E STEEL SDN BHD (891338-A)

NO 3, Lorong Sungai Puloh 7/KU 6,
Kawasan Perindustrian Sungai Puloh,42100 Selangor D.E
Tel : 03-3292 8686 / 32928666 / 32928777
Fax : 03-3292 8383

Ti-6AL-4V Grade 5 Titanium in sheet, bar, and plate

Titanium Grade 5, also known as **Ti6Al4V**, **Ti-6Al-4V** or **Ti 6-4**, it is one of the most popular alloys in the titanium industry and accounts for almost half of the titanium used in the world today. Commonly referred to as Ti-6AL-4V (or Ti 6-4), this designation refers to its chemical composition of almost 90% titanium, 6% aluminum, 4% vanadium, 0.25% (max) iron and 0.2% (max) oxygen. It features excellent strength, low modulus of elasticity, high corrosion resistance, good weldability and it is heat treatable. The addition of aluminum and vanadium increases the hardness of the material in the alloy matrix, improving its physical and mechanical properties.

CHEMICAL COMPOSITION

Weight %	Al	V	Fe	N	C	O	H	Ti
Min.	5,5	3,5						
Max.	6,8	4,5	0,25	0,05	0,08	0,2	0,015	BAL.

Related Specifications of Ti6Al4V (Grade 5)

- UNS R56400
- ASTM B348 (Grade 5)
- 3.7164
- 3.7165

Mechanical Properties

Property	Minimum	Typical Value
Tensile Strength MPa (ksi)	897 (130)	1000 (145)
0.2% Proof Stress MPa (ksi)	828 (120)	910 (132)
Elongation Over 2 Inches %	10	18
Reduction in Area %	20	
Elastic Modulus GPa (Msi)		114 (17)
Hardness Rockwell C		36
Specified Bend Radius <0.070 in x Thickness		4.5
Specified Bend Radius >0.070 in x Thickness		5.0
Welded Bend Radius x Thickness	6	
Charpy, V-Notch Impact J (ft.lbf)		24 (18)

E STEEL SDN BHD (891338-A)

NO 3, Lorong Sungai Puloh 7/KU 6,
Kawasan Perindustrian Sungai Puloh,42100 Selangor D.E
Tel : 03-3292 8686 / 32928666 / 32928777
Fax : 03-3292 8383

APPLICATIONS

Titanium Grade 5 is a pure alpha-beta titanium with aluminum as the alpha stabilizer and vanadium as the beta stabilizer. This alloy is primarily use for corrosion resistance and is the most widely used specification in all product forms. The alloy features very high strength, good corrosion resistance, excellent strength to weight ratio and high strength at cryogenic temperatures.

Weldability

Grade 5 alloy is easily welded in the annealed condition, or in the solution and partially aged condition, with aging being completed during the post weld heat treatment. Precautions must be taken to prevent oxygen, nitrogen, and hydrogen contamination. Fusion welding can be done in inert gas filled chambers, or using inert gas welding of the molten metal and the adjacent heated zones using a trailing shield.
Spot, seam, and flash welding can be performed without resorting to protective atmospheres.

MACHINABILITY The alloy can be machined using practices for austenitic steels with slow speeds, heavy feeds, rigid tooling and large amounts of non-chlorinated cutting fluid

Heat Treatment

Solution treat at 904-954 C(1660-1750 F) for 2 hours followed by water quench.

Forging

Rough forge at 982 C(1800 F), finish at @ 968 C (1750 C).

Hot Working

Hot forming will reduce both the springback and required forming forces, and will increase the overall ductility of the material.

Cold Working

The cold working characteristics of this material are similar to those of austenitic stainless steels. In multiple forming operations, intermediate stress relieving is recommended to offset the alloy's tendency to work harden. Post-work annealing is required to re-attain optimum performance characteristics.

Annealing

Hold at 732 C(1350 F) between 1/4 and 4 hours, Furnace cool to 566 C(1050 F) then air cool. Furnace cooling is not required for forgings and bars.

Aging

Age at 538 C (1000 F) for 4 hours, air cool.