

Material & Process Capability

Aheadd is Constellium’s new generation of optimized high-performance aluminium powders for Laser Powder Bed Fusion (LPBF). This Aluminum-Iron-Zirconium powder solution designed specifically for additive manufacturing using laser powder bed fusion (L-PBF). Aheadd CP1 brings multiple advantages including high strength & ductility, excellent thermal & electrical conductivity, high productivity LPBF processing, and simplified postprocessing. It is ideal for heat transfer applications in the motor sports, defense, & aerospace industries.

General Process

This data sheet specifies the expected mechanical properties and characteristics of this alloy when manufactured on a Velo3D Sapphire System. Parts built from Aheadd CP1 on a Sapphire System can be heat treated using a simplified process compared to other Aluminum alloys making it an attractive choice for consistent material properties. All data is based on parts built with Velo3D standard 50 µm layer thickness parameters. Velo3D uses Constellium Aheadd CP1.



	Sapphire Sapphire 1MZ	Sapphire XC Sapphire XC 1MZ
Typical Volume Rate ¹ , cc/hour	73	290
Density, g/cc (lbs/cubic in)	2.67 (0.097)	
Relative Density, percent	99+	
Surface Finish ² , S _a , µm (µin)	<20 (787)	

Mechanical Properties at Room Temperature

Property ³	After Heat Treatment ⁴	
	Mean-3σ	Mean
Modulus of Elasticity, GPa (msi)	55.4 (8.04)	63.6 (9.22)
Ultimate Tensile Strength, MPa (ksi)	330 (47.9)	335 (48.6)
Yield (0.2% Offset), MPa (ksi)	296 (42.9)	302 (43.8)
Elongation At Break, percent	13.7	17.6

1. Geometry-dependent. 2. For angles >25° from horizontal, actual finish depends on orientation and process selected.

3. Mechanical & test samples printed in vertical orientation, machined to ASTM E8 (round specimen #3). 4. Heat treatment solution at 400°C (752°F) for 4 hours dwell.