

Summary

- There are basically two types of rolling bearings: Ball bearings and roller bearings
- Ball bearing: Spherical rolling elements, point contact between rolling elements and bearing raceway, suitable for high speeds (e.g. deep groove ball bearing)
- Roller bearings: Roller-shaped rolling elements, line contact between rolling elements and bearing raceway, suitable for high loads (e.g. cylindrical roller bearings)

If you have read our article on [rolling bearing basics](#), you probably already know that rolling bearings can basically be divided into two types – ball bearings and roller bearings.

Ball bearing

Ball bearings are generally characterised by the fact that their [rolling elements](#) have the shape of a ball and contact the bearing [raceway](#) at one point. When they are loaded, the contact area forms a circle due to elastic deformation. Due to the [point contact](#), the [rolling resistance](#) of this type of bearing is low, so the bearings are primarily used in applications with higher [speed](#) and lower loads. Normally, their load capacity is not as high as that of roller bearings, however radial ball bearings can support loads in both axial and radial directions.

Rolling bearing types overview

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Ball bearings are circular and have round rolling elements.



Rolling bearing types overview

The elongated rolling elements of the roller bearings, here using *cylindrical roller bearings* as an example, have linear contact with the raceway.

Roller bearing

Roller bearings generally have the opposite characteristics of ball bearings: The contact surface of the loaded rolling elements with the raceway has the shape of a rectangle due to elastic deformation. **Line contact** leads to a comparatively high frictional **torque** and higher rigidity. For this reason, roller bearings are more suitable for applications with lower speeds compared to ball bearings. Roller bearings have a high load carrying capacity. With a few exceptions, they mainly support radial loads only.



Ball bearing	Roller bearing
Point contact	Line contact
Low rolling resistance	High frictional torque
Suitable for high speed applications	Applications must have lower speed than ball bearings
Lower load capacity	Higher load capacity, high stiffness
Load capacity typically possible in radial as well as axial direction	Load capacity in most cases only possible in radial direction

Where there is light, there is also shadow: Speed and load carrying capacity are important factors in the context of rolling bearings, but they can never be high at the same time.


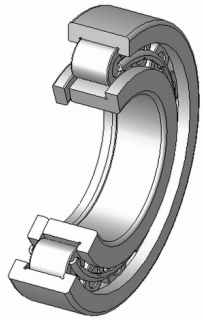

Rolling bearing types overview

Ball bearing and roller bearing types



Well-known ball bearing types are [deep groove ball bearings](#), [angular contact ball bearings](#) and four-point contact bearings. Among the roller bearings, [cylindrical roller bearings](#) are particularly noteworthy. Other roller bearing types in which the rolling elements have a slightly modified form of a cylindrical roller are, for example, [needle roller bearings](#) and [tapered roller bearings](#). In the subchapters of the [rolling bearing types](#) section, in-depth information on the individual ball bearing and roller bearing types as well as [housing bearings](#) can be found. The main properties of individual bearing types can be viewed in the table as an overview.

Type	Image	Advantages	Disadvantages
Ball bearing			
Deep groove ball bearing		<ul style="list-style-type: none">• Many lubrication options• Available in many sizes	<ul style="list-style-type: none">• Sensitive to shock loads• Relatively low service life
Angular contact ball bearing		<ul style="list-style-type: none">• Can be mounted in pairs. Higher load capacity than deep groove ball bearings• Preload possible	<ul style="list-style-type: none">• Comparatively complex assembly and higher costs

Rolling bearing types overview

<p>Thrust (axial) deep groove ball bearing</p>		<ul style="list-style-type: none"> • Separate installation of individual components possible • Can only compensate for misalignments to a limited extent • Must be radially clear by design 	<ul style="list-style-type: none"> • Lower speeds
<p>Roller bearing</p>			
<p>Cylindrical roller bearing</p>		<ul style="list-style-type: none"> • High load rating with the same installation space as other bearings • Highest speeds of all roller bearings 	<ul style="list-style-type: none"> • Misalignment should be avoided • High friction with full complement types
<p>Tapered roller bearing</p>		<ul style="list-style-type: none"> • Supports combined radial and axial loads • For use in pairs. Bearing clearance and preload can be adjusted as required 	<ul style="list-style-type: none"> • Lower limiting speeds than other roller bearings • Oil lubrication often necessary

Rolling bearing types overview

<p>Spherical roller bearing</p>		<ul style="list-style-type: none">• Support combined radial and axial loads• Highest load capacity of all rolling bearings• Accommodates misalignment	<ul style="list-style-type: none">• None other than typical roller bearing disadvantages in general
<p>Needle bearing</p>		<ul style="list-style-type: none">• Compact• Suitable for oscillating loads• Low cost• Highest load ratings with minimum space requirement compared to other rolling bearing types	<ul style="list-style-type: none">• Increased noise• Misalignment should be avoided

In addition to the general advantages and disadvantages of ball bearings or roller bearings, the individual bearing types have specific properties.

Rolling bearing types overview

Type	Outer ring	Inner ring	Rolling elements	Plastic	Pressed steel	Solid brass
 Ball bearing						
 Cylindrical roller bearing						
 Tapered roller bearing	 (cup)	 (cone)				
 Double-row spherical roller bearing						
 Needle bearing						
 Ball thrust bearing	 (housing ring)	 (shaft ring)				
 Spherical roller thrust bearing	 (housing ring)	 (shaft ring)				

Rolling bearing types overview

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This table gives you an overview of the most important types of rolling bearings, including their rolling elements and [cage designs](#).

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Characteristics of deep groove ball bearings In its current form, the deep groove ball bearing has existed – subject to some optimisation – for about

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