



SINGLE CHAMBER *VACUUM* **FURNACES**

The C.I. Hayes “VCH” Single Chamber Vacuum Furnace is a horizontally loaded, electrically heated, versatile batch furnace that may be programmed to run simple or complex thermal profile recipes. It is designed to provide a very uniform heating environment and allows the ability to cool workloads at various pressures ranging from sub-atmospheric to positive. Processes such as annealing, brazing, hardening, sintering, stress relieving and tempering may be performed in this furnace. Cycles for such processes may be automatically programmed for repeatable and precise control.

Vessel and Door

The vacuum/pressure vessel is cold-walled and horizontally positioned. It contains the insulated heating chamber with elements, heat exchanger, fan assembly and necessary feed-throughs (for power, pumping, sensors, 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, that allow access to the heat exchanger and heating chamber. 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 that completely surround the work area. They are positioned in a 360° arrangement to provide optimum radiation angles and even heat transfer characteristics to 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 insulation surface is lined with rigid graphite sheets backed by high purity bonded graphite felt material. The outer supporting cage structure for the insulation assembly is stainless steel. Due to the low heat storage of the insulating materials and its unique lateral heat transfer characteristics, extremely rapid heating and cooling cycles are possible.

Work Pedestal

The work hearth consists of piers and beams designed for forklift loading. Three horizontal beams, designed for heavy loads, are supported by vertical piers positioned off the furnace vessel wall. The materials for the beams and piers, dependent upon the process and temperature rating of the furnace, are molybdenum for applications over 2000°F (1093°C).

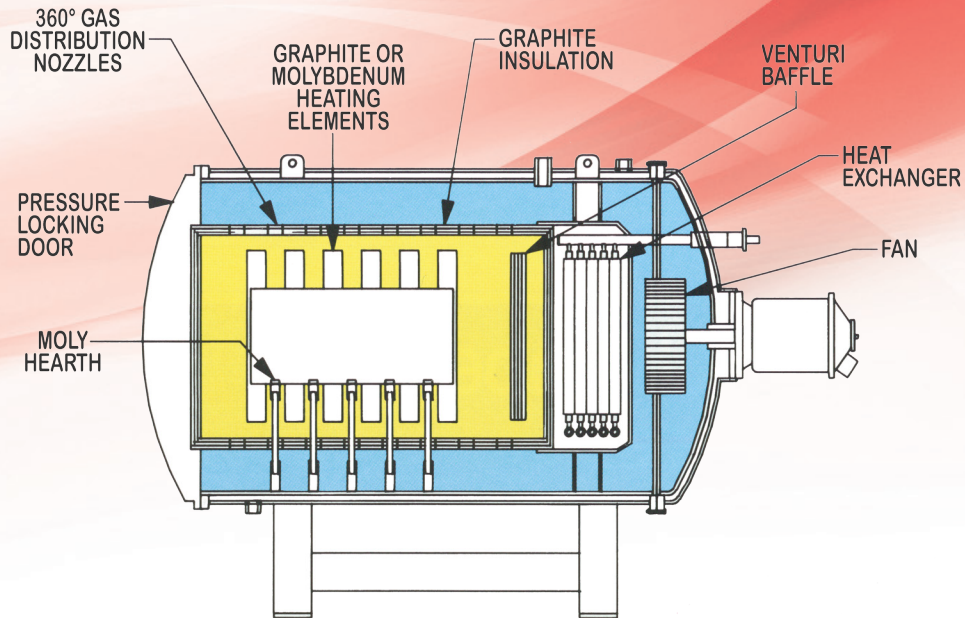
Recirculated Gas Cooling

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. Essentially, 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 the high velocity fan, out the rear of the heat area, and through the multi-pass heat exchanger. The gas is then directed along the cold wall of the vessel and back into the heating chamber in a circular pattern. For pressure quenching applications, atmosphere distribution ports are added on the circumference of the insulated heating chamber to provide enhanced cooling effects on the workload.

Component Design

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

SPECIFICATIONS



Model:	VMH-242436PQ	
Working Dimensions:	24"(H) x 24"(W) x 36"(D)	610mm (H) x 610mm (W) x 915mm (D)
Elements:	Molybdenum or Graphite	
Operating Temperature:	1200°F to 2400°F	650°C to 1316°C
Uniformity:	+/- 10°F (Above 1200°F)	+/- 5.6°C (Above 650°C)
Connected Load:	135 kVA	
Total Load:	196 kVA	
Backfill Requirements:	127ft ³ N ₂ (Per Atmosphere)	3600 Liters (Per Atmosphere)
Hearth Capacity:	1000# (Gross) at 2000°F	455kg (Gross) at 1093°C
Water Requirements:		
Steady State (2000°F)	50 GPM	190 LPM
Quench	100 GPM	380 LPM
Air Pressure Requirement:	90 PSIG (Min)	0.62 mPa (Min)
Work Support:	Moly Beams on Moly Piers	
Pressure Quench Range:	Partial Pressure to 20 BAR	
Vacuum Levels:		
(Ultimate Range)	100 Microns (Mechanical Pump) 10 Microns (Mechanical Pump and Blower) 10 ⁻⁵ Torr (Diffusion Pump)	
Floor Space (Furnace):	9'(H) x 15'(W) x 13'(L)	2.7m (H) x 4.5m (W) x 3.9m (L)

	Sinterite	C.I. Hayes	J.L. Becker
Continuous Belt Furnaces			
Sintering Furnaces	A	A	A
Brazing Furnaces	A	A	A
Steam Treat Furnaces	A		A
Annealing Furnaces	A	A	A
Austempering Furnaces			A
Normalizing			A
Stress Relief Furnaces			A
Tempering Furnaces	A		A
Mesh Belt Furnaces			A
Solid Belt Furnaces	A		
Cast Link Furnaces			A
Humpback Conveyor Furnaces	A	A	A
Other Continuous Furnaces			
Pusher Furnaces (2000°-3000° F)	A	A	
Pusher Furnaces (below 2000° F)			A
Roller Hearth			A
Walking Beam		A	A
Vacuum Furnaces			
Continuous & Modular		A	
Batch		A	
Integral, Gas, Pressure & Oil Quench		A	
Batch Furnaces			
Sintering Furnaces	A	V	
Carburizing Furnaces		V	A
Carbonitriding Furnaces			A
Normalizing Furnaces			A
Spheroidize Annealing Furnaces			A
Stress Relieving Furnaces			A
Brazing Furnaces	A	V	A
Annealing Furnaces	A	V	A
Tempering Furnaces	A	V	A
Box & Slot Furnaces (above 2000° F)			A
Steam Treat Furnaces	A		
Bell (Carbon) Furnaces	A		
Quenching Furnaces			A
Tip-Up Furnaces			A
Atmosphere Tip-Up Furnaces			A
Tempering Pit Furnaces			A
Carburizing Pit Furnaces			A
Nitriding Pit Furnaces			A
Car Bottom Furnaces			A
Tool Room Furnaces	A	V	
Atmosphere Generators			
Exothermic Gas up to 3000 CFH		A	A
Exothermic Gas up to 20000 CFH			A
Endothermic Gas up to 12000 CFH			A
Ammonia Dissociators up to 10000 CFH		A	A
Atmosphere Dryers		A	A
Quench Systems		V	A
Parts Washers			•
Charge Cars	•		•
Fabrications	•		•
Automation	•		•
Vacuum Impregnators	•		
Accelerated Delubrication Units	•		
Sinter Hardening/Accelerated Cooling Units	•		
Powder Handling Equipment	•		
Powder Blenders	•		
500# Barrel Dumpers	•		
Bulk Pack Inverters	•		
Powder Bag Hangers	•		
Furnace Load/Unloaders	•	•	•
Rebuild Services	•	•	•
Spare Parts	•	•	•
Training	•	•	•
Field Service	•	•	•

KEY
 A: Atmosphere
 V: Vacuum