

SECTION 23 5233.16
STEEL WATER-TUBE BOILERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Boilers.
- B. Controls and boiler trim.
- C. Indoor/outdoor reset controller.
- D. Hot water connections.
- E. Fuel burning system and connection.
- F. Chimney connection.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete.
- B. Section 23 0913 - Instrumentation and Control Devices for HVAC
- C. Section 23 2114 - Hydronic Specialties.
- D. Section 23 2214 - Steam and Condensate Heating Specialties.
- E. Section 26 2717 - Equipment Wiring: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. ANSI Z21.13 - American National Standard for Gas-Fired Low-Pressure Steam and Hot Water Boilers; 2012.
- B. ASME BPVC-I - Boiler and Pressure Vessel Code, Section I - Rules for Construction of Power Boilers; 2015.
- C. ASME BPVC-IV - Boiler and Pressure Vessel Code, Section IV - Rules for Construction of Heating Boilers; 2015.
- D. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1 - Rules for Construction of Pressure Vessels; 2015.
- E. HI BTS-2000 - Testing Standard, Method to Determine Heating Efficiency of Commercial Space Heating Boilers; 2007.
- F. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- G. NFPA 54 - National Fuel Gas Code; 2015.
- H. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittals procedures.
- B. Product Data: Provide data indicating general assembly, components, controls, safety controls, and wiring diagrams with electrical characteristics and connection requirements, and service connections.
- C. Manufacturer's Instructions: Indicate assembly, support details, connection requirements, and include start up instructions.
- D. Manufacturer's Inspection Report: Submit authorized boiler inspection prior to shipment.
- E. Manufacturer's Field Reports: Indicate that specified performance and efficiency has been met or exceeded; at minimum provide report of the following combustion tests: boiler firing rate, over fire draft, gas flow rate, heat input, burner manifold gas pressure, percent carbon monoxide (CO), percent oxygen (O), percent excess air, flue gas temperature at outlet, ambient temperature, net stack temperature, percent stack loss, percent combustion efficiency, and heat output.

- F. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, cleaning procedures, replacement parts list, and maintenance and repair data.
- G. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.06 REGULATORY REQUIREMENTS

- A. Conform to applicable code for internal wiring of factory wired equipment.
- B. Conform to ASME BPVC-I for construction of boilers.
- C. Units: AGA certified.
- D. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Protect boilers from damage by leaving factory inspection openings and shipping packaging in place until final installation.

1.08 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide a five year warranty to include coverage for heat exchanger.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Aldrich Company; _____: www.aldrichco.com.
- B. Bryan Steam Corporation; _____: www.bryanboilers.com.
- C. Cleaver-Brooks; _____: www.cleaver-brooks.com.
- D. Substitutions: See Section 01 6000 - Product Requirements.

2.02 MANUFACTURED UNITS

- A. Factory assembled, factory fire-tested, self-contained, readily transported unit ready for automatic operation except for connection of water, fuel, electrical, and vent services.
- B. Unit: Steel membrane wall water tube boiler on integral structural steel frame base with integral forced draft burner, burner controls, boiler trim, tankless water heater, refractory, insulation, and jacket.

2.03 BOILER SHELL

- A. Construct applicable ASME Boiler and Pressure Vessels Code for allowable working pressure of 30 psi water.
- B. Provide two lifting eyes on top of boiler.
- C. Provide adequate tappings, observation ports, removable panels and access doors for entry, cleaning, and inspection.
- D. Insulate casing with readily removable glass fiber blanket insulation covered by sectional performed sheet metal jacket.
- E. Factory paint boiler, base, and other components with hard finish silicone enamel.

2.04 HOT WATER BOILER TRIM

- A. Low Water Cut-off: With drain valve and manual reset to automatically prevent burner operation whenever boiler water falls below safe level.
- B. Temperature Controls:
 - 1. Auto reset type shall control burner on-off to maintain temperature.

2. Auto reset type shall control burner firing rate to maintain temperature.
 3. Manual reset type shall control burner to prevent boiler water temperature from exceeding safe system water temperature.
- C. Pressure Control: Fixed setting type shall control burner to ensure minimum operating pressure.
 - D. Blend Pump: Mounted between supply and return connections ensures minimum continuous circulation through boiler.
 - E. ASME rated pressure relief valves.
 - F. Combination pressure and thermometer gage.

2.05 FUEL BURNING SYSTEM

- A. General: Forced draft automatic burner integral with front head of boiler designed to burn No. 2 oil and natural gas and maintain fuel-air ratios automatically.
 1. Blower: Statically and dynamically balanced to supply combustion air; direct connected to motor.
 2. Damper Motor: Single motor controls combustion air damper and fuel valves.

2.06 PERFORMANCE REQUIREMENTS

- A. Performance rating shall be in accordance with Hydronics Institute HI BTS-2000.

2.07 CONTROL PANEL

- A. Mount NEMA 250, Type 1 hinged metal panel on boiler, containing electronic combustion control, blower motor starter, low fire hold timer, automatic-manual firing selection switch, oil-gas selector switch, and control switches.
- B. Electronic combustion control to control ignition, starting and stopping of burner, and provide both pre-combustion purge and post combustion purge. Burner to shut down in event of ignition, pilot, or main flame failure. Interlock to shut down burner upon combustion air pressure drop.
- C. Electronic detector to prevent primary fuel valves from opening until pilot flame is established.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install boiler and provide connection of natural gas service in accordance with requirements of NFPA 54 and applicable codes.
- C. Provide piping connections and accessories as indicated; refer to Section 23 2114.
- D. Pipe relief valves to nearest floor drain.
- E. Provide for connection to electrical service. Refer to Section 26 2717.

3.02 SYSTEM STARTUP

- A. Provide the services of manufacturer's field representative for starting and testing unit.

3.03 CLOSEOUT ACTIVITIES

- A. Train operating personnel in operation and maintenance of units.
- B. Provide the services of manufacturer's field representative to conduct training.

END OF SECTION 23 5233.16

