



Tetreon Technologies Product Specification for Thermco Horizontal Furnace Systems

PRODUCT SPECIFICATION

Specification
Number: F-HTR24/26

TMX control option

February 2005



Model 2400 and 2600 Series Mini Furnace Systems Designed for small production capability or R&D

APPLICATION

Tetreon can manufacture to your specification, 2, 3, or 4 tube Mini-Furnace systems that are ideal for research and development and include the sophistication and high reliability required by a full production system.

PHYSICAL DESCRIPTION

The frame structure of the furnace, load station and source modules is of unibody style construction where heavy gauge sheet metal is welded into a free standing structure. High quality 316L stainless steel is used on all wetted surfaces.

The Models 2400 and 2600 furnaces require the following floor space:

<i>Furnace</i>	<i>Load station</i>	<i>Source Cabinet</i>
L 1650 mm	L 1650 mm	L 1403 mm
D 737/1169 mm (24/26)	D 980 mm	D 914 mm
H 2279 mm (24xx)	H 1943 mm (24xx)	H 2259 mm (24xx)
H 2650 mm (26xx)	H 2349 mm (26xx)	H 2554 mm (26xx)

The 2400 series furnace is designed for wafer sizes up to 100 mm diameter (4") and the 2600 series is designed for wafer sizes up to 150 mm (6"). The systems can be configured as 2, 3 or 4 tube versions.



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PHYSICAL DESCRIPTION cont'd

Furnace:

The levelling feet structural bars are made of 2" square bar stock with four holes drilled and tapped 3/4 x 10 through in the vertical direction. The adjustment feet have large heavy duty pads. The stud protrudes through the bar inside the unit and incorporates a hex tip so that the feet may be accessed from inside the furnace.

The double, removable access doors can either be both hinged or one sliding and one hinged. They provide easy access to the heating chambers for maintenance purposes. Airflow inside the cabinet is controlled by silent running high efficiency fans mounted on the top of the furnace cabinet which draw in air through pre-filters over the heating chambers and through an air to water heat exchanger to minimise heat discharge into the clean room or fab maintenance area. Low heat loss at the tube ends is provided by vestibule blocks with an improved compression seal fabricated of high-purity, low-sodium insulating material.

The SCR firing cards, power transformers and miscellaneous electrical controls are mounted in the base of the furnace cabinet.

Load Station:

An ultra clean wafer loading environment is provided by HEPA filters mounted in the rear of the load station. Bottom mounted blower motors take air through pre-filters in the base of the load station and into the rear air plenum. Air is distributed as Horizontal Laminar Flow (HLF) over the whole wafer loading area providing a class 10 or better environment. Filters are 99.999% efficient in removing particles greater than 0.12 micron. Air speed can be balanced to the external fab laminar flow by motor speed controllers provided.

Automatic wafer loading is provided by Model D-type loaders employing dependable and accurate lead screw design for repeatable loading and unloading of cantilever paddles into the furnace tube. A choice of paddle types and door closure mechanisms are available.

Scavenger units on each tube level are provided in 316L stainless steel with individual damper control for extraction.

Source Cabinet:

Solid and stable, all metal construction with colour matched panels to the furnace and load station. The source cabinet has four individual stainless steel shelves at each furnace tube level for the mounting of gas chassis with a dividing stainless steel panel to separate gas systems from the furnace tube side. The cabinet is rotated at 90 degrees to the furnace to enable easy removal of the process tube for cleaning.

Extract is provided by a central common manifold with individual damper control at each shelf level. Electronic controls boards are mounted within a double walled sealed door design.

Pressure regulators, gauges and in-line filters are provided in a separated enclosure and gas manifolds are provided to each shelf level with shut off valves. Optional point of use particle filtration or chemical filtration can be provided for each gas chassis.



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Process Capability:

The following processes can be provided as standard in the Mini-Furnace range:

- Silicon Nitride
- Ramped temperature poly
- Uniform grain poly (flat temp)
- TEOS
- VLTO
- BPSG
- High temperature oxide (with or without external torch)
- 5 or 6 loop pyro with DCE (TCA) or HCL
- 3 or 4 loop liquid dopant (POCL3 or BBR3)
- 2 loop forming gas anneal
- High temp high flow anneal
- Low temp anneals or cure



Control System:

The Mini-Furnace range can be controlled by simple stand alone controllers that offer low cost and simplicity. Alternatively Tetreon can provide the industry leading Thermco TMX controller, recognised as one of the most flexible and reliable furnace control systems available and with a user installed base of thousands of units.

The TMX PC-MUX controller combines the tried and trusted recipe and system control formats of earlier generation TMX products but with new updated reliable PC based hardware. It comprises one computer per tube and one MUX computer for recipe generation and management in a free-standing console.

Performance Specifications:

Operating Temperature Range:

200 to 1250°C (1300°C with APM wire heater). Uniform heated zone with up to 15.0 litres per minute gas flow, depending on wafer load size and shielding/baffling at load end of process tube.

For process tubes up to 10.0 inches (235 mm) OD:
 400-750°C ± 1° 10-12 inches flat zone
 750-1250°C ±0.5° 10-12 inches flat zone

Cool Down Rate:

Furnace will cool from 1200 to 900°C at a linear rate of at least 3°C per minute.

Long Term Stability:

Furnace temperature will be stable within ± 0.25° C or better.

Power System:

Maximum reliability with secondary operated, zero-crossover fired SCR power controllers. SCR devices are specially selected for high overload ratings. Highly efficient direct convection or forced air cooling of all SCRs.

Efficient power transfer and balance by utilizing individual three-phase element transformers for each furnace tube. Transformers are rated for 100% duty cycle. Circuit breakers used throughout system for maximum protection and ease of operation.

Facilities Requirements:

Power:

440/460/480 volts, 3 phase, 60 Hz **or**
 380/400/415 volts, 3 phase, 50 Hz

Control:

120 volts, 1 phase, 50/60 Hz by customer **or**
 optional transformer

Water:

8GPM at 60°F