

Bennett Bolt Works, Inc.

Technical Data Sheet: ASTM A193

Jordan, NY
(315)689-3981

Originally approved in 1936, this specification is heavily utilized in petroleum and chemical construction applications. The ASTM standard covers alloy steel and stainless steel bolting materials for high temperature or high pressure service. This specification includes fasteners intended for use in pressure vessels, valves, flanges, and fittings. Although this material is often available in national coarse (UNC) thread pitches, if being used in traditional applications, threads are specified to 8 threads per inch (tpi) for diameters greater than one inch.

A193 Grades

B7	Alloy steel, AISI 4140/4142 quenched and tempered
B8	Class 1 Stainless steel, AISI 304, carbide solution treated.
B8M	Class 1 Stainless steel, AISI 316, carbide solution treated.
B8	Class 2 Stainless steel, AISI 304, carbide solution treated, strain hardened
B8M	Class 2 Stainless steel, AISI 316, carbide solution treated, strain hardened
B16	A heat-treated chromium-molybdenum-vanadium steel for high-pressure, high-temperature service.

A193 Recommended Hardware

Bolt Grade	Nuts	Washers
B7	A194 Grade 2H	F436
B8 Class 1	A194 Grade 8	SS304
B8M Class 1	A194 Grade 8M	SS316
B8 Class 2	A194 Grade 8	SS304
B8M Class 2	A194 Grade 8M	SS316

A193 Mechanical Properties

Grade	Size	Tensile ksi, min	Yield, ksi, min	Elong, %, min	RA % min
B7	Up to 2-1/2	125	105	16	50
	2-5/8 - 4	115	95	16	50
	4-1/8 - 7	100	75	18	50
B8 Class 1	All	75	30	30	50
B8M Class 1	All	75	30	30	50
B8 Class 2	Up to 3/4	125	100	12	35
	7/8/2001	115	80	15	35
	1-1/8 - 1-1/4	105	65	20	35
	1-3/8 - 1-1/2	100	50	28	45
B8M Class 2	Up to 3/4	110	95	15	45
B16	7/8/2001	100	80	20	45
	1-1/8 - 1-1/4	95	65	25	45
	1-3/8 - 1-1/2	90	50	30	45
	Up to 2-1/2	125	105	18	50
	2-5/8 - 4	110	95	17	45
	4-1/8 - 7	100	85	16	45

A193 Chemical Properties

Element	B7 (AISI 4140)	B8 (AISI 304)	B8M (AISI 316)	B16 (AISI 4140)
Carbon	0.37 - 0.49%	0.08% max	0.08% max	0.37 - 0.49%
Manganese	0.65 - 1.10%	2.00% max	2.00% max	0.65 - 1.10%
Phosphorus, max	0.04%	0.05%	0.05%	0.04%
Sulfur, max	0.04%	0.03%	0.03%	0.04%
Silicon	0.15 - 0.35%	1.00% max	1.00% max	0.15 - 0.35%
Chromium	0.75 - 1.20%	18.0 - 20.0%	16.0 - 18.0%	0.75 - 1.20%
Nickel		8.0 - 11.0%	10.0 - 14.0%	
Molybdenum	0.15 - 0.25%		2.00 - 3.00%	0.15 - 0.25%