

# Pennant Pump-Mounted Water Heater

Model PNCV 500-2000 Indoor/Outdoor

## Specification

Date: \_\_\_\_\_ Bid Date: \_\_\_\_\_  
Project #: \_\_\_\_\_ Location: \_\_\_\_\_  
Project Name: \_\_\_\_\_ Engineer: \_\_\_\_\_  
Contractor: \_\_\_\_\_ Prepared By: \_\_\_\_\_

Contractor shall supply and install Qty.: \_\_\_\_\_ Laars Model No. PNCV \_\_\_\_\_ pump-mounted water heater(s).

The heater shall be a Laars Pennant Model PNCV \_\_\_\_\_, 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 Z21.10.3 / CSA 4.3 Standard for Gas Water Heaters, 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 water heater design shall permit removal of the complete heat exchanger for service from either the front or top, to facilitate maintenance.

The heater shall come complete with a volute-mounted pump sized to provide the correct heater flow rate, for the heater and 30 feet (9.1m) of full-sized piping. Each unit shall have a pump time delay. The pump time delay shall be adjustable from 20 seconds to 10 minutes for continued pump circulation after the call for heat has been satisfied, to remove residual heat from the unit's combustion chamber.

The units shall use a proved hot surface ignition with a 15 second pre-purge cycle to clean out the combustion chamber. Upon a call for heat, if a flame is not detected, the ignition module shall attempt two more times before locking out, and requiring manual reset. If there is a loss of flame signal during a call for heat, the ignition control shall attempt three re-ignition cycles before locking out. (Pennant units with some options, such as ASME CSD-1, are built with single-try ignition controls.) The control circuit shall be 24V. Unit shall be 120V, single phase, less than 12 Amps. Mounted pump shall be 120V, single-phase (Amp draw depends on model size).

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.

Heaters shall have a forced draft design and shall meet a minimum 85% steady state 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.

Temperature control shall be an electronic PID temperature control with LCD and touchpad and shall control the water heater stage firing. The heater shall have connections for an external staging control, and a selector switch to enable the user to choose between the water heater's staging control or a field-supplied staging control, without bypassing any of the heater's safety controls. The heater display shall have diagnostic lights which include power on, call for heat, pump on, stage 1, stage 2, stage 3 (if applicable), stage 4 (if applicable) and service. The heater display shall be visible without the removal of any jacket panels or control panels. Additional diagnostic lights for service (low water flow, blocked flue, low air flow — blower 1, and low air flow — blower 2 (if applicable)) shall be easily accessed in the control panel. Dry alarm contacts for ignition failure shall be included. Models 500 and 750 shall be two-stage firing, model 1000 shall be three-stage firing, and models 1500 and 2000 shall be four-stage firing.

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 heater shall be provided with an integral, washable combustion air filter. The air filter shall provide 83% arrestance to protect the burners and blower(s) from debris. The air filter shall be constructed of open-cell polyurethane foam.

Heater shall include as standard equipment the following controls and trim:

- ASME 160 psi working pressure heat exchanger
- ASME "H" stamp
- Flanged water connections
- Glass-lined cast iron headers
- External header gaskets
- 125 psi (861 kPa) ASME rated pressure relief valve
- Flow switch
- Temperature and pressure gauge
- Multiple operating gas valve/pressure regulators
- Manual "A" gas valve
- Intake air filter
- Multiple, removable burner trays
- Stainless steel burners
- Built-in draft fan(s) for Category I or III venting
- Air pressure switch
- Burner site glass
- 24V control system
- 115/24VAC transformer
- Pump, mounted and wired
- Manual reset high limit
- Automatic reset high limit
- Electronic PID staging control with LCD and touchpad
- PC board for electrical connections
- External controller connections with selector switch
- Hot surface ignition
- On/Off toggle switch
- Pump time delay
- Diagnostic lights