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**SERIES 400 STEAM BOILER (100-1500 HP, STEAM 15-300 psig)  
SAMPLE SPECIFICATIONS**

The following sample specifications are provided by Hurst Boiler & Welding Co., Inc. to assist you in meeting your customer's specific needs and application. The sample specifications are typically utilized as the base template for the complete boiler specification. Contact your local Hurst Boiler & Welding Co., Inc. authorized representative for information on special insurance requirements, special code requirements, optional equipment, or general assistance in completing the specification.

**1.0 – General Boiler Specifications**

1.1 - The Steam Boiler shall be Hurst Boiler & Welding Co., Inc. Series 400,  hp designed for:

- 15 psig
- 150 psig
- 200 psig
- Other:  psig

1.2 - The maximum operating pressure shall be  psig and the minimum operating pressure shall be  psig.

1.3 - The boiler shall have a maximum output of  Btu/hr, or  horsepower when fired with  oil and/or natural gas, Btu/cu-ft. Electrical power available shall be  Volt  Phase  Cycle.

## 2.0 – Boiler Design

2.1 - The boiler shall be a three-pass wetback horizontal firetube type boiler with five (5) square feet of heating surface per rated boiler horsepower. It shall be mounted on a heavy steel frame with integral forced draft burner and burner controls. The complete packaged boiler approved as a unit by Underwriters Laboratories and shall bear the UL label.

2.2 - The boiler shall be completely preassembled and fire 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 :

- Factory Mutual
- Industrial Risk Insurance
- ASME CSD-1
- Other: \_\_\_\_\_

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## 3.0 – Pressure Vessel Construction

3.1 - The pressure vessel is built in strict accordance with ASME , to latest year of issue and addenda's. Manufacturer's quality control department in conjunction 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 a 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"x4" handholes in the boiler shell. One (1) 12"x16" manhole to be provided on boilers over 48" in diameter. 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 – 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.

3.5 - The exhaust gas vent shall be located at the rear of the boiler and be capable of supporting 2000 lbs. The boiler vent shall include a locking blade damper and a stack thermometer.

**3.6** - Provide observation ports at each end of 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(s) 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 of valspar. The top side (exterior) of the jacket shall feature a primer of 3 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** - High-pressure steam boilers 300 HP and larger must have a corrugated furnace. Low-pressure steam & hot water boilers may have a straight furnace. Furnace heat release shall not exceed 160,000 Btu per cubic foot of furnace volume. Provide a refractory plug in rear turn around for inspection and access to the furnace.

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## **4.0 – Steam Boiler Trim**

**4.1 - 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 valves.

**4.2 – Feedwater Pump Control** - The boiler feedwater pump control shall be included as an integral part of the water column to automatically actuate a motor driven feedwater pump to maintain the boiler water level within normal limits. McDonnell & Miller #157E.

**4.3 - Low Water Cutoff** - The low water cutoff shall be included as an integral part of the boiler feedwater control wired into the burner control circuit to pre-vent burner operation if the boiler water level falls below a safe operating level.

**4.4 - Auxiliary Low Water Cut-off** - Auxiliary low water cut-off shall be included, piped to the vessel, and wired to the burner control circuit. A manual reset device shall be used on this control.

**4.5 - Steam Pressure Gauge** - The steam pressure gauge shall be located at the front of the boiler and include cock and test connection.

**4.6 - Safety Valves** - Safety valves of a type and size to comply with ASME Code requirements shall be shipped loose.

**4.7 - 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), operating limit (auto reset), and firing rate control.

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## **5.0 – Burner**

**5.1 – 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 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 - Firing Sequence** - The burner operation shall be full modulation with low fire start.

**5.3 - 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.

**5.4 - 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.

**5.5 - 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.

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## 7.0 – Codes & 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 I.R.I.).

## 8.0 – Efficiency Guarantee

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.

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## 9.0 – Warranty

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

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## 10.0 – Execution

**10.1 – Shop 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.

**10.2 – After Installation** - 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.

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