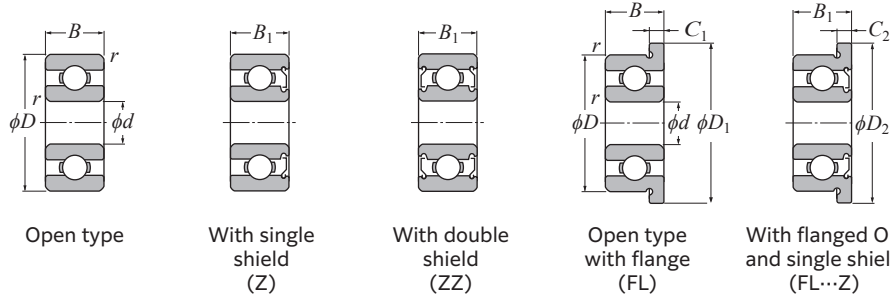


## ● Miniature and Small Size Ball Bearings

NTN

Metric series



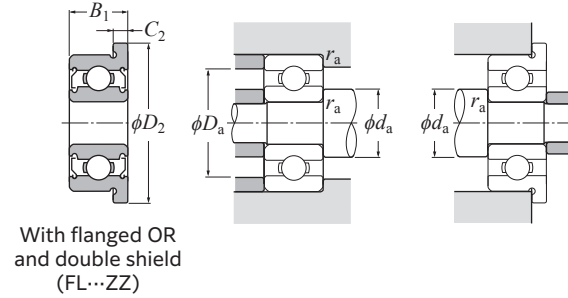
d 5–9 mm

| Boundary dimensions |     |     |       |       |       |       |       |                   |                   | Basic load rating |          | Fatigue load limit | Factor | Allowable speed    |                 |
|---------------------|-----|-----|-------|-------|-------|-------|-------|-------------------|-------------------|-------------------|----------|--------------------|--------|--------------------|-----------------|
| mm                  |     |     |       |       |       |       |       |                   |                   | dynamic           | static   | N                  | $f_0$  | min <sup>-1</sup>  |                 |
| $d$                 | $D$ | $B$ | $B_1$ | $D_1$ | $D_2$ | $C_1$ | $C_2$ | $r_{s \min}^{1)}$ | $r_{s \min}^{1)}$ | $C_r$             | $C_{0r}$ | $N_{Cu}$           | $f_0$  | Grease lubrication | Oil lubrication |
| 5                   | 11  | —   | 4     | —     | 12.6  | —     | 0.8   | 0.15              | 795               | 282               | 11.4     | 14.0               | 43 000 | 51 000             |                 |
|                     | 11  | 3   | 5     | 12.5  | 12.5  | 0.8   | 1     | 0.15              | 795               | 282               | 11.4     | 14.0               | 43 000 | 51 000             |                 |
|                     | 13  | 4   | 4     | 15    | 15    | 1     | 1     | 0.2               | 1 190             | 430               | 17.3     | 13.4               | 40 000 | 47 000             |                 |
|                     | 13  | —   | 5     | —     | 15    | —     | 1     | 0.2               | 1 190             | 430               | 17.3     | 13.4               | 40 000 | 47 000             |                 |
|                     | 14  | 5   | 5     | 16    | 16    | 1     | 1     | 0.2               | 1 470             | 505               | 20.5     | 12.8               | 39 000 | 46 000             |                 |
|                     | 16  | 5   | 5     | 18    | 18    | 1     | 1     | 0.3               | 1 940             | 680               | 23.1     | 12.4               | 37 000 | 44 000             |                 |
|                     | 19  | 6   | 6     | —     | —     | —     | —     | 0.3               | 2 590             | 885               | 64.5     | 12.1               | 34 000 | 40 000             |                 |
| 6                   | 10  | 2.5 | 3     | 11.2  | 11.2  | 0.6   | 0.6   | 0.1               | 515               | 196               | 5.15     | 15.2               | 43 000 | 51 000             |                 |
|                     | 12  | 3   | 4     | 13.2  | 13.6  | 0.6   | 0.8   | 0.15              | 920               | 365               | 14.8     | 14.5               | 40 000 | 47 000             |                 |
|                     | 13  | 3.5 | 5     | 15    | 15    | 1.0   | 1.1   | 0.15              | 1 200             | 440               | 17.5     | 13.7               | 39 000 | 46 000             |                 |
|                     | 15  | 5   | 5     | 17    | 17    | 1.2   | 1.2   | 0.2               | 1 490             | 530               | 21.3     | 13.3               | 37 000 | 44 000             |                 |
|                     | 16  | 6   | 6     | —     | —     | —     | —     | 0.2               | 1 960             | 695               | 28.1     | 12.7               | 36 000 | 42 000             |                 |
|                     | 17  | 6   | 6     | 19    | 19    | 1.2   | 1.2   | 0.3               | 2 430             | 865               | 35.0     | 12.3               | 35 000 | 42 000             |                 |
|                     | 19  | 6   | 6     | 22    | 22    | 1.5   | 1.5   | 0.3               | 2 590             | 885               | 64.5     | 12.1               | 34 000 | 40 000             |                 |
| 7                   | 11  | 2.5 | 3     | 12.2  | 12.2  | 0.6   | 0.6   | 0.1               | 610               | 269               | 7.05     | 15.6               | 40 000 | 47 000             |                 |
|                     | 13  | 3   | 4     | 14.2  | 14.6  | 0.6   | 0.8   | 0.15              | 915               | 375               | 15.2     | 14.9               | 38 000 | 45 000             |                 |
|                     | 14  | 3.5 | 5     | 16    | 16    | 1     | 1.1   | 0.15              | 1 300             | 505               | 20.4     | 14.0               | 37 000 | 44 000             |                 |
|                     | 17  | 5   | 5     | 19    | 19    | 1.2   | 1.2   | 0.3               | 1 780             | 715               | 28.8     | 14.0               | 35 000 | 41 000             |                 |
|                     | 19  | 6   | 6     | —     | —     | —     | —     | 0.3               | 2 480             | 910               | 60.0     | 12.9               | 34 000 | 40 000             |                 |
|                     | 22  | 7   | 7     | —     | —     | —     | —     | 0.3               | 3 700             | 1 400             | 97.0     | 12.5               | 32 000 | 37 000             |                 |
|                     | 22  | 7   | 7     | —     | —     | —     | —     | 0.3               | 3 700             | 1 400             | 97.0     | 12.5               | 32 000 | 37 000             |                 |
| 8                   | 12  | 2.5 | 3.5   | 13.2  | 13.6  | 0.6   | 0.8   | 0.1               | 570               | 252               | 6.60     | 15.9               | 38 000 | 45 000             |                 |
|                     | 14  | 3.5 | 4     | 15.6  | 15.6  | 0.8   | 0.8   | 0.15              | 910               | 385               | 15.5     | 15.2               | 36 000 | 43 000             |                 |
|                     | 16  | 4   | 5     | 18    | 18    | 1     | 1.1   | 0.2               | 1 780             | 715               | 28.8     | 14.0               | 35 000 | 41 000             |                 |
|                     | 19  | 6   | 6     | 22    | 22    | 1.5   | 1.5   | 0.3               | 2 200             | 865               | 35.0     | 13.8               | 33 000 | 39 000             |                 |
|                     | 22  | 7   | 7     | 25    | 25    | 1.5   | 1.5   | 0.3               | 3 700             | 1 400             | 97.0     | 12.5               | 32 000 | 37 000             |                 |
|                     | 24  | 8   | 8     | —     | —     | —     | —     | 0.3               | 4 450             | 1 590             | 122      | 11.7               | 31 000 | 36 000             |                 |
|                     | 24  | 8   | 8     | —     | —     | —     | —     | 0.3               | 4 450             | 1 590             | 122      | 11.7               | 31 000 | 36 000             |                 |
| 9                   | 14  | 3   | 4.5   | —     | —     | —     | —     | 0.1               | 1 020             | 465               | 18.8     | 15.5               | 36 000 | 42 000             |                 |
|                     | 17  | 4   | 5     | 19    | 19    | 1     | 1.1   | 0.2               | 1 910             | 820               | 33.0     | 14.4               | 33 000 | 39 000             |                 |
|                     | 20  | 6   | 6     | —     | —     | —     | —     | 0.3               | 2 750             | 1 090             | 44.0     | 13.5               | 32 000 | 38 000             |                 |
|                     | 24  | 7   | 7     | —     | —     | —     | —     | 0.3               | 3 750             | 1 450             | 94.5     | 12.9               | 31 000 | 36 000             |                 |
|                     | 26  | 8   | 8     | —     | —     | —     | —     | 0.6               | 5 050             | 1 960             | 138      | 12.4               | 30 000 | 35 000             |                 |
|                     | 26  | 8   | 8     | —     | —     | —     | —     | 0.6               | 5 050             | 1 960             | 138      | 12.4               | 30 000 | 35 000             |                 |

1) Smallest allowable dimension for chamfer dimension  $r$ .

## ● Miniature and Small Size Ball Bearings

NTN



With flanged OR and double shield (FL...ZZ)

Dynamic equivalent radial load  
 $P_r = X F_r + Y F_a$

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

Static equivalent radial load

$$P_{0r} = 0.6 F_r + 0.5 F_a$$

When  $P_{0r} < F_r$  use  $P_{0r} = F_r$ .

| Bearing numbers |                    |                    |                       |                                   |                                   | Installation-related dimensions |                          |               |               | Mass (approx.)    |                       |
|-----------------|--------------------|--------------------|-----------------------|-----------------------------------|-----------------------------------|---------------------------------|--------------------------|---------------|---------------|-------------------|-----------------------|
| Open type       | With single shield | With double shield | Open type with flange | With flanged OR and single shield | With flanged OR and double shield | mm                              |                          |               |               | Open type         | Open type with flange |
|                 |                    |                    |                       |                                   |                                   | $d_a$ Min.                      | $d_a$ Max. <sup>2)</sup> | $r_{as}$ Max. | $r_{as}$ Max. |                   |                       |
| —               | WBC5-11Z           | ZZ                 | —                     | FLWBC5-11Z                        | ZZ                                | 6.2                             | 6.8                      | 9.8           | 0.2           | 1.8 <sup>3)</sup> | 2 <sup>3)</sup>       |
| 685             | W685Z              | ZZ                 | FL685                 | FLW685Z                           | ZZ                                | 6.2                             | 6.8                      | 9.8           | 0.15          | 1.1               | 1.3                   |
| 695A            | 695AZ              | ZZ                 | FL695A                | FLW695AZ                          | ZZ                                | 6.6                             | 6.9                      | 11.4          | 0.2           | 2.4               | 2.7                   |
| —               | WBC5-13Z           | ZZ                 | —                     | FLWBC5-13Z                        | ZZ                                | 6.6                             | 6.9                      | 11.4          | 0.2           | 3.4 <sup>3)</sup> | 3.7 <sup>3)</sup>     |
| 605             | 605Z               | ZZ                 | FL605                 | FL605Z                            | ZZ                                | 6.6                             | 7.4                      | 12.4          | 0.2           | 3.5               | 3.9                   |
| 625             | 625Z               | ZZ                 | FL625                 | FL625Z                            | ZZ                                | 7                               | 7.6                      | 14            | 0.3           | 4.8               | 5.2                   |
| 635             | 635Z               | ZZ                 | —                     | —                                 | —                                 | 7                               | 9.5                      | 17            | 0.3           | 8                 | —                     |
| 676A            | WA676AZ            | ZZ                 | FL676A                | FLWA676AZ                         | ZZ                                | 6.6                             | 6.7                      | 9.2           | 0.1           | 0.65              | 0.74                  |
| BC6-12          | WBC6-12Z           | ZZ                 | FLBC6-12              | FLAWBC6-12Z                       | ZZ                                | 7.2                             | 7.9                      | 10.8          | 0.15          | 1.3               | 1.4                   |
| 686             | W686Z              | ZZ                 | FL686                 | FLW686Z                           | ZZ                                | 7                               | 7.2                      | 11.8          | 0.15          | 1.9               | 2.2                   |
| 696             | 696Z               | ZZ                 | FL696                 | FL696Z                            | ZZ                                | 7.6                             | 7.8                      | 13.4          | 0.2           | 3.8               | 4.3                   |
| BC6-16A         | BC6-16AZ           | ZZ                 | —                     | —                                 | —                                 | 7.6                             | 8                        | 14.4          | 0.2           | 5.2               | —                     |
| 606             | 606Z               | ZZ                 | FL606                 | FL606Z                            | ZZ                                | 8                               | 8.6                      | 15            | 0.3           | 6                 | 6.5                   |
| 626             | 626Z               | ZZ                 | FL626                 | FL626Z                            | ZZ                                | 8                               | 9.5                      | 17            | 0.3           | 8.1               | 9.2                   |
| 677             | WA677Z             | ZZ                 | FL677                 | FLWA677Z                          | ZZ                                | 7.8                             | 8.1                      | 10.2          | 0.1           | 0.67              | 0.77                  |
| BC7-13          | WBC7-13Z           | ZZ                 | FLBC7-13              | FLAWBC7-13Z                       | ZZ                                | 8.2                             | 8.9                      | 11.8          | 0.15          | 1.4               | 1.5                   |
| 687A            | W687AZ             | ZZ                 | FL687A                | FLW687AZ                          | ZZ                                | 8.2                             | 8.7                      | 12.8          | 0.15          | 2.1               | 2.4                   |
| 697             | 697Z               | ZZ                 | FL697                 | FL697Z                            | ZZ                                | 9                               | 10                       | 15            | 0.3           | 5.2               | 5.7                   |
| 607             | 607Z               | ZZ                 | —                     | —                                 | —                                 | 9                               | 10.4                     | 17            | 0.3           | 8                 | —                     |
| 627             | 627Z               | ZZ                 | —                     | —                                 | —                                 | 9                               | 12.2                     | 20            | 0.3           | 13                | —                     |
| 678A            | W678AZ             | ZZ                 | FL678A                | FLWA678AZ                         | ZZ                                | 8.8                             | 9.1                      | 11.2          | 0.1           | 0.75              | 0.86                  |
| BC8-14          | WBC8-14Z           | ZZ                 | FLBC8-14              | FLWBC8-14Z                        | ZZ                                | 9.2                             | 9.5                      | 12.8          | 0.15          | 1.8               | 1.9                   |
| 688A            | W688AZ             | ZZ                 | FL688A                | FLW688AZ                          | ZZ                                | 9.6                             | 10                       | 14.4          | 0.2           | 3.1               | 3.5                   |
| 698             | 698Z               | ZZ                 | FL698                 | FL698Z                            | ZZ                                | 10                              | 10.6                     | 17            | 0.3           | 7.3               | 8.4                   |
| 608             | 608Z               | ZZ                 | FL608                 | FL608Z                            | ZZ                                | 10                              | 12.2                     | 20            | 0.3           | 12                | 13                    |
| 628             | 628Z               | ZZ                 | —                     | —                                 | —                                 | 10                              | 12.1                     | 22            | 0.3           | 17                | —                     |
| 679             | W679Z              | ZZ                 | —                     | —                                 | —                                 | 9.8                             | 10.4                     | 13.2          | 0.1           | 1.4               | —                     |
| 689             | W689Z              | ZZ                 | FL689                 | FLW689Z                           | ZZ                                | 10.6                            | 10.7                     | 15.4          | 0.2           | 3.2               | 3.6                   |
| 699             | 699Z               | ZZ                 | —                     | —                                 | —                                 | 11                              | 11.6                     | 18            | 0.3           | 8.2               | —                     |
| 609JX2          | 609JX2Z            | ZZ                 | —                     | —                                 | —                                 | 11                              | 13.1                     | 22            | 0.3           | 14                | —                     |
| 629X50          | 629X50Z            | ZZ                 | —                     | —                                 | —                                 | 13                              | 13.9                     | 22            | 0.3           | 20                | —                     |

2) This dimension applies to sealed and shielded bearings. 3) Values for double shielded bearings are shown.