



# ASTM A193



*Below is a basic summary of a few of the common grades. ASTM A193 covers a number of other standard specifications not covered in this description including B5, B6, and B16.*

Grades	
<b>B7</b>	Alloy steel, AISI 4140/4142 quenched and tempered
<b>B8</b>	Class 1 Stainless steel, AISI 304, carbide solution treated.
<b>B8M</b>	Class 1 Stainless steel, AISI 316, carbide solution treated.
<b>B8</b>	Class 2 Stainless steel, AISI 304, carbide solution treated, strain hardened
<b>B8M</b>	Class 2 Stainless steel, AISI 316, carbide solution treated, strain hardened

**Scope**

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 8 threads per inch (tpi) for diameters above one inch.

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
	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

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

Recommended Nuts and Washers		
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

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