Ti-6Al-4V Titanium Grade 5 - AMS 4928- AMS 4911 - UNS R56400

Ti-6Al-4V Titanium, commonly referred to as 6Al-4V, is a 2-phase alpha-beta type Titanium alloy.

Titanium's unique combination of physical, mechanical and corrosion resistant properties makes it an ideal material for many different applications. Titanium's high strength to weight ratio makes titanium the prime choice for high strength, lightweight applications.

It is a grade used primarily for wrought products, such as Round Bar, Flat Bar, Rolled Plate, and Forged Products. It is produced in multiple melts starting with a vacuum arc remelt (VAR), electron beam (EB), or plasma arc hearth melt (PAM). Remelting is done in one or two steps in a VAR furnace.

In the annealed condition, its yield strength is 120 Ksi minimum. It is readily formed, and is weldable by using inert gas shielding. Spot, seam, flash and pressure welding are also used depending on the application. Its strength properties can be elevated by solution treatment and aging (STA). This grade has good elevated temperature strength, low temperature impact strength, and has good creep resistance. 6Al-4V Titanium shows good corrosion resistance to sea water and marine atmospheres, and in wet chlorine and chlorine dioxide. Machining is similar to that of Austenitic Stainless Steels, e.g. 304, 316. Slow speeds, heavy feeds, and non-chlorinated cutting fluid are typically used for most applications.

Chemical Composition:

Symbol	Element	Min %	Max %
Al	Aluminum	5.50%	6.75%
V	Vanadium	3.50%	4.50%
Fe	Iron		0.30%
O	Oxygen		0.20%
C	Carbon		0.08%
N	Nitrogen		0.05%
H	Hydrogen		0.0125%
Y	Yttrium		0.005%
	Other, each		0.100%
	Other, total		0.400%
Ti	Titanium		Remainder

Mechanical Properties:

Annealed Condition per AMS 4928

Size	Tensile Min	Yield Min	Elongation in 2"	Reduction of Area
Thru 2"	135 ksi	125 ksi	10% min	25% min
Over 2" thru 4"	130 ksi	120 ksi	10% min	25% min
over 4" thru 6"	130 ksi	120 ksi	10% min	20% min

Depending on section size, this material can be solution treated and aged to produce typical properties of 140 – 170 ksi tensile strength and 130 – 150 ksi yield strength

Ti-6AL-4V Titanium is typically used in the following applications:

Used primarily for parts requiring corrosion resistance, stress-corrosion, and high strength 600°F (316°C), with good ductility and strength in transverse direction for

Jet engine compressor blades, discs and rings

Airframe components

Military Hardware

Pressure vessels

Space craft components, including rocket engine

Medical & surgical devices. A variant 6Al-4V ELI (Extra Low Interstitial) is often used for these applications.

Recreational Equipment

Auto and Boat Racing

Other uses needing a high strength to weight ratio

Common Trade Names:

6-4 Titanium

Ti 64

6Al4V Titanium

Alpha Beta Titanium

Grade 5 Titanium

Ti-Grade 5

6%Al-4%V Titanium

Titan Grade 5 (6Al-4V) EN Designation

TC4

Ti64

ASTM Grade 5

DIN 3.7165

SAE 4928

Safe Handling:

Pyrophoric conditions:

Fines can ignite above 480° F (250° C)

Powder, grinding & turnings can ignite

Some corrosion produces (dry Cl2, red fuming, nitric acid)
Safety precautions:
Handle in small quantities
Electrically ground equipment (prevent sparks)
Use non-sparking equipment (monel, aluminum, stainless)
Put grindings/turnings in closed containers
Prohibit smoking
Safety fire extinguishing:
Use class D (metal fires)
Use dry common salt (cut off oxygen source)
Do not use water (hydrogen reaction possible)

Common Specifications:

AMS 4928 – Bars, Forgings, and Forging Stock (Annealed)
AMS 4965 – Bars, Forgings (Solution Treated and Aged)
AMS 4967 – Bars, Forgings (Annealed, Heat Treatable)
AMS 6930 – Bars, Forgings (Solution Treated and Aged)
AMS 6931 – Bars, Forgings (Annealed)
AMS 4911 – Sheet & Plate (Annealed)
ASTM F 1472 – Bars, Forgings, Sheet, Strip, and Plate
ISO 5832-3 – Wrought Alloy
ASTM B-348 – Bars, Forgings
ASTM B265 – Plate
6Al-4V MIL-T-9047 – Bars, Forgings
AMS-T-9047 – Bars, Forgings
MIL-T-9046 – Plate
AMS-T-9046 – Plate
AMS 4920 – Forgings Alpha-Beta or Beta Processed, Annealed
Boeing BMS 7-269
DMS 1583
DMS 1570
DMS 1592