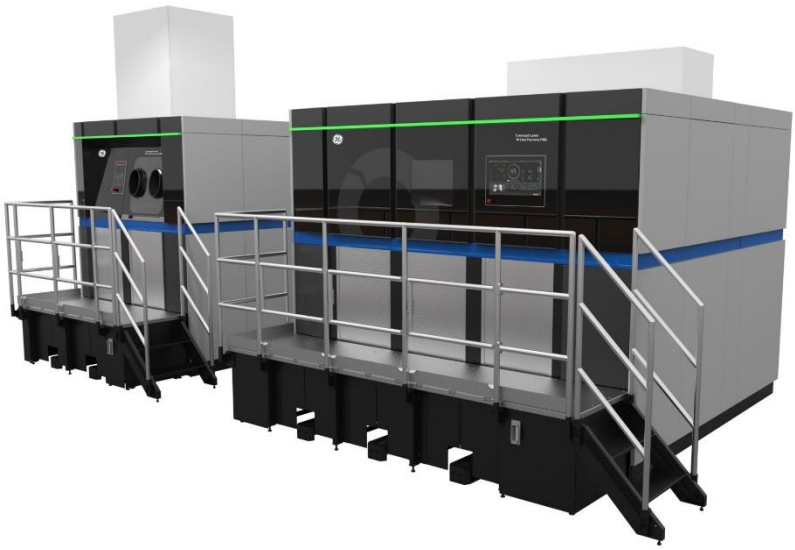
13 Al

22 Ti | 24 Cr | 26 Fe | 27 Co | 28 Ni | 29 Cu

M Line Aluminum A205

Parameters for GE Additive's Concept Laser M Line

Data in this material datasheet represent material built with a 40µm layer thickness and in a nitrogen atmosphere on a Concept Laser M Line. Values listed are typical.

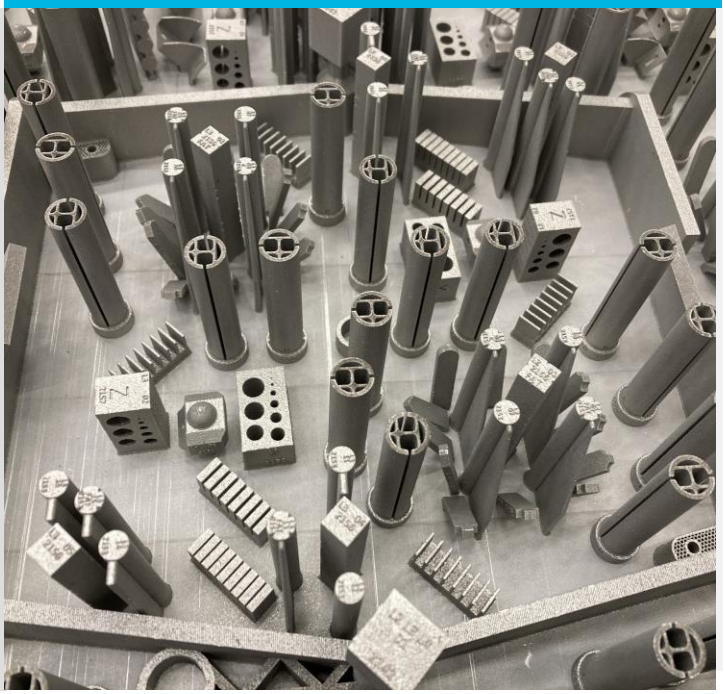


High-strength aluminum alloy A205

A205 is a lightweight aluminum alloy derived from the aerospace-approved A20X™ alloy. Due to a unique solidification mechanism, this material exhibits a highly refined microstructure leading to exceptional high strength, exceeding e.g. the yield strength of AlSi10Mg by more than 150 MPa (+60%) in the T7 or T6 state, respectively. Additionally, A205 demonstrates excellent thermal stability, stress corrosion resistance, and comparatively superior fatigue properties to other AlSi-based additively manufactured alloys. These superior properties – achieved through high cooling rates to create a high-density, crack-free, and finely scaled cellular microstructure – make A205 an excellent choice for additively manufactured applications.

M Line Aluminum A205

The novel A205 parameter for the Concept Laser M Line is developed leveraging the performance of the previous machine generations. The balanced parameter is a 40 µm parameter that produces surface roughness less than 10 µm without bead blasting or shot peening, while delivering good productivity. In the heat-treated condition superior elongation compared to castings of the same alloy (AMS4471) can be achieved. The balanced parameter can be used with either a rubber or steel recoater blade, depending on application needs.



M Line A205

With appropriate approval*, A205 can be used for lightweight components in aerospace and industrial applications.

Data in this material datasheet represent material built with 40µm layer thickness and in a nitrogen atmosphere on a Concept Laser M Line machine. Values listed are typical.

POWDER CHEMISTRY

Aluminum A205 powder chemical composition according to AMS 4471.

MACHINE CONFIGURATION

- M Line
- Nitrogen gas
- Steel recoater blade

AVAILABLE PARAMETERS

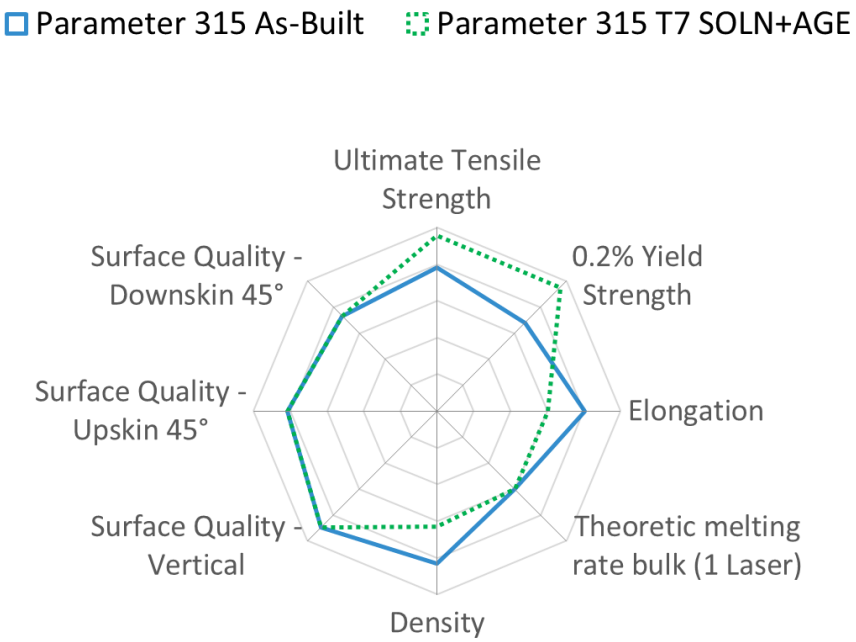
- **Balanced Parameter 315** 40 µm layer thickness, Rubber recoater

THERMAL STATES

1. As-built
2. T7 solution + age (T7 SOLN + AGE)

Please contact GE Additive for more details regarding the heat treatment.

HEAT TREAT COMPARISON



Spider plot is generated by normalizing typical material data (containing both horizontal and vertical) against a range defined for each material family. For **aluminum alloys,** the ranges are as follows: UTS: 0-500 MPa, 0.2%YS: 0-425 MPa, Density: 99-100%, Elongation: 0-20%, Productivity: 5-30 cm^3/hr, Surface Quality (all): 5-40 µm.

TYPICAL BUILD RATE

Balanced Parameter

	(cm³/h)
Typical build rate w/coating	10-70
Theoretical melting rate bulk per Laser[1]	21.0

[1]Calculated (layer thickness x scan velocity x hatch distance)

PHYSICAL DATA AT ROOM TEMPERATURE

	Surface Roughness Ra** - Overhang (µm)		
	45°	60°	75°
Upskin	12	9	7
Downskin	15	12	7

	Surface Roughness Ra** (µm)
H	--
V	9

	Relative Density (%)		Hardness (HV5)		Poisson's Ratio	
Thermal State	H	V	H	V	H	V
As-Built	99.8	99.8	108	--	--	--
T7 SOLN + AGE	99.6	99.6	--	--	--	--

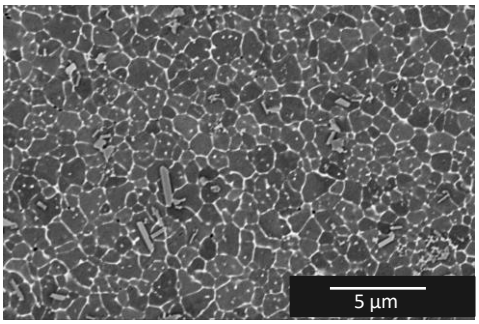
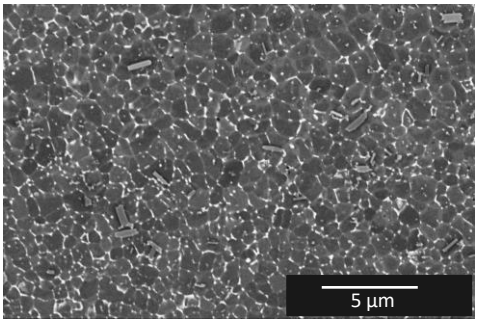
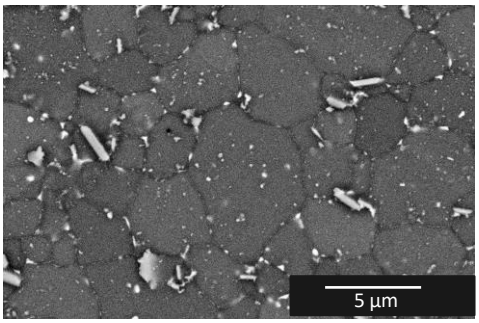
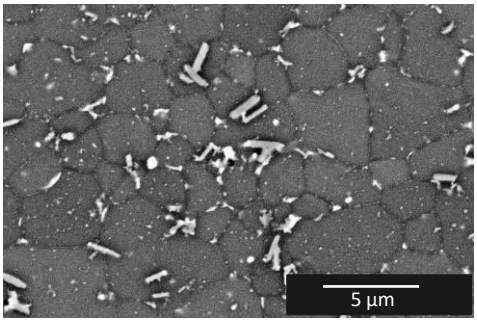
TENSILE DATA

Tensile testing done in accordance with ASTM E8 and ASTM E21

Test Temperature: RT	Modulus of Elasticity (GPa)		0.2% Yield Strength (MPa)		Ultimate Tensile Strength (MPa)		Elongation (%)		Reduction of Area (%)	
Thermal State	H	V	H	V	H	V	H	V	H	V
As-Built	74	74	310	260	390	390	15.5	15	28.0	23.0
T7 SOLN + AGE	75	73	405	400	480	470	8.5	7.0	--	--

H: HORIZONTAL (XY) orientation
V: VERTICAL (Z) orientation

* All of the figures contained herein are approximate only. The figures provided are dependent on a number of factors, including but not limited to, process and machine parameters, and the approval is brand specific and/or application specific. The information provided on this material data sheet is illustrative only and cannot be relied on as binding.
** Roughness measurements have been performed according to DIN EN ISO 4287 and DIN EN ISO 4288. In general analysis of the surface quality is strongly dependent on the methodology used and therefore deviations might be observed depending on methodology used. Vertical and horizontal sidewalls have been characterized using a tactile system, overhangs using an optical system.

	Horizontal	Vertical
As-Built		
T7 SOLN + AGE		

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