
SKF

Rod ends requiring maintenance

SKF manufactures rod ends requiring maintenance with a steel/steel or a steel/bronze sliding contact surface combination.

Steel/steel rod ends consist of a rod end housing and a steel/steel radial spherical plain bearing from the standard assortment, where the outer ring is secured in the housing. These rod ends are available with a female thread (→ **fig. 1**), male thread (→ **fig. 2**) or a welding shank (→ **fig. 3**).

Steel/bronze rod ends consist of a rod end housing and a steel/bronze spherical plain bearing. These bearings have an inner ring made of steel and an outer ring made of bronze. The bearing is held in position by staking the housing on both sides of the outer ring. These rod ends are available with a male or female thread.

SKF supplies rod ends with a threaded shank with a right-hand thread as standard. With the exception of rod ends with the designation suffix VZ019, all rod ends are also available with a left-hand thread. They are identified by the designation prefix L.

Fig. 1

Rod end with a female thread

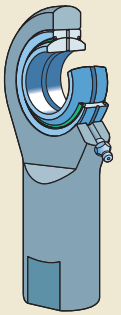
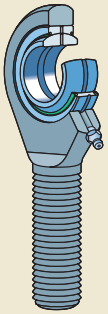


Fig. 2

Rod end with a male thread



Dimensions

The dimensions of SKF rod ends requiring maintenance are in accordance with the standards listed in **table 1**.

Male and female threads of SKF rod ends are in accordance with ISO 965-1:1998, except for rod ends with female thread having the designation suffix /VZ019, which is in accordance with ISO 8139:2009.

Tolerances

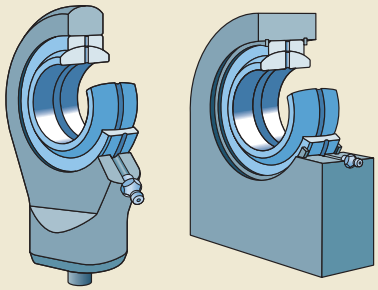
SKF rod end inner ring dimensional tolerances are in accordance with ISO 12240-4:1998. The tolerances for the steel/steel rod end inner rings are listed in **table 3** and the tolerances for steel/bronze rod end inner rings are listed in **table 2**.

The symbols used in these tables are explained in the following:

d nominal bore diameter
Δ_{dmp} deviation of the mean bore diameter from the nominal
Δ_{Bs} deviation of the single inner ring width from the nominal

Fig. 3

Rod ends with a welding shank



Radial internal clearance

The clearance values for steel/steel rod ends are in accordance with dimension series E and EH of ISO 12240-4:1998, as far as they have been standardized. The values are listed in **table 4** on **page 170**.

The clearance values for steel/bronze rod ends are in accordance with dimensions series K of ISO 12240-4:1998 and are listed in **table 5** on **page 170**.

Materials

SKF rod end housings for bearings that require maintenance are made of the materials listed in **table 6** on **page 170**.

The materials used for steel/steel radial spherical plain bearings incorporated in SKF rod ends are provided in the section *Materials* on **page 102.**

The bearings incorporated in the steel/bronze rod ends have an outer ring made of bronze and an inner ring made of bearing steel which has been hardened and ground.

Table 1

Standards

Series	Standards
SA(A)	ISO 12240-4:1998 dimension series E, EH
SI(A)	ISO 12240-4:1998 dimension series E, EH
SC	ISO 12240-4:1998 dimension series E
SCF	–
SIJ	ISO 8133:2006
SIR	–
SIQG	ISO 8132:2006
SAKAC	ISO 12240-4:1998 dimension series K
SIKAC	ISO 12240-4:1998 dimension series K
SIKAC/VZ019	ISO 8139:2009, ISO 12240-4:1998

Table 2

Inner ring dimensional tolerances for steel/bronze rod ends

Bore diameter d		SIKAC and SAKAC series			
		Δ_{dmp}		Δ_{Bs}	
over	incl.	high	low	high	low
mm		µm		µm	
–	**6**	12	0	0	–120
6	**10**	15	0	0	–120
10	**18**	18	0	0	–120
18	**30**	21	0	0	–120

Table 3

Inner ring dimensional tolerances for steel/steel rod ends

Bore diameter d		SA(A), SI(A), SIJ, SIR, SC and SCF series				SIQG series			
		Δ_{dmp}		Δ_{Bs}		Δ_{dmp}		Δ_{Bs}	
over	incl.	high	low	high	low	high	low	high	low
mm		µm		µm		µm		µm	
–	**10**	0	–8	0	–120	–	–	–	–
10	**18**	0	–8	0	–120	18	0	0	–180
18	**30**	0	–10	0	–120	21	0	0	–210
30	**50**	0	–12	0	–120	25	0	0	–250
50	**80**	0	–15	0	–150	30	0	0	–300
80	**120**	0	–20	0	–200	35	0	0	–350
120	**180**	0	–25	0	–250	40	0	0	–400
180	**250**	0	–30	0	–300	46	0	0	–460

Permissible operating temperature range

The permissible operating temperature range for SKF rod ends requiring maintenance depends on the rod end housing, the bearing, the bearing seals and the grease used for lubrication. The values for the permissible operating temperature range are listed in **table 7**.

The load carrying capacity of the rod end is reduced at temperatures above 100 °C. For temperatures below 0 °C, check to be sure that the fracture toughness of the rod end housing is adequate for the intended application.

Table 4

Radial internal clearance for steel/steel rod ends

Bore diameter d		Radial internal clearance Normal	
over	incl.	min	max
mm		µm	
–	12	16	68
12	20	20	82
20	35	25	100
35	60	30	120
60	90	36	142
90	140	42	165
140	240	50	192

Table 5

Radial internal clearance for steel/bronze rod ends

Bore diameter d		Radial internal clearance Normal	
over	incl.	min	max
mm		µm	
–	6	5	50
6	10	7	61
10	18	8	75
18	30	10	92

Table 6

Housing materials for rod ends requiring maintenance

Series	Size	Material	Material No.
SA(A)	6 to 80	Heat treatable steel C45V zinc coated and chromatized	1.0503
SI(A)	6 to 80	Heat treatable steel C45V zinc coated and chromatized	1.0503
SC	20 to 80	Construction steel S 355 J2G3 (St 52-3 N)	1.0570
SCF	20 to 80	Construction steel S 355 J2G3 (St 52-3 N)	1.0570
SIQG	12 to 63	Heat treatable steel C45	1.0503
	70 to 200	EN-GJS-400-15	–
SIJ	12 to 50	Heat treatable steel C45	1.0503
	60 to 100	EN-GJS-400-15	–
SIR	25 to 80	Heat treatable steel C45	1.0503
	90 to 120	EN-GJS-400-15	–
SAKAC	5 to 12	Free-machining steel 9 SMnPb 28 K zinc coated and chromatized	1.0718
	14 to 30	Heat treatable steel C35N zinc coated and chromatized	1.0501
SIKAC	5 to 12	Free-machining steel 9 SMnPb 28 K zinc coated and chromatized	1.0718
	14 to 30	Heat treatable steel C35N zinc coated and chromatized	1.0501

SKF reserves the right to use similar material or material of higher strength.

Fatigue strength

In all applications where a rod end is subjected to alternating loads, loads that vary in magnitude or where failure of a rod end is dangerous, make sure that the selected rod end has sufficient fatigue strength.

Relubrication facilities

SKF rod ends requiring maintenance are provided with a grease fitting or a lubrication hole in the rod end housing. Relubrication via the pin is also possible. Exceptions are steel/steel rod ends in the SA .. E and SI .. E series and a few smaller rod ends as indicated in the product tables. The type and design of relubrication facilities in the rod end housing are listed in **table 8**.

Table 7

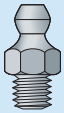
Permissible operating temperature range for rod ends requiring maintenance

Series	Permissible operating temperature range[1]	
	from	incl.
–	°C	
Steel/steel rod ends		
SA .. E(S)	–50	+200
SA(A) .. ES-2RS	–30	+130
SI .. E(S)	–50	+200
SI(A) .. ES-2RS	–30	+130
SIQG .. ES	–50	+200
SIJ .. ES	–50	+200
SIR .. ES	–50	+200
SC(F) .. ES	–50	+200
Steel/bronze rod ends		
SAKAC .. M	–30	+180
SIKAC .. M (/VZ 019)	–30	+180

[1] Permissible operating temperature range of the grease must be considered.

Table 8

Relubrication facilities for rod ends requiring maintenance

Series	Size	Relubrication facilities Design	
Steel/steel rod ends			
SA .. ES **SI .. ES** **SI .. ES** **SIJ .. ES** **SC .. ES**	15 to 20 15 to 20 15 to 20 16 to 20 20	Lubrication hole diameter 2,5 mm	
SA(A) .. ES(-2RS) **SI(A) .. ES(-2RS)** **SIJ .. ES** **SIR .. ES** **SIQG .. ES(A)** **SC .. ES** **SCF .. ES**	25 to 80 25 to 80 25 to 100 25 to 120 12 to 200 25 to 80 20 to 80	Grease fitting in accordance with DIN 71412: 1987	
Steel/bronze rod ends			
SAKAC .. M **SIKAC .. M(/VZ 019)**	6 to 30 6 to 30	Grease fitting in accordance with DIN 3405: 1986	

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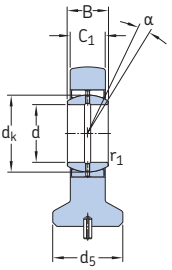
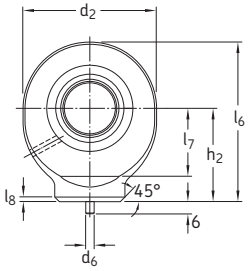
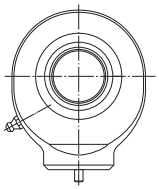
Rod ends with a cylindrical section welding shank, steel/steel
d **20 – 80** mm



SC .. ES



d = 20 mm



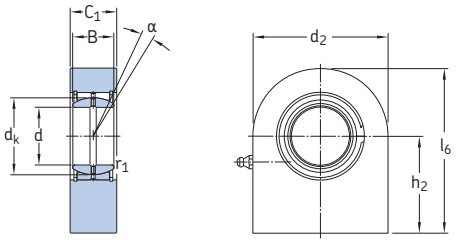
d ≥ 25 mm

Principal dimensions					Angle of tilt	Basic load ratings dynamic	static	Mass	Designation
d	d_2 max	B	C_1 max	h_2	α	C	C_0		
mm					degrees	kN		kg	–
20	54	16	13,5	38	9	30	46,5	0,20	**SC 20 ES**
25	65	20	18	45	7	48	73,5	0,45	**SC 25 ES**
30	75	22	20	51	6	62	96,5	0,65	**SC 30 ES**
35	84	25	22	61	6	80	112	1,00	**SC 35 ES**
40	94	28	24	69	7	100	134	1,30	**SC 40 ES**
45	104	32	28	77	7	127	180	1,90	**SC 45 ES**
50	114	35	31	88	6	156	220	2,50	**SC 50 ES**
60	137	44	39	100	6	245	335	4,60	**SC 60 ES**
70	162	49	43	115	6	315	455	6,80	**SC 70 ES**
80	182	55	48	141	6	400	550	9,70	**SC 80 ES**

Dimensions

d	d_k	d_5 max	d_6	l_6 max	l_7 min	r_1 min	l_8
mm							
20	29	29	4	66	24	0,3	2
25	35,5	35	4	78	30	0,6	3
30	40,7	42	4	89	34	0,6	3
35	47	49	4	104	40	0,6	3
40	53	54	4	118	46	0,6	4
45	60	60	6	132	50	0,6	4
50	66	64	6	150	58	0,6	4
60	80	72	6	173	73	1	4
70	92	82	6	199	85	1	5
80	105	97	6	237	98	1	5

Rod ends with a rectangular section welding shank, steel/steel
d **20 – 80** mm



SCF .. ES

Principal dimensions					Angle of tilt	Basic load ratings dynamic	static	Mass	Designation
d	d_2 max	B	C_1 max	h_2 js13	α	C	C_0		
mm					degrees	kN		kg	–
20	51,5	16	20	38	9	30	63	0,35	**SCF 20 ES**
25	56,5	20	24	45	7	48	65,5	0,53	**SCF 25 ES**
30	66,5	22	29	51	6	62	110	0,87	**SCF 30 ES**
35	85	25	31	61	6	80	183	1,55	**SCF 35 ES**
40	102	28	36,5	69	7	100	285	2,45	**SCF 40 ES**
45	112	32	41,5	77	7	127	360	3,40	**SCF 45 ES**
50	125,5	35	41,5	88	6	156	415	4,45	**SCF 50 ES**
60	142,5	44	51,5	100	6	245	530	7,00	**SCF 60 ES**
70	166,5	49	57	115	6	315	680	10,0	**SCF 70 ES**
80	182,5	55	62	141	6	400	750	15,0	**SCF 80 ES**
90	228,5	60	67	150	5	490	1 290	23,5	**SCF 90 ES**
100	252,5	70	72	170	7	610	1 430	31,5	**SCF 100 ES**
110	298	70	83	185	6	655	2 200	48,0	**SCF 110 ES**
120	363	85	92,5	210	6	950	3 250	79,5	**SCF 120 ES**

Dimensions

d	d_k	l_6 max	r_1 min
mm			
20	29	64	0,3
25	35,5	73,5	0,6
30	40,7	85	0,6
35	47	103,5	0,6
40	53	120	0,6
45	60	133	0,6
50	66	151	0,6
60	80	171,5	1
70	92	198,5	1
80	105	232,5	1
90	115	264,5	1
100	130	296,5	1
110	140	334	1
120	160	391,5	1