

Specifications for

Reflect-O-Ray® EDS 4DI GAS FIRED SYSTEMS COMPLIANT WITH NFPA 30A 7.6.6 REQUIREMENTS FOR SPECIALTY FUEL VEHICLE REPAIR BUILDINGS

PART 1 - GENERAL

It is the intent of this specification to identify design requirements and minimum standards for the quality, construction, delivery, installation, and operation of the low intensity, vacuum vented, gas fired infrared heating equipment. Minor variations, in accordance with standard practice, shall be indicated on the shop drawings and submitted for approval.

1.1 - CODES AND STANDARDS

- 1.1.1 The entire heating system shall be designed certified to:
 - a) American Gas Association "Gas-Fired Low-Intensity Infrared Heaters" conforming to the ANSI Z83.20- (Current Standard).
 - b) Canadian Gas Association Certified "Gas-Fired Low-Intensity Infrared Heaters" conforming to CSA 2.34 – (Current Standard).
- 1.1.2 Installation shall conform to local codes and local gas authorities including the National Electrical Code, National Fuel Gas Code, and applicable ANSI, NFPA & CAN/CGA & CSA codes.

1.2 - QUALITY ASSURANCE

- 1.2.1 The material construction and operation of the infrared heating equipment shall conform to the performance specifications contained herein. Approved manufacturer is: Combustion Research Corporation, 2516 Leach Rd., Rochester Hills, MI, 48309; Tel. No. 248.852.3611, Fax. No. 248.852.9165.
- 1.2.2 Manufacturer shall warrant mechanical and electrical components for a period of three (3) years from original invoice date.
- 1.2.3 Manufacturer shall warrant radiant tube for a period of ten (10) years (against internally created corrosion) from the original invoice date provided system is installed and maintained in accordance with the owner's manual.
- 1.2.4 System shall be furnished complete with burner(s), vacuum exhaustor(s), tubular infrared emitters, fittings, reflector shields, hangers and system controls.

1.3 - MANUFACTURER AND INSTALLER QUALIFICATIONS

- 1.3.1 The low intensity, gas fired infrared heating system shall be a product of a manufacturer who has had at least ten years experience in design and fabrication and who is regularly engaged in the manufacture of the type of gas fired low intensity infrared heating equipment specified herein. Only manufacturers that can submit evidence of actual installations of comparable designed construction, and that the products have proven practical, durable, and require a minimum of maintenance, will be qualified under this specification.
- 1.3.2 Installation of the gas fired low intensity infrared heating equipment shall be by supervised by an authorized representative of the heater manufacturer and shall be in accordance with approved installation drawings. Mechanics shall be skilled and experienced in the erection of the low intensity infrared heating equipment of the type specified herein.

1.4 - DELIVERY AND STORAGE

- 1.4.1 Materials shall be shipped in the manufacturers' standard protective packaging to the designated site.
- 1.4.2 The installing contractor is responsible for receiving, unloading and storage of materials. Storage shall be in dry locations free from dust and water and available for inspection and handling. Handle equipment carefully to prevent damage. Remove damaged items that cannot be restored to like new condition and replace with new items.

PART 2 - PRODUCT

2.1 - BURNERS

- 2.1.1 Burners shall be capable of firing at a high fire input of 40,000 BTU/hr (11.7 kW) – Low Fire input of 28,000 BTU/hr (8.2 kW) through 60,000 BTU/hr (17.6 kW) - low fire input of 42,000 BTU/hr (12.3 kW) at 5,000 BTU/Hr (1.5 kW) increments with natural gas or LP gas.
- 2.1.2 Burner power requirements 115 Volt, 60 Hz AC 1.8 A.
- 2.1.3 Burners shall include the following features:
 - a) A 4" (101.6 mm)-diameter combustion air inlet with an 24 VAC operated air damper for modulating the air on low to high fire input.
 - b) Burners shall be fitted a differential air pressure switch so as to prove adequate combustion air is present before burner fires.
 - c) Burners shall be fitted with solid state electronic controls with spark ignition & 100% lockout in event of low fire or main flame failure - Hot surface ignition shall not be allowed.
 - d) Regulator to be factory set at 3.5" W.C. (6.54 mm/Hg) for natural gas.
 - e) Burner(s) flame sensing shall be by flame rectification with a separate probe.
 - f) Burner(s) shall have a minimum 15-second pre-purge before ignition.
 - g) Burner(s) housing shall to be constructed of minimum 18 Ga. (1.587mm) aluminized steel, powder coated.
 - h) Burner(s) shall be fitted with inspection window for visual inspection of spark and flame.
 - i) Burner(s) shall be fitted with 3 indicator lights - "Power On", "Air Flow On", & "Burner On".
 - j) Burner controls, differential pressure switch, gas valve, electrical wiring, etc. shall be segregated form the combustion air supply.
 - k) Electric damper on the air inlet for modulated air at low and high fire.
 - l) Burner fitted with three foot (3') long grounded power cord.
- 2.1.4 Heating system to be in compliance with NFPA 30A 7.6.6 and CSA registered that the maximum allowed tube or surface temperature is 750°F (399°C) for specialty Fuel Vehicle Repair Buildings.
- 2.1.5 Burner(s) and vacuum exhauster electrically interlocked through the use of a Dual Input control panel.

2.2 - VACUUM EXHAUSTER

- 2.2.1 Dynamically balanced forward inclined fan wheel constructed of stainless steel with a cast iron hub.
- 2.2.2 Direct Drive.
- 2.2.3 Inlet cone and venturi plate engineered for maximum efficiency.
- 2.2.4 16-gauge (1.587 mm) aluminized steel housing and mounting bracket to be powder coated.
- 2.2.5 Motor to be one sixth (1/6) HP (115V, 3.0 amp) - 3000 RPM, one sixth (1/6) HP (115V, 3.0 amp) - 3450 RPM, one quarter (1/4) HP (115V, 3.5 amp - 402.5 watts) – 3450 RPM, one half (1/2) HP dual voltage (115/208-230V 6.2/3.1-3.0 Amps – 713 watts) – 3450 RPM, or one (1) HP dual voltage (115/208-230 V 12.4/6.7-6.2 Amps - 1,380 watts) - 3450 RPM, 60 Hz capacitor start internally protected, class B insulation. Sealed ball bearings front and rear.
- 2.2.6 Vibration isolating rubber mounts.
- 2.2.7 Stainless steel bird screen on side wall venting.
- 2.2.8 Four-inch (4.0" / 101.6 mm) Stainless Steel, insulated flexible vibration isolation connector.

2.3 - SYSTEM CONTROLS

- 2.3.1 Thermostat shall be a 24 VAC, two-stage.
- 2.3.2 Control panels shall be enclosed in a minimum of a NEMA 4 enclosure.
- 2.3.3 24 VAC control wiring for High/Low fire signal from the control panel to each burner assembly shall be three (3) conductor wire, minimum 22 Ga (field supplied).

2.4 - RADIANT TUBE HEAT EXCHANGING NETWORK

- 2.4.1 Combustion tube shall be 10' long, 16 gauge (1.587mm) aluminized steel 4.0" (101.6 mm) OD swaged one end for high fire inputs of 40,000 Btu/hr (11.71 kW) through 60,000 Btu/hr (17.6 kW).

- 2.4.2 Balance of radiant tubing shall be constructed of patented, spiral wound 22 gauge (0.76 mm) aluminized steel, 4.0" (101.6 mm) OD.
- 2.4.3 Elbows and tube coupler to be made of min. 18 gauge (1.32 mm) aluminized steel, swaged at both ends so as to fit into 4.0" (101.6 mm) spiral tube.
- 2.4.4 Reflectors to be made of minimum 0.025" (0.635 mm), bright one side, aluminum.
- 2.4.5 Tubing and reflector hangers to be made of 0.25" (6.35 mm) Dia. Zinc plated CRS.
- 2.4.6 All radiant tube joints are to be sealed and mechanically fastened with self drilling and tapping screws.
- 2.4.7 All radiant tubing to be continuously covered by the reflector, i.e. radiant tube elbows, "U" bends and fittings to be covered by reflectors -- NO GAPS BETWEEN REFLECTORS. Reflectors are to be overlapped a minimum of one-inch (1"/25.4 mm) and secured together with sheet metal screws allowing for one unsecured overlap joint for expansion on each straight run exceeding ten feet (10' / 3.048m).
- 2.4.8 Maximum radiant tube temperature shall be 750° F (399° C).
- 2.4.9 Minimum lineal length of radiant tubing per 100,000 Btu/hr (29.3 kW/hr) of input shall be 40 feet (12.194m).
- 2.4.10 The maximum firing rate shall be 2500 Btu/hr (0.732 kW/hr) per square foot (0.0929 square meter) of radiant tubing surface area. The total radiant tubing surface area is the radiant tubing which is covered by reflectors and associated with one vacuum exhauster.

2.5 - SYSTEM PERFORMANCE

- 2.5.1 System shall operate as vacuum system, whereas the entire radiant tube system will be under a negative pressure to preclude any possibility of the products of combustion venting into the heated space.
- 2.5.2 System shall attain a net exhaust temperature of not less than 200°F (93.3°C) in a 15 min. run cycle and shall not exceed a maximum net temperature of 375°F (190.46°C).
- 2.5.3 System STEADY STATE EFFICIENCY shall be a minimum of 82%, maximum 87%. The system cyclic efficiency shall be a minimum of 85%, maximum 91% (this is based on a 15 min. run time).
- 2.5.4 System shall be a non-condensing dry tube system, i.e. - After a minimum run time of 8 min. all condensation will cease and moisture will exit the system in a vapor state.
- 2.5.5 Maximum temperature of radiant tube shall not exceed a NET temperature of 1050°F (565.6°C).

PART 3 - EXECUTION

3.1 - INSTALLATION

- 3.1.1 Power Requirements: It is the installers' responsibility to verify the correct power requirements for the project.
- 3.1.2 Fuel Supply and Distribution:
 - a) A suitably designed gas distribution system shall be installed per shop drawings.
 - b) Each burner assembly shall be fitted with a manufacturer recommended, certified gas connector with manual shut off valve.
- 3.1.3 Assembly: Assemble and install the heating system in accordance with the installation manual and shop drawings.
- 3.1.4 Cleaning: Clean reflectors as may be required and touch up painted surfaces as may be needed.
- 3.1.5 Testing: Upon completion of installation, including work by other trades, adjust and test the heating system in accordance to the manufacturer's owners manual. Adjust and re-test heating system until entire installation is fully operable and acceptable.

END OF SECTION