

The Importance of Correct Fitting

A bearing can only perform to its full capacity when it is correctly fitted on the shaft and in the housing. Insufficient interference on fitting surface could cause bearing rings to creep in a circumferential direction. Once this happens, considerable wear occurs on the fitting surface and both shaft and housing are damaged. Furthermore, abrasive particles may enter the bearing causing vibration, excessive heat and damage to raceways. It is therefore necessary to provide bearing rings under rotating load with an adequate interference fit to prevent creep. When using thin-type bearings under low load, the bearings should be fastened by a nut. Statically loaded bearings generally do not need to be fitted with an interference fit. Only when subject to a high degree of vibration do both inner and outer rings require fitting with an interference fit.

Fitting of Bearing and Shaft

Condition (Steel Shaft)	Shaft Bore Diameter	Shaft Tolerance Class		
		Thin-Type	Others	
Inner Ring Rotating Load or Indeterminate Load Direction	Light Load $\leq 0.06C_r$, or Fluctuating Load	$10 \leq d \leq 18$ $18 \leq d \leq 30$ $30 \leq d \leq 50$	h5 h5 h5	js5 js5 js5
	Standard Load = $0.06 - 0.12C_r$	$10 \leq d \leq 18$ $18 \leq d \leq 30$ $30 \leq d \leq 50$	js5 js5 js5	j5 k5 k5
		Outer Ring Rotating Load	Necessary for Inner Ring turning Easily Around Shaft Unnecessary for Inner Ring Turning Easily Around Shaft	All Bore Diameters All Bore Diameters

Fitting of Bearing and Housing

Condition (One-Piece Housing)	Axial Directional Movement of Outer Ring	Tolerance Class of Housing Seats		
		Thin-Type	Others	
Inner Ring Rotating Load	Varying Loads	Easy to Move	H6	H7
	Light or Standard Load	Easy to Move	H7	H8
	High Temperature of Inner Ring and Shaft	Easy to Move	G6	G7
	Light or Standard Load	As a Rule, Impossible to Move	K5	K6
	Precise Rotation	Possible to Move	JS6	J6
Indeterminate Load Direction	Quiet Operation	Easy to Move	H6	H6
	Light or Standard Load	In General, Possible to Move	JS6	J7
	Standard or Heavy Load	As a Rule, Impossible to Move	K5	K7
Outer Ring Rotating Load	Large Shock Load	Impossible to Move	M5	M7
	Light or Fluctuating Load	Impossible to Move	M5	M7
Outer Ring Rotating Load	Standard or Heavy Load	Impossible to Move	N5	N7
	Thin-Type Housing Seats Heavy Load or Large Shock Load	Impossible to Move	P6	P7

Characteristics of Load and Fitting

ROTATING RING	LOAD	LOAD CONDITION	FITTING	
Inner Ring	Static	Inner Ring Rotating Load	Interference Fit for Inner Ring	
Outer Ring	Rotating	Outer Ring Static Load	Clearance Fit for Outer Ring	
Outer Ring	Static	Outer Ring Rotating Load	Clearance Fit for Inner Ring	
Inner Ring	Rotating	Inner Ring Static Load	Interference Fit for Outer Ring	
In the Case of Fluctuating Load Direction or Unbalanced Load		Rotating or Static	Indeterminate Load Direction	Interference Fit for Inner and Outer Ring

Tolerance of Shaft (Unit : μm)

Diameter (mm)	Average Bore Diameter Tolerance of Bearing (Class 0) Δ_{shp}		d6	e6	f6	g5	g6	h5	h6	h7	h8	h9	h10	js6	js6	j6	j6	j7	k6	k6	k7	m5	m6	n6	p6	r6	r7
	Over	Incl.																									
3	6	0	-30	-20	-10	-4	-4	0	0	0	0	0	0	± 2.5	± 4	+3	+6	+8	+6	+9	+13	+9	+12	+16	+20	+23	+27
6	10	0	-40	-25	-13	-5	-5	0	0	0	0	0	0	± 3	± 4.5	+4	+7	+10	+7	+10	+16	+12	+15	+19	+24	+28	+34
10	18	0	-50	-32	-16	-6	-6	0	0	0	0	0	0	± 4	± 5.5	+5	+8	+12	+9	+12	+19	+15	+18	+23	+29	+34	+41
18	30	0	-65	-40	-20	-7	-7	0	0	0	0	0	0	± 4.5	± 6.5	+5	+9	+13	+11	+15	+23	+17	+21	+28	+35	+41	+49
30	50	0	-80	-50	-25	-9	-9	0	0	0	0	0	0	± 5.5	± 8	+6	+11	+15	+13	+18	+27	+20	+25	+33	+42	+50	+59
		-12	-96	-66	-41	-20	-25	-11	-16	-25	-39	-62	-100			-5	-5	-10	+2	+2	+2	+9	+9	+17	+26	+34	+44

Tolerance of Housing (Unit : μm)

Diameter (mm)	Average Bore Diameter Tolerance of Bearing (Class 0) Δ_{shp}		E6	F6	F7	G6	G7	H6	H7	H8	J6	J7	JS6	JS7	K5	K6	K7	M5	M6	M7	N5	N6	N7	P6	P7
	Over	Incl.																							
10	18	0	+43	+27	+34	+17	+24	+11	+18	+27	+6	+10	± 5.5	± 9	+2	+2	+6	-4	-4	0	-9	-9	-5	-15	-11
18	30	0	+53	+33	+41	+20	+28	+13	+21	+33	+8	+12	± 6.5	± 10	+1	+2	+6	-5	-4	0	-12	-11	-7	-18	-14
30	50	0	+66	+41	+50	+25	+34	+16	+25	+39	+10	+14	± 8	± 12	+2	+3	+7	-5	-4	0	-13	-12	-8	-21	-17
50	80	0	+79	+49	+60	+29	+40	+19	+30	+46	+13	+18	± 9.5	± 15	+3	+4	+9	-6	-5	0	-15	-14	-9	-26	-21
		-13	+60	+30	+30	+10	+10	0	0	0	-6	-12			-10	-15	-21	-19	-24	-30	-28	-33	-39	-45	-51