

# Angular Contact Ball Bearings

Contact angle, paired arrangements, preload and precision guide

A practical guide to axial-load direction, stiffness and bearing arrangement.

## What this guide helps you do

Angular contact ball bearings are designed to support combined radial and axial loads. Axial load capacity depends on contact angle, internal geometry and arrangement. Single bearings generally support axial load more effectively in one direction; paired or multi-bearing arrangements are used when loads act in both directions or higher stiffness is needed.

## 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

- **Combined loads:** Useful where radial load and axial load occur together and shaft guidance or precision matters.
- **Arrangement is critical:** Single, back-to-back, face-to-face and tandem arrangements have different axial capacity, stiffness and moment behaviour.
- **Preload:** Preload can improve stiffness and reduce internal movement but also increases heat and sensitivity to fits and temperature.

## Design variants to compare

| Configuration / feature       | Selection notes                                                                                                   |
|-------------------------------|-------------------------------------------------------------------------------------------------------------------|
| Single bearing                | Confirm the permitted axial load direction and whether a second bearing reacts the opposing thrust.               |
| Back-to-back pair             | Often selected where moment stiffness is important; verify the matched set and mounting orientation.              |
| Face-to-face pair             | Can accommodate misalignment characteristics differently from back-to-back arrangements; check application needs. |
| Tandem pair                   | Can support axial load in one direction with load sharing when designed as a set.                                 |
| Precision classes and preload | Confirm tolerance class, preload class, contact angle and matched-pair requirements from the exact supplier data. |

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                                                                                        |
|------------------------|-----------------------------------------------------------------------------------------------------------------|
| Load                   | Radial load, axial load in both directions, moment, shock and load spectrum.                                    |
| Speed and heat         | Operating speed, lubricant, cage, contact angle, preload and cooling.                                           |
| Arrangement            | Number of bearings, orientation, spacer dimensions, locknut/shoulder arrangement and matched-pair requirements. |
| Precision              | Runout, rotational accuracy, stiffness, vibration and noise limits.                                             |
| Fit and thermal growth | Shaft/housing tolerances, material expansion, operating temperature and internal clearance/preload.             |
| Lubrication            | Grease or oil, viscosity, supply, quantity and relubrication interval.                                          |

### 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

- Keep matched bearings together and preserve orientation markings where supplied.
- Check shaft/housing seats, shoulder squareness, spacers and locknut threads before assembly.
- Apply the specified preload or setting method. Do not create preload by tightening until rotation feels firm.
- Use compatible lubricant and avoid excessive grease fill in high-speed applications.
- After run-in, check temperature, noise, runout and vibration under representative load and speed.

#### Symptom-to-check guide

| Observed symptom        | First checks                                                                           |
|-------------------------|----------------------------------------------------------------------------------------|
| Excessive heat          | Check preload, grease fill, speed, viscosity, fit and thermal expansion.               |
| Poor accuracy or runout | Check bearing precision, mounting faces, spacers, shaft geometry and contamination.    |
| Noise or vibration      | Review raceway condition, lubrication, balance, fits, preload and adjacent components. |
| Cage or contact damage  | Check speed, lubrication, axial loading and whether the arrangement matches the duty.  |
| Premature fatigue       | Review actual load spectrum, alignment, contamination, lubrication and installation.   |

**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.

- Full designation, contact angle, precision class, cage and preload suffix.
- Radial/axial loads, direction, speed, duty cycle and target life.
- Single bearing or matched pair/set; specify DB/DF/DT or the required arrangement in plain language.
- Shaft/housing drawings, spacer dimensions, locknut and shoulder geometry.
- Runout, stiffness, vibration/noise and temperature requirements.
- Lubricant, cooling, contamination, inspection documentation 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](mailto:service@eimbearing.com) or visit [www.eimbearing.com](http://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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