

# Aluminum F357

## Material & Process Capability

Aluminum F357 is a lightweight, corrosion resistant, and highly dynamic load-bearing material ideal for applications that require a combination of mechanical and thermal load endurance with low weight. It is typically used for heat transfer and other components in the defense and automotive industries.

The VELO<sup>3D</sup> 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

Aluminum F357 is a **foundry-grade and beryllium-free** aluminum-silicon alloy, similar to A357. It has excellent weld ability and corrosion resistance and is heat-treatable to T5, T6, and T7.

This data sheet specifies the expected mechanical properties and characteristics of this alloy when manufactured on a VELO<sup>3D</sup> Sapphire<sup>®</sup> System. Parts built from Aluminum F357 on a Sapphire System can be heat treated using processes similar to those used on parts manufactured by other methods. All data is based on parts built with VELO<sup>3D</sup> standard 50 µm layer thickness parameters. VELO<sup>3D</sup> uses Tekna Aluminium F357.

Accuracy, Small Parts	±0.050 (±0.002)	mm (in)
Accuracy, Large Parts	±0.2	percent
Minimum Wall Thickness; up to 500:1 aspect ratio	0.200 (0.008) mm	mm (in)
Typical Volume Rate <sup>1</sup>	80	cc per hr
Density	2.67 (0.097)	g/cc (lbs/in <sup>3</sup> )
Relative Density	99.9+	percent
Surface Finish, Sa <sup>2</sup>	6 (240)	µm (µin)

### Mechanical Properties at Room Temperature

Property <sup>3</sup>	As Printed		After Heat Treatment <sup>5</sup>		After Hot Isostatic Pressing <sup>6</sup>		
	Mean -3σ/ Min	Average	Mean -3σ/ Min	Average	Mean -3σ/ Min	Average	
Modulus of Elasticity <sup>4</sup>	53.4	73.0	48.2	71.8	49.2	75.8	GPa
Ultimate Tensile Strength	332 (48.1)	350 (50.7)	279 (40.5)	307 (44.5)	302 (43.8)	329 (47.7)	MPa (KSI)
Yield (0.2% Offset)	230 (33.4)	238 (34.5)	225 (32.6)	252 (36.6)	226 (32.8)	262 (37.9)	MPa (KSI)
Elongation At Break	2.61	7.09	5.45	10	9.12	12.76	percent

1. Geometry-dependent. 2. Depends on orientation and process selected. 3. Mechanical & test samples printed in vertical orientation. 4. For reference; estimated from ASTM E8 tensile testing. 5. Heat treatment solution at 540°C for 30 minutes, water quench and age at 160°C for 6 hours. 6. HIP at 510°C at 15 KSI for 4 hours, rapid cool, solution at 540°C for 30 minutes, water quench and age at 160°C for 6 hours.