

GRADE & MATERIAL IDENTIFICATION ASTM SPECIFICATIONS

Grade ID mark	ASTM spec number	Fastener Description	Nominal size range (inch)	Mechanical properties				
				Bolts, screws, studs		Nuts	Hardness	
				Yield strength (min psi)	Tensile strength (min psi)	Proof load (psi)	Brinell	
B5	A193	Bolts, screws, and studs for high temperature service	AISI 501	1/4 - 4	80,000	100,000	-	-
B6	A193	Bolts, screws, and studs for high temperature service	AIS I410	85,000	110,000	-	-	-
B7	A193	Bolts, screws, and studs for high temperature service	AISI 4140, 4142, 4145, 4140H, 4142H, 4145H	1/4 - 2-1/2	105,000	125,000	-	-
				Over 2-1/2 - 4	95,000	115,000	-	-
				Over	75,000	100,000	-	-
B16	A193	Bolts, screws, and studs for high temperature service	Chromium, molybdenum, and vanadium alloy steel	1/4 - 2-1/2	105,000	125,000	-	-
				Over 2-1/2 - 4	95,000	110,000	-	-
				Over 4-7	85,000	100,000	-	-
B8	A193 A320	Bolts, screws, and studs for high or low temperature service, respectively—Class 1	AISI 304, carbide solution treated	1/4 and larger	30,000	75,000	-	223 max
B8C	A193 A320	Bolts, screws, and studs for high or low temperature service, respectively—Class 1	AISI 347, carbide solution treated	1/4 and larger	30,000	75,000	-	223 max
B8M	A193 A320	Bolts, screws, and studs for high or low temperature service, respectively—Class 1	AISI 316, carbide solution treated	1/4 and larger	30,000	75,000	-	223 max
B8P	A193 A320	Bolts, screws, and studs for high or low temperature service, respectively—Class 1	AISI 305 [with restricted carbon], carbide solution treated	1/4 and larger	30,000	75,000	-	223 max
Optional	F593 Group 1	Stainless steel bolts, hex capscrews and studs [properties for cold worked]	304, 305, 384, *303, XM7 [CW]	1/4 - 5/8 incl.	65,000	100,000	-	B95 - C32
				3/4 - 1-1/2 incl.	45,000	85,000	-	B80 - C32
316	F593 Group 2	Stainless steel bolts, hex capscrews and studs [properties for cold worked]	316 [CW]	1/4 - 5/8 incl. 3/4 - 1-1/2 incl.	65,000 45,000	100,000	-	B95 - C32 B80 - C32

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B8T	A193, A320	Bolts, screws, and studs for high or low temperature service respectively — Class 1	AISI 321, carbide solution treated	1/4 and larger	30,000	75,000	-	223 max
B8	A193, A320	Bolts, screws, and studs for high or low temperature service respectively — Class 2	AISI 304, carbide solution treated & strain hardened	1/4 - 3/4	100,000	125,000	-	321 max
				Over 3/4 - 1	80,000	115,000	-	321 max
				Over 1 - 1-1/4	65,000	105,000	-	321 max
				Over 1-1/4 - 1-1/2	50,000	100,000	-	321 max
B8C	A193, A320	Bolts, screws, and studs for high or low temperature service respectively — Class 2	AISI 347, carbide solution treated & strain hardened	1/4 - 3/4	100,000	125,000	-	321 max
				Over 3/4 - 1	80,000	115,000	-	321 max
				Over 1 - 1-1/4	65,000	105,000	-	321 max
				Over 1-1/4 - 1-1/2	50,000	100,000	-	321 max
B8P	A193, A320	Bolts, screws, and studs for high or low temperature service respectively — Class 2	AISI 305 [with restricted carbon], carbide solution treated & strain hardened	1/4 - 3/4	100,000	125,000	-	321 max
				Over 3/4 - 1	80,000	115,000	-	321 max
				Over 1 - 1-1/4	65,000	105,000	-	321 max
				Over 1-1/4 - 1-1/2	50,000	100,000	-	321 max
B8T	A193, A320	Bolts, screws, and studs for high or low temperature service respectively — Class 2	AISI 321, carbide solution treated & strain hardened	1/4 - 3/4	100,000	125,000	-	321 max
				Over 3/4 - 1	80,000	115,000	-	321 max
				Over 1 - 1-1/4	65,000	105,000	-	321 max
				Over 1-1/4 - 1-1/2	50,000	100,000	-	321 max
B8M	A193, A320	Bolts, screws, and studs for high or low temperature service respectively — Class 2 [C]	AISI 316, carbide solution treated & strain hardened	1/4 - 3/4	95,000	110,000	-	321 max
				Over 3/4 - 1	80,000	100,000	-	321 max
				Over 1 - 1-1/4	65,000	95,000	-	321 max
				Over 1-1/4 - 1-1/2	50,000	90,000	-	321 max

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					Yield strength (min psi)	Tensile strength (min psi)	Proof load (psi)	Brinell
<u>1</u>	A194	Hot or cold forged nuts for high pressure & high temperature service	Carbon steel	1/4 and larger	-	-	130,000 120,000	121 min
<u>2</u>	A194	Hot or cold forged nuts for high pressure & high temperature service.	Carbon Steel	1/4 and larger	-	-	150,000 135,000	159/352
<u>2H</u>	A194	Hot or cold forged nuts for high pressure & high temperature service.	Carbon steel, heat treated	1/4 and larger	-	-	175,000 150,000	248/352
<u>3</u>	A194	Hot or cold forged nuts for high pressure & high temperature service.	AISI 501, heat treated	1/4 and larger	-	-	175,000 150,000	248/342
<u>4</u>	A194	Hot or cold forged nuts for high pressure & high temperature service.	Carbon molybdenum, heat treated	1/4 and larger	-	-	175,000 150,000	248/352
<u>6</u>	A194	Hot or cold forged nuts for high pressure & high temperature service.	AIS I410, heat treated	1/4 and larger	-	-	150,000 135,000	228/271
<u>7</u>	A194	Hot or cold forged nuts for high pressure & high temperature service.	AIS I4140/4142/4145, 4140H, 4142H, 4145H, heat treated	1/4 and larger	-	-	175,000 150,000	248/352
<u>8</u>	A194	Hot or cold forged nuts for high pressure & high temperature service.	AISI 304	1/4 and larger	-	-	80,000 75,000	126/300
<u>Optional</u>	F594	Stainless steel nuts	304, 305, 384,	1/4 - 5/8	-	-	100,000	B95-C32
	Group 1	[properties for cold worked]	*303, XM7 [CW]	3/4 -1-1/2	-	-	85,000	B80-C32
<u>316</u>	F594	Stainless steel nuts	316 [CW]	1-4 - 5/8	-	-	100,000	B95-C32
	Group 2	[properties for cold worked]		3/4 - 1-1/2	-	-	85,000	B80-C32

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					Bolts, screws, studs		Nuts	Hardness Brinell
					Yield strength (min psi)	Tensile strength (min psi)	Proof load (psi)	
8B	A194	Nuts machined from bars for high pressure & high temperature service.	AISI 304	1/4 and larger	-	-	80,000 75,000	126/300
8C	A194	Hot or cold forged nuts for high pressure & high temperature service.	AISI 347	1/4 and larger	-	-	80,000 75,000	126/300
8CB	A194	Nuts machined from bars for high pressure & high temperature service.	AISI 347	1/4 and larger	-	-	80,000 75,000	126/300
8M	A194	Hot or cold forged nuts for high pressure & high temperature service.	AISI 316	1/4 and larger	-	-	80,000 75,000	126/300
8MB	A194	Nuts machined from bars for high pressure & high temperature service.	AISI 316	1/4 and larger	-	-	80,000 75,000	126/300
8T	A194	Hot or cold forged nuts for high pressure & high temperature service.	AISI 321	1/4 and larger	-	-	80,000 75,000	126/300
8TB	A194	Nuts machined from bars for high pressure & high temperature service.	AISI 321	1/4 and larger	-	-	80,000 75,000	126/300
8P	A194	Hot or cold forged nuts for high pressure & high temperature service.	AISI 305 [with restricted carbon]	1/4 and larger	-	-	80,000 75,000	126/300
8PB	A194	Nuts machined from bars for high pressure & high temperature service.	AISI 305 [with restricted carbon]	1/4 and larger	-	-	80,000 75,000	126/300

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					Yield strength (min psi)	Tensile strength (min psi)	Proof load (psi)	Brinell
8	A194	Nuts machined from bars for high pressure & high temperature service.	AISI 304, strain hardened	1/4 - 3/4	-	-	125,000	
				7/8 - 1	-	-	115,000	
				1-1/8 - 1-1/4	-	-	105,000	
				1-3/8 - 1-1/2	-	-	100,000	
							90,000	
8C	A194	Nuts machined from bars for high pressure & high temperature service.	AISI 347, strain hardened	1/4 - 3/4	-	-	125,000	
				7/8 - 1	-	-	115,000	
				1-1/8 - 1-1/4	-	-	105,000	
				1-3/8 - 1-1/2	-	-	100,000	
							90,000	
8T	A194	Nuts machined from bars for high pressure & high temperature service	AISI 321, strain hardened	1/4 - 3/4	-	-	125,000	
				7/8 - 1	-	-	115,000	
				1-1/8 - 1-1/4	-	-	105,000	
				1-3/8 - 1-1/2	-	-	100,000	
							90,000	
8M	A194	Nuts machined from bars for high pressure & high temperature service.	AIS 316, strain hardened	1/4 - 3/4	-	-	110,000	
				7/8 - 1	-	-	100,000	
				1-1/8 - 1-1/4	-	-	95,000	
				1-3/8 - 1-1/2	-	-	90,000	
							80,000	

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8F	A194	Nuts machined from bars for high pressure & high temperature service.	AISI 303, with sulfur or 303Se with selenium strain hardened	1/4 - 3/4	-	-	125,000	
				7/8 - 1	-	-	115,000	
				1-1/8 - 1-1/4	-	-	100,000	
				1-3/8 - 1-1/2	-	-	105,000	95,000
8P	A194	Nuts machined from bars for high pressure & high temperature service.	AISI 305 [with restricted carbon], strain hardened	1/4 - 3/4	-	-	125,000	
				7/8 - 1	-	-	115,000	
				1-1/8 - 1-1/4	-	-	105,000	95,000
				1-3/8 - 1-1/2	-	-	100,000	90,000
L7	A320	Bolts, screws, and studs for low temperature service	AISI 4140, 4142 or 4145, quenched & tempered	1/4 - 2-1/2	105.00	125.00	-	