

QUALITY REQUIREMENTS

OEM Wälzlager –
Specifications and Requirements
for Supplying Quality Bearings
According to DIN/ISO-Standards



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1. Requirement Basics

To assure the multiple requirements on bearings in mechanical engineering and construction all supplied bearing types have to be manufactured dimensionally to international standards of DIN/ISO and are supposed to be produced at a high quality standard.

For strict observance some of the most crucial functional features of bearing components are specifically listed below.

OEM reserves its rights to control and evaluate the supplier's production process of their specific bearing types.

In addition OEM will check, analyze and assess continuously the quality of the supplied material by independent and neutral test institutes (e.g. Material-Test Lab – Brno/CZ and Prüftechnik Assmann – Aachen).

2. Technical Requirements on Bearings

2.1 External Dimensions have to be According to DIN/ISO Measures

- Deep groove ball bearings (single row) as per DIN 625-1 / DIN616:2000 or ISO15:1998
- Taper roller bearings as per DIN 616:2000, DIN ISO 355:1978 and DIN 720:1979
- Cylindrical roller bearings (single row) as per DIN 5412-1:2000 and DIN 616:2000 or ISO 15-1998
- Spherical roller bearings as per DIN 635-2:1984 and DIN 616:2000 or ISO 15-1998

2.2 Precision Class as per DIN 620-4 / ISO 492:2002

- P0 = (PN – normal precision class)
- or P6 (Class 6)

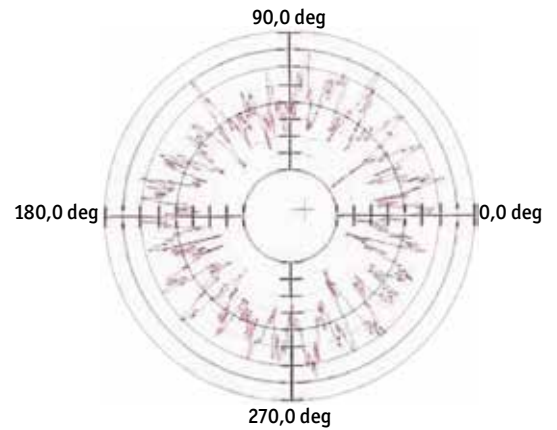
2.3 Manufacturing Quality of Functional Components

a) Bearing raceways (inner/outer) = roughness (in R_a -values/ μm)

Outer diameter (mm)	=	R_a - Reference value (μm)
20 – 80		0.05 – 0.07
80 – 120		0.06 – 0.08
120 – 180		0.07 – 0.10
180 – 250		0.08 – 0.12
> 250		= / < 0.10 – 0.12

b) Bearing raceways (inner/outer) = Radial runout (deviation in μm)

Outer diameter (mm)	=	Runout-value (μm)
20 – 80		0.8 – 1.25
80 – 120		1.25 – 1.50
120 – 180		1.50 – 2.25
180 – 250		1.75 – 2.25
> 250		= / < 2.25



2.4 Materials and Components

For through-hardened components = **bearing steel 100Cr6 as per DIN EN ISO 683-17:2000** (ASTM 52100; JIS SUJ2)

Important threshold of the **chemical steel composition**:

Carbon	C	= 0.93 – 1.05 %	Chromium	Cr	= 1.35 – 1.60 %
Silicon	Si	= 0.15 – 0.35 %	Molybdenum	Mo	= < 0.10 %
Manganese	Ma	= 0.25 – 0.45 %	Aluminium	Al	= < 0.05 %
Phosphorus	P	= 0.025 %	Copper	Cu	= < 0.30 %
Sulphur	S	= 0.015 %			

Hardness of bearing components (except cage) = 58 – 65 HRC

Cage material:

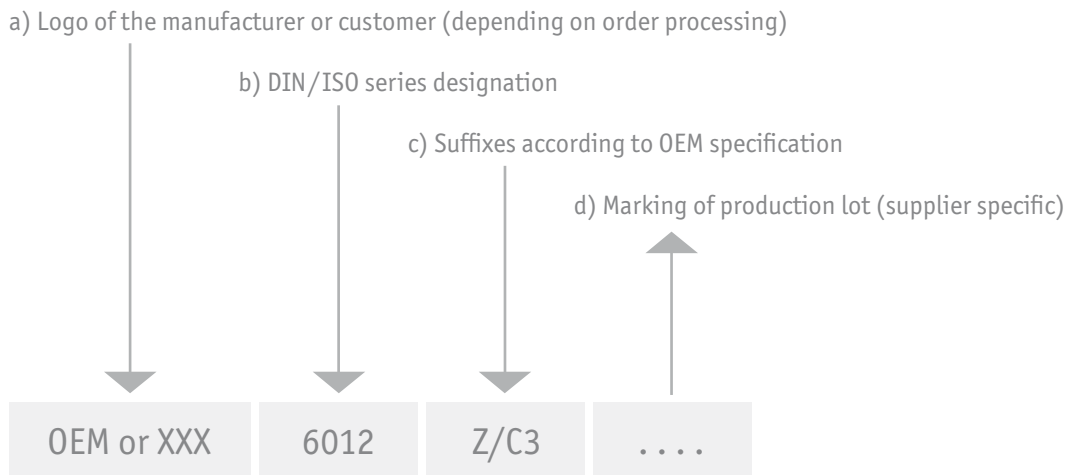
- Standard steel DIN EN 10111:1998
- Machined brass
- Plastic (PA66)

The type of cage material will be determined by OEM!

2.5 Part Numbering and Codes

The bearings have to be marked clearly on the face of the outer raceway (as far as the space is enough).
The type of marking can be freely chosen by the supplier and may be chemical, mechanical or by a laser machine.

Example – for the kind of marking:



2.6 Additional Codes/Packing/Transport

- Additional pre- or suffixes will be determined mutually between OEM and the supplier.
- The type of packing material (single, multiple, material) will be determined by OEM and agreed with the supplier.
- The execution of transport as well as transport warranties will be determined by OEM.

2.7 Quality and Operational Examinations

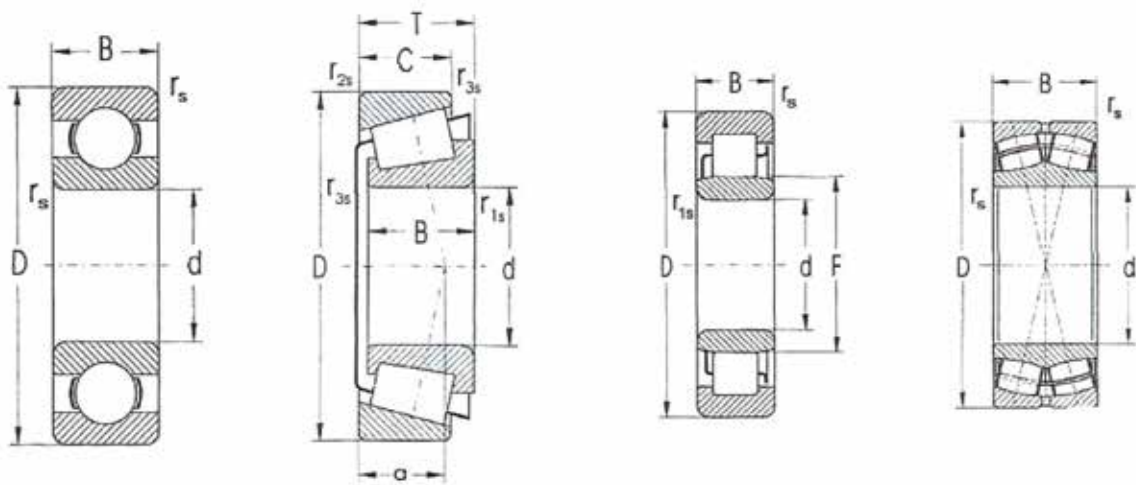
The bearing manufacturer ensures a consistent quality control level at all stages during and after the bearing production and assembly:

- Control of the proper functional component assembly (i. e. balls, cage, seals)
- Visual check after final assembly stage
- Cleaning and applying corrosive protection
- Depending on application conduction of a vibrational and/or sound-test
- Check and insure the right grease amount and type

2.8 Documentation/ Product Data

For all bearing types the supplier has to provide proper catalog data / data sheets which show the required and necessary information such as:

- Main dimensions
- Fitting dimensions
- Fatigue load limit
- Limiting speeds
- Calculation factors
- Weight
- Explanation of designations



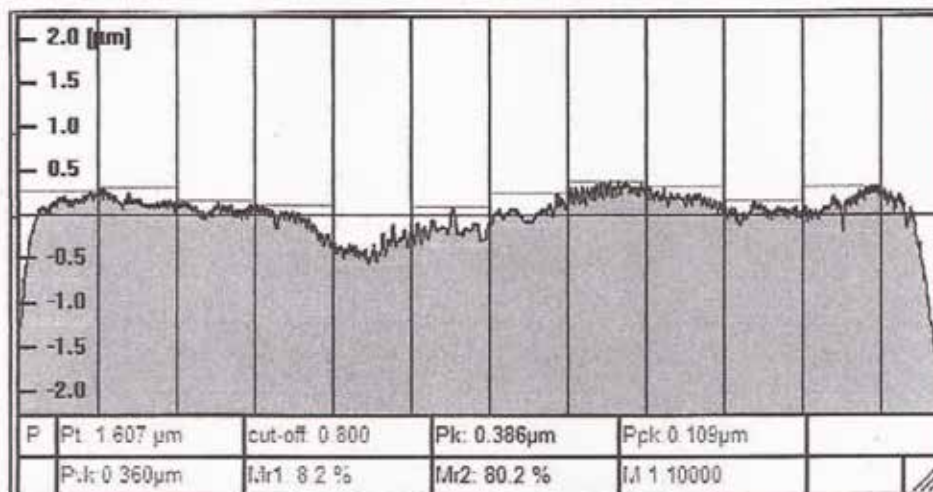
3. Bearing Types / Design – Quality Features

3.1 Deep Groove Ball Bearings

- Main dimensions according to DIN 625-1 or DIN 616:2000 or ISO 15:1998
- Precision class, production quality = P0/P6 (same as 2.2)
- Manufacturing quality of surface roughness R_a and the radial runout of the raceways have to be in the given limits of point 2.3 a) and b)
- Radial clearance as per DIN 620 / ISO 5753 = CN – normal clearance (except when OEM determines specific clearances due to the application)
- Number of balls respectively the load conditions /documentation
- Cage material = steel – if not differently stated by OEM
- Quality level of balls: G10 or G16
- Targeted raceway profile and characteristic

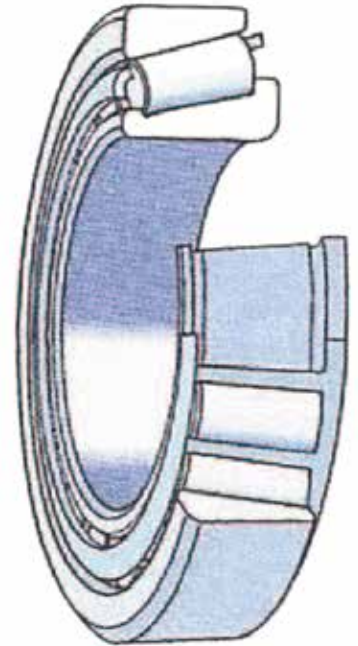


Example: Profile-flat projection at outer and inner rings

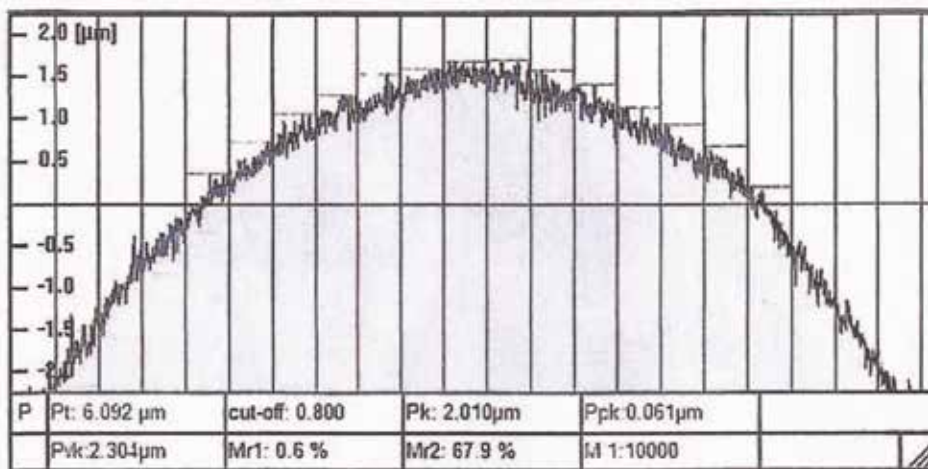


3.2 Taper Roller Bearings

- Main dimensions according to DIN 616:2000 or DIN ISO 355:1978; DIN 720:1979
- Precision class of running accuracy has to be according to "normal precision" per DIN620-2:1988 or ISO 492:2002
- Manufacturing quality of surface roughness R_a and the radial runout of the raceways have to be in the given limits of point 2.3 a) and b)
- Number of balls respectively the load conditions/documentation
- Cage material = steel – if not differently stated by OEM
- The quality of the tapered rollers has to reach at least the surface roughness R_a -values and the radial runout of point 2.3 a) and b) if not better.
- Targeted raceway profile as shown below – convex characteristic!

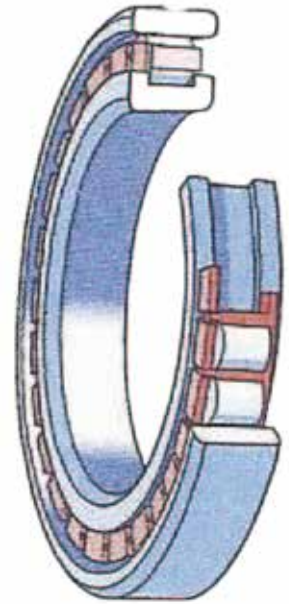


Example

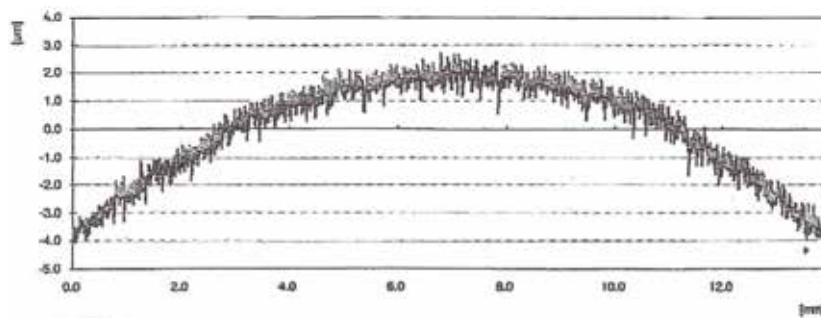


3.3 Cylindrical Roller Bearings

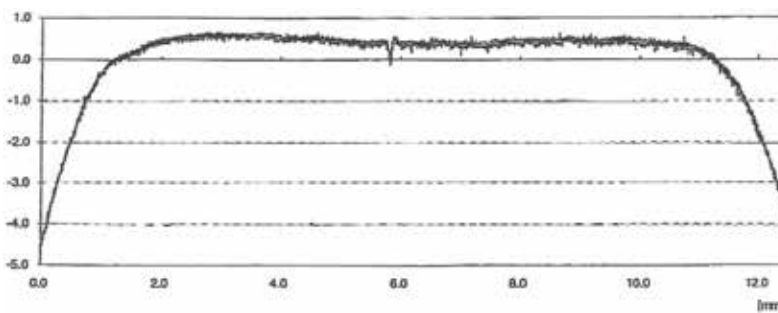
- Main dimensions according to DIN 616/5412-1:2000 or ISO 15:1998; (according to point 2.1)
- Precision class of running accuracy production quality = P0 (normal) or P6 as per DIN620-2:1988 or ISO 492:2002
- Manufacturing quality of surface roughness R_a and the radial runout of the raceways have to be in the given limits of point 2.3 a) and b)
- The quality of the cylindrical rollers has to reach at least the surface roughness R_a -values and the radial runout of point 2.3 a) and b) if not better.
- Targeted raceway profile and characteristics as shown below



Inner ring



Outer ring



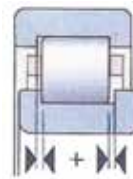
Radial clearance

= C-normal *), min/max values **)
Per DIN 620-4:1987 / ISO 5753:1991



Axial clearance

= depending on bearing type
(consider the standard data sheets)



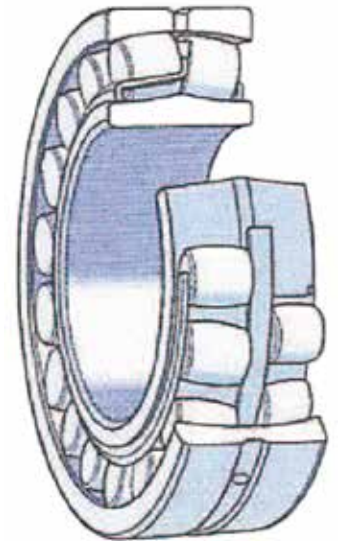
*) Different clearance will be mentioned in the order. **) Attention! Values apply only for non-installed bearings.

3.4 Spherical Roller Bearings (Referring to Cylindrical Bore Types)

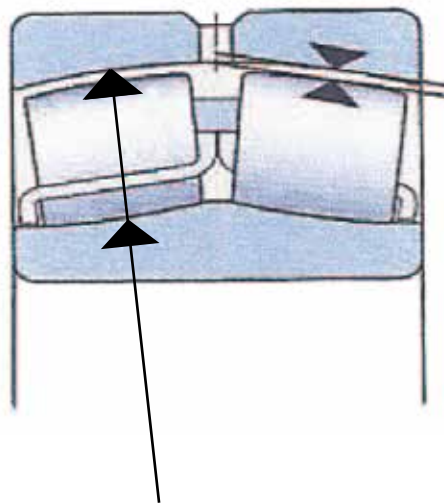
- Main dimensions according to DIN 625-2:1984 and DIN 616:2000 or ISO 15-1998
- Precision class of running accuracy production quality = P0 (normal) or P6 as per DIN620-2:1988 or ISO 492:2002
- Manufacturing quality of surface roughness R_a and the radial runout of raceways have to be in the given limits of point 2.3 a) and b)

Limits of additional functional features:

- Normal clearance CN according to DIN 620-4:1987 or ISO 5753:199. *) **)



Cylindrical bore, sketch



Geometric adjusted profiling of rollers and raceways

*) Changes in clearance are determined by OEM in case of order!

**) Attention! Values apply only for non-installed bearings with no load.

3.5 Additional Bearing Types, Specials

If OEM issues an order for bearing types that are not listed in above OEM-specifications, all main dimensions of the specific design have to be maintained according to the DIN/ISO-standards.

If OEM issues an order for special bearings, all specific design features will be determined with the order by documents/drawings.

For all OEM-orders the technical requirements and manufacturing quality have to be considered and applied according to the points 2.1 – 2.8 (pages 3-6).