



TITANIUM 6Al-4V Ti 6-4 / Grade 5 (UNS R56400)

Chemical Composition										
O	N	C	H	Fe	Al	V	Ti	Mo	Others/ea	Others/total
0.20	0.05	0.10	0.0125	0.30	5.5-6.75	3.50- 4.50	BAL	-	0.10	0.4

(maximum values unless range is shown)

Titanium 6Al-4V/Grade 5 (UNS R56400) is the most widely used titanium grade. It is a two phase $\alpha+\beta$ titanium alloy, with aluminum as the alpha stabilizer and vanadium as the beta stabilizer. This high-strength alloy can be used at cryogenic temperatures up to about 800°F (427°C). Titanium 6Al-4V alloy is principally used in the annealed condition.

As in other titanium alloys, Titanium 6Al-4V corrosion resistance is based on the existence of a consistent and continuous oxide layer which is formed spontaneously upon exposure to oxygen. It has excellent resistance to corrosion in seawater making it a good choice for use in offshore and subsea oil & gas operations where seawater corrosion and weight are concerns.

Titanium 6Al-4V is resistant to general corrosion but may be quickly attacked by environments that cause breakdown of the protective oxide layer including hydrofluoric (HF), hydrochloric (HCl), sulphuric and phosphoric acids. Titanium 6Al-4V resists attack by pure hydrocarbons, and most chlorinated and fluorinated hydrocarbons provided that water has not caused formation of small amounts of hydrochloric and hydrofluoric acids.

Titanium 6Al-4V is produced by primary melting using vacuum arc (VAR), electron beam (EB), or plasma arc hearth melting (PAM). Refining is achieved by vacuum arc remelting.

Like other titanium alloys, it has a modulus of elasticity of 107 Gpa (16.5 x 10³ ksi), roughly half that of carbon steels.

Advantages of Titanium 6Al-4V:

- Good corrosion resistance in seawater applications
- Low density/ high strength-to-weight ratio
- Low modulus of elasticity
- Low thermal expansion
- Non-magnetic
- Good fatigue resistance
- Good high temperature mechanical properties



Applications

Titanium 6Al-4V is used in applications where high strength, light weight and corrosion resistance are important. Potential applications include shafts and pressure housings, subsea wellhead and riser components, ROV components, seal rings, and other critical forgings requiring high strength-to-weight ratios. This alloy has also been used in cycling and motorsport applications to reduce weight/size of components.

Machinability

Titanium 6Al-4V can be machined using practices for austenitic stainless steels with slow speeds, heavy feeds, rigid tooling, and large amounts of non-chlorinated cutting fluid.

Weldability

Titanium 6Al-4V is easily welded in the annealed condition. Precautions must be taken to prevent oxygen, nitrogen, and hydrogen contamination.



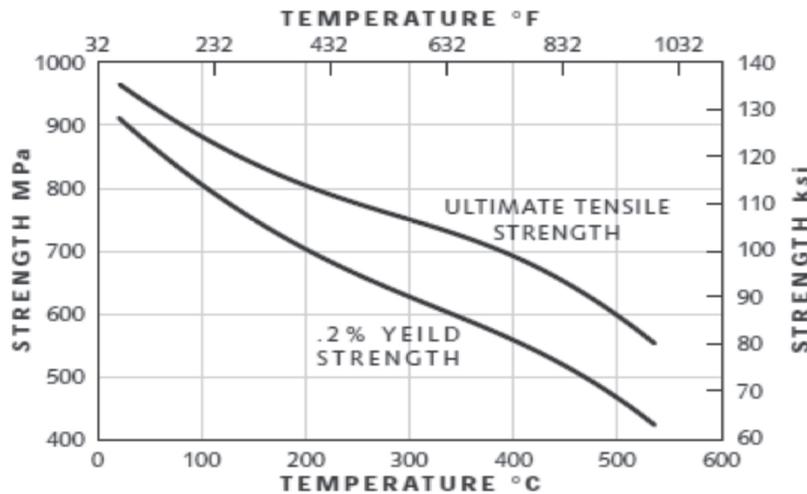
Physical Properties

Melting Range: 2,800-3,000°F (1,538 - 1,649°C)
Density: 0.160 lbs/cu. in.(4.47 gm/cc)
Beta Transus Temperature: 1830°F (± 25°); 999°C (± 14°)

Mechanical Properties

Typical Mechanical Properties Annealed Condition (min)		
	MPa	Ksi
Yield Strength (0.2%)	828	120
Tensile Strength	895	130
Elongation (%)	10	
Reduction in Area (%)	25	
Hardness	Rc 30-34	

Note: Variations in mechanical properties are dependent on size/condition/heat treatment



Titanium Engineers, with headquarters in Sugar Land, Texas, has over 25 years of experience in processing titanium and manufacturing titanium components. Unlike many other titanium processors, we have the knowledge and experience to process and machine titanium alloys correctly in order to ensure the mechanical properties and dimensional stability required by the customer are met.

Titanium Engineers has highly experienced engineers, metallurgists, and materials experts with decades of design experience. Titanium Engineers carries large inventories of Titanium 6Al-4V, Titanium 6Al-2Sn-4Zr-6Mo and Titanium Beta-C in both Europe and North America and will work with you to obtain the Titanium bar or machined components you need in the shortest possible time.

Please contact a member of our team for more information:

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