Technical Data Sheet

ATI X-750™

Precipitation Hardenable Nickel-Base Superalloy

(UNS N07750)

INTRODUCTION

ATI X-750™ alloy (UNS N07750) is a precipitation hardenable nickel-base superalloy which is used in applications requiring high strength to approximately 1300°F (704°C) and oxidation resistance to approximately 1800°F (982°C). Following heat treatment, ATI X-750™ alloy possesses high stress-rupture strength and a low creep rate at temperatures up to approximately 1500°F (816°C).
ATI X-750™ alloy is also highly resistant to corrosion. This alloy has been used primarily in the aerospace industry for items such as gas turbine rotor blades, gas turbine wheels, bolts, and other gas turbine structural parts. It has also found use in jet engine afterburners and airframe and missile structures. Non-aerospace applications include heat treat fixtures, forming tools, and extrusion dies.

CHEMICAL COMPOSITION

Element	UNS N07750 Limits
C	0.08 max.
Mn	1.00 max.
Si	0.50 max.
S	0.01 max.
Cr	14.0-17.0
Cb	0.70-1.20
Ti	2.25-2.75
Al	0.40-1.00
Co	1.00 max.
Cu	0.50 max.
Fe	5.0-9.0
Ni+Co	70.0 min.

SPECIFICATIONS & CERTIFICATES

The AMS 5542 and AMS 5598 specifications, among others, cover ATI X-750™ alloy strip, sheet and plate. The ASTM B637, AMS 5667, AMS 5668, AMS 5670, AMS 5671, and ASME SB637 specifications cover rod and bar.

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PRODUCT FORMS

ATI X-750™ alloy is available as strip, sheet, plate and long product forms.

PHYSICAL PROPERTIES

Density
0.299 lb/in^3 (8249 kg/m^3)

Modulus of Elasticity in Tension
31 x 10^6 psi (214 GPa)

HEAT TREATMENT

ATI X-750™ alloy is typically supplied in the annealed condition. For strength, it depends on a precipitation hardening reaction involving nickel, titanium, columbium, and aluminum. A variety of precipitation heat treatments are available for ATI X-750™. A common method of achieving high strength at room and elevated temperatures is by a precipitation heat treatment at 1350°F (732°C) for 8 hours followed by furnace cooling to 1150°F (621°C) and holding an additional 8 hours before air cooling.

MECHANICAL PROPERTIES

Solution annealed and aged properties of ATI X-750™ alloy per AMS 5542 & 5598 are shown below:

	Annealed Properties*	AMS 5542	AMS 5598
UTS (Maximum)	Strip	130 ksi (896 MPa)	135 ksi (931 MPa)
	Sheet	130 ksi (896 MPa)	135 ksi (931 MPa)
0.2% YS (Maximum)	Strip	--	--
	Sheet	65 ksi (448 MPa)	
Elongation (Maximum)	Strip	20%	18%
	Sheet	40%	35%
	Annealed Properties*	**AMS 5542**	**AMS 5598**
UTS (Minimum)	Strip	155 ksi (1069 MPa)	160 ksi (1103 MPa)
	Sheet	165 ksi (1138 MPa)	170 ksi (1172 MPa)
	Plate	155 ksi (1069 MPa)	160 ksi (1103 MPa)
0.2% YS (Minimum)	Strip	--	--
	Sheet	105 ksi (724 MPa)	115 ksi (793 MPa)
	Plate	100 ksi (689 MPa)	105 ksi (724 MPa)
Elongation (Minimum)	Strip	15%	12%
	Sheet	20%	18%
	Plate	20%	18%
Hardness (Minimum)	Strip	30	30
	Sheet	32	32
	Plate	30	30

* Note: Mechanical property requirements vary slightly with gauge; please refer to subject specifications for full requirements.

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FORMABILITY

In the solution-annealed condition, ATI X-750™ alloy may be readily formed by hot or cold working.

CORROSION RESISTANCE

ATI X-750™ alloy is resistant to severely corrosive conditions as well as high temperature oxidation. Its corrosion resistance is similar to AL 600™ alloy. ATI X-750™ alloy performs extremely well under both oxidizing and reducing conditions. It is resistant to most alkaline salt solutions and resists many acid salts. Immunity to stress corrosion cracking is present, even in the fully precipitation hardened condition.

WELDABILITY

The ATI X-750™ alloy can be welded by most of the common methods, including resistance welding and gas tungsten arc welding (GTAW). Matching filler wire should be used. If matching wire is not available, a more highly alloyed wire such as 718 alloy may be substituted. ATI X-750™ alloy should be welded in the annealed condition. Post weld heat treatment is required.

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