

ALLOY STEEL AND STAINLESS STEEL BOLTING MATERIALS FOR HIGH TEMPERATURE SERVICE



Abstract of ASTM A193/A193M 2001

Grade and Class	Diameter in.	Tensile Strength	Yield	Elongation in 4D min. %	Reduction of Area min. %	Hardness Max		Refer
			Strength 0.2% Offset			Brinell	Rockwell	to
	ksi	ksi	Min	Min	Note			
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 2-1/2	125	105	16	50	-	C35	1
	over 2-1/2 to 4	115	95	16	50	-	C35	
	over 4 to 7	100	75	18	50	-	C35	
B7M	to 4 incl.	100	80	18	50	235	B99	1.2
	over 4 to 7	100	75	18	50	235	B99	
B16	to 2-1/2	125	105	18	50	321	C35	1
	over 2-1/2 to 4	110	95	17	45	321	C35	
	over 4 to 7	100	85	16	45	321	C35	
Classes 1 and 1D: B8, B8M, B8P, B8LN, B8MLN	all	75	30	30	50	223	B96	3.4
Class 1:B8C, B8T	all	75	30	30	50	223	B96	4
Class 1A: B8A, B8CA, B8MA, B8PA, B8TA, B8LNA, B8MLNA, B8NA, B8MNA, B8MLCuNA	all	75	30	30	50	192	B90	3
Classes 1B and 1D: B8N, B8MN, B8MLCuN	all	80	35	30	40	223	B96	3.4
Class 1C and 1D: B8R	all	100	55	35	55	271	C28	3
Class 1C:B8RA	all	100	55	35	55	271	C28	3
Classes 1C and 1D: B8S	all	95	50	35	55	271	C28	3
Classes 1C: B8SA	all	95	50	35	55	271	C28	3
Class 2: B8, B8c, B8P, B8T, B8N	to 3/4	125	100	12	35	321	C35	3.5
	over 3/4 to 1	115	80	15	35	321	C35	
	over 1 to 1-1/4	105	65	20	45	321	C35	
	over 1-1/4 to 1-1/2 incl.	100	50	28	45	321	C35	
Class 2: B8M, B8MN, B8MLCuN	to 3/4	110	96	15	45	321	C35	3.5
	over 3/4 to 1 incl.	100	80	20	45	321	C35	
	over 1 to 1-1/4 incl.	95	65	25	45	321	C35	3
	over 1-1/4 to 1-1/2 incl.	90	50	30	45	321	C35	
Class 2B: B8, B8M2	to 2 incl.	95	75	25	40	321	C35	3.5
	over 2 to 2-1/2 incl.	90	65	30	40	321	C35	
	over 2-1/2 to 3 incl.	80	55	30	40	321	C35	
Class 2C: B8M3	to 2 incl.	85	65	30	60	321	C35	3.5
	over 2	85	60	30	60	321	C35	

NOTES:

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