ALLOY STEEL AND STAINLESS STEEL BOLTING MATERIALS FOR HIGH-TEMPERATURE SERVICE

Abstract of ASTM A193/A193M 1985

Table 2 Mechanical Requirements

Grade and Class	Diameter in.	Tensile Strength ksi	Yield Strength 0.2% Offset ksi	Elongation in 2 in. %	Reduction of Area %	Hardness Max		Refer to Note
		Min	Min	Min	Min	Brinell	Rockwell	
B5	to 4 incl	100	80	16	50	—	—	1
B6	to 4 incl	110	85	15	50	—	—	1
B6X	to 4 incl	90	70	16	50	—	C26	1
B7	to 2½ over 2½ to 4 over 4 to 7	125 115 100	105 95 75	16 16 18	50 50 50	— — —	— — —	1
B7M	to 2½ incl	100	80	18	50	235	B99	1, 2, 5
B16	to 2½ over 2½ to 4 over 4 to 7	125 110 100	105 95 85	18 17 16	50 45 45	— — —	— — —	1
Class 1: B8, B8C, B8M, B8P, B8T, B8LN, B8MLN	all	75	30	30	50	223	B96	3, 4
Class 1A: B8A, B8CA, B8MA, B8PA, B8TA, B8LNA, B8MLNA, B8NA, B8MNA	all	75	30	30	50	192	B90	3
Class 1B: B8N, B8MN	all	80	35	30	40	223	B96	3, 4
Class 1C: B8R	all	100	55	35	55	271	C28	3
B8RA	all	100	55	35	55	271	C28	3
B8S	all	95	50	35	55	271	C28	3
B8SA	all	95	50	35	55	271	C28	3
Class 2: B8, B8C, B8P, B8T, B8N	to ¾ over ¾ to 1 over 1 to 1½	125 115 100	100 80 50	12 15 28	35 35 45	321 321 321	C35 C35 C35	3
Class 2: B8MN	to ¾ over ¾ to 1 over 1 to 1¼ over 1¼ to 1½	110 100 95 90	95 80 65 50	15 20 25 30	45 45 45 45	321 321 321 321	C35 C35 C35 C35	3, 5
Class 2: B8M2	to 2 over 2 to 2½ over 2½ to 3	95 90 80	75 65 55	25 30 30	40 40 60	321 321 321	C35 C35 C35	3, 5
Class 3: B8M3	to 2 over 2	85 85	65 60	30 30	60 60	321 321	C35 C35	3, 5

NOTES:

1. The minimum tempering temperature for Grades B5, B6, B6X, and B7 shall be 1100°F (593°C); for Grade B7M, 1150°F (620°C); and for Grade B16, 1200°F (650°C). See Para. 6.
2. To meet the tensile strength requirements, the hardness shall be over Brinell 201 (Rockwell B94) minimum.
3. Materials of all Grades of Classes 1, 1B and 1C and Grade B8S products are carbide solution treated. Materials of all Grades of Class 1A and Grades B8RA and B8SA products are carbide solution treated in their finished condition for corrosion resistance; heat treatment is critical due to physical property requirements. Materials of all Grades of Class 2 and Class 3 products are carbide solution treated and strain hardened. Austenitic steels in the strain hardened condition may not show uniform properties throughout the section, particularly in diameters over ¾ in. See Para. 6.
4. For diameters ¾ in. and smaller, a maximum hardness of Brinell 241 (Rockwell B100) is permitted.
5. For diameters 1½ in. and larger, center (core) properties may be lower than indicated by test reports which are based on values determined at mid radius.