



## Advanced External Quench Vacuum Furnaces for Superior Processing!

VAC AERO is committed to building furnaces with the lowest cost of ownership achieved through superior design, top quality materials and high performance operation. Our external quench systems allow for easy access of the heat exchanger and quench motor. VAC AERO's advanced Honeywell HC900 control system provides unparalleled performance and includes technical support for remote control diagnostics and furnace troubleshooting.

### Hot Zone

- Standard operating temperature: 1000°F - 2400°F for entire range (wider temperature ranges are available).
- Temperature uniformity:  $\pm 10^\circ\text{F}$ , equivalent to Class II of AMS 2750E in clean, empty furnace.
- Insulation and heating elements mounted on a 14 ga. stainless steel support structure for superior longevity.
- Ultimate vacuum levels:  $10^{-6}$  torr range in clean, leak tight furnace (lower vacuum pressures are available with custom pumping systems).
- Modular hot zone design with multiple heating zones and no moving parts to minimize maintenance and downtime.
- Modular ring assembly with multiple gas plenums that also act as manifolds to distribute high velocity quenching gas uniformly throughout the workload.
- Heavy duty hearth constructed with pure molybdenum pins, caps and rails.
- Thin, low mass element design for quick response during heating and cooling.
- Elements can be added on top and bottom end shields.

**Metal-Based Insulation Package:** The heat shield package consists of one layer of 0.020" or 0.030" thick molybdenum (or lanthanated molybdenum) sheet backed by one layer of 0.010" thick molybdenum sheet, and three layers of 0.014" stainless steel sheet.

**Graphite-Based Insulation Package:** The heat shield package consists of three layers of 1/2" high purity graphite felt with an inner facing of graphite foil bonded carbon composite that provides added protection and enhanced reflectivity. Optional extra layer of sacrificial graphite foil or carbon composite available.



### Vacuum Chamber

- Vacuum chamber and door fabricated from carbon steel (optional stainless steel).
- Double-wall, water jacket design.
- Furnace autoclave door hinged and flanged for convenient, unobstructed loading and hot zone access.
- Hydraulic powered breech-lock clamping system to secure the door during processing (2 bar and up).
- Contains all necessary thermocouple jacks, gauge ports, pumping ports, hot-zone power feed-throughs and gas quench entries.
- Oversized water inlets and outlets assure maximum water flow.
- Workload thermocouple adapter plate, thermocouple plugs and vacuum feed through seals for type K or N workload thermocouples as well as a heat protected junction strip located near the chamber opening for convenient thermocouple connection.

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## Gas Quenching System

- The gas quench system distributes high velocity gas via modular plenums through circumferentially located internal nozzles for better gas penetration, improved gas velocity and more uniform gas distribution throughout the load.
- Selectable gas quench pressures: .85, 2, 4, 6 or 10 bar.
- Gas quenching system rated at between 4,500 and 12,000 cfm
- Gas quench system can be designed for use with Nitrogen or Argon gas.

## Vacuum Pumping System

Compact pumping system is designed for easy access and minimum installation area.

- Mechanical Pump: 300 CFM
- Vacuum Booster Blower: 1300 CFM
- Diffusion Pump: 6" to 35" Varian.
- Holding Pump: Agilent (Varian).
- Main, Roughing and Foreline Valves: Right angle poppet valve with electro-pneumatic operation, or butterfly valve (for pressure quench only).

## Control System & Cabinet

VAC AERO's uses the Honeywell HC900 process controller integrated with the Honeywell Experion HS software running on a Windows 7-based PC to provide Supervisory Control and Data Acquisition (SCADA).

- Digital Trimming is used to obtain uniformity over entire operating range.
- Controls and instrumentation are housed in a ventilated control cabinet.
- Enhanced maintenance and troubleshooting management and trending.
- Extensive alarm and event management and reporting.
- Operator sign-on/sign-off security provides multiple control levels to limit operator control of individual items of equipment.
- Temperature control using advanced algorithms, auto tuning, multiple PID loops, and multi-zone digital trimming.

## Installation, Training and Commissioning

All VAC AERO furnaces are shipped complete, tested and ready for installation. For an additional charge, VAC AERO offers installation supervision or complete installation services. As part of every furnace contract, VAC AERO provides free pre-delivery training in heat treating processes, furnace operation and maintenance. Commissioning activities include instrument configuration, verification of electrical, mechanical and thermal functions and performance testing consisting of a temperature uniformity survey and measuring of ultimate vacuum, leak up rate and pumping speed.

## Aftermarket & Furnace Upgrade Services

VAC AERO customers around the world enjoy lifetime technical support and unparalleled performance.

- Vacuum furnace maintenance and repairs.
- Hot Zone repairs, replacement and retrofits.
- Control system upgrades, updates and retrofits.

## Optional Auxiliary Systems

### Inert Gas Quench Gas Storage/Supply Systems

VAC AERO's IG tank is an ASME approved receiver, which will supply a sufficient volume of quench gas to backfill the chamber. The system is designed to be supplied from high pressure bulk gas storage or liquid storage source (cold converter) and includes back flow prevention, as well as purge and safety devices.

### Dual Loop Furnace Water Cooling System

The Dual Loop furnace cooling system supplies coolant to the furnace. Rugged and virtually maintenance-free, it consists of a compact manifold containing all necessary pressure regulators, valves, pressure switches and flow regulators with supply and drain hoses and fittings. One side of the closed loop system delivers treated coolant to the furnace. The other side raw water to remove heat from the furnace coolant through a plate/frame heat exchanger.

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