



DIVISION 23 52 33.13

ALUMINUM WATER-TUBE BOILERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes condensing gas-fired, aluminum tube hydronic heating boilers

Specifier Note: Use as needed

- B. Related Sections

- 1. Building Services Piping – Division 23 21 00
- 2. Breeching, Chimneys, and Stacks (Venting) – Division 23 51 00
- 3. HVAC Instrumentation and Controls – Division 23 09 00
- 4. Electrical – Division 23 09 33

1.2 REFERENCES

- A. ANSI Z21.13/CSA 4.9
- B. ASME, Section IV
- C. 2006 UMC, Section 1107.6
- D. ANSI/ASHRAE 15-1994, Section 8.13.6
- E. National Fuel Gas Code, ANSI Z223.1/NFPA 54
- F. I=B=R
- G. NEC
- H. ASHRAE 90.1

1.3 SUBMITTALS

- A. Product data sheet (including dimensions, rated capacities, shipping weights, accessories)
- B. Wiring diagram
- C. Warranty information
- D. Installation and operating instructions

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements
 - 1. ANSI Z21.13/CSA 4.9
 - 2. Local and national air quality regulations for low NOx (<20 PPM, <14ng/J NOx) boilers
- B. Certifications
 - 1. CSA
 - 2. ASME H Stamp and National Board Listed

1.5 HEAT EXCHANGER WARRANTY

- A. Pro-rated five-year closed-system heat exchanger warranty in commercial applications
- B. Pro-rated twenty-year closed-system heat exchanger warranty in residential applications
- C. Limited twenty-year thermal shock warranty

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Raypak, Inc.

1. Contact: 2151 Eastman Ave., Oxnard, CA 93030; Telephone: (805) 278-5300; Fax: (800) 872-9725; Web site: www.raypak.com
2. Product: XPak™ condensing aluminum alloy tube hydronic boiler(s)

2.2 BOILERS

A. General

1. The boiler(s) shall be fired with _____ gas at a rated input of _____ BTU/hr.
2. The boiler(s) shall be CSA tested and certified with a minimum AFUE rating of 90.4% (XPak 85) or 90.5% (XPak 120) at full fire.
3. The boiler(s) shall be ASME inspected and stamped and National Board registered for 45 PSIG maximum allowable working pressure and 176°F maximum allowable temperature, complete with a Manufacturer's Data Report.
4. The boiler(s) shall have a maximum weight of 93 lbs. or less.

B. Primary Heat Exchanger

1. The primary heat exchanger shall be of a helically wound, single-pass design and shall completely encircle the combustion chamber for maximum efficiency.
2. There shall be no banding material, bolts, or gaskets in the heat exchanger configuration. The heat exchanger is removable from the cabinet for replacement without removing the entire boiler assembly from the site. The aluminum combustion chamber shall be designed to have a trough located on the bottom front and back section leading to the middle to ensure that condensation does not collect in the boiler.
3. The low water volume primary heat exchanger shall be explosion-proof on the water side and shall carry a twenty-year warranty against thermal shock.
4. The flue connection and combustion air opening shall be located in three places on the top.
5. The gas connection, electrical connections, water connections and condensate drain shall be located on the bottom of the unit.

C. Condensate Drain

1. The boiler(s) will feature a condensate drain sensor which will shut down the boiler(s) if the condensate drain is blocked.

D. Burner

1. The combustion chamber shall be of the sealed combustion type employing the Raypak high temperature stainless steel inner and Inconel outer metal cylindrical, ported and lanced burner, mounted in a horizontal orientation along the centerline of the combustion chamber.
2. The burner shall be a premix design and constructed of high grade stainless steel and must be capable of firing at both a complete blue flame with maximum gas and air input as well as firing infrared when gas and air are reduced. The burner must be capable of firing at 100% of rated input when supplied with 4.0" WC of inlet gas pressure, so as to maintain service under heavy demand conditions; no exceptions.
3. The burner shall use a 0-10 VDC combustion air blower to precisely control the fuel/air mixture for maximum efficiency throughout the entire range of modulation. 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.
4. The blower shall infinitely vary its output in response to a signal supplied directly from the integrated modulating control, thereby electronically and precisely adjusting the volume of air and gas supplied for combustion. Turndown ratio shall be 3.4:1 on the XPak 85 and 4.3:1 on the XPak 120.

E. Ignition Control System

1. The boiler(s) shall be equipped with a 100 percent safety shutdown.

2. The ignition shall be spark ignition type with full flame rectification by the ignition source, with a five-try-for-ignition sequence, to ensure consistent operation.
 3. The igniter will be located to the side of the heat exchanger to protect the device from condensation.
 4. The ignition control module shall include an LED display that indicates up to 17 individual diagnostic faults.
 5. A viewing port shall be provided, permitting visual observation of burner operation.
- F. Gas Train
1. The boiler(s) shall have a firing/leak test valve and pressure test valve as required by ANSI Z21.13/CSA 4.9.
 2. The boiler(s) shall have dual-seated main gas valve.
 3. Gas control trains shall have a redundant safety shut-off feature, main gas regulation, and plugged pressure tapping to meet the requirements of ANSI Z21.13/CSA 4.9.
- G. Boiler Control
1. The following safety controls shall be provided:
 - a. High limit control with manual reset on controller.
 - b. Pressure switch, mounted and wired.
 - c. 45 PSIG ASME pressure relief valve, piped by the installer to an approved drain.
 - d. Condensate high level sensor.
 - e. Flue temperature sensor.
 - f. Flue temperature limit.
 2. The boiler(s) shall be equipped with an integrated modulating temperature controller with LED display that incorporates a non-ferrous three-speed pump and is factory mounted and wired to improve system efficiency. Water temperature sensors are included within the supply and return piping manifold.
 3. The boiler(s) shall also be equipped with outdoor reset capability, pump and DHW valve exercise function.
 4. The boiler is internally controlled via software which provides 0-10 VDC signal to the fan.
- H. Firing Mode: Provide electronic modulating control of the gas input to the boiler.
- I. Boiler Diagnostics
1. Provide internal circuit board indicating the following safety faults by a 2 character, LED display:
 - a. Condensate blockage - AL10
 - b. Manual reset high limit - AL20
 - c. Blocked vent - AL20
 - d. Internal Software Failure - AL52
 - e. Pressure switch – AL40
 - f. Sensor failure – AL71/AL73
 - g. High vent temperature – AL29
 - h. Ignition lock-out – AL10
- J. Cabinet
1. The corrosion-resistant galvanized-steel jackets shall be finished with a baked-on powder coat, which is suitable for outdoor installation, applied prior to assembly for complete coverage.
 2. The boiler(s), if located on a combustible wall, shall not require a separate combustible shield.
 3. The boiler(s) shall connect both the combustion air and flue products through the top of the unit.
- K. Boiler Pump – The boiler(s) shall be equipped with a three-speed factory-packaged pump system.

2.3 BOILER OPERATING CONTROLS

- A. The boiler(s) shall feature an integrated modulating control with selectable outdoor reset curves, which function with the optional, mounted and wired outdoor air sensor.
- B. System sensor and optional air temperature sensor shall be shipped loose for field installation by installing contractor. Inlet/Outlet sensors are factory-installed.

2.4 DIRECT VENT

- A. The boiler(s) shall meet safety standards for direct vent equipment as noted by the 2006 Uniform Mechanical Code, section 1107.6, and ASHRAE 15-1994, section 8.13.6.
- B. The boiler shall be capable of combined combustion air duct and vent lengths not to exceed 200 equivalent feet.

2.5 SOURCE QUALITY CONTROL

- A. The boiler(s) shall be completely assembled, wired, and fire-tested prior to shipment from the factory.
- B. The boiler(s) shall be furnished with the sales order, ASME Manufacturer's Data Report(s), inspection sheet, wiring diagram, rating plate and Installation and Operating Manual.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Must comply with:
 - 1. Local, state, provincial, and national codes, laws, regulations and ordinances
 - 2. National Fuel Gas Code, ANSI Z223.1/NFPA 54 – latest edition
 - 3. National Electrical Code, ANSI/NFPA 70 – latest edition
 - 4. Canada only: CAN/CSA B149 Installation Code and CSA C22.1 CEC Part I
 - 5. Manufacturer's installation instructions, including required service clearances and venting guidelines
- B. Manufacturer's representative to verify proper and complete installation.

3.2 START-UP

- A. Test during operation and adjust if necessary:
 - 1. Safeties
 - 2. Operating Controls
 - 3. Static and full load gas supply pressure
 - 4. Gas manifold and blower suction pressure
 - 5. Combustion analysis
 - 6. Submit copy of start-up report to home owner/end user.

END OF SECTION