



## Material data sheet – FlexLine

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### 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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### 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,<br>each  | -    | 0.10  |
| Other elements,<br>total | -    | 0.40  |
| Ti                       | bal. |       |

#### Particle size

|         |          |
|---------|----------|
| d50 [1] | 39 ±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 <sup>3</sup> /s (6.05 cm <sup>3</sup> /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 <sup>3</sup>       |
| Surface roughness after shot peening [4] | Approx. R <sub>a</sub> 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, R <sub>m</sub> | 1077 MPa   | 1065 MPa |
| Yield strength, R <sub>p0.2</sub>         | 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 (Solution treatment): 2 hours hold at 800 °C in protective Argon atmosphere. Cooling in room temperature under protective atmosphere to reduce oxidation.



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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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