H.C. Starck’s Refractory Metal Powders for Additive Manufacturing

H.C. Starck’s innovative powder technology coupled with our vertically integrated supply chain and metallurgical expertise ensures the highest quality molybdenum and tungsten powders for demanding applications and environments. Our application expertise and advanced technological processes enable us to customize our refractory metal powders to a customer’s precise requirements achieving outstanding material properties and optimum performance for Additive Manufacturing.

H.C. Starck’s Metal Powder Advantage

- Spherical powder morphology
- Exceptional flowability
- Excellent reproducibility
- Highest purity levels

Customized Powders for A/M Processes

- Binder Jetting
- Directed Energy Disposition
- Powder Bed Fusion

Plasma Densified Powders

- Molybdenum
- Tungsten
The conditions of your use and application of our products, technical assistance and information (whether verbal, written or by way of production evaluations), including any suggested formulations and recommendations, are beyond our control. Therefore, it is imperative that you test our products, technical assistance and information to determine to your own satisfaction whether they are suitable for your intended use and applications. This application-specific analysis at least must include testing to determine suitability from a technical as well as health, safety, and environmental standpoint. Such testing has not necessarily been done by H.C. Starck. All information is given without warranty or guarantee. It is expressly understood and agreed that the customer assumes and hereby expressly releases H.C. Starck from all liability, in tort, contract or otherwise, incurred in connection with the use of our products, technical assistance and information. Any statement or recommendation not contained herein is unauthorized and shall not bind H.C. Starck. Nothing herein shall be construed as a recommendation to use any product in conflict with patents covering any material or its use. No license is implied or granted under the claims of any patent. Properties of the products referred to herein shall, as a general rule, not be classed as information on the properties of the item for sale. In case of order please refer to issue number of the respective product data sheet. All sales and deliveries are based on the latest issue of the product data sheet and the latest versions of our General Conditions of Sale and Delivery.

The values in this publication are typical values and do not constitute a specification.

For additional info please contact:

H.C. Starck Inc.
460 Jay Street
Coldwater, MI 49036 USA
Phone: +1 517 279 3647
info@hcstarck.com

Particle Size Distribution

H.C. Starck’s customized powders are available in a wide spectrum of particle size distributions to match mechanical performance properties.

<table>
<thead>
<tr>
<th>Physical Properties</th>
<th>UNIT</th>
<th>Molybdenum</th>
<th>Tungsten</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typical Commercial Purity</td>
<td></td>
<td>&gt; 99.95%</td>
<td>&gt; 99.95%</td>
</tr>
<tr>
<td>Mean Particle Size D50</td>
<td>μm</td>
<td>20-30</td>
<td>20-30</td>
</tr>
<tr>
<td>D10/D90</td>
<td>μm</td>
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<tr>
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<td>Bulk Density</td>
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</tr>
<tr>
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<td>s/50g</td>
<td>8-10</td>
<td>5-8</td>
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Additional customized alloy powder products are available upon request.

Powder Solutions for A/M Applications

Medical (Mo, Ta, W, W Alloy)
- Collimators
- Radiation Shielding
- Orthopedic Implants
- Dental

Nuclear (Nb, W, W Alloy)
- Plasma Facing Components
- Radio Frequency Cavities

Industrial (Mo, W)
- Complex Crucibles
- Furnace Components
- Heat Exchangers

Aerospace (Mo, Ta, Nb)
- Nozzles, Pintles and Hot Gas Valves

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Binderjet printed tungsten collimators

Pure molybdenum powder bed fusion

Microstructure of Ta produced using Directed Energy Deposition