

A versatile solution

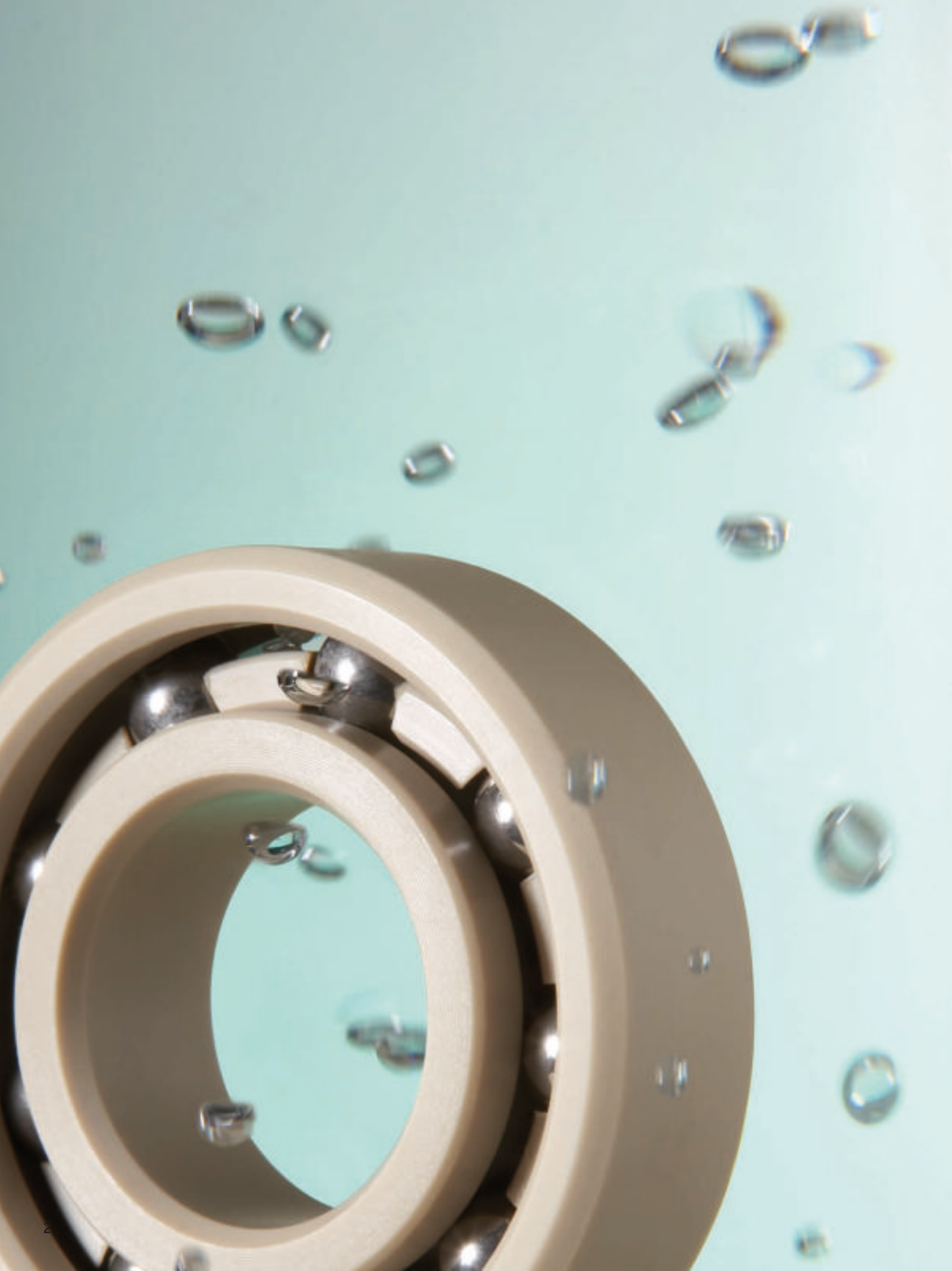
Polymer ball bearings from SKF

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 | 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]

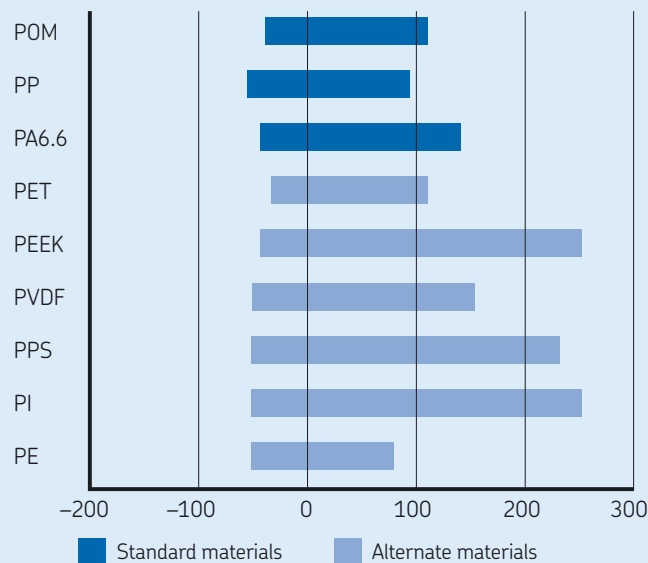


Diagram 2

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

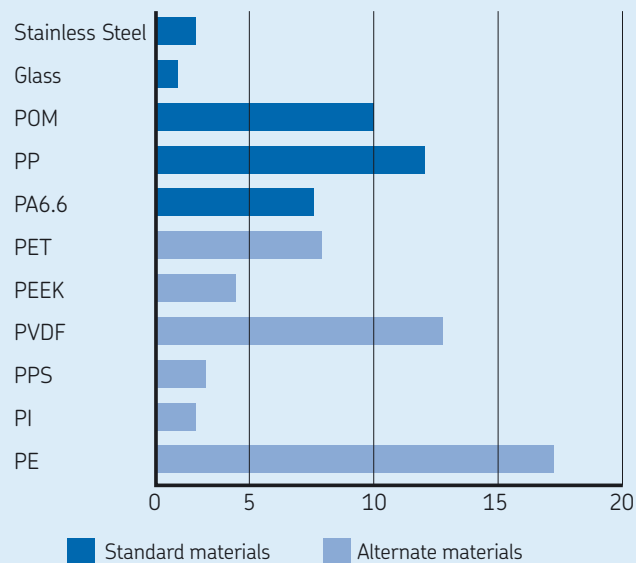
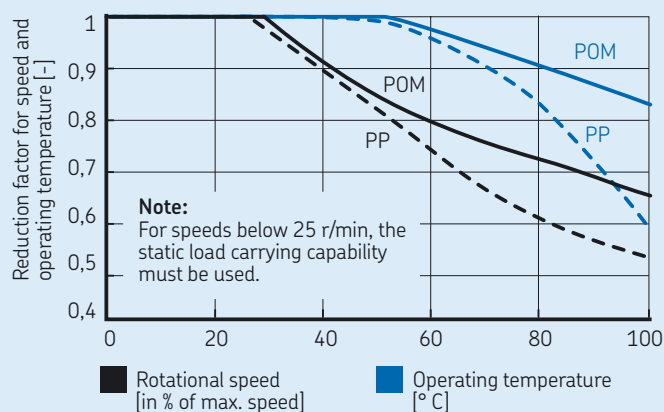


Diagram 3

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 | 70 | 150 |
| 17 | 20 | 80 | 160 |
| 20 | 25 | 80 | 170 |
| 30 | 35 | 90 | 180 |
| 35 | 45 | 100 | 200 |
| 45 | 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 | 47 | 50 | | | | | | | | | | |
| 17 | 50 | -40 | | 47 | 80 | 60 | | | | | | | | | | |
| 50 | 60 | -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) | | |

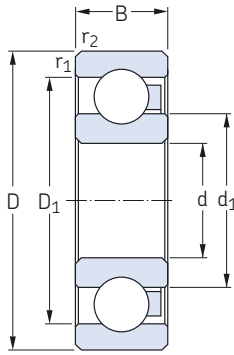
Designations

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 |

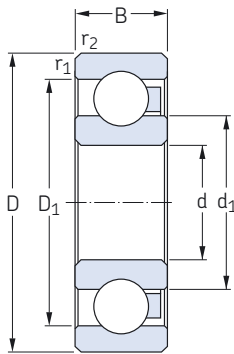
¹⁾ Above 50 °C consider reduction according to **diagram 3**

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

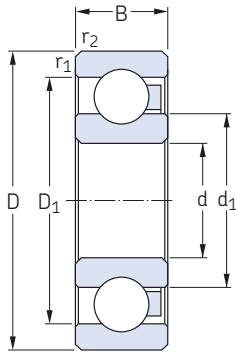
d 17 – 35 mm



| 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 |

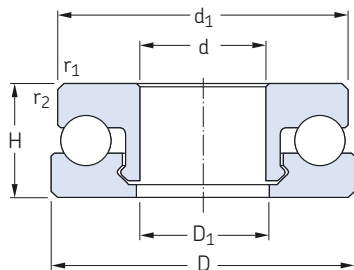
¹⁾ Above 50 °C consider reduction according to **diagram 3**

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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