

Bearing types: a practical map

Names, structures and applications - identify the family before comparing a model.

There is no single fixed count of bearing types. The support principle, rolling element, load direction and assembly form are different ways to classify a bearing. Use this map to separate those questions.

Support principle

Rolling contact uses balls or rollers. Plain support uses a sliding interface; its material and lubrication system determine how it works.

Rolling element

Ball or roller. A roller can be cylindrical, needle, tapered or spherical.

Primary load direction

Radial acts across the shaft. Axial / thrust acts along it. Some families accept combined loads.

Common family	Radial duty	Axial duty
Deep groove ball	Primary role	Either direction, within limits
Single-row angular contact	Combined-load design	One direction per bearing
Thrust ball	Not radial guidance	Primary role
Single-row tapered roller	Combined-load design	One direction per bearing

A radial bearing can have specified axial capacity. A thrust bearing is not a third rolling-element shape alongside balls and rollers.

Read this guide

Pages 2-3: eight common rolling-bearing families. Page 4: application questions. Page 5: plain and specialist support systems. Page 6: model-search worksheet and technical basis. This is not an exhaustive catalogue, dimensional schedule or fitting approval.

Four common ball-bearing families

The named examples are real catalogue records, not approvals for a particular machine.

Deep groove ball



Balls in deep ring grooves

Loads: Primarily radial; also axial in either direction within design limits.

Check: Keep the complete closure and clearance suffix. A 2RS version and an open version are different specifications.

SKF 6205 ETN9/C4

Angular contact ball



Balls with an inclined contact line

Loads: Combined radial and axial; a single row takes axial load in one direction.

Check: Contact angle, pair orientation and preload belong to the arrangement, not just the envelope size.

FAG 7205-B-XL-JP

Self-aligning ball



Two ball rows; common spherical outer raceway

Loads: Radial duty with limited axial capacity and alignment accommodation.

Check: Self-aligning does not mean unlimited angular movement; nearby shoulders and seals can restrict it.

SKF 1205 EM

Thrust ball



Balls between shaft and housing washers

Loads: Axial support; not a radial guiding bearing.

Check: Identify single or double direction and compare the whole assembly, not one washer.

SKF 51105

Four common roller-bearing families

Identify the roller form and ring arrangement; appearance alone does not establish interchangeability.

Cylindrical roller



Rollers with parallel sides

Loads: Mainly radial; rib arrangement controls axial behaviour.

Check: N/NU, NJ and NUP are not equivalent locating arrangements.

SKF NU 205 ECJ/C3M

Needle roller



Long, slender rollers

Loads: High radial capacity in a small radial section; thrust needle designs are a separate arrangement.

Check: Check whether an inner ring is present or the shaft itself must be a suitable raceway.

SKF HK 2012

Tapered roller



Conical rollers; cone and cup

Loads: Combined loads; a single row supports axial load in one direction.

Check: Keep both component numbers. Assembly width T differs from separate ring widths B and C.

SKF 30205 J2/Q

Spherical roller



Barrel-shaped rollers; self-aligning raceway

Loads: Substantial radial load with axial load in both directions, within design limits.

Check: Retain bore form, cage and clearance information when choosing a candidate.

SKF 22205 E/C2

Match the family to the duty

Application examples identify a starting family. They are not a model-selection verdict.

Family	Where to start	The limiting question
Deep groove ball	general rotating shafts such as motors and fans.	Keep the complete closure and clearance suffix. A 2RS version and an open version are different specifications.
Angular contact ball	pumps, spindles and other combined-load arrangements.	Contact angle, pair orientation and preload belong to the arrangement, not just the envelope size.
Self-aligning ball	Consider when shaft-to-housing alignment is a design concern.	Self-aligning does not mean unlimited angular movement; nearby shoulders and seals can restrict it.
Thrust ball	Axial shaft location with the radial load supported elsewhere.	Identify single or double direction and compare the whole assembly, not one washer.
Cylindrical roller	Radial shaft support in machinery and transmissions.	N/NU, NJ and NUP are not equivalent locating arrangements.
Needle roller	Compact mechanisms where radial space is limited.	Check whether an inner ring is present or the shaft itself must be a suitable raceway.
Tapered roller	Opposed shaft arrangements where axial adjustment is specified.	Keep both component numbers. Assembly width T differs from separate ring widths B and C.
Spherical roller	Heavy-duty shaft supports with alignment considerations.	Retain bore form, cage and clearance information when choosing a candidate.

Do not select by machine name alone

Two machines with the same name can have different shaft sizes, speeds, load directions, temperatures, sealing and locating arrangements. Start with the complete installed designation and the equipment documentation; then compare the actual duty and full specification.

Use the load calculator and retain the assumptions

Beyond the eight examples

Plain forms, assemblies and specialist systems are not extra roller shapes.

Form or system	What the term describes	What this guide does not decide
Journal bearing / sleeve bush	Sliding support around a shaft, commonly for radial support.	Material, lubrication, running clearance or shaft-surface specification.
Plain thrust bearing / washer	Sliding support at a shaft face or shoulder.	Permissible axial load or wear performance.
Spherical plain / rod end	Articulation through a spherical sliding interface; a rod end includes a mounting shank.	Sliding pair, permitted articulation, thread or exact mounting fit.
Mounted bearing unit	A bearing combined with its housing. A housing alone is not another rolling-element family.	Housing and insert interchange or base/bolt dimensions.
Linear bearing / guide	Guided translation instead of rotary shaft support.	Load rating, preload class or rail/carriage interchange.
Fluid-film support	Liquid or gas separates the supporting surfaces under specified conditions.	Film thickness, pressure, start-up behaviour or operating stability.
Magnetic support	Magnetic forces support the shaft as part of a support/control system.	Control-system design, backup arrangement or validated operating limits.

Keep similar words distinct

Hydrodynamic support develops a film through relative motion; externally pressurized support needs a pressure supply. “Antifriction” commonly describes rolling-element bearings, not zero friction. “Plain” does not automatically mean dry-running. Specialist designs need their own engineering data.

Find and compare an exact model

Keep the record traceable. A shared appearance or envelope size is only a candidate, not an approved replacement.

1. Rotation or translation?

A shaft rotating in a support and a carriage translating on a rail need different geometry.

Linear bearings and guides

2. Radial, axial or combined duty?

Resolve the load directions and identify which support locates the shaft.

Load calculations

3. What structure and complete marking?

Identify the family first; then retain brand, suffixes and assembly components.

Designation decoder

4. What size and operating conditions?

Use the named dimensions, then check ratings, speed, clearance and lubrication.

Dimension and model lookup

5. Is it actually interchangeable?

Compare the full technical requirement, not just the appearance or shared dimensions.

Interchange checklist

Technical basis and edition scope

Original BearingScope explanation and layout. Principles were checked against the NSK sources below, captured on 2 October 2026. The eight linked model examples use their existing BearingScope records and full suffixes. Product pictures are catalogue illustrations, not dimensioned engineering drawings.

NSK: Bearing Basics

NSK: Types of Rolling Bearings

NSK: Roller Bearings

NSK: Deep Groove Ball Bearings

NSK: Angular Contact Ball Bearings

NSK: Thrust Ball Bearings

NSK: Self-Aligning Ball Bearings

This independent reference does not reproduce a manufacturer catalogue or supply CAD, full dimension tables, load/speed limits, fitting torques, service intervals or vehicle fitment. Manufacturer names identify the technical basis and model records, not endorsement.

Continue with the live bearing-family reference