

SECTION 15510
HOT WATER BOILER

PART 1 - GENERAL

1.01 PROVISIONS INCLUDED

- A. The general provisions of the Contract, including General and Supplementary Conditions, and Division 1 General Requirements, apply to work specified in this Section.
- B. Requirements of Section 15050, "Basic Mechanical Materials and Methods" apply to work specified in this Section.

1.02 SUMMARY

- A. This Section includes high efficiency gas fired copper-fin boiler.
 - 1. Boiler
 - 2. Vertical direct vent with separate direct air intake
 - 3. Vertical vent caps
 - 4. Standard operating controls – native BACnet compatible.
 - 5. Oversize gas train for operating with natural gas at 4" w. c.

1.03 SUBMITTALS:

- A. Product Data: Submit manufacturer's technical product data, including rated capacities of selected model clearly indicated, weights (shipping, installed, and operating), furnished specialties and accessories; and installation and start-up instructions.
- B. Shop Drawings: Submit manufacturer's assembly-type shop drawings indicating dimensions, weight loadings and required clearances.
- C. Wiring Diagrams: Submit manufacturer's electrical requirements for power supply wiring to cast-iron boilers. Submit manufacturer's ladder-type wiring diagrams for interlock and control wiring required for final installation of boilers and controls. Clearly differentiate between portions of wiring that are factory-installed and portions to be field-installed.

1.04 OPERATION AND MAINTENANCE MANUALS

- A. The manuals shall include a table of contents, specifications, drawings, and description of equipment; installation instructions; operating instructions; Maintenance instructions; parts lists; and test data and performance curves. The table of contents shall be marked with the Owner's name, project name, equipment name, and the Owner's purchase order number.
- B. Where applicable, the information contained in the manual shall include a list of recommended spare parts and a schedule of required lubricants, as recommended by the Manufacturer. The data shall also include all nameplate information and shop order numbers for each item of equipment and component part thereof.

- C. Six copies of complete and final operation and maintenance manuals, including one set, suitable for reproduction.

1.05 QUALITY ASSURANCE

- A. Comply with USM IDAT per section 01810
- B. Manufacturer's Qualifications: Firms regularly engaged in manufacture of copper tube boilers, of types and capacities required, whose products have been in satisfactory use in similar service for not less than 5 years.
- C. The BOILER shall bear the ASME "H" stamp for 160 psi working pressure and shall be National Board listed.
- D. Verify proper operation of the burners, all controls and the heat exchanger by connection to water and venting for a factory fire test prior to shipping. A quality test report shall be shipped with each unit.
- E. Codes and Standards:
 - 1. NFPA Compliance: Install gas-fired boilers in accordance with NFPA Code 54 "National Fuel Gas Code".
 - 2. American National Standard Institute – ANSI Z21.13, ANSI Z223.1-1992 (NFPA No. 54) and National Electrical Code NFPA No. 70.
 - 3. American Society of Mechanical Engineers (ASME) Section IV of the Boiler and Pressure Vessel Code, Rules for the Construction of Heating Boilers.
 - 4. American Society of Mechanical Engineers (ASME) Section VI of the Boiler and Pressure Vessel Code, Recommended Rules for the Care and Operation of Heating Boilers.
 - 5. UL and NEMA Compliance: Provide boiler ancillary electrical components which have been listed and labeled by UL, and comply with NEMA standards.
 - 6. ASHRAE 90.1 energy efficiency standards.

1.06 WARRANTY:

- A. Provide a ten (10) year limited warranty against failure caused by defective workmanship or material for the complete heat exchanger assembly.
- B. Provide warranty service to one year from the date of project substantial completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Hot Water Boilers: Subject to compliance with requirements, provide factory assembled packaged gas-fired boilers of one of the following:
 - 1. Lochinvar "Power Fin"
 - 2. Approved equal

2.02 HOT WATER BOILERS

- A. Boiler: Lochinvar power-fin hot water operated on low pressure natural gas.
- B. General:
 - 1. Water containing section: "Fin Tube" design, with straight copper tubes having extruded integral fins spaced seven (7) fins per inch.
 - 2. Tubes: "rolled" securely into glass lined, cast iron headers.
- C. Heat exchanger:
 - 1. Circular in pattern; completely enclosing the combustion chamber; with boiler drains externally accessible.
 - 2. With removable access covers on the heat exchanger headers for the purposes of inspection, cleaning or repair.
 - 3. Mounted in a stress free jacket assembly in order to provide a "free floating design" able to withstand the effects of thermal shock.
- D. Combustion chamber:
 - 1. Sealed combustion type employing the Lochinvar power burner concept.
 - 2. Burner surface: constructed of heavy duty ceramic material and fire in a vertical plane within the combustion chamber.
 - 3. Burner: employ a special perforated flame injection tube extending the entire length of the heat exchanger; fire in a full 360 degree pattern; capability to fire from 25 percent up to 100 percent of rated input when supplied with 4 inches water column of inlet gas pressure.
 - 4. Provide external viewing port permitting visual observation of burner operation.
- E. Combustion air blower: utilizing pulse width modulation to precisely control the fuel/air mixture for maximum efficiency.
 - 1. Operate the combustion air blower for a pre-purge period before burner ignition
 - 2. Operate the combustion air blower for a post-purge period after burner operation to clear the combustion chamber.
- F. Jacket assembly: 16 gauge galvanized steel
 - 1. Fully gasketed and sealed inner and outer jacket panels
 - 2. Primed and pre-painted on both sides.
- G. Venting: boiler designed to allow field installation with direct vent vertical flue with a separate rooftop combustion air pipe using contractor supplied components.
- H. Standard operating controls -- provide:

1. Fully native bacnet compatibility.
 2. Adjustable immersion type temperature controller.
 3. Immersion safety high limit to regulate boiler water temperatures.
 4. Multiple air pressure switches to prove operation of the combustion air fan, monitor combustion chamber pressures and monitor operation of the flue.
 5. Electronically proven hot surface ignition system with full flame monitoring capability.
 6. Manually operated gas plug cock,
 7. Redundant main gas valves and built in low gas pressure regulator.
 8. Low gas pressure switch shall monitor gas supply.
- I. Additional standard controls:
1. Low voltage transformer for the control circuit,
 2. Flow switch to prove water flow.
 3. Inlet and outlet temperature gauges, and
 4. A factory installed ASME pressure relief valve.
- J. The units control panel contains:
1. 24 VAC control circuit and components
 2. A lighted on/off main power switch,
 3. Pilot lights to indicate sequential operation and
 4. Diagnostic pilot lights to indicate control sensed malfunctions.
 5. Components easily accessed and serviceable from the front and top of the unit.

PART 3 - EXECUTION

3.01 HOT WATER BOILER INSTALLATION

- A. Hot water boiler to be installed by a qualified contractor in accordance with manufacturer's installation instructions, standards and codes specified in "Quality Assurance".
- B. Install on 4" concrete pad.
- C. Install per manufacturer's written recommendations.
- D. Installation shall be consistent with existing boilers B1 and B2.

3.02 START-UP, ADJUSTMENT, AND TESTING

- A. Coordination: Coordinating all equipment and specified personnel necessary for start-up, adjustment, and testing will be the responsibility of the installing contractor.

3.03 MANUFACTURER'S FIELD SERVICES

- A. Hot Water Boiler Manufacturer: Furnish services of factory authorized agent to provide boiler start-up, adjustment, and testing as specified in "Start-Up."

3.04 SYSTEM START UP

- A. Boiler authorized representative will provide startup and one year warranty service. This responsibility shall not be waived or assumed by another party. Coordinate start-up with phased construction. Extend start-up services to correspond to schedule of phased construction where required.
- B. Make appropriate allowance, if required, for services required until date of substantial completion.
- C. Warranty service includes labor and materials to replace any parts or controls which might fail in service as the result of a defect in material or manufacture.

3.05 DEMONSTRATION AND TRAINING

- A. Owner's Instructions: Provide services of a factory-trained representative for full instruction on the care, operation, maintenance, and troubleshooting of the boiler. Training shall be a minimum of eight (8) hours. Schedule training with Owner.

3.06 SEQUENCE OF OPERATION

- A. Boiler #3 sequence shall match, exactly, the sequences of B-1 and B-2. B-3 shall serve as a redundant /back up boiler to B-1 and B-2. Lead lag sequence shall be expanded to include new B-3.

END OF SECTION 15510