



SPRING WIRE TECHNICAL DETAIL



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Modulus of Elasticity			Maximum Safe Temp						
Material	Torsion 10'	Tension 10'	Magnetic	Corrosion Fatigue	T.P / T.S.**	High	Low	Corrosion Resistance (general)	Spring Temper Range (KSI)
M400	10	10	Varies	Good		450 F	-320 F	Good	145/180
K-500	10	10	No	Good	38/42	500 F	-423 F	Good	145/195
600	11	11	No	Good	40/45	750 F	-423 F	Good	170/230
601	11.5	11.5	No	Good				Good	120/205
625	11	11	No	Excellent		700 F	-423 F	Excellent	
718*	11	11	No	Good		1200 F	-423 F	Good	210/250
X750	11	11	No	Good	40/45	1200 F	-453 F	Good	190/230
800	11	11	No	Good				Good	140/175
805	9	9	Slight	Good				Good	150/190
825	10	10	No	Good				Good	
NS902*	9.5	9.5	Slight	Fair				Fair	140/160
H C-276	11.4	11.4	No	Excellent				Excellent	
302/304	11	28	Slight	Fair	40/45	500 F	-320 F	Good	190/360
316	11	28	No	Good	45/50			Good	190/360
347	11	28.5	Slight	Fair	45/50			Fair	190/310
20Cb	11	28	No	Good				Good	
17-7 PH*	11	29	Yes	Fair		550 F	-320 F		230/365
TT-50	10.5	20	No	Good				Good	165/234
410	12	30	Yes	Poor	42/55	500 F		Fair	
430	13	28	Yes	Poor	42/55			Fair	160/200

*Age Hardenable

**Approximate Ratio of Torsional Proportional Limit to Ultimate Tensile Strength for Spring Wire

HASTELLOY is a registered trademark of Haynes Corp.

NS: Ni-Span-C H: Hastelloy TT: Tech-Tronic

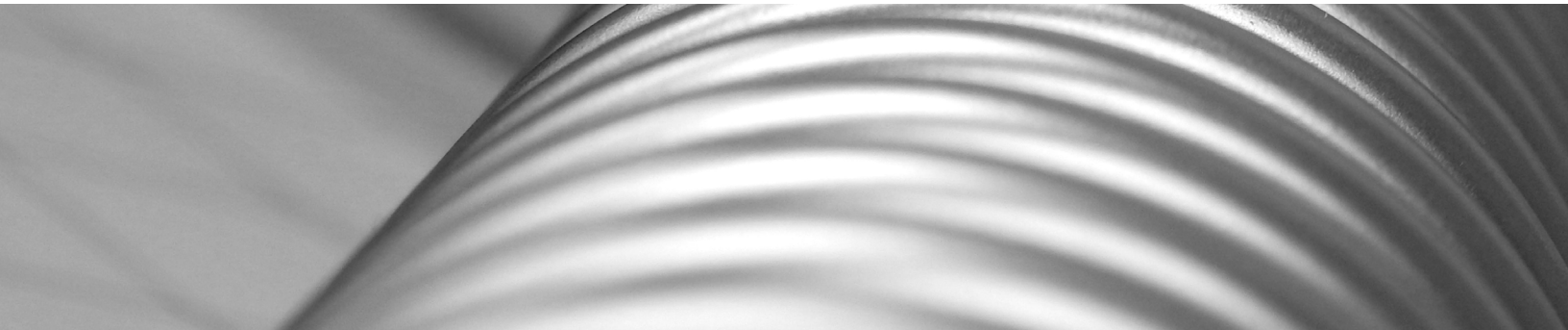
Minimum Tensile Strength Nickel Alloy Spring Wire

Diameter Range Inches (mm)	Minimum Tensile Strength (psi)		
	Monel® 400	Inconel® 600	Monel® K500*
<0.028(0.71)	165,000	185,000	165,000
0.0281(.071) – 0.057(1.45)	160,000	185,000	165,000
0.0571(1.45) – 0.144(2.90)	150,000	175,000	155,000
0.1441(2.90) – 0.229(5.82)	140,000	170,000	155,000
0.2291(5.82) – 0.312(7.92)	140,000	165,000	135,000
.3121(7.92) – 0.375(9.53)	135,000	160,000	135,000
0.3751(9.53)-0.437(11.10)	130,000	155,000	125,000
0.4371(11.10)-0.500(12.70)	130,000	155,000	120,000
0.5001(12.70)-0.563(14.30)	120,000	140,000	120,000
		X750	
<0.250(<6.36)		190,000	
0.250(6.35) – 0.625(15.88)		160,000	
	After Heat Treatment	X750	
0.012(0.30) – 0.250(6.35)		220,000	
0.2501(6.35) – 0.418(10.62)		200,000	
0.4181(10.62) – 0.625(15.88)		180,000	

Minimum Tensile Strength Type 302/304 Spring Wire

Diameter Range Inches (mm)	Tensile Range (psi)
<.009 (0.23)	325,000
0.009 (0.23) – 0.012 (0.30)	316,000 – 325,000
0.013 (0.33) – 0.016 (0.41)	308,000 – 314,000
0.017 (0.43) – 0.022 (0.56)	296,000 – 306,000
0.023 (0.58) – 0.028 (0.71)	289,000 – 292,000
0.029 (0.74) – 0.036 (0.91)	280,000 – 285,000
0.037 (0.94) – 0.045 (1.14)	272,000 – 280,000
0.046 (1.17) – 0.063 (1.60)	258,000 – 267,000
0.064 (1.63) – 0.080 (2.03)	246,000 – 252,000
0.081 (2.39) – 0.094 (2.39)	238,000 – 242,000
0.095 (2.41) – 0.120 (3.05)	222,000 – 238,000
0.121 (3.07) – 0.148 (3.76)	210,000 – 222,000
0.149 (3.78) – 0.162 (4.11)	200,000 – 205,000
0.163 (4.14) – 0.187 (4.75)	194,000 – 198,000
0.188 (4.78) – 0.207 (5.26)	188,000 – 194,000
0.208 (5.28) – 0.225 (5.72)	184,000 – 188,000
0.226 (5.74) – 0.278 (7.06)	174,000 – 182,000
0.279 (7.09) – 0.362 (9.19)	150,000 – 161,000
.363 (9.22) – 0.500 (12.70)	135,000 – 145,000
>0.501 (12.72)	130,000

*K-500 – For cold drawn, annealed and age hardened: all sizes: 130,000



Stress Equalizing		Age Hardening			
Alloy	Temp (F)	Time (hrs)	Temp (F)	Time (hrs)	Maximum Safe Operating Temperature (F)
Monel® 400	575-650	1/2-1	Not Possible		450
Monel® K500	575	1/2-1	1000	4	500
Inconel® 600	800-900	1/2-1	Not Possible		750
Inconel® 625	Not Recommended		Not Possible		700
X750 Spring Temper	875	3	1200	4	700
X750 (>0.025" diameter) w1 Temper (15% cold work)	Not Recommended		1350	16	1000
X750 (Annealed) Spring Temper (.0.025" diameter)	Not Recommended		1350	16	1200
X750 Spring Temper	Stress Relieved from Age Hardening		Solution Treat: 2100	2	1200
			High Temp Age: 1550	24	
			Regular Age: 1300	20	
Inconel® 718 Spring Temper	Stress Relieved from Age Hardening		1325	8	1000
			1150	8	
Inconel® 718 w1 Temper (15% cold work)	Not Recommended		1800	1	1200
			1320	8	
			1150 (Furnace Cool)	8	
Ni-Span C 902	750	1/2-1	1100-1350	4-5	
Alloy 805 (Temperature Compensating)	750	1/2	Not Possible		
Alloy 825	800	1	Not Possible		
Alloy 20Cb-3			Not Possible		
302 Stainless Steel	650-850	1/2	Not Possible		500
316 Stainless Steel	750-850	1	Not Possible		600
17-7 PH Spring Temper	Stress Relieved from Age Hardening		900	1	550
17-7 PH (15% cold work)	Stress Relieved from Age Hardening		1000	1	550
PH 15-7 Mo Spring Temper	Stress Relieved from Age Hardening		900	16 (requires air cool)	550