



Material Data Sheet Titanium Alloy TA6V / Ti6Al4V / Ti Gr5 (LBM)



This document provides information and data for parts built using Titanium powder TA6V, with specific properties (given in the table 'Physical and chemical properties of powder').

Description :

Titanium alloy TA6V is a noted material for its excellent mechanical properties and its low weight, reasons why it is appreciated by high-performance engineering and aerospace industry. The bio-compatibility of the alloy makes it perfect for the manufacturing of surgery tools and bio-medical implants. However, for any production of the applications mentioned above, it is required to get a validation according to the relevant standards.

Technical data :

Physical and chemical properties of powder (standard Ti6Al4V : ASTM B348-13)

	Elements	Minimum	Maximum
Materials composition (%weight)	Ti	Balance	
	Al	5.5	6.5
	Va	3.5	4.5
	Fe	-	0.25
	O	-	0,20
Tap density (g/cc)*			2.8
Particle size (µm)*	D10	≥ 5	
	D50	15	
	D90	≤ 25	

* Data certified by powder provider of AddUp

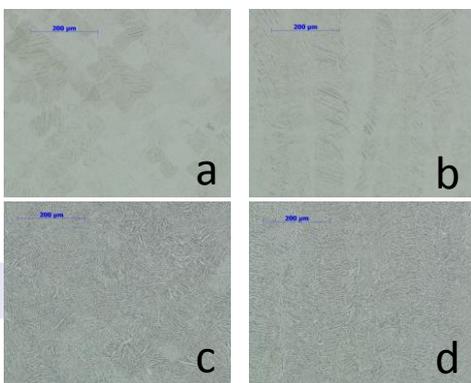
Mechanical Properties:

Mechanical properties (tested at room temperature according to standard NF EN 2002-001 and NF EN 148-1)

		After Heat Treatment	As-Built *
Ultimate tensile strength (Mpa/ksi)	(XY)	980 / 142	1280 / 185
	(Z)		1070 / 155
Yield strength, Rp0,2% (Mpa/ksi)	(XY)	860 / 124	1100 / 159
	(Z)		950 / 138
Elongation at break (E5d%)	(XY)	16	
	(Z)		
Young's Modulus (Gpa)	(XY)	115	
	(Z)		
Charpy impact test (KCV J/cm ²)	(XY)	19	
	(Z)	23	
Compactness		≥ 99.9%	

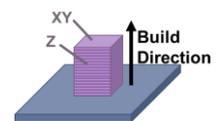
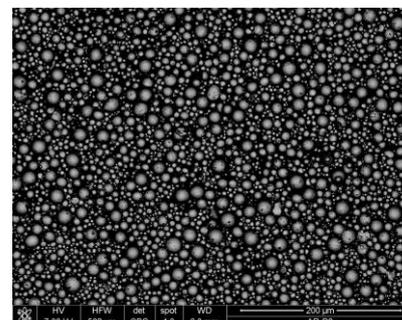
* Typical value

Microstructure



The microstructure obtained during SLM with Ti-6Al-4V is composed of acicular martensitic α' -phase. The Z surface (a) shows long columnar grains which grow according to the build direction, while the XY surface (b) shows a checkerboard like surface, due to the laser strategy crossing at 90° between each layer. The pictures (c) and (d) show respectively the Z surface and the XY surface of the sample after heat treatment, the microstructure is composed of $\alpha+\beta$ phase.

Observation by Scanning Electron Microscopy of the powder



Observation by Scanning Electron Microscopy of the powder

The Ti-6Al-4V powder of AddUp provider is very spherical grains. This morphology, without satellites on grain surface, may be a good advantage to create good powder bed.