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

M2 Series 5 Titanium Ti-6242

Parameters for GE Additive's Concept Laser M2 Series 5

Data in this material datasheet represents material built with 30 μm layer thickness and in an argon atmosphere on a Concept Laser M2 Series 5 single-laser or dual-laser machine, and requires build plate heating. Values listed are typical.



Titanium Ti-6242

Titanium alloy Ti-6Al-2Sn-4Zr-2Mo-0.08Si (Ti-6242) has a chemical composition et al. according to AMS 4919.

Ti-6242 is a near-alpha alloy and combines high mechanical strength, weldability, high temperature stability and creep resistance up to temperatures of 550°C (versus approximately 400 °C for Ti-6Al-4V).

Ti-6242 is used to manufacture lightweight production parts where high temperature stability is critical. Examples from the aerospace industry include turbine components, afterburner structures and various applications in the hot zone of the airframe.

M2 Series 5 Ti-6242

The novel Ti-6242 parameter has recently been developed for the Concept Laser M2 Series 5 machine. The base parameter is a 30 μm parameter that produces surface roughness less than 10 μm without bead blast or shot peening. Moreover, the microstructure shows extremely low amount of porosity without appearance of cracks. The parameter has outstanding tensile properties exceeding the limits for conventional processed Ti-6242 according to AMS4919J in the stress relieved state.



M2 Series 5 Ti-6242

With appropriate approval* Ti-6Al-2Sn-4Zr-2Mo-0.08Si (Ti-6242) can be used for the production of lightweight components in the field of motorsport and aerospace industries where it is used in jet compressors and airframe structures.

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POWDER CHEMISTRY

Ti-6242 powder chemical composition according to AMS 4919. For additional information on Ti-6242 powder, visit <https://www.advancedpowders.com/powders/titanium/ti6242>.

MACHINE CONFIGURATION

- Concept Laser M2 Series 5 (single-laser or dual-laser)
- Argon Gas
- Steel recoater blade

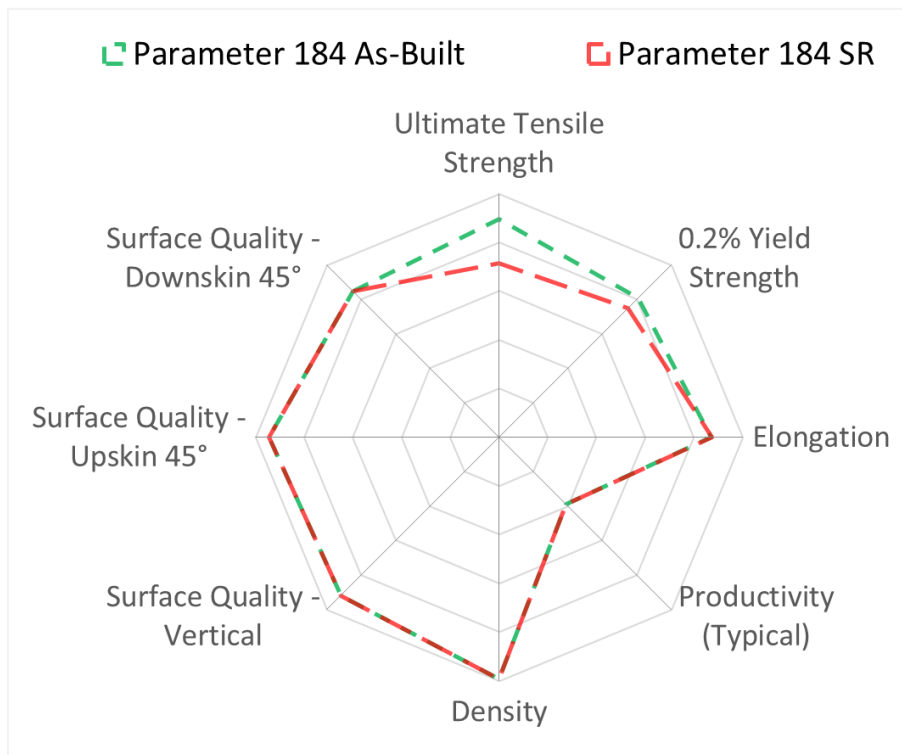
AVAILABLE PARAMETERS

- **Base Parameter 184** 30 µm layer thickness, steel recoater

THERMAL STATES

1. As-Built
2. Stress Relief (SR)
SR: 900°C, 1 hour in argon, furnace cooling

THERMAL STATE COMPARISON



Spider Plot is generated by normalizing typical material data (containing both horizontal and vertical data) against a range defined for each material family. For **Ti-6242**, the ranges are as follows: UTS: 600-1250 MPa, 0.2%YS: 500-1100 MPa, Elongation: 0-20 %, Density: 99-100 %, Productivity: 5-30 cm³/h, Surface Quality (all): 50-5 µm

| | (cm ³ /h) |
|--|----------------------|
| Typical build rate ¹ w/coating | 11.6 |
| Theoretical melting rate ² bulk per laser | 13.0 |

¹Using standard Factory Acceptance Test layout and 2 lasers

²Calculated (layer thickness x scan velocity x hatch distance)

PHYSICAL DATA AT ROOM TEMPERATURE

| | Surface Roughness Ra - Overhang (µm) | | | | Surface Roughness Ra (µm) | |
|----------|--------------------------------------|-----|-----|---|---------------------------|---|
| | 45° | 60° | 75° | | H | V |
| Upskin | 8 | 7 | 7 | H | 6 | |
| Downskin | 12 | 8 | 6 | V | 9 | |

| | Relative Density (%) | | Hardness (HV10) | | Poisson's Ratio | |
|----------|----------------------|------|-----------------|----|-----------------|----|
| | H | V | H | V | H | V |
| As-Built | 99.9 | 99.9 | 360 | -- | -- | -- |
| SR | 99.9 | 99.9 | 349 | -- | -- | -- |

Thermal State

As-Built

SR

TENSILE DATA

Tensile testing done in accordance with ASTM E8 and ASTM E21

Test Temperature:

RT

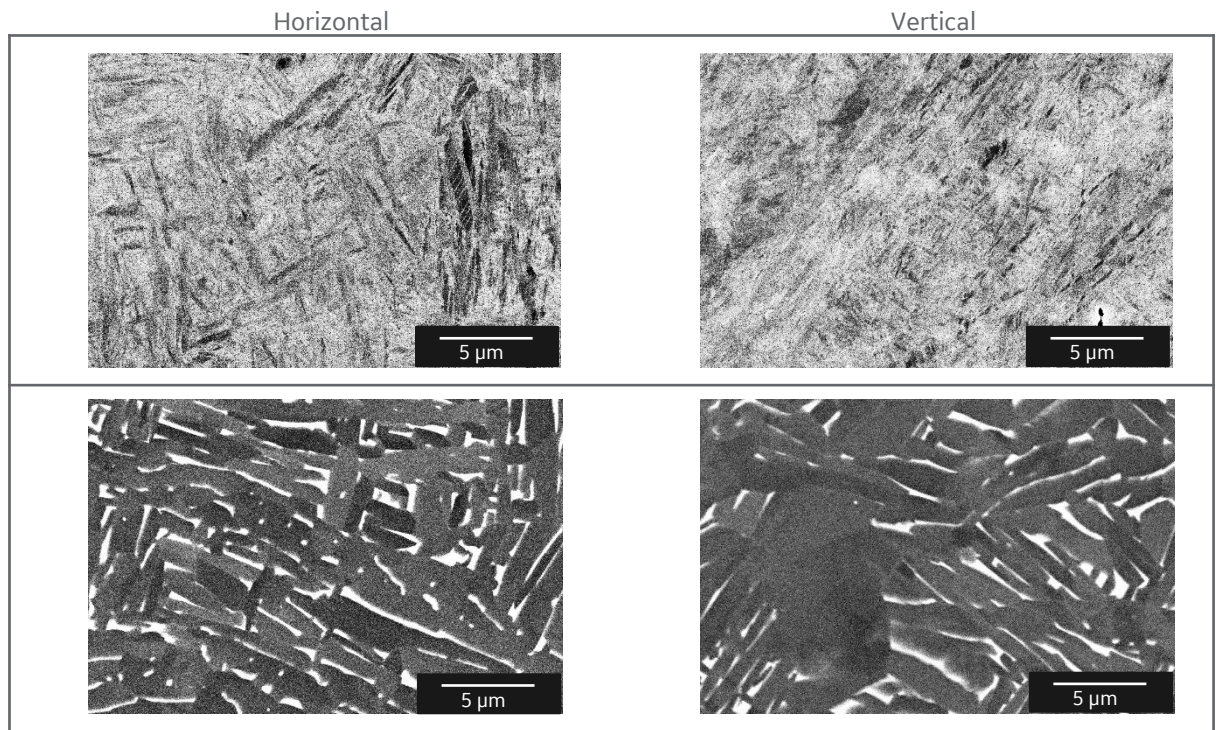
| | Modulus of Elasticity (GPa) | | 0.2% Yield Strength (MPa) | | Ultimate Tensile Strength (MPa) | | Elongation (%) | | Reduction of Area (%) | |
|----------|-----------------------------|-----|---------------------------|-----|---------------------------------|------|----------------|------|-----------------------|----|
| | H | V | H | V | H | V | H | V | H | V |
| As-Built | 111 | 104 | 1025 | 940 | 1245 | 1120 | 8.5 | 18.0 | -- | -- |
| SR | 121 | 117 | 985 | 910 | 1065 | 1060 | 12.0 | 15.0 | -- | -- |

Thermal State

As-Built

SR

SEM IMAGES



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.