

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.

Material data sheet

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 mm ³ /s (18 cm ³ /h) 1.1 in ³ /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.

Material data sheet

Physical and chemical properties of parts*

Part density [2]	Approx. 4.41 g/cm ³ Approx. 0.159 lb/in ³
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)

Material data sheet

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.



Material data sheet

Abbreviations

Min.	Minimum
Max.	Maximum
Approx.	Approximately
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.

EOS®, EOSINT®, DMLS®, DirectTool® and DirectPart® are registered trademarks of EOS GmbH.

© 2022 EOS GmbH Electro Optical Systems. All rights reserved.



Material data sheet

EOS Titanium Ti64

EOS Titanium Ti64 is a titanium alloy powder which has been optimized especially for processing on EOSINT M systems.

This document provides information and data for parts built using EOS Titanium Ti64 powder (EOS art.-no. 9011-0014) on the following system specifications:

- EOSINT M 280 with PSW 3.6 and Original EOS Parameter Set Ti64_Speed 1.0
- EOS M 290 400W with EOSPRINT 1.0 and Original EOS Parameter Set Ti64_Performance 1.0 und Ti64_Speed 1.0

Description

Parts built in EOS Titanium Ti64 have a chemical composition corresponding to ISO 5832-3, ASTM F1472 and ASTM B348.

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

This material is ideal for many high-performance engineering applications, for example in aerospace and motor racing, and also for the production of biomedical implants (note: subject to fulfilment of statutory validation requirements where appropriate).

Due to the layerwise building method, the parts have a certain anisotropy, which can be reduced or removed by appropriate heat treatment - see Technical Data for examples.

Material data sheet

Technical data

General process and geometric data

Typical achievable part accuracy [1], [8]	$\pm 50 \mu\text{m}$
Min. wall thickness [2], [8]	approx. 0.3 – 0.4 mm approx. 0.012 – 0.016 inch
Surface roughness, as built [3], [8]	
Ti64 Performance (30 μm)	R_a 9 – 12 μm , R_z 40 – 80 μm R_a 0.36 – 0.47 $\times 10^{-3}$ inch, R_z 1.6 – 3.2 $\times 10^{-3}$ inch
Ti64 Speed (60 μm)	R_a 6 – 10 μm , R_z 35 – 40 μm R_a 0.23 – 0.39 $\times 10^{-3}$ inch, R_z 1.37 – 1.57 $\times 10^{-3}$ inch
Volume rate [4]	
Ti64 Performance (30 μm)	5 mm^3/s (18 cm^3/h) 0.82 in^3/h
Ti64 Speed (60 μm)	9 mm^3/s (32.4 cm^3/h) 1.98 in^3/h

- [1] Based on users' experience of dimensional accuracy for typical geometries. Part accuracy is subject to appropriate data preparation and post-processing, in accordance with EOS training.
- [2] Mechanical stability is dependent on geometry (wall height etc.) and application
- [3] Due to the layerwise building, the surface structure depends strongly on the orientation of the surface, for example sloping and curved surfaces exhibit a stair-step effect. The values also depend on the measurement method used. The values quoted here given an indication of what can be expected for horizontal (up-facing) or vertical surfaces.
- [4] Volume rate is a measure of build speed during laser exposure. The total build speed depends on the average volume rate, the recoating time (related to the number of layers) and other factors such as DMLS-Start settings.

Material data sheet

Physical and chemical properties of parts*

Material composition	Ti (balance) Al (5.5 – 6.75 wt.-%) V (3.5 – 4.5 wt.-%) O (< 2000 ppm) N (< 500 ppm) C (< 800 ppm) H (< 150 ppm) Fe (< 3000 ppm)
Relative density	approx. 100 %
Density	4.41 g/cm ³ 0.159 lb/in ³

Material data sheet

Mechanical properties of parts* [8]

	As built	Heat treated [6]
Tensile strength [5]		
- in horizontal direction (XY)	typ. 1290 ± 50 MPa typ. 187 ± 7 ksi	min. 930 MPa (134.8 ksi) typ. 1100 ± 40 MPa (160 ± 6 ksi)
- in vertical direction (Z)	typ. 1240 ± 50 MPa typ. 187 ± 7 ksi	min. 930 MPa (134.8 ksi) typ. 1100 ± 40 MPa (160 ± 6 ksi)
Yield strength (R_{p0.2}) [5]		
- in horizontal direction (XY)	typ. 1140 ± 50 MPa typ. 165 ± 7 ksi	min. 860 MPa (124.7 ksi) typ. 1000 ± 50 MPa (145 ± 7 ksi)
- in vertical direction (Z)	typ. 1120 ± 80 MPa typ. 162 ± 12 ksi	min. 860 MPa (124.7 ksi) typ. 1000 ± 60 MPa (145 ± 9 ksi)
Elongation at break [5]		
- in horizontal direction (XY)	typ. (7 ± 3) %	min. 10 % typ. (13.5 ± 2 %)
- in vertical direction (Z)	typ. (10 ± 3) %	min. 10 % typ. (14.5 ± 2 %)
Modulus of elasticity [5]		
- in horizontal direction (XY)	typ. 110 ± 15 GPa typ. 16 ± 2 Msi	typ. 110 ± 15 GPa typ. 16 ± 2 Msi
- in vertical direction (Z)	typ. 110 ± 15 GPa typ. 16 ± 2 Msi	typ. 110 ± 15 GPa typ. 16 ± 2 Msi
Hardness [7]	typ. 320 ± 12 HV5	

[5] Tensile testing according to ISO 6892-1:2009 (B) Annex D, proportional test pieces, diameter of the neck area 5 mm (0.2 inch), original gauge length 25 mm (1 inch).

[6] Specimens were treated at 800 °C (1470 °F) for 4 hours in argon inert atmosphere. Mechanical properties are expressed as minimum values to indicate that mechanical properties exceed the minimum requirements of material specification standards. ASTM F1472-08. By fulfilling these minimum values, also the specifications of standards ASTM B348-09 and ISO 5832-3:2000 are met.

[7] Vickers hardness measurement (HV) according to EN ISO 6507-1 on polished surface. Note that measured hardness can vary significantly depending on how the specimen has been prepared.

[8] Hint: these properties were determined for Ti64_Performance 1.0 on an EOSINT M 280-400W and EOSINT M 290-400W. Test parts from Ti64_Speed 1.0 were determined on machine types EOSINT M 280-400W and correspond with data from an EOS M 290-400W.

Material data sheet

Thermal properties of parts*

Maximum long-term operating temperature	approx. 350 °C approx. 660 °F
---	----------------------------------

Abbreviations

typ.	typical
min.	minimum
wt.	weight
approx.	approximately

*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.

EOS®, EOSINT®, DMLS®, DirectTool® and DirectPart® are registered trademarks of EOS GmbH.

© 2022 EOS GmbH Electro Optical Systems. All rights reserved.



Material data sheet – FlexLine

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. 9011-0039) on the following system setup:

- EOS DMLS™ system: EOS M400 SF
 - HSS recoating blade
 - Argon atmosphere
 - IPCM M extra sieving module with 63µm mesh recommended
- EOSPRINT v.1.5/HCS v.2.4 or newer
- EOS Parameter set Ti64_030_FlexM400_100

Description

Parts built in EOS Titanium Ti64 have 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.

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.

Material data sheet - FlexLine

Technical Data

Powder properties

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 ± 3 µm
---------	-----------

[1] Particle size distribution analysis according to ISO 13320



Material data sheet – FlexLine

General process data

Layer thickness	30 µm
Volume rate [2]	5 mm ³ /s (18 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. R _a 5-10 µm; R _z 15-30 µm
Hardness as built [5]	typ. 340 HV5

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

[4] 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.

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

Tensile data at room temperature [6,7]

	As built	Heat treated [8]
Ultimate tensile strength	typ. 1270 MPa	typ. 1040 MPa
Yield strength, Rp0.2%	typ. 1100 MPa	typ. 930 MPa
Elongation at break A	typ. 8.7 %	typ. 14.0 %

[6] The numbers are average values and are determined from samples with horizontal and vertical orientation.

[7] Tensile testing according to ISO 6892-1 A14, proportional test pieces, diameter of the neck area 5 mm (0.2 inch), original gauge length 20 mm (0,79 inch).

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



Material data sheet – FlexLine

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.

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. EOS does not warrant any properties or fitness for a specific purpose, unless explicitly agreed upon. This also applies regarding any rights of protection as well as laws and regulations.

EOS[®], EOSINT[®], DMLS[®], DirectTool[®] and DirectPart[®] are registered trademarks of EOS GmbH.

©2017 EOS GmbH – Electro Optical Systems. All rights reserved.



Material data sheet – Flexline

EOS Titanium Ti64

EOS Titanium Ti64 is a titanium alloy powder intended for processing on EOS DM^{LS}™ machines.

This document provides information and data for parts built using

- EOS Powder: EOS Titanium Ti64 (EOS art.-no. 9011-0014)
- EOS Laser Sintering Machine: EOS M400-4
 - HSS Recoater Blade (EOS art.-no. 300007610)
 - DirectBase Ti40 Building Platform (EOS art.-no. 300013128)
 - Argon atmosphere
 - 63 µm mesh for powder sieving recommended (EOS art.-no. 9044-0032 for IPCM M Extra Sieving Module or EOS art.-no. 200001059 for IPM M Powder Station L)
 - EOSYSTEM v. 2.6 or higher
- EOS Software:
 - EOSPRINT v. 1.6 (EOS art. no. 7501-4031) / 2.0 (EOS art.-no. 7012-0119) or higher
- EOS Process:
 - Ti64 ParameterEditor (EOS art.-no. 7500-3086)
 - Name of the Default Job: Ti64_060_FlexM404_100.eosjob

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.

Material data sheet – Flexline

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 [1] max. 0.3 wt%

[1] Sieve analysis according to ASTM B214.

Material data sheet – Flexline

General process data

Layer thickness	60 µm
Volume rate [2]	Up to 4 x 9,0 mm ³ /s (4 x 32,4 cm ³ /h)

[2] 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 other factors such as exposure parameters of contours, supports, up and downskin, recoating time, Home-In or LPM settings, job design (load, part geometry or overlap settings).

Physical and chemical properties of parts

Part density [3]	Approx. 4.41 g/cm ³
Min. wall thickness [4]	Approx. 0.3 – 0.4 mm
Surface roughness after shot peening [5]	Ra 6–15 µm; Rz 30–75 µm

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

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

[5] 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 [6]	Approx. 330 ± 30 HV5
-----------------------	----------------------

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

Material data sheet – Flexline

Tensile data at room temperature [7,9]

	Heat treated [8]	
	Horizontal	Vertical
Ultimate tensile strength, Rm	1070 MPa	1080 MPa
Yield strength, Rp0.2	955 MPa	990 MPa
Elongation at break, A [10]	13 %	15 %

[7] Tensile testing according to ISO 6892-1 A14, proportional test pieces, diameter of the neck area 5 mm, original gauge length 20 mm.

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

[9] The numbers are average values determined from samples with horizontal and vertical orientation respectively

[10] Values are averaged and subject to variations depending on process conditions.



Material data sheet – Flexline

Abbreviations

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

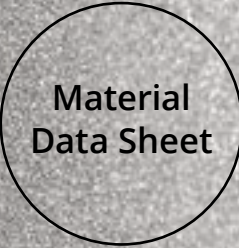
The quoted values refer to the use of this material with above specified type of EOS DMLS system, EOSYSTEM software version, parameter set and operation in compliance with parameter sheet and operating instructions. Part properties are measured with specified measurement methods using defined test geometries 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.

EOS does not warrant any properties or fitness for a specific purpose, unless explicitly agreed upon. This also applies regarding any rights of protection as well as laws and regulations.

EOS[®], EOSINT[®], DMLS[®], DirectTool[®] and DirectPart[®] are registered trademarks of EOS GmbH.

© 2018 EOS GmbH – Electro Optical Systems. All rights reserved.

A circular logo with a thin black border containing the text "Material Data Sheet" in a sans-serif font.

Material
Data Sheet

A close-up, high-angle photograph of a bicycle wheel rim and spokes, showing the intricate structure and metallic finish of the titanium components.

EOS Titanium Ti64

Low Weight, High Strength & Excellent Corrosion Resistance

EOS Titanium Ti64

EOS Titanium Ti64 is a Ti6Al4V alloy, which is well-known for having excellent mechanical properties: low density with high strength and excellent corrosion resistance. The alloy has low weight compared to superalloys and steels and higher fatigue resistance compared to other lightweight alloys.

Main Characteristics:

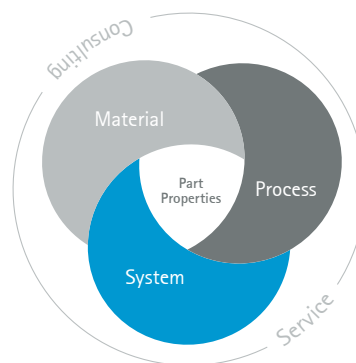
- Low weight combined with high strength
- Excellent corrosion resistance
- Parts can be machined, shot-peened and polished in as-built and heat treated states
- Chemical and part properties corresponding to Ti6Al4V, ISO5832-3, ASTM F1472, ASTM F2924 and ASTM F3302

Typical Applications:

- Medical components
- Aerospace components
- Automotive components
- Other industrial applications where low weight in combination with high strength are required

The EOS Quality Triangle

EOS uses an approach that is unique in the AM industry, taking each of the three central technical elements of the production process into account: the system, the material and the process – together simply described as the Quality Triangle. EOS focuses on delivering reproducible part properties for the customer.



All of the data stated in this material data sheet is produced according to EOS Quality Management System and international standards.

Powder Properties

Parts built in EOS Titanium Ti64 have a chemical composition corresponding to Ti6Al4V, ISO5832-3, ASTM F1472, ASTM F2924, and ASTM F3302

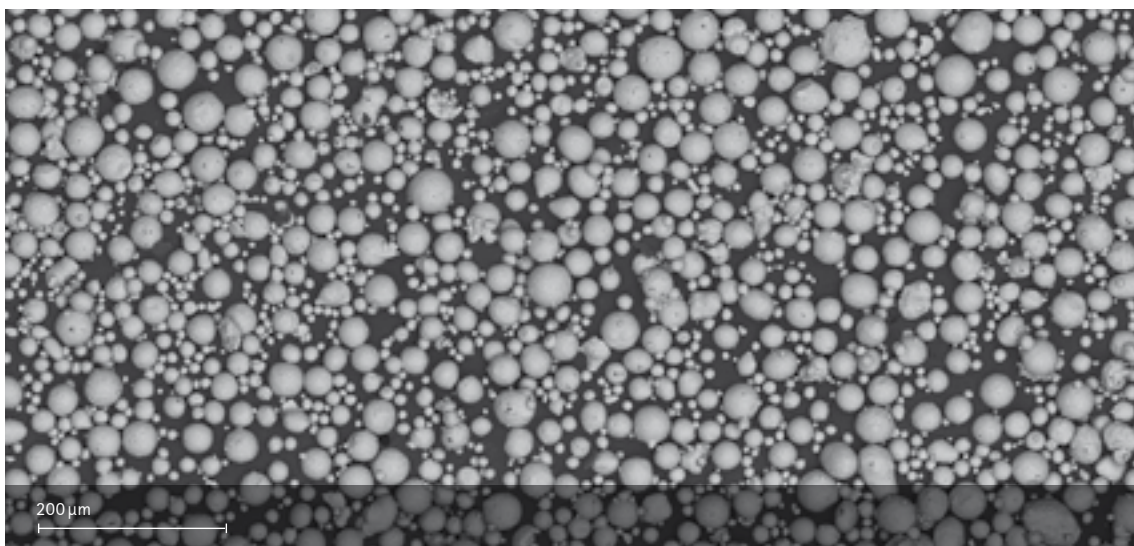
Powder chemical composition (wt.-%)

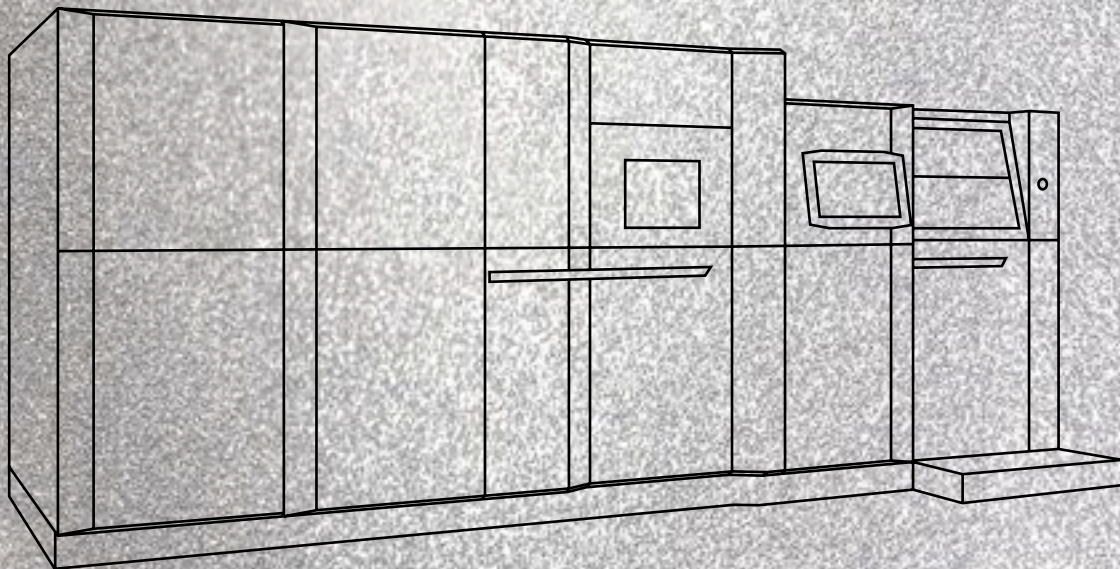
Element	Min.	Max.
Ti	Balance	
Al	5.50	6.75
V	3.50	4.50
O	-	0.20
N	-	0.05
C	-	0.08
H	-	0.015
Fe	-	0.30
Y	-	0.005
Other elements, each	-	0.10
Other elements, total	-	0.40

Powder particle size

Generic particle size distribution	15 - 53 μm
------------------------------------	-----------------------

SEM picture of EOS Titanium Ti64 powder.





EOS Titanium Ti64 for EOS M 300-4 | 60 μm

Process Information
Heat Treatment
Physical Part Properties
Mechanical Properties
Additional Data

EOS Titanium Ti64 for EOS M 300-4 | 60 µm

Main Characteristics:

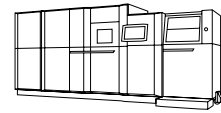
- Highest quality across the entire build plate by using advanced exposure strategies
- Optimized downskin parameters for highest surface quality
- Low angle buildability by maintaining optimal surfaces
- Reliable support parameters for very low angles

Process Information

System set-up	EOS M 300-4
EOS ParameterSet	Ti64 60µm M300-4
EOSPAR name	Ti64_060_CoreM304
Software requirements	EOSPRINT 2.13 or newer EOSYSTEM 2.17 or newer
Powder part no.	9011-0014 9011-0039
Recoater blade	EOS HSS blade, double-sided recoating
Inert gas	Argon
Sieve	63 µm

Additional information

Layer thickness	60 µm
Volume rate	up to 4 x 9.00 mm ³ /s
Recommended exposure strategy	Swimlanes



Chemical and Physical Properties of Parts¹

The chemical composition of parts is in compliance with standards ISO5832-3, ASTM F1472, ASTM F2924, and ASTM F3302. Composition complies with EOS Titanium Ti64 powder.



*Heat treated microstructure.
Etched according to
ASTM E407 modified recipe #190.*

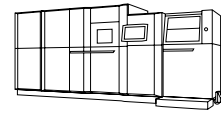
The areal defect percentage was determined from cross-cuts of the built parts using optical microscope fitted with a camera and analysis software. The analysis was carried out for a sample area of 15 x 15 mm. The defects were detected and analyzed with an image capture/analysis software with an automatic histogram based filtering procedure on monochrome images. The density of the built specimen was measured according to ISO3369.

Defects	Result	Number of samples
Average defect percentage	0.01 %	54
Density, ISO3369	Result	Number of samples
Average density	≥4.4 g/cm ³	10

Heat Treatment

Heat Treatment Description:

120 min (± 30 min) at 800 °C (± 10 °C) measured from the part in vacuum (1.3×10^{-3} - 1.3×10^{-5} mbar) followed by cooling under vacuum.



EOS Titanium Ti64 for EOS M300-4 | 60 μm

Mechanical Properties

Mechanical properties ISO6892-1
Heat treated and Swimlane strategy

	Yield strength $R_{p0.2}$ [MPa]	Tensile strength R_m [MPa]	Elongation at break A [%]	Number of samples
Vertical	1 040	1 140	14	80
Horizontal	1 030	1 130	12	32

The values shown are average values and dependent on the build platform temperature, the thermal load of the job layout as well as the position on the build plate.

Hardness as per ISO 6507

Heat treated and Swimlane strategy

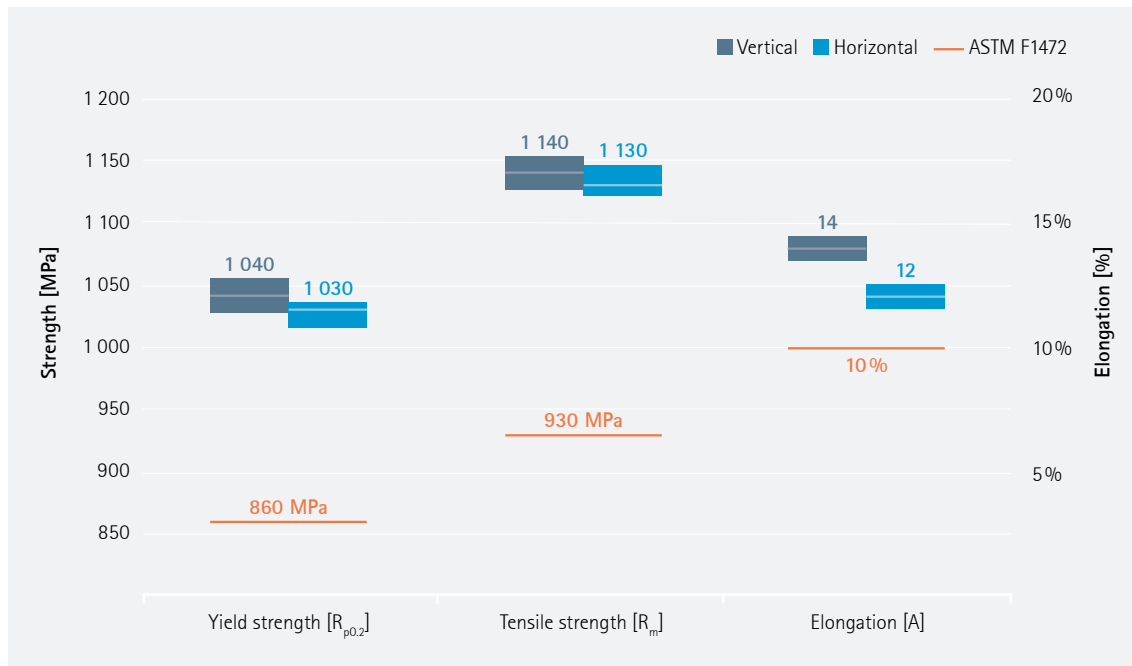
Hardness, HV	349 HV 5
Number of samples	16

Defects

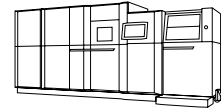
Result

Number of samples

Average defect percentage	0.01 %	54
---------------------------	--------	----



EOS Titanium Ti64 for EOS M300-4 I 60 μm Mechanical Properties

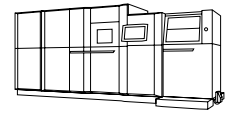


Mechanical properties ISO6892-1
as manufactured and Swimlane strategy

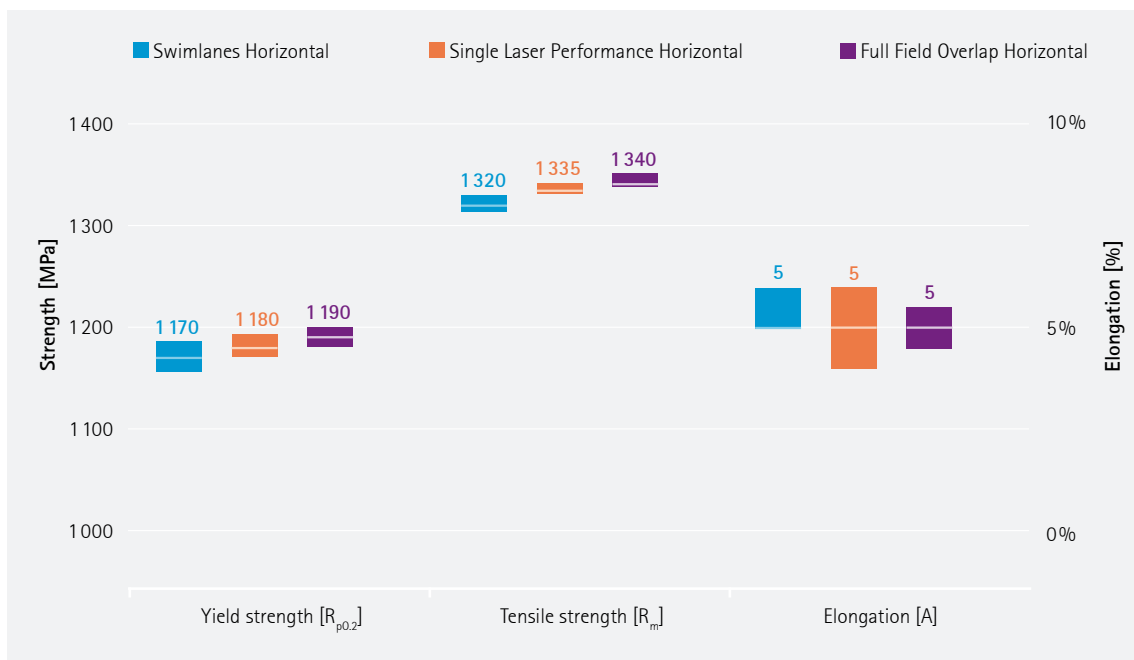
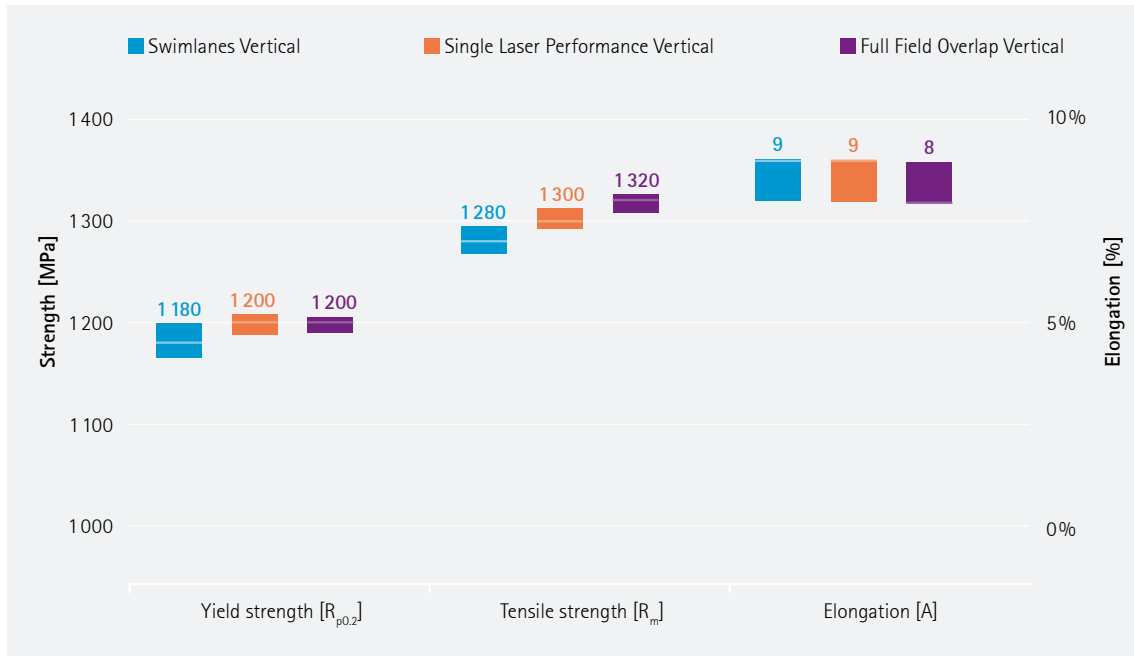
	Yield strength $R_{p0.2}$ [MPa]	Tensile strength R_m [MPa]	Elongation at break A [%]	Number of samples
Vertical	1 180	1 280	9	118
Horizontal	1 170	1 320	5	47

Hardness as per ISO 6507
as manufactured and Swimlane strategy

Hardness, HV	375 HV 5
Number of samples	16

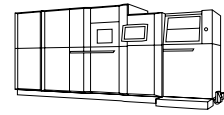


EOS Titanium Ti64 for EOS M300-4 | 60 μm Mechanical Properties for Different Exposure Strategies

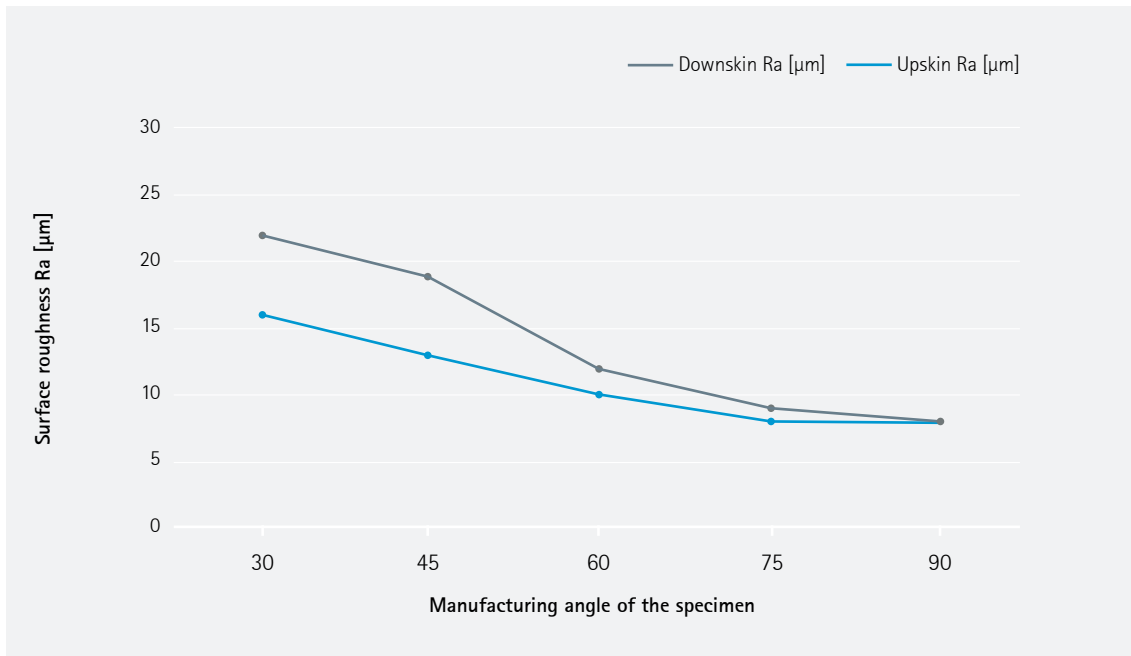


Defects as manufactured	Result	Number of samples
Swimlanes	0.01 %	54
Single Laser Performance	0.01 %	32
Full Field Overlap	0.01 %	24

Additional Data¹



Surface Roughness as Manufactured



The surface quality was characterized by optical measurement method according to internal procedure. The 90 degree angle corresponds to vertical surface.

Headquarters

EOS GmbH
Electro Optical Systems
Robert-Stirling-Ring 1
D-82152 Krailling/Munich
Germany
Phone +49 89 893 36-0
info@eos.info

www.eos.info

in EOS

✂ EOS3Dprinting

▶ EOS3Dprinting

#responsiblemanufacturing

#futureisadditive

Further Offices

EOS France
Phone +33 437 497 676

EOS Greater China
Phone +86 21 602 307 00

EOS India
Phone +91 443 964 8000

EOS Italy
Phone +39 023 340 1659

EOS Japan
Phone +81 45 670 0250

EOS Korea
Phone +82 2 6330 5800

EOS Nordic & Baltic
Phone +46 31 760 4640

EOS of North America
Phone +1 877 388 7916

EOS Singapore
Phone +65 6430 0463

EOS UK
Phone +44 1926 675 110

¹ 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.

Status 10/2023

EOS is certified according to ISO 9001. EOS® and EOSPRINT® are registered trademarks of EOS GmbH Electro Optical Systems in some countries.
For more information visit www.eos.info/trademarks.

Cover: This image shows a possible application.

