**SAMPLE SPECIFICATION**

**TRIAD PACKAGED STEAM BOILERS**

**Model \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**BHP \_\_\_\_\_\_\_\_ PSI \_\_\_\_\_\_\_\_ Fuel \_\_\_\_\_\_\_\_\_**

**I. GENERAL PRODUCT DESCRIPTION:**

Furnish and install a single or series of modular steel boilers rated at \_\_\_\_ HP or \_\_\_\_ MBH that are capable of responding in parallel (via a common main) without steam flowing into the inactive units. Each boiler shall be fired with (natural gas; oil; LP gas; or gas/oil). Boiler/burner package must be UL listed and labeled. Acceptable boiler design will be TRIAD Series \_\_\_\_\_ designed for steam applications.

Boilers shall be in accordance with Section I or Section IV of the ASME Boiler and Pressure Vessel Code and must be tested, stamped, and approved for 15 psi for Section IV, or \_\_\_\_ psi pressure for Section I and bear the ASME symbol. Each boiler shall be registered with the National Board of Boiler and Pressure Vessel Inspectors.

Each boiler shall be properly packaged for shipping. All specified boiler trim and controls must be factory pre-piped, wired, and assembled before shipment. Any items removed for shipment shall be field installed by the contractor.

**II. BOILER SIZE AND RATINGS**

Each unit shall be rated as \_\_\_\_\_\_ HP and shall produce \_\_\_\_\_\_ MBH or \_\_\_\_ Lbs/hr steam from 212 degrees F and shall operate at \_\_\_\_\_\_ PSI working pressure. Boiler input shall not exceed \_\_\_\_\_ MBH while producing a minimum of \_\_\_\_\_\_ MBH output.

**III. BOILER DESIGN:**

Boilers shall be of a vertical fire tube design and fired with UL listed burners, completely assembled and wired to NEC specifications. Burner shall be mounted on the lower part of the boiler. The combustion chamber shall be surrounded by water (water-backed). The bottom of the combustion chamber shall be insulated with high temperature castable refractory and an additional layer of high temperature blanket. Vessel walls shall be 1/4” thick boilerplate. Top and bottom tube sheets shall be 3/8” thick boilerplate. Fire tubes shall be of 12 gauge material.

There shall be 37 fire tubes for Series 300, and 73 fire tubes for Series 700 through Series 900, at 1 ½” in diameter. There shall be 70 fire tubes for Series 1600 through Series 2000 at 2” in diameter. Each fire tube shall include an angular Brock turbulator to maximize heat transfer efficiency.

Fire tubes shall be expanded/rolled and beaded or flared into the upper and lower tube sheets; welding of tubes to tube sheet will not be permitted. Inner shell shall be 1/4” thick boilerplate for Series 300 through 900. For Series 1600 through 2000 inner shell shall be 5/16” thick boilerplate. For Series 1600 boilers operating at pressures above 15 PSI the inner shell shall be 3/8”. Top and bottom tube sheets, tubes, and mud ring shall be accessible on the waterside for easy inspection and cleaning through at least 3 cleanout openings. Fire tubes shall be easily accessible for removal of turbulators and for cleaning or repair. Boilers shall include a drain and be set on structural steel rails with two lifting lugs. The Series 300 will have bolt-style leveling legs instead of rails. Each boiler shall be encased in a 22-gauge painted steel jacket insulated with refractory ceramic fiber blanket with a classification of at least 1800 degrees F, providing for low thermal conductivity.

All valves, fixed orifices, and associated piping shall be as recommended by the manufacturer.

The maximum rated temperature shall be 250°F.

**IV. BOILER TRIM:**

The following trim items shall be integral to the boiler and factory installed and wired. All boiler controls shall be UL Listed or Recognized.

* Provide a McDonnell & Miller 150 external float type primary Low Water Level Control and feedwater pump control that prevents operations if the boiler water level falls below a nominal operating level.
* Provide a Honeywell R845A Control Center to work in conjunction with the two Low Water Cut-offs and two pressure controls to manage overall operation of the boiler.
* Provide a water column piped to the boiler with a gauge glass and drain valve. The gauge glass shall be protected by brass gauge protectors.
* Provide a Honeywell L404F or P7810C Operating Pressure Limit Control for sequence of operation as specified.
* Provide a Safety Pressure High Limit Control that is a second high-limit with manual reset that prevents burner operation above nominal operating conditions.
* Provide a McDonnell & Miller 750 conductance type auxiliary low water level cutoff control with manual reset.
* Call for Heat Light to indicate when the boiler circuitry has been activated.
* Provide feedwater stop and check valves for operation above 15 PSI in accordance with ASME code.
* Provide one quick and one slow opening blowdown valve for operation above 15 PSI in accordance with ASME code.
* Pressure gauge of suitable range for monitoring operations.
* On/Off switch.
* ASME relief valve.

**V. BURNER EQUIPMENT:**

The horizontally mounted burner will be placed so that combustion takes place within the water-backed furnace of the boiler. The burner shall be a (Power Flame; Riello) model \_\_\_\_\_\_\_ power burner and fire (natural gas; oil; LP gas; or gas/oil combination). The burner and gas train shall be of a design that produces flame retention with rapid mixing of the fuel and combustion air. Each burner shall be designed and constructed as an integrated combustion system package – and shall be factory fire tested. Each burner shall be of welded steel construction and the firing head will incorporate a stainless steel flame retention diffuser. The entire fuel burner system and its installation shall conform to applicable codes. The UL listed burner shall contain pre-wired controls and a gas train in compliance with and meeting ASME CSD-1; (FM); (IRI) standards. Burners will comply with UL-796 for gas burners and UL 296 for oil burners. The units shall operate on \_\_\_\_ volt, \_\_\_\_\_ phase, \_\_\_\_ Hz power.

The burner shall normally operate without objectionable noise, vibration, or pulsation with not more that 20 percent excess air and with no CO in the products of combustion. The burner shall be of low-high-low or modulating operations. The burner to boiler interface shall allow for ready installation and removal for inspection and cleaning. All air required for combustion shall be supplied by a blower mounted integral to the burner. The gas train shall consist of a manual shutoff cock, main gas pressure regulator, main motorized gas valve, auxiliary solenoid gas valve, leak test cock and a butterfly type gas flow control valve.

The burner shall also include:

* Air Safety switch to prevent operation until sufficient combustion is achieved.

# Flame rod sensor or UV Scanner

* Gas electric pilot with 6000 volt ignition transformer.
* Field adjustable combustion air damper.

All control components shall be mounted and wired within an integral burner mounted control panel with an easy access lift off cover and a Power On and Main Fuel indicating lights and an On/Off control switch.

Units shall require only setting on floor with ready attachment to required power, suitably provided fuel, adequate venting, and appropriate water to operate.

**VI. TESTS**

Boilers shall be inspected via a hydrostatic test in the presence of a National Board Commissioned inspector who shall also certify a Data Report to be supplied with the boiler for ASME Code compliance. The boiler shall have a National Board Registration Number and an ASME symbol. Factory tests will also be conducted to check all controls on the boiler.

**VII. OPERATING MANUAL**

A manual detailing the Operations, Maintenance and Installation will be included with each boiler. A wiring diagram will also be included.

**VIII. WARRANTY**

Warranty shall include 1 year parts and workmanship; 2 years on pressure bound vessel. Boiler packages shall be as supplied by Superior Boiler Works, Inc. of Hutchinson, KS.