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## Elevated Temperature Mechanical Properties: Martensitic Stainless Steels

*(courtesy Carpenter Specialty Alloys)*

**Table 1: Typical Elevated Temperature Mechanical Properties – Hardened Type 410 (UNS41000)**

Test Temperature °F(°C)	0.2%YS ksi(MPa)	UTS ksi(MPa)	% Elongation in 2”	% Reduction of Area	Room Temp Rockwell C Hardness after test	Brinell Hot Hardness
400(204)	171(1179)	210(1448)	14	41	43.5	401
600(316)	163(1124)	208(1434)	18	51	43	385
800(427)	155(1069)	196(1351)	17	53	43	370
900(482)	140(965)	174(1200)	15	53	43.5	353
1000(538)	75(517)	79(545)	24	79	31	191
1100(593)	46(317)	50(345)	30	88	24	127
1200(649)	28(193)	32(221)	39	92	19	81

Hardened 1750°F (954°C), tempered one hour 50°F (28°C) above test temperature

**Table 2: Typical Elevated Temperature Tensile Properties – Annealed Type 410 (UNS41000)**

Test Temperature °F(°C)	0.2%YS ksi(MPa)	UTS ksi(MPa)	% Elongation in 2”	% Reduction of Area
900(482)	35(241)	48(331)	31	76
1000(538)	31(214)	41(283)	36	79
1100(593)	25(172)	33(228)	41	84
1200(649)	18(124)	23(159)	47	90
1300(704)	12(83)	16(110)	55	94
1400(760)	8(55)	11(76)	66	96

Annealed condition

**Table 3: Typical Creep and Stress Rupture Strength – Hardened Type 410 (UNS41000)**

Test Temperature °F(°C)	Stress for Rupture In:			Stress for 1% Creep in 10,000 hours ksi(MPa)
	100 hours ksi(MPa)	1,000 hours ksi(MPa)	10,000 hours ksi(MPa)	
800(427)	62(427)	56(386)	48(331)	34(234)
900(482)	46(317)	38(262)	32(221)	18(124)
1000(538)	30(207)	23(159)	17(117)	9(62)
1100(593)	16(110)	13(90)	10(69)	5(34)

Hardened 1800°F (982°C), tempered 1200°F (649°C), one hour

**Table 4: Typical Creep and Stress Rupture Strength – Annealed Type 410 (UNS41000)**

Test Temperature °F(°C)	Stress for Rupture In:			Stress for 1% Creep in 10,000 hours ksi(MPa)
	100 hours ksi(MPa)	1,000 hours ksi(MPa)	10,000 hours ksi(MPa)	
800(427)	60(414)	55(379)	52(359)	-
900(482)	47(324)	40(276)	33(228)	-
1000(538)	32(221)	26(179)	20(138)	9(62)
1100(593)	17(117)	11(76)	7(48)	4(27)
1200(649)	8(55)	6(41)	-	2(14)

Annealed condition