



High Performance Metal Solutions

High Performance Solutions for the Glass Industry

H.C.Starck 

High Performance Metal Solutions

A Leading Global Supplier to the Glass Industry

H.C. Starck Solutions understands glass melting, providing melting products and the need to provide products that perform well in hot molten glass, quartz melting and forming, and sputtered thin films for photovoltaic substrates. Our product solutions enable reduced contamination in the glass melt while yielding the highest glass purity. H.C. Starck Solutions' technical experience benefit processes in melting, homogenizing, feeding, and shaping of glass products in gas and electric glass melting furnaces.



Refractory materials like molybdenum are choice materials for their mechanical, electrical, process, corrosion, and cost conditions required for the glass melting process.



Glass Melting Electrodes (GME)

H.C. Starck Solutions supplies molybdenum glass melting electrodes with the highest standards for efficient glass melting and electric boosted melting. The high temperature strength and rigidity of molybdenum electrodes, plus the inherent electrical properties of molybdenum, provide maximum operating efficiency. The exceptional purity level of H.C. Starck Solutions' molybdenum electrodes, 99.95% minimum, achieves outstanding resistance to chemical corrosion, degradation and minimizes glass chemistry interactions.

H.C. Starck Solutions offers our high purity molybdenum (Mo) and premium molybdenum-zirconium (MoZr) glass

melting electrodes, available coated and uncoated with conventional and tapered threads. Our tapered threads allow a 60% reduction in connect time, are automatically self-seating and are less prone to galling or misalignment. Converter electrodes are also available for changing between electrodes.

- > **1.25" (32 mm) to 8" (203 mm) in diameter**
- > **Custom fabricated top mounted electrodes and bi-metallic**
- > **Machined or centerless ground surfaces for concentricity and straightness**

The Power of Innovation at H.C. Starck Solutions

As a worldwide leader in refractory metals, we have state-of-the-art laboratories to enhance our product's performance. By collaborating with our customers, H.C. Starck Solutions is creating the most innovative products with the best performance.

Glass Melting

- > Glass Melting Electrodes
- > Flow Orifices and Wear Parts
- > Oxidation Resistant Coatings
- > Stirrers

Quartz

- > Heat Shields
- > Heating Elements
- > Orifice Plates and Mandrels
- > Forming Tools

Photovoltaic

- > Molybdenum, Niobium, and their alloys
- > Rotary and Planar Sputtering Targets

Oxidation Resistant Coatings

H.C. Starck Solutions is continually improving our coatings to provide molybdenum and other refractory metals with outstanding protection against oxidation at high temperatures. Reliable and reproducible, these coatings protect against oxidation from air, oxygen-rich atmospheres, oxidizing chemicals and flames. The coating is fully compatible with molybdenum and can be used for the coating of glass melting electrodes and other components for the glass industry, protecting them from oxidation during the critical start-up period of a furnace.

Our silica-based coatings have no coloration or other detrimental effects upon the glass. The ceramic coating is

integral with and chemically bonded to the metal surface with no additional build up displaying a uniform smooth surface finish that does not separate or spall. Being produced via a chemical vapor deposition (CVD) process, the coatings are uniform, thinner and equally applied to all surfaces including the inside of thin tubes.

Molybdenum and Tungsten Fabrications

H.C. Starck Solutions provides large diameter molybdenum and tungsten fabrications suitable for quartz melting vessels, orifice plates and mandrels for quartz melting and the production of quartz tubing. In addition, we can manufacture fabrications from molybdenum sheet with forged molybdenum internals.

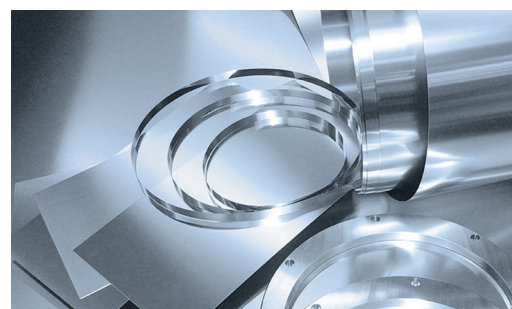
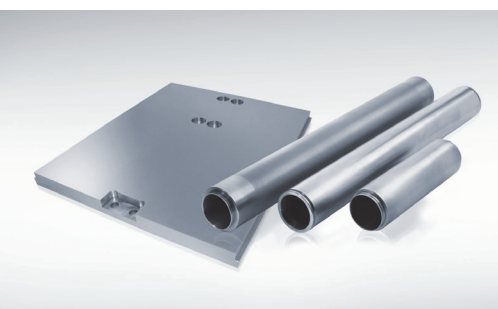
Gobbers and Stirrers

For homogenizing and feeding special glass melts, H.C. Starck Solutions offers a range of gobbers and stirrers that serve the thermal and chemical homogeneity requirements of glass melts. We manufacture glass stirrers from pure molybdenum or molybdenum tungsten alloys.

Sputtering Targets for Glass Coating and Photovoltaic

H.C. Starck Solutions also supplies molybdenum, niobium, and their alloys for thin film sputtering.

- > Rotary and Planar Targets
- > Extrusion of Large Diameter Rotary Targets
- > Segmented or Single Piece Planar Targets



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DPAP 03/2020

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