



Portage Public Schools, Portage, Michigan is soliciting sealed proposals for:

Project Name: PCEC Boiler Purchase - Project #20412

RFP ISSUE DATE: Wednesday, March 1st, 2017

PROPOSAL DUE: Wednesday, March 15th, 2017 - 1:00 PM

Number of Copies Required: 2 (Two) paper, 1 (One) PDF on flash drive

Facsimile/Email Proposals Will Not Be Accepted

DELIVERY ADDRESS & INSTRUCTIONS

Portage Public Schools
Purchasing Department
8107 Mustang Drive
Portage, MI 49002

Bids will be publicly opened and read at the above address.

Include on the Envelope the Project Name (above). All Envelopes Must Be Sealed.

General questions regarding the submission of this RFP should be directed to:

Karen Dentler, Purchasing Agent, at (269) 323-5181 or kdentler@portageps.org.

****Addendums (if any), bid tabulations, and award notices will be posted on our website: www.portageps.org under the District tab, then under Bids & Proposals.***

Questions relative to the Technical Specification may be addressed to:

David Skinner, Project Manager, Walbridge, at (269) 330-2550 or dskinner@walbridge.com

You are invited to submit a proposal for this equipment and or service. Specifications, terms, conditions and instructions for submitting proposals are contained herein. This Request for Proposal with all pages, documents and attachments contained herein, or subsequently added to and made a part hereof, submitted as a fully and properly executed proposal shall constitute the contract between the District and the successful proposer when approved and accepted on behalf of the District by an authorized official or agent of the District.

All proposers shall complete and return the Proposal and Award page(s) and submit all information requested herein in order for a proposal to be responsive. **FAILURE TO DO SO MAY RESULT IN THE PROPOSAL BEING REJECTED AS NON-RESPONSIVE.** The proposal document shall be returned in its entirety, in a properly identified and sealed envelope to the Purchasing Department at the above address. **PROPOSALS MUST BE RECEIVED BY TIME OF THE DUE DATE - LATE PROPOSALS WILL NOT BE CONSIDERED.**

Instructions to Proposers:

1. **EXAMINATION OF PROPOSAL DOCUMENT**-Before submitting a proposal, proposers shall carefully examine the specifications and shall fully inform themselves as to all existing conditions and limitations. The proposer shall indicate in the proposal the sum to cover the cost of all items included on the proposal form.
2. **PREPARATION OF PROPOSAL**-The proposal shall be legibly prepared in ink or typed. The proposal shall be legally signed and the complete address of the proposer given thereon. All proposals shall be tightly sealed and plainly marked SEALED PROPOSAL and identified by project name, bid opening date and time. Proposals opened by mistake, due to improper identification, will be so documented and resealed. The Purchasing Department will maintain and guarantee confidentiality of the contents until the specified opening date and time. Facsimile and/or e-mailed bids will not be accepted. The PDF version of the proposal must contain all documents, specification sheets, required forms, etc., contained in the paper copies.
3. **LATE PROPOSALS**-Any proposal received at the office designated hereinafter the exact time specified for receipt, will not be considered. (Note: The District reserves the right to consider bids that have been determined by the District to be received late due to mishandling by the District, or circumstances beyond the control of the proposer, after receipt of the proposal and before an award has been made.)
4. **ADDITIONAL CHARGES** - No additional charges, other than those listed on the price breakdown sheets, shall be made. Prices quoted will include verification/coordination of order and all costs for shipping and insurance costs.
5. **DISCOUNTS** - List any discounts that may be applicable from programs such as MiDEAL, US Commodities, etc. Note the District will apply for eRate funding where appropriate. Awarded proposers are expected to participate in eRate funding.
6. **FEDERAL OR STATE SALES, EXCISE, OR USE TAXES** - Portage Public School is tax exempt. Do not include Federal, State, or Local taxes in your bid price except as related to enhancements to real property.
7. **ACCEPTANCE OF PROPOSALS** - Portage Public Schools reserves the right to accept or reject any or all bids, either in whole or in part; to award contract to other than low bidder; to waive any irregularities and/or informalities; and in general to make awards in any manner deemed to be in the best interest of Portage Public Schools.

1. RFP Requirements

1.1. Product/Vendor

All equipment provided shall be new and of the specifications listed in Section 235239 of this RFP.

1.2. Order Fulfillment

It is expected that a single purchase order for the entire purchase will be issued the week of March 27th, 2017.

1.3. Freight

The base bid must include all freight charges for delivery of equipment to Portage Public Schools. Delivery will be to a single location.

1.4. Alternate Proposals

Any alternate proposals will be considered. Any equipment included in alternate bids must completely meet the specifications of the requested product. Alternates must be reported with unit pricing and in the same format as the main part of the RFP.

1.5. RFP Response

All responses must have pricing information submitted on the included forms. Full product literature must be included with your response. Estimated delivery time must be included in your response.

1.6. Bid Pricing

Bid responses, pricing, etc. must be valid for 90 days after the bid response due date and time, or the length of the contract if so applicable and specified.

GENERAL CONDITIONS

Portage Public Schools reserves the right to accept or reject any or all bids or partial bids, to accept a bid that is not low bid, etc. based on what is determined to be in the best interest of the Portage Public School district.

PPS shall familiarize himself/herself with and follow Manufacturer's recommended guidelines for maintenance and cleaning.

A representative from the vendor will accept any/all items being delivered. This representative will inform the Owner of missing or damaged items. All paperwork noting condition of items will come to the Portage Public Schools Purchasing office.

PPS shall conduct a final inspection of all merchandise ordered to assure that all items meet specifications, are in new and undamaged condition, are assembled or installed properly and placed in their properly designated locations.

CONTRACTOR RESPONSIBILITIES

The Contractor is defined as:

The bidder(s) awarded the contract(s) to provide, deliver, and/or install items and train staff on machinery or product use at the project location(s) detailed in Instructions to Bidders.

WARRANTIES

The Contractor shall provide written documentation from the Manufacturer, which guarantees items against defects in materials, manufacture and workmanship for a specified warranty length of time from the day of final settlement with Owner for the item. Final settlement shall not relieve the Manufacturer from liability for such defects, and upon notification from Owner, the Contractor or Manufacturer shall, by repair, replacement, or otherwise, place the item in a condition satisfactory to the Owner in every respect. Usual wear and tear and results of Owner's accidents are exempted from the requirements of this guarantee. Everything required to fulfill this guarantee shall be done without additional cost to the Owner. The products or workmanship of any Subcontractor are to be covered in the primary Manufacturer's guarantee.

DELIVERY AND INSTALLATION SCHEDULES

Contractor shall guarantee delivery between 8:00 a.m. and 3:00 p.m. Monday, through Friday.

It is the Contractor's responsibility to receive items delivered from the Manufacturer and to deliver those furnishings to the job site(s) at the time of installation. Drop shipping is unacceptable and if it occurs, will result in a deduction in the Contractor's contract price in the amount of cost incurred by the Owner or Owner's representative receiving and handling the drop shipment.

PAYMENT TERMS

Upon final approval from the Owner, based on substantial completion of the punch list items, final and complete payment will be made.

Send all invoices directly to:
Portage, MI 49002.

Mary Caswell, Portage Public Schools, 8107 Mustang Drive,

NO ADVERTISING CLAUSE

No written publication or photographs will be allowed without written approval of Portage Public Schools.

SECTION 235239 - FIRE-TUBE BOILERS (PURCHASE & DELIVERY ONLY)

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes the supply and delivery for a factory-fabricated, -assembled, and -tested, horizontal, fire-tube boilers with heat exchanger sealed pressure tight, built on a steel base; including insulated jacket, flue-gas vent, trim, accessories and controls for generating steam.
 - 1. Quantity of Boilers: 1 (one)
 - 2. Factory-assembled boiler shall be capable of entering the mechanical space through an existing 73"wide x 80" high opening (existing double-doors). Any field assembly of boiler components by a manufacturer's representative, necessary to meet existing opening dimensions, shall be included. Coordinate with Owner's mechanical contractor.
- B. The boiler will be rigged and installed by others under a separate contract.
- C. As part of the boiler purchase agreement, a manufacturer's certified representative shall provide installation checks, startup and operational testing services and training of the Owner's personnel.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product include the following:
 - 1. Construction details, material descriptions, dimensions, and weights of individual components, profiles, and finishes for boilers.
 - 2. Rated capacities, operating characteristics, and furnished specialties and accessories.
 - 3. Predicted boiler efficiency while operating at design capacity and at varying part loads with basis indicated.
 - 4. Calculations showing predicted surface temperature of boiler jacket with basis indicated.
 - 5. Dimensioned location of low, high, and normal water level, showing operating set point and each alarm set point.
 - 6. Temperature and pressure rating, size, and materials of construction for boiler trim components, including piping, fittings, flanges, unions, and valves. Provide valve manufacturer's product data for each valve furnished. For safety valves, include trip and reset settings and flow capacity.
- B. Shop Drawings: For boilers, boiler trim, and accessories.
 - 1. Include plans, elevations, sections, and mounting details.
 - 2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 3. Include diagrams for power, signal, and control wiring. Differentiate between factory and field installation.
 - 4. Include piping diagrams of factory-furnished piping that indicate size and each piping component.

1.3 INFORMATIONAL SUBMITTALS

- A. Installation instructions.
- B. Field quality-control reports.
- C. Sample Warranty: For special warranty.

- D. ASME Stamp Certification and Report: Submit "A," "S," or "PP" stamp certificate of authorization, as required by authorities having jurisdiction, and document hydrostatic testing of piping external to boiler.
- E. Startup service reports.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For boilers, components, and accessories to include in emergency, operation, and maintenance manuals.
- B. Spare Parts List: Recommended spare parts list with quantity for each.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Ship boilers from the factory free of water. Drain water and blow dry with compressed air if required to remove all water before shipping.
- B. Cover and protect flue, electrical controls, and piping connections before shipping. Protect and seal openings and connections with blinds, caps, plugs, and other materials during delivery, storage, and handling.
- C. Protect boiler components with removable temporary enclosures to prevent damage during shipping, storage, and installation.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace front- and rear-door refractories and heat exchangers of boilers that fail in materials or workmanship within specified warranty period.
 - 1. Horizontal Fire-Tube Boilers: Refractory in front and rear doors, 10 years from date of startup by factory-authorized personnel.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Gas-Fired Boiler Emissions: Not to exceed allowable ambient air quality standards in governing jurisdiction and indicated values.
 - 1. Carbon monoxide:
 - a. 50 parts per million at any point from 100 percent to 50 percent fire.
 - b. 150 parts per million at any point below 50percent fire.
 - 2. Nitrogen compounds: 30 parts per million (dry volume basis and corrected to 3 percent oxygen) at any point from 100 percent to low fire.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. ASME Compliance: Fabricate and label boilers to comply with 2010 ASME Boiler and Pressure Vessel Code.
- D. ASHRAE/IES 90.1 Compliance: Boilers shall have minimum efficiency according to "Gas and Oil Fired Boilers - Minimum Efficiency Requirements."
- E. UL Compliance: Test Boilers for compliance with UL 795. Boilers shall be listed and labeled by a testing agency acceptable to authorities having jurisdiction.

2.2 HORIZONTAL FIRE-TUBE BOILERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Clever-Brooks. Model # CB700-80-15-ST780
 - 2. Hurst Boiler. Model # LPX80
 - 3. Johnston Boiler. Model # PFTJ80-4
- B. Pressure Vessel Design: Dry or water back design with the following:
 - 1. Two or Four passes.
 - 2. Minimum Heat-Exchanger Surface: As required to achieve performance indicated.
 - 3. Provisions for lifting boiler in-place.
- C. Base:
 - 1. Factory-mounted pressure vessel and other boiler components on steel saddles or supports that are fastened securely to a structural steel base that is constructed to make a complete self-supported unit requiring only a flat level surface for support.
 - 2. Base included with attachments if required to secure boiler to structure.
 - 3. Manufacturer's standard provisions for lifting include the following.
 - a. Designed for handling and installation conditions encountered.
 - b. Sufficient to carry total weight of fully assembled boiler with a safety factor of 1.2.
- D. Shell:
 - 1. Horizontal, steel pressure vessel of size to satisfy performance requirements indicated.
 - 2. Manholes and Handholes:
 - a. Manhole for waterside inspection and access.
 - b. Handholes at front and rear of boiler for waterside inspections.
 - c. According to 2010 ASME Boiler and Pressure Vessel Code.
 - 3. Steam Boilers:
 - a. Connections for steam supply, feed water, level controls, and chemical treatment.
 - b. Baffle in shell below steam outlet to provide dry steam with no water carry over.
 - c. Bottom and surface blowdown connections.
 - d. Connections with safety relief valve(s).
 - e. Connections for other trim indicated.
- E. Furnace:
 - 1. Welded steel chamber that is welded to steel tube sheets.
 - 2. Arranged to provide uniform heat distribution under all firing conditions with no flame impingement on any refractory-covered or water backed surface.
 - 3. Surrounded by water without interfering with natural circulation of water within shell.
 - 4. Positioned from shell to inhibit unequal thermal stresses during operation.
- F. Fire Tubes:
 - 1. Steel, seamless or resistance welded.
 - 2. Fitted in accurately sized holes in tube sheets and rolled or welded in place.
 - 3. Aligned to prevent noticeable deformation with undue stress when boiler is put in service.
 - 4. Tube and tube sheet assembly shall be water- and gastight.
 - 5. Arranged not to interfere with natural circulation of water in shell or to inhibit cleaning and flushing of water sides.
 - 6. Readily removable from one end of boiler.
- G. Flue:
 - 1. Flanged connection located along top centerline of boiler and capable of supporting a field-installed flue stack with a weight of at least 2,000 lb.
 - 2. Equip boiler flue with bimetal thermometer in a stainless-steel case, with angle position adjustment and nominal 5-inch diameter face having a graduated scale and range of

approximately 1.5 times the outlet temperature. Mount thermometer in a Type 316 stainless-steel thermo-well that is located in a visible location to indicate flue-gas temperature.

H. Front and Rear Doors:

1. Bolted, Hinged or Davited, sealed with heat-resistant gaskets and fastened with lugs and cap screws.
2. Designed so tube sheets and flues are fully accessible for inspection or cleaning when doors are open without the need to disconnect burner, blower, and fuel piping.
3. Include observation ports in doors at both ends of boiler for inspection of flame conditions.
4. Door refractory and insulation shall be accessible for inspection and maintenance.
5. Reinforce doors of dry back boilers to limit deflection due to thermal stresses and burner combustion pulsations to prevent progressive cracking and loosening of refractory.

I. Refractories:

1. Refractories retained shall withstand temperature occurring under maximum load conditions.
2. Formed or cast-in sections shall be easily replaceable through factory openings.
3. Secure refractory sections in position to withstand vibration and shock occurring during shipment, and to withstand burner combustion pulsations.
4. Where used for the burner combustion ring and rear or target baffle, refractories shall have a parametric cone equivalent of not less than 33.
5. Provide refractory for doors and end covers exposed to temperatures of 600 deg F and higher.

J. Insulation:

1. Minimum 2-inch thick, mineral-fiber insulation surrounding the boiler shell and secured in place to prevent sagging or displacement.
2. Insulation of sufficient density or attached with reinforcement to prevent permanent deformation of protective jacket when subjected to an impact force and forces associated with service personnel walking, kneeling, and laying on boiler while performing service.
3. Insulating value sufficient to limit exterior surface temperature of pressure vessel jacket, doors, and end covers while operating in an ambient environment.

K. Jacket: Sheet metal, with factory-applied protective finish.

1. Nominal Thickness: Not less than 0.030 inch
2. Preformed shape to follow a smooth and uniform contour of pressure vessel and encapsulating insulation.
3. Consisting of multiple removable sections attached with corrosion-resistant screw-fasteners to facilitate removal and replacement multiple times.
4. Painted after assembly.

2.3 BURNER

A. Burner designed to fire gas.

B. Welded construction with multi-vane, stainless-steel, flame-retention diffuser.

C. Mount burner to permit unrestricted access to combustion chamber.

D. Burner Operation: full modulating control to return to low-fire position for ignition.

1. Gas-Fired Burner: 4 to 1 turndown.

2. A lesser turndown shall be considered if published factory performance testing shows no loss in operating performance and no negative impact on service life and maintenance while operating throughout full range of system operating conditions encountered.

E. Gas Pilot: Premix type with automatic electric ignition, complete with electronic flame scanner to monitor the pilot, so primary fuel valve cannot open until pilot flame has been established.

F. Manual adjustments not required to operate at varying loads.

G. Performance shall be repeatable after changes in firing rate.

H. Damper: Designed to provide accurate control of combustion air with minimum hysteresis. Damper shall close when boiler is off.

2.4 BLOWER

A. Combustion air supplied by a forced-draft blower assembly that is isolated to reduce vibration and noise.

B. Mount blower integral to burner or on hinged front access door to permit unrestricted access to combustion chamber.

C. Centrifugal type, with a forward-curve, backward-inclined airfoil or radial blade wheel.

D. Blower assembly shall be controlled through boiler's integral controls in response boiler manufacturer's prescribed sequence of operation that is coordinated with burner and fuel train to achieve performance indicated.

E. Blower Motor:

1. Motor Sizes: Minimum size as indicated and large enough so driven load does not require motor to operate in service factor.

F. Blower Drive Assembly: Direct drive.

2.5 GAS TRAIN

A. Control devices and sequence shall comply with ASME CSD-1 requirements.

B. Main gas piping train shall include:

1. Threaded pressure tapping with threaded plug upstream and downstream of valve and regulator.

2. One manually operated, lubricated plug cock, ball valve, or butterfly valve upstream and downstream of all valves and accessories.

3. One main pressure regulator with vent.

4. Primary and secondary automatic valves to operate simultaneously.

5. Manually operated gas valve with threaded plug located downstream of both automatic gas valves to permit leakage testing.

6. Normally open, full port electrically operated valve in a vent pipe connected between automatic valves.

7. Pressure gage with isolation valve located upstream and downstream of pressure regulator and at inlet to burner. Nominal 2-inch diameter face with graduated scale to indicate gas pressure. Gage shall have normal operating pressure of about 50 percent of full range.

8. Proof of closure switch for each motor-operated valve and pressure regulator.

- 9. Low-gas-pressure and high-gas-pressure switch.
- C. Main gas valves shall be wired to close automatically in the event of power failure, low water level, or any safety shutdown condition.
- D. Mount pilot and main gas trains on side of boiler and support from boiler base.

2.6 FLUE-GAS RECIRCULATION

- A. Equip boiler with packaged flue-gas recirculation system if required to satisfy emission requirements.
 - 1. Complete package integrating burner, combustion-air blower and damper, fuel train, and controls. Provide interconnecting external ducting if required by manufacturer's design.

2.7 TRIM

- A. Include devices sized to comply with ASME B31.1.
- B. Pressure Controllers: Operating, firing rate, and high limit.
- C. Safety Relief Valve:
 - 1. Size and Capacity: As required for equipment according to 2010 ASME Boiler and Pressure Vessel Code.
 - 2. Description: Fully enclosed steel spring with adjustable pressure range and positive shutoff; factory set and sealed.
 - a. Drip-Pan Elbow: Cast iron and having flanged or threaded inlet and outlet with threads complying with ASME B1.20.1.
- D. Pressure Gage: Nominal 4-inch diameter face with graduated scale and siphon, with isolation valve to indicate pressure vessel steam pressure. Gage shall have boiler normal operating pressure of about 50 percent of full range and an accuracy of 1 percent.
- E. Water Column: Minimum 12-inch glass gage with gage rods to protect glass, ball check and shutoff cocks, water column blowdown valves, and vacuum breaker. Midpoint of gage shall be at normal operating water level.
- F. Bottom Blowdown Valves: Factory-installed, duty-rated, slow-acting blowdown valves and interconnecting piping same size as boiler nozzle.
- G. Surface Blowdown Valves: Factory-installed, duty-rated isolation valves and interconnecting piping. In addition, provide electrically operated control valve, duty rated, to control total dissolved solids (TDS) through boiler controls.
- H. Stop Valves: Boiler outlets, except safety relief valves, shall be equipped with duty-rated stop valve in an accessible location as near as is practical to boiler nozzle and same size or larger than nozzle. Valves larger than NPS 2 shall have rising stem.
- I. Stop-Check Valves: Factory-installed, duty-rated stop-check valve and stop valve at boiler outlet with free-blow drain valve field installed between the two valves and visible when operating stop-check valve.
- J. Feedwater Valves: Factory-installed, duty-rated stop and check valves and interconnecting piping. Stop valves larger than NPS 2 shall have rising stem.

2.8 CONTROLS

- A. Boiler operating controls shall include the following devices and features:

1. Electric, factory-fabricated and field-installed panel to control burner firing rate to maintain steam pressure set point.
 2. Control transformer(s) with fuse protection, as required by manufacturer, to implement requirements indicated. Provide transformer with 25 percent spare capacity.
 3. Set-Point Adjust: Operating and alarm set points shall be field adjustable.
- B. Pressure Control for Steam Boilers:
1. Operating-Pressure Control: Factory wired and mounted to control boiler to maintain boiler at constant pressure within 2 percent of set point.
 2. High-Pressure Cutoff with Automatic Reset: Control stops burner if operating conditions rise above normal operating-pressure set point. Set point shall be adjustable.
 3. High-Pressure Cutoff with Manual Reset: Control stops burner operation upon reaching adjustable high limit set point that is below safety valve setting.
- C. Water-Level Control for Steam Boilers:
1. Operating Water-Level Control: Cycle feedwater pump(s) for water-level control.
 2. Low-Water Cutoff Switch: Float and electronic probe shall prevent burner operation on low water. Cutoff switch shall be automatic-reset type.
 3. Auxiliary Low-Water Cutoff Switch: Float and electronic probe shall prevent burner operation on low-water alarm limit. Cutoff switch shall be manual-reset type.
 4. Microprocessor-based control.
 5. Visual indication of level, alarms, and errors through alphanumeric display.
 6. Features:
 - a. Low-water cutoff and alarm.
 - b. Low- and high-water warning.
 - c. Control of feedwater pump.
 - d. Column blowdown detection and reminder.
 - e. Auxiliary low-water cutoff check.
 - f. Auto and manual reset.
 - g. Alarm annunciation.
- D. Boiler Emergency Shutdown: Interlock with field-installed boiler emergency shutdown switch to shut down boiler when activated. Manufacturer to furnish break-glass-type switch with permanent nameplate titled "Boiler Emergency Shutdown" for field installation.
- E. Chemical Feed System Interface: Dry contacts to interface control and operation of chemical feed pump.
- F. Burner Safety Controls for Steam Boilers: To maintain safe operating conditions, burner safety controls limit burner operation.
1. High Cutoff: Automatic and Manual reset stops burner if operating conditions rise above maximum boiler operating pressure.
 2. Low-Water Cutoff Switch: Float and electronic probe shall prevent burner operation on low water. Cutoff switch shall be automatic-reset type.
 3. Auxiliary Low-Water Cutoff Switch: Float and electronic probe shall prevent burner operation on low-water alarm limit. Cutoff switch shall be manual-reset type.
 4. Audible Alarm: Factory mounted on control panel with silence switch; shall sound alarm for above conditions.
- G. Burner Flame Safeguard Controls:
1. Factory equipped with flame safeguard control and infrared flame scanner.
 2. Microprocessor-based, solid-state control having sequence and flame-on visual indication and fault code indications of flame safeguard trip functions.
 3. Control shall have a fixed operating sequence incapable of being manually altered that includes start, prepurge, pilot and main fuel ignition run, and postpurge cycles.

4. Control shall be nonrecycle type for maximum safety that shall shut down the burner and indicate, as a minimum, the following trip functions:
 - a. Pilot and main flame failure.
 - b. High- and low-fire proving switch faults.
 - c. Running interlocks open.
 - d. False flame signal and fuel valve open.
5. Control shall include a run/test switch to allow interruptions to sequence just after prepurge and during pilot ignition trial, and run cycles for adjustments to firing rate motor, damper linkages, and pilot flame for minimum turndown tests.

H. Oxygen Trim Control:

1. Provide oxygen trim parallel positioning system to continuously monitor and display oxygen concentrations in boiler flue gas and adjust fuel and airflow to maintain an adjustable oxygen-level set point.

I. Surface Blowdown Control: Provide a conductivity sensor and control circuitry to operate an automatic control valve in surface blowdown piping to maintain total dissolved solids (TDS) within boiler manufacturer's prescribed level.

J. Building Automation System (BAS) Interface: Factory install hardware and software to enable system to monitor, control, and display boiler status and alarms.

1. Hardwired I/O Points:
 - a. Monitoring: On/off status, common trouble alarm, and low-water-level alarm.
 - b. Control: On/off operation, steam pressure adjustment.

K. Integrated Boiler-Control System:

1. Integral control of burner management for flame safety, boiler modulation, and operator interface functions with features and functions indicated.
2. Factory preconfigured.
3. Utilizing solid-state controls and sensors to provide various control functions, including the following:
 - a. Automatic sequencing of the boiler through standby, prepurge, pilot flame establishing period, main flame establishing period, run, flame proving and lockout, and postpurge.
 - b. Full modulating control of air and fuel through Proportional-Integral-Derivative (PID) algorithm.
 - c. Thermal shock protection.
 - d. High and low limit alarms and shutdowns.

L. Control Enclosures:

1. NEMA 250, Type 1.
2. Wiring shall be numbered and color-coded to match wiring diagram.
3. Mounted on boiler assembly at a location convenient to operator.
4. Provide hinged full-size door with key lock. Provide common key for all locks.
5. Enclosure shall consist of multiple sections divided by a partition with a separate hinged door for each section. One section shall house low-voltage controls and other section shall house line voltage controls.
6. Enclosure shall house the following:
 - a. Control transformers with fuses.
 - b. Labeled terminal strips.
 - c. Controller(s) to provide control and alarm functions indicated.
 - d. Audible indication of safety alarms.
7. Face of enclosure shall provide the following:
 - a. Visual indication of operating components and alarms.
 - b. Auto/local capability to allow operator to manually operate boiler locally.
 - c. Audible alarm-silence capability.
 - d. Labels for switches, lights, and displays to provide clear indication of service.

- M. Control Cable and Wire:
 - 1. Control cable and wiring shall be numbered and color-coded to match wiring diagram.
 - 2. Install cable and wiring located outside of enclosure(s) in a metal raceway. Use flexible conduit to make final terminations. Provide watertight installation for applications exposed to moisture.

2.9 ELECTRICAL POWER

- A. Single-Point Field Power Connection: Factory-installed and -wired switches, motor controllers, transformers, and other electrical devices necessary shall provide a single-point field power connection to boiler.
 - 1. Enclosure: NEMA 250, Type 1.
 - 2. Wiring shall be numbered and color-coded to match wiring diagram.
 - 3. Install wiring outside of an enclosure in a metal raceway. Make final connections to motors using flexible conduit.
 - 4. Field power interface shall be to fused disconnect switch.
 - 5. Provide each motor with overcurrent protection.

2.10 CAPACITIES AND CHARACTERISTICS

- A. Heating Medium: Steam.
- B. Design Pressure Rating: 15 psig.
- C. Safety Relief Valve Setting: 15 psig.
- D. Steam Operating Pressure: 10 psig.
- E. Steam-Flow Rate: 2,760 lb/h @ 212-deg F.
- F. Fuel-to-Steam Efficiency: 80 percent.
- G. Number of Passes: Two or Four.
- H. Gas Input: 3,348 MBh.
- I. Gas Pressure: 0.5 psig.
- J. Output Capacity: 2,678 MBh.
- K. Burner Blower:
 - 1. Motor Horsepower: 2 hp.
- L. Electrical Characteristics:
 - 1. Volts: 208 V.
 - 2. Phase: Three.
 - 3. Hertz: 60 Hz.

2.11 SOURCE QUALITY CONTROL

- A. Test and inspect factory-assembled boilers, before shipping, according to 2010 ASME Boiler and Pressure Vessel Code.

- B. Burner and Hydrostatic Test:
 - 1. Factory adjust burner to eliminate excess oxygen, carbon dioxide, oxides of nitrogen emissions, and carbon monoxide in flue gas and to achieve performance requirements indicated.
 - 2. Perform hydrostatic test of pressure vessel, piping, and trim of assembled boiler.

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

- A. The purchase of the boiler shall include start-up service by a manufacturer's representative after installation has been done. Installation will be a separate RFP issued at a later date.
- B. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.2 DEMONSTRATION

- A. Train owner's maintenance personnel to adjust, operate, and maintain boilers.

End of Section 235239.

BID PROPOSAL FORM

(Pages 15 – 18)

NAME OF BIDDER

Firm Name: _____
Address: _____
Telephone &
Fax: _____
Contact Name
and E-mail: _____

PROJECT NAME

Project Name: 20412 – PCEC Boiler Purchase

AGREEMENTS

The Owner reserves the right to accept or reject any or all Bids in whole or in part, or to waive any informalities therein. If in the Owner's opinion it is in their best interest, the contract may be awarded to other than the lowest bidder, for reasons of establishing uniformity, delivery time, etc.

The undersigned acknowledges the following are included with the Bid Proposal Form:
(please initial)

Detailed Product Specification Information (where applicable): _____

Warranty Specification Information (where applicable): _____

Two (2) paper copies: _____

One (1) PDF of the Entire Proposal (including all materials in paper copies): _____

One (1) Boiler: BRAND _____ MODEL _____

TOTAL DELIVERED COST _____

ESTIMATED DELIVER TIME AFTER RECEIPT OF ORDER _____

LEGAL STATUS OF BIDDER

CERTIFICATION REGARDING DEBARMENT, SUSPENSION, AND OTHER RESPONSIBILITY MATTERS. The Vendor and/or Bidder certifies to the best of its knowledge and belief that it and its principals: Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency; Have not within a three-year period preceding this agreement been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of federal or state antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property; Are not presently indicted for or otherwise criminally or civilly charged by a government entity (Federal, State, or local) with commission of any of the offences enumerated above in this certification; and Have not within a three-year period preceding this agreement had one or more public transactions (Federal, State, or local) terminated for cause or default; is not now or has been, within a three-year period preceding this date, been listed on the Excluded Parties List System website (EPLS).

Firm Name: _____

Name, title and signature of individual duly authorized to execute contracts:

Name: _____

Title: _____

Signature: _____

A Corporation organized and existing under the laws of the State of _____.

PORTAGE AFFILIATION (If it pertains):

Do you maintain a permanent office, factory, or other facility in Allegan, Barry, Branch, Calhoun, Cass, Kalamazoo, St. Joseph, or Van Buren counties with employees working in any of these counties? If yes, please provide the address:

Have you paid real or personal property taxes relating to said business in the previous tax year?

IRAN ECONOMIC SANCTIONS ACT

Effective April 1, 2013 all bids, proposals, and/or qualification statements received in the State of Michigan (MCL 129.313) must comply with the "Iran Economic Sanctions Act". The following certification is to be signed and included at the time of submittal.

CERTIFICATION

Pursuant to the Michigan Iran Economic Sanctions Act, 2012 P.A. 517, by submitting a bid, proposal or response, Respondent certifies, under civil penalty for false certification, that it is fully eligible to do so under law and that it is not an "Iran linked business", as that term is defined in the Act.

_____ Signature	_____ Title
_____ Company	_____ Date

FAMILIAL RELATIONSHIP DISCLOSURE STATEMENT

As required by Public Act 232 of 2005, all bids shall be accompanied by a sworn and notarized statement disclosing any familial relationship that exists between the owner or any employee of the bidder and any employee of the Portage Public School District or member of the Portage Public Schools Board of Education. The Board of Education shall not accept a bid that does not include this sworn and notarized disclosure statement.

The undersigned, the owner or authorized officer of _____(the "Bidder"), pursuant to the familial disclosure requirement provided in the Portage Public Schools advertisement for construction bids, hereby represent and warrant, except as provided below, that no familial relationships exist between the owner(s) or any employee of the company and any employee of the Portage Public School District or member of the Portage Public Schools Board of Education. If such a relationship exists, please explain:

Attach additional pages if necessary

By: _____(Bidder Signature)

Title: _____(type or print)

Date: _____

Subscribed and Sworn to Before Me:

This _____ day of _____, 20____A.D., in and for the

County of _____, Michigan.

My Commission expires _____.

Signature of Notary



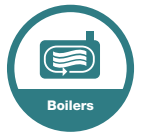
CB

MODEL

**15 - 100 HORSEPOWER
COMBINATION GAS/OIL FIRING**

THE MODEL CB

Offering easy installation, operation and maintenance.

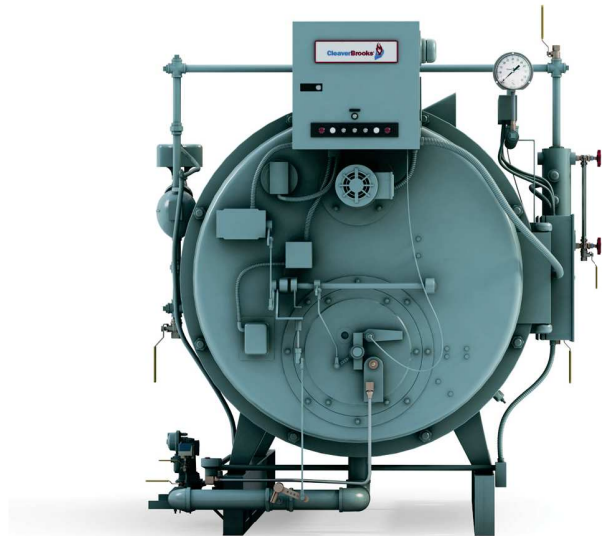


The Cleaver-Brooks Model CB firetube boiler is an integrated package with components designed to work together seamlessly and provide a single source solution with optimal safety, ease of maintenance, and low emissions. The model CB options include:

- Steam or hot water
- 15 to 100 HP
- Natural gas, #2 and #6 oil, combination
- 15 to 250+ psig on steam, 30 to 125 psig on hot water

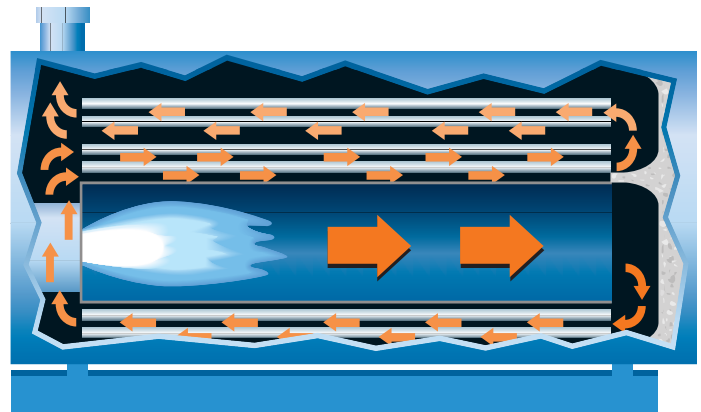
The CB dryback design includes 5 square feet of heating surface per boiler horsepower with maximum guaranteed efficiencies.

This package includes a pressure vessel, integral burner, and controls, including our LevelMaster low-water control on high-pressure steam units. The Hawk control can be added to further enhance your package.



FOUR PASS INTEGRAL DESIGN

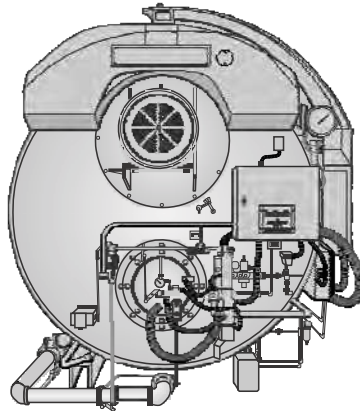
- Dryback boiler design
- Integral front head burner
- Maintains velocities
- Optimal radiant & convective heat transfer
- Saving energy
- Firing capability of gas and oil saves operating costs



Packaged Boiler Systems
221 Law Street • Thomasville, GA 31792 USA
800.250.5883 • info@cleaverbrooks.com
cleaverbrooks.com

MODEL CB BOILERS 15-100 HP

DIMENSIONS AND RATINGS



- Dimensions and ratings for the Model CB boilers are shown in the following tables and illustrations:
- Table A6-1. Model CB Steam Boiler Ratings (15 thru 100 hp)
- Table A6-2. Model CB Hot Water Boiler Ratings (15 thru 100 hp)
- Table A6-3. Safety Valve Openings
- Table A6-4. Relief Valve Openings
- Figure A6-1. Model CB Steam Boiler Dimensions (15 and 150 lb design pressure) (15 thru 100 hp)
- Figure A6-2 Model CB Hot Water Boiler Dimensions (15 and 150 lb design pressure) (15 thru 100 hp)
- Figure A6-3. Space Required to Open Rear Head on Model CB Boilers Equipped with Davits
- Figure A6-4. Model CB Boiler Mounting PiersL
- Figure A6-5. Lifting Lug Locations, Model CB Boilers

Table A6-1. Model CB Steam Boiler Ratings (15 - 100 hp)

BOILER HP	15 ^c	20 ^c	30 ^c	40 ^c	50	60	70	80	100
RATINGS - SEA LEVEL TO 3000 FT									
Rated Cap. (lbs steam/hr @212°F) Btu Output (1000 Btu/hr)	518 502	690 670	1035 1004	1380 1339	1725 1674	2070 2009	2415 2343	2760 2678	3450 3348
APPROXIMATE FUEL CONSUMPTION AT RATED CAPACITY									
Light Oil (gph) ^A	4.5	6.0	9.0	12.0	14.9	17.9	20.9	23.9	29.9
Heavy Oil (gph) ^B	-	-	-	-	13.9	16.7	19.5	22.3	27.9
Gas (cfh) 1000 Btu-Nat Gas (Therm/hr)	628 6.3	837 8.4	1255 12.6	1674 16.7	2092 20.9	2511 25.1	2929 29.3	3348 33.5	4184 41.8
POWER REQUIREMENTS - SEA LEVEL TO 3000 FT, 60 HZ									
Blower Motor hp (except gas)	1	1	1-1/2	2	2	2	2	2 ^D	3
Gas Models (only)	1	1	1-1/2	2	2	2	2	2 ^D	3
Oil Pump Motor, hp No. 2 Oil	Belt-Driven From Blower				1/3	1/3	1/3	1/3	1/3
Oil Pump Motor, hp No. 6 Oil	-	-	-	-	1/3	1/3	1/3	1/3	1/3
Oil Heater kW No. 6 Oil	-	-	-	-	5	5	5	5	5
Air Compressor Motor hp (Oil firing Only)	Air Compressor Belt-Driven from Blower Motor				2	2	2	2	2

NOTES:

1. For altitudes above 3000 ft, contact your local Cleaver-Brooks authorized representative for verification of blower motor hp.
- A. Based on 140,000 Btu/gal.
- B. Based on 150,000 Btu/gal.
- C. No. 6 Oil not available in 15-40 hp range.
- D. 3 hp above 2000 ft.

Table A6-2. Model CB Hot Water Boiler Ratings (15 - 100 hp)

BOILER HP	15 ^c	20 ^c	30 ^c	40 ^c	50	60	70	80	100
RATINGS - SEA LEVEL TO 3000 FT									
Rated Cap Btu Output (1000 Btu/hr)	502	670	1004	1339	1674	2009	2343	2678	3348
APPROXIMATE FUEL CONSUMPTION AT RATED CAPACITY									
Light Oil (gph) ^A	4.5	6.0	9.0	12.0	14.9	17.9	20.9	23.9	29.9
Heavy Oil (gph) ^B	-	-	-	-	13.9	16.7	19.5	22.3	27.9
Gas (cfh) MBtu- nat Gas (Therm/hr)	628 6.3	837 8.4	1255 12.6	1674 16.7	2092 20.9	2511 25.1	2929 29.3	3348 33.5	4184 41.8
POWER REQUIREMENTS - SEA LEVEL TO 3000 FT, 60 HZ									
Blower Motor hp (except gas)	1	1	1-1/2	2	2	2	2	2 ^D	3
Gas Models (only)	1	1	1-1/2	2	2	2	2	2 ^D	3
Oil Pump Motor, hp No. 2 Oil	Belt-Driven From Blower				1/3	1/3	1/3	1/3	1/3
Oil Pump Motor, hp No. 6 Oil	-	-	-	-	1/3	1/3	1/3	1/3	1/3
Oil Heater kW No. 6 Oil	-	-	-	-	5	5	5	5	5
Air Compressor Motor hp (Oil firing Only)	Air Compressor Belt-Driven from Blower Motor				2	2	2	2	2

NOTES:

1. For altitudes above 3000 ft, contact your local Cleaver-Brooks authorized representative for verification of blower motor hp.
- A. Based on 140,000 Btu/gal.
- B. Based on 150,000 Btu/gal.
- C. No. 6 Oil not available in 15-40 hp range.
- D. 3 hp above 2000 ft.

Table A6-3. Steam Boiler Safety Valve Openings

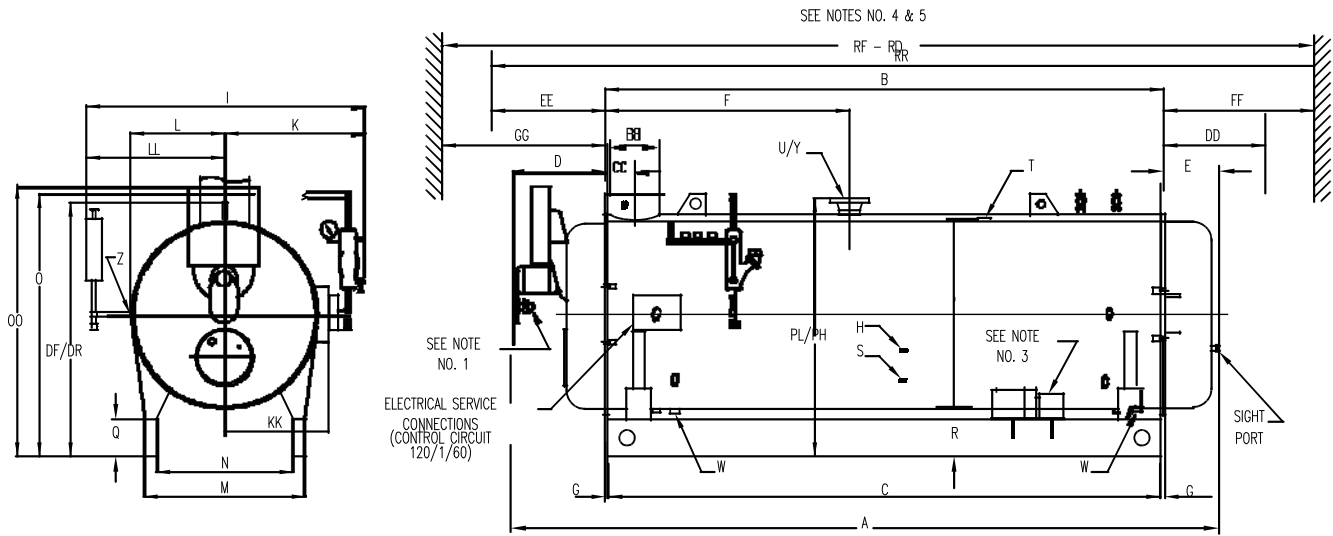
VALVE SETTING	15 PSIG STEAM		100 PSIG STEAM		125 PSIG STEAM		150 PSIG STEAM		200 PSIG STEAM		250 PSIG STEAM	
BOILER HP	NO. OF VALVES-REQ'D	OUTLET SIZE (IN.)	NO. OF VALVES-REQ'D	OUTLET SIZE (IN.)	NO. OF VALVES-REQ'D	OUTLET SIZE (IN.)	NO. OF VALVES-REQ'D	OUTLET SIZE (IN.)	NO. OF VALVES-REQ'D	OUTLET SIZE (IN.)	NO. OF VALVES-REQ'D	OUTLET SIZE (IN.)
15	1	1-1/2	1	1	1	3/4	1	3/4	1	3/4	1	3/4
20	1	1-1/2	1	1	1	1	1	3/4	1	3/4	1	3/4
25	1	2	1	1	1	1	1	1	1	3/4	1	3/4
30	1	2	1	1-1/4	1	1	1	1	1	3/4	1	3/4
40	1	2-1/2	1	1-1/4	1	1-1/4	1	1	1	1	1	1
50	1	2-1/2	1	1-1/2	1	1-1/2	1	1-1/4	1	1	1	1
60	1	2	1	1-1/2	1	1-1/2	1	1-1/4	1	1-1/4	1	1
70	1	2	1	2	1	1-1/2	1	1-1/2	1	1-1/4	1	1-1/4
80	1	2-1/2	1	2	1	1-1/2	1	1-1/2	1	1-1/4	1	1-1/4
100	1	2-1/2	1	2	1	2	1	1-1/2	1	1-1/2	1	1-1/4

Table A6-4. Hot Water Boiler Relief Valve Openings

VALVE SETTING	30 PSIG HW		60 PSIG HW		100 PSIG HW		125 PSIG HW	
BOILER HP	NO. OF VALVES-REQ'D	OUTLET SIZE (IN.)	NO. OF VALVES-REQ'D	OUTLET SIZE (IN.)	NO. OF VALVES-REQ'D	OUTLET SIZE (IN.)	NO. OF VALVES-REQ'D	OUTLET SIZE (IN.)
15	1	1	1	1	1	1	1	1
20	1	1	1	1	1	1	1	1
25	1	1-1/4	1	1	1	1	1	1
30	1	1-1/4	1	1	1	1	1	1
40	1	1-1/4	1	1	1	1	1	1
50	1	2	1	1-1/4	1	1	1	1
60	1	2	1	1-1/4	1	1	1	1
70	1	2	1	2	1	1-1/4	1	1
80	1	2	1	2	1	1-1/4	1	1-1/4
100	1	2-1/2	1	2	1	1-1/4	1	1-1/4

NOTES:

- Hot water relief valves are Kunkle #537.
- BHP followed by "A" designates hot water boilers furnished in a smaller vessel size with additional tubes in the upper portion of the vessel.



BOILER HP	DIM	15	20	30	40	50	60	70	80	100
LENGTHS										
Overall	A	96-5/8	96-5/8	114-5/8	140-5/8	129	129	168	168	187
Shell	B	62-5/8	62-5/8	80-5/8	106-5/8	92	92	131	131	150
Base Frame	C	59	59	77	103	91	91	130	130	148
Front Head Extension	D	18-1/2	18-1/2	18-1/2	18-1/2	18-1/2	18-1/2	18-1/2	18-1/2	18-1/2
Rear Head Extension	E	15-1/2	15-1/2	15-1/2	15-1/2	18-1/2	18-1/2	18-1/2	18-1/2	18-1/2
Front Ring Flange to Nozzle - 15 psig	F	36	36	45	57	46	46	65-1/2	65-1/2	75
Front Ring Flange to Nozzle - 150 psig	F	36	36	45	57	46	46	72-1/2	72-1/2	82
Ring Flange to Base	G	1-13/16	1-13/16	1-13/16	1-13/16	5/8	1/2	1/2	1/2	1/2
WIDTHS										
Overall	I	61	61	61	61	73	73	73	73	73
ID, Boiler	J	36	36	36	36	48	48	48	48	48
Center to Water Column	K	33	33	33	33	39	39	39	39	39
Center to Outside Hinge	KK	22	22	22	22	29	29	29	29	29
Center to Lagging	L	20	20	20	20	27	27	27	27	27
Center to Auxiliary LWCO	LL	28	28	28	28	34	34	34	34	34
Base, Outside	M	28	28	28	28	37-5/8	37-5/8	37-5/8	37-5/8	37-5/8
Base, Inside	N	22	22	22	22	29-5/8	29-5/8	29-5/8	29-5/8	29-5/8

Figure A6-1. Model CB Steam Boiler Dimensions and Weights (15 and 150 psig Design Pressure - 15 to 100 hp) Sheet 1 of 2

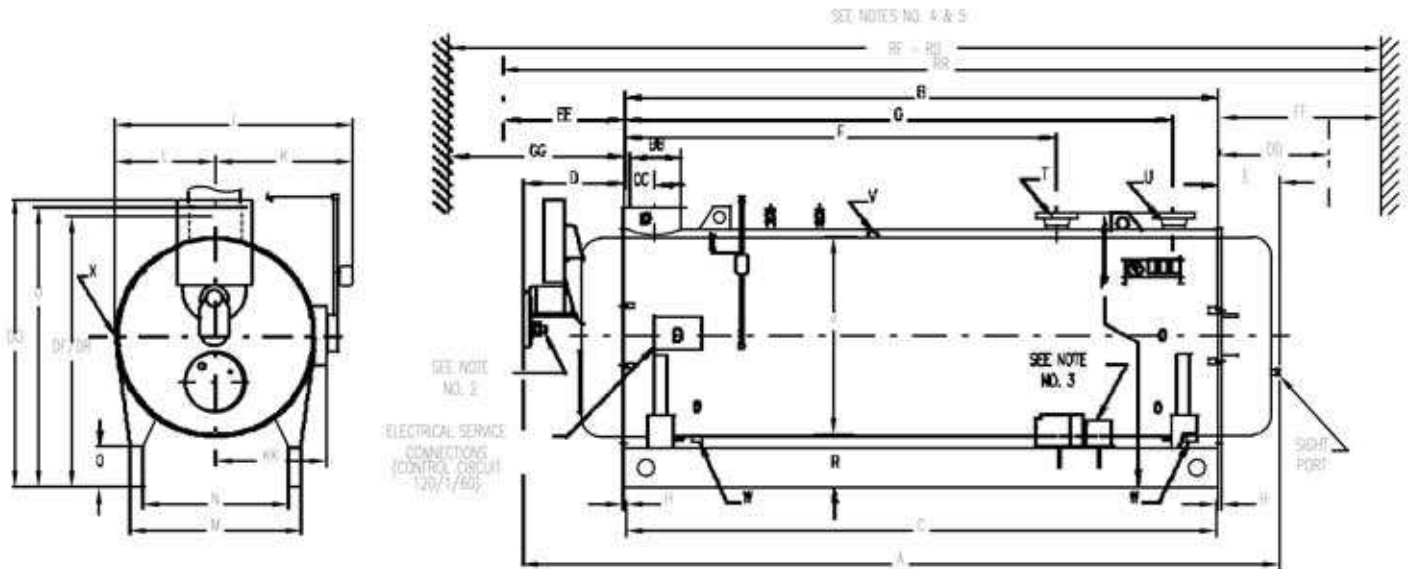
BOILER HP	DIM	15	20	30	40	50	60	70	80	100
HEIGHTS										
Base to Steam Outlet (15 psig only)	PL	50-1/4	50-1/4	50-1/4	50-1/4	70-1/2	70-1/2	70-1/2	70-1/2	70-1/2
Overall	OO	66	66	66	66	78-3/4	78-3/4	78-3/4	78-3/4	78-3/4
Base to Vent Outlet	O	53-1/2	53-1/2	53-1/2	53-1/2	70	70	70	70	70
Base to Steam Outlet (150 psig only)	PH	50-1/4	50-1/4	50-1/4	50-1/4	66-1/2	66-1/2	66-1/2	66-1/2	70-5/16
Height of Base	Q	8	8	8	8	12	12	12	12	12
Base to Bottom of Boiler	R	12	12	12	12	16	16	16	16	16
BOILER CONNECTIONS										
Chemical Feed	H	1	1	1	1	1	1	1	1	1
Feedwater, Right and Left	S	1	1	1	1	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4
Low Pressure (15 psig only) Steam Nozzle Drain, Front and Rear	U W	4 1	4 1	4 1	6 ^A 1-1/4	6 ^A 1-1/4	6 ^A 1-1/4	6 ^A 1-1/2	6 ^A 1-1/2	8 ^A 1-1/2
High Pressure (150 psig only) Surface Blowoff, Top C _L Steam Nozzle Blowdown, Front and Rear	T Y W	1 1-1/2 1	1 1-1/2 1	1 2 1	1 2 1	1 3 1-1/4	1 3 1-1/4	1 3 1-1/4	1 3 1-1/4	1 4 ^B 1-1/4
VENT STACK										
Diameter (flgd connection)	BB	6	6	8	8	10	10	12	12	12
Front Ring Flange to Vent C _L	CC	4	4	5	5	6	6	7	7	7
MINIMUM CLEARANCES										
Rear Door Swing ^c	DD	44	44	44	44	55	55	55	55	55
Front Door Swing ^c	EE	44	44	44	44	55	55	55	55	55
Tube Removal, Rear	FF	56	56	74	100	84	84	123	123	142
Tube Removal, Front	GG	46	46	64	90	74	74	113	113	132
MINIMUM BOILER ROOM LENGTH ALLOWING FOR DOOR SWING AND TUBE REMOVAL FROM:										
Rear of Boiler	RR	163	163	199	251	231	231	309	309	347
Front of Boiler	RF	153	153	189	241	221	221	299	299	337
Thru Window or Doorway	RD	151	151	169	195	202	202	241	241	260
WEIGHT IN LBS										
Normal Water Capacity		1340	1300	1710	2290	3130	2920	4620	4460	5088
Approx. Ship Wgt - 15 psig		3000	3100	3650	4350	6900	7000	8100	8200	9000
Approx. Ship Wgt - 150 psig		3100	3200	3800	4500	7000	7200	8800	9000	9500
Approx. Ship Wgt - 200 psig		3300	3400	4100	4700	7400	7600	9300	9500	10000

NOTES:

1. Air compressor belt driven from blower motor on sizes 15 thru 40
 2. Air compressor module on sizes 50 thru 100 hp.
 3. Accompanying dimensions, while sufficiently accurate for layout purposes, must be confirmed for construction by certified dimension prints.
- A. ANSI 150 psig flange.
B. ANSI 300 psig flange.
C. 15 thru 100 hp standard hinged door.

Figure A6-1. Model CB Steam Boiler Dimensions and Weights (15 and 150 psig Design Pressure - 15 to 100 hp)
Sheet 2 of 2





BOILER HP	DIM	15	20	30	40	50	60	70	80	100
LENGTHS										
Overall	A	97	97	114-5/8	140-5/8	129	129	168	168	187
Shell	B	62-5/8	62-5/8	80-5/8	106-5/8	92	92	131	131	150
Base Frame	C	59	59	77	103	91	91	130	130	148
Front Head Ext.	D	18-1/2	18-1/2	18-1/2	18-1/2	18-1/2	18-1/2	18-1/2	18-1/2	18-1/2
Rear Head Ext.	E	15-1/2	15-1/2	15-1/2	15-1/2	18-1/2	18-1/2	18-1/2	18-1/2	18-1/2
Front Ring Flange to Return	F	43-5/8	43-5/8	62	81	69	69	108	108	127
Front Ring Flange to Outlet	G	55-1/8	55-1/8	73-1/8	98-1/2	84-5/8	84-5/8	123-5/8	123-5/8	142-5/8
Ring Flange to Base	H	1-13/16	1-13/16	1-13/16	1-13/16	5/8	5/8	5/8	5/8	1
WIDTHS										
Overall	I	48-3/4	48-3/4	48-3/4	48-3/4	63	63	63	63	63
ID, Boiler	J	36	36	36	36	48	48	48	48	48
Center to Entrance Box	K	28-3/4	28-3/4	28-3/4	28-3/4	36	36	36	36	36
Center to Outside Hinge	KK	22	22	22	22	29	29	29	29	29
Center to Lagging	L	20	20	20	20	27	27	27	27	27
Base, Outside	M	28	28	28	28	37-5/8	37-5/8	37-5/8	37-5/8	37-5/8
Base, Inside	N	22	22	22	22	29-5/8	29-5/8	29-5/8	29-5/8	29-5/8

Figure A6-2. Model CB Hot Water Boiler Dimensions (30 psig and 125 psig Design Press. - 15 to 100 hp)
Sheet 1 of 2

BOILER HP	DIM	15	20	30	40	50	60	70	80	100
HEIGHTS										
Overall	OO	66	66	66	66	72-5/8	72-5/8	72-5/8	72-5/8	72-5/8
Base to Vent Outlet	O	53-1/2	53-1/2	53-1/2	53-1/2	70	70	70	70	70
Base to Return and outlet	P	50	50	50	50	70-1/2	70-1/2	70-1/2	70-1/2	70-1/2
Davit (Front)	DF	-	-	-	-	-	-	-	-	-
Davit (Rear)	DR	-	-	-	-	-	-	-	-	-
Height of Base	Q	8	8	8	8	12	12	12	12	12
Base to bottom of boiler	R	12	12	12	12	16	16	16	16	16
BOILER CONNECTIONS										
Water Return ^A	T	2-1/2	2-1/2	3	3	4	4	4	4	4
Water Outlet ^A -dip tube included	U	2-1/2	2-1/2	3	3	4	4	4	4	4
Air Vent	v	1	1	1	1	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4
Drain, Front and Rear	W	1	1	1	1-1/4	1-1/4	1-1/4	1-1/2	1-1/2	1-1/2
Auxiliary Connection	X	1	1	1	1	1	1	1	1	1
VENT STACK										
Diameter (flgd. connection)	BB	6	6	8	8	10	10	12	12	12
Front Ring Flange to vent C _L	CC	4	4	5	5	6	6	7	7	7
MINIMUM CLEARANCES										
Rear Door Swing	DD	44	44	44	44	55	55	55	55	55
Front Door Swing	EE	44	44	44	44	55	55	55	55	55
Tube Removal, Rear	FF	56	56	74	100	84	84	123	123	142
Tube, Removal, Front	GG	46	46	64	90	74	74	113	113	132
MINIMUM BOLER ROOM LENGTH ALLOWING FOR DOOR SWING AND TUBE REMOVAL FROM:										
Rear of Boiler	RR	163	163	199	251	231	231	309	309	347
Front of Boiler	RF	153	153	189	241	221	221	299	299	337
Thru Window or Doorway	RD	151	151	169	195	202	202	241	241	260
WEIGHT IN LBS										
Water Capacity Flooded		1500	1460	1915	2585	3665	3500	5420	5250	5960
Approx. Ship. Wgt. – 30 psig		3000	3100	3650	4350	6800	7000	8000	8100	8800
Approx. Ship. Wgt. – 125 psig		3300	3400	3880	4580	7100	7300	8350	8450	9150

NOTES:

1. Accompanying dimensions and ratings while sufficiently accurate for layout purposes, must be confirmed for construction by certified dimension prints.
2. Air compressor belt driven from blower motor on sizes 15 thru 40 hp.
3. Air compressor module on sizes 50 thru 100 hp.
4. 15 - 100 hp, hinged door standard.
5. Add 370 lbs to the 80 hp ship weight for 100A and 485 lbs to the 100 hp ship weight for the 125A.

A. 15-40 HP are threaded connection; 50-100 HP are 150# flange.

Figure A6-2. Model CB Hot Water Boiler Dimensions (30 psig Design Pressure - 15 to 100 hp) - Sheet 2 of 2

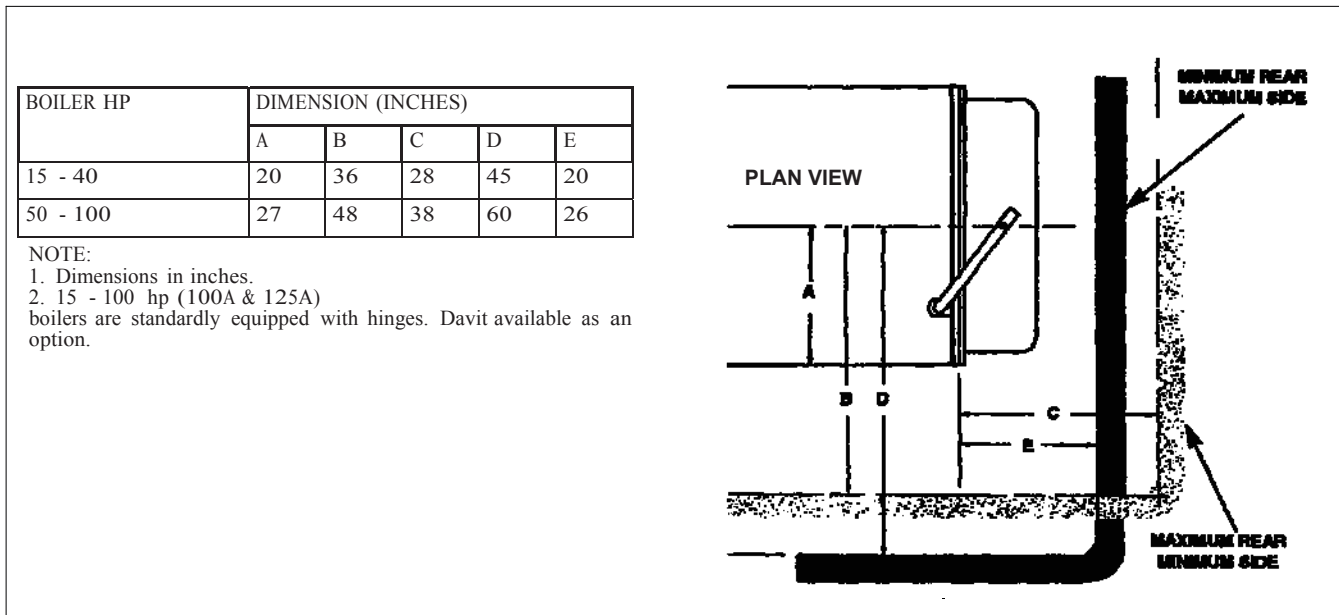
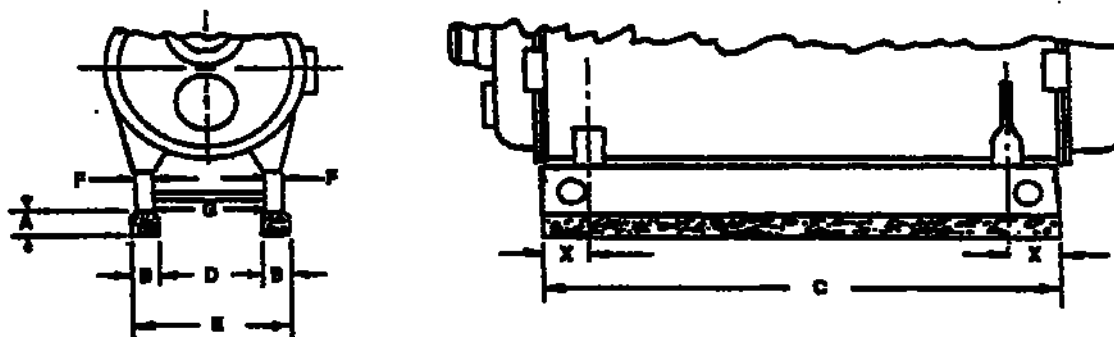


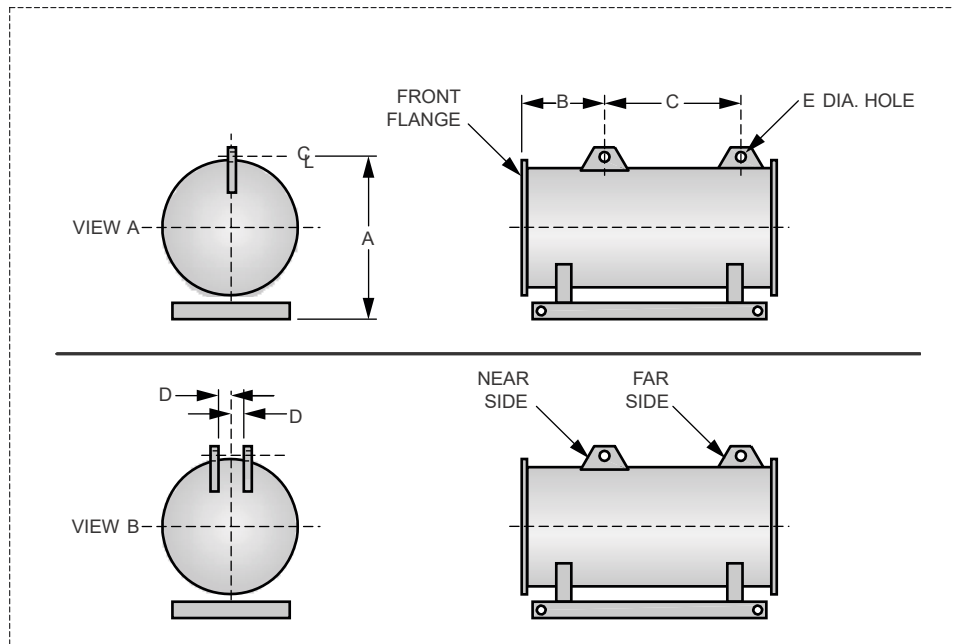
Figure A6-3. Space Required to Open Rear Head on Model CB Boilers Equipped with Davits



BOILER HP	A	B	C	D	E	F	G	X1	X2
15-20	6	8	59	17	33	3	22	9-3/4	9-3/4
25-30	6	8	77	17	33	3	22	9-3/4	9-3/4
40	6	8	103	17	33	3	22	9-3/4	9-3/4
50-60	6	8	91	26	42	4	29-5/8	8-1/4	8-1/4
70-80	6	8	130	26	42	4	29-5/8	8-1/4	8-1/4
100	6	8	148	26	42	4	29-5/8	8-1/4	8-1/4

NOTE:
 1. All numbers in table are in inches.
 2. 6-inch high mounting piers recommended for use beneath the boiler base frame. The use of these piers provides increased inspection accessibility to the piping beneath the boiler and added height for washing down the area beneath the boiler.

Figure A6-4. Model CB Boiler Mounting Piers



BOILER HP		VIEW	ALL DIMENSIONS IN INCHES				
			A	B	C	D	E
15	Steam	A	51-3/4	12	38-3/4	-	2-1/2
	Hot Water	B	50-1/2	12	38-3/4	6	2-1/2
20	Steam	A	51-3/4	12	38-3/4	-	2-1/2
	Hot Water	B	50-1/2	12	38-3/4	6	2-1/2
25	Steam	A	51-3/4	12	56-3/4	-	2-1/2
	Hot Water	B	50-1/2	12	56-3/4	6	2-1/2
30	Steam	A	51-3/4	12	56-3/4	-	2-1/2
	Hot Water	B	50-1/2	12	56-3/4	6	2-1/2
40	Steam	A	51-3/4	12	82-3/4	-	2-1/2
	Hot Water	B	50-1/2	12	82-3/4	6	2-1/2
50	All	B	68	18	57	10	2-1/2
60	All	B	68	18	57	10	2-1/2
70	All	B	68	27	67	10	2-1/2
80	All	B	68	27	67	10	2-1/2
100	All	B	68	27	86	10	2-1/2

NOTE:

1. A, B and C Dimensions may vary by 1/2 inch.
2. BHP followed by "A" designates hot water boilers furnished in a smaller vessel size with additional tubes in upper portion of vessel.

Figure A6-5. Lifting Lug Locations, Model CB Boilers



HURST

BOILER & WELDING CO., INC.

AVAILABLE WITH LOW NOX

HURST SERIES LPX

Horizontal Option 1
(QTY 1)

LOW PRESSURE BOILER

Capacities From 30 to 125 BHP.
1,004 to 4,184 MBTU/HR.

MODIFIED SCOTCH MARINE
2-PASS Fire Tube Design
Wetback Construction
Thru-the-Door Concept



*Designed for minimal clearances
where installation and floor space are
challenging*

STEAM

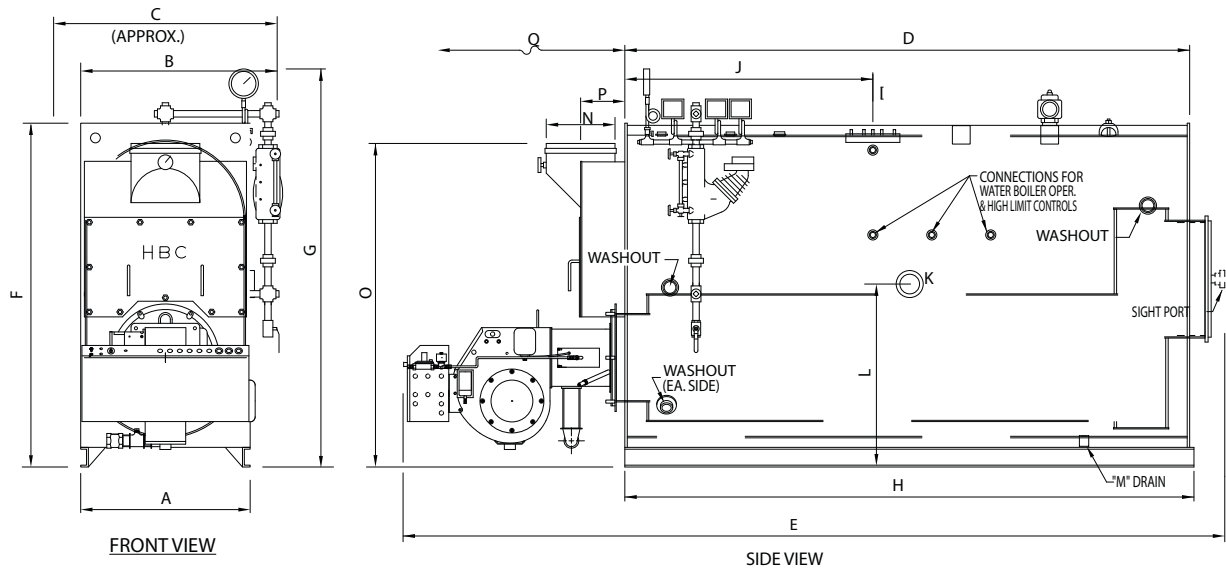
Pressures to 15 PSI.

HOT WATER

Section IV
Pressures to 60 PSI.

HURST PERFORMANCE SERIES BOILERS

SERIES LPX



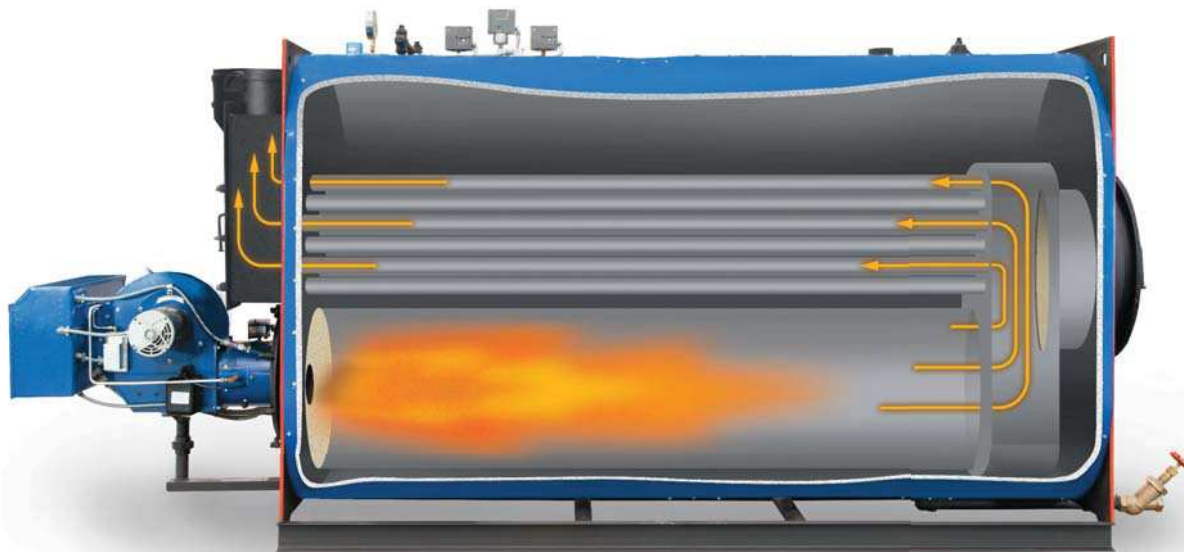
BOILER SPECIFICATIONS			30	40	50	60	70	80	90	100	125
BOILER HORSEPOWER											
STEAM OUTPUT	FROM & AT 212°F	LBS/HR	1035	1380	1725	2070	2415	2760	3105	3450	4313
GROSS OUTPUT		MBH	1004	1339	1674	2009	2343	2678	3013	3348	4184
FIRING RATE GAS	1,000 BTU CU./FT.	CFH	1260	1680	2100	2520	2940	3360	3780	4200	5250
FIRING RATE LIGHT OIL	140,000 BTU	GPH	9	12	15	18	21	24	26.9	30	37.4
A	WIDTH WITHOUT TRIM	IN	30	30	30	30	34	34	34	34.5	34.5
B	WIDTH WITH TRIM	IN	40	40	40	40	44	44	44	44	44
C	OVERALL WIDTH W/ GAS TRAIN & TRIM	IN	46	46	50	50	54	54	54	54	54
D	BOILER LENGTH	IN	77	77	85	85	92	92	92	115	115
E	OVERALL LENGTH W/ STD. BURNER	IN	120	124	133	133	140	145	145	170	170
F	HEIGHT WITHOUT TRIM	IN	62	62	66	66	68	68	68	70	70
G	HEIGHT WITH TRIM	IN	71	71	77.5	77.5	82.5	82.5	82.5	87	87
H	LENGTH OF SKID	IN	78	78	86	86	93	93	93	116	116
I	SUPPLY SIZE	IN	4	4	6	6	6	6	6	6	6
J	SUPPLY LOCATION	IN	38.5	38.5	42.5	42.5	46	46	46	50.5	50.5
K	RETURN SIZE	IN	4	4	4	4	4	4	4	4	4
L	RETURN LOCATION	IN	31.5	31.5	34	34	36.25	36.25	36.25	36.25	36.25
M	BOILER DRAIN SIZE	IN	1.25	1.25	1.25	1.25	1.5	1.5	1.5	1.5	1.5
N	STACK DIAMETER, O.D.	IN	10	10	12	12	12	12	12	14	14
O	STACK HEIGHT	IN	57	57	64	64	66	66	66	68	68
P	TO CENTER OF STACK	IN	7	7	8	8	8	8	8	9	9
Q	TUBE PULL SPACE	IN	72	72	80	80	86	86	86	108	108
	SHIPPING WEIGHT (NO BURNER OR TRIM PIPING)	LBS	3342	3562	3770	4010	4400	4620	4860	5200	5420
	WATER CONTENT - WATER	GAL.	291	291	376	376	443	443	443	538	538
	WATER CONTENT - STEAM	GAL.	228	228	306	306	360	360	360	430	430
BOILER HORSEPOWER			30	40	50	60	70	80	90	100	125

- ALL DIMENSIONS ARE IN INCHES
- CERTIFIED DRAWING AVAILABLE UPON REQUEST.
- DIMENSIONS SUBJECT TO CHANGE WITHOUT NOTICE.

Inspected and registered with the National Board of Boiler & Pressure Vessel Inspectors.



Designed, constructed and stamped in accordance with the requirements of the ASME Boiler Codes.



Enhanced Fire Tubes

Heat Transferring Embossed Surface

Mechanically embossed spiral ribs on the inside of the tube not only provides increased surface area, but also leads to a complex gas flow with a boundary layer producing a separation/reattachment phenomenon. This reattachment action substantially improves heat transfer.

With this enhanced tube design, the heat transfer rate is 85% greater than a plain fire tube. Cost savings of up to 20% on the entire boiler package can be obtained with the use of enhanced spiral ribbed tubes.



Modified two-pass scotch marine boiler. Designed for minimal clearances where installation and floor space are the challenge. Durable features start with the thickest vessel shell in its class, along with large furnace volume for ultimate combustion efficiency.

BOILER DESIGN: Modified: *Thru-the-door* 2-Pass Scotch Marine Firetube design with stress relieving "HURST Wetback" construction.

Pressure designs available for steam and hot water are:

30-125 HP. 15 PSI max. (STEAM)

30-125 HP. 60 PSI max. (HOT WATER)

Section IV

Factory assembled with trim, tested, ASME code, UL, and CSD-1 standards.

STEAM MODEL TRIM: Safety relief valve, operating pressure control, high limit pressure control with manual reset, steam pressure gauge with syphon, combination pump control and low water cut-off with gauge glass assembly and drain valve, auxiliary low water cut-off with manual reset.

HOT WATER MODEL TRIM: Safety relief valve, operating temperature control, high limit temperature control with manual reset, combination pressure & temperature gauge, low water cut-off control with manual reset.

BURNER: Matched UL listed "forced draft" power burners with factory pre-piped, wired and tested fuel configurations for natural gas, propane (LP) gas, No. 2 (diesel) oil, or combination of both gas/oil.

WET BACK ADVANTAGE

Dry back boilers are subject to deteriorating rear refractory, leaking baffles, leaking door seals, and often found with a heat-stressed rear tube sheet. Fragile refractory baffling and door seals will require continuous monitoring, maintenance, and replacement, costing thousands of dollars in materials and specialized labor costs over the life of the boiler. In addition, broken baffles and leaking seals will short-circuit the boiler's gas flow, causing high stack temperatures and lowering efficiency until repairs can be made. This can bring your production process to a costly halt.

All of those frustrating problems have been designed out of the Hurst Series LPX Wet back. It has a full wet back radiant heat transfer area that promotes superior internal water circulation and rapid heat absorption, rear tube sheet, and allows tubes to expand and contract at its own rate without tube sheet stress. The only rear refractory is a manway plug which allows access to the furnace for inspection.



“Wet back design eliminates, costly deteriorating refractory rear doors.”

Stress Relieving “Wet Back” Construction for Extended Life

Standard Steam Trim

- Operating & high limit pressure control
- Modulating pressure control (when appl.)
- Water column with gauge glass protector and drain valve
- Primary low water cut-off & pump control
- Probe Secondary low water cut-off w/ Manual Reset
- Steam pressure gauge, syphon & test cock
- Safety relief valve(s) per ASME Code

Standard Water Trim

- Operating & high limit temperature control
- Modulating temperature control (when appl.)
- Probe type low water cut-off control w/ Manual Reset
- Combination pressure & temperature gauge
- Hot water return baffle for shock resistance
- Safety relief valve(s) per ASME Code

HBC-09535
06/2014



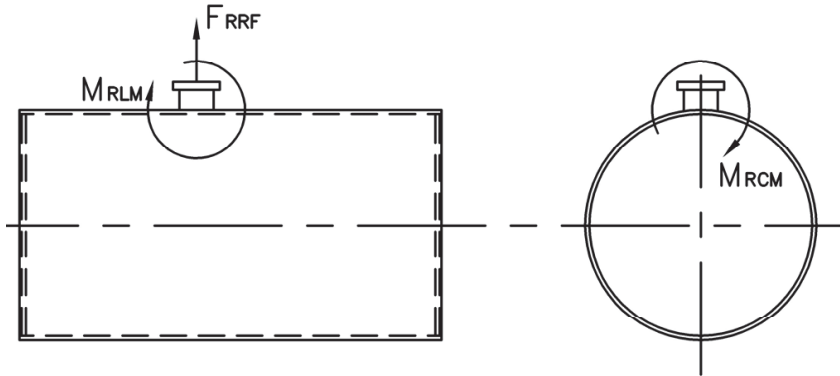
HURST BOILER & Welding Co., Inc.

100 Boilermaker Lane • Coolidge, GA 31738-0530
Tel: (229) 346-3545 • Fax: (229) 346-3874
email: info@hurstboiler.com

MODEL: PFTJ 50/80-4

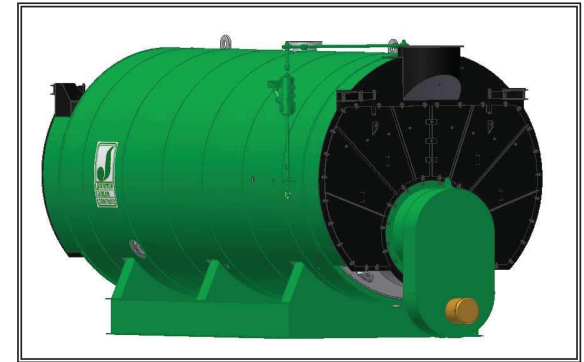
Nozzle Loadings

Maximum Allowable Load on Boiler Steam Nozzle					
	15# Design	150# Design	200# Design	250# Design	300# Design
F _{RRF} , lb	4,785	1,705	1,705	2,140	2,870
M _{RCM} , in-lb	19,895	9,194	9,190	15,390	18,035
M _{RLM} , in-lb	36,145	8,540	8,540	11,875	15,510



MODEL: PFTJ 50/80-4

4-Pass Steam Packaged Firetube Boiler



Ratings & Performance Data

Horsepower 50-80	20.2		
Steam Storage, ft ³	32.7		
Steam Disengaging Area, ft ²	399	Natural Gas Flow, SCFH (1,000 Btu/ft ³)**	3,266
Total Heating Surface, ft ²	24.0	Combustion Air (15% Excess), SCFM***	598
Furnace Outside Diameter, in	171,000	Flue Gas Flow Rate, lb/hr***	2,850
Furnace Heat Release Rate, Btu/ft ³ hr**	32.2	Stack Flue Gas Velocity, ft/min***	1,360
Total Combustion Volume, ft ³	101,000	#2 Oil Flow, gal/hr (140,000 Btu/gal)**	22.5
Total Heat Release Rate, Btu/ft ³ hr**	619	Flue Gas Side Pressure Drop, in. H ₂ O	3.0
Water Content N.W.L., gal	10,000	Water Content Flooded, gal	770
Approx. Dry Weight 15#, lb	10,300	Approx. Operating Weight 15#, lb	15,300
Approx. Dry Weight 150#, lb	10,900	Approx. Operating Weight 150#, lb	15,600
Approx. Dry Weight 200#, lb	11,400	Approx. Operating Weight 200#, lb	16,200
Approx. Dry Weight 250#, lb	12,000	Approx. Operating Weight 250#, lb	16,700
Approx. Dry Weight 300#, lb		Approx. Operating Weight 300#, lb	17,300

Performance Data*					
Operating Pressure (psig)	Steam Rate (lb/hr)	Natural Gas		#2 Oil	
		Stack Temp (F)	%Eff	Stack Temp (F)	%Eff
10	2,778	294	84.7	303	87.8
50	2,724	351	83.1	360	86.2
100	2,695	391	82.0	400	85.1
150	2,679	419	81.2	428	84.3
200	2,669	441	80.6	450	83.7
250	2,662	459	80.1	468	83.2
300	2,658	475	79.7	484	82.8

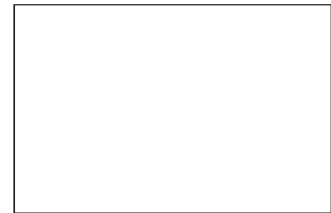
Calculations based on 80 horsepower design

*Based on 228°F feedwater and 3% O₂, ** Values calculated at 100 psi operating pressure, ***Calculated Firing Natural Gas

Stack Emissions-Natural Gas (1,000 Btu/CF)				
	PPMv (Corr to 3% O ₂)	lb/MBtu	lb/hr @ Full Rate	Ton/Yr @ Full Rate
NO _x *	110	0.131	0.428	1.873
	9	0.011	0.035	0.153
CO	50	0.037	0.12	0.526
CO ₂	2.55 lb/lb fuel	119.76	391	1,713
H ₂ O	2.03 lb/lb fuel	106.16	347	1,519
Stack Emissions-#2 Oil** (140,000 Btu/gal)				
NO _x	128	0.174	0.548	2.399
CO	50	0.037	0.116	0.506
CO ₂	3.20 lb/lb fuel	168.53	530	2,322
H ₂ O	1.12 lb/lb fuel	71.20	224	981

* 110 ppm "A" Burner, 9 ppm

**0.02% fuel bound Nitrogen

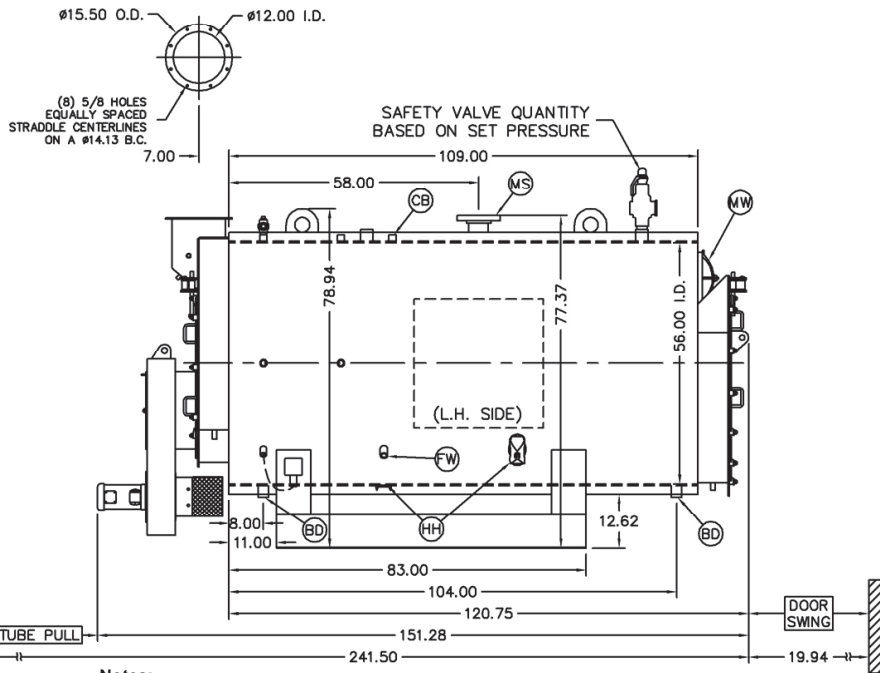
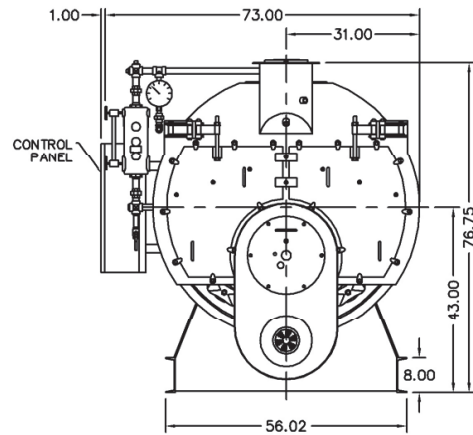


300 Pine Street
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Telephone: (616) 842-5050
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MODEL: PFTJ 50/80-4

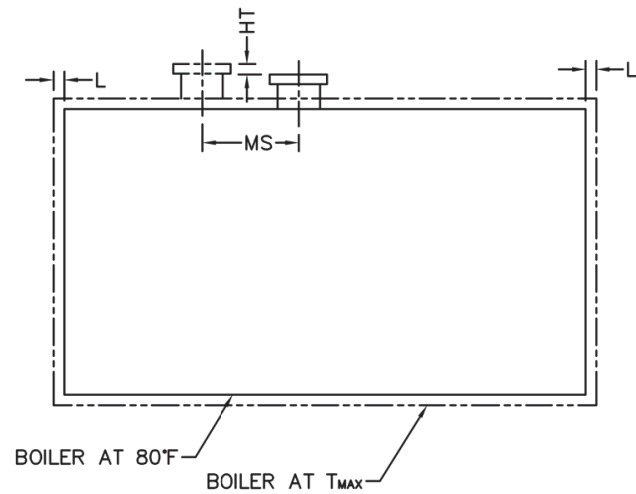
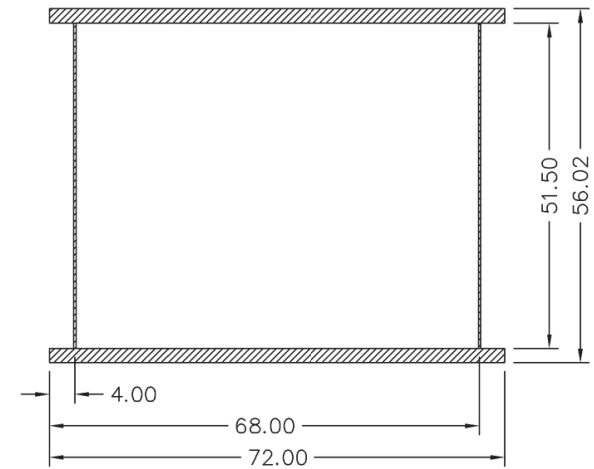
Connection & Opening Schedule			
Conn.	Description	Type	Qty
FW	Feedwater Inlet	1.00 FNPT	2
MS*	Main Steam	4.00 300# RF	1
CB	Continuous Blowoff	1.00 FNPT	1
BD	Blowdown Outlet	1.50 FNPT	2
MW	Manway	12 X 16	1
HH	Hand Hole	4 X 6	6

*8.00 150#RF Flange on 15 psig Design



Notes:
 150# Steam design shown, all dimensions given in inches.
 Fuel piping and/or optional boiler trim may increase overall width.
 Specifications subject to change to incorporate engineering advances.

Base Diagram



Thermal Expansion					
psig	15	150	200	250	300
Metal T _{MAX} (F)	240	366	388	406	421
L (in)	0.055	0.093	0.101	0.107	0.112
MS (in)	0.004	0.006	0.006	0.007	0.007
HT (in)	0.057	0.097	0.104	0.111	0.116