Date: Bid Date:

Project #: Location:

Project Name: Engineer:

Contractor: Prepared By:

Rheos+ Condensing Hydronic Boiler

Model RHHH 1200-2400 Indoor

Specification

Contractor shall supply and install Qty.: Laars Model No. RHHH boilers(s).
The boiler shall be a Laars Rheos+ Model RHHH modulating, sealed combustion, Category IV (condensing) boiler with a modulating input and output rate as shown on the schedule. The boiler shall have a combustion efficiency of 90% at full fire with 180°F (82°C) outlet temperature. The boiler shall be capable of up to 99% combustion efficiency, with lower return water temperature and/or modulating firing rate.
The boiler shall be design certified to comply with the current edition of the Harmonized ANSI Z21.13 / CSA 4.9 Standard for Gas-Fired Low Pressure Steam and Hot Water Boilers. The boiler shall be designed and constructed in accordance with the ASME Boiler & Pressure Vessel Code, Section IV requirements for 160 psi (1103 kPa) working pressure.
The boiler shall be capable of normal operation and full input with supply gas pressure as low as 4" w.c. Boiler shall automatically compensate for large fluctuations of gas supply pressure between 4" w.c. and 13" w.c.
The primary water tube heat exchanger shall be a vertical round design, with 7/8" (22mm) inner diameter intergral finned copper tubes. The tubes shall be rolled directly into lined ASME headers rated for 160 psi (1103 kPa) working pressure. The secondary condensing heat exchanger shall be a stacked horizontal design with 7/8" (22mm) inner diameter finned stainless steel tubes. The tubes shall be welded into stainless steel ASME headers rated for 160 psi (1103 kPa) working pressure. All waterways shall be non-ferrous. The heat exchangers shall be a low water volume design. All gaskets shall be non-metallic, and separated from the combustion chamber by at least 3.5" (89mm) to eliminate deterioration from heat. Headers shall have covers permitting visual inspection and cleaning of all internal surfaces.
The piping side header shall have threaded nipples to facilitate maintenance and permit removal of complete heat exchanger for service or replacement.
The heat exchanger shall be removable from the unit, without excessive disassembly of the boiler's combustion chamber.
The boiler shall be designed for minimum return (boiler inlet) water temperature down to 70°F (21°C). An internal mixing system, with microprocessor-based control, shall monitor and adjust inlet temperature to the copper heat exchanger, to ensure that condensation occurs on the stainless steel (condensing) heat exchanger only.
The boiler shall use a proven hot surface ignition with a 15 second pre-purge cycle to clear the venturi assembly and combustion chamber. The boiler water temperature shall be controlled by an electronic PI controller system, consisting of a setpoint controller and modulating control, with user-adjustable setpoint, differential, throttling (modulation) range, offset (from setpoint to top of modulation range) and minimum firing rate settings. the temperature control shall monitor return (inlet) water temperature to modulate the firing rate of the boiler. The control system shall display boiler inlet and outlet temperatures. The boiler shall start in low fire, and remain in low fire for 15-seconds at the start of each cycle. The boiler shall be 120V, single phase, 20A.
The burner shall be cylindrical type with woven metal fiber to provide a cleaner, more complete fuel combustion and low Nox emission, not exceeding 10 PPM.
The boiler shall come complete with an inline mounted pump sized to provide the correct boiler flow rate for primary/secondary applications only. Each unit shall be furnished with an EM^2 energy management monitor relay and pump timer. The timer shall be a high quality solid state electronic device. The device shall be user adjustable from 0.1 to 10 minutes for continued pump circulation after the call for heat has been satisfied, to remove residual heat from the unit.
The combustion chamber jacket shall be compact, utilizing a lightweight alumina-silica insulation tile board rated to 2200°F (1204°C). The outer jacket shall be a unitized shell finished with acrylic thermo-set paint baked at a temperature not less than 325°F (163°C).
The frame shall be constructed of 2" x 2" x 11 gauge box steel. The flue collector shall be constructed of 10 gauge steel for strength and durability. The jacket shall have access panels on each side of the boiler, to facilitate inspection and service of internal components. The flue collector shall have an access panel to allow inspection of the finned stainless steel condensing heat exchanger tubes.
The boiler shall have a forced draft design that is capable of precisely mixing the air and gas to achieve a minimum 90% steady-state combustion efficiency. The boiler shall employ a pre-mix fan that is approved for use with flammable gas and air mixtures. The air intake will use single-wall galvanized steel pipe, 24 gauge minimum, to a maximum of 50 linear feet with a maximum of 5 elbows. The boiler shall be designed for vertical venting or for horizontal direct venting applications using stainless steel vent. Venting applications will use type AL29-4C stainless steel pipe to a maximum of 50 linear feet with a maximum of 5 elbows. The venting configuration for direct combustion air and/or direct exhaust shall be installed using the Laars optional vent connector(s.)
The boiler gas train shall be for modulating firing and shall consist of a safety gas valve and a gas-air ratio control valve that precisely controls the air and gas mixture, and enables the boiler to modulate, to closely match heat load conditions.
The boiler shall be provided with an integral, washable combustion air filter. The air filter shall provide 83% arrestance to protect the burner and blower from debris. The air filter shall be constructed out of open cell polyurethane foam. The air filter shall be mounted in the boiler, and shall be intended for permanent use in the unit, (not only for the construction phase of the project).
The boiler shall be built with a selector switch which enables the user to choose between the unit's mounted modulation control and a labeled terminal strip for connection to an external 0-10VDC control source (such as a building automation system or multiple boiler control). The boiler shall have dry alarm contacts for ignition failure, and shall have the following diagnostic lights: Amber light to indicate power on; Amber light to indicate a call for heat; Amber light to indicate that the unit is in pre-purge; Green light to indicate that the main gas valve has been energized; Red light to indicate ignition failure.
The boiler shall include, as standard equipment, the following controls and trim:

- Pump, mounted and wired
- Flow Switch
- Electronic Low Water Cut-Off complete with test light and manual reset button
- Manual reset high limit
- Electronic PI setpoint/ modulation control system
- Microprocessor-based mixing control
- High gas pressure switch
- Low gas pressure switch
- Air pressure switch
- Pump time delay
- Selector switch for internal or external (0-10VDC) control
- Low-fire start time delay
- 75 psi (517 kPa) ASME rated Pressure relief valve
- Temperature and pressure gauge

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