

SECTION 23 5239.13
SCOTCH MARINE BOILERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Boilers.
- B. Controls and boiler trim.
- C. Hot water connections.
- D. Fuel burning system and connection.
- E. 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 23 5100 - Breechings, Chimneys, and Stacks.
- F. 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. NFPA 54 - National Fuel Gas Code; 2015.
- D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.
- F. UL 726 - Oil-Fired Boiler Assemblies; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal 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. Shop Drawings: Indicate general assembly, components, controls, safety controls, and wiring diagrams with electrical characteristics and connection requirements, and service connections.
- D. Manufacturer's Certificate: Certify that units meet or exceed specified requirements.
- E. Test Reports: Indicate specified performance and efficiency is met or exceeded. Provide combustion test that includes boiler firing rate, overfire 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. Manufacturer's Instructions: Indicate assembly, support details, connection requirements, and include start-up instructions.
- G. Manufacturer's Inspection Report: Submit authorized boiler inspection prior to shipment.
- H. Manufacturer's Field Reports: Indicate condition of equipment after start-up including control settings and performance chart of control system.

- I. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, cleaning procedures, replacement parts list, and maintenance and repair data.
- J. 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.
- B. Installer Qualifications: Company specializing in installing and servicing the products specified in this section, with minimum 3 years of experience and approved by manufacturer.

1.06 REGULATORY REQUIREMENTS

- A. Conform to ASME BPVC-I for construction of boilers.
- B. Units: UL (DIR) listed and labeled.
- C. Conform to applicable code for internal wiring of factory wired equipment.

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 ten year pro-rated warranty for entire package.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Cleaver-Brooks; _____: www.cleaver-brooks.com.
- B. PVI Industries, LLC; _____: www.pvi.com.
- C. Superior Boiler Works, Inc; _____: www.superiorboiler.com.
- D. Substitutions: See Section 01 6000 - Product Requirements.

2.02 MANUFACTURED UNITS

- A. Description: 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: Mount on integral structural steel frame base and include integral forced draft burner, burner controls, boiler trim, 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. Hinged front and rear doors, gas tight, insulated, and secured with heavy duty cap screws and replaceable brass nuts.
- D. Front and rear tube sheets and flue fully accessible for inspection and cleaning when doors are open.
- E. Provide observation ports at each end of boiler.
- F. Provide handholes and armholes for boiler inspection and cleaning.
- G. Insulate casing with readily removable, 2 inch thick glass fiber blanket insulation covered by sectional preformed sheet metal jacket. Boiler casing temperature not to exceed ambient room temperature by 18 degrees F maximum with surface air velocity of 1 foot per second.
- H. Factory paint boiler, base, and other components with hard finish silicone enamel.

- I. Water entering hot water boiler thoroughly mixed with hot boiler water through jet induced circulation.
- J. Provide thermometer, 3-1/2 inch diameter, black letters on white background, bi-metal type.

2.04 HOT WATER BOILER TRIM

- A. ASME rated pressure relief valve, 30 psi.
- B. Water temperature gage.
- C. Water pressure gage.
- D. Low water cut-off to prevent burner operation when boiler water falls below safe level.
- E. Operating temperature controller to control burner to maintain water temperature set point.
- 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. General: Forced draft automatic burner integral with front head of boiler designed to burn natural gas, be modulating with low fire ignition position, 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.
- B. Gas Burner: Forced draft, high radiant multiport power burner with electric ignition.
 - 1. Natural Gas Burner Piping: Include on unit complete gas train including high and low gas pressure switches, plug valve, and gas pressure regulator.

2.06 PERFORMANCE REQUIREMENTS

- A. Minimum Efficiency: Minimum 76 percent from 30 to 100 percent of full load firing rate, certified by factory tests.

2.07 CONTROL PANEL

- A. Mount panel on boiler. Hinged metal cabinet with key lock shall contain programming relay, blower motor starter.
- B. Program relay 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. Manual/automatic selector switch and damper motor positioning switch to permit automatic firing in accordance with load demand, or manual control of firing rate at any desired point between low fire and maximum rating.
- D. Electronic detector to prevent primary fuel valves from opening until pilot flame is established.
- E. Panel shall include indicating lights to show low water level, flame failure, fuel valve open and load demand. Mount indicating lights and switches in hinged drop-panel for wiring access.

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. Pipe relief valves to nearest floor drain.
- D. Provide for connection to electrical service. Refer to Section 26 2717.
- E. Mount thermometer in boiler breeching within 12 inches of flue nozzle. Refer to Section 23 5100.

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 5239.13