

INTRODUCTION

The car bottom furnace described by this instruction is designed to stress relieve weldments.

FURNACE RATING

Maximum Load Size -----	24 ft. long x 12 ft. wide x 10 ft. high
Maximum Temperature -----	1400 ^o F
Maximum Load Weight -----	60 Ton
BTU Rating -----	6,000,000 BTU/hr
Natural Gas -----	1000 BTU @ 3 PSI
Electric Power -----	440 VAC, 3 PH, 60 CY
Air -----	80 PSIG

DESCRIPTION

HEATING CHAMBER

The furnace is gas fired, car bottom with a lift type door. The furnace is lined with five inches of ceramic fiber block insulation on the door, back wall and the roof. The two side walls are lined with six inches of ceramic fiber block insulation. The side wall blocks have ceramic tubes inserted horizontally through the blocks for supporting alloy hanger hooks to receive electric heating elements if converted to electric heating in the future.

The walls can be repaired by cutting away the damaged section and fastening a new block of insulation in place.

Heat is supplied by sixteen direct fired gas burners. There are 8 burners on a side, positioned to fire under and above the load.

Alloy flue tubes extend through the walls and up the side walls to a position above the roof line.

The burners are divided into two equal zones, one at the front and one at the back.

FURNACE CAR

The car is mounted on wheels, in four rows. The car is driven by a chain attached to each end of car and pulled by an electric motor and gear reducer drive.

The car is in two sections to allow for flexibility.

The hearth consists of six inches of light weight castable and six inches of heavy duty castable. The hearth is cast into sections to allow for expansion.

The end of the car seals against ceramic fiber blanket at the end of the furnace and the door. There is a fiber blanket filled seal blade which is clamped with air cylinders against the side rails on the car and the furnace walls.

DOOR

The door is clamped against the face of the furnace using three air cylinders on each side of the door. When door is unclamped, it is raised vertically by cables to an electric motor driven hoist.

Slack cable switches are provided to stop drive motor if cable becomes slack. Control for the door is mounted on front of power cubicle.

COMBUSTION SYSTEM

All burners are North American 4422-4 series gas burners. They are equipped with electric ignited continuous burning pilots. Air for the burner is supplied by one blower and is controlled through out the heating cycle. The burners are controlled by modulating the air valves only.

During cooling cycle the gas valve will close tight and the main air valve will be opened to obtain extra cooling. The air valve will return to the "partially closed position" when the burners are on.

SAFETY DEVICES

The combustion system is designed to meet FIA requirements.

There are two trip release valves, with a solenoid vent valve between them in the main gas line and the pilot line. The safety shutoff valves must be electrically energized before they can be opened. It is wired so that gas and air pressure switches must be satisfied before the main valves can be opened. The pilot of a burner must be burning before the safety shutoff valve for the burner can be opened. This is done by means of a flame rod detection system mounted on each burner. The valves will also close in the event of a power failure.

There is an automatic purge timer on the blower. The timer prevents ignition of the burners until after the blower has purged any gas from the furnace.

The combustion system will not operate until the car is in place and the door and car seal are clamped in place.

TEMPERATURE CONTROL INSTRUMENTS:

There are two thermocouples in each zone. One is for overtemperature control only. The other one actuates a recorder-controller instrument that is connected with a programmer. The programmer is designed to make the furnace perform with the following cycle:

1. Raise to set-point at selected rate.
2. Soak at set point.
3. Cool at selected rate to 400^oF.

The set points, the rate of raise, and the hold time, can be adjusted by the operator. By means of selector switches, certain steps of this cycle can be deleted to allow other cycles to be processed.

THERMOCOUPLES:

Chromel-Alumel thermocouples are used with the temperature control and overtemperature instruments.

The thermocouples are located in the walls of the furnace.

OVERTEMPERATURE PROTECTION:

The instruments operate in conjunction with overtemperature thermocouples located in the furnace. If the furnace temperature exceeds the instrument setting, its contact will de-energize the safety shutoff valve, shutting down the burners. Another contact of the instrument will close, energizing a horn and light to signal the furnace operator that an overtemperature condition has developed.

INSTALLATION

Immediately upon receipt of the furnace, examine the equipment for any damage that might have been sustained in transit. If injury or rough handling is evident, a damage claim should be filed immediately with the transportation company, and the nearest General Electric Sales Office should be notified promptly.

FOUNDATION

The foundation for this furnace must be flat, level, and sufficient to support the furnace and work load.

ERECTION SITE

It is recommended that the motor and temperature control panel be installed inside a suitably heated and ventilated building. It is the manufacturer's recommendation that these instruments not be subjected to temperature below 32^oF. Otherwise, malfunction of the temperature control instruments will result.