

ABEC Classes

Precision ball and roller bearings are made to precision guidelines and specifications set forth by the **Annular Bearing Engineers Committee** of the **AFBMA** and have been accepted by the **American National Standards Institute** and conform, fundamentally, with those set forth by the **International Organization for Standardization**.

ABEC standards define the tolerances for several dimensional and characteristic parameters. The classes are defined as **ABEC 1**, **ABEC 3**, **ABEC 5**, **ABEC 7**, and **ABEC 9**. These standards *do not* address other aspects including, but not limited to: Materials, Lubrication, Cage design, Ball Complement [size-number-precision level], Contact Angle or Internal Clearances.

ABEC 1 Specifications

Tolerance in .0001"

INNER RING							OUTER RING						
BORE DIAMETER				Tol. for Bore		Radial Runout	OUTSIDE DIAMETER				Tol. for outer diameter		Radial Runout
MM		INCH		dm			MM		INCH		dm		
Over	Incl.	Over	Incl.	Low	High		Over	Incl.	Over	Incl.	Low	High	
0	10	0	.3937	-3	+0	4	0	18	0	.7087	+0	-3	6
10	18	.3937	.7087	-3	+0	4	18	30	.7087	1.1811	+0	-3.5	6
18	30	.7087	1.1811	-4	+0	5	30	50	1.1811	1.9685	+0	-4.5	8
30	50	1.1811	1.9685	-4.5	+0	6	50	80	1.9685	3.1496	+0	-5	10
50	80	1.9685	3.1496	-6	+0	8	80	120	3.1496	4.7244	+0	-6	14

ABEC 3 Specifications

Tolerance in .0001"

INNER RING							OUTER RING						
BORE DIAMETER				Tol. for Bore		Radial Runout	OUTSIDE DIAMETER				Tol. for O.D. diameter		Radial Runout
MM		INCH		dm			MM		INCH		dm		
Over	Incl.	Over	Incl.	Low	High		Over	Incl.	Over	Incl.	Low	High	
0	10	0	.3937	-3	+0	2.5	0	18	0	.7087	+0	-3	3
10	18	.3937	.7087	-3	+0	3	18	30	.7087	1.1811	+0	-3	3.5
18	30	.7087	1.1811	-3	+0	3	30	50	1.1811	1.9685	+0	-3.5	4
30	50	1.1811	1.9685	-4	+0	4	50	80	1.9685	3.1496	+0	-4.5	5
50	80	1.9685	3.1496	-4.5	+0	4	80	120	3.1496	4.7244	+0	-5	7

ABEC 5 Specifications

Tolerance in .0001"

INNER RING							OUTER RING						
BORE DIAMETER				Tol. for Bore		Radial Runout	OUTSIDE DIAMETER				Tol. for outer diameter		Radial Runout
MM		INCH		dm			MM		INCH		dm		
Over	Incl.	Over	Incl.	Low	High		Over	Incl.	Over	Incl.	Low	High	
0	10	0	.3937	-2	+0	2.5	0	18	0	.7087	+0	-2	3
10	18	.3937	.7087	-2	+0	3	18	30	.7087	1.1811	+0	-2.5	3.5
18	30	.7087	1.1811	-2.5	+0	3	30	50	1.1811	1.9685	+0	-3	4
30	50	1.1811	1.9685	-3	+0	4	50	80	1.9685	3.1496	+0	-3.5	5
50	80	1.9685	3.1496	-3.5	+0	4	80	120	3.1496	4.7244	+0	-4	7

ABEC 1, ABEC 3
WIDTH OF INDIVIDUAL INNER OR OUTER RING
Tolerance in .0001"

OTHER THAN DUPLEX				DUPLEX BEARINGS			
Nominal Bore in MM.		Width Tolerance		Nominal Bore in MM.		Width Tolerance	
Over	Incl.	+	-	Over	Incl.	+	-
0	50	0	47	0	50	0	98

Internal Clearances

Internal Clearance of a bearing is the distance the internal ring may move relative to the outer ring under no-load conditions. The movement in radial direction is the Radial Internal Clearance. Correspondingly the axial movement is called the Axial Internal Clearance. Normally, the Radial Internal Clearance is greater prior to mounting.

Standard Radial Internal Clearance values provide the optimum operating bearing clearances for applications where normal fit and operating conditions prevail. Where outer and inner rings are mounted with an interference fit, or ambient conditions exceed normal operating conditions, radial internal clearance fits other than standard should apply. For customary interference fits a C3 fit is often recommended. It should be noted that Internal Clearance Tolerances have nothing to do with ABEC tolerances or precision class ratings, consequently a high value of radial play does not imply or indicate lower quality or precision.

- C/1 Internal Clearance is smaller than C/2
- C/2 Internal Clearance is smaller than Standard
- STANDARD**
- C/3 Internal Clearance is larger than Standard
- C/4 Internal Clearance is larger than C/3
- C/5 Internal Clearance is larger than C/3

Tolerance Limits for Radial Internal Clearances:

Internal Clearance Tolerances have nothing to do with ABEC tolerances or precision class ratings, consequently a high value of radial play does not imply or indicate lower quality or precision.

Radial Internal Clearance of Single Row, Radial Contact Ball Bearings (under no load)

Basic Bore Diameter d		C-2		C-0		C-3		C-4	
mm		Low	High	Low	High	Low	High	Low	High
Over	Incl.	Low	High	Low	High	Low	High	Low	High
2.5	10	0	3	1	5	3	9	6	11
10	18	0	3.5	1	7	4	10	7	13
18	24	0	4	2	8	5	11	8	14
24	30	0.5	4.5	2	8	5	11	9	16
30	40	0.5	4.5	2	8	6	13	11	18
40	50	0.5	4.5	2.5	9	7	14	12	20
50	65	0.5	6	3.5	11	9	17	15	24
65	80	0.5	6	4	12	10	20	18	28