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SERIES 250 HOT WATER BOILER SAMPLE SPECIFICATIONS

1.0 Boiler Characteristics

- 1.1 The unit(s) shall be a two pass semi-wet back horizontal firetube type boiler and constructed for psi water. Boiler, burner and trim shall meet the requirements of Underwriters Laboratories, ASME CSD-1, ASME boiler code, (FM), (GE Global), and shall be registered with the National Board of Boiler and Pressure Vessel Inspectors.
- 1.2 The boiler shall have a maximum output of Btu/hr, or horsepower when fired with (oil and/or natural gas). Electrical power available shall be Volt Phase Cycle.

2.0 General Boiler Design

- 2.1 The boiler shall be a two-pass horizontal firetube type of the semi-wet back type utilizing firetubes with enhanced heating surfaces. It shall be mounted on a heavy steel frame with forced draft burner and burner controls. Tube sheets and all flues must be fully accessible for inspection and cleaning when doors are opened. The boilers shall be furnished with adequate handholes.
- 2.2 The boiler shall be completely preassembled and tested at the factory. The unit shall be ready for immediate mounting on floor or simple foundation and ready for attachment of water, fuel, electrical, vent, and blowdown connections.
- 2.3 The boiler shall be built to comply with the following insurance and codes: (UL), (GE GAP), (NFPA 85) and ASME CSD-1.

3.0 Pressure Vessel Construction: The semi-wetback design will provide for boiler tube removal through the front or rear doors.

- 3.1 The pressure vessel is built in strict accordance with ASME code section (I), (IV) and to latest year of issue and addendas. Manufacturer's quality control department performs all tests of materials and fabrication with a licensed authorized inspector in accordance with the N.B.I.C. code. Completed pressure vessel is post weld heat-treated where required and shop hydrostatically tested to ASME code requirements, and issued a national board number and an ASME H-2 data report which is furnished to the purchaser at time of shipment.
- 3.2 The boiler shall be furnished with four (4) 3" x 4" handholes in the boiler shell. One (1) 12" x 16" manhole is to be provided on boilers 100 HP and larger. Provide a plugged coupling in the front tube sheet to provide for furnace tube inspection. Two lifting lugs must be located on top of the boiler.
- 3.3 Front smoke box doors are to be bolt on type for boilers through 150 HP. Front smoke box doors on boilers 200 HP and larger shall be hinged and davited. Rear smoke box doors shall be davited on all size boilers. Doors are to be sealed with heat resistant gaskets and fastened using lugs and brass nuts. Design doors so front and rear tube sheets and all flues are fully accessible for inspection and cleaning when doors are open.
- 3.4 Provide a baffle in the boiler shell below the hot water return inlet flange to provide for tempering of the returned hot water and reduce the potential for thermal shock.
- 3.5 The exhaust gas vent shall be located at the front of the boiler and be capable of supporting 2,000 pounds. The boiler vent shall include a locking blade damper and a stack thermometer.
- 3.6 Provide observation ports at each end of the boiler for inspection of flame conditions. Provide a plugged test port at the rear of the furnace for testing of furnace backpressure.
- 3.7 Unit shall be provided with minimum 2" thick mineral wool insulation. The boiler shall be lagged with a 22-gauge thick carbon steel jacket. The boiler jacket shall feature a bottom side primer of polyurethane resin base coat of .2 mil. dry finish thickness and a final coat of .4 mil. dry finish thickness and a final coat of .8 mil. dry finish thickness of valspar polyurethane resin based paint. The application of the paint is to be automated roller type and is to be oven dried. The exterior finish of the boiler jacket shall have a limited warranty by the manufacturer for five (5) years from date of manufacture for chalking, fade, peeling, or blistering.
- 3.8 The entire boiler base frame and other components shall be factory painted before shipment using a hard-finish enamel coating.

3.9 Furnace heat release shall not exceed btu per cubic foot of furnace volume. Provide a refractory plug in rear turn around for inspection and access to the furnace.

4.0 Hot Water Boiler Trim

4.1 Water boiler trim shall include a probe type low water cut off with manual reset, relief valve(s), with combination pressure and temperature gauge, and operating and manual reset high limit aquastats.

4.2 Provide factory mounted connections in boiler's hot water supply and hot water return connections and provide hot water supply and return temperature gauges.

4.3 Provide boiler safety relief valve(s) set at psig.

- 4.4 Provide other boiler trim including (edit):
- A. High pressure control with manual reset
 - B. Boiler drain valve
 - C. Automatic air vent valve, 3/4"
 - D. Water pressure differential control

5.0 Burner

5.1 The combination burner shall be of the forced draft annular port flame retention type suitable for burning natural or manufactured gas air atomizing type for burning No. 2 oil. The burner shall burn the specified quantity of fuel without objectionable vibrations, noise, or pulsation with no CO in the products of combustion. (The burner shall meet < ppm Nox while firing on natural gas utilizing flue gas recirculation technology). The burner shall be factory installed and wired, shall bear the listing mark of Underwriters Laboratories, Inc. evidencing compliance with requirements of UL-796 for gas burners and UL 296 for oil burners. The entire boiler and burner unit shall be factory fire tested prior to shipment with a copy of the fire test being supplied to the owner.

5.2 Burner Design

A burner fan shall furnish all combustion air, which shall be an integral part of the burner. The burner fan and motor shall be mounted below the horizontal centerline of the boiler for ease of maintenance and inspection. The burner air control louver shall be of the low-pressure drop, inlet type to allow visual checking of the louver settings, and ease of cleaning or adjustment. The burner shall have an air flow safety switch to prove combustion flow. The burner shall have an interrupted gas-electric ignition system with a 6,000-volt ignition transformer. An observation port shall be provided in the burner to provide observation of both the pilot and main flame.

5.3 Gas Pilot

The gas pilot shall be the premix type with automatic electric ignition, complete with electronic flame scanner to monitor the pilot so the primary fuel valve cannot open until pilot flame has been established. The gas pilot train is to consist of shut-off cock, pressure regulator, and automatic gas valve.

5.4 Gas Train

The main gas train shall be mounted on the boiler and shall include the following: A manually operated gas cock at the inlet to the train, a gas pressure reducing regulator, a motorized automatic gas valve, a second automatic gas valve, and a manually operated leak test cock located down stream from the automatic gas valve. The gas train shall include high and low gas pressure switches to monitor the gas pressure.

6.0 Fuel Oil System

6.1 Oil Pump

The oil pump set shall consist of an oil pump with a capacity of twice the firing rate of the boiler, and motor mounted on a base. The oil pump assembly shall also have the following: oil pressure relief valve, suction strainer, vacuum and pressure gauge, and motor starter. The oil pump assembly shall ship loose for field installation.

6.2 Oil Piping

The oil burner piping shall include automatic oil safety valve, oil metering valve, fuel filter, and all necessary piping, and linkages for full modulation operation, all mounted and piped on the unit. Pressure gauge shall be provided to indicate oil pressure and air atomizing pressure. The unit shall have a low air pressure switch interlocked to prevent burner operation in the event of air pressure failure.

6.3 Control Panel

The factory pre-wired control panel should be mounted on the burner proper or on the side of the boiler to allow for ease of maintenance and troubleshooting. The control panel shall contain the following items: Electronic flame safeguard, control circuit transformer, motor starter, control circuit fuse, numbered terminal strips, and indicating lamps for major functions. The control panel shall include a manual-automatic selector switch and a damper motor positioning switch to permit automatic firing in accordance with load demand or manual control of the firing rate at any desired point between low fire and maximum rate. Changeover from one fuel to the other shall be accomplished by flipping a switch. No burner adjustment or linkage change shall be necessary when going from one fuel to the alternate fuel. The electronic flame safeguard shall be complete with all necessary accessories and devices to control ignition and starting and stopping of the burner, to provide pre-combustion purge and post-combustion purge, and to shut down the burner on failure of ignition, pilot, or main flame by the electronic scanner.

6.4 Codes and Standards

The boiler shall be inspected by an authorized inspector and be registered with the National Board of Boiler and Pressure Vessel Inspectors. The package boiler shall carry an Underwriters Laboratory label "B." The boiler-burner unit shall meet the requirements of (U.L. or F.M. or GE Global)

7.0 Efficiency Guarantee

7.1 The boiler must be guaranteed to operate at a minimum efficiency of percent at 100 percent of rating when burning natural gas and efficiency at 100% firing rate when burning oil.

8.0 Warranty

8.1 All equipment is to be guaranteed against defects in materials and/or workmanship for a period of 12 months from date of shipment.

8.2 Boiler front and rear door refractory shall be guaranteed for a period of five (5) years from date of shipment.

9.0 Execution

9.1 Tests

The packaged boiler must receive factory tests to check the construction, controls, and operation of the unit. The purchaser, if desired may witness all tests.

9.2 Start-up Service

After boiler installation is completed; the manufacturer shall provide the services of a field representative for starting the unit and training the operator at no additional costs. A factory approved and authorized start-up report shall be submitted to the customer/user at the time of start-up.