MATERIAL DATA

Spring Material Properties

REVISED: 01JUL20

DESCRIPTION	MATERIAL SPEC	MAX SERVICE TEMP (°F)	MIN SERVICE TEMP (°F)	DESCRIPTION	TYPICAL SIZES AVAILABLE
Carbon Steel Wire					
Music Wire	ASTM A228	250	0	Cold drawn high Carbon high tensile strength spring wire good for high stress and high cycle spring applications.	.009 - .283
Oil Tempered Wire	ASTM A229 (Cl I & Cl II) ASTM A230 (Valve Quality)	300	-4	Cold drawn and heat treated general purpose spring wire. Available in two tensile ranges as well as valve spring quality.	.030 - .625
Chrome Vanadium Wire	ASTM A231 ASTM A232 (Valve Quality)	425	-4	Cold drawn and heat treated Chrome-Vanadium alloy spring wire. Suitable for high stress applications, shock loads and higher temperatures. Also available in valve spring quality.	.032 - .625
Chrome Silicon Wire	ASTM A401 ASTM A877 (Valve Quality)	475	-4	Cold drawn and heat treated Chrome-Silicon alloy spring wire. Suitable for high stress applications, shock loads and higher temperatures. Higher tensile strength and 50 °F higher service temperature than Chrome Vanadium wire. Also available in valve spring quality.	.029 - .625
Stainless Steel Wire & Bar					
302 Stainless Wire	ASTM A313 AMS 5688	500	-330	Cold worked general purpose austenitic Chromium-Nickel stainless steel spring wire with good corrosion resistance.	.006 - .625
316 Stainless Wire	ASTM A313	550	-330	Cold worked austenitic Chromium-Nickel stainless steel spring wire with better corrosion resistance than 302SS due to higher Nickel content and addition of Molybdenum.	.012 - .625
17-7 PH Stainless Wire	ASTM A313 AMS 5678	600	-130	Cold worked and age hardened stainless steel spring wire with similar corrosion restistance to 302SS with higher strength and temperature resistance.	.015 - .625
304 Stainless Bar	ASTM A276	500		Cold worked general purpose austenitic stainless steel bar with good corrosion resistance.	.125 - .875
316 Stainless Bar	ASTM A276	550		Cold worked austenitic stainless steel bar with better corrosion resistance than 304SS due to higher Nickel content and addition of Molybdenum.	.25 - .875
17-4 PH Stainless Bar	ASTM A564	550		Precipitation hardenable stainless steel bar with similar corrosion resistance to 304SS. Can be heat treated at a variety of temperatures to develop a wide range of properties. Depending upon heat treat, properties can range from high tensile strength in the H900 condition to superior ductility and stress corrosion cracking resistance with higher temperature aging.	.125 - 1.75
A-286 Bar & Wire	AMS 5732, AMS 5737 AMS 5734	750	-330	Age hardened Iron-Nickel-Chromium alloy with high strength and corrosion resistance at elevate temperatures.	.048 - .75
Nickel & Cobalt Alloy Wire & Bar					
Inconel 600 Wire	ASTM B166	700	-300	Cold worked Nickel-Chromium-Iron alloy with good corrosion resistance, oxidation resistance and high strength.	.016 - .593
Inconel 625 Wire	ASTM B446	700	-300	Cold worked Nickel-Chromium-Molybdenum-Columbium (Niobium) alloy having excellent oxidation resistance, corrosion resistance and strength. Suitable for seawater applications.	.012 - .375
Inconel X-750 (Spring Temper) Wire	AMS 5699	700 1300 F (Triple HT)	-330	Cold worked and aged hardened Nickel-Chromium alloy with high strength, corrosion resistance, and oxidation resistance. NACE compliant to 50 HRC max.	.010 - .625
Inconel X-750 (#1 Temper) Wire	AMS 5698	1100		Cold worked and age hardened Nickel-Chromium alloy with high strength, corrosion resistance and oxidation resistance. NACE compliant to 50 HRC max.	.032 - .687
Inconel X-750 Bar	AMS 5667 ASTM B637 (UNS N07750 Ty 2)	700	-330	Aged hardened Nickel-Chromium alloy with high strength, corrosion resistance, and oxidation resistance. NACE compliant to 50 HRC max.	.250 - 1.75
Inconel 718 Wire	AMS 5662 AMS 5962	1200	-330	Cold worked and aged hardened Nickel-Chromium-Columbium (Niobium)-Molybdenum alloy having high strength and corrosion resistance.	.035 - 0.500
Inconel 718 Bar	AMS 5662	1200	-330	Age hardened Nickel-Chromium-Columbium (Niobium)-Molybdenum alloy having high strength and corrosion resistance.	.25 - 1.75
Elgiloy Wire	AMS 5833	850	-300	Cold worked and aged hardened Cobalt-Chromium-Nickel-Molybdenum alloy having high strength, excellent corrosion resistance and high fatigue stength. NACE compliant to 60 HRC max.	.012 - .562

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(Nickel & Cobalt Alloy Wire & Bar - cont'd)					
MP35N Wire	AMS 5844	800	-300	Cold worked and age hardened Cobalt-Nickel-Chromium-Molybdenum alloy having high strength, excellent corrosion resistance and high fatigue strength. NACE compliant to 55 HRC max.	.016 - .406
Monel 400 Wire	QQ-N-281	450	-300	Cold worked Nickel-Copper alloy with high strength and toughness. Excellent corrosion resistance in seawater and some acids.	.012 - .593
Monel K-500 Bar	QQ-N-286	450	-300	Cold worked and age hardened Nickel-Copper alloy with Aluminum and Titanium added for high strength. Excellent corrosion resistance and high strength.	.020 - 1.00
Hastelloy C276 Wire	ASTM B574	750	-300	Cold worked Nickel-Molybdenum-Chromium alloy with resistance to pitting, crevice corrosion and stress corrosion cracking.	.012 - .437
Rene 41 Bar & Wire	AMS 5712	1300	-300	Age hardened (or cold worked and age hardened) Nickel-Chromium alloy with high strength and oxidation resistance at elevated temperatures.	.018 - 1.5
Titanium Alloys					
Titanium Beta C (3-8-6-4-4) Wire	AMS 4957	750	-330	Cold worked and age hardened high strength Titanium alloy with excellent corrosion resistance and high strength to weight ratio.	.030 - .531
Titanium 6Al-4V (Grade 5) Wire	AMS 4965	800	-330	Age hardened with moderate strength and excellent corrosion resistance.	.030 - .250
Copper Alloy					
Phosphorus Bronze Wire	ASTM B159 (UNS C51000)	200	-330	Cold worked Phosphor-Bronze alloy with good electrical conductivity and corrosion resistance.	.010 - .187
Beryllium Copper Wire & Bar	ASTM B197 (UNS C17200) ASTM B196	400	-330	Cold worked and age hardened Beryllium-Copper alloy with good electrical conductivity and corrosion resistance.	.016 - .75
Brass (70/30) Wire	ASTM B134 (UNS C26000)	200		Cold worked Copper alloy with good corrosion resistance.	.020 - .162
Hot Rolled Alloy Bar					
5160H	ASTM A689 ASTM A304 (UNS H51600)	400		Hot rolled fine grained alloy bar. Heat treatable to high hardness with good fatigue life. Available in hot rolled as rolled (HRAR) and turned and polished or centerless ground surface conditions. Also available as flat bar for flat and bow springs.	.437 - 1.625
51B60H	ASTM A689 ASTM A304 (UNS H51601)	400		Hot rolled fine grained alloy bar. Heat treatable to high hardness with good fatigue life. Available in hot rolled as rolled (HRAR) and turned and polished or centerless ground surface conditions. Includes addition of Boron to increase hardenability.	1.375 - 2.5
4161H	ASTM A689 ASTM A304 (UNS H41610)	400		Hot rolled fine grained alloy bar. Heat treatable to high hardness with good fatigue life. Available in hot rolled as rolled (HRAR) and turned and polished or centerless ground surface conditions. Includes addition of Molybdenum to increase hardenability.	2.00 - 2.75
6150	ASTM A322 (UNS G61500)	400		Hot rolled fine grained alloy bar with addition of Vanadium. Typically cold finished. Heat treatable to high hardness with good fatigue life.	.437 - 1.125
4140	ASTM A322 (UNS G41400)	400		Hot rolled fine grained alloy bar with addition of Molybenum. Typically cold finished. Heat treatable to high hardness with good fatigue life and superior impact loading at low temperatures. Available in square cross sections.	.312 - .875 (Round) .437 - 1.25 (Square)
Tool Steel					
Tungsten Bar (H-12)	ASTM A681	700		Heat treatable high strength tool steel suitable for high temperatue applications.	.343 - 1.562

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Sheet & Strip					
1075 Strip	ASTM A684 (AISI 1075)	300		Heat treatable high carbon cold rolled strip suitable for flat and bow prings. Available annealed and pretempered.	.004 - .375 Thick
1095 Strip	ASTM A684 (AISI 1095)	250		Heat treatable high carbon cold rolled strip suitable for flat and bow springs. Available annealed and pretempered.	.007 - .375 Thick
301 Stainless Strip	ASTM A666	600	-330	Cold worked general purpose austenitic Chromium-Nickel stainless steel strip with good corrosion resistance. Available in various tempers.	.005 - .125 Thick
316 Stainless Strip	ASTM A666	600	-330	Cold worked austenitic Chromium-Nickel stainless steel spring wire with better resistance to chemical attack and corrosion than 301SS due to higher Nickel content and addition of Molybdenum. Available in annealed and 1/4 hard conditions.	.007 - .093 Thick
17-7 PH Stainless Sheet & Strip	AMS 5528 AMS 5529	700	-130	Cold worked and age hardened or annealed and age hardened stainless steel strip with similar corrosion restistance to 302SS with higher strength and temperature resistance.	.008 - .187 Thick
Inconel X-750 Sheet & Strip	AMS 5542 AMS 5598	1300	-330	Aged hardened Nickel-Chromium alloy with high strength and oxidation resistance at elevated temperatures	.006 - .125 Thick
Inconel 718 Sheet & Strip	AMS 5596	1200	-330	Age hardened Nickel-Chromium-Columbium (Niobium)-Molybdenum alloy having high strength and corrosion resistance.	.025 - .094 Thick
Inconel 600 Strip	ASTM B168	700	-300	Cold worked Nickel-Chromium-Iron alloy with good corrosion resistance, oxidation resistance and high strength.	.009 - .040 Thick
Inconel 625 Strip	ASTM B443	700	-300	Cold worked Nickel-Chromium-Molybdenum-Columbium (Niobium) alloy having excellent oxidation resistance, corrosion resistance and strength. Suitable for seawater applications.	.008 - .031 Thick
Elgiloy Strip	AMS 5876	850	-300	Cold worked and aged hardened Cobalt-Chromium-Nickel-Molybdenum alloy having high strength, excellent corrosion resistance and high fatigue stength.	.008 -.062 Thick
Beryllium Copper Strip	ASTM B194 (UNS C17200)	250		Cold worked and age hardened Beryllium-Copper alloy with good electrical conductivity and corrosion resistance.	.006 - .051 Thick
Brass (70/30) Strip	ASTM B36 (UNS C26000)	200		Cold worked Copper alloy with good corrosion resistance.	.032 - .062 Thick

NOTE: This data is supplied as reference only and all data should be validated if used for design or purchasing purposes.