COLIBRIUM ADDITIVE
a GE Aerospace company

13 Al

22 Ti | 24 Cr | 26 Fe | 27 Co | 28 Ni | 29 Cu

Electron Beam Ti6Al4V Grade 23

Spectra L v1.2

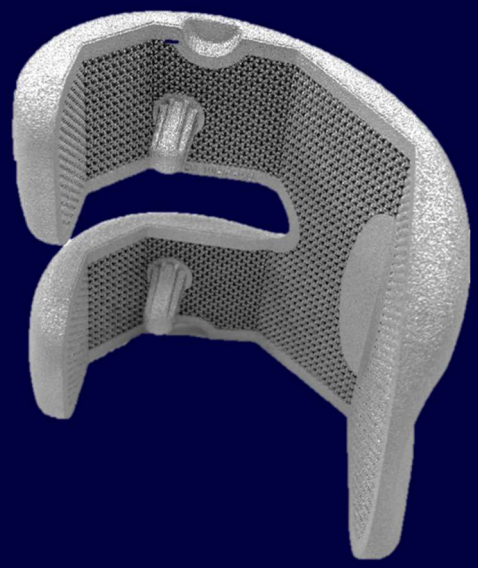
Titanium Ti6Al4V Grade 23 (ELI)

Ti6Al4V Grade 23, renowned for its exceptional strength-to-weight ratio, is ideal for additive manufacturing. It offers outstanding biocompatibility, making it perfect for medical implants. Its superior corrosion resistance ensures longevity and reliability in demanding environments. This alloy is widely used in the aerospace industry for critical components, in the medical field for durable implants, and in high-performance motorsports for lightweight, robust parts. Its versatile properties make Titanium Alloy 23 a preferred choice across these advanced industries.

Spectra L v1.2 Ti6Al4V

This data sheet contains the parameter release data for Colibrium Additive's new space-filling strategy in electron beam additive manufacturing: Point Melt. This stepwise change takes advantage of the electromagnetic coils for fast, precise beam manipulation. Importantly, parameters developed for prior Spectra L machine/software combinations may also be used with this configuration.

All parameters of this configuration dramatically exceed the requirements of ASTM F3001.



Spectra L Ti6Al4V Grade 23

Machine Configuration

Colibrium Additive EB-PBF Spectra L v1.2

EBM Control v6.4.9

0.004 mBar He-controlled vacuum

Flexible stainless steel recoater

Powder Chemistry

Ti6Al4V Grade 23 powder conforms to ASTM F3001.

Available Parameters

Process Theme 6.4.0 – Line Melt, 70 µm layer thickness

Process Theme 6.4.1 – Point Melt, 50 µm layer thickness

Thermal States

As-Built

Process Theme 6.4.0 – Line Melt

Physical Properties at Room Temperature

Thermal State	Porosity (%)		Hardness (HV10)		Archimedes Density (%)
	H	V	H	V	n/a
As-Built	0.09	0.05	337	341	99.5

	Surface Roughness (µm)	
	V (XZ)	V (YZ)
Ra	12.6	12.6
Rz	60.6	62.1

Tensile Performance at Room Temperature

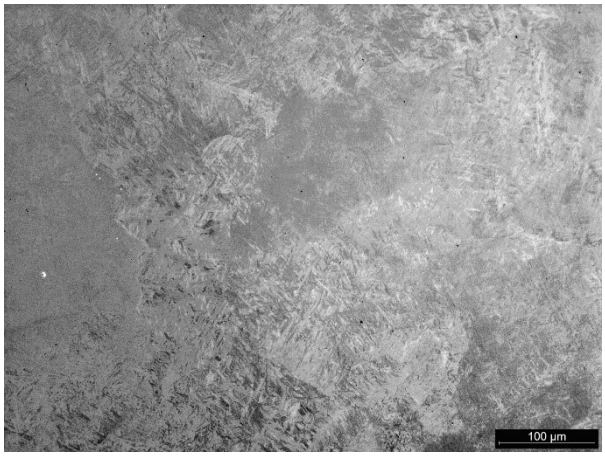
Thermal State	Modulus of Elasticity (GPa)		0.2% Yield Strength (MPa)		Ultimate Tensile Strength (MPa)	
	H	V	H	V	H	V
As-Built	--	--	907	918	986	996

Thermal State	Elongation (%)		Area Reduction (%)	
	H	V	H	V
As-Built	13.77	16.28	33.56	42.4

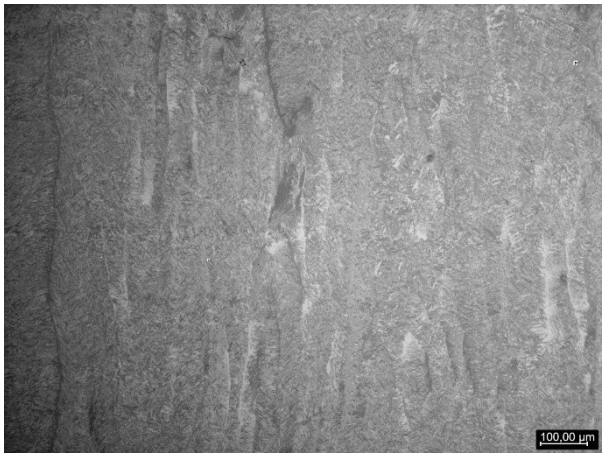
Microstructure

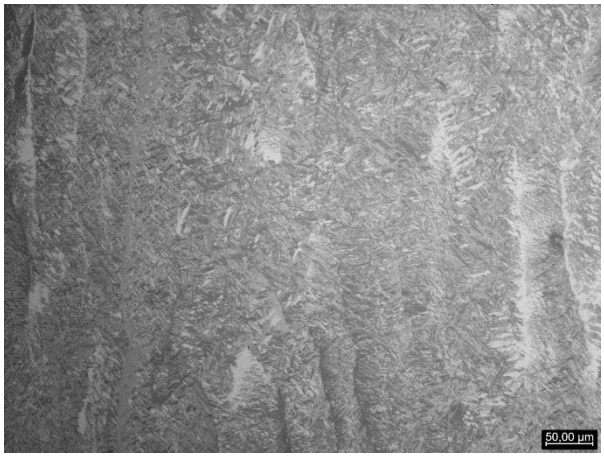
Microstructure exhibits z-elongated prior-beta grains, fully transformed to alpha + beta.

Horizontal



Vertical





Process Theme 6.4.1 – Point Melt

Physical Properties at Room Temperature

Thermal State	Porosity (%)		Hardness (HV10)		Archimedes Density (%)
	H	V	H	V	n/a
As-Built	0.06	0.09	320	320	99.7

	Surface Roughness (µm)	
	V (XZ)	V (YZ)
Ra	15.3	13.4
Rz	79.0	71.3

Tensile Performance at Room Temperature

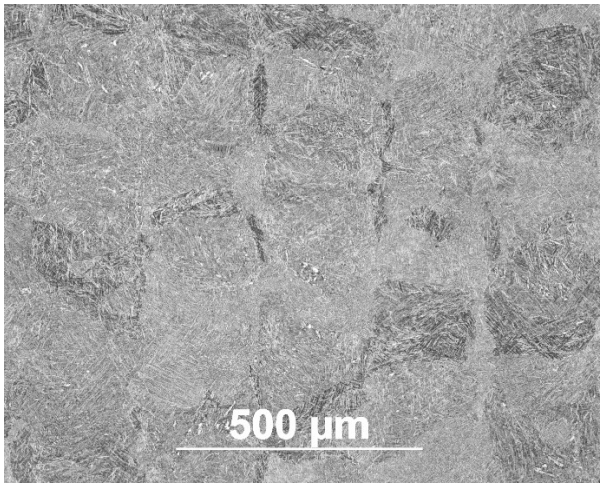
Thermal State	Modulus of Elasticity (GPa)		0.2% Yield Strength (MPa)		Ultimate Tensile Strength (MPa)	
	H	V	H	V	H	V
As-Built	--	--	940	935	1015	1005

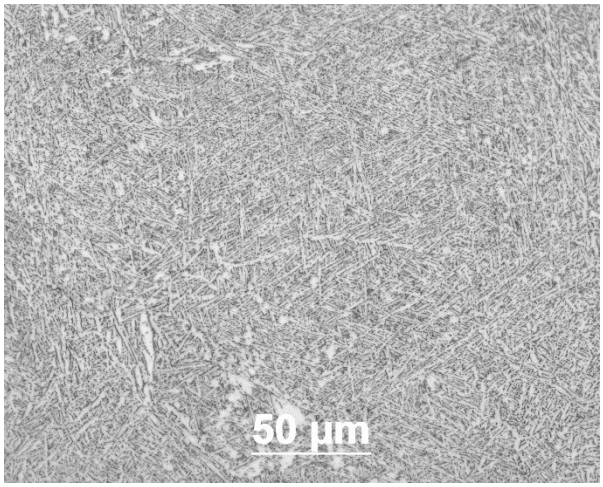
Thermal State	Elongation (%)		Area Reduction (%)	
	H	V	H	V
As-Built	12.5	13.5	33	42

Microstructure

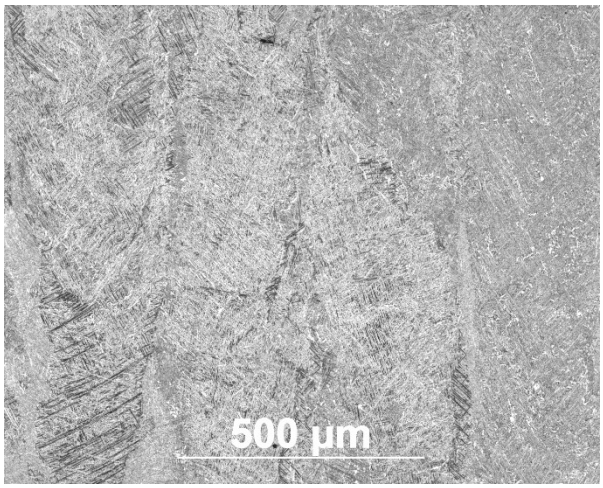
Microstructure exhibits z-elongated prior-beta grains, fully transformed to alpha + beta with no evidence of prior-beta grain boundary alpha.

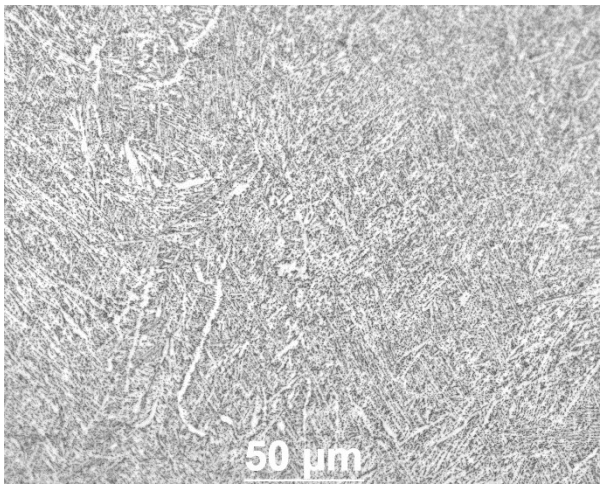
Horizontal





Vertical





Data Sheet Nomenclature and Notation

H: Horizontal, X or Y.
V: Vertical, Z.
Other angles are measured from horizontal.

Roughness measurements have been performed according to DIN EN ISO 4287 and DIN EN ISO 4288. In general analysis of the surface quality is strongly dependent on the methodology used and therefore deviations might be observed depending on methodology used.

Tensile evaluations were executed against ASTM E8.