Preciball

CHROME STEEL BALLS

DESCRIPTION Chrome steel balls are widely used in high speed ball bearings, valve industry, as well as, in a number of other industrial applications. Chrome steel balls have excellent surface quality, high hardness, high load bearing capacity and wear resistance, as a result of through hardening.

INTERNATIONAL EQUIVALENTS	USA	GERMANY	FRANCE	RUSSIA	CHINA	JAPAN
	52100	1.3505	100C6	9Ch1	GCr15	SUJ2

CHEMICAL COMPOSITION	C	Cr	Mn	Si	P	S
	0.93-1.10 %	1.30-1.65 %	0.20-0.45 %	0.15-0.35 %	0.03 % max.	0.025 % max.

HARDNESS + DENSITY	Hardness	Density
	60-66°HRC	7.85 g/cm³

APPLICATIONS Ball bearings, valve industry, ball screws, automotive industry, machine tools, grinding applications

DIMENSIONS + GRADES		
	0.250 mm – 300 mm	Chrome steel balls are produced according to international standards such as : ISO 3290 - DIN 5401 - ABMA

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ANSI/ABMA

TOLERANCES BY GRADE FOR INDIVIDUAL BALLS				TOLERANCES BY GRADE FOR LOTS OF BALLS			
	VDws	ΔRw	Ra	VDwt		ΔS	
Ball Grade	Allowable Ball Dia. Variation	Allowable Deviation from Spherical Form	Maximum Surface Roughness Arithmetic Average	Allowable Lot Dia. Variation	Nominal Ball Diameter Tolerance	Allowable Ball Gauge Deviation High Low	Container Marking Increment
METRIC µm							
3	0.08	0.08	0.012	0.13	*	+0.75 -0.75	0.25
5	0.13	0.13	0.02	0.25	*	+1.25 -1	0.25
10	0.25	0.25	0.025	0.5	*	+1.25 -1	0.25
16	0.4	0.4	0.025	0.8	*	+1.25 - 1	0.25
24	0.6	0.6	0.05	1.2	*	+2.5 -2.5	0.25
48	1.2	1.2	0.08	2.4	*	*	1.25
100	2.5	2.5	0.125	5	±12.5	*	*
200	5	5	0.2	10	±25	*	*
500	13	13	*	25	±50	*	*
1000	25	25	*				

Conversion table

Ball Size (inches to millimeters)

INCHES	MM	INCHES	MM
1/32	0.79375	**9/16**	14.28750
3/64	1.19063	**5/8**	15.87500
1/16	1.58750	**11/16**	17.46250
5/64	1.98438	**¾**	19.05000
3/32	2.38125	**13/16**	20.63750
1/8	3.17500	**7/8**	22.22500
5/32	3.96875	**1**	25.40000
3/16	4.76250	**1 1/16**	27.00020
7/32	5.55625	**1 1/8**	28.57500
¼	6.35000	**1 3/16**	30.16250
9/32	7.14375	**1 ¼**	31.75000
5/16	7.93750	**1 5/16**	33.33750
11/32	8.73125	**1 3/8**	34.92500
3/8	9.52500	**1 7/16**	36.51250
13/32	10.31875	**1 ½**	38.10000
7/16	11.11250	**1 5/8**	41.27500
15/32	11.90625	**1 ¾**	44.45000
½	12.70000	**1 7/8**	47.62500
17/32	13.49375	**2**	50.80000

DIN 5401 - NEW

Dw				VDws	tDw	Ra5)	VDwL	VDwA	IG;ST			
Grade	Nominal Ball Diameter		Gauge Allowance	µm max.	µm max.	µm max.	µm max.	µm max.	µm max.	Mean allowances in Each Grade (µm)		
G3	-	12,7	± 5,32	0,08	0,08	0,010	0,13	-	0,5	-5 .. .-0.5	0	+0.5 ... +5
G5	-	12,7	± 5,63	0,13	0,13	0,014	0,25	-	1	-5 ... -1	0	+1 ... +5
G10	-	25,4	± 9,75	0,25	0,25	0,020	0,5	-	1	-9 ... -1	0	+1 ... +9
G16	-	25,4	± 11,4	0,4	0,4	0,025	0,8	-	2	-10 ... -2	0	+2 ... +10
G20	-	38,1	± 11,5	0,5	0,5	0,032	1	-	2	-10 ... -2	0	+2 ... +10
G28	-	50,8	± 13,7	0,7	0,7	0,050	1,4	-	2	-12 ... -2	0	+2 ... +12
G40	-	100	± 19	1	1	0,060	2	-	4	-16 ... -4	0	+4 ... +16
G80	-	100	± 14	2	2	0,1	-	4,0	4	-12 ... -4	0	+4 ... +12
G100	-	150	± 47,5	2,5	2,5	0,1	5	-	10	-40 ... -10	0	+10 ... +40
G200	-	150	± 72,5	5	5	0,15	10	-	10	-60 ... -10	0	+10 ... +60
G300	-	25,4	± 70	10	10	0,2	-	20	20	-60 ... -20	0	+20 ... +60
G300	25,4	50,8	± 105	15	15	0,2	-	30	30	-90 ... -30	0	+ 30 ... +90
G300	50,8	75	± 140	20	20	0,2	-	40	40	-120 ... -40	0	+40 ... +120
G500	-	25,4	± 75	25	25	-	-	50	50	-50	0	+50
G500	25,4	50,8	± 112,5	25	25	-	-	75	75	-75	0	+75
G500	50,8	75	± 150	25	25	-	-	100	100	-100	0	+100
G500	75	100	± 187,5	32	32	-	-	125	125	-125	0	+125
G500	100	125	± 225	38	38	-	-	150	150	-150	0	+150
G500	125	150	± 262,5	44	44	-	-	175	175	-175	0	+175
G600	all		± 200	-	-	-	-	400	-	-	0	-
G700	all		± 1000	-	-	-	-	2000	-	-	0	-

ISO 3290

Grade	Ball Dia. Variation (µm)	Deviation from Spherical Form (µm)	Surface Roughness (µm)	Lot Dia. Variation (µm)	Gauge Interval (µm)	Preferred Gauge (µm)	Subgauge Interval (µm)	Subgauge (µm)
G3	0.08	0.08	0.010	0.13	0.5	-5...-0.5 0 +0.5...+5	0.1	-0.2,-0.1, 0, +0.1,+0.2
G5	0.13	0.13	0.014	0.25	1	-5...-1 0 +1...+5	0.2	-0.4,-0.2, 0, +0.2,+0.4
G10	0.25	0.25	0.020	0.5	1	-9...-1 0 +1...+9	0.2	-0.4,-0.2, 0, +0.2,+0.4
G16	0.4	0.4	0.025	0.8	2	-10...-2 0 +2...+10	0.4	-0.8,-0.4 0, +0.4,+0.8
G20	0.5	0.5	0.032	1	2	-10...-2 0 +2...+10	0.4	-0.8,-0.4 0, +0.4,+0.8
G24	0.6	0.6	0.040	1.2	2	-12...-2 0 +2...+12	0.4	-0.8,-0.4 0, +0.4,+0.8
G28	0.7	0.7	0.050	1.4	2	-12...-2 0 +2...+12	0.4	-0.8,-0.4 0, +0.4,+0.8
G40	1	1	0.060	2	4	-16...-4 0 +4...+16	0.8	-1.6,-0.8, 0, +0.8,+1.6
G60	1.5	1.5	0.080	3	6	-18...-6 0 +6...+18	1.2	-2.4,-1.2, 0. +1.2,+2.4
G100	2.5	2.5	0.100	5	10	-40...-10 0 +10...+40	2	-4,-2, 0, +2,+4
G200	5	5	0.150	10	15	-60...-15 0 +15...+60	3	-6,-3, 0, +3,+6

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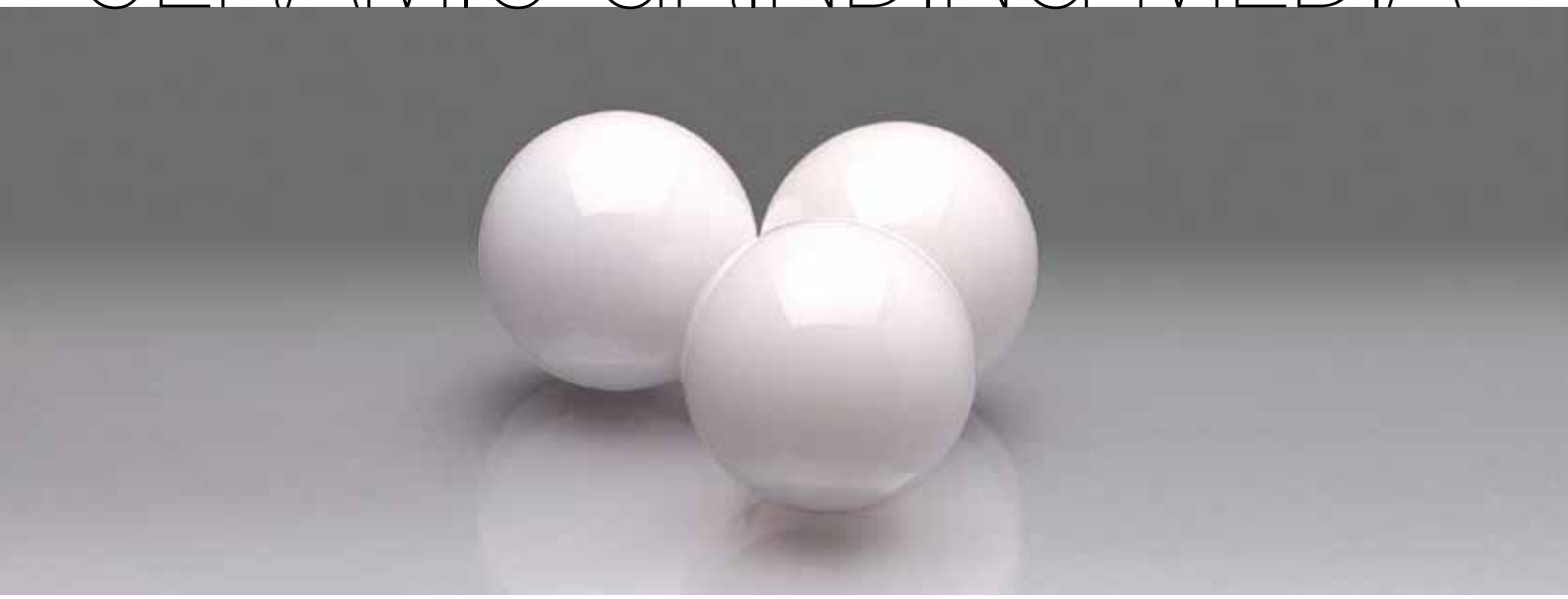
CERAMIC GRINDING MEDIA



	Zirconium Silicate	Zirconium Oxide Cerium stabilised	Zirconium Oxide Yttrium stabilis
	ZrO_2 : 55-65% SiO_2 : 35-45%	ZrO_2 : 75-85% CeO_2 : 15-25%	ZrO_2 : 94.5%+/-0.2 Y_2O_3 : 5.0%+/-0.2
SPECIFICATIONS			
Hardness	≥ 900 Hv	≥ 1100 Hv	≥ 1200 Hv
Roundness	≥ 92 %	≥ 92 %	≥ 92 %
Specific density	≥ 4 g/cm³	≥ 6.1 g/cm³	≥ 5.9 g/cm³
Bulk density	≥ 2.50 g/cm³	≥ 3.80 g/cm³	≥ 3.80 g/cm³
Sizes	From 0.4 to 13mm	From 0.3 to 5mm	From 0.1 to 2mm
APPLICATIONS	used for grinding, dispersion of : • Minerals such as $CaCO_3$, Kaolin,$ZrSiO_4$ • Medium-viscosity paints and inks,dyes • Inorganic & organic pigments • Mining : lead, copper, zinc…	used for grinding, dispersion of : • Inorganic & organic pigments : TiO_2, iron oxide… • High-viscosity paints & inks, dyes • Electric ceramics, magnetic ceramics	used for grinding, dispersion of : • Electric ceramics, magnetic ceramics, ferrite High-quality products such as automobile paints & inks, industrial paints • Cosmetics : lipsticks, sun protection creams… • Food industry, pharmaceutical industry
ADVANTAGES	• Sintered beads (low porosity, good roundness) • Homogeneous structure • High productivity • Suitable for both horizontal & vertical mills • Economical	• High density • High grinding efficiency • Suitable for both horizontal & vertical mills • Low contamination	• High density • High wear-resistance • High grinding efficiency • Low contamination • Low maintenance/repair costs • High shelf life

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CARBON STEEL BALLS

DESCRIPTION

- **Low carbon steel balls** also called case hardened carbon provide substantial savings for applications where moderate loads and low speed are requested.
- **High carbon steel balls** is through hardened and can be used for higher loads. It is a good alternative to chrome balls.

INTERNATIONAL EQUIVALENTS

USA	GERMANY	FRANCE	CHINA
AISI 1010-1015	1.0301-1.0010-1.1121	XC10	Q195-Q235
AISI 1085-1086	1.0616-1.1269	XC90	80

CHEMICAL COMPOSITION

	C	Si	Mn	P	S
Low carbon	0.06-0.12 %	0.10-0.40 %	0.25-0.65 %	0.05 % Max	0.05 % Max
High carbon	0.80-0.93 %	0.10-0.35 %	0.30-1.00 %	0.04 % Max	0.05 Max

HARDNESS + DENSITY

Hardness	Density
60°HRC Min.	7.861 g/cm³

APPLICATIONS

Low carbon steel balls : Castors, wheels, conveyors, low precision bearings, drawer slides…
High carbon steel balls : Bearings, automotive parts, sliding rails, polishing and grinding applications…

DIMENSIONS + GRADES

0.250 mm – 300 mm

Carbon steel balls are produced according to international standards such as :
ISO 3290 - DIN 5401 - ABMA

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STAINLESS STEEL BALLS
400 SERIES

DESCRIPTION

- Stainless steel balls are divided into 3 big families: Austenitic and Martensitic and Ferritic grades.
- Austenitic grades (300 series) are the most corrosion resistant of the stainless steel grades. They are recommended when there is a food contact. They are not or lightly Ferro-magnetic. They are not hardened.
- Martensitic grades (400 series) are corrosion resistant and have higher hardness. These grades are Ferro-magnetic. They are mainly used where hardness, strength and wear resistance are required.
- Ferritic grades are Ferro-magnetic but cannot be hardened or strengthened by heat treatment. They are more corrosive resistant than the Martensitic grades, but inferior to the austenitic grades.

INTERNATIONAL EQUIVALENTS	USA	GERMANY	FRANCE	CHINA	JAPAN
420	AISI 420	1.4021-1.4028	Z20C13	2CR13	420
420C	AISI 420C	1.4034	X46CR13	4CR13	-
440C	AISI 440C	1.4125	Z100CD17	9Cr18Mo	SUS440C

CHEMICAL COMPOSITION	C	Si	Mn	P	S	Cr	Mo
420	0.15-0.36%	1% max	1.50% max	0.04% max	0.04 % max	12-14 %	---
420C	0.43-050%	1% max	1% max	0.04% max	0.03 % max	12-14.5 %	---
440C	0.95-1.20%	1% max	1% max	0.04% max	0.03 % max	16-18 %	0.80 % max

HARDNESS + DENSITY	Hardness	Density
	420: 48-58°HRC 420C: 52-60°HRC 440C: 58-65°HRC	420: 7.75 g/cm³ 420C: 7.75 g/cm³ 440C: 7.75 g/cm³

APPLICATIONS Ball bearings, valve industry, automotive industry, quick couplings, ballpoint pens

DIMENSIONS + GRADES		
	0.250 mm – 300 mm	Carbon steel balls are produced according to international standards such as : ISO 3290 - DIN 5401 - ABMA

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STAINLESS STEEL BALLS
300 SERIES

DESCRIPTION

- Stainless steel balls are divided into 3 big families: Austenitic and Martensitic and Ferritic grades.
- Austenitic grades (300 series) are the most corrosion resistant of the stainless steel grades. They are recommended when there is a food contact. They are not or lightly Ferro-magnetic. They are not hardened.
- Martensitic grades (400 series) are corrosion resistant and have higher hardness. These grades are Ferro-magnetic. They are mainly used where hardness, strength and wear resistance are required.
- tFerritic grades are Ferro-magnetic but cannot be hardened or strengthened by heat treatment. They are more corrosive resistant than the Martensitic grades, but inferior to the austenitic grades.

INTERNATIONAL EQUIVALENTS	USA	GERMANY	FRANCE	JAPAN
304	AISI 304	1.4301	Z6CN18-09	SUS304
304L	AISI 304L	1.4307	Z3CN18-10	SUS304L
316	AISI 316	1.4401	Z6CND17-12	SUS316
316L	AISI 316L	1.4404	Z2CND17-12	SUS316L

CHEMICAL COMPOSITION	C	Si	Mn	P	S	Cr	Mo	Ni
304	0.08%max	1.00%max	2.00%max	0.045%max	0.03%max	17-20%		8-11%
304L	0.03%max	0.75%max	2.00%max	0.045%max	0.03%max	18-20%		8-10.5%
316	0.08%max	1.00%max	2.00%max	0.045%max	0.03%max	16-18.5%	2-3%	10-14%
316L	0.03%max	1.00%max	2.00%max	0.045%max	0.03%max	16-18.5%	2-3%	10-14%

HARDNESS + DENSITY	Hardness	Density	
	25-39°HRC	304:7.93 g/cm³	316:7.98 g/cm³

APPLICATIONS Special bearings, dispensers, valves, quick couplings, pumps, nail polish...

DIMENSIONS + GRADES 0.250 mm – 300 mm

Chrome steel balls are produced according to international standards such as: ISO 3290 - DIN 5401 - ABMA

ISO 9001 BUREAU VERITAS Certification

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