

# Brute

# Boiler

BNTH 399 - 850 Indoor



## Specification

Date: Bid Date:

Project #: Location:

Project Name: Engineer:

Contractor: Prepared By:

Contractor shall supply and install Qty.: \_\_\_\_\_ Bradford White Model No. BNTH \_\_\_\_\_ modulating boilers(s).

The boiler shall be a Bradford White, Brute, Model BNTH \_\_\_\_\_ rated at \_\_\_\_\_ BTU/hr input and \_\_\_\_\_ BTU/hr output. 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. 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 have minimum thermal and combustion efficiencies of 95%

The boiler shall be equipped with an ASME certified pressure relief valve set at 75psi 517 (kPa). Optional pressure relief valves with settings of 30psi (207kPa), 50psi (345 kPa), 60psi (413 kPa), 125psi (861 kPa) or 150psi (1034 kPa) shall be available.

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.

All water, gas, vent and air connections shall be on the top of the boiler, and the top jacket panels shall be split, such that they are removable without disconnecting the water, gas, vent or air pipes.

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 designed for vertical or horizontal Category IV venting with approved PVC, CPVC, stainless steel, or polypropylene:

- Models 399-500: Up to 100 equivalent feet of 4" diameter pipe
- Models 600-850: Up to 40 equivalent feet of 4" diameter pipe, or up to 100 equivalent feet of 6" diameter pipe

Air may be taken from the room, or ducted directly to the boiler using ABS, PVC, CPVC or galvanized pipe:

- Models 399-500: Up to 100 equivalent feet of 4" diameter pipe
- Models 600-850: Up to 40 equivalent feet of 4" diameter pipe, or up to 100 equivalent feet of 6" diameter pipe

The boiler shall be shipped with PVC sidewall vent and air terminals, for use with horizontal systems. The first section of CPVC vent pipe shall be shipped with each boiler.

Unit shall be 120VAC, single phase. 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. The boiler display shall be visible without the removal of any jacket panels or control panels.

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 be able to cascade and lead-lag with other Brute (BNT) controllers, without additional system controllers.

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.

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

*continued >>*

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-short cycle 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 **Brute** controllers, for a total of eight **Brute** 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 a system, if the controller is the master of other **Brute** boilers in a multiple boiler system. The control shall also show information about the 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:*

- Electronic PID modulating control with large color touchscreen display
- Built-in cascade function for multiple units, up to 8 total.
- Password-protected parameters for installer use
- Test feature allows forced min or max firing
- Complete diagnostics for analog and digital inputs
- Outdoor reset (sensor included)
- Indirect water heater priority (sensor included)
- System sensor included
- Multiple pump control for boiler pump, system pump and indirect domestic water pump, each with delay
- Display holds, alerts and errors in clear text form
- Dry alarm contacts for ignition failure
- 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 - less than 10ppm NOx
- Horizontal or vertical direct vent
- Horizontal vent and air terminals
- Vent and air pipe lengths of up to 100 equivalent feet (each)
- Built-in condensate trap
- Vent temperature cutoff feature
- Direct spark ignition system
- 160 psi maximum working pressure
- Stainless steel heat exchanger with welded construction (no gaskets)
- ASME "H" stamp
- 75 psi (517 kPa) ASME rated pressure relief valve
- Water flow switch
- Temperature & pressure gauge
- Drain valve
- Alarm output
- Accepts external 4-20mA (0-10V with optional convertor) modulation signal
- On/off toggle switch
- Manual reset high limit
- Burner site glass
- Zero clearance to combustible surfaces
- 10 year limited heat exchanger warranty



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Warranty: (800) 531-2111

[www.BradfordWhite.com](http://www.BradfordWhite.com)

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