

# Aluminum F357

## Material & Process Capability

Aluminum F357 is an Al-Si-Mg alloy originally developed for castings. It is a lightweight, corrosion resistant alloy with high strength and toughness and excellent thermal conductivity. It is typically used for heat transfer and structural applications in the defense and automotive industries. F357 is easily weldable and machinable and is heat treatable to T6.

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

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<sup>®</sup> 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)	(in)
Accuracy, Large Parts	±0.2	percent
Minimum Wall Thickness; up to 500:1 aspect ratio	0.200 (0.008)	(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.