

DIVISION 23 52 33.13

FINNED WATER-TUBE BOILERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes gas-fired, copper finned-tube hydronic heating boilers.
- B. Related Sections

Specifier Note: Use as needed

- 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. ASME CSD-1, 2018 (when required)

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 NO_x (0-20 PPM NO_x emissions) boilers
- B. Certifications
 - 1. CSA
 - 2. ASME H-Stamped and National Board registered

1.5 WARRANTY

- A. Limited one-year warranty from date of installation
- B. Limited twenty-year thermal shock warranty
- C. Limited ten-year closed-system heat exchanger warranty

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Raypak, Inc.
 - 1. Contact: 2151 Eastman Ave., Oxnard, CA 93030; Telephone: (805) 278-5300; Website: www.raypak.com
 - 2. Product: Hi Delta SS[®] copper finned-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 thermal efficiency of 84% at full fire.
3. The boiler(s) shall be ASME inspected, stamped and National Board registered for 160 PSIG maximum working pressure, complete with a Manufacturer's Data Report.
4. The boiler(s) shall have a floor loading of 45 lbs. / square foot or less.

B. Heat Exchanger

1. The heat exchanger shall be of a single-bank, horizontal-grid design with nine integral copper finned tubes, each end of which is rolled into an ASME boiler quality steel tube sheet.
2. The heat exchanger shall be sealed to 160 PSIG rated cast iron headers with high-temperature silicone O-ring gaskets.
3. The low water volume heat exchanger shall be explosion-proof on the water side and shall carry a twenty-year warranty against thermal shock.
4. The headers shall be secured to the tube sheet by stud bolts with flange nuts to permit inspection and maintenance without removal of external piping connections.
5. The boiler(s) shall be capable of operating at inlet water temperatures as low as 105°F without condensation.

C. Burners

1. The tubular burners shall have gas orifices, punched ports and slots, be capable of quiet ignition and extinction without flashback at the orifice, and be manufactured from corrosion resistant, stainless steel with low expansion coefficient.
2. The burners will be supplied with a fan-assisted, clean-burning, and highly efficient fuel-air mixture.

D. Ignition Control System

1. The boiler(s) shall be equipped with a 100% safety shutdown system.
2. The ignition shall be Hot Surface Ignition (HSI) type with full-flame rectification by remote sensing separate from the ignition source, with a three try-for-ignition sequence, to ensure consistent operation.
3. The igniter will be located away from the water inlet to protect the device from condensation during startup.
4. An external viewing port shall be provided, permitting visual observation of burner operation.

E. Gas Train

1. The boiler(s) shall have dual-seated main gas valve(s).
2. Gas control trains shall have a redundant safety shut-off feature, main gas regulator, and plugged-pressure tapping to meet the requirements of ANSI Z21.13/CSA 4.9.

F. Boiler Control

1. The following safety controls shall be provided:
 - a. High limit control
 - b. Flow switch
 - c. _____ PSIG ASME pressure relief valve, piped by the installer to an approved drain
 - d. Temperature and pressure gauge
2. The boiler(s) shall be equipped with an energy-saving pump relay, mounted and wired, which automatically shuts off the boiler pump at a set period after boiler shut-down (adjustable for two settings of five or ten minutes) to avoid standby losses associated with constant pump operation.

G. Firing Mode

1. Models HD101–HD401, provide two-stage fire control of the gas input to the boiler (on/off fire optional).

H. Boiler Diagnostics

1. Provide internal LED displaying the following boiler status/faults:
 - a. Steady on – Internal control failure
 - b. One flash – Air flow fault
 - c. Two flashes – Erroneous flame signal
 - d. Three flashes – Ignition lockout

- I. Combustion Chamber: The lightweight, high-temperature, multi-piece, interlocking ceramic fiber combustion chamber liner shall be sealed to reduce standby radiation losses, reducing jacket losses and increasing unit efficiency.

J. Venting

1. When routed vertically, the boiler's flue material and size shall be in accordance with the National Fuel Gas Code, ANSI Z223.1/NFPA 54 latest edition (Category I).
2. When routed horizontally, the boiler(s) flue material and size shall meet or exceed the requirements as specified for Category III in the National Fuel Gas Code, ANSI Z223.1/NFPA 54 latest edition.
3. The boiler(s) shall be TruSeal® direct vent ready. The boiler(s) shall meet safety standards for direct vent equipment as noted by: the 2006 UMC Section 1107.6; ASHRAE 15-1994, Section 8.13.6; and ANSI Z21.13/CSA 4.9.

K. Cabinet

1. The corrosion-resistant galvanized steel jackets shall be finished with a baked-on epoxy powder-coat which is suitable for outdoor installation, applied prior to assembly for complete coverage, and shall incorporate louvers in the outer panels to divert air past heated surfaces.
2. The boiler(s), if located on a combustible floor, shall not require a separate combustible floor base.
3. Combustion air intake shall be on left side of the cabinet.

Specifier Note: The remaining items in this section are options. Delete those that are not being specified.

L. Boiler Operating Controls

1. The boiler(s) shall feature an integral controller for sizes HD101-HD301 (optional on size HD401 only).

M. Boiler Pump - Refer to Equipment Schedule

N. Cold Water Run System

1. The boiler(s) shall be configured with a cold water run automatic proportional bypass system that ensures the boiler will experience inlet temperatures in excess of 105°F within 7 minutes to avoid damaging condensation.
2. The cold water run system shall be configured with a variable-speed pump that is controlled by a system-matched PID control that injects the correct amount of cold water directly into the boiler loop to maintain a minimum inlet temperature. The PID controller temperature sensor shall be located in the inlet header of the boiler.
3. The control shall have temperature setting DIP switches located on the face of the board. The PID Logic shall be capable of limiting system overshoot on initial start-up or call-for-heat.
4. The cold water run system shall be shipped loose for field installation.

2.3 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, 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. Shall be performed by Raypak factory-trained personnel.
- B. Test during operation and adjust if necessary:
 - 1. Safeties
 - 2. Operating Controls
 - 3. Static and full-load gas supply pressures
 - 4. Gas manifold and blower air pressures
- C. Submit copy of start-up report to Architect and Engineer.

3.3 TRAINING

- A. Provide factory-authorized service representative to train maintenance personnel on procedures and schedules related to start-up, shut-down, trouble shooting, servicing, and preventive maintenance.
- B. Schedule training at least seven days in advance.

END OF SECTION