

REDUCTION OF RADIAL CLEARANCE FOR NSK SPHERICAL ROLLER BEARINGS WITH TAPERED BORES

Units: Inch

Mounting a Bearing Using Radial Clearance Reduction

Example: The bearing to be mounted is a 22340CAMKE4C3 [200 mm bore (40 x 5) with C3 clearance]

- Using feeler gauges, the clearance in the bearing measures .009".
- From the "Reduction in Radial Clearance" column in the chart, the reduction in clearance is .0031" to .0039". Subtract these numbers from the measured clearance.

Measured Clearance	.009"	.009"
Reduction	<u>.0031"</u>	<u>.0039"</u>
Mounted Clearance	.0059"	.0051"
- Bearing is installed by one of the recommended methods until the clearance in the bearing is within the mounted clearance range. For best results, mount bearing at the middle of the range.

Nominal Bore Diameter (mm)		Radial Internal Clearance (Inches)						Reduction in Radial Clearance		Axial Displacement †				Minimum Permissible Residual Clearance After Mounting		
		CN		C3		C4				Taper 1:12		Taper 1:30				
over	incl.	min	max	min	max	min	max	min	max	min	max	min	max	CN	C3	C4
30	40	0.0014	0.0020	0.0020	0.0026	0.0026	0.0033	0.0010	0.0012	0.016	0.018	-	-	0.0004	0.0010	0.0014
40	50	0.0018	0.0024	0.0024	0.0031	0.0031	0.0039	0.0012	0.0014	0.018	0.022	-	-	0.0006	0.0012	0.0018
50	65	0.0022	0.0030	0.0030	0.0037	0.0037	0.0047	0.0012	0.0014	0.018	0.022	-	-	0.0010	0.0014	0.0024
65	80	0.0028	0.0037	0.0037	0.0047	0.0047	0.0059	0.0016	0.0018	0.024	0.028	-	-	0.0012	0.0016	0.0030
80	100	0.0031	0.0043	0.0043	0.0055	0.0055	0.0071	0.0018	0.0022	0.028	0.034	0.069	0.085	0.0014	0.0020	0.0033
100	120	0.0039	0.0053	0.0053	0.0067	0.0067	0.0087	0.0020	0.0024	0.030	0.035	0.075	0.089	0.0018	0.0026	0.0043
120	140	0.0047	0.0063	0.0063	0.0079	0.0079	0.0102	0.0024	0.0028	0.035	0.043	0.089	0.108	0.0022	0.0031	0.0051
140	160	0.0051	0.0071	0.0071	0.0091	0.0091	0.0118	0.0026	0.0031	0.039	0.051	0.098	0.128	0.0024	0.0039	0.0059
160	180	0.0055	0.0079	0.0079	0.0102	0.0102	0.0134	0.0028	0.0035	0.043	0.055	0.108	0.138	0.0028	0.0043	0.0067
180	200	0.0063	0.0087	0.0087	0.0114	0.0114	0.0146	0.0031	0.0039	0.051	0.063	0.128	0.157	0.0028	0.0043	0.0075
200	225	0.0071	0.0098	0.0098	0.0126	0.0126	0.0161	0.0035	0.0043	0.055	0.067	0.138	0.167	0.0031	0.0051	0.0083
225	250	0.0079	0.0106	0.0106	0.0138	0.0138	0.0177	0.0039	0.0047	0.063	0.075	0.157	0.187	0.0035	0.0055	0.0091
250	280	0.0087	0.0118	0.0118	0.0154	0.0154	0.0193	0.0043	0.0055	0.067	0.087	0.167	0.217	0.0039	0.0059	0.0098
280	315	0.0094	0.0130	0.0130	0.0169	0.0169	0.0213	0.0047	0.0059	0.075	0.095	0.187	0.236	0.0043	0.0063	0.0110
315	355	0.0106	0.0142	0.0142	0.0185	0.0185	0.0232	0.0055	0.0067	0.087	0.106	0.217	0.266	0.0047	0.0071	0.0118
355	400	0.0118	0.0157	0.0157	0.0205	0.0205	0.0256	0.0059	0.0075	0.095	0.118	0.236	0.295	0.0051	0.0079	0.0130
400	450	0.0130	0.0173	0.0173	0.0224	0.0224	0.0283	0.0067	0.0083	0.106	0.130	0.266	0.325	0.0055	0.0087	0.0142
450	500	0.0146	0.0193	0.0193	0.0248	0.0248	0.0311	0.0075	0.0094	0.118	0.146	0.295	0.364	0.0063	0.0094	0.0154
500	560	0.0161	0.0213	0.0213	0.0268	0.0268	0.0343	0.0083	0.0106	0.134	0.169	0.335	0.433	0.0067	0.0106	0.0161
560	630	0.0181	0.0236	0.0236	0.0299	0.0299	0.0386	0.0091	0.0118	0.146	0.189	0.364	0.472	0.0079	0.0122	0.0181
630	710	0.0201	0.0264	0.0264	0.0335	0.0335	0.0429	0.0102	0.0130	0.165	0.209	0.413	0.512	0.0087	0.0130	0.0205
710	800	0.0224	0.0295	0.0295	0.0378	0.0378	0.0480	0.0110	0.0146	0.177	0.232	0.453	0.591	0.0094	0.0154	0.0232
800	900	0.0252	0.0331	0.0331	0.0421	0.0421	0.0539	0.0122	0.0161	0.197	0.260	0.492	0.650	0.0110	0.0169	0.0260
900	1000	0.0280	0.0366	0.0366	0.0469	0.0469	0.0598	0.0134	0.0181	0.217	0.291	0.551	0.728	0.0122	0.0185	0.0287

† Axial displacement values apply only to solid steel shafts or hollow steel shafts where the bore is equal to or less than one-half of the outside diameter. If the material is other than steel, or if thin walled shafting is used, please consult NSK.
 1:12 Taper applies to Series 222, 223, 230, 231, 232, 233 and 239.
 1:30 Taper applies to Series 240, 241 and 242.
 For Pe less than 0.13Cr, use the lower half of the reduction range. For heavier loads or Pe greater than 0.13Cr, carburized or TL inner rings should be specified and the upper half of the reduction range can be used.

MOUNTING OF SPHERICAL ROLLER BEARINGS WITH TAPERED BORES

Bearings with tapered bores are mounted on tapered shafts or adapters (Figs. 1 and 2).

The internal clearance of a bearing varies with the axial movement of the taper. Check the clearance before mounting the bearing. Axially displace the bearing until the radial clearance reduction equals the value calculated on the reverse side.

Measure radial clearance during mounting with a feeler gauge. As shown in Fig. 3, the clearances for both rows of rollers must be measured simultaneously, and these two values should be kept roughly the same by adjusting the relative position of the outer and inner rings.

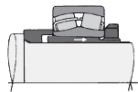


Fig. 1
Mounting with Adapter

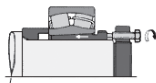


Fig. 2
Mounting with Withdraw Sleeve

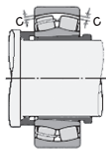


Fig. 3
Measuring Clearance of Spherical Roller Bearing

The average of these two measurements, taken for both rows, may be used as the residual internal clearance.

Measuring Clearance of Large Size Spherical Roller Bearings

When a large bearing is mounted on a shaft, the outer ring may be deformed into an oval shape by its own weight.

If the clearance is measured at the top of the deformed bearing, the measured value may be smaller than the true value. If an incorrect radial internal clearance is obtained in this manner and the values in the table on the reverse side of this card are used, then the actual interference fit may become too

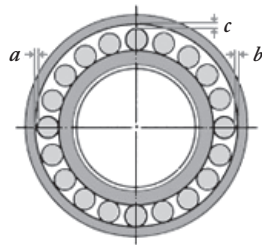


Fig. 4
Measuring Clearance of Large Size Spherical Roller Bearings

small. In this case, as shown in Fig. 4, one half of the total clearance at points a, b and c (which are on a horizontal line passing through the bearing center and at the highest position of the bearing) may be used as the residual internal clearance.

Determining Bearing Bore Size

Note: To obtain bore size, multiply the last two digits of part number by 5; e.g. part 22314 (14 x 5 = 70 mm bore). Part numbers with bore sizes 500 mm and larger are written with a slash, followed by the actual bore size; e.g. 232/710 (710 = bore size). For more details, see page 66 of the NSK Bearing Replacement Guide.