XACT METAL

Material Data Sheet

Inconel 718

Printer Process Specifications

Material	Inconel 718 (UNS N07718, 2.4668)
Layer Thickness (µm)	30
Laser Power (W)	100
Additive Manufacturing System	XM200C
Print Parameters	IN718-C-30-210419

Material Description

Inconel 718 is a precipitation hardenable Ni-Cr-Fe alloy engineered for extremely high yield strength and tensile strength from cryogenic temperatures up to 1400 °C. Its aging process is slow, allowing inconel 718 to be welded without spontaneous hardening. Unlike nickel alloys hardened with aluminum or titanium, inconel 718 is very weldable, and is well suited for SLM. Like most nickel alloys, inconel 718 has excellent corrosion resistance in its useful temperature range.

Material Properties

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

Applications

- High temperature bolts and fasteners
- Gas turbine components
- Aircraft engine components
- Cryogenic applications

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General Wrought Material Data [1]

Density [g/cc]	8.22
Thermal Conductivity [W/m*K]	6.5
Melting Range [°C]	1370 - 1430
Coefficient of Thermal Expansion (0 to 100 °C) [K^-1]	1.28 x10^{-5}

[1] From AZO Materials

Chemical Composition [2]

Element	**Mass %**
Ni	50.00 - 55.00
Cr	17.00 - 21.00
Fe	15.00 - 21.00
Nb+Ta	4.75 - 5.50
Mo	2.80 - 3.30
Ti	0.65 - 1.15
Al	0.20 - 0.80
Co	1.00 Max
Mn	0.35 Max
Si	0.35 Max
Cu	0.30 Max
C	0.08 Max
Ta	0.05 Max
P	0.015 Max
S	0.015 Max
B	0.006 Max

[2] From Praxair Surface Technologies

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Heat Treatment

Testing samples were stress relieved at 950 °C for 1 hour and air cooled.

As Printed Mechanical Properties

	Mean Value	**Standard Deviation**
Component Density [g/cc]	8.14	--
Percentage of Theoretical density	99.71%	--
Ultimate Tensile Strength (UTS) - ASTM E8		
Horizontal (XY) [ksi (MPa)]	216 (1487)	5.29 (36.5)
Vertical (Z) [ksi (MPa)]	199 (1372)	0.812 (5.60)
Yield Strength - ASTM E8		
Horizontal (XY) [ksi (MPa)]	183 (1261)	3.00 (20.7)
Vertical (Z) [ksi (MPa)]	168 (1160)	1.71 (11.8)
Elongation at Break - ASTM E8		
Horizontal (XY)	10.6%	3.1
Vertical (Z)	7.3%	1.0
Hardness (Rockwell) - ASTM E18	46.0 HRC	0.2 HRC

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Powder Particle Size Distribution [3]

Per ASTM B822 (Using Microtrac)	Min	Max
-16	-	5
d10 (microns)	10	20
d50 (microns)	25	35
d90 (microns)	35	50

[3] From Praxair Surface Technologies

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