EOS Titanium TiCP grade 2

EOS Titanium TiCP grade 2 is commercially pure titanium alloy intended for processing on EOS DMLS™ machines.
This document provides information and data for parts built using EOS Titanium TiCP grade 2 powder (EOS art.-no. 9011-0036) on the following system setup:

- EOS DMLS™ machine: EOS M 290 400W
- EOS software: EOSPRINT v. 1.3 / HCS v. 2.3.29
- EOS parameter set: TiCP 30µm FlexLine

Description

The parts built with EOS Titanium TiCP grade 2 powder have chemical composition corresponding to ASTM F67. The parts have good strength-to-weight ratio, corrosion resistance and ductility. Parts built with EOS Titanium TiCP grade 2 powder can be machined, shot-peened and polished in as-built and heat treated states. Due to the layer-wise building method, the parts have a certain anisotropy.

Quality Assurance

The quality of the EOS Titanium TiCP grade 2 powder lots is ensured by the Quality Assurance procedures. The procedures include sampling (ASTM B215), PSD analysis (DIN ISO 13320), and chemical analyses. The results of the quality assurance tests are given in the lot specific Mill Test Certificates (MTC).

Electro Optical Systems Finland Oy
Lemminkäisenkatu 36
FIN-20520 Turku
Telephone: +358 20 765 9144
Telefax: +358 20 765 9141

EOS GmbH - Electro Optical Systems
Robert-Stirling-Ring 1
D-82152 Krailling / München
Telephone: +49 (0)89 / 893 36-0
Telefax: +49 (0)89 / 893 36-285
Internet: www.eos.info

Technical Data

Powder properties

Material composition	Element	Min	Max
	N	-	0.03
	C	-	0.08
	H	-	0.015
	Fe	-	0.30
	O	-	0.25
	Ti		bal.
Max. particle size			
d50 [1]	38–45 µm		

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

General process data

Layer thickness	30 µm
Volume rate [2]	5.0 mm³/s (18 cm³/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 and chemical properties of parts

Part density [3]	min. 4.5 g/cm³
Surface roughness after shot peening [4]	R_a < 10 µm; R_z < 55 µm

[3] Weighing in air and water according to ISO 3369.
[4] Measurement according to ISO 4287. The numbers were measured at the horizontal (up-facing) and all vertical surfaces of test cubes. 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.

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Tensile data at room temperature [5, 6]

	As built	Heat treated [7]
Ultimate tensile strength, R_m	660 MPa	570 MPa
Yield strength, $R_{p0.2}$	560 MPa	445 MPa
Elongation at break, A	22 %	26 %
Reduction of area, Z	> 30 %	> 30 %

[5] The numbers are average values and are determined from samples with horizontal and vertical orientation.
[6] Tensile testing according to ISO 6892-1:2009 (B) Annex D, A14, proportional test pieces, diameter of the neck area 5 mm (0.2 inch), original gauge length 25 mm (1 inch).
[7] Heat treatment in 700 °C (± 10 °C) for 2 h (± 0.5 h) under argon.

Hardness [8]

	Heat treated [7]
Hardness HV5	195

[8] Hardness measurement according to standard EN ISO 6507-1:2005 with load 5kgf (HV5).

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Abbreviations

min.	minimum
max.	maximum
wt.	weight

Legal notes

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. 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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