

## UniFuse™ Ti6Al4V 60um 500W Performance

· Laser Powder Bed Fusion 3D printing, 60um Layer parameters

### Chemical Composition:

Element	Al [wt.-%]	V [wt.-%]	Fe [wt.-%]	Y [wt.-%]	C [wt.-%]	O [wt.-%]	N [wt.-%]	H [wt.-%]	Others [wt.-%]	Balance Ti
Min	5.50	3.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Max	6.50	4.50	0.25	0.005	0.08	0.13	0.05	0.012	0.40	88.07

### Powder Properties:

#### Density (g/cm<sup>3</sup>)

Tap Density	3.4 g/cm <sup>3</sup> ±0.1
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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 <sup>1)</sup>
Density [g/cm <sup>3</sup> ]	$\rho$	4.43
Density [%] <sup>2)</sup>	%	99.9 – 100.0 Typical 99.96
Porosity [%] <sup>2)</sup>	P	0.0 – 0.1 Typical 0.04
Ultimate Tensile Strength [MPa] <sup>3) 4)</sup>	R <sub>m xy-bar</sub>	1245 ± 21
	R <sub>m z-bar</sub>	1221 ± 9
Yield Strength [MPa] <sup>3) 4)</sup>	R <sub>p0.2xy-bar</sub>	1077 ± 19
	R <sub>p0.2z-bar</sub>	1083 ± 18
Fracture Elongation [%] <sup>3) 4)</sup>	A xy-bar	8 ± 1
	A z-bar	8 ± 2
Surface roughness in z-direction, no treatment [ $\mu$ m] <sup>6) 7)</sup>	Ra	11 ± 1

### HIP mechanical properties

Material properties	Symbol	HIP <sup>5)</sup>
Density [g/cm <sup>3</sup> ]	$\rho$	4.43
Density [%] <sup>2)</sup>	%	99.99%+
Porosity [%] <sup>2)</sup>	P	0.01
Ultimate Tensile Strength [MPa] <sup>3)4)</sup>	R <sub>m xy</sub> -bar	1010 ± 6
	R <sub>m z</sub> -bar	1000 ± 7
Yield Strength [MPa] <sup>3)4)</sup>	R <sub>p0.2xy</sub> -bar	924 ± 7
	R <sub>p0.2z</sub> -bar	896 ± 10
Fracture Elongation [%] <sup>3)4)</sup>	A <sub>xy</sub> -bar	15 ± 0.5
	A <sub>z</sub> -bar	14 ± 0.5
Surface roughness in z-direction [μm] <sup>6) 7)</sup>	Ra	11 ± 1

### Remarks:

- 1) Properties are given for the laser melted product. Auxiliary operations may influence the displayed properties. Auxiliary operations e.g., heat treatments or surface modifications by coating processes, bead blasting, etc. performed at Uniformity Labs or the customer will affect mechanical and physical properties.
- 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 table above have been determined on the basis of ASTM E8-21.
- 4) All mechanical characteristics are typical mean values valid for the indicated nominal density level, and will vary from printer to printer.
- 5) Specimens were HIP per ASTM F3001-14. Contact Uniformity Labs staff for details.
- 6) Roughness measurement in accordance with DIN EN ISO 4287.
- 7) Surface roughness value is dependent on the gasflow characteristic of the machine.