



*Spherical Roller bearings*

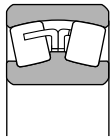
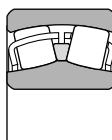

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## 1. Type, Structure and Characteristics

The barrel shaped spherical rolling elements of a self-aligning bearing track along two rows of raceway grooves in the inner ring. The center of the outer ring's raceway aligns with the center of the bearing. The self-aligning feature accommodates errors in housing assembly and misalignments between the inner and outer rings caused by bent shafts. The bearings have a large load capacity and are suitable for applications with vibration and impact loads.

In addition to a cylindrical shaft bore, the bearings are available with a tapered shaft bore. The tapered bore bearings can be shaft mounted using an adapter or removable sleeves. **Table 1** shows the types of the self-aligning roller bearings. Please consult with NTN Engineering for the special product (do part number starts with 2p)

**Table 1 Model of Self-Aligning Roller Bearings**

| Model             | Standard (Model B)  | Model C   | Model 213   |
|-------------------|---|---|---|
| Structure         |  |  |  |
| Bearing Series    | Bearings except Model C   | 24024~24038   | 213's bore should be more than 55mm.  |
| Roller            | A symmetrical roller  | Symmetrical roller  | A symmetrical roller  |
| Roller guide type | Guided by the inner rib which is united with the inner ring.                      | By the guide ring located between two rows of rollers.                            | By the guide ring located between the rollers on the outer ring raceway.          |
| Cage type         | Pressed cage<br>Machined cage   | Pressed cage  | Machined cage   |

## 1.2 Lubrication holes and grooves

Holes and grooves to supply lubricant are provided on self-aligning roller bearings with outside diameters greater than 320mm. If required, lubrication holes and grooves can be manufactured for bearings with ODs smaller than 320mm. Consult NTN Engineering for further details and add the supplemental code D1 to the part number. **Table 2** shows the dimensions for lubrication holes and grooves. The number of lubrication holes are shown in **Table 3**.

When a knock pin for lubricant retention is necessary, please contact NTN Engineering.

**Table 2 Lubrication hole and groove dimensions**

Unit mm

| Nominal bearing width |      | Oil groove width<br>$W_o$ | Oil hole dia<br>$d_o$ | Oil groove depth<br>$h$ |                   |
|-----------------------|------|---------------------------|-----------------------|-------------------------|-------------------|
| over                  | incl |                           |                       | Width series<br>1, 2, 3 | Width series<br>4 |
| 80                    | 100  | 14                        | 8                     | 2.5                     | 2.0               |
| 100                   | 120  | 16                        | 10                    | 3.0                     | 2.5               |
| 120                   | 160  | 20                        | 12                    | 3.5                     | 3.0               |
| 160                   | 200  | 27                        | 16                    | 5.0                     | 3.5               |
| 200                   | 315  | 33                        | 20                    | 6.0                     | 5.0               |
| 315                   | —    | 42                        | 25                    | 7.0                     | 6.5               |

**Table 3 Lubrication hole number**

| Nominal bearing outside dia. mm |       | Hole number<br>$Z_o$ |
|---------------------------------|-------|----------------------|
| over                            | incl  |                      |
| —                               | 320   | 4                    |
| 320                             | 1,010 | 8                    |
| 1,010                           | —     | 12                   |

## 2. Dimensional Accuracy/Rotation Accuracy

Refer to Table 3.3 (Page A-12)

## 3. Recommended Fitting

Refer to Table 4.2 (Page A-24)

## 4. Bearing Internal Clearance

Refer to Table 5.10 (Page A-36)

## 5. Allowable aligning angle

These bearings have a self-aligning function, and their allowable aligning angle varies depending on the dimension series and load conditions, but are mostly described as follows.

Normal load (Equivalent load to  $0.09 C_T$ ) ... 0.009rad (0.5°)  
 Light load ..... 0.035rad (2°)

## 6. Assembly of Tapered Hole Roller Bearings

Tapered hole spherical roller bearings use the measurement method as shown in Fig.1. A suitable tightening rate can be achieved by pushing the bearing toward the axial direction until it reaches the reduction rate of the radial internal clearance or pushing rate of axial direction. When heavy and high speed loads are applied, or when it is necessary to keep a higher tightening rate as the temperature difference between the inner and outer rings rises, be sure to have the maximum reduction rate of radial internal clearance or the pushing rate of the axial direction, as shown in Table 4, by using a bearing with a radial internal clearance of more than C3. The clearance after mounting in this case should be larger than the minimum clearance after mounting as shown in Table 4.

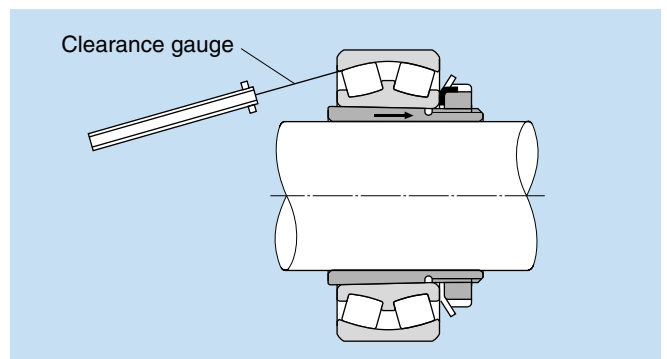


Fig.1 Measurement method of spherical roller bearing internal clearance

Table 4 Assembly of tapered hole spherical roller bearings

Unit:mm

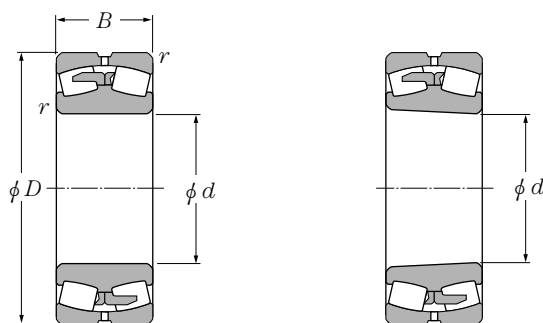
| Nominal bearing bore<br><i>d</i> |       | Reduction rate of<br>radial internal clearance |       | Pushing rate of axial direction |     |            |      | Minimum residual internal clearance |       |      |
|----------------------------------|-------|--|-------|---------------------------------|-----|------------|------|-------------------------------------|-------|------|
|                                  |       |  |       | taper 1/12                      |     | taper 1/30 |      |                                     |       |      |
| over                             | incl  | min  | max   | min                             | max | min        | max  | CN                                  | C3    | C4   |
| 80                               | 100   | 0.045  | 0.055 | 0.7                             | 0.8 | 1.75       | 2.25 | 0.035                               | 0.05  | 0.08 |
| 100                              | 120   | 0.05   | 0.06  | 0.75                            | 0.9 | 1.9        | 2.25 | 0.05                                | 0.065 | 0.1  |
| 120                              | 140   | 0.065  | 0.075 | 1.1                             | 1.2 | 2.75       | 3    | 0.055                               | 0.08  | 0.11 |
| 140                              | 160   | 0.075  | 0.09  | 1.2                             | 1.4 | 3          | 3.75 | 0.055                               | 0.09  | 0.13 |
| 160                              | 180   | 0.08   | 0.1   | 1.3                             | 1.6 | 3.25       | 4    | 0.06                                | 0.1   | 0.15 |
| 180                              | 200   | 0.09   | 0.11  | 1.4                             | 1.7 | 3.5        | 4.25 | 0.07                                | 0.1   | 0.16 |
| 200                              | 225   | 0.1  | 0.12  | 1.6                             | 1.9 | 4          | 4.75 | 0.08                                | 0.12  | 0.18 |
| 225                              | 250   | 0.11   | 0.13  | 1.7                             | 2   | 4.25       | 5    | 0.09                                | 0.13  | 0.2  |
| 250                              | 280   | 0.12   | 0.15  | 1.9                             | 2.4 | 4.75       | 6    | 0.1                                 | 0.14  | 0.22 |
| 280                              | 315   | 0.13   | 0.16  | 2                               | 2.5 | 5          | 6.25 | 0.11                                | 0.15  | 0.24 |
| 315                              | 355   | 0.15   | 0.18  | 2.4                             | 2.8 | 6          | 7    | 0.12                                | 0.17  | 0.26 |
| 355                              | 400   | 0.17   | 0.21  | 2.6                             | 3.3 | 6.5        | 8.25 | 0.13                                | 0.19  | 0.29 |
| 400                              | 450   | 0.2  | 0.24  | 3.1                             | 3.7 | 7.75       | 9.25 | 0.13                                | 0.2   | 0.31 |
| 450                              | 500   | 0.21   | 0.26  | 3.3                             | 4   | 8.25       | 10   | 0.16                                | 0.23  | 0.35 |
| 500                              | 560   | 0.24   | 0.3   | 3.7                             | 4.6 | 9.25       | 11.5 | 0.17                                | 0.25  | 0.36 |
| 560                              | 630   | 0.26   | 0.33  | 4                               | 5.1 | 10         | 12.5 | 0.2                                 | 0.29  | 0.41 |
| 630                              | 710   | 0.3  | 0.37  | 4.6                             | 5.7 | 11.5       | 14.5 | 0.21                                | 0.31  | 0.45 |
| 710                              | 800   | 0.34   | 0.43  | 5.3                             | 6.7 | 13.3       | 16.5 | 0.23                                | 0.35  | 0.51 |
| 800                              | 900   | 0.37   | 0.47  | 5.7                             | 7.3 | 14.3       | 18.5 | 0.27                                | 0.39  | 0.57 |
| 900                              | 1,000 | 0.41   | 0.53  | 6.3                             | 8.2 | 15.8       | 20.5 | 0.3                                 | 0.43  | 0.64 |
| 1,000                            | 1,120 | 0.45   | 0.58  | 6.8                             | 8.7 | 17         | 22.5 | 0.32                                | 0.48  | 0.7  |
| 1,120                            | 1,250 | 0.49   | 0.63  | 7.4                             | 9.4 | 18.5       | 24.5 | 0.34                                | 0.54  | 0.77 |

## 7. General Operating Cautions

Pressed cages or machined cages are standard depending on the bearing type and dimensions. However, a standard cage may not be used under high speed specifications or in conditions under severe vibration or impact.

When bearings are operated under small loads (about  $F_r \leq 0.04C_{or}$ ), or under axial loads only, prevent rolling elements from smearing by operating in conditions where  $F_a/F_r \leq 2e$ . (Refer to the dimension table for the value of “ $e$ .”) This is most apparent when using large size spherical roller bearings due to the large roller and cage mass. Please consult NTN Engineering for further details.





Cylindrical bore

Tapered bore  
taper 1:12

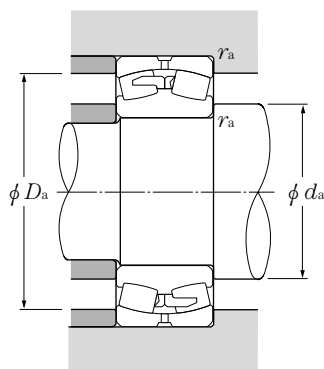
**d 100~140mm**

|         | Boundary dimensions |      |                           |       | dynamic  | Basic load ratings |          |                  | Bearing numbers           |                  | Abutment and fillet dimensions |                 |              |
|---------|---------------------|------|---------------------------|-------|----------|--------------------|----------|------------------|---------------------------|------------------|--------------------------------|-----------------|--------------|
|         | mm                  |      |                           |       |          | kN                 | static   | dynamic          | static                    | Cylindrical bore | tapered <sup>②</sup> bore      | $d_a$<br>min    | $D_a$<br>max |
| $d$     | $D$                 | $B$  | $r_{s\ min}$ <sup>①</sup> | $C_r$ | $C_{or}$ | $C_r$              | $C_{or}$ | Cylindrical bore | tapered <sup>②</sup> bore | $d_a$<br>min     | $D_a$<br>max                   | $r_{as}$<br>max |              |
| 100     | 165                 | 52   | 2                         | 310   | 470      | 31,500             | 47,500   | 23120B           | 23120BK                   | 110              | 155                            | 2               |              |
|         | 170                 | 65   | 2                         | 380   | 590      | 38,500             | 60,000   | 2P2009           | 2P2009K                   | 110              | 160                            | 2               |              |
|         | 170                 | 65   | 2                         | 405   | 640      | 41,500             | 65,500   | ☆2P2014          | 2P2014K                   | 110              | 160                            | 2               |              |
|         | 180                 | 46   | 2.1                       | 315   | 415      | 32,000             | 42,500   | 22220B           | 22220BK                   | 112              | 168                            | 2               |              |
|         | 180                 | 60.3 | 2.1                       | 405   | 580      | 41,500             | 59,000   | 23220B           | 23220BK                   | 112              | 168                            | 2               |              |
|         | 215                 | 47   | 3                         | 370   | 465      | 37,500             | 47,500   | 21320            | 21320K                    | 114              | 201                            | 2.5             |              |
|         | 215                 | 73   | 3                         | 605   | 755      | 61,500             | 77,000   | 22320B           | 22320BK                   | 114              | 201                            | 2.5             |              |
| 110     | 170                 | 45   | 2                         | 282   | 455      | 28,800             | 46,500   | 23022B           | 23022BK                   | 120              | 160                            | 2               |              |
|         | 180                 | 56   | 2                         | 370   | 580      | 37,500             | 59,500   | 23122B           | 23122BK                   | 120              | 170                            | 2               |              |
|         | 180                 | 69   | 2                         | 450   | 755      | 46,000             | 77,000   | 24122B           | 24122BK30                 | 120              | 170                            | 2               |              |
|         | 200                 | 53   | 2.1                       | 410   | 570      | 42,000             | 58,000   | 22222B           | 22222BK                   | 122              | 188                            | 2               |              |
|         | 200                 | 69.8 | 2.1                       | 515   | 760      | 52,500             | 77,500   | 23222B           | 23222BK                   | 122              | 188                            | 2               |              |
|         | 240                 | 50   | 3                         | 495   | 615      | 50,500             | 62,500   | 21322            | 21322K                    | 124              | 226                            | 2.5             |              |
|         | 240                 | 80   | 3                         | 745   | 930      | 76,000             | 95,000   | 22322B           | 22322BK                   | 124              | 226                            | 2.5             |              |
| 120     | 180                 | 46   | 2                         | 296   | 495      | 30,000             | 50,500   | 23024B           | 23024BK                   | 130              | 170                            | 2               |              |
|         | 180                 | 60   | 2                         | 390   | 670      | 39,500             | 68,500   | 24024B           | 24024BK30                 | 130              | 170                            | 2               |              |
|         | 180                 | 60   | 2                         | 395   | 695      | 40,000             | 71,000   | ☆24024C          | 24024CK30                 | 130              | 170                            | 2               |              |
|         | 180                 | 69   | 2                         | 415   | 785      | 42,500             | 80,000   | ☆2P2416          | 2P2416K                   | 130              | 170                            | 2               |              |
|         | 200                 | 62   | 2                         | 455   | 705      | 46,500             | 71,500   | 23124B           | 23124BK                   | 130              | 190                            | 2               |              |
|         | 200                 | 80   | 2                         | 575   | 945      | 58,500             | 96,500   | 24124B           | 24124BK30                 | 130              | 190                            | 2               |              |
|         | 215                 | 58   | 2.1                       | 485   | 700      | 49,500             | 71,500   | 22224B           | 22224BK                   | 132              | 203                            | 2               |              |
|         | 215                 | 76   | 2.1                       | 585   | 880      | 59,500             | 89,500   | 23224B           | 23224BK                   | 132              | 203                            | 2               |              |
| 260     | 86                  | 3    | 880                       | 1,120 | 89,500   | 114,000            | 22324B   | 22324BK          | 134                       | 246              | 2.5                            |                 |              |
| 130     | 200                 | 52   | 2                         | 375   | 620      | 38,500             | 63,500   | 23026B           | 23026BK                   | 140              | 190                            | 2               |              |
|         | 200                 | 69   | 2                         | 505   | 895      | 51,500             | 91,000   | 24026B           | 24026BK30                 | 140              | 190                            | 2               |              |
|         | 200                 | 69   | 2                         | 490   | 860      | 50,000             | 87,500   | ☆24026C          | 24026CK30                 | 140              | 190                            | 2               |              |
|         | 210                 | 64   | 2                         | 495   | 795      | 50,500             | 81,000   | 23126B           | 23126BK                   | 140              | 200                            | 2               |              |
|         | 210                 | 80   | 2                         | 585   | 995      | 60,000             | 102,000  | 24126B           | 24126BK30                 | 140              | 200                            | 2               |              |
|         | 230                 | 64   | 3                         | 570   | 790      | 58,000             | 80,500   | 22226B           | 22226BK                   | 144              | 216                            | 2.5             |              |
|         | 230                 | 80   | 3                         | 685   | 1,060    | 70,000             | 108,000  | 23226B           | 23226BK                   | 144              | 216                            | 2.5             |              |
|         | 280                 | 93   | 4                         | 1,000 | 1,290    | 102,000            | 131,000  | 22326B           | 22326BK                   | 148              | 262                            | 3               |              |
| 139.734 | 218                 | 80   | 1.1                       | 605   | 1,050    | 61,500             | 106,000  | 2P2803           | 2P2803K                   | 146              | 211                            | 1               |              |
| 140     | 210                 | 53   | 2                         | 405   | 690      | 41,000             | 70,500   | 23028B           | 23028BK                   | 150              | 200                            | 2               |              |
|         | 210                 | 69   | 2                         | 510   | 945      | 52,000             | 96,500   | 24028B           | 24028BK30                 | 150              | 200                            | 2               |              |

① Smallest allowable dimension for chamfer dimension  $r$ .

② Bearings appended with "K" have a tapered bore ratio of 1:12; bearings appended with "K30" have a tapered bore ratio of 1:30.

Remarks: 1. Bearing numbers marked "☆" are C type.



**Equivalent bearing load**

**dynamic**

$$P_r = X F_r + Y F_a$$

| $\frac{F_a}{F_r} \leq e$ |       | $\frac{F_a}{F_r} > e$ |       |
|--------------------------|-------|-----------------------|-------|
| X                        | Y     | X                     | Y     |
| 1                        | $Y_1$ | 0.67                  | $Y_2$ |

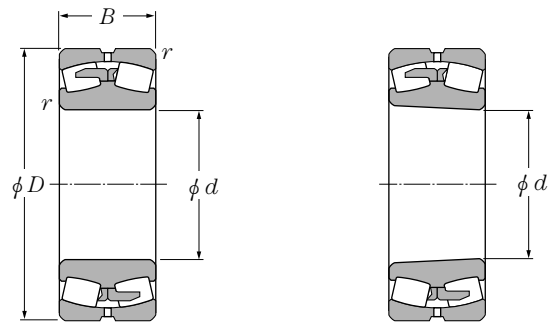
**static**

$$P_{or} = F_r + Y_0 F_a$$

For values of  $e$ ,  $Y_1$ ,  $Y_2$  and  $Y_0$  see the table below.

| Constant $e$ | Axial load factors |       |       | Mass (approx.)        |                   |
|--------------|--------------------|-------|-------|-----------------------|-------------------|
|              | $Y_1$              | $Y_2$ | $Y_0$ | Cylindrical bore (kg) | tapered bore (kg) |
| 0.32         | 2.12               | 3.15  | 2.07  | 4.3                   | 4.16              |
| 0.38         | 1.78               | 2.65  | 1.74  | 5.84                  | 5.62              |
| 0.38         | 1.75               | 2.61  | 1.72  | 5.91                  | 5.69              |
| 0.26         | 2.55               | 3.80  | 2.49  | 4.95                  | 4.84              |
| 0.34         | 1.98               | 2.94  | 1.93  | 6.47                  | 6.28              |
| 0.22         | 3.01               | 4.48  | 2.94  | 8.89                  | 8.78              |
| 0.37         | 1.80               | 2.69  | 1.76  | 12.4                  | 12.1              |
| <hr/>        |                    |       |       |                       |                   |
| 0.26         | 2.59               | 3.85  | 2.53  | 3.71                  | 3.58              |
| 0.31         | 2.17               | 3.24  | 2.13  | 5.4                   | 5.22              |
| 0.38         | 1.76               | 2.63  | 1.73  | 7.07                  | 6.96              |
| 0.27         | 2.51               | 3.74  | 2.46  | 7.2                   | 7.04              |
| 0.35         | 1.91               | 2.84  | 1.86  | 9.71                  | 9.43              |
| 0.21         | 3.20               | 4.77  | 3.13  | 11.2                  | 11.1              |
| 0.36         | 1.87               | 2.79  | 1.83  | 17.1                  | 16.7              |
| <hr/>        |                    |       |       |                       |                   |
| 0.25         | 2.69               | 4.01  | 2.63  | 4.05                  | 3.9               |
| 0.33         | 2.06               | 3.07  | 2.02  | 5.48                  | 5.39              |
| 0.32         | 2.12               | 3.15  | 2.07  | 5.48                  | 4.91              |
| 0.35         | 1.95               | 2.90  | 1.91  | 5.95                  | 5.65              |
| 0.31         | 2.17               | 3.24  | 2.13  | 7.7                   | 7.46              |
| 0.40         | 1.68               | 2.50  | 1.64  | 10.3                  | 10.1              |
| 0.27         | 2.47               | 3.68  | 2.42  | 9.1                   | 8.89              |
| 0.36         | 1.89               | 2.82  | 1.85  | 12.1                  | 11.7              |
| 0.37         | 1.80               | 2.69  | 1.76  | 21.5                  | 21                |
| <hr/>        |                    |       |       |                       |                   |
| 0.26         | 2.63               | 3.92  | 2.57  | 5.9                   | 5.69              |
| 0.34         | 1.98               | 2.95  | 1.94  | 8.08                  | 7.95              |
| 0.32         | 2.12               | 3.15  | 2.07  | 7.91                  | 7.78              |
| 0.30         | 2.23               | 3.32  | 2.18  | 8.47                  | 8.2               |
| 0.38         | 1.78               | 2.65  | 1.74  | 11                    | 10.8              |
| 0.28         | 2.39               | 3.56  | 2.33  | 11.2                  | 10.9              |
| 0.35         | 1.92               | 2.86  | 1.88  | 14.3                  | 13.9              |
| 0.37         | 1.81               | 2.69  | 1.77  | 26.8                  | 26.2              |
| <hr/>        |                    |       |       |                       |                   |
| 0.35         | 1.91               | 2.84  | 1.86  | 10.8                  | 10.3              |
| <hr/>        |                    |       |       |                       |                   |
| 0.25         | 2.73               | 4.06  | 2.67  | 6.35                  | 6.12              |
| 0.32         | 2.09               | 3.12  | 2.05  | 8.57                  | 8.43              |





Cylindrical bore

Tapered bore  
taper 1:12

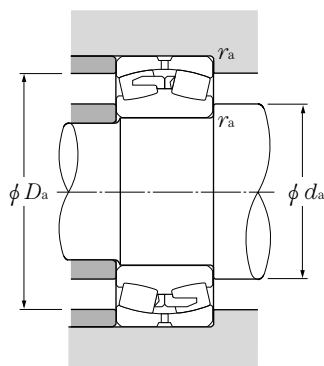
**d 140~180mm**

|            | Boundary dimensions |     |                          |       | dynamic  | Basic load ratings |          |          | Bearing numbers |                  | Abutment and fillet dimensions |       |       |
|------------|---------------------|-----|--------------------------|-------|----------|--------------------|----------|----------|-----------------|------------------|--------------------------------|-------|-------|
|            | mm                  |     |                          |       |          | kN                 | static   | dynamic  | static          | Cylindrical bore | tapered <sup>②</sup> bore      | $d_a$ | $D_a$ |
| $d$        | $D$                 | $B$ | $r_{s\min}$ <sup>①</sup> | $C_r$ | $C_{or}$ | $C_r$              | $C_{or}$ | $C_{or}$ |                 |                  |                                |       | min   |
| <b>140</b> | 210                 | 69  | 2                        | 520   | 940      | 53,000             | 95,500   | ☆24028C  | 24028CK30       | 150              | 200                            | 2     |       |
|            | 225                 | 68  | 2.1                      | 540   | 895      | 55,000             | 91,000   | 23128B   | 23128BK         | 152              | 213                            | 2     |       |
|            | 225                 | 85  | 2.1                      | 670   | 1,150    | 68,500             | 117,000  | 24128B   | 24128BK30       | 152              | 213                            | 2     |       |
|            | 250                 | 68  | 3                        | 685   | 975      | 70,000             | 99,500   | 22228B   | 22228BK         | 154              | 236                            | 2.5   |       |
|            | 250                 | 88  | 3                        | 805   | 1,270    | 82,000             | 129,000  | 23228B   | 23228BK         | 154              | 236                            | 2.5   |       |
|            | 300                 | 102 | 4                        | 1,130 | 1,460    | 115,000            | 149,000  | 22328B   | 22328BK         | 158              | 282                            | 3     |       |
| <b>150</b> | 225                 | 56  | 2.1                      | 445   | 775      | 45,500             | 79,000   | 23030B   | 23030BK         | 162              | 213                            | 2     |       |
|            | 225                 | 75  | 2.1                      | 585   | 1,060    | 59,500             | 108,000  | 24030B   | 24030BK30       | 162              | 213                            | 2     |       |
|            | 225                 | 75  | 2.1                      | 600   | 1,090    | 61,000             | 111,000  | ☆24030C  | 24030CK30       | 162              | 213                            | 2     |       |
|            | 250                 | 80  | 2.1                      | 730   | 1,190    | 74,500             | 121,000  | 23130B   | 23130BK         | 162              | 238                            | 2     |       |
|            | 250                 | 100 | 2.1                      | 885   | 1,520    | 90,500             | 155,000  | 24130B   | 24130BK30       | 162              | 238                            | 2     |       |
|            | 270                 | 73  | 3                        | 775   | 1,160    | 79,000             | 119,000  | 22230B   | 22230BK         | 164              | 256                            | 2.5   |       |
|            | 270                 | 96  | 3                        | 935   | 1,460    | 95,000             | 149,000  | 23230B   | 23230BK         | 164              | 256                            | 2.5   |       |
|            | 320                 | 108 | 4                        | 1,270 | 1,750    | 130,000            | 179,000  | 22330B   | 22330BK         | 168              | 302                            | 3     |       |
| <b>160</b> | 220                 | 45  | 2                        | 320   | 610      | 33,000             | 62,500   | 23932    | 23932K          | 170              | 210                            | 2     |       |
|            | 240                 | 60  | 2.1                      | 505   | 885      | 51,500             | 90,000   | 23032B   | 23032BK         | 172              | 228                            | 2     |       |
|            | 240                 | 80  | 2.1                      | 650   | 1,200    | 66,500             | 122,000  | 24032B   | 24032BK30       | 172              | 228                            | 2     |       |
|            | 240                 | 80  | 2.1                      | 665   | 1,250    | 67,500             | 127,000  | ☆24032C  | 24032CK30       | 172              | 228                            | 2     |       |
|            | 270                 | 86  | 2.1                      | 840   | 1,370    | 85,500             | 140,000  | 23132B   | 23132BK         | 172              | 258                            | 2     |       |
|            | 270                 | 109 | 2.1                      | 1,040 | 1,780    | 106,000            | 181,000  | 24132B   | 24132BK30       | 172              | 258                            | 2     |       |
|            | 290                 | 80  | 3                        | 870   | 1,290    | 88,500             | 132,000  | 22232B   | 22232BK         | 174              | 276                            | 2.5   |       |
|            | 290                 | 104 | 3                        | 1,050 | 1,660    | 107,000            | 170,000  | 23232B   | 23232BK         | 174              | 276                            | 2.5   |       |
|            | 340                 | 114 | 4                        | 1,410 | 1,990    | 144,000            | 203,000  | 22332B   | 22332BK         | 178              | 322                            | 3     |       |
| <b>170</b> | 230                 | 45  | 2                        | 330   | 650      | 34,000             | 66,000   | 23934    | 23934K          | 180              | 220                            | 2     |       |
|            | 260                 | 67  | 2.1                      | 630   | 1,080    | 64,000             | 110,000  | 23034B   | 23034BK         | 182              | 248                            | 2     |       |
|            | 260                 | 90  | 2.1                      | 800   | 1,470    | 81,500             | 150,000  | 24034B   | 24034BK30       | 182              | 248                            | 2     |       |
|            | 260                 | 90  | 2.1                      | 815   | 1,500    | 83,000             | 153,000  | ☆24034C  | 24034CK30       | 182              | 248                            | 2     |       |
|            | 280                 | 88  | 2.1                      | 885   | 1,490    | 90,500             | 152,000  | 23134B   | 23134BK         | 182              | 268                            | 2     |       |
|            | 280                 | 109 | 2.1                      | 1,080 | 1,880    | 110,000            | 191,000  | 24134B   | 24134BK30       | 182              | 268                            | 2     |       |
|            | 310                 | 86  | 4                        | 1,000 | 1,520    | 102,000            | 155,000  | 22234B   | 22234BK         | 188              | 292                            | 3     |       |
|            | 310                 | 110 | 4                        | 1,180 | 1,960    | 120,000            | 200,000  | 23234B   | 23234BK         | 188              | 292                            | 3     |       |
|            | 360                 | 120 | 4                        | 1,540 | 2,180    | 157,000            | 223,000  | 22334B   | 22334BK         | 188              | 342                            | 3     |       |
|            | <b>180</b>          | 250 | 52                       | 2     | 440      | 835                | 45,000   | 85,000   | 23936           | 23936K           | 190                            | 240   | 2     |
| 280        |                     | 74  | 2.1                      | 740   | 1,290    | 75,500             | 132,000  | 23036B   | 23036BK         | 192              | 268                            | 2     |       |
| 280        |                     | 100 | 2.1                      | 965   | 1,770    | 98,500             | 181,000  | 24036B   | 24036BK30       | 192              | 268                            | 2     |       |

① Smallest allowable dimension for chamfer dimension  $r$ .

② Bearings appended with "K" have a tapered bore ratio of 1:12; bearings appended with "K30" have a tapered bore ratio of 1:30.

Remarks: 1. Bearing numbers marked "☆" are C type.



**Equivalent bearing load**

**dynamic**

$$P_r = X F_r + Y F_a$$

| $\frac{F_a}{F_r} \leq e$ |       | $\frac{F_a}{F_r} > e$ |       |
|--------------------------|-------|-----------------------|-------|
| X                        | Y     | X                     | Y     |
| 1                        | $Y_1$ | 0.67                  | $Y_2$ |

**static**

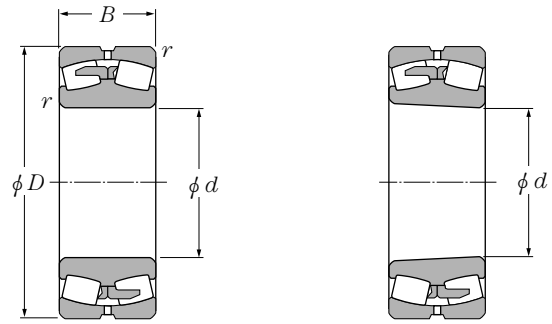
$$P_{or} = F_r + Y_0 F_a$$

For values of  $e$ ,  $Y_1$ ,  $Y_2$  and  $Y_0$  see the table below.

| Constant $e$ | Axial load factors |       |       | Mass (approx.)         |                    |
|--------------|--------------------|-------|-------|------------------------|--------------------|
|              | $Y_1$              | $Y_2$ | $Y_0$ | Cylindrical bore<br>kg | tapered bore<br>kg |
| 0.30         | 2.23               | 3.32  | 2.18  | 8.48                   | 7.66               |
| 0.30         | 2.25               | 3.35  | 2.20  | 10.2                   | 9.86               |
| 0.38         | 1.80               | 2.68  | 1.76  | 13.3                   | 13.1               |
| 0.28         | 2.39               | 3.55  | 2.33  | 14                     | 13.7               |
| 0.36         | 1.90               | 2.83  | 1.86  | 18.8                   | 18.2               |
| 0.37         | 1.80               | 2.69  | 1.76  | 33.8                   | 33                 |
| <hr/>        |                    |       |       |                        |                    |
| 0.24         | 2.76               | 4.11  | 2.70  | 7.73                   | 7.45               |
| 0.33         | 2.06               | 3.07  | 2.02  | 10.7                   | 10.5               |
| 0.30         | 2.25               | 3.34  | 2.20  | 10.5                   | 10.3               |
| 0.32         | 2.11               | 3.15  | 2.06  | 15.6                   | 15.1               |
| 0.40         | 1.69               | 2.51  | 1.65  | 20.2                   | 20                 |
| 0.27         | 2.46               | 3.66  | 2.40  | 18.1                   | 17.7               |
| 0.36         | 1.88               | 2.79  | 1.83  | 24.1                   | 23.4               |
| 0.35         | 1.92               | 2.86  | 1.88  | 42.7                   | 41.8               |
| <hr/>        |                    |       |       |                        |                    |
| 0.18         | 3.69               | 5.49  | 3.61  | 5.5                    | 5.33               |
| 0.25         | 2.74               | 4.09  | 2.68  | 9.42                   | 9.09               |
| 0.32         | 2.10               | 3.13  | 2.06  | 13                     | 12.8               |
| 0.31         | 2.18               | 3.24  | 2.13  | 12                     | 11.8               |
| 0.32         | 2.11               | 3.15  | 2.07  | 19.8                   | 19.2               |
| 0.40         | 1.67               | 2.48  | 1.63  | 26                     | 25.6               |
| 0.28         | 2.42               | 3.60  | 2.37  | 22.7                   | 22.2               |
| 0.36         | 1.86               | 2.77  | 1.82  | 30                     | 29.1               |
| 0.35         | 1.94               | 2.89  | 1.90  | 50.8                   | 49.7               |
| <hr/>        |                    |       |       |                        |                    |
| 0.17         | 3.91               | 5.83  | 3.83  | 5.8                    | 5.62               |
| 0.25         | 2.66               | 3.96  | 2.60  | 12.7                   | 12.3               |
| 0.34         | 1.98               | 2.95  | 1.94  | 17.7                   | 17.4               |
| 0.31         | 2.16               | 3.22  | 2.12  | 17.4                   | 17.1               |
| 0.31         | 2.15               | 3.21  | 2.11  | 21.5                   | 20.8               |
| 0.39         | 1.74               | 2.59  | 1.70  | 27.2                   | 26.8               |
| 0.28         | 2.39               | 3.56  | 2.34  | 28                     | 27.3               |
| 0.36         | 1.87               | 2.79  | 1.83  | 36.8                   | 35.7               |
| 0.34         | 1.96               | 2.91  | 1.91  | 59.8                   | 58.5               |
| <hr/>        |                    |       |       |                        |                    |
| 0.19         | 3.52               | 5.25  | 3.45  | 8.21                   | 7.95               |
| 0.26         | 2.59               | 3.85  | 2.53  | 16.7                   | 16.1               |
| 0.35         | 1.91               | 2.85  | 1.87  | 23.3                   | 22.9               |







Cylindrical bore

Tapered bore  
taper 1:12

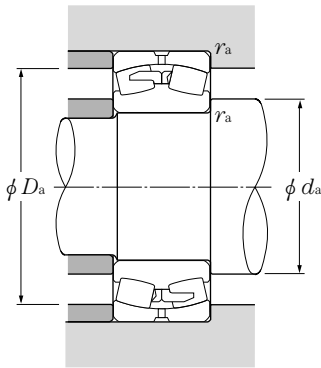
**d 180~240mm**

| d   | Boundary dimensions |     |                                 | dynamic<br>C <sub>r</sub> | Basic load ratings        |                           |                           | Bearing numbers  |                              | Abutment and fillet dimensions |                    |                     |
|-----|---------------------|-----|---------------------------------|---------------------------|---------------------------|---------------------------|---------------------------|------------------|------------------------------|--------------------------------|--------------------|---------------------|
|     | D                   | B   | r <sub>s min</sub> <sup>①</sup> |                           | static<br>C <sub>or</sub> | dynamic<br>C <sub>r</sub> | static<br>C <sub>or</sub> | Cylindrical bore | tapered <sup>②</sup><br>bore | d <sub>a min</sub>             | D <sub>a max</sub> | r <sub>as max</sub> |
| 180 | 280                 | 100 | 2.1                             | 965                       | 1,770                     | 98,500                    | 181,000                   | ☆24036C          | 24036CK30                    | 192                            | 268                | 2                   |
|     | 290                 | 110 | 2.1                             | 1,050                     | 1,890                     | 107,000                   | 193,000                   | 2P3604           | 2P3604K                      | 192                            | 278                | 2                   |
|     | 300                 | 96  | 3                               | 1,030                     | 1,730                     | 105,000                   | 176,000                   | 23136B           | 23136BK                      | 194                            | 286                | 2.5                 |
|     | 300                 | 118 | 3                               | 1,250                     | 2,210                     | 127,000                   | 225,000                   | 24136B           | 24136BK30                    | 194                            | 286                | 2.5                 |
|     | 320                 | 86  | 4                               | 1,040                     | 1,610                     | 106,000                   | 164,000                   | 22236B           | 22236BK                      | 198                            | 302                | 3                   |
|     | 320                 | 112 | 4                               | 1,230                     | 2,000                     | 125,000                   | 204,000                   | 23236B           | 23236BK                      | 198                            | 302                | 3                   |
|     | 380                 | 126 | 4                               | 1,740                     | 2,560                     | 177,000                   | 261,000                   | 22336B           | 22336BK                      | 198                            | 362                | 3                   |
| 190 | 260                 | 52  | 2                               | 460                       | 890                       | 47,000                    | 91,000                    | 23938            | 23938K                       | 200                            | 250                | 2                   |
|     | 290                 | 75  | 2.1                             | 755                       | 1,350                     | 77,000                    | 138,000                   | 23038B           | 23038BK                      | 202                            | 278                | 2                   |
|     | 290                 | 100 | 2.1                             | 995                       | 1,850                     | 102,000                   | 188,000                   | 24038B           | 24038BK30                    | 202                            | 278                | 2                   |
|     | 290                 | 100 | 2.1                             | 970                       | 1,820                     | 98,500                    | 186,000                   | ☆24038C          | 24038CK30                    | 202                            | 278                | 2                   |
|     | 320                 | 104 | 3                               | 1,190                     | 2,020                     | 122,000                   | 206,000                   | 23138B           | 23138BK                      | 204                            | 306                | 2.5                 |
|     | 320                 | 128 | 3                               | 1,420                     | 2,480                     | 144,000                   | 253,000                   | 24138B           | 24138BK30                    | 204                            | 306                | 2.5                 |
|     | 340                 | 92  | 4                               | 1,160                     | 1,810                     | 118,000                   | 185,000                   | 22238B           | 22238BK                      | 208                            | 322                | 3                   |
|     | 340                 | 120 | 4                               | 1,400                     | 2,330                     | 143,000                   | 237,000                   | 23238B           | 23238BK                      | 208                            | 322                | 3                   |
| 400 | 132                 | 5   | 1,870                           | 2,790                     | 191,000                   | 284,000                   | 22338B                    | 22338BK          | 212                          | 378                            | 4                  |                     |
| 200 | 280                 | 60  | 2.1                             | 545                       | 1,100                     | 56,000                    | 112,000                   | 23940            | 23940K                       | 212                            | 268                | 2                   |
|     | 310                 | 82  | 2.1                             | 915                       | 1,620                     | 93,000                    | 165,000                   | 23040B           | 23040BK                      | 212                            | 298                | 2                   |
|     | 310                 | 109 | 2.1                             | 1,160                     | 2,140                     | 118,000                   | 219,000                   | 24040B           | 24040BK30                    | 212                            | 298                | 2                   |
|     | 340                 | 112 | 3                               | 1,350                     | 2,270                     | 137,000                   | 231,000                   | 23140B           | 23140BK                      | 214                            | 326                | 2.5                 |
|     | 340                 | 140 | 3                               | 1,630                     | 2,900                     | 166,000                   | 295,000                   | 24140B           | 24140BK30                    | 214                            | 326                | 2.5                 |
|     | 360                 | 98  | 4                               | 1,310                     | 2,010                     | 134,000                   | 205,000                   | 22240B           | 22240BK                      | 218                            | 342                | 3                   |
|     | 360                 | 128 | 4                               | 1,610                     | 2,640                     | 165,000                   | 269,000                   | 23240B           | 23240BK                      | 218                            | 342                | 3                   |
|     | 420                 | 138 | 5                               | 2,040                     | 3,050                     | 208,000                   | 310,000                   | 22340B           | 22340BK                      | 222                            | 398                | 4                   |
| 220 | 300                 | 60  | 2.1                             | 565                       | 1,170                     | 57,500                    | 119,000                   | 23944            | 23944K                       | 232                            | 288                | 2                   |
|     | 340                 | 90  | 3                               | 1,060                     | 1,920                     | 108,000                   | 195,000                   | 23044B           | 23044BK                      | 234                            | 326                | 2.5                 |
|     | 340                 | 118 | 3                               | 1,350                     | 2,570                     | 138,000                   | 262,000                   | 24044B           | 24044BK30                    | 234                            | 326                | 2.5                 |
|     | 370                 | 120 | 4                               | 1,540                     | 2,670                     | 157,000                   | 272,000                   | 23144B           | 23144BK                      | 238                            | 352                | 3                   |
|     | 370                 | 150 | 4                               | 1,880                     | 3,400                     | 192,000                   | 345,000                   | 24144B           | 24144BK30                    | 238                            | 352                | 3                   |
|     | 400                 | 108 | 4                               | 1,580                     | 2,460                     | 161,000                   | 251,000                   | 22244B           | 22244BK                      | 238                            | 382                | 3                   |
|     | 400                 | 144 | 4                               | 2,010                     | 3,350                     | 205,000                   | 340,000                   | 23244B           | 23244BK                      | 238                            | 382                | 3                   |
|     | 400                 | 150 | 4                               | 2,040                     | 3,400                     | 208,000                   | 345,000                   | 2P4401           | 2P4401K30                    | 238                            | 382                | 3                   |
|     | 460                 | 145 | 5                               | 2,350                     | 3,500                     | 240,000                   | 360,000                   | 22344B           | 22344BK                      | 242                            | 438                | 4                   |
| 240 | 320                 | 60  | 2.1                             | 565                       | 1,190                     | 58,000                    | 121,000                   | 23948            | 23948K                       | 252                            | 308                | 2                   |
|     | 360                 | 92  | 3                               | 1,130                     | 2,140                     | 116,000                   | 219,000                   | 23048B           | 23048BK                      | 254                            | 346                | 2.5                 |

① Smallest allowable dimension for chamfer dimension r.

② Bearings appended with "K" have a tapered bore ratio of 1:12; bearings appended with "K30" have a tapered bore ratio of 1:30.

Remarks: 1. Bearing numbers marked "☆" are C type.



**Equivalent bearing load**

**dynamic**

$$P_r = X F_r + Y F_a$$

| $\frac{F_a}{F_r} \leq e$ |       | $\frac{F_a}{F_r} > e$ |       |
|--------------------------|-------|-----------------------|-------|
| X                        | Y     | X                     | Y     |
| 1                        | $Y_1$ | 0.67                  | $Y_2$ |

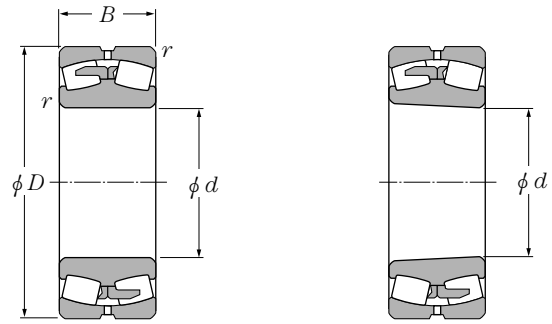
**static**

$$P_{or} = F_r + Y_0 F_a$$

For values of  $e$ ,  $Y_1$ ,  $Y_2$  and  $Y_0$  see the table below.

| Constant $e$ | Axial load factors |       |       | Mass (approx.)         |                    |
|--------------|--------------------|-------|-------|------------------------|--------------------|
|              | $Y_1$              | $Y_2$ | $Y_0$ | Cylindrical bore<br>kg | tapered bore<br>kg |
| 0.33         | 2.04               | 3.04  | 2.00  | 23                     | 22.6               |
| 0.37         | 1.82               | 2.70  | 1.78  | 27.5                   | 26.3               |
| 0.32         | 2.11               | 3.15  | 2.07  | 25.1                   | 24.2               |
| 0.39         | 1.72               | 2.56  | 1.68  | 34.3                   | 33.8               |
| 0.27         | 2.49               | 3.70  | 2.43  | 29.3                   | 28.6               |
| 0.35         | 1.91               | 2.84  | 1.86  | 39                     | 37.8               |
| 0.34         | 1.97               | 2.93  | 1.92  | 70                     | 68.5               |
| <hr/>        |                    |       |       |                        |                    |
| 0.18         | 3.81               | 5.67  | 3.73  | 8.6                    | 8.34               |
| 0.26         | 2.65               | 3.94  | 2.59  | 17.7                   | 17.1               |
| 0.33         | 2.03               | 3.02  | 1.98  | 24.3                   | 23.9               |
| 0.31         | 2.16               | 3.22  | 2.12  | 23                     | 22.6               |
| 0.33         | 2.07               | 3.09  | 2.03  | 35.3                   | 34.2               |
| 0.40         | 1.69               | 2.51  | 1.65  | 42.8                   | 42.2               |
| 0.27         | 2.47               | 3.68  | 2.42  | 36.6                   | 35.8               |
| 0.36         | 1.89               | 2.82  | 1.85  | 47.6                   | 46.2               |
| 0.34         | 1.97               | 2.94  | 1.93  | 81                     | 79.3               |
| <hr/>        |                    |       |       |                        |                    |
| 0.17         | 3.91               | 5.82  | 3.82  | 12.1                   | 11.7               |
| 0.26         | 2.59               | 3.85  | 2.53  | 22.7                   | 21.9               |
| 0.35         | 1.94               | 2.89  | 1.90  | 31                     | 30.5               |
| 0.33         | 2.05               | 3.05  | 2.00  | 43.3                   | 42                 |
| 0.41         | 1.64               | 2.44  | 1.60  | 53.4                   | 52.6               |
| 0.28         | 2.45               | 3.64  | 2.39  | 44                     | 43                 |
| 0.36         | 1.88               | 2.79  | 1.83  | 57.2                   | 55.5               |
| 0.34         | 1.98               | 2.95  | 1.94  | 93.2                   | 91.2               |
| <hr/>        |                    |       |       |                        |                    |
| 0.19         | 3.62               | 5.39  | 3.54  | 13.1                   | 12.7               |
| 0.26         | 2.59               | 3.85  | 2.53  | 29.9                   | 28.8               |
| 0.34         | 1.97               | 2.94  | 1.93  | 40.2                   | 39.6               |
| 0.33         | 2.07               | 3.09  | 2.03  | 53.3                   | 51.6               |
| 0.41         | 1.66               | 2.47  | 1.62  | 67                     | 66                 |
| 0.27         | 2.46               | 3.66  | 2.40  | 60.4                   | 59.1               |
| 0.36         | 1.85               | 2.76  | 1.81  | 80                     | 77.6               |
| 0.41         | 1.64               | 2.44  | 1.61  | 81.9                   | 80.8               |
| 0.33         | 2.06               | 3.07  | 2.02  | 117                    | 115                |
| <hr/>        |                    |       |       |                        |                    |
| 0.16         | 4.13               | 6.15  | 4.04  | 14                     | 13.6               |
| 0.25         | 2.69               | 4.01  | 2.63  | 33.4                   | 32.2               |





Cylindrical bore

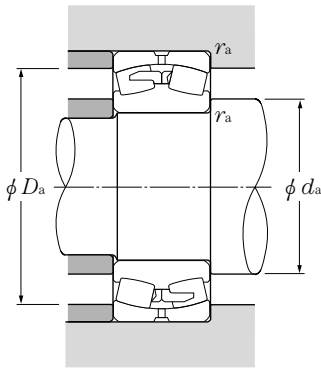
Tapered bore  
taper 1:12

**d 240~300mm**

|               | Boundary dimensions |        |                           |       | dynamic  | Basic load ratings |          |               | Bearing numbers  |                  | Abutment and fillet dimensions |           |           |
|---------------|---------------------|--------|---------------------------|-------|----------|--------------------|----------|---------------|------------------|------------------|--------------------------------|-----------|-----------|
|               | mm                  |        |                           |       |          | kN                 | static   | dynamic       | static           | Cylindrical bore | tapered <sup>①</sup> bore      | $d_a$ min | $D_a$ max |
| $d$           | $D$                 | $B$    | $r_{s\ min}$ <sup>②</sup> | $C_r$ | $C_{or}$ | $C_r$              | $C_{or}$ |               |                  |                  |                                |           |           |
| <b>240</b>    | 360                 | 118    | 3                         | 1,410 | 2,770    | 144,000            | 282,000  | <b>24048B</b> | <b>24048BK30</b> | 254              | 346                            | 2.5       |           |
|               | 400                 | 128    | 4                         | 1,730 | 3,050    | 177,000            | 310,000  | <b>23148B</b> | <b>23148BK</b>   | 258              | 382                            | 3         |           |
|               | 400                 | 160    | 4                         | 2,110 | 3,800    | 215,000            | 390,000  | <b>24148B</b> | <b>24148BK30</b> | 258              | 382                            | 3         |           |
|               | 440                 | 120    | 4                         | 1,940 | 3,100    | 198,000            | 315,000  | <b>22248B</b> | <b>22248BK</b>   | 258              | 422                            | 3         |           |
|               | 440                 | 160    | 4                         | 2,430 | 4,100    | 247,000            | 420,000  | <b>23248B</b> | <b>23248BK</b>   | 258              | 422                            | 3         |           |
|               | 500                 | 155    | 5                         | 2,720 | 4,100    | 278,000            | 420,000  | <b>22348B</b> | <b>22348BK</b>   | 262              | 478                            | 4         |           |
| <b>247.65</b> | 400.05              | 120.65 | 4                         | 1,590 | 2,780    | 162,000            | 283,000  | <b>2P5002</b> | <b>2P5002K</b>   | 266              | 382                            | 3         |           |
| <b>260</b>    | 360                 | 70     | 2.1                       | 805   | 1,590    | 82,000             | 163,000  | <b>2P5203</b> | <b>2P5203K</b>   | 272              | 348                            | 2         |           |
|               | 360                 | 75     | 2.1                       | 760   | 1,580    | 77,500             | 161,000  | <b>23952</b>  | <b>23952K</b>    | 272              | 348                            | 2         |           |
|               | 400                 | 104    | 4                         | 1,420 | 2,620    | 144,000            | 267,000  | <b>23052B</b> | <b>23052BK</b>   | 278              | 382                            | 3         |           |
|               | 400                 | 140    | 4                         | 1,830 | 3,550    | 186,000            | 365,000  | <b>24052B</b> | <b>24052BK30</b> | 278              | 382                            | 3         |           |
|               | 440                 | 144    | 4                         | 2,140 | 3,850    | 219,000            | 395,000  | <b>23152B</b> | <b>23152BK</b>   | 278              | 422                            | 3         |           |
|               | 440                 | 180    | 4                         | 2,510 | 4,600    | 256,000            | 470,000  | <b>24152B</b> | <b>24152BK30</b> | 278              | 422                            | 3         |           |
|               | 480                 | 130    | 5                         | 2,230 | 3,600    | 228,000            | 365,000  | <b>22252B</b> | <b>22252BK</b>   | 282              | 458                            | 4         |           |
|               | 480                 | 174    | 5                         | 2,760 | 4,700    | 281,000            | 480,000  | <b>23252B</b> | <b>23252BK</b>   | 282              | 458                            | 4         |           |
|               | 540                 | 165    | 6                         | 3,100 | 4,750    | 320,000            | 485,000  | <b>22352B</b> | <b>22352BK</b>   | 288              | 512                            | 5         |           |
| <b>280</b>    | 350                 | 52     | 2                         | 525   | 1,220    | 54,000             | 125,000  | <b>23856</b>  | <b>23856K</b>    | 290              | 340                            | 2         |           |
|               | 380                 | 75     | 2.1                       | 830   | 1,750    | 84,500             | 179,000  | <b>23956</b>  | <b>23956K</b>    | 292              | 368                            | 2         |           |
|               | 420                 | 106    | 4                         | 1,510 | 2,920    | 154,000            | 297,000  | <b>23056B</b> | <b>23056BK</b>   | 298              | 402                            | 3         |           |
|               | 420                 | 140    | 4                         | 1,950 | 3,950    | 199,000            | 405,000  | <b>24056B</b> | <b>24056BK30</b> | 298              | 402                            | 3         |           |
|               | 440                 | 160    | 4                         | 2,180 | 4,250    | 222,000            | 435,000  | <b>2P5604</b> | <b>2P5604K</b>   | 298              | 422                            | 3         |           |
|               | 460                 | 146    | 5                         | 2,300 | 4,250    | 234,000            | 435,000  | <b>23156B</b> | <b>23156BK</b>   | 302              | 438                            | 4         |           |
|               | 460                 | 180    | 5                         | 2,730 | 5,200    | 278,000            | 530,000  | <b>24156B</b> | <b>24156BK30</b> | 302              | 438                            | 4         |           |
|               | 500                 | 130    | 5                         | 2,310 | 3,800    | 236,000            | 390,000  | <b>22256B</b> | <b>22256BK</b>   | 302              | 478                            | 4         |           |
|               | 500                 | 176    | 5                         | 2,930 | 5,150    | 298,000            | 525,000  | <b>23256B</b> | <b>23256BK</b>   | 302              | 478                            | 4         |           |
|               | 580                 | 175    | 6                         | 3,500 | 5,350    | 360,000            | 545,000  | <b>22356B</b> | <b>22356BK</b>   | 308              | 552                            | 5         |           |
| <b>290</b>    | 430                 | 110    | 4                         | 1,380 | 2,860    | 141,000            | 291,000  | <b>2P5802</b> | <b>2P5802K</b>   | 308              | 412                            | 3         |           |
| <b>300</b>    | 420                 | 90     | 3                         | 1,110 | 2,320    | 113,000            | 237,000  | <b>23960</b>  | <b>23960K</b>    | 314              | 406                            | 2.5       |           |
|               | 460                 | 118    | 4                         | 1,890 | 3,550    | 193,000            | 365,000  | <b>23060B</b> | <b>23060BK</b>   | 318              | 442                            | 3         |           |
|               | 460                 | 160    | 4                         | 2,450 | 4,950    | 250,000            | 505,000  | <b>24060B</b> | <b>24060BK30</b> | 318              | 442                            | 3         |           |
|               | 500                 | 160    | 5                         | 2,750 | 5,000    | 280,000            | 510,000  | <b>23160B</b> | <b>23160BK</b>   | 322              | 478                            | 4         |           |
|               | 500                 | 200    | 5                         | 3,300 | 6,400    | 340,000            | 650,000  | <b>24160B</b> | <b>24160BK30</b> | 322              | 478                            | 4         |           |
|               | 540                 | 140    | 5                         | 2,670 | 4,350    | 272,000            | 440,000  | <b>22260B</b> | <b>22260BK</b>   | 322              | 518                            | 4         |           |
|               | 540                 | 192    | 5                         | 3,450 | 6,000    | 355,000            | 615,000  | <b>23260B</b> | <b>23260BK</b>   | 322              | 518                            | 4         |           |

① Smallest allowable dimension for chamfer dimension  $r$ .

② Bearings appended with "K" have a tapered bore ratio of 1:12; bearings appended with "K30" have a tapered bore ratio of 1:30.



**Equivalent bearing load**

**dynamic**

$$P_r = X F_r + Y F_a$$

| $\frac{F_a}{F_r} \leq e$ |       | $\frac{F_a}{F_r} > e$ |       |
|--------------------------|-------|-----------------------|-------|
| X                        | Y     | X                     | Y     |
| 1                        | $Y_1$ | 0.67                  | $Y_2$ |

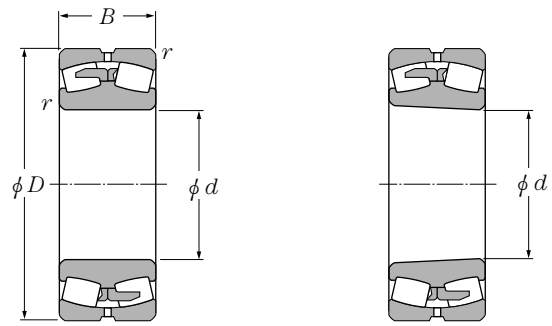
**static**

$$P_{or} = F_r + Y_0 F_a$$

For values of  $e$ ,  $Y_1$ ,  $Y_2$  and  $Y_0$  see the table below.

| Constant $e$ | Axial load factors |       |       | Mass (approx.)        |                   |
|--------------|--------------------|-------|-------|-----------------------|-------------------|
|              | $Y_1$              | $Y_2$ | $Y_0$ | Cylindrical bore (kg) | tapered bore (kg) |
| 0.32         | 2.09               | 3.12  | 2.05  | 43                    | 42.3              |
| 0.32         | 2.11               | 3.15  | 2.07  | 65.8                  | 63.8              |
| 0.40         | 1.69               | 2.51  | 1.65  | 82.2                  | 80.9              |
| 0.28         | 2.43               | 3.62  | 2.38  | 81.7                  | 80                |
| 0.37         | 1.83               | 2.72  | 1.79  | 108                   | 105               |
| 0.32         | 2.10               | 3.13  | 2.06  | 148                   | 145               |
| 0.31         | 2.18               | 3.24  | 2.13  | 58.2                  | 56.3              |
| 0.18         | 3.76               | 5.60  | 3.67  | 21.6                  | 21                |
| 0.19         | 3.53               | 5.26  | 3.45  | 24                    | 23.3              |
| 0.26         | 2.63               | 3.92  | 2.57  | 48.5                  | 46.8              |
| 0.34         | 1.96               | 2.91  | 1.91  | 65.2                  | 64.1              |
| 0.33         | 2.05               | 3.06  | 2.01  | 91.4                  | 88.6              |
| 0.41         | 1.63               | 2.43  | 1.60  | 114                   | 112               |
| 0.28         | 2.45               | 3.64  | 2.39  | 106                   | 104               |
| 0.37         | 1.83               | 2.72  | 1.79  | 141                   | 137               |
| 0.32         | 2.13               | 3.18  | 2.09  | 183                   | 179               |
| 0.12         | 5.42               | 8.07  | 5.30  | 11                    | 10.6              |
| 0.17         | 3.88               | 5.78  | 3.79  | 26.4                  | 25.6              |
| 0.25         | 2.73               | 4.06  | 2.67  | 52.4                  | 50.6              |
| 0.33         | 2.06               | 3.07  | 2.02  | 69                    | 67.9              |
| 0.35         | 1.92               | 2.86  | 1.88  | 88.6                  | 84.9              |
| 0.32         | 2.13               | 3.18  | 2.09  | 97.7                  | 94.6              |
| 0.39         | 1.73               | 2.58  | 1.69  | 120                   | 118               |
| 0.26         | 2.57               | 3.83  | 2.51  | 112                   | 110               |
| 0.36         | 1.90               | 2.83  | 1.86  | 150                   | 145               |
| 0.31         | 2.16               | 3.22  | 2.12  | 224                   | 220               |
| 0.25         | 2.69               | 4.00  | 2.63  | 56                    | 54.1              |
| 0.20         | 3.34               | 4.98  | 3.27  | 40                    | 38.7              |
| 0.25         | 2.66               | 3.96  | 2.60  | 72.4                  | 70.2              |
| 0.34         | 1.97               | 2.93  | 1.92  | 98                    | 96.4              |
| 0.32         | 2.11               | 3.15  | 2.07  | 131                   | 127               |
| 0.40         | 1.69               | 2.51  | 1.65  | 161                   | 159               |
| 0.26         | 2.57               | 3.83  | 2.51  | 141                   | 138               |
| 0.36         | 1.88               | 2.79  | 1.83  | 193                   | 187               |





Cylindrical bore

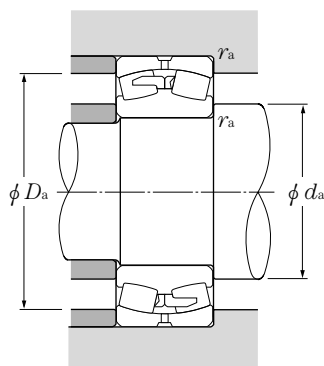
Tapered bore  
taper 1:12

**d 300~380mm**

| d          | Boundary dimensions |     |                                 | dynamic<br>C <sub>r</sub> | Basic load ratings        |                           |                           | Bearing numbers  |                              | Abutment and fillet dimensions |                    |                     |
|------------|---------------------|-----|---------------------------------|---------------------------|---------------------------|---------------------------|---------------------------|------------------|------------------------------|--------------------------------|--------------------|---------------------|
|            | D                   | B   | r <sub>s min</sub> <sup>①</sup> |                           | static<br>C <sub>or</sub> | dynamic<br>C <sub>r</sub> | static<br>C <sub>or</sub> | Cylindrical bore | tapered <sup>②</sup><br>bore | d <sub>a min</sub>             | D <sub>a max</sub> | r <sub>as max</sub> |
| <b>300</b> | 620                 | 185 | 7.5                             | 3,600                     | 5,400                     | 365,000                   | 550,000                   | <b>22360B</b>    | <b>22360BK</b>               | 336                            | 584                | 6                   |
| <b>320</b> | 400                 | 80  | 2.1                             | 870                       | 2,210                     | 89,000                    | 226,000                   | <b>24864</b>     | <b>24864K30</b>              | 332                            | 388                | 2                   |
|            | 440                 | 90  | 3                               | 1,140                     | 2,460                     | 116,000                   | 251,000                   | <b>23964</b>     | <b>23964K</b>                | 334                            | 426                | 2.5                 |
|            | 480                 | 121 | 4                               | 1,960                     | 3,850                     | 200,000                   | 395,000                   | <b>23064B</b>    | <b>23064BK</b>               | 338                            | 462                | 3                   |
|            | 480                 | 160 | 4                               | 2,510                     | 5,200                     | 255,000                   | 530,000                   | <b>24064B</b>    | <b>24064BK30</b>             | 338                            | 462                | 3                   |
|            | 540                 | 176 | 5                               | 3,100                     | 5,800                     | 320,000                   | 590,000                   | <b>23164B</b>    | <b>23164BK</b>               | 342                            | 518                | 4                   |
|            | 540                 | 218 | 5                               | 3,850                     | 7,300                     | 390,000                   | 745,000                   | <b>24164B</b>    | <b>24164BK30</b>             | 342                            | 518                | 4                   |
|            | 580                 | 150 | 5                               | 3,100                     | 5,050                     | 315,000                   | 515,000                   | <b>22264B</b>    | <b>22264BK</b>               | 342                            | 558                | 4                   |
|            | 580                 | 208 | 5                               | 4,000                     | 7,050                     | 410,000                   | 720,000                   | <b>23264B</b>    | <b>23264BK</b>               | 342                            | 558                | 4                   |
|            | 580                 | 213 | 5                               | 3,950                     | 6,900                     | 405,000                   | 705,000                   | <b>2P6404</b>    | <b>2P6404K</b>               | 342                            | 558                | 4                   |
| <b>330</b> | 540                 | 186 | 5                               | 3,100                     | 6,000                     | 315,000                   | 615,000                   | <b>2P6601</b>    | <b>2P6601K</b>               | 352                            | 518                | 4                   |
| <b>340</b> | 460                 | 90  | 3                               | 1,220                     | 2,650                     | 124,000                   | 270,000                   | <b>23968</b>     | <b>23968K</b>                | 354                            | 446                | 2.5                 |
|            | 520                 | 133 | 5                               | 2,310                     | 4,550                     | 235,000                   | 465,000                   | <b>23068B</b>    | <b>23068BK</b>               | 362                            | 498                | 4                   |
|            | 520                 | 180 | 5                               | 3,000                     | 6,200                     | 305,000                   | 630,000                   | <b>24068B</b>    | <b>24068BK30</b>             | 362                            | 498                | 4                   |
|            | 580                 | 190 | 5                               | 3,600                     | 6,600                     | 365,000                   | 670,000                   | <b>23168B</b>    | <b>23168BK</b>               | 362                            | 558                | 4                   |
|            | 580                 | 243 | 5                               | 4,600                     | 8,950                     | 470,000                   | 910,000                   | <b>24168B</b>    | <b>24168BK30</b>             | 362                            | 558                | 4                   |
|            | 620                 | 224 | 6                               | 4,450                     | 8,000                     | 455,000                   | 815,000                   | <b>23268B</b>    | <b>23268BK</b>               | 368                            | 592                | 5                   |
|            | 620                 | 229 | 6                               | 4,450                     | 8,000                     | 455,000                   | 815,000                   | <b>2P6802</b>    | <b>2P6802K</b>               | 368                            | 592                | 5                   |
| <b>360</b> | 440                 | 60  | 2.1                             | 735                       | 1,830                     | 74,500                    | 187,000                   | <b>23872</b>     | <b>23872K</b>                | 372                            | 428                | 2                   |
|            | 480                 | 75  | 3                               | 1,090                     | 2,350                     | 111,000                   | 239,000                   | <b>2P7202</b>    | <b>2P7202K</b>               | 374                            | 466                | 2.5                 |
|            | 480                 | 90  | 3                               | 1,320                     | 2,930                     | 135,000                   | 298,000                   | <b>23972</b>     | <b>23972K</b>                | 374                            | 466                | 2.5                 |
|            | 520                 | 133 | 5                               | 1,790                     | 3,900                     | 182,000                   | 395,000                   | <b>2P7201</b>    | <b>2P7201K</b>               | 382                            | 498                | 4                   |
|            | 530                 | 127 | 5                               | 2,060                     | 4,100                     | 210,000                   | 415,000                   | <b>2P7205</b>    | <b>2P7205K</b>               | 382                            | 508                | 4                   |
|            | 540                 | 134 | 5                               | 2,370                     | 4,700                     | 242,000                   | 480,000                   | <b>23072B</b>    | <b>23072BK</b>               | 382                            | 518                | 4                   |
|            | 540                 | 180 | 5                               | 3,100                     | 6,600                     | 320,000                   | 675,000                   | <b>24072B</b>    | <b>24072BK30</b>             | 382                            | 518                | 4                   |
|            | 600                 | 192 | 5                               | 3,750                     | 7,050                     | 385,000                   | 715,000                   | <b>23172B</b>    | <b>23172BK</b>               | 382                            | 578                | 4                   |
|            | 600                 | 243 | 5                               | 4,600                     | 9,150                     | 470,000                   | 935,000                   | <b>24172B</b>    | <b>24172BK30</b>             | 382                            | 578                | 4                   |
|            | 610                 | 255 | 5                               | 4,300                     | 8,300                     | 440,000                   | 845,000                   | <b>2P7206</b>    | <b>2P7206K</b>               | 382                            | 588                | 4                   |
| 650        | 232                 | 6   | 4,850                           | 8,700                     | 495,000                   | 885,000                   | <b>23272B</b>             | <b>23272BK</b>   | 388                          | 622                            | 5                  |                     |
| <b>380</b> | 520                 | 106 | 4                               | 1,560                     | 3,550                     | 159,000                   | 360,000                   | <b>23976</b>     | <b>23976K</b>                | 398                            | 502                | 3                   |
|            | 560                 | 135 | 5                               | 2,510                     | 5,150                     | 256,000                   | 525,000                   | <b>23076B</b>    | <b>23076BK</b>               | 402                            | 538                | 4                   |
|            | 560                 | 180 | 5                               | 3,250                     | 7,100                     | 330,000                   | 725,000                   | <b>24076B</b>    | <b>24076BK30</b>             | 402                            | 538                | 4                   |
|            | 620                 | 194 | 5                               | 3,900                     | 7,500                     | 400,000                   | 765,000                   | <b>23176B</b>    | <b>23176BK</b>               | 402                            | 598                | 4                   |
|            | 620                 | 243 | 5                               | 4,800                     | 9,650                     | 490,000                   | 985,000                   | <b>24176B</b>    | <b>24176BK30</b>             | 402                            | 598                | 4                   |

① Smallest allowable dimension for chamfer dimension r.

② Bearings appended with "K" have a tapered bore ratio of 1:12; bearings appended with "K30" have a tapered bore ratio of 1:30.



**Equivalent bearing load**

**dynamic**

$$P_r = X F_r + Y F_a$$

| $\frac{F_a}{F_r} \leq e$ |       | $\frac{F_a}{F_r} > e$ |       |
|--------------------------|-------|-----------------------|-------|
| X                        | Y     | X                     | Y     |
| 1                        | $Y_1$ | 0.67                  | $Y_2$ |

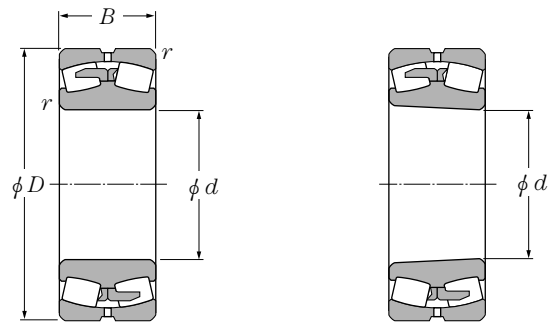
**static**

$$P_{or} = F_r + Y_0 F_a$$

For values of  $e$ ,  $Y_1$ ,  $Y_2$  and  $Y_0$  see the table below.

| Constant $e$ | Axial load factors |       |       | Mass (approx.)        |                   |
|--------------|--------------------|-------|-------|-----------------------|-------------------|
|              | $Y_1$              | $Y_2$ | $Y_0$ | Cylindrical bore (kg) | tapered bore (kg) |
| 0.32         | 2.13               | 3.17  | 2.08  | 270                   | 265               |
| 0.17         | 3.90               | 5.81  | 3.82  | 22.8                  | 22.4              |
| 0.19         | 3.50               | 5.21  | 3.42  | 43                    | 41.7              |
| 0.25         | 2.73               | 4.06  | 2.67  | 78.2                  | 75.5              |
| 0.33         | 2.06               | 3.07  | 2.02  | 103                   | 101               |
| 0.33         | 2.06               | 3.07  | 2.02  | 167                   | 162               |
| 0.40         | 1.67               | 2.48  | 1.63  | 207                   | 204               |
| 0.26         | 2.57               | 3.83  | 2.51  | 172                   | 168               |
| 0.36         | 1.86               | 2.77  | 1.82  | 243                   | 236               |
| 0.36         | 1.86               | 2.77  | 1.82  | 241                   | 233               |
| 0.34         | 1.99               | 2.96  | 1.94  | 166                   | 160               |
| 0.17         | 3.91               | 5.83  | 3.83  | 44.7                  | 43.3              |
| 0.25         | 2.68               | 3.99  | 2.62  | 104                   | 100               |
| 0.34         | 1.98               | 2.95  | 1.94  | 140                   | 138               |
| 0.33         | 2.05               | 3.06  | 2.01  | 210                   | 204               |
| 0.42         | 1.61               | 2.39  | 1.57  | 269                   | 265               |
| 0.37         | 1.84               | 2.75  | 1.80  | 300                   | 291               |
| 0.37         | 1.84               | 2.75  | 1.80  | 298                   | 288               |
| 0.12         | 5.78               | 8.61  | 5.66  | 19.2                  | 18.6              |
| 0.14         | 4.94               | 7.36  | 4.83  | 37.1                  | 36.1              |
| 0.17         | 3.99               | 5.93  | 3.90  | 47.2                  | 45.7              |
| 0.25         | 2.69               | 4.01  | 2.63  | 92.8                  | 89.5              |
| 0.23         | 2.92               | 4.35  | 2.86  | 95.3                  | 92.3              |
| 0.24         | 2.78               | 4.14  | 2.72  | 110                   | 106               |
| 0.33         | 2.06               | 3.07  | 2.02  | 147                   | 145               |
| 0.32         | 2.11               | 3.15  | 2.07  | 222                   | 215               |
| 0.40         | 1.67               | 2.48  | 1.63  | 281                   | 277               |
| 0.41         | 1.64               | 2.44  | 1.60  | 290                   | 277               |
| 0.36         | 1.87               | 2.78  | 1.83  | 339                   | 329               |
| 0.19         | 3.54               | 5.27  | 3.46  | 69.9                  | 67.7              |
| 0.24         | 2.87               | 4.27  | 2.80  | 115                   | 111               |
| 0.30         | 2.23               | 3.32  | 2.18  | 153                   | 150               |
| 0.31         | 2.16               | 3.22  | 2.12  | 235                   | 228               |
| 0.39         | 1.73               | 2.58  | 1.69  | 292                   | 287               |





Cylindrical bore

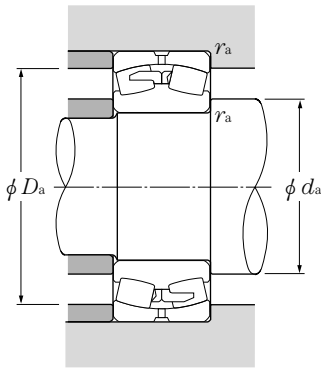
Tapered bore  
taper 1:12

**d 380~460mm**

| d   | Boundary dimensions |     |                                 | dynamic<br>C <sub>r</sub> | Basic load ratings        |                           |                           | Bearing numbers  |                              | Abutment and fillet dimensions |                    |                     |
|-----|---------------------|-----|---------------------------------|---------------------------|---------------------------|---------------------------|---------------------------|------------------|------------------------------|--------------------------------|--------------------|---------------------|
|     | D                   | B   | r <sub>s min</sub> <sup>①</sup> |                           | static<br>C <sub>0r</sub> | dynamic<br>C <sub>r</sub> | static<br>C <sub>0r</sub> | Cylindrical bore | tapered <sup>②</sup><br>bore | d <sub>a min</sub>             | D <sub>a max</sub> | r <sub>as max</sub> |
| 380 | 680                 | 240 | 6                               | 5,200                     | 9,650                     | 530,000                   | 985,000                   | 23276B           | 23276BK                      | 408                            | 652                | 5                   |
|     | 680                 | 245 | 6                               | 5,200                     | 9,650                     | 536,000                   | 985,000                   | 2P7603           | 2P7603K                      | 408                            | 652                | 5                   |
| 390 | 510                 | 90  | 3                               | 1,310                     | 3,050                     | 133,000                   | 310,000                   | 2P7801           | 2P7801K                      | 404                            | 496                | 2.5                 |
| 400 | 500                 | 100 | 2.1                             | 1,330                     | 3,500                     | 135,000                   | 360,000                   | 24880            | 24880K30                     | 412                            | 488                | 2                   |
|     | 540                 | 106 | 4                               | 1,580                     | 3,650                     | 161,000                   | 370,000                   | 23980            | 23980K                       | 418                            | 522                | 3                   |
|     | 600                 | 148 | 5                               | 2,980                     | 6,050                     | 305,000                   | 615,000                   | 23080B           | 23080BK                      | 422                            | 578                | 4                   |
|     | 600                 | 200 | 5                               | 3,850                     | 8,400                     | 390,000                   | 855,000                   | 24080B           | 24080BK30                    | 422                            | 578                | 4                   |
|     | 650                 | 200 | 6                               | 4,200                     | 8,050                     | 425,000                   | 820,000                   | 23180B           | 23180BK                      | 428                            | 622                | 5                   |
|     | 650                 | 250 | 6                               | 5,100                     | 10,300                    | 520,000                   | 1,060,000                 | 24180B           | 24180BK30                    | 428                            | 622                | 5                   |
|     | 720                 | 256 | 6                               | 5,850                     | 10,600                    | 595,000                   | 1,080,000                 | 23280B           | 23280BK                      | 428                            | 692                | 5                   |
| 720 | 260                 | 6   | 5,850                           | 10,600                    | 595,000                   | 1,080,000                 | 2P8002                    | 2P8002K          | 428                          | 692                            | 5                  |                     |
| 420 | 520                 | 75  | 2.1                             | 1,090                     | 2,710                     | 111,000                   | 277,000                   | 23884            | 23884K                       | 432                            | 508                | 2                   |
|     | 560                 | 106 | 4                               | 1,630                     | 3,850                     | 166,000                   | 390,000                   | 23984            | 23984K                       | 438                            | 542                | 3                   |
|     | 620                 | 150 | 5                               | 3,100                     | 6,400                     | 315,000                   | 650,000                   | 23084B           | 23084BK                      | 442                            | 598                | 4                   |
|     | 620                 | 200 | 5                               | 3,850                     | 8,450                     | 395,000                   | 865,000                   | 24084B           | 24084BK30                    | 442                            | 598                | 4                   |
|     | 700                 | 224 | 6                               | 5,200                     | 9,950                     | 530,000                   | 1,020,000                 | 23184B           | 23184BK                      | 448                            | 672                | 5                   |
|     | 700                 | 280 | 6                               | 6,150                     | 12,200                    | 625,000                   | 1,240,000                 | 24184B           | 24184BK30                    | 448                            | 672                | 5                   |
| 760 | 272                 | 7.5 | 6,550                           | 12,000                    | 665,000                   | 1,230,000                 | 23284B                    | 23284BK          | 456                          | 724                            | 6                  |                     |
| 440 | 600                 | 118 | 4                               | 2,030                     | 4,700                     | 207,000                   | 480,000                   | 23988            | 23988K                       | 458                            | 582                | 3                   |
|     | 650                 | 157 | 6                               | 3,300                     | 6,850                     | 335,000                   | 695,000                   | 23088B           | 23088BK                      | 468                            | 622                | 5                   |
|     | 650                 | 212 | 6                               | 4,300                     | 9,450                     | 440,000                   | 960,000                   | 24088B           | 24088BK30                    | 468                            | 622                | 5                   |
|     | 720                 | 226 | 6                               | 5,200                     | 10,100                    | 530,000                   | 1,030,000                 | 23188B           | 23188BK                      | 468                            | 692                | 5                   |
|     | 720                 | 280 | 6                               | 6,450                     | 13,100                    | 660,000                   | 1,330,000                 | 24188B           | 24188BK30                    | 468                            | 692                | 5                   |
|     | 790                 | 280 | 7.5                             | 6,900                     | 12,800                    | 705,000                   | 1,310,000                 | 23288B           | 23288BK                      | 476                            | 754                | 6                   |
|     | 790                 | 285 | 7.5                             | 6,900                     | 12,800                    | 705,000                   | 1,310,000                 | 2P8802           | 2P8802K                      | 476                            | 754                | 6                   |
| 450 | 620                 | 190 | 3                               | 3,050                     | 7,400                     | 315,000                   | 755,000                   | 2P9002           | 2P9002K                      | 464                            | 606                | 2.5                 |
| 460 | 580                 | 118 | 3                               | 1,840                     | 4,850                     | 187,000                   | 495,000                   | 24892            | 24892K30                     | 474                            | 566                | 2.5                 |
|     | 620                 | 118 | 4                               | 2,100                     | 4,950                     | 214,000                   | 505,000                   | 23992            | 23992K                       | 478                            | 602                | 3                   |
|     | 620                 | 140 | 4                               | 2,440                     | 6,000                     | 248,000                   | 610,000                   | 2P9203           | 2P9203K                      | 478                            | 602                | 3                   |
|     | 680                 | 163 | 6                               | 3,600                     | 7,450                     | 365,000                   | 760,000                   | 23092B           | 23092BK                      | 488                            | 652                | 5                   |
|     | 680                 | 218 | 6                               | 4,600                     | 10,200                    | 470,000                   | 1,040,000                 | 24092B           | 24092BK30                    | 488                            | 652                | 5                   |
|     | 760                 | 240 | 7.5                             | 5,700                     | 11,400                    | 585,000                   | 1,160,000                 | 23192B           | 23192BK                      | 496                            | 724                | 6                   |
|     | 760                 | 300 | 7.5                             | 7,100                     | 14,500                    | 725,000                   | 1,480,000                 | 24192B           | 24192BK30                    | 496                            | 724                | 6                   |

① Smallest allowable dimension for chamfer dimension r.

② Bearings appended with "K" have a tapered bore ratio of 1:12; bearings appended with "K30" have a tapered bore ratio of 1:30.



**Equivalent bearing load**

**dynamic**

$$P_r = X F_r + Y F_a$$

| $\frac{F_a}{F_r} \leq e$ |       | $\frac{F_a}{F_r} > e$ |       |
|--------------------------|-------|-----------------------|-------|
| X                        | Y     | X                     | Y     |
| 1                        | $Y_1$ | 0.67                  | $Y_2$ |

**static**

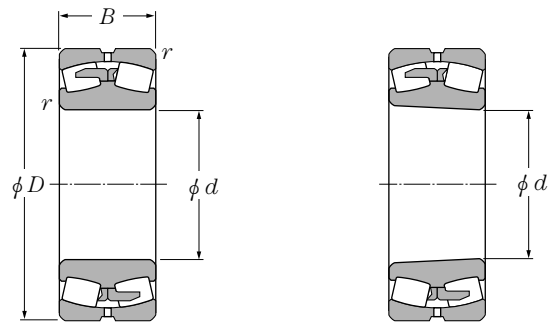
$$P_{or} = F_r + Y_0 F_a$$

For values of  $e$ ,  $Y_1$ ,  $Y_2$  and  $Y_0$  see the table below.

| Constant $e$ | Axial load factors |       |       | Mass (approx.)         |                    |
|--------------|--------------------|-------|-------|------------------------|--------------------|
|              | $Y_1$              | $Y_2$ | $Y_0$ | Cylindrical bore<br>kg | tapered bore<br>kg |
| 0.36         | 1.89               | 2.82  | 1.85  | 380                    | 369                |
| 0.36         | 1.89               | 2.82  | 1.85  | 382                    | 370                |
| 0.15         | 4.41               | 6.57  | 4.31  | 47.3                   | 45.7               |
| 0.18         | 3.76               | 5.59  | 3.67  | 45.3                   | 44.5               |
| 0.18         | 3.71               | 5.53  | 3.63  | 73                     | 70.7               |
| 0.24         | 2.80               | 4.16  | 2.73  | 149                    | 144                |
| 0.32         | 2.09               | 3.11  | 2.04  | 202                    | 200                |
| 0.31         | 2.21               | 3.28  | 2.16  | 264                    | 256                |
| 0.38         | 1.77               | 2.63  | 1.73  | 329                    | 324                |
| 0.37         | 1.81               | 2.69  | 1.77  | 457                    | 443                |
| 0.37         | 1.81               | 2.69  | 1.77  | 457                    | 443                |
| 0.12         | 5.42               | 8.08  | 5.30  | 34.8                   | 33.6               |
| 0.17         | 3.95               | 5.88  | 3.86  | 76.2                   | 73.8               |
| 0.24         | 2.85               | 4.24  | 2.78  | 157                    | 152                |
| 0.32         | 2.13               | 3.18  | 2.09  | 210                    | 207                |
| 0.32         | 2.11               | 3.15  | 2.07  | 354                    | 343                |
| 0.40         | 1.69               | 2.51  | 1.65  | 440                    | 433                |
| 0.36         | 1.86               | 2.77  | 1.82  | 544                    | 528                |
| 0.18         | 3.66               | 5.46  | 3.58  | 101                    | 98                 |
| 0.24         | 2.85               | 4.24  | 2.78  | 181                    | 175                |
| 0.32         | 2.11               | 3.15  | 2.07  | 245                    | 241                |
| 0.31         | 2.15               | 3.21  | 2.11  | 370                    | 358                |
| 0.39         | 1.75               | 2.61  | 1.71  | 456                    | 449                |
| 0.36         | 1.88               | 2.80  | 1.84  | 600                    | 582                |
| 0.36         | 1.88               | 2.80  | 1.84  | 595                    | 576                |
| 0.27         | 2.49               | 3.71  | 2.43  | 166                    | 157                |
| 0.18         | 3.76               | 5.59  | 3.67  | 73.6                   | 72.3               |
| 0.17         | 3.95               | 5.88  | 3.86  | 107                    | 104                |
| 0.21         | 3.22               | 4.80  | 3.15  | 122                    | 118                |
| 0.23         | 2.88               | 4.29  | 2.82  | 206                    | 200                |
| 0.31         | 2.15               | 3.21  | 2.11  | 276                    | 272                |
| 0.31         | 2.14               | 3.19  | 2.10  | 443                    | 429                |
| 0.39         | 1.71               | 2.55  | 1.67  | 550                    | 541                |







Cylindrical bore

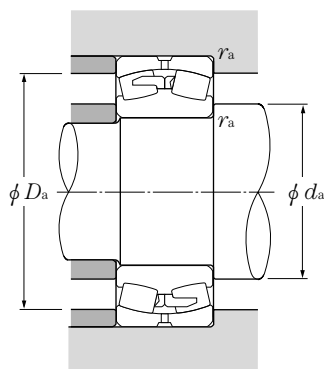
Tapered bore taper 1:12

**d 460~600mm**

| d          | Boundary dimensions |     |                                 | dynamic<br>C <sub>r</sub> | Basic load ratings        |                           | static<br>C <sub>or</sub> | Bearing numbers  |                           | Abutment and fillet dimensions |                    |                     |
|------------|---------------------|-----|---------------------------------|---------------------------|---------------------------|---------------------------|---------------------------|------------------|---------------------------|--------------------------------|--------------------|---------------------|
|            | D                   | B   | r <sub>s min</sub> <sup>①</sup> |                           | static<br>C <sub>or</sub> | dynamic<br>C <sub>r</sub> |                           | Cylindrical bore | tapered <sup>②</sup> bore | d <sub>a min</sub>             | D <sub>a max</sub> | r <sub>as max</sub> |
| <b>460</b> | 830                 | 296 | 7.5                             | 7,750                     | 14,500                    | 790,000                   | 1,470,000                 | <b>23292B</b>    | <b>23292BK</b>            | 496                            | 794                | 6                   |
| <b>480</b> | 650                 | 128 | 5                               | 2,330                     | 5,500                     | 238,000                   | 565,000                   | <b>23996</b>     | <b>23996K</b>             | 502                            | 628                | 4                   |
|            | 660                 | 200 | 3                               | 3,550                     | 8,350                     | 360,000                   | 850,000                   | <b>2P9602</b>    | <b>2P9602K</b>            | 494                            | 646                | 2.5                 |
|            | 700                 | 165 | 6                               | 3,650                     | 7,700                     | 370,000                   | 785,000                   | <b>23096B</b>    | <b>23096BK</b>            | 508                            | 672                | 5                   |
|            | 700                 | 218 | 6                               | 4,650                     | 10,500                    | 475,000                   | 1,070,000                 | <b>24096B</b>    | <b>24096BK30</b>          | 508                            | 672                | 5                   |
|            | 790                 | 248 | 7.5                             | 6,200                     | 12,300                    | 635,000                   | 1,260,000                 | <b>23196B</b>    | <b>23196BK</b>            | 516                            | 754                | 6                   |
|            | 790                 | 308 | 7.5                             | 7,450                     | 15,300                    | 760,000                   | 1,560,000                 | <b>24196B</b>    | <b>24196BK30</b>          | 516                            | 754                | 6                   |
|            | 870                 | 310 | 7.5                             | 8,300                     | 15,500                    | 845,000                   | 1,580,000                 | <b>23296B</b>    | <b>23296BK</b>            | 516                            | 834                | 6                   |
| <b>490</b> | 650                 | 130 | 5                               | 2,270                     | 5,450                     | 232,000                   | 555,000                   | <b>2P9801</b>    | <b>2P9801K</b>            | 512                            | 628                | 4                   |
| <b>500</b> | 620                 | 90  | 3                               | 1,550                     | 3,950                     | 158,000                   | 405,000                   | <b>238/500</b>   | <b>238/500K</b>           | 514                            | 606                | 2.5                 |
|            | 670                 | 128 | 5                               | 2,370                     | 5,600                     | 242,000                   | 570,000                   | <b>239/500</b>   | <b>239/500K</b>           | 522                            | 648                | 4                   |
|            | 720                 | 167 | 6                               | 3,850                     | 8,300                     | 390,000                   | 845,000                   | <b>230/500B</b>  | <b>230/500BK</b>          | 528                            | 692                | 5                   |
|            | 720                 | 218 | 6                               | 4,750                     | 10,900                    | 485,000                   | 1,110,000                 | <b>240/500B</b>  | <b>240/500BK30</b>        | 528                            | 692                | 5                   |
|            | 830                 | 264 | 7.5                             | 6,950                     | 13,700                    | 705,000                   | 1,400,000                 | <b>231/500B</b>  | <b>231/500BK</b>          | 536                            | 794                | 6                   |
|            | 830                 | 325 | 7.5                             | 8,050                     | 16,700                    | 825,000                   | 1,700,000                 | <b>241/500B</b>  | <b>241/500BK30</b>        | 536                            | 794                | 6                   |
|            | 920                 | 336 | 7.5                             | 9,400                     | 17,800                    | 960,000                   | 1,820,000                 | <b>232/500B</b>  | <b>232/500BK</b>          | 536                            | 884                | 6                   |
| <b>530</b> | 710                 | 136 | 5                               | 2,640                     | 6,450                     | 269,000                   | 655,000                   | <b>239/530</b>   | <b>239/530K</b>           | 552                            | 688                | 4                   |
|            | 780                 | 185 | 6                               | 4,400                     | 9,350                     | 445,000                   | 955,000                   | <b>230/530B</b>  | <b>230/530BK</b>          | 558                            | 752                | 5                   |
|            | 780                 | 250 | 6                               | 5,600                     | 12,700                    | 570,000                   | 1,290,000                 | <b>240/530B</b>  | <b>240/530BK30</b>        | 558                            | 752                | 5                   |
|            | 870                 | 272 | 7.5                             | 7,000                     | 14,200                    | 715,000                   | 1,450,000                 | <b>231/530B</b>  | <b>231/530BK</b>          | 566                            | 834                | 6                   |
|            | 870                 | 335 | 7.5                             | 8,300                     | 17,400                    | 850,000                   | 1,770,000                 | <b>241/530B</b>  | <b>241/530BK30</b>        | 566                            | 834                | 6                   |
|            | 980                 | 355 | 9.5                             | 10,400                    | 19,800                    | 1,060,000                 | 2,020,000                 | <b>232/530B</b>  | <b>232/530BK</b>          | 574                            | 936                | 8                   |
| <b>545</b> | 755                 | 230 | 4                               | 4,550                     | 10,800                    | 460,000                   | 1,100,000                 | <b>2P10901</b>   | <b>2P10901K</b>           | 563                            | 737                | 3                   |
| <b>560</b> | 680                 | 90  | 3                               | 1,650                     | 4,450                     | 168,000                   | 455,000                   | <b>238/560</b>   | <b>238/560K</b>           | 574                            | 666                | 2.5                 |
|            | 750                 | 140 | 5                               | 2,830                     | 6,700                     | 288,000                   | 680,000                   | <b>239/560</b>   | <b>239/560K</b>           | 582                            | 728                | 4                   |
|            | 820                 | 195 | 6                               | 4,800                     | 10,500                    | 490,000                   | 1,070,000                 | <b>230/560B</b>  | <b>230/560BK</b>          | 588                            | 792                | 5                   |
|            | 820                 | 258 | 6                               | 6,100                     | 14,100                    | 620,000                   | 1,440,000                 | <b>240/560B</b>  | <b>240/560BK30</b>        | 588                            | 792                | 5                   |
|            | 920                 | 280 | 7.5                             | 7,650                     | 15,500                    | 780,000                   | 1,580,000                 | <b>231/560B</b>  | <b>231/560BK</b>          | 596                            | 884                | 6                   |
|            | 920                 | 355 | 7.5                             | 9,950                     | 20,800                    | 1,010,000                 | 2,120,000                 | <b>241/560B</b>  | <b>241/560BK30</b>        | 596                            | 884                | 6                   |
|            | 1,030               | 365 | 9.5                             | 11,100                    | 21,100                    | 1,130,000                 | 2,150,000                 | <b>232/560B</b>  | <b>232/560BK</b>          | 604                            | 986                | 8                   |
| <b>600</b> | 800                 | 150 | 5                               | 3,150                     | 7,800                     | 325,000                   | 795,000                   | <b>239/600</b>   | <b>239/600K</b>           | 622                            | 778                | 4                   |
|            | 870                 | 200 | 6                               | 5,250                     | 12,000                    | 535,000                   | 1,220,000                 | <b>230/600B</b>  | <b>230/600BK</b>          | 628                            | 842                | 5                   |

① Smallest allowable dimension for chamfer dimension r.

② Bearings appended with "K" have a tapered bore ratio of 1:12; bearings appended with "K30" have a tapered bore ratio of 1:30.



**Equivalent bearing load**

**dynamic**

$$P_r = X F_r + Y F_a$$

| $\frac{F_a}{F_r} \leq e$ |       | $\frac{F_a}{F_r} > e$ |       |
|--------------------------|-------|-----------------------|-------|
| X                        | Y     | X                     | Y     |
| 1                        | $Y_1$ | 0.67                  | $Y_2$ |

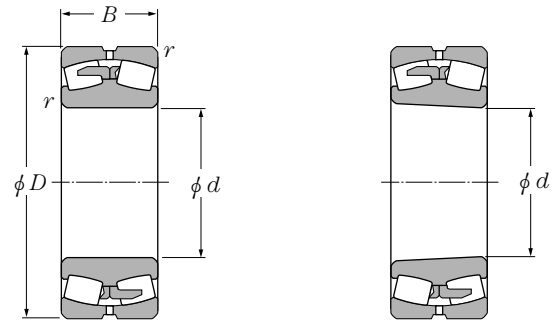
**static**

$$P_{or} = F_r + Y_0 F_a$$

For values of  $e$ ,  $Y_1$ ,  $Y_2$  and  $Y_0$  see the table below.

| Constant $e$ | Axial load factors |       |       | Mass (approx.)         |                    |
|--------------|--------------------|-------|-------|------------------------|--------------------|
|              | $Y_1$              | $Y_2$ | $Y_0$ | Cylindrical bore<br>kg | tapered bore<br>kg |
| 0.36         | 1.87               | 2.78  | 1.83  | 704                    | 683                |
| 0.18         | 3.85               | 5.73  | 3.76  | 123                    | 119                |
| 0.27         | 2.52               | 3.75  | 2.46  | 195                    | 185                |
| 0.23         | 2.94               | 4.38  | 2.88  | 217                    | 209                |
| 0.30         | 2.22               | 3.30  | 2.17  | 285                    | 280                |
| 0.31         | 2.15               | 3.21  | 2.11  | 492                    | 477                |
| 0.39         | 1.74               | 2.59  | 1.70  | 608                    | 600                |
| 0.36         | 1.87               | 2.78  | 1.83  | 814                    | 790                |
| 0.16         | 4.10               | 6.10  | 4.01  | 114                    | 109                |
| 0.13         | 5.38               | 8.02  | 5.26  | 59.6                   | 57.5               |
| 0.17         | 4.02               | 5.98  | 3.93  | 131                    | 127                |
| 0.23         | 2.98               | 4.44  | 2.91  | 226                    | 218                |
| 0.30         | 2.28               | 3.40  | 2.23  | 295                    | 290                |
| 0.32         | 2.12               | 3.16  | 2.08  | 584                    | 566                |
| 0.39         | 1.72               | 2.57  | 1.69  | 716                    | 705                |
| 0.39         | 1.74               | 2.59  | 1.70  | 1,000                  | 971                |
| 0.17         | 3.94               | 5.87  | 3.86  | 157                    | 152                |
| 0.22         | 3.03               | 4.52  | 2.97  | 306                    | 295                |
| 0.30         | 2.24               | 3.33  | 2.19  | 413                    | 406                |
| 0.30         | 2.22               | 3.30  | 2.17  | 653                    | 633                |
| 0.38         | 1.79               | 2.67  | 1.75  | 800                    | 788                |
| 0.39         | 1.74               | 2.59  | 1.70  | 1,200                  | 1,170              |
| 0.28         | 2.45               | 3.65  | 2.40  | 301                    | 286                |
| 0.11         | 5.97               | 8.88  | 5.83  | 66.1                   | 63.7               |
| 0.16         | 4.09               | 6.09  | 4.00  | 182                    | 176                |
| 0.22         | 3.03               | 4.51  | 2.96  | 353                    | 340                |
| 0.30         | 2.29               | 3.40  | 2.24  | 467                    | 459                |
| 0.30         | 2.27               | 3.38  | 2.22  | 752                    | 729                |
| 0.39         | 1.75               | 2.61  | 1.71  | 948                    | 934                |
| 0.36         | 1.88               | 2.80  | 1.84  | 1,360                  | 1,320              |
| 0.18         | 3.85               | 5.73  | 3.76  | 218                    | 211                |
| 0.21         | 3.17               | 4.72  | 3.10  | 400                    | 386                |





Cylindrical bore

Tapered bore  
taper 1:12

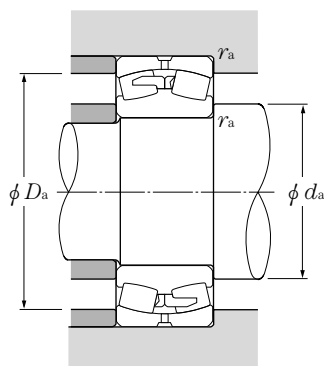
**d 600~780mm**

| d   | Boundary dimensions |     |                                 | dynamic<br>C <sub>r</sub> | Basic load ratings        |                           |                           | Bearing numbers  |                              | Abutment and fillet dimensions |                    |                     |
|-----|---------------------|-----|---------------------------------|---------------------------|---------------------------|---------------------------|---------------------------|------------------|------------------------------|--------------------------------|--------------------|---------------------|
|     | D                   | B   | r <sub>s min</sub> <sup>①</sup> |                           | static<br>C <sub>0r</sub> | dynamic<br>C <sub>r</sub> | static<br>C <sub>0r</sub> | Cylindrical bore | tapered <sup>②</sup><br>bore | d <sub>a min</sub>             | D <sub>a max</sub> | r <sub>as max</sub> |
| 600 | 870                 | 272 | 6                               | 6,450                     | 15,600                    | 655,000                   | 1,590,000                 | 240/600B         | 240/600BK30                  | 628                            | 842                | 5                   |
|     | 980                 | 300 | 7.5                             | 9,000                     | 18,400                    | 920,000                   | 1,880,000                 | 231/600B         | 231/600BK                    | 636                            | 944                | 6                   |
|     | 980                 | 375 | 7.5                             | 10,700                    | 23,200                    | 1,090,000                 | 2,360,000                 | 241/600B         | 241/600BK30                  | 636                            | 944                | 6                   |
|     | 1,090               | 388 | 9.5                             | 12,200                    | 23,700                    | 1,240,000                 | 2,420,000                 | 232/600B         | 232/600BK                    | 644                            | 1,046              | 8                   |
| 630 | 780                 | 150 | 4                               | 3,050                     | 8,800                     | 310,000                   | 895,000                   | 248/630          | 248/630K30                   | 648                            | 762                | 3                   |
|     | 850                 | 165 | 6                               | 3,700                     | 9,250                     | 375,000                   | 945,000                   | 239/630          | 239/630K                     | 658                            | 822                | 5                   |
|     | 920                 | 212 | 7.5                             | 5,900                     | 13,000                    | 600,000                   | 1,330,000                 | 230/630B         | 230/630BK                    | 666                            | 884                | 6                   |
|     | 920                 | 290 | 7.5                             | 7,550                     | 17,900                    | 770,000                   | 1,830,000                 | 240/630B         | 240/630BK30                  | 666                            | 884                | 6                   |
|     | 1,030               | 315 | 7.5                             | 9,600                     | 19,900                    | 975,000                   | 2,030,000                 | 231/630B         | 231/630BK                    | 666                            | 994                | 6                   |
|     | 1,030               | 400 | 7.5                             | 11,600                    | 25,000                    | 1,180,000                 | 2,550,000                 | 241/630B         | 241/630BK30                  | 666                            | 994                | 6                   |
|     | 1,150               | 412 | 12                              | 13,700                    | 26,800                    | 1,400,000                 | 2,740,000                 | 232/630B         | 232/630BK                    | 684                            | 1,096              | 10                  |
| 670 | 900                 | 170 | 6                               | 4,100                     | 10,300                    | 420,000                   | 1,050,000                 | 239/670          | 239/670K                     | 698                            | 872                | 5                   |
|     | 980                 | 230 | 7.5                             | 6,550                     | 14,600                    | 665,000                   | 1,490,000                 | 230/670B         | 230/670BK                    | 706                            | 944                | 6                   |
|     | 980                 | 308 | 7.5                             | 8,650                     | 20,600                    | 885,000                   | 2,100,000                 | 240/670B         | 240/670BK30                  | 706                            | 944                | 6                   |
|     | 1,090               | 336 | 7.5                             | 11,000                    | 22,800                    | 1,120,000                 | 2,330,000                 | 231/670B         | 231/670BK                    | 706                            | 1,054              | 6                   |
|     | 1,090               | 412 | 7.5                             | 12,700                    | 28,000                    | 1,300,000                 | 2,850,000                 | 241/670B         | 241/670BK30                  | 706                            | 1,054              | 6                   |
|     | 1,220               | 438 | 12                              | 16,100                    | 32,000                    | 1,640,000                 | 3,250,000                 | 232/670B         | 232/670BK                    | 724                            | 1,166              | 10                  |
| 680 | 980                 | 220 | 7.5                             | 6,050                     | 14,000                    | 615,000                   | 1,430,000                 | 2P13601          | 2P13601K                     | 716                            | 944                | 6                   |
| 710 | 950                 | 180 | 6                               | 4,450                     | 11,500                    | 450,000                   | 1,170,000                 | 239/710          | 239/710K                     | 738                            | 922                | 5                   |
|     | 1,030               | 236 | 7.5                             | 7,200                     | 16,200                    | 730,000                   | 1,650,000                 | 230/710B         | 230/710BK                    | 746                            | 994                | 6                   |
|     | 1,030               | 315 | 7.5                             | 9,300                     | 22,500                    | 945,000                   | 2,300,000                 | 240/710B         | 240/710BK30                  | 746                            | 994                | 6                   |
|     | 1,150               | 345 | 9.5                             | 11,600                    | 24,900                    | 1,190,000                 | 2,540,000                 | 231/710B         | 231/710BK                    | 754                            | 1,106              | 8                   |
|     | 1,150               | 438 | 9.5                             | 14,500                    | 32,000                    | 1,470,000                 | 3,250,000                 | 241/710B         | 241/710BK30                  | 754                            | 1,106              | 8                   |
|     | 1,280               | 450 | 12                              | 16,300                    | 32,500                    | 1,660,000                 | 3,300,000                 | 232/710B         | 232/710BK                    | 764                            | 1,226              | 10                  |
| 750 | 920                 | 128 | 5                               | 3,100                     | 8,450                     | 320,000                   | 865,000                   | 238/750          | 238/750K                     | 772                            | 898                | 4                   |
|     | 1,000               | 185 | 6                               | 5,000                     | 13,000                    | 510,000                   | 1,330,000                 | 239/750          | 239/750K                     | 778                            | 972                | 5                   |
|     | 1,090               | 250 | 7.5                             | 8,150                     | 18,300                    | 835,000                   | 1,860,000                 | 230/750B         | 230/750BK                    | 786                            | 1,054              | 6                   |
|     | 1,090               | 335 | 7.5                             | 10,100                    | 24,600                    | 1,030,000                 | 2,500,000                 | 240/750B         | 240/750BK30                  | 786                            | 1,054              | 6                   |
|     | 1,220               | 365 | 9.5                             | 12,800                    | 27,200                    | 1,310,000                 | 2,780,000                 | 231/750B         | 231/750BK                    | 794                            | 1,176              | 8                   |
|     | 1,360               | 475 | 15                              | 18,200                    | 36,500                    | 1,860,000                 | 3,750,000                 | 232/750B         | 232/750BK                    | 814                            | 1,296              | 12                  |
| 760 | 1,140               | 325 | 7.5                             | 10,200                    | 23,800                    | 1,040,000                 | 2,430,000                 | ☆2P15203         | 2P15203K                     | 796                            | 1,104              | 6                   |
| 780 | 1,220               | 375 | 9.5                             | 12,800                    | 28,700                    | 1,300,000                 | 2,920,000                 | 2P15605          | 2P15605K                     | 824                            | 1,176              | 8                   |

① Smallest allowable dimension for chamfer dimension r.

② Bearings appended with "K" have a tapered bore ratio of 1:12; bearings appended with "K30" have a tapered bore ratio of 1:30.

Remarks: 1. Bearing numbers marked "☆" are C type.



**Equivalent bearing load**

**dynamic**

$$P_r = X F_r + Y F_a$$

| $\frac{F_a}{F_r} \leq e$ |       | $\frac{F_a}{F_r} > e$ |       |
|--------------------------|-------|-----------------------|-------|
| X                        | Y     | X                     | Y     |
| 1                        | $Y_1$ | 0.67                  | $Y_2$ |

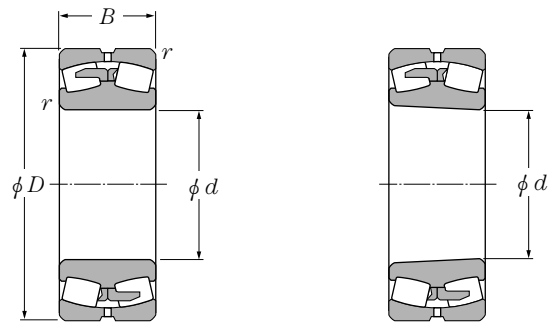
**static**

$$P_{or} = F_r + Y_0 F_a$$

For values of  $e$ ,  $Y_1$ ,  $Y_2$  and  $Y_0$  see the table below.

| Constant $e$ | Axial load factors |       |       | Mass (approx.)         |                    |
|--------------|--------------------|-------|-------|------------------------|--------------------|
|              | $Y_1$              | $Y_2$ | $Y_0$ | Cylindrical bore<br>kg | tapered bore<br>kg |
| 0.29         | 2.33               | 3.47  | 2.28  | 544                    | 535                |
| 0.30         | 2.22               | 3.30  | 2.17  | 908                    | 880                |
| 0.37         | 1.81               | 2.70  | 1.77  | 1,130                  | 1,110              |
| 0.36         | 1.86               | 2.77  | 1.82  | 1,540                  | 1,490              |
| <hr/>        |                    |       |       |                        |                    |
| 0.17         | 4.07               | 6.06  | 3.98  | 158                    | 155                |
| 0.18         | 3.66               | 5.45  | 3.58  | 277                    | 268                |
| 0.22         | 3.14               | 4.67  | 3.07  | 481                    | 464                |
| 0.30         | 2.28               | 3.40  | 2.23  | 657                    | 646                |
| 0.30         | 2.27               | 3.38  | 2.22  | 1,050                  | 1,020              |
| 0.38         | 1.78               | 2.66  | 1.74  | 1,330                  | 1,310              |
| 0.36         | 1.87               | 2.78  | 1.83  | 1,900                  | 1,840              |
| <hr/>        |                    |       |       |                        |                    |
| 0.18         | 3.76               | 5.59  | 3.67  | 317                    | 307                |
| 0.22         | 3.07               | 4.57  | 3.00  | 594                    | 573                |
| 0.29         | 2.29               | 3.41  | 2.24  | 794                    | 781                |
| 0.30         | 2.22               | 3.30  | 2.17  | 1,250                  | 1,210              |
| 0.37         | 1.83               | 2.73  | 1.79  | 1,530                  | 1,510              |
| 0.36         | 1.89               | 2.81  | 1.85  | 2,270                  | 2,200              |
| <hr/>        |                    |       |       |                        |                    |
| 0.21         | 3.17               | 4.72  | 3.10  | 550                    | 533                |
| <hr/>        |                    |       |       |                        |                    |
| 0.18         | 3.85               | 5.73  | 3.76  | 375                    | 363                |
| 0.22         | 3.02               | 4.50  | 2.96  | 663                    | 640                |
| 0.29         | 2.36               | 3.51  | 2.31  | 884                    | 870                |
| 0.29         | 2.32               | 3.45  | 2.27  | 1,420                  | 1,380              |
| 0.37         | 1.80               | 2.69  | 1.76  | 1,800                  | 1,770              |
| 0.35         | 1.91               | 2.84  | 1.87  | 2,540                  | 2,470              |
| <hr/>        |                    |       |       |                        |                    |
| 0.12         | 5.72               | 8.51  | 5.59  | 179                    | 173                |
| 0.17         | 3.90               | 5.81  | 3.81  | 412                    | 399                |
| 0.21         | 3.20               | 4.76  | 3.13  | 790                    | 763                |
| 0.29         | 2.35               | 3.49  | 2.29  | 1,060                  | 1,040              |
| 0.29         | 2.32               | 3.45  | 2.27  | 1,700                  | 1,650              |
| 0.35         | 1.92               | 2.86  | 1.88  | 3,050                  | 2,960              |
| <hr/>        |                    |       |       |                        |                    |
| 0.24         | 2.79               | 4.15  | 2.73  | 1,100                  | 1,060              |
| <hr/>        |                    |       |       |                        |                    |
| 0.30         | 2.25               | 3.34  | 2.20  | 1,610                  | 1,560              |





Cylindrical bore

Tapered bore  
taper 1:12

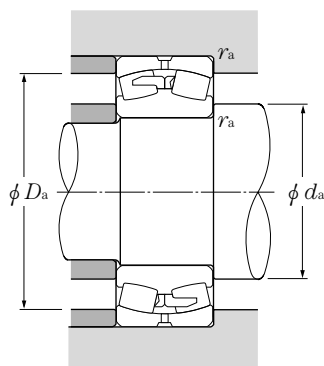
**d** 790~1,060mm

| d            | Boundary dimensions |     |                                 | dynamic<br>C <sub>r</sub> | Basic load ratings        |                           |                           | Bearing numbers  |                              | Abutment and fillet dimensions |                       |                        |
|--------------|---------------------|-----|---------------------------------|---------------------------|---------------------------|---------------------------|---------------------------|------------------|------------------------------|--------------------------------|-----------------------|------------------------|
|              | D                   | B   | r <sub>s.min</sub> <sup>①</sup> |                           | static<br>C <sub>0r</sub> | dynamic<br>C <sub>r</sub> | static<br>C <sub>0r</sub> | Cylindrical bore | tapered <sup>②</sup><br>bore | d <sub>a</sub><br>min          | D <sub>a</sub><br>max | r <sub>as</sub><br>max |
| <b>790</b>   | 1,100               | 310 | 7.5                             | 8,650                     | 21,000                    | 880,000                   | 2,150,000                 | <b>2P15802</b>   | <b>2P15802K</b>              | 826                            | 1,064                 | 6                      |
| <b>800</b>   | 1,060               | 195 | 6                               | 5,400                     | 13,700                    | 550,000                   | 1,400,000                 | <b>239/800</b>   | <b>239/800K</b>              | 828                            | 1,032                 | 5                      |
|              | 1,150               | 258 | 7.5                             | 8,400                     | 19,500                    | 860,000                   | 1,990,000                 | <b>230/800B</b>  | <b>230/800BK</b>             | 836                            | 1,114                 | 6                      |
|              | 1,150               | 345 | 7.5                             | 11,200                    | 27,800                    | 1,140,000                 | 2,840,000                 | <b>240/800B</b>  | <b>240/800BK30</b>           | 836                            | 1,114                 | 6                      |
|              | 1,280               | 375 | 9.5                             | 14,400                    | 31,000                    | 1,460,000                 | 3,150,000                 | <b>231/800B</b>  | <b>231/800BK</b>             | 844                            | 1,236                 | 8                      |
| <b>850</b>   | 1,030               | 136 | 5                               | 3,600                     | 10,500                    | 365,000                   | 1,070,000                 | <b>238/850</b>   | <b>238/850K</b>              | 872                            | 1,008                 | 4                      |
|              | 1,120               | 200 | 6                               | 5,850                     | 15,100                    | 595,000                   | 1,540,000                 | <b>239/850</b>   | <b>239/850K</b>              | 878                            | 1,092                 | 5                      |
|              | 1,220               | 272 | 7.5                             | 9,750                     | 22,700                    | 995,000                   | 2,310,000                 | <b>230/850B</b>  | <b>230/850BK</b>             | 886                            | 1,184                 | 6                      |
|              | 1,220               | 290 | 7.5                             | 9,150                     | 22,000                    | 935,000                   | 2,240,000                 | <b>2P17001</b>   | <b>2P17001K</b>              | 886                            | 1,184                 | 6                      |
|              | 1,220               | 290 | 7.5                             | 10,500                    | 24,000                    | 1,070,000                 | 2,450,000                 | ☆ <b>2P17011</b> | ☆ <b>2P17011K</b>            | 886                            | 1,184                 | 6                      |
|              | 1,220               | 330 | 7.5                             | 11,000                    | 26,900                    | 1,120,000                 | 2,740,000                 | ☆ <b>2P17012</b> | ☆ <b>2P17012K</b>            | 886                            | 1,184                 | 6                      |
|              | 1,220               | 365 | 7.5                             | 12,500                    | 31,500                    | 1,270,000                 | 3,200,000                 | <b>240/850B</b>  | <b>240/850BK30</b>           | 886                            | 1,184                 | 6                      |
|              | 1,360               | 400 | 12                              | 15,500                    | 34,000                    | 1,580,000                 | 3,500,000                 | <b>231/850B</b>  | <b>231/850BK</b>             | 904                            | 1,306                 | 10                     |
| 1,500        | 515                 | 15  | 22,300                          | 47,500                    | 2,270,000                 | 4,850,000                 | <b>232/850B</b>           | <b>232/850BK</b> | 914                          | 1,436                          | 12                    |                        |
| <b>900</b>   | 1,180               | 206 | 6                               | 6,650                     | 17,300                    | 675,000                   | 1,770,000                 | <b>239/900</b>   | <b>239/900K</b>              | 928                            | 1,152                 | 5                      |
|              | 1,280               | 280 | 7.5                             | 10,300                    | 24,700                    | 1,050,000                 | 2,520,000                 | <b>230/900B</b>  | <b>230/900BK</b>             | 936                            | 1,244                 | 6                      |
|              | 1,280               | 375 | 7.5                             | 13,200                    | 33,500                    | 1,350,000                 | 3,450,000                 | <b>240/900B</b>  | <b>240/900BK30</b>           | 936                            | 1,244                 | 6                      |
|              | 1,420               | 412 | 12                              | 16,800                    | 38,000                    | 1,720,000                 | 3,850,000                 | <b>231/900B</b>  | <b>231/900BK</b>             | 954                            | 1,366                 | 10                     |
| <b>950</b>   | 1,250               | 224 | 7.5                             | 7,750                     | 20,500                    | 790,000                   | 2,090,000                 | <b>239/950</b>   | <b>239/950K</b>              | 986                            | 1,214                 | 6                      |
|              | 1,280               | 260 | 7.5                             | 8,650                     | 22,200                    | 885,000                   | 2,270,000                 | <b>2P19014</b>   | <b>2P19014K</b>              | 986                            | 1,244                 | 6                      |
|              | 1,330               | 300 | 7.5                             | 8,400                     | 21,200                    | 855,000                   | 2,170,000                 | <b>2P19013</b>   | <b>2P19013K</b>              | 986                            | 1,294                 | 6                      |
|              | 1,360               | 300 | 7.5                             | 11,500                    | 28,400                    | 1,180,000                 | 2,900,000                 | <b>230/950B</b>  | <b>230/950BK</b>             | 986                            | 1,324                 | 6                      |
|              | 1,360               | 320 | 7.5                             | 11,500                    | 28,000                    | 1,170,000                 | 2,860,000                 | ☆ <b>2P19022</b> | ☆ <b>2P19022K</b>            | 986                            | 1,324                 | 6                      |
|              | 1,360               | 412 | 7.5                             | 15,500                    | 40,000                    | 1,580,000                 | 4,100,000                 | <b>240/950B</b>  | <b>240/950BK30</b>           | 986                            | 1,324                 | 6                      |
|              | 1,400               | 380 | 7.5                             | 14,100                    | 33,500                    | 1,440,000                 | 3,400,000                 | <b>2P19019</b>   | <b>2P19019K</b>              | 986                            | 1,364                 | 6                      |
| <b>1,000</b> | 1,320               | 236 | 7.5                             | 8,600                     | 22,700                    | 875,000                   | 2,310,000                 | <b>239/1000</b>  | <b>239/1000K</b>             | 1,036                          | 1,284                 | 6                      |
|              | 1,320               | 258 | 7.5                             | 8,500                     | 22,600                    | 865,000                   | 2,300,000                 | <b>2P20002</b>   | <b>2P20002K</b>              | 1,036                          | 1,284                 | 6                      |
|              | 1,420               | 308 | 7.5                             | 12,400                    | 30,000                    | 1,260,000                 | 3,050,000                 | <b>230/1000B</b> | <b>230/1000BK</b>            | 1,036                          | 1,384                 | 6                      |
|              | 1,420               | 412 | 7.5                             | 16,000                    | 42,000                    | 1,640,000                 | 4,250,000                 | <b>240/1000B</b> | <b>240/1000BK30</b>          | 1,036                          | 1,384                 | 6                      |
| <b>1,050</b> | 1,500               | 412 | 9.5                             | 15,800                    | 42,500                    | 1,600,000                 | 4,350,000                 | ☆ <b>2P21001</b> | ☆ <b>2P21001K</b>            | 1,094                          | 1,456                 | 8                      |
| <b>1,060</b> | 1,400               | 250 | 7.5                             | 9,300                     | 24,700                    | 950,000                   | 2,520,000                 | <b>239/1060</b>  | <b>239/1060K</b>             | 1,096                          | 1,364                 | 6                      |
|              | 1,500               | 325 | 9.5                             | 13,600                    | 33,500                    | 1,390,000                 | 3,400,000                 | <b>230/1060B</b> | <b>230/1060BK</b>            | 1,104                          | 1,456                 | 8                      |

① Smallest allowable dimension for chamfer dimension r.

② Bearings appended with "K" have a tapered bore ratio of 1:12; bearings appended with "K30" have a tapered bore ratio of 1:30.

Remarks: 1. Bearing numbers marked "☆" are C type.



**Equivalent bearing load**

**dynamic**

$$P_r = X F_r + Y F_a$$

| $\frac{F_a}{F_r} \leq e$ |       | $\frac{F_a}{F_r} > e$ |       |
|--------------------------|-------|-----------------------|-------|
| X                        | Y     | X                     | Y     |
| 1                        | $Y_1$ | 0.67                  | $Y_2$ |

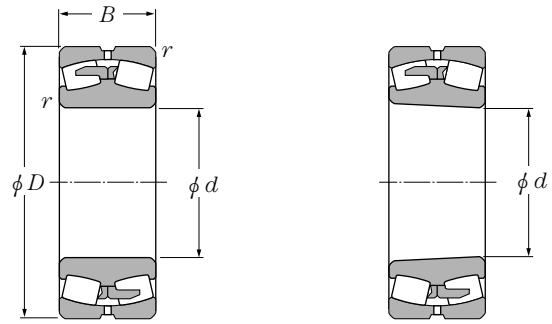
**static**

$$P_{or} = F_r + Y_0 F_a$$

For values of  $e$ ,  $Y_1$ ,  $Y_2$  and  $Y_0$  see the table below.

| Constant $e$ | Axial load factors |       |       | Mass (approx.)         |                    |
|--------------|--------------------|-------|-------|------------------------|--------------------|
|              | $Y_1$              | $Y_2$ | $Y_0$ | Cylindrical bore<br>kg | tapered bore<br>kg |
| 0.24         | 2.76               | 4.11  | 2.70  | 857                    | 817                |
| 0.17         | 4.05               | 6.04  | 3.96  | 487                    | 471                |
| 0.21         | 3.15               | 4.69  | 3.08  | 890                    | 859                |
| 0.28         | 2.41               | 3.59  | 2.36  | 1,190                  | 1,170              |
| 0.29         | 2.32               | 3.45  | 2.27  | 1,890                  | 1,830              |
| 0.11         | 6.01               | 8.94  | 5.87  | 232                    | 223                |
| 0.16         | 4.25               | 6.32  | 4.15  | 550                    | 532                |
| 0.20         | 3.32               | 4.95  | 3.25  | 1,050                  | 1,010              |
| 0.23         | 2.98               | 4.44  | 2.92  | 1,100                  | 1,070              |
| 0.21         | 3.28               | 4.88  | 3.21  | 1,060                  | 1,020              |
| 0.23         | 2.90               | 4.31  | 2.83  | 1,200                  | 1,160              |
| 0.28         | 2.42               | 3.61  | 2.37  | 1,410                  | 1,390              |
| 0.28         | 2.37               | 3.54  | 2.32  | 2,270                  | 2,200              |
| 0.35         | 1.94               | 2.89  | 1.90  | 3,890                  | 3,780              |
| 0.16         | 4.32               | 6.44  | 4.23  | 623                    | 603                |
| 0.20         | 3.32               | 4.95  | 3.25  | 1,170                  | 1,130              |
| 0.27         | 2.48               | 3.70  | 2.43  | 1,570                  | 1,540              |
| 0.28         | 2.42               | 3.60  | 2.36  | 2,500                  | 2,420              |
| 0.16         | 4.20               | 6.26  | 4.11  | 774                    | 749                |
| 0.17         | 3.98               | 5.92  | 3.89  | 921                    | 888                |
| 0.18         | 3.66               | 5.46  | 3.58  | 1,210                  | 1,170              |
| 0.21         | 3.26               | 4.85  | 3.18  | 1,430                  | 1,380              |
| 0.20         | 3.33               | 4.96  | 3.25  | 1,450                  | 1,400              |
| 0.28         | 2.39               | 3.56  | 2.34  | 1,970                  | 1,940              |
| 0.24         | 2.77               | 4.13  | 2.71  | 1,940                  | 1,870              |
| 0.16         | 4.21               | 6.26  | 4.11  | 916                    | 887                |
| 0.16         | 4.23               | 6.30  | 4.14  | 911                    | 877                |
| 0.20         | 3.37               | 5.02  | 3.29  | 1,580                  | 1,520              |
| 0.27         | 2.51               | 3.73  | 2.45  | 2,110                  | 2,080              |
| 0.24         | 2.85               | 4.25  | 2.79  | 2,290                  | 2,200              |
| 0.16         | 4.28               | 6.37  | 4.19  | 1,090                  | 1,060              |
| 0.20         | 3.36               | 5.00  | 3.28  | 1,850                  | 1,790              |





Cylindrical bore

Tapered bore taper 1:12

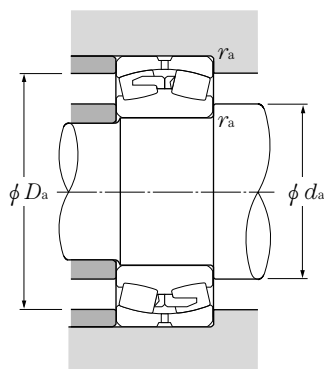
**d 1,060~1,800mm**

| d     | Boundary dimensions |     |                                 |                | dynamic         | Basic load ratings |                |                 | Bearing numbers |                  | Abutment and fillet dimensions |                    |                    |
|-------|---------------------|-----|---------------------------------|----------------|-----------------|--------------------|----------------|-----------------|-----------------|------------------|--------------------------------|--------------------|--------------------|
|       | mm                  |     |                                 |                |                 | kN                 | static         | dynamic         | static          | Cylindrical bore | tapered <sup>②</sup> bore      | d <sub>a</sub> min | D <sub>a</sub> max |
|       | D                   | B   | r <sub>s min</sub> <sup>①</sup> | C <sub>r</sub> | C <sub>or</sub> |                    | C <sub>r</sub> | C <sub>or</sub> | C <sub>or</sub> |                  |                                |                    |                    |
| 1,060 | 1,500               | 340 | 9.5                             | 13,100         | 32,000          | 1,340,000          | 3,250,000      |                 | 2P21202         | 2P21202K         | 1,104                          | 1,456              | 8                  |
|       | 1,500               | 438 | 9.5                             | 17,800         | 47,000          | 1,810,000          | 4,800,000      |                 | 240/1060B       | 240/1060BK30     | 1,104                          | 1,456              | 8                  |
| 1,120 | 1,360               | 180 | 6                               | 6,200          | 18,700          | 630,000            | 1,900,000      |                 | 238/1120        | 238/1120K        | 1,148                          | 1,332              | 5                  |
|       | 1,460               | 250 | 7.5                             | 9,850          | 26,700          | 1,000,000          | 2,720,000      |                 | 239/1120        | 239/1120K        | 1,156                          | 1,424              | 6                  |
|       | 1,580               | 345 | 9.5                             | 15,600         | 39,000          | 1,590,000          | 4,000,000      |                 | 230/1120B       | 230/1120BK       | 1,164                          | 1,536              | 8                  |
|       | 1,580               | 462 | 9.5                             | 19,500         | 52,500          | 1,990,000          | 5,350,000      |                 | 240/1120B       | 240/1120BK30     | 1,164                          | 1,536              | 8                  |
| 1,180 | 1,420               | 180 | 6                               | 6,350          | 19,700          | 650,000            | 2,010,000      |                 | 238/1180        | 238/1180K        | 1,208                          | 1,392              | 5                  |
|       | 1,540               | 272 | 7.5                             | 11,000         | 29,800          | 1,120,000          | 3,050,000      |                 | 239/1180        | 239/1180K        | 1,216                          | 1,504              | 6                  |
|       | 1,540               | 355 | 7.5                             | 13,700         | 40,500          | 1,390,000          | 4,150,000      |                 | 249/1180        | 249/1180K30      | 1,216                          | 1,504              | 6                  |
|       | 1,660               | 475 | 9.5                             | 20,700         | 55,500          | 2,110,000          | 5,650,000      |                 | 240/1180B       | 240/1180BK30     | 1,224                          | 1,616              | 8                  |
| 1,200 | 1,700               | 410 | 9.5                             | 17,600         | 44,500          | 1,800,000          | 4,550,000      |                 | 2P24005         | 2P24005K         | 1,244                          | 1,656              | 8                  |
|       | 1,700               | 410 | 12                              | 17,800         | 45,000          | 1,810,000          | 4,600,000      | ☆               | 2P24007         | 2P24007K         | 1,254                          | 1,646              | 10                 |
| 1,250 | 1,630               | 280 | 7.5                             | 12,100         | 33,500          | 1,230,000          | 3,400,000      |                 | 239/1250        | 239/1250K        | 1,286                          | 1,594              | 6                  |
|       | 1,750               | 390 | 9.5                             | 17,200         | 44,000          | 1,760,000          | 4,500,000      |                 | 2P25002         | 2P25002K         | 1,294                          | 1,706              | 8                  |
| 1,320 | 1,720               | 300 | 7.5                             | 13,600         | 38,000          | 1,390,000          | 3,900,000      |                 | 239/1320        | 239/1320K        | 1,356                          | 1,684              | 6                  |
|       | 1,850               | 480 | 12                              | 22,200         | 58,500          | 2,270,000          | 5,950,000      |                 | 2P26402         | 2P26402K         | 1,374                          | 1,796              | 10                 |
|       | 1,850               | 530 | 12                              | 25,200         | 67,500          | 2,570,000          | 6,900,000      |                 | 240/1320B       | 240/1320BK30     | 1,374                          | 1,796              | 10                 |
| 1,400 | 1,820               | 315 | 9.5                             | 15,100         | 43,000          | 1,540,000          | 4,400,000      |                 | 239/1400        | 239/1400K        | 1,444                          | 1,776              | 8                  |
| 1,500 | 1,820               | 315 | 7.5                             | 12,300         | 41,500          | 1,260,000          | 4,200,000      |                 | 248/1500        | 248/1500K30      | 1,536                          | 1,784              | 6                  |
| 1,800 | 2,180               | 375 | 9.5                             | 17,500         | 60,500          | 1,790,000          | 6,200,000      |                 | 248/1800        | 248/1800K30      | 1,844                          | 2,136              | 8                  |

① Smallest allowable dimension for chamfer dimension r.

② Bearings appended with "K" have a tapered bore ratio of 1:12; bearings appended with "K30" have a tapered bore ratio of 1:30.

Remarks: 1. Bearing numbers marked "☆" are C type.



**Equivalent bearing load**

**dynamic**

$$P_r = X F_r + Y F_a$$

| $\frac{F_a}{F_r} \leq e$ |       | $\frac{F_a}{F_r} > e$ |       |
|--------------------------|-------|-----------------------|-------|
| X                        | Y     | X                     | Y     |
| 1                        | $Y_1$ | 0.67                  | $Y_2$ |

**static**

$$P_{or} = F_r + Y_0 F_a$$

For values of  $e$ ,  $Y_1$ ,  $Y_2$  and  $Y_0$  see the table below.

| Constant $e$ | Axial load factors |       |       | Mass (approx.)         |                    |
|--------------|--------------------|-------|-------|------------------------|--------------------|
|              | $Y_1$              | $Y_2$ | $Y_0$ | Cylindrical bore<br>kg | tapered bore<br>kg |
| 0.21         | 3.25               | 4.83  | 3.17  | 1,870                  | 1,810              |
| 0.27         | 2.49               | 3.71  | 2.44  | 2,450                  | 2,140              |
| 0.11         | 5.97               | 8.89  | 5.84  | 536                    | 517                |
| 0.15         | 4.42               | 6.58  | 4.32  | 1,140                  | 1,100              |
| 0.21         | 3.29               | 4.80  | 3.21  | 2,160                  | 2,090              |
| 0.27         | 2.50               | 3.72  | 2.44  | 2,890                  | 2,840              |
| 0.11         | 6.27               | 9.34  | 6.13  | 559                    | 539                |
| 0.15         | 4.40               | 6.55  | 4.30  | 1,390                  | 1,340              |
| 0.21         | 3.28               | 4.88  | 3.21  | 1,740                  | 1,660              |
| 0.27         | 2.54               | 3.78  | 2.48  | 3,220                  | 3,170              |
| 0.21         | 3.19               | 4.75  | 3.12  | 2,860                  | 2,750              |
| 0.21         | 3.21               | 4.77  | 3.14  | 2,830                  | 2,730              |
| 0.15         | 4.42               | 6.58  | 4.32  | 1,600                  | 1,550              |
| 0.20         | 3.31               | 4.93  | 3.24  | 2,880                  | 2,780              |
| 0.16         | 4.34               | 6.46  | 4.24  | 1,900                  | 1,840              |
| 0.22         | 3.12               | 4.64  | 3.05  | 3,830                  | 3,670              |
| 0.25         | 2.65               | 3.94  | 2.59  | 4,320                  | 4,240              |
| 0.15         | 4.39               | 6.54  | 4.29  | 2,230                  | 2,160              |
| 0.15         | 4.54               | 6.75  | 4.43  | 1,660                  | 1,580              |
| 0.15         | 4.47               | 6.65  | 4.37  | 2,830                  | 2,770              |

