

Material data sheet – FlexLine

EOS Aluminium AlSi10Mg

EOS Aluminium AlSi10Mg is an aluminium alloy that has been specially optimised for processing on EOS M 400 systems.

This document contains information and data for building parts with EOS Aluminium AlSi10Mg powder (EOS part no. 9011-0024) in accordance with the following specifications:

- EOS M 400
- EOSPRINT v1.2 / EOSYSTEM v2.2.40
- AlSi10Mg 90µm FlexLine

Description

The alloy AlSi10Mg has good casting properties and is typically used for cast parts with thin walls and complex geometry. It is characterised by good strength and hardness, as well as high dynamic load bearing capacity, and it therefore also used for parts subjected to high loads. Parts made of EOS Aluminium AlSi10Mg are ideal for applications that require a combination of good thermal properties and low weight. They can be machined, wire eroded and electrical discharge machined, welded, micro-blasted, polished and coated.

Conventionally cast components made of this aluminium alloy are often heat-treated to improve the mechanical properties. For example using the T6 cycle, comprising solution annealing, quenching and artificial ageing. A special aspect of the laser sintering process is the extremely fast melting and re-solidification. Consequently, a structure with the related mechanical properties similar to the T6-treated cast parts results directly from the building process. For this reason, such heat treatments are not recommended for laser sintered parts, instead stress relief heat treatment for 2 hours at 300 °C is recommended. Due to the layering, the parts have anisotropic properties. These characteristics can be reduced or eliminated by suitable thermal post-treatment – see technical data for examples.

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Technical data

Powder properties

The chemical composition of the powder corresponds to the standard DIN EN 1706:2010

Material composition (wt%)

Element	Min	Max
Al	Rest	
Si	9.0	11.0
Fe	---	0.55
Cu	---	0.05
Mn	---	0.45
Mg	0.20	0.45
Ni	---	0.05
Zn	---	0.10
Pb	---	0.05
Sn	---	0.05
Ti	---	0.15

Particle size

d90 [1] < 106 µm

[1] Laser diffraction in accordance with ISO 13320-1.

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General process data

Layer thickness	90 µm
Volume rate [2]	27.8 mm ³ /s (100.3 cm ³ /h)

[2] The volume rate is a measure of the building speed during the exposure of the skin region. The total building speed is dependent on further factors such as the exposure parameters for contours, supports, Upskin and Downskin, the duration of the recoating, the home-in and LPM settings.

Physical and chemical properties of the parts

The chemical composition of the part corresponds to the standard DIN EN 1706:2010.

Material composition (wt%)			
Element	Min	Max	
Al	Rest		
Si	9.0	11.0	
Fe	---	0.55	
Cu	---	0.05	
Mn	---	0.45	
Mg	0.20	0.45	
Ni	---	0.05	
Zn	---	0.10	
Pb	---	0.05	
Sn	---	0.05	
Ti	---	0.15	

Density [3]	2.64 g/cm ³
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Roughness after microblasting [4]	Ra 11 µm; Rz 64 µm
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[3] Weighing in air and water in accordance with ISO 3369.

[4] Measurement of roughness as per ISO 4287. The values were determined on the vertical surface of a cube, as well as on the horizontal surface facing upward. Due to the layering, the surface structure is heavily dependent on the orientation of the surface, for instance a stepped effect is to be seen on inclined and round surfaces.

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Mechanical properties at room temperature [5, 6]

	As built	After heat treatment [7]
Tensile strength, Rm	395 MPa	290 MPa
Yield strength, Rp0.2	244 MPa	165 MPa
Ultimate strain, A	3.2 %	7.3 %

[5] The stated values are average values and were determined on samples with vertical and horizontal orientation.

[6] Mechanical strength tested as per EN ISO 6892-1:2009 B10, proportional bars, specimen diameter 5 mm, initial measured length 25 mm.

[7] Heat treatment: 300 °C / 2 h.

Abbreviations

Min. Minimum

Max. Maximum

Wt. Weight

The data apply for the combinations of EOS M400, EOSPRINT1.2 and parameter set AISi10Mg_90_FlexlineM400 specified on page 1 during processing as per parameter sheet M400_Parameter_sheet and the related applicable operating instructions. All measured values are average values and do not correspond to any specification. The part properties are determined using specified measuring processes as per defined test geometries and procedures. Further details on the test procedures employed by EOS are available on request. Deviations from the standard conditions can have an effect on the measured values.

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