

METAL SOLUTIONS

EOS Titanium Ti64 Grade 5

Material Data Sheet

EOS TITANIUM Ti64 GRADE 5

EOS Titanium Ti64 Grade 5 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. EOS Titanium Ti64 Grade 5 is a titanium alloy powder intended for manufacturing parts on EOS metal systems with EOS DMLS processes.

Parts built with EOS Titanium Ti64 Grade 5 powder can be machined, shot-peened and polished in as manufactured and heat treated states. Due to the layerwise building method, the parts have a certain anisotropy. Heat treatment is recommended to reduce internal stresses and increase ductility.

EOS Titanium Ti64 Grade 5 powder can be used on the EOS M 290 with a 40 µm and 80 µm process and on the EOS M 400-4 with an 80 µm process.

MAIN CHARACTERISTICS

- Low weight combined with high strength
- Excellent corrosion resistance
- High fatigue resistance compared to other lightweight alloys
- The parts fulfill chemical requirements for Grade 5 alloy

TYPICAL APPLICATIONS

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

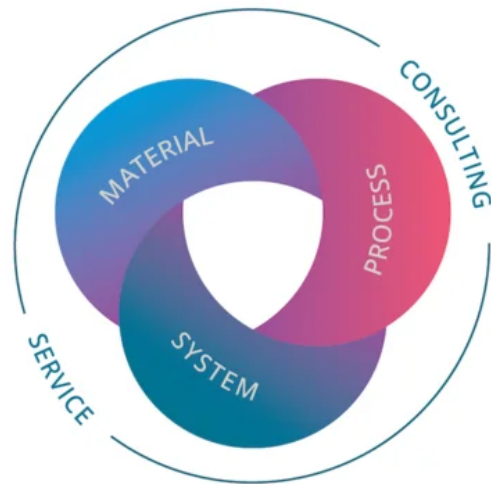
The EOS Quality Triangle

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. The data resulting from each combination is assigned a Technology Readiness Level (TRL) which makes the expected performance and production capability of the solution transparent.

EOS incorporates these TRLs into the following two categories:

- Premium products (TRL 7-9): offer highly validated data, proven capability and reproducible part properties.
- Core products (TRL 3 and 5): enable early customer access to newest technology still under development and are therefore less mature with less data.

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



POWDER PROPERTIES

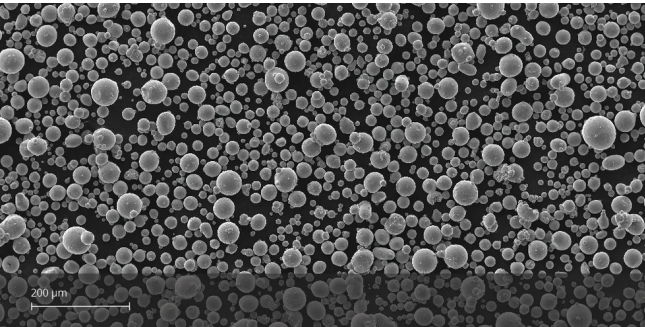
EOS Titanium Ti64 Grade 5 powder is classified as Grade 5 titanium alloy according to ASTM B348. The chemical composition is in compliance with standards ISO5832-3, ASTM F1472, ASTM F2924, and ASTM F3302.

Powder Chemical Composition (wt.-%)

Element	Min.	Max.
Ti	-	-
Al	5.5	6.75
V	3.5	4.5
O	-	0.2
N	-	0.05
C	-	0.08
H	-	0.015
Fe	-	0.3
Y	-	0.005

Powder Particle Size

GENERIC PARTICLE SIZE DISTRIBUTION	20 - 80 µm
------------------------------------	------------



SEM micrograph of Titanium Ti64 Grade 5 powder

HEAT TREATMENT

Description

As manufactured microstructure for additively manufactured Ti64 consists of fully acicular alpha prime (α') phase. Standard heat treatments for titanium do not necessarily produce desired microstructures due to this different starting microstructure. Heat treatment is recommended to relieve stresses and to increase ductility. Use of vacuum furnace is highly recommended to avoid the formation of alpha case on the surface of the parts.

Steps

120min (± 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 or argon quenching.

Material mechanical properties are relatively insensitive to changes in heating and cooling rates, but longer treatment times may result in decreased strength and increased elongation.

Parts heat treated according to the recommended heat treatment have a microstructure consisting of fine alpha + beta ($\alpha + \beta$) phase.

HEADQUARTERS

EOS GmbH
Electro Optical Systems

Robert-Stirling-Ring 1
82152 Krailling / Munich
Germany

Tel.: +49 89 893 36-0
Email: info@eos.info
URL: www.eos.info

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. In this respect, the limitations of liability pursuant to our General Terms and Conditions and the system sales or material contracts shall apply.

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.

The achievement of certain part properties as well as the assessment of the suitability of this material for a specific purpose is the sole responsibility of the user. Any information given herein is subject to change without notice.

Status as of 03.09.2024. Subject to technical modifications. EOS is certified according to ISO 9001.

EOS®, Additive Minds® Alumide®, AMQ®, CarbonMide®, DirectMetal®, DMLS®, EOSAME®, EOSINT®, EOSIZE®, EOSPACE®, EOSPRINT®, EOSTATE®, EOSTYLE®, FORMIGA®, LaserProFusion®, PA 2200®, PrimeCast® and PrimePart® are registered trademarks of EOS GmbH Electro Optical Systems in some countries. For more information visit www.eos.info/trademarks.