

**A564/A564M – 19a****TABLE 2 Solution Treatment**

UNS Designation	Type	Condition	Solution Treatment	Mechanical Test Requirements in Solution Treated Condition ^A							
				Tensile Strength, min		Yield Strength, min ^B		Elongation in 2 in. [50 mm] or 4D, min. %	Reduction of Area, min %	Hardness ^C	
				ksi	[MPa]	ksi	[MPa]			Rockwell C, max	Brinell, max
S17400	630	A	1900 ± 25 °F [1040 ± 15 °C] (cool as required to below 90 °F (32 °C))	...	...	...	...	...	...	38	363
S17700	631	A	1900 ± 25 °F [1040 ± 15 °C] (water quench)	...	...	...	...	...	...	HRB98	229
S15700	632	A	1900 ± 25 °F [1040 ± 15 °C] (water quench)	...	...	...	...	...	...	HRB100	269 ^D
S35500	634 ^E	A	1900 ± 25 °F [1040 ± 15 °C] quench, hold not less than 3 h at minus 100 °F or lower	...	...	...	...	...	...	...	363 ^E
S17600	635	A	1900 ± 25 °F [1040 ± 15 °C] (air cool)	120	[825]	75	[515]	10	45	32	302
S15500	XM-12	A	1900 ± 25 °F [1040 ± 15 °C] (cool as required to below 90 °F (32 °C))	...	...	...	...	...	...	38	363
S13800	XM-13	A	1700 ± 25 °F [925 ± 15 °C] Cool as required to below 60 °F [16 °C]	...	...	...	...	...	...	38	363
S45500	XM-16	A	1525 ± 25 °F [830 ± 15 °C] (cool rapidly)	...	...	...	...	...	...	36	331
S45000	XM-25	A	1900 ± 25 °F [1040 ± 15 °C] (cool rapidly)	125 ^F	[860]	95	[655]	10	40	32	321
S45503	...	A	1525 ± 25 °F [830 ± 15 °C] (cool rapidly)	...	...	...	...	...	...	36	331
S46500	...	A	1800 ± 25 °F [980 ± 15 °C] (oil or water quench), hold for min. 8 h at minus 100 °F (-73 °C), air warm	...	...	...	...	...	...	36	331
S46910	...	A	1830 – 2050 °F [1000 – 1120 °C] (cool rapidly)	87	[600]	58	[400]	10	...	33	315
S10120	...	A	1545 ± 25 °F [840 ± 14 °C] (cool rapidly below 90 °F [32 °C])	...	...	...	...	...	...	36	331
S11100	...	A	1545 ± 25 °F [840 ± 14 °C] (oil or water quench), hold for minimum of 8 h at -100 °F [-73 °C], ^G air warm	...	...	...	...	...	...	36	331

^A See 7.1.^B See 7.3.^C Either Rockwell C hardness or Brinell is permissible. On sizes ½ in. (12.70 mm) and smaller, Rockwell C is preferred.^D 321 for rounds cold drawn after solution treating.^E Equalization and over-tempering treatment 1425 ± 50 °F [775 ± 30 °C] for not less than 3 h, cool to room temperature, heat to 1075 ± 25 °F [580 ± 15 °C] for not less than 3 h.^F Maximum 165 ksi [1140 MPa] tensile strength only for sizes up to ½ in. (13 mm).^G Required hold time at minus 100 °F [-73 °C] is not mandatory if product is under 2 in. [51 mm] thickness.**TABLE 3 Solution-Annealed and Cold-Worked Condition**

UNS Designation	Type	Condition	Mechanical Test Requirements in Solution-Annealed and Cold-Worked Condition							
			Tensile Strength, min		Yield Strength, min		Elongation in 2 in. [50 mm] or 4D, min %	Reduction of Area, min %	Hardness	
			ksi	[MPa]	ksi	[MPa]			Rockwell C, max	Brinell, max
S46500	...	[Table 2 Condition A] + CW	...	...	...	...	...	...	40	380
S46910	...	CW ½ hard	131	[900]	109	[750]	8	...	40	380
	...	CW full hard	189	[1300]	175	[1200]	3	...	55	580