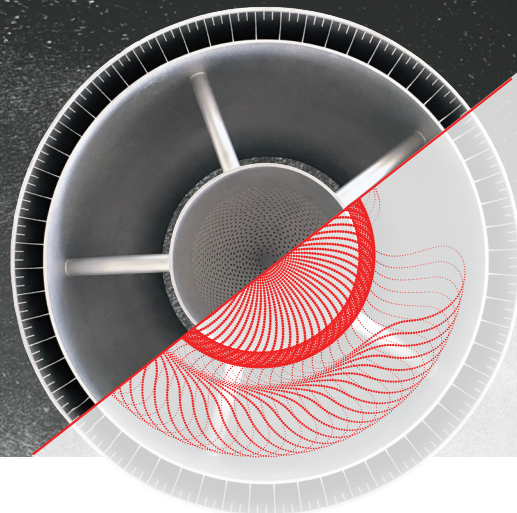


Additive Manufacturing

316L Stainless Steel



Designed for Processing in Laser Powder Bed Fusion (PBF-LB), Electron Beam Powder Bed Fusion (PBF-EB) or Directed Energy Deposition (DED) Systems

MetcoAdd™ 316L is a family of austenitic steel powders with chemistry similar to EN 1.4404 and UNS S316603

Room temperature static properties of PBF-LB processed, as-built, material coupons have been shown to be comparable to those of AMS 5424.

For reference purposes Oerlikon has processed MetcoAdd 316L-A using fixed parameters and 40 µm layer thickness to provide data below. Additional testing has been performed by an extensive network of consortia and customer partners on a broader range of machine types. Properties may be optimized based on application specific requirements.

Applications

- Aerospace: Clamping elements and heat exchangers
- Medical: Surgical tools and orthopedic implants
- Transport: Maritime components
- Tooling: Pressure injection dies and molds
- Consumer: Jewelry and watch components

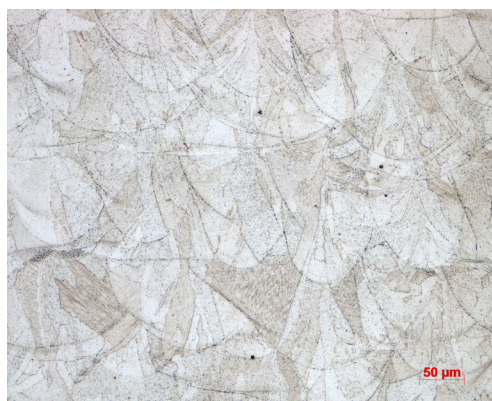
Typical As-built Properties (316L-A) ^{[1] [2] [3]}

	Concept Laser M2 Cusing	EOS M290	Test Method
Ultimate Tensile Strength (MPa), XY/Z	670±2 / 635±9	677±7 / 609±2	ASTM E8
Yield Strength (MPa), XY/Z	548±15 / 491±4	562±12 / 500±3	
Elongation at break %, XY/Z	45±2 / 44±8	45±3 / 59±1	
Hardness (VHN _{300g})	216±23	228±6	ASTM E384-17
Relative Density %	>99.6%	>99.8%	Internal Spec.

[1] Disclaimer: All data published in this datasheet has been shared for reference purposes only and is not sufficient to design or certify parts. No warranty or guarantee is made against these results.
 [2] Bounds are based on one standard deviation of each population with ten samples per orientation and machine. Test specimens were 6.35 mm diameter round bars machined from coupons (75x75x13mm). Direction XY data is an average of both X and Y horizontal build orientations.
 [3] The process parameters and heat treatments of AM builds produced with other powder cuts (316L-D) and or AM processes (DED and PBF-EB) may be optimized based on application specific requirements.

As-built Microstructure (x 20 magnification, Vertical Build Direction)

Concept Laser M2 Cusing



EOS M290



MetcoAdd 316L-A

Chemical Composition

	Weight Percent (nominal)					
	Fe	Cr	Ni	Mo	C	Other
MetcoAdd 316L-A / 316L-D	Balance	18	12	2	< 0.03	< 1.0

Particle Size Distribution and Hall Flow

	Nominal Range [μm]	D90 [μm]	D50 [μm]	D10 [μm]	Hall Flow [s/50 g]
MetcoAdd 316L-A	-45 +15	46	30	19	< 20
MetcoAdd 316L-D	-106 + 45	-	-	-	-

For the nominal range, particle size analysis 45 μm or above measured by sieve (ASTM B214), analysis below 45 μm by laser diffraction (ASTM C 1070, Microtrac). | Fractional analysis (D90, D50, D10) are nominal values by laser diffraction. Hall flow (ASTM B213).

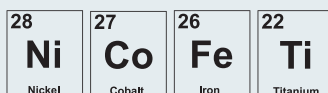
Product Information

Classification	Alloy, Iron Base
Chemistry	FeCrNiMoC
Manufacture	Gas atomized (Nitrogen)
Morphology	Spheroidal
Apparent Density	>4 g/cm ³ (typical)
Solidus	1390 \pm 10 °C / 2534 \pm 18 °F
Liquidus	1448 \pm 10 °C / 2638.4 \pm 18 °F
Process	Laser Powder Bed Fusion (PBF-LB) Electron Beam Powder Bed Fusion (PBF-EB) Directed Energy Deposition (DED)
Safety Data Sheet	50-1990 www.oerlikon.com/metco
Package size	316L-A: 4.5 kg / 10 lb approx. (stock) 316L-D: 4.5 kg / 10 lb approx. (stock)
Distribution	Global
Order No.	316L-A: 1093739 316L-D: 1305325

Usage Recommendations

- Blend contents prior to use to prevent segregation
- Keep in the original container, or an approved alternative, tightly closed when not in use
- Powder from previously opened containers should be stored in a humidity-controlled environment

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am



AM Metal Powder Portfolio

Check our full portfolio at <https://www.oerlikon.com/am/en/offerings/metal-powders> or contact us at am@oerlikon.com

We have a broad range of existing alloys, supported by ongoing development. We also know that current off-the-shelf solutions in AM cannot answer every production need. Our R&D teams can rapidly design, optimize, and produce new and custom alloy chemistries for pilot atomization and AM validation in our production facilities.

www.oerlikon.com/am