H.C.Starck

High Performance Metal Solutions

ADDITIVE MANUFACTURING PRODUCTS

Number PD-7201
Issue 0-08.02.2023

Pure Tantalum AM Parts (UNS R05200)

Description of Product:

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/cm3) 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. H.C. Starck Solutions 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 [1)]
(Mass fraction in % [cg/g]; ppm [µg/g])

Chemical composition of finished parts can be supplied on request when Purchase Order is placed. The chemical composition of the starting powder shall conform to the following limits:

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 [1)] 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)

1) Information on testing methods on request.

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Physical Properties

Density	16.60 g/cm^3
Relative Density	99+%
Surface Roughness	<10 µm
Thermal Conductivity	45 W/m·°K
Linear Coefficient of Thermal Expansion (200°C)	6.8·10^{-6}/°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 nomial size. Shipping containers will be marked with the name of the customer and the purchase order number.

Rejection
H.C. Starck Solutions 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

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