

**Axial needle roller and cage assemblies**  
**Axial bearing washers**  
**Axial needle roller bearings**

## Axial needle roller and cage assemblies, washers, axial needle roller bearings



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**Product overview** Axial needle roller and cage assemblies,  
washers, axial needle roller bearings

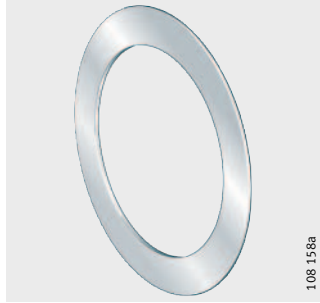
**Axial needle roller  
and cage assemblies**

**AXK**



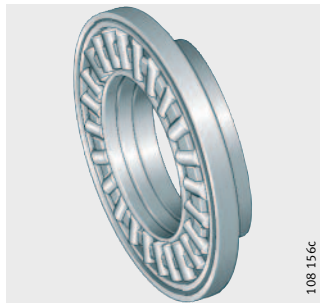
**Axial bearing washers**

**AS**



**Axial needle roller bearings  
With centring spigot**

**AXW**



**Other products**

**AX**



# Axial needle roller and cage assemblies, washers, axial needle roller bearings



## Features

### Axial needle roller and cage assemblies

Axial needle roller and cage assemblies AXK correspond to DIN 5 405-2. They comprise plastic or metal axial cages with integral needle rollers and have a very low axial section height.

The cage assemblies can support high axial forces in one direction. Radial loads must be supported by separate means.

Axial needle roller and cage assemblies require hardened and ground running surfaces as a raceway.

### Axial bearing washers

Axial bearing washers AS are punched, through hardened, polished and suitable for use as shaft or housing locating washers. They correspond to DIN 5 405-3 and are suitable for use with axial needle roller and cage assemblies AXK.

These washers are suitable for use where the adjacent machine part is unhardened but is sufficiently rigid and geometrically accurate.

### Axial needle roller bearings

Axial needle roller bearings AXW are units comprising axial needle roller and cage assemblies AXK and axial bearing washers with centring spigot. They can be combined with drawn cup needle roller bearings with open ends or with closed end, and with needle roller bearings.

The running surface for the needle roller and cage assembly must be hardened and ground.

### Operating temperature

Needle roller and cage assemblies and needle roller bearings with plastic cage are suitable for operating temperatures from  $-20\text{ }^{\circ}\text{C}$  to  $+120\text{ }^{\circ}\text{C}$ .

### Cages

Cage assemblies with a plastic cage have the suffix TV.

### Suffixes

Suffixes for available designs: see table.

### Available designs

Suffixes	Description	Design
TV <sup>1)</sup>	Plastic cage made from glass fibre reinforced polyamide 66	Standard
RR	Corrosion-resistant design, with Corrotect <sup>®</sup> plating	Special design <sup>2)</sup>

<sup>1)</sup> Axial needle roller and cage assemblies with plastic cage: see dimension table.

<sup>2)</sup> Available by agreement.

### Other products

Axial needle roller bearings are available in a special range with two raceways in various sizes; see Technical Publication API 18.

# Axial needle roller and cage assemblies, washers, axial needle roller bearings

## Design and safety guidelines

Axial bearing washers AS must always be fully supported on their entire abutment surface.

The abutment shoulders should be rigid, flat and perpendicular to the axis of rotation.

## Running surfaces

Radial cage running surfaces should be precision machined and resistant to wear,  $R_a 0,8$  ( $R_z 4$ ).

Raceways for axial needle roller and cage assemblies should be precision machined and resistant to wear:

- raceway hardness 58 HRC to 64 HRC
- hardening depth  $R_{ht} \geq 140 \cdot D_W / R_{p0,2}$ 
  - $R_{ht}$ , hardening depth in mm
  - $D_W$ , rolling element diameter in mm
  - $R_{p0,2}$ , proof stress in  $N/mm^2$
- roughness  $R_a 0,2$  ( $R_z 1$ )
- raceway dimensions  $E_a$  and  $E_b$  according to the dimension table must be observed
- runout tolerances to ISO tolerance grade IT 5, for special requirements to IT 4, in relation to the inside diameter of the cage assemblies ( $D_{c1}$ ) must be observed.

## Tolerances for shaft and housing bore

If axial needle roller bearings AXW are combined with drawn cup needle roller bearings or machined needle roller bearings, the same tolerances must be selected for the housing bore on the centring spigot as for the radial bearings.

### Housing bore and shaft tolerances

Bearing component		Shaft tolerance	Bore tolerance
AXK	Guided on shaft	h8	–
AS	As housing locating washer	Clear of shaft	H9
	As shaft locating washer	h8	Clear of housing

## Speeds

### Caution!

The limiting speeds  $n_G$  given in the dimension tables for AXK and AXW are for oil lubrication.

With grease lubrication, the permissible value is 25% of the value given in the table. Higher speeds may be possible by agreement.

## Minimum axial load

A minimum axial load  $F_{a \min}$  according to the formula must be applied.

$$F_{a \min} = 0,0005 \cdot C_{0a} + k_a \left( \frac{C_{0a} \cdot n}{10^8} \right)^2$$

$F_{a \min}$	N
Minimum axial load	
$k_a$	–
Factor for determining the minimum load; $k_a = 3$	
$C_{0a}$	N
Basic static load rating, axial	
$n$	$\text{min}^{-1}$
Speed.	

## Orientation of washers

Axial bearing washers AS are suitable as raceways on both sides.

**Accuracy  
Tolerances for  
bearing components**

Tolerances for bearing components: see table and *Figure 1*.

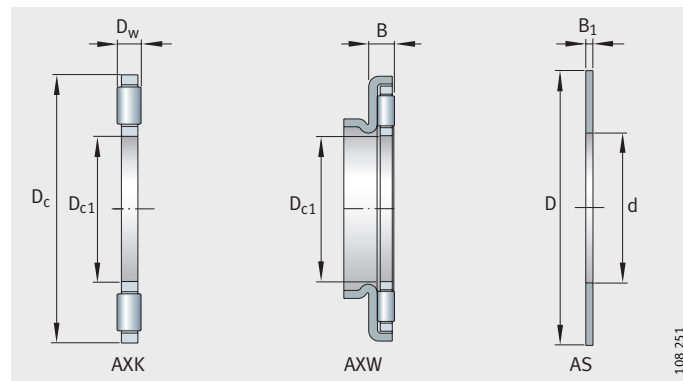
The diameter sort tolerance of the needle rollers in the axial needle roller and cage assembly AXK is 2 μm.

Axial bearing washers AS match themselves to the accuracy of the contact surface. They are flat under a minimum concentric load of 200 N.



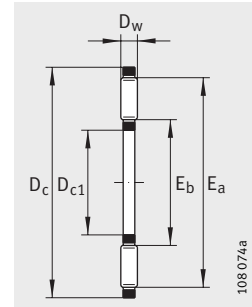
**Tolerances**

Series	Bore		Outside diameter		Height	
		Tolerance		Tolerance		Tolerance
AXK	$D_{c1}$	E12	$D_c$	c13	$D_w$	-0,01 mm
AXW	$D_{c1}$	E12	-	-	B	-0,2 mm
AS	d	E13	D	e13	$B_1$	±0,05 mm



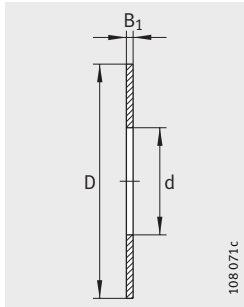
*Figure 1*  
Bearing components

# Axial needle roller and cage assemblies Axial bearing washers



AXK

Dimension table · Dimensions in mm							
Axial needle roller and cage assemblies		Axial bearing washers		Dimensions			
Designation	Mass m ≈g	Designation	Mass m ≈g	D <sub>c1</sub> /d	D <sub>c</sub> /D	D <sub>w</sub>	B <sub>1</sub>
AXK0414-TV	0,7	AS0414	1	4	14	2	1
AXK0515-TV	0,8	AS0515	1	5	15	2	1
AXK0619-TV	1	AS0619	2	6	19	2	1
AXK0821-TV	2	AS0821	2	8	21	2	1
AXK1024	3	AS1024	3	10	24	2	1
AXK1226	3	AS1226	3	12	26	2	1
AXK1528	4	AS1528	3	15	28	2	1
AXK1730	4	AS1730	4	17	30	2	1
AXK2035	5	AS2035	5	20	35	2	1
AXK2542	7	AS2542	7	25	42	2	1
AXK3047	8	AS3047	8	30	47	2	1
AXK3552	10	AS3552	9	35	52	2	1
AXK4060	16	AS4060	12	40	60	3	1
AXK4565	18	AS4565	13	45	65	3	1
AXK5070	20	AS5070	14	50	70	3	1
AXK5578	28	AS5578	18	55	78	3	1
AXK6085	33	AS6085	22	60	85	3	1
AXK6590	35	AS6590	24	65	90	3	1
AXK7095	60	AS7095	25	70	95	4	1
AXK75100	61	AS75100	27	75	100	4	1
AXK80105	63	AS80105	28	80	105	4	1
AXK85110	67	AS85110	29	85	110	4	1
AXK90120	86	AS90120	39	90	120	4	1
AXK100135	104	AS100135	50	100	135	4	1
AXK110145	122	AS110145	55	110	145	4	1
AXK120155	131	AS120155	59	120	155	4	1
AXK130170	205	AS130170	65	130	170	5	1
AXK140180	219	AS140180	79	140	180	5	1
AXK150190	232	AS150190	84	150	190	5	1
AXK160200	246	AS160200	89	160	200	5	1



108 071c

AS

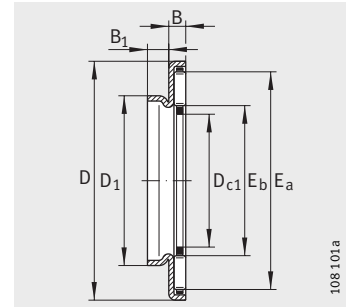


Raceway dimensions		Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
$E_b$	$E_a$	dyn. $C_a$ N	stat. $C_{0a}$ N	$C_{ua}$ N	$n_G$ $\text{min}^{-1}$	$n_B$ $\text{min}^{-1}$
5	13	4 400	8 000	940	21 400	14 900
6	14	4 750	9 200	1 070	20 500	13 000
7	18	6 800	15 500	1 580	18 800	10 800
9	20	7 800	19 400	1 970	17 700	8 800
12	23	9 200	25 500	2 500	16 900	7 400
14	25	9 900	29 000	2 850	15 200	6 500
17	27	11 300	36 000	3 600	13 400	5 100
19	29	11 900	39 500	3 950	12 300	4 600
22	34	13 100	46 500	4 750	10 500	4 350
29	41	14 700	58 000	5 900	8 600	3 850
34	46	16 300	70 000	7 100	7 500	3 200
39	51	17 800	81 000	8 300	6 600	2 800
45	58	28 000	114 000	11 800	5 800	2 440
50	63	30 000	128 000	13 300	5 200	2 170
55	68	32 000	143 000	14 800	4 800	1 950
60	76	38 000	186 000	20 300	4 350	1 780
65	83	44 500	234 000	26 500	3 950	1 590
70	88	46 500	255 000	28 500	3 700	1 470
74	93	54 000	255 000	26 500	3 500	1 430
79	98	55 000	265 000	28 000	3 300	1 350
84	103	56 000	280 000	29 500	3 100	1 280
89	108	58 000	290 000	30 500	2 950	1 220
94	118	73 000	405 000	44 500	2 750	1 120
105	133	91 000	560 000	58 000	2 450	980
115	143	97 000	620 000	63 000	2 260	890
125	153	102 000	680 000	68 000	2 090	810
136	167	133 000	840 000	75 000	1 920	760
146	177	138 000	900 000	79 000	1 800	710
156	187	143 000	960 000	82 000	1 690	660
166	197	148 000	1 020 000	86 000	1 600	620



# Axial needle roller bearings

With centring spigot

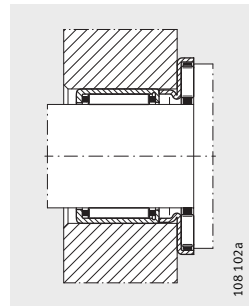


AXW

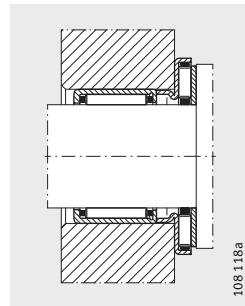
Dimension table · Dimensions in mm													
Designation	Mass m ≈ g	Dimensions					Raceway dimensions		Basic load ratings		Fatigue limit load C <sub>ua</sub> N	Limiting speed n <sub>G</sub> min <sup>-1</sup>	Reference speed n <sub>B</sub> min <sup>-1</sup>
		D <sub>c1</sub>	D <sub>1</sub>	D	B	B <sub>1</sub>	E <sub>b</sub>	E <sub>a</sub>	dyn. C <sub>a</sub> N	stat. C <sub>0a</sub> N			
<b>AXW10</b>	8,3	<b>10</b>	14	27	3,2	3	12	23	9 200	25 500	2 500	15 600	8 300
<b>AXW12</b>	9,1	<b>12</b>	16	29	3,2	3	14	25	9 900	29 000	2 850	14 000	7 300
<b>AXW15</b>	10	<b>15</b>	21	31	3,2	3,5	17	27	11 300	36 000	3 600	12 500	5 800
<b>AXW17</b>	11	<b>17</b>	23	33	3,2	3,5	19	29	11 900	39 500	3 950	11 500	5 300
<b>AXW20</b>	14	<b>20</b>	26	38	3,2	3,5	22	34	13 100	46 500	4 750	9 900	4 900
<b>AXW25</b>	20	<b>25</b>	32	45	3,2	4	29	41	14 700	58 000	5 900	8 200	4 250
<b>AXW30</b>	22	<b>30</b>	37	50	3,2	4	34	46	16 300	70 000	7 100	7 200	3 600
<b>AXW35</b>	27	<b>35</b>	42	55	3,2	4	39	51	17 800	81 000	8 300	6 400	3 100
<b>AXW40</b>	39	<b>40</b>	47	63	4,2	4	45	58	28 000	114 000	11 800	5 600	2 700
<b>AXW45</b>	43	<b>45</b>	52	68	4,2	4	50	63	30 000	128 000	13 300	5 100	2 400
<b>AXW50</b>	49	<b>50</b>	58	73	4,2	4,5	55	68	32 000	143 000	14 800	4 700	2 160

<sup>1)</sup> Dimensions for axial bearing washers AS, for drawn cup needle roller bearings with open ends, drawn cup needle roller bearings with open end and needle roller bearings: see corresponding product section.

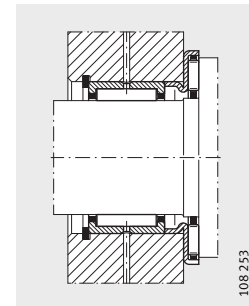
Combination with radial needle roller bearings



AXW with HK



AXW with AS and HK



AXW with NK, NKS, RNA49, RNA69



**Combination with drawn cup needle roller bearings with open ends, drawn cup needle roller bearings with closed end and with needle roller bearings**

Designation

AS	HK	HK...RS	BK	NK, NKS, RNA49, RNA69 Needle roller bearings <sup>1)</sup>	NKI, NKIS, NA49, NA69 Needle roller bearings <sup>1)</sup>
AS1024	HK1010, HK1012	–	BK1010, BK1012	NK7/10TV	–
–	HK1015	–	BK1015	NK7/12TV	–
AS1226	HK1210	–	BK1210	NK9/12TV	NKI6/12TV
–	–	–	–	NK9/16TV	NKI6/16TV
AS1528	HK1512, HK1516	HK1514-RS	BK1512, BK1516	–	–
–	HK1522-ZW	–	–	–	–
AS1730	HK1712	–	–	NK15/16, NK15/20	–
AS2035	HK2012, HK2016	HK2018-RS	BK2016	NK18/16, NK18/20	–
–	HK2020	–	BK2020	–	–
–	HK2030-ZW	–	–	–	–
AS2542	HK2512, HK2516	HK2518-RS	–	NK24/16, NK24/20	NKI20/16
–	HK2520, HK2526	–	BK2520, BK2526	NKS20	NKI20/20
–	HK2538-ZW	–	BK2538-ZW	–	–
AS3047	HK3012, HK3016	HK3018-RS	BK3012, BK3016	NK28/20, NK28/30	NA4904
–	HK3020, HK3026	–	BK3020, BK3026	NKS 24	NA6904
–	HK3038-ZW	–	BK3038-ZW	RNA4904, RNA6904	–
AS3552	HK3512, HK3516	HK3518-RS	–	NK32/20, NK32/30	NKIS20, NA4905
–	HK3520	–	BK3520	NKS28	NA6905
–	–	–	–	RNA4905, RNA6905	NKI28/20 NKI28/30
AS4060	HK4012, HK4016	HK4018-RS	–	NK37/20, NK37/30	NKIS25, NA4906
–	HK4020	–	BK4020	NKS32	NA6906
–	–	–	–	RNA4906, RNA6906	NKI32/20
–	–	–	–	–	NKI32/30
AS4565	HK4516, HK4520	HK4518-RS	BK4520	NK42/20, NK42/30	NKIS30
–	–	–	–	NKS37	NA49/32
–	–	–	–	RNA49/32, RNA69/32	NA69/32
AS5070	HK5020, HK5025	HK5022-RS	–	NKS43	NKIS35