

UniFuse™ AlSi10Mg 90µm 700W Performance

· Laser Powder Bed Fusion 3D printing

Chemical composition:

Elements	Al [wt.-%]	Si [wt.-%]	Fe [wt.-%]	Cu [wt.-%]	Mn [wt.-%]	Mg [wt.-%]	Ni [wt.-%]	Zn [wt.-%]	Pb [wt.-%]	Sn [wt.-%]	Ti [wt.-%]
Min	Bal. / Rest	9.0	0.0	0.0	0.0	0.20	0.0	0.0	0.0	0.0	0.0
Max	Bal. / Rest	11.0	0.10	0.03	0.15	0.45	0.05	0.10	0.05	0.05	0.15

Powder Properties:

Density (g/cm³)

Tap Density	2.0 ± 0.06 g/cm ³
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Typical properties at nominal density and nominal composition:

Coupon type: ASTM E8-21

As printed mechanical properties

Material properties	Symbol	As built ¹
Density [g/cm ³] ²⁾	ρ	2.67
Density [%] ²⁾	%	99.7 – 100.0
Porosity [%] ²⁾	p	0.0 – 0.3
Ultimate Tensile Strength [MPa] ^{3) 4)}	R_m xy-bar	420 ± 6
	R_m z-bar	401 ± 9
Yield Strength [MPa] ^{3) 4)}	$R_{p0.2}$ xy-bar	247 ± 1
	$R_{p0.2}$ z-bar	230 ± 3
Fracture Elongation [%] ^{3) 4)}	A xy-bar	6.8 ± 0.8
	A z-bar	4.4 ± 0.4
Surface roughness in z-direction [µm], no treatment ^{5) 6)}	R_a	15.0 ± 0.7

HIP & T6 mechanical properties

Material properties	Symbol	HIP & T6 ⁵⁾
Density [g/cm ³]	ρ	2.67
Density [%] ²⁾	%	99.99%+
Porosity [%] ²⁾	p	0.01
Ultimate Tensile Strength [MPa] ^{3) 4)}	R _{m xy-bar}	330 ± 3
	R _{m z-bar}	323 ± 5
Yield Strength [MPa] ^{3) 4)}	R _{p0.2 xy-bar}	254 ± 3
	R _{p0.2 z-bar}	250 ± 5
Fracture Elongation [%] ^{3) 4)}	A xy-bar	15.2 ± 0.8
	A z-bar	13.5 ± 1.2
Surface roughness in z-direction [μm], ^{6) 7)}	R _a	15.0 ± 0.7

Remarks:

- 1) Properties are given for the laser melted product printed at 90um layer thickness. Auxiliary operations, e.g., heat treatments, surface modifications, coating processes, bead blasting, etc. may influence the displayed properties. Error values provided with a +/- are given to one standard deviation for printing within machine and environmental specifications.
- 2) The indicated density limits are valid for the mean density of a component. For complex and geometrically unfavorable shapes the local segment density can deviate from these limits and therefore materials properties may be affected.
- 3) Materials properties stated in the tables above have been determined on the basis of ASTM E8-21.
- 4) All mechanical characteristics are typical mean values valid only for the indicated nominal density level, and will vary from printer to printer.
- 5) Specimens were HIP and T6 according to ASTM F3318-18.
- 6) Roughness measurement in accordance with DIN EN ISO 4287.
- 7) Surface roughness value is dependent on the gas flow characteristics of the machine.