

Bearings and Related Products for Continuous Casting Machines



In continuous casting machines, roll support bearings are used under heavy loads and at extremely low speed.

In addition, the operating conditions are severe, resulting in exposure to splashing water/steam and scales.

Accordingly, roll support bearings may fail in an extremely short period of time, typically due to wear and cracking.



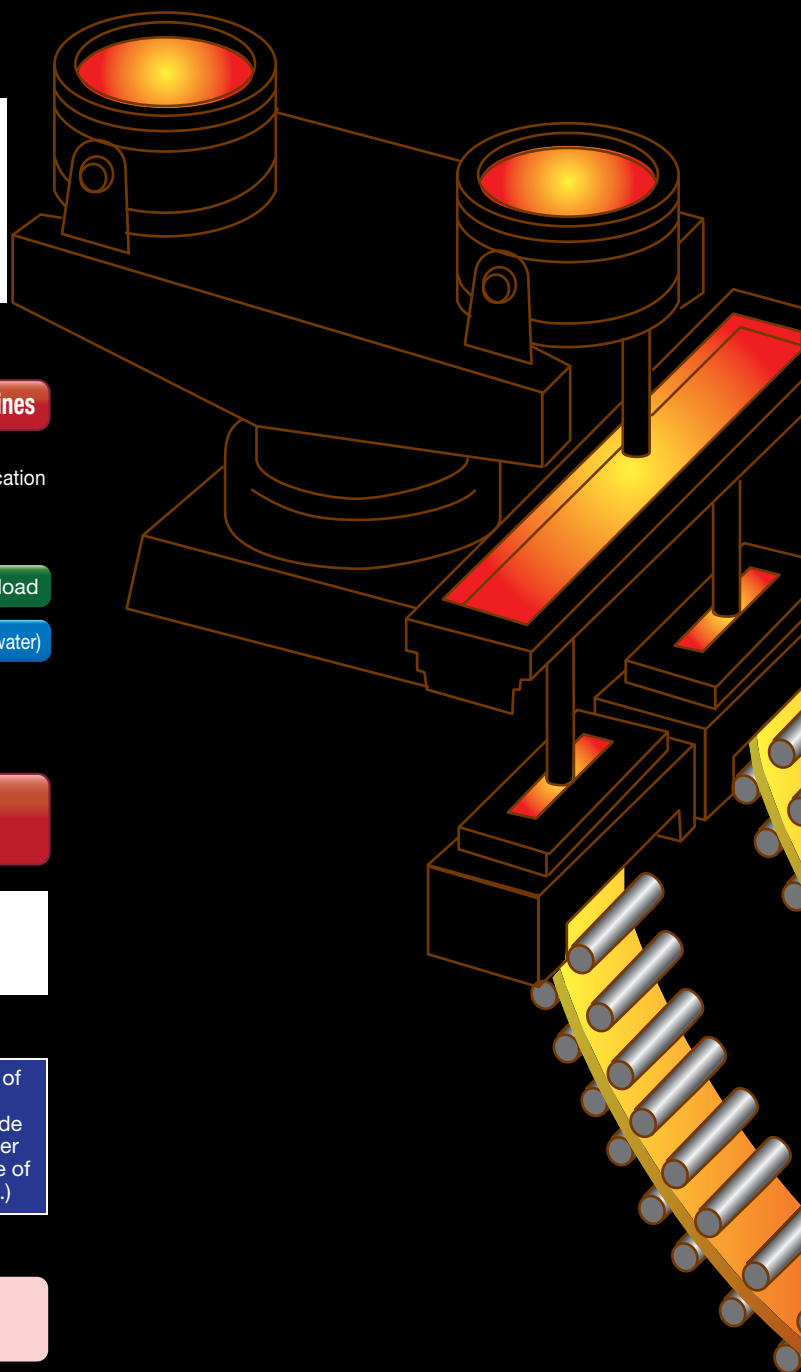
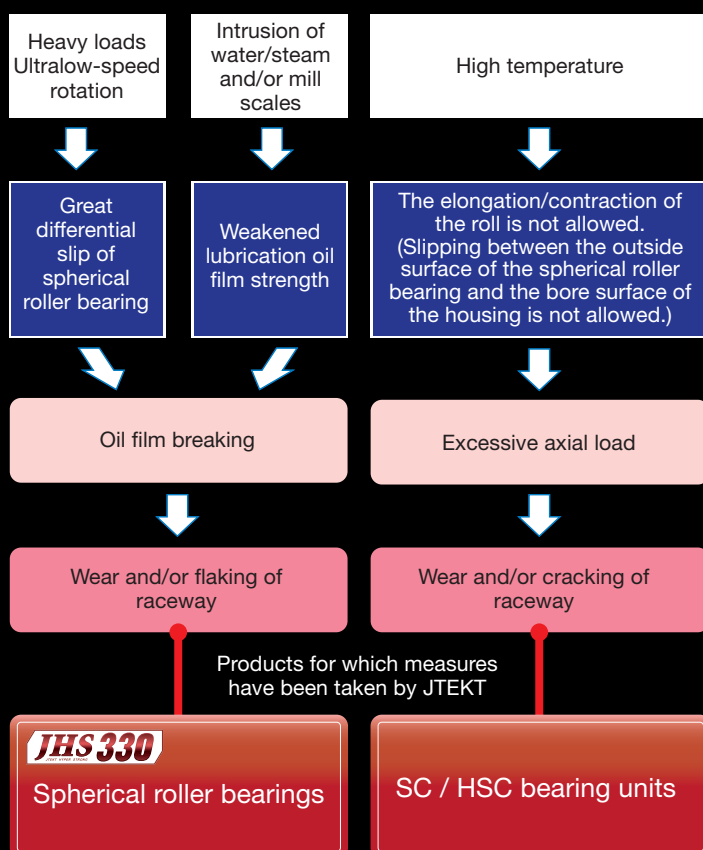
Long-life, highly corrosion-resistant JHS is driving innovations in steel production equipment.

Iron manufacturing and rolling mill lines must operate continuously while maintaining high reliability in severe production environments. Answering these needs through the realization of epoch-making long-life and high corrosion resistance is JTEKT Hyper Strong (JHS). By adopting newly developed materials and processes for bearing steel, seal materials and other components, we have realized a 2-to-4-fold increase in bearing service life compared to previously used bearings. Continuing on from JHS520 for rolling mill roll necks and JHS210 for Sendzimir rolling mill backup rolls, we are steadily expanding the bearing series according to each application. The JHS bearing series offers total support for achieving maximum performance and durability in the ever-evolving field of steel equipment. Please keep your expectations high. We won't let you down.

Required performance of the bearings for continuous casting machines

- Measures for **ultralow-speed** rotation, which is unfavorable for lubrication
- Measures for roll elongation under **high temperature**
- Measures for high contact stress / roll deflection under **heavy load**
- Measures for corrosion / lubrication failure due to the infiltration of **steam (water)**
- Measures for brinelling due to the intrusion of **mill scale**

Failure Mechanism of Spherical Roller Bearings for Continuous Casting Machines





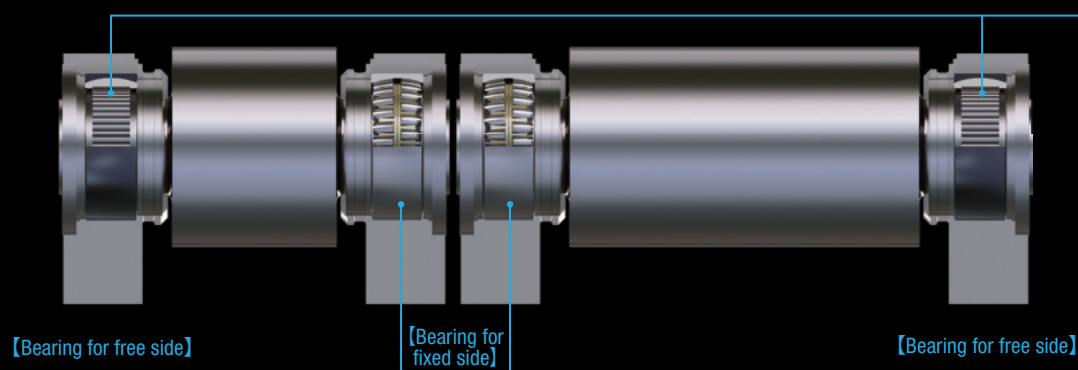
JTEKT has developed a series of products optimized to support the rolls of continuous casting machines, including bearings, oil seals, and HSC (Half Split Cylindrical Roller) bearing units, providing a systematic solution for extending the service life of bearings in this application.

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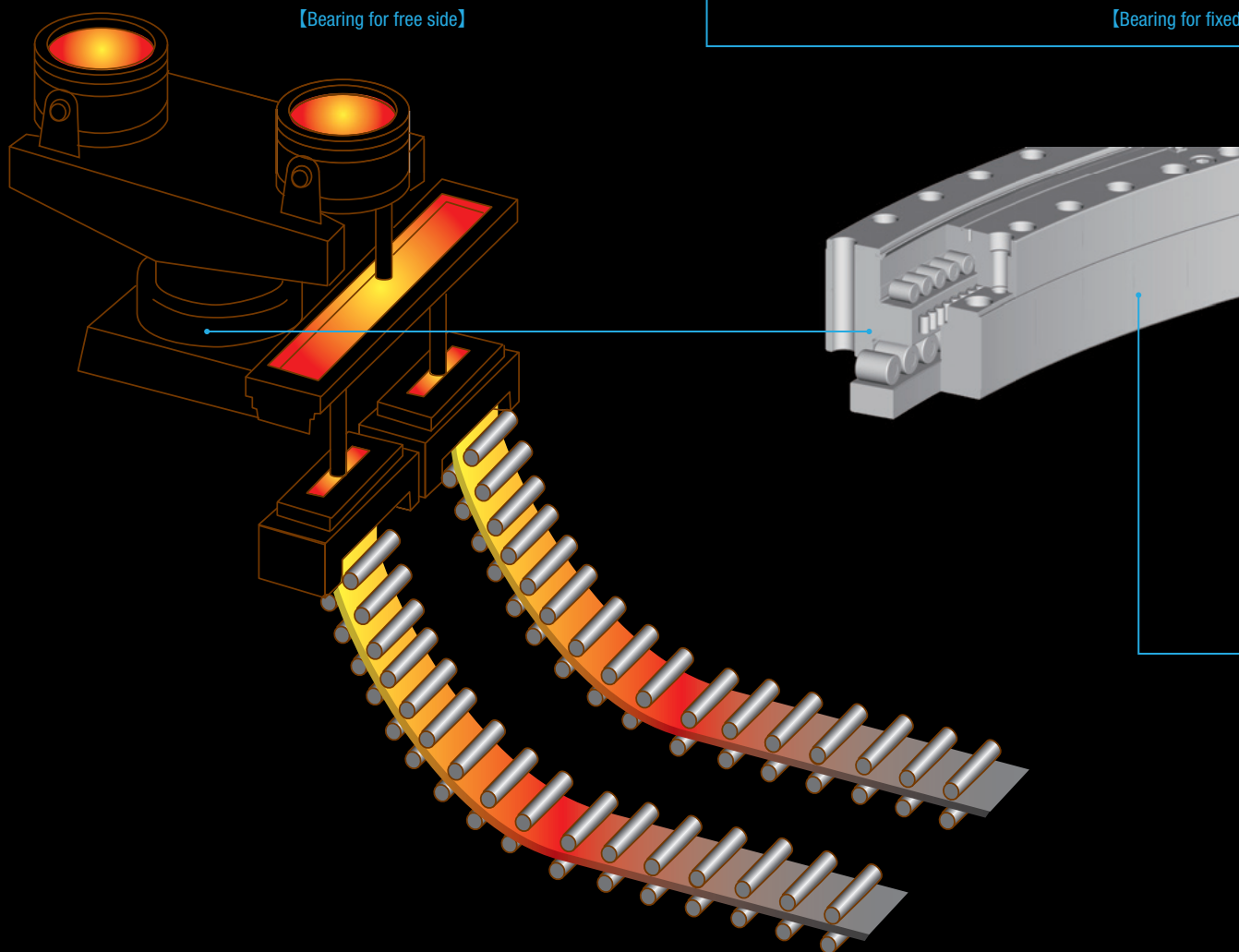
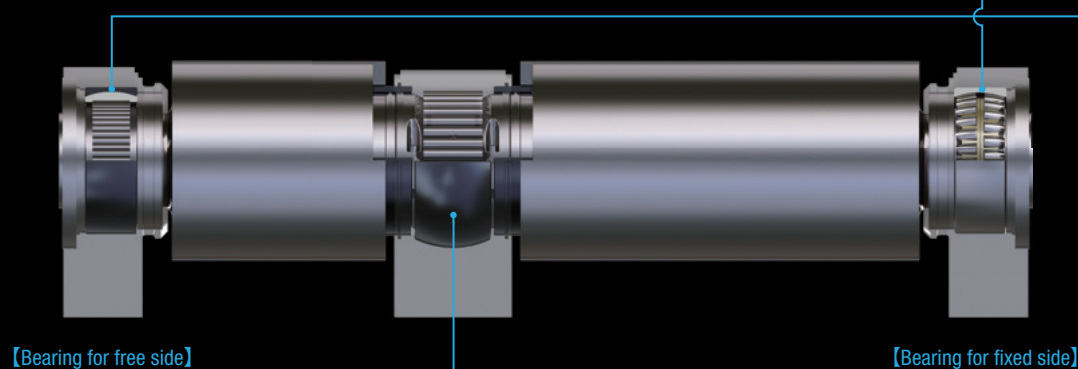
Roll configuration example 1 (single and split rolls)

- Optimal configuration for roll elongation absorption using single and split rolls



Roll configuration example 2 (pestle-shaped roll)

- Optimal configuration for roll elongation absorption using pestle-shaped roll



JHS 330
JUST HIGHER STRENGTH**Spherical roller bearings****Measures for heavy loads**

- Improved wear resistance with developed steel + special heat treatment
- Internal design reduces contact stress
- Designed for maximum load rating

Cylindrical roller bearings with self-aligning ring (SC bearing)**Measures for high temperature**

The roll elongation due to the thermal effect is absorbed between the inner ring and the roller.

Measures for heavy loads

- Absorption of misalignment during assembly and roll deflection
- The static load rating has been maximized by employing a full complement roller type.
- The anti-cracking performance has been improved by employing carburized steel.

Bearing units with half round outer ring (HSC bearing)**Measures for high temperature**

- Water-cooled structure with high cooling efficiency
- The elongation and contraction are absorbed by the raceway surface of the outer ring and the roller.

Measures for heavy loads

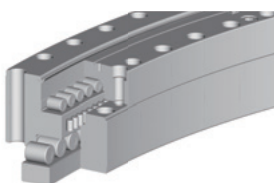
- Absorption of misalignment during assembly and roll deflection with self aligning ring
- Structure to support the intermediate part of the roll (All parts are half split.)
- The static load rating has been maximized by employing a full complement roller type.
- The anti-cracking performance has been improved by employing carburized steel.

JHS 370
JUST HIGHER STRENGTH**Oil seals****Measures for high temperature**

Made with HNBR and fluorine material suitable for continuous casting

Measures for intrusion of steam (water)**Measures for intrusion of mill scale**

Highly durable protective lip for long-term stable sealing

Slewing rim bearing for supporting the swing tower**Measures for heavy loads**

Designed for heavy loads and high rigidity to cope with the radial, axial, and moment load

Features

- (1) Outer ring made of developed steel with optimized amounts of Chromium (Cr), Molybdenum (Mo), Vanadium (V) and a special heat treatment
- (2) Improved wear resistance through control of the fine precipitates and increased hardness
- (3) Designed for maximum load rating ; internal design reduces contact stress
- (4) Roller position stabilization design

【Wear resistance】



Conventional bearing

Approx. 1.5-fold or better

JHS330 Spherical roller bearings



Outer ring

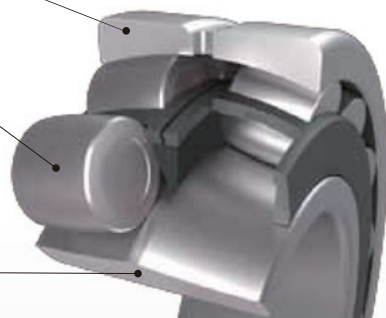
- JTEKT developed steel

Roller

- Roller maximized
- Number of rollers increased
- Roller position stabilized

Inner Ring

- JTEKT specification steel



JHS330 spherical roller bearing structure

Optimized internal design

Dynamic load rating/static load rating increased through design optimization

Dynamic load rating

Max. 1.15-fold
(Compared with conventional model)

Static load rating

Max. 1.30-fold
(Compared with conventional model)

Roller position stabilized

Induced axial load and guide ring wear have been reduced.

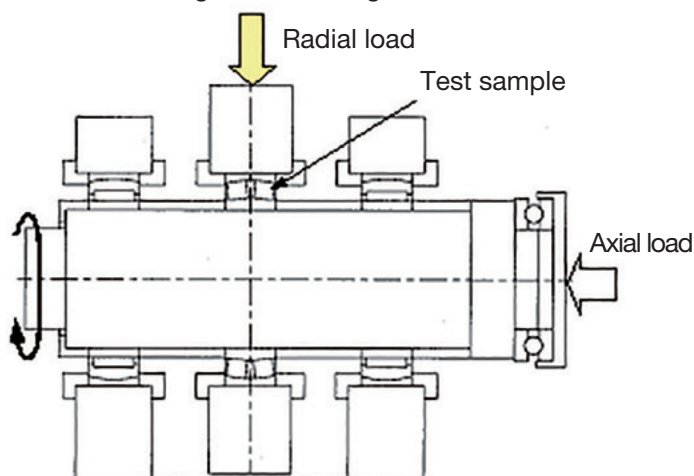
JHS330 advantages

- (1) Stable equipment operation thanks to excellent wear resistance
(longer operation periods, reduced number of sudden accidents)
- (2) Reduced maintenance costs with fewer bearing replacements

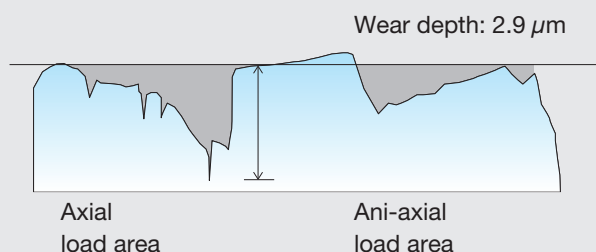
JHS330 performance: Bench wear evaluation results

Tested bearing	22222 ($\phi 110d \times \phi 200D \times 53B$)
Load	$F_r = 100 \text{ kN}$ (16% of C_{0r}) $F_a = 10 \text{ kN}$ (10% of F_r)
Rotation conditions	11 min^{-1} (continuous)
Lubrication	Alumix HD
Temperature	100°C ambient temperature
Testing time	312 hours

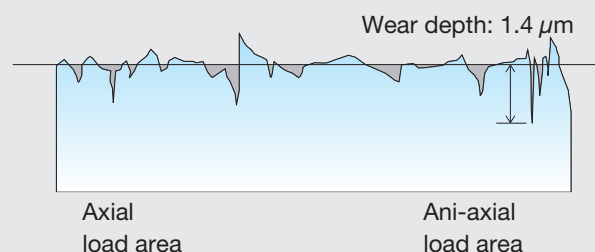
Schematic diagram of testing machine



Outer ring raceway surface of conventional bearing



JHS330 outer ring raceway surface

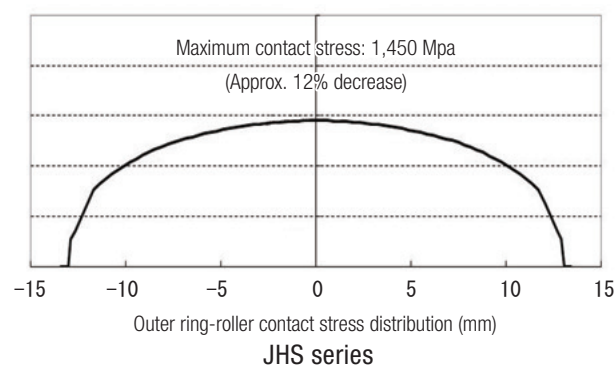
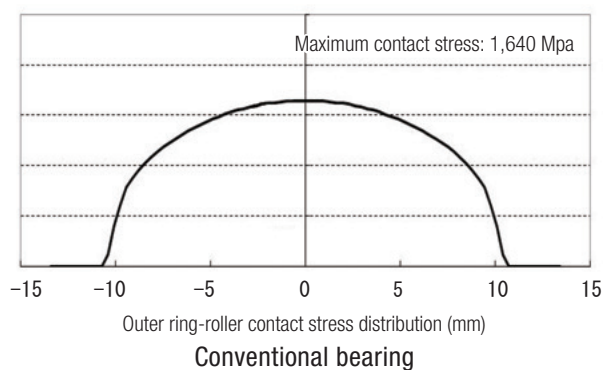


Bench wear evaluations confirmed wear resistance is more than 1.5 times greater than that of conventional bearings.

Optimized internal design

The contact stress of the outer ring (the weakest part of bearings used in continuous casting machines) has been reduced.

Example of comparison of the outer ring-roller contact stress distribution



Cylindrical roller bearings with self-aligning ring (SC bearings)

Features

- (1) Designed for heavy loads (maximum static load rating) by employing the full complement roller type
- (2) Smooth absorption of roll deflection and misalignment during installation with self-aligning ring
- (3) Cracks of the outer ring of the self-aligning ring prevented by employing a single split type
- (4) Design to prevent scuffing between the end of roller and the rib of outer ring adopted as standard

【Static load rating】

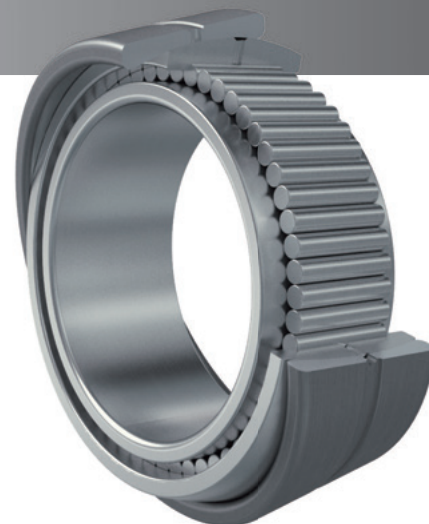


Spherical roller bearing

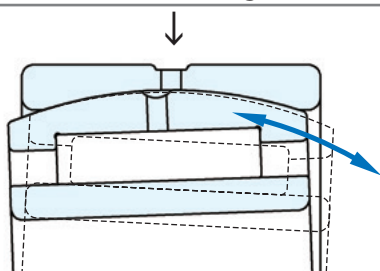


Max. 10% increase (approx.)

Cylindrical roller bearings with self-aligning ring (SC bearings)

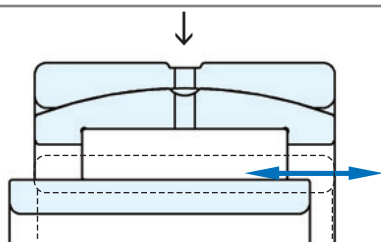


Smooth self alignment



Absorption of misalignment during installation and roll deflection

Smooth axial movement



Absorption of roll elongation due to heat

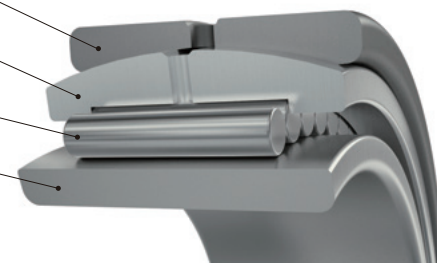
Features of cylindrical roller bearings with a self-aligning ring (SC bearing)

Self aligning ring

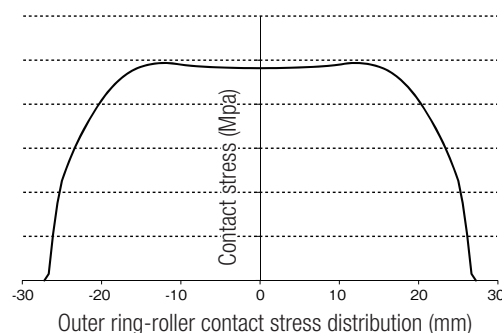
Outer ring

Roller

Inner Ring



Structure of cylindrical roller bearings with self-aligning ring (SC bearings)



Example of outer ring-roller contact stress distribution

Crowning is set up on rolling surface of its rollers, according to the size of loads.

Bearing units with half round outer ring (HSC bearings)

Features

- (1) A seal is arranged outside the inner ring to extend the roller. The static load rating of this full complement roller type product is up to 30% higher than that of the conventional product.
- (2) Water-cooled structure with high cooling efficiency
(High cooling efficiency, equivalent to that of conventional products with a 45% less water flow rate)
- (3) The outside diameter surface of the outer ring is finished spherically, providing a self aligning to the housing.
- (4) Design to prevent scuffing between the end of roller and the rib of outer ring adopted as standard
- (5) Lubrication/discharge hole design for oil / air lubrication

【Service life】



Conventional unit



Approx. **2.4-fold**

Bearing units with half round outer ring (HSC bearings)

【Static load rating】



Conventional unit



Max. **30% increase (approx.)**

Bearing units with half round outer ring (HSC bearings)

【Flow consumption】

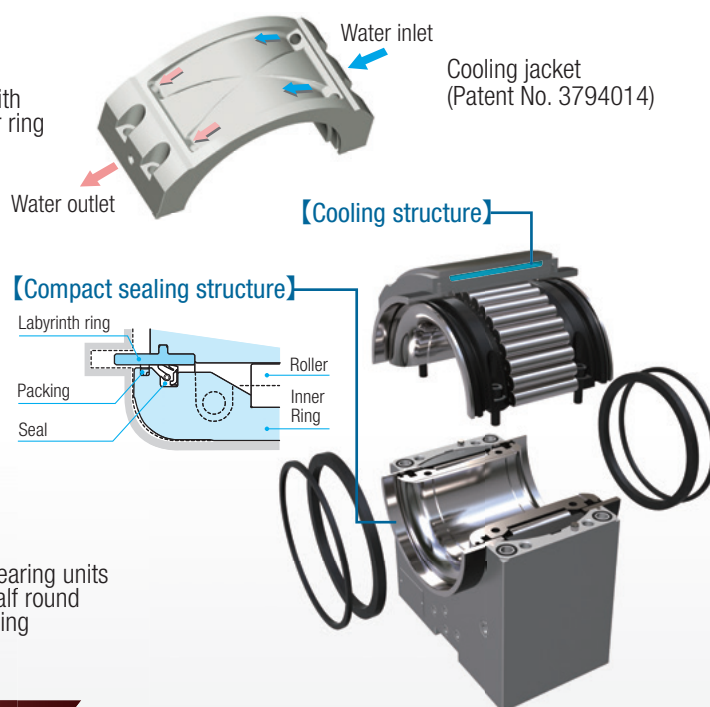


Conventional unit



Reduced **45% (approx.)**

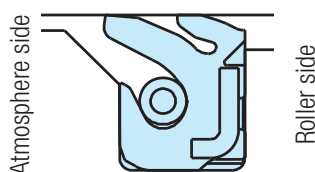
HSC bearing units with half round outer ring



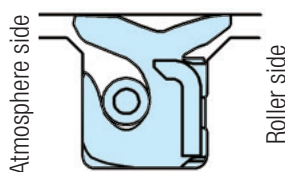
Oil seal for bearing units with half round outer ring

- Special lip shape
- (1) Adapting to roll deflection
 - (2) Preventing intrusion of water / mill scale
 - (3) Grease retained between lips

Grease discharge system

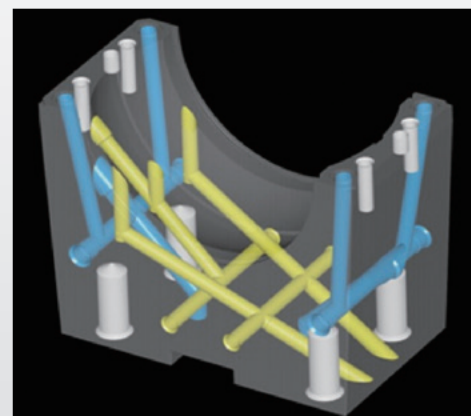


Grease recovery system



For oil seals for oil / air lubrication, contact JTEKT.

JTEKT designs complicated piping using a 3D model.



Half split housing for oil / air lubrication
(Blue: Water supply/discharge hole,
Yellow: Oil supply/discharge hole)

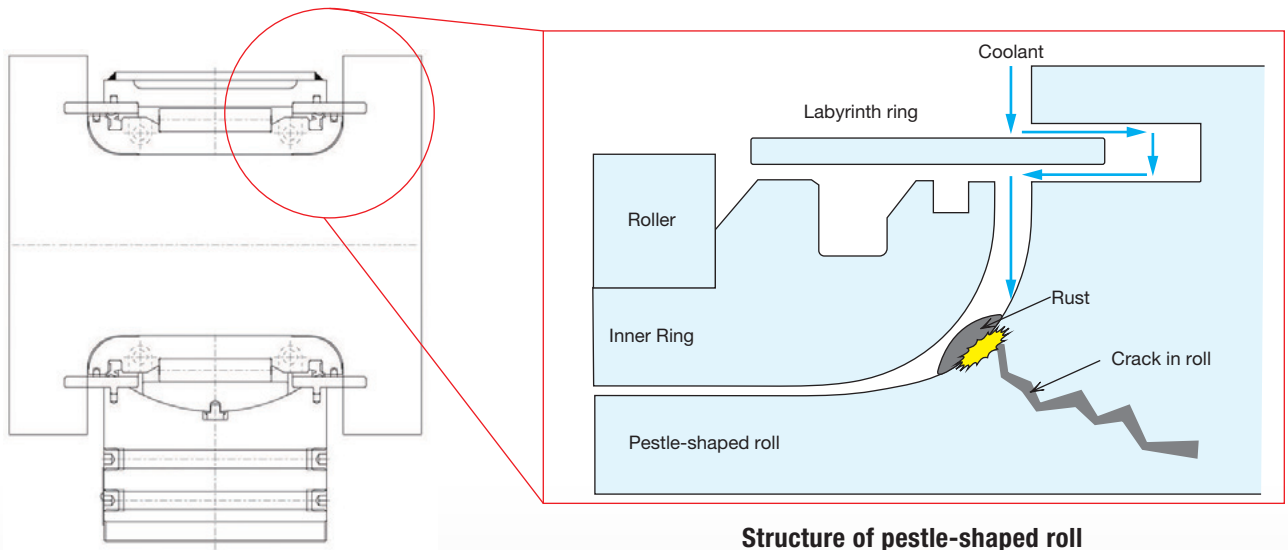
Bearing units with half round outer ring (HSC bearings) / Corrosion protection packing for rounded sections of pestle-shaped rolls

Features

- (1) Improved sealing between pestle-shaped rolls with packing installed on the inner ring of the HSC bearing
- (2) Prevents corrosion of rounded areas of the pestle roll due to water intrusion
- (3) Split-type packing for easy handling

Effect

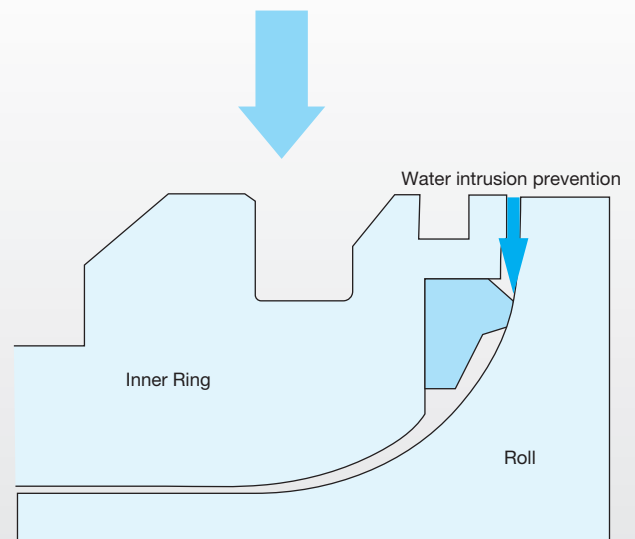
Reduced pestle-shaped roll maintenance costs and increased equipment operation stability



Structure of pestle-shaped roll



Condition upon packing installation



Packing installation example
Patent No. 6710566

Oil seals

JHS370
JUST HYPER STRONG

Features

- (1) Highly durable protective lip to inhibit water and scale intrusion
- (2) Bumper lip structure used for main lip to reduce shaft wear
- (3) Standard design featuring HNBR rubber material with excellent heat resistance and stable usability against water vapor and urea-based grease



MHSEA type

Auxiliary lip

Minute discharge venting reduces wear on shaft and lip

Dust lip

New design that inhibits scale intrusion

Bumper lip

Reduced shaft wear due to eccentricity and negative pressure

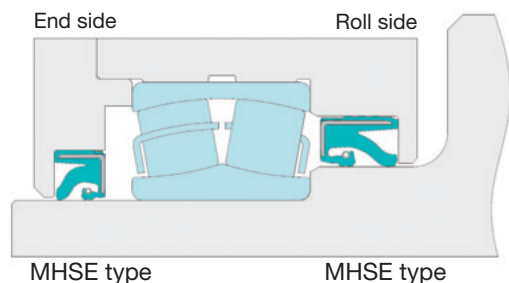
Main lip

Spring-loaded for stable lip tensioning

Compatible with all lubrication types for continuous casting equipment

[Bearing housing] Oil-air discharge system
Oil-air recovery system

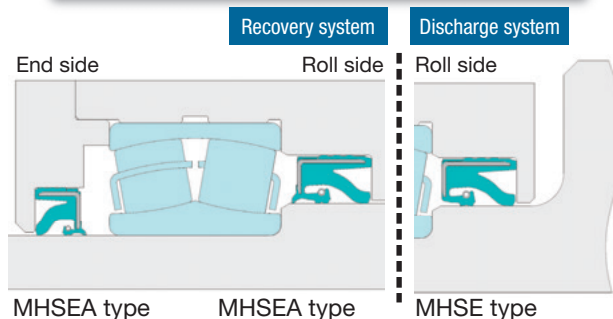
[Bearing housing] Grease discharge system
Grease recovery system



MHSE type

MHSE type

- Discharge/recovery controlled by main lip tension



MHSEA type

MHSEA type

MHSE type

- Discharge/recovery controlled by auxiliary lip

Rubber materials for oil seals in continuous casting equipment

Rubber material resistance comparison table

	Hydrogenated nitrile rubber (HNBR)	Fluorocarbon rubber (FKM)	Nitrile rubber (NBR)
Heat resistance	○	○	△
Urea-based grease resistance	○	△	○
Steam resistance	○	×	△
Water resistance	○	○	○
Wear resistance	○	○	○

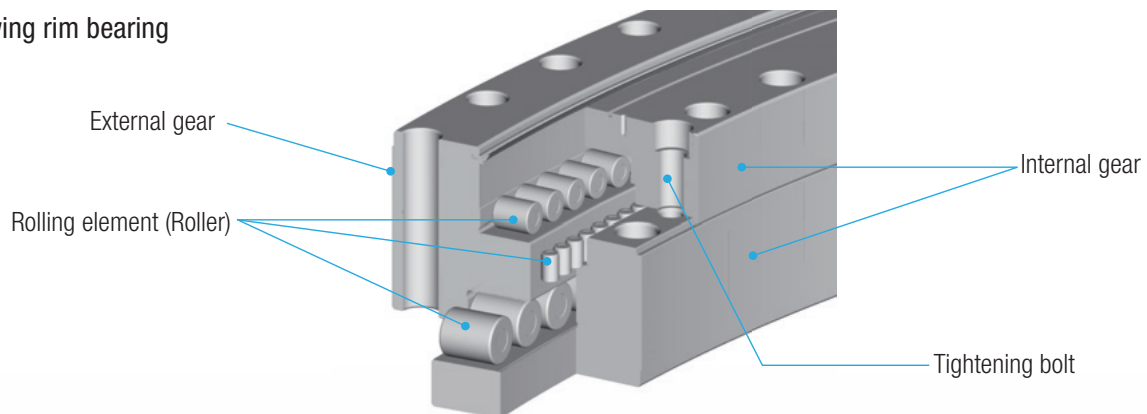
○ : Resistant (excluding certain cases) △ : No resistance (excluding certain cases) × : No resistance
 [Caution] Heat and steam resistance determination is based on an operating environment of 100°C.

Slewing rim bearing for supporting the swing tower (DTR type)

Features

- (1) Designed for heavy loads and high rigidity
- (2) Either the inner or outer ring is half split. The combination of three bearing rings (in total) with three rows of cylindrical rollers endures the radial, axial, and moment loads.
- (3) A sealing structure consisting of a labyrinth ring, dust seal, and pressure-resistant seal; a mechanism to prevent intrusion of foreign matter from outside
- (4) Capable of handling small and extra-large workpieces

Slewing rim bearing



Bearing No.	Boundary Dimensions (mm) (Bore dia. x Outside dia. x Bearing width)
DTR4370B	$\phi 4370 \times \phi 4900 \times 275$
DTR4385A	$\phi 4385 \times \phi 4916 \times 280$
DTR4805	$\phi 4805 \times \phi 5450 \times 320$
DTR4940	$\phi 4940 \times \phi 5495 \times 295$

Instructions for handling cylindrical roller bearings with self-aligning ring (SC bearings)

Cleaning

Clean the outer ring (self-aligning ring), inner ring, and rollers using white kerosene, etc. before assembly. (No cleaning is required for new parts.)

[Caution!] (1)

Take precautions against loss of rollers during cleaning. The rollers are subject to variation control in a set of bearings, and are therefore incompatible with other sets.

[Caution!] (2)

Handle bearings with care to prevent the raceway surface and rollers from being scratched, etc.

Preparation for assembling



Place the outer ring on an unused (new) cleaning rag. (See the photo.) Wash hands before work. Assemble the parts with bare hands.

[Caution!]

Exercise utmost care when handling the parts with bare hands to prevent injury.

Assembling procedure (1)

Application of grease to raceway surface of outer rings



Apply grease using fingers on the raceway surface of the outer ring. (See the photo.)

Assembling procedure (2)

Placement of rollers



Set rollers one by one on the raceway surface of the outer ring with grease applied on it. (See the photo.)

[Caution!]

Set all the rollers.

When all the rollers are set, they are arranged on the raceway surface of the outer ring with little clearance between them.

Failure to set all the rollers may cause the SC bearings to be damaged early. The designed performance cannot be demonstrated.

Assembling procedure (3)

Installation of inner ring



After setting all the rollers on the raceway surface of the outer ring, slowly insert the inner ring from above. (See the photo.)

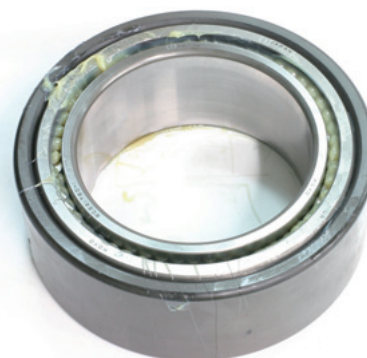
[Caution!]

If the inner ring cannot be inserted smoothly, the rollers may not be set properly on the raceway surface of the outer ring.

Do not insert the inner ring forcibly. Check that the rollers are properly set before inserting the inner ring again.

Assembling procedure (4)

Completion of installation



After assembly is completed, check that the rotation is smooth.

Handling bearing units with half round outer ring (HSC bearings) (1)

Preparation of Bearing and Housing

Carry the bearing and housing unit to work site for the installation.

Unpack them immediately before installation in order to prevent any damage or development of rust.

Unpacking of Bearing

Unpack the bearing and check the serial number indicated on inner rings. Cover the bearing with a plastic sheet or take other measures to keep the bearing free from dust or foreign matters.

[Caution!]

- Exercise great care in handling parts.
 - Half-split parts require the combination control based on the serial number and matching mark.
- Before assembly, make sure to check that the serial number matches the matching mark shown in Figs. 1 and 2.

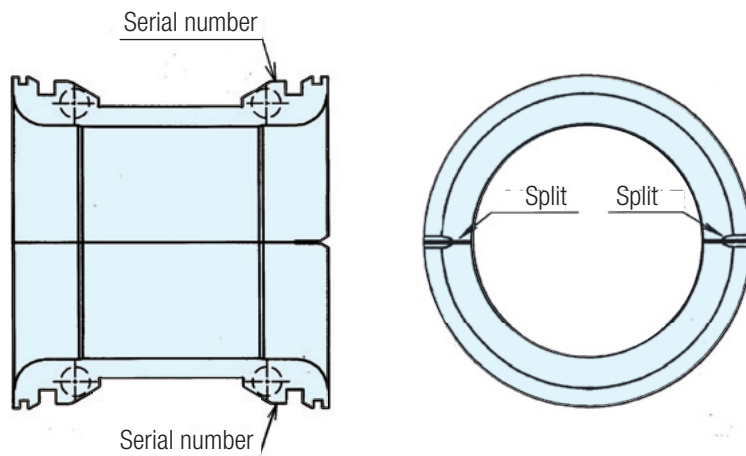


Fig.1 Serial Numbers and Matching Mark on the Bearing

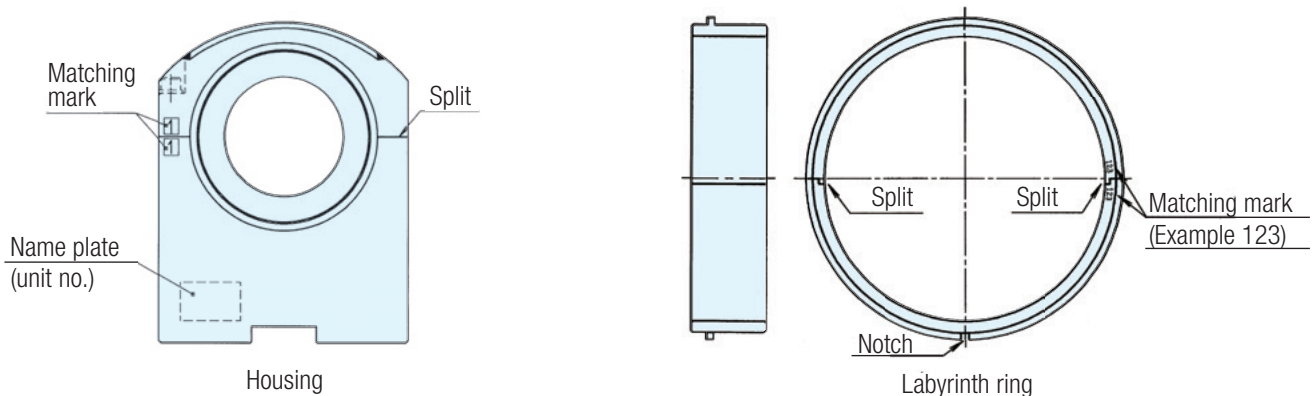


Fig.2 Serial Numbers and Matching Mark on the Housing and Labyrinth Ring

Pretreatment of Roll Necks

Apply molybdenum disulfide lightly to the roll neck
(shaded portion in Fig.3).

Fill the labyrinth groove in the roll neck with grease.

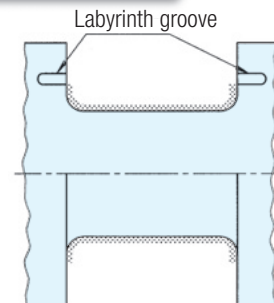


Fig. 3 Pretreatment of roll neck

Installation of Inner ring

- (1) Remove reamer bolts tightening the inner ring.
Take care that the removed reamer bolts are not contaminated by oil or grease.
- (2) Apply molybdenum disulfide lightly to the bore surfaces of the inner ring.
Take care to prevent molybdenum disulfide from being deposited on any threaded holes in the inner ring.
- (3) Degrease split surfaces including notch area of the inner ring with cleaning solvent, and apply the liquid packing on the degreased split surfaces including notch area.
(Apply the liquid packing on the split surfaces shaded area in Fig. 4 Pretreatment of Inner Ring).
Place notch packings before the liquid packing is dry. Exercise great care not to apply the liquid packing on the surfaces of seal groove neither packing groove, nor inside surface of the inner rings.
- (4) Install the half inner ring with threaded holes to the center of the roll neck from below. Fit the half inner ring with screw seats from above.
Tighten temporarily the upper and lower halves of the inner ring with reamer bolts (see Fig. 5).
If the lower half of the inner ring is too heavy to support by hand, use thea small jack.
Check that the grooves for preventing incorrect assembly of the inner ring are aligned (up and down). (The groove for preventing incorrect assembly is provided only on the notch side.)
- (5) Check the axial clearances between the roll neck and inner ring, which should be 0.5 mm on one side, to ensure that the inner ring is located at the center of the roll neck.
After checking that the inner ring is correctly positioned, tighten the four reamer bolts in a diagonal sequence in two to three cycles. Finally, tighten them with the torque wrench to the specified torque.
See the table on P. 17 for the tightening torque.
- (6) After the reamer bolts have been tightened, remove excess liquid packing squeezed out from the split of the inner ring.
- (7) Make sure that the inner ring has been properly installed on the roll, by rolling a greased roller or sliding a finger on the raceway surface. There should be no step at the split (see Fig. 6).

[Warning!]

Touch lightly the inner ring to check it with a finger.

Do not slide your finger in the direction of the split (axial direction).

Doing so may cause injury.

If there is a step at the split of the inner ring, examine its serial number again. Check the inner ring to see if the upper half or lower half is installed in the wrong direction or there is a disparity in the serial number.
Other possible causes include foreign matters caught between split surfaces of the inner ring.

Consult JTEKT if the step is not caused by any of the above factors.

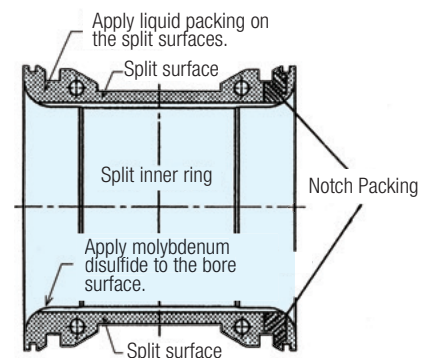


Fig. 4 Pretreatment of Inner Ring

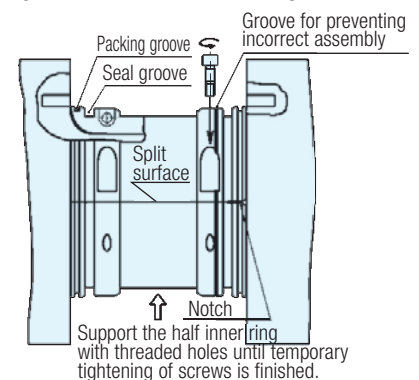


Fig. 5 Installation of Inner Ring

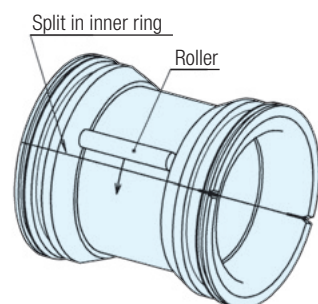


Fig. 6 Inspection of Inner ring Installation Condition

Handling bearing units with half round outer ring (HSC bearings) (2)

Packing Installation

- (1) Fit the packing to the groove so that the cut in the packing is at a 90° position from the split in the inner ring (see **Fig. 7**).
- (2) Apply the liquid packing on the cut surface of the packing. Wait until the liquid packing is touch-dry.
Check it with a finger to ensure that there is no adhesion at all of the liquid packing on it.
- (3) After the drying, cut off the surplus liquid packing on outside surface of the packing.

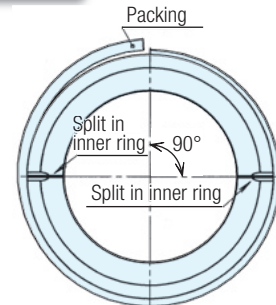


Fig. 7 Packing Installation

Oil Seal Installation

- (1) Clean the seal groove.
(It is acceptable to apply the grease in the seal groove for easier installation.)
- (2) Open the cut in the oil seal. Fit the oil seal in the seal groove in the inner ring ensuring the correct direction of the lips.
In the installation, the cut should be at a 90° position from the split in the inner ring, as with the packing (see **Fig. 8**).
- (3) Press the oil seal into the groove bit by bit. When installed, the oil seal should be free of looseness or clearance at its cut.
- (4) Fit the spring around the oil seal. Hooks are provided at both ends of the spring. Use these hooks to fit the spring on the oil seal. Perform the fitting on the raceway surface of the inner ring. After fitting, move and slide along the slope of the inner ring outside diameter to facilitate installation to the spring groove of the seal (see **Fig. 9**).
- (5) Apply grease to the packing and the oil seal on their surfaces (shaded area in **Fig. 8**).

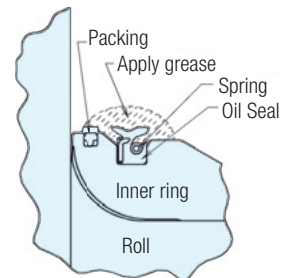


Fig. 8 Oil Seal Installation

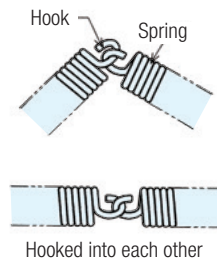


Fig. 9 Spring Installation

Installation of Bearing Outer Ring on Lower Housing

- (1) Apply molybdenum disulfide to the outer ring seating face (spherical seat) of the lower housing.
- (2) Fill the grease in a grease supply hole, indicated by 'IN' on the surface of the lower housing, and grease groove in the lower housing.
- (3) Fill grease into a dowel hole located on the outer ring (half ring), and insert a dowel pin in the dowel hole.
- (4) Apply a suitable quantity of grease all over the outer ring (half ring).
Place the outer ring (half ring) softly on the spherical seat of the lower housing with some displacement, stand back at a grease supply hole side and stick out at the other side (see **Fig. 10**). Then, push the end of the outer ring in order to fit the dowel pin into an oval dowel hole located in the bottom of the spherical seat of the lower housing.
This should allow the outer ring to fit into the lower housing smoothly.

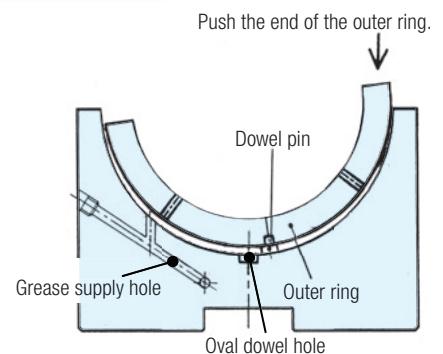


Fig. 10 Installation of Bearing Outer Ring to Lower Housing

Installation of Lower Housing and Lower Labyrinth Ring to the Roll

- (1) The labyrinth ring consists of two types of parts:
upper half without a notch and lower half with a notch.
Before installation, check the condition of the supplied labyrinth ring and the matching mark (see **Fig. 11**). Next, check that a pin is placed at the bottom of the labyrinth groove of the lower housing.
- (2) Degrease all surfaces of the upper labyrinth ring (without a notch) with cleaning solvent.
Apply liquid packing to the shaded area shown in **Fig. 12**.
Apply the liquid packing on the outside surface in area from side surface to circumferential step of the lower half ring of the labyrinth ring, with the same concept of the application for the upper one.
Air-dry the liquid packing after application (until it is touch-dry).

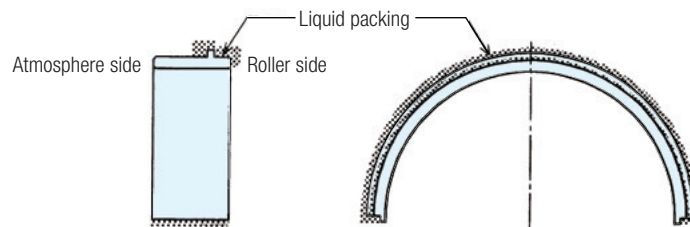
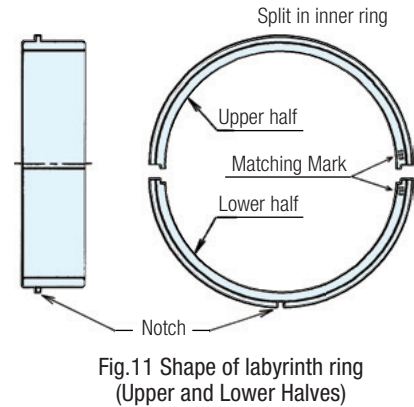


Fig. 12 Application of Liquid Packing to Upper Labyrinth Ring

- (3) Insert the lower labyrinth ring in the labyrinth groove in the roll.
Exercise care to avoid dropping the labyrinth ring.
- (4) Jack up the lower housing gradually with the jack.
Stop the jack when the lower housing comes in contact with the lower labyrinth ring (see **Fig. 13**).

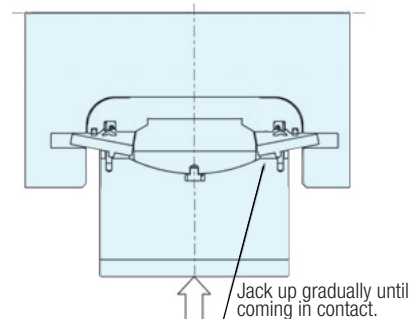


Fig. 13 Jacking Up Lower Housing

[Warning!]

Carefully jack up the lower housing.

Excessive jacking up may cause damage to the labyrinth ring or the labyrinth groove in the housing.

- (5) Fit the labyrinth ring into the groove in the lower housing (at both ends) with hands.
This fitting is carried out easily by looking at the parts from below.
- (6) Jack up the lower housing further by 3 to 5 mm.
Ideally, there should be a clearance of the roller diameter + 1 to 2 mm between the lower half of the inner ring and the raceway surface of the outer ring (see **Fig. 14**).

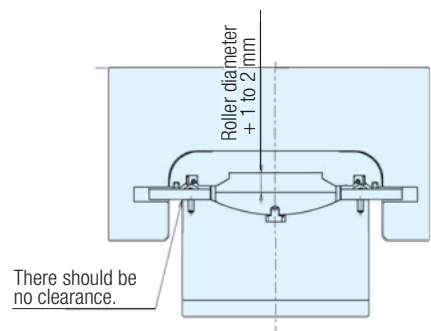
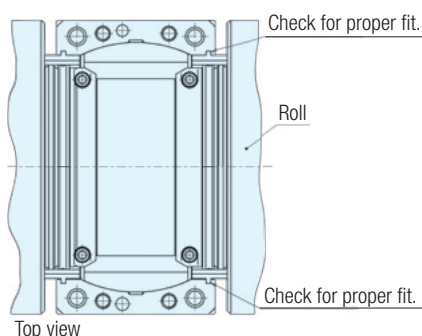


Fig. 14 Installation of Lower Housing and Lower Labyrinth

Handling bearing units with half round outer ring (HSC bearings) (3)

Installation of Upper Labyrinth Ring

- (1) Insert the upper labyrinth ring to the labyrinth groove of the roll so that the matching mark agrees with that of the lower labyrinth ring that has been installed. Make sure that the split surfaces of the upper and lower labyrinth ring mate with each other (see Fig. 15).

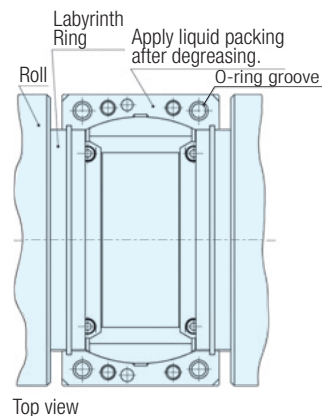


Fig. 15 Installation of Upper Labyrinth Ring

Installation of Rollers

- (1) After the lower half of the housing has been set, place rollers between the raceway surfaces of the inner and outer rings. Apply as much grease as possible to rollers. Fit in rollers one by one between the raceway surfaces of the inner and outer rings. Insert them while sliding the raceway surfaces (see Fig. 16).

[Caution!]

Caution: Rollers can slip off from the ribs of the inner ring if the lower housing has not been fully jacked up.

Exercise great care in the placement of rollers.

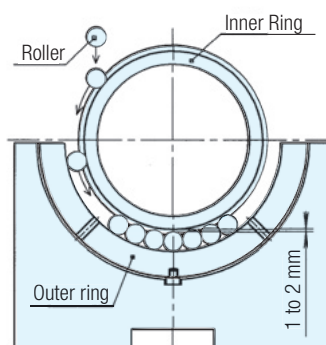


Fig. 16 Installation of Rollers for Lower Half of Bearing

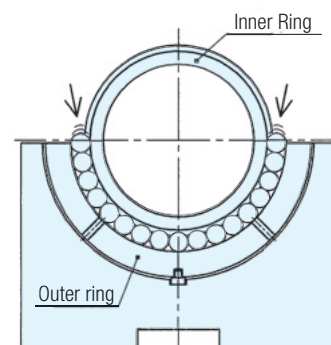


Fig. 17 Rollers Movement Check

- (2) After rollers have been inserted for the lower half of the bearing, press the rollers on both ends to make sure that the rollers move lightly (see Fig. 17).
- (3) After checking that the rollers move smoothly, jack up the lower housing until the rollers do not move. This eliminates the clearance for the lower half of the bearing.
- (4) As the next step, pile up the remaining rollers for the upper half of the bearing on the raceway surface of the inner ring (see Fig. 18).

[Caution!]

Apply grease sparingly to the two or three rollers above the split surface of the housing so as to prevent contamination of the split surfaces with grease.

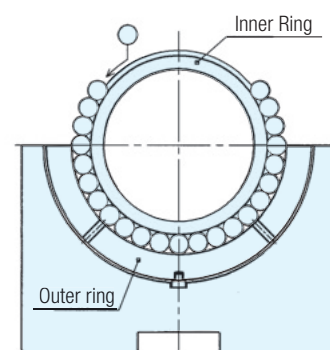


Fig. 18 Installation of Rollers for Upper Half of Bearing

Installation of Upper Housing

- (1) Degrease the split surfaces of the lower half of the Housing. Apply liquid packing lightly and evenly.
Spread the liquid packing equally with fingertips with care. Exercise care to avoid entry of the liquid packing into the O-ring groove or a screw hole during this process.
- (2) After it has been ensured that the liquid packing is touch-dry, fit an O-ring into the O-ring groove in the lower half of the housing.
- (3) Degrease the split surfaces of the upper half of the Housing. Then, apply grease to the center of the inside surface (raceway surface of the bearing).
- (4) Check the following at this time.
 - a. O-ring fitting condition
 - b. Installation condition of the upper and lower labyrinth ring
- (5) Check the positions of the parallel pin on the lower housing mating face and the parallel pin hole on the upper housing mating face.
While paying attention to the installation conditions of the labyrinth ring and oil seal, place the upper housing over the lower housing.
- (6) Press the upper housing lightly from above to check that the clearance decreases at the split between the upper and lower housing.
If this clearance does not decrease, improper fitting of the labyrinth ring into the labyrinth groove is a probable cause.
Remove the upper housing. Fit the labyrinth ring properly into the labyrinth groove and reinstall.
- (7) Tighten the upper and lower housing with hexagon socket head cap screws.
Tightly the four hexagon socket head cap screws equally in a diagonal sequence in two to three cycles.
See the following table for the tightening torque for the hexagon socket head cap screws.

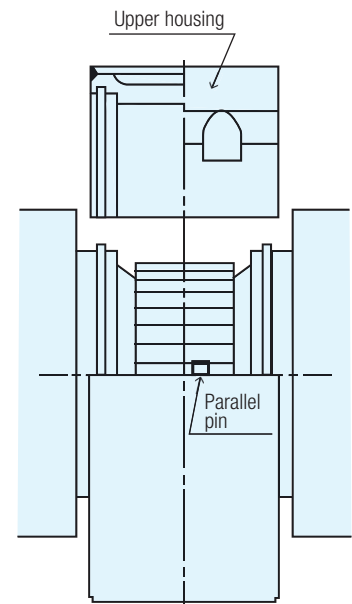


Fig. 19 Installation of Upper Housing

Final Inspection

Remove the jack from the lower housing, check the condition that the bearing can be rotated with oscillation of the whole housing by about 90°.

(The torque of the grease recovery type is higher than that of the open grease type)

[Caution!]

If the housing is not placed at the center of the roll neck, the deviation should be corrected.

To do so, make adjustments while rotating the bearing.

Tightening Torque of Screws

For inner ring		For housing	
Screw size	Torque (N·m)	Screw size	Torque (N·m)
M8	21~25	M12	39~49
M10	39~49	M16	90~130

Key points for inspecting parts (Spherical roller bearings)

[Characteristics of failures in Spherical roller bearing]

Wear, flaking, cracking of load zone on the raceway surface of outer rings due to differential slip of bearing

[Points for inspection]

(1) Cracking, flaking (2) Wear of raceway surface of outer rings (3) Brinelling of raceway surface, rust (4) Deformation

Deformation

<Replacement criteria>

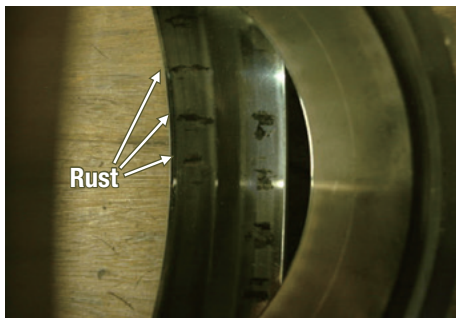
The assembly of the outer and inner rings is difficult to rotate manually, and self alignment is poor.

Rust

<Replacement criteria>

There are small dents that catch fingernails after polishing using #400 sandpaper or equivalent. The bearing is considered to be reusable in the following cases.

- There are small dents that slightly catch fingernails (to the similar extent on rollers), but there is no movement in the load zone (no turning of the outer ring in the housing). No rust has developed in the next load zone position to be used.



Rust on the raceway surface of outer rings

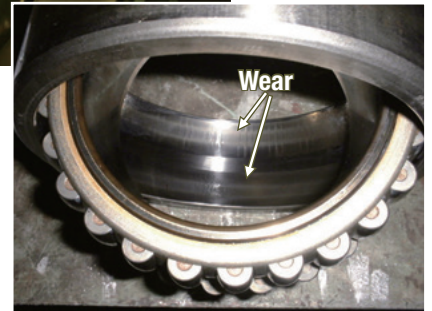
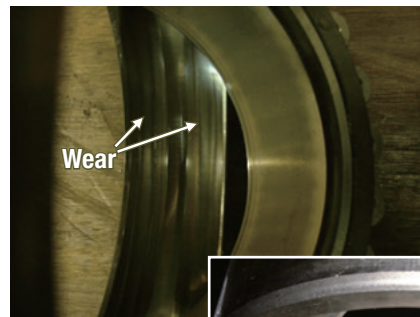
Wear

<Replacement criteria>

There is a step on the raceway surface of the outer ring that can be clearly felt on the fingertip.

The bearing is considered to be reusable in the following cases.

- There is a step that can be slightly felt on the fingertip (rust to the similar extent on the roller). There is no movement in the load zone (no turning of the outer ring in the housing). No wear is found in the next load zone position to be used.

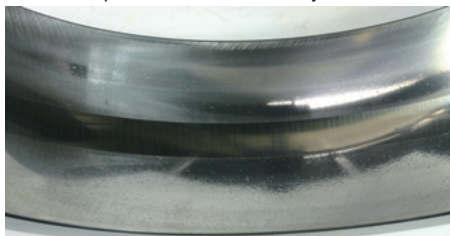


Double-peaked wear on the raceway surface of the outer ring

Brinelling

<Replacement criteria>

Brinelling due to foreign matter being caught is found on the entire perimeter of the raceway surface of the inner and outer rings. Roller pitch brinelling caused by an excessive load is found at the load zone position on the raceway surface of the outer ring.



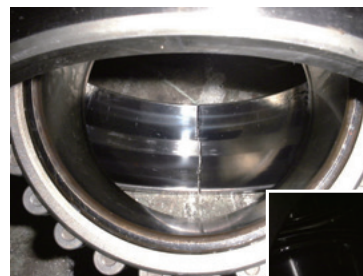
Flaking, cracking

<Replacement criteria>

Basically, the bearing must be replaced.

The bearing is considered to be reusable in the following cases.

- Flaking is minimal. There is no movement in the load zone (no turning of the outer ring in the housing). No flaking is found in the next load zone position to be used.



Cracks from the Double-peaked wear on the outer ring, flaking on the raceway surface of outer rings

Key points for inspecting parts (Cylindrical roller bearings with self-aligning ring (SC bearings))

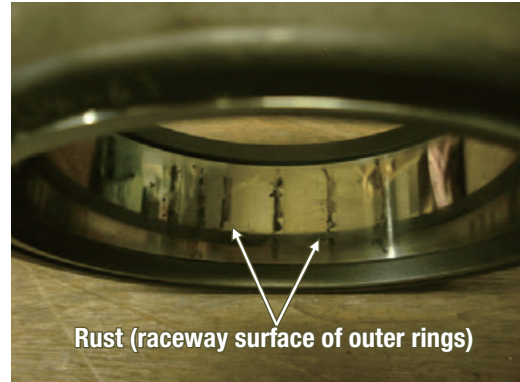
[Characteristics of failures in Cylindrical roller bearings with self-aligning ring] Flaking of raceway surface, brinelling
[Points for inspection] (1) Cracking, flaking (2) Brinelling of raceway surface, rust (3) Deformation

Rust

<Replacement criteria>

There are small dents that catch fingernails after polishing using #400 sandpaper or equivalent. The bearing is considered to be reusable in the following cases.

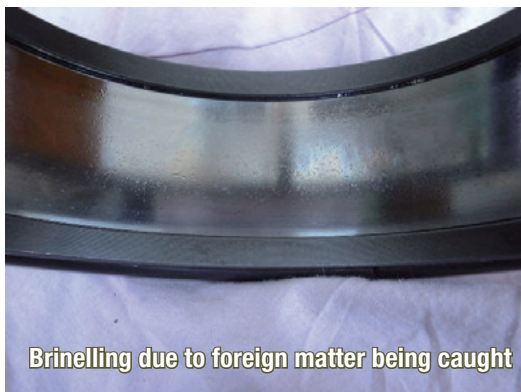
- There are small dents that slightly catch fingernails (to the similar extent on rollers), but there is no movement in the load zone (no turning of the outer ring in the housing). No rust has developed in the next load zone position to be used.



Brinelling

<Replacement criteria>

Brinelling due to foreign matter being caught is found on the entire perimeter of the raceway surface of the inner and outer rings. Roller pitch brinelling caused by an excessive load is found at the load zone position on the raceway surface of the outer ring.



Flaking, cracking

<Replacement criteria>

Basically, the bearing must be replaced.

The bearing is considered to be reusable in the following cases.

- Flaking is minimal. There is no movement in the load zone (no turning of the outer ring in the housing). No flaking is found in the next load zone position to be used.



Key points for inspecting parts (Bearing units with half round outer ring (HSC bearings))

[Characteristics of failures in bearing units with half round outer ring] Flaking of raceway surface, cracking
[Points for inspection] (1) Cracking, flaking (2) Brinelling of raceway surface, rust (3) Deformation

Deformation

<Replacement criteria>

Outer ring: The outer ring cannot be put into the bearing case.
Inner ring: The tightening bolt cannot be tightened.

Brinelling

<Replacement criteria>

Brinelling due to foreign matter being caught is found on the entire perimeter of the raceway surface of the inner and outer rings. Roller pitch brinelling caused by an excessive load is found at the load zone position on the raceway surface of the outer

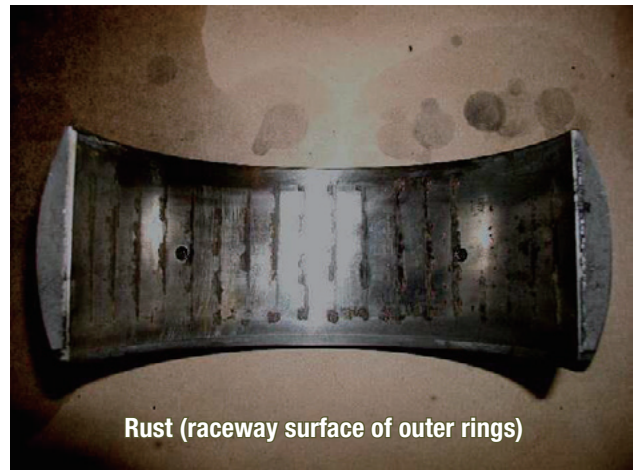


Rust

<Replacement criteria>

There are small dents that catch fingernails after polishing using #400 sandpaper or equivalent. The bearing is considered to be reusable in the following cases.

- There are small dents that slightly catch fingernails (to the similar extent on rollers), but there is no movement in the load zone (no turning of the outer ring in the housing). No rust has developed in the next load zone position to be used.



Flaking, cracking

<Replacement criteria>

Basically, the bearing must be replaced.

The bearing is considered to be reusable in the following cases.

- In the case of a full ring: Flaking is minimal. There is no movement in the load zone (no turning of the outer ring in the housing). No flaking is found in the next load zone position to be used.

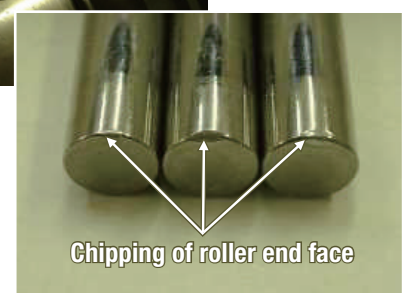
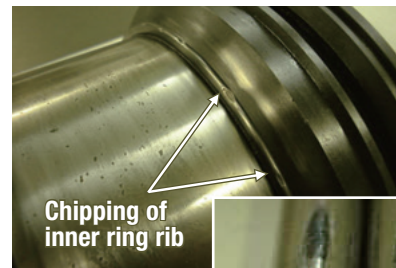


Chipping of inner ring rib, chipping of roller end face

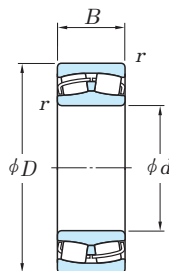
<Replacement criteria>

Chipping occurs when the housing is tightened when the roller is placed on the inner ring rib during assembly. Basically, the bearing must be replaced. The bearing is considered to be reusable in the following cases.

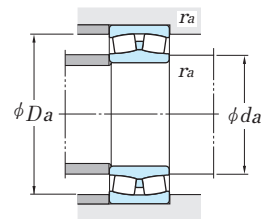
- The chipping of the inner ring rib is negligible and does not affect the contact position with the roller. The brinelling on the raceway surface of the inner and outer rings and the rolling surface of roller is also negligible.



JHS Series Dimensions tables for spherical roller bearings



Spherical roller bearing

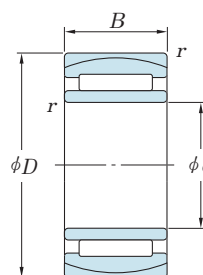


Mounting

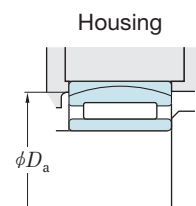
Spherical roller bearings												
Boundary Dimensions (mm)				Bearing No.	Basic Load Ratings (kN)		Mass (kg)	Mounting dimensions (mm)				
<i>d</i>	<i>D</i>	<i>B</i>	<i>r</i> (Min.)		<i>Cr</i>	<i>Cor</i>		<i>da</i>		<i>Da</i>		<i>da</i> (Max.)
(Min.)	(Max.)	(Max.)						(Min.)	(Max.)	(Min.)	(Max.)	(Max.)
50	110	40	2	22310RZ	255	237	1.92	60	62	96	100	2
55	100	25	1.5	22211RZ	154	144	0.87	64	64	91	91	1.5
65	120	31	1.5	22213RZ	222	211	1.55	74	76	109	111	1.5
	140	48	2.1	22313RZ	382	360	3.66	77	79	122	128	2
70	125	31	1.5	22214RZ	233	222	1.64	79	80	114	116	1.5
75	130	31	1.5	22215RZ	241	236	1.73	84	85	119	121	1.5
85	150	65	2.5	24217RHB	461	554	4.94	97	101	125	138	2
90	160	52.4	2	23218RZ	421	482	4.63	100	103	141	150	2
	190	64	3	22318RZ	672	662	8.82	104	108	166	176	2.5
100	165	52	2	23120RZ	412	510	4.52	110	114	147	155	2
105	160	56	2	24021RHA	398	550	4.10	115	119	142	150	2
110	170	45	2	23022RZ	377	486	3.85	120	123	156	160	2
	170	60	2	24022RZ	472	647	5.07	120	120	151	160	2
	180	56	2	23122RZ	484	605	5.72	120	125	161	170	2
	180	69	2	24122RZ	569	778	6.98	120	120	154	170	2
120	180	46	2	23024RZ	394	524	4.20	130	132	165	170	2
	180	60	2	24024RZ	484	709	5.43	130	130	160	170	2
	200	80	2	24124RZ	733	1020	10.20	130	133	172	190	2
130	200	69	2	24026RZ	625	914	8.03	140	143	177	190	2
	210	64	2	23126RZ	621	799	8.71	140	147	187	200	2
	210	80	2	24126RZ	754	1080	10.80	140	145	184	200	2
	230	64	3	22226RZ	821	914	11.60	144	148	206	216	2.5
140	210	53	2	23028RZ	530	723	6.62	150	155	192	200	2
	210	69	2	24028RZ	640	957	8.49	150	153	188	200	2
	225	68	2.1	23128RZ	710	940	10.60	152	158	201	213	2
	225	85	2.1	24128RZ	853	1170	13.10	152	153	194	213	2
150	225	75	2.1	24030RZ	724	1100	10.60	162	163	199	213	2
	250	100	2.1	24130RZ	1110	1590	19.90	162	166	213	238	2
	270	96	3	23230RZ	1200	1540	24.50	164	173	230	256	2.5
160	240	80	2.1	24032RZ	829	1270	12.90	172	175	215	228	2
	270	109	2.1	24132RH	1300	1890	25.10	172	179	229	258	2
170	260	90	2.1	24034RZ	1010	1540	17.50	182	184	227	248	2
	310	110	4	23234RHA	1520	1940	35.60	188	207	261	292	3
180	280	100	2.1	24036RHA	1200	1830	22.70	192	203	244	268	2
	300	118	3	24136RHA	1520	2240	31.80	194	207	255	286	2.5
	320	112	4	23236RHA	1660	2170	37.70	198	220	277	302	3
190	290	100	2.1	24038RHA	1230	1920	22.40	202	215	256	278	2
	320	104	3	23138RHA	1520	2080	33.20	204	227	281	306	2.5
	320	128	3	24138RHA	1770	2630	40.10	204	222	272	306	2.5
	340	120	4	23238RHA	1870	2470	44.90	208	233	293	322	3
200	310	109	2.1	24040RHA	1440	2230	28.50	212	227	272	298	2
	340	112	3	23140RHA	1730	2340	40.80	214	239	297	326	2.5
	340	140	3	24140RHA	2000	2970	49.50	214	232	286	326	2.5
220	370	150	4	24144RHA	2330	3550	62.00	238	255	313	352	3

[Reference] Contact JTEKT for the applicable JHS330 bearing numbers.

Dimensions tables for cylindrical roller bearings with self-aligning ring (SC bearings)



SC Bearing (Free side)



Mounting

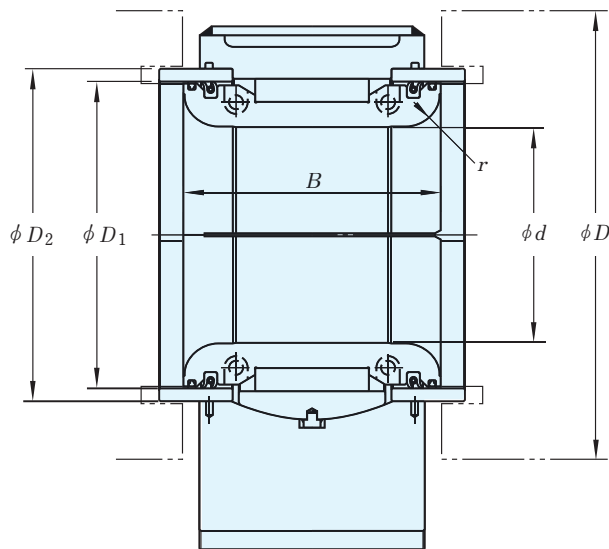
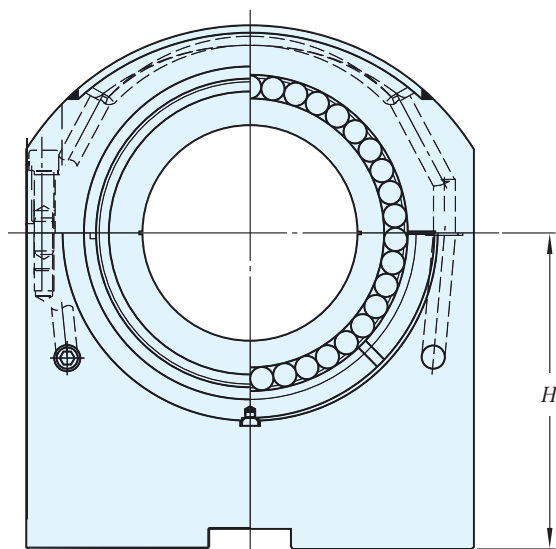
Cylindrical roller bearings with self-aligning ring (SC bearings)

Boundary Dimensions (mm)				Bearing No.	Basic Load Ratings (kN)		Acceptable roll heat expansion (mm)	Mass (kg)	Mounting dimensions (mm)		
<i>d</i>	<i>D</i>	<i>B</i> ¹⁾	<i>r</i> (Min.)		<i>C_r</i>	<i>C_{or}</i>			<i>D_a</i> (Min.)	<i>D_a</i> (Max.)	<i>d_a</i> (Max.)
50	110	40	2	SC101140VA	206	254	±4.5	2.1	96	99	62
55	90	32	1.1	SC119032VA	113	202	±3.5	0.9	81	82	61
	100	25	1.5	SC111025V-1A	118	146	±3	0.9	93	93	64
65	120	31	1.5	SC131231V-1A	148	206	±4	1.7	110	111	77
	140	48	2.1	SC131448VA	299	393	±5.5	4.0	123	127	82
70	125	31	1.5	SC141331VA	159	213	±6	1.8	116	117	84
75	130	31	1.5	SC151331V-1A	175	225	±4.5	1.8	120	121	84
85	150	65	3	SC171565V-1A	366	567	±10	5.3	129	137	96
90	160	45/48*	2	SC181645/48V-1A	311	507	±5.5	4.4	147	150	106
	160	50/56*	2	SC181650/56VA	334	486	±7	4.8	144	148	105
	160	52.4	2	SC181652VA	389	555	±5.2	4.9	144	148	102
	190	64	3	SC181964VA	496	683	±9	9.5	166	172	115
100	150	50	1.5	SC201550VA	290	543	±6	3.4	137	139	107
	165	52	2	SC201752V-1A	350	600	±5.5	4.9	149	153	113
105	160	56	2	SC211656VA	304	594	±9	4.3	144	149	115
110	170	45	2	SC221745RVA	296	496	±6.5	4.0	158	160	122
	170	60	2	SC221760V-5A	380	684	±8.5	5.4	152	157	122
	170	64	2	SC221764VA	350	722	±10	5.8	151	157	123
	180	56	2	SC221856V-8A	370	667	±7.5	6.2	162	167	125
	180	69	2	SC221869V-7A	497	803	±9.5	7.4	157	164	122
120	180	46	2	SC241846V-2A	290	588	±6	4.6	168	170	136
	180	54	2	SC241854V-1A	348	626	±8.5	5.1	165	169	132
	180	56/46*	2	SC241856/46VA	348	626	±5	5.2	165	169	132
	180	58	2	SC241858V-2A	348	626	±10.5	5.4	164	168	132
	180	60	2	SC241860V-4A	395	737	±8.5	5.7	163	168	132
	200	80	2	SC242080VA	653	1120	±9	11.0	174	183	136
130	200	52/79*	2	SC262052/79V-1A	369	701	±21	7.4	186	189	148
	200	69	2	SC262069V-2A	521	897	±10.5	8.3	179	186	143
	200	79/69*	2	SC262079/69VA	553	1090	±6	9.6	177	185	145
	210	64	2	SC262164VA	511	882	±10	9.2	190	196	147
	210	80	2	SC262180V-3A	649	1070	±11	11.5	184	193	141
	230	64	3	SC262364V-2A	553	950	±9	12.5	209	215	153
140	210	53	2	SC282153V-1A	416	834	±6	7.1	195	199	157
	210	69	2	SC282169V-1A	574	1030	±9.5	9.0	191	196	151
	225	68	2.1	SC282368V-1A	583	1020	±9.5	11.2	204	210	158
	225	73	2.1	SC282373V-1A	641	1150	±9	12.1	202	208	158
	225	85	2.1	SC282385V-2A	718	1200	±13	13.8	199	208	156
150	225	75	2.1	SC302375V-7A	645	1230	±9	11.4	203	209	163
	250	100	2.1	SC3025100V-2A	855	1620	±14	21.7	218	230	170
	270	96	3	SC302796V-1A	1070	1620	±12.5	25.6	236	247	173
160	240	80	2.1	SC322480-2VA	678	1280	±12.5	13.5	216	225	176
	270	109	2.1	SC3227109V-1A	1090	1790	±16.5	27.1	233	247	168
170	260	90	2.1	SC342690V-1A	777	1560	±14	18.8	232	241	188
	310	110	4	SC3431110V-1A	1400	2060	±14.5	38.8	270	285	194
180	280	100	2.1	SC3628100V-4A	1010	1790	±15.5	24.1	248	260	197
	300	118	3	SC3630118V-1A	1190	2420	±15.5	37.3	261	275	209
	320	112	4	SC3632112V-1A	1190	2350	±15	43.5	280	295	216
190	290	100	2.1	SC3829100V-1A	961	2030	±14	26.2	259	269	213
	320	104	3	SC3832104VA	1290	2270	±12	37.2	288	298	215
	320	128	4	SC3832128VA	1400	2790	±15.5	46.7	278	293	216
	340	120	4	SC3834120V-2A	1530	2480	±17.5	50.5	301	315	221
200	310	109	2.1	SC403111RVA	1220	2550	±11	33.5	273	286	220
	340	112	3	SC4034112V-1A	1360	2490	±16	45.8	304	317	236
	340	140	3	SC4034140VA	1700	3090	±19	56.4	292	313	227
	370	150	4	SC4437150VA	1930	3750	±19	72.3	320	340	250

[Note] 1) *indicates width of outer ring and inner ring, respectively.

[Reference] Contact JTEKT for bearing numbers not listed in the dimensions table.

Dimensions tables for bearing units with half round outer ring (HSC bearings) (1)



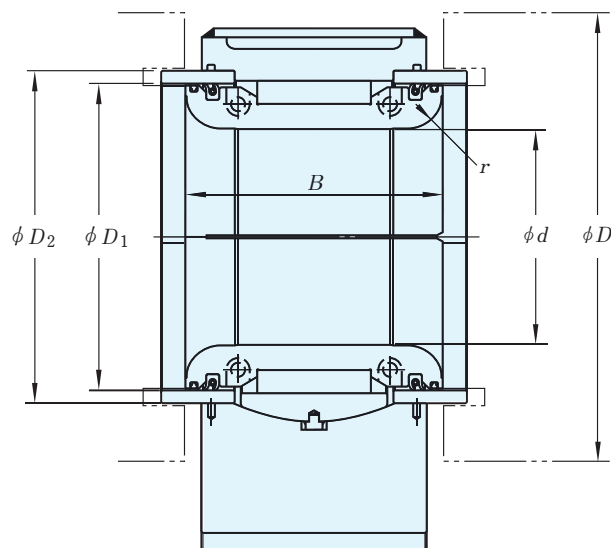
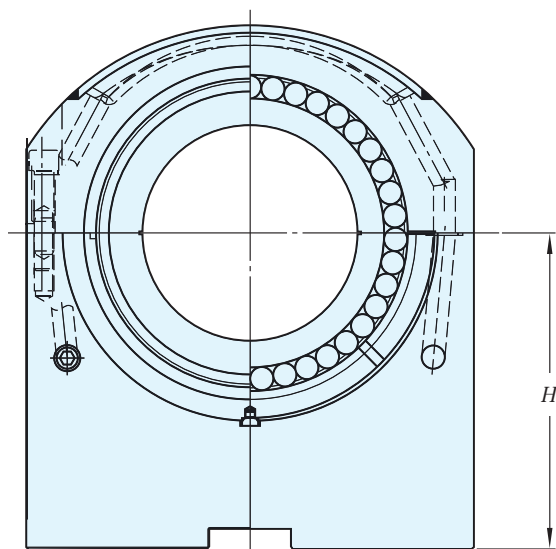
Applicable roll outside diameter	Boundary Dimensions (mm)						Housing No. ¹⁾	Bearing No.	Acceptable roll heat expansion (± mm)	Basic Load Ratings (kN)	
	D	d	B	H	D ₁	D ₂				C _r	C _{0r}
195		100	145	175	133	143	PBA391H	HSC2017-1C3	7	467	876
220		110	139	225	155	168	PBA399H	HSC2219-7C3	9	503	873
		110	139	225	155	168	PBA360H	HSC2219-6C3	9	543	966
225		100	169	132	140	150	PBA328H	HSC2019C3	8	758	1250
230		110	113	185	160	173	PBA171H	HSC2219-3C3	8	418	619
		110	141	246	160	173	PBA171AXH	HSC2219-1C3	8	663	1120
		110	150	190	160	173	PBA208H	HSC2019-2C3	8	696	1190
		110	154	180	160	173	PBA368H	HSC2219-4C3	8	696	1190
		110	154	180	160	173	PBA404H	HSC2220C3	9	721	1270
235		140	145	175	175	186.5	PBA339H	HSC2821C3	5	541	1160
240		115	202	251	160	175	PBA316H	HSC2321C3	9	937	1550
		115	173	220	212	220	PBA319H	HSC2321-1C3	8	624	919
		120	173	230	165	180	PBA396H	HSC2421-2C3	9	845	1510
250		120	153	185	175	190	PBA336H	HSC2421C3	8	819	1380
		120	153	145	175	190	PBA336AH	HSC2421C3	8	819	1380
		120	154	175	170	188	PBA378H	HSC2421-1C3	10	727	1190
		120	154	190	175	190	PBA251H-2	HSC2421-4C3	9	758	1400
		120	154	180	175	190	PBA251H	HSC2421-3C3	9	758	1400
		120	154	180	170	185	PBA407H	HSC2421-5C3	9	758	1400
255		125	174	180	180	195	PBA410H	HSC2522C3	9	997	1740
260		120	154	180	170	188	PBA379H	HSC2421-1C3	10	727	1190
		130	157	180	185	200	PBA412H	HSC2622-2C3	9	781	1480
265		140	175	242.5	190	205	PBA379H	HSC2823-2C3	9	876	1640
		140	191	250	190	205	PBA355H	HSC2823-1C3	6	904	1710
		140	222	200	228	241	PBA423H	HSC2822A	6	808	1550
270		130	154	190	185	200	PBA252H	HSC2622C3	9	781	1480
		140	126	205	199	212	PBA176H	HSC2823C3	8	634	992
		140	174	205	199	212	PBA207H	HSC2824-1C3	8	1080	1980

[Notes] 1) The housing No. does not include a bearing.

2) *indicates a special design.

[Reference] Contact JTEKT for bearing numbers not listed in the dimensions table.

Dimensions tables for bearing units with half round outer ring (HSC bearings) (2)



Applicable roll outside diameter		Boundary Dimensions (mm)					Housing No. ¹⁾	Bearing No.	Acceptable roll heat expansion (± mm)	Basic Load Ratings (kN)	
D	d	B	H	D ₁	D ₂	r ²⁾				C _r	C _{0r}
275	150	163	175	190	203.5	C10*	PBA389H	HSC3024C3	7	889	1800
280	130	174	205	185	200	20	PBA337H	HSC2624C3	8	1060	1910
	130	174	160	185	200	20	PBA337AH	HSC2624C3	8	1060	1910
	140	179	245	242	150	20	PBA320AH	HSC2824C3	8	753	1240
	145	196	260	200	215	20	PBA356H	HSC2925-1C3	6	1050	1930
	145	191	270	200	215	20	PBA352H	HSC2924C3	6	784	1440
290	140	139	215	208	223	16	PBA177H	HSC2825C3	8	1080	1980
	145	178	215	208	223	20	PBA206H	HSC2925C3	8	1210	2260
295	145	208	270	200	215	20	PBA357H	HSC2926C3	6	1210	2260
	150	208	310	200	215	20	PBA342H	HSC3026C3	6	1040	1840
300	150	178	205	208	223	20	PBA206BH	HSC3025-1C3	8	1210	2260
305	150	169	205	205	220	20	PBA408H	HSC3025C3	8.5	1070	1990
310	140	184	215	205	220	20	PBA3381H	HSC2827C3	8	1260	2210
	140	184	175	205	220	20	PBA338AH	HSC2827C3	8	1260	2210
320	150	187	220	220	235	20	PBA380H	HSC3028C3	9	1310	2370
	160	150	291	240	255	18	PBA178H	HSC3228C3	8	1030	1680
	160	199	270	215	230	20	PBA398H	HSC3227C3	9	1250	2410
	165	228	280	230	245	25	PBA358H	HSC3328C3	6	1290	2550
	160	200	225	230	240	20	PBA417H	HSC3227-1C3	8	1310	2370
330	170	235	255	230	245	25	PBA341H	HSC3429C3	6	1380	2550
340	180	235	280	245	260	25	PBA359H	HSC3630C3	6	1420	2720
350	190	199	235	253	268	29	PBA416H	HSC3830C3	10	1470	2880
370	190	233	280	326	336	20	PBA324H	HSC3834C3	7	1930	3540

[Notes] 1) The housing No. does not include a bearing.

2) *indicates a special design.

[Reference] Contact JTEKT for bearing numbers not listed in the dimensions table.



JTEKT Corporation WEB site

<https://www.jtekt.co.jp/e/>



JTEKT Bearing WEB site

<https://koyo.jtekt.co.jp/en/>



JTEKT Overseas hubs

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