

Fig. 1-8

1.6 Mounting of Ball Bearings

For a rotating shaft, relative rotation between shaft and bearing is usually prevented by mounting the inner ring with a press fit and securing it with a nut threaded on the shaft. Excessive interference of metal must be avoided in press fits, or the stretching of the inner ring may decrease the small but requisite internal looseness of the bearing.

The tolerances for shafts and housings as a function of their respective sizes are given in **Tables 1-8** and **1-9**. Please note that the nominal sizes are given in millimeters, however, the tolerances themselves are given in inches.

Although the outer ring, when the shaft rotates, is mounted more loosely than the inner ring, rotational creep between the ring and housing should be prevented. When two bearings are mounted on the same shaft, the outer ring of one of them should be permitted to shift axially to care for any differential expansion between shaft and housing. Several examples of typical mounting details with oil retainers are shown in **Fig. 1-8**. The catalogs of the various manufacturers contain useful illustrations of this kind, as well as other practical information.

Shafts or spindles in machine tools and precision equipment that must rotate without play or clearance in either the radial or axial directions can be mounted on preloaded ball bearings. The preloading, which removes all play from the bearing, can be secured in a number of different ways. For example, suppose the outer rings of the bearings at **A** in **Fig. 1-9** project a small but controlled amount beyond the inner rings. When the inner rings are brought into contact at **B** by means of the locknut, the balls will be displaced in the rings an amount sufficient

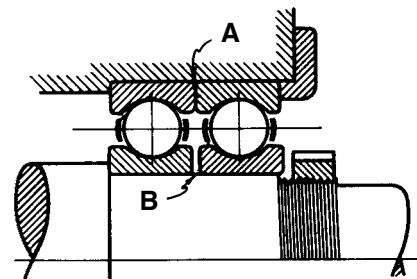


Fig. 1-9 Method for obtaining preloading in ball bearings

Table 1-8 Deviation of Shaft Diameters from Nominal Dimensions (inches)

Fit inner ring to shaft		Push fit	Push fit to wringing fit	Wringing fit	Drive fit		Light force fit		Force fit		Heavy force fit	
Nominal dia. (mm)		g6	h6	h5	j5	j6	k5	k6	m5	m6	n6	p6
Over	Incl.											
3	6	-0.0002 -0.0005	0 -0.0003	0 -0.0002	+0.0002 -0.0000							
6	10	-0.0002 -0.0006	0 -0.0004	0 -0.0002	-0.0002 -0.0006	-0.0003 -0.0001						
10	18	-0.0002 -0.0007	0 -0.0004	0 -0.0003	-0.0002 -0.0007	-0.0003 -0.0001	-0.0004 -0.0000	-0.0005 -0.0000				
18	30	-0.0003 -0.0008	0 -0.0005	0 -0.0004	-0.0003 -0.0008	-0.0004 -0.0002	-0.0004 -0.0001	-0.0006 -0.0001	-0.0007 -0.0003	-0.0008 -0.0003	-0.0011 -0.0006	
30	50	-0.0004 -0.0010	0 -0.0006	0 -0.0004	-0.0004 -0.0010	-0.0004 -0.0002	-0.0005 -0.0001	-0.0007 -0.0001	-0.0008 -0.0004	-0.0010 -0.0004	-0.0013 -0.0007	-0.0017 -0.0010
50	80	-0.0004 -0.0011	0 -0.0007	0 -0.0005	-0.0004 -0.0011	-0.0005 -0.0003	-0.0006 -0.0001	-0.0008 -0.0001	-0.0009 -0.0004	-0.0012 -0.0004	-0.0015 -0.0008	-0.0020 -0.0013
80	120	-0.0005 -0.0013	0 -0.0009	0 -0.0006	-0.0005 -0.0013	-0.0005 -0.0004	-0.0007 -0.0001	-0.0010 -0.0001	-0.0011 -0.0005	-0.0014 -0.0005	-0.0018 -0.0009	-0.0023 -0.0015
120	180	-0.0006 -0.0015	0 -0.0010	0 -0.0007	-0.0006 -0.0015	-0.0006 -0.0004	-0.0008 -0.0001	-0.0011 -0.0001	-0.0013 -0.0006	-0.0016 -0.0006	-0.0020 -0.0011	-0.0027 -0.0017

Table 1-9 Deviation of Housing Bores from Nominal Dimensions (inches)

Fit inner ring to shaft		Close running fit	Slide fit		Push fit		Wringing fit		Drive fit		Heavy drive fit		Light force fit	
Nominal dia. (mm)		G7	H8	H7	J7	J6	K6	K7	M6	M7	N6	N7	P6	P7
Over	Incl.													
10	18	-0.0002 -0.0009	0 -0.0011	0 -0.0007	-0.0003 -0.0004	-0.0002 -0.0002	-0.0004 -0.0001	-0.0005 -0.0002	-0.0006 -0.0002	-0.0007 0	-0.0008 -0.0004	-0.0009 -0.0002	-0.0010 -0.0006	-0.0011 -0.0004
18	30	-0.0003 -0.0011	0 -0.0013	0 -0.0008	-0.0004 -0.0005	-0.0002 -0.0003	-0.0004 -0.0001	-0.0006 -0.0002	-0.0007 -0.0002	-0.0008 0	-0.0009 -0.0004	-0.0011 -0.0003	-0.0012 -0.0007	-0.0014 -0.0006
30	50	-0.0004 -0.0013	0 -0.0015	0 -0.0010	-0.0004 -0.0006	-0.0002 -0.0004	-0.0005 -0.0001	-0.0007 -0.0003	-0.0008 -0.0002	-0.0010 0	-0.0011 -0.0005	-0.0013 -0.0003	-0.0015 -0.0008	-0.0017 -0.0007
50	80	-0.0004 -0.0016	0 -0.0018	0 -0.0012	-0.0005 -0.0007	-0.0002 -0.0005	-0.0006 -0.0002	-0.0008 -0.0004	-0.0009 -0.0002	-0.0012 0	-0.0013 -0.0006	-0.0015 -0.0004	-0.0018 -0.0010	-0.0020 -0.0008
80	120	-0.0005 -0.0019	0 -0.0021	0 -0.0014	-0.0005 -0.0009	-0.0002 -0.0006	-0.0007 -0.0002	-0.0010 -0.0004	-0.0011 -0.0002	-0.0014 0	-0.0015 -0.0004	-0.0018 -0.0004	-0.0020 -0.0012	-0.0023 -0.0009
120	180	-0.0006 -0.0021	0 -0.0025	0 -0.0016	-0.0006 -0.0010	-0.0003 -0.0007	-0.0008 -0.0002	-0.0011 -0.0005	-0.0013 -0.0003	-0.0016 0	-0.0018 -0.0008	-0.0020 -0.0005	-0.0024 -0.0014	-0.0027 -0.0011
180	250	-0.0006 -0.0024	0 -0.0028	0 -0.0018	-0.0006 -0.0012	-0.0003 -0.0009	-0.0009 -0.0002	-0.0013 -0.0005	-0.0015 -0.0003	-0.0018 0	-0.0020 -0.0009	-0.0024 -0.0006	-0.0028 -0.0016	-0.0031 -0.0013
250	315	-0.0007 -0.0027	0 -0.0032	0 -0.0020	-0.0006 -0.0014	-0.0003 -0.0010	-0.0011 -0.0002	-0.0014 -0.0006	-0.0016 -0.0004	-0.0020 0	-0.0022 -0.0010	-0.0026 -0.0006	-0.0031 -0.0019	-0.0035 -0.0014
315	400	-0.0007 -0.0030	0 -0.0035	0 -0.0022	-0.0007 -0.0015	-0.0003 -0.0011	-0.0011 -0.0003	-0.0016 -0.0007	-0.0018 -0.0004	-0.0022 0	-0.0024 -0.0010	-0.0029 -0.0006	-0.0034 -0.0020	-0.0039 -0.0016
400	500	-0.0008 -0.0033	0 -0.0038	0 -0.0025	-0.0008 -0.0017	-0.0003 -0.0013	-0.0013 -0.0003	-0.0018 -0.0007	-0.0020 -0.0004	-0.0025 0	-0.0026 -0.0011	-0.0031 -0.0007	-0.0037 -0.0022	-0.0043 -0.0018
500	630	-0.0009 -0.0035	0 -0.0041	0 -0.0027	-0.0009 -0.0018	-0.0003 -0.0014	-0.0019 -0.0003	-0.0019 -0.0008	-0.0022 -0.0005	-0.0027 0	-0.0029 -0.0012	-0.0034 -0.0007	-0.0041 -0.0024	-0.0046 -0.0020