

Normal Class Tolerances For Radial Bearings (Except Tapered Roller Bearings)

Inner Ring

Unit: μm

d(mm)		Δdmp		Vdp Diameter Series			Vdmp	ΔBs			ΔB1s		VBs	Kia
				8,9	0,1	2,3,4								
over	incl.	high	low	max	max	max	max	high	high	low	high	low	max	max
2.5	10	0	-8	10	8	6	6	0	-120	0	-250	15	10	
10	18	0	-8	10	8	6	6	0	-120	0	-250	20	10	
18	30	0	-10	13	10	8	8	0	-120	0	-250	20	13	
30	50	0	-12	15	12	9	9	0	-120	0	-250	20	15	
50	80	0	-15	19	19	11	11	0	-150	0	-380	25	20	
80	120	0	-20	25	25	15	15	0	-200	0	-380	25	25	
120	180	0	-25	31	31	19	19	0	-250	0	-500	30	30	
180	250	0	-30	38	38	23	23	0	-300	0	-500	30	40	
250	315	0	-35	44	44	26	26	0	-350	0	-500	35	50	

Outer Ring

Unit: μm

D(mm)		ΔDmp		VDP Diameter Series			Bearings With Shields or seal	VDmp	ΔCs1 ΔC1s Vcs			Kea
				8,9	0,1	2,3,4						
over	incl.	high	low	max	max	max	max	max	Values are identical to those for inner ring of same bearing (ΔBs ΔB1s VBs)			max
6	18	0	-8	10	8	6	10	6				15
18	30	0	-9	12	9	7	12	7				15
30	50	0	-11	14	11	8	16	8				20
50	80	0	-13	16	13	10	20	10				25
80	120	0	-15	19	19	11	26	11				35
120	150	0	-18	23	23	14	30	14				40
150	180	0	-25	31	31	19	38	19				45
180	250	0	-30	38	38	23	-	23				50
250	315	0	-35	44	44	26	-	26				60
315	400	0	-40	50	50	30	-	30				70

Normal Tolerances For Tapered Roller Bearings (Metric Sizes)

Inner Ring And Bearing Width

Unit: μm

d(mm)		Δdmp		Vdp	Vdmp	ΔBs		Kia	ΔTs		ΔT1s		ΔT2s	
over	incl.	high	low	max	max	high	low	max	high	low	high	low	high	low
10	18	0	-12	12	9	0	-120	15	+200	0	+100	0	+100	0
18	30	0	-12	12	9	0	-120	18	+200	0	+100	0	+100	0
30	50	0	-12	12	9	0	-120	20	+200	0	+100	0	+100	0
50	80	0	-15	15	11	0	-150	25	+200	0	+100	0	+100	0
80	120	0	-20	20	15	0	-200	30	+200	-200	+100	-100	+100	-100
120	180	0	-25	25	19	0	-250	35	+350	-250	+150	-150	+200	-100
180	250	0	-30	30	23	0	-300	50	+350	-250	+150	-150	+200	-100
250	315	0	-35	35	26	0	-350	60	+350	-250	+150	-150	+200	-100
315	400	0	-40	40	30	0	-400	70	+400	-400	+200	-200	+200	-200

Outer Ring

Unit: μm

D(mm)		ΔDmp		VDP	VDmp	ΔCs	Kea
over	incl.	high	low	max	max	Values are identical to those for inner ring of same bearing (ΔBs)	max
18	30	0	-12	12	9		18
30	50	0	-14	14	11		20
50	80	0	-16	16	12		25
80	120	0	-18	18	14		35
120	150	0	-20	20	15		40
150	180	0	-25	25	19		45
180	250	0	-30	30	23		50
250	315	0	-35	35	26		60
315	400	0	-40	40	30		70
400	500	0	-45	45	34		80

Radial Internal Clearance Of Magneto Ball Bearing

Unit: μm

Bore diameter d(mm)		C2		Normal	
over	incl.	min	max	min	max
2.5	10	10	40	20	50
10	30	20	50	30	60

Material Of Bearing Rings And Balls

the bearing rings and balls are made of high carbon chromium steel GCr15 which the chemical composition is equivalent to SAE 52100

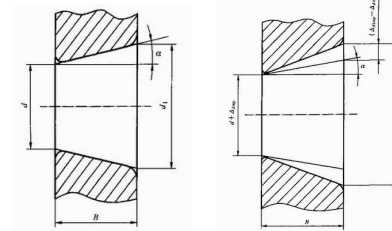
Steel No.	C	Cr	Si	Mn	S	P
GCr 15	0.95 ~ 1.05	1.30 ~ 1.65	0.15 ~ 0.35	0.20 ~ 0.40	< 0.020	< 0.027
SAE 52100	0.98 ~ 1.10	1.30 ~ 1.60	0.15 ~ 0.30	0.25 ~ 0.45	< 0.025	< 0.025

The hardness for bearing rings are HRC59 ~ 64 and HRC60 ~ 65 for steel balls

Normal Class Tolerance And Allowable Values (Class O) Of Tapered Hole Of Radial Bearings

 Δdmp : The average diameter tolerance $\Delta\text{d1mp}-\Delta\text{dmp}$: Taper tolerance

Vdp: Changes in volume diameter tolerance



Theoretical tapered hole

Tapered hole having dimensional difference of the average bore diameter within the flat surface

Circular cone morse taper 1: 12

Unit: μm

Nominal bore diameter d(mm)		Δdmp		$\Delta\text{d1mp}-\Delta\text{dmp}$		Vdp
over	incl.	high	low	high	low	max
-	10	+22	0	+15	0	9
10	18	+27	0	+18	0	11
18	30	+33	0	+21	0	13
30	50	+39	0	+25	0	16
50	80	+46	0	+30	0	19
80	120	+54	0	+35	0	22
120	180	+63	0	+40	0	40
180	250	+72	0	+46	0	46
250	315	+81	0	+52	0	52

Bearing Internal Clearance

Radial Internal Clearance Of Deep Groove Ball Bearings

Under Zero Measuring Load

Unit: μm

Bore diameter d(mm)		C2		Normal		C3		C4		C5	
over	incl.	min	max	min	max	min	max	min	max	min	max
2.5	10	0	7	2	13	8	23	14	29	20	37
10	18	0	9	3	18	11	25	18	33	25	45
18	24	0	10	5	20	13	28	20	36	28	48
24	30	1	11	5	20	13	28	23	41	30	53
30	40	1	11	6	20	15	33	28	46	40	64
40	50	1	11	6	23	18	36	30	51	45	73
50	65	1	15	8	28	23	43	38	61	55	90
65	80	1	15	10	30	25	51	46	71	65	105
80	100	1	18	12	36	30	58	53	84	75	120
100	120	2	20	15	41	36	66	61	97	90	140
120	140	2	23	18	48	41	81	71	114	105	160
140	160	2	23	18	53	46	91	81	130	120	180
160	180	2	25	20	61	53	102	91	147	135	200
180	200	2	30	25	71	63	117	107	163	150	230
200	225	4	32	28	82	73	132	120	187	175	255

Radial Internal Clearance Of Deep Groove Ball Bearings Based On Measure Load

Bore diameter d(mm)		Measuring load N (Kg)	Radial clearance increase (μm)			
			C2 C0 C3, C4, C5			
over	incl.					
10	18	24.5 (2.5)	3-4	4	4	
18	50	49 (5)	4-5	5	6	
50	200	147 (15)	6-8	8	9	

Radial Internal Clearance Of Bearings For Electric Motor

Unit: μm

Bore diameter d(mm)		Radial internal clearance CM			
		Deep groove ball bearing		Cylindrical roller bearing	
over	incl.	min	max	min	max
10	18	4	11	-	-
18	24	5	12	-	-
24	30	5	12	15	30
30	40	9	13	15	30
40	50	9	17	20	35
50	65	12	22	25	40
65	80	12	22	30	45
80	100	18	30	35	55
100	120	18	30	35	60

Radial Internal Clearance Of Self-Aligning Ball Bearings

Unit: μm

Bore diameter d(mm)		C2		Normal		C3		C4	
over	incl.	min	max	min	max	min	max	min	max
Bearings with cylindrical bore									
2.5	6	1	8	5	15	10	20	15	25
6	10	2	9	6	17	12	25	19	33
10	14	2	10	6	19	13	26	21	35
14	18	3	12	8	21	15	28	23	37
18	24	4	14	10	23	17	30	25	39
24	30	5	16	11	24	19	35	29	46
30	40	6	18	13	29	23	40	34	53
40	50	6	19	14	31	25	44	37	57
50	65	7	21	16	36	30	50	45	69
65	80	8	24	18	40	35	60	54	83
80	100	9	27	22	48	42	70	64	96
Bearings with tapered bore									
18	24	7	17	13	26	20	33	28	42
24	30	9	20	15	28	23	39	33	50
30	40	12	24	19	35	29	46	40	59
40	50	14	27	22	39	33	52	45	65
50	65	18	32	27	47	41	61	56	80
65	80	23	39	35	57	50	75	69	98
80	100	29	47	42	68	62	90	84	116