

Serengeti-IR™ UNITARY RESIDENTIAL SYSTEMS

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, 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) United States - Certified to CSA Requirement for residential heaters, No. 7-89 & "Gas-Fired Low-Intensity Infrared Heaters" conforming to the ANSI Z83.20- (Current Standard).
 - b) Canada - Certified to CSA 2.32 – (Current Standard), CSA 2.34 – (Current Standard)"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 - see warranty statement for details.
- 1.2.4 System shall be furnished complete with Burner(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 manufactures who 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 manufacturer's 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.

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PART 2 - PRODUCT

2.1 - BURNER

- 2.1.1 Burner shall be capable of firing at 40,000 BTU/hr (11.72 kW) up to and including 60,000 BTU/hr (17.56 kW) at 5,000 BTU/hr (1.46 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 Burner shall include the following features:
- a) Fitted with a 4" (102 mm) diameter combustion air inlet with a fixed combustion air-metering orifice.
 - b) Burner shall be fitted a differential air pressure switch so as to prove adequate combustion air is present before burner fires.
 - a) Burner shall be fitted with solid state electronic controls with spark ignition & 100% lockout in event of flame failure.
 - b) Regulator to be factory set at 3.5" W.C. (6.54 mm/Hg) for natural gas and 10.0" W.C. (18.68 mm/Hg) for propane gas.
 - c) Gas valve, ignition controls, and differential pressure switch shall be enclosed within the burner compartment and SEGREGATED from the combustion air supply.
 - d) Heavy-duty nozzle pre-mix combustion system - minimum 0.125" (3.17 mm) metal thickness.
 - e) Electrode and flame rod to be made of NiChrome.
 - f) Burner shall have a minimum 15-second pre-purge before ignition.
 - g) Burner shall casing to be constructed of 16 Ga. (1.587mm) aluminized steel, powder coated.
 - h) Burner shall be fitted with inspection window for visual inspection of spark and flame.
 - i) ½" NPT gas inlet on the back, side, bottom or top of burner assembly - GAS INLET IS NOT TO BE ON THE COMBUSTION TUBE SIDE OF BURNER.
- 2.1.4 Burners venting into common stack shall be operated with one thermostat.

2.2 - SYSTEM CONTROLS

- 2.2.1 Shall be supplied with:
- a) Supplied with pre-wired controls. 115V, 16 amp, 60 Hz.
 - b) Solid state spark ignition and flame rectification (separate probe) with 100% flame lockout and 30 second pre-purge (24 VAC, 22 VA).
 - c) Optional thermostat, 115V, 8 amp minimum rating.

2.3 - RADIANT TUBE HEAT EXCHANGING NETWORK

- 2.3.1 All radiant tubing (including combustion tube) shall be factory "heat treated" for high emissivity (0.83 to 0.90) finish inside and outside. Painted and non-treated radiant tubes shall not be allowed.
- 2.3.2 Combustion tube shall be 10' (3048mm) long 16 gauge aluminized steel 3.5" (89 mm) OD swaged one end.
- 2.3.3 Balance of radiant tubing shall be constructed of patented, high strength, long life, spiral wound 22 gauge aluminized steel, 3.5" (89 mm) OD.
- 2.3.4 Assembly: Assemble and install the heating system in accordance with the installation manual and shop drawings.
- a) Combustion tube to be supported with tube and reflector hangers on maximum centers of:
 - Straight tube systems - 54" (1372 mm)
 - "U" tube systems - 66" (1376 mm)

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- b) Remainder of radiant tube to be supported with tube and reflector hangers on maximum centers of:
 - Straight tube systems - 118" (2,997 mm) with intermediate reflector supports between each 118" (2,997 mm) distance.
 - "U" tube systems - 66" (1676 mm).
 - c) Burner head is to be supported by approved hanging method and not allowed to "free hang" off of the combustion tube.
 - 2.3.5 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 3.5" (89 mm) spiral tube.
 - 2.3.6 Reflectors to be made of minimum 0.025" (0.635 mm) bright aluminum.
 - 2.3.7 Tubing and reflector hangers to be made of 0.25" (6.35 mm) Dia. Zinc plated CRS.
 - 2.3.8 All joints to be sealed and mechanically fastened with self drilling and tapping screws.
 - 2.3.9 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 (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 (3,048 mm).
 - 2.3.10 Optional protective screen shall be made available.
- ## 2.4 - COMBUSTION AIR
- 2.4.1 Outside combustion air (if used) is to be provided without the use of supplementary supply blowers or fans.
 - 2.4.2 Outside combustion air ducting to be minimum of 4" (102 mm) OD (S&D PVC or galvanized stovepipe).
- ## 2.5 - SYSTEM PERFORMANCE
- 2.5.1 System shall attain a net exhaust temperature of not less than 200° F (92.5° C) in a 15 min. run cycle and shall not exceed a maximum net temperature of 400° F (204.2° C).
 - 2.5.2 System STEADY STATE EFFICIENCY shall be a minimum of 77%, maximum 87%.
 - 2.5.3 System shall be a non-condensing dry tube system i.e. - After a minimum run time of 8 minutes all condensation will cease and moisture will exit the system in a vapor state.

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 furnished with a stainless steel 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