

SECTION 23 5233
PACKAGED, MODULAR WATER-TUBE BOILERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Packaged water-tube boilers.
- B. Boiler accessory equipment.
- C. Controls.
- D. Electrical power.
- E. Venting.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete.
- B. Section 08 9100 - Louvers.
- C. Section 23 0513 - Common Motor Requirements for HVAC Equipment.
- D. Section 23 5100 - Breechings, Chimneys, and Stacks.
- E. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables.
- F. Section 26 0526 - Grounding and Bonding for Electrical Systems

1.03 ABBREVIATIONS AND ACRONYMS

- A. AGA: American Gas Association.

1.04 REFERENCE STANDARDS

- A. ASME B31.1 - Power Piping; 2014.
- B. ASME BPVC-I - Boiler and Pressure Vessel Code, Section I - Rules for Construction of Power Boilers; 2015.
- C. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1 - Rules for Construction of Pressure Vessels; 2015.
- D. ASTM A106/A106M - Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service; 2014.
- E. ASTM A178/A178M - Standard Specification for Electric-Resistance-Welded Carbon Steel and Carbon-Manganese Steel Boiler and Superheater Tubes; 2002 (Reapproved 2012).
- F. ASTM A959 - Standard Guide for Specifying Harmonized Standard Grade Compositions for Wrought Stainless Steels; 2011.
- G. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- H. NFPA 54 - National Fuel Gas Code; 2015.
- I. UL 726 - Oil-Fired Boiler Assemblies; Current Edition, Including All Revisions.
- J. UL 795 - Commercial-Industrial Gas Heating Equipment; Current Edition, Including All Revisions.

1.05 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: Vibration isolation and seismic restraint requirements; approved by Architect.
- D. Certificate: Certify that products of this section meet or exceed specified requirements.
- E. Manufacturer's Instructions: Indicate assembly, support details, connection requirements, and include start up instructions.

- F. Manufacturer's Inspection Report: Submit authorized boiler inspection prior to shipment.
- G. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, cleaning procedures, replacement parts list, and maintenance and repair data.
- H. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
- I. ASME "S" Stamp Certification and Report: Submit "S" stamp certificate of authorization as required by authorities having jurisdiction, and document hydrostatic testing of piping external to boiler.

1.06 WARRANTY

- A. Manufacturer, at its sole option, will repair or replace at no charge:
 - 1. Any boiler component supplied by manufacturer, if found to be defective in workmanship or material within twelve months from date of commissioning or eighteen months from date of shipment from factory, whichever occurs first.
 - 2. Any pressure parts supplied by manufacturer, if found to be defective in workmanship or material within seven years from date of shipment from factory (excluding shipping and labor charges).

1.07 DELIVERY, STORAGE, AND HANDLING

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

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. MIURA America Co., Ltd.: www.miuraboiler.com/sle.
 - 1. Operating Design Pressure: 170 psi.
- B. Substitutions: Not permitted.

2.02 PERFORMANCE REQUIREMENTS

- A. ASME Compliance: Fabricate and label boilers to comply with ASME BPVC.
- B. UL Compliance: UL 726 and UL 795.
- C. Boiler Efficiency (Fuel to Steam): 84 percent at 70 degrees fahrenheit feed water temperature, 70 psig steam.
- D. Outer casing temperature not to exceed 120 degrees fahrenheit at maximum boiler capacity.

2.03 PACKAGED WATER-TUBE BOILERS

- A. Factory-fabricated, steam, water-tube boiler on a skid mounted steel base including insulation, jacketing, venting, connections, and controls.
 - 1. Connections: Feed water inlet, fuel inlet(s), steam outlet, safety relief valve outlet(s), and blowdown outlet.
 - 2. Lifting lugs provided for rigging.
- B. Pressure Vessel: Vertical steel tubes and drums.
 - 1. Tubes swaged at both ends and welded into upper and lower steel headers.
 - a. Material: 2 NPS schedule 40 seamless pipe conforming to ASTM A106/A106M, Grade B or 2 inch electric-resistance welded carbon steel tubes conforming to ASTM A178/A178M.
 - 2. Inspection openings in upper and lower header.
 - 3. Steam separator.
- C. Combustion Chamber:
 - 1. Poured Refractory: 3 inch, 2700 deg F minimum.
 - 2. Site Glass Location: Top.
- D. Casing:
 - 1. Insulation Surrounding Pressure Vessel and Combustion Chamber:

- a. Two layers of fiberglass insulation separated by a steel inner casing.
 - 2. Flue Connection: Carbon steel.
 - 3. Mounting Base: Welded or bolted steel base for supporting boiler and boiler components and securing to concrete base or flooring.
- E. Control Compartment Enclosure: NEMA 250, Type 1A.
- F. Burner, Forced-Draft: Natural gas or propane.
- 1. Blower: Direct drive integral to burner. Adjustable, air-fuel ratio damper.
 - a. Motors: Comply with requirements specified in Section 23 0513. Motor sized so as to operate in service factor range above 1.0 when operating.
 - 2. Gas Train: Control devices to have full modulation control. Sequencing complying with AGA for gas.
 - 3. Pilot: Intermittent-electric-spark ignition with observation port.
- G. Barometric Damper: Galvanized-steel assembly with flue-gas thermometer.
- H. Trim for Steam:
- 1. All power piping to devices and building services to comply with ASME B31.1.
 - 2. Pressure Controllers: Operating, firing rate, and high limit with manual reset and back up.
 - 3. Safety Relief Valve:
 - 4. External water column liquid volume controller (LVC) with water level probes.
 - a. Drain Valves: 1 NPS or hose-ends.
 - 5. Automatic Blowdown Valves: Fast-opening.
 - 6. Stop Valves: Boiler inlets and outlets, except safety relief valves or pre-heater inlet and outlet. Rising stems on valves larger than 2 NPS.
 - 7. Stop-Check Valves: Factory-installed, stop-check valve and stop valve at boiler outlet with free-blow drain valve factory installed between the two valves and visible when operating stop-check valve.

2.04 BOILER ACCESSORY EQUIPMENT

- A. Heat Recovery:
- 1. Economizer: Gas to liquid heat exchanger, utilizing flue gasses to preheat boiler feed water.
 - a. ASME BPVC-I-1, pressure vessel with insulated outer casing.
 - 1) Gas-tight, inner seal welded steel casing.

2.05 CONTROLS

- A. Control Panels: Mounted directly to boilers and easily accessible.
- B. Boiler Operating Controls:
- 1. Adjustable set-points.
 - 2. Operating Pressure Control: Factory wired and mounted to cycle burner.
 - 3. Low-Water Cutoff and Pump Control: Cycle feedwater pump(s) for makeup water control.
 - 4. Sequence of Operation: Electric, factory-fabricated and field-installed panel to control burner firing rate.
 - 5. Include automatic, alternating-firing sequence for multiple boilers to ensure maximum system efficiency throughout the load range and to provide equal runtime for boilers.
- C. Burner Operating Controls: To maintain safe operating conditions, burner safety controls limit burner operation.
- 1. ON-OFF push button combustion control and an emergency stop push button switch.
 - 2. High Cutoff: Automatic reset stops burner if operating conditions rise above maximum boiler design pressure.
 - 3. Low-Water Cutoff Switch: An electronic probe shall prevent burner operation on low water. Cutoff switch shall be automatic-reset type.
 - 4. Audible Alarm: Factory mounted on control panel with silence switch; shall sound alarm for above conditions.

2.06 ELECTRICAL POWER

- A. Power Source: 3 phase 208 Volts.
 - 1. Factory wired: Transformers powering control circuit, motors, contactors and thermal overloads.
 - 2. Overcurrent protection: Circuit breakers. Motors, contactors and thermal overloads are factory wired.
- B. Controllers, Electrical Devices, and Wiring: Electrical devices and connections are specified in electrical Sections.
- C. Single-Point Field Power Connection: Factory installed switches, controllers, transformers, and other devices will have a single-point field connection.
 - 1. Enclosure: NEMA 250, Type 1.
 - 2. Wiring: Numbered and color-coded matching wiring diagram.
 - 3. Factory wiring exterior of an enclosure to be in a metal raceway.
 - 4. Field power interface shall be to circuit breaker.
 - 5. Branch power circuit to each motor and controls with circuit breaker.
 - 6. Overcurrent Protection: Each motor.

2.07 VENTING

- A. Complete system, ASTM A959, Type 29-4C stainless steel, pipe, vent terminal, thimble, indoor plate, vent adapter, condensate trap, chimney damper, and sealant. Refer to Section 23 5100.
- B. Combustion-Air Intake: Stainless steel, pipe, vent terminal with screen, inlet air coupling, silencer, and sealant. Refer to Section 08 9100.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine concrete equipment bases, locations, connection sizes, and any conditions affecting performance, maintenance, and operations.
- B. Determine exact boiler and equipment locations before establishing piping and electrical connections.
- C. Be sure spaces and conditions where boilers will be installed are suitable and to code according to Authority Having Jurisdiction.
- D. Proceed with installation after correction of unsatisfactory conditions.

3.02 INSTALLATION

- A. Install boilers on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in Section 03 3000.
- B. Gas-Fired Boilers: Install according to NFPA 54.
- C. Install necessary control wiring and electrical devices requiring field installation.

3.03 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Piping installation must not impede service and maintenance of boiler.
- C. Gas-train to gas piping with union. Piping to be same or larger than gas-train connection.
- D. Hot-water to supply and return tapings with shutoff valve with union or flange connections.
- E. Equipment drain connection to nearest floor drain. Pipe size same as connection. Provide isolation valve.
- F. Connect breeching boiler outlet. Comply with Section 23 5100.
- G. Install flue-gas recirculation duct from vent to burner. Comply with Section 23 5100.
- H. Ground equipment according to Section 26 0526.

I. Connect wiring according to Section 26 0519.

