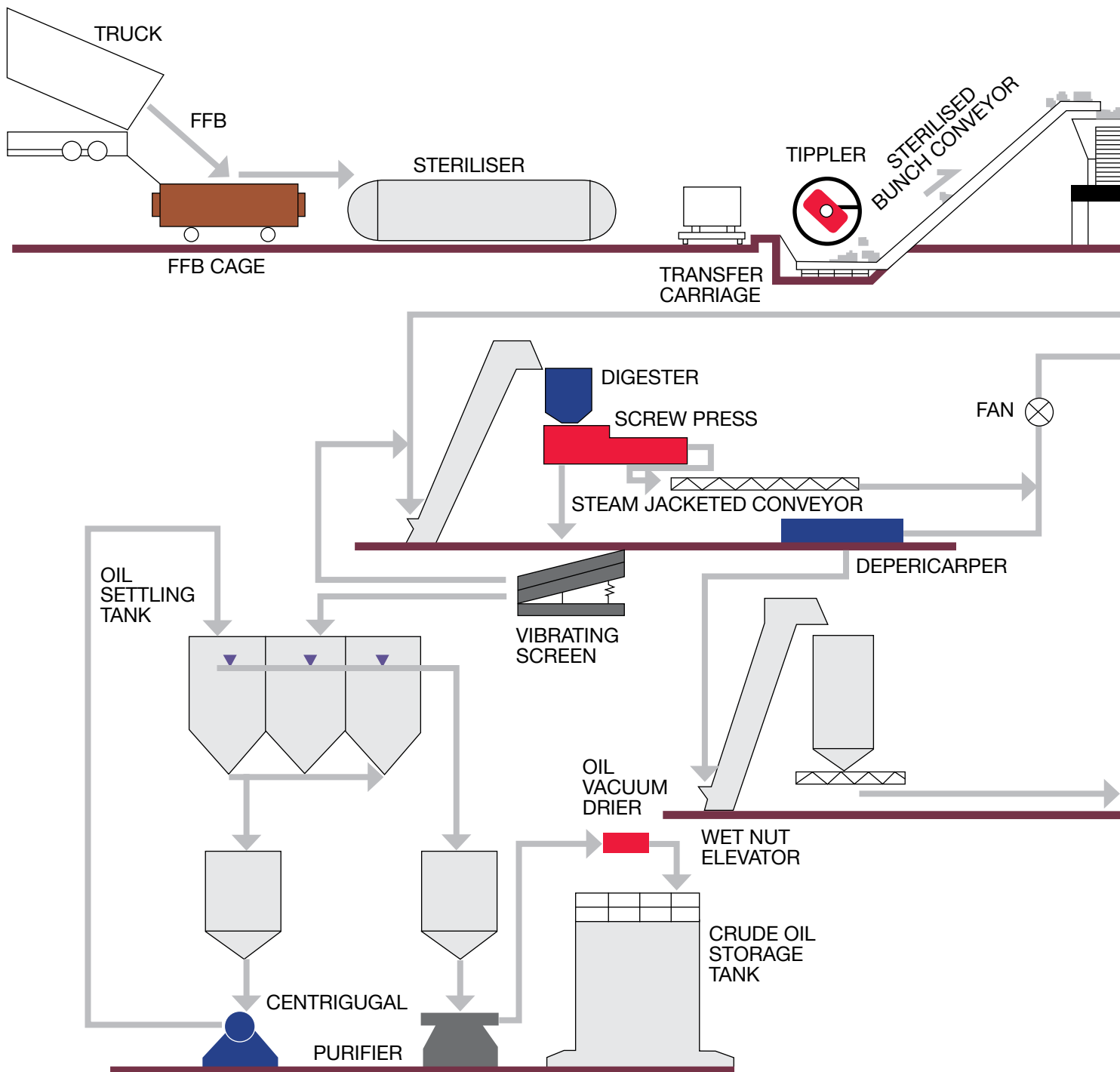


Bearings for Palm Oil Industry

Tougher, higher capacity and longer life bearings.



Palm Oil Mill Schematic Flow Diagram



A Product Line that Matches Specific Applications

Spherical Roller Thrust Bearings



Spherical Roller Thrust bearings have a spherical raceway in the outer ring with the rollers diagonally arranged in a single row. These bearings have a very high axial load capacity and are capable of taking moderate radial loads when an axial load is imposed. Because of the configuration of their rolling elements, spherical roller thrust bearings are capable of handling misalignment and are suited for moderate speed operation.

CA-VS Series Spherical Roller Bearings



CA-VS series bearings are CA series bearings that have been optimized for harsh vibrating applications, including vibrating screens and feeders.

HPS™ Spherical Roller Bearings



HPS series bearings are double-row self-aligning spherical roller bearings capable of carrying heavy radial loads with moderate axial loads in either direction. The spherical profile of the rollers, the inner ring raceway, and the outer ring raceway, enable a self-aligning function that allows full capacity loading. The HPS series offers high performance standard-size bearings with longer operating life and higher limiting speeds than conventional bearings.

EW/EM Series Cylindrical Roller Bearings

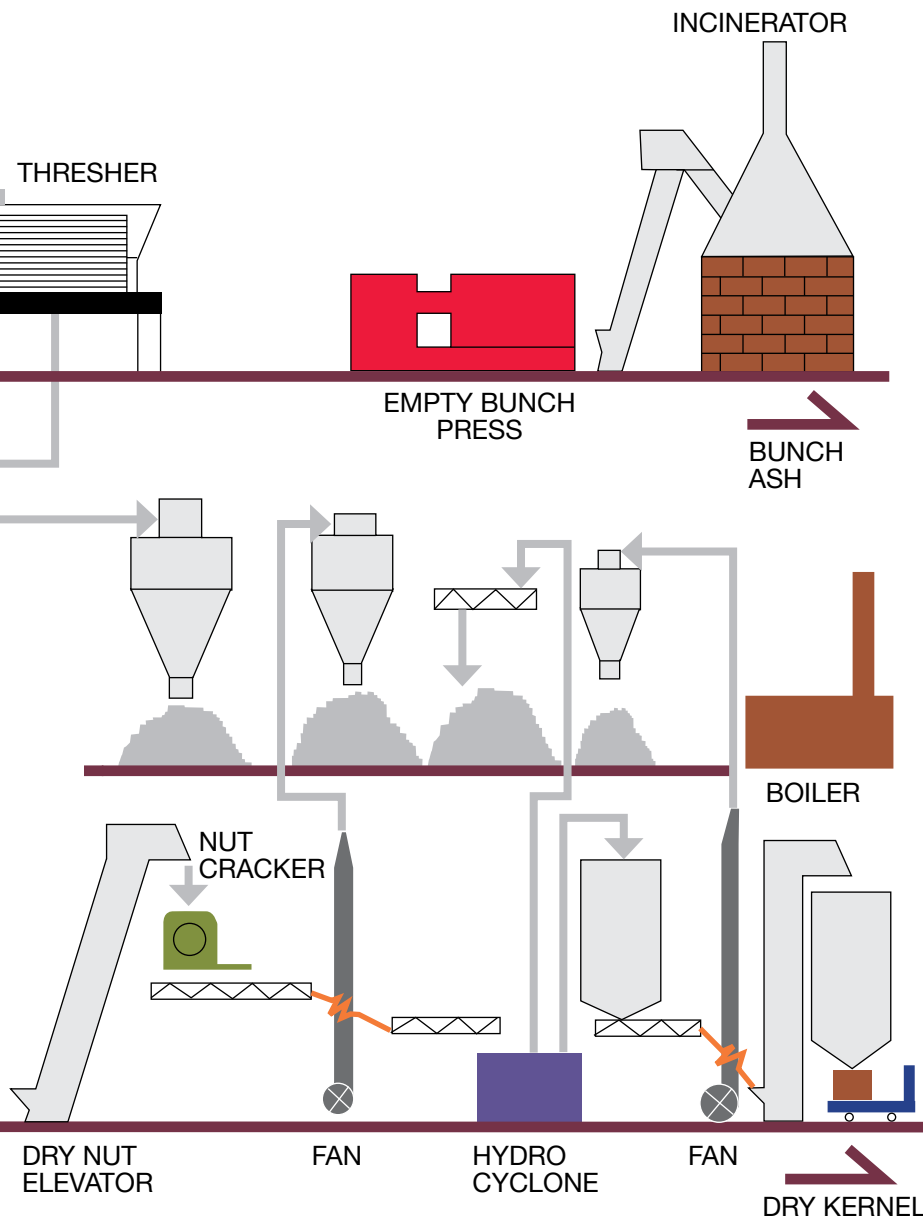


EM and EW series bearings are cylindrical roller bearings capable of carrying particularly large radial loads and are suitable for high-speed applications. The EW series features a pressed steel cage and the EM series features a one-piece machined brass cage. Both cages offer high-load capacity for standard-size bearings, in addition to excellent functionality and longer operating life.

Plummer Blocks



Plummer blocks are bearing housings that provide high rigidity and sealing capability for large machinery and heavy load applications. Plummer blocks are available in a wide range of types and models for various applications. The two global-standard types of plummer blocks, N and SD, are available from NSK for large-scale heavy-load applications.



NSK bearings support the palm oil industry machinery for the challenging task of raising efficiency and productivity of operations under harsh environments.

CA-VS Series Spherical Roller Bearings

The CA series is a standard-size bearing with a machined brass cage, tough and wear-resistant capabilities, and is ideal for applications operating under heavy or shock load conditions. NSK offers the U15 and VS units specifically for vibrating screens, feeders, and other vibrating applications.



FEATURES

Highly resistant to heavy or shock loads.

Long service life for vibrating applications.

Excellent self-aligning ability.

Preventive measure against shaft deflection.

Easy to install

EW/EM Series Cylindrical Roller Bearings

The EW and EM series of high-load capacity, standard-size cylindrical roller bearings deliver outstanding performance across a wide range of applications. High-load capacity is achieved by using more rollers than conventional bearings based on an innovative NSK concept. We also offer standard-size cylindrical roller bearings for today's needs that provide longer service life and low-noise and low-vibration performance through an optimally designed one-piece cage with high rigidity and low wear.

This cage feature is incorporated in the EW series as a pressed steel cage and in the EM series as a one-piece machined brass cage.



EW Series (pressed cage)

FEATURES

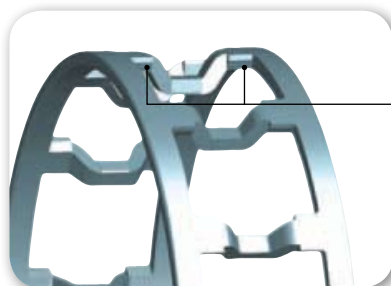
Compared to the NSK's conventional type:

Approximately **twice** the bearing life

30% to 40% less noise and vibrations

Cage strength increased **1.5 to 2** times

10% to 25% higher limiting speed



Roller cage guide face

Series offers bearing inner bore dimensions ranging from 25 mm to 65 mm

Catalog No. E1238

EM Series (machined cage)

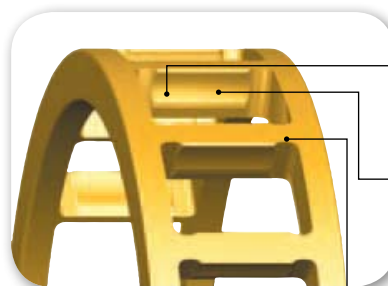
FEATURES

Compared to the NSK's conventional type:

Approximately **twice** the bearing life

50% to 60% less noise and vibrations

Enhanced cage strength



High precision cage

Advantages of a roller-guided cage

- Trouble-free packing of grease
- Improved oil flow

Greater accuracy of the roller guidance achieved through special pocket profiling

Large pocket corner radii relieve stress concentrations on the cage

Series offers bearing inner bore dimensions ranging from 25 mm to 200 mm

Catalog No. E1237

HPS™ Spherical Roller Bearings

Bearings are expected to reduce maintenance costs and enhance performance for a variety of equipment. HPS spherical roller bearings satisfy these requirements by fully utilizing NSK's experience and expertise to deliver longer life and higher limiting speed.

FEATURES

Compared to the conventional EA Series:

Bearing life Maximum
2 times
Increased dynamic load
rating to maximum
of 25%

Limiting speed
Maximum **20%** higher



HPS bearings are available with inner bore dimensions ranging from 40 mm to 130 mm

Outer Ring

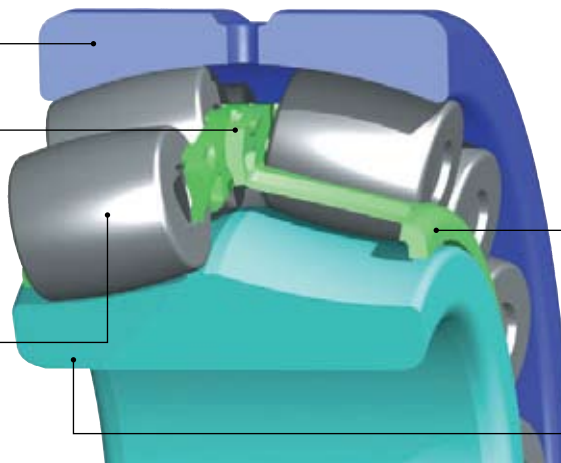
High-temperature operability (dimensional stability) and lubrication groove and holes

Cage Flange

High limiting speed

Rollers

Increased size and number



Cage

High-strength pressed steel with special surface treatment

Inner Ring

High-temperature operability (dimensional stability)

Catalog No. E1259

Spherical Roller Thrust Bearings



The spherical thrust bearings are designed to handle very heavy thrust loads in one direction while operating at low to moderate speeds. The design of the spherical thrust will also allow for some radial load while thrust load is imposed. The spherical shape of the outer ring raceway makes these bearings excellent for handling misalignment.

FEATURES

Good roller guiding
the oil flow

Large rollers
& strong case

Lower wear due
to optimal oil film
formation on ribs
and raceway

CA-VS Series Spherical Roller Bearings

Example: **223 20 CAM E4 C3 U15 -VS**

Bearing series symbols
(Bearing type+width series+diameter series)

Bearing bore (Bore number)

Cage type symbol
CAM: High load capacity machined brass cage

Bearing symbols for vibrating machines

Symbols of special dimensional tolerance for vibrating machines

Radial clearance (Internal clearance symbol)

Outer ring with oil groove and oil hole (External features symbol)

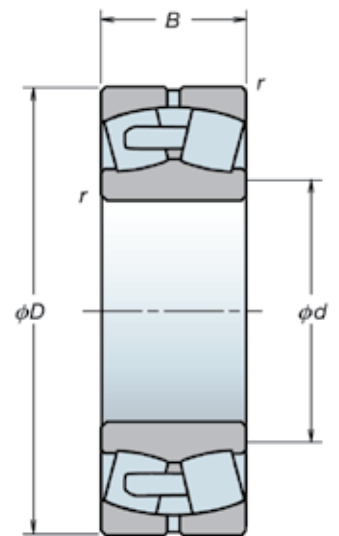
Dimensional tolerance and radial clearance

NSK's U15 specifications stabilize the load distribution by controlling the internal clearance and the dimensional tolerance of the bearing.

- The dimensional tolerance bearing is set at 1/2 relative to the outer diameter tolerance and the internal diameter tolerance.
- The radial internal clearance is set at 2/3 relative to the standard.

| Bearing numbers | Bore diameter | | Outside diameter | | Radial clearance (Cylindrical bore) | |
|-----------------|---------------|----------------|------------------|----------------|-------------------------------------|------------|
| | Nominal (mm) | Tolerance (μm) | Nominal (mm) | Tolerance (μm) | C3U15 (μm) | C4U15 (μm) |
| 22308 | 40 | 0 | 90 | | 50 to 60 | 65 to 80 |
| 22309 | 45 | -7 | 100 | | 60 to 75 | 85 to 100 |
| 22310 | 50 | | 110 | | | |
| 22311 | 55 | | 120 | -5 | | |
| 22312 | 60 | | 130 | -13 | 75 to 90 | 100 to 120 |
| 22313 | 65 | 0 | 140 | | | |
| 22314 | 70 | -9 | 150 | | | |
| 22315 | 75 | | 160 | -5 | 90 to 110 | 120 to 145 |
| 22316 | 80 | | 170 | -18 | | |
| 22317 | 85 | | 180 | | | |
| 22318 | 90 | | 190 | | 110 to 135 | 150 to 180 |
| 22319 | 95 | 0 | 200 | | | |
| 22320 | 100 | -12 | 215 | -10 | | |
| 22322 | 110 | | 240 | -23 | 135 to 160 | 180 to 210 |
| 22324 | 120 | | 260 | | | |
| 22326 | 130 | | 280 | | 160 to 190 | 205 to 240 |
| 22328 | 140 | | 300 | | | |
| 22330 | 150 | 0 | 320 | | 190 to 220 | 240 to 280 |
| 22332 | 160 | -15 | 340 | -13 | | |
| 22334 | 170 | | 360 | -28 | 200 to 240 | 260 to 310 |
| 22336 | 180 | | 380 | | | |
| 22338 | 190 | 0 | 400 | -13 | 220 to 260 | 285 to 340 |
| 22340 | 200 | -18 | 420 | -30 | | |

| Boundary dimensions (mm) | | | | Basic load ratings (kN) | | Limiting speeds (min ⁻¹) | | Bearing numbers |
|--------------------------|----------------------|-----------|-----------------------------|-------------------------|----------|--------------------------------------|------|--------------------|
| Bore diameter d | Outside diameter D | Width B | Chamfer dimension r (min) | C_r | C_{0r} | Grease | Oil | Cylindrical bore |
| 40 | 90 | 33 | 1.5 | 122 | 129 | 4120 | 5240 | 22308CAME4C3U15-VS |
| 45 | 100 | 36 | 1.5 | 148 | 167 | 3610 | 4600 | 22309CAME4C3U15-VS |
| 50 | 110 | 40 | 2 | 186 | 211 | 3320 | 4230 | 22310CAME4C3U15-VS |
| 55 | 120 | 43 | 2 | 209 | 241 | 3040 | 3870 | 22311CAME4C3U15-VS |
| 60 | 130 | 46 | 2.1 | 246 | 288 | 2790 | 3550 | 22312CAME4C3U15-VS |
| 65 | 140 | 48 | 2.1 | 265 | 315 | 2590 | 3290 | 22313CAME4C3U15-VS |
| 70 | 150 | 51 | 2.1 | 305 | 370 | 2400 | 3060 | 22314CAME4C3U15-VS |
| 75 | 160 | 55 | 2.1 | 340 | 415 | 2250 | 2870 | 22315CAME4C3U15-VS |
| 80 | 170 | 58 | 2.1 | 390 | 480 | 2120 | 2700 | 22316CAME4C3U15-VS |
| 85 | 180 | 60 | 3 | 415 | 510 | 1980 | 2530 | 22317CAME4C3U15-VS |
| 90 | 190 | 64 | 3 | 485 | 595 | 1910 | 2440 | 22318CAME4C3U15-VS |
| 95 | 200 | 67 | 3 | 525 | 675 | 1790 | 2280 | 22319CAME4C3U15-VS |
| 100 | 215 | 73 | 3 | 600 | 785 | 1650 | 2100 | 22320CAME4C3U15-VS |
| 110 | 240 | 80 | 3 | 740 | 980 | 1490 | 1900 | 22322CAME4C3U15-VS |
| 120 | 260 | 86 | 3 | 845 | 1120 | 1380 | 1760 | 22324CAME4C3U15-VS |
| 130 | 280 | 93 | 4 | 995 | 1350 | 1280 | 1630 | 22326CAME4C3U15-VS |
| 140 | 300 | 102 | 4 | 1160 | 1590 | 1100 | 1400 | 22328CAME4C3U15-VS |
| 150 | 320 | 108 | 4 | 1220 | 1690 | 1100 | 1400 | 22330CAME4C3U15-VS |
| 160 | 340 | 114 | 4 | 1360 | 1900 | 1100 | 1300 | 22332CAME4C3U15-VS |
| 170 | 360 | 120 | 4 | 1580 | 2110 | 1000 | 1200 | 22334CAME4C3U15-VS |
| 180 | 380 | 126 | 4 | 1740 | 2340 | 950 | 1200 | 22336CAME4C3U15-VS |
| 190 | 400 | 132 | 5 | 1890 | 2590 | 900 | 1100 | 22338CAME4C3U15-VS |
| 200 | 420 | 138 | 5 | 2000 | 2990 | 850 | 1000 | 22340CAME4C3U15-VS |

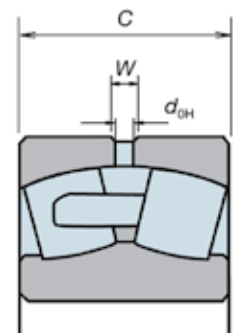


*Internal clearance of C3 and C4 is standard specification for the CA-VS series.

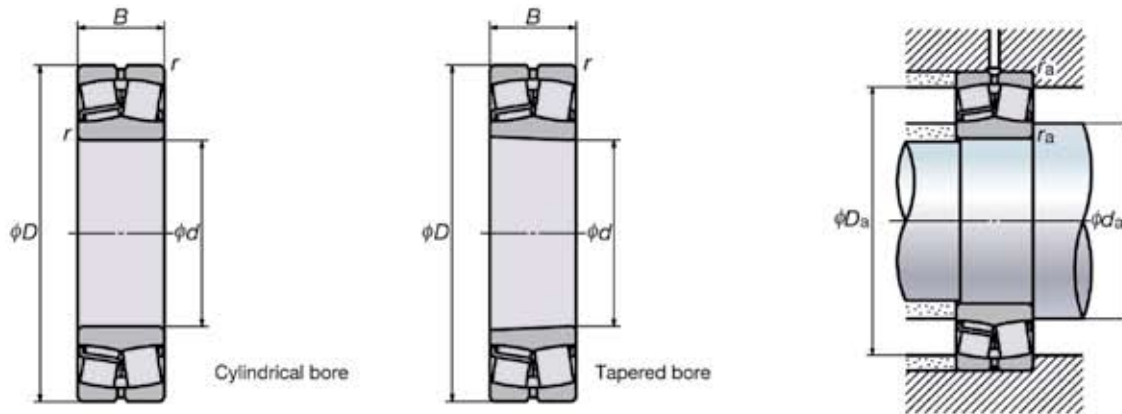
Dimensions of oil grooves and holes

Unit: mm

| Nominal outer ring width C | | Oil groove width W | Hole diameter d_{OH} |
|------------------------------|-------|----------------------|------------------------|
| over | incl. | | |
| 30 | 40 | 6 | 3 |
| 40 | 50 | 7 | 4 |
| 50 | 65 | 8 | 5 |
| 65 | 80 | 10 | 6 |
| 80 | 100 | 12 | 8 |
| 100 | 120 | 15 | 10 |
| 120 | 160 | 20 | 12 |



HPS Spherical Roller Bearings



| Boundary dimensions (mm) | | | | Basic load ratings (N) | | Limiting speeds (min ⁻¹) | | Bearing numbers | |
|--------------------------|-----|-----|--------------|------------------------|-----------|--------------------------------------|-------|------------------|------------------|
| d | D | B | r (min) | C_r | C_{Dr} | Grease | Oil | Cylindrical bore | Tapered bore (1) |
| 40 | 80 | 23 | 1.1 | 113 000 | 99 500 | 6 700 | 8 500 | 22208EAE4 | 22208EAKE4 |
| | 90 | 23 | 1.5 | 118 000 | 111 000 | 6 000 | 7 500 | 21308EAE4 | 21308EAKE4 |
| 45 | 90 | 33 | 1.5 | 170 000 | 153 000 | 5 300 | 6 700 | 22308EAE4 | 22308EAKE4 |
| | 85 | 23 | 1.1 | 118 000 | 111 000 | 6 000 | 7 500 | 22209EAE4 | 22209EAKE4 |
| 50 | 100 | 25 | 1.5 | 149 000 | 144 000 | 5 000 | 6 300 | 21309EAE4 | 21309EAKE4 |
| | 100 | 36 | 1.5 | 207 000 | 195 000 | 4 500 | 5 600 | 22309EAE4 | 22309EAKE4 |
| 55 | 90 | 23 | 1.1 | 124 000 | 119 000 | 5 600 | 7 100 | 22210EAE4 | 22210EAKE4 |
| | 110 | 27 | 2 | 178 000 | 174 000 | 4 500 | 5 600 | 21310EAE4 | 21310EAKE4 |
| | 110 | 40 | 2 | 246 000 | 234 000 | 4 300 | 5 300 | 22310EAE4 | 22310EAKE4 |
| 60 | 100 | 25 | 1.5 | 149 000 | 144 000 | 5 300 | 6 700 | 22211EAE4 | 22211EAKE4 |
| | 120 | 29 | 2 | 178 000 | 174 000 | 4 500 | 5 600 | 21311EAE4 | 21311EAKE4 |
| | 120 | 43 | 2 | 292 000 | 292 000 | 3 800 | 4 800 | 22311EAE4 | 22311EAKE4 |
| 65 | 110 | 28 | 1.5 | 178 000 | 174 000 | 4 800 | 6 000 | 22212EAE4 | 22212EAKE4 |
| | 130 | 31 | 2.1 | 238 000 | 244 000 | 3 800 | 4 800 | 21312EAE4 | 21312EAKE4 |
| | 130 | 46 | 2.1 | 340 000 | 340 000 | 3 600 | 4 500 | 22312EAE4 | 22312EAKE4 |
| 70 | 120 | 31 | 1.5 | 221 000 | 230 000 | 4 300 | 5 300 | 22213EAE4 | 22213EAKE4 |
| | 140 | 33 | 2.1 | 264 000 | 275 000 | 3 600 | 4 500 | 21313EAE4 | 21313EAKE4 |
| | 140 | 48 | 2.1 | 375 000 | 380 000 | 3 200 | 4 000 | 22313EAE4 | 22313EAKE4 |
| 75 | 125 | 31 | 1.5 | 225 000 | 232 000 | 4 000 | 5 300 | 22214EAE4 | 22214EAKE4 |
| | 150 | 35 | 2.1 | 310 000 | 325 000 | 3 200 | 4 000 | 21314EAE4 | 21314EAKE4 |
| | 150 | 51 | 2.1 | 425 000 | 435 000 | 3 000 | 3 800 | 22314EAE4 | 22314EAKE4 |
| 80 | 130 | 31 | 1.5 | 238 000 | 244 000 | 4 000 | 5 000 | 22215EAE4 | 22215EAKE4 |
| | 160 | 37 | 2.1 | 310 000 | 325 000 | 3 200 | 4 000 | 21315EAE4 | 21315EAKE4 |
| | 160 | 55 | 2.1 | 485 000 | 505 000 | 2 800 | 3 600 | 22315EAE4 | 22315EAKE4 |
| 85 | 140 | 33 | 2 | 264 000 | 275 000 | 3 600 | 4 500 | 22216EAE4 | 22216EAKE4 |
| | 170 | 39 | 2.1 | 355 000 | 375 000 | 3 000 | 3 800 | 21316EAE4 | 21316EAKE4 |
| | 170 | 58 | 2.1 | 540 000 | 565 000 | 2 600 | 3 400 | 22316EAE4 | 22316EAKE4 |
| 90 | 150 | 36 | 2 | 310 000 | 325 000 | 3 400 | 4 300 | 22217EAE4 | 22217EAKE4 |
| | 180 | 41 | 3 | 360 000 | 395 000 | 3 000 | 4 000 | 21317EAE4 | 21317EAKE4 |
| | 180 | 60 | 3 | 600 000 | 630 000 | 2 400 | 3 200 | 22317EAE4 | 22317EAKE4 |
| 95 | 160 | 40 | 2 | 360 000 | 395 000 | 3 200 | 4 000 | 22218EAE4 | 22218EAKE4 |
| | 190 | 43 | 3 | 415 000 | 450 000 | 2 800 | 3 600 | 21318EAE4 | 21318EAKE4 |
| | 190 | 64 | 3 | 665 000 | 705 000 | 2 400 | 3 000 | 22318EAE4 | 22318EAKE4 |
| 100 | 170 | 43 | 2.1 | 415 000 | 450 000 | 3 000 | 3 800 | 22219EAE4 | 22219EAKE4 |
| | 200 | 67 | 3 | 735 000 | 780 000 | 2 200 | 2 800 | 22319EAE4 | 22319EAKE4 |
| 110 | 180 | 46 | 2.1 | 455 000 | 490 000 | 2 800 | 3 600 | 22220EAE4 | 22220EAKE4 |
| | 215 | 73 | 3 | 860 000 | 930 000 | 2 000 | 2 600 | 22320EAE4 | 22320EAKE4 |
| 120 | 200 | 53 | 2.1 | 605 000 | 645 000 | 2 600 | 3 200 | 22222EAE4 | 22222EAKE4 |
| | 240 | 80 | 3 | 1 030 000 | 1 120 000 | 1 900 | 2 400 | 22322EAE4 | 22322EAKE4 |
| 130 | 215 | 58 | 2.1 | 685 000 | 765 000 | 2 400 | 3 000 | 22224EAE4 | 22224EAKE4 |
| | 260 | 86 | 3 | 1 190 000 | 1 320 000 | 1 700 | 2 200 | 22324EAE4 | 22324EAKE4 |
| 130 | 230 | 64 | 3 | 820 000 | 940 000 | 2 200 | 2 600 | 22226EAE4 | 22226EAKE4 |

Note (1) The suffix K indicates that the bearing has a tapered bore (taper 1:12).

Remarks 1. The maximum operating temperature of standard HPS spherical roller bearings is 200°C.

2. The suffix E4 indicates that the bearing has an oil groove and holes.

(The numbers and dimensions of oil grooves and holes are shown in Tables 1 and 2.)

Dynamic equivalent load

$$P = XF_r + YF_a$$

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

Static equivalent load

$$P_0 = F_r + Y_0 F_a$$

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

Table 1 Dimensions of oil grooves and holes

| Nominal outer ring width C | | Oil groove width W | Hole diameter d_{OH} |
|----------------------------|-------|--------------------|------------------------|
| over | incl. | | |
| 18 | 30 | 5 | 2.5 |
| 30 | 40 | 6 | 3 |
| 40 | 50 | 7 | 4 |
| 50 | 65 | 8 | 5 |
| 65 | 80 | 10 | 6 |
| 80 | 100 | 12 | 8 |

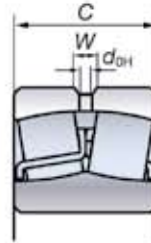
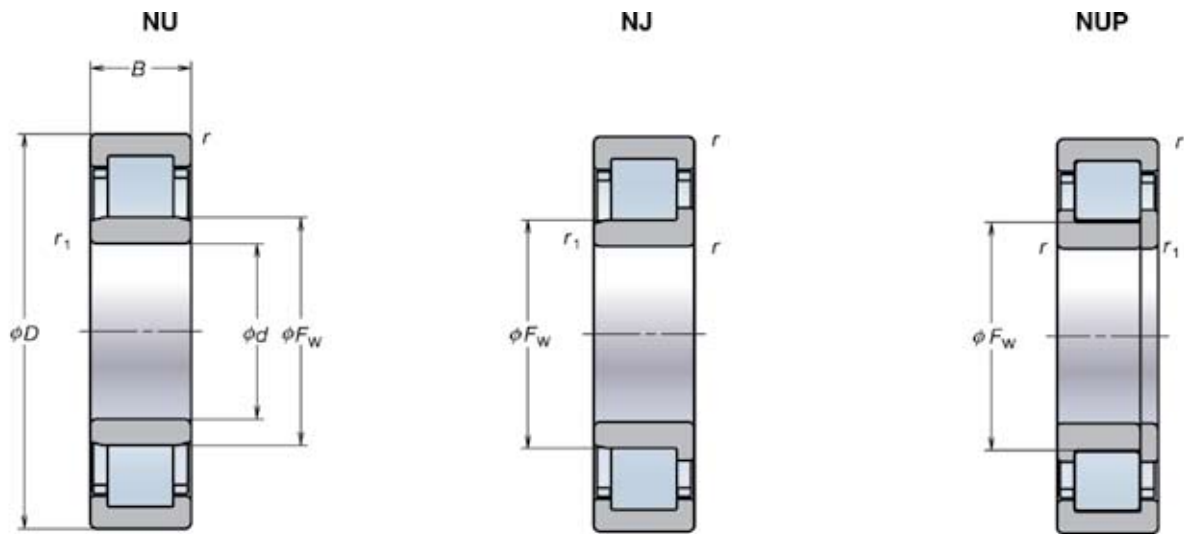


Table 2 Number of oil holes

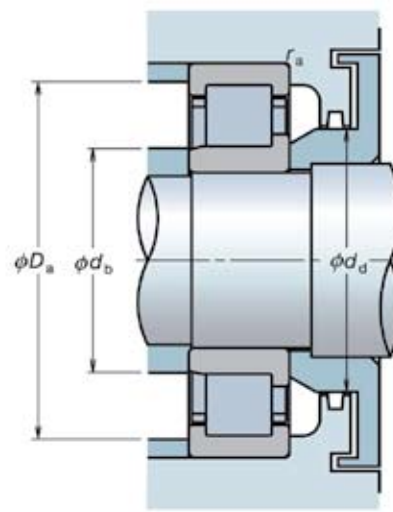
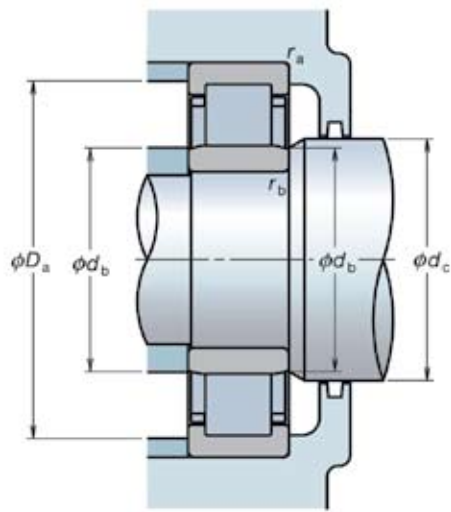
| Nominal outer ring diameter (mm) | | Number of holes |
|----------------------------------|-------|-----------------|
| over | incl. | |
| — | 180 | 4 |
| 180 | 250 | 6 |
| 250 | 315 | 6 |

| Abutment and fillet dimensions (mm) | | | | | Constant | Axial load factors | | | Mass (kg) approx |
|-------------------------------------|-------------|-------|-------------|-------------|----------|--------------------|-------|-------|------------------|
| (min) | d_a (max) | (max) | D_a (min) | r_a (max) | | e | Y_2 | Y_3 | |
| 47 | 49 | 73 | 70 | 1 | 0.28 | 3.6 | 2.4 | 2.4 | 0.50 |
| 49 | 54 | 81 | 75 | 1.5 | 0.25 | 3.9 | 2.7 | 2.6 | 0.73 |
| 49 | 52 | 81 | 77 | 1.5 | 0.35 | 2.8 | 1.9 | 1.9 | 0.98 |
| 52 | 54 | 78 | 75 | 1 | 0.25 | 3.9 | 2.7 | 2.6 | 0.55 |
| 54 | 65 | 91 | 89 | 1.5 | 0.23 | 4.3 | 2.9 | 2.8 | 0.96 |
| 54 | 59 | 91 | 86 | 1.5 | 0.34 | 2.9 | 2 | 1.9 | 1.34 |
| 57 | 60 | 83 | 81 | 1 | 0.24 | 4.3 | 2.9 | 2.8 | 0.61 |
| 60 | 72 | 100 | 98 | 2 | 0.23 | 4.4 | 3 | 2.9 | 1.21 |
| 60 | 64 | 100 | 93 | 2 | 0.35 | 2.8 | 1.9 | 1.9 | 1.78 |
| 64 | 65 | 91 | 89 | 1.5 | 0.23 | 4.3 | 2.9 | 2.8 | 0.81 |
| 65 | 72 | 110 | 98 | 2 | 0.23 | 4.4 | 3 | 2.9 | 1.58 |
| 65 | 73 | 110 | 103 | 2 | 0.34 | 2.9 | 2 | 1.9 | 2.30 |
| 69 | 72 | 101 | 98 | 1.5 | 0.23 | 4.4 | 3 | 2.9 | 1.10 |
| 72 | 87 | 118 | 117 | 2 | 0.22 | 4.5 | 3 | 3 | 1.98 |
| 72 | 79 | 118 | 111 | 2 | 0.34 | 3 | 2 | 1.9 | 2.89 |
| 74 | 80 | 111 | 107 | 1.5 | 0.24 | 4.2 | 2.8 | 2.7 | 1.51 |
| 77 | 94 | 128 | 126 | 2 | 0.22 | 4.6 | 3.1 | 3 | 2.45 |
| 77 | 84 | 128 | 119 | 2 | 0.33 | 3 | 2 | 2 | 3.52 |
| 79 | 84 | 116 | 111 | 1.5 | 0.23 | 4.3 | 2.9 | 2.8 | 1.58 |
| 82 | 101 | 138 | 135 | 2 | 0.22 | 4.6 | 3.1 | 3 | 3.00 |
| 82 | 91 | 138 | 129 | 2 | 0.33 | 3 | 2 | 2 | 4.28 |
| 84 | 87 | 121 | 117 | 1.5 | 0.22 | 4.5 | 3 | 3 | 1.64 |
| 87 | 101 | 148 | 134 | 2 | 0.22 | 4.6 | 3.1 | 3 | 3.64 |
| 87 | 97 | 148 | 137 | 2 | 0.33 | 3 | 2 | 2 | 5.26 |
| 90 | 94 | 130 | 126 | 2 | 0.22 | 4.6 | 3.1 | 3 | 2.01 |
| 92 | 109 | 158 | 146 | 2 | 0.23 | 4.4 | 3 | 2.9 | 4.32 |
| 92 | 103 | 158 | 145 | 2 | 0.33 | 3 | 2 | 2 | 6.23 |
| 95 | 101 | 140 | 135 | 2 | 0.22 | 4.6 | 3.1 | 3 | 2.54 |
| 99 | 108 | 166 | 142 | 2.5 | 0.24 | 4.3 | 2.9 | 2.8 | 5.20 |
| 99 | 110 | 166 | 155 | 2.5 | 0.33 | 3.1 | 2.1 | 2 | 7.23 |
| 100 | 108 | 150 | 142 | 2 | 0.24 | 4.3 | 2.9 | 2.8 | 3.30 |
| 104 | 115 | 176 | 152 | 2.5 | 0.24 | 4.3 | 2.9 | 2.8 | 6.10 |
| 104 | 115 | 176 | 163 | 2.5 | 0.33 | 3.1 | 2.1 | 2 | 8.56 |
| 107 | 115 | 158 | 152 | 2 | 0.24 | 4.3 | 2.9 | 2.8 | 4.04 |
| 109 | 121 | 186 | 172 | 2.5 | 0.33 | 3.1 | 2.1 | 2 | 9.91 |
| 112 | 119 | 168 | 160 | 2 | 0.24 | 4.3 | 2.9 | 2.8 | 4.84 |
| 114 | 130 | 201 | 184 | 2.5 | 0.33 | 3 | 2 | 2 | 12.7 |
| 122 | 129 | 188 | 178 | 2 | 0.25 | 4 | 2.7 | 2.6 | 6.99 |
| 124 | 145 | 226 | 206 | 2.5 | 0.33 | 3.1 | 2.1 | 2 | 17.6 |
| 132 | 142 | 203 | 190 | 2 | 0.25 | 3.9 | 2.7 | 2.6 | 8.80 |
| 134 | 157 | 246 | 222 | 2.5 | 0.32 | 3.1 | 2.1 | 2 | 22.2 |
| 144 | 152 | 216 | 204 | 2.5 | 0.26 | 3.8 | 2.6 | 2.5 | 11.0 |

EW Cylindrical Roller Bearings

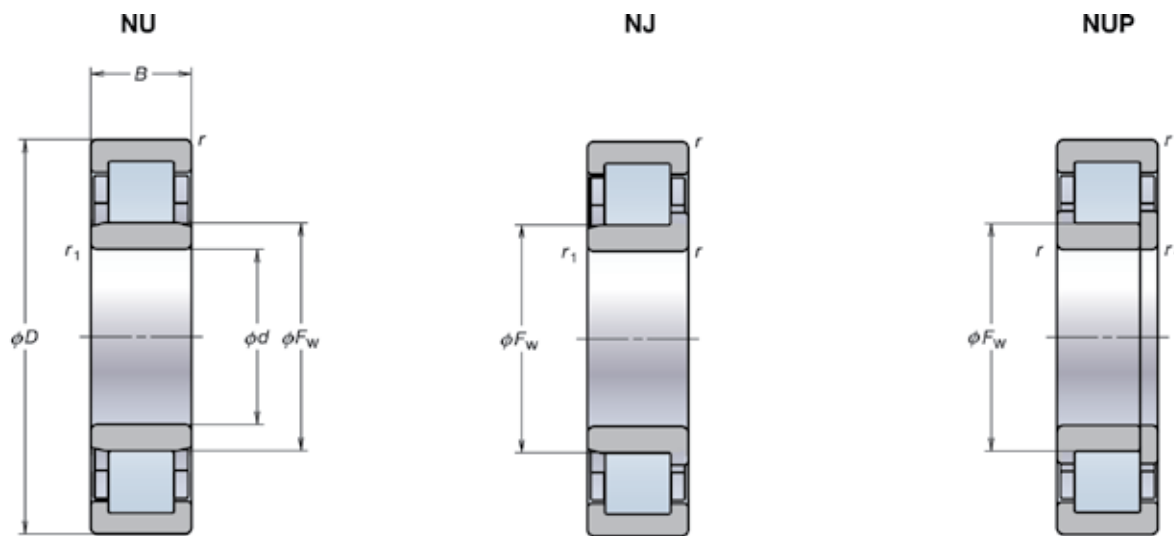


| Boundary dimensions (mm) | | | | | | Basic load ratings (N) | | Limiting speeds (min ⁻¹) | |
|--------------------------|----------|----------|-------------------|--------------------------------|-----------------------|------------------------|------------------------|--------------------------------------|--------|
| <i>d</i> | <i>D</i> | <i>B</i> | <i>r</i> (min) | <i>r</i> ₁ (min) | <i>F</i> _w | <i>C</i> _r | <i>C</i> _{0r} | Grease | Oil |
| 25 | 52 | 15 | 1 | 0.6 | 31.5 | 29 300 | 27 700 | 12 000 | 14 000 |
| | 62 | 17 | 1.1 | 1.1 | 34 | 41 500 | 37 500 | 10 000 | 12 000 |
| 30 | 62 | 16 | 1 | 0.6 | 37.5 | 39 000 | 37 500 | 9 500 | 12 000 |
| | 72 | 19 | 1.1 | 1.1 | 40.5 | 53 000 | 50 000 | 8 500 | 10 000 |
| 35 | 72 | 17 | 1.1 | 0.6 | 44 | 50 500 | 50 000 | 8 500 | 10 000 |
| | 80 | 21 | 1.5 | 1.1 | 46.2 | 66 500 | 65 500 | 7 500 | 9 500 |
| 40 | 80 | 18 | 1.1 | 1.1 | 49.5 | 55 500 | 55 500 | 7 500 | 9 000 |
| | 90 | 23 | 1.5 | 1.5 | 52 | 83 000 | 81 500 | 6 700 | 8 000 |
| 45 | 85 | 19 | 1.1 | 1.1 | 54.5 | 63 000 | 66 500 | 6 700 | 8 000 |
| | 100 | 25 | 1.5 | 1.5 | 58.5 | 97 500 | 98 500 | 6 000 | 7 500 |
| 50 | 90 | 20 | 1.1 | 1.1 | 59.5 | 69 000 | 76 500 | 6 300 | 7 500 |
| | 110 | 27 | 2 | 2 | 65 | 110 000 | 113 000 | 5 000 | 6 000 |
| 55 | 100 | 21 | 1.5 | 1.1 | 66 | 86 500 | 98 500 | 5 600 | 7 100 |
| | 120 | 29 | 2 | 2 | 70.5 | 137 000 | 143 000 | 4 500 | 5 600 |
| 60 | 110 | 22 | 1.5 | 1.5 | 72 | 97 500 | 107 000 | 5 300 | 6 300 |
| 65 | 120 | 23 | 1.5 | 1.5 | 78.5 | 108 000 | 119 000 | 4 800 | 5 600 |



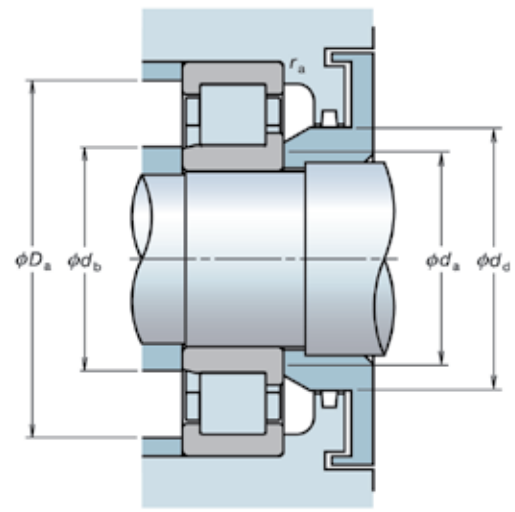
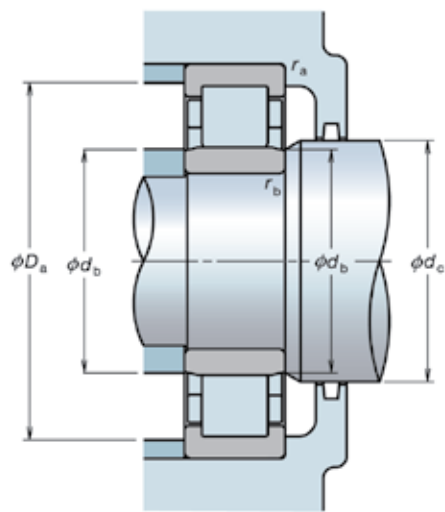
| Bearing numbers | | | Abutment and fillet dimensions (mm) | | | | | | | | Permissible axial movement S (mm) |
|-----------------|----|-----|-------------------------------------|-------------------|----|-------------|-------------|-------------|-------------|-------------|-----------------------------------|
| NU | NJ | NUP | d_a (min) | d_b (min) (max) | | d_c (min) | d_d (min) | D_a (max) | r_a (max) | r_b (max) | |
| NU205EW | NJ | NUP | 30 | 29 | 30 | 34 | 37 | 47 | 1 | 0.6 | 1.2 |
| NU305EW | NJ | NUP | 31.5 | 31.5 | 32 | 37 | 40 | 55.5 | 1 | 1 | 1.2 |
| NU206EW | NJ | NUP | 35 | 34 | 36 | 40 | 44 | 57 | 1 | 0.6 | 1.2 |
| NU306EW | NJ | NUP | 36.5 | 36.5 | 39 | 44 | 48 | 65.5 | 1 | 1 | 1.2 |
| NU207EW | NJ | NUP | 41.5 | 39 | 42 | 46 | 50 | 65.5 | 1 | 0.6 | 1.2 |
| NU307EW | NJ | NUP | 43 | 41.5 | 44 | 48 | 53 | 72 | 1.5 | 1 | 1.2 |
| NU208EW | NJ | NUP | 46.5 | 46.5 | 48 | 52 | 56 | 73.5 | 1 | 1 | 1.2 |
| NU308EW | NJ | NUP | 48 | 48 | 50 | 55 | 60 | 82 | 1.5 | 1.5 | 1.2 |
| NU209EW | NJ | NUP | 51.5 | 51.5 | 52 | 57 | 61 | 78.5 | 1 | 1 | 1.2 |
| NU309EW | NJ | NUP | 53 | 53 | 56 | 60 | 66 | 92 | 1.5 | 1.5 | 1.4 |
| NU210EW | NJ | NUP | 56.5 | 56.5 | 57 | 62 | 67 | 83.5 | 1 | 1 | 1.7 |
| NU310EW | NJ | NUP | 59 | 59 | 63 | 67 | 73 | 101 | 2 | 2 | 1.4 |
| NU211EW | NJ | NUP | 63 | 61.5 | 64 | 68 | 73 | 92 | 1.5 | 1 | 1.2 |
| NU311EW | NJ | NUP | 64 | 64 | 68 | 72 | 80 | 111 | 2 | 2 | 1.4 |
| NU212EW | NJ | NUP | 68 | 68 | 70 | 75 | 80 | 102 | 1.5 | 1.5 | 1.2 |
| NU213EW | NJ | NUP | 73 | 73 | 76 | 81 | 87 | 112 | 1.5 | 1.5 | 1.4 |

EM Cylindrical Roller Bearings



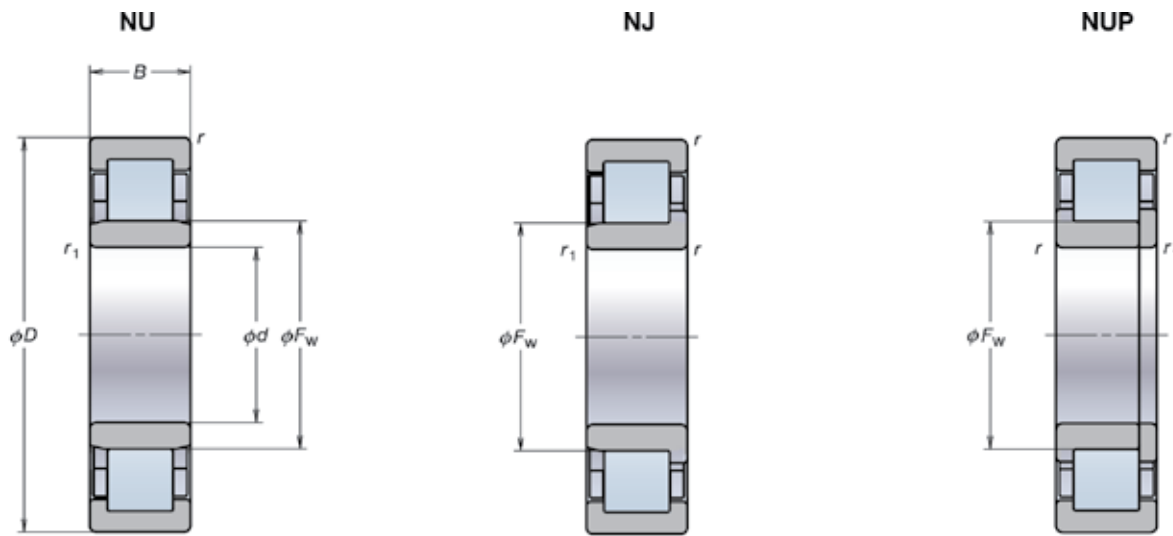
| Boundary dimensions (mm) | | | | | | Basic load ratings (N) | | Limiting speeds (min ⁻¹) | |
|--------------------------|-----|----|-----|----------------|----------------|------------------------|-----------------|--------------------------------------|--------|
| d | D | B | r | r ₁ | F _w | C _r | C _{or} | Grease | Oil |
| | | | min | min | | | | | |
| 25 | 52 | 15 | 1 | 0.6 | 31.5 | 29 300 | 27 700 | 13 000 | 16 000 |
| | 62 | 17 | 1.1 | 1.1 | 34 | 41 500 | 37 500 | 10 000 | 13 000 |
| 30 | 62 | 16 | 1 | 0.6 | 37.5 | 39 000 | 37 500 | 11 000 | 13 000 |
| | 72 | 19 | 1.1 | 1.1 | 40.5 | 53 000 | 50 000 | 8 500 | 11 000 |
| 35 | 72 | 17 | 1.1 | 0.6 | 44 | 50 500 | 50 000 | 9 500 | 11 000 |
| | 80 | 21 | 1.5 | 1.1 | 46.2 | 66 500 | 65 500 | 8 000 | 9 500 |
| 40 | 80 | 18 | 1.1 | 1.1 | 49.5 | 55 500 | 55 500 | 8 500 | 10 000 |
| | 90 | 23 | 1.5 | 1.5 | 52 | 83 000 | 81 500 | 6 700 | 8 500 |
| 45 | 85 | 19 | 1.1 | 1.1 | 54.5 | 63 000 | 66 500 | 7 500 | 9 000 |
| | 100 | 25 | 1.5 | 1.5 | 58.5 | 97 500 | 98 500 | 6 300 | 7 500 |
| 50 | 90 | 20 | 1.1 | 1.1 | 59.5 | 69 000 | 76 500 | 7 100 | 8 500 |
| | 110 | 27 | 2 | 2 | 65 | 110 000 | 113 000 | 5 600 | 6 700 |
| 55 | 100 | 21 | 1.5 | 1.1 | 66 | 86 500 | 98 500 | 6 300 | 7 500 |
| | 120 | 29 | 2 | 2 | 70.5 | 137 000 | 143 000 | 5 000 | 6 300 |
| 60 | 110 | 22 | 1.5 | 1.5 | 72 | 97 500 | 107 000 | 6 000 | 7 100 |
| | 130 | 31 | 2.1 | 2.1 | 77 | 150 000 | 157 000 | 4 800 | 5 600 |
| 65 | 120 | 23 | 1.5 | 1.5 | 78.5 | 108 000 | 119 000 | 5 300 | 6 300 |
| | 140 | 33 | 2.1 | 2.1 | 82.5 | 181 000 | 191 000 | 4 300 | 5 300 |
| 70 | 125 | 24 | 1.5 | 1.5 | 83.5 | 119 000 | 137 000 | 5 000 | 6 300 |
| | 150 | 35 | 2.1 | 2.1 | 89 | 205 000 | 222 000 | 4 000 | 5 000 |
| 75 | 130 | 25 | 1.5 | 1.5 | 88.5 | 130 000 | 156 000 | 4 800 | 6 000 |
| | 160 | 37 | 2.1 | 2.1 | 95 | 240 000 | 263 000 | 3 800 | 4 800 |
| 80 | 140 | 26 | 2 | 2 | 95.3 | 139 000 | 167 000 | 4 500 | 5 300 |
| | 170 | 39 | 2.1 | 2.1 | 101 | 256 000 | 282 000 | 3 600 | 4 300 |
| 85 | 150 | 28 | 2 | 2 | 100.5 | 167 000 | 199 000 | 4 300 | 5 000 |
| | 180 | 41 | 3 | 3 | 108 | 291 000 | 330 000 | 3 400 | 4 000 |
| 90 | 160 | 30 | 2 | 2 | 107 | 182 000 | 217 000 | 4 000 | 4 800 |
| | 190 | 43 | 3 | 3 | 113.5 | 315 000 | 355 000 | 3 200 | 3 800 |
| 95 | 170 | 32 | 2.1 | 2.1 | 112.5 | 220 000 | 265 000 | 3 800 | 4 500 |
| | 200 | 45 | 3 | 3 | 121.5 | 335 000 | 385 000 | 3 000 | 3 600 |
| 100 | 180 | 34 | 2.1 | 2.1 | 119 | 249 000 | 305 000 | 3 600 | 4 300 |
| | 215 | 47 | 3 | 3 | 127.5 | 380 000 | 425 000 | 2 800 | 3 400 |
| 105 | 190 | 36 | 2.1 | 2.1 | 125 | 262 000 | 310 000 | 3 400 | 4 000 |
| | 225 | 49 | 3 | 3 | 133 | 425 000 | 480 000 | 2 600 | 3 200 |
| 110 | 200 | 38 | 2.1 | 2.1 | 132.5 | 293 000 | 365 000 | 3 200 | 3 800 |
| | 200 | 53 | 2.1 | 2.1 | 132.5 | 385 000 | 515 000 | 2 800 | 3 400 |
| | 240 | 50 | 3 | 3 | 143 | 450 000 | 525 000 | 2 600 | 3 000 |

The following are also available: 1. N and NF type bearings 2. Cages with an outside diameter of less than 650 mm (Please contact NSK for details.)



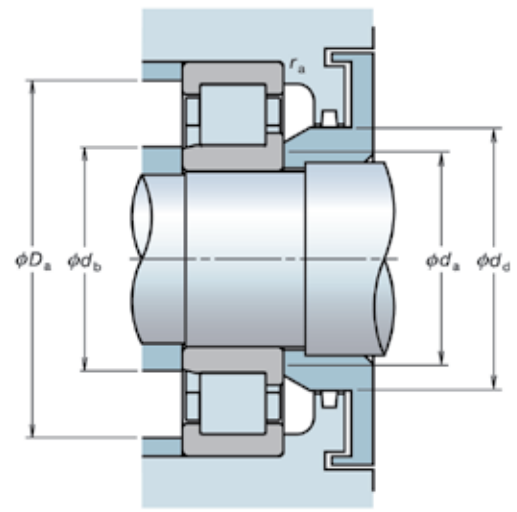
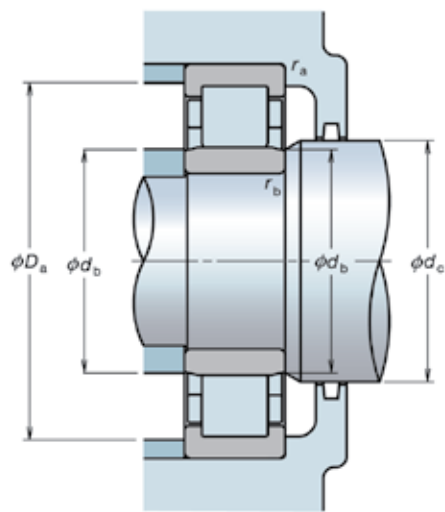
| Bearing numbers | | | Abutment and fillet dimensions (mm) | | | | | | | | Permissible axial movement S (mm) |
|-----------------|----|-----|-------------------------------------|-------|-----|-------|-------|-------|-------|-------|-----------------------------------|
| NU | NJ | NUP | d_a | d_b | | d_c | d_d | D_a | r_a | r_b | |
| | | | min | min | max | min | min | max | max | max | |
| NU205EM | NJ | NUP | 30 | 29 | 30 | 34 | 37 | 47 | 1 | 0.6 | 1.2 |
| NU305EM | NJ | NUP | 31.5 | 31.5 | 32 | 37 | 40 | 55.5 | 1 | 1 | 1.2 |
| NU206EM | NJ | NUP | 35 | 34 | 36 | 40 | 44 | 57 | 1 | 0.6 | 1.2 |
| NU306EM | NJ | NUP | 36.5 | 36.5 | 39 | 44 | 48 | 65.5 | 1 | 1 | 1.2 |
| NU207EM | NJ | NUP | 41.5 | 39 | 42 | 46 | 50 | 65.5 | 1 | 0.6 | 1.2 |
| NU307EM | NJ | NUP | 43 | 41.5 | 44 | 48 | 53 | 72 | 1.5 | 1 | 1.2 |
| NU208EM | NJ | NUP | 46.5 | 46.5 | 48 | 52 | 56 | 73.5 | 1 | 1 | 1.2 |
| NU308EM | NJ | NUP | 48 | 48 | 50 | 55 | 60 | 82 | 1.5 | 1.5 | 1.2 |
| NU209EM | NJ | NUP | 51.5 | 51.5 | 52 | 57 | 61 | 78.5 | 1 | 1 | 1.2 |
| NU309EM | NJ | NUP | 53 | 53 | 56 | 60 | 66 | 92 | 1.5 | 1.5 | 1.4 |
| NU210EM | NJ | NUP | 56.5 | 56.5 | 57 | 62 | 67 | 83.5 | 1 | 1 | 1.7 |
| NU310EM | NJ | NUP | 59 | 59 | 63 | 67 | 73 | 101 | 2 | 2 | 1.4 |
| NU211EM | NJ | NUP | 63 | 61.5 | 64 | 68 | 73 | 92 | 1.5 | 1 | 1.2 |
| NU311EM | NJ | NUP | 64 | 64 | 68 | 72 | 80 | 111 | 2 | 2 | 1.4 |
| NU212EM | NJ | NUP | 68 | 68 | 70 | 75 | 80 | 102 | 1.5 | 1.5 | 1.2 |
| NU312EM | NJ | NUP | 71 | 71 | 75 | 79 | 86 | 119 | 2 | 2 | 1.5 |
| NU213EM | NJ | NUP | 73 | 73 | 76 | 81 | 87 | 112 | 1.5 | 1.5 | 1.4 |
| NU313EM | NJ | NUP | 76 | 76 | 80 | 85 | 93 | 129 | 2 | 2 | 1.5 |
| NU214EM | NJ | NUP | 78 | 78 | 81 | 86 | 92 | 117 | 1.5 | 1.5 | 1.4 |
| NU314EM | NJ | NUP | 81 | 81 | 86 | 92 | 100 | 139 | 2 | 2 | 1.5 |
| NU215EM | NJ | NUP | 83 | 83 | 86 | 90 | 96 | 122 | 1.5 | 1.5 | 1.4 |
| NU315EM | NJ | NUP | 86 | 86 | 92 | 97 | 106 | 149 | 2 | 2 | 1.4 |
| NU216EM | NJ | NUP | 89 | 89 | 92 | 97 | 104 | 131 | 2 | 2 | 1.4 |
| NU316EM | NJ | NUP | 91 | 91 | 98 | 105 | 114 | 159 | 2 | 2 | 1.5 |
| NU217EM | NJ | NUP | 94 | 94 | 98 | 104 | 110 | 141 | 2 | 2 | 1.3 |
| NU317EM | NJ | NUP | 98 | 98 | 105 | 110 | 119 | 167 | 2.5 | 2.5 | 2 |
| NU218EM | NJ | NUP | 99 | 99 | 104 | 109 | 116 | 151 | 2 | 2 | 1.4 |
| NU318EM | NJ | NUP | 103 | 103 | 111 | 117 | 127 | 177 | 2.5 | 2.5 | 1.5 |
| NU219EM | NJ | NUP | 106 | 106 | 110 | 116 | 123 | 159 | 2 | 2 | 1.4 |
| NU319EM | NJ | NUP | 108 | 108 | 118 | 124 | 134 | 187 | 2.5 | 2.5 | 1.5 |
| NU220EM | NJ | NUP | 111 | 111 | 116 | 122 | 130 | 169 | 2 | 2 | 1.4 |
| NU320EM | NJ | NUP | 113 | 113 | 124 | 132 | 143 | 202 | 2.5 | 2.5 | 1.8 |
| NU221EM | NJ | NUP | 116 | 116 | 121 | 129 | 137 | 179 | 2 | 2 | 1.4 |
| NU321EM | NJ | NUP | 118 | 118 | 131 | 137 | 149 | 212 | 2.5 | 2.5 | 1.8 |
| NU222EM | NJ | NUP | 121 | 121 | 129 | 135 | 144 | 189 | 2 | 2 | 1.4 |
| NU2222EM | NJ | NUP | 121 | 121 | 129 | 135 | 144 | 189 | 2 | 2 | 1.4 |
| NU322EM | NJ | NUP | 123 | 123 | 139 | 145 | 158 | 227 | 2.5 | 2.5 | 3.8 |

EM Cylindrical Roller Bearings



| Boundary dimensions (mm) | | | | | | Basic load ratings (N) | | Limiting speeds (min ⁻¹) | |
|--------------------------|-----|-----|-----|----------------|----------------|------------------------|-----------------|--------------------------------------|-------|
| d | D | B | r | r ₁ | F _w | C _r | C _{or} | Grease | Oil |
| | | | min | min | | | | | |
| 120 | 215 | 40 | 2.1 | 2.1 | 143.5 | 335 000 | 420 000 | 3 000 | 3 400 |
| | 215 | 58 | 2.1 | 2.1 | 143.5 | 450 000 | 620 000 | 2 600 | 3 200 |
| | 260 | 55 | 3 | 3 | 154 | 530 000 | 610 000 | 2 200 | 2 800 |
| | 260 | 86 | 3 | 3 | 154 | 795 000 | 1 030 000 | 2 000 | 2 600 |
| 130 | 230 | 40 | 3 | 3 | 153.5 | 365 000 | 455 000 | 2 600 | 3 200 |
| | 230 | 64 | 3 | 3 | 153.5 | 530 000 | 735 000 | 2 400 | 3 000 |
| | 280 | 58 | 4 | 4 | 167 | 615 000 | 735 000 | 2 200 | 2 600 |
| | 280 | 93 | 4 | 4 | 167 | 920 000 | 1 230 000 | 1 900 | 2 400 |
| 140 | 250 | 42 | 3 | 3 | 169 | 395 000 | 515 000 | 2 400 | 3 000 |
| | 250 | 68 | 3 | 3 | 169 | 550 000 | 790 000 | 2 200 | 2 800 |
| | 300 | 62 | 4 | 4 | 180 | 665 000 | 795 000 | 2 000 | 2 400 |
| | 300 | 102 | 4 | 4 | 180 | 1 020 000 | 1 380 000 | 1 700 | 2 200 |
| 150 | 270 | 45 | 3 | 3 | 182 | 450 000 | 595 000 | 2 200 | 2 800 |
| | 270 | 73 | 3 | 3 | 182 | 635 000 | 930 000 | 2 000 | 2 600 |
| | 320 | 65 | 4 | 4 | 193 | 760 000 | 920 000 | 1 800 | 2 200 |
| | 320 | 108 | 4 | 4 | 193 | 1 160 000 | 1 600 000 | 1 600 | 2 000 |
| 160 | 290 | 48 | 3 | 3 | 195 | 500 000 | 665 000 | 2 200 | 2 600 |
| | 290 | 80 | 3 | 3 | 193 | 810 000 | 1 190 000 | 1 900 | 2 400 |
| | 340 | 68 | 4 | 4 | 204 | 860 000 | 1 050 000 | 1 700 | 2 000 |
| | 340 | 114 | 4 | 4 | 204 | 1 310 000 | 1 820 000 | 1 500 | 1 900 |
| 170 | 310 | 52 | 4 | 4 | 207 | 605 000 | 800 000 | 2 000 | 2 400 |
| | 310 | 86 | 4 | 4 | 205 | 925 000 | 1 330 000 | 1 800 | 2 200 |
| | 360 | 72 | 4 | 4 | 218 | 930 000 | 1 150 000 | 1 600 | 2 000 |
| | 360 | 120 | 4 | 4 | 216 | 1 490 000 | 2 070 000 | 1 400 | 1 800 |
| 180 | 320 | 52 | 4 | 4 | 217 | 625 000 | 850 000 | 1 900 | 2 200 |
| | 320 | 86 | 4 | 4 | 215 | 1 010 000 | 1 510 000 | 1 700 | 2 000 |
| | 380 | 75 | 4 | 4 | 231 | 985 000 | 1 230 000 | 1 500 | 1 800 |
| | 380 | 126 | 4 | 4 | 227 | 1 560 000 | 2 220 000 | 1 300 | 1 700 |
| 190 | 340 | 55 | 4 | 4 | 230 | 695 000 | 955 000 | 1 800 | 2 200 |
| | 340 | 92 | 4 | 4 | 228 | 1 100 000 | 1 670 000 | 1 600 | 2 000 |
| | 400 | 78 | 5 | 5 | 245 | 1 060 000 | 1 340 000 | 1 400 | 1 700 |
| | 400 | 132 | 5 | 5 | 240 | 1 770 000 | 2 520 000 | 1 300 | 1 600 |
| 200 | 360 | 58 | 4 | 4 | 243 | 765 000 | 1 060 000 | 1 700 | 2 000 |
| | 360 | 98 | 4 | 4 | 241 | 1 220 000 | 1 870 000 | 1 500 | 1 800 |
| | 420 | 80 | 5 | 5 | 258 | 1 140 000 | 1 450 000 | 1 300 | 1 600 |
| | 420 | 138 | 5 | 5 | 253 | 1 910 000 | 2 760 000 | 1 200 | 1 500 |

The following are also available: 1. N and NF type bearings 2. Cages with an outside diameter of less than 650 mm (Please contact NSK for details.)



| Bearing numbers | | | Abutment and fillet dimensions (mm) | | | | | | | | Permissible axial movement S (mm) |
|-----------------|----|-----|-------------------------------------|-------|-----|-------|-------|-------|-------|-------|-----------------------------------|
| NU | NJ | NUP | d_a | d_b | | d_c | d_d | D_a | r_a | r_b | |
| | | | min | min | max | min | min | max | max | max | |
| NU224EM | NJ | NUP | 131 | 131 | 140 | 146 | 156 | 204 | 2 | 2 | 1.5 |
| NU2224EM | NJ | NUP | 131 | 131 | 140 | 146 | 156 | 204 | 2 | 2 | 2 |
| NU324EM | NJ | NUP | 133 | 133 | 150 | 156 | 171 | 247 | 2.5 | 2.5 | 1.8 |
| NU2324EM | NJ | NUP | 133 | 133 | 150 | 156 | 171 | 247 | 2.5 | 2.5 | 2.8 |
| NU226EM | NJ | NUP | 143 | 143 | 150 | 158 | 168 | 217 | 2.5 | 2.5 | 1.5 |
| NU2226EM | NJ | NUP | 143 | 143 | 150 | 158 | 168 | 217 | 2.5 | 2.5 | 3 |
| NU326EM | NJ | NUP | 146 | 146 | 163 | 169 | 184 | 264 | 3 | 3 | 2.3 |
| NU2326EM | NJ | NUP | 146 | 146 | 163 | 169 | 184 | 264 | 3 | 3 | 2.3 |
| NU228EM | NJ | NUP | 153 | 153 | 165 | 171 | 182 | 237 | 2.5 | 2.5 | 1.5 |
| NU2228EM | NJ | NUP | 153 | 153 | 165 | 171 | 182 | 237 | 2.5 | 2.5 | 2.5 |
| NU328EM | NJ | NUP | 156 | 156 | 176 | 182 | 198 | 284 | 3 | 3 | 3.3 |
| NU2328EM | NJ | NUP | 156 | 156 | 176 | 182 | 198 | 284 | 3 | 3 | 2.8 |
| NU230EM | NJ | NUP | 163 | 163 | 177 | 184 | 196 | 257 | 2.5 | 2.5 | 1.5 |
| NU2230EM | NJ | NUP | 163 | 163 | 177 | 184 | 196 | 257 | 2.5 | 2.5 | 3 |
| NU330EM | NJ | NUP | 166 | 166 | 188 | 195 | 213 | 304 | 3 | 3 | 3.2 |
| NU2330EM | NJ | NUP | 166 | 166 | 188 | 195 | 213 | 304 | 3 | 3 | 2.2 |
| NU232EM | NJ | NUP | 173 | 173 | 190 | 197 | 210 | 277 | 2.5 | 2.5 | 1.8 |
| NU2232EM | NJ | NUP | 173 | 173 | 188 | 197 | 210 | 277 | 2.5 | 2.5 | 3.3 |
| NU332EM | NJ | NUP | 176 | 176 | 199 | 211 | 228 | 324 | 3 | 3 | 3.2 |
| NU2332EM | NJ | NUP | 176 | 176 | 199 | 211 | 228 | 324 | 3 | 3 | 2.7 |
| NU234EM | NJ | NUP | 186 | 186 | 202 | 211 | 223 | 294 | 3 | 3 | 3.8 |
| NU2234EM | NJ | NUP | 186 | 186 | 200 | 211 | 223 | 294 | 3 | 3 | 2.8 |
| NU334EM | NJ | NUP | 186 | 186 | 213 | 223 | 241 | 344 | 3 | 3 | 1.7 |
| NU2334EM | NJ | NUP | 186 | 186 | 210 | 223 | 241 | 344 | 3 | 3 | 6.2 |
| NU236EM | NJ | NUP | 196 | 196 | 212 | 221 | 233 | 304 | 3 | 3 | 2.2 |
| NU2236EM | NJ | NUP | 196 | 196 | 210 | 221 | 233 | 304 | 3 | 3 | 2.7 |
| NU336EM | NJ | NUP | 196 | 196 | 226 | 235 | 255 | 364 | 3 | 3 | 2.2 |
| NU2336EM | NJ | NUP | 196 | 196 | 222 | 235 | 255 | 364 | 3 | 3 | 6.2 |
| NU238EM | NJ | NUP | 206 | 206 | 225 | 234 | 247 | 324 | 3 | 3 | 1.7 |
| NU2238EM | NJ | NUP | 206 | 206 | 223 | 234 | 247 | 324 | 3 | 3 | 1.7 |
| NU338EM | NJ | NUP | 210 | 210 | 240 | 248 | 268 | 380 | 4 | 4 | 1.7 |
| NU2338EM | NJ | NUP | 210 | 210 | 235 | 248 | 268 | 380 | 4 | 4 | 6.2 |
| NU240EM | NJ | NUP | 216 | 216 | 238 | 247 | 261 | 344 | 3 | 3 | 2.2 |
| NU2240EM | NJ | NUP | 216 | 216 | 235 | 247 | 261 | 344 | 3 | 3 | 2.2 |
| NU340EM | NJ | NUP | 220 | 220 | 252 | 263 | 283 | 400 | 4 | 4 | 1.2 |
| NU2340EM | NJ | NUP | 220 | 220 | 247 | 263 | 283 | 400 | 4 | 4 | 7.7 |

Spherical Thrust Roller Bearings

Nomenclature – Spherical Thrust Bearings

Basic Type & Design

292xx: Spherical Roller Thrust, Light
293xx: Spherical Roller Thrust, Medium
294xx: Spherical Roller Thrust, Heavy

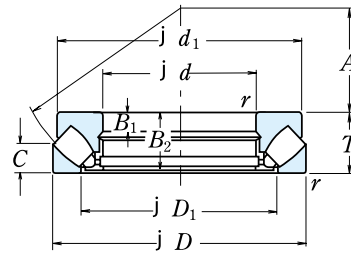
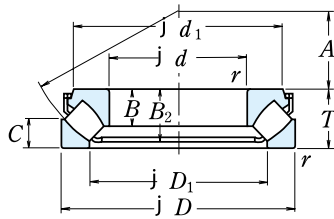
Cage Type

EB: Higher resistance to wear
M: Machined Brass
 (not always shown in the part number)

294

20

EB

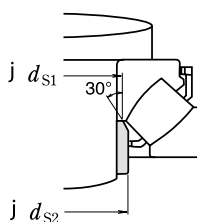
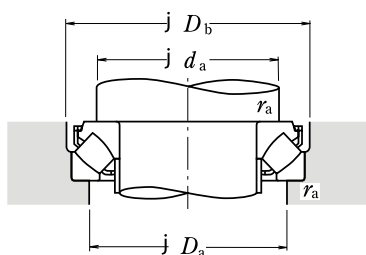


| Boundary Dimensions (mm) | | | | Basic Load Ratings | | | | Limiting Speeds (rpm) Oil | Bearing Numbers |
|--------------------------|-----|-----|-----------|--------------------|-----------|---------|----------|---------------------------|-----------------|
| d | D | T | r_{min} | (N) | | {kgf} | | | |
| | | | | C_a | C_{0a} | C_a | C_{0a} | | |
| 60 | 130 | 42 | 1.5 | 330 000 | 885 000 | 33 500 | 90 000 | 2 600 | 29412 E |
| 65 | 140 | 45 | 2 | 405 000 | 1 100 000 | 41 500 | 112 000 | 2 400 | 29413 E |
| 70 | 150 | 48 | 2 | 450 000 | 1 240 000 | 46 000 | 126 000 | 2 400 | 29414 E |
| 75 | 160 | 51 | 2 | 515 000 | 1 430 000 | 52 500 | 146 000 | 2 200 | 29415 E |
| 80 | 170 | 54 | 2.1 | 575 000 | 1 600 000 | 58 500 | 163 000 | 2 000 | 29416 E |
| 85 | 150 | 39 | 1.5 | 330 000 | 1 040 000 | 34 000 | 106 000 | 2 400 | 29317 E |
| | 180 | 58 | 2.1 | 630 000 | 1 760 000 | 64 500 | 179 000 | 1 900 | 29417 E |
| 90 | 155 | 39 | 1.5 | 350 000 | 1 080 000 | 35 500 | 110 000 | 2 200 | 29318 E |
| | 190 | 60 | 2.1 | 695 000 | 1 950 000 | 70 500 | 199 000 | 1 800 | 29418 E |
| 100 | 170 | 42 | 1.5 | 410 000 | 1 280 000 | 41 500 | 131 000 | 2 000 | 29320 E |
| | 210 | 67 | 3 | 840 000 | 2 400 000 | 86 000 | 245 000 | 1 600 | 29420 E |
| 110 | 190 | 48 | 2 | 530 000 | 1 710 000 | 54 000 | 174 000 | 1 800 | 29322 E |
| | 230 | 73 | 3 | 1 010 000 | 2 930 000 | 103 000 | 299 000 | 1 500 | 29422 E |
| 120 | 210 | 54 | 2.1 | 645 000 | 2 100 000 | 65 500 | 214 000 | 1 600 | 29324 E |
| | 250 | 78 | 4 | 1 160 000 | 3 400 000 | 119 000 | 350 000 | 1 400 | 29424 E |
| 130 | 225 | 58 | 2.1 | 740 000 | 2 450 000 | 75 500 | 250 000 | 1 500 | 29326 E |
| | 270 | 85 | 4 | 1 330 000 | 3 900 000 | 135 000 | 400 000 | 1 200 | 29426 E |
| 140 | 240 | 60 | 2.1 | 840 000 | 2 810 000 | 85 500 | 287 000 | 1 400 | 29328 E |
| | 280 | 85 | 4 | 1 370 000 | 4 200 000 | 140 000 | 425 000 | 1 200 | 29428 E |
| 150 | 250 | 60 | 2.1 | 870 000 | 2 900 000 | 89 000 | 296 000 | 1 400 | 29330 E |
| | 300 | 90 | 4 | 1 580 000 | 4 900 000 | 162 000 | 500 000 | 1 100 | 29430 E |
| 160 | 270 | 67 | 3 | 1 010 000 | 3 400 000 | 103 000 | 345 000 | 1 300 | 29332 E |
| | 320 | 95 | 5 | 1 740 000 | 5 400 000 | 178 000 | 550 000 | 1 100 | 29432 E |
| 170 | 280 | 67 | 3 | 1 050 000 | 3 500 000 | 107 000 | 355 000 | 1 200 | 29334 E |
| | 340 | 103 | 5 | 1 680 000 | 5 800 000 | 171 000 | 595 000 | 1 000 | 29434 |
| 180 | 300 | 73 | 3 | 1 230 000 | 4 200 000 | 125 000 | 430 000 | 1 100 | 29336 E |
| | 360 | 109 | 5 | 1 870 000 | 6 500 000 | 190 000 | 660 000 | 900 | 29436 |
| 190 | 320 | 78 | 4 | 1 370 000 | 4 700 000 | 140 000 | 480 000 | 1 100 | 29338 E |
| | 380 | 115 | 5 | 2 100 000 | 7 450 000 | 215 000 | 760 000 | 850 | 29438 |
| 200 | 280 | 48 | 2 | 540 000 | 2 310 000 | 55 000 | 236 000 | 1 500 | 29240 |
| | 340 | 85 | 4 | 1 570 000 | 5 450 000 | 160 000 | 555 000 | 1 000 | 29340 E |
| | 400 | 122 | 5 | 2 290 000 | 8 150 000 | 234 000 | 835 000 | 800 | 29440 |

Note (i) For heavy load applications, a d_a value should be chosen which is large enough to support the shaft washer rib.

Interchange – Spherical Thrust Bearings

| Description | | Interchange | | |
|-------------|--------------------------|-------------------------|-------------------------|-------------------------|
| | | NSK | SKF | FAG |
| Part Number | LIGHT MEDIUM HEAVY | 292XX 293XX 294XX | 292XX 293XX 294XX | 292XX 293XX 294XX |
| Suffix | STEEL CAGE BRASS CAGE | E M | E EM | EI E.MB |



Dynamic Equivalent Load

$$P = 1.2 F_r + F_a$$

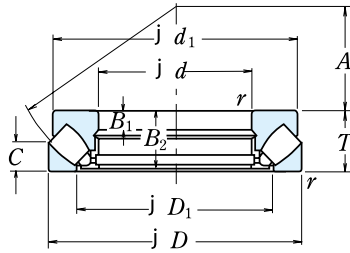
Static Equivalent Load

$$P_0 = 2.8 F_r + F_a$$

However, F_r/F_a 0.55 must be satisfied.

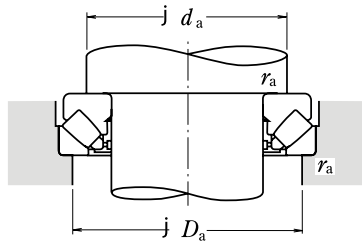
| Boundary Dimensions (mm) | | | | | | Spacer Sleeve Dimensions (mm) | | Abutment and Fillet Dimensions (mm) | | | | Mass (kg) |
|--------------------------|-------|----------|-------|------|-----|-------------------------------|---------------|-------------------------------------|------------|------------|------------|-----------|
| d_1 | D_1 | B, B_1 | B_2 | C | A | $d_{s1 \max}$ | $d_{s2 \max}$ | $d_{s1} (^\circ)_{\min}$ | $D_a \max$ | $D_b \min$ | $r_a \max$ | approx |
| 114.5 | 89 | 27 | 38 | 20 | 38 | 67 | 67 | 90 | 108 | 133 | 1.5 | 2.55 |
| 121.5 | 93 | 29.5 | 40.5 | 22 | 42 | 72 | 72 | 100 | 115 | 143 | 2 | 3.2 |
| 131.5 | 102 | 31 | 43 | 24 | 44 | 78 | 78 | 105 | 125 | 153 | 2 | 3.9 |
| 138 | 107 | 33.5 | 46 | 25 | 47 | 83 | 83 | 115 | 132 | 163 | 2 | 4.65 |
| 148 | 114.5 | 35 | 48.5 | 27 | 50 | 89 | 89 | 120 | 140 | 173 | 2 | 5.55 |
| 134.5 | 112 | 24.5 | 35.5 | 19 | 50 | 91 | 91 | 115 | 135 | 153 | 1.5 | 2.7 |
| 156.5 | 124 | 37 | 51.5 | 28 | 54 | 95 | 95 | 130 | 150 | 183 | 2 | 6.55 |
| 139.5 | 118 | 24.5 | 35 | 19 | 52 | 97 | 97 | 120 | 140 | 158 | 1.5 | 2.83 |
| 165.5 | 129.5 | 39 | 54.5 | 29 | 56 | 100 | 100 | 135 | 157 | 193 | 2 | 7.55 |
| 152 | 128 | 26.2 | 38 | 20.8 | 58 | 107 | 107 | 130 | 150 | 173 | 1.5 | 3.6 |
| 185 | 144 | 43 | 59.5 | 33 | 62 | 111 | 111 | 150 | 175 | 214 | 2.5 | 10.3 |
| 169.5 | 142.5 | 30.3 | 43.5 | 24 | 64 | 117 | 117 | 145 | 165 | 193 | 2 | 5.25 |
| 200 | 157 | 47 | 64.5 | 36 | 69 | 121 | 129 | 165 | 190 | 234 | 2.5 | 13.3 |
| 187.5 | 156.5 | 34 | 48.5 | 27 | 70 | 130 | 130 | 160 | 180 | 214 | 2 | 7.3 |
| 215 | 171 | 50.5 | 69.5 | 38 | 74 | 132 | 142 | 180 | 205 | 254 | 3 | 16.6 |
| 203.5 | 168.5 | 37 | 53.5 | 28 | 76 | 141 | 143 | 170 | 195 | 229 | 2 | 8.95 |
| 235 | 185 | 54 | 74.5 | 42 | 81 | 143 | 153 | 195 | 225 | 275 | 3 | 21.1 |
| 216.5 | 179 | 38.5 | 54 | 30 | 82 | 148 | 154 | 185 | 205 | 244 | 2 | 10.4 |
| 244.5 | 195.5 | 54 | 74.5 | 42 | 86 | 153 | 162 | 205 | 235 | 285 | 3 | 22.2 |
| 224 | 190 | 38 | 54.5 | 29 | 87 | 158 | 163 | 195 | 215 | 254 | 2 | 10.8 |
| 266 | 209 | 58 | 81 | 44 | 92 | 164 | 175 | 220 | 250 | 306 | 3 | 27.3 |
| 243 | 203 | 42 | 60 | 33 | 92 | 169 | 176 | 210 | 235 | 275 | 2.5 | 14.3 |
| 278 | 224.5 | 60.5 | 84.5 | 46 | 99 | 175 | 189 | 230 | 265 | 326 | 4 | 32.1 |
| 252 | 214.5 | 42.2 | 60.5 | 32 | 96 | 178 | 188 | 220 | 245 | 285 | 2.5 | 14.8 |
| 310 | 243 | 37 | 99 | 50 | 104 | - | - | 245 | 285 | - | 4 | 43.5 |
| 270 | 227 | 46 | 65.5 | 36 | 103 | 189 | 195 | 235 | 260 | 306 | 2.5 | 19 |
| 330 | 255 | 39 | 105 | 52 | 110 | - | - | 260 | 300 | - | 4 | 52 |
| 288.5 | 244 | 49 | 69 | 38 | 110 | 200 | 211 | 250 | 275 | 326 | 3 | 23 |
| 345 | 271 | 41 | 111 | 55 | 117 | - | - | 275 | 320 | - | 4 | 60 |
| 266 | 236 | 15 | 46 | 24 | 108 | - | - | 235 | 255 | - | 2 | 8.55 |
| 306.5 | 257 | 53.5 | 75 | 41 | 116 | 211 | 224 | 265 | 295 | 346 | 3 | 28.5 |
| 365 | 280 | 43 | 117 | 59 | 122 | - | - | 290 | 335 | - | 4 | 69 |

Spherical Thrust Roller Bearings



| Boundary Dimensions (mm) | | | | Basic Load Ratings | | | | Limiting Speeds (rpm) Oil | Bearing Numbers |
|-----------------------------|-----|-----|------------|--------------------|------------|---------|-----------|------------------------------------|--------------------|
| d | D | T | r_{\min} | (N) | | {kgf} | | | |
| | | | | C_a | C_{0a} | C_a | C_{0a} | | |
| 220 | 300 | 48 | 2 | 560 000 | 2 500 000 | 57 000 | 255 000 | 1 400 | 29244 |
| | 360 | 85 | 4 | 1 340 000 | 5 200 000 | 137 000 | 530 000 | 950 | 29344 |
| | 420 | 122 | 6 | 2 350 000 | 8 650 000 | 240 000 | 880 000 | 800 | 29444 |
| 240 | 340 | 60 | 2.1 | 800 000 | 3 450 000 | 82 000 | 350 000 | 1 200 | 29248 |
| | 380 | 85 | 4 | 1 360 000 | 5 400 000 | 139 000 | 550 000 | 950 | 29348 |
| | 440 | 122 | 6 | 2 420 000 | 9 100 000 | 247 000 | 930 000 | 750 | 29448 |
| 260 | 360 | 60 | 2.1 | 855 000 | 3 850 000 | 87 500 | 395 000 | 1 200 | 29252 |
| | 420 | 95 | 5 | 1 700 000 | 6 800 000 | 173 000 | 695 000 | 800 | 29352 |
| | 480 | 132 | 6 | 2 820 000 | 10 700 000 | 287 000 | 1 090 000 | 710 | 29452 |
| 280 | 380 | 60 | 2.1 | 885 000 | 4 100 000 | 90 000 | 420 000 | 1 100 | 29256 |
| | 440 | 95 | 5 | 1 830 000 | 7 650 000 | 187 000 | 780 000 | 800 | 29356 |
| | 520 | 145 | 6 | 3 400 000 | 13 100 000 | 345 000 | 1 330 000 | 630 | 29456 |
| 300 | 420 | 73 | 3 | 1 160 000 | 5 150 000 | 118 000 | 525 000 | 950 | 29260 |
| | 480 | 109 | 5 | 2 190 000 | 9 100 000 | 224 000 | 925 000 | 710 | 29360 |
| | 540 | 145 | 6 | 3 500 000 | 13 700 000 | 355 000 | 1 390 000 | 630 | 29460 |
| 320 | 440 | 73 | 3 | 1 190 000 | 5 450 000 | 122 000 | 555 000 | 950 | 29264 |
| | 500 | 109 | 5 | 2 230 000 | 9 400 000 | 227 000 | 960 000 | 670 | 29364 |
| | 580 | 155 | 7.5 | 3 650 000 | 14 600 000 | 370 000 | 1 490 000 | 560 | 29464 |
| 340 | 460 | 73 | 3 | 1 230 000 | 5 750 000 | 125 000 | 590 000 | 900 | 29268 |
| | 540 | 122 | 5 | 2 640 000 | 11 200 000 | 269 000 | 1 140 000 | 630 | 29368 |
| | 620 | 170 | 7.5 | 4 400 000 | 17 400 000 | 450 000 | 1 780 000 | 530 | 29468 |
| 360 | 500 | 85 | 4 | 1 550 000 | 7 300 000 | 158 000 | 745 000 | 800 | 29272 |
| | 560 | 122 | 5 | 2 670 000 | 11 500 000 | 272 000 | 1 180 000 | 600 | 29372 |
| | 640 | 170 | 7.5 | 4 200 000 | 17 200 000 | 430 000 | 1 750 000 | 500 | 29472 |
| 380 | 520 | 85 | 4 | 1 620 000 | 7 800 000 | 165 000 | 795 000 | 800 | 29276 |
| | 600 | 132 | 6 | 3 300 000 | 14 500 000 | 335 000 | 1 480 000 | 560 | 29376 |
| | 670 | 175 | 7.5 | 4 800 000 | 19 500 000 | 490 000 | 1 990 000 | 480 | 29476 |
| 400 | 540 | 85 | 4 | 1 640 000 | 8 000 000 | 167 000 | 815 000 | 750 | 29280 |
| | 620 | 132 | 6 | 3 250 000 | 14 500 000 | 330 000 | 1 480 000 | 530 | 29380 |
| | 710 | 185 | 7.5 | 5 400 000 | 22 100 000 | 550 000 | 2 250 000 | 450 | 29480 |
| 420 | 580 | 95 | 5 | 2 010 000 | 9 800 000 | 205 000 | 1 000 000 | 670 | 29284 |
| | 650 | 140 | 6 | 3 500 000 | 15 700 000 | 355 000 | 1 600 000 | 500 | 29384 |
| | 730 | 185 | 7.5 | 5 650 000 | 23 500 000 | 575 000 | 2 400 000 | 450 | 29484 |

Note (l) For heavy load applications, a d_a value should be chosen which is large enough to support the shaft washer rib.



Dynamic Equivalent Load

$$P = 1.2 F_r + F_a$$

Static Equivalent Load

$$P_0 = 2.8 F_r + F_a$$

However, $F_r/F_a \geq 0.55$ must be satisfied.

| Dimensions (mm) | | | | | | Abutment and Fillet Dimensions (mm) | | | Mass (kg) |
|-----------------|-------|-------|-------|-----|-----|-------------------------------------|--------------|--------------|-----------|
| d_1 | D_1 | B_1 | B_2 | C | A | $d_a^{(1)}$ min | D_a max | r_a max | approx |
| 285 | 254 | 15 | 46 | 24 | 117 | 260 | 275 | 2 | 9.2 |
| 335 | 280 | 29 | 81 | 41 | 125 | 285 | 315 | 3 | 33 |
| 385 | 308 | 43 | 117 | 58 | 132 | 310 | 355 | 5 | 74 |
| 325 | 283 | 19 | 57 | 30 | 130 | 285 | 305 | 2 | 16.5 |
| 355 | 300 | 29 | 81 | 41 | 135 | 300 | 330 | 3 | 35.5 |
| 405 | 326 | 43 | 117 | 59 | 142 | 330 | 375 | 5 | 79 |
| 345 | 302 | 19 | 57 | 30 | 139 | 305 | 325 | 2 | 18 |
| 390 | 329 | 32 | 91 | 45 | 148 | 330 | 365 | 4 | 48.5 |
| 445 | 357 | 48 | 127 | 64 | 154 | 360 | 405 | 5 | 105 |
| 365 | 323 | 19 | 57 | 30 | 150 | 325 | 345 | 2 | 19 |
| 410 | 348 | 32 | 91 | 46 | 158 | 350 | 390 | 4 | 52.5 |
| 480 | 384 | 52 | 140 | 68 | 166 | 390 | 440 | 5 | 132 |
| 400 | 353 | 21 | 69 | 38 | 162 | 355 | 380 | 2.5 | 30 |
| 450 | 379 | 37 | 105 | 50 | 168 | 380 | 420 | 4 | 74 |
| 500 | 402 | 52 | 140 | 70 | 175 | 410 | 460 | 5 | 140 |
| 420 | 372 | 21 | 69 | 38 | 172 | 375 | 400 | 2.5 | 32.5 |
| 470 | 399 | 37 | 105 | 53 | 180 | 400 | 440 | 4 | 77 |
| 555 | 436 | 55 | 149 | 75 | 191 | 435 | 495 | 6 | 175 |
| 440 | 395 | 21 | 69 | 37 | 183 | 395 | 420 | 2.5 | 33.5 |
| 510 | 428 | 41 | 117 | 59 | 192 | 430 | 470 | 4 | 103 |
| 590 | 462 | 61 | 164 | 82 | 201 | 465 | 530 | 6 | 218 |
| 480 | 423 | 25 | 81 | 44 | 194 | 420 | 455 | 3 | 51 |
| 525 | 448 | 41 | 117 | 59 | 202 | 450 | 495 | 4 | 107 |
| 610 | 480 | 61 | 164 | 82 | 210 | 485 | 550 | 6 | 228 |
| 496 | 441 | 27 | 81 | 42 | 202 | 440 | 475 | 3 | 52 |
| 568 | 477 | 44 | 127 | 63 | 216 | 480 | 525 | 5 | 140 |
| 640 | 504 | 63 | 168 | 85 | 230 | 510 | 575 | 6 | 254 |
| 517 | 460 | 27 | 81 | 42 | 212 | 460 | 490 | 3 | 55 |
| 590 | 494 | 44 | 127 | 64 | 225 | 500 | 550 | 5 | 150 |
| 680 | 536 | 67 | 178 | 89 | 236 | 540 | 610 | 6 | 306 |
| 553 | 489 | 30 | 91 | 46 | 225 | 490 | 525 | 4 | 72 |
| 620 | 520 | 48 | 135 | 68 | 235 | 525 | 575 | 5 | 170 |
| 700 | 556 | 67 | 178 | 89 | 244 | 560 | 630 | 6 | 323 |

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