

PENNANT

Hydronic Boiler

Date: Bid Date:

Project #: Location:

Project Name: Engineer:

Contractor: Prepared By:

Model PNCH 500-2000 Indoor/Outdoor

Specification



Contractor shall supply and install Qty.: Laars Model No. PNCH boiler(s).

The boiler shall be a Laars Pennant Model PNCH , rated at the input and output shown on the schedule. The unit(s) shall be design certified to comply with the current edition of the Harmonized ANSI Z21.13 / CSA 4.69 Standard for Gas-Fired Low Pressure Steam and Hot Water Boilers, and shall be design certified for both indoor and outdoor use. The unit(s) shall be designed and constructed in accordance with the ASME Boiler & Pressure Vessel Code, Section IV requirements for 160 psi (1103 kPa) working pressure, and shall bear the ASME "H" Stamp. The unit(s) shall be constructed to comply with the efficiency requirements of the latest edition of ASHRAE Standard 90.1.

The water tube heat exchanger shall be a straight tube design with ten 7/8" (22mm) inner diameter integral finned copper tubes. The tubes shall be rolled directly into glass-lined cast iron headers, rated for 160 psi (1103 kPa) working pressure. The heat exchanger shall be a low water volume design. All gaskets shall be non-metallic, outside the jacket, 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 heat exchanger shall have a ten year warranty.

The piping side header shall have removable flanges, and the boiler design shall permit removal of the complete heat exchanger for service from either the front or top, to facilitate maintenance.

The units shall use a proved hot surface ignition (HSI) with a 20 second pre-purge cycle to allow the ignitor adequate time to heat-up and to clean out the combustion chamber. Upon a call for heat, if a flame is not detected, the burner controller shall attempt two more times prior to a lockout condition requiring a manual reset. If there is a loss of flame signal during a call for heat, the burner controller shall attempt three re-ignition cycles before locking out. Pennant units with some options, such as ASME CSD-1, are configured with single-attempt ignition controls. The burner circuit is 24VAC, whereas the safety circuit is 24VDC. Unit shall be 120V, single phase, less than 12 Amps.

Burners shall be multi-port design, and shall be constructed of high temperature stainless steel. The burners shall be designed to mix air and gas, and burn cleanly with NOx emissions not exceeding 10ppm. Burners shall be in easily-removable burner tray assemblies with no more than 4 burners per tray.

The combustion chamber shall be lined with lightweight, ceramic fiberboard insulation to retain heat, and shall be approved for service temperatures of not less than 2000°F (1093°C). The outer jacket shall be a unitized shell finished with acrylic thermo-set paint baked at not less than 325°F (163°C). The frame shall be constructed of galvanized steel for strength and protection. Chamber shall include a sight glass for viewing flame.

Boilers shall have a forced draft design and shall be rated at a minimum 85% combustion efficiency. The unit shall be designed for vertical venting with standard B-vent as a fan-assisted Category I appliance, and for horizontal venting as a Category III appliance and shall not require an external draft hood. The unit shall accept ducted combustion air, or shall be able to pull combustion air from the room. Vent and ducted combustion air shall each be able to be piped to either the top or the back of the unit, in any combination. Changing from top-to-back or from back- to-top piping orientation shall be easily accomplished in the field.

The boiler control shall be an integrated electronic temperature and ignition control with a color touchscreen display and shall control the boiler operation and staging. Temperature control shall be selectable between PID temperature control and temperature differential control through the touchscreen. The boiler display shall be visible without the removal of any jacket panels or control panels.

The control shall have the ability to control the boiler pump, system pump, and indirect domestic water pump, each with delay features.

The control shall have the ability to integrate indirect domestic water heating with the boiler system. The control shall have domestic hot water priority, and shall have the ability to recognize a domestic water sensor or closure from a tank stat. The boiler shall be shipped with the domestic water heater sensor, as standard equipment.

The control shall have the ability to integrate system heating with the boiler system, and shall control to the system supply sensor when attached. The control shall have the ability to integrate a system return temperature sensor. The boiler shall be shipped with both a system supply and return sensor as standard equipment.

The control shall have built-in outdoor reset feature and the boiler shall be shipped with the outdoor reset sensor, as standard equipment.

The control shall have the ability to accept a 4-20mA or 0-10VDC input connection from an external control or building automation system, for external set point or staging control. The control shall have dry run and alarm contacts.

Allowable control adjustments shall include: boiler temperature set point; domestic water temperature set point; system temperature set point, automatic high limit; manual reset high limit; boiler PID gain parameters; DHW PID gain parameters; System PID gain parameters, manual staging control; pump delay time; pump exercise interval; outdoor reset selection; low boiler set point temperature (for outdoor reset operation); boiler temperature at high outdoor temperature (for outdoor reset operation); boiler set point at low outdoor temperature (for outdoor reset operation); warm weather shutdown; anti-short cycle.

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The control shall have user, installer, and OEM level passwords and verification features to ensure that safety-related parameters are not altered by mistake.

Control diagnostics shall include, at a minimum, the following: all digital inputs (safety chain or auxiliary), flame status or ignition failure, digital outputs (gas valves, boiler/system/domestic hot water pump, blower(s), etc.), temperature sensors (boiler inlet/outlet, system inlet/outlet, domestic hot water, outdoor ambient temperature), analog inputs (remote staging or remote set point), and analog outputs (mixing valve or variable speed pump). Dry contacts shall be included for both running and alarm conditions.

The control shall have a clock with a battery backup and will allow the user to access the demand cycles, burner cycles, boiler/system/domestic hot water pump cycles, minimum/maximum/average boiler temperature, minimum/maximum/average firing time, and the ten most recent lockout conditions.

If an issue occurs, the system will display a brief description of the issue on the control home screen.

Control has the ability to control up to 8 lead/lag units, hybrid operations (condensing/non-condensing boilers in cascade), BACnet, WiFi, and variable pump speed control (Vari-Prime).

Unit(s) shall have multiple gas trains, such that each gas train shall have a maximum input of 399,000 BTU/hr. Each gas train shall have a gas shutoff valve and main gas valve with built-in redundant valve seats and gas regulator. Unions shall be used before and after each main gas valve, to permit easy removal of the each gas valve, gas train and burner tray assembly from the front of the unit.

The boiler shall be provided with an integral, washable combustion air filter. The air filter shall provide 83% arrestment to protect the burners and blower(s) from debris. The air filter shall be constructed out of open-cell polyurethane foam. Models 500 and 750 shall be two-stage firing, model 1000 shall be three-stage firing, and models 1250-2000 shall be four-stage firing

Standard features shall include:

- ASME 160 psi working pressure heat exchanger
- ASME "H" stamp
- Flanged water connections
- Glass-lined headers
- External header gaskets
- 75 psi (517 kPa) ASME rated pressure relief valve (PNCH)
- Flow switch
- Multiple operating gas valve/pressure regulators
- Temperature pressure gauge
- Manual "A" gas valve
- Intake air filter
- Multiple, removable burner trays
- Stainless steel burners
- Built-in draft fan for Category I or III vent systems
- Air pressure switch
- Burner site glass
- 24V control system
- 115/24VAC transformer
- Manual reset high limit - hardware or software
- Automatic reset high limit - hardware or software
- Dry run and alarm contacts
- Electronic staging control with LCD touchscreen
- DIN Rail terminal blocks for electrical connections
- Accepts external 0-10VDC (4-20mA) for remote control
- Hot surface ignition
- On/Off toggle switch
- Pump time delay
- Touchscreen diagnostic indication
- Displays faults in clear text form
- Password protected parameters for installer use
- Complete diagnostics for analog and digital inputs
- Lead/Lag up to 8 boilers/heaters
- Hybrid Operations
- BACnet
- Variable Speed Pump Control (Vari-Prime)