Cylindrical Roller Bearings

High axial load carrying capacity due to optimized rib contact
Properties of cylindrical roller bearings

Cylindrical roller bearings have been used as non-locating bearings, semi-locating bearings and locating bearings for many decades. They consist of bearing rings, rolling elements and a cage, depending on the design. Their design means that they have an extremely high radial load carrying capacity and high rigidity. They are especially suitable for compact designs. In addition to high radial loads, cylindrical roller bearings can also support axial loads if they are used as semi-locating or locating bearings.

In principle, the friction values and therefore heat generation are higher in the case of sliding friction compared with rolling friction. This is why the axial load carrying capacity of cylindrical roller bearings is usually limited. Due to the distribution of forces inside the bearing, this limit is dependent on radial loads.

The permissible axial load is therefore limited to 40% of the radial load according to the current state of the art ($Fa/Fr = 0.4$). Measures for increasing the permissible axial load therefore involve improving the lubrication in the sliding contact and/or reducing the contact pressure in the contact between the rib and the roller.

INA cylindrical roller bearings with optimized rib contact

In future, the axial load can be up to 60% of the radial load with the new INA cylindrical roller bearings with optimized rib contact ($Fa/Fr = 0.6$).

Significantly higher axial load carrying capacity
The contact points between the roller end faces and the bearing ribs were improved by using newly developed calculation methods and manufacturing processes. The frictional torque in the bearing is reduced by up to 50%. The bearing temperature during operation is thereby lower. The operating life of the bearings under axial loads is now significantly longer.

The following series will be converted to the new design from mid 2007.

### Ordering example: LSL192330-TB

<table>
<thead>
<tr>
<th>Series in TB design</th>
<th>From bore diameter</th>
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</thead>
<tbody>
<tr>
<td>LSL1923</td>
<td>90 mm</td>
</tr>
<tr>
<td>SL1923</td>
<td></td>
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<tr>
<td>ZSL1923</td>
<td></td>
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<tr>
<td>SL1818</td>
<td>460 mm</td>
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<td>SL1822</td>
<td>140 mm</td>
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<td>SL1828</td>
<td>600 mm</td>
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<td>SL1829</td>
<td>300 mm</td>
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<tr>
<td>SL1830</td>
<td>180 mm</td>
</tr>
<tr>
<td>SL1850</td>
<td>180 mm</td>
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</tbody>
</table>

- Longer operating life of the bearing under axial loads
- Significantly higher axial load carrying capacity compared with standard bearings (the axial load can be up to 60% of the radial load)
- Reduced contact pressure due to optimized contact geometry
- No roller wear under axial loads due to improved lubricant film formation
- Lower bearing temperature due to reduced friction (the frictional torque under axial load is reduced by up to 50%)

- High overall equipment efficiency
- New design possibilities (downsizing)
- Lower operating costs due to reduced energy consumption
- Low maintenance costs
The special curvature of the roller end faces means that the contact geometry between the roller end face and the rib has been optimized, thereby reducing the maximum contact pressure. This enables the formation of a stable lubrication film – the end faces and ribs are separated by the lubricant. Under axial loads, the rollers slide on the lubricant film. This considerably reduces the risk of mixed friction conditions. This optimization completely avoids wear on the ribs and the roller end faces.

In future, the axial load can be up to 60% of the radial load with the new INA cylindrical roller bearings with optimized rib contact ($Fa/Fr=0.6$).

The operating life of the bearing under axial load is significantly increased due to improved roller geometry.

Cylindrical roller with optimized roller end face profile

Cylindrical roller with optimized roller end faces
The axial load is distributed on a significantly larger surface area.

- Lower contact pressure
- Higher axial load carrying capacity
- More favorable lubricant film formation
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• Very high cost-effectiveness
• Maximum possible level of service and support