

Manufacturing standard

STEEL BALLS 1/3

ISO3290-1 Bearing steel balls

Grade	Variation of ball diameter (µm)	Deviation from spherical form (µm)	Surface roughness (µm)	Variation of lot diameter (µm)	Gauge interval (µm)	Preferred gauges (µm)
G3	0.08	0.08	0.010	0.13	0.5	-5 → +5
G5	0.13	0.13	0.014	0.25	1	-5 → +5
G10	0.25	0.25	0.020	0.50	1	-9 → +9
G16	0.40	0.40	0.025	0.80	2	-10 → +10
G20	0.50	0.50	0.032	1.00	2	-10 → +10
G24	0.60	0.60	0.040	1.20	2	-12 → +12
G28	0.70	0.70	0.050	1.40	2	-12 → +12
G40	1.00	1.00	0.060	2.00	4	-16 → +16
G60	1.50	1.50	0.080	3.00	6	-18 → +18
G100	2.50	2.50	0.100	5.00	10	-40 → +40
G200	5.00	5.00	0.150	10	15	-60 → +60

ABMA Std10A-2001 Metal Balls for unground bearings and other uses

Grade	Variation of ball diameter (µm)	Deviation from spherical form (µm)	Surface roughness (µm)	Variation of lot diameter (µm)	Nominal ball diameter tolerance (µm)
G3	0.08	0.08	0.012	0.13	*
G5	0.13	0.13	0.020	0.25	*
G10	0.25	0.25	0.025	0.50	*
G16	0.40	0.40	0.025	0.80	*
G24	0.60	0.60	0.050	1.20	*
G48	1.20	1.20	0.080	2.40	*
G100	2.50	2.50	0.125	5.00	±12.5
G200	5.00	5.00	0.200	10	±25
G500	13	13	*	25	±50
G1000A	25	25	*	50	±125
G2000A	50	50	*	100	±250

Manufacturing standard

STEEL BALLS 2/3

DIN 5401 2002 Balls for rolling bearings and general industrial use

Grade	Diameter (mm)		Ball diameter variation (µm)	Deviation from spherical form (µm)	Surface roughness (µm)	Variation of lot diameter (µm)	Gauge interval (µm)	Preferred gauges (µm)
	De	à						
G3	-	12,7	0,08	0,08	0,010	0,13	0,5	-5 → +5
G5	-	12,7	0,13	0,13	0,014	0,25	1	-5 → +5
G10	-	25,4	0,25	0,25	0,020	0,50	1	-9 → +9
G16	-	25,4	0,40	0,40	0,025	0,80	2	-10 → +10
G20	-	38,1	0,5	0,50	0,032	1,00	2	-10 → +10
G28	-	50,8	0,70	0,70	0,050	1,40	2	-12 → +12
G40	-	100	1,00	1,00	0,060	2,00	4	-16 → +16
G80	-	100	2,00	2,00	0,100	4,00	4	-12 → +12
G100	-	150	2,50	2,50	0,100	5,00	10	-40 → +40
G200	-	150	5,00	5,00	0,150	10	10	-60 → +60
G300	-	25,4	10,00	10,00	0,200	20	20	-60 → +60
	25,4	50,8	15,00	15,00	0,200	30	30	-90 → +90
	50,8	75	-	-	0,200	40	40	-120 → +120
G500	-	25,4	25,00	25,00	-	50	50	-50 → +50
	25,4	50,8	25,00	25,00	-	75	75	-75 → +75
	50,8	75	25,00	25,00	-	100	100	-100 → +100
	75	100	32,00	32,00	-	125	125	-125 → +125
	100	125	38,00	38,00	-	150	150	-150 → +150
	125	150	44,00	44,00	-	175	175	-175 → +175
G600	Tous		-	-	-	400	-	-
G700	Tous		-	-	-	2000	-	-

Manufacturing standard

STEEL BALLS 3/3

Ancienne norme DIN 5401

Classe	Nominal diameter (mm)	Tolerances (µm)	Gauge interval (µm)	Preferred gauges (µm)	Nominal ball diameter tolerance (µm)
I	Jusqu'à 10	+/- 10,25	0,5	-10 → +10	+/- 5,00
II	Jusqu'à 25	+/- 10,50	1,00	-10 → +10	+/- 5,00
III	Jusqu'à 25	+/- 11,00	2,00	-10 → +10	+/- 9,00
	De 25 à 50	+/- 13,50	3,00	-12 → +12	+/- 11,00
	De 50 à 75	+/- 14,00	4,00	-12 → +12	+/- 11,50
	De 75 à 100	+/- 17,50	5,00	-15 → +15	+/- 13,00
	De 100 à 125	+/- 21,00	6,00	-18 → +18	+/- 19,00
IV	De 125 à 150	+/- 24,50	7,00	-21 → +21	+/- 14,00
	Jusqu'à 10	+/- 14,00	4,00	-12 → +12	+/- 47,00
V	Jusqu'à 25	+/- 75,00	50,00	+/- 50	+/- 2,00
	De 25 à 50	+/- 113,00	75,00	+/- 75	+/- 25,00
	De 50 à 75	+/- 150,00	100,00	+/- 100	+/- 38,00
	De 75 à 100	+/- 188,00	125,00	+/- 125	+/- 50,00
	De 100 à 125	+/- 225,00	150,00	+/- 150	+/- 63,00
VI	De 125 à 150	+/- 263,00	175,00	+/- 175	+/- 75,00
		+/- 200,00	400,00		+/- 88,00

→ **For class III, multiply columns 3, 4, 5 and 6 values :**

- By 5 ; for chrome steel balls AISI 52100 annealed
- By 5 ; for stainless steel balls unhardened or annealed
- By 2 ; for stainless steel balls
- By 10 ; for brass or bronze balls

Manufacturing standard

CERAMIC BALLS

ISO3290-2 Bearing ceramic balls

Grade	Variation of ball diameter (µm)	Deviation from spherical form (µm)	Surface roughness (µm)	Variation of lot diameter (µm)	Gauge interval (µm)	Preferred gauges (µm)
G3	0.08	0.08	0.010	0.13	0.5	-5 → +5
G5	0.13	0.13	0.014	0.25	1	-5 → +5
G10	0.25	0.25	0.020	0.50	1	-9 → +9
G16	0.40	0.40	0.025	0.80	2	-10 → +10
G20	0.50	0.50	0.032	1.00	2	-10 → +10
G24	0.60	0.60	0.040	1.20	2	-12 → +12
G28	0.70	0.70	0.050	1.40	2	-12 → +12
G40	1.00	1.00	0.060	2.00	4	-16 → +16
G60	1.50	1.50	0.080	3.00	6	-18 → +18
G100	2.50	2.50	0.100	5.00	10	-40 → +40

ASTM F2094

Grade ASTM F2094	Variation of ball diameter (µm)	Deviation from spherical form (µm)	Surface roughness (µm)	Variation of lot diameter (µm)	Gauge interval (µm)	Preferred gauges (µm)
2C	0.05	0.05	0.004	0.08		
3C	0.08	0.08	0.004	0.13	1	± 8
5C	0.13	0.13	0.005	0.25	1	± 8
10C	0.25	0.25	0.006	0.51	2	± 10
16C	0.40	0.4	0.009	0.8	2	± 10
24C	0.61	0.61	0.013	1.22	2	± 12
48C	1.22	1.22	0.013	2.44	4	± 16

Manufacturing standard

PLASTIC BALLS

Grade	Diameter tolerances (µm)	Deviation from spherical form (µm)
G0	+/- 12,70	10,00 max
G1	+/- 25,40	12,70 max
G2	+/- 50,80	25,40 max
G3	+/- 127,00	50,80 max