POWERED BY qualloy

MATERIAL DATA SHEET

316L 15-53µm

For Machines: M300 & Larger

2026/09/08

OVERVIEW

316L is a popular grade of stainless steel known for its corrosion resistance and versatility in various applications. It belongs to the austenitic stainless-steel family and is characterized by its low carbon content, which enhances its weldability and resistance to sensitization, reducing the risk of intergranular corrosion. Widely used in industries such as marine, pharmaceuticals, and food processing, 316L stainless steel offers excellent durability and resistance to corrosive environments, making it a preferred choice for diverse structural and functional purposes.

316L stainless steel is widely embraced in the pharmaceutical industry for equipment and storage due to its corrosion resistance and suitability for sterilization processes. It remains a top choice in marine applications, particularly shipbuilding, owing to its durability in harsh saltwater conditions. Additionally, in the food and beverage sector, 316L ensures hygiene standards in the production of tanks, piping systems, and fittings.

POWDER COMPATABILITY

- DIN EN 10088 1.4404 / UNS S31603

Disclaimer: Recommendations are for guidance only and the suitability of the material for any application can only be confirmed upon getting to know the actual service conditions. Continuous development may cause changes in technical data without any prior notice.

CHEMICAL COMPOSITION OF POWDER

Element	Min [wt.%]	Max [wt.%]
Ni	10,0	13,0
Cr	16,5	18,0
Mo	2,0	2,5
C		0,030
Si		1,0
Mn		2,0
P		0,045
S		0,015
Fe	Bal.	
O		0,05
N		0,10

POWDER PROPERTIES

PARTICLE SIZE DISTRIBUTION

Parameter	Min [µm]	Max [µm]	Standard
D10	17	23	ISO 13320:2020-01
D50	31	37	ISO 13320:2020-01
D90	51	57	ISO 13320:2020-01

Parameter	Min [%]	Max [%]	Standard
p3 [%] -15µm		5,0	ISO 13320:2020-01

FLOWABILITY AND DENSITIES

Parameter	Min	Max	Standard
Hall flow		20,0 s/50g	ISO 4490
Apparent density	4,0 g/cm³		ISO 3923-1

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PROCESS PROPERTIES

M300-500W-A-316L-0.05-EP2.1-HIGH QUALITY BORDER-V1.0

Parameter Information	M300-500W-A-316L-0.05-EP2.1-High Quality Border-V1.0
Layer thickness [µm]	50
Theoretical productivity per laser [CC/hr]	16,83
Minimum Relative Density	> 99.9 %
Machine compatibility	M300, M400, M450, M650, M825, M1250, M1550

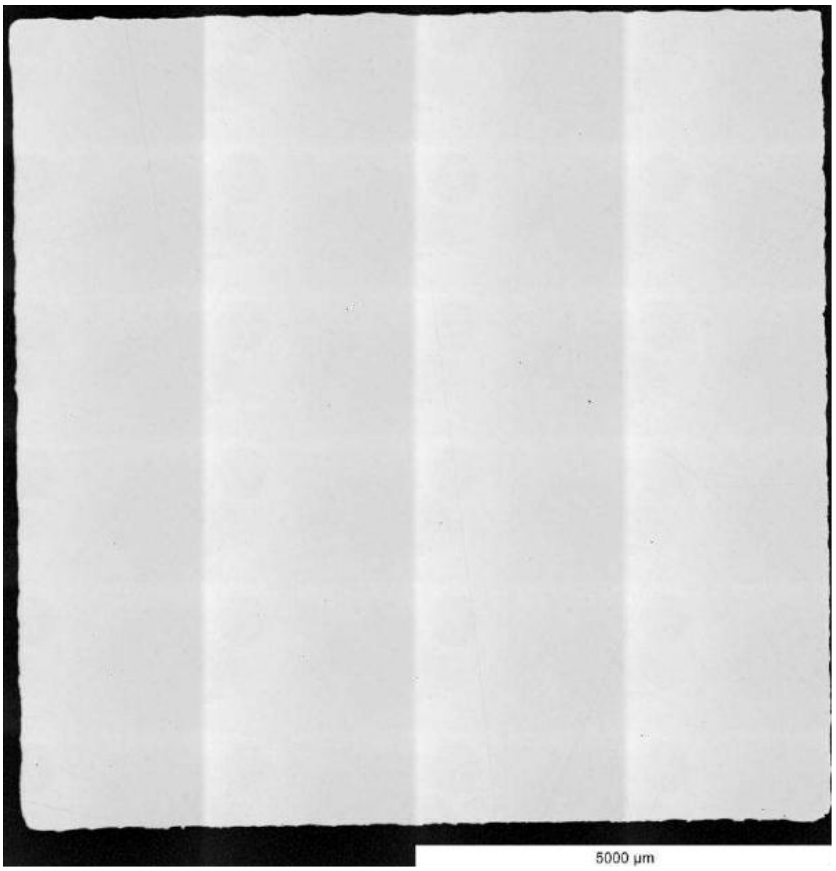


Figure 1: Metallographic Sample 316L, 50µm

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MECHANICAL PROPERTIES

- The test samples were printed in the EP-M300 with the 50μm process.
- DIN EN ISO 6892-1: 2020-06 B
- DIN 50125:2022-08: B6x30

Test condition	Orientation	Tensile Strength		Yield Strength		Elongation at break		Young's Modulus	
		Rm [MPa]		Rp0.2 [MPa]		A5 [%]		E [GPa]	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
As-built	XY	664	±15	531	±15	41	±5	166	±15
	Z	585	±15	452	±10	51	±5	149	±10

HEAT TREATMENT

316L does not require heat treatment to be able to achieve mechanical properties but may still carry some residual stress from the MPBF process after printing.

Recommended Stress relieve:

Stage	Parameters
Climb	150°c / h
Hold	500°c for 1 h
Cool down 1	Cool in oven to 300°c
Cool down 2	Cool in air

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DISCLAIMER

All test data has been created with a well-maintained machine with well-maintained powder if machine is operated incorrectly or the feed material is not maintained performance of the material may not be seen.

Alterations to the parameter sets after they have been provided to the customer may also affect the overall performance of the material.

Additional Information:

- All tensile testing carried out to (DIN EN ISO 6892-1: 2020-06 B, DIN 50125:2022-08: B6x30). Orientation Z defined as vertical perpendicular to the build plate. XY orientation defined as Parallel to the plate in the X or Y direction of the top view of the plate.

- All Hardness measurements carried out to standard (ISO 6508-1:2016).

- Theoretical productivity or build rate of each parameter has been calculated using the industry standard methodology. Theoretical productivity = Scan speed x Hatch distance x layer thickness. This provides a standardized value but does not consider application variables which are influenced by part geometry or number of lasers in the system. This is used to enable comparison between system manufacturers.

- All test data collected on systems is transferrable to the machines listed on the capability section of each parameter set. Material performance is achieved within the tolerance bandwidth stated in this document.