

Product Information

Vacuum Industries, Inc.

A Nevada Group Company

CONTINUOUS P/M VACUUM SINTERING FURNACE
TANTALUM ANODE MODEL
SERIES 3600 MODEL 710-8-1-2200



Load/unload tower, main console, and remote control panel No. 1 — all within easy reach from central operating platform. Main chamber port below furnace tower gives access for servicing. High capacity gas handling provided by 10,000 liter/sec. diffusion pump, freon-cooled baffle and full-bore right angle valve connection.

Application: Specifically designed for sintering oxygen and nitrogen sensitive, high temperature materials, the system's 2200°C heat zone is ideally suited for tantalum PM compacts. The completely integrated system provides for loading, sintering, and cooling mass produced, pre-sintered PM products under controlled conditions of temperature, vacuum and inert cooling gas. Similar Vacuum Industries' furnace systems are available for processing carbides and other PM products.

DESCRIPTION

Introduction: Air-to-air processing advantages are combined with high throughput in this convenient to operate, space conserving design. A rotary table in the main vacuum chamber indexes each successive load from loading position to heating position and on to six (6) vacuum cooling positions — then back to the starting position for gas cooling and unloading. A remotely operated vertical ram located below the rotary table lowers (and raises) loads from (and into) the load/unload tower. A similar ram raises (lowers) loads into (from) the furnace heat zone tower. The furnace heat zone operates continuously and is always charged ex-

cept during the short time when all loads are lowered to the rotary table for indexing.

Each load is cooled in vacuum on the rotary table through six (6) stations. Cooling in inert gas is possible when the load is returned to the load/unload tower just before unloading. The forced draft cooling system includes a high speed blower and a water-cooled heat exchanger to extract heat from the load, thus ensuring a safe exit temperature. The complete system is fully interlocked for automatic fail-safe control with manual override capability for maximum versatility.

FEATURES AND ADVANTAGES

- **High Production** Up to 100 lbs./hr. (56 kg/h); air-to-air load handling.
- **Optimized Environment** High vacuum process during 95% of cycle.
- **Convenient Operation** Load and unload from control platform.
- **Economy** Continuous operation extends heat zone life, conserves power.
- **Compact Size** Rotary carousel design saves space.
- **Safety** Water-jacketed throughout, hot spots avoided.
- **Protection** Interlocks insure against inadvertent load damage.
- **Fast Cooling** Inert gas recirculation and external heat exchanger
- **Industry Standard** Preference of leading tantalum anode producers.

Capacity

Effective Workspace: 7.5" dia. x 10" high
(190 mm x 254 mm)
Typical load: 50 lb. (28 kg) tantalum
No. of load stations: 8
Typical load cycle: 30 to 35 min. (depending on process)

Chamber

Main Vacuum Chamber — Type 304 stainless steel cylindrical vessel, welded-in dished cover, flanged dished base, mild steel flanges and water jackets; 18" dia. door for access to rotary table; 16" dia. flanged port (for load lock isolation valve).

Load/Unload Tower — Type 304 stainless steel cylindrical vessel with mild steel flanges and water jacketing; Type 304 stainless steel flat plate cover.

Furnace Tower — Welded-in Type 304 stainless steel cylinder with mild steel top flange and water jacketing; dished cover with power ports, port for sighting and lifting lugs.

Internals

Load Lock — radially retractable load support bars; 16" high vacuum isolation valve.

Rotary Table — nickel plated steel (water-cooled) with matched holes and centering pads for 8 stainless steel platens (drilled for users tantalum load support posts).

Furnace Heat Zone — Heating elements: heavy tantalum rod. Radiation Shields: Multi-layer dimpled tantalum sheet. Shield Support: Nickel; complete assembly removable as single unit.

Externals

Main Chamber — Two (2) water-cooled rams, hydraulically-operated, below load/unload and furnace towers. Rotary table drive mechanism and hydraulic motor. Hydraulic power unit. Sight port on access door.

Load/Unload Tower — Three (3) pneumatic actuators for radial load support bars. Cam-operated lift/swing-aside cover mechanism. Sight port on cover.

Furnace Tower — Sight port on cover (with isolation valve).

Vacuum Pumping Systems

Main Chamber: 16" (10,000 liter /sec) diffusion pump, bi-coolant chevron baffle with mechanical refrigeration system, high vacuum right angle valve; 1600/150 CFM combination blower/pump assembly for roughing and backing; 5 CFM mechanical holding pump; steel manifolding; remotely controlled, solenoid-actuated, pneumatically-operated valves.

Load Lock: 6" (1500 liter/sec.) diffusion pump; 50 CFM roughing and backing pump; 5 CFM holding pump; steel manifolding; pneumatically-operated valves.

Controls and Instrumentation

Main Control Console: free-standing, front access, NEMA-1 console with interlocked power disconnect switch; two (2) vacuum system control panels, each with mode selector switch, keylocking overrides and pilot lights for sequence controlled, semiautomatic pumping; furnace control panel with digital potentiometer for power adjustment, start-stop pushbuttons, ammeters and voltmeters, and cooling water pilot lights; load handling control panel (graphic display) with pushbuttons and pilot lights to control loading ram, furnace ram, table index and index lock, all interlocked for error-free operation.

Remote Panel #1 (convenient to load lock cover): operating controls for isolation valve, gas backfill, gas blower/heat exchanger, load ram, and load lock vent.

Remote Panel #2 (next to main chamber manhole cover): operating controls for rotary table index mechanism and furnace station ram.

Power Center

Housed in console base; includes main fused disconnect switch, starters, contactors, control power transformer. Completely wired, color coded and ready for connection to user service.

Power Supply

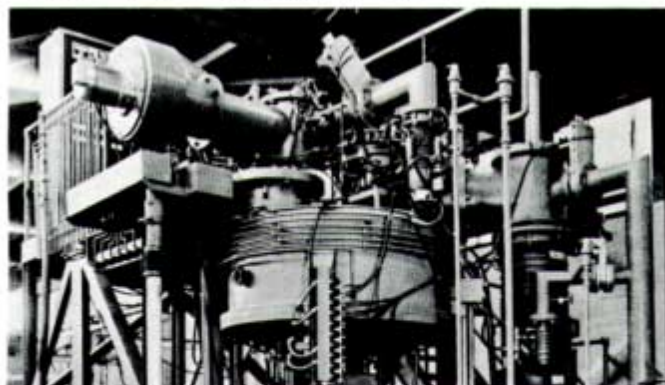
Balanced three-phase low voltage air-cooled transformer, 100 kVA saturable core reactor. Manual start, shunt trip, circuit breaker interlocks with cooling water supply.

Utilities

Electrical: 440 volts, 3-phase, 60 Hz; 210 amps.
Water: 40 gpm, 30-50 psig, 60-70° F, filtered.
Air: 80-100 psig, 10 CFM, filtered and lubricated 1 hr. duty cycle.

Space Required

Approximately 17'-0" long x 13'-0" wide x 9'-6" high including height of 72" platform mounted console. Pit required to accommodate hydraulics — 3' x 3' square x 7' deep.



Auxiliaries from rear, top left to right: cooling water distribution manifold, drain bosh; cooling gas heat exchanger and direct-drive blower with suction line to load lock; load lock pumping system and main chamber pumping system (mechanical pumps and blower out of view.)