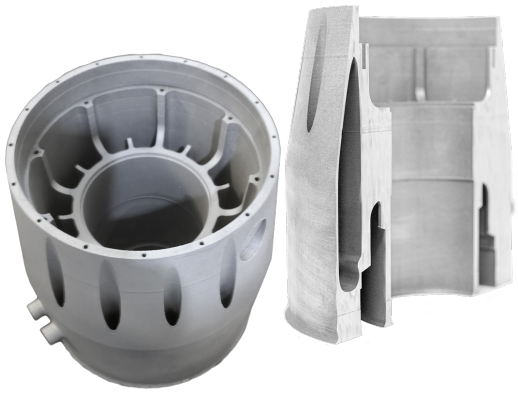
PRELIMINARY

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[3D] 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 beryllium-free aluminum-silicon alloy, similar to A357. It has excellent weldability 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[3D] Sapphire® 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[3D] standard 50 µm layer thickness parameters. VELO[3D] 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 (in)
Typical Volume Rate[1]	80	cc per hr
Density	2.67 (0.097)	g/cc (lbs/in^3)
Relative Density	99	percent
Surface Finish, Sa[2]	6 (240)	µm (µin)

Mechanical Properties at Room Temperature

	As Printed		After Heat Treatment[5]		After Hot Isostatic Pressing[6]		
Property[3]	Mean -3σ/Min	Average	Mean -3σ/Min	Average	Mean -3σ/Min	Average	
Modulus of Elasticity[4]	53.4	73.0	48.2	71.8	49.2	75.8	GPa (MSI)
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. Note: specifications may change without notice.

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