

PRODUCT INFORMATION



MIM-Vac™ 'M' FURNACES SERIES 3570 - VACUUM / CONTROLLED ATMOSPHERE BATCH FURNACE

The MIM-Vac M™ is Centorr/Vacuum Industries latest offering in its line of custom-engineered high temperature vacuum / controlled atmosphere furnaces designed specifically for the Metal Injection Molding Market.

Following the success of its graphite hot zone Injectavac™ which CVI pioneered in the early 1980's for the debind and sinter of parts containing 1st and 2nd stage MIM binders, today's MIM-Vac™ furnaces are the result of more than 10 years of experience in MIM technology and over 25 years debinding and sintering PM parts.

The core design is based on Centorr/Vacuum Industries Workhorse® Metal Hot Zone furnaces, which have been sold worldwide for the sintering of powdered metals (with over 300 units in the field), and the binder removal technology of Sintervac® units developed for the Tungsten Carbide industry (with over 600 in use worldwide).

The MIM-Vac™ 'M' is designed primarily for 2nd stage binder removal and sintering, and has a number of design improvements specific for use with MIM Feedstocks. Tight partial pressure control and even gas flow in conjunction with effective event-based programming and sound retort design allows the entire load to view the same series of conditions as a function of time. This results in consistent microstructures and repeatable carbon control.

Depending on the customer's process requirements, a variety of wax and polymer condensation strategies have been developed, including vacuum delube/condensation; Sweepgas™; Injectavac™ BRS™; MIM-Vac™ BRS™; and Thermal Incineration. The judicious use of advanced Molybdenum alloys in the hot zone and retort offers excellent creep resistance, higher recrystallization temperatures, and longer life.

Our revolutionary new gas-plenum retort has rows of perforations allowing even gas flow across all the work trays and is constructed of heavy gauge Lanthanated and TZM Molybdenum for low creep operation even at maximum temperatures, unlike other retort designs which warp and require replacing after as little as one year.

The Modular design offers quick and easy access to all major furnace components and results in significantly lower maintenance and repair costs over the life of the unit.

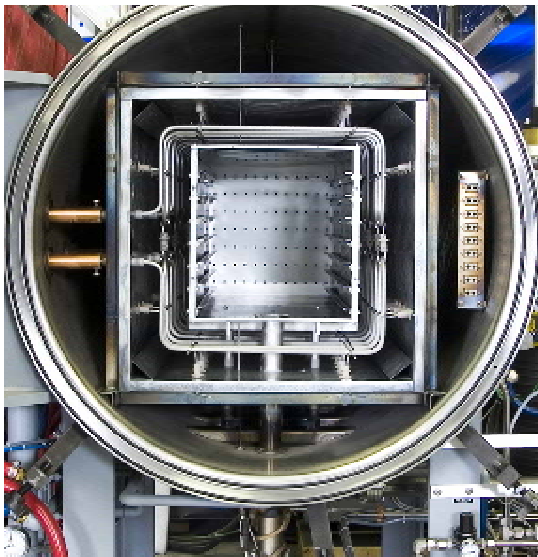
KEY FEATURES

- Cold Wall Vacuum furnace design with stainless steel inner and outer jackets with baffled water cooling.
- Operation to 1650°C. Temperature uniformity of $\pm 5^\circ\text{C}$ using up to six (6) zones of independent control.
- PLC with Industrial Programmable Controller or PC system using Intellution™ FIX32 HMI software customized by CVI for vacuum furnaces, with extensive data acquisition; maintenance screens, and remote operation capabilities.
- CVI's patented Sweepgas™ Binder Removal System consisting of heat traced/insulated debind manifolding, large 'T/P' binder traps with removable media, and high-temperature easily-cleaned isolation valves.
- Two Capacitance Manometers offering full range reading of system vacuum levels.
- Novel Molybdenum retort designed for durability, ease of replacement and low cost. Integral gas plenum provides for consistent gas flow dynamics and efficient binder removal.
- Advanced Molybdenum alloys used in Key Shields, retort, and heath posts and rails with heavy-duty Tungsten rod element design.
- Operation from partial pressures of 10 - 750 torr in either Argon/Nitrogen, and Hydrogen.
- Extensive safeties on the chamber, trap, and pumping system for managing partial pressures of Hydrogen gas.
- "Modular setup" for full unobstructed access to chamber, vacuum pumps, and binder trap without cumbersome panels to remove.
- Fast and easy furnace setup on site with one drop connections for air, water, inert/process gases and power.
- Robust fan cooling system with integrated water-cooled heat exchanger offering fast cooling from max temperature to 100°C in under 1 hr with an empty furnace.

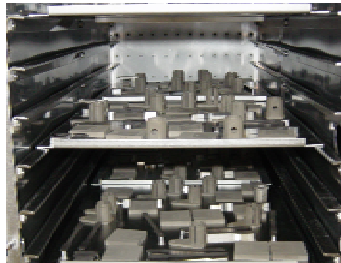
MIM-Vac™ 'M'

Vacuum / Controlled Atmosphere Furnace

- **Highest Product Consistency** is assured by the uniform binder removal, close temperature gradients, automatic control of each step in the process, and vacuum sintering.
- **Lowest Cost Operation** is provided by the rapid debind step, unattended operation, and freedom from hand loading of parts.
- **Flexibility** is provided by the preprogrammed controls which allow different materials and part sizes to be successfully processed without time-consuming adjustment of furnace conditions.
- **Minimum Maintenance Cost** is assured by the heavy construction and ease of access to all components of the furnace.

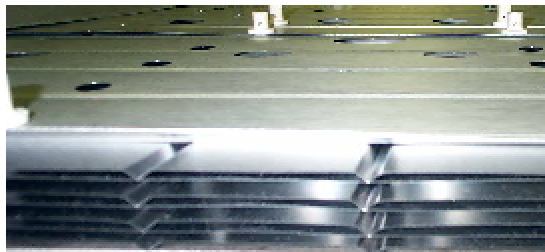
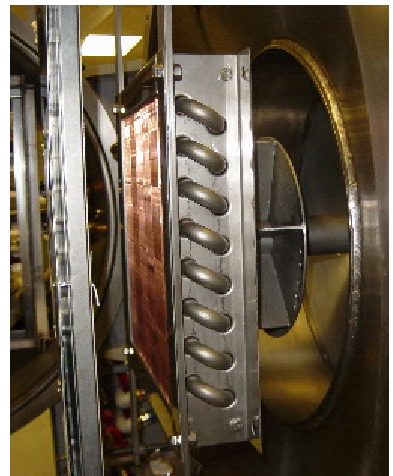


STD MODEL	USABLE CU. FT. (liters)	EFFECT HOT ZONE WxHxD (in / mm)	TRAY SIZE (in / mm)
100	2 (57)	12 x 12 x 24 (305 x 305 x 610)	12 x 12 (305 x 305)
450	6.75 (191)	18 x 18 x 36 (457 x 457 x 914)	8.5 X 12 (216 x 305)
500	9 (255)	18 x 18 x 48 (457 x 457 x 1220)	8.5 x 12 (216 x 305)



STANDARD FEATURES

- Mass Flow Controllers for precise, repeatable gas flow measurement and data logging.
- Integrated cooling fans with integral water-cooled heat exchangers.
- CE / VDE / NFPA 86 approvals and other non-U.S. standards for compliance.
- Flexible water cooled busswork for improved maintenance and best electrical efficiency.
- Optional Diffusion pumping system with backing pump and water-cooled baffle
- Special heat-traced/Insulated debind manifolding with CVI 'T/P' (Trap over Pot) design offering excellent mechanical and condensation filtration strategies.
- Partial Pressure Hydrogen safety features include pneumatic actuated door clamp interlock; double O-rings with vacuum pumpout grooves on all opening door flanges / binder traps; gas purged pump ballast, pump inlet, and exhaust; and no manually-actuated valves.
- Integrated water flow indicators/flow switches with low flow alarm setpoint, and optional type K thermocouples in major water circuits with overtemp alarm.
- Molybdenum alloy work trays with stiffeners available upon request.



ALLOYS PROCESSED

- 17-4 pH
- 316-L
- Tool Steels
- High Speed Steels
- Ti, Nickel, and Superalloys

FURNACE APPROVALS

Centorr Vacuum Industries furnaces are designed to our own internal quality standards developed over our 50 year history, and are built to the following industry standards:

ASTM NFPA 86 CE NEC



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