



Technical Data Sheet

GENERAL

ATI 718 alloy (UNS N07718) is an extremely versatile precipitation-hardening, Ni-base alloy with excellent strength and good ductility up to 1300° F (704° C). These characteristics, combined with good weldability, good formability, and excellent cryogenic properties account for the popularity of this alloy. The main hardening constituent is a niobium containing γ'' , Ni₃ (Nb, Al, Ti). The unique welding characteristics of this alloy are attributed to the kinetics of the precipitation reaction. It is produced by vacuum induction melting followed by consumable remelting (vacuum arc or electroslag).

Typical applications are high strength components for jet engines made from forgings, castings, and bar stock; welded and fabricated sheet-metal parts; fasteners; miscellaneous hardware, tooling; and liquid rocket components involving cryogenic temperatures.

SPECIFICATIONS

- AMS 5596, 5597 - Sheet, Strip, and Plate
- AMS 5662, 5663, 5664 - Bars, Forgings and Rings
- AMS 5832 - Wire

PHYSICAL PROPERTIES

Melting Range: 2,300-2,450° F , (1,260 - 1,343° C)

Density: 0.296 lbs/in³ ; 8.19 gm/cm³

HEAT TREATMENT

The heat treatment consists of solution treating followed by a double aging treatment. Depending on the mechanical properties desired, one of the following two heat treatments is utilized:

- For optimum impact properties:
Solution treat at 1,950° F (1,066° C) for 1 to 2 hours. Air cool.
Age at 1400° F (760° C) for 10 hours. Furnace cool to 1,200° F (649° C). Hold for total elapsed time of 20 hours. Air cool.
- For optimum tensile and creep-rupture properties:
Solution treat at 1,700-1,850° F (927 - 1,010° C) for 1 hour. Air cool.
Age at 1,325-1,400° F (718 - 760° C) for 8 hours. Furnace cool at 100° F (38° C) per hour to 1,150-1,200° F (621 - 649° C). Hold 8 hours. Air cool.

HARDNESS

The hardness in the solution treated condition is about 20-25 HRc which increases upon aging to about 36-44 HRc.

OXIDATION & CORROSION RESISTANCE

ATI 718 alloy has good oxidation resistance up to about 1,800° F (982° C). This alloy also possesses good corrosion resistance to many corrosive media, including resistance to stress-corrosion cracking.

FORGEABILITY/ FORMABILITY

ATI 718 alloy displays good hotworking characteristics. Recommended forging furnace temperatures for initial forgings are 2,050° F (1,121° C) maximum for initial forging and 1,775-1,800° F (968 - 982° C) minimum for finish forging. A reduction of 25% minimum during final forging, together with a low finishing temperature, is required to avoid a duplex grain structure and to establish proper mechanical properties.

This alloy is readily formable in the solution treated condition because of its good ductility.

MACHINABILITY

ATI 718 alloy is readily machinable in both the solution treated and age-hardened conditions.



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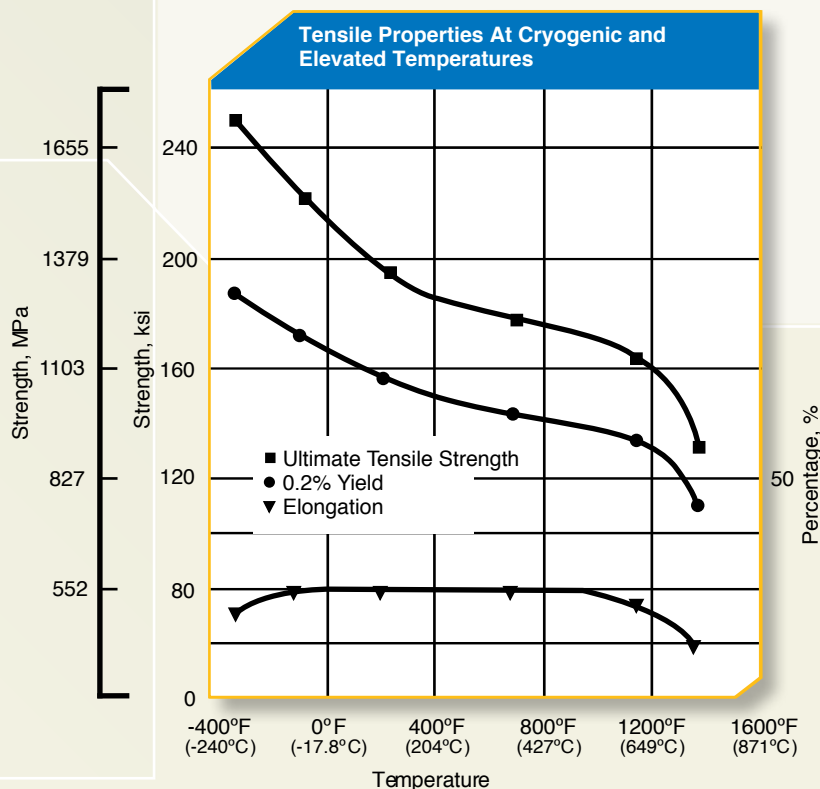
WELDABILITY

Satisfactory welds can be produced in both the solution treated and fully-aged conditions using inert gas-shielded arc , plasma arc, electron beam, and resistance welding techniques. Because of the sluggish aging response, ATI 718 alloy can be welded without hardening during the heating and cooling cycles, and the aged alloy can be repair welded several times without cracking even in complex weldments.

SPECIAL INSTRUCTIONS

All lubricants, particularly those containing sulfur, should be removed prior to heat treating and pickling.

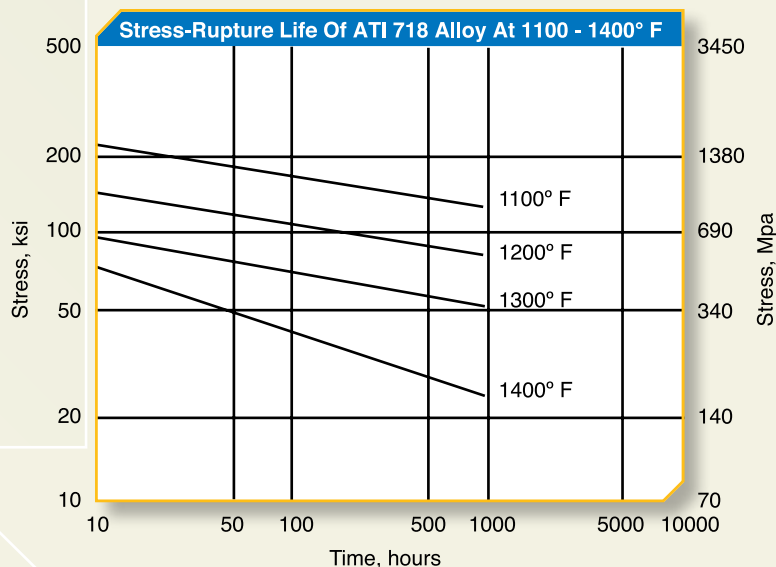
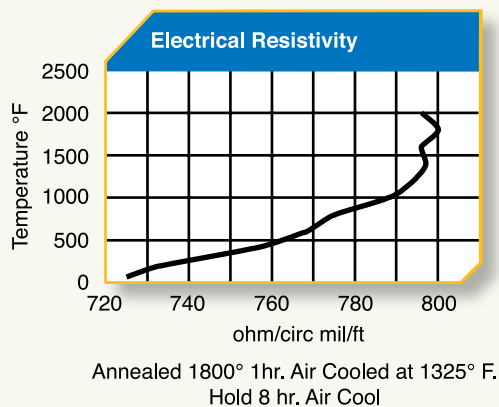
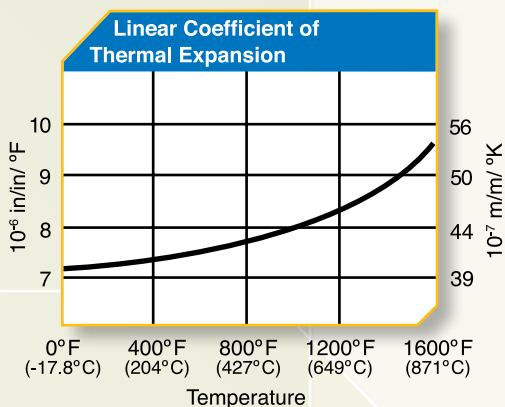
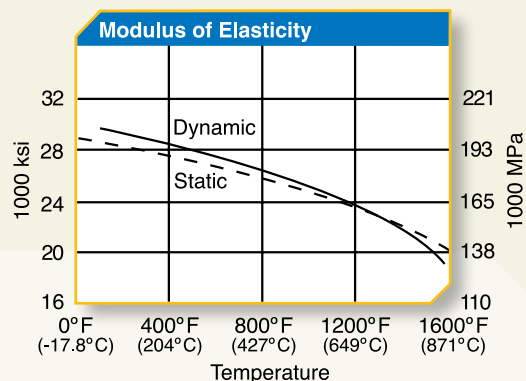
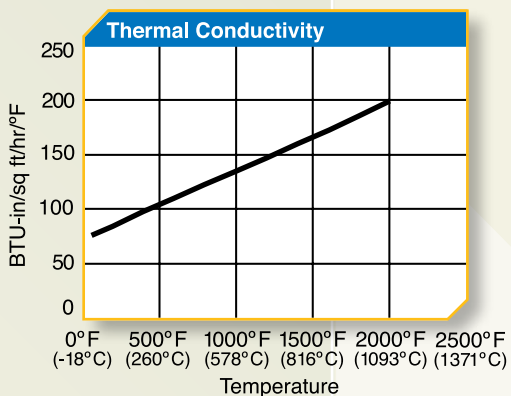
Chemical Composition														
	C	Mn	Si	S	P	Cr	Ni	Co	Fe	Mo	Ti	Al	B	Cb + Ta
% w/w, min.	-	-	-	-	-	17.00	50.0	-	Bal	2.8	0.65	0.20	-	5.0
% w/w, max.	0.08	0.35	0.35	0.015	0.015	21.00	55.0	1.0	-	3.3	1.15	0.80	0.006	5.5



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