

A versatile solution

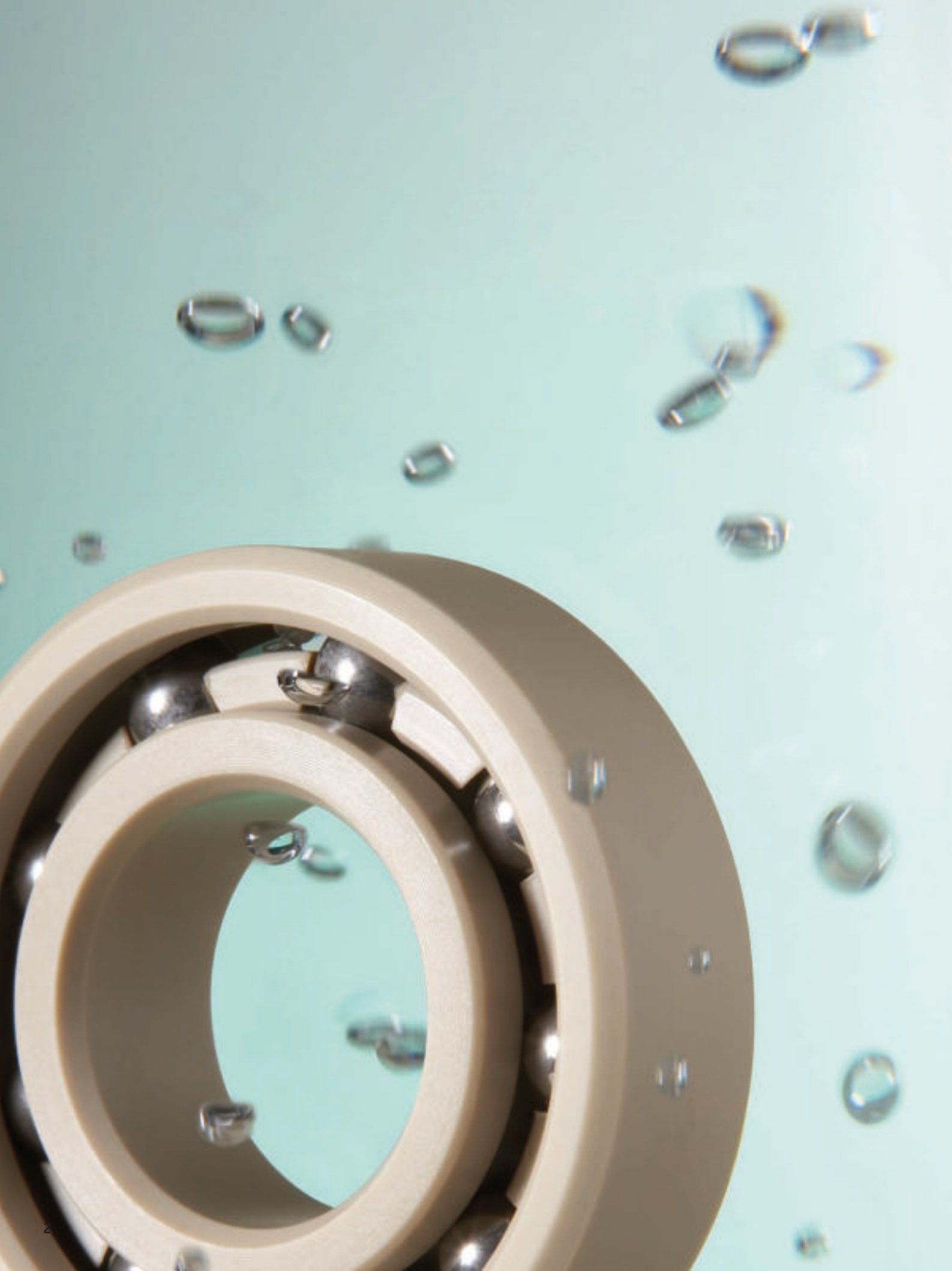
Polymer ball bearings from SKF

Corrosion and chemical resistant

Lightweight and quiet running

No lubrication needed





Polymer ball bearings from SKF for unique application conditions

Polymer ball bearings consist of:

- Polymer rings
- Balls made of stainless steel, glass, polymer or other materials and
- A polymer cage.

Polymer ball bearings can be made from a variety of materials and material combinations. The materials selected depend on the application. Polymers have significantly different properties than steel. One of the most unique properties is that they are corrosion and chemical resistant.

The polymers used to make bearings have a low coefficient of friction and are highly resistant to wear and fatigue. These self-lubricating bearings can run dry and require no relubrication.

However, the loads and maximum speeds that a polymer bearing can accommodate are much lower than for conventional all-steel bearings.

The high specific strength – (strength to weight ratio) is a valuable property of polymer bearings especially in applications where weight is an important design consideration. High dimensional stability throughout the lifespan is achieved by the low creep tendency of the polymers used.

Features and benefits

- Corrosion resistant
- Chemical resistant
- Self lubricating (no lubricant required)
- Light weight (80% less than steel)
- Some have high temperature usage
- Low coefficient of friction
- Quiet running
- Good damping properties
- Electrical insulator
- Integrated functions for special bearings
- Low lifecycle costs





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Applications

Polymer ball bearings are typically used in applications where resistance to moisture or chemicals is essential. In these applications, steel can not be used – or only with certain restrictions – making polymer ball bearings the best solution from both a technical and an economic perspective.

Polymer ball bearings can run without lubrication. Therefore they can also be deployed where no lubricants can be used, e. g. for hygienic reasons.

The possible areas of use are as varied as the properties and advantages of polymer ball bearings. The following is a partial list of those industries and applications where polymer ball bearings are already in use today:

- Food and beverage
- Medical
- Heating and air conditioning
- Chemical and electro plating
- Film, photographic and pharmaceutical
- Textile
- Electro technology
- Consumer goods
- Office products
- Model and lightweight construction
- Measuring equipment
- Material handling and transportation
- Vacuum applications

Product range

Single row ball bearings

Polymer ball bearings from SKF are available in various dimension series for bore diameters ranging from 3 to 60 mm.

The standard range covers four material combinations listed in **table 1**.

Thrust ball bearings

Polymer thrust ball bearings from SKF are available with bore diameters ranging from 10 to 45 mm with a full complement design (without cage). The standard materials used for bearing rings are Polyoxymethylene (POM) and Polypropylene (PP). Two different materials per bearing are used for the ball set. Stainless steel or glass balls are arranged alternately with balls made of the same polymer as the rings.

Table 1

Standard material combinations			
Combinations	Rings	Cage	Balls
1 and 2	Polyoxymethylene (POM)	Polyamide 6.6 (PA66)	Stainless steel or glass
3 and 4	Polypropylene (PP)	Polypropylene (PP)	Stainless steel or glass





Other polymer ball bearings and products

Other products are available in polymer on request:

- Single row ball bearings with inch dimensions
- Full complement single row ball bearings (without cage)
- Sealed single row ball bearings
- Double row ball bearings
- Track runner ball bearings
- Y bearings and Y bearing units
- Special size bearings
- Bearings made of other materials
- Bearing products with integrated functions

Special polymer ball bearings for particular applications can be produced economically, even in small quantities. A high level of integrated functions, e. g. gearing, is also possible. This can reduce the number of components and assembly costs. It also provides designers with options that are more efficient and appropriate for the application.

For additional information, contact the SKF application engineering service.



Table 2

Chemical resistance of available materials to common substances

Chemical group	Standard materials					Alternate Materials										
	POM	PP	PA6.6	1.4401	Glass	PE	PEEK	PET	PVDF	PPS	PI	Boro silicate glass	1.4034	Titanium	Si ₃ N ₄	Al ₂ O ₃
Hydrocarbons																
- aliphatic	+	+	+	0	+	+	+	+	+	+	+	+	+	+	+	+
- aromatic	+	+	0	+	0	0	+	0	+	0	+	+	+	+	+	+
- halogenic	+	0	0	-	0	0	0	0	+	+	0	+	+	+	+	+
Acids																
- weak	0	+	0	0	+	+	+	+	+	+	+	+	+	+	+	+
- strong	-	+	-	0	0	+	-	0	+	0	+	+	-	0	+	+
- oxidizing	-	-	-	0	+	0	-	-	0	-	-	+	-	+	+	+
- hydrofluoric acid	-	0	-	0	-	0	-	-	+	0	0	-	-	-	0	-
Alkaline																
- weak	+	+	0	0	+	+	+	0	+	+	+	+	+	0	0	+
- strong	+	+	0	0	0	+	+	-	-	0	0	0	0	0	-	+
Mineral lubricants	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Gasoline	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Alcohols	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Acetone	+	+	+	+	+	+	+	0	-	+	0	+	+	+	+	+
+ = good resistance: Can generally be used	0 = limited resistance: Bearing suitability should be tested under operating conditions					- = low resistance: Cannot be used										

Application guidelines

The following section provides general guidelines for the material selection and use of polymer ball bearings.

Note: Materials and ball bearings are often subjected to influences that can not be recognised in laboratory tests (temperature, pressure, material tension, interaction with chemical substances, design features etc.). Because of the complexity of the effects of these factors, SKF recommends field testing a selected polymer ball bearing to confirm that it will perform satisfactorily within the application.

Resistance to chemicals

Most polymers have good chemical resistance. Depending on the medium, alternative polymers that go beyond the standard range may have to be used.

Polypropylene (PP) resists acids, alkalines, salts and salt solutions, alcohols, oils, greases, wax and many solvents. Exposure to aromatic compounds and halogenized hydrocarbons results in swelling. PP does not resist strong oxidizing media (e. g. nitric acid, chromates or

halogens) and there is a risk of stress crack corrosion.

Polyoxymethylene (POM) resists weak acids, weak and strong alkaline and organic solvents as well as gasoline, benzene, oils and alcohols.

Polyamide 6.6 (PA66) resists almost all customary organic solvents and some weak acids and alkaline.

Table 2 lists the resistance of the available materials to common substances.

Service temperatures and thermal expansion

In addition to chemical resistance, operating temperature is a key criterion for selecting the appropriate bearing materials. **Diagram 1** provides a summary of operating temperatures for each available polymer.

Standard materials can accommodate temperatures up to about 100 °C (210 °F). The alternate materials listed can accommodate temperatures up to 250 °C (480 °F).

The thermal expansion combined with the operating temperature is also important as the values of the coefficient of thermal expansion of the various polymers can be up to 10 times greater than steel (→ **diagram 2**).

Thermal expansion affects the bearing internal clearance and must be considered when designing shaft and housing fits.

Load carrying capability

Static load carrying capability

The static load carrying capability is the upper load limit that a bearing can accommodate at a standstill without sustaining damage to the rolling elements or raceways. (→ **product tables**).

Dynamic load carrying capability

According to the current state of technology an analytical life calculation is not possible. The dynamic load carrying capability is an indicator for operational load in which the bearing fulfils its function in the majority of applications (→ **product tables**).

Dynamic load carrying capability depending on speed and operating temperature

The dynamic load carrying capability depends on the operating conditions. The effects of operating temperature and bearing speed on

Diagram 1

Operating temperature range [°C]

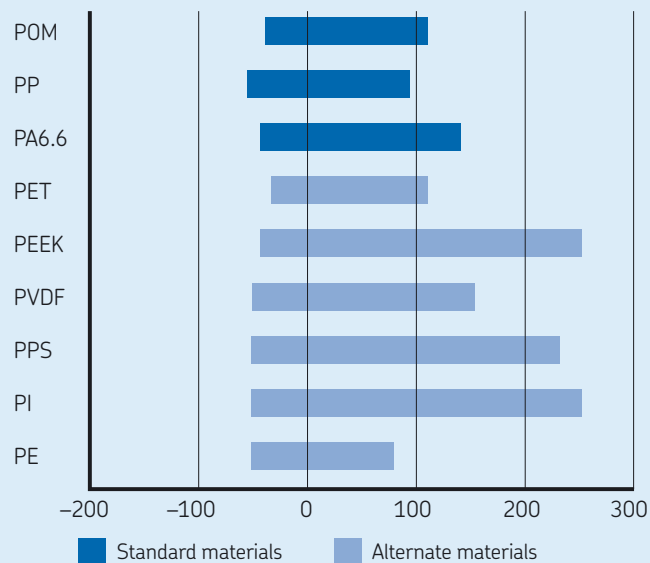


Diagram 2

Coefficient of thermal expansion [10^{-5} mm/mm K]

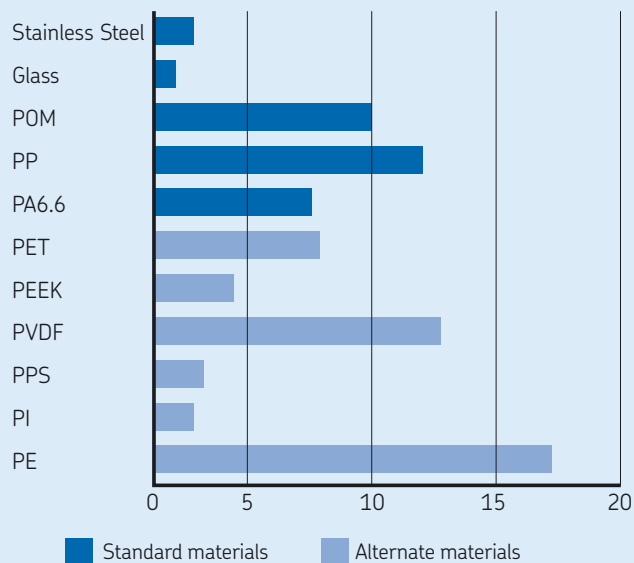
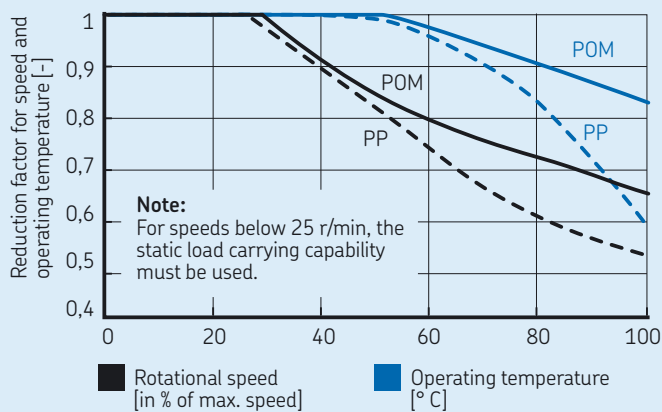


Diagram 3

Reduction of dynamic load carrying capability



the dynamic load capability can be estimated from **diagram 3**.

Example:

A 6301/HR11TN bearing with rings made of POM is to be used in an application that runs at 520 r/min with an operating temperature of 90 °C. From the product table this bearing is shown to have a dynamic load carrying capability of 310 N and a maximum speed of 1300 r/min.

According to **diagram 3** the reduction factor for an operating temperature of 90 °C is approximately 0,86.

Because 520 r/min is 40 % of the maximum speed, the reduction factor for the speed is about 0,9. Therefore the load should not exceed $0,86 \times 0,9 \times 310 \text{ N} = 239 \text{ N}$.

Selection of fits

Shaft and housing fits can have a substantial influence on the operating clearance in the bearing and its operating characteristics. Therefore, SKF recommends an interference fit for one ring only with approximately 20 µm overlap (on the shaft or in the housing). The other ring should have a slight clearance fit.

Under no circumstances should there be an interference fit on both rings, as insufficient operating clearance will cause the bearing to fail prematurely.

These are only guidelines to calculate a fit. Thermal expansion of the bearing and its components in operation must be taken into consideration

For additional information, contact the SKF application engineering service.

Bearing data – general

Dimensions

The boundary dimensions of polymer radial ball bearings conform to ISO 15:1998; except for chamfer dimensions. The boundary dimensions of polymer thrust ball bearings, with exception of the chamfer dimensions, conform to ISO 104:2002.

Tolerances

In general, the tolerances for polymer ball bearings are greater than for comparably sized all-steel bearings (→ **table 3**). When applied properly and used in the appropriate application, the greater tolerances have not had an adverse effect on bearing service life. For additional information contact the SKF application engineering service.

Radial internal clearance

Radial internal clearance for standard SKF polymer ball bearings depends on the bore diameter and is summarised in **table 4**.

Materials

Polyacetal (POM) and polypropylene (PP) rings are used for the standard range of polymer bearings. The cages are made of polyamide 6.6 (PA66) or PP. The balls are made of glass or stainless steel 1.4401 as per AISI 316. Balls in the standard range of thrust bearings are made of the same material as the rings and are arranged alternately with stainless steel or glass.

It is possible to meet the requirements for most applications with these materials.

Other materials are available on request (→ **designations on page 9**).

Table 4

Bearing internal clearance tolerance			
Bore d	Radial internal clearance		
	over incl.	min	max
mm mm	µm	µm	
9	9	60	140
9 17	17	70	150
17 20	20	80	160
20 25	25	80	170
30 35	35	90	180
35 45	45	100	200
45 60	60	110	210



Table 3

Tolerances															
Radial and thrust ball bearings								Radial bearings				Thrust bearings			
Inner ring				Outer ring				Width		Tolerance		Height		Tolerance	
d	Tolerance			D	Tolerance			B	Tolerance			H	Tolerance		
over incl.	high	low		over incl.	high	low		over incl.	high	low		over incl.	high	low	
mm mm	µm	µm		mm mm	µm	µm		mm mm	µm	µm		mm mm	µm	µm	
3	30	-30		30	30	40		4	25	0 -100		9	21	200 -200	
3 17	30	-30		30	47	50									
17 50	40	-40		47	80	60									
50 60	50	-50		80	95	80									

Table 5

Polymer ball bearings designation system

Examples	6302/HR11TN	6302	/HR	11TN
	16005/HR22Q2	16005	/HR	22Q2
	51204 V/HR11Q1	51204	V/HR	11Q1

Basic designation

type, basic design, standard boundary dimensions -> as for steel ball bearings

Suffixes for variants

V	full complement bearing (without cage)
HR	polymer ball bearing

Suffixes for materials

Figure 1	Outer ring
Figure 2	Inner ring
Figure 3	Balls
Figure 4	Cage or 2 nd ball material (full complement thrust ball bearings)

Material codes

1	POM	Q	Glass
2	PP	R	Boro silicate glass
3	Polyethylene (PE)	S	Stainless steel 1.4034
6	Polyetheretherketone (PEEK)	T	Stainless steel 1.4401
B	Polyethylenterephthalate (PET)	W	Titanium
K	Polyvinylidenfluoride (PVDF)	X	Ceramic Si ₃ N ₄
L	Polyphenylensulfide (PPS)	Z	Ceramic AL ₂ O ₃
M	Polyimide (PI)		
N	Polyamide 66 (PA66)		

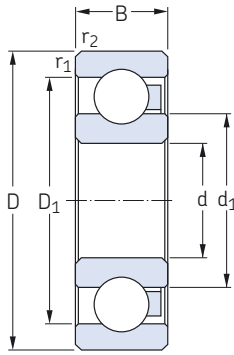
Designations

The designations for SKF polymer ball bearings are based on the SKF designation system. The bearing component materials are described clearly using suffixes. The designation system is shown in **table 5**.

The complete bearing designation is shown on the package but polymer ball bearings do not have the designation inscribed on either the inner or outer ring.

Single row ball bearings

d 3 – 15 mm



Boundary dimensions			Load carrying capability		Speed rating	Dimensions			Mass	Designations	
d	D	B	static ¹⁾	dynamic ²⁾	max ³⁾	d ₁	D ₁	r _{1,2} min x45°	max		
mm			N		r/min	mm			kg		
3	10	4	30	45	4500	5,6	7,9	0,2	0,4	623/HR11TN	623/HR11QN
	10	4	30	45	3960	5,6	7,9	0,2	0,3	623/HR22T2	623/HR22Q2
4	13	5	40	60	3600	6,6	9,8	0,3	1	624/HR11TN	624/HR11QN
	13	5	40	60	3170	6,6	9,8	0,3	0,8	624/HR22T2	624/HR22Q2
5	16	5	45	65	3050	7,5	12,5	0,4	1,5	625/HR11TN	625/HR11QN
	16	5	45	65	2680	7,5	12,5	0,4	1,4	625/HR22T2	625/HR22Q2
6	19	6	50	70	2600	9	15,4	0,4	3	626/HR11TN	626/HR11QN
	19	6	50	70	2290	9	15,4	0,4	3	626/HR22T2	626/HR22Q2
7	19	6	50	70	2600	10,8	15,9	0,4	3	607/HR11TN	607/HR11QN
	19	6	50	70	2290	10,8	15,9	0,4	1,8	607/HR22T2	607/HR22Q2
	22	7	55	80	2200	11,5	17,9	0,4	4	627/HR11TN	627/HR11QN
	22	7	55	80	1900	11,5	17,9	0,4	4	627/HR22T2	627/HR22Q2
8	22	7	55	80	2200	11,5	17,9	0,4	4	608/HR11TN	608/HR11QN
	22	7	55	80	1930	11,5	17,9	0,4	3	608/HR22T2	608/HR22Q2
9	24	7	60	90	2050	13,4	19,9	0,4	8	609/HR11TN	609/HR11QN
	24	7	60	90	1800	13,4	19,9	0,4	6	609/HR22T2	609/HR22Q2
	26	8	70	100	1900	13,7	21,3	0,4	7	629/HR11TN	629/HR11QN
	26	8	70	100	1670	13,7	21,3	0,4	6	629/HR22T2	629/HR22Q2
10	26	8	90	130	1900	15,1	21,4	0,4	7	6000/HR11TN	6000/HR11QN
	26	8	90	130	1670	15,1	21,4	0,4	6	6000/HR22T2	6000/HR22Q2
	28	8	90	130	1900	15,1	20,9	0,4	8	16100/HR11TN	16100/HR11QN
	28	8	90	130	1670	15,1	20,9	0,4	6	16100/HR22T2	16100/HR22Q2
	30	9	110	160	1650	17	23	0,9	9	6200/HR11TN	6200/HR11QN
	30	9	110	160	1450	17	23	0,9	8	6200/HR22T2	6200/HR22Q2
	35	11	190	280	1400	18	26,9	0,9	18	6300/HR11TN	6300/HR11QN
	35	11	190	280	1230	18	26,9	0,9	15	6300/HR22T2	6300/HR22Q2
12	28	8	110	160	1750	17,1	22,9	0,4	8	6001/HR11TN	6001/HR11QN
	28	8	110	160	1540	17,1	22,9	0,4	6	6001/HR22T2	6001/HR22Q2
	32	10	150	220	1550	18,2	25,7	0,9	12	6201/HR11TN	6201/HR11QN
	32	10	150	220	1360	18,2	25,7	0,9	10	6201/HR22T2	6201/HR22Q2
	37	12	210	310	1300	19,5	29,5	0,9	22	6301/HR11TN	6301/HR11QN
	37	12	210	310	1140	19,5	29,5	0,9	19	6301/HR22T2	6301/HR22Q2
15	32	8	130	190	1500	19,8	25,9	0,4	9	16002/HR11TN	16002/HR11QN
	32	8	130	190	1320	19,8	25,9	0,4	7	16002/HR22T2	16002/HR22Q2
	32	9	140	200	1500	20,6	26,4	0,4	10	6002/HR11TN	6002/HR11QN
	32	9	140	200	1320	20,6	26,4	0,4	8	6002/HR22T2	6002/HR22Q2
	35	11	170	250	1400	21,5	29	0,9	15	6202/HR11TN	6202/HR11QN
	35	11	170	250	1230	21,5	29	0,9	12	6202/HR22T2	6202/HR22Q2
	42	13	260	370	1200	23,7	33,7	0,9	28	6302/HR11TN	6302/HR11QN
	42	13	260	370	1060	23,7	33,7	0,9	23	6302/HR22T2	6302/HR22Q2

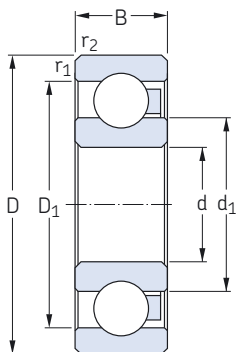
¹⁾ Above 50 °C consider reduction according to **diagram 3**

²⁾ Above 50 °C and/or above 20% of max speed rating consider reduction according to **diagram 3**

³⁾ Consider load carrying capability reduction according to **diagram 3**

Single row ball bearings

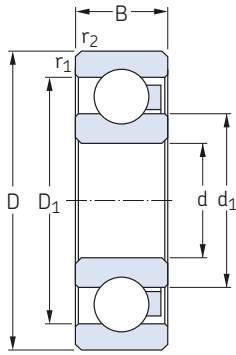
d 17 – 35 mm



Boundary dimensions			Load carrying capability		Speed rating	Dimensions			Mass	Designations	
d	D	B	static ¹⁾	dynamic ²⁾	max ³⁾	d ₁	D ₁	r _{1,2} min x45°	max		
mm			N		r/min	mm			kg		
17	35	8	160	240	1400	22,2	29,8	0,4	10	16003/HR11TN	16003/HR11QN
	35	8	160	240	1230	22,2	29,8	0,4	8	16003/HR22T2	16003/HR22Q2
	35	10	170	260	1400	23,1	28,9	0,4	12	6003/HR11TN	6003/HR11QN
	35	10	170	260	1230	23,1	28,9	0,4	9	6003/HR22T2	6003/HR22Q2
	40	12	220	320	1250	24,2	32,7	0,9	20	6203/HR11TN	6203/HR11QN
	40	12	220	320	1100	24,2	32,7	0,9	16	6203/HR22T2	6203/HR22Q2
	47	14	260	370	1050	26,5	37,4	0,9	38	6303/HR11TN	6303/HR11QN
	47	14	260	370	920	26,5	37,4	0,9	32	6303/HR22T2	6303/HR22Q2
20	42	8	190	290	1150	26,5	34,5	0,4	14	16004/HR11TN	16004/HR11QN
	42	8	190	290	1010	26,5	34,5	0,4	11	16004/HR22T2	16004/HR22Q2
	42	12	200	300	1150	27,2	34,8	0,9	21	6004/HR11TN	6004/HR11QN
	42	12	200	300	1010	27,2	34,8	0,9	17	6004/HR22T2	6004/HR22Q2
	47	14	270	420	1050	28,5	38,5	0,9	34	6204/HR11TN	6204/HR11QN
	47	14	270	420	920	28,5	38,5	0,9	28	6204/HR22T2	6204/HR22Q2
	52	15	350	500	950	30,3	41,6	0,9	49	6304/HR11TN	6304/HR11QN
	52	15	350	500	840	30,3	41,6	0,9	41	6304/HR22T2	6304/HR22Q2
25	47	8	210	310	1050	32,3	40,9	0,4	20	16005/HR11TN	16005/HR11QN
	47	8	210	310	920	32,3	40,9	0,4	17	16005/HR22T2	16005/HR22Q2
	47	12	240	360	1050	32,2	39,8	0,9	24	6005/HR11TN	6005/HR11QN
	47	12	240	360	920	32,2	39,8	0,9	20	6005/HR22T2	6005/HR22Q2
	52	15	320	480	950	34	44	0,9	40	6205/HR11TN	6205/HR11QN
	52	15	320	480	840	34	44	0,9	33	6205/HR22T2	6205/HR22Q2
	62	17	400	600	725	37	50	0,9	77	6305/HR11TN	6305/HR11QN
	62	17	400	600	640	37	50	0,9	64	6305/HR22T2	6305/HR22Q2
30	55	9	240	370	900	37,7	47,3	0,4	27	16006/HR11TN	16006/HR11QN
	55	9	240	370	790	37,7	47,3	0,4	22	16006/HR22T2	16006/HR22Q2
	55	13	280	420	900	38,2	46,8	0,9	36	6006/HR11TN	6006/HR11QN
	55	13	280	420	790	38,2	46,8	0,9	29	6006/HR22T2	6006/HR22Q2
	62	16	360	550	800	40,3	51,6	0,9	64	6206/HR11TN	6206/HR11QN
	62	16	360	550	700	40,3	51,6	0,9	53	6206/HR22T2	6206/HR22Q2
	72	19	460	700	675	44,7	59,2	1,4	114	6306/HR11TN	6306/HR11QN
	72	19	460	700	590	44,7	59,2	1,4	96	6306/HR22T2	6306/HR22Q2
35	62	9	240	370	800	43,7	53,3	0,4	33	16007/HR11TN	16007/HR11QN
	62	9	240	370	700	43,7	53,3	0,4	27	16007/HR22T2	16007/HR22Q2
	62	14	320	480	800	43,7	53,3	0,9	48	6007/HR11TN	6007/HR11QN
	62	14	320	480	700	43,7	53,3	0,9	39	6007/HR22T2	6007/HR22Q2
	72	17	410	620	700	47	60	0,9	95	6207/HR11TN	6207/HR11QN
	72	17	410	620	620	47	60	0,9	80	6207/HR22T2	6207/HR22Q2
	80	21	490	750	600	49,55	65,35	1,4	154	6307/HR11TN	6307/HR11QN
	80	21	490	750	530	49,55	65,35	1,4	130	6307/HR22T2	6307/HR22Q2

Single row ball bearings

d 40 – 60 mm



Boundary dimensions			Load carrying capability		Speed rating	Dimensions			Mass	Designations	
d	D	B	static ¹⁾	dynamic ²⁾	max ³⁾	d ₁	D ₁	r _{1,2} min x45°	max		
mm			N		r/min	mm			kg		
40	68	9	300	450	750	49,4	58,6	0,4	38	16008/HR11TN	16008/HR11QN
	68	9	300	450	660	49,4	58,6	0,4	31	16008/HR22T2	16008/HR22Q2
	68	15	350	520	750	49,2	58,8	0,9	57	6008/HR11TN	6008/HR11QN
	68	15	350	520	660	49,2	58,8	0,9	46	6008/HR22T2	6008/HR22Q2
	80	18	440	660	625	53	67	0,9	132	6208/HR11TN	6208/HR11QN
	80	18	440	660	550	53	67	0,9	113	6208/HR22T2	6208/HR22Q2
	90	23	520	800	575	56,1	73,75	1,9	208	6308/HR11TN	6308/HR11QN
	90	23	520	800	510	56,1	73,75	1,9	175	6308/HR22T2	6308/HR22Q2
45	75	10	330	500	650	55	65	0,9	49	16009/HR11TN	16009/HR11QN
	75	10	330	500	570	55	65	0,9	40	16009/HR22T2	16009/HR22Q2
	75	16	380	560	650	54,7	65,3	0,9	75	6009/HR11TN	6009/HR11QN
	75	16	380	560	570	54,7	65,3	0,9	62	6009/HR22T2	6009/HR22Q2
	85	19	470	720	580	57,5	72,35	1,9	138	6209/HR11TN	6209/HR11QN
	85	19	470	720	510	57,5	72,35	1,9	118	6209/HR22T2	6209/HR22Q2
	100	25	540	900	500	62,18	82,65	1,9	297	6309/HR11TN	6309/HR11QN
	100	25	540	900	440	62,18	82,65	1,9	255	6309/HR22T2	6309/HR22Q2
50	80	16	390	580	600	60	70	0,9	82	6010/HR11TN	6010/HR11QN
	80	16	390	580	530	60	70	0,9	67	6010/HR22T2	6010/HR22Q2
	90	20	540	770	550	62,5	77,35	1,9	154	6210/HR11TN	6210/HR11QN
	90	20	540	770	480	62,5	77,35	1,9	131	6210/HR22T2	6210/HR22Q2
55	90	18	400	600	550	66,3	78,7	0,9	121	6011/HR11TN	6011/HR11QN
	90	18	400	600	480	66,3	78,7	0,9	100	6011/HR22T2	6011/HR22Q2
	100	21	600	800	500	69,06	85,8	2,4	207	6211/HR11TN	6211/HR11QN
	100	21	600	800	440	69,06	85,8	2,4	178	6211/HR22T2	6211/HR22Q2
60	95	18	420	640	500	70,2	84,5	1,9	127	6012/HR11TN	6012/HR11QN
	95	18	420	640	440	70,2	84,5	1,9	105	6012/HR22T2	6012/HR22Q2

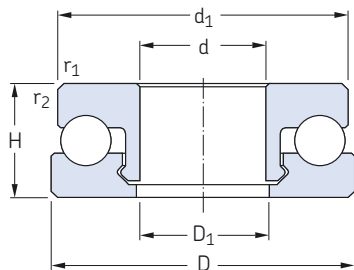
¹⁾ Above 50 °C consider reduction according to **diagram 3**

²⁾ Above 50 °C and/or above 20% of max speed rating consider reduction according to **diagram 3**

³⁾ At max speed consider dynamic load rating reduction according to **diagram 3**

Thrust ball bearings

d 10 – 45 mm



Boundary dimensions			Load carrying capability		Speed rating	Dimensions			Mass	Designations	
d	D	H	static ¹⁾	dynamic ²⁾	max ³⁾	D ₁	d ₁	r _{1,2} min x45°	max		
mm			N		r/min	mm			kg		
10	24	9	200	250	600	11	23	0,4	5,2	51100 V/HR11T1	51100 V/HR11Q1
	24	9	175	220	550	11	23	0,4	4	51100 V/HR22T2	51100 V/HR22Q2
	26	11	210	260	600	11	25	0,4	7,9	51200 V/HR11T1	51200 V/HR11Q1
	26	11	185	230	550	11	25	0,4	6	51200 V/HR22T2	51200 V/HR22Q2
12	26	9	320	400	540	13	25	0,4	5,6	51101 V/HR11T1	51101 V/HR11Q1
	26	9	280	350	500	13	25	0,4	4,3	51101 V/HR22T2	51101 V/HR22Q2
	28	11	330	410	540	13	27	0,4	9,5	51201 V/HR11T1	51201 V/HR11Q1
	28	11	290	360	500	13	27	0,4	6,7	51201 V/HR22T2	51201 V/HR22Q2
15	28	9	500	625	500	16	27	0,4	6,1	51102 V/HR11T1	51102 V/HR11Q1
	28	9	440	550	460	16	27	0,4	4,7	51102 V/HR22T2	51102 V/HR22Q2
	32	12	520	650	500	16	31	0,4	11,7	51202 V/HR11T1	51202 V/HR11Q1
	32	12	460	570	460	16	31	0,4	8,8	51202 V/HR22T2	51202 V/HR22Q2
17	30	9	570	710	480	18	29	0,4	6,8	51103 V/HR11T1	51103 V/HR11Q1
	30	9	500	625	440	18	29	0,4	5,4	51103 V/HR22T2	51103 V/HR22Q2
	35	12	600	750	480	18	34	0,4	14,9	51203 V/HR11T1	51203 V/HR11Q1
	35	12	530	660	440	18	34	0,4	11,8	51203 V/HR22T2	51203 V/HR22Q2
20	35	10	650	810	460	21	34	0,4	10,3	51104 V/HR11T1	51104 V/HR11Q1
	35	10	570	710	420	21	34	0,4	8,1	51104 V/HR22T2	51104 V/HR22Q2
	40	14	690	860	460	21	39	0,4	20,5	51204 V/HR11T1	51204 V/HR11Q1
	40	14	600	750	420	21	39	0,4	15,8	51204 V/HR22T2	51204 V/HR22Q2
25	42	11	710	880	410	26	41	0,4	14,6	51105 V/HR11T1	51105 V/HR11Q1
	42	11	625	770	375	26	41	0,4	7,9	51105 V/HR22T2	51105 V/HR22Q2
	47	15	750	930	400	26	46	0,4	28,7	51205 V/HR11T1	51205 V/HR11Q1
	47	15	660	815	370	26	46	0,4	21,8	51205 V/HR22T2	51205 V/HR22Q2
	52	18	820	1025	380	26	51	0,4	46,2	51305 V/HR11T1	51305 V/HR11Q1
	52	18	720	900	350	26	51	0,4	35,7	51305 V/HR22T2	51305 V/HR22Q2
30	47	11	760	950	400	31	46	0,9	17,3	51106 V/HR11T1	51106 V/HR11Q1
	47	11	670	835	370	31	46	0,9	13,2	51106 V/HR22T2	51106 V/HR22Q2
	52	16	820	1025	375	31	51	0,9	34	51206 V/HR11T1	51206 V/HR11Q1
	52	16	720	900	345	31	51	0,9	25,7	51206 V/HR22T2	51206 V/HR22Q2
	60	21	860	1070	360	31	59	0,9	62,8	51306 V/HR11T1	51306 V/HR11Q1
	60	21	755	940	330	31	59	0,9	47,1	51306 V/HR22T2	51306 V/HR22Q2
35	52	12	810	1010	390	36	51	0,9	20,8	51107 V/HR11T1	51107 V/HR11Q1
	52	12	710	885	360	36	51	0,9	15,7	51107 V/HR22T2	51107 V/HR22Q2
	62	18	870	1090	365	36	61	0,9	56,9	51207 V/HR11T1	51207 V/HR11Q1
	62	18	765	960	335	36	61	0,9	43,3	51207 V/HR22T2	51207 V/HR22Q2
40	60	13	890	1110	375	41	59	0,9	29,6	51108 V/HR11T1	51108 V/HR11Q1
	60	13	780	975	345	41	59	0,9	22,5	51108 V/HR22T2	51108 V/HR22Q2
45	65	14	950	1185	360	46	64	0,9	38,8	51109 V/HR11T1	51109 V/HR11Q1
	65	14	835	1040	330	46	64	0,9	27,6	51109 V/HR22T2	51109 V/HR22Q2



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