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).

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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

*Part properties are provided for information purposes only and EOS makes no representation or warranty, and disclaims any liability, with respect to actual part properties achieved. Part properties are dependent on a variety of influencing factors and therefore, actual part properties achieved by the user may deviate from the information stated herein. This document does not on its own represent a sufficient basis for any part design, neither does it provide any agreement or guarantee about the specific properties of a material or part or the suitability of a material or a part for a specific application.

This powder has not been developed, tested or certified as a medical device according to Directive 93/42/EEC (MDD) or Regulation (EU) 2017/745 (MDR) and is not intended to be used as a medical device, in particular for the purposes specified in Art. 2 No. 1 MDR. Insofar as you intend to use the powder as raw material for the manufacture of pharmaceutical products or medical devices (e.g. as raw material which as a material must meet the requirements of Annex 1, Chapter II MDR), the responsibility and liability for all analyses, tests, evaluations, procedures, risk assessments, conformity assessments, approval and certification procedures as well as for all other official and regulatory measures required for this purpose shall lie solely with you both with regard to the pharmaceutical product and/or medical device manufactured by you and with regard to the properties, suitability, testing, evaluation, risk assessment, other requirements for use of the powder as raw material.
This also applies to applications with food contact. In this respect, the limitations of liability pursuant to our General Terms and Conditions and the system sales or material contracts shall apply.

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