Meltio Stainless Steel 316L

ER316LSI / G 19 12 3 L Si / 1.4430

SS316L is an austenitic steel with excellent durability, low reactivity and adequate elevated temperature properties. The alloy has a low carbon content which makes it particularly recommended when there is a risk of intergranular corrosion. Thus, parts manufactured with SS316L are an excellent choice in corrosion prone applications.

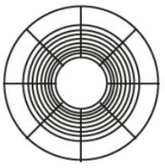
Properties	Corrosion Resistance, Machinable and Polishable
Applications	Machinery, Chemical and Food Industry and Naval

Wire Chemical Composition	Fe	C	Si	Mn	Cr	Ni	Mo
Weight Percent [%]	Bal.	0.02	0.9	1.7	18.5	12.0	2.7

Wire Density
8.0 g/cm³

Melting Point		
1671 K	1398 ºC	2548 °F

Spool Specs



Meltio Materials are tightly spooled and packaged to ensure the best compatibility with Meltio systems.

Wire Diameter	1.0 mm
Weight on Spool	15 kg
Volume on Spool	1875 cm³
Spool Type	BS300
Wire Coating	Uncoated

Heat Treatment

With SS316L it is not mandatory to perform a heat-treatment after 3D printing for general use case applications. As-built Meltio SS316L parts show a mainly austenitic structure with some ferrite content. This Ferrite content may be adjusted via re-austenization to fit the requirements of a specific application. Applying the heat-treatment a 99.8% austenitic structure structure can be achieved. SS316L may also be stress relieved between 450°C and 600°C without affecting its microstructure.

Re-austenization*

Protective atmosphere	1050°C	Maintain for 2h	Cooling at 20°C/s to RT

**Typical Parameters for a cylinder sample of 4 mm diameter and 10 mm long.*

Deposition Parameters

The following 3D printing parameters were found to provide fully dense samples. Please use the provided “Density Profiles” and refer to the document “Printing Parameters and their effect on part density” for additional information.

Laser Power [W]	**Velocity [mm/s]**	**Argon Flow [l/min]**	**Layer Height [mm]**	**Wire Speed [mm/s]**	**Energy Density [J/mm3]**
1100	7.5	10	1.0	9.6	147

Meltio Material Datasheet

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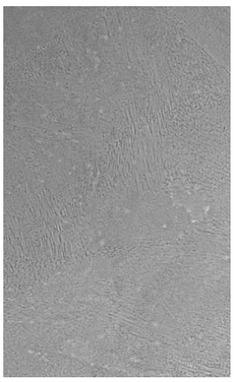
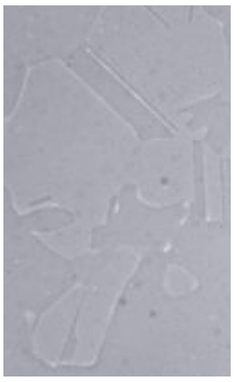
Micrography

The as-built SS316L samples show a microstructure with both cellular and columnar dendritic solidification mode. In as printed condition we find 5.6% ferritic structures which are reduced to 0.2 % after heat-treatment at 1050 ºC.



As-printed XY
100x Magnification

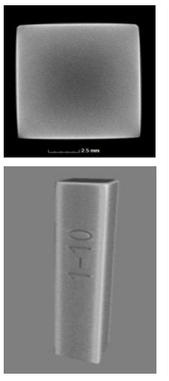
As-printed XY
1000x Magnification



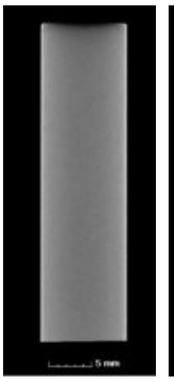
HT1050 XY
100x Magnification

Tomography

Computed Tomography Scan of 3D printed sample part in SS316L without detectable voids or defects. Resolution of 24 µm per pixel.



3D / Top View



Left View

Front View

Relative density as 3D printed	99.96%

Mechanical Properties

Results show that specimens printed using Meltio's wire-laser metal 3D printed process perform at the same level as samples made with conventional manufacturing methods. Results show low deviations and near isotropic properties even in the as printed state without the application of heat-treatments.

			UNE EN ISO 6892-1	
	Cast Properties ***(ASTM A403)***	**Wrought Properties** ***(ASTM A351)***	**Meltio XY Properties** ***(As printed)***	**Meltio XZ Properties** ***(As printed)***
Ultimate Tensile strength (UTS) [MPa]	515	550	643 ± 16	655 ± 28
Yield strength [MPa]	208	260	429 ± 6	347 ± 11
Elongation [%]	40	35	38 ± 2	41 ± 4
			**Tests Carried Out In IDONIAL* info@idonial.com	

			UNE EN ISO 6507-1
	Cast Properties ***(ASTM A403)***	**Wrought Properties** ***(ASTM A351)***	**Meltio Properties** ***(As printed)***
Hardness [HV-30]	215	225	198
			**Test Carried Out In the University of Jaen (UJA)* info@strainanalysisuja.es

** Meltio's work on material characterization is carried out using the Meltio M450 and it remains under constant development. Specifications provided herein may not reflect the latest state of our research. For further information and questions please contact us via info@meltio3d.com.*

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