



SPECIAL FURNACE CO INC

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OPTIONS

HIGH UNIFORMITY OPTIONS

HIGH TEMPERATURE FAN SYSTEM

Fans are the best way to increase the gradient uniformity inside the furnace. The maximum continuous temperature of the standard L&L fan system is 1875^oF. This system will normally provide a gradient uniformity within the furnace chamber of +/-15^oF or better with appropriate loading of the furnace. A machined aluminum heat dissipator removes heat from the shaft before the heat reaches the bearings. Two self centering pillow block bearings hold the shaft and a belt drives it from the motor. An OSHA shield is provided. The fan automatically turns off when the door is opened. Some fans have 6 pitched blades and blow down. The blade section is cast and then welded to a machined alloy shaft. Others have either 4 or 6 flat blades and pull the air up, discharging it to the sides. See quote for specifics.

WATER COOLED FAN FOR 2000^oF OR 2200^oF

Various water cooled fans made by Industrial Gas Engineering are available. These generally include a vertically mounted fan cartridge assembly for operation up to 2200^oF. The fan shaft and blade is statically and dynamically balanced. Typically these fans use about one gallon of water per minute for cooling.

RECIRCULATION MUFFLE

This system will insure a gradient uniformity within the furnace chamber of up to +/-5^oF. It is used in conjunction with a furnace fan. A reinforced, welded stainless steel recirculation muffle rests inside the furnace chamber. (This can be lifted out without damaging the refractory.) The muffle typically includes baffles along the sides. On recirculation muffles with top mounted fans the bottom is typically constructed of heavy reinforced perforated or expanded alloy which becomes the hearth of the furnace. These baffles direct the moving air around the elements and through the work space to the fan. They also shield the work from radiant hot spots. Where the fan is mounted horizontally in the back, the bottom is solid and the air is recirculated around through the open front. On top loading furnaces, the fan is normally mounted on the bottom and the air is pulled through the open top. A stainless steel 304 recirculation muffle can be used to 1400^oF while the 330 alloy muffles can be used to 1875^oF.

**FANS, VENTS, VENTURIES,
ATMOSPHERE, HEARTH AND
LOADERS, DOORS, PEEPHOLES,
ACCESSORIES, PUBLICATIONS**

VENT/COOLING OPTIONS

VENT HOLE(S)

One or more simple vent holes can be drilled into the furnace casing and insulation. Ceramic fiber plugs can also be provided. These can be located anywhere on the furnace to customer specifications.

MANUAL OUTLET WITH DAMPER

A sliding stainless steel damper with a heat resistant handle allow a 4" vent hole to open and closed.

MANUAL INLET WITH DAMPER

Various kinds of sliding manual dampers are offered, each sized and located according to specific requirements.

MOTOR DRIVEN VENTURI SYSTEM

A motor driven venturi vent system is available. This system sucks air out of the furnace and pulls in fresh air. Air inlets are located per customer specifications. (NOTE: venturis work by blowing air past a tube that is inserted into the furnace. This creates a vacuum without blowing cold air into the furnace. It has the advantage of having a controlled exhaust and minimizing heat shock in the furnace). A 1 H.P. motor, complete with motor starter, drives the system. Capacity is 300, 600 or 1250 CFM, depending on the size of unit ordered. A stack should be installed to exhaust the hot air. Normally, a hand operated stainless steel damper is provided with the venturi system to control the amount of air being exhausted from the furnace.

PROGRAMMABLE MOTORIZED VENTURI

The venturi motor is controlled with a magnetic motor starter and push-button, with a relay programmed by the programmable temperature controller for turning the motor on and off in order to follow a programmed cooling curve. A separate pneumatically controlled inlet damper is normally also added. The inlet and out dampers then open or close with the programmed switch.

ATMOSPHERE OPTIONS

ATMOSPHERE SEALED CASE WITH FLOWMETER/REGULATOR

The furnace case is tightly sealed for use with a protective inert atmosphere. Argon, nitrogen and gases enriched with up to 4% combustible gas (such as hydrogen or propane) can be used. No safety systems are required. A threaded alloy fitting introduces the gas into the furnace chamber. The element connection chamber is typically purged. The door seal is augmented with a woven ceramic fiber gasket. A properly sized flowmeter/regulator is included with the atmosphere system. A rule of thumb on atmosphere usage is to

figure six to ten times the furnace volume times the number of hours the work will be in the furnace.

FLAME CURTAIN

A flame curtain helps seal the door opening to help prevent air inrush when the door is opened. Solenoid valves, limit switches, shutoff valve, and all piping are included. The solenoid valves open when the door is opened. The pilot flame ignites the gas and forms a curtain of flame. Requires 1/2 to 1 psi gas pressure. Can be designed for propane. Uses compressed air to power combustion air. May be quoted with either electronic ignition or manual ignition. Complete safety shut off is included. A vertical door must be used with a flame curtain.

ALLOY MUFFLES AND RETORTS

Alloy muffles and retorts are made by L&L. These are designed for specific temperature and atmosphere conditions. They often include "D" shaped roofs and corrugation for strength at high temperatures. Muffles can be mounted on carts with furnace fronts to make it possible to load the muffle into the furnace and pull it out at high temperatures. Such systems make it possible to cool rapidly under atmosphere for air hardening tool steels. Alloy retorts have a much better dew point than the more commonly used atmosphere sealed case. This means that oxidation and decarburization resistance is better in a muffle or retort. Top loading and bell type units are available. See specific literature such as the XLC SERIES and JSC SERIES for this option.

COMBUSTIBLE ATMOSPHERE OPTIONS

Some furnaces are available with for use with hydrogen or highly enriched neutral atmospheres. Automatic burn offs, gas mixing systems, and automatic purging and safety systems are available. NFPA-86C regulations (National Fire Protection Agency) for special atmosphere furnaces are met or exceeded. See the following bulletins: H2 SERIES for 100% Hydrogen, NM SERIES for Nitrogen/Methanol system, EN SERIES for Endothermic Gas, MPH for Nitrogen/4% Hydrogen Mix and MPN SERIES for Nitrogen/5% Natural Gas Mix. Ask for specific brochures CB SERIES for carburizing furnaces, XLNH SERIES for neutral hardening furnaces.

DOOR OPTIONS

COUNTERBALANCED GUILLOTINE VERTICAL DOOR

The furnace door is mounted on a guillotine type vertical track. The door rides in the track, which pulls the door away from the furnace seal as soon as it begins to open vertically. The door is attached to the counterbalance by heavy roller chain. A hand crank, normally located on the right side of the furnace, effortlessly raises and lowers the door. An automatically engaged safety latch holds the door in the up position until manually released by the operator. A minimum of 3-1/2" refractory to refractory seal is provided.

PNEUMATIC OPERATION

A pneumatic cylinder can be added to the vertical door. This raises and lowers the door instead of a hand crank. This is controlled by a hand or foot operated valve. This switch controls both the up and down motion of the door. An adjustable cushion is built into the cylinder to prevent damage to the furnace seal as the door closes. In addition, the speed of the door motion is adjustable. The cylinder is high quality and is repairable if necessary. Included in the system are the oiler, filter and air regulator. 40 to 60 PSI shop air is required.

ELECTRIC MOTOR OPERATION

The counterbalanced door can also be operated by an electric motor. This has the advantage of precise positioning at various points in the travel of the door. Also the door does not have to open all the way before closing. Includes a safety torque limiter to protect against jams. It is much slower than the pneumatic door operator.

HEARTH & LOAD SYSTEMS

SILICON CARBIDE HEARTHS

These are standard on higher temperature furnaces like the GLF and GF. They are available as an option on XLE furnaces. The optional hearths often feature molded sides. The silicon carbide hearths are normally 1-1/2" thick and are fixed in place with cemented firebrick. Silicon carbide features high strength at high temperatures, a non warping flat surface, and excellent heat transfer (which is important if there are elements under the hearth).

ALLOY HEARTHS

Lower temperature furnaces are available with fabricated alloy hearths. These have welded sides (normally 1" high) and reinforced bottoms. 304, 330 and Inconel 601 series stainless steels are commonly used.

ROLLER HEARTHS AND TRAYS

Cast alloy roller hearths and cast trays with roller wheels mounted in bottom rails are commonly used for loading of heavy loads. External roller assemblies, either fixed or movable on casters, which match the roller trays are also made.

SERPENTINE HEARTHS

Fabricated "serpentine" hearth trays can be designed for almost any size and loading. They are made from a series of corrugated strips of alloy and heavy flatbars tied together with alloy rods.

CASTABLE PIERS HEARTH

Castable Piers for forklift loading are available. The piers are cast from insulating castable which is formulated for high heat shock resistance (and will withstand 2200°F/1200°C). In addition, the piers have alloy fibers cast into them for mechanical shock resistance. They are cast in sections that are easy to handle. They are fully cured for strength.

LOADING BASKETS

Alloy loading baskets made to order can be provided by L&L. Normally 1/4" or 1/2" mesh wire is used with a 3/8" or 1/2" diameter frame. Baskets can be made to stack. Size and weight requirements are necessary to quote.

LOADING RACKS

Alloy loading racks can be specially quoted. These will often have several shelves which are removable or can be positioned at different heights. Racks can be made to roll into furnace on roller rails for quick loading and unloading. Special shelves can be incorporated into recirculation muffles as well.

SPECIAL FORKLIFT LOADER

A forklift type loader is designed to lift a large tray or loading basket into the furnace and set it down on piers. The forks pivot slightly at the back and are lifted with a self contained hydraulic cylinder and pump. Rubber wheels, two of them swivel types allow the cart to be moved anywhere on the shop floor. Floor guides are included. Tracks with fixed casters are available. The larger loaders can be motorized. Available in a 500 pound, 1000 pound, 2000 pound version.

PEEPHOLES

CERAMIC PEEPHOLE ASSEMBLY

The furnace door or side can be fitted with a ceramic peephole assembly which permits viewing of the furnace chamber without opening the door. The assembly features a high temperature glass for eye protection and to prevent heat loss through the peephole.

ATMOSPHERE TIGHT PEEPHOLE ASSEMBLY

The cast iron peephole assembly includes a viewing glass. This is made by Tate-Jones. Other types are also available.

MISCELLANEOUS OPTIONS

OUTER CASE HEAT SHIELD

The furnace is provided with a series of sheet metal shields screwed onto the outside of the primary furnace case. These shields keep the case temperature to below 150°F or below.

QUENCH OPTIONS

AGITATED, HEATED QUENCH TANKS

See QT SERIES Bulletin for agitated heated quench tanks that range in capacity from 65 to 2340 gallons. A smaller simple agitated quench tank, the QTS 124 has a 25 gallon capacity.

AIR COOLING TABLE

A loading/unloading table has a fan underneath it that blows air up through an alloy grid to rapidly cool the tool steel. (Generally speaking, the faster that air hardening tool steel is cooled to less decarb and oxidation will occur during the cooling process. Also the Rockwell hardness will generally be better.) This table is bolted to the floor in front of the furnace. All clearances with the door and furnace are engineered for easy operation.

ACCESSORIES

INSULATED GLOVES

Insulated heat resistant gloves extend to the elbow with single piece construction. Aluminum backing for heat reflection. Woven heat resistant non-asbestos fiber with wool interior insulation.

TONGS

Forged steel tongs are available.

PUBLICATIONS

HEAT TREATER'S GUIDE

Consolidates essential heat treating data into a logical and easily accessible format. A standard compilation of data is provided for each of the standard AISA grades of carbon, alloy, tool, and stainless steels. Over 280 steels are included. 493 Pages. 1982. Illustrated.

THE HEAT TREATING SOURCE BOOK

A collection of over 70 articles on heat treating. Coverage includes stress relieving, normalizing, tool steels, aluminum alloys, nickel base super alloys, austenitic stainless steels, carburizing, carbonitriding and nitriding, atmosphere control and much more. 1986. 450 pages. Indexed. Illustrated.

METALS HANDBOOK, 10th EDITION

Covers heat treating and cleaning. 15 major sections. Most metals and alloys are covered in great detail. 1300 pages. 6707 illustrations. 1841 tables. This is the "bible" of the industry.