



STEEL BALL

Haimen City Mingzhu Steel Ball Co., Ltd

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COMPANY INTRODUCTION

Haimen City Mingzhu Steel Ball Co., Ltd. is a professional manufacturer of precision steel balls in China. The company was founded in 1992 and is located in Haimen, Jiangsu. It covers an area of 7,500m². The company has 105 sets of processing equipment, with an annual production output of 2,500 tons. We obtained the Certificate of Quality Management systems ISO9001:2008 and Quality Management System specification for the automotive industry IATF 16949: 2016.

We mainly produce chrome steel balls and stainless steel balls in accordance with international standards: ISO, DIN, JIS, AISI, with grade from G10 to G500, size range from 7/64' ' to 1-3/16' '. Besides, non-standard size, special material and machine processing like hole drilling, CNC machining can be made under special request. Nowadays these roller parts are widely used in precision bearings, automotive components, Ball screws, slide rails, pumps, sprayers, grinding medias.

Since the establishment, We have consistently adhered to the principle of quality assurance putting the quality of products in the most important position. A complete management system is established. Especially the inspection and tracking system from raw materials to finished products. All the produced steel balls are 100% sorted by roller bars and photoelectric surface defect detectors to ensure the quality.

We keep providing high-quality steel balls with the good service to meet the requirement of our customers. Besides the domestic market, our steel balls also export to many countries like USA, Korea, Italy, Germany, Latin America, etc.

We are getting poised for the challenge of gaining the satisfaction of all customers through a continuous improvement of our products and service.



IATF 16949: 2016 certification

PRODUCT INTRODUCTION

01/ Chrome Steel Balls

Description:

Chrome steel balls are primarily used in precision ball bearings and in a variety of industrial applications, like vehicles components, machine tools, valves, bikes and pumps. They have a superior surface finishing, an extraordinary hardness, and dimensional precision and a good carrying capacity, along with a great wear and deformation resistance. Because of these special mechanic properties, chrome steel balls are widely utilized to produce mechanical components.



Specification:

Chrome steel balls	
Diameters:	7/64' ' inch - 1-3/16 inch
Grade:	G10-G500
Application:	Bearings, automotive components, ball screw, linear guides, grinding medias, pumps, machine tools, value, etc.

Chemical composition:

	100Cr6	100CrMn6	Hardness
C	0.95% - 1.05%	0.90% - 1.05%	60 - 66HRC
Si	0.15% - 0.35%	0.50% - 0.70%	
Mn	0.25% - 0.45%	1.00% - 1.20%	
P	≤0.025%	≤0.030%	
S	≤0.020%	≤0.025%	
Cr	1.40% - 1.65%	1.40% - 1.65%	
Ni	-	≤0.30%	
Cu	-	≤0.30%	

02/ 420C stainless steel balls

Description:

420C stainless steel balls are primarily used in Special bearings, anti-friction bearings, special pumps, recirculating balls, medical instruments, lighters, automotive seat-belts, oil refinery devices and components. They have good resistance against corrosion with a high hardness. Their resistance against corrosion caused by water, steam, air, is good. This kind of steel is not suitable to be used with chemical agents like sea water and strong acids.



Specification:

420C stainless steel balls	
Diameters:	7/64' ' inch - 1-3/16 inch
Grade:	G10-G500
Application:	Special bearings, anti-friction bearings, special pumps, recirculating balls, medical instruments, lighters, automotive seat-belts, oil refinery devices and components.

Chemical composition:

		Hardness
C	0.43% - 0.50%	54 - 60HRC
Si	≤1.00%	
Mn	≤1.00%	
P	≤0.04%	
S	≤0.03%	
Cr	12.50% - 14.50%	

03/ 440C stainless steel balls

Description:

440C stainless steel balls render a great integral hardness, with a remarkable resistance to corrosion caused by water, steam, air as well as by gasoline, oil and alcohol. High degree of surface finish and very precise.

size tolerances make this type of stainless steel are the best for the usage in stainless steel high precision ball bearings, valves, ball pens and other stiff environment application.



Specification:

440C stainless steel balls	
Diameters:	7/64' ' inch - 1-3/16' ' inch
Grade:	G10-G500
Application:	ball bearings, oil refinery valves, ball point pens

Chemical composition:

		Hardness
C	0.95% - 1.20%	58 - 65 HRC
Si	≤1.00%	
Mn	≤1.00%	
P	≤0.04%	
S	≤0.03%	
Cr	16.00% - 18.00%	
Mo	≤0.75%	

04/ 304 stainless steel balls

Description:

304 stainless steel balls are resistant to corrosion of oxidative solution, particularly to those produced by chemical component of organic nature, they are resistant to water, sea-air, and organic acids. They aren't very resistant to the attacks of and sulfuric acids. Therefore they are suitable for valves and relevant applications with resistance to corrosion. This stainless steel, usually considered non magnetic.



Specification:

304 stainless steel balls	
Diameters:	7/64'' inch - 1-3/16 inch
Grade:	G80-G500
Application:	pumps and valves, aerosol and dispenser sprayers, miniature pumps, utensil in the foodstuff, medical application valves, agricultural back-pack sprayers.

Chemical composition:

		Hardness
C	≤0.08%	25 - 39HRC
Si	≤0.75%	
Mn	≤2.00%	
P	≤0.045%	
S	≤0.03%	
Cr	18.00% - 20.00%	
Ni	8.00% - 10.50%	
N	≤0.10%	

05/ 316 stainless steel balls

Description:

316 stainless steel balls are similar to the 304 stainless Steel ball, it has a better resistance to the corrosion under particular circumstances and this is mainly due to the addition of molybdenum. It's now primarily used for application in paper-industry, in food industry and for other process of industrial chemistry, concerning its general resistance to acids, excluding the hydro-chloric one.



Specification:

316 stainless steel balls	
Diameters:	7/64'' inch - 1-3/16'' inch
Grade:	G80-G500
Application:	pumps and valves, aerosol and dispenser sprayers, utensil in the food-stuff, paper, chemical, rubber, military, textile industry. Applications in photographic devices, medical instruments, quick couplings, recirculating balls, ink cartridges, jewels.

Chemical composition:

		Hardness
C	≤0.07%	25 - 39 HRC
Si	≤1.00%	
Mn	≤2.00%	
P	≤0.045%	
S	≤0.03%	
Cr	16.50% - 18.50%	
Mo	2.00% - 2.50%	
Ni	10.00% - 13.00%	
N	≤0.11%	

06/ carbon steel balls

Description:

The main characteristic of carbon steel consists in the heat treatment exclusively through the hardening of a superficial layer, while the hardness of the inner part of the ball doesn't vary. The balls of this material is economic for all those applications that don't require the use of full-hardened steel balls.

This type of steel has a great wear and load capacity but no corrosion resistance to water and chemical agent. Carbon steel balls should be plated for the outside use.



Specification:

1010 carbon steel balls	
Diameters:	7/64" inch - 1-3/16" inch
Grade:	G100-G1000
Superficial hardness:	55/62 HRC
Application:	casters, locks, drawer slides, bicycles, roller skates, slides, trolleys and conveyors.

Chemical composition:

	1010	1015	Hardness
C	0.08% - 0.10%	0.13% - 0.18%	55 - 62 HRC
Mn	0.30% - 0.60%	0.30% - 0.60%	
P	≤0.040%	≤0.040%	
S	≤0.050%	≤0.050%	

QUALITY INSPECTION

Our balls are sorted by the sorting bar and checked by the optical surface defect detector. Before packaging samples balls from the lot are to send for final inspection to check for the roughness, roundness, hardness, variation, crush load and vibration in compliance with the standard. If all requirements are met, a inspection report will be made for the customer. Our sophisticated laboratory is equipped with high precision machines and equipment: Rockwell hardness tester, Vickers hardness tester, crushing load machine, roughness meter, roundness meter, diameter comparator, metallographic microscope, vibration measuring instrument, etc..



Optical surface defect detector



Roundness meter



Roundness tester



Vickers hardness tester



Rockwell hardness tester



Metallographic microscope



Crush load tester



Vibration tester



Microscope

TECHNICAL DATA

● BALLS WEIGHT AND QUANTITY TABLE

DIAMETER		WEIGHT PER 1000 BALLS - KG.*	QUANTITY PER KG.
(MM)	(INCH)		
3	-	0.11	9091
3.175	1/8"	0.131	7634
3.5	-	0.175	5717
3.969	5/32"	0.255	3922
4	-	0.261	3831
4.7625	3/16"	0.441	2268
5	-	0.51	1961
5.1594	13/64"	0.56	1786
5.5562	7/32"	0.699	1431
5.9531	15/64"	0.86	1163
6	-	0.881	1136
6.35	1/4"	1.04	962
6.5	-	1.119	894
6.7469	17/64"	1.25	800
7.1438	7/32"	1.49	671
7.9375	5/16"	2.04	490
8	-	2.09	478
8.731	11/32"	2.71	369
9.525	3/8"	3.52	284
10.3188	13/32"	4.48	223
11	-	5.42	185
11.1125	7/16"	5.6	179

DIAMETER		WEIGHT PER 1000 BALLS - KG.*	QUANTITY PER KG.
(MM)	(INCH)		
11.5094	29/64"	6.22	161
11.9062	15/32"	6.88	145
12	-	7.04	142
12.3031	31/64"	7.6	132
12.7	1/2"	8.35	120
13.4938	17/32"	10	100
14.2875	9/16"	11.9	84
15.0812	19/32"	14	71.4
15.875	5/8"	16.3	61.3
16.6688	21/32"	18.9	52.9
17.4625	11/16"	21.7	46.1
18.2562	23/32"	24.8	40.3
19.05	3/4"	28.2	35.5
20.637	13/16"	35.8	27.9
22.225	7/8"	44.8	22.3
23.8125	15/16	55.1	18.2
25.4	1"	66.8	15
30.1625	1 3/16"	112	8.93
33.338	1 5/16	151.1	6.62
38.1	1 1/2"	225.6	4.43

* Multipling the weight of 1000 pcs by the following items to get the approximative weight for the other materials: Stainless steel 420(C)/440(C):0.980; Stainless steel 304(L)/316(L):1.008; Carbon steel 1010/1015: 1.005

● DIN 5401 2002-08 TOLERANCE SURFACE ROUGHNESS AND GAUGES FOR STEEL BALLS

Grade	Nominal diameter Dw (mm)		Limit deviations (μm)	Ball diameter variation	Roundness error	Surface roughness	Variation of Lot diameter		Subgauge interval	Subgauges (μm)
	From	To		"VDws Max.(μm)"	"tDws Max.(μm)"	"RaMax. (μm)"	"VDwL Max. (μm)"	"VDwA Max. (μm)"	"IG,ST (μm)"	
G3	-	12.7	±5.32	0.08	0.08	0.01	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	0.02	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	0.05	1.4	-	2	-12~-2,0,+2~+12
G40	-	100	±19	1	1	0.06	2	-	4	-16~-4,0,+4~+16
G80	-	100	±14	2	2	0.1	-	4	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	ALL	±200	-	-	-	-	400	-	-
G700	ALL	ALL	±1000	-	-	-	-	2000	-	-

● ISO 32902014 TOLERANCE, SURFACE ROUGHNESS AND GAUGES FOR STEEL BALLS

Grade	Variation Of Ball Diameter	Deviation From Sphercal Form max.	Surface Roughness Ra Max.	Variation Of Ball Lot Diameter	Gauge Interval	Preferred Gauges	Subgauge Interval	Subgauges
	Vdws Max.			Vdwl Max	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	1.0	-5.....-1 0 +1.....+5	0.2	-0.4.....-0.2 0 +0.2.....+4
G10	0.25	0.25	0.020	0.5	1.0	-9.....-1 0 +1.....+9	0.2	-0.4.....-0.2 0 +0.2.....+4
G16	0.4	0.4	0.025	0.8	2.0	-10.....-2 0 +2.....+10	0.4	-0.8.....-0.4 0 +0.4.....+0.8
G20	0.5	0.5	0.032	1.0	2.0	-10.....-2 0 +2.....+10	0.4	-0.8.....-0.4 0 +0.4.....+0.8
G28	0.7	0.7	0.050	1.4	2.0	-12.....-2 0 +2.....+12	0.4	-0.8.....-0.4 0 +0.4.....+0.8
G40	1.0	1.0	0.060	2.0	4.0	-16.....-4 0 +4.....+16	0.8	-1.6.....-0.8 0 +0.8.....+1.6
G60	1.5	1.5	0.080	3.0	6.0	-18.....-6 0 +6.....+18	1.2	-2.4.....-1.2 0 +1.2.....+2.4
G100	2.5	2.5	0.100	5.0	10.0	-40.....-10 0 +10.....+40	2.0	-4.....-2 0 +2.....+4
G200	5.0	5.0	0.150	10.0	15.0	-60.....-15 0 +15.....+60	3.0	-6.....-3 0 +3.....+6