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# SS 316L-0407 powder for additive manufacturing

## Process specification

| | |
|---|---|
| **Powder description** | Stainless steel powder |
| **Layer thickness** | 50 µm |
| **Laser power** | 200 W |
| **Additive manufacturing system** | 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

| | |
|---|---|
| **Density** | 7.99 g/cm$^3$ |
| **Thermal conductivity** | 16.2 W/mK |
| **Melting range** | 1 371 °C to 1 399 °C |
| **Coefficient of thermal expansion** (see note 1) | 16 $10^{-6}$ $K^{-1}$ |

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), after bead blasting.

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## 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 |
|---|---|
| **Upper tensile strength (UTS)** *(See note 2)* | |
| Horizontal direction (XY) | 676 MPa ±2 MPa |
| Vertical direction (Z) | 624 MPa ±17 MPa |
| **Yield strength** *(see note 2)* | |
| Horizontal direction (XY) | 547 MPa ±3 MPa |
| Vertical direction (Z) | 494 MPa ±14 MPa |
| **Elongation at break** *(see note 2)* | |
| Horizontal direction (XY) | 43% ±2% |
| Vertical direction (Z) | 35% ±8% |
| **Modulus of elasticity** *(see note 2)* | |
| Horizontal direction (XY) | 197 GPa ±4 GPa |
| Vertical direction (Z) | 190 GPa ±10 GPa |
| **Hardness (Vickers)** *(see note 3)* | |
| Horizontal direction (XY) | 198 HV0.5 ±8 HV0.5 |
| Vertical direction (Z) | 208 HV0.5 ±6 HV0.5 |
| **Surface roughness** ($R_a$) *(see note 4)* | |
| Horizontal direction (XY) | 4 µm to 6 µm |
| Vertical direction (Z) | 4 µm to 6 µm |

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