



Material data sheet – FlexLine

EOS Titanium Ti64 Flexline

EOS Titanium Ti64 is a titanium alloy powder intended for processing on EOS DMLS systems. This document provides information and data for parts built using EOS Titanium Ti64 powder (EOS art.-no. 9011-0039) on the following specifications:

- EOS DMLS system M100
 - HSS-Blade (300006274)
 - Type 2-dosage unit (300012325)
 - 63µm mesh for powder sieving recommended
 - Argon atmosphere
- EOSPRINT 1.5 or newer / EOSSYSTEM 1.7.12 or newer
- EOS Parameter set Ti64_Flexline_M100 1.0

Description

Parts built in EOS Titanium Ti64 Flexline have a chemical composition corresponding to ASTM F2924. Ti64 is well-known light alloy, characterized by having excellent mechanical properties and corrosion resistance combined with low specific weight and biocompatibility. This material is ideal for many high-performance applications. Parts built with EOS Titanium Ti64 powder can be machined, shot-peened and polished in as-built and heat treated states. Due to the layerwise building method the parts have a certain anisotropy.

Quality Assurance

The quality of the EOS Titanium Ti64 powder lots is ensured by the Quality Assurance procedures. The procedures include sampling (ASTM B215), PSD analysis (ISO 13320), chemical analyses (ASTM E2371, ASTM E1409, ASTM E1941, ASTM E1447), and mechanical testing (ISO 6892-1).

The results of the quality assurance tests are given in the lot specific Mill Test Certificates (MTC) according to EN 10204 type 3.1.

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Heat treatment

Heat treatment procedure:

Solution treatment: Hold at $800^{\circ}\text{C} \pm 10^{\circ}\text{C}$ for 2 hours in Argon atmosphere, cooling in room temperature under protective atmosphere to reduce oxidation.

Technical Data

Powder properties

The chemical composition of powder is in compliance with standard ASTM F2924.

Material composition [wt.%]

Element	Min	Max
Al	5.50	6.75
V	3.50	4.50
O	-	0.20
N	-	0.05
C	-	0.08
H	-	0.015
Fe	-	0.30
Y	-	0.005
Other elements, each	-	0.10
Other elements, total	-	0.40
Ti	bal.	

Particle size

d50 [1] 39 \pm 3 μm

[1] Particle size distribution analysis according to ISO 13320.



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General process data

Layer thickness	20 µm
Volume rate [2]	1.68 mm ³ /s (6.05 cm ³ /h)

[2] The volume rate is a measure of build speed during laser exposure of the skin area. The total build speed depends on this volume rate and many other factors such as exposure parameters of contours, supports, up and downskin, recoating time, Home-In or LPM settings.

Physical properties of parts

Part density [3]	4,4 g/cm ³
Surface roughness after shot peening [4]	Approx. Ra 4 µm
Part accuracy after shot peening	± 50 µm
Minimum wall thickness	0,3 mm
Average defect amount [5]	0,02 %

[3] Weighing in air and water according to ISO 3369.

[4] The values are measured at the vertical surfaces of test parts. Due to the layerwise building the roughness strongly depends on the orientation of the surface, for example sloping and curved surfaces exhibit a stair-step effect.

[5] Measured percentage area of defects in sample crosscut.

Tensile data at room temperature [6,7]

Heat treated [8]

	Horizontal	Vertical
Ultimate tensile strength, Rm	1077 MPa	1065 MPa
Yield strength, Rp0.2	964 MPa	956 MPa
Elongation at break, A	13,0 %	13,3 %

[6] The numbers are average values for horizontal and vertical orientation samples.

[7] Tensile testing according to ISO6892 (ANNEX D) Method A14, proportional test pieces, diameter of the neck area 4mm, original gauge length 16mm (4D).

[8] Heat treatment procedure: 2 hours hold at 800 °C in protective Argon atmosphere.



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Abbreviations

min. minimum

max. maximum

wt. weight

The quoted values refer to the use of this material with above specified EOS DMLS system, EOSYSTEM software version, parameter set and operation in compliance with parameter sheet and operating instructions. All measured values are average numbers. Part properties are measured with specified measurement methods using defined test geometries and procedures and. Further details of the test procedures used by EOS are available on request. Any deviation from these standard settings may affect the measured properties.

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