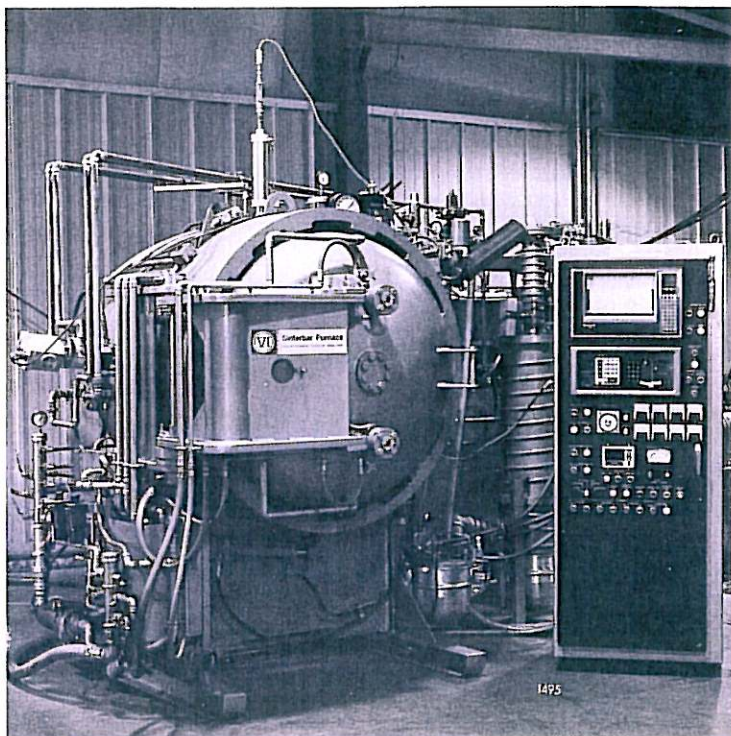


# Product Information

Vacuum Industries

## Sinterbar™ Pressure Furnaces

One-Step Delube/Debinder-Sinter-Consolidate  
for Advanced Ceramics, Carbides, Tool Steel



Sinterbar™ pressure sintering furnace Series 3750 Model 121812-2200-400 provides work space 12 in. x 18 in. x 12 in. long (300 x 450 x 300mm) at operating temperatures to 2200° C and pressures up to 400 psig (27.5 bar).

### Applications

Multi-mode Sinterbar furnaces provide state-of-the-art process capabilities for the following types of materials which benefit from single cycle debinding, sintering and overpressure densification.

**Ceramics** - Silicon nitride and other sinterable ceramics with sufficient molten glassy phases.

**Carbides** - Tungsten carbide grades with moderate cobalt content suited to liquid phase consolidation.

**Tool Steels** - Molybdenum and tungsten alloy steels with transient liquid phases suited for pressure consolidation.

The pressure sintering technique may be applicable to the production of many other materials including fiber and particle strengthened high temperature composites. Combined vacuum/pressure furnaces are also used for ceramic-to-metal and glass-to-metal sealing operations.

### Production Benefits

- Better Quality  
Increased part densities. Improved mechanical properties.
- Higher Yield  
Eliminates need to transfer fragile debinded parts from debinder to sinter furnace.

Sinterbar™ Pressure Furnaces are vital to the efficient and economical production of a wide variety of advanced ceramics, carbide tools and wear parts, and other high performance materials. They eliminate a separate hot isostatic pressing operation for many materials with liquid phases. Overpressure capabilities permit many sinterable ceramics to be processed at higher temperature for superior properties.

The "Sinterbar" pressure furnace design allows multi-mode operation in vacuum, partial pressures, and positive gas pressures up to 1500 psig (100 bar). Available in both vertical top loading and horizontal front loading models, furnace temperatures range up to 1450° C for ferrous materials, 1650° C for carbides and 2200° C for ceramics. For broader application in high performance engineering ceramics production, Sinterbar furnaces can be supplied with either graphite or carbon-free hot zones for operation at temperatures to 2200° C and pressures to 1500 psig (100 bar).

A complete furnace system includes all necessary controls for fully automatic operation of complete process cycles including Sweepgas™ binder removal. Sinterbar furnaces incorporate the latest developments in high temperature pressure furnace technology and Vacuum Industries is a leading manufacturer of pressure furnaces.

### • Cost Savings

One-step vs. multi-step process. Reduced overall cycle time. Simplified equipment, low maintenance. Overall reduction in capital investment compared to separate sinter and HIP furnaces.

### Furnace Advantages

- Multi-Purpose Operation  
Combines binder removal, presinter, sinter, and pressure consolidation steps in one continuous cycle.
- Material Compatibility  
Carbon-free all-metal or graphite furnace hot zones to suit product requirements.
- Loading Flexibility  
Horizontal front loading furnaces or vertical top loading furnaces.
- Automatic Operation  
Temperature and pressure cycles programmable for automatic control.



## Key Features

- Cold Wall Design  
Safe, compact water-cooled ASME code design chamber.
- Adjustable Gradient Hot Zone  
New heater design for maximum load temperature uniformity overcomes effects of gas convection.
- Reliable Heaters  
Rugged graphite or heavy tungsten rod.
- Variable Environments  
Vacuum, partial pressure and positive pressure. Inert or reactive gas capability.
- Binder Removal  
Sweepgas separation and collection system for many binder and lube materials.
- Accurate Repeatability  
Precise temperature measurement and control instrumentation.
- Operating Ease  
Quick acting patented access door. Automatic operation.

## Sample Evaluation

Potential users can determine the best process parameter for their materials in Sinterbar furnaces located at Vacuum

## Standard Models

Sinterbar pressure furnaces are available in the following standard sizes for maximum temperature ratings 1450° C, 1650° C or 2200°C. Modifications can be made to meet individual user needs. Custom furnaces can be designed to meet new technical requirements. Telephone or write for details.

Capacity Rating		Loading Access	Usable Work Space	Hot Zone Material
Load Weight kg (WC basis)	Work Volume ft. <sup>3</sup>	Front (H) Top (V)	Width x Height x Length Inches (mm-approx.)	Graphite (G) Carbon-Free (M)
5	Sinterbar Jr.	V	5 dia. x 5 high (125 d x 125 H)	G
30	0.6	V	10 dia. x 12 high (250 d x 300 H)	M
40	0.75	H	8 x 8 x 20 (200 x 200 x 500)	G,M
50	1	H	12 x 12 x 12 (300 x 300 x 300)	G,M
75	1.5	H	12 x 18 x 12 (300 x 450 x 300)	G
100	2	H	12 x 12 x 24 (300 x 300 x 600)	G
150	3	H	12 x 12 x 36 (300 x 300 x 900)	G
300	5	H	12 x 18 x 36 (300 x 450 x 900)	G
300	5	H	18 x 12 x 36 (450 x 300 x 900)	G
450	7	H	18 x 18 x 36 (450 x 450 x 900)	G
500	9	H	24 x 18 x 36 (600 x 450 x 900)	G

## How to Specify Sinterbar Furnaces

Refer to Series and Model numbers as follows:

### Series No.

3450	Vertical, Carbon Free
3550	Horizontal, Carbon Free
3750	Horizontal, Graphite
3850	Vertical, Graphite

### Model No.

<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>
Work Space Dimensions inches		Temperature °C		Pressure psig

Example: Series 3450 Model 1012-2200-1500 describes a vertical top-loading carbon-free furnace rated for 2200° C and 1500 psig.

Industries' plant. The test facility includes a laboratory size Sinterbar Jr. 2200° C furnace with 4" dia x 5" high (100 x 125mm) effective hot zone. The furnace is equipped with a Sweepgas™ System for binder/lubricant removal. Evaluation of parts run in the test facility will aid in selecting the most effective combined-cycle production or development furnaces. To schedule work in the evaluation facility, contact the factory.

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Vacuum Industries has designed and built specialized, high performance, high temperature furnaces since 1954. The leader in the field of critical high temperature vacuum and controlled atmosphere sintering furnaces for carbides, tool steels and ceramics, VI offers proven design integrity and reliable operation to users of Sinterbar furnaces. Careful manufacturing techniques and exhaustive testing prior to shipment ensures that all furnaces meet specifications and provide consistent, reliable operation. Experienced field service personnel are available on short notice if and when needed to provide continuity of production schedules.

The wide range of Sinterbar furnaces makes better P/M and ceramic products possible at lowest manufacturing cost.



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