

## Material Data Sheet

### Ti-6Al-4V

#### Printer Process Specifications

Material	Ti-6Al-4V (UNS R56200, 3.7164)
Layer Thickness (µm)	50
Laser Power (W)	180
Additive Manufacturing System	XM200C
Print Parameters	Ti64-C-50-210225

#### Material Description

Ti-6Al-4V is an alpha-beta titanium alloy with a high strength/weight ratio and excellent corrosion resistance. Its corrosion resistance stems from the titanium oxide passivation layer that forms on the outer surfaces of the metal. It is the most widely processed titanium alloy worldwide for a wide range of applications. Ti-6-4 has favorable mechanical properties from cryogenic temperatures up to over 400 °C.

#### Material Properties

- High strength to weight ratio
- Excellent corrosion resistance
- Low thermal expansion
- Good fatigue resistance

#### Applications

- Aerospace components
- Biomedical applications including implants and prostheses
- Marine applications
- Gas turbines
- Racing components

## General Wrought Material Data <sup>(1)</sup>

Density [g/cc]	4.429 - 4.512
Thermal Conductivity [W/m*K]	7.2
Melting Range [°C]	1878 - 1933
Coefficient of Thermal Expansion (0 to 100 °C) [K <sup>-1</sup> ]	8.7 - 9.1

<sup>(1)</sup> From AZO Materials

## Chemical Composition <sup>(2)</sup>

Element	Mass %
Ti	Balance
Al	5.50 - 6.50
V	3.50 - 4.50
Fe	0.25 Max
C	0.08 Max
O	0.2 Max
N	0.05 Max
H	0.015 Max
Others	0.10 Max
Total others	0.40 Max

<sup>(2)</sup> From Praxair Surface Technologies

## Heat Treatment

Testing samples were stress relieved in vacuum at 800 °C for 2 hours and vacuum cooled.

## Mechanical Properties

	Mean Value	Standard deviation
<b>Component Density [g/cc]</b>	4.41	--
<b>Percentage of Wrought density</b>	99.58%	--
<b>Ultimate Tensile Strength (UTS) - ASTM E8</b>		
Horizontal (XY) [ksi (MPa)]	146 (1005)	2.25 (15.52)
Vertical (Z) [ksi (MPa)]	147 (1011)	1.89 (13.05)
<b>Yield Strength - ASTM E8</b>		
Horizontal (XY) [ksi (MPa)]	135 (929.1)	2.05 (14.15)
Vertical (Z) [ksi (MPa)]	131 (904.9)	5.00 (3.447)
<b>Elongation at Break - ASTM E8</b>		
Horizontal (XY)	12.5%	1.77%
Vertical (Z)	6.1%	1.38%
<b>Hardness (Rockwell) - ASTM E18</b>	34.6 HRC	0.92 HRC
<b>Surface Roughness [um]</b>	8.36	--



## Powder Particle Size Distribution <sup>(3)</sup>

Per ASTM B822 (Using Microtrac)	Min	Max
-16	--	7
d10 (microns)	20	30
d50 (microns)	28	38
d90 (microns)	40	55

<sup>(3)</sup> From Praxair Surface Technologies

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