

# Single Row Insocoat Cylindrical Roller Bearings

## Detail Introduction :

Electric motors, generators and associated equipment are at risk when current passes through the bearings, damaging the contact surfaces of the rolling elements and races in the bearings (galvanic corrosion) and rapidly degrading the grease. Another risk for motors and generators is the high frequency currents caused by the inherent stray capacitance, which increases the risk of damage if the application uses a frequency converter.

The single row INSOCOAT cylindrical roller bearings are designed to prevent currents from passing through the bearings and they are coated with an insulating aluminium oxide layer on the outer surface of either the inner or outer ring, achieving excellent quality by applying a sophisticated plasma spraying process. This solution is very cost effective compared to other insulation methods.

The single row INSOCOAT cylindrical roller bearings have a layer of aluminium oxide approximately 100 microns thick on the outer or inner ring surface and can withstand voltages of up to 1000 VDC. The coating on INSOCOAT electrically insulated bearings effectively protects against the passage of alternating and direct currents with a minimum resistance of 50 M $\Omega$  and has been tested by SKF at over 3000 VDC.

Single row INSOCOAT cylindrical roller bearings have significant differences with other types of bearings, the advantages are more obvious, in the actual use of the process more superior performance, to countless manufacturers to provide a convenient, further improve the quality of equipment level, to promote the development of the industry, its specific characteristics are as follows.

Single row INSOCOAT cylindrical roller bearings have the following characteristics.

SKF's INSOCOAT electrically insulated bearings are coated with aluminium oxide using SKF's plasma spraying technology to firmly and evenly adhere the coating to the surface of the rings, followed by a number of other treatment processes to increase their resistance to moisture and humidity.

The dimensions and rotational accuracy of single row INSOCOAT cylindrical roller bearings are the same as those of standard bearings. The outer and inner rings are coated with a 100 or 300 micron aluminium oxide coating, which does not affect the dimensions or accuracy of the bearing.

The majority of INSOCOAT electrically insulated bearings have the insulating coating machined on the outer surface of the outer ring, and the outer ring with the insulating coating is generally for products with an outer diameter of  $\geq$  80 mm.

In general, the single row INSOCOAT cylindrical roller bearings developed and produced by SKF are electrically insulated bearings that prevent damage caused by the passage of electric current.

Main applications for single row INSOCOAT cylindrical roller bearings.

Single row INSOCOAT cylindrical roller bearings, comprising an outer ring, an inner ring locking ring and a cage. The outer ring is provided with an annular stress groove in the middle of the outer wall surface, and a plurality of annular locking grooves on the outer wall of the outer ring, and the shape and size of the locking ring are adapted to the shape and size of the annular locking grooves. The ring locking grooves are fitted with locking rings. The inner wall of the outer ring is provided with an annular cage guide groove on the ring surface opposite to the stress groove. The utility model has the advantages of easy assembly, high load carrying capacity, high ultimate speed, high reliability and long service life.

Single row INSOCOAT cylindrical roller bearings are usually subject to radial force only, compared with the same size ball bearings, radial bearing capacity increased by 1.5-3 times, good rigidity, impact resistance, it is particularly suitable for rigid support, but also support short shaft, heat elongation and axial displacement of the shaft and the installation and disassembly need to separate

the type of bearing machine. The bearings are particularly suitable for rigidly supported shafts, which also support short shafts, axial displacements caused by thermal elongation and the mounting and dismounting of machines requiring separate bearings. It is mainly used for large motors, machine tool spindles, front and rear engine support shafts, train and bus axle supports, diesel engine crankshafts, automobile tractor gearboxes, etc.

You can find out more about single row INSOCOAT cylindrical roller bearings by looking at the following details.

### 1?INSOCOAT cylindrical roller bearings Designs and variants

INSOCOAT bearings with a coated outer ring

INSOCOAT bearings typically have the external surfaces of the outer ring coated with aluminium oxide (fig. 1, fig. 2). These bearings are identified by the following designation suffixes (table 1):



fig. 1

fig. 2

Coating / designation suffix	Breakdown voltage (DC)	Minimum electrical resistance
–	V	M?
Standard layer		
VL0241, VL2071	3 000	200
Advanced layer		
VL0246, VL2076	3 000	400

Valid if:

Temperature T ? 40 °C (105 °F)

Relative humidity rH ? 60%

table 1

VL0241 – standard layer

VL0246 – advanced layer for higher electrical resistance

For availability, contact SKF.

### INSOCOAT bearings with a coated inner ring

INSOCOAT bearings that have the external surfaces of the inner ring coated with aluminium oxide (fig. 3, fig. 4) provide enhanced protection against high frequency electric currents. These bearings are identified by the following designation suffixes (table 1):



fig. 3



fig. 4

Coating / designation suffix	Breakdown voltage (DC)	Minimum electrical resistance
–	V	M?
Standard layer		
VL0241, VL2071	3 000	200
Advanced layer		
VL0246, VL2076	3 000	400

Valid if:

Temperature T ? 40 °C (105 °F)

Relative humidity rH ? 60%

table 1

VL2071 – standard layer

VL2076 – advanced layer for higher electrical resistance

For availability, contact SKF.

### Capped bearings

Some INSOCOAT deep groove ball bearings can be supplied capped (Capped bearings). For availability, contact SKF.

### Cages

SKF INSOCOAT deep groove ball bearings are fitted with one of the following cages:

a stamped steel cage, riveted, ball centred (no designation suffix)

a machined brass cage, riveted, ball centred (designation suffix M)

For additional information, refer to Cages.

SKF INSOCOAT cylindrical roller bearings are fitted with one of the following cages:

a glass fibre reinforced PA66 cage, window-type, roller centred (designation suffix P)

a machined brass cage, riveted, roller centred (designation suffix M)

a machined brass cage, window-type, inner or outer ring centred (depending on bearing design) (designation suffix ML)

For additional information, refer to Cages.

When used at high temperatures, some lubricants can have a detrimental effect on polyamide cages.

For additional information about the suitability of cages, refer to Cages.

### 2. Single row INSOCOAT cylindrical roller bearings Temperature limits

The permissible operating temperature for INSOCOAT bearings can be limited by:

the dimensional stability of the bearing rings and rolling elements

the cage

the lubricant

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

## Bearing rings and rolling elements

SKF INSOCOAT bearings are heat stabilized up to at least 150 °C (300 °F).

### Cages

Steel or brass cages can be used at the same operating temperatures as the bearing rings and rolling elements. For temperature limits of PA66 cages, refer to Polymer cages.

### Lubricants

For temperature limits of SKF greases, refer to Selecting a suitable SKF grease.

When using lubricants not supplied by SKF, temperature limits should be evaluated according to the SKF traffic light concept.

## 3. Single row INSOCOAT cylindrical roller bearings Design considerations

### Abutment dimensions

To maximize the effectiveness of the insulation, SKF recommends the following guidelines for dimensioning the shaft and housing shoulders:

Bearings with a coated outer ring (fig. 1, designation suffix VL0241 or VL0246):

housing abutment diameter ?  $D_{a \min}$

Bearings with a coated inner ring (fig. 2, designation suffix VL2071 or VL2076):

shaft abutment diameter ?  $d_{a \max}$

The values for  $D_{a \min}$  and  $d_{a \max}$  can be obtained from the product tables:

INSOCOAT deep groove ball bearings

INSOCOAT cylindrical roller bearings

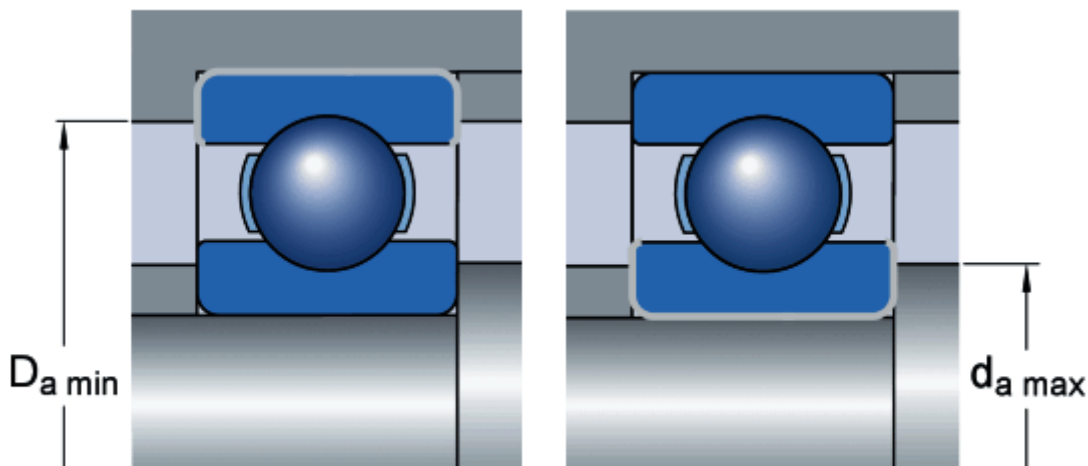


fig. 1

fig. 2

## 4. Single row INSOCOAT cylindrical roller bearings Mounting

During mounting, INSOCOAT bearings should be handled in the same way as standard bearings.

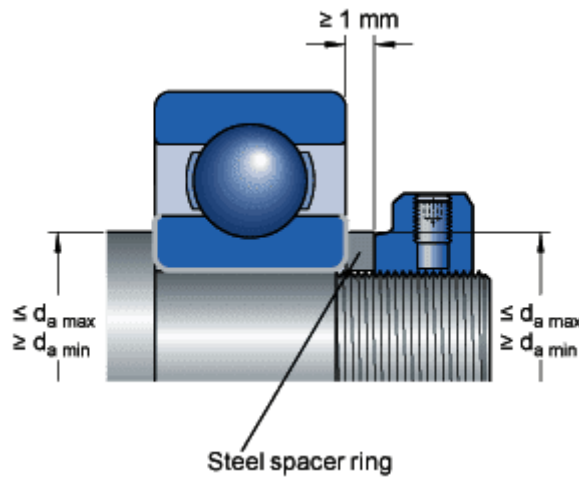
When using an induction heater for bearings with a coated inner ring (designation suffix VL2071 or VL2076), use a protective sleeve or an additional plastic support block.

In cases where springs are used to apply preload to deep groove ball bearings or lock nuts are used for axial clamping, SKF recommends inserting a steel spacer ring between the bearing and the preload or locking device (fig. 1).

The values for  $d_{a \min}$  and  $d_{a \max}$  can be obtained from the product tables:

INSOCOAT deep groove ball bearings

INSOCOAT cylindrical roller bearings



## The Complete guide to single row INSOCOAT cylindrical roller bearings.

Skf bearings for many years has always led the development of the bearing industry, skf has a strong innovation capacity, every year have invested a lot of money in research and development, for the bearing industry in a continuous flow of powerful innovation capacity. The single row INSOCOAT cylindrical roller bearings that have been developed and produced have broken through the barriers of technology and have shown strong advantages in the actual use of the process.

Below you will find detailed answers to some of the most frequently asked questions about single row INSOCOAT cylindrical roller bearings.

### 1. What are single row INSOCOAT cylindrical roller bearings?

Electrical corrosion can damage bearings in traction motors, electric motors and generators and reduce their performance, as well as rapidly deteriorating grease, leading to costly downtime and unscheduled maintenance. With its latest generation of insulated bearings, skf has raised the bar for performance, even in the most challenging environments. single row INSOCOAT cylindrical roller bearings increase the reliability and uptime of equipment in electrical applications.

Skf offers single row INSOCOAT cylindrical roller bearings that are resistant to galvanic corrosion in a variety of environments. The protective seal coating on the outer or inner ring incorporates insulation characteristics into the bearing, eliminating premature bearing failure caused by stray currents in various applications.

These bearings are specifically designed and manufactured for use in rotating motors such as generators to prevent damage caused by the passage of electrical currents, which have galvanically corroded bearing rolling contact surfaces, preventing the transfer of harmful currents from the rotor through the bearing to the frame, as well as preventing progressive galvanic erosion and premature failure of the bearing rolling contact surfaces.

Following the introduction of an improved plasma spraying process and optimised ceramic layer, SKF has made this excellent insulating coating standard across its INSOCOAT range and these bearings are now able to withstand voltages of up to 3000 V DC, which is sufficient to cope with most stray current problems in motors. In addition, the upgraded moisture-proof coating provides better protection against moisture storage and damage to the insulation properties of the bearings before they are used, and this protective coating makes single row INSOCOAT cylindrical roller bearings extremely robust during transport and handling.

### 2. What are the advantages of single row INSOCOAT cylindrical roller bearings?

1. Upgraded electrical specifications with an increased minimum ohmic resistance of 200 M $\Omega$  and withstanding voltages of up to 3000 V DC.
2. Clearly visible coating colours.
3. Resists galvanic corrosion and provides stable electrical performance in high humidity environments.
4. Increased equipment reliability, virtually eliminating bearing failures caused by stray currents, resulting in higher reliability and longer operating times.
5. Cost-effective resistance to galvanic corrosion, combining bearing and insulation properties in a single solution, single row INSOCOAT cylindrical roller bearings provide good galvanic corrosion

performance at a significantly lower total cost of ownership than shaft or housing insulation.

6. Increased plant uptime, reduced maintenance costs, increased plant life and extended maintenance intervals.

7. Easy to install, available in real time, can be installed using standard methods and tools and has a high degree of robustness during transport and handling.

### **3. How do I install single row INSOCOAT cylindrical roller bearings?**

The single row INSOCOAT cylindrical roller bearings should be cleaned with petrol or paraffin before installation, dried and then used to ensure good lubrication, generally with grease lubrication, but also with oil lubrication. When using grease lubrication, should use no impurities, anti-oxidation, anti-rust, extreme pressure and other performance superior grease. The grease filling volume is 30%-60% of the bearing and bearing box volume, not too much

The installation of single row INSOCOAT cylindrical roller bearings must be carried out under dry and clean environmental conditions. Before installation, the machining quality of the mating surfaces of the shaft and housing, the end face of the convex shoulder, the groove and the connection surface should be carefully checked. All mating and joint surfaces must be carefully cleaned and deburred, and the unmachined surface of the casting must be cleaned of type sand.

When mounting, equal pressure must be applied to the circumference of the collar end face to press the collar in, and the bearing end face must not be struck directly with tools such as hammer heads to avoid damage to the bearing. In the case of a small amount of interference, a sleeve can be used at room temperature to press the bearing collar end face, using a hammer to tap the sleeve, through the sleeve to press the collar in a balanced manner. If large quantities are installed, a hydraulic press can be used.

When the interference is large, oil bath heating or inductor heating bearing method can be used to install, heating temperature range of 80 ° -100 °, the highest can not exceed 120 °. At the same time, the bearing should be tightened with a nut or other appropriate method to prevent the bearing from contracting in the width direction after cooling and causing a gap between the collar and the shaft shoulder.

Single row INSOCOAT cylindrical roller bearings should be rotated after installation, firstly for rotating the shaft or bearing box, if there is no abnormality, then for no-load, low-speed operation with power, and then gradually increase the rotating speed and load depending on the operation, and detect noise, vibration and temperature rise, and if abnormalities are found, the operation should be stopped and checked, and only after the operation test is normal can be delivered for use.

### **4. Single Row INSOCOAT Cylindrical Roller Bearings radial clearance adjustment method.**

1. for cylindrical and oval shaft tile side clearance can use manual research and scraping or bearing in the parting surface with pad turning after repair scraping method adjustment.

2. For cylindrical and elliptical shaft tile top gap can be used manual research and scraping or when the situation allows the bearing in the parting surface pad method of adjustment.

3. For more oil wedge fixed shaft tile, in principle, do not allow repair scraping and adjust the shaft tile clearance, clearance should be replaced when the new tile.

4. For multi-oil wedge tiltable shaft tile, not allowed to repair and scrape the block, the gap is not suitable when the block should be replaced. For thickness adjustable tile, can be adjusted by adding stainless steel pad under the adjusting block behind the tile, or thinning the adjusting block thickness method to adjust the amount of tile. Note that for multi-oil wedge tiltable shaft tiles, the thickness error between the same group of tiles should be less than 0.01mm.

### **5. Single row INSOCOAT cylindrical roller bearings should pay attention to what problems when using?**

1. Vibration: In normal use, vibration is quite sensitive to bearing damage, spalling, indentation, rust, cracks, wear and so on will be reflected in the bearing vibration measurement.

Therefore, by using special bearing vibration measuring device (frequency analyzer, etc.) can measure the size of the vibration, through the frequency distribution can be inferred from the abnormal specific situation. The measured values vary depending on the conditions of use of the bearing or the position of the sensor installation, etc. Therefore, it is necessary to analyse and

compare the measured values of each machine beforehand to determine the criteria for judgement.

2. Temperature: High temperatures often indicate that the single row INSOCOAT cylindrical roller bearing is in an abnormal condition. High temperatures are also detrimental to the lubricant of the bearing. Sometimes bearing overheating can be attributed to the bearing lubricant. If the bearing is in continuous operation for a long period of time at temperatures in excess of 125°C it will reduce the life of the bearing. Causes of high temperature bearings include: insufficient or excessive lubrication, impurities in the bearing raceway, high limiting speed, long term overloading of the bearing, etc.

### **6. How do I dismantle single row INSOCOAT cylindrical roller bearings?**

The dismantling of single row INSOCOAT cylindrical roller bearings is carried out during regular maintenance and replacement. After dismantling, if the bearing is to be used again, or if the condition of the bearing is to be checked, the dismantling must be carried out as carefully as the installation. Take care not to damage the bearing parts, especially the dismantling of interference fit bearings, which is a difficult operation.

It is also important to design and make dismantling tools as required. In the dismantling, according to the drawings, study the dismantling method, order, investigate the conditions of the bearing fit, in order to seek to dismantle the operation of the infallible. Outer ring dismantling interference with the outer ring, prior to the circumference of the shell set several outer ring extrusion screw with screws, one side of an equally tightened screw, while dismantling. These screw holes are usually covered with blind plugs, tapered roller bearings and other breakaway bearings, set out a few cuts in the shell blocking shoulder, use a gasket, disassemble with a press, or gently knocking on the disassembly. The inner ring can be dismantled most simply by pulling it out with a press. In this case, care should be taken to allow the inner ring to withstand its pulling force. Again, the pull-out clamps shown are mostly used, and regardless of the type of clamp, they must be securely stuck to the side of the inner ring. For this reason, it is necessary to consider the size of the shoulder of the shaft, or to investigate the use of grooves in the shoulder to allow the use of pulling clamps.

### **7. What is the construction of single row INSOCOAT cylindrical roller bearings?**

In order to solve the problem of electrical current passing through bearings, SKF developed single row INSOCOAT cylindrical roller bearings, which are a more economical and practical solution for protecting bearings against electrical erosion than other common methods or measures used to protect bearings from insulation (e.g. shaft or housing insulation).

single row INSOCOAT cylindrical roller bearing load capacity, mainly to bear radial load, rolling body and the sleeve retaining edge friction is small, suitable for high-speed rotation. According to the collar has no baffle, can be divided into NU, NJ, NUP, N, NF and other single row bearing, the bearing is the inner circle, outer ring can be separated structure, inner circle or outer circle without baffle cylindrical roller bearing, its inner circle and outer ring can be to the axial for relative movement, so can be used as a free end bearing. In the inner circle and outer circle of a side of the double retaining edge, the other side of the collar has a single retaining edge of the cylindrical roller bearings, can bear a certain degree of a directional axial load. The general use of steel plate stamping cage, or copper alloy turned cage. But there are also some use of polyamide forming cage.

Single row INSOCOAT cylindrical roller bearings are mainly used in medium-sized motors, rolling stock, machine tools, spindles, internal combustion engines, generators, gas turbines, gearboxes, rolling mills, vibrating screens and lifting and transport machinery and other fields.

### **8. Single row INSOCOAT cylindrical roller bearings What are the common failures?**

1. bearing temperature is too high: in the operation of the body, the installation of the bearing parts allowed to have a certain temperature, when touching the body shell, should not feel hot hands as normal, the opposite indicates that the bearing temperature is too high.

The reasons for high bearing temperature are: the quality of lubricating oil does not meet the requirements or deterioration, the viscosity of lubricating oil is too high; the body assembly is too tight (clearance is not enough); the bearing assembly is too tight; the bearing seat ring is rotating on the shaft or in the shell; the load is too large; the bearing cage or rolling body is broken, etc.

2. bearing noise: single row INSOCOAT cylindrical roller bearing in the work allowed to have a slight running sound, if the sound is too loud or abnormal noise or impact sound, it indicates that the

bearing has a fault.

Single row INSOCOAT cylindrical roller bearing produces noise for more complex reasons, one of which is the bearing inner and outer ring with surface wear. As a result of this wear, the destruction of the bearing and shell, bearing and shaft with the relationship, resulting in the axis deviated from the correct position, in the shaft at high speed movement produces a strange sound. When the bearing fatigue, its surface metal flaking, will also make the bearing radial clearance increases to produce strange noise. In addition, insufficient lubrication of the bearing, the formation of dry friction, as well as the bearing broken will produce abnormal sound. Bearing wear loose, cage loose damage, will also produce strange sound.

Single row INSOCOAT cylindrical roller bearings are mounted in the same way as normal bearings, but to give full play to the working life that INSOCOAT electrically insulated bearings should achieve, they must be well lubricated and regularly replenished with lubricants that meet the working performance of the bearings clean.