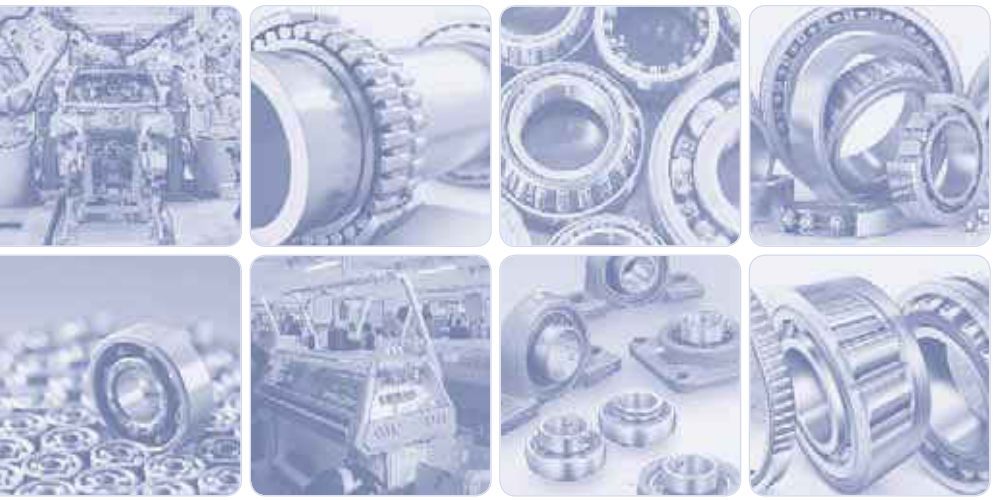
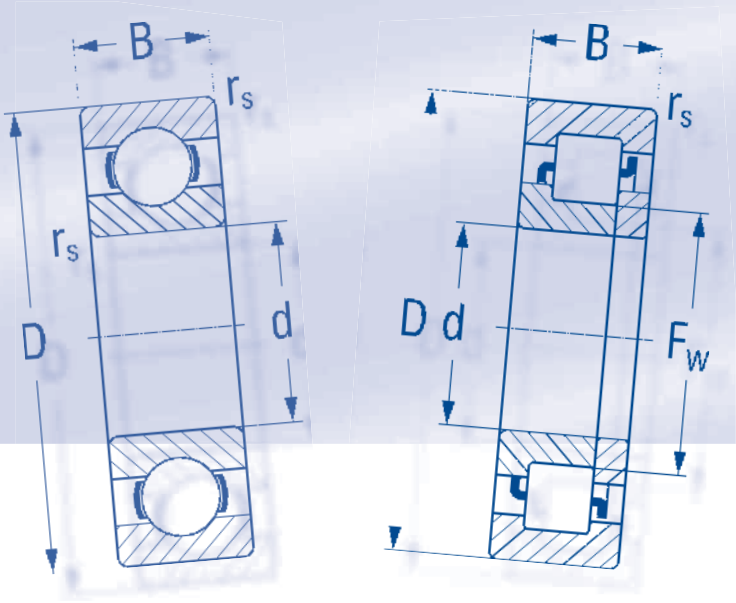
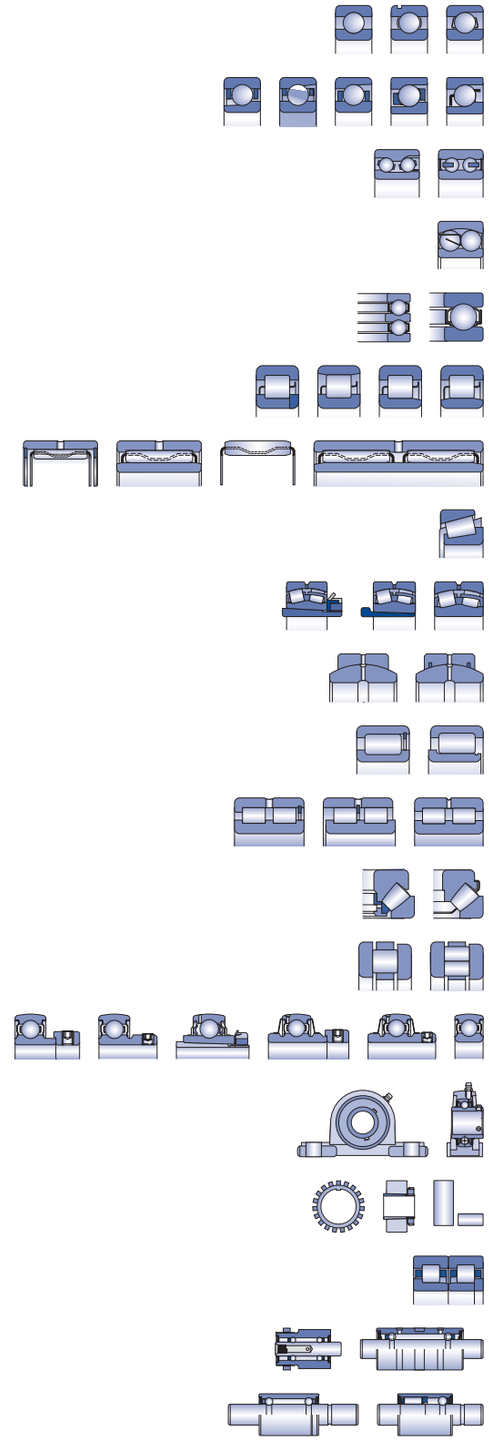




Rolling Bearings

Content



Single Row Deep Groove Ball Bearings

Single Row Angular Contact Ball Bearings

Double Row Angular Contact Ball Bearings

Double Row Self-Aligning Ball Bearings

Thrust ball bearings

Single Row Cylindrical Roller Bearings

Needle Roller Bearings

Single Row Tapered Roller Bearings

Double - Row Spherical Roller Bearings

Spherical Plain Radial Bearings

Single-row full-complement cylindrical roller bearings

Double-row full-complement cylindrical roller bearings

Spherical roller thrust bearings

Cylindrical roller thrust bearings

Insert bearings

Housing units

Accessories

Special Cylindrical Roller Bearings for Railway Vehicles

Special Bearings for Textile Machines and Measuring Instruments

Special Bearings for Water Pumps of Combustion Engines

Foreword

Publication Rolling Bearings shows a survey of standardized rolling bearings and accessories being produced and delivered under designation KINEX.

In the design, production, storage and sales of the rolling bearings international standards ISO and national standards are used.

Technical section of the publication contains the most important facts concerning calculations, the design data about the arrangement design, lubrication, as well as mounting and dismounting rolling bearings. The produced standardized rolling bearings and accessories in the basic design and in the main applications from the basic design, as e.g. bearings with tapered bore, shielded bearings or bearings with snap ring groove on outer ring, etc., are shown in the ”Rolling Bearings Dimension Tables“ part.

1. Basic Calculations

Required bearing size is determined by the action of the external forces and according to the bearing required life and its reliability in the arrangement. Magnitude, direction and kind of load acting on the bearing, as well as the operating speed, are decisive for the type and bearing size selection. Other special or important conditions of each individual arrangement must be taken into account, e.g. operating temperature, limited space availability, simplicity of mounting, lubrication requirements, sealing, etc., and all of these can influence selection of the most suitable bearing. For given concrete conditions various bearing types can meet those requirements.

From the point of view of outer load acting and the bearing function in respective arrangement or unit we distinguish two types of the rolling bearing load in the bearing technique:

- when rolling bearing rings are relatively rotating against each other and bearing is under outer load (which is valid for most bearings), this is called dynamic bearing load,
- when rolling bearing rings either do not move against each other or they move only very slowly, the bearing carries an oscillating motion or the outer load acts for a shorter time than one bearing revolution, this is called static bearing load.

For bearing safety calculation, the life limited by bearing breakdown due to material fatigue of a bearing component is decisive in the first case. In the second case there are durable deformations of functional surfaces on the contact surfaces of rolling elements and raceways.

1.1 Dynamic Load

1.1.1 Basic Dynamic Load Rating

Basic dynamic load rating is a constant invariable load which the bearing can theoretically carry at the nominal life of one million revolutions.

For radial bearings, the radial dynamic load rating C_r refers to constant load. For thrust bearings, the axial dynamic load rating C_a refers to unvariable, purely axial load, acting centrically.

Basic dynamic load ratings C_r and C_a, whose size depends on bearing dimensions, rolling element number, material and bearing design, are shown for each bearing in the dimension tables. Values of the basic dynamic load ratings were stated according to the standard ISO 281.These values are verified in testing equipments and by operation results.

1.1.2 Life

Rolling bearing life is defined as the number of revolution carried out by one bearing ring against the other ring, until the first signs of material fatigue occur on one ring or the rolling element.

Great differences in life can occur among bearings of the same type, that is why according to the standard ISO 281 the basic life is used as the basis for life calculation, i.e. life shown by the operation time attained or exceeded by a bearing group at 90% reliability.

Life Equation

Nominal bearing life is mathematically defined by the life equation valid for all bearing types.

$$L_{10} = \left(\frac{C}{P}\right)^p \quad \text{or} \quad \frac{C}{P} 5 \left(L_{10}\right)^{\frac{1}{p}}$$

L_{10} - nominal life [10^6rev]
C - basic dynamic load rating (values C_r,C_a are given in the dimension tables) [kN]
P - equivalent dynamic bearing load (equations for P_r, P_a calculations are in section 1.1.3 and at each design group of bearings) [kN]
p - exponent for ball bearings p = 3 for cylindrical, needle-, spherical- and tapered roller bearings $p = \frac{10}{3}$

C/P ratio in dependence on life L_{10} **Table 1**

For ball bearings				For cylindrical roller, needle roller, spherical roller and tapered roller bearings			
Life L_{10} 10^6 rev	$\frac{C}{P}$	Life L_{10} 10^6 rev	$\frac{C}{P}$	Life L_{10} 10^6 rev	$\frac{C}{P}$	Life L_{10} 10^6 rev	$\frac{C}{P}$
0.5	0.793	600	8.43	0.5	0.812	600	6.81
0.75	0.909	650	8.66	0.75	0.917	650	6.98
1	1	700	8.88	1	1	700	7.14
1.5	1.14	750	9.09	1.5	1.13	750	7.29
2	1.26	800	9.28	2	1.24	800	7.43
3	1.44	850	9.47	3	1.39	850	7.56
4	1.59	900	9.65	4	1.52	900	7.70
5	1.71	950	9.83	5	1.62	950	7.82
6	1.82	1 000	10	6	1.71	1 000	7.94
8	2	1 100	10.3	8	1.87	1 100	8.17
10	2.15	1 200	10.6	10	2	1 200	8.39
12	2.29	1 300	10.9	12	2.11	1 300	8.59
14	2.41	1 400	11.2	14	2.21	1 400	8.79
16	2.52	1 500	11.4	16	2.30	1 500	8.97
18	2.62	1 600	11.7	18	2.38	1 600	9.15
20	2.71	1 700	11.9	20	2.46	1 700	9.31
25	2.92	1 800	12.2	25	2.63	1 800	9.48
30	3.11	1 900	12.4	30	2.77	1 900	9.63
35	3.27	2 000	12.6	35	2.91	2 000	9.78
40	3.42	2 200	13	40	3.02	2 200	10.1
45	3.56	2 400	13.4	45	3.13	2 400	10.3
50	3.68	2 600	13.8	50	3.23	2 600	10.6
60	3.91	2 800	14.1	60	3.42	2 800	10.8
70	4.12	3 000	14.4	70	3.58	3 000	11
80	4.31	3 500	15.2	80	3.72	3 500	11.5
90	4.48	4 000	15.9	90	3.86	4 000	12
100	4.64	4 500	16.5	100	3.98	4 500	12.5
120	4.93	5 000	17.1	120	4.20	5 000	12.9
140	5.19	5 500	17.7	140	4.40	5 500	13.2
160	5.43	6 000	18.2	160	4.58	6 000	13.6
180	5.65	7 000	19.1	180	4.75	7 000	14.2
200	5.85	8 000	20	200	4.90	8 000	14.8
250	6.30	9 000	20.8	250	5.24	9 000	15.4
300	6.69	10 000	21.5	300	5.54	10 000	15.8
350	7.05	12 500	23.2	350	5.80	12 500	16.9
400	7.37	15 000	24.7	400	6.03	15 000	17.9
450	7.66	17 500	26	450	6.25	17 500	18.7
500	7.94	20 000	27.1	500	6.45	20 000	19.5
550	8.19	25 000	29.2	550	6.64	25 000	20.9

Table 1 shows dependence of the life L_{10} in million revolutions and respective ratio C/P.

If the rotational speed does not change, the revised life calculation expressing the nominal life in operation hours can be used:

$$L_{10h} = \left(\frac{C}{P}\right)^p \cdot \frac{10^6}{60 \cdot n}$$

h - nominal life [h]
n - rotational speed [min^{-1}]

C/P dependence from the nominal life L_{10} and the rotational speed n is shown for ball bearings in Table 2, for cylindrical roller, needle roller, spherical roller and tapered roller bearings in Table 3.

C/P ratio in dependence on life L_{10} and rotational speed n for ball bearings

Table 2

Life	Rotational speed n [min^{-1}]													
L_{10h}	10	16	25	40	63	100	125	160	200	250	320	400	500	630
h														
100	-	-	-	-	-	-	-	-	1.06	1.15	1.24	1.34	1.45	1.56
500	-	-	-	1.06	1.24	1.45	1.56	1.68	1.82	1.96	2.12	2.29	2.47	2.67
1 000	-	-	1.15	1.34	1.56	1.82	1.96	2.12	2.29	2.47	2.67	2.88	3.11	3.36
1 250	-	1.06	1.24	1.45	1.68	1.96	2.12	2.29	2.47	2.67	2.88	3.11	3.36	3.63
1 600	-	1.15	1.34	1.56	1.82	2.12	2.29	2.47	2.67	2.88	3.11	3.36	3.63	3.91
2 000	1.06	1.24	1.45	1.68	1.96	2.29	2.47	2.67	2.88	3.11	3.36	3.63	3.91	4.23
2 500	1.15	1.34	1.56	1.82	2.12	2.47	2.67	2.88	3.11	3.36	3.63	3.91	4.23	4.56
3 200	1.24	1.45	1.68	1.96	2.29	2.67	2.88	3.11	3.36	3.63	3.91	4.23	4.56	4.93
4 000	1.34	1.56	1.82	2.12	2.47	2.88	3.11	3.36	3.63	3.91	4.23	4.56	4.93	5.32
5 000	1.45	1.68	1.96	2.29	2.67	3.11	3.36	3.63	3.91	4.23	4.56	4.93	5.32	5.75
6 300	1.56	1.82	2.12	2.47	2.88	3.36	3.63	3.91	4.23	4.56	4.93	5.32	5.75	6.20
8 000	1.68	1.96	2.29	2.67	3.11	3.63	3.91	4.23	4.56	4.93	5.32	5.75	6.20	6.70
10 000	1.82	2.12	2.47	2.88	3.36	3.91	4.23	4.56	4.93	5.32	5.75	6.20	6.70	7.23
12 500	1.96	2.29	2.67	3.11	3.36	4.23	4.56	4.93	5.32	5.75	6.20	6.70	7.23	7.81
16 000	2.12	2.47	2.88	3.36	3.91	4.56	4.93	5.23	5.75	6.20	6.70	7.23	7.81	8.43
20 000	2.29	2.67	3.11	3.63	4.23	4.93	5.32	5.75	6.20	6.70	7.23	7.81	8.43	9.11
25 000	2.47	2.88	3.36	3.91	4.56	5.32	5.75	6.20	6.70	7.23	7.81	8.43	9.11	9.83
32 000	2.67	3.11	3.63	4.23	4.93	5.75	6.20	6.70	7.23	7.81	8.43	9.11	9.83	10.60
40 000	2.88	3.36	3.91	4.56	5.32	6.20	6.70	7.23	7.81	8.43	9.11	9.83	10.60	11.50
50 000	3.11	3.63	4.23	4.93	5.75	6.70	7.23	7.81	8.43	9.11	9.83	10.60	11.50	12.40
63 000	3.36	3.91	4.56	5.32	6.20	7.23	7.81	8.43	9.11	9.83	10.60	11.50	12.40	13.40
80 000	3.36	4.23	4.93	5.75	6.70	7.81	8.43	9.11	9.83	10.60	11.50	12.40	13.40	14.50
100 000	3.91	4.56	5.32	6.20	7.23	8.43	9.11	9.83	10.6	11.50	12.40	13.40	14.50	15.60
200 000	4.93	5.75	6.70	7.81	9.11	10.60	11.50	12.40	13.40	14.50	15.60	16.80	18.20	19.60

Life	Rotational speed n [min^{-1}]													
L_{10h}	800	1000	1250	1600	2000	2500	3200	4000	5000	6300	8000	10000	12500	16000
h														
100	1.68	1.82	1.96	2.12	2.29	2.47	2.67	2.88	3.11	3.36	3.63	3.91	4.23	4.56
500	2.88	3.11	3.36	3.63	3.91	4.23	4.56	4.93	5.32	5.75	6.20	6.70	7.23	7.81
1 000	3.63	3.91	4.23	4.56	4.93	5.32	5.75	6.20	6.70	7.23	7.81	8.43	9.11	9.83
1 250	3.91	4.23	4.56	4.93	5.32	5.75	6.20	6.70	7.23	7.81	8.43	9.11	9.83	10.60
1 600	4.23	4.56	4.93	5.32	5.75	6.20	6.70	7.23	7.81	8.43	9.11	9.83	10.60	11.50
2 000	4.56	4.93	5.32	5.75	6.20	6.70	7.23	7.81	8.43	9.11	9.83	10.60	11.50	12.40
2 500	4.93	5.32	5.75	6.20	6.70	7.23	7.81	8.43	9.11	9.83	10.60	11.50	12.40	13.40
3 200	5.32	5.75	6.20	6.70	7.23	7.81	8.43	9.11	9.83	10.60	11.50	12.40	13.40	14.50
4 000	5.75	6.20	6.70	7.23	7.81	8.43	9.11	9.83	10.60	11.50	12.40	13.40	14.50	15.60
5 000	6.20	6.70	7.23	7.81	8.43	9.11	9.83	10.60	11.50	12.40	13.40	14.50	15.60	16.80
6 300	6.70	7.23	7.81	8.43	9.11	9.83	10.60	11.50	12.40	13.40	14.50	15.60	16.80	18.20
8 000	7.23	7.81	8.43	9.11	9.83	10.60	11.50	12.40	13.40	14.50	15.60	16.80	18.20	19.60
10 000	7.81	8.43	9.11	9.83	10.60	11.50	12.40	13.40	14.50	15.60	16.80	18.20	19.60	21.20
12 500	8.43	9.11	9.83	10.60	11.50	12.40	13.40	14.50	15.60	16.80	18.20	19.60	21.20	22.90
16 000	9.11	9.83	10.6	11.50	12.40	13.40	14.50	15.60	16.80	18.20	19.60	21.20	22.90	24.70
20 000	9.83	10.6	11.5	12.40	13.40	14.50	15.60	16.80	18.20	19.60	21.20	22.90	24.70	26.70
25 000	10.60	11.50	12.40	13.40	14.50	15.60	16.80	18.20	19.60	21.20	22.90	24.70	26.70	28.80
32 000	11.50	12.40	13.40	14.50	15.60	16.80	18.20	19.60	21.20	22.90	24.70	26.70	28.80	31.10
40 000	12.40	13.40	14.50	15.60	16.80	18.20	19.60	21.20	22.90	24.70	26.70	28.80	31.10	-
50 000	13.40	14.50	15.60	16.80	18.20	19.60	21.20	22.90	24.70	26.70	28.80	31.10	-	-
63 000	14.50	15.60	16.80	18.20	19.60	21.20	22.90	24.70	26.70	28.80	31.10	-	-	-
80 000	15.60	16.80	18.20	19.60	21.20	22.90	24.70	26.70	28.80	31.10	-	-	-	-
100 000	16.80	18.20	19.60	21.20	22.90	24.70	26.70	28.80	31.10	-	-	-	-	-
200 000	21.20	22.90	24.70	26.70	28.80	31.10	-	-	-	-	-	-	-	-

C/P ratio in dependence on life L_{10} and rotational speed n for cylindrical roller, spherical roller and tapered roller bearings

Table 3

Life	Rotational speed n [min^{-1}]													
L_{10h}	10	16	25	40	63	100	125	160	200	250	320	400	500	630
h														
100	-	-	-	-	-	-	-	-	1.05	1.1	1.21	1.30	1.39	1.49
500	-	-	-	1.05	1.21	1.39	1.49	1.60	1.71	1.83	1.97	2.11	2.26	2.42
1 000	-	-	1.13	1.30	1.49	1.71	1.83	1.97	2.11	2.26	2.42	2.59	2.78	2.97
1 250	-	1.05	1.21	1.39	1.60	1.83	1.97	2.11	2.26	2.42	2.59	2.78	2.97	3.19
1 600	-	1.13	1.30	1.49	1.71	1.97	2.11	2.26	2.42	2.59	2.78	2.97	3.19	3.42
2 000	1.05	1.21	1.39	1.60	1.83	2.11	2.26	2.42	2.59	2.78	2.97	3.19	3.42	3.66
2 500	1.13	1.30	1.49	1.71	1.97	2.26	2.42	2.59	2.78	2.97	3.19	3.42	3.66	3.92
3 200	1.21	1.39	1.60	1.83	2.11	2.42	2.59	2.78	2.97	3.19	3.42	3.66	3.92	4.20
4 000	1.30	1.49	1.71	1.97	2.26	2.59	2.78	2.97	3.19	3.42	3.66	3.92	4.20	4.50
5 000	1.39	1.60	1.83	2.11	2.42	2.78	2.97	3.19	3.42	3.66	3.92	4.20	4.50	4.82
6 300	1.49	1.71	1.97	2.26	2.59	2.97	3.19	3.42	3.66	3.92	4.20	4.50	4.82	5.17
8 000	1.60	1.83	2.11	2.42	2.78	3.19	3.42	3.66	3.92	4.20	4.50	4.82	5.17	5.54
10 000	1.71	1.97	2.26	2.59	2.97	3.42	3.66	3.92	4.20	4.50	4.82	5.17	5.54	5.94
12 500	1.83	2.11	2.42	2.78	3.19	3.66	3.92	4.20	4.50	4.82	5.17	5.54	5.94	6.36
16 000	1.97	2.26	2.59	2.97	3.42	3.92	4.20	4.50	4.82	5.17	5.54	5.94	6.36	6.81
20 000	2.11	2.42	2.78	3.19	3.66	4.20	4.50	4.82	5.17	5.54	5.94	6.36	6.81	7.30
25 000	2.26	2.59	2.97	3.42	3.92	4.50	4.82	5.17	5.54	5.94	6.36	6.81	7.30	7.82
32 000	2.42	2.78	3.19	3.66	4.20	4.82	5.17	5.54	5.94	6.36	6.81	7.30	7.82	8.38
40 000	2.59	2.97	3.42	3.92	4.50	5.17	5.54	5.94	6.36	6.81	7.30	7.82	8.38	8.98
50 000	2.78	3.19	3.66	4.20	4.82	5.54	5.94	6.36	6.81	7.30	7.82	8.38	8.98	9.62
63 000	2.97	3.42	3.92	4.50	5.17	5.94	6.36	6.81	7.30	7.82	8.38	8.98	9.62	10.30
80 000	3.19	3.66	4.20	4.82	5.54	6.36	6.81	7.30	7.82	8.38	8.98	9.62	10.30	11.00
100 000	3.42	3.92	4.50	5.17	5.94	6.81	7.30	7.82	8.38	8.98	9.62	10.30	11.00	11.80
200 000	4.20	4.82	5.54	6.36	7.30	8.38	8.98	9.62	10.30	11.00	11.80	12.70	13.60	14.60

Life	Rotational speed n [min^{-1}]													
L_{10h}	800	1000	1250	1600	2000	2500	3200	4000	5000	6300	8000	10000	12500	16000
h														
100	1.60	1.71	1.83	1.97	2.11	2.26	2.42	2.59	2.78	2.97	3.19	3.42	3.66	3.92
500	2.59	2.78	2.97	3.19	3.42	3.66	3.92	4.20	4.50	4.82	5.70	5.54	5.94	6.36
1 000	3.19	3.42	3.66	3.92	4.20	4.50	4.82	5.17	5.54	5.94	6.36	6.81	7.30	7.82
1 250	3.42	3.66	3.92	4.20	4.50	4.82	5.17	5.54	5.94	6.36	6.81	7.30	7.82	8.38
1 600	3.66	3.92	4.20	4.50	4.82	5.17	5.54	5.94	6.36	6.81	7.30	7.82	8.38	8.98
2 000	3.92	4.20	4.50	4.82	5.17	5.54	5.94	6.36	6.81	7.30	7.82	8.38	8.98	9.62
2 500	4.20	4.50	4.82	5.17	5.54	5.94	6.36	6.81	7.30	7.82	8.38	8.98	9.62	10.30
3 200	4.50	4.82	5.17	5.54	5.94	6.36	6.81	7.30	7.82	8.38	8.98	9.62	10.30	11.00
4 000	4.82	5.17	5.54	5.94	6.36	6.81	7.30	7.82	8.38	8.98	9.62	10.30	11.00	11.80
5 000	5.17	5.54	5.94	6.36	6.81	7.30	7.82	8.38	8.98	9.62	10.30	11.00	11.80	12.70
6 300	5.54	5.94	6.36	6.81	7.30	7.82	8.38	8.98	9.62	10.30	11.00	11.80	12.70	13.60
8 000	5.94	6.36	6.81	7.30	7.82	8.38	8.98	9.62	10.30	11.00	11.80	12.70	13.60	14.60
10 000	6.36	6.81	7.30	7.82	8.38	8.98	9.62	10.30	11.00	11.80	12.70	13.60	14.60	15.60
12 500	6.81	7.30	7.82	8.38	8.98	9.62	10.30	11.00	11.80	12.70	13.60	14.60	15.60	16.70
16 000	7.30	7.82	8.38	8.98	9.62	10.30	11.00	11.80	12.70	13.60	14.60	15.60	16.70	17.90
20 000	7.82	8.38	8.98	9.62	10.30	11.00	11.80	12.70	13.60	14.60	15.60	16.70	17.90	19.20
25 000	8.38	8.98	9.62	10.30	11.00	11.80	12.70	13.60	14.60	15.60	16.70	17.90	19.20	20.60
32 000	8.98	9.62	10.30	11.00	11.80	12.70	13.60	14.60	15.60	16.70	17.90	19.20	20.60	-
40 000	9.62	10.30	11.00	11.80	12.70	13.60	14.60	15.60	16.70	17.90	19.20	20.60	-	-
50 000	10.30	11.00	11.80	12.70	13.60	14.60	15.60	16.70	17.90	19.20	20.60	-	-	-
63 000	11.00	11.80	12.70	13.60	14.60	15.60	16.70	17.90	19.20	20.60	-	-	-	-
80 000	11.80	12.70	13.60	14.60	15.60	16.70	17.90	19.20	20.60	-	-	-	-	-
100 000	12.70	13.60	14.60	15.60	16.70	17.90	19.20	20.60	-	-	-	-	-	-
200 000	15.60	16.70	17.90	19.20	20.60	-	-	-	-	-	-	-	-	-

In arrangements of the axles of road and railway vehicles the nominal life can be expressed by a revised relation in the volume of kilometers travelled.

$$L_{10km} = \left(\frac{C}{P}\right)^{p} \cdot \frac{\pi D}{1000}$$

L_{10km} - nominal life [10^6 km]
D - wheel diameter [m]

Reference Nominal Life Values

In cases, where the life for a given arrangement is not specified in advance, the values in tables 4 and 5 can be considered as adequate

Reference Nominal Life Values in Operating Hours **Table 4**

Machine Type	Nominal Life L_{10h} h
Devices and tools rarely used	1 000
Household electric appliances, small fans	2 000 to 4 000
Machines for intermittent operation, hand tools, workshop lifting tackles, agricultural machines	4 000 to 8 000
Machines with intermittent operation where high reliability is required, auxiliary power station equipment, belt conveyors, trucks, elevators	8 000 to 15 000
Rolling mills	6 000 to 12 000
Machines operating 8 - 16 hours - stationary electric motors, gear drives, textile machine spindles, plastic material processing machines, printing machines, cranes	15 000 to 30 000
Machine tools in general	20 000 to 30 000
Machines with continuous operation - stationary electric machines, conveying equipment, roller conveyors, pumps, centrifuges, blowers, compressors, hammer mills, crushers, briqueting presses, mine hoists, rope pulleys	40 000 to 60 000
Machines with continuous operation for high operating reliability - power station plants, water works machinery, paper making machines, ship machines	100 000 to 200 000

Reference Nominal Life Values in Kilometers **Table 5**

Vehicle Type	Nominal Life L_{10km} km
Road vehicle wheels :	
motor cycles	60 000
passenger cars	150 000 to 250 000
trucks, buses	400 000 to 500 000
Axle box bearings for railway vehicles:	
freight wagons (according to UIC) under continuous maximum axle load acting	800 000
tram cars	1 500 000
railway passanger carriages	3 000 000
motor wagons and motor units	3 000 000 to 4 000 000
locomotives	3 000 000 to 5 000 000

Equation of Adjusted Life

Adjusted life is a corrected nominal life, where by calculation not only of the load but the influence of bearing components, material, physical, mechanical, and chemical qualities of lubricants and the temperature regime of the bearing the operating environment are taken into account.

$$L_{na} = a_1 \cdot a_{23} \cdot L_{10}$$

L_{na} - adjusted life for (100-n)% reliability and other usual operation conditions [10^6 rev]
a_1 - life factor for other than 90% reliability, see Table 6
a_{23} - life factor of material, lubricant, production technology and operation conditions, see Pict. 1
L_{10} - nominal life

Factor a_1 Values **Table 6**

Reliability (%)	L_n	a_1
90	L_{10}	1.00
95	L_5	0.62
96	L_4	0.53
97	L_3	0.44
98	L_2	0.33
99	L_1	0.21

We can find basic values of a_{23} by using the diagram in Pict.1.

$$\chi = \frac{\upsilon}{\upsilon_1}$$

υ - kinematic lubricant viscosity by operation bearing temperature [$mm^2.s^{-1}$]
υ_1 - kinematic viscosity for defined rotational speed and selected bearing dimensions [$mm^2.s^{-1}$]

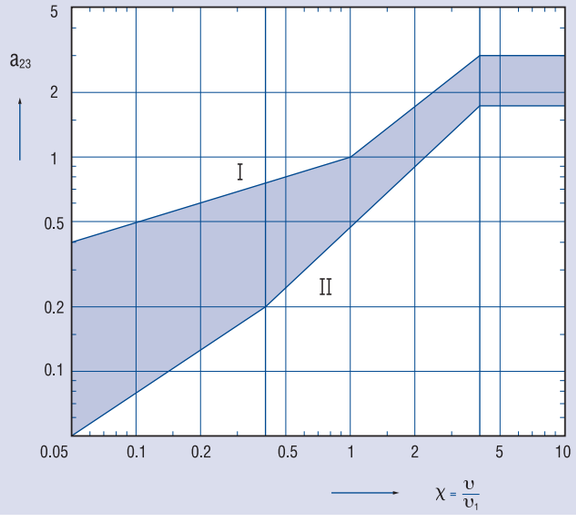
Values υ and υ_1 are determined according to the diagrams in Pict. 23 or 24.

In the diagram, Pict. 1, the line I is valid for radial ball bearings operating in a very clean environment. In other cases the factor a_{23} is lower, depending on the environment cleanliness, and the decreasing tendency is dependent on the bearing design group in following order:

- angular contact ball bearings
- tapered roller bearings
- cylindrical roller bearings
- double row self-aligning ball bearings
- spherical roller bearings

Line II can be used when stating the factor a_{23} for spherical roller bearings operating in a dusty environment.

Pict. 1



1.1.3 Equivalent Dynamic Load

In the arrangement the bearing is subjected to generally acting forces in various magnitudes, at various rotational speeds and with different acting period. From the point of view of calculation methodology the acting forces should be re-calculated into the constant load, by which the bearing will have the same life as it reaches in the conditions of the actual load.

Such a re-calculated constant radial or axial load is called the equivalent load P, or P_r (radial) or P_a (axial).

Combined Load
Constant Load

The outer forces acting on a bearing are not changed both from the point of view of size and time dependence.

Radial Bearings

If the radial bearings are simultaneously subjected to constant forces in radial and axial directions, the following equation is valid for calculating the radial equivalent dynamic load:

$$P_r = X.F_r + Y.F_a \quad [kN]$$

P_r	- radial equivalent dynamic load	[kN]
F_r	- radial bearing load	[kN]
F_a	- axial bearing load	[kN]
X	- radial dynamic load factor	
Y	- axial dynamic load factor	

Factors X and Y depend on the ratio F_a/F_r. Values X and Y are shown in the dimension tables or in the introduction to each bearing type where closer information regarding bearing calculation of the respective type is given.

Thrust Bearings

Thrust ball bearings can carry only forces acting in axial direction and the following equation is valid for calculating axial equivalent dynamic load:

$$P_a = F_a \quad [kN]$$

P_a - axial equivalent dynamic load	[kN]
F_a - axial bearing load	[kN]

Spherical roller thrust bearings can also carry some radial load, but only by simultaneous acting of axial load, when condition $F_r \leq 0.55\ F_a$ must be fulfilled. Axial equivalent dynamic load is calculated from equation

$$P_a = F_a + 1.2\ F_r \quad [kN]$$

Fluctuating Load

Real fluctuating load, whose time course we know, is for calculation replaced by mean hypothetical load. This hypothetical load has the same influence on the bearing as the fluctuating load.

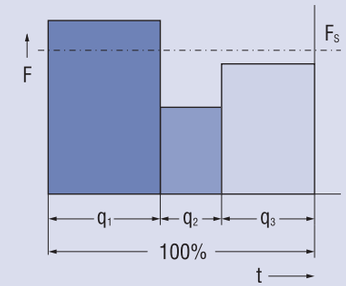
Change of Load Magnitude by Constant Rotational Speed

If the bearing is subjected to a load in a constant direction, whose magnitude is changed in dependence on time and the rotational speed is constant (Pict. 2), we can calculate the mean hypothetical load F_s according to the following equation

$$F_s = \left(\sum_{i=1}^{n} F_i^3 \cdot \frac{q_i}{100} \right)^{\frac{1}{3}} \quad [kN]$$

F_s	- mean hypothetical constant load	[kN]
$F_i = F_1,...Fn$	- constant partial actual load	[kN]
$q_i = q_1,...q_n$	- share of fractional load effects	[%]

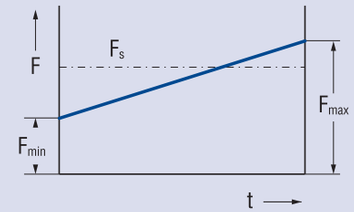
Pict. 2



At constant rotational speed with linear change of the load in constant direction (Pict. 3) the mean hypothetical load can be calculated from equation

$$F_s = \frac{F_{min} + 2F_{max}}{3} \quad [kN]$$

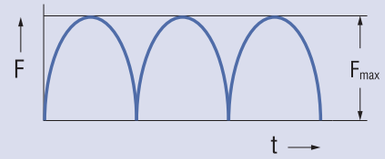
Pict. 3



If the actual load has a sine behaviour (Pict. 4), the mean hypothetical load is

$$F_s = 0.75 \cdot F_{max} \quad [kN]$$

Pict. 4



Change of Load Magnitude by Change of Rotational Speed

If the bearing is subjected in time to a varying load and the rotational speed is being changed, the mean hypothetical load is calculated from equation

$$F_s = \left(\frac{\sum_{i=1}^{n} F_i^3 \cdot q_i \cdot n_i}{\sum_{i=1}^{n} q_i \cdot n_i} \right)^{\frac{1}{3}} \quad kN]$$

$n_i = n_1, \ldots n_n$ - constant rotational speed in time of partial loads $F_1, \ldots F_n$ acting [min^{-1}]
$q_i = q_1, \ldots q_n$ - share of partial load and rotational speed acting [%]

If in dependence on time only the rotational speed is changed, the mean hypothetical constant rotational speed is calculated from equation

$$n_s = \frac{\sum_{i=1}^{n} q_i \cdot n_i}{100} \quad [min^{-1}]$$

n_s - mean rotational speed [min^{-1}]

Oscillating Motion of Bearing

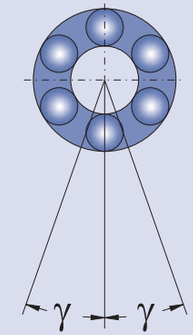
By oscillating motion with amplitude γ (Pict. 5) it is the simplest way of substituing the oscillating motion by hypothetical rotation, when the rotational speed equals the oscillation frequency. For radial bearings the mean hypothetical load is calculated from the equation:

$$F_s = F_r \left(\frac{\gamma}{90} \right)^{\frac{1}{p}} \quad kN]$$

F_s - mean hypothetical load [kN]
F_r - actual radial load [kN]
γ - oscillating motion amplitude [°]
p - exponent p = 3 for ball bearings

$p = \frac{10}{3}$ for cylindrical roller, needle roller, spherical roller and tapered roller bearings

Pict. 5



1.1.4 Temperature Influence

Delivered bearing assortment is determined for usage in an environment with operating temperatures up to 120 °C. Exceptions are double row spherical roller bearings which can work at temperatures up to 180 °C, and single row ball bearings with seals (RS, 2RS, RSR, 2RSR) applicable up to 110 °C, with seals RS2, -2RS2 applicable up to 180 °C.

For higher operation temperatures the bearings are produced so that their necessary physical and mechanical qualities and dimensional stability can be secured.

Values of the basic dynamic load ratings C_r or C_a shown in the dimension tables of this publication should be multiplied by factor f_t, shown in Table 7.

Values of f_t Factor **Table 7**

Operating Temperature to [°C]	150	200	250	300
Factor f_t	0.95	0.9	0.75	0.6

1.2 Static Load

1.2.1 Basic Static Load Rating

Radial basic static load rating C_{or} and axial basic static load rating C_{oa} are shown for each bearing in the dimension tables of this publication. Values C_{or} and C_{oa} were stated by a calculation according to the standard ISO 76.

Basic static load rating is the load which corresponds to calculated contact stresses at the most heavily loaded contact zone of the rolling element and bearing raceway:
- 4 600 MPa for double row self-aligning ball bearings
- 4 200 MPa for the other ball bearings
- 4 000 MPa for cylindrical roller, needle roller, spherical roller and tapered roller bearings

1.2.2 Equivalent Static Load

Equivalent static load is a re-calculated radial load P_{or} for radial bearings and axial axis load P_{oa} for thrust bearings.

$$P_{or} = X_o F_r + Y_o F_a \quad [kN]$$

$$P_{oa} = X_o Fr + Y_o F_a \quad [kN]$$

P_{or} - radial static equivalent load [kN]
P_{oa} - axial static equivalent load [kN]
F_r - radial bearing load [kN]
F_a - axial bearing load [kN]
X_o - radial load factor
Y_o - axial load factor

Factor s_0 **Table 8**

Bearing motion	Type of load, demands on bearing running	s_0	
		Ball Bearings	Cylindrical roller, needle roller, spherical roller, tapered roller bearings
Rotary	distinct impact load, high demands on smooth running	2	4
	after static loading bearing rotates under smaller load	1.5	3
	normal demands on smooth running		
	normal operating conditions and normal demands on running	1	1.5
	smooth impact-free operating	0.5	1
Oscillating	small oscillation angle with high frequency, with uneven impact loading	2	3.5
	large oscilating angle with low frequency and with approximately constant periodic load	1.5	2.5
Non-rotary	distinct impact load	1.5 to 1	3 to 2
	normal and small load, no special demands on bearing operation	1 to 0.4	2 to 0.8
	spherical roller thrust bearings at all kinds of motions and loads	-	4

Factors X_0 and Y_0 are given for individual bearings in the dimensional tables of this publication. Subsequently, closer data for stating the equivalent static load of given bearing type are also given here.

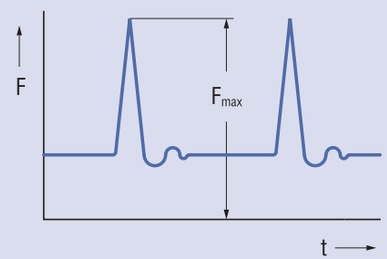
1.2.3 Bearing Safety under Static Load

In practice the bearing safety under static load is found by the ratio C_{or}/P_{or} or C_{oa}/P_{oa} and is compared with data in table 8, where the values of the least permissible factors s_0 for various operation conditions are shown.

$$s_0 = \frac{C_{or}}{P_{or}} \text{ or } \frac{C_{oa}}{P_{oa}}$$

s_0 - safety factor under static load
C_{or} - radial basic static load rating [kN]
C_{oa} - axial basic static load rating [kN]
P_{or} - radial equivalent static load or maximum acting impact force $F_{r\,max}$ (Pict. 6) under distinct impact load [kN]
P_{oa} - axial equivalent static load or maximum acting impact force $F_{a\,max}$ (Pict. 6) under distinct impact load [kN]

Pict. 6



1.3 Limiting Speed

Limiting speed depends on the bearing type, its accuracy, cage design, internal clearance, operating conditions in arrangement, kind of lubrication and on other factors. This influence summary determines the heat generation in the bearing and also limited rotational speed which is first of all limited by the lubricant operating temperature.

For orientation, limiting rotational speed values are shown in the dimension tables for individual bearings in normal tolerance class, both for grease and oil lubrication.

Given values are valid under presumption of adequate load ($L_{10h} \geq 100\,000$ h), normal operating conditions and cooling.

It is also necessary to reduce the limiting speed values for radial bearings which are permanently loaded by relatively great axial force.The resulting limiting speed values depend on the ratio of axial and radial load F_a/F_r.

The shown limiting speed can be exceeded for ball bearings up to 3 times, cylindrical roller bearings up to 2 times, for other bearings except spherical roller and tapered roller bearings up to 1.5 times and for spherical roller bearings 1.3 times.

This exceeding requires :

- adaptation of lubrication and cooling
- higher bearing tolerance class and corresponding accuracy of the abutment parts
- higher radial clearance than normal
- cage of suitable design and material

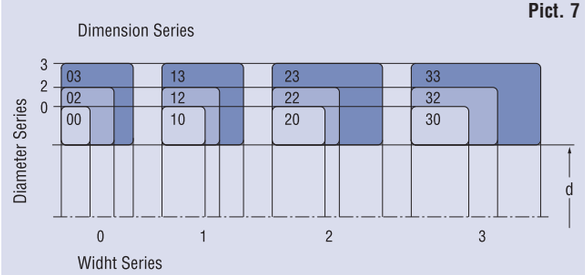
2. Rolling Bearing Design Data

2.1 Boundary Dimensions

Bearings introduced in this publication are made in dimensions complying with the international standards ISO 15, ISO 355 and ISO 104.

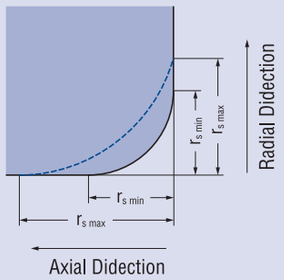
In the dimensional plan each bearing bore diameter **d** corresponds to several outer diameters **D** and various widths are added to them - **B** or **T** for radial and **H** for thrust bearings. Bearings having the same bore diameter and outer diameter belong to one diameter series which is designated according to the ascending outer diameter by figures 7, 8, 9, 0, 1, 2, 3, 4. Within each diameter series there are bearings of various width series according to the ascending width: 8, 0, 1, 2, 3, 4, 5, 6 for radial bearings and 7, 9, 1, 2 for thrust bearings. Diameter and width series form dimension series which are designated by a two digit number, where the first digit indicates the width series and the second the diameter one, as shown in Pict. 7.

Pict. 7



Dimensional plan also includes the bearing ring chamfer dimensions, so called mounting chamfer, see Pict. 8

Pict. 8



2.2 Designation

Bearing designation is created by numerical and letter symbols indicating the type, size and design of the bearing, see the scheme.

In the basic design the bearings are designated by a basic designation which consists of bearing type and size designation. The type designation is usually created by the symbol indicating the bearing design (see position 3 in the scheme) and the symbol for dimension series or diameter series (positions 4 and 5 in the scheme), e.g. bearing type 223, 302, NJ22, 511, 62, 12, etc. Bearing size designation is created by symbols for the nominal bore diameter **d** (see position 6 in the scheme).

Bearings with bore diameter d < 10 mm:

Digit separated by a slash, or the last digit indicates directly the bore dimension in mm, e.g. 619/2, 624.

Overview of chamfer limiting values according to international standard ISO 582 is given in Table 9.

Limiting Dimensions of Mounting Chamfer **Table 9**

$r_{s\,min}$	Radial Bearings except Tapered Roller Bearings				Tapered Roller Bearings				Thrust Bearings
	d or D above	to	$r_{s\,max}$ in radial direction	in axial direction	d or D above	to	$r_{s\,max}$ in radial direction	in axial direction	$r_{s\,max}$ in radial and axial direction
mm									
0.15	-	-	0.3	0.6	-	-	-	-	0.3
0.2	-	-	0.5	0.8	-	-	-	-	0.5
0.3	-	40	0.6	1	-	40	0.7	1.4	0.8
	40	-	0.8	1	40	-	0.9	1.6	0.8
0.6	-	40	1	2	-	40	1.1	1.7	1.5
	40	-	1.3	2	40	-	1.3	2	1.5
1	-	50	1.5	3	-	50	1.6	2.5	2.2
	50	-	1.9	3	50	-	1.9	3	2.2
1.1	-	120	2	3.5	-	-	-	-	2.7
	120	-	2.5	4	-	-	-	-	2.7
1.5	-	120	2.3	4	-	120	2.3	3	3.5
	120	-	3	5	120	250	2.8	3.5	3.5
	-	-	-	-	250	-	3.5	4	3.5
2	-	80	3	4.5	-	120	2.8	4	4
	80	220	3.5	5	120	250	3.5	4.5	4
	220	-	3.8	6	250	-	4	5	4
2.1	-	280	4	6.5	-	-	-	-	4.5
	280	-	4.5	7	-	-	-	-	4.5
2.5	-	100	3.8	6	-	120	3.5	5	-
	100	280	4.5	6	120	250	4	5.5	-
	280	-	5	7	250	-	4.5	6	-
3	-	280	5	8	-	120	4	5.5	5.5
	280	-	5.5	8	120	250	4.5	6.5	5.5
	-	-	-	-	250	400	5	7	5.5
	-	-	-	-	400	-	5.5	7.5	5.5
4	-	-	6.5	9	-	120	5	7	6.5
	-	-	-	-	120	250	5.5	7.5	6.5
	-	--	--	-	250	400	6	8	6.5
	-	-	-	-	400	-	6.5	8.5	6.5
5	-	-	8	10	-	180	6.5	8	8
	-	-	-	-	180	-	7.5	9	8
6	-	-	10	13	-	180	7.5	10	10
	-	-	-	-	180	-	9	11	10
7.5	-	-	12.5	17	-	-	-	-	12.5
9.5	-	-	15	19	-	-	-	-	15
12	-	-	18	24	-	-	-	-	18
15	-	-	21	30	-	-	-	-	21

Bearings with bore diameter d = 10 to 17 mm:

double digit number
- 00 indicates bore d = 10 mm, e.g. 6200
- 01 d = 12 mm, e.g. 6001
- 02 d = 15 mm, e.g. 6202
- 03 d = 17 mm, e.g. 6303

An exception to the designation are separable single row ball bearings - types E and BO, where the double digit number indicates directly the bore diameter in mm, e.g. E17.

Bearings with bore diameter d = 20 to 480 mm:

Bore diameter is a fivefold of the last double digit number, e.g. bearing 1320 has the bore diameter d = 20 x 5 = 100.

An exception create bearings with bore d = 22, 28, and 32 mm, where the double digit number separated by a slash indicates directly the bore diameter in mm, e.g. 320/32AX, further separable single row ball bearings - type E and single row cylindrical roller bearings - type E, where the double digit number, or number indicates directly the bore diameter in mm, e.g.: E20.

Bearings with bore diameter d ≥ 500 mm

The last three or four digit number separated by a slash indicates directly the bore diameter in mm, e.g. 230/530M, NU29/1060.

Bearings produced in different design than standard are designated by so called complete designation, see the scheme. It consists of the basic designation and prefixes and suffixes indicating the difference from the basic design.

Meaning of Prefixes and Suffixes

In compliance with complete designation a survey and meaning of used prefixes and suffixes is given in the following part. (Number in brackets at individual groups corresponds to the position number in the scheme).

Prefixes Material Different from Standard Bearing Steel (1)

- X — corrosion resisiting steel, e.g. X 623
- T — case hardened steel, e.g. T 32240

Incomplete Bearing (2)

- L — removable ring of separable bearing, e.g. LNU 206, for thrust ball bearings without shaft washer, e.g. L 51215
- R — separable bearing without removable ring, e.g. RNU 206 or R N310
- E — single shaft washer of thrust roller bearing, e.g. E 51314
- W — single housing washer of thrust ball bearing, e.g. W 51411
- K — cage with rolling elements, e.g. K NU320

Suffixes

Difference of Internal Design (7)

- A — single row angular contact ball bearing, contact angle α = 25°, e.g. B7205ATB P5
- AA — single row angular contact ball bearing with contact angle α = 26°, e.g. B72010AATB P4
- B — single row angular contact ball bearing with contact angle α = 40°, e.g. 7304B
- BE — single row angular contact ball bearing with contact angle α = 40°, in new design, e.g. 7310BETNG
- C — Single row angular contact ball bearing with contact angle α = 15°, e.g. B7202CTB P4
- CA — single row angular contact ball bearing with contact angle α = 12°, e.g. B7202CATB P5
- CB — single row angular contact ball bearing with contact angle α = 10°, e.g. B7206CBTB P4
- CC — double row spherical roller bearing in new design, e.g. 23996CCM
- D — single row ball bearing - type 160 with higher load rating, e.g. 16004D
- E — single row cylindrical roller bearing with higher load rating, e.g. NU209E

Difference of Boundary Dimensions

- X — change of boundary dimensions, introduced by new international standards, e.g. 32028AX

Shields or Seals

- RS — seal on one side, e.g. 6304RS
- -2RS — seals on both sides, e.g. 6204-2RS
- RSN — seal on one side and snap ring groove in outer ring opposite to seal side, e.g. 6306RSN
- RSNB — seal on one side and snap ring groove in outer ring on the same side as seal, e.g. 6210RSNB
- -2RSN — seals on both sides and snap ring groove in outer ring, e.g. 6310-2RSN
- RSR — seal on one side adhering to flat surface of inner ring, e.g. 624RSR
- -2RSR — seals on both sides adhering to flat surface of inner ring, e.g. 608-2RSR
- Z — metal shield on one side, e.g. 6206Z
- -2Z — metal shields on both sides, e.g. 6304-2Z
- ZN — metal shield on one side and snap ring groove in outer ring opposite to metal shield, e.g. 6208ZN
- ZNB — metal shield on one side and snap ring groove in outer ring on the same side as shield, e.g. 6306ZNB
- -2ZN — metal shields on both sides and snap ring groove in outer ring, e.g. 6208-2ZN
- ZR — metal shield on one side adhering to flat surface of inner ring, e.g. 608ZR
- -2ZR — metal shields on both sides adhering to flat surface of inner ring, e.g. 608-2ZR

Bearing Ring Design Variation (10)

- K — tapered bore, taper 1:12, e.g. 6207K
- K30 — tapered bore, taper 1:30, e.g. 24064K30M
- N — snap ring groove in outer ring, e.g. 6308N
- NR — snap ring groove in outer ring and inserted snap ring, e.g. 6310NR
- NX — snap ring groove in outer ring whose boundary dimensions do not correspond to ISO 464, e.g. 6210NX
- D — split inner ring, e.g. 3309D
- W33 — groove and lubrication holes in bearing outer ring surface, e.g. 23148W33M
- O — lubrication grooves in bearing outer ring, e.g. NU1014O

Cages (11)

Cage material for bearings in basic design is not usually indicated.

- J — pressed steel cage, rolling element centred, e.g. 6034J
- Y — pressed brass cage, rolling elements centred, e.g. 6001Y
- F — machined steel cage, rolling elements centred, e.g.6418F
- L — machined light metal cage, rolling elemnents centred, e.g. NG180L C3S0
- M — machined brass or bronze cage, rolling elements centred, e.g. NU330M
- T — machined cage made of textite, rolling elements centred, e.g. 6005T
- TN — machined cage made of polyamide or similar plastic, rolling elements centred, e.g. 6207TN
- TNG — machined cage made of polyamide or similar plastic with glass fibres, rolling elements centred, e.g. 2305TNG

Cage design (introduced symbols are always used in connection with cage material symbols).

- A — cage centred on outer ring, e.g. NU226MA
- B — cage centred on inner ring, e.g. 6210TB
- P — machined window-type cage, e.g. NU1060MAP
- H — one-piece open-type cage, e.g. 6209TNH
- S — cage with lubrication grooves, e.g. NJ418MAS
- V — bearing without cage, full rolling element number, e.g. NU209V

Tolerance Class (12)

- P0 — standard tolerance class (not indicated), e.g. 6204
- P6 — higher tolerance class than standard, e.g. 6322 P6
- P5 — higher tolerance class than P6, e.g. 6201 P5
- P5A — in some parameters higher tolerance class than P5, e.g. 6006TB P5A
- P4 — higher tolerance class than P5, e.g. 6207 P4
- P4A — in some parameters higher tolerance class than P4, e.g. 6007 P4A
- P2 — higher tolerance class than P4, e.g. 6306 P2
- P6E — higher tolerance class for rotating electric machines, e.g. 6204 P6E

Clearances (13)

C2 clearance less than normal, e.g. 608 C2
normal clearance (not indicated), e.g. 6204
C3 clearance greater than normal, e.g. 6310 C3
C4 clearance greater than C3, e.g. NU320M C4
C5 clearance greater than C4, e.g. 22330M C5
NA radial clearance for bearings with non-interchangable rings (always after radial clearance symbol), e.g. NU215 P63NA
R... radial clearance in non-standardized range (range in mm), e.g. 6210A R10-20
A... axial clearance in non-standardized range (range in mm), e.g. 3210 A20-30

Vibration Level (14)

C6 reduced vibration level lower than normal (not indicated) e.g. 6304 C6
C06 reduced vibration level lower than C6, e.g. 6205 C06
C66 reduced vibration level lower than C06, e.g. 6205 C66
Concrete C06 and C66 values are determined after negotiations between customer and supplier.
Note: Bearings in tolerance class P5 and higher have vibration level C6

Increased Operation Safety

C7, C8, C9 - bearings with increased operation safety determined primarily for aircraft industry, e.g. 16008 C8

Symbol Combination (12 - 15)

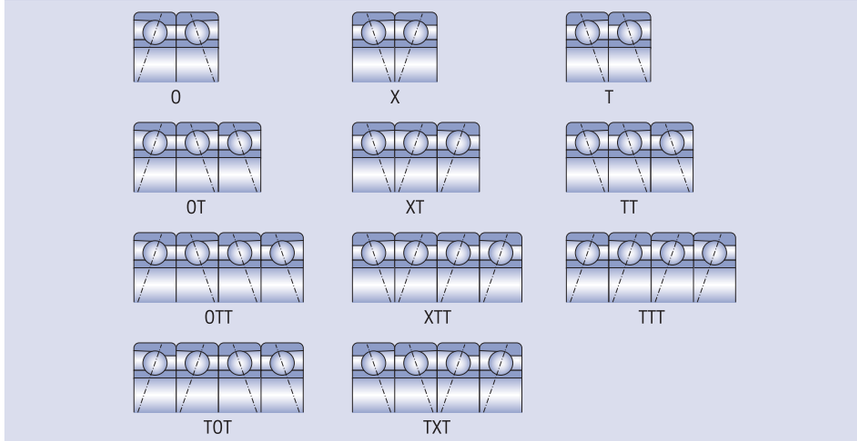
Symbols for tolerance class, bearing internal clearances, vibration levels and increased operation safety are combined, when symbol C is omitted from the second and following special bearing characteristics, e.g.:

P6 + C3 = P63	e.g. 6211 P63
P6 + C8 = P68	e.g. 16002 P68
C3 + C6 = C36	e.g. 6303-2RS C36
P5 + C3 + C9 = P539	e.g. 6205MA P539
P6 + C2NA + C6 = P626NA	e.g. NU1038 P626NA

Bearing Arrangement in Matched Set (16)

Designation of the arrangement in matched sets of two, three or four bearings consists of symbols indicating the bearing arrangement and symbols determining internal clearance, or preload of matched bearings.

Besides symbols shown in the table also U symbol is used and it indicates that respective bearings can be universally matched, e.g. B7003CTA P4UL.



Internal Clearance or Preload

Introduced symbols are always used in combination with matching symbols.
A bearing matching with clearance, e.g. 7305O A
O bearing matching without clearance, e.g. 7305 P6XO
L bearing matching with light preload, e.g. B7205CATB P4UL
M bearing matching with medium preload, e.g. B7204CATB P5XM
S bearing matching with great preload, e.g. B7304AATB P4OS

Stabilization for Operation at Higher Temperature

Both rings have stabilized dimensions for operation at higher temperature
S0 for operating temperature up to 150°C
S1 up to 200°C
S2 up to 250°C
S3 up to 300°C
S4 up to 350°C
S5 up to 400°C
Designation example - NG160 LB C4S3.

Friction Moment (18)

JU reduced friction moment, e.g. 619/2 JU
JUA bearings with determined friction moment for starting up, e.g. 623 JUA
JUB bearings with determined friction moment for running out, e.g. 623 JUB

Grease (19)

For designation of bearings with shields or seals on both sides, filled with grease different from the standard one, symbol combinations are used for designation. The first two symbols determine the operating temperature range and the third (a letter) the name or type of lubricant, according to producer's prescription, or another symbol (a digit) determines the grease volume, which the sealed or shielded inner bearing's space is filled with.

TL grease for low operating temperatures from -60°C to +100°C, designation example 6302-2RS TL
TM grease for medium operating temperatures from -30°C to +110°C, designation example 6204-2ZR TM
TH grease for high operating temperatures from -30°C to +200°C, designation example 6202-2Z TH
TW grease for both low and high operating temperatures from -40°C to +150°C, designation example 6310-2Z C4TW

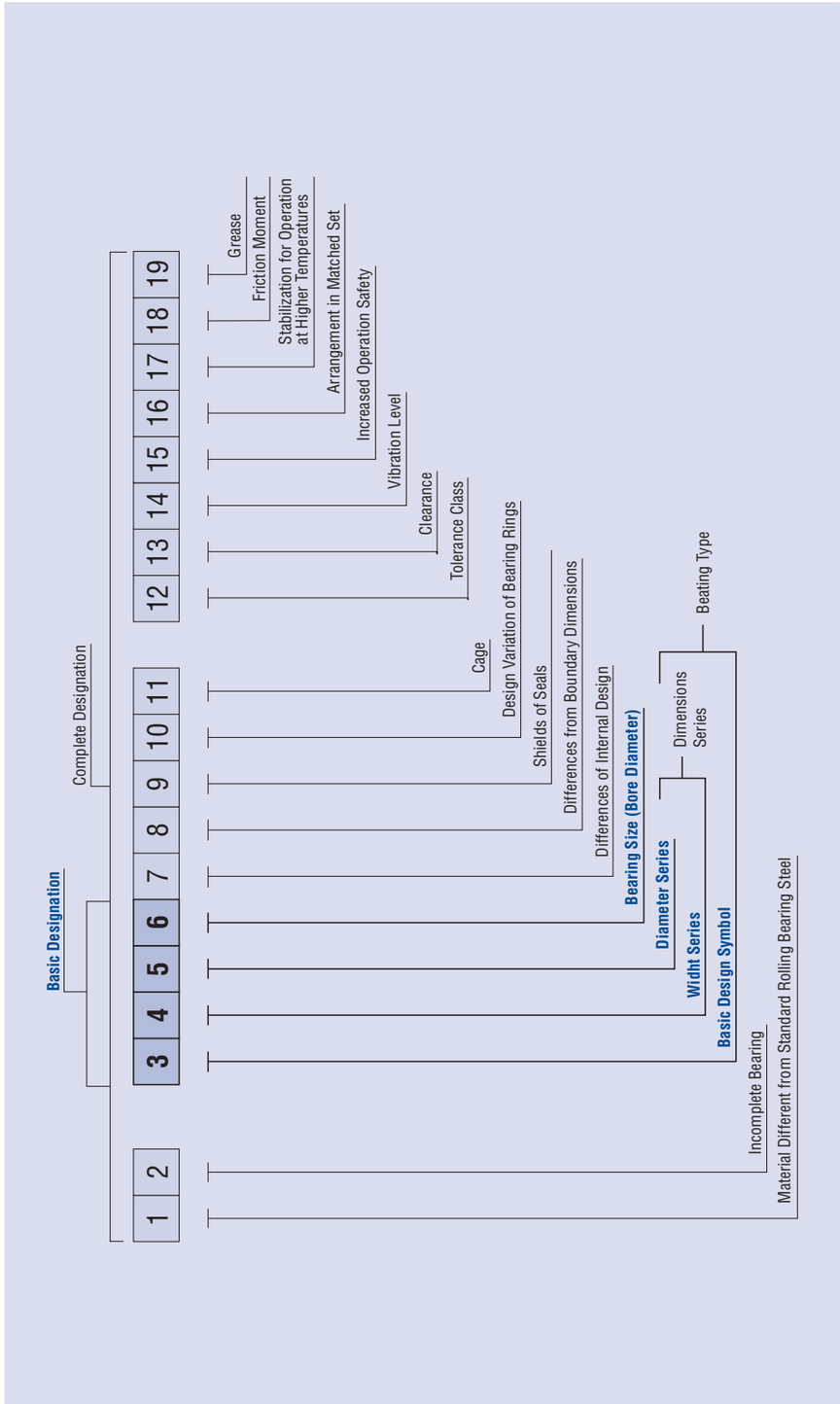
Note: Symbol TM need not be marked on bearings and packages.

Non-standard PLC bearings

PLC A-BC-DE-F designation structure

PLC symbol for special rolling bearing
A design group
- 0 single row ball bearings
- 1 double row ball bearings
- 2 thrust ball bearings
- 3 not occupied
- 4 single row cylindrical roller, spherical roller and needle roller bearings
- 5 double and multi-row cylindrical roller, spherical roller and needle roller bearings
- 6 single, double and four-row tapered roller bearings
- 7 special double row bearings
- 8 assembly units and separate parts
- 9 thrust cylindrical roller, spherical roller, tapered roller and needle roller bearings

BC dimensional group - two digit symbols
DE series number in dimensional group - two digit symbols
F variation of design - one digit symbol



2.3 Tolerance

Under bearing tolerance, dimension and operation accuracy is understood. Bearings are manufactured in tolerance classes P0, P6, P5A, P4, P4A, P2, SP and UP.

Tolerance class P0 is the basic one and a decreasing number in designation means the higher bearing tolerance class. Limiting values for dimension and operation accuracy shown in tables 20 to 30 comply with the standard ISO 492. Designation P5A and P4A are used for bearings manufactured in corresponding tolerance class (P5, P4), or selected parameters are in higher tolerance class than P5 and P4.

Tolerance Symbols and Their Meaning

d	Nominal bore diameter of a cylindrical bore or at the theoretical small end of a tapered bore
d_1	Nominal diameter at the theoretical large end of a tapered bore
d_2	Nominal diameter of shaft washer of double direction thrust bearings
Δ_{ds}	Deviation of a two-point size of bore diameter of a cylindrical bore from its nominal size
Δ_{dmp}	Cylindrical bore: deviation of a midrange size (out of two-point sizes) of bore diameter in any cross-section from its minal size Tapered bore: deviation of a mid-range size (out of two-point sizes) of bore iameter at the theoretical small end from its nominal size
Δ_{d1mp}	Deviation of a mid-range size (out of twopoint sizes) of bore diameter at the theoretical large end of a tapered bore from its nominal size
Δ_{d2mp}	Mean shaft washer bore diameter deviation of double direction thrust bearings in single radial plane
V_{dp}	Bore diameter variaton ; difference between the largest and smallest single bore diameters in one radial plane
V_{dsp}	Range of two-point sizes of bore diameter in any cross-section of a cylindrical or tapered bore
V_{dmp}	Range of mid-range sizes (out of two-point sizes) of bore diameter obtained from any cross-section of a cylindrical bore
V_{d2p}	Shaft washer bore diameter variation of double direction thurst bearings
D	Nominal ourside diameter
Δ_{Ds}	Deviation of a two-point size of outside diameter from its nominal size
Δ_{Dmp}	Deviation of a mid-range size (out of twopoint sizes) of outside diameter in any crosssection from its nominal size
V_{Dsp}	Range of two-point sizes of outside diameter in any cross-section
V_{Dp}	Outside diameter variation; difference between the largest and smallest single outsider diameters in one radial plane
V_{Dmp}	Range of mid-range sizes (out of two-point sizes) of outside diameter obtained from any cross-section
B	Nominal ring width
T	Nominal assembled bearing width
T_1	Nominal effective width of inner subunit assembled with a master outer ring
T_2	Nominal effective width of outer ring assembled with a master inner subunit
Δ_{Bs}	Symmetrical rings: deviation of a two-point size of inner ring width from its nominal size Asymmetrical rings, upper limit: deviation of a minimum circumscribed size of inner ring width, between two opposite lines, in any longitudinal section which includes the inner ring bore axis, from its nominal size Asymmetrical rings, lower limit: deviation of a two-point size of inner ring width from its nominal size
Δ_{Cs}	Symmetrical rings: deviation of a two-point size of outer ring width from its nominal size Asymmetrical rings, upper limit: deviation of a minimum

circumscribed size of outer ring width, between two opposite lines, in any longitudinal section which includes the outer ring outside surface axis, from its nominal size
Asymmetrical rings, lower limit: deviation of a two-point size of outer ring width from its nominal size

Δ_{Ts} Deviation of minimum circumscribed size of assembled bearing width from its nominal size

Δ_{T1s} Deviation of minimum circumscribed size of effective width (inner subunit assembled with a master outer ring) from its nominal size

Δ_{T2s} Deviation of minimum circumscribed size of effective width (outer ring assembled with a master inner subunit) from its nominal size

C Nominal ring width

V_{Bs} Symmetrical rings: range of two-point sizes of inner ring width
Asymmetrical rings: range of minimum circumscribed sizes of inner ring width, between two opposite lines, obtained from any longitudinal section which includes the inner ring bore axis

V_{Cs} Symmetrical rings: range of two-point sizes of outer ring width
Asymmetrical rings: range of minimum circumscribed sizes of outer ring width between two opposite lines, obtained from any longitudinal section which includes the outer ring outside surface axis

K_{ia} Circular radial run-out of inner ring bore surface of assembled bearing with respect to datum, i.e. axis, established from the outer ring outside surface

K_{ea} Circular radial run-out of outer ring outside surface of assembled bearing with respect to datum, i.e. axis, established from the inner ring bore surface

S_i Parallelism of inner ring raceway with respect to the face

S_e Parallelism of outer ring raceway with respect to the face

S_{ia} Circular axial run-out of inner ring face of assembled bearing with respect to datum, i.e. axis, established from the outer ring outside surface

S_{ea} Circular axial run-out of outer ring face of assembled bearing with respect to datum, i.e. axis, established from the inner ring bore surface

S_d Circular axial run-out of inner ring face with respect to datum, i.e. axis, established from the inner ring bore surface

S_D Perpendicularity of outer ring outside surface axis with respect to datum established from the outer ring face

Dimension and Running Accuracy of Radial Bearings (except Tapered Roller Bearings) **Table 10**

Tolerance Class normal

Inner Ring

Limit deviations and tolerance values in micrometers

d mm		$t_{\Delta dmp}$		$t_{V dsp}$ Diameter series			$t_{V Dmp}$	t_{Kia}	$t_{\Delta Bs}$			t_{VBs}
									All	Normal	Modified [a]	
>	≤	U	L	9	0, 1	2, 3, 4			U	L		
-	0.6	0	-8	10	8	6	6	10	0	-40	-	12
0.6	2.5	0	-8	10	8	6	6	10	0	-40	-	12
2.5	10	0	-8	10	8	6	6	10	0	-120	-250	15
10	18	0	-8	10	8	6	6	10	0	-120	-250	20
18	30	0	-10	13	10	8	8	13	0	-120	-250	20
30	50	0	-12	15	12	9	9	15	0	-120	-250	20
50	80	0	-15	19	19	11	11	20	0	-150	-380	25
80	120	0	-20	25	25	15	15	25	0	-200	-380	25
120	180	0	-25	31	31	19	19	30	0	-250	-500	30
180	250	0	-30	38	38	23	23	40	0	-300	-500	30
250	315	0	-35	44	44	26	26	so	0	-350	-500	35
315	400	0	-40	50	50	30	30	60	0	-400	-630	40
400	500	0	-45	56	56	34	34	65	0	-450	-	50
500	630	0	-50	63	63	38	38	70	0	-500	-	60
630	800	0	-75	-	-	-	-	80	0	-750	-	70
800	1 000	0	-100	-	-	-	-	90	0	-1 000	-	80
1 000	1 250	0	-125	-	-	-	-	100	0	-1 250	-	100
1 250	1 600	0	-160	-	-	-	-	120	0	-1 600	-	120
1 600	2 000	0	-200	-	-	-	-	140	0	-2 000	-	140

[a] Applies to inner rings and outer rings of single bearings made for paired and stack assemblies.
Also applies to inner rings with tapered bore with d ≥ 50 mm.

Tolerance Class normal

Outer Ring Limit deviations and tolerance values in micrometers

D mm		$t_{\Delta dmp}$		t_{VDsp} [a]				t_{VDmp} [a]	t_{Kea}	$t_{\Delta Cs}$ $t_{\Delta C1s}$ [b]		t_{VCs} t_{VC1s} [b]
				Open bearings			Capped bearings					
				Diameter series								
>	≤	U	L	9	0, 1	2, 3, 4	2, 3, 4			U	L	
-	2.5	0	-8	10	8	6	10	6	15	Identical to $t_{\Delta Bs}$ and t_{VBs} of an innerr ing of the same bearing as the outer ring		
2.5	6	0	-8	10	8	6	10	6	15			
6	18	0	-8	10	8	6	10	6	15			
18	30	0	-9	12	9	7	12	7	15			
30	50	0	-11	14	11	8	16	8	20			
50	80	0	-13	16	13	10	20	10	25			
80	120	0	-15	19	19	11	26	11	35			
120	150	0	-18	23	23	14	30	14	40			
150	150	0	-25	31	31	19	38	19	45			
180	250	0	-30	38	38	23	-	23	50			
250	315	0	-35	44	44	26	-	26	60			
315	400	0	-40	50	50	30	-	30	70			
400	500	0	-45	56	56	34	-	34	80			
500	630	0	-50	63	63	38	-	38	100			
630	800	0	-75	94	94	55	-	55	120			
800	1 000	0	-100	125	125	75	-	75	140			
1 000	1 250	0	-125	-	-	-	-	-	160			
1 250	1 600	0	-160	-	-	-	-	-	190			
1 600	2 000	0	-200	-	-	-	-	-	220			
2 000	2 500	0	-250	-	-	-	-	-	250			

NOTE: The limit deviations for the outside diameter, D_1, of an outer fing flange are given in Table 24

[a] Applies before mounting and after removal of internal or external snap ring.
[b] Applies to groove ball bearings only.

Tolerance Class P6

Inner Ring Limit deviations and tolerance values in micrometers

d mm		$t_{\Delta dmp}$		t_{Vdsp}			t_{Vdmp}	t_{Kia}	$t_{\Delta Bs}$			t_{VBs}
				Diameter series					All	Normal	Modified [a]	
>	≤	U	L	9	0, 1	2, 3, 4			U	L		
-	0.6	0	-7	9	7	5	5	5	0	-40	-	12
0.6	2.5	0	-7	9	7	5	5	5	0	-40	-	12
2.5	10	0	-7	9	7	5	5	6	0	-120	-250	15
10	18	0	-7	9	7	5	5	7	0	-120	-250	20
18	30	0	-8	10	8	6	6	8	0	-120	-250	20
30	50	0	-10	13	10	8	8	10	0	-120	-250	20
50	80	0	-12	15	15	9	9	10	0	-150	-380	25
80	120	0	-15	19	19	11	11	13	0	-200	-380	25
120	180	0	-18	23	23	14	14	18	0	-250	-500	30
180	250	0	-22	28	28	17	17	20	0	-300	-500	30
250	315	0	-25	31	31	19	19	25	0	-350	-500	35
315	400	0	-30	38	38	23	23	30	0	-400	-630	40
400	500	0	-35	44	44	26	26	35	0	-450	-	45
500	630	0	-40	50	50	30	30	40	0	-500	-	50

[a] Applies to inner rings and outer rings of single bearings made for paired and stack assemblies. Also applies to inner rings with tapered bore with d ≥ 50 mm.

Outer Ring Limit deviations and tolerance values in micrometers

D mm		$t_{\Delta Dmp}$		t_{VDsp} [a]				t_{VDmp} [a]	t_{Kea}	$t_{\Delta Cs}$ $t_{\Delta C1s}$ [b]		t_{vcs} t_{vc1s} [b]
				Open bearings			Capped bearings					
				Diameter series								
>	≤	U	L	9	0, 1	2, 3, 4	0, 1, 2, 3, 4			U	L	
-	2.5	0	-7	9	7	5	9	5	8	Identical to $t_{\Delta Bs}$ and t_{VBs} of the same an inner bearing ring of as the outer ring		
2.5	6	0	-7	9	7	5	9	5	8			
6	18	0	-7	9	7	5	9	5	8			
18	30	0	-8	10	8	6	10	6	9			
30	50	0	-9	11	9	7	13	7	10			
50	80	0	-11	14	11	8	16	8	13			
80	120	0	-13	16	16	10	20	10	18			
120	150	0	-15	19	19	11	25	11	20			
150	180	0	-18	23	23	14	30	14	23			
180	250	0	-20	25	25	15	-	15	25			
250	315	0	-25	31	31	19	-	19	30			
315	400	0	-28	35	35	21	-	21	35			
400	500	0	-33	41	41	25	-	25	40			
500	630	0	-38	48	48	29	-	29	50			
630	800	0	-45	56	56	34	-	34	60			
800	1 000	0	-60	75	75	45	-	45	75			

NOTE: The limit deviations for the outside diameter D_1 of an outer ring flange are given in table 24.

[a] Applies before maunting and after removal of internal or external snap ring.
[b] Applies to groove ball bearings only.

Dimension and Running Accuracy of Radial Bearings (except Tapered Roller Bearings) Table 12

Tolerance Class P5

Inner Ring Limit deviations and tolerance values in micrometers

d mm		$t_{\Delta dmp}$		t_{Vdsp} Diameter series		t_{Vdmp}	t_{Kia}	t_{Sd}	t_{Sia} [a]	$t_{\Delta Bs}$			t_{VBs}
										All	Normal	Modified [b]	
>	≤	U	L	9	0, 1, 2, 3, 4					U	L		
-	0.6	0	-5	5	4	3	4	7	7	0	-40	-250	5
0.6	2.5	0	-5	5	4	3	4	7	7	0	-40	-250	5
2.5	10	0	-5	5	4	3	4	7	7	0	-40	-250	5
10	18	0	-5	5	4	3	4	7	7	0	-80	-250	5
18	30	0	-6	6	5	3	4	8	8	0	-120	-250	5
30	50	0	-8	8	6	4	5	8	8	0	-120	-250	5
50	80	0	-9	9	7	5	5	8	8	0	-150	-250	6
80	120	0	-10	10	8	5	6	9	9	0	-200	-380	7
120	180	0	-13	13	10	7	8	10	10	0	-250	-380	8
180	250	0	-15	15	12	8	10	11	13	0	-300	-500	10
250	315	0	-18	18	14	9	13	13	15	0	-350	-500	13
315	400	0	-23	23	18	12	15	15	20	0	-400	-630	15

[b] Applies to groove ball bearings only.
[b] Applies to inner rings and outer rings of single bearings made for paired and stack assemblies. Also applies to inner rings with tapered bore with d ≥ 50 mm.

Outer Ring Limit deviations and tolerance values in micrometers

D mm		$t_{\Delta Dmp}$		t_{VDsp} [ab] Diameter series		t_{VDmp} [b]	t_{Kea}	t_{SD} [ce] t_{SD1} [de]	t_{Sea} [cd]	t_{Sea1} [d]	$t_{\Delta Cs}$ $t_{\Delta C1s}$ [d]		t_{VCs} t_{VC1s} [d]
>	≤	U	L	9	0, 1, 2, 3, 4						U	L	
-	2.5	0	-5	5	4	3	5	4	8	11	Identical to $t_{\Delta Bs}$ of an inner of the ring same bearing as the outer ring		5
2.5	6	0	-5	5	4	3	5	4	8	11			5
6	18	0	-5	5	4	3	5	4	8	11			5
18	30	0	-6	6	5	3	6	4	8	11			5
30	50	0	-7	7	5	4	7	4	8	11			5
50	80	0	-9	9	7	5	8	4	10	14			6
80	120	0	-10	10	8	5	10	4.5	11	16			8
120	150	0	-11	11	8	6	11	5	13	18			8
150	180	0	-13	13	10	7	13	5	14	20			8
180	250	0	-15	15	11	8	15	5.5	15	21			10
250	315	0	-18	18	14	9	18	6.5	18	25			11
315	400	0	-20	20	15	10	20	6.5	20	28			13
400	500	0	-23	23	17	12	23	7.5	23	33			15
500	630	0	-28	28	21	14	25	9	25	35			18
630	800	0	-35	35	26	18	30	10	30	42			20

NOTE: The limit deviations for the outside diameter D_1 of an outer ring flange are given in table 24.
[a] No values have been astablished for capped bearings.
[b] Applies before mouting and after removal of internal or external snap ring.
[c] Does not apply to bearings with flanged outer ring.
[d] Applies to groove ball bearings only
[e] Tolerance values have become holf the values compared to the previous edition of this International Standard because in this edition, SD and SD1 are defined as perpendicularity of outer ring outside surface axis with respect to datum established fro the outer ring face back face.

Dimension and Running Accuracy of Radial Bearings (except Tapered Roller Bearings) Table 13

Tolerance Class P4

Inner Ring Limit deviations and tolerance values in micrometers

d mm		$t_{\Delta dmp}$ [a] $t_{\Delta ds}$ [b]		t_{Vdsp} Diameter series		t_{Vdmp}	t_{Kia}	t_{Sd}	t_{Sia} [c]	$t_{\Delta Bs}$			t_{VBs}
										All	Normal	Modified [d]	
>	≤	U	L	9	0, 1, 2, 3, 4					U	L		
-	0.6	0	-4	4	3	2	2.5	3	3	0	-40	-250	2.5
0.6	2.5	0	-4	4	3	2	2.5	3	3	0	-40	-250	2.5
2.5	10	0	-4	4	3	2	2.5	3	3	0	-40	-250	2.5
10	18	0	-4	4	3	2	2.5	3	3	0	-80	-250	2.5
18	30	0	-5	5	4	2.5	3	4	4	0	-120	-250	2.5
30	50	0	-6	6	5	3	4	4	4	0	-120	-250	3
50	80	0	-7	7	5	3.5	4	5	5	0	-150	-250	4
80	120	0	-8	8	6	4	5	5	5	0	-200	-380	4
120	180	0	-10	10	8	5	6	6	7	0	-250	-380	5
180	250	0	-12	12	9	6	8	7	8	0	-300	-500	6

[a] These deviations apply to diameter series 9 only.
[b] These deviations apply to diameter series 0, 1, 2, 3 and 4 only.
[c] Applies to groove ball bearings only.
[d] Applies to inner rings and outer rings of single bearings made for paired or stack assemblies.

Outer Ring Limit deviations and tolerance values in micrometers

D mm		$t_{\Delta Dmp}$ [a] $t_{\Delta Ds}$ [b]		t_{VDsp} [cd] Diameter series		t_{VDmp} [d]	t_{Kea}	t_{SD} [ef] t_{SD1} [fg]	t_{Sea} [eg]	t_{Sea1} [g]	$t_{\Delta Cs}$ $t_{\Delta C1s}$ [g]		t_{VCs} t_{VC1s} [g]
>	≤	U	L	9	0, 1, 2, 3, 4						U	L	
-	2.5	0	-4	4	3	2	3	2	5	7	Identical to $t_{\Delta Bs}$ of an inner ring of the bearing same as the outer ring		2.5
2.5	6	0	-4	4	3	2	3	2	5	7			2.5
6	18	0	-4	4	3	2	3	2	5	7			2.5
18	30	0	-5	5	4	2.5	4	2	5	7			2.5
30	50	0	-6	6	5	3	5	2	5	7			2.5
50	80	0	-7	7	5	3.5	5	2	5	7			3
80	120	0	-8	8	6	4	6	2.5	6	8			4
120	150	0	-9	9	7	5	7	2.5	7	10			5
150	180	0	-10	10	8	5	8	2.5	8	11			5
180	250	0	-11	11	8	6	10	3.5	10	14			7
250	315	0	-13	13	10	7	11	4	10	14			7
315	400	0	-15	15	11	8	13	5	13	18			8

NOTE: The limit deviations for the outside diameter, D_1, of an outer ring flange are given in table 24.

[a] These deviations apply to diameter series 9 only.
[b] These deviations apply to diameter series 0, 1, 2, 3 and 4 only.
[c] No values have been astablished for capped bearings.
[d] Applies before mouting and after removal of internal or external snap ring.
[e] Does not apply to bearings with flanged outer ring.
[f] Tolerance values have become holf the values compared to the previous edition of this International Standard because in this edition, SD and SD1 are defined as perpendicularity of outer ring outside surface axis with respect to datum established fro the outer ring face back face.
[g] Applies to groove ball bearings only.

Dimension and Running Accuracy of Radial Bearings (except Tapered Roller Bearings) Table 14

Tolerance Class 2

Inner Ring Limit deviations and tolerance values in micrometers

d mm		$t_{\Delta dmp}$ [a] $t_{\Delta ds}$ [b]		t_{Vdsp}	t_{Vdmp}	t_{Kia}	t_{Sd}	t_{Sia} [c]	$t_{\Delta Bs}$			t_{VBs}
									All	Normal	Modified	
>	≤	U	L						U	L		
-	0.6	0	-2.5	2.5	1.5	1.5	1.5	1.5	0	-40	-250	1.5
0.6	2.5	0	-2.5	2.5	1.5	1.5	1.5	1.5	0	-40	-250	1.5
2.5	10	0	-2.5	2.5	1.5	1.5	1.5	1.5	0	-40	-250	1.5
10	18	0	-2.5	2.5	1.5	1.5	1.5	1.5	0	-80	-250	1.5
18	30	0	-2.5	2.5	1.5	2.5	1.5	2.5	0	-120	-250	1.5
30	50	0	-2.5	2.5	1.5	2.5	1.5	2.5	0	-120	-250	1.5
50	80	0	-4	4	2	2.5	1.5	2.5	0	-150	-250	1.5
80	120	0	-5	5	2.5	2.5	2.5	2.5	0	-200	-380	2.5
120	150	0	-7	7	3.5	2.5	2.5	2.5	0	-250	-380	2.5
150	180	0	-7	7	3.5	5	4	5	0	-250	-380	4
180	250	0	-8	8	4	5	5	5	0	-300	-500	5

[a] Applies to diameter series 9 only.
[b] Applies to diameter series 0, 1, 2, 3 and 4 only.
[c] Applies to groove ball bearings only.
[d] Applies to inner rings and outer rings of single bearings made for paired or stack assemblies.

Outer Ring Limit deviations and tolerance values in micrometers

D mm		$t_{\Delta Dmp}$ [a] $t_{\Delta Ds}$ [b]		t_{VDsp} [cd]	t_{VDmp} [d]	t_{Kea}	t_{SD} [ef] t_{SD1} [fg]	t_{Sea} [eg]	t_{Sea1} [g]	$t_{\Delta Cs}$ $t_{\Delta C1s}$ [g]		t_{VCs} t_{VC1s} [g]
>	≤	U	L							U	L	
-	2.5	0	-2.5	2.5	1.5	1.5	0.75	1.5	3			1.5
2.5	6	0	-2.5	2.5	1.5	1.5	0.75	1.5	3			1.5
6	18	0	-2.5	2.5	1.5	1.5	0.75	1.5	3			1.5
18	30	0	-4	4	2	2.5	0.75	2.5	4			1.5
30	50	0	-4	4	2	2.5	0.75	2.5	4			1.5
50	80	0	-4	4	2	4	0.75	4	6			1.5
80	120	0	-5	5	2.5	5	1.25	5	7			2.5
120	150	0	-5	5	2.5	5	1.25	5	7			2.5
150	180	0	-7	7	3.5	5	1.25	5	7			2.5
180	250	0	-8	8	4	7	2	7	10			4
250	315	0	-8	8	4	7	2.5	7	10			5
315	400	0	-10	10	5	8	3.5	8	11			7

Identical to $t_{\Delta Bs}$ of an inner of the ring same bearing as the outer ring

NOTE: The limit deviations for the outside diameter, D_1, of an outer ring flange are given in table 24.

[a] These deviations apply to diameter series 9 only.
[b] These deviations apply to diameter series 0, 1, 2, 3 and 4 only.
[c] No values have been astablished for capped bearings.
[d] Applies before mouting and after removal of internal or external snap ring.
[e] Does not apply to bearings with flanged outer ring.
[f] Tolerance values have become holf the values compared to the previous edition of this International Standard because in this edition, SD and SD1 are defined as perpendicularity of outer ring outside surface axis with respect to datum established fro the outer ring face back face.
[g] Applies to groove ball bearings only.

Dimension and Running Accuracy of Tapered Roller Bearings Table 15

Tolerance Class normal

Inner Ring Limit deviations and tolerance values in micrometers

d mm		$t_{\Delta dmp}$		t_{Vdsp}	t_{Vdmp}	t_{Kia}
>	≤	U	L			
-	10	0	-12	12	9	15
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
400	500	0	-45	45	34	80
500	630	0	-60	60	40	90
630	800	0	-75	75	45	100
800	1 000	0	-100	100	55	115
1 000	1 250	0	-125	125	65	130
1 250	1 600	0	-160	160	80	150
1 600	2 000	0	-200	200	100	170

Outer Ring Limit deviations and tolerance values in micrometers

D mm		$t_{\Delta Dmp}$		t_{VDsp}	t_{VDmp}	t_{Kea}
>	<	U	L			
-	18	0	-12	12	9	18
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
500	630	0	-50	60	38	100
630	800	0	-75	80	55	120
800	1 000	0	-100	100	75	140
1 000	1 250	0	-125	130	90	160
1 250	1 600	0	-160	170	100	180
1 600	2 000	0	-200	210	110	200
2 000	2 500	0	-250	265	120	220

NOTE: The limit deviations for the outside diameter, D_1, of an outer ring flange are given in table 24.

Dimension and Running Accuracy of Tapered Roller Bearings — Table 16

Tolerance Class normal

Widht - inner ring, outer ring, single row rolling bearings and single row bearing half assemblies

Limit deviations and tolerance values in micrometers

d mm		$t_{\Delta Bs}$		$t_{\Delta Cs}$		$t_{\Delta Ts}$ $t_{\Delta TFs}$		$t_{\Delta T1s}$		$t_{\Delta T2s}$ $t_{\Delta TF2s}$	
>	≤	U	L	U	L	U	L	U	L	U	L
-	10	0	-120	0	-120	+200	0	+100	0	+100	0
10	18	0	120	0	-120	+200	0	100	0	+100	0
18	30	0	-120	0	-120	+200	0	-100	0	+100	0
30	50	0	-120	0	-120	+200	0	-100	0	+100	0
50	80	0	-150	0	-150	+200	0	-100	0	+100	0
80	120	0	-200	0	-200	+200	-200	-100	-100	+100	-100
120	180	0	250	0	-250	1350	-250	150	150	+200	-100
180	250	0	-300	0	-300	+350	-250	-150	-150	+200	-100
250	315	0	-350	0	-350	+350	-250	-150	-150	+200	-100
315	400	0	400	0	-400	+400	-400	200	200	+200	-200
400	500	0	-450	0	-450	+150	-450	+225	-225	+225	-225
500	630	0	-500	0	-500	+500	-500	-	-	-	-
630	800	0	-750	0	-750	+600	-600	-	-	-	-
800	000	0	-1 000	0	-1 000	+750	-750	-	-	-	-
1 000	1 250	0	-1 250	0	-1 250	+900	-900	-	-	-	-
1 250	1 600	0	-1 600	0	-1 600	+1 050	-1 050	-	-	-	-
1 600	2 000	0	-2 000	0	-2 000	+1 200	-1 200	-	-	-	-

Dimension and Running Accuracy of Tapered Roller Bearings — Table 17

Tolerance Class 6X

Widht - inner ring, outer ring, single row rolling bearings and single row bearing half assemblies

Limit deviations and tolerance values in micrometers

d mm		$t_{\Delta Bs}$		$t_{\Delta Cs}$		$t_{\Delta Ts}$ $t_{\Delta TFs}$		$t_{\Delta T1s}$		$t_{\Delta T2s}$ $t_{\Delta TF2s}$	
>	≤	U	L	U	L	U	L	U	L	U	L
-	10	0	-50	0	-100	+100	0	+50	0	+50	0
10	18	0	-50	0	-100	+100	0	+50	0	+50	0
18	30	0	-50	0	-100	+100	0	+50	0	+50	0
30	50	0	-50	0	-100	+100	0	+50	0	+50	0
50	80	0	-50	0	-100	+100	0	+50	0	+50	0
80	120	0	-50	0	-100	+100	0	+50	0	+50	0
120	180	0	-50	0	-100	+150	0	+50	0	+100	0
180	250	0	-50	0	-100	+150	0	+50	0	+100	0
250	315	0	-50	0	-100	+200	0	+100	0	+100	0
315	400	0	-50	0	-100	+200	0	+100	0	+100	0
400	500	0	-50	0	-100	+200	0	+100	0	+100	0

The diameter tolerances and radial run-out for inner and outer rings of this tolerance class are the same as those given in Table 15 for the normal class.

Dimension and Running Accuracy of Tapered Roller Bearings — Table 18

Tolerance Class 5

Inner Ring

Limit deviations and tolerance values in micrometers

d mm		$t_{\Delta dmp}$		t_{Vdsp}	t_{Vdmp}	t_{Kia}	t_{Sd}
>	≤	U	L				
-	10	0	-7	5	5	5	7
10	18	0	-7	5	5	5	7
18	30	0	-8	6	5	5	8
30	50	0	-10	8	5	6	8
50	80	0	-12	9	6	7	8
80	120	0	-15	11	0	0	9
120	180	0	-18	14	2	11	10
180	250	0	-22	17	11	13	11
250	315	0	-25	19	13	13	13
315	400	o	-30	23	15	15	15
400	500	0	-35	28	17	20	17
500	630	0	-40	35	20	25	20
630	800	0	-50	45	25	30	25
800	1 000	0	-60	60	30	37	30
1 000	1 250	0	-75	75	37	45	40
1 250	1 600	0	-90	90	45	55	50

Outer Ring

Limit deviations and tolerance values in micrometers

D mm		$t_{\Delta Dmp}$		t_{VDsp}	t_{VDmp}	t_{Kea}	t_{SD} [ab] t_{SD1} [b]
>	≤	U	L				
-	18	0	-8	6	5	6	4
18	30	0	-8	6	5	6	4
30	50	0	-9	7	5	7	4
50	80	0	-11	8	6	8	4
80	120	0	-13	10	7	10	4.5
120	150	0	-15	11	8	11	5
150	180	0	-18	14	9	13	5
180	250	0	-20	15	10	15	5.5
250	315	0	-25	19	13	18	6.5
315	400	0	-28	22	14	20	6.5
400	500	0	-33	26	17	24	8.5
500	630	0	-38	30	20	30	10
630	800	0	-45	38	25	36	12.5
800	1 000	0	-60	50	30	43	15
1 000	1 250	0	-80	65	38	52	19
1 250	1 600	0	-100	90	50	62	25
1 600	2 000	0	-125	120	65	73	32.5

NOTE: The limit deviations for the outside diameter, D_1, of an outer ring flange are given in table 24.

[a] Does not apply to bearings with flanged outer ring.
[b] Tolerance values have become holf the values compared to the previous edition of this International Standard because in this edition, SD and SD1 are defined as perpendicularity of outer ring outside surface axis with respect to datum established fro the outer ring face back face.

Dimension and Running Accuracy of Tapered Roller Bearings — Table 19

Tolerance Class 5

Widht - inner ring, outer ring, single row rolling bearings and single row bearing half assemblies

Limit deviations and tolerance values in micrometers

d mm		$t_{\Delta Bs}$		$t_{\Delta Cs}$		$t_{\Delta Ts}$ $t_{\Delta TFs}$		$t_{\Delta T1s}$		$t_{\Delta T2s}$ $t_{\Delta TF2s}$	
>	≤	U	L	U	L	U	L	U	L	U	L
-	10	0	-200	0	-200	+200	-200	+100	-100	+100	-100
10	18	0	-200	0	-200	+200	-200	+100	-100	+100	-100
18	30	0	-200	0	-200	+200	-200	+100	-100	+100	-100
30	50	0	-240	0	-240	+200	-200	+100	-100	+100	-100
50	80	0	-300	0	-300	+200	-200	+100	-100	+100	-100
80	120	0	-400	0	-400	+200	-200	+100	-100	+100	-100
120	180	0	-500	0	-500	+350	-250	+150	-150	+200	-100
180	250	0	-600	0	-600	+350	-250	+150	-150	+200	-100
250	315	0	-700	0	-700	+350	-250	+150	-150	+200	-100
315	400	0	-800	0	-800	+400	-400	+200	-200	+200	-200
400	500	0	-900	0	-900	+450	-450	+225	-225	+225	-225
500	630	0	-1 100	0	100	+500	-500	-	-	-	-
630	800	0	-1 600	0	-1 600	+600	-600	-	-	-	-
800	1 000	0	-2 000	0	-2 000	+750	-750	-	-	-	-
1 000	1 250	0	-2 000	0	-2 000	+750	-750	-	-	-	-
1 250	1 600	0	-2 000	0	-2 000	+900	-900	-	-	-	-

Dimension and Running Accuracy of Tapered Roller Bearings — Table 20

Tolerance Class 4

Inner Ring

Limit deviations and tolerance values in micrometers

d mm		$t_{\Delta ds}$		t_{Vdsp}	t_{Vdmp}	t_{Kia}	t_{Sd}	t_{Sia}
>	≤	U	L					
-	10	0	-5	4	4	3	3	3
10	18	0	-5	4	4	3	3	3
18	30	0	-6	5	4	3	4	4
30	50	0	-8	6	5	4	4	4
50	80	0	-9	7	5	4	5	4
80	120	0	-10	8	5	5	5	5
120	180	0	-13	10	7	6	6	7
180	250	0	-15	11	8	8	7	8
250	315	0	-18	12	9	9	8	9

Outer Ring

Limit deviations and tolerance values in micrometers

D mm		$t_{\Delta Ds}$		t_{VDsp}	t_{VDmp}	t_{Kea}	t_{SD} [ab] t_{SD1} [b]	t_{Sea} [a]	t_{Sea1}
>	≤	U	L						
-	18	0	-6	5	4	4	2	5	7
18	30	0	-6	5	4	4	2	5	7
30	50	0	-7	5	5	5	2	5	7
50	80	0	-9	7	5	5	2	5	7
80	120	0	-10	8	5	6	2.5	6	8
120	150	0	-11	8	6	7	2.5	7	10
150	180	0	-13	10	7	8	2.5	8	11
180	250	0	-15	11	8	10	3.5	10	14
250	315	0	-18	14	9	11	4	10	14
315	400	0	-20	15	10	13	5	13	18

NOTE: The limit deviations for the outside diameter, D_1, of an outer ring flange are given in table 24.

[a] Does not apply to bearings with flanged outer ring.
[b] Tolerance values have become holf the values compared to the previous edition of this International Standard because in this edition, SD and SD1 are defined as perpendicularity of outer ring outside surface axis with respect to datum established fro the outer ring face back face.

Dimension and Running Accuracy of Tapered Roller Bearings — Table 21

Tolerance Class 4

Widht - inner ring, outer ring, single row rolling bearings and single row bearing half assemblies

Limit deviations and tolerance values in micrometers

d mm		$t_{\Delta Bs}$		$t_{\Delta Cs}$		$t_{\Delta Ts}$ $t_{\Delta TFs}$		$t_{\Delta T1s}$		$t_{\Delta T2s}$ $t_{\Delta TF2s}$	
>	≤	U	L	U	L	U	L	U	L	U	L
-	10	0	-200	0	-200	+200	-200	+100	-100	+100	-100
10	18	0	-200	0	-200	+200	-200	+100	-100	+100	-100
18	30	0	-200	0	-200	+200	-200	+100	-100	+100	-100
30	50	0	-240	0	-240	+200	-200	+100	-100	+100	-100
50	80	0	-300	0	-300	+200	-200	+100	-100	+100	-100
80	120	0	-400	0	-400	+200	-200	+100	-100	+100	-100
120	180	0	-500	0	-500	+350	-250	+150	-150	+200	-100
180	250	0	-600	0	-600	+350	-250	+150	-150	+200	-100
250	315	0	-700	0	-700	+350	-250	+150	-150	+200	-100

Dimension and Running Accuracy of Tapered Roller Bearings — Table 22

Tolerance Class 2

Inner Ring

Limit deviations and tolerance values in micrometers

d mm		$t_{\Delta ds}$		t_{Vdsp}	t_{Vdmp}	t_{Kia}	t_{Sd}	t_{S1a}
>	≤	U	L					
-	10	0	-4	2.5	1.5	2	1.5	2
10	18	0	-4	2.5	1.5	2	1.5	2
18	30	0	-4	2.5	1.5	2.5	1.5	2.5
30	50	0	-5	3	2	2.5	2	2.5
50	80	0	-5	4	2	3	2	3
80	120	0	-6	5	2.5	3	2.5	3
120	180	0	-7	7	3.5	4	3.5	4
180	250	0	-8	7	4	5	5	5
250	315	0	-8	8	5	6	5.5	6

Outer Ring

Limit deviations and tolerance values in micrometers

D mm		$t_{\Delta Ds}$		t_{VDsp}	t_{VDmp}	t_{Kea}	t_{SD} [ab] t_{SD1} [b]	t_{Sea} [a]	t_{Sea1}
>	<	U	L						
-	18	0	-5	4	2.5	2.5	0.75	2.5	4
18	30	0	-5	4	2.5	2.5	0.75	2.5	4
30	50	0	-5	4	2.5	2.5	1	2.5	4
50	80	0	-6	4	2.5	4	1.25	4	6
80	120	0	-6	5	3	5	1.5	5	7
120	150	0	-7	5	3.5	5	1.75	5	7
150	180	0	-7	7	4	5	2	5	7
180	250	0	-8	8	5	7	2.5	7	10
250	315	0	-9	8	5	7	3	7	10
315	400	0	-10	10	6	8	3.5	8	11

NOTE: The limit deviations for the outside diameter D1, of an outer ring flange are given in table 24.

[a] Does not apply to bearings with flanged outer ring.
[b] Tolerance values have become holf the values compared to the previous edition of this International Standard because in this edition, SD and SD1 are defined as perpendicularity of outer ring outside surface axis with respect to datum established fro the outer ring face back face.

Dimension and Running Accuracy of Tapered Roller Bearings — Table 23

Tolerance Class 2

Widht - inner ring, outer ring, single row rolling bearings and single row bearing half assemblies

Limit deviations and tolerance values in micrometers

d mm		$t_{\Delta Bs}$		$t_{\Delta Cs}$		$t_{\Delta Ts}$ $t_{\Delta TFs}$		$t_{\Delta T1s}$		$t_{\Delta T2s}$ $t_{\Delta TF2s}$	
>	≤	U	L	U	L	U	L	U	L	U	L
-	10	0	-200	0	-200	+200	-200	+100	-100	+100	-100
10	18	0	-200	0	-200	+200	-200	+100	-100	+100	-100
18	30	0	-200	0	-200	+200	-200	+100	-100	+100	-100
30	50	0	-240	0	-240	+200	-200	+100	-100	+100	-100
50	80	0	-300	0	-300	+200	-200	+100	-100	+100	-100
80	120	0	-400	0	-400	+200	-200	+100	-100	+100	-100
120	180	0	-500	0	-500	+200	-250	+100	-100	+100	-150
180	250	0	-600	0	-600	+200	-300	+100	-150	+100	-150
250	315	0	-700	0	-700	+200	-300	+100	-150	+100	-150

Radial bearings, flange on the outer ring — Table 24

Limit deviations of the outer diameter of the flange

Limit deviations and tolerance values in micrometers

D_1 mm		$t_{\Delta D1s}$			
		Locating flange		Non-locating flange	
>	≤	U	L	U	L
-	6	0	-36	+220	-36
6	10	0	-36	+220	-36
10	18	0	-43	+270	-43
18	30	0	-52	+330	-52
30	50	0	-62	+390	-62
50	80	0	-74	+460	-74
80	120	0	-87	+540	-87
120	180	0	-100	+630	-100
180	250	0	-115	+720	-115
250	315	0	-130	+810	-130
315	400	0	-140	+890	-140
400	500	0	-155	+970	-155
500	630	0	-175	+1 100	-175
630	800	0	-200	+1 250	-200
800	1 000	0	-230	+1 400	-230
1 000	1 250	0	-260	+1 650	-260
1 250	1 600	0	-310	+1 950	-310
1 600	2 000	0	-370	+2 300	-370
2 000	2 500	0	-440	+2 800	-440

Taper hole, taper 1:12 and 1:30 — Table 25

Tolerances for taper holes, for normal Tolerance Class, are specified in Tables 25 and 26.
Taper hole tolerances include:
- $t_{\Delta dmp}$,
- conicity tolerance, determined by the tolerances for the inclination of the cone $t_{\Delta SL}$,
- t_{Vdsp}.

NOTE: See Figure 9.

Limit deviations and tolerance values in micrometers

d mm		$t_{\Delta dmp}$		$t_{\Delta SL}$		t_{Vdsp} [ab]
>	≤	U	L	U	L	
-	10	+22	0	+15	0	9
10	18	+27	0	+18	0	11
18	30	+33	0	+21	0	13
30	50	+39	0	+25	0	16
50	80	+46	0	+30	0	19
80	120	+54	0	+35	0	22
120	180	+63	0	+40	0	40
180	250	+72	0	+46	0	46
250	315	+81	0	+52	0	52
315	400	+89	0	+57	0	57
400	500	+97	0	+63	0	63
500	630	+110	0	+70	0	70
630	800	+125	0	+80	0	-
800	1 000	+140	0	+90	0	-
1 000	1 250	+165	0	+105	0	-
1 250	1 600	+195	0	+125	0	-

[a] Applies in any cross-section of the bore.
[b] Does not apply to diameter series 7 and 8.

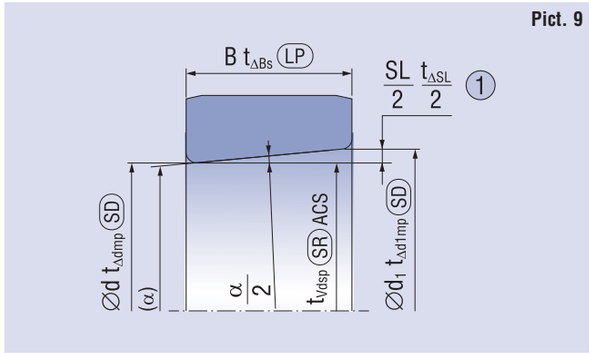
Taper hole, taper 1:30 — Table 26

Limit deviations and tolerance values in micrometers

d mm		$t_{\Delta dmp}$		$t_{\Delta SL}$		t_{Vdsp} [ab]
>	≤	U	L	U	L	
-	50	+15	0	+30	0	19
50	80	+15	0	+30	0	19
80	120	+20	0	+35	0	22
120	180	+25	0	+40	0	40
180	250	+30	0	+46	0	46
250	315	+35	0	+52	0	52
315	400	+40	0	+57	0	57
400	500	+45	0	+63	0	63
500	630	+50	0	+70	0	70

[a] Applies in any cross-section of the bore.
[b] Does not apply to diameter series 7 and 8.

Pict. 9



(1)

SL is a calculated nominal size from d and d_1, i.e. SL = (d_1 - d) = 2B tan(α/2);
ΔSL is a calculated characteristic, i.e. ΔSL = Δd1mp - Δdmp

2.4 Internal Clearance

Bearing clearance is the value of one bearing displacement length of assembled bearing with respect to the other ring from one end position to the other one. The displacement can be in radial direction (radial clearance) or axial (axial clearance).

In a mounted bearing smaller radial clearance can be found than the same bearing had before mounting. Radial clearance reduction is caused by interference of the bearing rings on the shaft and in housing bore and thus it is dependent on selected tolerance of bearing seating surface diameters.

Another change of radial clearance, mainly its reduction, arises during operation from temperatures evoked by its own operation and surrounding sources, but also by elastic deformations caused by load.

Clearance for standard designed bearings is determined so that one of the bearing rings can be fixed, what is sufficient for most operation conditions in the arrangement. For special arrangements with different requirement on the radial clearance bearings with various radial clearance designated C1 up to C5 are produced.

Values for various internal clearances according to the standard ISO 5753-1 are shown for individual bearing types in tables 27 up to 32 and these values are valid for non-mounted bearings by zero measuring load.

For double row angular contact ball bearings instead of radial clearance the axial clearance measured at axial load 100 N is introduced.

Single row angular contact ball bearings and single row tapered roller bearings are usually mounted in pairs and the radial or axial clearence is adjusted during mounting.

Radial Clearance of Single Row Ball Bearings **Table 27**

Bore Diameter		Radial Clearance									
d		C2		normal		C3		C4		C5	
over	to	min	max	min	max	min	max	min	max	min	max
mm		µm									
2.5	10	0	7	2	13	8	23	14	29	20	37
10	18	0	9	3	18	11	25	18	33	25	45
18	24	0	10	5	20	13	28	20	36	28	48
24	30	1	11	5	20	13	28	23	41	30	53
30	40	1	11	6	20	15	33	28	46	40	64
40	50	1	11	6	23	18	36	30	51	45	73
50	65	1	15	8	28	23	43	38	61	55	90
65	80	1	15	10	30	25	51	46	71	65	105
80	100	1	18	12	36	30	58	53	84	75	120
100	120	2	20	15	41	36	66	61	97	90	140
120	140	2	23	18	48	41	81	71	114	105	160
140	160	2	23	18	53	46	91	81	130	120	180
160	180	2	25	20	61	53	102	91	147	135	200
180	200	2	30	25	71	63	117	107	163	150	215

Axial Clearance of Double Row Angular Contact Ball Bearings **Table 28**

Bore Diameter		Axial Clearance							
d		C2		normal		C3		C4	
over	to	min	max	min	max	min	max	min	max
mm		µm							
6	10	1	11	5	21	12	28	25	45
10	18	1	12	6	23	13	31	27	47
18	24	2	14	7	25	16	34	28	48
24	30	2	15	8	27	18	37	30	50
30	40	2	16	9	29	21	40	33	54
40	50	2	19	11	33	23	44	36	58
50	65	3	22	13	36	26	48	40	63
65	80	3	24	15	40	30	54	46	71

Radial Clearance of Double Row Self-Aligning Ball Bearing

Table 29

Bore Diameter		Cylindrical Bore Radial Clearance										Tapered Bore Radial Clearance									
d		C2		normal		C3		C4		C5		C2		normal		C3		C4		C5	
over	to	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max
mm		µm										µm									
2.5	6	1	8	5	15	10	20	15	25	21	33	-	-	-	-	-	-	-	-	-	-
6	10	2	9	6	17	12	25	19	33	27	42	-	-	-	-	-	-	-	-	-	-
10	14	2	10	6	19	13	26	21	35	30	48	-	-	-	-	-	-	-	-	-	-
14	18	3	12	8	21	15	28	23	37	32	50	-	-	-	-	-	-	-	-	-	-
18	24	4	14	10	23	18	30	25	39	34	52	7	17	13	26	20	33	28	42	37	55
24	30	5	16	11	24	19	35	29	46	40	58	9	20	15	28	23	39	33	50	44	62
30	40	6	18	13	29	23	40	34	53	46	66	12	24	19	35	29	46	40	59	52	72
40	50	6	19	14	31	25	44	37	57	50	71	14	27	22	39	33	52	45	65	58	79
50	65	7	21	16	36	30	50	45	69	62	88	18	32	27	47	41	61	56	80	73	99
65	80	8	24	18	40	35	60	54	83	76	108	23	39	35	57	50	75	69	98	91	123
80	100	9	27	22	48	42	70	64	96	89	124	29	47	42	68	62	90	84	116	109	144
100	120	10	31	25	56	50	83	75	114	105	145	35	56	50	81	75	108	100	139	130	170
120	140	10	38	30	68	60	100	90	135	125	175	-	-	-	-	-	-	-	-	-	-
140	160	15	44	35	80	70	120	110	161	150	210	-	-	-	-	-	-	-	-	-	-

Radial Clearance of Single Row Cylindrical Roller Bearings

Table 30

Bore Diameter		Radial Clearance									
d		C2		normal		C3		C4		C5	
over	to	min	max	min	max	min	max	min	max	min	max
mm		µm									
10	24	0	25	20	45	35	60	50	75	65	90
24	30	0	25	20	45	35	60	50	75	70	95
30	40	5	30	25	50	45	70	60	85	80	105
40	50	5	35	30	60	50	80	70	100	95	125
50	65	10	40	40	70	60	90	80	110	110	140
65	80	10	45	40	75	65	100	90	125	130	165
80	100	15	50	50	85	75	110	105	140	155	190
100	120	15	55	50	90	85	125	125	165	180	220
120	140	15	60	60	105	100	145	145	190	200	245
140	160	20	70	70	120	115	165	165	215	225	275
160	180	25	75	75	125	120	170	170	220	250	300
180	200	35	90	90	145	140	195	195	250	275	330
200	225	45	105	105	165	160	220	220	280	305	365
225	250	45	110	110	175	170	235	235	300	330	395
250	280	55	125	125	195	190	260	260	330	370	440
280	315	55	130	130	205	200	275	275	350	410	485
315	355	65	145	145	225	225	305	305	385	455	535
355	400	100	190	190	280	280	370	370	460	510	600
400	450	110	210	210	310	310	410	410	510	565	665
450	500	110	220	220	330	330	440	440	550	625	735

Radial Clearance of Double Row Cylindrical Roller Bearings with Tapered Bore Bearing with Non-Interchangable Rings Determined for Machine Tool Spindles

Table 31

Bore Diameter		Radial Clearance			
d		C1NA		C2NA	
over	to	min	max	min	max
mm		µm			
24	30	15	25	25	35
30	40	15	25	25	40
40	50	17	30	30	45
50	65	20	35	35	50
65	80	25	40	40	60
80	100	35	55	45	70
100	120	40	60	50	80
120	140	45	70	60	90
140	160	50	75	65	100

Bore Diameter		Radial Clearance			
d		C1NA		C2NA	
over	to	min	max	min	max
mm		µm			
160	180	55	85	75	110
180	200	60	90	80	120
200	225	60	95	90	135
225	250	65	100	100	150
250	280	75	110	110	165
280	315	80	120	120	180
315	355	90	135	135	200
355	400	100	150	150	225
400	450	110	170	170	255

Radial Clerance of Single Row Needle Roller Bearings with Interchangable Rings

Table 32

Bore Diameter		Radial Clearance			
d		normal		C3	
over	to	min	max	min	max
mm		µm			
10	14	10	50	25	70
14	18	15	55	35	75
18	24	25	65	40	80
24	30	30	65	50	80
30	40	40	75	60	95
40	50	40	85	65	100
50	65	45	90	70	120
65	80	50	110	75	135
80	100	60	115	95	150
100	120	70	125	115	70
120	140	80	155	130	205
140	160	80	160	140	210

2.5 Cages

Cage in the rolling bearing fulfills the following roles

- separates rolling elements evenly around the periphery
- prevents contact of rolling elements and their sliding
- prevents falling out of the rolling elements from separable or self-aligning bearings when mounting.

From the point of view of design and material the cages are divided into pressed and machined.

Pressed cages are made of steel or brass sheet and are mostly used in dimensionally smaller and medium bearings. Their advantage in comparison with the solid cages is the smaller weight. Machined cages are made of steel, brass, bronze, light metals or plastic in various designs. Cages made of metals are used when there are higher demands on the cage rigidity and the bearing is determined for higher operational temperatures. Cages are radially centered on the rolling elements in bearings, this is the most usual way, or they are centered on the rib of either of the bearing rings.

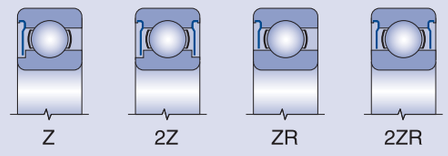
Bearings without cages, i.e. with full complement of rolling elements, are only rarely used, namely only for some bearing types, e.g. single row needle roller bearings.

In the texts about individual bearing types the survey of cages in standard design and delivery possibilities of bearings with cages of non-standard design are given in the section Cages.

2.6 Shields and Seals

Bearings with sealing on one or both sides are manufactured with shields (Z, 2Z, ZR, 2ZR) or seals (RS, 2RS, RSR, 2RSR).

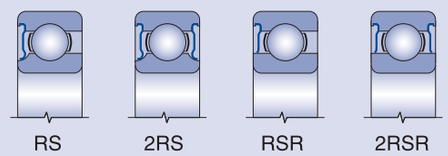
Shields form a non-contact sealing. In design Z and 2Z the fitting for the shield is in the inner ring, in design ZR and 2ZR the shield adheres on the smooth rib of the bearing inner ring.



Sealing is created by sealing rings made of rubber vulcanized on sheet steel reinforcement, which create an effective contact sealing with a chamfered fitting on the inner ring (RS, 2RS) as well as in design with contact on the smooth rib of the inner ring (RSR, 2RSR).

Seals and sealing rings are fastened in the grooves of the outer ring and are unseparable.

Sealing RS, 2RS, RSR, 2RSR can be used for temperature range -30°C to +110°C, sealing RS1, -2RS1,RSR1 and -2RSR1 for temperature range -45°C to +120°C, sealing RS2, -2RS2, RSR2, -RSR2 for temperature range -60°C to +180°C.



Bearings with sealings on both sides in standard design are filled with grease of a temperature range from -30°C to 110°C, whose qualities secure lubrication usually during the whole bearing life at normal operational conditions. Bearings in this design cannot be relubricated.

3. Bearing Arrangement Design

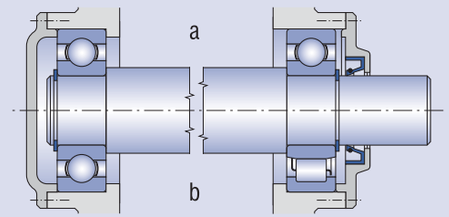
3.1 General Principles of Rolling Bearing Arrangement Design

Rotating shaft or another component arranged in rolling bearings is guided by them in radial as well as in axial direction so that the basic condition, the movement uniqueness, can be fulfilled. The component should be, as far as possible, statically determined, i.e. supported in two points radially and in one point axially.

A typical example of such an arrangement is in Pict. 9, where the shaft is radially guided in two bearings, one of which secures it in axial direction. The locating bearing carries the radial load and simultaneously also the axial load in both directions. Radial bearings that can accomodate combined load are mostly used as locating bearings, which carry, e.g. single row ball bearings, double row angular contact ball bearings, double row self aligning ball bearings, double row spherical roller bearings or single row angular contact ball bearings and tapered roller bearings. The two last mentioned bearing types must be mounted in pairs. The non-locating bearing carries only radial load and must permit certain displacement of the shaft in axial direction so that arising of non-desired axial preload caused by environment (temperature dillatations, production inaccuracies of connecting arrangement components, etc.) can be hindered.

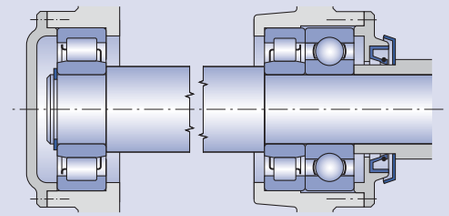
Axial displacement can be secured by displacement between one bearing ring and a machine part, which is directly connected with the bearing, e.g. between outer bearing ring and housing bore (Pict. 10a) or directly in the bearing (Pict.10b).

Pict. 10



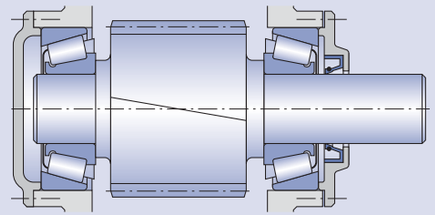
Arrangements, in which greater radial and axial loads act by higher rotational speed, should be set up so that the bearing can accommodate only radial or axial forces, see Pict. 11. In these cases it is possible to use for radial guidance some of the radial bearings and for axial guidance those radial bearings which are also able to carry axial load or a pair of these bearings, or double direction thrust bearing, or a pair of single direction thrust bearings. There is a condition where the axially locating thrust bearing should be arranged with radial clearance.

Pict. 11



Another, often used solution is the arrangement of two bearings, whose design enables the accommodation both radial and axial loads. Both bearings accommodate alternately the axial load, always according to direction of force acting, and simultaneously they carry also the radial load. An example of this arrangement is shown in Pict. 12.

Pict. 12



As a verified design the pair of single row tapered roller bearings or single row angular contact ball bearings are used. There can be used other bearing types which are able to carry the load both in radial and axial direction simultaneously, e.g. separable single row ball bearings or single row cylindrical roller bearings in NJ design, etc.

3.2 Bearing Location

Radial and axial bearing location on the shaft and in the housing bore or another part has a direct connection with the whole arrangement design. When selecting the way of location, the character and acting forces magnitude, the operating temperature in the arrangement and material of mating parts must be taken into account.

Mounting, dismounting and maintenance methods must be taken into consideration when designing mating parts dimensions.

3.2.1 Radial Location of Bearing

The bearing is located in radial direction on the mating cylindrical shaft and housing bore surface. In some cases, adapter or withdrawal sleeves are used by mounting on the shaft, or the bearing can be mounted directly on the tapered shaft.

The correct radial location of the bearing on the shaft significantly influences utilization of its load rating and correct function in arrangement. The following viewpoints are important:

a) safe location and uniform supporting of bearings
b) simple mounting and dismounting
c) displacement of non-locating bearing in axial direction

Basically, both bearing rings should be mounted in tight fits, because only in this way their reliable supporting around the whole periphery and radial fixing against turning can be achieved. To make mounting and dismounting easier or for moving the non-locating ring, a loose fit of one of the rings is permissible.

When selecting correct radial bearing location, following influences must be taken into account.

Circumferential Load occurs if the respective bearing ring rotates and the load direction is not changed or if the ring rotates and the load does not rotate. The bearing ring periphery is gradually loaded during one revolution. In this case the loaded bearing ring must be always fitted with necessary interference fit.

Point Load occurs when the bearing ring does not rotate and the external force is constantly directed into the same ring raceway point or if the ring and load rotate at the same rotating speed. The ring subjected to point load can be mounted with loose fit, if the conditions require it.

Indeterminate Load occurs if the ring is subjected to varying external forces at which directions and load changes cannot be determined (e.g. unbalanced mass, shocks, etc.). Under these conditions in most applications bearings with greater radial clearance should be used.

Load Magnitude directly influences selection of the interference fit (higher load - larger interference), especially in cases of impact loads. A firm fitting on the shaft or in the housing causes ring deformation, and as a result reduction of radial clearance arises. To secure the necessary radial clearance in the firm arrangement, it is necessary to use bearings with greater radial clerarance. Resulting clearance after mounting depends on the bearing type and its dimension.

Bearing Size and Type determines the size of necessary interference fit of the fitted ring. For smaller sized bearings smaller interference fits are selected, and vice versa. Relatively smaller interferences are used, e.g. for the same sizes of ball bearings in comparison with the cylindrical roller, tapered roller or spherical roller bearings.

Material and Design of Mating Components must be taken into account when determining their production tolerance. Results of practical experience are shown in the following tables. In cases where bearings are mounted into housings made of light metal alloys or on journals of hollow shafts, arrangements with higher interference are selected. Split housings are not suitable for arrangements with higher interferences, because there is danger of the bearing pinching in the dividing plane.

Heating generating in the bearing can cause loosening of the interference on the journal and turning of the ring. In the housing a converse case can come into being. The heating causes clearance decreasing and subsequently limiting and even stopping of the axial displacement of the non-locating bearing ring. That is why we pay a great deal of attention to this fact when designing an arrangement.

Fitting Accuracy from the point of view of its tolerances and geometric shapes is important because it can be transmitted towards the bearing ring raceways and defines the arrangement accuracy.

When using bearings with normal tolerance class, the tolerance of journal seating surface IT6 is selected, and for housing seating surface tolerance IT7.

For smaller dimensioned ball and cylindrical roller bearings it is possible to use for the journal tolerance IT5 and housing bore IT6.

For bearings in higher tolerance classes, for arrangements with high requirements on accuracy, e.g. spindels of machine tools, the least tolerance class IT5 is recommended for the shaft and for housing IT6.

Permissible ovality and conicity deviation and permissible lateral bearing runout of supporting surfaces must be in reference to axis smaller than the diameter tolerance of the journal and bore.

With higher bearing tolerance class also requirements on the seating surface accuracy increase. Recommended values are shown in tables 33 and 34.

Recommended Shape Accuracies of Bearing Seating Fits **Table 33**

Bearing Tolerance Class	Fitting Location	Permissible Ovality Deviation	Permissible Lateral Runout of Carrying Surfaces in Reference to Axis
P0, P6	shaft	$\frac{IT5}{2}$	IT3
	housing	$\frac{IT6}{2}$	IT4
P5, P4	shaft	$\frac{IT3}{2}$	IT2
	housing	$\frac{IT3}{2}$	IT3

Standard Tolerances IT2 to IT6 **Table 34**

Nominal Diameter over	to	Tolerance Class IT2	IT3	IT4	IT5	IT6
mm			µm			
6	10	1.5	2.5	4	6	9
10	18	2	3	5	8	11
18	30	2.5	4	6	9	13
30	50	2.5	4	7	11	16
50	80	3	5	8	13	19
80	120	4	6	10	15	22
120	180	5	8	12	18	25
180	250	7	10	14	20	29
250	315	8	12	16	23	32
315	400	9	13	18	25	36
400	500	10	15	20	27	40

Mounting and Dismounting bearings

if one of the rings is arranged with a loose fit it is simple. If, because of operational reasons, it is necessary to arrange both of the rings with an interference, a suitable bearing type should be selected, e.g. a separable bearing (tapered roller, cylindrical roller, needle roller bearing) or a bearing with tapered bore. Journals for sleeve arrangements of bearings with tapered bore can be in tolerance class h9 or h10, geometric shape should be in tolerance class IT5 or IT7 according to arrangement requirements.

Axial Displacement of Non-Locating Bearing Rings

must be secured by all operation conditions. When using a non-separable bearing, displacement of the stationary loaded ring is reached by its fitting with clearance (moveable).

In light metal alloy housings it is necessary, if the outer ring is fitted with clearance, to put a steel bush in the bore.

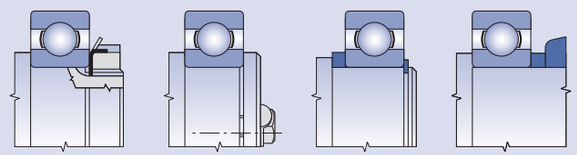
A reliable displacibility in axial direction is reached by using cylindrical roller bearing type N and NU or radial needle bearing.

Recommended journal and bore diameter tolerances of the mating components for radial and thrust bearings are shown in tables 35 to 40.

3.2.2 Axial Securing of Bearing

Inner bearing ring with cylindrical bore arranged on the journal with interference fit (fixed) is usually secured in the axial direction by means of a locknut, end-plate or snap ring, when the other face is usually supported by the shaft shoulder. Surrounding parts are used as abutment faces for inner rings, and if necessary, spacing rings are inserted between this component and bearing inner ring. Examples of axial bearing securing are shown in Pict.13.

Pict. 13



Radial Bearing Shaft Diameter Tolerances (Valid for Solid Steel Shafts) **Table 35**

Operating Conditions	Arrangement Examples	Journal Diameter [mm] Ball Bearings	Cylindrical, Needle [1] Tapered Roller Bearings	Spherical Roller Bearings	Tolerance
Inner Ring Point Load					
Light and Normal Load $P_r \leq 0,15\ C_r$	Free wheels, sheaves, belt pulleys	All Diameters			g6 [2]
Heavy Impact Load $P_r > 0,15\ C_r$	Industrial truck wheels, tension pulleys	All Diameters			h6
Inner Ring Circumferential Load or Indeterminite Load					
Light and Variable Load $P_r \leq 0,07\ C_r$	transport equipments, ventilators	(18) to 100 (100) to 200	≤ 40 (40) to 140	- -	j6 k6
Normal and Heavy Load $P_r > 0,07\ C_r$	General engineering, electric motors, turbines, pumps, combustion motors, gear boxes, woodworking machines	≤ 18 (18) to 100 (100) to 140 (140) to 200	- ≤ 40 (40) to 100 (100) to 140 (140) to 200 > 200	- ≤ 40 (40) to 65 (65) to 100 (100) to 140 >140	j5 k5 (k6) [3] m5 (m6) [3] m6 n6 p6
Extremely Heavy Load, Impacts, Complicated Operating Conditions $P_r > 0,15\ C_r$	Axle bearings for railway vehicles, traction motors, rolling mills	- - -	(50) to 140 (140) to 500 > 500	(50) to 100 (100) to 500 > 500	n6 [4] p6 [4] r6 (p6) [4]
High Arrangement Accuracy under Light Load $P_r \leq 0,07\ C_r$	Machine tools	≤ 18 (18) to 100 (100) to 200	- ≤ 40 (40) to 140 (140) to 200	- - - -	h5 [5] j5 [5] k5 [5] m5
Exclusively Axial Load		All Diameters			j6
Bearings with Tapered Bore and Adapter or Withdrawal Sleeve					
All Kinds of Load	General arrangements, axle bearings	All Diameters			h9/IT5
	for railway vehicles. Not complicated arrangements	All Diameters			h10/IT7

[1] Tolerances for needle roller bearings without rings.
[2] Tolerance f6 can be selected for securing axial displacibility
[3] Tolerances in brackets are selected usually for single row tapered roller bearings or at low rotational speeds where tolerance dispersion is not significant
[4] It is necessary to use bearings with higher radial clearance than normal
[5] Tolerances for single row ball bearings in tolerance classes P5 and P4 are shown on page 32 and 33 .

Housing Bore Diameter Tolerances for Radial Bearings
(Valid for Steel, Cast and Cast Steel Housings) **Table 36**

Operating Conditions	Displacibility of Outer Ring	Housing	Arrangement Examples	Tolerance
Outer Ring Circumferential Load				
Heavy Impact Load $P_r > 0.15\ C_r$ Thin Walled Housings	not displacable	one-part	Wheel hubs with cylindrical roller bearings, big end bearings	P7
Normal and Heavy Load $P_r > 0.07\ C_r$	not displacable		Wheel hubs with ball bearings, crane travel wheels, crankshaft bearings	N7
Light and Variable Load $P_r \leq 0.07\ C_r$	not displacable		Conveyor rollers, tension pulleys	M7
Indeterminate Load				
Heavy Impact Load $P_r > 0.15\ C_r$	not displacable	one-part	Traction motors	M7
Heavy and Normal Load $P_r > 0.07\ C_r$	As a rule, not displacable		Electric motors, pumps, crankshafts	K7
Light and Varying Load $P_r \leq 0.07\ C_r$	As arule, displacable		Electric motors, pumps, ventilators, crankshafts	J7
Accurate Arrangement				
Light Load $P_r \leq 0.07\ C_r$	As a rule, not displacable	one-part	Cylindrical roller bearings for machine tools ball bearings for	K6 [1]
	Displacable		machine tools.	J6 [2]
	Easily displacable		Small electric motors	H6
Outer Ring Point Load				
Any Load	Easily displacable	o ne-part or two-part	General engineering, axle bearings of railway vehicles	H7 [3]
Light and Normal Load $P_r \leq 0.15\ C_r$			General engineering, less complicated engineering	H8
			Drying rollers of paperworking machines, big electric motors	G7 [4]

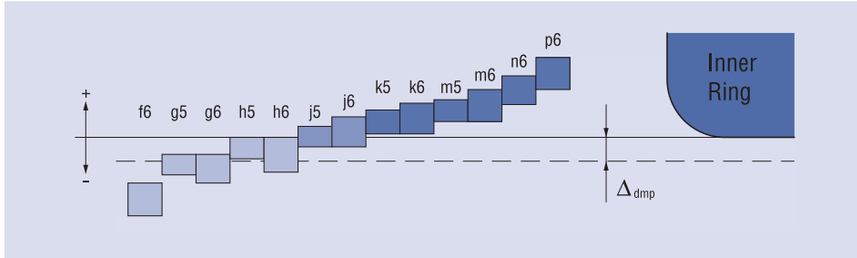
[1] For heavy loads tighter tolerances are selected - M6 or N6. For cylindrical roller bearings with tapered bore tolerances K5 or M5.
[2] Tolerances for single row ball bearings in tolerances P5 and P4 - see page 32 and 33.
[3] For bearings with outer diameter D < 250 mm, with temperature difference between outer ring and housing over 10°C, tolerance G7 is selected
[4] For bearings with outer diameter D > 250 mm, with temperature difference between outer ring and housing over 10°C, tolerance F7 is selected

Journal Diameter Tolerance for Thrust Bearings **Table 37**

Bearing Type	Load		Journal Diameter [mm]	Tolerance
Thrust Ball Bearings	Exclusively Axial Load		All Diameters	j6
Diameters Thrust Spherical Roller Bearings	Exclusively Axial Load		All Diameters	j6
	Simultaneously Axial and Radial Loads	Stationary Load of Shaft Washer or Indeterminate Load	All Diameters	j6
		Rotating Load of Shaft Washer	≤ 200 (200) to 400 > 400	k6 m6 n6

Housing Bore Diameter Tolerances for Thrust Bearings **Table 38**

Bearing Type	Load		Note	Tolerance
Thrust Ball Bearings arrangements housing	Exclusively Axial Load		In common washer can have clearance	H8
			Housing washer mounted with radial clearance	-
Thrust Spherical Roller Bearings	Simultaneously Axial and Radial Load	Stationary Load or Indeterminate Load of Housing Washer		H7
		Rotating Load of Housing Washer		M7



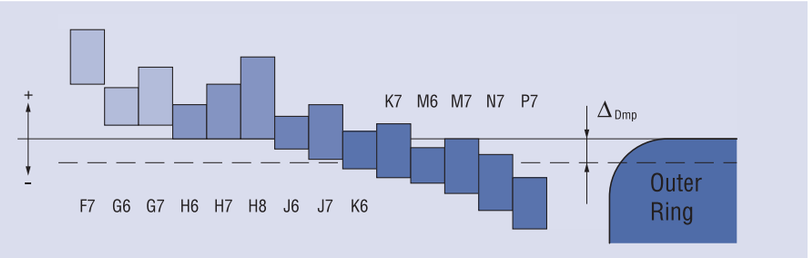
Journal Diameter Tolerance Limiting Deviations

Table 39

Journal Nominal Diameter		f6		g5		g6		h5		h6		j5		j6(J_s6)		k5	
over	to	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower
mm		µm															
1	3	-6	-12	-2	-6	-2	-8	0	-4	0	-6	+2	-2	+4	-2	+4	0
3	6	-10	-18	-4	-9	-4	-12	0	-5	0	-8	+3	-2	+6	-2	+6	+1
6	10	-13	-22	-5	-11	-5	-14	0	-6	0	-9	+4	-2	+7	-2	+7	+1
10	18	-16	-27	-6	-14	-6	-17	0	-8	0	-11	+5	-3	+8	-3	+9	+1
18	30	-20	-33	-7	-16	-7	-20	0	-9	0	-13	+5	-4	+9	-4	+11	+2
30	50	-25	-41	-9	-20	-9	-25	0	-11	0	-16	+6	-5	+11	-5	+13	+2
50	80	-30	-49	-10	-23	-10	-29	0	-13	0	-19	+6	-7	+12	-7	+15	+2
80	120	-36	-58	-12	-27	-12	-34	0	-15	0	-22	+6	-9	+13	-9	+18	+3
120	180	-43	-68	-14	-32	-14	-39	0	-18	0	-25	+7	-11	+14	-11	+21	+3
180	250	-50	-79	-15	-35	-15	-44	0	-20	0	-29	+7	-13	+16	-13	+24	+4
250	315	-56	-88	-17	-40	-17	-49	0	-23	0	-32	+7	-16	+16	-16	+27	+4
315	400	-62	-98	-18	-43	-18	-54	0	-25	0	-36	+7	-18	+18	-18	+29	+4
400	500	-68	-108	-20	-47	-20	-60	0	-27	0	-40	+7	-20	+20	-20	+32	+5
500	630	-76	-120	-	-	-22	-66	-	-	0	-44	-	-	+22	-22	-	-
630	800	-80	-130	-	-	-24	-74	-	-	0	-50	-	-	+25	-25	-	-
800	1000	-86	-142	-	-	-26	-82	-	-	0	-56	-	-	+28	-28	-	-
1000	1250	-98	-164	-	-	-28	-94	-	-	0	-66	-	-	+33	-33	-	-

Journal Nominal Diameter		k6		m5		m6		n6		p6		h9[1)]		IT5	h10[1)]		IT7
over	to	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower		upper	lower	
mm		µm															
1	3	+6	0	+6	+2	+8	+2	+10	+4	+12	+6	0	-25	4	0	-40	10
3	6	+9	+1	+9	+4	+12	+4	+16	+8	+20	+12	0	-30	5	0	-48	12
6	10	+10	+1	+12	+6	+15	+6	+19	+10	+24	+15	0	-36	6	0	-58	15
10	18	+12	+1	+15	+7	+18	+7	+23	+12	+29	+18	0	-43	8	0	-70	18
18	30	+15	+2	+17	+8	+21	+8	+28	+15	+35	+22	0	-52	9	0	-84	21
30	50	+18	+2	+20	+9	+25	+9	+33	+17	+42	+26	0	-62	11	0	-100	25
50	80	+21	+2	+24	+11	+30	+11	+39	+20	+51	+32	0	-74	13	0	-120	30
80	120	+25	+3	+28	+13	+35	+13	+45	+23	+59	+37	0	-87	15	0	-140	35
120	180	+28	+3	+33	+15	+40	+15	+52	+27	+68	+43	0	-100	18	0	-160	40
180	250	+33	+4	+37	+17	+46	+17	+60	+31	+79	+50	0	-115	20	0	-185	46
250	315	+36	+4	+43	+20	+52	+20	+66	+34	+88	+56	0	-130	23	0	-210	52
315	400	+40	+4	+46	+21	+57	+21	+73	+37	+98	+62	0	-140	25	0	-230	57
400	500	+45	+5	+50	+23	+63	+23	+80	+40	+108	+68	0	-155	27	0	-250	63
500	630	+44	0	-	-	+70	+26	+88	+44	+122	+78	0	-175	30	0	-280	70
630	800	+50	0	-	-	+80	+30	+100	+50	+138	+88	0	-200	35	0	-320	80
800	1000	+56	0	-	-	+90	+34	+112	+56	+156	+100	0	-230	40	0	-360	90
1000	1250	+66	0	-	-	+106	+40	+132	+66	+186	+120	0	-260	46	0	-420	105

[1)] For journals made in tolerance h9 and H10 for bearings with adapter or withdrawal sleeves deviations of roundness and cylindricity must not exceed basic tolerances IT5 and IT7



Bore Diameter Tolerance Limiting Deviations

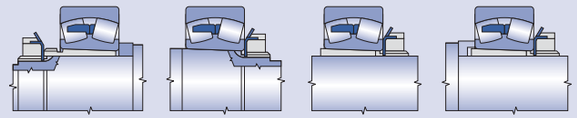
Table 40

Bore Nominal Diameter		F7		G6		G7		H6		H7		H8		J6(J_s6)	
over	to	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower
mm		µm													
6	10	+28	+13	+14	+5	+20	+5	+9	0	+15	0	+22	0	+5	-4
10	18	+34	+16	+17	+6	+24	+6	+11	0	+18	0	+27	0	+6	-5
18	30	+41	+20	+20	+7	+28	+7	+13	0	+21	0	+33	0	+8	-5
30	50	+50	+25	+25	+9	+34	+9	+16	0	+25	0	+39	0	+10	-6
50	80	+60	+30	+29	+10	+40	+10	+19	0	+30	0	+46	0	+13	-6
80	120	+71	+36	+34	+12	+47	+12	+22	0	+35	0	+54	0	+16	-6
120	180	+83	+43	+39	+14	+54	+14	+25	0	+40	0	+63	0	+18	-7
180	250	+96	+50	+44	+15	+61	+15	+29	0	+46	0	+72	0	+22	-7
250	315	+108	+56	+49	+17	+69	+17	+32	0	+52	0	+81	0	+25	-7
315	400	+119	+62	+54	+18	+75	+18	+36	0	+57	0	+89	0	+29	-7
400	500	+131	+68	+60	+20	+83	+20	+40	0	+63	0	+97	0	+33	-7
500	630	+146	+76	+66	+22	+92	+22	+44	0	+70	0	+110	0	+22	-22
630	800	+160	+80	+74	+24	+104	+24	+50	0	+80	0	+125	0	+25	-25
800	1000	+176	+86	+82	+26	+116	+26	+56	0	+90	0	+140	0	+28	-28
1000	1250	+203	+98	+94	+28	+133	+28	+66	0	+105	0	+165	0	+33	-33
1250	1600	+235	+110	+108	+30	+155	+30	+78	0	+125	0	+195	0	+39	-39

Bore Nominal Diameter		J7(J_s7)		K6		K7		M6		M7		N7		P7	
over	to	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower
mm		µm													
6	10	+8	-7	+2	-7	+5	-10	-3	-12	0	-15	-4	-19	-9	-24
10	18	+10	-8	+2	-9	+6	-12	-4	-15	0	-18	-5	-23	-11	-29
18	30	+12	-9	+2	-11	+6	-15	-4	-17	0	-21	-7	-28	-14	-35
30	50	+14	-11	+3	-13	+7	-18	-4	-20	0	-25	-8	-33	-17	-42
50	80	+18	-12	+4	-15	+9	-21	-5	-24	0	-30	-9	-39	-21	-51
80	120	+22	-13	+4	-18	+10	-25	-6	-28	0	-35	-10	-45	-24	-59
120	180	+25	-14	+4	-21	+12	-28	-8	-33	0	-40	-12	-52	-28	-68
180	250	+30	-16	+5	-24	+13	-33	-8	-37	0	-46	-14	-60	-33	-79
250	315	+36	-16	+5	-27	+16	-36	-9	-41	0	-52	-14	-66	-36	-88
315	400	+39	-18	+7	-29	+17	-40	-10	-46	0	-57	-16	-73	-41	-98
400	500	+43	-20	+8	-32	+18	-45	-10	-50	0	-63	-17	-80	-45	-108
500	630	+35	-35	0	-44	0	-70	-26	-70	-26	-96	-44	-114	-78	-148
630	800	+40	-40	0	-50	0	-80	-30	-80	-30	-110	-50	-130	-88	-168
800	1000	+45	-45	0	-56	0	-90	-34	-90	-34	-124	-56	-146	-100	-190
1000	1250	+52	-52	0	-66	0	-105	-40	-106	-40	-145	-66	-171	-120	-225
1250	1600	+62	-62	0	-78	0	-125	-48	-126	-48	-173	-78	-203	-140	-265

Examples of axial locating of bearings with tapered bore seated directly on the tapered journal or by means of an adapter or withdrawal sleeve are in Pict. 14.

Pict. 14



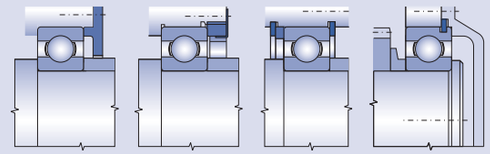
Permissible bearing axial load fixed by an adapter sleeve on smooth shafts without bearing resting on the shaft shoulder is calculated according to equation:

$$F_a = 3Bd$$

Fa	- permissible bearing axial load	[N]
B	- bearing width	[mm]
d	- bearing bore diameter	[mm]

If the axial displacement of the outer ring in the housing is not required, then we can use solution, when the face supporting or seating surface of the bearing cover, nut or snap ring are used. Bearings with grooves for snap ring (NR) do not require much space and their securing is simple. Examples - see Pict. 15.

Pict. 15



Abutment dimensions for each bearing shown in this publication are in the dimension tables.

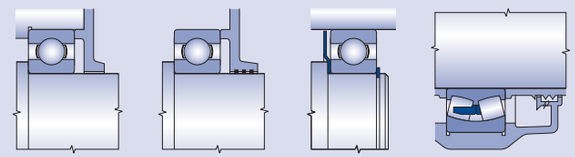
3.3 Sealing

Sealing of the bearing space is very important, because damaging materials which can be found in the bearing environment influence it and often can cause its breakdown. Sealing also has an opposite function - it prevents the lubricant leaking out of the bearing and arrangement space. That is why sealing must always be designed with regard to operating conditions of machines or equipments, arrangement design, lubricating method, maintenance possibility and economic questions concerning production and utilization.

3.3.1 Non-Contact Sealing

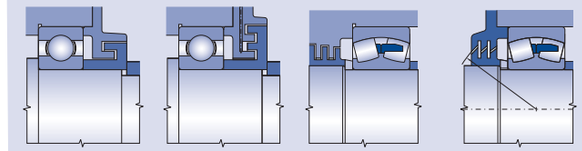
Between non-rotating and rotating parts there is only a narrow gap when using this sealing. It is filled with grease. Using this sealing, wear of components from friction does not occur and that is why this sealing can be used for the highest rotational speeds and for high operating temperatures. Examples of a gap sealing are in Pict. 16.

Pict. 16



Another very effective sealing is the labyrinth sealing which can improve the sealing effect by a greater number of labyrinths or prolongation of sealing gaps. Examples - see Pict. 17.

Pict. 17

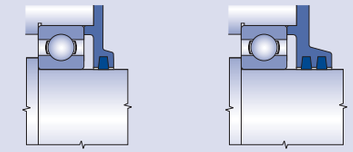


3.3.2 Rubber Sealing

Rubbing sealing is created of elastic or soft, but sufficiently impermiable material, which is inserted between the rotating and firm part. Such a sealing is usually cheap and is suitable for various designs. The disadvantage is the sliding friction of the contacting surfaces, and therefore there is limited utilization for high rotational speeds.

Sealing with a felt ring is the simplest (Pict. 18). It is suitable for operating temperature -40° to +160°C and for peripheral speeds to 7 $m.s^{-1}$ and sliding surface roughness max. R_a = 0,16, hardness min. 45 HRC or hard chromium plating. Dimensions of the felt rings are given by corresponding national standards.

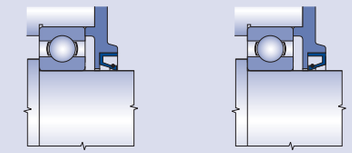
Pict. 18



A very wide-spread way of sealing is sealing with shaft washers (Pict. 19). Radial shaft seal washers are made of rubber or other suitable plastic reinforced by steel sheet reinforcement. According to the material used they are suitable for operating temperature from -30° to +160°C. Permissible peripheral speed depends on sliding surface roughness:

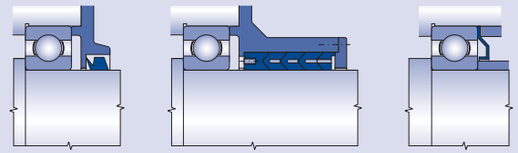
- to 2 $m.s^{-1}$ is roughness max. R_a = 0.8
- to 4 $m.s^{-1}$ is roughness max. R_a = 0.4
- to 12 $m.s^{-1}$ is roughness max. R_a = 0.2

Pict. 19



Except for mentioned most commonly used sealing rings there are rubbing sealing designs which use the just formed sealing rings made of rubber, plastic, etc., or special spring rings. This sealing is chosen either for applications with high requirements on bearing space sealing (great environment pollution, high temperature, chemical substance influence), or for economic reasons by mass or series production. Examples - see Pict. 20.

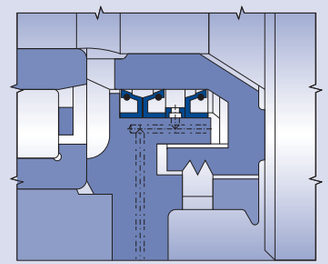
Pict. 20



3.3.3 Combined Sealing

Increase sealing effect can be reached by non-contact and rubbing sealing combination. Such a sealing is recommended for wet and polluted environment. Example - see Pict. 21.

Pict. 21



4. Bearing Lubrication

The correct bearing lubrication has a direct influence on the bearing life. Lubricant creates between the rolling element and bearing ring a carrying lubricating film which hinders their metal contact. It lubricates surfaces where friction arises, it has cooling effect, it protects the bearing from corrosion and in many cases seals the bearing space.

In the most cases - approximately 90%, bearings are lubricated with grease or oil, in rare exceptions by other lubricating means. When deciding which lubricant and which lubrication type should be used, operating conditions, characteristic qualities of the lubricant, equipment design and operating economy should be taken into account.

4.1 Grease Lubrication

In the design practice grease lubrication is preferred to oil lubrication from the point of view of arrangement simplicity, utilization of the sealing capabilities and simple maintenance.

For reliable bearing operation 1/3 to 1/2 of its free space is filled with grease at the first assembly. A greater grease amount has negative influence on the operation. Higher passive resistances cause the inner bearing space warming up undesirably, which can lead to its breakdown. Bearings making only a small number of revolutions during operation, from the point of view of corrosion protection should be completely filled.

4.1.1 Relubrication Interval

Relubrication interval is the period during which the grease has the necessary lubricating properties. After this period bearing must be relubricated, and old lubricant must be removed from the bearing space completely.

Relubricating period depends on the bearing type and size, rotational speed, operating temperature and grease quality. The recommended relubrication period for individual bearing types at normal load ($P \leq 0.15\ C$) and normal operational conditions is shown in diagrams in Pict. 22 and 23. The diagrams are valid for common greases and temperatures to +70°C. For temperatures over +70°C, the relubrication period is shortened for each 15°C on the half of original value. For temperatures under +40°C the relubrication period can be doubled.

For small sized, especially single row ball bearings, the relubrication periods are several times longer than the bearing life, that is why the bearings are, as a rule, not relubricated.

For this reason it is advantageous to use these bearings shielded or sealed on both sides and filled with grease. For some rotational speeds the relubrication period is out of the diagram curve, i.e. the permissible limit for grease lubrication has been reached and oil lubrication should be used.

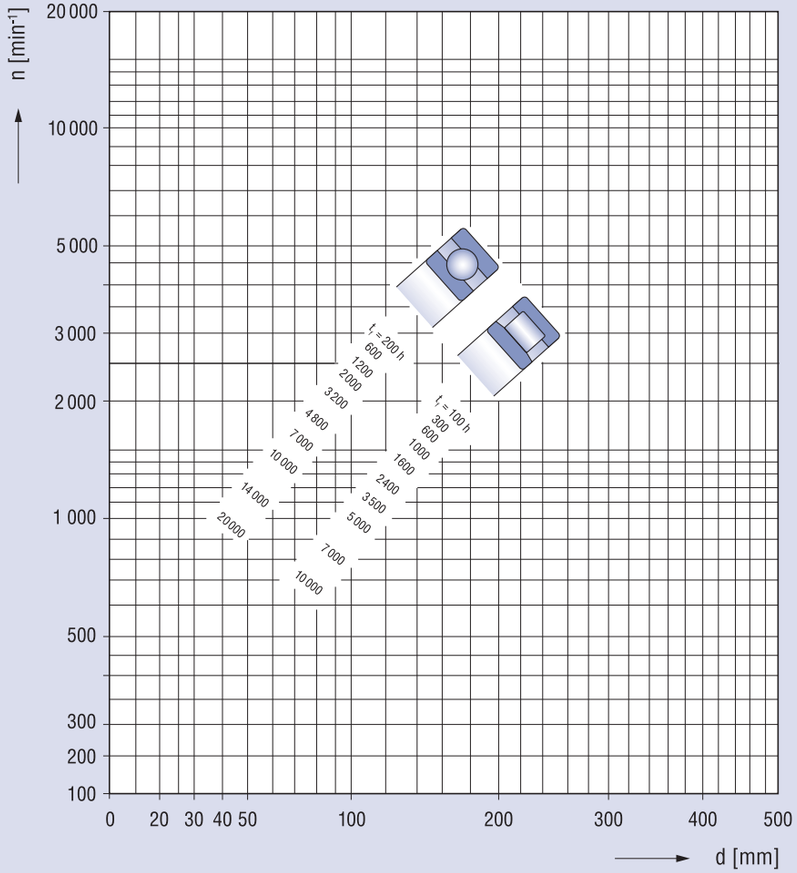
Necessary grease quantity for relubrication is calculated from the equation:

$$Q = 0.005\ DB$$

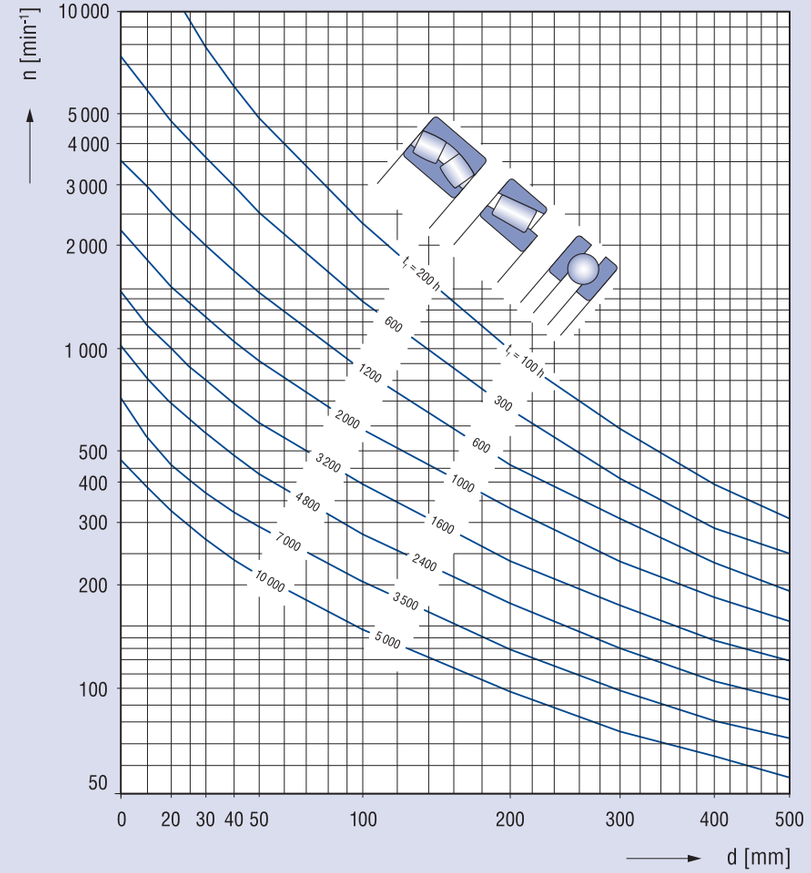
Q	- grease quantity	[g]
D	- bearing outer diameter	[mm]
B	- bearing width	[mm]

For bearings with higher rotational speed requiring a more frequent relubrication, it is necessary to remove the used lubrication from the bearing space so that temperature increase should not occur. For this reason the grease escape valve is suitable.

Pict. 22



Pict. 23



4.1.2 Bearing Greases

Bearing greases are produced most often of quality mineral or synthetic oils (sometimes with additives), thickened with fatty acid metallic soaps. Greases must have good lubricating properties and high chemical, temperature and mechanical stability. The grease list of bearing lubricants is in Table 41.

Rolling Bearing Grease Properties **Table 41**

Kind of Grease		Properties		
Thickening Application Agent	Basic Oil	Operating Temperature Extent [°C]	Resistance against Water	Using
lithium soap	mineral	-20 ÷ 130	resistant	multi-purpose lubricant
lime soap	mineral	-20 ÷ 50	high resistance	good sealing effect against water
soda soap	mineral	-20 ÷ 100	irresistant	emulsifies with water
aluminium soap	mineral	-20 ÷ 70	resistant	good sealing effect against water
complex lithium soap	mineral	-20 ÷ 150	resistant	multi-purpose lubricant
complex lime soap	mineral	-30 ÷ 130	high resistance	multi-purpose lubricant suitable for higher temperatures and load
complex soda soap	mineral	-20 ÷ 130	resistant	suitable for higher temperature and load
complex aluminium soap		-20 ÷ 150	mineral	suitable for higher temperature and load
complex barium soap	mineral	-30 ÷ 140	resistant	suitable for higher temperature and load
bentonite	mineral		resistant	suitable for high temperatures at low rotational speed
polyurea	mineral	-20 ÷ 160	resistant	suitable for high temperatures at medium rotational speed
lithium soap	silicon	-40 ÷ 170	high resistance	suitable for wide temperature range at medium rotational speed
complex barium soap	ester	-60 ÷ 140	resistant	suitable for higher temperatures and higher rotational speeds

4.2 Oil Lubrication

Oil lubrication is used, when operating rotational speed is so high that the grease relubrication period is too short. Another reason can also be the necessity of heat transfer from the bearing, or the high temperature of environment, which does not enable utilization of grease, or if surrounding parts are already lubricated by oil (e.g. geared wheels in the gear box). Except for some cases, spherical roller thrust bearings are always lubricated by oil.

When oil lubricating, lubricating must be secured both at starting and during operation. Excess oil increases temperature and bearing temperature.

Oil feed into bearing is secured in various design ways, out of which oil bath lubrication with oil level reaching middle of the lowest rolling element, oil circulation lubrication, jet lubrication, oil mist lubrication etc., are the most common.

4.2.1 Bearing Oils

For bearing lubrication mostly refined oils with good chemical stability which can be improved by antioxidizing agents are used.

The decisive oil property is kinematic viscosity which decreases with increasing temperature. Suitable oil viscosity ν_1 can be stated according to the diagram in Pict. 23 in dependence on the bearing mean diameter $d_S = (d+D)/2$ and rotational speed n. If the operating temperature is known or it can be found out, according to the diagram in Pict. 24 suitable oil and viscosity ν at internationally standardized temperature 40°C being necessary for calculation of ratio χ is determined.

By ratio $\chi < 1$ it is recommended to use EP oil with additives which improve the oil film load rating. By value χ decrease under 0.4 oils with EP additives are always used.

If the ratio χ is greater than 1, improved arrangement reliability is reached in operation.

Example :

- bearing d = 180 mm, D = 320 mm, d_S = 250 mm
- rotational speed n = 500 min^{-1}
- presumed operating temperature 60°C

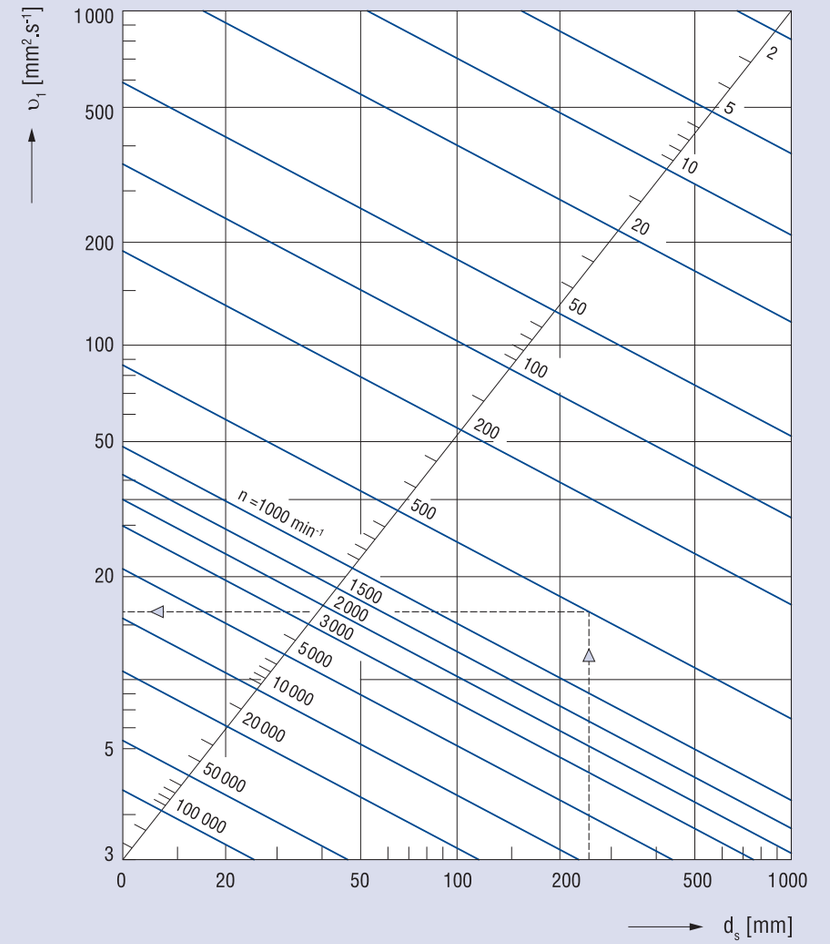
For these conditions according to diagram in Pict. 24 the minimum kinematic viscosity is $\upsilon_1 = 17\ mm^2.s^{-1}$.

If the operating temperature is 60°C, the oil selected according to the diagram in Pict. 25 at standardized temperature 40°C must have kinematic viscosity υ min. 35 $mm^2.s^{-1}$.

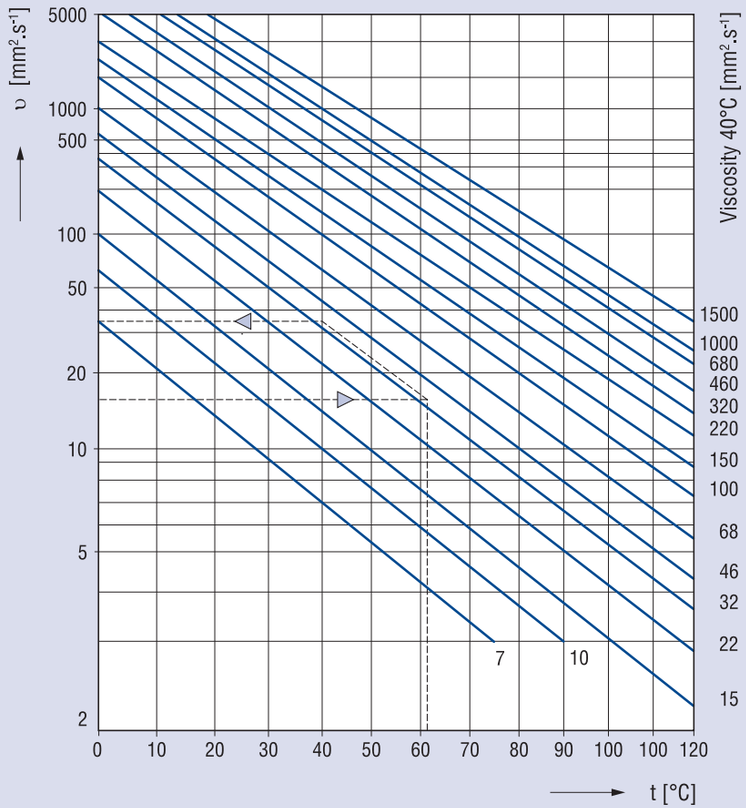
4.3 Lubrication with Solid Lubricants

Solid lubricants are used for bearing lubrication when the grease or oil cannot fulfil the requirements for reliable lubrication in conditions of limiting friction or from the viewpoint of high operating temperatures, chemical influences, etc.

Pict. 24



Pict. 25



5. Mouting and Dismouting Rolling Bearings

A very important requirement besides using the suitable mounting or dismounting tool is to make sure these tools are clean and the whole operation can be carried out in clean working environment. If this is not fulfilled, the impuritues have decisive influence on the bearing behaviour in operation and can also cause bearing breakdown. In the same way the cleanliness conditions must be fulfilled by the preparation of all lubricating means and components connected with the arrangement.

New bearings are preserved by manufacturer with preservatives which need not be removed before mounting. Bearings should be taken out just before mounting. Rarely the preservative is removed from the bearing. For this operation are used: - gas with 5 to 10% oil additive
- benzol, - diesel fuel, - water-free oil

After washing the bearing should be oiled, preserved from pollution and mounted as soon as possible.

Before mounting, the seating surfaces dimensions should be checked for cleanliness or damage.

Mounting Bearings with Cylindrical Bore

Bearings with cylindrical bore are mounted on the shaft at room temperature or heated. Dimensionally smaller bearings are mostly mounted at room temperature.

The force necessary for mounting is reached by hammer blows or more suitably by press. In both cases mounting jig is used. At mounting it is not permissible to transfer the mounting force through rolling elements. That is why the jig must always be placed on the ring or both rings being mounted while the mounting force is acting.

Heat mounting is used for greater bearings whose rings are fitted with a greater interference. Maximum heating temperature of the bearing is 100°C.

Mounting Bearings with Tapered Bore

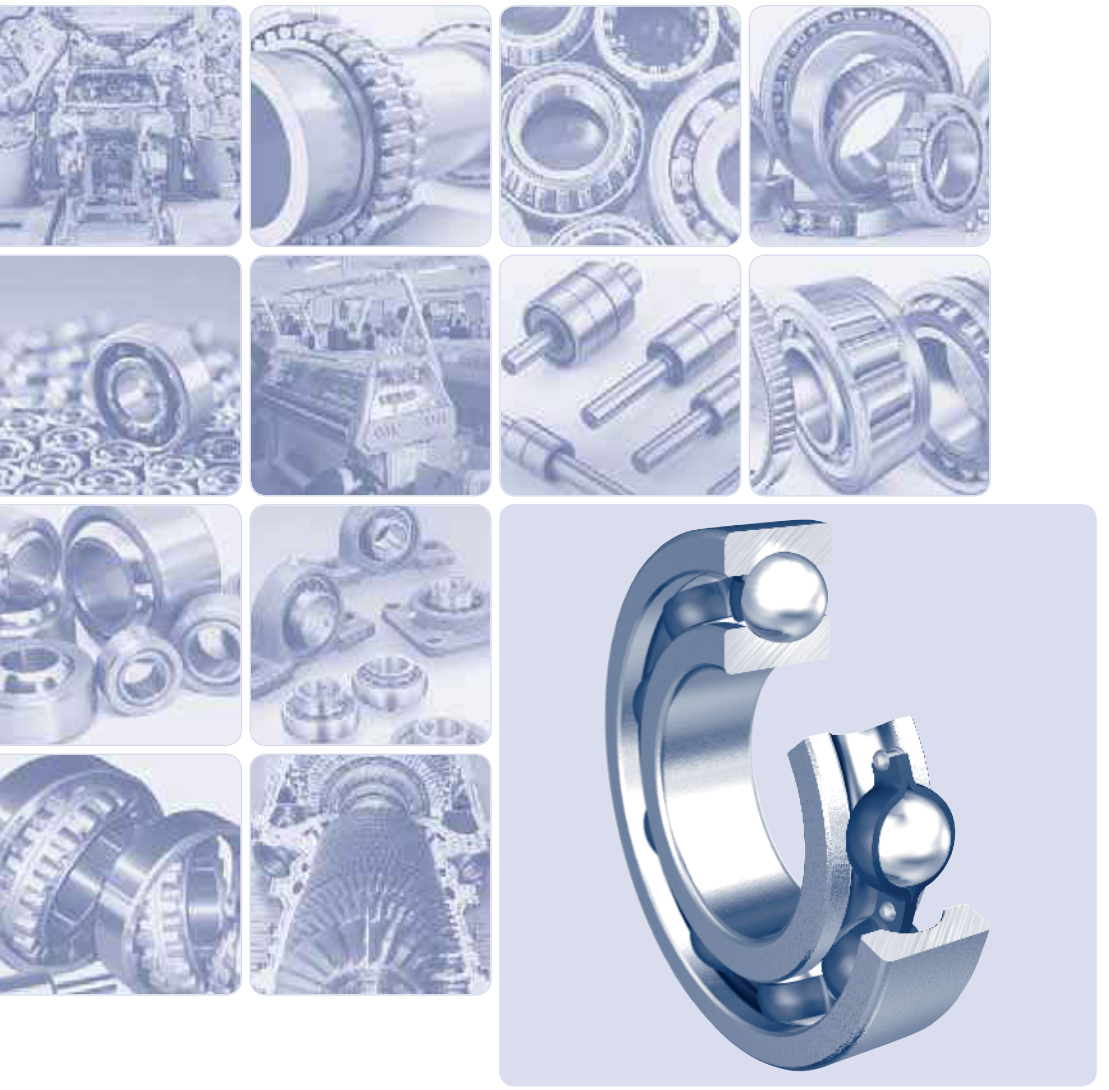
Bearings with a tapered bore are mounted on the shaft by means of adapter or withdrawal sleeves or are seated directly on the tapered journal. Reliable mounting is reached either by pressing the inner ring by a nut, or by sufficient inserting of the sleeve. In both cases the inner ring expands and bearing radial clearance decreases.

When mounting double row self aligning ball bearings the adapter sleeve nut can be tightened, but only to such an extent that the outer ring can be easily turned and swivelled.

6. Standards

Survey of national and international standards utilized by design, production, warehousing and sales of bearings:

- ISO 15 Rolling bearings Radial bearings Boundary dimensions, general plan.
- ISO 76 Rolling bearings. Static load ratings.
- ISO 104 Rolling bearings. Thrust bearings. Boundary dimensions, general plan.
- ISO 199 Rolling bearings. Thrust bearings. Geometrical product specification (GPS) and tolerance values.
- ISO 246 Rolling bearings. Cylindrical roller bearings, separate thrust collars. Boundary dimensions.
- ISO 281 Rolling bearings. Dynamic load ratings and rating life.
- ISO 355 Rolling bearings. Tapered roller bearings. Boundary dimensions and series designations.
- ISO 464 Rolling bearings. Radial bearings with locating snap ring. Dimensions, geometrical product specifications (GPS) and tolerance values.
- ISO 492 Rolling bearings. Radial bearings. Geometrical product specifications (GPS) and tolerance values.
- ISO 5753-1 Rolling bearings. Internal clearance. Part 1: Radial internal clearance for radial bearings.
- ISO 582 Rolling bearings. Chamfer dimensions. Maximum values.
- ISO 2982-1 Rolling bearings. Accessories. Part 1: Dimensions for adapter sleeve assemblies and withdrawal sleeves.
- ISO 2982-2 Rolling bearings. Accessories. Part 2: Dimensions for locknuts and locking devices.
- ISO 3228 Rolling bearings. Cast and pressed housings for insert bearings. Boundary dimensions and tolerances.
- ISO 3290-1 Rolling bearings. Balls. Part 1: Steel balls.
- ISO 9628 Rolling bearings. Insert bearings and eccentric locking collars. Geometrical product specifications (GPS) and tolerance values.
- ISO 12240-1 Spherical plain bearings. Part 1: Radial spherical plain bearings.
- EN 12080 Railway applications. Axleboxes. Rolling bearings.
- EN 12082 Railway applications. Axleboxes. Performance testing UIC 515-5 Powered and trailing stock. Bogies. Running gear. Tests for axle-boxes.



Single Row Deep Groove Ball Bearings

Single Row Deep Groove Ball Bearings

Single Row Deep Groove Ball Bearings

The single row deep groove ball bearings have relatively deep raceways on both rings without a filling slot and are non-separable. High load ratings are achieved by optimum ball sizes and by their conformity to the raceways. They can carry axial and radial loads in both directions and are suitable even for high rotational speeds. These bearings are manufactured in a broad assortment and are the most common rolling bearing type.

The table section are processed basic bearing parameters for the following subgroups:

Miniature Bearings
Thin walled Bearings 618 and 619 Series
Standard assortment 160, 60, 62, 63 and 64 Series
Bearings with Snap Ring Groove on Outer Ring

The outer ring with one rib of separable single row ball bearings, types E and BO, is designed so that the inner ring with a cage and rolling elements can be mounted separately. The bearings are manufactured with a bore diameter up to d = 180 mm and are suitable for lighter loads and high-speed applications.

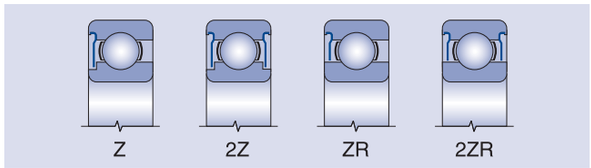
Boundary Dimensions

Boundary dimensions of the single row deep groove ball bearings given in the dimension tables with the exception of separable single row ball bearings of types E and BO, correspond to the international standard ISO 15. The snap ring groove dimensions comply with the international standard ISO 464.

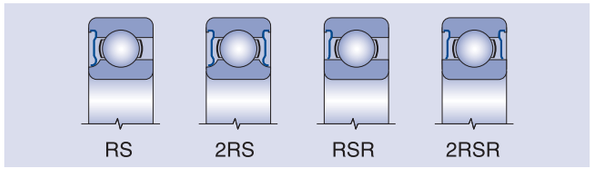
Bearings with Shields or Seals

The single row deep groove ball bearings with sealing on one or on both sides are manufactured with metallic shields (Z, -2Z or ZR, -2ZR) or with seals (RS, -2RS or RSR, -2RSR).

Bearings with shields have a non-contact sealing. The bearings are manufactured in the original design with steps for shields on the inner ring (Z, -2Z) or, in the new design, with a shield and a smooth rib on the inner ring (ZR, -2ZR).



The sealing rings made of rubber, vulcanized on metallic reinforced rings, provide an effective friction type seal. The bearings are manufactured in the design with rounded steps on the inner ring (RS, 2RS) or, in a new design, with a seal and a smooth rib on the inner ring (RSR, -2RSR).



Bearings with seals can be used within the temperature range from -30°C to 110°C.

Supplies of bearings with seals within the operating temperature range from -60°C to 180°C (RS2, 2RS2) should be negotiated with the supplier in advance.

Shields and seals are firmly fixed in the groove of the outer ring and these are not removable.

Bearings with sealings on both sides (-2Z, -2RS or -2ZR, -2RSR) are filled with a quality grease the properties of which usually ensure the lubrication during the whole bearing life under normal operating conditions. The bearings of this design cannot be relubricated and can be used within the operating temperature range from -30°C to 100°C. The supply of bearings with a different grease should be negotiated with the supplier in advance.

Grease

For bearings sealed on both sides, the designation of the grease filling different from standard grease is indicated by a symbol combination the first two letters of which indicate the operating temperature range (a symbol in accordance with STN 02 4608) and the third symbol identifies the grease name.

TL – Grease for low operating temperatures (from -60°C up to 100°C)
TM – Grease for medium operating temperatures (from -30°C up to 110°C)
TH – Grease for high operating temperatures (from -30°C up to 200°C)
TW – Grease for low and high operating temperatures (from -40°C up to 150°C)

Note: The symbols of greases for medium operating temeperatures need not be marked on the bearings.

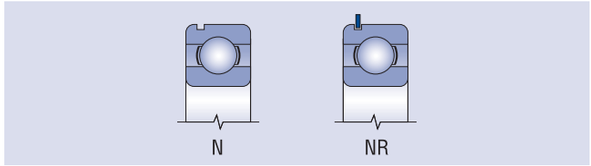
Bearings with Snap Ring Groove

The single row deep groove ball bearings with a snap ring groove (N) can be axially fixed in the housings easily and without high requirements on the space available simplifying the arrangement design.

For bearings with a groove in the outer ring, snap rings corresponding to STN 02 4605 are used (commercial designation R and the number indicating the outside diameter D of the corresponding bearing, e. g. R47).

Bearings with a snap ring groove and a locking snap ring are designated by the suffix NR, e. g. 6204NR. Locking snap rings for the bearings with a snap ring groove are supplied separately.

The bearings with a snap ring groove can also be supplied in the modification with shields or seals (ZN, -2ZN or RSN, -2RSN). The supply of these bearings must be negotiated in advance.



Tapered Bore

For some less demanding applications, e. g. in agricultural machines, etc., some sizes of single row deep groove ball bearings of type 62 and 63 with a tapered bore (K), taper 1:12, are manufactured. These bearings are also manufactured in a design with shields on both sides. The bearings are fixed on the cylindrical shaft by means of adapter sleeves of types H2, H3 or directly on the tapered shaft.

Cages

The single row deep groove ball bearings of the basic design are equipped with a pressed cage made of steel sheet, guided on balls, which is not designated.

These bearings are produced with different types of cages for special applications. Namely, bearings with a solid polyamide cage (TNH, TNGH) and a machined brass cage (M). The supply of these bearings should be negotiated in advance.

Tolerances

The limiting values of the dimensional and running accuracy deviation correspond to ISO 492. An exception is made only for the Single row deep groove ball bearings are commonly manufactured within the tolerance class P0 and P6. For special applications requiring high accuracy or for applications with a high rotational speed, the bearings in the higher tolerance clas-

ses P6, P5 and P4 are used. The bearings in higher tolerance class P6E are used for rotating electric machines.

The limiting values of the dimensional and runing accuracy deviation correspond to ISO 492. An exception is made only for the separable single row ball bearings of types E or B0 the outer diameter D of which has the limiting deviation +0.01/0.00 mm.

The bearings in the tolerance classes P5 and P4 are made of higher quality materials such as electroslag or vacuum remelted bearing steels.

Radial Clearance

The commonly manufactured single row deep groove ball bearings have a normal radial clearance which is not indicated. For special arrangements the bearings with a reduced radial clearance (C2) or with an increased radial clearance (C3, C4, C5) are supplied.

Vibration Level

The currently manufactured single row deep groove ball bearings have a normal vibration level determined by the manufacturer. For special applications with high requirements on noisless operation, bearings with reduced vibration level are supplied (C6).

Symbol Combination

The symbols for the tolerance classes, bearing internal clearances and vibration levels are combined with the simultaneous omission of the symbol C in the second and the following bearing special characteristics, e. g.:

P6 + C3 = P63	6004 P63
C3 + C6 = C36	6303-2RS C36
P6 + C3 + C6 = P636	6204-2Z P636

Stabilisation for Operation at Higher Temperature

For arrangements with a higher operating temperature than 120°C, special heat treated-stabilised-single row deep groove ball bearings are supplied the form stability of which at operating temperature 150°C up to 400°C (S0, S1, S2, S3, S4, S5) is ensured.

The supply of stabilised bearings should be negotiated with the supplier in advance.

Misalignment

For single row deep groove ball bearings only small mutual misalignment of bearing rings is permissible, therefore alignment deviation of seating surfaces can be very small. Misalignment causes additional loading of the bearing and thus its life is shortened.

Values of permissible misalignment at normal operating conditions are shown in the table.

Bearing Type	Load light ($F_r < 0.15\ C_{or}$)	heavy ($F_r \geq 0.15\ C_{or}$)
618, 619, 160, 60	2' to 6'	5' to 10'
62, 63, 64	5' to 10'	8' to 16'

Radial Equivalent Dynamic Load

Single row deep groove ball bearings:

$P_r = F_r$ for $F_a / F_r \leq e$ $\quad P_r = 0.56\ F_r + YF_a$ for $F_a / F_r > e$

Separable single row ball bearings:

$P_r = F_r$ for $F_a / F_r \leq 0.2$ $\quad P_r = 0.5\ F_r + 2.5\ F_a$ for $F_a / F_r > 0.2$

Coeficients

F_a/C_{or}	e	Y
0.025	0.22	2
0.040	0.24	1.8
0.070	0.27	1.6
0.130	0.31	1.4
0.250	0.37	1.2
0.500	0.44	1

Radial Equivalent Static Load

Single Row Deep Groove Ball Bearings:

$P_{or} = 0.6\ F_r + 0.5\ F_a$ ($P_{or} \geq F_r$)

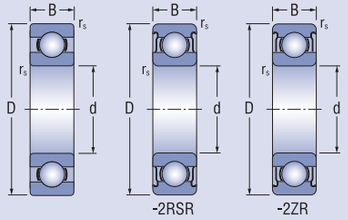
Separable Single Row Ball Bearings:

$P_{or} = 0.9\ F_r + 0.3\ F_a$ ($P_{or} \geq F_r$)

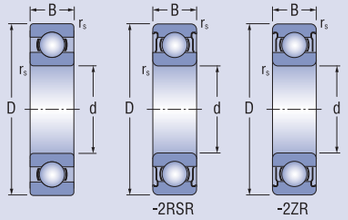
Designation

The bearing designation in the basic or current modified design is indicated in the dimension tables. The modification of the basic design is designated by additional symbols (prefixes and suffixes) in accordance with STN 02 4608. The meaning of the most frequently used symbols for the single row deep groove ball bearings is indicated in the table.

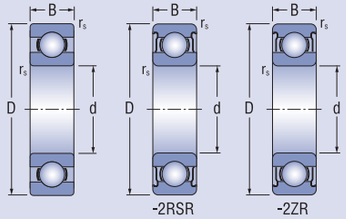
Symbol	Example of designation	Meaning
X	**X** 625 P5	Stainless steel
RS	6002**RS**	Single seal
-2RS	6300-**2RS**	Double seal
RSR	6210**RSR**	Seal on one side adhering to flat rib surface of inner ring
-2RSR	6210-**2RSR**	Seals on both sides adhering to flat rib surface of inner ring
Z	6317**Z**	Metallic shield on one side
ZN	6204**ZN**	Metallic shield on one side and snap ring groove on the opposite side
-2Z	6308-**2Z**	Metallic shields on both sides
-2ZR	6005-**2ZR**	Metallic shields on both sides resting on the flat rib of inner ring
K	6204-**2ZK**	Tapered bore with taper 1:12
N	6416**N**	Snap ring groove in outer ring
NR	6310**NR**	Snap ring groove in outer ring and inserted snap ring
Y	X 623**Y** P5	Pressed brass cage, rolling element centered
TNH	6002**TNH**	Balls guided plastic cage
M	6319**M**	Solid brass cage guided on balls
MA	6209**MA**	Solid brass cage guided on outer ring
TB	6308**TB**	Solid cage made of textite, guided on inner ring
P6	6303 **P6**	Tolerance class higher than normal
P6E	6204-2Z **P6E**	Higher tolerance class for rotating electric machines
P5	6208 **P5**	Tolerance class higher than P6
P4	6007 **P4**	Tolerance class higher than P5
C2	6003 **C2**	Radial clearance smaller than normal
C3	6302-2ZR **C3**	Radial clearance greater than normal
C4	6005-2RS **C4**	Radial clearance greater than C3
C5	6303-2ZR **C5**	Radial clearance greater than C4
C6	6300 **C6**	Reduced vibration level
R...	6210 **R**10-20	Radial clearance in non-standardized range (range in µm)
S0	6204 **S0**	Stabilization for operation at temperature up to 150°C
S1	6301 **S1**	Stabilization for operation at temperature up to 200°C
S2	6303-2ZR C5**S2**	Stabilization for operation at temperature up to 250°C
S3	6303-2ZR C5**S3**	Stabilization for operation at temperature up to 300°C
S4	6306-2ZR C5**S4**	Stabilization for operation at temperature up to 350°C
S5	6306-2ZR C5**S5**	Stabilization for operation at temperature up to 400°C
TPF	6204-2Z P6E **TPF**	Bearings manufactured according to special technical terms agreed upon with the customer



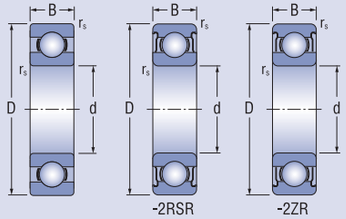
Dimensions				Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass	
					dynamic	static			grease	oil		
d	D	B	$r_{s\ min}$		C_r	C_{or}	C_u					
mm					kN				min^{-1}		kg	
3	9	3	0.2	**603**	0.39	0.14	0.006		52 000	63 000	0.90	
	10	4	0.2	**623**	0.64	0.22	0.010		42 000	50 000	1.63	
	10	4	0.2	**623-2RSR**	0.64	0.22	0.010		32 000		1.65	
	10	4	0.2	**623-2ZR**	0.64	0.22	0.010		42 000		1.65	
	13	4	0.2	**633**	1.16	0.40	0.018		39 000	46 000	3.33	
	13	4	0.2	**633-2RSR**	1.16	0.40	0.018		29 000		3.38	
	13	4	0.2	**633-2ZR**	1.16	0.40	0.018		39 000		3.38	
4	12	4	0.2	**604**	0.71	0.28	0.013		45 000	52 000	2.25	
	12	4	0.2	**604-2RSR**	0.71	0.28	0.013		33 000		2.29	
	12	4	0.2	**604-2ZR**	0.71	0.28	0.013		45 000		2.29	
	13	5	0.2	**624**	1.16	0.40	0.018		39 000	46 000	3.02	
	13	5	0.2	**624-2RSR**	1.16	0.40	0.018		29 000		3.04	
	13	5	0.2	**624-2ZR**	1.16	0.40	0.018		39 000		3.04	
	16	5	0.3	**634**	1.48	0.61	0.028		35 000	42 000	5.21	
	16	5	0.3	**634-2RSR**	1.48	0.61	0.028		24 000		5.25	
	16	5	0.3	**634-2ZR**	1.48	0.61	0.028		35 000		5.25	
5	14	5	0.2	**605**	1.06	0.44	0.020		38 000	45 000	3.48	
	14	5	0.2	**605-2RSR**	1.06	0.44	0.020		28 000		3.54	
	14	5	0.2	**605-2ZR**	1.06	0.44	0.020		38 000		3.54	
	16	5	0.3	**625**	1.48	0.61	0.028		35 000	42 000	4.86	
	16	5	0.3	**625-2RSR**	1.48	0.61	0.028		23 000		4.92	
	16	5	0.3	**625-2ZR**	1.48	0.61	0.028		35 000		4.92	
	19	6	0.3	**635**	2.24	0.91	0.041		30 000	38 000	8.34	
	19	6	0.3	**635-2RSR**	2.24	0.91	0.041		19 000		8.52	
	19	6	0.3	**635-2ZR**	2.24	0.91	0.041		30 000		8.52	
6	17	6	0.3	**606**	1.48	0.61	0.028		38 000	45 000	5.97	
	17	6	0.3	**606-2RSR**	1.48	0.61	0.028		26 000		6.08	
	17	6	0.3	**606-2ZR**	1.48	0.61	0.028		38 000		6.08	
	19	6	0.3	**626**	2.24	0.91	0.041		30 000	38 000	7.94	
	19	6	0.3	**626-2RSR**	2.24	0.91	0.041		21 000		8.10	
	19	6	0.3	**626-2ZR**	2.24	0.91	0.041		30 000		8.10	
	22	7	0.3	**636**	3.31	1.37	0.062		34 000	40 000	14.00	
	22	7	0.3	**636-2RSR**	3.31	1.37	0.062		22 000		14.23	
	22	7	0.3	**636-2ZR**	3.31	1.37	0.062		34 000		14.23	



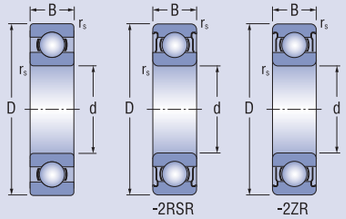
Dimensions				Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass	
					dynamic	static			grease	oil		
d	D	B	$r_{s\ min}$		C_r	C_{or}	C_u					
mm					kN				min^{-1}		kg	
7	19	6	0.3	**607**	2.24	0.91	0.028		35 000	42 000	7.51	
	19	6	0.3	**607-2RSR**	2.24	0.91	0.028		24 000		7.65	
	19	6	0.3	**607-2ZR**	2.24	0.91	0.028		35 000		7.65	
	22	7	0.3	**627**	3.31	1.37	0.062		34 000	40 000	12.70	
	22	7	0.3	**627-2RSR**	3.31	1.37	0.062		22 000		12.90	
	22	7	0.3	**627-2ZR**	3.31	1.37	0.062		34 000		12.90	
	19	6	0.3	**637**	4.55	1.97	0.090		29 000	35 000	24.00	
	19	6	0.3	**637-2RSR**	4.55	1.97	0.090		17 000		24.35	
	19	6	0.3	**637-2ZR**	4.55	1.97	0.090		29 000		24.35	
8	22	7	0.3	**608**	3.31	1.37	0.062		34 000	40 000	12.10	
	22	7	0.3	**608-2RSR**	3.31	1.37	0.062		23 000		12.20	
	22	7	0.3	**608-2ZR**	3.31	1.37	0.062		34 000		12.20	
	24	8	0.3	**628**	3.35	1.43	0.065		28 000	34 000	17.20	
	24	8	0.3	**628-2RSR**	3.35	1.43	0.065		20 000		17.40	
	24	8	0.3	**628-2ZR**	3.35	1.43	0.065		28 000		17.40	
9	24	7	0.3	**609**	3.33	1.41	0.064		32 000	38 000	14.50	
	24	7	0.3	**609-2RSR**	3.33	1.41	0.064		20 000		14.70	
	24	7	0.3	**609-2ZR**	3.33	1.41	0.064		32 000		14.70	
	26	8	0.3	**629**	4.55	1.97	0.090		29 000	35 000	19.30	
	26	8	0.3	**629-2RSR**	4.55	1.97	0.090		21 000		19.50	
	26	8	0.3	**629-2ZR**	4.55	1.97	0.090		29 000		19.50	



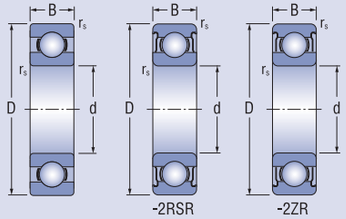
Dimensions				Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass	
					dynamic	static			grease	oil		
d	D	B	$r_{s\ min}$		C_r	C_{or}	C_u					
mm					kN				min^{-1}		kg	
10	19	5	0.3	**61800**	1.80	0.93	0.04		36 000	42 000	0.005	
	19	5	0.3	**61800-2RSR**	1.80	0.93	0.04		20 000		0.005	
	19	5	0.3	**61800-2ZR**	1.80	0.93	0.04		36 000		0.005	
	22	6	0.3	**61900**	2.70	1.30	0.06		34 000	40 000	0.009	
	22	6	0.3	**61900-2RSR**	2.70	1.30	0.06		19 000		0.009	
	22	6	0.3	**61900-2ZR**	2.70	1.30	0.06		34 000		0.009	
12	21	5	0.3	**61801**	1.90	1.00	0.04		32 000	38 000	0.007	
	21	5	0.3	**61801-2RSR**	1.90	1.00	0.04		19 000		0.007	
	21	5	0.3	**61801-2ZR**	1.90	1.00	0.04		32 000		0.007	
	24	6	0.3	**61901**	2.90	1.48	0.07		30 000	36 000	0.011	
	24	6	0.3	**61901-2RSR**	2.90	1.48	0.07		18 000		0.011	
	24	6	0.3	**61901-2ZR**	2.90	1.48	0.07		30 000		0.011	
15	24	5	0.3	**61802**	2.10	1.30	0.06		28 000	34 000	0.008	
	24	5	0.3	**61802-2RSR**	2.10	1.30	0.06		17 000		0.008	
	24	5	0.3	**61802-2ZR**	2.10	1.30	0.06		28 000		0.008	
	28	7	0.3	**61902**	4.30	2.32	0.10		24 000	30 000	0.016	
	28	7	0.3	**61902-2RSR**	4.30	2.32	0.10		16 000		0.016	
	28	7	0.3	**61902-2ZR**	4.30	2.32	0.10		24 000		0.016	
17	26	5	0.3	**61803**	2.18	1.48	0.07		24 000	30 000	0.019	
	26	5	0.3	**61803-2RSR**	2.18	1.48	0.07		16 000		0.019	
	26	5	0.3	**61803-2ZR**	2.18	1.48	0.07		24 000		0.019	
	30	7	0.3	**61903**	4.60	2.62	0.12		22 000	28 000	0.018	
	30	7	0.3	**61903-2RSR**	4.60	2.62	0.12		14 000		0.018	
	30	7	0.3	**61903-2ZR**	4.60	2.62	0.12		22 000		0.018	
20	32	7	0.3	**61804**	3.48	2.23	0.10		19 000	24 000	0.022	
	32	7	0.3	**61804-2RSR**	3.48	2.23	0.10		13 000		0.022	
	32	7	0.3	**61804-2ZR**	3.48	2.23	0.10		19 000		0.022	
	37	9	0.3	**61904**	6.38	3.68	0.17		18 000	22 000	0.036	
	37	9	0.3	**61904-2RSR**	6.38	3.68	0.17		12 000		0.036	
	37	9	0.3	**61904-2ZR**	6.38	3.68	0.17		18 000		0.036	
25	37	7	0.3	**61805**	4.29	2.91	0.13		17 000	20 000	0.028	
	37	7	0.3	**61805-2RSR**	4.29	2.91	0.13		11 000		0.028	
	37	7	0.3	**61805-2ZR**	4.29	2.91	0.13		17 000		0.028	
	42	9	0.3	**61905**	7.02	4.53	0.21		16 000	19 000	0.042	
	42	9	0.3	**61905-2RSR**	7.02	4.53	0.21		10 000		0.042	
	42	9	0.3	**61905-2ZR**	7.02	4.53	0.21		16 000		0.042	
30	42	7	0.3	**61806**	4.70	3.62	0.16		15 000	18 000	0.026	
	42	7	0.3	**61806-2RSR**	4.70	3.62	0.16		9 500		0.026	
	42	7	0.3	**61806-2ZR**	4.70	3.62	0.16		15 000		0.026	
	47	9	0.3	**61906**	7.21	5.01	0.23		14 000	17 000	0.048	
	47	9	0.3	**61906-2RSR**	7.21	5.01	0.23		8 500		0.048	
	47	9	0.3	**61906-2ZR**	7.21	5.01	0.23		14 000		0.048	



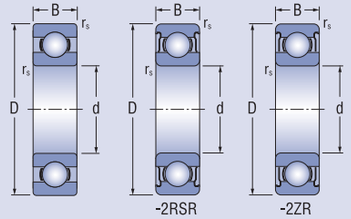
Dimensions				Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass	
					dynamic	static			grease	oil		
d	D	B	$r_{s\ min}$		C_r	C_{or}	C_u					
mm					kN				min^{-1}		kg	
35	47	7	0.3	**61807**	4.90	4.05	0.18		13 000	16 000	0.029	
	47	7	0.3	**61807-2RSR**	4.90	4.05	0.18		8 200		0.029	
	47	7	0.3	**61807-2ZR**	4.90	4.05	0.18		13 000		0.029	
	55	10	0.6	**61907**	9.50	6.81	0.31		11 000	14 000	0.074	
	55	10	0.6	**61907-2RSR**	9.50	6.81	0.31		8 100		0.074	
	55	10	0.6	**61907-2ZR**	9.50	6.81	0.31		11 000		0.074	
40	52	7	0.3	**61808**	5.10	4.40	0.20		11 000	14 000	0.033	
	52	7	0.3	**61808-2RSR**	5.10	4.40	0.20		7 000		0.033	
	52	7	0.3	**61808-2ZR**	5.10	4.40	0.20		11 000		0.033	
	62	12	0.6	**61908**	13.70	9.90	0.45		10 000	13 000	0.110	
	62	12	0.6	**61908-2RSR**	13.70	9.90	0.45		6 900		0.110	
	62	12	0.6	**61908-2ZR**	13.70	9.90	0.45		10 000		0.110	
45	58	7	0.3	**61809**	6.40	5.65	0.26		9 500	12 000	0.040	
	58	7	0.3	**61809-2RSR**	6.40	5.65	0.26		6 400		0.040	
	58	7	0.3	**61809-2ZR**	6.40	5.65	0.26		9 500		0.040	
	68	12	0.6	**61909**	14.10	10.90	0.50		8 400	10 000	0.128	
	68	12	0.6	**61909-2RSR**	14.10	10.90	0.50		6 100		0.128	
	68	12	0.6	**61909-2ZR**	14.10	10.90	0.50		8 400		0.128	
50	65	7	0.3	**61810**	6.60	6.10	0.28		9 000	11 000	0.052	
	65	7	0.3	**61810-2RSR**	6.60	6.10	0.28		5 800		0.052	
	65	7	0.3	**61810-2ZR**	6.60	6.10	0.28		9 000		0.052	
	72	12	0.6	**61910**	14.50	11.70	0.53		8 500	10 000	0.132	
	72	12	0.6	**61910-2RSR**	14.50	11.70	0.53		5 500		0.132	
	72	12	0.6	**61910-2ZR**	14.50	11.70	0.53		8 500		0.132	
55	72	9	0.3	**61811**	9.10	8.40	0.38		8 600	10 000	0.083	
	72	9	0.3	**61811-2RSR**	9.10	8.40	0.38		5 500		0.083	
	72	9	0.3	**61811-2ZR**	9.10	8.40	0.38		8 600		0.083	
	80	13	1.0	**61911**	15.90	13.20	0.60		8 100	9 600	0.180	
	80	13	1.0	**61911-2RSR**	15.90	13.20	0.60		5 100		0.180	
	80	13	1.0	**61911-2ZR**	15.90	13.20	0.60		8 100		0.180	
60	78	10	0.3	**61812**	9.15	8.75	0.40		8 000	9 400	0.093	
	78	10	0.3	**61812-2RSR**	9.15	8.75	0.40		4 800		0.093	
	78	10	0.3	**61812-2ZR**	9.15	8.75	0.40		8 000		0.093	
	85	13	1.0	**61912**	16.40	14.20	0.65		7 600	8 900	0.193	
	85	13	1.0	**61912-2RSR**	16.40	14.20	0.65		4 800		0.193	
	85	13	1.0	**61912-2ZR**	16.40	14.20	0.65		7 600		0.193	
65	85	10	0.3	**61813**	11.90	11.50	0.52		7 400	8 700	0.128	
	85	10	0.3	**61813-2RSR**	11.90	11.50	0.52		4 700		0.128	
	85	10	0.3	**61813-2ZR**	11.90	11.50	0.52		7 400		0.128	
	90	13	1.0	**61913**	17.40	16.10	0.73		7 000	8 200	0.206	
	90	13	1.0	**61913-2RSR**	17.40	16.10	0.73		4 600		0.206	
	90	13	1.0	**61913-2ZR**	17.40	16.10	0.73		7 000		0.206	



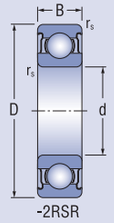
Dimensions				Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass	
					dynamic	static			grease	oil		
d	D	B	$r_{s\ min}$		C_r	C_{or}	C_u					
mm					kN				min^{-1}		kg	
70	90	10	0.6	**61814**	12.10	11.90	0.54		6 900	8 100	0.138	
	90	10	0.6	**61814-2RSR**	12.10	11.90	0.54		4 500		0.138	
	90	10	0.6	**61814-2ZR**	12.10	11.90	0.54		6 900		0.138	
	100	16	1.0	**61914**	23.70	21.20	0.96		6 500	7 700	0.336	
	100	16	1.0	**61914-2RSR**	23.70	21.20	0.96		4 300		0.336	
	100	16	1.0	**61914-2ZR**	23.70	21.20	0.96		6 500		0.336	
75	95	10	0.6	**61815**	12.50	12.80	0.58		6 400	7 600	0.147	
	95	10	0.6	**61815-2RSR**	12.50	12.80	0.58		4 300		0.147	
	95	10	0.6	**61815-2ZR**	12.50	12.80	0.58		6 400		0.147	
	105	16	1.0	**61915**	24.40	22.60	1.03		6 100	7 200	0.355	
	105	16	1.0	**61915-2RSR**	24.40	22.60	1.03		4 100		0.355	
	105	16	1.0	**61915-2ZR**	24.40	22.60	1.03		6 100		0.355	
80	100	10	0.6	**61816**	12.70	13.30	0.61		6 000	7 100	0.155	
	100	10	0.6	**61816-2RSR**	12.70	13.30	0.61		4 600		0.155	
	100	10	0.6	**61816-2ZR**	12.70	13.30	0.61		6 000		0.155	
	110	16	1.0	**61916**	24.90	24.00	1.09		5 700	6 700	0.375	
	110	16	1.0	**61916-2RSR**	24.90	24.00	1.09		3 800		0.375	
	110	16	1.0	**61916-2ZR**	24.90	24.00	1.09		5 700		0.375	
85	110	13	1.0	**61817**	19.25	19.79	0.90		5 700	6 700	0.245	
	110	13	1.0	**61817-2RSR**	19.25	19.79	0.90		3 400		0.245	
	110	13	1.0	**61817-2ZR**	19.25	19.79	0.90		5 700		0.245	
	120	18	1.1	**61917**	32.00	29.60	1.33		5 400	6 300	0.536	
	120	18	1.1	**61917-2RSR**	32.00	29.60	1.33		3 400		0.536	
	120	18	1.1	**61917-2ZR**	32.00	29.60	1.33		5 400		0.536	
90	115	13	1.0	**61818**	19.57	20.54	0.92		5 400	6 300	0.285	
	115	13	1.0	**61818-2RSR**	19.57	20.54	0.92		3 200		0.285	
	115	13	1.0	**61818-2ZR**	19.57	20.54	0.92		5 400		0.285	
	125	18	1.1	**61918**	33.00	31.50	1.38		5 100	6 000	0.554	
	125	18	1.1	**61918-2RSR**	33.00	31.50	1.38		2 700		0.554	
	125	18	1.1	**61918-2ZR**	33.00	31.50	1.38		5 100		0.554	
95	120	13	1.0	**61819**	19.80	21.30	0.93		5 000	5 900	0.300	
	120	13	1.0	**61819-2RSR**	19.80	21.30	0.93		3 200		0.300	
	120	13	1.0	**61819-2ZR**	19.80	21.30	0.93		5 000		0.300	
	130	18	1.1	**61919**	33.70	33.30	1.43		4 800	5 700	0.579	
	130	18	1.1	**61919-2RSR**	33.70	33.30	1.43		2 900		0.579	
	130	18	1.1	**61919-2ZR**	33.70	33.30	1.43		4 800		0.579	
100	125	13	1.0	**61820**	20.09	22.00	0.94		4 800	5 600	0.313	
	125	13	1.0	**61820-2RSR**	20.09	22.00	0.94		3 200		0.313	
	125	13	1.0	**61820-2ZR**	20.09	22.00	0.94		4 800		0.313	
	140	20	1.1	**61920**	42.70	41.90	1.74		4 500	5 300	0.785	
	140	20	1.1	**61920-2RSR**	42.70	41.90	1.74		3 100		0.785	
	140	20	1.1	**61920-2ZR**	42.70	41.90	1.74		4 500		0.785	



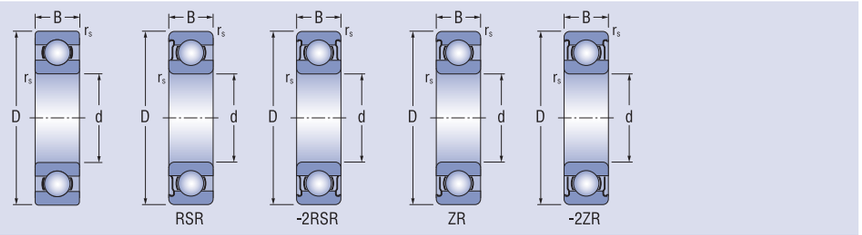
Dimensions				Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass	
					dynamic	static			grease	oil		
d	D	B	$r_{s\ min}$		C_r	C_{or}	C_u					
mm					kN				min^{-1}		kg	
105	130	13	1.0	**61821**	20.30	22.70	0.94		4 600	5 400	0.324	
	130	13	1.0	**61821-2RSR**	20.30	22.70	0.94		3 100		0.324	
	130	13	1.0	**61821-2ZR**	20.30	22.70	0.94		4 600		0.324	
	145	20	1.1	**61921**	42.50	42.00	1.71		4 300	5 100	0.856	
	145	20	1.1	**61921-2RSR**	42.50	42.00	1.71		2 900		0.856	
	145	20	1.1	**61921-2ZR**	42.50	42.00	1.71		4 300		0.856	
110	140	16	1.0	**61822**	24.90	28.20	1.15		4 300	5 100	0.497	
	140	16	1.0	**61822-2RSR**	24.90	28.20	1.15		2 900		0.497	
	140	16	1.0	**61822-2ZR**	24.90	28.20	1.15		4 300		0.497	
	150	20	1.1	**61922**	43.50	44.50	1.77		4 100	4 800	0.893	
	140	20	1.1	**61922-2RSR**	43.50	44.50	1.77		2 800		0.893	
	140	20	1.1	**61922-2ZR**	43.50	44.50	1.77		4 100		0.893	
120	150	16	1.0	**61824**	24.50	28.10	1.10		4 000	4 700	0.537	
	150	16	1.0	**61824-2RSR**	24.50	28.10	1.10		2 800		0.537	
	150	16	1.0	**61824-2ZR**	24.50	28.10	1.10		4 000		0.537	
	165	22	1.1	**61924**	53.00	54.00	2.06		3 800	4 400	1.21	
	165	22	1.1	**61924-2RSR**	53.00	54.00	2.06		2 400		1.21	
	165	22	1.1	**61924-2ZR**	53.00	54.00	2.06		3 800		1.21	
130	165	18	1.1	**61826**	33.10	37.80	1.41		3 700	4 300	0.758	
	165	18	1.1	**61826-2RSR**	33.10	37.80	1.41		2 400		0.758	
	165	18	1.1	**61826-2ZR**	33.10	37.80	1.41		3 700		0.758	
	180	24	1.5	**61926**	65.00	67.50	2.53		3 500	4 100	1.57	
	180	24	1.5	**61926-2RSR**	65.00	67.50	2.53		2 200		1.57	
	180	24	1.5	**61926-2ZR**	65.00	67.50	2.53		3 500		1.57	
140	175	18	1.1	**61828**	37.20	42.60	1.54		3 400	4 000	0.832	
	175	18	1.1	**61828-2RSR**	37.20	42.60	1.54		2 200		0.832	
	175	18	1.1	**61828-2ZR**	37.20	42.60	1.54		3 400		0.832	
	190	24	1.5	**61928**	66.50	71.30	2.53		3 200	3 800	1.67	
	190	24	1.5	**61928-2RSR**	66.50	71.30	2.53		2 100		1.67	
	190	24	1.5	**61928-2ZR**	66.50	71.30	2.53		3 200		1.67	
150	190	20	1.1	**61830**	45.80	53.30	1.85		3 100	3 700	1.15	
	190	20	1.1	**61830-2RSR**	45.80	53.30	1.85		2 000		1.15	
	190	20	1.1	**61830-2ZR**	45.80	53.30	1.85		3 100		1.15	
	210	28	2.0	**61930**	84.70	90.20	3.04		3 000	3 500	2.47	
	210	28	2.0	**61930-2RSR**	84.70	90.20	3.04		2 000		2.47	
	210	28	2.0	**61930-2ZR**	84.70	90.20	3.04		3 000		2.47	



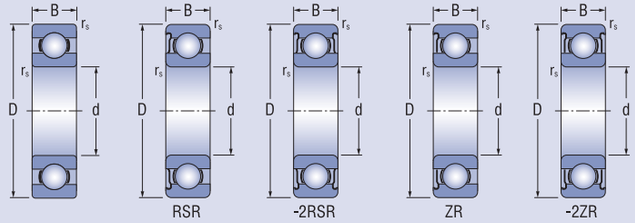
Dimensions				Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass	
					dynamic	static			grease	oil		
d	D	B	$r_{s\ min}$		C_r	C_{or}	C_u					
mm					kN				min^{-1}		kg	
160	200	20	1.1	**61832**	45.30	55.10	1.86		2 900	3 400	1.23	
	200	20	1.1	**61832-2RSR**	45.30	55.10	1.86		2 000		1.23	
	200	20	1.1	**61832-2ZR**	45.30	55.10	1.86		2 900		1.23	
	200	20	1.1	**61832M**	48.40	61.00	2.06		2 900	3 400	1.28	
	220	28	2.0	**61932**	83.50	90.50	2.98		2 700	3 200	3.25	
	220	28	2.0	**61932-2RSR**	83.50	90.50	2.98		1 900		3.25	
	220	28	2.0	**61932-2ZR**	83.50	90.50	2.98		2 700		3.25	
	220	28	2.0	**61932M**	86.90	96.00	3.14		2 700		3.30	
170	215	22	1.1	**61834M**	60.00	78.00	2.55		2 700	3 200	1.72	
	230	28	2.0	**61934M**	88.80	100.0	3.15		2 400	3 000	3.40	
180	225	22	1.1	**61836M**	61.00	79.0	2.52		2 600	3 000	2.03	
	250	33	2.0	**61936M**	118.00	133.0	4.12		2 200	2 800	5.05	
190	240	24	1.5	**61838M**	73.00	94.0	2.91		2 200	2 800	2.60	
	260	33	2.0	**61938M**	117.00	134.0	4.06		2 200	2 800	5.25	
200	250	24	1.5	**61840M**	74.00	98.0	2.97		2 200	2 800	2.70	
	280	38	2.1	**61940M**	143.00	158.0	4.63		2 000	2 600	7.40	
220	270	24	1.5	**61844M**	77.00	107.0	3.10		1 900	2 400	3.00	
	300	38	2.1	**61944M**	146.00	169.0	4.76		1 900	2 400	8.00	
240	300	28	2.0	**61848M**	99.00	137.0	3.79		1 800	2 200	4.50	
	320	38	2.1	**61948M**	154.00	190.0	5.02		1 800	2 200	8.60	
260	320	28	2.0	**61852M**	101.00	148.0	3.95		1 700	2 000	4.80	
	360	46	2.1	**61952M**	204.00	255.0	6.58		1 600	1 900	14.50	
280	350	33	2.0	**61856M**	133.0	191.0	4.89		1 600	1 900	7.40	
	380	46	2.1	**61956M**	209.0	272.0	6.80		1 500	1 800	15.00	
300	350	33	2.0	**61860M**	166.0	233.0	5.74		1 400	1 700	10.50	
	420	56	3.0	**61960M**	270.0	375.0	8.98		1 300	1 600	24.50	



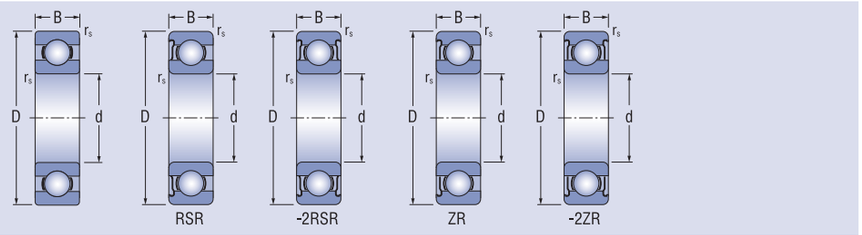
Dimensions				Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass	
					dynamic	static			grease	oil		
d	D	B	$r_{s\ min}$		C_r	C_{or}	C_u					
mm					kN				min^{-1}		kg	
10	30	14	0.3	**62200-2RSR**	5.95	2.61	0.118		13 000	-	0.04	
12	32	14	0.3	**62201-2RSR**	6.82	3.05	0.139		12 000	-	0.05	
15	35	14	0.6	**62202-2RSR**	7.65	3.72	0.169		10 000	-	0.05	
17	40	16	0.6	**62203-2RSR**	9.58	4.78	0.217		9 000	-	0.09	
20	47	18	1.0	**62204-2RSR**	12.80	6.65	0.302		8 000	-	0.13	
25	52	18	1.0	**62205-2RSR**	14.00	7.88	0.358		7 000	-	0.16	
30	62	20	1.0	**62206-2RSR**	19.50	11.30	0.512		6 000	-	0.25	
35	72	23	1.1	**62207-2RSR**	25.70	15.20	0.695		5 300	-	0.40	
40	80	23	1.1	**62208-2RSR**	29.50	18.10	0.823		4 500	-	0.47	
45	85	23	1.1	**62209-2RSR**	31.70	20.70	0.941		4 300	-	0.51	
50	90	23	1.1	**62210-2RSR**	35.10	23.20	1.054		3 800	-	0.54	
55	100	25	1.5	**62211-2RSR**	43.40	29.20	1.327		3 400	-	0.75	
60	110	28	1.5	**62212-2RSR**	52.50	35.90	1.631		3 200	-	1.00	
10	35	17	0.6	**62300-2RSR**	8.53	3.92	0.040		11 000	-	0.06	
12	37	17	1.0	**62301-2RSR**	9.72	5.08	0.231		10 000	-	0.07	
15	42	17	1.0	**62302-2RSR**	11.50	5.42	0.246		9 000	-	0.11	
17	47	19	1.0	**62303-2RSR**	13.50	6.58	0.298		8 500	-	0.16	
20	52	21	1.1	**62304-2RSR**	15.90	7.88	0.355		7 500	-	0.21	
25	62	24	1.1	**62305-2RSR**	22.40	11.48	0.523		6 000	-	0.32	
30	72	27	1.1	**62306-2RSR**	27.00	15.20	0.691		5 300	-	0.50	
35	80	31	1.5	**62307-2RSR**	33.40	19.20	0.873		4 500	-	0.68	
40	90	33	1.5	**62308-2RSR**	40.75	24.00	1.091		4 000	-	0.92	
45	100	36	1.5	**62309-2RSR**	52.80	31.83	1.447		3 600	-	1.20	
50	110	40	2.0	**62310-2RSR**	61.80	37.90	1.723		3 200	-	1.60	
55	120	43	2.0	**62311-2RSR**	71.60	44.90	2.023		3 000	-	2.05	
60	130	46	2.1	**62312-2RSR**	81.80	51.80	2.354		2 600	-	2.55	



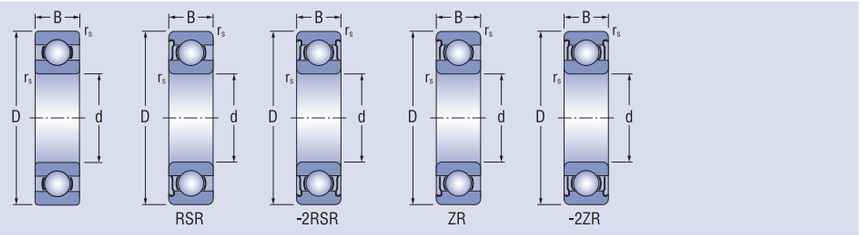
Dimensions				Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass	
					dynamic	static			grease	oil		
d	D	B	$r_{s\ min}$		C_r	C_{or}	C_u					
mm					kN				min^{-1}		kg	
10	26	8	0.3	**6000**	4.58	1.98	0.090		31 000	36 000	0.019	
	26	8	0.3	**6000RSR**	4.58	1.98	0.090		19 000		0.019	
	26	8	0.3	**6000-2RSR**	4.58	1.98	0.090		19 000		0.019	
	26	8	0.3	**6000ZR**	4.58	1.98	0.090		31 000	36 000	0.019	
	26	8	0.3	**6000-2ZR**	4.58	1.98	0.090		31 000		0.019	
	30	9	0.6	**6200**	5.10	2.38	0.108		24 000	29 000	0.031	
	30	9	0.6	**6200RSR**	5.10	2.38	0.108		17 000		0.031	
	30	9	0.6	**6200-2RSR**	5.10	2.38	0.108		17 000		0.031	
	30	9	0.6	**6200ZR**	5.10	2.38	0.108		24 000	30 000	0.031	
	30	9	0.6	**6200-2ZR**	5.10	2.38	0.108		24 000		0.031	
	35	11	0.6	**6300**	7.65	3.48	0.158		22 000	27 000	0.054	
	35	11	0.6	**6300RSR**	7.65	3.48	0.158		15 000		0.054	
	35	11	0.6	**6300-2RSR**	7.65	3.48	0.158		15 000		0.054	
	35	11	0.6	**6300ZR**	7.65	3.48	0.158		22 000	27 000	0.054	
	35	11	0.6	**6300-2ZR**	7.65	3.48	0.158		22 000		0.054	
12	28	8	0.3	**6001**	5.10	2.38	0.108		27 000	32 000	0.022	
	28	8	0.3	**6001RSR**	5.10	2.38	0.108		17 000		0.022	
	28	8	0.3	**6001-2RSR**	5.10	2.38	0.108		17 000		0.022	
	28	8	0.3	**6001ZR**	5.10	2.38	0.108		27 000	32 000	0.022	
	28	8	0.3	**6001-2ZR**	5.10	2.38	0.108		27 000		0.022	
	32	10	0.6	**6201**	6.82	3.05	0.139		22 000	27 000	0.037	
	32	10	0.6	**6201RSR**	6.82	3.05	0.139		15 000		0.037	
	32	10	0.6	**6201-2RSR**	6.82	3.05	0.139		15 000		0.037	
	32	10	0.6	**6201ZR**	6.82	3.05	0.139		22 000	27 000	0.037	
	32	10	0.6	**6201-2ZR**	6.82	3.05	0.139		22 000		0.037	
	37	12	1.0	**6301**	9.72	5.08	0.231		20 000	25 000	0.061	
	37	12	1.0	**6301RSR**	9.72	5.08	0.231		13 000		0.061	
	37	12	1.0	**6301-2RSR**	9.72	5.08	0.231		13 000		0.061	
	37	12	1.0	**6301ZR**	9.72	5.08	0.231		20 000	25 000	0.061	
	37	12	1.0	**6301-2ZR**	9.72	5.08	0.231		20 000		0.061	



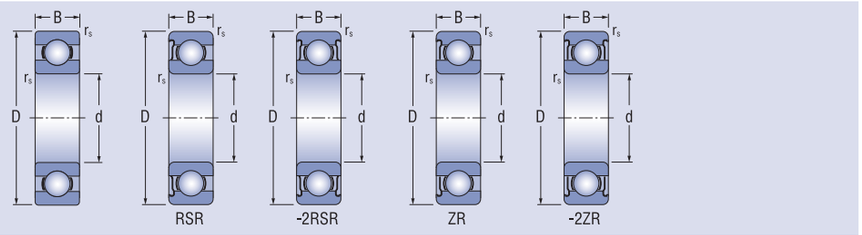
Dimensions				Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass	
					dynamic	static			grease	oil		
d	D	B	$r_{s\ min}$		C_r	C_{or}	C_u					
mm					kN				min^{-1}		kg	
15	32	8	0.3	**16002**	5.58	2.85	0.130		23 000	26 000	0.030	
	32	9	0.3	**6002**	5.58	2.85	0.130		23 000	27 000	0.030	
	32	9	0.3	**6002RSR**	5.58	2.85	0.130		14 000		0.030	
	32	9	0.3	**6002-2RSR**	5.58	2.85	0.130		14 000		0.030	
	32	9	0.3	**6002ZR**	5.58	2.85	0.130		23 000	27 000	0.030	
	32	9	0.3	**6002-2ZR**	5.58	2.85	0.130		23 000		0.030	
	35	11	0.6	**6202**	7.65	3.72	0.169		20 000	24 000	0.046	
	35	11	0.6	**6202RSR**	7.65	3.72	0.169		13 000		0.046	
	35	11	0.6	**6202-2RSR**	7.65	3.72	0.169		13 000		0.046	
	35	11	0.6	**6202ZR**	7.65	3.72	0.169		20 000	24 000	0.046	
	35	11	0.6	**6202-2ZR**	7.65	3.72	0.169		20 000		0.046	
	42	13	1.0	**6302**	11.50	5.42	0.246		17 000	20 000	0.085	
	42	13	1.0	**6302RSR**	11.50	5.42	0.246		12 000		0.085	
	42	13	1.0	**6302-2RSR**	11.50	5.42	0.246		12 000		0.085	
	42	13	1.0	**6302ZR**	11.50	5.42	0.246		17 000	20 000	0.085	
	42	13	1.0	**6302-2ZR**	11.50	5.42	0.246		17 000		0.085	
17	35	8	0.3	**16003**	6.00	3.25	0.148		20 000	24 000	0.033	
	35	10	0.3	**6003**	6.00	3.25	0.148		21 000	25 000	0.040	
	35	10	0.3	**6003RSR**	6.00	3.25	0.148		13 000		0.040	
	35	10	0.3	**6003-2RSR**	6.00	3.25	0.148		13 000		0.040	
	35	10	0.3	**6003ZR**	6.00	3.25	0.148		21 000	25 000	0.040	
	35	10	0.3	**6003-2ZR**	6.00	3.25	0.148		21 000		0.040	
	40	12	0.6	**6203**	9.58	4.78	0.217		17 000	21 000	0.073	
	40	12	0.6	**6203RSR**	9.58	4.78	0.217		12 000		0.073	
	40	12	0.6	**6203-2RSR**	9.58	4.78	0.217		12 000		0.073	
	40	12	0.6	**6203ZR**	9.58	4.78	0.217		17 000	21 000	0.073	
	40	12	0.6	**6203-2ZR**	9.58	4.78	0.217		17 000		0.073	
	47	14	1.0	**6303**	13.50	6.58	0.298		16 000	19 000	0.115	
	47	14	1.0	**6303RSR**	13.50	6.58	0.298		10 600		0.115	
	47	14	1.0	**6303-2RSR**	13.50	6.58	0.298		10 600		0.115	
	47	14	1.0	**6303ZR**	13.50	6.58	0.298		16 000	19 000	0.115	
	47	14	1.0	**6303-2ZR**	13.50	6.58	0.298		16 000		0.115	
	62	17	1.0	**6403**	22.10	7.80	0.354		12 600	15 000	0.270	



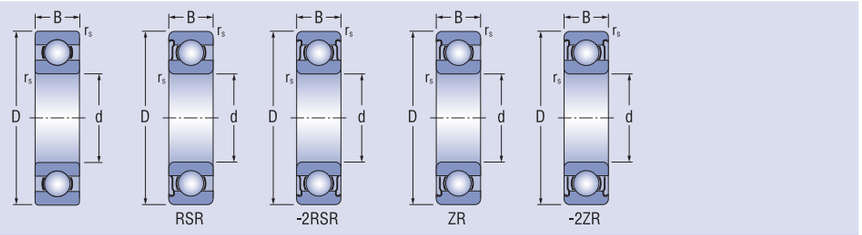
Dimensions				Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass	
					dynamic	static			grease	oil		
d	D	B	$r_{s\ min}$		C_r	C_{or}	C_u					
mm					kN				min^{-1}		kg	
20	42	8	0.3	**16004**	7.90	4.50	0.204		17 000	20 000	0.048	
	42	12	0.6	**6004**	9.38	5.02	0.228		17 000	21 000	0.070	
	42	12	0.6	**6004RSR**	9.38	5.02	0.228		11 000		0.070	
	42	12	0.6	**6004-2RSR**	9.38	5.02	0.228		10 000		0.070	
	42	12	0.6	**6004ZR**	9.38	5.02	0.228		17 000	21 000	0.070	
	42	12	0.6	**6004-2ZR**	9.38	5.02	0.228		17 000		0.070	
	47	14	1.0	**6204**	12.80	6.65	0.302		15 000	17 000	0.108	
	47	14	1.0	**6204RSR**	12.80	6.65	0.302		10 000		0.108	
	47	14	1.0	**6204-2RSR**	12.80	6.65	0.302		10 000		0.108	
	47	14	1.0	**6204ZR**	12.80	6.65	0.302		15 000	17 000	0.108	
	47	14	1.0	**6204-2ZR**	12.80	6.65	0.302		15 000		0.108	
	52	15	1.1	**6304**	15.90	7.88	0.355		14 000	17 000	0.145	
	52	15	1.1	**6304RSR**	15.90	7.88	0.355		9 400		0.145	
	52	15	1.1	**6304-2RSR**	15.90	7.88	0.355		9 400		0.145	
	52	15	1.1	**6304ZR**	15.90	7.88	0.355		14 000	17 000	0.145	
	52	15	1.1	**6304-2ZR**	15.90	7.88	0.355		14 000		0.145	
	72	19	1.1	**6404**	31.00	15.20	0.690		11 000	13 000	0.400	
25	47	8	0.3	**16005**	8.85	5.60	0.254		14 000	17 000	0.053	
	47	12	0.6	**6005**	10.00	5.85	0.266		15 000	18 000	0.082	
	47	12	0.6	**6005RSR**	10.00	5.85	0.266		9 500		0.082	
	47	12	0.6	**6005-2RSR**	10.00	5.85	0.266		9 500		0.082	
	47	12	0.6	**6005ZR**	10.00	5.85	0.266		15 000	18 000	0.082	
	47	12	0.6	**6005-2ZR**	10.00	5.85	0.266		15 000		0.082	
	52	15	1.0	**6205**	14.00	7.88	0.358		13 000	15 000	0.129	
	52	15	1.0	**6205RSR**	14.00	7.88	0.358		8 500		0.129	
	52	15	1.0	**6205-2RSR**	14.00	7.88	0.358		8 500		0.129	
	52	15	1.0	**6205ZR**	14.00	7.88	0.358		13 000	15 000	0.129	
	52	15	1.0	**6205-2ZR**	14.00	7.88	0.358		13 000		0.129	
	62	17	1.1	**6305**	22.40	11.48	0.523		11 000	13 000	0.230	
	62	17	1.1	**6305RSR**	22.40	11.48	0.523		7 500		0.230	
	62	17	1.1	**6305-2RSR**	22.40	11.48	0.523		7 500		0.230	
	62	17	1.1	**6305ZR**	22.40	11.48	0.523		11 000	13 000	0.230	
	62	17	1.1	**6305-2ZR**	22.40	11.48	0.523		11 000		0.230	
	80	21	1.5	**6405**	38.20	19.20	0.873		9 400	11 000	0.530	



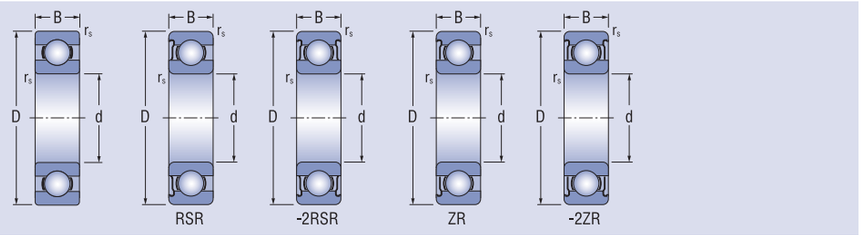
Dimensions				Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass	
					dynamic	static			grease	oil		
d	D	B	$r_{s\ min}$		C_r	C_{or}	C_u					
mm					kN				min^{-1}		kg	
30	55	9	0.3	**16006**	11.30	7.40	0.336		12 000	14 000	0.087	
	55	13	1.1	**6006**	13.20	8.30	0.377		12 000	15 000	0.119	
	55	13	1.1	**6006RSR**	13.20	8.30	0.377		7 900		0.119	
	55	13	1.1	**6006-2RSR**	13.20	8.30	0.377		7 900		0.119	
	55	13	1.1	**6006ZR**	13.20	8.30	0.377		12 000	15 000	0.119	
	55	13	1.1	**6006-2ZR**	13.20	8.30	0.377		12 000		0.119	
	62	16	1.1	**6206**	19.50	11.30	0.512		11 000	13 000	0.200	
	62	16	1.1	**6206RSR**	19.50	11.30	0.512		7 500		0.200	
	62	16	1.1	**6206-2RSR**	19.50	11.30	0.512		7 500		0.200	
	62	16	1.1	**6206ZR**	19.50	11.30	0.512		11 000	13 000	0.200	
	62	16	1.1	**6206-2ZR**	19.50	11.30	0.512		11 000		0.200	
	72	19	1.1	**6306**	27.00	15.20	0.691		10 000	12 000	0.331	
	72	19	1.1	**6306RSR**	27.00	15.20	0.691		6 700		0.331	
	72	19	1.1	**6306-2RSR**	27.00	15.20	0.691		6 700		0.331	
	72	19	1.1	**6306ZR**	27.00	15.20	0.691		10 000	12 000	0.331	
	72	19	1.1	**6306-2ZR**	27.00	15.20	0.691		10 000		0.331	
	90	23	1.5	**6406**	47.50	24.50	1.114		8 400	10 000	0.715	
35	62	9	0.3	**16007**	12.20	8.85	0.402		11 000	13 000	0.111	
	62	14	1.1	**6007**	16.21	10.42	0.474		10 000	13 000	0.151	
	62	14	1.1	**6007RSR**	16.21	10.42	0.474		7 100		0.151	
	62	14	1.1	**6007-2RSR**	16.21	10.42	0.474		7 100		0.151	
	62	14	1.1	**6007ZR**	16.21	10.42	0.474		10 000	13 000	0.151	
	62	14	1.1	**6007-2ZR**	16.21	10.42	0.474		10 000		0.151	
	72	17	1.1	**6207**	25.70	15.20	0.695		9 400	11 000	0.284	
	72	17	1.1	**6207RSR**	25.70	15.20	0.695		6 300		0.284	
	72	17	1.1	**6207-2RSR**	25.70	15.20	0.695		6 300		0.284	
	72	17	1.1	**6207ZR**	25.70	15.20	0.695		9 400	11 000	0.284	
	72	17	1.1	**6207-2ZR**	25.70	15.20	0.695		9 400		0.284	
	80	21	1.7	**6307**	33.40	19.20	0.873		8 400	10 000	0.447	
	80	21	1.7	**6307RSR**	33.40	19.20	0.873		5 600		0.447	
	80	21	1.7	**6307-2RSR**	33.40	19.20	0.873		5 600		0.447	
	80	21	1.7	**6307ZR**	33.40	19.20	0.873		8 400	10 000	0.447	
	80	21	1.7	**6307-2ZR**	33.40	19.20	0.873		8 400		0.447	
	100	25	1.5	**6407**	55.50	29.40	1.336		7 500	8 900	0.954	



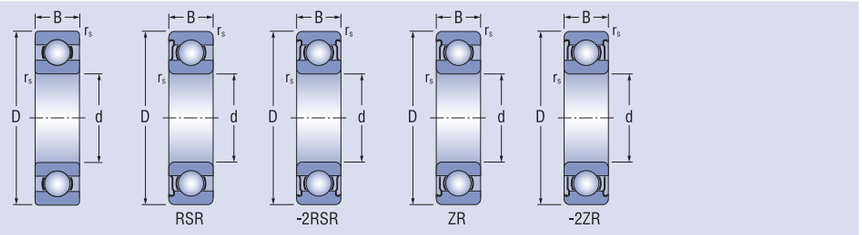
Dimensions				Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass	
					dynamic	static			grease	oil		
d	D	B	$r_{s\ min}$		C_r	C_{or}	C_u					
mm					kN				min^{-1}		kg	
40	68	9	0.3	**16008**	12.60	9.65	0.439		10 000	12 000	0.125	
	68	15	1.1	**6008**	17.03	11.70	0.532		9 500	12 000	0.187	
	68	15	1.1	**6008RSR**	17.03	11.70	0.532		6 300		0.187	
	68	15	1.1	**6008-2RSR**	17.03	11.70	0.532		6 300		0.187	
	68	15	1.1	**6008ZR**	17.03	11.70	0.532		9 500	12 000	0.187	
	68	15	1.1	**6008-2ZR**	17.03	11.70	0.532		9 500		0.187	
	80	18	1.1	**6208**	29.50	18.10	0.823		8 400	10 000	0.349	
	80	18	1.1	**6208RSR**	29.50	18.10	0.823		5 600		0.349	
	80	18	1.1	**6208-2RSR**	29.50	18.10	0.823		5 600		0.349	
	80	18	1.1	**6208ZR**	29.50	18.10	0.823		8 400	10 000	0.349	
	80	18	1.1	**6208-2ZR**	29.50	18.10	0.823		8 400		0.349	
	90	23	1.7	**6308**	40.75	24.00	1.091		7 500	9 000	0.625	
	90	23	1.7	**6308RSR**	40.75	24.00	1.091		5 300		0.625	
	90	23	1.7	**6308-2RSR**	40.75	24.00	1.091		5 300		0.625	
	90	23	1.7	**6308ZR**	40.75	24.00	1.091		7 500	9 000	0.625	
	90	23	1.7	**6308-2ZR**	40.75	24.00	1.091		7 500		0.625	
	110	27	2.0	**6408**	63.50	36.50	1.704		6 700	7 900	1.230	
45	75	10	0.6	**16009**	15.60	12.20	0.554		9 200	11 000	0.170	
	75	16	1.1	**6009**	21.09	14.77	0.671		9 000	11 000	0.231	
	75	16	1.1	**6009RSR**	21.09	14.77	0.671		5 600		0.231	
	75	16	1.1	**6009-2RSR**	21.09	14.77	0.671		5 600		0.231	
	75	16	1.1	**6009ZR**	21.09	14.77	0.671		9 000	11 000	0.231	
	75	16	1.1	**6009-2ZR**	21.09	14.77	0.671		9 000		0.231	
	85	19	1.1	**6209**	31.70	20.70	0.941		7 500	9 000	0.404	
	85	19	1.1	**6209RSR**	31.70	20.70	0.941		5 300		0.404	
	85	19	1.1	**6209-2RSR**	31.70	20.70	0.941		5 300		0.404	
	85	19	1.1	**6209ZR**	31.70	20.70	0.941		7 500	9 000	0.404	
	85	19	1.1	**6209-2ZR**	31.70	20.70	0.941		7 500		0.404	
	100	25	1.7	**6309**	52.80	31.83	1.447		7 100	8 400	0.828	
	100	25	1.7	**6309RSR**	52.80	31.83	1.447		4 700		0.828	
	100	25	1.7	**6309-2RSR**	52.80	31.83	1.447		4 700		0.828	
	100	25	1.7	**6309ZR**	52.80	31.83	1.447		7 100	8 400	0.828	
	100	25	1.7	**6309-2ZR**	52.80	31.83	1.447		7 100		0.828	
	120	29	2.0	**6409**	77.50	45.50	2.068		6 000	7 100	1.540	



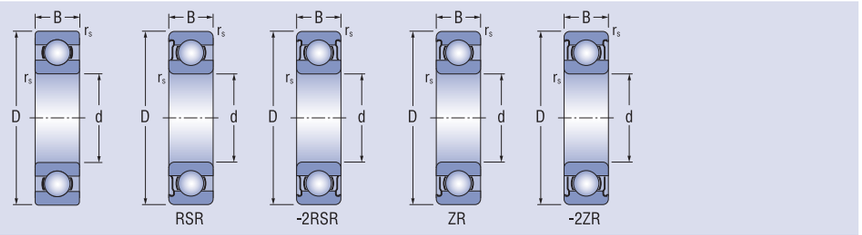
Dimensions				Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass	
					dynamic	static			grease	oil		
d	D	B	$r_{s\ min}$		C_r	C_{or}	C_u					
mm					kN				min^{-1}		kg	
50	80	10	0.6	**16010**	16.10	13.10	0.595		8 400	9 800	0.188	
	80	16	1.1	**6010**	22.00	16.25	0.736		8 500	10 000	0.251	
	80	16	1.1	**6010RSR**	22.00	16.25	0.736		5 300		0.251	
	80	16	1.1	**6010-2RSR**	22.00	16.25	0.736		5 300		0.251	
	80	16	1.1	**6010ZR**	22.00	16.25	0.736		8 500	10 000	0.251	
	80	16	1.1	**6010-2ZR**	22.00	16.25	0.736		8 500		0.251	
	90	20	1.1	**6210**	35.10	23.20	1.054		7 100	8 400	0.460	
	90	20	1.1	**6210RSR**	35.10	23.20	1.054		4 700		0.460	
	90	20	1.1	**6210-2RSR**	35.10	23.20	1.054		4 700		0.460	
	90	20	1.1	**6210ZR**	35.10	23.20	1.054		7 100	8 400	0.460	
	90	20	1.1	**6210-2ZR**	35.10	23.20	1.054		7 100		0.460	
	110	27	2.1	**6310**	61.80	37.90	1.723		6 300	7 500	1.060	
	110	27	2.1	**6310RSR**	61.80	37.90	1.723		4 200		1.060	
	110	27	2.1	**6310-2RSR**	61.80	37.90	1.723		4 200		1.060	
	110	27	2.1	**6310ZR**	61.80	37.90	1.723		6 300	7 500	1.060	
	110	27	2.1	**6310-2ZR**	61.80	37.90	1.723		6 300		1.060	
	130	31	2.0	**6410**	92.30	55.10	2.509		5 600	6 700	1.890	
55	90	11	0.6	**16011**	19.40	16.20	0.736		7 500	9 000	0.260	
	90	18	1.1	**6011**	30.26	22.00	1.000		7 500	9 000	0.381	
	90	18	1.1	**6011RSR**	30.26	22.00	1.000		4 700		0.381	
	90	18	1.1	**6011-2RSR**	30.26	22.00	1.000		4 700		0.381	
	90	18	1.1	**6011ZR**	30.26	22.00	1.000		7 500	9 000	0.381	
	90	18	1.1	**6011-2ZR**	30.26	22.00	1.000		7 500		0.381	
	100	21	1.7	**6211**	43.40	29.20	1.327		6 700	7 900	0.602	
	100	21	1.7	**6211RSR**	43.40	29.20	1.327		4 500		0.602	
	100	21	1.7	**6211-2RSR**	43.40	29.20	1.327		4 500		0.602	
	100	21	1.7	**6211ZR**	43.40	29.20	1.327		6 700	7 900	0.602	
	100	21	1.7	**6211-2ZR**	43.40	29.20	1.327		6 700		0.602	
	120	29	2.1	**6311**	71.60	44.90	2.023		5 600	6 700	1.380	
	120	29	2.1	**6311RSR**	71.60	44.90	2.023		3 800		1.380	
	120	29	2.1	**6311-2RSR**	71.60	44.90	2.023		3 800		1.380	
	120	29	2.1	**6311ZR**	71.60	44.90	2.023		5 600	6 700	1.380	
	120	29	2.1	**6311-2ZR**	71.60	44.90	2.023		5 600		1.380	
	140	33	2.1	**6411**	100.70	62.50	2.841		5 300	6 300	2.290	



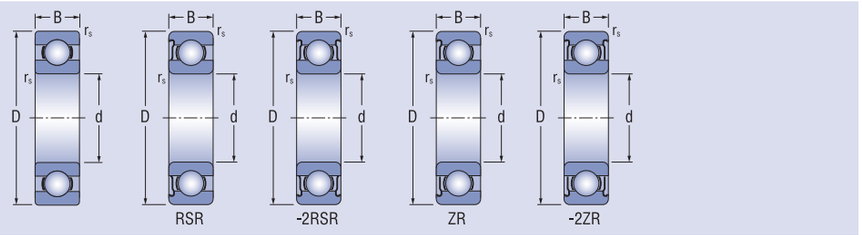
Dimensions				Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass	
					dynamic	static			grease	oil		
d	D	B	$r_{s\ min}$		C_r	C_{or}	C_u					
mm					kN				min^{-1}		kg	
60	95	11	0.6	**16012**	19.90	17.50	0.854		7 100	8 300	0.280	
	95	18	1.1	**6012**	31.66	24.22	1.101		6 700	8 000	0.411	
	95	18	1.1	**6012RSR**	31.66	24.22	1.101		4 500		0.411	
	95	18	1.1	**6012-2RSR**	31.66	24.22	1.101		4 500		0.411	
	95	18	1.1	**6012ZR**	31.66	24.22	1.101		6 700	8 000	0.411	
	95	18	1.1	**6012-2ZR**	31.66	24.22	1.101		6 700		0.411	
	110	22	1.7	**6212**	47.80	32.90	1.495		6 000	7 100	0.783	
	110	22	1.7	**6212RSR**	47.80	32.90	1.495		4 000		0.783	
	110	22	1.7	**6212-2RSR**	47.80	32.90	1.495		4 000		0.783	
	110	22	1.7	**6212ZR**	47.80	32.90	1.495		6 000	7 100	0.783	
	110	22	1.7	**6212-2ZR**	47.80	32.90	1.495		6 000		0.783	
	130	31	2.1	**6312**	81.80	51.80	2.354		5 300	6 300	1.720	
	130	31	2.1	**6312RSR**	81.80	51.80	2.354		3 500		1.720	
	130	31	2.1	**6312-2RSR**	81.80	51.80	2.354		3 500		1.720	
	130	31	2.1	**6312ZR**	81.80	51.80	2.354		5 300	6 300	1.720	
	130	31	2.1	**6312-2ZR**	81.80	51.80	2.354		5 300		1.720	
	150	35	2.1	**6412**	109.10	70.10	3.115		4 700	5 600	2.780	
65	100	11	0.6	**16013**	20.45	18.65	0.891		6 500	7 700	0.300	
	100	18	1.1	**6013**	32.07	24.90	1.141		6 300	7 500	0.446	
	100	18	1.1	**6013RSR**	32.07	24.90	1.141		4 200		0.455	
	100	18	1.1	**6013-2RSR**	32.07	24.90	1.141		4 200		0.464	
	100	18	1.1	**6013ZR**	32.07	24.90	1.141		6 300	7 500	0.455	
	100	18	1.1	**6013-2ZR**	32.07	24.90	1.141		6 300		0.464	
	120	23	1.7	**6213**	57.20	40.00	1.886		5 300	6 300	1.000	
	120	23	1.7	**6213RSR**	57.20	40.00	1.886		3 500		1.015	
	120	23	1.7	**6213-2RSR**	57.20	40.00	1.886		3 500		1.030	
	120	23	1.7	**6213ZR**	57.20	40.00	1.886		5 300	6 300	1.015	
	120	23	1.7	**6213-2ZR**	57.20	40.00	1.886		5 300		1.030	
	140	33	2.1	**6313**	93.00	60.00	2.703		5 000	6 000	2.140	
	140	33	2.1	**6313RSR**	93.00	60.00	2.703		3 300		2.160	
	140	33	2.1	**6313-2RSR**	93.00	60.00	2.703		3 300		2.180	
	140	33	2.1	**6313ZR**	93.00	60.00	2.703		5 000	6 000	2.160	
	140	33	2.1	**6313-2ZR**	93.00	60.00	2.703		5 000		2.180	
	160	37	2.1	**6413**	118.10	78.60	3.283		4 500	5 300	3.490	



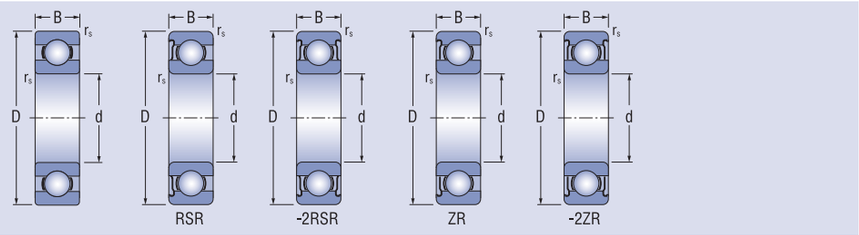
Dimensions				Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass	
					dynamic	static			grease	oil		
d	D	B	$r_{s\ min}$		C_r	C_{or}	C_u					
mm					kN				min^{-1}		kg	
70	110	13	0.6	**16014**	27.90	25.00	1.136		6 300	7 200	0.438	
	110	20	1.1	**6014**	38.60	30.43	1.409		5 600	6 700	0.622	
	110	20	1.1	**6014RSR**	38.60	30.43	1.409		3 800		0.630	
	110	20	1.1	**6014-2RSR**	38.60	30.43	1.409		3 800		0.640	
	110	20	1.1	**6014ZR**	38.60	30.43	1.409		5 600	6 700	0.630	
	110	20	1.1	**6014-2ZR**	38.60	30.43	1.409		5 600		0.640	
	125	24	1.7	**6214**	60.80	45.00	2.000		5 300	6 300	1.090	
	125	24	1.7	**6214RSR**	60.80	45.00	2.000		3 500		1.000	
	125	24	1.7	**6214-2RSR**	60.80	45.00	2.000		3 500		1.010	
	125	24	1.7	**6214ZR**	60.80	45.00	2.000		5 300	6 300	1.000	
	125	24	1.7	**6214-2ZR**	60.80	45.00	2.000		5 300		1.010	
	150	35	2.1	**6314**	104.10	68.00	2.956		4 700	5 600	2.610	
	150	35	2.1	**6314RSR**	104.10	68.00	2.956		3 200		2.635	
	150	35	2.1	**6314-2RSR**	104.10	68.00	2.956		3 200		2.660	
	150	35	2.1	**6314ZR**	104.10	68.00	2.956		4 700	5 600	2.635	
	150	35	2.1	**6314-2ZR**	104.10	68.00	2.956		4 700		2.660	
	180	42	3.0	**6414**	136.30	96.50	3.923		4 000	4 700	5.060	
75	115	13	0.6	**16015**	28.70	26.80	1.220		5 700	6 700	0.463	
	115	20	1.1	**6015**	40.20	33.20	1.523		5 300	6 300	0.654	
	115	20	1.1	**6015RSR**	40.20	33.20	1.523		3 500		0.666	
	115	20	1.1	**6015-2RSR**	40.20	33.20	1.523		3 500		0.678	
	115	20	1.1	**6015ZR**	40.20	33.20	1.523		5 300	6 300	0.666	
	115	20	1.1	**6015-2ZR**	40.20	33.20	1.523		5 300		0.678	
	130	25	1.7	**6215**	66.10	49.50	2.197		5 000	6 000	1.180	
	130	25	1.7	**6215RSR**	66.10	49.50	2.197		3 300		1.195	
	130	25	1.7	**6215-2RSR**	66.10	49.50	2.197		3 300		1.210	
	130	25	1.7	**6215ZR**	66.10	49.50	2.197		5 000	6 000	1.195	
	130	25	1.7	**6215-2ZR**	66.10	49.50	2.197		5 000		1.210	
	160	37	2.1	**6315**	113.40	77.00	3.214		4 200	5 000	3.180	
	160	37	2.1	**6315RSR**	113.40	77.00	3.214		3 100		3.205	
	160	37	2.1	**6315-2RSR**	113.40	77.00	3.214		3 100		3.230	
	160	37	2.1	**6315ZR**	113.40	77.00	3.214		4 200	5 000	3.205	
	160	37	2.1	**6315-2ZR**	113.40	77.00	3.214		4 200		3.230	
	190	45	3.0	**6415**	153.80	114.30	4.459		3 800	4 500	7.000	



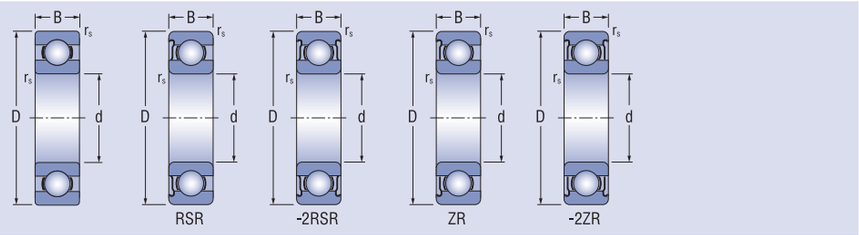
Dimensions				Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass	
					dynamic	static			grease	oil		
d	D	B	$r_{s\ min}$		C_r	C_{or}	C_u					
mm					kN				min^{-1}		kg	
80	125	14	0.6	**16016**	33.10	31.40	1.393		5 300	6 200	0.609	
	125	22	1.1	**6016**	47.54	39.80	1.796		5 000	6 000	0.867	
	125	22	1.1	**6016RSR**	47.54	39.80	1.796		3 300		0.880	
	125	22	1.1	**6016-2RSR**	47.54	39.80	1.796		3 300		0.893	
	125	22	1.1	**6016ZR**	47.54	39.80	1.796		5 000	6 000	0.880	
	125	22	1.1	**6016-2ZR**	47.54	39.80	1.796		5 000		0.893	
	140	28	2.1	**6216**	71.55	54.25	2.297		4 700	5 600	1.460	
	140	28	2.1	**6216RSR**	71.55	54.25	2.297		3 200		1.475	
	140	28	2.1	**6216-2RSR**	71.55	54.25	2.297		3 200		1.490	
	140	28	2.1	**6216ZR**	71.55	54.25	2.297		4 700	5 600	1.475	
	140	28	2.1	**6216-2ZR**	71.55	54.25	2.297		4 700		1.490	
	170	39	2.1	**6316**	130.00	86.50	3.516		4 000	4 700	3.750	
	170	39	2.1	**6316RSR**	130.00	86.50	3.516		2 700		3.785	
	170	39	2.1	**6316-2RSR**	130.00	86.50	3.516		2 700		3.820	
	170	39	2.1	**6316ZR**	130.00	86.50	3.516		4 000	4 700	3.785	
	170	39	2.1	**6316-2ZR**	130.00	86.50	3.516		4 000	4 700	3.820	
	200	48	3.0	**6416**	163.00	125.00	4.802		3 500	4 200	6.700	
85	130	14	0.6	**16017**	34.00	33.30	1.469		5 000	5 900	0.666	
	130	22	1.1	**6017**	52.70	44.60	1.955		4 700	5 600	0.916	
	130	22	1.1	**6017RSR**	52.70	44.60	1.955		3 200		0.928	
	130	22	1.1	**6017-2RSR**	52.70	44.60	1.955		3 200		0.940	
	130	22	1.1	**6017ZR**	52.70	44.60	1.955		4 700	5 600	0.928	
	130	22	1.1	**6017-2ZR**	52.70	44.60	1.955		4 700		0.940	
	150	28	2.1	**6217**	83.20	64.00	2.683		4 200	5 000	1.870	
	150	28	2.1	**6217RSR**	83.20	64.00	2.683		2 800		1.890	
	150	28	2.1	**6217-2RSR**	83.20	64.00	2.683		2 800		1.910	
	150	28	2.1	**6217ZR**	83.20	64.00	2.683		4 200	5 000	1.890	
	150	28	2.1	**6217-2ZR**	83.20	64.00	2.683		4 200		1.910	
	180	41	4.0	**6317**	132.70	96.60	3.811		3 800	4 500	4.250	
	180	41	4.0	**6317RSR**	132.70	96.60	3.811		2 500		4.290	
	180	41	4.0	**6317-2RSR**	132.70	96.60	3.811		2 500		4.330	
	180	41	4.0	**6317ZR**	132.70	96.60	3.811		3 800	4 500	4.290	
	180	41	4.0	**6317-2ZR**	132.70	96.60	3.811		2 500		4.330	
	210	52	4.0	**6417**	173.00	137.00	5.127		3 300	4 000	7.900	



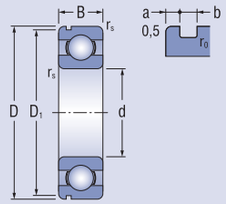
Dimensions				Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass	
					dynamic	static			grease	oil		
d	D	B	$r_{s\ min}$		C_r	C_{or}	C_u					
mm					kN				min^{-1}		kg	
90	140	16	1.0	**16018**	41.50	39.30	1.560		4 700	5 600	0.866	
	140	24	1.7	**6018**	58.00	49.80	2.119		4 500	5 300	1.210	
	140	24	1.7	**6018RSR**	58.00	49.80	2.119		3 000		1.220	
	140	24	1.7	**6018-2RSR**	58.00	49.80	2.119		3 000		1.230	
	140	24	1.7	**6018ZR**	58.00	49.80	2.119		4 500	5 300	1.220	
	140	24	1.7	**6018-2ZR**	58.00	49.80	2.119		4 500		1.230	
	160	30	2.0	**6218**	96.00	71.50	2.937		4 000	4 700	2.210	
	160	30	2.0	**6218RSR**	96.00	71.50	2.937		2 500		2.235	
	160	30	2.0	**6218-2RSR**	96.00	71.50	2.937		2 500		2.260	
	160	30	2.0	**6218ZR**	96.00	71.50	2.937		4 000	4 700	2.235	
	160	30	2.0	**6218-2ZR**	96.00	71.50	2.937		4 000		2.260	
	190	43	3.0	**6318**	144.00	108.50	3.923		3 500	4 200	5.430	
	190	43	3.0	**6318RSR**	144.00	108.50	3.923		2 300		5.480	
	190	43	3.0	**6318-2RSR**	144.00	108.50	3.923		2 300		5.530	
	190	43	3.0	**6318ZR**	144.00	108.50	3.923		3 500	4 200	5.480	
	190	43	3.0	**6318-2ZR**	144.00	108.50	3.923		2 300		5.530	
	225	54	4.0	**6418**	196.00	163.00	5.903		3 200	3 800	11.400	
95	145	16	1.0	**16019**	42.80	41.90	1.660		4 500	5 300	0.922	
	145	24	1.7	**6019**	57.80	50.10	2.241		4 200	5 000	1.270	
	145	24	1.7	**6019RSR**	57.80	50.10	2.241		2 800		1.295	
	145	24	1.7	**6019-2RSR**	57.80	50.10	2.241		2 800		1.320	
	145	24	1.7	**6019ZR**	57.80	50.10	2.241		4 200	5 000	1.295	
	145	24	1.7	**6019-2ZR**	57.80	50.10	2.241		4 200		1.320	
	170	32	2.1	**6219**	110.30	82.80	3.219		3 800	4 500	2.730	
	170	32	2.1	**6219RSR**	110.30	82.80	3.219		2 300		2.760	
	170	32	2.1	**6219-2RSR**	110.30	82.80	3.219		2 300		7.790	
	170	32	2.1	**6219ZR**	110.30	82.80	3.219		3 800	4 500	2.760	
	170	32	2.1	**6219-2ZR**	110.30	82.80	3.219		3 800		2.790	
	200	45	3.0	**6319**	153.00	119.00	4.195		3 300	4 000	6.230	
	200	45	3.0	**6319RSR**	153.00	119.00	4.195		2 100		6.285	
	200	45	3.0	**6319-2RSR**	153.00	119.00	4.195		2 100		6.340	
	200	45	3.0	**6319ZR**	153.00	119.00	4.195		3 300	4 000	6.285	
	200	45	3.0	**6319-2ZR**	153.00	119.00	4.195		3 300		6.340	



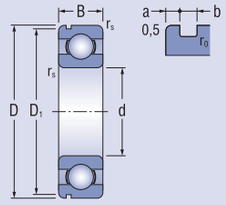
Dimensions				Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass	
					dynamic	static			grease	oil		
d	D	B	$r_{s\ min}$		C_r	C_{or}	C_u					
mm					kN				min^{-1}		kg	
100	150	16	1.0	**16020**	43.80	44.30	1.789		4 200	5 000	0.956	
	150	24	1.7	**6020**	64.50	56.10	2.195		4 200	5 000	1.320	
	150	24	1.7	**6020RSR**	64.50	56.10	2.195		2 800		1.335	
	150	24	1.7	**6020-2RSR**	64.50	56.10	2.195		2 800		1.350	
	150	24	1.7	**6020ZR**	64.50	56.10	2.195		4 200	5 000	1.335	
	150	24	1.7	**6020-2ZR**	64.50	56.10	2.195		4 200		1.350	
	180	34	2.1	**6220**	122.10	92.70	3.577		3 500	4 200	3.300	
	180	34	2.1	**6220RSR**	122.10	92.70	3.577		2 100		3.330	
	180	34	2.1	**6220-2RSR**	122.10	92.70	3.577		2 100		3.360	
	180	34	2.1	**6220ZR**	122.10	92.70	3.577		3 500	4 200	3.330	
	180	34	2.1	**6220-2ZR**	122.10	92.70	3.577		3 500		3.360	
	215	47	3.0	**6320**	173.00	140.40	4.855		3 200	3 800	7.670	
	215	47	3.0	**6320RSR**	173.00	140.40	4.855		1 800		7.725	
	215	47	3.0	**6320-2RSR**	173.00	140.40	4.855		1 800		7.780	
	215	47	3.0	**6320ZR**	173.00	140.40	4.855		3 200	3 800	7.725	
	215	47	3.0	**6320-2ZR**	173.00	140.40	4.855		3 200		7.780	
105	160	18	1.0	**16021**	54.00	54.00	1.971		4 000	4 700	1.240	
	160	26	2.1	**6021**	71.90	63.30	2.526		4 000	4 700	1.670	
	190	36	2.1	**6221**	133.00	104.50	3.895		3 300	4 000	3.880	
	225	49	3.0	**6321**	184.00	154.00	5.166		3 000	3 500	8.700	
110	170	19	1.0	**16022**	57.40	56.70	2.192		3 800	4 500	1.510	
	170	28	2.1	**6022**	81.90	72.90	2.731		3 800	4 500	2.060	
	200	38	2.1	**6222**	144.10	117.00	4.237		3 200	3 800	4.640	
	240	50	3.0	**6322**	205.00	178.00	6.047		2 800	3 300	9.550	
120	180	19	1.0	**16024**	58.80	60.40	2.375		3 300	4 000	1.620	
	180	28	2.1	**6024**	87.70	79.35	2.895		3 300	4 000	2.180	
	215	40	2.1	**6224**	155.30	131.00	4.600		3 000	3 500	5.620	
	260	55	3.0	**6324**	228.00	207.00	6.247		2 500	3 000	12.500	
130	200	22	1.1	**16026**	78.00	81.50	2.700		3 200	3 800	2.410	
	200	33	2.1	**6026**	105.10	96.80	3.538		3 200	3 800	3.340	
	230	40	3.0	**6226**	165.60	147.80	5.007		2 800	3 300	6.240	
	280	58	4.0	**6326**	228.00	216.00	6.857		2 400	2 800	14.700	
140	210	22	1.1	**16028**	81.00	86.50	2.800		3 000	3 600	2.550	
	210	33	2.1	**6028**	116.30	108.50	3.711		3 000	3 500	3.570	
	250	42	3.0	**6228**	179.10	166.90	5.407		2 500	3 000	8.070	
	300	62	4.0	**6328**	253.00	246.00	7.538		2 200	2 700	18.500	
150	225	24	1.1	**16030**	91.50	98.00	3.050		2 600	3 200	3.170	
	225	35	2.1	**6030**	131.70	124.55	4.150		2 600	3 200	4.380	
	270	45	3.0	**6230**	203.20	199.00	6.241		2 200	2 700	10.300	
	320	65	4.0	**6330**	277.00	280.00	8.302		2 000	2 500	21.400	



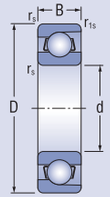
Dimensions				Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass	
					dynamic	static			grease	oil		
d	D	B	$r_{s\ min}$		C_r	C_{or}	C_u					
mm					kN				min^{-1}		kg	
160	240	25	1.5	**16032**	98.70	107.50	3.430		2 400	3 000	3.700	
	240	38	2.1	**6032M**	143.40	138.00	4.120		2 400	3 000	6.160	
	290	48	3.0	**6232**	202.00	202.00	6.121		2 100	2 500	12.500	
	340	68	4.0	**6332**	309.00	327.00	9.400		1 800	2 200	26.650	
170	260	28	1.5	**16034**	119.00	129.00	4.000		2 200	2 800	5.000	
	260	42	2.1	**6034M**	170.20	171.10	53.303		2 200	2 700	7.130	
	310	52	4.0	**6234**	228.00	240.00	7.041		1 900	2 400	15.200	
	360	72	4.0	**6334**	350.00	380.00	10.610		1 700	2 000	30.900	
180	280	31	2.0	**16036**	138.00	146.00	4.376		2 100	2 600	6.600	
	280	46	2.1	**6036**	188.00	198.00	5.934		2 100	2 500	8.510	
	320	52	4.0	**6236**	242.00	260.00	7.474		1 800	2 200	15.400	
190	290	31	2.0	**16038**	149.00	167.00	4.870		2 000	2 500	7.900	
	290	46	2.1	**6038**	196.00	215.00	6.308		2 000	2 400	8.860	
	340	55	4.0	**6238**	270.00	301.00	8.404		1 700	2 000	18.900	
200	310	34	2.1	**16040**	167.40	190.40	5.408		1 900	2 400	8.850	
	310	51	2.1	**6040**	205.00	225.00	6.404		1 900	2 200	11.640	
	360	58	4.0	**6240**	283.00	324.00	8.910		1 600	1 900	22.600	
220	340	37	2.1	**16044**	181.00	216.00	5.867		1 800	2 200	11.500	
	340	56	3.0	**6044M**	245.00	290.00	7.877		1 800	2 100	18.000	
	400	65	4.0	**6244M**	297.00	365.00	9.423		1 500	1 800	31.200	
240	360	37	2.1	**16048**	202.00	254.00	6.692		1 700	2 100	14.500	
	360	56	3.0	**6048M**	244.20	296.00	7.768		1 700	2 000	20.000	
	440	72	4.0	**6248M**	360.00	470.00	11.586		1 300	1 600	51.800	
260	400	44	3.0	**16052**	236.00	310.00	7.757		1 500	1 800	21.500	
	400	65	4.0	**6052M**	293.00	375.00	9.308		1 500	1 800	28.200	
	480	80	5.0	**6252M**	430.00	590.00	13.942		1 200	1 500	68.800	
280	420	44	3.0	**16056M**	240.00	325.00	8.017		1 500	1 800	23.000	
	420	65	4.0	**6056M**	305.00	408.00	9.913		1 500	1 800	32.100	
	500	80	5.0	**6256M**	425.00	600.00	13.810		1 100	1 400	70.400	
300	460	50	4.0	**16060M**	285.00	404.00	9.327		1 200	1 500	31.500	
	460	74	4.0	**6060M**	338.00	475.00	11.076		1 200	1 500	42.400	
320	480	50	4.0	**16064M**	293.00	430.00	9.861		1 100	1 400	34.000	
	480	74	4.0	**6064M**	345.00	510.00	11.591		1 100	1 400	46.510	
340	520	57	4.0	**16068M**	345.00	515.00	11.398		1 000	1 300	46.000	
	520	82	5.0	**6068M**	390.00	580.00	12.713		1 000	1 300	61.200	
360	540	57	4.0	**16072M**	345.00	540.00	11.570		1 000	1 300	50.000	
	540	82	5.0	**6072M**	400.00	622.00	13.327		1 000	1 300	68.000	
380	560	57	4.0	**16076M**	375.00	620.00	12.894		950	1 200	50.500	
	560	82	5.0	**6076M**	436.00	695.00	13.900		950	1 200	79.000	
400	600	90	5.0	**6080M**	520.00	865.00	17.644		850	1 100	89.400	



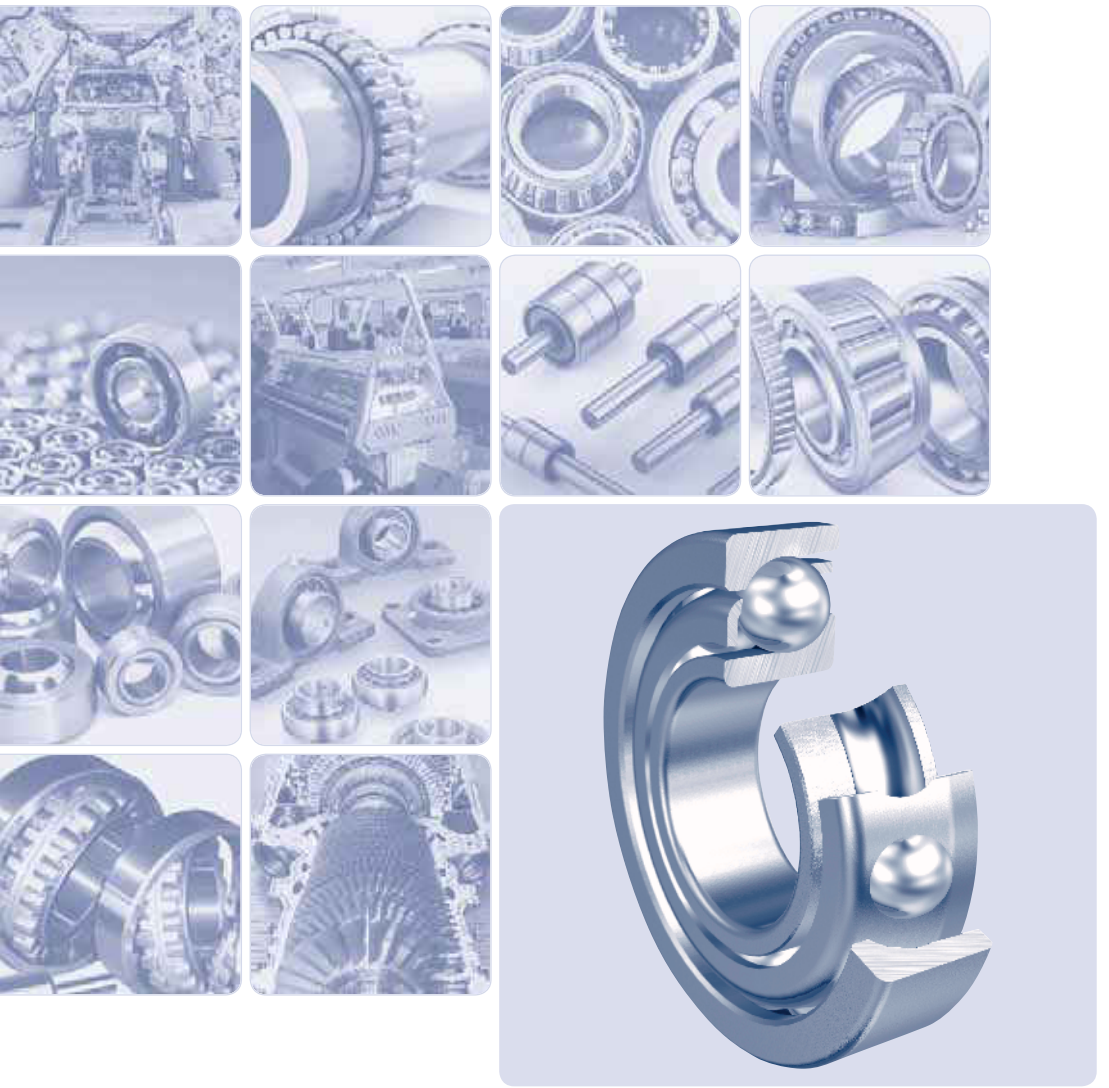
Dimensions								Bearing designation	Basic load rating dynamic	static		Fatigue load limit	Limiting speed for lubrication with grease	oil	Mass	
d	D	B	$r_{s\ min}$	$D_{1\ max}$	a_{max}	b_{min}	$r_{0\ max}$		C_r	C_{or}		C_u				
mm									kN				min^{-1}		kg	
17	35	10	0.3	33.17	2.06	1.35	0.4	**6003N**	6.00	3.25		0.148	21 000	25 000	0.040	
	40	12	0.6	38.10	2.06	1.35	0.4	**6203N**	9.58	4.78		0.217	17 000	21 000	0.073	
	47	14	1	44.60	2.46	1.35	0.4	**6303N**	13.56	6.56		0.298	16 000	19 000	0.115	
20	42	12	0.6	39.75	2.06	1.35	0.4	**6004N**	9.38	5.02		0.228	17 000	21 000	0.070	
	47	14	1	44.60	2.46	1.35	0.4	**6204N**	12.80	6.65		0.302	15 000	17 000	0.108	
	52	15	1.1	49.73	2.46	1.35	0.4	**6304N**	15.87	7.81		0.355	14 000	17 000	0.145	
25	47	12	0.6	44.60	2.06	1.35	0.4	**6005N**	10.00	5.85		0.266	15 000	18 000	0.082	
	52	15	1	49.73	2.46	1.35	0.4	**6205N**	14.00	7.88		0.358	13 000	15 000	0.129	
	62	17	1.1	59.61	3.28	1.90	0.6	**6305N**	22.40	11.48		0.523	11 000	13 000	0.230	
	80	21	1.5	76.81	3.28	1.90	0.6	**6405N**	38.20	19.20		0.873	9 400	11 000	0.530	
30	55	13	1.1	52.60	2.08	1.90	0.4	**6006N**	13.20	8.30		0.377	12 000	14 000	0.119	
	62	16	1.1	59.61	3.28	1.90	0.6	**6206N**	19.40	11.20		0.509	11 000	13 000	0.200	
	72	19	1.1	68.81	3.28	1.90	0.6	**6306N**	27.00	15.20		0.691	10 000	12 000	0.331	
	90	23	1.5	86.79	3.28	2.70	0.6	**6406N**	47.50	24.50		1.114	8 400	10 000	0.715	
35	62	14	1.1	59.61	2.06	1.90	0.6	**6007N**	16.21	10.42		0.474	10 000	13 000	0.154	
	72	17	1.1	68.81	3.28	1.90	0.6	**6207N**	25.70	15.30		0.695	9 400	11 000	0.284	
	80	21	1.7	78.81	3.28	1.90	0.6	**6307N**	33.40	19.20		0.873	8 400	10 000	0.447	
	100	25	1.5	96.80	3.28	2.70	0.6	**6407N**	56.80	29.60		1.345	7 500	8 900	0.954	
40	68	15	1.1	64.82	2.49	1.90	0.6	**6008N**	17.03	11.70		0.532	9 500	12 000	0.191	
	80	18	1.1	76.81	3.28	1.90	0.6	**6208N**	29.50	18.10		0.823	8 400	10 000	0.349	
	90	23	1.7	86.79	3.28	2.70	0.6	**6308N**	40.75	24.00		1.091	7 500	9 000	0.625	
	110	27	2.0	106.81	3.28	2.70	0.6	**6408N**	65.50	37.60		1.709	6 700	7 900	1.230	
45	75	16	1.1	71.83	2.49	1.90	0.6	**6009N**	21.09	14.77		0.671	9 000	11 000	0.241	
	85	19	1.1	81.81	3.28	1.90	0.6	**6209N**	31.70	20.70		0.941	7 500	9 000	0.404	
	100	25	1.7	96.80	3.28	2.70	0.6	**6309N**	52.80	31.83		1.447	7 100	8 400	0.828	
	120	29	2.0	115.21	4.06	3.10	0.6	**6409N**	77.50	45.50		2.068	6 000	7 100	1.540	
50	80	16	1.1	76.81	2.49	1.90	0.6	**6010N**	22.00	16.20		0.736	8 500	10 000	0.260	
	90	20	1.1	86.79	3.28	2.70	0.6	**6210N**	35.10	23.20		1.054	7 100	8 400	0.460	
	110	27	2.1	106.81	3.28	2.70	0.6	**6310N**	61.80	37.90		1.723	6 300	7 500	1.060	
	130	31	2.0	125.22	4.06	3.10	0.6	**6410N**	92.20	55.20		2.509	5 600	6 700	1.890	
55	90	18	1.1	86.79	2.87	2.70	0.6	**6011N**	30.30	22.00		1.000	7 500	9 000	0.383	
	100	21	1.7	96.80	3.28	2.70	0.6	**6211N**	43.40	29.20		1.327	6 700	7 900	0.602	
	120	29	2.1	115.21	4.06	3.10	0.6	**6311N**	71.50	44.50		2.023	5 600	6 700	1.380	
	140	33	2.1	135.23	4.90	3.10	0.6	**6411N**	100.70	62.50		2.841	5 300	6 300	2.290	
60	95	18	1.1	91.82	2.87	2.70	0.6	**6012N**	31.66	24.22		1.101	6 700	8 000	0.411	
	110	22	1.7	106.81	3.82	2.70	0.6	**6212N**	47.80	32.90		1.495	6 000	7 100	0.783	
	130	31	2.1	125.22	4.06	3.10	0.6	**6312N**	81.80	51.80		2.354	5 300	6 300	1.720	
	150	35	2.1	145.24	4.90	3.10	0.6	**6412N**	109.00	70.10		3.115	4 700	5 600	2.780	



Dimensions								Bearing designation	Basic load rating dynamic	static		Fatigue load limit	Limiting speed for lubrication with grease	oil	Mass	
d	D	B	$r_{s\ min}$	$D_{1\ max}$	a_{max}	b_{min}	$r_{0\ max}$		C_r	C_{or}		C_u				
mm									kN				min^{-1}		kg	
65	100	18	1.1	96.80	2.87	2.70	0.6	**6013N**	32.10	24.90		1.131	6 300	7 500	0.437	
	120	23	1.7	115.21	4.06	3.10	0.6	**6213N**	57.20	40.00		1.818	5 300	6 300	0.997	
	140	33	2.1	135.23	4.90	3.10	0.6	**6313N**	93.90	60.50		2.703	5 000	6 000	2.100	
	160	37	2.1	155.22	4.90	3.10	0.6	**6413N**	118.10	78.60		3.361	4 500	5 300	3.280	
70	110	20	1.1	106.81	2.87	2.70	0.6	**6014N**	38.00	31.00		1.409	5 600	6 700	0.604	
	125	24	1.7	120.22	4.06	3.10	0.6	**6214N**	62.00	44.00		2.000	5 300	6 300	1.090	
	150	35	2.1	145.24	4.90	3.10	0.6	**6314N**	104.00	68.00		2.956	4 700	5 600	2.540	
	180	42	3.0	173.66	5.69	3.50	0.6	**6414N**	139.50	99.50		4.029	4 000	4 700	4.850	
75	115	20	1.1	111.81	2.87	2.70	0.6	**6015N**	39.00	33.50		1.523	5 300	6 300	0.640	
	130	25	1.7	125.22	4.06	3.10	0.6	**6215N**	65.50	49.00		2.197	5 000	6 000	1.180	
	160	37	2.1	155.22	4.90	3.10	0.6	**6315N**	114.00	76.50		3.214	4 200	5 000	3.060	
	190	45	3.0	183.64	5.69	3.10	0.6	**6415N**	153.80	114.30		4.488	3 800	4 500	5.740	
80	125	22	1.1	120.22	2.87	3.10	0.6	**6016N**	47.50	40.00		1.796	5 000	6 000	0.872	
	140	28	2.1	135.23	4.90	3.10	0.6	**6216N**	72.00	53.00		2.297	4 700	5 600	1.400	
	170	39	2.1	163.65	5.69	3.50	0.6	**6316N**	130.00	86.50		3.516	4 000	4 700	3.642	
85	130	22	1.1	125.22	2.87	3.10	0.6	**6017N**	50.80	43.00		1.886	4 700	5 600	0.918	
	150	28	2.1	145.24	4.90	3.10	0.6	**6217N**	83.00	64.00		2.683	4 200	5 000	1.800	
	180	41	4	173.66	5.69	3.50	0.6	**6317N**	140.00	96.50		3.811	3 800	4 500	4.250	
90	140	24	1.7	135.23	3.71	3.10	0.6	**6018N**	58.50	50.00		2.075	4 500	5 300	1.200	
	160	30	2	155.22	4.90	3.10	0.6	**6218N**	96.50	72.00		2.937	4 000	4 700	2.160	
	190	43	3	183.64	5.69	3.50	0.6	**6318N**	143.00	107.20		4.118	3 500	4 200	4.980	



Dimensions					Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass	
						dynamic	static			grease	oil		
d	D	B	$r_{s\,min}$	$r_{1s\,min}$		C_r	C_{or}	C_u					
mm						kN				min^{-1}		kg	
4	16	5	0.15	0.10	**E4**	1.22	0.24	0.011		34 000	40 000	0.005	
5	16	5	0.15	0.10	**E5**	1.34	0.28	0.012		34 000	40 000	0.005	
6	21	7	0.30	0.15	**E6**	2.24	0.40	0.018		30 000	36 000	0.011	
7	22	7	0.30	0.15	**E7**	3.24	0.44	0.020		30 000	36 000	0.013	
8	24	7	0.30	0.15	**E8**	3.24	0.44	0.020		28 000	34 000	0.016	
9	28	8	0.30	0.15	**E9**	4.24	0.88	0.040		24 000	30 000	0.024	
10	28	8	0.30	0.15	**E10**	4.24	0.88	0.040		24 000	30 000	0.023	
11	32	7	0.30	0.15	**E11**	3.43	0.58	0.026		22 000	28 000	0.028	
12	32	7	0.30	0.15	**E12**	3.43	0.58	0.026		22 000	28 000	0.027	
13	30	7	0.30	0.15	**E13**	3.43	0.58	0.026		22 000	28 000	0.025	
15	35	8	0.30	0.15	**E15**	4.52	1.15	0.048		19 000	24 000	0.034	
17	44	11	0.60	0.30	**E17**	5.75	1.50	0.068		14 000	18 000	0.079	
17	44	11	0.60	0.30	**B017**	5.75	1.50	0.068		14 000	17 000	0.075	
20	47	12	0.60	0.30	**E20**	8.95	2.38	0.108		14 000	17 000	0.089	



Single Row Angular Contact Ball Bearings

Single Row Angular Contact Ball Bearings

Single Row Angular Contact Ball Bearings

The raceways of the single row angular contact ball bearings are in such position, that the connecting line of their contact points with the balls form an acute angle with the perpendicular line to the bearing axis, or contact angle. Bearings of design B have a contact angle α = 40° and have a high number of balls with good conformability which ensures their high load rating. They can carry radial loads acting simultaneously with high axial forces in one direction. Bearings are arranged in pairs so that axial guiding in both direction can be achieved.

Single row angular contact ball bearings of the design AA with a contact angle of α = 26° are used in applications with a higher axial load.

Bearings of the design B and AA are non-separable, although both rings have only one rib.

Boundary dimensions

The boundary dimensions of the single row angular contact ball bearings indicated in the dimension tables, correspond to the international dimensional standard ISO 15.

Designation

The bearing designation in the standard design is shown in the dimension tables. Differences from the standard design are designated by additional symbols according to STN 02 4608.

Cage

The single row angular contact ball bearings have a pressed steel cage which is not marked.

For special applications some bearings are manufactured with a polyamide cage (TNG). Deliveries of bearings with this cage need to be discussed in advance.

Accuracy

The single row angular contact ball bearings are commonly manufactured with the normal tolerance class P0 (the symbol is not indicated). For special applications requiring a high accuracy or for higher rottational speeds, the bearings are supplied in the higher tolerance class P6. Limiting decviation values of the dimension and running accuracy are indicated in ISO 492.

Inner clearance

The single row angular contact ball bearings are usualy mounted in pairs. The suitable operating clearance or preload is adjusted during mounting and depends on the arrangement design and operating conditions.

Misalignment

The single row angular contact ball bearings mounted in pairs are sensitive to the misalignment of bearing rings. Misalignment causes additional load on the bearings, which shortens their lifetime.

Radial Equivalent Dynamic and Static Load

Radial Equivalent Dynamic Load

The single row angular contact ball bearings with contact angle α = 40° (B)

$P_r = F_r$ pre $F_a/F_r \leq 1{,}14$

$P_r = 0{,}35 + 0{,}57F_a$ pre $F_a/F_r > 1{,}14$

The single row angular contact ball bearings with contact angle α = 26° (AA)

$P_r = F_r$ pre $F_a/F_r \leq 0{,}68$

$P_r = 0{,}41F_r + 0{,}87F_a$ pre $F_a/F_r > 0{,}68$

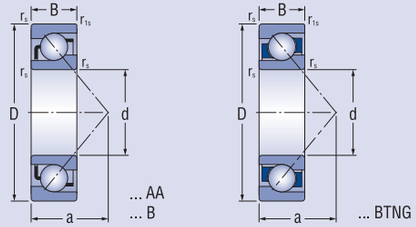
Radial Equivalent Static Load

The single row angular contact ball bearings with contact angle α = 40° (B)

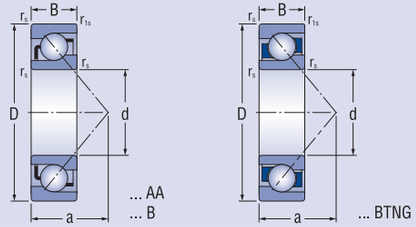
$$P_{or} = 0{,}5F_r + 0{,}26F_a$$

The single row angular contact ball bearings with contact angle α = 26° (AA)

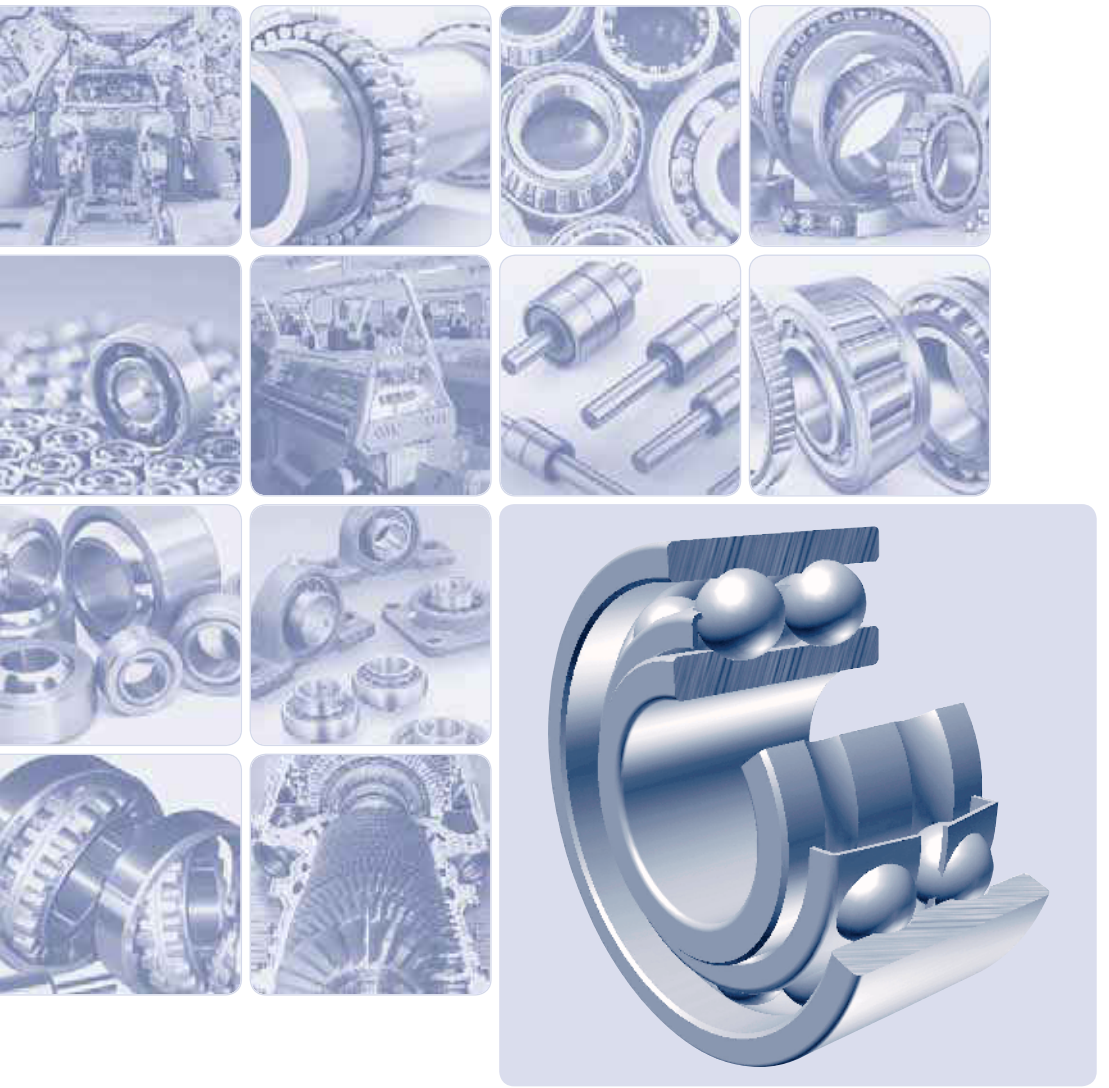
$$P_{or} = 0{,}5F_r + 0{,}37F_a$$



Dimensions						Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass	
							dynamic	static			grease	oil		
d	D	B	r_{smin}	r_{1smin}	a		C_r	C_{or}	C_u					
mm							kN				min^{-1}		kg	
10	30	9	0.6	0.15	9	**7200AA**	5.6	2.8	0.127		22 000	28 000	0.032	
	30	9	0.6	0.3	13	**7200B**	5.3	2.7	0.123		19 000	27 000	0.030	
12	32	10	0.6	0.15	10	**7201AA**	7.1	3.4	0.154		20 000	25 000	0.037	
	32	10	0.6	0.3	14	**7201B**	6.9	3.2	0.145		18 000	24 000	0.036	
	37	12	0.6	0.3	16	**7301B**	10.5	4.9	0.208		16 000	22 000	0.060	
15	35	11	0.6	0.15	11	**7202AA**	8.4	4.4	0.222		17 000	22 000	0.045	
	35	11	0.6	0.3	16	**7202B**	7.9	4.2	0.191		16 000	22 000	0.045	
	42	13	1.0	0.6	16	**7302B**	12.4	6.5	0.276		14 000	19 000	0.080	
17	40	12	0.6	0.3	13	**7203AA**	10.5	5.7	0.260		15 000	20 000	0.062	
	40	12	0.6	0.3	18	**7203B**	9.9	5.5	0.250		14 000	19 000	0.065	
	47	14	1.0	0.3	14.6	**7303AA**	16.2	8.1	0.368		13 000	19 000	0.065	
	47	14	1.0	0.6	20	**7303B**	14.1	8.1	0.368		13 000	17 000	0.110	
20	47	14	1.0	0.3	15	**7204AA**	14.0	7.8	0.354		13 000	18 000	0.110	
	47	14	1.0	0.6	21	**7204B**	13.4	7.6	0.323		12 000	16 000	0.110	
	52	15	1.1	0.6	15.9	**7304AA**	18.1	10.0	0.454		12 000	17 000	0.150	
	52	15	1.1	0.6	23	**7304B**	17.3	9.6	0.408		11 000	15 000	0.140	
25	52	15	1.0	0.3	16	**7205AA**	15.9	9.9	0.450		11 000	16 000	0.140	
	52	15	1.0	0.6	24	**7205B**	14.8	9.3	0.401		10 000	14 000	0.130	
	62	17	1.1	0.6	18.6	**7305AA**	25.1	14.0	0.636		9 500	14 000	0.230	
	62	17	1.1	0.6	27	**7305B**	24.3	14.1	0.640		9 000	13 000	0.230	
30	62	16	1.0	0.3	19	**7206AA**	22.0	14.0	0.636		9 000	13 000	0.210	
	62	16	1.0	0.6	27	**7206B**	20.5	13.5	0.567		8 500	12 000	0.200	
	72	19	1.1	0.6	21.6	**7306AA**	29.5	17.9	0.813		8 500	12 000	0.350	
	72	19	1.1	0.6	31	**7306B**	29.3	18.1	0.770		8 000	11 000	0.340	
35	72	17	1.1	0.6	21	**7207AA**	29.1	19.1	0.868		8 000	11 000	0.310	
	72	17	1.1	0.6	31	**7207B**	28.3	14.8	0.630		7 500	10 000	0.280	
	80	21	1.5	0.6	24.1	**7307AA**	38.8	24.9	1.132		7 500	10 000	0.470	
	80	21	1.5	0.6	35	**7307B**	38.3	24.4	1.052		7 000	9 500	0.450	
40	80	18	1.1	0.6	23	**7208AA**	35.2	24.4	1.109		7 500	10 000	0.370	
	80	18	1.1	0.6	34	**7208B**	34.5	23.8	1.013		6 700	9 000	0.420	
	90	23	1.5	0.6	26.8	**7308AA**	47.4	31.1	1.413		6 700	9 000	0.660	
	90	23	1.5	0.6	39	**7308B**	46.5	29.5	1.255		6 300	8 500	0.630	
45	85	19	1.1	0.6	25	**7209AA**	36.8	27.2	1.236		6 700	9 000	0.410	
	85	19	1.1	0.6	37	**7209B**	34.0	24.6	1.056		6 300	8 500	0.420	
	100	25	1.5	0.6	29.4	**7309AA**	61.8	41.0	1.864		6 000	8 000	0.860	
	100	25	1.5	0.6	43	**7309B**	59.6	39.6	1.800		5 600	7 500	0.850	
50	90	20	1.1	0.6	26	**7210AA**	40.8	30.5	1.386		6 300	8 500	0.460	
	90	20	1.1	0.6	39	**7210B**	40.4	25.6	1.089		5 600	8 000	0.470	
	110	27	2.0	1.0	32.3	**7310AA**	74.5	54.1	2.459		5 600	7 500	1.080	
	110	27	2.0	1.0	47	**7310B**	68.1	48.0	2.034		5 000	6 700	1.100	



Dimensions						Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass	
							dynamic	static			grease	oil		
d	D	B	r_{smin}	r_{1smin}	a		C_r	C_{or}	C_u					
mm							kN				min^{-1}		kg	
55	100	21	1.5	0.6	29	**7211AA**	50.5	38.1	1.839		5 600	7 000	0.610	
	100	21	1.5	0.6	43	**7211B**	46.3	36.0	1.500		5 300	7 000	0.620	
	120	29	2.0	1.0	35.1	**7311AA**	88.4	63.5	2.886		5 000	7 300	1.420	
	120	29	2.0	1.0	51	**7311B**	82.2	56.2	2.554		4 500	6 300	1.400	
60	110	22	1.5	0.6	31	**7212AA**	58.2	46.1	2.095		5 300	6 700	0.800	
	110	22	1.5	0.6	47	**7212B**	56.1	44.3	1.885		4 800	6 300	0.800	
	130	31	2.1	1.1	37.6	**7312AA**	101.0	73.6	3.345		4 800	6 300	1.710	
	130	31	2.1	1.1	55	**7312B**	91.5	65.4	2.736		4 300	5 600	1.750	
65	120	23	1.5	0.6	33	**7213AA**	66.6	52.5	2.386		4 800	6 300	1.000	
	120	23	1.5	0.6	50.5	**7213B**	65.7	50.2	2.118		4 300	6 000	1.000	
	140	33	2.1	1.1	40.4	**7313AA**	116.0	84.6	3.845		4 300	5 600	2.230	
	140	33	2.1	1.1	60	**7313B**	102.3	75.3	3.177		3 800	5 300	2.150	
70	125	24	1.5	0.6	35	**7214AA**	69.3	57.4	2.610		4 500	5 800	1.100	
	125	24	1.5	0.6	53	**7214B**	70.4	56.3	2.375		4 000	5 600	1.100	
	150	35	2.1	1.1	43.1	**7314AA**	128.5	96.1	4.271		4 000	5 300	2.670	
	150	35	2.1	1.1	64	**7314B**	114.6	85.9	3.436		3 600	5 000	2.650	
75	130	25	1.5	0.6	36	**7215AA**	75.3	63.0	2.863		4 300	5 600	1.200	
	130	25	1.5	0.6	56	**7215B**	68.6	58.2	2.425		3 800	5 300	1.200	
	160	37	2.1	1.1	45.9	**7315AA**	139.9	108.5	4.717		3 800	5 000	3.100	
	160	37	2.1	1.1	68	**7315B**	127.7	95.4	3.816		3 400	4 800	3.200	
80	140	26	2.0	1.0	39	**7216AA**	85.0	73.5	3.266		4 000	5 300	1.450	
	140	26	2.0	1.0	59	**7216B**	78.7	65.7	2.682		3 800	5 300	1.450	
	170	39	2.1	1.1	48.6	**7316AA**	151.5	121.7	5.291		3 600	4 800	3.600	
	170	39	2.1	1.1	72	**7316B**	141.4	107.9	4.150		3 200	4 800	3.800	
85	150	28	2.0	1.0	42	**7217AA**	94.7	81.4	3.539		3 800	5 000	1.800	
	150	28	2.0	1.0	63	**7217B**	83.2	74.1	2.917		3 600	5 000	1.850	
	180	41	3.0	1.1	76	**7317B**	155.8	120.9	4.478		3 000	4 000	4.450	
90	160	30	2.0	1.0	44	**7218AA**	116.9	100.0	4.255		3 600	4 800	2.250	
	160	30	2.0	1.0	67	**7218B**	107.6	92.4	3.554		3 200	4 300	2.300	
	190	43	3.0	1.1	80	**7318B**	157.9	136.9	4.978		3 000	4 000	5.300	
95	170	32	2.1	1.1	47	**7219AA**	128.2	108.9	4.537		3 400	4 500	2.700	
	170	32	2.1	1.1	72	**7219B**	121.4	106.7	3.981		3 000	4 000	2.700	
	200	45	3.0	1.1	84	**7319B**	172.0	154.1	5.407		2 800	4 000	6.400	
100	180	34	2.1	1.1	50	**7220AA**	141.9	122.0	5.083		3 200	4 300	3.250	
	180	34	2.1	1.1	76	**7220B**	140.7	122.5	4.706		2 800	3 800	3.300	
	215	47	3.0	1.1	90	**7320B**	190.0	177.3	5.930		2 600	3 800	7.290	
110	200	38	2.1	1.1	84	**7222B**	153.8	144.3	5.010		2 400	3 400	4.350	
	240	50	3.0	1.1	99	**7322B**	225.8	225.3	7.268		2 200	3 400	9.840	
120	215	40	2.1	1.1	90	**7224B**	165.4	161.4	5.249		2 200	3 200	5.200	
130	230	40	3.0	1.1	96	**7226B**	170.8	174.2	5.619		1 800	2 800	6.050	



Double Row Angular Contact Ball Bearings

Double Row Angular Contact Ball Bearings

Double Row Angular Contact Ball Bearings

The double-row angular contact ball bearings correspond to their construction and function to a pair of single-row angular contact ball bearings turned by back to back, forming an „O“ shape. Both rings have a relatively deep raceways and they cannot be dismantled. In case of „E“ type construction, there is a filling opening on one side.

The bearings achieve high load rate due to the optimal ball size and their contact with raceways. They can effectively bear radial and axial load in both directions and they are suitable for relatively high rotation frequencies.

The mounting of the "E" type construction bearings should be done in such a way, that the axial force is spread on the row of balls on the side opposite to the filling opening.

The raceways of the double row angular contact ball bearings are constructed in such way, that the flow lines of the contact points between balls and rings intersect the axis of the bearing outside the bearing itself (contact angle $\alpha = 32°$). This way the bearings can transfer the tilting point in the axial plane. Thus if there is limited space for mounting of the turning part, one bearing is sufficient.

Boundary Dimensions

The boundary dimensions of double row angular contact ball bearings indicated in the dimension tables correspond to the international dimensional plan ISO 15.

Designation

The designation of the bearings in the basic design is indicated in the dimension tables. The difference from the basic design is designated by additional symbols according to STN 02 4608.

Bearings with covers

Double row angular contact ball bearings with covers on both sides are produced with cover sheets (2ZR), or seals (2RSR). Bearings with covers on both sides are filled with high-quality plastic lubricant, properties of which assure lubrication throughout the whole lifetime of the bearing at normal operation conditions.

Cages

The double row angular contact ball bearings have a steel pressed cage which is marked. Steel cages are made in two designs depending on the used internal construction. Bearings in basic design have one-piece open cage which is similar to the plastic TNGH cages. Bearings in „E“ design have one cage in S shape which is similar to the one used standard single-row ball bearings.

For special seating requirements, some bearings are produced with polyamide cages which are marked TNGH. Supply of the bearings with this cage must be negotiated in advance.

Tolerance

The double row angular contact ball bearings are commonly manufactured within the normal tolerance class PO (the symbol PO is not indicated). For special applications requiring a high accuracy or operating under high speed, bearings within the higher tolerance class P6 can be supplied. The limiting values of the dimensional and running accuracy deviation correspond to ISO 194.

Axial Clearances

The commonly manufactured double row angular contact ball bearings have a normal axial clearance which is not indicated. For special applications, the bearings with the reduced (C2) or increased (C3, C4) axial clearance can be supplied.

Misalignment

For double row angular contact ball bearings mutual misalignment of bearing rings is not permissible. The misalignment of the rings causes additional load on the bearing and can shorten the endurance of the bearing.

Radial Equivalent Dynamic and Static Load

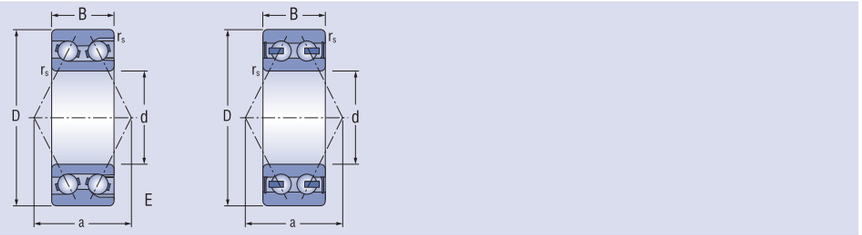
Radial Equivalent Dynamic Load

$$P_r = F_r + 0{,}73\ F_a \qquad \text{for } F_a/F_r \le 0{,}86$$

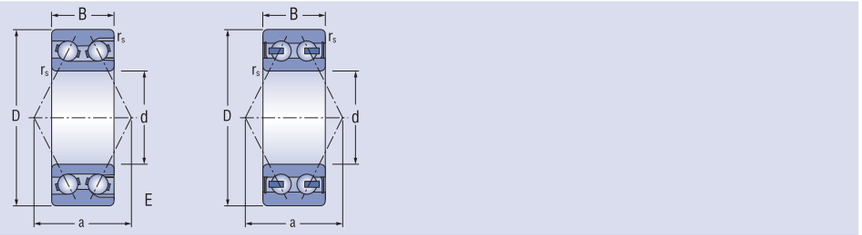
$$P_r = 0{,}62\ F_r + 1{,}17\ F_a \qquad \text{for } F_a/F_r > 0{,}86$$

Radial Equivalent Static Load

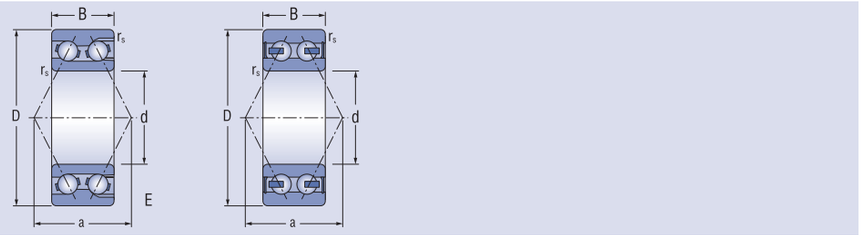
$$P_{or} = F_r + 0{,}63\ F_a$$



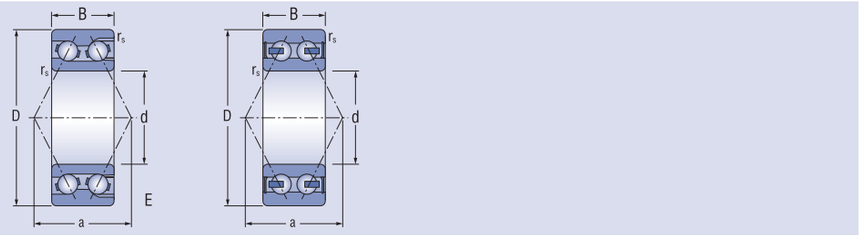
Dimensions					Designation	Basic load ratings dynamic	static	Fatigue load limit		Limiting speeds for lubrication with grease	oil	Mass	
d	D	B	$r_{s\,min}$	a		C_r	C_{or}	C_u					
mm						kN				min^{-1}		kg	
10	30	14.3	0.6	18.5	**3200E**	8.4	6.5	0.30		14 000	19 000	0.051	
	30	14.3	0.6	17.5	**3200**	7.6	4.4	0.20		14 000	19 000	0.049	
	30	14.3	0.6	17.5	**3200-2RSR**	7.6	4.4	0.20		12 500		0.049	
	30	14.3	0.6	17.5	**3200-2ZR**	7.6	4.4	0.20		14 000		0.049	
12	32	15.9	0.6	20.5	**3201E**	11.6	7.2	0.32		13 000	17 000	0.060	
	32	15.9	0.6	19.0	**3201**	9.1	5.1	0.23		13 000	17 000	0.057	
	32	15.9	0.6	19.0	**3201-2RSR**	9.1	5.1	0.23		11 500		0.057	
	32	15.9	0.6	19.0	**3201-2ZR**	9.1	5.1	0.23		13 000		0.057	
15	35	15.9	0.6	22.5	**3202E**	13.2	9.1	0.41		11 000	15 000	0.069	
	35	15.9	0.6	21.0	**3202**	10.0	6.1	0.28		11 000	15 000	0.064	
	35	15.9	0.6	21.0	**3202-2RSR**	10.0	6.1	0.28		9 600		0.064	
	35	15.9	0.6	21.0	**3202-2ZR**	10.0	6.1	0.28		11 000		0.064	
	42	19.0	1.0	26.0	**3302E**	16.7	11.9	0.51		9 900	13 000	0.127	
	42	19.0	1.0	26.0	**3302**	12.3	8.0	0.36		9 900	13 000	0.132	
	42	19.0	1.0	26.0	**3302-2RSR**	12.3	8.0	0.36		8 500		0.132	
	42	19.0	1.0	26.0	**3302-2ZR**	12.3	8.0	0.36		9 900		0.132	
17	40	17.5	0.6	25.5	**3203E**	14.5	11.0	0.53		9 900	13 000	0.099	
	40	17.5	0.6	24.0	**3203**	12.3	8.0	0.36		9 900	13 000	0.096	
	40	17.5	0.6	24.0	**3203-2RSR**	12.3	8.0	0.36		8 500		0.096	
	40	17.5	0.6	24.0	**3203-2ZR**	12.3	8.0	0.36		9 900		0.096	
	47	17.5	0.6	28.5	**3303E**	20.7	15.1	0.68		9 000	12 000	0.185	
	47	22.2	1.0	28.5	**3303**	17.4	10.4	0.47		9 000	12 000	0.181	
	47	22.2	1.0	28.5	**3303-2RSR**	17.4	10.4	0.47		7 700		0.181	
	47	22.2	1.0	28.5	**3303-2ZR**	17.4	10.4	0.47		9 000		0.181	
20	47	20.6	1.0	29.5	**3204E**	20.7	15.2	0.69		8 800	12 000	0.166	
	47	20.6	1.0	28.0	**3204**	19.0	12.1	0.55		8 800	12 000	0.153	
	47	20.6	1.0	28.0	**3204-2RSR**	19.0	12.1	0.55		8 800		0.153	
	47	20.6	1.0	28.0	**3204-2ZR**	19.0	12.1	0.55		7 400		0.153	
	52	20.6	1.1	32.0	**3304E**	25.0	18.6	0.84		8 000	11 000	0.221	
	52	22.2	1.1	30.5	**3304**	22.6	14.5	0.66		8 000	11 000	0.227	
	52	22.2	1.1	30.5	**3304-2RSR**	22.6	14.5	0.66		6 700		0.227	
	52	22.2	1.1	30.5	**3304-2ZR**	22.6	14.5	0.66		8 000		0.227	
25	52	20.6	1.0	32.5	**3205E**	22.8	18.4	0.83		7 300	9 800	0.183	
	52	20.6	1.0	31.5	**3205**	20.6	14.1	0.64		7 300	9 800	0.175	
	52	20.6	1.0	31.5	**3205-2RSR**	20.6	14.1	0.64		6 000		0.175	
	52	20.6	1.0	31.5	**3205-2ZR**	20.6	14.1	0.64		7 300		0.175	
	62	25.4	1.1	38.0	**3305E**	34.7	26.8	1.22		6 700	8 900	0.354	
	62	25.4	1.1	36.5	**3305**	26.7	18.0	0.82		6 700	8 900	0.362	
	62	25.4	1.1	36.5	**3305-2RSR**	26.7	18.0	0.82		5 500		0.362	
	62	25.4	1.1	36.5	**3305-2ZR**	26.7	18.0	0.82		6 700		0.362	



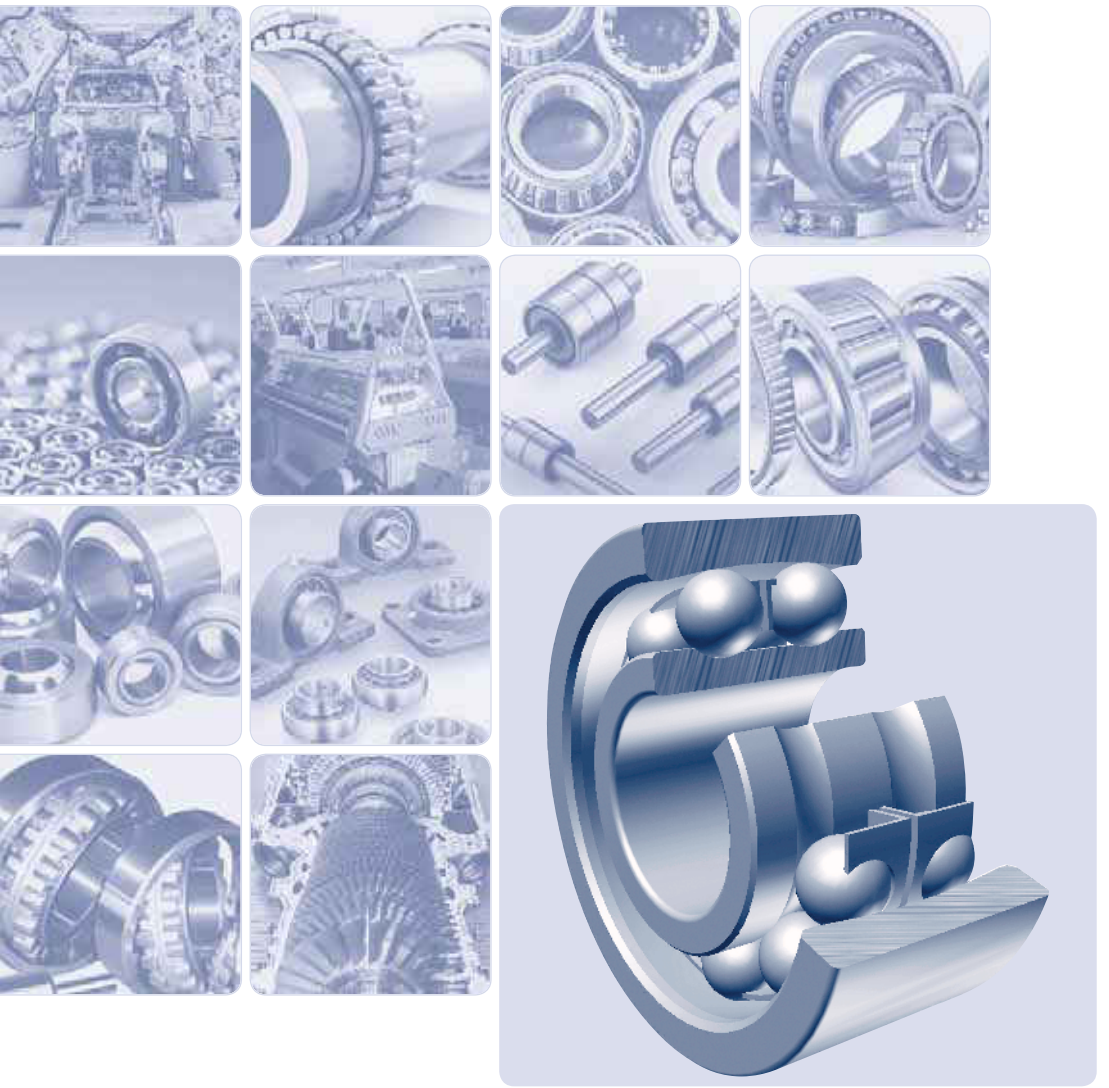
Dimensions					Designation	Basic load ratings dynamic	static	Fatigue load limit		Limiting speeds for lubrication with grease	oil	Mass	
d	D	B	$r_{s\,min}$	a		C_r	C_{or}	C_u					
mm						kN				min^{-1}		kg	
30	62	23.8	1.0	38.5	**3206E**	32.7	27.4	1.24		6 300	8 400	0.303	
	62	23.8	1.0	36.5	**3206**	24.4	17.6	0.80		6 300	8 400	0.286	
	62	23.8	1.0	36.5	**3206-2RSR**	24.4	17.6	0.80		5 000		0.286	
	62	23.8	1.0	36.5	**3206-2ZR**	24.4	17.6	0.80		6 300		0.286	
	72	30.2	1.1	44.5	**3306E**	45.8	37.0	1.70		5 700	7 600	0.558	
	72	30.2	1.1	43.0	**3306**	37.2	25.9	1.18		5 700	7 600	0.553	
	72	30.2	1.1	43.0	**3306-2RSR**	37.2	25.9	1.18		4 500		0.553	
	72	30.2	1.1	43.0	**3306-2ZR**	37.2	25.9	1.18		5 700		0.553	
35	72	27.0	1.1	44.5	**3207E**	38.1	33.2	1.52		5 500	7 400	0.458	
	72	27.0	1.1	42.5	**3207**	33.0	24.4	1.11		5 500	7 400	0.436	
	72	27.0	1.1	42.5	**3207-2RSR**	33.0	24.4	1.11		4 200		0.436	
	72	27.0	1.1	42.5	**3207-2ZR**	33.0	24.4	1.11		5 500		0.436	
	80	34.9	1.5	50.0	**3307E**	58.3	47.5	2.15		5 000	6 600	0.756	
	80	34.9	1.5	48.5	**3307**	49.5	35.1	1.59		5 000	6 600	0.756	
	80	34.9	1.5	48.5	**3307-2RSR**	49.5	35.1	1.59		3 800		0.756	
	80	34.9	1.5	48.5	**3307-2ZR**	49.5	35.1	1.59		5 000		0.756	
40	80	30.2	1.1	49.0	**3208E**	50.4	44.6	2.03		4 900	6 600	0.627	
	80	30.2	1.1	47.5	**3208**	40.1	30.6	1.40		4 900	6 600	0.590	
	80	30.2	1.1	47.5	**3208-2RSR**	40.1	30.6	1.40		3 800		0.590	
	80	30.2	1.1	47.5	**3208-2ZR**	40.1	30.6	1.40		4 900		0.590	
	90	36.5	1.5	55.0	**3308E**	72.0	60.3	2.68		4 400	5 900	1.030	
	90	36.5	1.5	53.5	**3308**	60.5	44.0	2.00		4 400	5 900	1.010	
	90	36.5	1.5	53.5	**3308-2RSR**	60.5	44.0	2.00		3 300		1.010	
	90	36.5	1.5	53.5	**3308-2ZR**	60.5	44.0	2.00		4 400		1.010	
45	85	30.2	1.1	52.5	**3209E**	54.8	52.0	2.36		4 400	5 900	0.678	
	85	30.2	1.1	50.5	**3209**	42.8	34.6	1.57		4 400	5 900	0.640	
	85	30.2	1.1	50.5	**3209-2RSR**	42.8	34.6	1.57		3 300		0.640	
	85	30.2	1.1	50.5	**3209-2ZR**	42.8	34.6	1.57		4 400		0.640	
	100	39.7	1.5	61.0	**3309E**	87.1	74.4	3.35		4 000	5 300	1.370	
	100	39.7	1.5	60.0	**3309**	72.5	54.0	2.45		4 000	5 300	1.340	
	100	39.7	1.5	60.0	**3309-2RSR**	72.5	54.0	2.45		2 900		1.340	
	100	39.7	1.5	60.0	**3309-2ZR**	72.5	54.0	2.45		4 000		1.340	
50	90	30.2	1.1	55.5	**3210E**	54.2	53.0	2.41		4 000	5 300	0.698	
	90	30.2	1.1	54.0	**3210**	45.2	38.9	1.77		4 000	5 300	0.689	
	90	30.2	1.1	54.0	**3210-2RSR**	45.2	38.9	1.77		2 900		0.689	
	90	30.2	1.1	54.0	**3210-2ZR**	45.2	38.9	1.77		4 000		0.689	
	110	44.4	2.0	67.0	**3310E**	103.3	90.0	4.07		3 600	4 800	1.980	
	110	44.4	2.0	65.5	**3310**	85.3	64.7	2.94		3 600	4 800	1.810	
	110	44.4	2.0	65.5	**3310-2RSR**	85.3	64.7	2.94		2 500		1.810	
	110	44.4	2.0	65.5	**3310-2ZR**	85.3	64.7	2.94		3 600		1.810	



Dimensions					Designation	Basic load ratings dynamic	static	Fatigue load limit		Limiting speeds for lubrication with grease	oil	Mass	
d	D	B	$r_{s\,min}$	a		C_r	C_{or}	C_u					
mm						kN				min^{-1}		kg	
55	100	33.3	1.5	61.5	**3211E**	69.3	68.8	3.11		3 600	4 900	1.070	
	100	33.3	1.5	60.5	**3211**	54.0	47.3	2.15		3 600	4 900	0.986	
	100	33.3	1.5	60.5	**3211-2RSR**	54.0	47.3	2.15		2 500		0.986	
	100	33.3	1.5	60.5	**3211-2ZR**	54.0	47.3	2.15		3 600		0.986	
	120	49.2	2.0	75.0	**3311E**	114.2	108.0	4.91		3 300	4 400	2.420	
	120	49.2	2.0	73.0	**3311**	106.3	82.0	3.71		3 300	4 400	2.320	
	120	49.2	2.0	73.0	**3311-2RSR**	106.3	82.0	3.71		2 300		2.320	
	120	49.2	2.0	73.0	**3311-2ZR**	106.3	82.0	3.71		3 300		2.320	
60	110	36.5	1.5	67.5	**3212E**	85.9	86.6	3.95		3 400	4 500	1.340	
	110	36.5	1.5	65.5	**3212**	59.9	53.8	2.44		3 400	4 500	1.270	
	110	36.5	1.5	65.5	**3212-2RSR**	59.9	53.8	2.44		2 400		1.270	
	110	36.5	1.5	65.5	**3212-2ZR**	59.9	53.8	2.44		3 400		1.270	
	130	54.0	1.5	82.0	**3312E**	123.5	119.6	5.42		3 000	4 000	3.070	
	130	54.0	2.1	79.5	**3312**	121.5	95.5	4.32		3 000	4 000	3.050	
	130	54.0	2.1	79.5	**3312-2RSR**	121.5	95.5	4.32		2 100		3.050	
	130	54.0	2.1	79.5	**3312-2ZR**	121.5	95.5	4.32		3 000		3.050	
65	120	38.1	1.5	72.5	**3213E**	85.0	87.7	4.00		3 100	4 200	1.680	
	120	38.1	1.5	71.0	**3213**	73.5	66.7	3.00		3 100	4 200	1.570	
	120	38.1	1.5	71.0	**3213-2RSR**	73.5	66.7	3.00		2 100		1.570	
	120	38.1	1.5	71.0	**3213-2ZR**	73.5	66.7	3.00		3 100		1.570	
	140	58.7	2.1	88.5	**3313E**	154.3	150.8	6.82		2 800	3 700	3.900	
	140	58.7	2.1	84.5	**3313**	138.0	109.0	4.95		2 800	3 700	3.960	
	140	58.7	2.1	84.5	**3313-2RSR**	138.0	109.0	4.95		1 900		3.960	
	140	58.7	2.1	84.5	**3313-2ZR**	138.0	109.0	4.95		2 800		3.960	
70	125	39.7	1.5	76.5	**3214E**	91.2	99.9	4.50		2 900	3 900	1.840	
	125	39.7	1.5	74.5	**3214**	80.6	73.9	3.36		2 900	3 900	1.800	
	125	39.7	1.5	74.5	**3214-2RSR**	80.6	73.9	3.36		2 000		1.800	
	125	39.7	1.5	74.5	**3214-2ZR**	80.6	73.9	3.36		2 900		1.800	
	150	63.5	2.1	97.0	**3314E**	153.8	153.9	6.70		2 600	3 500	5.200	
	150	63.5	2.1	93.0	**3314**	155.0	125.2	5.44		2 600	3 500	4.740	
	150	63.5	2.1	93.0	**3314-2RSR**	155.0	125.2	5.44		1 800		4.740	
	150	63.5	2.1	93.0	**3314-2ZR**	155.0	125.2	5.44		2 600		4.740	
75	130	41.3	1.5	79.5	**3215E**	100.5	111.3	5.00		2 700	3 600	2.010	
	130	41.3	1.5	78.0	**3215**	88.0	81.5	3.51		2 700	3 600	1.900	
	130	41.3	1.5	78.0	**3215-2RSR**	88.0	81.5	3.51		1 900		1.900	
	130	41.3	1.5	78.0	**3215-2ZR**	88.0	81.5	3.51		2 700		1.900	
	160	68.3	2.1	104.0	**3315E**	199.7	199.4	8.40		2 400	3 200	6.300	
	160	68.3	2.1	98.0	**3315**	168.3	141.3	5.64		2 400	3 200	5.650	
	160	68.3	2.1	98.0	**3315-2RSR**	168.3	141.3	5.64		1 700		5.650	
	160	68.3	2.1	98.0	**3315-2ZR**	168.3	141.3	5.64		2 400		5.650	



Dimensions					Designation	Basic load ratings dynamic	static	Fatigue load limit		Limiting speeds for lubrication with grease	oil	Mass	
d	D	B	$r_{s\,min}$	a		C_r	C_{or}	C_u					
mm						kN				min^{-1}		kg	
80	140	44.4	2.0	88.0	**3216E**	120.9	135.1	5.90		2 500	3 400	2.710	
	140	44.4	2.0	83.5	**3216**	104.0	97.2	4.20		2 500	3 400	2.390	
	140	44.4	2.0	83.5	**3216-2RSR**	104.0	97.2	4.20		1 800		2.390	
	140	44.4	2.0	83.5	**3216-2ZR**	104.0	97.2	4.20		2 500		2.390	
	170	68.3	2.0	113.1	**3316E**	224.3	226.8	9.20		2 400	3 200	7.210	
	170	68.3	2.1	102.5	**3316**	182.3	160.7	6.53		2 400	3 200	7.210	
	170	68.3	2.1	102.5	**3316-2RSR**	182.3	160.7	6.53		1 700		7.210	
	170	68.3	2.1	102.5	**3316-2ZR**	182.3	160.7	6.53		2 400		7.210	
85	150	49.2	2.0	95.0	**3217E**	121.3	131.8	5.72		2 400	3 200	3.480	
	150	49.2	2.0	91.0	**3217**	112.0	106.5	4.50		2 400	3 200	3.060	
	150	49.2	2.0	91.0	**3217-2RSR**	112.0	106.5	4.50		1 700		3.060	
	150	49.2	2.0	91.0	**3217-2ZR**	112.0	106.5	4.50		2 400		3.060	
	180	73.0	3.0	118.0	**3317E**	244.2	256.1	10.1		2 200	3 000	8.300	
	180	73.0	3.0	110.0	**3317**	196.0	185.0	7.30		2 200	3 000	8.300	
	180	73.0	3.0	110.0	**3317-2RSR**	196.0	185.0	7.30		1 600		8.300	
	180	73.0	3.0	110.0	**3317-2ZR**	196.0	185.0	7.30		2 200		8.300	
90	160	52.4	2.0	101.0	**3218E**	166.2	180.6	7.30		2 200	3 000	4.240	
	160	52.4	2.0	95.5	**3218**	119.8	116.3	4.73		2 200		3.730	
	160	52.4	2.0	95.5	**3218-2RSR**	119.8	116.3	4.73		1 600		3.730	
	160	52.4	2.0	95.5	**3218-2ZR**	119.8	116.3	4.73		2 200		3.730	
	190	73.0	3.0	125.5	**3318E**	257.9	268.5	10.3		2 100	2 800	9.230	
	190	73.0	3.0	136.0	**3318**	211.4	196.9	7.61		2 100	2 800	9.230	
	190	73.0	3.0	136.0	**3318-2RSR**	211.4	196.9	7.61		1 500		9.230	
	190	73.0	3.0	136.0	**3318-2ZR**	211.4	196.9	7.61		2 100		9.230	
95	170	55.6	2.1	106.0	**3219E**	178.4	205.8	8.10		2 100	2 800	5.100	
	170	55.6	2.1	106.0	**3219**	138.9	130.9	5.17		2 100		5.100	
	170	55.6	2.1	106.0	**3219-2RSR**	138.9	130.9	5.17		1 500		5.100	
	170	55.6	2.1	106.0	**3219-2ZR**	138.9	130.9	5.17		2 100		5.100	
	200	77.8	3.0	132.2	**3319E**	285.4	319.9	11.9		2 000	2 600	10.90	
	200	77.8	3.0	143.0	**3319**	233.0	226.0	8.45		2 000	2 600	11.40	
	200	77.8	3.0	143.0	**3319-2RSR**	233.0	226.0	8.45		1 400		11.40	
	200	77.8	3.0	143.0	**3319-2ZR**	233.0	226.0	8.45		2 000		11.40	
100	180	60.3	2.1	111.0	**3220E**	177.0	207.1	8.0		2 000	2 700	5.880	
	180	60.3	2.1	111.0	**3220**	157.6	150.3	5.75		2 000	2 700	5.880	
	180	60.3	2.1	111.0	**3220-2RSR**	157.6	150.3	5.75		1 400		5.880	
	180	60.3	2.1	111.0	**3220-2ZR**	157.6	150.3	5.75		2 000		5.880	
	215	82.6	3.0	140.4	**3320E**	296.5	330.5	12.0		1 800	2 500	13.50	
	215	82.6	3.0	153.0	**3320**	296.5	332.6	12.0		1 800	2 500	14.60	
	215	82.6	3.0	153.0	**3320-2RSR**	296.5	332.6	12.0		1 300		14.60	
	215	82.6	3.0	153.0	**3320-2ZR**	296.5	332.6	12.0		1 800	2 500	14.60	



Double Row Self-Aligning Ball Bearings

Double Row Self-Aligning Ball Bearings

Double Row Self-Aligning Ball Bearings

The double row self-aligning ball bearings have two rows of balls and a spherical raceway on the outer ring. Certain misalignment of the inner ring referring to the outer ring around the bearing centre will work independently of the bearing operation. The bearings are used for applications which presume certain bore misalignment in the bearing housings or deflaction and oscillation of the shaft at long mutual distance of the bearing. The bearings are non-separable. With respect to their small contact angle and the imperfect conformity of the balls to the raceways, they are not recommended for carrying larger axial forces. The bearings are manufactured with cylindrical or tapered bores.

Boundary Dimensions

The boundary dimensions of the double row self-aligning ball bearings indicated in the dimension tables correspond to the international dimensional pian ISO 15. Adapter sleeve dimension correspond to dimension according to ISO 113.

Designation

The designation of the bearings in the basic design and in the modification with a tapered bore (K) is indicated in the dimension tables. Bearing differences from the basic design are indicated by additional symbols.

Tapered Bore

The double row self-aligning ball bearings are manufactured with a cylindrical or tapered bore (K), taper 1:12 as indicated in the dimension tables.

The bearings are fixed on cylindrical shafts by adapter sleeves. The designation of the adapter sleeves belonging to individual bearings is stated in the table section of this publication.

Cages

The double row self-aligning ball bearings have cages made by pressing a steel sheet which are not designated. Bearings of the 12, 13 Series have a single cage. Bearings of the 22, 23 Series have a two-piece cage. For special applications, bearings with polyamide cages which are marked TNGH can be manufactured. The delivery of the bearings with this cage must be negotiated in advance.

Tolerance

The double row self-aligning ball bearings are commonly manufactured within the normal tolerance class P0 (the symbol P0 is not indicated). For speciál applications requiring high accuracy or in operation under high speed, the bearings can be supplied in the higher tolerance class P6.

Radial Clearance

The commonly manufactured double row self-aligning ball bearings have a normal radial clearance which is not indicated. For special applications, bearings with reduced (C2) or increased (C3, C4) radial clearances can be supplied.

Misalignment

The double row self-aligning ball bearings can be tilted out of the central position without affecting the correct bearing operation. The permissible misalignment values are stated in the following chart.

Bearing Type	Permissible Misalignment
13, 23	3°
12, 22	2°30´

Radial Equivalent Dynamic Load

$P_r = F_r + Y_1 F_a$ for $F_a/F_r \leq e$

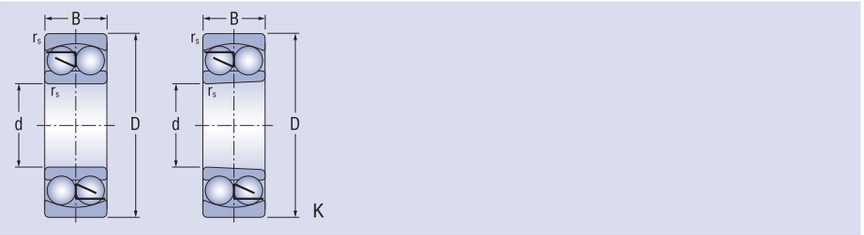
$P_r = 0{,}65\ F_r + Y_2 F_a$ for $F_a/F_r > e$

The factor values e, Y_1 and Y_2 for individual bearings, are indicated in the dimension tables.

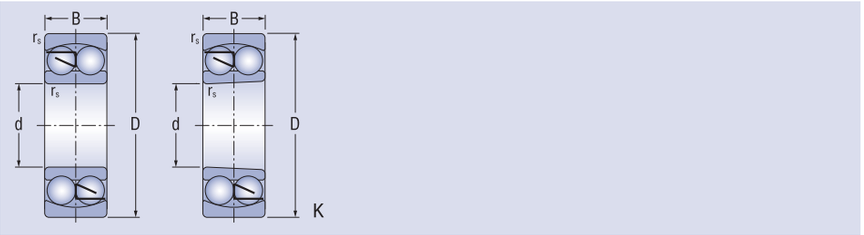
Radial Equivalent Static Load

$P_{or} = F_r + Y_0 F_a$

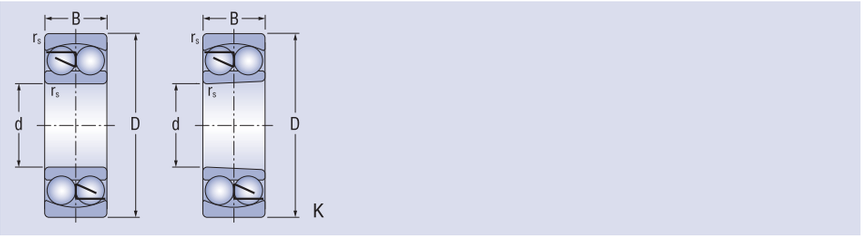
The factor values Y_0 for individual bearings are indicated in the dimension tables.



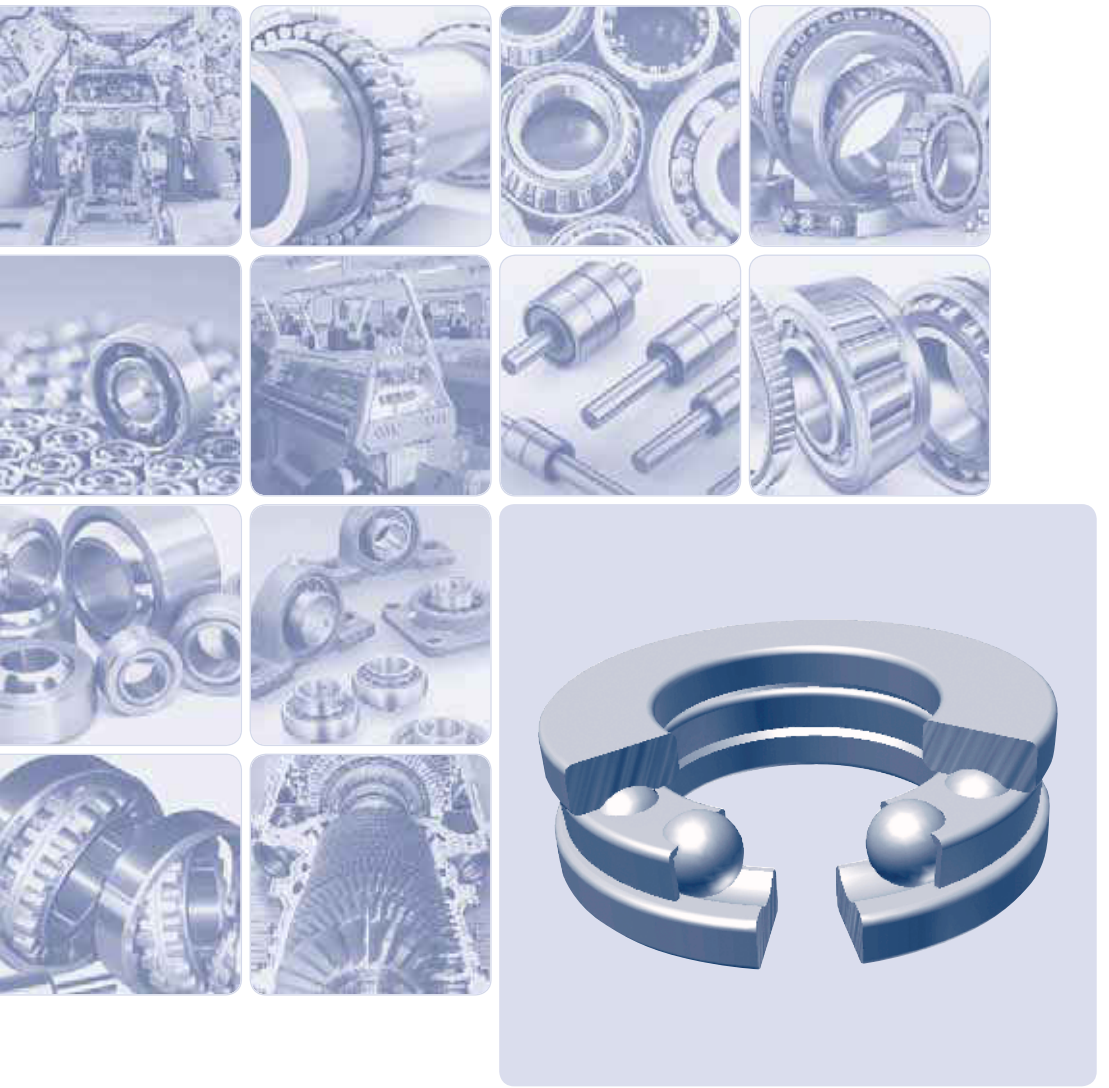
Dimensions				Designation		Basic load ratings		Fatigue load limit		Limiting speeds for lubrication with		Mass		Corresponding adapter sleeve	Coefficients			
				Cylindrical Bore	Tapered Bore	dynamic	static			grease	oil							
d	D	B	r_{smin}			C_r	C_{or}	C_u				~	K		e	Y_1	Y_2	Y_0
mm						kN				min^{-1}		kg						
10	30	9	0.6	**1200**	–	3.7	1.6	0.07		20 000	21 000	0.035	–	–	0.32	2.0	3.0	2.0
	30	14	0.6	**2200**	–	7.1	1.6	0.07		24 000	28 000	0.050	–	–	0.65	1.0	1.5	1.0
	35	11	0.6	**1300**	–	7.2	1.6	0.07		20 000	24 000	0.060	–	–	0.33	1.9	3.0	2.0
12	32	10	0.6	**1201**	–	6.8	2.0	0.09		19 000	21 000	0.042	–	–	0.34	1.9	2.9	2.0
	32	14	0.6	**2201**	–	8.1	1.7	0.08		22 000	26 000	0.059	–	–	0.57	1.1	1.7	1.2
	37	12	1.0	**1301**	–	9.4	2.1	0.10		18 000	22 000	0.070	–	–	0.35	1.8	2.8	1.9
	37	17	1.0	**2301**	–	12.5	2.7	0.12		17 000	22 000	0.104	–	–	0.6	1.05	1.6	1.1
15	35	11	0.6	**1202**	–	6.8	2.0	0.09		16 000	20 000	0.051	–	–	0.33	1.9	2.9	2.0
	35	14	0.6	**2202**	–	8.5	1.8	0.08		16 000	18 000	0.060	–	–	0.49	1.3	2.0	1.3
	42	13	1.0	**1302**	–	9.5	2.3	0.10		16 000	20 000	0.100	–	–	0.33	1.9	2.9	2.0
	42	17	1.0	**2302**	–	12.0	2.9	0.13		14 000	18 000	0.143	–	–	0.52	1.2	1.9	1.3
17	40	12	0.6	**1203**	**1203K**	7.9	2.0	0.09		16 000	20 000	0.076	0.074	H203	0.31	2.1	3.2	2.2
	40	16	0.6	**2203**	**–**	10.5	2.4	0.11		14 000	16 000	0.090	–	–	0.50	1.3	1.9	1.3
	47	14	1.0	**1303**	**–**	12.5	3.2	0.14		14 000	17 000	0.140	–	–	0.33	1.9	3.0	2.0
	47	19	1.0	**2303**	**–**	14.5	3.6	0.16		13 000	16 000	0.176	–	–	0.52	1.2	1.9	1.3
20	47	14	1.0	**1204**	**1204K**	10.0	2.9	0.13		14 000	17 000	0.120	0.118	H204	0.27	2.3	3.6	2.4
	47	18	1.0	**2204**	**–**	11.5	2.8	0.13		13 000	14 000	0.150	–	–	0.49	1.3	2.0	1.4
	52	15	1.1	**1304**	**–**	12.5	3.4	0.15		12 000	15 000	0.170	–	–	0.29	2.2	3.3	2.3
	52	21	1.1	**2304**	**–**	20.5	5.5	0.25		12 000	12 000	0.220	–	–	0.51	1.2	1.9	1.3
25	52	15	1.0	**1205**	**1205K**	12.0	3.3	0.15		12 000	14 000	0.140	0.138	H205	0.27	2.3	3.6	2.4
	52	18	1.0	**2205**	**2205K**	12.5	3.4	0.16		12 000	14 000	0.163	0.158	H305	0.43	1.5	2.3	1.5
	62	17	1.1	**1305**	**1305K**	17.8	5.1	0.23		10 000	13 000	0.257	0.252	H305	0.28	2.3	3.5	2.4
	62	24	1.1	**2305**	**2305K**	26.5	6.5	0.30		10 000	11 000	0.355	0.327	H2305	0.47	1.3	2.1	1.4
30	62	16	1.0	**1206**	**1206K**	15.8	4.7	0.21		10 000	12 000	0.230	0.226	H206	0.25	2.6	4.0	2.7
	62	20	1.0	**2206**	**2206K**	15.2	4.6	0.21		10 000	12 000	0.260	0.254	H306	0.40	1.6	2.5	1.7
	72	19	1.1	**1306**	**1306K**	21.5	6.3	0.29		8 500	11 000	0.398	0.392	H306	0.26	2.5	3.8	2.6
	72	27	1.1	**2306**	**2306K**	31.5	8.7	0.40		8 000	10 000	0.520	0.509	H2306	0.44	1.4	2.2	1.5
35	72	17	1.1	**1207**	**1207K**	15.8	5.1	0.23		8 500	10 000	0.320	0.315	H207	0.23	2.7	4.2	2.9
	72	23	1.1	**2207**	**2207K**	21.8	6.7	0.30		8 500	10 000	0.440	0.433	H307	0.37	1.7	2.6	1.8
	80	21	1.5	**1307**	**1307K**	25.0	8.0	0.36		7 500	9 500	0.540	0.532	H307	0.25	2.6	4.0	2.7
	80	31	1.5	**2307**	**2307K**	39.2	11.0	0.50		7 100	9 000	0.680	0.670	H2307	0.46	1.4	2.1	1.4
40	80	18	1.1	**1208**	**1208K**	19.2	6.4	0.29		7 500	9 000	0.418	0.412	H208	0.22	2.9	4.4	3.0
	80	23	1.1	**2208**	**2208K**	22.5	7.4	0.34		7 500	9 000	0.510	0.502	H308	0.33	1.9	2.9	2.0
	90	23	1.5	**1308**	**1308K**	29.5	9.5	0.43		6 700	8 500	0.720	0.620	H308	0.24	2.6	4.1	2.7
	90	33	1.5	**2308**	**2308K**	44.8	13.2	0.60		6 300	8 000	0.962	0.950	H2308	0.43	1.5	2.3	1.5
45	85	19	1.1	**1209**	**1209K**	21.8	7.3	0.33		7 100	8 500	0.468	0.462	H209	0.21	3.0	4.6	3.1
	85	23	1.1	**2209**	**2209K**	23.2	8.0	0.36		7 100	8 500	0.547	0.537	H309	0,31	2.1	3.2	2.2
	100	25	1.5	**1309**	**1309K**	38.0	12.8	0.58		6 300	7 500	0.958	0.944	H309	0.25	2.5	3.9	2.7
	100	36	1.5	**2309**	**2309K**	55.0	16.2	0.74		5 600	7 100	1.277	1.263	H2309	0.42	1.5	2.3	1.6



Dimensions				Designation		Basic load ratings		Fatigue load limit		Limiting speeds for lubrication with		Mass		Corresponding adapter sleeve	Coefficients			
				Cylindrical Bore	Tapered Bore	dynamic	static			grease	oil							
d	D	B	r_{smin}			C_r	C_{or}	C_u				~	K		e	Y_1	Y_2	Y_0
mm						kN				min^{-1}		kg						
50	90	20	1.1	**1210**	**1210K**	22.8	8.1	0.37		6 300	8 000	0.526	0.517	H210	0.20	3.1	4.9	3.3
	90	23	1.1	**2210**	**2210K**	23.2	8.5	0.38		6 300	8 000	0.599	0.585	H310	0.29	2.2	3.4	2.3
	110	27	2.0	**1310**	**1310K**	43.2	14.2	0.65		5 600	6 700	1.208	1.191	H310	0.24	2.7	4.1	2.8
	110	40	2.0	**2310**	**2310K**	64.5	19.8	0.90		5 000	6 300	1.689	1.671	H2310	0.43	1.5	2.3	1.6
55	100	21	1.5	**1211**	**1211K**	26.8	10.0	0.45		6 000	7 100	0.718	0.706	H211	0.20	3.2	5.0	3.4
	100	25	1.5	**2211**	**2211K**	26.8	10.0	0.45		6 000	7 100	0.810	0.792	H311	0.28	2.3	3.5	2.4
	120	29	2.0	**1311**	**1311K**	51.6	18.2	0.83		5 000	6 300	1.580	1.560	H311	0.24	2.7	4.2	2.8
	120	43	2.0	**2311**	**2311K**	75.2	23.5	1.07		4 800	6 000	2.094	2.070	H2311	0.41	1.5	2.4	1.6
60	110	22	1.5	**1212**	**1212K**	30.2	11.5	0.52		5 300	6 300	0.900	0.887	H212	0,19	3,4	5,3	3,6
	110	28	1.5	**2212**	**2212K**	34.0	12.5	0.57		5 300	6 300	1.096	1.076	H312	0,28	2,3	3,5	2,4
	130	31	2.0	**1312**	**1312K**	57.2	20.8	0.94		4 500	5 600	1.960	1.930	H312	0,23	2,8	4,3	2,9
	130	46	2.0	**2312**	**2312K**	86.8	27.5	1.25		4 300	5 300	2.610	2.540	H2312	0,41	1,6	2,4	1,6
65	120	23	1.5	**1213**	**1213K**	31.0	12.5	0.57		4 800	6 000	1.080	0.901	H213	0.17	3.7	5.7	3.9
	120	31	1.5	**2213**	**2213K**	43.5	16.2	0.74		4 800	6 000	1.467	1.436	H313	0.28	2.2	3.5	2.3
	140	33	2.1	**1313**	**1313K**	61.8	22.8	1.01		4 300	5 300	2.370	2.330	H313	0.23	2.8	4.3	2.9
	140	48	2.1	**2313**	**2313K**	96.0	32.5	1.48		3 800	4 800	3.220	3.150	H2313	0.38	1.6	2.5	1.7
70	125	24	1.5	**1214**	**1214K**	34.5	13.5	0.61		4 600	5 600	1.290	1.265	H214	0,18	3,5	5,4	3,7
	125	31	1.5	**2214**	**2214K**	44.0	17.0	0.77		4 500	5 600	1.620	1.585	H314	0,27	2,4	3,7	2,5
	150	35	2.1	**1314**	**1314K**	74.5	27.5	1.19		4 000	5 000	2.980	2.935	H314	0,22	2,8	4,4	3,0
	150	51	2.1	**2314**	**2314K**	110.0	37.5	1.62		3 600	4 500	3.920	3.830	H2314	0,38	1,7	2,6	1,8
75	130	25	1.5	**1215**	**1215K**	38.8	15.2	0.69		4 300	5 300	1.350	1.330	H215	0.18	3.6	5.6	3.8
	130	31	1.5	**2215**	**2215K**	44.2	18.0	0.82		4 300	5 300	1.720	1.680	H315	0.25	2.5	3.9	2.6
	160	37	2.1	**1315**	**1315K**	79.0	29.8	1.24		3 800	4 500	3.550	3.500	H315	0.22	2.8	4.4	3.1
	160	55	2.1	**2315**	**2315K**	122.0	42.8	1.80		3 400	4 300	4.710	4.600	H2315	0.38	1.7	2.6	1.8
80	140	26	2.0	**1216**	**1216K**	39.5	16.8	0.72		4 000	5 000	1.650	1.620	H216	0.16	3.9	6.1	3.8
	140	33	2.0	**2216**	**2216K**	48.8	20.2	0.88		4 000	5 000	2.190	2.120	H316	0.25	2.5	3.9	2.6
	170	39	2.1	**1316**	**1316K**	88.5	32.8	1.32		3 600	4 300	4.190	4.130	H316	0.22	2.9	4.5	3.1
	170	58	2.1	**2316**	**2316K**	128.0	45.5	1.85		3 200	4 000	5.700	5.560	H2316	0.37	1.7	2.6	1.8
85	150	28	2.0	**1217**	**1217K**	48.8	20.5	0.86		3 800	4 500	2.100	2.065	H217	0.17	3.7	5.7	3.9
	150	36	2.0	**2217**	**2217K**	58.2	23.5	0.99		3 800	4 500	2.530	2.470	H317	0.25	2.5	3.8	2.6
	180	41	3.0	**1317**	**1317K**	97.8	37.8	1.48		3 400	4 000	4.950	4.870	H317	0.22	2.9	4.5	3.0
	180	60	3.0	**2317**	**2317K**	134.0	48.8	1.95		3 000	3 800	6.730	6.570	H2317	0.37	1.7	2.7	1.8
90	160	30	2.0	**1218**	**1218K**	56.5	23.2	0.94		3 600	4 300	2.440	2.400	H218	0.17	3.8	5.8	3.9
	160	40	2.0	**2218**	**2218K**	70.0	28.5	1.16		3 600	4 300	3.220	3.150	H318	0.27	2.4	3.6	2.5
	190	43	3.0	**1318**	**1318K**	115.0	44.5	1.71		3 200	3 800	5.990	5.900	H318	0.22	2.8	4.4	3.0
	190	64	3.0	**2318**	**2318K**	142.0	57.2	2.22		2 800	3 600	8.270	8.080	H2318	0.38	1.7	2.6	1.8
95	170	32	2.1	**1219**	**1219K**	63.5	27.0	1.06		3 400	4 000	3.060	3.000	H219	0.17	3.7	5.7	3.9
	170	43	2.1	**2219**	**2219K**	82.8	33.8	1.33		3 400	4 000	4.200	4.100	H319	0.27	2.4	3.6	2.5
	200	45	3.0	**1319**	**1319K**	125.0	46.0	1.72		3 000	3 600	6.980	6.880	H319	0.23	2.8	4.3	2.9
	200	67	3.0	**2319**	**2319K**	162.0	68.8	2.62		2 600	3 400	9.560	9.340	H2319	0.38	1.7	2.6	1.8



Dimensions				Designation		Basic load ratings		Fatigue load limit		Limiting speeds for lubrication with		Mass		Corresponding adapter sleeve	Coefficients			
				Cylindrical Bore	Tapered Bore	dynamic	static			grease	oil							
d	D	B	r_{smin}			C_r	C_{or}	C_u				~	K		e	Y_1	Y_2	Y_0
mm						kN				min^{-1}		kg						
100	180	34	2.1	**1220**	**1220K**	68.5	29.2	1.12		3 200	3 800	3.700	3.640	H220	0.17	3.6	5.6	3.8
	180	46	2.1	**2220**	**2220K**	97.2	40.5	1.56		3 200	3 800	4.610	4.500	H320	0.27	2.4	3.6	2.5
	215	52	3.0	**1320**	**1320K**	135.0	48.0	1.74		2 800	3 200	8.640	8.530	H320	0.24	2.7	4.1	2.8
	215	73	3.0	**2320**	**2320K**	192.0	78.5	2.86		2 400	3 200	12.400	12.100	H2320	0.38	1.7	2.6	1.7



Thrust ball bearings

Thrust ball bearings

Thrust ball bearings

The single direction thrust ball bearings consist of two washers with raceways for one row of balls with a cage. The washers have flat seating surfaces. They must be supported in order to spread the load on the balls evenly. These bearings are designed to carry axial forces acting in one direction only. They cannot carry radial forces.

The double direction thrust ball bearings have two cages with balls positioned between the central shaft washer and two housing washers with flat seating surfaces. The central shaft washer has raceways for balls on both sides and is mounted on the shaft.

The double direction thrust ball bearings can carry axial loads acting in both directions. They cannot carry radial forces.

Boundary Dimensions

The boundary dimensions of the thrust ball bearings indicated in the dimension tables correspond to the international dimensional plan ISO 104.

Designation

The designation of the bearings in the basic design is indicated in the dimension tables. The differences from the basic design are designated by additional symbols in accordance with the STN 02 4608.

Cage

The thrust ball bearings have strip steel cages which are not marked. For special applications, some bearings types are available with a machined brass cage (M). Bearings with these cages are only made to order.

Tolerance

Thrust ball bearings are usually produced in normal tolerance class P0 (symbol P0 is not shown). In special cases of arrangement, demanding higher accuracy, bearings are produced in higher tolerance classes P6. Tolerances of accuracy, deviations of dimensions and operation are stated in ISO STN 199.

Misalignment

The thrust ball bearings require as accurate alignment of seating surfaces as possible. Any misalignment causes increased stress between the rolling elements and raceways contact. Therefore, the thrust ball bearings are not suitable for carrying forces under misalignment of the shaft and housing washers.

Axial Equivalent Dynamic Load

$$P_a = F_a \qquad [kN]$$

Minimum Axial Load

When using the thrust ball bearings under higher rotational speeds, the sliding of the balls between the ring raceways due to centrifugal forces can occur if the axial load F_a drops below a certain minimum value determined from the following equation:

$$F_{amin} = M \left(\frac{n_{max}}{1000}\right)^2$$

where: $F_{a\,min}$ – minimum axial load [kN]
n_{max} – maximum rotational speed [min^{-1}]
M – minimum axial load factor
(values are indicated in the dimension tables)

If the external axial load is low (lower than $F_{a\,min}$) or if the bearing is relieved during the operation, such as when one row of balls in the double direction thrust ball bearings or one bearing in the arrangement of a single direction bearing pair is relieved, it is necessary to secure the minimum axial load, e.g. using springs.

Axial Equivalent Static Load

$$P_{oa} = F_a \qquad [kN]$$

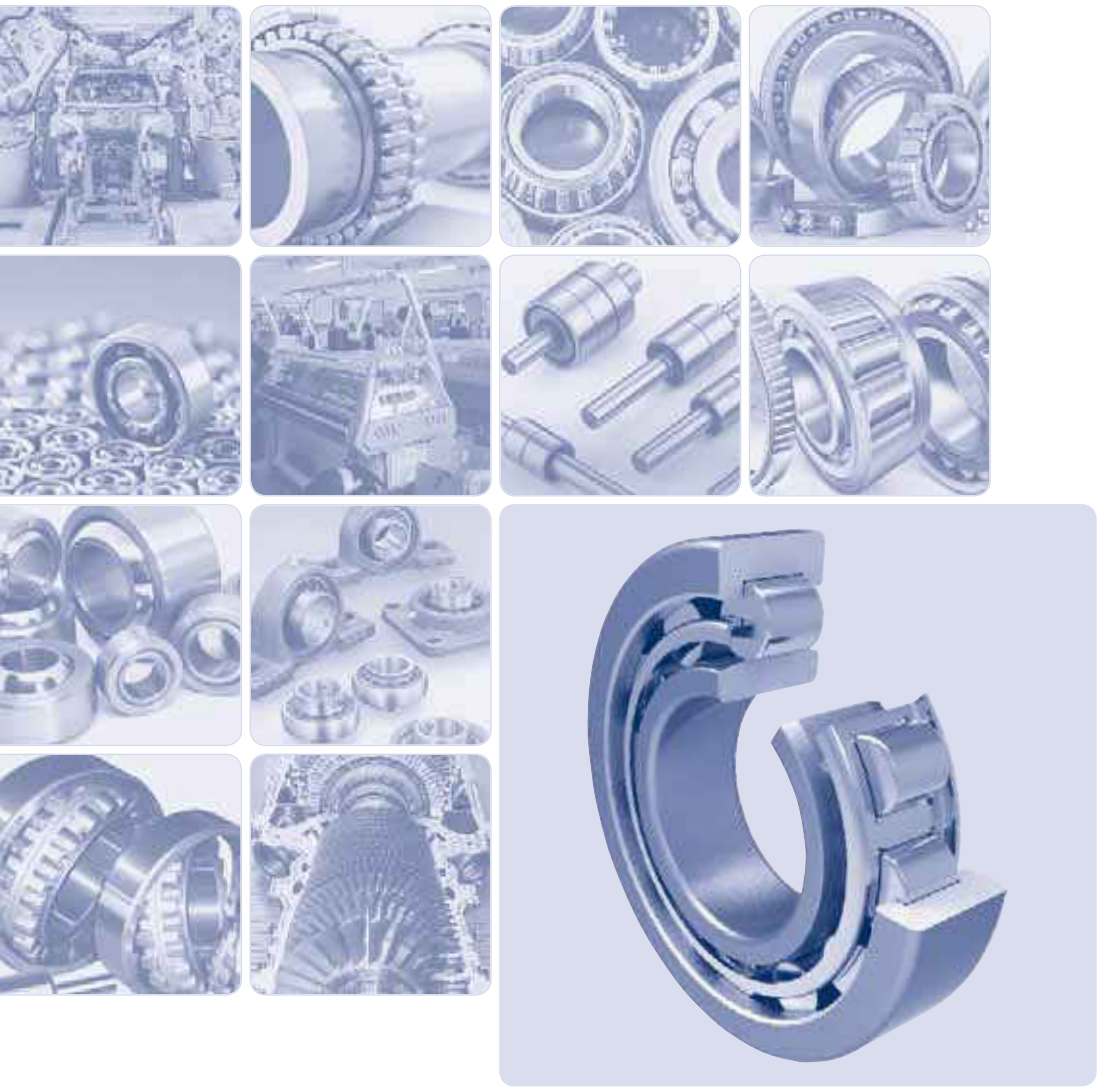
Dimensions						Designation	Basic load ratings		Fatigue load limit		Limiting speed for lubrication with		Mass	
							dynamic	static			grease	oil		
d	D	d_1	D_1	H	$r_{s\,min}$		C_r	C_{or}	C_u					
mm							kN				min^{-1}		kg	
10	24	24	11	9	0.3	**51100**	10.0	14.0	0.64		6 300	9 000	0.020	
	26	26	12	11	0.6	**51200**	12.7	17.0	0.77		6 000	8 000	0.030	
12	26	26	13	9	0.3	**51101**	10.3	15.2	0.69		6 000	8 500	0.022	
	28	28	14	11	0.6	**51201**	13.2	19.0	0.86		5 300	7 500	0.032	
15	28	28	16	9	0.3	**51102**	10.5	16.8	0.76		5 600	8 000	0.024	
	32	32	17	12	0.6	**51202**	16.5	24.8	1.13		4 800	6 700	0.044	
17	30	30	18	9	0.3	**51103**	10.8	18.2	0.83		5 300	7 500	0.028	
	35	35	19	12	0.6	**51203**	17.2	27.2	1.24		4 500	6 300	0.051	
20	35	35	21	10	0.3	**51104**	14.2	24.5	1.11		4 800	6 700	0.040	
	40	40	22	14	0.6	**51204**	22.3	37.5	1.71		3 800	5 300	0.073	
25	42	42	26	11	0.6	**51105**	15.4	30.2	1.37		4 300	6 000	0.060	
	47	47	27	15	0.6	**51205**	27.8	50.5	2.30		3 400	4 800	0.110	
	52	52	27	18	1.0	**51305**	35.7	61.5	2.80		3 000	4 300	0.171	
	60	60	27	24	1.0	**51405**	55.5	89.2	4.06		2 200	3 400	0.340	
30	47	47	32	11	0.6	**51106**	16.0	34.2	1.55		4 000	5 600	0.068	
	52	52	32	16	0.6	**51206**	28.1	54.2	2.46		3 200	4 500	0.138	
	60	60	32	21	1.0	**51306**	42.8	78.5	3.58		2 400	3 600	0.265	
	70	70	32	28	1.0	**51406**	72.7	125.8	5.73		1 900	3 000	0.360	
35	52	52	37	12	0.6	**51107**	18.5	41.5	1.89		3 800	5 300	0.090	
	62	62	37	18	1.0	**51207**	39.2	78.2	3.55		2 800	4 000	0.220	
	68	68	37	24	1.0	**51307**	55.4	105.0	4.77		2 000	3 200	0.378	
	80	80	37	32	1.1	**51407**	86.8	155.2	7.05		1 700	2 600	0.820	
40	60	60	42	13	0.6	**51108**	26.8	62.8	2.86		3 400	4 800	0.110	
	68	68	42	19	1.0	**51208**	47.0	98.2	4.46		2 400	3 600	0.270	
	78	78	42	26	1.0	**51308**	69.2	135.0	6.14		1 900	3 000	0.550	
	90	90	42	36	1.1	**51408**	112.4	205.3	9.32		1 500	2 200	1.180	
45	65	65	47	14	0.6	**51109**	27.0	66.0	3.00		3 200	4 500	0.150	
	73	73	47	20	1.0	**51209**	47.8	105.0	4.77		2 200	3 400	0.320	
	85	85	47	28	1.0	**51309**	75.8	150.0	6.82		1 700	2 600	0.690	
	100	100	47	39	1.1	**51409**	140.7	262.4	11.93		1 400	2 000	1.640	
50	70	70	52	14	0.6	**51110**	27.1	69.2	3.15		3 000	4 300	0.160	
	78	78	52	22	1.0	**51210**	48.5	112.0	5.09		2 000	3 200	0.390	
	95	95	52	31	1.1	**51310**	96.5	202.0	9.18		1 600	2 400	1.000	
	110	110	52	43	1.5	**51410**	160.0	302.0	13.73		1 300	1 900	1.860	
55	78	78	57	16	0.6	**51111**	33.8	89.2	4.05		2 800	4 000	0.240	
	90	90	57	25	1.0	**51211**	67.7	158.0	7.23		1 900	3 000	0.620	
	105	105	57	35	1.1	**51311**	114.5	242.0	11.10		1 500	2 200	1.340	
	120	120	57	48	1.5	**51411**	182.5	355.0	16.14		1 100	1 700	2.640	

Dimensions						Designation	Basic load ratings		Fatigue load limit		Limiting speed for lubrication with		Mass	
							dynamic	static			grease	oil		
d	D	d_1	D_1	H	$r_{s\,min}$		C_r	C_{or}	C_u					
mm							kN				min^{-1}		kg	
60	85	85	62	17	1.0	**51112**	40.3	108.0	4.91		2 600	3 800	0.290	
	95	95	62	26	1.0	**51212**	73.5	178.0	8.09		1 800	2 800	0.690	
	110	110	62	35	1.1	**51312**	118.0	262.0	11.91		1 400	2 000	1.390	
	130	130	62	51	1.5	**51412**	200.0	395.0	17.95		1 000	1 600	3.310	
65	90	90	67	18	1.0	**51113**	40.5	112.0	5.09		2 400	3 600	0.340	
	100	100	67	27	1.0	**51213**	74.8	188.0	8.59		1 700	2 600	0.750	
	115	115	67	36	1.1	**51313**	138.9	262.0	11.91		1 300	1 900	1.570	
	140	140	68	56	2.0	**51413**	232.0	448.0	20.36		900	1 400	3.910	
70	95	95	72	18	1.0	**51114**	40.8	115.0	5.23		2 200	3 400	0.360	
	105	105	72	27	1.0	**51214**	73.5	188.0	8.55		1 600	2 400	0.790	
	125	125	72	40	1.1	**51314**	148.3	340.0	15.50		1 200	1 800	1.980	
	150	150	73	60	2.0	**51414**	257.0	565.0	24.56		850	1 300	4.850	
75	100	100	77	19	1.0	**51115**	48.2	140.0	6.36		2 000	3 200	0.390	
	110	110	77	27	1.0	**51215**	74.8	198.0	9.00		1 500	2 200	0.820	
	135	135	77	44	1.5	**51315**	163.4	380.0	16.89		1 100	1 700	2.700	
	160	160	78	65	2.0	**51415**	268.0	615.0	26.74		800	1 200	6.080	
80	105	105	82	19	1.0	**51116**	48.8	145.0	6.59		1 900	3 000	0.430	
	115	115	82	28	1.0	**51216**	83.8	222.0	10.09		1 400	2 000	0.925	
	140	140	82	44	1.5	**51316**	161.1	380.0	16.89		1 000	1 600	2.800	
	170	170	83	68	2.1	**51416**	292.0	635.0	25.81		750	1 100	7.120	
85	110	110	87	19	1.0	**51117**	49.2	150.0	6.82		1 800	2 800	0.460	
	125	125	88	31	1.0	**51217**	103.4	280.0	12.73		1 300	1 900	1.300	
	150	150	88	49	1.5	**51317**	209.1	495.0	20.80		950	1 500	3.700	
	180	180	88	72	2.1	**51417**	318.0	782.0	31.28		700	1 000	8.280	
90	120	120	92	22	1.0	**51118**	65.0	208.0	9.24		1 700	2 600	0.680	
	135	135	93	35	1.1	**51218**	115.0	315.0	14.00		1 200	1 800	1.770	
	155	155	93	50	1.5	**51318**	229.8	556.4	24.38		900	1 400	3.900	
	190	190	93	77	2.1	**51418**	325.0	825.0	31.73		670	950	9.860	
100	135	135	102	25	1.0	**51120**	85.0	268.0	11.20		1 600	2 400	0.950	
	150	150	103	38	1.1	**51220**	132.0	375.0	15.62		1 100	1 700	2.400	
	170	170	103	55	1.5	**51320**	236.5	595.0	23.31		800	1 200	5.100	
	210	210	103	85	3.0	**51420**	400.0	1080.0	39.42		600	850	13.300	
110	145	145	112	25	1.0	**51122**	87.0	288.0	11.60		1 500	2 200	1.080	
	160	160	113	38	1.1	**51222**	138.0	412.0	16.48		1 000	1 600	2.600	
	190	190	113	63	2.0	**51322**	278.0	755.0	27.96		700	1 100	7.900	
120	155	155	122	25	1.0	**51124**	89.0	310.0	12.01		1 400	2 000	1.200	
	170	170	123	39	1.1	**51224**	154.0	470.0	17.74		950	1 500	2.900	
130	170	170	132	30	1.0	**51126M**	104.0	350.0	12.99		1 300	1 900	1.800	
	190	187	133	45	1.5	**51226M**	191.0	565.0	20.30		900	1 400	4.320	
140	180	178	142	31	1.0	**51128M**	107.0	375.0	13.47		1 200	1 800	2.100	
	200	197	143	46	1.5	**51228M**	193.0	595.0	20.74		850	1 300	4.600	

Dimensions						Designation	Basic load ratings		Fatigue load limit		Limiting speed for lubrication with		Mass
							dynamic	static			grease	oil	
d	D	d_1	D_1	H	$r_{s\,min}$		C_r	C_{or}	C_u				
mm							kN				min^{-1}		kg
150	190	188	152	31	1.0	**51130M**	109.0	400.0	13.94		1 100	1 700	2.200
	215	212	153	50	1.5	**51230M**	220.0	685.0	23.04		800	1 200	6.100
160	200	198	162	31	1.0	**51132M**	112.0	425.0	14.40		1 000	1 600	2.300
	225	222	163	51	1.5	**51232M**	223.0	720.0	23.59		750	1 100	6.700
170	215	213	172	34	1.0	**51134M**	135.0	510.0	16.71		1100	1700	2.720
	240	237	173	55	1.5	**51234M**	280.0	915.0	29.04		850	1300	7.410
180	225	222	182	34	1.1	**51136M**	136.0	530.0	16.93		1100	1700	2.790
	250	247	183	56	1.5	**51236M**	284.0	955.0	29.60		800	1200	7.940
190	240	237	193	37	1.1	**51138M**	172.0	655.0	20.30		1000	1600	3.600
	270	267	194	62	2.1	**51238M**	302.0	1010.0	30.27		750	1100	11.800
200	250	247	203	37	1.1	**51140M**	173.0	675.0	20.45		1000	1500	3.750
	280	277	204	62	2.1	**51240M**	315.0	1110.0	32.56		710	1100	12.300
220	270	267	223	37	1.1	**51144M**	179.0	740.0	21.49		950	1500	4.900
	300	297	224	63	2.1	**51244M**	325.0	1210.0	34.11		670	1000	13.600
240	300	297	243	45	1.5	**51148M**	229.0	935.0	25.86		850	1200	6.550
	340	335	244	78	2.1	**51248M**	420.0	1650.0	44.04		560	850	23.700
260	320	317	263	45	1.5	**51152M**	233.0	990.0	26.42		800	1200	7.010
	360	355	264	79	2.1	**51252M**	435.0	1800.0	46.47		560	850	25.100
280	350	347	283	53	1.5	**51156M**	315.0	1310.0	33.55		710	1000	12.000
	380	375	284	80	2.1	**51256M**	450.0	1950.0	48.79		470	720	27.000
300	380	376	304	62	2.1	**51160M**	360.0	1560.0	38.45		600	900	17.200
	420	415	304	95	3.0	**51260M**	570.0	2600.0	62.28		400	600	42.500
320	400	396	324	63	2.1	**51164M**	379.0	1760.0	42.16		540	810	19.000
	440	435	325	95	3.0	**51264M**	577.0	2710.0	63.19		400	600	45.000
340	420	416	344	64	2.1	**51168M**	387.0	1860.0	43.37		500	770	20.500
	440	455	345	96	4.0	**51268M**	584.0	2830.0	65.13		380	570	48.000
360	440	436	364	65	2.1	**51172M**	394.0	1960.0	44.54		500	720	21.500
	500	495	365	110	5.0	**51272M**	701.0	3500.0	76.72		340	500	70.000
380	460	456	384	65	2.1	**51176M**	397.0	2200.0	48.79		500	720	23.000
	520	515	385	112	5.0	**51276M**	728.0	4150.0	88.92		340	500	73.000
400	480	476	404	65	2.1	**51180M**	403.0	2280.0	49.40		460	700	24.000
	540	535	405	112	5.0	**51280M**	761.0	4500.0	94.35		340	500	78.000

Dimensions								Designation	Basic load ratings			Fatigue load limit	Limiting speed for lubrication with		Mass	
									dynamic	static			grease	oil		
d_2	D	d_3	D_1	H	B	$r_{s\,min}$	$r_{1s\,min}$		C_r	C_{or}		C_u				
mm									kN				min^{-1}		kg	
10	32	32	17	22	5	0.6	0.3	**52202**	15.4	24.0		1.09	4 800	7 100	0.081	
15	40	40	22	26	6	0.6	0.3	**52204**	22.5	37.5		1.71	4 000	6 000	0.148	
	60	60	27	45	11	1.0	0.6	**52405**	56.0	89.5		4.06	3 200	4 600	0.636	
20	47	47	27	28	7	0.6	0.3	**52205**	28.0	50.5		2.30	3 400	5 300	0.213	
	52	52	27	34	8	1.0	0.3	**52305**	36.0	61.5		2.80	3 000	4 500	0.324	
	70	70	32	52	12	1.0	0.6	**52406**	73.0	126.0		5.73	2 700	3 500	0.970	
25	52	52	32	29	7	0.6	0.3	**52206**	29.5	58.0		2.64	3 200	5 000	0.254	
	60	60	32	38	9	1.0	0.3	**52306**	43.0	78.5		3.58	2 600	4 000	0.483	
	80	80	37	59	14	1.1	0.6	**52407**	87.5	155.0		7.05	2 200	3 000	1.440	
30	62	62	37	34	8	0.6	0.3	**52207**	39.5	78.0		3.55	2 800	4 300	0.406	
	68	68	37	44	10	1.0	0.3	**52307**	56.0	105.0		4.77	2 400	3 600	0.710	
	68	68	42	36	9	1.0	0.6	**52208**	46.8	106.0		4.82	2 600	4 000	0.550	
	78	78	42	49	12	1.0	0.6	**52308**	70.0	135.0		6.14	2 000	3 000	1.040	
	90	90	42	65	15	1.1	0.6	**52408**	103.0	188.0		8.54	1 900	2 700	1.940	
35	73	73	47	37	9	1.0	0.6	**52209**	48.0	105.0		4.77	2 400	3 600	0.606	
	85	85	47	52	12	1.0	0.6	**52309**	80.5	163.0		7.41	1 900	2 800	1.280	
	100	100	47	72	17	1.1	0.6	**52409**	128.0	246.0		11.18	1 800	2 500	2.640	
40	78	78	52	39	9	1.0	0.6	**52210**	49.0	111.0		5.05	2 400	3 400	0.697	
	95	95	52	58	14	1.1	0.6	**52310**	97.5	202.0		9.18	1 700	2 600	1.780	
	110	100	52	78	18	1.5	0.6	**52410**	147.0	288.0		13.09	1 600	2 400	3.510	
45	90	90	57	45	10	1.0	0.6	**52211**	70.0	159.0		7.23	2 000	3 000	1.110	
	105	105	57	64	15	1.1	0.6	**52311**	115.0	244.0		11.18	1 500	2 400	2.430	
	120	120	57	87	20	1.5	0.6	**52411**	181.0	350.0		15.91	1 400	2 100	4.540	
50	95	95	62	46	10	1.0	0.6	**52212**	71.5	169.0		7.68	1 900	3 000	1.220	
	110	110	62	64	15	1.1	0.6	**52312**	119.0	263.0		11.95	1 500	2 200	2.590	
	130	130	62	93	21	1.5	0.6	**52412**	202.0	395.0		17.95	1 300	1 900	5.800	
55	100	100	67	47	10	1.0	0.6	**52213**	75.5	189.0		8.59	1 900	2 800	1.340	
	115	115	67	65	15	1.1	0.6	**52313**	123.0	282.0		12.82	1 400	2 000	2.900	
	105	105	72	47	10	1.0	1.0	**52214**	74.0	189.0		8.59	1 800	2 800	1.440	
	125	125	72	72	16	1.1	1.0	**52314**	137.0	315.0		14.32	1 300	1 900	3.640	
60	110	110	77	47	10	1.0	1.0	**52215**	78.0	209.0		9.50	1 800	2 600	1.540	
	135	135	77	79	18	1.5	1.0	**52315**	159.0	365.0		16.59	1 200	1 800	4.720	
65	115	115	82	48	10	1.0	1.0	**52216**	79.0	218.0		9.95	1 700	2 600	1.660	
	140	140	82	79	18	1.5	1.0	**52316**	176.0	424.0		19.03	1 200	1 800	5.060	
70	125	125	88	55	12	1.0	1.0	**52217**	96.0	264.0		12.00	1 500	2 200	2.260	
	150	150	88	87	19	1.5	1.0	**52317**	206.0	489.0		21.19	1 100	1 600	6.430	
75	135	135	93	62	14	1.1	1.0	**52218**	114.0	310.0		13.75	1 400	2 000	3.090	
	155	155	93	88	19	1.5	1.0	**52318**	214.0	525.0		22.25	1 100	1 600	6.790	

Dimensions								Designation	Basic load ratings dynamic	static		Fatigue load limit	Limiting speed for lubrication with grease	oil	Mass	
d_2	D	d_3	D_1	H	B	$r_{s\,min}$	$r_{1s\,min}$		C_r	C_{or}		C_u				
mm									kN				min^{-1}		kg	
85	150	150	103	67	15	1.1	1.0	**52220**	135.0	375.0		15.72	1 300	1 900	4.080	
	170	170	103	97	21	1.5	1.0	**52320**	239.0	595.0		23.95	950	1 500	8.820	
95	160	160	113	67	15	1.1	1.0	**52222**	136.0	395.0		15.90	1 200	1 800	4.390	
	190	189.5	113	110	24	2.1	1.0	**52322**	282.0	755.0		28.74	850	1 300	12.700	
100	170	170	123	68	15	1.1	1.0	**52224**	141.0	430.0		16.82	1 200	1 800	4.920	
	210	209.5	123	123	27	2.1	1.1	**52324**	330.0	930.0		33.95	750	1 100	17.600	
110	190	189.5	133	80	18	1.5	1.1	**52226M**	183.0	550.0		20.41	1 000	1 500	7.430	
120	200	199.5	143	81	18	1.5	1.1	**52228M**	186.0	575.0		20.66	1 000	1 500	8.010	
130	215	214.5	153	89	20	1.5	1.1	**52230M**	238.0	735.0		25.43	900	1 300	10.400	
140	225	224.5	163	90	20	1.5	1.1	**52232M**	249.0	805.0		27.08	850	1 300	11.200	
150	240	239.5	173	97	21	3.0	2.1	**52234M**	280.0	915.0		29.78	800	1 200	13.600	



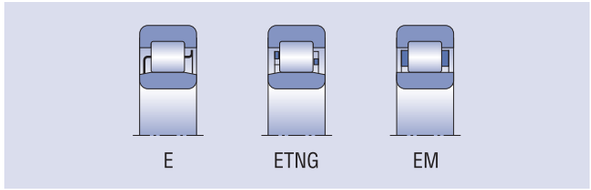
Single Row Cylindrical Roller Bearings

Single Row Cylindrical Roller Bearings

Single Row Cylindrical Roller Bearings

Single-row cylindrical roller bearings are separable and generally consist of two parts. One part is the outer or inner ring with rollers attached with a cage and guiding rings, and the second part is the separate ring. This design allows separate mounting of rings and thus simplifies handling of individual parts.

The E design is available for the whole range of roller bearings with a pressed sheet-metal cage. The E design is also available for roller bearings with plastic and brass cages.



Single-row cylindrical roller bearings are capable of transmitting high radial forces in small built-in spaces. Certain designs are also capable of transmitting forces impacting from one or both directions. The raceway design of the inner and outer ring with the ZB shape of the roller surface, enables to spread the impacting forces evenly on the contact area. What's more, this design also facilitates the desirable creation of oil film between the contacting parts, optimal rolling away, reduced friction, heat generation and thus reduced stress of the bed.

Single-row cylindrical roller bearings have higher load-bearing capacity than single-row ball bearings of the same size, and are suitable for mounting with high radial load, high rotational frequency and where fixed mounting of both rings is required.

Designs

Single-row cylindrical roller bearings are made in several designs.

The NU design has rollers guided between ribs on the outer ring, while the N design has rollers guided between ribs on the inner ring. Both designs allow axial shift of the rings in both directions.

The NJ design is constructed with two guiding ribs on the outer ring and one on the inner ring. The NF design is made with two guiding ribs on the inner ring and one on the outer ring. Both designs allow transmission of a limited axial force in one direction.

Besides the elements used in the NJ design, the NUP design has an additional flat ring, functioning as the second supporting head on the inner ring and allows the bearing to transfer limited axial forces in both directions.

Axial guiding in both directions can be achieved by using HJ angle rings for NJ design bearings and axial guiding in one direction for NU design bearings. Designation of the shaped angle ring belonging to individual bearings with tapered hole are stated in dimension tables.

The individual design variants are depicted in the table part of this publication.

Basic dimensions

The basic dimensions of single-row cylindrical roller bearings stated in dimension charts comply with the international dimension plan ISO 15.

Identification

Identification of the basic design bearings is provided in the table part of the publication. Deviations from the basic designs are indicated by additional symbols in accordance with STN 02 4608. The meaning of the most commonly used symbols is provided in the following table.

Symbol	Example of designation	Meaning
R	**R** NU205	Bearing without one (separable) ring
L	**L**NU206	Removable ring of separable bearing
C3	NJ311 **C3**	Radial clearance greater than normal
R...	NU210 **R**70-90	Radial clearance in non-standardized range (range in µm)
E	NU2209**E**	Modification of internal design, higher load rating
M	NJ305E**M**	Solid brass cage connected by rivets
M1	NJ207E**M1**	Solid brass cage connected without rivets
TNG	NU306**ETNG**	Solid polyamide cage centered on cylindrical roller
N	NU207**N**	Snap ring groove on outer ring
NR	NU206**NR**	Snap ring groove on outer ring and inserted snap ring
P6	NU217 **P6**	Tolerance class higher than normal
S0	NU220 C3**S0**	Stabilization for operation at temperature up to 150 °C
S1	NU220 C3**S1**	Stabilization for operation at temperature up to 200 °C
S2	NU220 C3**S2**	Stabilization for operation at temperature up to 250 °C

Cages

Single-row roller bearings are made with a sheet-metal steel cage guided on rollers, which is not marked.

Bearings for special mounting applications are made with plastic or brass cages.

The additional symbol for plastic cages, TNG means that the cage is made as a single part from polyamide PA 6.6., reinforced with 25% of glass fibre.

Brass cages are manufactured in two designs – M with the brass cage joint with steel rivets and M1 with the cage flange and body joint with pressed-out legs.

If the brass cage is to be guided on the outer MA ring or the inner MB ring, the delivery of bearings must be discussed in advance.

The symbols for the cage material and design are stated in the table part of this publication.

Tolerances

Bearings are commonly produced in normal tolerance class P0 which is not indicated. Bearings for more demanding arrangements are delivered in tolerance classes P6, P5 and P4.

Radial Clearance

Commonly produced bearings have normal radial clearance which is not indicated. For special arrangements bearings with smaller clearance C2 or greater radial clearance C3, C4 and C5 are delivered.

The symbols for a tolerance class and radial clearance are grouped together in the basic designation, e. g.:

P6 + C3 = P63

P6 + C4 = P64 etc.

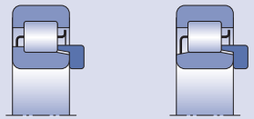
Bearings with Angle Rings

Angle rings – type HJ2, HJ2E, HJ3, HJ3E and HJ4 can be used for bearings in NJ and NU designs.

Examples of bearing designation:

NJ2 + HJ2 = NH2	NU2 + HJ2 = NUJ2
NJ3 + HJ3 = NH3	NU3 + HJ3 = NUJ3
NJ4 + HJ4 = NH4	NU4 + HJ4 = NUJ4

Pictures of individual basic designs and combinations are in the dimension tables of this publication.



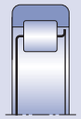
NH NUJ

Bearings without Inner Ring

Single row cylindrical roller bearings without inner ring designated R NU are delivered for arrangements with limited space for bearing mounting.

The hardened and grinded pin is the inner bearing ring raceway.

Dimension tolerance on the pin is usually “g6” for normal radial clearance, “f6” for greater radial clearance and “h5” for smaller radial clearance. Ovality and cylindricity deviations of the “raceway” on this pin can not be greater than deviations for tolerance class IT3. Surface roughness for this surface should be R_a = 0.2 and for less demanding arrangements R_a = 0.4.



R NU

Basic load rating C_r and C_{or} values shown in the dimension tables, are valid for bearings RNU if the pin surface hardness will be in the range 59 to 65 HRC. With decreasing hardness value, the load rating values C_r decreases as well. It must be multiplied by the factor f_h from the following table. Minimum depth of pin hardening after grinding depends on the cylindrical roller diameter and load magnitude and should be 1 to 3 mm.

Hardness HRC	58	56	54	51	48	45	40	35	30
Factor f_h	0.9	0.8	0.7	0.6	0.5	0.4	0.3	0.25	0.2

Misalignment

Mutual bearing ring misalignment of single row cylindrical roller bearings is very small. Permissible misalignment values are in the table.

Bearing	Type Load	
	small ($F_r < 0{,}1C_{or}$)	great ($F_r \geq 0{,}1C_{or}$)
NU10, NU2, NU3, NU4	2’ – 3’	5’ – 7’
NU22, NU23	1’ – 3’	3’ – 4’
Designs NJ, NUP, N[1)] of all dimension series	1’ – 2’	3’ – 4’

[1)] Smaller values of the number pair are valid for bearings of width series 2 and higher

Dynamic equivalent radial load

The dynamic load for single-row cylindrical roller bearings with radial load only and without axial forces is calculated according to the following formula:

$P_r = F_r$ [kN]

If roller bearings are also used to transmit axial forces, the dynamic load is calculated according to the following formula:

$P_r = F_r$ for $F_a/F_r \leq e$

$P_r = 0{,}92\ F_r + Y.\ F_a$ for $F_a/F_r > e$

where

e = calculation coefficient
e = 0.2 for 2, 3, 4 grade roller bearings
e = 0.3 for 22, 23 grade roller bearings

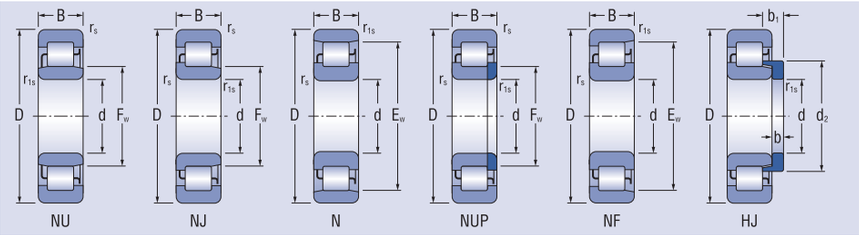
Y = axial load coefficient
Y = 0.6 for 2, 3, 4 grade roller bearings
Y = 0.4 for 22, 23 grade roller bearings

To ensure reliable operation of cylindrical roller bearings transmitting axial load, simultaneous load with a radial force must be ensured and the ratio F_a/F_r should not be greater than 0.5.

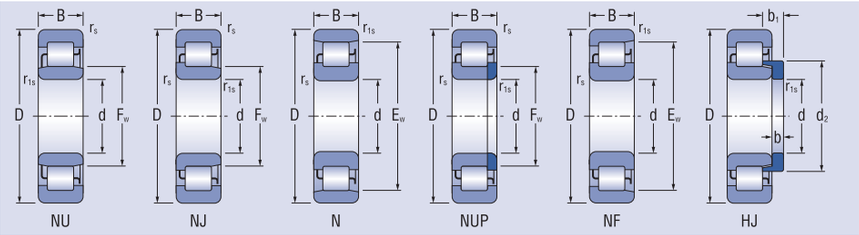
Static equivalent radial load

The following applies for cylindrical roller bearings under static load:

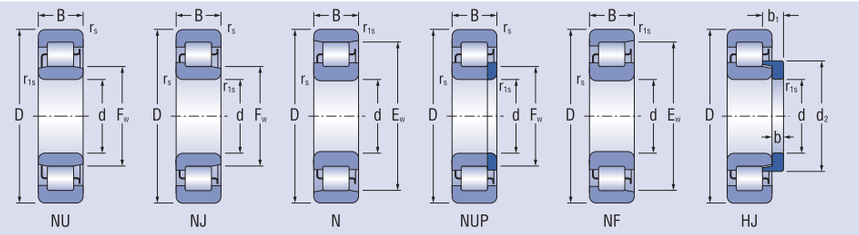
$P_{or} = F_r$ [kN]



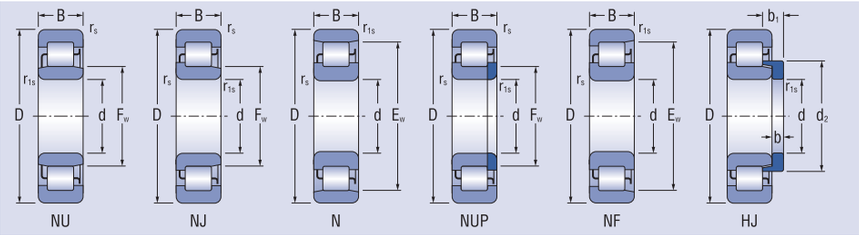
Dimensions							Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass of Bearings	Separate Thrust Collar	Mass of separate Thrust Collar	
								dynamic	static			grease	oil				
d	D	B	$r_{s\,min}$	$r_{s1\,min}$	F_w	E_w		C_r	C_{or}	C_u							
mm								kN				min^{-1}		kg		kg	
17	40	12	0.6	0.3	22.1	-	**NU203EM**	14.7	11.5	1.41		15 000	18 000	0.08	HJ203	0.009	
	40	12	0.6	0.3	22.1	-	**NJ203EM**	14.7	11.5	1.41		15 000	18 000	0.08	HJ203	0.009	
	40	12	0.6	0.3	22.1	-	**NUP203EM**	14.7	11.5	1.41		15 000	18 000	0.08	-	-	
	40	12	0.6	0.3	-	35.1	**N203EM**	14.7	11.5	1.41		15 000	18 000	0.08	-	-	
	40	12	0.6	0.3	-	35.1	**NF203EM**	14.7	11.5	1.41		15 000	18 000	0.08	-	-	
	40	12	0.6	0.3	22.1	-	**NU203EM1**	15.7	12.6	1.54		15 000	18 000	0.08	HJ203	0.009	
	40	12	0.6	0.3	22.1	-	**NJ203EM1**	15.7	12.6	1.54		15 000	18 000	0.08	HJ203	0.009	
	40	12	0.6	0.3	22.1	-	**NUP203EM1**	15.7	12.6	1.54		15 000	18 000	0.08	-	-	
	40	12	0.6	0.3	-	35.1	**N203EM1**	15.7	12.6	1.54		15 000	18 000	0.08	-	-	
	40	12	0.6	0.3	-	35.1	**NF203EM1**	15.7	12.6	1.54		15 000	18 000	0.08	-	-	
	40	16	0.6	0.3	22.1	-	**NU2203EM1**	20.9	18.1	2.21		15 000	18 000	0.103	HJ2203	0.010	
	40	16	0.6	0.3	22.1	-	**NJ2203EM1**	20.9	18.1	2.21		15 000	18 000	0.103	HJ2203	0.010	
	40	16	0.6	0.3	22.1	-	**NUP2203EM1**	20.9	18.1	2.21		15 000	18 000	0.103	-	-	
	40	16	0.6	0.3	-	35.1	**N2203EM1**	20.9	18.1	2.21		15 000	18 000	0.103	-	-	
	40	16	0.6	0.3	-	35.1	**NF2203EM1**	20.9	18.1	2.21		15 000	18 000	0.103	-	-	
	47	14	1.0	0.6	24.2	-	**NU303EM1**	21.6	17.1	2.09		14 000	17 000	0.110	HJ303	0.012	
	47	14	1.0	0.6	24.2	-	**NJ303EM1**	21.6	17.1	2.09		14 000	17 000	0.110	HJ303	0.012	
	47	14	1.0	0.6	24.2	-	**NUP303EM1**	21.6	17.1	2.09		14 000	17 000	0.110	-	-	
	47	14	1.0	0.6	-	40.2	**N303EM1**	21.6	17.1	2.09		14 000	17 000	0.110	-	-	
	47	14	1.0	0.6	-	40.2	**NF303EM1**	21.6	17.1	2.09		14 000	17 000	0.110	-	-	
	60	17	1.1	0.6	-	-	**NU403EM**	24.3	20.6	2.51		12 000	14 000	0.336	HJ403	0.030	
	60	17	1.1	0.6	-	-	**NJ403EM**	24.3	20.6	2.51		12 000	14 000	0.336	HJ403	0.030	
	60	17	1.1	0.6	-	-	**NUP403EM**	24.3	20.6	2.51		12 000	14 000	0.336	-	-	
	60	17	1.1	0.6	-	-	**N403EM**	24.3	20.6	2.51		12 000	14 000	0.336	-	-	
	60	17	1.1	0.6	-	-	**NF403EM**	24.3	20.6	2.51		12 000	14 000	0.336	-	-	
20	47	14	1.1	0.6	26.5	-	**NU204EM**	22.6	19.0	2.31		14 000	17 000	0.112	HJ204	0.012	
	47	14	1.1	0.6	26.5	-	**NJ204EM**	22.6	19.0	2.31		14 000	17 000	0.112	HJ204	0.012	
	47	14	1.1	0.6	26.5	-	**NUP204EM**	22.6	19.0	2.31		14 000	17 000	0.112	-	-	
	47	14	1.1	0.6	-	41.5	**N204EM**	22.6	19.0	2.31		14 000	17 000	0.112	-	-	
	47	14	1.1	0.6	-	41.5	**NF204EM**	22.6	19.0	2.31		14 000	17 000	0.112	-	-	
	47	14	1.1	0.6	26.5	-	**NU204EM1**	26.2	23.2	2.83		14 000	17 000	0.112	HJ204	0.012	
	47	14	1.1	0.6	26.5	-	**NJ204EM1**	26.2	23.2	2.83		14 000	17 000	0.112	HJ204	0.012	
	47	14	1.1	0.6	26.5	-	**NUP204EM1**	26.2	23.2	2.83		14 000	17 000	0.112	-	-	
	47	14	1.1	0.6	-	41.5	**N204EM1**	26.2	23.2	2.83		14 000	17 000	0.112	-	-	
	47	14	1.1	0.6	-	41.5	**NF204EM1**	26.2	23.2	2.83		14 000	17 000	0.112	-	-	
	47	18	1.1	0.6	26.5	-	**NU2204EM1**	31.1	28.9	3.52		14 000	17 000	0.150	HJ2204	0.012	
	47	18	1.1	0.6	26.5	-	**NJ2204EM1**	31.1	28.9	3.52		14 000	17 000	0.150	HJ2204	0.012	
	47	18	1.1	0.6	26.5	-	**NUP2204EM1**	31.1	28.9	3.52		14 000	17 000	0.150	-	-	
	47	18	1.1	0.6	-	41.5	**N2204EM1**	31.1	28.9	3.52		14 000	17 000	0.150	-	-	
	47	18	1.1	0.6	-	41.5	**NF2204EM1**	31.1	28.9	3.52		14 000	17 000	0.150	-	-	
	52	15	1.1	0.6	27.5	-	**NU304E**	26.7	21.5	2.62		13 000	16 000	0.153	HJ304	0.018	
	52	15	1.1	0.6	27.5	-	**NJ304E**	26.7	21.5	2.62		13 000	16 000	0.153	HJ304	0.018	



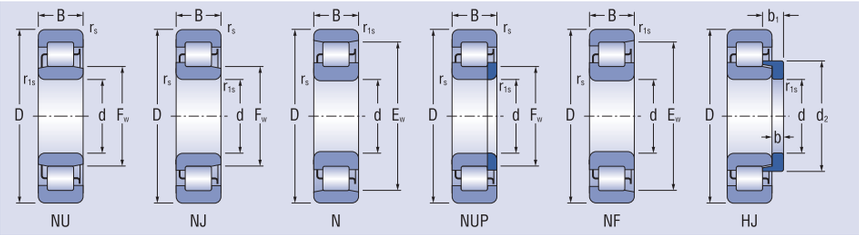
Dimensions							Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass of Bearings	Separate Thrust Collar	Mass of separate Thrust Collar	
								dynamic	static			grease	oil				
d	D	B	$r_{s\,min}$	$r_{s1\,min}$	F_w	E_w		C_r	C_{or}	C_u							
mm								kN				min^{-1}		kg		kg	
20	52	15	1.1	0.6	27.5	-	**NUP304E**	26.7	21.5	2.62		13 000	16 000	0.153	-	-	
	52	15	1.1	0.6	-	45.5	**N304E**	29.1	24.2	2.95		13 000	16 000	0.153	-	-	
	52	15	1.1	0.6	-	45.5	**NF304E**	26.7	21.5	2.62		13 000	16 000	0.153	-	-	
	52	15	1.1	0.6	27.5	-	**NU304ETNG**	31.5	27.0	3.29		13 000	16 000	0.153	HJ304	0.018	
	52	15	1.1	0.6	27.5	-	**NJ304ETNG**	31.5	27.0	3.29		13 000	16 000	0.153	HJ304	0.018	
	52	15	1.1	0.6	27.5	-	**NUP304ETNG**	31.5	27.0	3.29		13 000	16 000	0.153	-	-	
	52	15	1.1	0.6	-	45.5	**N304ETNG**	31.5	27.0	3.29		13 000	16 000	0.153	-	-	
	52	15	1.1	0.6	-	45.5	**NF304ETNG**	31.5	27.0	3.29		13 000	16 000	0.153	-	-	
	52	15	1.1	0.6	27.5	-	**NU304EM1**	31.5	27.0	3.29		13 000	16 000	0.153	HJ304	0.018	
	52	15	1.1	0.6	27.5	-	**NJ304EM1**	31.5	27.0	3.29		13 000	16 000	0.153	HJ304	0.018	
	52	15	1.1	0.6	27.5	-	**NUP304EM1**	31.5	27.0	3.29		13 000	16 000	0.153	-	-	
	52	15	1.1	0.6	-	45.5	**N304EM1**	31.5	27.0	3.29		13 000	16 000	0.153	-	-	
	52	15	1.1	0.6	-	45.5	**NF304EM1**	31.5	27.0	3.29		13 000	16 000	0.153	-	-	
	52	21	1.1	0.6	27.5	-	**NU2304EM1**	41.9	38.8	4.73		12 000	14 000	0.219	HJ2304	0.019	
	52	21	1.1	0.6	27.5	-	**NJ2304EM1**	41.9	38.8	4.73		12 000	14 000	0.219	HJ2304	0.019	
	52	21	1.1	0.6	27.5	-	**NUP2304EM1**	41.9	38.8	4.73		12 000	14 000	0.219	-	-	
	52	21	1.1	0.6	-	45.5	**N2304EM1**	41.9	38.8	4.73		12 000	14 000	0.219	-	-	
	52	21	1.1	0.6	-	45.5	**NF2304EM1**	41.9	38.8	4.73		12 000	14 000	0.219	-	-	
25	52	15	1.1	0.6	31.5	-	**NU205E**	25.9	23.5	2.86		12 000	15 000	0.135	HJ205	0.014	
	52	15	1.1	0.6	31.5	-	**NJ205E**	25.9	23.5	2.86		12 000	15 000	0.135	HJ205	0.014	
	52	15	1.1	0.6	31.5	-	**NUP205E**	25.9	23.5	2.86		12 000	15 000	0.135	-	-	
	52	15	1.1	0.6	-	46.5	**N205E**	25.9	23.5	2.86		12 000	15 000	0.135	-	-	
	52	15	1.1	0.6	-	46.5	**NF205E**	25.9	23.5	2.86		12 000	15 000	0.135	-	-	
	52	15	1.1	0.6	31.5	-	**NU205ETNG**	28.2	26.2	3.20		12 000	15 000	0.135	HJ205	0.014	
	52	15	1.1	0.6	31.5	-	**NJ205ETNG**	28.2	26.2	3.20		12 000	15 000	0.135	HJ205	0.014	
	52	15	1.1	0.6	31.5	-	**NUP205ETNG**	28.2	26.2	3.20		12 000	15 000	0.135	-	-	
	52	15	1.1	0.6	-	46.5	**N205ETNG**	28.2	26.2	3.20		12 000	15 000	0.135	-	-	
	52	15	1.1	0.6	-	46.5	**NF205ETNG**	28.2	26.2	3.20		12 000	15 000	0.135	-	-	
	52	15	1.1	0.6	31.5	-	**NU205EM1**	28.2	26.2	3.20		12 000	15 000	0.135	HJ205	0.014	
	52	15	1.1	0.6	31.5	-	**NJ205EM1**	28.2	26.2	3.20		12 000	15 000	0.135	HJ205	0.014	
	52	15	1.1	0.6	31.5	-	**NUP205EM1**	28.2	26.2	3.20		12 000	15 000	0.135	-	-	
	52	15	1.1	0.6	-	46.5	**N205EM1**	28.2	26.2	3.20		12 000	15 000	0.135	-	-	
	52	15	1.1	0.6	-	46.5	**NF205EM1**	28.2	26.2	3.20		12 000	15 000	0.135	-	-	
	52	18	1.1	0.6	31.5	-	**NU2205E**	29.1	27.2	3.32		12 000	15 000	0.169	HJ2205	0.015	
	52	18	1.1	0.6	31.5	-	**NJ2205E**	29.1	27.2	3.32		12 000	15 000	0.169	HJ2205	0.015	
	52	18	1.1	0.6	31.5	-	**NUP2205E**	29.1	27.2	3.32		12 000	15 000	0.169	-	-	
	52	18	1.1	0.6	-	46.5	**N2205E**	31.3	29.9	3.64		12 000	15 000	0.169	-	-	
	52	18	1.1	0.6	-	46.5	**NF2205E**	29.1	27.2	3.32		12 000	15 000	0.169	-	-	
	52	18	1.1	0.6	31.5	-	**NU2205ETNG**	35.4	35.3	4.31		12 000	15 000	0.169	HJ2205	0.015	
	52	18	1.1	0.6	31.5	-	**NJ2205ETNG**	35.4	35.3	4.31		12 000	15 000	0.169	HJ2205	0.015	
	52	18	1.1	0.6	31.5	-	**NUP2205ETNG**	35.4	35.3	4.31		12 000	15 000	0.169	-	-	
	52	18	1.1	0.6	-	46.5	**N2205ETNG**	35.4	35.3	4.31		12 000	15 000	0.169	-	-	



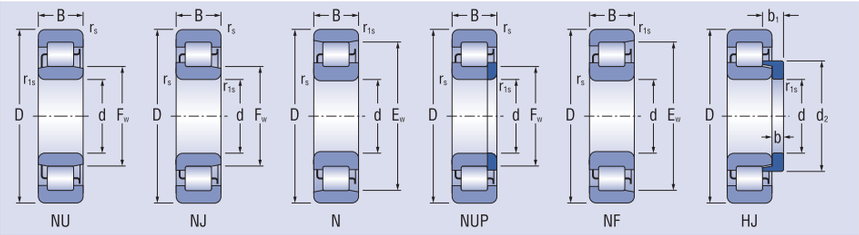
Dimensions							Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass of Bearings	Separate Thrust Collar	Mass of separate Thrust Collar	
								dynamic	static			grease	oil				
d	D	B	$r_{s\,min}$	$r_{s1\,min}$	F_w	E_w		C_r	C_{or}	C_u							
mm								kN				min^{-1}		kg		kg	
25	52	18	1.1	0.6	-	46.5	**NF2205ETNG**	35.4	35.3	4.31		12 000	15 000	0.169	-	-	
	52	18	1.1	0.6	31.5	-	**NU2205EM1**	33.4	32.6	3.98		12 000	15 000	0.169	HJ2205	0.015	
	52	18	1.1	0.6	31.5	-	**NJ2205EM1**	33.4	32.6	3.98		12 000	15 000	0.169	HJ2205	0.015	
	52	18	1.1	0.6	31.5	-	**NUP2205EM1**	33.4	32.6	3.98		12 000	15 000	0.169	-	-	
	52	18	1.1	0.6	-	46.5	**N2205EM1**	33.4	32.6	3.98		12 000	15 000	0.169	-	-	
	52	18	1.1	0.6	-	46.5	**NF2205EM1**	33.4	32.6	3.98		12 000	15 000	0.169	-	-	
	62	17	1.1	1.1	34.0	-	**NU305E**	35.8	30.6	3.73		10 000	12 000	0.245	HJ305	0.025	
	62	17	1.1	1.1	34.0	-	**NJ305E**	35.8	30.6	3.73		10 000	12 000	0.245	HJ305	0.025	
	62	17	1.1	1.1	34.0	-	**NUP305E**	35.8	30.6	3.73		10 000	12 000	0.245	-	-	
	62	17	1.1	1.1	-	54.0	**N305E**	38.7	34.0	4.15		10 000	12 000	0.245	-	-	
	62	17	1.1	1.1	-	54.0	**NF305E**	35.8	30.6	3.73		10 000	12 000	0.245	-	-	
	62	17	1.1	1.1	34.0	-	**NU305ETNG**	41.6	37.4	4.56		10 000	12 000	0.245	HJ305	0.025	
	62	17	1.1	1.1	34.0	-	**NJ305ETNG**	41.6	37.4	4.56		10 000	12 000	0.245	HJ305	0.025	
	62	17	1.1	1.1	34.0	-	**NUP305ETNG**	41.6	37.4	4.56		10 000	12 000	0.245	-	-	
	62	17	1.1	1.1	-	54.0	**N305ETNG**	41.6	37.4	4.56		10 000	12 000	0.245	-	-	
	62	17	1.1	1.1	-	54.0	**NF305ETNG**	41.6	37.4	4.56		10 000	12 000	0.245	-	-	
	62	17	1.1	1.1	34.0	-	**NU305EM1**	41.6	37.4	4.56		10 000	12 000	0.245	HJ305	0.025	
	62	17	1.1	1.1	34.0	-	**NJ305EM1**	41.6	37.4	4.56		10 000	12 000	0.245	HJ305	0.025	
	62	17	1.1	1.1	34.0	-	**NUP305EM1**	41.6	37.4	4.56		10 000	12 000	0.245	-	-	
	62	17	1.1	1.1	-	54.0	**N305EM1**	41.6	37.4	4.56		10 000	12 000	0.245	-	-	
	62	17	1.1	1.1	-	54.0	**NF305EM1**	41.6	37.4	4.56		10 000	12 000	0.245	-	-	
	62	24	1.1	0.6	34.0	-	**NU2305E**	48.8	45.3	5.52		10 000	12 000	0.356	HJ2305	0.027	
	62	24	1.1	0.6	34.0	-	**NJ2305E**	48.8	45.3	5.52		10 000	12 000	0.356	HJ2305	0.027	
	62	24	1.1	0.6	34.0	-	**NUP2305E**	48.8	45.3	5.52		10 000	12 000	0.356	-	-	
	62	24	1.1	0.6	-	54.0	**N2305E**	48.8	45.3	5.52		10 000	12 000	0.356	-	-	
	62	24	1.1	0.6	-	54.0	**NF2305E**	48.8	45.3	5.52		10 000	12 000	0.356	-	-	
	62	24	1.1	0.6	34.0	-	**NU2305ETNG**	57.0	56.0	6.83		10 000	12 000	0.356	HJ2305	0.027	
	62	24	1.1	0.6	34.0	-	**NJ2305ETNG**	57.0	56.0	6.83		10 000	12 000	0.356	HJ2305	0.027	
	62	24	1.1	0.6	34.0	-	**NUP2305ETNG**	57.0	56.0	6.83		10 000	12 000	0.356	-	-	
	62	24	1.1	0.6	-	54.0	**N2305ETNG**	57.0	56.0	6.83		10 000	12 000	0.356	-	-	
	62	24	1.1	0.6	-	54.0	**NF2305ETNG**	57.0	56.0	6.83		10 000	12 000	0.356	-	-	
	62	24	1.1	0.6	34.0	-	**NU2305EM1**	57.0	56.0	6.83		10 000	12 000	0.356	HJ2305	0.027	
	62	24	1.1	0.6	34.0	-	**NJ2305EM1**	57.0	56.0	6.83		10 000	12 000	0.356	HJ2305	0.027	
	62	24	1.1	0.6	34.0	-	**NUP2305EM1**	57.0	56.0	6.83		10 000	12 000	0.356	-	-	
	62	24	1.1	0.6	-	54.0	**N2305EM1**	57.0	56.0	6.83		10 000	12 000	0.356	-	-	
	62	24	1.1	0.6	-	54.0	**NF2305EM1**	57.0	56.0	6.83		10 000	12 000	0.356	-	-	
	80	21	1.1	1.1	39.5	-	**NU405EM**	53.4	45.7	5.57		8 000	9 500	0.532	HJ405	0.050	
	80	21	1.1	1.1	39.5	-	**NJ405EM**	53.4	45.7	5.57		8 000	9 500	0.532	HJ405	0.050	
	80	21	1.1	1.1	39.5	-	**N405EM**	53.4	45.7	5.57		8 000	9 500	0.532	-	-	
	80	21	1.1	1.1	-	65.5	**NUP405EM**	53.4	45.7	5.57		8 000	9 500	0.532	-	-	
	80	21	1.1	1.1	-	65.5	**NF405EM**	53.4	45.7	5.57		8 000	9 500	0.532	-	-	



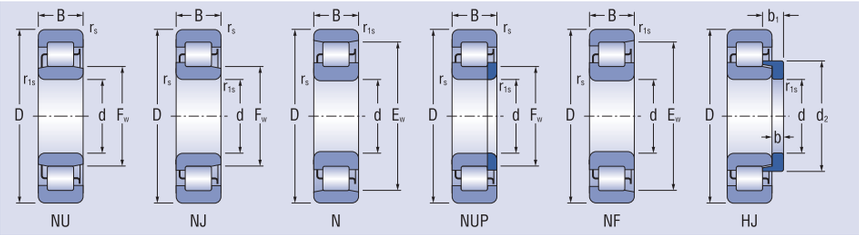
Dimensions							Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass of Bearings	Separate Thrust Collar	Mass of separate Thrust Collar	
								dynamic	static			grease	oil				
d	D	B	$r_{s\,min}$	$r_{s1\,min}$	F_w	E_w		C_r	C_{or}	C_u							
mm								kN				min^{-1}		kg		kg	
30	62	16	1.1	0.6	37.5	-	**NU206E**	34.5	31.6	3.80		9 500	12 000	0.205	HJ206	0.025	
	62	16	1.1	0.6	37.5	-	**NJ206E**	34.5	31.6	3.80		9 500	12 000	0.205	HJ206	0.025	
	62	16	1.1	0.6	37.5	-	**NUP206E**	34.5	31.6	3.80		9 500	12 000	0.205	-	-	
	62	16	1.1	0.6	-	55.5	**N206E**	36.8	34.5	4.20		9 500	12 000	0.205	-	-	
	62	16	1.1	0.6	-	55.5	**NF206E**	34.5	31.6	3.80		9 500	12 000	0.205	-	-	
	62	16	1.1	0.6	37.5	-	**NU206ETNG**	39.1	37.4	4.56		9 500	12 000	0.205	HJ206	0.025	
	62	16	1.1	0.6	37.5	-	**NJ206ETNG**	39.1	37.4	4.56		9 500	12 000	0.205	HJ206	0.025	
	62	16	1.1	0.6	37.5	-	**NUP206ETNG**	39.1	37.4	4.56		9 500	12 000	0.205	-	-	
	62	16	1.1	0.6	-	55.5	**N206ETNG**	39.1	37.4	4.56		9 500	12 000	0.205	-	-	
	62	16	1.1	0.6	-	55.5	**NF206ETNG**	39.1	37.4	4.56		9 500	12 000	0.205	-	-	
	62	16	1.1	0.6	37.5	-	**NU206EM1**	39.1	37.4	4.56		9 500	12 000	0.205	HJ206	0.025	
	62	16	1.1	0.6	37.5	-	**NJ206EM1**	39.1	37.4	4.56		9 500	12 000	0.205	HJ206	0.025	
	62	16	1.1	0.6	37.5	-	**NUP206EM1**	39.1	37.4	4.56		9 500	12 000	0.205	-	-	
	62	16	1.1	0.6	-	55.5	**N206EM1**	39.1	37.4	4.56		9 500	12 000	0.205	-	-	
	62	16	1.1	0.6	-	55.5	**NF206EM1**	39.1	37.4	4.56		9 500	12 000	0.205	-	-	
	62	20	1.1	0.6	37.5	-	**NU2206E**	43.1	42.1	5.14		9 400	12 000	0.261	HJ2206	0.026	
	62	20	1.1	0.6	37.5	-	**NJ2206E**	43.1	42.1	5.14		9 400	12 000	0.261	HJ2206	0.026	
	62	20	1.1	0.6	37.5	-	**NUP2206E**	43.1	42.1	5.14		9 400	12 000	0.261	-	-	
	62	20	1.1	0.6	-	55.5	**N2206E**	46.1	46.0	5.61		9 400	12 000	0.261	-	-	
	62	20	1.1	0.6	-	55.5	**NF2206E**	43.1	42.1	5.14		9 400	12 000	0.261	-	-	
	62	20	1.1	0.6	37.5	-	**NU2206ETNG**	48.9	49.8	6.08		9 400	12 000	0.261	HJ2206	0.026	
	62	20	1.1	0.6	37.5	-	**NJ2206ETNG**	48.9	49.8	6.08		9 400	12 000	0.261	HJ2206	0.026	
	62	20	1.1	0.6	37.5	-	**NUP2206ETNG**	48.9	49.8	6.08		9 400	12 000	0.261	-	-	
	62	20	1.1	0.6	-	55.5	**N2206ETNG**	48.9	49.8	6.08		9 400	12 000	0.261	-	-	
	62	20	1.1	0.6	-	55.5	**NF2206ETNG**	48.9	49.8	6.08		9 400	12 000	0.261	-	-	
	62	20	1.1	0.6	37.5	-	**NU2206EM1**	46.1	46.0	5.61		9 400	12 000	0.261	HJ2206	0.026	
	62	20	1.1	0.6	37.5	-	**NJ2206EM1**	46.1	46.0	5.61		9 400	12 000	0.261	HJ2206	0.026	
	62	20	1.1	0.6	37.5	-	**NUP2206EM1**	46.1	46.0	5.61		9 400	12 000	0.261	-	-	
	62	20	1.1	0.6	-	55.5	**N2206EM1**	46.1	46.0	5.61		9 400	12 000	0.261	-	-	
	62	20	1.1	0.6	-	55.5	**NF2206EM1**	46.1	46.0	5.61		9 400	12 000	0.261	-	-	
	72	19	1.1	1.1	40.5	-	**NU306E**	42.8	37.7	4.60		8 400	10 000	0.368	HJ306	0.042	
	72	19	1.1	1.1	40.5	-	**NJ306E**	42.8	37.7	4.60		8 400	10 000	0.368	HJ306	0.042	
	72	19	1.1	1.1	40.5	-	**NUP306E**	42.8	37.7	4.60		8 400	10 000	0.368	-	-	
	72	19	1.1	1.1	-	62.5	**N306E**	46.3	41.9	5.11		8 400	10 000	0.368	-	-	
	72	19	1.1	1.1	-	62.5	**NF306E**	42.8	37.7	4.60		8 400	10 000	0.368	-	-	
	72	19	1.1	1.1	40.5	-	**NU306ETNG**	53.1	50.2	6.13		8 400	10 000	0.368	HJ306	0.042	
	72	19	1.1	1.1	40.5	-	**NJ306ETNG**	53.1	50.2	6.13		8 400	10 000	0.368	HJ306	0.042	
	72	19	1.1	1.1	40.5	-	**NUP306ETNG**	53.1	50.2	6.13		8 400	10 000	0.368	-	-	
	72	19	1.1	1.1	-	62.5	**N306ETNG**	53.1	50.2	6.13		8 400	10 000	0.368	-	-	
	72	19	1.1	1.1	-	62.5	**NF306ETNG**	53.1	50.2	6.13		8 400	10 000	0.368	-	-	
	72	19	1.1	1.1	40.5	-	**NU306EM1**	53.1	50.2	6.13		8 400	10 000	0.368	HJ306	0.042	
	72	19	1.1	1.1	40.5	-	**NJ306EM1**	53.1	50.2	6.13		8 400	10 000	0.368	HJ306	0.042	



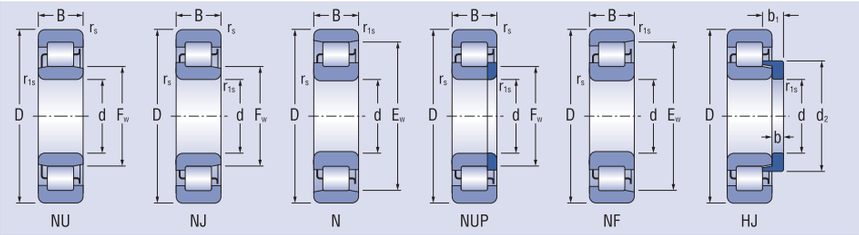
Dimensions							Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass of Bearings	Separate Thrust Collar	Mass of separate Thrust Collar	
								dynamic	static			grease	oil				
d	D	B	$r_{s\,min}$	$r_{s1\,min}$	F_w	E_w		C_r	C_{or}	C_u							
mm								kN				min^{-1}		kg		kg	
30	72	19	1.1	1.1	40.5	-	**NUP306EM1**	53.1	50.2	6.13		8 400	10 000	0.368	-	-	
	72	19	1.1	1.1	-	62.5	**N306EM1**	53.1	50.2	6.13		8 400	10 000	0.368	-	-	
	72	19	1.1	1.1	-	62.5	**NF306EM1**	53.1	50.2	6.13		8 400	10 000	0.368	-	-	
	72	27	1.1	1.1	40.5	-	**NU2306E**	60.2	58.2	7.10		8 400	10 000	0.540	HJ2306	0.043	
	72	27	1.1	1.1	40.5	-	**NJ2306E**	60.2	58.2	7.10		8 400	10 000	0.540	HJ2306	0.043	
	72	27	1.1	1.1	40.5	-	**NUP2306E**	60.2	58.2	7.10		8 400	10 000	0.540	-	-	
	72	27	1.1	1.1	-	62.5	**N2306E**	60.2	58.2	7.10		8 400	10 000	0.540	-	-	
	72	27	1.1	1.1	-	62.5	**NF2306E**	60.2	58.2	7.10		8 400	10 000	0.540	-	-	
	72	27	1.1	1.1	40.5	-	**NU2306ETNG**	74.6	77.7	9.47		8 400	10 000	0.540	HJ2306	0.043	
	72	27	1.1	1.1	40.5	-	**NJ2306ETNG**	74.6	77.7	9.47		8 400	10 000	0.540	HJ2306	0.043	
	72	27	1.1	1.1	40.5	-	**NUP2306ETNG**	74.6	77.7	9.47		8 400	10 000	0.540	-	-	
	72	27	1.1	1.1	-	62.5	**N2306ETNG**	74.6	77.7	9.47		8 400	10 000	0.540	-	-	
	72	27	1.1	1.1	-	62.5	**NF2306ETNG**	74.6	77.7	9.47		8 400	10 000	0.540	-	-	
	72	27	1.1	1.1	40.5	-	**NU2306EM**	65.1	64.7	7.89		8 400	10 000	0.540	HJ2306	0.043	
	72	27	1.1	1.1	40.5	-	**NJ2306EM**	65.1	64.7	7.89		8 400	10 000	0.540	HJ2306	0.043	
	72	27	1.1	1.1	40.5	-	**NUP2306EM**	65.1	64.7	7.89		8 400	10 000	0.540	-	-	
	72	27	1.1	1.1	-	62.5	**N2306EM**	65.1	64.7	7.89		8 400	10 000	0.540	-	-	
	72	27	1.1	1.1	-	62.5	**NF2306EM**	65.1	64.7	7.89		8 400	10 000	0.540	-	-	
	72	27	1.1	1.1	40.5	-	**NU2306EM1**	74.6	77.7	9.47		8 400	10 000	0.540	HJ2306	0.043	
	72	27	1.1	1.1	40.5	-	**NJ2306EM1**	74.6	77.7	9.47		8 400	10 000	0.540	HJ2306	0.043	
	72	27	1.1	1.1	40.5	-	**NUP2306EM1**	74.6	77.7	9.47		8 400	10 000	0.540	-	-	
	72	27	1.1	1.1	-	62.5	**N2306EM1**	74.6	77.7	9.47		8 400	10 000	0.540	-	-	
	72	27	1.1	1.1	-	62.5	**NF2306EM1**	74.6	77.7	9.47		8 400	10 000	0.540	-	-	
	90	23	1.5	1.5	45.0	-	**NU406EM**	65.6	58.4	7.12		7 300	8 500	0.910	HJ406	0.080	
	90	23	1.5	1.5	45.0	-	**NJ406EM**	65.6	58.4	7.12		7 300	8 500	0.910	HJ406	0.080	
	90	23	1.5	1.5	45.0	-	**NUP406EM**	65.6	58.4	7.12		7 300	8 500	0.910	-	-	
	90	23	1.5	1.5	-	73.0	**N406EM**	65.6	58.4	7.12		7 300	8 500	0.910	-	-	
	90	23	1.5	1.5	-	73.0	**NF406EM**	65.6	58.4	7.12		7 300	8 500	0.910	-	-	
35	72	17	1.1	0.6	44	-	**NU207E**	44.8	43.0	5.25		8 000	10 000	0.301	HJ207	0.034	
	72	17	1.1	0.6	44	-	**NJ207E**	44.8	43.0	5.25		8 000	10 000	0.301	HJ207	0.034	
	72	17	1.1	0.6	44	-	**NUP207E**	44.8	43.0	5.25		8 000	10 000	0.301	-	-	
	72	17	1.1	0.6	-	64	**N207E**	44.8	43.0	5.25		8 000	10 000	0.301	-	-	
	72	17	1.1	0.6	-	64	**NF207E**	44.8	43.0	5.25		8 000	10 000	0.301	-	-	
	72	17	1.1	0.6	44	-	**NU207ETNG**	50.3	50.2	6.12		8 000	10 000	0.301	HJ207	0.034	
	72	17	1.1	0.6	44	-	**NJ207ETNG**	50.3	50.2	6.12		8 000	10 000	0.301	HJ207	0.034	
	72	17	1.1	0.6	44	-	**NUP207ETNG**	50.3	50.2	6.12		8 000	10 000	0.301	-	-	
	72	17	1.1	0.6	-	64	**N207ETNG**	50.3	50.2	6.12		8 000	10 000	0.301	-	-	
	72	17	1.1	0.6	-	64	**NF207ETNG**	50.3	50.2	6.12		8 000	10 000	0.301	-	-	
	72	17	1.1	0.6	44	-	**NU207EM1**	47.5	46.6	5.68		8 000	10 000	0.301	HJ207	0.034	
	72	17	1.1	0.6	44	-	**NJ207EM1**	47.5	46.6	5.68		8 000	10 000	0.301	HJ207	0.034	
	72	17	1.1	0.6	44	-	**NUP207EM1**	47.5	46.6	5.68		8 000	10 000	0.301	-	-	
	72	17	1.1	0.6	-	64	**N207EM1**	47.5	46.6	5.68		8 000	10 000	0.301	-	-	



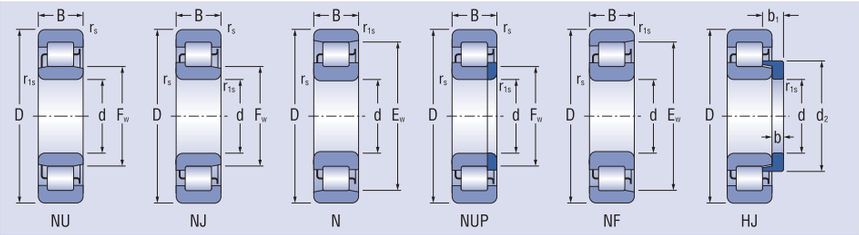
Dimensions							Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass of Bearings	Separate Thrust Collar	Mass of separate Thrust Collar	
								dynamic	static			grease	oil				
d	D	B	$r_{s\,min}$	$r_{s1\,min}$	F_w	E_w		C_r	C_{or}	C_u							
mm								kN				min^{-1}		kg		kg	
35	72	17	1.1	0.6	-	64	**NF207EM1**	47.5	46.6	5.68		8 000	10 000	0.301	-	-	
	72	23	1.1	0.6	44	-	**NU2207E**	51.5	51.3	6.25		8 000	10 000	0.416	HJ2207	0.035	
	72	23	1.1	0.6	44	-	**NJ2207E**	51.5	51.3	6.25		8 000	10 000	0.416	HJ2207	0.035	
	72	23	1.1	0.6	44	-	**NUP2207E**	51.5	51.3	6.25		8 000	10 000	0.416	-	-	
	72	23	1.1	0.6	-	64	**N2207E**	54.9	55.9	6.81		8 000	10 000	0.416	-	-	
	72	23	1.1	0.6	-	64	**NF2207E**	51.5	51.3	6.25		8 000	10 000	0.416	-	-	
	72	23	1.1	0.6	44	-	**NU2207ETNG**	61.6	65.3	7.96		8 000	10 000	0.416	HJ2207	0.035	
	72	23	1.1	0.6	44	-	**NJ2207ETNG**	61.6	65.3	7.96		8 000	10 000	0.416	HJ2207	0.035	
	72	23	1.1	0.6	44	-	**NUP2207ETNG**	61.6	65.3	7.96		8 000	10 000	0.416	-	-	
	72	23	1.1	0.6	-	64	**N2207ETNG**	61.6	65.3	7.96		8 000	10 000	0.416	-	-	
	72	23	1.1	0.6	-	64	**NF2207ETNG**	61.6	65.3	7.96		8 000	10 000	0.416	-	-	
	72	23	1.1	0.6	44	-	**NU2207EM1**	58.3	60.6	7.39		8 000	10 000	0.416	HJ2207	0.035	
	72	23	1.1	0.6	44	-	**NJ2207EM1**	58.3	60.6	7.39		8 000	10 000	0.416	HJ2207	0.035	
	72	23	1.1	0.6	44	-	**NUP2207EM1**	58.3	60.6	7.39		8 000	10 000	0.416	-	-	
	72	23	1.1	0.6	-	64	**N2207EM1**	58.3	60.6	7.39		8 000	10 000	0.416	-	-	
	72	23	1.1	0.6	-	64	**NF2207EM1**	58.3	60.6	7.39		8 000	10 000	0.416	-	-	
	80	21	1.5	1.1	46.2	-	**NU307E**	62.4	60.0	7.31		7 500	9 200	0.486	HJ307	0.060	
	80	21	1.5	1.1	46.2	-	**NJ307E**	62.4	60.0	7.31		7 500	9 200	0.486	HJ307	0.060	
	80	21	1.5	1.1	46.2	-	**NUP307E**	62.4	60.0	7.31		7 500	9 200	0.486	-	-	
	80	21	1.5	1.1	-	70.2	**N307E**	62.4	60.0	7.31		7 500	9 200	0.486	-	-	
	80	21	1.5	1.1	-	70.2	**NF307E**	62.4	60.0	7.31		7 500	9 200	0.486	-	-	
	80	21	1.5	1.1	46.2	-	**NU307ETNG**	66.6	65.4	7.97		7 500	9 200	0.486	HJ307	0.060	
	80	21	1.5	1.1	46.2	-	**NJ307ETNG**	66.6	65.4	7.97		7 500	9 200	0.486	HJ307	0.060	
	80	21	1.5	1.1	46.2	-	**NUP307ETNG**	66.6	65.4	7.97		7 500	9 200	0.486	-	-	
	80	21	1.5	1.1	-	70.2	**N307ETNG**	66.6	65.4	7.97		7 500	9 200	0.486	-	-	
	80	21	1.5	1.1	-	70.2	**NF307ETNG**	66.6	65.4	7.97		7 500	9 200	0.486	-	-	
	80	21	1.5	1.1	46.2	-	**NU307EM**	62.4	60.0	7.31		7 500	9 200	0.486	HJ307	0.060	
	80	21	1.5	1.1	46.2	-	**NJ307EM**	62.4	60.0	7.31		7 500	9 200	0.486	HJ307	0.060	
	80	21	1.5	1.1	46.2	-	**NUP307EM**	62.4	60.0	7.31		7 500	9 200	0.486	-	-	
	80	21	1.5	1.1	-	70.2	**N307EM**	62.4	60.0	7.31		7 500	9 200	0.486	-	-	
	80	21	1.5	1.1	-	70.2	**NF307EM**	62.4	60.0	7.31		7 500	9 200	0.486	-	-	
	80	21	1.5	1.1	46.2	-	**NU307EM1**	66.6	65.4	7.97		7 500	9 200	0.486	HJ307	0.060	
	80	21	1.5	1.1	46.2	-	**NJ307EM1**	66.6	65.4	7.97		7 500	9 200	0.486	HJ307	0.060	
	80	21	1.5	1.1	46.2	-	**NUP307EM1**	66.6	65.4	7.97		7 500	9 200	0.486	-	-	
	80	21	1.5	1.1	-	70.2	**N307EM1**	66.6	65.4	7.97		7 500	9 200	0.486	-	-	
	80	21	1.5	1.1	-	70.2	**NF307EM1**	66.6	65.4	7.97		7 500	9 200	0.486	-	-	
	80	31	1.5	1.1	46.2	-	**NU2307E**	75.1	75.4	9.20		7 500	9 200	0.736	HJ2307	0.064	
	80	31	1.5	1.1	46.2	-	**NJ2307E**	75.1	75.4	9.20		7 500	9 200	0.736	HJ2307	0.064	
	80	31	1.5	1.1	46.2	-	**NUP2307E**	75.1	75.4	9.20		7 500	9 200	0.736	-	-	
	80	31	1.5	1.1	-	70.2	**N2307E**	75.1	75.4	9.20		7 500	9 200	0.736	-	-	
	80	31	1.5	1.1	-	70.2	**NF2307E**	75.1	75.4	9.20		7 500	9 200	0.736	-	-	
	80	31	1.5	1.1	46.2	-	**NU2307ETNG**	93.2	100.6	12.27		7 500	9 200	0.736	HJ2307	0.064	



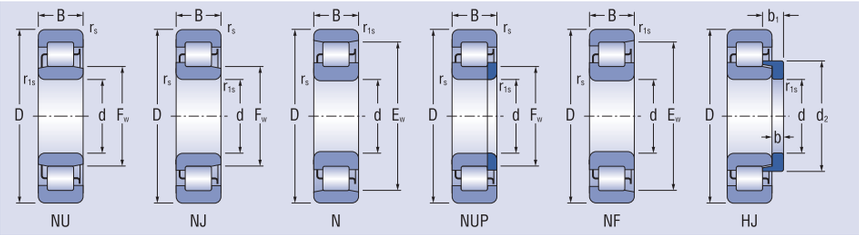
Dimensions							Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass of Bearings	Separate Thrust Collar	Mass of separate Thrust Collar	
								dynamic	static			grease	oil				
d	D	B	$r_{s\,min}$	$r_{s1\,min}$	F_w	E_w		C_r	C_{or}	C_u							
mm								kN				min^{-1}		kg		kg	
35	80	31	1.5	1.1	46.2	-	**NJ2307ETNG**	93.2	100.6	12.27		7 500	9 200	0.736	HJ2307	0.064	
	80	31	1.5	1.1	46.2	-	**NUP2307ETNG**	93.2	100.6	12.27		7 500	9 200	0.736	-	-	
	80	31	1.5	1.1	-	70.2	**N2307ETNG**	93.2	100.6	12.27		7 500	9 200	0.736	-	-	
	80	31	1.5	1.1	-	70.2	**NF2307ETNG**	93.2	100.6	12.27		7 500	9 200	0.736	-	-	
	80	31	1.5	1.1	46.2	-	**NU2307EM**	87.3	92.2	11.24		7 500	9 200	0.736	HJ2307	0.064	
	80	31	1.5	1.1	46.2	-	**NJ2307EM**	87.3	92.2	11.24		7 500	9 200	0.736	HJ2307	0.064	
	80	31	1.5	1.1	46.2	-	**NUP2307EM**	87.3	92.2	11.24		7 500	9 200	0.736	-	-	
	80	31	1.5	1.1	-	70.2	**N2307EM**	87.3	92.2	11.24		7 500	9 200	0.736	-	-	
	80	31	1.5	1.1	-	70.2	**NF2307EM**	87.3	92.2	11.24		7 500	9 200	0.736	-	-	
	80	31	1.5	1.1	46.2	-	**NU2307EM1**	93.2	100.6	12.27		7 500	9 200	0.736	HJ2307	0.064	
	80	31	1.5	1.1	46.2	-	**NJ2307EM1**	93.2	100.6	12.27		7 500	9 200	0.736	HJ2307	0.064	
	80	31	1.5	1.1	46.2	-	**NUP2307EM1**	93.2	100.6	12.27		7 500	9 200	0.736	-	-	
	80	31	1.5	1.1	-	70.2	**N2307EM1**	93.2	100.6	12.27		7 500	9 200	0.736	-	-	
	80	31	1.5	1.1	-	70.2	**NF2307EM1**	93.2	100.6	12.27		7 500	9 200	0.736	-	-	
	100	25	1.5	1.5	53	-	**NU407EM**	77.0	71.0	8.66		6 400	7 500	1.137	HJ407	0.130	
	100	25	1.5	1.5	53	-	**NJ407EM**	77.0	71.0	8.66		6 400	7 500	1.137	HJ407	0.130	
	100	25	1.5	1.5	53	-	**NUP407EM**	77.0	71.0	8.66		6 400	7 500	1.137	-	-	
	100	25	1.5	1.5	-	83	**N407EM**	77.0	71.0	8.66		6 400	7 500	1.137	-	-	
	100	25	1.5	1.5	-	83	**NF407EM**	77.0	71.0	8.66		6 400	7 500	1.137	-	-	
40	68	15	1.0	0.6	47	-	**NU1008EM**	29.0	32.0	3.90		9 400	11 000	0.230	-	-	
	68	15	1.0	0.6	47	-	**NJ1008EM**	29.0	32.0	3.90		9 400	11 000	0.230	-	-	
	68	15	1.0	0.6	47	-	**NUP1008EM**	29.0	32.0	3.90		9 400	11 000	0.230	-	-	
	80	18	1.1	1.1	49.5	-	**NU208E**	49.6	47.5	5.80		7 200	8 800	0.358	HJ208	0.050	
	80	18	1.1	1.1	49.5	-	**NJ208E**	49.6	47.5	5.80		7 200	8 800	0.358	HJ208	0.050	
	80	18	1.1	1.1	49.5	-	**NUP208E**	49.6	47.5	5.80		7 200	8 800	0.358	-	-	
	80	18	1.1	1.1	-	71.5	**N208E**	49.6	47.5	5.80		7 200	8 800	0.358	-	-	
	80	18	1.1	1.1	-	71.5	**NF208E**	49.6	47.5	5.80		7 200	8 800	0.358	-	-	
	80	18	1.1	1.1	49.5	-	**NU208ETNG**	55.7	55.4	6.75		7 200	8 800	0.358	HJ208	0.050	
	80	18	1.1	1.1	49.5	-	**NJ208ETNG**	55.7	55.4	6.75		7 200	8 800	0.358	HJ208	0.050	
	80	18	1.1	1.1	49.5	-	**NUP208ETNG**	55.7	55.4	6.75		7 200	8 800	0.358	-	-	
	80	18	1.1	1.1	-	71.5	**N208ETNG**	55.7	55.4	6.75		7 200	8 800	0.358	-	-	
	80	18	1.1	1.1	-	71.5	**NF208ETNG**	55.7	55.4	6.75		7 200	8 800	0.358	-	-	
	80	18	1.1	1.1	49.5	-	**NU208EM1**	55.7	55.4	6.75		7 200	8 800	0.358	HJ208	0.050	
	80	18	1.1	1.1	49.5	-	**NJ208EM1**	55.7	55.4	6.75		7 200	8 800	0.358	HJ208	0.050	
	80	18	1.1	1.1	49.5	-	**NUP208EM1**	55.7	55.4	6.75		7 200	8 800	0.358	-	-	
	80	18	1.1	1.1	-	71.5	**N208EM1**	55.7	55.4	6.75		7 200	8 800	0.358	-	-	
	80	18	1.1	1.1	-	71.5	**NF208EM1**	55.7	55.4	6.75		7 200	8 800	0.358	-	-	
	80	23	1.1	1.1	49.5	-	**NU2208E**	60.4	61.0	7.44		7 200	8 800	0.504	HJ2208	0.051	
	80	23	1.1	1.1	49.5	-	**NJ2208E**	60.4	61.0	7.44		7 200	8 800	0.504	HJ2208	0.051	
	80	23	1.1	1.1	49.5	-	**NUP2208E**	60.4	61.0	7.44		7 200	8 800	0.504	-	-	
	80	23	1.1	1.1	-	71.5	**N2208E**	64.4	66.5	8.11		7 200	8 800	0.504	-	-	
	80	23	1.1	1.1	-	71.5	**NF2208E**	60.4	61.0	7.44		7 200	8 800	0.504	-	-	



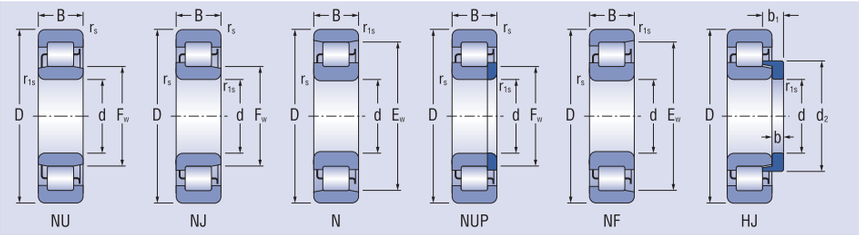
Dimensions							Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass of Bearings	Separate Thrust Collar	Mass of separate Thrust Collar	
								dynamic	static			grease	oil				
d	D	B	$r_{s\,min}$	$r_{s1\,min}$	F_w	E_w		C_r	C_{or}	C_u							
mm								kN				min^{-1}		kg		kg	
40	80	23	1.1	1.1	49.5	-	**NU2208ETNG**	72.3	77.6	9.47		7 200	8 800	0.504	HJ2208	0.051	
	80	23	1.1	1.1	49.5	-	**NJ2208ETNG**	72.3	77.6	9.47		7 200	8 800	0.504	HJ2208	0.051	
	80	23	1.1	1.1	49.5	-	**NUP2208ETNG**	72.3	77.6	9.47		7 200	8 800	0.504	-	-	
	80	23	1.1	1.1	-	71.5	**N2208ETNG**	72.3	77.6	9.47		7 200	8 800	0.504	-	-	
	80	23	1.1	1.1	-	71.5	**NF2208ETNG**	72.3	77.6	9.47		7 200	8 800	0.504	-	-	
	80	23	1.1	1.1	49.5	-	**NU2208EM**	64.4	66.5	8.11		7 200	8 800	0.504	HJ2208	0.051	
	80	23	1.1	1.1	49.5	-	**NJ2208EM**	64.4	66.5	8.11		7 200	8 800	0.504	HJ2208	0.051	
	80	23	1.1	1.1	49.5	-	**NUP2208EM**	64.4	66.5	8.11		7 200	8 800	0.504	-	-	
	80	23	1.1	1.1	-	71.5	**N2208EM**	64.4	66.5	8.11		7 200	8 800	0.504	-	-	
	80	23	1.1	1.1	-	71.5	**NF2208EM**	64.4	66.5	8.11		7 200	8 800	0.504	-	-	
	80	23	1.1	1.1	49.5	-	**NU2208EM1**	72.3	77.6	9.47		7 200	8 800	0.504	HJ2208	0.051	
	80	23	1.1	1.1	49.5	-	**NJ2208EM1**	72.3	77.6	9.47		7 200	8 800	0.504	HJ2208	0.051	
	80	23	1.1	1.1	49.5	-	**NUP2208EM1**	72.3	77.6	9.47		7 200	8 800	0.504	-	-	
	80	23	1.1	1.1	-	71.5	**N2208EM1**	72.3	77.6	9.47		7 200	8 800	0.504	-	-	
	80	23	1.1	1.1	-	71.5	**NF2208EM1**	72.3	77.6	9.47		7 200	8 800	0.504	-	-	
	90	23	1.5	1.5	52	-	**NU308E**	71.8	67.0	8.17		6 600	8 200	0.656	HJ308	0.088	
	90	23	1.5	1.5	52	-	**NJ308E**	71.8	67.0	8.17		6 600	8 200	0.656	HJ308	0.088	
	90	23	1.5	1.5	52	-	**NUP308E**	71.8	67.0	8.17		6 600	8 200	0.656	-	-	
	90	23	1.5	1.5	-	80	**N308E**	77.0	73.7	8.98		6 600	8 200	0.656	-	-	
	90	23	1.5	1.5	-	80	**NF308E**	71.8	67.0	8.17		6 600	8 200	0.656	-	-	
	90	23	1.5	1.5	52	-	**NU308ETNG**	82.3	80.4	9.80		6 600	8 200	0.656	HJ308	0.088	
	90	23	1.5	1.5	52	-	**NJ308ETNG**	82.3	80.4	9.80		6 600	8 200	0.656	HJ308	0.088	
	90	23	1.5	1.5	52	-	**NUP308ETNG**	82.3	80.4	9.80		6 600	8 200	0.656	-	-	
	90	23	1.5	1.5	-	80	**N308ETNG**	82.3	80.4	9.80		6 600	8 200	0.656	-	-	
	90	23	1.5	1.5	-	80	**NF308ETNG**	82.3	80.4	9.80		6 600	8 200	0.656	-	-	
	90	23	1.5	1.5	52	-	**NU308EM**	77.0	73.7	8.98		6 600	8 200	0.656	HJ308	0.088	
	90	23	1.5	1.5	52	-	**NJ308EM**	77.0	73.7	8.98		6 600	8 200	0.656	HJ308	0.088	
	90	23	1.5	1.5	52	-	**NUP308EM**	77.0	73.7	8.98		6 600	8 200	0.656	-	-	
	90	23	1.5	1.5	-	80	**N308EM**	77.0	73.7	8.98		6 600	8 200	0.656	-	-	
	90	23	1.5	1.5	-	80	**NF308EM**	77.0	73.7	8.98		6 600	8 200	0.656	-	-	
	90	23	1.5	1.5	52	-	**NU308EM1**	82.3	80.4	9.80		6 600	8 200	0.656	HJ308	0.088	
	90	23	1.5	1.5	52	-	**NJ308EM1**	82.3	80.4	9.80		6 600	8 200	0.656	HJ308	0.088	
	90	23	1.5	1.5	52	-	**NUP308EM1**	82.3	80.4	9.80		6 600	8 200	0.656	-	-	
	90	23	1.5	1.5	-	80	**N308EM1**	82.3	80.4	9.80		6 600	8 200	0.656	-	-	
	90	23	1.5	1.5	-	80	**NF308EM1**	82.3	80.4	9.80		6 600	8 200	0.656	-	-	
	90	33	1.5	1.5	52	-	**NU2308E**	98.8	101.0	12.31		7 000	8 400	0.978	HJ2308	0.093	
	90	33	1.5	1.5	52	-	**NJ2308E**	98.8	101.0	12.31		7 000	8 400	0.978	HJ2308	0.093	
	90	33	1.5	1.5	52	-	**NUP2308E**	98.8	101.0	12.31		7 000	8 400	0.978	-	-	
	90	33	1.5	1.5	-	80	**N2308E**	98.8	101.0	12.31		7 000	8 400	0.978	-	-	
	90	33	1.5	1.5	-	80	**NF2308E**	98.8	101.0	12.31		7 000	8 400	0.978	-	-	
	90	33	1.5	1.5	52	-	**NU2308ETNG**	113.2	121.1	14.77		7 000	8 400	0.978	HJ2308	0.093	
	90	33	1.5	1.5	52	-	**NJ2308ETNG**	113.2	121.1	14.77		7 000	8 400	0.978	HJ2308	0.093	



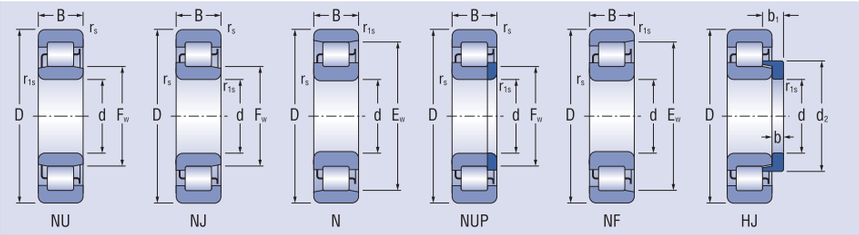
Dimensions							Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass of Bearings	Separate Thrust Collar	Mass of separate Thrust Collar	
								dynamic	static			grease	oil				
d	D	B	$r_{s\,min}$	$r_{s1\,min}$	F_w	E_w		C_r	C_{or}	C_u							
mm								kN				min^{-1}		kg		kg	
40	90	33	1.5	1.5	52	-	**NUP2308ETNG**	113.2	121.1	14.77		7 000	8 400	0.978	-	-	
	90	33	1.5	1.5	-	80	**N2308ETNG**	113.2	121.1	14.77		7 000	8 400	0.978	-	-	
	90	33	1.5	1.5	-	80	**NF2308ETNG**	113.2	121.1	14.77		7 000	8 400	0.978	-	-	
	90	33	1.5	1.5	52	-	**NU2308EM**	102.7	110.0	13.41		7 000	8 400	0.978	HJ2308	0.093	
	90	33	1.5	1.5	52	-	**NJ2308EM**	102.7	110.0	13.41		7 000	8 400	0.978	HJ2308	0.093	
	90	33	1.5	1.5	52	-	**NUP2308EM**	102.7	110.0	13.41		7 000	8 400	0.978	-	-	
	90	33	1.5	1.5	-	80	**N2308EM**	102.7	110.0	13.41		7 000	8 400	0.978	-	-	
	90	33	1.5	1.5	-	80	**NF2308EM**	102.7	110.0	13.41		7 000	8 400	0.978	-	-	
	90	33	1.5	1.5	52	-	**NU2308EM1**	113.2	121.1	14.77		7 000	8 400	0.978	HJ2308	0.093	
	90	33	1.5	1.5	52	-	**NJ2308EM1**	113.2	121.1	14.77		7 000	8 400	0.978	HJ2308	0.093	
	90	33	1.5	1.5	52	-	**NUP2308EM1**	113.2	121.1	14.77		7 000	8 400	0.978	-	-	
	90	33	1.5	1.5	-	80	**N2308EM1**	113.2	121.1	14.77		7 000	8 400	0.978	-	-	
	90	33	1.5	1.5	-	80	**NF2308EM1**	113.2	121.1	14.77		7 000	8 400	0.978	-	-	
	110	27	2.1	2.1	58	-	**NU408EM**	103.9	99.3	12.10		5 700	6 700	1.312	HJ408	0.140	
	110	27	2.1	2.1	58	-	**NJ408EM**	103.9	99.3	12.10		5 700	6 700	1.312	HJ408	0.140	
	110	27	2.1	2.1	58	-	**NUP408EM**	103.9	99.3	12.10		5 700	6 700	1.312	-	-	
	110	27	2.1	2.1	-	92	**N408EM**	103.9	99.3	12.10		5 700	6 700	1.312	-	-	
	110	27	2.1	2.1	-	92	**NF408EM**	103.9	99.3	12.10		5 700	6 700	1.312	-	-	
45	75	16	1.0	0.6	52.5	-	**NU1009EM**	34.5	39.0	4.75		8 500	10 000	0.260	-	-	
	75	16	1.0	0.6	52.5	-	**NJ1009EM**	34.5	39.0	4.75		8 500	10 000	0.260	-	-	
	75	16	1.0	0.6	52.5	-	**NUP1009EM**	34.5	39.0	4.75		8 500	10 000	0.260	-	-	
	85	19	1.1	1.1	54.5	-	**NU209E**	56.6	57.6	7.02		6 600	8 200	0.434	HJ209	0.055	
	85	19	1.1	1.1	54.5	-	**NJ209E**	56.6	57.6	7.02		6 600	8 200	0.434	HJ209	0.055	
	85	19	1.1	1.1	54.5	-	**NUP209E**	56.6	57.6	7.02		6 600	8 200	0.434	-	-	
	85	19	1.1	1.1	-	76.5	**N209E**	56.6	57.6	7.02		6 600	8 200	0.434	-	-	
	85	19	1.1	1.1	-	76.5	**NF209E**	56.6	57.6	7.02		6 600	8 200	0.434	-	-	
	85	19	1.1	1.1	54.5	-	**NU209ETNG**	63.1	66.5	8.11		6 600	8 200	0.434	HJ209	0.055	
	85	19	1.1	1.1	54.5	-	**NJ209ETNG**	63.1	66.5	8.11		6 600	8 200	0.434	HJ209	0.055	
	85	19	1.1	1.1	54.5	-	**NUP209ETNG**	63.1	66.5	8.11		6 600	8 200	0.434	-	-	
	85	19	1.1	1.1	-	76.5	**N209ETNG**	63.1	66.5	8.11		6 600	8 200	0.434	-	-	
	85	19	1.1	1.1	-	76.5	**NF209ETNG**	63.1	66.5	8.11		6 600	8 200	0.434	-	-	
	85	19	1.1	1.1	54.5	-	**NU209EM**	56.6	57.6	7.02		6 600	8 200	0.434	HJ209	0.055	
	85	19	1.1	1.1	54.5	-	**NJ209EM**	56.6	57.6	7.02		6 600	8 200	0.434	HJ209	0.055	
	85	19	1.1	1.1	54.5	-	**NUP209EM**	56.6	57.6	7.02		6 600	8 200	0.434	-	-	
	85	19	1.1	1.1	-	76.5	**N209EM**	56.6	57.6	7.02		6 600	8 200	0.434	-	-	
	85	19	1.1	1.1	-	76.5	**NF209EM**	56.6	57.6	7.02		6 600	8 200	0.434	-	-	
	85	19	1.1	1.1	54.5	-	**NU209EM1**	63.1	66.5	8.11		6 600	8 200	0.434	HJ209	0.055	
	85	19	1.1	1.1	54.5	-	**NJ209EM1**	63.1	66.5	8.11		6 600	8 200	0.434	HJ209	0.055	
	85	19	1.1	1.1	54.5	-	**NUP209EM1**	63.1	66.5	8.11		6 600	8 200	0.434	-	-	
	85	19	1.1	1.1	-	76.5	**N209EM1**	63.1	66.5	8.11		6 600	8 200	0.434	-	-	
	85	19	1.1	1.1	-	76.5	**NF209EM1**	63.1	66.5	8.11		6 600	8 200	0.434	-	-	
	85	23	1.1	1.1	54.5	-	**NU2209E**	68.4	73.3	8.94		6 600	8 200	0.544	HJ2209	0.055	



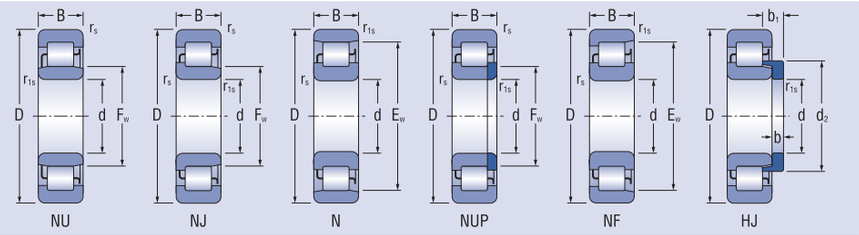
Dimensions							Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass of Bearings	Separate Thrust Collar	Mass of separate Thrust Collar	
								dynamic	static			grease	oil				
d	D	B	$r_{s\,min}$	$r_{s1\,min}$	F_w	E_w		C_r	C_{or}	C_u							
mm								kN				min^{-1}		kg		kg	
45	85	23	1.1	1.1	54.5	-	**NJ2209E**	68.4	73.3	8.94		6 600	8 200	0.544	HJ2209	0.055	
	85	23	1.1	1.1	54.5	-	**NUP2209E**	68.4	73.3	8.94		6 600	8 200	0.544	-	-	
	85	23	1.1	1.1	-	76.5	**N2209E**	68.4	73.3	8.94		6 600	8 200	0.544	-	-	
	85	23	1.1	1.1	-	76.5	**NF2209E**	68.4	73.3	8.94		6 600	8 200	0.544	-	-	
	85	23	1.1	1.1	54.5	-	**NU2209ETNG**	76.0	84.6	10.31		6 600	8 200	0.544	HJ2209	0.055	
	85	23	1.1	1.1	54.5	-	**NJ2209ETNG**	76.0	84.6	10.31		6 600	8 200	0.544	HJ2209	0.055	
	85	23	1.1	1.1	54.5	-	**NUP2209ETNG**	76.0	84.6	10.31		6 600	8 200	0.544	-	-	
	85	23	1.1	1.1	-	76.5	**N2209ETNG**	76.0	84.6	10.31		6 600	8 200	0.544	-	-	
	85	23	1.1	1.1	-	76.5	**NF2209ETNG**	76.0	84.6	10.31		6 600	8 200	0.544	-	-	
	85	23	1.1	1.1	54.5	-	**NU2209EM1**	76.0	84.6	10.31		6 600	8 200	0.544	HJ2209	0.055	
	85	23	1.1	1.1	54.5	-	**NJ2209EM1**	76.0	84.6	10.31		6 600	8 200	0.544	HJ2209	0.055	
	85	23	1.1	1.1	54.5	-	**NUP2209EM1**	76.0	84.6	10.31		6 600	8 200	0.544	-	-	
	85	23	1.1	1.1	-	76.5	**N2209EM1**	76.0	84.6	10.31		6 600	8 200	0.544	-	-	
	85	23	1.1	1.1	-	76.5	**NF2209EM1**	76.0	84.6	10.31		6 600	8 200	0.544	-	-	
	100	25	1.5	1.5	58.5	-	**NU309E**	87.9	85.5	10.43		5 900	7 300	0.891	HJ309	0.110	
	100	25	1.5	1.5	58.5	-	**NJ309E**	87.9	85.5	10.43		5 900	7 300	0.891	HJ309	0.110	
	100	25	1.5	1.5	58.5	-	**NUP309E**	87.9	85.5	10.43		5 900	7 300	0.891	-	-	
	100	25	1.5	1.5	-	88.5	**N309E**	93.7	93.3	11.38		5 900	7 300	0.891	-	-	
	100	25	1.5	1.5	-	88.5	**NF309E**	87.9	85.5	10.43		5 900	7 300	0.891	-	-	
	100	25	1.5	1.5	58.5	-	**NU309ETNG**	99.6	101.1	12.33		5 900	7 300	0.891	HJ309	0.110	
	100	25	1.5	1.5	58.5	-	**NJ309ETNG**	99.6	101.1	12.33		5 900	7 300	0.891	HJ309	0.110	
	100	25	1.5	1.5	58.5	-	**NUP309ETNG**	99.6	101.1	12.33		5 900	7 300	0.891	-	-	
	100	25	1.5	1.5	-	88.5	**N309ETNG**	99.6	101.1	12.33		5 900	7 300	0.891	-	-	
	100	25	1.5	1.5	-	88.5	**NF309ETNG**	99.6	101.1	12.33		5 900	7 300	0.891	-	-	
	100	25	1.5	1.5	58.5	-	**NU309EM**	87.9	85.5	10.43		5 900	7 300	0.891	HJ309	0.110	
	100	25	1.5	1.5	58.5	-	**NJ309EM**	87.9	85.5	10.43		5 900	7 300	0.891	HJ309	0.110	
	100	25	1.5	1.5	58.5	-	**NUP309EM**	87.9	85.5	10.43		5 900	7 300	0.891	-	-	
	100	25	1.5	1.5	-	88.5	**N309EM**	87.9	85.5	10.43		5 900	7 300	0.891	-	-	
	100	25	1.5	1.5	-	88.5	**NF309EM**	87.9	85.5	10.43		5 900	7 300	0.891	-	-	
	100	25	1.5	1.5	58.5	-	**NU309EM1**	93.7	93.3	11.38		5 900	7 300	0.891	HJ309	0.110	
	100	25	1.5	1.5	58.5	-	**NJ309EM1**	93.7	93.3	11.38		5 900	7 300	0.891	HJ309	0.110	
	100	25	1.5	1.5	58.5	-	**NUP309EM1**	93.7	93.3	11.38		5 900	7 300	0.891	-	-	
	100	25	1.5	1.5	-	88.5	**N309EM1**	93.7	93.3	11.38		5 900	7 300	0.891	-	-	
	100	25	1.5	1.5	-	88.5	**NF309EM1**	93.7	93.3	11.38		5 900	7 300	0.891	-	-	
	100	36	1.5	1.5	58.5	-	**NU2309E**	122.8	131.8	16.07		5 900	7 300	1.331	HJ2309	0.116	
	100	36	1.5	1.5	58.5	-	**NJ2309E**	122.8	131.8	16.07		5 900	7 300	1.331	HJ2309	0.116	
	100	36	1.5	1.5	58.5	-	**NUP2309E**	122.8	131.8	16.07		5 900	7 300	1.331	-	-	
	100	36	1.5	1.5	-	88.5	**N2309E**	122.8	131.8	16.07		5 900	7 300	1.331	-	-	
	100	36	1.5	1.5	-	88.5	**NF2309E**	122.8	131.8	16.07		5 900	7 300	1.331	-	-	
	100	36	1.5	1.5	58.5	-	**NU2309ETNG**	139.2	155.7	18.99		5 900	7 300	1.331	HJ2309	0.116	
	100	36	1.5	1.5	58.5	-	**NJ2309ETNG**	139.2	155.7	18.99		5 900	7 300	1.331	HJ2309	0.116	
	100	36	1.5	1.5	58.5	-	**NUP2309ETNG**	139.2	155.7	18.99		5 900	7 300	1.331	-	-	



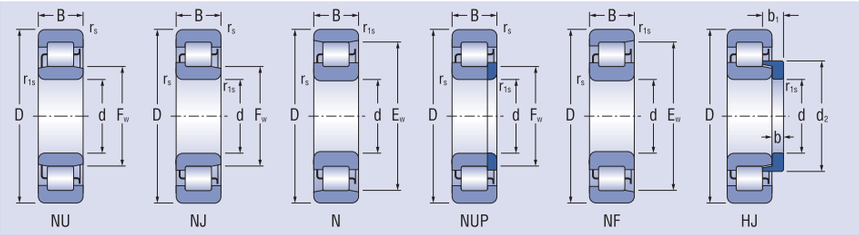
Dimensions							Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass of Bearings	Separate Thrust Collar	Mass of separate Thrust Collar	
								dynamic	static			grease	oil				
d	D	B	$r_{s\,min}$	$r_{s1\,min}$	F_w	E_w		C_r	C_{or}	C_u							
mm								kN				min^{-1}		kg		kg	
45	100	36	1.5	1.5	-	88.5	**N2309ETNG**	139.2	155.7	18.99		5 900	7 300	1.331	-	-	
	100	36	1.5	1.5	-	88.5	**NF2309ETNG**	139.2	155.7	18.99		5 900	7 300	1.331	-	-	
	100	36	1.5	1.5	58.5	-	**NU2309EM**	122.8	131.8	16.07		5 900	7 300	1.331	HJ2309	0.116	
	100	36	1.5	1.5	58.5	-	**NJ2309EM**	122.8	131.8	16.07		5 900	7 300	1.331	HJ2309	0.116	
	100	36	1.5	1.5	58.5	-	**NUP2309EM**	122.8	131.8	16.07		5 900	7 300	1.331	-	-	
	100	36	1.5	1.5	-	88.5	**N2309EM**	122.8	131.8	16.07		5 900	7 300	1.331	-	-	
	100	36	1.5	1.5	-	88.5	**NF2309EM**	122.8	131.8	16.07		5 900	7 300	1.331	-	-	
	100	36	1.5	1.5	58.5	-	**NU2309EM1**	131.1	143.7	17.53		5 900	7 300	1.331	HJ2309	0.116	
	100	36	1.5	1.5	58.5	-	**NJ2309EM1**	131.1	143.7	17.53		5 900	7 300	1.331	HJ2309	0.116	
	100	36	1.5	1.5	58.5	-	**NUP2309EM1**	131.1	143.7	17.53		5 900	7 300	1.331	-	-	
	100	36	1.5	1.5	-	88.5	**N2309EM1**	131.1	143.7	17.53		5 900	7 300	1.331	-	-	
	100	36	1.5	1.5	-	88.5	**NF2309EM1**	131.1	143.7	17.53		5 900	7 300	1.331	-	-	
	120	29	2.1	2.1	64.5	-	**NU409EM**	116.3	113.1	13.79		5 100	6 000	1.869	HJ409	0.180	
	120	29	2.1	2.1	64.5	-	**NJ409EM**	116.3	113.1	13.79		5 100	6 000	1.869	HJ409	0.180	
	120	29	2.1	2.1	64.5	-	**NUP409EM**	116.3	113.1	13.79		5 100	6 000	1.869	-	-	
	120	29	2.1	2.1	-	100.5	**N409EM**	116.3	113.1	13.79		5 100	6 000	1.869	-	-	
	120	29	2.1	2.1	-	100.5	**NF409EM**	116.3	113.1	13.79		5 100	6 000	1.869	-	-	
50	80	16	1.0	0.6	57.5	-	**NU1010EM**	36.0	41.5	5.06		7 900	9 400	0.286	-	-	
	80	16	1.0	0.6	57.5	-	**NJ1010EM**	36.0	41.5	5.06		7 900	9 400	0.286	-	-	
	80	16	1.0	0.6	57.5	-	**NUP1010EM**	36.0	41.5	5.06		7 900	9 400	0.286	-	-	
	90	20	1.1	1.1	59.5	-	**NU210E**	59.7	62.9	7.67		6 100	7 600	0.488	HJ210	0.061	
	90	20	1.1	1.1	59.5	-	**NJ210E**	59.7	62.9	7.67		6 100	7 600	0.488	HJ210	0.061	
	90	20	1.1	1.1	59.5	-	**NUP210E**	59.7	62.9	7.67		6 100	7 600	0.488	-	-	
	90	20	1.1	1.1	-	81.5	**N210E**	59.7	62.9	7.67		6 100	7 600	0.488	-	-	
	90	20	1.1	1.1	-	81.5	**NF210E**	59.7	62.9	7.67		6 100	7 600	0.488	-	-	
	90	20	1.1	1.1	59.5	-	**NU210ETNG**	66.0	71.9	8.77		6 100	7 600	0.488	HJ210	0.061	
	90	20	1.1	1.1	59.5	-	**NJ210ETNG**	66.0	71.9	8.77		6 100	7 600	0.488	HJ210	0.061	
	90	20	1.1	1.1	59.5	-	**NUP210ETNG**	66.0	71.9	8.77		6 100	7 600	0.488	-	-	
	90	20	1.1	1.1	-	81.5	**N210ETNG**	66.0	71.9	8.77		6 100	7 600	0.488	-	-	
	90	20	1.1	1.1	-	81.5	**NF210ETNG**	66.0	71.9	8.77		6 100	7 600	0.488	-	-	
	90	20	1.1	1.1	59.5	-	**NU210EM**	59.7	62.9	7.67		6 100	7 600	0.488	HJ210	0.061	
	90	20	1.1	1.1	59.5	-	**NJ210EM**	59.7	62.9	7.67		6 100	7 600	0.488	HJ210	0.061	
	90	20	1.1	1.1	59.5	-	**NUP210EM**	59.7	62.9	7.67		6 100	7 600	0.488	-	-	
	90	20	1.1	1.1	-	81.5	**N210EM**	59.7	62.9	7.67		6 100	7 600	0.488	-	-	
	90	20	1.1	1.1	-	81.5	**NF210EM**	59.7	62.9	7.67		6 100	7 600	0.488	-	-	
	90	20	1.1	1.1	59.5	-	**NU210EM1**	66.0	71.9	8.77		6 100	7 600	0.488	HJ210	0.061	
	90	20	1.1	1.1	59.5	-	**NJ210EM1**	66.0	71.9	8.77		6 100	7 600	0.488	HJ210	0.061	
	90	20	1.1	1.1	59.5	-	**NUP210EM1**	66.0	71.9	8.77		6 100	7 600	0.488	-	-	
	90	20	1.1	1.1	-	81.5	**N210EM1**	66.0	71.9	8.77		6 100	7 600	0.488	-	-	
	90	20	1.1	1.1	-	81.5	**NF210EM1**	66.0	71.9	8.77		6 100	7 600	0.488	-	-	
	90	23	1.1	1.1	59.5	-	**NU2210E**	72.0	80.1	9.76		6 100	7 600	0.586	HJ2210	0.061	
	90	23	1.1	1.1	59.5	-	**NJ2210E**	72.0	80.1	9.76		6 100	7 600	0.586	HJ2210	0.061	



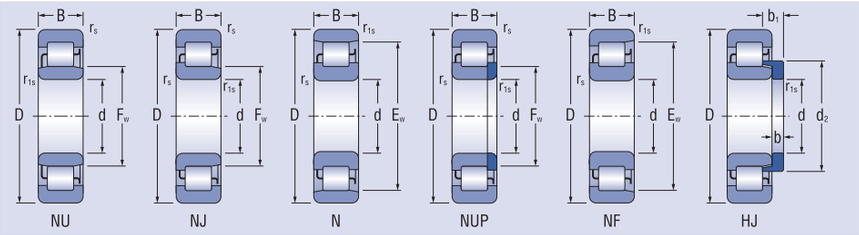
Dimensions							Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass of Bearings	Separate Thrust Collar	Mass of separate Thrust Collar	
								dynamic	static			grease	oil				
d	D	B	$r_{s\,min}$	$r_{s1\,min}$	F_w	E_w		C_r	C_{or}	C_u							
mm								kN				min^{-1}		kg		kg	
50	90	23	1.1	1.1	59.5	-	**NUP2210E**	72.0	80.1	9.76		6 100	7 600	0.586	-	-	
	90	23	1.1	1.1	-	81.5	**N2210E**	72.0	80.1	9.76		6 100	7 600	0.586	-	-	
	90	23	1.1	1.1	-	81.5	**NF2210E**	72.0	80.1	9.76		6 100	7 600	0.586	-	-	
	90	23	1.1	1.1	59.5	-	**NU2210ETNG**	79.6	91.5	11.16		6 100	7 600	0.586	HJ2210	0.061	
	90	23	1.1	1.1	59.5	-	**NJ2210ETNG**	79.6	91.5	11.16		6 100	7 600	0.586	HJ2210	0.061	
	90	23	1.1	1.1	59.5	-	**NUP2210ETNG**	79.6	91.5	11.16		6 100	7 600	0.586	-	-	
	90	23	1.1	1.1	-	81.5	**N2210ETNG**	79.6	91.5	11.16		6 100	7 600	0.586	-	-	
	90	23	1.1	1.1	-	81.5	**NF2210ETNG**	79.6	91.5	11.16		6 100	7 600	0.586	-	-	
	90	23	1.1	1.1	59.5	-	**NU2210EM1**	79.6	91.5	11.16		6 100	7 600	0.586	HJ2210	0.061	
	90	23	1.1	1.1	59.5	-	**NJ2210EM1**	79.6	91.5	11.16		6 100	7 600	0.586	HJ2210	0.061	
	90	23	1.1	1.1	59.5	-	**NUP2210EM1**	79.6	91.5	11.16		6 100	7 600	0.586	-	-	
	90	23	1.1	1.1	-	81.5	**N2210EM1**	79.6	91.5	11.16		6 100	7 600	0.586	-	-	
	90	23	1.1	1.1	-	81.5	**NF2210EM1**	79.6	91.5	11.16		6 100	7 600	0.586	-	-	
	110	27	2.1	2.1	65	-	**NU310E**	99.1	98.2	11.97		5 400	6 600	1.160	HJ310	0.151	
	110	27	2.1	2.1	65	-	**NJ310E**	99.1	98.2	11.97		5 400	6 600	1.160	HJ310	0.151	
	110	27	2.1	2.1	65	-	**NUP310E**	99.1	98.2	11.97		5 400	6 600	1.160	-	-	
	110	27	2.1	2.1	-	97	**N310E**	105.7	107.1	13.06		5 400	6 600	1.160	-	-	
	110	27	2.1	2.1	-	97	**NF310E**	99.1	98.2	11.97		5 400	6 600	1.160	-	-	
	110	27	2.1	2.1	65	-	**NU310ETNG**	112.3	116.0	14.15		5 400	6 600	1.160	HJ310	0.151	
	110	27	2.1	2.1	65	-	**NJ310ETNG**	112.3	116.0	14.15		5 400	6 600	1.160	HJ310	0.151	
	110	27	2.1	2.1	65	-	**NUP310ETNG**	112.3	116.0	14.15		5 400	6 600	1.160	-	-	
	110	27	2.1	2.1	-	97	**N310ETNG**	112.3	116.0	14.15		5 400	6 600	1.160	-	-	
	110	27	2.1	2.1	-	97	**NF310ETNG**	112.3	116.0	14.15		5 400	6 600	1.160	-	-	
	110	27	2.1	2.1	65	-	**NU310EM**	105.7	107.1	13.06		5 400	6 600	1.160	HJ310	0.151	
	110	27	2.1	2.1	65	-	**NJ310EM**	105.7	107.1	13.06		5 400	6 600	1.160	HJ310	0.151	
	110	27	2.1	2.1	65	-	**NUP310EM**	105.7	107.1	13.06		5 400	6 600	1.160	-	-	
	110	27	2.1	2.1	-	97	**N310EM**	105.7	107.1	13.06		5 400	6 600	1.160	-	-	
	110	27	2.1	2.1	-	97	**NF310EM**	105.7	107.1	13.06		5 400	6 600	1.160	-	-	
	110	27	2.1	2.1	65	-	**NU310EM1**	112.3	116.0	14.15		5 400	6 600	1.160	HJ310	0.151	
	110	27	2.1	2.1	65	-	**NJ310EM1**	112.3	116.0	14.15		5 400	6 600	1.160	HJ310	0.151	
	110	27	2.1	2.1	65	-	**NUP310EM1**	112.3	116.0	14.15		5 400	6 600	1.160	-	-	
	110	27	2.1	2.1	-	97	**N310EM1**	112.3	116.0	14.15		5 400	6 600	1.160	-	-	
	110	27	2.1	2.1	-	97	**NF310EM1**	112.3	116.0	14.15		5 400	6 600	1.160	-	-	
	110	40	2.1	2.1	65	-	**NU2310E**	145.1	160.3	19.55		5 400	6 600	1.770	HJ2310	0.158	
	110	40	2.1	2.1	65	-	**NJ2310E**	145.1	160.3	19.55		5 400	6 600	1.770	HJ2310	0.158	
	110	40	2.1	2.1	65	-	**NUP2310E**	145.1	160.3	19.55		5 400	6 600	1.770	-	-	
	110	40	2.1	2.1	-	97	**N2310E**	145.1	160.3	19.55		5 400	6 600	1.770	-	-	
	110	40	2.1	2.1	-	97	**NF2310E**	145.1	160.3	19.55		5 400	6 600	1.770	-	-	
	110	40	2.1	2.1	65	-	**NU2310ETNG**	164.6	189.5	23.11		5 400	6 600	1.770	HJ2310	0.158	
	110	40	2.1	2.1	65	-	**NJ2310ETNG**	164.6	189.5	23.11		5 400	6 600	1.770	HJ2310	0.158	
	110	40	2.1	2.1	65	-	**NUP2310ETNG**	164.6	189.5	23.11		5 400	6 600	1.770	-	-	
	110	40	2.1	2.1	-	97	**N2310ETNG**	164.6	189.5	23.11		5 400	6 600	1.770	-	-	



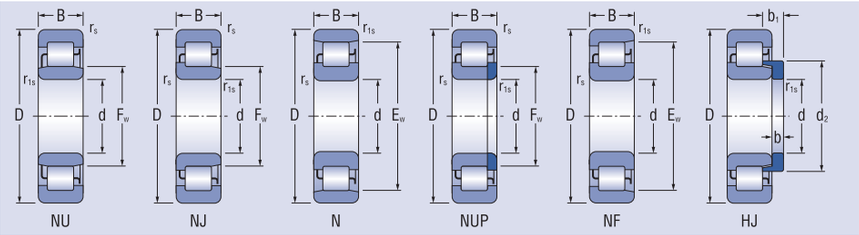
Dimensions							Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass of Bearings	Separate Thrust Collar	Mass of separate Thrust Collar	
								dynamic	static			grease	oil				
d	D	B	$r_{s\,min}$	$r_{s1\,min}$	F_w	E_w		C_r	C_{or}	C_u							
mm								kN				min^{-1}		kg		kg	
50	110	40	2.1	2.1	-	97	**NF2310ETNG**	164.6	189.5	23.11		5 400	6 600	1.770	-	-	
	110	40	2.1	2.1	65	-	**NU2310EM**	154.9	174.9	21.33		5 400	6 600	1.770	HJ2310	0.158	
	110	40	2.1	2.1	65	-	**NJ2310EM**	154.9	174.9	21.33		5 400	6 600	1.770	HJ2310	0.158	
	110	40	2.1	2.1	65	-	**NUP2310EM**	154.9	174.9	21.33		5 400	6 600	1.770	-	-	
	110	40	2.1	2.1	-	97	**N2310EM**	154.9	174.9	21.33		5 400	6 600	1.770	-	-	
	110	40	2.1	2.1	-	97	**NF2310EM**	154.9	174.9	21.33		5 400	6 600	1.770	-	-	
	110	40	2.1	2.1	65	-	**NU2310EM1**	164.6	189.5	23.11		5 400	6 600	1.770	HJ2310	0.158	
	110	40	2.1	2.1	65	-	**NJ2310EM1**	164.6	189.5	23.11		5 400	6 600	1.770	HJ2310	0.158	
	110	40	2.1	2.1	65	-	**NUP2310EM1**	164.6	189.5	23.11		5 400	6 600	1.770	-	-	
	110	40	2.1	2.1	-	97	**N2310EM1**	164.6	189.5	23.11		5 400	6 600	1.770	-	-	
	110	40	2.1	2.1	-	97	**NF2310EM1**	164.6	189.5	23.11		5 400	6 600	1.770	-	-	
	130	31	2.1	2.1	70.8	-	**NU410EM**	142.1	140.4	17.12		4 700	5 600	2.308	HJ410	0.230	
	130	31	2.1	2.1	70.8	-	**NJ410EM**	142.1	140.4	17.12		4 700	5 600	2.308	HJ410	0.230	
	130	31	2.1	2.1	70.8	-	**NUP410EM**	142.1	140.4	17.12		4 700	5 600	2.308	-	-	
	130	31	2.1	2.1	-	110.8	**N410EM**	142.1	140.4	17.12		4 700	5 600	2.308	-	-	
	130	31	2.1	2.1	-	110.8	**NF410EM**	142.1	140.4	17.12		4 700	5 600	2.308	-	-	
55	90	18	1.1	1.0	64.5	-	**NU1011EM**	41.5	50.0	6.09		7 100	8 400	0.400	-	-	
	90	18	1.1	1.0	64.5	-	**NJ1011EM**	41.5	50.0	6.09		7 100	8 400	0.400	-	-	
	90	18	1.1	1.0	64.5	-	**NUP1011EM**	41.5	50.0	6.09		7 100	8 400	0.400	-	-	
	100	21	1.5	1.1	66	-	**NU211E**	74.6	81.3	9.92		5 500	6 800	0.668	HJ211	0.087	
	100	21	1.5	1.1	66	-	**NJ211E**	74.6	81.3	9.92		5 500	6 800	0.668	HJ211	0.087	
	100	21	1.5	1.1	66	-	**NUP211E**	74.6	81.3	9.92		5 500	6 800	0.668	-	-	
	100	21	1.5	1.1	-	90	**N211E**	74.6	81.3	9.92		5 500	6 800	0.668	-	-	
	100	21	1.5	1.1	-	90	**NF211E**	74.6	81.3	9.92		5 500	6 800	0.668	-	-	
	100	21	1.5	1.1	66	-	**NU211ETNG**	86.3	98.7	12.03		5 500	6 800	0.668	HJ211	0.087	
	100	21	1.5	1.1	66	-	**NJ211ETNG**	86.3	98.7	12.03		5 500	6 800	0.668	HJ211	0.087	
	100	21	1.5	1.1	66	-	**NUP211ETNG**	86.3	98.7	12.03		5 500	6 800	0.668	-	-	
	100	21	1.5	1.1	-	90	**N211ETNG**	86.3	98.7	12.03		5 500	6 800	0.668	-	-	
	100	21	1.5	1.1	-	90	**NF211ETNG**	86.3	98.7	12.03		5 500	6 800	0.668	-	-	
	100	21	1.5	1.1	66	-	**NU211EM1**	82.4	92.9	11.33		5 500	6 800	0.668	HJ211	0.087	
	100	21	1.5	1.1	66	-	**NJ211EM1**	82.4	92.9	11.33		5 500	6 800	0.668	HJ211	0.087	
	100	21	1.5	1.1	66	-	**NUP211EM1**	82.4	92.9	11.33		5 500	6 800	0.668	-	-	
	100	21	1.5	1.1	-	90	**N211EM1**	82.4	92.9	11.33		5 500	6 800	0.668	-	-	
	100	21	1.5	1.1	-	90	**NF211EM1**	82.4	92.9	11.33		5 500	6 800	0.668	-	-	
	100	25	1.5	1.1	66	-	**NU2211E**	87.7	100.1	12.20		5 500	6 800	0.812	HJ2211	0.089	
	100	25	1.5	1.1	66	-	**NJ2211E**	87.7	100.1	12.20		5 500	6 800	0.812	HJ2211	0.089	
	100	25	1.5	1.1	66	-	**NUP2211E**	87.7	100.1	12.20		5 500	6 800	0.812	-	-	
	100	25	1.5	1.1	-	90	**N2211E**	87.7	100.1	12.20		5 500	6 800	0.812	-	-	
	100	25	1.5	1.1	-	90	**NF2211E**	87.7	100.1	12.20		5 500	6 800	0.812	-	-	
	100	25	1.5	1.1	66	-	**NU2211ETNG**	101.4	121.5	14.82		5 500	6 800	0.812	HJ2211	0.089	
	100	25	1.5	1.1	66	-	**NJ2211ETNG**	101.4	121.5	14.82		5 500	6 800	0.812	HJ2211	0.089	
	100	25	1.5	1.1	66	-	**NUP2211ETNG**	101.4	121.5	14.82		5 500	6 800	0.812	-	-	



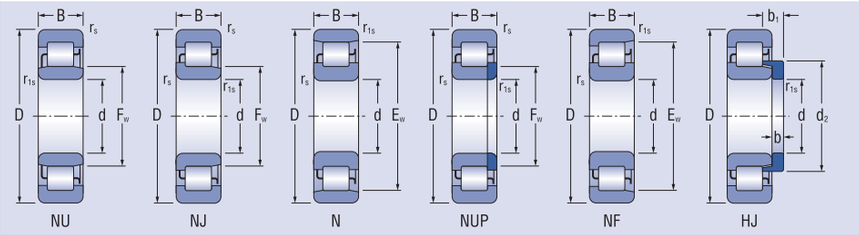
Dimensions							Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass of Bearings	Separate Thrust Collar	Mass of separate Thrust Collar	
								dynamic	static			grease	oil				
d	D	B	$r_{s\,min}$	$r_{s1\,min}$	F_w	E_w		C_r	C_{or}	C_u							
mm								kN				min^{-1}		kg		kg	
55	100	25	1.5	1.1	-	90	**N2211ETNG**	101.4	121.5	14.82		5 500	6 800	0.812	-	-	
	100	25	1.5	1.1	-	90	**NF2211ETNG**	101.4	121.5	14.82		5 500	6 800	0.812	-	-	
	100	25	1.5	1.1	66	-	**NU2211EM1**	96.9	114.4	13.95		5 500	6 800	0.812	HJ2211	0.089	
	100	25	1.5	1.1	66	-	**NJ2211EM1**	96.9	114.4	13.95		5 500	6 800	0.812	HJ2211	0.089	
	100	25	1.5	1.1	66	-	**NUP2211EM1**	96.9	114.4	13.95		5 500	6 800	0.812	-	-	
	100	25	1.5	1.1	-	90	**N2211EM1**	96.9	114.4	13.95		5 500	6 800	0.812	-	-	
	100	25	1.5	1.1	-	90	**NF2211EM1**	96.9	114.4	13.95		5 500	6 800	0.812	-	-	
	120	29	2.1	2.1	70.5	-	**NU311E**	122.3	122.2	14.90		4 900	6 100	1.480	HJ311	0.194	
	120	29	2.1	2.1	70.5	-	**NJ311E**	122.3	122.2	14.90		4 900	6 100	1.480	HJ311	0.194	
	120	29	2.1	2.1	70.5	-	**NUP311E**	122.3	122.2	14.90		4 900	6 100	1.480	-	-	
	120	29	2.1	2.1	-	106.5	**N311E**	130.4	133.3	16.25		4 900	6 100	1.480	-	-	
	120	29	2.1	2.1	-	106.5	**NF311E**	122.3	122.2	14.90		4 900	6 100	1.480	-	-	
	120	29	2.1	2.1	70.5	-	**NU311ETNG**	138.6	144.4	17.60		4 900	6 100	1.480	HJ311	0.194	
	120	29	2.1	2.1	70.5	-	**NJ311ETNG**	138.6	144.4	17.60		4 900	6 100	1.480	HJ311	0.194	
	120	29	2.1	2.1	70.5	-	**NUP311ETNG**	138.6	144.4	17.60		4 900	6 100	1.480	-	-	
	120	29	2.1	2.1	-	106.5	**N311ETNG**	138.6	144.4	17.60		4 900	6 100	1.480	-	-	
	120	29	2.1	2.1	-	106.5	**NF311ETNG**	138.6	144.4	17.60		4 900	6 100	1.480	-	-	
	120	29	2.1	2.1	70.5	-	**NU311EM**	130.4	133.3	16.25		4 900	6 100	1.480	HJ311	0.194	
	120	29	2.1	2.1	70.5	-	**NJ311EM**	130.4	133.3	16.25		4 900	6 100	1.480	HJ311	0.194	
	120	29	2.1	2.1	70.5	-	**NUP311EM**	130.4	133.3	16.25		4 900	6 100	1.480	-	-	
	120	29	2.1	2.1	-	106.5	**N311EM**	130.4	133.3	16.25		4 900	6 100	1.480	-	-	
	120	29	2.1	2.1	-	106.5	**NF311EM**	130.4	133.3	16.25		4 900	6 100	1.480	-	-	
	120	29	2.1	2.1	70.5	-	**NU311EM1**	138.6	144.4	17.60		4 900	6 100	1.480	HJ311	0.194	
	120	29	2.1	2.1	70.5	-	**NJ311EM1**	138.6	144.4	17.60		4 900	6 100	1.480	HJ311	0.194	
	120	29	2.1	2.1	70.5	-	**NUP311EM1**	138.6	144.4	17.60		4 900	6 100	1.480	-	-	
	120	29	2.1	2.1	-	106.5	**N311EM1**	138.6	144.4	17.60		4 900	6 100	1.480	-	-	
	120	29	2.1	2.1	-	106.5	**NF311EM1**	138.6	144.4	17.60		4 900	6 100	1.480	-	-	
	120	43	2.1	2.1	70.5	-	**NU2311E**	178.4	198.5	24.21		5 000	6 100	2.270	HJ2311	0.202	
	120	43	2.1	2.1	70.5	-	**NJ2311E**	178.4	198.5	24.21		5 000	6 100	2.270	HJ2311	0.202	
	120	43	2.1	2.1	70.5	-	**NUP2311E**	178.4	198.5	24.21		5 000	6 100	2.270	-	-	
	120	43	2.1	2.1	-	106.5	**N2311E**	178.4	198.5	24.21		5 000	6 100	2.270	-	-	
	120	43	2.1	2.1	-	106.5	**NF2311E**	178.4	198.5	24.21		5 000	6 100	2.270	-	-	
	120	43	2.1	2.1	70.5	-	**NU2311EM**	190.2	216.5	26.41		5 000	6 100	2.270	HJ2311	0.202	
	120	43	2.1	2.1	70.5	-	**NJ2311EM**	190.2	216.5	26.41		5 000	6 100	2.270	HJ2311	0.202	
	120	43	2.1	2.1	70.5	-	**NUP2311EM**	190.2	216.5	26.41		5 000	6 100	2.270	-	-	
	120	43	2.1	2.1	-	106.5	**N2311EM**	190.2	216.5	26.41		5 000	6 100	2.270	-	-	
	120	43	2.1	2.1	-	106.5	**NF2311EM**	190.2	216.5	26.41		5 000	6 100	2.270	-	-	
	120	43	2.1	2.1	70.5	-	**NU2311EM1**	202.2	234.6	28.61		5 000	6 100	2.270	HJ2311	0.202	
	120	43	2.1	2.1	70.5	-	**NJ2311EM1**	202.2	234.6	28.61		5 000	6 100	2.270	HJ2311	0.202	
	120	43	2.1	2.1	70.5	-	**NUP2311EM1**	202.2	234.6	28.61		5 000	6 100	2.270	-	-	
	120	43	2.1	2.1	-	106.5	**N2311EM1**	202.2	234.6	28.61		5 000	6 100	2.270	-	-	
	120	43	2.1	2.1	-	106.5	**NF2311EM1**	202.2	234.6	28.61		5 000	6 100	2.270	-	-	



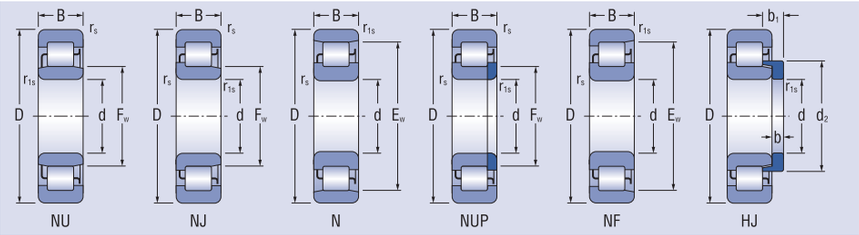
Dimensions							Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass of Bearings	Separate Thrust Collar	Mass of separate Thrust Collar	
								dynamic	static			grease	oil				
d	D	B	$r_{s\,min}$	$r_{s1\,min}$	F_w	E_w		C_r	C_{or}	C_u							
mm								kN				min^{-1}		kg		kg	
55	140	33	2.1	2.1	77.2	-	**NU411EM**	152.4	156.0	19.02		4 500	5 300	2.549	HJ411	0.300	
	140	33	2.1	2.1	77.2	-	**NJ411EM**	152.4	156.0	19.02		4 500	5 300	2.549	HJ411	0.300	
	140	33	2.1	2.1	77.2	-	**NUP411EM**	152.4	156.0	19.02		4 500	5 300	2.549	-	-	
	140	33	2.1	2.1	-	117.2	**N411EM**	152.4	156.0	19.02		4 500	5 300	2.549	-	-	
	140	33	2.1	2.1	-	117.2	**NF411EM**	152.4	156.0	19.02		4 500	5 300	2.549	-	-	
60	95	18	1.1	1.0	69.5	-	**NU1012EM**	44.0	55.0	6.70		6 700	7 900	0.478	-	-	
	95	18	1.1	1.0	69.5	-	**NJ1012EM**	44.0	55.0	6.70		6 700	7 900	0.478	-	-	
	95	18	1.1	1.0	69.5	-	**NUP1012EM**	44.0	55.0	6.70		6 700	7 900	0.478	-	-	
	110	22	1.5	1.5	72	-	**NU212E**	87.2	92.4	11.27		5 100	6 200	0.827	HJ212	0.108	
	110	22	1.5	1.5	72	-	**NJ212E**	87.2	92.4	11.27		5 100	6 200	0.827	HJ212	0.108	
	110	22	1.5	1.5	72	-	**NUP212E**	87.2	92.4	11.27		5 100	6 200	0.827	-	-	
	110	22	1.5	1.5	-	100	**N212E**	91.8	99.0	12.08		5 100	6 200	0.827	-	-	
	110	22	1.5	1.5	-	100	**NF212E**	87.2	92.4	11.27		5 100	6 200	0.827	-	-	
	110	22	1.5	1.5	72	-	**NU212ETNG**	96.4	105.6	12.88		5 100	6 200	0.827	HJ212	0.108	
	110	22	1.5	1.5	72	-	**NJ212ETNG**	96.4	105.6	12.88		5 100	6 200	0.827	HJ212	0.108	
	110	22	1.5	1.5	72	-	**NUP212ETNG**	96.4	105.6	12.88		5 100	6 200	0.827	-	-	
	110	22	1.5	1.5	-	100	**N212ETNG**	96.4	105.6	12.88		5 100	6 200	0.827	-	-	
	110	22	1.5	1.5	-	100	**NF212ETNG**	96.4	105.6	12.88		5 100	6 200	0.827	-	-	
	110	22	1.5	1.5	72	-	**NU212EM1**	96.4	105.6	12.88		5 100	6 200	0.827	HJ212	0.108	
	110	22	1.5	1.5	72	-	**NJ212EM1**	96.4	105.6	12.88		5 100	6 200	0.827	HJ212	0.108	
	110	22	1.5	1.5	72	-	**NUP212EM1**	96.4	105.6	12.88		5 100	6 200	0.827	-	-	
	110	22	1.5	1.5	-	100	**N212EM1**	96.4	105.6	12.88		5 100	6 200	0.827	-	-	
	110	22	1.5	1.5	-	100	**NF212EM1**	96.4	105.6	12.88		5 100	6 200	0.827	-	-	
	110	28	1.5	1.5	72	-	**NU2212E**	111.2	126.0	15.37		5 100	6 200	1.100	HJ2212	0.108	
	110	28	1.5	1.5	72	-	**NJ2212E**	111.2	126.0	15.37		5 100	6 200	1.100	HJ2212	0.108	
	110	28	1.5	1.5	72	-	**NUP2212E**	111.2	126.0	15.37		5 100	6 200	1.100	-	-	
	110	28	1.5	1.5	-	100	**N2212E**	111.2	126.0	15.37		5 100	6 200	1.100	-	-	
	110	28	1.5	1.5	-	100	**NF2212E**	111.2	126.0	15.37		5 100	6 200	1.100	-	-	
	110	28	1.5	1.5	72	-	**NU2212ETNG**	130.0	155.1	18.92		5 100	6 200	1.100	HJ2212	0.108	
	110	28	1.5	1.5	72	-	**NJ2212ETNG**	130.0	155.1	18.92		5 100	6 200	1.100	HJ2212	0.108	
	110	28	1.5	1.5	72	-	**NUP2212ETNG**	130.0	155.1	18.92		5 100	6 200	1.100	-	-	
	110	28	1.5	1.5	-	100	**N2212ETNG**	130.0	155.1	18.92		5 100	6 200	1.100	-	-	
	110	28	1.5	1.5	-	100	**NF2212ETNG**	130.0	155.1	18.92		5 100	6 200	1.100	-	-	
	110	28	1.5	1.5	72	-	**NU2212EM**	117.6	135.7	16.6		5 100	6 200	1.100	HJ2212	0.108	
	110	28	1.5	1.5	72	-	**NJ2212EM**	117.6	135.7	16.6		5 100	6 200	1.100	HJ2212	0.108	
	110	28	1.5	1.5	72	-	**NUP2212EM**	117.6	135.7	16.6		5 100	6 200	1.100	-	-	
	110	28	1.5	1.5	-	100	**N2212EM**	117.6	135.7	16.6		5 100	6 200	1.100	-	-	
	110	28	1.5	1.5	-	100	**NF2212EM**	117.6	135.7	16.6		5 100	6 200	1.100	-	-	
	110	28	1.5	1.5	72	-	**NU2212EM1**	130.0	155.1	18.92		5 100	6 200	1.100	HJ2212	0.108	
	110	28	1.5	1.5	72	-	**NJ2212EM1**	130.0	155.1	18.92		5 100	6 200	1.100	HJ2212	0.108	
	110	28	1.5	1.5	72	-	**NUP2212EM1**	130.0	155.1	18.92		5 100	6 200	1.100	-	-	
	110	28	1.5	1.5	-	100	**N2212EM1**	130.0	155.1	18.92		5 100	6 200	1.100	-	-	



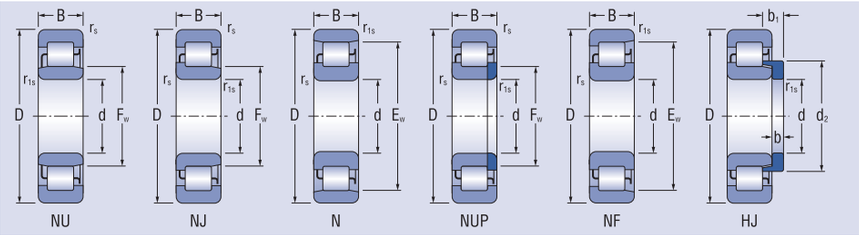
Dimensions							Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass of Bearings	Separate Thrust Collar	Mass of separate Thrust Collar	
								dynamic	static			grease	oil				
d	D	B	$r_{s\,min}$	$r_{s1\,min}$	F_w	E_w		C_r	C_{or}	C_u							
mm								kN				min^{-1}		kg		kg	
60	110	28	1.5	1.5	-	100	**NF2212EM1**	130.0	155.1	18.92		5 100	6 200	1.100	-	-	
	130	31	2.1	2.1	77	-	**NU312E**	135.3	137.2	16.73		4 500	5 600	1.840	HJ312	0.231	
	130	31	2.1	2.1	77	-	**NJ312E**	135.3	137.2	16.73		4 500	5 600	1.840	HJ312	0.231	
	130	31	2.1	2.1	77	-	**NUP312E**	135.3	137.2	16.73		4 500	5 600	1.840	-	-	
	130	31	2.1	2.1	-	115	**N312E**	144.4	149.7	18.25		4 500	5 600	1.840	-	-	
	130	31	2.1	2.1	-	115	**NF312E**	135.3	137.2	16.73		4 500	5 600	1.840	-	-	
	130	31	2.1	2.1	77	-	**NU312ETNG**	153.3	162.1	19.77		4 500	5 600	1.840	HJ312	0.231	
	130	31	2.1	2.1	77	-	**NJ312ETNG**	153.3	162.1	19.77		4 500	5 600	1.840	HJ312	0.231	
	130	31	2.1	2.1	77	-	**NUP312ETNG**	153.3	162.1	19.77		4 500	5 600	1.840	-	-	
	130	31	2.1	2.1	-	115	**N312ETNG**	153.3	162.1	19.77		4 500	5 600	1.840	-	-	
	130	31	2.1	2.1	-	115	**NF312ETNG**	153.3	162.1	19.77		4 500	5 600	1.840	-	-	
	130	31	2.1	2.1	77	-	**NU312EM**	144.4	149.7	18.25		4 500	5 600	1.840	HJ312	0.231	
	130	31	2.1	2.1	77	-	**NJ312EM**	144.4	149.7	18.25		4 500	5 600	1.840	HJ312	0.231	
	130	31	2.1	2.1	77	-	**NUP312EM**	144.4	149.7	18.25		4 500	5 600	1.840	-	-	
	130	31	2.1	2.1	-	115	**N312EM**	144.4	149.7	18.25		4 500	5 600	1.840	-	-	
	130	31	2.1	2.1	-	115	**NF312EM**	144.4	149.7	18.25		4 500	5 600	1.840	-	-	
	130	31	2.1	2.1	77	-	**NU312EM1**	150.0	156.0	19.02		4 500	5 600	1.840	HJ312	0.231	
	130	31	2.1	2.1	77	-	**NJ312EM1**	153.3	162.1	19.77		4 500	5 600	1.840	HJ312	0.231	
	130	31	2.1	2.1	77	-	**NUP312EM1**	153.3	162.1	19.77		4 500	5 600	1.840	-	-	
	130	31	2.1	2.1	-	115	**N312EM1**	153.3	162.1	19.77		4 500	5 600	1.840	-	-	
	130	31	2.1	2.1	-	115	**NF312EM1**	153.3	162.1	19.77		4 500	5 600	1.840	-	-	
	130	46	1.5	1.5	77	-	**NU2312E**	199.3	225.7	27.52		4 500	5 600	2.830	HJ2312	0.241	
	130	46	1.5	1.5	77	-	**NJ2312E**	199.3	225.7	27.52		4 500	5 600	2.830	HJ2312	0.241	
	130	46	1.5	1.5	77	-	**NUP2312E**	199.3	225.7	27.52		4 500	5 600	2.830	-	-	
	130	46	1.5	1.5	-	115	**N2312E**	206.8	240.0	29.26		4 500	5 600	2.830	-	-	
	130	46	1.5	1.5	-	115	**NF2312E**	199.3	225.7	27.52		4 500	5 600	2.830	-	-	
	130	46	1.5	1.5	77	-	**NU2312EM**	206.8	240.0	29.26		4 500	5 600	2.830	HJ2312	0.241	
	130	46	1.5	1.5	77	-	**NJ2312EM**	206.8	240.0	29.26		4 500	5 600	2.830	HJ2312	0.241	
	130	46	1.5	1.5	77	-	**NUP2312EM**	206.8	240.0	29.26		4 500	5 600	2.830	-	-	
	130	46	1.5	1.5	-	115	**N2312EM**	206.8	240.0	29.26		4 500	5 600	2.830	-	-	
	130	46	1.5	1.5	-	115	**NF2312EM**	206.8	240.0	29.26		4 500	5 600	2.830	-	-	
	130	46	1.5	1.5	77	-	**NU2312EM1**	225.9	266.7	32.53		4 500	5 600	2.830	HJ2312	0.241	
	130	46	1.5	1.5	77	-	**NJ2312EM1**	225.9	266.7	32.53		4 500	5 600	2.830	HJ2312	0.241	
	130	46	1.5	1.5	77	-	**NUP2312EM1**	225.9	266.7	32.53		4 500	5 600	2.830	-	-	
	130	46	1.5	1.5	-	115	**N2312EM1**	225.9	266.7	32.53		4 500	5 600	2.830	-	-	
	130	46	1.5	1.5	-	115	**NF2312EM1**	225.9	266.7	32.53		4 500	5 600	2.830	-	-	
	150	35	2.1	2.1	83	-	**NU412EM**	189.6	194.0	23.25		3 900	4 600	3.510	HJ412	0.340	
	150	35	2.1	2.1	83	-	**NJ412EM**	189.6	194.0	23.25		3 900	4 600	3.510	HJ412	0.340	
	150	35	2.1	2.1	83	-	**NUP412EM**	189.6	194.0	23.25		3 900	4 600	3.510	-	-	
	150	35	2.1	2.1	-	127	**N412EM**	189.6	194.0	23.25		3 900	4 600	3.510	-	-	
	150	35	2.1	2.1	-	127	**NF412EM**	189.6	194.0	23.25		3 900	4 600	3.510	-	-	



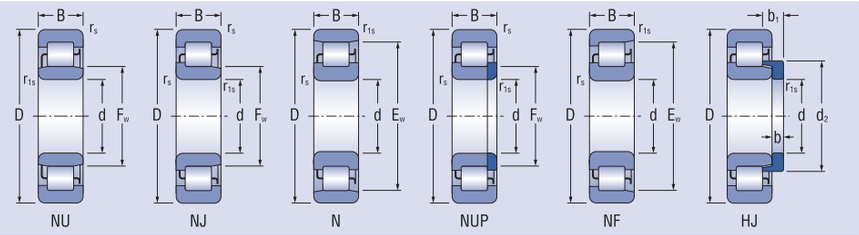
Dimensions							Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass of Bearings	Separate Thrust Collar	Mass of separate Thrust Collar	
								dynamic	static			grease	oil				
d	D	B	$r_{s\,min}$	$r_{s1\,min}$	F_w	E_w		C_r	C_{or}	C_u							
mm								kN				min^{-1}		kg		kg	
65	100	18	1.1	1.0	74.5	-	**NU1013EM**	45.0	58.5	7.13		6 300	7 500	0.512	-	-	
	100	18	1.1	1.0	74.5	-	**NJ1013EM**	45.0	58.5	7.13		6 300	7 500	0.512	-	-	
	100	18	1.1	1.0	74.5	-	**NUP1013EM**	45.0	58.5	7.13		6 300	7 500	0.512	-	-	
	120	23	1.5	1.5	78.5	-	**NU213E**	99.5	107.1	13.06		4 600	5 700	1.050	HJ213	0.129	
	120	23	1.5	1.5	78.5	-	**NJ213E**	99.5	107.1	13.06		4 600	5 700	1.050	HJ213	0.129	
	120	23	1.5	1.5	78.5	-	**NUP213E**	99.5	107.1	13.06		4 600	5 700	1.050	-	-	
	120	23	1.5	1.5	-	108.5	**N213E**	104.8	114.7	14.00		4 600	5 700	1.050	-	-	
	120	23	1.5	1.5	-	108.5	**NF213E**	99.5	107.1	13.06		4 600	5 700	1.050	-	-	
	120	23	1.5	1.5	78.5	-	**NU213ETNG**	110.0	122.4	14.92		4 600	5 700	1.050	HJ213	0.129	
	120	23	1.5	1.5	78.5	-	**NJ213ETNG**	110.0	122.4	14.92		4 600	5 700	1.050	HJ213	0.129	
	120	23	1.5	1.5	78.5	-	**NUP213ETNG**	110.0	122.4	14.92		4 600	5 700	1.050	-	-	
	120	23	1.5	1.5	-	108.5	**N213ETNG**	110.0	122.4	14.92		4 600	5 700	1.050	-	-	
	120	23	1.5	1.5	-	108.5	**NF213ETNG**	110.0	122.4	14.92		4 600	5 700	1.050	-	-	
	120	23	1.5	1.5	78.5	-	**NU213EM1**	110.0	122.4	14.92		4 600	5 700	1.050	HJ213	0.129	
	120	23	1.5	1.5	78.5	-	**NJ213EM1**	110.0	122.4	14.92		4 600	5 700	1.050	HJ213	0.129	
	120	23	1.5	1.5	78.5	-	**NUP213EM1**	110.0	122.4	14.92		4 600	5 700	1.050	-	-	
	120	23	1.5	1.5	-	108.5	**N213EM1**	110.0	122.4	14.92		4 600	5 700	1.050	-	-	
	120	23	1.5	1.5	-	108.5	**NF213EM1**	110.0	122.4	14.92		4 600	5 700	1.050	-	-	
	120	31	1.5	1.5	78.5	-	**NU2213E**	129.5	149.8	18.27		4 600	5 700	1.460	HJ2213	0.132	
	120	31	1.5	1.5	78.5	-	**NJ2213E**	129.5	149.8	18.27		4 600	5 700	1.460	HJ2213	0.132	
	120	31	1.5	1.5	78.5	-	**NUP2213E**	129.5	149.8	18.27		4 600	5 700	1.460	-	-	
	120	31	1.5	1.5	-	108.5	**N2213E**	129.5	149.8	18.27		4 600	5 700	1.460	-	-	
	120	31	1.5	1.5	-	108.5	**NF2213E**	129.5	149.8	18.27		4 600	5 700	1.460	-	-	
	120	31	1.5	1.5	78.5	-	**NU2213ETNG**	151.3	184.4	22.49		4 600	5 700	1.460	HJ2213	0.132	
	120	31	1.5	1.5	78.5	-	**NJ2213ETNG**	151.3	184.4	22.49		4 600	5 700	1.460	HJ2213	0.132	
	120	31	1.5	1.5	78.5	-	**NUP2213ETNG**	151.3	184.4	22.49		4 600	5 700	1.460	-	-	
	120	31	1.5	1.5	-	108.5	**N2213ETNG**	151.3	184.4	22.49		4 600	5 700	1.460	-	-	
	120	31	1.5	1.5	-	108.5	**NF2213ETNG**	151.3	184.4	22.49		4 600	5 700	1.460	-	-	
	120	31	1.5	1.5	78.5	-	**NU2213EM1**	151.3	184.4	22.49		4 600	5 700	1.460	HJ2213	0.132	
	120	31	1.5	1.5	78.5	-	**NJ2213EM1**	151.3	184.4	22.49		4 600	5 700	1.460	HJ2213	0.132	
	120	31	1.5	1.5	78.5	-	**NUP2213EM1**	151.3	184.4	22.49		4 600	5 700	1.460	-	-	
	120	31	1.5	1.5	-	108.5	**N2213EM1**	151.3	184.4	22.49		4 600	5 700	1.460	-	-	
	120	31	1.5	1.5	-	108.5	**NF2213EM1**	151.3	184.4	22.49		4 600	5 700	1.460	-	-	
	140	33	2.1	2.1	82.5	-	**NU313E**	161.9	165.3	20.01		4 200	5 200	1.280	HJ313	0.287	
	140	33	2.1	2.1	82.5	-	**NJ313E**	161.9	165.3	20.01		4 200	5 200	1.280	HJ313	0.287	
	140	33	2.1	2.1	82.5	-	**NUP313E**	161.9	165.3	20.01		4 200	5 200	1.280	-	-	
	140	33	2.1	2.1	-	124.5	**N313E**	172.6	180.3	21.83		4 200	5 200	1.280	-	-	
	140	33	2.1	2.1	-	124.5	**NF313E**	161.9	165.3	20.01		4 200	5 200	1.280	-	-	
	140	33	2.1	2.1	82.5	-	**NU313ETNG**	183.5	195.3	23.64		4 200	5 200	1.280	HJ313	0.287	
	140	33	2.1	2.1	82.5	-	**NJ313ETNG**	183.5	195.3	23.64		4 200	5 200	1.280	HJ313	0.287	
	140	33	2.1	2.1	82.5	-	**NUP313ETNG**	183.5	195.3	23.64		4 200	5 200	1.280	-	-	
	140	33	2.1	2.1	-	124.5	**N313ETNG**	183.5	195.3	23.64		4 200	5 200	1.280	-	-	



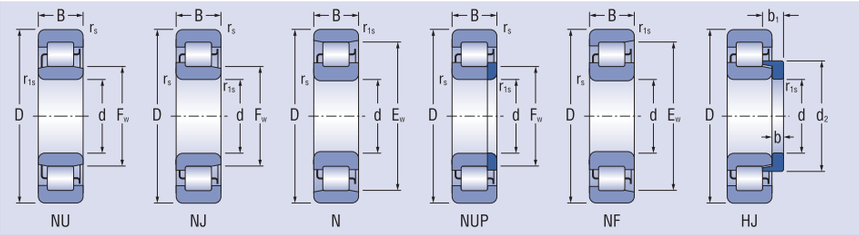
Dimensions							Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass of Bearings	Separate Thrust Collar	Mass of separate Thrust Collar	
								dynamic	static			grease	oil				
d	D	B	$r_{s\,min}$	$r_{s1\,min}$	F_w	E_w		C_r	C_{or}	C_u							
mm								kN				min^{-1}		kg		kg	
65	140	33	2.1	2.1	-	124.5	**NF313ETNG**	183.5	195.3	23.64		4 200	5 200	1.280	-	-	
	140	33	2.1	2.1	82.5	-	**NU313EM**	172.6	180.3	21.83		4 200	5 200	1.280	HJ313	0.287	
	140	33	2.1	2.1	82.5	-	**NJ313EM**	172.6	180.3	21.83		4 200	5 200	1.280	HJ313	0.287	
	140	33	2.1	2.1	82.5	-	**NUP313EM**	172.6	180.3	21.83		4 200	5 200	1.280	-	-	
	140	33	2.1	2.1	-	124.5	**N313EM**	172.6	180.3	21.83		4 200	5 200	1.280	-	-	
	140	33	2.1	2.1	-	124.5	**NF313EM**	172.6	180.3	21.83		4 200	5 200	1.280	-	-	
	140	33	2.1	2.1	82.5	-	**NU313EM1**	183.5	195.3	23.64		4 200	5 200	1.280	HJ313	0.287	
	140	33	2.1	2.1	82.5	-	**NJ313EM1**	183.5	195.3	23.64		4 200	5 200	1.280	HJ313	0.287	
	140	33	2.1	2.1	82.5	-	**NUP313EM1**	183.5	195.3	23.64		4 200	5 200	1.280	-	-	
	140	33	2.1	2.1	-	124.5	**N313EM1**	183.5	195.3	23.64		4 200	5 200	1.280	-	-	
	140	33	2.1	2.1	-	124.5	**NF313EM1**	183.5	195.3	23.64		4 200	5 200	1.280	-	-	
	140	48	2.1	2.1	82.5	-	**NU2313E**	221.6	247.9	30.23		4 200	5 200	3.380	HJ2313	0.306	
	140	48	2.1	2.1	82.5	-	**NJ2313E**	221.6	247.9	30.23		4 200	5 200	3.380	HJ2313	0.306	
	140	48	2.1	2.1	82.5	-	**NUP2313E**	221.6	247.9	30.23		4 200	5 200	3.380	-	-	
	140	48	2.1	2.1	-	124.5	**N2313E**	235.4	268.7	32.77		4 200	5 200	3.380	-	-	
	140	48	2.1	2.1	-	124.5	**NF2313E**	221.6	247.9	30.23		4 200	5 200	3.380	-	-	
	140	48	2.1	2.1	82.5	-	**NU2313EM**	235.4	268.7	32.77		4 200	5 200	3.380	HJ2313	0.306	
	140	48	2.1	2.1	82.5	-	**NJ2313EM**	235.4	268.7	32.77		4 200	5 200	3.380	HJ2313	0.306	
	140	48	2.1	2.1	82.5	-	**NUP2313EM**	235.4	268.7	32.77		4 200	5 200	3.380	-	-	
	140	48	2.1	2.1	-	124.5	**N2313EM**	235.4	268.7	32.77		4 200	5 200	3.380	-	-	
	140	48	2.1	2.1	-	124.5	**NF2313EM**	235.4	268.7	32.77		4 200	5 200	3.380	-	-	
	140	48	2.1	2.1	82.5	-	**NU2313EM1**	249.9	291.1	35.50		4 200	5 200	3.380	HJ2313	0.306	
	140	48	2.1	2.1	82.5	-	**NJ2313EM1**	249.9	291.1	35.50		4 200	5 200	3.380	HJ2313	0.306	
	140	48	2.1	2.1	82.5	-	**NUP2313EM1**	249.9	291.1	35.50		4 200	5 200	3.380	-	-	
	140	48	2.1	2.1	-	124.5	**N2313EM1**	249.9	291.1	35.50		4 200	5 200	3.380	-	-	
	140	48	2.1	2.1	-	124.5	**NF2313EM1**	249.9	291.1	35.50		4 200	5 200	3.380	-	-	
	160	37	2.1	2.1	89.5	-	**NU413EM**	204.7	216.4	25.48		3 600	4 300	4.180	HJ413	0.420	
	160	37	2.1	2.1	89.5	-	**NJ413EM**	204.7	216.4	25.48		3 600	4 300	4.180	HJ413	0.420	
	160	37	2.1	2.1	89.5	-	**NUP413EM**	204.7	216.4	25.48		3 600	4 300	4.180	-	-	
	160	37	2.1	2.1	-	135.5	**N413EM**	204.7	216.4	25.48		3 600	4 300	4.180	-	-	
	160	37	2.1	2.1	-	135.5	**NF413EM**	204.7	216.4	25.48		3 600	4 300	4.180	-	-	
70	110	20	1.1	1.0	80	-	**NU1014EM**	64.0	81.5	9.94		5 600	6 700	0.706	-	-	
	110	20	1.1	1.0	80	-	**NJ1014EM**	64.0	81.5	9.94		5 600	6 700	0.706	-	-	
	110	20	1.1	1.0	80	-	**NUP1014EM**	64.0	81.5	9.94		5 600	6 700	0.706	-	-	
	125	24	1.5	1.5	83.5	-	**NU214E**	110.3	124.2	15.15		4 400	5 400	1.160	HJ214	0.156	
	125	24	1.5	1.5	83.5	-	**NJ214E**	110.3	124.2	15.15		4 400	5 400	1.160	HJ214	0.156	
	125	24	1.5	1.5	83.5	-	**NUP214E**	110.3	124.2	15.15		4 400	5 400	1.160	-	-	
	125	24	1.5	1.5	-	113.5	**N214E**	115.8	132.5	16.16		4 400	5 400	1.160	-	-	
	125	24	1.5	1.5	-	113.5	**NF214E**	110.3	124.2	15.15		4 400	5 400	1.160	-	-	
	125	24	1.5	1.5	83.5	-	**NU214ETNG**	121.2	140.8	17.17		4 400	5 400	1.160	HJ214	0.156	
	125	24	1.5	1.5	83.5	-	**NJ214ETNG**	121.2	140.8	17.17		4 400	5 400	1.160	HJ214	0.156	
	125	24	1.5	1.5	83.5	-	**NUP214ETNG**	121.2	140.8	17.17		4 400	5 400	1.160	-	-	



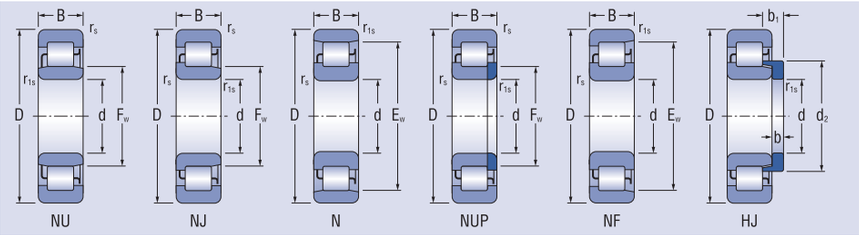
Dimensions							Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass of Bearings	Separate Thrust Collar	Mass of separate Thrust Collar	
								dynamic	static			grease	oil				
d	D	B	$r_{s\,min}$	$r_{s1\,min}$	F_w	E_w		C_r	C_{or}	C_u							
mm								kN				min^{-1}		kg		kg	
70	125	24	1.5	1.5	-	113.5	**N214ETNG**	121.2	140.8	17.17		4 400	5 400	1.160	-	-	
	125	24	1.5	1.5	-	113.5	**NF214ETNG**	121.2	140.8	17.17		4 400	5 400	1.160	-	-	
	125	24	1.5	1.5	83.5	-	**NU214EM**	110.3	124.2	15.15		4 400	5 400	1.160	HJ214	0.156	
	125	24	1.5	1.5	83.5	-	**NJ214EM**	110.3	124.2	15.15		4 400	5 400	1.160	HJ214	0.156	
	125	24	1.5	1.5	83.5	-	**NUP214EM**	110.3	124.2	15.15		4 400	5 400	1.160	-	-	
	125	24	1.5	1.5	-	113.5	**N214EM**	110.3	124.2	15.15		4 400	5 400	1.160	-	-	
	125	24	1.5	1.5	-	113.5	**NF214EM**	110.3	124.2	15.15		4 400	5 400	1.160	-	-	
	125	24	1.5	1.5	83.5	-	**NU214EM1**	121.2	140.8	17.17		4 400	5 400	1.160	HJ214	0.156	
	125	24	1.5	1.5	83.5	-	**NJ214EM1**	121.2	140.8	17.17		4 400	5 400	1.160	HJ214	0.156	
	125	24	1.5	1.5	83.5	-	**NUP214EM1**	121.2	140.8	17.17		4 400	5 400	1.160	-	-	
	125	24	1.5	1.5	-	113.5	**N214EM1**	121.2	140.8	17.17		4 400	5 400	1.160	-	-	
	125	24	1.5	1.5	-	113.5	**NF214EM1**	121.2	140.8	17.17		4 400	5 400	1.160	-	-	
	125	31	1.5	1.5	83.5	-	**NU2214E**	136.5	162.9	19.87		4 400	5 400	1.550	HJ2214	0.159	
	125	31	1.5	1.5	83.5	-	**NJ2214E**	136.5	162.9	19.87		4 400	5 400	1.550	HJ2214	0.159	
	125	31	1.5	1.5	83.5	-	**NUP2214E**	136.5	162.9	19.87		4 400	5 400	1.550	-	-	
	125	31	1.5	1.5	-	113.5	**N2214E**	136.5	162.9	19.87		4 400	5 400	1.550	-	-	
	125	31	1.5	1.5	-	113.5	**NF2214E**	136.5	162.9	19.87		4 400	5 400	1.550	-	-	
	125	31	1.5	1.5	83.5	-	**NU2214ETNG**	157.9	197.8	24.13		4 400	5 400	1.550	HJ2214	0.159	
	125	31	1.5	1.5	83.5	-	**NJ2214ETNG**	157.9	197.8	24.13		4 400	5 400	1.550	HJ2214	0.159	
	125	31	1.5	1.5	83.5	-	**NUP2214ETNG**	157.9	197.8	24.13		4 400	5 400	1.550	-	-	
	125	31	1.5	1.5	-	113.5	**N2214ETNG**	157.9	197.8	24.13		4 400	5 400	1.550	-	-	
	125	31	1.5	1.5	-	113.5	**NF2214ETNG**	157.9	197.8	24.13		4 400	5 400	1.550	-	-	
	125	31	1.5	1.5	83.5	-	**NU2214EM1**	157.9	197.8	24.13		4 400	5 400	1.550	HJ2214	0.159	
	125	31	1.5	1.5	83.5	-	**NJ2214EM1**	157.9	197.8	24.13		4 400	5 400	1.550	HJ2214	0.159	
	125	31	1.5	1.5	83.5	-	**NUP2214EM1**	157.9	197.8	24.13		4 400	5 400	1.550	-	-	
	125	31	1.5	1.5	-	113.5	**N2214EM1**	157.9	197.8	24.13		4 400	5 400	1.550	-	-	
	125	31	1.5	1.5	-	113.5	**NF2214EM1**	157.9	197.8	24.13		4 400	5 400	1.550	-	-	
	150	35	2.1	2.1	89	-	**NU314E**	183.0	191.2	22.66		3 900	4 800	2.790	HJ314	0.331	
	150	35	2.1	2.1	89	-	**NJ314E**	183.0	191.2	22.66		3 900	4 800	2.790	HJ314	0.331	
	150	35	2.1	2.1	89	-	**NUP314E**	183.0	191.2	22.66		3 900	4 800	2.790	-	-	
	150	35	2.1	2.1	-	133	**N314E**	195.3	208.6	24.73		3 900	4 800	2.790	-	-	
	150	35	2.1	2.1	-	133	**NF314E**	183.0	191.2	22.66		3 900	4 800	2.790	-	-	
	150	35	2.1	2.1	89	-	**NU314ETNG**	207.4	226.0	26.79		3 900	4 800	2.790	HJ314	0.331	
	150	35	2.1	2.1	89	-	**NJ314ETNG**	207.4	226.0	26.79		3 900	4 800	2.790	HJ314	0.331	
	150	35	2.1	2.1	89	-	**NUP314ETNG**	207.4	226.0	26.79		3 900	4 800	2.790	-	-	
	150	35	2.1	2.1	-	133	**N314ETNG**	207.4	226.0	26.79		3 900	4 800	2.790	-	-	
	150	35	2.1	2.1	-	133	**NF314ETNG**	207.4	226.0	26.79		3 900	4 800	2.790	-	-	
	150	35	2.1	2.1	89	-	**NU314EM**	195.3	208.6	24.73		3 900	4 800	2.790	HJ314	0.331	
	150	35	2.1	2.1	89	-	**NJ314EM**	195.3	208.6	24.73		3 900	4 800	2.790	HJ314	0.331	
	150	35	2.1	2.1	89	-	**NUP314EM**	195.3	208.6	24.73		3 900	4 800	2.790	-	-	
	150	35	2.1	2.1	-	133	**N314EM**	195.3	208.6	24.73		3 900	4 800	2.790	-	-	
	150	35	2.1	2.1	-	133	**NF314EM**	195.3	208.6	24.73		3 900	4 800	2.790	-	-	



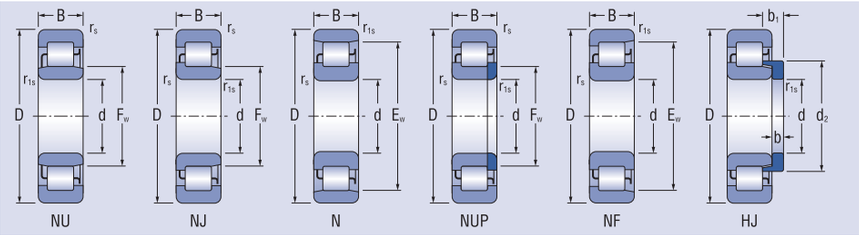
Dimensions							Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass of Bearings	Separate Thrust Collar	Mass of separate Thrust Collar	
								dynamic	static			grease	oil				
d	D	B	$r_{s\,min}$	$r_{s1\,min}$	F_w	E_w		C_r	C_{or}	C_u							
mm								kN				min^{-1}		kg		kg	
70	150	35	2.1	2.1	89	-	**NU314EM1**	207.4	226.0	26.79		3 900	4 800	2.790	HJ314	0.331	
	150	35	2.1	2.1	89	-	**NJ314EM1**	207.4	226.0	26.79		3 900	4 800	2.790	HJ314	0.331	
	150	35	2.1	2.1	89	-	**NUP314EM1**	207.4	226.0	26.79		3 900	4 800	2.790	-	-	
	150	35	2.1	2.1	-	133	**N314EM1**	207.4	226.0	26.79		3 900	4 800	2.790	-	-	
	150	35	2.1	2.1	-	133	**NF314EM1**	207.4	226.0	26.79		3 900	4 800	2.790	-	-	
	150	51	2.1	2.1	89	-	**NU2314E**	243.8	276.6	33.73		3 900	4 800	4.090	HJ2314	0.355	
	150	51	2.1	2.1	89	-	**NJ2314E**	243.8	276.6	33.73		3 900	4 800	4.090	HJ2314	0.355	
	150	51	2.1	2.1	89	-	**NUP2314E**	243.8	276.6	33.73		3 900	4 800	4.090	-	-	
	150	51	2.1	2.1	-	133	**N2314E**	260.3	301.8	36.80		3 900	4 800	4.090	-	-	
	150	51	2.1	2.1	-	133	**NF2314E**	243.8	276.6	33.73		3 900	4 800	4.090	-	-	
	150	51	2.1	2.1	89	-	**NU2314EM**	260.3	301.8	36.80		3 900	4 800	4.090	HJ2314	0.355	
	150	51	2.1	2.1	89	-	**NJ2314EM**	260.3	301.8	36.80		3 900	4 800	4.090	HJ2314	0.355	
	150	51	2.1	2.1	89	-	**NUP2314EM**	260.3	301.8	36.80		3 900	4 800	4.090	-	-	
	150	51	2.1	2.1	-	133	**N2314EM**	260.3	301.8	36.80		3 900	4 800	4.090	-	-	
	150	51	2.1	2.1	-	133	**NF2314EM**	260.3	301.8	36.80		3 900	4 800	4.090	-	-	
	150	51	2.1	2.1	89	-	**NU2314EM1**	276.4	326.4	39.87		3 900	4 800	4.090	HJ2314	0.355	
	150	51	2.1	2.1	89	-	**NJ2314EM1**	276.4	326.4	39.87		3 900	4 800	4.090	HJ2314	0.355	
	150	51	2.1	2.1	89	-	**NUP2314EM1**	276.4	326.4	39.87		3 900	4 800	4.090	-	-	
	150	51	2.1	2.1	-	133	**N2314EM1**	276.4	326.4	39.87		3 900	4 800	4.090	-	-	
	150	51	2.1	2.1	-	133	**NF2314EM1**	276.4	326.4	39.87		3 900	4 800	4.090	-	-	
	180	42	3.0	3.0	100	-	**NU414EM**	265.3	287.6	32.73		3 400	4 000	5.970	HJ414	0.610	
	180	42	3.0	3.0	100	-	**NJ414EM**	265.3	287.6	32.73		3 400	4 000	5.970	HJ414	0.610	
	180	42	3.0	3.0	100	-	**NUP414EM**	265.3	287.6	32.73		3 400	4 000	5.970	-	-	
	180	42	3.0	3.0	-	152	**N414EM**	265.3	287.6	32.73		3 400	4 000	5.970	-	-	
	180	42	3.0	3.0	-	152	**NF414EM**	265.3	287.6	32.73		3 400	4 000	5.970	-	-	
75	115	20	1.1	1.0	85	-	**NU1015EM**	65.5	85.0	10.36		5 300	6 300	0.750	-	-	
	115	20	1.1	1.0	85	-	**NJ1015EM**	65.5	85.0	10.36		5 300	6 300	0.750	-	-	
	115	20	1.1	1.0	85	-	**NUP1015EM**	65.5	85.0	10.36		5 300	6 300	0.750	-	-	
	130	25	1.5	1.5	88.5	-	**NU215E**	116.4	133.7	16.31		4 200	5 200	1.290	HJ215	0.165	
	130	25	1.5	1.5	88.5	-	**NJ215E**	116.4	133.7	16.31		4 200	5 200	1.290	HJ215	0.165	
	130	25	1.5	1.5	88.5	-	**NUP215E**	116.4	133.7	16.31		4 200	5 200	1.290	-	-	
	130	25	1.5	1.5	-	118.5	**N215E**	122.2	142.7	17.40		4 200	5 200	1.290	-	-	
	130	25	1.5	1.5	-	118.5	**NF215E**	116.4	133.7	16.31		4 200	5 200	1.290	-	-	
	130	25	1.5	1.5	88.5	-	**NU215ETNG**	133.4	160.5	19.42		4 200	5 200	1.290	HJ215	0.165	
	130	25	1.5	1.5	88.5	-	**NJ215ETNG**	133.4	160.5	19.42		4 200	5 200	1.290	HJ215	0.165	
	130	25	1.5	1.5	88.5	-	**NUP215ETNG**	133.4	160.5	19.42		4 200	5 200	1.290	-	-	
	130	25	1.5	1.5	-	118.5	**N215ETNG**	133.4	160.5	19.42		4 200	5 200	1.290	-	-	
	130	25	1.5	1.5	-	118.5	**NF215ETNG**	133.4	160.5	19.42		4 200	5 200	1.290	-	-	
	130	25	1.5	1.5	88.5	-	**NU215EM**	121.5	142.7	17.27		4 200	5 200	1.290	HJ215	0.165	
	130	25	1.5	1.5	88.5	-	**NJ215EM**	121.5	142.7	17.27		4 200	5 200	1.290	HJ215	0.165	
	130	25	1.5	1.5	88.5	-	**NUP215EM**	121.5	142.7	17.27		4 200	5 200	1.290	-	-	
	130	25	1.5	1.5	-	118.5	**N215EM**	121.5	142.7	17.27		4 200	5 200	1.290	-	-	



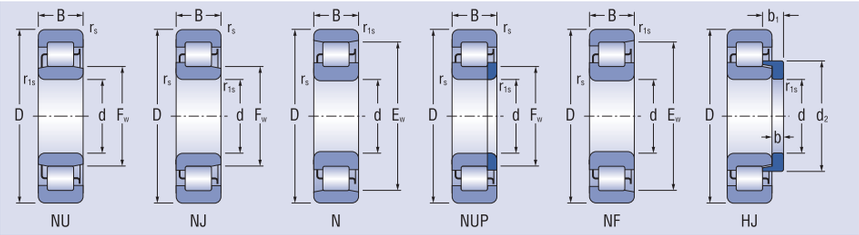
Dimensions							Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass of Bearings	Separate Thrust Collar	Mass of separate Thrust Collar	
								dynamic	static			grease	oil				
d	D	B	$r_{s\,min}$	$r_{s1\,min}$	F_w	E_w		C_r	C_{or}	C_u							
mm								kN				min^{-1}		kg		kg	
75	130	25	1.5	1.5	-	118.5	**NF215EM**	121.5	142.7	17.27		4 200	5 200	1.290	-	-	
	130	25	1.5	1.5	88.5	-	**NU215EM1**	133.4	160.5	19.42		4 200	5 200	1.290	HJ215	0.165	
	130	25	1.5	1.5	88.5	-	**NJ215EM1**	133.4	160.5	19.42		4 200	5 200	1.290	HJ215	0.165	
	130	25	1.5	1.5	88.5	-	**NUP215EM1**	133.4	160.5	19.42		4 200	5 200	1.290	-	-	
	130	25	1.5	1.5	-	118.5	**N215EM1**	133.4	160.5	19.42		4 200	5 200	1.290	-	-	
	130	25	1.5	1.5	-	118.5	**NF215EM1**	133.4	160.5	19.42		4 200	5 200	1.290	-	-	
	130	31	1.5	1.5	88.5	-	**NU2215E**	143.3	174.6	21.13		4 200	5 200	1.640	HJ2215	0.167	
	130	31	1.5	1.5	88.5	-	**NJ2215E**	143.3	174.6	21.13		4 200	5 200	1.640	HJ2215	0.167	
	130	31	1.5	1.5	88.5	-	**NUP2215E**	143.3	174.6	21.13		4 200	5 200	1.640	-	-	
	130	31	1.5	1.5	-	118.5	**N2215E**	143.3	174.6	21.13		4 200	5 200	1.640	-	-	
	130	31	1.5	1.5	-	118.5	**NF2215E**	143.3	174.6	21.13		4 200	5 200	1.640	-	-	
	130	31	1.5	1.5	88.5	-	**NU2215ETNG**	164.3	211.3	25.58		4 200	5 200	1.640	HJ2215	0.167	
	130	31	1.5	1.5	88.5	-	**NJ2215ETNG**	164.3	211.3	25.58		4 200	5 200	1.640	HJ2215	0.167	
	130	31	1.5	1.5	88.5	-	**NUP2215ETNG**	164.3	211.3	25.58		4 200	5 200	1.640	-	-	
	130	31	1.5	1.5	-	118.5	**N2215ETNG**	164.3	211.3	25.58		4 200	5 200	1.640	-	-	
	130	31	1.5	1.5	-	118.5	**NF2215ETNG**	164.3	211.3	25.58		4 200	5 200	1.640	-	-	
	130	31	1.5	1.5	88.5	-	**NU2215EM**	150.4	187.8	22.73		4 200	5 200	1.640	HJ2215	0.167	
	130	31	1.5	1.5	88.5	-	**NJ2215EM**	150.4	187.8	22.73		4 200	5 200	1.640	HJ2215	0.167	
	130	31	1.5	1.5	88.5	-	**NUP2215EM**	150.4	187.8	22.73		4 200	5 200	1.640	-	-	
	130	31	1.5	1.5	-	118.5	**N2215EM**	150.4	187.8	22.73		4 200	5 200	1.640	-	-	
	130	31	1.5	1.5	-	118.5	**NF2215EM**	150.4	187.8	22.73		4 200	5 200	1.640	-	-	
	130	31	1.5	1.5	88.5	-	**NU2215EM1**	164.3	211.3	25.58		4 200	5 200	1.640	HJ2215	0.167	
	130	31	1.5	1.5	88.5	-	**NJ2215EM1**	164.3	211.3	25.58		4 200	5 200	1.640	HJ2215	0.167	
	130	31	1.5	1.5	88.5	-	**NUP2215EM1**	164.3	211.3	25.58		4 200	5 200	1.640	-	-	
	130	31	1.5	1.5	-	118.5	**N2215EM1**	164.3	211.3	25.58		4 200	5 200	1.640	-	-	
	130	31	1.5	1.5	-	118.5	**NF2215EM1**	164.3	211.3	25.58		4 200	5 200	1.640	-	-	
	160	37	2.1	2.1	95	-	**NU315E**	214.7	226.3	26.29		3 600	4 400	3.340	HJ315	0.410	
	160	37	2.1	2.1	95	-	**NJ315E**	214.7	226.3	26.29		3 600	4 400	3.340	HJ315	0.410	
	160	37	2.1	2.1	95	-	**NUP315E**	214.7	226.3	26.29		3 600	4 400	3.340	-	-	
	160	37	2.1	2.1	-	143	**N315E**	229.2	246.8	28.68		3 600	4 400	3.340	-	-	
	160	37	2.1	2.1	-	143	**NF315E**	214.7	226.3	26.29		3 600	4 400	3.340	-	-	
	160	37	2.1	2.1	95	-	**NU315EM**	229.2	246.8	28.68		3 600	4 400	3.340	HJ315	0.410	
	160	37	2.1	2.1	95	-	**NJ315EM**	229.2	246.8	28.68		3 600	4 400	3.340	HJ315	0.410	
	160	37	2.1	2.1	95	-	**NUP315EM**	229.2	246.8	28.68		3 600	4 400	3.340	-	-	
	160	37	2.1	2.1	-	143	**N315EM**	229.2	246.8	28.68		3 600	4 400	3.340	-	-	
	160	37	2.1	2.1	-	143	**NF315EM**	229.2	246.8	28.68		3 600	4 400	3.340	-	-	
	160	37	2.1	2.1	95	-	**NU315EM1**	243.4	267.4	31.07		3 600	4 400	3.340	HJ315	0.410	
	160	37	2.1	2.1	95	-	**NJ315EM1**	243.4	267.4	31.07		3 600	4 400	3.340	HJ315	0.410	
	160	37	2.1	2.1	95	-	**NUP315EM1**	243.4	267.4	31.07		3 600	4 400	3.340	-	-	
	160	37	2.1	2.1	-	143	**N315EM1**	243.4	267.4	31.07		3 600	4 400	3.340	-	-	
	160	37	2.1	2.1	-	143	**NF315EM1**	243.4	267.4	31.07		3 600	4 400	3.340	-	-	
	160	55	2.1	2.1	95	-	**NU2315E**	293.1	337.6	40.86		3 600	4 400	5.040	HJ2315	0.439	



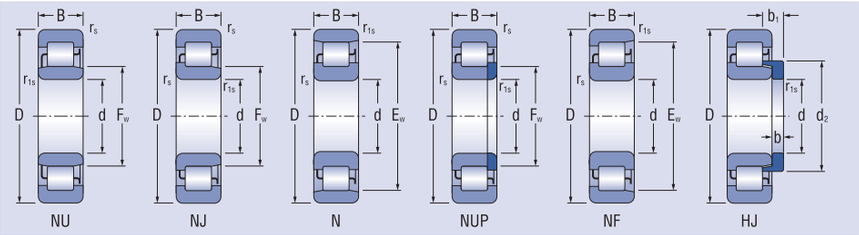
Dimensions							Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass of Bearings	Separate Thrust Collar	Mass of separate Thrust Collar	
								dynamic	static			grease	oil				
d	D	B	$r_{s\,min}$	$r_{s1\,min}$	F_w	E_w		C_r	C_{or}	C_u							
mm								kN				min^{-1}		kg		kg	
75	160	55	2.1	2.1	95	-	**NJ2315E**	293.1	337.6	40.86		3 600	4 400	5.040	HJ2315	0.439	
	160	55	2.1	2.1	95	-	**NUP2315E**	293.1	337.6	40.86		3 600	4 400	5.040	-	-	
	160	55	2.1	2.1	-	143	**N2315E**	312.9	368.2	44.57		3 600	4 400	5.040	-	-	
	160	55	2.1	2.1	-	143	**NF2315E**	293.1	337.6	40.86		3 600	4 400	5.040	-	-	
	160	55	2.1	2.1	95	-	**NU2315EM**	312.9	368.2	44.57		3 600	4 400	5.040	HJ2315	0.439	
	160	55	2.1	2.1	95	-	**NJ2315EM**	312.9	368.2	44.57		3 600	4 400	5.040	HJ2315	0.439	
	160	55	2.1	2.1	95	-	**NUP2315EM**	312.9	368.2	44.57		3 600	4 400	5.040	-	-	
	160	55	2.1	2.1	-	143	**N2315EM**	312.9	368.2	44.57		3 600	4 400	5.040	-	-	
	160	55	2.1	2.1	-	143	**NF2315EM**	312.9	368.2	44.57		3 600	4 400	5.040	-	-	
	160	55	2.1	2.1	95	-	**NU2315EM1**	332.2	398.9	48.29		3 600	4 400	5.040	HJ2315	0.439	
	160	55	2.1	2.1	95	-	**NJ2315EM1**	332.2	398.9	48.29		3 600	4 400	5.040	HJ2315	0.439	
	160	55	2.1	2.1	95	-	**NUP2315EM1**	332.2	398.9	48.29		3 600	4 400	5.040	-	-	
	160	55	2.1	2.1	-	143	**N2315EM1**	332.2	398.9	48.29		3 600	4 400	5.040	-	-	
	160	55	2.1	2.1	-	143	**NF2315EM1**	332.2	398.9	48.29		3 600	4 400	5.040	-	-	
	190	45	3.0	3.0	104.5	-	**NU415EM**	300.6	326.5	36.59		3 200	3 700	7.010	HJ415	0.710	
	190	45	3.0	3.0	104.5	-	**NJ415EM**	300.6	326.5	36.59		3 200	3 700	7.010	HJ415	0.710	
	190	45	3.0	3.0	104.5	-	**NUP415EM**	300.6	326.5	36.59		3 200	3 700	7.010	-	-	
	190	45	3.0	3.0	-	160.5	**N415EM**	300.6	326.5	36.59		3 200	3 700	7.010	-	-	
	190	45	3.0	3.0	-	160.5	**NF415EM**	300.6	326.5	36.59		3 200	3 700	7.010	-	-	
80	125	22	1.1	1.0	91.5	-	**NU1016EM**	76.5	98.0	11.95		5 000	6 000	0.990	-	-	
	125	22	1.1	1.0	91.5	-	**NJ1016EM**	76.5	98.0	11.95		5 000	6 000	0.990	-	-	
	125	22	1.1	1.0	91.5	-	**NUP1016EM**	76.5	98.0	11.95		5 000	6 000	0.990	-	-	
	140	26	2.1	2.1	95.3	-	**NU216E**	130.9	152.4	18.06		3 900	4 800	1.550	HJ216	0.222	
	140	26	2.1	2.1	95.3	-	**NJ216E**	130.9	152.4	18.06		3 900	4 800	1.550	HJ216	0.222	
	140	26	2.1	2.1	95.3	-	**NUP216E**	130.9	152.4	18.06		3 900	4 800	1.550	-	-	
	140	26	2.1	2.1	-	127.3	**N216E**	136.6	161.9	19.75		3 900	4 800	1.550	-	-	
	140	26	2.1	2.1	-	127.3	**NF216E**	130.9	152.4	18.06		3 900	4 800	1.550	-	-	
	140	26	2.1	2.1	95.3	-	**NU216ETNG**	142.5	171.4	20.32		3 900	4 800	1.550	HJ216	0.222	
	140	26	2.1	2.1	95.3	-	**NJ216ETNG**	142.5	171.4	20.32		3 900	4 800	1.550	HJ216	0.222	
	140	26	2.1	2.1	95.3	-	**NUP216ETNG**	142.5	171.4	20.32		3 900	4 800	1.550	-	-	
	140	26	2.1	2.1	-	127.3	**N216ETNG**	142.5	171.4	20.32		3 900	4 800	1.550	-	-	
	140	26	2.1	2.1	-	127.3	**NF216ETNG**	142.5	171.4	20.32		3 900	4 800	1.550	-	-	
	140	26	2.1	2.1	95.3	-	**NU216EM1**	142.5	171.4	20.32		3 900	4 800	1.550	HJ216	0.222	
	140	26	2.1	2.1	95.3	-	**NJ216EM1**	142.5	171.4	20.32		3 900	4 800	1.550	HJ216	0.222	
	140	26	2.1	2.1	95.3	-	**NUP216EM1**	142.5	171.4	20.32		3 900	4 800	1.550	-	-	
	140	26	2.1	2.1	-	127.3	**N216EM1**	142.5	171.4	20.32		3 900	4 800	1.550	-	-	
	140	26	2.1	2.1	-	127.3	**NF216EM1**	142.5	171.4	20.32		3 900	4 800	1.550	-	-	
	140	33	2.1	2.1	95.3	-	**NU2216E**	173.0	219.9	26.06		3 900	4 800	2.050	HJ216	0.222	
	140	33	2.1	2.1	95.3	-	**NJ2216E**	173.0	219.9	26.06		3 900	4 800	2.050	HJ216	0.222	
	140	33	2.1	2.1	95.3	-	**NUP2216E**	173.0	219.9	26.06		3 900	4 800	2.050	-	-	
	140	33	2.1	2.1	-	127.3	**N2216E**	173.0	219.9	26.06		3 900	4 800	2.050	-	-	
	140	33	2.1	2.1	-	127.3	**NF2216E**	173.0	219.9	26.06		3 900	4 800	2.050	-	-	



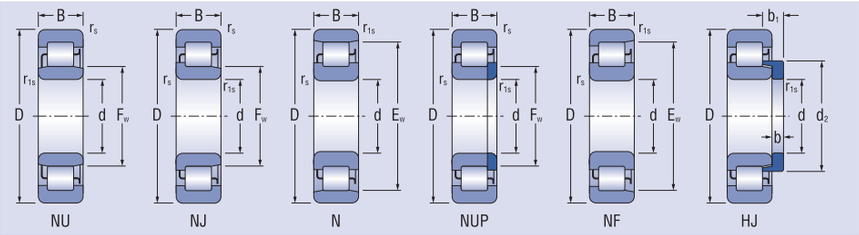
Dimensions							Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass of Bearings	Separate Thrust Collar	Mass of separate Thrust Collar	
								dynamic	static			grease	oil				
d	D	B	$r_{s\,min}$	$r_{s1\,min}$	F_w	E_w		C_r	C_{or}	C_u							
mm								kN				min^{-1}		kg		kg	
80	140	33	2.1	2.1	95.3	-	**NU2216ETNG**	189.0	247.4	29.32		3 900	4 800	2.050	HJ2216	0.222	
	140	33	2.1	2.1	95.3	-	**NJ2216ETNG**	189.0	247.4	29.32		3 900	4 800	2.050	HJ2216	0.222	
	140	33	2.1	2.1	95.3	-	**NUP2216ETNG**	189.0	247.4	29.32		3 900	4 800	2.050	-	-	
	140	33	2.1	2.1	-	127.3	**N2216ETNG**	189.0	247.4	29.32		3 900	4 800	2.050	-	-	
	140	33	2.1	2.1	-	127.3	**NF2216ETNG**	189.0	247.4	29.32		3 900	4 800	2.050	-	-	
	140	33	2.1	2.1	95.3	-	**NU2216EM**	173.0	219.9	26.06		3 900	4 800	2.050	HJ2216	0.222	
	140	33	2.1	2.1	95.3	-	**NJ2216EM**	173.0	219.9	26.06		3 900	4 800	2.050	HJ2216	0.222	
	140	33	2.1	2.1	95.3	-	**NUP2216EM**	173.0	219.9	26.06		3 900	4 800	2.050	-	-	
	140	33	2.1	2.1	-	127.3	**N2216EM**	173.0	219.9	26.06		3 900	4 800	2.050	-	-	
	140	33	2.1	2.1	-	127.3	**NF2216EM**	173.0	219.9	26.06		3 900	4 800	2.050	-	-	
	140	33	2.1	2.1	95.3	-	**NU2216EM1**	189.0	247.4	29.32		3 900	4 800	2.050	HJ2216	0.222	
	140	33	2.1	2.1	95.3	-	**NJ2216EM1**	189.0	247.4	29.32		3 900	4 800	2.050	HJ2216	0.222	
	140	33	2.1	2.1	95.3	-	**NUP2216EM1**	189.0	247.4	29.32		3 900	4 800	2.050	-	-	
	140	33	2.1	2.1	-	127.3	**N2216EM1**	189.0	247.4	29.32		3 900	4 800	2.050	-	-	
	140	33	2.1	2.1	-	127.3	**NF2216EM1**	189.0	247.4	29.32		3 900	4 800	2.050	-	-	
	170	39	2.1	2.1	101	-	**NU316E**	231.5	246.4	28.10		3 400	4 100	4.120	HJ316	0.461	
	170	39	2.1	2.1	101	-	**NJ316E**	231.5	246.4	28.10		3 400	4 100	4.120	HJ316	0.461	
	170	39	2.1	2.1	101	-	**NUP316E**	231.5	246.4	28.10		3 400	4 100	4.120	-	-	
	170	39	2.1	2.1	-	151	**N316E**	247.1	268.8	30.65		3 400	4 100	4.120	-	-	
	170	39	2.1	2.1	-	151	**NF316E**	231.5	246.4	28.10		3 400	4 100	4.120	-	-	
	170	39	2.1	2.1	101	-	**NU316EM**	247.1	268.8	30.65		3 400	4 100	4.120	HJ316	0.461	
	170	39	2.1	2.1	101	-	**NJ316EM**	247.1	268.8	30.65		3 400	4 100	4.120	HJ316	0.461	
	170	39	2.1	2.1	101	-	**NUP316EM**	247.1	268.8	30.65		3 400	4 100	4.120	-	-	
	170	39	2.1	2.1	-	151	**N316EM**	247.1	268.8	30.65		3 400	4 100	4.120	-	-	
	170	39	2.1	2.1	-	151	**NF316EM**	247.1	268.8	30.65		3 400	4 100	4.120	-	-	
	170	39	2.1	2.1	101	-	**NU316EM1**	262.4	291.2	33.21		3 400	4 100	4.120	HJ316	0.461	
	170	39	2.1	2.1	101	-	**NJ316EM1**	262.4	291.2	33.21		3 400	4 100	4.120	HJ316	0.461	
	170	39	2.1	2.1	101	-	**NUP316EM1**	262.4	291.2	33.21		3 400	4 100	4.120	-	-	
	170	39	2.1	2.1	-	151	**N316EM1**	262.4	291.2	33.21		3 400	4 100	4.120	-	-	
	170	39	2.1	2.1	-	151	**NF316EM1**	262.4	291.2	33.21		3 400	4 100	4.120	-	-	
	170	58	2.1	2.1	101	-	**NU2316E**	319.2	372.5	44.14		3 400	4 100	6.000	HJ2316	0.494	
	170	58	2.1	2.1	101	-	**NJ2316E**	319.2	372.5	44.14		3 400	4 100	6.000	HJ2316	0.494	
	170	58	2.1	2.1	101	-	**NUP2316E**	319.2	372.5	44.14		3 400	4 100	6.000	-	-	
	170	58	2.1	2.1	-	151	**N2316E**	319.2	372.5	44.14		3 400	4 100	6.000	-	-	
	170	58	2.1	2.1	-	151	**NF2316E**	319.2	372.5	44.14		3 400	4 100	6.000	-	-	
	170	58	2.1	2.1	101	-	**NU2316EM**	340.8	406.3	48.15		3 400	4 100	6.000	HJ2316	0.494	
	170	58	2.1	2.1	101	-	**NJ2316EM**	340.8	406.3	48.15		3 400	4 100	6.000	HJ2316	0.494	
	170	58	2.1	2.1	101	-	**NUP2316EM**	340.8	406.3	48.15		3 400	4 100	6.000	-	-	
	170	58	2.1	2.1	-	151	**N2316EM**	340.8	406.3	48.15		3 400	4 100	6.000	-	-	
	170	58	2.1	2.1	-	151	**NF2316EM**	340.8	406.3	48.15		3 400	4 100	6.000	-	-	
	170	58	2.1	2.1	101	-	**NU2316EM1**	361.8	440.2	52.17		3 400	4 100	6.000	HJ2316	0.494	
	170	58	2.1	2.1	101	-	**NJ2316EM1**	361.8	440.2	52.17		3 400	4 100	6.000	HJ2316	0.494	



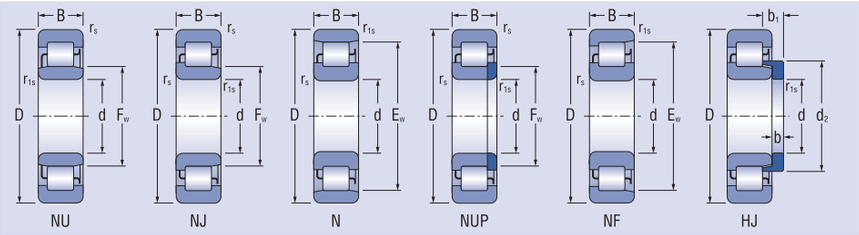
Dimensions							Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass of Bearings	Separate Thrust Collar	Mass of separate Thrust Collar	
								dynamic	static			grease	oil				
d	D	B	$r_{s\,min}$	$r_{s1\,min}$	F_w	E_w		C_r	C_{or}	C_u							
mm								kN				min^{-1}		kg		kg	
80	170	58	2.1	2.1	101	-	**NUP2316EM1**	361.8	440.2	52.17		3 400	4 100	6.000	-	-	
	170	58	2.1	2.1	-	151	**N2316EM1**	361.8	440.2	52.17		3 400	4 100	6.000	-	-	
	170	58	2.1	2.1	-	151	**NF2316EM1**	361.8	440.2	52.17		3 400	4 100	6.000	-	-	
	200	48	3.0	3.0	110	-	**NU416EM**	323.1	348.5	38.41		3 000	3 500	8.110	HJ416	0.800	
	200	48	3.0	3.0	110	-	**NJ416EM**	323.1	348.5	38.41		3 000	3 500	8.110	HJ416	0.800	
	200	48	3.0	3.0	110	-	**NUP416EM**	323.1	348.5	38.41		3 000	3 500	8.110	-	-	
	200	48	3.0	3.0	-	170	**N416EM**	323.1	348.5	38.41		3 000	3 500	8.110	-	-	
	200	48	3.0	3.0	-	170	**NF416EM**	323.1	348.5	38.41		3 000	3 500	8.110	-	-	
85	130	22	1.1	1.0	96.5	-	**NU1017EM**	78.0	104.0	12.41		4 700	5 600	1.050	-	-	
	130	22	1.1	1.0	96.5	-	**NJ1017EM**	78.0	104.0	12.41		4 700	5 600	1.050	-	-	
	130	22	1.1	1.0	96.5	-	**NUP1017EM**	78.0	104.0	12.41		4 700	5 600	1.050	-	-	
	150	28	2.1	2.1	100.5	-	**NU217E**	153.6	177.3	20.60		3 600	4 400	1.920	HJ217	0.249	
	150	28	2.1	2.1	100.5	-	**NJ217E**	153.6	177.3	20.60		3 600	4 400	1.920	HJ217	0.249	
	150	28	2.1	2.1	100.5	-	**NUP217E**	153.6	177.3	20.60		3 600	4 400	1.920	-	-	
	150	28	2.1	2.1	-	136.5	**N217E**	161.5	189.2	23.03		3 600	4 400	1.920	-	-	
	150	28	2.1	2.1	-	136.5	**NF217E**	153.6	177.3	20.60		3 600	4 400	1.920	-	-	
	150	28	2.1	2.1	100.5	-	**NU217ETNG**	169.0	200.97	23.35		3 600	4 400	1.920	HJ217	0.249	
	150	28	2.1	2.1	100.5	-	**NJ217ETNG**	169.0	200.97	23.35		3 600	4 400	1.920	HJ217	0.249	
	150	28	2.1	2.1	100.5	-	**NUP217ETNG**	169.0	200.97	23.35		3 600	4 400	1.920	-	-	
	150	28	2.1	2.1	-	136.5	**N217ETNG**	169.0	200.97	23.35		3 600	4 400	1.920	-	-	
	150	28	2.1	2.1	-	136.5	**NF217ETNG**	169.0	200.97	23.35		3 600	4 400	1.920	-	-	
	150	28	2.1	2.1	100.5	-	**NU217EM**	161.2	189.2	21.98		3 600	4 400	1.920	HJ217	0.249	
	150	28	2.1	2.1	100.5	-	**NJ217EM**	161.2	189.2	21.98		3 600	4 400	1.920	HJ217	0.249	
	150	28	2.1	2.1	100.5	-	**NUP217EM**	161.2	189.2	21.98		3 600	4 400	1.920	-	-	
	150	28	2.1	2.1	-	136.5	**N217EM**	161.2	189.2	21.98		3 600	4 400	1.920	-	-	
	150	28	2.1	2.1	-	136.5	**NF217EM**	161.2	189.2	21.98		3 600	4 400	1.920	-	-	
	150	28	2.1	2.1	100.5	-	**NU217EM1**	169.0	200.97	23.35		3 600	4 400	1.920	HJ217	0.249	
	150	28	2.1	2.1	100.5	-	**NJ217EM1**	169.0	200.97	23.35		3 600	4 400	1.920	HJ217	0.249	
	150	28	2.1	2.1	100.5	-	**NUP217EM1**	169.0	200.97	23.35		3 600	4 400	1.920	-	-	
	150	28	2.1	2.1	-	136.5	**N217EM1**	169.0	200.97	23.35		3 600	4 400	1.920	-	-	
	150	28	2.1	2.1	-	136.5	**NF217EM1**	169.0	200.97	23.35		3 600	4 400	1.920	-	-	
	150	36	2.1	2.1	100.5	-	**NU2217ETNG**	219.4	277.7	32.79		3 600	4 400	2.550	HJ2217	0.250	
	150	36	2.1	2.1	100.5	-	**NJ2217ETNG**	219.4	277.7	32.79		3 600	4 400	2.550	HJ2217	0.250	
	150	36	2.1	2.1	100.5	-	**NUP2217ETNG**	219.4	277.7	32.79		3 600	4 400	2.550	-	-	
	150	36	2.1	2.1	-	136.5	**N2217ETNG**	219.4	277.7	32.79		3 600	4 400	2.550	-	-	
	150	36	2.1	2.1	-	136.5	**NF2217ETNG**	219.4	277.7	32.79		3 600	4 400	2.550	-	-	
	150	36	2.1	2.1	100.5	-	**NU2217EM1**	219.4	277.7	32.79		3 600	4 400	2.550	HJ2217	0.250	
	150	36	2.1	2.1	100.5	-	**NJ2217EM1**	219.4	277.7	32.79		3 600	4 400	2.550	HJ2217	0.250	
	150	36	2.1	2.1	100.5	-	**NUP2217EM1**	219.4	277.7	32.79		3 600	4 400	2.550	-	-	
	150	36	2.1	2.1	-	136.5	**N2217EM1**	219.4	277.7	32.79		3 600	4 400	2.550	-	-	
	150	36	2.1	2.1	-	136.5	**NF2217EM1**	219.4	277.7	32.79		3 600	4 400	2.550	-	-	



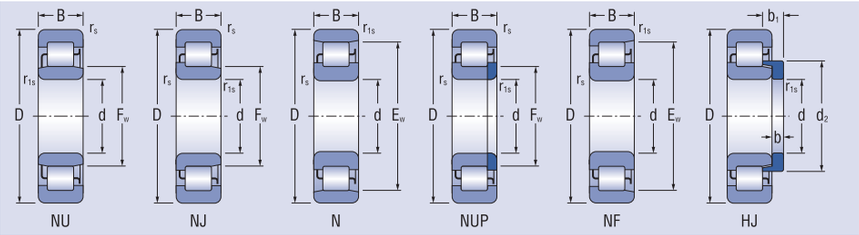
Dimensions							Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass of Bearings	Separate Thrust Collar	Mass of separate Thrust Collar	
								dynamic	static			grease	oil				
d	D	B	$r_{s\,min}$	$r_{s1\,min}$	F_w	E_w		C_r	C_{or}	C_u							
mm								kN				min^{-1}		kg		kg	
85	180	41	3.0	3.0	108	-	**NU317E**	249.1	267.8	30.01		3 100	3 900	5.300	HJ317	0.566	
	180	41	3.0	3.0	108	-	**NJ317E**	249.1	267.8	30.01		3 100	3 900	5.300	HJ317	0.566	
	180	41	3.0	3.0	108	-	**NUP317E**	249.1	267.8	30.01		3 100	3 900	5.300	-	-	
	180	41	3.0	3.0	-	160	**N317E**	265.9	292.1	34.81		3 100	3 900	5.300	-	-	
	180	41	3.0	3.0	-	160	**NF317E**	249.1	267.8	30.01		3 100	3 900	5.300	-	-	
	180	41	3.0	3.0	108	-	**NU317EM**	282.3	316.4	35.47		3 100	3 900	5.300	HJ317	0.566	
	180	41	3.0	3.0	108	-	**NJ317EM**	282.3	316.4	35.47		3 100	3 900	5.300	HJ317	0.566	
	180	41	3.0	3.0	108	-	**NUP317EM**	282.3	316.4	35.47		3 100	3 900	5.300	-	-	
	180	41	3.0	3.0	-	160	**N317EM**	282.3	316.4	35.47		3 100	3 900	5.300	-	-	
	180	41	3.0	3.0	-	160	**NF317EM**	282.3	316.4	35.47		3 100	3 900	5.300	-	-	
	180	60	3.0	3.0	108	-	**NU2317EM**	377.8	460.3	51.59		3 100	3 900	6.710	HJ2317	0.606	
	180	60	3.0	3.0	108	-	**NJ2317EM**	377.8	460.3	51.59		3 100	3 900	6.710	HJ2317	0.606	
	180	60	3.0	3.0	108	-	**NUP2317EM**	377.8	460.3	51.59		3 100	3 900	6.710	-	-	
	180	60	3.0	3.0	-	160	**N2317EM**	377.8	460.3	51.59		3 100	3 900	6.710	-	-	
	180	60	3.0	3.0	-	160	**NF2317EM**	377.8	460.3	51.59		3 100	3 900	6.710	-	-	
	210	52	4.0	4.0	115.5	-	**NU417EM**	365.0	397.0	43.08		2 800	3 300	9.620	HJ417	0.890	
	210	52	4.0	4.0	115.5	-	**NJ417EM**	365.0	397.0	43.08		2 800	3 300	9.620	HJ417	0.890	
	210	52	4.0	4.0	115.5	-	**NUP417EM**	365.0	397.0	43.08		2 800	3 300	9.620	-	-	
	210	52	4.0	4.0	-	179.5	**N417EM**	365.0	397.0	43.08		2 800	3 300	9.620	-	-	
	210	52	4.0	4.0	-	179.5	**NF417EM**	365.0	397.0	43.08		2 800	3 300	9.620	-	-	
90	140	24	1.5	1.1	103	-	**NU1018EM**	93.0	125.0	14.61		4 500	5 300	1.310	-	-	
	140	24	1.5	1.1	103	-	**NJ1018EM**	93.0	125.0	14.61		4 500	5 300	1.310	-	-	
	140	24	1.5	1.1	103	-	**NUP1018EM**	93.0	125.0	14.61		4 500	5 300	1.310	-	-	
	160	30	2.1	2.1	107	-	**NU218E**	170.2	206.9	23.59		3 400	4 100	2.370	HJ218	0.316	
	160	30	2.1	2.1	107	-	**NJ218E**	170.2	206.9	23.59		3 400	4 100	2.370	HJ218	0.316	
	160	30	2.1	2.1	107	-	**NUP218E**	170.2	206.9	23.59		3 400	4 100	2.370	-	-	
	160	30	2.1	2.1	-	145	**N218E**	178.2	211.3	25.60		3 400	4 100	2.370	-	-	
	160	30	2.1	2.1	-	145	**NF218E**	170.2	206.9	23.59		3 400	4 100	2.370	-	-	
	160	30	2.1	2.1	107	-	**NU218ETNG**	187.0	224.5	25.60		3 400	4 100	2.370	HJ218	0.316	
	160	30	2.1	2.1	107	-	**NJ218ETNG**	187.0	224.5	25.60		3 400	4 100	2.370	HJ218	0.316	
	160	30	2.1	2.1	107	-	**NUP218ETNG**	187.0	224.5	25.60		3 400	4 100	2.370	-	-	
	160	30	2.1	2.1	-	145	**N218ETNG**	187.0	224.5	25.60		3 400	4 100	2.370	-	-	
	160	30	2.1	2.1	-	145	**NF218ETNG**	187.0	224.5	25.60		3 400	4 100	2.370	-	-	
	160	30	2.1	2.1	107	-	**NU218EM**	178.2	211.3	24.10		3 400	4 100	2.370	HJ218	0.316	
	160	30	2.1	2.1	107	-	**NJ218EM**	178.2	211.3	24.10		3 400	4 100	2.370	HJ218	0.316	
	160	30	2.1	2.1	107	-	**NUP218EM**	178.2	211.3	24.10		3 400	4 100	2.370	-	-	
	160	30	2.1	2.1	-	145	**N218EM**	178.2	211.3	24.10		3 400	4 100	2.370	-	-	
	160	30	2.1	2.1	-	145	**NF218EM**	178.2	211.3	24.10		3 400	4 100	2.370	-	-	
	160	30	2.1	2.1	107	-	**NU218EM1**	187.0	224.5	25.60		3 400	4 100	2.370	HJ218	0.316	
	160	30	2.1	2.1	107	-	**NJ218EM1**	187.0	224.5	25.60		3 400	4 100	2.370	HJ218	0.316	
	160	30	2.1	2.1	107	-	**NUP218EM1**	187.0	224.5	25.60		3 400	4 100	2.370	-	-	



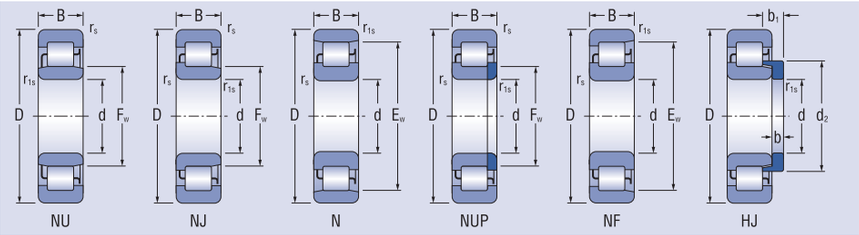
Dimensions							Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass of Bearings	Separate Thrust Collar	Mass of separate Thrust Collar	
								dynamic	static			grease	oil				
d	D	B	$r_{s\,min}$	$r_{s1\,min}$	F_w	E_w		C_r	C_{or}	C_u							
mm								kN				min^{-1}		kg		kg	
90	160	30	2.1	2.1	-	145	**N218EM1**	187.0	224.5	25.60		3 400	4 100	2.370	-	-	
	160	30	2.1	2.1	-	145	**NF218EM1**	187.0	224.5	25.60		3 400	4 100	2.370	-	-	
	160	40	2.1	2.1	107	-	**NU2218ETNG**	246.3	321.0	37.30		3 400	4 100	3.230	HJ2218	0.328	
	160	40	2.1	2.1	107	-	**NJ2218ETNG**	246.3	321.0	37.30		3 400	4 100	3.230	HJ2218	0.328	
	160	40	2.1	2.1	107	-	**NUP2218ETNG**	246.3	321.0	37.30		3 400	4 100	3.230	-	-	
	160	40	2.1	2.1	-	145	**N2218ETNG**	246.3	321.0	37.30		3 400	4 100	3.230	-	-	
	160	40	2.1	2.1	-	145	**NF2218ETNG**	246.3	321.0	37.30		3 400	4 100	3.230	-	-	
	160	40	2.1	2.1	107	-	**NU2218EM**	235.3	302.1	35.11		3 400	4 100	3.230	HJ2218	0.328	
	160	40	2.1	2.1	107	-	**NJ2218EM**	235.3	302.1	35.11		3 400	4 100	3.230	HJ2218	0.328	
	160	40	2.1	2.1	107	-	**NUP2218EM**	235.3	302.1	35.11		3 400	4 100	3.230	-	-	
	160	40	2.1	2.1	-	145	**N2218EM**	235.3	302.1	35.11		3 400	4 100	3.230	-	-	
	160	40	2.1	2.1	-	145	**NF2218EM**	235.3	302.1	35.11		3 400	4 100	3.230	-	-	
	160	40	2.1	2.1	107	-	**NU2218EM1**	246.3	321.0	37.30		3 400	4 100	3.230	HJ2218	0.328	
	160	40	2.1	2.1	107	-	**NJ2218EM1**	246.3	321.0	37.30		3 400	4 100	3.230	HJ2218	0.328	
	160	40	2.1	2.1	107	-	**NUP2218EM1**	246.3	321.0	37.30		3 400	4 100	3.230	-	-	
	160	40	2.1	2.1	-	145	**N2218EM1**	246.3	321.0	37.30		3 400	4 100	3.230	-	-	
	160	40	2.1	2.1	-	145	**NF2218EM1**	246.3	321.0	37.30		3 400	4 100	3.230	-	-	
	190	43	3.0	3.0	113.5	-	**NU318E**	282.0	304.4	33.55		2 900	3 600	6.190	HJ318	0.623	
	190	43	3.0	3.0	113.5	-	**NJ318E**	282.0	304.4	33.55		2 900	3 600	6.190	HJ318	0.623	
	190	43	3.0	3.0	113.5	-	**NUP318E**	282.0	304.4	33.55		2 900	3 600	6.190	-	-	
	190	43	3.0	3.0	-	169.5	**N318E**	301.0	332.0	38.98		2 900	3 600	6.190	-	-	
	190	43	3.0	3.0	-	169.5	**NF318E**	282.0	304.4	33.55		2 900	3 600	6.190	-	-	
	190	43	3.0	3.0	113.5	-	**NU318EM**	319.7	359.7	39.66		2 900	3 600	6.190	HJ318	0.623	
	190	43	3.0	3.0	113.5	-	**NJ318EM**	319.7	359.7	39.66		2 900	3 600	6.190	HJ318	0.623	
	190	43	3.0	3.0	113.5	-	**NUP318EM**	319.7	359.7	39.66		2 900	3 600	6.190	-	-	
	190	43	3.0	3.0	-	169.5	**N318EM**	319.7	359.7	39.66		2 900	3 600	6.190	-	-	
	190	43	3.0	3.0	-	169.5	**NF318EM**	319.7	359.7	39.66		2 900	3 600	6.190	-	-	
	190	64	3.0	3.0	113.5	-	**NU2318EM**	438.2	539.6	61.54		2 900	3 600	8.040	HJ2318	0.669	
	190	64	3.0	3.0	113.5	-	**NJ2318EM**	438.2	539.6	61.54		2 900	3 600	8.040	HJ2318	0.669	
	190	64	3.0	3.0	113.5	-	**NUP2318EM**	438.2	539.6	61.54		2 900	3 600	8.040	-	-	
	190	64	3.0	3.0	-	169.5	**N2318EM**	438.2	539.6	61.54		2 900	3 600	8.040	-	-	
	190	64	3.0	3.0	-	169.5	**NF2318EM**	438.2	539.6	61.54		2 900	3 600	8.040	-	-	
	225	54	4.0	4.0	123.5	-	**NU418EM**	409.6	450.5	47.93		2 600	3 100	11.790	HJ418	1.050	
	225	54	4.0	4.0	123.5	-	**NJ418EM**	409.6	450.5	47.93		2 600	3 100	11.790	HJ418	1.050	
	225	54	4.0	4.0	123.5	-	**NUP418EM**	409.6	450.5	47.93		2 600	3 100	11.790	-	-	
	225	54	4.0	4.0	-	191.5	**N418EM**	409.6	450.5	47.93		2 600	3 100	11.790	-	-	
	225	54	4.0	4.0	-	191.5	**NF418EM**	409.6	450.5	47.93		2 600	3 100	11.790	-	-	
95	145	24	1.5	1.1	108	-	**NU1019EM1**	96.5	129.0	14.89		4 200	5 000	1.420	-	-	
	145	24	1.5	1.1	108	-	**NJ1019EM1**	96.5	129.0	14.89		4 200	5 000	1.420	-	-	
	145	24	1.5	1.1	108	-	**NUP1019EM1**	96.5	129.0	14.89		4 200	5 000	1.420	-	-	
	170	32	2.1	2.1	112.5	-	**NU219ETNG**	224.1	270.0	30.27		3 100	3 900	2.890	HJ219	0.356	



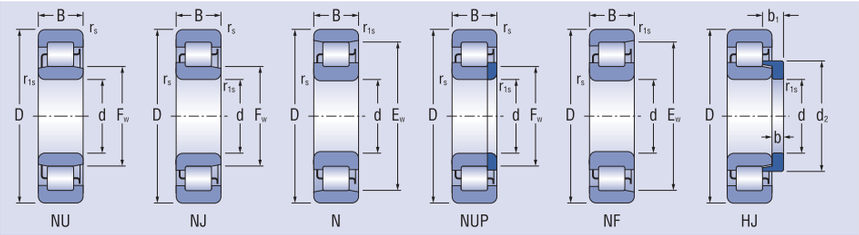
Dimensions							Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass of Bearings	Separate Thrust Collar	Mass of separate Thrust Collar	
								dynamic	static			grease	oil				
d	D	B	$r_{s\,min}$	$r_{s1\,min}$	F_w	E_w		C_r	C_{or}	C_u							
mm								kN				min^{-1}		kg		kg	
95	170	32	2.1	2.1	112.5	-	**NJ219ETNG**	224.1	270.0	30.27		3 100	3 900	2.890	HJ219	0.356	
	170	32	2.1	2.1	112.5	-	**NUP219ETNG**	224.1	270.0	30.27		3 100	3 900	2.890	-	-	
	170	32	2.1	2.1	-	154.5	**N219ETNG**	224.1	270.0	30.27		3 100	3 900	2.890	-	-	
	170	32	2.1	2.1	-	154.5	**NF219ETNG**	224.1	270.0	30.27		3 100	3 900	2.890	-	-	
	170	32	2.1	2.1	112.5	-	**NU219EM**	213.6	254.1	28.48		3 100	3 900	2.890	HJ219	0.356	
	170	32	2.1	2.1	112.5	-	**NJ219EM**	213.6	254.1	28.48		3 100	3 900	2.890	HJ219	0.356	
	170	32	2.1	2.1	112.5	-	**NUP219EM**	213.6	254.1	28.48		3 100	3 900	2.890	-	-	
	170	32	2.1	2.1	-	154.5	**N219EM**	213.6	254.1	28.48		3 100	3 900	2.890	-	-	
	170	32	2.1	2.1	-	154.5	**NF219EM**	213.6	254.1	28.48		3 100	3 900	2.890	-	-	
	170	43	2.1	2.1	112.5	-	**NU2219ETNG**	291.0	378.6	43.18		3 100	3 900	3.980	HJ2219	0.362	
	170	43	2.1	2.1	112.5	-	**NJ2219ETNG**	291.0	378.6	43.18		3 100	3 900	3.980	HJ2219	0.362	
	170	43	2.1	2.1	112.5	-	**NUP2219ETNG**	291.0	378.6	43.18		3 100	3 900	3.980	-	-	
	170	43	2.1	2.1	-	154.5	**N2219ETNG**	291.0	378.6	43.18		3 100	3 900	3.980	-	-	
	170	43	2.1	2.1	-	154.5	**NF2219ETNG**	291.0	378.6	43.18		3 100	3 900	3.980	-	-	
	170	43	2.1	2.1	112.5	-	**NU2219EM**	277.9	356.3	40.64		3 100	3 900	3.980	HJ2219	0.362	
	170	43	2.1	2.1	112.5	-	**NJ2219EM**	277.9	356.3	40.64		3 100	3 900	3.980	HJ2219	0.362	
	170	43	2.1	2.1	112.5	-	**NUP2219EM**	277.9	356.3	40.64		3 100	3 900	3.980	-	-	
	170	43	2.1	2.1	-	154.5	**N2219EM**	277.9	356.3	40.64		3 100	3 900	3.980	-	-	
	170	43	2.1	2.1	-	154.5	**NF2219EM**	277.9	356.3	40.64		3 100	3 900	3.980	-	-	
	200	45	3.0	3.0	121.5	-	**NU319E**	301.4	336.4	36.51		2 800	3 400	7.040	HJ319	0.777	
	200	45	3.0	3.0	121.5	-	**NJ319E**	301.4	336.4	36.51		2 800	3 400	7.040	HJ319	0.777	
	200	45	3.0	3.0	121.5	-	**NUP319E**	301.4	336.4	36.51		2 800	3 400	7.040	-	-	
	200	45	3.0	3.0	-	177.5	**N319E**	301.4	336.4	36.51		2 800	3 400	7.040	-	-	
	200	45	3.0	3.0	-	177.5	**NF319E**	301.4	336.4	36.51		2 800	3 400	7.040	-	-	
	200	45	3.0	3.0	121.5	-	**NU319EM**	320.0	364.5	39.55		2 800	3 400	7.040	HJ319	0.777	
	200	45	3.0	3.0	121.5	-	**NJ319EM**	320.0	364.5	39.55		2 800	3 400	7.040	HJ319	0.777	
	200	45	3.0	3.0	121.5	-	**NUP319EM**	320.0	364.5	39.55		2 800	3 400	7.040	-	-	
	200	45	3.0	3.0	-	177.5	**N319EM**	320.0	364.5	39.55		2 800	3 400	7.040	-	-	
	200	45	3.0	3.0	-	177.5	**NF319EM**	320.0	364.5	39.55		2 800	3 400	7.040	-	-	
	200	67	3.0	3.0	121.5	-	**NU2319EM**	438.7	546.7	61.27		2 800	3 400	9.400	HJ2319	0.830	
	200	67	3.0	3.0	121.5	-	**NJ2319EM**	438.7	546.7	61.27		2 800	3 400	9.400	HJ2319	0.830	
	200	67	3.0	3.0	121.5	-	**NUP2319EM**	438.7	546.7	61.27		2 800	3 400	9.400	-	-	
	200	67	3.0	3.0	-	177.5	**N2319EM**	438.7	546.7	61.27		2 800	3 400	9.400	-	-	
	200	67	3.0	3.0	-	177.5	**NF2319EM**	438.7	546.7	61.27		2 800	3 400	9.400	-	-	
	240	55	4.0	4.0	133.5	-	**NU419EM**	411.0	457.9	47.83		2 400	2 900	13.570	HJ419	1.300	
	240	55	4.0	4.0	133.5	-	**NJ419EM**	411.0	457.9	47.83		2 400	2 900	13.570	HJ419	1.300	
	240	55	4.0	4.0	133.5	-	**NUP419EM**	411.0	457.9	47.83		2 400	2 900	13.570	-	-	
	240	55	4.0	4.0	-	201.5	**N419EM**	411.0	457.9	47.83		2 400	2 900	13.570	-	-	
	240	55	4.0	4.0	-	201.5	**NF419EM**	411.0	457.9	47.83		2 400	2 900	13.570	-	-	



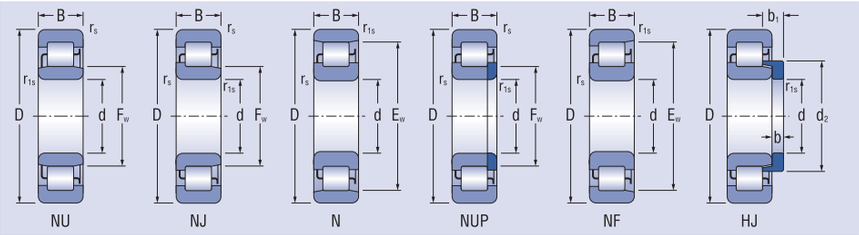
Dimensions							Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass of Bearings	Separate Thrust Collar	Mass of separate Thrust Collar	
								dynamic	static			grease	oil				
d	D	B	$r_{s\,min}$	$r_{s1\,min}$	F_w	E_w		C_r	C_{or}	C_u							
mm								kN				min^{-1}		kg		kg	
100	150	24	1.5	1.1	113	-	**NU1020EM**	98.0	134.0	15.28		3 800	4 800	1.480	-	-	
	150	24	1.5	1.1	113	-	**NJ1020EM**	98.0	134.0	15.28		3 800	4 800	1.480	-	-	
	150	24	1.5	1.1	113	-	**NUP1020EM**	98.0	134.0	15.28		3 800	4 800	1.480	-	-	
	180	34	2.1	2.1	119	-	**NU220ETNG**	253.6	311.1	34.29		2 900	3 600	3.500	HJ220	0.436	
	180	34	2.1	2.1	119	-	**NJ220ETNG**	253.6	311.1	34.29		2 900	3 600	3.500	HJ220	0.436	
	180	34	2.1	2.1	119	-	**NUP220ETNG**	253.6	311.1	34.29		2 900	3 600	3.500	-	-	
	180	34	2.1	2.1	-	163	**N220ETNG**	253.6	311.1	34.29		2 900	3 600	3.500	-	-	
	180	34	2.1	2.1	-	163	**NF220ETNG**	253.6	311.1	34.29		2 900	3 600	3.500	-	-	
	180	34	2.1	2.1	119	-	**NU220EM**	241.5	292.8	32.28		2 900	3 600	3.500	HJ220	0.436	
	180	34	2.1	2.1	119	-	**NJ220EM**	241.5	292.8	32.28		2 900	3 600	3.500	HJ220	0.436	
	180	34	2.1	2.1	119	-	**NUP220EM**	241.5	292.8	32.28		2 900	3 600	3.500	-	-	
	180	34	2.1	2.1	-	163	**N220EM**	241.5	292.8	32.28		2 900	3 600	3.500	-	-	
	180	34	2.1	2.1	-	163	**NF220EM**	241.5	292.8	32.28		2 900	3 600	3.500	-	-	
	180	34	2.1	2.1	119	-	**NU220EM1**	250.0	305.0	33.55		2 900	3 600	3.500	HJ220	0.436	
	180	34	2.1	2.1	119	-	**NJ220EM1**	250.0	305.0	33.55		2 900	3 600	3.500	HJ220	0.436	
	180	34	2.1	2.1	119	-	**NUP220EM1**	250.0	305.0	33.55		2 900	3 600	3.500	-	-	
	180	34	2.1	2.1	-	163	**N220EM1**	250.0	305.0	33.55		2 900	3 600	3.500	-	-	
	180	34	2.1	2.1	-	163	**NF220EM1**	250.0	305.0	33.55		2 900	3 600	3.500	-	-	
	180	46	2.1	2.1	119	-	**NU2220ETNG**	336.8	450.0	49.61		2 900	3 600	4.850	HJ2220	0.447	
	180	46	2.1	2.1	119	-	**NJ2220ETNG**	336.8	450.0	49.61		2 900	3 600	4.850	HJ2220	0.447	
	180	46	2.1	2.1	119	-	**NUP2220ETNG**	336.8	450.0	49.61		2 900	3 600	4.850	-	-	
	180	46	2.1	2.1	-	163	**N2220ETNG**	336.8	450.0	49.61		2 900	3 600	4.850	-	-	
	180	46	2.1	2.1	-	163	**NF2220ETNG**	336.8	450.0	49.61		2 900	3 600	4.850	-	-	
	180	46	2.1	2.1	119	-	**NU2220EM1**	336.8	450.0	49.61		2 900	3 600	4.850	HJ2220	0.447	
	180	46	2.1	2.1	119	-	**NJ2220EM1**	336.8	450.0	49.61		2 900	3 600	4.850	HJ2220	0.447	
	180	46	2.1	2.1	119	-	**NUP2220EM1**	336.8	450.0	49.61		2 900	3 600	4.850	-	-	
	180	46	2.1	2.1	-	163	**N2220EM1**	336.8	450.0	49.61		2 900	3 600	4.850	-	-	
	180	46	2.1	2.1	-	163	**NF2220EM1**	336.8	450.0	49.61		2 900	3 600	4.850	-	-	
	215	47	3.0	3.0	127.5	-	**NU320E**	343.5	371.4	39.52		2 600	3 200	8.750	HJ320	0.882	
	215	47	3.0	3.0	127.5	-	**NJ320E**	343.5	371.4	39.52		2 600	3 200	8.750	HJ320	0.882	
	215	47	3.0	3.0	127.5	-	**NUP320E**	343.5	371.4	39.52		2 600	3 200	8.750	-	-	
	215	47	3.0	3.0	-	191.5	**N320E**	366.2	405.2	45.94		2 600	3 200	8.750	-	-	
	215	47	3.0	3.0	-	191.5	**NF320E**	343.5	371.4	39.52		2 600	3 200	8.750	-	-	
	215	47	3.0	3.0	127.5	-	**NU320EM**	389.2	439.0	46.71		2 600	3 200	8.750	HJ320	0.882	
	215	47	3.0	3.0	127.5	-	**NJ320EM**	389.2	439.0	46.71		2 600	3 200	8.750	HJ320	0.882	
	215	47	3.0	3.0	127.5	-	**NUP320EM**	389.2	439.0	46.71		2 600	3 200	8.750	-	-	
	215	47	3.0	3.0	-	191.5	**N320EM**	389.2	439.0	46.71		2 600	3 200	8.750	-	-	
	215	47	3.0	3.0	-	191.5	**NF320EM**	389.2	439.0	46.71		2 600	3 200	8.750	-	-	
	215	73	3.0	3.0	127.5	-	**NU2320EM**	579.2	731.6	77.85		2 600	3 200	12.100	HJ2320	0.934	
	215	73	3.0	3.0	127.5	-	**NJ2320EM**	579.2	731.6	77.85		2 600	3 200	12.100	HJ2320	0.934	
	215	73	3.0	3.0	127.5	-	**NUP2320EM**	579.2	731.6	77.85		2 600	3 200	12.100	-	-	
	215	73	3.0	3.0	-	191.5	**N2320EM**	579.2	731.6	77.85		2 600	3 200	12.100	-	-	



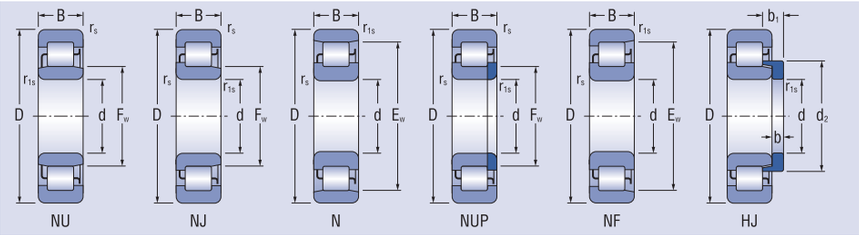
Dimensions							Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass of Bearings	Separate Thrust Collar	Mass of separate Thrust Collar	
								dynamic	static			grease	oil				
d	D	B	$r_{s\,min}$	$r_{s1\,min}$	F_w	E_w		C_r	C_{or}	C_u							
mm								kN				min^{-1}		kg		kg	
100	215	73	3.0	3.0	-	191.5	**NF2320EM**	579.2	731.6	77.85		2 600	3 200	12.100	-	-	
	250	58	4.0	4.0	139	-	**NU420EM**	453.9	507.3	52.30		2 300	2 900	15.560	HJ420	1.550	
	250	58	4.0	4.0	139	-	**NJ420EM**	453.9	507.3	52.30		2 300	2 900	15.560	HJ420	1.550	
	250	58	4.0	4.0	139	-	**NUP420EM**	453.9	507.3	52.30		2 300	2 900	15.560	-	-	
	250	58	4.0	4.0	-	211	**N420EM**	453.9	507.3	52.30		2 300	2 900	15.560	-	-	
	250	58	4.0	4.0	-	211	**NF420EM**	453.9	507.3	52.30		2 300	2 900	15.560	-	-	
105	160	26	2.0	1.1	119.5	-	**NU1021EM**	112.0	153.0	17.14		3 800	4 800	1.840	-	-	
	160	26	2.0	1.1	119.5	-	**NJ1021EM**	112.0	153.0	17.14		3 800	4 800	1.840	-	-	
	160	26	2.0	1.1	119.5	-	**NUP1021EM**	112.0	153.0	17.14		3 800	4 800	1.840	-	-	
	190	36	2.1	2.1	125.5	-	**NU221E**	240.3	277.8	30.15		2 700	3 400	4.630	HJ221	0.510	
	190	36	2.1	2.1	125.5	-	**NJ221E**	240.3	277.8	30.15		2 700	3 400	4.430	HJ221	0.510	
	190	36	2.1	2.1	125.5	-	**NUP221E**	240.3	277.8	30.15		2 700	3 400	4.430	-	-	
	190	36	2.1	2.1	-	171.5	**N221E**	240.3	277.8	30.15		2 700	3 400	4.430	-	-	
	190	36	2.1	2.1	-	171.5	**NF221E**	240.3	277.8	30.15		2 700	3 400	4.430	-	-	
	190	36	2.1	2.1	125.5	-	**NU221ETNG**	265.6	317.5	34.46		2 700	3 400	4.430	HJ221	0.510	
	190	36	2.1	2.1	125.5	-	**NJ221ETNG**	265.6	317.5	34.46		2 700	3 400	4.430	HJ221	0.510	
	190	36	2.1	2.1	125.5	-	**NUP221ETNG**	265.6	317.5	34.46		2 700	3 400	4.430	-	-	
	190	36	2.1	2.1	-	171.5	**N221ETNG**	265.6	317.5	34.46		2 700	3 400	4.430	-	-	
	190	36	2.1	2.1	-	171.5	**NF221ETNG**	265.6	317.5	34.46		2 700	3 400	4.430	-	-	
	225	49	3.0	3.0	133	-	**NU321EM**	436.4	495.6	51.82		2 400	2 900	10.130	HJ321	1.050	
	225	49	3.0	3.0	133	-	**NJ321EM**	436.4	495.6	51.82		2 400	2 900	10.130	HJ321	1.050	
	225	49	3.0	3.0	133	-	**NUP321EM**	436.4	495.6	51.82		2 400	2 900	10.130	-	-	
	225	49	3.0	3.0	-	201	**N321EM**	436.4	495.6	51.82		2 400	2 900	10.130	-	-	
	225	49	3.0	3.0	-	201	**NF321EM**	436.4	495.6	51.82		2 400	2 900	10.130	-	-	
110	170	28	2.0	1.1	125	-	**NU1022EM**	140.0	190.0	20.94		3 600	4 500	2.310	-	-	
	170	28	2.0	1.1	125	-	**NJ1022EM**	140.0	190.0	20.94		3 600	4 500	2.310	-	-	
	170	28	2.0	1.1	125	-	**NUP1022EM**	140.0	190.0	20.94		3 600	4 500	2.310	-	-	
	200	38	2.1	2.1	132.5	-	**NU222E**	256.1	305.4	32.56		2 600	3 200	5.670	HJ222	0.617	
	200	38	2.1	2.1	132.5	-	**NJ222E**	256.1	305.4	32.56		2 600	3 200	5.670	HJ222	0.617	
	200	38	2.1	2.1	132.5	-	**NUP222E**	256.1	305.4	32.56		2 600	3 200	5.670	-	-	
	200	38	2.1	2.1	-	180.5	**N222E**	256.1	305.4	32.56		2 600	3 200	5.670	-	-	
	200	38	2.1	2.1	-	180.5	**NF222E**	256.1	305.4	32.56		2 600	3 200	5.670	-	-	
	200	38	2.1	2.1	132.5	-	**NU222ETNG**	296.3	370.9	39.54		2 600	3 200	5.670	HJ222	0.617	
	200	38	2.1	2.1	132.5	-	**NJ222ETNG**	296.3	370.9	39.54		2 600	3 200	5.670	HJ222	0.617	
	200	38	2.1	2.1	132.5	-	**NUP222ETNG**	296.3	370.9	39.54		2 600	3 200	5.670	-	-	
	200	38	2.1	2.1	-	180.5	**N222ETNG**	296.3	370.9	39.54		2 600	3 200	5.670	-	-	
	200	38	2.1	2.1	-	180.5	**NF222ETNG**	296.3	370.9	39.54		2 600	3 200	5.670	-	-	
	200	38	2.1	2.1	132.5	-	**NU222EM**	283.1	349.0	37.21		2 600	3 200	5.670	HJ222	0.617	
	200	38	2.1	2.1	132.5	-	**NJ222EM**	283.1	349.0	37.21		2 600	3 200	5.670	HJ222	0.617	
	200	38	2.1	2.1	132.5	-	**NUP222EM**	283.1	349.0	37.21		2 600	3 200	5.670	-	-	
	200	38	2.1	2.1	-	180.5	**N222EM**	283.1	349.0	37.21		2 600	3 200	5.670	-	-	
	200	38	2.1	2.1	-	180.5	**NF222EM**	283.1	349.0	37.21		2 600	3 200	5.670	-	-	



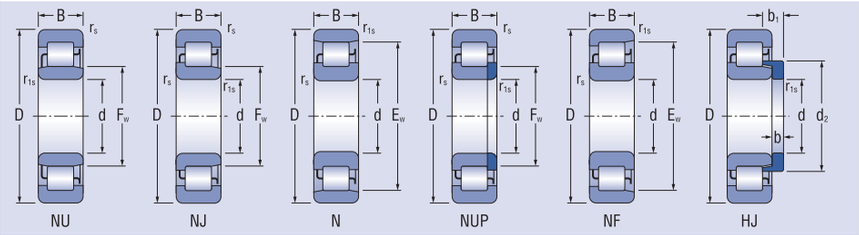
Dimensions							Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass of Bearings	Separate Thrust Collar	Mass of separate Thrust Collar	
								dynamic	static			grease	oil				
d	D	B	$r_{s\,min}$	$r_{s1\,min}$	F_w	E_w		C_r	C_{or}	C_u							
mm								kN				min^{-1}		kg		kg	
110	200	38	2.1	2.1	132.5	-	**NU222EM1**	296.3	370.9	39.54		2 600	3 200	5.670	HJ222	0.617	
	200	38	2.1	2.1	132.5	-	**NJ222EM1**	296.3	370.9	39.54		2 600	3 200	5.670	HJ222	0.617	
	200	38	2.1	2.1	132.5	-	**NUP222EM1**	296.3	370.9	39.54		2 600	3 200	5.670	-	-	
	200	38	2.1	2.1	-	180.5	**N222EM1**	296.3	370.9	39.54		2 600	3 200	5.670	-	-	
	200	38	2.1	2.1	-	180.5	**NF222EM1**	296.3	370.9	39.54		2 600	3 200	5.670	-	-	
	200	53	2.1	2.1	132.5	-	**NU2222EM**	369.8	492.1	55.62		2 600	3 200	6.890	HJ2222	0.647	
	200	53	2.1	2.1	132.5	-	**NJ2222EM**	369.8	492.1	55.62		2 600	3 200	6.890	HJ2222	0.647	
	200	53	2.1	2.1	132.5	-	**NUP2222EM**	369.8	492.1	55.62		2 600	3 200	6.890	-	-	
	200	53	2.1	2.1	-	180.5	**N2222EM**	369.8	492.1	55.62		2 600	3 200	6.890	-	-	
	200	53	2.1	2.1	-	180.5	**NF2222EM**	369.8	492.1	55.62		2 600	3 200	6.890	-	-	
	200	53	2.1	2.1	132.5	-	**NU2222EM1**	387.0	552.8	59.11		2 600	3 200	6.890	HJ2222	0.647	
	200	53	2.1	2.1	132.5	-	**NJ2222EM1**	387.0	552.8	59.11		2 600	3 200	6.890	HJ2222	0.647	
	200	53	2.1	2.1	132.5	-	**NUP2222EM1**	387.0	552.8	59.11		2 600	3 200	6.890	-	-	
	200	53	2.1	2.1	-	180.5	**N2222EM1**	387.0	552.8	59.11		2 600	3 200	6.890	-	-	
	200	53	2.1	2.1	-	180.5	**NF2222EM1**	387.0	552.8	59.11		2 600	3 200	6.890	-	-	
	240	50	3.0	3.0	143	-	**NU322EM**	462.4	541.5	55.64		2 100	2 600	11.700	HJ322	1.210	
	240	50	3.0	3.0	143	-	**NJ322EM**	462.4	541.5	55.64		2 100	2 600	11.700	HJ322	1.210	
	240	50	3.0	3.0	143	-	**NUP322EM**	462.4	541.5	55.64		2 100	2 600	11.700	-	-	
	240	50	3.0	3.0	-	211	**N322EM**	462.4	541.5	55.64		2 100	2 600	11.700	-	-	
	240	50	3.0	3.0	-	211	**NF322EM**	462.4	541.5	55.64		2 100	2 600	11.700	-	-	
	240	80	3.0	3.0	143	-	**NU2322EM**	647.6	832.7	85.86		2 100	2 600	17.000	HJ2322	1.250	
	240	80	3.0	3.0	143	-	**NJ2322EM**	647.6	832.7	85.86		2 100	2 600	17.000	HJ2322	1.250	
	240	80	3.0	3.0	143	-	**NUP2322EM**	647.6	832.7	85.86		2 100	2 600	17.000	-	-	
	240	80	3.0	3.0	-	211	**N2322EM**	647.6	832.7	85.86		2 100	2 600	17.000	-	-	
	240	80	3.0	3.0	-	211	**NF2322EM**	647.6	832.7	85.86		2 100	2 600	17.000	-	-	
	280	65	4.0	4.0	155	-	**NU422EM**	554.7	631.2	63.00		2 200	2 700	21.880	HJ422	2.120	
	280	65	4.0	4.0	155	-	**NJ422EM**	554.7	631.2	63.00		2 200	2 700	21.880	HJ422	2.120	
	280	65	4.0	4.0	155	-	**NUP422EM**	554.7	631.2	63.00		2 200	2 700	21.880	-	-	
	280	65	4.0	4.0	-	235	**N422EM**	554.7	631.2	63.00		2 200	2 700	21.880	-	-	
	280	65	4.0	4.0	-	235	**NF422EM**	554.7	631.2	63.00		2 200	2 700	21.880	-	-	
120	180	28	2.0	1.1	135	-	**NU1024EM**	150.0	208.0	22.46		3 300	4 000	2.470	-	-	
	180	28	2.0	1.1	135	-	**NJ1024EM**	150.0	208.0	22.46		3 300	4 000	2.470	-	-	
	180	28	2.0	1.1	135	-	**NNUP1024EM**	150.0	208.0	22.46		3 300	4 000	2.470	-	-	
	215	40	2.1	2.1	143.5	-	**NU224E**	312.5	383.5	40.07		2 400	3 000	6.870	HJ224	0.708	
	215	40	2.1	2.1	143.5	-	**NJ224E**	312.5	383.5	40.07		2 400	3 000	6.870	HJ224	0.708	
	215	40	2.1	2.1	143.5	-	**NUP224E**	312.5	383.5	40.07		2 400	3 000	6.870	-	-	
	215	40	2.1	2.1	-	195.5	**N224E**	312.5	383.5	40.07		2 400	3 000	6.870	-	-	
	215	40	2.1	2.1	-	195.5	**NF224E**	312.5	383.5	40.07		2 400	3 000	6.870	-	-	
	215	40	2.1	2.1	143.5	-	**NU224ETNG**	343.3	434.6	45.41		2 400	3 000	6.870	HJ224	0.708	
	215	40	2.1	2.1	143.5	-	**NJ224ETNG**	343.3	434.6	45.41		2 400	3 000	6.870	HJ224	0.708	
	215	40	2.1	2.1	143.5	-	**NUP224ETNG**	343.3	434.6	45.41		2 400	3 000	6.870	-	-	
	215	40	2.1	2.1	-	195.5	**N224ETNG**	343.3	434.6	45.41		2 400	3 000	6.870	-	-	



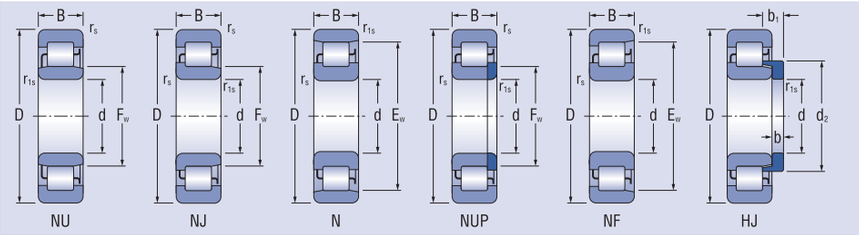
Dimensions							Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass of Bearings	Separate Thrust Collar	Mass of separate Thrust Collar	
								dynamic	static			grease	oil				
d	D	B	$r_{s\,min}$	$r_{s1\,min}$	F_w	E_w		C_r	C_{or}	C_u							
mm								kN				min^{-1}		kg		kg	
120	215	40	2.1	2.1	-	195.5	**NF224ETNG**	343.3	434.6	45.41		2 400	3 000	6.870	-	-	
	215	40	2.1	2.1	143.5	-	**NU224EM1**	343.3	434.6	45.41		2 400	3 000	6.870	HJ224	0.708	
	215	40	2.1	2.1	143.5	-	**NJ224EM1**	343.3	434.6	45.41		2 400	3 000	6.870	HJ224	0.708	
	215	40	2.1	2.1	143.5	-	**NUP224EM1**	343.3	434.6	45.41		2 400	3 000	6.870	-	-	
	215	40	2.1	2.1	-	195.5	**N224EM1**	343.3	434.6	45.41		2 400	3 000	6.870	-	-	
	215	40	2.1	2.1	-	195.5	**NF224EM1**	343.3	434.6	45.41		2 400	3 000	6.870	-	-	
	215	58	2.1	2.1	143.5	-	**NU2224EM**	439.0	595.1	62.16		2 200	3 000	8.540	HJ2224	0.751	
	215	58	2.1	2.1	143.5	-	**NJ2224EM**	439.0	595.1	62.16		2 200	3 000	8.540	HJ2224	0.751	
	215	58	2.1	2.1	143.5	-	**NUP2224EM**	439.0	595.1	62.16		2 200	3 000	8.540	-	-	
	215	58	2.1	2.1	-	195.5	**N2224EM**	439.0	595.1	62.16		2 200	3 000	8.540	-	-	
	215	58	2.1	2.1	-	195.5	**NF2224EM**	439.0	595.1	62.16		2 200	3 000	8.540	-	-	
	215	58	2.1	2.1	143.5	-	**NU2224EM1**	450.1	615.8	64.33		2 200	3 000	8.540	HJ2224	0.751	
	215	58	2.1	2.1	143.5	-	**NJ2224EM1**	450.1	615.8	64.33		2 200	3 000	8.540	HJ2224	0.751	
	215	58	2.1	2.1	143.5	-	**NUP2224EM1**	450.1	615.8	64.33		2 200	3 000	8.540	-	-	
	215	58	2.1	2.1	-	195.5	**N2224EM1**	450.1	615.8	64.33		2 200	3 000	8.540	-	-	
	215	58	2.1	2.1	-	195.5	**NF2224EM1**	450.1	615.8	64.33		2 200	3 000	8.540	-	-	
	260	55	3.0	3.0	154	-	**NU324EM**	535.0	620.6	62.24		1 900	2 400	14.900	HJ324	1.410	
	260	55	3.0	3.0	154	-	**NJ324EM**	535.0	620.6	62.24		1 900	2 400	14.900	HJ324	1.410	
	260	55	3.0	3.0	154	-	**NUP324EM**	535.0	620.6	62.24		1 900	2 400	14.900	-	-	
	260	55	3.0	3.0	-	230	**N324EM**	535.0	620.6	62.24		1 900	2 400	14.900	-	-	
	260	55	3.0	3.0	-	230	**NF324EM**	535.0	620.6	62.24		1 900	2 400	14.090	-	-	
	260	86	3.0	3.0	154	-	**NU2324EM**	798.6	1 037.1	108.34		1 900	2 400	25.000	HJ2324	1.450	
	260	86	3.0	3.0	154	-	**NJ2324EM**	798.6	1 037.1	108.34		1 900	2 400	25.000	HJ2324	1.450	
	260	86	3.0	3.0	154	-	**NUP2324EM**	798.6	1 037.1	108.34		1 900	2 400	25.000	-	-	
	260	86	3.0	3.0	-	230	**N2324EM**	798.6	1 037.1	108.34		1 900	2 400	25.000	-	-	
	260	86	3.0	3.0	-	230	**NF2324EM**	798.6	1 037.1	108.34		1 900	2 400	25.000	-	-	
130	200	33	2.0	1.1	148	-	**NU1026EM**	180.0	250.0	26.23		3 200	3 800	3.800	-	-	
	200	33	2.0	1.1	148	-	**NJ1026EM**	180.0	250.0	26.23		3 200	3 800	3.800	-	-	
	200	33	2.0	1.1	148	-	**NUP1026EM**	180.0	250.0	26.23		3 200	3 800	3.800	-	-	
	230	40	3.0	3.0	153.5	-	**NU226ETNG**	371.7	467.6	47.81		2 200	2 800	7.010	HJ226	0.780	
	230	40	3.0	3.0	153.5	-	**NJ226ETNG**	371.7	467.6	47.81		2 200	2 800	7.010	HJ226	0.780	
	230	40	3.0	3.0	153.5	-	**NUP226ETNG**	371.7	467.6	47.81		2 200	2 800	7.010	-	-	
	230	40	3.0	3.0	-	209.5	**N226ETNG**	371.7	467.6	47.81		2 200	2 800	7.010	-	-	
	230	40	3.0	3.0	-	209.5	**NF226ETNG**	371.7	467.6	47.81		2 200	2 800	7.010	-	-	
	230	40	3.0	3.0	153.5	-	**NU226EM**	351.0	433.5	44.31		2 200	2 800	7.010	HJ226	0.780	
	230	40	3.0	3.0	153.5	-	**NJ226EM**	351.0	433.5	44.31		2 200	2 800	7.010	HJ226	0.780	
	230	40	3.0	3.0	153.5	-	**NUP226EM**	351.0	433.5	44.31		2 200	2 800	7.010	-	-	
	230	40	3.0	3.0	-	209.5	**N226EM**	351.0	433.5	44.31		2 200	2 800	7.010	-	-	
	230	40	3.0	3.0	-	209.5	**NF226EM**	351.0	433.5	44.31		2 200	2 800	7.010	-	-	
	230	64	3.0	3.0	153.5	-	**NU2226EM**	509.7	700.2	71.58		2 200	2 800	10.600	HJ2226	0.860	
	230	64	3.0	3.0	153.5	-	**NJ2226EM**	509.7	700.2	71.58		2 200	2 800	10.600	HJ2226	0.860	
	230	64	3.0	3.0	153.5	-	**NUP2226EM**	509.7	700.2	71.58		2 200	2 800	10.600	-	-	



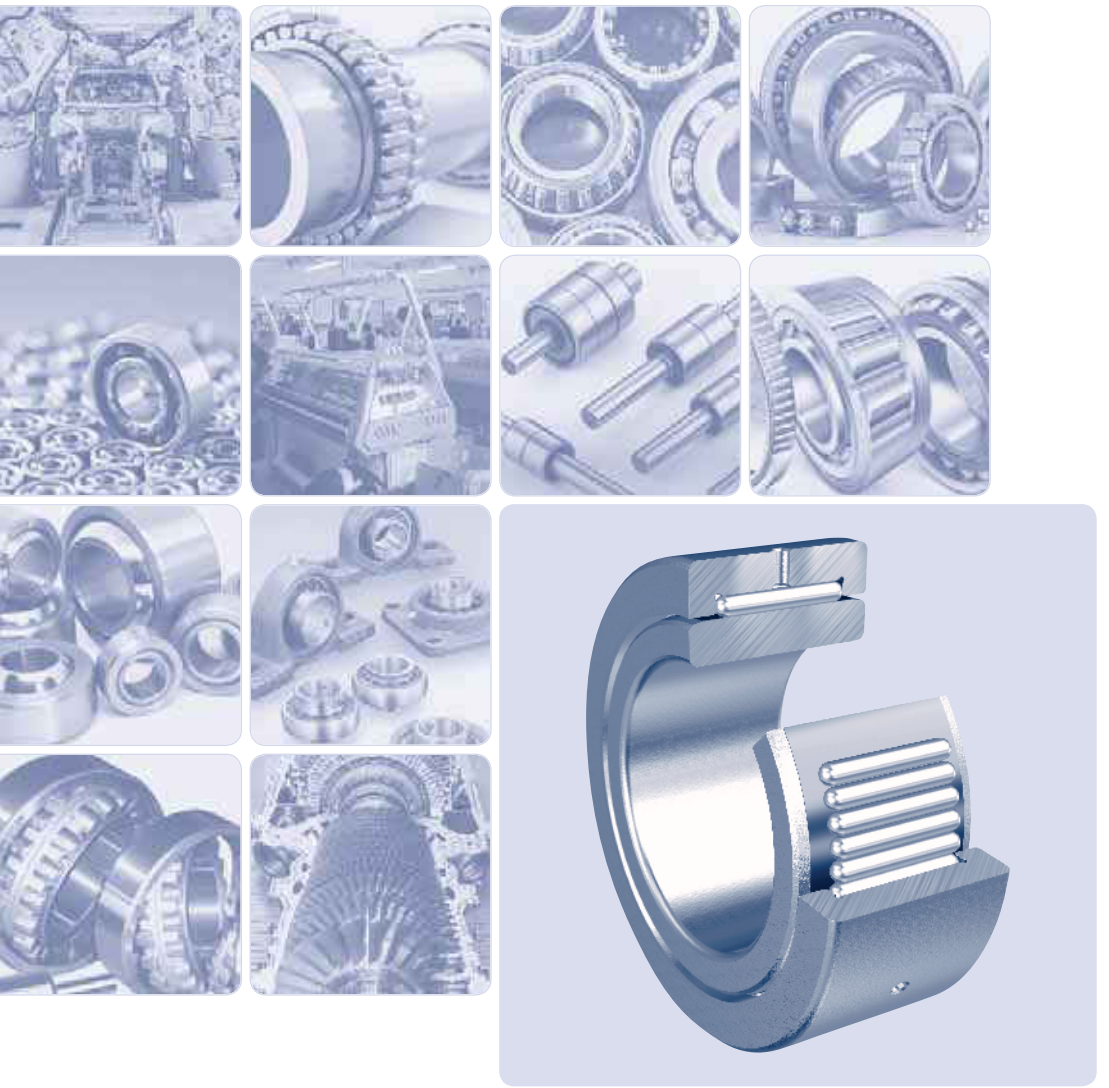
Dimensions							Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass of Bearings	Separate Thrust Collar	Mass of separate Thrust Collar	
								dynamic	static			grease	oil				
d	D	B	$r_{s\,min}$	$r_{s1\,min}$	F_w	E_w		C_r	C_{or}	C_u							
mm								kN				min^{-1}		kg		kg	
130	230	64	3.0	3.0	-	209.5	**N2226EM**	509.7	700.2	71.58		2 200	2 800	10.600	-	-	
	230	64	3.0	3.0	-	209.5	**NF2226EM**	509.7	700.2	71.58		2 200	2 800	10.600	-	-	
	280	58	4.0	4.0	167	-	**NU326EM**	590.2	694.0	68.03		1 800	2 200	18.200	HJ326	1.640	
	280	58	4.0	4.0	167	-	**NJ326EM**	590.2	694.0	68.03		1 800	2 200	18.200	HJ326	1.640	
	280	58	4.0	4.0	167	-	**NUP326EM**	590.2	694.0	68.03		1 800	2 200	18.200	-	-	
	280	58	4.0	4.0	-	247	**N326EM**	590.2	694.0	68.03		1 800	2 200	18.200	-	-	
	280	58	4.0	4.0	-	247	**NF326EM**	590.2	694.0	68.03		1 800	2 200	18.200	-	-	
140	210	33	2.0	1.1	158	-	**NU1028EM**	183.0	265.0	27.32		3 000	3 400	4.090	-	-	
	210	33	2.0	1.1	158	-	**NJ1028EM**	183.0	265.0	27.32		3 000	3 400	4.090	-	-	
	210	33	2.0	1.1	158	-	**NUP1028EM**	183.0	265.0	27.32		3 000	3 400	4.090	-	-	
	250	42	3.0	3.0	169	-	**NU228E**	369.7	473.5	47.26		2 000	2 600	9.290	HJ228	0.986	
	250	42	3.0	3.0	169	-	**NJ228E**	369.7	473.5	47.26		2 000	2 600	9.290	HJ228	0.986	
	250	42	3.0	3.0	169	-	**NUP228E**	369.7	473.5	47.26		2 000	2 600	9.290	-	-	
	250	42	3.0	3.0	-	225	**N228E**	369.7	473.5	47.26		2 000	2 600	9.290	-	-	
	250	42	3.0	3.0	-	225	**NF228E**	369.7	473.5	47.26		2 000	2 600	9.290	-	-	
	250	42	3.0	3.0	169	-	**NU228ETNG**	386.9	503.1	50.21		2 000	2 600	9.290	HJ228	0.986	
	250	42	3.0	3.0	169	-	**NJ228ETNG**	386.9	503.1	50.21		2 000	2 600	9.290	HJ228	0.986	
	250	42	3.0	3.0	169	-	**NUP228ETNG**	386.9	503.1	50.21		2 000	2 600	9.290	-	-	
	250	42	3.0	3.0	-	225	**N228ETNG**	386.9	503.1	50.21		2 000	2 600	9.290	-	-	
	250	42	3.0	3.0	-	225	**NF228ETNG**	386.9	503.1	50.21		2 000	2 600	9.290	-	-	
	250	42	3.0	3.0	169	-	**NU228EM**	386.9	503.1	50.21		2 000	2 600	9.290	HJ228	0.986	
	250	42	3.0	3.0	169	-	**NJ228EM**	386.9	503.1	50.21		2 000	2 600	9.290	HJ228	0.986	
	250	42	3.0	3.0	169	-	**NUP228EM**	386.9	503.1	50.21		2 000	2 600	9.290	-	-	
	250	42	3.0	3.0	-	225	**N228EM**	386.9	503.1	50.21		2 000	2 600	9.290	-	-	
	250	42	3.0	3.0	-	225	**NF228EM**	386.9	503.1	50.21		2 000	2 600	9.290	-	-	
	250	68	3.0	3.0	169	-	**NU2228EM**	530.4	754.6	75.09		2 000	2 600	14.700	HJ2228	1.080	
	250	68	3.0	3.0	169	-	**NJ2228EM**	530.4	754.6	75.09		2 000	2 600	14.700	HJ2228	1.080	
	250	68	3.0	3.0	169	-	**NUP2228EM**	530.4	754.6	75.09		2 000	2 600	14.700	-	-	
	250	68	3.0	3.0	-	225	**N2228EM**	530.4	754.6	75.09		2 000	2 600	14.700	-	-	
	250	68	3.0	3.0	-	225	**NF2228EM**	530.4	754.6	75.09		2 000	2 600	14.700	-	-	
	300	62	4.0	4.0	180	-	**NU328EM**	649.8	798.3	76.84		1 700	2 100	23.000	HJ328	2.050	
	300	62	4.0	4.0	180	-	**NJ328EM**	649.8	798.3	76.84		1 700	2 100	23.000	HJ328	2.050	
	300	62	4.0	4.0	180	-	**NUP3208EM**	649.8	798.3	76.84		1 700	2 100	23.000	-	-	
	300	62	4.0	4.0	-	260	**N328EM**	649.8	798.3	76.84		1 700	2 100	23.000	-	-	
	300	62	4.0	4.0	-	260	**NF3208EM**	649.8	798.3	76.84		1 700	2 100	23.000	-	-	
150	225	35	2.1	1.5	169.5	-	**NU1030EM**	208.0	310.0	31.30		2 700	3 200	4.930	-	-	
	225	35	2.1	1.5	169.5	-	**NJ1030EM**	208.0	310.0	31.30		2 700	3 200	4.930	-	-	
	225	35	2.1	1.5	169.5	-	**NUP1030EM**	208.0	310.0	31.30		2 700	3 200	4.930	-	-	
	270	45	3.0	3.0	182	-	**NU230EM**	435.0	571.1	55.75		1 900	2 400	11.900	HJ230	1.260	
	270	45	3.0	3.0	182	-	**NJ230EM**	435.0	571.1	55.75		1 900	2 400	11.900	HJ230	1.260	
	270	45	3.0	3.0	182	-	**NUP230EM**	435.0	571.1	55.75		1 900	2 400	11.900	-	-	
	270	45	3.0	3.0	-	242	**N230EM**	435.0	571.1	55.75		1 900	2 400	11.900	-	-	



Dimensions							Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass of Bearings	Separate Thrust Collar	Mass of separate Thrust Collar	
								dynamic	static			grease	oil				
d	D	B	$r_{s\,min}$	$r_{s1\,min}$	F_w	E_w		C_r	C_{or}	C_u							
mm								kN				min^{-1}		kg		kg	
150	270	45	3.0	3.0	-	242	**NF230EM**	435.0	571.1	55.75		1 900	2 400	11.900	-	-	
	270	73	3.0	3.0	182	-	**NU2230EM1**	640.0	938.3	91.59		1 900	2 500	18.500	HJ2230	1.350	
	270	73	3.0	3.0	182	-	**NJ2230EM1**	640.0	938.3	91.59		1 900	2 500	18.500	HJ2230	1.350	
	270	73	3.0	3.0	182	-	**NUP2230EM1**	640.0	938.3	91.59		1 900	2 500	18.500	-	-	
	270	73	3.0	3.0	-	242	**N2230EM1**	640.0	938.3	91.59		1 900	2 500	18.500	-	-	
	270	73	3.0	3.0	-	242	**NF2230EM1**	640.0	938.3	91.59		1 900	2 500	18.500	-	-	
	320	65	4.0	4.0	193	-	**NU330EM**	772.0	944.1	88.91		1 600	2 000	28.500	HJ330	2.300	
	320	65	4.0	4.0	193	-	**NJ330EM**	772.0	944.1	88.91		1 600	2 000	28.500	HJ330	2.300	
	320	65	4.0	4.0	193	-	**NUP330EM**	772.0	944.1	88.91		1 600	2 000	28.500	-	-	
	320	65	4.0	4.0	-	283	**N330EM**	772.0	944.1	88.91		1 600	2 000	28.500	-	-	
	320	65	4.0	4.0	-	283	**NF330EM**	772.0	944.1	88.91		1 600	2 000	28.500	-	-	
160	240	38	2.1	1.5	180	-	**NU1032EM**	245.0	355.0	35.16		2 500	3 000	5.920	-	-	
	240	38	2.1	1.5	180	-	**NJ1032EM**	245.0	355.0	35.16		2 500	3 000	5.920	-	-	
	240	38	2.1	1.5	180	-	**NUP1032EM**	245.0	355.0	35.16		2 500	3 000	5.920	-	-	
	290	48	3.0	3.0	195	-	**NU232EM**	492.0	653.1	62.45		1 800	2 300	14.500	HJ232	1.500	
	290	48	3.0	3.0	195	-	**NJ232EM**	492.0	653.1	62.45		1 800	2 300	14.500	HJ232	1.500	
	290	48	3.0	3.0	195	-	**NUP232EM**	492.0	653.1	62.45		1 800	2 300	14.500	-	-	
	290	48	3.0	3.0	-	259	**N232EM**	492.0	653.1	62.45		1 800	2 300	14.500	-	-	
	290	48	3.0	3.0	-	259	**NF232EM**	492.0	653.1	62.45		1 800	2 300	14.500	-	-	
170	260	42	2.1	2.1	193	-	**NU1034EM**	300.0	430.0	41.68		2 300	2 800	7.960	-	-	
	260	42	2.1	2.1	193	-	**NJ1034EM**	300.0	430.0	41.68		2 300	2 800	7.960	-	-	
	260	42	2.1	2.1	193	-	**NUP1034EM**	300.0	430.0	41.68		2 300	2 800	7.960	-	-	
	310	52	4.0	4.0	207	-	**NU234EM**	586.0	770.7	72.28		1 700	2 200	19.00	HJ234	1.650	
	310	52	4.0	4.0	207	-	**NJ234EM**	586.0	770.7	72.28		1 700	2 200	19.00	HJ234	1.650	
	310	52	4.0	4.0	207	-	**NUP234EM**	586.0	770.7	72.28		1 700	2 200	19.00	-	-	
	310	52	4.0	4.0	-	279	**N234EM**	586.0	770.7	72.28		1 700	2 200	19.00	-	-	
	310	52	4.0	4.0	-	279	**NF234EM**	586.0	770.7	72.28		1 700	2 200	19.00	-	-	
180	280	46	2.1	2.1	205	-	**NU1036EM**	360.0	520.0	49.39		2 100	2 600	10.500	-	-	
	280	46	2.1	2.1	205	-	**NJ1036EM**	360.0	520.0	49.39		2 100	2 600	10.500	-	-	
	280	46	2.1	2.1	205	-	**NUP1036EM**	360.0	520.0	49.39		2 100	2 600	10.500	-	-	
	320	52	4.0	4.0	217	-	**NU236EM**	609.6	821.7	76.12		1 600	2 000	21.000	HJ236	1.700	
	320	52	4.0	4.0	217	-	**NJ236EM**	609.6	821.7	76.12		1 600	2 000	21.000	HJ236	1.700	
	320	52	4.0	4.0	217	-	**NUP236EM**	609.6	821.7	76.12		1 600	2 000	21.000	-	-	
	320	52	4.0	4.0	-	289	**N236EM**	609.6	821.7	76.12		1 600	2 000	21.000	-	-	
	320	52	4.0	4.0	-	289	**NF236EM**	609.6	821.7	76.12		1 600	2 000	21.000	-	-	
190	290	46	2.1	2.1	215	-	**NU1038EM**	365.0	550.0	51.57		2 000	2 400	10.900	-	-	
	290	46	2.1	2.1	215	-	**NJ1038EM**	365.0	550.0	51.57		2 000	2 400	10.900	-	-	
	290	46	2.1	2.1	215	-	**NUP1038EM**	365.0	550.0	51.57		2 000	2 400	10.900	-	-	



Dimensions							Bearing designation	Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass of Bearings	Separate Thrust Collar	Mass of separate Thrust Collar	
								dynamic	static			grease	oil				
d	D	B	$r_{s\,min}$	$r_{s1\,min}$	F_w	E_w		C_r	C_{or}	C_u							
mm								kN				min^{-1}		kg		kg	
200	310	51	2.1	2.1	229	-	**NU1040EM**	400.0	600.0	55.25		1 900	2 200	14.100	-	-	
	310	51	2.1	2.1	229	-	**NJ1040EM**	400.0	600.0	55.25		1 900	2 200	14.100	-	-	
	310	51	2.1	2.1	229	-	**NUP1040EM**	400.0	600.0	55.25		1 900	2 200	14.100	-	-	
	380	58	4.0	4.0	243	-	**NU240EM**	745.1	1 022.8	91.60		1 400	1 800	38.000	HJ240	2.550	
	380	58	4.0	4.0	243	-	**NJ240EM**	745.1	1 022.8	91.60		1 400	1 800	38.000	HJ240	2.550	
	380	58	4.0	4.0	243	-	**NUP240EM**	745.1	1 022.8	91.60		1 400	1 800	38.000	-	-	
	380	58	4.0	4.0	-	323	**N240EM**	745.1	1 022.8	91.60		1 400	1 800	38.000	-	-	
	380	58	4.0	4.0	-	323	**NF240EM**	745.1	1 022.8	91.60		1 400	1 800	38.000	-	-	
220	340	56	3.0	3.0	250	-	**NU1044EM**	510.0	765.0	68.50		1 700	2 000	18.500	-	-	
	340	56	3.0	3.0	250	-	**NJ1044EM**	510.0	765.0	68.50		1 700	2 000	18.500	-	-	
	340	56	3.0	3.0	250	-	**NUP1044EM**	510.0	765.0	68.50		1 700	2 000	18.500	-	-	
240	360	56	3.0	3.0	270	-	**NU1048EM**	540.0	850.0	74.55		1 600	1 900	20.400	-	-	
	360	56	3.0	3.0	270	-	**NJ1048EM**	540.0	850.0	74.55		1 600	1 900	20.400	-	-	
	360	56	3.0	3.0	270	-	**NUP1048EM**	540.0	850.0	74.55		1 600	1 900	20.400	-	-	
260	400	65	4.0	4.0	296	-	**NU1052EM**	655.0	1 020.0	86.94		1 500	1 800	29.900	-	-	
	400	65	4.0	4.0	296	-	**NJ1052EM**	655.0	1 020.0	86.94		1 500	1 800	29.900	-	-	
	400	65	4.0	4.0	296	-	**NUP1052EM**	655.0	1 020.0	86.94		1 500	1 800	29.900	-	-	
280	420	65	4.0	4.0	316	-	**NU1056EM**	680.0	1 100.0	92.12		1 350	1 600	31.400	-	-	
	420	65	4.0	4.0	316	-	**NJ1056EM**	680.0	1 100.0	92.12		1 350	1 600	31.400	-	-	
	420	65	4.0	4.0	316	-	**NUP1056EM**	680.0	1 100.0	92.12		1 350	1 600	31.400	-	-	
300	460	74	4.0	4.0	340	-	**NU1060EM**	900.0	1 430.0	116.83		1 200	1 400	44.300	-	-	
	460	74	4.0	4.0	340	-	**NJ1060EM**	900.0	1 430.0	116.83		1 200	1 400	44.300	-	-	
	460	74	4.0	4.0	340	-	**NUP1060EM**	900.0	1 430.0	116.83		1 200	1 400	44.300	-	-	



Needle Roller Bearings

Needle bearings with guide ribs without and with inner ring

Needle bearings with guide ribs without and with inner ring

Needle bearings without inner ring and with inner ring are the roller bearings for high loading with simple spatial construction. Needle rollers guided evenly to the axis in fix cage are made with tolerance diameter of 2 µm. Outer ring with ribs and a cage with needle rollers create the construction unit.

Needle bearings with ribs without inner ring are supplied in following design: NK, NKS, RNA 49, RNA 69.
Needle bearings with ribs with inner ring are supplied in following design: NKI, NKIS, NA48, NA49, NA 69.

Needle bearings with ribs without inner ring

Needle bearings without inner ring allow optimal solution of the placing problem, whereby the raceway on the shaft may be hardened or grinded. Compared to the bearings with inner ring, it is possible to produce reinforced shafts and enhance the operation accuracy of the bearing as the tolerance of inner ring is eliminated.

The shell circle of these needle bearings when not assembled is in the tolerance field of F6. The shell circle is a inner circle made by the needle rollers when they touch to the raceway of the outer ring without clearance.

For lubrication purposes the bearings have a lubrication groove and opening, this does not apply for bearings NK F ≤ 10 mm.

Needle bearings with ribs, with inner rings

The design with inner ring is used when the raceway cannot be made on the shaft. Outer ring with a cage and inner ring may be assembled independently.
The shift values (“s”) specified in the dimension tables cannot be exceeded in view of the manufacturing tolerances and the thermal expansion of connecting elements during operation. If the table values are insufficient, needle bearings may be combined with wider IR and LR rings, as shown in the dimension tables.

For lubrication purposes the bearings have a lubrication groove and opening, this does not apply for bearings NKI d ≤ 7 mm.

Main dimensions

Main dimensions of needle bearings, which are given by the dimensional tables, correspond to the international dimensional plan of ISO 1206.

Designation

Designation of needle roller bearings in the basic design is stated in dimensional tables.

Cages

Needle bearings have a steel cage which is not marked. For special cases of placing some bearings are made with a polyamide cage which is marked TV. Supply of the bearings with this cage must be negotiated in advance.

Tolerance

Needle bearings are produced in normal tolerance degree P0 (P0 symbol is not marked). For special placing, demanding high accuracy, bearings with higher degree of accuracy P6 are supplied.

Radial clearance

Normally produced needle bearings have normal radial clearance which is not marked. Bearings with reduced (C2) or increased (C3, C4, C5) radial clearance are supplied for special placing cases.

The radial clearance of needle roller bearings with inner rings corresponds to the ISO 5753-1 norm.

Misalignment

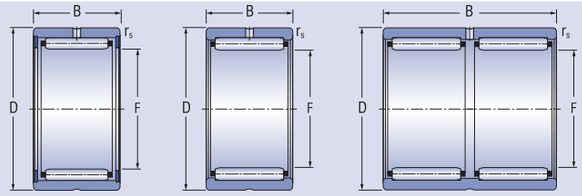
In the case of needle bearings with inner rings, rings can only be tilted slightly. The admissible misalignment is up to 2´. The specific admissible misalignment depends on the internal bearing design, radial clearance during operation, and the force and torque transmitted by the bearing. The quoted value is therefore approximate.

Dynamic equivalent radial load

$$P_r = F_r$$

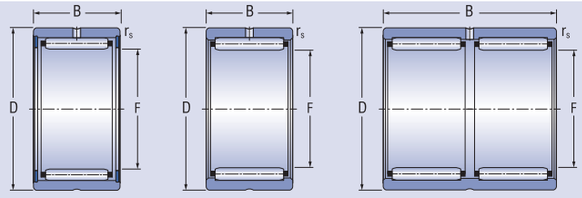
Static equivalent radial load

$$P_{or} = F_r$$



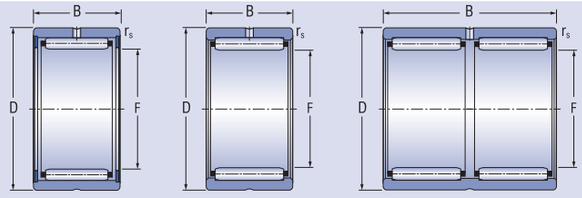
NK (F ≤ 10 mm) NK (F ≥ 12 mm), NKS (F ≥ 14 mm) R NA49, R NA69 (F ≤ 35 mm) R NA69 (F ≥ 40 mm)

Dimensions					Designation	Basic load ratings		Fatigue load limit		Limiting speeds for lubrication with		Mass	
						dynamic	static			grease	oil		
d	D	B	r_s	F		C_r	C_{or}	C_u					
mm						kN				min^{-1}		kg	
5	10	10	0.15	5	**NK5/10TV**	2.1	1.8	0.214		26 000	40 000	0.004	
	10	12	0.15	5	**NK5/12TV**	2.9	2.7	0.329		26 000	40 000	0.004	
6	12	10	0.15	6	**NK6/10**	2.6	2.2	0.268		22 000	36 000	0.005	
	12	12	0.15	6	**NK6/12TN**	3.4	3.1	0.384		22 000	36 000	0.006	
7	14	10	0.3	7	**NK7/10TN**	2.9	2.7	0.329		20 000	34 000	0.007	
	14	12	0.3	7	**NK7/12TN**	3.7	3.6	0.439		20 000	34 000	0.009	
8	15	12	0.3	8	**NK8/12**	4.0	4.1	0.500		19 000	32 000	0.011	
	15	16	0.3	8	**NK8/16**	5.6	5.8	0.707		19 000	32 000	0.013	
9	16	12	0.3	9	**NK9/12**	4.9	5.0	0.603		18 000	30 000	0.012	
	16	16	0.3	9	**NK9/16**	6.5	7.1	0.865		18 000	30 000	0.015	
10	17	12	0.3	10	**NK10/12**	5.2	5.5	0.670		17 000	28 000	0.013	
	17	16	0.3	10	**NK10/16**	5.6	7.4	0.896		17 000	28 000	0.016	
12	19	12	0.3	12	**NK12/12**	5.7	6.6	0.798		16 000	26 000	0.013	
	19	16	0.3	12	**NK12/16**	8.2	9.8	1.195		16 000	26 000	0.018	
14	22	13	0.3	14	**R NA4900**	8.2	9.2	1.115		16 000	26 000	0.018	
	22	16	0.3	14	**NK14/16**	11.0	13.7	1.670		16 000	26 000	0.023	
	22	20	0.3	14	**NK14/20**	13.2	17.3	2.109		16 000	26 000	0.028	
15	23	16	0.3	15	**NK15/16**	10.8	13.7	1.670		16 000	26 000	0.024	
	23	20	0.3	15	**NK15/20**	13.2	17.3	2.109		16 000	26 000	0.031	
16	24	13	0.3	16	**R NA4901**	9.0	11.0	1.341		15 000	24 000	0.020	
	24	16	0.3	16	**NK16/16**	11.4	15.0	1.829		15 000	24 000	0.025	
	24	20	0.3	16	**NK16/20**	13.7	19.0	2.317		15 000	24 000	0.032	
	24	22	0.3	16	**R NA6901**	14.3	20.0	2.439		15 000	24 000	0.036	
17	25	16	0.3	17	**NK17/16**	12.0	16.0	1.951		15 000	24 000	0.027	
	25	20	0.3	17	**NK17/20**	15.0	19.0	2.317		15 000	24 000	0.034	
18	26	16	0.3	18	**NK18/16**	12.0	16.3	1.987		15 000	24 000	0.028	
	26	20	0.3	18	**NK18/20**	14.3	20.4	2.487		15 000	24 000	0.035	
19	27	16	0.3	19	**NK19/16**	13.0	17.0	2.073		14 000	22 000	0.037	
	27	20	0.3	19	**NK19/20**	15.0	22.0	2.682		14 000	22 000	0.039	
20	28	13	0.3	20	**R NA4902**	11.0	12.9	1.573		13 000	20 000	0.023	
	28	16	0.3	20	**NK20/16**	12.5	17.6	2.146		13 000	20 000	0.032	
	28	20	0.3	20	**NK20/20**	15.6	23.6	2.878		13 000	20 000	0.038	
	28	23	0.3	20	**R NA6902**	16.6	25.5	3.109		13 000	20 000	0.042	
	32	20	0.6	20	**NKS20**	22.0	25.0	3.048		13 000	20 000	0.058	
21	29	16	0.3	21	**NK21/16**	13.4	20.0	2.439		13 000	20 000	0.032	
	29	20	0.3	21	**NK21/20**	16.3	25.0	3.048		13 000	20 000	0.040	
22	30	13	0.3	22	**R NA4903**	10.4	14.6	1.780		12 000	19 000	0.025	
	30	16	0.3	22	**NK22/16**	13.4	20.0	2.439		12 000	19 000	0.033	
	30	20	0.3	22	**NK22/20**	16.0	25.0	3.048		12 000	19 000	0.041	
	30	23	0.3	22	**R NA6903**	18.0	29.0	3.536		12 000	19 000	0.056	
	35	20	0.6	22	**NKS22**	20.8	25.5	3.109		12 000	19 000	0.069	



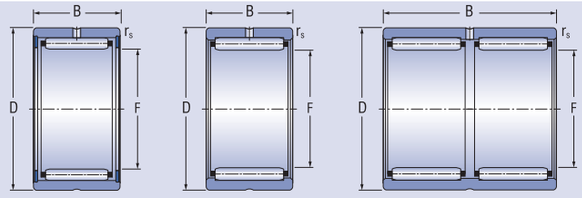
NK (F ≤ 10 mm) NK (F ≥ 12 mm), NKS (F ≥ 14 mm) R NA49, R NA69 (F ≤ 35 mm) R NA69 (F ≥ 40 mm)

Dimensions					Designation	Basic load ratings		Fatigue load limit		Limiting speeds for lubrication with		Mass	
						dynamic	static			grease	oil		
d	D	B	r_s	F		C_r	C_{or}	C_u					
mm						kN				min^{-1}		kg	
24	32	16	0.3	24	**NK24/16**	14.3	22.4	2.731		10 000	17 000	0.035	
	32	20	0.3	24	**NK24/20**	17.3	28.5	3.475		10 000	17 000	0.045	
	37	20	0.6	24	**NKS24**	26.0	31.0	3.780		10 000	17 000	0.073	
25	33	16	0.3	25	**NK25/16**	14.3	22.4	2.731		10 000	17 000	0.037	
	33	20	0.3	25	**NK25/20**	17.0	28.5	3.475		10 000	17 000	0.047	
	37	17	0.3	25	**R NA4904**	19.0	23.6	2.878		10 000	17 000	0.061	
	37	30	0.3	25	**R NA6904**	33.5	49.0	5.975		10 000	17 000	0.091	
	38	20	0.6	25	**NKS25**	25.8	31.0	3.780		10 000	17 000	0.076	
26	34	16	0.3	26	**NK26/16**	14.6	23.6	2.878		9 500	16 000	0.039	
	34	20	0.3	26	**NK26/20**	17.6	30.0	3.658		9 500	16 000	0.048	
28	37	20	0.3	28	**NK28/20**	20.0	32.0	3.902		9 000	15 000	0.057	
	37	30	0.3	28	**NK28/30**	26.5	52.0	6.341		9 000	15 000	0.088	
	39	17	0.3	28	**R NA49/22**	20.8	27.5	3.353		9 000	15 000	0.059	
	39	30	0.3	28	**R NA69/22**	40.8	51.0	6.219		9 000	15 000	0.107	
	42	20	0.6	28	**NKS28**	27.5	36.5	4.451		9 000	15 000	0.094	
29	38	20	0.3	29	**NK29/20**	20.8	34.0	4.146		8 500	14 000	0.059	
	38	30	0.3	29	**NK29/30**	27.0	54.0	6.585		8 500	14 000	0.090	
30	40	20	0.3	30	**NK30/20**	21.6	36.0	4.390		8 500	14 000	0.071	
	40	30	0.3	30	**NK30/30**	31.5	58.5	7.134		8 500	14 000	0.107	
	42	17	0.3	30	**R NA4905**	21.6	30.0	3.658		8 500	14 000	0.071	
	42	30	0.3	30	**R NA6905**	36.5	57.0	6.951		8 500	14 000	0.127	
	45	22	0.6	30	**NKS30**	31.0	40.5	4.939		8 500	14 000	0.114	
32	42	20	0.3	32	**NK32/20**	22.0	37.5	4.573		8 000	13 000	0.074	
	42	30	0.3	32	**NK32/30**	32.5	62.0	7.560		8 000	13 000	0.122	
	45	17	0.3	32	**R NA49/28**	22.4	31.5	3.841		8 000	13 000	0.080	
	45	30	0.3	32	**R NA69/28**	40.0	60.0	7.317		8 000	13 000	0.140	
	47	22	0.6	32	**NKS32**	32.5	44.0	5.365		8 000	13 000	0.120	
35	45	20	0.3	35	**NK35/20**	23.2	41.5	5.060		7 500	12 000	0.081	
	45	30	0.3	35	**NK35/30**	34.0	68.0	8.292		7 500	12 000	0.122	
	47	17	0.3	35	**R NA4906**	23.2	33.5	4.085		7 500	12 000	0.081	
	47	30	0.3	35	**R NA6906**	39.0	65.5	7.987		7 500	12 000	0.148	
	50	22	0.6	35	**NKS35**	34.0	47.5	5.792		7 500	12 000	0.130	
37	47	20	0.3	37	**NK37/20**	23.6	43.5	5.304		7 000	11 000	0.084	
	47	30	0.3	37	**NK37/30**	34.5	71.0	8.658		7 000	11 000	0.128	
	52	22	0.6	37	**NKS37**	35.5	51.0	6.219		7 000	11 000	0.134	
38	48	20	0.3	38	**NK38/20**	20.8	41.5	5.060		7 000	11 000	0.087	
	48	30	0.3	38	**NK38/30**	30.5	68.0	8.292		7 000	11 000	0.131	



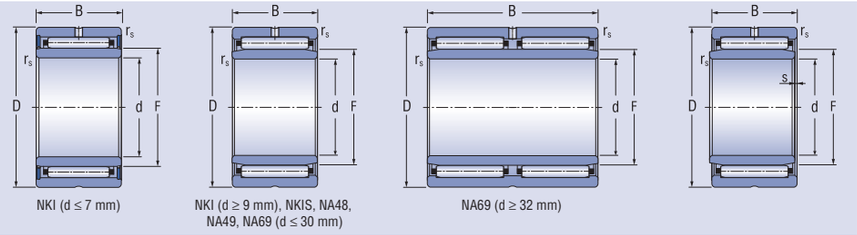
NK (F ≤ 10 mm) NK (F ≥ 12 mm), NKS (F ≥ 14 mm) R NA49, R NA69 (F ≤ 35 mm) R NA69 (F ≥ 40 mm)

Dimensions					Designation	Basic load ratings		Fatigue load limit		Limiting speeds for lubrication with		Mass	
						dynamic	static			grease	oil		
d	D	B	r_s	F		C_r	C_{or}	C_u					
mm						kN				min^{-1}		kg	
40	50	20	0.3	40	**NK40/20**	25.0	47.5	5.792		6 700	10 000	0.089	
	50	30	0.3	40	**NK40/30**	36.5	76.5	9.329		6 700	10 000	0.137	
	52	20	0.6	40	**R NA49/32**	28.5	46.5	5.670		6 700	10 000	0.100	
	52	36	0.6	40	**R NA69/32**	43.0	78.0	9.512		6 700	10 000	0.185	
	55	22	0.6	40	**NKS40**	36.5	54.0	6.585		6 700	10 000	0.140	
42	52	20	0.3	42	**NK42/20**	25.5	49.0	5.764		6 700	10 000	0.085	
	52	30	0.3	42	**NK42/30**	37.5	80.0	9.756		6 700	10 000	0.141	
	55	20	0.6	42	**R NA4907**	29.0	49.0	5.975		6 700	10 000	0.114	
	55	36	0.6	42	**R NA6907**	44.0	83.0	10.121		6 700	10 000	0.218	
43	53	20	0.3	43	**NK43/20**	25.7	51.0	6.219		6 300	9 500	0.096	
	53	30	0.3	43	**NK43/30**	38.0	83.0	10.121		6 300	9 500	0.134	
	58	22	0.6	43	**NKS43**	37.5	57.0	6.951		6 300	9 500	0.150	
45	55	20	0.3	45	**NK45/20**	26.5	53.0	6.463		6 300	9 500	0.100	
	55	30	0.3	45	**NK45/30**	39.0	86.5	10.548		6 300	9 500	0.151	
	60	22	0.6	45	**NKS45**	39.0	61.0	7.439		6 300	9 500	0.156	
47	57	20	0.3	47	**NK47/20**	27.0	55.0	6.707		6 000	9 000	0.104	
	57	30	0.3	47	**NK47/30**	39.0	90.0	10.975		6 000	9 000	0.158	
48	62	22	0.6	48	**R NA4908**	40.0	64.0	7.804		5 600	8 500	0.154	
	62	40	0.6	48	**R NA6908**	64.0	118.0	14.390		5 600	8 500	0.300	
50	62	25	0.6	50	**NK50/25**	37.5	76.5	9.329		5 600	8 500	0.171	
	62	35	0.6	50	**NK50/35**	51.0	114.0	13.902		5 600	8 500	0.242	
	65	22	1.0	50	**NKS50**	41.5	68.0	8.292		5 600	8 500	0.170	
52	68	22	0.6	52	**R NA4909**	41.5	69.5	8.475		5 300	8 000	0.201	
	68	40	0.6	52	**R NA6909**	65.5	125.0	15.243		5 300	8 000	0.392	
55	68	25	0.6	55	**NK55/25**	41.5	81.5	5.060		5 000	7 500	0.207	
	68	35	0.6	55	**NK55/35**	57.0	122.0	14.878		5 000	7 500	0.293	
	72	22	1.0	55	**NKS55**	42.5	72.0	8.780		5 000	7 500	0.225	
58	72	22	0.6	58	**R NA4910**	43.0	76.5	9.329		4 800	7 000	0.179	
	72	40	0.6	58	**R NA6910**	67.0	132.0	16.097		4 800	7 000	0.364	
60	72	25	0.6	60	**NK60/25**	40.0	88.0	10.731		4 800	7 000	0.202	
	72	35	0.6	60	**NK60/35**	55.0	132.0	16.097		4 800	7 000	0.286	
	80	28	1.1	60	**NKS60**	60.0	98.0	11.951		4 800	7 000	0.337	
63	80	25	1.0	63	**R NA4911**	56.0	99.6	12.146		4 500	6 700	0.285	
	80	45	1.0	63	**R NA6911**	83.0	160.0	19.512		4 500	6 700	0.540	
65	78	25	0.6	65	**NK65/25**	43.0	91.5	11.158		4 300	6 300	0.257	
	78	35	0.6	65	**NK65/35**	60.0	137.0	16.707		4 300	6 300	0.300	
	85	28	1.1	65	**NKS65**	64.0	108.0	13.170		4 300	6 300	0.362	
68	82	25	0.6	68	**NK68/25**	43.5	95.0	11.585		4 000	6 000	0.287	
	82	35	0.6	68	**NK68/35**	60.0	143.0	17.439		4 000	6 000	0.350	
	85	25	1.0	68	**R NA4912**	58.5	108.0	13.170		4 000	6 000	0.304	
	85	45	1.0	68	**R NA6912**	71.0	176.0	21.463		4 000	6 000	0.570	



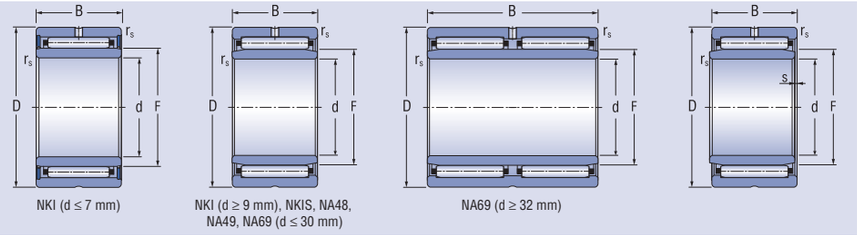
NK (F ≤ 10 mm) NK (F ≥ 12 mm), NKS (F ≥ 14 mm) R NA49, R NA69 (F ≤ 35 mm) R NA69 (F ≥ 40 mm)

Dimensions					Designation	Basic load ratings		Fatigue load limit		Limiting speeds for lubrication with		Mass	
						dynamic	static			grease	oil		
d	D	B	r_s	F		C_r	C_{or}	C_u					
mm						kN				min^{-1}		kg	
70	85	25	0.6	70	**NK70/25**	41.5	90.5	11.036		4 000	6 000	0.298	
	85	35	0.6	70	**NK70/35**	58.5	140.0	17.073		4 000	6 000	0.411	
	90	28	1.1	70	**NKS70**	65.5	114.0	13.902		4 000	6 000	0.383	
72	90	25	1.0	72	**R NA4913**	58.5	114.0	13.902		4 000	6 000	0.346	
	90	45	1.0	72	**R NA6913**	95.0	196.0	23.902		4 000	6 000	0.679	
73	90	25	0.6	73	**NK73/25**	95.0	112.0	13.658		3 800	5 600	0.320	
	90	35	0.6	73	**NK73/35**	75.0	166.0	20.243		3 800	5 600	0.450	
75	92	25	0.6	75	**NK75/25**	41.5	91.5	11.158		3 800	5 600	0.364	
	92	23	0.6	75	**NK75/35**	58.5	143.0	17.439		3 800	5 600	0.518	
	95	28	1.1	75	**NKS75**	69.5	125.0	15.243		3 800	5 600	0.413	
80	95	25	1.0	80	**NK80/25**	58.5	122.0	14.878		3 600	5 300	0.331	
	95	35	1.0	80	**NK80/35**	72.0	176.0	21.463		3 600	5 300	0.380	
	100	30	1.0	80	**R NA4914**	78.0	150.0	18.292		3 600	5 300	0.502	
	100	54	1.0	80	**R NA6914**	125.0	270.0	32.926		3 600	5 300	0.946	
85	105	25	1.0	85	**NK85/25**	69.0	129.0	15.731		3 400	5 000	0.400	
	105	30	1.0	85	**R NA4915**	80.0	156.0	19.024		3 400	5 000	0.528	
	105	35	1.0	85	**NK85/35**	98.0	208.0	25.365		3 400	5 000	0.712	
	105	54	1.0	85	**R NA6915**	129.0	290.0	35.365		3 400	5 000	1.020	
90	110	25	1.0	90	**NK90/25**	72.0	140.0	17.073		3 000	4 500	0.530	
	110	30	1.0	90	**R NA4916**	83.0	170.0	20.731		3 000	4 500	0.556	
	110	35	1.0	90	**NK90/35**	102.0	220.0	26.829		3 000	4 500	0.620	
	110	54	1.0	90	**R NA6916**	118.0	320.0	39.024		3 000	4 500	1.050	
95	115	26	1.0	95	**NK95/26**	46.5	116.0	14.146		3 000	4 500	0.572	
	115	36	1.0	95	**NK95/36**	104.0	228.0	27.804		3 000	4 500	0.640	
100	120	26	1.0	100	**NK100/26**	75.0	153.0	18.334		2 800	4 300	0.480	
	120	35	1.1	100	**R NA4917**	100.0	220.0	26.346		2 800	4 300	0.715	
	120	36	1.1	100	**NK100/36**	108.0	245.0	29.340		2 800	4 300	0.658	
	120	63	1.1	100	**R NA6917**	143.0	415.0	49.698		2 800	4 300	1.150	
105	125	26	1.0	105	**NK105/26**	50.0	129.0	15.448		2 600	4 000	0.625	
	125	35	1.1	105	**R NA4918**	104.0	236.0	28.262		2 600	4 000	0.746	
	125	36	1.0	105	**NK105/36**	69.5	196.0	23.472		2 600	4 000	0.870	
	125	63	1.1	105	**R NA6918**	160.0	405.0	48.501		2 600	4 000	1.300	
110	130	30	1.1	110	**NK110/30**	93.0	208.0	24.909		2 400	3 800	0.600	
	130	35	1.1	110	**R NA4919**	106.0	245.0	29.340		2 400	3 800	0.777	
	130	40	1.1	110	**NK110/40**	122.0	290.0	34.729		2 400	3 800	0.900	
	130	63	1.1	110	**R NA6919**	150.0	455.0	54.489		2 400	3 800	1.470	
115	140	40	1.1	115	**R NA4920**	127.0	285.0	34.130		2 200	3 600	1.220	
125	150	40	1.1	125	**R NA4922**	134.0	315.0	51.640		2 000	3 400	1.320	
	150	40	1.1	125	**R NA4922**	134.0	315.0	51.640		2 000	3 400	1.320	



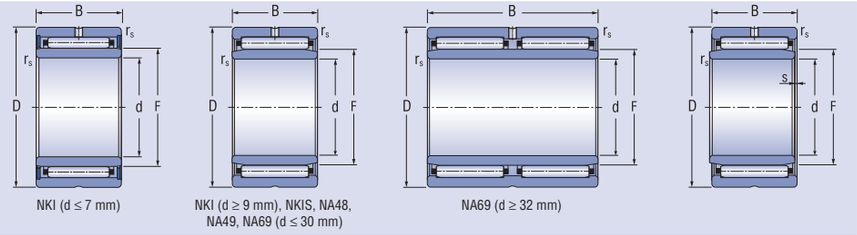
NKI (d ≤ 7 mm) | NKI (d ≥ 9 mm), NKIS, NA48, NA49, NA69 (d ≤ 30 mm) | NA69 (d ≥ 32 mm)

Dimensions						Designation	Basic load ratings		Fatigue load limit		Limiting speeds for lubrication with		Mass	
							dynamic	static			grease	oil		
d	D	B	r_s	F	s		C_r	C_{or}	C_u					
mm							kN				min^{-1}		kg	
5	15	12	0.3	8	1.5	**NKI5/12TV**	4.4	5.0	0.609		19 000	32 000	0.014	
	15	16	0.3	8	2.0	**NKI5/16TV**	5.6	6.8	0.829		19 000	32 000	0.017	
6	16	12	0.3	9	1.5	**NKI6/12TV**	4.1	4.8	0.585		18 000	30 000	0.015	
	16	16	0.3	9	2.0	**NKI6/16TV**	5.9	7.7	0.939		18 000	30 000	0.019	
7	17	12	0.3	10	1.5	**NKI7/12TV**	5.2	6.6	0.804		17 000	28 000	0.017	
	17	16	0.3	10	2.0	**NKI7/16TV**	5.6	7.4	0.902		17 000	28 000	0.021	
9	19	12	0.3	12	1.5	**NKI9/12TV**	6.4	7.7	0.939		16 000	26 000	0.018	
	19	16	0.3	12	2.0	**NKI9/16TV**	6.4	9.2	1.121		16 000	26 000	0.024	
10	22	13	0.3	14	0.5	**NA4900**	8.2	9.2	1.121		16 000	26 000	0.025	
	22	16	0.3	14	0.5	**NKI10/16**	11.0	13.7	1.670		16 000	26 000	0.032	
	22	20	0.3	14	0.5	**NKI10/20**	13.2	17.3	2.109		16 000	26 000	0.040	
12	24	13	0.3	16	0.5	**NA4901**	9.0	11.0	1.341		15 000	24 000	0.028	
	24	16	0.3	16	0.5	**NKI12/16**	11.4	15.0	1.829		15 000	24 000	0.036	
	24	20	0.3	16	0.5	**NKI12/20**	13.7	19.0	2.317		15 000	24 000	0.046	
	24	22	0.3	16	1.0	**NA6901**	14.3	20.0	2.439		15 000	24 000	0.051	
15	27	16	0.3	19	0.5	**NKI15/16**	12.5	17.3	2.109		14 000	22 000	0.042	
	27	20	0.3	19	0.5	**NKI15/20**	15.0	22.0	2.682		14 000	22 000	0.054	
	28	13	0.3	20	0.5	**NA4902**	10.2	13.7	1.670		13 000	20 000	0.037	
	28	23	0.3	20	1.0	**NA6902**	16.6	25.5	3.109		13 000	20 000	0.067	
17	29	16	0.3	21	0.5	**NKI17/16**	13.4	20.0	2.439		13 000	20 000	0.047	
	29	20	0.3	21	0.5	**NKI17/20**	16.3	25.0	3.048		13 000	20 000	0.059	
	30	13	0.3	22	0.5	**NA4903**	10.4	14.6	1.780		12 000	19 000	0.040	
	30	23	0.3	22	1.0	**NA6903**	18.0	29.0	3.536		12 000	19 000	0.084	
	37	20	0.3	24	0.5	**NKIS17**	26.0	31.0	3.780		10 000	17 000	0.108	
20	32	16	0.3	24	0.5	**NKI20/16**	14.3	22.4	2.731		10 000	17 000	0.053	
	32	20	0.3	24	0.5	**NKI20/20**	17.3	28.5	3.475		10 000	17 000	0.067	
	37	17	0.3	25	0.8	**NA4904**	19.0	23.6	2.878		10 000	17 000	0.084	
	37	30	0.3	25	1.0	**NA6904**	33.5	49.0	5.975		10 000	17 000	0.133	
	42	20	0.3	28	0.5	**NKIS20**	27.5	36.5	4.451		9 000	15 000	0.130	
22	34	16	0.3	26	0.5	**NKI22/16**	14.6	23.6	2.878		9 500	16 000	0.058	
	34	20	0.3	26	0.5	**NKI22/20**	17.6	30.0	3.658		9 500	16 000	0.071	
	39	17	0.3	28	0.8	**NA49/22**	20.8	27.5	3.353		9 000	15 000	0.089	
	39	30	0.3	28	0.5	**NA69/22**	29.0	51.0	6.219		9 000	15 000	0.163	
25	38	20	0.3	29	1.0	**NKI25/20**	20.8	34.0	4.146		8 500	14 000	0.086	
	38	30	0.3	29	1.5	**NKI25/30**	27.0	54.0	6.585		8 500	14 000	0.130	
	42	17	0.3	30	0.8	**NA4905**	21.6	30.0	3.658		8 500	14 000	0.099	
	42	30	0.3	30	1.0	**NA6905**	36.5	57.0	6.951		8 500	14 000	0.178	
	47	22	0.6	32	1.0	**NKIS25**	32.5	44.0	5.365		8 000	13 000	0.174	



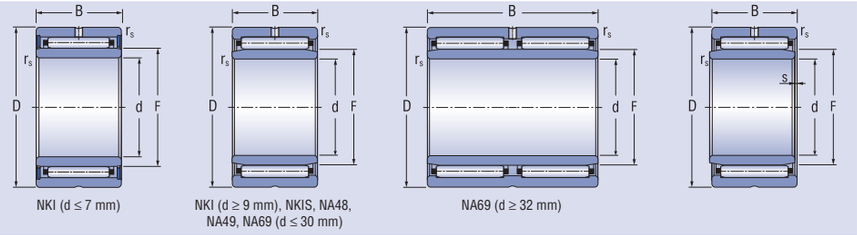
NKI ($d \leq 7$ mm) | NKI ($d \geq 9$ mm), NKIS, NA48, NA49, NA69 ($d \leq 30$ mm) | NA69 ($d \geq 32$ mm)

Dimensions						Designation	Basic load ratings		Fatigue load limit		Limiting speeds for lubrication with		Mass	
							dynamic	static			grease	oil		
d	D	B	r_s	F	s		C_r	C_{or}	C_u					
mm							kN				min^{-1}		kg	
28	42	20	0.3	32	1.0	**NKI28/20**	22.0	37.5	4.573		8 000	13 000	0.104	
	42	30	0.3	32	1.5	**NKI28/30**	32.5	62.0	7.560		8 000	13 000	0.156	
	45	17	0.3	32	0.8	**NA49/28**	22.4	31.5	3.841		8 000	13 000	0.108	
	45	30	0.3	32	1.0	**NA69/28**	40.0	60.0	7.317		8 000	13 000	0.190	
30	45	20	0.3	35	1.0	**NKI30/20**	23.2	41.5	5.060		7 500	12 000	0.120	
	45	30	0.3	35	1.5	**NKI30/30**	34.0	68.0	8.292		7 500	12 000	0.179	
	47	17	0.3	35	0.8	**NA4906**	23.2	33.5	4.085		7 500	12 000	0.114	
	47	30	0.3	35	1.0	**NA6906**	39.0	65.5	7.987		7 500	12 000	0.205	
	52	22	0.6	37	1.0	**NKIS30**	35.5	51.0	6.219		7 000	11 000	0.198	
32	47	20	0.3	37	0.5	**NKI32/20**	23.6	43.0	5.243		7 000	11 000	0.127	
	47	30	0.3	37	1.0	**NKI32/30**	34.5	71.0	8.658		7 000	11 000	0.192	
	52	20	0.6	40	0.8	**NA49/32**	28.5	46.5	5.670		6 700	10 000	0.169	
	52	36	0.6	40	0.5	**NA69/32**	43.0	78.0	9.512		6 700	10 000	0.313	
35	50	20	0.3	40	0.5	**NKI35/20**	25.0	47.5	8.320		6 700	10 000	0.135	
	50	30	0.3	40	1.0	**NKI35/30**	36.5	76.5	9.329		6 700	10 000	0.208	
	55	20	0.6	42	0.8	**NA4907**	29.0	49.0	5.975		6 700	10 000	0.179	
	55	36	0.6	42	0.5	**NA6907**	44.0	83.0	10.121		6 700	10 000	0.340	
	58	22	0.6	43	0.5	**NKIS35**	37.5	57.0	6.951		6 300	9 500	0.235	
38	53	20	0.3	43	0.5	**NKI38/20**	26.0	51.0	6.219		6 300	9 500	0.146	
	53	30	0.3	43	1.0	**NKI38/30**	38.0	83.0	10.121		6 300	9 500	0.196	
40	55	20	0.3	45	0.5	**NKI40/20**	26.5	53.0	6.463		6 300	9 500	0.152	
	55	30	0.3	45	1.0	**NKI40/30**	39.0	86.5	10.548		6 300	9 500	0.229	
	62	22	0.6	48	1.0	**NA4908**	40.0	64.0	7.804		5 600	8 500	0.248	
	62	40	0.6	48	0.5	**NA6908**	64.0	118.0	14.390		5 600	8 500	0.473	
	65	22	1.0	50	0.5	**NKIS40**	41.5	68.0	8.292		5 600	8 500	0.292	
42	57	20	0.3	47	0.5	**NKI42/20**	27.0	55.0	6.707		6 000	9 000	0.159	
	57	30	0.3	47	1.0	**NKI42/30**	39.0	90.0	10.975		6 000	9 000	0.241	
45	62	25	0.6	50	1.5	**NKI45/25**	37.5	76.5	9.329		5 600	8 500	0.244	
	62	35	0.6	50	2.0	**NKI45/35**	51.0	114.0	13.902		5 600	8 500	0.345	
	68	22	0.6	52	1.0	**NA4909**	41.5	69.5	8.475		5 300	8 000	0.291	
	68	40	0.6	52	0.5	**NA6909**	65.5	125.0	15.243		5 300	8 000	0.559	
	72	22	1.0	55	0.5	**NKIS45**	42.5	72.0	8.780		5 300	7 500	0.360	
50	68	25	0.6	55	1.5	**NKI50/25**	41.5	81.5	9.939		5 000	7 500	0.288	
	68	35	0.6	55	2.0	**NKI50/35**	57.0	122.0	14.352		5 000	7 500	0.406	
	72	22	0.6	58	1.0	**NA4910**	43.0	76.5	9.329		4 800	7 000	0.296	
	72	40	0.6	58	0.5	**NA6910**	67.0	132.0	16.097		4 800	7 000	0.577	
	80	28	1.1	60	2.0	**NKIS50**	60.0	98.0	11.951		4 800	7 000	0.523	



NKI (d ≤ 7 mm) | NKI (d ≥ 9 mm), NKIS, NA48, NA49, NA69 (d ≤ 30 mm) | NA69 (d ≥ 32 mm)

Dimensions						Designation	Basic load ratings		Fatigue load limit		Limiting speeds for lubrication with		Mass	
							dynamic	static			grease	oil		
d	D	B	r_s	F	s		C_r	C_{or}	C_u					
mm							kN				min^{-1}		kg	
55	72	25	0.6	60	1.5	**NKI55/25**	40.0	88.0	10.731		4 800	7 000	0.290	
	72	35	0.6	60	2.0	**NKI55/35**	55.0	132.0	16.097		4 800	7 000	0.410	
	80	25	1.0	63	1.5	**NA4911**	56.0	100.0	12.195		4 500	6 700	0.426	
	80	45	1.0	63	1.5	**NA6911**	83.0	160.0	19.512		4 500	6 700	0.800	
	85	28	1.1	65	2.0	**NKIS55**	64.0	108.0	13.170		4 300	6 300	0.569	
60	82	25	0.6	68	1.0	**NKI60/25**	44.0	95.0	11.585		4 000	6 000	0.440	
	82	35	0.6	68	1.0	**NKI60/35**	60.0	143.0	17.439		4 000	6 000	0.520	
	85	25	1.0	68	1.5	**NA4912**	58.5	108.0	13.170		4 000	6 000	0.457	
	85	45	1.0	68	1.5	**NA6912**	71.0	176.0	21.463		4 000	6 000	0.854	
	90	28	1.1	70	2.0	**NKIS60**	65.5	114.0	13.902		4 000	6 000	0.607	
65	90	25	0.6	73	1.0	**NKI65/25**	55.0	112.0	13.658		3 800	5 600	0.500	
	90	25	1.0	72	1.0	**NA4913**	58.5	114.0	13.902		4 000	6 000	0.489	
	90	35	0.6	73	1.5	**NKI65/35**	75.0	166.0	20.243		3 800	5 600	0.690	
	90	45	1.0	72	1.5	**NA6913**	95.0	196.0	23.902		4 000	6 000	0.945	
	95	28	1.1	75	2.0	**NKIS65**	69.5	125.0	15.243		3 800	5 600	0.655	
70	95	25	1.0	80	0.8	**NKI70/25**	58.5	122.0	14.878		3 600	5 300	0.561	
	95	35	1.0	80	0.8	**NKI70/35**	72.0	176.0	21.463		3 600	5 300	0.700	
	100	28	1.1	80	1.5	**NKIS70**	72.0	137.0	16.707		3 400	5 000	0.680	
	100	30	1.0	80	1.5	**NA4914**	78.0	150.0	18.292		3 600	5 300	0.772	
	100	54	1.0	80	1.0	**NA6914**	125.0	270.0	32.926		3 600	5 300	1.450	
75	105	25	1.0	85	1.0	**NKI75/25**	69.5	129.0	15.731		3 400	5 000	0.640	
	105	30	1.0	85	1.5	**NA4915**	80.0	156.0	19.024		3 400	5 000	0.817	
	105	35	1.0	85	1.0	**NKI75/35**	98.0	208.0	25.365		3 400	5 000	1.050	
	105	54	1.0	85	1.0	**NA6915**	129.0	290.0	35.365		3 400	5 000	1.550	
80	110	25	1.0	90	1.0	**NKI80/25**	72.0	140.0	17.073		3 000	4 500	0.790	
	110	30	1.0	90	1.5	**NA4916**	83.0	170.0	20.731		3 000	4 500	0.862	
	110	35	1.0	90	1.0	**NKI80/35**	102.0	220.0	26.829		3 000	4 500	0.980	
	110	54	1.0	90	1.0	**NA6916**	118.0	320.0	39.024		3 000	4 500	1.620	
85	115	26	1.0	95	1.5	**NKI85/26**	46.5	116.0	14.146		3 000	4 500	0.862	
	115	36	1.0	95	1.5	**NKI85/36**	104.0	228.0	27.804		3 000	4 500	1.040	
	120	35	1.1	100	1.0	**NA4917**	100.0	220.0	26.346		2 800	4 300	1.310	
	120	63	1.1	100	1.0	**NA6917**	143.0	415.0	49.698		2 800	4 300	2.430	
90	120	26	1.0	100	1.5	**NKI90/26**	75.0	153.0	18.322		2 800	4 300	0.780	
	120	36	1.0	100	1.5	**NKI90/36**	108.0	245.0	29.340		2 800	4 300	1.080	
	125	35	1.1	105	1.0	**NA4918**	104.0	236.0	27.888		2 600	4 000	1.370	
	125	63	1.1	105	1.0	**NA6918**	160.0	405.0	47.859		2 600	4 000	2.640	
95	125	26	1.0	105	1.5	**NKI95/26**	50.0	129.0	15.244		2 600	4 000	0.935	
	125	36	1.0	105	1.5	**NKI95/36**	69.5	196.0	23.161		2 600	4 000	1.300	
	130	35	1.1	110	1.0	**NA4919**	106.0	245.0	28.563		2 400	3 800	1.430	
	130	63	1.1	110	1.0	**NA6919**	150.0	455.0	53.046		2 400	3 800	2.670	



NKI (d ≤ 7 mm) | NKI (d ≥ 9 mm), NKIS, NA48, NA49, NA69 (d ≤ 30 mm) | NA69 (d ≥ 32 mm)

Dimensions						Designation	Basic load ratings		Fatigue load limit		Limiting speeds for lubrication with		Mass	
							dynamic	static			grease	oil		
d	D	B	r_s	F	s		C_r	C_{or}	C_u					
mm							kN				min^{-1}		kg	
100	130	30	1.1	110	1.5	**NKI100/30**	93.0	208.0	24.249		2 400	3 800	0.984	
	130	40	1.1	110	2.0	**NKI100/40**	122.0	290.0	33.809		2 400	3 800	1.410	
	135	32	1.1	115	1.5	**NKIS100**	95.0	216.0	24.839		2 200	3 600	1.340	
	140	40	1.1	115	2.0	**NA4920**	127.0	285.0	32.705		2 200	3 600	2.010	
110	140	30	1.0	120	2.0	**NA4822**	81.5	216.0	24.629		2 000	3 400	1.210	
	150	40	1.1	125	0.8	**NA4922**	134.0	315.0	35.341		2 000	3 400	2.190	
120	150	30	1.0	130	2.0	**NA4824**	85.0	236.0	26.305		1 900	3 200	1.310	
	165	45	1.1	135	0.8	**NA4924**	160.0	380.0	41.614		1 800	3 000	3.040	
130	165	35	1.1	145	1.5	**NA4826**	98.0	300.0	32.304		1 700	2 800	1.990	
	180	50	1.5	150	1.0	**NA4926**	190.0	490.0	51.987		1 700	2 800	4.140	
140	175	35	1.1	155	1.5	**NA4828**	102.0	315.0	33.297		1 600	2 600	2.120	
	190	50	1.5	160	1.0	**NA4928**	193.0	520.0	54.177		1 600	2 600	4.410	
150	190	40	1.1	165	1.5	**NA4830**	125.0	375.0	39.210		1 600	2 600	2.980	
160	200	40	1.1	175	1.5	**NA4832**	139.0	390.0	39.740		1 500	2 400	3.150	
170	215	45	1.1	185	1.5	**NA4834**	163.0	480.0	48.093		1 400	2 200	4.250	
180	225	45	1.1	195	1.5	**NA4836**	166.0	510.0	50.315		1 400	2 200	4.480	

Drawn cup needle roller bearings open / closed

Drawn cup needle roller bearings open / closed

Opened and closed drawn cup needle roller bearings are needle roller bearings with the smallest radial construction height consisting of a thin walled non-cutting outer rings and needle cages. Cage with needles allows rolling placing with high load capacity and also provides excellent function of the bearing even at high speeds and long lubrication intervals thanks to the large spaces for grease.

These drawn cup needle roller bearings, if not placed directly on the hardened shafts, may be combined with inner rings LR or IR. Inner rings belonging to specific bearings are indicated in the dimension tables.

Drawn cup needle roller bearings are supplied in these design:
HK – opened drawn cup needle roller bearings with a cage
BK – drawn cup needle roller bearings with a cage, one-side closed

In comparison with opened drawn cup needle roller bearings the closed drawn cup needle roller bearings type do have closed bottoms and are suitable to close the placing at the end of the shaft and to capture the start-up forces.

Main dimensions

Main dimensions of drawn cup needle roller bearings opened and drawn cup needle roller bearings closed, which are given by the dimensional tables, correspond to the international dimensional plan of ISO 3245

Designation

Designation of drawn cup needle roller bearings opened and drawn cup needle roller bearings closed in the main realization is given in dimensional tables.

Cages

Drawn cup needle roller bearings have steel cages, which are not specifically indicated. The smallest sizes and bearings for special applications are made with polyamide cages indicated by the added letters TV.

Sealing drawn cup needle roller bearings

Sealed drawn cup needle roller bearings have seals with a latch protecting the bearing from contaminants and retaining plastic lubricants under the normal operating conditions. They can be used under temperatures ranging from –30°C to +100°C. These bearings are always supplied filled with a suitable plastic lubricant.

The main dimensions and specification of drawn cup needle roller bearings in the RS and -2RS design are listed in the dimension tables.

Assembly tolerance

Thin walled outer rings of opened and closed drawn cup needle roller bearings made by non-cutting mechanical working become their final dimensional and shape accuracy only after being pressed into the body housing. Dimensional and shape accuracy of the hole is given by the position of shell circle and quality of placing when assembled. When respecting the tolerances of bodies given in the table, the shell circle of needle rollers at solid bodies in the tolerance field F8 gives with given tolerances of the shaft the normal operational clearance.

Material of the body (solid body)	Tolerance of the hole	Tolerance of the shaft without inner ring	with inner rings
steel or cast iron	N6 (N7)	h5 (h6)	k5 (j6)
light metal	R6 (R7)		

In case of less solid bodies there is a need to test and define by which tolerance of the shaft the required radial tolerance will be reached with.

Accuracy of shape of hole in the body must in IT 5 limits.

Deviations of width of the opened and closed drawn cup needle roller bearings are -0,2 mm.

Checking of dimensions of the opened and closed drawn cup needle roller bearings

Checking of dimensions of drawn cup needle roller bearings in not pressed state is not possible as the thin-walled ring may be imperfectly circular due to the production technology. Only after pressing into the hole of the body with recommended tolerances the bearing obtains its accuracy for its proper operation.

Dimensions can be checked as follows:

1. A bearing is pressed in a ring gauge (wall thickness ≥20 mm) with a bore according to the following table.
2. A testing pin is used to check that the inner diameter is within the relevant tolerance.

Internal diameter	External diameter	Ring gauge bore	Testing pin diameter	
		Nominal dimension	Upper deviation	Lower deviation
Fw	D			
mm	mm	mm	µm	µm
2	4.6	4.587	24	6
3	6.5	6.484	24	6
4	8	7.984	28	10
5	9	8.984	28	10
6	10	9.984	28	10
7	11	10.98	31	13
8	12	11.98	31	13
9	13	12.98	31	13
10	14	13.98	31	13
12	16	15.98	34	16
12	18	17.98	34	16
13	19	18.976	34	16
14	20	19.976	34	16
15	21	20.976	34	16
16	22	21.976	34	16
17	23	22.976	34	16
18	24	23.976	34	16
20	26	25.976	41	20
22	28	27.976	41	20
25	32	31.972	41	20
28	35	34.972	41	20
30	37	36.972	41	20
32	39	38.972	50	25
35	42	41.972	50	25
40	47	46.972	50	25
45	52	51.967	50	25
50	58	57.967	50	25
55	63	62.967	60	30
60	68	67.967	60	30

Misalignment

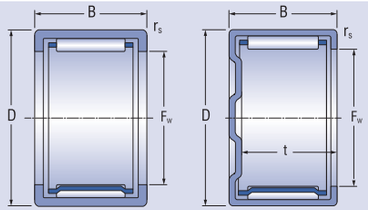
The admissible misalignment for drawn cup needle roller bearings fitted directly on tempered shafts or combined with inner LR or IR inner rings is very small. The admissible misalignment is up to 2´. The admissible misalignment depends on the internal bearing design, radial clearence during operation, and the forces and torque transmitted by the bearing. The quoted value is therefore approximate.

Dynamic equivalent radial load

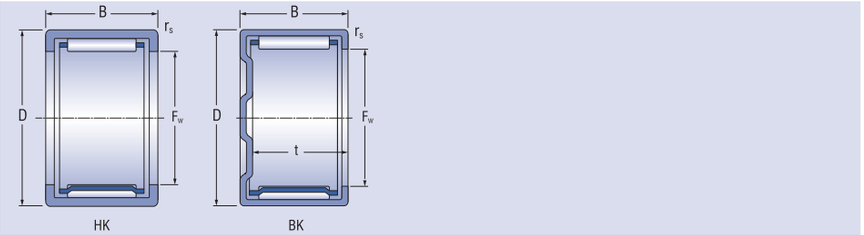
$$P_r = F_r$$

Static equivalent radial load

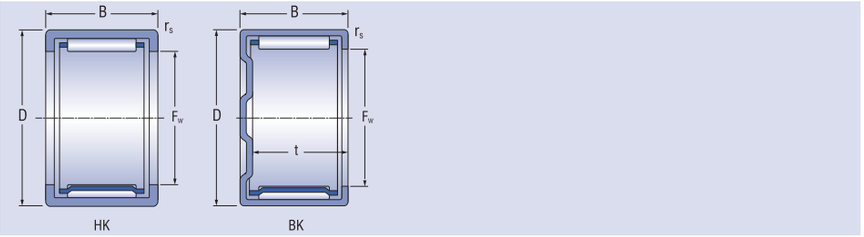
$$P_{or} = F_r$$



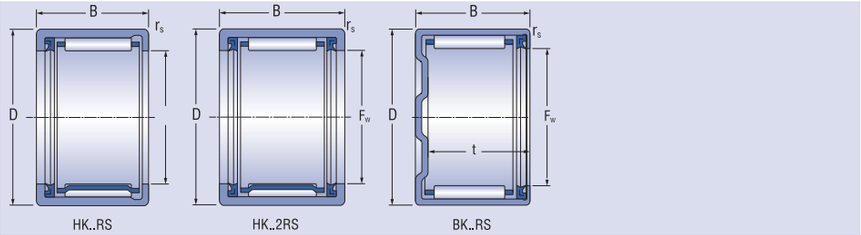
Dimensions						Designation	Basic load ratings dynamic	static	Fatigue load limit		Limiting speeds for lubrication with grease	oil	Mass	Applicable inner rings		
d	F	D	B	t_{min}	r_{smin}		C_r	C_{or}	C_u					IR	LR	
mm							kN				min^{-1}		g			
3	3	6.5	6	–	0.3	**HK0306TN**	1.32	0.95	0.115		40 000	60 000	1.0	–	–	
	3	6.5	6	5.2	0.3	**BK0306TN**	1.32	0.95	0.115		40 000	60 000	1.0	–	–	
4	4	8	8	–	0.4	**HK0408TN**	1.76	1.37	0.167		32 000	48 000	1.6	–	–	
	4	8	8	6.4	0.4	**BK0408TN**	1.76	1.37	0.167		32 000	48 000	1.8	–	–	
5	5	9	9	–	0,4	**HK0509**	2.45	2.16	0.263		24 000	38 000	2.0	–	–	
	5	9	9	7.4	0,4	**BK0509**	2.45	2.16	0.263		24 000	38 000	2.1	–	–	
6	6	10	8	–	0.4	**HK0608**	2.28	2.04	0.248		20 000	34 000	2.1	–	–	
	6	10	8	7.4	0.4	**BK0608**	2.28	2.04	0.248		20 000	34 000	2.2	–	–	
	6	10	9	–	0.4	**HK0609**	3.05	2.9	0.353		20 000	34 000	2.2	–	–	
	6	10	9	7.4	0.4	**BK0609**	3.05	2.9	0.353		20 000	34 000	2.6	–	–	
7	7	11	9	–	0.4	**HK0709**	3.1	3.15	0.384		18 000	30 000	2.3	–	–	
	7	11	9	7.4	0.4	**BK0709**	3.1	3.15	0.384		18 000	30 000	2.9	–	–	
8	8	12	8	–	0.4	**HK0808**	2.8	2.85	0.347		16 000	26 000	2.7	–	–	
	8	12	8	6.4	0.4	**BK0808**	2.8	2.85	0.347		16 000	26 000	3.0	–	–	
	8	12	10	–	0.4	**HK0810**	3.8	4.15	0.506		16 000	26 000	3.0	IR5x8x12	–	
	8	12	10	8.4	0.4	**BK0810**	3.8	4.15	0.506		16 000	26 000	3.4	IR5x8x12	–	
9	9	13	10	–	0.4	**HK0910**	4.4	5.2	0.634		15 000	24 000	4.0	IR6x9x12	–	
	9	13	10	8.4	0.4	**BK0910**	4.4	5.2	0.634		15 000	24 000	4.3	IR6x9x12	–	
	9	13	12	–	0.4	**HK0912**	5.4	6.8	0.829		15 000	24 000	4.6	IR6x9x12	–	
	9	13	12	10.4	0.4	**BK0912**	5.4	6.8	0.829		15 000	24 000	4.9	IR6x9x12	–	
10	10	14	10	–	0.4	**HK1010**	4.55	5.7	0.695		14 000	22 000	4.1	IR7x10x10.5	–	
	10	14	10	8.4	0.4	**BK1010**	4.55	5.7	0.695		14 000	22 000	4.3	IR7x10x10.5	–	
	10	14	12	–	0.4	**HK1012**	5.6	7.35	0.896		14 000	22 000	4.8	IR7x10x12	–	
	10	14	12	10.4	0.4	**BK1012**	5.6	7.35	0.896		14 000	22 000	5.0	IR7x10x12	–	
	10	14	15	–	0.4	**HK1015**	7.1	10.0	1.219		14 000	22 000	6.0	IR7x10x16	–	
	10	14	15	13.4	0.4	**BK1015**	7.1	10.0	1.219		14 000	22 000	6.2	IR7x10x16	–	
12	12	16	10	–	0.4	**HK1210**	4.75	6.3	0.768		12 000	19 000	4.6	IR8x12x10,5	LR8x12x10.5	
	12	16	10	8.4	0.4	**BK1210**	4.75	6.3	0.768		12 000	19 000	5.2	IR8x12x10,5	LR8x12x10.5	
	12	18	12	–	1	**HK1212**	6.55	7.8	0.951		12 000	19 000	5.6	IR8x12x12.5	LR8x12x12.5	
	12	18	12	9.3	1	**BK1212**	6.55	7.8	0.951		12 000	19 000	6.2	IR8x12x12.5	LR8x12x12.5	
13	13	19	12	–	1	**HK1312**	6.8	8.5	1.036		11 000	18 000	8.9	IR10x13x12.5	LR10x13x12.5	
	13	19	12	9.3	1	**BK1312**	6.8	8.5	1.036		11 000	18 000	11.2	IR10x13x12.5	LR10x13x12.5	
14	14	20	12	–	1	**HK1412**	6.8	8.5	1.036		10 000	17 000	10.5	IR10x14x13	–	
	14	20	12	9.3	1	**BK1412**	6.8	8.5	1.036		10 000	17 000	12.0	IR10x14x13	–	
15	15	21	12	–	1	**HK1512**	7.5	9.8	1.195		9 500	16 000	11.1	IR12x15x12.5	LR12x15x12.5	
	15	21	12	9.3	1	**BK1512**	7.5	9.8	1.195		9 500	16 000	12.7	IR12x15x12.5	LR12x15x12.5	
	15	21	16	–	1	**HK1516**	10.2	14.6	1.780		9 500	16 000	15.0	IR12x15x16.5	LR12x15x16.5	
	15	21	16	13.3	1	**BK1516**	10.2	14.6	1.780		9 500	16 000	16.5	IR12x15x16.5	LR12x15x16.5	
	15	21	22	–	1	**HK1522**	12.9	19.6	2.390		9 500	16 000	20.4	IR12x15x22.5	LR12x15x22.5	
	15	21	22	19.3	1	**BK1522**	12.9	19.6	2.390		9 500	16 000	22.0	IR12x15x22.5	LR12x15x22.5	



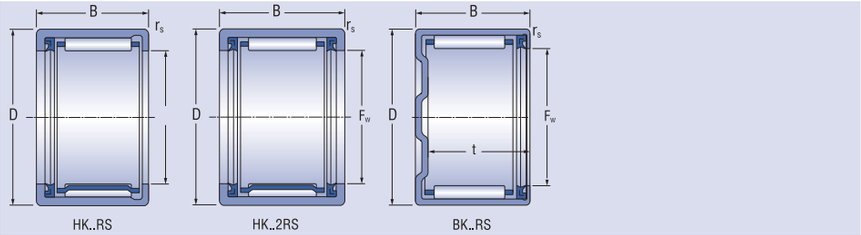
Dimensions						Designation	Basic load ratings		Fatigue load limit		Limiting speeds for lubrication with		Mass	Applicable inner rings		
							dynamic	static			grease	oil				
d	F	D	B	t_{min}	r_{smin}		C_r	C_{or}	C_u					IR	LR	
mm							kN				min^{-1}		g			
16	16	22	12	–	1	**HK1612**	7.35	9.8	1.195		9 500	16 000	11.7	IR12x16x13	–	
	16	22	12	9.3	1	**BK1612**	7.35	9.8	1.195		9 500	16 000	13.8	IR12x16x13	–	
	16	22	16	–	1	**HK1616**	10.2	15.0	1.829		9 500	16 000	15.8	IR12x16x16	–	
	16	22	16	13.3	1	**BK1616**	10.2	15.0	1.829		9 500	16 000	17.6	IR12x16x16	–	
	16	22	22	–	1	**HK1622**	12.7	19.6	2.390		9 500	16 000	21.7	IR12x16x22	–	
	16	22	22	19.3	1	**BK1622**	12.7	19.6	2.390		9 500	16 000	23.4	IR12x16x22	–	
17	17	23	12	–	1	**HK1712**	7.65	10.6	1.292		9 000	15 000	12.2	–	–	
	17	23	12	9.3	1	**BK1712**	7.65	10.6	1.292		9 000	15 000	14.5	–	–	
18	18	24	12	–	1	**HK1812**	8.0	11.2	1.365		9 000	15 000	13.1	IR15x18x12.5	–	
	18	24	12	9.3	1	**BK1812**	8.0	11.2	1.365		9 000	15 000	14.9	IR15x18x12.5	–	
	18	24	16	–	1	**HK1816**	11.0	17.0	2.073		9 000	15 000	17.5	IR15x18x16.5	–	
	18	24	16	13.3	1	**BK1816**	11.0	17.0	2.073		9 000	15 000	19.9	IR15x18x16.5	–	
20	20	26	12	–	1	**HK2012**	8.5	12.7	1.548		8 000	13 000	14.1	IR15x20x13	–	
	20	26	12	9.3	1	**BK2012**	8.5	12.7	1.548		8 000	13 000	16.7	IR15x20x13	–	
	20	26	16	–	1	**HK2016**	11.8	19.0	2.317		8 000	13 000	19.3	IR17x20x16.5	–	
	20	26	16	13.3	1	**BK2016**	11.8	19.0	2.317		8 000	13 000	22.3	IR17x20x16.5	–	
	20	26	20	–	1	**HK2020**	14.6	25.5	3.109		8 000	13 000	24.1	IR17x20x20.5	–	
	20	26	20	17.3	1	**BK2020**	14.6	25.5	3.109		8 000	13 000	27.1	IR17x20x20.5	–	
	20	26	30	–	1	**HK2030**	20.0	38.0	4.634		8 000	13 000	41.0	IR17x20x30.5	–	
	20	26	30	27.3	1	**BK2030**	20.0	38.0	4.634		8 000	13 000	43.0	IR17x20x30.5	–	
22	22	28	12	–	1	**HK2212**	8.65	13.4	1.634		7 500	12 000	15.0	IR17x22x13	–	
	22	28	12	9.3	1	**BK2212**	8.65	13.4	1.634		7 500	12 000	18.1	IR17x22x13	–	
	22	28	16	–	1	**HK2216**	12.5	21.2	2.585		7 500	12 000	20.9	IR17x22x16	–	
	22	28	16	13.3	1	**BK2216**	12.5	21.2	2.585		7 500	12 000	24.3	IR17x22x16	–	
	22	28	20	–	1	**HK2220**	14.6	25.5	3.109		7 500	12 000	26.2	IR17x22x23	–	
	22	28	20	17.3	1	**BK2220**	14.6	25.5	3.109		7 500	12 000	29.9	IR17x22x23	–	
25	25	32	12	–	1	**HK2512**	10.8	15.6	1.902		6 700	10 000	20.0	IR20x25x12.5	–	
	25	32	12	9.3	1	**BK2512**	10.8	15.6	1.902		6 700	10 000	23.2	IR20x25x12.5	–	
	25	32	16	–	1	**HK2516**	15.6	25.0	3.048		6 700	10 000	27.3	IR20x25x17	–	
	25	32	16	13.3	1	**BK2516**	15.6	25.0	3.048		6 700	10 000	31.0	IR20x25x17	–	
	25	32	20	–	1	**HK2520**	19.6	34.0	4.146		6 700	10 000	34.1	IR20x25x20.5	–	
	25	32	20	17.3	1	**BK2520**	19.6	34.0	4.146		6 700	10 000	38.7	IR20x25x20.5	–	
	25	32	26	–	1	**HK2526**	23.6	43.0	5.243		6 700	10 000	44.8	IR20x25x26.5	–	
	25	32	26	23.3	1	**BK2526**	23.6	43.0	5.243		6 700	10 000	49.0	IR20x25x26.5	–	
	25	32	38	–	1	**HK2538**	33.5	68.0	8.292		6 700	10 000	64.7	IR20x25x38.5	–	
	25	32	38	35.3	1	**BK2538**	33.5	68.0	8.292		6 700	10 000	69.0	IR20x25x38.5	–	
28	28	35	16	–	1	**HK2816**	15.3	25.5	3.109		6 300	9 500	30.1	IR22x28x17	–	
	28	35	16	13.3	1	**BK2816**	15.3	25.5	3.109		6 300	9 500	34.1	IR22x28x17	–	
	28	35	20	–	1	**HK2820**	20.0	36.0	4.390		6 300	9 500	37.6	IR22x28x20.5	–	
	28	35	20	17.3	1	**BK2820**	20.0	36.0	4.390		6 300	9 500	43.0	IR22x28x20.5	–	



Dimensions						Designation	Basic load ratings		Fatigue load limit		Limiting speeds for lubrication with		Mass	Applicable inner rings		
							dynamic	static			grease	oil				
d	F	D	B	t_{min}	r_{smin}		C_r	C_{or}	C_u					IR	LR	
mm							kN				min^{-1}		g			
30	30	37	12	–	1	**HK3012**	11.2	17.3	2.109		5 600	8 500	24.0	IR25x30x12.5	–	
	30	37	12	9.3	1	**BK3012**	11.2	17.3	2.109		5 600	8 500	27.9	IR25x30x12.5	–	
	30	37	16	–	1	**HK3016**	16.0	28.0	3.414		5 600	8 500	32.0	IR25x30x17	–	
	30	37	16	13.3	1	**BK3016**	16.0	28.0	3.414		5 600	8 500	37.1	IR25x30x17	–	
	30	37	20	–	1	**HK3020**	21.6	40.5	4.939		5 600	8 500	40.1	IR25x30x20.5	–	
	30	37	20	17.3	1	**BK3020**	21.6	40.5	4.939		5 600	8 500	46.5	IR25x30x20.5	–	
	30	37	26	–	1	**HK3026**	26.0	52.0	6.341		5 600	8 500	52.9	IR25x30x26.5	–	
	30	37	26	23.3	1	**BK3026**	26.0	52.0	6.341		5 600	8 500	59.4	IR25x30x26.5	–	
	30	37	38	–	1	**HK3038**	36.5	81.5	9.939		5 600	8 500	76.1	IR25x30x38.5	–	
	30	37	38	35.3	1	**BK3038**	36.5	81.5	9.939		5 600	8 500	82.5	IR25x30x38.5	–	
35	35	42	12	–	1	**HK3512**	12.9	22.0	2.682		5 000	7 500	27.7	IR30x35x12.5	–	
	35	42	12	9.3	1	**BK3512**	12.9	22.0	2.682		5 000	7 500	32.9	IR30x35x12.5	–	
	35	42	16	–	1	**HK3516**	16.6	30.5	3.719		5 000	7 500	36.9	IR30x35x17	–	
	35	42	16	13.3	1	**BK3516**	16.6	30.5	3.719		5 000	7 500	43.8	IR30x35x17	–	
	35	42	20	–	1	**HK3520**	23.2	47.5	5.792		5 000	7 500	46.1	IR30x35x20.5	–	
	35	42	20	17.3	1	**BK3520**	23.2	47.5	5.792		5 000	7 500	54.8	IR30x35x20.5	–	
40	40	47	12	–	1	**HK4012**	12.9	23.2	2.829		4 500	6 700	31.1	IR35x40x12.5	–	
	40	47	12	9.3	1	**BK4012**	12.9	23.2	2.829		4 500	6 700	38.2	IR35x40x12.5	–	
	40	47	16	–	1	**HK4016**	18.0	35.5	4.329		4 500	6 700	41.4	IR35x40x17	–	
	40	47	16	13.3	1	**BK4016**	18.0	35.5	4.329		4 500	6 700	51.0	IR35x40x17	–	
	40	47	20	–	1	**HK4020**	24.0	51.0	6.219		4 500	6 700	51.8	IR35x40x20.5	–	
	40	47	20	17.3	1	**BK4020**	24.0	51.0	6.219		4 500	6 700	62.0	IR35x40x20.5	–	
45	45	52	16	–	1	**HK4516**	19.0	39.0	4.756		4 000	6 000	46.2	IR40x45x17	–	
	45	52	16	13.3	1	**BK4516**	19.0	39.0	4.756		4 000	6 000	56.0	IR40x45x17	–	
	45	52	20	–	1	**HK4520**	25.0	56.0	6.829		4 000	6 000	56.0	IR40x45x20.5	–	
	45	52	20	17.3	1	**BK4520**	25.0	56.0	6.829		4 000	6 000	72.0	IR40x45x20.5	–	
50	50	58	20	–	1	**HK5020**	27.5	57.0	6.951		3 600	5 300	72.0	IR45x50x20.5	–	
	50	58	20	17.3	1	**BK5020**	27.5	57.0	6.951		3 600	5 300	87.3	IR45x50x20.5	–	
	50	58	25	–	1	**HK5025**	33.5	75.0	9.146		3 600	5 300	90.1	IR45x50x25.5	–	
	50	58	25	22.3	1	**BK5025**	33.5	75.0	9.146		3 600	5 300	109.0	IR45x50x25.5	–	



Dimensions						Designation	Basic load ratings dynamic	static	Fatigue load limit		Limiting speeds for lubrication with grease	Mass	Applicable inner rings		
d	F_w	D	B	t	r_{smin}		C_r	C_{or}	C_u				IR	LR	
mm							kN				min^{-1}	g			
8	8	12	10	–	0.4	**HK0810RS**	2.3	2.1	0.256		14 000	2.9	IR5x8x12	–	
	8	12	12	–	0.4	**HK0812-2RS**	2.3	2.1	0.256		14 000	3.4	IR5x8x16	–	
10	10	14	12	–	0.4	**HK1012RS**	4.1	5.0	0.609		13 000	4.2	IR7x10x16	–	
	10	14	14	–	0.4	**HK1014-2RS**	4.1	5.0	0.609		13 000	5.2	IR7x10x16	–	
12	12	18	14	–	0.4	**HK1214RS**	6.1	7.0	0.853		12 000	10.7	IR8x12x12.5	LR8x12x12.5	
	12	18	16	–	1	**HK1216-2RS**	6.1	7.0	0.853		12 000	11.5	IR8x12x16	–	
14	14	20	14	–	1	**HK1414RS**	6.1	7.5	0.914		11 000	12.0	IR10x14x16	–	
	14	20	14	11.3	1	**BK1414RS**	6.1	7.5	0.914		11 000	14.1	IR10x14x16	–	
	14	20	16	–	1	**HK1416-2RS**	6.1	7.5	0.914		11 000	14.0	IR10x14x20	–	
15	15	21	14	–	1	**HK1514RS**	6.8	8.8	1.073		11 000	12.6	IR12x15x16.5	–	
	15	21	14	11.3	1	**BK1514RS**	6.8	8.8	1.073		11 000	14.4	12x15x16.5	–	
	15	21	16	–	1	**HK1516-2RS**	6.8	8.8	1.073		11 000	14.3	IR12x15x16.5	LR12x15x16.5	
	15	21	18	–	1	**HK1518RS**	9.5	11.4	1.390		11 000	16.0	–	–	
	15	21	20	–	1	**HK1520-2RS**	9.5	11.4	1.390		11 000	22.0	IR12x15x22.5	LR12x15x22.5	
16	16	22	14	–	1	**HK1614RS**	7.2	9.2	1.121		10 000	15.1	IR12x16x16	–	
	16	22	14	11.3	1	**BK1614RS**	7.2	9.2	1.121		10 000	15.3	IR12x16x13	–	
	16	22	16	–	1	**HK1616-2RS**	7.2	9.2	1.121		10 000	15.1	IR12x16x16.5	–	
	16	22	20	–	1	**HK1620-2RS**	9.9	12.3	1.500		10 000	16.8	IR12x16x20	–	
	16	22	25	–	1	**HK1625-2RS**	9.9	12.3	1.500		10 000	19.4	–	–	
18	18	24	14	–	1	**HK1814RS**	7.8	9.9	1.207		9 500	15.1	IR15x18x16.5	–	
	18	24	16	–	1	**HK1816-2RS**	7.8	9.9	1.207		9 500	17.0	IR15x18x16.5	–	
20	20	26	12	–	1	**HK2012-2RS**	9.5	11.9	1.451		9 000	11.7	–	–	
	20	26	16	–	1	**HK2016-2RS**	8.0	10.1	1.231		9 000	18.8	IR17x20x16.5	–	
	20	26	18	–	1	**HK2018 RS**	12.7	20.1	2.451		9 000	21.4	IR17x20x20.5	–	
	20	26	18	15.3	1	**BK2018 RS**	12.7	20.1	2.451		9 000	24.4	IR17x20x16.5	–	
	20	26	20	–	1	**HK2020-2RS**	12.7	20.1	2.451		9 000	23.5	IR17x20x20.5	–	
22	22	28	12	–	1	**HK2212 RS**	8.3	10.0	1.219		7 500	14.0	–	–	
	22	28	14	–	1	**HK2214 RS**	9.0	12.4	1.512		7 500	18.3	IR17x22x16	–	
	22	28	16	–	1	**HK2216-2RS**	9.0	12.4	1.512		7 500	20.3	IR17x22x16	–	
	22	28	18	15.3	1	**HK2218 RS**	10.4	20.1	2.451		7 500	23.5	IR17x22x20.5	–	
	22	28	20	–	1	**HK2220-2RS**	10.4	20.1	2.451		7 500	25.5	IR17x22x20.5	–	
25	25	32	16	–	1	**HK2516-2RS**	9.8	13.2	1.609		6 700	27.3	IR20x25x17	–	
	25	32	18	–	1	**HK2518 RS**	13.6	20.0	2.439		6 700	31.0	IR20x25x20	–	
	25	32	18	15.3	1	**BK2518 RS**	13.6	20.0	2.439		6 700	35.3	IR20x25x20	–	
	25	32	20	–	1	**HK2520-2RS**	13.6	20.0	2.439		6 700	33.1	IR20x25x20.5	–	
	25	32	24	–	1	**HK2524-2RS**	17.9	30.0	3.658		6 700	39.7	–	–	
	25	32	30	–	1	**HK2530-2RS**	24.5	43.0	5.243		6 700	47.3	IR20x25x30	–	
28	28	35	20	–	1	**HK2820-2RS**	11.4	22.5	2.743		6 300	36.9	IR22x28x20.5	–	



Dimensions						Designation	Basic load ratings dynamic	static	Fatigue load limit		Limiting speeds for lubrication with grease	Mass	Applicable inner rings		
d	F_w	D	B	t	r_{smin}		C_r	C_{or}	C_u				IR	LR	
mm							kN				min^{-1}	g			
30	30	37	16	–	1	**HK3016-2RS**	10.1	16.2	1.975		5 600	28.5	IR25x30x17	–	
	30	37	18	–	1	**HK3018 RS**	16.2	26.0	3.170		5 600	36.6	IR25x30x20.5	–	
	30	37	20	–	1	**HK3020-2RS**	16.2	26.0	3.170		5 600	39.1	IR25x30x20.5	–	
	30	37	24	–	1	**HK3024-2RS**	21.0	38.5	4.695		5 600	49.7	–	–	
35	35	42	16	–	1	**HK3516-2RS**	10.1	20.3	2.475		5 000	36.4	IR30x35x17	–	
	35	42	18	–	1	**HK3518 RS**	16.7	30.5	3.719		5 000	37.4	IR30x35x20.5	–	
	35	42	20	–	1	**HK3520-2RS**	16.7	30.5	3.719		5 000	41.1	IR30x35x20.5	–	
40	40	47	16	–	1	**HK4016-2RS**	11.0	21.3	2.597		4 500	41.2	IR35x40x17	–	
	40	47	18	–	1	**HK4018 RS**	19.0	30.5	3.719		4 500	47.3	IR35x40x20.5	–	
	40	47	20	–	1	**HK4020-2RS**	19.0	30.5	3.719		4 500	50.2	IR35x40x20.5	–	
45	45	52	18	–	1	**HK4518 RS**	20.3	41.0	5.000		4 000	54.2	IR40x45x20.5	–	
	45	52	20	–	1	**HK4520-2RS**	20.3	41.0	5.000		4 000	57.4	IR40x45x20.5	–	
50	50	58	22	–	1	**HK5022 RS**	30.0	61.0	7.439		3 600	77.2	IR45x50x25.5	–	
	50	58	24	–	1	**HK5024-2RS**	30.0	61.0	7.439		3 600	84.0	IR45x50x25.5	–	

Inner rings

Inner rings

Inner rings are made from hardened rolling bearing steel and have precision machined or ground raceways.

They are used where:

- the shaft cannot be used as a raceway for needle roller and cage assemblies, drawn cup needle roller bearings with open ends, drawn cup needle roller bearings with closed end and needle roller bearings
- needle roller bearings must be combined with wider inner rings in order to allow larger axial displacements of the shaft in relation to the housing
- optimum running surfaces are required for seal lips.

Inner rings are supllied in following designs:

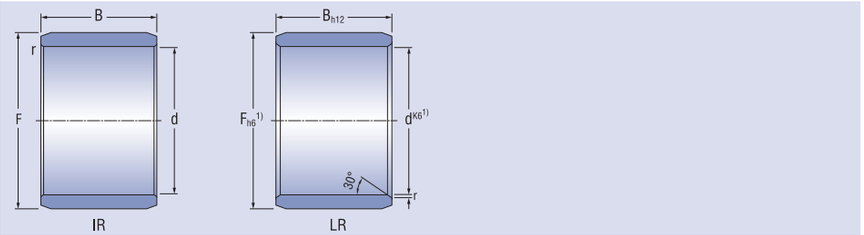
Inner ring IR – normal accuracy, according to the DIN 620
Inner ring LR – with higher tolerances, see dimensional tables

Inner rings IR

Inner rings IR have a precision machined raceway. Chamfers on the end faces allow easy insertion into the bearing and prevent damage to the seal lips of the bearing.Inner rings are available with and without a lubrication hole.

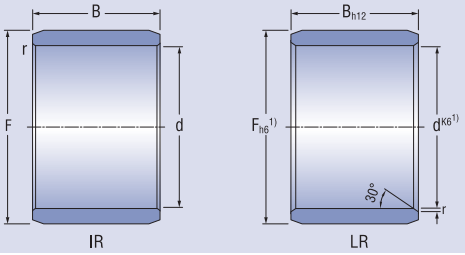
Inner rings LR

Inner rings LR have a ground raceway. The end faces are turned and the edges are broken. These rings have larger tolerances than the rings IR. They are thus suitable for applications that allow larger width tolerances and less demanding requirements for axial runout.



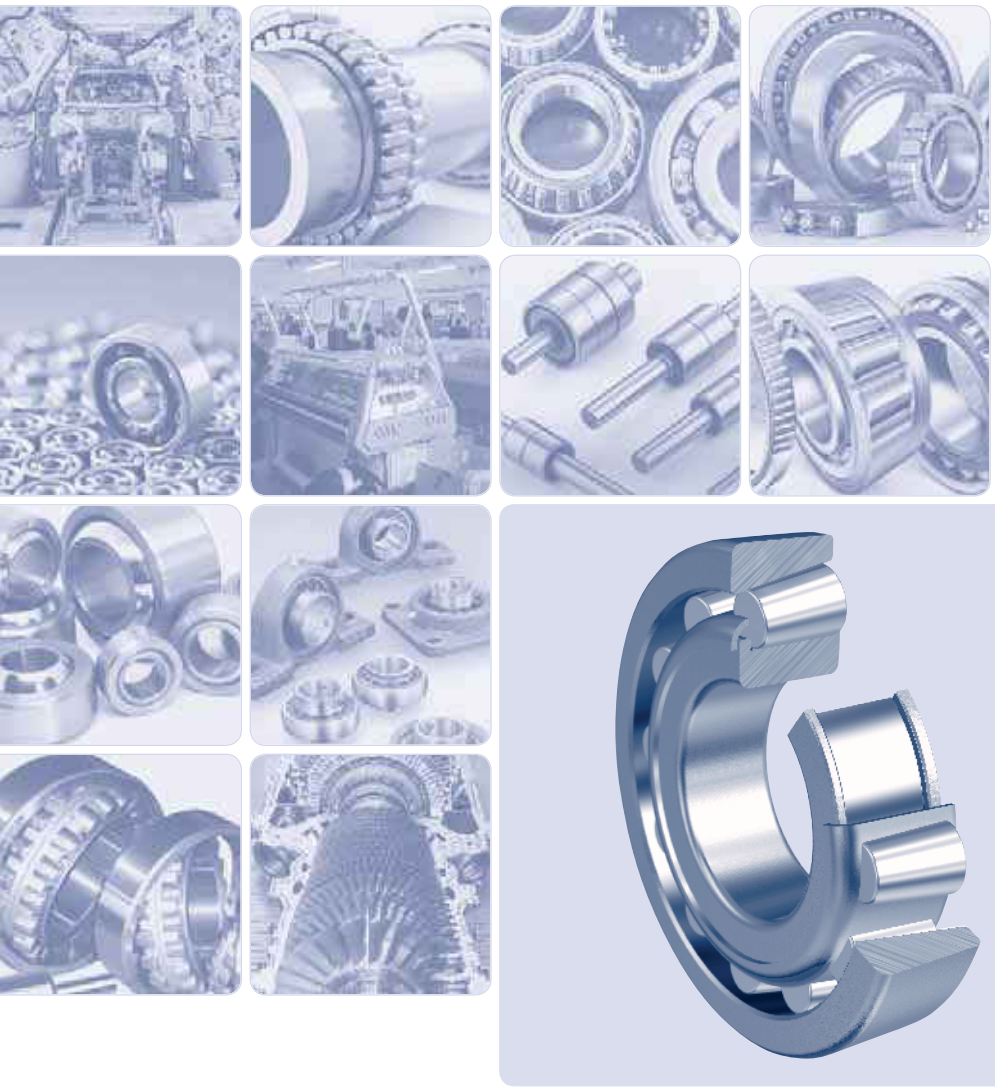
Dimensions				Inner ring designation	Mass	
d	F	D	$r_{s\ min}$			
mm					g	
5	8	12	0.3	**IR5x8x12**	2.8	
	8	16	0.3	**IR5x8x16**	3.7	
6	9	12	0.3	**IR6x9x12**	3.2	
	9	16	0.3	**IR6x9x16**	4.3	
	10	10	0.3	**IR6x10x10**	3.7	
	10	12	0.3	**• IR6x10x12**	4.6	
7	10	10.5	0.3	**IR7x10x10.5**	3.1	
	10	12	0,3	**IR7Xx10x12**	3.6	
	10	16	0.3	**IR7x10x16**	4.9	
8	12	10	0.3	**IR8x12x10**	4.8	
	12	10.5	0.3	**IR/LR8x12x10.5**	5.0	
	12	12	0.3	**IR8x12x12**	5.7	
	12	12.5	0.3	**IR8x12x12.5**	5.9	
9	12	12	0.3	**IR9x12x12**	4.5	
	12	16	0.3	**IR9x12x16**	6.1	
10	13	12.5	0.3	**IR/LR10x13x12.5**	5.2	
	14	12	0.3	**° IR10x14x12**	7.3	
	14	13	0.3	**IR10x14x13**	7.4	
	14	14	0.3	**• IR10x14x14**	8.0	
	14	16	0.3	**IR10x14x16**	9.2	
	14	20	0.3	**IR10x14x20**	11.6	
12	15	12	0.3	**IR12x15x12**	5.8	
	15	12.5	0.3	**IR12x15x12.5**	6.1	
	15	16	0.3	**IR12x15x16**	8.0	
	15	16.5	0.3	**IR/LR12x15x16.5**	8.1	
	15	22.5	0.3	**IR/LR12x15x22.5**	11.0	
	16	12	0.3	**° IR12x16x12**	7.9	
	16	13	0.3	**IR12x16x13**	8.7	
	16	14	0.3	**• IR12x16x14**	9.5	
	16	16	0.3	**IR12x16x16**	11.0	
	16	20	0.3	**IR12x16x20**	13.5	
14	17	17	0.3	**IR14x17x17**	10.0	
15	18	12.5	0.3	**IR15x18x12.5**	7.2	
	18	16	0.3	**IR15x18x16**	9.6	
	18	16.5	0.3	**IR15x18x16.5**	9.9	
	19	16	0.3	**IR15x19x16**	12.8	
	19	20	0.3	**IR15x15x20**	16.4	
	20	12	0.3	**° IR15x20x12**	12.1	
	20	13	0.3	**IR15x20x13**	13.5	
	20	14	0.3	**• IR15x20x14**	14.7	
	20	23	0.3	**IR15x20x23**	24.4	

Dimensions				Inner ring designation	Mass	
d	F	D	$r_{s\ min}$			
mm					g	
17	20	16	0.3	**IR17x20x16**	10.7	
	20	16.5	0.3	**IR17x20x16.5**	11.1	
	20	20	0.3	**IR17x20x20**	13.5	
	20	20.5	0.3	**IR17x20x20.5**	13.8	
	20	30.5	0.3	**IR17x20x30.5**	20.6	
	21	16	0.3	**IR17x21x16**	14.3	
	21	20	0.3	**IR17x21x20**	18.0	
	22	13	0.3	**IR17x22x13**	14.9	
	22	14	0.3	**• IR17x22x14**	16.4	
	22	16	0.3	**IR17x22x16**	18.7	
	22	23	0.3	**IR17x22x23**	27.1	
	24	20	0.3	**IR17x24x20**	33.6	
20	24	16	0.3	**IR20x24x16**	16.5	
	24	20	0.3	**IR20x24x20**	21.3	
	25	12.5	0.3	**IR20x25x12.5**	20.0	
	25	17	0.3	**IR20x25x17**	22.4	
	25	18	0.3	**IR20x25x18**	24.3	
	25	20	0.3	**IR20x25x20**	27.5	
	25	20.5	0.3	**IR20x25x20.5**	28.2	
22	26	16	0.3	**IR22x26x16**	17.5	
	26	20	0.3	**IR22x26x20**	23.2	
	28	17	0.3	**IR22x28x17**	29.8	
	28	20	0.3	**IR22x28x20**	35.0	
	28	20.5	0.3	**IR22x28x20.5**	36.0	
25	29	20	0.3	**IR25x29x20**	25.5	
	29	30	0.3	**IR25x29x30**	39.3	
	30	12.5	0.3	**IR25x30x12.5**	20.0	
	30	15.5	0.3	**IR25x30x15.5**	23.2	
	30	16.5	0.3	**IR25x30x16.5**	26.7	
	30	17	0.3	**• IR25x30x17**	27.5	
	30	18	0.3	**IR25x30x18**	29.8	
	30	20	0.3	**IR25x30x20**	32.6	
	30	20.5	0.3	**IR25x30x20.5**	33.5	
	30	26.5	0.3	**IR25x30x26.5**	43.3	
	30	30	0.3	**IR25x30x30**	50.1	
	30	32	0.3	**IR25x30x32**	53.0	
	30	38.5	0.3	**IR25x30x38.5**	63.8	



Dimensions				Inner ring designation	Mass	
d	F	D	$r_{s\ min}$			
mm					g	
30	35	12.5	0.3	**IR30x35x12.5**	23.3	
	35	13	0.3	**IR30x35x13**	25.0	
	35	16	0.3	**IR30x35x16**	30.8	
	35	17	0.3	**IR30x35x17**	32.3	
	35	18	0.3	• **IR30x35x18**	35.3	
	35	20	0.3	**IR30x35x20**	40.0	
	35	20.5	0.3	**IR30x35x20.5**	40.7	
	35	26	0.3	**IR30x35x26**	50.3	
	35	30	0.3	**IR30x35x30**	58.9	
35	40	12.5	0.3	**IR35x40x12.5**	27.2	
	40	16.5	0.3	**IR35x40x16.5**	37.4	
	40	17	0.3	**IR35x40x17**	38.4	
	40	20	0.3	**IR35x40x20**	44.4	
	40	20.5	0.3	**IR35x40x20.5**	46.1	
	40	30	0.3	**IR35x40x30**	67.9	
40	45	16.5	0.3	**IR40x45x16.5**	41.4	
	45	17	0.3	**IR40x45x17**	42.5	
	45	20	0.3	**IR40x45x20**	50.5	
	45	20.5	0.3	**IR40x45x20.5**	52.5	
	45	30	0.3	**IR40x45x30**	77.1	
45	50	20.5	0.3	**IR45x50x20**	57.0	
	50	25.5	0.3	**IR45x50x25.5**	75.1	
	50	35	0.3	**IR45x50x35**	101.0	

° with lubrication hole
• with lubrication hole without counterbore



Single Row Tapered Roller Bearings

Single Row Tapered Roller Bearings

Single Row Tapered Roller Bearings

The single row tapered roller bearings have one row of tapered rollers resting on the guiding rib of the inner ring with their functional faces. Due to the great number of tapered rollers, these bearings have a high load rating capacity in the radial as well as axial directions. The axial load carrying capacity depends on the contact angle magnitude. The arrangement with single row tapered roller bearings is usually formed by a bearing pair. A single bearing can carry the axial load only in one direction. The bearings are separable. The inner ring (cone) with tapered rollers and a cage is one assembly unit. The outer ring (cup) is the other assembly unit.

The single row tapered roller bearings are manufactured in metric dimensions as well as in inch dimensions.

Boundary Dimensions

The boundary dimensions of metric single row tapered roller bearings indicated in the dimension tables correspond to the international dimensional standard ISO 355.

The boundary dimensions of inch single row tapered roller bearings indicated in the dimension tables correspond to the American standard AFBMA Standard 19.2 (USA).

Designation

The designation of standard design bearings is given in the table part of this publication. The additional mark X used on the 320 series bearings means, that the main dimensions are changed in accordance with the recommendations of the international standards ISO.

The differences of the basic design are indicated by additional symbols according to designation system indicated in section 2.2.

Cage

The single row tapered roller bearings are equipped with a pressed steel cage which is not marked.

Tolerances

The bearings are commonly produced in normal tolerance class P0 which is not indicated.

Internal Clearance

The single row tapered roller bearings are usually mounted in pairs, in which required clearance, or preload are adjusted when mounting. Clearance or preload magnitude is determined according to the requirements on arrangements.

Misalignment

The seating surfaces for single row tapered roller bearings must be coaxial, aligned only with small deviations, because the admissible ring misalignment is very small. Under common operating conditions the misalignment is

– under low load ($F_r < 0.1C_{or}$) 1' to 1.5'
– under high load ($F_r \geq 0.1C_{or}$) 2' to 4'

Radial Equivalent Dynamic and Static Load

The calculation methods are defined in the ISO 281 (dynamic load) and ISO 76 (static load) norm.

Dimensions								Bearing designation	Basic load rating dynamic	static	Fatigue load limit		Limiting speed for lubrication with grease	oil	Mass	
d	D	B	C	T	r_{1s}	r_{2s}	a ≈		C_r	C_{or}	C_u					
mm									kN				min^{-1}		kg	
15	35	11	10	11.75	0.6	0.6	8.3	**30202A**	16.6	15.5	1.9		10 000	14 000	0.053	
	42	13	11	14.25	0.6	0.6	9.5	**30302A**	22.9	21.6	2.6		9 500	12 000	0.094	
17	40	12	11	13.25	1.0	1.0	9.9	**30203A**	20.7	21.9	2.7		10 000	14 000	0.079	
	47	14	12	15.25	1.0	1.0	10.4	**30303A**	28.3	27.2	3.3		9 200	12 000	0.133	
20	42	15	12	15.00	0.6	0.6	10.3	**32004AX**	25.0	28.2	3.4		9 400	13 000	0.095	
	47	14	12	15.25	1.0	1.0	11.2	**30204A**	28.2	30.6	3.7		8 700	12 000	0.127	
	47	18	15	19.25	1.0	1.0	12.8	**32204A**	32.5	34.8	4.2		8 700	12 000	0.156	
	52	15	13	16.25	1.5	1.5	11.1	**30304A**	33.1	33.2	4.0		8 300	11 000	0.179	
	52	21	18	22.25	1.5	1.5	13.6	**32304A**	42.7	46.3	5.3		7 500	9 500	0.230	
25	47	15	11.5	15.00	0.6	0.6	11.6	**32005AX**	28.0	34.0	4.1		8 000	11 000	0.110	
	52	15	13	16.25	1.0	1.0	12.5	**30205A**	32.2	37.0	4.5		7 500	10 000	0.153	
	52	18	16	19.25	1.0	1.0	13.9	**32205A**	39.8	44.8	5.5		7 900	11 000	0.188	
	52	22	18	22.00	1.0	1.0	14.0	**33205A**	47.1	55.8	6.8		7 300	9 800	0.217	
	62	17	15	18.25	1.5	1.5	13.0	**30305A**	46.9	48.1	5.9		6 700	9 000	0.263	
	62	17	13	18.25	1.5	1.5	20.1	**31305A**	40.7	46.1	5.7		5 600	7 500	0.260	
	62	24	20	25.25	1.5	1.5	15.9	**32305A**	61.6	68.8	8.4		6 000	8 000	0.365	
30	55	17	13	17.00	1.0	1.0	13.3	**32006AX**	35.8	46.8	5.7		6 700	9 000	0.173	
	62	16	14	17.25	1.0	1.0	13.8	**30206A**	43.3	50.5	6.1		6 300	8 500	0.231	
	62	20	17	21.25	1.0	1.0	15.6	**32206A**	51.8	63.7	7.8		6 300	8 400	0.286	
	62	25	19.5	25.00	1.0	1.0	15.7	**33206A**	63.8	75.4	9.1		5 600	7 500	0.347	
	72	19	16	20.75	1.5	1.5	15.3	**30306A**	59.0	63.1	7.7		5 600	7 500	0.387	
	72	19	14	20.75	1.5	1.5	23.1	**31306A**	52.5	60.4	7.4		5 000	6 700	0.389	
	72	27	23	28.75	1.5	1.5	18.9	**32306A**	81.6	96.4	11.2		5 300	7 000	0.562	
35	62	18	14	18.00	1.0	1.0	15.1	**32007AX**	48.2	57.9	7.1		6 000	8 000	0.224	
	72	17	15	18.25	1.5	1.5	15.3	**30207A**	54.2	63.5	7.7		5 300	7 000	0.332	
	72	23	19	24.25	1.5	1.5	17.9	**32207A**	70.6	89.5	10.9		5 300	7 000	0.447	
	72	28	22	28.00	1.5	1.5	18.2	**33207A**	82.6	101.7	12.0		5 500	7 400	0.515	
	80	21	18	22.75	2.0	1.5	16.8	**30307A**	75.3	82.6	10.1		5 000	6 700	0.515	
	80	21	15	22.75	2.0	1.5	25.8	**31307A**	65.1	76.8	9.4		4 500	6 000	0.508	
	80	31	25	32.75	2.0	1.5	20.4	**32307A**	99.0	118.3	14.0		4 800	6 300	0.752	
40	68	19	14.5	19.00	1.0	1.0	14.9	**32008AX**	51.9	71.1	8.6		5 300	7 100	0.268	
	80	18	16	19.75	1.5	1.5	16.9	**30208A**	63.0	74.0	9.0		4 800	6 300	0.422	
	80	23	19	24.75	1.5	1.5	18.9	**32208A**	77.9	97.2	11.4		4 800	6 300	0.531	
	80	32	25	32.00	1.5	1.5	20.8	**33208A**	105.8	135.5	16.2		4 300	5 600	0.715	
	90	23	20	25.25	2.0	1.5	19.5	**30308A**	90.9	107.8	12.7		4 500	6 000	0.748	
	90	23	17	25.25	2.0	1.5	29.0	**31308A**	81.4	96.4	11.2		4 000	5 300	0.727	
	90	33	27	35.25	2.0	1.5	23.3	**32308A**	115.7	147.8	17.8		4 400	5 900	1.040	

Dimensions								Bearing designation	Basic load rating dynamic	Basic load rating static	Fatigue load limit		Limiting speed for lubrication with grease	Limiting speed for lubrication with oil	Mass	
d	D	B	C	T	r_{1s}	r_{2s}	a ≈		C_r	C_{or}	C_u					
mm									kN				min^{-1}		kg	
45	75	20	16	20.00	1.0	1.0	16.5	**32009AX**	58.4	81.4	9.9		4 800	6 400	0.337	
	80	26	20	26.00	1.5	1.5	19.1	**33109A**	87.1	117.2	14.4		4 600	6 200	0.535	
	85	19	16	20.75	1.5	1.5	18.6	**30209A**	67.9	83.6	10.1		4 500	6 000	0.474	
	85	23	19	24.75	1.5	1.5	20.1	**32209A**	80.7	104.0	12.6		4 500	6 000	0.573	
	85	32	25	32.00	1.5	1.5	21.9	**33209A**	109.5	145.1	18.0		4 000	5 300	0.771	
	100	25	22	27.25	2.0	1.5	21.3	**30309A**	108.9	129.8	15.4		4 000	5 300	0.983	
	100	25	18	27.25	2.0	1.5	31.7	**31309A**	95.6	113.8	14.2		3 400	4 500	0.950	
	100	36	30	38.25	2.0	1.5	25.6	**32309A**	145.3	189.4	23.0		4 000	5 300	1.400	
50	80	20	15.5	20.00	1.0	1.0	17.8	**32010AX**	61.1	89.0	11.1		4 400	5 800	0.365	
	80	24	19	24.00	1.0	1.0	17.0	**33010A**	76.8	110.9	13.5		4 500	5 600	0.433	
	85	26	20	26.00	1.5	1.5	20.4	**33110A**	89.3	124.1	14.6		4 300	5 300	0.572	
	90	20	17	21.75	1.5	1.5	20.0	**30210A**	73.3	92.0	11.5		4 300	5 600	0.529	
	90	23	19	24.75	1.5	1.5	21.0	**32210A**	82.0	107.0	12.6		4 300	5 600	0.626	
	90	32	24.5	32.00	1.5	1.5	23.2	**33210A**	112.9	154.6	19.0		4 300	5 700	0.825	
	110	27	23	29.25	2.0	1.5	23.0	**30310A**	130.0	157.0	18.9		3 600	4 800	1.280	
	110	27	19	29.25	2.0	1.5	34.8	**31310A**	108.0	128.5	15.8		3 200	4 300	1.214	
	110	40	33	42.25	2.0	1.5	28.2	**32310A**	177.5	236.1	28.4		3 600	4 800	1.890	
55	90	23	17.5	23.00	1.5	1.5	19.8	**32011AX**	80.2	117.2	14.1		4 000	5 400	0.551	
	90	27	21	27.00	1.5	1.5	19.0	**33011A**	94.9	144.7	17.4		4 000	5 000	0.651	
	100	21	18	22.75	2.0	1.5	21.0	**30211A**	90.8	113.7	14.2		3 800	5 000	0.713	
	100	25	21	26.75	2.0	1.5	22.8	**32211A**	108.0	142.3	17.8		3 800	5 000	0.854	
	100	35	27	35.00	2.0	1.5	25.1	**33211A**	143.1	196.7	23.7		3 400	4 500	1.153	
	120	29	25	31.50	2.5	2.0	24.9	**30311A**	153.3	187.6	23.2		3 200	4 300	1.630	
	120	29	21	31.50	2.5	2.0	37.5	**31311A**	130.0	158.0	19.7		2 800	3 800	1.560	
	120	43	35	45.50	2.5	2.0	30.4	**32311A**	203.0	271.4	32.8		3 300	4 400	2.377	
60	95	23	17.5	23.00	1.5	1.5	20.9	**32012AX**	81.7	122.2	15.4		3 700	4 900	0.584	
	95	27	21	27.00	1.5	1.5	19.8	**33012A**	96.7	151.1	18.3		3 700	4 900	0.684	
	100	30	23	30.00	1.5	1.5	23.1	**33112A**	117.1	173.2	20.9		3 600	4 500	0.895	
	110	22	19	23.75	1.5	1.5	22.3	**30212A**	103.3	130.0	15.5		3 400	4 500	0.905	
	110	28	24	29.75	1.5	1.5	25.0	**32212A**	133.0	179.0	22.1		3 000	4 500	1.170	
	110	38	29	38.00	2.0	1.5	27.5	**33212A**	165.8	231.4	28.9		3 600	4 700	1.570	
	130	31	26	33.50	2.0	1.5	26.6	**30312A**	171.4	210.0	25.7		3 000	4 000	1.990	
	130	31	22	33.50	2.0	1.5	40.1	**31312A**	145.4	176.8	21.3		2 700	3 700	1.900	
	130	46	37	48.50	2.0	1.5	32.0	**32312A**	226.7	303.0	37.2		3 000	4 000	2.900	

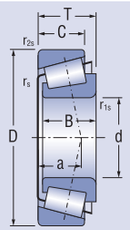
Dimensions								Bearing designation	Basic load rating dynamic	static	Fatigue load limit		Limiting speed for lubrication with grease	oil	Mass	
d	D	B	C	T	r_{1s}	r_{2s}	a ≈		C_r	C_{or}	C_u					
mm									kN				min^{-1}		kg	
65	100	23	17.5	23.00	1.5	1.5	22.4	**32013AX**	82.8	127.3	15.5		3 400	4 600	0.621	
	100	27	21	27.00	1.5	1.5	20.9	**33013A**	98.1	157.7	19.3		3 600	4 800	0.732	
	110	34	26.5	34.00	1.5	1.5	26.0	**33113A**	142.8	220.4	26.5		3 400	4 300	1.300	
	120	23	20	24.75	2.0	1.5	23.8	**30213A**	120.0	152.0	19.0		3 100	4 200	1.130	
	120	31	27	32.75	2.0	1.5	27.3	**32213A**	160.9	221.7	26.6		3 000	4 200	1.544	
	120	41	32	41.00	2.0	1.5	29.5	**33213A**	202.2	281.6	34.8		3 100	4 200	1.980	
	140	33	28	36.00	3.0	2.5	28.7	**30313A**	195.9	241.7	29.6		2 600	3 600	2.440	
	140	33	23	36.00	3.0	2.5	44.2	**31313A**	165.7	202.6	25.0		2 200	3 200	2.370	
	140	48	39	51.00	3.0	2.5	34.3	**32313A**	259.6	349.8	42.1		2 800	3 700	3.514	
70	110	25	19	25.00	1.5	1.5	23.8	**32014AX**	104.0	160.0	19.6		3 200	4 200	0.830	
	110	31	25.5	31.00	1.5	1.5	22.0	**33014A**	134.4	220.4	27.5		3 400	4 300	1.070	
	120	37	29	37.00	2.0	1.5	28.2	**33114A**	172.1	267.0	32.6		3 200	4 000	1.700	
	125	24	21	26.25	2.0	1.5	25.8	**30214A**	132.3	173.6	21.7		2 900	3 900	1.259	
	125	31	27	33.25	2.0	1.5	28.8	**32214A**	168.5	237.1	29.2		2 900	3 800	1.640	
	125	41	32	41.00	2.0	1.5	30.7	**33214A**	208.6	298.3	36.3		3 000	3 800	2.100	
	150	35	30	38.00	3.0	2.5	30.7	**30314A**	219.0	271.7	32.4		2 400	3 400	2.985	
	150	35	25	38.00	3.0	2.5	46.8	**31314A**	187.0	231.0	27.2		2 000	3 000	2.867	
	150	51	42	54.00	3.0	2.5	36.5	**32314A**	298.9	408.5	48.0		2 600	3 500	4.342	
75	115	25	19	25.00	1.5	1.5	25.2	**32015AX**	104.0	160.0	19.0		3 000	4 000	0.877	
	115	31	25.5	31.00	1.5	1.5	22.8	**33015A**	133.1	221.2	27.5		3 200	4 000	1.120	
	125	37	29	37.00	2.0	1.5	29.4	**33115A**	176.1	280.0	34.4		2 900	3 900	1.800	
	130	25	22	27.25	2.0	1.5	27.4	**30215A**	138.4	185.4	22.5		2 700	3 600	1.361	
	130	31	27	33.25	2.0	1.5	30.0	**32215A**	170.3	242.1	29.8		2 700	3 600	1.740	
	130	41	31	41.00	2.0	1.5	31.9	**33215A**	207.1	299.7	36.1		2 900	3 900	2.167	
	160	37	31	40.00	3.0	2.5	32.0	**30315A**	252.8	318.8	36.6		2 000	3 200	3.570	
	160	37	26	40.00	3.0	2.5	49.7	**31315A**	208.5	258.9	30.1		2 100	2 900	3.470	
	160	55	45	58.00	3.0	2.5	39.4	**32315A**	347.4	483.1	56.2		2 400	3 200	5.373	
80	125	29	22	29.00	1.5	1.5	26.8	**32016AX**	141.0	220.0	26.5		2 800	3 700	1.270	
	125	36	29.5	36.00	1.5	1.5	25.2	**33016A**	181.9	304.3	36.7		3 000	3 800	1.630	
	130	37	29	37.00	2.0	1.5	30.7	**33116A**	179.6	292.3	35.1		2 800	3 800	1.930	
	140	26	22	28.25	2.5	2.0	28.1	**30216A**	160.4	212.8	25.0		2 500	3 400	1.670	
	140	33	28	25.25	2.5	2.0	31.4	**32216A**	198.1	279.0	33.3		2 500	3 400	2.130	
	140	46	35	46.00	2.5	2.0	35.1	**33216A**	245.7	361.8	43.1		2 600	3 400	2.830	
	170	39	33	42.50	3.0	2.0	34.4	**30316A**	278.8	352.5	40.9		1 900	3 000	4.175	
	170	39	27	42.50	3.0	2.0	52.8	**31316A**	229.8	287.1	33.2		2 000	2 800	4.120	
	170	58	48	61.50	3.0	2.0	42.1	**32316A**	388.0	543.1	60.8		2 200	3 000	6.380	

Dimensions								Bearing designation	Basic load rating dynamic	Basic load rating static	Fatigue load limit		Limiting speed for lubrication with grease	Limiting speed for lubrication with oil	Mass	
d	D	B	C	T	r_{1s}	r_{2s}	a ≈		C_r	C_{or}	C_u					
mm									kN				min^{-1}		kg	
85	130	29	22	29.00	1.5	1.5	28.1	**32017AX**	139.8	220.3	26.6		2 600	3 500	1.316	
	130	36	29.5	36.00	1.5	1.5	26.2	**33017A**	180.4	305.5	36.4		2 800	3 600	1.690	
	140	41	32	41.00	2.5	2.0	33.1	**33117A**	216.0	354.0	41.4		2 600	3 500	2.427	
	150	28	24	30.50	2.5	2.0	30.3	**30217A**	177.6	236.8	27.4		2 400	3 200	2.060	
	150	36	30	38.50	2.5	2.0	33.9	**32217A**	226.7	324.0	37.9		2 400	3 200	2.680	
	150	49	37	49.00	2.5	2.0	36.9	**33217A**	281.7	415.7	48.7		2 400	3 200	3.520	
	180	41	34	44.50	4.0	3.0	35.9	**30317A**	304.9	388.2	42.6		1 900	2 800	4.966	
	180	41	28	44.50	4.0	3.0	55.6	**31317A**	253.9	319.1	37.0		1 900	2 600	4.708	
	180	60	49	63.50	4.0	3.0	43.5	**32317A**	422.0	592.8	67.2		2 000	2 800	7.310	
90	140	32	24	32.00	2.0	1.5	30.0	**32018AX**	171.3	271.0	31.8		2 500	3 300	1.720	
	140	39	32.5	39.00	2.0	1.5	27.6	**33018A**	232.6	388.6	45.2		2 500	3 300	2.180	
	150	45	35	45.00	2.5	2.0	34.9	**33118A**	252.1	414.7	47.4		2 600	3 400	3.131	
	160	30	26	32.50	2.5	2.0	32.3	**30218A**	200.1	269.6	31.2		2 200	3 000	2.539	
	160	40	34	42.50	2.5	2.0	36.8	**32218A**	269.0	395.0	44.5		2 200	3 000	3.440	
	160	55	42	55.00	2.5	2.0	40.8	**33218A**	330.6	499.7	58.1		2 200	3 000	4.550	
	190	43	36	46.50	4.0	3.0	37.5	**30318A**	342.1	440.9	48.1		1 800	2 700	5.800	
	190	43	30	46.50	4.0	3.0	58.5	**31318A**	281.7	357.1	40.2		1 700	2 400	5.474	
	190	64	53	67.50	4.0	3.0	46.2	**32318A**	478.3	683.3	71.7		1 900	2 600	8.810	
95	145	32	24	32.00	2.0	1.5	31.4	**32019AX**	174.6	281.3	32.0		2 300	3 100	1.794	
	145	39	32.5	39.00	2.0	1.5	28.4	**33019A**	231.0	389.9	44.5		2 300	3 100	2.270	
	170	32	27	34.50	3.0	2.5	34.2	**30219A**	226.6	309.0	34.1		2 100	2 800	3.040	
	170	43	37	45.50	3.0	2.5	39.2	**32219A**	302.5	448.4	50.3		2 100	2 800	4.236	
	170	58	44	58.00	3.0	2.5	42.7	**33219A**	377.4	568.4	65.7		2 000	2 800	5.480	
	200	45	38	49.50	4.0	3.0	40.0	**30319A**	370.0	477.7	52.5		1 700	2 600	6.809	
	200	45	32	49.50	4.0	3.0	61.2	**31319A**	311.4	400.0	43.0		1 700	2 400	6.460	
	200	67	55	71.50	4.0	3.0	49.0	**32319A**	516.1	737.7	77.4		1 800	2 400	10.10	
100	150	32	24	32.00	2.0	1.5	32.8	**32020AX**	173.1	281.7	32.4		2 200	3 000	1.850	
	150	39	32.5	39.00	2.0	1.5	29.1	**33020A**	229.5	391.2	45.0		2 200	3 000	2.330	
	180	34	29	37.00	3.0	2.5	36.4	**30220A**	253.9	350.3	38.5		2 000	2 700	3.714	
	180	46	39	49.00	3.0	2.5	41.9	**32220A**	341.0	512.0	56.9		2 000	2 700	5.110	
	180	63	48	63.00	3.0	2.5	45.5	**33220A**	436.5	666.2	76.6		2 000	2 700	6.725	
	215	47	39	51.50	4.0	3.0	42.0	**30320A**	406.4	526.4	57.2		1 600	2 500	8.164	
	215	51	35	56.50	4.0	3.0	68.4	**31320A**	372.9	488.2	52.4		1 600	2 200	8.614	
	215	73	60	77.50	4.0	3.0	52.9	**32320A**	600.1	872.2	101.1		1 600	2 000	13.00	
105	160	35	26	35.00	2.5	2.0	34.6	**32021AX**	205.0	335.0	37.8		2 100	2 800	2.400	
	160	43	34	43.00	2.5	2.0	30.8	**33021A**	257.4	437.4	49.1		2 200	3 000	2.967	
	190	36	30	39.00	3.0	2.5	38.5	**30221A**	285.3	398.6	43.3		1 900	2 500	4.383	
	190	50	43	53.00	3.0	2.5	45.0	**32221A**	381.0	579.2	63.0		1 900	2 500	6.276	
	225	49	41	53.50	4.0	3.0	43.3	**30321A**	432.0	562.0	65.1		1 500	2 400	9.380	
	225	53	36	58.00	4.0	3.0	70.2	**31321A**	398.0	525.0	56.5		1 500	2 000	9.580	
	225	77	63	81.50	4.0	3.0	56	**32321A**	646.4	955.6	109.3		1 500	1 900	14.80	

Dimensions								Bearing designation	Basic load rating dynamic	static	Fatigue load limit		Limiting speed for lubrication with grease	oil	Mass	
d	D	B	C	T	r_{1s}	r_{2s}	a ≈		C_r	C_{or}	C_u					
mm									kN				min^{-1}		kg	
110	170	38	29	38.00	2.5	2.0	36.6	**32022AX**	245.7	403.4	44.5		2 000	2 700	3.017	
	170	47	37	47.00	2.5	2.0	33.2	**33022A**	288.7	502.7	55.1		2 100	2 800	3.810	
	200	38	32	41.00	3.0	2.5	40.4	**30222A**	314.9	443.6	47.4		1 800	2 400	5.203	
	200	53	46	56.00	3.0	2.5	47.3	**32222A**	431.7	666.3	70.9		1 800	2 400	7.412	
	240	50	42	54.50	4.0	3.0	45.1	**30322A**	472.0	585.0	67.2		1 400	2 300	11.00	
	240	57	38	63.00	4.0	3.0	74.8	**31322A**	458.0	581.0	66.8		1 400	1 800	12.10	
	240	80	65	84.50	4.0	3.0	58	**32322A**	722.8	1 076.0	118.4		1 400	1 800	17.80	
120	180	38	29	38.00	2.5	2.0	39.3	**32024AX**	242.1	404.4	43.3		1 800	2 500	3.180	
	215	40	34	43.50	3.0	2.5	44.1	**30224A**	337.4	483.3	50.3		1 600	2 300	6.192	
	215	58	50	61.50	3.0	2.5	52.3	**32224A**	477.7	758.1	79.8		1 700	2 200	9.267	
	260	55	46	59.50	4.0	3.0	50.0	**30324A**	562.0	715.0	78.6		1 300	2 200	14.20	
	260	62	42	68.00	4.0	3.0	81.7	**31324A**	535.0	695.0	77.2		1 300	1 700	15.30	
	260	86	69	90.50	4.0	3.0	61.6	**32324A**	825.8	1 226.2	137.0		1 300	1 700	22.10	
130	200	45	34	45.00	2.5	2.0	43.3	**32026AX**	335.0	558.0	58.7		1 700	2 300	4.940	
	230	40	34	43.75	4.0	3.0	46.1	**30226A**	366.0	521.4	53.2		1 500	2 200	6.954	
	230	64	54	67.75	4.0	3.0	56.6	**32226A**	552.0	888.0	96.4		1 600	2 000	11.40	
	280	58	49	67.75	5.0	4.0	52.8	**30326A**	620.0	755.0	83.0		1 200	2 100	17.30	
	280	66	44	72.00	5.0	4.0	87.1	**31326A**	592.0	805.0	88.5		1 100	1 500	18.40	
140	210	45	34	45.00	2.5	2.0	46.0	**32028AX**	330.0	568.0	58.8		1 600	2 200	5.150	
	250	42	36	45.75	4.0	3.0	49.0	**30228A**	409.2	584.7	58.5		1 400	2 000	8.748	
	250	68	58	71.75	4.0	3.0	60.7	**32228A**	645.0	1 050.0	110.4		1 500	1 800	14.40	
	300	62	53	67.75	5.0	4.0	55.7	**30328A**	722.0	975.0	103.7		1 100	2 000	21.40	
	300	70	47	77.00	5.0	4.0	92.9	**31328A**	678.0	928.0	97.7		1 000	1 400	22.80	
150	225	48	36	48.00	3.0	2.5	49.2	**32030AX**	368.0	635.0	65.1		1 500	2 000	6.250	
	270	45	38	49.00	4.0	3.0	52.4	**30230A**	451.2	645.9	63.1		1 300	1 800	10.818	
	270	73	60	77.00	4.0	3.0	65.4	**32230A**	720.0	1 182.0	130.0		1 100	1 500	18.20	
160	240	51	38	51	3.0	2.5	52.6	**32032AX**	419.6	734.5	71.6		1 400	1 900	7.653	
	290	80	67	84.00	4.0	3.0	70.9	**32232A**	857.0	1 436.5	136.6		1050	1 800	23.170	

Single Row Tapered Roller Bearings in inch sizes

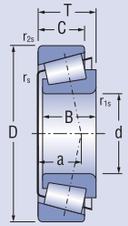
d = 15.875 - 44.450 mm
d = 0.6250 - 1.7500 inch



Dimensions						Bearing designation	Basic load rating			Fatigue load limit	Dimensions mounting rounding		Mass	
d	D	B	C	T	a ≈		dynamic C_r	static C_{or}			r_{1s}	r_{2s}		
mm/**inch**							kN/**lbs**			min^{-1}	mm/**inch**		kg/**lbs**	
15.875	42.863	14.288	9.525	14.288	13.0	**K-11590/**	17.3	18.6		2.3	1.5	1.5	0.063	
0.6250	**1.6875**	**0.5625**	**0.3750**	**0.5625**	**0.5118**	**K-11520**	**3 889**	**4 181**		**517**	**0.059**	**0.059**	**0.14**	
16.000	47.000	21.000	16.000	21.000	14.9	**K-HM81649/**	36.9	40.6		5.0	1.0	2.0	0.199	
0.6299	**1.8504**	**0.8268**	**0.6299**	**0.8268**	**0.5866**	**K-HM81610**	**8 295**	**9 127**		**1 124**	**0.039**	**0.079**	**0.439**	
17.462	39.878	14.605	10.670	13.843	8.7	**K-LM11749/**	22.9	23.4		2.8	1.27	1.27	0.081	
0.6875	**1.5700**	**0.5750**	**0.4201**	**0.5450**	**0.3425**	**K-LM11710**	**5 160**	**5 260**		**629**	**0.05**	**0.05**	**0.18**	
19.050	45.237	16.637	12.065	15.494	9.5	**K-LM11949/**	25.6	26.6		3.2	1.27	1.27	0.124	
0.7500	**1.7810**	**0.6550**	**0.4750**	**0.6100**	**0.3740**	**K-LM11910**	**5 755**	**5 980**		**719**	**0.05**	**0.05**	**0.27**	
21.986	45.237	16.637	12.065	15.494	10.0	**K-LM12749/**	28.7	29.9		3.6	1.27	1.27	0.116	
0.8656	**1.7810**	**0.6550**	**0.4750**	**0.6100**	**0.3937**	**K-LM12710**	**6 452**	**6 722**		**809**	**0.05**	**0.05**	**0.26**	
25.400	50.292	14.732	10.668	14.224	10.9	**K-L44643/**	24.6	28.7		3.5	1.27	1.27	0.125	
1.0000	**1.9800**	**0.5800**	**0.4200**	**0.5600**	**0.4291**	**K-L44610**	**5 530**	**6 452**		**787**	**0.05**	**0.05**	**0.27**	
26.988	50.292	14.732	10.668	14.224	10.9	**K-L44649/**	24.6	28.7		3.5	3.68	1.27	0.115	
1.0625	**1.9800**	**0.5800**	**0.4200**	**0.5600**	**0.4291**	**K-L44610**	**5 530**	**6 452**		**787**	**0.14**	**0.05**	**0.25**	
29.000	50.292	14.732	10.668	14.224	10.8	**K-L45449/**	25.6	33.5		4.1	3.68	1.27	0.114	
1.1417	**1.9800**	**0.5800**	**0.4200**	**0.5600**	**0.4251**	**K-L45410**	**5 755**	**7 531**		**922**	**0.14**	**0.05**	**0.25**	
30.162	64.292	21.433	16.670	21.433	17.7	**K-M86649/**	44.7	59.6		7.3	1.57	1.57	0.341	
1.1875	**2.5312**	**0.8438**	**0.6563**	**0.8438**	**0.6968**	**K-M86610**	**10 050**	**13 400**		**1 641**	**0.0618**	**0.0618**	**0.75**	
31.750	59.131	16.764	11.811	15.875	12.6	**K-LM67048/**	31.6	38.3		4.7	4.75	1.27	0.179	
1.2500	**2.3280**	**0.6600**	**0.4650**	**0.6250**	**0.4960**	**K-LM67010**	**7 104**	**8 610**		**1 056**	**0.1870**	**0.05**	**0.41**	
31.750	62.000	19.050	14.288	18.161	13.3	**K-15123/**	46.8	53.9		6.5	4.75	2.5	0.243	
1.2500	**2.4409**	**0.7500**	**0.5625**	**0.7150**	**0.5236**	**K-15245**	**10 500**	**12 100**		**1 461**	**0.1870**	**0.1**	**0.51**	
34.925	65.088	18.288	13.970	18.034	14.1	**K-LM48548/**	43.0	53.1		6.5	4.75	1.27	0.249	
1.3750	**2.5625**	**0.7200**	**0.5500**	**0.7100**	**0.5551**	**K-LM48510**	**9 667**	**11 937**		**1 461**	**0.1870**	**0.05**	**0.55**	
34.925	73.025	24.608	19.050	23.813	15.7	**PLC65-3**	57.3	76.4		9.3	3.56	2.36	0.495	
1.3750	**2.8750**	**0.9688**	**0.7500**	**0.9375**	**0.6181**		**12 882**	**17 175**		**2 091**	**0.1402**	**0.0929**	**1.09**	
35.000	60.000	16.764	11.938	15.875	13.2	**K-L68149/**	31.6	42.2		5.1	4.75	1.27	0.174	
1.3780	**2.3622**	**0.6600**	**0.4700**	**0.6250**	**0.5196**	**K-L68111**	**7 104**	**9 487**		**1 146**	**0.1870**	**0.05**	**0.40**	
38.000	63.000	17.000	13.500	17.100	14.6	**K-JL69349/**	43.5	58.2		7.1	1.5	1.27	0.196	
1.4961	**2.4803**	**0.6693**	**0.5315**	**0.6793**	**0.5748**	**K-JL69310**	**9 600**	**13 100**		**1 596**	**0.0591**	**0.05**	**0.43**	
38.100	65.088	18.288	13.970	18.034	13.7	**K-LM29749**	49.2	60.7		7.4	2.30	1.10	0.240	
1.5000	**2.5625**	**0.7200**	**0.5500**	**0.7100**	**0.5393**	**K-LM29710**	**11 061**	**13 646**		**1 663**	**0.0906**	**0.0433**	**0.53**	
39.688	80.167	30.391	29.370	29.370	18.4	**K-3386/**	81.0	104.0		13.0	0.80	3.20	0.704	
1.5625	**3.1562**	**1.1965**	**1.1563**	**1.1563**	**0.7244**	**K-3320**	**18 210**	**23 380**		**2 922**	**0.031**	**0.126**	**1.55**	
40.000	80.000	22.403	17.826	21.000	14.5	**K-344A/**	70.8	73.6		9.0	0.80	1.30	0.514	
1.5787	**3.1496**	**0.8820**	**0.7018**	**0.8268**	**0.5708**	**K-322**	**15 916**	**16 546**		**2 023**	**0.031**	**0.051**	**1.14**	
40.100	67.975	18.000	13.500	17.500	13.9	**K-LM300849/**	47.3	59.6		7.3	3.60	1.50	0.230	
1.5787	**2.6762**	**0.7087**	**0.5315**	**0.6890**	**0.5472**	**K-LM300811**	**10 633**	**13 400**		**1 641**	**0.142**	**0.059**	**0.51**	
44.450	83.058	25.400	19.050	23.813	17.6	**K-25580/**	59.6	87.4		11.0	5.23	2.5	0.572	
1.7500	**3.2700**	**1.0000**	**0.7500**	**0.9375**	**0.6929**	**K-25521**	**13 400**	**19 650**		**2 473**	**0.20**	**0.1**	**1.21**	

Single Row Tapered Roller Bearings in inch sizes

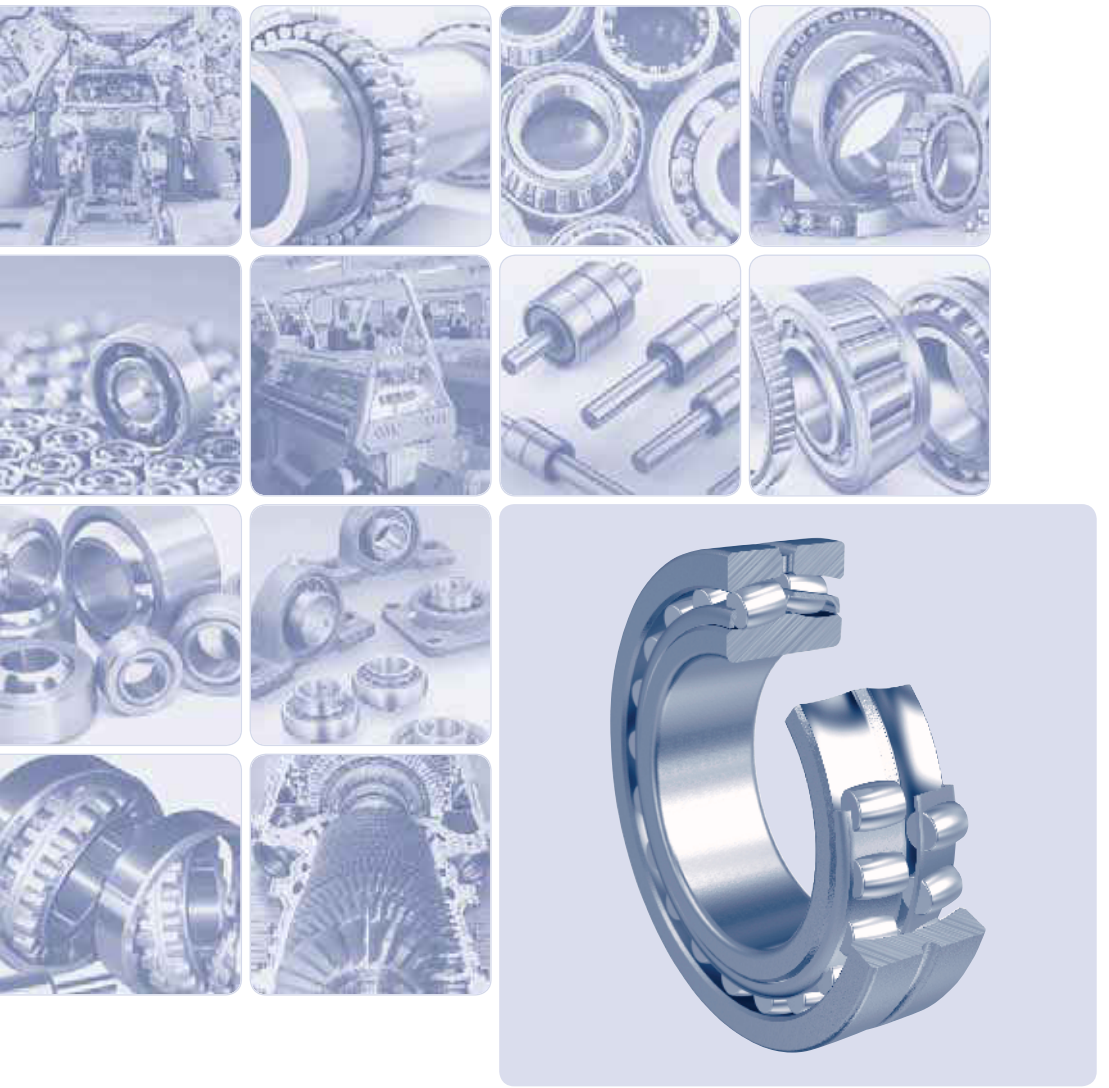
d = 45.242 - 146.050 mm
d = 1.7812 - 5.7500 inch



Dimensions						Bearing designation	Basic load rating dynamic	static		Fatigue load limit	Dimensions mounting rounding		Mass	
d	D	B	C	T	a ≈		C_r	C_{or}			r_{1s}	r_{2s}		
mm/**inch**							kN/**lbs**			min^{-1}	mm/**inch**		kg/**lbs**	
45.242	77.788	19.842	15.800	19.842	17.2	**K-LM603049/**	59.6	77.9		9.5	1.0	1.0	0.378	
1.7812	**3.0625**	**0.7812**	**0.6220**	**0.7812**	**0.6771**	**K-LM603011**	**13 400**	**17 513**		**2 136**	**0.039**	**0.039**	**0.84**	
50.000	82.000	21.500	17.000	21.500	16.1	**K-JLM104948/**	75.2	104.0		13.0	3.0	0.5	0.410	
1.9685	**3.2283**	**0.8465**	**0.6693**	**0.8465**	**0.6338**	**K-JLM104910**	**16 906**	**23 380**		**2 922**	**0.118**	**0.020**	**0.91**	
50.800	101.600	36.068	29.988	34.925	22.1	**K-529/**	123.0	162.0		20.2	0.80	3.20	1.22	
2.0000	**4.0000**	**1.4200**	**1.1806**	**1.3750**	**0.8700**	**K-522**	**27 652**	**36 420**		**4 541**	**0.031**	**0.126**	**2.69**	
57.150	127.000	44.450	34.925	44.450	35.0	**K-65225/**	228.0	276.0		34.5	3.5	3.3	2.79	
2.2500	**5.0000**	**1.7500**	**1.3750**	**1.7500**	**1.3779**	**K-65500**	**51 256**	**62 047**		**7 756**	**0.138**	**0.130**	**6.15**	
65.000	110.000	28.000	22.500	28.000	24.5	**K-JM511946/**	133.0	188.0		23.5	3.0	2.5	1.05	
2.5591	**4.3307**	**1.1024**	**0.8858**	**1.1024**	**0.9645**	**K-JM511910**	**29 900**	**42 264**		**5 283**	**0.118**	**0.098**	**2.32**	
75.000	115.000	25.000	19.000	25.000	25.3	**K-JLM714149/**	104.0	158.0		19.7	5.0	2.5	0.955	
2.9528	**4.5276**	**0.9843**	**0.7480**	**0.9843**	**0.9960**	**K-JLM714110**	**23 380**	**35 520**		**4 429**	**0.197**	**0.098**	**2.11**	
88.900	152.400	39.688	30.162	39.688	33.1	**K-HM518445/**	230.0	344.0		42.4	6.4	3.3	2.88	
3.5000	**6.0000**	**1.5625**	**1.1875**	**1.5625**	**1.3031**	**K-HM518410**	**51 706**	**77 334**		**9 532**	**0.252**	**0.130**	**6.35**	
89.974	146.975	40.000	32.500	40.000	30.8	**K-HM218248/**	243.0	365.0		44.5	7.0	3.5	2.59	
3.5423	**5.7864**	**1.5748**	**1.2795**	**1.5748**	**1.2125**	**K-HM218210**	**54 630**	**82 055**		**10 004**	**0.276**	**0.138**	**5.71**	
90.000	145.000	34.000	27.000	35.000	33.0	**K-JM718149/**	213.0	315.0		38.8	6.0	2.5	2.15	
3.5433	**5.7087**	**1.3386**	**1.0630**	**1.3780**	**1.2992**	**K-JM718110**	**47 884**	**70 815**		**8 722**	**0.236**	**0.098**	**4.74**	
146.050	193.675	28.575	23.020	28.575	33.5	**K-36691/**	181.0	390.0		44.5	5.8	1.5	2.31	
5.7500	**7.6250**	**1.1250**	**0.9063**	**1.1250**	**1.3189**	**K-36620**	**40 690**	**87 675**		**10 004**	**0.228**	**0.059**	**5.10**	

Dimensional Tolerances

Δd = +0,013 mm / +0,00051 inch
ΔD = +0,025 mm / +0,00098 inch
ΔT = +0,200 mm / +0,00787 inch



Double - Row Spherical Roller Bearings

Double - Row Spherical Roller Bearings

Double - Row Spherical Roller Bearings

Double-row spherical roller bearings are capable of capturing heavy radial load with simultaneous axial load in both directions.

Large number of long, symmetrical barrels of a large diameter arranged in two rows with a common spherical raceway on the outer ring are typical for these bearings.

The spherical shape of the raceway on the outer ring permits angular misalignment of the rings during operation and thus ensures even distribution of load on the rolling elements even with small shaft tilt or axial misalignment of the ring surfaces. These unique parameters help spherical roller bearings achieving:

- Lower operating temperatures and higher revolutions,
- Transmission of greater axial load,
- Longer lifespan.

Double-row spherical roller bearings are used in particular for installation of rollers in rolling mills, in gearboxes, in axles of rail vehicles, etc.

Double-row spherical roller bearings are difficult to dismantle and therefore are installed as a single unit.

Main dimensions

The main dimensions of double-row spherical-roller bearings are specified in the dimension tables and they correspond to the international ISO 15 dimension requirements.

Designation

The designation of bearings in the basic design is indicated in the dimension tables. The difference from the basic design is indicated by additional symbols.

Tapered bore

Double-row spherical roller bearings are produced with a cylindrical or tapered bore – tapering 1:12 is indicated by the symbol “K”. Tapering 1:30 indicated by the symbol “K30” is available for the 240 and 241 series. Bearings with a tapered bore are mounted directly on a tapered shaft or on a cylindrical shaft using fastening or tightening sleeves in accordance with ISO 113 and ISO 2982-1,2. Designation of adapter sleeve or withdrawal sleeve belonging to individual bearings with tapered hole are stated in dimension tables.

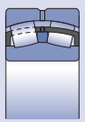
Groove and lubrication holes on the outer ring

Double-row spherical roller bearings are designed with a grove and three lubrication holes on the outer ring (W33) for delivering lubricant directly to the bearing between the two rows or barrels. This helps to achieve better lubrication of bearings and consequently greater reliability in operation. Deliveries of bearings without the groove and lubrication holes need to be discussed in advance.

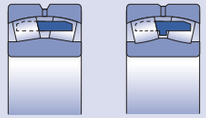
Bearing construction

The internal structure of double-row spherical roller bearings uses symmetrical barrels with several modifications depending on the cage type.

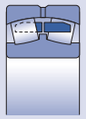
CC the bearings have an inner ring without guide rings and with one free centre ring placed between the two rows of barrels. The guide ring is centred on the inner ring including two cages moulded from a steel band.



CA the bearings have guide rings on the inner ring. A single-piece double ridge solid brass cage is guided on the inner ring. The hole diameter in the 213 series is d ≤ 100 mm, in the 222 series the hole diameter is d ≤ 110 mm, and in the 223 series with the hole diameter d ≤ 90 mm, the cage is guided on rolling elements.



MB the bearings have guide rings on the inner ring and two double ridge solid brass cages guided on a fixed central ring.



Precision

Double-row spherical roller bearings are normally producted with the standard P0 precision grade (the P0 symbol is not stated). Deliveries of bearing with greater precision need to be discussed in advance.

Radial play

Commonly produced double-row spherical roller bearings have the standard radial play, which is not indicated. Bearings with reduced (C2) or increased (C3, C4, C5) radial play are available for special applications.

Stabilisation for operation at higher temperatures

Double-row spherical roller bearings are heat treated in standard production, allowing the application of bearings at operating temperatures up to 150 °C without any inadmissible changes in dimensions. The relevant additional symbol S0 is not indicated. Bearings with normal stabilisation up to 120 °C indicated with the S00 symbol or bearings with stabilisation from 150 °C to 400 °C (S1, S2, S3, S4 and S5) are available for special applications. Deliveries of these bearings needs to be discussed in advance.

Misalignment

Double-row spherical roller bearings can be tilted from the central position without disrupting their correct operation as shown by the values in the following table.

Admissible tilt	Bearing type
1°30´	222XX, 230XX, 231XX, 233XX, 239XX
2°	223XX, 240XX
2°30´	232XX, 241XX

The axial bearing capacity of bearings installed onto the clamping tapered-sleeve adapters

When installing two-row spherical-roller bearings onto the smooth shafts using the clamping tapered-sleeve adapters, the size of the axial load depends on the friction between the shaft and the tapered-sleeve adapter. For the properly installed bearings the acceptable axial load can be calculated as follows:

$$F_{ap} = 3Bd$$

F_{ap}	- maximum acceptable axial load	[N]
D	- width of the bearing	[mm]
D	- diameter of the bearing hole	[mm]

Equivalent dynamic and static loads

Equivalent dynamic load

If the radial bearing is subject to simultaneous radial and axial load of the constant magnitude and direction, the radial dynamic equivalent load is calculated as follows:

$P_r = F_r + Y_1 F_a$ for $F_a/F_r \leq e$

$P_r = 0{,}67\ VF_r + Y2\ F_a$ for $F_a/F_r > e$

The e, Y_1, Y_2 coefficient values for individual bearings are listed in the dimension tables.

Static equivalent radial load

$P_{or} = F_r + Y_o \,.\, F_a$

The Y_o coefficient values for individual bearings are listed in the dimension tables.

Limiting revolution frequency

The limiting revolution frequency values specified in the table annexes to the catalogue state the maximum number of revolutions under which the bearing runs trouble-free at a particular safety level under following operating conditions:

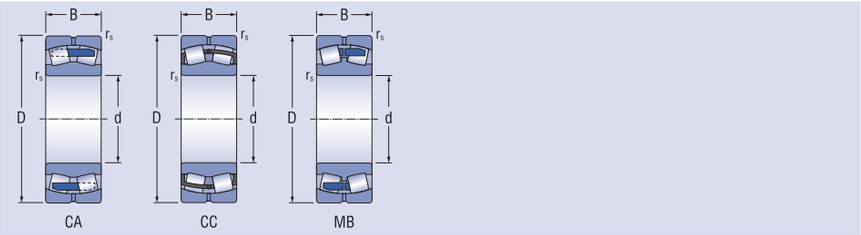
- bearing load corresponds to the service life $L_{10h} \cong 100.000$ hours,
- the magnitude of the axial forces F_a affecting a radial spherical-roller bearing reaches max. 25 % of the magnitude of the radial forces F_r,
- bearings have been produced for the normal accuracy class with the normal radial clearance,
- revolution frequency limiting values specified for oil lubrication applies to oil-bath lubrication.

Radial clearance Spherical Roller Bearings with Cylindrical Bore

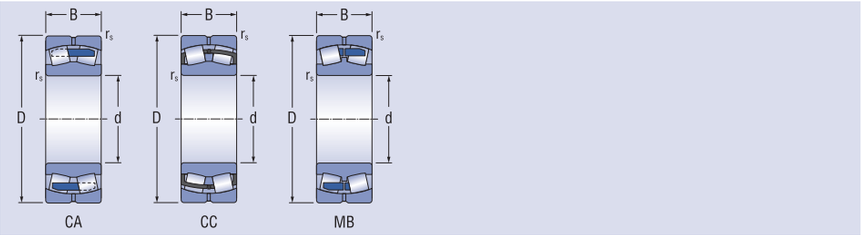
Bore diameter d		Clearance C2		normal		C3		C4		C5	
over	to	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
mm		µm									
24	30	15	25	25	40	40	55	55	75	75	95
30	40	15	30	30	45	45	60	60	80	80	100
40	50	20	35	35	55	55	75	75	100	100	125
50	65	20	40	40	65	65	90	90	120	120	150
65	80	30	50	50	80	80	110	110	145	145	180
80	100	35	60	60	100	100	135	135	180	180	225
100	120	40	75	75	120	120	160	160	210	210	260
120	140	50	95	95	145	145	190	190	240	240	300
140	160	60	110	110	170	170	220	220	280	280	350
160	180	65	120	120	180	180	240	240	310	310	390
180	200	70	130	130	200	200	260	260	340	340	430
200	225	80	140	140	220	220	290	290	380	380	470
225	250	90	150	150	240	240	320	320	420	420	520
250	280	100	170	170	260	260	350	350	460	460	570
280	315	110	190	190	280	280	370	370	500	500	630
315	355	120	200	200	310	310	410	410	550	550	690
355	400	130	220	220	340	340	450	450	600	600	760
400	450	140	240	240	370	370	500	500	660	660	820
450	500	140	260	260	410	410	550	550	720	720	900
500	560	150	280	280	440	440	600	600	780	780	1000
560	630	170	310	310	480	480	650	650	850	850	1100
630	710	190	350	350	530	530	700	700	920	920	1190
710	800	210	390	390	580	580	770	770	1010	1010	1300
800	900	230	430	430	650	650	860	860	1120	1120	1440

Radial clearance Spherical Roller Bearings with Tapered Bore

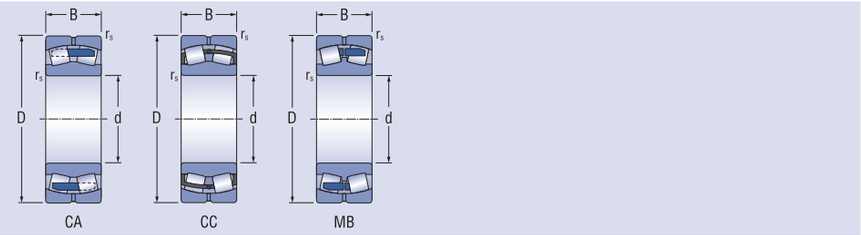
Bore diameter d		Clearance C2		normal		C3		C4		C5	
over	to	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
mm		µm									
24	30	20	30	30	40	40	55	55	75	-	-
30	40	25	35	35	50	50	65	65	85	85	105
40	50	30	45	45	60	60	80	80	100	100	130
50	65	40	55	55	75	75	95	95	120	120	160
65	80	50	70	70	95	95	120	120	150	150	200
80	100	55	80	80	110	110	140	140	180	180	230
100	120	65	100	100	135	135	170	170	220	220	280
120	140	80	120	120	160	160	200	200	260	260	330
140	160	90	130	130	180	180	230	230	300	300	380
160	180	100	140	140	200	200	260	260	340	340	430
180	200	110	160	160	220	220	290	290	370	370	470
200	225	120	180	180	250	250	320	320	410	410	520
225	250	140	200	200	270	270	350	350	450	450	570
250	280	150	220	220	300	300	390	390	490	490	620
280	315	170	240	240	330	330	430	430	540	540	680
315	355	190	270	270	360	360	470	470	590	590	740
355	400	210	300	300	400	400	520	520	650	650	820
400	450	230	330	330	440	440	570	570	720	720	910
450	500	260	370	370	490	490	630	630	790	790	1000
500	560	290	410	410	540	540	680	680	870	870	1100
560	630	320	460	460	600	600	760	760	980	980	1230
630	710	350	510	510	670	670	850	850	1090	1090	1360
710	800	390	570	570	750	750	960	960	1220	1220	1500
800	900	440	640	640	840	840	1070	1070	1370	1370	1690



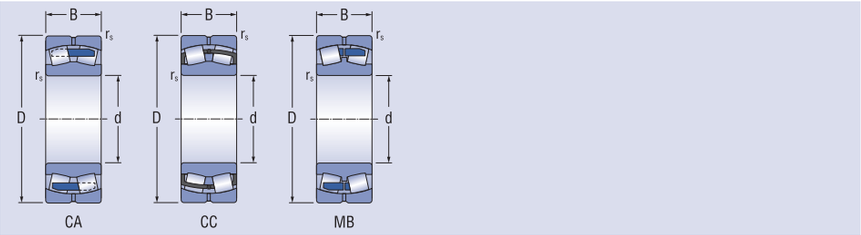
Dimensions				Bearing designation		Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass	Corresponding			Coefficients			
				cylindricall bore	tapered bore	dynamic	static			grease	oil		Adapter sleeve	Withdrawal sleeve	Withdrawal nut				
d	D	B	$r_{s\ min}$			C_r	C_{or}	C_u								e	Y_1	Y_2	Y_0
mm						kN				min^{-1}		kg							
20	52	15	1.1	**21304CA**	**21304CAK**	33.7	32.1	3.91		9 000	11 000	0,18	H304	-	-	0.30	2.25	3.34	2.2
25	52	18	1.0	**22205CA**	**22205CAK**	43.2	45.0	5.48		8 000	10 000	0,18	H305	-	-	0.34	2	3	2
	52	18	1.0	**22205CC**	**22205CCK**	43.2	45.0	5.48		8 000	10 000	0,18	H305	-	-	0.34	2	3	2
	62	17	1.1	**21305CA**	**21305CAK**	48.0	49.3	6.01		7 000	8 000	0,28	H305	-	-	0.30	2.3	3.4	2.2
30	62	20	1.0	**22206MB**	**22206MBK**	53.0	56.8	6.92		5 300	8 000	0,29	H306	-	-	0.31	2.2	3.2	2.1
	62	20	1.0	**22206CA**	**22206CAK**	56.0	61.0	7.43		6 300	8 000	0,30	H306	-	-	0.31	2.2	3.2	2.1
	62	20	1.0	**22206CC**	**22206CCK**	56.0	61.0	7.43		6 700	8 500	0,28	H306	-	-	0.31	2.2	3.2	2.1
	72	19	1.1	**21306CA**	**21306CAK**	57.9	63.9	7.80		5 500	7 000	0,41	H306	-	-	0.27	2.5	3.7	2.5
35	72	23	1.1	**22207MB**	**22207MBK**	73.2	83.1	10.13		5 800	7 000	0,43	H307	-	-	0.31	2.2	3.3	2.2
	72	23	1.1	**22207CA**	**22207CAK**	75.0	83.1	10.13		6 300	7 700	0,45	H307	-	-	0.31	2.2	3.3	2.2
	72	23	1.1	**22207CC**	**22207CCK**	75.0	83.1	10.13		6 600	8 000	0,44	H307	-	-	0.31	2.2	3.3	2.2
	80	21	1.5	**21307CA**	**21307CAK**	67.0	76.0	9.26		5 000	6 300	0,54	H307	-	-	0.28	2.4	3.6	2.5
40	80	23	1.1	**22208MB**	**22208MBK**	78.5	91.9	11.20		5 500	6 600	0.55	H308	AH308	KM9	0.27	2.5	3.7	2.4
	80	23	1.1	**22208CA**	**22208CAK**	86.9	93.5	11.40		6 000	7 000	0.54	H308	AH308	KM9	0.27	2.5	3.7	2.4
	80	23	1.1	**22208CC**	**22208CCK**	86.9	93.5	11.40		6 000	7 300	0.52	H308	AH308	KM9	0.27	2.5	3.7	2.4
	90	23	1.5	**21308CA**	**21308CAK**	92.3	99.0	12.07		4 600	5 500	0.75	H308	AH308	KM9	0.26	2.6	3.9	2.6
	90	23	1.5	**21308CC**	**21308CCK**	92.3	99.0	12.07		4 600	5 500	0.74	H308	AH308	KM9	0.26	2.6	3.9	2.6
	90	33	1.5	**22308MB**	**22308MBK**	116	129	17.33		5 000	6 000	1.03	H2308	AH2308	KM9	0.36	1.8	2.6	1.8
	90	33	1.5	**22308CA**	**22308CAK**	124	142	17.33		5 300	6 300	1.00	H2308	AH2308	KM9	0.36	1.8	2.6	1.8
	90	33	1.5	**22308CC**	**22308CCK**	124	142	17.33		5 300	6 300	1.02	H2308	AH2308	KM9	0.36	1.8	2.6	1.8
45	85	23	1.1	**22209MB**	**22209MBK**	84.2	97.6	11.90		5 000	6 000	0.59	H309	AH309	KM10	0.25	2.7	4	2.6
	85	23	1.1	**22209CA**	**22209CAK**	93.0	102	12.44		5 500	7 000	0.58	H309	AH309	KM10	0.25	2.7	4	2.6
	85	23	1.1	**22209CC**	**22209CCK**	93.0	102	12.44		5 500	7 000	0.57	H309	AH309	KM10	0.25	2.7	4	2.6
	100	25	1.5	**21309CA**	**21309CAK**	115	121	14.70		3 200	4 000	1.02	H309	AH309	KM10	0.24	2.8	4.2	2.8
	100	25	1.5	**21309CC**	**21309CCK**	115	121	14.70		3 200	4 000	1.00	H309	AH309	KM10	0.24	2.8	4.2	2.8
	100	36	1.5	**22309MB**	**22309MBK**	143	169	20.54		5 000	6 000	1.40	H2309	AH2309	KM10	0.36	1.9	2.8	1.9
	100	36	1.5	**22309CA**	**22309CAK**	156	175	21.34		5 500	7 000	1.38	H2309	AH2309	KM10	0.36	1.9	2.8	1.9
	100	36	1.5	**22309CC**	**22309CCK**	156	175	21.34		5 500	7 000	1.37	H2309	AH2309	KM10	0.36	1.9	2.8	1.9
50	90	23	1.1	**22210MB**	**22210MBK**	86.8	104	12.62		3 800	4 800	0.67	H310	AHX310	KM11	0.24	2.8	4.2	2.8
	90	23	1.1	**22210CA**	**22210CAK**	95.0	112	13.65		4 600	5 400	0.62	H310	AHX310	KM11	0.24	2.8	4.2	2.8
	90	23	1.1	**22210CC**	**22210CCK**	95.0	112	13.65		4 600	5 400	0.61	H310	AHX310	KM11	0.24	2.8	4.2	2.8
	110	27	2.0	**21310CA**	**21310CAK**	129	144	17.56		2 800	3 800	1.30	H310	AHX310	KM11	0.24	2.8	4.2	2.8
	110	27	2.0	**21310CC**	**21310CCK**	129	144	17.56		2 800	3 800	1.30	H310	AHX310	KM11	0.24	2.8	4.2	2.8
	110	40	2.0	**22310MB**	**22310MBK**	193	227	27.70		3 400	4 300	1.90	H2310	AHX2310	KM11	0.36	1.9	2.7	1.8
	110	40	2.0	**22310CA**	**22310CAK**	193	227	27.70		4 600	5 600	1.85	H2310	AHX2310	KM11	0.36	1.9	2.7	1.8
	110	40	2.0	**22310CC**	**22310CCK**	193	227	27.70		4 600	5 600	1.79	H2310	AHX2310	KM11	0.36	1.9	2.7	1.8



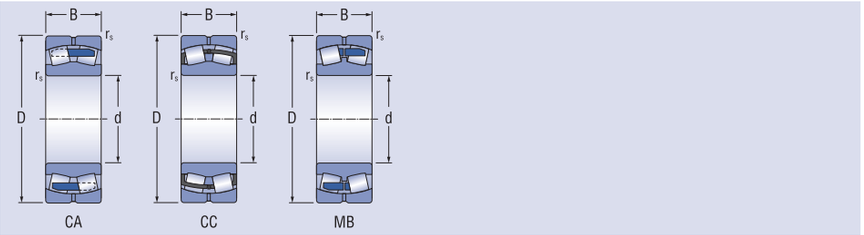
Dimensions				Bearing designation		Basic load rating		Fatigue load limit		Limiting speed		Mass	Corresponding			Coefficients			
				cylindricall bore	tapered bore	dynamic	static			for lubrication with grease	oil		Adapter sleeve	Withdrawal sleeve	Withdrawal nut				
d	D	B	$r_{s\,min}$			C_r	C_{or}	C_u								e	Y_1	Y_2	Y_0
mm						kN				min^{-1}		kg							
55	100	25	1.5	**22211MB**	**22211MBK**	102	119	14.48		3 400	4 300	0.86	H311	AHX311	KM12	0.23	2.9	4.4	2.9
	100	25	1.5	**22211CA**	**22211CAK**	106	126	15.35		4 000	5 000	0.84	H311	AHX311	KM12	0.23	2.9	4.4	2.9
	100	25	1.5	**22211CC**	**22211CCK**	106	126	15.35		4 000	5 200	0.84	H311	AHX311	KM12	0.23	2.9	4.4	2.9
	120	29	2.0	**21311CA**	**21311CAK**	146	174	21.26		2 600	3 400	1.65	H311	AHX311	KM12	0.24	2.8	4.2	2.8
	120	29	2.0	**21311CC**	**21311CCK**	146	174	21.26		2 600	3 400	1.65	H311	AHX311	KM12	0.24	2.8	4.2	2.8
	120	43	2.0	**22311MB**	**22311MBK**	210	252	30.71		3 000	3 800	2.40	H2311	AHX2311	KM12	0.35	1.9	2.8	1.9
	120	43	2.0	**22311CA**	**22311CAK**	224	258	31.46		4 000	4 800	2.35	H2311	AHX2311	KM12	0.35	1.9	2.8	1.9
	120	43	2.0	**22311CC**	**22311CCK**	226	258	31.70		4 000	4 800	2.31	H2311	AHX2311	KM12	0.35	1.9	2.8	1.9
60	110	28	1.5	**22212MB**	**22212MBK**	129	146	17.78		3 200	4 000	1.22	H312	AHX312	KM13	0.24	2.8	4.2	2.8
	110	28	1.5	**22212CA**	**22212CAK**	140	166	20.24		3 600	4 500	1.20	H312	AHX312	KM13	0.24	2.8	4.2	2.8
	110	28	1.5	**22212CC**	**22212CCK**	140	166	20.24		3 600	4 500	1.15	H312	AHX312	KM13	0.24	2.8	4.2	2.8
	130	31	2.1	**21312CA**	**21312CAK**	167	203	24.75		2 400	3 200	2.08	H312	AHX312	KM13	0.22	3	4.6	2.8
	130	31	2.1	**21312CC**	**21312CCK**	167	203	24.75		2 400	3 200	2.08	H312	AHX312	KM13	0.22	3	4.6	2.8
	130	46	2.1	**22312MB**	**22312MBK**	244	296	36.04		2 800	3 600	3.00	H2312	AHX2312	KM13	0.35	1.9	2.9	1.9
	130	46	2.1	**22312CA**	**22312CAK**	255	296	36.04		3 800	4 400	2.95	H2312	AHX2312	KM13	0.35	1.9	2.9	1.9
	130	46	2.1	**22312CC**	**22312CCK**	255	301	36.73		3 800	4 400	2.88	H2312	AHX2312	KM13	0.35	1.9	2.9	1.9
65	120	31	1.5	**22213MB**	**22213MBK**	168	209	25.47		2 800	3 600	1.63	H313	AH313	KM15	0.24	2.9	4.2	2.8
	120	31	1.5	**22213CA**	**22213CAK**	168	209	25.47		3 600	4 800	1.60	H313	AH313	KM15	0.24	2.9	4.2	2.8
	120	31	1.5	**22213CC**	**22213CCK**	168	209	25.47		3 600	4 800	1.54	H313	AH313	KM15	0.24	2.9	4.2	2.8
	140	33	2.1	**21313CA**	**21313CAK**	183	239	28.66		2 200	3 000	2.57	H313	AH313	KM15	0.23	2.9	4.3	2.8
	140	33	2.1	**21313CC**	**21313CCK**	183	239	28.66		2 200	3 000	2.57	H313	AH313	KM15	0.23	2.9	4.3	2.8
	140	48	2.1	**22313MB**	**22313MBK**	295	353	42.38		2 400	3 200	3.60	H2313	AH2313	KM15	0.34	2	3	2
	140	48	2.1	**22313CA**	**22313CAK**	295	353	42.38		3 600	4 200	3.55	H2313	AH2313	KM15	0.34	2	3	2
	140	48	2.1	**22313CC**	**22313CCK**	295	353	42.38		3 600	4 200	3.47	H2313	AH2313	KM15	0.34	2	3	2
70	125	31	1.5	**22214MB**	**22214MBK**	176	219	26.68		2 600	3 400	1.66	H314	AH314	KM16	0.23	2.9	4.2	2.8
	125	31	1.5	**22214CA**	**22214CAK**	176	221	26.95		3 600	4 600	1.70	H314	AH314	KM16	0.23	2.9	4.2	2.8
	125	31	1.5	**22214CC**	**22214CCK**	176	221	26.95		3 600	4 600	1.60	H314	AH314	KM16	0.23	2.9	4.2	2.8
	150	35	2.1	**21314CA**	**21314CAK**	218	276	32.43		2 000	2 800	3.11	H314	AH314	KM16	0.23	2.9	4.3	2.9
	150	35	2.1	**21314CC**	**21314CCK**	218	276	32.43		2 000	2 800	3.11	H314	AH314	KM16	0.23	2.9	4.3	2.9
	150	51	2.1	**22314MB**	**22314MBK**	342	426	50.11		3 600	4 000	4.40	H2314	AHX2314	KM16	0.34	2	3	2
	150	51	2.1	**22314CA**	**22314CAK**	342	426	50.11		3 600	4 000	4.40	H2314	AHX2314	KM16	0.34	2	3	2
	150	51	2.1	**22314CC**	**22314CCK**	342	426	50.11		3 600	4 000	4.34	H2314	AHX2314	KM16	0.34	2	3	2
75	130	31	1.5	**22215MB**	**22215MBK**	185	236	28.50		2 400	3 200	1.75	H315	AH315	KM17	0.22	3.1	4.5	2.9
	130	31	1.5	**22215CA**	**22215CAK**	185	236	28.50		3 400	4 200	1.80	H315	AH315	KM17	0.22	3.1	4.5	2.9
	130	31	1.5	**22215CC**	**22215CCK**	185	236	28.50		3 400	4 200	1.69	H315	AH315	KM17	0.22	3.1	4.5	2.9
	160	37	2.1	**21315CA**	**21315CAK**	245	311	35.81		1 900	2 600	3.76	H315	AH315	KM17	0.23	2.9	4.4	2.9
	160	37	2.1	**21315CC**	**21315CCK**	245	311	35.81		1 900	2 600	3.76	H315	AH315	KM17	0.23	2.9	4.4	2.9
	160	55	2.1	**22315MB**	**22315MBK**	373	447	51.71		2 000	2 800	5.40	H2315	AHX2315	KM17	0.33	2	3	2
	160	55	2.1	**22315CA**	**22315CAK**	373	451	52.17		3 000	3 600	5.35	H2315	AHX2315	KM17	0.33	2	3	2
	160	55	2.1	**22315CC**	**22315CCK**	373	461	53.33		3 000	3 600	5.28	H2315	AHX2315	KM17	0.33	2	3	2



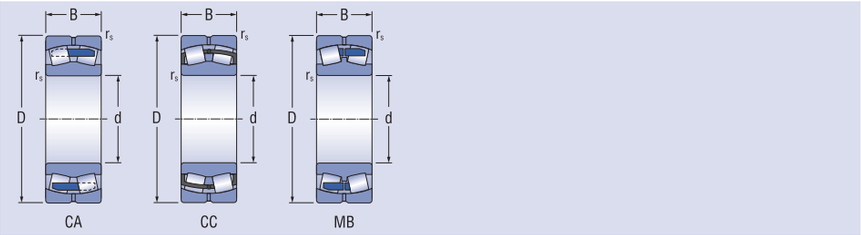
Dimensions				Bearing designation		Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass	Corresponding			Coefficients			
				cylindricall bore	tapered bore	dynamic	static			grease	oil		Adapter sleeve	Withdrawal sleeve	Withdrawal nut				
d	D	B	$r_{s\,min}$			C_r	C_{or}	C_u								e	Y_1	Y_2	Y_0
mm						kN				min^{-1}		kg							
80	140	33	2.0	**22216MB**	**22216MBK**	199	257	30.29		3 200	3 800	2.14	H316	AH316	KM18	0.22	3.1	4.5	3
	140	33	2.0	**22216CA**	**22216CAK**	210	265	31.27		3 200	3 800	2.09	H316	AH316	KM18	0.22	3.1	4.5	3
	140	33	2.0	**22216CC**	**22216CCK**	210	265	31.27		3 200	3 800	2.14	H316	AH316	KM18	0.22	3.1	4.5	3
	170	39	2.1	**21316CA**	**21316CAK**	268	359	40.65		1 800	2 400	4.47	H316	AH316	KM18	0.23	3	4.4	2.9
	170	39	2.1	**21316CC**	**21316CCK**	268	359	40.65		1 800	2 400	4.53	H316	AH316	KM18	0.23	3	4.4	2.9
	170	58	2.1	**22316MB**	**22316MBK**	436	533	60.55		1 900	2 600	6.40	H2316	AHX2316	KM18	0.33	2	3	2
	170	58	2.1	**22316CA**	**22316CAK**	436	533	60.55		2 800	3 400	6.39	H2316	AHX2316	KM18	0.33	2	3	2
	170	58	2.1	**22316CC**	**22316CCK**	436	533	60.55		2 800	3 400	6.32	H2316	AHX2316	KM18	0.33	2	3	2
85	150	36	2.0	**22217MB**	**22217MBK**	237	310	35.91		2 000	2 800	2.70	H317	AHX317	KM19	0.22	3	4.4	2.9
	150	36	2.0	**22217CA**	**22217CAK**	256	330	38.17		3 000	3 800	2.67	H317	AHX317	KM19	0.22	3	4.4	2.9
	150	36	2.0	**22217CC**	**22217CCK**	256	330	38.17		3 000	3 800	2.73	H317	AHX317	KM19	0.22	3	4.4	2.9
	180	41	3.0	**21317CA**	**21317CAK**	313	397	44.30		1 700	2 200	4.98	H317	AHX317	KM19	0.24	2.8	4.2	2.8
	180	41	3.0	**21317CC**	**21317CCK**	313	397	44.30		1 700	2 200	5.15	H317	AHX317	KM19	0.24	2.8	4.2	2.8
	180	60	3.0	**22317MB**	**22317MBK**	432	560	62.52		1 800	2 400	7.40	H2317	AHX2317	KM19	0.32	2.1	3.1	2
	180	60	3.0	**22317CA**	**22317CAK**	433	560	62.52		2 500	3 200	7.35	H2317	AHX2317	KM19	0.32	2.1	3.1	2
	180	60	3.0	**22317CC**	**22317CCK**	433	572	63.86		2 500	3 200	7.27	H2317	AHX2317	KM19	0.32	2.1	3.1	2
90	160	40	2.0	**22218MB**	**22218MBK**	282	374	42.50		1 900	2 600	3.46	H318	AHX318	KM20	0.23	2.9	4.2	2.8
	160	40	2.0	**22218CA**	**22218CAK**	282	374	42.48		2 800	3 600	3.41	H318	AHX318	KM20	0.23	2.9	4.2	2.8
	160	40	2.0	**22218CC**	**22218CCK**	282	374	42.48		2 800	3 600	3.46	H318	AHX318	KM20	0.23	2.9	4.2	2.8
	160	52,4	2.0	**23218CA**	**23218CAK**	365	492	56.01		1 700	2 200	4.56	H2318	AHX3218	KM20	0.31	2.2	3.3	2.2
	160	52,4	2.0	**23218CC**	**23218CCK**	365	497	56.57		1 800	2 400	4.56	H2318	AHX3218	KM20	0.31	2.2	3.3	2.2
	190	43	3.0	**21318CA**	**21318CAK**	351	433	47.63		1 600	2 200	5.82	H318	AHX318	KM20	0.23	3	4.5	2.9
	190	43	3.0	**21318CC**	**21318CCK**	351	433	47.63		1 600	2 200	6.05	H318	AHX318	KM20	0.23	3	4.5	2.9
	190	64	3.0	**22318MB**	**22318MBK**	489	641	70.37		1 700	2 200	8.69	H2318	AHX2318	KM20	0.33	2.1	3.1	2
	190	64	3.0	**22318CA**	**22318CAK**	489	641	70.37		2 600	3 000	8.40	H2318	AHX2318	KM20	0.33	2.1	3.1	2
	190	64	3.0	**22318CC**	**22318CCK**	497	659	72.32		2 600	3 000	8.69	H2318	AHX2318	KM20	0.33	2.1	3.1	2
95	170	43	2,1	**22219MB**	**22219MBK**	315	411	45.85		1 800	2 400	4.20	H319	AHX319	KM21	0.23	2.9	4.2	2.7
	170	43	2,1	**22219CA**	**22219CAK**	315	411	45.85		2 600	3 000	4.14	H319	AHX319	KM21	0.23	2.9	4.2	2.7
	170	43	2,1	**22219CC**	**22219CCK**	315	411	45.85		2 600	3 000	4.20	H319	AHX319	KM21	0.23	2.9	4.2	2.7
	200	45	3.0	**21319CA**	**21319CAK**	389	500	54.13		1 700	2 200	6.90	H319	AHX319	KM21	0.22	3	4.5	3
	200	45	3.0	**21319CC**	**21319CCK**	389	500	54.13		1 700	2 200	7.00	H319	AHX319	KM21	0.22	3	4.5	3
	200	67	3.0	**22319MB**	**22319MBK**	536	710	76.66		1 600	2 000	10.10	H2319	AHX2319	KM21	0.33	2.1	3.1	2
	200	67	3.0	**22319CA**	**22319CAK**	536	710	76.66		2 200	2 800	10.10	H2319	AHX2319	KM21	0.33	2.1	3.1	2
	200	67	3.0	**22319CC**	**22319CCK**	546	726	78.44		2 200	2 800	10.10	H2319	AHX2319	KM21	0.33	2.1	3.1	2



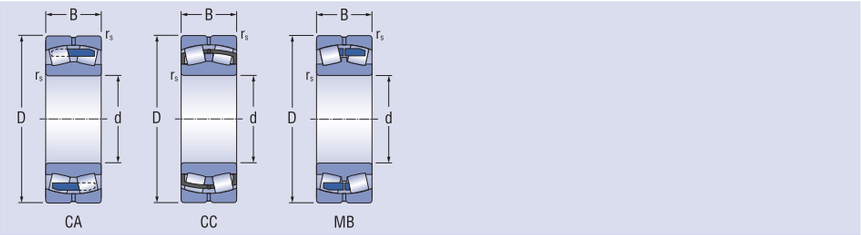
Dimensions				Bearing designation		Basic load rating		Fatigue load limit		Limiting speed		Mass	Corresponding			Coefficients			
				cylindricall bore	tapered bore	dynamic	static			for lubrication with grease	oil		Adapter sleeve	Withdrawal sleeve	Withdrawal nut				
d	D	B	$r_{s\,min}$			C_r	C_{or}	C_u								e	Y_1	Y_2	Y_0
mm						kN				min^{-1}		kg							
100	150	50	1.5	**24020CA**	**24020CAK**	251	448	51.03		1 200	1 500	3.02	-	AH24020	KM21	0.30	2.3	3.4	2.3
	150	50	1.5	**24020CC**	**24020CCK**	260	461	52.51		1 200	1 500	3.02	-	AH24020	KM21	0.30	2.3	3.4	2.3
	165	52	2.0	**23120CA**	**23120CAK**	360	540	60.37		1 600	2 000	4.43	H3120	AHX3120	KM22	0.29	2.4	3.5	2.3
	165	52	2.0	**23120CC**	**23120CCK**	362	545	60.93		1 700	2 200	4.43	H3120	AHX3120	KM22	0.29	2.4	3.5	2.3
	180	46	2.1	**22220MB**	**22220MBK**	361	474	52.13		1 700	2 200	5.03	H320	AHX320	KM22	0.24	2.9	4.1	2.7
	180	46	2.1	**22220CA**	**22220CAK**	361	474	52.11		2 500	3 200	4.96	H320	AHX320	KM22	0.24	2.9	4.1	2.7
	180	46	2.1	**22220CC**	**22220CCK**	361	474	52.11		2 500	3 200	5.15	H320	AHX320	KM22	0.24	2.9	4.1	2.7
	180	60,3	2.1	**23220CA**	**23220CAK**	428	637	73.12		1 600	2 000	6.73	H2320	AHX3220	KM22	0.31	2.2	3.2	2.1
	180	60,3	2.1	**23220CC**	**23220CCK**	433	649	74.51		1 600	2 200	6.73	H2320	AHX3220	KM22	0.31	2.2	3.2	2.1
	215	47	3.0	**21320CA**	**21320CAK**	433	546	57.97		1 600	2 000	8.28	H320	AHX320	KM22	0.22	3.1	4.6	3
	215	47	3.0	**21320CC**	**21320CCK**	433	546	57.97		1 600	2 000	8.41	H320	AHX320	KM22	0.22	3.1	4.6	3
	215	73	3.0	**22320MB**	**22320MBK**	626	840	89.01		1 800	2 200	13.03	H2320	AHX2320	KM22	0.33	2	3	2
	215	73	3.0	**22320CA**	**22320CAK**	626	840	89.01		2 200	2 600	12.95	H2320	AHX2320	KM22	0.33	2	3	2
	215	73	3.0	**22320CC**	**22320CCK**	637	857	90.78		2 200	2 600	13.03	H2320	AHX2320	KM22	0.33	2	3	2
110	170	45	2.0	**23022MB**	**23022MBK**	201	422	46.34		1 400	1 800	3.79	H322	AHX322	KM24	0.24	2.9	4.3	2.8
	170	45	2.0	**23022CA**	**23022CAK**	279	461	50.60		1 500	1 900	3.79	H322	AHX322	KM24	0.24	2.9	4.3	2.8
	170	45	2.0	**23022CC**	**23022CCK**	280	466	51.14		1 500	1 900	3.68	H322	AHX322	KM24	0.24	2.9	4.3	2.8
	180	56	2.0	**23122MB**	**23122MBK**	270	489	53.17		1 300	1 700	6.25	H3122	AHX3122	KM24	0.30	2.3	3.4	2.2
	180	56	2.0	**23122CA**	**23122CAK**	386	613	66.65		1 300	1 700	6.25	H3122	AHX3122	KM24	0.30	2.3	3.4	2.2
	180	56	2.0	**23122CC**	**23122CCK**	389	620	67.41		1 600	2 000	5.81	H3122	AHX3122	KM24	0.30	2.3	3.4	2.2
	180	69	2.0	**24122CA**	**24122CAK**	474	798	86.87		1 600	2 000	6.93	-	AH24122	KM23	0.35	1.9	2.8	1.9
	180	69	2.0	**24122CC**	**24122CCK**	474	798	86.87		1 600	2 000	6.90	-	AH24122	KM23	0.35	1.9	2.8	1.9
	200	53	2.1	**22222MB**	**22222MBK**	447	593	63.13		1 800	2 200	7.40	H322	AHX3122	KM24	0.25	2.7	4	2.6
	200	53	2.1	**22222CA**	**22222CAK**	447	593	63.13		2 200	3 000	7.23	H322	AHX3122	KM24	0.25	2.7	4	2.6
	200	53	2.1	**22222CC**	**22222CCK**	452	606	64.57		2 200	3 000	7.40	H322	AHX3122	KM24	0.25	2.7	4	2.6
	200	69,8	2.1	**23222CA**	**23222CAK**	530	809	86.30		1 400	1 800	9.70	H2322	AHX3222	KM25	0.33	2.1	3.1	2
	200	69,8	2.1	**23222CC**	**23222CCK**	536	824	87.91		1 500	1 900	9.70	H2322	AHX3222	KM25	0.33	2.1	3.1	2
	240	50	3.0	**21322CA**	**21322CAK**	490	671	68.63		1 400	1 800	11.64	H322	AHX322	KM25	0.22	3.1	4.6	3
	240	50	3.0	**21322CC**	**21322CCK**	490	671	68.63		1 400	1 800	11.64	H322	AHX322	KM25	0.22	3.1	4.6	3
	240	80	3.0	**22322MB**	**22322MBK**	750	960	98.65		1 200	1 600	18.22	H2322	AHX2322	KM25	0.33	2.1	3.1	2
	240	80	3.0	**22322CA**	**22322CAK**	786	993	102.1		1 800	2 200	18.22	H2322	AHX2322	KM25	0.33	2.1	3.1	2
	240	80	3.0	**22322CC**	**22322CCK**	786	993	102.1		1 800	2 200	17.80	H2322	AHX2322	KM25	0.33	2.1	3.1	2



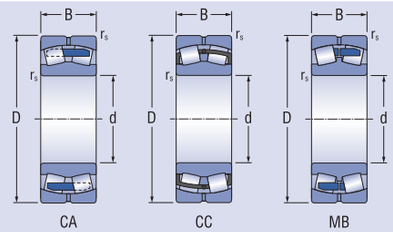
Dimensions				Bearing designation		Basic load rating		Fatigue load limit		Limiting speed		Mass	Corresponding			Coefficients			
				cylindricall bore	tapered bore	dynamic	static			for lubrication with grease	oil		Adapter sleeve	Withdrawal sleeve	Withdrawal nut				
d	D	B	$r_{s\,min}$			C_r	C_{or}	C_u								e	Y_1	Y_2	Y_0
mm						kN				min^{-1}		kg							
120	180	46	2.0	**23024MB**	**23024MBK**	218	484	52.16		1 200	1 600	3.86	H3024	AHX3024	KM26	0.23	3	4.5	2.9
	180	46	2.0	**23024CA**	**23024CAK**	354	560	60.36		1 400	1 800	3.86	H3024	AHX3024	KM26	0.23	3	4.5	2.9
	180	46	2.0	**23024CC**	**23024CCK**	359	565	60.90		1 400	1 800	3.81	H3024	AHX3024	KM26	0.23	3	4.5	2.9
	180	60	2.0	**24024CA**	**24024CAK**	390	700	75.43		1 500	2 000	5.29	-	AH24024	KM25	0.30	2.3	3.4	2.2
	180	60	2.0	**24024CC**	**24024CCK**	391	700	75.43		1 500	2 000	5.29	-	AH24024	KM25	0.30	2.3	3.4	2.2
	200	62	2.0	**23124MB**	**23124MBK**	321	589	62.08		1 100	1 500	7.85	H3124	AHX3124	KM26	0.28	2.4	3.5	2.3
	200	62	2.0	**23124CA**	**23124CAK**	531	780	82.21		1 300	1 700	7.85	H3124	AHX3124	KM26	0.28	2.4	3.5	2.3
	200	62	2.0	**23124CC**	**23124CCK**	530	780	82.21		1 400	1 800	7.85	H3124	AHX3124	KM26	0.28	2.4	3.5	2.3
	200	80	2.0	**24124CA**	**24124CAK**	645	1 028	108.6		1 400	1 800	10.18	-	AH24124	KM26	0.37	1.8	2.7	1.8
	200	80	2.0	**24124CC**	**24124CCK**	645	1 028	108.6		1 400	1 800	10.18	-	AH24124	KM26	0.37	1.8	2.7	1.8
	215	58	2.1	**22224MB**	**22224MBK**	520	730	76.02		1 100	1 500	9.17	H3124	AHX3124	KM26	0.25	2.7	3.9	2.5
	215	58	2.1	**22224CA**	**22224CAK**	520	730	76.02		1 300	1 700	9.14	H3124	AHX3124	KM26	0.25	2.7	3.9	2.5
	215	58	2.1	**22224CC**	**22224CCK**	520	730	76.02		1 400	1 800	9.17	H3124	AHX3124	KM26	0.25	2.7	3.9	2.5
	215	76	2.1	**23224CA**	**23224CAK**	660	968	101.1		1 300	1 700	12.02	H2324	AHX3224	KM27	0.33	2	3	2
	215	76	2.1	**23224CC**	**23224CCK**	668	984	102.7		1 300	1 700	12.02	H2324	AHX3224	KM27	0.33	2	3	2
	260	86	3.0	**22324MB**	**22324MBK**	895	1 145	114.8		1 100	1 500	22.26	H2324	AHX2324	KM27	0.33	2.1	3.1	2
	260	86	3.0	**22324CA**	**22324CAK**	895	1 145	114.8		1 700	2 000	22.26	H2324	AHX2324	KM27	0.33	2.1	3.1	2
	260	86	3.0	**22324CC**	**22324CCK**	895	1 145	114.8		1 700	2 000	22.26	H2324	AHX2324	KM27	0.33	2.1	3.1	2
130	200	52	2.0	**23026MB**	**23026MBK**	278	626	65.51		1 100	1 500	6.08	H3026	AHX3026	KM28	0.23	2.9	4.3	2.9
	200	52	2.0	**23026CA**	**23026CAK**	400	666	69.70		1 200	1 600	6.08	H3026	AHX3026	KM28	0.23	2.9	4.3	2.9
	200	52	2.0	**23026CC**	**23026CCK**	400	666	69.70		1 200	1 600	6.05	H3026	AHX3026	KM28	0.23	2.9	4.3	2.9
	200	69	2.0	**24026CA**	**24026CAK**	472	852	89.25		1 400	1 800	7.95	-	AH24026	KM27	0.31	2.2	3.2	2.1
	200	69	2.0	**24026CC**	**24026CCK**	486	878	91.97		1 400	1 800	7.95	-	AH24026	KM27	0.31	2.2	3.2	2.1
	210	64	2.0	**23126CA**	**23126CAK**	492	812	84.31		1 300	1 700	8.54	H3126	AHX3126	KM28	0.28	2.4	3.6	2.4
	210	64	2.0	**23126CC**	**23126CCK**	496	826	85.76		1 300	1 700	8.54	H3126	AHX3126	KM28	0.28	2.4	3.6	2.4
	210	80	2.0	**24126CA**	**24126CAK**	585	1 030	106.8		1 200	1 600	10.83	-	AH24126	KM28	0.35	1.9	2.9	1.9
	210	80	2.0	**24126CC**	**24126CCK**	616	1 036	107.5		1 300	1 700	10.83	-	AH24126	KM28	0.35	1.9	2.9	1.9
	230	64	3.0	**22226MB**	**22226MBK**	625	883	94.12		1 200	1 600	11.46	H3126	AHX3126	KM28	0.26	2.6	3.8	2.5
	230	64	3.0	**22226CA**	**22226CAK**	625	883	94.12		2 000	2 600	11.32	H3126	AHX3126	KM28	0.26	2.6	3.8	2.5
	230	64	3.0	**22226CC**	**22226CCK**	625	883	94.12		2 000	2 600	11.43	H3126	AHX3126	KM28	0.26	2.6	3.8	2.5
	230	80	3.0	**23226CA**	**23226CAK**	759	1 172	119.5		1 200	1 600	14.36	H2326	AHX3226	KM29	0.33	2.1	3.1	2
	230	80	3.0	**23226CC**	**23226CCK**	759	1 172	119.5		1 200	1 600	14.36	H2326	AHX3226	KM29	0.33	2.1	3.1	2
	280	93	4.0	**22326MB**	**22326MBK**	1 020	1 377	134.5		950	1 300	27.71	H2326	AHX2326	KM29	0.33	2.1	3.1	2
	280	93	4.0	**22326CA**	**22326CAK**	1 020	1 377	134.5		1 600	1 900	27.71	H2326	AHX2326	KM29	0.33	2.1	3.1	2
	280	93	4.0	**22326CC**	**22326CCK**	1 020	1 380	134.8		1 600	1 900	27.46	H2326	AHX2326	KM29	0.33	2.1	3.1	2



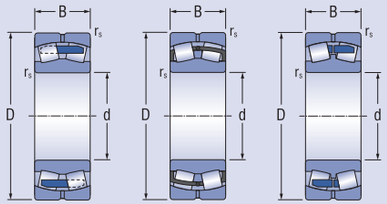
Dimensions				Bearing designation		Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass	Corresponding			Coefficients			
				cylindricall bore	tapered bore	dynamic	static			grease	oil		Adapter sleeve	Withdrawal sleeve	Withdrawal nut				
d	D	B	$r_{s\ min}$			C_r	C_{or}	C_u								e	Y_1	Y_2	Y_0
mm						kN				min^{-1}		kg							
140	210	53	2.0	**23028MB**	**23028MBK**	294	654	67.31		950	1 300	6.52	H3028	AHX3028	KM30	0.22	3	4.5	3
	210	53	2.0	**23028CA**	**23028CAK**	444	719	74.00		1 100	1 500	6.52	H3028	AHX3028	KM30	0.22	3	4.5	3
	210	53	2.0	**23028CC**	**23028CCK**	450	760	78.22		1 600	1 900	6.52	H3028	AHX3028	KM30	0.22	3	4.5	3
	210	69	2.0	**24028CA**	**24028CAK**	505	901	92.79		1 200	1 600	8.52	-	AH24028	KM29	0.29	2.3	3.4	2.3
	210	69	2.0	**24028CC**	**24028CCK**	505	922	94.95		1 300	1 700	8.52	-	AH24028	KM29	0.29	2.3	3.4	2.3
	225	68	2.1	**23128MB**	**23128MBK**	410	623	63.02		950	1 300	10.28	H3128	AHX3128	KM30	0.27	2.5	3.7	2.4
	225	68	2.1	**23128CA**	**23128CAK**	561	953	96.40		1 100	1 500	10.28	H3128	AHX3128	KM30	0.27	2.5	3.7	2.4
	225	68	2.1	**23128CC**	**23128CCK**	554	932	94.27		1 200	1 600	10.28	H3128	AHX3128	KM30	0.27	2.5	3.7	2.4
	225	85	2.1	**24128CA**	**24128CAK**	680	1 200	121.8		1 100	1 500	13.13	-	AH24128	KM30	0.35	1.9	2.9	1.9
	225	85	2.1	**24128CC**	**24128CCK**	690	1 236	125.5		1 200	1 600	13.13	-	AH24128	KM30	0.35	1.9	2.9	1.9
	250	68	3.0	**22228MB**	**22228MBK**	720	990	98.51		1 000	1 400	14.48	H3128	AHX3128	KM30	0.25	2.7	3.9	2.5
	250	68	3.0	**22228CA**	**22228CAK**	720	990	98.51		1 700	2 200	14.48	H3128	AHX3128	KM30	0.25	2.7	3.9	2.5
	250	68	3.0	**22228CC**	**22228CCK**	720	990	98.51		1 800	2 200	14.48	H3128	AHX3128	KM30	0.25	2.7	3.9	2.5
	250	88	3.0	**23228CA**	**23228CAK**	826	1 320	131.5		1 000	1 400	19.28	H2328	AHX3228	KM31	0.33	2	3	2
	250	88	3.0	**23228CC**	**23228CCK**	836	1 340	133.5		1 100	1 500	19.28	H2328	AHX3228	KM31	0.33	2	3	2
	300	102	4.0	**22328MB**	**22328MBK**	1 154	1 620	154.9		900	1 200	35.50	H2328	AHX2328	KM31	0.34	2	3	2
	300	102	4.0	**22328CA**	**22328CAK**	1 154	1 620	154.9		1 400	1 500	35.50	H2328	AHX2328	KM31	0.34	2	3	2
	300	102	4.0	**22328CC**	**22328CCK**	1 164	1 680	160.6		1 400	1 500	35.16	H2328	AHX2328	KM31	0.34	2	3	2
150	225	56	2.1	**23030MB**	**23030MBK**	338	790	79.63		900	1 200	7.77	H3030	AHX3030	KM32	0.22	3.1	4.6	3
	225	56	2.1	**23030CA**	**23030CAK**	461	804	81.04		1 100	1 400	7.77	H3030	AHX3030	KM32	0.22	3.1	4.6	3
	225	56	2.1	**23030CC**	**23030CCK**	461	804	81.04		1 100	1 400	7.77	H3030	AHX3030	KM32	0.22	3.1	4.6	3
	225	75	2.1	**24030CA**	**24030CAK**	570	1 070	107.8		1 100	1 400	10.60	-	AH24030	KM31	0.30	2.3	3.4	2.2
	225	75	2.1	**24030CC**	**24030CCK**	587	1 100	110.9		1 200	1 500	10.60	-	AH24030	KM31	0.30	2.3	3.4	2.2
	250	80	2.1	**23130MB**	**23130MBK**	527	1 110	109.5		850	1 100	16.08	H3130	AHX3130	KM33	0.29	2.3	3.4	2.3
	250	80	2.1	**23130CA**	**23130CAK**	761	1 263	124.6		1 000	1 300	16.08	H3130	AHX3130	KM33	0.29	2.3	3.4	2.3
	250	80	2.1	**23130CC**	**23130CCK**	761	1 263	124.6		1 100	1 400	16.08	H3130	AHX3130	KM33	0.29	2.3	3.4	2.3
	250	100	2.1	**24130CA**	**24130CAK**	906	1 600	157.8		1 000	1 300	19.80	-	AH24130	KM32	0.37	1.8	2.7	1.8
	250	100	2.1	**24130CC**	**24130CCK**	910	1 650	162.8		1 100	1 400	19.80	-	AH24130	KM32	0.37	1.8	2.7	1.8
	270	73	3.0	**22230MB**	**22230MBK**	523	900	87.80		1 200	1 700	18.77	H3130	AHX3130	KM33	0.25	2.7	3.9	2.5
	270	73	3.0	**22230CA**	**22230CAK**	970	1 330	129.7		1 800	2 000	18.77	H3130	AHX3130	KM33	0.25	2.7	3.9	2.5
	270	73	3.0	**22230CC**	**22230CCK**	970	1 330	129.7		1 800	2 000	18.34	H3130	AHX3130	KM33	0.25	2.7	3.9	2.5
	270	96	3.0	**23230CA**	**23230CAK**	1 008	1 560	152.2		950	1 300	24.50	H2330	AHX3230	KM33	0.33	2	3	2
	270	96	3.0	**23230CC**	**23230CCK**	1 008	1 586	154.7		1 100	1 400	24.50	H2330	AHX3230	KM33	0.33	2	3	2
	320	108	4.0	**22330MB**	**22330MBK**	1 300	1 790	168.5		850	1 100	43.13	H2330	AHX2330	KM33	0.33	2	3	2
	320	108	4.0	**22330CA**	**22330CAK**	1 300	1 850	174.3		1 200	1 500	43.13	H2330	AHX2330	KM33	0.33	2	3	2
	320	108	4.0	**22330CC**	**22330CCK**	1 308	1 905	179.5		1 200	1 500	42.82	H2330	AHX2330	KM33	0.33	2	3	2



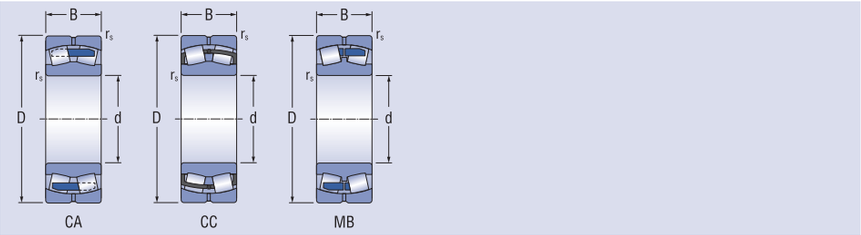
Dimensions				Bearing designation		Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass	Corresponding			Coefficients			
				cylindricall bore	tapered bore	dynamic	static			grease	oil		Adapter sleeve	Withdrawal sleeve	Withdrawal nut				
d	D	B	$r_{s\ min}$			C_r	C_{or}	C_u								e	Y_1	Y_2	Y_0
mm						kN				min^{-1}		kg							
160	240	60	2.1	**23032MB**	**23032MBK**	379	850	83.96		850	1 100	9.71	H3032	AH3032	KM34	0.22	3.1	4.6	3
	240	60	2.1	**23032CA**	**23032CAK**	529	930	91.86		1 000	1 300	9.54	H3032	AH3032	KM34	0.22	3.1	4.6	3
	240	60	2.1	**23032CC**	**23032CCK**	529	930	91.86		1 300	1 700	9.71	H3032	AH3032	KM34	0.22	3.1	4.6	3
	240	80	2.1	**24032CA**	**24032CAK**	710	1 330	131.5		1 000	1 300	12.98	-	AH24032	KM34	0.30	2.3	3.4	2.2
	240	80	2.1	**24032CC**	**24032CCK**	710	1 330	131.5		1 100	1 400	12.98	-	AH24032	KM34	0.30	2.3	3.4	2.2
	270	86	2.1	**23132MB**	**23132MBK**	536	1 140	110.0		800	1 000	20.51	H3132	AH3132	KM36	0.32	2.1	3	2
	270	86	2.1	**23132CA**	**23132CAK**	870	1 460	140.9		900	1 200	20.51	H3132	AH3132	KM36	0.32	2.1	3	2
	270	86	2.1	**23132CC**	**23132CCK**	870	1 480	142.8		1 000	1 300	20.51	H3132	AH3132	KM36	0.32	2.1	3	2
	270	109	2.1	**24132CA**	**24132CAK**	1 080	1 886	182.1		900	1 200	25.86	-	AH24132	KM34	0.38	1.8	2.7	1.8
	270	109	2.1	**24132CC**	**24132CCK**	1 080	1 930	186.3		1 000	1 300	25.86	-	AH24132	KM34	0.38	1.8	2.7	1.8
	290	80	3.0	**22232MB**	**22232MBK**	921	1 290	123.2		1 500	1 700	22.96	H3132	AH3132	KM36	0.26	2.6	3.8	2.5
	290	80	3.0	**22232CA**	**22232CAK**	921	1 290	123.2		1 700	1 900	22.96	H3132	AH3132	KM36	0.26	2.6	3.8	2.5
	290	80	3.0	**22232CC**	**22232CCK**	921	1 290	123.2		1 200	1 900	22.96	H3132	AH3132	KM36	0.26	2.6	3.8	2.5
	290	104	3.0	**23232CA**	**23232CAK**	1 129	1 837	175.1		1 700	1 900	30.20	H2332	AH3232	KM36	0.34	2	2.9	1.9
	290	104	3.0	**23232CC**	**23232CCK**	1 129	1 837	175.1		1 200	1 900	30.20	H2332	AH3232	KM36	0.34	2	2.9	1.9
	340	114	4.0	**22332CA**	**22332CAK**	1 470	1 950	180.6		1 100	1 300	51.50	H2332	AH2332	KM36	0.33	2	3	2
170	260	67	2.1	**23034MB**	**23034MBK**	458	1040	100.5		800	1 000	13.18	H3034	AH3034	KM36	0.23	2.9	4.4	2.9
	260	67	2.1	**23034CA**	**23034CAK**	726	1172	113.3		900	1 200	13.18	H3034	AH3034	KM36	0.23	2.9	4.4	2.9
	260	67	2.1	**23034CC**	**23034CCK**	733	1173	113.3		1 200	1 600	13.18	H3034	AH3034	KM36	0.23	2.9	4.4	2.9
	260	90	2.1	**24034CA**	**24034CAK**	841	1552	150.3		900	1 200	16.70	-	AH24034	KM36	0.31	2.2	3.2	2.1
	260	90	2.1	**24034CC**	**24034CCK**	841	1565	151.6		1 000	1 300	16.70	-	AH24034	KM36	0.31	2.2	3.2	2.1
	280	88	2.1	**23134CA**	**23134CAK**	960	1565	149.3		850	1 100	21.10	H3134	AH3134	KM38	0.29	2.4	3.5	2.3
	280	88	2.1	**23134CC**	**23134CCK**	960	1590	151.7		1 000	1 300	21.10	H3134	AH3134	KM38	0.29	2.4	3.5	2.3
	280	109	2.1	**24134CA**	**24134CAK**	1 110	1940	184.9		900	1 200	26.97	-	AH24134	KM36	0.36	1.9	2.8	1.8
	280	109	2.1	**24134CC**	**24134CCK**	1 110	1980	188.7		1 000	1 300	26.97	-	AH24134	KM36	0.36	1.9	2.8	1.8
	310	86	4.0	**22234MB**	**22234MBK**	740	1330	124.4		1 100	1 300	28.69	H3134	AH3134	KM38	0.26	2.6	3.9	2.6
	310	86	4.0	**22234CA**	**22234CAK**	990	1500	140.3		1 300	1 600	28.54	H3134	AH3134	KM38	0.26	2.6	3.9	2.6
	310	86	4.0	**22234CC**	**22234CCK**	1 002	1540	144.1		1 100	1 400	28.69	H3134	AH3134	KM38	0.26	2.6	3.9	2.6
	310	110	4.0	**23234CA**	**23234CAK**	1 244	2034	190.2		800	1 100	37.30	H2334	AH3234	KM38	0.34	2	3	2
	310	110	4.0	**23234CC**	**23234CCK**	1 244	2090	195.5		900	1 200	37.30	H2334	AH3234	KM38	0.34	2	3	2
	360	120	4.0	**22334CA**	**22334CAK**	1 560	2120	193.0		1 100	1 200	60.38	H2334	AH2334	KM38	0.34	2	3	2



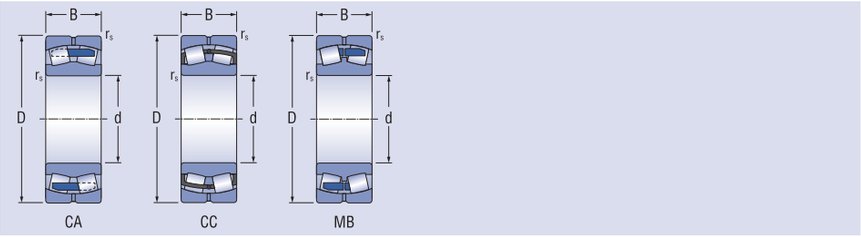
Dimensions				Bearing designation		Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass	Corresponding			Coefficients			
				cylindricall bore	tapered bore	dynamic	static			grease	oil		Adapter sleeve	Withdrawal sleeve	Withdrawal nut				
d	D	B	$r_{s\,min}$			C_r	C_{or}	C_u								e	Y_1	Y_2	Y_0
mm						kN				min^{-1}		kg							
180	280	74	2.1	**23036MB**	**23036MBK**	556	1 260	119.2		750	950	17.62	H3036	AH3036	KM38	0.24	2.9	4.2	2.8
	280	74	2.1	**23036CA**	**23036CAK**	830	1 350	127.7		900	1 100	17.62	H3036	AH3036	KM38	0.24	2.9	4.2	2.8
	280	74	2.1	**23036CC**	**23036CCK**	840	1 350	127.7		1 200	1 400	16.95	H3036	AH3036	KM38	0.24	2.9	4.2	2.8
	280	100	2.1	**24036CA**	**24036CAK**	979	1 830	173.4		900	1 100	23.35	-	AH24036	KM38	0.32	2.1	3.1	2
	280	100	2.1	**24036CC**	**24036CCK**	979	1 870	177.2		1 000	1 300	23.35	-	AH24036	KM38	0.32	2.1	3.1	2
	300	96	3.0	**23136MB**	**23136MBK**	1 060	1 850	173.2		750	900	27.12	H3136	AH3136	KM40	0.29	2.3	3.4	2.3
	300	96	3.0	**23136CA**	**23136CAK**	1 140	1 860	174.1		800	1 000	27.12	H3136	AH3136	KM40	0.29	2.3	3.4	2.3
	300	96	3.0	**23136CC**	**23136CCK**	1 140	1 880	176.0		900	1 200	26.97	H3136	AH3136	KM40	0.29	2.3	3.4	2.3
	300	118	3.0	**24136CA**	**24136CAK**	1 270	2 230	208.5		800	1 000	34.02	-	AH24136	KM38	0.37	1.8	2.7	1.8
	300	118	3.0	**24136CC**	**24136CCK**	1 270	2 280	213.2		900	1 200	34.02	-	AH24136	KM38	0.37	1.8	2.7	1.8
	320	86	4.0	**22236MB**	**22236MBK**	1 080	1 410	130.3		900	1 100	29.82	H3136	AH2236	KM40	0.25	2.7	4	2.7
	320	86	4.0	**22236CA**	**22236CAK**	1 080	1 590	146.9		1 300	1 500	29.71	H3136	AH2236	KM40	0.25	2.7	4	2.7
	320	86	4.0	**22236CC**	**22236CCK**	1 080	1 630	150.6		1 100	1 300	29.45	H3136	AH2236	KM40	0.25	2.7	4	2.7
	320	112	4.0	**23236CA**	**23236CAK**	1 280	2 170	200.7		1 000	1 200	39.32	H2336	AH3236	KM40	0.33	2.1	3.1	2
	320	112	4.0	**23236CC**	**23236CCK**	1 310	2 230	206.2		1 100	1 300	39.32	H2336	AH3236	KM40	0.33	2.1	3.1	2
	380	126	4.0	**22336CA**	**22336CAK**	1 762	2 636	234.3		1 000	1 100	69.26	H2336	AH2336	KM40	0.33	2.1	3.1	2
190	290	75	2.1	**23038MB**	**23038MBK**	570	1 260	117.8		700	900	20.03	H3038	AH3038	HML41T	0.23	2.9	4.4	2.9
	290	75	2.1	**23038CA**	**23038CAK**	867	1 490	139.4		1 000	1 200	20.03	H3038	AH3038	HML41T	0.23	2.9	4.4	2.9
	290	75	2.1	**23038CC**	**23038CCK**	877	1 520	142.2		1 100	1 400	17.71	H3038	AH3038	HML41T	0.23	2.9	4.4	2.9
	290	100	2.1	**24038CA**	**24038CAK**	1 023	1 983	185.8		800	1 100	24.24	-	AH24038	KM40	0.31	2.2	3.2	2.1
	290	100	2.1	**24038CC**	**24038CCK**	1 023	1 983	185.8		900	1 200	24.24	-	AH24038	KM40	0.31	2.2	3.2	2.1
	320	104	3.0	**23138MB**	**23138MBK**	811	1 880	172.8		670	850	35.31	H3138	AH3138	HM42T	0.30	2.3	3.4	2.2
	320	104	3.0	**23138CA**	**23138CAK**	1 226	2 120	194.8		750	1 000	35.31	H3138	AH3138	HM42T	0.30	2.3	3.4	2.2
	320	104	3.0	**23138CC**	**23138CCK**	1 230	2 180	200.3		850	1 100	34.54	H3138	AH3138	HM42T	0.30	2.3	3.4	2.2
	320	128	3.0	**24138CA**	**24138CAK**	1 467	2 593	238.6		700	1 000	42.50	-	AH24138	KM40	0.40	1.7	2.5	1.7
	320	128	3.0	**24138CC**	**24138CCK**	1 467	2 660	244.7		850	1 100	42.50	-	AH24138	KM40	0.40	1.7	2.5	1.7
	340	92	4.0	**22238CA**	**22238CAK**	1 190	1 760	160.0		1 200	1 500	37.09	H3138	AH2238	HM42T	0.25	2.7	4	2.6
	340	120	4.0	**23238CA**	**23238CAK**	1 508	2 560	232.6		700	1 000	47.51	H2338	AH3238	HM42T	0.33	2	3	2
	340	120	4.0	**23238CC**	**23238CCK**	1 508	2 560	232.6		800	1 100	47.51	H2338	AH3238	HM42T	0.33	2	3	2
	400	132	5.0	**22338CA**	**22338CAK**	1 937	2 848	250.1		900	1 000	80.87	H2338	AH2338	HM42T	0.32	2.1	3.1	2
200	310	82	2.1	**23040MB**	**23040MBK**	597	1 340	122.5		670	850	23.46	H3040	AH3040	HML43T	0.24	2.9	4.3	2.8
	310	82	2.1	**23040CA**	**23040CAK**	930	1 650	150.9		900	1 100	23.46	H3040	AH3040	HML43T	0.24	2.9	4.3	2.8
	310	82	2.1	**23040CC**	**23040CCK**	930	1 690	154.6		1 000	1 300	22.78	H3040	AH3040	HML43T	0.24	2.9	4.3	2.8
	310	109	2.1	**24040CA**	**24040CAK**	1 120	2 220	203.8		670	850	30.72	-	AH24040	HM42T	0.32	2.1	3.1	2.1
	310	109	2.1	**24040CC**	**24040CCK**	1 150	2 280	209.3		850	1 100	30.72	-	AH24040	HM42T	0.32	2.1	3.1	2.1
	340	112	3.0	**23140MB**	**23140MBK**	937	2 070	186.8		630	800	42.99	H3140	AH3140	HM44T	0.30	2.2	3.3	2.2
	340	112	3.0	**23140CC**	**23140CCK**	1 420	2 547	229.8		800	1 000	42.99	H3140	AH3140	HM44T	0.30	2.2	3.3	2.2
	340	140	3.0	**24140MB**	**24140MBK**	1 480	2 550	230.1		700	900	53.15	-	AH24140	HM42T	0.39	1.9	2.6	1.7
	340	140	3.0	**24140CC**	**24140CCK**	1 670	3 030	373.4		800	1 000	53.15	-	AH24140	HM42T	0.39	1.9	2.6	1.7
	360	98	4.0	**22240CA**	**22240CAK**	1 290	1 990	177.7		1 100	1 400	43.95	H3140	AH2240	HM44T	0.25	2.6	3.9	2.6
	360	128	4.0	**23240CC**	**23240CCK**	1 690	2 870	255.7		1 100	1 400	57.32	H2340	AH3240	HM44T	0.33	2	3	2
	420	138	5.0	**22340CA**	**22340CAK**	2 117	3 126	270.5		730	900	92.78	H2340	AH2340	HM44T	0.32	2.1	3.1	2



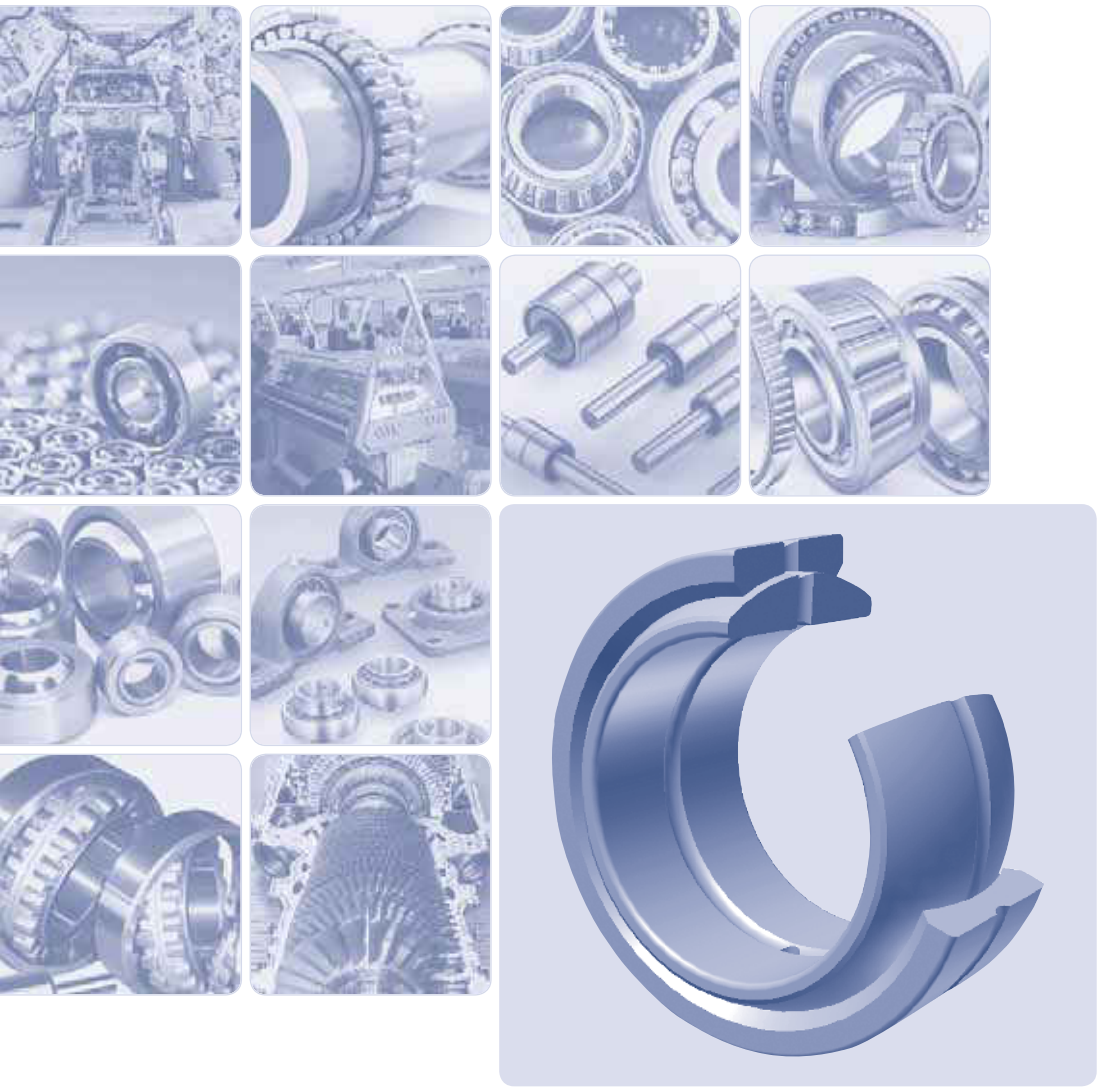
Dimensions				Bearing designation		Basic load rating		Fatigue load limit		Limiting speed		Mass	Corresponding			Coefficients			
				cylindricall bore	tapered bore	dynamic	static			for lubrication with grease	oil		Adapter sleeve	Withdrawal sleeve	Withdrawal nut				
d	D	B	$r_{s\,min}$			C_r	C_{or}	C_u								e	Y_1	Y_2	Y_0
mm						kN				min^{-1}		kg							
220	340	90	3.0	**23044MB**	**23044MBK**	783	1 860	165.6		600	750	28.8	H3944	AH3044	HML47T	0.22	3.0	4.5	2.9
	340	90	3.0	**23044CA**	**23044CAK**	1 090	2 040	181.6		950	1 200	29.7	H3944	AH3044	HML47T	0.24	2.9	4.2	2.8
	340	90	3.0	**23044CC**	**23044CCK**	1 090	2 040	181.6		950	1 200	29.7	H3944	AH3044	HML47T	0.24	2.9	4.2	2.8
	340	118	3.0	**24044CA**	**24044CAK**	1 350	2 760	245.7		750	1 000	38.1	-	AOH24044	HM46T	0.32	2.1	3.1	2.1
	340	118	3.0	**24044CC**	**24044CCK**	1 350	2 760	245.7		750	1 000	38.1	-	AOH24044	HM46T	0.32	2.1	3.1	2.1
	370	120	4.0	**23144MB**	**23144MBK**	1 060	2 420	212.1		600	750	55.0	H3144	AH3144	HM48T	0.29	2.3	3.4	2.2
	370	120	4.0	**23144CC**	**23144CCK**	1 660	2 900	254.1		700	950	51.5	H3144	AH3144	HM48T	0.29	2.3	3.4	2.2
	370	120	4.0	**23144CA**	**23144CAK**	1 660	2 900	254.1		700	950	51.5	H3144	AH3144	HM48T	0.29	2.3	3.4	2.2
	370	150	4.0	**24144CC**	**24144CCK**	1 900	3 580	313.7		700	950	62.3	-	AOH24144	HM46T	0.38	1.8	2.6	1.7
	400	108	4.0	**22244CA**	**22244CAK**	1 500	2 380	205.7		730	900	61.5	H3144	AH2244	HM48T	0.25	2.7	4.0	2.6
	400	144	4.0	**23244CC**	**23244CCK**	2 130	3 720	321.2		670	900	78.5	H2344	AH2344	HM48T	0.34	2.0	3.0	2.0
	400	144	4.0	**23244CA**	**23244CAK**	2 130	3 720	321.2		670	900	78.5	H2344	AH2344	HM48T	0.34	2.0	3.0	2.0
	460	145	5.0	**22344CA**	**22344CAK**	2 140	3 290	276.3		660	800	120.0	H2344	AH2344	HM48T	0.31	2.2	3.2	2.1
240	360	92	3.0	**23048MB**	**23048MBK**	816	2 120	184.8		530	670	35.5	H3048	AH3048	HM52T	0.23	3.0	4.5	2.9
	360	92	3.0	**23048CA**	**23048CAK**	1 140	2 190	191.2		850	1 100	32.4	H3048	AH3048	HM52T	0.23	3.0	4.5	2.9
	360	92	3.0	**23048CC**	**23048CCK**	1 160	2 220	193.5		850	1 100	32.4	H3048	AH3048	HM52T	0.23	3.0	4.5	2.9
	360	118	3.0	**24048CA**	**24048CAK**	1 440	2 930	255.5		700	950	40.8	-	AOH24048	HM50T	0.3	2.3	3.4	2.2
	360	118	3.0	**24048CC**	**24048CCK**	1 490	2 930	255.5		700	950	40.8	-	AOH24048	HM50T	0.3	2.3	3.4	2.2
	400	128	4.0	**23148MB**	**23148MBK**	1 230	2 910	248.9		500	630	55.5	H3148	AH3148	HM52T	0.29	2.3	3.4	2.3
	400	128	4.0	**23148CA**	**23148CAK**	1 840	3 310	283.1		670	850	63.7	H3148	AH3148	HM52T	0.29	2.3	3.4	2.3
	400	128	4.0	**23148CC**	**23148CCK**	1 840	3 310	283.1		670	850	63.7	H3148	AH3148	HM52T	0.29	2.3	3.4	2.3
	400	128	4.0	**24148CA**	**24148CAK**	2 160	4 090	349.8		670	850	76.9	-	AOH24148	HM52T	0.38	1.8	2.7	1.8
	400	160	4.0	**24148CC**	**24148CCK**	2 160	4 090	349.8		670	850	76.9	-	AOH24148	HM52T	0.38	1.8	2.7	1.8
	440	120	4.0	**22248CA**	**22248CAK**	1 820	3 640	305.7		900	1 200	85.0	H3148	AH2248	HM52T	0.26	2.6	2.9	2.6
	440	160	4.0	**23248CC**	**23248CCK**	2 560	4 220	366.1		630	800	107.3	H2348	AH2348	HM52T	0.35	1.9	2.9	1.8
	440	160	4.0	**23248CA**	**23248CAK**	2 560	4 220	388.0		630	800	107.3	H2348	AH2348	HM52T	0.35	1.9	2.9	1.8
	500	155	5.0	**22348CA**	**22348CAK**	2 580	3 640	298.0		600	750	153.0	H2348	AH2348	HM52T	0.3	2.2	3.3	2.2
260	400	104	4.0	**23052CA**	**23052CAK**	1 030	2 520	213.5		500	630	51.5	H3052	AH3052	HM56T	0.23	2.9	4.3	2.9
	400	104	4.0	**23052CC**	**23052CCK**	1 460	2 850	241.5		900	1 100	47.7	H3052	AH3052	HM56T	0.23	2.9	4.3	2.9
	400	104	4.0	**23052CA**	**23052CAK**	1 410	2 770	240.1		900	1 100	49.8	H3052	AH3052	HM56T	0.23	2.9	4.3	2.9
	400	104	4.0	**24052CA**	**24052CAK**	1 790	3 850	326.2		630	850	66.7	-	AH24052	HM56T	0.32	2.1	3.1	2.1
	400	140	4.0	**24052CC**	**24052CCK**	1 840	3 850	326.2		630	850	62.4	-	AH24052	HM56T	0.32	2.1	3.1	2.1
	440	144	4.0	**23152MB**	**23152MBK**	1 470	3 410	283.9		450	560	95.3	H3152	AH3152	HM58T	0.32	2.0	3.1	2.0
	440	144	4.0	**23152CC**	**23152CCK**	2 270	4 190	348.8		600	800	88.2	H3152	AH3152	HM58T	0.32	2.0	3.1	2.0
	440	144	4.0	**23152CA**	**23152CAK**	2 230	4 050	344.6		600	800	88.9	H3152	AH3152	HM58T	0.32	2.0	3.1	2.0
	440	180	4.0	**24152CC**	**24152CCK**	2 730	5 330	443.7		600	800	107.6	-	AH24152	HM56T	0.39	1.8	2.6	1.7
	440	180	4.0	**24152CA**	**24152CAK**	2 660	5 220	437.1		600	800	115.0	-	AH24152	HM56T	0.39	1.8	2.6	1.7
	480	130	5.0	**22252CA**	**22252CAK**	2 280	3 600	294.7		850	1 100	106.0	H3152	AH2252	HM58T	0.29	2.3	3.4	2.2
	540	174	5.0	**23252CC**	**23252CCK**	2 910	4 750	397.9		630	800	145.0	H2352	AH2352	HM58T	0.37	1.8	2.6	1.7
	540	174	5.0	**23252CA**	**23252CAK**	2 910	4 750	397.9		630	800	140.0	H2352	AH2352	HM58T	0.37	1.8	2.6	1.7
	540	165	6.0	**22352CA**	**22352CAK**	2 860	4 310	344.7		480	700	191.0	H2352	AH2352	HM58T	0.3	2.3	3.4	2.2



Dimensions				Bearing designation		Basic load rating		Fatigue load limit		Limiting speed		Mass	Corresponding			Coefficients			
				cylindricall bore	tapered bore	dynamic	static			for lubrication with grease	oil		Adapter sleeve	Withdrawal sleeve	Withdrawal nut				
d	D	B	$r_{s\ min}$			C_r	C_{or}	C_u								e	Y_1	Y_2	Y_0
mm						kN				min^{-1}		kg							
280	420	106	4.0	**23056CA**	**23056CAK**	1 110	2 760	242.6		700	900	62.0	H3056	AH3056	HM3060	0.22	3.0	4.5	3.0
	420	106	4.0	**23056CC**	**23056CCK**	1 580	3 030	252.2		700	900	50.9	H3056	AH3056	HM3060	0.22	3.0	4.5	3.0
	420	140	4.0	**24056CA**	**24056CAK**	1 940	4 100	341.3		600	800	69.2	-	AH24056	HM58T	0.3	2.2	3.3	2.2
	420	140	4.0	**24056CC**	**24056CCK**	1 960	4 100	341.3		600	800	65.8	-	AH24056	HM58T	0.3	2.2	3.3	2.2
	460	146	5.0	**23156CA**	**23156CAK**	2 380	4 410	361.0		560	750	104.0	H3156	AH3156	HM62T	0.29	2.3	3.5	2.3
	460	146	5.0	**23156CC**	**23156CCK**	2 380	4 410	361.0		560	750	94.1	H3156	AH3156	HM62T	0.29	2.3	3.5	2.3
	460	180	5.0	**24156CA**	**24156CAK**	2 745	5 480	448.7		560	750	119.0	-	AH24156	HM3160	0.37	1.8	2.7	1.8
	460	180	5.0	**24156CC**	**24156CCK**	2 810	5 480	448.7		560	750	113.2	-	AH24156	HM3160	0.37	1.8	2.7	1.8
	500	130	5.0	**22256MB**	**22256MBK**	2 150	3 480	280.5		800	900	112.3	H3156	AH2256	HM62T	0.28	2.4	3.5	2.3
	500	130	5.0	**22256CA**	**22256CAK**	2 300	3 610	290.1		800	1 000	118.0	H3156	AH2256	HM62T	0.28	2.4	3.5	2.3
	500	176	5.0	**23256CA**	**23256CAK**	3 120	5 100	411.0		600	750	147.0	H2356	AH2356	HM62T	0.36	1.9	2.7	1.8
	580	175	6.0	**22356CA**	**22356CAK**	3 490	5 200	407.0		450	600	238.0	H2356	AH2356	HM62T	0.3	2.3	3.4	2.2
300	460	118	4.0	**23060MB**	**23060MBK**	1 290	3 160	256.6		430	530	75.2	H3060	AH3060	HM3064	0.23	3.0	4.4	2.9
	460	118	4.0	**23060CC**	**23060CAK**	1 910	3 800	325.1		800	1 000	73.6	H3060	AH3060	HM3064	0.23	3.0	4.4	2.9
	460	160	4.0	**24060CA**	**24060CAK**	2 320	4 700	401.2		600	750	99.0	-	AH24060	HM62T	0.32	2.1	3.2	2.1
	460	160	4.0	**24060CC**	**24060CCK**	2 430	5 160	419.1		530	700	94.1	-	AH24060	HM62T	0.32	2.1	3.2	2.1
	500	160	5.0	**23160MB**	**23160MBK**	2 250	4 550	363.9		500	700	133.0	H3160	AH3160	HM66T	0.29	2.3	3.4	2.3
	500	160	5.0	**23160CA**	**23160CAK**	2 710	4 850	372.9		670	850	126.0	H3160	AH3160	HM66T	0.29	2.3	3.4	2.3
	500	200	5.0	**24160CA**	**24160CAK**	3 250	6 170	493.5		530	670	163.0	-	AH24160	HM3164	0.37	1.8	2.7	1.8
	500	200	5.0	**24160CC**	**24160CCK**	3 380	5 940	493.5		530	670	159.0	-	AH24160	HM3164	0.37	1.8	2.7	1.8
	540	140	5.0	**22260CA**	**22260CAK**	2 520	3 950	311.3		700	850	134.0	H3160	AH2260	HM66T	0.27	2.5	3.6	2.4
	540	192	5.0	**23260CA**	**23260CAK**	3 570	5 600	441.4		530	670	192.0	H3260	AH3260	HM66T	0.36	1.8	2.7	1.8
	480	121	4.0	**23064CA**	**23064CAK**	1 930	4 000	319.9		800	900	84.7	H3064	AH3064	HML69T	0.22	3.0	4.5	3.0
	480	160	4.0	**24064CA**	**24064CAK**	2 480	5 100	407.9		560	700	106.0	-	AOH24064	HM66T	0.3	2.2	3.3	2.2
	540	176	5.0	**23164CA**	**23164CAK**	3 150	5 200	406.9		630	700	200.0	H3164	AH3164	HM70T	0.3	2.2	3.3	2.2
	540	218	5.0	**24164CC**	**24164CCK**	3 620	6 810	533.0		480	600	208.0	-	AOH24164	HM3168	0.38	1.8	2.6	1.7
	580	150	5.0	**22264CA**	**22264CAK**	2 490	4 550	351.3		670	850	175.0	H3164	AH2264	HM70T	0.27	2.5	3.6	2.3
	580	208	5.0	**23264CA**	**23264CAK**	3 920	6 820	526.5		500	630	253.0	H3264	AH3264	HM70T	0.37	1.8	2.6	1.7
340	520	133	5.0	**23068CA**	**23068CAK**	1 980	4 400	344.3		700	900	115.0	H3068	AH3068	HML73T	0.23	2.9	4.4	2.9
	520	180	5.0	**24068CA**	**24068CAK**	2 460	5 700	446.1		530	670	137.0	-	AOH24068	HM3072	0.33	2.0	3.0	2.0
	580	190	5.0	**23168CA**	**23168CAK**	3 050	6 300	483.2		600	750	206.0	H3168	AH3168	HM74T	0.3	2.2	3.3	2.2
	580	243	5.0	**24168CA**	**24168CAK**	4 480	7 720	581.1		320	400	256.0	-	AOH24168	HM3172	0.4	1.7	2.5	1.7
	620	224	6.0	**23268CA**	**23268CAK**	4 600	8 130	615.6		420	500	314.0	H3268	AH3268	HM74T	0.37	1.8	2.6	1.7
360	540	134	5.0	**23072CA**	**23072CAK**	2 280	4 800	370.6		670	850	126.0	H3072	AH3072	HML77T	0.22	3.1	4.6	3.0
	540	180	5.0	**24072CA**	**24072CAK**	3 050	6 370	491.8		450	560	150.0	-	AOH24072	HM76T	0.3	2.2	3.3	2.2
	600	192	5.0	**23172CA**	**23172CAK**	3 250	6 850	518.7		590	700	255.0	H3172	AH3172	HM3180	0.3	2.3	3.4	2.2
	600	243	5.0	**24172CA**	**24172CAK**	5 600	8 400	636.1		300	380	270.0	-	AH24172	HM3176	0.38	1.8	2.6	1.7
	650	232	6.0	**23272CA**	**23272CAK**	4 650	8 300	619.0		400	500	330.0	H3272	AH3272	HM3180	0.35	1.8	2.6	1.7



Dimensions				Bearing designation		Basic load rating		Fatigue load limit		Limiting speed for lubrication with		Mass	Corresponding			Coefficients			
				cylindricall bore	tapered bore	dynamic	static			grease	oil		Adapter sleeve	Withdrawal sleeve	Withdrawal nut				
d	D	B	$r_{s\,min}$			C_r	C_{or}	C_u								e	Y_1	Y_2	Y_0
mm						kN				min^{-1}		kg							
380	560	135	5.0	**23076CA**	**23076CAK**	2 480	5 000	381.0		630	800	130.0	H3076	AH3076	HML82T	0.21	3.2	4.7	3.1
	560	180	5.0	**24076CA**	**24076CAK**	3 150	6 800	518.2		480	600	153.0	-	AOH24076	HM3080	0.29	2.3	3.5	2.3
	620	194	5.0	**23176CA**	**23176CAK**	3 400	7 350	549.8		400	500	244.0	H3176	AH3176	HM3184	0.29	2.3	3.5	2.3
	620	243	5.0	**24176CC**	**24176CCK**	5 800	9 260	692.7		280	360	295.0	-	AOH24176	HM3180	0.36	1.9	2.7	1.8
	680	240	6.0	**23276CA**	**23276CAK**	5 200	9 350	287.3		380	480	395.0	H3276	AH3276	HM3184	0.36	1.9	2.7	1.8
400	600	148	5.0	**23080CA**	**23080CAK**	2 540	5 900	441.3		600	750	158.0	H3080	AH3080	HML86T	0.22	3.1	4.6	3.0
	600	200	5.0	**24080CA**	**24080CAK**	3 600	7 800	583.5		450	560	202.0	-	AOH24080	HM3084	0.3	2.2	3.3	2.2
	650	200	6.0	**23180CA**	**23180CAK**	4 080	7 650	563.9		380	480	275.0	H3180	AH3180	HM3188	0.28	2.4	3.8	2.4
	650	250	6.0	**24180CA**	**24180CAK**	5 100	9 800	722.4		180	240	336.0	-	AOH24180	HM3184	0.35	1.9	2.8	1.9
	720	256	6.0	**23280CA**	**23280CAK**	6 140	11 300	817.0		340	430	353.0	H3280	AH3280	HM3188	0.36	1.8	2.7	1.8



Spherical Plain Radial Bearings

Spherical Plain Bearings

Spherical Plain Bearings

Spherical plain bearings type GE are radial plain bearings which consist of one inner and one outer ring made of bearing steel, which have spherical sliding surfaces.

The bearings are suitable for arrangements with large radial loads and little tilting or swinging.

In addition, they can accommodate axial loads of a certain magnitude in both directions.

Boundary Dimensions

The boundary dimensions of GE-type spherical plain bearings comply with the ISO 12240-1 international standard.

Designation

The designation of spherical plain bearings with the standard design is given in the dimension table and consists of the type designation (GE) and size (the number indicates the internal diameter in mm), e.g. GE30.

Additional designation:

Mark E – bearings with a phosphated surface, e.g. GE30E.
Mark S – bearings with perimeter groove and two lubrication bores in the inner and an outer ring, e.g. GE30ES.

Mark ES means E + S.
Mark 2RS – bearings with a seal on both sides.

Precision

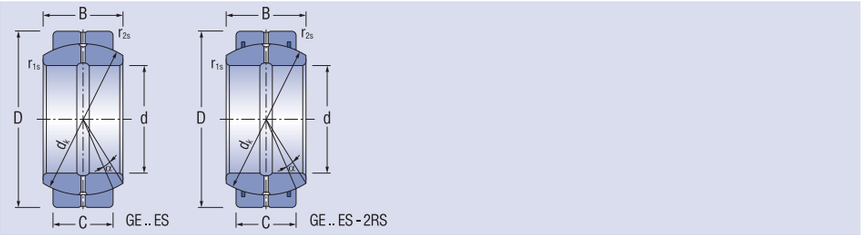
Spherical plain bearings are manufactured with normal precision grade, which is not designated. The deviation values comply with the ISO 12240-1 international standard.

Radial Clearance

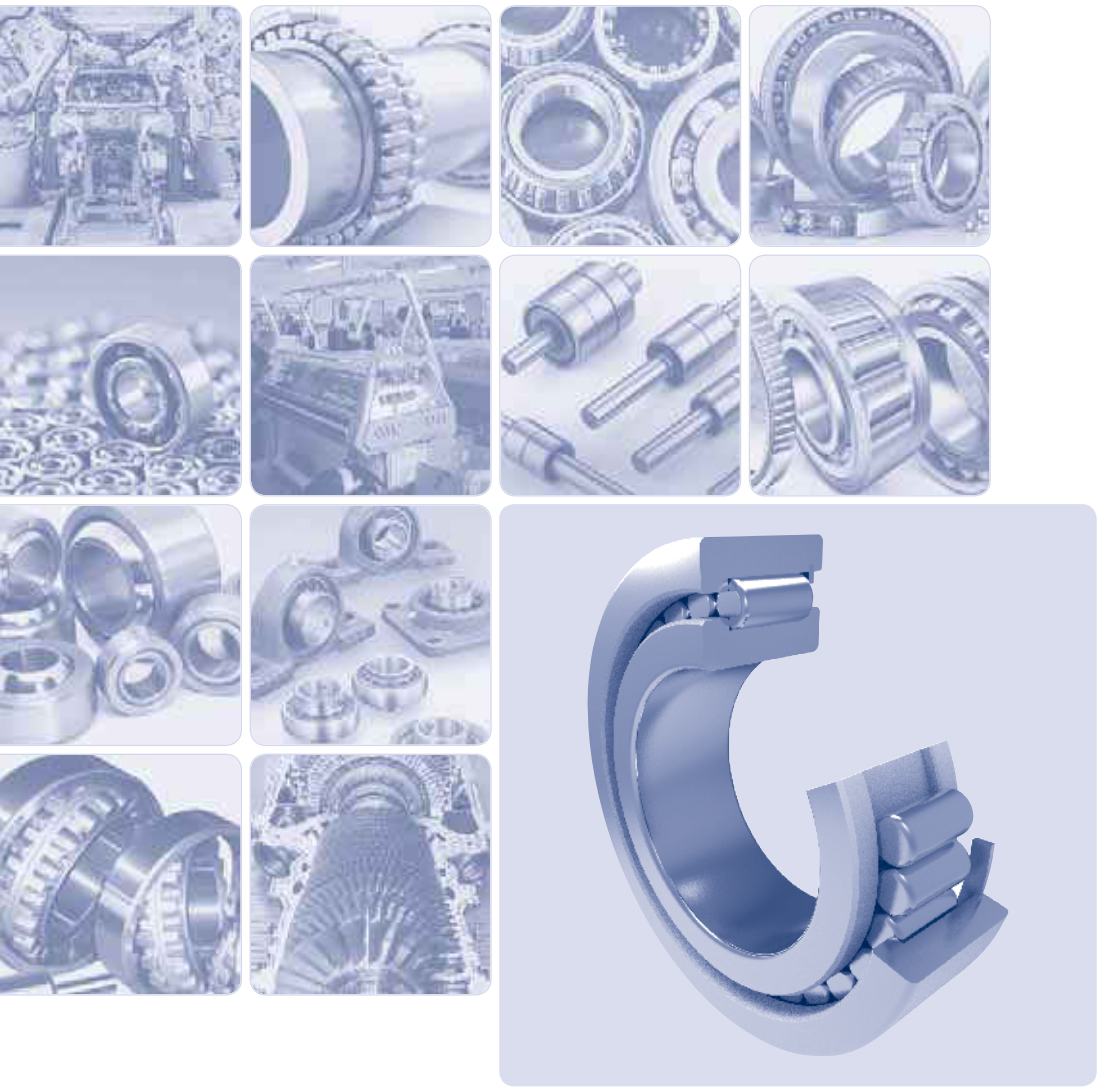
Spherical bearings are normally manufactured with a normal radial play, which is not designated.

The values of radial clearances are given in the following table.

Bore diameter		Radial Play					
		C2		Normal		C3	
over	to	min.	max.	min.	max.	min.	max.
mm		µm					
2.5	12	8	32	32	68	68	104
12	20	10	40	40	82	82	124
20	35	12	50	50	100	100	150
35	60	15	60	60	120	120	180
60	90	18	72	72	142	142	212
90	140	18	85	85	165	165	245
140	200	180	100	100	192	192	284
200	240	18	110	110	214	214	318
240	300	18	125	125	239	239	353



Dimensions								Designation			Basic load ratings dynamic	static	Mass	
d	D	B	C	d_k	$R_{1s\ min}$	$R_{2s\ min}$	~α				C_r	C_{or}	NA	
mm							°				kN		kg	
5	14	6	4	10	0.3	0.3	13	**GE5E**			3.4	17	0.005	
6	14	6	4	10	0.3	0.3	13	**GE6E**			3.4	17	0.004	
8	16	8	5	13	0.3	0.3	15	**GE8E**			5.5	27.5	0.007	
10	19	9	6	16	0.3	0.3	12	**GE10E**			8.2	40.5	0.011	
12	22	10	7	18	0.3	0.3	11	**GE12E**			10.8	54	0.016	
15	26	12	9	22	0.3	0.3	8	**GE15ES**	**GE15ES-2RS**		17	85	0.025	
16	30	14	10	25	0.3	0.3	10	**GE16ES**	**GE16ES-2RS**		21.2	106	0.041	
17	30	14	10	25	0.3	0.3	10	**GE17ES**	**GE17ES-2RS**		21.2	106	0.041	
20	35	16	12	29	0.6	0.3	9	**GE20ES**	**GE20ES-2RS**		30	146	0.061	
25	42	20	16	35.5	0.6	0.6	7	**GE25ES**	**GE25ES-2RS**		48	240	0.110	
30	47	22	18	40.7	0.6	0.6	6	**GE30ES**	**GE30ES-2RS**		62	310	0.140	
35	55	25	20	47	0.6	1.0	6	**GE35ES**	**GE35ES-2RS**		80	400	0.220	
40	62	28	22	53	0.6	1.0	7	**GE40ES**	**GE40ES-2RS**		100	500	0.300	
45	68	32	25	60	0.6	1.0	7	**GE45ES**	**GE45ES-2RS**		127	640	0.410	
50	75	35	28	66	0.6	1.0	6	**GE50ES**	**GE50ES-2RS**		156	780	0.530	
55	85	40	32	74	0.6	1.0	7	**GE55ES**	**GE55ES-2RS**		200	1000	0.940	
60	90	44	36	80	1.0	1.0	6	**GE60ES**	**GE60ES-2RS**		245	1220	1.000	
70	105	49	40	92	1.0	1.0	6	**GE70ES**	**GE70ES-2RS**		315	1560	1.500	
80	120	55	45	105	1.0	1.0	6	**GE80ES**	**GE80ES-2RS**		400	2000	2.200	
90	130	60	50	115	1.0	1.0	5	**GE90ES**	**GE90ES-2RS**		490	2450	2.700	
100	150	70	55	130	1.0	1.0	7	**GE100ES**	**GE100ES-2RS**		610	3050	4.300	
110	160	70	55	140	1.0	1.0	6	**GE110ES**	**GE110ES-2RS**		655	3250	4.700	
120	180	85	70	160	1.0	1.0	6	**GE120ES**	**GE120ES-2RS**		950	4750	8.000	
140	210	90	70	180	1.0	1.0	7	**GE140ES**	**GE140ES-2RS**		1080	5400	11.000	
160	230	105	80	200	1.0	1.0	8	**GE160ES**	**GE160ES-2RS**		1360	6800	14.000	
180	260	105	80	225	1.0	1.0	6	**GE180ES**	**GE180ES-2RS**		1530	7650	18.500	
200	290	130	100	250	1.1	1.1	7	**GE200ES**	**GE200ES-2RS**		2120	10600	28.000	
220	320	135	100	275	1.1	1.1	8	**GE220ES**	**GE220ES-2RS**		2320	11600	35.510	
240	340	140	100	300	1.1	1.1	8	**GE240ES**	**GE240ES-2RS**		2550	12700	39.910	
260	370	150	110	325	1.1	1.1	7	**GE260ES**	**GE260ES-2RS**		3030	15190	51.540	
280	400	155	120	350	1.1	1.1	6	**GE280ES**	**GE280ES-2RS**		3570	17850	65.060	
300	430	165	120	375	1.1	1.1	7	**GE300ES**	**GE300ES-2RS**		3800	19100	78.070	



Single-row full-complement cylindrical roller bearings

Single-row full-complement cylindrical roller bearings

Single-row full-complement cylindrical roller bearings

Single-row full-complement cylindrical roller bearings are suitable for arrangements with a large radial load and lower speeds compared to cylindrical roller bearings with a cage. Full-complement cylindrical roller bearings have the largest possible number of rollers and are without a cage. Additional designation V.

Single-row full-complement cylindrical roller bearings are manufactured in two designs.

NCF Design

The inner ring of the bearing has guiding flanges on both sides. The outer ring has one guiding flange. The NCF design bearing is axially guiding in one direction. The bearing accommodates axial load in one direction and accommodates axial displacement of the shaft relative to the housing in the opposite direction. The outer ring has a retaining ring on the side without the guiding flange, which secures the components in the mounted state. The NCF design corresponds to the SL1818, SL1819, SL1830 and SL1822 designs of INA bearings.

NJG Design

The outer ring of the bearing has guiding flanges on both sides. The inner ring has one guiding flange. The NJG design bearing is axially guiding in one direction. The bearing accommodates axial load in one direction and accommodates axial displacement of the shaft relative to the housing in the opposite direction. The NJG bearing is a dismountable bearing. When the inner ring is removed, the rollers hold together with the outer ring due to the optimal alignment of the raceway diameter of the outer ring and the diameter and number of rollers. The NJG design bearings belong to the heavy 23 dimension series. The NJG design corresponds to the SL1923 design of INA bearings.

Boundary Dimensions

The boundary dimensions of single-row full-complement cylindrical roller bearings given in the dimension tables comply with the ISO 15 international dimension plan.

Precision

Single-row full-complement cylindrical roller bearings are normally manufactured with the normal precision grade P0, which is not designated. Limiting values for dimensional and running accuracy deviations are given in ISO 492.

Designation

The designation of bearings with the basic design is given in the dimension tables. The difference from the basic design is designated by additional marks according to STN 02 4608. The table section also contains the designation of the INA design with matches for individual bearings.

Radial Clearance

Single-row full-complement cylindrical roller bearings are manufactured with a normal radial clearance, which is not designated. Bearings with reduced (C2) or increased (C3, C4, C5) radial clearance are available for special arrangements. The values of radial clearance comply with ISO 5753-1 and are valid for bearings in the unmounted state.

Permissible Misalignment

The permissible misalignment of single-row full-complement cylindrical roller bearings is subject to the same conditions as standard single-row cylindrical roller bearings with a cage (see the Single-row Cylindrical Roller Bearings chapter).

Operating Temperatures

For arrangements with an operating temperature higher than 120°C, bearings are supplied with specially heat-treated components, which ensure dimensional and shape stability even with long-term exposure to higher temperatures from 150°C to 400°C (S0, S1, S2, S3, S4). The supply of stabilised bearings needs to be negotiated in advance with the supplier.

Minimum Load

For single-row full-complement cylindrical roller bearings, a minimum radial load corresponding to 4% of the basic dynamic bearing capacity is recommended. Cylindrical roller bearings work reliably when axial loads are applied if the bearings are radially loaded at the same time. The $F_a/F_r \leq 0.5$ ratio must be observed.

Dynamic and Static Equivalent Bearing Load

Dynamic Equivalent Bearing Load

If full-complement cylindrical roller bearings are used exclusively with a radial load without axial forces, the dynamic load is calculated as follows:

$$P_r = F_r$$

If the bearings are also used to accommodate axial forces, the dynamic loads are calculated as follows:

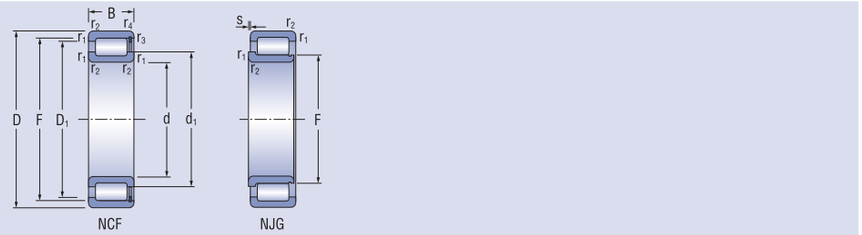
Where:
e = calculation coefficient
e = 0.2 for NCF series bearings (18)
e = 0.3 for NCF (22, 29, 30) and NJG (23) series bearings

Y = axial load coefficient
Y = 0.6 for NCF series bearings (18)
Y = 0.4 for NCF (22, 29, 30) and NJG (23) series bearings

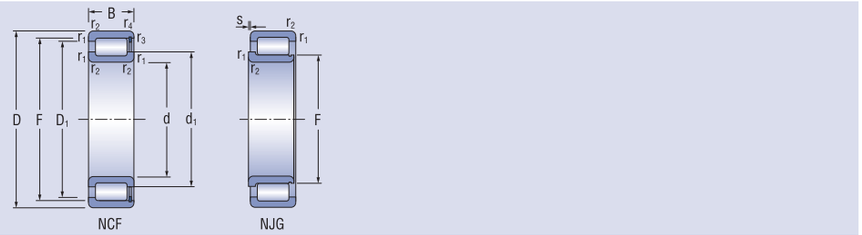
Static Equivalent Bearing Load

The following applies to statically loaded cylindrical roller bearings:

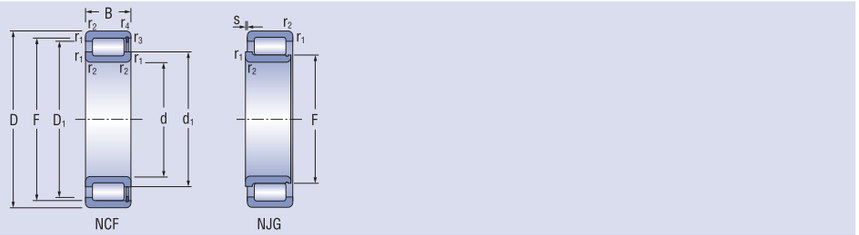
$$P_{0r} = F_r$$



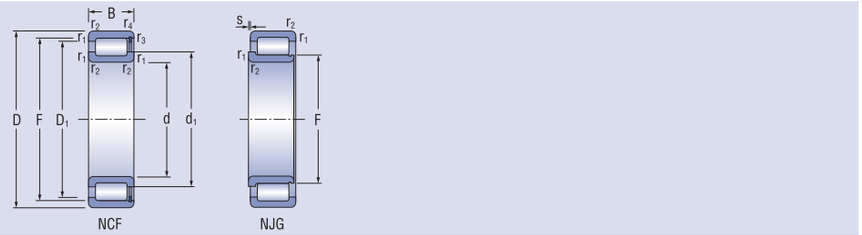
Dimensions									Bearing designation			Basic load rating dynamic	static	Fatigue load limit	Limiting speed for lubrication with grease	oil	Mass of Bearings	
d	D	B	$r_{s\,min}$	s	F	E	$d_1 \approx$	$D_1 \approx$		INA		C_r	C_{or}	C_u				
mm												kN			min^{-1}		kg	
20	42	16	0.6	1.5	–	36.5	29	33	**NCF3004V**	**SL183004**		28.0	30.6	3.7	7 400	10 000	0.11	
	47	18	1.0	1	–	41.5	30	37	**NCF2204V**	**SL182204**		30.3	29.4	3.6	6 400	9 500	0.16	
25	47	16	0.6	1.5	–	42.5	34.5	38.5	**NCF3005V**	**SL183005**		31.2	34.4	4.2	6 100	9 000	0.12	
	52	18	1.0	1	–	46.5	35	42	**NCF2205V**	**SL182205**		38.9	38.5	4.7	5 400	8 500	0.18	
	62	24	1.1	2	31.72	–	36.5	47.5	**NJG2305V**	**SL192305**		57.5	56.5	6.9	4 700	7 500	0.37	
30	55	19	1.0	2	–	49.5	40	45	**NCF3006V**	**SL183006**		40.3	45.0	5.5	5 500	7 500	0.20	
	62	20	1.0	1	–	55	42	50.5	**NCF2206V**	**SL182206**		60.8	66.2	8.8	4 500	7 000	0.30	
	72	27	1.1	2	38.3	–	43.5	56	**NJG2306V**	**SL192306**		79.5	83.7	10.2	4 900	6 500	0.56	
35	62	20	1.0	2	–	55.5	45	51	**NCF3007V**	**SL183007**		51.9	63.4	7.7	4 800	6 500	0.26	
	72	23	1.1	1	–	64	47	59	**NCF2207V**	**SL182207**		91.8	97.5	11.9	4 200	6 000	0.44	
	80	31	1.5	2	44.68	–	51	65.5	**NJG2307V**	**SL192307**		114	121	14.7	3 700	5 500	0.74	
40	68	21	1.0	2	–	61.5	50.5	57.5	**NCF3008V**	**SL183008**		54.1	64.1	7.8	5 000	6 000	0.31	
	80	23	1.1	1	–	71	54	66	**NCF2208V**	**SL182208**		97.1	107	13.8	4 400	5 500	0.55	
	90	33	1.5	2	51.12	–	57.5	75	**NJG2308V**	**SL192308**		148	159	19.4	3 600	5 000	1.01	
45	75	23	1.0	2	–	66.5	55.5	62	**NCF3009V**	**SL183009**		63.9	81.8	10.0	5 000	5 500	0.40	
	85	23	1.1	1	–	74.5	57.5	69.5	**NCF2209V**	**SL182209**		112	131	15.9	4 400	5 500	0.55	
	100	36	1.5	3	56.1	–	62.5	80	**NJG2309V**	**SL192309**		157	175	21.3	2 900	4 500	1.37	
50	80	23	1.0	2	–	72	59	67.5	**NCF3010V**	**SL183010**		74.3	93.7	11.4	3 500	5 000	0.43	
	90	23	1.1	1	–	81.5	64.5	76.5	**NCF2210V**	**SL182210**		121	149	18.1	3 000	4 600	0.64	
	110	40	2.0	3	60.72	–	68.5	89.5	**NJG2310V**	**SL192310**		162	177	23.2	2 700	4 100	1.81	
55	90	26	1.1	2	–	83.5	68.5	78.5	**NCF3011V**	**SL183011**		93.3	122	14.9	3 100	4 500	0.64	
	100	25	1.5	1	–	89	70	83.5	**NCF2211V**	**SL182211**		120	151	18.5	2 700	4 100	0.87	
	120	43	2.0	3	67.11	–	75.5	99	**NJG2311V**	**SL192311**		183	220	26.9	2 300	3 700	2.28	
60	85	16	1.0	1	–	78.5	69	84.5	**NCF2912V**	**SL182912**		50.4	74.7	9.1	2 800	4 500	0.29	
	95	26	1.1	2	–	86.5	71.5	81.5	**NCF3012V**	**SL183012**		96.0	129	15.7	2 900	4 200	0.69	
	110	28	1.5	1.5	–	99	77	93	**NCF2212V**	**SL182212**		148	184	22.4	2 500	3 800	1.18	
	130	46	2.1	3	73.62	–	82	105.5	**NJG2312V**	**SL192312**		232	275	33.5	2 200	3 400	2.88	
65	90	16	1.0	1	–	85	75.5	81	**NCF2913V**	**SL182913**		55.7	82.5	10.7	2 600	4 200	0.31	
	100	26	1.1	2	–	93	78	88	**NCF3013V**	**SL183013**		101	141	17.2	2 800	3 900	0.73	
	120	31	1.5	1.5	–	106	82.5	100	**NCF2213V**	**SL182213**		172	218	26.6	2 400	3 500	1.57	
	140	48	2.1	3.5	80.69	–	90	116.5	**NJG2313V**	**SL192313**		252	303	36.8	2 100	3 200	3.52	
70	100	19	1.0	1	–	92.5	81	87.5	**NCF2914V**	**SL182914**		71.2	107	13.1	2 500	3 800	0.49	
	110	30	1.1	3	–	100	81.5	95	**NCF3014V**	**SL183014**		132	178	21.7	2 700	3 600	1.02	
	125	31	1.5	1.5	–	111	87	105	**NCF2214V**	**SL182214**		1523	198	24.2	2 300	3 300	1.66	
	150	51	2.1	3.5	84.14	–	93.5	121.5	**NJG2314V**	**SL192314**		277	346	41.6	2 000	2 900	4.33	
75	105	19	1.0	1	–	97.5	86	93	**NCF2915V**	**SL182915**		74.3	114	13.9	2 300	3 600	0.52	
	115	30	1.1	3	–	107.5	89	102.5	**NCF3015V**	**SL183015**		140	196	23.9	2 500	3 400	1.06	
	130	31	1.5	1.5	–	116	91.5	110	**NCF2215V**	**SL182215**		185	245	29.9	2 100	3 200	1.75	
	160	55	2.1	3.5	91.22	–	101.5	131.5	**NJG2315V**	**SL192315**		336	403	47.1	1 900	2 700	5.30	



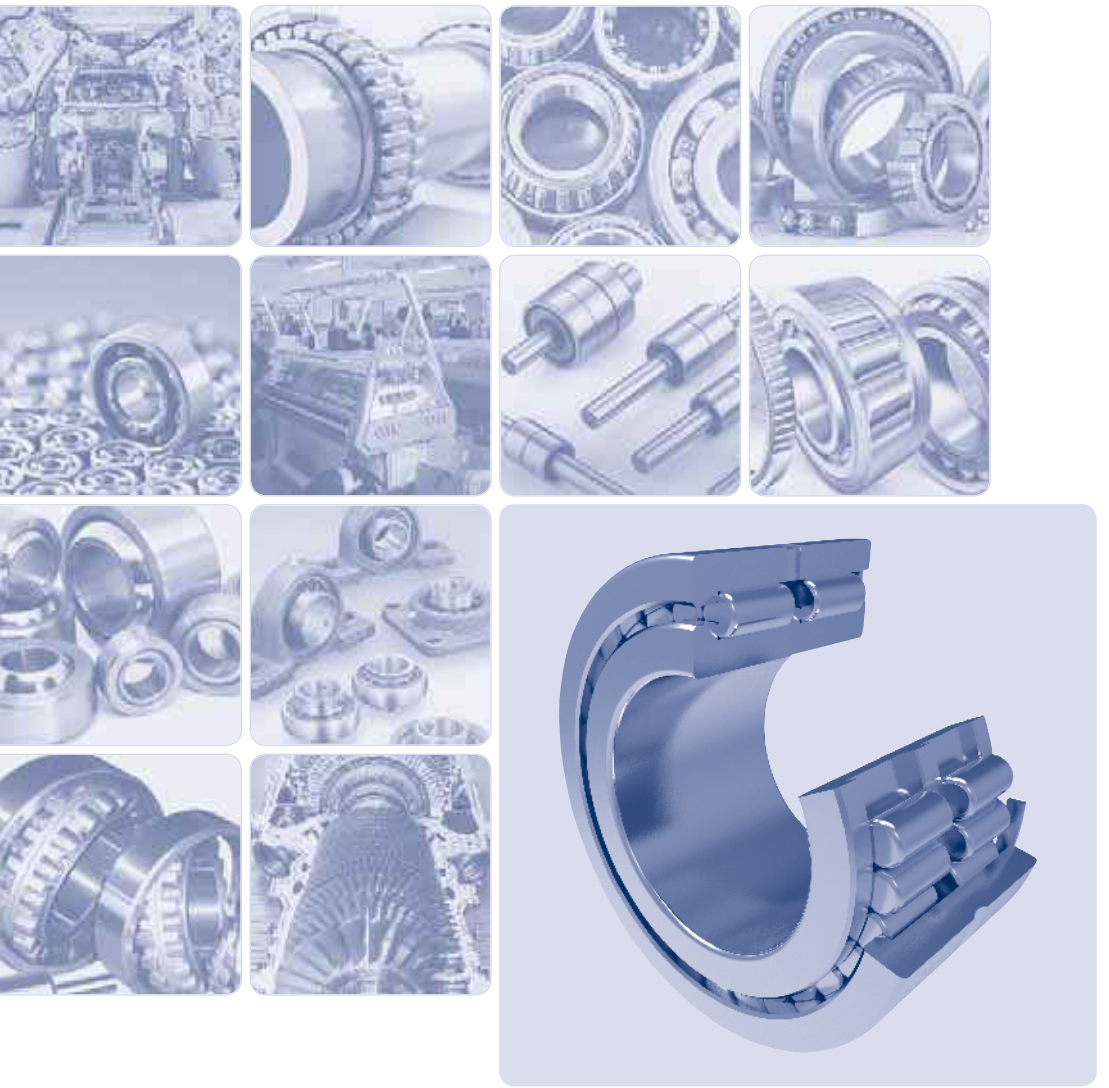
Dimensions									Bearing designation			Basic load rating dynamic	static	Fatigue load limit	Limiting speed for lubrication with grease	oil	Mass of Bearings	
d	D	B	$r_{s\,min}$	s	F	E	$d_1 \approx$	$D_1 \approx$		INA		C_r	C_{or}	C_u				
mm												kN			min^{-1}		kg	
80	110	19	1.0	1	–	102	91	98	**NCF2916V**	**SL182916**		81.9	126	15.3	2 200	3 400	0.55	
	125	34	1.1	4	–	117	95	111	**NCF3016V**	**SL183016**		169	230	27.8	2 400	3 200	1.43	
	140	33	2.0	1.5	–	126	98.5	119	**NCF2216V**	**SL182216**		210	271	32.2	2 000	2 900	2.15	
	170	58	2.1	3.5	98.24	–	109.5	142	**NJG2316V**	**SL192316**		354	438	50.3	1 800	2 600	6.32	
85	120	22	1.1	1	–	109	96	105	**NCF2917V**	**SL182917**		102	157	19.2	2 100	3 200	0.81	
	130	34	1.1	4	–	121	99.5	115.5	**NCF3017V**	**SL183017**		173	242	28.9	2 300	3 000	1.51	
	150	36	2.0	1.5	–	133	104.5	126	**NCF2217V**	**SL182217**		248	329	38.4	1 900	2 800	2.74	
	180	60	3.0	4	107.01	–	118	150.5	**NJG2317V**	**SL192317**		389	504	56.7	1 700	2 400	7.34	
90	125	22	1.0	1	–	115	102	110.5	**NCF2918V**	**SL182918**		104	163	19.6	2 000	3 000	0.84	
	140	37	1.5	4	–	130	106	124	**NCF3018V**	**SL183018**		202	287	33.5	2 200	2 800	1.97	
	160	40	2.0	2.5	–	140.5	110	133	**NCF2218V**	**SL182218**		268	357	41.0	1 900	2 600	3.48	
	190	64	3.0	4	105.26	–	117	152	**NJG2318V**	**SL192318**		445	545	61.0	1 600	2 300	8.83	
95	130	22	1.1	1	–	122	106.5	117	**NCF2919V**	**SL182919**		107	174	20.5	1 900	2 900	0.86	
	170	43	2.1	2.5	–	155.5	122	147	**NCF2219V**	**SL182219**		311	429	47.8	1 800	2 400	4.17	
	200	67	3.0	4	114.65	–	126.5	161.5	**NJG2319V**	**SL192319**		493	634	69.5	1 500	2 200	10.2	
100	140	24	1.1	1.5	–	130	113.5	125.5	**NCF2920V**	**SL182920**		130	204	23.6	1 800	2 700	1.14	
	150	37	1.5	4	–	139	115.5	133.5	**NCF3020V**	**SL183020**		213	314	35.9	2 000	2 600	2.15	
	180	46	2.1	2.5	–	163	127.5	154	**NCF2220V**	**SL182220**		406	541	59.8	1 700	2 300	5.13	
	215	73	3.0	4	119.3	–	132.5	172.5	**NJG2320V**	**SL192320**		572	715	77.0	1 400	2 100	13.0	
110	150	24	1.1	1.5	–	141	124	136	**NCF2922V**	**SL182922**		131	213	24.0	1 600	2 500	1.23	
	170	45	2.0	5.5	–	156	127.5	149	**NCF3022V**	**SL183022**		280	407	45.0	1 900	2 300	3.5	
	200	53	2.1	4	–	177	137.5	167	**NCF2222V**	**SL182222**		421	582	62.5	1 600	2 100	7.24	
	240	80	3.0	5	134.27	–	151	199.5	**NJG2322V**	**SL192322**		664	890	93.1	1 200	1 900	17.0	
120	165	27	1.1	1.5	–	154	135	148.5	**NCF2924V**	**SL182924**		170	288	31.6	1 500	2 300	1.73	
	180	46	2.0	5.5	–	167	139	160.5	**NCF3024V**	**SL183024**		295	445	48.2	1 800	2 200	3.8	
	215	58	2.1	4	–	192.5	150.5	182	**NCF2224V**	**SL182224**		480	668	69.9	1 500	1 900	9.08	
	260	86	3.0	5	147.39	–	164	213	**NJG2324V**	**SL192324**		806	1 050	106.3	1 100	1 700	22.3	
130	180	30	1.5	2	–	166	146	161	**NCF2926V**	**SL182926**		214	354	38.1	1 500	2 100	2.33	
	200	52	2.0	5.5	–	183	148.5	175	**NCF3026V**	**SL183026**		330	511	53.7	1 700	2 000	5.65	
	230	64	3.0	5	–	207	162.5	196	**NCF2226V**	**SL182226**		560	790	80.9	1 000	1 800	11.25	
140	190	30	1.5	2	–	179	157	173.5	**NCF2928V**	**SL182928**		221	380	39.8	1 400	2 000	2.42	
	210	53	2.0	5.5	–	197	162.5	189	**NCF3028V**	**SL183028**		336	537	55.0	1 500	1 900	6.04	
	250	68	3.0	5	–	222	174	210	**NCF2228V**	**SL182228**		625	890	89.1	950	1 700	14.47	
150	190	19	0.6	01 1	–	179.5	164.2	175.2	**NCF1830V**	**SL181830**		108	197	20.5	1 300	1 700	1.30	
	210	36	2.0	2.5	–	196.5	185.5	224	**NCF2930V**	**SL182930**		280	490	50.0	1 500	1 800	3.77	
	225	56	2.1	7	–	207	169	189	**NCF3030V**	**SL183030**		390	625	63.1	1 500	1 700	7.33	
	270	73	3.0	6	–	237	189	224	**NCF2230V**	**SL182230**		765	1 037	101.2	1 200	1 500	18.43	
160	200	20	0.6	1.1	–	189	173	185	**NCF1832V**	**SL181832**		112	209	21.4	1 200	1 600	1.70	
	220	36	2.0	2.5	–	207.6	179.7	200.5	**NCF2932V**	**SL182932**		302	514	51.7	1 300	1 700	4.0	
	240	60	2.1	7	–	225.45	184.8	215.8	**NCF3032V**	**SL183032**		530	628	62.2	1 300	1 600	8.8	
	290	80	3.0	6	–	267.1	210	253	**NCF2232V**	**SL182232**		990	1 490	142.5	1 000	1 500	23.0	



Dimensions									Bearing designation			Basic load rating dynamic	Basic load rating static	Fatigue load limit	Limiting speed for lubrication with grease	Limiting speed for lubrication with oil	Mass of Bearings	
d	D	B	$r_{s\ min}$	s	F	E	$d_1 \approx$	$D_1 \approx$		INA		C_r	C_{or}	C_u				
mm												kN			min^{-1}		kg	
170	215	22	0.6	01 1	–	204.5	185	200	**NCF1834V**	**SL181834**		149	272	27.3	1 300	1 600	1.80	
	230	36	2.0	02 5	–	218.45	190.6	211.3	**NCF2934V**	**SL182934**		311	576	57.1	1 200	1 600	4.3	
	260	67	2.1	7	–	243.55	198.1	232.7	**NCF3034V**	**SL183034**		681	1 040	100.8	1 100	1 500	12.2	
	310	86	4.0	7	–	281.9	220	268	**NCF2234V**	**SL182234**		1 090	1 680	157.6	900	1 400	28.65	
180	225	22	0.6	01 1	–	215.2	196	211	**NCF1836V**	**SL181836**		153	290	28.6	1 200	1 400	1.90	
	250	42	2.0	3	–	231.85	200.7	224	**NCF2936V**	**SL182936**		397	709	68.7	1 200	1 500	6.2	
	280	74	2.1	7	–	261	212.2	249.4	**NCF3036V**	**SL183036**		788	1 270	120.6	1 000	1 400	16.1	
	320	86	4.0	7	–	294	233	279	**NCF2236V**	**SL182236**		1 130	1 780	164.9	850	1 300	29.8	
190	230	23	1.1	01 5	–	229	208	224	**NCF1838V**	**SL181838**		176	330	32.2	1 100	1 400	2.30	
	260	42	2.0	2	–	244.15	211.5	238.5	**NCF2938V**	**SL182938**		410	753	72.0	1 100	1 400	6.5	
	290	75	2.1	9	–	270.6	221.8	259	**NCF3038V**	**SL183038**		809	1 330	124.7	1 000	1 400	17.0	
	340	92	4.0	9	–	309.5	244	295	**NCF2238V**	**SL182238**		1 240	1 970	179.3	800	1 200	35.65	
200	250	24	1.5	2	–	237.6	216.6	231.6	**NCF1840V**	**SL181840**		179	343	32.8	1 200	1 400	2.57	
	280	48	2.1	3	–	261.6	225.5	252.4	**NCF2940V**	**SL182940**		498	924	86.7	1 000	1 400	9.1	
	310	82	2.1	9	–	288.6	236.6	276.2	**NCF3040V**	**SL183040**		925	1 540	141.8	900	1 300	21.8	
	360	98	4.0	9	–	325	262	308	**NCF2240V**	**SL182240**		1 390	2 230	199.7	800	1 200	43.12	
220	270	24	1.5	2	–	258.5	237.3	252.3	**NCF1844V**	**SL181844**		188	377	35.1	1 000	1 300	2.8	
	300	48	2.1	3	–	282.45	246.3	273.2	**NCF2944V**	**SL182944**		522	1 010	92.5	850	1 200	9.9	
	340	90	3.0	9	–	213.1	254.6	299.2	**NCF3044V**	**SL183044**		1 110	1 840	164.8	850	1 200	28.4	
	400	108	4.0	8	–	366	277	349	**NCF2244V**	**SL182244**		1 720	2 740	238.0	750	1 100	58.0	
240	300	28	2.0	2	–	287.5	260.5	281	**NCF1848V**	**SL181848**		264	520	47.1	950	1 200	4.4	
	320	48	2.1	3	–	303.7	267.5	294.4	**NCF2948V**	**SL182948**		544	1 090	97.6	750	1 200	10.6	
	360	92	3.0	11	–	336	277.5	322.1	**NCF3048V**	**SL183048**		1 170	2 010	176.3	750	1 100	30.9	
260	350	33	2.0	02 5	–	308	281	301.5	**NCF1852V**	**SL181852**		275	561	49.0	850	1 100	4.71	
	360	60	2.1	5	–	333.7	291.5	323.4	**NCF2952V**	**SL182952**		764	1 490	129.4	700	1 000	18.5	
	400	104	4.0	11	–	375.97	304	358.4	**NCF3052V**	**SL183052**		1 590	2 640	225.0	650	1 000	44.5	
280	350	33	2.0	02 5	–	335	304	327	**NCF1856V**	**SL181856**		335	682	58.9	800	1 000	7.0	
	380	60	2.1	03 5	–	359.5	314	348.5	**NCF2956V**	**SL182956**		887	1 750	149.2	600	1 000	19.7	
	420	106	4.0	11	–	390.3	319.5	372.9	**NCF3056V**	**SL183056**		1 630	2 770	232.0	600	950	48.0	
300	380	38	2.1	3	–	360	323.5	350.5	**NCF1860V**	**SL181860**		428	858	72.5	700	950	10.0	
	420	72	3.0	5	–	389.45	338	376.9	**NCF2960V**	**SL182960**		1 130	2 240	186.0	550	900	31.2	
	460	118	4.0	14	–	434.85	353.6	415.6	**NCF3060V**	**SL183060**		2 000	3 560	290.9	500	850	66.6	
320	400	38	2.1	3	–	381	344.5	371.5	**NCF1864V**	**SL181864**		442	912	75.7	650	900	10.6	
	440	72	3.0	5	–	409.85	358.5	397.4	**NCF2964V**	**SL182964**		1 170	2 380	194.5	500	850	32.9	
	480	121	4.0	14	–	449.5	369.5	430.1	**NCF3064V**	**SL183064**		2 050	3 720	299.3	500	800	71.7	
340	420	38	2.1	3	–	402.2	365.5	392.5	**NCF1868V**	**SL181868**		455	966	78.9	650	850	11.2	
	460	72	3.0	5	–	430.2	379	418.7	**NCF2968V**	**SL182968**		1 210	2 520	202.8	480	800	34.7	
	520	133	5.0	16	–	485.65	396.1	463.9	**NCF3068V**	**SL183068**		2 410	4 570	359.8	450	750	95.8	
360	440	38	2.1	3	–	423.5	387	413.5	**NCF1872V**	**SL181872**		468	1 010	81.3	550	800	11.7	
	480	72	3.0	5	–	450.6	399.5	438.6	**NCF2972V**	**SL182972**		1 240	2 660	210.9	440	750	36.4	
	540	134	5.0	16	–	503.45	414	481.6	**NCF3072V**	**SL183072**		2 440	4 460	346.4	430	700	101.0	



Dimensions									Bearing designation			Basic load rating dynamic	static	Fatigue load limit	Limiting speed for lubrication with grease	oil	Mass of Bearings	
d	D	B	$r_{s\,min}$	s	F	E	$d_1 \approx$	$D_1 \approx$		INA		C_r	C_{or}	C_u				
mm												kN			min^{-1}		kg	
380	480	46	2.1	4	–	459	415.5	448	**NCF1876V**	**SL181876**		650	1 360	107.1	550	750	19.2	
	520	82	4.0	5	–	486.7	426	472.1	**NCF2976V**	**SL182976**		1 490	3 160	245.4	400	700	52.1	
	560	135	5.0	16	–	521.25	431.7	499.5	**NCF3076V**	**SL183076**		2 500	4 650	356.5	410	700	106.0	
400	500	46	2.1	4	–	475.5	432	464.5	**NCF1880V**	**SL181880**		664	1 420	110.3	490	700	20.0	
	540	82	4.0	5	–	510.85	450	496.1	**NCF2980V**	**SL182980**		1 530	3 330	255.3	370	700	54.3	
	600	148	5.0	18	–	558.52	462.5	535.1	**NCF3080V**	**SL183080**		2 980	5 520	415.4	360	650	140.0	
420	520	46	2.1	4	–	500	457	489.5	**NCF1884V**	**SL181884**		684	1 500	115.0	470	700	20.9	
	560	82	4.0	5	–	524	462	509	**NCF2984V**	**SL 182984**		1 750	3 510	265.7	360	650	56.9	
440	540	46	2.1	4	–	517	473.5	506	**NCF1888V**	**SL181888**		697	1 560	118.1	440	650	21.8	
	600	95	4.0	7	–	562	490	544.6	**NCF2988V**	**SL 182988**		2 040	4 480	333.2	330	600	78.1	
460	580	56	3.0	5	–	554	501.5	541	**NCF1892V**	**SL181892**		945	2 020	150.2	420	600	33.9	
	620	95	4.0	7	–	576.3	504	559.6	**NCF2992V**	**SL 182992**		2 070	4 600	338.2	320	600	81.1	
480	600	56	3.0	5	–	474.5	522	561	**NCF1896V**	**SL181896**		965	2 100	154.4	400	600	35.2	
	650	100	5.0	7	–	614.75	538	596.6	**NCF2996V**	**SL 182996**		2 310	5 110	370.7	290	550	94.7	
500	620	56	3.0	5	–	594.5	542	581.5	**NCF18/500V**	**SL1818/500**		985	2 190	159.3	380	600	36.5	
	670	100	5.0	7	–	630	553	612.7	**NCF29/500V**	**SL 1829/500**		2 380	7 510	539.1	280	550	98.3	



Double-row full-complement cylindrical roller bearings

Double-row full-complement cylindrical roller bearings

Double-row full-complement cylindrical roller bearings

Double-row full-complement cylindrical roller bearings are suitable for arrangements with a large radial load and lower speeds compared to cylindrical roller bearings with a cage. Full-complement cylindrical roller bearings have the largest possible number of rollers and are without a cage. Additional designation V.

Double-row full-complement cylindrical roller bearings are all made with an additional lubrication groove and bores on the outer ring, which allows perfect access of lubricant to the rolling space of each roller row.

Double-row full-complement cylindrical roller bearings are manufactured in four designs, which are not dismountable.

NNCL Design

The inner ring of the bearing has three guiding flanges. The outer ring has no guiding flange. The bearing is kept in the mounted state by a retaining ring located in the outer ring between the rows of rollers. The NNCL bearing is axially loose, allowing axial displacement of the shaft relative to the housing. The NNCL design corresponds to the SL0248 and SL0249 designs of INA bearings.

NNCF Design

The inner ring of the bearing has three guiding flanges. The outer ring has one guiding flange and there is a retaining ring on the opposite side to secure the components in the mounted state. The NNCF design bearing is axially guiding in one direction and may accommodate axial load on the side of the guiding flange. The NNCF design corresponds to the SL1850 design of INA bearings.

NNC Design

The inner ring of the bearing has three guiding flanges. The outer ring is divided and has two guiding flanges. The outer ring is held together by retaining rings, which should not be loaded axially. The NNC design bearing is axially guiding in both directions. The NNC design corresponds to the SL0148 and SL0149 designs of INA bearings.

NNF Design

The inner ring is divided and each has guiding flanges, held together by an elastic ring.

The outer ring has a guiding flange. They can accommodate axial forces in both directions. These bearings can accommodate tilting moments because of the greater distance between the rows of rollers.

The outer ring of NNF bearings is 1 mm narrower than the inner ring and has two grooves. As a standard, the bearings are supplied with seals on both sides and the inner space is filled with lubricant, which ensures the operation of the bearings in normal working conditions up to 110°C.

Boundary Dimensions

The boundary dimensions of double-row full-complement cylindrical roller bearings given in the dimension tables comply with the ISO 15 international dimension plan.

Designation

The designation of bearings with the basic design is given in the dimension tables. The difference from the basic design is designated by additional marks according to STN 02 4608. The table section also contains the designation of the INA design with matches for individual bearings.

Precision

Double-row full-complement cylindrical roller bearings are normally manufactured with the normal precision grade P0, which is not designated. The bearings can also be manufactured with a higher precision grade P6. The availability of these bearings needs to be consulted with the supplier. Limiting values for dimensional and running accuracy deviations are given in ISO 492.

Radial Clearance

Double-row full-complement cylindrical roller bearings are manufactured with a normal radial clearance, which is not designated. Bearings with reduced (C2) or increased (C3, C4, C5) radial clearance are available for special arrangements. The values of radial clearance comply with ISO 5753-1 and are valid for bearings in the unmounted state.

Axial Clearance

The NNC design bearings that are axially guiding in both directions must have a certain axial clearance that ranges from 0.1 to 0.2 mm for all bearing sizes.

Axial Displacement

The NNCL and NNCF designs of double-row full-complement cylindrical roller bearings are able to compensate axial displacement of the shaft relative to the housing to a certain extent, without reducing the bearing life. The values of the maximum axial displacement “s” are given in the dimension tables.

Permissible Misalignment

The misalignment of the inner ring of double-row full-complement cylindrical roller bearings relative to the outer ring leads to moment load in the bearing, which results in increased load and shorter bearing life.

Operating Temperatures

For arrangements with an operating temperature higher than 120°C, bearings are supplied with specially heat-treated components, which ensure dimensional and shape stability even with long-term exposure to higher temperatures from 150°C to 400°C (S0, S1, S2, S3, S4). The supply of such bearings needs to be negotiated in advance.

For double-row full-complement cylindrical roller bearings, minimum radial load corresponding to 4% of the basic dynamic bearing capacity is recommended.

Cylindrical roller bearings work reliably when axial loads are applied if the bearings are radially loaded at the same time. The $F_a/F_r \leq 0.25$ ratio must be observed.

Dynamic and Static Equivalent Bearing Load

Dynamic Equivalent Bearing Load

If cylindrical roller bearings are used exclusively with radial load without axial forces, the dynamic load is calculated as follows:

$$P_r = F_r$$

If the bearings are also used to accommodate axial forces, the dynamic loads are calculated as follows:

$P_r = F_r$ for $F_a/F_r \leq e$

$P_r = 0.92 \cdot F_r + Y \cdot F_a$ for $Fa/F_r > e$

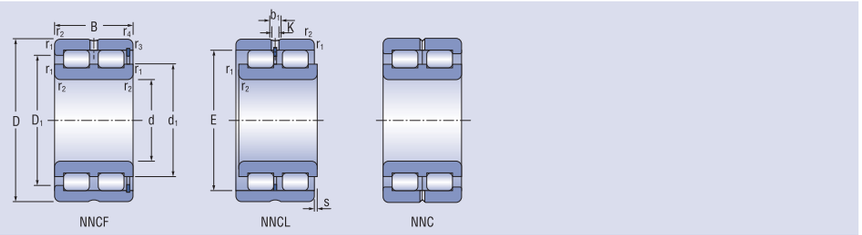
Where:
e = calculation coefficient
e = 0.15 for double-row bearings

Y = axial load coefficient
Y = 0.4 for double-row bearings

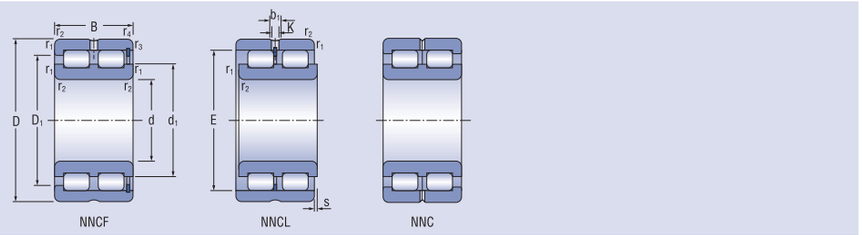
Static Equivalent Bearing Load

The following applies to statically loaded cylindrical roller bearings:

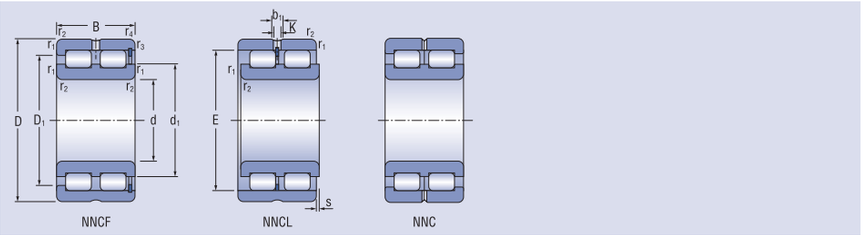
$$P_{0r} = F_r$$



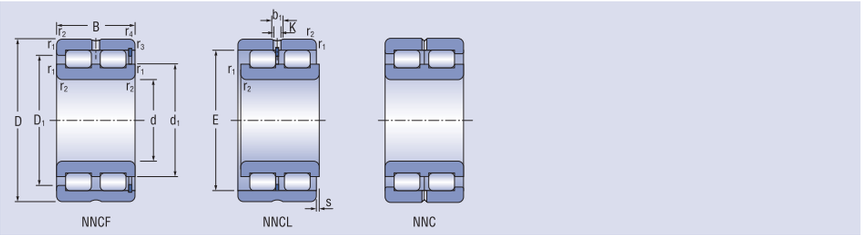
Dimensions									Bearing designation			Basic load rating dynamic	static	Fatigue load limit	Limiting speed for lubrication with grease	oil	Mass of Bearings	
d	D	B	r_{smin}	s	C	d1 ≈	**D1** ≈	**E**		INA		C_r	C_{or}	C_u				
mm												kN			min^{-1}		kg	
20	42	30	0.6	1	15	28.4	33.3	36.81	**NNCF5004V**	**SL185004**		47.10	55.80	6.80	7 000	8 300	0.20	
25	47	30	0.6	1	15	34.5	39.0	42.51	**NNCF5005V**	**SL185005**		53.50	68.70	8.40	5 700	6 800	0.23	
30	55	34	1.0	1.5	17	40.0	45.3	49.60	**NNCF5006V**	**SL185006**		69.10	90.00	11.00	6 200	7 300	0.35	
35	62	36	1.0	1.5	18	44.9	51.2	55.52	**NNCF5007V**	**SL185007**		83.60	113.60	13.80	4 300	5 100	0.46	
40	68	38	1.0	1.5	19	50.5	57.2	61.74	**NNCF5008V**	**SL185008**		99.60	140.90	17.20	3 900	4 800	0.56	
45	75	40	1.0	1.5	20	55.3	62.6	66.85	**NNCF5009V**	**SL185009**		105.80	156.70	19.10	3 400	4 300	0.71	
50	80	40	1.0	1.5	20	59.1	67.6	72.33	**NNCF5010V**	**SL185010**		131.30	193.30	23.60	3 200	4 000	0.76	
55	90	46	1.1	1.5	23	68.5	78.7	83.54	**NNCF5011V**	**SL185011**		177.50	279.80	34.10	2 700	3 500	1.16	
60	85	25	1.0	1	12.5	70.5	73.5	77.51	**NNCF4912V**	**SL184912**		71.20	132.00	16.10	2 800	3 400	0.50	
	85	25	1.0	–	12.5	70.3	73.5	–	**NNC4912V**	**SL014912**		71.20	132.00	16.10	2 800	3 400	0.49	
	85	25	1.0	1	12.5	70.3	–	77.51	**NNCL4912V**	**SL024912**		71.20	132.00	16.10	2 800	3 400	0.47	
	95	46	1.1	1.5	23	71.7	81.9	86.74	**NNCF5012V**	**SL185012**		182.50	293.90	35.80	2 700	3 200	1.24	
65	100	46	1.1	1.5	23	78.1	88.3	93.09	**NNCF5013V**	**SL185013**		192.30	322.00	39.30	2 400	2 900	1.32	
70	100	30	1.0	1	15	83.0	87.0	91.87	**NNCF4914V**	**SL184914**		107.10	197.40	24.10	2 400	2 900	0.77	
	100	30	1.0	–	15	82.5	87.4	–	**NNC4914V**	**SL014914**		106.90	197.60	24.10	2 400	2 900	0.78	
	100	30	1.0	1	15	82.5	–	91.87	**NNCL4914V**	**SL024914**		106.90	197.60	24.10	2 400	2 900	0.75	
	110	54	1.1	3	27	81.5	95.7	100.28	**NNCF5014V**	**SL185014**		226.30	356.80	43.50	2 200	2 700	1.85	
75	115	54	1.1	3	27	89.0	102.9	107.90	**NNCF5015V**	**SL185015**		239.00	392.60	47.90	2 100	2 500	1.93	
80	110	30	1.0	1	15	91.4	96.0	100.78	**NNCF4916V**	**SL184916**		113.40	220.10	26.80	2 100	2 500	0.87	
	110	30	1.0	–	15	91.4	96.2	–	**NNC4916V**	**SL014916**		113.40	220.10	26.80	2 100	2 500	0.88	
	110	30	1.0	1	15	91.4	–	100.78	**NNCL4916V**	**SL024916**		113.40	220.30	26.80	2 100	2 500	0.85	
	125	60	1.1	3.5	30	95.0	111.7	117.40	**NNCF5016V**	**SL185016**		288.70	460.60	55.60	1 950	2 300	2.59	
85	130	60	1.1	3.5	30	99.0	116.1	121.95	**NNCF5017V**	**SL185017**		297.00	483.80	57.60	1 950	2 300	2.72	
90	125	35	1.1	1.5	17.5	103	111	115.20	**NNCF4918V**	**SL184918**		152.50	306.40	36.60	1 950	2 300	1.35	
	125	35	1.1	–	17.5	103.9	110.7	–	**NNC4918V**	**SL014918**		152.50	306.40	36.60	1 950	2 300	1.35	
	125	35	1.1	1.5	17.5	103	–	115.20	**NNCL4918V**	**SL024918**		152.50	306.40	36.60	1 950	2 300	1.30	
	140	67	1.5	4	33.5	106.1	124.5	130.65	**NNCF5018V**	**SL185018**		346.00	573.50	66.90	1 700	2 100	3.62	
100	140	40	1.1	2	20	116	125	129.60	**NNCF4920V**	**SL184920**		194.30	400.00	46.20	1 600	1 900	1.95	
	140	40	1.1	–	20	116.4	125	–	**NNC4920V**	**SL014920**		194.30	400.00	46.20	1 600	1 900	1.95	
	140	40	1.1	2	20	116.4	–	129.60	**NNCL4920V**	**SL024920**		194.30	400.00	46.20	1 600	1 900	1.90	
	150	67	1.5	4	33.5	115.7	134	140.20	**NNCF5020V**	**SL185020**		364.50	628.30	71.60	1 600	1 900	3.94	
110	150	40	1.1	2	20	125	134	138.20	**NNCF4922V**	**SL184922**		202.10	431.00	48.70	1 500	1 800	2.10	
	150	40	1.1	–	20	125	133.6	–	**NNC4922V**	**SL014922**		202.10	431.00	48.70	1 500	1 800	2.15	
	150	40	1.1	2	20	125	–	138.20	**NNCL4922V**	**SL024922**		202.10	431.00	48.70	1 500	1 800	2.10	
	170	80	2.0	5	40	127.3	149.3	156.70	**NNCF5022V**	**SL185022**		319.60	483.00	53.40	1 450	1 700	6.32	
120	165	45	1.1	3	22.5	139	149	153.55	**NNCF4924V**	**SL184924**		225.60	479.10	52.30	1 350	1 600	2.90	
	165	45	1.1	–	22.5	138.6	148.6	–	**NNC4924V**	**SL014924**		225.60	479.10	52.30	1 350	1 600	2.95	
	165	45	1.1	3	22.5	138.6	–	153.55	**NNCL4924V**	**SL024924**		225.60	479.10	52.30	1 350	1 600	2.85	
	180	80	2.0	5	40	138.8	160.7	168.15	**NNCF5024V**	**SL185024**		505.10	891.70	96.20	1 350	1 600	6.77	



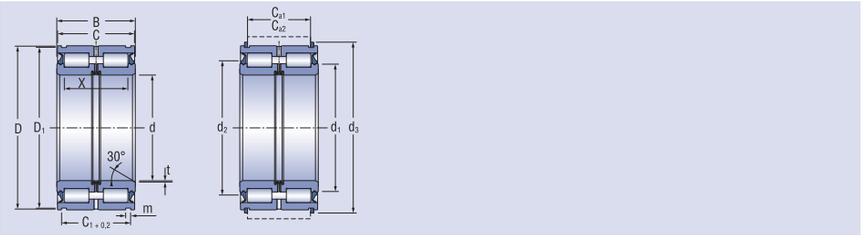
Dimensions									Bearing designation			Basic load rating dynamic	static	Fatigue load limit	Limiting speed for lubrication with grease	oil	Mass of Bearings	
d	D	B	r_{smin}	s	C	d1 ≈	**D1** ≈	**E**		INA		C_r	C_{or}	C_u				
mm												kN			min^{-1}		kg	
130	180	50	1.5	4	25	149	160	165.40	**NNCF4926V**	**SL184926**		261.80	554.00	59.20	1 250	1 500	3.90	
	180	50	1.5	–	25	148.4	160	–	**NNC4926V**	**SL014926**		261.80	554.00	59.20	1 250	1 500	3.95	
	180	50	1.5	4	25	149.5	–	165.40	**NNCL4926V**	**SL024926**		261.80	554.00	59.20	1 250	1 500	3.80	
	200	95	2.0	5	47.5	148.6	175.5	184.40	**NNCF5026V**	**SL185026**		716.20	1 247.30	131.50	1 200	1 400	10.20	
140	190	50	1.5	4	25	160	171	175.90	**NNCF4928V**	**SL184928**		272.00	594.50	62.40	1 200	1 400	4.15	
	190	50	1.5	–	25	159	170.5	–	**NNC4928V**	**SL014928**		272.00	594.50	62.40	1 200	1 400	4.20	
	190	50	1.5	4	25	160	–	175.90	**NNCL4928V**	**SL024928**		272.00	594.50	62.40	1 200	1 400	4.10	
	210	95	2.0	5	47.5	162.6	189.5	198.40	**NNCF5028V**	**SL185028**		756.80	1 372.60	141.20	1 100	1 300	11.10	
150	190	40	1.1	2	20	165	174	178.30	**NNCF4830V**	**SL184830**		234.30	575.10	59.90	1 200	1 400	2.80	
	190	40	1.1	–	20	165.1	174.2	–	**NNC4830V**	**SL014830**		234.30	575.10	59.90	1 200	1 400	2.90	
	190	40	1.1	2	20	165.1	–	178.30	**NNCL4830V**	**SL024830**		234.30	575.10	59.90	1 200	1 400	2.80	
	210	60	2.0	4	30	171	187	192.77	**NNCF4930V**	**SL184930**		405.10	853.60	87.50	1 100	1 300	6.55	
	210	60	2.0	–	30	171.8	187.2	–	**NNC4930V**	**SL014930**		405.10	853.60	87.50	1 100	1 300	6.65	
	210	60	2.0	4	30	171.8	–	192.77	**NNCL4930V**	**SL024930**		405.10	853.60	87.50	1 100	1 300	6.45	
	225	100	2.0	6	50	170	198	207.45	**NNCF5030V**	**SL185030**		793.80	1 435.00	145.60	1 000	1 200	13.30	
160	200	40	1.1	2	20	174	182	186.90	**NNCF4832V**	**SL184832**		240.40	606.60	61.90	1 100	1 300	3.00	
	200	40	1.1	–	20	173.7	182.8	–	**NNC4832V**	**SL014832**		240.40	606.60	61.90	1 100	1 300	3.10	
	200	40	1.1	2	20	173.7	–	186.90	**NNCL4832V**	**SL024832**		240.40	606.60	61.90	1 100	1 300	3.00	
	220	60	2.0	4	30	184	200	206.16	**NNCF4932V**	**SL184932**		422.40	922.50	92.80	1 000	1 200	6.90	
	220	60	2.0	–	30	184.2	200.3	–	**NNC4932V**	**SL014932**		422.40	922.50	92.80	1 000	1 200	7.00	
	220	60	2.0	4	30	184.2	–	206.16	**NNCL4932V**	**SL024932**		422.40	922.50	92.80	1 000	1 200	6.80	
	240	109	2.1	6	54.5	184	216	224.80	**NNCF5032V**	**SL185032**		909.60	1 655.30	164.00	930	1 100	15.80	
170	215	45	1.1	3	22.5	187	197	201.30	**NNCF4834V**	**SL184834**		264.70	650.60	65.30	1 000	1 200	4.00	
	215	45	1.1	–	22.5	186.3	197	–	**NNC4834V**	**SL014834**		264.70	650.60	65.30	1 000	1 200	4.10	
	215	45	1.1	3	22.5	186.3	–	201.30	**NNCL4834V**	**SL024834**		264.70	650.60	65.30	1 000	1 200	3.95	
	230	60	2.0	4	30	193	209	206.16	**NNCF4934V**	**SL184934**		433.80	968.70	96.20	930	1 100	7.20	
	230	60	2.0	–	30	193.1	209.1	–	**NNC4934V**	**SL014934**		433.80	968.70	96.20	930	1 100	7.35	
	230	60	2.0	4	30	193.1	–	215.08	**NNCL4934V**	**SL024934**		433.80	968.70	96.20	930	1 100	7.10	
	260	122	2.1	6	61	198	232	243.00	**NNCF5034V**	**SL185034**		1 168.40	2 160.00	209.40	850	1 000	23.00	
180	225	45	1.1	3	22.5	200	210	214.10	**NNCF4836V**	**SL184836**		274.40	696.30	68.50	930	1 100	4.20	
	225	45	1.1	–	22.5	199.1	209.8	–	**NNC4836V**	**SL014836**		274.40	696.30	68.50	930	1 100	4.30	
	225	45	1.1	3	22.5	199.1	–	214.10	**NNCL4836V**	**SL024836**		274.40	696.30	68.50	930	1 100	4.15	
	250	69	2.0	4	34.5	205	224	230.50	**NNCF4936V**	**SL184936**		558.00	1 247.50	121.10	850	1 000	10.50	
	250	69	2.0	–	34.5	204.9	224.1	–	**NNC4936V**	**SL014936**		558.00	1 247.50	121.10	850	1 000	10.80	
	250	69	2.0	4	34.5	204.9	–	230.50	**NNCL4936V**	**SL024936**		558.00	1 247.50	121.10	850	1 000	10.50	
	280	136	2.1	8	68	212	249	260.50	**NNCF5036V**	**SL185036**		1 350.50	2 534.80	240.70	850	1 000	30.50	



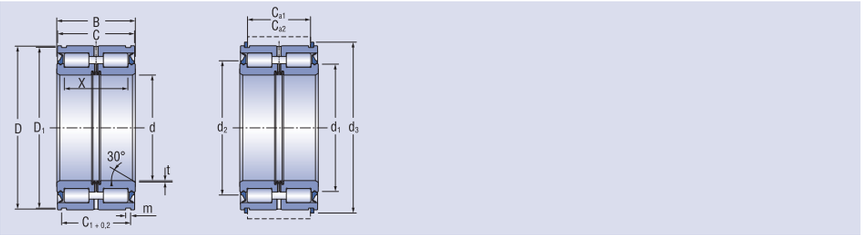
Dimensions									Bearing designation			Basic load rating dynamic	static	Fatigue load limit	Limiting speed for lubrication with grease	oil	Mass of Bearings	
d	D	B	r_{smin}	s	C	d1 ≈	**D1** ≈	**E**		INA		C_r	C_{or}	C_u				
mm												kN			min^{-1}		kg	
190	240	50	1.5	4	25	209	221	225	**NNCF4838V**	**SL184838**		313.30	784.30	76.10	850	1 000	5.50	
	240	50	1.5	–	25	207.6	220.7	–	**NNC4838V**	**SL014838**		313.30	784.30	76.10	850	1 000	5.65	
	240	50	1.5	4	25	207.6	–	225	**NNCL4838V**	**SL024838**		313.30	784.30	76.10	850	1 000	5.45	
	260	69	2.0	4	34.5	215	234	240.70	**NNCF4938V**	**SL184938**		572.00	1 312.20	125.40	850	1 000	11.00	
	260	69	2.0	–	34.5	215	234.3	–	**NNC4938V**	**SL014938**		572.00	1 312.20	125.40	850	1 000	11.20	
	260	69	2.0	4	34.5	215	–	240.70	**NNCL4938V**	**SL024938**		572.00	1 312.20	125.40	850	1 000	10.90	
	290	136	2.1	8	68	222	258	270	**NNCF5038V**	**SL185038**		1 386.90	2 656.10	249.10	800	950	31.50	
200	250	50	1.5	4	25	219	231	235.50	**NNCF4840V**	**SL184840**		322.10	824.70	78.90	850	1 000	5.80	
	250	50	1.5	–	25	218.1	231.2	–	**NNC4840V**	**SL014840**		322.10	824.70	78.90	850	1 000	5.90	
	250	50	1.5	4	25	218.1	–	235.50	**NNCL4840V**	**SL024840**		322.10	824.70	78.90	850	1 000	5.70	
	280	80	2.1	5	40	230	252	259.34	**NNCF4940V**	**SL184940**		671.80	1 514.40	141.80	800	950	15.50	
	280	80	2.1	–	40	230.5	252.3	–	**NNC4940V**	**SL014940**		671.80	1 514.40	141.80	800	950	15.80	
	280	80	2.1	5	40	230.5	–	259.34	**NNCL4940V**	**SL024940**		671.80	1 514.40	141.80	800	950	15.30	
	310	150	2.1	9	75	236	276	288.00	**NNCF5040V**	**SL185040**		1 635.20	3 202.80	294.70	800	950	41.00	
220	270	50	1.5	4	25	239	252	256.50	**NNCF4844V**	**SL184844**		338.10	906.00	84.40	800	1 000	6.30	
	270	50	1.5	–	25	239.1	252.3	–	**NNC4844V**	**SL014844**		338.10	906.00	84.40	800	1 000	6.40	
	270	50	1.5	4	25	239.1	–	256.50	**NNCL4844V**	**SL024844**		338.10	906.00	84.40	800	1 000	6.20	
	300	80	2.1	5	40	248	269	276.52	**NNCF4944V**	**SL184944**		696.60	1 631.70	149.50	800	1 000	17.00	
	300	80	2.1	–	40	248	268.5	–	**NNC4944V**	**SL014944**		696.60	1 631.70	149.50	800	1 000	17.20	
	300	80	2.1	5	40	248	–	276.52	**NNCL4944V**	**SL024944**		696.60	1 631.70	149.50	800	1 000	16.70	
	340	160	3.0	9	80	255	300	312.20	**NNCF5044V**	**SL185044**		1 903.60	3 676.40	330.50	720	850	52.50	
240	300	60	2.0	4	30	259	277	281.90	**NNCF4848V**	**SL184848**		506.10	1 316.80	119.60	750	900	9.90	
	300	60	2.0	–	30	259.5	276.7	–	**NNC4848V**	**SL014848**		506.10	1 316.80	119.60	750	900	10.00	
	300	60	2.0	4	30	259.5	–	281.90	**NNCL4848V**	**SL024848**		506.10	1 316.80	119.60	750	900	9.90	
	320	80	2.1	5	40	270	292	299.46	**NNCF4948V**	**SL184948**		731.70	1 787.00	159.80	720	850	18.50	
	320	80	2.1	–	40	270.6	292.3	–	**NNC4948V**	**SL014948**		731.70	1 787.00	159.80	720	850	18.50	
	320	80	2.1	5	40	270.6	–	299.46	**NNCL4948V**	**SL024948**		731.70	1 787.00	159.80	720	850	17.90	
	360	160	3.0	9	80	278	322	335.60	**NNCF5048V**	**SL185048**		2 005.10	4 028.40	353.60	680	800	56.00	
260	320	60	2.0	4	30	282	299	304.20	**NNCF4852V**	**SL184852**		528.50	1 432.80	126.90	680	800	11.00	
	320	60	2.0	–	30	281.8	298.8	–	**NNC4852V**	**SL014852**		528.50	1 432.80	126.90	680	800	11.00	
	320	60	2.0	4	30	281.8	–	304.20	**NNCL4852V**	**SL024852**		528.50	1 432.80	126.90	680	800	10.60	
	360	100	2.1	6	50	294	322	331.33	**NNCF4952V**	**SL184952**		1 082.90	2 548.60	221.80	630	750	31.50	
	360	100	2.1	–	50	294.5	322.1	–	**NNC4952V**	**SL014952**		1 082.90	2 548.60	221.80	630	750	32.00	
	360	100	2.1	6	50	294.5	–	331.33	**NNCL4952V**	**SL024952**		1 082.90	2 548.60	221.80	630	750	31.20	
	400	190	4.0	10	95	304	357	373.50	**NNCF5052V**	**SL185052**		2 656.70	5 115.30	435.60	590	700	85.50	
280	350	69	2.0	4	34.5	307	326	332.40	**NNCF4856V**	**SL184856**		693.00	1 889.60	163.10	630	750	16.00	
	350	69	2.0	–	34.5	306.8	326.4	–	**NNC4856V**	**SL014856**		693.00	1 889.60	163.10	630	750	16.00	
	350	69	2.0	4	34.5	306.8	–	332.40	**NNCL4856V**	**SL024856**		693.00	1 889.60	163.10	630	750	15.60	
	380	100	2.1	6	50	316	345	353.34	**NNCF4956V**	**SL184956**		1 126.20	2 745.30	234.00	590	700	33.50	
	380	100	2.1	–	50	316.5	344.6	–	**NNC4956V**	**SL014956**		1 126.20	2 745.30	234.00	590	700	34.00	
	380	100	2.1	6	50	316.5	–	353.34	**NNCL4956V**	**SL024956**		1 126.20	2 745.30	234.00	590	700	33.10	
	420	190	4.0	10	95	320	372	389.00	**NNCF5056V**	**SL185056**		2 731.60	5 372.50	451.70	570	670	90.50	



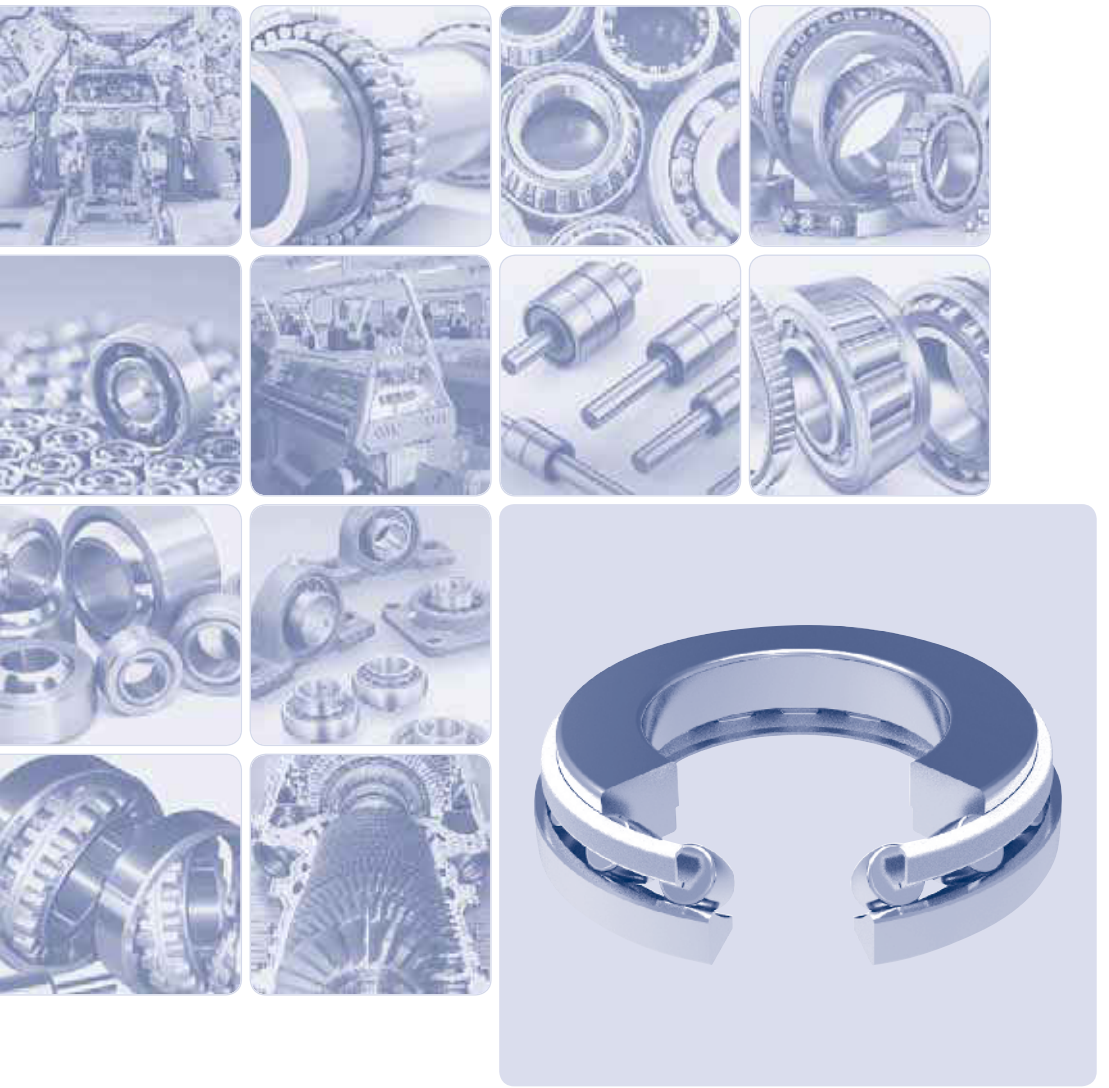
Dimensions									Bearing designation			Basic load rating dynamic	static	Fatigue load limit	Limiting speed for lubrication with grease	oil	Mass of Bearings	
d	D	B	r_{smin}	s	C	d1 ≈	**D1** ≈	**E**		INA		C_r	C_{or}	C_u				
mm												kN			min^{-1}		kg	
300	380	80	2.1	6	40	328	350	356.70	**NNCF4860V**	**SL184860**		810.00	2 177.10	184.00	590	700	22.50	
	380	80	2.1	–	40	327.9	349.9	–	**NNC4860V**	**SL014860**		810.00	2 177.10	184.00	590	700	23.00	
	380	80	2.1	6	40	327.9	–	356.70	**NNCL4860V**	**SL024860**		810.00	2 177.10	184.00	590	700	22.00	
	420	118	3.0	6	59	341	374	385.51	**NNCF4960V**	**SL184960**		1 585.90	3 819.50	316.60	570	670	52.50	
	420	118	3.0	–	59	340.7	374.3	–	**NNC4960V**	**SL014960**		1 585.90	3 819.50	316.60	570	670	53.00	
	420	118	3.0	6	59	340.7	–	385.51	**NNCL4960V**	**SL024960**		1 585.90	3 819.50	316.60	570	670	51.90	
	460	218	4.0	9	109	352	418	433.00	**NNCF5060V**	**SL185060**		3 383.50	6 795.80	553.70	510	600	130.00	
320	400	80	2.1	6	40	351	373	379.70	**NNCF4864V**	**SL184864**		841.30	2 332.90	193.30	530	630	23.50	
	400	80	2.1	–	40	350.9	372.9	–	**NNC4864V**	**SL014864**		841.30	2 332.90	193.30	530	630	24.00	
	400	80	2.1	6	40	350.9	–	379.70	**NNCL4864V**	**SL024864**		841.30	2 332.90	193.30	530	630	23.50	
	440	118	3.0	6	59	368	401	412.27	**NNCF4964V**	**SL184964**		1 657.70	4 123.00	336.60	510	600	55.50	
	440	118	3.0	–	59	367.5	401.1	–	**NNC4964V**	**SL014964**		1 657.70	4 123.00	336.60	510	600	56.00	
	440	118	3.0	6	59	367.5	–	412.27	**NNCL4964V**	**SL024964**		1 657.70	4 123.00	336.60	510	600	54.90	
	480	218	4.0	9	109	370	434	449.00	**NNCF5064V**	**SL185064**		3 438.10	7 025.00	565.40	470	560	135.00	
340	420	80	2.1	6	40	368	390	396.90	**NNCF4868V**	**SL184868**		859.20	2 450.00	200.20	510	600	25.00	
	420	80	2.1	–	40	368.1	390.1	–	**NNC4868V**	**SL014868**		859.20	2 450.00	200.20	510	600	25.50	
	420	80	2.1	6	40	368.1	–	396.90	**NNCL4868V**	**SL024868**		859.20	2 450.00	200.20	510	600	25.00	
	460	118	3.0	6	59	385	419	430.11	**NNCF4968V**	**SL184968**		1 702.30	4 330.20	348.60	470	560	58.50	
	460	118	3.0	–	59	385.3	418.9	–	**NNC4968V**	**SL014968**		1 702.30	4 330.20	348.60	470	560	59.00	
	460	118	3.0	6	59	385.3	–	430.11	**NNCL4968V**	**SL024968**		1 702.30	4 330.20	348.60	470	560	57.80	
	520	243	5.0	11	121.5	395	468	485.00	**NNCF5068V**	**SL185068**		4 140.00	8 434.20	664.20	530	530	185.00	
360	440	80	2.1	6	40	391	413	419.80	**NNCF4872V**	**SL184872**		889.60	2 605.60	209.30	470	560	26.50	
	440	80	2.1	–	40	391	413.2	–	**NNC4872V**	**SL014872**		889.60	2 605.60	209.30	470	560	27.00	
	440	80	2.1	6	40	391	–	419.80	**NNCL4872V**	**SL024872**		899.60	2 605.60	209.30	470	560	26.00	
	480	118	3.0	6	59	404	437	447.95	**NNCF4972V**	**SL184972**		1 743.40	4 538.10	360.30	450	530	61.50	
	480	118	3.0	–	59	404	436.8	–	**NNC4972V**	**SL014972**		1 743.40	4 538.10	360.30	450	530	62.10	
	480	118	3.0	6	59	404	–	447.95	**NNCL4972V**	**SL024972**		1 743.40	4 538.10	360.30	450	530	60.80	
	540	243	5.0	11	121.5	412	486	503.00	**NNCF5072V**	**SL185072**		4 250.70	8 838.00	687.60	420	500	195.00	
380	480	100	2.1	6	50	419	447	455.80	**NNCF4876V**	**SL184876**		1 305.70	3 663.60	287.80	450	530	45.00	
	480	100	2.1	–	50	419	447.2	–	**NNC4876V**	**SL014876**		1 305.70	3 663.60	287.80	450	530	45.50	
	480	100	2.1	6	50	419	–	455.80	**NNCL4876V**	**SL024876**		1 305.70	3 663.60	287.80	450	530	44.00	
	520	140	4.0	7	70	430	469	481.35	**NNCF4976V**	**SL184976**		2 218.20	5 754.20	447.00	420	500	91.50	
	520	140	4.0	–	70	430.2	468.7	–	**NNC4976V**	**SL014976**		2 218.20	5 754.20	447.00	420	500	92.40	
	520	140	4.0	7	70	430.2	–	481.35	**NNCL4976V**	**SL024976**		2 218.20	5 754.20	447.00	420	500	90.50	
	560	243	5.0	11	121.5	431	504	521.00	**NNCF5076V**	**SL185076**		4 360.00	9 242.00	710.60	400	480	200.00	
400	500	100	2.1	6	50	434	462	470.59	**NNCF4880V**	**SL184880**		1 328.80	3 794.50	295.20	420	500	46.00	
	500	100	2.1	–	50	433.8	462	–	**NNC4880V**	**SL014880**		1 328.80	3 794.50	295.20	420	500	46.50	
	500	100	2.1	6	50	433.8	–	470.59	**NNCL4880V**	**SL024880**		1 328.80	3 794.50	295.20	420	500	45.80	
	540	140	4.0	7	70	451	489	501.74	**NNCF4980V**	**SL184980**		2 274.30	6 035.80	462.70	400	480	95.50	
	540	140	4.0	–	70	450.5	489	–	**NNC4980V**	**SL014980**		2 274.30	6 035.80	462.70	400	480	96.50	
	540	140	4.0	7	70	450.5	–	501.74	**NNCL4980V**	**SL024980**		2 274.30	6 035.80	462.70	400	480	94.50	
	600	272	5.0	11	136	460	540	558.00	**NNCF5080V**	**SL185080**		4 695.30	9 900.00	745.80	380	450	270.00	



Dimensions																Bearing designation		Basic load rating		Fatigue load limit	
																		dynamic	static		
d	D	B	C	C_1	D_1	m	r_{smin}	t	x	C_{a1} [1]	C_{a2} [2]	d_1	d_2	d_3				C_r	C_{or}	C_u	
mm																		kN			
20	42	30	29	24.7	40.2	1.8	0.3	0.5	22.5	21.5	21	30.55	34	47		**SL045004-PP2NR**	**NNF 5004**	40.6	46.0	5.6	
25	47	30	29	24.7	45.2	1.8	0.3	0.5	22.5	21.5	21	35.35	39	52		**SL045005-PP2NR**	**NNF 5005**	46.5	57.0	7.0	
30	55	34	33	28.2	53	2.1	0.3	0.5	25.5	25	24	40.6	44	60		**SL045006-PP2NR**	**NNF 5006**	57.5	74.6	9.1	
35	62	36	35	30.2	60	2.1	0.3	0.5	27.5	27	26	46.1	50	67		**SL045007-PP2NR**	**NNF 5007**	65.2	82.1	10.2	
40	68	38	37	32.2	65.8	2.7	0.6	0.8	28.5	28	27	51.4	55	75		**SL045008-PP2NR**	**NNF 5008**	67.9	90.0	11.0	
45	75	40	39	34.2	72.8	2.7	0.6	0.8	30.5	30	29	57	61	82		**SL045009-PP2NR**	**NNF 5009**	102.1	143.8	17.5	
50	80	40	39	34.2	77.8	2.7	0.6	0.8	30.5	30	29	61.8	66	87		**SL045010-PP2NR**	**NNF 5010**	108.9	160.2	19.5	
55	90	46	45	40.2	87.4	3.2	0.6	1.0	36	35	34	68.6	73	99		**SL045011-PP2NR**	**NNF 5011**	129.5	191.8	23.4	
60	95	46	45	40.2	92.4	3.2	0.6	1.0	36	35	34	73.7	79	104		**SL045012-PP2NR**	**NNF 5012**	137.3	211.3	25.8	
65	100	46	45	40.2	97.4	3.2	0.6	1.0	36	35	34	78.8	84	109		**SL045013-PP2NR**	**NNF 5013**	140.4	221.9	27.6	
70	110	54	53	48.2	107.1	4.2	0.6	1.0	42	43	40	84.5	91	119		**SL045014-PP2NR**	**NNF 5014**	197.0	318.6	38.9	
75	115	54	53	48.2	112.1	4.2	0.6	1.0	42	43	40	89.95	97	124		**SL045015-PP2NR**	**NNF 5015**	195.8	321.0	39.1	
80	125	60	59	54.2	122.1	4.2	0.6	1.5	48	49	46	97.1	105	137		**SL045016-PP2NR**	**NNF 5016**	244.3	412.1	49.9	
85	130	60	59	54.2	127.1	4.2	0.6	1.5	48	49	46	103.9	112	142		**SL045017-PP2NR**	**NNF 5017**	249.8	430.6	51.4	
90	140	67	66	59.2	137	4.2	0.6	1.5	54	54	51	109.3	118	152		**SL045018-PP2NR**	**NNF 5018**	316.8	535.6	62.6	
95	145	67	66	59.2	142	4.2	0.6	1.5	54	54	51	113.35	122	157		**SL045019-PP2NR**	**NNF 5019**	324.6	560.2	64.7	
100	150	67	66	59.2	147	4.2	0.6	1.5	54	54	51	117.35	128	162		**SL045020-PP2NR**	**NNF 5020**	322.7	563.2	64.2	
110	170	80	79	70.2	167	4.2	0.6	1.8	64	65	62	131.55	143	182		**SL045022-PP2NR**	**NNF 5022**	406.0	683.2	75.3	
120	180	80	79	71.2	176	4.2	0.6	1.8	64	65	63	140.9	153	196		**SL045024-PP2NR**	**NNF 5024**	428.3	749.5	80.9	
130	200	95	94	83.2	196	4.2	0.6	1.8	77	77	75	156.75	170	216		**SL045026-PP2NR**	**NNF 5026**	565.6	1 023.2	107.4	
	190	80	79	71.2	186	4.2	0.6	1.8	64	65	63	150.55	160	206		**SL04130-PP**	**NNF130-PP**	351.9	718.9	76.1	
140	210	95	94	83.2	206	5.2	0.6	1.8	77	77	73	165.4	181	226		**SL045028-PP2NR**	**NNF 5028**	593.6	1 110.1	114.5	
	200	80	79	71.2	196	4.2	0.6	1.8	64	65	63	159.95	170	216		**SL04140-PP**	**NNF140-PP**	365.0	770.8	80.2	
150	225	100	99	87.2	221	5.2	0.6	2.0	80	81	77	175.7	192	245		**SL045030-PP2NR**	**NNF 5030**	679.3	1 304.0	131.7	
	210	80	79	71.2	206	5.2	0.6	1.8	64	65	61	174.4	185	226		**SL04150-PP**	**NNF150-PP**	452.5	938.0	95.9	
160	240	109	108	95.2	236	5.2	0.6	2.0	89	89	85	189	207	260		**SL045032-PP2NR**	**NNF 5032**	764.4	1 503.1	148.9	
	220	80	79	71.2	216	5.2	0.6	1.8	64	65	61	184.05	196	236		**SL04160-PP**	**NNF160-PP**	464.4	940.8	94.6	
170	260	122	121	107.2	254	5.2	0.6	2.0	100	99	97	200.7	220	282		**SL045034-PP2NR**	**NNF 5034**	935.2	1 807.2	175.2	
	230	80	79	71.2	226	5.2	0.6	1.8	64	65	61	193.9	206	250		**SL04170-PP**	**NNF170-PP**	496.0	960.6	95.2	
180	280	136	135	118.2	274	5.2	0.6	2.0	112	110	108	217.8	239	302		**SL045036-PP2NR**	**NNF 5036**	1 117.7	2 077.5	197.3	
	240	80	79	71.2	236	5.2	0.6	1.8	64	65	61	203.1	216	260		**SL04180-PP**	**NNF180-PP**	607.4	1 220.2	119.1	
190	290	136	135	118.2	284	5.2	0.6	2.0	112	110	108	225.65	248	312		**SL045038-PP2NR**	**NNF 5038**	1 189.9	2 286.2	214.4	
	260	80	79	73.2	254	5.2	0.6	1.8	64	65	63	217.55	231	282		**SL04190-PP**	**NNF190-PP**	646.5	1 304.7	124.8	
200	310	150	149	128.2	304	6.3	0.6	2.0	126	120	116	243.05	267	336		**SL045040-PP2NR**	**NNF 5040**	1 322.3	2 543.7	234.3	
	270	80	79	73.2	264	5.2	0.6	1.8	64	65	63	227.15	241	292		**SL04200-PP**	**NNF200-PP**	692.7	1 396.1	131.8	
220	340	160	159	138.2	334	6.3	1.0	2.0	132	130	126	259.85	286	366		**SL045044-PP2NR**	**NNF 5044**	1 634.6	3 154.4	282.5	
	300	95	94	83.2	294	5.2	1.0	2.0	72	75	73	248.7	264	322		**SL04220-PP**	**NNF220-PP**	750.5	1 592.1	145.8	



Dimensions																Bearing designation		Basic load rating dynamic	Basic load rating static	Fatigue load limit	
d	D	B	C	C_1	D_1	m	r_{smin}	t	x	C_{a1} [1]	C_{a2} [2]	d_1	d_2	d_3				C_r	C_{or}	C_u	
mm																		kN			
240	360	160	159	138.2	354	6.3	1.0	2.0	132	130	126	279.25	305	386		**SL045048-PP2NR**	**NNF 5048**	1628.7	3355.9	294.3	
	320	95	94	83.2	314	6.3	1.0	2.0	72	75	71	271.7	287	346		**SL04240-PP**	**NNF240-PP**	803.2	1722.5	154.2	
260	400	190	189	162.2	394	6.3	1.1	3.0	150	154	150	304.95	336	426		**SL045052-PP2NR**	**NNF 5052**	2081.6	4202.3	358.2	
	340	95	94	83.2	334	6.3	1.0	3.0	75	75	71	292.7	310	366		**SL04260-PP**	**NNF260-PP**	791.3	1732.3	151.9	
280	420	190	189	163.2	413	7.3	1.1	3.0	150	154	149	320.95	354	453		**SL045056-PP2NR**	**NNF 5056**	2180.3	4547.1	380.8	
300	460	218	216	185.2	453	7.3	1.1	3.0	170	176	171	346.85	375	493		**SL045060-PP2NR**	**NNF 5060**	2772.2	5731.2	468.3	
	380	95	94	83.2	374	6.3	1.0	3.0	75	75	71	328	346	406		**SL04300-PP**	**NNF300-PP**	973.2	2367.0	200.0	



Spherical roller thrust bearings

Spherical roller thrust bearings

Spherical roller thrust bearings

Spherical roller thrust bearings have a large number of asymmetrical rollers with good fit to the raceways of the shaft washer and housing ring. They are suitable for accommodating large loads at relatively high speeds. In addition to high axial loads, these bearings can also accommodate certain radial forces. The spherical raceway of the housing ring can compensate misalignments between the shaft and the housing. Spherical roller thrust bearings are dismountable, which allows separate mounting of shaft units (shaft washers with a cage and rolling elements) and housing rings.

Due to the internal structure of these bearings, oil lubrication is necessary, except for operation at very low speeds.

Boundary Dimensions

The boundary dimensions of spherical roller thrust bearings given in the dimension tables comply with the ISO 104 international dimension plan.

Designation

The designation of bearings with the basic design is given in the dimension tables. The difference from the basic design is designated by additional marks.

Cages

Spherical roller thrust bearings have brass cages, guided using a steel sleeve on a shaft washer (designation M), or have brass cages, guided on a shaft washer.

The J design spherical roller thrust bearings have a sheet steel cage guided on a shaft washer. Spherical roller thrust bearings with a sheet steel cage (J) are interchangeable with bearings with a solid brass cage. If a spherical roller thrust bearing with a brass cage, arranged so that the shaft washer rests on the shaft against the face of the steel sleeve that guides the cage, is to be replaced by the J design bearing, a spacer needs to be inserted between the shaft washer and the original shaft mounting, as shown in the picture.

Precision

Spherical roller thrust bearings are normally manufactured with normal precision grade P0 (the P0 mark is not designated). The manufacturing of bearings with a higher precision grade needs to be discussed in advance.

Permissible Misalignment

The spherical raceway of the housing ring of spherical roller thrust bearings allows, under normal operating conditions ($Pa \leq 0.1\ Ca$), a misalignment from the centre without disrupting the correct function of the bearing by the values given in the table.

Bearing Type	Permissible Misalignment
292	2°
293	2°30´
294	3°

Arrangement Structure

The connection dimensions given in the dimension tables are suitable for bearings where the load $P_a \leq 0.1\ C_a$. At higher loads, it is appropriate to support the bearing rings across the entire end face, i.e. $d_a = d_1$ and $D_a = D_1$.

Axial Equivalent Dynamic and Static Load

Axial Equivalent Dynamic Load

Depending on the effect of wobbling of the bearing arrangement and its elimination by mutual movement of rings and in compliance with the condition $F_r \leq 0.55.F_a$, the following applies:

$P_a = F_a + 1.2.F_r$ - if the wobbling affects the load distribution in the bearing

$P_a = 0.88.(F_a + 1.2.F_r)$ - if the wobbling does not affect the load distribution in the bearing

Where:
P_a - equivalent dynamic bearing load (N)
F_a - axial load (N)
F_r - radial load (N)

If $F_r > 0.55.F_a$, the calculation of the arrangement should be consulted with R&D KINEX.

Axial Equivalent Static Load

For axial load, provided that $Fr \leq 0.55.Fa$, the following applies:

$$P_{0a} = F_a + 2.7.F_r$$

Where:
P_{0a} - equivalent static bearing load (N)
F_a - axial load (N)
F_r - radial load (N)

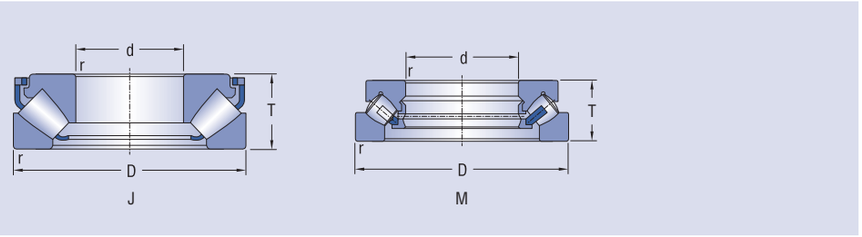
If $F_r > 0.55.F_a$, the calculation of the arrangement should be consulted with R&D KINEX.

Minimum Axial Load

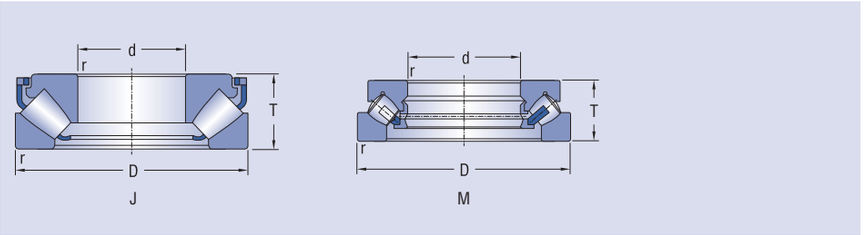
The operation of spherical roller thrust bearings poses a risk of the rolling elements slipping between the raceways of the rings due to centrifugal forces and friction in the lubricant and consequent damage to the rolling elements or raceways. As a result, a certain minimum load must be applied to the bearing. The minimum load will be calculated with sufficient accuracy using the following formula:

$$F_{amin} = 0.00125.C_{0a}$$

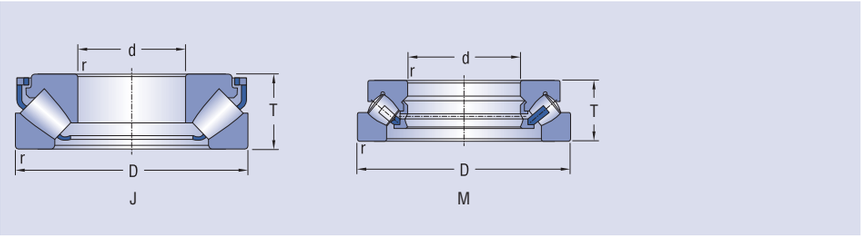
Where:
F_{amin} - minimum load
C_{0a} - static load capacity



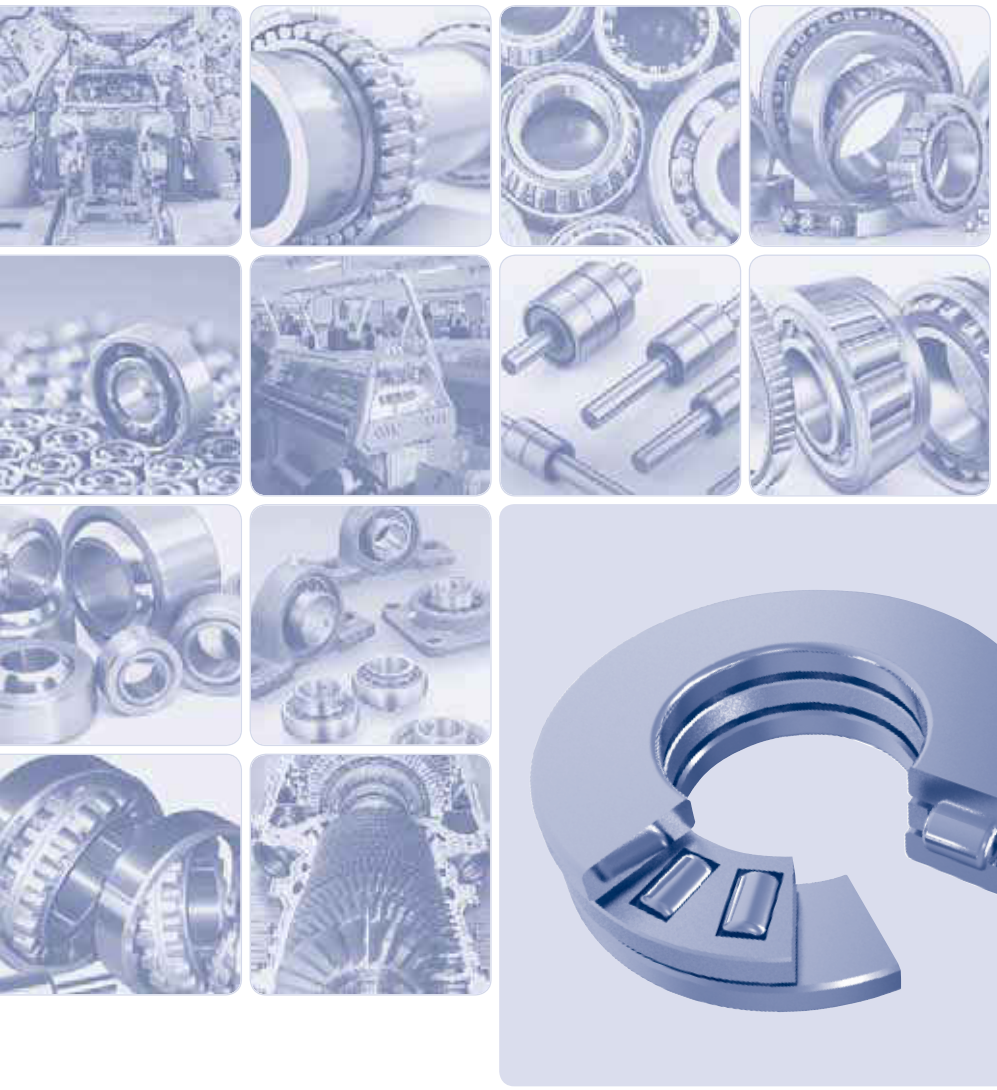
Dimensions				Bearing designation	Basic load rating dynamic	static	Fatigue load limit		Limiting speed for lubrication with oil	Mass of Bearings	
d	D	T	$r_{s\ min}$		C_r	C_{or}	C_u				
mm					kN				min^{-1}	kg	
60	130	42	1.5	**29412J**	345	915	115		2 600	2.52	
	130	42	1.5	**29412M**	290	925	112		2 400	2.80	
65	140	45	2	**29413J**	460	1 080	130		2 400	3.10	
	140	45	2	**29413M**	340	1 080	130		2 200	3.75	
70	150	48	2	**29414J**	450	1 240	148		2 200	3.83	
	150	48	2	**29414M**	380	1 230	145		2 000	4.31	
75	160	51	2	**29415J**	525	1 430	166		2 200	4.61	
	160	51	2	**29415M**	440	1 270	147		2 000	4.72	
80	170	54	2.1	**29416J**	575	1 630	186		2 000	5.50	
	170	54	2.1	**29416M**	468	1 380	157		1 900	6.09	
85	180	58	2.1	**29417J**	645	1 760	201		1 900	6.61	
	180	58	2.1	**29417M**	510	1 658	185		1 800	7.05	
90	190	60	2.1	**29418J**	695	1 950	220		1 800	7.65	
	190	60	2.1	**29418M**	560	1 980	218		1 700	8.01	
100	170	42	1.5	**29320J**	410	1 280	262		2 000	3.57	
	210	67	3	**29420J**	840	2 400	267		1 700	10.6	
	210	67	3	**29420M**	760	2 500	267		1 600	14.2	
110	190	48	2	**29322J**	530	1 710	186		1 600	5.24	
	190	48	2	**29322M**	455	1 646	177		1 600	7.03	
	230	73	3	**29422J**	1 010	2 930	312		1 400	13.40	
	230	73	3	**29422M**	905	2 610	271		1 400	17.90	
120	210	54	2.1	**29324J**	645	2 100	222		1 600	7.33	
	210	54	2.1	**29324M**	545	2 100	220		1 400	7.92	
	250	78	4	**29424J**	1 170	3 450	410		1 300	16.20	
	250	78	4	**29424M**	960	3 300	355		1 300	18.80	
130	225	58	2.1	**29326J**	753	2 500	256		1 500	8.85	
	225	58	2.1	**29326M**	600	2 260	232		1 300	9.65	
	270	85	4	**29426J**	1 380	4 050	401		1 200	22.1	
	270	85	4	**29426M**	1 110	3 500	346		1 200	29.2	
140	240	60	2.1	**29328J**	845	2 850	286		1 400	10.30	
	240	60	2.1	**29328M**	707	2 490	250		1 300	11.20	
	280	85	4	**29428J**	1 400	4 300	419		1 200	22.40	
	280	85	4	**29428M**	1 160	4 200	410		1 200	25.50	
150	250	60	2.1	**29330J**	870	2 900	287		1 400	10.90	
	250	60	2.1	**29330M**	715	2 500	247		1 200	11.50	
	300	90	4	**29430J**	1 530	4 900	468		1 100	27.70	
	300	90	4	**29430M**	1 310	4 750	454		1 100	30.40	
160	270	67	3	**29332J**	1 000	3 400	329		1 200	14.30	
	270	67	3	**29332M**	840	3 330	322		1 100	15.80	
	320	95	5	**29432J**	1 790	5 450	511		1 000	32.60	
	320	95	5	**29432M**	1 450	4 850	454		1 000	35.10	



Dimensions				Bearing designation	Basic load rating dynamic	static	Fatigue load limit		Limiting speed for lubrication with oil	Mass of Bearings	
d	D	T	$r_{s\ min}$		C_r	C_{or}	C_u				
mm					kN				min^{-1}	kg	
170	280	67	3	**29334J**	1 100	3 500	334		1 200	14.80	
	280	67	3	**29334M**	850	3 400	325		1 100	16.50	
	340	103	5	**29434J**	2 360	6 550	603		950	40.00	
	340	103	5	**29434M**	1 658	5 330	490		950	40.80	
180	300	73	3	**29336J**	1 430	4 300	403		1 100	19.10	
	300	73	3	**29336M**	1 000	4 050	380		1 000	21.70	
	360	109	5	**29436J**	2 600	7 350	665		950	47.40	
	360	109	5	**29436M**	1 870	6 110	553		900	62.20	
190	320	78	4	**29338J**	1 630	4 750	437		1 100	22.90	
	320	78	4	**29338M**	1 180	4 950	455		950	26.00	
	380	115	5	**29438J**	2 850	8 000	712		850	56.00	
	380	115	5	**29438M**	2 230	7 690	685		850	61.40	
200	280	48	2	**29240M**	536	2 270	212		1 150	8.90	
	340	85	4	**29340J**	1 860	5 500	497		950	28.60	
	340	85	4	**29340M**	1 140	4 750	430		900	33.00	
	400	122	5	**29440J**	2 760	9 000	789		800	65.80	
	400	122	5	**29440M**	2 460	8 470	742		800	73.00	
220	300	48	2	**29244M**	542	2 490	228		1 050	10.00	
	360	85	4	**29344M**	1 380	5 240	264		900	34.00	
	420	122	6	**29444M**	2 540	8 990	773		750	74.90	
240	340	60	2.1	**29248M**	822	3 680	326		900	16.70	
	380	85	4	**29348M**	1 410	5 500	477		800	35.50	
	440	122	6	**29448M**	2 610	9 500	802		750	83.00	
260	360	60	2.1	**29252M**	838	3 720	323		900	18.50	
	420	95	5	**29352M**	1 810	6 950	587		750	51.50	
	480	132	6	**29452M**	3 100	11 100	914		670	110.0	
280	380	60	2.1	**29256M**	862	4 020	342		850	19.50	
	440	95	5	**29356M**	1 840	7 150	593		710	53.20	
	520	145	6	**29456M**	3 650	13 600	1 094		660	137.0	
300	420	73	3	**29260M**	1 060	4 880	405		750	30.50	
	480	109	5	**29360M**	2 250	8 790	712		630	70.00	
	540	145	6	**29460M**	3 880	14 900	1 181		620	146.0	
320	440	73	3	**29264M**	1 430	6 480	529		750	32.70	
	500	109	5	**29364M**	2 310	9 380	749		680	74.90	
	580	155	7.5	**29464M**	4 160	16 100	1 250		560	179.0	
340	460	73	3	**29268M**	1 390	6 420	516		700	33.0	
	540	122	5	**29368M**	2 700	11 000	860		620	106.0	
	620	170	7.5	**29468M**	4 960	19 400	1 477		500	224.0	
360	500	85	4	**29272M**	1 460	6 800	535		650	51.80	
	560	122	5	**29372M**	2 780	11 600	895		600	109.0	
	640	170	6	**29472M**	5 380	21 200	1 595		500	230.0	



Dimensions				Bearing designation	Basic load rating dynamic	static	Fatigue load limit		Limiting speed for lubrication with oil	Mass of Bearings	
d	D	T	$r_{s\ min}$		C_r	C_{or}	C_u				
mm					kN				min^{-1}	kg	
380	520	85	4	**29276M**	1580	7 690	597		600	53.00	
	600	132	6	**29376M**	3340	14 000	1 060		560	140.0	
	670	175	7.5	**29476M**	5870	24 000	1 780		470	260.0	
400	540	85	4	**29280M**	1650	8 000	613		600	55.50	
	620	132	6	**29380M**	3450	14 600	1 092		560	150.0	
	710	185	7.5	**29480M**	6560	26 500	1 932		470	310.0	



Cylindrical roller thrust bearings

Cylindrical roller thrust bearings

Cylindrical roller thrust bearings

Cylindrical roller thrust bearings consist of cylindrical rollers and cage thrust assemblies and two bearing washers. The design can be single-row or double-row. They are rigid, have high load capacity and are resistant to impact loads. They can only accommodate axial forces.

Boundary Dimensions

The boundary dimensions of cylindrical roller thrust bearings given in the dimension tables comply with the ISO 104 international dimension plan.

Design

The components of cylindrical roller thrust bearings allow a combination of a cage with rollers and raceways formed by individual machine parts, or a combination of one raceway formed by a machine part and a bearing ring. A separate cage with rollers has the additional designation K, a separate shaft washer is designated WS and a separate housing ring is designated GS.

Designation

The designation of bearings with the basic design is given in the dimension tables. The difference from the basic design is designated by additional marks.

Cages

Cylindrical roller thrust bearings cages are made of polyamide 66 (designation TN) or brass (designation M).

Precision

Cylindrical roller thrust bearings are normally manufactured with normal precision grade P0 (the P0 mark is not designated). Bearings with higher precision grades P6 and P5 are available for special arrangements that require higher precision. Limiting values for dimensional and running accuracy deviations are given in ISO 199.

Minimum Axial Load

Cylindrical roller thrust bearings must be subjected to a certain minimum load to ensure reliable bearing function. If this load is not observed, abnormal rolling and slipping of the rolling elements and consequent damage to the raceways may occur.

The minimum load is calculated as follows:

$$F_{a\,min} = \left(\frac{C_{oa}}{2000}\right) + M \cdot \left(\frac{n}{1000}\right)^2$$

Where

$F_{a\,min}$	- minimum axial load	[kN]
C0a	- static load capacity	[kN]
n	- speed	[min^{-1}]
M	- coefficient of minimum axial load (The values are given in the dimension tables.)	

Unless the minimum load is caused naturally in the bearing arrangement, the bearing must be loaded with additional force by a shaft nut or springs.

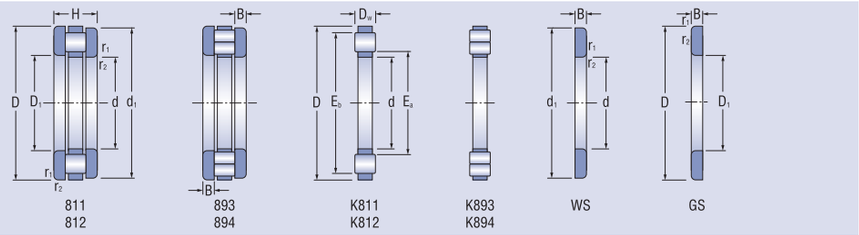
Axial Equivalent Dynamic and Static Load

Axial Equivalent Dynamic Load

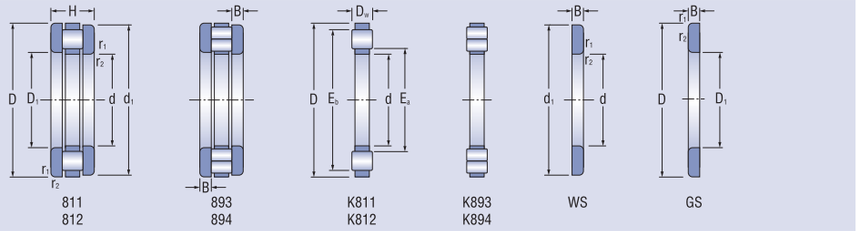
$P_a = F_a$

Axial Equivalent Static Load

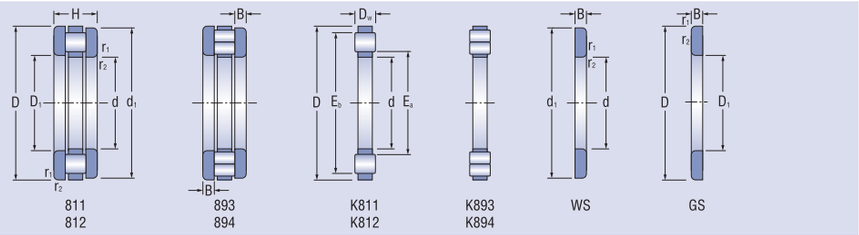
$P_{oa} = F_a$



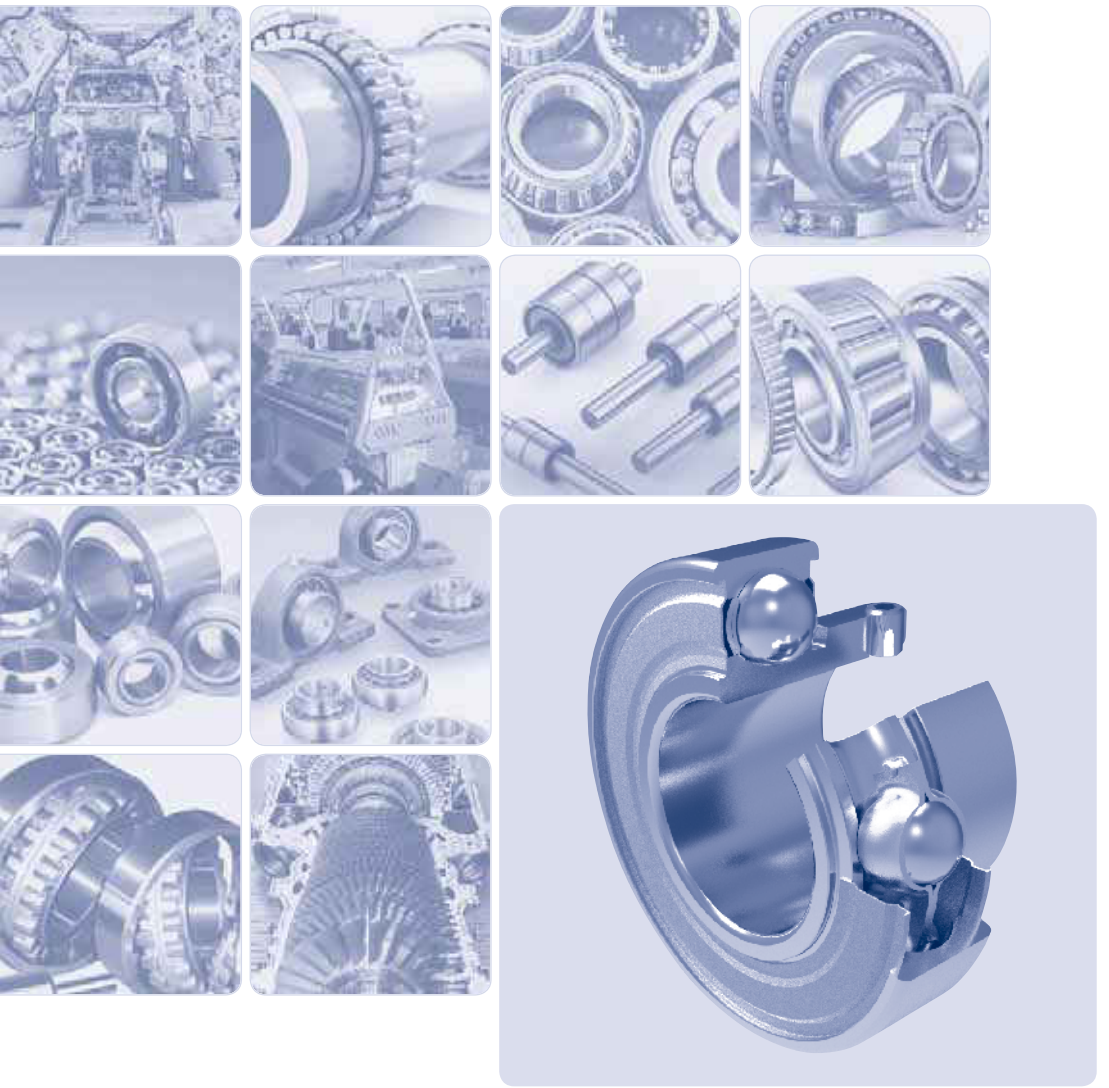
Dimensions										Bearing designation		Basic load rating dynamic	static	Fatigue load limit		Limiting speed for lubrication with grease	oil	Mass of Bearings	Bearing component designation Cage with rollers	Shaft ring	Housing ring
d	D_1	D	d_1	H	D_w	B	r_{smin}	E_b	E_a			C_r	C_{or}	C_u							
mm												kN				min^{-1}		kg			
15	16	28	28	9	3.5	2.75	0.3	16	27	**81102TN**		11.7	24.0	2.9	0.00006	13 600	6 300	0.024	K81102TN	WS 81102	GS 81102
17	18	30	30	9	3.5	2.75	0.3	18	29	**81103TN**		12.9	28.4	3.4	0.00008	12 400	5 400	0.027	K81103TN	WS 81103	GS 81103
20	21	35	35	10	4.5	2.75	0.3	21	34	**81104TN**		18.7	39.8	4.8	0.00019	10 500	4 300	0.037	K81104TN	WS 81104	GS 81104
25	26	42	42	11	5	3	0.6	26	41	**81105TN**		25.2	59.0	7.2	0.0004	8 600	3 500	0.053	K81105TN	WS 81105	GS 81105
30	32	47	47	11	5	3	0.6	31	46	**81106TN**		26.8	68.3	8.3	0.0005	7 500	3 050	0.057	K81106TN	WS 81106	GS 81106
	32	52	52	16	7.5	4.25	0.6	31	50	**81206TN**		49.5	108.4	13.2	0.0014	7 100	2 650	0.123	K81206TN	WS 81206	GS 81206
	32	60	60	18	5.5	6.25	1	33	59	**89306TN**		52.4	159.7	19.5	0.003	6 400	2 600	0.240	K89306TN	WS 89306	GS 89306
35	37	52	52	12	5	3.5	0.6	36	51	**81107TN**		29.4	81.8	10.0	0.0007	6 600	2 600	0.073	K81107TN	WS 81107	GS 81107
	37	62	62	18	7.5	5.25	1	39	58	**81207TN**		50.7	121.5	14.8	0.003	5 900	2 320	0.195	K81207TN	WS 81207	GS 81207
	37	68	68	20	6	7	1	38	67	**89307TN**		61.5	194.0	23.6	0.004	5 600	2 390	0.340	K89307TN	WS 89307	GS 89307
40	42	60	60	13	6	3.5	0.6	42	58	**81108TN**		42.7	120.8	14.7	0.0016	5 800	2 190	0.105	K81108TN	WS 81108	GS 81108
	42	68	68	19	9	5	1	43	66	**81208TN**		84.1	211.2	25.7	0.0053	5 200	1 860	0.249	K81208TN	WS 81208	GS 81208
	42	78	78	22	7	7.5	1	44	77	**89308TN**		79.6	252.4	30.8	0.011	4 800	1 780	0.484	K89308TN	WS 89308	GS 89308
45	47	65	65	14	6	4	0.6	47	63	**81109TN**		44.9	134.5	16.4	0.002	5 300	1 970	0.130	K81109TN	WS 81109	GS 81109
	47	73	73	20	9	5.5	1	48	70	**81209TN**		82.4	214.8	26.2	0.0059	4 850	1 820	0.287	K81209TN	WS 81209	GS 81209
	47	85	85	24	7.5	8.25	1	49	83	**89309TN**		107.9	371.6	45.3	0.015	4 400	1 620	0.615	K89309TN	WS 89309	GS 89309
50	52	70	70	14	6	4	0.6	52	68	**81110TN**		47.0	148.3	18.8	0.0023	4 800	1 810	0.140	K81110TN	WS 81110	GS 81110
	52	78	78	22	9	6.5	1	53	75	**81210TN**		81.0	217.8	26.5	0.0072	4 450	1 550	0.356	K81210TN	WS 81210	GS 81210
	52	95	95	27	8	9.5	1.1	56	92	**89310TN**		130.8	473.5	57.7	0.023	3 950	1 460	0.887	K89310TN	WS 89310	GS 89310
55	57	78	78	16	6	5	0.6	57	77	**81111TN**		70.0	259.4	31.6	0.0068	4 300	1 330	0.218	K81111TN	WS 81111	GS 81111
	57	90	90	25	11	7	1	59	85	**81211TN**		110.0	287.4	35.0	0.013	4 000	1 510	0.568	K81211TN	WS 81211	GS 81211
	57	105	105	30	9	10.5	1.1	61	103	**89311TN**		151.1	537.7	65.6	0.026	3 600	1 490	1.180	K89311TN	WS 89311	GS 89311
60	62	85	85	17	7.5	4.75	1	62	82	**81112TN**		80.1	267.6	32.6	0.0075	4 000	1 360	0.266	K81112TN	WS 81112	GS 81112
	62	95	95	26	11	7.5	1	64	91	**81212TN**		136.2	394.5	48.1	0.018	3 700	1 300	0.642	K81212TN	WS 81212	GS 81212
	62	110	110	30	9	10.5	1.1	66	108	**89312TN**		154.0	566.5	69.1	0.033	3 350	1 350	1.260	K89312TN	WS 89312	GS 89312
	62	130	130	42	14	14	1.5	65	126	**89412TN**		309.3	1008.4	123.0	0.111	3 000	1 080	2.818	K89412TN	WS 89412	GS 89412
65	67	90	90	18	7.5	5.25	1	67	87	**81113TN**		83.4	289.6	35.3	0.0083	3 700	1 260	0.310	K81113TN	WS 81113	GS 81113
	67	100	100	27	11	8	1	69	96	**81213TN**		139.4	419.5	51.1	0.020	3 450	1 240	0.721	K81213TN	WS 81213	GS 81213
	67	115	115	30	9	10.5	1.1	71	113	**89313TN**		152.1	570.2	69.5	0.033	3 200	1 330	1.330	K89313TN	WS 89313	GS 89313
	68	140	140	45	15	15	2	70	135	**89413TN**		352.6	1166.3	141.2	0.150	2 800	1 000	3.520	K89413TN	WS 89413	GS 89413
70	72	95	95	18	7.5	5.25	1	72	92	**81114TN**		86.4	311.6	38.0	0.0096	3 500	1 170	0.33	K81114TN	WS 81114	GS 81114
	72	105	105	27	11	8	1	74	102	**81214TN**		148.0	465.5	56.7	0.023	3 250	1 130	0.77	K81214TN	WS 81214	GS 81214
	72	125	125	34	10	12	1.1	76	123	**89314TN**		99.9	315.9	38.5	0.050	2 950	1 200	1.82	K89314TN	WS 89314	GS 89314
	73	150	150	48	16	16	2	76	147	**89414TN**		378.5	1246.5	147.7	0.171	2 650	1 000	4.18	K89414TN	WS 89414	GS 89414
75	77	100	100	19	7.5	5.75	1	78	97	**81115TN**		83.3	303.2	37.0	0.009	3 300	1 190	0.40	K81115TN	WS 81115	GS 81115
	77	110	110	27	11	8	1	79	106	**81215TN**		135.8	426.4	52.0	0.019	3 100	1 210	0.80	K81215TN	WS 81215	GS 81215
	77	135	135	36	11	12.5	1.5	81	132	**89315TN**		226.8	866.6	104.1	0.075	2 750	1 080	2.23	K89315TN	WS 89315	GS 89315
	78	160	160	51	17	17	2	82	153	**89415M**		398.1	1297.5	150.7	0.187	2 400	1 000	5.96	K89415M	WS 89415	GS 89415



Dimensions										Bearing designation		Basic load rating dynamic	static	Fatigue load limit		Limiting speed for lubrication with grease	oil	Mass of Bearings	Bearing component designation Cage with rollers	Shaft ring	Housing ring
d	D_1	D	d_1	H	D_w	B	r_{smin}	E_b	E_a			C_r	C_{or}	C_u							
mm												kN				min^{-1}		kg			
80	82	105	105	19	7.5	5.75	1	83	102	**81116TN**		82.2	304.8	37.1	0.009	3 100	1 170	0.40	K81116TN	WS 81116	GS 81116
	82	115	115	28	11	8.5	1	84	112	**81216TN**		158.7	536.7	65.4	0.029	2 900	990	0.90	K81216TN	WS 81216	GS 81216
	82	140	140	36	11	12.5	1.5	86	137	**89316TN**		241.0	958.3	113.6	0.090	2 600	990	2.37	K89316TN	WS 89316	GS 89316
	83	170	170	54	18	18	2.1	88	165	**89416M**		443.6	1463.0	166.	0.239	2 260	950	7.40	K89416M	WS 89416	GS 89416
85	87	110	110	19	7.5	5.75	1	87	108	**81117TN**		87.3	336.8	41.0	0.012	2 950	1 070	0.42	K81117TN	WS 81117	GS 81117
	88	125	125	31	12	9.5	1	90	119	**81217TN**		170.9	565.9	68.0	0.025	2 750	1 060	1.26	K81217TN	WS 81217	GS 81217
	88	150	150	39	12	13.5	1.5	93	147	**89317M**		256.5	990.8	115.1	0.097	2 400	1 030	3.39	K89317M	WS89317	GS 89317
	88	180	180	58	19	19.5	2.1	93	175	**89417M**		491.2	1 638.5	183.6	0.298	2 130	900	8.65	K89417M	WS 89417	GS 89417
90	92	120	120	22	9	6.5	1	93	117	**81118TN**		110.4	405.5	48.7	0.014	2 750	1 070	0.62	K81118TN	WS 81118	GS 81118
	93	135	135	35	14	10.5	1.1	95	129	**81218TN**		231.5	759.4	89.4	0.061	2 550	910	1.77	K81218TN	WS 81218	GS 81218
	93	155	155	39	12	13.5	1.5	98	152	**89318M**		264.1	1 047.8	120.2	0.108	2 310	980	3.63	K89318M	WS 89318	GS 89318
	93	190	190	60	20	20	2.1	99	185	**89418M**		541.8	1 823.9	201.0	0.360	2 010	850	9.94	K89418M	WS 89418	GS 89418
100	102	135	135	25	11	7	1	104	131	**81120TN**		157.2	570.3	66.2	0.028	2 460	920	0.95	K81120TN	WS 81120	GS 81120
	103	150	150	38	15	11.5	1.1	107	142	**81220TN**		271.4	921.7	105.1	0.056	2 300	840	2.20	K81220TN	WS 81220	GS 81220
	103	170	170	42	13	14.5	1.5	107	167	**89320M**		302.6	1 219.9	135.9	0.150	2 090	910	4.56	K89320M	WS 89320	GS 89320
	103	210	210	67	22	22.5	3	111	205	**89420M**		680.7	2 372.2	253.6	0.627	1 810	720	13.4	K89420M	WS 89420	GS 89420
110	112	145	145	25	11	7	1	114	141	**81122TN**		162.9	619.1	70.2	0.031	2 260	850	1.40	K81122TN	WS 81122	GS 81122
	113	160	160	38	15	11.5	1.1	117	152	**81222TN**		257.4	890.6	99.2	0.068	2 130	860	2.29	K81222TN	WS 81222	GS 81222
	113	190	190	48	15	16.5	2	120	186	**89322M**		402.2	1 639.5	177.0	0.270	1 890	790	6.70	K89322M	WS 89322	GS 89322
	113	230	30	73	24	24.5	3	121	223	**89422M**		802.5	2 844.1	295.8	0.898	1 660	640	17.4	K89422M	WS 89422	GS 89422
120	122	155	155	25	11	7	1	124	151	**81124TN**		168.8	667.9	74.0	0.038	2 100	780	1.12	K81124TN	WS 81124	GS 81124
	123	170	170	39	15	12	1.1	127	162	**81224TN**		253.6	898.2	98.0	0.076	1 990	790	2.54	K81224TN	WS 81224	GS 81224
	123	210	210	54	17	18.5	2.1	130	206	**89324M**		509.3	2 093.3	219.7	0.450	1 710	690	9.44	K89324M	WS 89324	GS 89324
	123	250	250	78	26	26	4	133	243	**89424M**		934.7	3 358.7	340.5	1.217	1 520	580	21.9	K89424M	WS 89424	GS 89424
130	132	170	170	30	12	9	1	135	165	**81126TN**		199.6	801.5	86.5	0.049	1 930	760	1.67	K81126TN	WS 81126	GS 81126
	133	190	187	45	19	13	1.5	137	181	**81226TN**		379.1	1 296.6	137.3	0.170	1 800	710	3.98	K81226TN	WS 81226	GS 81226
	134	225	225	58	18	20	2.1	141	220	**89326M**		566.1	2 362.8	242.5	0.562	1 590	650	11.2	K89326M	WS 89326	GS 89326
	134	270	270	85	28	28.5	4	145	263	**89426M**		1 061.7	3 856.7	382.0	1.620	1 400	530	27.1	K89426M	WS 89426	GS 89426
140	142	180	178	31	12	9.5	1	145	175	**81128TN**		186.8	752.1	79.6	0.059	1 800	710	1.90	K81128TN	WS 81128	GS 81128
	143	200	197	46	19	13.5	1.5	147	191	**81228M**		360.0	1 241.6	129.1	0.162	1 700	730	5.70	K81228M	WS 81228	GS 81228
	144	240	240	60	19	20.5	2.1	152	235	**89328M**		649.8	2 780.9	279.7	0.769	1 490	570	13.2	K89328M	WS 89328	GS 89328
	144	280	280	85	28	28.5	4	155	273	**89428M**		1 105.1	4 164.2	406.5	1.843	1 340	490	29.8	K89428M	WS 89428	GS 89428
150	152	190	188	31	12	9.5	1	155	185	**81130TN**		213.6	917.7	95.4	0.067	1 700	660	2.20	K81130TN	WS 81130	GS 81130
	153	215	212	50	21	14.5	1.5	158	211	**81230M**		468.7	1 665.6	169.6	0.300	1 540	650	7.17	K81230M	WS 81230	GS 81230
	154	250	250	60	19	20.5	2.1	162	245	**89330M**		665.2	2 929.5	290.2	0.845	1 410	510	13.9	K89330M	WS 89330	GS 89330
	154	300	300	90	30	30	4	167	293	**89430M**		1 260.7	4804.8	459.4	2.509	1 240	445	35.4	K89430M	WS 89430	GS 89430
160	162	200	198	31	12	9.5	1	165	195	**81132TN**		215.5	948.6	97.0	0.085	1 600	670	2.12	K81132TN	WS 81132	GS 81132
	163	225	222	51	21	15	1.5	168	220	**81232M**		480.5	1 756.7	176.0	0.330	1 470	610	7.60	K81232M	WS 81232	GS 81232
	164	320	320	95	32	31.5	5	179	313	**89432M**		1 425.7	5 491.2	515.0	3.300	1 160	410	42.0	K89432M	WS 89432	GS 89432



Dimensions										Bearing designation		Basic load rating dynamic	static	Fatigue load limit		Limiting speed for lubrication with grease	oil	Mass of Bearings	Bearing component designation Cage with rollers	Shaft ring	Housing ring
d	D_1	D	d_1	H	D_w	B	r_{smin}	E_b	E_a			C_r	C_{or}	C_u							
mm												kN				min^{-1}		kg			
170	172	215	213	34	14	10	1.1	176	209	**81134TN**		285.2	1 242.9	124.5	0.110	1 500	570	2.41	K81134TN	WS 81134	GS 81134
	173	240	234	55	22	16.5	1.5	180	235	**81234M**		540.9	2 027.2	199.3	0.430	1 370	600	9.30	K81234M	WS 81234	GS 81234
	174	340	340	103	34	34.5	5	191	233	**89434M**		1 599.9	6 223.4	573.1	4.150	1 090	375	51.9	K89434M	WS 89434	GS 89434
180	183	225	222	34	14	10	1.1	185	219	**81136M**		266.5	1 174.3	115.9	0.130	1 420	590	3.30	K81136M	WS 81136	GS 81136
	183	250	247	56	22	17	1.5	190	245	**81236M**		552.5	2 127.2	206.2	0.470	1 310	580	9.90	K81236M	WS 81236	GS 81236
	184	184	360	109	36	36.5	5	200	351	**89436M**		1 767.0	6 918.9	626.3	5.100	1 040	360	60.0	K89436M	WS 89436	GS 89436
190	193	240	237	37	15	11	1.1	197	233	**81138M**		308.5	1 355.6	131.4	0.170	1 330	570	4.74	K81138M	WS 81138	GS 81138
	194	270	267	62	26	18	2	200	265	**81238M**		701.9	2 599.6	246.9	0.680	1 220	530	12.8	K81238M	WS 81238	GS 81238
	195	380	380	115	38	38.5	5	214	373	**89438M**		1 958.8	7 738.0	689.2	6.500	990	330	72.1	K89438M	WS 89438	GS 89438
200	203	250	247	37	15	11	1.1	206	243	**81140M**		312.6	1 402.6	134.1	0.190	1 270	530	4.95	K81140M	WS 81140	GS 81140
	204	280	277	62	26	18	2	210	275	**81240M**		720.8	2 737.9	256.7	0.790	1 170	485	14.2	K81240M	WS 81240	GS 81240
	205	400	400	122	40	41	5	226	393	**89440M**		2 159.7	8 602.9	754.6	8.000	940	315	82.6	K89440M	WS 89440	GS 89440
220	223	270	267	37	15	11	1.1	226	263	**81144M**		333.6	1 581.8	147.4	0.240	1 170	470	5.22	K81144M	WS 81144	GS 81144
	224	300	297	63	26	18.5	2	230	296	**81244M**		756.5	3 014.7	276.0	0.910	1 080	435	15.3	K81244M	WS 81244	GS 81244
	225	420	420	122	40	41	6	244	411	**89444M**		2 340.5	9 843.7	846.8	10.000	870	270	90.1	K89444M	WS 89444	GS 89444
240	243	300	297	45	18	13.5	1.5	248	296	**81148M**		478.3	2 270.1	205.5	0.500	1 050	440	8.45	K81148M	WS 81148	GS 81148
	244	340	335	78	32	23	2.1	261	335	**81248M**		1 098.7	4 321.6	382.9	1.900	960	395	26.2	K81248M	WS 81248	GS 81248
	245	440	440	122	40	41	6	266	433	**89448M**		2 407.4	10 510.3	887.9	12.000	830	250	95.9	K89448M	WS 89448	GS 89448
260	263	320	317	45	18	13.5	1.5	268	316	**81152M**		488.9	2 404.6	213.0	0.560	980	390	9.80	K81152M	WS 81152	GS 81152
	264	360	355	79	32	23.5	2.1	280	353	**81252M**		1 152.0	4 735.0	411.2	2.300	910	355	28.6	K81252M	WS 81252	GS 81252
	265	480	480	132	44	44	6	288	472	**89452M**		2 857.3	12 588.6	1 036.8	16.000	760	224	125.0	K89452M	WS 89452	GS 89452
280	283	350	347	53	22	15.5	4.5	288	346	**81156M**		689.1	3 306.3	285.7	1.100	900	345	12.6	K81156M	WS 81156	GS 81156
	284	380	375	80	32	24	2.1	300	373	**81256M**		1 170.9	4 958.7	422.6	2.400	850	335	31.0	K81256M	WS 81256	GS 81256
	285	520	520	145	48	48.5	6	311	512	**89456M**		3 377.4	13 194.7	1 061.6	19.000	700	199	159.0	K89456M	WS 89456	GS 89456
300	304	380	376	62	25	18.5	2	315	373	**81160M**		852.5	4 054.1	342.4	1.500	840	330	19.4	K81160M	WS 81160	GS 81160
	304	420	415	95	38	28.5	3	328	413	**81260M**		1 545.5	6 388.8	530.5	4.200	780	305	48.2	K81260M	WS 81260	GS 81260
	305	540	540	145	48	48.5	6	331	533	**89460M**		3 479.6	15 993.9	1 268.1	25.920	670	188	170.0	K89460M	WS 89460	GS 89460
320	324	400	396	63	25	19	2	334	394	**81164M**		876.8	4 311.5	358.0	1.900	790	290	20.7	K81164M	WS 81164	GS 81164



Insert bearings and Housing units

Insert bearings

Insert bearings

Insert bearings are single-row ball bearings with double seal on both sides. The outer ring has a spherical surface and can therefore tilt in the housing to compensate any misalignments between the shaft and the housing. The inner ring is wider than the outer ring and is mounted to the shaft using an eccentric adapter ring or screws.

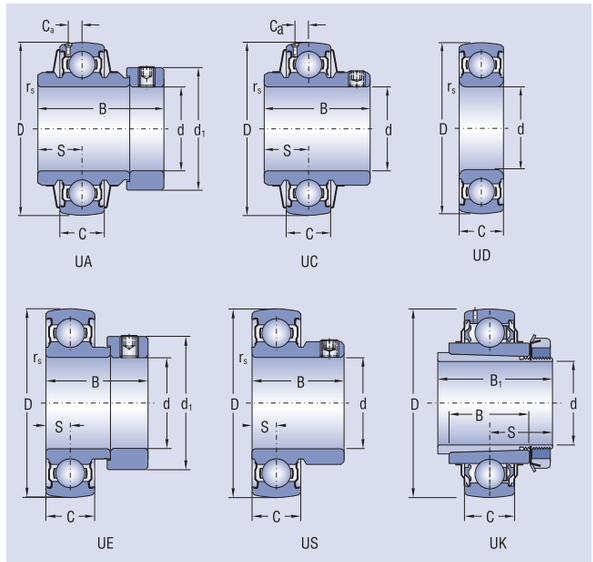
The bearings are filled with a high-quality plastic lubricant, whose properties ensure reliable lubrication, usually throughout the life of the bearing. If necessary, the bearings can be additionally lubricated using a lubrication head located on the housing.

Insert bearings are suitable for short shaft arrangements and for arrangements with small thermal dilatations, which are compensated by the axial clearance in the bearings or by the pliancy of the structure on which the bearing housings are mounted.

The maximum operating temperature is 100°C and the minimum operating temperature is -30°C.

Construction Design

Insert bearings are available in several designs, which cover different technical requirements. All insert bearings have a spherical surface of the outer ring and a seal that provides optimal protection against contamination, especially in a polluted operating environment.



UA Design

The UA design insert bearings have a prolonged inner ring on both sides. The design is similar to the UC bearing design. The only difference is the shaft mounting. The inner ring of the bearing is mounted on the shaft using an eccentric adapter ring, which is fixed to the shaft by screw(s). The UA design enables fast, efficient and easy mounting of bearings on the shaft and they are suitable for one-directional rotation.

UC Design

The UC design insert bearings have a prolonged inner ring on both sides, so a more effective seal can be used. Bearing units with these bearings have larger internal space for a larger quantity of plastic lubricant and hence extended servicing time, especially for operations in difficult conditions. Like the US design, the inner ring is fixed to the shaft with two screws. The UC design bearings can be additionally lubricated through the lubrication bores on the outer ring.

UE Design

The UA design insert bearings have a prolonged inner ring on one side and are mounted on the shaft using an eccentric adapter ring. These bearings are suitable for applications with one-directional rotation.

UD Design

The UD design insert bearings have the outer and inner ring of equal width.

US Design

The US design insert bearings have a prolonged inner ring on one side. These bearings are suitable for standard applications with changes in the direction of rotation. The inner ring is fixed to the shaft with two screws, which are placed at a 120° angle. This fixing guarantees fast, efficient and easy mounting of the bearing on the shaft.

UK Design

The UK design insert bearings have a prolonged inner ring on both sides and a tapered bore – conicity of 1:12. They are mounted on the shaft using an adapter sleeve. The designation of adapter sleeves belonging to the individual bearings with a tapered bore is given in the dimension tables. The UK design insert bearings have the ability to withstand heavy loads. Because they are mounted using adapter sleeves, they can be mounted on shafts of different diameters by replacing different types of adapter sleeves, which is more versatile than other types of insert bearings.

Boundary Dimensions

The boundary dimensions of insert bearings and eccentric adapter rings comply with the ISO 9628 international standard.

Designation

The designation of insert bearings with the basic design is given in the dimension tables.

Cages

Insert bearings have cages pressed from sheet steel, which are not designated.

Precision

Insert bearings are normally manufactured with normal precision grade P0 (the P0 mark is not designated). For special bearing arrangements, bearings are manufactured with higher precision grade P6 and P5. The supply of such bearings needs to be negotiated in advance.

Insert bearings have a uniform bore diameter tolerance – H6. This tolerance ensures a movable arrangement in each case when machining a shaft in the tolerance zone h. As a rule, it is sufficient to manufacture the shaft from drawn steel produced in tolerance h8 to h11. For higher loads and higher speeds, it is necessary to manufacture the shaft in tolerance h6 or h7.

Radial Clearance

Insert bearings have the C3 radial clearance, which is not designated and whose range corresponds to the range of radial clearances of single-row ball bearings of the same dimensions. The supply of bearings with a different range of radial clearance needs to be negotiated in advance.

Limiting Speed

The limiting speed that the insert bearings can achieve depends primarily on the arrangement on the shaft.

The following table shows the limiting speeds for the various shaft diameter tolerances.

Bore diameter	Limiting speed with a plastic lubricant for bearings of the UA, UE, UD and UC series with shaft tolerance				
d	h6	h7	h8	h9	h11
mm	min^{-1}				
17	9 500	6 000	4 300	1 500	950
20	8 500	5 300	3 800	1 300	850
25	7 000	4 500	3 200	1 000	700
30	6 300	4 000	2 800	900	630
35	5 300	3 400	2 200	750	530
40	4 800	3 000	1 900	670	480
45	4 300	2 600	1 700	600	430
50	4 000	2 400	1 600	560	400
55	3 600	2 000	1 400	500	360
60	3 400	1 900	1 300	480	340
65	3 000	1 700	1 100	430	300
70	2 800	1 600	1 000	400	280
80	2 400	1 400	900	360	240
90	2 000	1 200	800	320	200

Minimum Load

Insert bearings must be subjected to a certain minimum load to ensure reliable bearing function. The minimum load is 1% of the basic dynamic bearing capacity.

Radial and Static Equivalent Dynamic Load

Radial Equivalent Dynamic Load

The equivalent dynamic load of insert bearings is determined in the same way as for standard ball bearings:

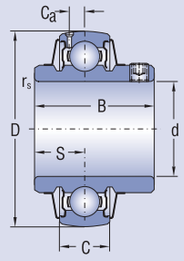
$P_r = F_r$ pre $F_a/F_r \leq e$

$P_r = 0{,}56.F_r + Y.F_a$ pre $F_a/F_r > e$

Radial Equivalent Static Load

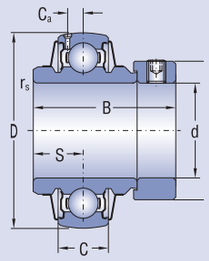
The following applies to the static load of insert bearings:

$P_{0r} = 0{,}6.F_r + 0{,}5.F_a$ pre $(P_{0r} \geq F_r)$



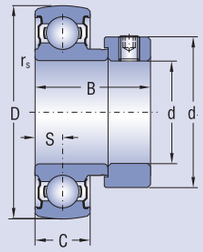
UC

Dimensions									Bearing designation		Set screw	Basic load rating dynamic	static	Weight	
d	D	d_1	B	s	C	C_1	r	G							
mm												kN		kg	
12	47	28.6	31	12.7	17	3.6	0.6	4.5	**UC201**		M6x1	12.8	6.7	0.21	
15	47	28.6	31	12.7	17	3.6	0.6	4.5	**UC202**		M6x1	12.8	6.7	0.19	
17	47	28.6	31	12.7	17	3.6	0.6	4.5	**UC203**		M6x1	12.8	6.7	0.18	
20	47	28.6	31	12.7	17	4	1	4.5	**UC204**		M6x1	12.8	6.7	0.16	
25	52	33.8	34.1	14.3	17	4.3	1	5.0	**UC205**		M6x1	14.0	7.9	0.22	
30	62	39.8	38.1	15.9	19	5	1	5	**UC206**		M6x1	19.5	11.3	0.35	
35	72	46.8	42.9	17.5	20	5.7	1.1	6	**UC207**		M8x1	25.7	15.2	0.52	
40	80	52.5	49.2	19	21	6.2	1.1	8	**UC208**		M8x1	32.0	17.8	0.70	
45	85	57.3	49.2	19	22	6.3	1.1	8	**UC209**		M8x1	32.7	20.2	0.74	
50	90	62.1	51.6	19	24	6.5	1.1	9	**UC210**		M10x1	35.1	23.2	0.83	
55	100	70.0	55.6	22.2	25	7.2	1.5	9	**UC211**		M10x1	43.3	29.2	1.15	
60	110	77.0	65.1	25.4	27	8.2	1.5	10	**UC212**		M10x1	47.8	32.8	1.15	
65	120	82.1	65.1	25.4	27	8	1.5	10	**UC213**		M10x1	57.2	40.1	1.96	
70	125	87.0	74.6	30.2	29	9	1.5	12	**UC214**		M12x1.5	60.8	40.5	2.18	
75	130	91.5	77.8	33.3	30	9	1.5	12	**UC215**		M12x1.5	66.8	49.5	2.42	
80	140	98.5	82.6	33.3	33	10.3	2	14	**UC216**		M12x1.5	71.5	54.2	2.82	
85	150	105.0	85.7	34.1	36	11	2	14	**UC217**		M12x1.5	83.5	63.8	3.40	
90	160	111.5	96	39.7	37	12	2	14	**UC218**		M12x1.5	95.8	71.5	4.30	



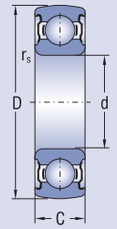
UA

Dimensions							Bearing designation	Set screw		Basic load rating dynamic	static	Weight	
d	D	C	C_1	s	B_1	k							
mm										kN		kg	
15	40	14	3.6	13.9	37.3	28.6	**UA202**	M6x1		12.8	6.7	0.22	
17	40	14	3.6	13.9	37.3	28.6	**UA203**	M6x1		12.8	6.7	0.20	
20	47	16	4	17.1	43.7	33.3	**UA204**	M6x1		12.8	6.7	0.22	
25	52	17	4.3	17.4	44.3	38.1	**UA205**	M6x1		14.0	7.9	0.25	
30	62	19	5	18.3	48.4	44.5	**UA206**	M8x1		19.5	11.3	0.41	
35	72	20	5.7	18.8	51.1	55.6	**UA207**	M8x1		25.7	15.2	0.60	
40	80	21	6.2	21.4	56.3	60.3	**UA208**	M8x1		32.0	17.8	0.78	
45	85	22	6.3	21.4	56.3	63.5	**UA209**	M8x1		32.7	20.2	0.85	
50	90	23	6.5	24.6	62.7	69.9	**UA210**	M8x1		35.1	23.2	1.01	
55	100	25	7.2	27.8	71.4	76.2	**UA211**	M10x1		43.3	29.2	1.39	
60	110	27	8.2	31	77.8	84.2	**UA212**	M10x1		47.8	32.8	1.87	
65	120	28	8	34.1	85.7	97	**UA213**	M10x1		57.2	40.1	2.41	
70	125	30	9	34.1	85.7	97	**UA214**	M10x1		60.8	40.5	2.57	
75	130	30	9	37.3	92.1	102	**UA215**	M12x1		66.8	49.5	2.85	
80	140	33	10.3	40.5	100	111.1	**UA216**	M12x1		71.5	54.2	3.12	



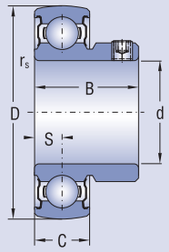
UE

Dimensions							Bearing designation		Basic load rating dynamic	static	Weight	
d	D	C	C_1	s	B_1	d_1						
mm									kN		kg	
12	40	12	3.6	6	28.6	28.6	**UE201**		9.6	4.6	0.14	
15	40	12	3.6	6	28.6	28.6	**UE202**		9.6	4.6	0.13	
17	40	12	3.6	6	28.6	28.6	**UE203**		9.6	4.6	0.12	
20	47	14	4	7.5	31	33.3	**UE204**		12.8	6.7	0.15	
25	52	15	4.3	7.5	31	38.1	**UE205**		14.0	7.9	0.19	
30	62	16	5	9	35.7	44.5	**UE206**		19.5	11.3	0.31	
35	72	17	5.7	9.5	38.9	55.6	**UE207**		25.7	15.2	0.50	
40	80	18	6.2	11	43.7	60.3	**UE208**		32.0	17.8	0.66	
45	85	19	6.3	11	43.7	63.5	**UE209**		32.7	20.2	0.73	
50	90	20	6.5	11	43.7	69.9	**UE210**		35.1	23.2	0.82	
55	100	21	7.2	12	48.4	76.2	**UE211**		43.3	29.2	0.87	
60	110	22	8.2	13.5	53.1	84.2	**UE212**		47.8	32.8	1.30	



UD

Dimensions			Bearing designation	Basic load rating		Weight	
				dynamic	static		
d	D	B					
mm				kN		kg	
12	32	10	**UD201**	12.8	6.7	0.04	
15	35	11	**UD202**	12.8	6.7	0.04	
17	40	12	**UD203**	12.8	6.7	0.06	
20	47	14	**UD204**	12.8	6.7	0.10	
25	52	15	**UD205**	14.0	7.9	0.13	
30	62	16	**UD206**	19.5	11.3	0.20	
35	72	17	**UD207**	25.7	15.2	0.29	
40	80	18	**UD208**	32.0	17.8	0.37	
45	85	19	**UD209**	32.7	20.2	0.46	
50	90	20	**UD210**	35.1	23.2	0.57	



US

Dimensions						Bearing designation		Basic load rating dynamic	static	Weight	
d	D	C	C_1	s	B_1						
mm								kN		kg	
12	40	12	3.6	6	22	**US201**		9.6	4.6	0.10	
15	40	12	3.6	6	22	**US202**		9.6	4.6	0.10	
17	40	12	3.6	6	22	**US203**		9.6	4.6	0.10	
20	47	14	4	7	25	**US204**		12.8	6.7	0.12	
25	52	15	4.3	7.5	27	**US205**		14.0	7.9	0.16	
30	62	16	5	8	30	**US206**		19.5	11.3	0.25	
35	72	17	5.7	8.5	32	**US207**		25.7	15.2	0.36	
40	80	18	6.2	9	34	**US208**		32.0	17.8	0.45	
45	85	19	6.3	10.2	41.2	**US209**		32.7	20.2	0.56	
50	90	20	6.5	10.9	43.5	**US210**		35.1	23.2	0.62	
55	100	21	7.2	11.8	45.3	**US211**		43.3	29.2	1.10	
60	110	22	8.2	14.9	53.7	**US212**		47.8	32.8	1.30	

Bearing units

Bearing units

I Bearing units are a combination of insert bearings and a bearing housing, which can be in different shapes. Bearing units are supplied pre-assembled. Bearings contain lubricant for longer life. If necessary, the units can be additionally lubricated. The threaded bore for mounting a lubricator is closed with a plastic plug. The lubricator is a part of the supply and is packaged separately.

Use

Bearing units are mainly used in agricultural machinery, transport equipment, food machinery, etc.

Misalignment

Bearing units are self-aligning due to the spherical shape of the seat and bearing. A bearing unit allows angular movement in all directions. This solution to some extent compensates the misalignment of the shaft.

Bearing Housings

Bearing housings include pillow block units (the P construction design), flanged units (the F construction design) and take-up units (the T construction design).

Bearing housings are made of grey cast iron as a standard. In special cases, a supply from another material may be arranged. All external surfaces of the bearing housing that are not machined are protected by paint. Functional machined surfaces are protected by an anti-corrosion protective layer, which is easily removable during mounting.

Boundary Dimensions of Bearing Housings

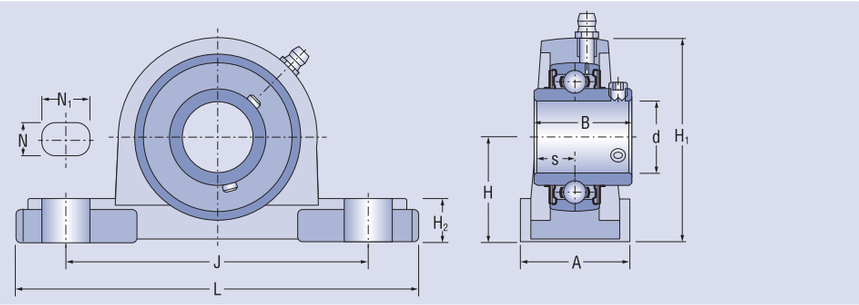
The boundary dimensions of bearing housings comply with ISO 3228.

Replaceability of Bearings

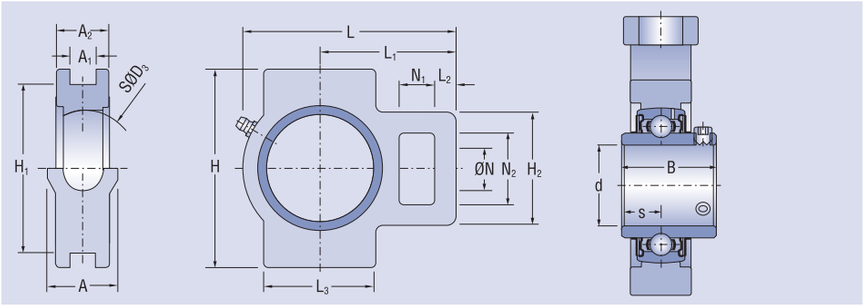
Insert bearings in the bearing unit are replaceable. In the event of a bearing malfunction, a new bearing can be mounted in the existing bearing housing.

Designation

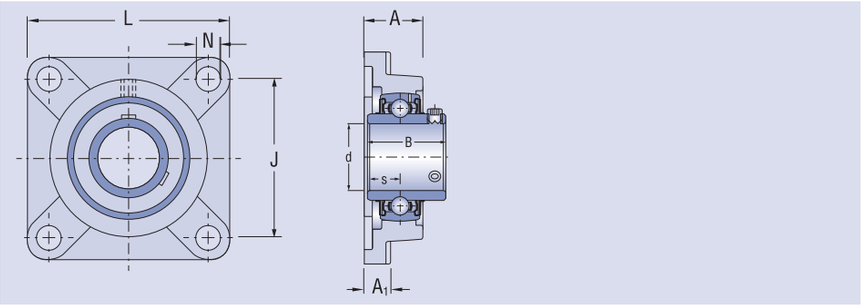
The designation of the bearing units is given in the table section, which also contains the designation of the respective bearing and bearing housing.



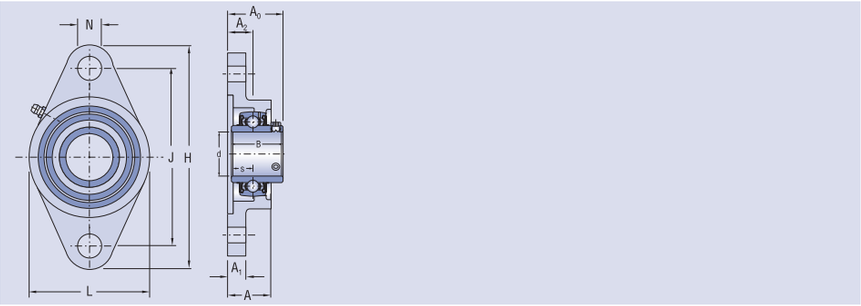
Dimensions											Bearing unit		Bolt size	Insert bearing	Housing	Weight	
d	L	J	A	N	N_1	H	**H_1**	**H_2**	B	S							
mm																kg	
12	127	95	38	13	19	30.2	62	14	31.0	12.7	**UCP201**		M10	UC201	P203	0.7	
15	127	95	38	13	19	30.2	62	14	31.0	12.7	**UCP202**		M10	UC202	P203	0.7	
17	127	95	38	13	19	30.2	62	14	31.0	12.7	**UCP203**		M10	UC203	P203	0.7	
20	127	95	38	13	19	33.3	65	14	31.0	12.7	**UCP204**		M10	UC204	P204	0.7	
25	140	105	38	13	19	36.5	70	15	34.1	14.3	**UCP205**		M10	UC205	P205	0.8	
30	165	121	48	17	21	42.9	83	17	38.1	15.9	**UCP206**		M12	UC206	P206	1.3	
35	167	127	48	17	21	47.6	92	18	42.9	17.5	**UCP207**		M12	UC207	P207	1.6	
40	184	137	54	17	21	49.2	98	18	49.2	19.0	**UCP208**		M12	UC208	P208	1.9	
45	190	146	54	17	21	54.0	106	20	49.2	19.0	**UCP209**		M12	UC209	P209	2.2	
50	206	159	60	20	25	57.2	112	21	51.6	19.0	**UCP210**		M16	UC210	P210	2.6	
55	219	171	60	20	25	63.5	126	22	55.6	22.2	**UCP211**		M16	UC211	P211	3.3	
60	241	184	70	20	25	69.8	137	25	65.1	25.4	**UCP212**		M16	UC212	P212	4.6	
65	265	203	70	25	29	76.2	150	27	65.1	25.4	**UCP213**		M20	UC213	P213	5.9	
70	266	210	72	25	30	79.4	156	27	74.6	30.2	**UCP214**		M20	UC214	P214	6.6	
75	275	217	74	25	30	82.6	163	28	77.8	33.3	**UCP215**		M20	UC215	P215	7.4	
80	292	232	78	25	30	88.9	175	30	82.6	33.3	**UCP216**		M20	UC216	P216	9.0	
85	310	247	83	25	30	95.2	187	32	85.7	34.1	**UCP217**		M20	UC217	P217	11.0	
90	327	262	88	27	33	101.6	200	34	96.0	39.7	**UCP218**		M22	UC218	P218	13.0	



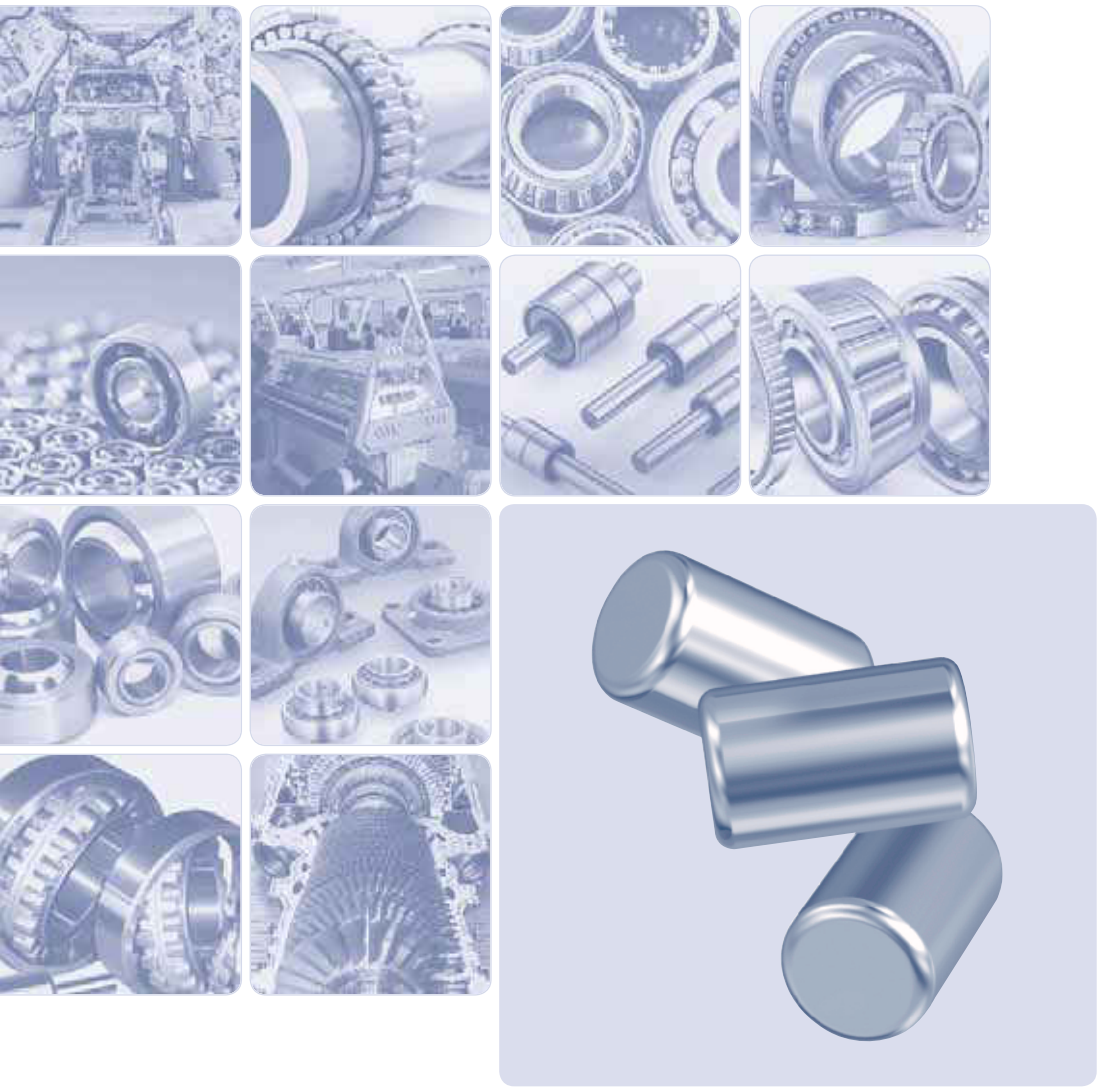
Dimensions																Bearing unit		Insert bearing	Housing	Weight	
d	B	s	L	L_1	L_2	L_3	H	H_1	H_2	A	A_1	A_2	N	N_1	N_2						
mm																				kg	
17	31.0	12.7	94	61	10	51	89	76	51	32	12	21	19	16	32	**UCT203**		UC203	T204	0.8	
20	31.0	12.7	94	61	10	51	89	76	51	32	12	21	19	16	32	**UCT204**		UC204	T204	0.8	
25	34.1	14.3	97	62	10	51	89	76	51	32	12	24	19	16	32	**UCT205**		UC205	T205	0.9	
30	38.1	15.9	113	70	10	57	102	89	56	37	12	28	22	16	37	**UCT206**		UC206	T206	1.3	
35	42.9	17.5	129	78	13	64	102	89	64	37	12	30	22	16	37	**UCT207**		UC207	T207	1.7	
40	49.2	19.0	144	88	16	83	114	102	83	49	16	33	29	19	49	**UCT208**		UC208	T208	2.3	
45	49.2	19.0	144	87	16	83	117	102	83	49	16	35	29	19	49	**UCT209**		UC209	T209	2.4	
50	51.6	19.0	149	90	16	86	117	102	83	49	16	37	29	19	49	**UCT210**		UC210	T210	2.5	
55	55.6	22.2	171	106	19	95	146	130	102	64	22	38	35	25	64	**UCT211**		UC211	T211	4.0	
60	65.1	25.4	194	119	19	102	146	130	102	64	22	42	35	32	64	**UCT212**		UC212	T212	4.9	
65	65.1	25.4	224	137	21	121	167	151	111	70	26	44	41	32	70	**UCT213**		UC213	T213	7.0	
70	74.6	30.2	224	137	21	121	167	151	111	70	26	46	41	32	70	**UCT214**		UC214	T214	7.1	
75	77.8	33.3	232	140	21	121	167	151	111	70	26	48	41	32	70	**UCT215**		UC215	T215	7.5	
80	82.6	33.3	235	140	21	121	184	165	111	70	26	51	41	32	70	**UCT216**		UC216	T216	8.2	
85	85.7	34.1	260	162	29	157	198	173	124	73	30	54	48	38	73	**UCT217**		UC217	T217	11.0	



Dimensions								Bearing unit		Bolt size	Insert bearing	Housing	Weight	
d	L	J	B	A	A_1	N	S							
				mm									kg	
17	86	64	31.0	33.3	12	12	12.7	**UCF203**		M10	UC203	F204	0.6	
20	86	64	31.0	33.3	12	12	12.7	**UCF204**		M10	UC204	F204	0.7	
25	95	70	34.1	35.8	14	12	14.3	**UCF205**		M10	UC205	F205	0.9	
30	108	83	38.1	40.2	14	12	15.9	**UCF206**		M10	UC206	F206	1.1	
35	117	92	42.9	44.4	16	14	17.5	**UCF207**		M12	UC207	F207	1.5	
40	130	102	49.2	51.2	16	16	19.0	**UCF208**		M14	UC208	F208	1.9	
45	137	105	49.2	52.2	18	16	19.0	**UCF209**		M14	UC209	F209	2.3	
50	143	111	51.6	54.6	18	16	19.0	**UCF210**		M16	UC210	F210	2.7	
55	162	130	55.6	58.4	20	19	22.2	**UCF211**		M16	UC211	F211	3.9	
60	175	143	65.1	68.7	20	19	25.4	**UCF212**		M16	UC212	F212	4.7	
65	187	149	65.1	69.7	22	19	25.4	**UCF213**		M16	UC213	F213	5.7	
70	193	152	74.6	75.4	22	19	30.2	**UCF214**		M16	UC214	F214	6.1	
75	200	159	77.8	78.5	22	19	33.3	**UCF215**		M16	UC215	F215	6.9	
80	208	165	82.6	83.3	22	23	33.3	**UCF216**		M20	UC216	F216	8.1	
85	220	175	85.7	87.6	24	23	34.1	**UCF217**		M20	UC217	F217	9.3	
90	235	187	96.0	96.3	24	23	39.7	**UCF218**		M20	UC218	F218	11.0	



Dimensions										Bearing unit		Bolt size	Insert bearing	Housing	Weight	
d	H	J	L	A	A_1	A_2	A_0	N	s							
mm															kg	
12	113	90	60	25.5	12	15	33.3	12	12.7	**UCFL201**		M10	UC201	FL204	0.5	
15	113	90	60	25.5	12	15	33.3	12	12.7	**UCFL202**		M10	UC202	FL204	0.5	
17	113	90	60	25.5	12	15	33.3	12	12.7	**UCFL203**		M10	UC203	FL204	0.5	
20	113	90	60	25.5	12	15	33.3	12	12.7	**UCFL204**		M10	UC204	FL204	0.5	
25	130	99	68	27.0	14	16	35.8	16	14.3	**UCFL205**		M14	UC205	FL205	0.6	
30	148	117	80	31.0	14	18	40.2	16	15.9	**UCFL206**		M14	UC206	FL206	0.9	
35	161	130	90	34.0	16	19	44.4	16	17.5	**UCFL207**		M14	UC207	FL207	1.2	
40	175	144	100	36.0	16	21	51.2	16	19.0	**UCFL208**		M14	UC208	FL208	1.5	
45	188	148	108	38.0	18	22	52.2	19	19.0	**UCFL209**		M16	UC209	FL209	1.9	
50	197	157	115	40.0	18	22	54.6	19	19.0	**UCFL210**		M16	UC210	FL210	2.2	
55	224	184	130	43.0	18	25	58.4	18	22.2	**UCFL211**		M16	UC211	FL211	3.1	
60	250	202	140	48.0	18	29	68.7	18	25.4	**UCFL212**		M16	UC212	FL212	4.0	
65	258	210	155	50.0	20	30	69.7	23	25.4	**UCFL213**		M20	UC213	FL213	5.0	
70	265	216	160	54.0	20	31	75.4	23	30.2	**UCFL214**		M20	UC214	FL214	5.6	
75	275	225	164	55.0	22	34	78.5	23	33.3	**UCFL215**		M20	UC215	FL215	6.0	
80	290	233	180	58.0	22	34	83.3	25	33.3	**UCFL216**		M22	UC216	FL216	7.8	
85	305	248	190	63.0	22	36	87.6	25	34.1	**UCFL217**		M22	UC217	FL217	9.8	
90	320	265	205	68.0	23	40	96.3	25	39.7	**UCFL218**		M22	UC218	FL218	12.4	



Accessories

Accessories

The term “accessories” involve standardized machine components used for locking the rolling bearings on the shaft or in the housing bore. These are: adapter and withdrawal sleeves, locknuts and withdrawal nuts and locking washers.

The adapter sleeves are the most common type used and their mounting is simpler than that of the withdrawal sleeves. The bearings using withdrawal sleeves must be supported by a firm part for ex. shoulder. The withdrawal sleeves have to be locked in place by means of a locknut or end plate.

Adapter sleeves

The adapter sleeves are used for locking the double row self-aligning ball bearings and double row spherical-roller bearings with a taper bore (K) onto the cylindrical shaft. These sleeves make the mounting and dismounting of the bearing much easier and simplify the seating construction.

The adapter sleeves are delivered as a set, including locknut and locking washer.

The designation of the adapter sleeves including nuts and locking devices is indicated in the dimension tables. The boundary dimensions of adapter sleeves correspond to the norm ISO 2982-1.

The adapter sleeves corresponding to the respective bearings with tapered bore are indicated in the dimension tables of double row self-aligning ball bearings and double row spherical-roller bearings.

Withdrawal Sleeves

Withdrawal sleeves are used for locking of the double row spherical-roller bearings with a tapered bore (K) on the cylindrical shafts.

The designation of the withdrawal sleeves including nuts and locking devices is indicated in the dimensions tables. The boundary dimensions of adapter sleeves correspond to the norm ISO 2982-1.

The withdrawal sleeves corresponding to the respective bearings with tapered bore are indicated in the dimension tables of double row spherical--roller bearings.

The nuts for withdrawal are not included and must be ordered separately.

Locknuts and Withdrawal Nuts

The round locknuts are used for locking the inner ring of the bearing on the adapter sleeve or directly on the shaft. The withdrawal nuts are applied for dismounting of double row spherical-roller bearings with a tapered bore secured by a withdrawal sleeve.

The designation of the locknuts and withdrawal nuts is indicated in the dimensions tables.

The boundary dimensions of locknuts and withdrawal nuts correspond to the norm ISO 2982-2.

Locking Washer

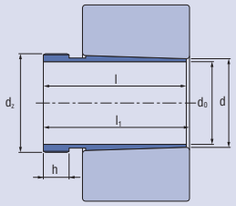
The locking washers are used for locking the locknuts. The designation of the locking washers is indicated in the dimensions tables.

The boundary dimensions of locking washers correspond to the norm ISO 2982-2.

Dimensions						Designation	Mass	The relevant parts	
								Nuts	Washers
d_0	d	d_z	D	l	a				
mm							kg		
14	17	M17x1	28	20	6	**H203**	0.030	KM3	MB3
17	20	M20x1	32	24	7	**H204**	0.036	KM4	MB4
	20	M20x1	32	28	7	**H304**	0.045	KM4	MB4
20	25	M25x1.5	38	26	8	**H205**	0.064	KM5	MB5
	25	M25x1.5	38	29	8	**H305**	0.071	KM5	MB5
	25	M25x1.5	38	35	8	**H2305**	0.085	KM5	MB5
25	30	M30x1.5	45	27	8	**H206**	0.086	KM6	MB6
	30	M30x1.5	45	31	8	**H306**	0.095	KM6	MB6
	30	M30x1.5	45	38	8	**H2306**	0.11	KM6	MB6
30	35	M35x1.5	52	29	9	**H207**	0.12	KM7	MB7
	35	M35x1.5	52	35	9	**H307**	0.14	KM7	MB7
	35	M35x1.5	52	43	9	**H2307**	0.16	KM7	MB7
35	40	M40x1.5	58	31	10	**H208**	0.17	KM8	MB8
	40	M40x1.5	58	36	10	**H308**	0.19	KM8	MB8
	40	M40x1.5	58	46	10	**H2308**	0.22	KM8	MB8
40	45	M45x1.5	65	33	11	**H209**	0.22	KM9	MB9
	45	M45x1.5	65	39	11	**H309**	0.25	KM9	MB9
	45	M45x1.5	65	50	11	**H2309**	0.28	KM9	MB9
45	50	M50x1.5	70	35	12	**H210**	0.26	KM10	MB10
	50	M50x1.5	70	42	12	**H310**	0.28	KM10	MB10
	50	M50x1.5	70	55	12	**H2310**	0.35	KM10	MB10
50	55	M55x2	75	37	12	**H211**	0.28	KM11	MB11
	55	M55x2	75	45	12	**H311**	0.32	KM11	MB11
	55	M55x2	75	59	12	**H2311**	0.39	KM11	MB11
55	60	M60x2	80	38	13	**H212**	0.32	KM12	MB12
	60	M60x2	80	47	13	**H312**	0.37	KM12	MB12
	60	M60x2	80	62	13	**H2312**	0.45	KM12	MB12
60	65	M65x2	85	40	14	**H213**	0.36	KM13	MB13
	65	M65x2	85	50	14	**H313**	0.42	KM13	MB13
	65	M65x2	85	65	14	**H2313**	0.52	KM13	MB13
60	70	M70x2	92	41	14	**H214**	0.55	KM14	MB14
	70	M70x2	92	52	14	**H314**	0.67	KM14	MB14
	70	M70x2	92	68	14	**H2314**	0.88	KM14	MB14
65	75	M75x2	98	43	15	**H215**	0.66	KM15	MB15
	75	M75x2	98	55	15	**H315**	0.78	KM15	MB15
	75	M75x2	98	73	15	**H2315**	1.08	KM15	MB15
70	80	M80x2	105	46	17	**H216**	0.83	KM16	MB16
	80	M80x2	105	59	17	**H316**	0.96	KM16	MB16
	80	M80x2	105	78	17	**H2316**	1.22	KM16	MB16

Dimensions						Designation	Mass	The relevant parts	
								Nuts	Washers
d_0	d	d_z	D	l	a				
mm							kg		
75	85	M85x2	110	50	18	**H217**	0.95	KM17	MB17
	85	M85x2	110	63	18	**H317**	1.12	KM17	MB17
	85	M85x2	110	82	18	**H2317**	1.28	KM17	MB17
80	90	M90x2	120	52	18	**H218**	1.12	KM18	MB18
	90	M90x2	120	65	18	**H318**	1.26	KM18	MB18
	90	M90x2	120	86	18	**H2318**	1.63	KM18	KM18
85	95	M95x2	125	55	19	**H219**	1.25	KM19	MB19
	95	M95x2	125	68	19	**H319**	1.46	KM19	MB19
	95	M95x2	125	90	19	**H2319**	1.82	KM19	MB19
90	100	M100x2	130	58	20	**H220**	1.43	KM20	MB20
	100	M100x2	130	71	20	**H320**	1.65	KM20	MB20
	100	M100x2	130	76	20	**H3120**	1.82	KM20	MB20
	100	M100x2	130	97	20	**H2320**	2.08	KM20	MB20
100	110	M110x2	145	77	21	**H322**	2.11	KM22	MB22
	110	M110x2	145	81	21	**H3122**	2.37	KM22	MB22
	110	M110x2	145	105	21	**H2322**	2.75	KM22	MB22
110	120	M120x2	145	72	22	**H3024**	1.89	KML24	MBL24
	120	M120x2	155	88	22	**H3124**	2.55	KM24	MB24
	120	M120x2	155	112	22	**H2324**	3.10	KM24	MB24
115	130	M130x2	155	80	23	**H3026**	2.85	KML26	MBL26
	130	M130x2	165	92	23	**H3126**	3.56	KM26	MB26
	130	M130x2	165	121	23	**H2326**	4.58	KM26	MB26
125	140	M140x2	165	82	24	**H3028**	3.09	KML28	MBL28
	140	M140x2	180	97	24	**H3128**	4.18	KM28	MB28
	140	M140x2	180	131	24	**H2328**	5.47	KM28	MB28
135	150	M150x2	180	87	26	**H3030**	3.82	KML30	MBL30
	150	M150x2	195	111	26	**H3130**	5.40	KM30	MB30
	150	M150x2	195	139	26	**H2330**	6.51	KM30	MB30
140	160	M160x3	190	93	28	**H3032**	5.13	KML32	MBL32
	160	M160x3	210	119	28	**H3132**	7.43	KM32	MB32
	160	M160x3	210	147	28	**H2332**	8.92	KM32	MB32
150	170	M170x3	200	101	29	**H3034**	5.88	KML34	MBL34
	170	M170x3	220	122	29	**H3134**	8.22	KM34	MB34
	170	M170x3	220	154	29	**H2334**	10.05	KM34	MB34
160	180	M180x3	210	109	30	**H3036**	6.75	KML36	MBL36
	180	M180x3	230	131	30	**H3136**	9.32	KM36	MB36
	180	M180x3	230	161	30	**H2326**	11.13	KM36	MB36
170	190	M190x3	220	112	31	**H3038**	7.35	KML38	MBL38
	190	M190x3	240	141	31	**H3138**	10.67	KM38	MB38
	190	M190x3	240	169	31	**H2338**	12.28	KM38	MB38

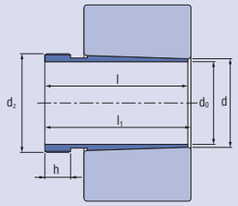
Dimensions						Designation	Mass	The relevant parts	
								Nuts	Washers
d_0	d	d_z	D	l	a				
mm							kg		
180	200	M200x3	240	120	32	**H3040**	9.04	KML40	MBL40
	200	M200x3	250	150	32	**H3140**	12.03	KM40	MB40
	200	M200x3	250	176	32	**H2340**	13.72	KM40	MB40
200	220	M220x4	260	126	30	**H3044**	9.90	HML44	MBL44
	220	M220x4	280	161	35	**H3144**	15.00	HM44	MB44
	220	M220x4	280	186	35	**H2344**	17.00	HM44	MB44
220	240	M240x4	290	133	34	**H3048**	12.00	HML48	MBL48
	240	M240x4	300	172	37	**H3148**	16.00	HM48	MB48
	240	M240x4	300	199	37	**H2348**	19.00	HM48	MB48
240	260	Tr260x4	310	145	34	**H3052**	13.05	HML52	MBL52
	260	Tr260x4	330	190	39	**H3152**	21.00	HM52	MB52
	260	Tr260x4	330	211	39	**H2352**	23.00	HM52	MB52
260	280	Tr280x4	330	152	38	**H3056**	16.00	HML56	MBL56
	280	Tr280x4	350	195	41	**H3156**	23.00	HM56	MB56
	200	Tr280x4	350	224	41	**H2356**	27.00	HM56	MB56
280	300	Tr300x4	360	168	42	**H3060**	20.50	HML60	MSL60
	300	Tr300x4	380	208	40	**H3160**	29.00	HM60	MS60
	300	Tr300x4	380	240	40	**H2360**	32.00	HM60	MS60
300	320	Tr320x5	380	171	42	**H3064**	22.00	HML64	MSL64
	320	Tr320x5	400	226	42	**H3164**	32.00	HM64	MS64
	320	Tr320x5	400	258	42	**H3264**	35.00	HM64	MS64
320	340	Tr340x5	400	187	45	**H3068**	27.00	HML68	MSL68
	340	Tr340x5	440	254	55	**H3168**	50.00	HM68	MS68
	340	Tr340x5	440	288	72	**H3268**	51.50	HM68	MS68
340	360	Tr360x5	420	188	45	**H3072**	29.00	HML72	MSL72
	360	Tr360x5	460	259	58	**H3172**	56.00	HM72	MS72
	360	Tr360x5	460	299	75	**H3272**	60.50	HM72	MS72
360	380	Tr380x5	450	193	48	**H3076**	35.50	HML76	MSL76
	380	Tr380x5	490	264	60	**H3176**	61.50	HM76	MS76
	380	Tr380x5	490	310	60	**H3276**	69.50	HM76	MS76
380	400	Tr400x5	470	210	52	**H3080**	40.00	HML80	MSL80
	400	Tr400x5	520	272	62	**H3180**	73.00	HM80	MS80
	400	Tr400x5	520	328	62	**H3280**	81.00	HM80	MS80



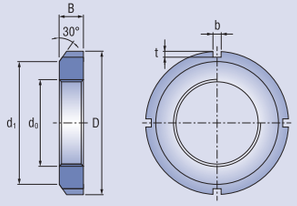
Dimensions						Designation	Mass	The relevant parts	
								Nuts	
d_0	d	d_z	l	l_1	h				
mm							kg		
35	40	M45x1.5	29	32	6	**AH308**	0.093	KM9	
	40	M45x1.5	40	43	7	**AH2308**	0.129	KM9	
40	45	M50x1.5	31	34	6	**AH309**	0.12	KM10	
	45	M50x1.5	44	47	7	**AH2309**	0.16	KM10	
45	50	M55x2	35	38	7	**AHX310**	0.132	KM11	
	50	M55x2	50	53	9	**AHX2310**	0.190	KM11	
50	55	M60x2	37	40	7	**AHX311**	0.168	KM12	
	55	M60x2	54	57	10	**AHX2311**	0.257	KM12	
55	60	M65x2	40	43	8	**AHX312**	0.194	KM13	
	60	M65x2	58	61	11	**AHX2312**	0.298	KM13	
60	65	M70x2	42	45	8	**AH313**	0.20	KM14	
	65	M70x2	61	64	12	**AH2313**	0.36	KM14	
65	70	M75x2	43	47	8	**AH314**	0.25	KM15	
	70	M75x2	64	68	12	**AHX2314**	0.47	KM15	
70	75	M80x2	45	49	8	**AH315**	0.30	KM16	
	75	M80x2	68	72	12	**AHX2315**	0.48	KM16	
75	80	M90x2	48	52	8	**AH316**	0.37	KM18	
	80	M90x2	71	75	12	**AHX2316**	0.58	KM18	
80	85	M95x2	52	56	9	**AHX317**	0.44	KM19	
	85	M95x2	74	78	13	**AHX2317**	0.66	KM19	
85	90	M100x2	53	57	9	**AHX318**	0.47	KM20	
	90	M100x2	63	67	10	**AHX3218**	0.58	KM20	
	90	M100x2	79	83	14	**AHX2318**	0.77	KM20	
90	95	M105x2	57	61	10	**AHX319**	0.54	KM21	
	95	M105x2	85	89	16	**AHX2319**	0.90	KM21	
95	100	M110x2	59	63	10	**AHX320**	0.59	KM22	
	100	M105x2	62	71	12	**AH24020**	0.50	KM21	
	100	M110x2	64	68	11	**AHX3120**	0.67	KM22	
	100	M110x2	73	77	11	**AHX3220**	0.77	KM22	
	100	M110x2	90	94	16	**AHX2320**	1.02	KM22	
105	110	M120x2	63	67	12	**AHX322**	0.75	KM24	
	110	M120x2	68	72	11	**AHX3122**	0.77	KM24	
	110	M120x2	82	86	11	**AHX3222**	0.98	KM24	
	110	M115x2	82	91	13	**AH24122**	0.71	KM23	
	110	M110x2	98	102	16	**AHX2322**	1.38	KM24	
115	120	M130x2	60	64	13	**AHX3024**	0.75	KM26	
	120	M125x2	73	82	13	**AH24024**	0.71	KM25	
	120	M130x2	75	79	12	**AHX3124**	0.95	KM26	
	120	M130x2	90	94	13	**AHX3224**	1.26	KM26	
	120	M130x2	93	102	13	**AH24124**	1.01	KM26	
	120	M130x2	105	109	17	**AHX2324**	1.58	KM26	

Dimensions						Designation	Mass	The relevant parts Nuts	
d_0	d	d_z	l	l_1	h				
mm							kg		
125	130	M140x2	67	71	14	**AHX3026**	0.92	KM28	
	130	M140x2	78	82	12	**AHX3126**	1.10	KM28	
	130	M135x2	83	93	14	**AH24026**	0.88	KM27	
	130	M140x2	94	104	14	**AH24126**	1.14	KM28	
	130	M145x2	98	102	15	**AHX3226**	1.52	KM29	
	130	M145x2	115	119	19	**AHX2326**	1.95	KM29	
135	140	M150x2	77	82	14	**AHX3028**	1.12	KM30	
	140	M150x2	83	88	14	**AHX3128**	1.29	KM30	
	140	M145x2	83	93	14	**AH24028**	0.95	KM29	
	140	M150x2	99	109	14	**AH24128**	1.29	KM30	
	140	M155x2	104	109	15	**AHX3228**	1.85	KM31	
	140	M155x2	125	130	20	**AHX2328**	2.37	KM31	
145	150	M160x3	72	77	15	**AHX3030**	1.16	KM32	
	150	M155x2	90	101	15	**AH24030**	1.08	KM31	
	150	M165x3	96	101	15	**AHX3130**	1.70	KM33	
	150	M165x3	114	119	17	**AHX3230**	2.10	KM33	
	150	M160x3	115	126	15	**AHX24130**	1.55	KM32	
	150	M165x3	135	140	24	**AHX2330**	2.75	KM33	
150	160	M170x3	77	82	16	**AH3032**	2.05	KM34	
	160	M170x3	95	106	15	**AH24032**	2.31	KM34	
	160	M180x3	103	108	16	**AH3132**	2.97	KM36	
	160	M180x3	124	130	20	**AH3232**	3.65	KM36	
	160	M170x3	124	135	15	**AH24132**	3.00	KM34	
	160	M180x3	140	146	24	**AH2332**	4.35	KM36	
160	170	M180x3	85	90	17	**AH3034**	2.46	KM36	
	170	M190x3	104	109	16	**AH3134**	3.45	KM38	
	170	M180x3	106	117	16	**AH24034**	2.73	KM36	
	170	M180x3	125	136	16	**AH24134**	3.26	KM36	
	170	M190x3	134	140	24	**AH3234**	4.81	KM38	
	170	M190x3	146	152	24	**AH2334**	5.28	KM38	
170	180	M190x3	92	98	17	**AH3036**	2.83	KM38	
	180	M200x3	105	110	17	**AH2236**	3.74	KM40	
	180	M200x3	116	122	19	**AH3136**	3.81	KM40	
	180	M190x3	116	127	16	**AH24036**	3.21	KM38	
	180	M190x3	134	145	16	**AH24136**	3.74	KM38	
	180	M200x3	140	146	24	**AH3236**	5.28	KM40	
	180	M200x3	154	160	26	**AH2326**	6.04	KM40	

Dimensions						Designation	Mass	The relevant parts Nuts	
d_0	d	d_z	l	l_1	h				
mm							kg		
180	190	Tr205x4	96	102	18	**AH3038**	3.35	HML41T	
	190	Tr210x4	112	117	18	**AH2238**	4.24	HM42T	
	190	M200x3	118	131	18	**AH24038**	3.51	KM40	
	190	Tr210x4	125	131	20	**AH3138**	4.45	HM42T	
	190	Tr210x4	145	152	25	**AH3238**	5.40	HM42T	
	190	M200x3	146	159	18	**AH24138**	4.42	KM40	
	190	Tr210x4	160	167	26	**AH2338**	6.20	HM42T	
190	200	Tr215x4	102	108	19	**AH3040**	3.77	HML43T	
	200	Tr220x4	118	123	19	**AH2240**	4.70	HM44T	
	200	Tr210x4	127	140	18	**AH24040**	3.98	HM42T	
	200	Tr220x4	134	140	21	**AH3140**	5.63	HM44T	
	200	Tr220x4	153	160	25	**AH3240**	6.61	HM44T	
	200	Tr210x4	158	171	18	**AH24140**	5.03	HM42T	
	200	Tr220x4	170	177	30	**AH2340**	7.62	HM44T	
200	220	Tr230x4	111	117	20	**AH3044**	7.40	HML47T	
	220	Tr240x4	130	136	20	**AH2244**	9.20	HM48T	
	220	Tr230x4	138	152	20	**AOH24044**	7.45	HM46T	
	220	Tr240x4	145	151	23	**AH3144**	9.30	HM48T	
	220	Tr230x4	170	184	20	**AOH24144**	10.00	HM46T	
	220	Tr240x4	181	189	30	**AH2344**	13.50	HM48T	
220	240	Tr260x4	116	123	21	**AH3048**	7.95	HM52T	
	240	Tr250x4	138	153	20	**AOH24048**	8.05	HM50T	
	240	Tr260x4	144	150	21	**AH2248**	11.10	HM52T	
	240	Tr260x4	154	161	25	**AH3148**	12.00	HM52T	
	240	Tr260x4	180	195	20	**AOH24148**	11.50	HM52T	
	240	Tr260x4	189	197	30	**AH2348**	14.00	HM52T	
240	260	Tr280x4	128	135	23	**AH3052**	9.60	HM56T	
	260	Tr290x4	155	161	23	**AH2252**	12.50	HM58T	
	260	Tr270x4	162	178	22	**AOH24052**	10.50	HM56T	
	260	Tr290x4	172	179	26	**AH3152**	16.00	HM58T	
	260	Tr280x4	202	218	22	**AOH24152**	14.00	HM56T	
	260	Tr290x4	205	213	30	**AH2352**	17.50	HM58T	
260	280	Tr300x4	131	139	24	**AH3056**	11.00	HM3060	
	280	Tr300x4	155	163	24	**AH2256**	15.00	HM62T	
	280	Tr300x4	162	179	22	**AOH24056**	13.50	HM58T	
	280	Tr300x4	175	183	28	**AH3156**	17.00	HM62T	
	280	Tr300x4	202	219	22	**AOH24156**	15.00	HM3160	
	280	Tr300x4	212	220	30	**AH2356**	21.50	HM62T	

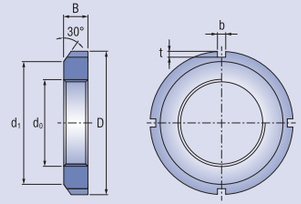


Dimensions						Designation	Mass	The relevant parts Nuts	
d_0	d	d_z	l	l_1	h				
mm							kg		
280	300	Tr320x5	145	153	26	**AH3060**	13.00	HM3064	
	300	Tr330x5	170	178	26	**AH2260**	18.00	HM66T	
	300	Tr310x5	184	202	24	**AOH24060**	14.00	HM62T	
	300	Tr330x5	192	200	30	**AH3160**	19.00	HM66T	
	300	Tr330x5	228	236	34	**AH3260**	23.50	HM66T	
	300	Tr320x5	224	242	24	**AOH24160**	18.50	HM3164	
300	320	Tr340x5	149	157	27	**AH3064**	16.50	HML69T	
	320	Tr340x5	180	190	27	**AH2264**	20.00	HM70T	
	320	Tr340x5	184	202	24	**AOH24064**	18.00	HM66T	
	320	Tr340x5	209	217	31	**AH3164**	24.50	HM70T	
	320	Tr340x5	246	254	36	**AH3264**	27.50	HM70T	
	320	Tr340x5	242	260	24	**AOH24164**	20.50	HM3168	
320	340	Tr365x5	162	171	28	**AH3068**	17.50	HML73T	
	340	Tr360x5	206	225	26	**AOH24068**	18.00	HM3072	
	340	Tr370x5	225	234	33	**AH3168**	26.50	HM74T	
	340	Tr370x5	264	273	38	**AH3268**	32.00	HM74T	
	340	Tr360x5	269	288	26	**AOH24168**	25.50	HM3172	
340	360	Tr385x5	167	176	30	**AH3072**	19.00	HML77T	
	360	Tr380x5	206	226	26	**AOH24072**	20.00	HM76T	
	360	Tr400x5	229	238	35	**AH3172**	30.00	HM3180	
	360	Tr400x5	274	283	40	**AH3272**	33.00	HM3180	
	360	Tr380x5	269	289	26	**AOH24172**	26.00	HM3176	
360	380	Tr400x5	170	180	31	**AH3076**	22.50	HML82T	
	380	Tr400x5	208	228	28	**AOH24076**	23.50	HM3080	
	380	Tr400x5	232	242	36	**AH3176**	33.00	HM3184	
	380	Tr400x5	284	294	42	**AH3276**	42.00	HM3184	
	380	Tr400x5	271	291	28	**AOH24176**	31.00	HM3180	
380	400	Tr430x5	183	193	33	**AH3080**	27.00	HML86T	
	400	Tr420x5	228	248	28	**AOH24080**	27.00	HM3084	
	400	Tr440x5	240	250	38	**AH3180**	39.50	HM3188	
	400	Tr440x5	303	312	44	**AH3280**	51.50	HM3188	
	400	Tr420x5	278	298	28	**AOH24180**	35.00	HM3184	



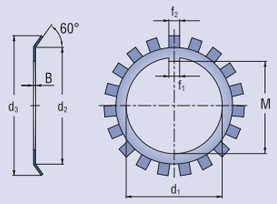
Dimensions						Designation	Mass	Relevant part-washer	
d_0	d	d_z	D	l	a				
mm							kg		
M17x1	24	28	5	4	2	**KM3**	0.012	MB3	
M20x1	26	32	6	4	2	**KM4**	0.020	MB4	
M25x1.5	32	38	7	5	2	**KM5**	0.028	MB5	
M30x1.5	38	45	7	5	2	**KM6**	0.038	MB6	
M35x1.5	44	52	8	5	2	**KM7**	0.058	MB7	
M40x1.5	50	58	9	6	2.5	**KM8**	0.078	MB8	
M45x1.5	56	65	10	6	2.5	**KM9**	0.11	MB9	
M50x1.5	61	70	11	6	2.5	**KM10**	0.14	MB10	
M55x2	67	75	11	7	3	**KM11**	0.15	MB11	
M60x2	73	80	11	7	3	**KM12**	0.16	MB12	
M65x2	79	85	12	7	3	**KM13**	0.19	MB13	
M70x2	85	92	12	8	3.5	**KM14**	0.22	MB14	
M75x2	90	98	13	8	3.5	**KM15**	0.27	MB15	
M80x2	95	105	15	8	3.5	**KM16**	0.36	MB16	
M85x2	102	110	16	8	3.5	**KM17**	0.42	MB17	
M90x2	108	120	16	10	4	**KM18**	0.51	MB18	
M95x2	113	125	17	10	4	**KM19**	0.58	MB19	
M100x2	120	130	18	10	4	**KM20**	0.68	MB20	
M105x2	126	140	18	12	5	**KM21**	0.81	MB21	
M110x2	133	145	19	12	5	**KM22**	0.89	MB22	
M115x2	137	150	19	12	5	**KM23**	0.91	MB23	
M120x2	135	145	20	12	5	**KML24**	0.69	MBL24	
	138	155	20	12	5	**KM24**	0.98	MB24	
M125x2	148	160	21	12	5	**KM25**	1.12	MB25	
M130x2	145	155	21	12	5	**KML26**	0.084	MBL26	
	149	165	21	12	5	**KM26**	1.21	MB26	
M135x2	160	175	22	14	6	**KM27**	1.39	MB27	
M140x2	155	165	22	12	5	**KML28**	0.92	MBL28	
	160	180	22	14	6	**KM28**	1.40	MB28	
M145x2	171	190	22	14	6	**KM29**	1.65	MB29	
M150x2	170	180	24	14	5	**KML30**	1.29	MBL30	
	171	195	24	14	6	**KM30**	1.85	MB30	
M155x3	182	200	25	16	7	**KM31**	2.05	MB31	
M160x3	180	190	25	14	5	**KML32**	1.42	MBL32	
	182	210	25	16	7	**KM32**	2.25	MB32	
M165x3	193	210	26	16	7	**KM33**	2.31	MB33	
M170x3	190	200	26	16	5	**KML34**	1.60	MBL34	
	193	220	26	16	7	**KM34**	2.55	MB34	
M180x3	200	210	27	16	5	**KML36**	1.82	MBL36	
	203	230	27	18	8	**KM36**	2.70	MB36	

Locknuts and Withdrawal Nuts



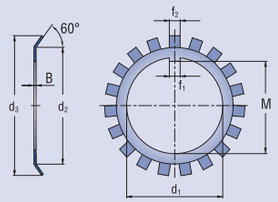
Dimensions						Designation	Mass	Relevant part-washer	
d_0	d	d_Z	D	l	a				
mm							kg		
M190x3	210	220	28	16	5	**KML38**	1.90	MBL38	
	214	240	28	18	8	**KM38**	3.04	MB38	
M200x3	222	240	29	18	8	**KML40**	2.58	MBL40	
	226	250	29	18	8	**KM40**	3.30	MB40	
Tr205x4	232	250	30	18	8	**HML41T**	3.20	MBL41	
Tr210x4	238	270	30	20	10	**HM42T**	4.22	MS42	
TR215x4	242	260	30	20	9	**HML43T**	3.72	MSL43	
Tr220x4	250	280	32	20	10	**HM44T**	4.84	MB44	
Tr230x4	260	290	34	20	10	**HM46T**	5.40	MS46	
Tr235x4	262	280	34	20	9	**HML47T**	4.10	MSL47	
Tr240x4	270	300	34	20	10	**HM48T**	5.60	MB48	
Tr250x4	290	320	36	20	10	**HM50T**	7.20	MS50	
Tr260x4	300	330	36	24	12	**HM52T**	7.33	MB52	
Tr280x4	320	350	38	24	12	**HM56T**	8.60	MB56	
Tr290x4	330	370	40	24	12	**HM58T**	10.54	MS58	
Tr300x4	336	360	42	24	12	**HM3060**	8.40	MS3060	
	340	380	40	24	12	**HM3160**	10.60	MS3160	
Tr310x5	350	390	42	24	12	**HM62T**	13.00	MS62	
Tr320x5	356	380	42	24	12	**HM3064**	8.84	MS3064	
	360	400	42	24	12	**HM3164**	11.82	MS3164	
Tr330x5	380	420	52	28	15	**HM66T**	20.00	MS66	
Tr340x5	400	440	55	28	15	**HM3168**	21.42	MS3168	
Tr345x5	384	410	45	28	13	**HML69T**	13.00	MSL69	
Tr350x5	410	450	55	28	15	**HM70T**	22.80	MS70	
Tr360x5	394	420	45	28	13	**HM3072**	10.60	MS3072	
	420	460	58	28	15	**HM3172**	24.00	MS3172	
Tr365x5	404	430	48	28	13	**HML73T**	14.00	MSL73	
Tr370x5	430	470	58	28	15	**HM74T**	28.00	MS74	
Tr380x5	430	470	45	32	18	**HM76T**	20.20	MS76	
Tr385x5	440	490	60	32	18	**HM3176**	28.20	MS3176	
	422	450	48	28	14	**HML77T**	15.00	MSL77	
Tr400x5	442	470	52	28	14	**HM3080**	16.00	MS3080	
	460	520	62	32	18	**HM3180**	33.60	MS3180	
Tr410x5	452	480	52	32	14	**HML82T**	19.00	MSL82	
Tr420x5	462	490	52	32	14	**HM3084**	16.80	MS3084	
	490	540	70	32	18	**HM3184**	40.40	MS3184	
Tr430x5	472	500	52	32	14	**HML86T**	20.00	MS86	
Tr440x5	510	560	70	36	20	**HM3188**	41.60	MS3188	

Locking Washer

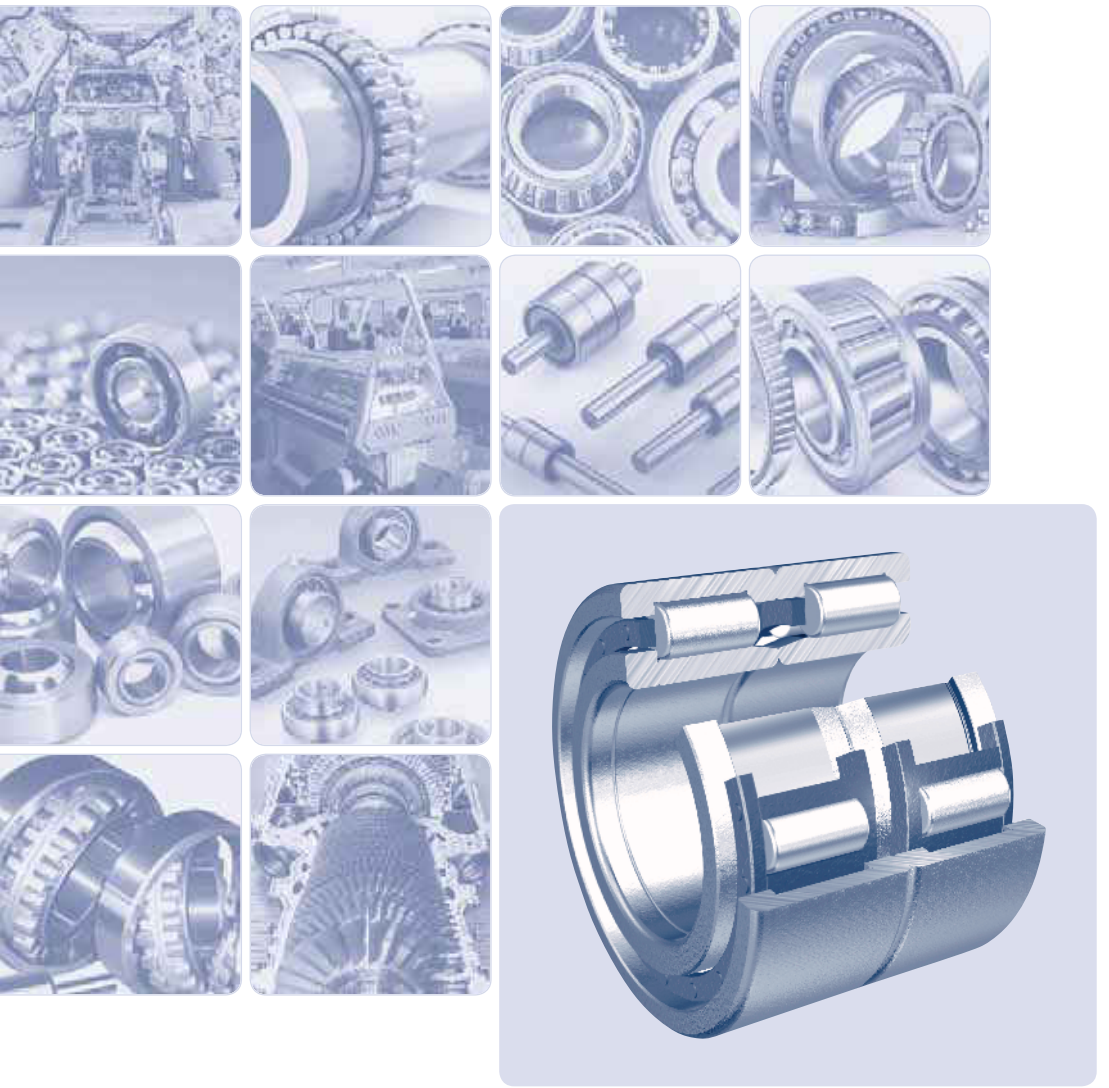


Dimensions								Washer marking	Mass of 100 pcs.	
d_1	d_2	d_3	B	f_1	f_2	M				
mm									kg	
17	24	32	1	4	4	15.5		**MB3**	0.32	
20	26	36	1	4	4	18.5		**MB4**	0.35	
25	32	42	1.25	5	5	23		**MB5**	0.64	
30	38	49	1.25	5	5	27.5		**MB6**	0.78	
35	44	57	1.25	6	5	32.5		**MB7**	1.04	
40	50	62	1.25	6	6	37.5		**MB8**	1.23	
45	56	69	1.25	6	6	42.5		**MB9**	1.52	
50	61	74	1.25	6	6	47.5		**MB10**	1.60	
55	67	81	1.5	8	7	52.5		**MB11**	1.96	
60	73	86	1.5	8	7	57.5		**MB12**	2.53	
65	79	92	1.5	8	7	62.5		**MB13**	2.90	
70	85	98	1.5	8	8	66.5		**MB14**	3.34	
75	90	104	1.5	8	8	71.5		**MB15**	3.56	
80	95	112	1.8	10	8	76.5		**MB16**	4.64	
85	102	119	1.8	10	8	81.5		**MB17**	5.24	
90	108	126	1.8	10	10	86.5		**MB18**	6.23	
95	113	133	1.8	10	10	91.5		**MB19**	6.70	
100	120	140	1.8	12	10	96.5		**MB20**	7.65	
105	126	145	1.8	12	12	100.5		**MB21**	8.26	
110	133	154	1.8	12	12	105.5		**MB22**	9.40	
115	137	159	2	12	12	110.5		**MB23**	10.80	
120	135	148	2	14	12	115		**MBL24**	7.00	
	138	164	2	14	12	115		**MB24**	10.50	
125	148	170	2	14	12	120		**MB25**	11.80	
130	145	158	2	14	12	125		**MBL26**	8.70	
	149	175	2	14	12	125		**MB26**	11.30	
135	160	185	2	14	14	130		**MB27**	14.40	
140	155	170	2	16	12	135		**MBL28**	10.90	
	160	192	2	16	14	135		**MB28**	14.20	
145	172	202	2	16	14	140		**MB29**	14.80	
150	170	186	2	16	14	145		**MBL30**	11.30	
	171	205	2	16	14	145		**MB30**	15.50	
155	182	212	2.5	16	16	147.5		**MB31**	20.90	
160	180	197	2.5	18	14	154		**MBL32**	16.20	
	182	217	2.5	18	16	154		**MB32**	22.20	
165	193	222	2.5	18	16	157.5		**MB33**	24.10	
170	190	209	2.5	18	16	164		**MBL34**	17.00	
	193	232	2.5	18	16	164		**MB34**	24.70	

Locking Washer



Dimensions							Washer marking	Mass of 100 pcs.	
d_1	d_2	d_3	B	f_1	f_2	M			
mm								kg	
180	200	215	2.5	20	16	174	**MBL36**	18.00	
	203	242	2.5	20	18	174	**MB36**	26.80	
190	210	228	2.5	20	16	184	**MBL38**	20.50	
	214	252	2.5	20	18	184	**MB38**	27.80	
200	222	248	2.5	20	18	194	**MBL40**	21.40	
	226	262	2.5	20	18	194	**MB40**	29.30	
220	250	292	3.0	24	22	210	**MB44**	35.0	
240	270	312	3.0	24	22	233	**MB48**	45.0	
260	300	342	3.0	28	26	253	**MB52**	65.0	
280	320	362	3.0	28	26	273	**MB56**	105.0	



Special Cylindrical Roller Bearings for Railway Vehicles

Special Cylindrical Roller Bearings for Railway Vehicles

KINEX bearings are used in railway vehicles for axleboxes, in traction motors and generators, in drives of blowers, in exciters and axle–driven generators, in compressors' motors and in gear–boxes.

For railway vehicle axleboxes the bearings with machined brass or plastic cages are manufactured. For higher speeds the internal design is specifically adapted.

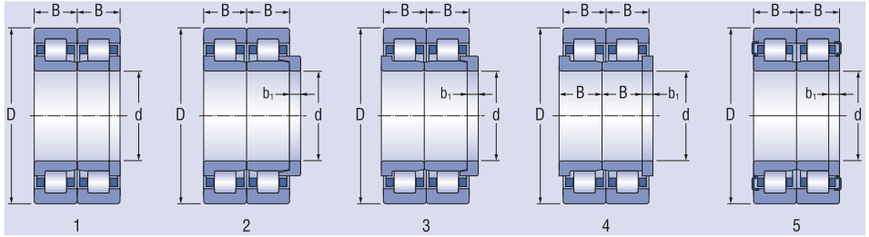
The roller bearings with machined brass cages, in various design versions, are used mostly for traction motors and drives arrangements.

Under the term "railway vehicle" we understand:

- diesel and electric locomotives,
- diesel and electric motor train sets,
- motor coaches,
- passanger coaches,
- good wagons,
- special railway vehicles.

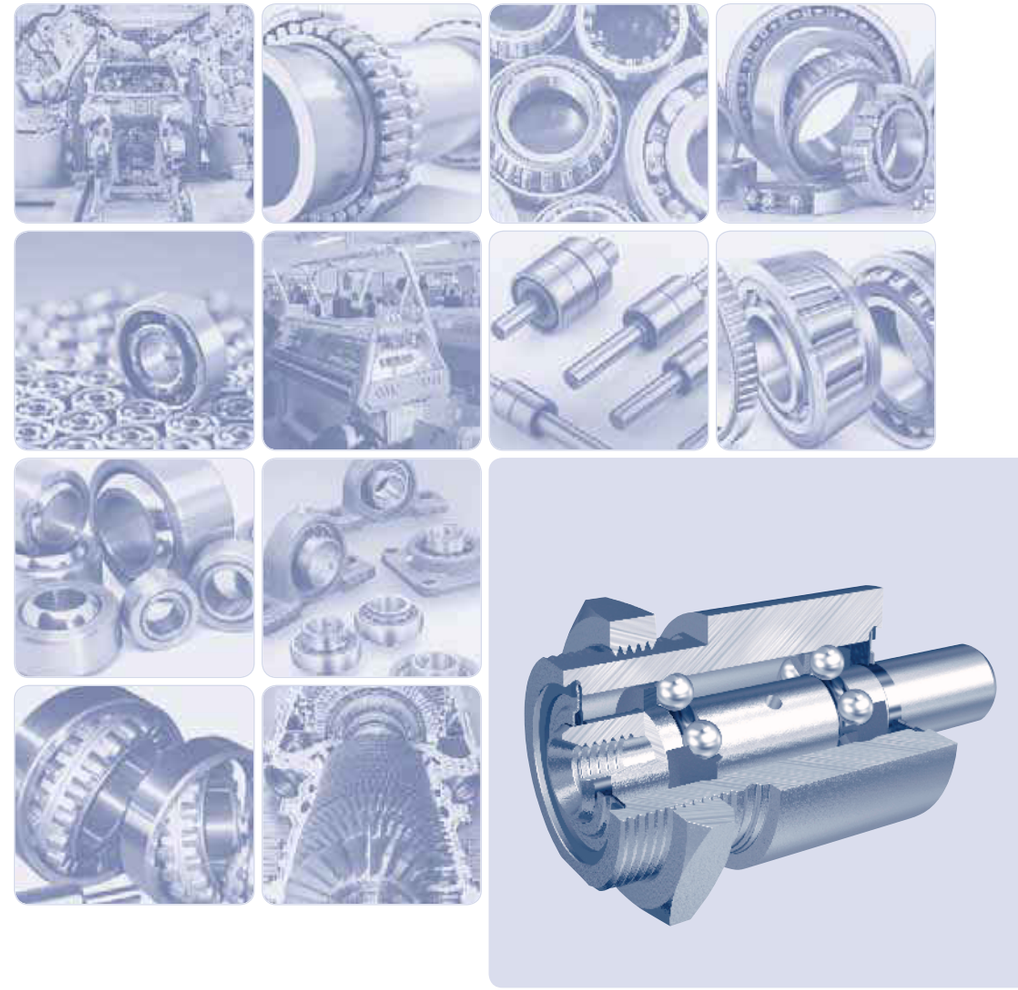
The axle box bearing production is assured in complience with the European standard EN 12080. The axle bearings correspond to the requirements of the European standard EN 12082, UIC 515-5.

Detailed information on bearings for railway vehicles (calculations,mounting, dismounting, maintenance...) are given in a special publication "Bearings for Railway Vehicles".



Dimensions				Bearing designation		Cage		Basic load rating dynamic	static	Maximum speed of rail vehicle	Mass of a pair of bearings	Pict.	
d	D	B	b_1					C_r	C_{or}				
mm								kN		$km.hod^{-1}$	kg		
100	180	60.3	-	**PLC 49-200-2-1 (WJ100X180)**	**PLC 49-201-2 (WJP 100x180)** [1)3)4)]	TNG		333.5	444.4	160	12.2	1	
	180	120.6	-	**WJ/WJP 100x180x120,8 P TN C4**		TNG		333.5	444.4	160	12.1	1	
110	215	73	-	**PLC 410-207-1 (WJ110X215M)**	**PLC 410-208-1 (WJP 110x215M)** [1)4)5)]	M		494.5	668.6	160	24.4	1	
118	215	80	-	**PLC 410-213-3**	**PLC410-214-3** [1)4)5)]	M		519.8	740.9	160	25.7	1	
	240	80	-	**WJ 118x240x80 TN**	**WJP 118x240x80 P TN** [1)3)4)]	TNG		553.8	742.5	160	32.4	1	
	240	80	-	**PLC 410-23**	**PLC 410-24** [1)2)4)]	TNG		553.8	742.5	160	34.2	1	
118.5	240	80	-	**WJ 118,5x240x80 TN**	**WJP 118,5x240x80 P TN** [1)3)4)]	M		553.8	742.5	160	32.3	1	
119	240	80	-	**WJ 119x240x80 TN**	**WJP 119x240x80 P TN** [1)3)4)]	TNG		553.8	742.5	160	32.1	1	
119.3	240	80	-	**WJ 119,3x240x80 TN**	**WJP 119,3x240x80 P TN** [1)3)4)]	TNG		553.8	742.5	160	32.1	1	
120	200	62	-	**PLC 49-202**	**PLC 49-203** [1)4)5)]	M		372.8	549.1	120	16	1	
	215	73	-	**PLC 410-231-2 (WJ 120x215x73)**	**PLC 410-232-2 (WJP 120x215x73)** [1)3)4)]	TNG		518.5	717.5	160	21	1	
	215	80	-	**PLC 410-213**	**PLC 410-214** [1)2)4)]	M		519.8	740.9	160	25.2	1	
	240	80	-	**PLC 410-13**	**PLC 410-14** [1)2)4)]	M		553.8	742.5	160	33.7	1	
	240	80	-	**PLC 410-13-1**	**PLC 410-14-1** [1)4)5)]	M		553.8	742.5	160	33.7	1	
	240	80	-	**WJ 120x240x80 TN**	**WJP 120x240x80 P TN** [1)3)4)]	TNG		553.8	742.5	160	31.9	1	
128	240	80	-	**PLC 410-15-3**	**PLC 410-16-3** [1)3)4)]	M		516.3	752.1	160	33.1	1	
	240	80	-	**PLC 410-15-2-3 (WJ 128x240)**	**PLC 410-16-2-3 (WJP 128x240)** [1)3)4)]	TNG		516.3	752.1	160	31	1	
	240	80	-	**WJ 128x240x80 TN**	**WJP 128x240x80 P TN** [1)3)4)]	TNG		539.6	775.4	160	30.8	1	
129	240	80	-	**PLC 410-15-4**	**PLC 410-16-41)3)4)**	M		516.3	752.1	160	32.9	1	
	240	80	-	**PLC 410-15-2-4 (WJ 129x240)**	**PLC 410-16-2-4 (WJP 129x240)** [1)3)4)]	TNG		516.3	752.1	160	30.8	1	
	240	80	-	**WJ 129x240x80 TN**	**WJP 129x240x80 P TN** [1)3)4)]	TNG		539.6	775.4	160	30.6	1	
129.3	240	80	-	**WJ 129,3x240x80 TN**	**WJP 129,3x240x80 P TN** [1)3)4)]	TNG		539.6	775.4	160	30.5	1	
130	220	73	-	**PLC 410-223-2**	**PLC 410-224-2** [1)3)4)]	TNG		505.0	761.7	160	21.08	1	
	240	80	-	**PLC 410-15**	**PLC 410-16** [1)2)4)]	M		516.3	752.1	160	32.6	1	
	240	80	-	**PLC 410-15-2 (WJ 130x240)**	**PLC 410-16-2 (WJP 130x240)** [1)3)4)]	TNG		516.3	752.1	160	30.4	1	
	240	80	-	**PLC 410-33-1**	**PLC 410-34-1** [1)2)4)]	M		539.6	775.4	160	32.7	1	
	240	80	-	**WJ 130x240x80 TN**	**WJP 130x240x80 P TN** [1)3)4)]	TNG		539.6	775.4	160	30.3	1	
	240	86	21.55	**WJ 130x240x80 TN**	**WJP 130x240x86 P TN** [1)3)4)]	TNG		539.6	775.4	160	30.7		
	240	160	-	**PLC 410-215/216**		TNG		539.6	775.4	200	30.6	5	
	250	80	-	**PLC 410-17**	**PLC 410-18** [1)2)4)]	M		580.0	800.3	160	36.3	1	
	250	80	-	**PLC 410-17-2**	**PLC 410-18-2** [1)3)4)]	TNG		580.0	800.3	160	33.8	1	
158	300	84	15	**PLC 411-200**	**PLC 411-201** [1)2)4)]	M		869.5	1 214.3	160	58.3	2	
159	300	84	15	**PLC 411-20**	**PLC 411-21** [1)2)4)]	M		869.5	1 214.3	160	57.9	2	
160	300	84	15	**PLC 411-10**	**PLC 411-12** [1)2)4)]	M		869.5	1 214.3	160	57.1	2	
180	320	86	12	**NJ2236M C4A450-900**	**NUC2236M C4 + HJ2236X16.33** [2)4)]	M		713.5	1 082.8	160	64.4	2	
	320	86	15	**NJ2236XM C4**	**NUC2236M C4 + PLC 810-1**	M		713.5	1 082.8	160	64.5	3	
	320	86	15	**NJ2236XMAS C4**	**NUC2236MAS C4 + PLC 810-1**	MAS		713.5	1 082.8	160	64.9	3	
	320	86	17	**NJ2236XM C4**	**NUC2236M C4+príložnj krúžok NUP2236**	M		713.5	1 082.8	160	64.6	4	

[1)] Pair of bearings is marked shortly e. g. PLC410-13/14
[2)] Machined brasscage (steel riveted) or-1 (cross piece riveted)
[3)] Glass-fiber reinforced polyamide cage, roller centred
[4)] Inner ring interchangeable
[5)] Two-piece machined brass pronged cage



Special Double Row Ball Bearings
for Textile Machines and Measuring Instruments

Special Double Row Ball Bearings for Textile Machines and Measuring Instruments

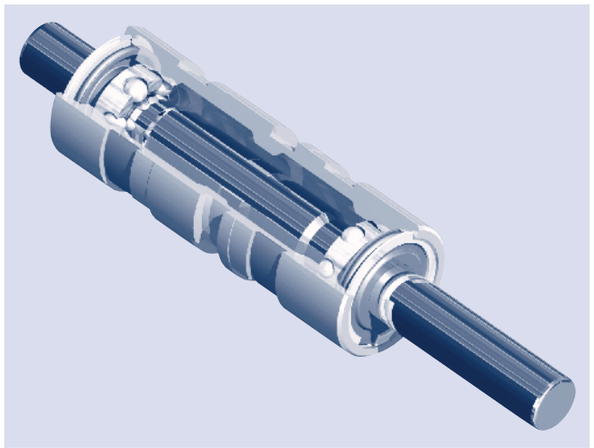
Special double-row ball bearings for textile machines and measurement instruments built not separable unit, which consists of cylindrical bushing and shaft, arranged in two rows of balls. The balls are led in light one-sided cages. The raceways on the shaft and in cylindrical bushing are made in high accuracy degree. Effective contact or non-contact seals on both sides of bearings prevent penetration of impurities. The bearings are filled with a grease of high quality providing constant lubrication during their whole life. In some cases the design of the bushings makes possible relubrication during a bearings life.

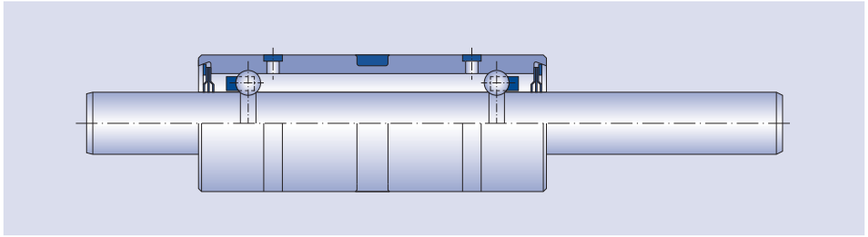
A special double-row ball bearing creates a complete bearing unit which enables simple assembly and maintenance. The development of these bearing hangs together with a solution of arrangements of the most important parts in the textile machines but also for measuring instruments.

Special double-row ball bearing for textile machines are designed for high rotational speed and relatively light load. They are known for they high dimensional accuracy and smooth run warranting their high effectiveness. KINEX BEARINGS, a.s. supplies these bearings according to demand of the users complemented with some other components, e.g. pulleys drive discs. In some cases there are complete integrated bearing units which make from the technological and economical point of view possible the more effective production of textile machines.

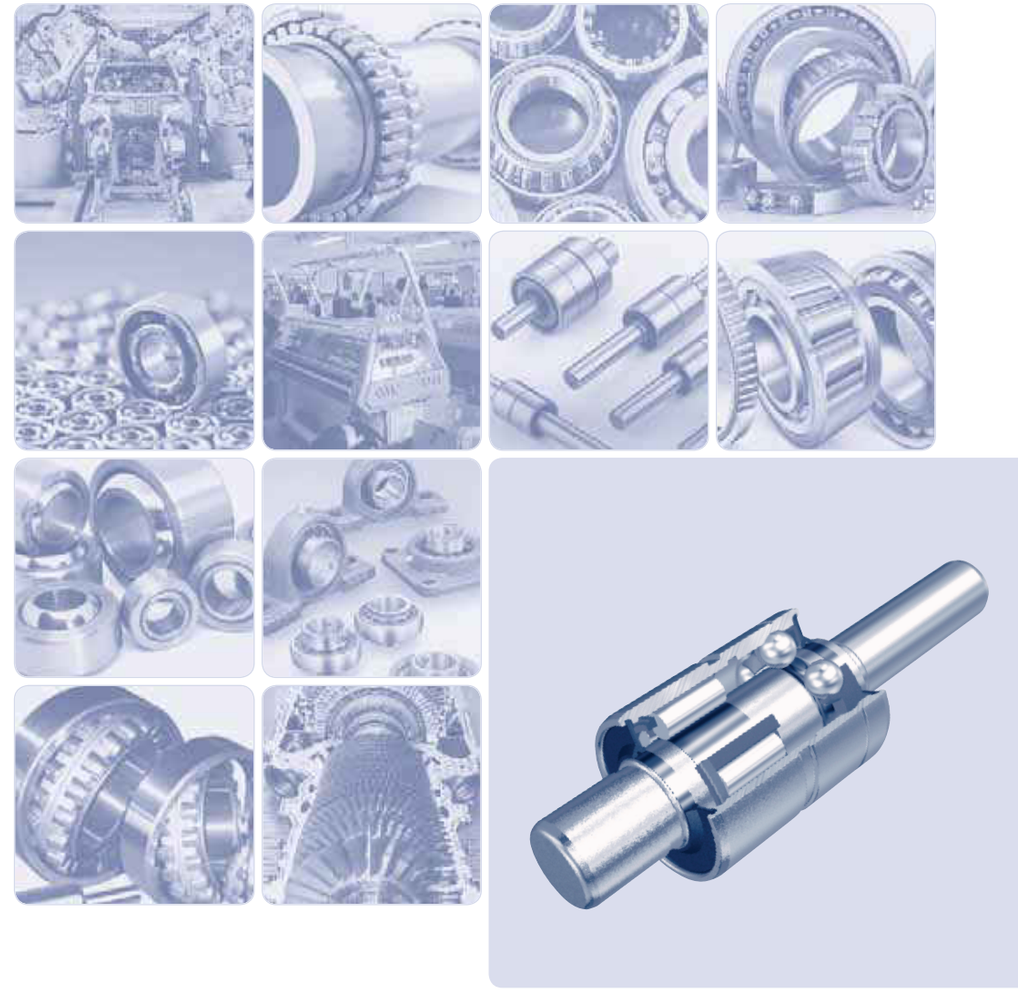
Special double-row ball bearing for textile machines are used in shaping machines such is spindles of torsional units, in non-spindle spinning machines by housing a bearing of spinning chamber, of card strips disc etc.

Special double-row ball bearing for measuring instruments are known for their high dimensional accuracy as well as for operational reliability, but they are working at lower rotational speeds as the bearings in textile machines.





Bearing designation	Basic load ratings dynamic C_r kN	static C_{or}	Limiting Speed n min^{-1}	
72-6	1.88	0.55	90 000	
73-1-13	2.00	0.69	40 000	
73-1-14	2.33	0.69	60 000	
73-1-14b	2.33	0.69	60 000	
73-1-20	2.33	0.69	40 000	
73-1-22	2.33	0.69	60 000	
73-1-24	2.33	0.69	75 000	
73-1-28	1.96	0.69	15 000	
73-1-31	2.33	0.69	80 000	
73-1-35	2.33	0.69	15 000	
73-1-36	1.96	0.69	15 000	
73-1-40	2.00	0.69	15 000	
73-1-43	1.96	0.69	15 000	
73-1-49	2.00	0.69	15 000	
73-1-64	2.00	0.69	60 000	
73-7-3	3.62	1.55	20 000	
73-7-4	3.62	1.55	8 000	
73-7-5	3.62	1.52	7 500	
76-3	5.11	2.35	10 000	
76-3-1	5.11	2.35	12 000	
76-3-7	5.11	2.35	10 000	
T001	1.88	0.55	90 000	
T004	1.62	0.48	80 000	
T010	1.31	0.38	105 000	
T011	1.31	0.38	105 000	
T013	1.31	0.38	105 000	
T100			110 000	
83-15			80 000	
83-18-5			105 000	
83-18-6			115 000	
83-23-1			100 000	



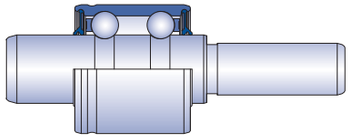
Special Double Row Bearings
for Water Pumps of Combustion Engines

Special Double Row Bearings for Water Pumps of Combustion Engines

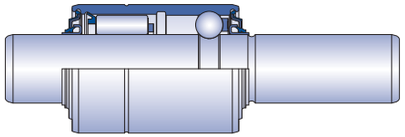
The special double row bearings built not separable and sealed unit. They are composed of a schaft and cylindrical bushing which is arranged in two rows of rolling elements. The rolling elements are seated in light single-sided plastic cages. The raceways on the shaft and in the cylindrical bushing are produced with a very high degree of accuracy. In order to protect them against penetration of impurities, they are equipped on both sides by efficiency contact sealing. The bearings are filled with high quality grease, which provides the sufficient lubrication for the whole lifetime og the bearing. They have been designed to meet all customer`s requirements for minimum weight, maximal compactness, high quality and stability of material and close quality supervision during the whole production process.

On the market, KINEX BEARINGS, a.s., presents three modifications of bearings for water pumps:

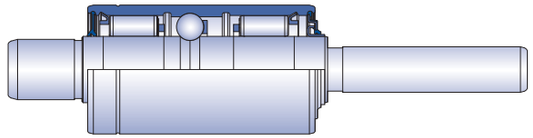
- **Double-row with two rows of balls - type K**



- **Double-row with one row of balls and one row of rollers - type R**



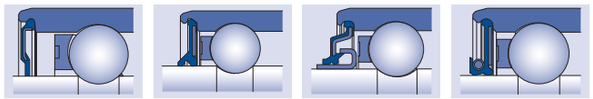
- **Triple-row with one row of balls and two rows of rollers**



The R type is charecteristic by significantly higher resistance against radial load on the cylindrical rollers row side. The rollers are placed on the loaded side of the bearings thet extends its lifetime.

The bearings are designated by type (K or R) and three- or four-figures number. In certain cases the numbers is followed by OS or S which means, in comparison with bearing without OS or S that the special double-row bearing has been produced for repairs of water pumps.

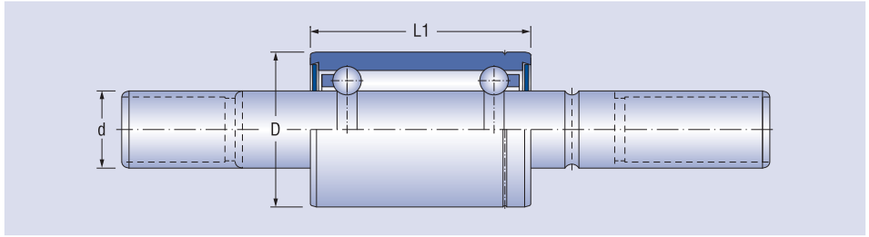
Bearings are produced with four types of seals:



one lip seal | double lips seal | triple lips seal | S - seal

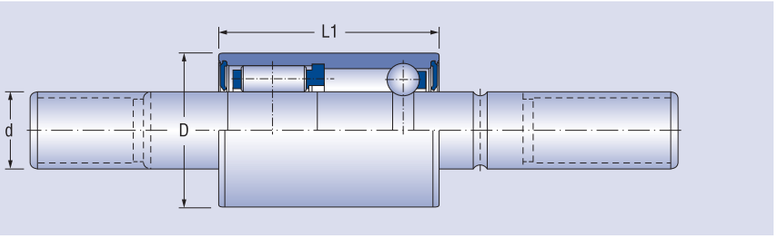
Seals are made of materials NBR, HNBR, FKM.

Water pump bearings type K



D mm	L_1 mm	d mm	
24	19,9 - 33,5	12,000	
26	30,0 - 40,0	12,000	
28	20,0	15,918	
30	22,0 - 59,0	15,000	
	22,0 - 59,0	15,918	
	22,0 - 59,0	16,000	
	22,0 - 59,0	17,200	
32	45,0	16,000	
34	30,0 - 47,0	17,000	
35	29,9 - 46,0	15,918	
	29,9 - 54,0	16,000	
	29,9 - 56	17,500	
36	30,0 - 60,0	16,000	
	30,0 - 60,0	17,000	
	30,0 - 60,0	18,961	
	30,0 - 60,0	20,000	
38	38,9 - 58,0	18,961	
40	38,9 - 62,0	15,918	
	42,0 - 62,0	17,000	
	42,0 - 62,0	18,961	
	24,0 - 25,0	19,012	
	42,0 - 62,0	20,000	
	22,0	24,500	
42	42,0 - 46,0	16,000	
	39,0	18,961	
	42,0 - 46,0	20,000	
	32,0	22,000	
47	30,0 - 75,0	20,000	
	30,0 - 75,0	25,400	
52	59,0	25,061	

Water pump bearings type R



D mm	L1 mm	d mm	
56	70,0	25,000	
24	26,9	12,008	
28	20 - 27	17,200	
30	27,0 - 52,0	15,000	
	22,9 - 52	15,918	
	27,0 - 52,0	16,000	
	27,0 - 52,0	17,200	
30,254	38,9 - 52	15,918	
35	38,9 - 56,0	18,961	
36	40,0 - 56,0	18,961	
38	41,1 - 54,1	18,961	
40	38,9 - 52,5	18,961	
	38,9 - 52,5	20,000	
41	38.9 - 52,5	20,000	
42	32,0 - 52,5	20,000	
47,587	69,85	25,362	
47,625	54,1 - 69,9	25,400	
52	53,5	25,000	
55	60,0 - 75,0	25,000