

# SKF

## A new sealing standard for longer service life



**Deep groove ball bearings with RSL and RSH seals**

Improved sealing properties

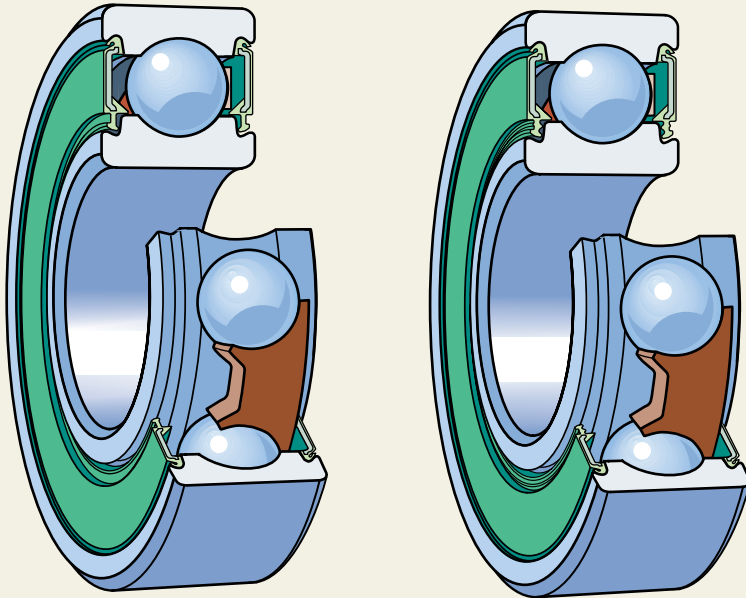
Low friction

Longer service life



# A new generation of seals offers more possibilities

Fig 1



## That is just for starts

The initial range of deep groove ball bearings with the new seal generation cover bearings

- of series 60, 62 and 63,
- with bore diameters from 6 to 25 mm and
- with a maximum outside diameter of 52 mm.

The bearings can be sealed at both sides, or on one side only.

## A wide range of applications

Every industrial segment worldwide specifies SKF sealed deep groove ball bearings. Some of the mayor applica-tions include:

- Electric motors
- Automotive and trucks electric components, such as alternators
- Power tools and household appliances
- Automotive and industrial gearboxes
- Two wheelers
- Material handling
- Agriculture and forestry equipments
- Fluid machinery
- Textile machinery

Deep groove ball bearings with new RSL and RSH seals

## The most popular bearing

Deep groove ball bearings are the most widely used bearing type on the market. Their versatile design makes them the preferred solution for applications that operate under combined radial and axial load at high speed.

SKF offers a wide range of deep groove ball bearings in open, shielded and sealed designs. The shielded and sealed designs offer many advantages over an open design making it the preferred choice wherever possible. When sealed at both sides, these bearings are greased for life and require no maintenance. They are also easy to mount.

Now SKF sealed bearings just got better. We developed two new seal designs that provide longer service life and lower energy consumption for your applications. These two sealing alternatives replace our current designs as the SKF standard for sealed deep groove ball bearings in the range specified in this brochure.

This publication introduces you to the two new SKF seal designs:

- The low-friction RSL seal replacing the RZ seal.
- The rubbing RSH seal replacing the RS1 seal. This design is patented or patent pending in several countries.

The shielded bearings of Z and 2Z designs remain unchanged.

## General data

All general data related to dimensions, tolerances, and internal clearance are the same for new sealed RSL and RSH bearings, as for the current bearings with RZ and RS1 seals.

## Joint properties valid for both seal designs

The RSL and RSH seals share many important properties including the elastomer material and reinforcement.

### Seals

The seals are made of nitrile rubber (NBR), which has an operating temperature range of  $-50$  to  $+100$  °C and up to  $+120$  °C for brief periods.

They show good resistance to:

- most mineral oil based lubricants,
- fuels including petrol, diesel and light heating oils,
- oils and greases based on animal and vegetable fat,
- water.

A robust design and adequate contact force were achieved by optimising the shape of the seal lip using FEM calculations.

Sealing efficiencies are provided by a combination of seal lip and an additional labyrinth formed by a gap between the tapered rubber part and the inner ring shoulder (→ fig 1).

### Reinforcement

Use of a uniquely shaped sheet steel reinforces the rubber material making the seal stiff while keeping the body lean. There is more axial space available inside the bearing improving lubrication conditions and providing longer service life. The seal retainment in the outer ring has been optimised providing proper sealing function in outer ring rotating applications.

### Seal counterface

To provide longer bearing service life, lip wear is reduced by manufacturing the seal counterfaces to very high precision and providing recesses in the inner ring shoulders for the seal lip to slide.

## The low-friction RSL seal

The low-friction RSL seal replaces the existing RZ seal. Depending on bearing size and available space, there are two different designs. The seal for bearings with

- bore diameter smaller than 10 mm is shown in fig 2,
- bore diameter equal or larger than 10 mm is shown in fig 3.

Although sealing efficiency is enhanced, however, the low friction does not increase the energy consumption.

Compared to RZ, the RSL seal provides at same operating conditions:

- improved grease retention and
- improved exclusion of moisture and contaminants.

The RSL seal can be identified by the suffix:

- RSL: a seal at one side of the bearing, e.g. 6203-RSL,
- 2RSL: seals at both sides of the bearing, e.g. 6204-2RSL.

RSL seal for bore diameter smaller than 10 mm

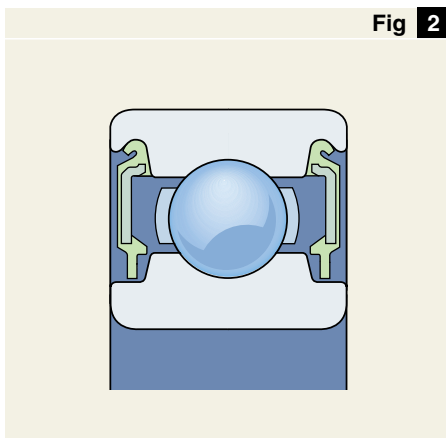


Fig 2

RSL seal for bore diameter equal or larger than 10 mm

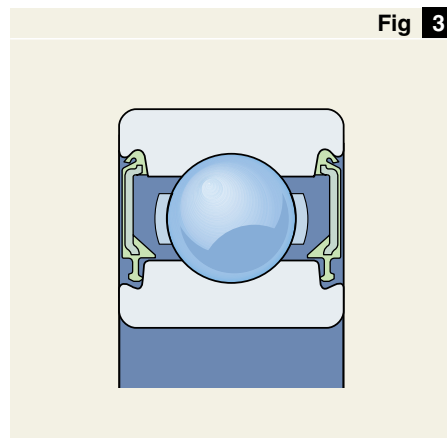


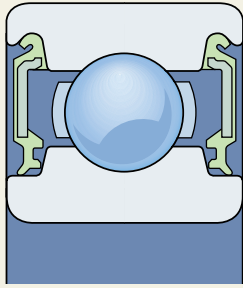
Fig 3

Performance comparison between RSL and RZ seals

Characteristics	Table 1	
	Seal type RSL	RZ
Low friction	++	+++
Speed ability	+++	+++
Grease retention	+++	+
Dust exclusion	++	+
Static water exclusion	O	—
Dynamic water exclusion	O	—
High pressure water exclusion	O	—

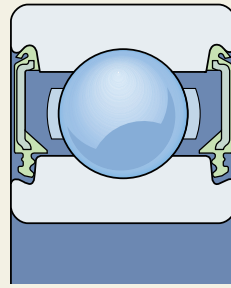
Symbols:  
 +++ = excellent ++ = very good + = good O = fair  
 — = not recommended

Fig 4



RSH seal for bore diameter smaller than 10 mm

Fig 5



RSH seal for bore diameter equal or larger than 10 mm

Table 2

Characteristics	Seal type	
	RSH	RS1
Low friction	○	○
Speed ability	○	○
Grease retention	+++	++
Dust exclusion	+++	+++
Static water exclusion	+++	++
Dynamic water exclusion	+	+
High pressure water exclusion	+++	○

Symbols:  
 +++ = excellent ++ = very good + = good ○ = fair  
 — = not recommended

Performance comparison between RSH and RS1 seals

## The rubbing RSH seal

In addition to the mentioned properties of RSL seal the new RSH seal (→ figs 4 and 5) has the following features:

- A secondary seal lip withstands high-pressure cleaning and prevents against water entry. The contact pressure between this seal lip and the seal counterface increases when pressure is applied to the outside of the bearing, while the overlap of the seal and the inner ring shoulder prevent the seal from being pressed into the bearing and leaking.
- Seals for bearings with bore diameter from 10 mm onwards have radial slots in the tapered attachment. These enable the seal lip and the counterface to be properly lubricated enabling the grease to act as a third protection. This also contributes to increase the service life of the bearing.

There are also two RSH designs, which depending on bearing size and available space, differ slightly in its position of the primary seal lip. The seal for bearings with

- bore diameter smaller than 10 mm is shown in fig 4,
- bore diameter equal or larger than 10 mm is shown in fig 5.

The RSH seal replaces the existing RS1 seal. Compared to the high effective RS1 seal, the RSH seal:

- increases the grease retention and
- improves the exclusion of water, specifically under high-pressure water impact, and contaminants.

The RSH seal can be identified by the suffix:

- RSH: a seal at one side of the bearing, e.g. 6203-RSH,
- 2RSH: seals at both sides of the bearing, e.g. 6204-2RSH.



## SKF – superior deep groove ball bearings

All SKF deep groove ball bearings benefit from never-ending improvements developed together with leading OEM's. You'll find very best with regard to

- material
- cages
- grease fillings
- shields and seals
- low vibration and noise level
- high precision

to meet your application requirements.

### Material

SKF deep groove ball bearings are made from high quality through-hardening carbon chromium steel for high fatigue strength and wear resistance.

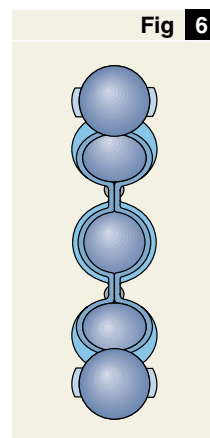
### Cages

Most SKF deep groove ball bearings are equipped with pressed metal sheet cages (→ fig 6). For particular applications, bearings can be supplied with other cage types, such as:

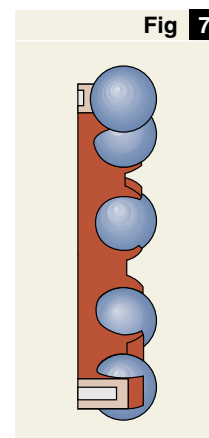
- Glass fibre reinforced polyamide 6,6 (suffix TN9, → fig 7). Thanks to material properties, TN9 cages provide numerous advantages, such as high-speed capability and lower sensitivity to poor lubrication. The trend is to use polyamide cages when continuous operating temperature is below 120 °C.

- Machined brass cages, mainly used for medium and large size deep groove ball bearings (→ fig 8).

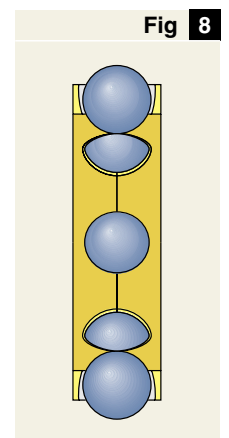
*Standard metal sheet cage*



*Polyamide 6,6 cage*

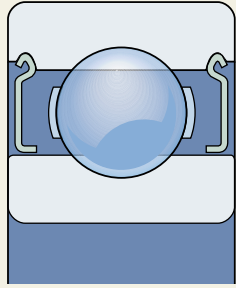


*Brass cage*



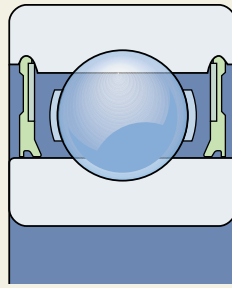
## Deep groove ball bearings with RSL and RSH seals

Fig 9



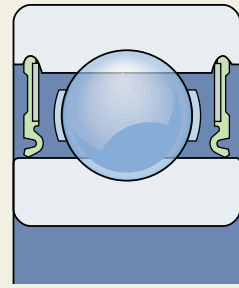
**Shields of Z design**

Fig 10



**Seals of RZ design**

Fig 11



**Seals of RS1 design**

### Grease fillings

Bearings with shields and seals on both sides are greased for life. SKF has selected a range of proven greases, covering most applications (→ table 3).

To meet specific applications needs all bearings can be filled with tailored greases on request.

### Shields and seals

Depending on size and series SKF still offers bearings with:

- the shields of Z design (→ fig 9),
- the low-friction seals of RZ design (→ fig 10), and
- the rubbing seals of RS1 design (→ fig 11).

The applicable range as well as selection criteria according to application requirements are given in table 4.

### SKF lubricating greases

Table 3

Characteristics	Standard grease <sup>1)</sup>		High temperature grease <sup>2)</sup>		Low temperature grease	Wide temperature range grease	Wide temperature range and silent running grease
<b>Bearing outer diameter</b>	≤ 62 mm	> 62 mm	≤ 62 mm	> 62 mm	All	All	All
<b>SKF grease code</b>	MT47	MT33	GJN	HT22	LT20	GWB	LHT23
<b>Suffix in bearing designation</b>	–		GJN	HT	LT	WT	LHT23
<b>Consistency class (according to NLGI)</b>	2	3	2	3	2	2-3	2
<b>Thickener</b>	Lithium soap		Polyurea soap	Lithium complex soap	Lithium soap	Polyurea soap	Lithium soap
<b>Base oil</b>	Mineral oil		Mineral oil		Diester oil	Ester oil	Ester oil
<b>Operating temperature, °C (continuous operation)</b>	–30 to +110	–30 to +120	–30 to +150	–20 to +140	–55 to +110	–40 to +160	–50 to +140

<sup>1)</sup> The standard grease for deep groove ball bearings of series 617, 618, 619 with outer diameter up to 30 mm, is an ester oil and lithium base grease with an operating temperature range from –55 to +90 °C.

<sup>2)</sup> US standard may differ, GJN grease often used above 62 mm too.

## Quality

SKF deep groove ball bearings are well known for their high quality. They are manufactured to tolerances higher than normal – e.g. bearings up to 110 mm outer diameter to ISO precision class P6 and with a P5 running accuracy up to 52 mm – and they reach the highest quality level regarding to vibration level and silent running. These results are from continuous improvements in cleanliness, ring and ball quality, silent greases, etc. developed and implemented over years.

## Advanced features and function integration

For demanding applications, SKF offers deep groove ball bearings with advanced features such as

- special steel
- ceramic balls
- high temperature resistant polymer cages (PA46, PEEK)
- seals from special rubber mixes (ACM, FKM)
- seize-resistant bearings
- extreme temperature bearings
- integrated oil sealed bearing (ICOS™)
- bearings with Solid Oil

An SKF deep groove ball bearing is always a vital component part of a global mechanism. Its specific role as the heart of the system – supporting the shaft, carrying loads and interfacing fixed and rotating components – drives

SKF to integrate more functions in the volume location of a standard deep groove ball bearing.

SKF “Intelligent units” integrate additional robust functions. These “fit and forget” solutions contribute to simplified mounting processes and reduced number of parts. Typical examples are Sensor-Bearing Units.

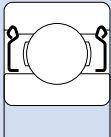
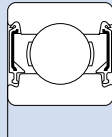
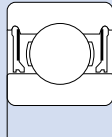
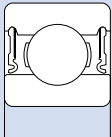
SKF offers detailed mounting instructions, available on [www.skf.com/mount](http://www.skf.com/mount)

In addition to the bearings and seals, SKF offers the advantages of an international industrial Group operating in some 130 countries with an

- international sales network including a large number of sales companies and some 20 000 distributors and retailers and
- worldwide International Standard Quality Certification to: ISO 9001, QS 9000, ISO 14001 and ISO/TS 16949.

### Product range and performance comparison

Table 4

				
	Shield Z	Low friction seal RSL	Rubbing seal RZ RSH	RS1 <sup>1)</sup>
<b>Applicable range per series<sup>2)</sup></b>				
618	61800 - 61803	—	61804 - 61828	61800 - 61828
619	619/7 - 61902	—	61903 - 61910	61903 - 61912
60	604 - 6032	607 - 6005	6006 - 6008	6006 - 6032
62	623 - 6226	626 - 6205	6206, 6208	6206 - 6221
63	634 - 6321	6300 - 6304	6305, 6306	6305 - 6319
<b>Characteristics<sup>3)</sup></b>				
Low friction	+++	++	+++	O
Speed ability	+++	+++	+++	O
Grease retention	O	+++	+	+++
Dust exclusion	O	++	+	+++
Static water exclusion	—	O	—	+++
Dynamic water exclusion	—	O	—	+
High pressure water exclusion	—	O	—	O

<sup>1)</sup> According to groove riding seal design on deep groove ball bearings with outer diameter up to 52 mm incl. for series 618 and 619, and above 150 mm approx. for series 60, 62 and 63.

<sup>2)</sup> Availability to be checked with SKF or SKF distributors.

<sup>3)</sup> Symbols : +++ = excellent ++ = very good + = good O = fair — = not recommended



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