



CONSARC

An Inductotherm Group Company

Vacuum Cap Furnaces



Vacuum Cap Furnace

New vacuum degassing and controlled atmosphere melting technology from Consarc.

Consarc, an Inductotherm Group Company, has developed a new range of induction melting furnaces for processing ferrous and non-ferrous metals under vacuum in the liquid state.

Consarc has more than 40 years experience with designing Vacuum Induction Melting furnaces (VIM) and Inductotherm is the world leader in induction melting furnace and power supply technology. With this new product the technology and experience of these two giants in their field is combined to provide a flexible melting furnace system for melting metals in air, vacuum or controlled atmosphere — Vacuum Cap (VCAP)

The VCAP furnace is designed for Induction Melting a solid charge in an air atmosphere (or vacuum), with final degassing stage under vacuum. The final pouring of the metal is performed in air or under protective atmosphere of inert gas. Configuration is based on the Inductotherm range of steel shell induction furnaces which are fully adapted by Consarc for vacuum treatment of liquid metal.

The furnace shell is fully sealed for vacuum operation and a sealing flange/apron is provided on top of the unit. Following the air melt operation (or vacuum/inert gas if required), a water cooled vacuum lid can be placed on top of the furnace, either by factory crane or dedicated lift/swing pivot arm (option). The system is making a vacuum chamber connected to a multi stage mechanical vacuum pumping system which can evacuate the atmosphere above the molten bath.

The induction melting coil is powered from an Inductotherm VIP Power supply with the power and frequency matched for fast melt rates (high productivity) and optimum stirring (metallurgical quality) in the liquid state. The stirring frequency ensures that the alloy is fully homogenized and that fresh liquid metal is cycled to the surface of the bath to aid the degassing procedure.

Once the atmosphere is evacuated, the degassing procedure and intensified C-O reaction allows removal of undesirable gases, Hydrogen, Nitrogen, and Oxygen to much lower levels than would be possible in air.

At the end of the degassing sequence, the vacuum lid can be removed and a protection ring is placed around the sealing flange. The furnace is then ready for tilt pouring into the customer's transfer ladle or molds. The pouring process is usually carried out in air (option for protective atmosphere).

Vacuum Cap Furnace Specifications

Applications and Materials

The VCAP furnaces are available to suit a wide variety of application in sizes ranging from 80 kg to 20 tonnes. Typical applications might include:

- Low and high carbon steels
- Stainless steels
- Cobalt based alloys
- Tool and die steels
- Nickel based alloys
- Non ferrous alloys

Metallurgical Considerations

Some typical processes that can be performed in the VCAP range include:

- Air melting from solid charge (option for vacuum melting)
- Controlled atmosphere melting from solid charge
- Alloy homogenization and chemistry adjustment
- Vacuum degassing (hydrogen and nitrogen removal)
- Reduction of low vapor pressure tramp elements (e.g. Pb, Cd, Bi, Zn)
- Deoxidation using combination of vacuum and C-O reaction
- Decarburization - Intensified C-O reaction at low pressure enabling excellent decarburization for extra low carbon levels.
- Desulphurization
- Argon purging of metal with pourous plug

Some of the more important customer product advantages from VCAP operation are:

- Generally significant improvement of mechanical properties, such as yield strength, ductility, impact strength, fatigue and stress rupture elevated temperature properties.
- Improvement of technological characteristics, such as hot workability, weldability and machinability.
- Better microcleanliness due to strong carbon deoxidation and smaller residual inclusions.
- Significantly reduce scatter in product properties and characteristics, less rejections.

Flexible Design Approach

The VCAP furnace range provides a fully flexible, cost effective approach to furnace build with a range of options to best suit individual customer budget and technical requirements.

The standard units are complete with:

- Induction furnace & vacuum shell
- Hydraulic tilt system
- Inductotherm VIP power supply
- Water cooled vacuum lid
- Viewing ports
- Immersion thermocouple
- Vacuum pumping system
- Water cooling manifolds
- Control systems

Optional accessories can be fitted as required including:

- Porous plug inert gas (argon) purging
- Optical pyrometer
- Closed loop water cooling
- Hydraulic lining pushout
- High voltage supply transformer
- Automated vacuum lid handling
- Vacuum isolated sampling and fines charging
- Scrap and raw material charging
- SCADA supervisory control systems





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Leading Manufacturers of Melting, Thermal Processing and
Production Systems for the Metals and Materials Industry Worldw



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