 200
	180	105	85	3	1	555 000	905 000	1 600	2 200
	180	107	87	3	1	555 000	905 000	1 600	2 200
	180	110	90	3	1	555 000	905 000	1 600	2 200
	215	112	87	4	1	725 000	1 050 000	1 400	1 900
	190	88	70	3	1	480 000	735 000	1 500	2 000
105	190	117	96	3	1	620 000	1 020 000	1 500	2 000
	190	115	95	3	1	620 000	1 020 000	1 500	2 000
	225	116	91	4	1	780 000	1 130 000	1 300	1 800
	180	56	50	2.5	0.6	264 000	400 000	1 500	2 000
110	180	70	56	2.5	0.6	340 000	555 000	1 500	2 000
	180	125	100	2.5	0.6	550 000	1 060 000	1 500	2 100
	200	90	72	3	1	540 000	840 000	1 400	1 900
	200	92	74	3	1	540 000	840 000	1 400	1 900
	200	120	100	3	1	685 000	1 130 000	1 400	1 900
	200	121	101	3	1	685 000	1 130 000	1 400	1 900
	240	118	93	4	1.5	830 000	1 190 000	1 200	1 700
	180	46	41	2.5	0.6	184 000	296 000	1 500	2 000
	180	58	46	2.5	0.6	260 000	450 000	1 500	2 000
	200	62	55	2.5	0.6	310 000	500 000	1 400	1 800
120	200	78	62	2.5	0.6	415 000	690 000	1 400	1 900
	200	100	84	2.5	0.6	515 000	885 000	1 400	1 800
	215	97	78	3	1	575 000	900 000	1 300	1 800
	215	132	109	3	1	750 000	1 270 000	1 300	1 800
	260	128	101	4	1	915 000	1 310 000	1 100	1 500
	260	188	145	4	1	1 320 000	2 110 000	1 100	1 500



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	Y_3	0.67	Y_2

Static Equivalent Load

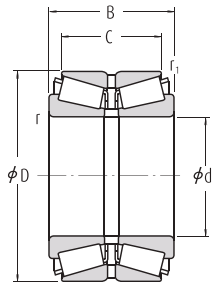
$$P_0 = F_r + Y_0 F_a$$

The values of e , Y_2 , Y_3 and Y_0 are given in the table below.

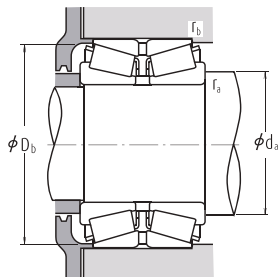
Bearing Numbers	Abutment and Fillet Dimensions (mm)				Constant e	Axial Load Factors			Mass (kg) approx.
	d_a min.	D_b min.	r_a max.	r_b max.		Y_2	Y_3	Y_0	
HR 90 KBE 043+L	111	178	3	1	0.35	2.9	2.0	1.9	12.7
HR 90 KBE 1901+L	111	179	3	1	0.35	2.9	2.0	1.9	17.9
HR 95 KBE 42+L	113	161	2.5	1	0.42	2.4	1.6	1.6	6.75
HR 95 KBE 52+L	113	163	2.5	1	0.42	2.4	1.6	1.6	8.60
HR 95 KBE 43+L	116	187	3	1	0.35	2.9	2.0	1.9	14.7
100 KBE 31+L	115	156	2	0.6	0.33	3.0	2.0	2.0	4.04
HR100 KBE 1805+L	118	170	2.5	1	0.42	2.4	1.6	1.6	8.16
HR100 KBE 042+L	118	170	2.5	1	0.42	2.4	1.6	1.6	8.13
HR100 KBE 1801+L	118	170	2.5	1	0.42	2.4	1.6	1.6	8.22
HR100 KBE 42+L	118	170	2.5	1	0.42	2.4	1.6	1.6	8.7
HR100 KBE 1802+L	118	173	2.5	1	0.42	2.4	1.6	1.6	10.6
HR100 KBE 52X+L	118	173	2.5	1	0.42	2.4	1.6	1.6	10.7
HR100 KBE 1804+L	118	173	2.5	1	0.42	2.4	1.6	1.6	11
HR100 KBE 043+L	121	200	3	1	0.35	2.9	2.0	1.9	18.1
HR105 KBE 42X+L	123	179	2.5	1	0.42	2.4	1.6	1.6	9.76
HR105 KBE 1902+L	123	182	2.5	1	0.42	2.4	1.6	1.6	13.4
HR105 KBE 52+L	123	182	2.5	1	0.42	2.4	1.6	1.6	13.1
HR105 KBE 043+L	126	209	3	1	0.35	2.9	2.0	1.9	20.4
110 KBE 31+L	125	172	2	0.6	0.39	2.6	1.7	1.7	5.11
110 KBE 031+L	125	172	2	0.6	0.39	2.6	1.7	1.7	6.33
110 KBE 1802+L	125	172	2	0.6	0.26	3.8	2.6	2.5	11.4
HR110 KBE 42+L	128	190	2.5	1	0.42	2.4	1.6	1.6	11.2
HR110 KBE 42X+L	128	190	2.5	1	0.42	2.4	1.6	1.6	11.5
HR110 KBE 2001+L	128	193	2.5	1	0.42	2.4	1.6	1.6	15.4
HR110 KBE 52X+L	128	193	2.5	1	0.42	2.4	1.6	1.6	15.2
HR110 KBE 043+L	131	223	3	1.5	0.35	2.9	2.0	1.9	23.6
120 KBE 30+L	135	172	2	0.6	0.40	2.5	1.7	1.6	3.75
120 KBE 030+L	135	172	2	0.6	0.39	2.6	1.7	1.7	4.64
120 KBE 31+L	135	190	2	0.6	0.39	2.6	1.7	1.7	7.35
120 KBE 031+L	135	190	2	0.6	0.39	2.6	1.7	1.7	8.97
120 KBE 2001+L	135	193	2	0.6	0.37	2.7	1.8	1.8	11.3
HR120 KBE 42X+L	138	204	2.5	1	0.44	2.3	1.6	1.5	13.7
HR120 KBE 52X+L	138	207	2.5	1	0.44	2.3	1.6	1.5	18.8
HR120 KBE 43+L	141	240	3	1	0.35	2.9	2.0	1.9	29.4
HR120 KBE 2601+L	141	242	3	1	0.35	2.9	2.0	1.9	44.6

Double-Row Tapered Roller Bearings

Bore Diameter 125 – 150 mm



Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)	
d	D	B ₂	C	r min.	r ₁ min.	C _r	C _{0r}	Grease	Oil
125	210	110	88	4	1	560 000	1 030 000	1 300	1 800
130	230	98	78.5	4	1	640 000	1 010 000	1 200	1 600
	230	100	80.5	4	1	640 000	1 010 000	1 200	1 600
	280	137	107.5	5	1.5	940 000	1 350 000	1 000	1 400
	230	145	115	4	1	905 000	1 580 000	1 200	1 700
	230	145	117.5	4	1	905 000	1 580 000	1 200	1 700
140	230	150	120	4	1	905 000	1 580 000	1 200	1 700
	210	53	47	2.5	0.6	280 000	495 000	1 200	1 700
	210	66	53	2.5	1	305 000	530 000	1 200	1 700
	210	106	94	2.5	0.6	555 000	1 200 000	1 300	1 700
	225	68	61	3	1	400 000	630 000	1 200	1 600
	225	84	68	3	1	490 000	850 000	1 200	1 600
	225	85	68	3	1	490 000	850 000	1 200	1 600
	230	120	94	3	1	685 000	1 270 000	1 200	1 600
	230	140	110	3	1	820 000	1 550 000	1 200	1 600
	240	132	106	4	1.5	685 000	1 360 000	1 100	1 500
150	250	102	82.5	4	1	670 000	1 030 000	1 100	1 500
	250	153	125.5	4	1	1 040 000	1 830 000	1 100	1 500
	300	145	115.5	5	1.5	1 030 000	1 480 000	1 000	1 300
	225	56	50	3	1	300 000	545 000	1 200	1 600
	225	70	56	3	1	395 000	685 000	1 200	1 600
	250	80	71	3	1	510 000	810 000	1 100	1 400
	250	100	80	3	1	630 000	1 090 000	1 100	1 400
	250	115	95	3	1	745 000	1 320 000	1 100	1 500
	260	150	115	4	1	815 000	1 520 000	1 100	1 400
	270	109	87	4	1	830 000	1 330 000	1 000	1 400
	270	164	130	4	1	1 210 000	2 150 000	1 000	1 400
	270	174	140	4	1	1 210 000	2 150 000	1 000	1 400
	320	154	120	5	1.5	1 420 000	2 130 000	900	1 200



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	Y_3	0.67	Y_3

Static Equivalent Load

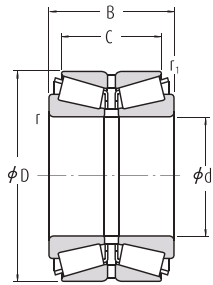
$$P_0 = F_r + Y_0 F_a$$

The values of e , Y_2 , Y_3 and Y_0 are given in the table below.

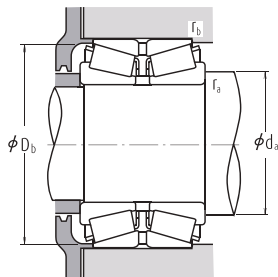
Bearing Numbers	Abutment and Fillet Dimensions (mm)				Constant e	Axial Load Factors			Mass (kg) approx.
	d_a min.	D_b min.	r_a max.	r_b max.		Y_2	Y_3	Y_0	
125 KBE 2101+L	146	201	3	1	0.43	2.3	1.6	1.5	14.5
HR130 KBE 42+L	151	220	3	1	0.44	2.3	1.6	1.5	15.8
HR130 KBE 2301+L	151	220	3	1	0.44	2.3	1.6	1.5	15.9
130 KBE 43+L	157	258	4	1.5	0.36	2.8	1.9	1.8	35
HR130 KBE 2302+L	151	221	3	1	0.44	2.3	1.6	1.5	24.1
HR130 KBE 52+L	151	222	3	1	0.44	2.3	1.6	1.5	23.8
HR130 KBE 2303+L	151	221	3	1	0.44	2.3	1.6	1.5	24.2
140 KBE 30+L	155	202	2	0.6	0.39	2.6	1.7	1.7	6.02
140 KBE 030+L	155	202	2	1	0.40	2.5	1.7	1.6	7.02
140 KBE 2101+L	155	202	2	0.6	0.33	3.0	2.0	2.0	12.3
140 KBE 31+L	158	216	2.5	1	0.39	2.6	1.7	1.7	9.31
140 KBE 031+L	158	215	2.5	1	0.39	2.6	1.7	1.7	11.6
140 KBE 2201+L	158	215	2.5	1	0.39	2.6	1.7	1.7	11.7
140 KBE 2301+L	158	220	2.5	1	0.33	3.0	2.0	2.0	17.6
140 KBE 2302+L	158	221	2.5	1	0.35	2.9	2.0	1.9	20.7
140 KBE 2401+L	161	227	3	1.5	0.44	2.3	1.5	1.5	22.7
HR140 KBE 42+L	161	237	3	1	0.44	2.3	1.6	1.5	18.9
HR140 KBE 52X+L	161	241	3	1	0.44	2.3	1.6	1.5	29.6
140 KBE 43+L	167	275	4	1.5	0.36	2.8	1.9	1.8	42.6
150 KBE 30+L	168	213	2.5	1	0.35	2.9	2.0	1.9	7.41
150 KBE 030+L	168	215	2.5	1	0.35	2.9	2.0	1.9	8.70
150 KBE 31+L	168	240	2.5	1	0.40	2.5	1.7	1.6	14.2
150 KBE 031+L	168	238	2.5	1	0.39	2.6	1.7	1.7	17.8
150 KBE 2502+L	168	238	2.5	1	0.37	2.7	1.8	1.8	20.9
150 KBE 2601+L	171	242	3	1	0.43	2.3	1.6	1.5	30.0
HR150 KBE 42+L	171	253	3	1	0.44	2.3	1.6	1.5	24.3
HR150 KBE 52X+L	171	257	3	1	0.44	2.3	1.6	1.5	37.3
HR150 KBE 2701+L	171	257	3	1	0.44	2.3	1.6	1.5	39.7
HR150 KBE 43+L	177	295	4	1.5	0.35	2.9	2.0	1.9	53.4

Double-Row Tapered Roller Bearings

Bore Diameter 160 – 200 mm



Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)	
d	D	B ₂	C	r min.	r ₁ min.	C _r	C _{0r}	Grease	Oil
160	240	60	53	3	1	355 000	580 000	1 100	1 500
	240	75	60	3	1	395 000	710 000	1 100	1 500
	240	110	90	3	1	650 000	1 290 000	1 100	1 500
	270	86	76	3	1	540 000	885 000	1 000	1 300
	270	108	86	3	1	775 000	1 380 000	1 000	1 300
	270	140	120	3	1	990 000	1 880 000	1 000	1 300
	280	150	125	4	1	1 100 000	2 020 000	1 000	1 300
	290	115	91	4	1	800 000	1 220 000	900	1 300
	290	178	144	4	1	1 360 000	2 440 000	1 000	1 300
	340	160	126	5	1.5	1 310 000	1 920 000	800	1 100
165	290	150	125	4	1	1 140 000	2 130 000	900	1 300
170	250	85	65	3	1	435 000	845 000	1 000	1 400
	260	67	60	3	1	400 000	700 000	1 000	1 300
	260	84	67	3	1	575 000	1 030 000	1 000	1 300
	280	88	78	3	1	630 000	1 040 000	900	1 300
	280	110	88	3	1	820 000	1 450 000	900	1 300
	280	150	130	3	1	1 110 000	2 160 000	1 000	1 300
	310	192	152	5	1.5	1 590 000	2 910 000	900	1 200
	280	74	66	3	1	455 000	810 000	900	1 300
	280	93	74	3	1	655 000	1 220 000	900	1 200
	300	96	85	4	1.5	725 000	1 210 000	900	1 200
180	300	120	96	4	1.5	940 000	1 690 000	900	1 200
	320	127	99	5	1.5	895 000	1 390 000	800	1 200
	320	192	152	5	1.5	1 640 000	3 050 000	900	1 200
	340	180	140	5	1.5	1 410 000	2 510 000	800	1 100
	290	75	67	3	1	490 000	845 000	900	1 200
	290	94	75	3	1	670 000	1 230 000	900	1 200
	320	104	92	4	1.5	800 000	1 380 000	800	1 100
	320	130	104	4	1.5	1 070 000	1 960 000	800	1 100
	340	133	105	5	1.5	990 000	1 580 000	800	1 100
	340	204	160	5	1.5	1 910 000	3 550 000	800	1 100
190	310	152	123	3	1	1 300 000	2 740 000	800	1 100
	320	146	110	5	1.5	990 000	2 120 000	800	1 100
	330	180	140	5	1.5	1 390 000	2 730 000	800	1 100
	340	112	100	4	1.5	940 000	1 670 000	800	1 000
	340	140	112	4	1.5	1 260 000	2 250 000	800	1 000
	360	142	110	5	1.5	1 100 000	1 780 000	700	1 000
	360	218	174	5	1.5	2 070 000	3 850 000	800	1 000



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	Y_3	0.67	Y_2

Static Equivalent Load

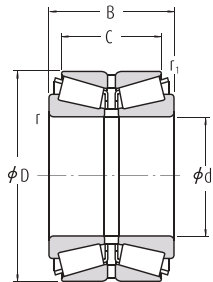
$$P_0 = F_r + Y_0 F_a$$

The values of e , Y_2 , Y_3 and Y_0 are given in the table below.

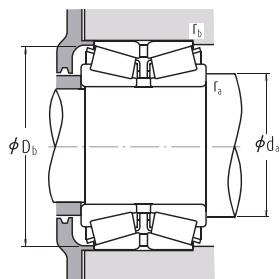
Bearing Numbers	Abutment and Fillet Dimensions (mm)				Constant e	Axial Load Factors			Mass (kg) approx.
	d_a min.	D_b min.	r_a max.	r_b max.		Y_2	Y_3	Y_0	
160 KBE 30+L	178	231	2.5	1	0.37	2.7	1.8	1.8	8.56
160 KBE 030+L	178	230	2.5	1	0.40	2.5	1.7	1.6	10.5
160 KBE 240+L	178	232	2.5	1	0.38	2.6	1.8	1.7	16.2
160 KBE 31+L	178	255	2.5	1	0.40	2.5	1.7	1.6	18.6
160 KBE 031+L	178	256	2.5	1	0.39	2.6	1.7	1.7	23.1
160 KBE 270+L	178	261	2.5	1	0.39	2.6	1.7	1.7	30.6
160 KBE 280+L	181	266	3	1	0.32	3.2	2.1	2.1	35.9
160 KBE 42+L	181	275	3	1	0.43	2.3	1.6	1.5	28.2
HR160 KBE 52X+L	181	277	3	1	0.44	2.3	1.6	1.5	47.3
160 KBE 43+L	187	314	4	1.5	0.36	2.8	1.9	1.8	60.4
165 KBE 290+L	186	272	3	1	0.33	3.1	2.1	2.0	39.5
170 KBE 250+L	188	241	2.5	1	0.44	2.3	1.5	1.5	12.3
170 KBE 30+L	188	248	2.5	1	0.40	2.5	1.7	1.6	11.8
170 KBE 030+L	188	249	2.5	1	0.39	2.6	1.7	1.7	14.4
170 KBE 31+L	188	266	2.5	1	0.39	2.6	1.7	1.7	19.7
170 KBE 031+L	188	268	2.5	1	0.39	2.6	1.7	1.7	24.2
170 KBE 2802+L	188	269	2.5	1	0.39	2.6	1.7	1.7	34.6
HR170 KBE 52X+L	197	297	4	1.5	0.44	2.3	1.6	1.5	57.3
180 KBE 30+L	198	265	2.5	1	0.40	2.5	1.7	1.6	15.4
180 KBE 030+L	198	265	2.5	1	0.35	2.9	2.0	1.9	14.4
180 KBE 31+L	201	284	3	1.5	0.39	2.6	1.7	1.7	24.8
180 KBE 031+L	201	287	3	1.5	0.39	2.6	1.7	1.7	31.1
180 KBE 42+L	207	300	4	1.5	0.44	2.3	1.5	1.5	36.5
HR180 KBE 52X+L	207	308	4	1.5	0.45	2.2	1.5	1.5	59.2
180 KBE 340+L	207	305	4	1.5	0.43	2.3	1.6	1.5	68.1
190 KBE 30+L	208	279	2.5	1	0.39	2.6	1.7	1.7	16.2
190 KBE 030+L	208	279	2.5	1	0.40	2.5	1.7	1.6	20.1
190 KBE 31+L	211	301	3	1.5	0.40	2.5	1.7	1.6	30.9
190 KBE 031+L	211	302	3	1.5	0.39	2.6	1.7	1.7	39.0
190 KBE 42+L	217	320	4	1.5	0.40	2.5	1.7	1.6	43.9
HR190 KBE 52X+L	217	327	4	1.5	0.44	2.3	1.6	1.5	70.8
HR200 KBE 310+L	218	301	2.5	1	0.43	2.3	1.6	1.5	40.1
200 KBE 320+L	227	301	4	1.5	0.52	1.9	1.3	1.3	41.6
200 KBE 330+L	227	316	4	1.5	0.42	2.4	1.6	1.6	54.4
200 KBE 31+L	221	321	3	1.5	0.40	2.5	1.7	1.6	38.8
200 KBE 031+L	221	324	3	1.5	0.39	2.6	1.7	1.7	47.0
200 KBE 42+L	227	338	4	1.5	0.40	2.5	1.7	1.6	52.6
HR200 KBE 52+L	227	344	4	1.5	0.41	2.5	1.7	1.6	88.3

Double-Row Tapered Roller Bearings

Bore Diameter 206 – 260 mm



Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)	
d	D	B ₂	C	r min.	r ₁ min.	C _r	C _{0r}	Grease	Oil
206	283	102	83	4	1.5	580 000	1 430 000	900	1 200
210	355	116	103	4	1.5	905 000	1 520 000	700	1 000
220	300	110	88	3	1	730 000	1 710 000	800	1 100
	340	90	80	4	1.5	695 000	1 280 000	700	1 000
	340	113	90	4	1.5	920 000	1 830 000	700	1 000
	370	120	107	5	1.5	1 110 000	1 940 000	700	1 000
	370	150	120	5	1.5	1 460 000	2 760 000	700	1 000
	400	158	122	5	1.5	1 390 000	2 300 000	600	900
240	360	92	82	4	1.5	780 000	1 490 000	700	900
	360	115	92	4	1.5	1 020 000	2 040 000	700	900
	400	128	114	5	1.5	1 180 000	2 190 000	600	900
	400	160	128	5	1.5	1 620 000	3 050 000	600	900
	400	209	168	5	1.5	2 220 000	4 450 000	600	900
250	380	98	87	4	1	795 000	1 460 000	600	900
260	400	104	92	5	1.5	895 000	1 670 000	600	800
	400	130	104	5	1.5	1 210 000	2 460 000	600	800
	440	144	128	5	1.5	1 540 000	2 760 000	600	800
	440	172	145	5	1.5	1 870 000	3 500 000	600	800
	440	180	144	5	1.5	2 110 000	4 150 000	600	800



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	Y_3	0.67	Y_3

Static Equivalent Load

$$P_0 = F_r + Y_0 F_a$$

The values of e , Y_2 , Y_3 and Y_0 are given in the table below.

Bearing Numbers	Abutment and Fillet Dimensions (mm)				Constant e	Axial Load Factors			Mass (kg) approx.
	d_a min.	D_b min.	r_a max.	r_b max.		Y_2	Y_3	Y_0	
206 KBE 2801+L	227	275	3	1.5	0.51	2.0	1.3	1.3	18.1
210 KBE 31+L	231	338	3	1.5	0.46	2.2	1.5	1.4	41.7
220 KBE 3001+L	238	292	2.5	1	0.37	2.7	1.8	1.8	21.2
220 KBE 30+L	241	324	3	1.5	0.40	2.5	1.7	1.6	27.9
220 KBE 030+L	241	327	3	1.5	0.40	2.5	1.7	1.6	34.7
220 KBE 31+L	247	345	4	1.5	0.39	2.6	1.7	1.7	48.3
220 KBE 031+L	247	349	4	1.5	0.39	2.6	1.7	1.7	60.2
220 KBE 42+L	247	371	4	1.5	0.40	2.5	1.7	1.6	74.2
240 KBE 30+L	261	344	3	1.5	0.39	2.6	1.7	1.7	30.1
240 KBE 030+L	261	344	3	1.5	0.35	2.9	2.0	1.9	37.3
240 KBE 31+L	267	380	4	1.5	0.43	2.3	1.6	1.5	60.0
240 KBE 031+L	267	378	4	1.5	0.39	2.6	1.7	1.7	73.6
240 KBE 4003+L	267	384	4	1.5	0.33	3.0	2.0	2.0	96.4
250 KBE 3801+L	271	365	3	1	0.40	2.5	1.7	1.6	35.5
260 KBE 30+L	287	379	4	1.5	0.40	2.5	1.7	1.6	43.4
260 KBE 030+L	287	382	4	1.5	0.40	2.5	1.7	1.6	54.1
260 KBE 31+L	287	416	4	1.5	0.39	2.6	1.7	1.7	82.5
260 KBE 4401+L	287	414	4	1.5	0.38	2.6	1.8	1.7	98.1
260 KBE 031+L	287	416	4	1.5	0.39	2.6	1.7	1.7	104.0





Spherical Roller Bearings

DESIGNS, TYPES AND FEATURES

High load capacity designs EA, C, CD and CA, shown in the figures are available. Types EA, C and CD have pressed steel cages, and type CA has machined brass cage. The EA type bearings listed here are classified as ITJ bearings, which offer particularly high load-carrying capacity, high limiting speeds and are highly functional under high-temperature operating conditions of up to 200°C.

An oil groove and holes are provided in the outer ring to supply lubricant and the bearing numbers are suffixed with E4.

To use bearings with oil grooves and holes, it is recommended to provide an oil groove in the housing bore, since the depth of the groove in the bearing is limited. The number and dimensions of the oil groove and holes are shown in Tables 1 and 2.

If bearings with a hole for a locking pin to prevent outer ring rotation are required, please inform ITJ.

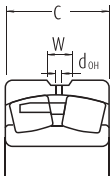
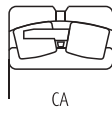
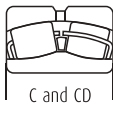


Table 1 Dimensions of Oil Grooves and Holes Units : mm

Nominal Outer Ring Width C		Oil Groove Width W	Hole Diameter d_{OH}
over	incl.		
18	30	5	2.5
30	40	6	3
40	50	7	4
50	65	8	5
65	80	10	6
80	100	12	8
100	120	15	10
120	160	20	12
160	200	25	15
200	250	30	20
250	315	35	20
315	400	40	25
400	—	40	25

Table 2 Number of Oil Holes

Nominal Outer Ring Diameter D (mm)		Number of Holes
over	incl.	
—	180	4
180	250	6
250	315	6
315	400	6
400	500	6
500	630	8
630	800	8
800	1000	8
1000	1250	8
1250	1600	8
1600	2000	8

PERMISSIBLE MISALIGNMENT

The permissible misalignment of spherical roller bearings varies depending on the size and load, but it is approximately 0.018 to 0.045 radian (1° to 2.5°) with normal loads.

LIMITING SPEEDS (GREASE)

The limiting speeds (grease) listed in the bearing tables should be adjusted depending on the bearing load conditions. Also, higher speeds are attainable by making changes in the lubrication method, cage design, etc.

PRECAUTIONS FOR USE OF SPHERICAL ROLLER BEARINGS

If the load on spherical roller bearings becomes too small during operation or if the ratio of axial and radial loads is larger than the value of 'e' (listed in the bearing tables), slippage occurs between the rollers and raceways, which may result in smearing. The higher the weight of the rollers and cage, the higher this tendency becomes, especially for large spherical roller bearings.

If very small bearing loads are expected, please contact ITJ for selection of an appropriate bearing.



Spherical Roller Bearings

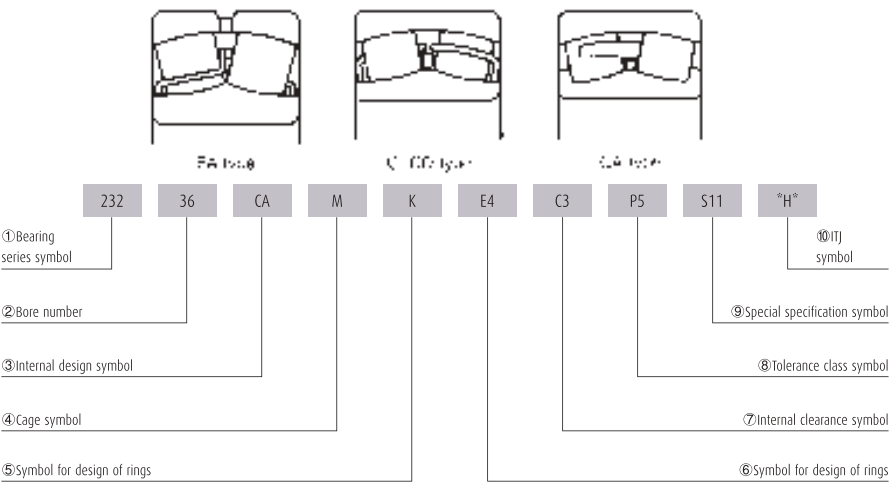
TECHNICAL DATA

Free Space of Spherical Roller Bearings

The spherical roller bearing has self-aligning ability and capacity to carry substantially large radial and bi-axial loads. For these reasons, this bearing is used widely in many applications. Application problems include a long span, which causes substantial deflection of the shaft, as well as installation errors and axial misalignment. These bearings may be exposed to a large radial or shock loads.

Grease lubrication is common for spherical roller bearings because it simplifies the seal construction around the housing and makes maintenance and inspection easier. In this case, it is important to select a grease appropriate to the operating conditions and to fill the bearing with the proper amount of grease considering the housing internal space.

As a reference, the bearing free space for conventional types plus four other types (EA, C, CD, and CA) is shown in Table 1. Under general operating conditions, it is appropriate to pack a large quantity of grease into the bearing internal space and to pack grease into the housing internal space other than the bearing itself, to the extent of 1/3 to 2/3 that of the free space.



- ① Bearing series symbol 239, 230, 240, 231, 241, 222, 232, 213, 223: Spherical Roller Bearings
Bore number indicates bore diameter. Bore number $\times 5$ (mm)
EA, CA: High Load Capacity
M: Machined Brass Cage (for CA Design)
Omitted: Pressed Steel Cage (for EA Design)
K: Tapered Bore of Inner Ring (Taper 1:12)
K30: Tapered Bore of Inner Ring (Taper 1:30)
E4: Lubricating groove in outside surface and Holes in outer ring
Omitted: CN clearance, C3: Clearance greater than CN,
C4: Clearance greater than C3, C5: Clearance greater than C4
Omitted: ISO Normal, P6: ISO Class 6, P5: ISO Class 5, P4: ISO Class 4
S11: Dimensional Stabilizing Treatment Working Temperature Lower than 200°C
(Omitted for EA Design)
°H°: ITJ Symbol
Tolerance Class: ISO Normal
- ② Bore number
- ③ Internal design symbol
- ④ Cage symbol
- ⑤ Symbol for design of rings
- ⑦ Internal clearance symbol
- ⑧ Tolerance class symbol
- ⑨ Special specification symbol
- ⑩ ITJ

Table 1 Free Space of Spherical Roller Bearing (EA, C, CD, and CA)

Units : cm³

Bearing Bore No.	Bearing Free Space				
	Bearing Series				
	230	231	222	232	223
11	—	—	29	—	78
12	—	—	42	—	96
13	—	—	48	—	113
14	—	—	52	—	139
15	—	—	57	—	170
16	—	—	71	—	206
17	—	—	91	—	234
18	—	—	110	130	283
19	—	—	135	—	327
20	—	—	169	203	410
22	100	150	242	294	560
24	109	228	297	340	700
26	161	240	365	405	955
28	170	292	400	530	1 230
30	209	465	505	680	1 430
32	254	575	680	850	1 710
34	355	610	785	1 090	2 070
36	465	785	810	1 120	2 460
38	565	970	1 160	1 340	2 830
40	715	1 160	1 400	1 640	2 900
44	940	1 500	1 880	2 270	3 750
48	1 030	1 900	2 550	3 550	4 700
52	1 530	2 940	3 300	4 750	5 900
56	1 820	3 150	3 400	4 950	7 250
60	2 200	4 050	4 300	6 200	8 750

Remarks

22211 to 22226, 22311 to 22324 are EA Type Bearings.
 23122 to 23148, 23218 to 23244 are C Type Bearings.
 23022 to 23036, 22228 to 22236 are CD Type Bearings.
 23038 to 23060, 23152 to 23160, 22238 to 22260,
 23248 to 23260, and 22326 to 22360 are CA Type Bearing.

Spherical Roller Bearings

Measurement of Bearing Clearance

For the bearing mounting, the measurement of internal bearing clearance is a most important task. Before handling the bearing and measuring the internal bearing clearance, be sure to wear thin rubber gloves. (If a bearing is touched by a bare hand, the touched part may rust.) When measuring the internal bearing clearance, pay careful attention so that the rollers are positioned correctly.

1. Measurement of Bearing Clearance

To measure only internal bearing clearance, set the bearing standing upright (vertically) on a flat surface, while holding its outer ring with one hand. While paying attention not to incline the inner and outer rings, stabilize the rollers by turning the inner ring to the right and left by about one half to one full rotation. Adjust rollers until one randomly chosen roller of the double rows is positioned to be exactly at the top. Now, the internal clearance is measured with a thickness gauge. The measurement position and measured point vary slightly depending on the size of the outer ring outside diameter.

1.1 Bearing Outside Diameter Is Smaller Than 200 mm

Insert the thickness gauge between rollers of 2 rows which have a roller positioned exactly at the top of the bearing and outer ring. Now, measure the internal clearance (Δ_i). (Fig. 1)

1.2 Bearing Outside Diameter Is Larger Than 200 mm

Insert the thickness gauge between the rollers of the 2 rows, which each have been positioned to be exactly at the top, and outer ring and between 2 rows of bearing at symmetrical position relative to the bearing center, then measure the respective

internal clearance of the bearing. (Fig. 2). For the internal bearing clearance (Δ_i), take that value measured between 2 rows of just top of bearing and outer ring as respectively Δ_{i1} and Δ_{i2} and that value measured just at top of the bearing as Δ_{it} .

$$\Delta_{it} = 1/2 (\Delta_{i1} + \Delta_{i2})$$

Among internal clearances between 2 rows of rollers that are symmetrical relative to the bearing center and outer ring, take that measurement between 2 rows of rollers of left side respectively as Δ_{il1} and Δ_{il2} . The internal clearance on the left side of the bearing is Δ_{il} :

$$\Delta_{il} = 1/2 (\Delta_{il1} + \Delta_{il2})$$

Take that measurement between 2 rows of rollers of right side respectively as Δ_{ir1} and Δ_{ir2} . The internal clearance of the right side of the bearing is Δ_{ir} :

$$\Delta_{ir} = 1/2 (\Delta_{ir1} + \Delta_{ir2})$$

The internal bearing clearance (Δ_i) is given by the following equation:

$$\Delta_i = 1/2 (\Delta_{it} + \Delta_{il} + \Delta_{ir})$$

2. Measuring Bearing Clearance When Mounted on Shaft or Sleeve

Basically, the measurement of the clearance is taken when the outer ring of bearing hangs down from rollers. At first, while holding the bearing up-right, rotate the outer ring in the clockwise and counter-clockwise directions by one half to one full rotation until both rows have a randomly chosen roller positioned exactly at the bottom. The clearance is measured with a thickness gauge but diameter.

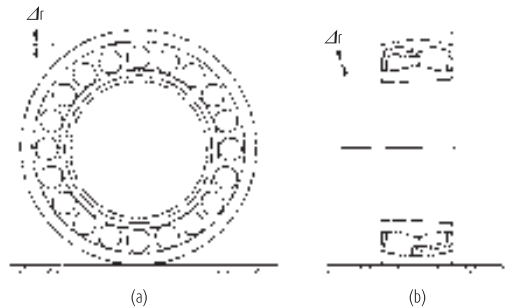


Fig. 1 Clearance Measurement Point (Bearing Outside Diameter: Less Than 200 mm)

the measurement point varies slightly depending on the size of the outer ring outside diameter.

2.1 Bearing Outside Diameter Is Smaller Than 200 mm

Insert the thickness gauge between rollers of 2 rows that are positioned just at the bottom of bearing and outer ring and measure the internal clearance (Δ_{IS}). (Fig. 3)

2.2 Bearing Outside Diameter Is Larger Than 200 mm

Insert the thickness gauge between rollers of 2 rows that are positioned just at the bottom of bearing and outer ring and between 2 rows of bearing rollers symmetrical relative to the bearing center, then, measure the respective internal clearance of the bearing. (Fig. 3) For the internal bearing clearance (Δ_I), take the measurement when the roller is positioned exactly at the bottom, since the bearing has 2 rows, two values must be measured. The bearing internal clearance is Δ_{IS1} and Δ_{IS2} while that value measured at the exact bottom of the bearing is Δ_{IS} .

$$\Delta_{IS} = 1/2 (\Delta_{IS1} + \Delta_{IS2})$$

Among internal clearances between 2 rows of rollers symmetrical relative to the bearing center and outer ring, take that value measured between 2 rows of rollers of left side respectively as Δ_{IL1} and Δ_{IL2} and the internal clearance of left side of bearing as Δ_{IL} .

$$\Delta_{IL} = 1/2 (\Delta_{IL1} + \Delta_{IL2})$$

The internal clearances measured between 2 rows of rollers on the right side respectively as Δ_{IR1} and Δ_{IR2} . The internal clearance of right side of bearing is Δ_{IR} .

$$\Delta_{IR} = 1/2 (\Delta_{IR1} + \Delta_{IR2})$$

The internal bearing clearance (Δ_I) is given by the following equation:

$$\Delta_I = 1/2 (\Delta_{IS} + \Delta_{IL} + \Delta_{IR})$$

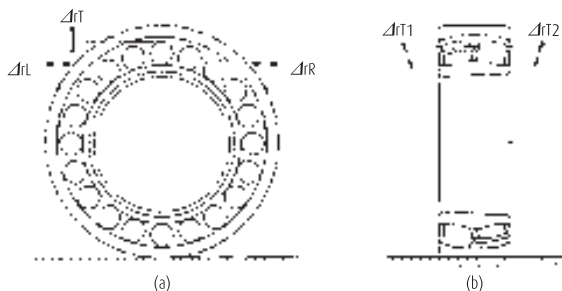


Fig. 2 Clearance Measurement Point (Bearing Outside Diameter: Larger Than 200 mm)

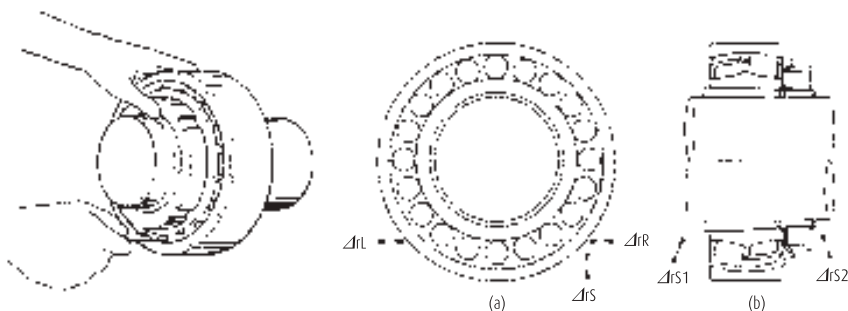


Fig. 3 Clearance Measurement Point

Spherical Roller Bearings

3. Temperature Equilibrium When Taking Measurements

To ensure accurate bearing measurement of the internal clearance or dimensions, the temperature of the measurement instrument and that of the components to be measured must be brought to the same temperature. Especially, if the bearing is mounted by using an oil heating tank or induction heater, then measure the internal clearance only after a complete cool down. For example, if a bearing is brought from the warehouse to the measurement place, the temperature of the stored bearing may still be high, thus, if the clearance or dimension were measured without confirming the bearing temperature, the measured value may be wrong.

For a large bearing with an outer ring outside diameter that is larger than 400 mm, if a clearance or dimension measurement is necessary, it is recommended to leave the unpacked bearing for about 24 hours on the surface plate, before making a clearance or dimension measurement. Put the end face of the bearing on a surface plate prior to measurement to ensure a measurement with both objects at the same temperature.

4. Clearance Adjustment When Mounting Bearing on a Tapered Shaft or Sleeve

Mount the bearing with its inner ring having a tapered bore to the tapered shaft or sleeve (adapter, removable sleeve). When pushing in the bearing to the tapered shaft or sleeve, the inner ring of bearing is widened resulting in increase of "interference" and reduction of internal clearance. It is important to give proper interference and internal clearance when mounting the bearing. Next, we show the reduction amount of the clearance to achieve the proper mounting.

(Mounting of spherical roller bearings having tapered bore Table 2)

When mounting a bearing, each time the bearing is pushed further onto the tapered shaft or sleeve, measure the variation of internal clearance and repeat the above procedure until the clearance reduction amount to the specified value listed in the Table 2 is attained. This procedure is called "Clearance adjustment" and when the clearance reduction amount is attained, the clearance necessary for bearing running is secured. The confirmation of the clearance reduction amount by measurement with a thickness gauge is very important. Depending on the method of clearance adjustment, the measured value obtained with the thickness gauge may not be correct. Therefore, the following corrective procedure must be executed.

1. In case to heat

When the temperatures of bearing and shaft are both at the same room temperature, measure again the clearance with the thickness gauge to confirm that the specified value is secured.

2. In case that a lock-washer is used as a turning stopper of the lock nut.

Prior to bending the tooth of the lock-washer into cutout of lock nut, measure again the clearance with the thickness gauge to confirm that the specified value is secured.

3. In case a hydraulic nut is used

After removal of the hydraulic nut, mount the lock nut and measure the clearance again to confirm that the specified value remains constant prior to stopping the turning.

4. In case an oil injection pump is used

Drop to zero the pressure of high pressure oil fed from the oil injection pump so that there is no pressure on bearing or sleeve fitted part. Next, measure the clearance with the thickness gauge to confirm that the specified value remains secured.

Radial Internal Clearance and Clearance Reduction Amount of the Bearing to be Mounted

- › When radial internal clearance is CN clearance (normal clearance) Perform the clearance adjustment while aiming at a middle value between minimum and maximum clearance reduction amount.
- › When radial internal clearance is C3 or C4 clearance Perform the clearance adjustment aiming at the maximum clearance reduction amount.

Internal Clearance Adjustment of Tapered-Bore Bearings

Perform the adjustment by measuring the clearance reduction amount with the thickness gauge.

1. To mount a bearing on a tapered shaft, perform each time when the bearing is pushed in by the lock nut, end plate, end cap or hydraulic nut.
2. When using an adapter sleeve, perform each time when the bearing is pushed in by the lock nut or hydraulic nut.
3. When using a removable sleeve, perform each time when the removable sleeve is pushed in by the lock nut or hydraulic nut.

When measuring the clearance during those operations, as the outer ring of bearing is hanging down from of rollers, turn the outer ring to right and left by one half to one full rotation while keeping the bearing in its correct posture.

Position one randomly chosen roller from each row of rollers to the exact bottom position. Then, insert the thickness gauge to an appropriate place depending on size of the outer ring outside diameter to measure the internal clearance. For the clearance adjustment, the measured value of each clearance measurement shall be recorded.

Table 2 Mounting of Spherical Roller Bearings with Tapered Bores

Units : mm

Bearing Bore Diameter d (mm)		Reduction in Radial Clearance		Axial Movement				Minimum Permissible Residual Clearance		
over	incl.	min.	max.	Taper 1:12		Taper 1:30				
				min.	max.	min.	max.			
30	40	0.025	0.030	0.40	0.45	—	—	0.010	0.025	0.035
40	50	0.030	0.035	0.45	0.55	—	—	0.015	0.030	0.045
50	65	0.030	0.035	0.45	0.55	—	—	0.025	0.035	0.060
65	80	0.040	0.045	0.60	0.70	—	—	0.030	0.040	0.075
80	100	0.045	0.055	0.70	0.85	1.75	2.15	0.035	0.050	0.085
100	120	0.050	0.060	0.75	0.90	1.9	2.25	0.045	0.065	0.110
120	140	0.060	0.070	0.90	1.1	2.25	2.75	0.055	0.080	0.130
140	160	0.065	0.080	1.0	1.3	2.5	3.25	0.060	0.100	0.150
160	180	0.070	0.090	1.1	1.4	2.75	3.5	0.070	0.110	0.170
180	200	0.080	0.100	1.3	1.6	3.25	4.0	0.070	0.110	0.190
200	225	0.090	0.110	1.4	1.7	3.5	4.25	0.080	0.130	0.210
225	250	0.100	0.120	1.6	1.9	4.0	4.75	0.090	0.140	0.230
250	280	0.110	0.140	1.7	2.2	4.25	5.5	0.100	0.150	0.250
280	315	0.120	0.150	1.9	2.4	4.75	6.0	0.110	0.160	0.280
315	355	0.140	0.170	2.2	2.7	5.5	6.75	0.120	0.180	0.300
355	400	0.150	0.190	2.4	3.0	6.0	7.5	0.130	0.200	0.330
400	450	0.170	0.210	2.7	3.3	6.75	8.25	0.140	0.220	0.360
450	500	0.190	0.240	3.0	3.7	7.5	9.25	0.160	0.240	0.390
500	560	0.210	0.270	3.4	4.3	8.5	11.0	0.170	0.270	0.410
560	630	0.230	0.300	3.7	4.8	9.25	12.0	0.200	0.310	0.460
630	710	0.260	0.330	4.2	5.3	10.5	13.0	0.220	0.330	0.520
710	800	0.280	0.370	4.5	5.9	11.5	15.0	0.240	0.390	0.590
800	900	0.310	0.410	5.0	6.6	12.5	16.5	0.280	0.430	0.660
900	1 000	0.340	0.460	5.5	7.4	14.0	18.5	0.310	0.470	0.730
1 000	1 120	0.370	0.500	5.9	8.0	15.0	20.0	0.360	0.530	0.800

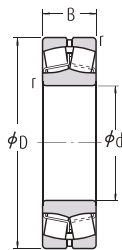
Remarks

The values for reduction in radial internal clearance are for bearings with CN clearance.

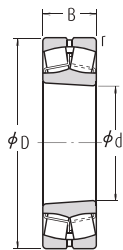
For bearings with C3 or C4 Clearance, the maximum values listed should be used for the reduction in radial internal clearance.

Spherical Roller Bearings

Bore Diameter 20 – 55 mm



Cylindrical Bore
EA



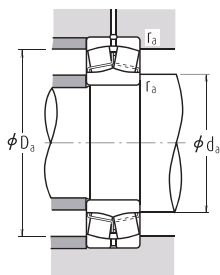
Tapered Bore
EA



Without an Oil Groove or Holes
CD

Boundary Dimensions (mm)				Basic Load Ratings (N)		Thermal Reference Speed	Speeds (min ⁻¹)		Bearing
d	D	B	r min.	C _r	C _{0r}		Limiting Speeds		Cylindrical Bore
							Mechanical	Grease	
20	52	15	1.1	29 300	26 900	10 000	—	6 300	21304CE4
25	52	18	1.0	37 500	37 000	10 000	—	7 100	22205CE4
	62	17	1.1	43 000	40 500	9 000	—	5 300	21305CE4
30	62	20	1.0	50 000	50 000	8 500	—	6 000	22206CE4
	72	19	1.1	55 000	54 000	7 500	—	4 500	21306CE4
35	72	23	1.1	69 000	71 000	7 500	—	5 300	22207CE4
	80	21	1.5	71 500	76 000	7 100	—	4 000	21307CE4
40	80	23	1.1	113 000	99 000	7 100	12 000	6 700	22208EA4 ^o
	90	23	1.5	118 000	111 000	6 700	11 000	6 000	21308EA4 ^o
	90	33	1.5	170 000	153 000	5 600	9 000	5 300	22308EA4 ^o
45	85	23	1.1	118 000	111 000	6 300	11 000	6 000	22209EA4 ^o
	100	25	1.5	149 000	144 000	6 000	9 000	5 000	21309EA4 ^o
	100	36	1.5	207 000	195 000	5 000	8 000	4 500	22309EA4 ^o
50	90	23	1.1	124 000	119 000	6 000	9 500	5 600	22210EA4 ^o
	110	27	2.0	178 000	174 000	5 300	8 000	4 500	21310EA4 ^o
	110	40	2.0	246 000	234 000	4 800	7 100	4 300	22310EA4 ^o
55	100	25	1.5	149 000	144 000	5 300	9 000	5 300	22211EA4 ^o
	120	29	2.0	178 000	174 000	5 300	8 000	4 500	21311EA4 ^o
	120	43	2.0	292 000	292 000	4 300	6 000	3 800	22311EA4 ^o

Note (¹) The suffix K represents bearings with tapered bores (taper 1 : 12).



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	Y_3	0.67	Y_3

Static Equivalent Load

$$P_0 = F_r + Y_0 F_a$$

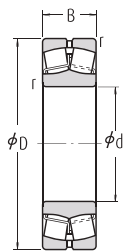
The values of e , Y_2 , Y_3 and Y_0 are given in the table below.

Numbers	Abutment and Fillet Dimensions (mm)					Constant e	Axial Load Factors			Mass (kg) approx.
	d_3		D_3		r_a		Y_2	Y_3	Y_0	
Tapered Bore (1)	min.	max.	min.	max.	max.					
21304CDKE4	27	28	45	42	1.0	0.31	3.2	2.1	2.1	0.17
22205CKE4	31	31	46	45	1.0	0.35	2.9	1.9	1.9	0.17
21305CDKE4	32	34	55	51	1.0	0.29	3.4	2.3	2.3	0.26
22206CKE4	36	37	56	54	1.0	0.33	3.1	2.1	2.0	0.27
21306CDKE4	37	40	65	59	1.0	0.28	3.6	2.4	2.3	0.39
22207CKE4	42	43	65	63	1.0	0.32	3.1	2.1	2.0	0.42
21307CDKE4	44	47	71	67	1.5	0.28	3.6	2.4	2.4	0.53
22208EAKE4*	47	49	73	70	1.0	0.28	3.6	2.4	2.4	0.50
21308EAKE4*	49	55	81	75	1.5	0.25	3.9	2.7	2.6	0.73
22308EAKE4*	49	52	81	77	1.5	0.35	2.8	1.9	1.9	0.98
22209EAKE4*	52	55	78	75	1.0	0.25	3.9	2.7	2.6	0.55
21309EAKE4*	54	65	91	89	1.5	0.23	4.3	2.9	2.8	0.96
22309EAKE4*	54	60	91	86	1.5	0.34	2.9	2.0	1.9	1.34
22210EAKE4*	57	60	83	81	1.0	0.24	4.3	2.9	2.8	0.61
21310EAKE4*	60	72	100	98	2.0	0.23	4.4	3.0	2.9	1.21
22310EAKE4*	60	64	100	93	2.0	0.35	2.8	1.9	1.9	1.78
22211EAKE4*	64	65	91	89	1.5	0.23	4.3	2.9	2.8	0.81
21311EAKE4*	65	72	110	98	2.0	0.23	4.4	3.0	2.9	1.58
22311EAKE4*	65	73	110	103	2.0	0.34	2.9	2.0	1.9	2.3

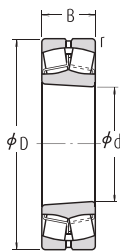


Spherical Roller Bearings

Bore Diameter 60 – 90 mm



Cylindrical Bore
EA



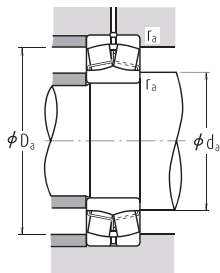
Tapered Bore
EA



Without an Oil Groove or Holes
CD

Boundary Dimensions (mm)				Basic Load Ratings (N)		Thermal Reference Speed	Speeds (min ⁻¹)		Bearing
d	D	B	r min.	C _r	C _{0r}		Limiting Speeds		Cylindrical Bore
							Mechanical	Grease	
60	95	26.0	1.1	98 500	141 000	4 800	—	3 600	23012CE4
	110	28.0	1.5	178 000	174 000	5 300	8 000	4 800	22212EAE4*
	130	31.0	2.1	238 000	244 000	4 800	6 700	3 800	21312EAE4*
	130	46.0	2.1	340 000	340 000	4 000	5 600	3 600	22312EAE4*
65	120	31.0	1.5	221 000	230 000	4 800	7 500	4 300	22213EAE4*
	140	33.0	2.1	264 000	275 000	4 500	6 000	3 600	21313EAE4*
	140	48.0	2.1	375 000	380 000	3 800	5 000	3 200	22313EAE4*
70	125	31.0	1.5	225 000	232 000	4 500	7 100	4 000	22214EAE4*
	150	35.0	2.1	310 000	325 000	4 300	5 600	3 200	21314EAE4*
	150	51.0	2.1	425 000	435 000	3 600	4 800	3 000	22314EAE4*
75	130	31.0	1.5	238 000	244 000	4 300	6 700	4 000	22215EAE4*
	160	37.0	2.1	310 000	325 000	4 000	5 600	3 200	21315EAE4*
	160	55.0	2.1	485 000	505 000	3 400	4 300	2 800	22315EAE4*
80	140	33.0	2.0	264 000	275 000	4 000	6 000	3 600	22216EAE4*
	170	39.0	2.1	355 000	375 000	3 800	4 800	3 000	21316EAE4*
	170	58.0	2.1	540 000	565 000	3 200	3 800	2 600	22316EAE4*
85	150	36.0	2.0	310 000	325 000	4 000	5 600	3 400	22217EAE4*
	180	41.0	3.0	360 000	395 000	3 800	5 000	3 000	21317EAE4*
	180	60.0	3.0	600 000	630 000	3 000	3 400	2 400	22317EAE4*
90	160	40.0	2.0	360 000	395 000	3 800	5 000	3 200	22218EAE4*
	160	52.4	2.0	340 000	490 000	2 800	—	1 800	23218CE4
	190	43.0	3.0	415 000	450 000	3 600	4 500	2 800	21318EAE4*
	190	64.0	3.0	665 000	705 000	2 800	3 000	2 400	22318EAE4*

Note (1) The suffix K represents bearings with tapered bores (taper 1 : 12).



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	Y_2	0.67	Y_2

Static Equivalent Load

$$P_0 = F_r + Y_0 F_a$$

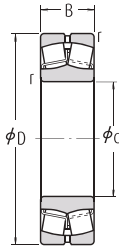
The values of e , Y_2 , Y_3 and Y_0 are given in the table below.

Numbers	Abutment and Fillet Dimensions (mm)					Constant	Axial Load Factors			Mass (kg)
	d_a		D_a		r_a		Y_2	Y_3	Y_0	
Tapered Bore (°)	min.	max.	min.	max.	max.	e				approx.
23012CKE4	67	68	88	85	1	0.26	3.9	2.6	2.5	0.68
22212EAKE4*	69	72	101	98	1.5	0.23	4.4	3.0	2.9	1.1
21312EAKE4*	72	87	118	117	2	0.22	4.5	3.0	3.0	1.98
22312EAKE4*	72	79	118	111	2	0.34	3.0	2.0	1.9	2.89
22213EAKE4*	74	80	111	107	1.5	0.24	4.2	2.8	2.7	1.51
21313EAKE4*	77	94	128	126	2	0.22	4.6	3.1	3.0	2.45
22313EAKE4*	77	84	128	119	2	0.34	3.0	2.0	2.0	3.52
22214EAKE4*	79	84	116	111	1.5	0.23	4.3	2.9	2.8	1.58
21314EAKE4*	82	101	138	135	2	0.22	4.6	3.1	3.0	3.0
22314EAKE4*	82	91	138	129	2	0.33	3.0	2.0	2.0	4.28
22215EAKE4*	84	87	121	117	1.5	0.22	4.5	3.0	3.0	1.64
21315EAKE4*	87	101	148	134	2	0.22	4.6	3.1	3.0	3.64
22315EAKE4*	87	97	148	137	2	0.33	3.0	2.0	2.0	5.26
22216EAKE4*	90	94	130	126	2	0.22	4.6	3.1	3.0	2.01
21316EAKE4*	92	109	158	146	2	0.23	4.4	3.0	2.9	4.32
22316EAKE4*	92	103	158	145	2	0.33	3.0	2.0	2.0	6.23
22217EAKE4*	95	101	140	135	2	0.22	4.6	3.1	3.0	2.54
21317EAKE4*	99	108	166	142	2.5	0.24	4.3	2.9	2.8	5.2
22317EAKE4*	99	110	166	155	2.5	0.33	3.1	2.1	2.0	7.23
22218EAKE4*	100	108	150	142	2	0.24	4.3	2.9	2.8	3.3
23218CKE4	100	105	150	138	2	0.32	3.2	2.1	2.1	4.51
21318EAKE4*	104	115	176	152	2.5	0.24	4.3	2.9	2.8	6.1
22318EAKE4*	104	115	176	163	2.5	0.33	3.1	2.1	2.0	8.56

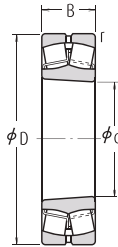


Spherical Roller Bearings

Bore Diameter 95 – 110 mm



Cylindrical Bore
EA



Tapered Bore
EA

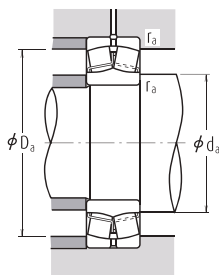


Without an Oil Groove or Holes
CD

Boundary Dimensions (mm)				Basic Load Ratings (N)		Thermal Reference Speed	Speeds (min ⁻¹)		Bearing
d	D	B	r min.	C _r	C _{0r}		Limiting Speeds		
							Mechanical	Grease	
95	170	43.0	2.1	415 000	450 000	3 800	4 500	3 000	22219EAE4*
	170	55.6	2.1	370 000	525 000	2 600	—	1 700	23219CAME4
	200	45.0	3.0	430 000	435 000	3 600	—	1 500	21319CAME4*
	200	45.0	3.0	430 000	435 000	3 400	—	1 500	21319CE4
	200	67.0	3.0	735 000	780 000	2 600	3 000	2 200	22319EAE4*
100	150	37.0	1.5	212 000	335 000	3 200	—	2 200	23020CDE4
	150	50.0	1.5	276 000	470 000	2 800	—	1 800	24020CE4
	165	52.0	2.0	345 000	530 000	2 800	—	1 700	23120CE4
	165	65.0	2.0	345 000	535 000	2 400	—	1 700	24120CAME4
	180	46.0	2.1	455 000	490 000	3 600	4 300	2 800	22220EAE4*
	180	60.3	2.1	525 000	605 000	2 800	3 800	1 600	23220CAME4*
	180	60.3	2.1	525 000	605 000	2 600	—	1 600	23220CE4
	215	47.0	3.0	495 000	485 000	3 400	4 500	1 400	21320CAME4*
	215	47.0	3.0	495 000	485 000	3 200	—	1 400	21320CE4
	215	73.0	3.0	750 000	785 000	2 600	3 400	1 700	22320CAME4(2)*
110	170	45.0	2.0	293 000	465 000	3 200	—	2 000	23022CDE4
	170	60.0	2.0	380 000	645 000	2 600	—	1 600	24022CE4
	180	56.0	2.0	480 000	630 000	3 200	4 000	1 600	23122CAME4*
	180	56.0	2.0	480 000	630 000	2 600	—	1 600	23122CE4
	180	69.0	2.0	575 000	750 000	2 200	3 400	1 600	24122CAME4*
	180	69.0	2.0	575 000	750 000	2 000	—	1 600	24122CE4
	200	53.0	2.1	605 000	645 000	3 400	3 400	2 600	22222EAE4*
	200	69.8	2.1	645 000	760 000	2 600	3 400	1 500	23222CAME4*
	200	69.8	2.1	645 000	760 000	2 200	—	1 500	23222CE4
	240	50.0	3.0	450 000	545 000	3 000	—	1 300	21322CE4
	240	50.0	3.0	565 000	545 000	3 000	4 300	1 300	21322CAME4*
	240	80.0	3.0	1 030 000	1 120 000	2 200	—	1 500	22322EAE4*
	240	80.0	3.0	925 000	980 000	2 200	3 000	1 500	22322CAME4(2)*

Notes

- (1) The suffix K or K30 represents bearings with tapered bores (taper 1 : 12 or 1 : 30).
- (2) EA is also available. Load rating of EA is around 10% higher than CAM's, please consult ITJ.



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	Y_2	0.67	Y_2

Static Equivalent Load

$$P_0 = F_r + Y_0 F_a$$

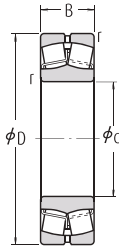
The values of e , Y_2 , Y_3 and Y_0 are given in the table below.

Numbers Tapered Bore (1)	Abutment and Fillet Dimensions (mm)					Constant e	Axial Load Factors			Mass (kg) approx.
	d_a		D_a		r_a		Y_2	Y_3	Y_0	
min.	max.	min.	max.	min.	max.					
22219EAKE4°	107	115	158	152	2	0.24	4.3	2.9	2.8	4.04
23219CAMKE4	107	—	158	146	2	0.32	3.1	2.1	2.0	5.33
23219CAMKE4	109	127	186	172	2.5	0.22	4.6	3.1	3.0	6.92
21319CKE4	109	127	186	172	2.5	0.22	4.6	3.1	3.0	6.92
22319EAKE4	109	121	186	172	2.5	0.33	3.1	2.1	2.0	9.91
23020CDKE4	109	112	141	136	1.5	0.22	4.6	3.1	3.0	2.31
24020CK30E4	109	110	141	132	1.5	0.30	3.4	2.3	2.2	3.08
23120CKE4	110	113	155	144	2	0.30	3.4	2.3	2.2	4.38
24120CAMK30E4	110	—	155	143	2	0.35	2.9	1.9	1.9	5.42
22220EAKE4°	112	119	168	160	2	0.24	4.3	2.9	2.8	4.84
23220CAMKE4°	112	118	168	155	2	0.32	3.2	2.1	2.1	6.6
23220CKE4	112	118	168	155	2	0.32	3.2	2.1	2.1	6.6
21320CAMKE4°	114	133	201	184	2.5	0.23	4.4	3.0	2.9	8.46
21320CKE4	114	133	201	184	2.5	0.21	4.7	3.2	3.1	8.46
22320CAMKE4(2)°	114	130	201	184	2.5	0.35	2.9	1.9	1.9	12.7
23022CDKE4	120	124	160	153	2	0.24	4.2	2.8	2.8	3.76
24022CK30E4	120	121	160	148	2	0.32	3.1	2.1	2.1	4.96
23122CAMKE4°	120	127	170	158	2	0.28	3.5	2.4	2.3	5.7
23122CKE4	120	127	170	158	2	0.29	3.6	2.4	2.3	5.8
24122CAMK30E4°	120	123	170	154	2	0.36	2.8	1.9	1.8	6.84
24122CK30E4	120	123	170	154	2	0.37	2.9	1.9	1.8	6.85
22222EAKE4°	122	129	188	178	2	0.25	4.0	2.7	2.6	6.99
23222CAMKE4°	122	130	188	170	2	0.34	3.0	2.0	1.9	9.54
23222CKE4	122	130	188	170	2	0.35	3.1	2.1	1.10	9.55
21322CAKE4	124	—	226	206	2.5	0.22	4.6	3.1	3.0	11.2
21322CAMKE4°	124	—	226	206	2.5	0.22	4.6	3.1	3.0	11.2
22322EAKE4°	124	145	226	206	2.5	0.33	3.1	2.1	2.0	17.6
22322CAMKE4(2)°	124	145	226	206	2.5	0.33	3.1	2.1	2.0	17.6

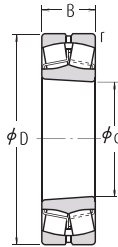


Spherical Roller Bearings

Bore Diameter 120 – 130 mm



Cylindrical Bore
EA



Tapered Bore
EA

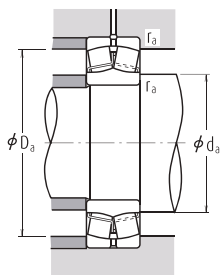


Without an Oil Groove or Holes
CD

Boundary Dimensions (mm)				Basic Load Ratings (N)		Thermal Reference Speed	Speeds (min ⁻¹)		Bearing
d	D	B	r min.	C _r	C _{0r}		Limiting Speeds		
							Mechanical	Grease	
120	180	46.0	2.0	395 000	525 000	3 200	4 500	1 800	23024CAME4 *
	180	46.0	2.0	395 000	525 000	2 800	—	1 800	23024CDE4
	180	60.0	2.0	480 000	680 000	2 600	3 600	1 500	24024CAME4 *
	180	60.0	2.0	480 000	680 000	2 400	—	1 500	24024CE4
	200	62.0	2.0	580 000	720 000	2 800	3 600	1 400	23124CAME4 *
	200	62.0	2.0	580 000	720 000	2 400	—	1 400	23124CE4
	200	80.0	2.0	695 000	905 000	2 000	3 000	1 400	24124CAME4 *
	200	80.0	2.0	695 000	905 000	1 800	—	1 400	24124CE4
	215	58.0	2.1	685 000	765 000	3 200	3 000	2 400	22224EAE4 *
	215	76.0	2.1	790 000	970 000	2 200	3 000	1 300	23224CAME4 *
	215	76.0	2.1	790 000	970 000	2 000	—	1 300	23224CE4
	260	86.0	3.0	1 190 000	1 320 000	—	—	—	22324EAE4 *
	260	86.0	3.0	1 060 000	1 120 000	2 000	2 800	1 400	22324CAME4 (2) *
	130	200	52.0	2.0	500 000	655 000	3 000	3 800	1 700
200		52.0	2.0	500 000	655 000	2 800	—	1 700	23026CDE4
200		69.0	2.0	620 000	865 000	2 200	3 200	1 400	24026CAME4 *
200		69.0	2.0	620 000	865 000	2 200	—	1 400	24026CE4
210		64.0	2.0	630 000	825 000	2 200	3 400	1 300	23126CAME4 *
210		64.0	2.0	630 000	825 000	2 200	—	1 300	23126CE4
210		80.0	2.0	735 000	1 010 000	1 800	2 800	1 300	24126CAME4 *
210		80.0	2.0	735 000	1 010 000	1 600	—	1 300	24126CE4
230		64.0	3.0	820 000	940 000	2 800	2 600	2 200	22226EAE4 *
230		80.0	3.0	875 000	1 080 000	2 000	2 800	1 200	23226CAME4 *
230		80.0	3.0	875 000	1 080 000	1 800	—	1 200	23226CE4
280		93.0	4.0	1 240 000	1 350 000	1 800	2 600	1 300	22326CAME4 *
280		93.0	4.0	1 240 000	1 350 000	1 900	—	1 300	22326CE4

Notes

- (1) The suffix K or K30 represents bearings with tapered bores (taper 1 : 12 or 1 : 30).
- (2) EA is also available. Load rating of EA is around 10% higher than CAM's, please consult ITJ.



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	Y_2	0.67	Y_2

Static Equivalent Load

$$P_0 = F_r + Y_0 F_a$$

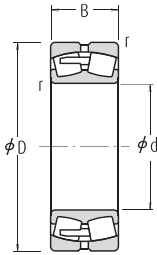
The values of e , Y_2 , Y_3 and Y_0 are given in the table below.

Numbers	Abutment and Fillet Dimensions (mm)					Constant	Axial Load Factors			Mass (kg)
	d_a		D_a		r_a		Y_2	Y_3	Y_0	
Tapered Bore (°)	min.	max.	min.	max.	max.	e				approx.
23024CAMKE4 *	130	134	170	163	2	0.22	4.5	3.0	2.9	4.11
23024CDKE4	130	134	170	163	2	0.22	4.5	3.0	2.9	4.11
24024CAMK30E4 *	130	131	170	158	2	0.32	3.2	2.1	2.1	5.33
24024CK30E4	130	131	170	158	2	0.32	3.2	2.1	2.1	5.33
23124CAMKE4 *	130	138	190	175	2	0.29	3.5	2.4	2.3	7.85
23124CKE4	130	138	190	175	2	0.29	3.5	2.4	2.3	7.85
24124CAMK30E4 *	130	136	190	171	2	0.37	2.7	1.8	1.8	10
24124CK30E4	130	136	190	171	2	0.37	2.7	1.8	1.8	10
22224EAKE4 *	132	142	203	190	2	0.25	3.9	2.7	2.6	8.8
23224CAMKE4 *	132	140	203	182	2	0.35	2.9	1.9	1.9	12.1
23224CKE4	132	140	203	182	2	0.34	2.9	2.0	1.9	12.1
22324EAKE4 *	134	157	246	222	2.5	0.32	3.1	2.1	2.0	22.2
22324CAMKE4 (2) *	134	157	246	222	2.5	0.32	3.1	2.1	2.0	22.2
23026CAMKE4 *	140	147	190	180	2	0.23	4.3	2.9	2.8	5.98
23026CDKE4	140	147	190	180	2	0.23	4.3	2.9	2.8	5.98
24026CAMK30E4 *	140	143	190	175	2	0.31	3.2	2.2	2.1	7.84
24026CK30E4	140	143	190	175	2	0.31	3.2	2.2	2.1	7.84
23126CAMKE4 *	140	149	200	184	2	0.28	3.6	2.4	2.4	8.69
23126CKE4	140	149	200	184	2	0.28	3.6	2.4	2.4	8.69
24126CAMK30E4 *	140	146	200	180	2	0.37	2.7	1.8	1.8	10.7
24126CK30E4	140	146	200	180	2	0.35	2.9	1.9	1.9	10.7
22226EAKE4 *	144	152	216	204	2.5	0.26	3.8	2.6	2.5	11
23226CAMKE4 *	144	150	216	196	2.5	0.34	2.9	2.0	1.9	14.3
23226CKE4	144	150	216	196	2.5	0.34	2.9	2.0	1.9	14.3
22326CAMKE4 *	148	166	262	236	3	0.34	2.9	2.0	1.9	28.1
22326CKE4	148	166	262	236	3	0.34	2.9	2.0	1.9	28.1

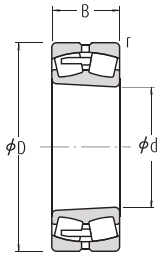


Spherical Roller Bearings

Bore Diameter 140 – 150 mm



Cylindrical Bore
CA



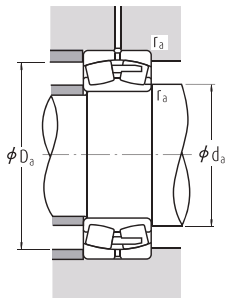
Tapered Bore
CA



Without an Oil Groove or Holes
CA

Boundary Dimensions (mm)				Basic Load Ratings (N)		Thermal Reference Speed	Speeds (min ⁻¹)		Bearing
d	D	B	r min.	C _r	C _{0r}		Limiting Speeds		
							Mechanical	Grease	Cylindrical Bore
140	210	53	2	525 000	715 000	2 800	3 800	1 600	23028CAME4 *
	210	53	2	420 000	715 000	2 400	—	1 600	23028CDE4
	210	69	2	635 000	905 000	2 200	3 000	1 300	24028CAME4 *
	210	69	2	525 000	945 000	2 000	—	1 300	24028CE4
	225	68	2.1	725 000	945 000	2 400	3 200	1 200	23128CAME4 *
	225	68	2.1	580 000	945 000	2 000	—	1 200	23128CE4
	225	85	2.1	835 000	1 160 000	1 600	2 600	1 200	24128CAME4 *
	225	85	2.1	670 000	1 160 000	1 500	—	1 200	24128CE4
	250	68	3	835 000	945 000	2 600	3 200	1 400	22228CAME4 *
	250	68	3	645 000	930 000	2 400	—	1 400	22228CDE4
	250	88	3	1 040 000	1 300 000	1 800	2 600	1 100	23228CAME4 *
	250	88	3	835 000	1 300 000	1 600	—	1 100	23228CE4
	300	102	4	1 450 000	1 590 000	1 700	2 400	1 200	22328CAME4 *
	300	102	4	1 160 000	1 590 000	1 700	—	1 200	22328CE4
150	225	56	2.1	590 000	815 000	2 600	3 600	1 400	23030CAME4 *
	225	56	2.1	470 000	815 000	2 200	—	1 400	23030CDE4
	225	75	2.1	740 000	1 090 000	1 900	3 000	1 200	24030CAME4 *
	225	75	2.1	590 000	1 090 000	1 800	—	1 200	24030CE4
	250	80	2.1	905 000	1 180 000	2 200	2 800	1 100	23130CAME4 *
	250	80	2.1	725 000	1 180 000	1 800	—	1 100	23130CE4
	250	100	2.1	1 070 000	1 450 000	1 400	2 400	1 100	24130CAME4 *
	250	100	2.1	890 000	1 530 000	1 300	—	1 100	24130CE4
	270	73	3	955 000	1 120 000	2 400	3 000	1 300	22230CAME4 *
	270	73	3	765 000	1 120 000	2 200	—	1 300	22230CDE4
	270	96	3	1 220 000	1 560 000	1 700	2 400	1 100	23230CAME4 *
	270	96	3	975 000	1 560 000	1 500	—	1 100	23230CE4
	320	108	4	1 530 000	1 690 000	1 600	2 200	1 100	22330CAME4 *

Note (1) The suffix K or K30 represents bearings with tapered bores (taper 1 : 12 or 1 : 30).



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	Y_3	0.67	Y_3

Static Equivalent Load

$$P_0 = F_r + Y_0 F_a$$

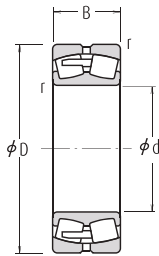
The values of e , Y_2 , Y_3 and Y_0 are given in the table below.

Numbers	Abutment and Fillet Dimensions (mm)					Constant	Axial Load Factors			Mass (kg)
	d_a		D_a		r_a		Y_2	Y_3	Y_0	
Tapered Bore (°)	min.	max.	min.	max.	max.	e				approx.
23028CAMKE4 *	150	157	200	190	2	0.22	4.5	3.0	2.9	6.49
23028CDKE4	150	157	200	190	2	0.22	4.5	3.0	2.9	6.49
24028CAMK30E4 *	150	154	200	186	2	0.31	3.4	2.3	2.2	8.37
24028CK30E4	150	154	200	186	2	0.29	3.4	2.3	2.2	8.37
23128CAMKE4 *	152	158	213	198	2	0.28	3.6	2.4	2.3	10.5
23128CKE4	152	158	213	198	2	0.28	3.6	2.4	2.3	10.5
24128CAMK30E4 *	152	156	213	193	2	0.37	2.7	1.8	1.8	13
24128CK30E4	152	156	213	193	2	0.35	2.9	1.9	1.9	13
22228CAMKE4 *	154	167	236	221	2.5	0.26	3.9	2.6	2.5	14.5
22228CDKE4	154	167	236	219	2.5	0.25	4.0	2.7	2.6	14.5
23228CAMKE4 *	154	163	236	213	2.5	0.35	2.9	1.9	1.9	18.8
23228CKE4	154	163	236	213	2.5	0.35	2.9	1.9	1.9	18.8
22328CAMKE4 *	158	177	282	253	3	0.35	2.9	1.9	1.9	35.4
22328CKE4	158	177	282	253	3	0.35	2.9	1.9	1.9	35.4
23030CAMKE4 *	162	168	213	203	2	0.22	4.6	3.1	3.0	7.9
23030CDKE4	162	168	213	203	2	0.22	4.6	3.1	3.0	7.9
24030CAMK30E4 *	162	165	213	198	2	0.30	3.4	2.3	2.2	10.5
24030CK30E4	162	165	213	198	2	0.30	3.4	2.3	2.2	10.5
23130CAMKE4 *	162	174	238	218	2	0.30	3.4	2.3	2.2	15.8
23130CKE4	162	174	238	218	2	0.30	3.4	2.3	2.2	15.8
24130CAMK30E4 *	162	169	238	212	2	0.38	2.6	1.8	1.7	19.8
24130CK30E4	162	169	238	212	2	0.38	2.6	1.8	1.7	19.8
22230CAMKE4 *	164	179	256	236	2.5	0.26	3.9	2.6	2.5	18.4
22230CDKE4	164	179	256	236	2.5	0.26	3.9	2.6	2.5	18.4
23230CAMKE4 *	164	176	256	230	2.5	0.35	2.9	1.9	1.9	24.2
23230CKE4	164	176	256	230	2.5	0.35	2.9	1.9	1.9	24.2
22330CAMKE4 *	164	—	302	270	3	0.35	2.9	1.9	1.9	41.5

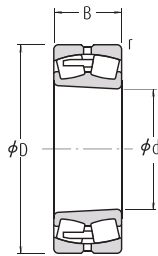


Spherical Roller Bearings

Bore Diameter 160 – 170 mm



Cylindrical Bore
CA



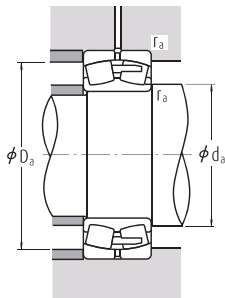
Tapered Bore
CA



Without an Oil Groove and Holes
CA

Boundary Dimensions (mm)				Basic Load Ratings (N)		Thermal Reference Speed	Speeds (min ⁻¹)		Bearing
d	D	B	r min.	C _r	C _{0r}		Limiting Speeds		Cylindrical Bore
							Mechanical	Grease	
160	220	45	2	450 000	675 000	3 000	3 200	1 400	23932CAME4 *
	220	45	2	360 000	675 000	3 000	—	1 400	23932CAE4
	240	60	2.1	675 000	955 000	2 400	3 200	1 300	23032CAME4 *
	240	60	2.1	540 000	955 000	2 200	—	1 300	23032CDE4
	240	80	2.1	845 000	1 260 000	1 800	2 800	1 100	24032CAME4 *
	240	80	2.1	680 000	1 260 000	1 700	—	1 100	24032CE4
	270	86	2.1	1 070 000	1 400 000	2 000	2 600	1 000	23132CAME4 *
	270	86	2.1	855 000	1 400 000	1 700	—	1 000	23132CE4
	270	109	2.1	1 240 000	1 670 000	1 300	2 200	1 000	24132CAME4 *
	270	109	2.1	1 040 000	1 760 000	1 200	—	1 000	24132CE4
	290	80	3	1 140 000	1 320 000	2 200	2 800	1 200	22232CAME4 *
	290	80	3	910 000	1 320 000	2 000	—	1 200	22232CDE4
	290	104	3	1 370 000	1 770 000	1 500	2 200	1 000	23232CAME4 *
	290	104	3	1 100 000	1 770 000	1 500	—	1 000	23232CE4
	340	114	4	1 700 000	1 900 000	1 400	2 200	1 100	22332CAME4 *
170	230	45	2	450 000	680 000	3 000	3 600	1 400	23934CAME4 *
	260	67	2.1	795 000	1 090 000	2 200	3 000	1 200	23034CAME4 *
	260	67	2.1	640 000	1 090 000	2 000	—	1 200	23034CDE4
	260	90	2.1	1 030 000	1 520 000	1 600	2 400	1 000	24034CAME4 *
	260	90	2.1	825 000	1 520 000	1 500	—	1 000	24034CE4
	280	88	2.1	1 180 000	1 570 000	1 800	2 600	1 000	23134CAME4 *
	280	88	2.1	940 000	1 570 000	1 500	—	1 000	23134CE4
	280	109	2.1	1 280 000	1 770 000	1 200	2 200	1 000	24134CAME4 *
	280	109	2.1	1 080 000	1 860 000	1 100	—	1 000	24134CE4
	310	86	4	1 240 000	1 500 000	2 000	2 600	1 100	22234CAME4 *
	310	86	4	990 000	1 500 000	1 800	—	1 100	22234CDE4
	310	110	4	1 500 000	1 910 000	1 400	2 200	900	23234CAME4 *
	310	110	4	1 200 000	1 910 000	1 300	—	900	23234CE4
	360	120	4	1 970 000	2 110 000	1 300	2 000	1 000	22334CAME4 *

Note (1) The suffix K or K30 represents bearings with tapered bores (taper 1 : 12 or 1 : 30).



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	Y_3	0.67	Y_2

Static Equivalent Load

$$P_0 = F_r + Y_0 F_a$$

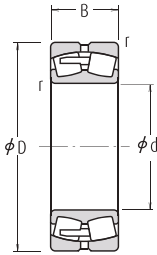
The values of e , Y_2 , Y_3 and Y_0 are given in the table below.

Numbers Tapered Bore (°)	Abutment and Fillet Dimensions (mm)					Constant e	Axial Load Factors			Mass (kg) approx.
	d_a min.	d_a max.	D_a min.	D_a max.	r_a max.		Y_2	Y_3	Y_0	
23932CAMKE4 *	170	—	210	203	2	0.18	5.6	3.8	3.7	4.97
23932CAKE4	170	—	210	203	2	0.18	5.6	3.8	3.7	4.97
23032CAMKE4 *	172	179	228	216	2	0.22	4.5	3.0	2.9	9.66
23032CDKE4	172	179	228	216	2	0.22	4.5	3.0	2.9	9.66
24032CAMK30E4 *	172	177	228	212	2	0.30	3.4	2.3	2.2	12.7
24032CK30E4	172	177	228	212	2	0.30	3.4	2.3	2.2	12.7
23132CAMKE4 *	172	185	258	234	2	0.30	3.4	2.3	2.2	20.3
23132CKE4	172	185	258	234	2	0.30	3.4	2.3	2.2	20.3
24132CAMK30E4 *	172	179	258	229	2	0.39	2.6	1.7	1.7	25.4
24132CK30E4	172	179	258	229	2	0.39	2.6	1.7	1.7	25.4
22232CAMKE4 *	174	190	276	255	2.5	0.26	3.8	2.6	2.5	23.1
22232CDKE4	174	190	276	255	2.5	0.26	3.8	2.6	2.5	23.1
23232CAMKE4 *	174	189	276	245	2.5	0.34	2.9	2.0	1.9	30.5
23232CKE4	174	189	276	245	2.5	0.34	2.9	2.0	1.9	30.5
22332CAMKE4 *	178	—	322	287	3	0.35	2.9	1.9	1.9	49.3
23934CAMKE4 *	180	—	220	213	2	0.17	5.8	3.9	3.8	5.38
23034CAMKE4 *	182	191	248	233	2	0.23	4.3	2.9	2.8	13
23034CDKE4	182	191	248	233	2	0.23	4.3	2.9	2.8	13
24034CAMK30E4 *	182	188	248	228	2	0.31	3.2	2.2	2.1	17.3
24034CK30E4	182	188	248	228	2	0.31	3.2	2.2	2.1	17.3
23134CAMKE4 *	182	194	268	245	2	0.29	3.5	2.3	2.3	21.8
23134CKE4	182	194	268	245	2	0.29	3.5	2.3	2.3	21.8
24134CAMK30E4 *	182	190	268	239	2	0.38	2.7	1.8	1.7	26.6
24134CK30E4	182	190	268	239	2	0.37	2.7	1.8	1.8	26.6
22234CAMKE4 *	188	206	292	270	3	0.26	3.8	2.6	2.5	28.8
22234CDKE4	188	206	292	270	3	0.26	3.8	2.6	2.5	28.8
23234CAMKE4 *	188	201	292	261	3	0.35	2.9	1.9	1.9	36.4
23234CKE4	188	201	292	261	3	0.34	2.9	2.0	1.9	36.4
22334CAMKE4 *	188	—	342	304	3	0.35	2.9	1.9	1.9	57.9

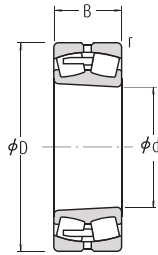


Spherical Roller Bearings

Bore Diameter 180 – 190 mm



Cylindrical Bore
CA



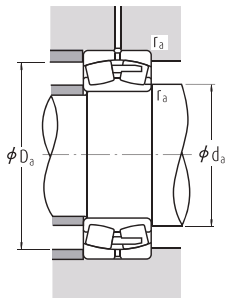
Tapered Bore
CA



Without an Oil Groove and Holes
CA

Boundary Dimensions (mm)				Basic Load Ratings (N)		Thermal Reference Speed	Speeds (min ⁻¹)		Bearing
d	D	B	r min.	C _r	C _{0r}		Limiting Speeds		Cylindrical Bore
							Mechanical	Grease	
180	250	52	2	470 000	890 000	2 600	—	1 200	23936CAE4
	250	52	2	590 000	890 000	2 600	3 000	1 200	23936CAME4 *
	280	74	2.1	935 000	1 270 000	2 000	2 800	1 200	23036CAME4 *
	280	74	2.1	750 000	1 270 000	1 900	—	1 200	23036CDE4
	280	100	2.1	1 210 000	1 750 000	1 500	2 200	950	24036CAME4 *
	280	100	2.1	965 000	1 750 000	1 400	—	950	24036CE4
	300	96	3	1 320 000	1 760 000	1 700	2 200	900	23136CAME4 *
	300	96	3	1 050 000	1 760 000	1 400	—	900	23136CE4
	300	118	3	1 490 000	2 040 000	1 100	2 000	900	24136CAME4 *
	300	118	3	1 190 000	2 040 000	1 000	—	900	24136CE4
	320	86	4	1 280 000	1 540 000	2 000	2 600	1 100	22236CAME4 *
	320	86	4	1 020 000	1 540 000	1 800	—	1 100	22236CDE4
	320	112	4	1 620 000	2 110 000	1 300	2 000	850	23236CAME4 *
	320	112	4	1 300 000	2 110 000	1 200	—	850	23236CE4
	380	126	4	2 170 000	2 340 000	1 200	2 000	950	22336CAME4 *
190	260	52	2	575 000	875 000	2 600	3 000	1 200	23938CAME4 *
	290	75	2.1	970 000	1 350 000	2 000	2 600	1 100	23038CAME4 *
	290	100	2.1	1 220 000	1 840 000	1 400	2 200	900	24038CAME4 *
	290	100	2.1	975 000	1 840 000	1 400	—	900	24038CE4
	320	104	3	1 480 000	2 020 000	1 600	2 200	850	23138CAME4 *
	320	104	3	1 190 000	2 020 000	1 300	—	850	23138CE4
	320	128	3	1 710 000	2 330 000	1 000	1 900	850	24138CAME4 *
	320	128	3	1 370 000	2 330 000	950	—	850	24138CE4
	340	92	4	1 420 000	1 730 000	1 800	2 400	1 000	22238CAME4 *
	340	120	4	1 800 000	2 350 000	1 200	1 900	800	23238CAME4 *
	340	120	4	1 440 000	2 350 000	1 100	—	800	23238CE4
	400	132	5	2 370 000	2 590 000	1 200	1 900	900	22338CAME4 *

Note (1) The suffix K or K30 represents bearings with tapered bores (taper 1 : 12 or 1 : 30).



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	Y_3	0.67	Y_2

Static Equivalent Load

$$P_0 = F_r + Y_0 F_a$$

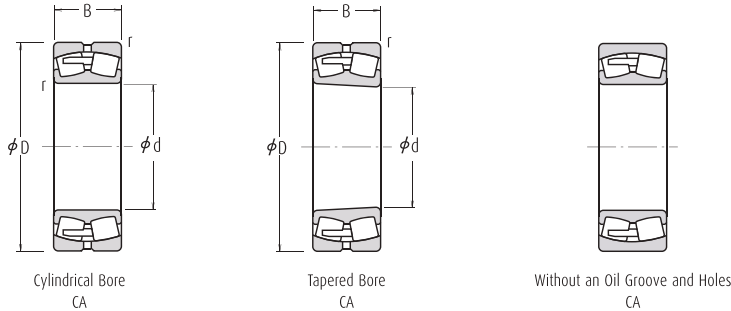
The values of e , Y_2 , Y_3 and Y_0 are given in the table below.

Numbers	Abutment and Fillet Dimensions (mm)					Constant	Axial Load Factors			Mass (kg)
	d _a		D _a		r _a		Y ₂	Y ₃	Y ₀	
Tapered Bore (°)	min.	max.	max.	min.	max.	e				
23936CAKE4	190	—	240	230	2	0.18	5.5	3.7	3.6	7.64
23936CAMKE4°	190	—	240	230	2	0.18	5.5	3.7	3.6	7.64
23036CAMKE4°	192	202	268	249	2	0.24	4.2	2.8	2.8	17.1
23036CDKE4	192	202	268	249	2	0.24	4.2	2.8	2.8	17.1
24036CAMK30E4°	192	200	268	245	2	0.32	3.1	2.1	2.0	22.7
24036CK30E4	192	200	268	245	2	0.32	3.1	2.1	2.0	22.7
23136CAMKE4°	194	206	286	260	2.5	0.31	3.3	2.2	2.2	27.5
23136CKE4	194	206	286	260	2.5	0.30	3.4	2.3	2.2	27.5
24136CAMK30E4°	194	202	286	255	2.5	0.37	2.7	1.8	1.8	33.1
24136CK30E4	194	202	286	255	2.5	0.37	2.7	1.8	1.8	33.1
22236CAMKE4°	198	212	302	278	3	0.26	3.9	2.6	2.6	30.2
22236CDKE4	198	212	302	278	3	0.26	3.9	2.6	2.6	30.2
23236CAMKE4°	198	211	302	274	3	0.35	2.9	1.9	1.9	38.9
23236CKE4	198	211	302	274	3	0.33	3.0	2.0	2.0	38.9
22336CAMKE4°	198	—	362	322	3	0.34	2.9	2.0	1.9	67
23938CAMKE4°	200	—	250	240	2	0.18	5.7	3.8	3.7	8.03
23038CAMKE4°	202	—	278	261	2	0.24	4.2	2.8	2.8	17.6
24038CAMK30E4°	202	210	278	253	2	0.32	3.1	2.1	2.0	24
24038CK30E4	202	210	278	253	2	0.31	3.2	2.2	2.1	24
23138CAMKE4°	204	219	306	276	2.5	0.31	3.2	2.2	2.1	34.5
23138CKE4	204	219	306	276	2.5	0.31	3.3	2.2	2.2	34.5
24138CAMK30E4°	204	211	306	269	2.5	0.40	2.5	1.7	1.6	41.5
24138CK30E4	204	211	306	269	2.5	0.40	2.5	1.7	1.6	41.5
22238CAMKE4°	208	—	322	296	3	0.26	3.8	2.6	2.5	35.5
23238CAMKE4°	208	222	322	288	3	0.35	2.8	1.9	1.9	47.6
23238CKE4	208	222	322	288	3	0.35	2.9	1.9	1.9	47.6
22338CAMKE4°	212	—	378	338	4	0.34	2.9	2.0	1.9	77.6



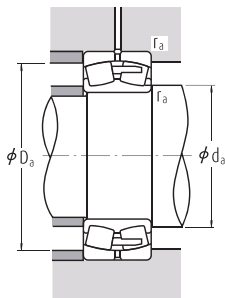
Spherical Roller Bearings

Bore Diameter 200 – 220 mm



Boundary Dimensions (mm)				Basic Load Ratings (N)		Thermal Reference Speed	Speeds (min ⁻¹)		Bearing
d	D	B	r min.	C _r	C _{0r}		Limiting Speeds		Cylindrical Bore
							Mechanical	Grease	
200	280	60	2.1	570 000	1 060 000	—	—	—	23940CAE4
	280	60	2.1	710 000	1 060 000	2 400	2 600	1 100	23940CAME4 *
	310	82	2.1	1 180 000	1 700 000	1 800	2 400	1 000	23040CAME4 *
	310	109	2.1	1 420 000	2 120 000	1 300	2 000	850	24040CAME4 *
	310	109	2.1	1 140 000	2 120 000	1 300	—	850	24040CE4
	340	112	3	1 700 000	2 330 000	1 500	2 000	800	23140CAME4 *
	340	112	3	1 360 000	2 330 000	1 200	—	800	23140CE4
	340	140	3	1 960 000	2 660 000	950	1 800	800	24140CAME4 *
	340	140	3	1 570 000	2 670 000	900	—	800	24140CE4
	360	98	4	1 620 000	2 010 000	1 700	2 200	950	22240CAME4 *
	360	128	4	2 070 000	2 750 000	1 100	1 800	750	23240CAME4 *
	360	128	4	1 660 000	2 750 000	1 000	—	750	23240CE4
	420	138	5	2 500 000	2 990 000	1 100	1 700	850	22340CAME4 *
	220	300	60	2.1	785 000	1 240 000	2 200	2 600	1 000
340		90	3	1 360 000	1 980 000	1 600	2 200	950	23044CAME4 *
340		118	3	1 640 000	2 490 000	1 200	1 900	750	24044CAME4 *
340		118	3	1 360 000	2 600 000	1 100	—	750	24044CE4
370		120	4	1 960 000	2 710 000	1 300	1 800	710	23144CAME4 *
370		120	4	1 570 000	2 710 000	1 100	—	710	23144CE4
370		150	4	2 250 000	3 200 000	850	1 600	710	24144CAME4 *
370		150	4	1 800 000	3 200 000	850	—	710	24144CE4
400		108	4	1 960 000	2 430 000	1 500	2 000	850	22244CAME4 *
400		144	4	2 520 000	3 400 000	1 000	1 600	670	23244CAME4 *
400		144	4	2 020 000	3 400 000	850	—	670	23244CE4
460		145	5	2 940 000	3 400 000	950	1 600	750	22344CAME4 *

Note (¹) The suffix K or K30 represents bearings with tapered bores (taper 1 : 12 or 1 : 30).



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	Y_3	0.67	Y_3

Static Equivalent Load

$$P_0 = F_r + Y_0 F_a$$

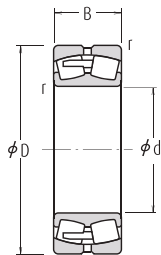
The values of e , Y_3 , Y_3 and Y_0 are given in the table below.

Numbers	Abutment and Fillet Dimensions (mm)					Constant	Axial Load Factors			Mass (kg)
	d _a		D _a		r _a		e	Y ₂	Y ₃	
Tapered Bore (°)	min.	max.	max.	min.	r _a max.	e	Y ₂	Y ₃	Y ₀	approx.
23940CAKE4	212	—	268	258	2	0.20	5.1	3.4	3.3	11
23940CAMKE4°	212	—	268	258	2	0.20	5.1	3.4	3.3	11
23040CAMKE4°	212	—	268	279	2	0.25	4.0	2.7	2.6	22.6
24040CAMK30E4°	212	223	298	271	2	0.33	3.0	2.0	2.0	30.4
24040CK30E4	212	223	298	271	2	0.32	3.1	2.1	2.0	30.4
23140CAMKE4°	214	232	326	293	2.5	0.30	3.2	2.1	2.1	42.7
23140CKE4	214	232	326	293	2.5	0.31	3.2	2.2	2.1	42.7
24140CAMK30E4°	214	226	326	290	2.5	0.39	2.5	1.7	1.7	51.3
24140CK30E4	214	226	326	290	2.5	0.39	2.6	1.8	1.7	51.3
22240CAMKE4°	218	—	342	315	3	0.26	3.8	2.6	2.5	42.6
23240CAMKE4°	218	237	342	307	3	0.35	2.9	1.9	1.9	57.1
23240CKE4	222	237	342	307	3	0.34	2.9	2.0	1.9	57.1
22340CAMKE4°	232	—	398	352	4	0.34	2.9	2.0	1.9	92.6
23944CAMKE4°	234	—	288	278	2	0.18	5.7	3.8	3.7	12.2
23044CAMKE4°	234	—	326	302	2.5	0.24	4.1	2.8	2.7	29.7
24044CAMK30E4°	234	244	326	296	2.5	0.32	3.2	2.1	2.1	40.5
24044CK30E4	238	244	326	296	2.5	0.31	3.2	2.1	2.1	40.5
23144CAMKE4°	238	254	352	320	3	0.31	3.3	2.2	2.2	53
23144CKE4	238	254	352	320	3	0.30	3.3	2.2	2.2	53
24144CAMK30E4°	238	—	352	313	3	0.39	2.6	1.7	1.7	66.7
24144CK30E4	238	248	352	313	3	0.39	2.6	1.7	1.7	66.7
22244CAMKE4°	238	—	382	348	3	0.27	3.7	2.5	2.4	59
23244CAMKE4°	238	260	382	337	3	0.36	2.8	1.9	1.8	80.4
23244CKE4	238	260	382	337	3	0.35	2.9	1.9	1.9	80.4
22344CAMKE4°	242	—	438	391	4	0.33	3.0	2.0	2.0	116

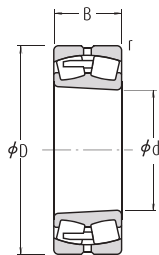


Spherical Roller Bearings

Bore Diameter 240 – 280 mm



Cylindrical Bore
CA



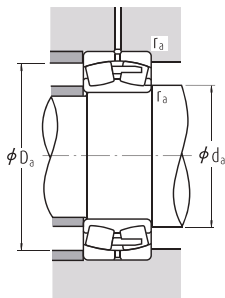
Tapered Bore
CA



Without an Oil Groove and Holes
CA

Boundary Dimensions (mm)				Basic Load Ratings (N)		Thermal Reference Speed	Speeds (min ⁻¹)		Bearing
d	D	B	r min.	C _r	C _{0r}		Limiting Speeds		Cylindrical Bore
							Mechanical	Grease	
240	320	60	2.1	635 000	1 300 000	1 900	2 600	950	23948CAE4
	320	60	2.1	795 000	1 300 000	1 900	2 600	950	23948CAME4°
	360	92	3	1 450 000	2 140 000	1 500	2 200	850	23048CAME4°
	360	118	3	1 730 000	2 730 000	1 100	1 800	710	24048CAME4°
	360	118	3	1 390 000	2 730 000	1 000	—	710	24048CE4
	400	128	4	2 230 000	3 100 000	1 200	1 700	670	23148CAME4°
	400	128	4	1 790 000	3 100 000	1 000	—	670	23148CE4
	400	160	4	2 660 000	3 800 000	750	1 500	670	24148CAME4°
	400	160	4	2 130 000	3 800 000	670	—	670	24148CE4
	440	120	4	2 340 000	2 890 000	1 400	1 800	750	22248CAME4°
	440	160	4	3 050 000	4 050 000	850	1 500	630	23248CAME4°
	500	155	5	3 250 000	3 800 000	850	1 500	670	22348CAME4°
260	360	75	2.1	1 170 000	1 870 000	1 800	2 200	850	23952CAME4°
	400	104	4	1 780 000	2 580 000	1 300	1 900	800	23052CAME4°
	400	140	4	2 270 000	3 500 000	950	1 600	630	24052CAME4°
	440	144	4	2 700 000	3 750 000	1 100	1 500	600	23152CAME4°
	440	180	4	3 200 000	4 700 000	630	1 300	600	24152CAME4°
	480	130	5	2 720 000	3 400 000	1 200	1 700	670	22252CAME4°
	480	174	5	3 400 000	4 550 000	800	1 400	560	23252CAME4°
	540	165	6	3 900 000	4 600 000	750	1 400	630	22352CAME4°
280	380	75	2.1	1 160 000	1 950 000	1 600	2 000	800	23956CAME4°
	420	106	4	1 930 000	2 950 000	1 200	1 800	710	23056CAME4°
	420	140	4	2 350 000	3 800 000	850	1 500	600	24056CAME4°
	460	146	5	2 790 000	4 000 000	1 000	1 500	560	23156CAME4°
	460	180	5	3 300 000	5 000 000	600	1 300	560	24156CAME4°
	500	130	5	2 850 000	3 650 000	1 100	1 600	630	22256CAME4°
	500	176	5	3 600 000	4 900 000	750	1 300	530	23256CAME4°
	580	175	6	4 350 000	5 150 000	670	1 300	560	22356CAME4°

Note (°) The suffix K or K30 represents bearings with tapered bores (taper 1 : 12 or 1 : 30).



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	Y_3	0.67	Y_2

Static Equivalent Load

$$P_0 = F_r + Y_0 F_a$$

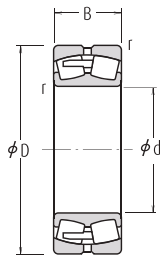
The values of e , Y_2 , Y_3 and Y_0 are given in the table below.

Numbers	Abutment and Fillet Dimensions (mm)					Constant e	Axial Load Factors			Mass (kg) approx.
	d_a		D_a		r_a		Y_2	Y_3	Y_0	
Tapered Bore (°)	min.	max.	min.	max.	max.					
23948CAKE4	252	—	308	298	2	0.17	6.0	4.0	3.9	13.3
23948CAMKE4 [°]	253	—	308	298	2	0.18	6.1	4.1	3.10	13.4
23048CAMKE4 [°]	254	—	346	324	2.5	0.24	4.2	2.8	2.7	32.6
24048CAMK30E4 [°]	254	265	346	317	2.5	0.30	3.4	2.3	2.2	43.4
24048CK30E4	254	265	346	317	2.5	0.29	3.4	2.3	2.2	43.4
23148CAMKE4 [°]	258	275	382	347	3	0.31	3.3	2.2	2.2	66.9
23148CKE4	258	275	382	347	3	0.30	3.3	2.2	2.2	66.9
24148CAMK30E4 [°]	258	268	382	341	3	0.38	2.7	1.8	1.8	79.5
24148CK30E4	258	268	382	341	3	0.38	2.7	1.8	1.8	79.5
22248CAMKE4 [°]	258	—	422	383	3	0.27	3.7	2.5	2.4	80.2
23248CAMKE4 [°]	258	—	422	372	3	0.37	2.7	1.8	1.8	106
22348CAMKE4 [°]	262	—	478	423	4	0.32	3.2	2.1	2.1	147
23952CAMKE4 [°]	272	—	348	333	2	0.19	5.4	3.6	3.5	23
23052CAMKE4 [°]	278	—	382	356	3	0.25	4.1	2.7	2.7	46.6
24052CAMK30E4 [°]	278	—	382	348	3	0.32	3.1	2.1	2.1	62.6
23152CAMKE4 [°]	278	—	422	380	3	0.32	3.2	2.1	2.1	88.2
24152CAMK30E4 [°]	278	—	422	371	3	0.39	2.6	1.7	1.7	109
22252CAMKE4 [°]	282	—	458	418	4	0.27	3.7	2.5	2.5	104
23252CAMKE4 [°]	282	—	458	406	4	0.37	2.7	1.8	1.8	137
22352CAMKE4 [°]	288	—	512	462	5	0.32	3.2	2.1	2.1	180
23956CAMKE4 [°]	292	—	368	351	2	0.18	5.7	3.8	3.8	24.5
23056CAMKE4 [°]	298	—	402	377	3	0.24	4.2	2.8	2.7	50.5
24056CAMK30E4 [°]	298	—	402	369	3	0.31	3.3	2.2	2.2	66.4
23156CAMKE4 [°]	302	—	438	400	4	0.30	3.3	2.2	2.2	94.3
24156CAMK30E4 [°]	302	—	438	392	4	0.37	2.7	1.8	1.8	115
22256CAMKE4 [°]	302	—	478	439	4	0.25	4.0	2.7	2.6	110
23256CAMKE4 [°]	302	—	478	425	4	0.35	2.9	1.9	1.9	147
22356CAMKE4 [°]	308	—	552	496	5	0.31	3.2	2.1	2.1	221

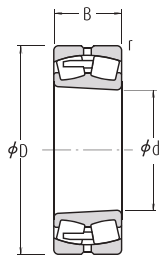


Spherical Roller Bearings

Bore Diameter 300 – 380 mm



Cylindrical Bore
CA



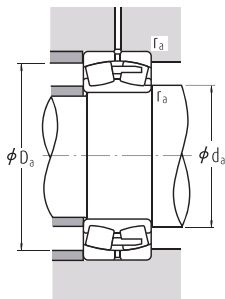
Tapered Bore
CA



Without an Oil Groove and Holes
CA

Boundary Dimensions (mm)				Basic Load Ratings (N)		Thermal Reference Speed	Speeds (min ⁻¹)		Bearing
d	D	B	r min.	C _r	C _{0r}		Limiting Speeds		Cylindrical Bore
							Mechanical	Grease	
300	420	90	3	1 540 000	2 490 000	1 500	1 800	710	23960CAME4°
	460	118	4	2 400 000	3 700 000	1 100	1 600	670	23060CAME4°
	460	160	4	2 890 000	4 600 000	800	1 400	530	24060CAME4°
	500	160	5	3 350 000	4 800 000	900	1 400	500	23160CAME4°
	500	200	5	3 900 000	5 800 000	530	1 200	500	24160CAME4°
	540	140	5	3 250 000	4 250 000	1 000	1 500	600	22260CAME4°
320	540	192	5	4 250 000	5 900 000	670	1 200	480	23260CAME4°
	440	90	3	1 620 000	2 750 000	1 400	1 700	670	23964CAME4°
	480	121	4	2 450 000	3 850 000	1 000	1 600	630	23064CAME4°
	480	160	4	3 050 000	5 050 000	710	1 300	500	24064CAME4°
	540	176	5	3 850 000	5 500 000	800	1 300	480	23164CAME4°
	540	218	5	4 400 000	6 650 000	480	1 100	480	24164CAME4°
340	580	150	5	3 750 000	4 850 000	950	1 400	530	22264CAME4°
	580	208	5	4 850 000	6 900 000	600	1 100	450	23264CAME4°
	460	90	3	1 670 000	2 840 000	1 300	1 700	630	23968CAME4°
	520	133	5	2 850 000	4 400 000	950	1 500	560	23068CAME4°
	520	180	5	3 650 000	6 050 000	670	1 200	480	24068CAME4°
	580	190	5	4 500 000	6 600 000	710	1 200	430	23168CAME4°
360	580	243	5	5 300 000	7 900 000	450	1 000	430	24168CAME4°
	620	224	6	4 400 000	7 800 000	480	—	400	23268CAME4°
	480	90	3	1 730 000	3 050 000	1 200	1 700	600	23972CAME4°
	540	134	5	2 990 000	4 700 000	900	1 400	530	23072CAME4°
	540	180	5	3 650 000	6 100 000	630	1 200	450	24072CAME4°
	600	192	5	4 800 000	7 100 000	670	1 100	400	23172CAME4°
380	600	243	5	5 250 000	8 000 000	430	1 000	400	24172CAME4°
	600	232	6	4 800 000	8 550 000	450	—	380	23272CAME4°
	520	106	4	2 340 000	4 100 000	1 100	1 500	530	23976CAME4°
	560	135	5	3 150 000	5 100 000	850	1 400	530	23076CAME4°
	560	180	5	3 850 000	6 600 000	600	1 200	430	24076CAME4°
	620	194	5	4 000 000	7 600 000	530	—	400	23176CAME4°
380	620	243	5	4 350 000	8 450 000	360	—	400	24176CAME4°
	680	240	6	5 150 000	9 200 000	430	—	360	23276CAME4°

Note (1) The suffix K or K30 represents bearings with tapered bores (taper 1 : 12 or 1 : 30).



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	Y_3	0.67	Y_2

Static Equivalent Load

$$P_0 = F_r + Y_0 F_a$$

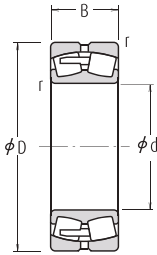
The values of e , Y_2 , Y_3 and Y_0 are given in the table below.

Numbers	Abutment and Fillet Dimensions (mm)					Constant	Axial Load Factors			Mass (kg)
	d _a		D _a		r _a		Y ₂	Y ₃	Y ₀	
Tapered Bore (°)	min.	max.	max.	min.	max.	e				
23960CAMKE4°	314	—	406	386	2.5	0.19	5.2	3.5	3.4	38.2
23060CAMKE4°	318	—	442	413	3	0.24	4.2	2.8	2.7	70.5
24060CAMK30E4°	318	—	442	400	3	0.32	3.1	2.1	2.0	93.6
23160CAMKE4°	322	—	478	433	4	0.31	3.3	2.2	2.2	125
24160CAMK30E4°	322	—	478	423	4	0.38	2.6	1.8	1.7	152
22260CAMKE4°	322	—	518	473	4	0.25	4.0	2.7	2.6	139
23260CAMKE4°	322	—	518	458	4	0.35	2.9	1.9	1.9	189
23964CAMKE4°	334	—	426	406	2.5	0.18	5.5	3.7	3.6	40.6
23064CAMKE4°	338	—	462	432	3	0.24	4.2	2.8	2.8	75.6
24064CAMK30E4°	338	—	462	422	3	0.31	3.3	2.2	2.2	99.7
23164CAMKE4°	342	—	518	466	4	0.31	3.2	2.1	2.1	162
24164CAMK30E4°	342	—	518	456	4	0.39	2.6	1.7	1.7	196
22264CAMKE4°	342	—	558	508	4	0.26	3.9	2.6	2.6	174
23264CAMKE4°	342	—	558	488	4	0.36	2.8	1.9	1.8	239
23968CAMKE4°	354	—	446	427	2.5	0.18	5.7	3.8	3.7	42.4
23068CAMKE4°	362	—	498	465	4	0.24	4.2	2.8	2.8	101
24068CAMK30E4°	362	—	498	454	4	0.32	3.2	2.1	2.1	135
23168CAMKE4°	362	—	558	499	4	0.31	3.2	2.1	2.1	206
24168CAMK30E4°	362	—	558	489	4	0.40	2.5	1.7	1.7	257
23268CAMKE4°	368	—	592	521	5	0.36	2.8	1.9	1.8	295
23972CAMKE4°	374	—	466	447	2.5	0.17	6.0	4.1	4.0	44.7
23072CAMKE4°	382	—	518	485	4	0.24	4.2	2.8	2.8	106
24072CAMK30E4°	382	—	518	476	4	0.32	3.2	2.1	2.1	139
23172CAMKE4°	382	—	578	520	4	0.31	3.2	2.2	2.1	217
24172CAMK30E4°	382	—	578	507	4	0.40	2.5	1.7	1.7	264
23272CAMKE4°	388	—	622	549	5	0.36	2.8	1.9	1.8	342
23976CAMKE4°	398	—	502	482	3	0.18	5.5	3.7	3.6	65.4
23076CAMKE4°	402	—	538	506	4	0.22	4.5	3.0	3.0	113
24076CAMK30E4°	402	—	538	496	4	0.29	3.4	2.3	2.3	148
23176CAMKE4°	402	—	598	540	4	0.30	3.3	2.2	2.2	229
24176CAMK30E4°	402	—	598	529	4	0.38	2.6	1.8	1.7	275
23276CAMKE4°	408	—	652	578	5	0.35	2.9	1.9	1.9	372

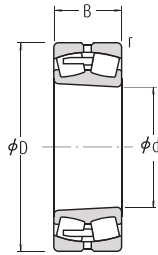


Spherical Roller Bearings

Bore Diameter 400 – 460 mm



Cylindrical Bore
CA



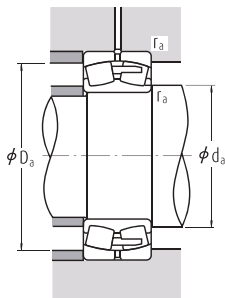
Tapered Bore
CA



Without an Oil Groove and Holes
CA

Boundary Dimensions (mm)				Basic Load Ratings (N)		Thermal Reference Speed	Speeds (min ⁻¹)		Bearing
d	D	B	r min.	C _r	C _{0r}		Limiting Speeds		
							Mechanical	Grease	
400	540	106	4	2 370 000	4 250 000	1 000	1 400	530	23980CAME4 ^s
	600	148	5	3 700 000	5 900 000	800	1 300	480	23080CAME4 ^s
	600	200	5	4 500 000	7 600 000	550	1 100	400	24080CAME4 ^s
	650	200	6	4 150 000	7 900 000	500	—	380	23180CAME4
	650	250	6	4 950 000	10 100 000	320	—	380	24180CAME4
	720	256	6	5 800 000	10 400 000	380	—	340	23280CAME4
420	560	106	4	2 340 000	4 250 000	1 000	1 400	500	23984CAME4 ^s
	620	150	5	2 910 000	5 850 000	670	—	450	23084CAME4
	620	200	5	3 750 000	8 100 000	480	—	380	24084CAME4
	700	224	6	5 000 000	9 400 000	480	—	340	23184CAME4
	700	280	6	6 000 000	12 000 000	280	—	340	24184CAME4
	760	272	7.5	6 450 000	11 700 000	360	—	320	23284CAME4
440	600	118	4	2 190 000	4 800 000	630	—	450	23988CAME4
	650	157	6	3 150 000	6 350 000	630	—	430	23088CAME4
	650	212	6	4 150 000	9 100 000	450	—	360	24088CAME4
	720	226	6	5 300 000	10 300 000	430	—	320	23188CAME4
	720	280	6	6 000 000	12 100 000	280	—	320	24188CAME4
	790	280	7.5	6 900 000	12 800 000	340	—	300	23288CAME4
460	620	118	4	2 220 000	4 950 000	600	—	430	23992CAME4
	680	163	6	3 450 000	7 100 000	600	—	400	23092CAME4
	680	218	6	4 500 000	9 950 000	430	—	340	24092CAME4
	760	240	7.5	5 700 000	10 900 000	430	—	300	23192CAME4
	760	300	7.5	6 300 000	12 400 000	280	—	300	24192CAME4
	830	296	7.5	7 350 000	13 700 000	320	—	280	23292CAME4

Note (1) The suffix K or K30 represents bearings with tapered bores (taper 1 : 12 or 1 : 30).



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	Y_3	0.67	Y_2

Static Equivalent Load

$$P_0 = F_r + Y_0 F_a$$

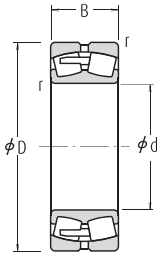
The values of e , Y_2 , Y_3 and Y_0 are given in the table below.

Numbers	Abutment and Fillet Dimensions (mm)					Constant	Axial Load Factors			Mass (kg)
	d_a		D_a		r_a		Y_2	Y_3	Y_0	
Tapered Bore (°)	min.	max.	min.	max.	max.	e				approx.
23980CAMKE4°	418	—	522	501	3	0.18	5.7	3.9	3.8	69.1
23080CAMKE4°	422	—	578	540	4	0.23	4.4	3.0	2.9	146
24080CAMK30E4°	422	—	578	527	4	0.31	3.3	2.2	2.2	193
23180CAMKE4	428	—	622	569	5	0.29	3.4	2.3	2.3	257
24180CAMK30E4	428	—	622	551	5	0.37	2.7	1.8	1.8	316
23280CAMKE4	428	—	692	610	5	0.36	2.8	1.9	1.9	449
23984CAMKE4°	438	—	542	521	3	0.17	6.0	4.0	3.9	71.6
23084CAMKE4	442	—	598	562	4	0.23	4.3	2.9	2.8	151
24084CAMK30E4	442	—	598	549	4	0.31	3.2	2.2	2.1	199
23184CAMKE4	448	—	672	607	5	0.31	3.3	2.2	2.2	341
24184CAMK30E4	448	—	672	598	5	0.38	2.6	1.8	1.7	421
23284CAMKE4	456	—	724	644	6	0.35	2.9	1.9	1.9	534
23988CAMKE4	458	—	582	555	3	0.18	5.7	3.9	3.8	96.3
23088CAMKE4	468	—	622	587	5	0.23	4.3	2.9	2.8	173
24088CAMK30E4	468	—	622	576	5	0.31	3.2	2.1	2.1	237
23188CAMKE4	468	—	692	627	5	0.3	3.3	2.2	2.2	360
24188CAMK30E4	468	—	692	617	5	0.37	2.7	1.8	1.8	433
23288CAMKE4	476	—	754	669	6	0.35	2.9	1.9	1.9	594
23992CAMKE4	478	—	602	575	3	0.17	5.9	4.0	3.9	100
23092CAMKE4	488	—	652	615	5	0.22	4.6	3.1	3.0	201
24092CAMK30E4	488	—	652	604	5	0.29	3.4	2.3	2.3	266
23192CAMKE4	496	—	724	661	6	0.31	3.3	2.2	2.2	423
24192CAMK30E4	496	—	724	646	6	0.39	2.6	1.7	1.7	512
23292CAMKE4	496	—	794	702	6	0.37	2.8	1.9	1.8	691

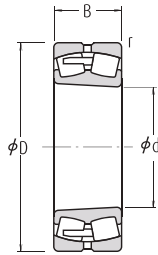


Spherical Roller Bearings

Bore Diameter 480 – 560 mm



Cylindrical Bore
CA



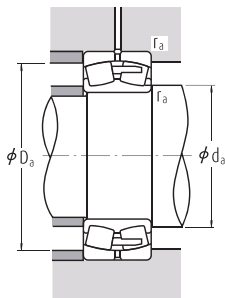
Tapered Bore
CA



Without an Oil Groove and Holes
CA

Boundary Dimensions (mm)				Basic Load Ratings (N)		Thermal Reference Speed	Speeds (min ⁻¹)		Bearing
d	D	B	r min.	C _r	C _{0r}		Limiting Speeds		
							Mechanical	Grease	
480	650	128	5	2 580 000	5 850 000	560	—	400	23996CAME4
	700	165	6	3 800 000	7 950 000	560	—	400	23096CAME4
	700	218	6	4 600 000	10 200 000	400	—	320	24096CAME4
	790	248	7.5	6 050 000	11 700 000	400	—	300	23196CAME4
	790	308	7.5	7 150 000	14 600 000	240	—	300	24196CAME4
	870	310	7.5	7 850 000	14 400 000	300	—	260	23296CAME4
500	670	128	5	2 460 000	5 550 000	560	—	400	239/500CAME4
	720	167	6	3 750 000	8 100 000	530	—	380	230/500CAME4
	720	218	6	4 450 000	9 900 000	400	—	300	240/500CAME4
	830	264	7.5	6 850 000	13 400 000	360	—	280	231/500CAME4
	830	325	7.5	8 000 000	16 000 000	220	—	280	241/500CAME4
	920	336	7.5	9 000 000	16 600 000	280	—	260	232/500CAME4
530	710	136	5	2 930 000	6 800 000	500	—	360	239/530CAME4
	780	185	6	4 440 000	9 200 000	500	—	340	230/530CAME4
	780	250	6	5 400 000	11 800 000	360	—	280	240/530CAME4
	870	272	7.5	7 150 000	14 100 000	340	—	260	231/530CAME4
	870	335	7.5	8 500 000	17 500 000	200	—	260	241/530CAME4
	980	355	9.5	10 100 000	18 800 000	260	—	240	232/530CAME4
560	750	140	5	3 100 000	7 250 000	480	—	340	239/560CAME4
	820	195	6	5 000 000	10 700 000	450	—	320	230/560CAME4
	820	258	6	5 950 000	13 300 000	340	—	260	240/560CAME4
	920	280	7.5	7 850 000	15 500 000	320	—	240	231/560CAME4
	920	355	7.5	9 400 000	19 600 000	190	—	240	241/560CAME4
	1 030	365	9.5	10 900 000	20 500 000	240	—	220	232/560CAME4

Note (1) The suffix K or K30 represents bearings with tapered bores (taper 1 : 12 or 1 : 30).



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	Y_2	0.67	Y_2

Static Equivalent Load

$$P_0 = F_r + Y_0 F_a$$

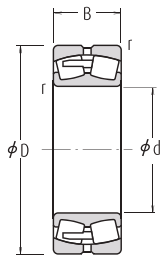
The values of e , Y_2 , Y_3 and Y_0 are given in the table below.

Numbers	Abutment and Fillet Dimensions (mm)					Constant	Axial Load Factors			Mass (kg)
	d_a		D_a		r_a		Y_2	Y_3	Y_0	
Tapered Bore (°)	min.	max.	min.	max.	max.	e				approx.
23996CAMKE4	502	—	628	602	4	0.18	5.7	3.8	3.7	121
23096CAMKE4	508	—	672	633	5	0.22	4.6	3.1	3.0	211
24096CAMK30E4	508	—	672	625	5	0.30	3.4	2.3	2.2	270
23196CAMKE4	516	—	754	688	6	0.31	3.3	2.2	2.2	475
24196CAMK30E4	516	—	754	670	6	0.37	2.6	1.7	1.7	567
23296CAMKE4	516	—	834	733	6	0.36	2.8	1.9	1.8	795
239/500CAMKE4	522	—	648	622	4	0.17	6.0	4.0	3.9	124
230/500CAMKE4	528	—	692	655	5	0.21	4.8	3.2	3.1	220
240/500CAMK30E4	528	—	692	643	5	0.30	3.4	2.3	2.2	276
231/500CAMKE4	536	—	794	720	6	0.31	3.2	2.2	2.1	567
241/500CAMK30E4	536	—	794	703	6	0.39	2.6	1.7	1.7	666
232/500CAMKE4	536	—	884	773	6	0.38	2.7	1.8	1.8	969
239/530CAMKE4	552	—	688	659	4	0.17	6.0	4.0	3.9	149
230/530CAMKE4	558	—	752	706	5	0.22	4.6	3.1	3.0	298
240/530CAMK30E4	558	—	752	690	5	0.31	3.3	2.2	2.2	390
231/530CAMKE4	566	—	834	758	6	0.30	3.3	2.2	2.2	628
241/530CAMK30E4	566	—	834	740	6	0.38	2.6	1.8	1.7	773
232/530CAMKE4	574	—	936	824	8	0.38	2.7	1.8	1.7	1 170
239/560CAMKE4	582	—	728	697	4	0.16	6.1	4.1	4.0	172
230/560CAMKE4	588	—	792	742	5	0.22	4.5	3.0	2.9	344
240/560CAMK30E4	588	—	792	729	5	0.30	3.3	2.2	2.2	440
231/560CAMKE4	596	—	884	804	6	0.30	3.4	2.3	2.2	727
241/560CAMK30E4	596	—	884	782	6	0.39	2.6	1.8	1.7	886
232/560CAMKE4	604	—	986	870	8	0.36	2.8	1.9	1.8	1 320

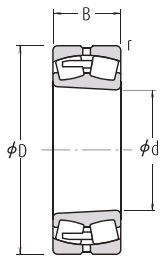


Spherical Roller Bearings

Bore Diameter 600 – 750 mm



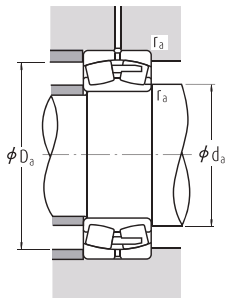
Cylindrical Bore
CA



Tapered Bore
CA

Boundary Dimensions (mm)				Basic Load Ratings (N)		Thermal Reference Speed	Speeds (min ⁻¹)		Bearing
d	D	B	r min.	C _r	C _{0r}		Limiting Speeds		
							Mechanical	Grease	
600	800	150	5	3 450 000	8 100 000	450	—	320	239/600CAME4
	870	200	6	5 450 000	12 200 000	400	—	300	230/600CAME4
	870	272	6	6 600 000	15 100 000	300	—	240	240/600CAME4
	980	300	7.5	8 750 000	17 500 000	280	—	220	231/600CAME4
	980	375	7.5	10 400 000	21 900 000	170	—	220	241/600CAME4
630	1 090	388	9.5	12 700 000	24 900 000	200	—	200	232/600CAME4
	850	165	6	4 000 000	9 350 000	400	—	300	239/630CAME4
	920	212	7.5	5 900 000	12 700 000	400	—	280	230/630CAME4
	920	290	7.5	7 550 000	17 700 000	280	—	220	240/630CAME4
	1 030	315	7.5	9 600 000	19 400 000	260	—	200	231/630CAME4
670	1 030	400	7.5	11 300 000	23 900 000	160	—	200	241/630CAME4
	1 150	412	12	13 400 000	25 600 000	200	—	180	232/630CAME4
	900	170	6	4 350 000	10 300 000	380	—	260	239/670CAME4
	980	230	7.5	6 850 000	15 000 000	360	—	240	230/670CAME4
	980	308	7.5	8 450 000	19 500 000	260	—	200	240/670CAME4
710	1 090	336	7.5	10 600 000	21 600 000	240	—	190	231/670CAME4
	1 090	412	7.5	12 400 000	26 500 000	150	—	190	241/670CAME4
	1 220	438	12	14 900 000	28 700 000	180	—	170	232/670CAME4
	950	180	6	4 800 000	11 700 000	360	—	240	239/710CAME4
	1 030	236	7.5	7 100 000	15 800 000	340	—	240	230/710CAME4
750	1 030	315	7.5	8 850 000	20 700 000	240	—	190	240/710CAME4
	1 150	438	9.5	13 900 000	30 500 000	130	—	170	241/710CAME4
	1 280	450	12	15 700 000	30 500 000	170	—	160	232/710CAME4
	1 000	185	6	5 250 000	12 800 000	320	—	220	239/750CAME4
	1 090	250	7.5	7 750 000	17 200 000	320	—	220	230/750CAME4
750	1 090	335	7.5	10 100 000	24 000 000	220	—	180	240/750CAME4
	1 360	475	15	17 700 000	35 500 000	150	—	140	232/750CAME4

Note (1) The suffix K or K30 represents bearings with tapered bores (taper 1 : 12 or 1 : 30).



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	Y_2	0.67	Y_2

Static Equivalent Load

$$P_0 = F_r + Y_0 F_a$$

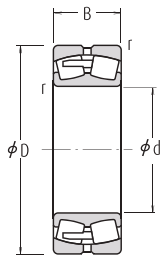
The values of e , Y_2 , Y_3 and Y_0 are given in the table below.

Numbers	Abutment and Fillet Dimensions (mm)					Constant	Axial Load Factors			Mass (kg)
	d _a		D _a		r _a		e	Y ₂	Y ₃	
Tapered Bore (°)	min.	max.	max.	min.	max.					
239/600CAMKE4	622	—	778	745	4	0.17	5.9	3.9	3.9	205
230/600CAMKE4	628	—	842	794	5	0.21	4.8	3.3	3.2	389
240/600CAMK30E4	628	—	842	772	5	0.30	3.3	2.2	2.2	529
231/600CAMKE4	636	—	944	856	6	0.30	3.4	2.3	2.2	898
241/600CAMK30E4	636	—	944	836	6	0.39	2.6	1.8	1.7	1 050
232/600CAMKE4	644	—	1 046	923	8	0.36	2.8	1.9	1.8	1 590
239/630CAMKE4	658	—	822	786	5	0.18	5.6	3.8	3.7	259
230/630CAMKE4	666	—	884	835	6	0.22	4.7	3.1	3.1	468
240/630CAMK30E4	666	—	884	815	6	0.30	3.3	2.2	2.2	637
231/630CAMKE4	666	—	994	900	6	0.30	3.4	2.3	2.2	1 040
241/630CAMK30E4	666	—	994	876	6	0.38	2.7	1.8	1.7	1 250
232/630CAMKE4	684	—	1 096	970	10	0.37	2.8	1.9	1.8	1 850
239/670CAMKE4	698	—	872	836	5	0.17	5.8	3.9	3.8	300
230/670CAMKE4	706	—	944	891	6	0.22	4.7	3.1	3.1	571
240/670CAMK30E4	706	—	944	868	6	0.30	3.3	2.2	2.2	773
231/670CAMKE4	706	—	1 054	952	6	0.30	3.3	2.2	2.2	1 230
241/670CAMK30E4	706	—	1 054	934	6	0.37	2.7	1.8	1.8	1 440
232/670CAMKE4	724	—	1 166	1 024	10	0.37	2.7	1.8	1.8	2 210
239/710CAMKE4	738	—	922	883	5	0.17	5.8	3.9	3.8	352
230/710CAMKE4	746	—	994	936	6	0.22	4.6	3.1	3.0	647
240/710CAMK30E4	746	—	994	916	6	0.29	3.4	2.3	2.2	861
241/710CAMK30E4	754	—	1 106	981	8	0.38	2.6	1.8	1.7	1 730
232/710CAMKE4	764	—	1 226	1 080	10	0.36	2.8	1.9	1.8	2 470
239/750CAMKE4	778	—	972	931	5	0.17	6.0	4.1	4.0	398
230/750CAMKE4	786	—	1 054	990	6	0.22	4.6	3.1	3.0	768
240/750CAMK30E4	786	—	1 054	969	6	0.29	3.4	2.3	2.2	1 030
232/750CAMKE4	814	—	1 296	1 148	12	0.36	2.8	1.9	1.8	2 980

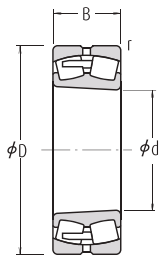


Spherical Roller Bearings

Bore Diameter 800 – 1400 mm



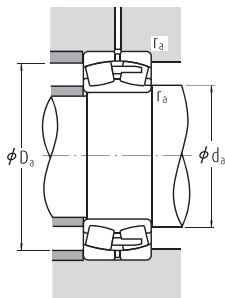
Cylindrical Bore
CA



Tapered Bore
CA

Boundary Dimensions (mm)				Basic Load Ratings (N)		Thermal Reference Speed	Speeds (min ⁻¹)		Bearing
d	D	B	r min.	C _r	C _{0r}		Limiting Speeds		Cylindrical Bore
							Mechanical	Grease	
800	1 060	195	6	5 600 000	13 700 000	300	—	220	239/800CAME4
	1 150	258	7.5	8 350 000	19 100 000	300	—	200	230/800CAME4
	1 150	345	7.5	10 900 000	26 300 000	200	—	160	240/800CAME4
	1 280	375	9.5	13 800 000	29 200 000	190	—	150	231/800CAME4
	1 420	488	15	20 300 000	41 000 000	130	—	130	232/800CAME4
850	1 120	200	6	6 100 000	15 200 000	280	—	190	239/850CAME4
	1 220	272	7.5	9 300 000	21 400 000	280	—	180	230/850CAME4
	1 220	365	7.5	11 600 000	28 300 000	190	—	150	240/850CAME4
	1 500	515	15	22 300 000	45 500 000	120	—	120	232/850CAME4
900	1 180	206	6	6 660 000	16 700 000	260	—	180	239/900CAME4
	1 280	280	7.5	9 850 000	22 800 000	260	—	160	230/900CAME4
	1 280	375	7.5	12 800 000	31 500 000	170	—	140	240/900CAME4
	1 580	515	15	23 400 000	47 500 000	120	—	110	232/900CAME4
950	1 250	224	7.5	7 600 000	19 900 000	240	—	160	239/950CAME4
	1 360	300	7.5	11 300 000	26 500 000	240	—	150	230/950CAME4
	1 360	412	7.5	14 500 000	36 500 000	160	—	120	240/950CAME4
	1 660	530	15	24 700 000	50 500 000	110	—	100	232/950CAME4
1 000	1 320	236	7.5	8 200 000	21 700 000	220	—	150	239/1000CAME4
	1 420	308	7.5	11 900 000	28 100 000	220	—	140	230/1000CAME4
	1 420	412	7.5	15 300 000	38 500 000	150	—	110	240/1000CAME4
1 060	1 400	250	7.5	9 300 000	24 400 000	200	—	130	239/1060CAME4
	1 500	325	9.5	13 000 000	31 500 000	200	—	120	230/1060CAME4
	1 500	438	9.5	16 800 000	43 000 000	140	—	100	240/1060CAME4
1 120	1 580	345	9.5	15 400 000	38 000 000	180	—	110	230/1120CAME4
	1 580	462	9.5	18 700 000	49 500 000	120	—	95	240/1120CAME4
1 180	1 660	475	9.5	20 200 000	52 500 000	120	—	85	240/1180CAME4
1 250	1 750	500	9.5	21 000 000	59 500 000	110	—	75	240/1250CAME4
1 320	1 850	530	12	22 600 000	63 500 000	100	—	67	240/1320CAME4
1 400	1 950	545	12	24 500 000	65 000 000	95	—	60	240/1400CAME4

Note (1) The suffix K or K30 represents bearings with tapered bores (taper 1 : 12 or 1 : 30).



Dynamic Equivalent Load $P = X F_r + Y F_a$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	Y_3	0.67	Y_2

Static Equivalent Load

$$P_0 = F_r + Y_0 F_a$$

The values of e , Y_2 , Y_3 and Y_0 are given in the table below.

Numbers Tapered Bore (°)	Abutment and Fillet Dimensions (mm)					Constant e	Axial Load Factors			Mass (kg) approx.
	d_a min.	d_a max.	D_a min.	D_a max.	r_a max.		Y_2	Y_3	Y_0	
239/800CAMKE4	828	—	1 032	987	5	0.17	6.0	4.0	3.9	462
230/800CAMKE4	836	—	1 114	1 045	6	0.21	4.7	3.2	3.1	870
240/800CAMK30E4	836	—	1 114	1 029	6	0.27	3.7	2.5	2.5	1 130
231/800CAMKE4	844	—	1 236	1 127	8	0.28	3.6	2.4	2.3	1 870
232/800CAMKE4	864	—	1 356	1 208	12	0.35	2.8	1.9	1.9	3 250
239/850CAMKE4	878	—	1 092	1 046	5	0.16	6.2	4.2	4.1	523
230/850CAMKE4	886	—	1 184	1 109	6	0.21	4.8	3.2	3.1	1 020
240/850CAMK30E4	886	—	1 184	1 093	6	0.28	3.6	2.4	2.4	1 350
232/850CAMKE4	914	—	1 436	1 274	12	0.35	2.8	1.9	1.9	3 890
239/900CAMKE4	928	—	1 152	1 103	5	0.16	6.4	4.3	4.2	591
230/900CAMKE4	936	—	1 244	1 169	6	0.20	4.9	3.3	3.2	1 160
240/900CAMK30E4	936	—	1 244	1 147	6	0.28	3.6	2.4	2.4	1 520
232/900CAMKE4	964	—	1 516	1 354	12	0.33	3.0	2.0	2.0	4 300
239/950CAMKE4	986	—	1 214	1 169	6	0.16	6.3	4.2	4.1	732
230/950CAMKE4	986	—	1 324	1 241	6	0.21	4.8	3.2	3.2	1 400
240/950CAMK30E4	986	—	1 324	1 219	6	0.28	3.6	2.4	2.3	1 880
232/950CAMKE4	1 014	—	1 596	1 428	12	0.32	3.1	2.1	2.1	4 800
239/1000CAMKE4	1 036	—	1 284	1 229	6	0.16	6.4	4.3	4.2	881
230/1000CAMKE4	1 036	—	1 384	1 298	6	0.20	4.9	3.3	3.2	1 560
240/1000CAMK30E4	1 036	—	1 384	1 275	6	0.27	3.7	2.5	2.4	2 010
239/1060CAMKE4	1 096	—	1 384	1 302	6	0.16	6.1	4.1	4.0	1 030
230/1060CAMKE4	1 104	—	1 456	1 368	8	0.21	4.9	3.3	3.2	1 790
240/1060CAMK30E4	1 104	—	1 456	1 346	8	0.28	3.6	2.4	2.4	2 410
230/1120CAMKE4	1 164	—	1 536	1 444	8	0.20	5.0	3.4	3.3	2 120
240/1120CAMK30E4	1 164	—	1 536	1 421	8	0.27	3.7	2.5	2.5	2 790
240/1180CAMK30E4	1 224	—	1 616	1 494	8	0.27	3.7	2.5	2.4	3 180
240/1250CAMK30E4	1 294	—	1 706	1 579	8	0.25	4.0	2.7	2.6	3 700
240/1320CAMK30E4	1 374	—	1 796	1 656	10	0.26	3.9	2.6	2.6	4 400
240/1400CAMK30E4	1 454	—	1 896	1 767	10	0.25	4.0	2.7	2.6	4 900





Thrust Ball Bearings

DESIGN, TYPES, AND FEATURES

THRUST BALL BEARINGS

Thrust ball bearings are classified into those with flat seats or aligning seats depending on the shape of the outer ring seat (housing washer). They can sustain axial loads but no radial loads.

The series of thrust ball bearings available are shown in Table 1.

For Single-Direction Thrust Ball Bearings, pressed steel cages and machined brass cages are usually used as shown in Table 2.

The cages in Double-Direction Thrust Ball Bearings are the same as those in Single-Direction Thrust Ball Bearings of the same diameter series.

The basic load ratings listed in the bearing tables are based on the standard cage type shown in Table 2.

If the type of cage is different for bearings with the same number, the number of balls may vary, in such a case, the load rating will differ from the one listed in the bearing tables.

Table 1 Series of Thrust Ball Bearings

	W/Flat Seat	W/Aligning Seat	W/Aligning Seat Washer
Single-Direction	511	—	—
	512	532	532U
	513	533	533U
	514	534	534U
Double-Direction	522	542	542U
	523	543	543U
	524	544	544U

Table 2 Standard Cages for Thrust Ball Bearings

Pressed Steel	Machined Brass
51100 – 51152X	51156X – 51172X
51200 – 51236X	51238X – 51272X
51305 – 51336X	51338X – 51340X
51405 – 51418X	51420X – 51436X
53200 – 53236X	53238X – 53272X
53305 – 53336X	53338X – 53340X
53405 – 53418X	53420X – 53436X

Bearing number
example:

51 1 20 X

① Bearing type symbol

② Dimension symbol

④ Internal Design symbol

③ Bore number

① Bearing type symbol: 51: single direction
52: double direction

② Dimension symbol: 1: 1 series
2: 2 series
3: 3 series
4: 4 series

③ Bore number: Less than 03, Bearing bore 00 : 10 mm, 01 : 12 mm,
02 : 15 mm, 03 : 17 mm

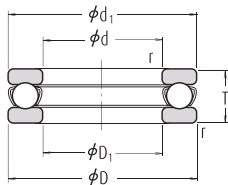
Over 04, Bearing bore Bore number $\times 5$ (mm)

④ Internal Design symbol: see note (1) in bearing tables

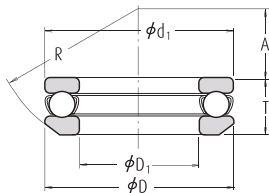


Single-Direction Thrust Ball Bearings

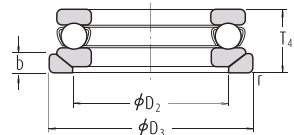
Bore Diameter 10 – 50 mm



With Flat Seat

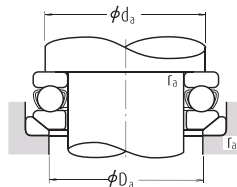
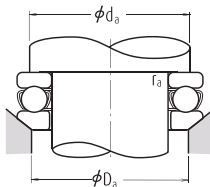
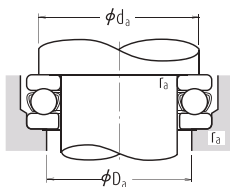


With Aligning Seat



With Aligning Seat Washer

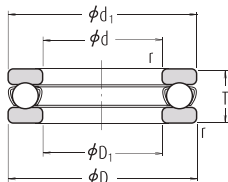
Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		With Flat Seat
d	D	T	T ₃	T ₄	r min.	C _a	C _{0a}	Grease	Oil	
10	24	9	—	—	0.3	10 100	14 000	6 700	10 000	51100
	26	11	11.6	13	0.6	12 800	17 100	6 000	9 000	51200
12	26	9	—	—	0.3	10 400	15 400	6 700	10 000	51101
	28	11	11.4	13	0.6	13 300	19 000	5 600	8 500	51201
15	28	9	—	—	0.3	10 600	16 800	6 300	9 500	51102
	32	12	13.3	15	0.6	16 700	24 800	5 000	7 500	51202
17	30	9	—	—	0.3	11 400	19 500	6 000	9 000	51103
	35	12	13.2	15	0.6	17 300	27 300	4 800	7 500	51203
20	35	10	—	—	0.3	15 100	26 600	5 300	8 000	51104
	40	14	14.7	17	0.6	22 500	37 500	4 300	6 300	51204
25	42	11	—	—	0.6	19 700	37 000	4 800	7 100	51105
	47	15	16.7	19	0.6	28 000	50 500	3 800	5 600	51205
30	52	18	19.8	22	1	36 000	61 500	3 200	5 000	51305
	60	24	26.4	29	1	56 000	89 500	2 600	4 000	51405
35	47	11	—	—	0.6	20 600	42 000	4 300	6 700	51106
	52	16	17.8	20	0.6	29 500	58 000	3 400	5 300	51206
40	60	21	22.6	25	1	43 000	78 500	2 800	4 300	51306
	70	28	30.1	33	1	73 000	126 000	2 200	3 400	51406
45	52	12	—	—	0.6	22 100	49 500	4 000	6 000	51107
	62	18	19.9	22	1	39 500	78 000	3 000	4 500	51207
50	68	24	25.6	28	1	56 000	105 000	2 400	3 800	51307
	80	32	34	37	1.1	87 500	155 000	2 000	3 000	51407
55	60	13	—	—	0.6	27 100	63 000	3 600	5 300	51108
	68	19	20.3	23	1	47 500	98 500	2 800	4 300	51208
60	78	26	28.5	31	1	70 000	135 000	2 200	3 400	51308
	90	36	38.2	42	1.1	103 000	188 000	1 700	2 600	51408
65	65	14	—	—	0.6	28 100	69 000	3 400	5 000	51109
	73	20	21.3	24	1	48 000	105 000	2 600	4 000	51209
70	85	28	30.1	33	1	80 500	163 000	2 000	3 000	51309
	100	39	42.4	46	1.1	128 000	246 000	1 600	2 400	51409
75	70	14	—	—	0.6	29 000	75 500	3 200	4 800	51110
	78	22	23.5	26	1	49 000	111 000	2 400	3 600	51210
80	95	31	34.3	37	1.1	97 500	202 000	1 800	2 800	51310
	110	43	45.6	50	1.5	147 000	288 000	1 400	2 200	51410



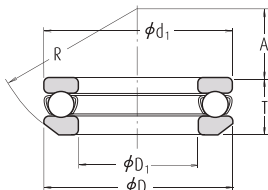
Bearing Numbers		Dimensions (mm)							Abutment and Fillet Dimensions (mm)			Mass (kg) approx.		
With Aligning Seat	With Aligning Seat Washer	d_1	D_1	D_2	D_3	b	A	R	d_a min.	D_a max.	r_a max.	With Flat Seat	With Aligning Seat	With Aligning Seat Washer
—	—	24	11	—	—	—	—	—	18	16	0.3	0.019	—	—
53200	53200 U	26	12	18	28	3.5	8.5	22	20	16	0.6	0.028	0.029	0.036
—	—	26	13	—	—	—	—	—	20	18	0.3	0.021	—	—
53201	53201 U	28	14	20	30	3.5	11.5	25	22	18	0.6	0.031	0.031	0.039
—	—	28	16	—	—	—	—	—	23	20	0.3	0.023	—	—
53202	53202 U	32	17	24	35	4	12	28	25	22	0.6	0.043	0.048	0.059
—	—	30	18	—	—	—	—	—	25	22	0.3	0.025	—	—
53203	53203 U	35	19	26	38	4	16	32	28	24	0.6	0.050	0.055	0.069
—	—	35	21	—	—	—	—	—	29	26	0.3	0.037	—	—
53204	53204 U	40	22	30	42	5	18	36	32	28	0.6	0.077	0.080	0.096
—	—	42	26	—	—	—	—	—	35	32	0.6	0.056	—	—
53205	53205 U	47	27	36	50	5.5	19	40	38	34	0.6	0.111	0.123	0.151
53305	53305 U	52	27	38	55	6	21	45	41	36	1	0.169	0.182	0.224
53405	53405 U	60	27	42	62	8	19	50	46	39	1	0.334	0.353	0.426
—	—	47	32	—	—	—	—	—	40	37	0.6	0.064	—	—
53206	53206 U	52	32	42	55	5.5	22	45	43	39	0.6	0.137	0.154	0.183
53306	53306 U	60	32	45	62	7	22	50	48	42	1	0.267	0.28	0.336
53406	53406 U	70	32	50	75	9	20	56	54	46	1	0.519	0.535	0.666
—	—	52	37	—	—	—	—	—	45	42	0.6	0.081	—	—
53207	53207 U	62	37	48	65	7	24	50	51	46	1	0.21	0.231	0.292
53307	53307 U	68	37	52	72	7.5	24	56	55	48	1	0.386	0.403	0.488
53407	53407 U	80	37	58	85	10	23	64	62	53	1	0.769	0.785	0.967
—	—	60	42	—	—	—	—	—	52	48	0.6	0.12	—	—
53208	53208 U	68	42	55	72	7	28.5	56	57	51	1	0.27	0.289	0.355
53308	53308 U	78	42	60	82	8.5	28	64	63	55	1	0.536	0.581	0.704
53408	53408 U	90	42	65	95	12	26	72	70	60	1	1.1	1.12	1.38
—	—	65	47	—	—	—	—	—	57	53	0.6	0.143	—	—
53209	53209 U	73	47	60	78	7.5	26	56	62	56	1	0.31	0.333	0.419
53309	53309 U	85	47	65	90	10	25	64	69	61	1	0.672	0.702	0.888
53409	53409 U	100	47	72	105	12.5	29	80	78	67	1	1.46	1.53	1.87
—	—	70	52	—	—	—	—	—	62	58	0.6	0.153	—	—
53210	53210 U	78	52	62	82	7.5	32.5	64	67	61	1	0.378	0.404	0.504
53310	53310 U	95	52	72	100	11	28	72	77	68	1	0.931	1.01	1.27
53410	53410 U	110	52	80	115	14	35	90	86	74	1.5	1.94	1.98	2.41

Single-Direction Thrust Ball Bearings

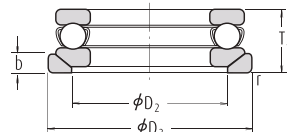
Bore Diameter 55 – 100 mm



With Flat Seat

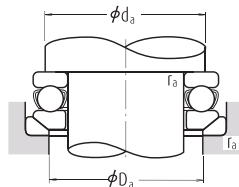
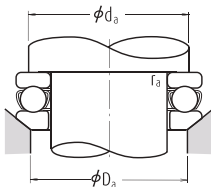
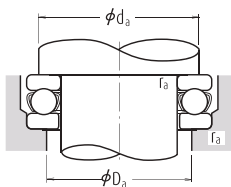


With Aligning Seat



With Aligning Seat Washer

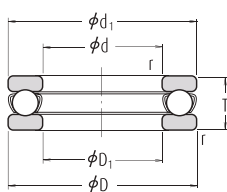
Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		With Flat Seat
d	D	T	T ₃	T ₄	r min.	C _a	C _{0a}	Grease	Oil	
55	78	16	—	—	0.6	35 000	93 000	2 800	4 300	51111
	90	25	27.3	30	1	70 000	159 000	2 200	3 200	51211
	105	35	39.3	42	1.1	115 000	244 000	1 600	2 400	51311
	120	48	50.5	55	1.5	181 000	350 000	1 300	1 900	51411
60	85	17	—	—	1	41 500	113 000	2 600	4 000	51112
	95	26	28	31	1	71 500	169 000	2 000	3 000	51212
	110	35	38.3	42	1.1	119 000	263 000	1 600	2 400	51312
	130	51	54	58	1.5	202 000	395 000	1 200	1 800	51412
65	90	18	—	—	1	42 000	117 000	2 400	3 800	51113
	100	27	28.7	32	1	75 500	189 000	1 900	2 800	51213
	115	36	39.4	43	1.1	123 000	282 000	1 500	2 400	51313
	140	56	60.2	65	2	234 000	495 000	1 100	1 700	51413
70	95	18	—	—	1	43 500	127 000	2 400	3 600	51114
	105	27	28.8	32	1	74 000	189 000	1 900	2 800	51214
	125	40	44.2	48	1.1	137 000	315 000	1 400	2 000	51314
	150	60	63.6	69	2	252 000	555 000	1 000	1 500	51414
75	100	19	—	—	1	43 500	131 000	2 200	3 400	51115
	110	27	28.3	32	1	78 000	209 000	1 800	2 800	51215
	135	44	48.1	52	1.5	159 000	365 000	1 300	1 900	51315
	160	65	69	75	2	254 000	560 000	950	1 400	51415
80	105	19	—	—	1	45 000	141 000	2 200	3 400	51116
	115	28	29.5	33	1	79 000	218 000	1 800	2 600	51216
	140	44	47.6	52	1.5	164 000	395 000	1 300	1 900	51316
	170	68	72.2	78	2.1	272 000	620 000	900	1 300	51416
85	110	19	—	—	1	46 500	150 000	2 200	3 200	51117
	125	31	33.1	37	1	96 000	264 000	1 600	2 400	51217
	150	49	53.1	58	1.5	207 000	490 000	1 100	1 700	51317
	180	72	77	83	2.1	310 000	755 000	850	1 300	51417 X
90	120	22	—	—	1	60 000	190 000	1 900	3 000	51118
	135	35	38.5	42	1.1	114 000	310 000	1 400	2 200	51218
	155	50	54.6	59	1.5	214 000	525 000	1 100	1 700	51318
	190	77	81.2	88	2.1	330 000	825 000	800	1 200	51418 X
100	135	25	—	—	1	86 000	268 000	1 700	2 600	51120
	150	38	40.9	45	1.1	135 000	375 000	1 300	2 000	51220
	170	55	59.2	64	1.5	239 000	595 000	1 000	1 500	51320
	210	85	90	98	3	370 000	985 000	710	1 100	51420 X



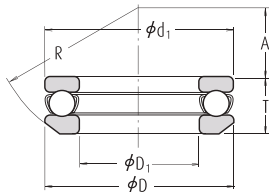
Bearing Numbers (1)		Dimensions (mm)							Abutment and Fillet Dimensions (mm)			Mass (kg) approx.		
With Aligning Seat	With Aligning Seat Washer	d_1	D_1	D_2	D_3	b	A	R	d_a min.	D_a max.	r_a max.	With Flat Seat	With Aligning Seat	With Aligning Seat Washer
—	—	78	57	—	—	—	—	—	69	64	0.6	0.227	—	—
53211	53211 U	90	57	72	95	9	35	72	76	69	1	0.599	0.656	0.819
53311	53311 U	105	57	80	110	11.5	30	80	85	75	1	1.31	1.45	1.78
53411	53411 U	120	57	88	125	15.5	28	90	94	81	1.5	2.58	2.59	3.16
—	—	85	62	—	—	—	—	—	75	70	1	0.281	—	—
53212	53212 U	95	62	78	100	9	32.5	72	81	74	1	0.673	0.731	0.897
53312	53312 U	110	62	85	115	11.5	41	90	90	80	1	1.4	1.51	1.83
53412	53412 U	130	62	95	135	16	34	100	102	88	1.5	3.16	3.2	3.91
—	—	90	67	—	—	—	—	—	80	75	1	0.324	—	—
53213	53213 U	100	67	82	105	9	40	80	86	79	1	0.756	0.812	0.989
53313	53313 U	115	67	90	120	12.5	38.5	90	95	85	1	1.54	1.67	2.04
53413	53413 U	140	68	100	145	17.5	40	112	110	95	2	4.1	4.22	5.13
—	—	95	72	—	—	—	—	—	85	80	1	0.346	—	—
53214	53214 U	105	72	88	110	9	38	80	91	84	1	0.793	0.866	1.05
53314	53314 U	125	72	98	130	13	43	100	103	92	1	2.0	2.2	2.64
53414	53414 U	150	73	110	155	19.5	34	112	118	102	2	5.05	5.12	6.21
—	—	100	77	—	—	—	—	—	90	85	1	0.389	—	—
53215	53215 U	110	77	92	115	9.5	49	90	96	89	1	0.845	1.27	1.11
53315	53315 U	135	77	105	140	15	37	100	111	99	1.5	2.6	2.8	3.42
53415	53415 U	160	78	115	165	21	42	125	125	110	2	6.15	6.23	7.58
—	—	105	82	—	—	—	—	—	95	90	1	0.417	—	—
53216	53216 U	115	82	98	120	10	46	90	101	94	1	0.931	1.01	1.23
53316	53316 U	140	82	110	145	15	50	112	116	104	1.5	2.74	2.94	3.55
53416	53416 U	170	83	125	175	22	36	125	133	117	2	7.21	7.33	8.9
—	—	110	87	—	—	—	—	—	100	95	1	0.44	—	—
53217	53217 U	125	88	105	130	11	52	100	109	101	1	1.22	1.35	1.63
53317	53317 U	150	88	115	155	17.5	43	112	124	111	1.5	3.57	3.78	4.67
53417 X	53417 XU	177	88	130	185	23	47	140	141	124	2	8.51	8.72	10.4
—	—	120	92	—	—	—	—	—	108	102	1	0.646	—	—
53218	53218 U	135	93	110	140	13.5	45	100	117	108	1	1.69	1.89	2.38
53318	53318 U	155	93	120	160	18	40	112	129	116	1.5	3.83	4.11	5.09
53418 X	53418 XU	187	93	140	195	25.5	40	140	149	131	2	10.2	10.3	12.4
—	—	135	102	—	—	—	—	—	121	114	1	0.96	—	—
53220	53220 U	150	103	125	155	14	52	112	130	120	1	2.25	2.49	3.03
53320	53320 U	170	103	135	175	18	46	125	142	128	1.5	4.98	5.31	6.37
53420 X	53420 XU	205	103	155	220	27	50	160	165	145	2.5	14.8	15	18.1

Single-Direction Thrust Ball Bearings

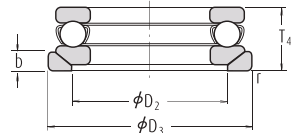
Bore Diameter 110 – 190 mm



With Flat Seat

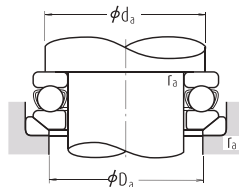
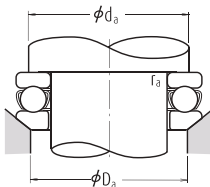
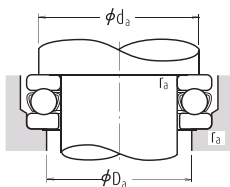


With Aligning Seat



With Aligning Seat Washer

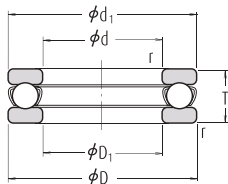
Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		With Flat Seat
d	D	T	T ₃	T ₄	r min.	C _a	C _{0a}	Grease	Oil	
110	145	25	—	—	1	88 000	288 000	1 700	2 400	51122
	160	38	40.2	45	1.1	136 000	395 000	1 300	1 900	51222
	190	63	67.2	72	2	282 000	755 000	900	1 300	51322 X
	230	95	99.7	109	3	415 000	1 150 000	630	950	51422 X
120	155	25	—	—	1	90 000	310 000	1 600	2 400	51124
	170	39	40.8	46	1.1	141 000	430 000	1 200	1 800	51224
	210	70	74.1	80	2.1	330 000	930 000	800	1 200	51324 X
	250	102	107.3	118	4	480 000	1 400 000	600	900	51424 X
130	170	30	—	—	1	105 000	350 000	1 400	2 000	51126
	190	45	47.9	53	1.5	183 000	550 000	1 100	1 600	51226 X
	225	75	80.3	86	2.1	350 000	1 030 000	750	1 100	51326 X
	270	110	115.2	128	4	525 000	1 590 000	530	800	51426 X
140	180	31	—	—	1	107 000	375 000	1 300	2 000	51128 X
	200	46	48.6	55	1.5	186 000	575 000	1 000	1 500	51228 X
	240	80	84.9	92	2.1	370 000	1 130 000	670	1 000	51328 X
	280	112	117	131	4	550 000	1 750 000	530	800	51428 X
150	190	31	—	—	1	110 000	400 000	1 300	1 900	51130 X
	215	50	53.3	60	1.5	238 000	735 000	950	1 400	51230 X
	250	80	83.7	92	2.1	380 000	1 200 000	670	1 000	51330 X
	300	120	125.9	140	4	620 000	2 010 000	480	710	51430 X
160	200	31	—	—	1	113 000	425 000	1 200	1 900	51132 X
	225	51	54.7	61	1.5	249 000	805 000	900	1 400	51232 X
	270	87	91.7	100	3	475 000	1 570 000	600	900	51332 X
	320	130	135.3	150	5	650 000	2 210 000	450	670	51432 X
170	215	34	—	—	1.1	135 000	510 000	1 100	1 700	51134 X
	240	55	58.7	65	1.5	280 000	915 000	850	1 300	51234 X
	280	87	91.3	100	3	465 000	1 570 000	600	900	51334 X
	340	135	141	156	5	715 000	2 480 000	430	630	51434 X
180	225	34	—	—	1.1	136 000	530 000	1 100	1 700	51136 X
	250	56	58.2	66	1.5	284 000	955 000	800	1 200	51236 X
	300	95	99.3	109	3	480 000	1 680 000	560	850	51336 X
	360	140	148.3	164	5	750 000	2 730 000	400	600	51436 X
190	240	37	—	—	1.1	172 000	655 000	1 000	1 600	51138 X
	270	62	65.7	73	2	320 000	1 110 000	750	1 100	51238 X
	320	105	111	121	4	550 000	1 960 000	500	750	51338 X



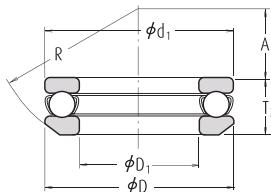
Bearing Numbers (1)		Dimensions (mm)							Abutment and Fillet Dimensions (mm)			Mass (kg) approx.		
With Aligning Seat	With Aligning Seat Washer	d_1	D_1	D_2	D_3	b	A	R	d_a min.	D_a max.	r_a max.	With Flat Seat	With Aligning Seat	With Aligning Seat Washer
—	—	145	112	—	—	—	—	—	131	124	1	1.04	—	—
53222	53222 U	160	113	135	165	14	65	125	140	130	1	2.42	2.65	3.2
53322 X	53322 XU	187	113	150	195	20.5	51	140	158	142	2	7.19	7.55	9.1
53422 X	53422 XU	225	113	170	240	29	59	180	181	159	2.5	20	20.5	24.3
—	—	155	122	—	—	—	—	—	141	134	1	1.12	—	—
53224	53224 U	170	123	145	175	15	61	125	150	140	1	2.7	2.94	3.58
53324 X	53324 XU	205	123	165	220	22	63	160	173	157	2	9.7	10.1	12.4
53424 X	53424 XU	245	123	185	260	32	70	200	196	174	3	26.2	26.5	31.3
—	—	170	132	—	—	—	—	—	154	146	1	1.68	—	—
53226 X	53226 XU	187	133	160	195	17	67	140	166	154	1.5	3.95	4.35	5.33
53326 X	53326 XU	220	134	177	235	26	53	160	186	169	2	12.1	12.7	15.8
53426 X	53426 XU	265	134	200	280	38	58	200	212	188	3	32.3	32.4	38.8
—	—	178	142	—	—	—	—	—	164	156	1	1.83	—	—
53228 X	53228 XU	197	143	170	210	17	87	160	176	164	1.5	4.3	4.74	5.89
53328 X	53328 XU	235	144	190	250	26	68	180	199	181	2	14.2	16.3	19.5
53428 X	53428 XU	275	144	206	290	38	83	225	222	198	3	34.7	34.8	41.4
—	—	188	152	—	—	—	—	—	174	166	1	1.95	—	—
53230 X	53230 XU	212	153	180	225	20.5	79	160	189	176	1.5	5.52	6.09	7.82
53330 X	53330 XU	245	154	200	260	26	89.5	200	209	191	2	15	17.3	20.5
53430 X	53430 XU	295	154	225	310	41	69	225	238	212	3	43.5	43.8	51.9
—	—	198	162	—	—	—	—	—	184	176	1	2.07	—	—
53232 X	53232 XU	222	163	190	235	21	74	160	199	186	1.5	6.04	6.78	8.7
53332 X	53332 XU	265	164	215	280	29	77	200	225	205	2.5	19.6	22.3	26.7
53432 X	53432 XU	315	164	240	330	41.5	84	250	254	226	4	52.7	52.9	62
—	—	213	172	—	—	—	—	—	197	188	1	2.72	—	—
53234 X	53234 XU	237	173	200	250	21.5	91	180	212	198	1.5	7.41	8.21	10.5
53334 X	53334 XU	275	174	220	290	29	105	225	235	215	2.5	20.3	23.2	28
53434 X	53434 XU	335	174	255	350	46	74	250	269	241	4	61.2	61.3	73
—	—	222	183	—	—	—	—	—	207	198	1	2.79	—	—
53236 X	53236 XU	247	183	210	260	21.5	112	200	222	208	1.5	7.94	8.57	10.8
53336 X	53336 XU	295	184	240	310	32	91	225	251	229	2.5	25.9	29.2	34.9
53436 X	53436 XU	355	184	270	370	46.5	97	280	285	255	4	70.5	72.1	84.9
—	—	237	193	—	—	—	—	—	220	210	1	3.6	—	—
53238 X	53238 XU	267	194	230	280	23	98	200	238	222	2	11.8	12.9	15.7
53338 X	53338 XU	315	195	255	330	33	104	250	266	244	3	36.5	38.1	44.7

Single-Direction Thrust Ball Bearings

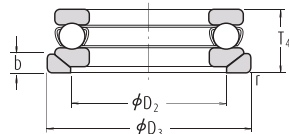
Bore Diameter 200 – 360 mm



With Flat Seat

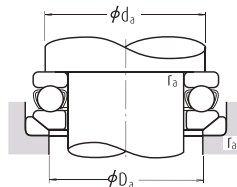
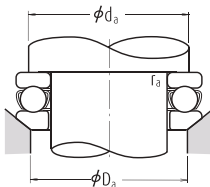
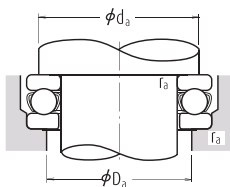


With Aligning Seat



With Aligning Seat Washer

Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		With Flat Seat
d	D	T	T ₃	T ₄	r min.	C _a	C _{0a}	Grease	Oil	
200	250	37	—	—	1.1	173 000	675 000	1 000	1 500	51140 X
	280	62	65.3	74	2	315 000	1 110 000	710	1 100	51240 X
	340	110	118.4	130	4	600 000	2 220 000	480	710	51340 X
220	270	37	—	—	1.1	179 000	740 000	950	1 500	51144 X
	300	63	65.6	75	2	325 000	1 210 000	670	1 000	51244 X
240	300	45	—	—	1.5	229 000	935 000	850	1 200	51148 X
	340	78	81.6	92	2.1	420 000	1 650 000	560	850	51248 X
260	320	45	—	—	1.5	233 000	990 000	800	1 200	51152 X
	360	79	82.8	93	2.1	435 000	1 800 000	560	850	51252 X
280	350	53	—	—	1.5	315 000	1 310 000	710	1 000	51156 X
	380	80	85	94	2.1	450 000	1 950 000	530	800	51256 X
300	380	62	—	—	2	360 000	1 560 000	600	900	51160 X
	420	95	100.5	112	3	540 000	2 410 000	450	670	51260 X
320	400	63	—	—	2	365 000	1 660 000	600	900	51164 X
	440	95	100.5	112	3	585 000	2 680 000	450	670	51264 X
340	420	64	—	—	2	375 000	1 760 000	560	850	51168 X
	460	96	100.3	113	3	595 000	2 800 000	430	630	51268 X
360	440	65	—	—	2	385 000	1 860 000	560	800	51172 X
	500	110	116.7	130	4	705 000	3 500 000	380	560	51272 X

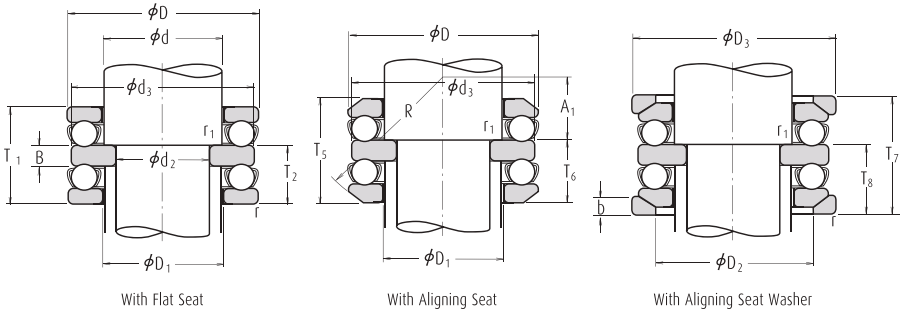


Bearing Numbers (1)		Dimensions (mm)							Abutment and Fillet Dimensions (mm)			Mass (kg) approx.		
With Aligning Seat	With Aligning Seat Washer	d ₁	D ₁	D ₂	D ₃	b	A	R	d _a min.	D _a max.	r _a max.	With Flat Seat	With Aligning Seat	With Aligning Seat Washer
—	—	247	203	—	—	—	—	—	230	220	1	3.75	—	—
53240 X	53240 XU	277	204	240	290	23	125	225	248	232	2	12.3	13.4	16.1
53340 X	53340 XU	335	205	270	350	38	92	250	282	258	3	43.6	46.2	54.8
—	—	267	223	—	—	—	—	—	250	240	1	4.09	—	—
53244 X	53244 XU	297	224	260	310	25	118	225	268	252	2	13.6	14.9	18
—	—	297	243	—	—	—	—	—	276	264	1.5	6.55	—	—
53248 X	53248 XU	335	244	290	350	30	122	250	299	281	2	23.7	25.6	30.7
—	—	317	263	—	—	—	—	—	296	284	1.5	7.01	—	—
53252 X	53252 XU	355	264	305	370	30	152	280	319	301	2	25.1	27.3	33.2
—	—	347	283	—	—	—	—	—	322	308	1.5	12	—	—
53256 X	53256 XU	375	284	325	390	31	143	280	339	321	2	27.1	30.3	37
—	—	376	304	—	—	—	—	—	348	332	2	17.2	—	—
53260 X	53260 XU	415	304	360	430	34	164	320	371	349	2.5	43.5	47.7	56.1
—	—	396	324	—	—	—	—	—	368	352	2	18.6	—	—
53264 X	53264 XU	435	325	380	450	36	157	320	391	369	2.5	45	49.9	59.4
—	—	416	344	—	—	—	—	—	388	372	2	19.9	—	—
53268 X	53268 XU	455	345	400	470	36	199	360	411	389	2.5	47.9	52.7	62
—	—	436	364	—	—	—	—	—	408	392	2	21.5	—	—
53272 X	53272 XU	495	365	430	510	43	172	360	442	418	3	68.8	76.3	90.9

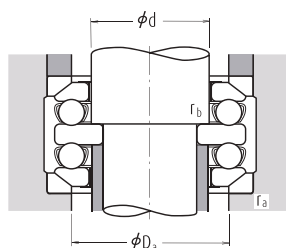
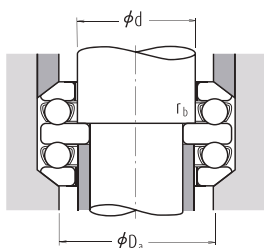
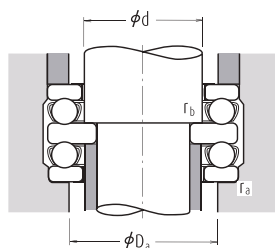


Double-Direction Thrust Ball Bearings

Bore Diameter 10 – 55 mm



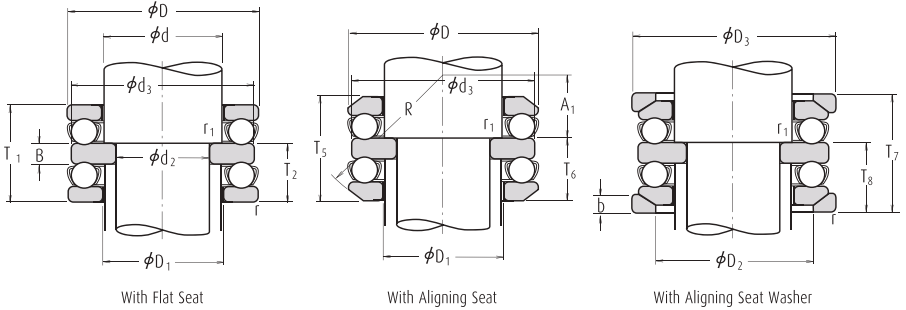
Boundary Dimensions (mm)								Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		Bearing Numbers	
d_2	d	D	T_1	T_5	T_7	r min.	r_1 min.	C_a	C_{0a}	Grease	Oil	With Flat Seat	With Aligning Seat
10	15	32	22	24.6	28	0.6	0.3	16 700	24 800	4 800	7 100	52202	54202
15	20	40	26	27.4	32	0.6	0.3	22 500	37 500	4 000	6 000	52204	54204
	25	60	45	49.8	55	1	0.6	56 000	89 500	2 400	3 600	52405	54405
20	25	47	28	31.4	36	0.6	0.3	28 000	50 500	3 400	5 300	52205	54205
	30	52	34	37.6	42	1	0.3	36 000	61 500	3 000	4 500	52305	54305
25	30	70	52	56.2	62	1	0.6	73 000	126 000	2 200	3 200	52406	54406
	30	52	29	32.6	37	0.6	0.3	29 500	58 000	3 200	5 000	52206	54206
30	30	60	38	41.2	46	1	0.3	43 000	78 500	2 600	4 000	52306	54306
	35	80	59	63	69	1.1	0.6	87 500	155 000	1 800	2 800	52407	54407
35	35	62	34	37.8	42	1	0.3	39 500	78 000	2 800	4 300	52207	54207
	35	68	44	47.2	52	1	0.3	56 000	105 000	2 400	3 600	52307	54307
40	40	68	36	38.6	44	1	0.6	47 500	98 500	2 600	3 800	52208	54208
	40	78	49	54	59	1	0.6	70 000	135 000	2 000	3 000	52308	54308
40	40	90	65	69.4	77	1.1	0.6	103 000	188 000	1 700	2 400	52408	54408
	45	73	37	39.6	45	1	0.6	48 000	105 000	2 400	3 600	52209	54209
45	45	85	52	56.2	62	1	0.6	80 500	163 000	1 900	2 800	52309	54309
	45	100	72	78.8	86	1.1	0.6	128 000	246 000	1 500	2 200	52409	54409
40	50	78	39	42	47	1	0.6	49 000	111 000	2 400	3 400	52210	54210
	50	95	58	64.6	70	1.1	0.6	97 500	202 000	1 700	2 600	52310	54310
50	50	110	78	83.2	92	1.5	0.6	147 000	288 000	1 400	2 000	52410	54410
	55	90	45	49.6	55	1	0.6	70 000	159 000	2 000	3 000	52211	54211
45	55	105	64	72.6	78	1.1	0.6	115 000	244 000	1 500	2 400	52311	54311
	55	120	87	92	101	1.5	0.6	181 000	350 000	1 200	1 800	52411	54411
50	60	95	46	50	56	1	0.6	71 500	169 000	1 900	3 000	52212	54212
	60	110	64	70.6	78	1.1	0.6	119 000	263 000	1 500	2 200	52312	54312
60	60	130	93	99	107	1.5	0.6	202 000	395 000	1 100	1 700	52412	54412
	65	140	101	109.4	119	2	1	234 000	495 000	1 000	1 600	52413	54413
55	65	100	47	50.4	57	1	0.6	75 500	189 000	1 900	2 800	52213	54213
	65	115	65	71.8	79	1.1	0.6	123 000	282 000	1 500	2 200	52313	54313
70	70	105	47	50.6	57	1	1	74 000	189 000	1 800	2 800	52214	54214
	70	125	72	80.4	88	1.1	1	137 000	315 000	1 300	2 000	52314	54314
70	150	107	114.2	125	2	1		252 000	555 000	1 000	1 500	52414	54414



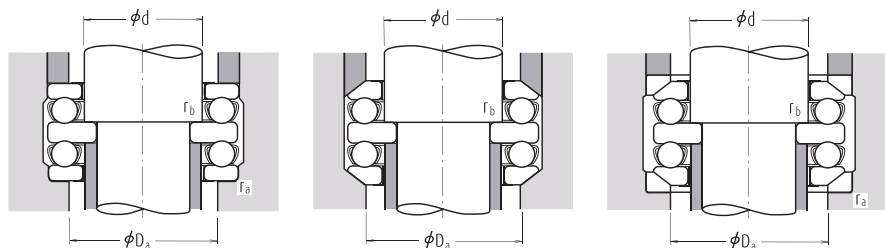
With Aligning Seat Washer	Dimensions (mm)												Abutment and Fillet Dimensions (mm)			Mass (kg) approx.		
	d ₃	D ₁	D ₂	D ₃	T ₂	T ₆	T ₈	B	b	A ₁	R	D _a max.	r _a max.	r _b max.	With Flat Seat	With Aligning Seat	With Aligning Seat Washer	
54202 U	32	17	24	35	13.5	14.8	16.5	5	4	10.5	28	24	0.6	0.3	0.081	0.090	0.113	
54204 U	40	22	30	42	16	16.7	19	6	5	16	36	30	0.6	0.3	0.148	0.151	0.185	
54405 U	60	27	42	62	28	30.4	33	11	8	15	50	42	1	0.6	0.641	0.68	0.825	
54205 U	47	27	36	50	17.5	19.2	21.5	7	5.5	16.5	40	36	0.6	0.3	0.213	0.236	0.293	
54305 U	52	27	38	55	21	22.8	25	8	6	18	45	38	1	0.3	0.324	0.35	0.434	
54406 U	70	32	50	75	32	34.1	37	12	9	16	56	50	1	0.6	0.978	1.01	1.27	
54206 U	52	32	42	55	18	19.8	22	7	5.5	20	45	42	0.6	0.3	0.254	0.288	0.345	
54306 U	60	32	45	62	23.5	25.1	27.5	9	7	19.5	50	45	1	0.3	0.483	0.511	0.621	
54407 U	80	37	58	85	36.5	38.5	41.5	14	10	18.5	64	58	1	0.6	1.43	1.47	1.83	
54207 U	62	37	48	65	21	22.9	25	8	7	21	50	48	1	0.3	0.406	0.447	0.57	
54307 U	68	37	52	72	27	28.6	31	10	7.5	21	56	52	1	0.3	0.71	0.744	0.915	
54208 U	68	42	55	72	22.5	23.8	26.5	9	7	25	56	55	1	0.6	0.543	0.581	0.713	
54308 U	78	42	60	82	30.5	33	35.5	12	8.5	23.5	64	60	1	0.6	1.04	1.13	1.38	
54408 U	90	42	65	95	40	42.2	46	15	12	22	72	65	1	0.6	1.98	2.02	2.54	
54209 U	73	47	60	78	23	24.3	27	9	7.5	23	56	60	1	0.6	0.606	0.652	0.823	
54309 U	85	47	65	90	32	34.1	37	12	10	21	64	65	1	0.6	1.28	1.34	1.71	
54409 U	100	47	72	105	44.5	47.9	51.5	17	12.5	23.5	80	72	1	0.6	2.71	2.85	3.53	
54210 U	78	52	62	82	24	25.5	28	9	7.5	30.5	64	62	1	0.6	0.697	0.75	0.949	
54310 U	95	52	72	100	36	39.3	42	14	11	23	72	72	1	0.6	1.78	1.94	2.46	
54410 U	110	52	80	115	48	50.6	55	18	14	30	90	80	1.5	0.6	3.51	3.59	4.45	
54211 U	90	57	72	95	27.5	29.8	32.5	10	9	32.5	72	72	1	0.6	1.11	1.22	1.55	
54311 U	105	57	80	110	39.5	43.8	46.5	15	11.5	25.5	80	80	1	0.6	2.43	2.7	3.35	
54411 U	120	57	88	125	53.5	56	60.5	20	15.5	22.5	90	88	1.5	0.6	4.66	4.68	5.82	
54212 U	95	62	78	100	28	30	33	10	9	30.5	72	78	1	0.6	1.22	1.33	1.66	
54312 U	110	62	85	115	39.5	42.8	46.5	15	11.5	36.5	90	85	1	0.6	2.59	2.82	3.45	
54412 U	130	62	95	135	57	60	64	21	16	28	100	95	1.5	0.6	5.74	5.82	7.24	
54413 U	140	68	100	145	62	66.2	71	23	17.5	34	112	100	2	1	7.41	7.66	9.47	
54213 U	100	67	82	105	28.5	30.2	33.5	10	9	38.5	80	82	1	0.6	1.34	1.45	1.81	
54313 U	115	67	90	120	40	43.4	47	15	12.5	34.5	90	90	1	0.6	2.8	3.06	3.8	
54214 U	105	72	88	110	28.5	30.3	33.5	10	9	36.5	80	88	1	1	1.44	1.59	1.95	
54314 U	125	72	98	130	44	48.2	52	16	13	39	100	98	1	1	3.67	4.07	4.95	
54414 U	150	73	110	155	65.5	69.1	74.5	24	19.5	28.5	112	110	2	1	8.99	9.12	11.3	

Double-Direction Thrust Ball Bearings

Bore Diameter 60 – 130 mm



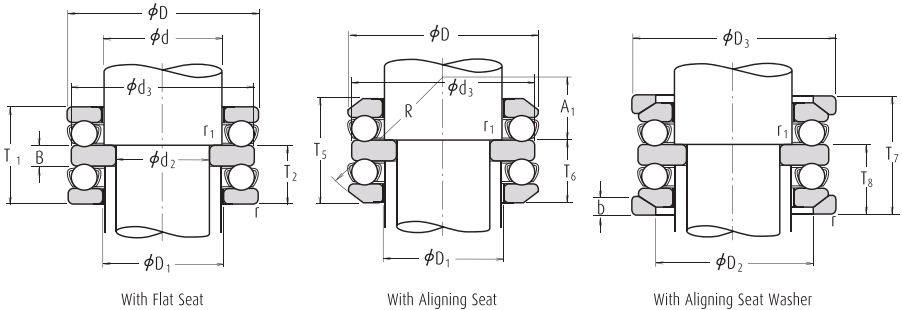
Boundary Dimensions (mm)								Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		Bearing Numbers (*)	
d_2	d	D	T_1	T_3	T_7	r min.	r_1 min.	C_a	C_{0a}	Grease	Oil	With Flat Seat	With Aligning Seat
60	75	110	47	49.6	57	1	1	78 000	209 000	1 800	2 600	52215	54215
	75	135	79	87.2	95	1.5	1	159 000	365 000	1 200	1 800	52315	54315
	75	160	115	123	135	2	1	254 000	560 000	900	1 400	52415	54415
65	80	115	48	51	58	1	1	79 000	218 000	1 700	2 600	52216	54216
	80	140	79	86.2	95	1.5	1	164 000	395 000	1 200	1 800	52316	54316
	80	170	120	128.4	140	2.1	1	272 000	620 000	850	1 300	52416	54416
70	85	180	128	138	150	2.1	1.1	310 000	755 000	800	1 200	52417 X	54417 X
	85	125	55	59.2	67	1	1	96 000	264 000	1 500	2 200	52217	54217
	85	150	87	95.2	105	1.5	1	207 000	490 000	1 100	1 600	52317	54317
75	90	190	135	143.4	157	2.1	1.1	330 000	825 000	750	1 100	52418 X	54418 X
	90	135	62	69	76	1.1	1	114 000	310 000	1 400	2 000	52218	54218
	90	155	88	97.2	106	1.5	1	214 000	525 000	1 100	1 600	52318	54318
80	100	210	150	160	176	3	1.1	370 000	985 000	670	1 000	52420 X	54420 X
	85	100	150	67	72.8	81	1.1	135 000	375 000	1 300	1 900	52220	54220
	100	170	97	105.4	115	1.5	1	239 000	595 000	950	1 500	52320	54320
90	110	230	166	—	—	3	1.1	415 000	1 150 000	600	900	52422 X	—
	95	110	160	67	71.4	81	1.1	136 000	395 000	1 200	1 800	52222	54222
	110	190	110	118.4	128	2	1	282 000	755 000	850	1 300	52322 X	54322 X
100	120	250	177	—	—	4	1.5	515 000	1 540 000	560	850	52424 X	—
	120	170	68	71.6	82	1.1	1.1	141 000	430 000	1 200	1 800	52224	54224
	120	210	123	131.2	143	2.1	1.1	330 000	930 000	750	1 100	52324 X	54324 X
110	130	270	192	—	—	4	1.5	525 000	1 590 000	530	800	52426 X	—
	130	190	80	85.8	96	1.5	1.1	183 000	550 000	1 000	1 500	52226 X	54226 X
	130	225	130	—	—	2.1	1.1	350 000	1 030 000	710	1 100	52326 X	—
120	140	280	196	—	—	4	1.5	550 000	1 750 000	500	750	52428 X	—
	140	200	81	86.2	99	1.5	1.1	186 000	575 000	1 000	1 500	52228 X	54228 X
	140	240	140	—	—	2.1	1.1	370 000	1 130 000	670	1 000	52328 X	—
130	150	300	209	—	—	4	2	620 000	2 010 000	480	710	52430 X	—
	150	215	89	95.6	109	1.5	1.1	238 000	735 000	900	1 300	52230 X	54230 X
	150	250	140	—	—	2.1	1.1	380 000	1 200 000	630	950	52330 X	—
	160	320	228	—	—	5	2	650 000	2 210 000	430	630	52432 X	—



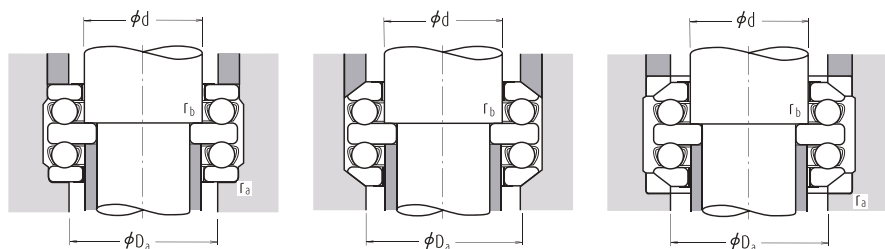
With Aligning Seat Washer	Dimensions (mm)											Abutment and Fillet Dimensions (mm)			Mass (kg) approx.		
	d ₃	D ₁	D ₂	D ₃	T ₂	T ₆	T ₈	B	b	A ₁	R	D _a max.	r _a max.	r _b max.	With Flat Seat	With Aligning Seat	With Aligning Seat Washer
54215 U	110	77	92	115	28.5	29.8	33.5	10	9.5	47.5	90	92	1	1	1.54	1.66	2.06
54315 U	135	77	105	140	48.5	52.6	56.5	18	15	32.5	100	105	1.5	1	4.74	5.14	6.38
54415 U	160	78	115	165	70.5	74.5	80.5	26	21	36.5	125	115	2	1	10.8	11	13.7
54216 U	115	82	98	120	29	30.5	34	10	10	45	90	98	1	1	1.66	1.78	2.21
54316 U	140	82	110	145	48.5	52.1	56.5	18	15	45.5	112	110	1.5	1	4.99	5.39	6.61
54416 U	170	83	125	175	73.5	77.7	83.5	27	22	30.5	125	125	2	1	12.6	12.8	16
54417 XU	179.5	88	130	185	78.5	83.5	89.5	29	23	40.5	140	130	2	1	15.4	15.8	19.5
54217 U	125	88	105	130	33.5	35.6	39.5	12	11	49.5	100	105	1	1	2.26	2.45	3.02
54317 U	150	88	115	155	53	57.1	62	19	17.5	39	112	115	1.5	1	6.38	6.8	10.5
54418 XU	189.5	93	140	195	82.5	86.7	93.5	30	25.5	34.5	140	140	2	1	17.5	18.1	22.5
54218 U	135	93	110	140	38	41.5	45	14	13.5	42	100	110	1	1	3.09	3.42	4.39
54318 U	155	93	120	160	53.5	58.1	62.5	19	18	36.5	112	120	1.5	1	6.79	7.33	9.29
54420 XU	209.5	103	155	220	91.5	96.5	104.5	33	27	43.5	160	155	2.5	1	26.8	27.2	33.4
54220 U	150	103	125	155	41	43.9	48	15	14	49	112	125	1	1	4.08	4.54	5.64
54320 U	170	103	135	175	59	63.2	68	21	18	42	125	135	1.5	1	8.82	9.47	11.6
—	229	113	—	—	101.5	—	—	37	—	—	—	159	2.5	1	35.6	—	—
54222 U	160	113	135	165	41	43.2	48	15	14	62	125	135	1	1	4.39	4.83	5.94
54322 XU	189.5	113	150	195	67	71.2	76	24	20.5	47	140	150	2	1	12.7	13.5	16.6
—	249	123	—	—	108.5	—	—	40	—	—	—	174	3	1.5	47.6	—	—
54224 U	170	123	145	175	41.5	43.3	48.5	15	15	58.5	125	145	1	1	4.92	5.4	6.68
54324 XU	209.5	123	165	220	75	79.1	85	27	22	58	160	165	2	1	17.6	16.4	22.9
—	269	134	—	—	117	—	—	42	—	—	—	188	3	1.5	57.8	—	—
54226 XU	189.5	133	160	195	49	51.9	57	18	17	63	140	160	1.5	1	7.43	8.24	10.2
—	224	134	—	—	80	—	—	30	—	—	—	169	2	1	21.5	—	—
—	279	144	—	—	120	—	—	44	—	—	—	198	3	1.5	62.4	—	—
54228 XU	199.5	143	170	210	49.5	52.1	58.5	18	17	83.5	160	170	1.5	1	8.01	8.87	11.2
—	239	144	—	—	85.5	—	—	31	—	—	—	181	2	1	24.8	—	—
—	299	153	—	—	127.5	—	—	46	—	—	—	212	3	2	77.8	—	—
54230 XU	214.5	153	180	225	54.5	57.8	64.5	20	20.5	74.5	160	180	1.5	1	10.4	11.5	15
—	249	154	—	—	85.5	—	—	31	—	—	—	191	2	1	30.3	—	—
—	319	164	—	—	138	—	—	50	—	—	—	226	4	2	93.6	—	—

Double-Direction Thrust Ball Bearings

Bore Diameter 135 – 190 mm



Boundary Dimensions (mm)								Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)		Bearing Numbers (1)	
d ₂	d	D	T ₁	T ₃	T ₇	r min.	r ₁ min.	C _a	C _{0a}	Grease	Oil	With Flat Seat	With Aligning Seat
135	170	340	236	—	—	5	2.1	715 000	2 480 000	400	600	52434 X	—
140	160	225	90	97.4	110	1.5	1.1	249 000	805 000	850	1 300	52232 X	54232 X
	160	270	153	—	—	3	1.1	475 000	1 570 000	600	900	52332 X	—
	180	360	245	—	—	5	3	750 000	2 730 000	380	560	52436 X	—
150	170	240	97	104.4	117	1.5	1.1	280 000	915 000	800	1 200	52234 X	54234 X
	170	280	153	—	—	3	1.1	465 000	1 570 000	560	850	52334 X	—
	180	250	98	102.4	118	1.5	2	284 000	955 000	800	1 200	52236 X	54236 X
	180	300	165	—	—	3	3	480 000	1 680 000	530	800	52336 X	—
160	190	270	109	116.4	131	2	2	320 000	1 110 000	710	1 100	52238 X	54238 X
	190	320	183	—	—	4	2	550 000	1 960 000	480	710	52338 X	—
170	200	280	109	115.6	133	2	2	315 000	1 110 000	710	1 000	52240 X	54240 X
	200	340	192	—	—	4	2	600 000	2 220 000	450	670	52340 X	—
190	220	300	110	115.2	134	2	2	325 000	1 210 000	670	1 000	52244 X	54244 X



With Aligning Seat Washer	Dimensions (mm)												Abutment and Fillet Dimensions (mm)			Mass (kg) approx.		
	d ₃	D ₁	D ₂	D ₃	T ₂	T ₆	T ₈	B	b	A ₁	R	D _a max.	r _a max.	r _b max.	With Flat Seat	With Aligning Seat	With Aligning Seat Washer	
—	339	174	—	—	143	—	—	50	—	—	—	240	4	2	110	—	—	
54232 XU	224.5	163	190	235	55	58.7	65	20	21	70	160	190	1.5	1	11.2	12.7	16.5	
—	269	164	—	—	93	—	—	33	—	—	—	205	2.5	1	35.1	—	—	
—	359	184	—	—	148.5	—	—	52	—	—	—	254	4	2.5	126	—	—	
54234 XU	239.5	173	200	250	59	62.7	69	21	21.5	87	180	200	1.5	1	13.6	15.2	19.8	
—	279	174	—	—	93	—	—	33	—	—	—	215	2.5	1	40.8	—	—	
54236 XU	249	183	210	260	59.5	61.7	69.5	21	21.5	108.5	200	210	1.5	2	14.8	16.1	20.6	
—	299	184	—	—	101	—	—	37	—	—	—	229	2.5	2.5	46.3	—	—	
54238 XU	269	194	230	280	66.5	70.2	77.5	24	23	93.5	200	230	2	2	22.1	22.2	29.8	
—	319	195	—	—	111.5	—	—	40	—	—	—	244	3	2	113	—	—	
54240 XU	279	204	240	290	66.5	69.8	78.5	24	23	120.5	225	240	2	2	23.1	23.2	30.6	
—	339	205	—	—	117	—	—	42	—	—	—	258	3	2	78.4	—	—	
54244 XU	299	224	260	310	67	69.6	79	24	25	114	225	260	2	2	25.2	27.8	34.1	

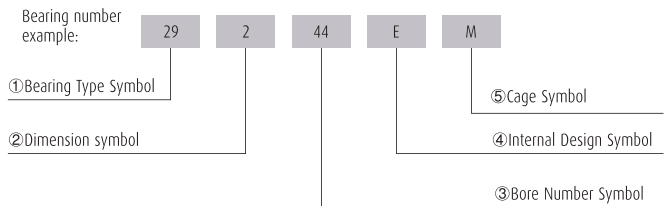


Thrust Spherical Roller Bearings

DESIGN, TYPES, AND FEATURES

THRUST SPHERICAL ROLLER BEARINGS

These are thrust bearings containing convex rollers. They have a selfaligning capability and are free of any influence of mounting error or shaft deflection. Besides the original type, the E type with pressed cages for high load capacity is also available. Their bearing numbers are suffixed by E. For horizontal shaft or high speed application, machined brass cages are recommended. For details, contact ITJ. Since there are several places where lubrication is difficult, such as the area between the roller heads and inner ring rib, the sliding surfaces between cage and guide sleeve, etc., oil lubrication should be used even at low speed. The cages in the original type are machined brass.



Dimensions related to Mounting

The dimensions related to mounting of thrust spherical roller bearings are listed in the Bearing Table. If the bearing load is heavy, it is necessary to design the shaft shoulder with ample strength in order to provide sufficient support for the shaft washer.

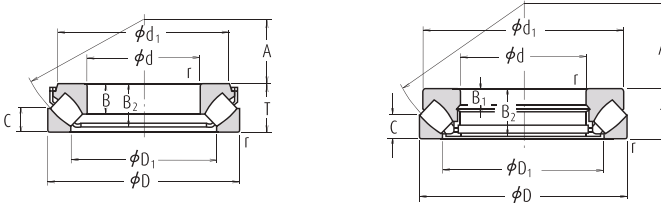
Permissible Misalignment

The permissible misalignment of thrust spherical roller bearings varies depending on the size, but it is approximately 0.018 to 0.036 radian (1° to 2°) with average loads.



Thrust Spherical Roller Bearings

Bore Diameter 60 – 200 mm



Boundary Dimensions (mm)				Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)	Bearing Numbers
d	D	T	r min.	C _a	C _{0a}	Oil	
60	130	42	1.5	330 000	885 000	2 600	29412 E
65	140	45	2	405 000	1 100 000	2 400	29413 E
70	150	48	2	450 000	1 240 000	2 400	29414 E
75	160	51	2	515 000	1 430 000	2 200	29415 E
80	170	54	2.1	575 000	1 600 000	2 000	29416 E
85	150	39	1.5	330 000	1 040 000	2 400	29317 E
	180	58	2.1	630 000	1 760 000	1 900	29417 E
90	155	39	1.5	350 000	1 080 000	2 200	29318 E
	190	60	2.1	695 000	1 950 000	1 800	29418 E
100	170	42	1.5	410 000	1 280 000	2 000	29320 E
	210	67	3	840 000	2 400 000	1 600	29420 E
110	190	48	2	530 000	1 710 000	1 800	29322 E
	230	73	3	1 010 000	2 930 000	1 500	29422 E
120	210	54	2.1	645 000	2 100 000	1 600	29324 E
	250	78	4	1 160 000	3 400 000	1 400	29424 E
130	225	58	2.1	740 000	2 450 000	1 500	29326 E
	270	85	4	1 330 000	3 900 000	1 200	29426 E
140	240	60	2.1	840 000	2 810 000	1 400	29328 E
	280	85	4	1 370 000	4 200 000	1 200	29428 E
150	250	60	2.1	870 000	2 900 000	1 400	29330 E
	300	90	4	1 580 000	4 900 000	1 100	29430 E
160	270	67	3	1 010 000	3 400 000	1 300	29332 E
	320	95	5	1 740 000	5 400 000	1 100	29432 E
170	280	67	3	1 050 000	3 500 000	1 200	29334 E
	340	103	5	1 680 000	5 800 000	1 000	29434
180	300	73	3	1 230 000	4 200 000	1 100	29336 E
	360	109	5	1 870 000	6 500 000	900	29436
190	320	78	4	1 370 000	4 700 000	1 100	29338 E
	380	115	5	2 100 000	7 450 000	850	29438
200	280	48	2	540 000	2 310 000	1 500	29240
	340	85	4	1 570 000	5 450 000	1 000	29340 E
	400	122	5	2 290 000	8 150 000	800	29440

Note (1) For heavy load applications, a d_a value should be chosen which is large enough to support the shaft washer rib.

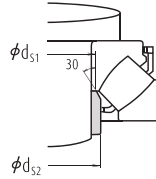
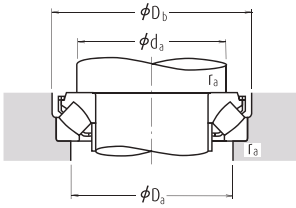
Dynamic Equivalent Load

$$P = 1.2F_r + F_a$$

Static Equivalent Load

$$P_0 = 2.8F_r + F_a$$

However, $F_r/F_a \leq 0.55$ must be satisfied.

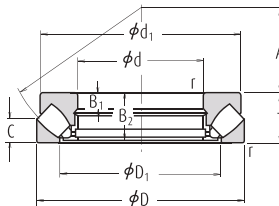


Dimensions (mm)						Spacer Sleeve Dimensions (mm)		Abutment and Fillet Dimensions (mm)				Mass (kg)
d ₁	D ₁	B, B ₁	B ₂	C	A	d _{s1} max.	d _{s2} max.	d _a (l) min.	D _a max.	D _a min.	r _a max.	approx.
114.5	89	27	38	20	38	67	67	90	108	133	1.5	2.55
121.5	93	29.5	40.5	22	42	72	72	100	115	143	2	3.2
131.5	102	31	43	24	44	78	78	105	125	153	2	3.9
138	107	33.5	46	25	47	83	83	115	132	163	2	4.65
148	114.5	35	48.5	27	50	89	89	120	140	173	2	5.55
134.5	112	24.5	35.5	19	50	91	91	115	135	153	1.5	2.7
156.5	124	37	51.5	28	54	95	95	130	150	183	2	6.55
139.5	118	24.5	35	19	52	97	97	120	140	158	1.5	2.83
165.5	129.5	39	54.5	29	56	100	100	135	157	193	2	7.55
152	128	26.2	38	20.8	58	107	107	130	150	173	1.5	3.6
185	144	43	59.5	33	62	111	111	150	175	214	2.5	10.3
169.5	142.5	30.3	43.5	24	64	117	117	145	165	193	2	5.25
200	157	47	64.5	36	69	121	129	165	190	234	2.5	13.3
187.5	156.5	34	48.5	27	70	130	130	160	180	214	2	7.3
215	171	50.5	69.5	38	74	132	142	180	205	254	3	16.6
203.5	168.5	37	53.5	28	76	141	143	170	195	229	2	8.95
235	185	54	74.5	42	81	143	153	195	225	275	3	21.1
216.5	179	38.5	54	30	82	148	154	185	205	244	2	10.4
244.5	195.5	54	74.5	42	86	153	162	205	235	285	3	22.2
224	190	38	54.5	29	87	158	163	195	215	254	2	10.8
266	209	58	81	44	92	164	175	220	250	306	3	27.3
243	203	42	60	33	92	169	176	210	235	275	2.5	14.3
278	224.5	60.5	84.5	46	99	175	189	230	265	326	4	32.1
252	214.5	42.2	60.5	32	96	178	188	220	245	285	2.5	14.8
310	243	37	99	50	104	—	—	245	285	—	4	43.5
270	227	46	65.5	36	103	189	195	235	260	306	2.5	19
330	255	39	105	52	110	—	—	260	300	—	4	52
288.5	244	49	69	38	110	200	211	250	275	326	3	23
345	271	41	111	55	117	—	—	275	320	—	4	60
266	236	15	46	24	108	—	—	235	255	—	2	8.55
306.5	257	53.5	75	41	116	211	224	265	295	346	3	28.5
365	280	43	117	59	122	—	—	290	335	—	4	69



Thrust Spherical Roller Bearings

Bore Diameter 220 – 420 mm



Boundary Dimensions (mm)				Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)	Bearing Numbers
d	D	T	r min.	C _a	C _{0a}	Oil	
220	300	48	2	560 000	2 500 000	1 400	29244
	360	85	4	1 340 000	5 200 000	950	29344
	420	122	6	2 350 000	8 650 000	800	29444
240	340	60	2.1	800 000	3 450 000	1 200	29248
	380	85	4	1 360 000	5 400 000	950	29348
	440	122	6	2 420 000	9 100 000	750	29448
260	360	60	2.1	855 000	3 850 000	1 200	29252
	420	95	5	1 700 000	6 800 000	800	29352
	480	132	6	2 820 000	10 700 000	710	29452
280	380	60	2.1	885 000	4 100 000	1 100	29256
	440	95	5	1 830 000	7 650 000	800	29356
	520	145	6	3 400 000	13 100 000	630	29456
300	520	145	6	3 950 000	14 900 000	630	29456 EM
	420	73	3	1 160 000	5 150 000	950	29260
	480	109	5	2 190 000	9 100 000	710	29360
320	540	145	6	3 500 000	13 700 000	630	29460
	440	73	3	1 190 000	5 450 000	950	29264
	500	109	5	2 230 000	9 400 000	670	29364
340	580	155	7.5	3 650 000	14 600 000	560	29464
	460	73	3	1 230 000	5 750 000	900	29268
	540	122	5	2 640 000	11 200 000	630	29368
360	620	170	7.5	4 400 000	17 400 000	530	29468
	500	85	4	1 550 000	7 300 000	800	29272
	560	122	5	2 670 000	11 500 000	600	29372
380	640	170	7.5	4 200 000	17 200 000	500	29472
	640	170	7.5	5 450 000	20 400 000	500	29472 EM
	520	85	4	1 620 000	7 800 000	800	29276
400	600	132	6	3 300 000	14 500 000	560	29376
	670	175	7.5	4 800 000	19 500 000	480	29476
	540	85	4	1 640 000	8 000 000	750	29280
420	620	132	6	3 250 000	14 500 000	530	29380
	710	185	7.5	5 400 000	22 100 000	450	29480
	580	95	5	2 010 000	9 800 000	670	29284
420	650	140	6	3 500 000	15 700 000	500	29384
	730	185	7.5	5 650 000	23 500 000	450	29484

Note (1) For heavy load applications, a d_s value should be chosen which is large enough to support the shaft washer rib.

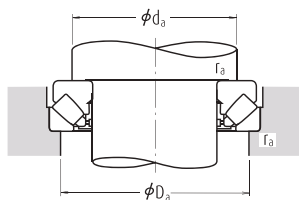
Dynamic Equivalent Load

$$P = 1.2F_r + F_a$$

Static Equivalent Load

$$P_0 = 2.8F_r + F_a$$

However, $F_r/F_a \leq 0.55$ must be satisfied.

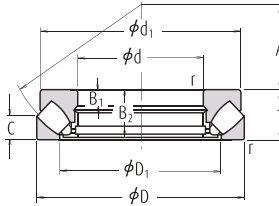


Dimensions (mm)						Abutment and Fillet Dimensions (mm)			Mass (kg)
d_1	D_1	B_1	B_2	C	A	d_a (!) min.	D_a max.	r_a max.	approx.
285	254	15	46	24	117	260	275	2	9.2
335	280	29	81	41	125	285	315	3	33
385	308	43	117	58	132	310	355	5	74
325	283	19	57	30	130	285	305	2	16.5
355	300	29	81	41	135	300	330	3	35.5
405	326	43	117	59	142	330	375	5	79
345	302	19	57	30	139	305	325	2	18
390	329	32	91	45	148	330	365	4	48.5
445	357	48	127	64	154	360	405	5	105
365	323	19	57	30	150	325	345	2	19
410	348	32	91	46	158	350	390	4	52.5
480	384	52	140	68	166	390	440	5	132
480	380	52	140	70	166	410	445	5	134
400	353	21	69	38	162	355	380	2.5	30
450	379	37	105	50	168	380	420	4	74
500	402	52	140	70	175	410	460	5	140
420	372	21	69	38	172	375	400	2.5	32.5
470	399	37	105	53	180	400	440	4	77
555	436	55	149	75	191	435	495	6	175
440	395	21	69	37	183	395	420	2.5	33.5
510	428	41	117	59	192	430	470	4	103
590	462	61	164	82	201	465	530	6	218
480	423	25	81	44	194	420	455	3	51
525	448	41	117	59	202	450	495	4	107
610	480	61	164	82	210	485	550	6	228
580	474	61	164	83	210	495	550	6	220
496	441	27	81	42	202	440	475	3	52
568	477	44	127	63	216	480	525	5	140
640	504	63	168	85	230	510	575	6	254
517	460	27	81	42	212	460	490	3	55
590	494	44	127	64	225	500	550	5	150
680	536	67	178	89	236	540	610	6	306
553	489	30	91	46	225	490	525	4	72
620	520	48	135	68	235	525	575	5	170
700	556	67	178	89	244	560	630	6	323



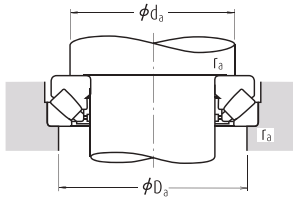
Thrust Spherical Roller Bearings

Bore Diameter 440 – 500 mm



Boundary Dimensions (mm)				Basic Load Ratings (N)		Limiting Speeds (min ⁻¹)	Bearing Numbers
d	D	T	r min.	C ₉₀	C _{90a}	Oil	
440	600	95	5	2 030 000	10 100 000	670	29288
	680	145	6	3 750 000	16 700 000	480	29388
	780	206	9.5	6 550 000	27 200 000	400	29488
460	780	206	9.5	8 000 000	31 500 000	400	29488 EM
	620	95	5	2 060 000	10 300 000	670	29292
	710	150	6	4 100 000	18 400 000	450	29392
480	800	206	9.5	6 750 000	28 600 000	380	29492
	650	103	5	2 370 000	12 100 000	600	29296
	730	150	6	4 150 000	19 000 000	450	29396
500	850	224	9.5	7 200 000	31 000 000	360	29496
	670	103	5	2 390 000	12 400 000	600	292/500
	750	150	6	4 350 000	20 400 000	450	293/500
	870	224	9.5	7 850 000	33 000 000	340	294/500

Note (1) For heavy load applications, a d₉₀ value should be chosen which is large enough to support the shaft washer rib.



Dynamic Equivalent Load

$$P = 1.2F_r + F_a$$

Static Equivalent Load

$$P_0 = 2.8F_r + F_a$$

However, $F_r/F_a \leq 0.55$ must be satisfied.

Dimensions (mm)						Abutment and Fillet Dimensions (mm)			Mass (kg)
d_1	D_1	B_1	B_2	C	A	d_2 (!) min.	D_2 max.	r_2 max.	approx.
575	508	30	91	49	235	510	545	4	77
645	548	49	140	70	245	550	600	5	190
745	588	74	199	100	260	595	670	8	407
710	577	74	199	101	257	605	675	8	402
592	530	30	91	46	245	530	570	4	80
666	567	51	144	72	257	575	630	5	210
765	608	74	199	100	272	615	690	8	420
624	556	33	99	55	259	555	595	4	97
690	590	51	144	72	270	595	650	5	215
810	638	81	216	108	280	645	730	8	545
645	574	33	99	55	268	575	615	4	100
715	611	51	144	74	280	615	670	5	220
830	661	81	216	107	290	670	750	8	560



SNN SERIES AND SD SERIES



Plummer Blocks

Housing Features – Designation

The plumber block housings detailed in this brochure are manufactured in accordance with ISO/R113 standards.

Bearing Nomenclature

Example:

Housing design code

Size

Size

SNN 511 - 609



Housings Features

- › Colour: RAL 7001, Pantone 444C
- › Housing Material: Cast Iron Grade 200
- › Cap bolts: Mild steel AISI1010 Grade 8.8
- › Metal plugs: Mild steel AISI 1010
- › Tolerance of bearing seating: H7
- › The bearing seating is protected against corrosion, all the non machined internal parts are primed.
- › Each housing is supplied with a straight grease nipple (see dimensions in the lubrication section).
- › Each SNN housing is supplied with 2 lubrication holes on the cap and 1 drain hole on the base.

Housings Designation

500 Series

for light series bearings with tapered bore
1200K, 2200K, 22200K, 23200K

600 Series

for medium series bearings with tapered bore
1300K, 2300K, 21300K, 22300K

The SNN 500 and 600 series comprise a number of housings which, when combined with different seal options and ball or spherical roller bearings, provide an answer for most plumber block applications with shaft diameters ranging from 20 mm to 140 mm.

Plummer blocks typical arrangement

Fig. 1

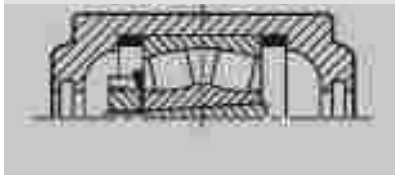


Fig. 1:

In the fixed plummer block, to prevent axial displacement of the bearing, 2 locating rings are installed, one on either side of the bearing.

Locating Rings are manufactured in aluminium.

Fig. 2



Fig. 2:

One bearing should be free to move axially. This plummer block should not be assembled with locating rings.

How to order SNN complete Plummer Blocks from ITJ

Example 1 – Application with 2 plummer blocks

Free end

Through shaft diam 50 mm, equipped with 1 spherical roller bearing 22211EAK, double lip seals on both sides.

Parts required:

- › 1 ITJ housing SNN511-609
- › 1 ITJ bearing 22211EAKE4
- › 1 ITJ adapter sleeve H311
- › 1 seal pack G511-KIT (2 seals included)

Fixed end

Shaft end, diam 50 mm, equipped with 1 spherical roller bearing 22211EAK, double lip seal on 1 side.

Parts required:

- › 1 ITJ housing SNN511-609
- › 1 ITJ bearing 22211EAKE4
- › 1 ITJ adapter sleeve H311
- › 1 locating ring kit SR100/9.5-KIT (2 rings included)
- › 1 seal pack G511-KIT (2 seals included)
- › 1 end cover 511A

Example 2 – Application with 2 plummer blocks

Free end

Through shaft diam 75 mm, equipped with 1 spherical roller bearing 22217EAK, labyrinth seals on both sides.

Parts required:

- › 1 ITJ housing SNN517
- › 1 ITJ bearing 22217EAKE4
- › 1 ITJ adapter sleeve H317
- › 2 seals TS517U (the kit includes 1 labyrinth and o-ring)

Fixed end

Shaft end, diam 75 mm, equipped with 1 spherical roller bearing 22217EAK, labyrinth seal on 1 side.

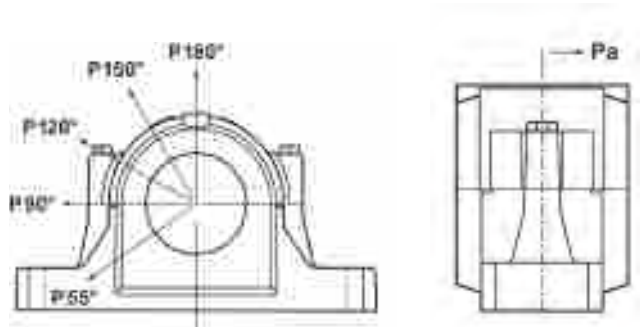
Parts required:

- › 1 ITJ housing SNN517
- › 1 ITJ bearing 22217EAKE4
- › 1 ITJ adapter sleeve H317
- › 1 locating ring kit SR150/12.5-KIT (2 rings included)
- › 1 seal TS517U (the kit includes 1 labyrinth and o-ring)
- › 1 end cover 517A



Plummer Blocks

Breaking Loads for SNN Housings



Housing No.	Breaking Load (kN)						Max. Loads of the two cap bolts (kN)
	Pa	P55°	P90°	P120°	P150°	P180°	P180°
SNN 505	52	155	95	70	60	80	25
SNN 506-605	55	170	100	80	65	85	25
SNN 507-606	60	190	115	85	80	95	25
SNN 508-607	70	215	130	95	85	110	25
SNN 509	75	230	140	100	90	115	25
SNN 510-608	85	265	155	120	110	130	25
SNN 511-609	90	275	170	125	115	140	40
SNN 512-610	100	300	180	130	120	150	40
SNN 513-611	110	340	205	150	130	170	40
SNN 515-612	135	410	250	185	160	205	40
SNN 516-613	140	430	260	190	175	215	40
SNN 517	155	480	290	205	190	240	40
SNN 518-615	180	550	340	250	215	275	85
SNN 519-616	190	580	350	260	230	290	85
SNN 520-617	200	620	370	280	250	310	130
SNN 522-619	220	680	410	310	275	340	130
SNN 524-620	260	790	470	350	320	400	130
SNN 526	295	900	540	410	360	450	190
SNN 528	345	1050	630	470	430	530	190
SNN 530	390	1200	730	540	480	600	190
SNN 532	470	1450	860	640	570	720	190

Cap bolt material: Grade 8.8
Reference values only

Cap & Fixing Bolts Sizes – Recommended Tightening Torques

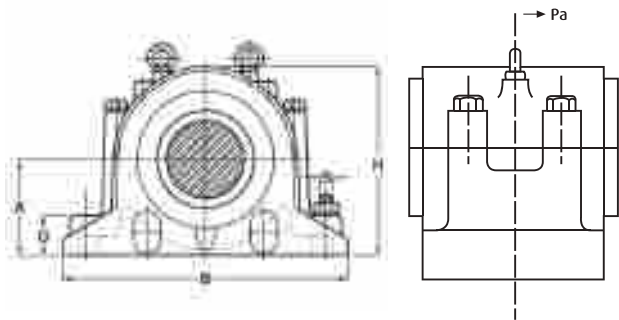
SNN Housing	Cap Bolt Size Grade 8.8	Recommended max. Tightening Torque	Base Bolts Size Grade 8.8	Recommended max. Tightening Torque
		Nm		Nm
SNN505	M10	50	M12	80
SNN506-605	M10	50	M12	80
SNN507-606	M10	50	M12	80
SNN508-607	M10	50	M12	80
SNN509	M10	50	M12	80
SNN510-608	M10	50	M12	80
SNN511-609	M12	80	M16	200
SNN512-610	M12	80	M16	200
SNN513-609	M12	80	M16	200
SNN515-612	M12	80	M16	200
SNN516-613	M16	150	M20	385
SNN517	M16	150	M20	385
SNN518-615	M16	150	M20	385
SNN519-616	M16	150	M20	385
SNN520-617	M20	200	M24	665
SNN522-619	M20	200	M24	665
SNN524-620	M20	200	M24	665
SNN526	M24	350	M24	665
SNN528	M24	350	M30	1310
SNN530	M24	350	M30	1310
SNN532	M24	350	M30	1310

BOLT SIZE AND BREAKING LOADS



Plummer Blocks SD3100 Series

Plummer blocks of series SD3100 are used with large spherical roller bearings of series 23100 with tapered bore on adapter sleeves.



Material: Cast Iron Grade 200
Colour: Dark Blue 533C
Cap bolts grade: 8.8
(size: see table below)

Supplied with 1 straight grease nipple

Tolerance of bearing seating: H7
Draining hole: 1/4PT

SD 3100 Bolt Size

Housing	Bolt Size
SD3134TS/TAC	M20*2.5P*140LG
SD3136TS/TAC	M24*3.0P*140LG
SD3138TS/TAC	M24*3.0P*140LG
SD3140TS/TAC	M24*3.0P*170LG
SD3144TS/TAC	M24*3.0P*170LG
SD3148TS/TAC	M30*3.5P*200LG
SD3152TS/TAC	M30*3.5P*200LG
SD3156TS/TAC	M30*3.5P*210LG
SD3160TS/TAC	M30*3.5P*220LG
SD3164TS/TAC	M30*3.5P*220LG
SD3168TS/TAC	M36*4.0P*260LG
SD3172TS/TAC	M36*4.0P*280LG
SD3176TS/TAC	M36*4.0P*280LG
SD3180TS/TAC	M36*4.0P*310LG

Note Housings for Taconite seals (TAC) on request

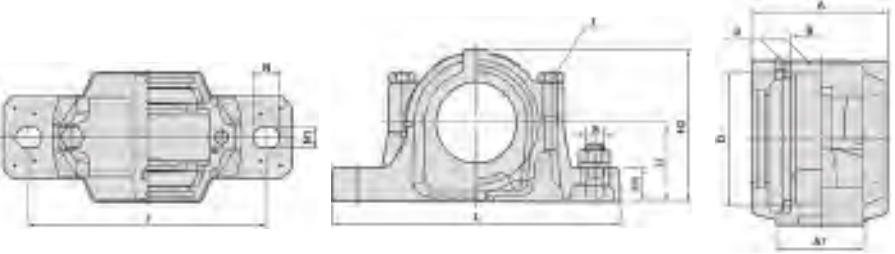
Breaking Loads of SD Housings

Housing No.		Breaking Load (kN)					Max. Load of Cap Bolts (kN)
		P55°	P90°	P120°	P150°	P180°	
SD	3134	2273	1016	762	747	846	380
SD	3136	2540	1150	850	835	946	380
SD	3138	2941	1300	1020	966	1095	380
SD	3140	3476	1600	1165	1143	1296	380
SD	3144	4280	1900	1435	1407	1594	380
SD	3148	4548	2000	1524	1495	1694	620
SD	3152	5083	2300	1703	1670	1893	620
SD	3156	5350	2400	1810	1760	1993	620
SD	3160	6420	2900	2215	2110	2390	620
SD	3164	7490	3400	2525	2400	2790	620
SD	3168	9320	4200	3260	3050	3490	800
SD	3172	9750	4400	3370	3200	3690	800
SD	3176	10230	4550	3500	3320	3710	800
SD	3180	10720	4800	3770	3560	4000	800

Note Housings for Taconite seals (TAC) on request

Plummer Blocks SNN 500 - 600 Series

Shaft Diameter 20 – 65 mm



Shaft Diam. D (mm)	Bearing		Adapter Sleeve	Locating Ring Kit (2 rings)	Housing Designation	D (mm)	H (mm)	J (mm)	A (mm)	L (mm)	A1 (mm)	H1 (mm)	H2 (mm)
	Ball	Roller											
20	1205K	-	H205	SR52x5	SNN505	52	40	130	70	165	46	22	73
	2205K	22205K	H305	SR52x3.5	SNN505	52	40	130	70	165	46	22	73
	1305K	21305K	H305	SR62x7.5	SNN506-605	62	50	150	80	185	52	22	88
25	2305K	-	H2305	SR62x4	SNN506-605	62	50	150	80	185	52	22	88
	1206K	-	H206	SR62x8	SNN506-605	62	50	150	80	185	52	22	88
	2206K	22206K	H306	SR62x6	SNN506-605	62	50	150	80	185	52	22	88
30	1306K	21306K	H306	SR72x7.5	SNN507-606	72	50	150	85	185	52	22	93
	2306K	-	H2306	SR72x3.5	SNN507-606	72	50	150	85	185	52	22	93
	1207K	-	H207	SR72x8.5	SNN507-606	72	50	150	85	185	52	22	93
35	2207K	22207K	H307	SR72x5.5	SNN507-606	72	50	150	85	185	52	22	93
	1307K	21307K	H307	SR80x9	SNN508-607	80	60	170	90	205	60	25	107
	2307K	-	H2307	SR80x4	SNN508-607	80	60	170	90	205	60	25	107
40	1208K	-	H208	SR80x10.5	SNN508-607	80	60	170	90	205	60	25	107
	2208K	22208K	H308	SR80x8	SNN508-607	80	60	170	90	205	60	25	107
	1308K	21308K	H308	SR90x9	SNN510-608	90	60	170	95	205	60	25	113
45	2308K	22308K	H2308	SR90x4	SNN510-608	90	60	170	95	205	60	25	113
	1209K	-	H209	SR85x5.5	SNN509	85	60	170	90	205	60	25	111
	2209K	22209K	H309	SR85x3.5	SNN509	85	60	170	90	205	60	25	111
50	1309K	21309K	H309	SR100x9.5	SNN511-609	100	70	210	100	255	70	28	129
	2309K	22309K	H2309	SR100x4	SNN511-609	100	70	210	100	255	70	28	129
	1210K	-	H210	SR90x10.5	SNN510-608	90	60	170	95	205	60	25	113
55	2210K	22210K	H310	SR90x9	SNN510-608	90	60	170	95	205	60	25	113
	1310K	21310K	H310	SR110x10.5	SNN512-610	110	70	210	110	255	70	30	134
	2310K	22310K	H2310	SR110x4	SNN512-610	110	70	210	110	255	70	30	134
60	1211K	-	H211	SR100x11.5	SNN511-609	100	70	210	100	255	70	28	129
	2211K	22211K	H311	SR100x9.5	SNN511-609	100	70	210	100	255	70	28	129
	1311K	21311K	H311	SR120x11	SNN513-611	120	80	230	115	275	80	30	150
65	2311K	22311K	H2311	SR120x4	SNN513-611	120	80	230	115	275	80	30	150
	1212K	-	H212	SR110x13	SNN512-610	110	70	210	110	255	70	30	134
	2212K	22212K	H312	SR110x10	SNN512-610	110	70	210	110	255	70	30	134
70	1312K	21312K	H312	SR130x12.5	SNN515-612	130	80	230	120	280	80	30	155
	2312K	22312K	H2312	SR130x5	SNN515-612	130	80	230	120	280	80	30	155
	1213K	-	H213	SR120x14	SNN513-611	120	80	230	115	275	80	30	150
75	2213K	22213K	H313	SR120x10	SNN513-611	120	80	230	115	275	80	30	150
	1313K	21313K	H313	SR140x12.5	SNN516-613	140	95	260	130	315	90	32	175
	2313K	22313K	H2313	SR140x5	SNN516-613	140	95	260	130	315	90	32	175
80	1215K	-	H215	SR130x15.5	SNN515-612	130	80	230	120	280	80	30	155
	2215K	22215K	H315	SR130x12.5	SNN515-612	130	80	230	120	280	80	30	155
	1315K	21315K	H315	SR160x14	SNN518-615	160	100	290	145	345	100	35	193
85	2315K	22315K	H2315	SR160x5	SNN518-615	160	100	290	145	345	100	35	193



G Seals

C Seals

V Seals

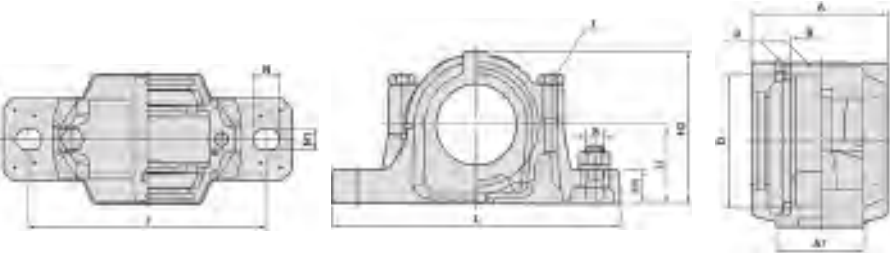
TS-U Seals

TACK Seals

g (mm)	t (mm)	N (mm)	N1 (mm)	s (mm)	P	G Seals KIT	C Seals KIT	V Seals KIT (B1: Fitted Width)	TS-U Seals	TACK Seals	End Cover	Mass (kg)
25	M10	20	15	M12	R1/8	G505-KIT	C505-KIT	V505-KIT (6 ± 0.8)	TS505U	TACK505	505A	1.45
25	M10	20	15	M12	R1/8	G505-KIT	C505-KIT	V505-KIT (6 ± 0.8)	TS505U	TACK505	505A	1.45
32	M10	20	15	M12	R1/8	G605-KIT	C605-KIT	V605-KIT (6 ± 0.8)	TS605U	TACK605	505A	2.00
32	M10	20	15	M12	R1/8	G605-KIT	C605-KIT	V605-KIT (6 ± 0.8)	TS605U	TACK605	505A	2.00
32	M10	20	15	M12	R1/8	G506-KIT	C506-KIT	V506-KIT (6 ± 0.8)	TS506U	TACK506	506A	2.00
32	M10	20	15	M12	R1/8	G506-KIT	C506-KIT	V506-KIT (6 ± 0.8)	TS506U	TACK506	506A	2.00
34	M10	20	15	M12	R1/8	G606-KIT	C606-KIT	V606-KIT (6 ± 0.8)	TS606U	TACK606	507A	2.20
34	M10	20	15	M12	R1/8	G606-KIT	C606-KIT	V606-KIT (6 ± 0.8)	TS606U	TACK606	507A	2.20
34	M10	20	15	M12	R1/8	G507-KIT	C507-KIT	V507-KIT (6 ± 0.8)	TS507U	TACK507	507A	2.20
34	M10	20	15	M12	R1/8	G507-KIT	C507-KIT	V507-KIT (6 ± 0.8)	TS507U	TACK507	507A	2.20
39	M10	20	15	M12	R1/8	G607-KIT	C607-KIT	V607-KIT (6 ± 0.8)	TS607U	TACK607	508A	2.90
39	M10	20	15	M12	R1/8	G607-KIT	C607-KIT	V607-KIT (6 ± 0.8)	TS607U	TACK607	508A	2.90
39	M10	20	15	M12	R1/8	G508-KIT	C508-KIT	V508-KIT (6 ± 0.8)	TS508U	TACK508	508A	2.90
39	M10	20	15	M12	R1/8	G508-KIT	C508-KIT	V508-KIT (6 ± 0.8)	TS508U	TACK508	508A	2.90
41	M10	20	15	M12	R1/8	G608-KIT	C608-KIT	V608-KIT (6 ± 0.8)	TS608U	TACK608	510A	3.10
41	M10	20	15	M12	R1/8	G608-KIT	C608-KIT	V608-KIT (6 ± 0.8)	TS608U	TACK608	510A	3.10
30	M10	20	15	M12	R1/8	G509-KIT	C509-KIT	V509-KIT (7 ± 1)	TS509U	TACK509	509A	3.00
30	M10	20	15	M12	R1/8	G509-KIT	C509-KIT	V509-KIT (7 ± 1)	TS509U	TACK509	509A	3.00
44	M12	24	18	M16	R1/8	G609-KIT	C609-KIT	V609-KIT (7 ± 1)	TS609U	TACK609	511A	4.80
44	M12	24	18	M16	R1/8	G609-KIT	C609-KIT	V609-KIT (7 ± 1)	TS609U	TACK609	511A	4.80
41	M10	20	15	M12	R1/8	G510-KIT	C510-KIT	V510-KIT (7 ± 1)	TS510U	TACK510	510A	3.10
41	M10	20	15	M12	R1/8	G510-KIT	C510-KIT	V510-KIT (7 ± 1)	TS510U	TACK510	510A	3.10
48	M12	24	18	M16	R1/8	G610-KIT	C610-KIT	V610-KIT (7 ± 1)	TS610U	TACK610	512A	5.40
48	M12	24	18	M16	R1/8	G610-KIT	C610-KIT	V610-KIT (7 ± 1)	TS610U	TACK610	512A	5.40
44	M12	24	18	M16	R1/8	G511-KIT	C511-KIT	V511-KIT (7 ± 1)	TS511U	TACK511	511A	4.80
44	M12	24	18	M16	R1/8	G511-KIT	C511-KIT	V511-KIT (7 ± 1)	TS511U	TACK511	511A	4.80
51	M12	24	18	M16	R1/8	G611-KIT	C611-KIT	V611-KIT (7 ± 1)	TS611U	TACK611	513A	6.60
51	M12	24	18	M16	R1/8	G611-KIT	C611-KIT	V611-KIT (7 ± 1)	TS611U	TACK611	513A	6.60
48	M12	24	18	M16	R1/8	G512-KIT	C512-KIT	V512-KIT (7 ± 1)	TS512U	TACK512	512A	5.40
48	M12	24	18	M16	R1/8	G512-KIT	C512-KIT	V512-KIT (7 ± 1)	TS512U	TACK512	512A	5.40
56	M12	24	18	M16	R1/8	G612-KIT	C612-KIT	V612-KIT (7 ± 1)	TS612U	TACK612	515A	6.80
56	M12	24	18	M16	R1/8	G612-KIT	C612-KIT	V612-KIT (7 ± 1)	TS612U	TACK612	515A	6.80
51	M12	24	18	M16	R1/8	G513-KIT	C513-KIT	V513-KIT (7 ± 1)	TS513U	TACK513	513A	6.60
51	M12	24	18	M16	R1/8	G513-KIT	C513-KIT	V513-KIT (7 ± 1)	TS513U	TACK513	513A	6.60
58	M16	28	22	M20	R1/4	G613-KIT	C613-KIT	V613-KIT (7 ± 1)	TS613U	TACK613	516A	10.20
58	M16	28	22	M20	R1/4	G613-KIT	C613-KIT	V613-KIT (7 ± 1)	TS613U	TACK613	516A	10.20
56	M12	24	18	M16	R1/8	G515-KIT	C515-KIT	V515-KIT (7 ± 1)	TS515U	TACK515	515A	6.80
56	M12	24	18	M16	R1/8	G515-KIT	C515-KIT	V515-KIT (7 ± 1)	TS515U	TACK515	515A	6.80
65	M16	28	22	M20	R1/4	G615-KIT	C615-KIT	V615-KIT (7 ± 1)	TS615U	TACK615	518A	13.00
65	M16	28	22	M20	R1/4	G615-KIT	C615-KIT	V615-KIT (7 ± 1)	TS615U	TACK615	518A	13.00

Plummer Blocks SNN 500 - 600 Series

Shaft Diameter 70 - 140 mm



Shaft Diam. D (mm)	Bearing		Adapter Sleeve	Locating Ring Kit (2 rings)	Housing Designation	D (mm)	H (mm)	J (mm)	A (mm)	L (mm)	A1 (mm)	H1 (mm)	H2 (mm)
	Ball	Roller											
70	1216K	-	H216	SR140x16	SNN516-613	140	95	260	130	315	90	32	175
	2216K	22216K	H316	SR140x12.5	SNN516-613	140	95	260	130	315	90	32	175
	1316K	21316K	H316	SR170x14.5	SNN519-616	170	112	290	145	345	100	35	210
	2316K	22316K	H2316	SR170x5	SNN519-616	170	112	290	145	345	100	35	210
75	1217K	-	H217	SR150x16.5	SNN517	150	95	260	135	320	90	32	183
	2217K	22217K	H317	SR150x12.5	SNN517	150	95	260	135	320	90	32	183
	1317K	21317K	H317	SR180x14.5	SNN520-617	180	112	320	160	380	110	40	215
	2317K	22317K	H2317	SR180x5	SNN520-617	180	112	320	160	380	110	40	215
80	1218K	-	H218	SR160x17.5	SNN518-615	160	100	290	145	345	100	35	193
	2218K	22218K	H318	SR160x12.5	SNN518-615	160	100	290	145	345	100	35	193
	-	23218K	H2318	SR160x6.25	SNN518-615	160	100	290	145	345	100	35	193
	1219K	-	H219	SR170x18	SNN519-616	170	112	290	145	345	100	35	210
85	2219K	22219K	H319	SR170x12.5	SNN519-616	170	112	290	145	345	100	35	210
	1319K	21319K	H319	SR200x17.5	SNN522-619	200	125	350	175	410	120	45	240
	2319K	22319K	H2319	SR200x6.5	SNN522-619	200	125	350	175	410	120	45	240
	1220K	-	H220	SR180x18	SNN520-617	180	112	320	160	380	110	40	215
90	2220K	22220K	H320	SR180x12	SNN520-617	180	112	320	160	380	110	40	215
	-	23220K	H2320	SR180x4.75	SNN520-617	180	112	320	160	380	110	40	215
	1320K	21320K	H320	SR215x19.5	SNN524-620	215	140	350	185	410	120	45	271
	2320K	22320K	H2320	SR215x6.5	SNN524-620	215	140	350	185	410	120	45	271
100	1222K	-	H222	SR200x21	SNN522-619	200	125	350	175	410	120	45	240
	2222K	22222K	H322	SR200x13.5	SNN522-619	200	125	350	175	410	120	45	240
	-	23222K	H2322	SR200x5	SNN522-619	200	125	350	175	410	120	45	240
	110	-	H3124	SR215x14	SNN524-620	215	140	350	185	410	120	45	271
110	-	23224K	H2324	SR215x5	SNN524-620	215	140	350	185	410	120	45	271
	115	-	H3126	SR230x13	SNN526	230	150	380	190	445	130	50	288
	-	23226K	H2326	SR230x5	SNN526	230	150	380	190	445	130	50	288
	125	-	H3128	SR250x15	SNN528	250	150	420	205	500	150	50	298
125	-	23228K	H2328	SR250x5	SNN528	250	150	420	205	500	150	50	298
	135	-	H3130	SR270x16.5	SNN530	270	160	450	220	530	160	60	322
	-	23230K	H2330	SR270x5	SNN530	270	160	450	220	530	160	60	322
140	-	22232K	H3132	SR290x17	SNN532	290	170	470	235	550	160	60	342
	-	23232K	H2332	SR290x5	SNN532	290	170	470	235	550	160	60	342



G Seals

C Seals

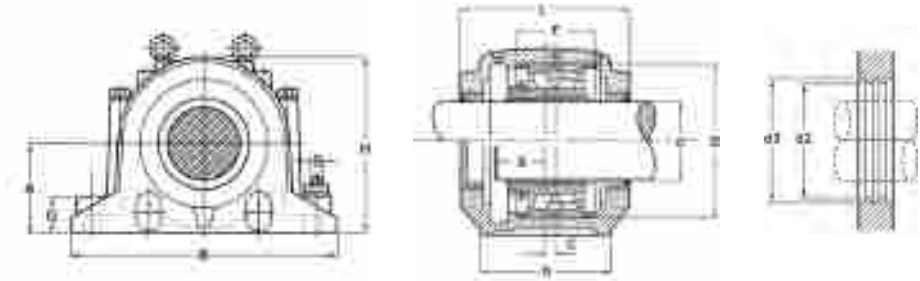
V Seals

TS-U Seals

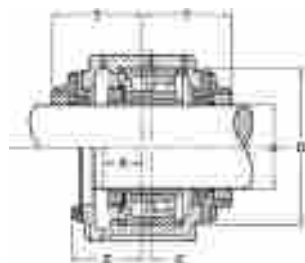
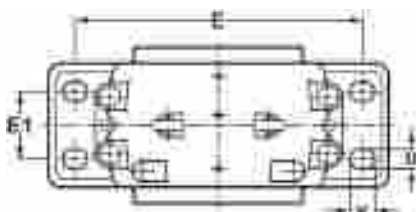
TACK Seals

g (mm)	t (mm)	N (mm)	N1 (mm)	s (mm)	P	G Seals KIT	C Seals KIT	V Seals KIT (B1: Fitted Width)	TS-U Seals	TACK Seals	End Cover	Mass (kg)
58	M16	28	22	M20	R1/4	G516-KIT	C516-KIT	V516-KIT (9 ±1.2)	TS516U	TACK516	516A	10.20
58	M16	28	22	M20	R1/4	G516-KIT	C516-KIT	V516-KIT (9 ±1.2)	TS516U	TACK516	516A	10.20
68	M16	28	22	M20	R1/4	G616-KIT	C616-KIT	V616-KIT (9 ±1.2)	TS616U	TACK616	519A	14.50
68	M16	28	22	M20	R1/4	G616-KIT	C616-KIT	V616-KIT (9 ±1.2)	TS616U	TACK616	519A	14.50
61	M16	28	22	M20	R1/4	G517-KIT	C517-KIT	V517-KIT (9 ±1.2)	TS517U	TACK517	517A	11.20
61	M16	28	22	M20	R1/4	G517-KIT	C517-KIT	V517-KIT (9 ±1.2)	TS517U	TACK517	517A	11.20
70	M20	32	26	M24	R1/4	G617-KIT	C617-KIT	V617-KIT (9 ±1.2)	TS617U	TACK617	520A	18.30
70	M20	32	26	M24	R1/4	G617-KIT	C617-KIT	V617-KIT (9 ±1.2)	TS617U	TACK617	520A	18.30
65	M16	28	22	M20	R1/4	G518-KIT	C518-KIT	V518-KIT (9 ±1.2)	TS518U	TACK518	518A	13.00
65	M16	28	22	M20	R1/4	G518-KIT	C518-KIT	V518-KIT (9 ±1.2)	TS518U	TACK518	518A	13.00
65	M16	28	22	M20	R1/4	G518-KIT	C518-KIT	V518-KIT (9 ±1.2)	TS518U	TACK518	518A	13.00
68	M16	28	22	M20	R1/4	G519-KIT	C519-KIT	V519-KIT (9 ±1.2)	TS519U	TACK519	519A	14.50
68	M16	28	22	M20	R1/4	G519-KIT	C519-KIT	V519-KIT (9 ±1.2)	TS519U	TACK519	519A	14.50
80	M20	32	26	M24	R1/4	G619-KIT	C619-KIT	V619-KIT (9 ±1.2)	TS619U	TACK619	522A	24.00
80	M20	32	26	M24	R1/4	G619-KIT	C619-KIT	V619-KIT (9 ±1.2)	TS619U	TACK619	522A	24.00
70	M20	32	26	M24	R1/4	G520-KIT	C520-KIT	V520-KIT (9 ±1.2)	TS520U	TACK520	520A	18.30
70	M20	32	26	M24	R1/4	G520-KIT	C520-KIT	V520-KIT (9 ±1.2)	TS520U	TACK520	520A	18.30
70	M20	32	26	M24	R1/4	G520-KIT	C520-KIT	V520-KIT (9 ±1.2)	TS520U	TACK520	520A	18.30
86	M20	32	26	M24	R3/8	G620-KIT	C620-KIT	V620-KIT (9 ±1.2)	TS620U	TACK620	524A	26.20
86	M20	32	26	M24	R3/8	G620-KIT	C620-KIT	V620-KIT (9 ±1.2)	TS620U	TACK620	524A	26.20
80	M20	32	26	M24	R1/4	G522-KIT	C522-KIT	V522-KIT (9 ±1.2)	TS522U	TACK522	522A	24.00
80	M20	32	26	M24	R1/4	G522-KIT	C522-KIT	V522-KIT (9 ±1.2)	TS522U	TACK522	522A	24.00
80	M20	32	26	M24	R1/4	G522-KIT	C522-KIT	V522-KIT (9 ±1.2)	TS522U	TACK522	522A	24.00
86	M20	32	26	M24	R3/8	G524-KIT	C524-KIT	V524-KIT (9 ±1.2)	TS524U	TACK524	524A	26.20
86	M20	32	26	M24	R3/8	G524-KIT	C524-KIT	V524-KIT (9 ±1.2)	TS524U	TACK524	524A	26.20
90	M24	35	28	M24	R3/8	G526-KIT	C526-KIT	V526-KIT (9 ±1.2)	TS526U	TACK526	526A	33.00
90	M24	35	28	M24	R3/8	G526-KIT	C526-KIT	V526-KIT (9 ±1.2)	TS526U	TACK526	526A	33.00
98	M24	42	35	M30	R3/8	G528-KIT	C528-KIT	V528-KIT (9 ±1.2)	TS528U	TACK528	528A	40.00
98	M24	42	35	M30	R3/8	G528-KIT	C528-KIT	V528-KIT (9 ±1.2)	TS528U	TACK528	528A	40.00
106	M24	42	35	M30	R3/8	G530-KIT	C530-KIT	V530-KIT (9 ±1.2)	TS530U	TACK530	530A	49.00
106	M24	42	35	M30	R3/8	G530-KIT	C530-KIT	V530-KIT (9 ±1.2)	TS530U	TACK530	530A	49.00
114	M24	42	35	M30	R3/8	G532-KIT	C532-KIT	V532-KIT (9 ±1.2)	TS532U	TACK532	532A	55.00
114	M24	42	35	M30	R3/8	G532-KIT	C532-KIT	V532-KIT (9 ±1.2)	TS532U	TACK532	532A	55.00

Plummer Blocks SD 3100 Series



Housing	Shaft Diameter (d)		Dimensions mm																		
	Metric	Inch	D	d2 (H12)	d3 (H12)	A	B	F	E	b	G	H	L	C	E1	X	T	Z	U	V	
SD3134	150	6	280	187	197	170	510	108	430	180	70	335	230	14	100	76	154	120	28	35	
SD3136	160	6.1/2	300	195	205	180	530	116	450	190	75	355	240	15	110	81	159	130	30	38	
SD3138	170	6.3/4	320	217	230	190	560	124	480	210	80	375	260	10	120	86	168	140	35	48	
SD3140	180	7	340	222	237	210	610	132	510	230	85	410	280	10	130	91	178	150	35	42	
SD3144	200	8	370	246	265	220	640	140	540	240	90	435	290	12	140	96	184	155	36	46	
SD3148	220	9	400	265	285	240	700	148	600	260	95	475	310	12	150	102	194	160	38	46	
SD3152	240	9.1/2	440	285	305	260	770	164	650	280	100	515	320	13	160	112	200	170	45	60	
SD3156	260	10	460	307	327	280	790	166	670	280	105	550	330	16	160	115	200	170	45	60	
SD3160	280	11	500	325	345	300	830	180	710	310	110	590	350	22	190	124	213	190	45	64	
SD3164	300	-	540	345	365	320	880	196	750	330	115	630	370	23	200	135	224	200	45	72	
SD3168	320	-	580	368	390	340	965	210	840	380	120	670	390	25	240	155	244	220	52	70	
SD3172	340	-	600	388	408	360	1040	212	890	390	130	720	400	22	255	159	249	225	60	77	
SD3176	360	-	620	408	428	380	1120	214	980	400	135	750	405	22	255	162	260	240	68	88	
SD3180	380	-	650	428	448	400	1245	220	1050	420	140	790	425	22	270	167	276	260	75	96	

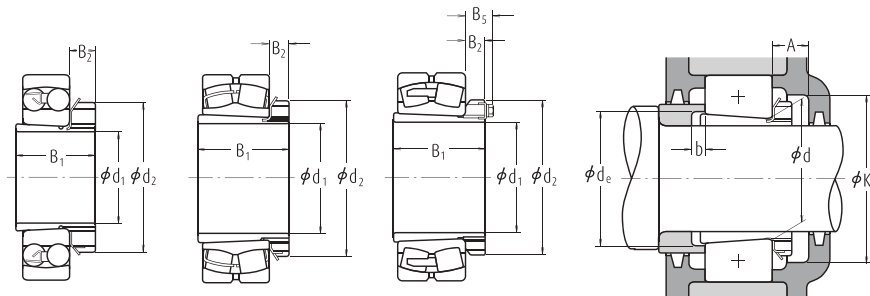


Bolt Diameter S	Spherical Roller Bearing	Adapter Sleeve		Weight kg	Locating Ring Dim.	Housing	Labyrinth Seal	End Cover
		Metric	Inch					
M24	23134K	H3134	HE3134	66	280x10	SD3134	TS34	TSA34
M24	23136K	H3136	HE3136	75	300x10	SD3136	TS36	TSA36
M24	23138K	H3138	HE3138	87	320x10	SD3138	TS38	TSA38
M30	23140K	H3140	HE3140	113	340x10	SD3140	TS40	TSA40
M30	23144K	H3144	-	129	370x10	SD3144	TS44	TSA44
M30	23148K	H3148	-	163	400x10	SD3148	TS48	TSA48
M36	23152K	H3152	-	199	440x10	SD3152	TS52	TSA52
M36	23156K	H3156	-	226	460x10	SD3156	TS56	TSA56
M36	23160K	H3160	-	283	500x10	SD3160	TS60	TSA60
M36	23164K	H3164	-	346	540x10	SD3164	TS64	TSA64
M36	23168K	H3168	-	514	580x10	SD3168	TS68	TSA68
M48	23172K	H3172	-	594	600x10	SD3172	TS72	TSA72
M56	23176K	H3176	-	702	620x10	SD3176	TS76	TSA76
M64	23180K	H3180	-	740	650x10	SD3180	TS80	TSA80



Adapters for Rolling Bearings

Shaft Diameter 17 – 40 mm

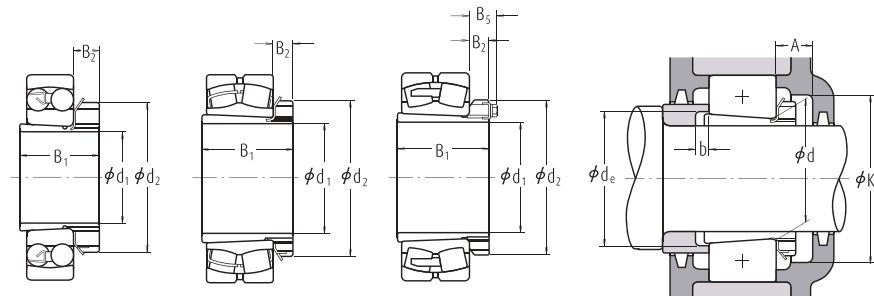


Shaft Diameter (mm)	Nominal Bearing Bore Dia. (mm)	Nominal Numbers	Dimensions (mm)				Adapter Sleeve Numbers	Abutment Dimensions (mm)				Mass (kg)
		Applicable Bearings	B ₁	d ₂	B ₂	B ₅		A min.	K min.	d _e min.	b min.	approx.
17	20	1204K + H204X	24	32	7	—	A204X	14	39	23	5	0.045
	20	2204K + H304X	28	32	7	—	A304X	14	39	24	5	0.045
	20	1304K + H304X	28	32	7	—	A304X	14	39	24	8	0.045
20	20	2304K + H2304X	31	32	7	—	A2304X	14	39	24	5	0.050
	25	1205K + H205X	26	38	8	—	A205X	15	45	28	5	0.065
	25	2205K + H305X	29	38	8	—	A305X	15	45	29	5	0.075
	25	1305K + H305X	29	38	8	—	A305X	15	45	29	6	0.075
	25	21305C DKE4 + H305X	29	38	8	—	A305X	15	45	29	6	0.075
	25	2305K + H2305X	35	38	8	—	A2305X	15	45	29	5	0.090
25	30	1206K + H206X	27	45	8	—	A206X	15	50	33	5	0.10
	30	2206K + H306X	31	45	8	—	A306X	15	50	34	5	0.11
	30	1306K + H306X	31	45	8	—	A306X	15	50	34	6	0.11
	30	21306C DKE4 + H306X	31	45	8	—	A306X	15	50	34	6	0.11
	30	2306K + H2306X	38	45	8	—	A2306X	15	50	35	5	0.125
	35	1207K + H207X	29	52	9	—	A207X	17	58	38	5	0.125
30	35	2207K + H307X	35	52	9	—	A307X	17	58	39	5	0.145
	35	1307K + H307X	35	52	9	—	A307X	17	58	39	7	0.145
	35	21307C DKE4 + H307X	35	52	9	—	A307X	17	58	39	7	0.145
	35	2307K + H2307X	43	52	9	—	A2307X	17	58	40	5	0.16
	40	1208K + H208X	31	58	10	—	A208X	17	65	44	5	0.175
	40	2208K + H308X	36	58	10	—	A308X	17	65	44	5	0.19
35	40	1308K + H308X	36	58	10	—	A308X	17	65	44	5	0.19
	40	21308E AKE4 + H308X	36	58	10	—	A308X	17	65	44	5	0.19
	40	2308K + H2308X	46	58	10	—	A2308X	17	65	45	5	0.225
	40	22308E AKE4 + H2308X	46	58	10	—	A2308X	17	65	45	5	0.225
	45	1209K + H209X	33	65	11	—	A209X	17	72	49	5	0.225
	45	2209K + H309X	39	65	11	—	A309X	17	72	49	8	0.26
40	45	1309K + H309X	39	65	11	—	A309X	17	72	49	5	0.26
	45	21309E AKE4 + H309X	39	65	11	—	A309X	17	72	49	5	0.26
	45	2309K + H2309X	50	65	11	—	A2309X	17	72	50	5	0.30
	45	22309E AKE4 + H2309X	50	65	11	—	A2309X	17	72	50	5	0.30

Remark

The suffix X represents adapter sleeves having narrow slits, for which washers with straight tabs should be used.

Shaft Diameter 45 – 60 mm



Shaft Diameter (mm)	Nominal Bearing Bore Dia. (mm)	Nominal Numbers	Dimensions (mm)				Adapter Sleeve Numbers	Abutment Dimensions (mm)				Mass (kg)
		Applicable Bearings	B ₁	d ₂	B ₂	B ₅		A min.	K min.	d _e min.	b min.	
45	50	1210K + H210X	35	70	12	—	A210X	19	76	53	5	0.275
	50	2210K + H310X	42	70	12	—	A310X	19	76	54	10	0.30
	50	1310K + H310X	42	70	12	—	A310X	19	76	54	5	0.30
	50	21310E AKE4 + H310X	42	70	12	—	A310X	19	76	54	5	0.30
	50	2310K + H2310X	55	70	12	—	A2310X	19	76	56	5	0.35
	50	22310E AKE4 + H2310X	55	70	12	—	A2310X	19	76	56	5	0.35
50	55	1211K + H211X	37	75	12	—	A211X	19	85	60	6	0.305
	55	2211K + H311X	45	75	12	—	A311X	19	85	60	11	0.35
	55	22211E AKE4 + H311X	45	75	12	—	A311X	19	85	60	11	0.35
	55	1311K + H311X	45	75	12	—	A311X	19	85	60	6	0.35
	55	21311E AKE4 + H311X	45	75	12	—	A311X	19	85	60	6	0.35
	55	2311K + H2311X	59	75	12	—	A2311X	19	85	61	6	0.40
55	55	22311E AKE4 + H2311X	59	75	12	—	A2311X	19	85	61	6	0.40
	60	1212K + H212X	38	80	13	—	A212X	20	90	64	5	0.365
	60	2212K + H312X	47	80	13	—	A312X	20	90	65	9	0.40
	60	22212E AKE4 + H312X	47	80	13	—	A312X	20	90	65	9	0.40
	60	1312K + H312X	47	80	13	—	A312X	20	90	65	5	0.40
	60	21312E AKE4 + H312X	47	80	13	—	A312X	20	90	65	5	0.40
60	60	2312K + H2312X	62	80	13	—	A2312X	20	90	66	5	0.45
	60	22312E AKE4 + H2312X	62	80	13	—	A2312X	20	90	66	5	0.45
	65	1213K + H213X	40	85	14	—	A213X	21	96	70	5	0.40
	65	2213K + H313X	50	85	14	—	A313X	21	96	70	8	0.45
	65	22213E AKE4 + H313X	50	85	14	—	A313X	21	96	70	8	0.45
	65	1313K + H313X	50	85	14	—	A313X	21	96	70	5	0.45
65	65	21313E AKE4 + H313X	50	85	14	—	A313X	21	96	70	5	0.45
	65	2313K + H2313X	65	85	14	—	A2313X	21	96	72	5	0.55
	65	22313E AKE4 + H2313X	65	85	14	—	A2313X	21	96	72	5	0.55
	70	22214E AKE4 + H314X	52	92	14	—	A314X	21	96	70	8	0.65
	70	21314E AKE4 + H314X	52	92	14	—	A314X	21	96	70	5	0.65
	70	22314E AKE4 + H2314X	68	92	14	—	A2314X	21	96	72	5	0.80

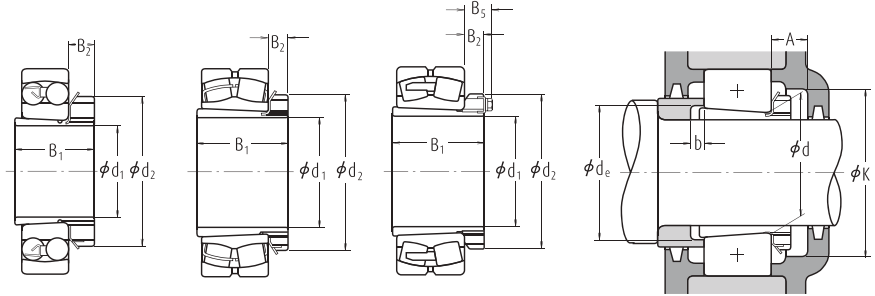
Remark

The suffix X represents adapter sleeves having narrow slits, for which washers with straight tabs should be used.



Adapters for Rolling Bearings

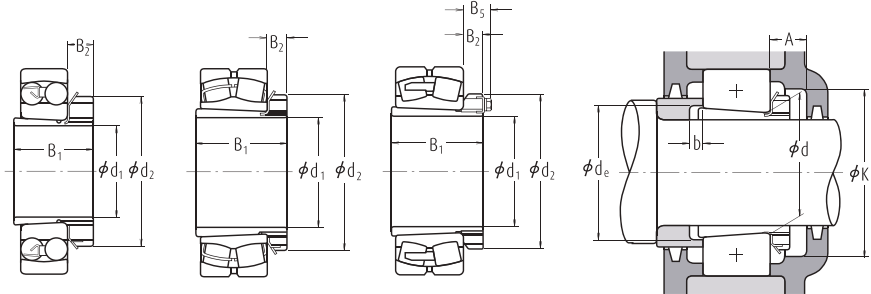
Shaft Diameter 65 – 80 mm



Shaft Diameter (mm)	Nominal Bearing Bore Dia. (mm)	Nominal Numbers Applicable Bearings	Dimensions (mm)				Adapter Sleeve Numbers	Abutment Dimensions (mm)				Mass (kg)
			B ₁	d ₂	B ₂	B ₅		A min.	K min.	d _e min.	b min.	approx.
65	75	1215K + H215X	43	98	15	—	A215X	23	110	80	5	0.70
	75	2215K + H315X	55	98	15	—	A315X	23	110	80	12	0.85
	75	22215E AKE4 + H315X	55	98	15	—	A315X	23	110	80	12	0.85
	75	1315K + H315X	55	98	15	—	A315X	23	110	80	5	0.85
	75	21315E AKE4 + H315X	55	98	15	—	A315X	23	110	80	5	0.85
	75	2315K + H2315X	73	98	15	—	A2315X	23	110	82	5	1.05
70	75	22315E AKE4 + H2315X	73	98	15	—	A2315X	23	110	82	5	1.05
	80	1216K + H216X	46	105	17	—	A216X	25	120	85	5	0.85
	80	2216K + H316X	59	105	17	—	A316X	25	120	86	12	1.05
	80	22216E AKE4 + H316X	59	105	17	—	A316X	25	120	86	12	1.05
	80	1316K + H316X	59	105	17	—	A316X	25	120	86	5	1.05
	80	21316E AKE4 + H316X	59	105	17	—	A316X	25	120	86	5	1.05
75	80	2316K + H2316X	78	105	17	—	A2316X	25	120	87	5	1.3
	80	22316E AKE4 + H2316X	78	105	17	—	A2316X	25	120	87	5	1.3
	85	1217K + H217X	50	110	18	—	A217X	27	128	90	6	1.0
	85	2217K + H317X	63	110	18	—	A317X	27	128	91	12	1.2
	85	22217E AKE4 + H317X	63	110	18	—	A317X	27	128	91	12	1.2
	85	1317K + H317X	63	110	18	—	A317X	27	128	91	6	1.2
80	85	21317E AKE4 + H317X	63	110	18	—	A317X	27	128	91	6	1.2
	85	2317K + H2317X	82	110	18	—	A2317X	27	128	94	6	1.45
	85	22317E AKE4 + H2317X	82	110	18	—	A2317X	27	128	94	6	1.45
	90	1218K + H218X	52	120	18	—	A218X	28	139	95	6	1.15
	90	2218K + H318X	65	120	18	—	A318X	28	139	96	10	1.4
	90	22218E AKE4 + H318X	65	120	18	—	A318X	28	139	96	10	1.4
80	90	1318K + H318X	65	120	18	—	A318X	28	139	96	6	1.4
	90	21318E AKE4 + H318X	65	120	18	—	A318X	28	139	96	6	1.4
	90	2318K + H2318X	86	120	18	—	A2318X	28	139	99	6	1.7
	90	22318E AKE4 + H2318X	86	120	18	—	A2318X	28	139	99	6	1.7
	90	23218C KE4 + H2318X	86	120	18	—	A2318X	28	139	99	6	1.7
	90	22318E AKE4 + H2318X	86	120	18	—	A2318X	28	139	99	6	1.7

Remark The suffix X represents adapter sleeves having narrow slits, for which washers with straight tabs should be used.

Shaft Diameter 85 – 115 mm



Shaft Diameter (mm)	Nominal Bearing Bore Dia. (mm)	Nominal Numbers	Dimensions (mm)				Adapter Sleeve Numbers	Abutment Dimensions (mm)				Mass (kg)
			B ₁	d ₂	B ₂	B ₅		A min.	K min.	d _e min.	b min.	
85	95	1219K + H219X	55	125	19	—	A219X	29	145	101	7	1.35
	95	2219K + H319X	68	125	19	—	A319X	29	145	102	9	1.55
	95	22219E AKE4 + H319X	68	125	19	—	A319X	29	145	102	9	1.55
	95	1319K + H319X	68	125	19	—	A319X	29	145	102	7	1.55
	95	21319C KE4 + H319X	68	125	19	—	A319X	29	145	102	7	1.55
	95	2319K + H2319X	90	125	19	—	A2319X	29	145	105	7	1.9
90	95	22319E AKE4 + H2319X	90	125	19	—	A2319X	29	145	105	7	1.9
	100	1220K + H220X	58	130	20	—	A220X	30	150	106	7	1.45
	100	2220K + H320X	71	130	20	—	A320X	30	150	107	8	1.7
	100	22220E AKE4 + H320X	71	130	20	—	A320X	30	150	107	8	1.7
	100	1320K + H320X	71	130	20	—	A320X	30	150	107	7	1.7
	100	21320C KE4 + H320X	71	130	20	—	A320X	30	150	107	7	1.7
100	100	2320K + H320X	97	130	20	—	A2320X	30	150	110	7	2.15
	100	23220C KE4 + H320X	97	130	20	—	A2320X	30	150	110	7	2.15
	100	22320E AKE4 + H320X	97	130	20	—	A2320X	30	150	110	7	2.15
	110	23122C KE4 + H3122X	81	145	21	—	A3122X	32	170	117	7	2.25
	110	1222K + H222X	63	145	21	—	A222X	32	170	116	7	1.95
	110	2222K + H322X	77	145	21	—	A322X	32	170	117	6	2.3
110	110	22222E AKE4 + H322X	77	145	21	—	A322X	32	170	117	6	2.3
	110	1322K + H322X	77	145	21	—	A322X	32	170	117	9	2.3
	110	2322K + H322X	105	145	21	—	A2322X	32	170	121	7	2.75
	110	23222C KE4 + H3222X	105	145	21	—	A2322X	32	170	121	17	2.75
	110	22322E AKE4 + H3222X	105	145	21	—	A2322X	32	170	121	7	2.75
	120	23024C DKE4 + H3024	72	145	22	—	A3024	33	180	127	7	1.95
115	120	23124C KE4 + H3124	88	155	22	—	A3124	33	180	128	7	2.65
	120	22224E AKE4 + H3124	88	155	22	—	A3124	33	180	128	11	2.65
	120	23224C KE4 + H324	112	155	22	—	A2324	33	180	131	17	3.2
	120	22324E AKE4 + H324	112	155	22	—	A2324	33	180	131	7	3.2
	130	23026C DKE4 + H3026	80	165	23	—	A3026	34	190	137	8	2.85
	130	23126C KE4 + H3126	92	165	23	—	A3126	34	190	138	8	3.65
115	130	22226E AKE4 + H3126	92	165	23	—	A3126	34	190	138	8	3.65
	130	23226C KE4 + H326	121	165	23	—	A2326	34	190	142	21	4.6
	130	22326C KE4 + H2326	121	165	23	—	A2326	34	190	142	8	4.6

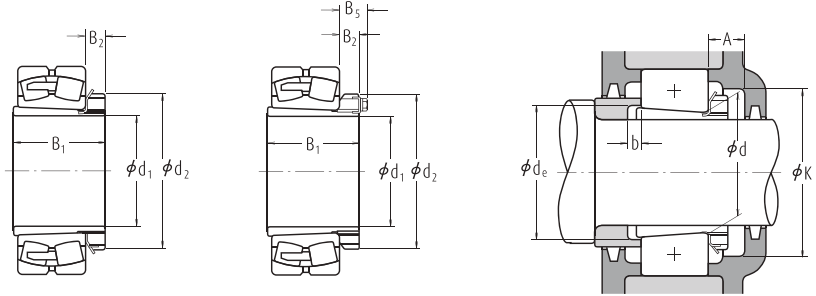
Sleeves

Remark

The suffix X represents adapter sleeves having narrow slits, for which washers with straight tabs should be used.

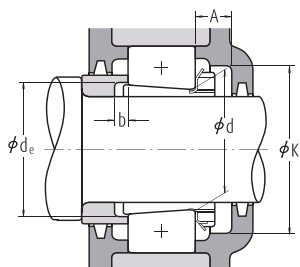
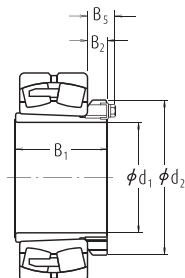
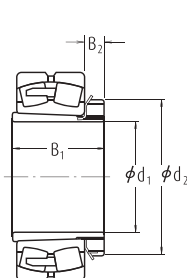
Adapters for Rolling Bearings

Shaft Diameter 125 – 170 mm



Shaft Diameter (mm)	Nominal Bearing Bore Dia. (mm)	Nominal Numbers	Dimensions (mm)				Adapter Sleeve Numbers	Abutment Dimensions (mm)				Mass (kg)
		Applicable Bearings	B ₁	d ₂	B ₂	B ₅		A min.	K min.	d _e min.	b min.	
125	140	23028C DKE4 + H3028	82	165	24	—	A3028	36	205	147	8	3.15
	140	23128C KE4 + H3128	97	180	24	—	A3128	36	205	149	8	4.35
	140	22228C DKE4 + H3128	97	180	24	—	A3128	36	205	149	8	4.35
	140	23228C KE4 + H2328	131	180	24	—	A2328	36	205	152	22	5.55
135	140	22328C KE4 + H2328	131	180	24	—	A2328	36	205	152	8	5.55
	150	23030C DKE4 + H3030	87	180	26	—	A3030	37	220	158	8	3.9
	150	23130C KE4 + H3130	111	195	26	—	A3130	37	220	160	8	5.5
	150	22230C DKE4 + H3130	111	195	26	—	A3130	37	220	160	15	5.5
140	150	23230C KE4 + H2330	139	195	26	—	A2330	37	220	163	20	6.6
	150	2330C AKE4 + H2330	139	195	26	—	A2330	37	220	163	8	6.6
	160	23932C AKE4 + H3932	78	190	28	—	A3932	39	205	168	8	4.64
	160	23032C DKE4 + H3032	93	190	28	—	A3032	39	230	168	8	5.2
140	160	23132C KE4 + H3132	119	210	28	—	A3132	39	230	170	8	7.65
	160	22232C DKE4 + H3132	119	210	28	—	A3132	39	230	170	14	7.65
	160	23232C KE4 + H2332	147	210	28	—	A2332	39	230	174	18	9.15
	160	2332C AKE4 + H2332	147	210	28	—	A2332	39	230	174	8	9.15
150	170	23934B CAKE4 + H3934	79	200	29	—	A3934	40	215	179	8	5.07
	170	23034C DKE4 + H3034	101	200	29	—	A3034	40	250	179	8	6.0
	170	23134C KE4 + H3134	122	220	29	—	A3134	40	250	180	8	8.4
	170	22234C DKE4 + H3134	122	220	29	—	A3134	40	250	180	10	8.4
150	170	23234C KE4 + H2334	154	220	29	—	A2334	40	250	185	18	10
	170	22334C AKE4 + H2334	154	220	29	—	A2334	40	250	185	8	10
160	180	23936C AKE4 + H3936	87	210	30	—	A3936	41	230	189	8	5.87
	180	23036C DKE4 + H3036	109	210	30	—	A3036	41	260	189	8	6.85
	180	23136C KE4 + H3136	131	230	30	—	A3136	41	260	191	8	9.5
	180	22236C DKE4 + H3136	131	230	30	—	A3136	41	260	191	18	9.5
160	180	23236C KE4 + H2336	161	230	30	—	A2336	41	260	195	22	11.5
	180	22336C AKE4 + H2336	161	230	30	—	A2336	41	260	195	8	11.5
170	190	23938C AKE4 + H3938	89	220	31	—	A3938	43	240	199	9	6.35
	190	23038C AKE4 + H3038	112	220	31	—	A3038	43	270	199	9	7.45
	190	23138C KE4 + H3138	141	240	31	—	A3138	43	270	202	9	11
	190	22238C AKE4 + H3138	141	240	31	—	A3138	43	270	202	21	11
170	190	23238C KE4 + H2338	169	240	31	—	A2338	43	270	206	21	12.5
	190	22338C AKE4 + H2338	169	240	31	—	A2338	43	270	206	9	12.5

Shaft Diameter 180 – 260 mm

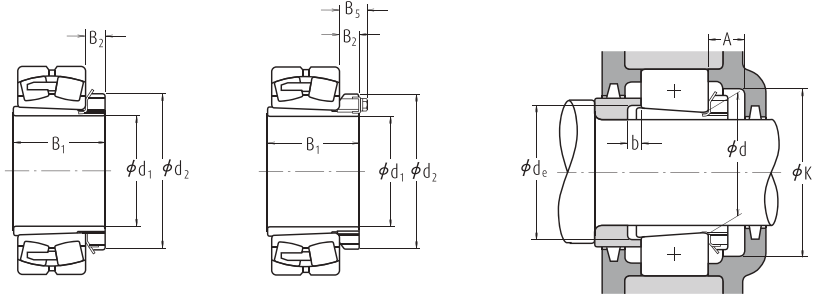


Shaft Diameter (mm)	Nominal Bearing Bore Dia. (mm)	Nominal Numbers	Dimensions (mm)				Adapter Sleeve Numbers	Abutment Dimensions (mm)				Mass (kg)
			B ₁	d ₂	B ₂	B ₅		A min.	K min.	d _e min.	b min.	
180	200	23940C AKE4 + H3940	98	240	32	—	A3940	46	260	210	10	8.0
	200	23040C AKE4 + H3040	120	240	32	—	A3040	46	280	210	10	9.2
	200	23140C KE4 + H3140	150	250	32	—	A3140	46	280	212	10	12
	200	22240C AKE4 + H3140	150	250	32	—	A3140	46	280	212	24	12
	200	23240C KE4 + H2340	176	250	32	—	A2340	46	280	216	20	14
	200	22340C AKE4 + H2340	176	250	32	—	A2340	46	280	216	10	14
200	220	23944C AKE4 + H3944	96	260	30	41	A3944	55	280	231	10	8.32
	220	23044C AKE4 + H3044	128	260	30	41	A3044	55	320	231	12	10.5
	220	23144C KE4 + H3144	158	280	32	44	A3144	55	320	233	10	14.5
	220	22244C AKE4 + H3144	158	280	32	44	A3144	55	320	233	22	14.5
	220	23244C KE4 + H2344	183	280	32	44	A2344	55	320	236	11	16.5
	220	22344C AKE4 + H2344	183	280	32	44	A2344	55	320	236	10	16.5
220	240	23948C AKE4 + H3948	101	290	34	46	A3948	60	300	251	11	11.2
	240	23048C AKE4 + H3048	133	290	34	46	A3048	60	340	251	11	13
	240	23148C KE4 + H3148	169	300	34	46	A3148	60	340	254	11	17.5
	240	22248C AKE4 + H3148	169	300	34	46	A3148	60	340	254	19	17.5
	240	23248C KE4 + H2348	196	300	34	46	A2348	60	340	257	6	19.5
	240	22348C AKE4 + H2348	196	300	34	46	A2348	60	340	257	11	19.5
240	260	23952C AKE4 + H3952	116	310	34	46	A3952	60	330	272	11	13.4
	260	23052C AKE4 + H3052	147	310	34	46	A3052	60	370	272	13	15.5
	260	23152C AKE4 + H3152	187	330	36	49	A3152	60	370	276	11	22
	260	22252C AKE4 + H3152	187	330	36	49	A3152	60	370	276	25	22
	260	23252C AKE4 + H2352	208	330	36	49	A2352	60	370	278	2	24
	260	22352C AKE4 + H2352	208	330	36	49	A2352	60	370	278	11	24
260	280	23956C AKE4 + H3956	121	330	38	50	A3956	65	350	292	12	15.5
	280	23056C AKE4 + H3056	152	330	38	50	A3056	65	390	292	12	17.5
	280	23156C AKE4 + H3156	192	350	38	51	A3156	65	390	296	12	24.5
	280	22256C AKE4 + H3156	192	350	38	51	A3156	65	390	296	28	24.5
	280	23256C AKE4 + H2356	221	350	38	51	A2356	65	390	299	11	28
	280	22356C AKE4 + H2356	221	350	38	51	A2356	65	390	299	12	28

Sleeves

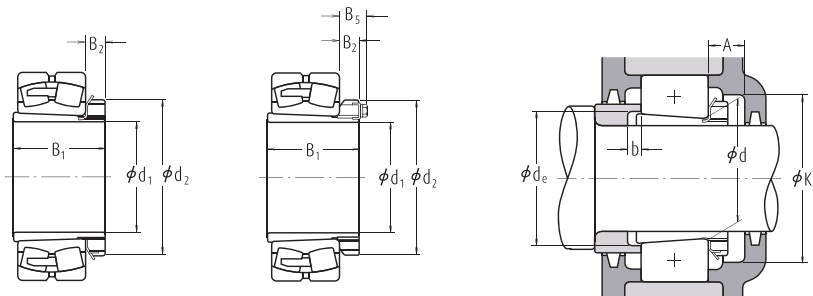
Adapters for Rolling Bearings

Shaft Diameter 280 – 410 mm



Shaft Diameter (mm)	Nominal Bearing Bore Dia. (mm)	Nominal Numbers	Dimensions (mm)				Adapter Sleeve Numbers	Abutment Dimensions (mm)				Mass (kg)
		Applicable Bearings	B_1	d_2	B_2	B_5		A min.	K min.	d_e min.	b min.	
280	300	23960C AKE4 + H3960	140	360	42	54	A3960	69	380	313	12	20.7
	300	23060C AKE4 + H3060	168	360	42	54	A3060	69	430	313	12	23
	300	23160C AKE4 + H3160	208	380	40	53	A3160	69	430	317	12	30
	300	22260C AKE4 + H3160	208	380	40	53	A3160	69	430	317	32	30
300	300	23260C AKE4 + H3260	240	380	40	53	A3260	69	430	321	12	34
	320	23964C AKE4 + H3964	140	380	42	55	A3964	72	400	334	13	21.8
	320	23064C AKE4 + H3064	171	380	42	55	A3064	72	450	334	13	24.5
	320	23164C AKE4 + H3164	226	400	42	56	A3164	72	450	339	13	35
320	320	22264C AKE4 + H3164	226	400	42	56	A3164	72	450	339	39	35
	320	23264C AKE4 + H3264	258	400	42	56	A3264	72	450	343	13	39.5
	340	23968C AKE4 + H3968	144	400	45	58	A3968	75	430	354	14	24.6
	340	23068C AKE4 + H3068	187	400	45	58	A3068	75	490	355	14	28.5
340	340	23168C AKE4 + H3168	254	440	55	72	A3168	75	490	360	14	49.5
	340	23268C AKE4 + H3268	288	440	55	72	A3268	75	490	364	14	54.5
	360	23972C AKE4 + H3972	144	420	45	58	A3972	75	450	374	14	25.7
	360	23072C AKE4 + H3072	188	420	45	58	A3072	75	510	375	14	30.5
360	360	23172C AKE4 + H3172	259	460	58	75	A3172	75	510	380	14	54
	360	23272C AKE4 + H3272	299	460	58	75	A3272	75	510	385	14	60.5
	380	23976C AKE4 + H3976	164	450	48	62	A3976	82	480	396	15	31.9
	380	23076C AKE4 + H3076	193	450	48	62	A3076	82	540	396	15	36
380	380	23176C AKE4 + H3176	264	490	60	77	A3176	82	540	401	15	61.5
	380	23276C AKE4 + H3276	310	490	60	77	A3276	82	540	405	15	69.5
	400	23980C AKE4 + H3980	168	470	52	66	A3980	86	500	417	15	35.2
	400	23080C AKE4 + H3080	210	470	52	66	A3080	86	580	417	15	41.5
400	400	23180C AKE4 + H3180	272	520	62	82	A3180	86	580	421	15	70.5
	400	23280C AKE4 + H3280	328	520	62	82	A3280	86	580	427	15	81
	420	23984C AKE4 + H3984	168	490	52	66	A3984	86	520	437	16	36.6
	420	23084C AKE4 + H3084	212	490	52	66	A3084	86	600	437	16	43.5
410	420	23184C AKE4 + H3184	304	540	70	90	A3184	86	600	443	16	84
	420	23284C AKE4 + H3284	352	540	70	90	A3284	86	600	448	16	94
	440	23988C AKE4 + H3988	189	520	60	77	A3988	99	550	458	17	58.6
	440	23088C AKE4 + H3088	228	520	60	77	A3088	99	620	458	17	65
410	440	23188C AKE4 + H3188	307	560	70	90	A3188	99	620	464	17	104
	440	23288C AKE4 + H3288	361	560	70	90	A3288	99	620	469	17	118

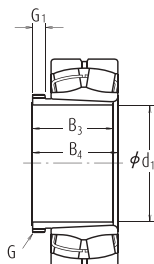
Shaft Diameter 430 – 470 mm



Shaft Diameter (mm)	Nominal Bearing Bore Dia. (mm)	Nominal Numbers	Dimensions (mm)				Adapter Sleeve Numbers	Abutment Dimensions (mm)				Mass (kg)
			B ₁	d ₂	B ₂	B ₅		A min.	K min.	d _e min.	b min.	
430	460	23992C AKE4 + H3992	189	540	60	77	A3992	99	570	478	17	62
	460	23092C AKE4 + H3092	234	540	60	77	A3092	99	650	478	17	69.5
	460	23192C AKE4 + H3192	326	580	75	95	A3192	99	650	485	17	116
450	460	23292C AKE4 + H3292	382	580	75	95	A3292	99	650	491	17	132
	480	23996C AKE4 + H3996	200	560	60	77	A3996	99	600	499	18	67.5
	480	23096C AKE4 + H3096	237	560	60	77	A3096	99	690	499	18	73.5
	480	23196C AKE4 + H3196	335	620	75	95	A3196	99	690	505	18	133
	480	23296C AKE4 + H3296	397	620	75	95	A3296	99	690	512	18	152
470	500	239/500C AKE4 + H39/500	208	580	68	85	A39/500	109	620	519	18	74.6
	500	230/500C AKE4 + H30/500	247	580	68	85	A30/500	109	700	519	18	82
	500	231/500C AKE4 + H31/500	356	630	80	100	A31/500	109	700	527	18	143
	500	232/500C AKE4 + H32/500	428	630	80	100	A32/500	109	700	534	18	166

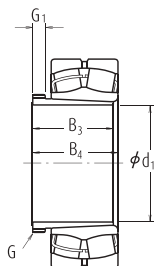
Withdrawal Sleeves for Rolling Bearings

Shaft Diameter 35 – 85 mm



Shaft Diameter (mm)	Nominal Bearing Bore Dia. (mm)	Nominal Numbers	Screw Thread	Dimensions (mm)			Mass (kg)
d ₁	d	Applicable Bearings	G	B ₃	G ₁	B ₄	approx.
35	40	21308EAKE4 + AH308	M 45 × 1.5	29	6	32	0.09
	40	22308EAKE4 + AH2308	M 45 × 1.5	40	7	43	0.13
40	45	21309EAKE4 + AH309	M 50 × 1.5	31	6	34	0.11
	45	22309EAKE4 + AH2309	M 50 × 1.5	44	7	47	0.165
45	50	21310EAKE4 + AHX310	M 55 × 2	35	7	38	0.16
	50	22310EAKE4 + AHX2310	M 55 × 2	50	9	53	0.235
50	55	22211EAKE4 + AHX311	M 60 × 2	37	7	40	0.19
	55	21311EAKE4 + AHX311	M 60 × 2	37	7	40	0.19
	55	22311EAKE4 + AHX2311	M 60 × 2	54	10	57	0.285
55	60	22212EAKE4 + AHX312	M 65 × 2	40	8	43	0.215
	60	21312EAKE4 + AHX312	M 65 × 2	40	8	43	0.215
	60	22312EAKE4 + AHX2312	M 65 × 2	58	11	61	0.34
60	65	22213EAKE4 + AH313	M 75 × 2	42	8	45	0.255
	65	21313EAKE4 + AH313	M 75 × 2	42	8	45	0.255
	65	22313EAKE4 + AH2313	M 75 × 2	61	12	64	0.395
65	70	22214EAKE4 + AH314	M 80 × 2	43	8	47	0.28
	70	21314EAKE4 + AH314	M 80 × 2	43	8	47	0.28
	70	22314EAKE4 + AHX2314	M 80 × 2	64	12	68	0.53
70	75	22215EAKE4 + AH315	M 85 × 2	45	8	49	0.315
	75	21315EAKE4 + AH315	M 85 × 2	45	8	49	0.315
	75	22315EAKE4 + AHX2315	M 85 × 2	68	12	72	0.605
75	80	22216EAKE4 + AH316	M 90 × 2	48	8	52	0.365
	80	21316EAKE4 + AH316	M 90 × 2	48	8	52	0.365
	80	22316EAKE4 + AHX2316	M 90 × 2	71	12	75	0.665
80	85	22217EAKE4 + AHX317	M 95 × 2	52	9	56	0.48
	85	21317EAKE4 + AHX317	M 95 × 2	52	9	56	0.48
	85	22317EAKE4 + AHX2317	M 95 × 2	74	13	78	0.745
85	90	22218EAKE4 + AHX318	M 100 × 2	53	9	57	0.52
	90	21318EAKE4 + AHX318	M 100 × 2	53	9	57	0.52
	90	23218CKE4 + AHX2318	M 100 × 2	63	10	67	0.58
	90	22318EAKE4 + AHX2318	M 100 × 2	79	14	83	0.845

Shaft Diameter 90 – 135 mm

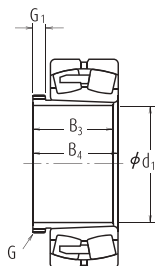


Shaft Diameter (mm)	Nominal Bearing Bore Dia. (mm)	Nominal Numbers		Screw Thread	Dimensions (mm)			Mass (kg)
d ₁	d	Applicable Bearings		G	B ₃	G ₁	B ₄	approx.
90	95	22219EAKE4	+ AHX319	M 105 × 2	57	10	61	0.595
	95	21319CKE4	+ AHX319	M 105 × 2	57	10	61	0.595
	95	22319EAKE4	+ AHX2319	M 105 × 2	85	16	89	0.89
95	100	21320CKE4	+ AHX3120	M 110 × 2	64	11	68	0.70
	100	22220EAKE4	+ AHX320	M 110 × 2	59	10	63	0.66
	100	21320CKE4	+ AHX320	M 110 × 2	59	10	63	0.66
105	100	23220CKE4	+ AHX3220	M 110 × 2	73	11	77	0.77
	100	22320EAKE4	+ AHX2320	M 110 × 2	90	16	94	1.0
	110	23122CKE4	+ AHX3122	M 120 × 2	68	11	72	0.76
	110	22222EAKE4	+ AHX3122	M 120 × 2	68	11	72	0.76
	110	24122CK30E4	+ AH24122	M 115 × 2	82	13	91	0.73
	110	23222CKE4	+ AHX3222	M 125 × 2	82	11	86	1.04
	110	22322EAKE4	+ AHX2322	M 125 × 2	98	16	102	1.35
115	120	23024CDKE4	+ AHX3024	M 130 × 2	60	13	64	0.75
	120	24024CK30E4	+ AH24024	M 125 × 2	73	13	82	0.70
	120	23124CKE4	+ AHX3124	M 130 × 2	75	12	79	0.95
	120	22224EAKE4	+ AHX3124	M 130 × 2	75	12	79	0.95
	120	24124CK30E4	+ AH24124	M 130 × 2	93	13	102	1.02
	120	23224CKE4	+ AHX3224	M 135 × 2	90	13	94	1.3
	120	22324EAKE4	+ AHX2324	M 135 × 2	105	17	109	1.6
125	130	23026CDKE4	+ AHX3026	M 140 × 2	67	14	71	0.95
	130	24026CK30E4	+ AH24026	M 135 × 2	83	14	93	0.89
	130	23126CKE4	+ AHX3126	M 140 × 2	78	12	82	1.08
	130	22226EAKE4	+ AHX3126	M 140 × 2	78	12	82	1.08
	130	24126CK30E4	+ AH24126	M 140 × 2	94	14	104	1.14
	130	23226CKE4	+ AHX3226	M 145 × 2	98	15	102	1.58
	130	22326EAKE4	+ AHX2326	M 145 × 2	115	19	119	1.97
135	140	23028CDKE4	+ AHX3028	M 150 × 2	68	14	73	1.01
	140	24028CK30E4	+ AH24028	M 145 × 2	83	14	93	0.96
	140	23128CKE4	+ AHX3128	M 150 × 2	83	14	88	1.28
	140	22228CDKE4	+ AHX3128	M 150 × 2	83	14	88	1.28
	140	24128CK30E4	+ AH24128	M 150 × 2	99	14	109	1.3
	140	23228CKE4	+ AHX3228	M 155 × 3	104	15	109	1.84
	140	22328EAKE4	+ AHX2328	M 155 × 3	125	20	130	2.33

Sleeves

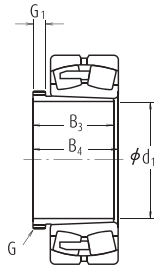
Withdrawal Sleeves for Rolling Bearings

Shaft Diameter 145 – 180 mm



Shaft Diameter (mm)	Nominal Bearing Bore Dia. (mm)	Nominal Numbers	Screw Thread	Dimensions (mm)			Mass (kg)
d ₁	d	Applicable Bearings	G	B ₃	G ₁	B ₄	approx.
145	150	23030CDKE4 + AHX3030	M 160 × 3	72	15	77	1.15
	150	24030CK30E4 + AH24030	M 155 × 3	90	15	101	1.11
	150	23130CKE4 + AHX3130	M 165 × 3	96	15	101	1.79
	150	22230CDKE4 + AHX3130	M 165 × 3	96	15	101	1.79
	150	24130CK30E4 + AH24130	M 160 × 3	115	15	126	1.63
	150	23230CKE4 + AHX3230	M 165 × 3	114	17	119	2.22
150	150	22330CAKE4 + AHX2330	M 165 × 3	135	24	140	2.82
	160	23032CDKE4 + AH3032	M 170 × 3	77	16	82	2.05
	160	24032CK30E4 + AH24032	M 170 × 3	95	15	106	2.28
	160	23132CKE4 + AH3132	M 180 × 3	103	16	108	3.2
	160	22232CDKE4 + AH3132	M 180 × 3	103	16	108	3.2
	160	24132CK30E4 + AH24132	M 170 × 3	124	15	135	3.03
160	160	23232CKE4 + AH3232	M 180 × 3	124	20	130	4.1
	160	22332CAKE4 + AH2332	M 180 × 3	140	24	146	4.7
	170	23034CDKE4 + AH3034	M 180 × 3	85	17	90	2.45
	170	24034CK30E4 + AH24034	M 180 × 3	106	16	117	2.74
	170	23134CKE4 + AH3134	M 190 × 3	104	16	109	3.4
	170	22234CDKE4 + AH3134	M 190 × 3	104	16	109	3.4
170	170	24134CK30E4 + AH24134	M 180 × 3	125	16	136	3.26
	170	23234CKE4 + AH3234	M 190 × 3	134	24	140	4.8
	170	22334CAKE4 + AH2334	M 190 × 3	146	24	152	5.25
	180	23036CDKE4 + AH3036	M 190 × 3	92	17	98	2.8
	180	24036CK30E4 + AH24036	M 190 × 3	116	16	127	3.19
	180	23136CKE4 + AH3136	M 200 × 3	116	19	122	4.2
180	180	24136CK30E4 + AH24136	M 190 × 3	134	16	145	3.74
	180	22236CDKE4 + AH2236	M 200 × 3	105	17	110	3.75
	180	23236CKE4 + AH3236	M 200 × 3	140	24	146	5.3
	180	22336CAKE4 + AH2336	M 200 × 3	154	26	160	5.85
	190	23038CAKE4 + AH3038	Tr 205 × 4	96	18	102	3.35
	190	24038CK30E4 + AH24038	M 200 × 3	118	18	131	3.47
190	190	23138CKE4 + AH3138	Tr 210 × 4	125	20	131	4.9
	190	24138CK30E4 + AH24138	M 200 × 3	146	18	159	4.38
	190	22238CAKE4 + AH2238	Tr 210 × 4	112	18	117	4.25
	190	23238CKE4 + AH3238	Tr 210 × 4	145	25	152	5.9
	190	22338CAKE4 + AH2338	Tr 210 × 4	160	26	167	6.65

Shaft Diameter 190 – 260 mm



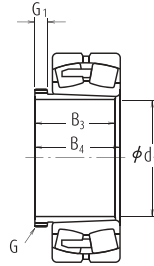
Shaft Diameter (mm)	Nominal Bearing Bore Dia. (mm)	Nominal Numbers		Screw Thread	Dimensions (mm)			Mass (kg)
		Applicable Bearings			G	B ₃	G ₁	
190	200	23040CAKE4	+ AH3040	Tr 215 × 4	102	19	108	3.8
	200	24040CK30E4	+ AH24040	Tr 210 × 4	127	18	140	3.92
	200	23140CKE4	+ AH3140	Tr 220 × 4	134	21	140	5.5
	200	24140CK30E4	+ AH24140	Tr 210 × 4	158	18	171	5.0
	200	22240CAKE4	+ AH2240	Tr 220 × 4	118	19	123	4.7
	200	23240CKE4	+ AH3240	Tr 220 × 4	153	25	160	6.7
200	200	22340CAKE4	+ AH2340	Tr 220 × 4	170	30	177	7.55
	220	23044CAKE4	+ AH3044	Tr 235 × 4	111	20	117	7.4
	220	24044CK30E4	+ AH24044	Tr 230 × 4	138	20	152	8.23
	220	23144CKE4	+ AH3144	Tr 240 × 4	145	23	151	10.5
	220	24144CK30E4	+ AH24144	Tr 230 × 4	170	20	184	10.3
	220	22244CAKE4	+ AH2244	Tr 240 × 4	130	20	136	9.1
220	220	23244CKE4	+ AH2344	Tr 240 × 4	181	30	189	13.5
	220	22344CAKE4	+ AH2344	Tr 240 × 4	181	30	189	13.5
	240	23048CAKE4	+ AH3048	Tr 260 × 4	116	21	123	8.75
	240	24048CK30E4	+ AH24048	Tr 250 × 4	138	20	153	9.0
	240	23148CKE4	+ AH3148	Tr 260 × 4	154	25	161	12
	240	24148CK30E4	+ AH24148	Tr 260 × 4	180	20	195	12.6
240	240	22248CAKE4	+ AH2248	Tr 260 × 4	144	21	150	11
	240	23248CAKE4	+ AH2348	Tr 260 × 4	189	30	197	15.5
	240	22348CAKE4	+ AH2348	Tr 260 × 4	189	30	197	15.5
	260	23052CAKE4	+ AH3052	Tr 280 × 4	128	23	135	10.5
	260	24052CAK30E4	+ AH24052	Tr 270 × 4	162	22	178	11.7
	260	23152CAKE4	+ AH3152	Tr 290 × 4	172	26	179	16
260	260	24152CAK30E4	+ AH24152	Tr 280 × 4	202	22	218	15.5
	260	22252CAKE4	+ AH2252	Tr 290 × 4	155	23	161	14
	260	23252CAKE4	+ AH2352	Tr 290 × 4	205	30	213	19.5
	260	22352CAKE4	+ AH2352	Tr 290 × 4	205	30	213	19.5
	280	23056CAKE4	+ AH3056	Tr 300 × 4	131	24	139	12
	280	24056CAK30E4	+ AH24056	Tr 290 × 4	162	22	179	12.6
280	280	23156CAKE4	+ AH3156	Tr 310 × 5	175	28	183	17.5
	280	24156CAK30E4	+ AH24156	Tr 300 × 4	202	22	219	16.8
	280	22256CAKE4	+ AH2256	Tr 310 × 5	155	24	163	15
	280	23256CAKE4	+ AH2356	Tr 310 × 5	212	30	220	21.5
	280	22356CAKE4	+ AH2356	Tr 310 × 5	212	30	220	21.5



Sleeves

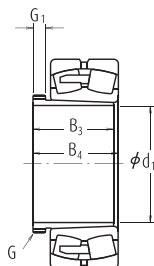
Withdrawal Sleeves for Rolling Bearings

Shaft Diameter 280 – 380 mm



Shaft Diameter (mm)	Nominal Bearing Bore Dia. (mm)	Nominal Numbers		Screw Thread	Dimensions (mm)			Mass (kg)
d ₁	d	Applicable Bearings		G	B ₃	G ₁	B ₄	approx.
280	300	23060CAKE4	+ AH3060	Tr 320 × 5	145	26	153	14.5
	300	24060CAK30E4	+ AH24060	Tr 310 × 5	184	24	202	15.5
	300	23160CAKE4	+ AH3160	Tr 330 × 5	192	30	200	21
	300	24160CAK30E4	+ AH24160	Tr 320 × 5	224	24	242	20.3
	300	22260CAKE4	+ AH2260	Tr 330 × 5	170	26	178	18
300	300	23260CAKE4	+ AH3260	Tr 330 × 5	228	34	236	20
	320	23064CAKE4	+ AH3064	Tr 345 × 5	149	27	157	16
	320	24064CAK30E4	+ AH24064	Tr 330 × 5	184	24	202	16.4
	320	23164CAKE4	+ AH3164	Tr 350 × 5	209	31	217	24.5
	320	24164CAK30E4	+ AH24164	Tr 340 × 5	242	24	260	23.5
320	320	23264CAKE4	+ AH3264	Tr 350 × 5	246	36	254	25
	340	23068CAKE4	+ AH3068	Tr 365 × 5	162	28	171	19.5
	340	24068CAK30E4	+ AH24068	Tr 360 × 5	206	26	225	21.2
	340	23168CAKE4	+ AH3168	Tr 370 × 5	225	33	234	29
	340	24168CAK30E4	+ AH24168	Tr 360 × 5	269	26	288	28.3
340	340	23268CAKE4	+ AH3268	Tr 370 × 5	264	38	273	35.5
	360	23072CAKE4	+ AH3072	Tr 385 × 5	167	30	176	21
	360	24072CAK30E4	+ AH24072	Tr 380 × 5	206	26	226	22.5
	360	23172CAKE4	+ AH3172	Tr 400 × 5	229	35	238	33
	360	24172CAK30E4	+ AH24172	Tr 380 × 5	269	26	289	30
360	360	23272CAKE4	+ AH3272	Tr 400 × 5	274	40	283	41.5
	380	23076CAKE4	+ AH3076	Tr 410 × 5	170	31	180	23.5
	380	24076CAK30E4	+ AH24076	Tr 400 × 5	208	28	228	24.1
	380	23176CAKE4	+ AH3176	Tr 420 × 5	232	36	242	35.5
	380	24176CAK30E4	+ AH24176	Tr 400 × 5	271	28	291	32.1
380	380	23276CAKE4	+ AH3276	Tr 420 × 5	284	42	294	45.5
	400	23080CAKE4	+ AH3080	Tr 430 × 5	183	33	193	27.5
	400	24080CAK30E4	+ AH24080	Tr 420 × 5	228	28	248	28
	400	23180CAKE4	+ AH3180	Tr 440 × 5	240	38	250	39.5
	400	24180CAK30E4	+ AH24180	Tr 420 × 5	278	28	298	34.8
	400	23280CAKE4	+ AH3280	Tr 440 × 5	302	44	312	51.5

Shaft Diameter 400 – 480 mm

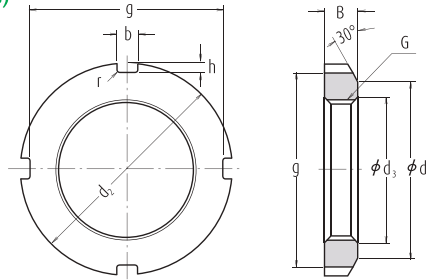


Shaft Diameter (mm)	Nominal Bearing Bore Dia. (mm)	Nominal Numbers	Screw Thread	Dimensions (mm)			Mass (kg)
d_1	d	Applicable Bearings	G	B_3	G_1	B_4	approx.
400	420	23084CAKE4 + AH3084	Tr 450 × 5	186	34	196	29
	420	24084CAK30E4 + AH24084	Tr 440 × 5	230	30	252	29.8
	420	23184CAKE4 + AH3184	Tr 460 × 5	266	40	276	46.5
	420	24184CAK30E4 + AH24184	Tr 440 × 5	310	30	332	41.4
420	420	23284CAKE4 + AH3284	Tr 460 × 5	321	46	331	59
	440	23088CAKE4 + AHX3088	Tr 470 × 5	194	35	205	42
	440	24088CAK30E4 + AH24088	Tr 460 × 5	242	30	264	33
	440	23188CAKE4 + AHX3188	Tr 480 × 5	270	42	281	50
440	440	24188CAK30E4 + AH24188	Tr 460 × 5	310	30	332	43.5
	440	23288CAKE4 + AHX3288	Tr 480 × 5	330	48	341	64
	460	23092CAKE4 + AHX3092	Tr 490 × 5	202	37	213	46
	460	24092CAK30E4 + AH24092	Tr 480 × 5	250	32	273	35.9
460	460	23192CAKE4 + AHX3192	Tr 510 × 6	285	43	296	58
	460	24192CAK30E4 + AH24192	Tr 480 × 5	332	32	355	49.7
	460	23292CAKE4 + AHX3292	Tr 510 × 6	349	50	360	74.5
	480	23096CAKE4 + AHX3096	Tr 520 × 6	205	38	217	51
480	480	24096CAK30E4 + AH24096	Tr 500 × 5	250	32	273	37.5
	480	23196CAKE4 + AHX3196	Tr 530 × 6	295	45	307	63
	480	24196CAK30E4 + AH24196	Tr 500 × 5	340	32	363	53
	480	23296CAKE4 + AHX3296	Tr 530 × 6	364	52	376	82
480	500	230/500CAKE4 + AHX30/500	Tr 540 × 6	209	40	221	54.5
	500	240/500CAK30E4 + AH240/500	Tr 530 × 6	253	35	276	41.9
	500	231/500CAKE4 + AHX31/500	Tr 550 × 6	313	47	325	71
	500	241/500CAK30E4 + AH241/500	Tr 530 × 6	360	35	383	61.2
	500	232/500CAKE4 + AHX32/500	Tr 550 × 6	393	54	405	94.5

Sleeves

Nuts for Rolling Bearings

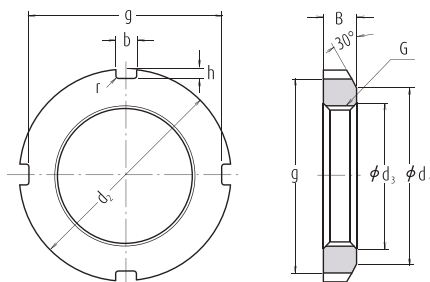
(For Adapters and Shafts)



Nut with Washer

Units : mm

Nominal Numbers	Nut Series AN										Reference		
	Screw Threads	Basic Dimensions								Mass (kg)	Adapter (1) Sleeve Bore Dia. Numbers	Washer Numbers	Shaft Dia.
	G	d ₂	d ₁	g	b	h	d ₃	B	r max.	approx.			
AN 02	M 15×1	25	21	21	4	2	15.5	5	0.4	0.010	—	AW 02 X	15
AN 03	M 17×1	28	24	24	4	2	17.5	5	0.4	0.013	—	AW 03 X	17
AN 04	M 20×1	32	26	28	4	2	20.5	6	0.4	0.019	04	AW 04 X	20
AN 05	M 25×1.5	38	32	34	5	2	25.8	7	0.4	0.025	05	AW 05 X	25
AN 06	M 30×1.5	45	38	41	5	2	30.8	7	0.4	0.043	06	AW 06 X	30
AN 07	M 35×1.5	52	44	48	5	2	35.8	8	0.4	0.053	07	AW 07 X	35
AN 08	M 40×1.5	58	50	53	6	2.5	40.8	9	0.5	0.085	08	AW 08 X	40
AN 09	M 45×1.5	65	56	60	6	2.5	45.8	10	0.5	0.119	09	AW 09 X	45
AN 10	M 50×1.5	70	61	65	6	2.5	50.8	11	0.5	0.148	10	AW 10 X	50
AN 11	M 55×2	75	67	69	7	3	56	11	0.5	0.158	11	AW 11 X	55
AN 12	M 60×2	80	73	74	7	3	61	11	0.5	0.174	12	AW 12 X	60
AN 13	M 65×2	85	79	79	7	3	66	12	0.5	0.203	13	AW 13 X	65
AN 14	M 70×2	92	85	85	8	3.5	71	12	0.5	0.242	14	AW 14 X	70
AN 15	M 75×2	98	90	91	8	3.5	76	13	0.5	0.287	15	AW 15 X	75
AN 16	M 80×2	105	95	98	8	3.5	81	15	0.6	0.395	16	AW 16 X	80
AN 17	M 85×2	110	102	103	8	3.5	86	16	0.6	0.45	17	AW 17 X	85
AN 18	M 90×2	120	108	112	10	4	91	16	0.6	0.555	18	AW 18 X	90
AN 19	M 95×2	125	113	117	10	4	96	17	0.6	0.66	19	AW 19 X	95
AN 20	M 100×2	130	120	122	10	4	101	18	0.6	0.70	20	AW 20 X	100
AN 21	M 105×2	140	126	130	12	5	106	18	0.7	0.845	21	AW 21 X	105
AN 22	M 110×2	145	133	135	12	5	111	19	0.7	0.965	22	AW 22 X	110
AN 23	M 115×2	150	137	140	12	5	116	19	0.7	1.01	—	AW 23 X	115
AN 24	M 120×2	155	138	145	12	5	121	20	0.7	1.08	24	AW 24 X	120
AN 25	M 125×2	160	148	150	12	5	126	21	0.7	1.19	—	AW 25 X	125



Nut with Washer

Units : mm

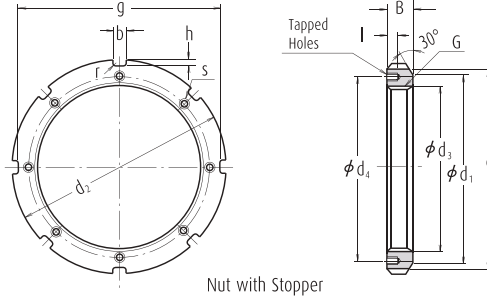
Nominal Numbers	Nut Series AN										Reference		
	Screw Threads	Basic Dimensions								Mass (kg)	Adapter (1) Sleeve Bore Dia. Numbers	Washer Numbers	Shaft Dia.
	G	d ₂	d ₁	g	b	h	d ₃	B	r max.	approx.			
AN 26	M 130×2	165	149	155	12	5	131	21	0.7	1.25	26	AW 26	130
AN 27	M 135×2	175	160	163	14	6	136	22	0.7	1.55	—	AW 27	135
AN 28	M 140×2	180	160	168	14	6	141	22	0.7	1.56	28	AW 28	140
AN 29	M 145×2	190	172	178	14	6	146	24	0.7	2.0	—	AW 29	145
AN 30	M 150×2	195	171	183	14	6	151	24	0.7	2.03	30	AW 30	150
AN 31	M 155×3	200	182	186	16	7	156.5	25	0.7	2.21	—	—	—
AN 32	M 160×3	210	182	196	16	7	161.5	25	0.7	2.59	32	AW 32	160
AN 33	M 165×3	210	193	196	16	7	166.5	26	0.7	2.43	—	—	—
AN 34	M 170×3	220	193	206	16	7	171.5	26	0.7	2.8	34	AW 34	170
AN 36	M 180×3	230	203	214	18	8	181.5	27	0.7	3.05	36	AW 36	180
AN 38	M 190×3	240	214	224	18	8	191.5	28	0.7	3.4	38	AW 38	190
AN 40	M 200×3	250	226	234	18	8	201.5	29	0.7	3.7	40	AW 40	200
Nut Series ANL													
ANL 24	M 120×2	145	133	135	12	5	121	20	0.7	0.78	24	AWL 24	120
ANL 26	M 130×2	155	143	145	12	5	131	21	0.7	0.88	26	AWL 26	130
ANL 28	M 140×2	165	151	153	14	6	141	22	0.7	0.99	28	AWL 28	140
ANL 30	M 150×2	180	164	168	14	6	151	24	0.7	1.38	30	AWL 30	150
ANL 32	M 160×3	190	174	176	16	7	161.5	25	0.7	1.56	32	AWL 32	160
ANL 34	M 170×3	200	184	186	16	7	171.5	26	0.7	1.72	34	AWL 34	170
ANL 36	M 180×3	210	192	194	18	8	181.5	27	0.7	1.95	36	AWL 36	180
ANL 38	M 190×3	220	202	204	18	8	191.5	28	0.7	2.08	38	AWL 38	190
ANL 40	M 200×3	240	218	224	18	8	201.5	29	0.7	2.98	40	AWL 40	200

Sleeves



Nuts for Rolling Bearings

(For Adapters and Shafts)

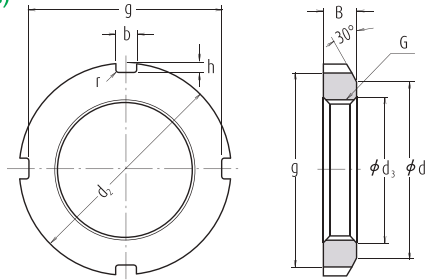


Nut with Stopper

Units : mm

Nominal Numbers	Nut Series AN												Reference			
	Screw Threads	Basic Dimensions								Tapped Holes		Mass (kg) approx.	Adapter (1) Sleeve Bore Dia. Numbers	Stopper Numbers	Shaft Dia.	
		G	d ₂	d ₁	g	b	h	d ₃	B	r max.	Screw Threads (S)					d ₄
AN 44	Tr 220×4	280	250	260	20	10	222	32	0.8	15	M 8×1.25	238	5.2	44	AL 44	220
AN 48	Tr 240×4	300	270	280	20	10	242	34	0.8	15	M 8×1.25	258	5.95	48	AL 44	240
AN 52	Tr 260×4	330	300	306	24	12	262	36	0.8	18	M 10×1.5	281	8.05	52	AL 52	260
AN 56	Tr 280×4	350	320	326	24	12	282	38	0.8	18	M 10×1.5	301	9.05	56	AL 52	280
AN 60	Tr 300×4	380	340	356	24	12	302	40	0.8	18	M 10×1.5	326	11.8	60	AL 60	300
AN 64	Tr 320×5	400	360	376	24	12	322.5	42	0.8	18	M 10×1.5	345	13.1	64	AL 64	320
AN 68	Tr 340×5	440	400	410	28	15	342.5	55	1	21	M 12×1.75	372	23.1	68	AL 68	340
AN 72	Tr 360×5	460	420	430	28	15	362.5	58	1	21	M 12×1.75	392	25.1	72	AL 68	360
AN 76	Tr 380×5	490	450	454	32	18	382.5	60	1	21	M 12×1.75	414	31	76	AL 76	380
AN 80	Tr 400×5	520	470	484	32	18	402.5	62	1	27	M 16×2	439	37	80	AL 80	400
AN 84	Tr 420×5	540	490	504	32	18	422.5	70	1	27	M 16×2	459	43.5	84	AL 80	420
AN 88	Tr 440×5	560	510	520	36	20	442.5	70	1	27	M 16×2	477	45	88	AL 88	440
AN 92	Tr 460×5	580	540	540	36	20	462.5	75	1	27	M 16×2	497	50.5	92	AL 88	460
AN 96	Tr 480×5	620	560	580	36	20	482.5	75	1	27	M 16×2	527	62	96	AL 96	480
AN 100	Tr 500×5	630	580	584	40	23	502.5	80	1	27	M 16×2	539	63.5	/500	AL 100	500
Nut Series ANL																
ANL 44	Tr 220×4	260	242	242	20	9	222	30	0.8	12	M 6×1	229	3.1	44	ALL 44	220
ANL 48	Tr 240×4	290	270	270	20	10	242	34	0.8	15	M 8×1.25	253	5.15	48	ALL 48	240
ANL 52	Tr 260×4	310	290	290	20	10	262	34	0.8	15	M 8×1.25	273	5.65	52	ALL 48	260
ANL 56	Tr 280×4	330	310	310	24	10	282	38	0.8	15	M 8×1.25	293	6.8	56	ALL 56	280
ANL 60	Tr 300×4	360	336	336	24	12	302	42	0.8	15	M 8×1.25	316	9.6	60	ALL 60	300
ANL 64	Tr 320×5	380	356	356	24	12	322.5	42	0.8	15	M 8×1.25	335	9.95	64	ALL 64	320
ANL 68	Tr 340×5	400	376	376	24	12	342.5	45	1	15	M 8×1.25	355	11.7	68	ALL 64	340
ANL 72	Tr 360×5	420	394	394	28	13	362.5	45	1	15	M 8×1.25	374	12	72	ALL 72	360
ANL 76	Tr 380×5	450	422	422	28	14	382.5	48	1	18	M 10×1.5	398	14.9	76	ALL 76	380
ANL 80	Tr 400×5	470	442	442	28	14	402.5	52	1	18	M 10×1.5	418	16.9	80	ALL 76	400
ANL 84	Tr 420×5	490	462	462	32	14	422.5	52	1	18	M 10×1.5	438	17.4	84	ALL 84	420
ANL 88	Tr 440×5	520	490	490	32	15	442.5	60	1	21	M 12×1.75	462	26.2	88	ALL 88	440
ANL 92	Tr 460×5	540	510	510	32	15	462.5	60	1	21	M 12×1.75	482	28	92	ALL 88	460
ANL 96	Tr 480×5	560	530	530	36	15	482.5	60	1	21	M 12×1.75	502	29.5	96	ALL 96	480
ANL 100	Tr 500×5	580	550	550	36	15	502.5	68	1	21	M 12×1.75	522	33.5	/500	ALL 96	500

(For Withdrawal Sleeves)



Units : mm

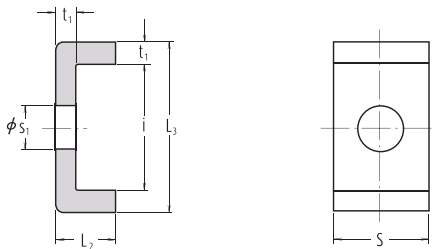
Nominal Numbers	Nut Series HN										Reference			
	Screw Threads	Basic Dimensions								Mass (kg) approx.	Withdrawal Sleeve Numbers			
		G	d ₂	d ₁	g	b	h	d ₃	B	r max.	AH 31	AH 22	AH 32	AH 23
HN 42	Tr 210×4	270	238	250	20	10	212	30	0.8	4.75	AH 3138	AH 2238	AH 3238	AH 2338
HN 44	Tr 220×4	280	250	260	20	10	222	32	0.8	5.35	AH 3140	AH 2240	AH 3240	AH 2340
HN 48	Tr 240×4	300	270	280	20	10	242	34	0.8	6.2	AH 3144	AH 2244	—	AH 2344
HN 52	Tr 260×4	330	300	306	24	12	262	36	0.8	8.55	AH 3148	AH 2248	—	AH 2348
HN 58	Tr 290×4	370	330	346	24	12	292	40	0.8	11.8	AH 3152	AH 2252	—	AH 2352
HN 62	Tr 310×5	390	350	366	24	12	312.5	42	0.8	13.4	AH 3156	AH 2256	—	AH 2356
HN 66	Tr 330×5	420	380	390	28	15	332.5	52	1	20.4	AH 3160	AH 2260	AH 3260	—
HN 70	Tr 350×5	450	410	420	28	15	352.5	55	1	25.2	AH 3164	AH 2264	AH 3264	—
HN 74	Tr 370×5	470	430	440	28	15	372.5	58	1	28.2	AH 3168	—	AH 3268	—
HN 80	Tr 400×5	520	470	484	32	18	402.5	62	1	40	AH 3172	—	AH 3272	—
HN 84	Tr 420×5	540	490	504	32	18	422.5	70	1	46.9	AH 3176	—	AH 3276	—
HN 88	Tr 440×5	560	510	520	36	20	442.5	70	1	48.5	AH 3180	—	AH 3280	—
HN 92	Tr 460×5	580	540	540	36	20	462.5	75	1	55	AH 3184	—	AH 3284	—
HN 96	Tr 480×5	620	560	580	36	20	482.5	75	1	67	AHX 3188	—	AHX 3288	—
HN 102	Tr 510×6	650	590	604	40	23	513	80	1	75	AHX 3192	—	AHX 3292	—
HN 106	Tr 530×6	670	610	624	40	23	533	80	1	78	AHX 3196	—	AHX 3296	—
HN 110	Tr 550×6	700	640	654	40	23	553	80	1	92.5	AHX 31/500	—	AHX 32/500	—
Nut Series HNL											AH 30	AH 2		
HNL 41	Tr 205×4	250	232	234	18	8	207	30	0.8	3.45	AH 3038	AH 238		
HNL 43	Tr 215×4	260	242	242	20	9	217	30	0.8	3.7	AH 3040	AH 240		
HNL 47	Tr 235×4	280	262	262	20	9	237	34	0.8	4.6	AH 3044	AH 244		
HNL 52	Tr 260×4	310	290	290	20	10	262	34	0.8	5.8	AH 3048	AH 248		
HNL 56	Tr 280×4	330	310	310	24	10	282	38	0.8	6.7	AH 3052	AH 252		
HNL 60	Tr 300×4	360	336	336	24	12	302	42	0.8	9.6	AH 3056	AH 256		
HNL 64	Tr 320×5	380	356	356	24	12	322.5	42	1	10.3	AH 3060	—		
HNL 69	Tr 345×5	410	384	384	28	13	347.5	45	1	11.5	AH 3064	—		
HNL 73	Tr 365×5	430	404	404	28	13	367.5	48	1	14.2	AH 3068	—		
HNL 77	Tr 385×5	450	422	422	28	14	387.5	48	1	15	AH 3072	—		
HNL 82	Tr 410×5	480	452	452	32	14	412.5	52	1	19	AH 3076	—		
HNL 86	Tr 430×5	500	472	472	32	14	432.5	52	1	19.8	AH 3080	—		
HNL 90	Tr 450×5	520	490	490	32	15	452.5	60	1	23.8	AH 3084	—		
HNL 94	Tr 470×5	540	510	510	32	15	472.5	60	1	25	AHX 3088	—		
HNL 98	Tr 490×5	580	550	550	36	15	492.5	60	1	34	AHX 3092	—		
HNL 104	Tr 520×6	600	570	570	36	15	523	68	1	37	AHX 3096	—		
HNL 108	Tr 540×6	630	590	590	40	20	543	68	1	43.5	AHX 30/500	—		

Sleeves

Nuts for Rolling Bearings

(Combination of Withdrawal Sleeves and Nuts)

Nominal Numbers	Reference						
	Withdrawal Sleeve Numbers						
	AH 30	AH 31	AH 2	AH 22	AH 32	AH 3	AH 23
AN 09	—	—	AH 208	—	—	AH 308	AH 2308
AN 10	—	—	AH 209	—	—	AH 309	AH 2309
AN 11	—	—	AH 210	—	—	AHX 310	AHX 2310
AN 12	—	—	AH 211	—	—	AHX 311	AHX 2311
AN 13	—	—	AH 212	—	—	AHX 312	AHX 2312
AN 14	—	—	—	—	—	—	—
AN 15	—	—	AH 213	—	—	AH 313	AH 2313
AN 16	—	—	AH 214	—	—	AH 314	AHX 2314
AN 17	—	—	AH 215	—	—	AH 315	AHX 2315
AN 18	—	—	AH 216	—	—	AH 316	AHX 2316
AN 19	—	—	AH 217	—	—	AHX 317	AHX 2317
AN 20	—	—	AH 218	—	AHX 3218	AHX 318	AHX 2318
AN 21	—	—	AH 219	—	—	AHX 319	AHX 2319
AN 22	—	—	AH 220	—	AHX 3220	AHX 320	AHX 2320
AN 23	—	—	AH 221	—	—	AHX 321	—
AN 24	—	AHX 3122	AH 222	—	—	AHX 322	—
AN 25	—	—	—	—	AHX 3222	—	AHX 2322
AN 26	AHX 3024	AHX 3124	AH 224	—	—	AHX 324	—
AN 27	—	—	—	—	AHX 3224	—	AHX 2324
AN 28	AHX 3026	AHX 3126	AH 226	—	—	AHX 326	—
AN 29	—	—	—	—	AHX 3226	—	AHX 2326
AN 30	AHX 3028	AHX 3128	AH 228	—	—	AHX 328	—
AN 31	—	—	—	—	AHX 3228	—	AHX 2328
AN 32	AHX 3030	—	AH 230	—	—	—	—
AN 33	—	AHX 3130	—	—	AHX 3230	AHX 330	AHX 2330
AN 34	AH 3032	—	AH 232	—	—	—	—
AN 36	AH 3034	AH 3132	AH 234	—	AH 3232	AH 332	AH 2332
AN 38	AH 3036	AH 3134	AH 236	—	AH 3234	AH 334	AH 2334
AN 40	—	AH 3136	—	AH 2236	AH 3236	—	AH 2336

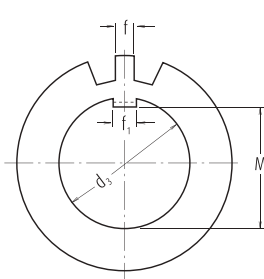


Units : mm

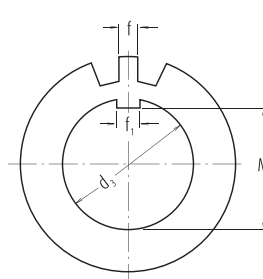
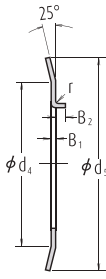
Nominal Numbers	Stopper Series AL							Reference
	Basic Dimensions						Mass (kg) per 100 pcs	Nut Numbers
	t ₁	S	L ₂	s ₁	i	L ₃	approx.	
AL 44	4	20	12	9	22.5	30.5	2.6	AN 44, AN 48
AL 52	4	24	12	12	25.5	33.5	3.4	AN 52, AN 56
AL 60	4	24	12	12	30.5	38.5	3.8	AN 60
AL 64	5	24	15	12	31	41	5.35	AN 64
AL 68	5	28	15	14	38	48	6.65	AN 68, AN 72
AL 76	5	32	15	14	40	50	7.95	AN 76
AL 80	5	32	15	18	45	55	8.2	AN 80, AN 84
AL 88	5	36	15	18	43	53	9.0	AN 88, AN 92
AL 96	5	36	15	18	53	63	10.4	AN 96
AL 100	5	40	15	18	45	55	10.5	AN 100
Stopper Series ALL								
ALL 44	4	20	12	7	13.5	21.5	2.12	ANL 44
ALL 48	4	20	12	9	17.5	25.5	2.29	ANL 48, ANL 52
ALL 56	4	24	12	9	17.5	25.5	2.92	ANL 56
ALL 60	4	24	12	9	20.5	28.5	3.15	ANL 60
ALL 64	5	24	15	9	21	31	4.55	ANL 64, ANL 68
ALL 72	5	28	15	9	20	30	5.05	ANL 72
ALL 76	5	28	15	12	24	34	5.3	ANL 76, ANL 80
ALL 84	5	32	15	12	24	34	6.1	ANL 84
ALL 88	5	32	15	14	28	38	6.45	ANL 88, ANL 92
ALL 96	5	36	15	14	28	38	7.3	ANL 96, ANL 100



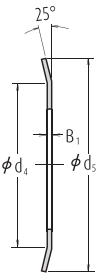
Lock-Washers for Rolling Bearings



Bent-Tab



Straight-Tab

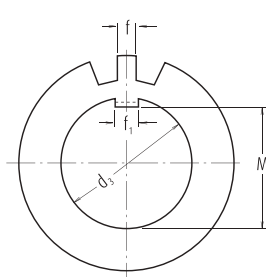


Units : mm

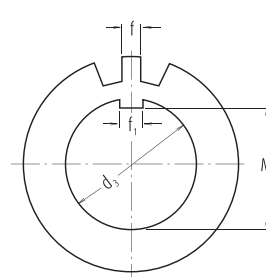
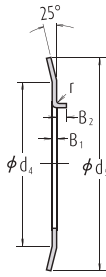
Nominal Numbers		Lock-washer Series AW											Reference		
		Basic Dimensions									No. of Teeth	Mass (kg) per 100 pcs approx.	Adapter (1) Sleeve Bore Dia. Numbers	Nut Numbers	Shaft Dia.
Bent-Tab	Straight-Tab	d ₃	M	f ₁	B ₁	f	d ₄	d ₅	Bent-Tab r	B ₂					
AW 02	AW 02 X	15	13.5	4	1	4	21	28	1	2.5	13	0.253	—	AN 02	15
AW 03	AW 03 X	17	15.5	4	1	4	24	32	1	2.5	13	0.315	—	AN 03	17
AW 04	AW 04 X	20	18.5	4	1	4	26	36	1	2.5	13	0.35	04	AN 04	20
AW 05	AW 05 X	25	23	5	1.2	5	32	42	1	2.5	13	0.64	05	AN 05	25
AW 06	AW 06 X	30	27.5	5	1.2	5	38	49	1	2.5	13	0.78	06	AN 06	30
AW 07	AW 07 X	35	32.5	6	1.2	5	44	57	1	2.5	15	1.04	07	AN 07	35
AW 08	AW 08 X	40	37.5	6	1.2	6	50	62	1	2.5	15	1.23	08	AN 08	40
AW 09	AW 09 X	45	42.5	6	1.2	6	56	69	1	2.5	17	1.52	09	AN 09	45
AW 10	AW 10 X	50	47.5	6	1.2	6	61	74	1	2.5	17	1.6	10	AN 10	50
AW 11	AW 11 X	55	52.5	8	1.2	7	67	81	1	4	17	1.96	11	AN 11	55
AW 12	AW 12 X	60	57.5	8	1.5	7	73	86	1.2	4	17	2.53	12	AN 12	60
AW 13	AW 13 X	65	62.5	8	1.5	7	79	92	1.2	4	19	2.9	13	AN 13	65
AW 14	AW 14 X	70	66.5	8	1.5	8	85	98	1.2	4	19	3.35	14	AN 14	70
AW 15	AW 15 X	75	71.5	8	1.5	8	90	104	1.2	4	19	3.55	15	AN 15	75
AW 16	AW 16 X	80	76.5	10	1.8	8	95	112	1.2	4	19	4.65	16	AN 16	80
AW 17	AW 17 X	85	81.5	10	1.8	8	102	119	1.2	4	19	5.25	17	AN 17	85
AW 18	AW 18 X	90	86.5	10	1.8	10	108	126	1.2	4	19	6.25	18	AN 18	90
AW 19	AW 19 X	95	91.5	10	1.8	10	113	133	1.2	4	19	6.7	19	AN 19	95
AW 20	AW 20 X	100	96.5	12	1.8	10	120	142	1.2	6	19	7.65	20	AN 20	100
AW 21	AW 21 X	105	100.5	12	1.8	12	126	145	1.2	6	19	8.25	21	AN 21	105
AW 22	AW 22 X	110	105.5	12	1.8	12	133	154	1.2	6	19	9.4	22	AN 22	110
AW 23	AW 23 X	115	110.5	12	2	12	137	159	1.5	6	19	10.8	—	AN 23	115
AW 24	AW 24 X	120	115	14	2	12	138	164	1.5	6	19	10.5	24	AN 24	120
AW 25	AW 25 X	125	120	14	2	12	148	170	1.5	6	19	11.8	—	AN 25	125

Note (1) Applicable to adapter sleeve Series A31, A2, A3, and A23.

Remark Lock-washers with straight tabs shall be used with adapter sleeves having narrow slits. For adapter sleeves having wide slits, either type of lock-washer may be used.



Bent-Tab



Straight-Tab

Units : mm

Nominal Numbers		Lock-washer Series AW										Reference				
		Basic Dimensions										No. of Teeth	Mass (kg) per 100 pcs approx.	Adapter (1) Sleeve Bore Dia. Numbers	Nut Numbers	Shaft Dia.
Bent-Tab	Straight-Tab	d ₃	M	f ₁	B ₁	f	d ₄	d ₅	Bent-Tab r	B ₂						
AW 26	AW 26 X	130	125	14	2	12	149	175	1.5	6	19	11.3	26	AN 26	130	
AW 27	AW 27 X	135	130	14	2	14	160	185	1.5	6	19	14.4	—	AN 27	135	
AW 28	AW 28 X	140	135	16	2	14	160	192	1.5	8	19	14.2	28	AN 28	140	
AW 29	AW 29 X	145	140	16	2	14	172	202	1.5	8	19	16.8	—	AN 29	145	
AW 30	AW 30 X	150	145	16	2	14	171	205	1.5	8	19	15.9	30	AN 30	150	
AW 31	AW 31 X	155	147.5	16	2.5	16	182	212	1.5	8	19	20.9	—	AN 31	155	
AW 32	AW 32 X	160	154	18	2.5	16	182	217	1.5	8	19	22.2	32	AN 32	160	
AW 33	AW 33 X	165	157.5	18	2.5	16	193	222	1.5	8	19	24.1	—	AN 33	165	
AW 34	AW 34 X	170	164	18	2.5	16	193	232	1.5	8	19	24.7	34	AN 34	170	
AW 36	AW 36 X	180	174	20	2.5	18	203	242	1.5	8	19	26.8	36	AN 36	180	
AW 38	AW 38 X	190	184	20	2.5	18	214	252	1.5	8	19	27.8	38	AN 38	190	
AW 40	AW 40 X	200	194	20	2.5	18	226	262	1.5	8	19	29.3	40	AN 40	200	
Washer Series AWL																
AWL 24	AWL 24 X	120	115	14	2	12	133	155	1.5	6	19	7.7	24	ANL 24	120	
AWL 26	AWL 26 X	130	125	14	2	12	143	165	1.5	6	19	8.7	26	ANL 26	130	
AWL 28	AWL 28 X	140	135	16	2	14	151	175	1.5	8	19	10.9	28	ANL 28	140	
AWL 30	AWL 30 X	150	145	16	2	14	164	190	1.5	8	19	11.3	30	ANL 30	150	
AWL 32	AWL 32 X	160	154	18	2.5	16	174	200	1.5	8	19	16.2	32	ANL 32	160	
AWL 34	AWL 34 X	170	164	18	2.5	16	184	210	1.5	8	19	19	34	ANL 34	170	
AWL 36	AWL 36 X	180	174	20	2.5	18	192	220	1.5	8	19	18	36	ANL 36	180	
AWL 38	AWL 38 X	190	184	20	2.5	18	202	230	1.5	8	19	20.5	38	ANL 38	190	
AWL 40	AWL 40 X	200	194	20	2.5	18	218	250	1.5	8	19	21.4	40	ANL 40	200	

Note (1) Series AW is applicable to adapter sleeve Series A31 and A23.
Series AWL is applicable to adapter sleeve Series A30.

Remark Lock-washers with straight tabs shall be used with adapter sleeves having narrow slits. For adapter sleeves having wide slits, either type of lock-washer may be used.



