

Shanghai EverSkill M&E Co.,Ltd.

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FOR SUCCESS*

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Global Customer Service

We anticipate and meet customer needs with the highest quality products and services in a timely and cost effective manner.

World Wide Availability

We support product development cycles with dedicated sales engineering resources and factory that deliver on time, anywhere in the world.

Service

At Everskill, we have built a singular source, under one name, for all your needs. We dedicate our varied resources to provide you with the service in the fastest possible time. Establishing an alliance with Everskill at the start of your project will bring this full spectrum of capabilities to your design team and will ultimately provide you with a competitive advantage.

About EverSkill

Shanghai EverSkill M&E Co., Ltd is devoted to producing refractory metal parts. Everskill's products include Tungsten, Molybdenum, Tantalum, Niobium, Titanium, Nickel, Zirconium and their related alloys in form of common products such as: plate, strip, foil, bar, rod, wire, pipe; and deep processing products such as crucible, sputtering target, machining parts, heat elements, heat insulation screens, furnace bodies and corrosion-resistant equipments.

Everskill has in depth technical know how in the field of rare and refractory metal materials. Our products are exported to many countries, such as the USA, Japan, Germany, Australia, Canada, India, and South Korea. And the quality of the products were well received, which help us found long-term cooperation with the customers.

We are ISO 9001:2008-certified and we have a strong technological force with complete and excellent production equipment, advanced technology and a whole set of testing facilities. Our company is supported by a well-established system covering quality control, product sales and after-sale services. We are capable of providing services for our customers and develop top-quality products according to your specifications.

For more information on our products and services, contact us today.



ISO 9001:2008

Application Fields of Refractory Materials

Refractory metal components are used in a wide range of industries and applications for high-temperature furnaces and thermal processing plants.

Some important fields of thermal application for refractory metal products are:

- Sintering of metals and ceramics
- Powder processing (calcining, reduction, agglomeration)
- Brazing, high-temperature annealing and heat treatment
- Metal injection moulding (MIM)
- Annealing of stainless and electrical steel in N₂/H₂ atmospheres
- Aerospace including maintenance, repair and overhaul (MRO)
- Medical technology
- Electronics and semiconductor industries
- Lighting industry
- Production of nuclear fuel
- Thermal waste treatment
- Research and development



Sintered MIM parts



Turbine blades after repair treatment

At the component design stage solutions are tailored to the application, taking into account important process parameters such as temperature, size, atmosphere, environment, temperature uniformity and load. EverSkill works in close partnership with both OEMs and end users for all requirements of new equipment and replacement parts.

Broad Product Range

EverSkill offers the widest range of refractory metal mill products and finished parts for thermal processing equipment available anywhere in the world.

Semi-finished products in standard dimensions can be supplied in a matter of days from worldwide distribution centres. Finished parts ranging from simple parts cut from sheet to complex furnace hot zones are manufactured at sites in Europe, Asia and America following uniformly strict quality guidelines.

EverSkill supplies:

- Standard mill products (plates, sheets, ribbons, rods, wires) and simple cut pieces according to customer's needs, despatched from central store.
- Laser- or water jet-cut pieces with user-defined profile according to customer drawing (EDI possible) from our cutting center.
- Processed and assembled components such as boats, charge carriers, thermocouple protection tubes and other furnace components according to customer drawings.
- Complex components (hot zones, radiation shields, charge carriers, HIP parts, tubes for rotary furnaces and other engineered parts) are designed and manufactured by EverSkill together with the customer

Our innovative and experienced employees are ready to meet every challenge. Together with the customer they find the right product design using the best choice of materials for individual applications.



Standard mill products



Furnace components and spare parts



Complex engineered components

Customized Solutions for Individual Demands

Everskill offers much more than the on-time delivery of high-quality mill products and finished components for industrial plants and furnaces.

The customer can call on EverSkill's entire service package as a world market-leader. Especially important is the expertise of our engineering in materials, products and applications.

- Innovative materials and design concepts
- Individual product solutions
- Customer support at the design concept stage
- Realisation of turn-key solutions
- Engineering at the highest level
- Use of modern design tools including CAD, finite element analysis or 3-D modelling
- On-site repair work and fitting of replacement parts
- Consultation partner throughout the entire project

In many cases selecting the most suitable material and design to fit the requirements leads to a noticeable improvement of the entire plant. We also ensure future competitive advantages for our customers through continuous improvements in our materials, products and capabilities.

EverSkill Materials for High Performance

The materials used in high-temperature furnaces and engineered components are regularly subjected to extreme thermal and mechanical loading as well as harsh chemical environments.

Advantages of EverSkill materials:

- High melting point permits operation up to 2800 °C / 5072 °F
- Excellent high temperature strength
- Suitable for use in protective atmospheres (e.g. Ar, He, N₂, H₂)
- Very low heat capacity reduces energy consumption
- Minimum distortion during rapid temperature changes
- Resistance to aggressive chemical environments
- Dense metallic surface avoids the absorption of gas and moisture
- Complex shaping by metal-forming and machining processes
- No contamination of equipment or product (carbon- and binder-free materials)

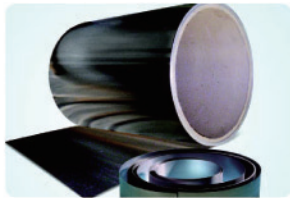
In addition to pure refractory metals, EverSkill offers advanced high-performance alloys such as ML, TZM or WVM. The addition of dopant elements in combination with special thermo-mechanical processing routes significantly improves the material properties and therefore the performance of the finished products.

Standard Components and Mill Products

EverSkill always has a comprehensive range of standard components and mill products in stock, deliveries can be made in a few days. Various material grades based on Mo, W and Ta are available.

- Sheets, plates and foils
- Rods with random or cut length
- Small parts such as screws, bolts, nuts, rivets and washers
- Rails and posts for load support
- Threaded rods
- Support studs, bolts and pins
- Wires and bundled wires for heating elements
- Tubes and thermocouple sheaths
- Ceramic isolators

Mill products are offered in standard dimensions, aimed specifically at furnace applications, particularly for heating elements and radiation shields. The table on page 15 provides an overview of the main standard components and typical mill product dimensions.



Mo and ML coils



Spare parts for standard hot zones



Multistranded wire (ML)

Delivery Program for Standard Semi-Finished Products

Availability	Mo		TZM		ML		W (WVM)	
	Length x width mm (inch)	thickness / Ø mm (inch)	Length x width mm (inch)	thickness / Ø mm (inch)	Length x width mm (inch)	thickness / Ø mm (inch)	Length x width mm (inch)	thickness / Ø mm (inch)
Sheets < 1.0mm (0.039)	609.6 x 1981.2 (24 x 78)	0.127 (0.005) 0.254 (0.010) 0.381 (0.015) 0.508 (0.020) 0.635 (0.025) 0.762 (0.030)			609.6 x 1981.2 (24 x 78)	0.254 (0.010) 0.381 (0.015) 0.508 (0.020) 0.762 (0.030)	508x838.2 (20x33)	0.127 (0.050) 0.254 (0.010) 0.508 (0.020)
Sheets >= 1.0mm (0.039) Cut to requirements	1 - 3 mm: 600 x 2000 (23.6 x 78.7) 4 - 5 mm: 500 x 1000 (19.7 x 39.4)	1.0 (0.039) 1.5 (0.059) 2.0 (0.079) 2.5 (0.098) 3.0 (0.118) 4.0 (0.157) 5.0 (0.197)	max size: 600x2000 (23.6x78.7)	1.0 (0.039) 1.5 (0.059) 2.0 (0.079) 3.0 (0.118)	max size: 600x2000 (23.6x78.7)	1.0 (0.039) 1.5 (0.059) 2.54 (0.10) 3.17 (0.125) 5.0 (0.197)	1 - 2 mm: 500 x 1000 (19.7 x 39.4) 3 - 5 mm: 200 x 600 (7.9 x 23.6)	1.0 (0.039) 1.5 (0.059) 2.0 (0.079) 3.0 (0.118) 4.0 (0.157) 5.0 (0.197)
Plates >=6.35mm (0.25) Hearth rails cut to requirements	max length: 2000 (78.7)	6.35 (0.250) 7.94 (0.313) 9.52 (0.375)	max length: 1828.8 (72)	6.35 (0.250) 7.94 (0.313) 9.52 (0.375)				
Coiled sheet	609.6x>7600 (24x>299)	0.127 (0.005) 0.254 (0.010) 0.381 (0.015)						
Coiled ribbon (Heating elements) Cutting, rolling and grooves applied to requirements						width: 76.2 (3.0) 101.6 (4.0) 127 (5.0)	0.635 (0.025) 0.762 (0.030)	
Wire Pins cut to length	acc. EverSkill Express	0.5 - 3.0 (0.020 - 0.118) 3.17 (0.125)				0.5 (0.020) 0.8 (0.031) 1.0 (0.039) 1.524 (0.060) 2.286 (0.090)	WVM	0.635 (0.025) 0.8 (0.031) 0.9 (0.035) 1.0 (0.039)
Rod Posts cut to length; Heating elements banded to requirements		6.0 (0.236) 6.35 (0.25) 8.0 (0.315) 9.52 (0.375) 10.0 (0.394) 19.05 (0.75) 25.4 (1.0)		19.05 (0.75) 25.4 (1.0)		6.35 (0.25) 9.52 (0.375) 19.05 (0.75) 25.4 (1.0)	acc. EverSkill Express	
Multistranded wire (Binding wire, Heating elements)						0.35 (0.014) x 3 0.8 (0.0315) x 3 x 7 0.8 (0.0315) x 7 x 7 1.0 (0.039) x 7 x 7		
Tubes (Thermocouples)		3.175 x 0.381 (0.125 x 0.015) 6.35 x 0.508 (0.25 x 0.02) 10 x 1 (0.39 x 0.039) 12.7 x 1 (0.50 x 0.039) 16 x 1 (0.63 x 0.039) 19.05 x 1.524 (0.75 x 0.060) 25 x 1.5 (0.98 x 0.059)						

EverSkill High Performance Materials for Furnace Construction

Mo

Pure molybdenum finds many applications in high-temperature furnace building because of its high availability, good workability and favourable high-temperature properties (low vapour pressure, high melting point).

TZM

(molybdenum doped with titanium and zirconium)

TZM contains small additions of finely dispersed particles (consisting of Ti, Zr and C), which inhibit grain growth at high temperatures. This significantly increases ductility and creep strength. TZM has a higher recrystallisation temperature than pure Mo.

It is best suited to components subjected to both high thermal and mechanical loading such as hearth assemblies, racks and fixtures.

ML/MLR/MLS

(molybdenum doped with lanthanum oxide)

ML is used whenever embrittlement after recrystallisation must be avoided and when dimensional and shape-stability must be ensured at high temperatures. Heating elements, thermal-radiation shields and sintering boats are good examples. Doping of Mo with small quantities of La_2O_3 increases the recrystallisation temperature to $1400\text{ }^\circ\text{C}$ / $2552\text{ }^\circ\text{F}$. After recrystallisation the resultant elongated grain structure with jagged grain boundaries (in contrast to the coarse-grained structure of recrystallised pure Mo) allows a considerable increase in ductility. Furthermore the creep resistance strength of ML is significantly higher than that of the pure metal.

W

Tungsten has the highest melting point of all refractory metals and possesses excellent resistance to hot gas corrosion. It is brittle at room temperature and must be handled and worked with great care.

WL (tungsten doped with lanthanum oxide)

This material can be worked more easily and has a higher creep strength than pure W.

WVM

WVM is doped with calcium aluminium silicate, which gives it higher form stability at high temperatures than pure tungsten. WVM is used for heating elements for very high furnace temperatures up to $2800\text{ }^\circ\text{C}$ / $5072\text{ }^\circ\text{F}$ in the form of single or stranded wires and mesh heaters.

Ta

Tantalum is easy to work and can be used in cold forming. It is readily weldable and retains its ductility after being subjected to high temperature. However the high material price usually restricts its use to special applications, mainly in corrosive atmospheres.

Nb

Like tantalum, niobium is used in corrosive environments because of its outstanding passivating properties. Niobium is equally suited to welding, but has a lower mechanical strength than tantalum.

Ni

Nickel is primarily sold for first use as refined metal (cathode, powder, briquet, etc.) or ferronickel. About 65% of the nickel consumed in the Western World is used to make austenitic stainless steel. Another 12% goes into superalloys (e.g., Inconel 600) or nonferrous alloys (e.g., cupronickel). Both families of alloys are widely used because of their corrosion resistance.

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Sales Network

“Satisfying Our Customers
Equals To Satisfy Ourselves”

Our Sales Network

“Satisfying our customers equals to satisfy ourselves”, based on optimizing our resource and good quality and management system, we keep on developing and innovating to offer our clients the best solution; At the same time our products are also exported to America, Germany, France, Switzerland, Italy Japan, Korea etc our ten countries in the world and we found permanent and stable cooperative relation with them; We will also make good use of our advantage of advanced technique to promote new materials in the new fields and to head and fit the changeable requirement



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