Material data sheet

EOS Titanium Ti64

EOS Titanium Ti64 is a titanium alloy powder intended for processing on EOS DMLS™ machines.

This document provides information and data for parts built using:

- EOS Titanium Ti64 powder (EOS art.-no. 9011-0014 and 9011-0039)
- EOS DMLS™ machine: EOSINT M 290 400 W
- HSS blade (2200-4073)
  - Argon atmosphere
  - IPCM extra sieving module with 63 µm mesh (9044-0032) recommended
- EOSYSTEM:
  - EOSPRINT v 1.5 or newer
  - HCS v 2.4.14 or newer
- EOS Parameter set: Ti64_Performance_M291 1.10

Description

EOS Titanium Ti64 has a chemical composition corresponding to ASTM F1472 and ASTM F2924.

Ti64 is well-known light alloy, characterized by having excellent mechanical properties and corrosion resistance combined with low specific weight. Ti64 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.

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Technical Data

Powder properties

The chemical composition of the powder (wt-%):

Material composition

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.	

Max. particle size

> 63µm	0.3 wt%

General process data

Layer thickness	30 µm
Volume rate [1]	5 mm³/s (18 cm³/h) 1.1 in³/h

[1] The volume rate is a measure of build speed during laser exposure of the skin area per laser scanner. 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.

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Physical and chemical properties of parts

Part density [2]	Approx. 4.41 g/cm³ Approx. 0.159 lb/in³
Min. wall thickness [3]	Approx. 0.3 - 0.4 mm Approx. 0.012 - 0.016 inch
Surface roughness after shot peening [4]	Ra 5 - 9 µm; Rz 20-50 µm Ra 0.20 – 0.35 x 10-³ inch Rz 0.79 – 1.96 x 10-³ inch

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

[3] Mechanical stability is dependent on geometry (wall height etc.) and application.

[4] Measurement according to ISO 4287. 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.

Hardness

Hardness as build [5]	Approx. 320 HV5

[5] Hardness measurement according to standard EN ISO 6507-1 with load 5kg (HV5)

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Tensile data at room temperature [6, 7]

	Heat treated [8]	
	Horizontal	**Vertical**
Ultimate tensile strength, Rm	1055 MPa	1075 MPa
Yield strength, Rp0.2	945 MPa	965 MPa
Elongation at break, A	13 %	14 %
Reduction of area, Z	> 25 %	> 25 %

[6] Tensile testing according to ISO 6892-1 A14, proportional test pieces. Horizontal: diameter of the neck area 5 mm (0.2 inch), original gauge length 20 mm (0,79 inch). Vertical: diameter of the neck area 4 mm (0.16 inch), original gauge length 16 mm (0.63 inch).

[7] The numbers are average values determined from samples with horizontal and vertical orientation respectively. Values are subject to variations depending on process conditions.

[8] Heat treatment procedure: Specimens were heat treated at 800 °C for 2 hours in argon inert atmosphere.

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Abbreviations

Min.	Minimum
Max.	Maximum
Approx.	Approximately
Wt.	Weight

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

The data correspond to EOS knowledge and experience at the time of publication and they are subject to change without notice as part of EOS' continuous development and improvement processes.

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