Mission Critical Metallics®

ATI 13-8Mo Alloy

GENERAL

ATI 13-8Mo Alloy (UNS S13800) is a precipitation hardening stainless steel that combines excellent strength, good toughness, and good general corrosion resistance. It is a through-hardening alloy, which allows it to be used in parts with large cross sections, where yield strengths in excess of 200 ksi (1,380 MPa) may be required. Good transverse toughness properties are achieved by tight chemical composition control (to prevent the formation of delta phase), low carbon content (to minimize grain boundary precipitation), and double vacuum melting (to reduce alloy segregation). Since the rate of cooling from the solution temperature is not critical, large cross sections can be air-cooled. This alloy is produced by a primary vacuum induct ion melt process (VIM), followed by a consumable vacuum arc remelting (VAR) step.

Typical uses are aircraft parts, rocket engine mounts, nuclear reactor parts, landing gear components, high performance shafts, and petrochemical parts that require high strength combined with good resistance to stress corrosion.

SPECIFICATIONS - AMS

- AMS 5629 - Bars, forgings, rings, and extrusions
- AMS 5864 - Plate

PHYSICAL PROPERTIES

Melting Range: 2,560 to 2,680º F (1,404 to 1,471º C)
Density: 0.279 lbs/in^3 (7.76 gm/cc)

HEAT TREATMENT

Solution treatment from 1,675 to 1,725º F (913 to 941º C) for 15 to 30 minutes at temperature. Air cool or oil quench to below 60º F (15º C) to ensure complete transformation to martensite. Aging is normally carried out from 950 to 1,150º F (510 to 621º C), depending upon the desired final properties. Heat treatment is usually performed in air. Heat treatment of brazed components may be done in inert atmospheres. Reducing atmospheres should not be used because of the potential for nitrogen contamination.

HARDNESS

Hardness in the solution annealed condition is approximately Rockwell C 33. See the attached table for hardness in the various aged conditions.

OXIDATION AND CORROSION RESISTANCE

ATI 13-8Mo alloy has excellent oxidation resistance up to 1,500º F (816º C). Corrosion resistance decreases slightly as the aging temperature is raised. This alloy has the best resistance to stress corrosion cracking of all of the precipitation hardenable stainless steels. Its resistance to general corrosion is greatest in the fully-hardened condition. The alloy shows very little rusting when exposed to a 5 percent salt fog at 95º F (35º C).

FORGEABILITY/ FORMABILITY

ATI 13-8Mo alloy has good hot working characteristics, and can be forged over a wide temperature range. Temperatures up to 2,200° F (1,204º C) may be used. For optimum properties, forging temperature should not exceed 1,900º F (1,038º C). Hot working should not be done below 1,700º F (927º C). After forging, parts should be cooled to room temperature, then solution treated prior to aging. The alloy can be cold formed in the annealed condition, utilizing conventional cold forming techniques.

MACHINABILITY

ATI 13-8Mo alloy can be machined in both the annealed and hardened conditions. In the annealed condition, use machine speeds 20 to 30 percent lower than those used on 304 stainless steel.

WELDABILITY

ATI 13-8Mo alloy is normally welded using inert gas tungsten arc techniques, although most other welding processes may be used. These include plasma arc, electron beam, gas metal arc, and shielded metal arc processes. Helium is the preferred shielding gas.

SPECIAL PRECAUTIONS

All lubricants and coolants, particularly sulfur-bearing, should be removed prior to heat treatment, brazing and pickling.

ATI Allvac
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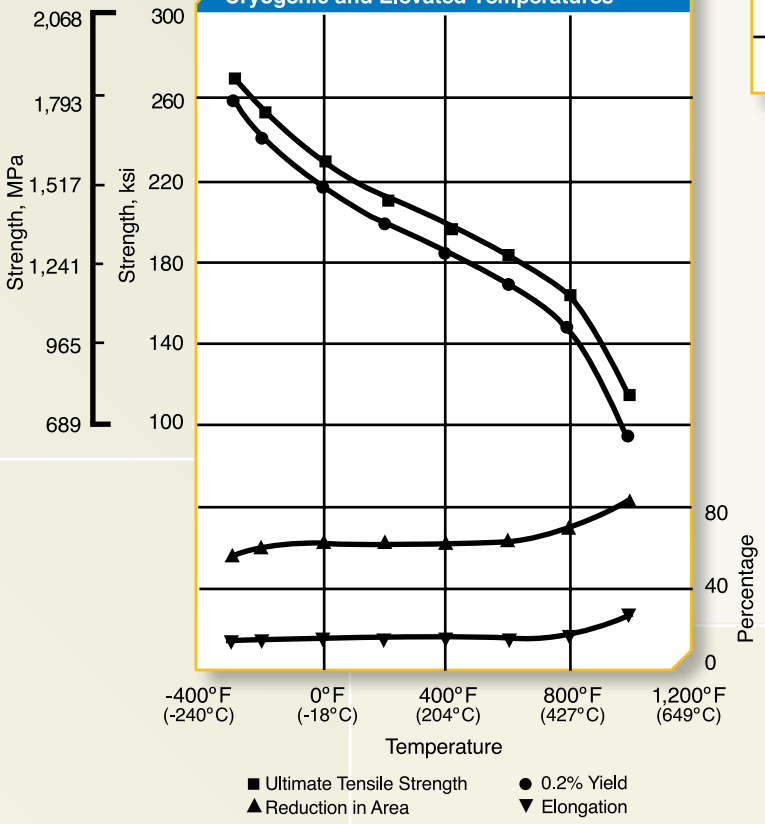
Chemical Composition

	C	Mn	Si	P	S	Cr	Ni	Mo	Al	N	Fe
wt %, min.	-	-	-	-	-	12.25	7.50	2.00	0.90	-	Bal.
wt %, max.	0.05	0.10	0.10	0.010	0.008	13.25	8.50	2.50	1.35	0.010	Bal.

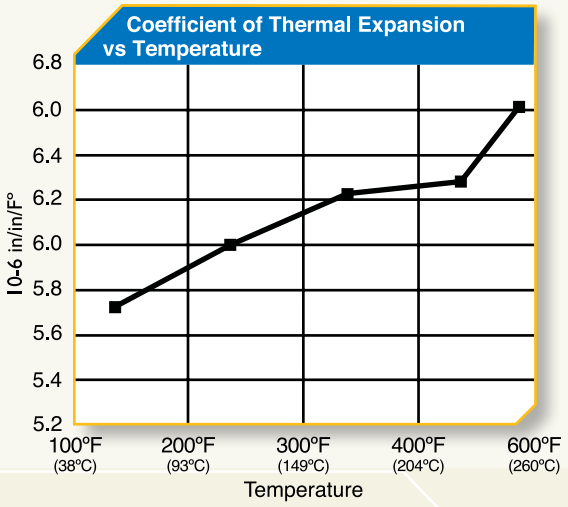
Tensile Properties Of Bar At Cryogenic and Elevated Temperatures



Condition

	H950	H1000	H1050	H1100	H1150
Hardness Rockwell C	47	45	43	35	33

Coefficient of Thermal Expansion vs Temperature



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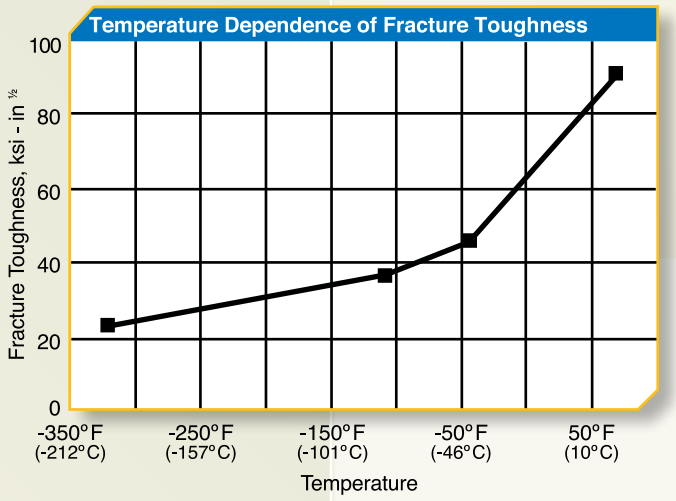

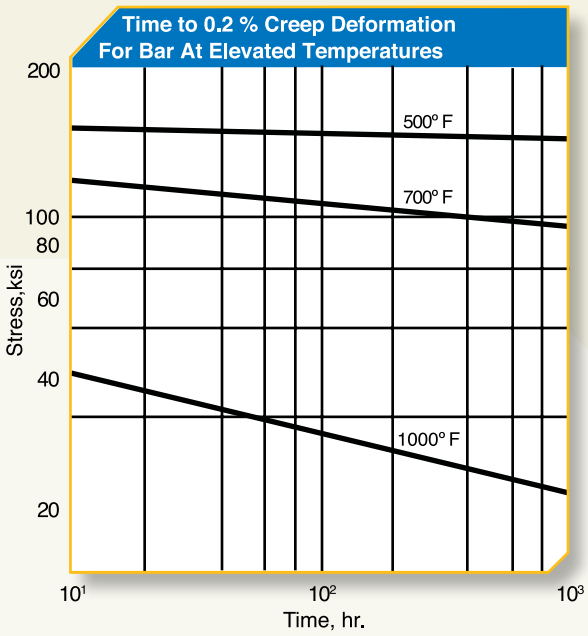

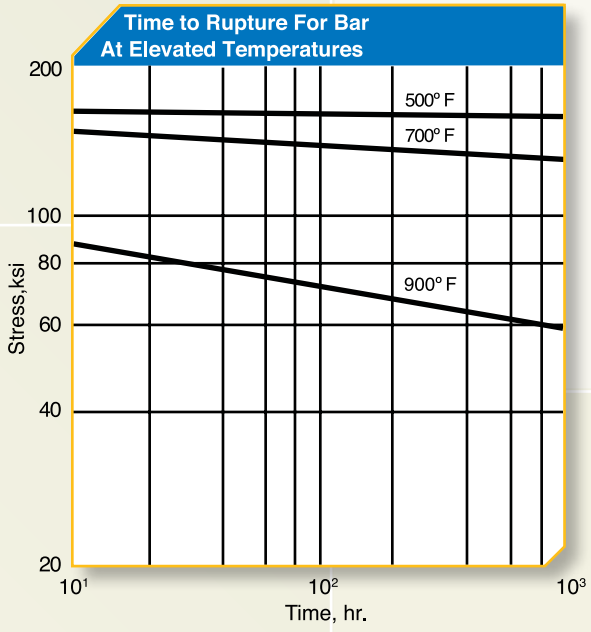

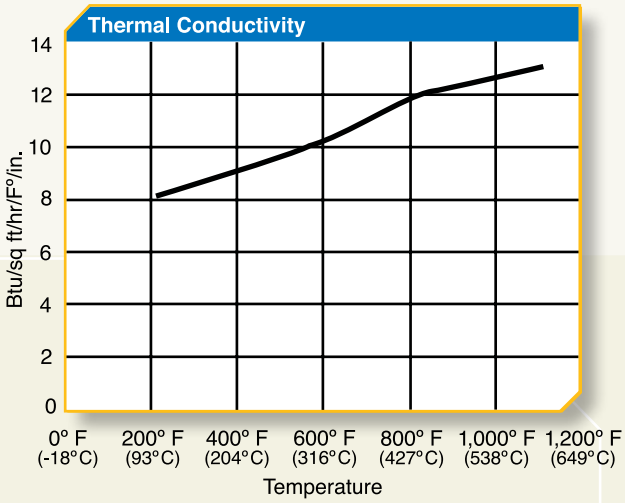

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