

**Group 1100 - General Specifications**

**FURNACE DATA**

<b>Hot Zone Size</b>	<b>Model</b>	<b>Max Temp In Helium</b>	<b>Power Supply</b>
2.0" dia. x 6" long (51 mm x 152 mm)	1100-2560-M1	1800° C	12 kVA
2.0" dia. x 6" long (51 mm x 152 mm)	1100-2560-W2	2500° C	20 kVA
2.0" dia. x 6" long (51 mm x 152 mm)	1100-2560-W4	3000° C	45 kVA
2.5" dia. x 8" long (64 mm x 203 mm)	1100-3080-M1	1800° C	15 kVA
2.5" dia. x 8" long (64 mm x 203 mm)	1100-3080-W2	2600° C	40 kVA
3.0" dia. x 8" long (76 mm x 203 mm)	1100-3580-W1	2200° C	20 kVA
3.0" dia. x 8" long (76 mm x 203 mm)	1100-3580-W3	2700° C	45 kVA
3.5" dia. x 8" long (89 mm x 203 mm)	1100-4080-M1	1800° C	20 kVA
3.5" dia. x 8" long (89 mm x 203 mm)	1100-4080-W2	2200° C	40 kVA
3.5" dia. x 10" long (89 mm x 254 mm)	1100-40100-W2	2200° C	50 kVA
4.5" dia. x 18" long (114 mm x 254 mm)	1100-50100-MS	1200° C	12 kVA

**FEATURES**

This specification is for a single zone, high temperature furnace that is capable of operation in dry inert, reducing, and vacuum atmospheres. The basic Model 1100 system includes the refractory metal furnace, support column and bracket, manual power supply, and water-cooled flexible power leads. The operational specifications for these systems are as follows.

**HOT ZONE**

Depending on the specific model either molybdenum or tungsten wire mesh, or molybdenum sheet, is used for the heating element.

**THERMAL RADIATION SHIELDS**

Radiation shields are molybdenum or tungsten-molybdenum sheet. Minimum shield thickness is 0.010" (0.024 mm).

## **WORK SUPPORT HEARTH**

Molybdenum or tungsten work support hearth is attached to the furnace bottom door.

## **FURNACE CONSTRUCTION**

The furnace shell is heavy-wall, seamless extruded 6061 T6 aluminum with an anodized exterior. The bulkheads are hard-anodized aluminum and the doors are nickel-plated copper. The shell and bulkheads have integral water-cooling passages. External surface temperatures are maintained at 65° C or less. O-ring seals are Viton.

Radial and axial ports are provided to permit viewing and instrumentation access to the furnace hot zone. Two 1 1/8 inch-16 threaded ports are located at the middle of the hot zone. One port has a shuttered viewing window with anti-fog gas diffuser for atmosphere operation. The second port is blanked off but will accept a second window and shutter assembly for straight-through viewing access. A plugged thermocouple feedthrough is located 45° from the window. A plugged instrumentation port is provided through the center of each end door. A radial vacuum port with a water-cooled cover plate is also located at the furnace mid-point, 90° from the window.

## **MAXIMUM TEMPERATURE**

Temperature to 3000° C in vacuum, inert, and reducing gas atmospheres.

## **TEMPERATURE UNIFORMITY**

At 1700° C a 2-inch (50 mm) long uniform temperature zone with a uniformity tolerance of  $\pm 3^{\circ}$  C is possible in all models. A uniformity tolerance of  $\pm 8^{\circ}$  C is possible over 4 inches (100 mm). Uniformities will improve above 2000° C due to the high thermal radiation flux. Full length, very uniform hot zones can be provided for specific operating conditions upon special order.

## **CYCLE TIME**

Heat-up time from ambient to maximum temperature is usually 30 minutes or less. Power-off cooling time from maximum to 100° C is 2 to 3 hours. More rapid cooling can be achieved by increasing gas flow into the furnace chamber or adding the optional cooling chamber accessory.

## **POWER SUPPLY**

The power supply consists of an SCR power regulator and step-down load transformer.

Power is activated with an on/off switch that controls a furnace power contactor. A panel meter indicates secondary voltage and current. A safety interlock with warning lamp, audible alarm, and operate/reset switch monitors cooling water flow and optional alarm circuits.

Power is manually adjustable from 0-100% by means of a panel-mounted, digi-dial on a 10-turn potentiometer. Power supply components are housed in a floor console that shares a common 25" by 44" base with the furnace support column.

## **AVERAGE POWER CONSUMPTION**

At maximum temperature, steady state power consumption is approximately 75% of rating in vacuum, 83% in argon and 87% in helium or hydrogen. Power supplies have ample reserves to compensate for the additional power required by increased heat losses due gas convection and to the eventual discoloration of the radiation shields.

## **FACILITY REQUIREMENTS**

**Electric:** 208/230 volt, 60 hertz, single phase (or 220 volt, 50 hertz, single phase), for systems requiring 20 kVA or less. 440/480 volt, 60 Hz, 3 phase (or 380 volt, 50 Hz, 3 phase) for systems requiring 30 kVA or more.

**Water:** 2.0–8.0 gpm at 50 psig; 65-85° F (7.5 to 30.0 l/min. at 345 kPa; 18-30° C) depending upon the model. The water should be filtered if it contains sand or other solid matter.

**Space:** Maximum floor area: 5' x 5' (1.3 m x 1.3 m) including access. Height: 7' (2.1 m).

**Installation:** Systems are complete and require only connection to user supplied sources of power, cooling water, and operating gas/vacuum.

## **GROUP 1100 – ACCESSORIES AND OPTIONS**

### **TEMPERATURE SENSORS**

Standard temperature sensors are tungsten 5% vs. tungsten 26% rhenium thermocouples and radiation pyrometers. Thermocouples are usable at temperatures through 2000° C. Optical pyrometers are recommended for use at temperatures above the thermocouple range and are effective from room temperature to 3000° C with controlled atmosphere conditions.

### **AUTOMATIC TEMPERATURE CONTROL**

Automatic temperature control may be achieved with a versatile, high stability, precision PID, setpoint programming controller. Different models with a variety of features are available. These features include self-tuning, multiple stored programs with multiple ramp/dwell segments, and event outputs. Digital serial communications via EIA 232/422/485 are available.

### **TEMPERATURE RECORDING**

Recorders are available in single and multi-pen and single and multi-point models in several chart widths and speeds.

### **VACUUM PUMPING SYSTEMS**

Model VS63M pumping system is recommended for use with this furnace. The integrated, stainless steel pumping module consists of a 2.5" (63 mm) oil diffusion pump, optically opaque water-cooled baffle, and manually operated high vacuum, roughing, and foreline valves. Pumping speed of the module is 130 l/sec. for air.

Other major components are: a 2-stage 3.4 cfm (96 l/min.) mechanical pump, and an ionization gauge control with 2-station thermocouple gauge control. One cold cathode ionization gauge tube and 2 thermocouple gauge tubes are included.

A water-cooled, stainless steel elbow and all manifolding, vacuum lines, and water-cooling circuits required to connect the module to the furnace are also included.

Pumping systems with 4" (100 mm) and 6" (160 mm) diffusion pumps are also available for use in high outgassing applications. Standard system options are air-operated valves and automatic valve control.

## **GAS CONTROL SYSTEMS**

Inert gas controls, burnoff systems for combustible gases, and the Model GSS-97 hydrogen gas safety system are available for controlled atmosphere operation.

## **HEARTH ELEVATOR**

A hearth elevator is available to facilitate bottom furnace loading. An elevator attached to the furnace permits smooth raising and lowering of the furnace bottom door and work support hearth.

## **QUENCH AND COOLING CHAMBERS**

Liquid quench and gas-cooling chambers are optionally available for use with all Group 1100 models.

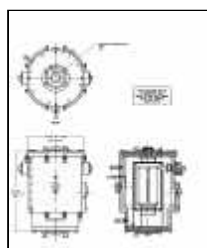
## **SPECIAL MODIFICATIONS**

Additional radial view ports including dual opposed windows for optical extensometer work and long, slot-shaped, through-view access.

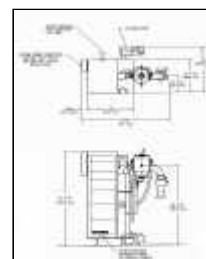
Stainless steel and nickel-plated copper vessel construction for corrosive gas use including hydrogen fluoride and chlorine.

High pressure construction to ASME standards for pressure vessels.

Special models are available with hot zone lengths to 36 inches (914 mm).



Furnace Assembly  
Model 1100



System Assembly  
Typical Model 1100



Labmaster  
Group 1100 Furnace

April 1999 Press Release

Click photo to view  
larger image

[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.  
All Rights Reserved