

Tolerance, class, chamfer dimension of bearings

TOLERANCES OF INNER RING AND OUTER RING WIDTH (ISO)

d (mm)		Δd_{imp}				Δd_i		V_{dip}										V_{dop}					
		P0		P6		P5		P4		P4		P0		P6		P5		P4		P0	P6	P5	P4
		Diameter series		Diameter series		Diameter series		Diameter series		Diameter series		Diameter series		Diameter series		Diameter series							
		0,2,3		7,8,9		0		2,3		7,8,9		0		2,3		7,8,9		0,2,3		7,8,9		0,2,3	
Over	Incl.	Upper	Lower	Lower	Lower	Lower	Upper	Lower	Max.		Max.		Max.		Max.		Max.		Max.	Max.	Max.	Max.	
0,6 (1)	2,5	0	-8	-7	-5	-4	0	-4	10	8	6	9	7	5	5	4	4	3	6	5	3	2	
2,5	10	0	-8	-7	-5	-4	0	-4	10	8	6	9	7	5	5	4	3	6	5	3	2		
10	18	0	-8	-7	-5	-4	0	-4	10	8	6	9	7	5	5	4	3	6	5	3	2		
18	30	0	-10	-8	-6	-5	0	-5	13	10	8	10	8	6	6	5	4	8	6	3	2,5		
30	50	0	-12	-10	-8	-6	0	-6	15	12	9	13	10	8	8	6	5	9	8	4	3		

Remarks1: The upper value of the bore diameter in this table is not applicable when the distance from the bearing ring face is less than 1.2 times the chamfer dimension f_{smax}
 Remarks2: According to the revision of ANSI/ABMA Std.20-1996, the classes ABEC1 • ABEC3 • ABEC5 • ABEC7 are equivalent to CLASS0 • CLASS6 • CLASS5 • CLASS4.

TOLERANCES OF OUTER RING (ISO)

D (mm)		ΔD_{imp}				ΔD_o		$V_{Dp}^{(1)}$										$V_{Dop}^{(2)}$						
		P0		P6		P5		P4		P4		P0		P6		P5		P4		P0	P6	P5	P4	
		Open		Seal Shield		Open		Seal Shield		Open		Open												
		Diameter series		Diameter series		Diameter series		Diameter series		Diameter series		Diameter series		Diameter series										
Over	Incl.	Upper	Lower	Lower	Lower	Upper	Lower	Max.		Max.		Max.		Max.		Max.		Max.	Max.	Max.	Max.			
2,5 (1)	6	0	-8	-7	-5	-4	0	-4	10	8	6	10	9	7	5	9	5	4	4	3	6	5	3	2
6	18	0	-8	-7	-5	-4	0	-4	10	8	6	10	9	7	5	9	5	4	4	3	6	5	3	2
18	30	0	-9	-8	-6	-5	0	-5	12	9	7	12	10	8	6	10	6	5	5	4	7	6	3	2,5
30	50	0	-11	-9	-7	-6	0	-6	14	11	8	16	11	9	7	13	7	5	6	5	8	7	4	3
50	80	0	-13	-11	-9	-7	0	-7	16	13	10	20	14	11	8	16	9	7	7	5	10	8	5	3,5

Remarks1: The lower value of the outside diameter in this table is not applicable when the distance from the bearing ring face is less than 1.2 times the chamfer dimension f_{smax}
 Remarks2: According to the revision of ANSI/ABMA Std.20-1996, the classes ABEC1 • ABEC3 • ABEC5 • ABEC7 are equivalent to CLASS0 • CLASS6 • CLASS5 • CLASS4.

TOLERANCES OF INNER RING AND OUTER RING WIDTH (ABMA)

Unit μm

d (mm)		Δd_{imp}		Δd_i		V_{dip}		V_{dop}		$\Delta B_i (\Delta C_i)$		V_{B_i}		K_{B_i}		S_{B_i}		S_{f_i}	
		ABEC 5P ABEC 7P		ABEC 5P ABEC 7P		ABEC 5P ABEC 7P		ABEC 5P ABEC 7P		Single bearing ABEC 5P ABEC 7P		ABEC 5P ABEC 7P		ABEC 5P ABEC 7P		ABEC 5P ABEC 7P		ABEC 5P ABEC 7P	
		Upper	Lower	Upper	Lower	Max.	Max.	Upper	Lower	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.
—	10	0	-5	0	-5	2,5	2,5	0	-25	5	2,5	3,5	2,5	7	3	7	3		
10	18	0	-5	0	-5	2,5	2,5	0	-25	5	2,5	3,5	2,5	7	3	7	3		
18	30	0	-5	0	-5	2,5	2,5	0	-25	5	2,5	3,5	2,5	7	3	7	3		

Remarks1: ABEC5P and ABEC7P are the tolerance classes for high precision bearings.

LIMIT TOLERANCE VALUES (METRIC) OF CHAMFER DIMENSIONS OF RADIAL BEARINGS

Unit:mm

f_{smin}	d(mm)		f_{smax}		f_{amax}
	Over	Incl.	Radial	Axial	
0.05	-	-	0.10	0.20	0.05
0.08	-	-	0.16	0.30	0.08
0.10	-	-	0.20	0.40	0.10
0.15	-	-	0.30	0.60	0.15
0.20	-	-	0.50	0.80	0.20
0.30	-	40	0.60	1.00	0.30
0.30	40	-	0.80	1.00	0.30
0.60	-	40	1.00	2.00	0.60
0.60	40	-	1.30	2.00	0.60
1.00	-	50	1.50	3.00	1.00
1.00	50	-	1.80	3.00	1.00
1.10	-	120	2.00	3.50	1.00
1.10	120	-	2.50	4.00	1.00
1.50	-	120	2.30	4.00	1.50
1.50	120	-	3.00	5.00	1.50

- d : Nominal bore diameter
- Δd_{imp} : Single plane mean bore diameter deviation
- Δd_i : Deviation of a single bore diameter
- V_{dip} : Bore diameter variation in a single radial plane
- V_{dop} : Mean bore diameter variation
- $\Delta B_i (\Delta C_i)$: Deviation of the single inner and outer ring width from the nominal dimension
- $V_{B_i} (V_{C_i})$: Variation Of the inner and outer ring width
- K_{B_i} : Radial runout of assembled bearing inner ring
- S_{B_i} : Face runout with bore
- S_{f_i} : Assembled bearing inner ring face runout with raceway
- D : Nominal outside diameter
- ΔD_{imp} : Single plane mean outside diameter deviation
- ΔD_o : Deviation of a single outside diameter
- $V_{Dp}^{(1)}$: Outside diameter variation in a single radial plane
- $V_{Dop}^{(2)}$: Mean outside diameter variation
- K_{B_o} : Radial runout of assembled bearing outer ring
- S_o : Variation of outside surface generatrix inclination with face
- S_{B_o} : Assembled bearing outer ring face runout with raceway
- V_{C_o} : Variation of the outer ring width
- ΔD_{B_i} : Flange outside diameter deviation
- ΔD_{B_o} : Flange width deviation
- f_{smin} : Smallest permissible single chamfer dimension (minimum limit)
- d : Nominal bore diameter
- f_{smax} : Largest permissible single chamfer dimension (maximum limit)
- f_{amax} : Largest permissible single shaft and housing fillet radius

Note(1) : The value of f_{amax} in axial direction of bearing with nominal width of under 2mm is the same as the one in radial direction

Unit μm

$\Delta B_s(\Delta C_s)^{(1)}$		$V B_s(V C_s)^{(2)}$				K_{ia}				S_D		S_{ia}		d (mm)		
Single bearing		Inner/outer ring		Inne ring		P0	P6	P5	P4	P5	P4	P5	P4			
P0 P6	P5 P4	P0	P6	P5	P4											
Upper	Lower	Lower	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Over	Incl.	
0	-40	-40	12	12	5	2.5	10	5	4	2.5	7	3	7	3	0.6(1)	2.5
0	-120	-40	15	15	5	2.5	10	6	4	2.5	7	3	7	3	2.5	10
0	-120	-80	20	20	5	2.5	10	7	4	2.5	7	3	7	3	10	18
0	-120	-120	20	20	5	2.5	13	8	4	3	8	4	8	4	18	30
0	-120	-120	20	20	5	3	15	10	5	4	8	4	8	4	30	50

Note (1): 0.6mm is included in this classification.

Note (2): The inner ring width variation is the same for the outer ring of the same bearing size. CLASS5 and CLASS4 referring to outer ring only.

Unit μm

K_{er}				S_D		S_{er}		$V C_s^{(1)}$		D (mm)		Flanged type				d (mm)		Flanged type			
P0	P6	P5	P4	P5	P4	P5	P4	P5	P4			ΔD_{is}						ΔC_{is}			
												P0	P6	P5	P4			P0	P6	P5	P4
Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Over	Incl.	Upper	Lower	Upper	Lower	Over	Incl.	Upper	Lower	Upper	Lower
15	8	5	3	8	4	8	5	5	2.5	-	10	+220	-36	0	-36	0.6	2.5	0	-40	0	-40
15	8	5	3	8	4	8	5	5	2.5	10	18	+270	-43	0	-43	2.5	10	0	-120	0	-40
15	9	6	4	8	4	8	5	5	2.5	18	30	+330	-52	0	-52	10	18	0	-120	0	-80
20	10	7	5	8	4	8	5	5	2.5	30	50	+390	-62	0	-62	18	30	0	-120	0	-120
25	13	8	5	8	4	10	5	6	3	50	80	+460	-74	0	-74	30	50	0	-120	0	-120

Note (1): Size 2.5mm is included in this classification.

Note (2): Applicable without locating snap ring.

Note (3): The outer ring width variations for CLASS0 and CLASS6 are the same as for the inner ring of the same bearing size.

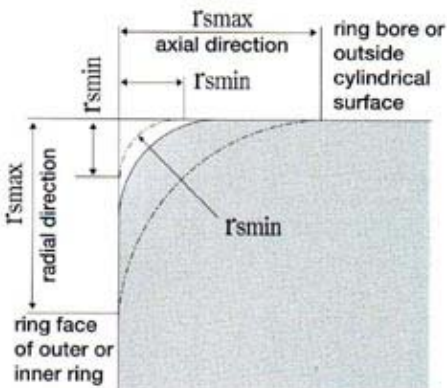
TOLERANCES OF OUTER RING (ABMA)

Unit μm

D (mm)		ΔD_{mp}		ΔD_i						$V D_p, V D_{mp}$		$\Delta B_s(\Delta C_s)$		$V C_s^{(1)}$		S_D		K_{er}		S_{er}		Flanged type						
				Open			Seal, Shield			ABEC 5P, 7P	Seal	Single bearing	ABEC 5P	ABEC 7P	ABEC 5P	ABEC 7P	ABEC 5P	ABEC 7P	ABEC 5P	ABEC 7P	ABEC 5P	ABEC 7P	ΔD_{is}		$\Delta C_{is}^{(2)}$		$S_{er1}^{(3)}$	
				ABEC 5P, 7P	ABEC 5P	ABEC 7P	ABEC 5P, 7P	ABEC 5P	ABEC 7P	ABEC 5P, 7P	ABEC 5P	ABEC 7P	Open	Seal	Upper	Lower	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Upper	Lower
Over	Incl.	Upper	Lower	Lower	Upper	Lower	Lower	Upper	Lower	Lower	Max.	Max.	Upper	Lower	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Upper	Lower	Upper	Lower	Max.	Max.
-	18	0	-5	-5	0	-5	-5	+1	-6	-6	2.5	5	0	-25	5	2.5	8	4	5	3.5	8	5	0	-25	0	-51	7.5	5
18	30	0	-6	-5	0	-6	-5	+1	-7	-6	2.5	5	0	-25	5	2.5	8	4	6	4	8	5	0	-25	0	-51	7.5	5
30	50	0	-6	-5	0	-6	-5	+1	-7	-6	2.5	5	0	-25	5	2.5	8	4	6	4	8	5	0	-25	0	-51	7.5	5

Note (1): Applies to flange width variation of flanged bearing.

Note (2): Applies to flange back face.



$r_{s \text{ min}}$ =smallest permissible single chamfer dimension (minimum limit)

$r_{s \text{ max}}$ =largest permissible single chamfer dimension (maximum limit)

$r_{a \text{ max}}$ =largest permissible single shaft and housing fillet radius

NOTE: The exact shape of the chamfer surface is not specified, but its contour in an axial plane shall not be allowed to project beyond the imaginary circular arc, of radius $r_{s \text{ min}}$, tangential to the ring face and the bore or outside cylindrical surface of the ring (see figure).