


# Double direction angular contact thrust ball bearings

## Contents

**Double direction angular contact thrust ball bearings** **214**
Two different designs 214
Bearings of series 2344(00) 215
Bearings of series BTM 216
Hybrid double direction angular contact thrust ball bearings 217
Marking of double direction angular contact thrust ball bearings 217
Bearing data general 218
Effect of interference fit on preload 221
Cages 221
Speed ratings 222
Equivalent dynamic bearing load 223
Equivalent static bearing load 223
Designation system 224

**Product tables** **225**
Double direction angular contact thrust ball bearings 226
Hybrid double direction angular contact ball bearings 230

# Double direction angular contact thrust ball bearings

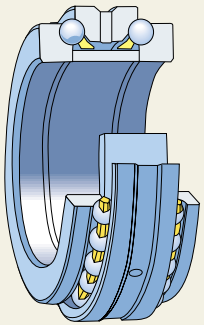
## Two different designs

SKF offers two main families of double direction angular contact thrust ball bearings: the series 2344(00) (➔ **fig** 1) and the series BTM (➔ **fig** 2).
Two basic variants exist for series BTM: Series BTM – A with 30° contact angle and Series BTM – B with 40° contact angle.

These bearings are able to locate a spindle axially in both directions, and are intended for mounting at the side of the double row, or single row cylindrical roller bearings of series NN 30 K and N 10 K, having the same bore size and outside diameters. The outside diameter of the housing washer, is however, made to tolerances such that sufficient radial clearance to the housing bore seating is obtained. This is to ensure that the thrust bearing is only subjected to axial loads. An additional benefit is the simplified machining of the housing bore.

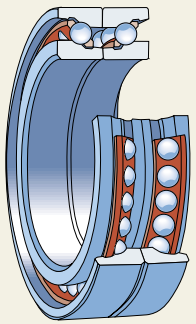
*Double direction angular contact thrust ball bearings: series 2344(00)*

Fig 1



*Double direction angular contact thrust ball bearings: series BTM*

Fig 2



## Bearings of series 2344(00)

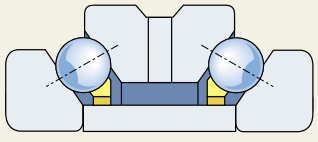
The bearings belonging to series 2344(00) are of separable design: they have a one piece housing washer, two ball and cage assemblies with a large number of balls, and two shaft washers separated by a spacer sleeve (➔ **fig** 3).

When mounted the bearings become preloaded. Bearings of series 2344(00) have a contact angle of 60°. To facilitate efficient lubrication, the bearings have a groove and three lubrication holes in the housing washer.

The preload, the 60° contact angle, together with the large number of balls, and cage assembly impart high axial stiffness to the bearings. A re-designed cage makes them suitable for relatively high speed operations.

*Series 2344(00) cross section*

Fig 3



# Bearings of series BTM

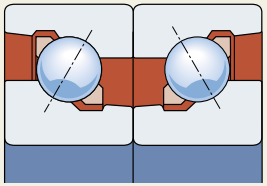
Bearings of series BTM are non-separable and designed as single direction angular contact thrust ball bearings, although always supplied in back-to-back sets, and are able to carry thrust loads in both directions. When mounted the bearings become preloaded.

The bearings have a contact angle of 30° (➔ **fig 4**) or 40° (➔ **fig 5**) and the same bore and outside diameter as series 2344(00), but a 25 % lower sectional height (width), which makes them particularly suitable for very compact arrangements. They do not have the same high load carrying capacity and axial stiffness as those of series 2344(00), but can operate at higher speeds.

Since bearings of series BTM are only intended to accommodate axial loads, their axial load carrying capacity is quoted in the bearing tables, although by ISO definition they are radial bearings, by virtue of having a 30° or 40° contact angle.

***Series BTM – A***

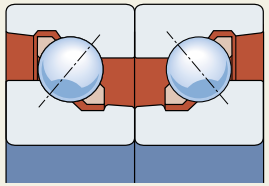
Fig 4



30° contact angle

***Series BTM – B***

Fig 5



40° contact angle

# Hybrid double direction angular contact thrust ball bearings

If the performance required is close to all-steel bearing limits, or if higher rigidity or longer life are needed, it is recommended to switch from an all-steel to a hybrid double direction angular contact thrust ball bearing.

SKF is prepared to supply the bearings of series 2344(00) and BTM equipped with ceramic balls. The hybrid execution is identified by the suffix HC.

More details concerning the advantages offered by ceramic material can be found in the chapter Principles of bearing selection and application, section material for high-precision bearings **page 9**.

# Marking of double direction angular contact thrust ball bearings

The bearing rings carry several markings for identification purposes. Each bearing is marked with the complete designation. Bearings of the series 2344(00) are of separable design; therefore to avoid wrong positioning of the inner washers and spacers, each component – i.e. inner rings, outer rings and the spacer – is marked with a serial number.

This also prevents the mixing of components from two bearings with different serial numbers.

Bearings of series BTM are non separable and matched into back-to-back sets of two. In addition to the complete designation, the actual deviation of the inner bore diameter from nominal are marked on the inner ring; this is to facilitate the selection of the actual bore in order to obtain the desired fits after mounting. A ‘V’-shaped marking is made on the outside diameter of the bearings. The bearings should be mounted in the order shown by this marking to obtain correct preload. It also indicates how the set should be mounted compared with the axial load. The point of the ‘V’ gives the direction in which the axial load should act on the inner ring(s). Each bearing of a series BTM bearing set is marked with the complete designation of the bearing set. To prevent mixing of bearings belonging to different sets, a serial number is shown on the face of the inner ring of each bearing.

# Bearing data general

## Dimensions

The dimensions of SKF double direction angular contact thrust ball bearings are not standardised, but are generally accepted on the market. The bore and outside diameters of bearings of series 2344(00), BTM – A and BTM – B, do however, correspond to those of Diameter Series 0 according to ISO 15:1998.

## Tolerances

SKF double direction angular contact thrust ball bearings of series 2340(00) are made to tolerance class SP (Special Precision) specifications as standard. Bearings made to tolerance class UP (Ultra Precision) can be supplied to order.

SKF double direction angular contact thrust ball bearings of series BTM – A and BTM – B are made to tolerance class P4C for enhanced running accuracy and even more precise bore diameters.

The values for class SP, UP and P4C tolerances are given in the **Tables 1, 2 and 3**.

Hybrid double direction angular contact thrust ball bearings are made to the same tolerances as the corresponding all-steel type.

***Class SP tolerances for 2344(00) angular contact thrust ball bearing series***

**Table 1**

**Shaft washer and bearing height**

| d over | d incl. | $\Delta_{ds}$ high | $\Delta_{ds}$ low | $S_i$[1] max | $\Delta_{Ts}$ high | $\Delta_{Ts}$ low |
|---|---|---|---|---|---|---|
| mm | | µm | | µm | µm | |
| **18** | **30** | +1 | –9 | 3 | +50 | –80 |
| **30** | **50** | +1 | –11 | 3 | +60 | –100 |
| **50** | **80** | +2 | –14 | 4 | +70 | –120 |
| **80** | **120** | +3 | –18 | 4 | +85 | –140 |
| **120** | **180** | +3 | –21 | 5 | +95 | –160 |
| **180** | **250** | +4 | –26 | 5 | +120 | –200 |

**Housing washer**

| D over | D incl. | $\Delta_{Ds}$ high | $\Delta_{Ds}$ low | $\Delta_{Cs}$ high | $\Delta_{Cs}$ low | $S_e$ |
|---|---|---|---|---|---|---|
| mm | | µm | | µm | | |
| **30** | **50** | –20 | –27 | 0 | – 60 | |
| **50** | **80** | –24 | –33 | 0 | – 60 | Values are |
| **80** | **120** | –28 | –38 | 0 | – 60 | identical |
| | | | | | | to those |
| **120** | **150** | –33 | –44 | 0 | – 60 | of shaft |
| **150** | **180** | –33 | –46 | 0 | – 60 | washer |
| **180** | **250** | –37 | –52 | 0 | – 60 | of same |
| | | | | | | bearing |
| **250** | **315** | –41 | –59 | 0 | – 60 | |

[1] The tolerance values quoted must be considered approximate, as the raceway runout is measured in the direction of the ball load. When the bearings have been mounted, the axial runout is generally smaller than quoted in the table

***Class UP tolerances for series 2344(00) angular contact thrust ball bearings***

**Table 2**

**Shaft washer and bearing height**

| d over | d incl. | $\Delta_{ds}$ high | $\Delta_{ds}$ low | $S_i$[1] max | $\Delta_{Ts}$ high | $\Delta_{Ts}$ low |
|---|---|---|---|---|---|---|
| mm | | µm | | µm | µm | |
| **18** | **30** | 0 | – 6 | 1,5 | +50 | – 80 |
| **30** | **50** | 0 | – 8 | 1,5 | +60 | – 100 |
| **50** | **80** | 0 | – 9 | 2 | +70 | – 120 |
| **80** | **120** | 0 | – 10 | 2 | +85 | – 140 |
| **120** | **180** | 0 | – 13 | 3 | +95 | – 160 |
| **180** | **250** | 0 | – 15 | 3 | +120 | – 200 |

**Housing washer**

| D over | D incl. | $\Delta_{Ds}$ high | $\Delta_{Ds}$ low | $\Delta_{Cs}$ high | $\Delta_{Cs}$ low | $S_e$ |
|---|---|---|---|---|---|---|
| mm | | µm | | µm | | |
| **30** | **50** | – 20 | – 27 | 0 | – 60 | |
| **50** | **80** | – 24 | – 33 | 0 | – 60 | Values are |
| **80** | **120** | – 28 | – 38 | 0 | – 60 | identical |
| | | | | | | to those |
| **120** | **150** | – 33 | – 44 | 0 | – 60 | of shaft |
| **150** | **180** | – 33 | – 46 | 0 | – 60 | washer |
| **180** | **250** | – 37 | – 52 | 0 | – 60 | of same |
| | | | | | | bearing |
| **250** | **315** | – 41 | – 59 | 0 | – 60 | |

[1] The tolerance values quoted must be considered approximate, as the raceway runout is measured in the direction of the ball load. When the bearings have been mounted, the axial runout is generally smaller than quoted in the table

***Class P4C tolerances for series BTM – A and BTM – B angular contact thrust ball bearings***

**Table 3**

**Inner ring**

| d over | d incl. | $\Delta_{ds}$ high | $\Delta_{ds}$ low | $S_i$[1] max | $\Delta_{B1s}$ high | $\Delta_{B1s}$ low |
|---|---|---|---|---|---|---|
| mm | | µm | | µm | µm | |
| **50** | **80** | 0 | –7 | 3 | 0 | –100 |
| **80** | **120** | 0 | –8 | 4 | 0 | –200 |
| **120** | **180** | 0 | –10 | 4 | 0 | –250 |
| **180** | **250** | 0 | –14 | 5 | 0 | –250 |

**Outer ring**

| D over | D incl. | $\Delta_{Ds}$ high | $\Delta_{Ds}$ low | $\Delta_{C1s}$ high | $\Delta_{C1s}$ low | $S_e$ |
|---|---|---|---|---|---|---|
| mm | | µm | | µm | | |
| **80** | **120** | –28 | –38 | 0 | –100 | Values are |
| **120** | **150** | –33 | –44 | 0 | –200 | identical |
| **150** | **180** | –33 | –46 | 0 | –250 | to those |
| | | | | | | of shaft |
| **180** | **250** | –37 | –52 | 0 | –250 | washer |
| **250** | **315** | –41 | –59 | 0 | –250 | of same |
| | | | | | | bearing |

[1] The tolerance values quoted must be considered approximate, as the raceway runout is measured in the direction of the ball load. When the bearings have been mounted, the axial runout is generally smaller than quoted in the table

### Preload

The preload of double direction angular contact thrust ball bearings series 2344(00), BTM – A and BTM – B is predetermined during manufacture. This is done by individually setting the distance sleeve length for bearings of series 2344(00) and by a precisely adjusted standout of inner versus outer ring for bearing pairs of series BTM – A and BTM – B. The bearings of series 2344(00) have one standard preload class while bearings of series BTM – A and BTM – B are available in two different preload classes, identified by suffixes A and B respectively.

For bearings of the series 2344(00) series, which are of separable design; rings, washers nor spacers shall be exchanged in position (i.e. the position of inner rings must not be reversed) neither mixed with rings belonging to other bearings; otherwise the predetermined preload will not be achieved. Similarly, a bearing in a set of series BTM shall not be mounted together with a bearing taken from another set.

The axial preload values for SKF double direction angular contact thrust ball bearings are given in **Tables 4 and 5**.

**Table 4**

***Axial preload values: 2344(00) series***

| Bore diameter | Standard preload | Bore diameter | Standard preload |
|---|---|---|---|
| mm | N | mm | N |
| **40** | 360 | **100** | 690 |
| **45** | 390 | **110** | 735 |
| **50** | 415 | **120** | 800 |
| **55** | 440 | **130** | 870 |
| **60** | 470 | **140** | 940 |
| **65** | 490 | **150** | 1 015 |
| **70** | 515 | **160** | 1 100 |
| **75** | 545 | **170** | 1 185 |
| **80** | 575 | **180** | 1 290 |
| **85** | 600 | **190** | 1 385 |
| **90** | 625 | **200** | 1 525 |
| **95** | 655 | | |

**Table 5**

***Axial preload values: BTM – A and BTM – B series***

| Bore diameter | Series BTM – A | | Series BTM – B | |
|---|---|---|---|---|
| | Preload Class A | Preload Class B | Preload Class A | Preload Class B |
| mm | N | | | |
| **60** | 200 | 450 | 250 | 720 |
| **65** | 200 | 450 | 250 | 720 |
| **70** | 250 | 600 | 350 | 950 |
| **80** | 300 | 750 | 400 | 1 200 |
| **85** | 300 | 750 | 400 | 1 200 |
| **90** | 400 | 1 000 | 550 | 1 450 |
| **100** | 400 | 1 000 | 550 | 1 650 |
| **110** | 600 | 1 400 | 750 | 2 250 |
| **120** | 600 | 1 500 | 850 | 2 450 |
| **130** | 800 | 1 900 | 1 050 | 3 000 |



## Effect of interference fit on preload

The preload values listed in the **Tables 4 and 5** refer to unmounted bearings. Preload may increase due to interference fits where the inner rings are not free to decrease in diameter, as a consequence of the axial load. In unmounted condition, the effect of the axial measuring load due to ring wall thickness is negligible. When fitting bearings on a shaft, interference between shaft and bearing shaft washers (inner rings) can cause the raceways to expand, generating an increase in preload. Double direction angular thrust ball bearings are usually fitted to the shaft seating to tolerance h4. If interference occurs, the relation between axial preload and radial (diametrical) preload increase can be expressed as:

$$\delta_a = \delta_r / \tan \alpha$$

where:
$\delta_a$ = axial preload increase
$\delta_r$ = radial preload increase
$\alpha$ = bearing contact angle

It is not necessary to make corrections for the mounted preload as long as there is no interference fit.

## Cages

SKF double direction angular contact thrust ball bearings of series 2344(00) have two separated cages that are ball-centred. They can either be of machined brass – identified by the suffix M1– or of heat stabilised, glass fibre reinforced polyamide 6,6 – identified by the suffix TN9. Depending on the bearing size, the former or the latter design is considered standard (→ **Table 6 page 222**).

The same cage design and material (TN9) is used for bearings of series BTM – A and BTM – B.

The cages are suited to withstand load cycles and rapid speed changes (in direction and value) and also to ensure good grease retention and stable conditions for preloaded bearings.

Lubricants normally used for rolling bearings have no detrimental effect on the properties of the polyamide cage, with the exception of some synthetic oils and greases based on synthetic oils. Other exceptions are lubricants with a high content of EP additives when used at elevated temperatures. The bearings equipped with TN9 cages may be used without restriction at temperatures up to +120°C. Higher temperatures can be tolerated for short periods without any negative effect on the material, provided that long periods at much lower temperatures follow.

# Speed ratings

The speed ratings quoted in the product tables are guideline values and are valid, provided that the bearings are lightly loaded, that they are light preloaded and that the transport of heat away from the bearing position is good. In the case of bearings of series BTM – A and BTM – B all-steel or hybrid, a speed reduction factor of 0,55 has to be considered in case of preload of class B.

There is no need to consider speed reduction factors due to preload for bearings of series 2344(00), BTM – A or BTM – B with preload class A.

Table 6

| Bearing dimensions bore code | bore diameter | 2344(00) series brass cage (M1) | 2344(00) series polyamide cage (TN9) | BTM – A, BTM – B polyamide cage |
|---|---|---|---|---|
| **05** | 25 | STD | – | – |
| **06** | 30 | STD | – | – |
| **07** | 35 | STD | – | – |
| **08** | 40 | STD | – | – |
| **09** | 45 | STD | – | – |
| **10** | 50 | STD | – | – |
| **11** | 55 | STD | – | – |
| **12** | 60 | – | STD | STD |
| **13** | 65 | – | STD | STD |
| **14** | 70 | – | STD | STD |
| **15** | 75 | STD | | – |
| **16** | 80 | OPT | STD | STD |
| **17** | 85 | OPT | STD | STD |
| **18** | 90 | OPT | STD | STD |
| **19** | 95 | STD | – | – |
| **20** | 100 | OPT | STD | STD |
| **22** | 110 | STD | – | SD |
| **24** | 120 | OPT | STD | STD |
| **26** | 130 | OPT | STD | STD |
| **28** | 140 | STD | – | – |
| **30** | 150 | STD | – | – |
| **32** | 160 | STD | – | – |
| **34** | 170 | STD | – | – |
| **36** | 180 | STD | – | – |
| **38** | 190 | STD | – | – |
| **40** | 200 | STD | – | – |

**STD** = standard cage; **OPT** = on request; **SD** = special design
**Note:** the BTM bearings have no cage suffix as only one type is available



# Equivalent dynamic bearing load

Double direction angular contact thrust ball bearings are subjected only to axial load. If this acts centrically, then

$P = Fa$

# Equivalent static bearing load

As per above – equivalent dynamic bearing load

$Po = Fa$

# Designation system

***Designation system of double direction angular contact thrust ball bearings***

Table 7

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| BTM | 90 | | B | | / | HC | P4C | DB | A |
| 2344 | 20 | | | TN9 | / | HC | SP | | |

**Bearing series**
**BTM** Double direction angular contact thrust ball bearing, High-speed series
**2344** Double direction angular contact thrust ball bearing

**Bore diameter**
**05** (×5) 25 mm bore diameter (series 2344 only)
**I**
**40** (×5) 200 mm bore diameter (series 2344 only)

**60** bore diameter, mm, uncoded (series BTM, only)
**I**
**130** bore diameter, mm, uncoded (series BTM, only)

**Internal design**
**B** Internal design code (series 2344 and brass cage only), blank for series BTM

**Contact angle**
**–** 60° (blank for series 2344 only)
**A** 30° (for series BTM – A only)
**B** 40° (for series BTM – B only)

**Cage design and material**
**–** Rolling elements riding, polyamide 6,6 (series BTM only)
**M1** Rolling elements riding, machined brass (series 2344 only)
**TN9** Rolling elements riding, grass fibre reinforced polyamide 6,6 (series 2344 only)

**Rolling element material**
**–** Chromium steel
**HC** Silicon nitride

**Precision class**
**SP** Special precision (P4 running accuracy, series 2344 only)
**UP** Ultra precision (P2 running accuracy, series 2344 only)
**P4C** Special precision – series BTM only

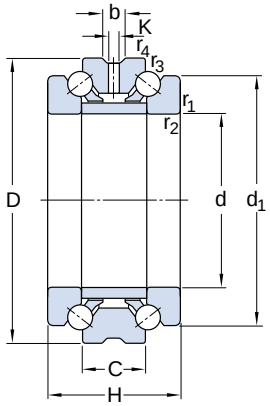
**Matching**
**DB** Set of two bearing matched back-to-back as standard (series BTM only)
Blank for series 2344

**Preload**
**A** Light preload (series BTM – A only)
**B** Heavy (series BTM – B only)
**G..** Special preload, daN (series BTM only)

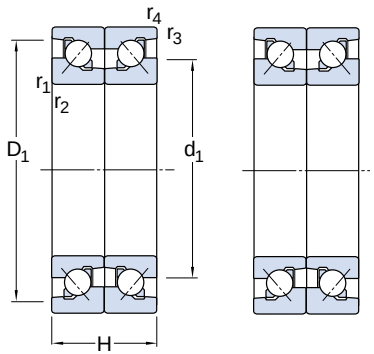


# Product tables

## Double direction angular contact thrust ball bearings
d **35 – 90** mm



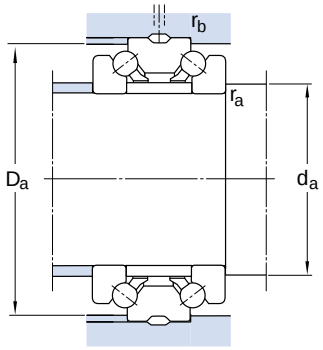

2344(00)

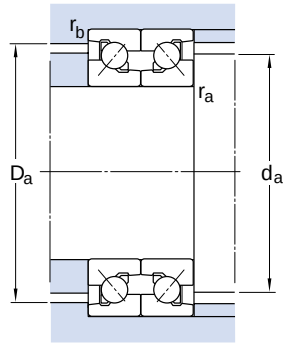



BTM – B



BTM – A

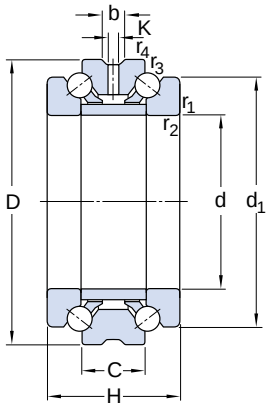


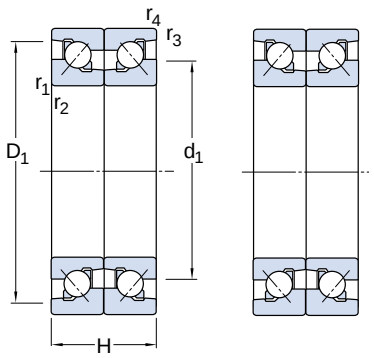

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Lubrication grease | oil spot | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| d | D | H | C | $C_0$ | $P_u$ | | | | |
| mm | | | N | | N | r/min | | kg | – |
| **35** | 62 | 34 | 18 600 | 49 000 | 1 830 | 10 000 | 13 000 | 0,38 | **234407 BM1** |
| **40** | 68 | 36 | 21 600 | 60 000 | 2 240 | 9 500 | 12 000 | 0,46 | **234408 BM1** |
| **45** | 75 | 38 | 24 700 | 71 000 | 2 600 | 9 000 | 11 000 | 0,58 | **234409 BM1** |
| **50** | 80 | 38 | 25 500 | 78 000 | 2 850 | 8 500 | 10 000 | 0,62 | **234410 BM1** |
| **55** | 90 | 44 | 33 800 | 104 000 | 3 800 | 7 000 | 8 500 | 0,94 | **234411 BM1** |
| **60** | 95 | 33 | 26 500 | 62 000 | 2 500 | 9 300 | 11 900 | 0,77 | **BTM 60 A/DB** |
| | 95 | 33 | 31 000 | 71 000 | 2 800 | 8 300 | 10 600 | 0,77 | **BTM 60 B/DB** |
| | 95 | 44 | 34 500 | 108 000 | 4 000 | 7 000 | 8 500 | 1 | **234412 TN9** |
| **65** | 100 | 33 | 27 500 | 68 000 | 2 600 | 8 700 | 11 200 | 0,82 | **BTM 65 A/DB** |
| | 100 | 33 | 32 500 | 76 500 | 2 900 | 7 800 | 10 000 | 0,82 | **BTM 65 B/DB** |
| | 100 | 44 | 35 800 | 116 000 | 4 300 | 6 700 | 8 000 | 1,05 | **234413 TN9** |
| **70** | 110 | 36 | 33 500 | 83 000 | 3 150 | 8 000 | 10 200 | 1,12 | **BTM 70 A/DB** |
| | 110 | 36 | 40 000 | 95 000 | 3 600 | 7 200 | 9 100 | 1,12 | **BTM 70 B/DB** |
| | 110 | 48 | 43 600 | 143 000 | 5 300 | 6 300 | 7 500 | 1,45 | **234414 TN9** |
| | 115 | 48 | 44 200 | 150 000 | 5 600 | 6 000 | 7 000 | 1,55 | **234415 BM1** |
| **80** | 125 | 40,5 | 41 500 | 104 000 | 3 900 | 7 000 | 9 000 | 1,59 | **BTM 80 A/DB** |
| | 125 | 40,5 | 49 000 | 120 000 | 4 400 | 6 300 | 8 000 | 1,59 | **BTM 80 B/DB** |
| | 125 | 54 | 54 000 | 180 000 | 6 550 | 5 300 | 6 300 | 2,1 | **234416 TN9** |
| **85** | 130 | 40,5 | 41 500 | 110 000 | 3 900 | 6 700 | 8 600 | 1,69 | **BTM 85 A/DB** |
| | 130 | 40,5 | 50 000 | 125 000 | 4 500 | 6 000 | 7 500 | 1,69 | **BTM 85 B/DB** |
| | 130 | 54 | 54 000 | 190 000 | 6 700 | 5 300 | 6 300 | 2,2 | **234417 TN9** |
| **90** | 140 | 45 | 49 000 | 125 000 | 4 470 | 6 300 | 8 000 | 2,22 | **BTM 90 A/DB** |
| | 140 | 45 | 57 000 | 143 000 | 5 100 | 5 600 | 7 000 | 2,22 | **BTM 90 B/DB** |
| | 140 | 60 | 62 400 | 220 000 | 7 650 | 4 800 | 5 600 | 3 | **234418 TN9** |

| Dimensions | | | | | | | Abutment and fillet dimensions | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| d | d1 ≈ | C, $D_1$ | K | b | $r_{1,2}$ min | $r_{3,4}$ min | $d_a$ min | $D_a$ min | $r_a$ max | $r_a$ max |
| mm | | | | | | | mm | | | |
| **35** | 53 | 17 | 3 | 5,5 | 1 | 0,15 | 45 | 58 | 1 | 0,1 |
| **40** | 58,5 | 18 | 3 | 5,5 | 1 | 0,15 | 50 | 64 | 1 | 0,1 |
| **45** | 65 | 19 | 3 | 5,5 | 1 | 0,15 | 56 | 71 | 1 | 0,1 |
| **50** | 70 | 19 | 3 | 5,5 | 1 | 0,15 | 61 | 76 | 1 | 0,1 |
| **55** | 78 | 22 | 3 | 5,5 | 1,1 | 0,3 | 68 | 85 | 1 | 0,3 |
| **60** | 75,9 | 89 | – | – | 1,1 | 0,6 | 67 | 89 | 1 | 0,6 |
| | 75,9 | 89 | – | – | 1,1 | 0,6 | 67 | 89 | 1 | 0,6 |
| | 83 | 22 | 3 | 5,5 | 1,1 | 0,3 | 73 | 90 | 1 | 0,3 |
| **65** | 80,9 | 94,3 | – | – | 1,1 | 0,6 | 75 | 94 | 1 | 0,6 |
| | 80,9 | 94,3 | – | – | 1,1 | 0,6 | 75 | 94 | 1 | 0,6 |
| | 88 | 22 | 3 | 5,5 | 1,1 | 0,3 | 78 | 95 | 1 | 0,3 |
| **70** | 88,6 | 103,6 | – | – | 1,1 | 0,6 | 82 | 104 | 1 | 0,6 |
| | 88,6 | 103,6 | – | – | 1,1 | 0,6 | 82 | 104 | 1 | 0,6 |
| | 97 | 24 | 3 | 5,5 | 1,1 | 0,3 | 85 | 105 | 1 | 0,3 |
| | 102 | 24 | 3 | 5,5 | 1,1 | 0,3 | 90 | 110 | 1 | 0,3 |
| **80** | 100,8 | 118,2 | – | – | 1,1 | 0,6 | 93 | 118 | 1 | 0,6 |
| | 100,8 | 118,2 | – | – | 1,1 | 0,6 | 93 | 118 | 1 | 0,6 |
| | 110 | 27 | 4,5 | 8,3 | 1,1 | 0,3 | 97 | 119 | 1 | 0,3 |
| **85** | 105,8 | 123,2 | – | – | 1,1 | 0,6 | 98 | 124 | 1 | 0,6 |
| | 105,8 | 123,2 | – | – | 1,1 | 0,6 | 98 | 124 | 1 | 0,6 |
| | 115 | 27 | 4,5 | 8,3 | 1,1 | 0,3 | 102 | 124 | 1 | 0,3 |
| **90** | 113 | 132 | – | – | 1,5 | 0,6 | 104 | 132 | 1,5 | 0,6 |
| | 113 | 132 | – | – | 1,5 | 0,6 | 104 | 132 | 1,5 | 0,6 |
| | 123 | 30 | 4,5 | 8,3 | 1,5 | 0,3 | 109 | 132 | 1,5 | 0,3 |

## Double direction angular contact thrust ball bearings
d **95 – 200** mm



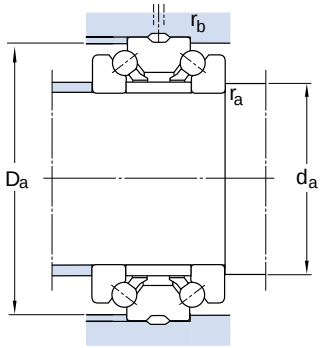

2344(00)

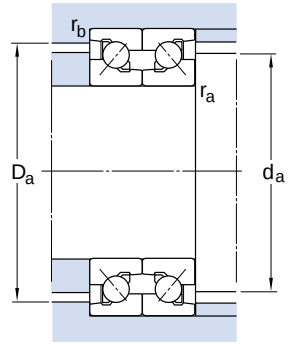



BTM – B



BTM – A

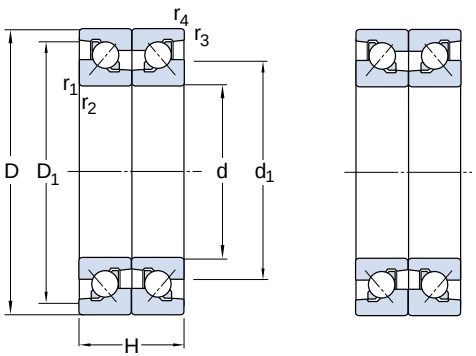



4

| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Lubrication grease | oil spot | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| d | D | H | C | $C_0$ | $P_u$ | | | | |
| mm | | | N | | N | r/min | | kg | – |
| **95** | 145 | 60 | 63 700 | 232 000 | 7 800 | 4 800 | 5 600 | 3,05 | **234419 BM1** |
| **100** | 150 | 45 | 51 000 | 140 000 | 4 740 | 6 000 | 7 500 | 2,45 | **BTM 100 A/DB** |
| | 150 | 45 | 61 000 | 163 000 | 5 400 | 5 300 | 6 700 | 2,45 | **BTM 100 B/DB** |
| | 150 | 60 | 66 300 | 245 000 | 8 150 | 4 800 | 5 600 | 3,15 | **234420 TN9** |
| **110** | 170 | 54 | 71 000 | 193 000 | 6 300 | 5 100 | 6 400 | 3,9 | **BTM 110 A/DB** |
| | 170 | 54 | 83 000 | 220 000 | 7 350 | 4 600 | 5 700 | 3,9 | **BTM 110 B/DB** |
| | 170 | 72 | 92 300 | 335 000 | 10 400 | 4 000 | 4 800 | 5,05 | **234422 BM1** |
| **120** | 180 | 54 | 73 500 | 212 000 | 6 500 | 4 800 | 6 000 | 4,18 | **BTM 120 A/DB** |
| | 180 | 54 | 86 500 | 240 000 | 7 200 | 4 300 | 5 300 | 4,18 | **BTM 120 B/DB** |
| | 180 | 72 | 93 600 | 360 000 | 10 800 | 3 800 | 4 500 | 5,7 | **234424 TN9** |
| **130** | 200 | 63 | 90 000 | 265 000 | 7 700 | 4 500 | 5 600 | 6,27 | **BTM 130 A/DB** |
| | 200 | 63 | 108 000 | 300 000 | 8 800 | 3 800 | 4 800 | 6,27 | **BTM 130 B/DB** |
| | 200 | 84 | 117 000 | 455 000 | 13 200 | 3 400 | 4 000 | 8,15 | **234426 TN9** |
| **140** | 210 | 84 | 117 000 | 475 000 | 13 200 | 3 200 | 3 800 | 8,65 | **234428 BM1** |
| **150** | 225 | 90 | 140 000 | 570 000 | 15 300 | 3 000 | 3 600 | 10,5 | **234430 BM1** |
| **160** | 240 | 96 | 156 000 | 640 000 | 16 600 | 2 800 | 3 400 | 14 | **234432 BM1** |
| **170** | 260 | 108 | 195 000 | 780 000 | 19 600 | 2 400 | 3 000 | 17,5 | **234434 BM1** |
| **180** | 280 | 120 | 225 000 | 915 000 | 22 400 | 2 000 | 2 600 | 23 | **234436 BM1** |
| **190** | 290 | 120 | 225 000 | 950 000 | 22 800 | 2 000 | 2 600 | 24 | **234438 BM1** |
| **200** | 310 | 132 | 265 000 | 1 100 000 | 25 500 | 1 900 | 2 400 | 31 | **234440 BM1** |

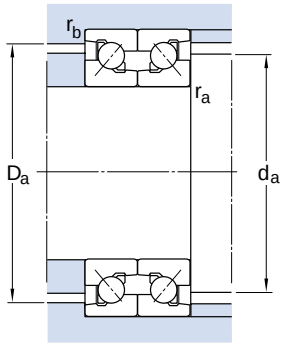
| Dimensions | | | | | | | Abutment and fillet dimensions | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| d | d1 ≈ | C, $D_1$ | K | b | $r_{1,2}$ min | $r_{3,4}$ min | $d_a$ min | $D_a$ min | $r_a$ max | $r_a$ max |
| mm | | | | | | | mm | | | |
| **95** | 128 | 30 | 4,5 | 8,3 | 1,5 | 0,3 | 114 | 137 | 1,5 | 0,3 |
| **100** | 123 | 141,6 | – | – | 1,5 | 0,6 | 114 | 142 | 1,5 | 0,6 |
| | 123 | 141,6 | – | – | 1,5 | 0,6 | 114 | 142 | 1,5 | 0,6 |
| | 133 | 30 | 4,5 | 8,3 | 1,5 | 0,3 | 119 | 142 | 1,5 | 0,3 |
| **110** | 137,9 | 155,2 | – | – | 2 | 1 | 127 | 160 | 2 | 1 |
| | 137,9 | 155,2 | – | – | 2 | 1 | 127 | 160 | 2 | 1 |
| | 150 | 36 | 4,5 | 8,3 | 2 | 0,6 | 132 | 161 | 2 | 0,6 |
| **120** | 147,7 | 170,3 | – | – | 2 | 1 | 137 | 170 | 2 | 1 |
| | 147,7 | 170,3 | – | – | 2 | 1 | 137 | 170 | 2 | 1 |
| | 160 | 36 | 4,5 | 8,3 | 2 | 0,6 | 142 | 171 | 2 | 0,6 |
| **130** | 162,6 | 187,7 | – | – | 2 | 1 | 150 | 190 | 2 | 1 |
| | 162,6 | 187,7 | – | – | 2 | 1 | 150 | 190 | 2 | 1 |
| | 177 | 42 | 6 | 11,1 | 2 | 0,6 | 156 | 190 | 2 | 0,6 |
| **140** | 187 | 42 | 6 | 11,1 | 2,1 | 0,6 | 166 | 200 | 2 | 0,6 |
| **150** | 200 | 45 | 7,5 | 13,9 | 2,1 | 0,6 | 178 | 213 | 2 | 0,6 |
| **160** | 212 | 48 | 7,5 | 13,9 | 2,1 | 0,6 | 190 | 227 | 2 | 0,6 |
| **170** | 230 | 54 | 7,5 | 13,9 | 2,1 | 0,6 | 204 | 246 | 2 | 0,6 |
| **180** | 248 | 60 | 9 | 16,7 | 2,1 | 0,6 | 214 | 264 | 2 | 0,6 |
| **190** | 258 | 60 | 9 | 16,7 | 2,1 | 0,6 | 224 | 274 | 2 | 0,6 |
| **200** | 274 | 66 | 9 | 16,7 | 2,1 | 0,6 | 236 | 292 | 2 | 0,6 |




BTM – B



BTM – A






| Principal dimensions | | | Basic load ratings dynamic | static | Fatigue load limit | Speed ratings Lubrication grease | oil spot | Mass | Designation |
|---|---|---|---|---|---|---|---|---|---|
| d | D | H | C | $C_0$ | $P_u$ | | | | |
| mm | | | N | | N | r/min | | kg | – |
| **60** | 95 | 33 | 26 500 | 62 000 | 2 500 | 11 100 | 14 300 | 0,72 | **BTM 60 A/HCDB** |
| | 95 | 33 | 31 000 | 71 000 | 2 800 | 10 000 | 12 700 | 0,72 | **BTM 60 B/HCDB** |
| **65** | 100 | 33 | 27 500 | 68 000 | 2 600 | 10 500 | 13 500 | 0,77 | **BTM 65 A/HCDB** |
| | 100 | 33 | 32 500 | 76 500 | 2 900 | 9 400 | 12 000 | 0,77 | **BTM 65 B/HCDB** |
| **70** | 110 | 36 | 33 500 | 83 000 | 3 150 | 9 500 | 12 300 | 1,04 | **BTM 70 A/HCDB** |
| | 110 | 36 | 40 000 | 95 000 | 3 600 | 8 600 | 10 900 | 1,04 | **BTM 70 B/HCDB** |
| **80** | 125 | 40,5 | 41 500 | 104 000 | 3 900 | 8 400 | 10 800 | 1,48 | **BTM 80 A/HCDB** |
| | 125 | 40,5 | 49 000 | 120 000 | 4 400 | 7 600 | 9 600 | 1,48 | **BTM 80 B/HCDB** |
| **85** | 130 | 40,5 | 41 500 | 110 000 | 3 900 | 7 200 | 10 300 | 1,58 | **BTM 85 A/HCDB** |
| | 130 | 40,5 | 50 000 | 125 000 | 4 500 | 7 200 | 9 000 | 1,58 | **BTM 85 B/HCDB** |
| **90** | 140 | 45 | 49 000 | 125 000 | 4 470 | 7 600 | 9 600 | 2,08 | **BTM 90 A/HCDB** |
| | 140 | 45 | 57 000 | 143 000 | 5 100 | 6 700 | 8 400 | 2,08 | **BTM 90 B/HCDB** |
| **100** | 150 | 45 | 51 000 | 140 000 | 4 740 | 7 200 | 9 000 | 2,29 | **BTM 100 A/HCDB** |
| | 150 | 45 | 61 000 | 163 000 | 5 400 | 6 400 | 8 000 | 2,29 | **BTM 100 B/HCDB** |
| **110** | 170 | 54 | 71 000 | 193 000 | 6 300 | 6 200 | 7 700 | 3,64 | **BTM 110 A/HCDB** |
| | 170 | 54 | 83 000 | 220 000 | 7 350 | 5 500 | 6 800 | 3,64 | **BTM 110 B/HCDB** |
| **120** | 180 | 54 | 73 500 | 212 000 | 6 500 | 5 800 | 7 200 | 3,90 | **BTM 120 A/HCDB** |
| | 180 | 54 | 86 500 | 240 000 | 7 200 | 5 200 | 6 400 | 3,90 | **BTM 120 B/HCDB** |
| **130** | 200 | 63 | 90 000 | 265 000 | 7 700 | 5 400 | 6 700 | 5,87 | **BTM 130 A/HCDB** |
| | 200 | 63 | 108 000 | 300 000 | 8 800 | 4 600 | 5 800 | 5,87 | **BTM 130 B/HCDB** |

| Dimensions | | | | | Abutment and fillet dimensions | | | |
|---|---|---|---|---|---|---|---|---|
| d | $d_1$ ≈ | C, $D_1$ | $r_{1,2}$ min | $r_{3,4}$ min | $d_a$ min | $D_a$ min | $r_a$ max | $r_b$ max |
| mm | | | | | mm | | | |
| **60** | 75,9 | 89 | 1,1 | 0,6 | 70 | 90 | 1 | 0,6 |
| | 75,9 | 89 | 1,1 | 0,6 | 70 | 90 | 1 | 0,6 |
| **65** | 80,9 | 94,3 | 1,1 | 0,6 | 75 | 95 | 1 | 0,6 |
| | 80,9 | 94,3 | 1,1 | 0,6 | 75 | 95 | 1 | 0,6 |
| **70** | 88,6 | 103,6 | 1,1 | 0,6 | 82 | 105 | 1 | 0,6 |
| | 88,6 | 103,6 | 1,1 | 0,6 | 82 | 105 | 1 | 0,6 |
| **80** | 100,8 | 118,2 | 1,1 | 0,6 | 93 | 117 | 1 | 0,6 |
| | 100,8 | 118,2 | 1,1 | 0,6 | 93 | 117 | 1 | 0,6 |
| **85** | 105,8 | 123,2 | 1,1 | 0,6 | 98 | 124 | 1 | 0,6 |
| | 105,8 | 123,2 | 1,1 | 0,6 | 98 | 124 | 1 | 0,6 |
| **90** | 113 | 132 | 1,5 | 0,6 | 104 | 131 | 1 | 0,6 |
| | 113 | 132 | 1,5 | 0,6 | 104 | 131 | 1 | 0,6 |
| **100** | 123 | 141,6 | 1,5 | 0,6 | 114 | 141 | 1 | 0,6 |
| | 123 | 141,6 | 1,5 | 0,6 | 114 | 141 | 1 | 0,6 |
| **110** | 137,9 | 155,2 | 2 | 1 | 127 | 160 | 1,5 | 1 |
| | 137,9 | 155,2 | 2 | 1 | 127 | 160 | 1,5 | 1 |
| **120** | 147,7 | 170,3 | 2 | 1 | 137 | 171 | 1,5 | 1 |
| | 147,7 | 170,3 | 2 | 1 | 137 | 171 | 1,5 | 1 |
| **130** | 162,6 | 187,7 | 2 | 1 | 150 | 190 | 1,5 | 1 |
| | 162,6 | 187,7 | 2 | 1 | 150 | 190 | 1,5 | 1 |