Material Data Sheet

Ti-Alloy TA15[1]

General

TA15 is a near-alpha titanium-alloy with additives of aluminum, zirconium, and others. Very good mechanical properties, also at high temperatures, a good weldability as well as a high specific strength complete the outstanding pro le of this material. Due to its combination of a high loadability in multiaxial stress state and a high corrosion resistance, TA15 is primarily used within the aerospace industry and engines. Examples of application include heavily loaded components such as frames and other structural parts of airframes.

Material Structure

SLM®-processed components made of TA15 show a homogenous, nearly non-porous structure, with mechanical values in the range of material specifications. TA15's microstructure in the as-build condition consists of fine basket-weaves with α-laths. Through subsequent processing such as heat-treatment or hot isostatic pressing (HIP), the components' properties can be adapted to meet specific requirements.

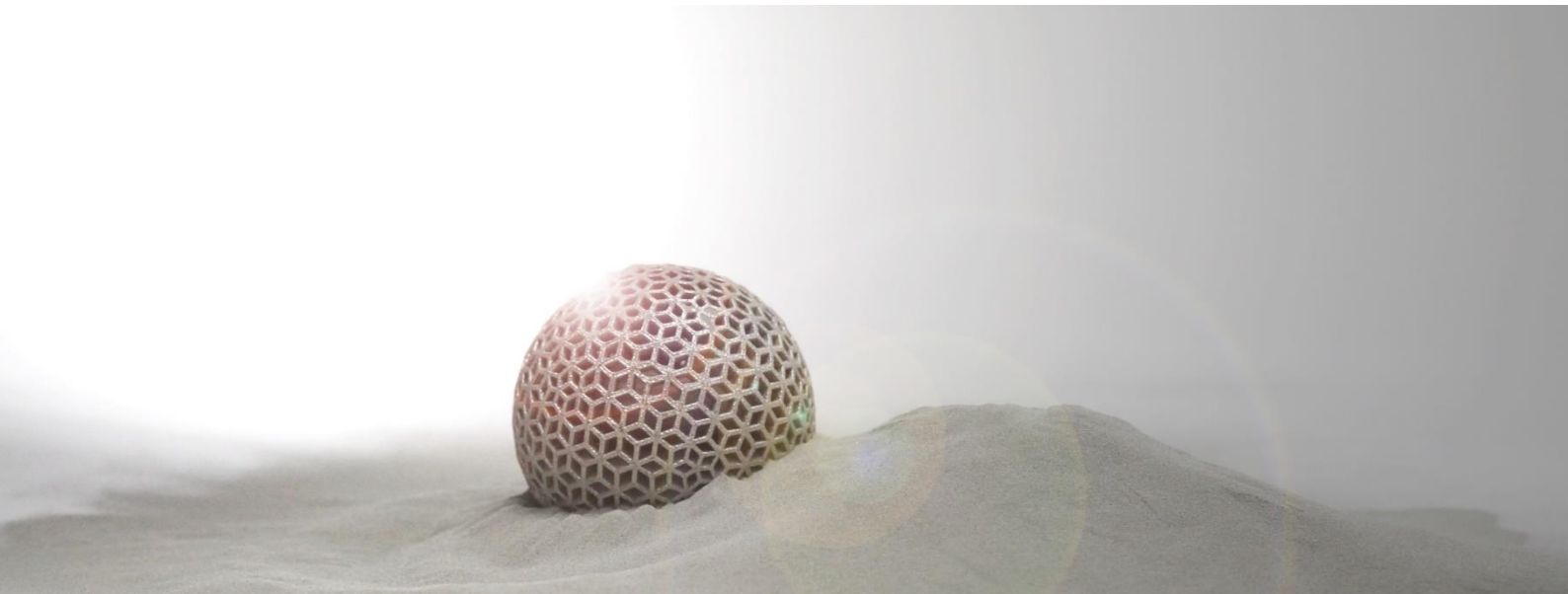
Chemical composition [Mass fraction in %][6]

Ti	Al	Zr	Mo	V	Si	C	Fe	O	N	H	Others
Balance	5.5 – 7.1	1.5 – 2.5	0.5 – 2.0	0.8 – 2.5	0.15	0.08	0.25	0.15	0.05	0.015	0.10

Total others
0.30

Powder properties

Particle size[6]	20 – 63 µm	Particle shape[7]	Spherical
Mass density[2]	~ 4.5 g/cm³	Thermal conductivity[6]	/



Ti-Alloy TA15[1]

Layer thickness 30 µm [3]	As-built

Build-up rate [4]	[cm³/h]	28.51 cm³/h
Component density[5]	[%]	> 99.5 %

Tensile test[8]			M	SD
Tensile strength	R_m [MPa]	H	1358	34
		V	1404	8
Offset yield strength	$R_{p0,2}$ [MPa]	H	1186	27
		V	1260	16
Elongation at break	A [%]	H	4	1
		V	6	1
Reduction of area	Z [%]	H	6	1
		V	13	2
Young's modulus	E [GPa]	H	110	7
		V	110	1

Hardness test[9]		M	SD
Vickers hardness	HV10	385	4

Roughness measurement[10]			As-built		Corundum blasted		Glass-bead blasted	
			M	SD	M	SD	M	SD
Roughness average	Ra	[µm]	17	4	13	3	11	2
Mean roughness depth	Rz	[µm]	102	19	88	18	69	14

Material Data Sheet

Ti-Alloy TA15[1]

The properties and mechanical characteristics apply to powder that is tested and sold by SLM Solutions, and that has been processed on SLM Solutions machines using the original SLM Solutions parameters in compliance with the applicable operating instructions (including installation conditions and maintenance). The part properties are determined based on specified procedures. More details about the procedures used by SLM Solutions are available upon request.

The specifications correspond to the most recent knowledge and experience available to us at the time of publication and do not form a sufficient basis for component design on their own. Certain properties of products or parts or the suitability of products or parts for specific applications are not guaranteed. The manufacturer of the products or parts is responsible for the qualified verification of the properties and their suitability for specific applications. The manufacturer of the products or parts is responsible for protecting any third-party proprietary rights as well as existing laws and regulations.

[1] Material according to GB/T 3620-2007.

[2] Rough value. Material density varies within the range of possible chemical composition variations.

[3] Material data file: TA15_SLM_MBP3.0_60_CE2_400W_Stripes_V1.2

[4] Optical density determination by light microscopy.

[5] Theoretical build-up rate for each laser = layer thickness x scan speed x track distance.

[6] With respect to powder material.

[7] According to DIN EN ISO 3252:2001.

[8] Tensile test according to DIN EN ISO 6892-1:2017 B (DIN 50125:2016 – B6x30); orientation: 0°, 90°; heat treatment: none; testing machine: Zwick 1484; load range: 200 kN; testing speed: 0,008 1/s; testing temperature: room temperature. Test samples were turned before tensile test.

[9] Hardness testing according to DIN EN ISO 6507-1:2018.

[10] Roughness measurement according to DIN EN ISO 4288:1998; λc = 2,5 mm.

SLM Solutions Group AG | Estlandring 4 | 23560 Lübeck | Germany
+49 451 4060 - 3000 | info@slm-solutions.com | slm-solutions.com

SLM Solutions Group AG | 200702-TA15