

Oil-Fired Hot Water Caravan MasterSpec

SECTION 235223 CAST IRON MODULAR BOILERS (Oil-Fired Hot Water)

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This section includes factory packaged, gas-fired, cast iron boilers, trim, and accessories for closed heating water systems.

1.3 SUBMITTALS

- A. Product Data: Include performance data, operating characteristics, furnished specialties, and accessories.
- B. Shop Drawings: For boiler(s), boiler trim, and accessories. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Design Calculations signed and sealed by a professional engineer
 - 2. Wiring Diagrams: Power, signal, and control wiring.
- c. Warranty: 1 year full boiler and 10 year heat exchanger manufacturer's warranty.

1.4 INFORMATIONAL SUBMITTALS

- A. Operation and Maintenance: To include in operation and maintenance manuals.
- B. Other Informational Submittal:
 - 1. ASME Report: Submit ASME documentation as required by authorities having jurisdiction.
 - 2. Startup report

1.5 CLOSEOUT SUBMITTALS

- A. Operational and Maintenance Data: to include in boiler emergency, operation and maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Electrical Components, Devices and Accessories: Listed and labeled as defined in NFPA 70. Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. ASME Compliance: Fabricate and Label Boiler to comply with ASME Boiler and Pressure and Vessel Code.

- C. ASHRAE/IESNA 90.1 Compliance: Boiler(s) shall have minimum efficiency according to “Gas and Oil Fired Boilers – Minimum Efficiency Requirements.
- D. DOE Compliance: Minimum Efficiency shall comply with 10 CFR 430, Subpart B, Appendix N, “Uniform Test Method for Measuring the Energy Consumption of Furnaces and Boilers.”
- E. AHRI Compliance: Boiler(s) shall be tested and rated according to AHRI’s “Rating Procedure for Heating Boilers” and “Testing Standard for Commercial Boilers”, with the AHRI Emblem on a rating plate affixed to the boiler.
- F. CSA Compliance: Boiler(s) to be compliant with CSA certification.

1.7 COORDINATION

- A. Coordinate boiler(s) Placement on Equipment Pad

1.8 WARRANTY

- A. Standard Warranty: Manufacturer’s standard warranty in which manufacturer agrees to repair or replace components and heat exchangers that fail due to failure in materials or workmanship within specified warranty period.
 - 1. Warranty Period for Heat Exchangers: 10 years from installation.
 - 2. Warranty Period for Other Factory Supplied Parts: 1 year from installation.

PART 2 – PRODUCTS

2.1 CAST IRON BOILER(S)

- A. Basis of Design: Slant/Fin LDWO boiler(s) as specified on drawings. All others must be submitted as equal alternate.
- B. Furnish and install ____ (Quantity) Slant/Fin Model _____ Cast Iron Oil-Fired Modular boiler(s). Install in accordance with code requirements and manufacturer’s installation and start –up manual. Installation code requirements include ASME CSD-1. Installer to include start up and set-up of boiler system in scope of work.

2.2 CONSTRUCTION

- A. Description: Factory fabricated and assembled and tested floor mounted oil-fired boiler modules with burners, chimney vented field connected oil-fired hot water modular boilers
- B. Electrical: The electrical service to the boiler(s) is 120 VAC 1 Phase 60 HZ. All electrical wiring must be installed according to all applicable codes, standards and regulations. In USA electrical installation must comply with NFPA 70, National Electric Code – latest edition.
- C. Heat Exchanger: Shall be vertical sectional, wet-base cast iron assembly. Water seal between sections shall be metal push nipples, rubber seals are not acceptable. Each module shall be constructed in accordance with Section IV of the ASME Boiler and Pressure Vessel Code for low pressure boilers with a maximum working pressure water of 100 PSIG. Each module shall be equipped with a temperature/pressure gauge, drain valve and ASME pressure relief valve set at ____ (pick one 30PSI, 50PSI, 75PSI or 100PSI). Each modules’ pressure relief valve capacity shall exceed the modules gross output, the installer shall pipe each relief valve to within 6 inches of the floor. The relief valves pipe shall be no smaller than pipe size of relief valve and there will be

no valves connected to the relief valve piping. All cast iron assemblies shall have a full 10 year manufacturer's warranty.

- D. Burner: Each module shall have a #2 fuel oil-fired burner. Burner shall be agency approved manufactured by one of the following national brands. Carlin, Beckett or Riello. Every burner shall be factory tested with a combustion analyzer in the boiler manufacturer's factory.
- E. Boiler Control: Every boiler module shall have a factory mounted and wired high temperature limit control, flame rollout switch, and blocked vent safety switch to interrupt power to the gas valve in the event of a related unsafe condition.
- F. Venting: Each module has a factory supplied and field installed draft regulator to compensate for excessive draft in the chimney. Breeching dimensions follow boiler manufacturer's application guide. Chimney requirements comply with boiler manufacturer's recommendations and code requirements. Vent connector to include "slip sleeve" to facilitate cleaning and maintenance of modules.
- G. Oil Piping: Fuel Oil piping to comply with manufacturer's boiler application guide. All oil tubing connections shall be made with a flared joint, compression fittings are not allowed. Oil storage tank gas piping must comply with all code requirements and manufacture's application guide. Storage tank and piping shall be properly sized to supply sufficient fuel to modular boiler and all oil-fired appliances connected to fuel supply system.
- H. Water Piping: Boiler(s) water piping must be installed following boiler manufacturer's instructions. Boiler modules will be piped reverse return piping, in accordance with boiler manufacturer's application guide. Water quality must meet or exceed boiler manufacturer's instructions. Installing contractor shall follow manufacturer's instructions for cleaning heating system and boiler(s) piping. Use of Glycol must follow boiler manufacturer's instructions and will be checked and maintained at least once per year. Installer must follow all code requirements. Boiler(s) water quality must be maintained, especially if glycol is used in the system. There will be no isolation valves between boiler modules. Water flow through each module shall not exceed 34 GPM for 7-section module, 30 GPM for 6-section module and 25 GPM for 5 section module. Minimum system water pressure is 15 P.S.I. cold water.
- I. General: Boiler(s) installation must comply with applicable code requirements including ASME CSD-1, latest edition, Part CW-600 "Steam and waterside Control; Modular Boilers". Installer must follow manufacturer's instructions. Installer to commission the boiler(s) following manufacturer's instructions contained within the manufacturer's application guide.

2.4 CONTROLS

- A. Refer to Division 230900 "Instrumentation and Control for HVAC".
- B. Boiler(s) controls shall have features including.
 - 1. Each boiler module shall have a mounted and wired high limit control with a maximum setting of 220°F.
 - 4. Modular Boiler Control – The main modular boiler control shall determine when each boiler module will fire and what the system target water temperature is. Settings of the control shall include – (pick feature and add if necessary)

- A. Setpoint temperature – a set target supply water temperature for the system. (Specify setpoint temperature).
- B. Outdoor temperature reset – adjust target supply water temperature as outdoor temperature changes. (List design water temperature and lowest target water temperature).
- C. Night setback – night setback feature shall lower target water temperature as outdoor temperature changes.
- D. External control and BMS option
 - 1. 0-10 VDC remote water control
- E. Short cycle protection
- F. DHW option
- G. Installer to supply and install all safety controls that satisfy ASME CSD-1 requirements, including a manual reset high limit and manual reset low water cutoff. Both manual reset high limit and manual reset low water cutoff shall cut power to modular boiler system(s) in cases where control is tripped.
- H. Installer to supply and install all safety controls required by codes.

2.5 CAPACITIES AND CHARACTERISTICS

- A. Heating Medium – Water or Glycol Mix
- B. Maximum Pressure – 100 Pounds Per Square Inch (PSI)
- C. Maximum Temperature – 220⁰ Fahrenheit (F) Cast iron castings ASME approved up to 250⁰F
- D. Safety Relief Valve Setting – 30, 50, 75 or 100 Pounds Per Square Inch (Choose One)
- E. Heat Exchanger Design Pressure Rating – 100 PSI
- F. Minimum Efficiency – AHRI Listed
 - 1. 82.5% Minimum Thermal Efficiency
- G. Fuel (Pick one – Natural Gas or LP Gas)

2.6 SOURCE QUALITY CONTROL

- A. Factory assembled and tested in accordance with ASME Boiler and Pressure Vessel Code
- B. LC Tested and Listed in accordance with ANSI Z21.13 CSA 4.9 Latest Edition

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Before boiler(s) installation, examine rough-in for location, water piping, fuel piping, electrical, air intake and exhaust venting.
- B. Examine mechanical spaces for suitable conditions where boilers will be installed.

- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 BOILER INSTALLATION

- A. Install boiler(s) in accordance with manufacturer's instruction
- B. Install boiler(s) in accordance with code requirements.
- C. Install boiler(s) on properly sized equipment pad in accordance with boiler manufacturer's recommendation.
- C. Install electrical and water moving and safety devices not factory mounted and wired.
- D. Install control wiring

3.3 CONNECTIONS

- A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to boiler(s) to allow service and maintenance.
- C. Fuel-oil supply to boiler shall be sized to provide sufficient fuel to boiler and any additional oil-fired appliance connected to fuel-oil supply.
- D. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems"
- E. Connect wiring according to Section 260519 "Low Voltage Electrical Power Conductors and Cables"

3.4 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports
 1. Perform installation and startup checks according to boiler manufacturer's instructions.
 2. Leak test: Test water and fuel piping in accordance to code requirements. Repair as required.
 3. Test and adjust controls and safety controls. Replace and repair controls as required.
 4. Boiler Test: Startup and adjust boiler(s) to conform to manufacturer's instructions. Repair boiler if required. Adjust air-fuel ratio and combustion following manufacturer's specifications. Combustion testing must be done with calibrated combustion analyzer.
 4. Operational test – Start boiler(s) to confirm proper rotation and operation.
 5. Complete "Installation/startup checklist" contained within boiler manufacturer's installation instructions.
 6. Provide completed field quality documentation to building commissioning agent.

3.5 DEMONSTRATION

- A. Engage a factory authorized agent to train building maintenance personnel to operate boiler(s). Refer to Section 017900 "Demonstration and Training".

END OF SECTION 235233

September 3, 2019

