

Stainless Steel 415

Material & Process Capability

Stainless Steel 415 is a chromium-nickel stainless steel with additional molybdenum. It exhibits high mechanical properties due to the concentration of molybdenum and nickel. Its molybdenum content also provides basic pitting and crevice corrosion resistance. The combination of good corrosion resistance and excellent strength and toughness makes it a perfect candidate for mechanically highly stressed components in wet corrosive environments.

General Process

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 with Velo3D standard 50 µm layer thickness parameters, using Carpenter CT 415-AAVD 45-90 µm, a Velo3D approved powder.



Density, g/cc (lbs/cubic in)	7.8 (0.281)
Relative Density, percent	99.9+
Surface Finish ¹ , S _a , µm (µin)	<30 (1180)

Mechanical Properties at Room Temperature

Property ²		After Heat Treatment ⁴						
		Ultimate Tensile Strength, MPa (ksi)		Yield (0.2% Offset), MPa (ksi)		Elongation At Break, percent		
Process Recipe	TBR (cc/h) ³	Sample Size	Mean-3σ	Mean	Mean-3σ	Mean	Mean-3σ	Mean
1kW/50 µm	35	66	866 (126)	887 (129)	531 (77)	569 (83)	18.9	21.8

- For angles >25° from horizontal, actual finish depends on orientation and process selected.
- Mechanical & test samples printed in vertical orientation, machined to ASTM E8 (round specimen #3).
- TBR: Theoretical Build Rate (TBR) is a per-laser build rate calculated from the process conditions of bulk core as *scan speed x hatch spacing x layer thickness*. This value represents a single laser only and is reported for comparison purposes across different materials and recipes, but does not correspond to true build rate, which is dependent on geometry and system characteristics (i.e. number of lasers, recoat times, etc.)
- Solution anneal at 1052 °C (1925 °F) for 2 hours. Temper at 613 °C (1135 °F) for 5 hours.