

**SECTION 15622  
DIRECT GAS-FIRED BURNER & MANIFOLD SYSTEM**

**PART 1: GENERAL**

**1.1 Section includes:**

- A. Direct gas-fired heater modules**
- B. Controls**
- C. Equipment schedule**

**1.2 Related Sections**

- A. Section 01655: Starting up mechanical systems**
- B. Section 15070: Pipe and pipe fittings**
- C. Section 15100: Valves**
- D. Section 15120: Piping specialties**
- E. Section 15400: Plumbing systems**
- F. Section 15990: Testing, adjusting and balancing**
- G. Section 16050: Basic electrical materials and methods**

**1.3 References**

- A. American National Standards Institute (ANSI):  
Establishes requirements applicable to certifying direct gas-fired heaters.**
- B. American Conference of Governmental Hygienists: Establishes air quality standards.**
- C. Environmental Protection Agency (EPA): Enforces air quality standards.**
- D. Occupational Safety and Health Administration (OSHA): Enforces air quality standards and safety in the work place.**
- E. National Electric Code (NEC): Establishes electrical standards.**
- F. Underwriters Laboratory (UL): Independent testing facility certifies code conformance.**
- G. National Fire Protection Agency (NFPA): Establishes fire prevention standards.**
- H. Factory Mutual Insurance (FM): Certifies gas manifold to owners Insurance carrier.**

**I. Industrial risk Insurance (IRI): Certifies gas manifold to owners insurance carrier.**

#### **1.4 Quality Assurance**

**Manufacturer shall:**

- A. Provide direct gas-fired heater module built in conformance to NFPA-54 standards.**
- B. Provide direct gas-fired heating equipment, when used in conjunction with a correctly sized air supply module, does not exceed contaminant threshold limits for a safe environment, as established by the American Conference of Governmental Hygienists.**
- C. Furnish proof, satisfactory to the owner or his representative, of having manufactured {pressure-modulating} direct gas-fired heating modules for a minimum of five years.**
- D. Make its facility available to owner or his representative for quality control audit without prior notification.**

#### **1.5 Submittals**

- A. Manufacturer shall submit product data, including dimensions, duct & service connections, accessories, controls with schematics and sequence of operation, electrical nameplate data, wiring diagrams, gas piping diagrams, burner data {and filter data}.**
- B. Manufacturer shall furnish rigging, assembly, and installation instructions.**
- C. Manufacturer shall furnish Operation and Maintenance Manuals, including descriptive literature, operation instructions, maintenance and repair data, and parts listings.**

#### **2.1 Acceptable Manufacturers**

**AbsolutAire, Inc. (Kalamazoo, MI) 269-382-1875**

## 2.2 Direct Gas-Fired Heating Modules

Manufacturer shall:

- A. Provide a direct gas-fired {Rooftop/Horizontal/Suspended/Upright} Heating module as required {with variable outdoor air feature for building pressurization} {with variable outdoor air/return air feature for building pressurization}.
- B. Provide self-contained, packaged direct fired heating modules which shall include; casing; modulating burner; mixing chamber; {positive position, variable outdoor-air/return-air dampers}; and automatic controls for temperature {and pressure}.
- C. Provide a casing which shall be minimum 18-gauge aluminized steel, Welded to structural steel framing. All exterior casing seams are to be 100% weather-tight. All interior and exterior surfaces will be cleaned of all oil and grease. Painted exterior will consist of a high-quality prime coat and a finish coat of machinery enamel with rust inhibitors. Color is to be as selected by the owner. {Interior surfaces will be lined with 1-inch, 1-1/2 pound density, coated fiberglass insulation. The insulation shall comply to UL standard 181 for erosion and NFPA 90A for fire resistivity. All exposed edges will be coated to eliminate erosion. Fiberglass will be held in place with adhesive and welded pins.} {Interior surfaces will be lined with 20 gauge aluminized steel which sandwiches 2-inch, 3 pound density, coated fiberglass insulation. The insulation shall comply to UL standard 181 for erosion and NFPA 90A for fire resistivity. Insulation will be held in place with adhesive and welded pins. Interior service area floors to be 16 gauge aluminized steel.}
- D. Provide {a filter mix box to provide filtration of all outdoor and return air through the same filter media}, or, {an outside air (OA) filter section}. Filters shall be polyester replacement media in galvanized locking frames. {Manufacturer shall provide a clogged filter warning (light/alarm)}.
- E. Provide a gas burner which shall be Type NP-I or NP-II as manufactured by Maxon Burner Company, (or its approved equivalent) specifically designed to burn natural gas or propane below the maximum non-contaminating levels required by OSHA and the American Conference of Governmental Industrial Hygienists. Burner shall have non-clogging, stainless steel baffles attached to a non-corrosive cast-aluminum gas supply section with no moving parts. The burner shall have up to a 25-to-1 turndown ratio and be designed for 100% thermal efficiency for the life of the equipment.

**F. Burner module will be designed to require (by others) an outdoor air velocity across the burner which shall be a constant 3,000 feet per minute through the burner profile. The burner velocity shall be constant at all times throughout the operation of the heater. No air from the indoor space shall be allowed to recirculate across the burner.**

**G. Provide the following Control Systems:**

**1. The Control Panel**

**The heater control panel shall be similar to NEMA 3R and contain all standard electrical components, such as 120-volt and 24-volt transformers; control circuit fuse; flame relay and a full number- coded terminal strip. Heater controls shall be protected by a hinged-door weather enclosure. Eight (8) labeled pilot lights shall indicate the operation of all primary control components. Pilot lights shall indicate the following:**

- a. High-temperature limit switch status**
- b. Fan airflow switch status**
- c. Low gas-pressure switch status**
- d. High gas-pressure switch status**
- e. Burner lockout alarm**
- f. Burner status**
- g. Fan status**
- h. Low temperature alarm**

**The control enclosure shall be lighted with a minimum 25 watt incandescent light bulb {powered by others} {able to operate with the main disconnect switch in the off position}. The heater control panel shall have a burner flame relay to lock out the flame in abnormal conditions. A remote relay reset button shall allow personnel to reset the burner at the remote control panel. The complete control and safety system as well as the burner and gas manifold shall be factory tested.**

**2. Temperature Control**

**{Space Temperature Control. A solid-state temperature control system, located inside the control panel, shall have a sensing thermistor located in the space as shown on the plans. The thermistor senses and controls the room temperature in the occupied mode. One thermistor, mounted in the heater discharge, controls the maximum and minimum discharge air temperature in response to burner modulation}.**

**{DDC Temperature Control. The temperature {at discharge} {in the space}**

will be controlled by a 0-10V or 4-20 ma signal sent (by others) to a Maxitrol A200 signal conditioner which controls the main gas valve position.

### **3. Damper Control**

The heater box shall incorporate {a separate outdoor-air/return-air mixing chamber, containing two (2) sets of 16-gauge galvanized multi-blade dampers, interlinked to work opposite each other. Each damper shall control up to 85% of the total heater fan volume. These dampers shall provide a total outdoor air turndown ratio of 6.67 to 1 by proportional control means as outlined herein. This damper control shall be through {a manual potentiometer control of damper position} {automatic building pressure sensitivity control of the outdoor-air/return-air proportional adjustment} {input signal of 0-10 V or 4-20 ma by others} {An automatic pressure control, linked to the outdoor-air/return-air dampers, is used to sense the room pressure. This diaphragm/photohelic} switch is mounted on the heater. The pressure-sensing range shall be 0.01 to 0.2 with a null of .02 to .03. A manual/auto-selector override switch shall be provided to allow personnel to select manual or automatic pressure control. A potentiometer shall be located inside the remote control panel for manual control}.

### **{4. The Remote Control Panel**

A remote control monitoring panel shall be provided which incorporates all heater operating switches and pilot lights. The remote control panel shall be a NEMA 12 enclosure, properly vented and constructed of painted mild steel. It shall enclose the temperature selectors (occupied/unoccupied), the manual/auto pressure control selector switch, and the 7-day time clock. Wiring to the remote panel from the main control panel shall be accomplished with low voltage (24 volt maximum) wiring circuits. The control panel shall provide each heater the following:

- a. a manual pressure-control potentiometer
- b. a occupied room temperature stat. (The stat room sensor \ shall be remote mounted where noted on the plan).
- c. a room-temperature unoccupied cycle state (the state sensor remote shall be mounted where noted on the plan).
- d. a programmable 7-day time clock with a minimum of four (4) programmable on/off schedules per day, with a battery back-up reserve.
- e. a burner alarm horn with silence switch,
- f. a {tamper-proof, key-operated} SUMMER-OFF-WINTER switch,
- g. A {tamper-proof, key-operated} remote burner-flame reset switch,
- h. a {tamper-proof, key-operated} manual/auto building-pressure selector switch, and

- i. These system pilot lights:
  - a. Power on
  - b. Fan on
  - c. High-temperature limit switch
  - d. Fan airflow switch
  - e. Low gas-pressure switch
  - f. High gas-pressure switch
  - g. Pilot valve open
  - h. Power to valves
  - i. Burner on
  - j. Burner lockout alarm
  - k. Low temperature alarm}

#### **5. The Low-Temperature Limit Switch**

This switch turns the fan motor off when cold air is being discharged from the heater. The minimum discharge temperature may be selected from 0 degrees to 70 degrees F. The switch is factory-set at 40 degrees F. A separate timer shall by-pass this switch for five (5) minutes on initial start-up.

#### **6. The High-Temperature Limit Switch**

This switch turns the burner off when the discharge air temperature exceeds 120 degrees F. The burner must then be manually reset at the heater.

- H. Provide a gas manifold which shall be sized for the rated BTU capacity of the heater, as scheduled on the drawings. The gas manifold enclosure shall be illuminated with a minimum 25 Watt incandescent light bulb, able to operate with {or without} the main disconnect switch in the on position. The gas manifold will be constructed in conformance to:
  - 1. Factory Manual (FM) insurance requirements or
  - 2. Industrial Risk Insurers (IRI) insurance requirements.
- I. Provide high and low gas-pressure switches. The high gas-pressure switch, to be located on the burner end of the manifold, shall turn the burner off when the gas pressure is too high. The maximum gas-pressure range will be from 3" W.C. to 21" W.C. The low gas-pressure switch, to be located on the inlet end of the manifold, shall turn the burner off when the gas pressure is too low. The minimum gas pressure range will be from 3" W.C. to 21" W.C.

#### **2.3 Accessories (Select accessories as desired)**

**Manufacturer shall provide the following accessories:**

## **ROOF-MOUNTED HEATERS**

### **A. Roof Curb**

Each heater shall have a full-perimeter, 20" high curb, formed of 14-gauge galvanized (G-90 coated) or aluminized steel. Contractor shall shim the curb so that it is level and shall install a scant strip and wood nailer per detail on the plans.

### **B. Inlet Hood**

An inlet hood (galvanized or aluminized steel) shall be constructed to mount on the outdoor-air-intake of the heater. Average inlet velocities shall not exceed 500 FPM.

**-OR-**

### **C. Louvered Outdoor-Air Intake Plenum**

All outdoor-air intake plenums shall be manufactured with galvanized or aluminized steel and shall have horizontal, drainable-blade louvers. The louvers shall be mounted on the front and both sides of the plenum. The average face velocity of the louvers shall not exceed 1,000 FPM. A bird screen shall be affixed to the inside face of each louvered side of the plenum. The floor of the intake plenum shall be drainable to the roof of the building. A hinged access shall be provided for entry into each plenum.

## **INDOOR SUSPENDED and UPRIGHT HEATERS**

### **Service Platform**

Each heater shall be furnished with a service platform, running the full length of the heater, which shall be constructed of corrosion resistant 16-gauge multi-grip floor plate with an OSHA-approved handrail and steel safety chains at each end.

## **INDOOR SUSPENDED**

### **A. Vibration Isolators**

Vibration isolators shall consist of a steel housing and an isolation element, molded entirely of a colored oil-resistant neoprene stock for easy identification of capacity. The hangers shall have a deflection of 1/4" or less and will be supplied by the heater manufacturer.

## **B. Steel Channels**

**Structural steel channels shall support the heater and service platform as one. Hangers and miscellaneous hardware will be furnished by the installing contractor.**

### **ROOF MOUNTED or INDOOR SUSPENDED**

#### **Discharge Plate (where noted on the plans)**

**Discharge plates shall be provided with heaters, as shown on the plans. These plates are to be constructed of 16-gauge corrosion resistant steel, reinforced with angle iron, painted by the manufacturer. Contractor shall supply all necessary hanger rods and shall install discharge plate in accordance with manufacturer's recommendations.**

**-or-**

#### **Discharge Head (where noted on the plans)**

**Manufacturer shall provide double deflection, 180 degree or 360 degree discharge head(s), as detailed on the plans. The head shall be constructed of aluminized or galvanized steel. Adjustable, locking, double-deflection blades will be provided to control direction of the airflow, both vertically and horizontally. Each discharge head will be properly cleaned and then prime and finish coat painted to match the heater.**

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