FINNED WATER-TUBE POOL HEATERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes gas-fired, Cupro-Nickel finned-tube pool heaters.

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. Electrical – Division 23 09 33

1.2 REFERENCES

A. ANSI Z21.56/CSA 4.7

B. ASME, BPV Section IV

C. 2006 UMC, Section 1107.6

D. ANSI/ASHRAE 15-1994, Section 8.13.6

E. National Fuel Gas Code ANSI Z 223.1/NFPA 54

F. National Electrical Code, ANSI/NFPA 70

G. CSD-1-2012 (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 Z21.56/CSA 4.7
2. Local and national air quality regulations for low NOx (< 20 PPM NOx emissions) pool heaters

B. Certifications

1. CSA
2. ASME HLW Stamp and National Board Listed

1.5 HEAT EXCHANGER WARRANTY

A. Limited five-year warranty from date of installation

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: Hi Delta® cupro-nickel finned-tube pool heater(s)

2.2 POOL HEATERS

A. General

1. The pool heater(s) shall be fired with _____ gas at a rated input of _____ BTU/hr.
2. The pool heater(s) shall be CSA tested and certified with a minimum thermal efficiency of 83.1 percent at full fire.
3. The pool heater(s) shall be ASME inspected and HLW-stamped and National Board registered for 160 PSIG working pressure, complete with a Manufacturer's Data Report.
4. The pool heater(s) shall have a floor loading of sixty-five (65) lbs. /square foot or less.

B. Heat Exchanger

1. The heat exchanger shall be of a single-bank, horizontal-grid design with eight integral cupro-nickel finned tubes, each end of which is rolled into an ASME boiler-quality steel tube sheet.
2. The heat exchanger shall be sealed to one hundred sixty (160) PSIG-rated brass headers with high-temperature silicone "O" rings.
3. The low water volume heat exchanger shall be explosion-proof on the water side.
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. The heat exchanger shall incorporate "V" baffles between the tubes to ensure complete contact of the external tube surfaces with the products of combustion.
5. The pool heater(s) shall be capable of operating at inlet water temperatures as low as 105°F without condensation.
6. The pool heater(s) shall be designed to accommodate field changes of either left or right hand plumbing and electrical while leaving the tube bundle in place.

C. Burners

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

D. Ignition Control System

1. The pool heater(s) shall be equipped with a 100 percent safety shutdown.
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 start-up.
4. The ignition control module shall include an LED that indicates fifteen (15) individual diagnostic flash codes and transmits any fault codes to the LCD display.
5. Two external viewing ports shall be provided, permitting visual observation of burner operation.

E. Gas Train

1. The pool heater(s) shall have a firing/leak test valve and pressure test valve as required by CSD-1.
2. The pool heater(s) shall have dual-seated main gas valve(s).
3. Gas control trains shall have a redundant safety shut-off feature, main gas regulator, shut-off cock and plugged pressure tapping to meet the requirements of ANSI Z21.56/CSA 4.7.

F. Pool Heater Control

1. The following safety controls shall be provided:
   a. Fixed high limit control with manual reset
   b. Flow switch, mounted and wired
   c. 125 PSIG ASME pressure relief valve, piped by the installer to an approved drain
   d. Temperature and pressure gauge

2. The pool heater(s) shall be equipped with the VERSA IC® temperature controller (setpoint range 66°F - 106°F) with LCD display that incorporates an adjustable energy-saving pump control relay and freeze protection and is factory-mounted and wired to improve system efficiency; four (4) water sensors included (system sensor and return sensor are shipped loose).

G. Firing Mode
   1. For all models, provide on/off control of the gas input to the pool heater.

H. Pool Heater Diagnostics
   1. Provide external LED panel displaying the following water heater status/faults:
      a. Power on – Green
      b. Call for heat – Amber
      c. Burner firing – Blue
      d. Service – Red
   2. Provide monitoring of all safeties, internal/external interlocks with fault display by a 3-1/2 in. LCD display:
      a. System status
      b. Ignition failure
      c. False flame
      d. Ignition proving current (HSI)
      e. Field Interlock
      f. Air pressure switch
      g. Low 24VAC
      h. Manual reset high limit
      i. Blocked vent
      j. Controller alarm
      k. Flow switch fault
      l. Sensor failure
         I. Inlet sensor (open or short)
         II. Outlet sensor (open or short)
         III. System sensor (open or short)
         IV. High limit sensor (open or short)
      m. Internal control fault
      n. ID card fault
      o. Cascade communications error

      Specifier Note: The following items are options. Delete if not being specified.

      p. Low water cut-off
      q. Low gas pressure switch
      r. High gas pressure switch
      s. Controller alarm
      t. Cold Water Run
   3. A central point wiring board with diagnostic LED's indicating the status of each relay.
   4. Provide ignition module indicating the following flash codes by LED signal and displayed on LCD display:
      a. 1 flash – Low air pressure
      b. 2 flashes – Flame in the combustion chamber w/o CFH
      c. 3 flashes – Ignition lock-out (flame failure)
      d. 4 flashes – Low hot surface igniter current
      e. 5 flashes – Low 24VAC
      f. 6 flashes – Vent temperature fault (not used)
      g. 7 flashes – Hi-limit fault
      h. 8 flashes – Sensor fault
      i. 9 flashes – Low gas pressure fault
      j. 10 flashes – Water pressure fault (not used)
      k. 11 flashes – Blower speed fault (not used)
      l. 12 flashes – Low water cut off
      m. 13 flashes – Hi-temperature delta T
      n. 14 flashes – Ft-bus communication fault

o. 15 flashes – General safety fault

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 pool heater'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 pool heater(s) shall be ducted combustion air ready.

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 pool heater(s), if located on a combustible floor, shall not require a separate combustible floor base.
   3. The pool heater(s) shall have the option of venting the flue products either through the top or the back of the unit.
   4. Combustion air intake shall be on the left side of the cabinet (standard), right side optional.

L. Automatic Bypass (Sparkomatic)
   1. The pool heater(s) shall be configured with an external bronze pump and bypass arrangement designed to maintain the water entering the heater at the proper temperature that will prevent condensation and scale in the heat exchanger. The entire waterway shall be non-ferrous.

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

M. Pool Heater Pump - Refer to Equipment Schedule

N. SureRack® Pool Heater Stacking Kit
   1. The pool heaters shall be stacked directly one on top of the other, without offset, to minimize footprint.

O. Cold Water Run System
   1. The pool heater(s) shall be configured with a Cold Water Run automatic proportional by-pass system that ensures the pool heater will experience inlet temperatures in excess of 105°F in less than seven (7) minutes to avoid damaging condensation. The unit can automatically shut down if the inlet temperature is not achieved within the seven (7) minute time frame.
   2. The Cold Water Run system shall be configured with a variable-speed pump that is controlled by the VERSA IC software that injects the correct amount of cold water directly into the pool heater loop to maintain a minimum inlet temperature. The factory-installed pool heater inlet temperature sensor shall be utilized for the cold water run system.
   3. The control shall have a temperature setting adjustment located in the Setup menu of the VERSA IC. The inlet temperature range shall be 105°F to 120°F. The PID logic shall be capable of limiting system overshoot to a maximum of 10°F on initial start-up or call-for-heat.
   4. The Cold Water Run system shall be completely wired and mounted at the factory.
   5. The control shall have alarm contacts.

P. Low Gas Supply Pressure Manifold
   1. The pool heater(s) shall be CSA certified for full-input operation down to four (4.0) inches W.C. dynamic inlet natural gas supply pressure.

Q. TruSeal® Direct Vent
   1. The pool heater(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 Z21.56/CSA 4.7.

2.3 POOL HEATER OPERATING CONTROL

A. Each pool heater shall have the ability to receive a 0 to 10 VDC signal from a Central Energy Management and Direct Drive Control System (EMCS) to vary the setpoint control. Each heater shall have an alarm contact for connection to a central EMCS system.

B. Each pool heater shall be equipped with Modbus communications compatibility with up to one hundred forty-six (146) points of data available.
   1. B-85 Gateway – BACnet MS/TP, BACnet IP, N2 Metasys or Modbus TCP (optional)
   2. B-86 Gateway - LonWorks

2.4 SOURCE QUALITY CONTROL

A. The pool heater(s) shall be completely assembled, wired, and fire-tested prior to shipment from the factory.

B. The pool heater(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. Standard for Controls and Safety Devices for Automatically Fired Boilers, ANSI/ASME CSD-1, when required
   5. Canada only: CAN/CSA B149 Installation Code and CSA C22.1 CEC Part I
   6. 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 (2.2 - F)
   2. Operating Controls (2.3)
   3. Static and full load gas supply pressure
   4. Gas manifold and blower air pressure

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, troubleshooting, servicing, and preventive maintenance.

B. Schedule training at least seven (7) days in advance.

END OF SECTION