

Backing Bearings

Detail Introduction :

SKF Backing bearings are rolling bearings with a particularly thick outer ring, which are mounted in groups on a stationary shaft as support rollers when in use. The pressure on the working roller is transferred to the backing roller through the intermediate roller and to the frame through the saddle system. The backing bearing is multi-row cylindrical roller bearing, the bearing itself requires very high precision, especially the section height (T value) from inner diameter to outer diameter after eliminating the radial clearance is especially important, in each shaft, the T value is controlled within 0.005mm, so that the bearing parts must be very high precision.

The main structure form of backing bearing is double or three row cylindrical roller bearing, with or without integral retaining edge or retaining ring, with full roller bearing (without cage) or with cage bearing form. The advantages of backing bearing without retaining edge and movable edge retaining ring are simple geometry and high radial load carrying capacity, but this kind of backing bearing can not bear axial load itself, so it must be placed between the outer ring and the side of the supporting saddle bronze or engineering plastic thrust washer; backing bearing with retaining edge (or retaining ring) does not need thrust washer, because these bearings are designed so that they can bear both radial force and axial forces at the same time.

Backing bearings are precision mechanical components that require a very high degree of precision in their own parts and must be precisely grouped and matched for optimal operating function when mounted and used. In the process of using backing bearings, the following data of each set of bearings should be marked and tracked: bearing group number and position number, inner ring stress point position, nominal outer diameter size, H value (the height of the section from inner diameter to outer diameter after eliminating radial clearance) height.

Therefore, SKF Backing bearings are distinctly different from other types of bearings, with significant advantages and features not found in other types of bearings.

The main features of SKF Backing bearings.

1. High load carrying capacity.
2. Low friction: Optimized internal geometry reduces friction and heat generated by the bearing.
3. Long service life: Logarithmic roller profile reduces edge stress at roller/raceway contact under all load conditions. In addition, logarithmic outer ring OD profile reduces edge loading during operation, contributing to longer service life.
4. Enhanced operational reliability: The surface finish of the roller and raceway contact surfaces supports the formation of a hydrodynamic lubrication film.
5. Effective lubrication: Most SKF Backing bearings have lubrication holes, and many have one or more annular grooves in the inner ring of the bearing to allow lubrication through the support shaft. It is because SKF Backing bearings have many significant advantages that they are shown to be powerful in actual use and play a very powerful role in many industries.

The main application areas of SKF Backing bearings.

Backing bearings are precision mechanical components that must be precisely matched when applied in order to achieve the best operating function. Today SKF Backing bearings are generally used on multi-roller cold rolling mill equipment, but can also be used in other applications such as straightening machines.

In the same size straightening machine, the load capacity of the backing rolls in the roll system can be increased by 30% to 50%. Because the total bearing capacity of the support rolls mainly depends on the bearing capacity of the installed bearings. In the case that the bearing bore size is basically the same, the more the number of bearings or the wider the width of individual bearings although the number does not vary much, the higher the load carrying capacity will be. Using the structure of the backing bearing, because of its axial no more rollers, the axial space becomes larger, can do this more easily.

Using SKF Backing bearings directly for the support roller structure form is more simple, the internal space is larger, easy to air circulation and heat dissipation, but also convenient for the dredging and discharge of iron oxide, each bearing lubrication point of the piping is easier to achieve. Only the reasonable choice of the structure of the backing bearing form, and the correct installation, good lubrication and careful maintenance can extend the service life of the bearing, so as to further improve the accuracy of the product when processing production.

Skf bearing can provide high quality bearing products for global customers, its factories are located in many countries and regions around the world, for the bearing industry in a continuous flow of strong technical support. skf backing bearing is skf all bearings among the highly recognized a bearing, with superior performance and quality to help many manufacturers to improve the quality of equipment. You can learn more about SKF Backing bearings through the following content.

1.SKF Backing bearings Designs and variants

The most popular designs of SKF backing bearings are based on double or three-row cylindrical roller bearings (fig. 1). In addition, backing bearings based on single row needle roller bearings and double row tapered roller bearings are available.

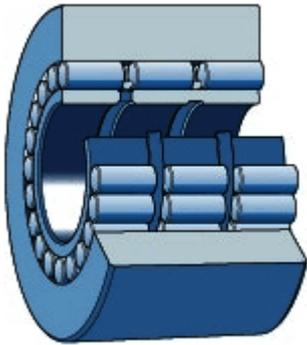


fig. 1

Cylindrical roller backing bearings

SKF cylindrical roller backing bearings are available in several designs and variants. The major differences between the bearings are:

The number of roller rows (two or three)

Bearing design with cage(s) or full complement of roller sets

The outer ring configuration

With/without integral flange(s)

The inner ring configuration

With/without integral flange(s)

With/without flange ring(s)

With/without guide ring(s)

Bore with/without annular groove(s) and lubrication hole(s)

Bore with/without lubrication hole(s)

Open or sealed design

NBR, HNBR or FKM contact seal on both sides

Fey-ring seal on both sides

Gap-type seal on both sides

Details about the actual designs and variants are available in the product table.

WARNING

Seals made of FKM (fluoro rubber) exposed to an open flame or temperatures above 300 °C (570 °F) are a health and environmental hazard! They remain dangerous even after they have cooled.

Read and follow the safety precautions under this WARNING .

Safety precautions for fluoro rubber and Polytetrafluoroethylene

Fluoro rubber (FKM) and Polytetrafluoroethylene (PTFE) are very stable and harmless up to normal operating temperatures of 200 °C (390 °F). However, if exposed to temperatures above 300 °C (570 °F), such as fire or the open flame of a cutting torch, FKM and PTFE give off hazardous fumes. These fumes can be harmful if inhaled, as well as if they contact the eyes. In addition, once the seals have

been heated to such temperatures, they are dangerous to handle even after they have cooled. Therefore, they should never come in contact with the skin.

If it is necessary to handle bearings with seals that have been subjected to high temperatures, such as when dismantling the bearing, the following safety precautions should be observed:

Always wear protective goggles, gloves and appropriate breathing apparatus.

Place all off the remains of the seals in an airtight plastic container marked with a symbol for “material will etch”.

Follow the safety precautions in the appropriate material safety data sheet (MSDS).

If there is contact with the seals, wash hands with soap and plenty of water and, if contact has been made with the eyes, flush eyes with plenty of water and consult a doctor immediately. If the fumes have been inhaled, consult a doctor immediately.

The user is responsible for the correct use of the product during its service life and its proper disposal. SKF takes no responsibility for the improper handling of FKM or PTFE, or for any injury resulting from their use.

Axial guidance

Backing bearings with integral flanges or flange rings on both the inner and outer rings can take some axial load and can provide axial guidance. Other backing bearings require thrust washers between the outer ring side faces and the support saddles (fig. 2).

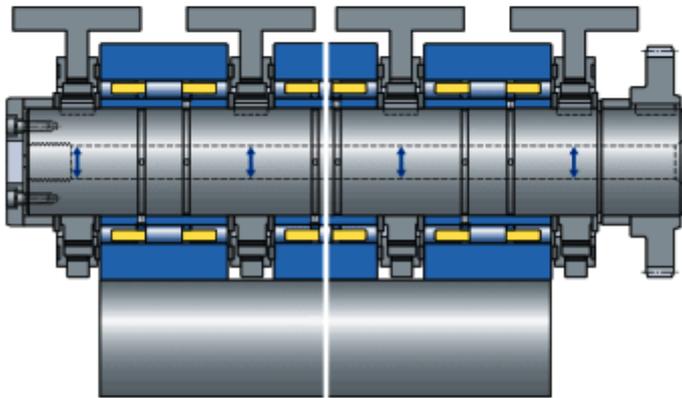
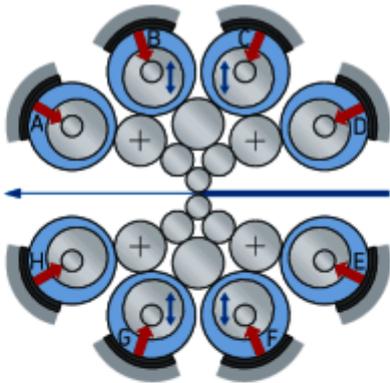


fig. 2

Other backing bearings

SKF can also supply single row needle roller and double row tapered roller backing bearings on request.

Needle roller backing bearings

are based on full complement (no cage) needle roller bearings (fig. 3) incorporate an outer ring without a flange incorporate an inner ring with two integral flanges and lubrication holes are the smallest within the SKF assortment, providing a low cross-sectional height

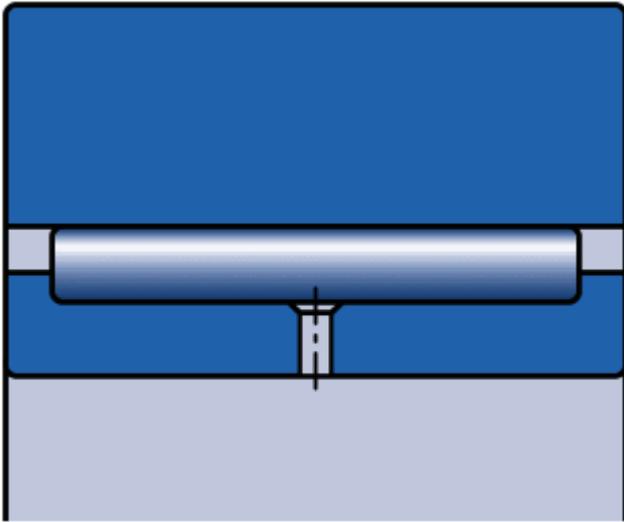


fig. 3

Tapered roller backing bearings

are based on double row tapered roller bearings, TDO design (back-to-back arrangement, fig. 4)
 are sealed on both sides with a stamped sheet steel washer
 have lubrication grooves in the small side faces of the inner rings
 accommodate axial and heavy radial loads

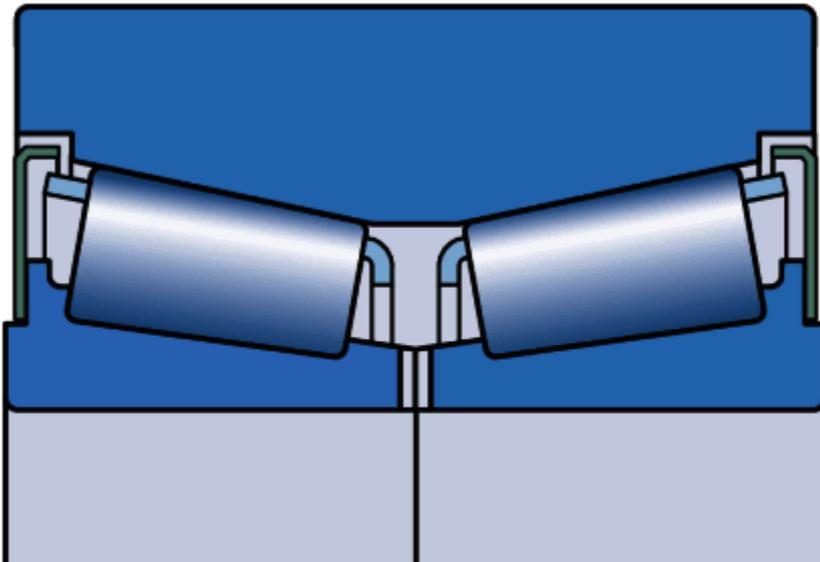


fig. 4

Cages

SKF backing bearings, if not a full complement of rollers, are fitted with one, two or three of the cages described below.

Cylindrical roller backing bearings

are fitted with machined metal cages, double prong-type and/or prong-type, ring or roller centred (fig. 5, fig. 6)

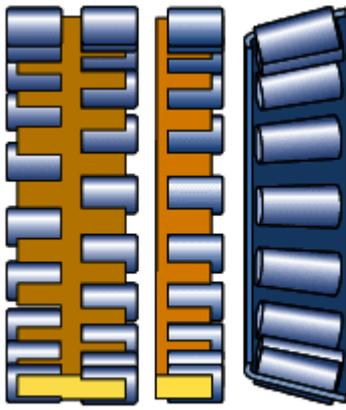


fig. 5 fig. 6 fig. 7

Tapered roller backing bearings

are fitted with two stamped steel cages, window-type, roller centred (fig. 7)

2?SKF Backing bearings Temperature limits

The permissible operating temperature for backing bearings can be limited by:
 the dimensional stability of the bearing rings and rollers
 the cage(s)
 the seals

Where temperatures outside the permissible range are expected, contact SKF.

Bearing rings and rollers

SKF backing bearings are heat stabilized up to:

150 °C (300 °F) where based on cylindrical or tapered roller bearings

120 °C (250 °F) where based on needle roller bearings

Cages

Metal cages can be used at the same operating temperatures as the bearing rings and rollers.

Seals

The permissible operating temperature for seals depends on the seal material:

NBR: -40 to +100 °C (-40 to +210 °F)

Temperatures up to 120 °C (250 °F) can be tolerated for brief periods.

FKM: -30 to +200 °C (-20 to +390 °F)

Temperatures up to 230 °C (445 °F) can be tolerated for brief periods.

HNBR: -40 to +150 °C (-40 to +300 °F)

Fey-ring seals can be used at the same operating temperatures as the bearing rings and rollers.

Typically, temperature peaks are at the seal lip.

3?SKF Backing bearings Lubrication

Open (without seals) backing bearings in cluster mills are lubricated by the rolling oil or water-in-oil emulsion used in the rolling process to remove the bearing frictional heat and the heat produced by the reduction of the material thickness.

The viscosity of the emulsion used for bearing lubrication should be at least 8 to 12 mm²/s at 40 °C (105 °F). This low viscosity is normally insufficient for bearing lubrication and, therefore, the flow rate per backing bearing must be considerably higher than with oil lubrication. Recommended flow rates are listed in table 1.

Backing bearing outside diameter		Rolling oil flow rate per bearing
D		
>	?	
mm		l/min

100	120	5 ... 7
150	180	10 ... 15
180	210	12 ... 20
210	250	15 ... 25
250	280	20 ... 35
280	320	30 ... 60
400	520	55 ... 80

Certain backing bearings, for example, double row cylindrical roller backing bearings with integral Fey-ring seals or double row tapered roller backing bearings, require oil mist or oil-air lubrication. For cylindrical roller backing bearings with integral contact seals, circulating oil lubrication with a separate supply system should be used.

For oil lubricated backing bearings, the use of a mineral oil with EP additives and a viscosity of 100 to 150 mm²/s at 40 °C (105 °F) is recommended. Recommended oil quantities for the individual lubrication methods are listed in table 2. Higher quantities are required under heavy loads and/or high roll speeds.

Backing bearing		Oil quantity		
outside diameter		per bearing for lubrication method		
D		Oil mist	Oil-air	Circulating oil
>	?			
mm		cm ³ /h	cm ³ /h	l/min
100	120	3 ... 5	0,3 ... 0,5	0,3 ... 0,5
150	180	5 ... 7	0,5 ... 0,7	0,5 ... 0,7
180	210	6 ... 10	0,6 ... 1	0,6 ... 1
210	250	7 ... 12	0,7 ... 1,2	0,7 ... 1,2
250	280	8 ... 13	0,8 ... 1,3	0,8 ... 1,3
280	320	12 ... 22	1,2 ... 2,2	1,2 ... 2,2
400	520	18 ... 30	1,8 ... 3	1,8 ... 3

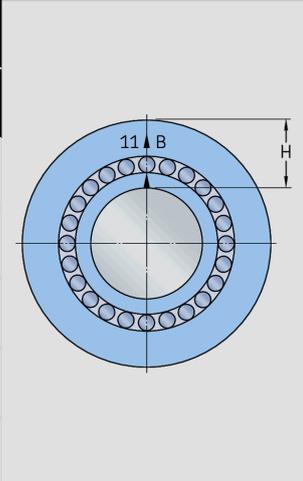
Where tapered roller backing bearings are used, it is important to ensure there is sufficient lubrication of the roller end / flange contact area. An oil containing EP additives and having a viscosity of at least 400 mm²/s at 40 °C (105 °F) should be used.

4?SKF Backing bearings Mounting

SKF strongly recommends the use of backing bearings belonging to the same cross-sectional height group (table 1) on any one support shaft. After removing the transport locking devices, backing bearings and support saddles should be pushed alternately onto the shaft using suitable mounting equipment. During mounting, care must be taken that, for example, the inner ring of cylindrical roller

backing bearings is not pushed out of the roller complement as this will cause the rollers of full complement bearings to fall out of the bearing.

Cross-sectional height group	Cross-sectional height H	
	U	L
–	μm	
A or 4	0	–5
B or 2	–5	–10
C or 0	–10	–15



To avoid a negative effect of the wall thickness variation of the inner rings on the quality of the rolled material, all inner rings on a support shaft should be turned so that the arrows indicating the position of the maximum wall thickness all point in the same direction (fig. 1).

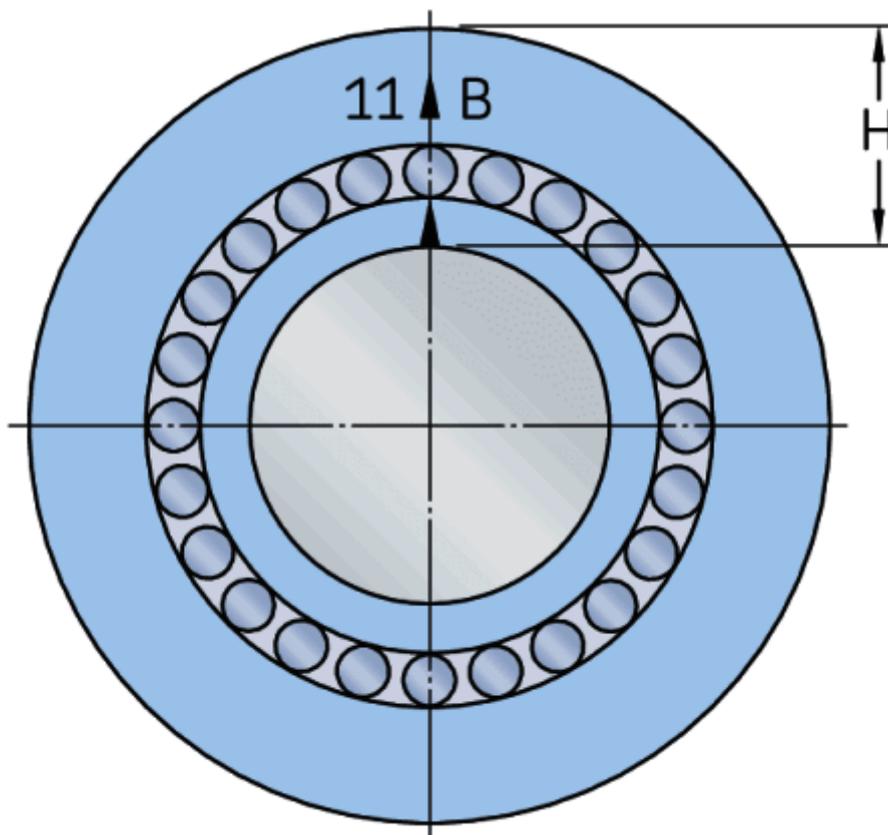


fig. 1

The complete guide to SKF Backing bearings.

Skf is a leading enterprise in the bearing industry, leading the development of the industry, providing strong technical support for the development of society, and strongly promoting the innovation ability of various industries.

The following are answers to some common questions about SKF Backing bearings.

1. What is SKF Backing bearings?

SKF Backing bearings are rolling bearings with a particularly thick outer ring, which are mounted in groups on a stationary shaft to become support rollers when in use.

The pressure on the work rollers is transferred to the support rollers through intermediate rollers and transmitted to the frame through the saddle system. The backing bearing is a multi-row cylindrical roller bearing, the bearing itself requires very high precision, especially the section height (T value)

from inner diameter to outer diameter after eliminating the radial clearance is particularly important, in each shaft, the T value is controlled within 0.005mm, so that the bearing parts must be very high precision.

SKF Backing bearings are designed in a variety of structural forms to suit specific operating conditions. Its main structural form is double or three cylindrical roller bearings, some structural forms of backing bearings with non-contact seals at both ends of both ends.

Compared with the outer ring with retaining edge and with movable edge retaining ring backing bearing, the outer ring without retaining edge and movable edge retaining ring backing bearing advantage is the collection of simple shape, high radial load capacity. At the same time, it also adopts bus bar profile shaping, so it can get good stress distribution in the whole outer diameter surface whether it is evenly distributed load or skewed load.

2.What are the main types of SKF Backing bearings?

SKF Backing bearings are available in various forms, usually cylindrical roller bearings or tapered roller bearings.

1. Cylindrical roller bearings: can be used with or without the integral edge of the double row or single row cylindrical roller bearings, no edge of the bearing structure is simple, high radial bearing capacity, with the edge of the bearing does not need thrust washers, because the bearing itself can withstand both radial force and axial force.

2. Tapered roller bearings: generally use double-row tapered roller bearings, in addition to withstand radial heavy load, but also can withstand the axial load.

3. What is the structural form of SKF Backing bearings?

SKF Backing bearings are a kind of rolling bearings with a particularly thick outer ring, which were first used as the outermost support rolls in the multi-roller Senjimir cold rolling mill. Backing bearings are cylindrical roller bearings or tapered roller bearings, which can be double or triple row cylindrical roller bearings with or without integral retaining edges.

The advantage of bearing without baffle edge is simple structure, high radial bearing capacity, but the disadvantage is that it can not bear the axial load, need to set bronze or plastic thrust washer between the outer ring and the side of the support saddle. With the edge of the bearing does not need thrust washers, the bearing itself can simultaneously withstand radial force and a certain axial force, the bearing sides can be sealed, the inner ring can be set up on the lubrication groove to supply lubricant to the bearing.

4.What are the advantages of SKF Backing bearings?

As the market for cold rolled products surface quality, thickness tolerance, and flatness requirements continue to improve, especially the plate and strip is more stringent requirements, driving the development of rolling mill equipment to be able to roll a thinner thickness, tighter tolerances, better surface quality products. This has put forward higher requirements for bearings, especially bearings for support rolls.

The SKF Backing bearing is currently recognized worldwide as the first choice for support roll bearings in multi-roll mills, which requires the backing bearing to have a high degree of precision, and its main advantages are as follows.

1. The bearing adopts double sealing, the inner layer is high temperature resistant fluorine rubber J-type oil seal, the outer layer is metal protection device, mainly to prevent the entry of fine iron oxide.

2. It can withstand large radial load.

3. The running accuracy grade is better than p4 grade.

4. Both ends of outer ring have large circular transition surface to prevent stress concentration at the side.

5. The outer diameter of the bearing is directly used as the roller surface.

6. Separable and repairable.

5. What is the lubrication method of SKF Backing bearings?

The effect of lubrication is directly related to the service life of the SKF Backing bearing, there are three main lubrication methods for these bearings.

1. Circulating oil lubrication: mainly lubricated with lip seal backing bearing, lubricant flow through the bearing internal take away heat, and then circulate to the lubricating oil base station cooling recirculation. Can use higher viscosity lubricant, so that bearing life relative with emulsion lubrication has a great improvement.

2. Rolling emulsion lubrication: the most economical way of lubrication, no seal backing bearings mostly use its lubrication, need a larger flow of emulsion quickly through the bearing internal to achieve the role of lubrication and cooling.

3. Oil and gas lubrication: mainly lubricates the backing bearing with lip seal, using clean and dry compressed air to blow lubricant into the bearing, forming pressure inside the bearing, so that the lubricant adheres to the bearing surface, while preventing the invasion of foreign matter, its high lubrication cost, but the most ideal lubrication effect.

6. How to maintain and repair SKF Backing bearings?

As SKF Backing bearings are installed on the support rolls of multi-roller mills, the distribution position of the rolls is inevitably subjected to different forces, which causes different degrees of bearing wear, backing bearings should be used after 2 cycles, the bearing on the support rolls with higher load bearing and lower load bearing on the support rolls should be positioned interchangeably, and the inner ring should be rotated 90° each cycle, so that can make the bearing wear as much as possible to maintain the same.

Due to the high requirements of the rolling material of the multi-roller mill, after a certain cycle, due to the wear of SKF Backing bearing, the accuracy of all aspects is reduced, and when the requirements of the rolling material cannot be met, the bearing needs to be reground to restore the accuracy. In the inner ring and rolling body without obvious pitting and spalling trend before, only need to grind the outer ring surface can restore the bearing accuracy.

For the outer ring intact, rolling body missing, spalling and inner ring serious pitting or spalling of the whole rent backing bearing, need to make new parts and re-group, repair.

7. How to install SKF Backing bearings?

As SKF Backing bearings inner ring at both ends of the movable edge and bearing is not a whole, need to rely on the installation of the fixed distance sleeve or standoff for axial positioning, at the same time in the backing bearing by a certain axial force, but also need to rely on the movable edge, standoffs will be axial force transfer to the roller seat. Therefore, the installation should pay attention to the bearing fixing method and the clearance between the bearing end face and the bearing.

The original dimensional accuracy of the backing bearing is very high. When installing the backing bearing, it is necessary to install two backing bearings with identical or similar dimensions and section heights into one part. The 6 sets of parts arranged in sequence along the axis of the straightening roller are also required to be matched according to the above principle. If the backing bearings on the same side are not installed in a straight line, the shaft will not bear the force uniformly during the straightening process, which will cause vibration and bias load, resulting in roller fatigue damage, thus affecting the product quality and reducing the working life of the bearings.

In the straightening process, each backing bearing wear degree is different, in order to improve the accuracy of SKF Backing bearing and extend its service life, should be regularly replaced backing bearing position, that is, the backing bearing in the middle of the straightening roller and the two ends of the backing bearing interchange, will bear a higher load backing bearing and bear a lower load backing bearing interchange.

8. Why is the wear level of each SKF Backing bearing different in the rolling process?

SKF Backing bearings are mostly used in cold rolling mills and will experience different levels of wear during use, the main reasons for this are shown below.

1. When the width of the rolled strip is narrower than the large rolling width of the mill, the load on the backing bearing in the middle of the roll is greater than the load on the backing bearings at both ends of the roll, so there will be more serious wear.

2. Due to the characteristics of the roll system of the multi-roll cold rolling mill, its external shaft is subjected to higher load than the internal shaft, which increases the wear of the backing bearings on the external shaft.