



## ADDITIVE MANUFACTURING PRODUCTS

# Pure Tantalum AM Parts (UNS R05200)

Tantalum's high temperature mechanical properties are useful in vacuum furnace and aerospace propulsion applications. Heat exchangers and reactor vessels used in the processing of concentrated oxidizing acids utilize Tantalum for its outstanding corrosion performance. Tantalum's high density (16.6 g/cm<sup>3</sup>) and ductility at cryogenic temperatures make it well suited for radiation shielding in spacecraft. Tantalum has excellent biocompatibility combined with radiopacity for application as biomedical implants. Elmet Technologies produces additively manufactured Tantalum parts using laser powder bed fusion (L-PBF). A key advantage of the metal is its high strength at temperatures up to 3,000°C (5,432°F).

### CHEMICAL CHARACTERISTICS<sup>1</sup>

(Mass fraction in % [cg/g]; ppm [µg/g])

Ta	99.9 min %
C	100 max. ppm wt
O	400 max. ppm wt

### CONDITION

Parts will be supplied in the as-printed condition unless otherwise requested

### MECHANICAL PROPERTIES<sup>1)</sup>

Tensile properties can be supplied on request when Purchase Order is placed

### TYPICAL PROPERTIES

Test Condition	Print Orientation	Tensile Strength MPa (ksi)	Yield Strength 0.2% offset MPa (ksi)	Elongation %
22°C (72°F)	Horizontal	505 (73)	445 (65)	27
22°C (72°F)	Vertical	610 (88)	605 (88)	20

### COMPRESSION PROPERTIES

Test Condition	Print Orientation	Modulus GPa (Msi)	Compressive Stress 0.2% offset MPa (ksi)
22°C (72°F)	Vertical	50 (7.3)	310 (45)

<sup>1</sup> Information on testing methods on request.

## PHYSICAL PROPERTIES

Density	16.60 g/cm <sup>3</sup>
Relative Density	99+%
Surface Roughness	<10 μm
Thermal Conductivity	45 W/m·°K
Linear Coefficient of Thermal Expansion (200°C)	6.8·10 <sup>-6</sup> /°K

**Hazards identification in Advertising (Directive 67/548/EEC Article 26 and Directive 1999/45/EC Article 13) None.**

## IDENTIFICATION

The material will be identified with appropriate specification number, ingot or lot number, and nominal size. Shipping containers will be marked with the name of the customer and the purchase order number.

## REJECTION

Elmet Technologies must receive written notification of rejected material with the reason for rejection. The right is reserved to inspect rejected material at customer plant for claim validation. The material may be returned only after proper authorization.

## APPLICABLE STANDARDS

ASTM E8/E8M Test Method for Tension Testing of Metallic Materials

ASTM E9 Standard Test Method of Compression Testing of Metallic Materials at Room Temperature

ASTM B311 Test Method for Density Determination for Powder Metallurgy (P/M) Materials Containing Less Than Two Percent Porosity

ASTM E1461 Standard Test Method for Thermal Diffusivity by the Flash Method

ASTM E228 Standard Test Method for Linear Thermal Expansion of Solid Materials With a Push-Rod Dilatometer



### ELMET TECHNOLOGIES

1560 Lisbon Street • Lewiston, Maine 04240

P +1.207.333.6100

sales@elmettech.com

www.elmettechnologies.com

The conditions of your use and application of Elmet Technologies products, technical assistance, and information (whether verbal, written or by way of production evaluations), including any suggested formulations and recommendations, is your responsibility. Therefore, you are encouraged to test our products and review any technical assistance and/or information you may receive from Elmet Technologies with your own resources, and determine to your own satisfaction whether Elmet Technologies products are suitable for your intended uses and applications. This application-specific analysis should include at minimum testing to determine suitability for the intended use from a technical as well as health, safety, and environmental standpoint. Any technical assistance and/or information provided by Elmet Technologies is given without any express or implied warranty or guarantee. You agree and understand and hereby expressly release Elmet Technologies from all liability, in tort, contract or otherwise, incurred in connection with the use of our products, technical assistance and/or information, except as may be contained otherwise in a written agreement between you and Elmet Technologies. Any statement or recommendation not contained herein or in a written agreement between you and Elmet Technologies is unauthorized and shall not bind Elmet Technologies. Nothing herein shall be construed as a recommendation to use any Elmet Technologies products in a manner violative of the intellectual property rights of any third party. No license is implied or granted under or to Elmet Technologies intellectual property. All product deliveries are based on the then current product specification and Elmet Technologies' Conditions of Sale. IN NO EVENT WILL ELMET TECHNOLOGIES BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.