

Chemical Requirements

Carbon, Alloy Steel and Stainless Steel Bolting Materials for Low Temperature Services

ASTM Designation A 320

Type	Grade Symbol	Material	Carbon %	Manganese %	Phosphorus %	Sulfur %	Silicon %	Chromium %	Nickel %	Molybdenum %	Titanium %	Columbium & Tantalum %	Selenium %	Boron %
Ferritic Steel	L7, L7M & L70	AISI 4140, 4142 & 4145	0.38-0.48	0.75-1.00	0.035 max.	0.040 max.	0.15-0.35	0.80-1.10		0.15-0.25				
	L7A & L71	AISI 4037	0.35-0.40	0.70-0.90	0.035 max.	0.040 max.	0.15-0.35			0.20-0.30				
	L7B & L72	AISI 4137	0.35-0.40	0.70-0.90	0.035 max.	0.040 max.	0.15-0.35	0.80-1.10		0.15-0.25				
	L43	AIAI 4340	0.38-0.43	0.60-0.85	0.035 max.	0.040 max.	0.15-0.35	0.70-0.90	1.65-2.00	0.20-0.30				
	L1		0.17-0.24	0.70-1.40	0.035 max.	0.050 max.	0.15-0.30							0.0005-0.003
Austenitic Steels	B8 & B8A	AISI 304	0.08 max.	2.00 max.	0.045 max.	0.030 max.	1.00 max.	18.00-20.00	8.00-10.50					
	B8C & B8CA	AISI 347	0.08 max.	2.00 max.	0.045 max.	0.030 max.	1.00 max.	17.00-19.00	9.00-13.00			10 x carbon content min.		
	B8F & B8FA	AISI 303 + sulfur	0.15 max.	2.00 max.	0.20 max.	0.15 min.	1.00 max.	17.00-19.00	8.00-10.00					
	B8F & B8FA	AISI 303 + selenium	0.15 max.	2.00 max.	0.20 max.	0.060 max.	1.00 max.	17.00-19.00	8.00-10.00				0.15-0.35	
	B8M & B8MA	AISI 316	0.08 max.	2.00 max.	0.045 max.	0.030 max.	1.00 max.	16.00-18.00	10.00-14.00	2.00-3.00				
	B8P & B8PA	AISI 305 + restricted carbon	0.08 max.	2.00 max.	0.045 max.	0.030 max.	1.00 max.	17.00-19.00	10.50-13.00					
	B8T & B8TA	AISI 321	0.08 max.	2.00 max.	0.045 max.	0.030 max.	1.00 max.	17.00-19.00	9.00-12.00			5 x carbon content min.		
	B8LN & B8LNA	AISI 304N + restricted carbon	0.030 max.	2.00 max.	0.045 max.	0.030 max.	1.00 max.	18.00-20.00	8.00-10.50					
	B8MLN & B8MLNA	AISI 316N + restricted carbon	0.030 max.	2.00 max.	0.045 max.	0.030 max.	1.00 max.	16.00-18.00	10.00-14.00	2.00-3.00				

Mechanical Requirements

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Type	Grade Symbol	Diameter Inch (mm.)	Heat Treatment	Tensile Strength, min., ksi (Mpa)	Yield Strength, 0.2 % offset, min., ksi (Mpa)	Elongation in 4 D, min., %	Reduction of Area, min., %	Hardness, max.
Ferritic Steel	L7, L7A, L7B, L7C, L70, L71, L72 & L73	2½ (65) and under	quenched and tempered	125 (860)	105 (725)	16	50	
	L43	up to 4 (100), included	quenched and tempered	125 (860)	105 (725)	16	50	
	L7M	2½ (65) and under	quenched and tempered at 1,150 °F (620 °C), min.	100 (690)	80 (550)	18	50	235 HB or 99 HRB
	L1	1 (25.4) and under	quenched and tempered	125 (860)	105 (720)	16	50	
Austenitic Steels	B8, B8C, B8F, B8M, B8P, B8T, B8LN & B8MLN	Classes 1, all diameters	carbide solution treated	75 (515)	30 (205)	35	50	223 HB or 96 HRB
	B8A, B8CA, B8FA, B8MA, B8PA, B8TA, B8LNA, B8MLNA, B8NA & B8MNA	Classes 1A, all diameters	carbide solution treated in the finished condition	75 (515)	30 (205)	35	50	192 HB or 90 HRB
	B8, B8C, B8F, B8P & B8T	Classes 2, ¾ (20) and under	carbide solution treated in the finished condition	125 (860)	100 (690)	12	35	321 HB 35 HRC
		over ¾ to 1 (20 to 25) included		115 (795)	80 (550)	15	30	321 HB 35 HRC
		over 1 to 1¼ (25.4 to 31.6) included		105 (725)	65 (450)	20	35	321 HB 35 HRC
		over 1¼ to 1½ (32 to 40) included		100 (690)	50 (345)	28	45	321 HB 35 HRC
	B8M	Classes 2, ¾ (20) and under	carbide solution treated in the finished condition	110 (760)	95 (665)	15	45	321 HB 35 HRC
		over ¾ to 1 (20 to 25) included		100 (690)	80 (550)	20	45	321 HB 35 HRC
		over 1 to 1¼ (25.4 to 31.6) included		95 (655)	65 (450)	25	45	321 HB 35 HRC
		over 1¼ to 1½ (32 to 40) included		90 (620)	50 (345)	30	45	321 HB 35 HRC

Recommended Test Temperature for Stock Parts

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Grade Symbol	Test Temperature	
	°F	°C
L7M, L70, L71, L72, & L73	-100	-73
L7, L7A, L7B & L7C	-150	-101
L43	-150	-101
L1	-100	-73

Impact Energy Absorption Requirements

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Size of Specimen, mm.	Minimum Impact Value Required for Average of each Set of 3 Specimens, ft-lbf (J)	Minimum Impact Value Permitted for 1 Specimen, Only of a Set, ft-lbf (J)
Grade L7M, L70, L71, L72, L73, L7, L7A, L7B & L7C		
10 by 10	20 (27)	15 (20)
10 by 7.5	16 (22)	12 (16)
Grade L1		
10 by 10	40 (54)	30 (41)
10 by 7.5	32 (44)	24 (32)