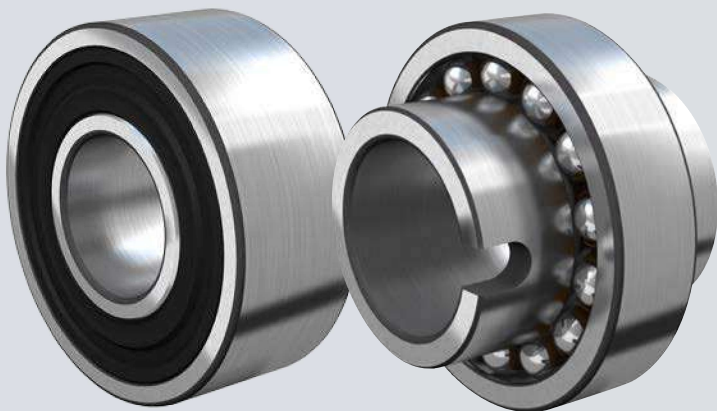




Self-aligning ball bearings



4 Self-aligning ball bearings



| | | | |
|--|------------|--|------|
| Designs and variants | 439 | | |
| Sealed bearings | 439 | | |
| Greases for capped bearings | 440 | | |
| Grease life for capped bearings | 440 | | |
| Large self-aligning ball bearings | 440 | | |
| Bearings with an extended inner ring | 440 | | |
| Cages | 442 | | |
| Bearing data | 443 | | |
| (Dimension standards, tolerances, internal clearance, permissible misalignment) | | | |
| Loads | 445 | | |
| (Minimum load, axial load carrying capacity, equivalent dynamic bearing load, equivalent static bearing load) | | | |
| Temperature limits | 445 | | |
| Permissible speed | 446 | | |
| Design considerations | 446 | | |
| Ball protrusion | 446 | | |
| Bearings on sleeves | 446 | | |
| Bearings with an extended inner ring | 446 | | |
| Appropriate bearing housings | 447 | | |
| Mounting | 447 | | |
| Mounting bearings with a cylindrical bore | 447 | | |
| Mounting bearings with a tapered bore | 447 | | |
| Designation system | 449 | | |
| Product tables | | | |
| 4.1 Self-aligning ball bearings | 450 | | |
| 4.2 Self-aligning ball bearings on an adapter sleeve .. | 458 | | |
| 4.3 Self-aligning ball bearings with an extended inner ring | 462 | | |
| | | Other self-aligning ball bearings | |
| | | Bearings with Solid Oil | 1023 |

4 Self-aligning ball bearings

4



More information

| | |
|---|-----------|
| General bearing knowledge | 17 |
| Bearing selection process | 59 |
| Lubrication | 109 |
| Bearing interfaces. | 139 |
| Seat tolerances for standard conditions | 148 |
| Selecting internal clearance | 182 |
| Sealing, mounting and dismantling | 193 |

Mounting instructions for individual bearings → skf.com/mount

SKF Drive-up Method
→ skf.com/drive-up

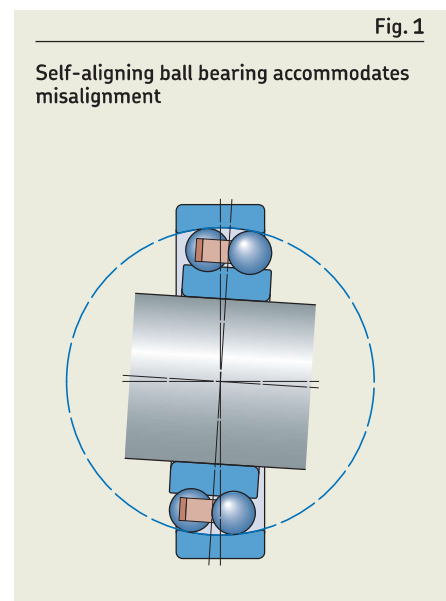
SKF bearing maintenance handbook ISBN 978-91-978966-4-1

Self-aligning ball bearings have two rows of balls, a common sphered raceway in the outer ring and two deep uninterrupted raceway grooves in the inner ring. They are available open or sealed. The bearings are insensitive to angular misalignment of the shaft relative to the housing (**fig. 1**), which can be caused, for example, by shaft deflection.

Bearing features

- **Accommodate static and dynamic misalignment**
The bearings are self-aligning like spherical roller bearings or CARB bearings.
- **Excellent high-speed performance**
Self-aligning ball bearings generate less friction than any other type of rolling bearing, which enables them to run cooler even at high speeds.
- **Minimum maintenance**
Because of low heat generation, the bearing temperature is lower, leading to extended bearing life and maintenance intervals.

- **Low friction**
Very loose conformity between balls and outer ring keeps friction and frictional heat at low levels.
- **Excellent light load performance**
Self-aligning ball bearings have low minimum load requirements.
- **Low noise**
Self-aligning ball bearings can reduce noise and vibration levels, for example, in fans.



Designs and variants

SKF standard assortment

SKF self-aligning ball bearing variants are:

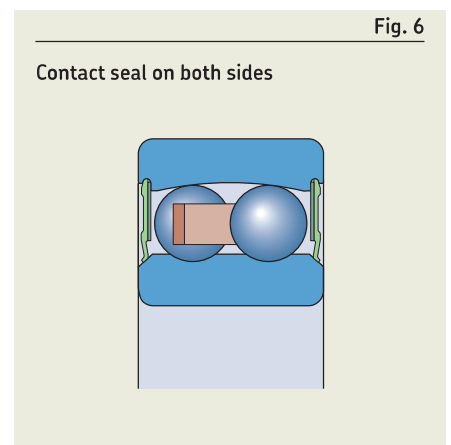
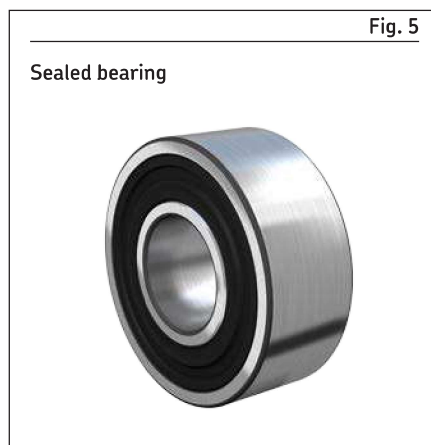
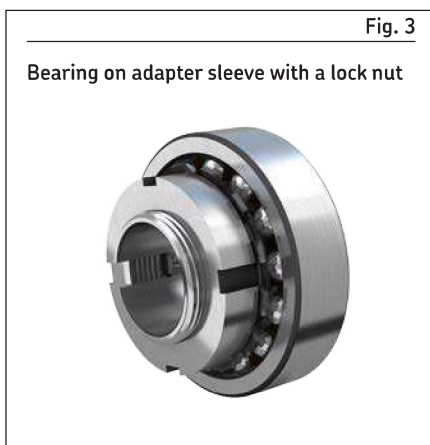
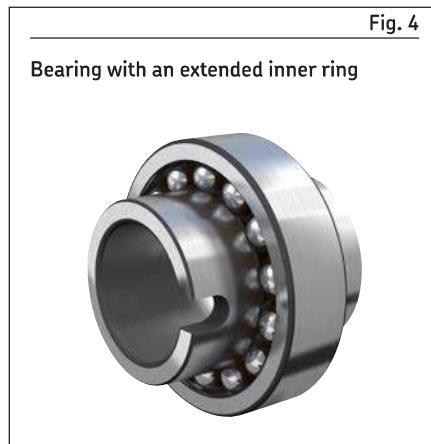
- open (fig. 2)
 - with cylindrical bore
 - with tapered bore, e.g. for use with adapter sleeves (fig. 3)
 - with extended inner ring (fig. 4)
- sealed (fig. 5)
 - with cylindrical bore
 - with tapered bore, e.g. for use with adapter sleeves

Sealed bearings

Sealed bearings equipped with contact seals on both sides (fig. 6) are available:

- in the 22 and 23 series
- with bore diameter $10 \leq d \leq 70$ mm
- with seals made of sheet steel reinforced NBR (oil and wear-resistant, designation suffix -2RS1)

Permissible angular misalignment of sealed bearings is slightly reduced compared to open design bearings.



4 Self-aligning ball bearings

Greases for capped bearings

Bearings sealed on both sides are lubricated for the life of the bearing and are virtually maintenance-free. They are filled with one of the following standard greases, which have good corrosion-inhibiting properties (table 1):

- $D \leq 62 \rightarrow$ MT47 grease
- $D > 62 \rightarrow$ MT33 grease

Grease life for capped bearings

- is presented as L_{10} , i.e. the time period at the end of which 90% of the bearings are still reliably lubricated
- depends on the operating temperature and the nd_m value (diagram 1)

The grease life specified in diagram 1 is valid for the following combination of operating conditions:

- horizontal shaft
- inner ring rotation
- light load ($P \leq 0,05 C$)
- operating temperature within the green temperature zone of the grease (table 1)
- stationary machine
- low vibration levels

Where the operating conditions differ, the grease life obtained from the diagram should be adjusted:

- vertical shafts \rightarrow 50% of the obtained value
- heavier loads ($P > 0,05 C$) \rightarrow apply reduction factor (table 2)

When sealed bearings must operate under certain extreme conditions, such as very high speeds or high temperatures, grease may appear on the capping diameter. For bearing arrangements where this would be detrimental, appropriate actions should be taken. For additional information, contact the SKF application engineering service.

Large self-aligning ball bearings

- are available in the 130 and 139 series
- are equipped with an annular groove in the outer ring and (fig. 7):
 - three equally-spaced lubrication holes in the outer ring
 - six equally-spaced lubrication holes in the inner ring
- can be used in any application where low friction is preferred over high load carrying capacity (e.g. in the paper industry)

Bearings with an extended inner ring

- are (fig. 8) designed for less demanding applications that use commercial grade shafting
- have a special bore tolerance, class JS7 (table 3), that facilitates mounting and dismounting
- are located axially on the shaft by means of a slot at one end of the inner ring that engages a pin or shoulder screw (fig. 9) fitted to the shaft
 - This also prevents the shaft from spinning in the bearing bore.

Diagram 1

Grease life for standard capped self-aligning ball bearings where $P = 0,05 C$

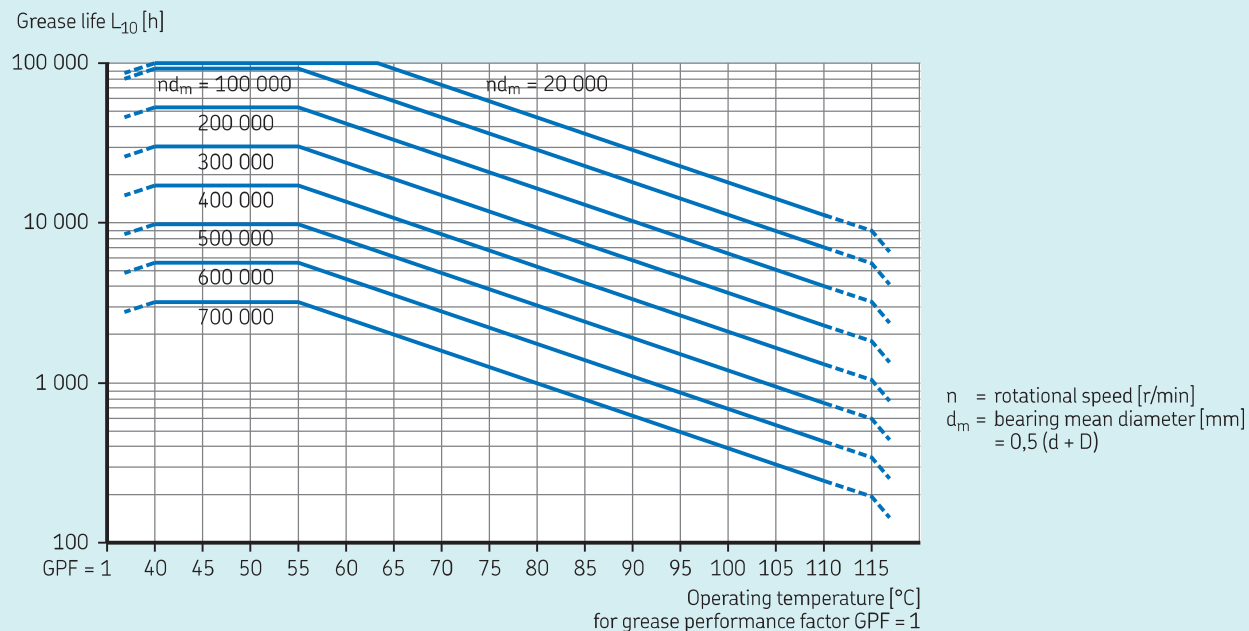


Table 1

Technical specifications of SKF standard greases for sealed self-aligning ball bearings¹⁾

| Bearing outside diameter [mm] | Grease | Temperature range ¹⁾ | | | | | | | Thickener | Base oil type | NLGI grade | Base oil viscosity [mm ² /s] | |
|-------------------------------|--------|---------------------------------|---|----|-----|-----|-----|-----|--------------|---------------|------------|---|--------------------|
| | | -50 | 0 | 50 | 100 | 150 | 200 | 250 | | | | at 40 °C (105 °F) | at 100 °C (210 °F) |
| D ≤ 62 | MT47 | | | | | | | | Lithium soap | Mineral | 2 | 70 | 7,3 |
| D > 62 | MT33 | | | | | | | | Lithium soap | Mineral | 3 | 100 | 10 |

-60 30 120 210 300 390 480 °F

¹⁾ Refer to the SKF traffic light concept (page 117).



Fig. 7

Annular groove and lubrication holes

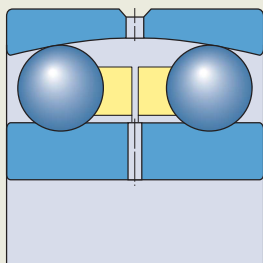


Table 2

Reduction factor for the grease life, depending on the load

| Load P | Reduction factor |
|----------|------------------|
| ≤ 0,05 C | 1 |
| 0,1 C | 0,7 |
| 0,125 C | 0,5 |
| 0,25 C | 0,2 |

Table 3

Bore tolerance of self-aligning ball bearings with an extended inner ring

| Bore diameter d | Tolerance class JS7 Deviation | |
|-----------------|-------------------------------|-------------|
| | U | L |
| mm | μm | |
| 18 | 30 | +10,5 -10,5 |
| 30 | 50 | +12,5 -12,5 |
| 50 | 80 | +15 -15 |

Fig. 8

Bearing with an extended inner ring

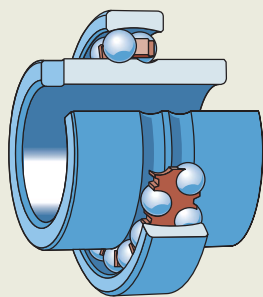


Fig. 9

Axial location of bearings with an extended inner ring

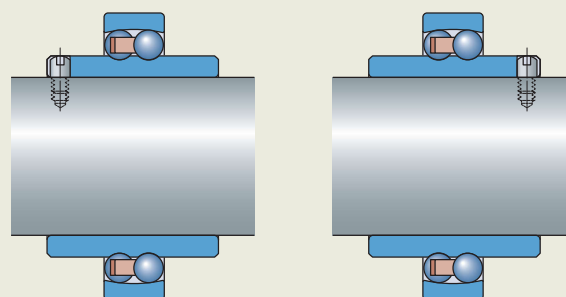
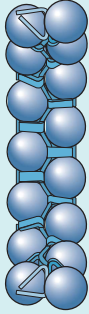
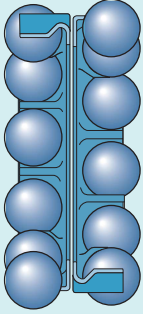
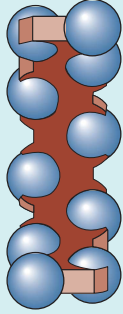
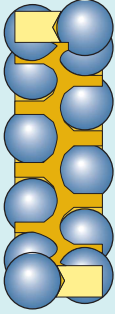
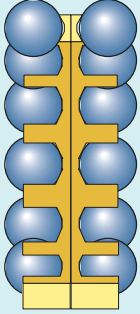


Table 4

Cages for self-aligning ball bearings

| | | | | | |
|------------------|---|---|---|---|---|
| |  |  |  |  |  |
| Cage type | One-piece, ball centred | Two-piece, ball centred | One-piece snap-type, ball centred | One-piece, ball centred | Two-piece, ball centred |
| Material | Stamped steel | Stamped steel | PA66, glass fibre reinforced | Machined brass | Machined brass |
| Suffix | – | – | TN9 | M (no designation suffix when $d \geq 150$ mm) | M (no designation suffix when $d \geq 150$ mm) |

For bearings with non-standard cages, contact SKF.

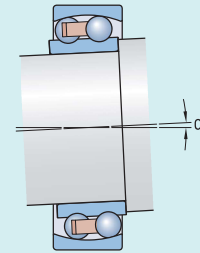
Cages

Depending on their series and size, SKF self-aligning ball bearings are fitted with one of the cages shown in [table 4](#).

When used at high temperatures, some lubricants can have a detrimental effect on polyamide cages. For additional information about the suitability of cages, refer to *Cages*, [page 187](#).

Table 5

Permissible angular misalignment



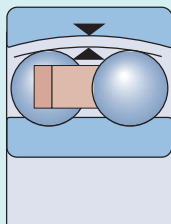
| Bearings/series | Misalignment α |
|-------------------------|-----------------------|
| – | 0 |
| 108, 126, 127, 129, 135 | 3 |
| 12 (E) | 2,5 |
| 13 (E) | 3 |
| 22 (E) | 2,5 |
| 22 E-2RS1 | 1,5 |
| 23 (E) | 3 |
| 23 E-2RS1 | 1,5 |
| 112 (E) | 2,5 |
| 130, 139 | 3 |

Bearing data

| | |
|---|--|
| Dimension standards | Boundary dimensions: ISO 15 Except for: <ul style="list-style-type: none"> • Bearings with an extended inner ring |
| Tolerances For additional information → page 35 | Normal Except for: <ul style="list-style-type: none"> • Bearings with an extended inner ring: bore to tolerance class JS7 (table 3, page 441) in accordance with ISO 286-2 Values: ISO 492 (table 2, page 38) |
| Internal clearance For additional information → page 182 | Normal, C3 Check availability of C2 (cylindrical bore only) Except for: <ul style="list-style-type: none"> • Bearings in the 130 and 139 series: C3 • Bearings with an extended inner ring: ranging from the minimum value of C2 to the maximum value of Normal Values: ISO 5753-1 (table 6, page 444) Values are valid for unmounted bearings under zero measuring load. |
| Permissible misalignment | Guideline values for normal operating condition (table 5). Whether these values can be fully exploited depends on the design of the adjacent components, such as external seals. |



Radial internal clearance of self-aligning ball bearings



Bearings with a cylindrical bore

| Bore diameter | | Radial internal clearance | | | | | |
|---------------|-----|---------------------------|------|--------|------|------|------|
| d | | C2 | | Normal | | C3 | |
| > | ≤ | min. | max. | min. | max. | min. | max. |
| mm | | μm | | | | | |
| 2,5 | 6 | 1 | 8 | 5 | 15 | 10 | 20 |
| 6 | 10 | 2 | 9 | 6 | 17 | 12 | 25 |
| 10 | 14 | 2 | 10 | 6 | 19 | 13 | 26 |
| 14 | 18 | 3 | 12 | 8 | 21 | 15 | 28 |
| 18 | 24 | 4 | 14 | 10 | 23 | 17 | 30 |
| 24 | 30 | 5 | 16 | 11 | 24 | 19 | 35 |
| 30 | 40 | 6 | 18 | 13 | 29 | 23 | 40 |
| 40 | 50 | 6 | 19 | 14 | 31 | 25 | 44 |
| 50 | 65 | 7 | 21 | 16 | 36 | 30 | 50 |
| 65 | 80 | 8 | 24 | 18 | 40 | 35 | 60 |
| 80 | 100 | 9 | 27 | 22 | 48 | 42 | 70 |
| 100 | 120 | 10 | 31 | 25 | 56 | 50 | 83 |
| 120 | 140 | 10 | 38 | 30 | 68 | 60 | 100 |
| 140 | 160 | – | – | – | – | 70 | 120 |
| 160 | 180 | – | – | – | – | 82 | 138 |
| 180 | 200 | – | – | – | – | 93 | 157 |
| 200 | 225 | – | – | – | – | 100 | 170 |
| 225 | 250 | – | – | – | – | 115 | 195 |

Bearings with a tapered bore

| Bore diameter | | Radial internal clearance | | | | | |
|---------------|-----|---------------------------|------|--------|------|------|------|
| d | | C2 | | Normal | | C3 | |
| > | ≤ | min. | max. | min. | max. | min. | max. |
| mm | | μm | | | | | |
| 18 | 24 | – | – | 13 | 26 | 30 | 33 |
| 24 | 30 | – | – | 15 | 28 | 23 | 39 |
| 30 | 40 | – | – | 19 | 35 | 29 | 46 |
| 40 | 50 | – | – | 22 | 39 | 33 | 52 |
| 50 | 65 | – | – | 27 | 47 | 41 | 61 |
| 65 | 80 | – | – | 35 | 57 | 50 | 75 |
| 80 | 100 | – | – | 42 | 68 | 62 | 90 |
| 100 | 120 | – | – | 50 | 81 | 75 | 108 |

Loads

| Minimum load | | Symbols |
|--|---|--|
| For additional information → page 106 | $F_{rm} = k_r \left(\frac{v n}{1\,000} \right)^{2/3} \left(\frac{d_m}{100} \right)^2$ | B bearing width [mm] d bearing bore diameter [mm] d _m bearing mean diameter [mm] = 0,5 (d + D) |
| Axial load carrying capacity | Bearings mounted on an adapter sleeve on plain shafts without a fixed abutment: $F_{ap} = 0,003 B d$ provided the bearings are correctly mounted. | e calculation factor (product tables , page 450) F _a axial load [kN] F _{ap} maximum permissible axial load [kN] |
| Equivalent dynamic bearing load | $F_a/F_r \leq e \rightarrow P = F_r + Y_1 F_a$ $F_a/F_r > e \rightarrow P = 0,65 F_r + Y_2 F_a$ | F _r radial load [kN] F _{rm} minimum radial load [kN] k _r minimum load factor (product tables) |
| For additional information → page 91 | | n rotational speed [r/min] P equivalent dynamic bearing load [kN] |
| Equivalent static bearing load | $P_0 = F_r + Y_0 F_a$ | P ₀ equivalent static bearing load [kN] Y ₀ , Y ₁ , Y ₂ calculation factors (product tables) ν oil viscosity at operating temperature [mm ² /s] |
| For additional information → page 105 | | |

4



Temperature limits

The permissible operating temperature for self-aligning ball bearings can be limited by:

- the dimensional stability of the bearing rings and balls
- the cage
- the seals
- the lubricant

Where temperatures outside the permissible range are expected, contact SKF.

Bearing rings and balls

SKF self-aligning ball bearings are heat stabilized up to 120 °C (250 °F).

Cages

Steel or brass cages can be used at the same operating temperatures as the bearing rings and balls. For temperature limits of polymer cages, refer to *Polymer cages*, [page 188](#).

Seals

The permissible operating temperature for NBR seals is -40 to +100 °C (-40 to +210 °F). Temperatures up to 120 °C (250 °F) can be tolerated for brief periods.

Typically, temperature peaks are at the seal lip.

Lubricants

Temperature limits for the greases used in sealed SKF self-aligning ball bearings are provided in [table 1](#), [page 441](#). For temperature limits of other SKF greases, refer to *Selecting a suitable SKF grease*, [page 116](#).

When using lubricants not supplied by SKF, temperature limits should be evaluated according to the SKF traffic light concept ([page 117](#)).

Permissible speed Bearings on sleeves

The speed ratings in the **product tables** indicate:

- the **reference speed**, which enables a quick assessment of the speed capabilities from a thermal frame of reference
- the **limiting speed**, which is a mechanical limit that should not be exceeded unless the bearing design and the application are adapted for higher speeds



For additional information, refer to *Operating temperature and speed*, [page 130](#).

Design considerations

Ball protrusion

The balls of some bearings in the 12 and 13 series protrude from the side faces of the bearing ([fig. 10](#)). The values of the protrusion are listed in the **product table**, [page 457](#), and should be considered when designing components in close proximity to the bearing.

Self-aligning ball bearings with a tapered bore can be mounted with:

- an adapter sleeve on plain or stepped shafts ([fig. 11](#))
- a withdrawal sleeve on stepped shafts ([fig. 12](#))

Adapter sleeves are supplied complete with a locking device.

For appropriate SKF adapter sleeves, refer to the **product table**, [page 458](#).

When using sealed bearings, make sure appropriate SKF adapter sleeve assemblies (e.g. E design sleeve, refer to the **product table**) are used to prevent the locking device from interfering with the seal ([fig. 13](#)). Alternatively, use a spacer ring between the bearing and the lock washer.

For additional information

- *Adapter sleeves*, [page 1065](#)
- *Withdrawal sleeves*, [page 1087](#)

Bearings with an extended inner ring

When two of these bearings are used to support a shaft, to locate the shaft axially the inner ring slots must be arranged facing towards or away from each other ([fig. 9](#), [page 441](#)).

Fig. 10

Protrusion of balls from side faces

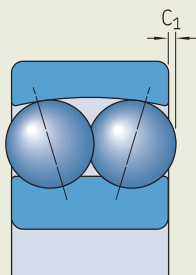
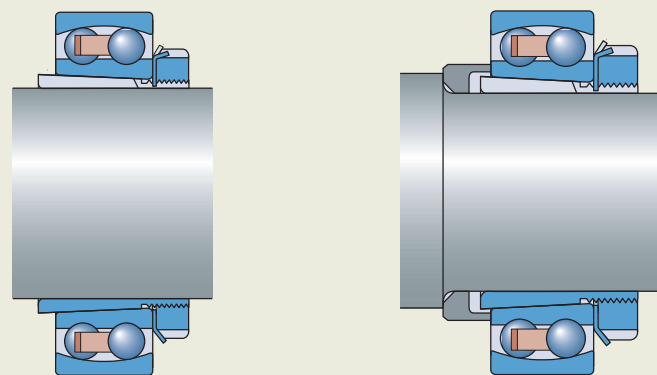


Fig. 11

Bearings with a tapered bore mounted with an adapter sleeve



On a plain shaft

On a stepped shaft

Appropriate bearing housings

Appropriate SKF bearing housings are available in a variety of designs and sizes for a wide range of applications. The designs include:

- SNL, SE plummer (pillow) block housings in the 2, 3, 5 and 6 series
- FNL flanged housings
- SAF plummer (pillow) block housings for inch shafts

Additional information about SKF bearing housings is available online at skf.com/housings.

Mounting

Mounting bearings with a cylindrical bore

Refer to *Mounting bearings with a cylindrical bore*, page 201.

Mounting bearings with a tapered bore

Bearings with a tapered bore are mounted with an interference fit, by using one of the following methods:

- 1 Feeling the clearance reduction by turning and swivelling the outer ring (fig. 14)**
 - This method is valid for bearings with Normal radial clearance (not for sealed bearings).
 - The clearance reduction in the bearing is sufficient when the outer ring can be turned easily, but a slight resistance is felt when it is swivelled out.
- 2 Measuring the lock nut tightening angle (table 7, page 448)**
- 3 Measuring the axial drive-up (table 7)**
- 4 Applying the SKF Drive-up Method**

For bearings with $d \geq 50$ mm, SKF recommends using the SKF Drive-up Method. This is a fast, reliable and safe method to determine the appropriate interference fit. Additional information is available online at skf.com/drive-up.

For additional information about these mounting methods, refer to *Mounting bearings with a tapered bore*, page 203, or the *SKF bearing maintenance handbook*.



Fig. 12

Bearing with a tapered bore mounted with a withdrawal sleeve on a stepped shaft

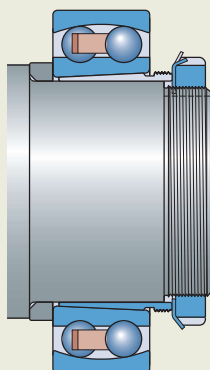


Fig. 13

Sealed bearing with a tapered bore mounted with an E design adapter sleeve

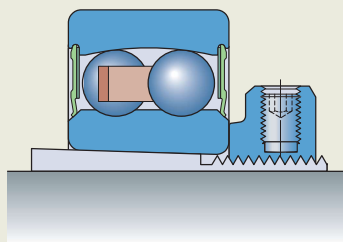


Fig. 14

Check clearance reduction

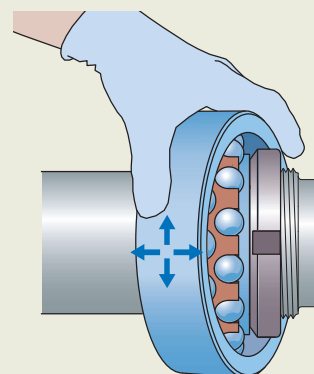
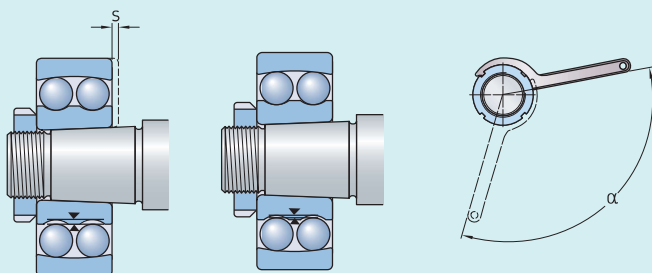


Table 7

Drive-up data for self-aligning ball bearings with a tapered bore

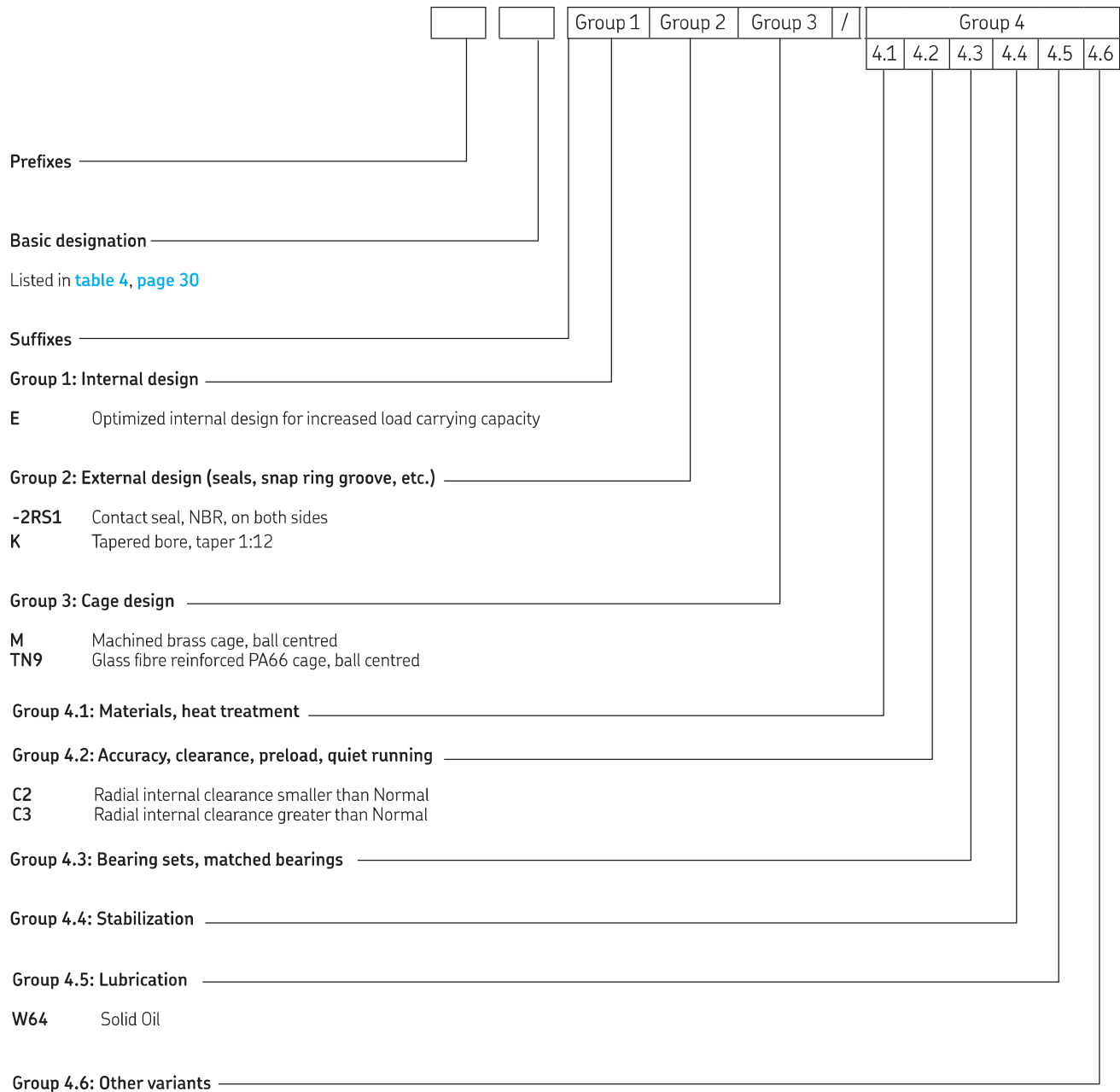


| Bore diameter d | Axial drive-up $s^{1)2)}$ | Lock nut tightening angle $\alpha^{1)}$ |
|----------------------|------------------------------|--|
| mm | mm | ° |
| 20 | 0,22 | 80 |
| 25 | 0,22 | 55 |
| 30 | 0,22 | 55 |
| 35 | 0,30 | 70 |
| 40 | 0,30 | 70 |
| 45 | 0,35 | 80 |
| 50 | 0,35 | 80 |
| 55 | 0,40 | 75 |
| 60 | 0,40 | 75 |
| 65 | 0,40 | 80 |
| 70 | 0,40 | 80 |
| 75 | 0,45 | 85 |
| 80 | 0,45 | 85 |
| 85 | 0,60 | 110 |
| 90 | 0,60 | 110 |
| 95 | 0,60 | 110 |
| 100 | 0,60 | 110 |
| 110 | 0,70 | 125 |
| 120 | 0,70 | 125 |

¹⁾ Not valid for the SKF Drive-up Method.

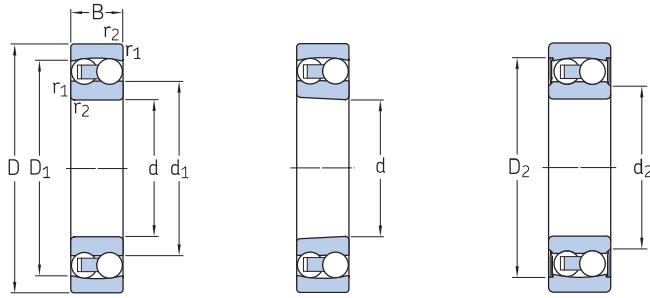
²⁾ The listed values are valid only for solid steel shafts and general applications. They are to be used as guideline values only, as it is difficult to establish an exact starting position. Also, the axial drive-up, s , differs slightly between the different bearings series.

Designation system



4.1 Self-aligning ball bearings

d 5 – 20 mm



Cylindrical bore

Tapered bore

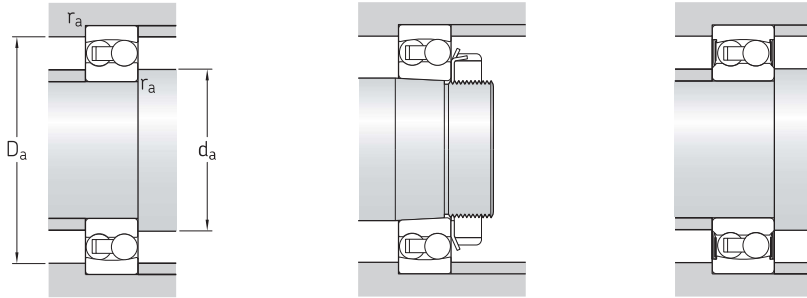
Sealed

4.1



| Principal dimensions | | | Basic load ratings | | Fatigue load limit | Speed ratings | | Mass | Designations | |
|----------------------|----|----|--------------------|--------|--------------------|-----------------|----------------|-------|-------------------------------|--------------|
| d | D | B | dynamic | static | | Reference speed | Limiting speed | | Bearing with cylindrical bore | tapered bore |
| mm | | | kN | | kN | r/min | | kg | – | |
| 5 | 19 | 6 | 2,51 | 0,48 | 0,025 | 63 000 | 45 000 | 0,009 | ▶ 135 TN9 | – |
| 6 | 19 | 6 | 2,51 | 0,48 | 0,025 | 70 000 | 45 000 | 0,009 | ▶ 126 TN9 | – |
| 7 | 22 | 7 | 2,65 | 0,56 | 0,029 | 63 000 | 40 000 | 0,014 | ▶ 127 TN9 | – |
| 8 | 22 | 7 | 2,65 | 0,56 | 0,029 | 60 000 | 40 000 | 0,014 | ▶ 108 TN9 | – |
| 9 | 26 | 8 | 3,9 | 0,82 | 0,043 | 60 000 | 38 000 | 0,022 | ▶ 129 TN9 | – |
| 10 | 30 | 9 | 5,53 | 1,18 | 0,061 | 56 000 | 36 000 | 0,034 | ▶ 1200 ETN9 | – |
| | 30 | 14 | 5,53 | 1,18 | 0,06 | – | 17 000 | 0,048 | ▶ 2200 E-2RS1TN9 | – |
| | 30 | 14 | 8,06 | 1,73 | 0,09 | 50 000 | 34 000 | 0,047 | ▶ 2200 ETN9 | – |
| 12 | 32 | 10 | 6,24 | 1,43 | 0,072 | 50 000 | 32 000 | 0,04 | ▶ 1201 ETN9 | – |
| | 32 | 14 | 6,24 | 1,43 | 0,08 | – | 16 000 | 0,053 | ▶ 2201 E-2RS1TN9 | – |
| | 32 | 14 | 8,52 | 1,9 | 0,098 | 45 000 | 30 000 | 0,053 | ▶ 2201 ETN9 | – |
| | 37 | 12 | 9,36 | 2,16 | 0,12 | 40 000 | 28 000 | 0,067 | ▶ 1301 ETN9 | – |
| | 37 | 17 | 11,7 | 2,7 | 0,14 | 38 000 | 28 000 | 0,095 | 2301 | – |
| 15 | 35 | 11 | 7,41 | 1,76 | 0,09 | 45 000 | 28 000 | 0,049 | ▶ 1202 ETN9 | – |
| | 35 | 14 | 7,41 | 1,76 | 0,09 | – | 14 000 | 0,058 | ▶ 2202 E-2RS1TN9 | – |
| | 35 | 14 | 8,71 | 2,04 | 0,11 | 38 000 | 26 000 | 0,06 | ▶ 2202 ETN9 | – |
| | 42 | 13 | 10,8 | 2,6 | 0,14 | 34 000 | 24 000 | 0,094 | ▶ 1302 ETN9 | – |
| | 42 | 17 | 10,8 | 2,6 | 0,14 | – | 12 000 | 0,11 | ▶ 2302 E-2RS1TN9 | – |
| | 42 | 17 | 11,9 | 2,9 | 0,15 | 32 000 | 24 000 | 0,12 | ▶ 2302 | – |
| 17 | 40 | 12 | 8,84 | 2,2 | 0,12 | 38 000 | 24 000 | 0,073 | ▶ 1203 ETN9 | – |
| | 40 | 16 | 8,84 | 2,2 | 0,12 | – | 12 000 | 0,089 | ▶ 2203 E-2RS1TN9 | – |
| | 40 | 16 | 10,6 | 2,55 | 0,14 | 34 000 | 24 000 | 0,088 | ▶ 2203 ETN9 | – |
| | 47 | 14 | 12,7 | 3,4 | 0,18 | 28 000 | 20 000 | 0,12 | ▶ 1303 ETN9 | – |
| | 47 | 19 | 12,7 | 3,4 | 0,18 | – | 11 000 | 0,16 | ▶ 2303 E-2RS1TN9 | – |
| | 47 | 19 | 14,3 | 3,55 | 0,19 | 30 000 | 22 000 | 0,18 | 2303 M | – |
| 20 | 47 | 14 | 12,7 | 3,4 | 0,18 | 32 000 | 20 000 | 0,12 | ▶ 1204 ETN9 | 1204 EKTN9 |
| | 47 | 18 | 12,7 | 3,4 | 0,18 | – | 10 000 | 0,14 | ▶ 2204 E-2RS1TN9 | – |
| | 47 | 18 | 16,8 | 4,15 | 0,22 | 28 000 | 20 000 | 0,14 | ▶ 2204 ETN9 | – |
| | 52 | 15 | 14,3 | 4 | 0,21 | 26 000 | 18 000 | 0,16 | ▶ 1304 ETN9 | – |
| | 52 | 21 | 14,3 | 4 | 0,21 | – | 9 000 | 0,21 | ▶ 2304 E-2RS1TN9 | – |
| | 52 | 21 | 18,2 | 4,75 | 0,24 | 26 000 | 19 000 | 0,22 | 2304 TN9 | – |

▶ Popular item

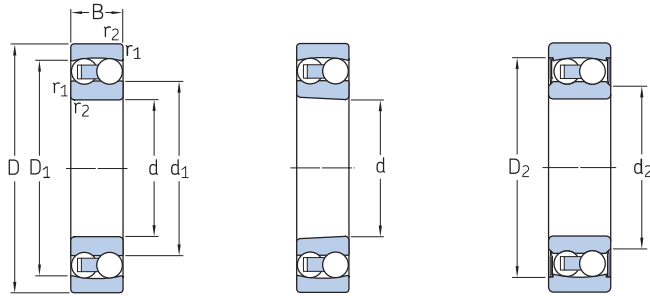


4.1

| Dimensions | | | | | | Abutment and fillet dimensions | | | | | Calculation factors | | | | | |
|------------|---------------------------------|---------------------------------|----------------|---|---|--------------------------------|------------------------|------------------------|------------------------|------------------------|---------------------|------|----------------|----------------|----------------|--|
| d | d ₁ , d ₂ | D ₁ , D ₂ | C ₁ | b | K | r _{1,2} min. | d _a min. | d _a max. | D _a max. | r _a max. | k _r | e | Y ₁ | Y ₂ | Y ₀ | |
| mm | | | | | | | mm | | | | | - | | | | |
| 5 | 10,3 | 15,4 | - | - | - | 0,3 | 7,4 | - | 16,6 | 0,3 | 0,045 | 0,33 | 1,9 | 3 | 2 | |
| 6 | 10,3 | 15,4 | - | - | - | 0,3 | 8,4 | - | 16,6 | 0,3 | 0,04 | 0,33 | 1,9 | 3 | 2 | |
| 7 | 12,7 | 17,6 | - | - | - | 0,3 | 9,4 | - | 19,6 | 0,3 | 0,04 | 0,33 | 1,9 | 3 | 2 | |
| 8 | 12,7 | 17,6 | - | - | - | 0,3 | 10,4 | - | 19,6 | 0,3 | 0,03 | 0,33 | 1,9 | 3 | 2 | |
| 9 | 14,8 | 20,4 | - | - | - | 0,3 | 11,4 | - | 23,6 | 0,3 | 0,04 | 0,33 | 1,9 | 3 | 2 | |
| 10 | 16,5 | 23,5 | - | - | - | 0,6 | 14,2 | - | 25,8 | 0,6 | 0,04 | 0,33 | 1,9 | 3 | 2 | |
| | 14,6 | 24,8 | - | - | - | 0,6 | 14 | 14 | 25,8 | 0,6 | 0,045 | 0,33 | 1,9 | 3 | 2 | |
| | 15,3 | 24,3 | - | - | - | 0,6 | 14,2 | - | 25,8 | 0,6 | 0,045 | 0,54 | 1,15 | 1,8 | 1,3 | |
| 12 | 18,2 | 25,7 | - | - | - | 0,6 | 16,2 | - | 27,8 | 0,6 | 0,04 | 0,33 | 1,9 | 3 | 2 | |
| | 15,5 | 27,4 | - | - | - | 0,6 | 15,5 | 15,5 | 27,8 | 0,6 | 0,045 | 0,33 | 1,9 | 3 | 2 | |
| | 17,4 | 26,4 | - | - | - | 0,6 | 16,2 | - | 27,8 | 0,6 | 0,045 | 0,5 | 1,25 | 2 | 1,3 | |
| 15 | 20,2 | 29,5 | - | - | - | 1 | 17,6 | - | 31,4 | 1 | 0,04 | 0,35 | 1,8 | 2,8 | 1,8 | |
| | 18,9 | 29,1 | - | - | - | 1 | 17,6 | - | 31,4 | 1 | 0,05 | 0,6 | 1,05 | 1,6 | 1,1 | |
| | 21,1 | 28,9 | - | - | - | 0,6 | 19,2 | - | 30,8 | 0,6 | 0,04 | 0,33 | 1,9 | 3 | 2 | |
| 15 | 19 | 30,4 | - | - | - | 0,6 | 19 | 19 | 30,8 | 0,6 | 0,045 | 0,33 | 1,9 | 3 | 2 | |
| | 20,8 | 29,5 | - | - | - | 0,6 | 19,2 | - | 30,8 | 0,6 | 0,045 | 0,43 | 1,5 | 2,3 | 1,6 | |
| | 23,9 | 34,3 | - | - | - | 1 | 20,6 | - | 36,4 | 1 | 0,04 | 0,31 | 2 | 3,1 | 2,2 | |
| 17 | 20,3 | 36,3 | - | - | - | 1 | 20 | 20 | 36,4 | 1 | 0,05 | 0,31 | 2 | 3,1 | 2,2 | |
| | 23,1 | 33,3 | - | - | - | 1 | 20,6 | - | 36,4 | 1 | 0,05 | 0,52 | 1,2 | 1,9 | 1,3 | |
| | 24 | 32,9 | - | - | - | 0,6 | 21,2 | - | 35,8 | 0,6 | 0,04 | 0,31 | 2 | 3,1 | 2,2 | |
| 17 | 21,1 | 35 | - | - | - | 0,6 | 21 | 21 | 35,8 | 0,6 | 0,045 | 0,31 | 2 | 3,1 | 2,2 | |
| | 23,8 | 33,4 | - | - | - | 0,6 | 21,2 | - | 35,8 | 0,6 | 0,045 | 0,43 | 1,5 | 2,3 | 1,6 | |
| | 28,8 | 40 | - | - | - | 1 | 22,6 | - | 41,4 | 1 | 0,04 | 0,3 | 2,1 | 3,3 | 2,2 | |
| 20 | 25,5 | 41,3 | - | - | - | 1 | 22 | 25,5 | 41,4 | 1 | 0,05 | 0,3 | 2,1 | 3,3 | 2,2 | |
| | 26,1 | 37,2 | - | - | - | 1 | 22,6 | - | 41,4 | 1 | 0,05 | 0,52 | 1,2 | 1,9 | 1,3 | |
| | 28,8 | 40 | - | - | - | 1 | 25,6 | - | 41,4 | 1 | 0,04 | 0,3 | 2,1 | 3,3 | 2,2 | |
| 20 | 25,9 | 41,3 | - | - | - | 1 | 25 | 25,5 | 41,4 | 1 | 0,045 | 0,3 | 2,1 | 3,3 | 2,2 | |
| | 27,3 | 40 | - | - | - | 1 | 25,6 | - | 41,4 | 1 | 0,045 | 0,4 | 1,6 | 2,4 | 1,6 | |
| | 33,3 | 44,6 | - | - | - | 1 | 27 | - | 45 | 1 | 0,04 | 0,28 | 2,2 | 3,5 | 2,5 | |
| 20 | 28,6 | 46,3 | - | - | - | 1,1 | 26,5 | 28,5 | 45 | 1,1 | 0,05 | 0,28 | 2,2 | 3,5 | 2,5 | |
| | 29,1 | 41,9 | - | - | - | 1,1 | 27 | - | 45 | 1,1 | 0,05 | 0,52 | 1,2 | 1,9 | 1,3 | |

4.1 Self-aligning ball bearings

d 25 – 45 mm



Cylindrical bore

Tapered bore

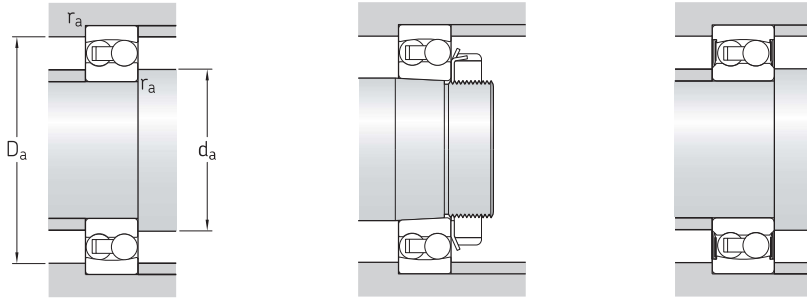
Sealed

4.1



| Principal dimensions | | | Basic load ratings | | Fatigue load limit | Speed ratings | | Mass | Designations | |
|----------------------|-----|----|--------------------|----------------|--------------------|-----------------|----------------|------|-------------------------------|-------------------|
| d | D | B | C | C ₀ | | Reference speed | Limiting speed | | Bearing with cylindrical bore | tapered bore |
| mm | | | kN | | kN | r/min | | kg | – | |
| 25 | 52 | 15 | 14,3 | 4 | 0,21 | 28 000 | 18 000 | 0,14 | ▶ 1205 ETN9 | ▶ 1205 EKTN9 |
| | 52 | 18 | 14,3 | 4 | 0,21 | – | 9 000 | 0,16 | ▶ 2205 E-2RS1TN9 | ▶ 2205 E-2RS1KTN9 |
| | 52 | 18 | 16,8 | 4,4 | 0,23 | 26 000 | 18 000 | 0,16 | ▶ 2205 ETN9 | ▶ 2205 EKTN9 |
| | 62 | 17 | 19 | 5,4 | 0,28 | 22 000 | 15 000 | 0,26 | ▶ 1305 ETN9 | ▶ 1305 EKTN9 |
| | 62 | 24 | 19 | 5,4 | 0,28 | – | 7 500 | 0,34 | ▶ 2305 E-2RS1TN9 | ▶ 2305 E-2RS1KTN9 |
| | 62 | 24 | 27 | 7,1 | 0,37 | 22 000 | 16 000 | 0,34 | ▶ 2305 ETN9 | ▶ 2305 EKTN9 |
| 30 | 62 | 16 | 15,6 | 4,65 | 0,24 | 24 000 | 15 000 | 0,22 | ▶ 1206 ETN9 | ▶ 1206 EKTN9 |
| | 62 | 20 | 15,6 | 4,65 | 0,24 | – | 7 500 | 0,26 | ▶ 2206 E-2RS1TN9 | ▶ 2206 E-2RS1KTN9 |
| | 62 | 20 | 23,8 | 6,7 | 0,35 | 22 000 | 15 000 | 0,26 | ▶ 2206 ETN9 | ▶ 2206 EKTN9 |
| | 72 | 19 | 22,5 | 6,8 | 0,36 | 19 000 | 13 000 | 0,39 | ▶ 1306 ETN9 | ▶ 1306 EKTN9 |
| | 72 | 27 | 22,5 | 6,8 | 0,36 | – | 6 700 | 0,51 | ▶ 2306 E-2RS1TN9 | ▶ 2306 E-2RS1KTN9 |
| | 72 | 27 | 31,2 | 8,8 | 0,45 | 18 000 | 13 000 | 0,5 | ▶ 2306 | ▶ 2306 K |
| 35 | 72 | 17 | 19 | 6 | 0,31 | 20 000 | 13 000 | 0,32 | ▶ 1207 ETN9 | ▶ 1207 EKTN9 |
| | 72 | 23 | 19 | 6 | 0,31 | – | 6 300 | 0,41 | ▶ 2207 E-2RS1TN9 | ▶ 2207 E-2RS1KTN9 |
| | 72 | 23 | 30,2 | 8,8 | 0,455 | 18 000 | 12 000 | 0,4 | ▶ 2207 ETN9 | ▶ 2207 EKTN9 |
| | 80 | 21 | 26,5 | 8,5 | 0,43 | 16 000 | 11 000 | 0,51 | ▶ 1307 ETN9 | ▶ 1307 EKTN9 |
| | 80 | 31 | 26,5 | 8,5 | 0,43 | – | 5 600 | 0,7 | ▶ 2307 E-2RS1TN9 | ▶ 2307 E-2RS1KTN9 |
| | 80 | 31 | 39,7 | 11,2 | 0,59 | 16 000 | 12 000 | 0,68 | ▶ 2307 ETN9 | ▶ 2307 EKTN9 |
| 40 | 80 | 18 | 19,9 | 6,95 | 0,36 | 18 000 | 11 000 | 0,42 | ▶ 1208 ETN9 | ▶ 1208 EKTN9 |
| | 80 | 23 | 19,9 | 6,95 | 0,36 | – | 5 600 | 0,5 | ▶ 2208 E-2RS1TN9 | ▶ 2208 E-2RS1KTN9 |
| | 80 | 23 | 31,9 | 10 | 0,51 | 16 000 | 11 000 | 0,51 | ▶ 2208 ETN9 | ▶ 2208 EKTN9 |
| | 90 | 23 | 33,8 | 11,2 | 0,57 | 14 000 | 9 500 | 0,68 | ▶ 1308 ETN9 | ▶ 1308 EKTN9 |
| | 90 | 33 | 33,8 | 11,2 | 0,57 | – | 5 000 | 0,96 | ▶ 2308 E-2RS1TN9 | ▶ 2308 E-2RS1KTN9 |
| | 90 | 33 | 54 | 16 | 0,82 | 14 000 | 10 000 | 0,93 | ▶ 2308 ETN9 | ▶ 2308 EKTN9 |
| 45 | 85 | 19 | 22,9 | 7,8 | 0,4 | 17 000 | 11 000 | 0,47 | ▶ 1209 ETN9 | ▶ 1209 EKTN9 |
| | 85 | 23 | 22,9 | 7,8 | 0,4 | – | 5 300 | 0,53 | ▶ 2209 E-2RS1TN9 | ▶ 2209 E-2RS1KTN9 |
| | 85 | 23 | 32,5 | 10,6 | 0,54 | 15 000 | 10 000 | 0,55 | ▶ 2209 ETN9 | ▶ 2209 EKTN9 |
| | 100 | 25 | 39 | 13,4 | 0,7 | 12 000 | 8 500 | 0,96 | ▶ 1309 ETN9 | ▶ 1309 EKTN9 |
| | 100 | 36 | 39 | 13,4 | 0,7 | – | 4 500 | 1,3 | ▶ 2309 E-2RS1TN9 | ▶ 2309 E-2RS1KTN9 |
| | 100 | 36 | 63,7 | 19,3 | 1 | 13 000 | 9 000 | 1,25 | ▶ 2309 ETN9 | ▶ 2309 EKTN9 |

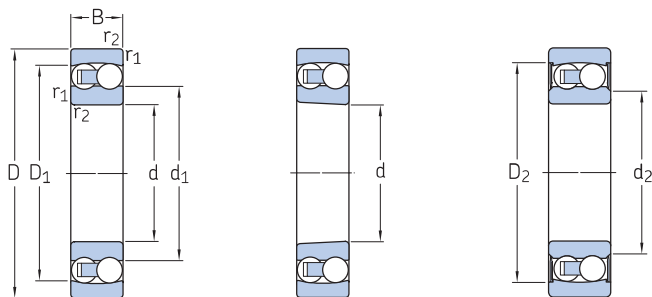
▶ Popular item



| Dimensions | | | | | | Abutment and fillet dimensions | | | | | Calculation factors | | | | |
|------------|---------------------------------|---------------------------------|----------------|---|---|--------------------------------|------------------------|------------------------|------------------------|------------------------|---------------------|------|----------------|----------------|----------------|
| d | d ₁ , d ₂ | D ₁ , D ₂ | C ₁ | b | K | r _{1,2} min. | d _a min. | d _a max. | D _a max. | r _a max. | k _r | e | Y ₁ | Y ₂ | Y ₀ |
| mm | | | | | | | mm | | | | - | | | | |
| 25 | 33,3 | 44,6 | - | - | - | 1 | 30,6 | - | 46,4 | 1 | 0,04 | 0,28 | 2,2 | 3,5 | 2,5 |
| | 31 | 46,3 | - | - | - | 1 | 30,6 | 31 | 46,4 | 1 | 0,045 | 0,28 | 2,2 | 3,5 | 2,5 |
| | 32,2 | 45,1 | - | - | - | 1 | 30,6 | - | 46,4 | 1 | 0,045 | 0,35 | 1,8 | 2,8 | 1,8 |
| | 38 | 50,7 | - | - | - | 1,1 | 32 | - | 55 | 1,1 | 0,04 | 0,28 | 2,2 | 3,5 | 2,5 |
| | 32,8 | 52,7 | - | - | - | 1,1 | 32 | 32,5 | 55 | 1,1 | 0,05 | 0,28 | 2,2 | 3,5 | 2,5 |
| | 35,5 | 52,3 | - | - | - | 1,1 | 32 | - | 55 | 1,1 | 0,05 | 0,44 | 1,4 | 2,2 | 1,4 |
| 30 | 40,3 | 51,9 | - | - | - | 1 | 35,6 | - | 56,4 | 1 | 0,04 | 0,25 | 2,5 | 3,9 | 2,5 |
| | 36,7 | 54,1 | - | - | - | 1 | 35,6 | 36,5 | 56,4 | 1 | 0,045 | 0,25 | 2,5 | 3,9 | 2,5 |
| | 38,7 | 54 | - | - | - | 1 | 35,6 | - | 56,4 | 1 | 0,045 | 0,33 | 1,9 | 3 | 2 |
| | 45,1 | 59,1 | - | - | - | 1,1 | 37 | - | 65 | 1,1 | 0,04 | 0,25 | 2,5 | 3,9 | 2,5 |
| | 40,4 | 61,9 | - | - | - | 1,1 | 37 | 40 | 65 | 1,1 | 0,05 | 0,25 | 2,5 | 3,9 | 2,5 |
| | 41,9 | 59,8 | - | - | - | 1,1 | 37 | - | 65 | 1,1 | 0,05 | 0,44 | 1,4 | 2,2 | 1,4 |
| 35 | 47 | 60,9 | - | - | - | 1,1 | 42 | - | 65 | 1,1 | 0,04 | 0,23 | 2,7 | 4,2 | 2,8 |
| | 42,7 | 62,7 | - | - | - | 1,1 | 42 | 42,5 | 65 | 1,1 | 0,045 | 0,23 | 2,7 | 4,2 | 2,8 |
| | 45,3 | 62,9 | - | - | - | 1,1 | 42 | - | 65 | 1,1 | 0,045 | 0,31 | 2 | 3,1 | 2,2 |
| | 51,5 | 67,5 | - | - | - | 1,5 | 44 | - | 71 | 1,5 | 0,04 | 0,25 | 2,5 | 3,9 | 2,5 |
| | 43,7 | 69,2 | - | - | - | 1,5 | 43,5 | 43,5 | 71 | 1,5 | 0,05 | 0,25 | 2,5 | 3,9 | 2,5 |
| | 46,7 | 67 | - | - | - | 1,5 | 44 | - | 71 | 1,5 | 0,05 | 0,46 | 1,35 | 2,1 | 1,4 |
| 40 | 53,8 | 67,5 | - | - | - | 1,1 | 47 | - | 73 | 1,1 | 0,04 | 0,22 | 2,9 | 4,5 | 2,8 |
| | 49 | 69,8 | - | - | - | 1,1 | 47 | 49 | 73 | 1,1 | 0,045 | 0,22 | 2,9 | 4,5 | 2,8 |
| | 52,3 | 70,2 | - | - | - | 1,1 | 47 | - | 73 | 1,1 | 0,045 | 0,28 | 2,2 | 3,5 | 2,5 |
| | 61,4 | 80,2 | - | - | - | 1,1 | 49 | - | 81 | 1,1 | 0,04 | 0,23 | 2,7 | 4,2 | 2,8 |
| | 55,4 | 81,8 | - | - | - | 1,5 | 49 | 55 | 81 | 1,5 | 0,05 | 0,23 | 2,7 | 4,2 | 2,8 |
| | 53,7 | 77,8 | - | - | - | 1,5 | 49 | - | 81 | 1,5 | 0,05 | 0,4 | 1,6 | 2,4 | 1,6 |
| 45 | 57,5 | 72,5 | - | - | - | 1,1 | 52 | - | 78 | 1,1 | 0,04 | 0,21 | 3 | 4,6 | 3,2 |
| | 52,9 | 75,3 | - | - | - | 1,1 | 52 | 53 | 78 | 1,1 | 0,045 | 0,21 | 3 | 4,6 | 3,2 |
| | 55,3 | 73,2 | - | - | - | 1,1 | 52 | - | 78 | 1,1 | 0,045 | 0,26 | 2,4 | 3,7 | 2,5 |
| | 67,7 | 87,8 | - | - | - | 1,5 | 54 | - | 91 | 1,5 | 0,04 | 0,23 | 2,7 | 4,2 | 2,8 |
| | 60,9 | 90 | - | - | - | 1,5 | 54 | 60,5 | 91 | 1,5 | 0,05 | 0,23 | 2,7 | 4,2 | 2,8 |
| | 60,1 | 86 | - | - | - | 1,5 | 54 | - | 91 | 1,5 | 0,05 | 0,33 | 1,9 | 3 | 2 |

4.1 Self-aligning ball bearings

d 50 – 80 mm



Cylindrical bore

Tapered bore

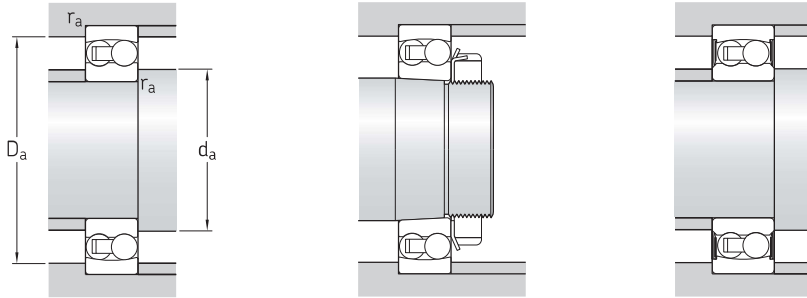
Sealed

4.1



| Principal dimensions | | | Basic load ratings | | Fatigue load limit | Speed ratings | | Mass | Designations | |
|----------------------|-----|----|--------------------|--------|--------------------|-----------------|----------------|------|-------------------------------|-------------------|
| d | D | B | dynamic | static | | Reference speed | Limiting speed | | Bearing with cylindrical bore | tapered bore |
| mm | | | kN | | kN | r/min | | kg | – | |
| 50 | 90 | 20 | 26,5 | 9,15 | 0,48 | 16 000 | 10 000 | 0,53 | ▶ 1210 ETN9 | ▶ 1210 EKTN9 |
| | 90 | 23 | 22,9 | 8,15 | 0,42 | – | 4 800 | 0,57 | ▶ 2210 E-2RS1TN9 | ▶ 2210 E-2RS1KTN9 |
| | 90 | 23 | 33,8 | 11,2 | 0,57 | 14 000 | 9 500 | 0,6 | ▶ 2210 ETN9 | ▶ 2210 EKTN9 |
| | 110 | 27 | 43,6 | 14 | 0,72 | 12 000 | 8 000 | 1,2 | ▶ 1310 ETN9 | ▶ 1310 EKTN9 |
| | 110 | 40 | 43,6 | 14 | 0,72 | – | 4 000 | 1,65 | ▶ 2310 E-2RS1TN9 | ▶ 2310 E-2RS1KTN9 |
| | 110 | 40 | 63,7 | 20 | 1,04 | 14 000 | 9 500 | 1,65 | ▶ 2310 | ▶ 2310 K |
| 55 | 100 | 21 | 27,6 | 10,6 | 0,54 | 14 000 | 9 000 | 0,71 | ▶ 1211 ETN9 | ▶ 1211 EKTN9 |
| | 100 | 25 | 27,6 | 10,6 | 0,54 | – | 4 300 | 0,79 | ▶ 2211 E-2RS1TN9 | ▶ 2211 E-2RS1KTN9 |
| | 100 | 25 | 39 | 13,4 | 0,7 | 12 000 | 8 500 | 0,81 | ▶ 2211 ETN9 | ▶ 2211 EKTN9 |
| | 120 | 29 | 50,7 | 18 | 0,92 | 11 000 | 7 500 | 1,6 | ▶ 1311 ETN9 | ▶ 1311 EKTN9 |
| | 120 | 43 | 76,1 | 24 | 1,25 | 11 000 | 7 500 | 2,1 | ▶ 2311 | ▶ 2311 K |
| 60 | 110 | 22 | 31,2 | 12,2 | 0,62 | 12 000 | 8 500 | 0,9 | ▶ 1212 ETN9 | ▶ 1212 EKTN9 |
| | 110 | 28 | 31,2 | 12,2 | 0,62 | – | 3 800 | 1,05 | ▶ 2212 E-2RS1TN9 | ▶ 2212 E-2RS1KTN9 |
| | 110 | 28 | 48,8 | 17 | 0,88 | 11 000 | 8 000 | 1,1 | ▶ 2212 ETN9 | ▶ 2212 EKTN9 |
| | 130 | 31 | 58,5 | 22 | 1,12 | 9 000 | 6 300 | 1,95 | ▶ 1312 ETN9 | ▶ 1312 EKTN9 |
| | 130 | 46 | 87,1 | 28,5 | 1,46 | 9 500 | 7 000 | 2,6 | ▶ 2312 | ▶ 2312 K |
| 65 | 120 | 23 | 35,1 | 14 | 0,72 | 11 000 | 7 000 | 1,15 | ▶ 1213 ETN9 | ▶ 1213 EKTN9 |
| | 120 | 31 | 35,1 | 14 | 0,72 | – | 3 600 | 1,4 | ▶ 2213 E-2RS1TN9 | ▶ 2213 E-2RS1KTN9 |
| | 120 | 31 | 57,2 | 20 | 1,02 | 10 000 | 7 000 | 1,45 | ▶ 2213 ETN9 | ▶ 2213 EKTN9 |
| | 140 | 33 | 65 | 25,5 | 1,25 | 8 500 | 6 000 | 2,45 | ▶ 1313 ETN9 | ▶ 1313 EKTN9 |
| | 140 | 48 | 95,6 | 32,5 | 1,66 | 9 000 | 6 300 | 3,25 | ▶ 2313 | ▶ 2313 K |
| 70 | 125 | 24 | 35,8 | 14,6 | 0,75 | 11 000 | 7 000 | 1,25 | ▶ 1214 ETN9 | – |
| | 125 | 31 | 35,8 | 14,6 | 0,75 | – | 3 400 | 1,45 | ▶ 2214 E-2RS1TN9 | – |
| | 125 | 31 | 44,2 | 17 | 0,88 | 10 000 | 6 700 | 1,5 | ▶ 2214 | – |
| | 150 | 35 | 74,1 | 27,5 | 1,34 | 8 500 | 6 000 | 3 | ▶ 1314 | – |
| | 150 | 51 | 111 | 37,5 | 1,86 | 8 000 | 6 000 | 3,9 | ▶ 2314 | – |
| 75 | 130 | 25 | 39 | 15,6 | 0,8 | 10 000 | 6 700 | 1,35 | ▶ 1215 | ▶ 1215 K |
| | 130 | 31 | 58,5 | 22 | 1,12 | 9 000 | 6 300 | 1,6 | ▶ 2215 ETN9 | ▶ 2215 EKTN9 |
| | 160 | 37 | 79,3 | 30 | 1,43 | 8 000 | 5 600 | 3,55 | ▶ 1315 | ▶ 1315 K |
| | 160 | 55 | 124 | 43 | 2,04 | 7 500 | 5 600 | 4,7 | ▶ 2315 | ▶ 2315 K |
| 80 | 140 | 26 | 39,7 | 17 | 0,83 | 9 500 | 6 000 | 1,65 | ▶ 1216 | ▶ 1216 K |
| | 140 | 33 | 65 | 25,5 | 1,25 | 8 500 | 6 000 | 2 | ▶ 2216 ETN9 | ▶ 2216 EKTN9 |
| | 170 | 39 | 88,4 | 33,5 | 1,5 | 7 500 | 5 300 | 4,2 | ▶ 1316 | ▶ 1316 K |
| | 170 | 58 | 135 | 49 | 2,24 | 7 000 | 5 300 | 6,1 | ▶ 2316 | ▶ 2316 K |

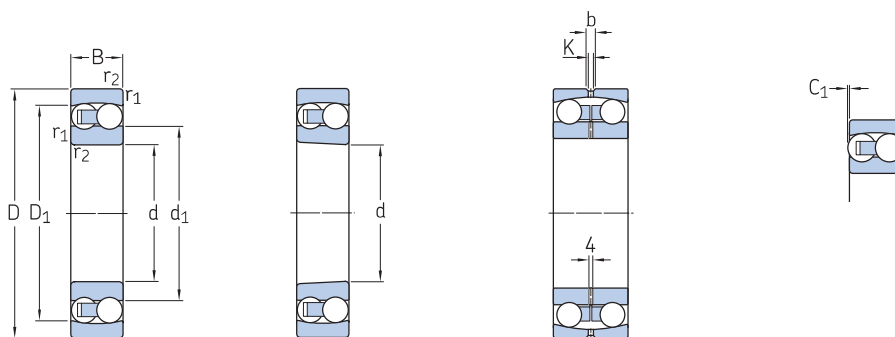
▶ Popular item



| Dimensions | | | | | | Abutment and fillet dimensions | | | | | Calculation factors | | | | | |
|------------|---------------------------------|---------------------------------|----------------|---|---|--------------------------------|------------------------|------------------------|------------------------|------------------------|---------------------|------|----------------|----------------|----------------|--|
| d | d ₁ , d ₂ | D ₁ , D ₂ | C ₁ | b | K | r _{1,2} min. | d _a min. | d _a max. | D _a max. | r _a max. | k _r | e | Y ₁ | Y ₂ | Y ₀ | |
| mm | | | | | | | mm | | | | | - | | | | |
| 50 | 61,7 | 78,1 | - | - | - | 1,1 | 57 | - | 83 | 1,1 | 0,04 | 0,21 | 3 | 4,6 | 3,2 | |
| | 57,7 | 79,4 | - | - | - | 1,1 | 57 | 58 | 83 | 1,1 | 0,045 | 0,2 | 3,2 | 4,9 | 3,2 | |
| | 61,4 | 80,2 | - | - | - | 1,1 | 57 | - | 83 | 1,1 | 0,045 | 0,23 | 2,7 | 4,2 | 2,8 | |
| | 70,3 | 92,6 | - | - | - | 2 | 61 | - | 99 | 2 | 0,04 | 0,24 | 2,6 | 4,1 | 2,8 | |
| | 62,9 | 95,2 | - | - | - | 2 | 61 | 62,5 | 99 | 2 | 0,05 | 0,24 | 2,6 | 4,1 | 2,8 | |
| | 66 | 92,5 | - | - | - | 2 | 61 | - | 99 | 2 | 0,05 | 0,43 | 1,5 | 2,3 | 1,6 | |
| 55 | 70,3 | 86,5 | - | - | - | 1,5 | 64 | - | 91 | 1,5 | 0,04 | 0,19 | 3,3 | 5,1 | 3,6 | |
| | 65,9 | 88,5 | - | - | - | 1,5 | 64 | 65,5 | 91 | 1,5 | 0,045 | 0,19 | 3,3 | 5,1 | 3,6 | |
| | 67,7 | 87,8 | - | - | - | 1,5 | 64 | - | 91 | 1,5 | 0,045 | 0,23 | 2,7 | 4,2 | 2,8 | |
| | 77,9 | 102 | - | - | - | 2 | 66 | - | 109 | 2 | 0,04 | 0,23 | 2,7 | 4,2 | 2,8 | |
| | 72 | 101 | - | - | - | 2 | 66 | - | 109 | 2 | 0,05 | 0,4 | 1,6 | 2,4 | 1,6 | |
| 60 | 78 | 95,6 | - | - | - | 1,5 | 69 | - | 101 | 1,5 | 0,04 | 0,19 | 3,3 | 5,1 | 3,6 | |
| | 73,2 | 97 | - | - | - | 1,5 | 69 | 73 | 101 | 1,5 | 0,045 | 0,19 | 3,3 | 5,1 | 3,6 | |
| | 74,4 | 96,9 | - | - | - | 1,5 | 69 | - | 101 | 1,5 | 0,045 | 0,24 | 2,6 | 4,1 | 2,8 | |
| | 91,6 | 117 | - | - | - | 2,1 | 72 | - | 118 | 2 | 0,04 | 0,22 | 2,9 | 4,5 | 2,8 | |
| | 77,1 | 110 | - | - | - | 2,1 | 72 | - | 118 | 2 | 0,05 | 0,33 | 1,9 | 3 | 2 | |
| 65 | 85,1 | 104 | - | - | - | 1,5 | 74 | - | 111 | 1,5 | 0,04 | 0,18 | 3,5 | 5,4 | 3,6 | |
| | 79,3 | 106 | - | - | - | 1,5 | 74 | 79 | 111 | 1,5 | 0,045 | 0,18 | 3,5 | 5,4 | 3,6 | |
| | 80,6 | 106 | - | - | - | 1,5 | 74 | - | 111 | 1,5 | 0,045 | 0,24 | 2,6 | 4,1 | 2,8 | |
| | 99 | 126 | - | - | - | 2 | 77 | - | 128 | 2 | 0,04 | 0,22 | 2,9 | 4,5 | 2,8 | |
| | 86 | 120 | - | - | - | 2,1 | 77 | - | 128 | 2 | 0,05 | 0,37 | 1,7 | 2,6 | 1,8 | |
| 70 | 87,4 | 107 | - | - | - | 1,5 | 79 | - | 116 | 1,5 | 0,04 | 0,18 | 3,5 | 5,4 | 3,6 | |
| | 81,4 | 109 | - | - | - | 1,5 | 79 | 81 | 116 | 1,5 | 0,045 | 0,18 | 3,5 | 5,4 | 3,6 | |
| | 88 | 109 | - | - | - | 1,5 | 79 | - | 116 | 1,5 | 0,04 | 0,27 | 2,3 | 3,6 | 2,5 | |
| | 97,5 | 127 | - | - | - | 2,1 | 82 | - | 138 | 2 | 0,045 | 0,22 | 2,9 | 4,5 | 2,8 | |
| | 92 | 129 | - | - | - | 2,1 | 82 | - | 138 | 2 | 0,05 | 0,37 | 1,7 | 2,6 | 1,8 | |
| 75 | 93 | 115 | - | - | - | 1,5 | 84 | - | 121 | 1,5 | 0,04 | 0,17 | 3,7 | 5,7 | 4 | |
| | 91,6 | 117 | - | - | - | 1,5 | 84 | - | 121 | 1,5 | 0,045 | 0,22 | 2,9 | 4,5 | 2,8 | |
| | 104 | 136 | - | - | - | 2,1 | 87 | - | 148 | 2 | 0,045 | 0,22 | 2,9 | 4,5 | 2,8 | |
| | 97,8 | 137 | - | - | - | 2,1 | 87 | - | 148 | 2 | 0,05 | 0,37 | 1,7 | 2,6 | 1,8 | |
| | 102 | 123 | - | - | - | 2 | 91 | - | 129 | 2 | 0,04 | 0,16 | 3,9 | 6,1 | 4 | |
| 80 | 99 | 126 | - | - | - | 2 | 91 | - | 129 | 2 | 0,045 | 0,22 | 2,9 | 4,5 | 2,8 | |
| | 110 | 145 | - | - | - | 2,1 | 92 | - | 158 | 2 | 0,045 | 0,22 | 2,9 | 4,5 | 2,8 | |
| | 104 | 146 | - | - | - | 2,1 | 92 | - | 158 | 2 | 0,05 | 0,37 | 1,7 | 2,6 | 1,8 | |

4.1 Self-aligning ball bearings

d 85 – 240 mm



Cylindrical bore

Tapered bore

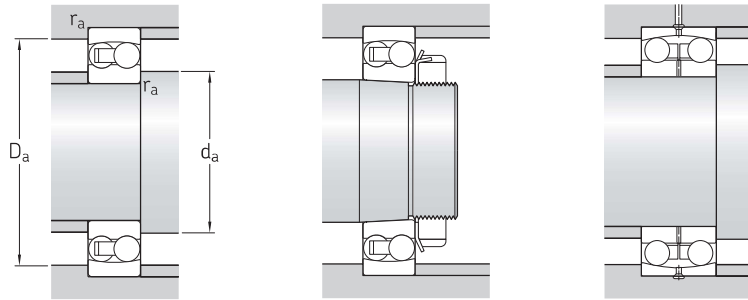
130.., 139..

4.1



| Principal dimensions | | | Basic load ratings | | Fatigue load limit | Speed ratings | | Mass | Designations | |
|----------------------|-----|----|--------------------|----------------|--------------------|-----------------|----------------|------|-------------------------------|--------------|
| d | D | B | C | C ₀ | | Reference speed | Limiting speed | | Bearing with cylindrical bore | tapered bore |
| mm | | | kN | | kN | r/min | | kg | – | |
| 85 | 150 | 28 | 48,8 | 20,8 | 0,98 | 9 000 | 5 600 | 2,05 | ▶ 1217 | ▶ 1217 K |
| | 150 | 36 | 58,5 | 23,6 | 1,12 | 8 000 | 5 600 | 2,5 | ▶ 2217 | ▶ 2217 K |
| | 180 | 41 | 97,5 | 38 | 1,7 | 7 000 | 4 800 | 5 | 1317 | ▶ 1317 K |
| | 180 | 60 | 140 | 51 | 2,28 | 6 700 | 4 800 | 7,05 | 2317 | – |
| 90 | 160 | 30 | 57,2 | 23,6 | 1,08 | 8 500 | 5 300 | 2,5 | ▶ 1218 | ▶ 1218 K |
| | 160 | 40 | 70,2 | 28,5 | 1,32 | 7 500 | 5 300 | 3,4 | ▶ 2218 | ▶ 2218 K |
| | 190 | 43 | 117 | 44 | 1,93 | 6 700 | 4 500 | 5,8 | 1318 | 1318 K |
| | 190 | 64 | 151 | 57 | 2,5 | 6 300 | 4 500 | 8,45 | 2318 | 2318 K |
| 95 | 170 | 32 | 63,7 | 27 | 1,2 | 8 000 | 5 000 | 3,1 | 1219 | ▶ 1219 K |
| | 170 | 43 | 83,2 | 34,5 | 1,53 | 7 000 | 5 000 | 4,1 | 2219 | 2219 K |
| | 200 | 45 | 133 | 51 | 2,16 | 6 300 | 4 300 | 6,7 | 1319 | 1319 K |
| | 200 | 67 | 165 | 64 | 2,75 | 6 000 | 4 500 | 9,8 | 2319 M | 2319 KM |
| 100 | 180 | 34 | 68,9 | 30 | 1,29 | 7 500 | 4 800 | 3,7 | ▶ 1220 | ▶ 1220 K |
| | 180 | 46 | 97,5 | 40,5 | 1,76 | 6 700 | 4 800 | 5 | 2220 | 2220 K |
| | 215 | 47 | 143 | 57 | 2,36 | 6 000 | 4 000 | 8,3 | 1320 | ▶ 1320 K |
| | 215 | 73 | 190 | 80 | 3,25 | 5 600 | 4 000 | 12,5 | 2320 | 2320 K |
| 110 | 200 | 38 | 88,4 | 39 | 1,6 | 6 700 | 4 300 | 5,15 | ▶ 1222 | ▶ 1222 K |
| | 200 | 53 | 124 | 52 | 2,12 | 6 000 | 4 300 | 7,1 | 2222 | 2222 K |
| | 240 | 50 | 163 | 72 | 2,75 | 5 300 | 3 600 | 12 | 1322 M | 1322 KM |
| 120 | 215 | 42 | 119 | 53 | 2,12 | 6 300 | 4 000 | 6,75 | 1224 M | 1224 KM |
| 130 | 230 | 46 | 127 | 58,5 | 2,24 | 5 600 | 3 600 | 8,3 | ▶ 1226 M | 1226 KM |
| 150 | 225 | 56 | 57,2 | 23,6 | 0,88 | 5 600 | 3 400 | 7,5 | 13030 | – |
| 180 | 280 | 74 | 95,6 | 40 | 1,34 | 4 500 | 2 800 | 16 | 13036 | – |
| 200 | 280 | 60 | 60,5 | 29 | 0,97 | 4 300 | 2 600 | 10,5 | 13940 | – |
| 220 | 300 | 60 | 60,5 | 30,5 | 0,97 | 3 800 | 2 400 | 11 | 13944 | – |
| 240 | 320 | 60 | 60,5 | 32 | 0,98 | 3 800 | 2 200 | 11,5 | 13948 | – |

▶ Popular item

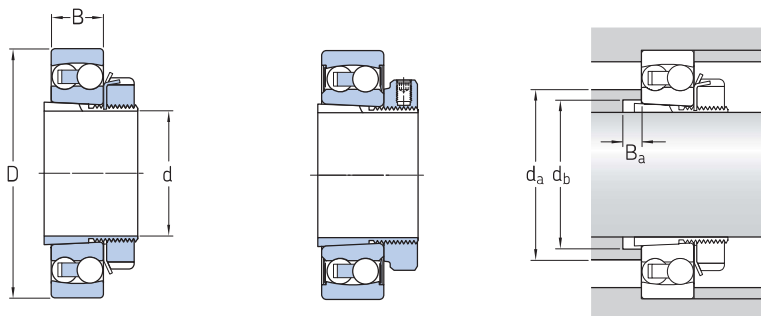


4.1

| Dimensions | | | | | Abutment and fillet dimensions | | | | | Calculation factors | | | | | |
|------------|---------------------------------|---------------------------------|----------------|------|--------------------------------|-----------------------|---------------------|---------------------|---------------------|---------------------|----------------|------|----------------|----------------|----------------|
| d | d ₁ , d ₂ | D ₁ , D ₂ | C ₁ | b | K | r _{1,2} min. | d _a min. | d _a max. | D _a max. | r _a max. | k _r | e | Y ₁ | Y ₂ | Y ₀ |
| mm | | | | | | | mm | | | | - | | | | |
| 85 | 107 | 131 | - | - | - | 2 | 96 | - | 139 | 2 | 0,04 | 0,17 | 3,7 | 5,7 | 4 |
| | 106 | 131 | - | - | - | 2 | 96 | - | 139 | 2 | 0,04 | 0,25 | 2,5 | 3,9 | 2,5 |
| | 117 | 153 | - | - | - | 3 | 99 | - | 166 | 3 | 0,045 | 0,22 | 2,9 | 4,5 | 2,8 |
| | 115 | 154 | - | - | - | 3 | 99 | - | 166 | 3 | 0,05 | 0,37 | 1,7 | 2,6 | 1,8 |
| | 115 | 154 | - | - | - | 3 | 99 | - | 166 | 3 | 0,05 | 0,37 | 1,7 | 2,6 | 1,8 |
| 90 | 112 | 139 | - | - | - | 2 | 101 | - | 149 | 2 | 0,04 | 0,17 | 3,7 | 5,7 | 4 |
| | 112 | 140 | - | - | - | 2 | 101 | - | 149 | 2 | 0,04 | 0,27 | 2,3 | 3,6 | 2,5 |
| | 122 | 163 | 1 | - | - | 3 | 104 | - | 176 | 3 | 0,045 | 0,22 | 2,9 | 4,5 | 2,8 |
| | 121 | 163 | - | - | - | 3 | 104 | - | 176 | 3 | 0,05 | 0,37 | 1,7 | 2,6 | 1,8 |
| 95 | 120 | 149 | - | - | - | 2,1 | 107 | - | 158 | 2 | 0,04 | 0,17 | 3,7 | 5,7 | 4 |
| | 119 | 149 | - | - | - | 2,1 | 107 | - | 158 | 2 | 0,04 | 0,27 | 2,3 | 3,6 | 2,5 |
| | 127 | 171 | 1,5 | - | - | 3 | 109 | - | 186 | 3 | 0,045 | 0,23 | 2,7 | 4,2 | 2,8 |
| | 128 | 171 | - | - | - | 3 | 109 | - | 186 | 3 | 0,05 | 0,37 | 1,7 | 2,6 | 1,8 |
| 100 | 127 | 156 | - | - | - | 2,1 | 112 | - | 168 | 2 | 0,04 | 0,17 | 3,7 | 5,7 | 4 |
| | 124 | 157 | - | - | - | 2,1 | 112 | - | 168 | 2 | 0,04 | 0,27 | 2,3 | 3,6 | 2,5 |
| | 136 | 182 | 2,5 | - | - | 3 | 114 | - | 201 | 3 | 0,045 | 0,23 | 2,7 | 4,2 | 2,8 |
| | 135 | 184 | - | - | - | 3 | 114 | - | 201 | 3 | 0,05 | 0,37 | 1,7 | 2,6 | 1,8 |
| 110 | 140 | 174 | - | - | - | 2,1 | 122 | - | 188 | 2 | 0,04 | 0,17 | 3,7 | 5,7 | 4 |
| | 138 | 175 | - | - | - | 2,1 | 122 | - | 188 | 2 | 0,04 | 0,28 | 2,2 | 3,5 | 2,5 |
| | 154 | 203 | 2,5 | - | - | 3 | 124 | - | 226 | 3 | 0,045 | 0,22 | 2,9 | 4,5 | 2,8 |
| 120 | 149 | 1,3 | - | - | 2,1 | 132 | - | 203 | 2 | 0,04 | 0,19 | 3,3 | 5,1 | 3,6 | |
| 130 | 163 | 202 | 1,3 | - | - | 3 | 144 | - | 216 | 3 | 0,04 | 0,19 | 3,3 | 5,1 | 3,6 |
| 150 | 175 | 204 | - | 8,3 | 4,5 | 2,1 | 161 | - | 214 | 2 | 0,02 | 0,24 | 2,6 | 4,1 | 2,8 |
| 180 | 212 | 250 | - | 13,9 | 7,5 | 2,1 | 191 | - | 269 | 2 | 0,02 | 0,25 | 2,5 | 3,9 | 2,5 |
| 200 | 229 | 258 | - | 8,3 | 4,5 | 2,1 | 211 | - | 269 | 2 | 0,015 | 0,19 | 3,3 | 5,1 | 3,6 |
| 220 | 248 | 278 | - | 8,3 | 4,5 | 2,1 | 231 | - | 289 | 2 | 0,015 | 0,18 | 3,5 | 5,4 | 3,6 |
| 240 | 268 | 298 | - | 8,3 | 4,5 | 2,1 | 251 | - | 309 | 2 | 0,015 | 0,16 | 3,9 | 6,1 | 4 |

4.2 Self-aligning ball bearings on an adapter sleeve

d 17 – 90 mm



Open bearing on a standard sleeve

Sealed bearing on an E design sleeve

4.2



| Principal dimensions | | | Abutment and fillet dimensions | | | Mass Bearing + sleeve | Designations Bearing ¹⁾ | Sleeve ²⁾ |
|----------------------|-----|----|--------------------------------|------------------------|------------------------|-----------------------------|---------------------------------------|----------------------|
| d | D | B | d _a max. | d _b min. | B _a min. | | | |
| mm | | | mm | | | kg | – | |
| 17 | 47 | 14 | 28,5 | 23 | 5 | 0,16 | 1204 EKTN9 | H 204 |
| 20 | 52 | 15 | 33 | 28 | 5 | 0,21 | ▶ 1205 EKTN9 | H 205 |
| | 52 | 18 | 31 | 28 | 5 | 0,23 | 2205 E-2RS1KTN9 | H 305 E |
| | 52 | 18 | 32 | 28 | 5 | 0,23 | 2205 EKTN9 | H 305 |
| | 62 | 17 | 37 | 28 | 6 | 0,33 | 1305 EKTN9 | H 305 |
| | 62 | 24 | 32,5 | 29 | 5 | 0,42 | 2305 E-2RS1KTN9 | H 2305 |
| | 62 | 24 | 35,5 | 29 | 5 | 0,42 | 2305 EKTN9 | H 2305 |
| 25 | 62 | 16 | 40 | 33 | 5 | 0,32 | ▶ 1206 EKTN9 | H 206 |
| | 62 | 20 | 36,5 | 33 | 5 | 0,36 | 2206 E-2RS1KTN9 | H 306 E |
| | 62 | 20 | 38 | 33 | 5 | 0,36 | 2206 EKTN9 | H 306 |
| | 72 | 19 | 44 | 33 | 6 | 0,49 | 1306 EKTN9 | H 306 |
| | 72 | 27 | 40 | 35 | 5 | 0,62 | 2306 E-2RS1KTN9 | H 2306 |
| | 72 | 27 | 41 | 35 | 5 | 0,61 | 2306 K | H 2306 |
| 30 | 72 | 17 | 47 | 38 | 5 | 0,44 | ▶ 1207 EKTN9 | H 207 |
| | 72 | 23 | 42,5 | 39 | 5 | 0,55 | 2207 E-2RS1KTN9 | H 307 E |
| | 72 | 23 | 45 | 39 | 5 | 0,54 | 2207 EKTN9 | H 307 |
| | 80 | 21 | 51 | 39 | 7 | 0,65 | 1307 EKTN9 | H 307 |
| | 80 | 31 | 43,5 | 40 | 5 | 0,86 | 2307 E-2RS1KTN9 | H 2307 E |
| | 80 | 31 | 46 | 40 | 5 | 0,84 | ▶ 2307 EKTN9 | H 2307 |
| 35 | 80 | 18 | 53 | 43 | 6 | 0,58 | ▶ 1208 EKTN9 | H 208 |
| | 80 | 23 | 49 | 44 | 6 | 0,67 | 2208 E-2RS1KTN9 | H 308 E |
| | 80 | 23 | 52 | 44 | 6 | 0,58 | 2208 EKTN9 | H 308 |
| | 90 | 23 | 61 | 44 | 6 | 0,85 | 1308 EKTN9 | H 308 |
| | 90 | 33 | 53 | 45 | 6 | 1,1 | ▶ 2308 EKTN9 | H 2308 |
| | 90 | 33 | 55 | 45 | 6 | 1,2 | 2308 E-2RS1KTN9 | H 2308 |
| 40 | 85 | 19 | 57 | 48 | 6 | 0,68 | ▶ 1209 EKTN9 | H 209 |
| | 85 | 23 | 53 | 50 | 8 | 0,76 | 2209 E-2RS1KTN9 | H 309 E |
| | 85 | 23 | 55 | 50 | 8 | 0,78 | 2209 EKTN9 | H 309 |
| | 100 | 25 | 67 | 50 | 6 | 1,2 | 1309 EKTN9 | H 309 |
| | 100 | 36 | 60 | 50 | 6 | 1,4 | ▶ 2309 EKTN9 | H 2309 |
| | 100 | 36 | 60,5 | 50 | 6 | 1,55 | 2309 E-2RS1KTN9 | H 2309 |

▶ Popular item

¹⁾ For additional bearing data → [product table, page 450](#)

²⁾ For additional adapter sleeve data → [product table, page 1072](#)

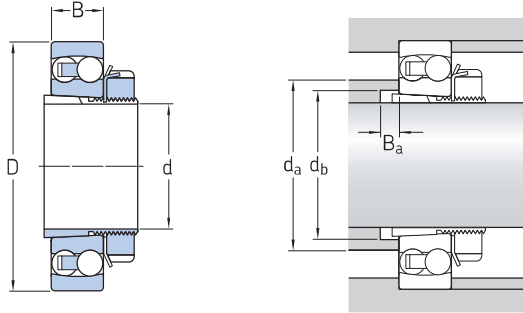
| Principal dimensions | | | Abutment and fillet dimensions | | | Mass Bearing + sleeve | Designations Bearing ¹⁾ | Sleeve ²⁾ | |
|----------------------|-----|-----|--------------------------------|------------------------|------------------------|-----------------------------|---------------------------------------|----------------------|-------|
| d | D | B | d _a max. | d _b min. | B _a min. | | | | |
| mm | | | mm | | | kg | – | | |
| 45 | 90 | 20 | 62 | 53 | 6 | 0,77 | ▶ 1210 EKTN9 | H 210 | |
| | 90 | 23 | 58 | 55 | 10 | 0,84 | 2210 E-2RS1KTN9 | H 310 E | |
| | 90 | 23 | 61 | 55 | 10 | 0,87 | 2210 EKTN9 | H 310 | |
| | 110 | 27 | 70 | 55 | 6 | 1,45 | 1310 EKTN9 | H 310 | |
| | 110 | 40 | 62,5 | 56 | 6 | 2 | 2310 E-2RS1KTN9 | H 2310 | |
| | 110 | 40 | 65 | 56 | 6 | 1,9 | ▶ 2310 K | H 2310 | |
| 50 | 100 | 21 | 70 | 60 | 7 | 0,99 | ▶ 1211 EKTN9 | H 211 | |
| | 100 | 25 | 65,5 | 60 | 11 | 1,1 | 2211 E-2RS1KTN9 | H 311 E | |
| | 100 | 25 | 67 | 60 | 11 | 1,15 | 2211 EKTN9 | H 311 | |
| | 120 | 29 | 77 | 60 | 7 | 1,9 | 1311 EKTN9 | H 311 | |
| | 120 | 43 | 72 | 61 | 7 | 2,4 | ▶ 2311 K | H 2311 | |
| | 55 | 110 | 22 | 78 | 64 | 7 | 1,2 | ▶ 1212 EKTN9 | H 212 |
| 110 | | 28 | 73 | 65 | 9 | 1,4 | 2212 E-2RS1KTN9 | H 312 E | |
| 110 | | 28 | 74 | 65 | 9 | 1,45 | 2212 EKTN9 | H 312 | |
| 130 | | 31 | 87 | 65 | 7 | 2,15 | 1312 EKTN9 | H 312 | |
| 130 | | 46 | 76 | 66 | 7 | 2,95 | ▶ 2312 K | H 2312 | |
| 60 | | 120 | 23 | 85 | 70 | 7 | 1,45 | ▶ 1213 EKTN9 | H 213 |
| | 120 | 31 | 79 | 70 | 7 | 1,75 | ▶ 2213 E-2RS1KTN9 | H 313 E | |
| | 120 | 31 | 80 | 70 | 9 | 1,8 | 2213 EKTN9 | H 313 | |
| | 140 | 33 | 98 | 70 | 7 | 2,85 | 1313 EKTN9 | H 313 | |
| | 140 | 48 | 85 | 72 | 7 | 3,6 | ▶ 2313 K | H 2313 | |
| | 65 | 130 | 25 | 93 | 80 | 7 | 2 | ▶ 1215 K | H 215 |
| 130 | | 31 | 93 | 80 | 13 | 2,3 | 2215 EKTN9 | H 315 | |
| 160 | | 37 | 104 | 80 | 7 | 4,2 | 1315 K | H 315 | |
| 160 | | 55 | 97 | 82 | 7 | 5,55 | ▶ 2315 K | H 2315 | |
| 70 | | 140 | 26 | 101 | 85 | 7 | 2,4 | ▶ 1216 K | H 216 |
| | | 140 | 33 | 99 | 85 | 13 | 2,85 | 2216 EKTN9 | H 316 |
| | 170 | 39 | 109 | 85 | 7 | 5 | 1316 K | H 316 | |
| | 170 | 58 | 104 | 88 | 7 | 7,1 | ▶ 2316 K | H 2316 | |
| | 75 | 150 | 28 | 107 | 90 | 8 | 2,95 | ▶ 1217 K | H 217 |
| | | 150 | 36 | 105 | 91 | 13 | 3,3 | 2217 K | H 317 |
| 180 | | 41 | 117 | 91 | 8 | 6 | 1317 K | H 317 | |
| 80 | | 160 | 30 | 112 | 95 | 8 | 3,5 | ▶ 1218 K | H 218 |
| | | 160 | 40 | 112 | 96 | 11 | 5,5 | 2218 K | H 318 |
| | | 190 | 43 | 122 | 96 | 8 | 6,9 | 1318 K | H 318 |
| | 190 | 64 | 115 | 100 | 8 | 9,8 | 2318 K | H 2318 | |
| | 85 | 170 | 32 | 120 | 100 | 8 | 4,25 | ▶ 1219 K | H 219 |
| | | 170 | 43 | 118 | 102 | 10 | 5,3 | 2219 K | H 319 |
| 200 | | 45 | 127 | 102 | 8 | 7,9 | 1319 K | H 319 | |
| 200 | | 67 | 128 | 105 | 8 | 11,5 | 2319 KM | H 2319 | |
| 90 | | 180 | 34 | 127 | 106 | 8 | 5 | ▶ 1220 K | H 220 |
| | | 180 | 46 | 124 | 108 | 9 | 6,4 | 2220 K | H 320 |
| | 215 | 47 | 136 | 108 | 8 | 9,65 | 1320 K | H 320 | |
| | 215 | 73 | 130 | 110 | 8 | 14 | 2320 K | H 2320 | |



▶ Popular item
¹⁾ For additional bearing data → [product table, page 450](#)
²⁾ For additional adapter sleeve data → [product table, page 1072](#)

4.2 Self-aligning ball bearings on an adapter sleeve

d 100 – 115 mm



4.2



| Principal dimensions | | | Abutment and fillet dimensions | | | Mass Bearing + sleeve | Designations Bearing ¹⁾ | Sleeve ²⁾ |
|----------------------|-----|----|--------------------------------|------------------------|------------------------|-----------------------------|---------------------------------------|----------------------|
| d | D | B | d _a max. | d _b min. | B _a min. | | | |
| mm | | | mm | | | kg | – | |
| 100 | 200 | 38 | 140 | 116 | 8 | 6,8 | ▶ 1222 K 2222 K 1322 KM | H 222 |
| | 200 | 53 | 137 | 118 | 8 | 8,85 | | H 322 |
| | 240 | 50 | 154 | 118 | 10 | 13,5 | | H 322 |
| 110 | 215 | 42 | 150 | 127 | 12 | 8,3 | 1224 KM | H 3024 |
| 115 | 230 | 46 | 163 | 137 | 15 | 11 | 1226 KM | H 3026 |

▶ Popular item

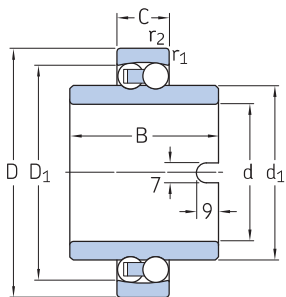
¹⁾ For additional bearing data → [product table, page 450](#)

²⁾ For additional adapter sleeve data → [product table, page 1072](#)



4.3 Self-aligning ball bearings with an extended inner ring

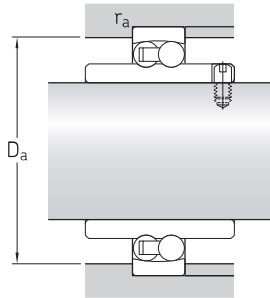
d 20 – 60 mm



4.3



| Principal dimensions | | | Basic load ratings | | Fatigue load limit | Limiting speed | Mass | Designation |
|----------------------|-----|----|--------------------|----------------|--------------------|----------------|------|-------------------|
| d | D | C | C | C ₀ | P _u | | | |
| mm | | | kN | | kN | r/min | kg | – |
| 20 | 47 | 14 | 12,7 | 3,4 | 0,18 | 9 000 | 0,18 | 11204 ETN9 |
| 25 | 52 | 15 | 14,3 | 4 | 0,21 | 8 000 | 0,22 | 11205 ETN9 |
| 30 | 62 | 16 | 15,6 | 4,65 | 0,24 | 6 700 | 0,35 | 11206 TN9 |
| 35 | 72 | 17 | 19 | 6 | 0,305 | 5 600 | 0,54 | 11207 TN9 |
| 40 | 80 | 18 | 19 | 6,55 | 0,335 | 5 000 | 0,72 | 11208 TN9 |
| 45 | 85 | 19 | 22,9 | 7,8 | 0,4 | 4 500 | 0,77 | 11209 TN9 |
| 50 | 90 | 20 | 26,5 | 9,15 | 0,475 | 4 300 | 0,85 | 11210 TN9 |
| 60 | 110 | 22 | 31,2 | 12,2 | 0,62 | 3 400 | 1,15 | 11212 TN9 |



4.3

| Dimensions | | | | | Abutment and fillet dimensions | | Calculation factors | | | | |
|------------|------------|------------|----|-------------------|--------------------------------|---------------|---------------------|------|-------|-------|-------|
| d | d_1 ≈ | D_1 ≈ | B | $r_{1,2}$ min. | D_a max. | r_a max. | k_r | e | Y_1 | Y_2 | Y_0 |
| mm | | | | | mm | | – | | | | |
| 20 | 28,8 | 40 | 40 | 1 | 41,4 | 1 | 0,04 | 0,3 | 2,1 | 3,3 | 2,2 |
| 25 | 33,3 | 44,6 | 44 | 1 | 46,4 | 1 | 0,04 | 0,28 | 2,2 | 3,5 | 2,5 |
| 30 | 40,1 | 51,9 | 48 | 1 | 56,4 | 1 | 0,04 | 0,25 | 2,5 | 3,9 | 2,5 |
| 35 | 47 | 60,9 | 52 | 1,1 | 65 | 1,1 | 0,04 | 0,23 | 2,7 | 4,2 | 2,8 |
| 40 | 54 | 67,5 | 56 | 1,1 | 73 | 1,1 | 0,04 | 0,22 | 2,9 | 4,5 | 2,8 |
| 45 | 57,7 | 72,5 | 58 | 1,1 | 78 | 1,1 | 0,04 | 0,21 | 3 | 4,6 | 3,2 |
| 50 | 61,7 | 78,1 | 58 | 1,1 | 83 | 1,1 | 0,04 | 0,21 | 3 | 4,6 | 3,2 |
| 60 | 78 | 95,6 | 62 | 1,5 | 101 | 1,5 | 0,04 | 0,19 | 3,3 | 5,1 | 3,6 |