

SECTION 23XXXX - CONDENSING BOILERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes packaged, factory-fabricated and -assembled, gas-fired, stainless steel condensing boilers, trim, and accessories for generating hot water.

1.3 SUBMITTALS

- A. Product Data: Include performance data, operating characteristics, furnished specialties, and accessories.
- B. Shop Drawings: For boilers, boiler trim, and accessories. Include plans, elevations, sections, details, and attachments to other work.
- C. Source quality-control test reports.
- D. Field quality-control test reports.
- E. Operation and maintenance data.
- F. Warranty: Special warranty specified in this Section.
- G. Other Informational Submittals: Startup service reports specific to burner type as provided by manufacturer.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Provides products manufactured in ASME-certified facilities.
- B. 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.
- C. ASME Compliance: Fabricate and label boilers to comply with ASME Boiler and Pressure Vessel Code.
- D. ASHRAE/IESNA 90.1 Compliance: Boilers shall have minimum efficiency according to "Gas and Oil Fired Boilers - Minimum Efficiency Requirements."

- E. UL Compliance: Test boilers for compliance with UL 795, "Commercial-Industrial Gas Heating Equipment." Boilers shall be listed and labeled by a testing agency acceptable to authorities having jurisdiction.
- F. AHRI Compliance: Boilers shall be tested and rated according to AHRI "Rating Procedure for Heating Boilers" and "Testing Standard for Commercial Boilers," with AHRI emblem on a nameplate affixed to boiler.

1.5 WARRANTY

- 1. Warranty Period for Water-Tube Condensing Boilers:
 - a. Leakage and Materials: 10 years from date of Substantial Completion.
 - b. Heat Exchanger Damaged by Thermal Stress and Corrosion: Non-prorated for 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Bosch Thermotechnology Corp.; Bosch SSB<XXX> Condensing Boiler, or a comparable product by one of the following:
 - 1. Viessmann Manufacturing Co. (US) Inc.
 - 2. Lochinvar LLC.

2.2 MANUFACTURED UNITS

- A. Description: Factory-fabricated, assembled, and pressure tested, water-tube condensing boiler with heat exchanger sealed pressure tight, built on a steel base; including insulated jacket; flue-gas vent; water supply, and condensate drain connections. Each boiler shall be assembled with required wiring and piping as a self-contained unit.
- B. Heat Exchanger: Plasma welded 316L dual tube stainless steel heat exchanger and burner tube with high quality condensing heating surfaces. Each watertube shall be at least 7/8" ID. Stainless steel heat exchangers shall be inspected and tested to ASME Section IV requirements and shall bear the ASME section IV seal of approval. Only boilers employing nonferrous materials on all flue gas passes will be considered.
- C. "Near condensing" copper fin designs, cast iron, cast aluminum, or secondary condensing exchangers will not be considered.

- D. Pressure Vessel: Carbon steel with welded heads and tube connections, counter-flow design with low- and high-temperature returns. The pressure vessel shall be in accordance with ASME Section IV pressure vessel code. The pressure vessel shall contain a volume of water no less than:

Model	Water Volume in Gallons (Liters)
SSB800	13.0 (50)
SSB1000TL	16.0 (60)
SSB1000TL	20.0 (75)

- E. Burner:
1. <Insert fuel>, premixed burner.
 2. The burner shall operate with a 5:1 turn down on each module; SSB800SA, SSB1000SA, and SSB1000TL shall operate with a minimum 10:1 turndown ratio, SSB1000TL2 shall operate with a minimum 20:1 turndown ratio, SSB1000TL3 shall operate with a minimum 30:1 turndown ratio, and SSB1000TL4 shall operate with a minimum 40:1 turndown ratio,
- F. Blower: Centrifugal fan to operate during each burner firing sequence and to pre-purge and post-purge the combustion chamber.
1. Motors: Comply with requirements specified in Division 23 Section "Common Motor Requirements for HVAC Equipment."
 - a. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
- G. Gas Train: The boiler shall be supplied with two gas valves designed with negative pressure regulation and shall be capable of the following minimum turndown ratios:

Model	Turndown	Min Input in BTU/hr (kW)	Max Input in BTU/hr (kW)
SSB800	10:01	79,800 (23)	798,000 (234)
SSB1000	10:01	102,400 (29)	1,024,000 (300)
SSB1000TL	10:01	102,400 (29)	1,024,000 (300)

- H. Hydraulic Manifold: The Boiler(s) hydraulic manifold piping (water, gas and exhaust/ air) shall be factory installed and self-contained within the Boiler(s) outer cabinet.
- I. The boiler shall have a minimum of 86 sqft/1000 MBH of effective fireside heating surface.

- J. Ignition: Pilot ignition with 100 percent main-valve shutoff with electronic flame supervision.
- K. High Altitude: Boiler shall operate at altitudes up to 2,000 feet above sea level without additional parts or adjustments.
- L. Casing:
 - 1. Jacket: Sheet metal, with snap-in or interlocking closures.
 - 2. Finish: Electrostatic powder-coated protective finish.
 - 3. Insulation: Minimum 10mm thick, glass fiber insulation surrounding the heat exchanger.
 - 4. Combustion Chamber and Other Flue Passage Access: Full-sized front access
 - 5. Access: Side panels easily removed.
- M. Design Values and Capacities:
 - 1. Design Water Pressure Rating: 80 psig.
 - 2. Safety Relief Valve Setting: **75 psig**
 - 3. Minimum Entering-Water Temperature: No minimum temperature required.
 - 4. Entering-Water Temperature: <Insert deg F.>
 - 5. Leaving-Water Temperature: <Insert deg F.>
 - 6. Design Water Flow Rate: <Insert gpm.>
 - 7. Minimum Water Flow Rate: No minimum flow rate required.
 - 8. Design Pressure Drop: <Insert psig.>
 - 9. Minimum AHRI Thermal Efficiency: **96.8** percent.
 - 10. Gas Input: <Insert mbh.>
 - 11. Gross Output Capacity: <Insert mbh.>
 - 12. Electrical Characteristics:
 - a. Volts: **120VAC**
 - b. Phase: **Single**
 - c. Hertz: **60**
 - d. Full-Load Amperes: **15.1 FLA**
 - e. Minimum Circuit Ampacity: <Insert value.>
 - f. Maximum Overcurrent Protection: <Insert amperage.>

2.3 Trim

- A. Include devices sized to comply with ANSI B31.9, "Building Services Piping."
- B. Boiler(s) shall be equipped with a multi-speed circulator pump on each module.**
- C. Aquastat Controllers: Operating, firing rate, and high limit.
- D. Safety Relief Valve: ASME rated.
- E. Low Water Cut-off: Manual reset whenever boiler water level falls below safe level.

- F. Pressure and Temperature Gage: 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.
- G. Drain Valve: Minimum **NPS 3/4** hose-end gate valve.
- H. Condensate Neutralization System:

2.4 CONTROLS

- A. Boiler(s) shall be equipped with an integrated 7" color touch-screen controller that shall monitor and control all combustion process functions, control of the boiler water temperature to a value required by the connected components and shall display current water temperatures or fault conditions with changes in operation status.
- B. The boiler shall have multiple heating parameters designed for the most common applications with options including:
 - 0 – Heating demand (end switch / Thermostat)
 - 1 – Weather compensations with heating demand
 - 2 – Weather compensation with full outdoor temperature reset
 - 3 – Permanent heat demand
 - 4 – Analog input of setpoint
- C. The boiler shall have multiple domestic hot water heating parameters designed for the most common applications with options including:
 - 0 – No DHW
 - 1 – Indirect Tank with Sensor
 - 2 – Indirect Tank with Aquastat
- D. The boiler control shall have multiple circulator pump parameters designed for the most common applications with options including:
 - 0 – 1 Heating DHW
 - 1 – 1 three-way valve to operate DHW
 - 2 – 1 System, 1 Heating, 1 DHW
 - 3 – 1 System, 1 Heating, 1 three-way valve to operate DHW
 - 4 – 1 System, 1 Heating, DHW controlled by others
- E. Controllers, Electrical Devices, and Wiring: Electrical devices and connections are specified in Division 26 Sections.

2.5 SOURCE QUALITY CONTROL

- A. Test and inspect factory-assembled boilers, before shipping, according to ASME Boiler and Pressure Vessel Code.

PART 3 - EXECUTION

3.1 BOILER INSTALLATION

- A. Install boilers level on concrete base. Concrete base is specified in Division 23 Section "Common Work Results for HVAC," and concrete materials and installation requirements are specified in Division 03.
- B. Install gas-fired boilers according to NFPA 54.
- C. Assemble and install boiler trim.
- D. Install electrical devices furnished with boiler but not specified to be factory mounted.
- E. Install control wiring to field-mounted electrical devices.

3.2 CONNECTIONS

- A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. All external hydraulic connections shall be able to be connected in any configuration on either the left or right side of the Boiler(s) in order to allow for maximum installation flexibility and site requirements.
- C. Install piping adjacent to boiler to allow service and maintenance.
- D. 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.
- E. Connect gas piping to boiler gas-train inlet with union. Piping shall be at least full size of gas train connection. Provide a reducer if required.
- F. Connect hot-water piping to supply- and return-boiler connections with shutoff valve and union or flange at each connection.
- G. Install piping from safety relief valves to nearest floor drain.
- H. Boiler Venting:
 - 1. Install flue venting per the table below:

	SSB800	SSB1000	SSB100TL
Vent Materials	CPVC, PP, Stainless Steel, AL29-4C	CPVC, PP, Stainless Steel, AL29-4C	PP, Stainless Steel, AL29-4C

2. Connect full size to boiler connections. [**Comply with requirements in** Division 23 Section "Breechings, Chimneys, and Stacks."]

I. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."

J. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

1. Manufacturer's Field Service: Engage a factory-authorized service representative or technician to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

B. Tests and Inspections:

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. Operational Test: Start units to confirm proper motor rotation and unit operation. Adjust air-fuel ratio and combustion.

4. 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 fuel supply, water level, and water temperature.

b. Set field-adjustable switches and circuit-breaker trip ranges as indicated.

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

3.4 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain boilers. Refer to Division 01 Section "Demonstration and Training."

END OF SECTION 23XXXX