

## **DEBIND & SINTER SINGLE CHAMBER VACUUM FURNACES**

**RELIABILITY, EXPERTISE,  
SERVICE & SELECTION**

*The Gasbarre Model VCH-R is a single chamber, cold wall, front loading vacuum furnace with graphite retort designed to debind and sinter product programmed to run simple or complex thermal profile recipes. It is designed to provide a very uniform heating environment and allows workloads to cool at various pressures ranging from vacuum to sub-atmospheric to positive. The furnace is designed with a maximum temperature rating of 1550°C (2800°F) within an effective work zone.*

### **VESSEL & DOOR**

The vacuum/pressure vessel is cold-walled and horizontally positioned. It contains the graphite retort, heating elements, heat exchanger, fan assembly and necessary feed-throughs (for power, pumping, sensors, atmospheres, etc.) It is supported on a framework that allows easy access for forklift loading. It includes a front loading door, as well as a rear flanged and bolted head. The rear head is elongated and is supported on a saddle with casters. It contains the heat exchanger and fan assembly and is designed to disconnect and pull away from the main vessel for ease of access and maintenance. The front door is hinged and can be provided with a breach lock mechanism to permit the furnace to be pressurized during gas quenching. The vessel is designed to work in extremely low vacuum to high pressure levels and may be provided with a basic roughing pump and mechanical booster combination, as well as diffusion pumping systems.

### **HEATING ELEMENTS**

The furnace is heated with wide band graphite strip elements. They are positioned in a 360° arrangement to provide optimum radiation angles and even heat transfer characteristics to the retort and the workload. The heating elements are divided into three trimmable zones, which further aids in enhancing the temperature uniformity within the working area.

### **CHAMBER INSULATION**

The inner surface of the insulation assembly is a CFS composite flex shield, backed by high purity graphite felt to minimize thermal losses and insure uniform temperature control. The outer supporting surface of the insulation assembly is a sheet metal, stainless steel cage. Rapid heating and cooling cycles are possible due to the low heat storage of the graphite material.

### **RETORT & HEARTH**

A graphite retort is positioned within the heat chamber to contain the workload. It is supported on pier rails and posts that are constructed of CFC material. It is essentially stationary within the furnace, removable when replacement or repairs are required. The retort is rectangular and comprised of precision machined parts that are bolted together. The front plate has fasteners that are removable for loading and unloading of work pieces or workloads. The retort operates under full vacuum (during sintering) and with partial pressure atmosphere (during debind stage). During the debind stage, the retort is fed with inert and/or reducing gas

## RETORT & HEARTH, Cont'd

at a controlled flow rate and pressure. The gas is ultimately directed and exhausted from the retort, along with binder vapors, through a graphite pipe by a dedicated pumping system preceded by a cold trap. Outside the retort, a slightly higher pressure is maintained to minimize binder vapors from leaving the retort through any seams. The graphite retort is designed to provide a balanced flow of gas past the work pieces that are placed or layered within the retort.

## COOLING

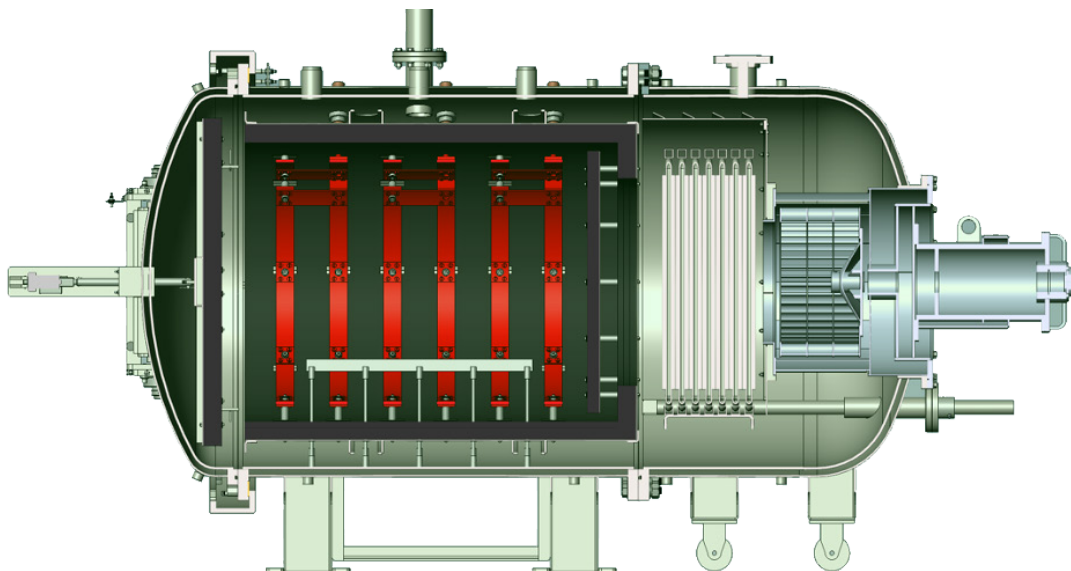
The furnace cooling system consists of the water-jacketed vessel wall, a heat exchanger positioned outside and behind the insulated heating area, and a fan assembly positioned on the furnace rear head. During the cooling portion of the thermal cycle, the chamber is backfilled with an inert gas to a selected pressure. The gas is pulled through the workload by a high velocity fan, out the rear of the heat area, and through the multi-pass heat exchanger. The gas is then directed along the

## COOLING, Cont'd

cold wall of the vessel and back into the heating chamber in a circular pattern. The graphite chamber is provided with front and rear baffles to allow circulation of the inert gas into and out of the chamber during cooling. At the rear, positioned directly in front of the heat exchanger, is a fixed blind baffle. The oversized, fully insulated baffle positioned over the chamber gas outlet blocks any line of sight to the furnace heating elements. The front baffle is retractable and is programmed to open during cooling. Often, the furnace is programmed to vacuum cool to some temperature prior to introducing inert gas to begin the forced convection phase.

## COMPONENT DESIGN

Each area of the furnace has been carefully engineered for ease of equipment operation, maintenance and long life under full production conditions.



MODEL NO.	LOAD SIZE (IN.)			GROSS LOADING
	Width	Length	Height	(lb)
VCH-R-181824	18	18	24	500
VCH-R-242436	24	24	36	1,000
VCH-R-363648	36	36	48	2,000

*Custom engineered sizes available upon request*