

440C Stainless Steel Balls

Material Characteristics

Three quality stainless steels are available for applications in corrosive environments. AISI Type 440C offers the greatest hardness and surface finish, and is available in double vacuum melted materials. AISI Type 302 provides extreme toughness and corrosion resistance from oxidizing solutions and many organic chemicals in an unhardened state.

Hardness

Our modern heat treating facilities, complete with controlled atmosphere and temperature, allow us to maintain Rockwell hardness within three (3) points in any production run and to attain any specific hardness designated by the customer. AISI 440C corrosion resistant, hardened steel balls are made with a through hardness from RC 58 to 65†, depending on requirements. (A table correcting Rockwell "C" values for the curved surface to Rockwell "C" for parallel flats may be found on page 6).

†Per ABMA Std 10, Table 1

Material Analysis†

Carbon	0.95 to 1.20%
Manganese	Maximum of 1.00%
Silicon	Maximum of 1.00%
Phosphorus	Maximum of .40%
Sulphur	Maximum of .30%
Chromium	16.00 to 18.00%
Molybdenum	Maximum of .75%
Nickel	Maximum of .75%
Copper	Maximum of .50%

†Per AMS 5630

Mechanical Properties

Tensile Strength	285,000 psi
Yield Strength	275,000 psi
Elongation in two inches	2%
Reduction in area	10%
Modulus of Elasticity	29,000,000 psi
Density	.277 lb./cubic inch

NOTE: All stainless steel balls are passivated. 420 stainless steel balls available on request.

Material Conversion									
Material	AISI	Federal	Military	ASTM	JIS	UNS	DIN	AMS	Military and Gov't Stds.
Type 440C								5630	
	440C	QQ-S-763	–	A276	SUS440C	S-44004	X105CrMo17	5618†	MS 19060
		CL 440C						7445††	

† Consumable electrode vacuum melted.

†† Balls, corrosion resistant steel, 17Cr, hardened.



440C Stainless Steel Balls

Size in Inches	Metric Sizes	Balls per Pound	Metric Balls per Carton†	Metric Balls per Carton	Carton in Approximate Pounds
.006		45,871,000	–		–
.008		13,477,082	–		–
.010		6,944,444	–		–
.015		2,040,816	–		–
.020		861,326	–		–
.025		440,723	–		–
1/32	1mm	225,938	–	400,000	–
3/64		66,916	–		–
1/16	2mm	28,200	200,000	150,000	9.0
3/32		8,380	60,000		12.2
7/64	3mm	5,263	60,000	60,000	11.6
1/8		3,530	40,000		11.6
9/64	4mm	2,481	30,000	20,000	12.4
5/32		1,810	20,000		11.3
11/64		1,359	15,000		11.3
3/16		5mm	1,050		12,500
13/64	822		10,000	12.4	
7/32	6mm	659	8,000	6,000	12.4
15/64		536	6,000		11.4
1/4		441	5,000		11.6
17/64		7mm	368		4,000
9/32	310		3,500	11.5	
5/16	8mm	226	2,500	2,500	11.3
11/32		170	2,600		12.0
3/8	9mm	131	1,500	1,750	11.7
13/32		103	1,250		12.4
7/16	10mm	82	1,000	1,000	12.4
15/32		67	750		11.4
1/2	11mm	51	500	750	11.1
17/32		46	500		11.1
9/16	12mm	39	450		11.9
5/8		28	300		10.6
11/16		21	250		11.8
3/4		16	150		12.5
13/16		13	150		11.9
7/8		10	100		9.9
15/16		8	75		9.2
1		7	50		10.4

† Grade 10 and better packed in smaller quantities in bubble pack.

302, 302HQ, 316, 316L Stainless Steel Balls**Material Characteristics**

For resistance to sulfuric acid compounds and other severely corrosive environments, Type 316 austenitic steel with increased nickel is available. If required, Thomson can also provide a quality ball in Types 410, 420, and 430 stainless steels.

Hardness

Non-annealed hardness, uniform throughout, as measured on parallel flats, is typically Rockwell "C" 25 to 39†. Annealed hardness, available on request, is typically Rockwell "B" 75 to 90. (A table converting Rockwell "C" to Rockwell "B" and Brinell ratings may be found on page 6.)

†Per ABMA Std 10, Table 1

Material Analysis† – 302/302HQ

Carbon	Maximum of 0.15%
Manganese	Maximum of 2.00%
Phosphorus	Maximum of 0.045%
Sulphur	Maximum of 0.030%
Silicon	Maximum of 1.00%
Chromium	17.00 to 19.00%
Nickel	8.00 to 10.00%
Nitrogen	Maximum of 0.10%
Copper††	3.00 to 4.00%

†Per ASTM A276-89

††Type HQ

**Mechanical Properties (Type 302)
(At Rockwell "B" 75-90)**

Tensile Strength	100,000 to 180,000 psi
Yield Strength	50,000 to 150,000 psi
Elongation in two inches	55 to 60%
Reduction in area	55 to 65%
Modulus of Elasticity	29,000,000 psi
Density	.286 lb./cubic inch

Material Analysis† – 316/316L

Carbon	Maximum of 0.08% (0.03%)††
Manganese	Maximum of 2.00%
Phosphorus	Maximum of 0.045%
Sulphur	Maximum of 0.030%
Silicon	Maximum of 1.00%
Chromium	16.00 to 18.00%
Nickel	10.00 to 14.00%
Nitrogen	Maximum of 0.10%
Molybdenum	2.00 to 3.00%

†Per ASTM A276-89

††Type 316L

Mechanical Properties (Type 316)

Tensile Strength	90,000 psi
Yield Strength	45,000 psi
Elongation in two inches	35%
Reduction in area	60%
Modulus of Elasticity	28,000,000 psi
Density	29 lb./cubic inch

NOTE: All stainless steel balls are passivated. 420 stainless steel balls available on request.

Material Conversion

Material	AISI	Federal	ASTM	DIN	UNS	JIS	AMS
Stainless Steel	Type 302	QQ-S-763	A276	—	S-30200	—	5636
		CL 302					
	Type 316	QQ-S-763	A276	X5CrNiMo17122	S-31603	SUS316	5648
		CL 316					