



SPECIAL FURNACE CO INC

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NM SERIES

APPLICATIONS

The NM Series flow control system uses nitrogen and methanol to provide a highly protective atmosphere for carburizing, neutral hardening and other processes. Optional ammonia flow system provides carbonitriding capability. The 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.) 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 percentage of methanol vs nitrogen can be varied to adjust for varying conditions. The combustible portion of the atmosphere is introduced above 1400°F (760°C). Flow rates and ranges are engineered for specific systems.

FEATURES

ATMOSPHERE SPARGER

The methanol and nitrogen are injected into the furnace through an alloy sparger which is located inside the furnace. This sparger atomizes and dissociates the methanol before it actually enters the furnace interior.

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. Fittings are brass flare type NPT fittings where possible. These are easy to disassemble for maintenance work and are extremely tight.

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.

NITROGEN - METHANOL - NATURAL GAS (OR PROPANE) ATMOSPHERE CONTROL PANEL

METHANOL FLOW CONTROL

Methanol system includes manual shut off valve, pressure gauge, solenoid for automatic shut off, flowmeter with regulating valve, low flow switch, and 10 micron filter to keep methanol line free of particulates.

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 second low-low alarm.)

METHANOL LOW FLOW ALARM

Methanol line has a flow switch to shut it off if methanol flow is not sufficient to maintain combustion. There is a delay timer to temporarily bypass the switch 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.)

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.
- **METHANOL TANK AND SUPPLY:** A stainless steel tank, designed for pressure use up to 150 psi, holds the methanol supply. This is pressurized with nitrogen from the main nitrogen supply. This supply includes a manual shut off ball valve, pressure regulator, and pressure gauge. There is also a pressure gauge to measure the pressure inside the tank, a blow off valve for releasing pressure before opening the tank and a pressure relief valve for the tank. The installation of the methanol tank may require the approval of local fire authorities. L&L recommends locating tank outside in a protected location. L&L will provide support information for such people but it is the customer's responsibility to obtain such approval and perform any necessary installation work and to meet such code requirements as fire extinguisher systems. Typical size is 16 gallons but size is dependent on application.
- **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.)
- **LOW-LOW FLAMMABLES ALARM:** A second low temperature alarm, set as low as 800°F (425°C), can be provided which will allow the methanol to flow, once it has been introduced above 1400°F (760°C), as long as it does not flow below the 800°F (425°C).
- **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. (NOTE: Process compressed air is used to dilute or counteract enrichment gas when controlling the atmosphere with a carbon control).
- **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.