SPECIAL FURNACE CO INC
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EN SERIES

APPLICATIONS

The EN Series flow control system controls the flow of endothermic gas for carburizing, neutral hardening and other processes. Optional ammonia flow system provides carbonitriding capability. Endothermic gas provides a base atmosphere of 40% nitrogen, 40% hydrogen and 20% carbon monoxide. Natural gas or propane is added to increase carbon potential. Optional compressed air is used to lower carbon potential when necessary and for carbon burn out. Nitrogen is also used as an emergency purge. The combustible atmosphere is introduced above 1400°F (760°C). Flow rates and ranges are engineered for specific systems. Normally the customer supplies the source of endothermic gas.

FEATURES

FLOW CONTROL PANEL

A floor standing flow control panel contains all the flow train components. This panel is constructed of 10 gauge sheet steel from the floor to the top of the panel. The panel has an open back for easy maintenance and 12” deep side panels for protection of the components and good appearance.

FITTINGS AND PIPING

Piping is copper and black iron pipe. Fittings are brass flare type NPT fittings for copper piping and NPT iron pipe fittings for the black iron pipe.

NITROGEN FLOW CONTROL

Nitrogen gas line includes manual shut off ball valve, pressure regulator, pressure relief valve, pressure gauge, flowmeter with regulating valve, normally open solenoid for automatic actuation, and check valve.

ENDOTHERMIC GAS FLOW CONTROL

Endothermic gas flow system includes manual shut off valve, pressure gauge, solenoid for automatic shut off, Waukee flowmeter with regulating valve (specifically calibrated for endothermic gas at your inlet pressure), and low flow detection system.

ENDOTHERMIC GAS WITH NATURAL GAS (OR PROPANE) ATMOSPHERE FLOW CONTROL SYSTEM

NATURAL GAS OR PROPANE GAS FLOW CONTROL

Natural Gas or propane line includes manual shut off valve, pressure regulator, pressure gauge, solenoid for automatic shut off, flowmeter with regulating valve, and check valve.

BURN OFF

Natural gas fed burn off at exit port does not require flammables to be present for flame to burn. Includes electronic ignition (turned on from control panel). Turns off automatically if flame goes out. Complete gas train with ball valve, solenoid, pressure gauge and adjustment valve. (Can be specified for propane.)

VISUAL INDICATION OF GASES

There are pilot lights which indicate which gases are flowing.

VISUAL AND AUDIBLE ALARMS

A piezo buzzer with push button silencer is provided to indicate any alarm condition. In addition, specific pilot lights indicate precisely which alarm conditions are activated. Silencer does not turn off pilot light indicator. A flashing light is optional.

LOW TEMPERATURE ALARM

The control has a temperature based alarm which is set at 1400°F (760°C) below which flammables may not be introduced. (See information below on optional low temperature bypass for this alarm.)

ENDOTHERMIC GAS LOW FLOW ALARM

Endothermic gas line has a differential pressure switch and adjustable orifice valve which will indicate low flow condition even at low pressures. There is a delay timer to temporarily bypass the system for start up.

DOOR INTERLOCK ALARM

There is a door interlock switch which prevents flammables from flowing unless the door is closed.

POWER FAILURE

Emergency purge is activated if there is a power failure. (There is a normally open solenoid to do this.) Endothermic gas automatically turns off also.

NITROGEN PURGE CAPABILITY

A pressure switch monitors the ability of the nitrogen to flow in case of an alarm condition. Flammables can not flow without sufficient nitrogen pressure.

LOSS OF BURN OFF FLAME IGNITION SOURCE

Turns off flammables and initiates inert purge.

ATMOSPHERE SAMPLE PORT

An alloy sample port is provided. There is a ball valve to close this off when not in use. This is used to sample the atmosphere for dew point content.

SAFETY REGULATIONS

This atmosphere system is designed to meet or exceed the regulations of the National Fire Protection Agency for controlled atmosphere furnaces (NFPA-86C.)

IRI OR FM APPROVAL

L&L will provide all necessary information to customer's insurance carrier for approval purposes.

ATMOSPHERE INSTRUCTIONS

A very complete instruction manual, specifically written for the atmosphere system, is included. This includes theory of operation of all major systems and subsystems, full maintenance instructions and schedules, component lists, component instructions and data sheets, emergency procedures, cautions, and start up and shut down procedures. A complete flow schematic of the atmosphere system is provided.

OPTIONS

- **FLAME CURTAIN:** Automatically controlled flame curtain to reduce oxygen inrush. Requires 1 psi natural gas pressure. (Can be specified for propane also.) Includes natural gas fed pilot light with its own regulator to prevent pressure feedback from flame curtain. Gas turns off automatically if pilot goes off. Includes electronic ignition which is activated from control panel. The flame curtain is activated when the door opens. Uses compressed air.
- **AMMONIA LINE FLOW CONTROL:** Ammonia line includes manual shut off ball valve, relief valve, pressure gauge, solenoid for automatic shut off, flowmeter with regulating valve, and check valve. All components are stainless steel or carbon steel to resist ammonia attack. All check valves on the other lines are also stainless steel.
- **DOOR PURGE TIMER:** There is a separate flowmeter for a fast purge. This is activated by a solenoid valve and is activated by the door and kept on by a settable timer (0-15 minutes is typical).
- **LOW TEMPERATURE BYPASS:** Once the flammables have been introduced above 1400°F (760°C) this system will allow them to flow even if the temperature dips below 1400°F as long as the low flow indicator system determines there is sufficient flow, the burn off is functioning, and all other alarm conditions are satisfied.
- **PROCESS COMPRESSED AIR FLOW CONTROL:** Compressed air line includes manual shut off valve, Balston filters (DX and BX grade) to convert standard compressed air into instrument quality air, pressure regulator, pressure gauge, solenoid for automatic shut off, flowmeter with regulating valve, and check valve. This line is separate from any compressed air used to operate flame curtain for pneumatic devices on the furnace.
- **CARBON CONTROL:** Honeywell UDC 5000 Carbon Potential Controller with oxygen probe. This controls the natural gas and compressed air solenoid to automatically control the carbon potential inside the furnace. This allows precision and repeatable case hardening. Note that this system is an "on line" system and is fully automatic. It does not require tedious sampling of the furnace atmosphere and adjustment of the constituent gases.
- **BOOST/DIFFUSE PROGRAMMING:** An event switch in the main program control will switch between two carbon set points in the carbon control. Another event switch will turn carbon potential off completely. This system allows you to completely program a carburizing cycle using the main program control. All carbon potential is typically turned off until after the part has soaked at ideal temperature. Then a high carbon potential is turned on for the most efficient carbon saturation into the part. Then the carbon potential is lowered for the most efficient carbon penetration into the subsurface of the part.
- **DIGITAL TEMPERATURE RECORDER:** Strip chart and round chart versions available. This records the temperature with one pen and the carbon potential with another (reads it from an auxiliary output from the carbon control).
- **START UP SERVICE:** An L&L technician will review and check out customer's installation, start up and burn in furnace, and train the operators. This includes setting all alarms, flow switches, etc., leak testing entire atmosphere system, and reviewing operation, adjustment and maintenance procedures for the controls, atmosphere system, and furnace with customer's personnel.