



### Specialist in Tantalum Equipment for the Chemical Industry

**COMETEC** is the leading international specialist in the construction of corrosion-resistant equipment made from tantalum for the chemical industry and offers the entire range of tantalum technology:

- Comprehensive advice, documentation proving economic viability and extensive background knowledge on this special material.
- Tantalum processing precision work complying with all regulations, your specifications, all the appropriate standards, guaranteed delivery, in-house tool construction.
- Exemplary equipment, components and repair parts setting standards in tantalum equipment construction.

Since 1988 **COMETEC** has been a world-wide leader specializing in the construction of tantalum equipment, and as a result of developing our own techniques we have full mastery over this material. Additionally, for certain applications **COMETEC** also works with niobium as a cost effective alternative to tantalum, such as nitric acid manufacturing at low temperatures.

**COMETEC** has gained all its knowledge through years of experience and is offering you the benefit of this knowledge.

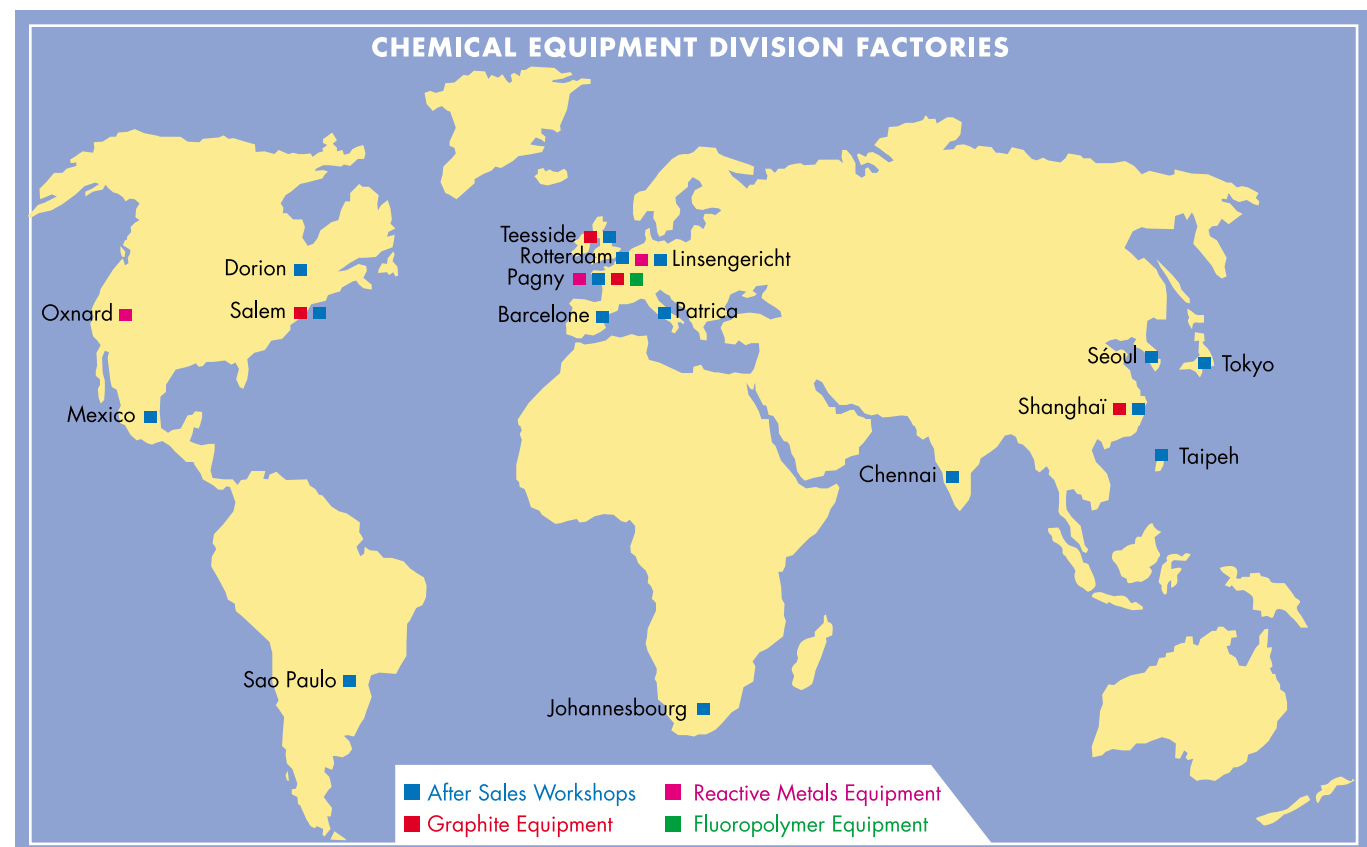
COMETEC GmbH plant, Linsengericht, Germany.



### CHEMICAL EQUIPMENT DIVISION worldwide specialist in corrosion resistant equipment

has built an international reputation. Based on people, methods and technical expertise, we contribute to our customer's success using the quality and innovation of our products and services.

#### A global player



DESIGN GRAPHIQUE : IMARK 04 37 22 02 03



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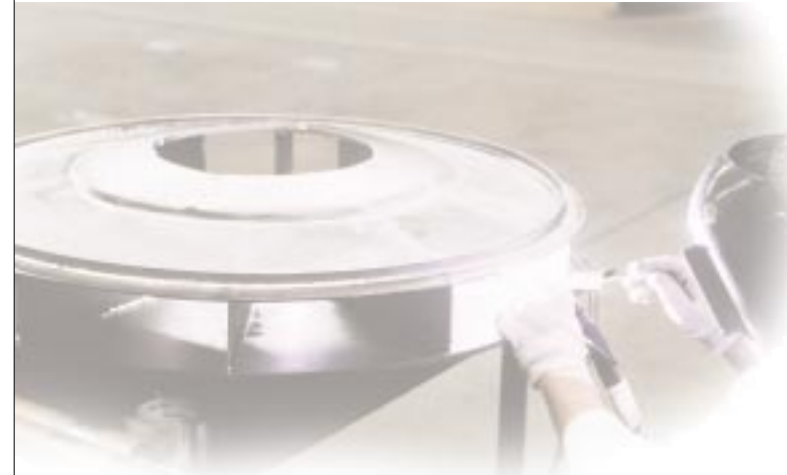
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### Reactive Metals Equipment (RME)



We made it



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### A world leader in metallic equipment that resists the most severe corrosive environments

**ASTROCOSMOS METALLURGICAL** has joined **CARBONE LORRAINE** group to form the world's largest producer of corrosion-resistant equipment. We can now solve virtually any severe corrosion problem in chemicals, pharmaceuticals, fertilizers, mining and refining, pulp and paper, and waste disposal processes. We offer complete design, engineering and fabrication of towers, columns, tanks, pressure vessels, heat exchangers, piping systems and other custom designed equipment.

**ASTROCOSMOS METALLURGICAL** is the world leader in process equipment, designed and constructed of titanium, zirconium, tantalum, niobium and the nickel alloys. With many, many "firsts" and "largest" in our experience we can handle your projects.

**ASTROCOSMOS METALLURGICAL** is dedicated to producing the most cost-effective process equipment for our customers. We are the only manufacturer combining complete design, engineering and fabrication with a comprehensive repair service and a metal service center specializing in next-day delivery. These operations, integrated in our plants, have the flexibility to serve your needs with maximum efficiency.

AstroCosmos Metallurgical headquarter



# Ti TITANIUM

Commercially pure (unalloyed) titanium has a density of about 4.51 g/cm<sup>3</sup> (0.163 lbs/in<sup>3</sup>) with tensile strength ranging from 2,402 to 5,491 daN/cm<sup>2</sup> (35,000 to 80,000 psi).

### Chemical Resistance

Titanium's resistance to the corrosive effect of salt water is among the best available. It is virtually immune to atmosphere corrosion and is highly resistant to general localized attack under most oxidizing, neutral and inhibited reducing conditions including metallic salts, chlorides, hydroxides, nitric and chromic acids.

### A wide range of metals

- Titanium
- Zirconium
- Tantalum
- Niobium
- High Nickel alloys

### Services adapted to customer requirements

- Design - Engineering
  - thermal analysis and guarantee
  - seismic
  - wind
  - finite element analysis
  - corrosion resistance analysis and testing
  - cycling
  - stress/strain
  - CAD
- Fabrication
- In-plant installation
- Commissioning and maintenance

# Zr ZIRCONIUM

Its density is approximately 6.45 g/cm<sup>3</sup> (0.234 lbs/in<sup>3</sup>) and its tensile strength is in the range of 3,775 to 5,491 daN/cm<sup>2</sup> (55,000 to 80,000 psi).

### Chemical Resistance

Zirconium exhibits excellent resistance to most organic and mineral acids as well as alkaline solutions and fused alkalis. It is particularly useful in contact with acetic, nitric, sulfuric and hydrochloric acids.

# Ta TANTALUM

Has a density of approximately 16.60 g/cm<sup>3</sup> (0.601 lbs/in<sup>3</sup>) with a tensile strength of about 2,745 to 4,118 daN/cm<sup>2</sup> (40,000 to 60,000 psi).

### Chemical Resistance

Tantalum is inert to practically all organic and inorganic compounds at temperatures under 250°C, except hydrofluoric acids and strong alkalis.

# Nb NIOBIUM

Its density is approximately 8.58 g/cm<sup>3</sup>, (0.310 lbs/in<sup>3</sup>) and its tensile strength is 1,716 daN/cm<sup>2</sup> (25,000 psi) at room temperature.

### Chemical Resistance

Niobium is inert to salt solutions and mineral acids at room temperature. Chemical resistance drops as temperature increases. Niobium is inert to nitric acid but limited to pump below 100°C.

# Ni NICKEL ALLOYS

Nickel alloys such as the HASTELLOY® family offer a combination of excellent corrosion resistance, strength, toughness and weldability, metallurgical stability and fabricability.

### Chemical Resistance

Nickel is resistant to a wide range of corrosives and is particularly suited for use with alkaline solution. Good resistance to neutral and slightly acid solutions.

All the equipment you are looking for:

• Columns

• Heat exchangers

• Piping

• Tanks and reactors

Perfected and cost-effective construction technologies

• Miscellaneous

- Quality - Control - specifications serving high performance equipment
- Quality assurance
  - Highly qualified welders and personnel
  - Certification: DIN, ISO, CE ...
  - Fabrication to code: ASME, TEMA, ANSI, PED...
  - Inspection and tests: hydraulic, pneumatic, radiographic, dye-penetrant, helium mass-spectrometer, halogen, magnetic particle, positive material identification, ultrasonic.

- solid metal
- loose lined
- "cladded" explosion roll bond
- superior welding processes

At the service of the most diversified industries...

### Titanium

- Chlorine production
- Production of PTA
- Gold, copper and nickel mining
- Pulp and paper
- EMD processors
- Copper foil production
- Agricultural chemicals, pesticides, herbicides
- Bromine industries
- Specialty chemicals
- Electrochemical industry
- Polycarbonates
- VCM

At the service of the most diversified industries...

### Zirconium

- Agricultural chemicals
- Specialty chemicals
- Formic acid production
- Acetic acid production
- Plastic and polymers
- Organic processing
- Polycarbonates
- Biomass
- VCM
- EMD
- Titanium dioxide
- Silicone production
- Urea
- Sulfuric acid recovery
- Magnesium processing
- Nitric acid production
- Production of feed additives

At the service of the most diversified industries...

### Tantalum

- Specialty chemicals
- Silicone production
- Acid recovery
- Steel industry
- Pharmaceuticals
- Polycarbonates
- Herbicides
- Hydrometallurgy
- VCM
- Sulfuric acid regeneration

### High Nickel alloys

- Steel and stainless steel pickling
- Pharmaceuticals
- Silicone processing
- Production of acetic acid
- Incineration and pollution combustion
- Fertilizer industry

For more information visit our Web sites:

- [www.astrocosmos.com](http://www.astrocosmos.com)
- [www.cometec.com](http://www.cometec.com)
- [www.chem.carbone.lorraine.com](http://www.chem.carbone.lorraine.com)