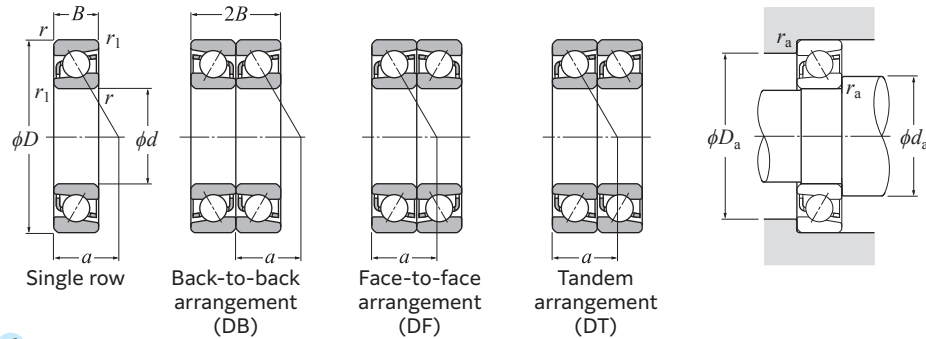


# Single and Duplex Angular Contact Ball Bearings

NTN



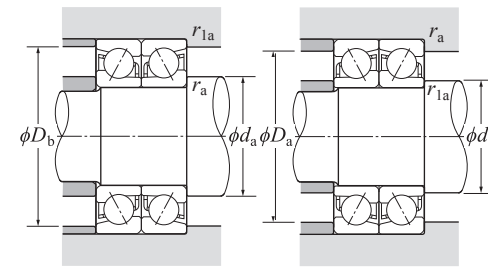
d 10–30 mm

| Boundary dimensions |    |    |    |                                  |                                   | Basic load rating |                 | Fatigue load limit | Allowable speed <sup>1)</sup> |                 | Bearing number <sup>2)</sup> | Load center | Mass                 |
|---------------------|----|----|----|----------------------------------|-----------------------------------|-------------------|-----------------|--------------------|-------------------------------|-----------------|------------------------------|-------------|----------------------|
| mm                  |    |    |    |                                  |                                   | dynamic           | static          | kN                 | min <sup>-1</sup>             |                 |                              | mm          | kg                   |
| d                   | D  | B  | 2B | r <sub>s</sub> min <sup>3)</sup> | r <sub>is</sub> min <sup>3)</sup> | C <sub>r</sub>    | C <sub>0r</sub> | C <sub>u</sub>     | Grease lubrication            | Oil lubrication |                              | a           | Single row (approx.) |
| 10                  | 26 | 8  | 16 | 0.3                              | 0.15                              | 5.10              | 2.07            | 0.162              | 29 000                        | 39 000          | 7000                         | 9           | 0.023                |
|                     | 30 | 9  | 18 | 0.6                              | 0.3                               | 6.00              | 2.74            | 0.214              | 28 000                        | 37 000          | 7200                         | 10.5        | 0.029                |
|                     | 30 | 9  | 18 | 0.6                              | 0.3                               | 5.50              | 2.52            | 0.197              | 24 000                        | 32 000          | 7200B                        | 13          | 0.029                |
|                     | 35 | 11 | 22 | 0.6                              | 0.3                               | 11.2              | 4.95            | 0.385              | 26 000                        | 34 000          | 7300                         | 12          | 0.04                 |
|                     | 35 | 11 | 22 | 0.6                              | 0.3                               | 10.5              | 4.60            | 0.360              | 22 000                        | 29 000          | 7300B                        | 15          | 0.041                |
| 12                  | 28 | 8  | 16 | 0.3                              | 0.15                              | 5.60              | 2.46            | 0.193              | 26 000                        | 35 000          | 7001                         | 10          | 0.025                |
|                     | 32 | 10 | 20 | 0.6                              | 0.3                               | 8.40              | 3.95            | 0.310              | 25 000                        | 33 000          | 7201                         | 11.5        | 0.035                |
|                     | 32 | 10 | 20 | 0.6                              | 0.3                               | 7.75              | 3.65            | 0.287              | 21 000                        | 28 000          | 7201B                        | 14          | 0.036                |
|                     | 37 | 12 | 24 | 1                                | 0.6                               | 12.4              | 5.25            | 0.410              | 23 000                        | 30 000          | 7301                         | 13          | 0.044                |
|                     | 37 | 12 | 24 | 1                                | 0.6                               | 11.7              | 4.95            | 0.385              | 19 000                        | 26 000          | 7301B                        | 16.5        | 0.045                |
| 15                  | 32 | 9  | 18 | 0.3                              | 0.15                              | 6.40              | 3.15            | 0.246              | 23 000                        | 31 000          | 7002                         | 11.5        | 0.035                |
|                     | 35 | 11 | 22 | 0.6                              | 0.3                               | 10.0              | 4.70            | 0.370              | 22 000                        | 29 000          | 7202                         | 12.5        | 0.046                |
|                     | 35 | 11 | 22 | 0.6                              | 0.3                               | 9.25              | 4.35            | 0.340              | 18 000                        | 25 000          | 7202B                        | 16          | 0.046                |
|                     | 42 | 13 | 26 | 1                                | 0.6                               | 14.9              | 7.20            | 0.560              | 19 000                        | 26 000          | 7302                         | 15          | 0.055                |
|                     | 42 | 13 | 26 | 1                                | 0.6                               | 13.8              | 6.65            | 0.520              | 17 000                        | 22 000          | 7302B                        | 19          | 0.057                |
| 17                  | 35 | 10 | 20 | 0.3                              | 0.15                              | 7.95              | 3.85            | 0.299              | 21 000                        | 28 000          | 7003                         | 12.5        | 0.046                |
|                     | 40 | 12 | 24 | 0.6                              | 0.3                               | 13.2              | 6.60            | 0.515              | 19 000                        | 26 000          | 7203                         | 14.5        | 0.064                |
|                     | 40 | 12 | 24 | 0.6                              | 0.3                               | 12.2              | 6.10            | 0.480              | 17 000                        | 22 000          | 7203B                        | 18          | 0.066                |
|                     | 47 | 14 | 28 | 1                                | 0.6                               | 17.7              | 8.65            | 0.675              | 18 000                        | 24 000          | 7303                         | 16          | 0.107                |
|                     | 47 | 14 | 28 | 1                                | 0.6                               | 16.4              | 8.05            | 0.630              | 15 000                        | 20 000          | 7303B                        | 20.5        | 0.109                |
| 20                  | 42 | 12 | 24 | 0.6                              | 0.3                               | 10.7              | 5.60            | 0.440              | 19 000                        | 25 000          | 7004                         | 15          | 0.08                 |
|                     | 47 | 14 | 28 | 1                                | 0.6                               | 16.1              | 8.40            | 0.655              | 17 000                        | 23 000          | 7204                         | 17          | 0.1                  |
|                     | 47 | 14 | 28 | 1                                | 0.6                               | 14.7              | 7.70            | 0.605              | 15 000                        | 20 000          | 7204B                        | 21.5        | 0.102                |
|                     | 52 | 15 | 30 | 1.1                              | 0.6                               | 20.7              | 10.4            | 0.815              | 16 000                        | 21 000          | 7304                         | 18          | 0.138                |
|                     | 52 | 15 | 30 | 1.1                              | 0.6                               | 19.2              | 9.65            | 0.755              | 13 000                        | 18 000          | 7304B                        | 22.5        | 0.141                |
| 25                  | 42 | 9  | 18 | 0.3                              | 0.15                              | 7.90              | 4.95            | 0.360              | 17 000                        | 22 000          | 7905                         | 14          | 0.05                 |
|                     | 47 | 12 | 24 | 0.6                              | 0.3                               | 11.9              | 6.85            | 0.535              | 16 000                        | 21 000          | 7005                         | 16.5        | 0.093                |
|                     | 52 | 15 | 30 | 1                                | 0.6                               | 18.0              | 10.3            | 0.805              | 14 000                        | 19 000          | 7205                         | 19          | 0.125                |
|                     | 52 | 15 | 30 | 1                                | 0.6                               | 16.4              | 9.40            | 0.740              | 12 000                        | 16 000          | 7205B                        | 24          | 0.129                |
|                     | 62 | 17 | 34 | 1.1                              | 0.6                               | 29.3              | 15.8            | 1.24               | 13 000                        | 17 000          | 7305                         | 21          | 0.23                 |
| 30                  | 62 | 17 | 34 | 1.1                              | 0.6                               | 27.0              | 14.6            | 1.14               | 11 000                        | 15 000          | 7305B                        | 27          | 0.234                |
|                     | 47 | 9  | 18 | 0.3                              | 0.15                              | 8.35              | 5.75            | 0.395              | 14 000                        | 19 000          | 7906                         | 15.5        | 0.058                |
| 30                  | 55 | 13 | 26 | 1                                | 0.6                               | 15.4              | 9.45            | 0.725              | 13 000                        | 18 000          | 7006                         | 19          | 0.135                |

1) This value achieved with machined cages; when pressed cages are used, 80 % of this value is acceptable. 2) Bearing numbers appended with the code "B" have a contact angle of 40°; bearings without this code have a contact angle of 30°. 3) Smallest allowable dimension for chamfer dimension r or r<sub>1</sub>.

# Single and Duplex Angular Contact Ball Bearings

NTN



Dynamic equivalent radial load

$$P_r = X F_r + Y F_a$$

| Contact angle | e    | Single, DT       |   |               |      | DB, DF           |      |               |      |
|---------------|------|------------------|---|---------------|------|------------------|------|---------------|------|
|               |      | $F_a/F_r \leq e$ |   | $F_a/F_r > e$ |      | $F_a/F_r \leq e$ |      | $F_a/F_r > e$ |      |
|               |      | X                | Y | X             | Y    | X                | Y    | X             | Y    |
| 30°           | 0.80 | 1                | 0 | 0.39          | 0.76 | 1                | 0.78 | 0.63          | 1.24 |
| 40°           | 1.14 | 1                | 0 | 0.35          | 0.57 | 1                | 0.55 | 0.57          | 0.93 |

Static equivalent radial load

$$P_{0r} = X_0 F_r + Y_0 F_a$$

| Contact angle | Single, DT |       | DB, DF |       |
|---------------|------------|-------|--------|-------|
|               | $X_0$      | $Y_0$ | $X_0$  | $Y_0$ |
| 30°           | 0.5        | 0.33  | 1      | 0.66  |
| 40°           | 0.5        | 0.26  | 1      | 0.52  |

For single and DT arrangement, when  $P_{0r} < F_r$  use  $P_{0r} = F_r$ .

| Basic load rating |                 | Allowable speed <sup>1)</sup> |                 | Bearing number |    |    | Installation-related dimensions |                     |                     |                     |                      |                       |
|-------------------|-----------------|-------------------------------|-----------------|----------------|----|----|---------------------------------|---------------------|---------------------|---------------------|----------------------|-----------------------|
| dynamic           | static          | (duplex)                      | (duplex)        | DB             | DF | DT | mm                              |                     |                     |                     |                      |                       |
| C <sub>r</sub>    | C <sub>0r</sub> | Grease lubrication            | Oil lubrication |                |    |    | d <sub>a</sub> Min.             | d <sub>b</sub> Min. | D <sub>a</sub> Max. | D <sub>b</sub> Max. | r <sub>as</sub> Max. | r <sub>1as</sub> Max. |
| 8.30              | 4.15            | 23 000                        | 31 000          | DB             | DF | DT | 12.5                            | 12.5                | 23.5                | 24.8                | 0.3                  | 0.15                  |
| 9.75              | 5.45            | 22 000                        | 30 000          | DB             | DF | DT | 14.5                            | 12.5                | 25.5                | 27.5                | 0.6                  | 0.3                   |
| 8.95              | 5.05            | 19 000                        | 26 000          | DB             | DF | DT | 14.5                            | 12.5                | 25.5                | 27.5                | 0.6                  | 0.3                   |
| 18.2              | 9.85            | 20 000                        | 27 000          | DB             | DF | DT | 14.5                            | 12.5                | 30.5                | 32.5                | 0.6                  | 0.3                   |
| 17.1              | 9.20            | 18 000                        | 24 000          | DB             | DF | DT | 14.5                            | 12.5                | 30.5                | 32.5                | 0.6                  | 0.3                   |
| 9.10              | 4.90            | 21 000                        | 28 000          | DB             | DF | DT | 14.5                            | 14.5                | 25.5                | 26.8                | 0.3                  | 0.15                  |
| 13.7              | 7.95            | 20 000                        | 26 000          | DB             | DF | DT | 16.5                            | 14.5                | 27.5                | 29.5                | 0.6                  | 0.3                   |
| 12.6              | 7.35            | 17 000                        | 23 000          | DB             | DF | DT | 16.5                            | 14.5                | 27.5                | 29.5                | 0.6                  | 0.3                   |
| 20.1              | 10.5            | 18 000                        | 24 000          | DB             | DF | DT | 17.5                            | 16.5                | 31.5                | 32.5                | 1                    | 0.6                   |
| 19.0              | 9.90            | 16 000                        | 21 000          | DB             | DF | DT | 17.5                            | 16.5                | 31.5                | 32.5                | 1                    | 0.6                   |
| 10.4              | 6.30            | 18 000                        | 24 000          | DB             | DF | DT | 17.5                            | 17.5                | 29.5                | 30.8                | 0.3                  | 0.15                  |
| 16.3              | 9.40            | 17 000                        | 23 000          | DB             | DF | DT | 19.5                            | 17.5                | 30.5                | 32.5                | 0.6                  | 0.3                   |
| 15.1              | 8.70            | 15 000                        | 20 000          | DB             | DF | DT | 19.5                            | 17.5                | 30.5                | 32.5                | 0.6                  | 0.3                   |
| 24.2              | 14.4            | 15 000                        | 21 000          | DB             | DF | DT | 20.5                            | 19.5                | 36.5                | 37.5                | 1                    | 0.6                   |
| 22.5              | 13.3            | 13 000                        | 18 000          | DB             | DF | DT | 20.5                            | 19.5                | 36.5                | 37.5                | 1                    | 0.6                   |
| 12.9              | 7.65            | 17 000                        | 22 000          | DB             | DF | DT | 19.5                            | 19.5                | 32.5                | 33.8                | 0.3                  | 0.15                  |
| 21.5              | 13.2            | 15 000                        | 21 000          | DB             | DF | DT | 21.5                            | 19.5                | 35.5                | 37.5                | 0.6                  | 0.3                   |
| 19.8              | 12.2            | 13 000                        | 18 000          | DB             | DF | DT | 21.5                            | 19.5                | 35.5                | 37.5                | 0.6                  | 0.3                   |
| 28.7              | 17.3            | 14 000                        | 19 000          | DB             | DF | DT | 22.5                            | 21.5                | 41.5                | 42.5                | 1                    | 0.6                   |
| 26.6              | 16.1            | 12 000                        | 16 000          | DB             | DF | DT | 22.5                            | 21.5                | 41.5                | 42.5                | 1                    | 0.6                   |
| 17.5              | 11.2            | 15 000                        | 20 000          | DB             | DF | DT | 24.5                            | 24.5                | 37.5                | 39.5                | 0.6                  | 0.3                   |
| 26.1              | 16.8            | 14 000                        | 18 000          | DB             | DF | DT | 25.5                            | 24.5                | 41.5                | 42.5                | 1                    | 0.6                   |
| 23.9              | 15.4            | 12 000                        | 16 000          | DB             | DF | DT | 25.5                            | 24.5                | 41.5                | 42.5                | 1                    | 0.6                   |
| 33.5              | 20.8            | 12 000                        | 17 000          | DB             | DF | DT | 27                              | 24.5                | 45                  | 47.5                | 1                    | 0.6                   |
| 31.0              | 19.3            | 11 000                        | 14 000          | DB             | DF | DT | 27                              | 24.5                | 45                  | 47.5                | 1                    | 0.6                   |
| 12.9              | 9.95            | 13 000                        | 18 000          | DB             | DF | DT | 27.5                            | 27.5                | 39.5                | 40.8                | 0.3                  | 0.15                  |
| 19.3              | 13.7            | 12 000                        | 17 000          | DB             | DF | DT | 29.5                            | 29.5                | 42.5                | 44.5                | 0.6                  | 0.3                   |
| 29.2              | 20.6            | 11 000                        | 15 000          | DB             | DF | DT | 30.5                            | 29.5                | 46.5                | 47.5                | 1                    | 0.6                   |
| 26.6              | 18.8            | 10 000                        | 13 000          | DB             | DF | DT | 30.5                            | 29.5                | 46.5                | 47.5                | 1                    | 0.6                   |
| 47.5              | 31.5            | 10 000                        | 14 000          | DB             | DF | DT | 32                              | 29.5                | 55                  | 57.5                | 1                    | 0.6                   |
| 44.0              | 29.3            | 9 100                         | 12 000          | DB             | DF | DT | 32                              | 29.5                | 55                  | 57.5                | 1                    | 0.6                   |
| 13.6              | 11.5            | 12 000                        | 15 000          | DB             | DF | DT | 32.5                            | 32.5                | 44.5                | 45.8                | 0.3                  | 0.15                  |
| 25.0              | 18.9            | 11 000                        | 14 000          | DB             | DF | DT | 35.5                            | 35.5                | 49.5                | 50.5                | 1                    | 0.6                   |

Note: For bearing series 79 and 70, inner rings are constructed with groove abutments on both sides. Therefore, the inner ring chamfer dimension r<sub>1</sub> is identical to dimension r. Furthermore, the radius r<sub>1a</sub> of the shaft corner roundness is likewise identical to r<sub>a</sub>.