Principles of bearing selection and application

Bearing terminology

**Bearing arrangement**

> fig 1

1. Cylindrical roller bearing
2. Four-point contact ball bearing
3. Housing
4. Shaft
5. Shaft abutment shoulder
6. Shaft diameter
7. Locking plate
8. Radial shaft seal
9. Distance ring
10. Housing bore diameter
11. Housing bore
12. Housing cover
13. Snap ring

![Bearing arrangement diagram](image1.png)

**Radial bearings**

> figs 2 and 3

1. Inner ring
2. Outer ring
3. Rolling element: ball, cylindrical roller, needle roller, tapered roller, spherical roller
4. Cage
5. Capping device
   - Seal – made of elastomer, contacting (shown in figure) or non-contacting
   - Shield – made of sheet steel, non-contacting
6. Outer ring outside diameter
7. Inner ring bore
8. Inner ring shoulder diameter
9. Outer ring shoulder diameter
10. Snap ring groove
11. Snap ring
12. Outer ring side face
13. Seal anchorage groove

![Radial bearings diagram](image2.png)
14 Outer ring raceway
15 Inner ring raceway
16 Sealing groove
17 Inner ring side face
18 Chamfer
19 Bearing mean diameter
20 Total bearing width
21 Guiding flange
22 Retaining flange
23 Contact angle

Thrust bearings (➔ fig 3)
24 Shaft washer
25 Rolling element and cage assembly
26 Housing washer
27 Housing washer with sphered seating surface
28 Seating support washer
Bearing types

Radial bearings

Deep groove ball bearings
- single row, with or without filling slots
  - open basic design (1)
  - with shields
  - with contact seals (2)
  - with snap ring groove, with or without snap ring
- single row with fixed section
  - open basic design (3)
  - with contact seals
- double row (4)

Angular contact ball bearings
- single row
  - design for universal matching (5)
  - basic design for single mounting
  - single row high precision ¹)
  - standard design for single mounting (6)
  - design for universal matching
  - matched bearing sets
- double row
  - with one-piece inner ring (7)
  - open basic design
  - with shields
  - with contact seals
  - with two-piece inner ring

Footnote → page 31
Bearing types

**Radial bearings**
Four-point contact ball bearings (8)

**Self-aligning ball bearings**
with cylindrical or tapered bore
open basic design (9)
with contact seals (10)
with extended inner ring (11)

**Cylindrical roller bearings**
single row
NU type (12)
N type (13)
NJ type (14)
NUP type (15)
angle ring (16)
for NU and NJ type bearings
Radial bearings

Cylindrical roller bearings
double row\(^1\)
with cylindrical or tapered bore
  NNU type (17)
  NN type (18)
  NNUP type

four-row\(^2\)
with cylindrical or tapered bore
  open design (19)
  with contact seals

Full complement cylindrical roller bearings
single row
  NCF type (20)
  NJG type (21)

double row
  with integral flanges on the inner ring (22)
  with integral flanges on the inner and outer rings
  with contact seals (23)

Needle roller and cage assemblies\(^3\)
single row (24)
double row (25)

Drawn cup needle roller bearings, open ends\(^3\)
single and double row
  open basic design (26)
  with contact seals (27)

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Radial bearings

Drawn cup needle roller bearings, closed end
- single and double row
- open basic design
- with contact seal

Needle roller bearings with flanges
- single and double row
- without inner ring
- with inner ring
- open basic design
- with contact seals

Needle roller bearings without flanges
- single and double row
- with inner ring
- without inner ring

Alignment needle roller bearings
- without inner ring
- with inner ring

Combined needle roller bearings
- Needle roller/angular contact ball bearings
  - single direction
  - double direction

Needle roller/thrust ball bearings
- with full complement thrust ball bearing
- with cage-guided ball set
- with or without cover

Footnote ➔ page 31
Radial bearings

Needle roller/cylindrical roller thrust bearings
without cover (39)
with cover (40)

Taper roller bearings

single row
single bearings (41)
matched bearing sets
  face-to-face (42)
  back-to-back
  in tandem

double row\(^2\)
  TDO configuration (back-to-back) (43)
  TDI configuration (face-to-face) (44)

four-row\(^3\)
  TQO configuration (45)
  TQI configuration

Spherical roller bearings

with cylindrical or tapered bore
open basic designs (46)
with contact seals (47)

CARB toroidal roller bearings

with cylindrical or tapered bore
open basic designs
  with cage-guided roller set (48)
with full complement roller set
  with contact seals (49)

Footnote ➔ page 31
**Bearing types**

**Thrust bearings**

**Thrust ball bearings**
- single direction
  - with flat housing washer (50)
  - with sphered housing washer with (51) or without seating washer

- double direction
  - with flat housing washers (52)
  - with sphered housing washers with (53) or without seating washers

**Angular contact thrust ball bearings**
- high precision bearings
  - single direction
    - standard design for single mounting (54)
    - design for universal matching
    - matched bearing sets (55)

- double direction
  - standard design (56)
  - high-speed design (57)

**Cylindrical roller thrust bearings**
- single direction
  - single row (58)
  - double row (59)
- components
  - cylindrical roller and cage thrust assemblies
  - shaft and housing washers

**Needle roller thrust bearings**
- single direction (60)
  - needle roller and cage thrust assemblies
  - raceway washers
  - thrust washers

Footnote ➔ page 31
Thrust bearings

Spherical roller thrust bearings
single direction (61)

Taper roller thrust bearings\(^2\)
single direction
with or without (62) cover
screw down bearings
double direction (63)

Footnote ➔ page 31
Bearing types

Track runner bearings

Cam rollers
- single row ball bearing cam roller (64)
- double row ball bearing cam roller (65)

Support rollers
- without axial guidance
  - with or without contact seals
  - without inner ring
  - with inner ring (66)
- with axial guidance by thrust washers
  - with or without contact seals
  - with cage-guided needle roller set (67)
  - full complement
- with axial guidance by cylindrical rollers
  - with labyrinth seals (68)
  - with contact seals (69)
  - with lamellar seals

Cam followers
- with axial guidance by thrust plate
  - with or without contact seals
  - with concentric seating (70)
  - with eccentric seating collar
  - with full complement needle roller set
- with axial guidance by cylindrical rollers
  - with labyrinth seals (71)
  - with contact seals
  - with concentric seating
  - with eccentric seating collar

Footnote ➔ page 31
Y-bearings

Y-bearings (insert bearings) 4)  
with grub screw locking  
inner ring extended on one side (72)  
inner ring extended on both sides (73)

with eccentric locking collar  
inner ring extended on one side (74)  
inner ring extended on both sides (75)

with tapered bore  
inner ring extended on both sides (76)  
for adapter sleeve mounting

with standard inner ring  
for locating by interference fit on the shaft (77)

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1) See SKF catalogue “High-precision bearings” or “SKF Interactive Engineering Catalogue”
2) See “SKF Interactive Engineering Catalogue”
3) See SKF catalogue “Needle roller bearings” or “SKF Interactive Engineering Catalogue”
4) See SKF catalogue “Y-bearing units” or “SKF Interactive Engineering Catalogue”