

NEEDLE ROLLER BEARINGS

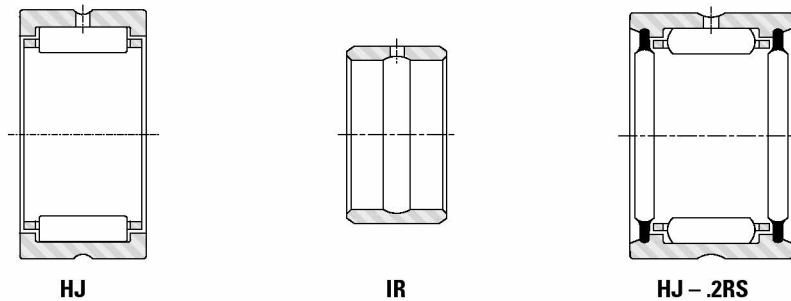
INCH SERIES

When there is a requirement for a rolling bearing to support very high dynamic, static or even shock loads with a restricted mounting space – the needle roller bearing may give best results.

REFERENCE STANDARDS ARE:

- **ANSI/ABMA Standard 18.2** – needle roller bearings – radial, inch design.
- **ASTM Standard F 2246** – standard specification for bearing, roller, needle: thick outer ring with rollers and cage.
- **Military Standard MS 51961** – bearing, roller, needle: thick outer ring with rollers and cage.
- **ASTM Standard F2431** – standard specification for ring, bearing, inner: needle roller bearing with thick outer ring.

IDENTIFICATION



The prefix letters HJ in the needle roller bearing designation denote that the bearing is manufactured to inch nominal dimensions.

Bearings are available with one or two lip-contact seals, as listed on pages B-202 and B-203. One seal is designated by suffix letters RS. Two seals are designated by .2RS.

Inner rings can be used with HJ Series needle roller bearings for applications where it is impractical to use the shaft as the inner

raceway. These inch series inner rings are identified by the prefix letters IR.

Because the entire identification code may not appear on the bearing itself, the manufacturer's parts list or another reliable source should always be consulted when ordering bearings for service or field replacement to make certain that the correct bearing with the correct lubricant is used.

CONSTRUCTION

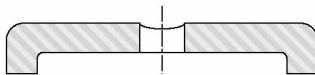


Fig. B-45. One-piece, channel-shaped outer ring



Fig. B-46. Steel cage

The HJ Series needle roller bearing has a one-piece channel-shaped outer ring of bearing-quality steel heat treated to provide maximum load rating. The integral end flanges provide axial location for the needle rollers. The bores of the end flanges serve as piloting surfaces for the cage, locating it to prevent removal of the lubricant film on the raceway.

These bearings have a steel cage, which provides inward retention for the needle rollers. The design assures roller stability and minimizes friction between the cage and the needle rollers. The cage has a maximum strength consistent with the inherent high load ratings of needle roller bearings.

The needle rollers are made from high-carbon chrome steel, through-hardened, ground and lapped to close tolerance with controlled contour for optimum load distribution.

SEALS

Shaft contact seals, which fit into the same housing bore as the heavy-duty needle roller bearings, may be obtained from recognized seal manufacturers. Bearings can also be made available with one or two integral seals. For information and listing of sealed bearings, see pages B-202 and B-203.



LUBRICATION

The outer rings of the HJ bearings are supplied with a lubrication groove on the O.D. and a lubrication hole in this groove to facilitate re-lubrication through the outer ring. The IR inner rings have lubrication grooves in the bore and a re-lubrication hole to facilitate re-lubrication through the inner ring.

HJ Series bearings (with or without seals) are typically shipped protected with a corrosion-preventive compound that is not a lubricant. When specified by the customer, HJ Series bearings may be ordered prelubricated with suitable greases and oils.

MOUNTING DIMENSIONS

HJ needle roller bearings are normally mounted in their housings with a clearance fit if the load is stationary relative to the housing, and with a tight transition fit if the load rotates relative to the housing. Because the tight transition fit of the bearing in its housing may result in a reduction of the needle roller complement bore diameter, the shaft raceway diameter should be reduced to a like amount.

The mounting dimensions in the bearing tables (pages B-196 to B-203) list the suggested ISO H7 tolerances for the housing bore and the suggested ISO h6 tolerances for the shaft raceway when the outer ring is to be mounted with a clearance fit. The tables also list the suggested ISO N7 tolerances for the housing bore and the suggested ISO f6 tolerances for the shaft raceway when the outer ring is to be mounted with a tight transition fit.

Other mounting dimensions may be required for special conditions such as:

1. Extremely heavy radial loads.
2. Shock loads.
3. Load rotating relative to both inner and outer rings.
4. Temperature gradient across bearing.
5. Housing with heat expansion coefficient differing from that of the bearing.

If these conditions are expected, please consult your representative.

DIMENSIONAL ACCURACY, BEARINGS

HJ SERIES

Tolerances for the HJ bearings are given in Tables B-25 and B-26. Pages B-196 to B-203 list the nominal outer diameter, width and needle roller complement bore diameter for the HJ bearings.

Table B-25. Outer diameter and width tolerances, HJ bearings

D				Deviaiton from nominal							
Nominal outer diameter				of single mean outer diameter, $D_{mp}^{(1)}$				of width, C			
>	≤	>	≤	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
mm	mm	in.	in.	mm	mm	in.	in.	mm	mm	in.	in.
19.050	50.800	0.7500	2.0000	+0	-0.013	+0	-0.0005	+0	-0.013	+0	-0.005
50.800	82.550	2.0000	3.2500	+0	-0.015	+0	-0.0006	+0	-0.013	+0	-0.005
82.550	120.650	3.2500	4.7500	+0	-0.020	+0	-0.0008	+0	-0.013	+0	-0.005
120.650	184.150	4.7500	7.2500	+0	-0.025	+0	-0.0010	+0	-0.013	+0	-0.005
184.150	260.350	7.2500	10.2500	+0	-0.030	+0	-0.0012	+0	-0.013	+0	-0.005
260.350	317.500	10.2500	12.5000	+0	-0.036	+0	-0.0014	+0	-0.013	+0	-0.005

⁽¹⁾ "Single mean diameter" is defined as the mean diameter in a single radial plane.

Table B-26. Roller complement bore tolerance, HJ bearings

F_w				Deviaiton from nominal of the smallest single diameter ⁽¹⁾ of the roller complement bore, $F_r^{(1)}$			
Nominal roller complement bore diameter				Max.	Min.	Max.	Min.
>	≤	>	≤	mm	mm	in.	in.
mm	mm	in.	in.	mm	mm	in.	in.
12.700	15.875	0.5000	0.6250	+0.043	+0.020	+0.0017	+0.0008
15.875	28.575	0.6250	1.1250	+0.046	+0.023	+0.0018	+0.0009
28.575	41.275	1.1250	1.6250	+0.048	+0.025	+0.0019	+0.0010
41.275	47.625	1.6250	1.8750	+0.050	+0.025	+0.0020	+0.0010
47.625	69.850	1.8750	2.7500	+0.053	+0.028	+0.0021	+0.0011
69.850	76.200	2.7500	3.0000	+0.058	+0.028	+0.0023	+0.0011
76.200	101.600	3.0000	4.0000	+0.060	+0.030	+0.0024	+0.0012
101.600	114.300	4.0000	4.5000	+0.066	+0.030	+0.0026	+0.0012
114.300	152.400	4.5000	6.0000	+0.069	+0.033	+0.0027	+0.0013
152.400	165.120	6.0000	6.5000	+0.074	+0.033	+0.0029	+0.0013
165.100	195.850	6.5000	7.7500	+0.077	+0.036	+0.0030	+0.0014
196.850	234.950	7.7500	9.2500	+0.082	+0.036	+0.0032	+0.0014

⁽¹⁾ "The smallest single diameter of the roller complement bore" is defined as the diameter of the cylinder which, when used as a bearing inner ring, results in zero radial internal clearance in the bearing on at least one diameter.

DIMENSIONAL ACCURACY, INNER RINGS

IR SERIES

Tolerances for the IR inner rings are given in Tables B-27 and B-28. Pages B-204 to B-207 list the nominal outer diameter, width and bore diameter for the IR series inner rings.

Table B-27. Bore and with tolerances, IR inner rings

d				Deviaiton from nominal							
Nomini outer diameter				of single mean outer diameter, $d_{mp}^{(1)}$				of width, B			
>	≤	>	≤	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
mm	mm	in.	in.	mm	mm	in.	in.	mm	mm	in.	in.
7.938	19.050	0.3125	0.7500	+0	-0.010	+0	-0.0004	+0.25	+0.12	+0.010	+0.005
19.050	50.800	0.7500	2.0000	+0	-0.013	+0	-0.0005	+0.25	+0.12	+0.010	+0.005
50.800	82.550	2.0000	3.2500	+0	-0.015	+0	-0.0006	+0.25	+0.12	+0.010	+0.005
82.550	107.950	3.2500	4.2500	+0	-0.020	+0	-0.0008	+0.25	+0.12	+0.010	+0.005
107.950	120.650	4.2500	4.7500	+0	-0.020	+0	-0.0009	+0.38	+0.25	+0.015	+0.010
120.650	177.800	4.7500	7.0000	+0	-0.025	+0	-0.0010	+0.38	+0.25	+0.015	+0.010
177.800	203.200	7.0000	8.0000	+0	-0.030	+0	-0.00012	+0.38	+0.25	+0.015	+0.010

⁽¹⁾ "Single mean diameter" is defined as the mean diameter in a single radial plane.

Table B-28. Outer diameter tolerance, IR inner rings

F_w				Deviaiton from nominal			
Nomini bore diameter				of single mean outer diameter, $F_{mp}^{(1)}$			
>	≤	>	≤	Max.	Min.	Max.	Min.
mm	mm	in.	in.	mm	mm	in.	in.
12.700	15.875	0.5000	0.6250	-0.013	-0.023	-0.0005	-0.0009
15.875	25.400	0.6250	1.0000	-0.018	-0.031	-0.0007	-0.0012
25.400	28.575	1.0000	1.1250	-0.023	-0.036	-0.0009	-0.0014
28.575	34.925	1.1250	1.3750	-0.023	-0.036	-0.0009	-0.0015
34.925	47.625	1.3750	1.8750	-0.025	-0.038	-0.0010	-0.0016
47.625	76.200	1.8750	3.0000	-0.028	-0.040	-0.0011	-0.0018
76.200	95.250	3.0000	3.7500	-0.033	-0.046	-0.0013	-0.0022
95.250	114.300	3.7500	4.5000	-0.038	-0.056	-0.0015	-0.0024
114.300	139.700	4.5000	5.5000	-0.038	-0.061	-0.0015	-0.0025
139.700	165.100	5.5000	6.5000	0.043	-0.063	-0.0017	-0.0027
165.100	209.550	6.5000	8.2500	-0.046	-0.068	-0.0019	-0.0031
209.550	234.950	8.2500	9.2500	-0.051	-0.078	-0.0020	-0.0032

⁽¹⁾ "Single mean diameter" is defined as the mean diameter in a single radial plane.

LOAD RATING FACTORS

DYNAMIC LOADS

Needle roller bearings can accommodate only radial loads.

$$P = F_r$$

P = The maximum dynamic radial load that may be applied to a needle roller bearing based on the dynamic load rating, C, given in the bearing tables. This load should be $\leq C/3$.

SPECIAL BEARINGS

For needle roller bearings with special dimensions or special features, such as split outer ring, consult your representative.

STATIC LOADS

Needle roller bearings can accommodate only radial loads.

$$P_0 = F_r$$