CWI Specialty Series Alloy: Inconel® X-750

CENTRAL WIRE INDUSTRIES

Alloy X-750 (UNS N07750) is a high-performance austenitic nickel-chromium alloy and is made precipitation-hardenable by the addition of aluminum and titanium. It has good resistance to corrosion and oxidation along with high tensile and creep-rupture properties at high temperatures. For extended applications that require high strength at high temperatures, Alloy X-750 may require a solution treatment, with air cooling between intermediate and final aging. Alloy X-750 has good elevated temperature strength properties to 1300ºF (700˚C), and oxidation resistance to 1800ºF (983˚C).

Inconel® is a registered trademark of Special Metals Corporation group of companies

Nominal Composition

	C	Mn	Si	S	Cr	Ni	Cb (Nb)	Ti	Al	Fe	Co	Ta	Cu
Min					14.0	70.0	0.70	2.25	0.40	5.0			
Max	0.08	1.00	0.50	0.01	17.0		1.20	2.75	1.00	9.0	1.0	0.05	0.50

Physical Properties

	At 70°F	At 1000°F	At 20°C	At 538°C
Density	0.299 lb/in³		8.28 g/cm³	
Modulus of Elasticity (E)	31.0 x 10^6 psi	26.7 x 10^6 psi	214 GPa	184 GPa
Modulus of Rigidity (G)	12.0 x 10^6 psi		82.7 GPa	
Coefficient of Expansion	7.8 µin/in.-°F (70°F to 1000°F)		14.5 µm/m-°C (20°C to 538°C)	
Electrical Resistivity	20.1 µ ohm.in		122 µΩ.cm	
Thermal Conductivity	83 Btu-in/ft²hr-°F		12.0 W/m-K	

Applicable Specifications

Wire & Bar	AMS 5698, AMS 5699, NACE MR0175 (ISO 15156-3), NACE MR0103 (ISO 17945), ASTM B637, MIL-DTL-24493

Typical Mechanical Properties – Spring Applications

Condition	Heat Treatment	Tensile Strength	Suggested Operating Conditions
Solution Treated	2000 – 2200°F (1093 – 1204°C)	130 ksi max (896 MPa) max	
No.1 Temper (AMS 5698)	As supplied condition.	130 – 165 ksi (896 – 1140 MPa)	
No.1 Temper + Aged	1350°F (732°C) for 16 hours	165 – 220 ksi (1140 – 1520 MPa)	Optimum resistance to relaxation at temperatures up to 1000°F (538°C) with moderate or low stresses.
Spring Temper (AMS 5699)	As supplied condition.	160 – 200 ksi (1100 – 1380 MPa)	
Spring Temper + Aged	After spring coiling age. 1200°F (649°C) minimum for 4 hours	180 – 250 ksi (1240 – 1795 MPa)	Optimum resistance to relaxation at temperatures up to 700°F (371°C) with low stresses.
Spring Temper + Solution + Aged (3 Step Heat treatment)	After spring coiling, Solution Heat Treat: 2100°F (1149°C) for 2 hours and air cool. Age Harden at 1550°F (843°C) for 24 hours and air cool. Reheat to 1300°F (704°C) for 20 hours and air cool.	145 - 190 ksi (1000 – 1310 MPa)	Optimum resistance to relaxation at temperatures in the range 1000 – 1300°F (538 – 704°C).

Available Forms	Packaging Options
• Round wire (0.009” to 0.625”) • Bars • Shaped wire	• Coils • Spools • Bars • Custom packaging

The contents of this document are presented for informational purposes only and while every effort has been made to ensure their accuracy, they are not to be construed as guarantees, express or implied, regarding the products or services described herein or their use or applicability. The user must fully evaluate every process and application in all aspects.