

VERTICAL LOADING INTEGRAL QUENCH RETORT FURNACE

APPLICATIONS

The IQV 1224 is a vertical loading integral quench furnace. The seal between the furnace chamber and the quench tank is made in the quenchant media. This provides the furnace with a unique safety feature. The quench tank is open to the air and provides automatic relief to excess pressures inside the retort. There is no large "vestibule" to fill with combustible gas at a low temperature. In addition, the retort provides superior atmosphere protection because there is no outgassing of oxygen from the insulation. The three-zone heating, even heating of the elements that surround the retort, fan and recirculation muffle provide excellent temperature and gas uniformity. The furnace is extremely responsive and controllable, allowing, for instance, very shallow case depths in carbonitriding, previously obtainable only in cyanide salt bath furnaces. The vertical downloading is ideal for long vertical parts that need to be protected from distortion. It also allows for a very quick quench transfer time. There is no water consumption for cooling, and consumption of gas and fluids is minimal. The unit is completely self-contained, needing only hookup to bottles of nitrogen, ammonia and propane and an included pressurized tank of methanol. This furnace is ideal for beryllium copper heat treating, carburizing, carbonitriding, carbon restoration and neutral hardening. The entire control system is software-driven on a PLC with integrated PID control loops, allowing the system to be completely automated. Even with a polymer quench, the dew point can be as low as +10°F.



FEATURES

FURNACE CASE, STAND AND ENCLOSURE

The furnace case is split into two separate halves that are joined by a hinge and bolt-on latches. This makes element and tube replacement simple. A heavy-duty integrated stand is built in three sections for easy shipping. This stand is covered with removable sheet metal panels for attractive appearance and safety. There is a door for access to the loading fixture. This must be closed after the load is fixed onto the load hook in order for the loading sequence to proceed. High temperature silicone-based primer is painted on all surfaces and finished with machine enamel.

FURNACE SYSTEM

The furnace is insulated with 4" of ceramic fiber backed up with 2" of mineral wool. No asbestos is used. Iron-aluminum-chrome alloy coiled elements are embedded in ceramic fiber-molded sections that are evenly distributed around the retort.

FAN AND RECIRCULATION MUFFLE

Inside the retort is a radial fan and recirculation muffle that forces the atmosphere through the workload. This results in even distribution of the reactive gasses and good temperature uniformity. This provides consistent and repeatable work.

INTEGRAL QUENCH SYSTEM

An agitated and heated quench tank includes a propeller agitator, high K.W. electric immersion heater, and drain. Designed for polymer quench. The quench tank is supported on a lifting platform that is raised and lowered by means of a brake motor/gear reducer drive system. The platform and tank is counterweighted, and connected to sprockets on the driven shafts. Control is either automatic or manual by means of push buttons on the control panel.

LOAD ELEVATOR

The load rests on a plug that is lifted in and out of the retort by means of a pneumatic cylinder, which provides a very fast quench.

NITROGEN/METHANOL ATMOSPHERE SYSTEM

A complete nitrogen/methanol atmosphere control system is included. Methanol dissociates into 67% hydrogen and 33% carbon monoxide. Along with 40% added nitrogen, this provides the base atmosphere (very similar to endothermic gas but more uniform and with a lower dew point) and is ideal for carburizing, carbonitriding or neutral hardening. Propane gas is added to increase carbon potential. Ammonia is added for carbonitriding. Nitrogen is also used as an emergency and auxiliary superpurge. The atmosphere is contained within a 330 alloy retort, preventing out-gassing from the insulation. The atmosphere outlet is on the bottom just above the quench tank. This forces the gas toward the bottom of the retort to the control dew point. A floor standing flow control panel contains all of the flow train components. Most items such as valves, flowmeters, regulators and gauges are flush panel mounted. The methanol system includes a nitrogen pressurized stainless-steel tank. A monitored electric ignitor maintains a positive ignition source at the gas exit. This atmosphere system is designed to meet or exceed the regulations of the National Fire Protection Agency for controlled atmosphere furnaces (NFPA 86C).

AUTOMATED CONTROL SYSTEM

The entire system is controlled with a Honeywell HC900 logic control and PID controller. This includes the three furnace heating zones, quench tank heater, and all process and safety logic. The entire operation is automated so that once you establish your operating parameters for a process, it is very easy to operate with unskilled labor. Power controls are zero-fired SCRs. Control voltage is 120. All fuses, contactors and controls are located in a NEMA 12 panel with a fused disconnect switch. Thermocouples are inconel sheathed Type K. The control voltage is transformed to 120 volts. A Honeywell UDC 1200 digital FM-approved

high limit backup control with manual reset is included with backup contactors and separate thermocouple element. Single point power connection. Meets National Electrical Code.

TESTING AND INSTRUCTIONS

The furnace is thoroughly tested in our factory. A complete instruction manual includes easy startup instructions, theory of operation, maintenance instructions, parts list, detailed troubleshooting guide, ladder logic diagram, panel layout, general dimension and assembly drawings. Start-up service and training is included.

WARRANTY

The furnace is warranted for one year except for elements and thermocouples, which are warranted for six months.

OPTIONS

- **CARBON CONTROL:** With oxygen probe
- **RECORDERS:** Strip or round chart

SPECIFICATIONS

- **WORKING DIMENSIONS:** 12" diameter x 24" high
- **MAXIMUM LOAD WEIGHT:** 200 Lbs
- **LOADING HEIGHT:** 75" from floor
- **OUTSIDE DIMENSIONS:** 100" W x 200" H x 55" D
- **PANEL DIMENSIONS:** 84" W x 72" H x 24" D
- **FURNACE K.W.:** 24
- **QUENCH TANK K.W.:** 4
- **VOLTS:** 208/3/60, 240/3/60, 380/3/50 or 480/3/60
- **UTILITIES AND SUPPLIES:** Compressed air, nitrogen, propane, methanol, anhydrous ammonia (for carbonitriding), polymer for quench, fill water for quench tank evaporation.
- **MAXIMUM TEMPERATURE:** 1,800°F (980°C)
- **UNIFORMITY:** +/-15°F
- **APPROXIMATE SHIPPING WEIGHT:** 6,500 Pounds

