

ADVANCED DESIGN BOILER™ WATER HEATERS (TYPE WH) SUGGESTED SPECIFICATIONS

Section I: General Requirements

1. Provide _____ Raypak Advanced Design Boiler Model _____ water heaters with an input rating of _____ BTUH each, and a recovery capacity of _____ gallons per hour at _____ °F, when fired with natural gas or propane supplied to the water heater at a maximum pressure of 10.5" WC for natural gas (13.0" WC for propane) and minimum pressure of 7.0" WC for natural gas (12.0" WC for propane).
2. The water heater(s) shall be design certified and tested with a listed thermal efficiency of 84% using only the primary heat exchanger. Each water heater shall bear the ASME stamp, and shall be inspected by and registered with the National Board for 160 PSIG working pressure. ASME Data Sheets shall be supplied with the water heater(s). The water heater(s) shall comply with the energy efficiency requirements of the latest edition of the ASHRAE 90.1 standard.
3. Individual water heater(s) shall be completely factory assembled and tested. The water heater(s) shall be packaged with jacket, burner, controls and trim mounted and wired. A factory fire test shall be done before shipment to ensure proper operation. Assembled water heater(s) shall be packaged and shipped in suitable heavy duty crates.
4. The water heater(s) shall have a floor loading of 150 lbs/square foot or less and shall have a small footprint with a power density of at least 85,000 BTUH output/square foot.
5. The water heater(s) shall carry a one (1) year limited warranty against failure caused by defective workmanship or material.
6. The water heater(s) shall meet safety standards for direct vent as noted by the 2006 Universal Mechanical Code, Sections 1107.6, and ASHRAE 15-1994, Section 8.13.6.

Section II: Water Heater Primary Heat Exchanger

1. The primary heat exchanger shall be of the vertical cylindrical multi-pass design and shall completely enclose the combustion chamber for maximum efficiency. The primary heat exchanger shall be set in a stress free jacket, and shall be of free floating design.
2. The water section of the primary heat exchanger shall be of the straight fin-tube design with 1" x .062" wall cupro-nickel tubes having extruded integral fins spaced seven (7) fins per inch. The tubes shall be set vertically and shall be rolled into an ASME water heater quality carbon steel tube sheet. A heavy gauge stainless steel slotted heat exchanger wrap will ensure proper combustion gas flow across the cupro-nickel finned tubes.
3. Chemical resistant silicone based O-rings, with a temperature rating of over 500°F, shall provide a water tight seal between the finned tubes and the high grade SB-62 bronze headers at top and bottom of the heat exchanger. The headers shall be equipped with access ports to simplify visual inspection and tube cleaning. The headers shall be attached to the tube sheet with ASME stud bolts and flange nuts and shall be removable for access to the tube sheet and inner combustion chamber for cleaning or repairs.
4. The low water volume primary heat exchanger shall be explosion-proof on the water side and shall bear a 20 year warranty against thermal shock caused by momentary fluctuations in system inlet water temperature, up to a maximum Delta T within the heat exchanger of 150°F with water outlet temperature not exceeding 210°F.
5. The primary heat exchanger shall be capable of inlet operating at temperatures as low as 105°F without steady state condensation.
6. The primary heat exchanger shall have accessible water heater drains.

Section III: Burner and Combustion Chamber

1. The combustion chamber shall be of the sealed combustion type employing the Raypak aerodynamically stabilized power burner.
2. The burner shall be of a non-clogging bluff head design, and shall be fabricated from high temperature carbon steel. The burner shall fire in a pattern resulting in uniform heat transfer upon the heating surface.
3. The burner head shall be backed with a ten (10) year unconditional warranty against manufacturing defects.
4. The burner shall use a combustion air blower to precisely control the fuel/air mixture for maximum efficiency. The combustion air blower shall operate for a pre-purge period before burner ignition and a post-purge period after burner operation to clear the combustion chamber.
5. The combustion chamber outer panels shall be fully gasketed and sealed with a high temperature sealing compound.
6. An external viewing port shall be provided, permitting visual observation of burner operation.
7. The water heater(s) shall be equipped to provide on/off control of the gas input to the water heater.
8. The water heater(s) shall comply with air quality restrictions for Low NOx water heaters and shall emit 0 - 30 ppm NOx, depending on combustion air quality and fuel composition.

9. The water heater(s) shall be equipped with 100% safety shutdown on loss of pilot flame. Pilot flame ignition shall be by electronic intermittent ignition with electronic flame supervision having a nominal 0.8 second flame response time, with an optional manual reset on flame failure.

Section IV: Water Heater Jacket

1. The water heater(s) shall be constructed with a 20 gauge steel outer jacket assembly. The base shall be constructed from 6" structural steel channels.
2. All external surfaces shall be protected with a baked-on, epoxy powder coat finish suitable for outdoor installation.
3. All steel jacket components shall be galvanized.
4. The water heater(s) shall be certified for installation on combustible floors without additional safety provisions.
5. Required clearances from combustible surfaces shall be equal to or greater than one inch on all sides except the water side. Water side clearances shall be the minimum required for piping connection and associated installation clearances.

Section V: Venting

1. The water heater(s) exhaust outlet shall be field adjustable to provide either back or right side vent connection.
2. The water heater(s) shall be designed to allow field installation of multiple venting options. The water heater(s), used without a condensing heat exchanger (CHX), shall be vented in one of the following manners:
 - with Category I (non-positive pressure, non-condensing) vent material utilizing a properly sized natural draft vent system;
 - with a horizontal direct vent system using separate air intake/flue pipes and an approved vent cap. Intake material shall be PVC or similar rated material appropriate for low temperature combustion air intake. Flue pipe material shall be Category III (positive pressure, non condensing);
 - with a through wall vent system using a Category III flue pipe material and vent cap;
 - using the AGA certified outdoor installation intake/flue outlet cap supplied by the manufacturer.

- or -

The water heater(s), when used with the condensing heat exchanger, shall be vented using one of the following methods using appropriate vent material designed for condensing applications (Category IV):

- with a horizontal or vertical direct vent system using separate air intake/flue pipes and an approved vent cap. Intake material shall be PVC or similar rated material appropriate for low temperature combustion air intake. Flue pipe material shall be Category IV (positive pressure, condensing);
- with a through wall vent system using a Category IV flue pipe material and vent cap;
- using the certified outdoor installation intake/flue outlet cap supplied by the manufacturer.

Section VI : Standard Equipment

1. All gas controls shall comply with American National Standards Institute, ANSI Z21.10.3/CSA 4.3 for gas water heaters, and shall be located inside the water heater jacket for easy accessibility, adjustment and service.
2. The water heater(s) shall each be equipped with a _____ PSIG ASME pressure relief valve, piped by the installer to an approved drain. The water heater(s) shall also be equipped with a clearly visible easy-to-read temperature and pressure gauge of rugged construction.
3. Each water heater shall be equipped with an adjustable immersion type auto reset temperature limit and an immersion manual reset safety high limit to limit the maximum water temperatures.
4. The water heater(s) shall be equipped with an energy-saving Economaster II pump control relay that is user adjustable from 3 to 10 minutes and is factory mounted and wired to improve system efficiency.
5. All control components shall be easily accessed and serviceable from the front and top of the unit.
6. Each water heater shall be equipped with the following components:
 - a) low pressure main gas regulator(s);
 - b) a manually operating shut off cock;
 - c) one manual firing cock (Models 500), or two manual firing cocks (Models 751-1501);
 - d) plugged pressure tapping;
 - e) low voltage transformer;
 - f) air pressure switches to monitor operation of combustion air fan and flue;
 - g) a water flow switch;
 - h) redundant safety shut off feature;
 - i) additional controls.

Section VII: Optional Secondary Condensing Heat Exchanger

1. The water heater(s) shall be equipped with optional Condensing Heat Exchanger(s) (CHX) for maximum efficiency.
2. Each CHX shall be constructed entirely of condensate benign materials and shall be corrosion resistant under normal operating conditions. The CHX shall be designed so that the unit has no moving parts.
3. The CHX shall increase the thermal efficiency of each water heater to a maximum of 97%.