

ADVANCED DESIGN BOILER™ HEATING BOILERS (TYPE H) SUGGESTED SPECIFICATIONS

Section I: General Requirements

1. Provide _____ Raypak Model _____ Advanced Design Boiler(s) with an input rating of _____ BTUH each, and an output of _____ BTUH, when fired with natural gas [propane] supplied to the boiler at 10.5" WC [13.0" WC propane] maximum and 7.0" WC [12.0" WC propane] minimum pressure. (Note: propane is not available for 1501)
2. The boiler(s) shall be design certified and tested with a listed thermal efficiency of 84% using only the primary heat exchanger. Each boiler shall be constructed in accordance with Section IV of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, 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 boiler(s). The boiler(s) shall comply with the energy efficiency requirements of the latest edition of the ASHRAE 90.1 standard.
3. Individual boilers shall be completely factory assembled and tested. The boiler(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 boiler(s) shall be packaged and shipped in suitable heavy duty crates or boxes.
4. The boiler(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 boiler(s) shall carry a one (1) year limited parts warranty against failure caused by defective workmanship or material.
6. The boiler(s) shall meet ALL safety standards for refrigeration machinery rooms as defined by the 2006 Universal Mechanical Code, Section 1107.6, and ANSI/ASHRAE 15-1994, Section 8.13.6.

Section II: Boiler 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 copper tubes having extruded integral fins spaced seven (7) fins per inch. The tubes shall be set vertically and shall be rolled into an ASME boiler quality carbon steel tube sheet. A heavy gauge stainless steel slotted heat exchanger wrap will ensure proper combustion gas flow across the copper finned tubes.
3. Chemical resistant silicon 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 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 boiler operation with water temperature differences not to exceed 150°F between the boiler inlet and outlet.
5. The primary heat exchanger shall be capable of operating down to 105°F without steady state condensation. It will carry a ten (10) years limited warranty against failure caused by defective workmanship or material.
6. The primary heat exchanger shall have accessible boiler 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 boiler(s) shall be equipped to provide on/off control of the gas input to the boiler.
8. The boiler(s) shall comply with air quality restrictions for Low NOx boilers and shall generate 0 - 30 ppm of NOx emissions, depending on combustion air quality and fuel composition.
9. The boiler(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, requiring a manual reset on flame failure.

Section IV: Boiler Jacket

1. The boiler(s) shall be constructed with a 20 gauge steel outer jacket assembly. The base shall be constructed from 6" structural steel channels, to allow the use of a forklift.
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. All external panels can be removed separately without tools for accessibility.
4. The boiler(s) shall be certified for installation on combustible floors without additional safety provisions.
5. Required clearances from combustible surfaces shall be less 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 boiler(s) exhaust outlet shall be field adjustable to provide either back or right side vent connection.
2. The boiler(s) shall be designed to allow field installation of multiple venting options. The boiler(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 design certified outdoor installation intake/flue outlet cap supplied by the manufacturer.

- or -

The boiler(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 design 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 Z21.13/CSA 4.9, and shall be located inside the boiler jacket for easy accessibility, adjustment and service.
2. The boiler(s) shall each be equipped with a _____ PSIG ASME pressure relief valve, piped by the installer to an approved drain. The boiler(s) shall also be equipped with a clearly visible easy-to-read temperature and pressure gauge of rugged construction.
3. Each boiler 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 boiler(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 boiler shall be equipped with the following components:
 - a) low pressure main gas regulator(s);
 - b) a low gas pressure switch;
 - c) a manually operating shut off cock;
 - d) one manual firing cock (Models 500), or two manual firing cocks (Models 751-1501);
 - e) plugged pressure tapping;
 - f) low voltage transformer;
 - g) air pressure switches to monitor operation of combustion air fan and flue;
 - h) a water flow switch;
 - i) redundant safety shut off feature;
 - j) additional controls.

Section VII: Optional Secondary Condensing Heat Exchanger

1. The boiler(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 boiler to a maximum of 97%.