

SECTION 235213 - ELECTRIC BOILERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes electric boilers, trim, and accessories for generating hot water.
- B. Reference and Industry Standards

Enterprise Green Communities Criteria

- 1. Mandatory Requirements: See the current edition of NYC overlay of EGC reference standard for full specifications.
 - a. NYC New Construction projects must achieve at least 60 optional points, and Substantial and Moderate Rehab projects must also achieve at least 55 optional points.
 - b. Building Performance Standard Criterion 5.1b
 - c. Sizing of Heating and Cooling Equipment 5.6
 - d. Combustion Equipment 7.3
- C. Comply with the current edition of the New York City Energy Conservation Code.
- D. Comply with relevant HPD design guidelines section or appendix.
- E. Project will elevate new equipment above 2050's SLR-adjusted DFE or above grade if applicable for projects in flood-prone areas.
- F. Floodproof equipment that cannot be elevated for projects in flood-prone areas.
- G. <https://www.nyc.gov/site/hpd/services-and-information/sustainability.page>
- H. <https://www.nyc.gov/site/hpd/services-and-information/blds.page>

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.
- B. Sample Warranty: For special warranty.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

2.2 MANUFACTURED UNITS

- A. Description: Factory-fabricated, -assembled, and -tested electric boilers with trim and controls necessary to generate hot water.
- B. Pressure Vessel: Carbon-steel Cast-iron pressure vessel mounted on structural-steel base.
- C. Nozzles: Flanges for water inlet and outlet and heating element inserts; threaded connections for trim and controls.
- D. Insulation: Two layers of ~~2-inch-~~ (50-mm-) thick, glass-fiber insulation.
- E. Jacket: Galvanized sheet metal casing with baked-enamel] [powder-coated] protective finish and removable panels with snap-in or interlocking closures for access to pressure vessel.
- F. Lifting Lugs: Welded to pressure vessel, extending above jacket.
- G. Heating Elements: Copper Incoloy-sheathed, replaceable electric-resistance element, rated 20-kW maximum, with maximum ~~50 W/sq. in.~~ (7.7 W/sq. cm) over heat-transfer length.
- H. Mounting Base: For securing boiler to concrete base.
- I. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- J. ASME Compliance: Fabricate and label boilers to comply with 2013 ASME Boiler and Pressure Vessel Code.
- K. NFPA Compliance: Design and fabricate boilers to comply with NFPA 70, Article 424, Paragraphs G and H.
- L. UL Compliance: Test boilers for compliance with UL 834. Boilers shall be listed and labeled by a testing agency acceptable to authorities having jurisdiction.
- M. CSA Compliance: Test boilers for compliance with CSA B51.

2.3 TRIM FOR HOT-WATER BOILERS

- A. Include devices sized to comply with ASME B31.1 ASME B31.9.

- B. Aquastat Controllers: Operating auto-reset high limit.
- C. Safety Relief Valve: ASME rated.
- D. Pressure and Temperature Gage: Minimum **3-1/2-inch- (89-mm-)** diameter, combination water-pressure and -temperature gage. Gages shall have operating-pressure and -temperature ranges, so normal operating range is about 50 percent of full range.
- E. Boiler Air Vent: [Automatic.
- F. Dip-tube in water outlet.
- G. Drain Valve: Minimum **NPS 3/4 (DN 20)** hose-end ball valve sized according to requirements of authorities having jurisdiction.

2.4 CONTROLS

- A. Boiler operating controls shall include the following devices and features:
 - 1. Control transformer.
 - 2. Step controller.
 - 3. Recycling relay returns controller to off position after power failure.
 - 4. Multistage thermostat.
 - 5. Control-circuit switch.
 - 6. Visual indication for each step.
 - 7. Supply-voltage indicator.
 - 8. Set-Point Adjust: Set points shall be adjustable.
 - 9. Sequence of Operation: Electric, factory-fabricated and field-installed panel to control element sequence controller to maintain space temperature in response to thermostat with heat anticipator located in heated space.
 - a. Include automatic, alternating-operation sequence for multiple boilers to provide equal runtime for boilers.
 - 10. Sequence of Operation: Electric, factory-fabricated and field-installed panel to control element sequence controller to reset supply-water temperature inversely with outside-air temperature. At **0 deg F (minus 17 deg C)** outside-air temperature, set supply-water temperature at **deg F (93 deg C)** 180 deg F; at **60 deg F (15 deg C)** outside-air temperature, set supply-water temperature at **140 deg F (60 deg C)**.
 - a. Include automatic, alternating-operation sequence for multiple boilers to provide equal runtime for boilers.
- B. Safety Controls: To maintain safe operating conditions, safety controls limit boiler operation.
 - 1. High Cutoff Automatic reset stops boiler if operating conditions rise above set point or maximum boiler design temperature.
 - 2. Low-Water Cutoff Switch: [Electronic probe shall prevent boiler operation on low water. Cutoff switch shall be manual-reset type.

3. Audible Alarm: Factory mounted on control panel with silence switch; shall sound alarm for above conditions.
4. Hardwired Points:
 - a. Monitoring: On/off status, common trouble alarm] [low-water-level alarm] <Insert monitoring>.
 - b. Control: On/off operation, [hot water supply temperature set-point adjustment] <Insert control>.
5. A communication interface with building management system shall enable building management system operator to remotely control and monitor the boiler from an operator workstation. Control features available and monitoring points displayed locally at boiler control panel shall be available through building management system.

2.5 ELECTRICAL POWER

- A. Single-Point Field Power Connection: Factory-installed and -wired switches, transformers, and electrical devices necessary shall provide a single-point field power connection to boiler.
 1. Interlock with door to de-energize power with door open.
- B. Electrical Enclosures: NEMA 250, Type enclosure with hinged door and key-locking handle.
- C. Install factory wiring outside of an enclosure in a metal raceway.
- D. Comply with NFPA 70.
 1. Electrical Circuits: 48 A, maximum.
- E. Connectors: Mechanical lugs bolted to copper bus bars or distribution blocks with pressure connectors.
- F. Fuses: NEMA FU 1, Class J or K5; 60 A, maximum.
- G. Contactors: Three-pole magnetic contactors, listed for 500,000 cycles at full load.
- H. Factory-wired internal control devices and heating elements.
 1. Wiring shall be numbered and color coded to match wiring diagram.

2.6 CAPACITIES AND CHARACTERISTICS

- A. Hot-Water Heating:
 1. Design Water-Pressure Rating:
 2. Safety Relief Valve Setting:
 3. Entering-Water Temperature:
 4. Leaving-Water Temperature:

5. Design Water Flow Rate:

B. Electrical Characteristics:

1. Volts: 208 V.
2. Phase: Three.
3. Hertz: 60 Hz.

2.7 SOURCE QUALITY CONTROL

- A. Test and inspect factory-assembled boilers, before shipping, according to 2013 ASME Boiler and Pressure Vessel Code].
- B. Hydrostatic Test: Factory test assembled boiler, including hydrostatic test.

PART 3 - EXECUTION

3.1 BOILER INSTALLATION

A. Equipment Mounting:

1. Install boilers on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in Section 033000 "Cast-in-Place Concrete."

- B. Install electrical devices furnished with boiler but not specified to be factory mounted.

3.2 CONNECTIONS

- A. Piping installation requirements are specified in Section 232113 "Hydronic Piping." Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to boiler to allow service and maintenance.
- C. Connect hot-water piping to supply- and return-boiler tapings, with shutoff valve and union or flange at each connection.
- D. Install piping from safety relief valves to nearest floor drain.
- E. Install piping from equipment drain connection to nearest floor drain. Piping shall be at least full size of connection. Provide an isolation valve if required.

3.3 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections with the assistance of a factory-authorized service representative]:
 1. Perform installation and startup checks according to manufacturer's written instructions.
 2. Leak Test: Hydrostatic test. Repair leaks and retest until no leaks exist.

3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

- a. Check and adjust initial operating set points and high- and low-limit safety set points of water level and water temperature.
- b. Set field-adjustable switches and circuit-breaker trip ranges as indicated.

B. Remove and replace malfunctioning units and retest as specified above.

C. Boiler will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.4 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.5 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain boilers. Refer to Section 017900 "Demonstration and Training."

END OF SECTION 235213