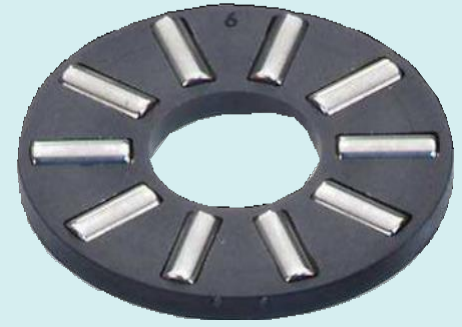




12

## Needle roller thrust bearings



# 12 Needle roller thrust bearings

## More information

**General bearing knowledge** 17

**Bearing selection process** 59

Lubrication 109

Bearing interfaces 139

Sealing, mounting and  
dismounting 193

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

SKF needle roller thrust bearings are fitted with a form-stable cage to reliably retain and guide a large number of needle rollers. Needle roller thrust bearings provide a high degree of stiffness within a minimum axial space. In applications where the faces of adjacent machine components can serve as raceways, needle roller thrust bearings take up no more space than a conventional thrust washer.

## Bearing features

- **Accommodate heavy axial loads and peak loads**

The very small diameter deviation of the rollers within one assembly enables these bearings to accommodate heavy axial loads and peak loads.

- **Extended bearing service life**

To prevent stress peaks, the roller ends are relieved slightly to modify the line contact between the raceway and rollers.

## Designs and variants

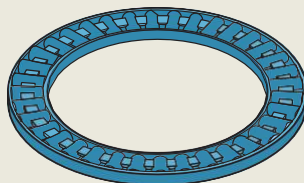
SKF supplies needle roller thrust bearings in two designs:

- needle roller and cage thrust assemblies, AXK series ([fig. 1](#))
- needle roller thrust bearings with a centring lange, AXW series ([fig. 2](#))

In applications where adjacent components cannot serve as raceways, the assemblies can be combined with bearing washers in different series (Bearing washers, [page 898](#)).

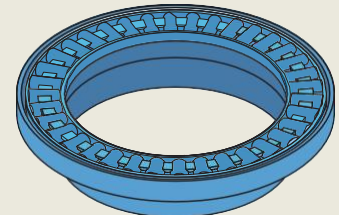
**Fig. 1**

**AXK needle roller and cage thrust assembly**



**Fig. 2**

**AXW needle roller thrust bearing with a centring lange**



## Needle roller and cage thrust assemblies

AXK series needle roller and cage thrust assemblies (fig. 1):

- are available for  $4 \leq d \leq 160$  mm
- can accommodate axial loads in one direction only
- can be combined with washers in the LS, AS, GS811 or WS811 series (Bearing washers, page 898) in applications where adjacent components cannot serve as raceways

## Double direction bearings

Double direction bearings:

- can accommodate axial loads in both directions
  - can be created by combining two needle roller and cage thrust assemblies and two bearing washers with an intermediate washer
- Depending on the design, an intermediate washer can be shaft or housing centred (fig. 3 and fig. 4)

Intermediate washers must have the same hardness and surface finish as bearing washers. SKF does not supply intermediate washers, but provides material specifications and dimensional data on request.

For additional information, refer to Design considerations, page 903

## Needle roller thrust bearings with a centring flange

AXW series needle roller thrust bearings with a centring flange (fig. 2 and fig. 5):

- are available for  $10 \leq d \leq 50$  mm
- accommodate axial loads in one direction only
- consist of a needle roller and cage thrust assembly and a thrust washer with a centring flange

The flange facilitates mounting and accurately centres the housing washer radially (fig. 6 and fig. 7)

## Combined needle roller bearing arrangements

To accommodate combined radial and axial loads, needle roller thrust bearings in the AXW series can be combined with the following radial needle roller bearings:

- drawn cup needle roller bearings with a closed end or with open ends (fig. 6)
- needle roller bearings with machined rings (fig. 7)

These arrangements provide a cost-effective and compact solution for combined loads

Fig. 3

### Double direction bearing, shaft centred

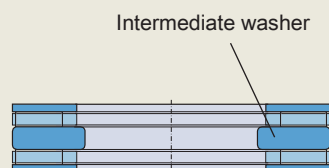


Fig. 5

### AXW needle roller thrust bearing with a centring flange

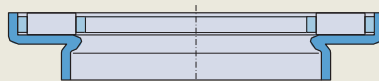


Fig. 4

### Double direction bearing, housing centred

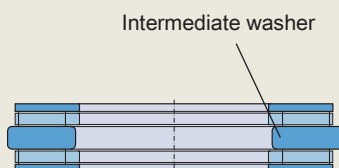


Fig. 6

### AXW series bearing combined with a drawn cup needle roller bearing

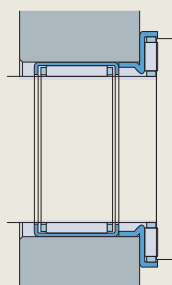
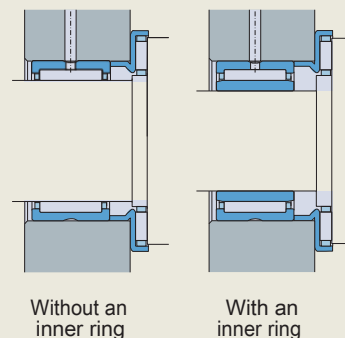


Fig. 7

### AXW series bearing combined with a needle roller bearing with machined rings



### Bearing washers

Bearing washers are required in applications where adjacent machine components cannot serve as raceways

Appropriate washers are listed in the [product tables, page 906](#) and must be ordered separately, because of the number of possible combinations

The following series can be combined with needle roller thrust bearings:

#### LS series universal washers

([fig. 8](#))

- are made of hardened carbon chromium bearing steel
- can be used as shaft or housing washers for needle roller thrust bearings in the AXK series
- can be used as shaft washers for bearings in the AXW series
- are available for  $6 \leq d \leq 160$  mm
- raceway surface is ground, while all other surfaces are turned
- are used for applications where accurate centring of the washers is not necessary or where low speeds are involved
- washer face opposite the side with the chamfers is the raceway surface and should face the rollers

#### AS series thin universal washers

([fig. 9](#))

- are 1 mm thick
- are made of spring steel and hardened
- can be used as shaft or housing washers for needle roller thrust bearings in the AXK series
- can be used as shaft washers for bearings in the AXW series
- are available for  $4 \leq d \leq 160$  mm
- can be used to provide a cost-effective bearing solution, if adjacent machine components are not hardened, but have adequate stiffness and the requirements to geometrical tolerances are moderate

Both faces of the washers are polished and can be used as raceways

### 811 series shaft (preix WS) and housing washers (preix GS)

- are used primarily with cylindrical roller and cage thrust assemblies
- can also be combined with needle roller and cage thrust assemblies
- can be used in high-speed applications where accurate centring of the bearing washers is required

For additional information about 811 series washers, refer to Cylindrical roller thrust bearings, [page 877](#)

### Cages

SKF needle roller thrust bearings are fitted with one of the cages shown in [table 1](#). Bearings in the AXW series are fitted exclusively with steel cages

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](#)

Fig. 8

#### LS series universal washer

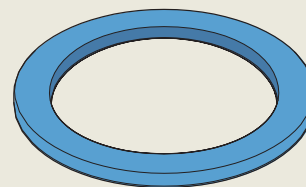
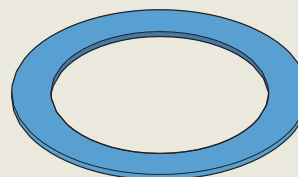


Fig. 9

#### AS series thin universal washer



# Bearing data

|                                                         |                                                                                                                                             |
|---------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Dimension standards</b>                              | Boundary dimensions: ISO 3031 (where standardized)<br>Bearings in the AXW series are not standardized                                       |
| <b>Tolerances</b>                                       | Tolerances, tolerance classes, standards ( <a href="#">table 2, page 900</a> )                                                              |
| For additional information<br>* <a href="#">page 35</a> | Values for tolerance classes ( <a href="#">table 3, page 901</a> )<br><br>Variation of gauge lot diameter of the rollers: ISO 3096, Grade 2 |
| <b>Permissible misalignment</b>                         | Cannot tolerate any misalignment                                                                                                            |

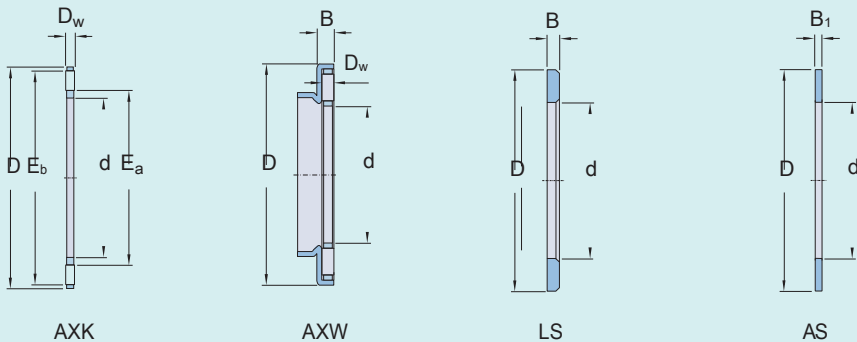
Table 1

## Cages for needle roller thrust bearings

|                  |                                                                                     |                                                                                     |                                                                                     |
|------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                  |  |  |  |
| <b>Materials</b> | Machined steel                                                                      | Sheet steel                                                                         | Glass fibre reinforced PA66                                                         |
| <b>Suffix</b>    | –                                                                                   | –                                                                                   | TN                                                                                  |

Table 2

Tolerances for needle roller thrust bearings



| Bearing, component                                              |       | Tolerance, tolerance class <sup>1)</sup> , standard |
|-----------------------------------------------------------------|-------|-----------------------------------------------------|
| Dimensions                                                      |       |                                                     |
| <b>Needle roller and cage thrust assemblies, AXK</b>            |       |                                                     |
| Bore diameter                                                   | $d$   | E12                                                 |
| Outside diameter                                                | $D$   | c13                                                 |
| Roller diameter                                                 | $D_w$ | Grade 2, ISO 3096                                   |
| <b>Needle roller thrust bearings with a centring lange, AXW</b> |       |                                                     |
| Bore diameter                                                   | $d$   | E12                                                 |
| Outside diameter                                                | $D$   | —                                                   |
| Thickness                                                       | $B$   | 0/−0,2 mm                                           |
| Roller diameter                                                 | $D_w$ | Grade 2, ISO 3096                                   |
| <b>Universal washers, LS</b>                                    |       |                                                     |
| Bore diameter                                                   | $d$   | E12                                                 |
| Outside diameter                                                | $D$   | a12                                                 |
| Thickness                                                       | $B$   | h11                                                 |
| Axial run-out                                                   | $s_i$ | Normal, ISO 199                                     |
| <b>Thin universal washers, AS</b>                               |       |                                                     |
| Bore diameter                                                   | $d$   | E13                                                 |
| Outside diameter                                                | $D$   | e13                                                 |
| Thickness (1 mm)                                                | $B_1$ | ±0,05 mm                                            |

<sup>1)</sup> The envelope requirement (symbol  ISO 14405-1) is not shown but applies to all tolerance classes

Table 3

## ISO tolerance classes

| Nominal diameter |            | a12  |        | c13  |      | e13  |      | h11  |     | E12  |     | E13  |     |
|------------------|------------|---------------------------------------------------------------------------------------|--------|---------------------------------------------------------------------------------------|------|---------------------------------------------------------------------------------------|------|----------------------------------------------------------------------------------------|-----|-----------------------------------------------------------------------------------------|-----|-----------------------------------------------------------------------------------------|-----|
| >                | ≤          | Deviations                                                                            |        | Deviations                                                                            |      | Deviations                                                                            |      | Deviations                                                                             |     | Deviations                                                                              |     | Deviations                                                                              |     |
| U                | L          | U                                                                                     | L      | U                                                                                     | L    | U                                                                                     | L    | U                                                                                      | L   | U                                                                                       | L   | U                                                                                       | L   |
| mm               | μm         | μm                                                                                    |        | μm                                                                                    |      | μm                                                                                    |      | μm                                                                                     |     | μm                                                                                      |     | μm                                                                                      |     |
| –                | <b>3</b>   | –                                                                                     | –      | –                                                                                     | –    | –                                                                                     | –    | 0                                                                                      | –60 | –                                                                                       | –   | –                                                                                       | –   |
| <b>3</b>         | <b>6</b>   | –                                                                                     | –      | –                                                                                     | –    | –                                                                                     | –    | 0                                                                                      | –75 | +140                                                                                    | +20 | +200                                                                                    | +20 |
| <b>6</b>         | <b>10</b>  | –                                                                                     | –      | –                                                                                     | –    | –                                                                                     | –    | 0                                                                                      | –90 | +175                                                                                    | +25 | +245                                                                                    | +25 |
| <b>10</b>        | <b>18</b>  | –                                                                                     | –      | –95                                                                                   | –365 | –32                                                                                   | –302 | –                                                                                      | –   | +212                                                                                    | +32 | +302                                                                                    | +32 |
| <b>18</b>        | <b>30</b>  | –300                                                                                  | –510   | –110                                                                                  | –440 | –40                                                                                   | –370 | –                                                                                      | –   | +250                                                                                    | +40 | +370                                                                                    | +40 |
| <b>30</b>        | <b>40</b>  | –310                                                                                  | –560   | –120                                                                                  | –510 | –50                                                                                   | –440 | –                                                                                      | –   | +300                                                                                    | +50 | +440                                                                                    | +50 |
| <b>40</b>        | <b>50</b>  | –320                                                                                  | –570   | –130                                                                                  | –520 | –50                                                                                   | –440 | –                                                                                      | –   | +300                                                                                    | +50 | +440                                                                                    | +50 |
| <b>50</b>        | <b>65</b>  | –340                                                                                  | –640   | –140                                                                                  | –600 | –60                                                                                   | –520 | –                                                                                      | –   | +360                                                                                    | +60 | +520                                                                                    | +60 |
| <b>65</b>        | <b>80</b>  | –360                                                                                  | –660   | –150                                                                                  | –610 | –60                                                                                   | –520 | –                                                                                      | –   | +360                                                                                    | +60 | +520                                                                                    | +60 |
| <b>80</b>        | <b>100</b> | –380                                                                                  | –730   | –170                                                                                  | –710 | –72                                                                                   | –612 | –                                                                                      | –   | +422                                                                                    | +72 | +612                                                                                    | +72 |
| <b>100</b>       | <b>120</b> | –410                                                                                  | –760   | –180                                                                                  | –720 | –72                                                                                   | –612 | –                                                                                      | –   | +422                                                                                    | +72 | +612                                                                                    | +72 |
| <b>120</b>       | <b>140</b> | –460                                                                                  | –860   | –200                                                                                  | –830 | –85                                                                                   | –715 | –                                                                                      | –   | +485                                                                                    | +85 | +715                                                                                    | +85 |
| <b>140</b>       | <b>160</b> | –520                                                                                  | –920   | –210                                                                                  | –840 | –85                                                                                   | –715 | –                                                                                      | –   | +485                                                                                    | +85 | +715                                                                                    | +85 |
| <b>160</b>       | <b>180</b> | –580                                                                                  | –980   | –230                                                                                  | –860 | –85                                                                                   | –715 | –                                                                                      | –   | –                                                                                       | –   | –                                                                                       | –   |
| <b>180</b>       | <b>200</b> | –660                                                                                  | –1 120 | –240                                                                                  | –960 | –100                                                                                  | –820 | –                                                                                      | –   | –                                                                                       | –   | –                                                                                       | –   |

## Loads

|                                                                                                       |                       |                                                                                                                                                                                                                                                              |
|-------------------------------------------------------------------------------------------------------|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Minimum load</b><br><br>For additional information<br>* <a href="#">page 106</a>                   | $F_{am} = 0,0005 C_0$ | <b>Symbols</b><br><br>$C_0$ basic static load rating [kN] ( <a href="#">product tables, page 906</a> )<br>$F_a$ axial load [kN]<br>$F_{am}$ minimum axial load [kN]<br>$P$ equivalent dynamic bearing load [kN]<br>$P_0$ equivalent static bearing load [kN] |
| <b>Equivalent dynamic bearing load</b><br><br>For additional information<br>* <a href="#">page 91</a> | $P = F_a$             |                                                                                                                                                                                                                                                              |
| <b>Equivalent static bearing load</b><br><br>For additional information<br>* <a href="#">page 105</a> | $P_0 = F_a$           |                                                                                                                                                                                                                                                              |

## Temperature limits

The permissible operating temperature for needle roller thrust bearings can be limited by:

- the dimensional stability of the bearing washers and rollers
- the cage
- the lubricant

Where temperatures outside the permissible range are expected, contact SKF

### Bearing washers and rollers

The bearings are heat stabilized up to at least 120 °C (250 °F)

### Cages

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

### Lubricants

For temperature limits of 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

The speed ratings in the [product tables, page 906](#) 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

## Abutment dimensions

Abutment dimensions should fulfill the following:

- Support surfaces on shafts and in housings should be at right angles to the shaft or housing axis and should provide uninterrupted support over the entire washer face
- The abutment diameter on the shaft should be  $\leq E_a$  and in the housing  $\geq E_b$ . Values for  $E_a$  and  $E_b$  ([product tables, page 906](#)) take the movement and position of the roller set into consideration
- Shafts and housings should be manufactured to suitable tolerance classes ([table 4](#)) to provide satisfactory radial guidance for the individual thrust bearing components:
  - Housing centred washers † radial space between the shaft and washer bore required
  - Shaft centred washers † radial space between the washer and the housing bore required

Needle roller and cage thrust assemblies in the AXW series are generally combined with drawn cup needle roller bearings ([fig. 6, page 897](#)) or needle roller bearings with machined rings ([fig. 7, page 897](#)). The same housing tolerance must be selected for the centring lange as for the radial bearing.

Needle roller and cage thrust assemblies are generally shaft centred, to reduce the circumferential speed at which the cage slides against the guiding surface. This is particularly important for higher-speed applications. The guiding surface should be ground.

## Raceways on shafts and in housings

- should have the same hardness, surface finish and axial run-out as a bearing washer, if the load carrying capacity of a needle roller and cage thrust assembly is to be fully exploited
- should be designed using the dimensions  $E_a$  and  $E_b$  ([product tables, page 906](#)), which take radial displacement of the roller set into consideration

For additional information, refer to Raceways on shafts and in housings, [page 179](#)

Table 4

### Shaft and housing tolerance classes

| Bearing component                               | Series | Tolerance class <sup>1)</sup> |                    |
|-------------------------------------------------|--------|-------------------------------|--------------------|
|                                                 |        | Shaft centred                 | Housing centred    |
| <b>Needle roller and cage thrust assemblies</b> | AXK    | h8                            | –                  |
| <b>Universal washers</b>                        | LS     | h8<br>radial space            | radial space<br>H9 |
| <b>Thin universal washers</b>                   | AS     | h8<br>radial space            | radial space<br>H9 |
| <b>Shaft washers</b>                            | WS 811 | h8                            | –                  |
| <b>Housing washers</b>                          | GS 811 | –                             | H9                 |

<sup>1)</sup> The envelope requirement (symbol  in ISO 14405-1) is not shown but applies to all tolerance classes

|  |  |         |         |         |   |         |     |     |     |     |     |     |
|--|--|---------|---------|---------|---|---------|-----|-----|-----|-----|-----|-----|
|  |  | Group 1 | Group 2 | Group 3 | / | Group 4 |     |     |     |     |     |     |
|  |  |         |         |         |   |         | 4 1 | 4 2 | 4 3 | 4 4 | 4 5 | 4 6 |

**GS** Housing washer  
**WS** Shaft washer

811 dimension series indicates the series and size for shaft and housing washers

**AS ..** Thin universal washer, the number following identifies the bore and outside diameter

**AXK..** Needle roller and cage thrust assembly, the number

**AXW ..** Needle roller thrust bearing with a centring lange,

**LS..** the number following identifies the bore diameter  
Universal washer, the number following identifies  
the bore and outside diameter

### Group 1: Internal design

**Group 2: External design (seals, snap ring groove, etc.)**

### Group 3: Cage design

**TN** Glass fibre reinforced PA66 cage

### Group 4.1: Materials, heat treatment

#### Group 4.2: Accuracy, clearance, preload, quiet running

### Group 4.3: Bearing sets, matched bearings

#### Group 4.4: Stabilization

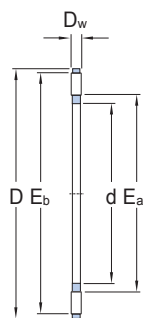
### Group 4.5: Lubrication

#### Group 4.6: Other variants



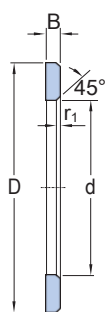
## 12.1 Needle roller and cage thrust assemblies

d 4 – 85 mm

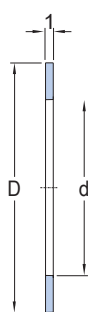


| Principal dimensions |     |                |                       |                       | Basic load ratings |                | Fatigue load limit | Speed ratings   |                | Mass | Designation          |
|----------------------|-----|----------------|-----------------------|-----------------------|--------------------|----------------|--------------------|-----------------|----------------|------|----------------------|
| d                    | D   | D <sub>w</sub> | E <sub>a</sub><br>min | E <sub>b</sub><br>max | C                  | C <sub>0</sub> | P <sub>u</sub>     | Reference speed | Limiting speed |      |                      |
| mm                   |     |                |                       |                       | kN                 |                | kN                 | r/min           |                | g    | –                    |
| <b>4</b>             | 14  | 2              | 5                     | 13                    | 4,15               | 8,3            | 0,95               | 7 500           | 15 000         | 0,7  | <b>AXK 0414 TN</b>   |
| <b>5</b>             | 15  | 2              | 6                     | 14                    | 4,5                | 9,5            | 1,08               | 6 700           | 14 000         | 0,8  | ► <b>AXK 0515 TN</b> |
| <b>6</b>             | 19  | 2              | 7                     | 18                    | 6,3                | 16             | 1,86               | 6 000           | 12 000         | 1    | <b>AXK 0619 TN</b>   |
| <b>8</b>             | 21  | 2              | 9                     | 20                    | 7,2                | 20             | 2,32               | 5 600           | 11 000         | 2    | ► <b>AXK 0821 TN</b> |
| <b>10</b>            | 24  | 2              | 12                    | 23                    | 8,5                | 26             | 3                  | 5 300           | 10 000         | 3    | ► <b>AXK 1024</b>    |
| <b>12</b>            | 26  | 2              | 14                    | 25                    | 9,15               | 30             | 3,45               | 5 000           | 10 000         | 3    | ► <b>AXK 1226</b>    |
| <b>15</b>            | 28  | 2              | 17                    | 27                    | 10,4               | 37,5           | 4,3                | 4 800           | 9 500          | 4    | ► <b>AXK 1528</b>    |
| <b>17</b>            | 30  | 2              | 19                    | 29                    | 11                 | 40,5           | 4,75               | 4 500           | 9 500          | 3,65 | ► <b>AXK 1730</b>    |
| <b>20</b>            | 35  | 2              | 22                    | 34                    | 12                 | 47,5           | 5,6                | 4 300           | 8 500          | 5    | ► <b>AXK 2035</b>    |
| <b>25</b>            | 42  | 2              | 29                    | 41                    | 13,4               | 60             | 6,95               | 3 800           | 7 500          | 7    | ► <b>AXK 2542</b>    |
| <b>30</b>            | 47  | 2              | 34                    | 46                    | 15                 | 72             | 8,3                | 3 600           | 7 000          | 8    | ► <b>AXK 3047</b>    |
| <b>35</b>            | 52  | 2              | 39                    | 51                    | 16,6               | 83             | 9,8                | 3 200           | 6 300          | 10   | ► <b>AXK 3552</b>    |
| <b>40</b>            | 60  | 3              | 45                    | 58                    | 25                 | 114            | 13,7               | 2 800           | 5 600          | 16   | ► <b>AXK 4060</b>    |
| <b>45</b>            | 65  | 3              | 50                    | 63                    | 27                 | 127            | 15,3               | 2 600           | 5 300          | 18   | ► <b>AXK 4565</b>    |
| <b>50</b>            | 70  | 3              | 55                    | 68                    | 28,5               | 143            | 17                 | 2 400           | 5 000          | 20   | ► <b>AXK 5070</b>    |
| <b>55</b>            | 78  | 3              | 60                    | 76                    | 34,5               | 186            | 22,4               | 2 200           | 4 300          | 28   | ► <b>AXK 5578</b>    |
| <b>60</b>            | 85  | 3              | 65                    | 83                    | 37,5               | 232            | 28,5               | 2 200           | 4 300          | 33   | ► <b>AXK 6085</b>    |
| <b>65</b>            | 90  | 3              | 70                    | 88                    | 39                 | 255            | 31                 | 2 000           | 4 000          | 35   | ► <b>AXK 6590</b>    |
| <b>70</b>            | 95  | 4              | 74                    | 93                    | 49                 | 255            | 31                 | 1 800           | 3 600          | 60   | ► <b>AXK 7095</b>    |
| <b>75</b>            | 100 | 4              | 79                    | 98                    | 50                 | 265            | 32,5               | 1 700           | 3 400          | 61   | ► <b>AXK 75100</b>   |
| <b>80</b>            | 105 | 4              | 84                    | 103                   | 51                 | 280            | 34                 | 1 700           | 3 400          | 63   | ► <b>AXK 80105</b>   |
| <b>85</b>            | 110 | 4              | 89                    | 108                   | 52                 | 290            | 35,5               | 1 700           | 3 400          | 67   | ► <b>AXK 85110</b>   |

► Popular item



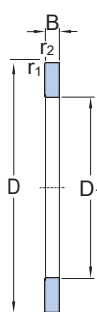
LS



AS



WS 811

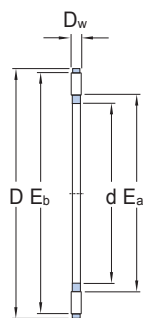


GS 811

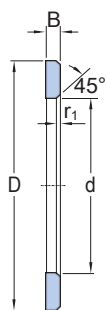
| Dimensions |                |     |                |      |                         | Masses                      |    | Designations        |                          |              |                |
|------------|----------------|-----|----------------|------|-------------------------|-----------------------------|----|---------------------|--------------------------|--------------|----------------|
| d          | d <sub>1</sub> | D   | D <sub>1</sub> | B    | r <sub>1,2</sub><br>min | Washers<br>LS,<br>WS,<br>GS | AS | Universal<br>washer | Thin universal<br>washer | Shaft washer | Housing washer |
| mm         |                |     |                |      |                         | g                           |    | —                   |                          |              |                |
| 4          | —              | 14  | —              | —    | —                       | —                           | 1  | —                   | AS 0414                  | —            | —              |
| 5          | —              | 15  | —              | —    | —                       | —                           | 1  | —                   | AS 0515                  | —            | —              |
| 6          | —              | 19  | —              | 2,75 | 0,3                     | 6                           | 2  | LS 0619             | AS 0619                  | —            | —              |
| 8          | —              | 21  | —              | 2,75 | 0,3                     | 6                           | 2  | LS 0821             | AS 0821                  | —            | —              |
| 10         | —              | 24  | —              | 2,75 | 0,3                     | 8                           | 3  | LS 1024             | AS 1024                  | —            | —              |
| 12         | —              | 26  | —              | 2,75 | 0,3                     | 9                           | 3  | LS 1226             | AS 1226                  | —            | —              |
| 15         | 28             | 28  | 16             | 2,75 | 0,3                     | 9                           | 3  | LS 1528             | AS 1528                  | WS 81102     | GS 81102       |
| 17         | 30             | 30  | 18             | 2,75 | 0,3                     | 9                           | 4  | LS 1730             | AS 1730                  | WS 81103     | GS 81103       |
| 20         | 35             | 35  | 21             | 2,75 | 0,3                     | 13                          | 5  | LS 2035             | AS 2035                  | WS 81104     | GS 81104       |
| 25         | 42             | 42  | 26             | 3    | 0,6                     | 19                          | 7  | LS 2542             | AS 2542                  | WS 81105     | GS 81105       |
| 30         | 47             | 47  | 32             | 3    | 0,6                     | 22                          | 8  | LS 3047             | AS 3047                  | WS 81106     | GS 81106       |
| 35         | 52             | 52  | 37             | 3,5  | 0,6                     | 29                          | 9  | LS 3552             | AS 3552                  | WS 81107     | GS 81107       |
| 40         | 60             | 60  | 42             | 3,5  | 0,6                     | 40                          | 12 | LS 4060             | AS 4060                  | WS 81108     | GS 81108       |
| 45         | 65             | 65  | 47             | 4    | 0,6                     | 50                          | 13 | LS 4565             | AS 4565                  | WS 81109     | GS 81109       |
| 50         | 70             | 70  | 52             | 4    | 0,6                     | 55                          | 14 | LS 5070             | AS 5070                  | WS 81110     | GS 81110       |
| 55         | 78             | 78  | 57             | 5    | 0,6                     | 88                          | 18 | LS 5578             | AS 5578                  | WS 81111     | GS 81111       |
| 60         | 85             | 85  | 62             | 4,75 | 1                       | 97                          | 22 | LS 6085             | AS 6085                  | WS 81112     | GS 81112       |
| 65         | 90             | 90  | 67             | 5,25 | 1                       | 115                         | 24 | LS 6590             | AS 6590                  | WS 81113     | GS 81113       |
| 70         | 95             | 95  | 72             | 5,25 | 1                       | 123                         | 25 | LS 7095             | AS 7095                  | WS 81114     | GS 81114       |
| 75         | 100            | 100 | 77             | 5,75 | 1                       | 142                         | 27 | LS 75100            | AS 75100                 | WS 81115     | GS 81115       |
| 80         | 105            | 105 | 82             | 5,75 | 1                       | 151                         | 28 | LS 80105            | AS 80105                 | WS 81116     | GS 81116       |
| 85         | 110            | 110 | 87             | 5,75 | 1                       | 159                         | 29 | LS 85110            | AS 85110                 | WS 81117     | GS 81117       |

## 12.1 Needle roller and cage thrust assemblies

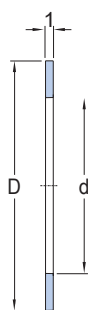
d 90 – 160 mm



| Principal dimensions |     |                |                       |                       | Basic load ratings |                | Fatigue load limit | Speed ratings      |                   | Mass | Designation         |
|----------------------|-----|----------------|-----------------------|-----------------------|--------------------|----------------|--------------------|--------------------|-------------------|------|---------------------|
| d                    | D   | D <sub>w</sub> | E <sub>a</sub><br>min | E <sub>b</sub><br>max | C                  | C <sub>0</sub> | P <sub>u</sub>     | Reference<br>speed | Limiting<br>speed |      |                     |
| mm                   |     |                |                       |                       | kN                 |                | kN                 | r/min              |                   | g    | –                   |
| <b>90</b>            | 120 | 4              | 94                    | 118                   | 65,5               | 405            | 49                 | 1 500              | 3 000             | 86   | ► <b>AXK 90120</b>  |
| <b>100</b>           | 135 | 4              | 105                   | 133                   | 76,5               | 560            | 65,5               | 1 400              | 2 800             | 104  | ► <b>AXK 100135</b> |
| <b>110</b>           | 145 | 4              | 115                   | 143                   | 81,5               | 620            | 72                 | 1 300              | 2 600             | 122  | ► <b>AXK 110145</b> |
| <b>120</b>           | 155 | 4              | 125                   | 153                   | 86,5               | 680            | 76,5               | 1 300              | 2 600             | 131  | ► <b>AXK 120155</b> |
| <b>130</b>           | 170 | 5              | 136                   | 167                   | 112                | 830            | 93                 | 1 100              | 2 200             | 205  | <b>AXK 130170</b>   |
| <b>140</b>           | 180 | 5              | 146                   | 177                   | 116                | 900            | 96,5               | 1 000              | 2 000             | 219  | ► <b>AXK 140180</b> |
| <b>150</b>           | 190 | 5              | 156                   | 187                   | 120                | 950            | 102                | 1 000              | 2 000             | 232  | <b>AXK 150190</b>   |
| <b>160</b>           | 200 | 5              | 166                   | 197                   | 125                | 1 000          | 106                | 950                | 1 900             | 246  | ► <b>AXK 160200</b> |



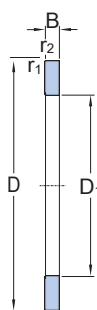
LS



AS



WS 811



GS 811

# Dimensions

d    d<sub>1</sub>    D    D<sub>1</sub>    B    r<sub>1,2</sub>  
min

mm

# Masses

Washers  
LS,  
WS,  
GS    AS

g

# Designations

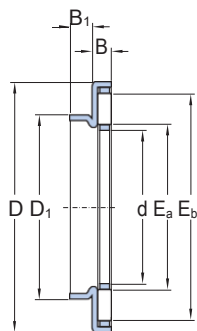
Universal washer    Thin universal washer    Shaft washer    Housing washer

—

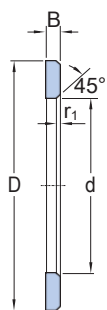
|            |     |     |     |     |   |     |    |                  |                  |                 |                 |
|------------|-----|-----|-----|-----|---|-----|----|------------------|------------------|-----------------|-----------------|
| <b>90</b>  | 120 | 120 | 92  | 6,5 | 1 | 234 | 39 | <b>LS 90120</b>  | <b>AS 90120</b>  | <b>WS 81118</b> | <b>GS 81118</b> |
| <b>100</b> | 135 | 135 | 102 | 7   | 1 | 350 | 50 | <b>LS 100135</b> | <b>AS 100135</b> | <b>WS 81120</b> | <b>GS 81120</b> |
| <b>110</b> | 145 | 145 | 112 | 7   | 1 | 385 | 55 | <b>LS 110145</b> | <b>AS 110145</b> | <b>WS 81122</b> | <b>GS 81122</b> |
| <b>120</b> | 155 | 155 | 122 | 7   | 1 | 415 | 59 | <b>LS 120155</b> | <b>AS 120155</b> | <b>WS 81124</b> | <b>GS 81124</b> |
| <b>130</b> | 170 | 170 | 132 | 9   | 1 | 663 | 65 | <b>LS 130170</b> | <b>AS 130170</b> | <b>WS 81126</b> | <b>GS 81126</b> |
| <b>140</b> | 178 | 180 | 142 | 9,5 | 1 | 749 | 79 | <b>LS 140180</b> | <b>AS 140180</b> | <b>WS 81128</b> | <b>GS 81128</b> |
| <b>150</b> | 188 | 190 | 152 | 9,5 | 1 | 796 | 84 | <b>LS 150190</b> | <b>AS 150190</b> | <b>WS 81130</b> | <b>GS 81130</b> |
| <b>160</b> | 198 | 200 | 162 | 9,5 | 1 | 842 | 89 | <b>LS 160200</b> | <b>AS 160200</b> | <b>WS 81132</b> | <b>GS 81132</b> |

## 12.2 Needle roller thrust bearings with a centring lange

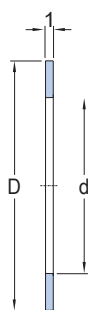
d 10 – 45 mm



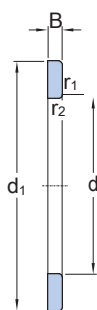
| Principal dimensions |    |                |     |                |                       |                       | Basic load ratings<br>dynamic static |                | Fatigue<br>load limit | Speed ratings<br>Reference speed Limiting speed |        | Mass | Designation   |
|----------------------|----|----------------|-----|----------------|-----------------------|-----------------------|--------------------------------------|----------------|-----------------------|-------------------------------------------------|--------|------|---------------|
| d                    | D  | D <sub>1</sub> | B   | B <sub>1</sub> | E <sub>a</sub><br>min | E <sub>b</sub><br>max | C                                    | C <sub>0</sub> | P <sub>u</sub>        |                                                 |        |      |               |
| mm                   |    |                |     |                |                       |                       | kN                                   |                | kN                    | r/min                                           |        | g    | –             |
| <b>10</b>            | 27 | 14             | 3,2 | 3              | 12                    | 23                    | 8,5                                  | 26             | 3                     | 5 300                                           | 10 000 | 8,3  | <b>AXW 10</b> |
| <b>12</b>            | 29 | 16             | 3,2 | 3              | 14                    | 25                    | 9,15                                 | 30             | 3,45                  | 5 000                                           | 10 000 | 9,1  | <b>AXW 12</b> |
| <b>15</b>            | 31 | 21             | 3,2 | 3,5            | 17                    | 27                    | 10,4                                 | 37,5           | 4,3                   | 4 800                                           | 9 500  | 10   | <b>AXW 15</b> |
| <b>20</b>            | 38 | 26             | 3,2 | 3,5            | 22                    | 34                    | 12                                   | 47,5           | 5,6                   | 4 300                                           | 8 500  | 14   | <b>AXW 20</b> |
| <b>25</b>            | 45 | 32             | 3,2 | 4              | 29                    | 41                    | 13,4                                 | 60             | 6,95                  | 3 800                                           | 7 500  | 20   | <b>AXW 25</b> |
| <b>30</b>            | 50 | 37             | 3,2 | 4              | 34                    | 46                    | 15                                   | 72             | 8,3                   | 3 600                                           | 7 000  | 22   | <b>AXW 30</b> |
| <b>35</b>            | 55 | 42             | 3,2 | 4              | 39                    | 51                    | 16,6                                 | 83             | 9,8                   | 3 200                                           | 6 300  | 27   | <b>AXW 35</b> |
| <b>40</b>            | 63 | 47             | 4,2 | 4              | 45                    | 58                    | 25                                   | 114            | 13,7                  | 2 800                                           | 5 600  | 39   | <b>AXW 40</b> |
| <b>45</b>            | 68 | 52             | 4,2 | 4              | 50                    | 63                    | 27                                   | 127            | 15,3                  | 2 600                                           | 5 300  | 43   | <b>AXW 45</b> |



LS



AS



WS 811

# Dimensions

# Masses

Washers  
LS, WS AS

# Designations

Universal  
washer Thin universal  
washer Shaft washer

d d<sub>1</sub>, D B r<sub>1,2</sub>  
min

mm

g

–

|           |    |      |     |    |    |                |                |                 |
|-----------|----|------|-----|----|----|----------------|----------------|-----------------|
| <b>10</b> | 24 | 2,75 | 0,3 | 8  | 3  | <b>LS 1024</b> | <b>AS 1024</b> | –               |
| <b>12</b> | 26 | 2,75 | 0,3 | 9  | 3  | <b>LS 1226</b> | <b>AS 1226</b> | –               |
| <b>15</b> | 28 | 2,75 | 0,3 | 9  | 3  | <b>LS 1528</b> | <b>AS 1528</b> | <b>WS 81102</b> |
| <b>20</b> | 35 | 2,75 | 0,3 | 13 | 5  | <b>LS 2035</b> | <b>AS 2035</b> | <b>WS 81104</b> |
| <b>25</b> | 42 | 3    | 0,6 | 19 | 7  | <b>LS 2542</b> | <b>AS 2542</b> | <b>WS 81105</b> |
| <b>30</b> | 47 | 3    | 0,6 | 22 | 8  | <b>LS 3047</b> | <b>AS 3047</b> | <b>WS 81106</b> |
| <b>35</b> | 52 | 3,5  | 0,6 | 29 | 9  | <b>LS 3552</b> | <b>AS 3552</b> | <b>WS 81107</b> |
| <b>40</b> | 60 | 3,5  | 0,6 | 40 | 12 | <b>LS 4060</b> | <b>AS 4060</b> | <b>WS 81108</b> |
| <b>45</b> | 65 | 4    | 0,6 | 50 | 13 | <b>LS 4565</b> | <b>AS 4565</b> | <b>WS 81109</b> |