

**SECTION 15559: STEEL WATER TUBE BOILERS**  
**RECOMMENDED SPECIFICATIONS FOR PARKER DIRECT FIRED HOT WATER BOILERS**  
**GAS, OIL OR COMBINATION GAS/OIL FIRED OR PREMIX LOW NO<sub>x</sub>**

**PART I: GENERAL**

**1.01 PROCUREMENT SPECIFICATION FOR BOILER**

**1.02 DIVISION 16: ELECTRICAL**

**1.03 REFERENCES**

- A. ANSI Z21.13: Gas-Fired Low-Pressure Steam and Hot Water Boilers
- B. ASME SEC I: Boiler & Pressure Vessel Codes, Rules for Construction of Power Boilers
- C. ASME SEC IV: Boiler and Pressure Vessel Codes, Rules for Construction of Heating Boilers
- D. ASME SEC VIII: Boilers and Pressure Vessel Codes, Rules for Construction of Pressure Vessels
- E. CSA: Directory of Certified Appliances and Accessories
- F. Intertek Testing Laboratories (ETL)
- G. NFPA 54 (AGA Z223.1): National Fuel Gas Code
- H. NFPA 58: Storage and Handling of Liquefied Petroleum Gases
- I. NFPA 70: National Electrical Code
- J. UL 795: Gas and Oil Equipment Directory
- K. Title VIII: California Code of Regulations
- L. Underwriters' Laboratories, Inc. (UL) Listed Products, UL Standard 795, for Commercial Industrial Gas Heating Equipment

**1.04 QUALIFICATIONS**

- A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum twenty years experience.

**1.05 REGULATORY REQUIREMENTS**

- A. Conform to applicable code for internal wiring of factory wired equipment.
- B. Units: ETL or UL Certified as a Complete Gas Fired Boiler Assemblies.
- C. Gas Train shall comply with UL Standard 795 & ASME CSD-1.  FM Approved, or  IRI Approved Gas Trains are an option.
- D. Conform to ASME Section I & IV for boiler construction.
- E. Comply with local Air Quality Management District requirements. Local jurisdiction is \_\_\_\_\_.

**1.06 DELIVERY, STORAGE, RIGGING, MOVING, AND PROTECTION**

- A. Transport, handle, store, and protect products to point of delivery and receiving (by contractor).
- B. Coordinate shipping dates and off-loading requirements with installing contractor prior to shipment.
- C. Protect boilers and accessories before, during, and after installation from damage to casing (or any other related components) by leaving factory shipping packaging in place until immediately prior to final acceptance.

**1.07 WARRANTY**

- A. Manufacturer's Warranty: Provide non-prorated warranty for not less than 20-years against damage caused by thermal shock at all normal operating conditions.
- B. Provide a 5-year prorated warranty from the date of start-up or 15-mos. from ship date against defects in workmanship and materials on the pressure vessel.
- C. Provide a minimum 1-year Parts Warranty from date of start-up, or 15-months from ship date.

**201-5-I-VI Specifications****Page 2.****PART 2: EQUIPMENT****2.01 BOILERS****A. MANUFACTURER**

1. Parker Boiler Co., Model \_\_\_\_\_ Direct Fired Hot Water Boiler.

**B. MANUFACTURED UNITS**

1. The boiler shall be flexible bent steel, water tube design. The heater shall be fired with \_\_\_\_\_ fuel(s) , \_\_\_\_\_ BTUH input rating, \_\_\_\_\_ BTUH output rating, and shall be furnished complete and assembled, factory fired and tested with controls and trim, mounted and wired. Minimum heating surface of \_\_\_\_\_-square feet.
2. Electrical Characteristics as shown on drawings.

**C. CODES & STANDARDS**

1. The heater shall be manufactured in accordance with the ASME Section I & IV Code, and registered with The National Board of Boiler and Pressure Vessel Inspectors, for a minimum pressure of 125 PSI MAWP.. Relief valve to be furnished for \_\_\_\_\_ PSI pressure and operating controls for  240°F maximum temperature, or  350°F maximum temperature. Furnish with  "H" Stamp Section IV, or  "S" Stamp Section I.

All controls trim shall be in compliance with UL Standards. Power Gas, Oil and Combination Gas/Oil Boilers are furnished with a UL Listed Burner. The standard atmospheric natural gas fired hot water boiler shall be furnished as an Underwriters' Laboratories, Inc. Listed Gas Fired Boiler Assembly and displays this symbol on the nameplate. Canadian, Propane, Outdoor and Low NOx Models shall be C-ETL or ETL Listed Industrial and Commercial Gas Fired Packaged Boilers, certified to Can1-3.1 and UL795.

**D. CONSTRUCTION**

1. The boiler shall be of the bent water tube design with tubes Grade SA-53 steel minimum 1-5/16" O.D. and wall thickness minimum .133" welded to top and bottom headers with high tensile weld metal. End of Headers to have accessible inspection openings. Tubing shall be staggered to provide a minimum of 8-pass self-baffled heating surface and designed with down-comers to provide internal self-circulation. The tubes shall be of the bent design to permit free expansion and contraction. The boiler shall be mounted on a steel frame and enclosed in a heavy steel cabinet with controls mounted.
2. The cabinet shall consist of an inner and outer liner of minimum 16-gauge steel insulated with a high-temperature thermal fiber insulation minimum 1-1/2" thick. A minimum of one (1) inspection door shall be provided on the cabinet for accessibility to the burners and tubes. The cabinet shall be finished in an attractive baked enamel heat resistant finish for long-life protection.
3. The boiler shall be furnished complete with controls and trim to provide safe, efficient operation. standard trim items furnished with the boiler shall include electronic flame safety with electric ignition, draft hood or barometric damper, safety relief valves, temperature and pressure gauge, operating temperature control, manual reset high-limit temperature control and Warrick Probe type manual reset low water cutoff with test and reset buttons. The boiler shall be furnished with an enclosed boiler control panel with hinged door, boiler controls and main burner switch, and fuse for over-current protection. The Parker-Lite Sequence Indicator System with indicating lights shall be provided on boilers over 2.5 million BTUH, all Low NOx and power burners.

**2.02 CONTROLS & TRIM (Choose one (1) burner type ONLY):****A. ALL BOILERS**

1. All controls and trim shall be in compliance with UL Standard 795. The gas manifold shall include dual electric gas valves, gas pressure regulator, a main shut off valve and a leak test cock above 400,000 BTU. On boilers over 2.5 million BTUH provide primary motorized gas valve in addition to standard type and high and low manual reset gas pressure switches.

**B. ATMOSPHERIC BOILERS**

The burner shall be multiple cast iron atmospheric up-shot, self-aspiring burners with fixed orifice requiring no air adjustment. Type of firing shall be  on-off,  two-stage or  modulating. Burner shall be for standard natural gas, 950 to 1150 BTU content and rated at 4" W.C. pressure at burner. Standard trim items furnished with the boiler shall include electronic flame safety with electric ignition,  draft hood or  barometric damper with flue gas spill switch.

**C. POWER, GAS FIRED BOILERS**

The boiler shall be equipped with a gas burner, which is listed by Underwriters' Laboratories and displays the listing label. All controls and trim shall be in compliance with UL Standard 795. The burner shall be suitable for use with natural gas. The burner shall be complete with electronic flame safeguard, air pressure switch, blower motor and controls with modulating or two-stage firing over 700,000 BTUH. A gas pilot of the premix type with electric ignition shall provide reliable ignition. Gas Train components shall be similar to atmospheric natural gas.

**D. OIL FIRED BOILERS**

The boiler shall be equipped with an oil burner, which is listed by Underwriters' Laboratories and displays the listing label. All controls and trim shall be in compliance with UL Standard 296. The burner shall be the high pressure atomizing type approved for operation with A.S.T.M. D396 Commercial No. 2 Oil, and shall be complete with electronic flame safeguard with  direct electric spark ignition or with  gas pilot. Furnished with modulating or two-stage firing over 500,000 BTUH, two (2) main oil valves, oil pump, nozzles, blower motor and starter, air pressure switch control for automatic firing, provided as standard.

**E. COMBINATION GAS/OIL FIRED BOILERS**

The boiler shall be equipped with a combination gas/oil burner, which is listed by Underwriters' Laboratories and displays the listing label. All controls and trim shall be in compliance with UL Standards 296 and 795. The burner shall be suitable for use with either natural gas or oil, meeting standards of A.S.T.M. D396, Commercial No. 2 Oil. Fuel change-over shall be accomplished by a fuel selector switch. The burner shall be complete with electronic flame safeguard, oil pump with separate motor, nozzles, blower motor, oil pump, starter, and air pressure switch control for modulating or two-stage firing. A  gas pilot of the premix type or  direct spark pilot with electric ignition shall provide reliable ignition of both the gas and oil flame. Gas and oil train components shall be as stated in 5A and 5C.

**F. LOW NO<sub>x</sub> BURNERS FOR \_\_\_\_\_ PPM NO<sub>x</sub> (Specify If Required & Verify w/ Local APCD)**

The boiler shall incorporate a fan assisted combustion system with a burner bed of multiple Metal Fiber Burners. These burners shall be linked to a single fan through a gas air premix manifold. The premix burners shall provide a high degree of NO<sub>x</sub> level repeatability once system is adjusted. No filters shall be required.

The burners shall be capable of generating Low NO<sub>x</sub> without generating significant CO emissions. NO<sub>x</sub> emissions are guaranteed less than \_\_\_\_\_ PPM at 3% O<sub>2</sub> with CO emissions guaranteed less than \_\_\_\_\_ PPM @ 3% O<sub>2</sub>.

The burners shall consist of a Metal Fiber hot face made from a iron chromium alloy with a bonding Yttrium Element. The Metal Fiber shall be backed by a layer of 430 stainless steel and an additional perforated plate. The Metal Fiber Burners shall provide a high degree of resistance to mechanical and thermal shock, fast cool down and corrosion resistance. Maximum pressure drop through burner at normal firing rates shall be 1.25" W.C.

On boilers equipped with modulation or two stage firing and units over 970,000 BTUH, a blower mixer, which distributes a ratio-controlled gas/air mixture to the burners shall be utilized. Blower construction shall be non-sparking with totally enclosed motor. The gas air ratio shall be controlled through the throttling range by a characterizable fuel valve supplied as part of the blower mixer.

On boilers 970,000 BTUH input and below which are on/off fired provide single inlet blower. Housing shall be die cast aluminum with forward curve wheel. Gas shall be injected downstream of the blower. Air proving switch, blower starter and heat roll out switch shall be provided. Programming flame safeguard with interrupted pilot shall be provided.

**201-5-I-VI Specifications****Page 4.**

**Designer Note:** Delete items below which are not applicable for your project and/or add additional special trim as desired (consult factory).

**G. FACTORY TRIM OPTIONS**

1. California Code Trim
2. Parker Lite Sequence Indicator System (std. 2.5 MM BTU & above)
3. All-Limit Alarm 4" Bell
4. All-Limit Alarm Terminals (dry contacts)
5. Anchor Clips, 4 mounted and drilled
6. Remote start-stop relay (24 VAC in from EMCS)
7. Factory Mutual Gas Train (FM Trim)
8. IRI Gas Train (meets & exceeds FM Trim)
9. Inlet flow switch to automatically prevent burner operation when low flow through boiler
10. Weather protective cover/ outdoor trim for installation on non-combustible base
11. Non-combustible base shield
12. LPG firing (ETL Listed)
13. Additional operating control with LCD Display of sensed temperature, set point and differential, remote sensor and adjustable differential from minimum 1°F to Maximum 35°F
14. Built in "R" High Efficiency Finned Tube Convective Section. "R" Coil to be built into boiler cabinet and consist of U-Finned Tubes, providing two (2) additional flue gas passes. Water inlet to be on front of boiler. The finned pipe shall be steel SA Pipe 1.05" OD, .113" wall with ½" high fins at 4.5 FPI.
15.  Draft Hood or  Barometric Damper (specify Vertical or Horizontal Mounting Position when using barometric damper)

**NOTE:**

Additional required equipment for an operable hot water system is required. See Sections \_\_\_\_\_ for pumps(s), expansion tank, air separators, pot feeders, and other accessories.

**2.03 PERFORMANCE**

Performance rating shall be in accordance with UL Testing and Rating Standard.

**2.04 VENTING**

Boilers equipped with draft hoods or "R" Coils are suitable for UL Listed Type "B" Vent System. Units with Barometric Damper require UL Listed Chimney. Venting materials by installing contractor.

**PART 3: EXECUTION****3.01 MANUFACTURER'S OR MANUFACTURER'S REP FIELD SERVICES**

- A. The manufacturer or manufacturer's rep shall provide factory-trained technicians to properly start-up the equipment for maximum performance. Boiler shall be started and tested throughout entire firing range. Systems shall be tested in the presence of the designated owner's representative to demonstrate the system operation. Provide start-up report to the owner.
- B. Instruct operating personnel in operation and maintenance of units.