



ASTM A193

Scope - This specification is heavily utilized in petroleum and chemical construction applications and covers alloy steel and stainless steel bolting materials for high temperature or high-pressure service. This specification is intended for use in pressure vessels, valves, flanges, and fittings.

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

Mechanical Properties	Grade	Markings	Size	Tensile ksi, min	Yield, ksi, min	Elong, %, min	RA, %, min	Hardness Max
	B7	B7	Up to 2-1/2	125	105	16	50	C35
			2-5/8 to 4	115	95	16	50	C35
			4-1/8 to 7	100	75	18	50	C35
	B8 Class 1	B8	All	75	30	30	50	B96
	B8M Class 1	B8M	All	75	30	30	50	B96
	B8 Class 2	B8SH	Up to 3/4	125	100	12	35	C35
			7/8 to 1	115	80	15	35	C35
			1-1/8 to 1-1/4	105	65	20	35	C35
			1-3/8 to 1-1/2	100	50	28	45	C35
B8M Class 2	B8MSH	Up to 3/4	110	95	15	45	C35	
		7/8 to 1	100	80	20	45	C35	
		1-1/8 to 1-1/4	95	65	25	45	C35	
		1-3/8 to 1-1/2	90	50	30	45	C35	

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	0.035	0.045	0.045
	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 Mating Materials	Bolt Grade	Nuts Spec/Grade	Washers Spec/Grade
	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