

Material data sheet – FlexLine

EOS Aluminium AlSi10Mg

EOS Aluminium AlSi10Mg is an aluminium metal alloy powder intended for processing on EOS DMLS™ systems.

This document provides information and data for parts built using

- EOS powder: EOS Aluminium AlSi10Mg (EOS art.-no. 9011-0024)
- EOS Laser Sintering Machine: EOS M400-4
 - HSS Recoater Blade (EOS art.-no. 300007610)
 - DirectBase AL40 building platform (EOS art.-no. 300005789)
 - Nitrogen atmosphere
 - 90 µm mesh for powder sieving recommended (EOS art.-no. 300000493 for IPCM M extra Sieving Module or EOS art.-no. 200001061 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:
 - AlSi10Mg ParameterEditor (EOS art.-no. 7500-3085)
 - Name of the Default Job: AlSi10Mg_030_FlexM404_100.eosjob

Description

The alloy AlSi10Mg 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. It is typically used for cast parts with thin walls and complex geometry. 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.

Processing of aluminium powder EOS Aluminium AlSi10Mg at elevated building platform temperature of 165 °C minimises internal stresses, which are characteristic for DMLS parts. The laser-sintering process is characterized by extremely rapid melting and re-solidification.

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Due to the layerwise building method, the parts have a certain anisotropy. Suitable heat treatment can be used for further improvement of part properties and reduction of anisotropy. Conventionally cast components in this type of aluminium alloy are often heat treated to improve the mechanical properties, for example using the T6 cycle of solution annealing, quenching and age hardening.

Technical Data

Powder properties

The chemical composition of the powder (wt-%) is in compliance with standard DIN EN 1706 (EN-AC-43000).

Material composition

Element	Min	Max
Al	Balance	
Si	9.0	11.0
Fe		0.55
Cu		0.05
Mn		0.45
Mg	0.25	0.45
Ni		0.05
Zn		0.10
Pb		0.05
Sn		0.05
Ti		0.15

Particle size

>90 µm [1] <0.5 wt.%

[1] Sieve analysis according to ASTM B214.

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General process data

Layer thickness	30 µm
Volume rate [2]	Up to 4 x 7.4 mm ³ /s (4 x 26.7cm 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, Job design (load, part geometry or overlap settings).

Physical and chemical properties of parts

Part density, typical [3]	Approx. 2.65 g/cm ³
Surface roughness after shot peening [4]	Ra 12-20 µm; Rz 75-110 µm

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

[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.

Tensile data at room temperature [5,6]

As Manufactured

	Horizontal	Vertical
Ultimate tensile strength, Rm	410 MPa	440 MPa
Yield strength, Rp0.2	265 MPa	240 MPa
Elongation at break, A	6 %	4 %

[5] Tensile testing according to ISO 6892-1 B10, proportional test pieces, diameter of the neck area 5 mm, original gauge length 25 mm.

[6] The numbers are average values determined from samples with horizontal and vertical orientation respectively. Values are subject to variations depending on process conditions.



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Abbreviations

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

The quoted values refer to the use of this material with above specified EOS DMLS system, PSW version / 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. Further details of the test procedures used by EOS are available on request. Any deviation from these standard settings may affect the measured properties.

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