

SECTION 23 5223
CAST-IRON BOILERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Boilers.
- B. Controls and boiler trim.
- C. Hot water connections.
- D. Fuel connection.
- E. Collector, draft hood, and chimney connection.
- F. Circulator.
- G. Expansion tank.

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 23 5100 - Breechings, Chimneys, and Stacks.

1.03 REFERENCE STANDARDS

- A. AHRI 1500 - Performance Rating of Commercial Space Heating Boilers; 2015.
- B. ANSI Z21.13 - American National Standard for Gas-Fired Low-Pressure Steam and Hot Water Boilers; 2012.
- 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. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- F. NFPA 54 - National Fuel Gas Code; 2015.
- G. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating general layout, dimensions, and size and location of water, gas, and vent connections, and electrical characteristics and connection requirements.
- C. Manufacturer's Instructions: Submit manufacturer's complete installation instructions.
- D. Manufacturer's Field Reports: Indicate condition of equipment after start-up including control settings and performance chart of control system.
- E. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, cleaning procedures, replacement parts list, and maintenance and repair data.
- F. 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 code for internal wiring of factory wired equipment.

- B. Conform to ASME BPVC-IV and ASME BPVC-VIII-1 for boiler construction.
- C. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for the purpose specified and indicated.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Protect units before, during, and after installation from damage to casing by leaving factory shipping packaging in place until immediately prior to final acceptance.

1.08 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide a ten year pro-rated warranty for cast iron boiler sections.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Smith Cast Iron Boilers/Mestek, Inc; _____: www.smithboiler.com.
- B. Slant/Fin Corporation; _____: www.slantfin.com.
- C. Weil-McLain/SPX Corporation; _____: www.weil-mclain.com.
- D. Cleaver Brooks; _____: www.cleaver-brooks.com
- E. Substitutions: See Section 01 6000 - Product Requirements.

2.02 MANUFACTURED UNITS

- A. Hot Water Boilers: Suitable for forced draft with insulated jacket, sectional cast iron heat exchanger, natural gas burning system, refractory, controls, tankless water heater, and boiler trim including circulator and fill system consisting of diaphragm type expansion tank, fill and check valve, and automatic air vent.
- B. Provide water wall design consisting of water backed combustion area with water circulating around firebox. Refractory chamber or separate base not required.

2.03 FABRICATION

- A. Access: To flue passages for cleaning and flame observation ports.
- B. Tankless Water Heater: Finned, copper tube heat exchanger mounted in top port.

2.04 HOT WATER BOILER TRIM

- A. ASME rated pressure relief valve, _____ psig.
- B. Combination water pressure and temperature gage.
- C. Low water cut-off to prevent burner operation when boiler water falls below safe level.
- D. Operating temperature controller with outdoor reset to maintain boiler water temperature.
- E. Electronic operating temperature controller:
 - 1. NEMA 250 Type 1 enclosure with full cover for wall mounting.
 - 2. Ambient temperature range -30 to 150 degrees F.
 - 3. Adjustable reset ratio of outside air temperature change to discharge control point change 1:2 to 100:1.
 - 4. Integral set point adjustment 80 to 230 degrees F.
 - 5. Electronic primary and outdoor sensors.
- F. High limit temperature controller with manual reset for burner to prevent boiler water temperature from exceeding safe system temperature.
- G. Boiler air vent.

2.05 FUEL BURNING SYSTEM

- A. Burner Operation: On-off with low fire position for ignition.

- B. Gas Burner: Atmospheric type for natural gas adjustable combustion air supply, pressure regulator, gas valves, manual shut-off, intermittent spark or glow coil ignition, flame sensing device, and automatic 100 percent shut-off.
- C. Gas Burner Safety Controls: Energize ignition, limit time for establishment of flame, prevent opening of gas valve until pilot flame is proven, stop gas flow on ignition failure, energize blower motor, and after air flow proven and slight delay, allow gas valve to open.
- D. Collector and Draft Hood: Non-metallic vent pipe.
- E. Controls: Pre-wired, factory assembled electronic controls in control cabinet with flame scanner or detector, programming control, relays, and switches. Provide pre-purge and post-purge ignition and shut-down of burner in event of ignition pilot and main flame failure with manual reset.

2.06 CIRCULATOR

- A. Type: Horizontal shaft, single stage, direct connected, with resiliently mounted motor for in line mounting, oil lubricated, for 125 psig maximum working pressure. Provide redundant pumps.
 1. Casing: Cast iron.
 2. Impeller: Cadmium plated steel, keyed to shaft.
 3. Bearings: Two, oil lubricated bronze sleeves.
 4. Shaft: Alloy steel with copper sleeve, integral thrust collar.
 5. Seal: Carbon rotating against a stationary ceramic seat, 225 degrees F maximum continuous operating temperature.
 6. Drive: Flexible coupling.
- B. Performance:

2.07 DIAPHRAGM TYPE EXPANSION TANK

- A. Construction: Welded steel, tested and stamped in accordance with ASME BPVC-VIII-1; rated for working pressure of 125 psig, with flexible diaphragm sealed into tank, and steel legs or saddles.
- B. Accessories: Pressure gage and air-charging fitting, tank drain; precharge to 12 psi.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install boiler on concrete housekeeping base, sized minimum 4 inches larger than boiler base. Refer to Section 03 3000.
- C. Provide connection of natural gas service in accordance with requirements of NFPA 54 and applicable codes.
- D. Provide piping connections and accessories as indicated; refer to Section 23 2114.
- E. Pipe relief valves to nearest floor drain.

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.

END OF SECTION 23 5223

