

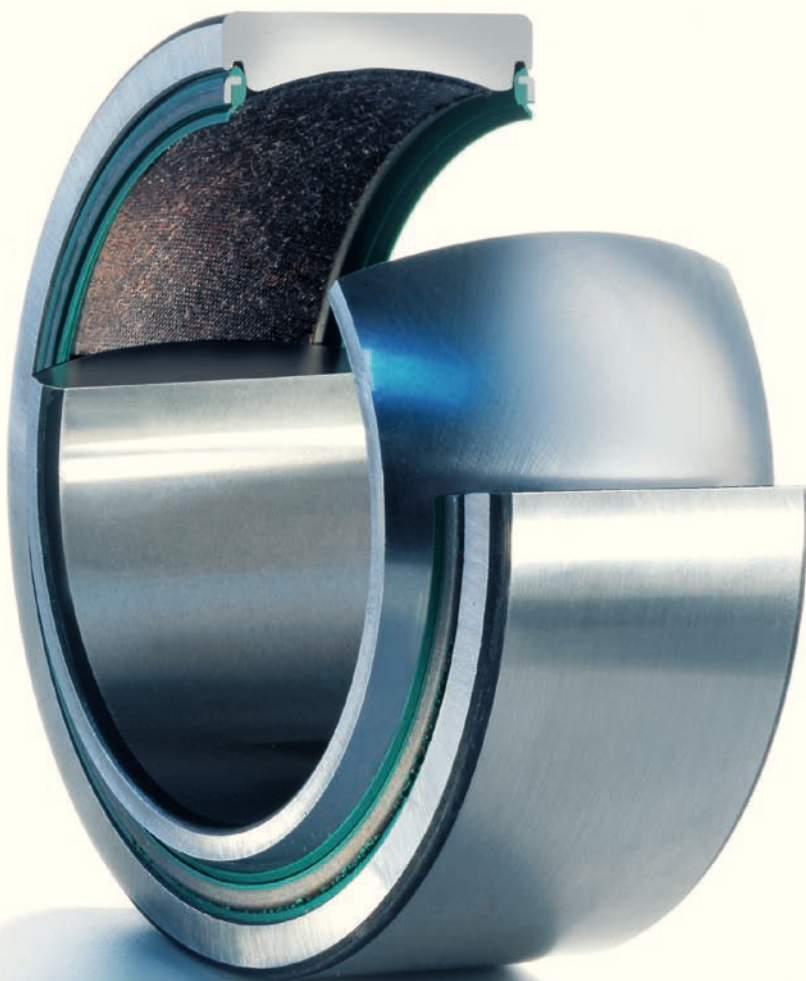


# High performance TX spherical plain bearings and rod ends

## Maintenance-free plain bearing solutions from SKF

- Extremely robust for heavy-duty applications
- Extremely wear-resistant for longer service life
- Totally maintenance-free – everywhere





*The TX spherical plain bearing*

# A maintenance-free world

## The challenge

Today there is an increasing need to provide bearing solutions that will minimize maintenance and consume less lubricant while increasing bearing service life. To meet this challenge and future demands, SKF has developed TX spherical plain bearings and rod ends.

This line of bearings and rod ends represents a new level of performance for maintenance-free spherical plain bearings.

Available in either through-hardened or stainless steel, TX spherical plain bearings are characterized by the following

- improved PTFE fabric
- stronger, more efficient seals
- optimized contact surfaces.

Each of these improvements has had an impact on the ability of the bearing to accommodate heavier loads and last longer even in contaminated environments.

The advantage of increased load capability is that the bearings can accommodate heavier loads in the same or even smaller space than previous maintenance-free designs. This opens the door to down-sizing options that have not been available until now.

And because TX spherical plain bearings do not rely on traditional oil-based lubricants that require relubrication, these bearings are an "environmentally friendly" alternative when compared to traditional plain bearing designs.

TX spherical plain bearings are in a performance class of their own. Their unique features include

- an optimized and stronger PTFE fabric liner with high wear-resistance
- stronger high-performance seals
- superfinished or hard chromium plated sliding contact surfaces
- bearing rings of through-hardened or stainless steel.



## Application areas

Extended service life, increased reliability and maintenance-free operation are the major advantages of these high-performance TX spherical plain bearings and rod ends.

In addition to the applications listed on the right, these bearings and rod ends can be used wherever spherical plain bearings and rod ends are normally used.

- Dam gates
- Hydraulic cylinders
- Stabilizers
- Cranes
- Conveyor chains
- Forestry machinery
- Industrial robots
- Textile and printing machinery
- Machines for the food industry
- Automotive applications
- Wind turbine rotor blades
- Structural rods of all types.



## Improvements provide longer service life

### Optimized PTFE fabric

The SKF PTFE liner (→ **fig. 1**) is what gives the TX bearing its performance characteristics. Both the structure of this self-lubricating fabric and the resin have been improved to make TX bearings stronger than previous designs.

But it is not just the sliding surface that has been improved. The bonding agent has also been improved to provide better adhesion to the hardened surface of the outer ring. This bonding agent is three times stronger than previous formulas.

The SKF PTFE liner also provides the following benefits

- greater stiffness, resulting in less deformation under load
- better wear-resistance for increased service life
- excellent frictional behaviour, thus simplifying the design of the bearing arrangement
- low affinity to moisture, which provides water repellent properties.

### Strong seals

TX spherical plain bearings are equipped with high-performance LS seals so that the bearing can achieve maximum service life even under contaminated conditions.

The high-performance LS seal has three sealing lips that exert pressure on the counter-face of the inner ring to protect the bearing against contaminants and moisture (→ **fig. 2**).

To keep the seal firmly in place, it contains a robust sheet steel reinforcement. This sheet steel "backbone" provides mechanical stability as it protects the elastomer against damage from coarse contaminants.

For large-size bearings where LS seals are not available, the RS double-lip seal is used.

### Sliding contact surfaces

The sphered convex surface of the through-hardened inner ring is ground and polished before it is chromium plated. This enhances the transfer of PTFE from the TX fabric liner to the counter surface during a brief running in phase. It is a requisite to provide characteristically low friction and low wear in operation.

### Available in stainless steel too

For normal operating conditions, SKF TX spherical plain bearings made from steel for through hardening are the best choice. However, in corrosive environments, the use of stainless steel bearings may be more cost-effective when total costs or the service life of the machine are taken into account.

So, where TX spherical plain bearings are involved, there is no need to compromise.

## In line with trends

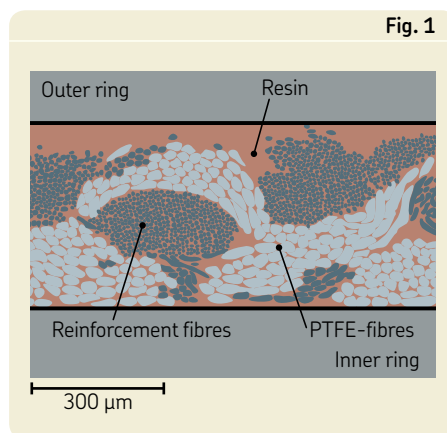
### Increased load carrying capacity

Both the dynamic and static load carrying capacity of the TX liner have been increased when compared to the old T liner (→ **diagram 1**). This provides design engineers with any one of the following options

- increase service life of existing designs
- maintain power output of down-sized designs
- replace steel-on-steel spherical plain bearings with maintenance-free TX bearings.

Improved reliability, the opportunity to down-size and maintenance-free operation are just three more reasons to take a closer look at SKF TX spherical plain bearings and rod ends.

Cross section of the optimized PTFE fabric liner



Detail of the LS seal, showing the three sealing lips and the sheet steel reinforcement

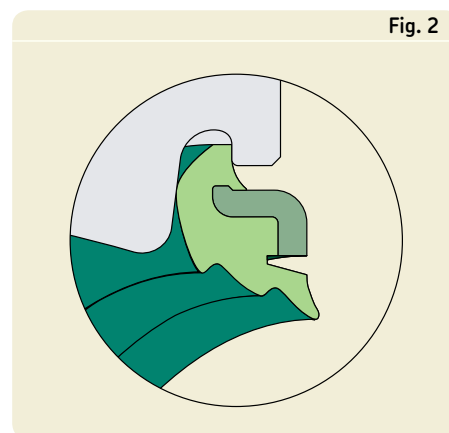


Diagram 1

#### Increased load carrying capacity of TX spherical plain bearings

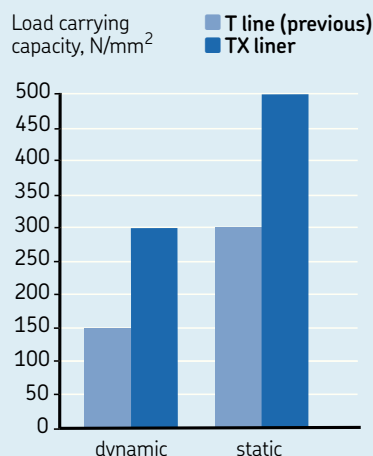
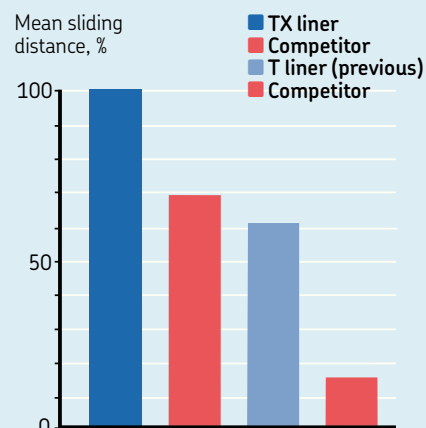


Diagram 2

#### Extended service life of TX spherical plain bearings





## Extended service life

When compared to competitive products and the previous SKF design, TX spherical plain bearings had a significantly longer service life (→ **diagram 2**). The extra sliding distance that the bearings provide means increased service life and reliability for machine designers and end users alike.

## Expanded operating range

The TX line of spherical plain bearings can not only accommodate heavier loads, they can also achieve higher sliding velocities than previous designs (→ **diagram 3**). These improved operating parameters enable design engineers to use maintenance-free TX spherical plain bearings where it may not have been possible before.

## Profit from our knowledge

Now you can add value to your products with maintenance-free TX spherical plain bearings from SKF. Your customers will be able to see that their applications are providing increased service life and that maintenance-free really does mean "fit and forget".

But don't forget – performance comes at a price. And when you look at the price/performance ratio, you will see that TX spherical plain bearings can substantially reduce

system costs – making them a very cost-effective alternative to other plain bearing designs.

## A complete range of maintenance-free solutions

The bore diameter of TX spherical plain bearings in the GE series range from 12 to 300 mm. These bearings, which cover the most popular sizes, are available in through-hardened as well as stainless steel.

In addition, TX spherical plain bearings are also available in the following series

- GEH series radial bearings with a larger angle of tilt (→ **fig. 3**)
- GEZ inch series radial bearings (→ **fig. 4**)
- GEC series radial bearings with a bore diameter greater than 300 mm
- GAC series angular contact spherical plain bearings (→ **fig. 5**)
- GX series spherical plain thrust bearings (→ **fig. 6**).

For technical assistance, contact your local SKF application engineering service.

Diagram 3

### Expanded operating range for TX spherical plain bearings and rod ends

Dotted line shows permissible range when heat is effectively dissipated from the bearing

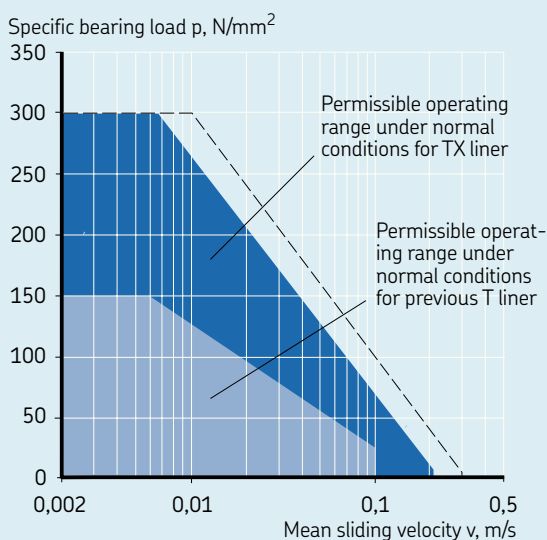
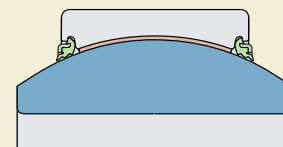
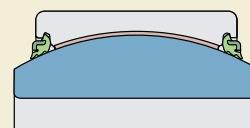


Fig. 3



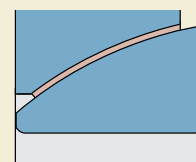
Radial bearings with a larger angle of tilt

Fig. 4



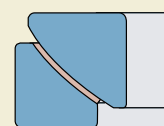
Radial bearings with inch dimensions

Fig. 5



Angular contact spherical plain bearings

Fig. 6



Spherical plain thrust bearings

## Selection of bearing size

### Basic rating life

Due to their enhanced performance characteristics, the basic rating life calculation method used for TX spherical plain bearings has been revised. The basic rating life calculation method takes into account the life improvements made to the bearings. The equation is

$$G_h = b_1 b_2 b_4 \frac{K_p}{p^n v}$$

where

$G_h$  = basic rating life, operating hours

$b_1$  = load direction factor (→ **table 1**)

$b_2$  = temperature factor (→ **diagram 4**)

$b_4$  = velocity factor (→ **diagram 5**)

$p$  = specific bearing load, N/mm<sup>2</sup>

$K_p$  = constant for the specific bearing load (→ **table 2**)

$n$  = exponent for the specific bearing load (→ **table 2**)

$v$  = mean sliding velocity, m/s

### Requisite size

To determine the requisite bearing size it is necessary to know the basic rating life required for the actual application. This normally depends on the type of machine, the operating conditions and the demands regarding operational reliability.

As a first approximation a guideline value for the load ratio  $C/P$  of 2 can be used to obtain the requisite basic dynamic load rating  $C$  for TX spherical plain bearings and rod ends.

The suitability of a bearing or rod end for a particular load and sliding velocity can then be checked using **diagram 3**. The values of the equivalent dynamic bearing load  $P$ , the specific bearing load  $p$  and the mean sliding velocity  $v$  needed to do this can be determined using the equations below.

If the bearing is found to be suitable then the basic rating life can be calculated using the life equation shown above.

### Equivalent dynamic bearing load

TX radial spherical plain bearings can accommodate some axial load  $F_a$  in addition to a simultaneously acting radial load  $F_r$  (→ **fig. 7**). The equivalent dynamic bearing load can be obtained from

$$P = y F_r$$

where

$P$  = equivalent dynamic bearing load, kN

$F_r$  = radial component of the load, kN

$y$  = axial load factor according to **diagram 6**

### Specific bearing load

The specific bearing load can be calculated using

$$p = 300 \frac{P}{C}$$

where

$p$  = specific dynamic bearing load, N/mm<sup>2</sup>

$P$  = equivalent dynamic bearing load, kN

$C$  = basic dynamic load rating, kN

If the load acts radially only, the load  $P = F_r$  can be inserted in the equation to calculate the specific bearing load.

### Mean sliding velocity

Where movement is continuous the mean sliding velocity can be calculated from

$$v = 5,82 \times 10^{-7} d_k \beta f$$

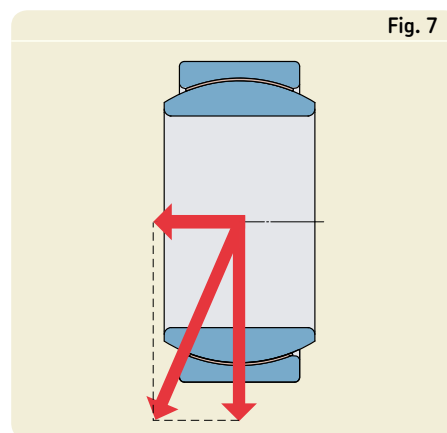
where

$v$  = mean sliding velocity, m/s

$d_k$  = sphere diameter of the inner ring, mm

$\beta$  = half angle of oscillation (→ **fig. 8**), degrees (for rotation,  $\beta = 90^\circ$ )

$f$  = frequency of oscillation, min<sup>-1</sup>, or rotational speed, r/min



Combined (radial and axial) acting load

### Angle of oscillation

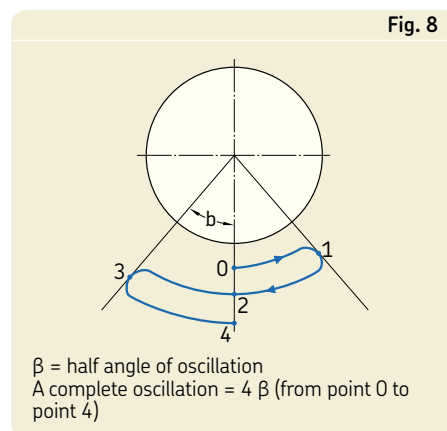


Table 1

Load direction factor $b_1$		
Type of load	Specific load (N/mm <sup>2</sup> )	Factor $b_1$
Constant single direction	up to 300	1
Varying loads (alternating, pulsating) at load frequencies up to 0,5 Hz	up to 50	0,55
	50 to 100	0,4
over 0,5 to 1 Hz	up to 50	0,35
	50 to 100	0,15
over 1 to 5 Hz	up to 50	0,1

Table 2

Constant $K_p$ and exponent $n$ for the specific bearing load			
Specific bearing load over incl.		Constant $K_p$	Exponent $n$
N/mm <sup>2</sup>		—	—
25	25	770	0,2
90	90	4 000	0,7
90	300	40 000	1,2

Diagram 4

Temperature factor  $b_2$

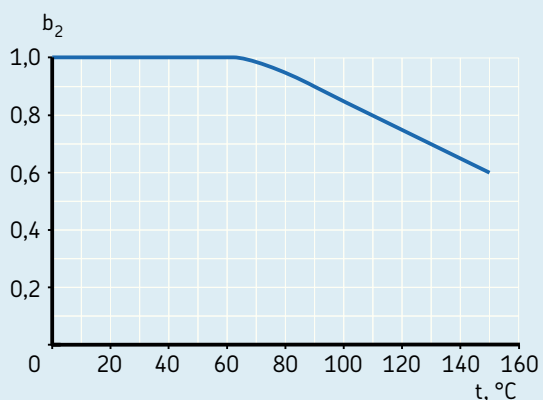
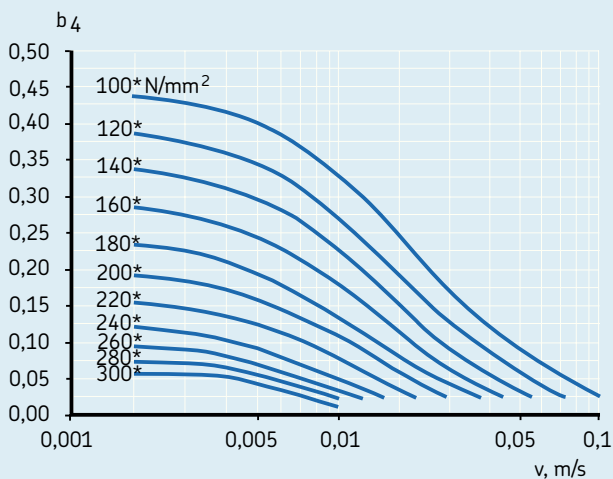
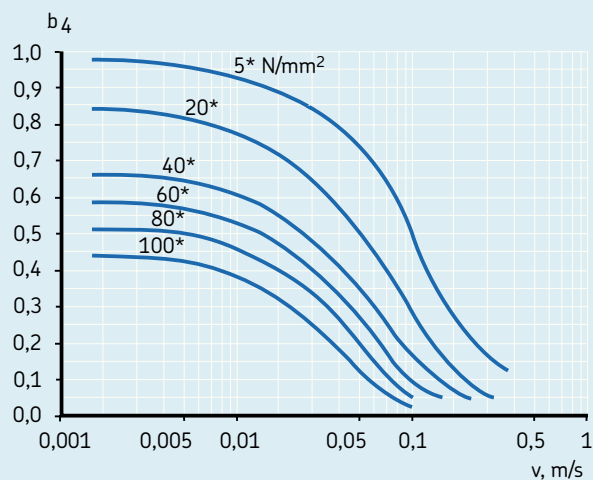


Diagram 5

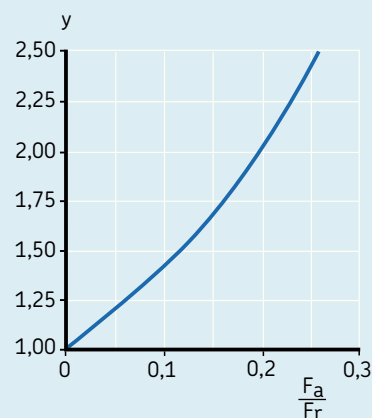
Velocity factor  $b_4$



\* specific bearing load

Diagram 6

Factor  $y$  for TX spherical plain bearings





## Calculations made easy

The calculation methods shown here have been programmed and incorporated into the "SKF Interactive Engineering Catalogue" online at [www.skf.com](http://www.skf.com). This makes the selection of spherical plain bearings/rod ends effortless – just a few clicks of the mouse being all that is required.

## Bearing data – general

### Designs

TX spherical plain bearings are, depending on size and material, available in the following designs:

#### TXE-2LS

This bearing has rings that are through-hardened and ground. The inner ring has a hard chromium plated sliding surface. The outer ring, which is purposely fractured at one position, contains the TX fabric liner and is fitted with heavy-duty LS seals (→ **fig. 9**).

#### TXA-2LS and TXA-2RS

Like the TXE-2LS, these bearings have rings that are through-hardened and ground. The inner ring sliding surface has been plated with hard chromium. The outer ring, which contains the TX fabric liner, is split axially and held together by a band inserted in a groove. Smaller sizes are fitted with LS high performance triple lip seals (→ **fig. 10**), larger bearings have RS double lip seals.

#### TXGR

This stainless steel bearing combines a hardened X46Cr13 inner ring that has a superfinished sliding surface with an unhardened X17CrNi16-2 outer ring. The outer ring is pressed around the inner ring and is not fractured (→ **fig. 11**).

#### TXG3E-2LS

The stainless steel X46Cr13 rings for this bearing are hardened and ground. The inner ring has a superfinished sliding surface. The outer ring, which is purposely fractured at one position, contains the TX fabric liner and heavy-duty LS seals (→ **fig. 9**).

#### TXG3A-2LS and TXG3A-2RS

The stainless steel X46Cr13 rings for this bearing are hardened and ground. The inner ring has a superfinished sliding surface. The outer ring, which contains the TX fabric liner, is split axially and held together by a band inserted in a groove. Smaller sizes are fitted with LS high performance seals (→ **fig. 10**), larger bearings have RS double lip seals.

### Rod ends

SKF rod ends consist of a cast iron housing that contains a standard TXE-2LS spherical plain bearing (→ **fig. 12**). Rod ends are available with a right or left hand, male (**a**) or female (**b**) thread.

*TXE-2LS and TXG3E-2LS bearing designs, the outer ring is fractured in one place to enable assembly*

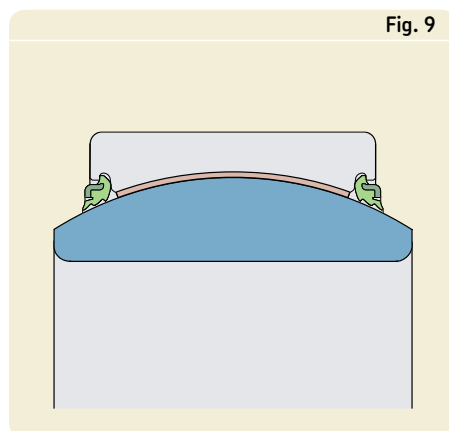


Fig. 9

*TXA-2LS and TXG3A-2LS bearing designs, the outer ring is split axially and held together by a band inserted in a groove*

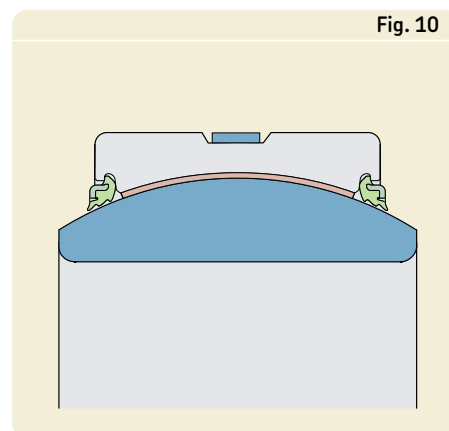


Fig. 10



## Dimensions

The dimensions of TX spherical plain bearings and rod ends are in accordance with ISO 12240-1:1998 and ISO 12240-4:1998 respectively.

## Tolerances

TX spherical plain bearings are produced to the tolerances in accordance with ISO 12240-1:1998 and shown in the catalogue "SKF spherical plain bearings and rod ends" or in the "SKF Interactive Engineering Catalogue" online at [www.skf.com](http://www.skf.com).

## Radial internal clearance

TX spherical plain bearings are produced with the radial internal clearance shown in **table 3**.

## Operating temperature range

The PTFE liner used in TX spherical plain bearings can accommodate operating temperatures ranging from  $-50$  to  $+150$  °C. However, the load carrying capacity of the lining is reduced when temperatures reach or exceed  $65$  °C.

The permissible operating temperature for the seal material used for TX spherical plain bearings is indicated below

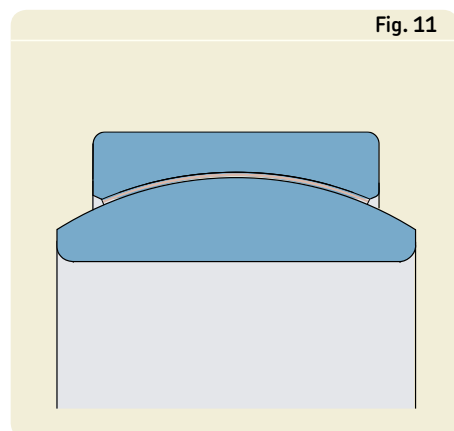
- bearings with heavy-duty LS seals:  $-25$  to  $+120$  °C
- bearings with standard RS seals:  $-30$  to  $+130$  °C.

Table 3

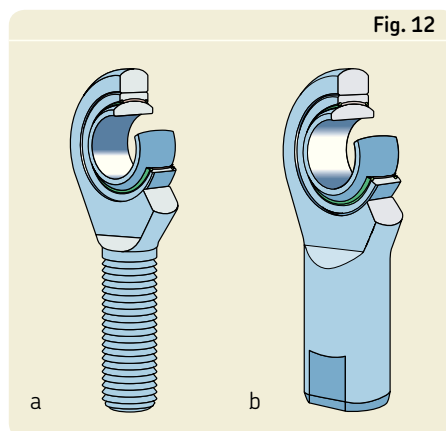
### Radial internal clearance

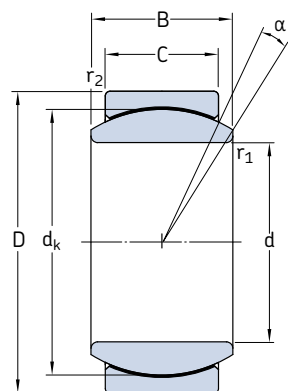
Bore diameter d over incl.		Radial internal clearance	
		min	max
mm		µm	
90	90	0	50
	140	50	130
140	180	50	140
180	300	80	190

TXGR bearing design

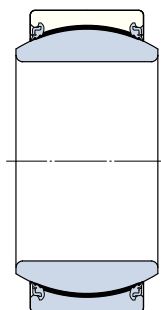


Rod ends incorporating TXE-2LS bearings  
(a) with male thread  
(b) with female thread

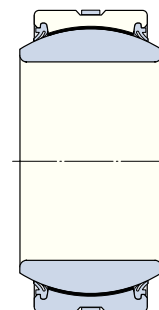




GE .. TXGR



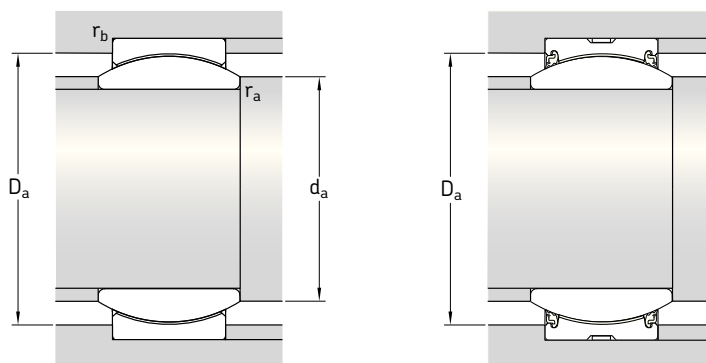
GE .. TX(G3)E-2LS



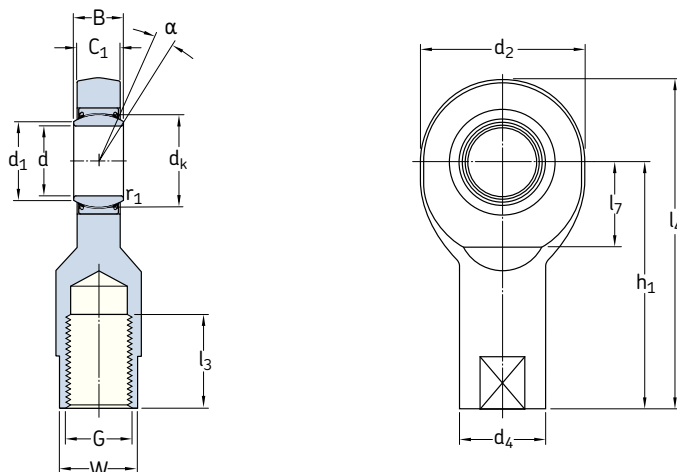
GE .. TX(G3)A-2LS(-2RS)

Principal dimensions				Angle of tilt <sup>1)</sup>	Basic load ratings		Mass	Designations	
d	D	B	C		dynamic	static		Through-hardened steel bearing	Stainless steel bearing
mm				α	C	C <sub>0</sub>	kg	–	
12	22	10	7	10	30	50	0,017	–	GE 12 TXGR
15	26	12	9	8	47,5	80	0,032	–	GE 15 TXGR
17	30	14	10	10	60	100	0,050	–	GE 17 TXGR
20	35	16	12	9	83	140	0,065	GE 20 TXE-2RS	GE 20 TXG3E-2RS
25	42	20	16	7	137	228	0,12	GE 25 TXE-2LS	GE 25 TXG3E-2LS
30	47	22	18	6	176	290	0,16	GE 30 TXE-2LS	GE 30 TXG3E-2LS
35	55	25	20	6	224	375	0,23	GE 35 TXE-2LS	GE 35 TXG3E-2LS
40	62	28	22	6	280	465	0,32	GE 40 TXE-2LS	GE 40 TXG3E-2LS
45	68	32	25	7	360	600	0,46	GE 45 TXE-2LS	GE 45 TXG3E-2LS
50	75	35	28	6	440	735	0,56	GE 50 TXE-2LS	GE 50 TXG3E-2LS
60	90	44	36	6	695	1 160	1,10	GE 60 TXE-2LS	GE 60 TXG3E-2LS
70	105	49	40	6	880	1 460	1,55	GE 70 TXE-2LS	GE 70 TXG3A-2LS
80	120	55	45	5	1 140	1 900	2,30	GE 80 TXE-2LS	GE 80 TXG3A-2LS
90	130	60	50	5	1 370	2 320	2,75	GE 90 TXE-2LS	GE 90 TXG3A-2LS
100	150	70	55	6	1 730	2 850	4,40	GE 100 TXA-2LS	GE 100 TXG3A-2LS
110	160	70	55	6	1 860	3 100	4,80	GE 110 TXA-2LS	GE 110 TXG3A-2LS
120	180	85	70	6	2 700	4 500	8,25	GE 120 TXA-2LS	GE 120 TXG3A-2LS
140	210	90	70	7	3 000	5 000	11,0	GE 140 TXA-2RS	GE 140 TXG3A-2RS
160	230	105	80	8	3 800	6 400	14,0	GE 160 TXA-2RS	GE 160 TXG3A-2RS
180	260	105	80	6	4 300	7 200	18,5	GE 180 TXA-2RS	GE 180 TXG3A-2RS
200	290	130	100	7	6 000	10 000	28,0	GE 200 TXA-2RS	GE 200 TXG3A-2RS
220	320	135	100	8	6 550	11 000	35,5	GE 220 TXA-2RS	–
240	340	140	100	8	7 200	12 000	40,0	GE 240 TXA-2RS	–
260	370	150	110	7	8 650	14 300	51,5	GE 260 TXA-2RS	–
280	400	155	120	6	10 000	16 600	65,0	GE 280 TXA-2RS	–
300	430	165	120	7	10 800	18 000	78,5	GE 300 TXA-2RS	–

<sup>1)</sup> In order to take full advantage of the angle of tilt, the shaft shoulder should not be larger than d<sub>a max</sub>



Dimensions				Abutment and fillet dimensions					
d	d <sub>k</sub>	r <sub>1</sub> min	r <sub>2</sub> min	d <sub>a</sub> min	d <sub>a</sub> max	D <sub>a</sub> min	D <sub>a</sub> max	r <sub>a</sub> max	r <sub>b</sub> max
mm				mm					
12	18	0,3	0,3	13,8	15	17,1	20,4	0,3	0,3
15	22	0,3	0,3	16,9	18,4	20,9	24,3	0,3	0,3
17	25	0,3	0,3	19	20,7	23,7	28,3	0,3	0,3
20	29	0,3	0,3	22,1	24,2	27,6	33,2	0,3	0,3
25	35,5	0,6	0,6	28,2	29,3	36,9	39,2	0,6	0,6
30	40,7	0,6	0,6	33,3	34,2	41,3	44	0,6	0,6
35	47	0,6	1	38,5	39,8	48,5	51	0,6	1
40	53	0,6	1	43,5	45	54,5	57,5	0,6	1
45	60	0,6	1	49,5	50,8	61	63,5	0,6	1
50	66	0,6	1	54,5	56	66,5	70,5	0,6	1
60	80	1	1	66,5	66,8	80	84	1	1
70	92	1	1	76,5	77,9	92	99	1	1
80	105	1	1	87	89,4	105	113	1	1
90	115	1	1	97,5	98,1	113	123	1	1
100	130	1	1	108	109,5	131	144	1	1
110	140	1	1	118	121	141,5	153	1	1
120	160	1	1	130	135,5	157,5	172	1	1
140	180	1	1	149	155,5	180	202	1	1
160	200	1	1	170	170	197	222	1	1
180	225	1,1	1,1	191	199	224,5	250	1	1
200	250	1,1	1,1	213	213,5	244,5	279	1	1
220	275	1,1	1,1	233	239,5	271	309	1	1
240	300	1,1	1,1	253	265	298	329	1	1
260	325	1,1	1,1	273	288	321,5	359	1	1
280	350	1,1	1,1	294	313,5	344,5	388	1	1
300	375	1,1	1,1	314	336,5	371	418	1	1

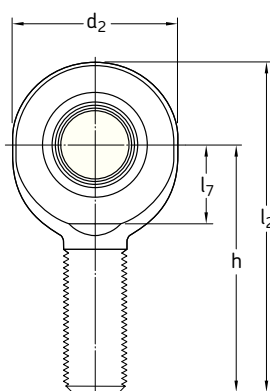
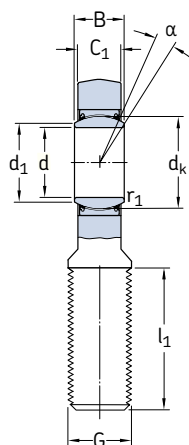


Dimensions														Angle of tilt	Basic load ratings <sup>1)</sup>		Mass	Designation <sup>2)</sup>
d	G 6H	h <sub>1</sub>	d <sub>k</sub>	d <sub>1</sub>	d <sub>2</sub> max	d <sub>4</sub> ~	B	C <sub>1</sub> max	l <sub>3</sub> min	l <sub>4</sub> max	l <sub>7</sub> min	w h14	r <sub>1</sub> min	α	dynamic C	static C <sub>0</sub>	kg	Rod end with right-hand thread
mm														degrees	kN			–
35	M 36×3	130	47	39,8	84	49	25	22	60	174	40	41	0,6	6	224	134	1,40	SI 35 TXE-2LS
40	M 39×3	142	53	45	94	58	28	24	65	191	46	50	0,6	7	280	166	2,20	SIA 40 TXE-2LS
	M 42×3	145	53	45	94	58	28	24	65	194	46	50	0,6	7	280	166	2,30	SI 40 TXE-2LS
45	M 42×3	145	60	50,7	104	65	32	28	65	199	50	55	0,6	7	360	224	2,90	SIA 45 TXE-2LS
	M 45×3	165	60	50,7	104	65	32	28	65	219	50	55	0,6	7	360	224	3,20	SI 45 TXE-2LS
50	M 45×3	160	66	56	114	70	35	31	68	219	58	60	0,6	6	440	270	4,10	SIA 50 TXE-2LS
	M 52×3	195	66	56	114	70	35	31	68	254	58	60	0,6	6	440	270	4,50	SI 50 TXE-2LS
60	M 52×3	175	80	66,8	137	82	44	39	70	246	73	70	1	6	695	400	6,30	SIA 60 TXE-2LS
	M 60×4	225	80	66,8	137	82	44	39	70	296	73	70	1	6	695	400	7,10	SI 60 TXE-2LS
70	M 72×4	265	92	77,8	162	92	49	43	80	349	85	80	1	6	880	530	10,5	SI 70 TXE-2LS
80	M 80×4	295	105	89,4	182	105	55	48	85	389	98	90	1	5	1 140	655	19,0	SI 80 TXE-2LS

<sup>1)</sup> Dynamic load rating of the bearing to be used for basic rating life calculation only. Check suitability of the rod end against its static load rating in all cases.  
The dynamic load applied on the rod end must not exceed its static load rating

<sup>2)</sup> Rod ends with a left hand thread are identified by the additional designation prefix L, e.g. SALA 50 TXE-2LS or SAL 50 TXE-2LS





Dimensions													Angle of tilt	Basic load ratings <sup>1)</sup>		Mass	Designation <sup>2)</sup>
d	G 6g	h	dk	d1 ~	d2 max	B	C1 max	l1 min	l2 max	l7 min	r1 min	α		dynamic C	static C0		Rod end with right-hand thread
mm													degrees	kN		kg	–
35	M 36×3	130	47	39,8	84	25	22	82	174	40	0,6	6		224	110	1,30	SA 35 TXE-2LS
40	M 39×3	150	53	45	94	28	24	86	199	46	0,6	6		280	140	1,85	SAA 40 TXE-2LS
	M 42×3	145	53	45	94	28	24	90	194	46	0,6	6		280	140	1,90	SA 40 TXE-2LS
45	M 42×3	163	60	50,7	104	32	28	92	217	50	0,6	7		360	200	2,45	SAA 45 TXE-2LS
	M 45×3	165	60	50,7	104	32	28	95	219	50	0,6	7		360	200	2,55	SA 45 TXE-2LS
50	M 45×3	185	66	56	114	35	31	104	244	58	0,6	6		440	245	3,30	SAA 50 TXE-2LS
	M 52×3	195	66	56	114	35	31	110	254	58	0,6	6		440	245	3,90	SA 50 TXE-2LS
60	M 52×3	210	80	66,8	137	44	39	115	281	73	1	6		695	360	5,70	SAA 60 TXE-2LS
	M 60×4	225	80	66,8	137	44	39	120	296	73	1	6		695	360	6,25	SA 60 TXE-2LS
70	M 72×4	265	92	77,8	162	49	43	132	349	85	1	6		880	490	10,0	SA 70 TXE-2LS
80	M 80×4	295	105	89,4	182	55	48	147	389	98	1	5		1 140	585	14,5	SA 80 TXE-2LS

<sup>1)</sup> Dynamic load rating of the bearing to be used for basic rating life calculation only. Check suitability of the rod end against its static load rating in all cases.  
The dynamic load applied on the rod end must not exceed its static load rating

<sup>2)</sup> Rod ends with a left hand thread are identified by the additional designation prefix L, e.g. SALA 50 TXE-2LS or SAL 50 TXE-2LS

# Always the best choice

SKF maintenance-free spherical plain bearings are an excellent choice when reducing friction, decreasing environmental impact and cost-effective design are all important considerations. In addition to TX spherical plain bearings, SKF offers a wide range of maintenance-free plain bearings and rod ends, including two additional types of dry sliding contact surface combinations.

**Maintenance free spherical plain bearings with a sintered bronze composite against a hard chromium surface – GE .. C and GE .. CJ2 series**  
Suitable for applications where there are moderate to heavy loads, where low friction and insensitivity to misalignment are required.

**Maintenance-free spherical plain bearings with a PTFE composite against a hard chromium or steel surface – GEC .. FBASA and GEP .. FS series**  
Suitable for severe applications where there are heavy loads and where low friction and insensitivity to misalignment are required.

**Maintenance-free angular contact spherical plain bearings with a PTFE composite against a hard chromium surface – GAC .. F series**  
Particularly suitable for applications where there are combined (radial and axial) loads; where loads may be heavy and in one direction and where re-lubrication is not possible or desirable.

**Maintenance-free spherical plain thrust bearings with a PTFE composite against a hard chromium surface – GX .. F series**  
Suitable for applications where there are heavy axial loads in one direction, where low friction and insensitivity to misalignment are required.



**Maintenance-free rod ends with a sintered bronze composite against a hard chromium surface – SI .. C and SA .. C series**

Suitable for applications where there are moderate loads acting in one direction, even at high temperatures, and where low friction and insensitivity to misalignment are required.

**Maintenance-free rod ends with a PTFE composite against a hard chromium surface – SIKB .. F and SAKB .. F series**

Suitable for applications where there are moderate loads acting in one direction, and where low friction and insensitivity to misalignment are required and where high temperatures are not an issue.

**PTFE composite bushings – PCM .. E and PCMF .. E series**

Bushings with a PTFE composite dry sliding material have good dimensional stability and thermal conductivity and provide smooth, low-friction operation without lubrication and maintenance.

**Thrust washers and strips – PCMW and PCMS series**

Suitable for thrust bearing arrangements that have to perform oscillating or slow rotational movements; where axial space is extremely limited; where freedom from maintenance is required.

**Stainless steel backed composite bushings – PI series**

Completely self-lubricating bushings that can accommodate heavy loads under low sliding velocity conditions in a corrosive environment.

**Filament wound bushings – PWM series**

Maintenance-free and corrosion-resistant high-performance bushings for applications where heavy loads and vibrations occur and where maintenance-free operation is preferred.

**Sintered bronze bushings – PSM and PSMF series**

Bushings consisting of sintered metallic bronze matrix with fully impregnated pores. Most suitable for applications with rotating movements and where self-lubricating properties are required.





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