Date: Bid Date:

Project #: Location:

Project Name: Engineer:

Contractor: Prepared By:

MagnaTech

Volume Water Heater

BMGV 1600 - 4000
Indoor/Outdoor

BRADFORD WHITE

Specification

Contractor shall supply and install Qty.: Bradford White Model No. BMGV_____modulating water heater(s).

The heater shall be a Bradford White, MagnaTech, Model BMGV_____rated at_____BTU/hr input and_____BTU/hr output. The heater shall modulate 20-100% of full fire. The unit(s) shall be design-certified to comply with the current edition of the Harmonized ANSI Z21.10.3 / CSA 4.3 Standard for Gas Water Heaters. The unit(s) shall be designed and constructed in accordance with the ASME Heater & Pressure Vessel Code, Section IV requirements for 160 psi (1103 kPa) maximum working pressure, and shall bear the ASME "HLW" Stamp and be listed by the National Board.

The heater shall be listed with AHRI (Air Conditioning, Heating and Refrigeration Institute). The heater shall have a minimum thermal efficiency of 95%.

The unit(s) shall be constructed to comply with the efficiency requirements of the latest edition of ASHRAE Standard 90.1.

The heater shall be certified for placement indoors and outdoors, where freezing conditions do not exist.

The heater must have knockdown feature that allows the top section of the heater to be removed, allowing for easy handling and installation.

The heater shall be equipped with an ASME certified pressure relief valve set at 125psi (861 kPa). Optional pressure relief valves with settings of 30psi (207kPa), 50psi (345 kPa), 60psi (413 kPa), 75psi (517 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 with micro-fin tubing, welded construction, with no gaskets, o-rings or bolts in the header. The heater shall be fully condensing design with built-in condensate drain and trap. The heat exchanger shall have a limited five-year warranty.

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

The heater shall be sealed combustion. The heater 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. Heater shall be certified for no more than 11 inches clearance to combustible surfaces.

The heater shall be equipped with an engineered gas/air chamber that ensures proper mixing for stable combustion at all firing rates

Heater shall operate at Gas Pressures of 4" to 10.5" NG and 8" to 14" LP (w.c.), and shall need no component changes to operate at high altitude, up to 10,000 feet.

The heater 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 9ppm. The heater shall meet the emissions requirements of SCAQMD 2012.

The heater shall be designed for vertical or horizontal Category IV venting, up to 100 equivalent feet, with 6" (1600), 8" (2000 & 2500), 10” (3000 & 3500) or 12” (4000) diameter CPVC, polyproylene or stainless steel vent material.

Air may be taken from the room, or ducted directly to the heater using up to 100 equivalent feet of 6" (1600), 8" (2000 & 2500), 10” (3000 & 3500) or 12” (4000) diameter of ABS, PVC, CPVC or galvanized pipe.

The heater shall be a vertical, micro-finned tube exchanger design, with one control and one burner.

The heater control shall be an integrated electronic PID temperature and ignition control with large touchscreen and color display and shall control the heater operation and firing rate. The heater display shall be visible without the removal of any jacket panels or control panels.

The control shall have the ability to control the domestic water pump, with a time delay and exercise feature.

The control shall easily allow the user to force the heater 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 dry alarm contacts for ignition failure. The control shall monitor flue gas temperature and shall stop the heater from firing if temperature is excessive.

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Allowable control adjustments shall include: heater temperature setpoint; domestic water temperature setpoint; automatic high limit: °F or °C display; DHW setpoint for time of day input; DHW PID gain parameters; manual firing rate control; pump delay time; pump exercise interval; 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 MagnaTech controllers, for a total of eight MagnaTech water heaters, without additional system controllers.

The burners shall be controlled to keep each one in the lowest firing rate possible, based on system demand, to maximize efficiency. For example, in multiple heater systems, the master control shall choose to bring on all heaters at low firing rates, instead of one heater 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 heater it is monitoring.

The control shall graphically depict the firing rate of the burner in the heater, and/or each burner in system, if the controller is the master of other MGV heaters in a multiple heater system.

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 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, status of sensors, fan speed, setpoints, remote control input, burner status, lockout codes, alarm reasons, domestic water pump status.

Control diagnostics shall include, at a minimum, the following: ignition failure, grounded flame rod, safety chain interrupt, heater 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 and DHW 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)
- Pre-mix stainless steel burner
- Low NOx system exceeds the most stringent regulations for air quality – 9ppm NOx
- Gas Pressures. 4" to 10.5" NG and 8" to 14" LP (w.c.)
- For placement indoors and outdoors (in non-freezing environments)
- 'Knock-Down' feature: Removable top section for easy handling /installation
- Sealed combustion chamber
- The heater shall be equipped with an engineered gas/air chamber that ensures proper mixing for stable combustion at all firing rates
- Horizontal or vertical direct vent
- Vent and air pipe lengths of up to 100 equivalent feet (each)
- Air filter
- Stainless steel heat exchanger with welded construction (no gaskets)
- ASME “HLW” stamp
- 160 psi maximum working pressure
- 125 psi (861 kPa) ASME rated pressure relief valve
- Groove lock fittings on all units (optional with flanges)
- Built-in condensate trap
- Electronic PID modulating control with large touchscreen and color display
- Controller cascades with up to eight MagnaTechs to lead/lag the units together.
- Accepts external modulation control (4-20mA or 0-10VDC)
- Accepts external 4-20mA or 0-10VDC temperature set point signal
- Sensor for domestic water tank
- Domestic water pump time delay
- Low water cutoff
- Manual reset high limit
- Auto reset high limit
- High gas pressure switch
- Normally open alarm contact
- Vent temperature cutoff
- Water flow switch
- Temperature & pressure gauge
- Burner sight glass
- 10-Year limited warranty