

## CHS MasterSpec

### SECTION 235216.13 – FIRE TUBE STAINLESS-STEEL CONDENSING BOILERS

#### PART 1 – GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

##### 1.2 SUMMARY

- A. This section includes factory packaged, gas-fired, fire-tube boilers, trim, and accessories for closed heating water systems.

##### 1.3 SUMMITTALS

- A. Product Data: Include performance data, operating characteristics, furnished specialties, and accessories.
- B. Shop Drawings: For boiler(s), boiler trim, and accessories. Include plans, elevations, sections, details, and attachments to other work.
  - 1. Design Calculations signed and sealed by a professional engineer
  - 2. Wiring Diagrams: Power, signal, and control wiring.
- c. Warranty: 1 year full boiler and 10 year heat exchanger manufacturer's warranty.

##### 1.4 INFORMATIONAL SUBMITTALS

- A. Operation and Maintenance: To include in operation and maintenance manuals.
- B. Other Informational Submittal:
  - 1. ASME Report: Submit ASME documentation as required by authorities having jurisdiction.
  - 2. Startup report

##### 1.5 CLOSEOUT SUBMITTALS

- A. Operational and Maintenance Data: to include in boiler emergency, operation and maintenance manuals.

##### 1.6 QUALITY ASSURANCE

- A. Electrical Components, Devices and Accessories: Listed and labeled as defined in NFPA 70. Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. ASME Compliance: Fabricate and Label Boiler to comply with ASME Boiler and Pressure and Vessel Code.

- C. ASHRAE/IESNA 90.1 Compliance: Boiler(s) shall have minimum efficiency according to “Gas and Oil Fired Boilers – Minimum Efficiency Requirements.
- D. DOE Compliance: Minimum Efficiency shall comply with 10 CFR 430, Subpart B, Appendix N, “Uniform Test Method for Measuring the Energy Consumption of Furnaces and Boilers.”
- E. AHRI Compliance: Boiler(s) shall be tested and rated according to AHRI’s “Rating Procedure for Heating Boilers” and “Testing Standard for Commercial Boilers”, with the AHRI Emblem on a rating plate affixed to the boiler.
- F. CSA Compliance: Boiler(s) to be compliant with CSA certification.

## 1.7 COORDINATION

- A. Coordinate boiler(s) mounting and location on wall or floor stands.

## 1.8 WARRANTY

- A. Standard Warranty: Manufacturer’s standard warranty in which manufacturer agrees to repair or replace components and heat exchangers that fail due to failure in materials or workmanship within specified warranty period.
  - 1. Warranty Period for Heat Exchangers: 10 years from installation.
  - 2. Warranty Period for Other Factory Supplied Parts: 1 year from installation.

## PART 2 – PRODUCTS

### 2.1 FIRE-TUBE BOILER(S)

- A. Basis of Design: Slant/Fin CHS boiler(s) as specified on drawings. All others must be submitted as equal alternate.
- B. Furnish and install \_\_\_\_ (Quantity) Slant/Fin Model \_\_\_\_\_ (Choose CHS-85; CHS-110; CHS-154; CHS-175; CHS-200; CHS-285; CHS-340; CHS-399) high efficiency modulating input condensing boiler(s), (Choose Natural Gas-Fired or LP Gas-Fired). Install in accordance with code requirements and manufacturer’s installation and start –up manual. Installation code requirements include ASME CSD-1. Installer to include start up and set-up of boiler system in scope of work.

### 2.2 CONSTRUCTION

- A. Description: Factory fabricated and assembled and tested wall hung (or optional floor mount with stand) modulating input condensing gas-fired boiler(s) with stainless steel fire tube heat exchanger; sealed combustion; combustion air intake connection; exhaust vent outlet connection; stainless steel internal heating water piping with supply and return connections out either top or bottom of boiler(s); fuel gas connection on either top or bottom of boiler(s); condensate drain connection with factory supplied trap to prevent exhaust gas from entering boiler room.
- B. Electrical: The electrical service to the boiler(s) is 120 VAC 1 Phase 60 HZ. Boilers’ main power is polarized. All electrical wiring must be installed according to all applicable codes, standards and regulations. In USA electrical installation must comply with NFPA 70, National Electric Code – latest edition.

- C. Heat Exchanger: Shall be a stainless steel, fire tube design manufactured in accordance with ASME Section IV code. The heat exchanger shall be National Board listed and have the ASME "H" stamp present. The heat exchanger's maximum working pressure shall be 80 PSI at 200F water temperature and pass a factory hydrostatic test at 120 PSI. Cast Iron, copper and aluminum heat exchangers are not acceptable. Upon request manufacturer shall provide matching "ASME Form H-2 Manufacturers Data Report For All Types Of Boilers Except Watertube And Those Made of Cast Iron" with a National Board number listed.
- D. Burner: Shall be stainless steel, premix, forced draft and for use with Natural Gas and LP Gas. The burner shall be capable of modulating input within published turndown within boilers' turndown ratio without loss of combustion efficiency.
- E. Boiler Controller: The boilers' controller and display shall be manufactured by Honeywell. The Control default setting shall enable the commissioning agent to start the boiler and complete the boiler commissioning. The control display shall have a Home Button, Information Button, Back Button, OK Button, Up Arrow Button, Down Button, Right Button, and Left Button. There shall be a Reset Button on the control. Display's default home screen shall list system set point temperature, operating temperature, outlet temperature, inlet temperature and outdoor temperature when outdoor sensor is wired in. Home screen shall also list boiler name, state of burner operation, boiler demand source, access status for control programming and list any alert/hold or lockout status. Information screen shall list menu options including quick start, login, test, advanced setup, diagnostics and display setup. Quick Start menu shall include basic programming including CH set point temperature, DHW set point temperature, outdoor reset enable/disable, outdoor reset parameters including minimum/maximum water temperature, minimum/maximum outdoor temperature, high water limit and maximum exhaust temperature. Password protected options shall include forced firing rate, manual burner and circulator operation, and advanced setup options including CH, DHW, Lead Lag, System, Circulator, Operation Statistics, Minimum and Maximum Firing Rate, and safety configuration settings. Control shall also have a history screen giving alert and lockout history. Control shall accept a 0 to 20 mA input to control set point temperature or the boiler, Control shall be able to cascade control up to eight CHS boilers. Control shall be able to heat DHW (domestic hot water) by using either a Thermostat or sensor. Control shall be factory mounted and wired.
- F. Boiler(s) Venting: Approved vent materials for boiler(s) shall be PVC, CPVC, Polypropylene and Stainless Steel. Maximum length of air intake and vent for CHS-85 & CHS-110 shall be 150 equivalent feet; for CHS-154 through CHS-399 shall be 100 equivalent feet. Up to 3 cascading CHS-300 through CHS-399 boilers may be common vented using approved polypropylene system, common vent system supplied by boiler manufacturer. Boilers' air intake and vent must be installed following boiler manufacturer's instructions.
- G. Condensate drain connection must use boilers' condensate traps supplied with the boiler(s) and the connection to the sanitary sewer pipes must be open and vented to prevent siphoning of condensate out of the condensate trap. There should be a second trap to prevent sewer gases from entering boiler area. Installer to supply and install condensate Neutralizer sized appropriately for the boiler system.
- H. Gas Piping: Fuel gas piping must comply with all local codes and National Fuel Gas Code, ANSI Z223.1/NFPA 54. Gas supply pipes must be sized to provide sufficient gas to have less than a 1 inch water column gas pressure drop when boiler(s) starts with all appliances firing that are connected to the same fuel source as the boiler(s).

- I. Water Piping: Boiler(s) water piping must be installed following boiler manufacturer's instructions. Water quality must meet or exceed boiler manufacturer's instructions. Installing contractor shall follow manufacturer's instructions for cleaning heating system and boiler(s) piping. Use of Glycol must follow boiler manufacturer's instructions and boiler glycol will be checked and maintained at least once per year. The boiler(s) piping shall include a primary loop to ensure adequate water flow through the boilers' heat exchanger. Installer must follow all code requirements. Boiler(s) water quality must be maintained, especially if glycol is used in the system. All CHS boiler installation shall have be closed loop system. The boiler system should not be drained and refilled unless it is absolutely necessary. Any leaks in the boiler system shall be sealed immediately.
- J. General: Boiler(s) installation must comply with applicable code requirements. Installer must follow manufacturer's instructions. Installer to commission the boiler(s) following manufacturer's instructions and complete the "Installation/start-up checklist" contained in the boilers' IOM. There is a "Maintenance Checklist" in the boilers' IOM that must be kept up to date.
- K: Boiler Jacket: Boiler jacket to be painted steel with removable steel front cover. Boiler maintenance and programming may be performed from the front of the boiler(s). Boilers' wall mounting brackets are provided with the boiler(s) and are designed to lock the boiler to the wall.

## 2.3 TRIM

### A. Safety Relief Valve

1. Size and Capacity: 30 PSI (50 PSI or 75 PSI) Factory set and sealed, installer to mount on the boiler(s) with full size drain pipe connected with discharge pipe ended approximately 6 inches from the floor. The end of the drain pipe shall not be threaded, to prohibit plugging the end of the discharge pipe.
2. Pressure Gauge: Factory supplied and shall have a range that exceeds system normal operating pressure by 50%.
3. Boiler Drain Valve: Supplied by boiler manufacturer with end that accepts standard hose-end connection.
4. Condensate Trap: Supplied with the boiler(s). Installer to install on the boilers' condensate drain outlet of the boiler(s). Installer to add condensate neutralizer with appropriate capacity for boiler system. Follow code requirements.

## 2.4 CONTROLS

- A. Refer to Division 230900 "Instrumentation and Control for HVAC".
- B. Boiler(s) controls shall have features including.
  1. Backlit LCD screen with text information, programming and error messages.
  2. Circulator Controls

### A. Boiler circulator relay

B. System circulator relay

C. DHW circulator relay

3. Outdoor reset – Boiler(s) shall have factory supplied outdoor sensor to enable boiler control to automatically change boiler water target temperature based on changes in outdoor air temperature. This shall be an adjustable feature.

4. Warm weather Shutdown – Boiler(s) shall have automatic shutdown feature activated by measured outdoor temperature.

5. External control

A. 0-10 VDC remote control

6. Integrated cascade control

A. up to 9 boilers (up to 3 boilers for common vent)

7. History

A. Lockout history

B. Alert history

C. Factory mounted and wired automatic reset Low Water Cut-Off shall be included with each boiler.

D. Manual re-set high limit (maximum 200<sup>0</sup>F setting) and manual re-set low water cut-off to be installed and tested for operation. Safety controls shall be installed to meet all code requirements.

## 2.5 CAPCITIES AND CHARACTERISTICS

A. Heating Medium – Water or Glycol Mix

B. Maximum Pressure – 80 Pounds Per Square Inch (PSI) (75 PSI relief valve)

C. Maximum Temperature – 200<sup>0</sup> Fahrenheit (F)

D. Safety Relief Valve Setting – 30 or 50 or 75 Pounds Per Square Inch (Choose One)

E. Minimum Efficiency – AHRI Listed

1. 95% Thermal Efficiency (for 300K input and over)

2. 95% AFUE (for under 300K input)

F. Fuel (Pick one – Natural Gas or LP Gas)

## 2.6 SOURCE QUALITY CONTROL

A. Factory assembled and tested in accordance with ASME Boiler and Pressure Vessel Code

B. CSA Tested and Listed in accordance with ANSI Z21.13 CSA 4.9 Latest Edition

## PART 3 – EXECUTION

### 3.1 EXAMINATION

- A. Before boiler(s) installation, examine rough-in for hanging, location, water piping, fuel piping, electrical, air intake and exhaust venting.
- B. Examine mechanical spaces for suitable conditions where boilers will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 BOILER INSTALLATION

- A. Install boiler(s) in accordance with manufacturer's instruction
- B. Install boiler(s) in accordance with code requirements including NFPA54.
- C. Install electrical and water moving and safety devices not factory mounted and wired.
- D. Install control wiring

### 3.3 CONNECTIONS

- A. Piping installation requirements are specified in other Sections.  
Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to boiler(s) to allow service and maintenance.
- C. Connect fuel gas piping to boiler with a union. Gas piping to boiler(s) to be sized for total gas demand requirements with piping at least full size of gas connection to boiler(s). Provide and install reducer if required.
- D. Install condensate drain in accordance with boiler manufacturer's instructions. Supply and install condensate neutralizer properly sized to treat condensate from boiler system.
- E. Boiler Air Intake and Exhaust Vent
  - 1. Install in accordance to boiler manufacturer's instructions
  - 2. Install in accordance to code requirements
- F. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems"
- G. Connect wiring according to Section 260519 "Low Voltage Electrical Power Conductors and Cables"

### 3.4 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports
  - 1. Perform installation and startup checks according to boiler manufacturer's instructions.
  - 2. Leak test: Test water and fuel piping in accordance to code requirements. Repair as required.
  - 3. Test and adjust controls and safety controls. Replace and repair controls as required.
  - 4. Boiler Test: Startup and adjust boiler(s) to conform to manufacturer's instructions. Repair boiler if required. Adjust air-fuel ratio and combustion following manufacturer's specifications. Combustion testing must be done with calibrated combustion analyzer.

4. Operational test – Start boiler(s) to confirm proper rotation and operation.
5. Complete “Installation checklist” contained within boiler manufacturer’s installation instructions.
6. Provide completed field quality documentation to building commissioning agent.

3.5 DEMONSTRATION

- A. Engage a factory authorized agent to train building maintenance personnel to operate boiler(s). Refer to Section 017900 “Demonstration and Training”.

**END OF SECTION 235216.13**

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