XACT METAL

Material Data Sheet

Austenitic Stainless Steel 316L

Printer Process Specifications

Material	316L (UNS S31673, 1.4441)
Layer Thickness	30 microns
LAser Diameter	100 microns
Laser Power	200 W
Additive Manufacturing System	XM200G

Material Description

316L is an austenitic stainless steel alloyed with up to 18% chromium, 14% nickel, & 3% molybdenum and with less than 0.03% carbon. The low carbon content minimizes sensitization (carbide precipitation at grain boundaries) and subsequently enhances weldability. It is a very popular alloy commonly used in petrochemical, food processing, marine, consumer/lifestyle, and similar applications requiring corrosion resistance, impact toughness, and good weldability.

Material Properties

- High hardness and toughness
- High corrosion resistance
- Highly machinable / Can be polished and shot peened
- Good weldability

Applications

- Industrial processing components such as spindles and screws
- Surgical tools
- Maritime components
- Cutlery, kitchenware, and fashion eyewear

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General Wrought Material Data [1]

Density	8 g/cc
Thermal Conductivity	16.2 W/m·K
Melting Range	1371 to 1399 °C
Coefficient of Thermal Expansion (0 to 100 °C)	16 x 10^6 / K

[1] From AZO Materials

Chemical Composition [2]

Element	**Mass %**
Fe	Balance
Cr	16.00 to 18.00
Ni	10.00 to 14.00
Mo	2.00 to 3.00
Mn	2.00 Max
Si	1.00 Max
N	0.10 Max
O	0.10 Max
P	0.04 Max
C	0.03 Max
S	0.03 Max

[2] From PraxAir Surface Technologies

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Mechanical Properties

XM200C	**Mean Value**	**Standard Deviation**
Component Density [g/cc]	7.99	--
Percentage of Theoretical density	99.8%	--
Ultimate Tensile Strength (UTS) - ASTM E8		
Horizontal (XY) [ksi (MPa)]	88.0 (607)	1.0 (7.0)
Vertical (Z) [ksi (MPa)]	83.0 (572)	1.0 (7.1)
Yield Strength - ASTM E8		
Horizontal (XY) [ksi (MPa)]	66.0 (455)	2.0 (14)
Vertical (Z) [ksi (MPa)]	66.0 (455)	1.0 (6.9)
Elongation at Break - ASTM E8		
Horizontal (XY)	37%	2.0%
Vertical (Z)	44%	2.3%
Hardness (Rockwell) - ASTM E18	90 HRB	0.9 HRC

XM200G	Mean Value	Standard Deviation
Component Density [g/cc]	7.99	--
Percentage of Theoretical density	99.8%	--
Ultimate Tensile Strength (UTS) - ASTM E8		
Horizontal (XY) [ksi (MPa)]	89.5 (617)	0.44 (3.1)
Vertical (Z) [ksi (MPa)]	83.0 (572)	0.41 (2.8)
Yield Strength - ASTM E8		
Horizontal (XY) [ksi (MPa)]	67.4 (465)	0.23 (1.6)
Vertical (Z) [ksi (MPa)]	63.5 (438)	1.0 (6.9)
Elongation at Break - ASTM E8		
Horizontal (XY)	43%	1.0%
Vertical (Z)	48%	5.8%
Hardness (Rockwell) - ASTM E18	90 HRB	0.8 HRC

Powder Particle Size Distribution [(3)]

Per ASTM B822 (Using Microtrac)	Min	Max
-16	N/A	5
d10 (microns)	15	25
d50 (microns)	25	35
d90 (microns)	40	60

[(3)] From PraxAir Surface Technologies

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Xact Metal has spent significant effort to ensure the content of this Material Data Sheet is correct at the date of publication but makes no warranties or representations regarding the content. Xact Metal excludes liability for any inaccuracies in this document.

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