

SECTION 15550 - WATER TUBE BOILERS AND ACCESSORIES

City of San Diego, CWP Guidelines

PART 1 -- GENERAL

1.1 WORK OF THIS SECTION

- A. The WORK of this Section includes providing packaged steel water tube boilers, with power burners, related controls, and accessories, suitable for hot water and fired by natural or digester gas.

1.2 RELATED SECTIONS

- A. The WORK of the following Sections applies to the WORK of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this WORK.

1. Section 03300 Cast-in-Place Structural Concrete
2. Section 07600 Flashing and Sheet Metal
3. Section 11000 Equipment General Provisions
4. Section 11175 Pumps, General
5. Section 11201 Hot Water Circulating Pumps
6. Section 15000 Piping Components
7. Section 15410 Plumbing Piping
8. Section 15750 Packaged Air Conditioning Equipment
9. Section 15855 Air Handling and Moving Equipment
10. Section 15950 HVAC Controls and Sequence of Operations
11. Section 15990 Testing Adjusting and Balancing

1.3 CODES

- A. The WORK of this Section shall comply with the current editions of the following codes as adopted by the City of San Diego Municipal Code:

1. Uniform Mechanical Code
2. Uniform Plumbing Code

1.4 SPECIFICATIONS AND STANDARDS

- A. Except as otherwise indicated, the current editions of the following apply to the WORK of this Section:

1. ANSI/AGA Z21.13 Gas-Fired Low-Pressure Steam and Hot Water Boilers
2. ANSI/AGA Z223.1 National Fuel Gas Code
3. ANSI/ASME SEC4 Boiler and Pressure Vessel Codes - Rules for Construction of Heating Boilers

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| 4. | ANSI/NFPA 70 | National Electrical Code |
| 5. | HI (Hydronics Institute) | Testing and Rating Standard for Cast Iron and Steel Heating Boilers |
| 6. | AGA | American Gas Association |

1.5 SHOP DRAWINGS AND SAMPLES

- A. The following shall be submitted in compliance with Section 01300:
1. Shop drawings indicating general assembly, components, controls, safety controls, wiring diagrams and service connections.
 2. Combustion test report.

1.6 OWNER'S MANUAL

- A. The following shall be included in the OWNER'S MANUAL in compliance with Section 01300:
1. Manufacturer's product data including catalogue cuts.
 2. Manufacturer's installation instructions.
 3. Manufacturer's maintenance procedures.
 4. Manufacturer's certificate that products comply with the indicated requirements.
 5. Field reports indicating condition and operation at startup.
 6. Test reports.

1.7 REGULATORY REQUIREMENTS

- A. Steel water tube boilers shall:
1. Conform to ANSI/ASME [SEC4] [and] [ANSI/AGA Z21.13] for construction of boilers;
 2. Conform to [applicable] [ANSI/NFPA 70] code for internal wiring of factory wired equipment; and
 3. Be AGA certified.

1.8 SERVICES OF MANUFACTURER

- A. **Inspection, Startup, and Field Adjustment:** An authorized service representative of the manufacturer shall visit the site for not less than [2] days and witness the following:
1. Installation of the boiler.
 2. Inspection, checking, and adjusting the boiler.
 3. Startup and field-testing for proper operation.

4. Performing field adjustments to ensure that the boiler installation and operation comply with the Specifications.
- B. **Instruction of OWNER's Personnel:** The authorized service representative shall also instruct the OWNER's personnel in the operation and maintenance of the boiler including step-by-step troubleshooting procedures with necessary test equipment for not less than [1] day(s).
- C. **Local Service:** The manufacturer shall have a local service agency (within 50 miles of the site) which maintains properly trained personnel and adequate spare parts and is able to respond and complete repairs within 24 hours.
- D. **Combustion Test Report:** The authorized service representative shall prepare a combustion test report. Test shall include boiler firing rate, overfire draft, gas flow rate, heat input, burner manifold gas pressure, percent carbon monoxide (CO), percent oxygen (O₂), percent excess air, flue gas temperature at outlet, ambient temperature, stack temperature, percent stack loss, percent combustion efficiency, and heat output.

1.9 FACTORY TESTING

- A. **Product Testing:** Boilers shall be tested at the factory for compliance with the indicated requirements.
- B. **Witnesses:** The OWNER and the CONSTRUCTION MANAGER (at the option of either) reserves the right to witness factory tests.

1.10 FIELD TESTING

- A. **Testing:** Boilers shall be field-tested for compliance with the indicated requirements.

1.11 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. **Delivery of Materials:** Boilers shall be delivered in original, unbroken packages, containers, or bundles bearing the name of the manufacturer.
- B. **Storage:** Boilers shall be carefully stored in a manner that will prevent damage and in an area that is protected from the elements.
- C. **Protection:** Boilers shall be protected from damage by leaving factory coverings and shipping packaging in place until final installation.

PART 2 -- PRODUCTS

2.1 GENERAL

- A. **General:** Only boilers certified as complying with the indicated requirements shall be provided.
- B. **Products:** Boilers shall be new, of current manufacture, and shall be the products of reputable manufacturers specializing in the manufacture of such products.

2.2 MANUFACTURED UNITS

- A. Water tube boilers shall:
 - 1. Be factory assembled, factory fire-tested, self-contained, ready for automatic operation except for connection of water, fuel, electrical, and vent services.
 - 2. Be steel membrane wall water tube boiler on integral structural steel frame base with integral forced draft burner, burner controls, boiler trim, refractory, insulation and jacket.

2.3 BOILER SHELL

- A. The boiler shall:
 - 1. Be constructed in accordance with applicable ANSI/ASME Boiler and Pressure Vessel Code for allowable working pressure of [30] [60] [] psi water.
 - 2. Include two lifting eyes on top of boiler.
 - 3. Include tappings, observation ports, removal panels and access doors for entry, cleaning, and inspection.
 - 4. Include casing with readily removable glass fiber blanket insulation covered by sectional preformed sheet metal jacket designed to ensure that boiler casing temperature does not exceed ambient boiler room temperature by 18 degrees F maximum with surface air velocity of one foot per second.
 - 5. Include factory painted boiler, base, and other components with hard finish silicone enamel.

2.4 HOT WATER BOILER TRIM

- A. Boiler trim shall include:
 - 1. Pressure gauge, thermometer and ASME rated pressure relief valves.
 - 2. Low water cut-off to automatically prevent burner operation when boiler water drops below safe level with manual reset.

3. Temperature controller to control burner operation to maintain boiler water temperature.
4. High limit temperature controller to control burner to prevent boiler water temperature from exceeding safe system water temperature.
5. Air vent tapping in boiler shell.

2.5 FUEL BURNING SYSTEM

A. The fuel burning system shall include:

1. Forced draft automatic burner integral with front head of boiler designed to burn [digester gas] [and] [natural gas]; burner operation shall be [on-off] [hi-low] [modulating] with low fire ignition position; fuel-air ratios shall be maintained automatically with flue gas temperature minimum 68 degrees F above dew point temperature of flue gases at boiler outlet.
2. Forced draft, high radiant multi-port gas power burner with gas-electric ignition and gas pressure regulator.
3. Statically and dynamically balanced blowers directly connected to motors to supply combustion air. Equipment with inlet silencer and outlet air dampers.
4. Natural [digester] gas burner piping with complete gas train including pressure reducing valve.

2.6 CONTROL PANEL

A. The control panel:

1. Shall be mounted on the boiler and shall be hinged metal cabinet designed to contain programming relay, blower motor starter, and control switches.
2. Shall include program relay to control ignition, starting and stopping of burner, and provide both pre-combustion purge and post combustion purge; burner shall shut down in event of ignition, pilot, or main flame failure; interlock shall shut down burner upon combustion air pressure drop.

2.7 PERFORMANCE

A. Boiler performance shall comply with the following:

1. Minimum efficiency, [certified] [verified] by [factory] [and] [site] tests shall be minimum [76] [80] [] percent from 30 to 100 percent of full load firing rate.
2. [] boilers for producing hot water each with gross input [] BTUH, gross output [] BTUH at sea level.

2.8 NAMEPLATES AND SPARE PARTS

- A. Boilers shall include nameplates of stainless steel engraved or stamped and fastened to the equipment in accessible locations. Nameplates shall contain the manufacturer's name, model, serial number, size, characteristics, and appropriate data listing the boiler ratings.
- B. Spare parts shall include 2 drive belts and seals.

2.9 BOILER ACCESSORIES

- A. Steel water tube boilers shall include the following accessories:
 - 1. [] gallon air release tank including valves and fittings.
 - 2. Make-up water piping and connections.
 - [3. Automatic air vents mounted at high points.]
 - [3. Manual air vents mounted at high points.]
 - 4. Drains and piping to nearest floor drain.
 - 5. Boiler flue with weather cap, fittings, brackets and flashing.
 - 6. Circulating pump complying with Section 11201.

PART 3 -- EXECUTION

3.1 INSTALLATION

- A. **General:** Boilers shall be installed in accordance with the manufacturer's written installation instructions and shall be mounted on a concrete pad complying with Section 03300.
- B. **Gas Service:** Gas service shall be connected in accordance with ANSI/AGA Z223.1.
- C. **Relief Valves:** Relief valves shall be piped to nearest floor drains.
- D. **Boiler Accessories:** Boiler accessories shall be installed for proper operation.

** END OF SECTION **