

# NEOTHERM Boiler with Pump

Date: Bid Date:

Project #: Location:

Project Name: Engineer:

Contractor: Prepared By:

Model NTH 150 - 500 Outdoor

## Specification



Contractor shall supply and install Qty.: \_\_\_\_\_ Laars Model No. NTH \_\_\_\_\_ modulating boiler(s) with pump(s).

The boiler shall be a Laars NeoTherm Model NTH \_\_\_\_\_, rated at the input and output shown on the schedule. The boiler shall modulate 20-100% of full fire. The unit(s) 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, and shall include certification for outdoor installation. 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) maximum working pressure, and shall bear the ASME "H" Stamp and be listed by the National Board. The unit(s) shall be constructed to comply with the efficiency requirements of the latest edition of ASHRAE Standard 90.1. The boiler shall be equipped with an ASME certified pressure relief valve. Models 285-500 standard pressure relief valves shall be set 75psi (517 kPa). Models 150-210 standard pressure relief valves shall be set at 30psi (207 kPa) Optional pressure relief valves with settings of 30psi (207 kPa), 50psi (345 kPa), 60psi (413 kPa), 125psi (861 kPa) or 150psi (1034 kPa) shall be available

The boiler shall be listed with AHRI (Air Conditioning, Heating and Refrigeration Institute). The boiler shall have minimum efficiencies of:

|     | AFUE  | Thermal | Combustion |
|-----|-------|---------|------------|
| 150 | 95.0% | N/A     | N/A        |
| 210 | 95.0% | N/A     | N/A        |
| 285 | 95.0% | N/A     | N/A        |
| 399 | N/A   | 96.5%   | 96.5%      |
| 500 | N/A   | 95.0%   | 95.0%      |

The water tube heat exchanger shall be stainless steel, rated for 160 psi (1103 kPa) working pressure. The heat exchanger shall be a low water volume design, welded construction, with no gaskets, o-rings or bolts in the header. Heat exchanger shall be accessible for visual inspection and cleaning of all internal surfaces. The boiler shall be fully condensing design with built-in condensate drain and trap. The heat exchanger shall have a limited ten-year warranty.

Each boiler shall be fully test fired, (with water, gas, and venting connected), and all safety components tested, at the factory.

The boiler shall be sealed combustion, and removal of jacket panels shall not affect the combustion seal. The boiler 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. Boiler shall be certified for zero clearance to combustible surfaces.

The boiler shall be shipped with a pump and a conduit for field installation. The pump shall be capable of serving the boiler's heat exchanger and 30 feet of piping that is the same size as the boiler's water connections, with a normal number of pipe fittings.

Boiler shall operate on 4-13" w.c. gas pressure, and shall need no component changes to operate at high altitude, up to 10,000 feet.

The boiler shall use a premix burner with a stainless steel woven metal fiber wrap, and a negative pressure gas valve to burn cleanly, with NOx emissions not exceeding 10ppm. The boiler shall meet the emissions requirements of SCAQMD 2012.

The boiler shall be design-certified as a high efficiency Category IV unit, and shall include a short section of vent pipe with adapter and bird screen for outdoor installation.

Unit shall be 120VAC, single phase, less than 6 Amps (including pump) for connection to a 15A breaker. The control circuit shall be 24VAC.

The boiler control shall be an integrated electronic PID temperature and ignition control with large color touchscreen display and shall control the boiler operation and firing rate.

When a display or control is field-replaced, the device shall have the ability to read parameter setpoints from the original set-up, so the system does not have to be re-programmed.

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 on the same terminals. The boiler shall be shipped with the domestic water heater sensor, as standard equipment.

The control shall have built-in outdoor reset feature with customizable reset curves, based on the outdoor temperature and desired system water temperature. The boiler shall be shipped with the outdoor reset sensor, as standard equipment.

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The control shall easily allow the user to force the boiler into minimum or maximum firing rate, for setup and diagnostic purposes, and shall have a cleaning mode that allows the user to wipe the screen without activating any functions from the touchscreen.

The control shall have the ability to accept a 4-20mA or 0-10VDC input connection from an external control or building automation system, to modulate the flame. The control shall have dry alarm contacts for ignition failure.

The control shall monitor flue gas temperature and shall stop the boiler from firing if temperature is excessive.

The control shall have a variable speed boiler pump control option.

Allowable control adjustments shall include: boiler temperature setpoint; domestic water temperature setpoint; automatic high limit; °F or °C display; setpoint for time of day input; DHW setpoint for time of day input; PID gain parameters; DHW PID gain parameters; manual firing rate control; pump delay time; pump exercise interval; outdoor reset selection; low boiler setpoint temperature (for outdoor reset operation); boiler temperature at high outdoor temperature (for outdoor reset operation); boiler setpoint at low outdoor temperature (for outdoor reset operation); warm weather shutdown; automatic remote signal detection; anti-shortcycle feature enable/disable.

The control shall have installer-level password, and verification feature to ensure that safety-related parameters are not altered by mistake.

The control shall be able to cascade and lead-lag with other NeoTherm controllers, for a total of eight NeoTherm boilers, without additional system controllers.

In multiple boiler systems the boilers shall be controlled to keep each one in the lowest firing rate possible, based on system demand, to maximize efficiency. For example, the master control shall choose to bring on all boilers at low firing rates, instead of one boiler at a high rate, to meet the system needs.

A control that is chosen as master in a system with multiple controllers shall display an icon of each of the controls that it is controlling. The color of the icon shall indicate if the control is in normal operation, in lockout, in standby mode, in a hold state, or if there is a communication error. In addition to adjustable parameters, the master display shall also be able to show information about the following for each boiler it is monitoring:

- domestic hot water
- burner control
- demand and modulation
- inlet temperature
- fan
- domestic water pump
- boiler pump
- system pump
- flame detection
- statistics
- stack limit
- frost protection

The control shall graphically depict the firing rate of each boiler in system, if the controller is the master of other boilers in a multiple boiler system. The control shall also show information about system, such as outdoor temperature and system temperature, where applicable.

The controller shall be able to send information through a modbus connection, including (but not limited to) inlet and outlet water temperatures, stack temperature, DHW temperature and priority, central heating temperature, frost protection, warm weather shutdown, status of sensors, fan speed, setpoints, remote control input, burner status, lockout codes, alarm reasons, system pump status, boiler pump status and domestic water pump status.

Control diagnostics shall include, at a minimum, the following: ignition failure, grounded flame rod, safety chain interrupt, boiler high limit exceeded, domestic water high limit exceeded, temperature rise limit exceeded, stack limit exceeded, pressure sensor fault, combustion pressure fault, blocked air intake, sensor errors (open or shorted), 24VAC voltage low or high, modulation fault, pump fault, AC input phases reversed, and fan speed proving rate failure.

The control shall have a clock with a battery backup and will allow the user to access the burner run time, and cycle counts for the burner, DHW pump, system pump and boiler pump.

The control shall differentiate between a lockout, a hold, or an alert. If an issue occurs, the system will display a brief description of the issue on the control screen. The user shall be able to tap the display to be presented with a more detailed explanation of the issue.

*Standard features shall include:*

- High condensing efficiency
- Modulation down to 20% of full fire (5:1 turndown)
- Sealed combustion chamber
- Pre-mix stainless steel burner
- Low NOx system exceeds the most stringent regulations for air quality – 10ppm NOx
- Built-in condensate trap
- Vent temperature cutoff
- Indirect water heater priority (sensor included)
- ASME 160 psi (1102 kPa) working pressure heat exchanger
- Stainless steel heat exchanger with welded construction
- ASME "H" stamp
- 75 psi (517 kPa) ASME rated pressure relief valve (models 285-500)
- 30 psi (207 kPa) ASME rated pressure relief valve (models 150-210)
- Temperature and pressure gauge
- Drain valve
- Multiple pump control for boiler pump, system pump and indirect domestic water pump, each with delay
- Electronic PID modulating control
- Direct spark ignition
- Large user-interface and display
- Alarm output
- Accepts external 4-20mA (0-10V with optional convertor) modulation signal
- Outdoor reset (sensor included)
- On/Off toggle switch
- Manual reset high limit
- Burner site glass
- Flue gas temperature cutoff
- Zero clearance to combustible surfaces
- Built-in cascade function for multiple units, up to 8 total.
- 10-Year limited heat exchanger warranty