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SERIES 250 – 2 PASS SEMI-WET BACK

Series 250 Steam Boiler Specifications

1.0 – Boiler Characteristics

1.1 The boiler shall be Hurst Boiler & Welding Co., Inc., Series 250, hp designed for psig. The boiler operating pressure shall be . The Hurst boiler is basis of design. Other manufacturers may be considered with a ten day prior approval if other salient characteristics are met. Dimensions are critical.

1.2 The boiler shall have a maximum output of Btu/hr, or horsepower when fired with (#2 oil) or (natural gas), (1,000 Btu/cu. Ft). Electrical power available shall be volt cycle phase.

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 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. 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 The front and rear doors shall be hinged and davited. 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 Rear refractory and insulation shall be contained in the formed rear door, which must swing open for inspection of all tube ends and refractory. The refractory shall carry a 5-year, pro-rated warranty from the manufacturer.

3.5 The boiler tubes shall not include turbulators, swirlers or other add-on appurtenances to achieve rated efficiencies. Tubes shall be 2.5" OD.

3.6 Front and rear tubesheets and all flues must be fully accessible when the door are open, to facilitate boiler inspection and cleaning.

3.7 The exhaust gas vent shall be located near the front of the boiler on the top center line and shall be capable of supporting a weight of 2,000 lbs. Each stack outlet shall contain a stack thermometer. Furnish a manually operated stack outlet damper with locking quadrant.

3.8 The boiler shell shall contain a chemical feed connection with 316 stainless steel quill with ball check feature.

3.9 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.

3.10 Boiler 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 prorated warranty by the manufacturer for five (5) years from date of manufacture for chalking, fade, peeling, or blistering.

3.11 The entire boiler base frame, smoke boxes, doors and other components shall be factory painted before shipment using high temperature flat black enamel.

3.12 Provide a baffle in the boiler shell below the main steam outlet flange to provide for dry steam with no water carry over. Provide a baffle at the feedwater inlet to temper the water.

4.0 – Emission Controls

4.1 The boiler shall be equipped with a low emission burner option for guaranteed NOx performance at (60, 30, 20, ≤10) ppm or less, dry volume basis and corrected to 3% O₂ when firing natural gas.

4.2 The low emission option shall include an integral burner, and boiler package, providing NOx reduction using the combustion air fan and enhanced boiler design to achieve the guaranteed NOx levels. Boiler fuel-to-steam efficiency and rated boiler capacity shall be guaranteed while the boiler is operation at the low NOx performance levels.

5.0 – Steam Boiler Trim

5.1 Water Column

A water column shall be located on the right hand side of the boiler complete with try-cocks, gauge glass set, and water column blowdown valve. Provide a gauge glass protector.

5.2 Low Water Cutoff

The low water cutoff shall be included and wired into the burner control circuit to prevent burner operation if the boiler water level falls below a safe operating level. *Proprietary controls for water level are not acceptable.

5.3 Auxiliary Low Water Cutoff

Auxiliary low water cutoff shall be included, and wired to the burner control circuit. A manual reset device shall be used on this control. Provide a high water level control for

alarm and annunciation of high water level with auto reset feature.

5.4 Pressure Gauge

A steam pressure gauge shall be located at the front of each boiler and include a shutoff cock and test connection.

5.5 Safety Valves

Safety valves of a type and size to comply with ASME Code requirements shall be shipped loose. Provide a drip pan elbow for each valve for installation by the installing contractor.

5.6 Steam Pressure Controls

The steam pressure control to regulate burner operation shall be mounted near the water column. Controls shall be a high limit (manual reset), operation limit (auto reset), and firing rate control.

5.7 Boiler Valves

5.7.1 Provide a ¾" stainless steel chemical feed quill with a built in check valve, factory mounted on boiler.

5.7.2 Provide a 316 stainless steel water sample cooler, factory mounted on boiler.

5.7.3 Provide factory mounted feedwater stop and check valves.

5.7.4 Provide a steam pressure gauge located at the front of each boiler. It includes a shutoff cock and a test connection.

5.7.5 Provide factory mounted and piped bottom blowdown assembly including two (2) quick opening and one (1) slow opening blowdown valves, all piped to a common blowdown header discharge at the rear of the boiler.

5.7.6 Provide a top mounted surface blowdown assembly including a factory supplied and mounted skimmer tube, and an automatic surface blowdown controller which opens and closes a motorized valve based on intermittent operator selected intervals measuring the conductivity of the boiler water.

5.7.7 A factory supplied main steam valve group shall include a reducing spool piece, stop-check, angle non-return valve, a free blow tapping and test valve, and an O S & Y gate valve. All shall be factory hydro tested with the boiler and included on the ASME H2 data report.

6.0 – Burner General

The combination burner shall be of the forced draft annular port flame retention type suitable for burning natural or manufactured gas and air atomizing 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 the requirements of the UL-796 for gas burners and UL-296 for oil burners. The entire boiler and burner shall be factory fire tested prior to shipment with a copy of the fire test being supplied to the owner.

6.1 Firing Sequence

The burner operation shall be full modulation with low fire start.

6.2 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 controls 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.

6.3 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.

6.4 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, pressure regulator, and automatic gas valve.

6.5 Fuel Oil System

6.5.1 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.

6.5.2 Oil Piping

The oil burner piping shall include automatic oil safety valve, oil metering valve, fuel filter, and all necessary piping, and linkages for fuel 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.

6.6 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.

6.7 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 packaged boiler shall carry an Underwriters Laboratory label "B." The boiler-burner unit shall meet the requirements of (U.L.), (F.M.), or (NFPA85).

7.0 Efficiency Guarantee

7.1 The boiler must be guaranteed to operate at a minimum fuel-to-steam efficiency of at 100% of rating when burning natural gas and fuel-to-steam 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.

9.0 Execution

9.1 Shop Tests

9.1.1 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

9.2.1 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.

9.2.2 A factory approved and authorized start-up report shall be submitted to the customer/user at the time of start-up.