



Spectra H Titanium Ti6Al4V Grade 5

Base Parameter for Arcam EBM Spectra H

Data in this material datasheet represents material built with 50µm layer thickness and in an Vacuum atmosphere on a Arcam EBM Spectra H – V1.0. Values listed are typical.

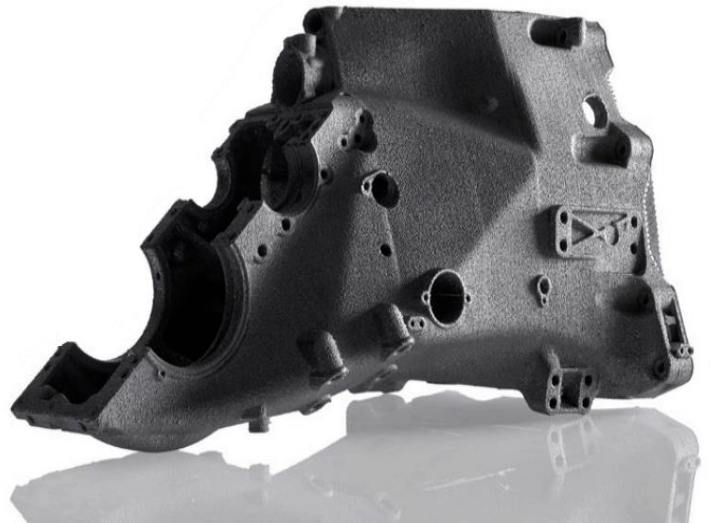


Titanium Ti6Al4V

The high strength, low weight ratio and outstanding corrosion resistance inherent to titanium and its alloys has led to a wide and diversified range of successful applications which demand high levels of reliable performance in surgery and medicine as well as in aerospace, automotive, chemical plant, power generation, oil and gas extraction, sports, and other major industries. The biocompatibility of Ti6Al4V is excellent, especially when direct contact with tissue or bone is required. In the majority of other engineering applications, titanium replaces heavier, less serviceable or less cost-effective materials.

Spectra H - Ti6Al4V - Grade 5

In the Arcam Spectra H-machine the Ti6Al4V - Grade 5 process runs at a powder bed temperature of around 700°C. The elevated powder bed temperature eliminates the need for post-build stress-relieving and allows the building of parts in multiple layers in the Z-direction which further increases productivity. The chosen layer thickness enables both high build speed and high resolution.



Spectra H Ti6Al4V Grade 5

This material is developed as a standard material according to Production level (P-material). It has been fully verified according to Arcam EBM Process Verification, with data available for full build envelope. The process parameters can be further optimized to suit the specific needs for individual applications. The parameters set fulfils ASTM F2924 standard both regards to chemical composition as well as mechanical properties.

POWDER INFORMATION

AP&C Ti6Al4V – Grade 5 powder 45-106 μm particle size distribution. For more information on Ti6Al4V powder, visit <https://www.advancedpowders.com/powders/titanium/ti-6al-4v-5>,

MACHINE CONFIGURATION

- Spectra H – V1.0
- EBM Control 5.5

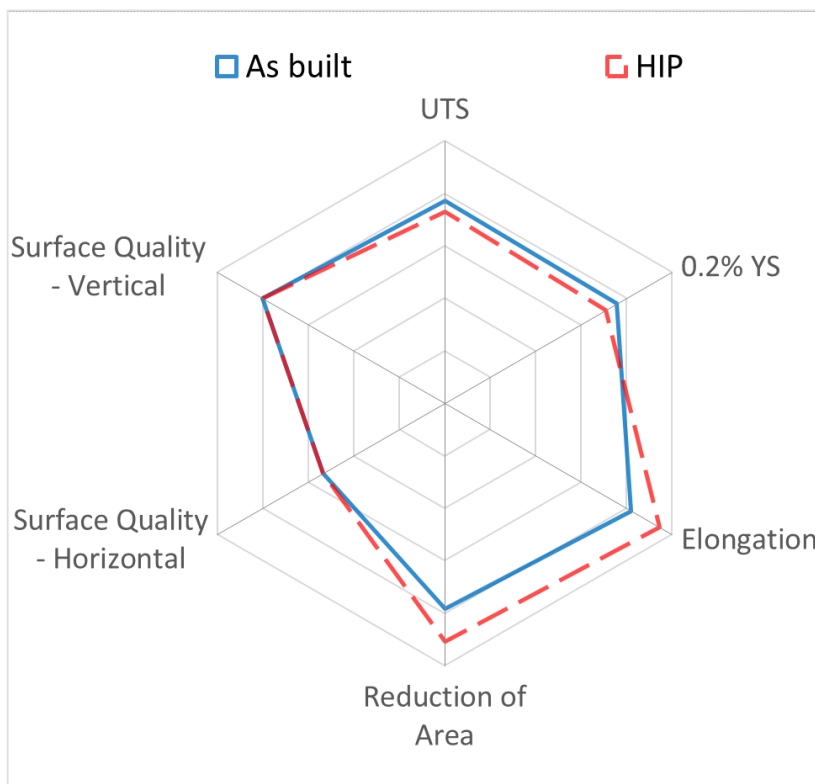
AVAILABLE PARAMETERS

- Spectra H Ti6Al4V Grade 5 Base - 50 μm layer thickness

THERMAL TREATMENTS

1. As-Built
2. HIP – 920 $^{\circ}\text{C} \pm 10^{\circ}\text{C}$, 1000bar $\pm 50\text{bar}$, 120min $\pm 30\text{min}$, cool under inert atmosphere to below 425 $^{\circ}\text{C}$

THERMAL TREATMENT COMPARISON



Spider Plot is generated by normalizing typical material data (containing only vertical data) against a range defined for each material family. For **Titanium Alloys**, the ranges are as follows:
UTS: 0-1300 MPa
0.2%YS: 0-1200 MPa
Elongation: 0-20%
Reduction of Area: 0-60%
Surface Quality (all): 25-40 μm

Surface Roughness (µm)

Upskin	H	32
Downskin	V	28

	Porosity (% Density)		Hardness (HV30)		Poisson's Ratio	
	H	V	H	V (XZ - YZ)	H	V
Thermal State 1 As-Built	99.8	99.8	350	327 - 326	--	--
2 HIP	--	--	--	--	--	--

TENSILE DATA

Tensile testing done in accordance with ASTM E8 and ASTM E21

Temperature: RT

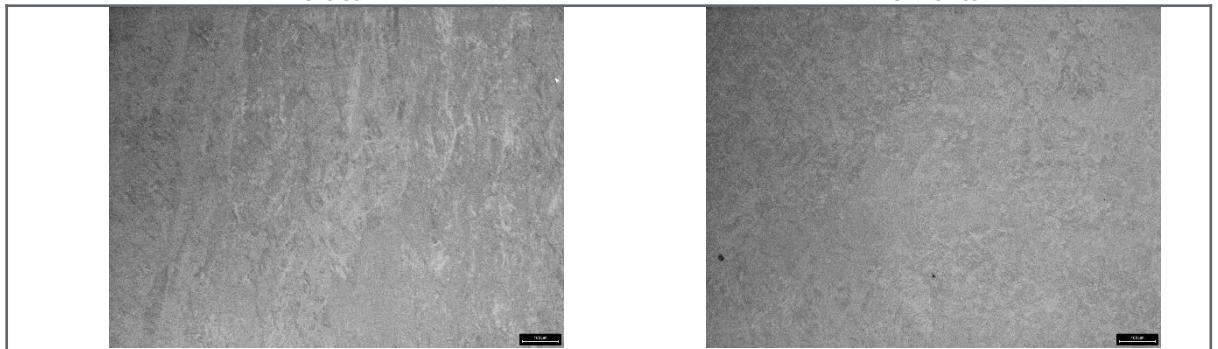
	Modulus of Elasticity (GPa)		0.2% YS (MPa)		UTS (MPa)		Elongation (%)		Reduction of Area (%)	
	H	V	H	V	H	V	H	V	H	V
Thermal State 1 As-Built	--	--	915	910	1005	1005	14.7	16.4	35.7	43.0
2 HIP	--	--	--	850	--	950	--	18.9	--	50.0

SEM IMAGES

Vertical

Horizontal

1 As-Built



1 HIP



H: HORIZONTAL (XY) orientation
V: VERTICAL (Z) orientation

* All of the figures contained herein are approximate only. The figures provided are dependent on a number of factors, including but not limited to, process and machine parameters, and the approval is brand specific and/or application specific. The information provided on this material data sheet is illustrative only and cannot be relied on as binding.