

Needle Roller Bearings

Compact radial support, shaft raceways and lubrication guide

Useful where radial space is limited and the surrounding shaft/housing design is part of the bearing system.

What this guide helps you do

Needle roller bearings use long, slender rollers to provide radial load capacity in a compact radial envelope. Many configurations rely on a hardened and accurately finished shaft or housing raceway, while others include inner and/or outer rings. The configuration must be selected together with the mating surfaces, alignment and lubrication method.

At a glance

Question	Why it matters
What is the application?	Defines load direction, duty cycle, environment and required life.
What is the complete arrangement?	Bearing, shaft, housing, seals, lubricant and mounting structure work together.
What must be confirmed before ordering?	Full designation, dimensions, load/speed conditions and approved technical data.

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Prepared for engineering review and RFQ preparation. It is not a released product drawing, guaranteed rating, certificate or substitute for the selected manufacturer's catalogue.

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1. Understand the bearing arrangement

Start by defining the function the bearing must perform. Similar-looking bearings can differ in load direction, stiffness, speed capability, mounting requirements and maintenance needs.

Application fit

- **Compact envelope:** Suitable when radial space is limited, provided the shaft/housing can meet the required raceway geometry and hardness.
- **Configuration matters:** Drawn-cup, machined-ring, with-inner-ring, without-inner-ring, sealed and thrust-related arrangements have different interface needs.
- **Applications:** Transmissions, automotive and agricultural mechanisms, machine tools, power tools and compact industrial linkages.

Design variants to compare

Configuration / feature	Selection notes
With inner ring	Useful when the shaft cannot serve directly as a suitable raceway or when a separate inner raceway is required.
Without inner ring	Can reduce radial space when the shaft is designed as the raceway. Shaft hardness, finish, geometry and lubrication are critical.
Drawn-cup type	Compact outer-ring design; verify housing fit, mounting method and load/speed limits.
Caged or full complement	Roller guidance, friction, speed and lubricant needs differ; confirm the appropriate design.
Sealed versions	Can help retain lubricant and exclude contaminants, but seals affect envelope and operating conditions.

Do not compare price or nominal size until the configuration, suffixes and interface dimensions are aligned. If a part is replacing an existing bearing, use the complete designation and drawing rather than appearance alone.

2. Selection inputs and interface checks

The table below is a working checklist. Record known values and mark unknown values for confirmation before quotation or engineering approval.

Input	What to provide / verify
Space and dimensions	Shaft diameter, raceway diameter, outside diameter, width, shoulder and chamfer geometry.
Raceway quality	Hardness, surface finish, roundness, geometry, material and case depth where specified.
Load and speed	Radial load, shock, speed, oscillation, duty cycle and required life.
Alignment	Shaft deflection, housing alignment, roller skew risk and permissible misalignment.
Lubrication	Grease/oil type, supply route, replenishment and operating temperature.
Assembly	Press-fit method, lead-in chamfer, support tooling, seal protection and access for inspection.

Questions to resolve before approval

- Are loads steady, intermittent, reversing or shock-loaded?
- Is the stated speed continuous, peak, or a short-duration value?
- Are shaft and housing fits, shoulders and support stiffness known?
- Will temperature, lubricant or sealing requirements change during operation?
- Is interchangeability required, and what drawing or source confirms it?

When data are missing, state the assumption explicitly. Do not turn an unknown load, speed, clearance or preload into an invented numerical value.

3. Installation, lubrication and maintenance

Many early bearing failures are associated with contamination, poor fits, misalignment, inappropriate lubrication or installation damage. Follow the selected product's installation instructions and document the final setting where relevant.

Installation checklist

- Confirm whether the shaft or a separate inner ring is the intended raceway before ordering.
- Check the shaft raceway's hardness, finish, roundness and geometry against the approved design; do not assume a standard shaft is suitable.
- Use a controlled press tool and the specified lead-in chamfer. Avoid cocking or deforming thin outer rings during installation.
- Ensure lubricant can reach the rolling contact. Small clearances and high roller density make lubrication details important.
- Protect seals and cage elements during assembly, then check free rotation and axial alignment where applicable.

Symptom-to-check guide

Observed symptom	First checks
Rapid raceway wear	Check shaft hardness/finish, lubrication, contamination and load beyond the design.
Scoring or smearing	Review lubricant film, speed, load, sliding at roller ends and alignment.
Cage damage	Check installation handling, roller guidance, vibration, lubrication and speed.
Outer-ring distortion	Inspect housing fit, housing roundness, press-fit method and wall stiffness.
Heat or seizure	Check lubricant supply, operating clearance, misalignment and thermal expansion.

Record the operating condition when a symptom appears: load, speed, temperature, noise/vibration, lubrication state, recent maintenance and any change to the surrounding structure. This information helps separate a bearing issue from an installation or system issue.

4. RFQ checklist — send the right information

A complete RFQ reduces clarification cycles and helps the supplier check whether the requested bearing and arrangement match the application. Provide drawings or photos where dimensions and interfaces are difficult to describe.

- Complete bearing designation and whether inner ring, outer ring, cage and seals are required.
- Shaft/raceway and housing dimensions, material, hardness, finish and tolerances.
- Radial load, speed, oscillation, duty cycle and temperature.
- Alignment, shaft deflection and housing rigidity.
- Lubricant, sealing, contamination exposure and maintenance access.
- Assembly method, expected life, quality documents and traceability.
- Quantity, packaging and delivery destination.

Suggested RFQ email structure

Field	Your information
Product / full designation	_____
Quantity and annual demand	_____
Application / equipment	_____
Loads, speed and duty cycle	_____
Dimensions / drawing number	_____
Operating environment / lubricant	_____
Quality documents / inspection	_____
Delivery destination / target date	_____

Need help confirming a designation or a substitution? Send the full model number, drawing, quantity and operating conditions to service@eimbearing.com or visit www.eimbearing.com.

5. Technical boundaries and final verification

This document provides general selection and procurement guidance. It does not provide product-specific rated loads, fatigue-life guarantees, maximum speeds, permissible misalignment, preload values, fit tolerances or installation torque unless those values are stated in an approved drawing or product-specific data sheet.

Before release to production

- Confirm the full bearing designation, suffixes and dimensional drawing.
- Confirm the source and revision of any load, speed, life or precision rating used in calculations.
- Verify the bearing, shaft, housing, seals, lubricant and mounting fasteners as a complete system.
- Record any deviations, substitutions and approval responsibilities.
- Follow the supplier's current installation, lubrication and maintenance instructions.

Important note

Catalogue values and suffix meanings may vary by manufacturer and product family. Where a guide describes a general bearing arrangement, it should not be interpreted as proof that two products are interchangeable. Confirm final technical suitability with the applicable product drawing and written supplier confirmation.

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