ATI Ti-5Al-2Sn-2Zr-4Cr-4Mo Alloy

(UNS R58650)

INTRODUCTION

ATI Ti-5Al-2Sn-2Zr-4Cr-4Mo Alloy (UNS R58650), also known as Ti-17, was developed by General Electric as a high strength, deep hardening alloy for fan and compressor discs and for other large components. It has been classified as a “beta-rich” alpha-beta alloy. The alloy may be processed in the beta region, or in the alpha plus beta region. This Ti-17 alloy has higher tensile and creep strengths than Ti-6Al-4V. While its hardenability is similar to other beta alloys, ATI 17™ Alloy has a lower density and a higher modulus than most other beta titanium alloys.

ATI 17™ Alloy is normally produced by plasma cold hearth melting (PAM), and is followed by vacuum arc remelting (VAR). The alloy is normally supplied as forging billet, but it may also be supplied as forged or rolled bar.

SPECIFICATIONS & CERTIFICATES

- AMS 4995 - Billet

FORMABILITY

ATI 17™ Alloy can be cold worked and cold formed using techniques that are used for other austenitic stainless steels, although somewhat higher loads may be required.

FORGEABILITY

ATI 17™ Alloy has excellent forgeability and hot workability. Alpha-beta forging is performed in the 1,500 to 1,575°F range. Total reductions of 50 to 75 percent are recommended to achieve proper equiaxed structures. Beta forging is done in the 1650 to 799°F range. A final reduction of 30 to 50 percent in a single step is recommended.

ATI 17™ Alloy may be forged by hot die or isothermal forging techniques to obtain forging geometries closer to net shape.

CORROSION RESISTANCE

There are no corrosion data available for this alloy; however, the alloy may be susceptible to stress corrosion attack because of its high chromium content.

WELDABILITY

It is recommended that more highly alloyed austenitic alloys be used in welds of ATI 17™ Alloy, in order to provide the best corrosion resistance. Autogenous welds exhibit less corrosion than the base material due to segregation; however, the corrosion resistance can be improved by post-weld annealing.

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SPECIAL PRECAUTIONS

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

PHYSICAL PROPERTIES

Density: 0.168 lbs/in^3; (4.658 gms/cc)
Beta transus: 1,635°F; (890°C)

HEAT TREATMENT

There are different solution heat treatments for alpha-beta and beta processed material. Alpha-beta processed material has a double solution treatment; the first treatment is at 1,500 to 1,575°F (815 to 860°C) for 4 hours followed by rapid air cooling. The higher temperatures are used when higher toughness is desired. The second solution treatment is done at 1,475°F (800°C) followed by a water quench. Fan air-cooling may be used for thinner sections; however, higher and more consistent properties may be obtained by water quenching. Beta processed material receives a single solution anneal at 1,475°F (800°C) for 4 hours.

The recommended aging treatment for both alpha-beta and beta processed materials is 1,150 to 1,200°F (620 to 650°C) for 8 hours.

HARDNESS

Hardness for solution treated and aged material is approximately 39-40 HR_C.

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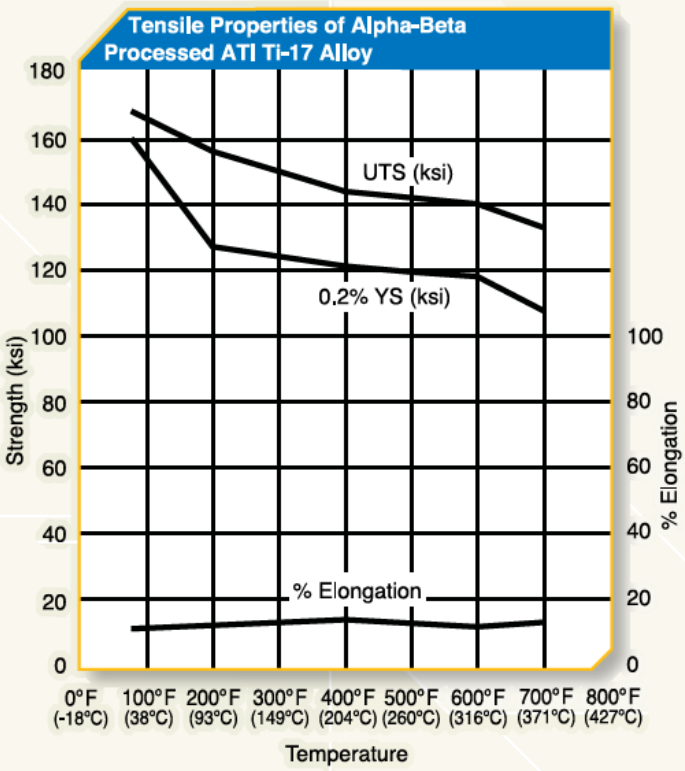
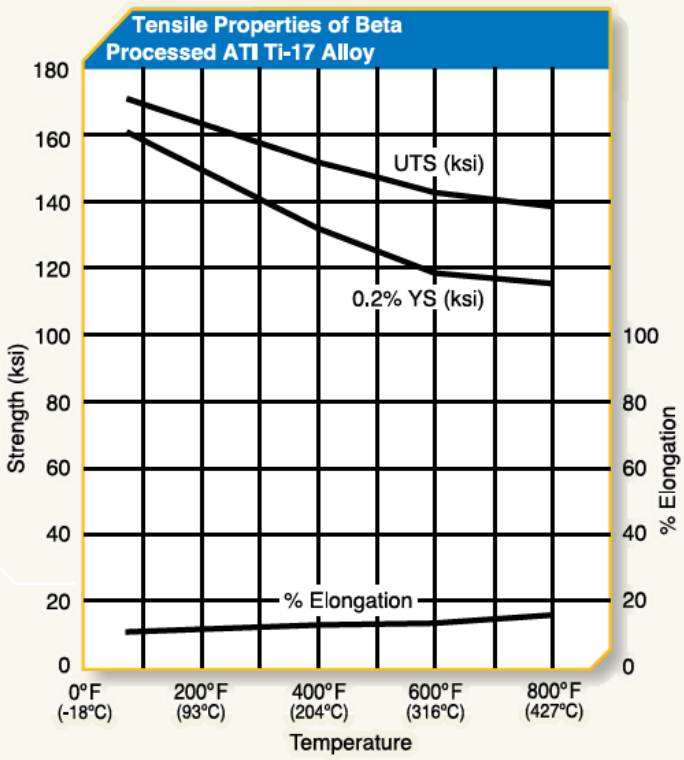
Chemical Composition

	Al	Sn	Zr	Mo	Cr	O	N	H	Fe
wt %, min.	4.5	1.5	1.5	3.5	3.5	0.08	-	-	-
wt %, max.	5.5	2.5	2.5	4.5	4.5	0.13	0.04	0.0125	0.3





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