XACT METAL

Material Data Sheet

Inconel 625

Printer Process Specifications

Material	Inconel 625 (UNS N06625, 2.4856)
Layer Thickness (µm)	30
Laser Power (W)	100
Additive Manufacturing System	XM200C
Print Parameters	In625-C-30-210312

Material Description

Inconel 625 is a Ni-Cr-Mo superalloy with high strength and excellent performance at high temperatures. Originally made for steam-line piping, Inconel 625 has many advantageous properties for a range of applications. The chromium-nickel matrix resists most oxidizing agents, while the molybdenum protects against pitting corrosion. Due to its niobium content, Inconel 625 has excellent weldability, resisting intergranular cracking, and performs well in tensile and creep testing due to its precipitation-strengthening alloying elements.

Material Properties

- High strength and creep resistance
- High corrosion resistance
- High performance at elevated temperatures
- Excellent weldability

Applications

- Aircraft ducting and exhaust systems
- Marine propeller blades and mooring lines
- Chemical processing
- Nuclear applications

XACT METAL

General Wrought Material Data [1]

Density [g/cc]	8.44
Thermal Conductivity [W/m*K]	9.86
Melting Range [°C]	1290-1350
Coefficient of Thermal Expansion (0 to 100 °C) [K^-1]	1.278 x10^{-5}

[1] From AZO Materials

Chemical Composition [2]

Element	**Mass %**
Ni	Balance
Cr	20.00-23.00
Mo	3.15-4.15
Nb+Ta	4.75-5.50
Fe	5.00 Max
Co	1.00 Max
Ti	0.40 Max
Al	0.40 Max
Si	0.50 Max
Mn	0.50 Max
C	0.10 Max
Cu	0.05 Max
Ta	0.05 Max
P	0.015 Max
S	0.015 Max
B	0.010 Max

[2] From Praxair Surface Technologies

XACT METAL

Heat Treatment

Testing samples were stress relieved at 870 °C for 1 hour and air cooled.

Mechanical Properties

	Mean Value	**Standard Deviation**
Component Density [g/cc]	8.44	--
Percentage of Theoretical density	99.90%	--
Ultimate Tensile Strength (UTS) - ASTM E8		
Horizontal (XY) [ksi (MPa)]	142 (979.9)	2.10 (14.48)
Vertical (Z) [ksi (MPa)]	123 (848.1)	4.08 (28.15)
Yield Strength - ASTM E8		
Horizontal (XY) [ksi (MPa)]	93.7 (646.0)	1.25 (8.631)
Vertical (Z) [ksi (MPa)]	87.1 (600.7)	1.75 (12.07)
Elongation at Break - ASTM E8		
Horizontal (XY)	33%	2.95
Vertical (Z)	21%	3.37
Hardness (Rockwell) - ASTM E18	25.5 HRC	1.31 HRC
Surface Roughness [um]	4.27	--

XACT METAL

Powder Particle Size Distribution [3]

Per ASTM B822 (Using Microtrac)	Min	Max
-16	--	5.0
d10 (microns)	15	25
d50 (microns)	25	35
d90 (microns)	40	55

[3] From Praxair Surface Technologies

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.

May - 2021