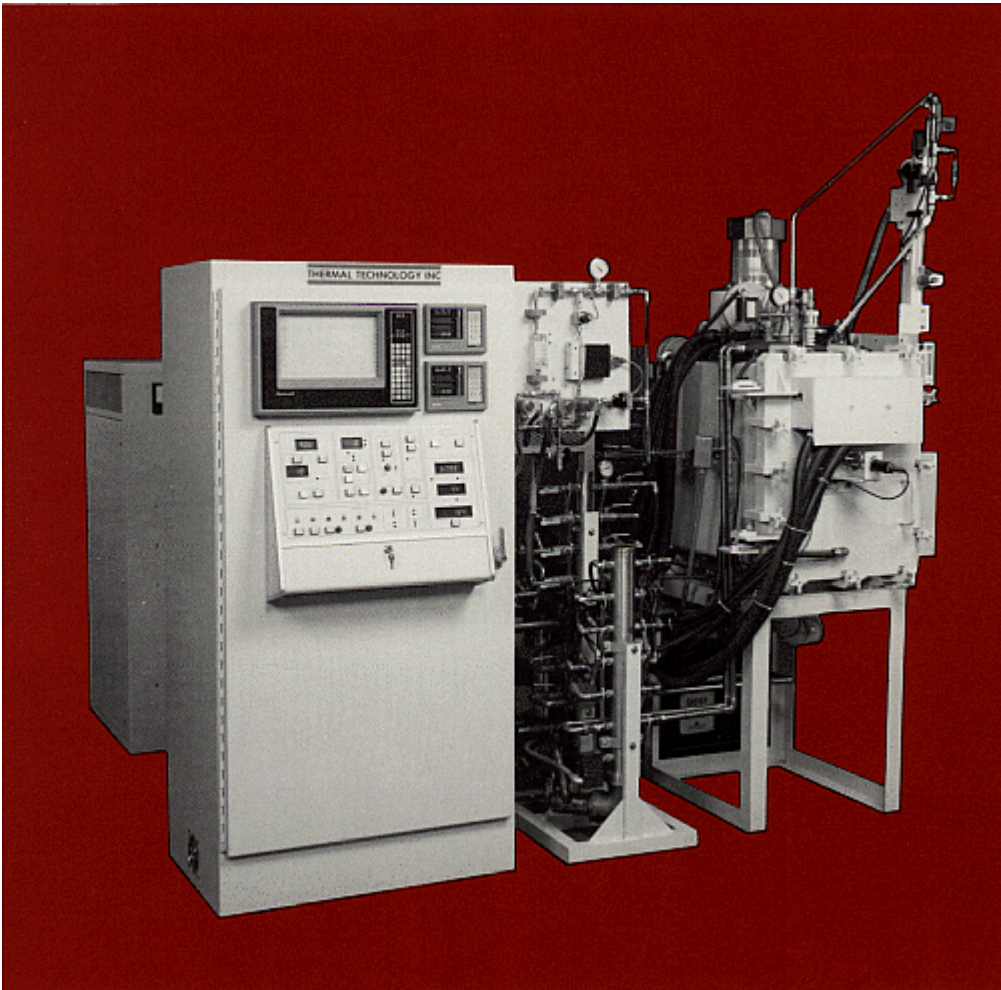


BONDMASTER

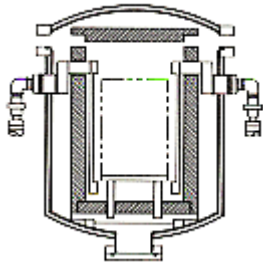
VACUUM/CONTROLLED ATMOSPHERE
FURNACES FOR REACTION BONDING OF
SILICON NITRIDE OR SILICON CARBIDE



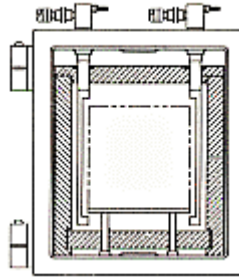
General Description

Bondmaster furnaces are designed for reaction bonding of silicon nitride or silicon carbide ceramics. Furnaces are rated to 1500°C for gas phase bonding of silicon nitride and related materials and to 2200°C for liquid phase bonding of silicon carbide.

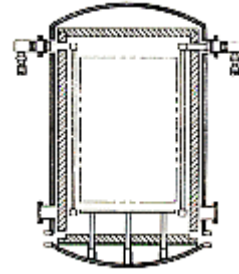
Each furnace is supplied as a complete system including: vacuum chamber; heat zone; power supply; vacuum pump; and a programmable control system. Gas flow control systems are included with 1500°C furnaces. Additional options and upgrades are available to meet individual requirements.



**Top Loader
(Model 612)**



**Front Loader
(Model 121212)**

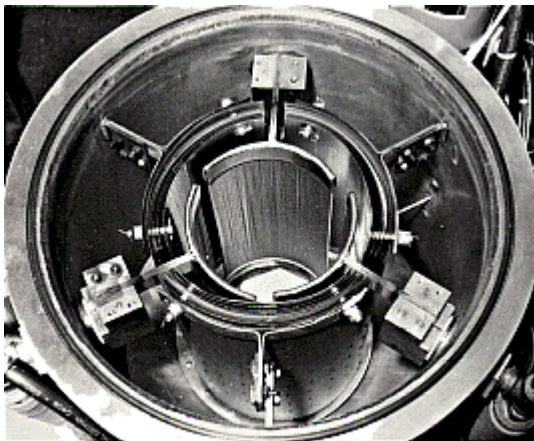


**Bottom Loader
(Model 1624)**

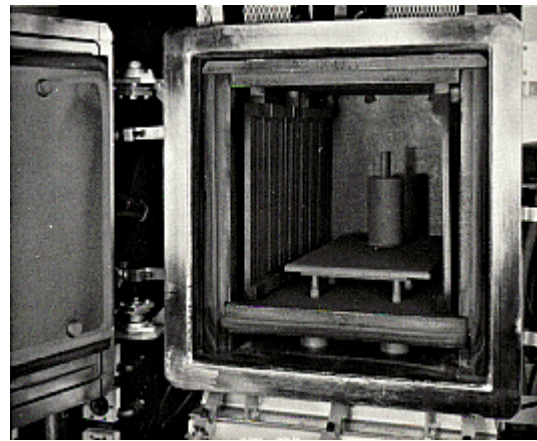
Chamber and Heat Zone

Standard Bondmaster vacuum vessels are made of mild steel which is coated internally to inhibit oxidation and improve vacuum performance. Stainless steel chambers, water jacket and flanges are optionally available for areas with poor water quality or when the ultimate in cleanliness is required.

Furnaces rated to 2200°C for processing silicon carbide are provided with graphite heating elements and graphite insulation. Furnaces rated to 1500°C for silicon nitride can be furnished with either graphite or metallic heat zones. Metallic heat zones use tungsten heating elements which are resistant to silicide formation. Similarly, a tungsten inner radiation shield is used instead of molybdenum to prevent interaction and prolong heat zone life.



Model 612M



Model 121224G

Loading	Work-Zone (inches)	Work Volume (cubic feet)	Hearth Capacity (lbs)	Power* Supply (KVA)	Vacuum Pump (cfm)	Relative Price	Model Number
Top	5ø x 10	0.1	10	20/40	16	1.0	612
Top	10ø x 14	0.6	50	40/60	27	1.1	1218
Front	12 x 12 x 12	1.0	100	60/80	27	1.2	121212
Bottom	13ø x 18	1.4	150	80/110	50	1.6	1624
Front	12 x 12 x 24	2.0	200	100/140	50	1.5	121224

*1500°C/2200°C

Atmosphere Control

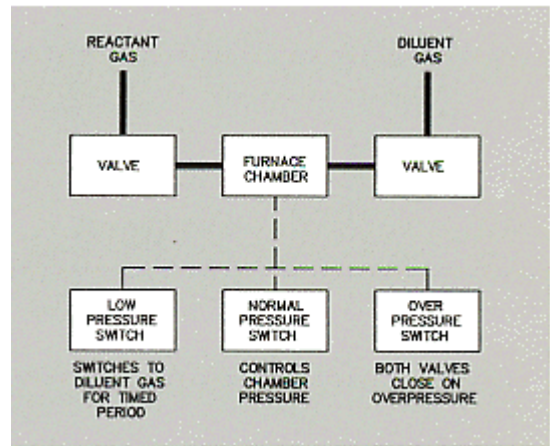
Standard Gas Flow Control System

Bondmaster furnaces are supplied with two stage mechanical vacuum pumps for rapid chamber evacuation to 0.1 torr in approximately five minutes. High vacuum diffusion, cryogenic, or turbomolecular pumps can be provided on request.

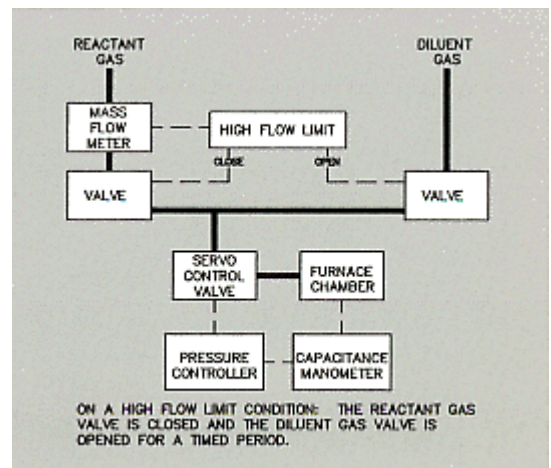
Gas phase bonding furnaces are provided with gas flow control systems including pressure interlocks to prevent runaway gas consumption. Optional gas pressure control systems are available for fully automatic operation, complete with a flow interlock for protection from excessive reaction rates. A flow totalizer can also be added to log total gas consumption and signal run completion.

Liquid phase bonding furnaces are not provided with nitrogen gas demand systems on standard models. An automatic backfill system is included for processing near atmospheric pressure with inert gas. Both gas pressure and gas flow control systems are optionally available.

Bondmaster furnaces must be equipped with a hydrogen gas safety system if explosive concentrations of reducing gases will be present. This optional system includes a blowoff port, burnoff tower, and extensive safety interlocks.



Optional Gas Pressure Control System

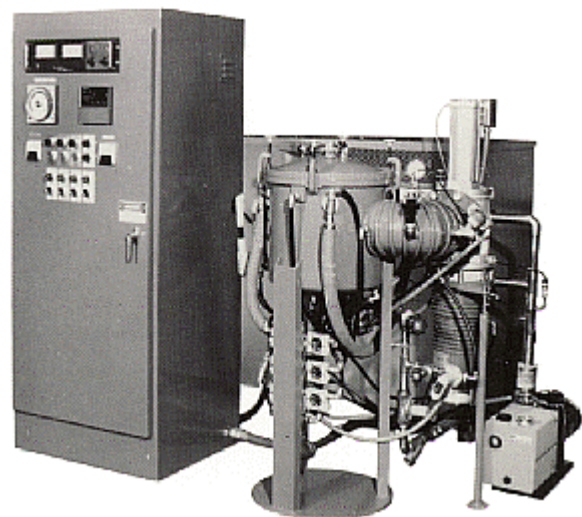


Special Features

- Either tungsten or graphite elements for long life
- Durable tungsten key shield on metallic heat zones
- Choice of gas flow control or pressure control systems
- Automatic protection from runaway exothermic reactions
- Convenient loading format – either top, front, or bottom
- Optional graphite retort for vapor containment
- Complete instrumentation package including temperature sensor, programmable microprocessor, and gas controls

Power Supply

Two different power supplies are available for each standard Bondmaster, depending on whether the furnace will be used to 1500°C or 2200°C. Each supply is generously sized with ample reserves for load heatup and compensation for heat zone aging. See table at right for typical heat zone power consumption at full temperature.



Model Number	Approximate Power Consumption (KVA)		
	1500°C ¹	1500°C ²	2200°C ²
612	10	10	20
1218	25	20	40
121212	35	25	55
1624	45	35	70
121224	55	45	90

Notes:

Larger supplies are optionally available for rapid heatup of heavy loads or operation backfilled with hydrogen rich gas mixtures.

Instrumentation

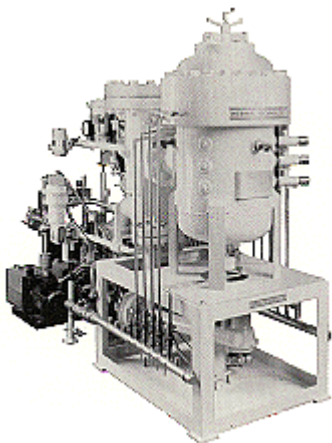
Microprocessor based programmable controllers are provided for all furnaces. The standard controller is capable of storing ten ramp and ten soak segments as well as two process events such as pumpdown or backfill. Controllers with more extensive capabilities are optionally available, as well as custom designed control systems to meet any requirement.

An infrared pyrometer is provided for all 2200°C furnaces, and a tungsten rhenium thermocouple for all 1500°C furnaces. Independent over-temperature control systems using either a thermocouple or power transducer are optionally available. Two thermocouple gauges measure vacuum and a PLC coordinates system functions and provides safety interlocks.

1. Metallic heat zone with one atmosphere of nitrogen.
2. Graphite heat zone with one atmosphere of N₂ or Ar



- microprocessor
- pyrometer or TC
- gas control
- TC gauges
- programmable logic controller
- voltmeters
- ammeters



1500 PSI

Reaction bonding can be performed with internal furnace pressures up to 1500 psi. Thermal Technology's Pressuremaster furnaces use graphite heat zones and ASME code stamped pressure vessels for safe and reliable high temperature processing. Four standard furnace models are available with capacities from 0.1 ft³ to 3.5 ft³. Reactive gas supply systems will be designed to meet individual requirements.

Custom Furnace Design

Thermal Technology has been a leading supplier of reaction bonding furnaces for more than ten years. Building on this experience, our engineering team can design a custom furnace system to meet your exact requirements. When your needs exceed the capabilities of our standard models, you can count on receiving the same quality and reliability in a customized system.

Extensive design, fabrication, and testing skills are available for use in developing furnaces built for a specific application. Our custom designed furnaces are located at National Laboratories and major corporations around the world. When you need the best—call Thermal Technology.



BONDMASTER Installation Data

	Layout ¹	Electrical ²	
--	---------------------	-------------------------	--

Model Number	WxDxH (feet)	460V, 30, 60 Hz (kVA)	Water ^{2,3} (gpm)
612	6x6x6	30/50	4/8
1218	6x6x6	50/80	8/12
121212	6x6x6	80/100	12/16
1624	7x7x8	100/130	16/22
121224	6x7x6	120/160	20/28

Notes:

1. Includes furnace, power supply, control cabinet, and pumping system. Exact dimensions depend on choice of accessories. Components can be re-arranged to different dimensions to suit individual requirements.
2. Alternate power supplies, pumps, and fans may require different inputs.
3. Water must be clean and free of contamination and minerals, regulated to 50psig, and 70°F maximum temperature.

All Specifications are subject to change. Final quotation will be the governing documents in all case.

[Home](#) | [Welcome](#) | [Company Profile](#)
[astroDivision](#) | [brewDivision](#) | [europeDivision](#) | [light alloyDivision](#)

Products

[Contact Us](#) | [Request Information](#) | [Employees](#)
[Press Releases](#) | [Search](#) | [Site Index](#)

Copyright © 1996-2000 Thermal Technology Inc.
Website Designed by [WebNet Express](#)
All Rights Reserved