



# Rod ends requiring maintenance

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## 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.

## 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
- $\Delta_{dmp}$  deviation of the mean bore diameter from the nominal
- $\Delta_{Bs}$  deviation of the single inner ring width from the nominal

Fig. 1

Rod end with a female thread

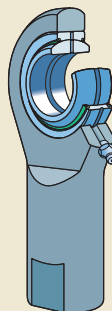


Fig. 2

Rod end with a male thread

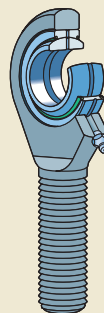
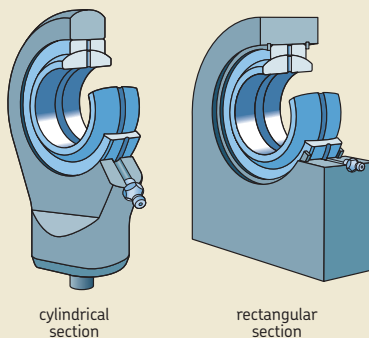


Fig. 3

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

Table 2

### Inner ring dimensional tolerances for steel/bronze rod ends

Bore diameter d over incl.		SIKAC and SAKAC series			
		$\Delta_{dmp}$ high	low	$\Delta_{Bs}$ high	low
mm		$\mu\text{m}$		$\mu\text{m}$	
–	<b>6</b>	12	0	0	–120
<b>6</b>	<b>10</b>	15	0	0	–120
<b>10</b>	<b>18</b>	18	0	0	–120
<b>18</b>	<b>30</b>	21	0	0	–120

Table 3

### Inner ring dimensional tolerances for steel/steel rod ends

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

## Rod ends requiring maintenance

### 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	
over	incl.	Normal 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	
over	incl.	Normal 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 chromatinized	1.0503
SI(A)	6 to 80	Heat treatable steel C45V zinc coated and chromatinized	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 70 to 200	Heat treatable steel C45 EN-GJS-400-15	1.0503 –
SIJ	12 to 50 60 to 100	Heat treatable steel C45 EN-GJS-400-15	1.0503 –
SIR	25 to 80 90 to 120	Heat treatable steel C45 EN-GJS-400-15	1.0503 –
SAKAC	5 to 12 14 to 30	Free-machining steel 9 SMnPb 28 K zinc coated and chromatinized Heat treatable steel C35N	1.0718 1.0501
SIKAC	5 to 12 14 to 30	Free-machining steel 9 SMnPb 28 K zinc coated and chromatinized Heat treatable steel C35N	1.0718 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


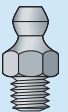

### Permissible operating temperature range for rod ends requiring maintenance

Series	Permissible operating temperature range <sup>1)</sup>	
	from	incl.
—	°C	
<b>Steel/steel rod ends</b>		
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
<b>Steel/bronze rod ends</b>		
SAKAC .. M	-30	+180
SIKAC .. M (/VZ 019)	-30	+180

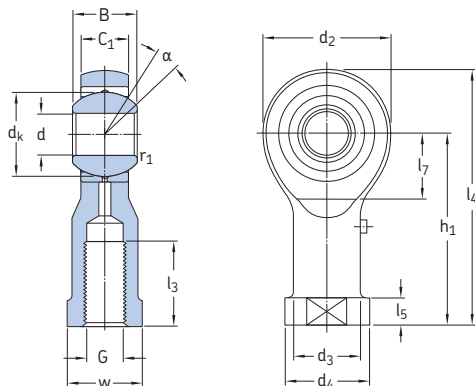
<sup>1)</sup> Permissible operating temperature range of the grease must be considered.

Table 8

### Relubrication facilities for rod ends requiring maintenance

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

**Rod ends with a female thread, steel/bronze**  
**d 5 – 30 mm**



SI(L)KAC.. M/(VZ019)  
d ≥ 6 mm

Principal dimensions				Angle of tilt	Basic load ratings		Mass	Designations	left-hand thread		
d	d <sub>2</sub> max	G 6H	B		C <sub>1</sub> max	h <sub>1</sub>				C	C <sub>0</sub>
mm				degrees	kN		kg	–			
5	19	M 5	8	7,5	27	13	3,25	5,4	0,017	SIKAC 5 M <sup>1)</sup>	SILKAC 5 M <sup>1)</sup>
	19	M 4	8	7,5	27	13	3,25	5,4	0,017	SIKAC 5 M/VZ019 <sup>1)</sup>	–
6	21	M 6	9	7,5	30	13	4,3	5,4	0,025	SIKAC 6 M	SILKAC 6 M
8	25	M 8	12	9,5	36	14	7,2	9,15	0,043	SIKAC 8 M	SILKAC 8 M
10	29	M 10	14	11,5	43	13	10	12,2	0,072	SIKAC 10 M	SILKAC 10 M
	29	M 10×1,25	14	11,5	43	13	10	12,2	0,072	SIKAC 10 M/VZ019	–
12	33	M 12	16	12,5	50	13	13,4	14	0,11	SIKAC 12 M	SILKAC 12 M
	33	M 12×1,25	16	12,5	50	13	13,4	14	0,11	SIKAC 12 M/VZ019	–
14	37	M 14	19	14,5	57	16	17	20,4	0,16	SIKAC 14 M	SILKAC 14 M
16	43	M 16	21	15,5	64	15	21,6	29	0,22	SIKAC 16 M	SILKAC 16 M
	43	M 16×1,5	21	15,5	64	15	21,6	29	0,22	SIKAC 16 M/VZ019	–
18	47	M 18×1,5	23	17,5	71	15	26	35,5	0,30	SIKAC 18 M	SILKAC 18 M
20	51	M 20×1,5	25	18,5	77	14	31,5	35,5	0,40	SIKAC 20 M	SILKAC 20 M
22	55	M 22×1,5	28	21	84	15	38	45	0,50	SIKAC 22 M	SILKAC 22 M
25	61	M 24×2	31	23	94	15	47,5	53	0,65	SIKAC 25 M	SILKAC 25 M
30	71	M 30×2	37	27	110	17	64	69,5	1,15	SIKAC 30 M	SILKAC 30 M
	71	M 27×2	37	27	110	17	64	69,5	1,15	SIKAC 30 M/VZ019	–

<sup>1)</sup>No relubrication facilities.

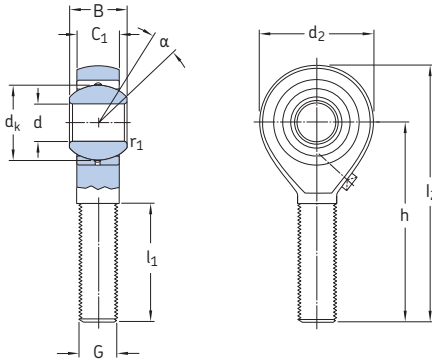
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**Dimensions**

d	d <sub>k</sub>	d <sub>3</sub> ≈	d <sub>4</sub> max	l <sub>3</sub> min	l <sub>4</sub> max	l <sub>5</sub> ≈	l <sub>7</sub> min	r <sub>1</sub> min	w h14
<hr/>									
mm									
<hr/>									
<b>5</b>	11,1	9	12	8	38	4	9	0,3	9
	11,1	9	12	10	38	4	9	0,3	9
<b>6</b>	12,7	10	14	9	42	5	10	0,3	11
<b>8</b>	15,8	12,5	17	12	50	5	12	0,3	14
<b>10</b>	19	15	20	15	59	6,5	14	0,3	17
	19	15	20	20	59	6,5	14	0,3	17
<b>12</b>	22,2	17,5	23	18	68	6,5	16	0,3	19
	22,2	17,5	23	22	68	6,5	16	0,3	19
<b>14</b>	25,4	20	27	21	77	8	18	0,3	22
<b>16</b>	28,5	22	29	24	87	8	21	0,3	22
	28,5	22	29	28	87	8	21	0,3	22
<b>18</b>	31,7	25	32	27	96	10	23	0,3	27
<b>20</b>	34,9	27,5	37	30	105	10	25	0,3	30
<b>22</b>	38,1	30	40	33	114	12	27	0,3	32
<b>25</b>	42,8	33,5	44	36	127	12	30	0,3	36
<b>30</b>	50,8	40	52	45	148	15	35	0,3	41
	50,8	40	52	51	148	15	35	0,3	41



**Rod ends with a male thread, steel/bronze**  
**d 5 – 30 mm**



SA(L)KAC... M  
d ≥ 6 mm

Principal dimensions						Angle of tilt	Basic load ratings		Mass	Designations	
d	d <sub>2</sub> max	G 6g	B	C <sub>1</sub> max	h	α	C	C <sub>0</sub>		Rod end with right-hand thread	left-hand thread
mm						degrees	kN		kg	–	
5	19	M 5	8	6	33	13	3,25	4,8	0,013	SAKAC 5 M <sup>1)</sup>	SALKAC 5 M <sup>1)</sup>
6	21	M 6	9	6,75	36	13	4,3	4,8	0,020	SAKAC 6 M	SALKAC 6 M
8	25	M 8	12	9	42	14	7,2	8	0,032	SAKAC 8 M	SALKAC 8 M
10	29	M 10	14	10,5	48	13	10	10,8	0,054	SAKAC 10 M	SALKAC 10 M
12	33	M 12	16	12	54	13	12,2	12,2	0,085	SAKAC 12 M	SALKAC 12 M
14	37	M 14	19	13,5	60	16	17	17,3	0,13	SAKAC 14 M	SALKAC 14 M
16	43	M 16	21	15	66	16	21,6	23,2	0,19	SAKAC 16 M	SALKAC 16 M
18	47	M 18×1,5	23	16,5	72	16	26	29	0,26	SAKAC 18 M	SALKAC 18 M
20	51	M 20×1,5	25	18	78	16	29	29	0,34	SAKAC 20 M	SALKAC 20 M
22	55	M 22×1,5	28	20	84	16	38	39	0,44	SAKAC 22 M	SALKAC 22 M
25	61	M 24×2	31	22	94	15	46,5	46,5	0,60	SAKAC 25 M	SALKAC 25 M
30	71	M 30×2	37	25	110	17	61	61	1,05	SAKAC 30 M	SALKAC 30 M

<sup>1)</sup>No relubrication facilities.

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**Dimensions**

d	d <sub>k</sub>	l <sub>1</sub> min	l <sub>2</sub> max	r <sub>1</sub> min
<hr/>				
mm				
<hr/>				
5	11,1	19	44	0,3
6	12,7	21	48	0,3
8	15,8	25	56	0,3
10	19	28	64	0,3
12	22,2	32	72	0,3
14	25,4	36	80	0,3
16	28,5	37	89	0,3
18	31,7	41	97	0,3
20	34,9	45	106	0,3
22	38,1	48	114	0,3
25	42,8	55	127	0,3
30	50,8	66	148	0,3