Technical Data Sheet

ATI 80 A™ Alloy

Nickel-base Alloy

(UNS N07080)

INTRODUCTION

ATI 80 A™ Alloy is nominally an 80% nickel - 20% chromium alloy which is strengthened by precipitation hardening through the addition of titanium and aluminum. It was introduced in England over 40 years ago, and was the forerunner of nickel-based, precipitation hardening superalloys for use in jet engines. The alloy possesses good creep-rupture properties combined with very good oxidation resistance and satisfactory high temperature fatigue characteristics. ATI 80 A™ Alloy is generally used for high strength applications up to 1,400°F (760°C), but may be used as high as 1,550°F (843°C) for short duration service. ATI employs vacuum induction melting and vacuum arc remelting to produce this alloy. Major applications are turbine blading for jet engines and stationary gas turbines, high temperature bolting, and other hot components and hardware in gas turbines.

SPECIFICATIONS

• 2 HR 1 - Billets, Bars, Forgings and Parts

PHYSICAL PROPERTIES

Melting Range: 2,408-2,489°F (1,320-1,365°C)
Density: 0.297 lbs./in.^{3}, 8.22 x 10^3 kg/m^3

HEAT TREATMENT

The preferred heat treatment for bars consists of:
Solution Treatment: 1,976°F (1,080°C), 8 hours, air cool
Aging Treatment: 1,292°F (700°C), 16 hours, air cool

For applications up to 1,100-1,200°F (593-649°C) where greater creep-rupture ductility is desirable, a three-step heat treatment is used which consists of inserting an additional aging or stabilizing treatment of 1,562°F (850°C), 24 hours, air cool between the solution treatment and the final age at 1,292°F (700°C).

HARDNESS

The hardness in the solution treated condition is about Rockwell B 91-99 which increases to about Rockwell C 29-38 upon aging.

OXIDATION RESISTANCE

The oxidation resistance is very good up to at least 1,800°F (982°C), especially when subjected to repeated heating and cooling cycles. However, the alloy is susceptible to intergranular oxidation when held in air for prolonged times at the annealing or solution treating temperatures.

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FORGEABILITY

Forging can be successfully accomplished in the temperature range of 1,800-2,050°F (982-1,121°C).

FORMABILITY

ATI 80 A™ Alloy is readily cold-formed in the solution treated condition because of its good ductility at room temperature.

MACHINABILITY

ATI 80 A™ Alloy is machinable in all conditions, but best machinability is obtained when the material is in the fully heat treated condition. The machining characteristics are similar to those of ATI X-750™ Alloy.

WELDABILITY

Welding can be accomplished successfully using inert-gas-shielded arc-welding or resistance-welding techniques. For arc-welding of thicker sections, the use of ATI X-750™ Alloy electrodes is recommended. Weldments should be solution treated and aged prior to service.

SPECIAL PRECAUTIONS

Exposure to sulfurous atmospheres at elevated temperatures must be avoided. Also, parts must be carefully cleaned to completely remove all sulfur-based machining oils or lubricants prior to welding or heat treatment.

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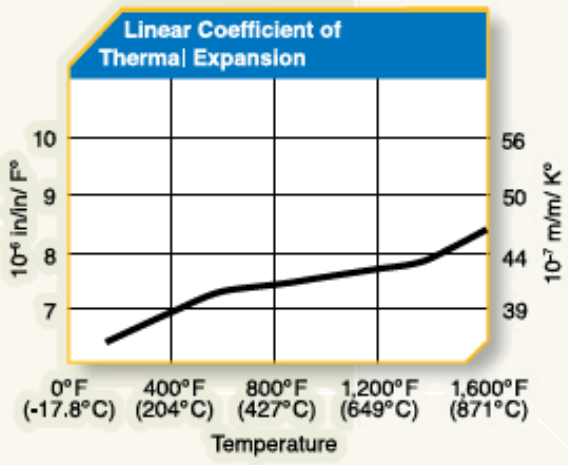
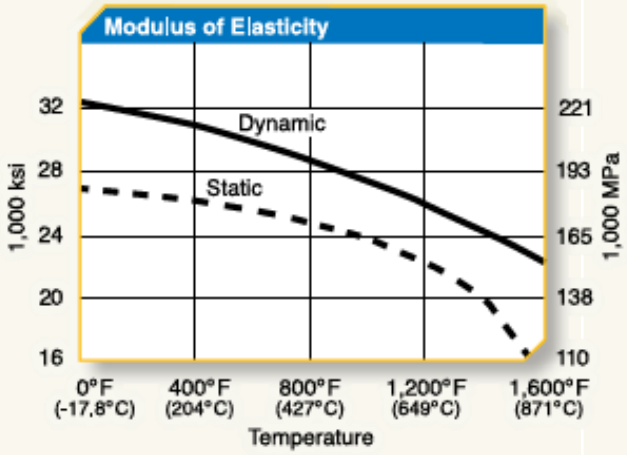
Chemical Composition

	C	S	Cr	Ni	Co	Fe	Cu	Mn	Ti	Al	Si	B
Wt. %, min.	0.04	-	19.0	Bal.	-	-	-	-	2.10	1.0	-	-
Wt. %, max.	0.10	0.015	21.0	-	1.0	1.5	0.20	1.0	2.70	1.8	1.0	0.008

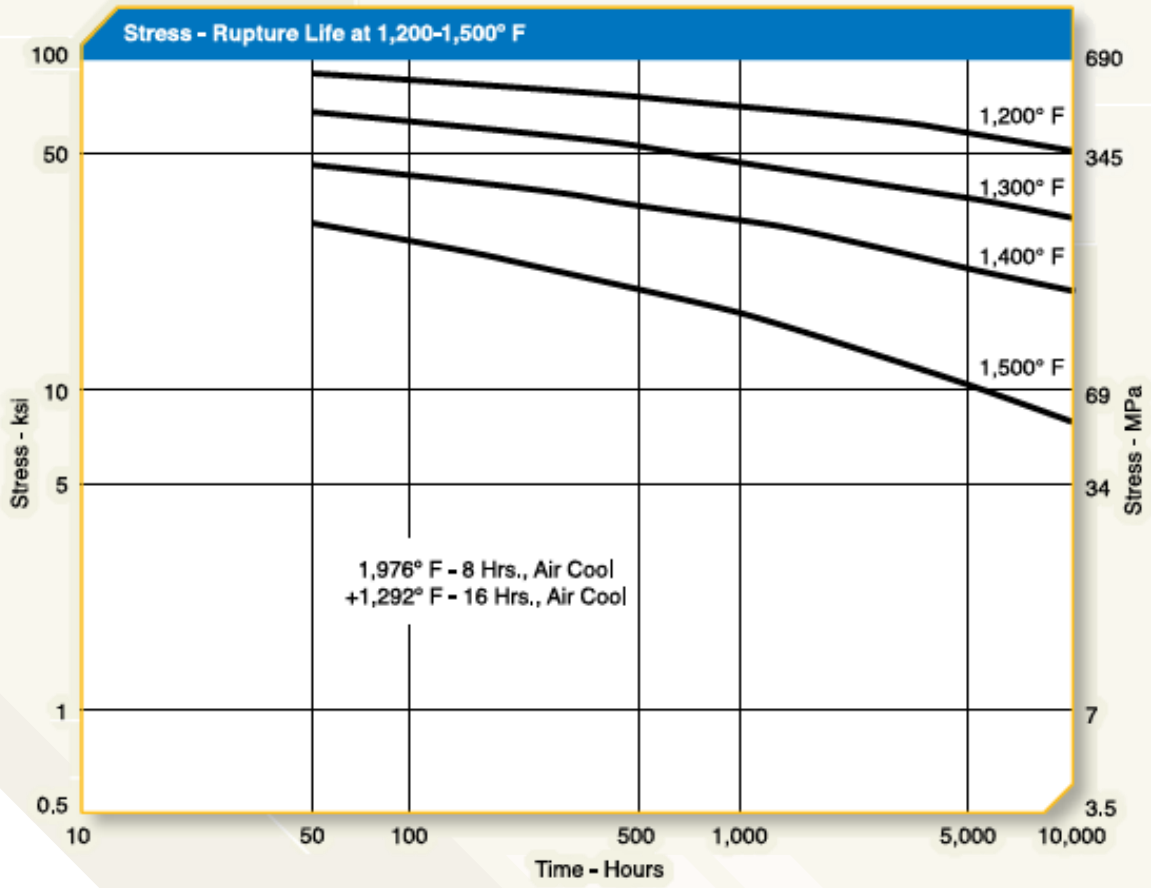
Linear Coefficient of Thermal Expansion



Modulus of Elasticity



Stress - Rupture Life at 1,200-1,500° F



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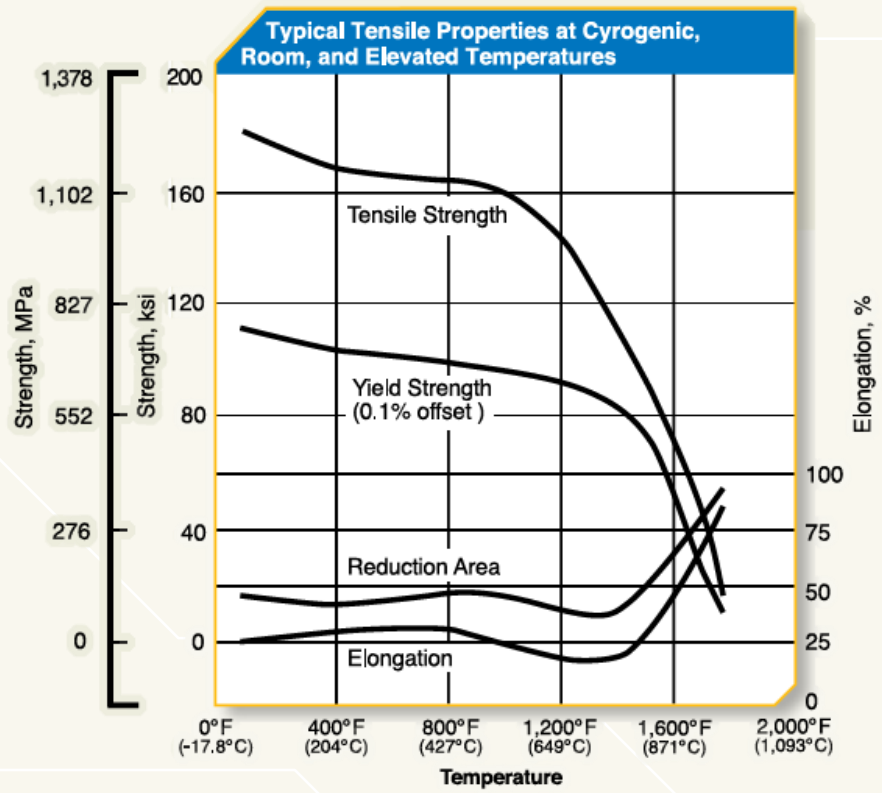

Heat Treatment
1,976° F - 8 Hours, Air Cool
1,292° F - 16 Hours, Air Cool

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