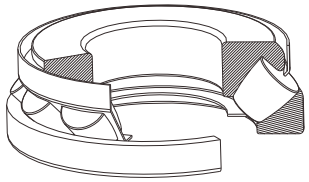
Different from single thrust bearings, double direction thrust ball bearings can take two-direction axial load.

Can compensate the influence of misalignment. Since the bearings are separable, it is easy for mounting.

When in service, in order to alleviate the influence caused by mounting error, etc., thrust ball bearings with self-aligning seat washers can also be mounted on the outer ring.

Small size bearings mainly adopt steel sheet pressed cage; large bearings adopt machined cage.

12) Spherical Thrust roller bearing

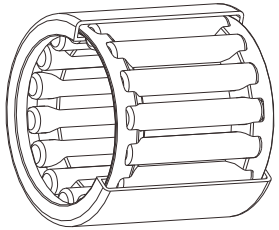


Rollers of these bearings are barrel-shaped. Since the raceway in the housing washer is spherical, they are self-aligning .Barrel-shaped roller are arranged slantwise, therefore the deflection of the axle is permitted. Axial load capacity is very large, and can take some radial load as well as axial load. Generally adopt oil lubrication while used.

Adopted cages mainly include: copper alloy cut cage.

These bearings are mainly used in hydraulic generator, vertical type motor, vessel propeller shaft, tower crane, extruder, etc.

13) Needle roller bearing



Needle roller bearings contain a great many long and thin needle rollers whose length is 3 ~ 10 times longer than their diameters. The structure is compact, the outer diameter and the inscribed circle diameter of the bearing is small, so the radial load capacity is high.

Needle roller bearings mainly include the following types:

Needle roller bearings with pressed outer ring which is made of special steel sheet; Needle roller bearings with solid outer ring which is made of cut rings; Cage and roller components without rings and needle roller bearings for gyor wheels.

Besides the above-mentioned, there are also other types with or without inner rings or cages.

The cages of needle roller bearings are mainly pressed steel sheet cages.

2 Boundary dimension and basic number of rolling bearings

2.1 Boundary dimension

The main dimension of bearings refer to the inner diameter (d), outer diameter (D), width (B) or height (H) and chamfer size (r), etc., which are required when mounting the bearings onto the axle or into the housing. See Figure 2.1 ~ 2.3.

For the main dimension series, the International Standardization Organization (ISO) has established international standards (ISO 15, ISO 355 and ISO 104) to ensure the exchangeability and economical efficiency internationally. Corresponding specifications have been made for the main size of radial bearings, tapered roller bearings and thrust bearings, i.e. the inner diameter, outer diameter, width and chamfer size of bearings have been serialized and standardized. The standards of China also adopt the standard specifications of ISO. The corresponding standard numbers are GB/T273.1, GB/T273.2 and GB/T273.3. The assembling chamfer standard is GB/T274.

The dimension including inner diameter and diameter series, and width (or height series).See Figure 2.4-2.5

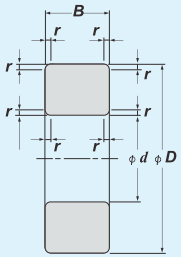


Fig. 2.1 Radial bearing (excluding tapered roller bearing)

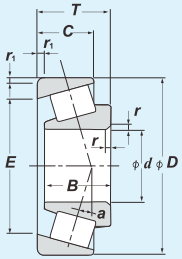


Fig. 2.2 Tapered roller bearing

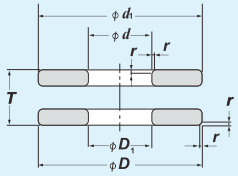


Fig. 2.3 Single direction thrust bearing

Table 2.1 Dimension series

	Dimension series				
	Diameter series (outside dimension)		Width series (width)	Height series (height)	Reference figure
Radial bearing (excluding tapered roller bearing)	No.	7,8,9,0,1,2,3,4	8, 0, 1, 2, 3, 4, 5, 6	——	Figure 2.4
	Dimension	Small ⟷ Large	Small ⟷ Large		
Tapered roller bearing	No.	9,0,1,2,3	0, 1, 2, 3	——	——
	Dimension	Small ⟷ Large	Small ⟷ Large		
Thrust Bearing	No.	0,1,2,3,4	——	7, 9, 1, 2	Figure 2.5
	Dimension	Small ⟷ Large		Small ⟷ Large	

Diameter series refer to the dimension series of outer diameter of the bearings with the same inner diameter. The outside dimensions are 7, 8, 9, 0, 1, 2, 3, 4, etc. which are increasing series.

Width series refer to the dimension of width dimension of the bearings with the same diameter. There are width dimensions are 7, 8, 9, 0, 1, 2, 3, 4, etc. which are increasing series.

The height series of thrust bearings correspond to the width series of radial bearings, with four increasing series of height dimensions, 7, 9, 1, 2, etc. See Table 2.1.

The bearing dimension series number are consist of the width (height) series codes and the diameter series codes.

See Fig. 2.4 and Fig. 2.5 for their relations.

For metric system tapered roller bearings, ISO 355 specifies that the diameter series of the relative inner diameters are represented by A, B, C, D, E, F and G, the outer diameters are increasing series, and width dimensions are represented by A, B, C, D and E, which are incremental, in addition, specifies the contact angle series (1, 2, 3, 4, 5, 6, 7), which are increasing series. The standards of China specify that the diameter series and width series are both 0, 1, 2 and 3.

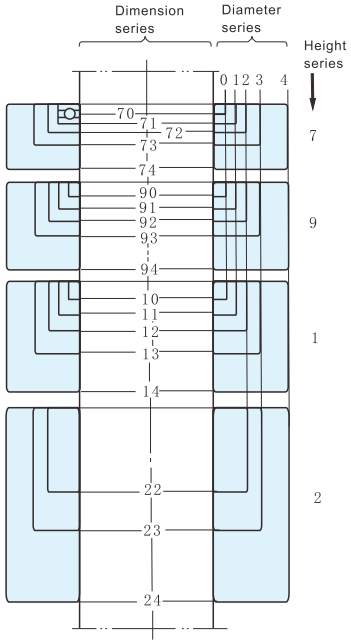


Fig. 2.5 Dimension series of thrust bearings

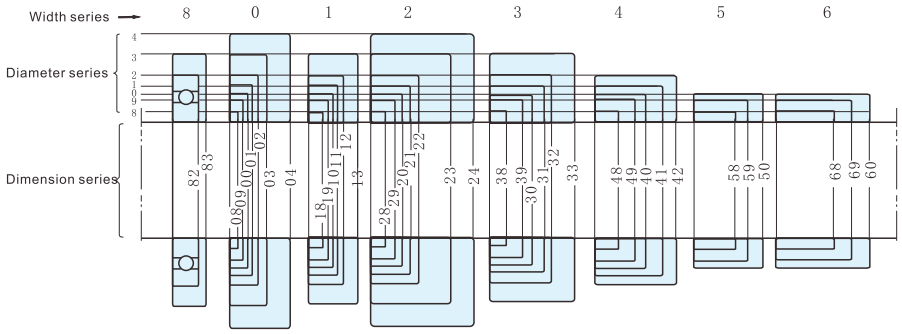


Fig. 2.4 Dimension series of radial bearings(excluding tapered roller bearings)

2.2 Structure of bearing number

Bearings number is consist of basic number. Prefix code and suffix code. In which basic number describes bearing type ,structure and size while prefix code or suffix code is bearing shape ,tolerance and some Supplementary specification when technical requirement is changed .

Table 2.2 Arrangement rules of bearing codes

	Prefix code	Basic number			Suffix code							
					1	2	3	4	5	6	7	8
Example	Whole set bearing component	Type code	Dimension series code	Inner diametercode	Internal structure	Transformation of seal and shield	Cage and its material	Bearing material	Class of tolerance	Clearance	Arrangement	Other
6204-2RZ/P53		6	(0)2	04		2RZ			P5	C3		

2.2 Basic number

Except needle roller bearings, the basic number of the bearing whose dimension conforms to any of GB/T273.1, GB/T273.2, GB/T273.3 and GB 3882 and consists of bearing type code, dimension Series code and inner diameter code.

Basic number:

In the basic number, when the bearing number is represented by letters, there shall be a space of half character between the the bearing dimensional series code, inner diameter code or mounting fit characteristic number.

For example: NU 2300

For general bearing types, dimension series code and bearing basic numbers consisting of bearing type code and dimension series code. See Table 2.3