

HMS Industries

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Bearing Clearances

The clearance of bearing is generally around zero to a few thousandths. A pre-load condition (clearance less than zero) is possible if the application demands it. It is important to distinguish between initial and operating bearing clearance because there may be a reduction or expansion of clearance depending on the interference fit or thermal expansion. The clearances of a bearing can be identified with the suffixes C1, C2, C3, C4 and C5. C3 to C5 clearances are larger than normal while C1 and C2 represent a smaller clearance. An increased clearance is used when there is a tighter than normal fit. However, the decreased clearance is useful in maintaining very close shaft guidance.

In general, most bearings are designated based on their radial clearance, not axial. The axial is important when end play and shaft location is a concern and there could be a possibility of interference with other parts. If not stated, the axial clearance can be calculated based on the size and radial clearance of a bearing. Please contact HMS with any questions regarding operating, axial or other clearance concerns.

The manufactured clearance values of several different types and sizes of bearings can be found in the pages below.

Internal Radial Clearance

Deep Groove Ball Bearings

Clearance values in .0001 inch for cylindrical bore bearings

Bore (d) mm		C2		Normal		C3		C4		C5	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
2.5	6	0	3	1	5	3	9	5	12	8	14
6	10	0	3	1	5	3	9	5	12	8	15
10	18	0	3.5	1	7	4	10	7	13	10	16
18	24	0	4	2	8	5	11	8	14	11	18
24	30	.5	4.5	2	8	5	11	9	16	13	21
30	40	.5	4.5	2	9	6	13	11	18	15	24
40	50	.5	4.5	2	9	7	14	12	20	17	27
50	65	.5	6	3	11	9	17	15	24	21	33
65	80	.5	6	4	12	10	20	18	28	25	39
80	100	.5	7	5	14	12	23	21	33	30	45
100	120	1	8	6	16	14	26	24	38	35	52
120	140	1	9	7	19	16	32	28	45	41	61
140	160	1	9	7	21	18	36	32	51	45	69
160	180	1	10	9	24	21	40	36	58	52	80
180	200	1	12	10	28	25	46	42	64	58	90

Self-Aligning Ball Bearings

Clearance values in .0001 inch for cylindrical bore bearings

Bore (d) mm		C2		Normal		C3		C4		C5	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
2.5	6	.5	2	2	4	4	6	6	8	8	12
6	10	1	2.5	2.5	5	5	7.5	7.5	11	11	15
10	14	1	2.5	2.5	5	5	8	8	12	12	17
14	18	1.5	3	3	6	6	9	9	13	13	17
18	24	1.5	4	4	7	7	10	10	13	13	18
24	30	2	4	4	7.5	7.5	12	12	16	16	22
30	40	2.5	5	5	9	9	13	13	18	18	25
40	50	2.5	5.5	5.5	10	10	15	15	20	20	28
50	65	3	6	6	12	12	18	18	25	25	35
65	80	3	7	7	14	14	21	21	30	30	42
80	100	3.2	8.5	8.5	17	17	25	25	35	35	50
100	120	4	10	10	20	20	30	30	41	41	57
120	140	4	12	12	35	35	35	35	51	51	67
140	160	6	14	14	43	43	43	43	59	59	77

Cylindrical Roller Bearings

Bore (d) mm				Clearance values in .0001 inch								For tapered bore bearings*			
				For cylindrical bore bearings (Reference: ISO Standards)											
mm		inch		C2		Normal		C3		C4		C1NA		C2NA	
over	incl.	over	incl.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
0	24	0	15/16	4	8	8	12	14	18	18	22	5	8	8	12
24	30	15/16	1-1/8	4	10	10	14	16	20	20	24	6	10	10	14
30	40	1-1/8	1-9/16	5	10	10	16	18	22	22	28	6	10	10	16
40	50	1-9/16	1-15/16	6	12	12	18	20	26	26	32	8	12	12	18
50	65	1-15/16	2-1/2	6	14	14	20	22	30	30	35	8	14	14	20
65	80	2-1/2	3-1/8	8	16	16	24	28	35	35	43	10	16	16	24
80	100	3-1/8	3-15/16	10	18	18	28	31	41	41	49	12	18	18	28
100	120	3-15/16	4-11/16	10	20	20	32	37	47	47	57	14	20	20	32
120	140	4-11/16	5-1/2	12	24	24	35	41	53	53	63	16	24	24	35
140	160	5-1/2	6-1/4	14	26	26	39	45	59	59	71	18	26	26	39
160	180	6-1/4	7-1/16	14	30	30	43	49	65	65	79	20	30	30	43
180	200	7-1/16	7-13/16	16	32	32	47	55	71	71	87	22	32	32	47
200	225	7-13/16	8-13/16	18	35	35	53	61	79	79	95	24	35	35	53
225	250	8-13/16	9-13/16	20	39	39	59	67	85	85	104	26	39	39	59
250	280	9-13/16	11	22	43	43	65	73	95	95	116	30	43	43	65
280	315	11	12-3/8	24	47	47	71	81	104	104	128	32	47	47	71
315	355	12-3/8	14	26	53	53	79	89	116	116	142	35	53	53	79
355	400	14	15-3/4	30	59	59	87	100	130	130	160	39	59	59	89
400	450	15-3/4	17-11/16	34	67	67	100	112	146	146	179	43	67	67	100
450	500	17-11/16	19-11/16	37	75	75	112	124	161	161	199	49	75	75	112
500	560	19-11/16	22-1/16	39	83	83	126	138	177	177	217	*Double row bearings for machine tool spindles			
560	630	22-1/16	24-13/16	43	91	91	138	150	197	197	242				
630	710	24-13/16	27-15-16	51	102	102	157	171	224	224	274				
710	800	27-15-16	31-1/2	55	114	114	177	191	250	250	307				
800	900	31-1/2	35-7/16	63	130	130	197	213	276	276	339				
900	1000	35-7/16	39-3/8	71	142	142	220	236	307	307	382				

Spherical Roller Bearings, Double Row

Reference: ISO and AFBMA Standards

Clearance values in .0001 inch

For cylindrical bore

Bore (d) mm		C2		Normal		C3		C4		C5	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
30	40	6	12	12	18	18	24	24	32	32	41
40	50	8	14	14	22	22	30	30	39	39	51
50	65	8	16	16	26	26	35	35	47	47	63
65	80	12	20	20	32	32	43	43	57	57	73
80	100	14	24	24	39	39	53	53	71	71	91
100	120	16	30	30	47	47	63	63	82	82	102
120	140	20	37	37	57	57	75	75	95	95	118
140	160	24	43	43	67	67	87	87	110	110	137
160	180	26	47	47	71	71	95	95	122	122	153
180	200	28	51	51	79	79	102	102	134	134	169
200	225	32	55	55	87	87	114	114	150	150	185
225	250	35	59	59	95	95	126	126	165	165	205
250	280	39	67	67	102	102	138	138	181	181	224
280	315	43	75	75	110	110	146	146	197	197	248
315	355	47	79	79	122	122	161	161	216	216	272
355	400	51	87	87	134	134	177	177	236	236	299
400	450	55	95	95	146	146	197	197	260	260	331
450	500	55	102	102	161	161	216	216	283	283	358
500	560	59	110	110	173	173	236	236	307	307	386
560	630	67	122	122	189	189	256	256	335	335	421
630	710	75	138	138	209	209	276	276	362	362	457
710	800	83	153	153	228	228	303	303	397	397	500
800	900	91	169	169	256	256	338	338	441	441	555
900	1000	102	189	189	280	280	366	366	480	480	607

Spherical Roller Bearings, Double Row

Reference: ISO and AFBMA Standards

Clearance values in .0001 inch

For tapered bore

Bore (d) mm		C2		Normal		C3		C4		C5	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
30	40	10	14	14	20	20	26	26	34	34	41
40	50	12	18	18	24	24	32	32	39	39	51
50	65	16	22	22	30	30	37	37	47	47	63
65	80	20	28	28	37	37	47	47	59	59	79
80	100	21	32	32	43	43	55	55	71	71	91
100	120	26	39	39	53	53	67	67	87	87	110
120	140	32	47	47	63	63	79	79	102	102	130
140	160	35	51	51	71	71	91	91	118	118	150
160	180	39	55	55	79	79	102	102	134	134	169
180	200	43	63	63	87	87	114	114	146	146	185
200	225	47	71	71	98	98	126	126	161	161	205
225	250	55	79	79	106	106	138	138	177	177	224
250	280	59	87	87	118	118	154	154	193	193	244
280	315	67	95	95	130	130	169	169	213	213	268
315	355	75	106	106	142	142	185	185	232	232	291
355	400	83	118	118	158	158	205	205	256	256	323
400	450	91	130	130	173	173	224	224	284	284	358
450	500	102	146	146	193	193	248	248	311	311	394
500	560	114	161	161	213	213	268	268	343	343	433
560	630	126	181	181	236	236	299	299	386	386	484
630	710	138	201	201	264	264	335	335	429	429	535
710	800	154	224	224	295	295	378	378	480	480	591
800	900	173	252	252	331	331	421	421	539	539	665
900	1000	193	280	280	366	366	469	469	598	598	732

Internal Axial Clearance

Angular Contact Ball Bearings, Double Row

Bore (d) mm		Clearance Values in .0001 Inch							
		C2		Normal		C3		C4	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.
2.5	6	1	4	3	7	6	11	11	17
6	10	1	5	3.5	8	8	13	12	19
10	18	1.5	6	4	9	9	15	14	21
18	24	2	7	5	11	10	17	16	23
24	30	3	8	6	12	11	19	18	26
30	40	3	9	7	14	13	21	20	28
40	50	3	9	8	15	15	22	22	30
50	65	4	10	9	17	16	24	24	33
65	80	4	11	9	18	17	26	25	35
80	100	4	12	10	19	18	28	27	37
100	120	4	13	11	20	19	28	28	38