(2) Bearings with accuracy classes, Class 3 and Class 0 ([1])

Unit: μm

Condition		Bearing nominal bore diameter d mm		Bearing bore diameter deviation $\triangle_{ds}$		Shaft dimensional tolerance		Remarks
		over	up to	Upper	Lower	Upper	Lower	
Rotating inner ring load	Precision machine tool spindles	—	76.200	+13	0	+30	+18	——
		76.200	304.800	+13	0	+30	+18	
		304.800	609.600	+25	0	+64	+38	
		609.600	914.400	+38	0	+102	+64	
	Heavy load Impact load High speed rotation	—	76.200	+13	0	—	—	As average interference, allowance adopt the value around 0.0005d.
		76.200	304.800	+25	0	—	—	
		304.800	609.600	+51	0	—	—	
		609.600	914.400	+76	0	—	—	
Rotating outer ring load	Precision machined tool spindles axes	—	76.200	+13	0	+30	+18	——
		76.200	304.800	+13	0	+30	+18	
		304.800	609.600	+25	0	+64	+38	
		609.600	914.400	+38	0	+102	+64	

Note: ([1]) Bearing's d exceeding 304.800mm do not have Class 0.

Table 6.7 Fit of Inch system series tapered roller bearing and housing bore

(1) Bearings with accuracy classes Class 4 and Class 2

Unit: μm

Condition		Bearing nominal outer diameter D mm		Bearing outside diameter deviation $\triangle_{Ds}$		Shaft dimensional tolerance		Remarks
		over	up to	Upper	Lower	Upper	Lower	
Rotating inner ring load	Used for free end or fixed end	—	76.200	+25	0	+76	+51	Outer ring is easy to move in the axial direction
		76.200	127.000	+25	0	+76	+51	
		127.000	304.800	+25	0	+76	+51	
		304.800	609.600	+51	0	+152	+102	
		609.600	914.400	+76	0	+229	+152	
	Outer ring position can be adjusted in the axial direction	—	76.200	+25	0	+25	0	Outer ring can move in the axial direction
		76.200	127.000	+25	0	+25	0	
		127.000	304.800	+25	0	+51	0	
		304.800	609.600	+51	0	+76	+25	
		609.600	914.400	+76	0	+127	+25	
	Outer ring position cannot be adjusted in the axial direction	—	76.200	+25	0	−13	−38	In principle outer ring is fixed to axial direction
		76.200	127.000	+25	0	−25	−51	
		127.000	304.800	+25	0	−25	−51	
		304.800	609.600	+51	0	−25	−76	
		609.600	914.400	+76	0	−25	−102	
Rotating outer ring load	Normal load or outer ring position cannot be adjusted in axial direction	—	76.200	+25	0	−13	−38	Outer ring is fixed to axial direction
		76.200	127.000	+25	0	−25	−51	
		127.000	304.800	+25	0	−25	−51	
		304.800	609.600	+51	0	−25	−76	
		609.600	914.400	+76	0	−25	−102	

(2) Bearings with accuracy classes, Class 3 and Class 0 ([1])

Unit: μm

Condition		Bearing nominal outer diameter D mm		Bearing outside diameter deviation $\triangle_{Ds}$		Shaft dimensional tolerance		Remarks
		Over	Up to	Upper	Lower	Upper	Lower	
Rotating inner ring load	Used for free end	—	76.200	+13	0	+38	+25	Outer ring is easy to move in the axial direction
		76.200	304.800	+13	0	+38	+25	
		304.800	609.600	+25	0	+64	+38	
		609.600	914.400	+38	0	+89	+51	
	Used for fixed end	—	76.200	+13	0	+25	+13	Outer ring can move in the axial direction
		76.200	304.800	+13	0	+25	+13	
		304.800	609.600	+25	0	+51	+25	
		609.600	914.400	+38	0	+76	+38	
	Outer ring position can be adjusted in the axial direction	—	76.200	+13	0	+13	0	In principle outer ring is fixed to axial direction
		76.200	304.800	+13	0	+25	0	
		304.800	609.600	+25	0	+25	0	
		609.600	914.400	+38	0	+38	0	
	Outer ring position cannot be adjusted in the axial direction	—	76.200	+13	0	0	−13	Outer ring is fixed to axial direction
		76.200	304.800	+13	0	0	−25	
		304.800	609.600	+25	0	0	−25	
		609.600	914.400	+38	0	0	−38	
Rotating outer ring load	Normal load or outer ring position cannot be adjusted in axial direction	—	76.200	+13	0	−13	−25	Outer ring is fixed to axial direction
		76.200	152.400	+13	0	−13	−25	
		152.400	304.800	+13	0	−13	−38	
		304.800	609.600	+25	0	−13	−38	
		609.600	914.400	+38	0	−13	−51	

Note: ([1]) Bearing's D exceeding 304.800mm do not have Class 0.

6.2 Bearing clearance

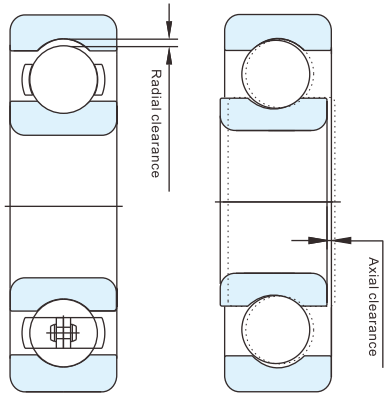

Fig. 6.2 Bearing clearance

Clearance (i.e. internal clearance) is a very important operation characteristic of bearings. Clearance's magnitude has an quite effect on the fatigue life, vibration, noise, temperature rise and mechanical movement accuracy of the bearings. When selecting, both the structure dimension and the clearance of the bearings need to be determined.

Bearing's clearance refers to the space between the inner/outer ring and the rolling element, i.e. the distance of movement from this end to the opposite end by fixing either inner ring or outer ring , and then move the other ring in the up-and-down (radial direction) or left-and-right (axial direction) direction. The radial distance of movement is called radial clearance, and axial distance of movement is called axial clearance. See Fig. 6.2.

6.2.1 Mutual relations of bearing clearances

According to the different states of the bearings, clearance falls into original clearance, fit clearance and operating clearance. Bearing clearance (bearing's original clearance) is the clearance before the bearing is mounted, the clearance without load, also called the bearing's theoretical clearance or geometry clearance ($\triangle 0$), and is the clearance when the bearing is finished in the manufactory.

After the inner ring is mounted on the shaft or outer ring is mounted on the bearing housing, the radial dimension of the bearing ring is changed. Generally the bearing inner ring expands due to interference fit, and outer ring shrinks. The clearance after bearing Mounted is called fit clearance ($\triangle f$).Fit clearance is less than original clearance, and its decrease is about 70 % ~ 90 % of the interference depending on the bearing structure, dimension and the different shapes of shaft and housing.

Bearing operating clearance includes effective clearance. For no-load operation, bearing ring is affected by temperature rise and inner/outer ring temperature difference, and the bearing clearance will decrease. The decreased clearance is called effective clearance ($\triangle u$). This is the clearance when bearing is in noload operations.

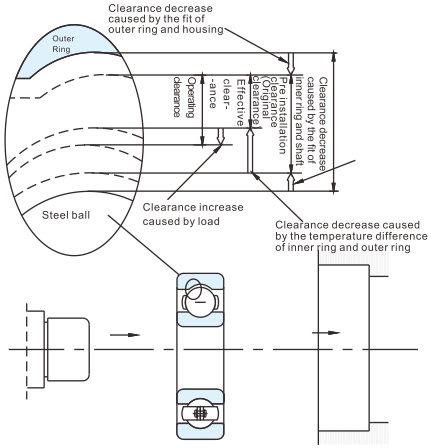

Fig. 6.3 Sketch of single row deep groove ball bearing clearance

When the bearing runs under service load, elastic deformation will occur to the contact surface of the bearing rolling element and raceway, resulting in bearing clearance increase, which called operating clearance ($\triangle$).

The mutual relations of the original clearance $\triangle_0$, fit clearance $\triangle_f$, effective clearance $\triangle_u$ and operating clearance $\triangle$ of deep groove ball bearings are shown in Fig. 6.3.

Subtract the clearance decrease i.e. δ_{fi}(clearance decrease inner ring and shaft fit) and δf_0 (clearance decrease caused by outer ring and housing fit) caused by fit from theoretical clearance i.e. original clearance $\triangle_0$, and the result is the assembling clearance after mounted.

$\triangle_f = \triangle_0 - \delta_{fi} - \delta_{f0}$

Since heat is dropped away via shaft and housing on which, the outer ring is mounted, and the heat dissipation conditions are good, so the outer ring temperature is lower than that of inner ring and rolling element, and the general discrepancy is 5℃ ~ 10℃. When grease lubrication is used, or shaft via heat medium, the heat of the shaft will be passed to the bearing; or where the rotation speed is high, the temperature difference between inner ring and outer ring is even larger. Because of the temperature difference of inner and outer rings, radial clearance will decrease as a result of the difference of thermal expansion. Its rough decrease can be determined with the following formula:

$\delta_t = \alpha \times \triangle_t \times D_e$

In the equations:

δ_t: Clearance decrease caused by the temperature difference of inner and outer rings

α : Linear expansion coefficient of bearing steel

$\triangle_t$: Temperature difference of inner and outer rings ℃

D_e: Raceway diameter of outer ring

For ball bearing: $D_e = 0.20 \times (d+4D)$

For roller bearing: $D_e = 0.25 \times (d+3D)$

Include:

d: Bearing inner diameter

D: Bearing outer diameter

Bearing 's effective clearance $\triangle_u$ is obtained by subtracting the decrease caused by temperature difference of inner and outer rings δ_t from the fit clearance $\triangle_f$, i.e. $\triangle_u = \triangle_f - \delta_t$. $\triangle_u$ is the major portion of operating clearance. When bearings working under different service loads, the service load will cause elastic deformation to the rolling element and the ring, thereby make the bearing internal clearance increase, i.e. δ_w working clearance is:

$\triangle = \triangle_u + \delta_w$

$= \triangle_0 - \delta_{fi} - \delta_{f0} - \delta_t + \delta_w$

In the equations:

$\triangle$: Operating clearance mm

$\triangle_0$: Original clearance mm

$\triangle_{fi}$: Clearance decrease caused by inner ring and shaft fit mm

δ_{f0}: Clearance decrease caused by outer ring and housing fit mm

δ_t: Clearance decrease caused by the temperature difference of inner and outer rings

δ_w: Clearance increase caused by load mm

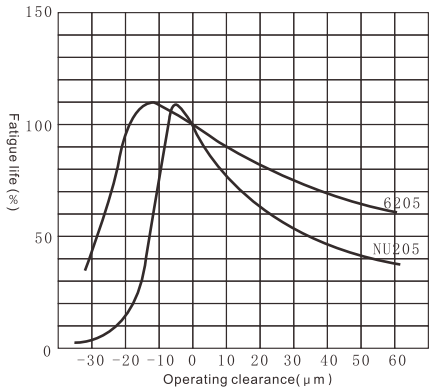

Fig. 6.4 Relation of operating clearance and fatigue life

6.2.2 Bearing's original clearance and operating clearance

National standards specify the clearance groups of various bearings and the clearance values of each group. Group 0 is applicable for ordinary working conditions, and is preferred; Group 2 is smaller than Group 0; Group 3, Group 4 and Group 5 are larger than Group 0.

When measuring the (original) clearance of the bearing, in order to get steady measured value, specified measure load shall be applied to the bearing ring, and then measure the clearance value of the bearing. This value is called clearance value with load. It is larger than noload clearance value, i.e. original clearance (also called theoretical clearance or geometry clearance), because the given bearing test load will cause plastic deformation to the bearing internal. See Table 6.8 for the radial clearance measured value increase of deep groove ball bearings. Generally the measured clearance value need to be revised and the clearance $\triangle_0$ caused by elastic deformation need to be subtracted. Original clearance shall conform to standard specifications.

Compared with ball bearings, the standard clearance zones of cylindrical roller bearings and needle roller bearings are wider, and the elastic deformation quantity caused by measured load is small, therefore can be ignored.

Table 6.8 Correction of deep groove ball bearings under measure load

Bearing nominal bore diameter d (mm)		Measure load (N)	Clearance correction (μm)				
over	up to		Group 2	Standard (Group 0)	Group 3	Group 4	Group 5
2.5	18	24.5	3~4	4	4	4	4
18	50	49	4~5	5	6	6	6
50	280	147	6~8	8	9	9	9

Remarks:
In the correction of C2 clearance, small numbers are applicable for minimum clearance, and large numbers are applicable for maximum clearance.
When d > 280 mm, please contact the technical center of C&U Group.

When choosing bearings, first of all determine suitable operating clearance according to the working conditions of the machine to be installed, and estimate the original clearance of the chosen bearing from operating clearance. The magnitude of the working clearance Is the significant factor of determining the working performance and bearing life.

For determining the operating clearance, theoretically speaking, in the smooth running state of the bearing, with a little negative operating clearance, the life of the bearing is longest. But in fact it is very difficult to keep this kind of optimum condition. Once the working conditions fluctuate, the negative clearance will increase, bearing temperature will rise, and the bearing life will decrease greatly instead. Sometimes the elongation of shaft caused by temperature rise may generate large added axial load. Relation of operating clearance and fatigue life is shown in Fig. 6.4.Therefore, when selecting original clearance, it is required to select bearing original clearance from the clearance values with operating clearances a little larger than zero. Single row angular contact ball bearing and tapered roller bearing also require to keep a certain operating clearance except for preload. The former is negative clearance, and the latter is positive clearance. For working expansion of shaft, proper axial clearance is required to large axial load caused by the elongation of the shaft, which might shorten the bearing life.

When selecting original clearances for bearings of different structures, the basic clearance values in the clearance group of each bearing shall be preferred. It is applicable for ordinary working conditions, which inner ring mounted by interference fit can take load below normal load (P ≈ 0.1C) and inner ring rotation speed is below the 50 % of limit speed. If mounting and operation conditions are different from ordinary working conditions, special clearance groups less or greater than base group shall be chosen. For example, when inner/outer ring adopts interference fit, and working temperature is abnormal, larger or smaller clearance groups shall be used. See Table 6.9 for the adoption examples of abnormal clearances.

Table 6.9 Application examples of non-conventional clearances

Working conditions	Working conditions	Adopted clearance
Take heavy load, impact load, large interference	Axle shaft for rolling stock	C3
	Vibration screen	C3、C4
Take indeterminate direction load, inner and outer rings both adopt interference fit	Rolling stock pulling motor	C4
	Tractor, end reducer	C4
Bearing or inner ring heated	Paper machine, drying apparatus	C3、C4
	Mill table	C3
Reduce rotation vibration and noise	Micromotors	C2

When selecting clearances which do not belong to the base group (Group 0), they cannot be too large or too small. For bearings with too large original clearances, too large working clearances will cause the decrease of the load area inside the bearing, the increase of rolling contact stress inside the bearing, the decrease of the bearing's running accuracy, increase of vibration and noise, and the reduction of bearing working life. Only when the machine requires large interference fit, large temperature difference of inner and outer rings, or low friction torque, the bearings with clearance values of Group 3, Group 4 or Group 5 larger than Group 0 can be adopted. But, too small clearance will also cause the increase of bearing heating value, temperature rise, even result in the seizure of bearing during running. Therefore clearances smaller than group 0 can only be used when the requirement for the bearing running accuracy is high and there is need to limit the axial displacement strictly. The general principle is to determine the original clearance of the selected bearing according to the operating clearance of the bearing.

6.2.3 Standards and recommended values of bearing clearance

Table 6.10 Radial clearance of deep groove ball bearing (cylindrical bore)

Bearing nominal bore diameter d (mm)		Clearance (μm)									
		Group 2		Group 0		Group 3		Group 4		Group 5	
Over	Up to	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
2.5	6	0	7	2	13	8	23	–	–	–	–
6	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	2	35	25	85	75	140	125	195	175	265
225	250	2	40	30	95	85	160	145	225	205	300
250	280	2	45	35	105	90	170	155	245	225	340
280	315	2	55	40	115	100	190	175	270	245	370
315	355	3	60	45	125	110	210	195	300	275	410
355	400	3	70	55	145	130	240	225	340	315	460
400	450	3	80	60	170	150	270	250	380	350	510
450	500	3	90	70	190	170	300	280	420	390	570
500	560	10	100	80	210	190	330	310	470	440	630
560	630	10	110	90	230	210	360	340	520	490	690
630	710	20	130	110	260	240	400	380	570	540	760
710	800	20	140	120	290	270	450	430	630	600	840

Table 6.11 Radial clearance of self-aligning ball bearing (cylindrical bore)

Bearing nominal bore diameter d (mm)		Clearance (μm)									
		Group 2		Group 0		Group 3		Group 4		Group 5	
over	up to	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
2.5	6	1	8	5	15	10	20	15	25	21	33
6	10	2	9	6	17	12	25	19	33	27	42
10	14	2	10	6	19	13	26	21	35	30	48
14	18	3	12	8	21	15	28	23	37	32	50
18	24	4	14	10	23	17	30	25	39	34	52
24	30	5	16	11	24	19	35	29	46	40	58
30	40	6	18	13	29	23	40	34	53	46	66
40	50	6	19	14	31	25	44	37	57	50	71
50	65	7	21	16	36	30	50	45	69	62	88
65	80	8	24	18	40	35	60	54	83	76	108
80	100	9	27	22	48	42	70	64	96	89	124
100	120	10	31	25	56	50	83	75	114	105	145
120	140	10	38	30	68	60	100	90	135	125	175
140	160	15	44	35	80	70	120	110	161	150	210

Table 6.12 Radial clearance of self-aligning ball bearing (tapered bore)

Bearing nominal bore diameter d (mm)		Clearance (μm)									
		Group 2		Group 0		Group 3		Group 4		Group 5	
over	up to	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
2.5	6	–	–	–	–	–	–	–	–	–	–
6	10	–	–	–	–	–	–	–	–	–	–
10	14	–	–	–	–	–	–	–	–	–	–
14	18	–	–	–	–	–	–	–	–	–	–
18	24	7	17	13	26	20	33	28	42	37	55
24	30	9	20	15	28	23	39	33	50	44	62
30	40	12	24	19	35	29	46	40	59	52	72
40	50	14	27	22	39	33	52	45	65	58	79
50	65	18	32	27	47	41	61	56	80	73	99
65	80	23	39	35	57	50	75	69	98	91	123
80	100	29	47	42	68	62	90	84	116	109	144
100	120	35	56	50	81	75	108	100	139	130	170
120	140	40	68	60	98	90	130	120	165	155	205
140	160	45	74	65	110	100	150	140	191	180	240

Table 6.13 Radial clearance of cylindrical ball bearing(cylindrical bore)

Bearing nominal bore diameter d (mm)		Clearance (μm)									
		Group 2		Group 0		Group 3		Group 4		Group 5	
over	up to	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
–	10	0	25	20	45	35	60	50	75	–	–
10	24	0	25	20	45	35	60	50	75	65	90
24	30	0	25	20	45	35	60	50	75	70	95
30	40	5	30	25	50	45	70	60	85	80	105
40	50	5	35	30	60	50	80	70	100	95	125
50	65	10	40	40	70	60	90	80	110	110	140
65	80	10	45	40	75	65	100	90	125	130	165
80	100	15	50	50	85	75	110	105	140	155	190
100	120	15	55	50	90	85	125	125	165	180	220
120	140	15	60	60	105	100	145	145	190	200	245
140	160	20	70	70	120	115	165	165	215	225	275
160	180	25	75	75	125	120	170	170	220	250	300
180	200	35	90	90	145	140	195	195	250	275	330
200	225	45	105	105	165	160	220	220	280	305	365
225	250	45	110	110	175	170	235	235	300	330	395
250	280	55	125	125	195	190	260	260	330	370	440
280	315	55	130	130	205	200	275	275	350	410	485
315	355	65	145	145	225	225	305	305	385	455	535
355	400	100	190	190	280	280	370	370	460	510	600
400	450	110	210	210	310	310	410	410	510	565	665
450	500	110	220	220	330	330	440	440	550	625	735

Radial clearance of needle roller bearing

Except for pressed outer ring and heavy series, needle roller bearings with inner, outer ring and cage adopts the radial clearance values of cylindrical roller bearings which are given in Table 6.13.

For radial clearances of heavy needle roller bearings with inner and outer rings and needle roller bearings with cage whose inner ring delivered as a separate part, the radial clearance are determined by raceway diameter of the inner ring and internal diameter of needle roller component . Please contact the technical center of C&U Group.

Radial clearances of deep groove ball bearings for motors

Bearing nominal bore diameter d (mm)		Clearance (μm)	
		CM	
Over	Up to	Min	Max
10 (Included)	18	4	11
18	30	5	12
30	50	9	17
50	80	12	22
80	120	18	30
120	160	24	38

Table 6.14 Radial clearance of spherical roller bearing (cylindrical bore)

Bearing nominal bore diameter d (mm)		Clearance (μm)									
		Group 2		Group 0		Group 3		Group 4		Group 5	
over	up to	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
14	18	10	20	20	35	35	45	45	60	60	75
18	24	10	20	20	35	35	45	45	60	60	75
24	30	15	25	25	40	40	55	55	75	75	95
30	40	15	30	30	45	45	60	60	80	80	100
40	50	20	35	35	55	55	75	75	100	100	125
50	65	20	40	40	65	65	90	90	120	120	150
65	80	30	50	50	80	80	110	110	145	145	180
80	100	35	60	60	100	100	135	135	180	180	225
100	120	40	75	75	120	120	160	160	210	210	260
120	140	50	95	95	145	145	190	190	240	240	300
140	160	60	110	110	170	170	220	220	280	280	350
160	180	65	120	120	180	180	240	240	310	310	390
180	200	70	130	130	200	200	260	260	340	340	430
200	225	80	140	140	220	220	290	290	380	380	470
225	250	90	150	150	240	240	320	320	420	420	520
250	280	100	170	170	260	260	350	350	460	460	570
280	315	110	190	190	280	280	370	370	500	500	630
315	355	120	200	200	310	310	410	410	550	550	690
355	400	130	220	220	340	340	450	450	600	600	750
400	450	140	240	240	370	370	500	500	660	660	820
450	500	140	260	260	410	410	550	550	720	720	900
500	560	150	280	280	440	440	600	600	780	780	1000
560	630	170	310	310	480	480	650	650	850	850	1100
630	710	190	350	350	530	530	700	700	920	920	1190
710	80	210	390	390	580	580	770	770	1010	1010	1300
800	900	230	430	430	650	650	860	860	1120	1120	1440
900	1000	260	480	480	710	710	930	930	1220	1220	1570

Table 6.15 Radial clearance of spherical roller bearing (tapered bore)

Bearing nominal bore diameter d (mm)		Clearance (μm)									
		Group 2		Group 0		Group 3		Group 4		Group 5	
over	up to	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
18	24	15	25	25	35	35	45	45	65	65	75
24	30	20	30	30	40	40	55	55	75	75	95
30	40	25	35	35	50	50	65	65	85	85	105
40	50	30	45	45	60	60	80	80	100	100	130
50	65	40	55	55	75	75	95	95	120	120	160
65	80	50	70	70	95	95	120	120	150	150	200
80	100	55	80	80	110	110	140	140	180	180	230
100	120	65	100	100	135	135	170	170	220	220	280
120	140	80	120	120	160	160	200	200	260	260	330
140	160	90	130	130	180	180	230	230	300	300	380
160	180	100	140	140	200	200	260	260	340	340	430
180	200	110	160	160	220	220	290	290	370	370	470
200	225	120	180	180	250	250	320	320	410	410	520
225	250	140	200	200	270	270	350	350	450	450	570
250	280	150	220	220	300	300	390	390	490	490	620
280	315	170	240	240	330	330	430	430	540	540	680
315	355	190	270	270	360	360	470	470	590	590	740
355	400	210	300	300	400	400	520	520	650	650	820
400	450	230	330	330	440	440	570	570	720	720	910
450	500	260	370	370	490	490	630	630	790	790	1000
500	560	290	410	410	540	540	680	680	870	870	1100
560	630	320	460	460	600	600	760	760	980	980	1230
630	710	350	510	510	670	670	850	850	1090	1090	1360
710	800	390	570	570	750	750	960	960	1220	1220	1500
800	900	440	640	640	840	840	1070	1070	1370	1370	1690
900	1000	490	710	710	930	930	1190	1190	1520	1520	1680

Table 6.16 Radial clearance of four-row cylindrical roller bearing (cylindrical bore)

Bearing nominal bore diameter d (mm)		Clearance (μm)									
		Group 2		Group 0		Group 3		Group 4		Group 5	
over	up to	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
80	100	15	50	50	85	75	110	105	140	155	190
100	120	15	55	50	90	85	125	125	165	180	220
120	140	15	60	60	105	100	145	145	190	200	245
140	160	20	70	70	120	115	165	165	215	225	275
160	180	25	75	75	125	120	170	170	220	250	300
180	200	35	90	90	145	140	195	195	250	275	330
200	225	45	105	105	165	160	220	220	280	305	365
225	250	45	110	110	175	170	235	235	300	330	395
250	280	55	125	125	195	190	260	260	330	370	440
280	315	55	130	130	205	200	275	275	350	410	485
315	355	65	145	145	225	225	305	305	385	455	535
355	400	100	190	190	280	280	370	370	460	510	600
400	450	110	210	210	310	310	410	410	510	565	665
450	500	110	220	220	330	330	440	440	550	625	735
500	560	120	240	240	360	360	480	480	600	–	–
560	630	140	260	260	380	380	500	500	620	–	–
630	710	145	285	285	425	425	565	565	705	–	–
740	800	150	310	310	470	470	630	630	790	–	–
800	900	180	350	350	520	520	690	690	860	–	–
900	1000	200	390	390	580	580	770	770	960	–	–
1000	1120	220	430	430	640	640	850	850	1060	–	–
1120	1250	230	470	470	710	710	950	950	1190	–	–
1250	1400	270	530	530	790	790	1050	1050	1310	–	–

Table 6.17 Recommended radial clearance for double row cylindrical roller bearing

Bearing nominal bore diameter d (mm)		Cylindrical bore (μm)				Tapered bore (μm)					
		Group 1		Group 2		Group 1		Group 2		Group 3	
over	up to	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
—	24	10	20	20	30	5	15	10	20	20	30
24	30	15	25	25	35	5	15	10	25	25	35
30	40	15	25	25	40	5	15	12	25	25	40
40	50	17	30	30	45	5	18	15	30	30	45
50	65	20	35	35	50	5	20	15	35	35	50
65	80	25	40	40	60	10	25	20	40	40	60
80	100	35	55	45	70	10	30	25	45	45	70
100	120	40	60	50	80	10	30	25	50	50	80
120	140	45	70	60	90	10	35	30	60	60	90
140	160	50	75	65	100	10	35	35	65	65	100
160	180	55	85	75	110	10	40	35	75	75	110
180	200	60	90	80	120	15	45	40	80	80	120
200	225	60	95	90	135	15	50	45	90	90	135
225	250	65	100	100	150	15	50	50	100	100	150
250	280	75	110	110	165	20	55	55	110	110	165
280	315	80	120	120	180	20	60	60	120	120	180
315	355	90	135	135	200	20	65	65	135	135	200
355	400	100	150	150	225	25	75	75	150	150	225
400	450	110	170	170	255	25	85	85	170	170	255
450	500	120	190	190	285	25	95	95	190	190	285

Table 6.18 Axial clearance of four-point contact ball bearing

Unit: μm

Bearing nominal bore diameter d (mm)		Group 2		Group 0		Group 3		Group 4	
Over	Up to	Min	Max	Min	Max	Min	Max	Min	Max
17	40	26	66	56	106	96	146	136	186
40	60	36	86	76	126	116	166	156	206
60	80	46	96	86	136	126	176	166	226
80	100	56	106	96	156	136	196	186	246
100	140	66	126	116	176	156	216	206	266
140	180	76	156	136	196	176	236	226	296
180	220	96	176	156	216	196	256	246	316