

Inconel 718

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Material & Process Capability

Inconel[®] 718 is a precipitation-hardenable nickel-based superalloy known for its superb tensile strength when subjected to extreme pressure and heat. It has rupture strength at temperatures up to 1290°F (980°C), making it ideal for high temperature applications such as gas turbine and power/process industry parts. The material is often used for critical applications in the aerospace, defense, and petrochemical industries.

The Velo3D intelligent additive printing solution uniquely enables companies to build the parts they need without compromising design or quality - resulting in complex parts higher in performance than traditional casting techniques or other additive methods.

General Process

In addition to its strength, Inconel 718 is characterized by its superb fatigue, creep and corrosion resistance in extreme environments subjected to high mechanical loads. However, it is a difficult metal to shape and machine using subtractive manufacturing techniques.

This data sheet specifies the expected mechanical properties and characteristics of this alloy when manufactured on a Velo3D Sapphire[®] System. All data is based on parts built using Velo3D standard 50 µm layer thickness parameters, using Praxair Tru-Form 718-35, a Velo3D-approved powder. Parts built from IN718 on a Sapphire System can be heat treated like those manufactured by other methods.



Typical Volume Rate ¹ , cc/hour	60
Density, g/cc (lbs/cubic in)	8.19 (0.296)
Relative Density, percent	99.9+
Surface Finish ² , S _a , µm (µin)	<15 (590) for angles >25° from horizontal

Mechanical Properties at Room Temperature

Property ³	As Printed		After Heat Treatment & HIP ⁴	
	Mean -3σ	Mean	Mean -3σ	Mean
Modulus of Elasticity, GPa (msi)	103 (14.9)	110 (15.9)	166 (24.1)	199 (28.9)
Ultimate Tensile Strength, MPa (ksi)	912 (132)	953 (138)	1286 (187)	1320 (191)
Yield (0.2% Offset), MPa (ksi)	512 (74.3)	603 (87.4)	1022 (148)	1063 (154)
Elongation At Break, percent	24.1	30.9	15.3	20.7
Hardness, HRC			42.3	43.4

1. Geometry-dependent. **2.** Depends on orientation and process selected. **3.** Mechanical & test samples printed in vertical orientation.

4. Heat treatment per ASTM F3055, Hot Isostatic Pressing: ASTM F3055, solution & age per AMS 5662.