

# SS 316L-0407 powder for additive manufacturing

## Process specification

<b>Powder description</b>	Stainless steel powder
<b>Layer thickness</b>	50 µm
<b>Laser power</b>	200 W
<b>Additive manufacturing system</b>	AM250

## Material description

316L-0407 alloy is an austenitic stainless steel which comprises iron alloyed with chromium of mass fraction up to 18%, nickel up to 14% and molybdenum up to 3%, along with other minor elements. The alloy is an extra-low carbon variation on the standard 316L alloy.

Due to its low carbon content, 316L-0407 is resistant to sensitisation (carbide precipitation at grain boundaries) and displays good welding characteristics. It also has low stress to rupture and tensile strength at high temperatures.

## Material properties

- High hardness and toughness
- High corrosion resistance
- High machine-ability
- Can be highly polished

## Applications

- Plastic injection and pressure die-casting moulds, extrusion dies
- Surgical tools
- Cutlery and kitchenware
- Maritime components
- Spindles and screws
- General engineering

## Generic data - wrought material

<b>Density</b>	7.99 g/cm <sup>3</sup>
<b>Thermal conductivity</b>	16.2 W/mK
<b>Melting range</b>	1371 °C to 1399 °C
<b>Coefficient of thermal expansion</b> (see note 1)	16 10 <sup>-6</sup> K <sup>-1</sup>

Note 1 In the range of 0 °C to 100 °C.

Note 2 Tested at ambient temperature by Nadcap and UKAS accredited independent laboratory. Test ASTM E8. Machined prior to testing.

Note 3 Tested to ASTM E384-11, after polishing.

Note 4 Tested to JIS B 0601-2001 (ISO 97). As built after bead blasting.

## Composition of powder

Element	Mass (%)
Iron	Balance
Chromium	16.00 to 18.00
Nickel	10.00 to 14.00
Molybdenum	2.00 to 3.00
Manganese	< 2.00
Silicon	< 1.00
Nitrogen	< 0.10
Oxygen	< 0.10
Phosphorus	< 0.045
Carbon	< 0.03
Sulphur	< 0.03

## Mechanical properties of additively manufactured components

	As Built
<b>Upper tensile strength (UTS)</b> (See note 2)	
Horizontal direction (XY)	662 MPa ±2 MPa
Vertical direction (Z)	574 MPa ±10 MPa
<b>Yield strength</b> (see note 2)	
Horizontal direction (XY)	518 MPa ±5 MPa
Vertical direction (Z)	440 MPa ±10 MPa
<b>Elongation at break</b> (see note 2)	
Horizontal direction (XY)	38% ±1%
Vertical direction (Z)	26% ±12%
<b>Modulus of elasticity</b> (see note 2)	
Horizontal direction (XY)	167 GPa ±8 GPa
Vertical direction (Z)	134 GPa ±17 GPa
<b>Hardness (Vickers)</b> (see note 3)	
Horizontal direction (XY)	212 HV0.5 ±2 HV0.5
Vertical direction (Z)	220 HV0.5 ±6 HV0.5
<b>Surface roughness (R<sub>a</sub>)</b> (see note 4)	
Horizontal direction (XY)	10 µm to 16 µm
Vertical direction (Z)	6 µm to 8 µm

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