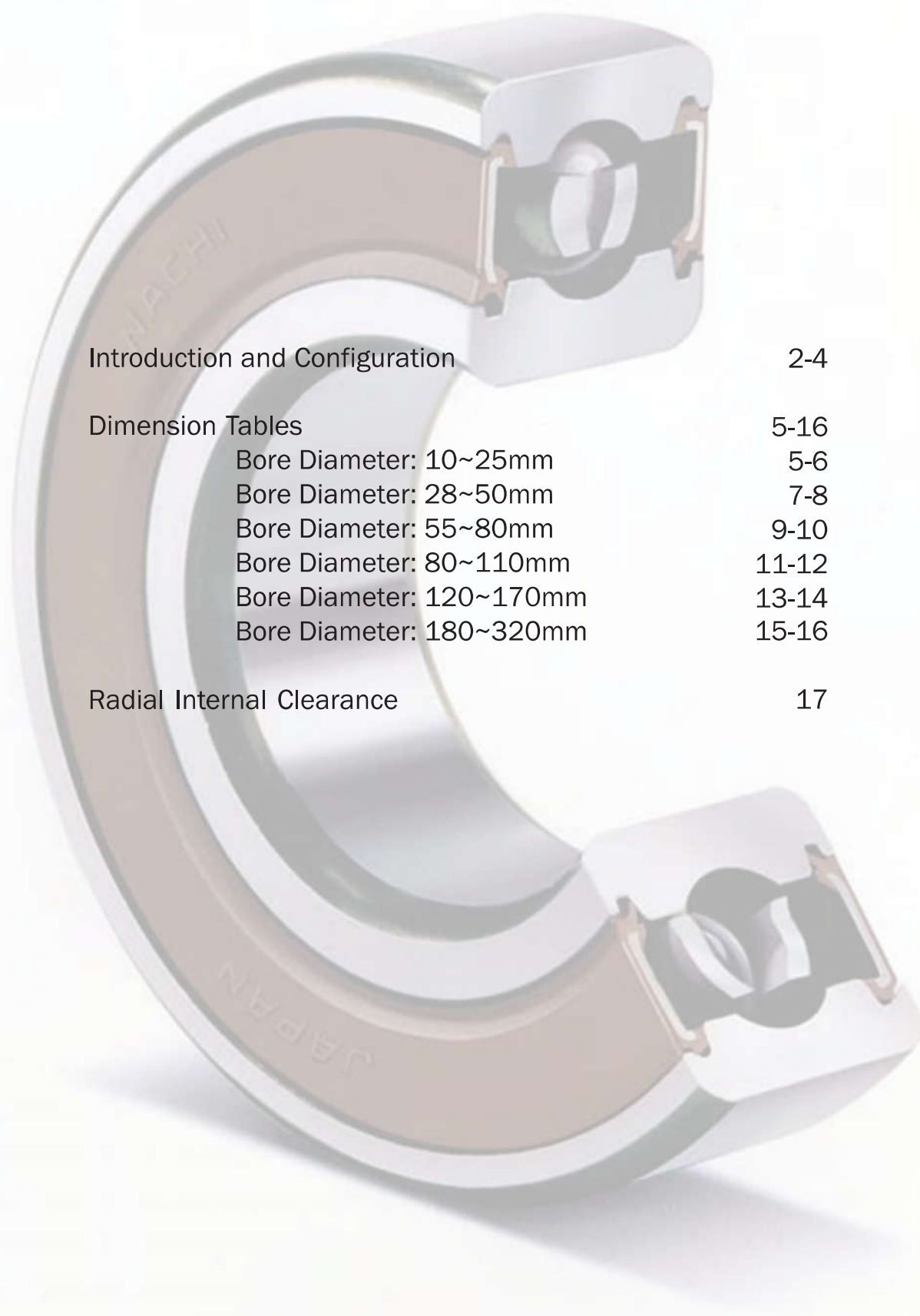


**NACHI**

# **DEEP GROOVE BALL BEARINGS**



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## Deep Groove Ball Bearings

Because of their versatility, Single-row, Deep Groove Ball Bearings are the most popular of all ball bearing types.

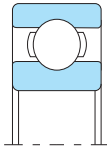
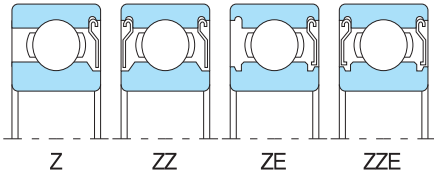
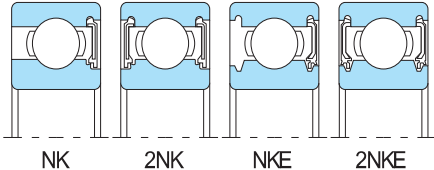
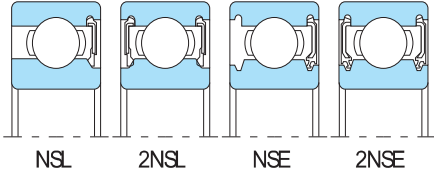
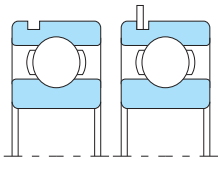
NACHI Deep-groove Ball Bearings are available in a wide range of series defined by the JIS(ISO) standard dimension plan and are also made to meet specialized dimension and configuration requirements. NACHI Deep Groove Ball Bearings are manufactured in both standard precision

grade (ISO Grade 0 - ABEC Grade 1) as well as in high-precision grades.

Table 1 shows common, standard configurations of Single-row Deep Groove Ball Bearings.

Table 2 next page shows a comparison of general characteristics of seal and shield designs for Single-row, Deep Groove Ball bearings.

**Table 1. Standard Configuration of Single-row, Deep Groove Ball Bearings**

| Configuration*                 |                                                                                                                                                                                                               | Design                                                          | Cross section                                                                                                             |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| Open (no seals, shields)       |                                                                                                                                                                                                               | Consists of inner and outer rings, balls, and cage.             | <br>Open                              |
| Sealed or shielded Bearings    | Shield                                                                                                                                                                                                        | One or two steel shields provide labyrinth clearance            | <br>Z      ZZ      ZE      ZZE       |
|                                | Non-contact Rubber Seal                                                                                                                                                                                       | One or two non-contact rubber seals provide labyrinth clearance | <br>NK      2NK      NKE      2NKE   |
|                                | Contact Rubber Seal                                                                                                                                                                                           | One or two contact rubber seals in contact with inner ring      | <br>NSL      2NSL      NSE      2NSE |
| Snap-ring Groove in Outer Ring | N: with snap-ring groove in outer ring.<br>NR: with groove and snap ring in outer ring.<br>(Use of snap ring allows easy mounting and simplified housing design.)<br>Bearings may also be sealed or shielded. |                                                                 | <br>N      NR                        |

Note : One seal or shield type bearings may have a seal groove on the other side.

## Deep Groove Ball Bearings

Table 2. Comparison of Seal and Shield Characteristics

| Characteristics                                                    | Shield<br>(Z, ZE) | Non-contact Rubber Seal<br>(NK, NKE) | Contact Rubber Seal<br>(NSL, NSE)                                                                                                                                                                                              |
|--------------------------------------------------------------------|-------------------|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Friction torque                                                    | Low               | Low                                  | Higher than NK,NKE, Z and ZE                                                                                                                                                                                                   |
| High speed                                                         | Excellent         | Excellent                            | Good<br>(There is some limitation)                                                                                                                                                                                             |
| Grease sealing                                                     | Good              | Better than Z,ZE                     | <ul style="list-style-type: none"> <li>• Excellent at low speed</li> <li>• The grease may leak from the bearing at high speeds and high temperature.</li> <li>• The grease may leak in case of outer ring rotation.</li> </ul> |
| Dust proofing                                                      | Good              | Better than Z,ZE                     | Excellent<br>(Can be used in severe dust environments)                                                                                                                                                                         |
| Water proofing                                                     | unsuitable        | unsuitable                           | Excellent                                                                                                                                                                                                                      |
| Recommended operation temperature range for standard filled grease | -25~120°          | -25~120°                             | -25~100°                                                                                                                                                                                                                       |

## Attention

(1) Deep-groove Ball Bearings can sustain radial, axial or composite loads.

However when excessive axial load is applied, please consult with NACHI.

(2) Because sealed or shielded bearings are designed for inner ring rotating applications, the filled grease may leak when they are used with a high speed outer ring rotating condition.

In such a case, please contact NACHI.

(3) When bearings with contact rubber seals are used in a severe operating condition such as high speed or high temperature, the filled grease may leak.

In such a case, a design change or another kind of grease is required.

(4) When a bearing is mounted on a shaft (into a housing), force should only be applied to the side face of the inner (outer) ring.

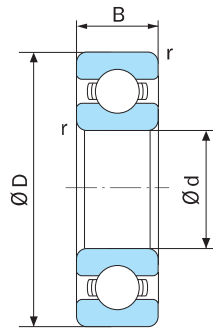
(5) The sealed or shielded bearings should not be washed or heated before mounting.

(6) It should be noted that mounting errors such as misalignment of the bearing rings cause an appreciable increase in noise level.

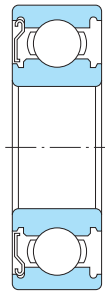
(7) The bearings must always be subjected to a minimum load to prevent sliding movements occurring between the balls and the raceways.

## Deep Groove Ball Bearings

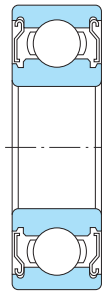
Bore Diameter: 10~25mm



Open



One shield  
(ZE)



Two shields  
(ZZE)



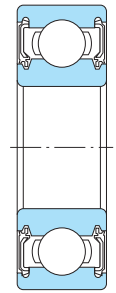
One contact  
seal  
(NSE)



Two contact  
seals  
(2NSE)



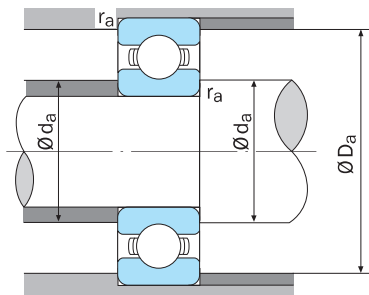
One non-contact  
seal  
(NKE)



Two non-contact  
seals  
(2NKE)

| Boundary dimensions (mm) |    |    |            | Bearing No. |             |          |                   |            |                       |            |  |
|--------------------------|----|----|------------|-------------|-------------|----------|-------------------|------------|-----------------------|------------|--|
| d                        | D  | B  | r<br>(min) | Open type   | Shield type |          | Contact seal type |            | Non-contact seal type |            |  |
| 10                       | 19 | 5  | 0.3        | 6800        | 6800Z       | 6800ZZ   | —                 | —          | —                     | —          |  |
|                          | 22 | 6  | 0.3        | 6900        | 6900ZE      | 6900ZZE  | 6900NSE           | 6900-2NSE  | 6900NKE               | 6900-2NKE  |  |
|                          | 26 | 8  | 0.3        | 6000        | 6000ZE      | 6000ZZE  | 6000NSE           | 6000-2NSE  | 6000NKE               | 6000-2NKE  |  |
|                          | 30 | 9  | 0.6        | 6200        | 6200ZE      | 6200ZZE  | 6200NSE           | 6200-2NSE  | 6200NKE               | 6200-2NKE  |  |
|                          | 35 | 11 | 0.6        | 6300        | 6300ZE      | 6300ZZE  | 6300NSE           | 6300-2NSE  | 6300NKE               | 6300-2NKE  |  |
| 12                       | 21 | 5  | 0.3        | 6801        | 6801ZE      | 6801ZZE  | 6801NSE           | 6801-2NSE  | 6801NKE               | 6801-2NKE  |  |
|                          | 24 | 6  | 0.3        | 6901        | 6901ZE      | 6901ZZE  | 6901NSE           | 6901-2NSE  | 6901NKE               | 6901-2NKE  |  |
|                          | 28 | 8  | 0.3        | 6001        | 6001ZE      | 6001ZZE  | 6001NSE           | 6001-2NSE  | 6001NKE               | 6001-2NKE  |  |
|                          | 32 | 10 | 0.6        | 6201        | 6201ZE      | 6201ZZE  | 6201NSE           | 6201-2NSE  | 6201NKE               | 6201-2NKE  |  |
|                          | 37 | 12 | 1          | 6301        | 6301ZE      | 6301ZZE  | 6301NSE           | 6301-2NSE  | 6301NKE               | 6301-2NKE  |  |
| 15                       | 24 | 5  | 0.3        | 6802        | 6802ZE      | 6802ZZE  | 6802NSE           | 6802-2NSE  | 6802NKE               | 6802-2NKE  |  |
|                          | 28 | 7  | 0.3        | 6902        | 6902ZE      | 6902ZZE  | 6902NSE           | 6902-2NSE  | 6902NKE               | 6902-2NKE  |  |
|                          | 32 | 8  | 0.3        | 16002       | —           | —        | —                 | —          | —                     | —          |  |
|                          | 32 | 9  | 0.3        | 6002        | 6002ZE      | 6002ZZE  | 6002NSE           | 6002-2NSE  | 6002NKE               | 6002-2NKE  |  |
|                          | 35 | 11 | 0.6        | 6202        | 6202ZE      | 6202ZZE  | 6202NSE           | 6202-2NSE  | 6202NKE               | 6202-2NKE  |  |
|                          | 42 | 13 | 1          | 6302        | 6302ZE      | 6302ZZE  | 6302NSE           | 6302-2NSE  | 6302NKE               | 6302-2NKE  |  |
| 17                       | 26 | 5  | 0.3        | 6803        | 6803ZE      | 6803ZZE  | 6803NSE           | 6803-2NSE  | 6803NKE               | 6803-2NKE  |  |
|                          | 30 | 7  | 0.3        | 6903        | 6903ZE      | 6903ZZE  | 6903NSE           | 6903-2NSE  | 6903NKE               | 6903-2NKE  |  |
|                          | 35 | 8  | 0.3        | 16003       | —           | —        | —                 | —          | —                     | —          |  |
|                          | 35 | 10 | 0.3        | 6003        | 6003ZE      | 6003ZZE  | 6003NSE           | 6003-2NSE  | 6003NKE               | 6003-2NKE  |  |
|                          | 40 | 12 | 0.6        | 6203        | 6203ZE      | 6203ZZE  | 6203NSE           | 6203-2NSE  | 6203NKE               | 6203-2NKE  |  |
|                          | 47 | 14 | 1          | 6303        | 6303ZE      | 6303ZZE  | 6303NSE           | 6303-2NSE  | 6303NKE               | 6303-2NKE  |  |
| 20                       | 32 | 7  | 0.3        | 6804        | 6804ZE      | 6804ZZE  | 6804NSE           | 6804-2NSE  | 6804NKE               | 6804-2NKE  |  |
|                          | 37 | 9  | 0.3        | 6904        | 6904ZE      | 6904ZZE  | 6904NSE           | 6904-2NSE  | 6904NKE               | 6904-2NKE  |  |
|                          | 42 | 8  | 0.3        | 16004       | —           | —        | —                 | —          | —                     | —          |  |
|                          | 42 | 12 | 0.6        | 6004        | 6004ZE      | 6004ZZE  | 6004NSE           | 6004-2NSE  | 6004NKE               | 6004-2NKE  |  |
|                          | 47 | 14 | 1          | 6204        | 6204ZE      | 6204ZZE  | 6204NSE           | 6204-2NSE  | 6204NKE               | 6204-2NKE  |  |
|                          | 52 | 15 | 1.1        | 6304        | 6304ZE      | 6304ZZE  | 6304NSE           | 6304-2NSE  | 6304NKE               | 6304-2NKE  |  |
| 22                       | 50 | 14 | 1          | 62/22       | 62/22ZE     | 62/22ZZE | 62/22NSE          | 62/22-2NSE | 62/22NKE              | 62/22-2NKE |  |
|                          | 56 | 16 | 1.1        | 63/22       | 63/22ZE     | 63/22ZZE | 63/22NSE          | 63/22-2NSE | 63/22NKE              | 63/22-2NKE |  |
| 25                       | 37 | 7  | 0.3        | 6805        | 6805ZE      | 6805ZZE  | 6805NSE           | 6805-2NSE  | 6805NKE               | 6805-2NKE  |  |
|                          | 42 | 9  | 0.3        | 6905        | 6905ZE      | 6905ZZE  | 6905NSE           | 6905-2NSE  | 6905NKE               | 6905-2NKE  |  |
|                          | 47 | 8  | 0.3        | 16005       | —           | —        | —                 | —          | —                     | —          |  |
|                          | 47 | 12 | 0.6        | 6005        | 6005ZE      | 6005ZZE  | 6005NSE           | 6005-2NSE  | 6005NKE               | 6005-2NKE  |  |
|                          | 52 | 15 | 1          | 6205        | 6205ZE      | 6205ZZE  | 6205NSE           | 6205-2NSE  | 6205NKE               | 6205-2NKE  |  |
|                          | 62 | 17 | 1.1        | 6305        | 6305ZE      | 6305ZZE  | 6305NSE           | 6305-2NSE  | 6305NKE               | 6305-2NKE  |  |





- Dynamic equivalent radial load

$$Pr = XFr + YFa$$

- Static equivalent radial load

Larger value of following to be used:

$$Por = 0.6Fr + 0.5Fa$$

$$Por = Fr$$

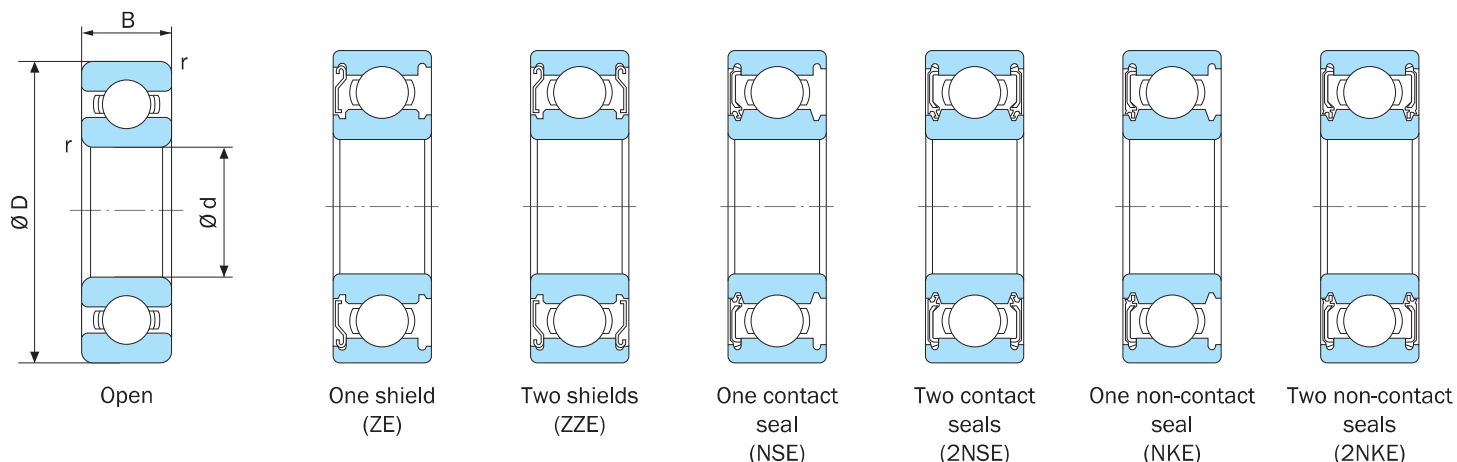
| $\frac{foFa}{Cor}$ | e    | $\frac{Fa}{Fr} \leq e$ |   | $\frac{Fa}{Fr} > e$ |      |
|--------------------|------|------------------------|---|---------------------|------|
|                    |      | X                      | Y | X                   | Y    |
| 0.172              | 0.19 |       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

$$1N = 0.102kgf$$

|  | Basic<br>dynamic<br>load rating<br>Cr (N) | Basic<br>static<br>load rating<br>Cor (N) | Factor<br>fo | Limiting speed (rpm)          |          |                 | Abutment and fillet<br>dimensions (mm) |             |             | Mass (kg) | Bearing No. |
|--|-------------------------------------------|-------------------------------------------|--------------|-------------------------------|----------|-----------------|----------------------------------------|-------------|-------------|-----------|-------------|
|  |                                           |                                           |              | Grease lubrication            |          | Oil lubrication | da<br>(min)                            | Da<br>(max) | ra<br>(max) |           |             |
|  |                                           |                                           |              | Open type,ZE,<br>ZZE,NKE,2NKE | NSE,2NSE | Open type,ZE    |                                        |             |             |           |             |
|  | 2120                                      | 985                                       | 14.2         | 37000                         | 24000    | 44000           | 12                                     | 17          | 0.3         | 0.005     | 6800        |
|  | 2490                                      | 1130                                      | 14.0         | 33000                         | 22000    | 38000           | 12                                     | 20          | 0.3         | 0.009     | 6900        |
|  | 4550                                      | 1970                                      | 12.4         | 30000                         | 22000    | 36000           | 12                                     | 24          | 0.3         | 0.019     | 6000        |
|  | 5100                                      | 2390                                      | 13.2         | 25000                         | 18000    | 30000           | 15                                     | 25          | 0.6         | 0.032     | 6200        |
|  | 8100                                      | 3450                                      | 11.3         | 23000                         | 17000    | 27000           | 15                                     | 30          | 0.6         | 0.053     | 6300        |
|  | 1920                                      | 1040                                      | 15.3         | 32000                         | 20000    | 39000           | 14                                     | 19          | 0.3         | 0.006     | 6801        |
|  | 2700                                      | 1320                                      | 14.5         | 30000                         | 20000    | 36000           | 14                                     | 22          | 0.3         | 0.011     | 6901        |
|  | 5100                                      | 2390                                      | 13.2         | 28000                         | 18000    | 32000           | 14                                     | 26          | 0.3         | 0.023     | 6001        |
|  | 6800                                      | 3050                                      | 12.3         | 22000                         | 17000    | 28000           | 17                                     | 27          | 0.6         | 0.037     | 6201        |
|  | 9750                                      | 4250                                      | 11.2         | 20000                         | 16000    | 24000           | 18                                     | 31          | 1.0         | 0.060     | 6301        |
|  | 2080                                      | 1260                                      | 15.8         | 28000                         | 17000    | 34000           | 17                                     | 22          | 0.3         | 0.007     | 6802        |
|  | 4300                                      | 2250                                      | 14.3         | 26000                         | 17000    | 31000           | 17                                     | 26          | 0.3         | 0.016     | 6902        |
|  | 5600                                      | 2840                                      | 13.9         | 24000                         | —        | 28000           | 20                                     | 27          | 0.3         | 0.025     | 16002       |
|  | 5600                                      | 2840                                      | 13.9         | 24000                         | 15000    | 28000           | 17                                     | 30          | 0.3         | 0.032     | 6002        |
|  | 7650                                      | 3700                                      | 13.1         | 20000                         | 15000    | 24000           | 20                                     | 30          | 0.6         | 0.045     | 6202        |
|  | 11400                                     | 5400                                      | 12.3         | 17000                         | 13000    | 21000           | 21                                     | 36          | 1.0         | 0.082     | 6302        |
|  | 2630                                      | 1570                                      | 16.1         | 26000                         | 15000    | 30000           | 19                                     | 24          | 0.3         | 0.008     | 6803        |
|  | 4600                                      | 2550                                      | 14.7         | 24000                         | 15000    | 29000           | 19                                     | 28          | 0.3         | 0.018     | 6903        |
|  | 6000                                      | 3250                                      | 14.3         | 22000                         | —        | 26000           | 22                                     | 30          | 0.3         | 0.032     | 16003       |
|  | 6000                                      | 3250                                      | 14.3         | 22000                         | 14000    | 26000           | 19                                     | 33          | 0.3         | 0.039     | 6003        |
|  | 9550                                      | 4800                                      | 13.1         | 18000                         | 12000    | 21000           | 22                                     | 35          | 0.6         | 0.065     | 6203        |
|  | 13600                                     | 6550                                      | 12.3         | 16000                         | 11000    | 19000           | 23                                     | 41          | 1.0         | 0.115     | 6303        |
|  | 4000                                      | 2640                                      | 15.5         | 22000                         | 13000    | 26000           | 22                                     | 30          | 0.3         | 0.019     | 6804        |
|  | 6350                                      | 3700                                      | 14.8         | 19000                         | 12000    | 23000           | 22                                     | 35          | 0.3         | 0.036     | 6904        |
|  | 7900                                      | 4500                                      | 14.5         | 18000                         | —        | 21000           | 25                                     | 37          | 0.3         | 0.050     | 16004       |
|  | 9400                                      | 5000                                      | 13.9         | 18000                         | 11000    | 21000           | 24                                     | 38          | 0.6         | 0.070     | 6004        |
|  | 12800                                     | 6600                                      | 13.1         | 16000                         | 11000    | 18000           | 26                                     | 41          | 1.0         | 0.106     | 6204        |
|  | 15900                                     | 7900                                      | 12.4         | 14000                         | 10000    | 17000           | 27                                     | 45          | 1.1         | 0.144     | 6304        |
|  | 13900                                     | 6950                                      | 13.1         | 14000                         | 9700     | 17000           | 28                                     | 44          | 1.0         | 0.120     | 62/22       |
|  | 18400                                     | 9250                                      | 12.4         | 13000                         | 9500     | 16000           | 29                                     | 49          | 1.0         | 0.176     | 63/22       |
|  | 4300                                      | 2940                                      | 16.0         | 18000                         | 10000    | 22000           | 27                                     | 35          | 0.3         | 0.022     | 6805        |
|  | 7000                                      | 4500                                      | 15.3         | 16000                         | 10000    | 20000           | 27                                     | 40          | 0.3         | 0.042     | 6905        |
|  | 6950                                      | 4600                                      | 15.6         | 15000                         | —        | 18000           | 30                                     | 42          | 0.3         | 0.060     | 16005       |
|  | 10100                                     | 5850                                      | 14.5         | 15000                         | 9500     | 18000           | 29                                     | 43          | 0.6         | 0.079     | 6005        |
|  | 14000                                     | 7900                                      | 13.9         | 13000                         | 9000     | 16000           | 31                                     | 46          | 1.0         | 0.128     | 6205        |
|  | 23600                                     | 12100                                     | 12.2         | 12000                         | 8100     | 14000           | 32                                     | 55          | 1.0         | 0.232     | 6305        |

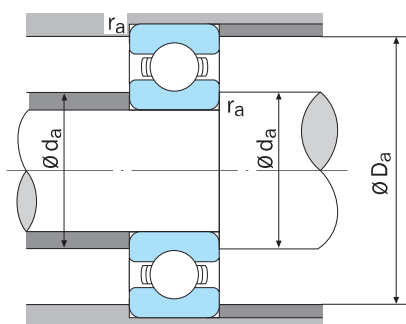
## Deep Groove Ball Bearings

Bore Diameter: 28~50mm



| Boundary dimensions (mm) |     |    |         | Bearing No. |             |          |                   |            |                       |            |  |
|--------------------------|-----|----|---------|-------------|-------------|----------|-------------------|------------|-----------------------|------------|--|
| d                        | D   | B  | r (min) | Open type   | Shield type |          | Contact seal type |            | Non-contact seal type |            |  |
| 28                       | 58  | 16 | 1       | 62/28       | 62/28ZE     | 62/28ZZE | 62/28NSE          | 62/28-2NSE | 62/28NKE              | 62/28-2NKE |  |
|                          | 68  | 18 | 1.1     | 63/28       | 63/28ZE     | 63/28ZZE | 63/28NSE          | 63/28-2NSE | 63/28NKE              | 63/28-2NKE |  |
| 30                       | 42  | 7  | 0.3     | 6806        | 6806ZE      | 6806ZZE  | 6806NSE           | 6806-2NSE  | 6806NKE               | 6806-2NKE  |  |
|                          | 47  | 9  | 0.3     | 6906        | 6906ZE      | 6906ZZE  | 6906NSE           | 6906-2NSE  | 6906NKE               | 6906-2NKE  |  |
|                          | 55  | 9  | 0.3     | 16006       | —           | —        | —                 | —          | —                     | —          |  |
|                          | 55  | 13 | 1       | 6006        | 6006ZE      | 6006ZZE  | 6006NSE           | 6006-2NSE  | 6006NKE               | 6006-2NKE  |  |
|                          | 62  | 16 | 1       | 6206        | 6206ZE      | 6206ZZE  | 6206NSE           | 6206-2NSE  | 6206NKE               | 6206-2NKE  |  |
|                          | 72  | 19 | 1.1     | 6306        | 6306ZE      | 6306ZZE  | 6306NSE           | 6306-2NSE  | 6306NKE               | 6306-2NKE  |  |
| 32                       | 65  | 17 | 1       | 62/32       | 62/32ZE     | 62/32ZZE | 62/32NSE          | 62/32-2NSE | 62/32NKE              | 62/32-2NKE |  |
|                          | 75  | 20 | 1.1     | 63/32       | 63/32ZE     | 63/32ZZE | 63/32NSE          | 63/32-2NSE | 63/32NKE              | 63/32-2NKE |  |
| 35                       | 47  | 7  | 0.3     | 6807        | 6807ZE      | 6807ZZE  | 6807NSE           | 6807-2NSE  | 6807NKE               | 6807-2NKE  |  |
|                          | 55  | 10 | 0.6     | 6907        | 6907ZE      | 6907ZZE  | 6907NSE           | 6907-2NSE  | 6907NKE               | 6907-2NKE  |  |
|                          | 62  | 9  | 0.3     | 16007       | —           | —        | —                 | —          | —                     | —          |  |
|                          | 62  | 14 | 1       | 6007        | 6007ZE      | 6007ZZE  | 6007NSE           | 6007-2NSE  | 6007NKE               | 6007-2NKE  |  |
|                          | 72  | 17 | 1.1     | 6207        | 6207ZE      | 6207ZZE  | 6207NSE           | 6207-2NSE  | 6207NKE               | 6207-2NKE  |  |
|                          | 80  | 21 | 1.5     | 6307        | 6307ZE      | 6307ZZE  | 6307NSE           | 6307-2NSE  | 6307NKE               | 6307-2NKE  |  |
| 40                       | 52  | 7  | 0.3     | 6808        | 6808ZE      | 6808ZZE  | 6808NSE           | 6808-2NSE  | 6808NKE               | 6808-2NKE  |  |
|                          | 62  | 12 | 0.6     | 6908        | 6908ZE      | 6908ZZE  | 6908NSE           | 6908-2NSE  | 6908NKE               | 6908-2NKE  |  |
|                          | 68  | 9  | 0.3     | 16008       | —           | —        | —                 | —          | —                     | —          |  |
|                          | 68  | 15 | 1       | 6008        | 6008ZE      | 6008ZZE  | 6008NSE           | 6008-2NSE  | 6008NKE               | 6008-2NKE  |  |
|                          | 80  | 18 | 1.1     | 6208        | 6208ZE      | 6208ZZE  | 6208NSE           | 6208-2NSE  | 6208NKE               | 6208-2NKE  |  |
|                          | 90  | 23 | 1.5     | 6308        | 6308ZE      | 6308ZZE  | 6308NSE           | 6308-2NSE  | 6308NKE               | 6308-2NKE  |  |
| 45                       | 58  | 7  | 0.3     | 6809        | 6809ZE      | 6809ZZE  | 6809NSE           | 6809-2NSE  | 6809NKE               | 6809-2NKE  |  |
|                          | 68  | 12 | 0.6     | 6909        | 6909ZE      | 6909ZZE  | 6909NSE           | 6909-2NSE  | 6909NKE               | 6909-2NKE  |  |
|                          | 75  | 10 | 0.6     | 16009       | —           | —        | —                 | —          | —                     | —          |  |
|                          | 75  | 16 | 1       | 6009        | 6009ZE      | 6009ZZE  | 6009NSE           | 6009-2NSE  | 6009NKE               | 6009-2NKE  |  |
|                          | 85  | 19 | 1.1     | 6209        | 6209ZE      | 6209ZZE  | 6209NSE           | 6209-2NSE  | 6209NKE               | 6209-2NKE  |  |
|                          | 100 | 25 | 1.5     | 6309        | 6309ZE      | 6309ZZE  | 6309NSE           | 6309-2NSE  | 6309NKE               | 6309-2NKE  |  |
| 50                       | 65  | 7  | 0.3     | 6810        | 6810ZE      | 6810ZZE  | 6810NSE           | 6810-2NSE  | 6810NKE               | 6810-2NKE  |  |
|                          | 72  | 12 | 0.6     | 6910        | 6910ZE      | 6910ZZE  | 6910NSE           | 6910-2NSE  | 6910NKE               | 6910-2NKE  |  |
|                          | 80  | 10 | 0.6     | 16010       | —           | —        | —                 | —          | —                     | —          |  |
|                          | 80  | 16 | 1       | 6010        | 6010ZE      | 6010ZZE  | 6010NSE           | 6010-2NSE  | 6010NKE               | 6010-2NKE  |  |
|                          | 90  | 20 | 1.1     | 6210        | 6210ZE      | 6210ZZE  | 6210NSE           | 6210-2NSE  | 6210NKE               | 6210-2NKE  |  |
|                          | 110 | 27 | 2       | 6310        | 6310ZE      | 6310ZZE  | 6310NSE           | 6310-2NSE  | 6310NKE               | 6310-2NKE  |  |





• **Dynamic equivalent radial load**

$$Pr = XFr + YFa$$

• **Static equivalent radial load**

Larger value of following to be used:

$$Por = 0.6Fr + 0.5Fa$$

$$Por = Fr$$

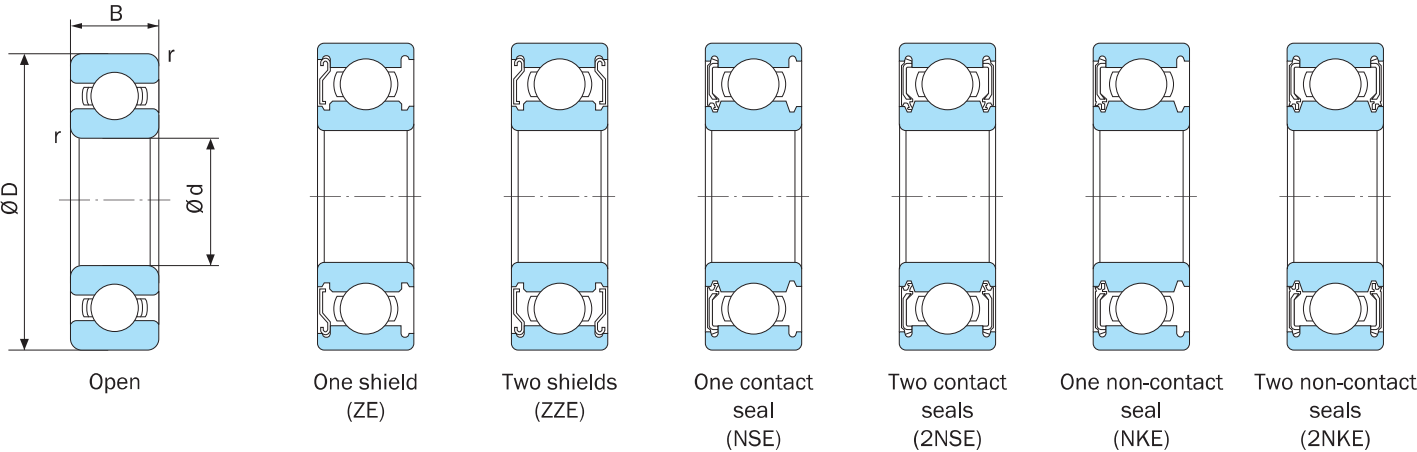
| $\frac{foFa}{Cor}$ | e    | $\frac{Fa}{Fr} \leq e$ |   | $\frac{Fa}{Fr} > e$ |      |
|--------------------|------|------------------------|---|---------------------|------|
|                    |      | X                      | Y | X                   | Y    |
| 0.172              | 0.19 |       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

$$1N = 0.102kgf$$

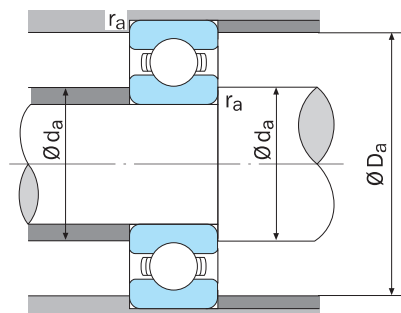
|  | Basic dynamic load rating<br>Cr (N) | Basic static load rating<br>Cor (N) | Factor fo | Limiting speed (rpm)       |                   |                 | Abutment and fillet dimensions (mm) |          |          | Mass (kg) | Bearing No. |
|--|-------------------------------------|-------------------------------------|-----------|----------------------------|-------------------|-----------------|-------------------------------------|----------|----------|-----------|-------------|
|  |                                     |                                     |           | Grease lubrication         |                   | Oil lubrication | da (min)                            | Da (max) | ra (max) |           |             |
|  |                                     |                                     |           | Open type,ZE, ZZE,NKE,2NKE | NSE,2NSE NSL,2NSL | Open type,ZE    |                                     |          |          |           |             |
|  | 17900                               | 9750                                | 13.1      | 12000                      | 8200              | 14000           | 34                                  | 52       | 1.0      | 0.175     | 62/28       |
|  | 26800                               | 14000                               | 12.4      | 11000                      | 7500              | 13000           | 35                                  | 61       | 1.0      | 0.287     | 63/28       |
|  | 5350                                | 3800                                | 16.4      | 15000                      | 9000              | 18000           | 32                                  | 40       | 0.3      | 0.026     | 6806        |
|  | 7250                                | 5000                                | 15.8      | 14000                      | 8500              | 17000           | 32                                  | 45       | 0.3      | 0.045     | 6906        |
|  | 9950                                | 6550                                | 15.4      | 13000                      | —                 | 15000           | 35                                  | 50       | 0.3      | 0.085     | 16006       |
|  | 13200                               | 8300                                | 14.8      | 13000                      | 8000              | 15000           | 35                                  | 50       | 1.0      | 0.117     | 6006        |
|  | 19500                               | 11300                               | 13.9      | 11000                      | 7500              | 13000           | 36                                  | 56       | 1.0      | 0.199     | 6206        |
|  | 26700                               | 15000                               | 13.2      | 10000                      | 6700              | 12000           | 37                                  | 65       | 1.0      | 0.346     | 6306        |
|  | 22400                               | 13100                               | 13.6      | 11000                      | 7100              | 12000           | 38                                  | 59       | 1.0      | 0.230     | 62/32       |
|  | 30000                               | 16200                               | 12.7      | 9500                       | 6500              | 11000           | 39                                  | 68       | 1.0      | 0.382     | 63/32       |
|  | 4750                                | 3800                                | 16.4      | 14000                      | 7600              | 16000           | 37                                  | 45       | 0.3      | 0.029     | 6807        |
|  | 10400                               | 7150                                | 15.6      | 12000                      | 7500              | 15000           | 39                                  | 51       | 0.6      | 0.073     | 6907        |
|  | 11700                               | 8150                                | 15.6      | 12000                      | —                 | 14000           | 40                                  | 57       | 0.3      | 0.110     | 16007       |
|  | 16000                               | 10300                               | 14.8      | 12000                      | 6800              | 14000           | 40                                  | 57       | 1.0      | 0.156     | 6007        |
|  | 25700                               | 15300                               | 13.8      | 9800                       | 6300              | 11000           | 42                                  | 65       | 1.0      | 0.288     | 6207        |
|  | 33500                               | 19200                               | 13.2      | 8800                       | 6000              | 10000           | 44                                  | 71       | 1.5      | 0.457     | 6307        |
|  | 5950                                | 4900                                | 16.2      | 12000                      | 6700              | 14000           | 42                                  | 50       | 0.3      | 0.033     | 6808        |
|  | 13700                               | 9950                                | 15.8      | 11000                      | 6300              | 13000           | 44                                  | 58       | 0.6      | 0.108     | 6908        |
|  | 11100                               | 8550                                | 16.1      | 10000                      | —                 | 12000           | 45                                  | 63       | 0.3      | 0.125     | 16008       |
|  | 16800                               | 11500                               | 15.3      | 10000                      | 6100              | 12000           | 45                                  | 63       | 1.0      | 0.194     | 6008        |
|  | 29100                               | 17900                               | 14.0      | 8700                       | 5600              | 10000           | 47                                  | 73       | 1.0      | 0.366     | 6208        |
|  | 40500                               | 24100                               | 13.2      | 7800                       | 5300              | 9200            | 49                                  | 81       | 1.5      | 0.633     | 6308        |
|  | 5350                                | 4900                                | 16.1      | 11000                      | 6000              | 13000           | 47                                  | 56       | 0.3      | 0.040     | 6809        |
|  | 14100                               | 10900                               | 16.1      | 10000                      | 5600              | 12000           | 49                                  | 64       | 0.6      | 0.122     | 6909        |
|  | 12900                               | 10500                               | 16.2      | 9200                       | —                 | 11000           | 52                                  | 68       | 0.6      | 0.170     | 16009       |
|  | 20900                               | 15200                               | 15.3      | 9200                       | 5400              | 11000           | 50                                  | 70       | 1.0      | 0.246     | 6009        |
|  | 32500                               | 20500                               | 14.1      | 7800                       | 5300              | 9300            | 52                                  | 78       | 1.0      | 0.407     | 6209        |
|  | 53000                               | 32000                               | 13.1      | 7000                       | 4800              | 8200            | 54                                  | 91       | 1.5      | 0.833     | 6309        |
|  | 6400                                | 5800                                | 16.1      | 10000                      | 5300              | 12000           | 52                                  | 63       | 0.3      | 0.052     | 6810        |
|  | 14500                               | 11700                               | 16.1      | 9500                       | 5300              | 11000           | 54                                  | 68       | 0.6      | 0.125     | 6910        |
|  | 16100                               | 13100                               | 16.1      | 8500                       | —                 | 10000           | 57                                  | 73       | 0.6      | 0.180     | 16010       |
|  | 21800                               | 16600                               | 15.6      | 8500                       | 5000              | 10000           | 55                                  | 75       | 1.0      | 0.264     | 6010        |
|  | 35000                               | 23200                               | 14.4      | 7100                       | 4800              | 8600            | 57                                  | 83       | 1.0      | 0.463     | 6210        |
|  | 62000                               | 38000                               | 13.1      | 6400                       | 4300              | 7500            | 60                                  | 100      | 2.0      | 1.07      | 6310        |

Deep Groove Ball Bearings

Bore Diameter: 55~80mm



| Boundary dimensions (mm) |     |    |            | Bearing No. |             |         |                   |           |                       |           |  |
|--------------------------|-----|----|------------|-------------|-------------|---------|-------------------|-----------|-----------------------|-----------|--|
| d                        | D   | B  | r<br>(min) | Open type   | Shield type |         | Contact seal type |           | Non-contact seal type |           |  |
| 55                       | 72  | 9  | 0.3        | 6811        | 6811Z       | 6811ZZ  | —                 | —         | —                     | —         |  |
|                          | 80  | 13 | 1          | 6911        | 6911Z       | 6911ZZ  | —                 | —         | —                     | —         |  |
|                          | 90  | 11 | 0.6        | 16011       | —           | —       | —                 | —         | —                     | —         |  |
|                          | 90  | 18 | 1.1        | 6011        | 6011ZE      | 6011ZZE | 6011NSE           | 6011-2NSE | 6011NKE               | 6011-2NKE |  |
|                          | 100 | 21 | 1.5        | 6211        | 6211ZE      | 6211ZZE | 6211NSE           | 6211-2NSE | 6211NKE               | 6211-2NKE |  |
|                          | 120 | 29 | 2          | 6311        | 6311ZE      | 6311ZZE | 6311NSE           | 6311-2NSE | 6311NKE               | 6311-2NKE |  |
| 60                       | 78  | 10 | 0.3        | 6812        | 6812Z       | 6812ZZ  | —                 | —         | —                     | —         |  |
|                          | 85  | 13 | 1          | 6912        | 6912Z       | 6912ZZ  | —                 | —         | —                     | —         |  |
|                          | 95  | 11 | 0.6        | 16012       | —           | —       | —                 | —         | —                     | —         |  |
|                          | 95  | 18 | 1.1        | 6012        | 6012ZE      | 6012ZZE | 6012NSE           | 6012-2NSE | 6012NKE               | 6012-2NKE |  |
|                          | 110 | 22 | 1.5        | 6212        | 6212ZE      | 6212ZZE | 6212NSE           | 6212-2NSE | 6212NKE               | 6212-2NKE |  |
|                          | 130 | 31 | 2.1        | 6312        | 6312ZE      | 6312ZZE | 6312NSE           | 6312-2NSE | 6312NKE               | 6312-2NKE |  |
| 65                       | 85  | 10 | 0.6        | 6813        | 6813Z       | 6813ZZ  | —                 | —         | —                     | —         |  |
|                          | 90  | 13 | 1          | 6913        | 6913Z       | 6913ZZ  | —                 | —         | —                     | —         |  |
|                          | 100 | 11 | 0.6        | 16013       | —           | —       | —                 | —         | —                     | —         |  |
|                          | 100 | 18 | 1.1        | 6013        | 6013ZE      | 6013ZZE | 6013NSE           | 6013-2NSE | 6013NKE               | 6013-2NKE |  |
|                          | 120 | 23 | 1.5        | 6213        | 6213ZE      | 6213ZZE | 6213NSE           | 6213-2NSE | 6213NKE               | 6213-2NKE |  |
|                          | 140 | 33 | 2.1        | 6313        | 6313ZE      | 6313ZZE | 6313NSE           | 6313-2NSE | 6313NKE               | 6313-2NKE |  |
| 70                       | 90  | 10 | 0.6        | 6814        | 6814Z       | 6814ZZ  | —                 | —         | —                     | —         |  |
|                          | 100 | 16 | 1          | 6914        | 6914Z       | 6914ZZ  | —                 | —         | —                     | —         |  |
|                          | 110 | 13 | 0.6        | 16014       | —           | —       | —                 | —         | —                     | —         |  |
|                          | 110 | 20 | 1.1        | 6014        | 6014ZE      | 6014ZZE | 6014NSE           | 6014-2NSE | 6014NKE               | 6014-2NKE |  |
|                          | 125 | 24 | 1.5        | 6214        | 6214ZE      | 6214ZZE | 6214NSE           | 6214-2NSE | 6214NKE               | 6214-2NKE |  |
|                          | 150 | 35 | 2.1        | 6314        | 6314ZE      | 6314ZZE | 6314NSE           | 6314-2NSE | 6314NKE               | 6314-2NKE |  |
| 75                       | 95  | 10 | 0.6        | 6815        | 6815Z       | 6815ZZ  | —                 | —         | —                     | —         |  |
|                          | 105 | 16 | 1          | 6915        | 6915Z       | 6915ZZ  | —                 | —         | —                     | —         |  |
|                          | 115 | 13 | 0.6        | 16015       | —           | —       | —                 | —         | —                     | —         |  |
|                          | 115 | 20 | 1.1        | 6015        | 6015ZE      | 6015ZZE | 6015NSE           | 6015-2NSE | 6015NKE               | 6015-2NKE |  |
|                          | 130 | 25 | 1.5        | 6215        | 6215ZE      | 6215ZZE | 6215NSE           | 6215-2NSE | 6215NKE               | 6215-2NKE |  |
|                          | 160 | 37 | 2.1        | 6315        | 6315ZE      | 6315ZZE | 6315NSE           | 6315-2NSE | 6315NKE               | 6315-2NKE |  |
| 80                       | 100 | 10 | 0.6        | 6816        | 6816Z       | 6816ZZ  | —                 | —         | —                     | —         |  |
|                          | 110 | 16 | 1          | 6916        | 6916Z       | 6916ZZ  | —                 | —         | —                     | —         |  |
|                          | 125 | 14 | 0.6        | 16016       | —           | —       | —                 | —         | —                     | —         |  |
|                          | 125 | 22 | 1.1        | 6016        | 6016Z       | 6016ZZ  | —                 | —         | —                     | —         |  |
|                          | 140 | 26 | 2          | 6216        | 6216Z       | 6216ZZ  | 6216NSL           | 6216-2NSL | 6216NK                | 6216-2NK  |  |
|                          | 170 | 39 | 2.1        | 6316        | 6316Z       | 6316ZZ  | 6316NSL           | 6316-2NSL | 6316NK                | 6316-2NK  |  |



## • Dynamic equivalent radial load

$$Pr = XFr + YFa$$

## • Static equivalent radial load

Larger value of following to be used:

$$Por = 0.6Fr + 0.5Fa$$

$$Por = Fr$$

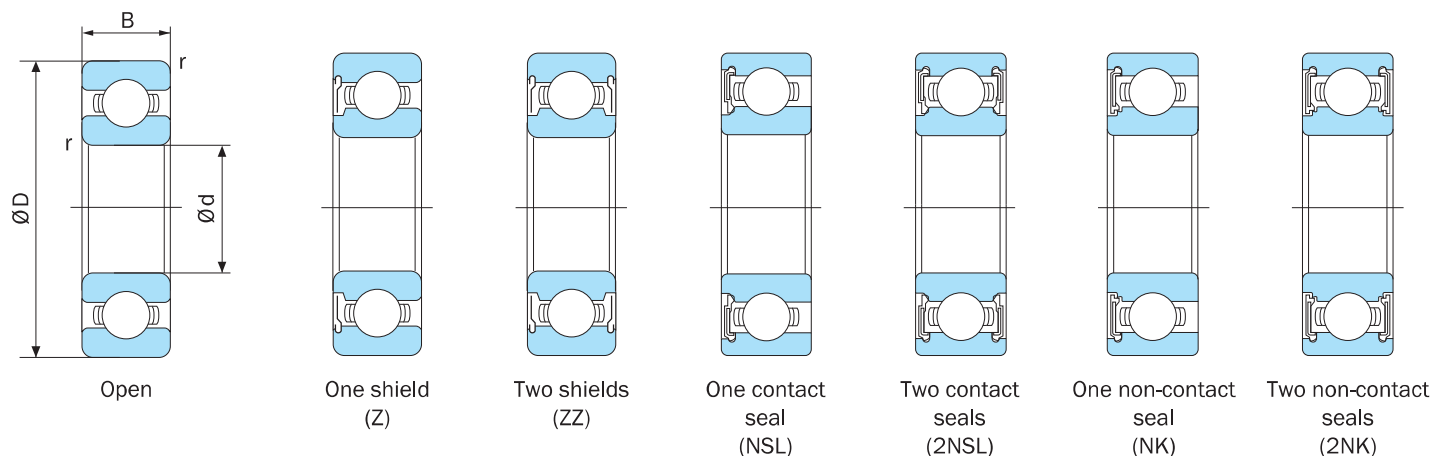
| foFa<br>Cor | e    | $\frac{Fa}{Fr} \leq e$ |   | $\frac{Fa}{Fr} > e$ |      |
|-------------|------|------------------------|---|---------------------|------|
|             |      | X                      | Y | X                   | Y    |
| 0.172       | 0.19 |                        |   |      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

$$1N = 0.102kgf$$

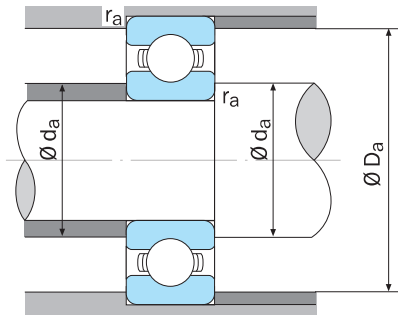
|  | Basic<br>dynamic<br>load rating<br>Cr (N) | Basic<br>static<br>load rating<br>Cr (N) | Factor<br>fo | Limiting speed (rpm)          |                      |                 | Abutment and fillet<br>dimensions (mm) |             |             | Mass (kg) | Bearing No. |
|--|-------------------------------------------|------------------------------------------|--------------|-------------------------------|----------------------|-----------------|----------------------------------------|-------------|-------------|-----------|-------------|
|  |                                           |                                          |              | Grease lubrication            |                      | Oil lubrication | da<br>(min)                            | Da<br>(max) | ra<br>(max) |           |             |
|  |                                           |                                          |              | Open type,ZE,<br>ZZE,NKE,2NKE | NSE,2NSE<br>NSL,2NSL | Open type,ZE    |                                        |             |             |           |             |
|  | 8800                                      | 8100                                     | 16.2         | 8700                          | —                    | 10000           | 57                                     | 70          | 0.3         | 0.083     | 6811        |
|  | 16000                                     | 13200                                    | 16.2         | 8200                          | —                    | 9600            | 60                                     | 75          | 1.0         | 0.177     | 6911        |
|  | 15200                                     | 13500                                    | 16.5         | 7700                          | —                    | 9000            | 62                                     | 83          | 0.6         | 0.260     | 16011       |
|  | 28300                                     | 21300                                    | 15.4         | 7700                          | 4500                 | 9000            | 61                                     | 84          | 1.0         | 0.384     | 6011        |
|  | 43500                                     | 29300                                    | 14.4         | 6400                          | 4300                 | 7700            | 64                                     | 91          | 1.5         | 0.607     | 6211        |
|  | 71500                                     | 44500                                    | 13.1         | 5800                          | 4000                 | 6800            | 65                                     | 110         | 2.0         | 1.37      | 6311        |
|  | 11500                                     | 10600                                    | 16.3         | 8000                          | —                    | 9500            | 62                                     | 76          | 0.3         | 0.106     | 6812        |
|  | 15200                                     | 13500                                    | 16.5         | 7600                          | —                    | 9000            | 65                                     | 80          | 1.0         | 0.191     | 6912        |
|  | 16200                                     | 14300                                    | 16.5         | 7100                          | —                    | 8500            | 67                                     | 88          | 0.6         | 0.280     | 16012       |
|  | 29400                                     | 23200                                    | 15.5         | 7100                          | 4100                 | 8500            | 66                                     | 89          | 1.0         | 0.418     | 6012        |
|  | 52500                                     | 36000                                    | 14.3         | 6000                          | 3800                 | 7100            | 69                                     | 101         | 1.5         | 0.783     | 6212        |
|  | 82000                                     | 52000                                    | 13.2         | 5400                          | 3600                 | 6300            | 72                                     | 118         | 2.0         | 1.70      | 6312        |
|  | 11900                                     | 11500                                    | 16.2         | 7500                          | —                    | 8700            | 69                                     | 81          | 0.6         | 0.125     | 6813        |
|  | 17400                                     | 16000                                    | 16.5         | 7100                          | —                    | 8500            | 70                                     | 85          | 1.0         | 0.200     | 6913        |
|  | 20500                                     | 18600                                    | 16.4         | 6700                          | —                    | 8000            | 72                                     | 93          | 0.6         | 0.300     | 16013       |
|  | 30500                                     | 25200                                    | 15.7         | 6700                          | 4000                 | 8000            | 71                                     | 94          | 1.0         | 0.438     | 6013        |
|  | 57000                                     | 40000                                    | 14.4         | 5500                          | 3600                 | 6500            | 74                                     | 111         | 1.5         | 0.990     | 6213        |
|  | 92500                                     | 59500                                    | 13.2         | 4900                          | 3400                 | 6000            | 77                                     | 128         | 2.0         | 2.08      | 6313        |
|  | 12100                                     | 11900                                    | 16.1         | 7000                          | —                    | 8100            | 74                                     | 86          | 0.6         | 0.135     | 6814        |
|  | 23700                                     | 21100                                    | 16.3         | 6500                          | —                    | 7700            | 75                                     | 95          | 1.0         | 0.327     | 6914        |
|  | 26800                                     | 23600                                    | 16.2         | 6100                          | —                    | 7100            | 77                                     | 103         | 0.6         | 0.433     | 16014       |
|  | 38000                                     | 31000                                    | 15.6         | 6100                          | 3600                 | 7100            | 76                                     | 104         | 1.0         | 0.607     | 6014        |
|  | 62000                                     | 44000                                    | 14.4         | 5100                          | 3400                 | 6300            | 79                                     | 116         | 1.5         | 1.07      | 6214        |
|  | 104000                                    | 68000                                    | 13.2         | 4600                          | 3200                 | 5400            | 82                                     | 138         | 2.0         | 2.52      | 6314        |
|  | 12500                                     | 12800                                    | 16.0         | 6500                          | —                    | 7600            | 79                                     | 91          | 0.6         | 0.145     | 6815        |
|  | 20800                                     | 19700                                    | 16.5         | 6200                          | —                    | 7200            | 80                                     | 100         | 1.0         | 0.345     | 6915        |
|  | 27600                                     | 25300                                    | 16.4         | 5700                          | —                    | 6700            | 82                                     | 108         | 0.6         | 0.457     | 16015       |
|  | 39500                                     | 33500                                    | 15.7         | 5700                          | 3400                 | 6700            | 81                                     | 109         | 1.0         | 0.645     | 6015        |
|  | 66000                                     | 49500                                    | 14.7         | 4800                          | 3200                 | 5600            | 84                                     | 121         | 1.5         | 1.18      | 6215        |
|  | 113000                                    | 77000                                    | 13.2         | 4300                          | 2900                 | 5000            | 87                                     | 148         | 2.0         | 3.02      | 6315        |
|  | 12700                                     | 13300                                    | 15.9         | 6000                          | —                    | 7100            | 84                                     | 96          | 0.6         | 0.155     | 6816        |
|  | 27600                                     | 25300                                    | 16.4         | 5700                          | —                    | 6700            | 85                                     | 105         | 1.0         | 0.363     | 6916        |
|  | 32000                                     | 29600                                    | 16.4         | 5300                          | —                    | 6300            | 87                                     | 118         | 0.6         | 0.597     | 16016       |
|  | 47500                                     | 39500                                    | 15.6         | 5300                          | —                    | 6300            | 86                                     | 119         | 1.0         | 0.855     | 6016        |
|  | 72500                                     | 53000                                    | 14.6         | 4500                          | 3000                 | 5300            | 90                                     | 130         | 2.0         | 1.40      | 6216        |
|  | 123000                                    | 86500                                    | 13.2         | 4000                          | 2800                 | 4800            | 92                                     | 158         | 2.0         | 3.59      | 6316        |

## Deep Groove Ball Bearings

Bore Diameter: 80~110mm



| Boundary dimensions (mm) |     |    |         | Bearing No. |             |        |                   |           |                       |          |  |
|--------------------------|-----|----|---------|-------------|-------------|--------|-------------------|-----------|-----------------------|----------|--|
| d                        | D   | B  | r (min) | Open type   | Shield type |        | Contact seal type |           | Non-contact seal type |          |  |
| 85                       | 110 | 13 | 1       | 6817        | 6817Z       | 6817ZZ | —                 | —         | —                     | —        |  |
|                          | 120 | 18 | 1.1     | 6917        | 6917Z       | 6917ZZ | —                 | —         | —                     | —        |  |
|                          | 130 | 14 | 0.6     | 16017       | —           | —      | —                 | —         | —                     | —        |  |
|                          | 130 | 22 | 1.1     | 6017        | 6017Z       | 6017ZZ | —                 | —         | —                     | —        |  |
|                          | 150 | 28 | 2       | 6217        | 6217Z       | 6217ZZ | 6217NSL           | 6217-2NSL | 6217NK                | 6217-2NK |  |
|                          | 180 | 41 | 3       | 6317        | 6317Z       | 6317ZZ | 6317NSL           | 6317-2NSL | 6317NK                | 6317-2NK |  |
| 90                       | 115 | 13 | 1       | 6818        | 6818Z       | 6818ZZ | —                 | —         | —                     | —        |  |
|                          | 125 | 18 | 1.1     | 6918        | 6918Z       | 6918ZZ | —                 | —         | —                     | —        |  |
|                          | 140 | 16 | 1       | 16018       | —           | —      | —                 | —         | —                     | —        |  |
|                          | 140 | 24 | 1.5     | 6018        | 6018Z       | 6018ZZ | —                 | —         | —                     | —        |  |
|                          | 160 | 30 | 2       | 6218        | 6218Z       | 6218ZZ | 6218NSL           | 6218-2NSL | 6218NK                | 6218-2NK |  |
|                          | 190 | 43 | 3       | 6318        | 6318Z       | 6318ZZ | 6318NSL           | 6318-2NSL | 6318NK                | 6318-2NK |  |
| 95                       | 120 | 13 | 1       | 6819        | 6819Z       | 6819ZZ | —                 | —         | —                     | —        |  |
|                          | 130 | 18 | 1.1     | 6919        | 6919Z       | 6919ZZ | —                 | —         | —                     | —        |  |
|                          | 145 | 16 | 1       | 16019       | —           | —      | —                 | —         | —                     | —        |  |
|                          | 145 | 24 | 1.5     | 6019        | 6019Z       | 6019ZZ | —                 | —         | —                     | —        |  |
|                          | 170 | 32 | 2.1     | 6219        | 6219Z       | 6219ZZ | 6219NSL           | 6219-2NSL | 6219NK                | 6219-2NK |  |
|                          | 200 | 45 | 3       | 6319        | 6319Z       | 6319ZZ | 6319NSL           | 6319-2NSL | 6319NK                | 6319-2NK |  |
| 100                      | 125 | 13 | 1       | 6820        | 6820Z       | 6820ZZ | —                 | —         | —                     | —        |  |
|                          | 140 | 20 | 1.1     | 6920        | 6920Z       | 6920ZZ | —                 | —         | —                     | —        |  |
|                          | 150 | 16 | 1       | 16020       | —           | —      | —                 | —         | —                     | —        |  |
|                          | 150 | 24 | 1.5     | 6020        | 6020Z       | 6020ZZ | —                 | —         | —                     | —        |  |
|                          | 180 | 34 | 2.1     | 6220        | 6220Z       | 6220ZZ | 6220NSL           | 6220-2NSL | 6220NK                | 6220-2NK |  |
|                          | 215 | 47 | 3       | 6320        | 6320Z       | 6320ZZ | 6320NSL           | 6320-2NSL | 6320NK                | 6320-2NK |  |
| 105                      | 130 | 13 | 1       | 6821        | —           | —      | —                 | —         | —                     | —        |  |
|                          | 145 | 20 | 1.1     | 6921        | —           | —      | —                 | —         | —                     | —        |  |
|                          | 160 | 18 | 1       | 16021       | —           | —      | —                 | —         | —                     | —        |  |
|                          | 160 | 26 | 2       | 6021        | 6021Z       | 6021ZZ | —                 | —         | —                     | —        |  |
|                          | 190 | 36 | 2.1     | 6221        | 6221Z       | 6221ZZ | —                 | —         | —                     | —        |  |
|                          | 225 | 49 | 3       | 6321        | 6321Z       | 6321ZZ | —                 | —         | —                     | —        |  |
| 110                      | 140 | 16 | 1       | 6822        | —           | —      | —                 | —         | —                     | —        |  |
|                          | 150 | 20 | 1.1     | 6922        | —           | —      | —                 | —         | —                     | —        |  |
|                          | 170 | 19 | 1       | 16022       | —           | —      | —                 | —         | —                     | —        |  |
|                          | 170 | 28 | 2       | 6022        | 6022Z       | 6022ZZ | —                 | —         | —                     | —        |  |
|                          | 200 | 38 | 2.1     | 6222        | 6222Z       | 6222ZZ | —                 | —         | —                     | —        |  |
|                          | 240 | 50 | 3       | 6322        | 6322Z       | 6322ZZ | —                 | —         | —                     | —        |  |



1N=0.102kgf

• **Dynamic equivalent radial load**

$$Pr = XFr + YFa$$

• **Static equivalent radial load**

Larger value of following to be used:

$$Por = 0.6Fr + 0.5Fa$$

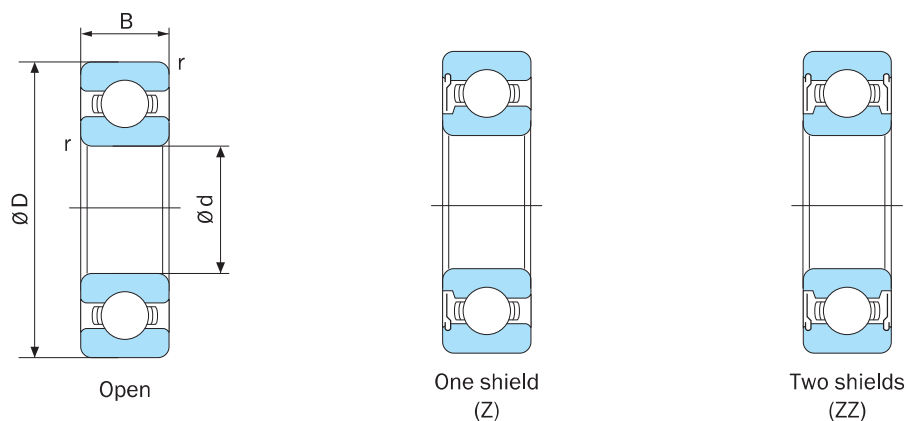
$$Por = Fr$$

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

|  | Basic<br>dynamic<br>load rating<br>Cr (N) | Basic<br>static<br>load rating<br>Cor (N) | Factor<br>fo | Limiting speed (rpm)      |          |                 | Abutment and fillet<br>dimensions (mm) |             |             | Mass (kg) | Bearing No. |
|--|-------------------------------------------|-------------------------------------------|--------------|---------------------------|----------|-----------------|----------------------------------------|-------------|-------------|-----------|-------------|
|  |                                           |                                           |              | Grease lubrication        |          | Oil lubrication | da<br>(min)                            | Da<br>(max) | ra<br>(max) |           |             |
|  |                                           |                                           |              | Open type,Z,<br>ZZ,NK,2NK | NSL,2NSL | Open type,Z     |                                        |             |             |           |             |
|  | 18700                                     | 19000                                     | 16.2         | 5700                      | —        | 6700            | 90                                     | 105         | 1.0         | 0.265     | 6817        |
|  | 32000                                     | 29600                                     | 16.4         | 5400                      | —        | 6300            | 91                                     | 113         | 1.0         | 0.517     | 6917        |
|  | 31500                                     | 29800                                     | 16.4         | 5000                      | —        | 6000            | 92                                     | 123         | 0.6         | 0.626     | 16017       |
|  | 49500                                     | 43000                                     | 15.7         | 5000                      | —        | 6000            | 91                                     | 124         | 1.1         | 0.895     | 6017        |
|  | 84000                                     | 62000                                     | 14.5         | 4300                      | 2800     | 5000            | 95                                     | 140         | 2.0         | 1.79      | 6217        |
|  | 133000                                    | 96500                                     | 13.3         | 3800                      | 2600     | 4500            | 99                                     | 166         | 2.5         | 4.23      | 6317        |
|  | 19000                                     | 19700                                     | 16.1         | 5400                      | —        | 6300            | 95                                     | 110         | 1.0         | 0.280     | 6818        |
|  | 33000                                     | 31500                                     | 16.4         | 5100                      | —        | 6000            | 96                                     | 119         | 1.0         | 0.540     | 6918        |
|  | 41500                                     | 39500                                     | 16.3         | 4800                      | —        | 5600            | 99                                     | 131         | 1.0         | 0.848     | 16018       |
|  | 58000                                     | 49500                                     | 15.6         | 4800                      | —        | 5600            | 97                                     | 133         | 1.5         | 1.17      | 6018        |
|  | 96000                                     | 71500                                     | 14.5         | 4000                      | 2600     | 4800            | 100                                    | 150         | 2.0         | 2.15      | 6218        |
|  | 143000                                    | 107000                                    | 13.3         | 3600                      | 2400     | 4300            | 104                                    | 176         | 2.5         | 4.91      | 6318        |
|  | 19300                                     | 20500                                     | 16.0         | 5000                      | —        | 6000            | 100                                    | 115         | 1.0         | 0.298     | 6819        |
|  | 33500                                     | 33500                                     | 16.5         | 4800                      | —        | 5700            | 101                                    | 124         | 1.0         | 0.567     | 6919        |
|  | 41000                                     | 39500                                     | 16.4         | 4600                      | —        | 5300            | 104                                    | 136         | 1.0         | 0.885     | 16019       |
|  | 60500                                     | 54000                                     | 15.8         | 4500                      | —        | 5300            | 102                                    | 138         | 1.5         | 1.22      | 6019        |
|  | 109000                                    | 81500                                     | 14.4         | 3800                      | 2600     | 4500            | 107                                    | 158         | 2.0         | 2.62      | 6219        |
|  | 153000                                    | 118000                                    | 13.3         | 3300                      | 2400     | 3900            | 109                                    | 186         | 2.5         | 5.67      | 6319        |
|  | 19600                                     | 21200                                     | 16.0         | 4800                      | —        | 5600            | 105                                    | 120         | 1.0         | 0.311     | 6820        |
|  | 37000                                     | 36500                                     | 16.5         | 4500                      | —        | 5300            | 106                                    | 134         | 1.0         | 0.771     | 6920        |
|  | 37500                                     | 39500                                     | 16.4         | 4300                      | —        | 5300            | 109                                    | 141         | 1.0         | 0.910     | 16020       |
|  | 60000                                     | 54000                                     | 15.9         | 4300                      | —        | 5300            | 107                                    | 143         | 1.5         | 1.26      | 6020        |
|  | 122000                                    | 93000                                     | 14.4         | 3600                      | 2400     | 4300            | 112                                    | 168         | 2.0         | 3.14      | 6220        |
|  | 173000                                    | 141000                                    | 13.2         | 3200                      | 2200     | 3700            | 114                                    | 201         | 2.5         | 7.00      | 6320        |
|  | 19900                                     | 21900                                     | 15.9         | 4800                      | —        | 5600            | 110                                    | 125         | 1.0         | 0.325     | 6821        |
|  | 42500                                     | 42000                                     | 16.4         | 4300                      | —        | 5300            | 111                                    | 139         | 1.0         | 0.793     | 6921        |
|  | 37500                                     | 50500                                     | 16.4         | 4000                      | —        | 4800            | 114                                    | 151         | 1.0         | 1.20      | 16021       |
|  | 72500                                     | 65500                                     | 15.8         | 4000                      | —        | 4800            | 113                                    | 152         | 2.0         | 1.60      | 6021        |
|  | 133000                                    | 104000                                    | 14.3         | 3400                      | —        | 4000            | 117                                    | 178         | 2.0         | 3.76      | 6221        |
|  | 184000                                    | 153000                                    | 13.2         | 3000                      | —        | 3600            | 119                                    | 211         | 2.5         | 8.05      | 6321        |
|  | 27300                                     | 29400                                     | 16.9         | 4300                      | —        | 5300            | 115                                    | 135         | 1.0         | 0.510     | 6822        |
|  | 38000                                     | 38500                                     | 16.4         | 4300                      | —        | 5000            | 116                                    | 144         | 1.0         | 0.830     | 6922        |
|  | 44000                                     | 45000                                     | 16.5         | 3800                      | —        | 4500            | 119                                    | 161         | 1.0         | 1.46      | 16022       |
|  | 84500                                     | 73000                                     | 15.5         | 3800                      | —        | 4500            | 118                                    | 162         | 2.0         | 1.97      | 6022        |
|  | 144000                                    | 117000                                    | 14.3         | 3200                      | —        | 3800            | 122                                    | 188         | 2.0         | 4.36      | 6222        |
|  | 205000                                    | 179000                                    | 13.1         | 2900                      | —        | 3400            | 124                                    | 226         | 2.5         | 9.54      | 6322        |

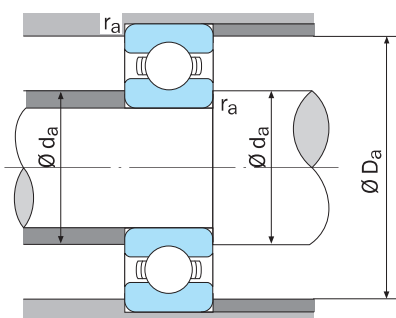
## Deep Groove Ball Bearings

Bore Diameter: 120~170mm



| Boundary dimensions (mm) |     |    |         | Bearing No. |             |        |                   |   |                       |   |  |
|--------------------------|-----|----|---------|-------------|-------------|--------|-------------------|---|-----------------------|---|--|
| d                        | D   | B  | r (min) | Open type   | Shield type |        | Contact seal type |   | Non-contact seal type |   |  |
| 120                      | 150 | 16 | 1       | 6824        | —           | —      | —                 | — | —                     | — |  |
|                          | 165 | 22 | 1.1     | 6924        | —           | —      | —                 | — | —                     | — |  |
|                          | 180 | 19 | 1       | 16024       | —           | —      | —                 | — | —                     | — |  |
|                          | 180 | 28 | 2       | 6024        | 6024Z       | 6024ZZ | —                 | — | —                     | — |  |
|                          | 215 | 40 | 2.1     | 6224        | 6224Z       | 6224ZZ | —                 | — | —                     | — |  |
|                          | 260 | 55 | 3       | 6324        | 6324Z       | 6324ZZ | —                 | — | —                     | — |  |
| 130                      | 165 | 18 | 1.1     | 6826        | —           | —      | —                 | — | —                     | — |  |
|                          | 180 | 24 | 1.5     | 6926        | —           | —      | —                 | — | —                     | — |  |
|                          | 200 | 22 | 1.1     | 16026       | —           | —      | —                 | — | —                     | — |  |
|                          | 200 | 33 | 2       | 6026        | 6026Z       | 6026ZZ | —                 | — | —                     | — |  |
|                          | 230 | 40 | 3       | 6226        | 6226Z       | 6226ZZ | —                 | — | —                     | — |  |
|                          | 280 | 58 | 4       | 6326        | 6326Z       | 6326ZZ | —                 | — | —                     | — |  |
| 140                      | 175 | 18 | 1.1     | 6828        | —           | —      | —                 | — | —                     | — |  |
|                          | 190 | 24 | 1.5     | 6928        | —           | —      | —                 | — | —                     | — |  |
|                          | 210 | 22 | 1.1     | 16028       | —           | —      | —                 | — | —                     | — |  |
|                          | 210 | 33 | 2       | 6028        | 6028Z       | 6028ZZ | —                 | — | —                     | — |  |
|                          | 250 | 42 | 3       | 6228        | 6228Z       | 6228ZZ | —                 | — | —                     | — |  |
|                          | 300 | 62 | 4       | 6328        | 6328Z       | 6328ZZ | —                 | — | —                     | — |  |
| 150                      | 190 | 20 | 1.1     | 6830        | —           | —      | —                 | — | —                     | — |  |
|                          | 210 | 28 | 2       | 6930        | —           | —      | —                 | — | —                     | — |  |
|                          | 225 | 24 | 1.1     | 16030       | —           | —      | —                 | — | —                     | — |  |
|                          | 225 | 35 | 2.1     | 6030        | 6030Z       | 6030ZZ | —                 | — | —                     | — |  |
|                          | 270 | 45 | 3       | 6230        | 6230Z       | 6230ZZ | —                 | — | —                     | — |  |
|                          | 320 | 65 | 4       | 6330        | —           | —      | —                 | — | —                     | — |  |
| 160                      | 200 | 20 | 1.1     | 6832        | —           | —      | —                 | — | —                     | — |  |
|                          | 220 | 28 | 2       | 6932        | —           | —      | —                 | — | —                     | — |  |
|                          | 240 | 38 | 2.1     | 6032        | —           | —      | —                 | — | —                     | — |  |
|                          | 290 | 48 | 3       | 6232        | 6232Z       | 6232ZZ | —                 | — | —                     | — |  |
|                          | 340 | 68 | 4       | 6332        | —           | —      | —                 | — | —                     | — |  |
| 170                      | 215 | 22 | 1.1     | 6834        | —           | —      | —                 | — | —                     | — |  |
|                          | 230 | 28 | 2       | 6934        | —           | —      | —                 | — | —                     | — |  |
|                          | 260 | 42 | 2.1     | 6034        | —           | —      | —                 | — | —                     | — |  |
|                          | 310 | 52 | 4       | 6234        | —           | —      | —                 | — | —                     | — |  |
|                          | 360 | 72 | 4       | 6334        | —           | —      | —                 | — | —                     | — |  |





## • Dynamic equivalent radial load

$$Pr = XFr + YFa$$

## • Static equivalent radial load

Larger value of following to be used:

$$Por = 0.6Fr + 0.5Fa$$

$$Por = Fr$$

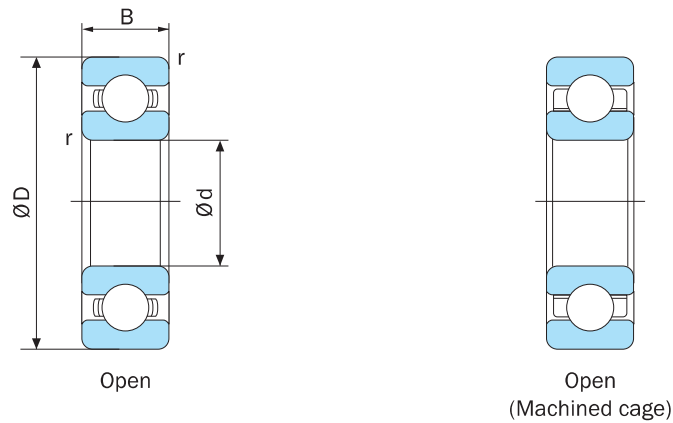
| $\frac{Fa}{Cor}$ | e    | $\frac{Fa}{Fr} \leq e$ |   | $\frac{Fa}{Fr} > e$ |      |
|------------------|------|------------------------|---|---------------------|------|
|                  |      | X                      | Y | X                   | Y    |
| 0.172            | 0.19 |               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

$$1N = 0.102kgf$$

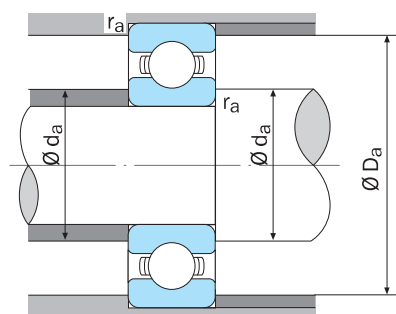
|  | Basic<br>dynamic<br>load rating<br>Cr (N) | Basic<br>static<br>load rating<br>Cor (N) | Factor<br>fo | Limiting speed (rpm)      |          |                 | Abutment and fillet<br>dimensions (mm) |                         |                         | Mass (kg) | Bearing No. |
|--|-------------------------------------------|-------------------------------------------|--------------|---------------------------|----------|-----------------|----------------------------------------|-------------------------|-------------------------|-----------|-------------|
|  |                                           |                                           |              | Grease lubrication        |          | Oil lubrication | d <sub>a</sub><br>(min)                | D <sub>a</sub><br>(max) | r <sub>a</sub><br>(max) |           |             |
|  |                                           |                                           |              | Open type,Z,<br>ZZ,NK,2NK | NSL,2NSL | Open type,Z     |                                        |                         |                         |           |             |
|  | 28300                                     | 31500                                     | 16.0         | 4000                      | —        | 4800            | 125                                    | 145                     | 1.0                     | 0.549     | 6824        |
|  | 53000                                     | 54000                                     | 16.5         | 3800                      | —        | 4600            | 126                                    | 159                     | 1.0                     | 1.13      | 6924        |
|  | 48000                                     | 50000                                     | 16.4         | 3600                      | —        | 4300            | 129                                    | 171                     | 1.0                     | 1.80      | 16024       |
|  | 88000                                     | 79500                                     | 15.7         | 3600                      | —        | 4300            | 128                                    | 172                     | 2.0                     | 2.67      | 6024        |
|  | 145000                                    | 118000                                    | 14.4         | 2900                      | —        | 3400            | 132                                    | 203                     | 2.0                     | 5.15      | 6224        |
|  | 207000                                    | 185000                                    | 13.6         | 2600                      | —        | 3100            | 134                                    | 246                     | 2.5                     | 14.6      | 6324        |
|  | 37000                                     | 41000                                     | 16.1         | 3700                      | —        | 4400            | 136                                    | 158                     | 1.0                     | 0.790     | 6826        |
|  | 65000                                     | 67000                                     | 16.4         | 3500                      | —        | 4200            | 137                                    | 173                     | 1.5                     | 1.78      | 6926        |
|  | 55000                                     | 59500                                     | 16.3         | 3200                      | —        | 3800            | 144                                    | 186                     | 1.0                     | 2.69      | 16026       |
|  | 106000                                    | 101000                                    | 15.7         | 3200                      | —        | 3800            | 138                                    | 192                     | 2.0                     | 3.92      | 6026        |
|  | 167000                                    | 146000                                    | 14.5         | 2700                      | —        | 3200            | 144                                    | 216                     | 2.5                     | 5.82      | 6226        |
|  | 229000                                    | 214000                                    | 13.6         | 2400                      | —        | 2800            | 148                                    | 262                     | 3.0                     | 18.2      | 6326        |
|  | 38000                                     | 44500                                     | 16.0         | 3400                      | —        | 4000            | 146                                    | 169                     | 1.0                     | 0.840     | 6828        |
|  | 66500                                     | 71000                                     | 16.5         | 3200                      | —        | 3800            | 147                                    | 183                     | 1.5                     | 1.90      | 6928        |
|  | 56000                                     | 62000                                     | 16.2         | 3000                      | —        | 3500            | 154                                    | 196                     | 1.0                     | 2.86      | 16028       |
|  | 110000                                    | 109000                                    | 15.9         | 3000                      | —        | 3600            | 148                                    | 202                     | 2.0                     | 4.15      | 6028        |
|  | 166000                                    | 150000                                    | 14.8         | 2500                      | —        | 2900            | 154                                    | 236                     | 2.5                     | 7.47      | 6228        |
|  | 253000                                    | 246000                                    | 13.6         | 2200                      | —        | 2600            | 158                                    | 282                     | 3.0                     | 21.8      | 6328        |
|  | 47500                                     | 54500                                     | 16.1         | 3200                      | —        | 3800            | 156                                    | 184                     | 1.0                     | 1.20      | 6830        |
|  | 85500                                     | 87000                                     | 16.4         | 3000                      | —        | 3500            | 158                                    | 202                     | 2.0                     | 2.64      | 6930        |
|  | 76500                                     | 82500                                     | 16.5         | 2800                      | —        | 3200            | 164                                    | 211                     | 1.0                     | 3.58      | 16030       |
|  | 126000                                    | 126000                                    | 15.9         | 2800                      | —        | 3200            | 159                                    | 216                     | 2.0                     | 4.48      | 6030        |
|  | 176000                                    | 168000                                    | 15.2         | 2300                      | —        | 2700            | 164                                    | 256                     | 2.5                     | 9.41      | 6230        |
|  | 274000                                    | 284000                                    | 13.9         | 2100                      | —        | 2400            | 168                                    | 302                     | 3.0                     | 26.2      | 6330        |
|  | 48500                                     | 56500                                     | 16.0         | 2900                      | —        | 3400            | 166                                    | 194                     | 1.0                     | 1.30      | 6832        |
|  | 87500                                     | 95500                                     | 16.5         | 2800                      | —        | 3300            | 168                                    | 212                     | 2.0                     | 3.01      | 6932        |
|  | 137000                                    | 135000                                    | 15.9         | 2600                      | —        | 3000            | 169                                    | 231                     | 2.0                     | 5.89      | 6032        |
|  | 185000                                    | 186000                                    | 15.4         | 2100                      | —        | 2500            | 174                                    | 276                     | 2.5                     | 14.3      | 6232        |
|  | 278000                                    | 287000                                    | 13.9         | 1900                      | —        | 2300            | 178                                    | 322                     | 3.0                     | 28.6      | 6332        |
|  | 60000                                     | 70500                                     | 16.1         | 2700                      | —        | 3200            | 177                                    | 208                     | 1.0                     | 1.85      | 6834        |
|  | 86000                                     | 95000                                     | 16.4         | 2600                      | —        | 3100            | 178                                    | 222                     | 2.0                     | 3.17      | 6934        |
|  | 161000                                    | 160000                                    | 15.7         | 2400                      | —        | 2800            | 179                                    | 251                     | 2.0                     | 7.92      | 6034        |
|  | 212000                                    | 224000                                    | 15.3         | 2000                      | —        | 2400            | 188                                    | 292                     | 3.0                     | 17.5      | 6234        |
|  | 325000                                    | 355000                                    | 13.6         | 1800                      | —        | 2100            | 188                                    | 342                     | 3.0                     | 34.0      | 6334        |

Deep Groove Ball Bearings

Bore Diameter: 180~320mm



| Boundary dimensions (mm) |     |    |         | Bearing No. |             |   |                   |   |                       |   |  |
|--------------------------|-----|----|---------|-------------|-------------|---|-------------------|---|-----------------------|---|--|
| d                        | D   | B  | r (min) | Open type   | Shield type |   | Contact seal type |   | Non-contact seal type |   |  |
| 180                      | 225 | 22 | 1.1     | 6836        | —           | — | —                 | — | —                     | — |  |
|                          | 250 | 33 | 2       | 6936        | —           | — | —                 | — | —                     | — |  |
|                          | 280 | 46 | 2.1     | 6036        | —           | — | —                 | — | —                     | — |  |
|                          | 320 | 52 | 4       | 6236        | —           | — | —                 | — | —                     | — |  |
|                          | 380 | 75 | 4       | 6336        | —           | — | —                 | — | —                     | — |  |
| 190                      | 240 | 24 | 1.5     | 6838        | —           | — | —                 | — | —                     | — |  |
|                          | 260 | 33 | 2       | 6938        | —           | — | —                 | — | —                     | — |  |
|                          | 290 | 46 | 2.1     | 6038        | —           | — | —                 | — | —                     | — |  |
|                          | 340 | 55 | 4       | 6238        | —           | — | —                 | — | —                     | — |  |
|                          | 400 | 78 | 5       | 6338        | —           | — | —                 | — | —                     | — |  |
| 200                      | 250 | 24 | 1.5     | 6840        | —           | — | —                 | — | —                     | — |  |
|                          | 280 | 38 | 2.1     | 6940        | —           | — | —                 | — | —                     | — |  |
|                          | 310 | 51 | 2.1     | 6040        | —           | — | —                 | — | —                     | — |  |
|                          | 360 | 58 | 4       | 6240        | —           | — | —                 | — | —                     | — |  |
|                          | 420 | 80 | 5       | 6340        | —           | — | —                 | — | —                     | — |  |
| 220                      | 270 | 24 | 1.5     | 6844        | —           | — | —                 | — | —                     | — |  |
|                          | 300 | 38 | 2.1     | 6944        | —           | — | —                 | — | —                     | — |  |
|                          | 340 | 56 | 3       | 6044        | —           | — | —                 | — | —                     | — |  |
|                          | 400 | 65 | 4       | 6244        | —           | — | —                 | — | —                     | — |  |
| 240                      | 300 | 28 | 2       | 6848        | —           | — | —                 | — | —                     | — |  |
|                          | 320 | 38 | 2.1     | 6948        | —           | — | —                 | — | —                     | — |  |
|                          | 360 | 56 | 3       | 6048        | —           | — | —                 | — | —                     | — |  |
|                          | 440 | 72 | 4       | 6248        | —           | — | —                 | — | —                     | — |  |
| 260                      | 320 | 28 | 2       | 6852        | —           | — | —                 | — | —                     | — |  |
|                          | 360 | 46 | 2.1     | 6952        | —           | — | —                 | — | —                     | — |  |
|                          | 400 | 65 | 4       | 6052        | —           | — | —                 | — | —                     | — |  |
|                          | 480 | 80 | 5       | 6252        | —           | — | —                 | — | —                     | — |  |
| 280                      | 350 | 33 | 2       | 6856        | —           | — | —                 | — | —                     | — |  |
|                          | 380 | 46 | 2.1     | 6956        | —           | — | —                 | — | —                     | — |  |
|                          | 420 | 65 | 4       | 6056        | —           | — | —                 | — | —                     | — |  |
|                          | 500 | 80 | 5       | 6256        | —           | — | —                 | — | —                     | — |  |
| 300                      | 380 | 38 | 2.1     | 6860        | —           | — | —                 | — | —                     | — |  |
|                          | 420 | 56 | 3       | 6960        | —           | — | —                 | — | —                     | — |  |
|                          | 460 | 74 | 4       | 6060        | —           | — | —                 | — | —                     | — |  |
|                          | 540 | 85 | 5       | 6260        | —           | — | —                 | — | —                     | — |  |
| 320                      | 400 | 38 | 2.1     | 6864        | —           | — | —                 | — | —                     | — |  |
|                          | 440 | 56 | 3       | 6964        | —           | — | —                 | — | —                     | — |  |
|                          | 480 | 74 | 4       | 6064        | —           | — | —                 | — | —                     | — |  |



1N=0.102kgf

• **Dynamic equivalent radial load**

$$Pr = XFr + YFa$$

• **Static equivalent radial load**

Larger value of following to be used:

$$Por = 0.6Fr + 0.5Fa$$

$$Por = Fr$$

| $\frac{f_0 Fa}{Cor}$ | e    | $\frac{Fa}{Fr} \leq e$ |   | $\frac{Fa}{Fr} > e$ |      |
|----------------------|------|------------------------|---|---------------------|------|
|                      |      | X                      | Y | X                   | Y    |
| 0.172                | 0.19 |                        |   |                     | 2.30 |
| 0.345                | 0.22 | 1                      | 0 | 0.56                | 1.99 |
| 0.689                | 0.26 |                        |   |                     | 1.71 |
| 1.03                 | 0.28 |                        |   |                     | 1.55 |
| 1.38                 | 0.30 | 1                      | 0 | 0.56                | 1.45 |
| 2.07                 | 0.34 |                        |   |                     | 1.31 |
| 3.45                 | 0.38 |                        |   |                     | 1.15 |
| 5.17                 | 0.42 | 1                      | 0 | 0.56                | 1.04 |
| 6.89                 | 0.44 |                        |   |                     | 1.00 |

|  | Basic<br>dynamic<br>load rating<br>Cr (N) | Basic<br>static<br>load rating<br>Cor (N) | Factor<br>fo | Limiting speed (rpm)      |          |                 | Abutment and fillet<br>dimensions (mm) |             |             | Mass (kg) | Bearing No. |
|--|-------------------------------------------|-------------------------------------------|--------------|---------------------------|----------|-----------------|----------------------------------------|-------------|-------------|-----------|-------------|
|  |                                           |                                           |              | Grease lubrication        |          | Oil lubrication | da<br>(min)                            | Da<br>(max) | ra<br>(max) |           |             |
|  |                                           |                                           |              | Open type,Z,<br>ZZ,NK,2NK | NSL,2NSL | Open type,Z     |                                        |             |             |           |             |
|  | 60500                                     | 73000                                     | 16.0         | 2600                      | —        | 3000            | 187                                    | 218         | 1.0         | 2.02      | 6836        |
|  | 106000                                    | 117000                                    | 16.5         | 2400                      | —        | 2900            | 188                                    | 242         | 2.0         | 4.68      | 6936        |
|  | 174000                                    | 180000                                    | 15.8         | 2300                      | —        | 2700            | 189                                    | 271         | 2.0         | 10.3      | 6036        |
|  | 227000                                    | 242000                                    | 15.1         | 1900                      | —        | 2200            | 198                                    | 302         | 3.0         | 18.3      | 6236        |
|  | 325000                                    | 360000                                    | 13.9         | 1700                      | —        | 2000            | 198                                    | 362         | 3.0         | 41.9      | 6336        |
|  | 73000                                     | 88000                                     | 16.1         | 2400                      | —        | 2900            | 198                                    | 232         | 1.5         | 2.60      | 6838        |
|  | 108000                                    | 123000                                    | 16.4         | 2300                      | —        | 2700            | 198                                    | 252         | 2.0         | 4.90      | 6938        |
|  | 188000                                    | 200000                                    | 15.7         | 2100                      | —        | 2500            | 199                                    | 281         | 2.0         | 10.8      | 6038        |
|  | 255000                                    | 282000                                    | 15.1         | 1800                      | —        | 2100            | 208                                    | 322         | 3.0         | 23.0      | 6238        |
|  | 355000                                    | 415000                                    | 14.1         | 1600                      | —        | 1900            | 212                                    | 378         | 4.0         | 48.2      | 6338        |
|  | 74000                                     | 91000                                     | 15.9         | 2300                      | —        | 2700            | 208                                    | 242         | 1.5         | 2.70      | 6840        |
|  | 130000                                    | 146000                                    | 16.5         | 2200                      | —        | 2600            | 209                                    | 271         | 2.0         | 6.88      | 6940        |
|  | 202000                                    | 222000                                    | 15.8         | 2000                      | —        | 2400            | 209                                    | 301         | 2.0         | 13.9      | 6040        |
|  | 268000                                    | 310000                                    | 15.2         | 1700                      | —        | 2000            | 218                                    | 342         | 3.0         | 28.2      | 6240        |
|  | 380000                                    | 445000                                    | 13.9         | 1500                      | —        | 1800            | 222                                    | 398         | 4.0         | 54.6      | 6340        |
|  | 76500                                     | 98000                                     | 15.9         | 2100                      | —        | 2400            | 228                                    | 262         | 1.5         | 2.98      | 6844        |
|  | 132000                                    | 154000                                    | 16.4         | 2000                      | —        | 2300            | 229                                    | 291         | 2.0         | 7.45      | 6944        |
|  | 214000                                    | 248000                                    | 15.9         | 1800                      | —        | 2200            | 230                                    | 330         | 2.5         | 18.4      | 6044        |
|  | 310000                                    | 375000                                    | 15.1         | 1500                      | —        | 1800            | 238                                    | 382         | 3.0         | 37.0      | 6244        |
|  | 98500                                     | 127000                                    | 15.9         | 1900                      | —        | 2200            | 250                                    | 291         | 2.0         | 4.60      | 6848        |
|  | 154000                                    | 186000                                    | 16.3         | 1800                      | —        | 2100            | 249                                    | 311         | 2.0         | 8.02      | 6948        |
|  | 222000                                    | 268000                                    | 16.1         | 1700                      | —        | 2000            | 250                                    | 350         | 2.5         | 19.6      | 6048        |
|  | 340000                                    | 430000                                    | 15.2         | 1200                      | —        | 1500            | 258                                    | 322         | 3.0         | 49.9      | 6248        |
|  | 101000                                    | 136000                                    | 15.8         | 1700                      | —        | 2000            | 269                                    | 311         | 2.0         | 4.95      | 6852        |
|  | 204000                                    | 254000                                    | 16.4         | 1600                      | —        | 1900            | 269                                    | 351         | 2.0         | 13.4      | 6952        |
|  | 252000                                    | 320000                                    | 16.1         | 1500                      | —        | 1800            | 272                                    | 388         | 3.0         | 29.3      | 6052        |
|  | 400000                                    | 540000                                    | 15.1         | 1100                      | —        | 1400            | 282                                    | 458         | 4.0         | 67.5      | 6252        |
|  | 133000                                    | 177000                                    | 16.1         | 1600                      | —        | 1900            | 290                                    | 341         | 2.0         | 7.35      | 6856        |
|  | 209000                                    | 270000                                    | 16.3         | 1500                      | —        | 1800            | 289                                    | 371         | 2.0         | 14.3      | 6956        |
|  | 266000                                    | 350000                                    | 16.1         | 1400                      | —        | 1600            | 293                                    | 405         | 3.0         | 31.0      | 6056        |
|  | 400000                                    | 550000                                    | 15.3         | 1000                      | —        | 1300            | 302                                    | 478         | 4.0         | 71.0      | 6256        |
|  | 166000                                    | 219000                                    | 16.0         | 1500                      | —        | 1700            | 311                                    | 369         | 2.0         | 10.4      | 6860        |
|  | 269000                                    | 370000                                    | 16.5         | 1400                      | —        | 1600            | 311                                    | 409         | 2.5         | 22.8      | 6960        |
|  | 355000                                    | 490000                                    | 15.0         | 1300                      | —        | 1500            | 313                                    | 447         | 3.0         | 43.8      | 6060        |
|  | 465000                                    | 670000                                    | 15.2         | 950                       | —        | 1200            | 322                                    | 518         | 4.0         | 88.6      | 6260        |
|  | 164000                                    | 218000                                    | 15.9         | 1400                      | —        | 1600            | 330                                    | 389         | 2.0         | 10.9      | 6864        |
|  | 266000                                    | 370000                                    | 16.4         | 1300                      | —        | 1500            | 331                                    | 429         | 2.5         | 24.1      | 6964        |
|  | 340000                                    | 470000                                    | 15.3         | 1200                      | —        | 1400            | 333                                    | 467         | 3.0         | 46.1      | 6064        |

## Radial Internal Clearance

Table 5 Radial Internal Clearance of Deep Groove Ball Bearings (with Cylindrical Bore) (JIS)

Unit:  $\mu\text{m}$

| Bearing Bore<br>dia. Nominal<br>d (mm) |       | Radial Clearance |     |             |     |     |     |     |     |     |      |
|----------------------------------------|-------|------------------|-----|-------------|-----|-----|-----|-----|-----|-----|------|
|                                        |       | C2               |     | CN (Normal) |     | C3  |     | C4  |     | C5  |      |
| Over                                   | Incl. | min              | max | min         | max | min | max | min | max | min | max  |
| 2.5                                    | 6     | 0                | 7   | 2           | 13  | 8   | 23  | —   | —   | —   | —    |
| 6                                      | 10    | 0                | 7   | 2           | 13  | 8   | 23  | 14  | 29  | 20  | 37   |
| 10                                     | 18    | 0                | 9   | 3           | 18  | 11  | 25  | 18  | 33  | 25  | 45   |
| 18                                     | 24    | 0                | 10  | 5           | 20  | 13  | 28  | 20  | 36  | 28  | 48   |
| 24                                     | 30    | 1                | 11  | 5           | 20  | 13  | 28  | 23  | 41  | 30  | 53   |
| 30                                     | 40    | 1                | 11  | 6           | 20  | 15  | 33  | 28  | 46  | 40  | 64   |
| 40                                     | 50    | 1                | 11  | 6           | 23  | 18  | 36  | 30  | 51  | 45  | 73   |
| 50                                     | 65    | 1                | 15  | 8           | 28  | 23  | 43  | 38  | 61  | 55  | 90   |
| 65                                     | 80    | 1                | 15  | 10          | 30  | 25  | 51  | 46  | 71  | 65  | 105  |
| 80                                     | 100   | 1                | 18  | 12          | 36  | 30  | 58  | 53  | 84  | 75  | 120  |
| 100                                    | 120   | 2                | 20  | 15          | 41  | 36  | 66  | 61  | 97  | 90  | 140  |
| 120                                    | 140   | 2                | 23  | 18          | 48  | 41  | 81  | 71  | 114 | 105 | 160  |
| 140                                    | 160   | 2                | 23  | 18          | 53  | 46  | 91  | 81  | 130 | 120 | 180  |
| 160                                    | 180   | 2                | 25  | 20          | 61  | 53  | 102 | 91  | 147 | 135 | 200  |
| 180                                    | 200   | 2                | 30  | 25          | 71  | 63  | 117 | 107 | 163 | 150 | 230  |
| 200                                    | 225   | 2                | 35  | 25          | 85  | 75  | 140 | 125 | 195 | 175 | 265  |
| 225                                    | 250   | 2                | 40  | 30          | 95  | 85  | 160 | 145 | 225 | 205 | 300  |
| 250                                    | 280   | 2                | 45  | 35          | 105 | 90  | 170 | 155 | 245 | 225 | 340  |
| 280                                    | 315   | 2                | 55  | 40          | 115 | 100 | 190 | 175 | 270 | 245 | 370  |
| 315                                    | 355   | 3                | 60  | 45          | 125 | 110 | 210 | 195 | 300 | 275 | 410  |
| 355                                    | 400   | 3                | 70  | 55          | 145 | 130 | 240 | 225 | 340 | 315 | 460  |
| 400                                    | 450   | 3                | 80  | 60          | 170 | 150 | 270 | 250 | 380 | 350 | 510  |
| 450                                    | 500   | 3                | 90  | 70          | 190 | 170 | 300 | 280 | 420 | 390 | 570  |
| 500                                    | 560   | 10               | 100 | 80          | 210 | 190 | 330 | 310 | 470 | 440 | 630  |
| 560                                    | 630   | 10               | 110 | 90          | 230 | 210 | 360 | 340 | 520 | 490 | 690  |
| 630                                    | 710   | 20               | 130 | 110         | 260 | 240 | 400 | 380 | 570 | 540 | 760  |
| 710                                    | 800   | 20               | 140 | 120         | 290 | 270 | 450 | 430 | 630 | 600 | 840  |
| 800                                    | 900   | 20               | 160 | 140         | 320 | 300 | 500 | 480 | 700 | 670 | 940  |
| 900                                    | 1000  | 20               | 170 | 150         | 350 | 330 | 550 | 530 | 770 | 740 | 1040 |
| 1000                                   | 1120  | 20               | 180 | 160         | 380 | 360 | 600 | 580 | 850 | 820 | 1150 |
| 1120                                   | 1250  | 20               | 190 | 170         | 410 | 390 | 650 | 630 | 920 | 890 | 1260 |