

10 Cylindrical roller thrust bearings

Designs and variants	1038
Single direction cylindrical roller thrust bearings	1038
Double direction cylindrical roller thrust bearings	1038
Components	1039
Bearing washers.	1039
Cages.	1040

Bearing data	1041
(Dimension standards, tolerances, misalignment, friction, starting torque, power loss, defect frequencies)	

Loads	1044
(Minimum load, equivalent loads)	

Temperature limits	1045
-------------------------------------	-------------

Permissible speed	1045
------------------------------------	-------------

Design of bearing arrangements	1046
Abutment dimensions	1046
Raceways on shafts and in housings . . .	1046

Designation system	1047
-------------------------------------	-------------

Product table

11.1 Cylindrical roller thrust bearings	1048
--	-------------



11 Cylindrical roller thrust bearings

Designs and variants

SKF cylindrical roller thrust bearings are designed to accommodate heavy axial loads and shock loads. They must not be subjected to any radial load. The ends of the rollers are relieved slightly to modify the line contact between the raceways and rollers. This prevents stress peaks at the roller ends to extend bearing service life.

Cylindrical roller thrust bearings are very stiff and require little axial space. They are separable, that means that shaft washer, housing washer, and cylindrical roller and cage thrust assembly can be mounted separately.

Cylindrical roller thrust bearings are manufactured with one or two rows of rollers (→ fig. 1). Bearings in the 811 and 812 series are mainly used in applications where thrust ball bearings do not have sufficient load carrying capacity.

Single direction cylindrical roller thrust bearings

As standard, cylindrical roller thrust bearings are available as single direction bearings (→ fig. 1) and can accommodate axial loads in one direction only.

Double direction cylindrical roller thrust bearings

Double direction cylindrical roller thrust bearings can accommodate axial loads in both

More information

Bearing life and load ratings. 63

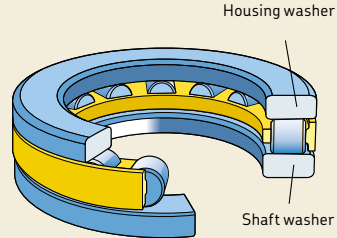
Design considerations 159

Abutment and fillet dimensions. 208

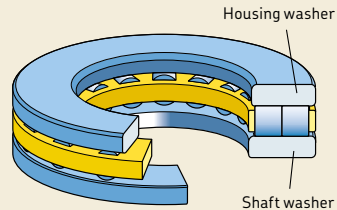
Lubrication 239

Mounting, dismantling and bearing care 271

Fig. 1

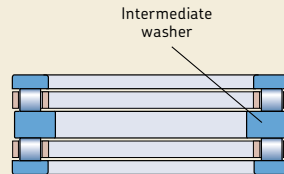


Single row bearing, 811 and 812 series

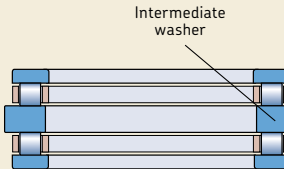


Double row bearing, 893 and 894 series

Fig. 2



Shaft centred bearing



Housing centred bearing

directions. They can be created by combining two cylindrical 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. 2**).

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

For additional information, refer to *Design of bearing arrangements* (→ **page 1046**).

Components

SKF can supply the components of cylindrical roller thrust bearings (→ **fig. 3**) separately. The components are listed in the product tables and include:

- cylindrical roller and cage thrust assemblies (prefix K)
- shaft washers (prefix WS)
- housing washers (prefix GS)

Single components might be required for applications where:

- The faces of adjacent machine components can serve as raceways and bearing arrangements with a low axial section height are required.
- Other combinations of cylindrical roller and cage thrust assemblies and washers are required, for example with two shaft or housing washers.

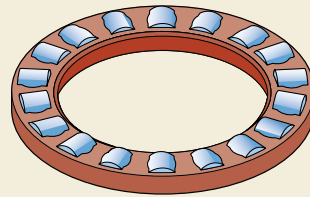
Bearing washers

SKF supplies bearing washers in different designs and series. Bearing washers are required in cases where adjacent machine components cannot serve as raceways. Appropriate washers are listed in the product tables.

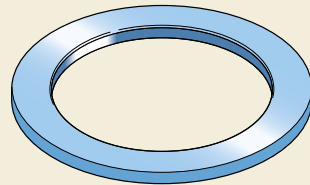
Shaft and housing washers

Shaft washers (prefix WS) and housing washers (prefix GS) are made of hardened carbon chromium bearing steel. The raceway surfaces are precision ground. Shaft washers have a ground bore while housing washers have a ground outside surface. Therefore, SKF rec-

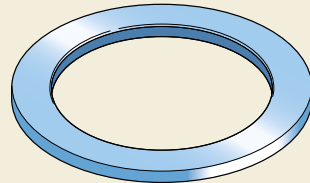
Fig. 3



Prefix K



Prefix WS



Prefix GS

ommends using these washers in high-speed applications where accurate centring of the bearing washers is required.

LS series universal washers

LS series universal washers can be used as both shaft or housing washers for bearings in the 811 series. These washers are used for applications where accurate centring of the bearing washers is not necessary or where slow speeds are involved.

For additional information about these washers, refer to *Needle roller thrust bearings* (→ **page 1057**).

11 Cylindrical roller thrust bearings



Cages

Depending on their series and size, SKF cylindrical roller thrust bearings are fitted with one of the cages shown in **table 1**.

The lubricants generally used for rolling bearings do not have a detrimental effect on cage properties. However, some synthetic oils and greases with a synthetic oil base and lubricants containing a high proportion of EP additives, when used at high temperatures, can have a detrimental effect on polyamide cages. For additional information about the suitability of cages, refer to *Cages* (→ **page 37**) and *Cage materials* (→ **page 152**).

Table 1

Cages for cylindrical roller thrust bearings

		
Material	Glass fibre reinforced PA66	Machined brass
Suffix	TN	M

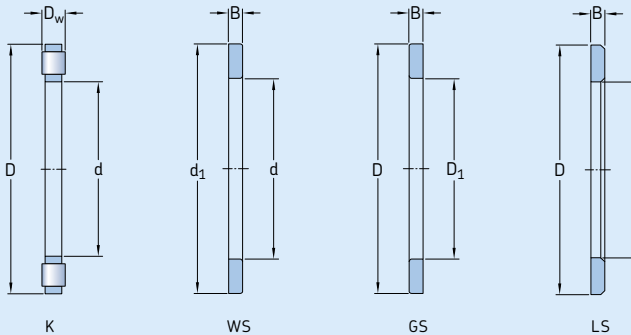
Bearing data

Dimension standards	Boundary dimensions: ISO 104
Tolerances	Normal Check availability of P5 for larger bearings Values: ISO 199 (→ table 10, page 144)
For additional information (→ page 132)	Components: (→ table 2, page 1042) Values: (→ table 3, page 1043) Variation of gauge lot diameter of the rollers: ISO 12297
Misalignment	Cannot tolerate any angular misalignment between the shaft and the housing or between the shaft and the axial support surfaces in the housing.
Friction, starting torque, power loss	Frictional moment, starting torque and power loss can be calculated as specified under <i>Friction</i> (→ page 97), or using the tools available online at skf.com/bearingcalculator .
Defect frequencies	Defect frequencies can be calculated using the tools available online at skf.com/bearingcalculator .

11 Cylindrical roller thrust bearings

Table 2

Tolerances for cylindrical roller thrust bearings



Bearing component Dimensions	Tolerance, tolerance class ¹⁾ , standard
---------------------------------	---

Cylindrical roller and cage thrust assemblies, K

Bore diameter	d	E11
Outside diameter	D	a13
Roller diameter	D_w	ISO 12297

Shaft washers, WS

Bore diameter	d	Normal, ISO 199
Outside diameter	d_1	–
Thickness	B	h11
Axial run-out	s_i	Normal, ISO 199

Housing washers, GS

Outside diameter	D	Normal, ISO 199
Bore diameter	D_1	–
Thickness	B	h11
Axial run-out	s_e	Normal, ISO 199

Universal washers, LS

Bore diameter	d	E12
Outside diameter	D	a12
Thickness	B	h11
Axial run-out	s_i	Normal, ISO 199

¹⁾ All ISO tolerance classes are valid with the envelope requirement (such as H7(E)) in accordance with ISO 14405-1.

Table 3

ISO tolerance classes

Nominal dimension		a12(E) Deviations		a13(E) Deviations		E11(E) Deviations		E12(E) Deviations		h11(E) Deviations	
over	incl.	high	low	high	low	high	low	high	low	high	low
mm		µm		µm		µm		µm		µm	
-	3	-	-	-	-	-	-	-	-	0	-60
3	6	-	-	-	-	-	-	-	-	0	-75
6	10	-	-	-	-	-	-	-	-	0	-90
10	18	-	-	-	-	+142	+32	+212	+32	0	-110
18	30	-300	-510	-300	-630	+170	+40	+250	+40	0	-130
30	40	-310	-560	-310	-700	+210	+50	+300	+50	-	-
40	50	-320	-570	-320	-710	+210	+50	+300	+50	-	-
50	65	-340	-640	-340	-800	+250	+60	+360	+60	-	-
65	80	-360	-660	-360	-820	+250	+60	+360	+60	-	-
80	100	-380	-730	-380	-920	+292	+72	+422	+72	-	-
100	120	-410	-760	-410	-950	+292	+72	+422	+72	-	-
120	140	-460	-860	-460	-1 090	+335	+85	+485	+85	-	-
140	160	-520	-920	-520	-1 150	+335	+85	+485	+85	-	-
160	180	-580	-980	-580	-1 210	+335	+85	-	-	-	-
180	200	-660	-1 120	-660	-1 380	+390	+100	-	-	-	-
200	225	-	-	-740	-1 460	+390	+100	-	-	-	-
225	250	-	-	-820	-1 540	+390	+100	-	-	-	-
250	280	-	-	-920	-1 730	+430	+110	-	-	-	-
280	315	-	-	-1 050	-1 860	+430	+110	-	-	-	-
315	355	-	-	-1 200	-2 090	+485	+125	-	-	-	-
355	400	-	-	-1 350	-2 240	+485	+125	-	-	-	-
400	450	-	-	-1 500	-2 470	+535	+135	-	-	-	-
450	500	-	-	-1 650	-2 620	+535	+135	-	-	-	-
500	630	-	-	-1 900	-3 000	+585	+145	-	-	-	-
630	800	-	-	-2 100	-3 350	-	-	-	-	-	-

11 Cylindrical roller thrust bearings

Loads

	Cylindrical roller thrust bearings	Symbols
Minimum load For additional information (→ page 86)	$F_{am} = 0,0005 C_0 + A \left(\frac{n}{1\,000} \right)^2$ <p>The weight of the components supported by the bearing, particularly when the shaft is vertical, together with external forces, generally exceed the requisite minimum load. If this is not the case, the bearing must be subjected to an additional axial load by using springs or a shaft nut.</p>	A = minimum load factor (→ product tables) C ₀ = basic static load rating [kN] (→ product tables) F _a = axial load [kN] F _{am} = minimum axial load [kN] n = rotational speed [r/min] P = equivalent dynamic bearing load [kN] P ₀ = equivalent static bearing load [kN]
Equivalent dynamic bearing load For additional information (→ page 85)	$P = F_a$	
Equivalent static bearing load For additional information (→ page 88)	$P_0 = F_a$	

Temperature limits

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

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

When temperatures outside the permissible range are expected, contact the SKF application engineering service.

Bearing washers and rollers

SKF cylindrical roller thrust bearings undergo a special heat treatment. The bearings are heat stabilized up to at least 120 °C (250 °F).

Cages

Brass cages can be used at the same operating temperatures as the bearing washers and rollers. For temperature limits of polymer cages, refer to *Cage materials* (→ **page 152**).

Lubricants

Temperature limits for SKF greases are provided under *Lubrication* (→ **page 239**). When using lubricants not supplied by SKF, the temperature limits should be evaluated according to the SKF traffic light concept (→ **page 244**).

Permissible speed

The permissible speed can be estimated using the speed ratings listed in the product tables and applying the information provided under *Speeds* (→ **page 117**).

11 Cylindrical roller thrust bearings

Design of bearing arrangements

Abutment dimensions

The support surfaces in housings and on shafts should be at right angles to the shaft axis and provide uninterrupted support over the entire washer face. The abutment diameter on the shaft should be $\geq d_{a\text{ min}}$ and in the housing $\leq D_{a\text{ max}}$ (→ **fig. 4**). Values for $d_{a\text{ min}}$ and $D_{a\text{ max}}$ are listed in the product tables.

To provide satisfactory radial guidance for the individual thrust bearing components, suitable tolerance classes for shafts and housings are listed in **table 4**. A radial gap between the shaft and washer bore is required for housing centred washers. Shaft centred washers require a radial gap between the washer and housing bore.

Cylindrical roller and cage thrust assemblies are generally centred radially by the shaft, 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

If the load carrying capacity of a cylindrical roller and cage thrust assembly is to be fully exploited, the raceways on the shaft or in the housing should have the same hardness, surface finish and axial run-out as a bearing washer.

The dimensions E_a and E_b (→ **product tables**) take the possible displacement of the roller set into consideration and should be applied when designing raceways on shafts and in housings.

For additional information, refer to *Raceways on shafts and in housings* (→ **page 210**).

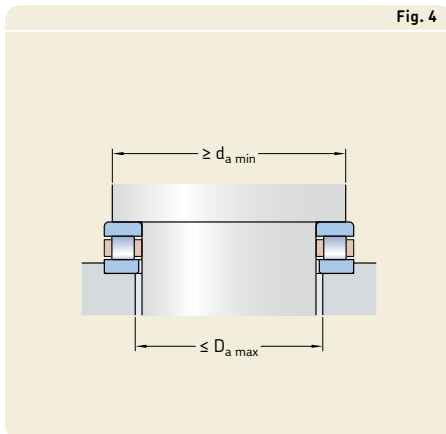


Fig. 4

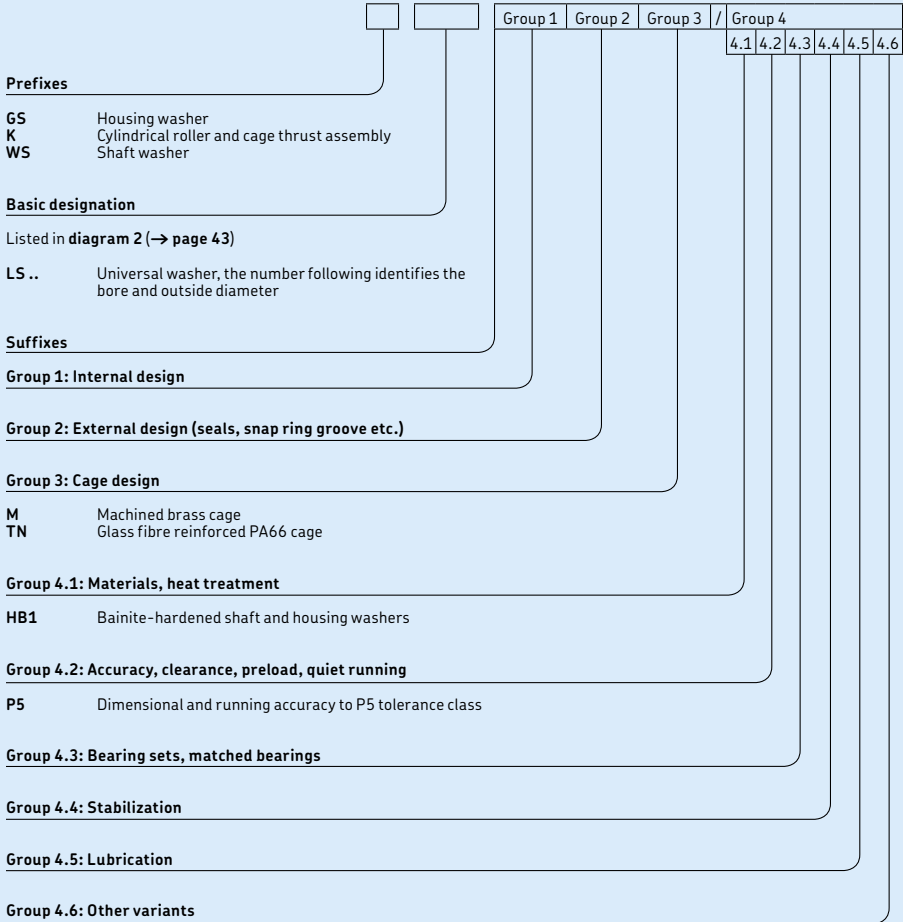
Table 4

Shaft and housing tolerance classes

Bearing component	Prefix	Tolerance class ¹⁾	
		Shaft centred	Housing centred
Cylindrical roller and cage thrust assemblies	K	h8	–
Shaft washers	WS	h8	–
Housing washers	GS	–	H9

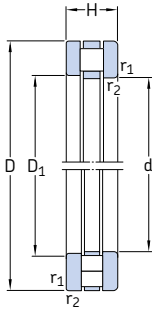
¹⁾ All ISO tolerance classes are valid with the envelope requirement (such as H7 \oplus) in accordance with ISO 14405-1.

Designation system

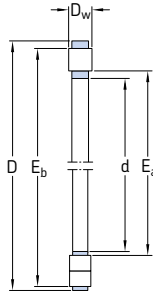


11.1 Cylindrical roller thrust bearings

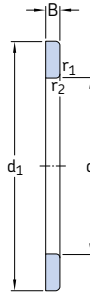
d 15 – 65 mm



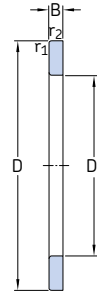
811, 812
893, 894



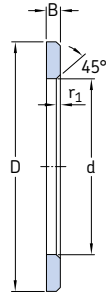
K 811, K 812
K 893, K 894



WS

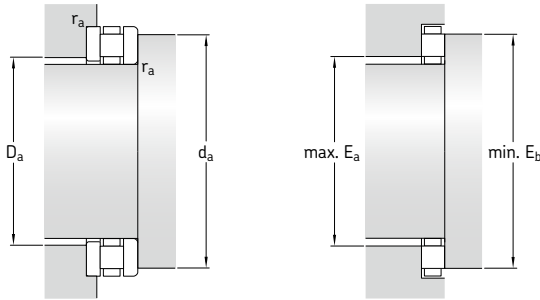


GS



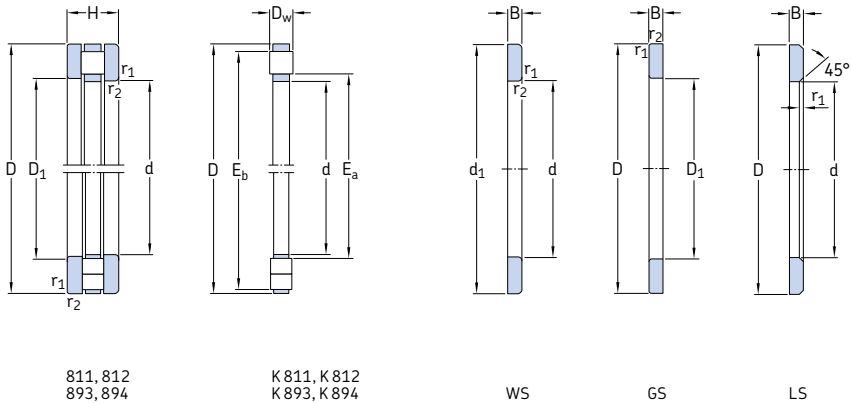
LS

Principal dimensions				Basic load ratings		Fatigue load limit	Minimum load factor	Speed ratings	Mass	Designation		
d	D	H	Ea	Eb	dynamic C	static C0	Pu	Reference speed	Limiting speed			
mm					kN		kN	-	r/min	kg	-	
15	28	9	16	27	11,2	27	2,45	0,000 058	4 300	8 500	0,024	81102 TN
17	30	9	18	29	12,2	31,5	2,85	0,000 079	4 300	8 500	0,027	81103 TN
20	35	10	21	34	18,6	48	4,65	0,00018	3 800	7 500	0,037	81104 TN
25	42	11	26	41	25	69,5	6,8	0,00039	3 200	6 300	0,053	81105 TN
30	47	11	31	46	27	78	7,65	0,00049	3 000	6 000	0,057	81106 TN
52	16	31	50	50	134	13,4	0,0014	2 400	4 800	0,12	81206 TN	
60	18	33	59	52	183	18,3	0,0027	2 600	5 300	0,24	89306 TN	
35	52	12	36	51	29	93	9,15	0,00069	2 800	5 600	0,073	81107 TN
62	18	39	58	62	190	19,3	0,0029	2 000	4 000	0,21	81207 TN	
68	20	38	67	62	220	22	0,0039	2 400	4 800	0,34	89307 TN	
40	60	13	42	58	43	137	13,7	0,0015	2 400	5 000	0,11	81108 TN
68	19	43	66	83	255	26,5	0,0052	1 900	3 800	0,25	81208 TN	
78	22	44	77	95	365	36,5	0,011	2 000	4 000	0,48	89308 TN	
45	65	14	47	63	45	153	15,3	0,0019	2 200	4 500	0,13	81109 TN
73	20	48	70	83	255	26,5	0,0052	1 800	3 600	0,29	81209 TN	
85	24	49	83	108	425	43	0,014	1 800	3 600	0,62	89309 TN	
50	70	14	52	68	47,5	166	16,6	0,0022	2 200	4 300	0,14	81110 TN
78	22	53	75	91,5	300	31	0,0072	1 700	3 400	0,36	81210 TN	
95	27	56	92	132	530	54	0,022	1 600	3 200	0,89	89310 TN	
55	78	16	57	77	69,5	285	29	0,0065	1 900	3 800	0,23	81111 TN
90	25	59	85	122	390	40	0,012	1 400	2 800	0,57	81211 TN	
105	30	61	103	143	570	58,5	0,026	1 500	3 000	1,2	89311 TN	
60	85	17	62	82	80	300	30,5	0,0072	1 800	3 600	0,27	81112 TN
95	26	64	91	137	465	47,5	0,017	1 400	2 800	0,65	81212 TN	
110	30	66	108	153	640	65,5	0,033	1 400	2 800	1,25	89312 TN	
130	42	65	126	310	1 180	125	0,11	1 200	2 400	2,8	89412 TN	
65	90	18	67	87	83	320	32,5	0,0082	1 700	3 400	0,31	81113 TN
100	27	69	96	140	490	50	0,019	1 300	2 600	0,72	81213 TN	
115	30	71	113	153	640	65,5	0,033	1 400	2 800	1,35	89313 TN	
140	45	70	135	355	1 370	143	0,15	1 100	2 200	3,5	89413 TN	

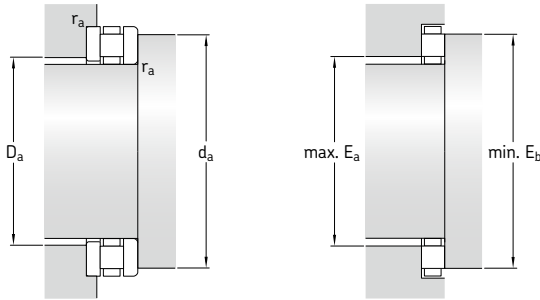


Dimensions						Abutment and fillet dimensions			Designation of components		Housing washer	Universal washer
d	d ₁	D ₁	B	D _w	r _{1,2} min.	d _a min.	D _a max.	r _a max.	Cylindrical roller and cage thrust assembly	Shaft washer		
mm						mm			-			
15	28	16	2,75	3,5	0,3	27	16	0,3	K 81102 TN	WS 81102	GS 81102	LS 1528
17	30	18	2,75	3,5	0,3	29	18	0,3	K 81103 TN	WS 81103	GS 81103	LS 1730
20	35	21	2,75	4,5	0,3	34	21	0,3	K 81104 TN	WS 81104	GS 81104	LS 2035
25	42	26	3	5	0,6	41	26	0,6	K 81105 TN	WS 81105	GS 81105	LS 2542
30	47	32	3	5	0,6	46	31	0,6	K 81106 TN	WS 81106	GS 81106	LS 3047
	52	32	4,25	7,5	0,6	50	31	0,6	K 81206 TN	WS 81206	GS 81206	-
	60	32	6,25	5,5	1	59	33	1	K 89306 TN	WS 89306	GS 89306	-
35	52	37	3,5	5	0,6	51	36	0,6	K 81107 TN	WS 81107	GS 81107	LS 3552
	62	37	5,25	7,5	1	58	39	1	K 81207 TN	WS 81207	GS 81207	-
	68	37	7	6	1	67	38	1	K 89307 TN	WS 89307	GS 89307	-
40	60	42	3,5	6	0,6	58	42	0,6	K 81108 TN	WS 81108	GS 81108	LS 4060
	68	42	5	9	1	66	43	1	K 81208 TN	WS 81208	GS 81208	-
	78	42	7,5	7	1	77	44	1	K 89308 TN	WS 89308	GS 89308	-
45	65	47	4	6	0,6	63	47	0,6	K 81109 TN	WS 81109	GS 81109	LS 4565
	73	47	5,5	9	1	70	48	1	K 81209 TN	WS 81209	GS 81209	-
	85	47	8,25	7,5	1	83	49	1	K 89309 TN	WS 89309	GS 89309	-
50	70	52	4	6	0,6	68	52	0,6	K 81110 TN	WS 81110	GS 81110	LS 5070
	78	52	6,5	9	1	75	53	1	K 81210 TN	WS 81210	GS 81210	-
	95	52	9,5	8	1,1	92	56	1,1	K 89310 TN	WS 89310	GS 89310	-
55	78	57	5	6	0,6	77	56	0,6	K 81111 TN	WS 81111	GS 81111	LS 5578
	90	57	7	11	1	85	59	1	K 81211 TN	WS 81211	GS 81211	-
	105	57	10,5	9	1,1	103	62	1,1	K 89311 TN	WS 89311	GS 89311	-
60	85	62	4,75	7,5	1	82	62	1	K 81112 TN	WS 81112	GS 81112	LS 6085
	95	62	7,5	11	1	91	64	1	K 81212 TN	WS 81212	GS 81212	-
	110	62	10,5	9	1,1	108	67	1,1	K 89312 TN	WS 89312	GS 89312	-
	130	62	14	14	1,5	126	65	1,5	K 89412 TN	WS 89412	GS 89412	-
65	90	67	5,25	7,5	1	87	67	1	K 81113 TN	WS 81113	GS 81113	LS 6590
	100	67	8	11	1	96	69	1	K 81213 TN	WS 81213	GS 81213	-
	115	67	10,5	9	1,1	113	72	1,1	K 89313 TN	WS 89313	GS 89313	-
	140	68	15	15	2	135	70	2	K 89413 TN	WS 89413	GS 89413	-

11.1 Cylindrical roller thrust bearings d 70 – 120 mm



Principal dimensions				Basic load ratings		Fatigue load limit	Minimum load factor	Speed ratings		Mass	Designation	
d	D	H	E _a	E _b	dynamic C	static C ₀	P _u	A	Reference speed	Limiting speed	kg	-
mm					kN		kN	-	r/min		kg	-
70	95	18	72	92	86,5	345	34,5	0,0095	1 700	3 400	0,33	81114 TN
	105	27	74	102	146	530	55	0,022	1 300	2 600	0,77	81214 TN
	125	34	76	123	186	800	81,5	0,051	1 300	2 600	1,8	89314 TN
	150	48	76	147	380	1 460	150	0,17	1 000	2 000	4,2	89414 TN
75	100	19	78	97	83	335	34	0,009	1 600	3 200	0,39	81115 TN
	110	27	79	106	137	490	50	0,019	1 200	2 400	0,8	81215 TN
	135	36	81	132	228	965	98	0,074	1 200	2 400	2,25	89315 TN
	160	51	82	156	400	1 530	156	0,19	950	1 900	5,95	89415 M
80	105	19	83	102	81,5	335	34	0,009	1 500	3 000	0,4	81116 TN
	115	28	84	112	160	610	63	0,03	1 200	2 400	0,9	81216 TN
	140	36	86	137	240	1 060	108	0,09	1 200	2 400	2,35	89316 TN
	170	54	88	165	440	1 730	173	0,24	900	1 800	7,05	89416 M
85	110	19	87	108	88	365	37,5	0,011	1 500	3 000	0,42	81117 TN
	125	31	90	119	170	640	67	0,033	1 100	2 200	1,2	81217 TN
	150	39	93	146	255	1 100	110	0,097	1 100	2 200	3,4	89317 M
	180	58	93	175	490	1 930	190	0,3	850	1 700	8,65	89417 M
90	120	22	93	117	110	450	45,5	0,016	1 300	2 600	0,62	81118 TN
	135	35	95	129	232	865	90	0,06	1 000	2 000	1,75	81218 TN
	155	39	98	151	265	1 160	114	0,11	1 000	2 000	3,65	89318 M
	190	60	99	185	540	2 120	208	0,36	800	1 600	9,95	89418 M
100	135	25	104	131	156	630	62	0,032	1 200	2 400	0,95	81120 TN
	150	38	107	142	270	1 060	104	0,09	900	1 800	2,2	81220 TN
	170	42	109	166	300	1 370	132	0,15	950	1 900	4,55	89320 M
	210	67	111	205	680	2 800	265	0,63	700	1 400	13,5	89420 M
110	145	25	114	141	163	680	65,5	0,037	1 100	2 200	1,05	81122 TN
	160	38	117	152	260	1 000	98	0,08	850	1 700	2,3	81222 TN
	190	48	120	185	400	1 830	173	0,27	850	1 700	6,7	89322 M
	230	73	121	223	800	3 350	310	0,9	630	1 300	17,5	89422 M
120	155	25	124	151	170	735	68	0,043	1 100	2 200	1,1	81124 TN
	170	39	127	162	255	1 000	96,5	0,08	800	1 600	2,55	81224 TN
	210	54	132	205	510	2 360	216	0,45	750	1 500	9,45	89324 M
	250	78	133	243	930	3 900	355	1,2	600	1 200	22	89424 M

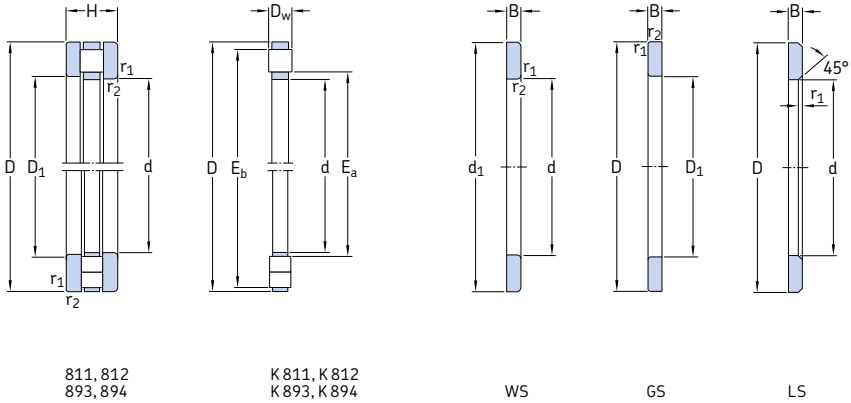


Dimensions						Abutment and fillet dimensions			Designation of components		Housing washer	Universal washer
d	d ₁	D ₁	B	D _w	r _{1,2}	d _a	D _a	r _a	Cylindrical roller and cage thrust assembly	Shaft washer		
mm	~	~			min.	min.	max.	max.				
70	95	72	5,25	7,5	1	92	72	1	K 81114 TN	WS 81114	GS 81114	LS 7095
	105	72	8	11	1	102	74	1	K 81214 TN	WS 81214	GS 81214	-
	125	72	12	10	1,1	123	78	1,1	K 89314 TN	WS 89314	GS 89314	-
	150	73	16	16	2	147	78	2	K 89414 TN	WS 89414	GS 89414	-
75	100	77	5,75	7,5	1	97	78	1	K 81115 TN	WS 81115	GS 81115	LS 75100
	110	77	8	11	1	106	79	1	K 81215 TN	WS 81215	GS 81215	-
	135	77	12,5	11	1,5	132	83	1,5	K 89315 TN	WS 89315	GS 89315	-
	160	78	17	17	2	156	84	2	K 89415 M	WS 89415	GS 89415	-
80	105	82	5,75	7,5	1	102	83	1	K 81116 TN	WS 81116	GS 81116	LS 80105
	115	82	8,5	11	1	112	84	1	K 81216 TN	WS 81216	GS 81216	-
	140	82	12,5	11	1,5	137	88	1,5	K 89316 TN	WS 89316	GS 89316	-
	170	83	18	18	2,1	166	89	2,1	K 89416 M	WS 89416	GS 89416	-
85	110	87	5,75	7,5	1	108	87	1	K 81117 TN	WS 81117	GS 81117	LS 85110
	125	88	9,5	12	1	119	90	1	K 81217 TN	WS 81217	GS 81217	-
	150	88	13,5	12	1,5	147	93	1,5	K 89317 M	WS 89317	GS 89317	-
	180	88	19,5	19	2,1	176	94	2,1	K 89417 M	WS 89417	GS 89417	-
90	120	92	6,5	9	1	117	93	1	K 81118 TN	WS 81118	GS 81118	LS 90120
	135	93	10,5	14	1,1	129	95	1,1	K 81218 TN	WS 81218	GS 81218	-
	155	93	13,5	12	1,5	152	98	1,5	K 89318 M	WS 89318	GS 89318	-
	190	93	20	20	2,1	186	100	2,1	K 89418 M	WS 89418	GS 89418	-
100	135	102	7	11	1	131	104	1	K 81120 TN	WS 81120	GS 81120	LS 100135
	150	103	11,5	15	1,1	142	107	1,1	K 81220 TN	WS 81220	GS 81220	-
	170	103	14,5	13	1,5	167	109	1,5	K 89320 M	WS 89320	GS 89320	-
	210	103	22,5	22	3	206	112	3	K 89420 M	WS 89420	GS 89420	-
110	145	112	7	11	1	141	114	1	K 81122 TN	WS 81122	GS 81122	LS 110145
	160	113	11,5	15	1,1	152	117	1,1	K 81222 TN	WS 81222	GS 81222	-
	190	113	16,5	15	2	186	120	2	K 89322 M	WS 89322	GS 89322	-
	230	113	24,5	24	3	225	123	3	K 89422 M	WS 89422	GS 89422	-
120	155	122	7	11	1	151	124	1	K 81124 TN	WS 81124	GS 81124	LS 120155
	170	123	12	15	1,1	162	127	1,1	K 81224 TN	WS 81224	GS 81224	-
	210	123	18,5	17	2,1	206	130	2,1	K 89324 M	WS 89324	GS 89324	-
	250	123	26	26	4	245	135	4	K 89424 M	WS 89424	GS 89424	-

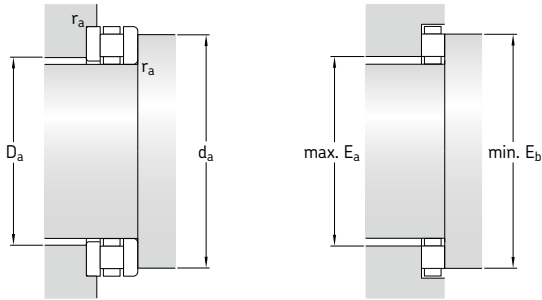
11.1

11.1 Cylindrical roller thrust bearings

d 130 – 240 mm



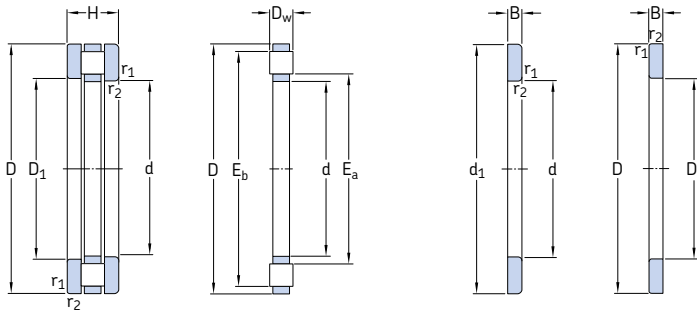
Principal dimensions				Basic load ratings		Fatigue load limit P_u	Minimum load factor A	Speed ratings		Mass kg	Designation	
d	D	H	E_a	E_b	dynamic C			static C_0	Reference speed			Limiting speed
mm						kN	kN	-	r/min	kg	-	
130	170	30	135	165	200	880	81,5	0,062	950	1 900	1,65	81126 TN
	190	45	137	181	380	1 460	137	0,17	700	1 400	4	81226 TN
	225	58	141	219	560	2 650	240	0,56	700	1 400	11	89326 M
	270	85	145	263	1 060	4 500	400	1,6	530	1 100	27	89426 M
140	180	31	145	175	208	930	85	0,069	900	1 800	1,9	81128 TN
	200	46	150	191	360	1 400	129	0,16	700	1 400	5,05	81228 M
	240	60	152	234	640	3 100	275	0,77	670	1 300	12,5	89328 M
	280	85	155	273	1 100	4 800	425	1,8	530	1 100	29,5	89428 M
150	190	31	155	185	212	1 000	88	0,08	850	1 700	2,2	81130 TN
	215	50	162	210	465	1 900	170	0,29	630	1 300	7,2	81230 M
	250	60	162	244	670	3 250	285	0,85	630	1 300	14	89330 M
	300	90	167	293	1 250	5 600	480	2,5	500	1 000	35,5	89430 M
160	200	31	165	195	216	1 020	90	0,08	850	1 700	2,1	81132 TN
	225	51	171	219	480	2 000	176	0,32	600	1 200	7,6	81232 M
	320	95	179	313	1 430	6 400	540	3,3	480	950	42	89432 M
170	215	34	176	209	285	1 340	118	0,14	800	1 600	2,4	81134 TN
	240	55	184	233	540	2 280	200	0,42	560	1 100	9,3	81234 M
	340	103	191	333	1 600	7 200	600	4,1	430	850	52	89434 M
180	225	34	185	219	270	1 270	110	0,13	750	1 500	3,7	81136 M
	250	56	194	243	550	2 400	204	0,46	560	1 100	9,95	81236 M
	360	109	200	351	1 760	8 000	655	5,1	400	800	60	89436 M
190	240	37	197	233	310	1 460	125	0,17	700	1 400	4,75	81138 M
	270	62	205	263	695	2 900	250	0,67	500	1 000	12	81238 M
	380	115	212	371	1 960	9 000	720	6,5	380	750	65,5	89438 M
200	250	37	206	243	310	1 500	125	0,18	700	1 400	4,95	81140 M
	280	62	215	273	720	3 100	255	0,77	500	1 000	13,5	81240 M
	400	122	224	391	2 160	10 000	800	8	360	700	75	89440 M
220	270	37	226	263	335	1 700	137	0,23	670	1 300	5,2	81144 M
	300	63	236	294	750	3 350	275	0,9	480	950	15	81244 M
	420	122	244	411	2 320	11 200	880	10	340	700	84,5	89444 M
240	300	45	248	296	475	2 450	196	0,48	560	1 100	8,45	81148 M
	340	78	263	333	1 100	4 900	390	1,9	400	800	22	81248 M



Dimensions					Abutment and fillet dimensions			Designation of components		Housing washer	Universal washer	
d	d ₁	D ₁	B	D _w	r _{1,2} min.	d _a min.	D _a max.	r _a max.	Cylindrical roller and cage thrust assembly			Shaft washer
mm					mm			-				
130	170	132	9	12	1	165	135	1	K 81126 TN	WS 81126	GS 81126	LS 130170
	187	133	13	19	1,5	181	137	1,5	K 81226 TN	WS 81226	GS 81226	-
	225	134	20	18	2,1	220	141	2,1	K 89326 M	WS 89326	GS 89326	-
	270	134	28,5	28	4	265	147	4	K 89426 M	WS 89426	GS 89426	-
140	178	142	9,5	12	1	175	145	1	K 81128 TN	WS 81128	GS 81128	LS 140180
	197	143	13,5	19	1,5	191	147	1,5	K 81228 M	WS 81228	GS 81228	-
	240	144	20,5	19	2,1	235	152	2,1	K 89328 M	WS 89328	GS 89328	-
	280	144	28,5	28	4	275	157	4	K 89428 M	WS 89428	GS 89428	-
150	188	152	9,5	12	1	185	155	1	K 81130 TN	WS 81130	GS 81130	LS 150190
	212	153	14,5	21	1,5	211	158	1,5	K 81230 M	WS 81230	GS 81230	-
	250	154	20,5	19	2,1	245	162	2,1	K 89330 M	WS 89330	GS 89330	-
	300	154	30	30	4	295	168	4	K 89430 M	WS 89430	GS 89430	-
160	198	162	9,5	12	1	195	165	1	K 81132 TN	WS 81132	GS 81132	LS 160200
	220	163	15	21	1,5	220	168	1,5	K 81232 M	WS 81232	GS 81232	-
	320	164	31,5	32	5	315	179	5	K 89432 M	WS 89432	GS 89432	-
170	213	172	10	14	1,1	209	176	1,1	K 81134 TN	WS 81134	GS 81134	-
	237	173	16,5	22	1,5	235	180	1,5	K 81234 M	WS 81234	GS 81234	-
	340	174	34,5	34	5	335	191	5	K 89434 M	WS 89434	GS 89434	-
180	222	183	10	14	1,1	219	185	1,1	K 81136 M	WS 81136	GS 81136	-
	247	183	17	22	1,5	245	190	1,5	K 81236 M	WS 81236	GS 81236	-
	360	184	36,5	36	5	353	203	5	K 89436 M	WS 89436	GS 89436	-
190	237	193	11	15	1,1	233	197	1,1	K 81138 M	WS 81138	GS 81138	-
	267	194	18	26	2	265	200	2	K 81238 M	WS 81238	GS 81238	-
	380	195	38,5	38	5	373	214	5	K 89438 M	WS 89438	GS 89438	-
200	250	203	11	15	1,1	243	206	1,1	K 81140 M	WS 81140	GS 81140	-
	277	204	18	26	2	275	210	2	K 81240 M	WS 81240	GS 81240	-
	400	205	41	40	5	393	226	5	K 89440 M	WS 89440	GS 89440	-
220	267	223	11	15	1,1	263	226	1,1	K 81144 M	WS 81144	GS 81144	-
	297	224	18,5	26	2	296	230	2	K 81244 M	WS 81244	GS 81244	-
	420	225	41	40	6	413	246	6	K 89444 M	WS 89444	GS 89444	-
240	297	243	13,5	18	1,5	296	248	1,5	K 81148 M	WS 81148	GS 81148	-
	335	244	23	32	2,1	335	261	2,1	K 81248 M	WS 81248	GS 81248	-

11.1

11.1 Cylindrical roller thrust bearings d 260 – 630 mm



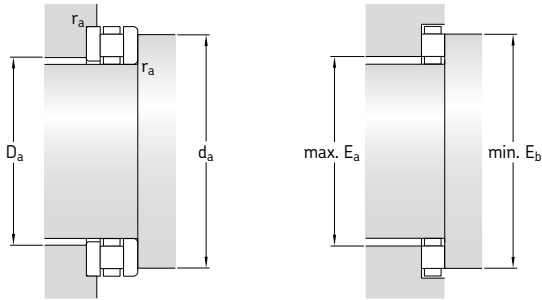
811, 812

K 811, K 812

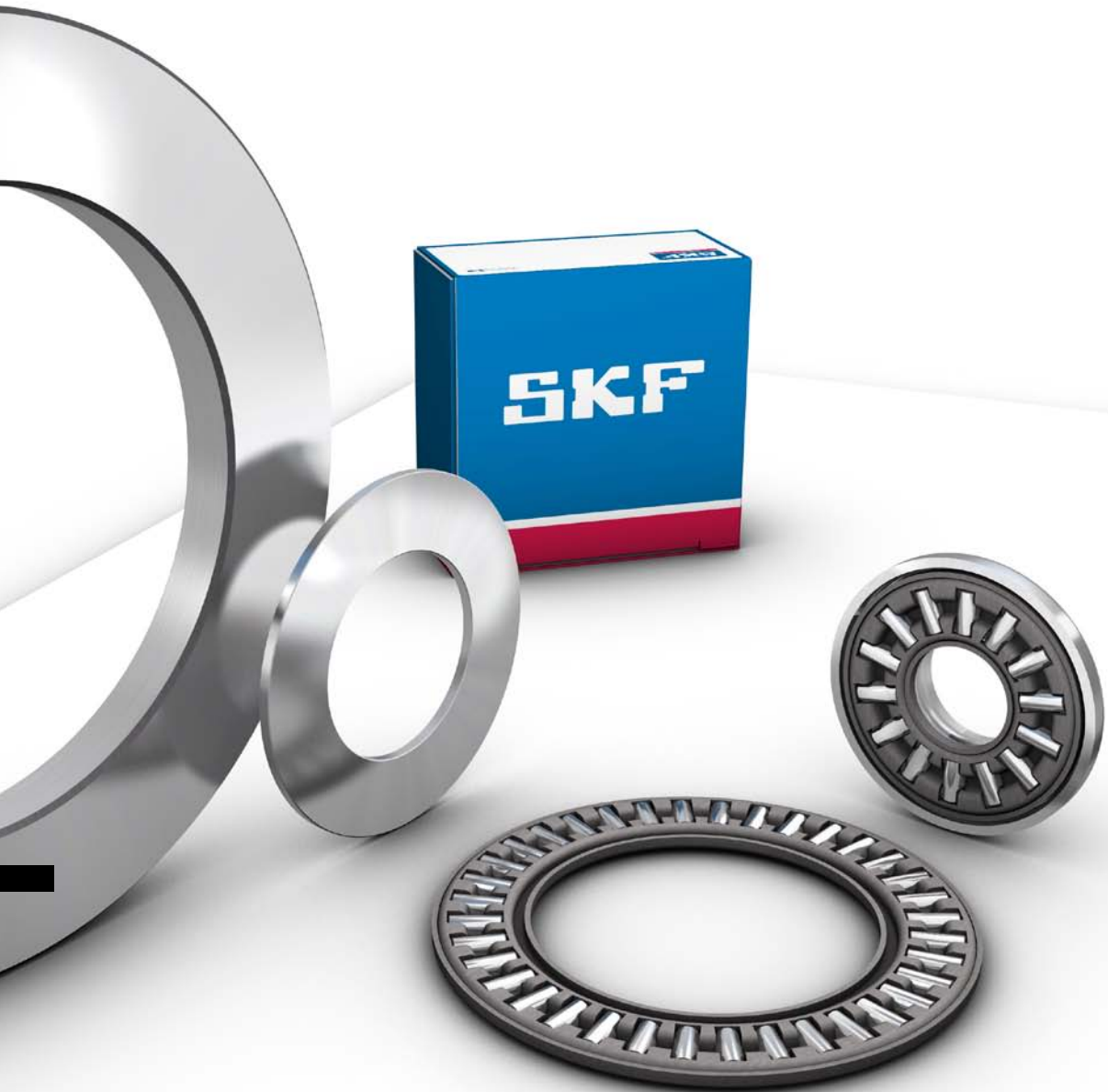
WS

GS

Principal dimensions				Basic load ratings		Fatigue load limit	Minimum load factor	Speed ratings		Mass	Designation	
d	D	H	E _a	E _b	dynamic C	static C ₀	P _u	A	Reference speed	Limiting speed	kg	-
mm					kN		kN	-	r/min			
260	320	45	268	316	490	2 600	200	0,54	530	1 100	9,1	81152 M
	360	79	281	351	1 140	5 300	415	2,20	380	750	27	81252 M
280	350	53	288	346	680	3 550	275	1	480	950	12,5	81156 M
	380	80	301	371	1 160	5 500	425	2,4	360	750	30	81256 M
300	380	62	315	373	850	4 400	335	1,5	430	850	19,5	81160 M
	420	95	329	412	1 530	7 200	540	4	320	630	43	81260 M
320	400	63	334	394	880	4 650	345	1,7	400	800	20,5	81164 M
	440	95	348	434	1 560	7 500	550	4,5	300	600	42,5	81264 M
340	420	64	354	414	900	4 900	355	1,9	380	800	22,5	81168 M
	460	96	367	452	1 630	8 000	585	5,1	300	600	47	81268 M
360	440	65	374	434	900	4 900	355	1,9	380	750	19,5	81172 M
	500	110	393	492	2 160	10 400	750	8,7	260	530	65,5	81272 M
380	460	65	393	453	930	5 300	375	2,2	360	750	22	81176 M
400	480	65	413	473	965	5 600	390	2,5	360	700	23	81180 M
420	500	65	433	493	980	5 850	400	2,7	340	700	24	81184 M
440	540	80	459	533	1 430	8 000	550	5,1	300	600	39,5	81188 M
460	560	80	479	553	1 460	8 500	570	5,8	300	600	41	81192 M
480	580	80	500	573	1 460	8 650	585	6,0	280	560	43	81196 M
500	600	80	519	592	1 560	9 300	620	6,9	280	560	44	811/500 M
530	640	85	554	632	1 730	10 600	680	9	260	530	55,5	811/530 M
560	670	85	584	662	1 760	11 100	710	9,7	260	500	58	811/560 M
600	710	85	624	702	1 800	11 600	720	11	240	500	62	811/600 M
630	750	95	650	732	2 160	13 700	865	15,0	220	450	80	811/630 M



Dimensions					Abutment and fillet dimensions			Designation of components			
d	d ₁ ~	D ₁ ~	B	D _w	r _{1,2} min.	d _a min.	D _a max.	r _a max.	Cylindrical roller and cage thrust assembly	Shaft washer	Housing washer
mm						mm			-		
260	317	263	13,5	18	1,5	316	268	1,5	K 81152 M	WS 81152	GS 81152
	355	264	23,5	32	2,1	353	280	2,1			
280	347	283	15,5	22	1,5	346	288	1,5	K 81156 M	WS 81156	GS 81156
	375	284	24	32	2,1	373	300	2,1			
300	376	304	18,5	25	2	373	315	2	K 81160 M	WS 81160	GS 81160
	415	304	28,5	38	3	413	328	3			
320	396	324	19	25	2	394	334	2	K 81164 M	WS 81164	GS 81164
	435	325	28,5	38	3	434	348	2,5			
340	416	344	19,5	25	2	414	354	2	K 81168 M	WS 81168	GS 81168
	455	345	29	38	3	452	367	2,5			
360	436	364	20	25	2	434	374	2	-	-	-
	495	365	32,5	45	4	492	393	3			
380	456	384	20	25	2	453	393	2	-	-	-
400	476	404	20	25	2	473	413	2	-	-	-
420	495	424	20	25	2	493	433	2	-	-	-
440	535	444	24	32	2,1	533	459	2	-	-	-
460	555	464	24	32	2,1	553	479	2	-	-	-
480	575	484	24	32	2,1	573	500	2	-	-	-
500	595	505	24	32	2,1	592	519	2	-	-	-
530	635	535	25,5	34	3	632	554	2,5	-	-	-
560	665	565	25,5	34	3	662	584	2,5	-	-	-
600	705	605	25,5	34	3	702	624	2,5	-	-	-
630	746	634	28,5	38	3	732	650	2,5	-	-	-



12 Needle roller thrust bearings

Designs and variants	1058
Needle roller and cage thrust assemblies	1058
Double direction bearings	1058
Needle roller thrust bearings with a centring flange.	1059
Combined needle roller bearing arrangements.	1060
Bearing washers.	1060
LS series universal washers	1061
AS series thin universal washers.	1061
811 series shaft and housing washers.	1061
Cages.	1062
Bearing data	1063
(Dimension standards, tolerances, misalignment, friction, starting torque, power loss, defect frequencies)	
Loads	1066
(Minimum load, equivalent loads)	
Temperature limits	1067
Permissible speed	1067
Design of bearing arrangements	1068
Abutment dimensions	1068
Raceways on shafts and in housings	1068
Designation system	1069

Product tables

12.1 Needle roller and cage thrust assemblies and appropriate washers.	1070
12.2 Needle roller thrust bearings with a centring flange and appropriate washers.	1074



Designs and variants

SKF needle roller thrust bearings are fitted with a form-stable cage to reliably retain and guide a large number of needle rollers. The very small diameter deviation of the rollers within one assembly enables these bearings to accommodate heavy axial loads and shock loads. The ends of the rollers are relieved slightly to modify the line contact between the raceways and rollers. This prevents stress peaks at the roller ends to extend bearing service life.

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. SKF supplies needle roller thrust bearings in two designs (→ **fig. 1**):

- needle roller and cage thrust assemblies, AXK series
- needle roller thrust bearings with a centring flange, AXW series (→ **fig. 3**)

In applications where adjacent components cannot serve as raceways, the assemblies can be combined with bearing washers in different series (→ *Bearing washers*, **page 1060**).

More information

Bearing life and load ratings	63
Design considerations	159
Abutment and fillet dimensions	208
Lubrication	239
Mounting, dismantling and bearing care	271

Needle roller and cage thrust assemblies

SKF needle roller and cage thrust assemblies in the AXK series (→ **fig. 1**) are available for shaft diameters ranging from 4 to 160 mm. They can be combined with washers in the LS, AS, GS 811 or WS 811 series (→ *Bearing washers*, **page 1060**) in applications where adjacent components cannot serve as raceways. These thrust assemblies can accommodate axial loads in one direction only.

Double direction bearings

Double direction needle roller thrust bearings can accommodate axial loads in both directions. They 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. 2**).

Fig. 1

