

# INSTALLATION AND OPERATOR'S MANUAL



## CSL6230 THRU CSL12590 CAST IRON BOILERS

Keep these instructions with the boiler at all times for  
future reference

BOYERTOWN FURNACE CO.  
PO Box 100  
BOYERTOWN, PA 19512  
1-610-369-1450

[www.boyertownfurnace.com](http://www.boyertownfurnace.com)

## Be Aware of Hazard Definitions

**Danger:** Denotes presence of a hazard which, if ignored, will result in severe personal injury, death or property damage

**Warning:** Denotes presence of a hazard which, if ignored, could result in severe personal injury, death or substantial property damage.

**Caution:** Denotes the presence of a hazard which, if ignored, could result in minor personal injury or property damage

**Notice:** Intended to bring attention to information, but not related to personal injury or property damage.

**Warning:** This equipment must be installed, adjusted, serviced and started only by a qualified service agency – an individual or agency, licensed and experienced with all codes and ordinances, and who is responsible for the installation and adjustment of the equipment. All aspects of the installation must conform to the authority having jurisdiction, or in the absence of such requirements, to the National Fuel Gas Code, ANSI Z2231.1/NFPA 54 or to the installation of Oil Burning Equipment, NFPA 31.

Read all instructions before proceeding. Follow all instructions completely. Failure to follow these instructions could result in equipment malfunction causing severe personal injury, death or substantial property damage.

Do not alter this boiler in any way. The manufacturer will not be liable for any damage resulting from changes made in the field to the boiler or its components or from improper installation. Failure to comply could result in severe personal injury, death, or substantial property damage.

Your oil fired boiler is designed to burn natural gas, LP gas, No. 1 or No. 2 heating oil only. Never use gasoline or a mixture of gasoline and oil.

Do not store gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

The area around the boiler should be kept free and clear of combustible materials.

Never burn garbage or refuse in your boiler.

Never try to ignite oil by tossing burning papers or other material into your boiler.

Do not attempt to start the burner when excess oil vapors or gas has accumulated in the boiler.

Do not operate boiler if the heat exchanger is damaged.

Do not jumper, attempt to bypass, or override any of the safety limit controls.

Do not use this boiler if any part has been under water. Immediately call a qualified service technician to inspect the boiler and replace any part of the boiler, control system or burner that has been under water.

All installations must conform to the requirements of the authority having jurisdiction. Such applicable requirements take precedence over the general instructions of this manual.

Where required by the authority having jurisdiction, the installation must conform to the American Society of Mechanical Engineers Safety Code for Controls and Safety Devices for Automatically Fired Boilers, ANSI/ASME CSD-1.

**Warning:** Any Appliance that burns natural gas, propane gas or fuel oil is capable of producing carbon monoxide (CO). Carbon monoxide (CO) is a gas which is odorless, tasteless and colorless but is very toxic.

If your boiler is not vented properly or is not working properly, dangerous levels of CO may accumulate. CO is lighter than air and may travel throughout the building. Brief exposure to high levels of CO or prolonged exposure to lesser amounts of CO may result in carbon monoxide poisoning.

Exposure can be fatal and exposure to high concentrations may result in the sudden onset of symptoms including unconsciousness.

Symptoms of CO poisoning include the following:

Dizziness	Vision Problems	Shortness of Breath
Headaches	Loss of Muscle Control	Unclear Thinking
Nausea	Weakness	Unconsciousness

The symptoms of CO poisoning are often confused with influenza, and the highest incidence of poisoning occurs at the heating season which is during flu season. A victim may not experience all of the listed symptoms. Suspect the presence of CO if the symptoms tend to disappear when you leave your home.

The following sign may indicate the presence of carbon monoxide:

- Hot gasses from the appliance, venting system or chimney escaping into the living area.
- Flames coming out around the appliance.
- Yellow colored flames in the appliance when burning gas.
- Stale or smelly air.
- The presence of soot or carbon in or around the boiler.
- High unexplained humidity inside the building.

If any of these symptoms of CO poisoning occur, or if any of the signs of carbon monoxide are present, leave the premises immediately and contact a qualified service company, the gas company or the fire department.

To reduce the risk of CO poisoning have your heating system, vent system and chimney inspected and serviced before each heating season

**Notice:** Concealed Damage - If you discover damage to the burner, boiler or controls during unpacking, notify the carrier at once and file the appropriate claim. When calling or writing about the boiler please have the following information available: the boiler model number and serial number which is located on the upper left front of the unit. Record the model and serial number for future reference in the space provided in this manual.

## Table of Contents

Ratings and Data	5
Clearances	6
Ventilation and Combustion Air	6
Boiler Assembly	6
Boiler Trim Piping	8
System Piping	9
Jacket Installation	9
Venting	15
Burner Installation	17
Fuel Piping	18
Wiring	18
Operation	20
Burner Settings	21
Maintenance	23
Warranty	23
Installation and Service Check List	24



## **Boiler Components**

INSPECT FOR DAMAGE. All equipment is carefully manufactured, inspected, and packaged by experienced workers. Our responsibility ceases upon delivery of the skidded boiler and component boxes to the carrier in good condition. ANY CLAIMS FOR DAMAGE OR SHORTAGES IN SHIPMENT MUST BE FILED IMMEDIATELY against the carrier by the consignee.

The boiler is shipped in multiple packages consisting of the following items:

1. Assembled casting strapped to a skid.
2. Cabinet parts box. See jacket assembly instructions for a complete listing of all items included.
3. Burner/Parts Box – Includes burner, aquastats, low water cutoff, safety relief valve, drain valve and associated trim piping. See packing list included in box for a complete list of all components.

## **Installation Clearances**

**Warning:** Boilers in rooms shall be installed with the clearances from combustible materials not less than indicated below. Combustible materials are those made of or surfaced with wood, compressed paper, plant fibers, plastics, or other material that will ignite and burn, whether flame proofed or not, or whether plastered or not.

The boiler must not be installed on combustible flooring. The boiler is approved for installation on non combustible flooring only. The boiler must not be installed on carpeting or vinyl flooring

### **Minimum clearances to combustible construction are as follows:**

**TOP - 24 IN.**  
**FRONT - 24 IN.**  
**FLUE CONNECTOR SINGLE WALL VENT PIPING - 18 IN.**  
**REAR - 6 IN.**  
**SIDES - 6 IN.**

Consult NFPA-31 for construction techniques where the above minimum clearances cannot be obtained

### **Minimum recommended clearances for service and access are as follows:**

**TOP - 24 IN.**  
**FRONT - 24 IN. FROM BURNER**  
**FLUE CONNECTOR - 18 IN.**  
**REAR - 18 IN.**  
**SIDES - 12 IN.**

## **Ventilation and Combustion Air**

**Warning:** This boiler must be supplied with combustion and ventilation air in accordance with ANSI Z223.1/NFPA54 and all applicable local codes. Air openings to combustion area must not be obstructed. Adequate combustion air must be supplied at all times. Ventilation of boiler room must be adequate enough to provide sufficient air for combustion. Never use an exhaust fan in the boiler room. The boiler room must never be under a negative pressure or improper burner operation, flue gas leakage and carbon monoxide emissions may occur.

Opening sizes must comply with state or local codes. In their absence, use the following when the boiler is installed in a confined room:

When a boiler is located in an unconfined space in a building of conventional frame or masonry construction infiltration may provide adequate air for combustion and ventilation. If there is any doubt, install air supply provisions for combustion and ventilation air.

When a boiler is located in a confined space and air for combustion and room ventilation is from inside buildings, the confined space shall be provided with two permanent openings, one starting 12 inches from the top and one 12 inches from the bottom of the enclosed space. Each opening shall have a minimum free area of 1 square inch per one thousand (1,000) BTU/HR of the total input rating of all appliances in the enclosed space, but must not be less than one hundred (100) square inches. These openings must freely communicate with the interior areas having adequate infiltration from the outside.

When a boiler is installed in a confined space, or in a building of unusually tight construction, air for combustion and room ventilation must be obtained from the outdoors by means of two permanent openings one starting 12 inches from the top and one 12 inches from the bottom of the enclosed space. When air is taken through the outside wall or vertical ducts, at least one square inch of free opening must be provided per 4000 Btu/Hr. When air is taken through horizontal ducts at least one square inch of free opening must be provided per 2000Bth/Hr. The minimum dimensions of rectangular air ducts shall not be less than 3 inches.

In calculating free area using louvers, grills or screens for the above, consideration shall be given to their blocking effect. Screens used shall not be smaller than ¼ inch mesh. If free area through a design of louver or grill is known, it should be used in calculating the opening size required to provide the free area specified. If the design and free area is not known, it may be assumed that wood louvers will have 20-25% free area and metal louvers and grills will have 60-75% free area.

Louvers and grills shall be fixed in the open position or interlocked with the boiler so that they are opened automatically during boiler operation.

## **Boiler Location**

**Warning:** Never install the boiler on top of combustible flooring. Never install the boiler in an area where combustible materials, gasoline or any other products containing flammable vapors or liquids are stored.

Locate the boiler in an area that provides good access to the unit. To provide the best possible serviceability the boiler should be installed using the minimum recommended service and accessibility clearances as previously listed. Under no circumstances should the unit be installed next to combustible materials with clearances less than listed in installation clearances above.

The boiler should be installed on a level, flat concrete floor or pad that is structurally sound and will support the combined weight of the boiler when filled with water. This boiler is designed to be installed on noncombustible flooring only.

The boiler should be installed as close to the chimney as possible while still being located centrally to the piping system.

## **Boiler Block Assembly**

All boilers are shipped as an assembled block. If it is necessary to split the block into sections for installation purposes reassemble the sections as follows:

To assemble split blocks, move the sections into line facing each other. Sections may be slid along boards placed beneath the sections. Inspect nipple ports for damage or burrs. Remove any burrs by brushing the ports very lightly. Remove old section sealant from the castings. Wipe the push nipples and nipple ports with a clean cloth. Apply a film of nipple compound to both nipple and port. Install the nipple in the port and then seal by hitting with a rubber mallet. Apply section sealant to one section only and slide the sections together. Install the four draw rods. Draw the sections together until the sections make iron to iron contact at a point around the top and bottom ports of each section. Check to ensure that the combustion chamber is sealed using a flash light or other lighting device. Place the light into the combustion chamber

and look for light on the floor or surrounding walls (this is best done in a dark room). If light appears out of the boiler, reseal between the sections.

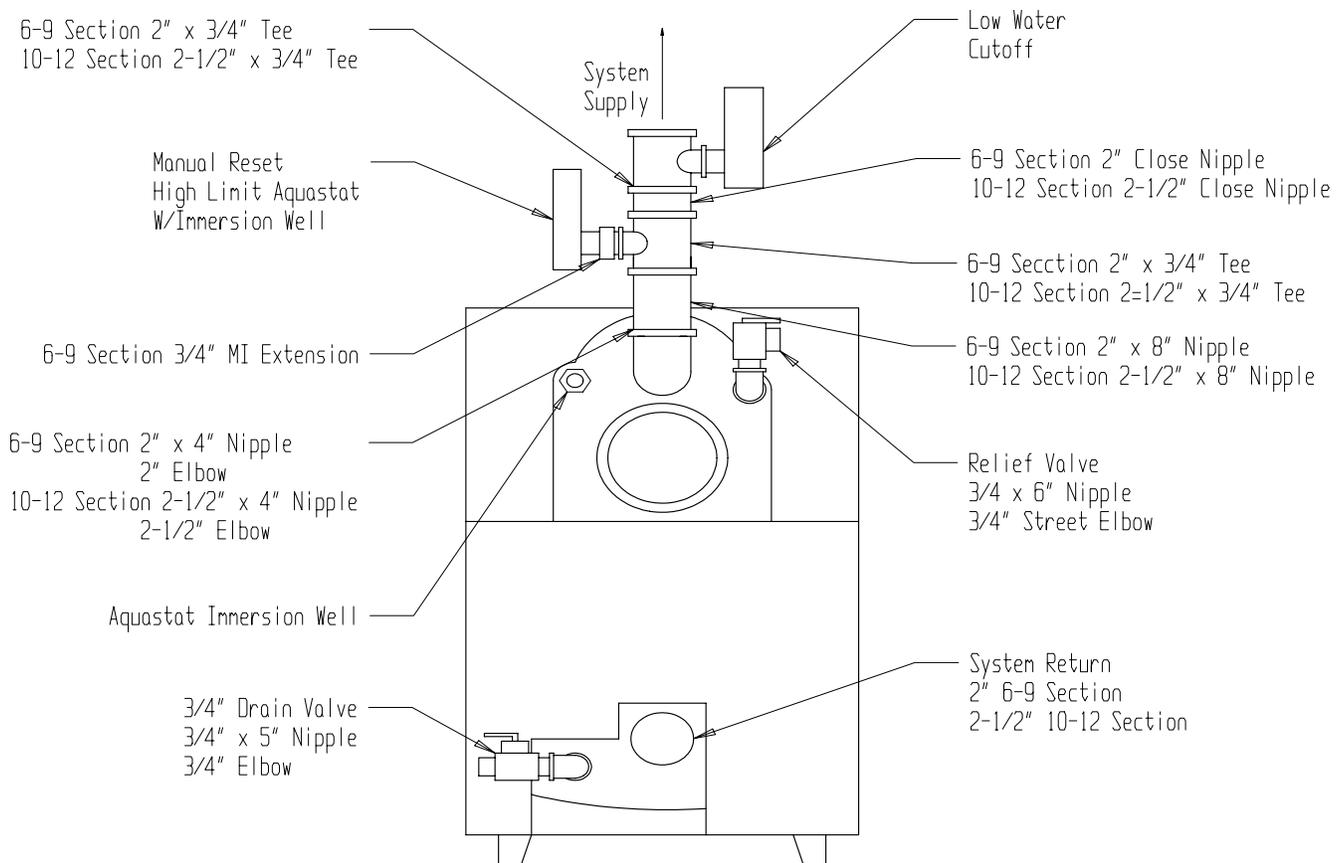
Boilers which were split for installation will need to be hydrostatic pressure tested in accordance with Section IV of the ASME Boiler and Pressure Code at a pressure equal to 1-1/2 times the maximum allowable pressure on the boiler nameplate.

**Caution:** Do not hydrostatically test the boiler with any controls installed. Damage to controls can occur due to over pressure.

**Warning:** Do not leave boiler unattended during hydrostatic testing. Cold water fill could expand as it warms causing excessive pressure, resulting in severe injury, death or substantial property damage. Leaks, if found, must be repaired immediately. Failure to do so can damage boiler, resulting in substantial property damage.

## Boiler Trim Piping

1. Install the 3/4" aquastat immersion well in upper right side tapping of the rear boiler section. Install the temperature sensor all the way into the well until it hits bottom and fasten in place with the retaining clip as provided.
2. Pipe in pressure relief valve with 3/4" street elbow and with the 3/4" x 3" nipple in upper left side of the rear section. Relief valve discharge must be piped to a safe place of discharge. See system piping.
3. Pipe in boiler drain with 3/4" coupling and the 3/4" x 6" nipple in the lower left side rear section.
4. Pipe in boiler gauge with 1/2" x 1/4" reducing bushing in upper front section.
5. Install auxiliary high limit aquastat and low water cutoff as shown using the provided piping.



## System Piping

**Important...** INSTALLATION MUST BE PERFORMED BY A TECHNICALLY QUALIFIED SERVICEMEN.

**SOLAIA COMMERCIAL BOILERS HAVE A MAXIMUM OPERATING PRESSURE OF 58PSI**

NOTE: If normal operating pressures are greater than 30psi please contact the manufacturer for required trim.

Pipes that are connected to boiler fittings must be supported and placed so that they do not create stresses on the boiler fittings themselves.

The Solaia boiler is a highly efficient boiler in which care must be taken to ensure that high volumes of low temperature water are not introduced into the boiler. Operating at return water temperatures below 130°F for extended periods of time will allow for the accumulation of condensation, scale and increased soot formation in the boiler. Corrosion and eventual heat exchanger failure will result.

### **Low water cut off**

A low water cutoff has been provided with the boiler package. See boiler trim piping for the recommended location. Always follow the low water cutoff manufacturer's recommendations for installation.

### **Relief Valves**

**Warning:** The discharge of the pressure relief or safety valve must be piped close to the floor to prevent scalding in the event of a discharge. The discharge piping must be sized the same as the valve outlet. Never install any valve between the boiler and the safety valve or in the discharge piping. Failure to comply with this warning can result in an explosion causing property damage, severe personal injury, or death.

Relief valves are to be properly piped in to conform to code standards. Discharge piping from the relief valve must be sufficiently supported so as to avoid strain on the safety valve body.

Discharge piping should terminate 6" above the floor to eliminate damage to the structure or personal injury. It should be piped to a location where it can be inspected for any visible signs of leakage. It must not be piped to a point where freezing may occur.

## Jacket Installation

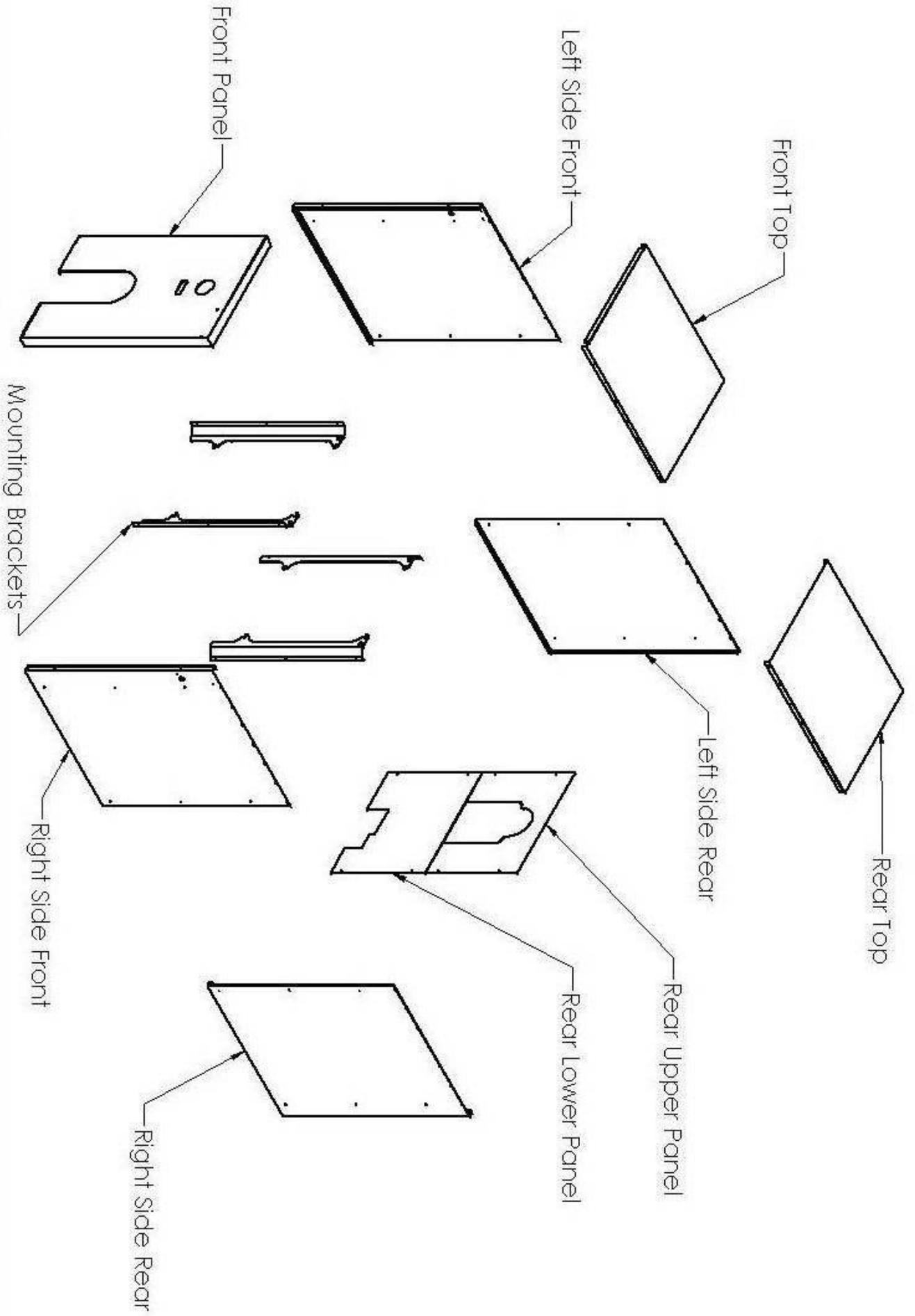
The boiler jacket is designed so that all piping connections can be made before the Jacket is installed.

### **Jacket Components**

- |                         |                                     |
|-------------------------|-------------------------------------|
| 2) Mounting Brackets A  | (1) Right Front Panel               |
| (2) Mounting Brackets B | (1) Right Rear Panel                |
| (1) Front Panel         | (1) Top Front Panel                 |
| (1) Upper Rear Panel    | (1) Top Rear Panel                  |
| (1) Lower Rear Panel    | (1) Insulation Strip 3" x 48" x 87" |
| (1) Left Front Panel    | (1) Insulation Strip 3" x 12" x 87" |
| (1) Left Rear Panel     | (1) Insulation Rear Panel           |
|                         | (1) Trim Bag                        |

### **Trim Bag Components**

- |   |  |
|---|--|
| (10) #8 x 1/2" Hex Washer Head Self Drilling Screws | (3) Lengths Plastic Strapping – 11 Ft. |
| (60) #10 x 3/4" Hex Washer Sheet Metal Screws       | (3) Strapping Clips                    |
| (6) #10 x 5/8" Phillips Flat Head Screws            | (6) Feet Foil Tape                     |
| (6) Brass Cup Washers                               | (4) SB875-11 Anti Short Bushings       |



### Mounting Bracket Installation

Attach four jacket mounting brackets to the boiler. Note there are two different jacket brackets which end up on opposite corners facing outward. Slide the slots in the mounting brackets over the boiler tie rods between the two 12 x 1.75 mm nuts located on each end of the tire rods. Tighten the outer nuts to secure the brackets into position. Place two of the SB875-11 anti short bushings into holes in jacket brackets on the same side of the boiler as the aquastat immersion well.

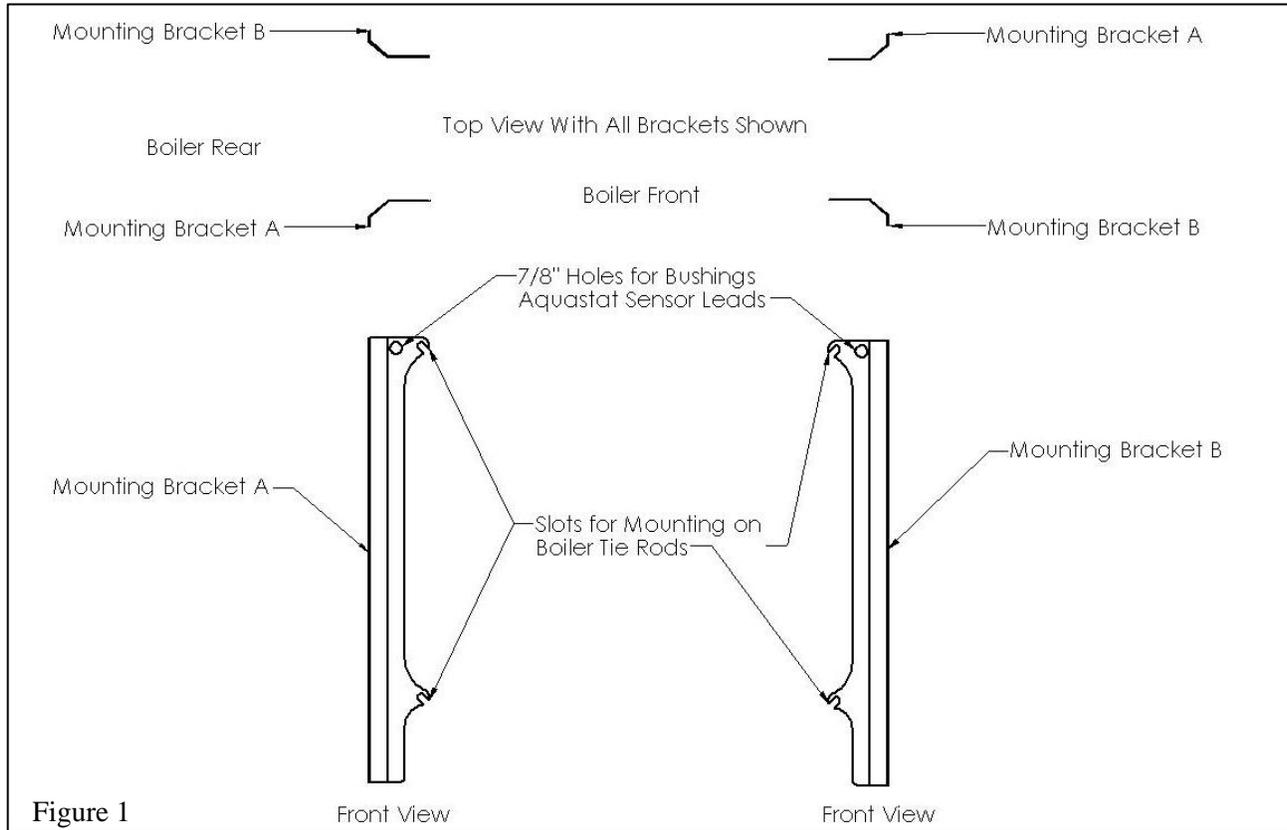


Figure 1

### Insulation Installation

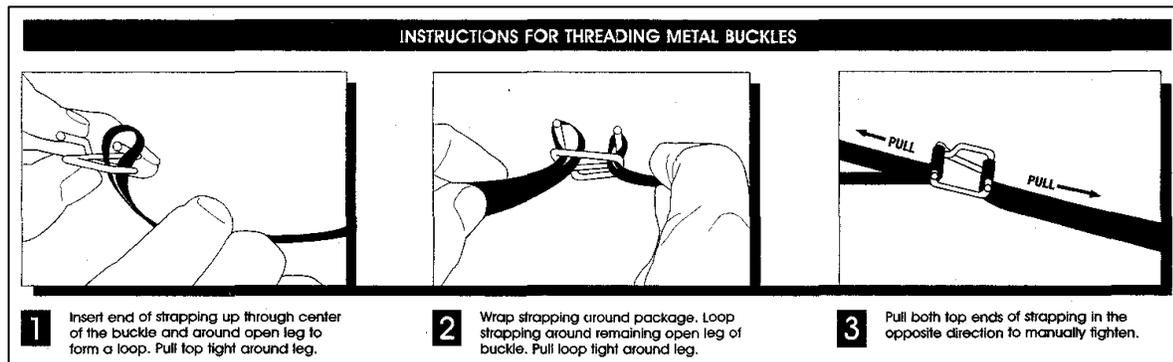
Cut the 3" x 48" x 87" insulation to the appropriate widths as listed below.

- |                              |                              |
|------------------------------|------------------------------|
| 6-Section.....25- 1/4" x 87" | 10-Section.....44-1/4" x 87" |
| 7-Section .....30" x 87"     | 11-Section.....36-7/8" x 87" |
| 8-Section.....34-1/4" x 87"  | 12-Section.....41-5/8" x 87" |
| 9-Section.....39-1/2" x 87"  |                              |

Tape the 3" x 12" x 87" insulation strip to the 3" x 36 7/8" x 87" piece to make the wrapper for the 11 section boiler or to the 3" x 41 5/8" x 87" piece to make the wrapper for the 12 section boiler using the foil tape.

Drape the insulation over the boiler with the foil side facing out.

Fasten the insulation to the boiler using the three supplied plastic straps and buckles.



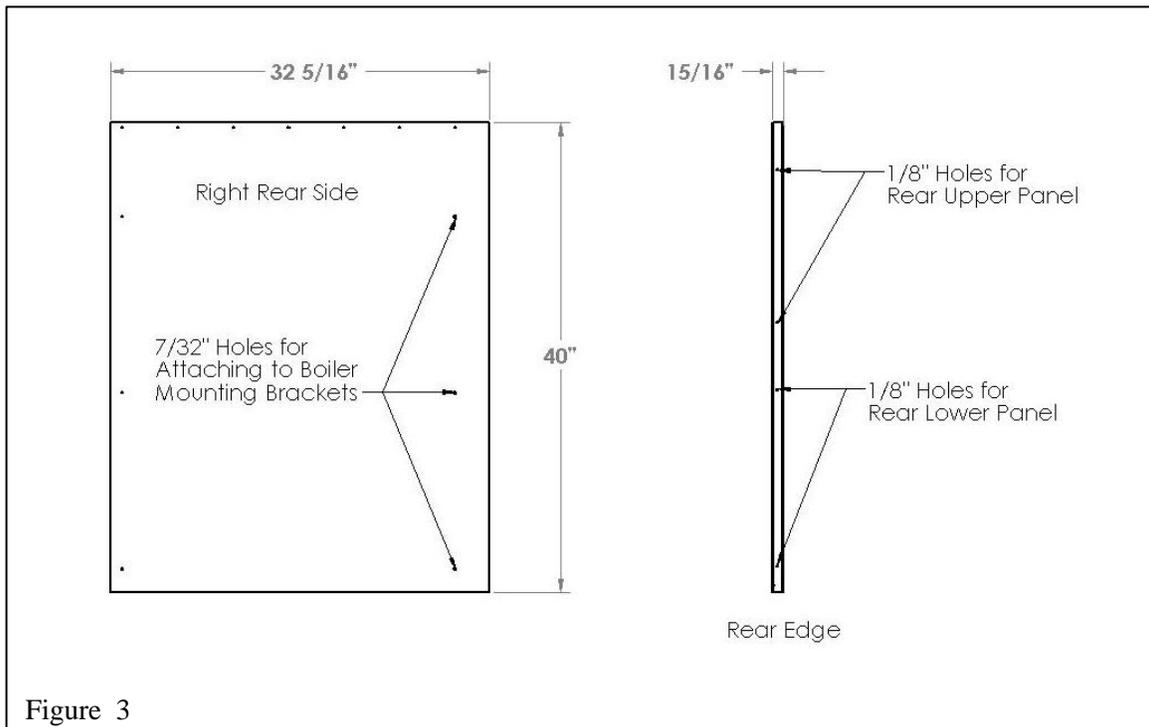
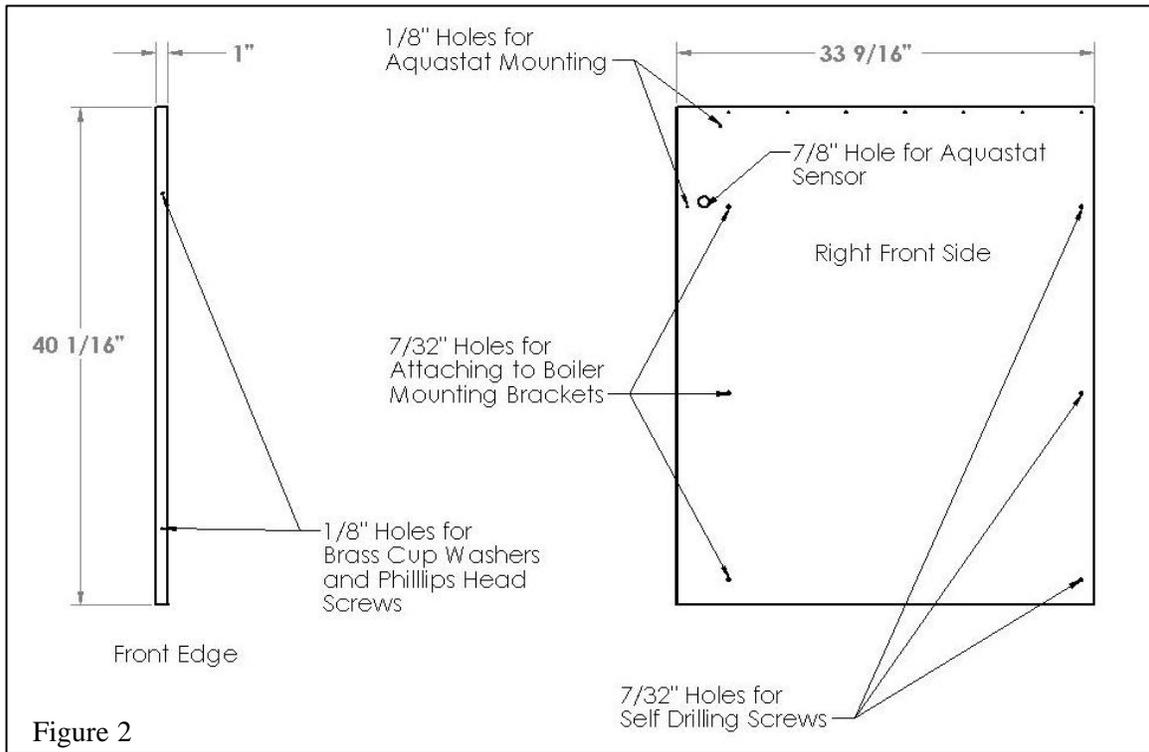
**1** Insert end of strapping up through center of the buckle and around open leg to form a loop. Pull top tight around leg.

**2** Wrap strapping around package. Loop strapping around remaining open leg of buckle. Pull loop tight around leg.

**3** Pull both top ends of strapping in the opposite direction to manually tighten.

### Assemble Side Panels

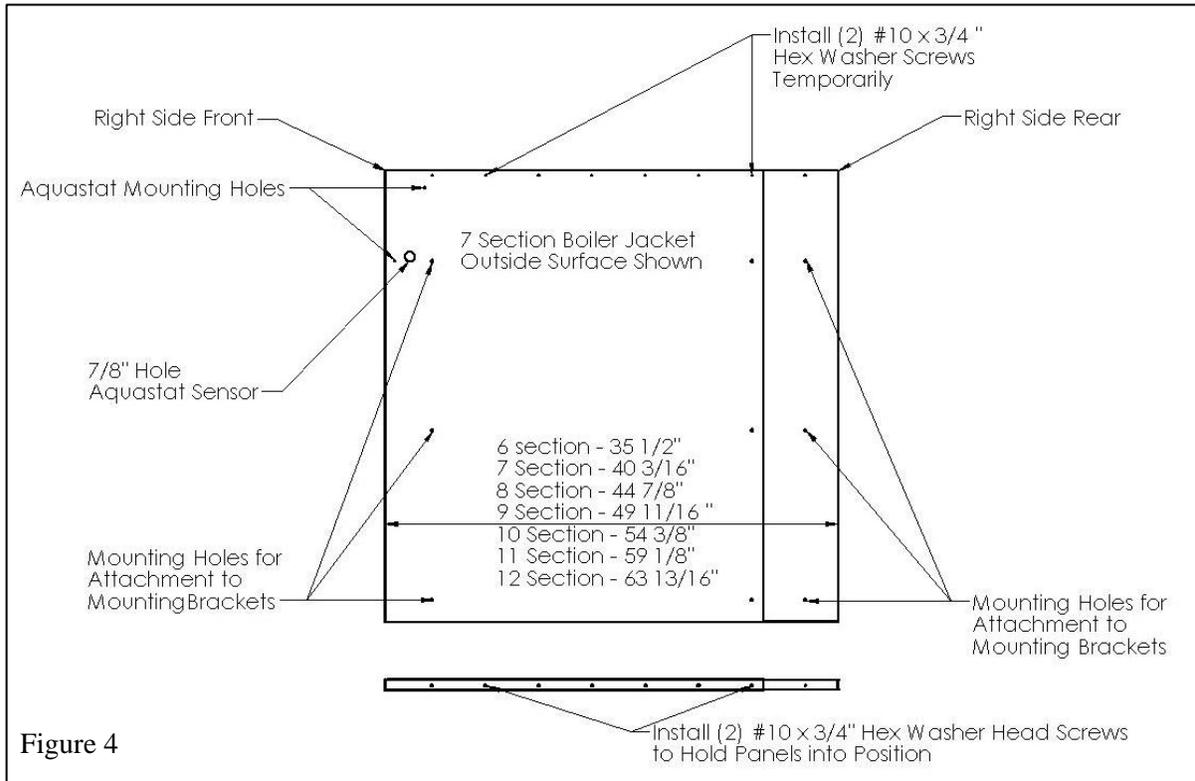
The boiler side panels are designed to telescope to the appropriate length in order to fit any size boiler. See Figure 2 below for front side and Figure 3 for rear side jacket panels.



On a flat surface place the rear side upside down with the bottom channel facing up. Place the bottom channel of the front panel over the channel of the rear panel and adjust the overall length of the side panel as shown in Figure 4 below.

Place two #10 x 3/4" hex washer sheet metal screws into the bottom channel to lock the overall length of the assembled side to the proper length as shown in the figure below.

Install two #10 x 3/4" hex washer sheet metal screws along the top to hold the two halves together temporarily.



Repeat the above procedure for the left side jacket assembly.

### Assemble Side Jacket Assemblies to Boiler

Align the six holes as indicated in Figure 4 with those located in the boiler mounting brackets. Fasten the sides to the brackets using six #10 x 3/4" hex washer sheet metal screws.

Install three #8 x 1/2" hex washer head self drilling screws in the holes as indicated in Figure 4 to further attach the sides together.

Remove the two #10 x 3/4" hex washer sheet metal screws which were installed temporarily along the top of the jacket side assemblies.

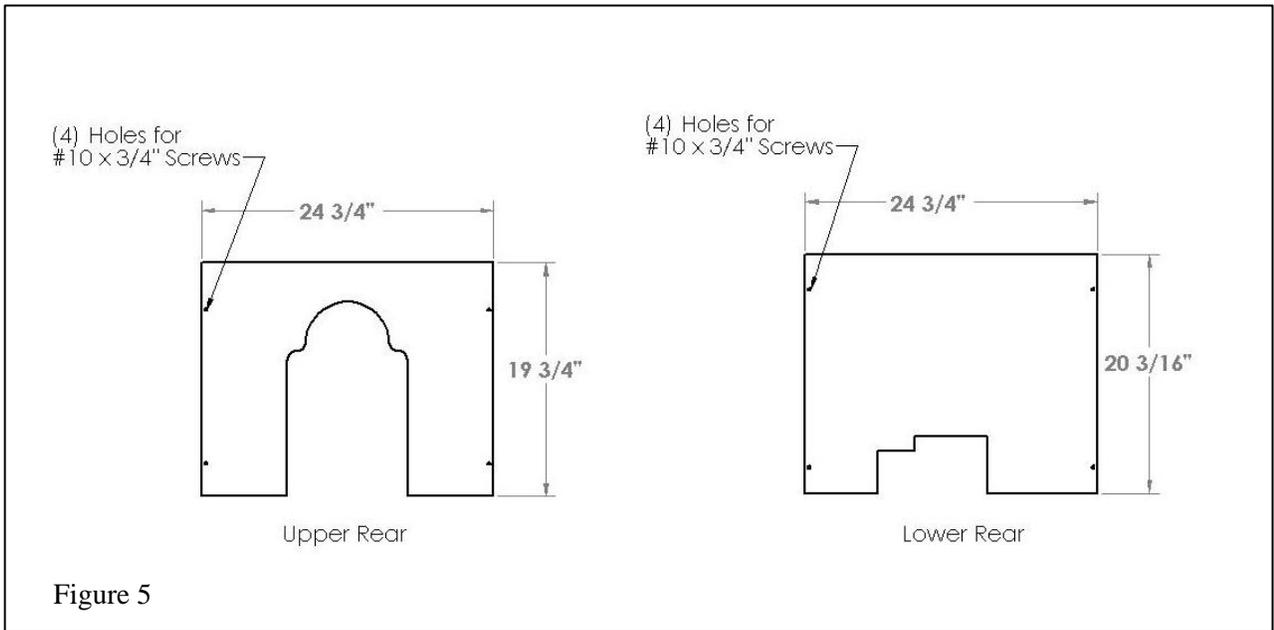
Install two brass cup washers and two #10 x 5/8" Phillips flat head screws into the 1/8" holes on the front edge of both the left and right side panel as shown in Figure 2

### Rear Jacket Panels

Place rear panel insulation on back section of boiler with the foil facing outward.

Install the lower rear jacket panel to the side panels using four #10 x 3/4" hex washer sheet metal screws. See Figure 3 and Figure 5.

Install the upper rear jacket panel to the side panels using four #10 x 3/4" hex washer sheet metal screws. See Figure 3 and Figure 5.

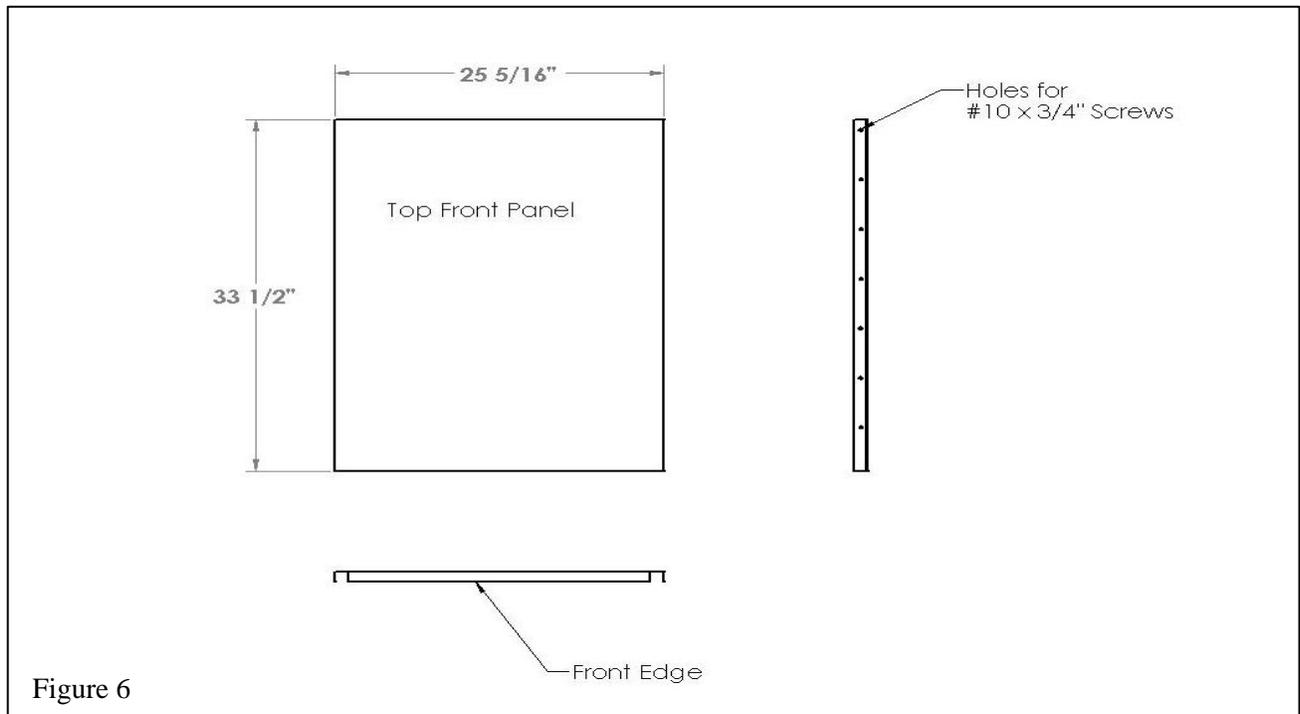


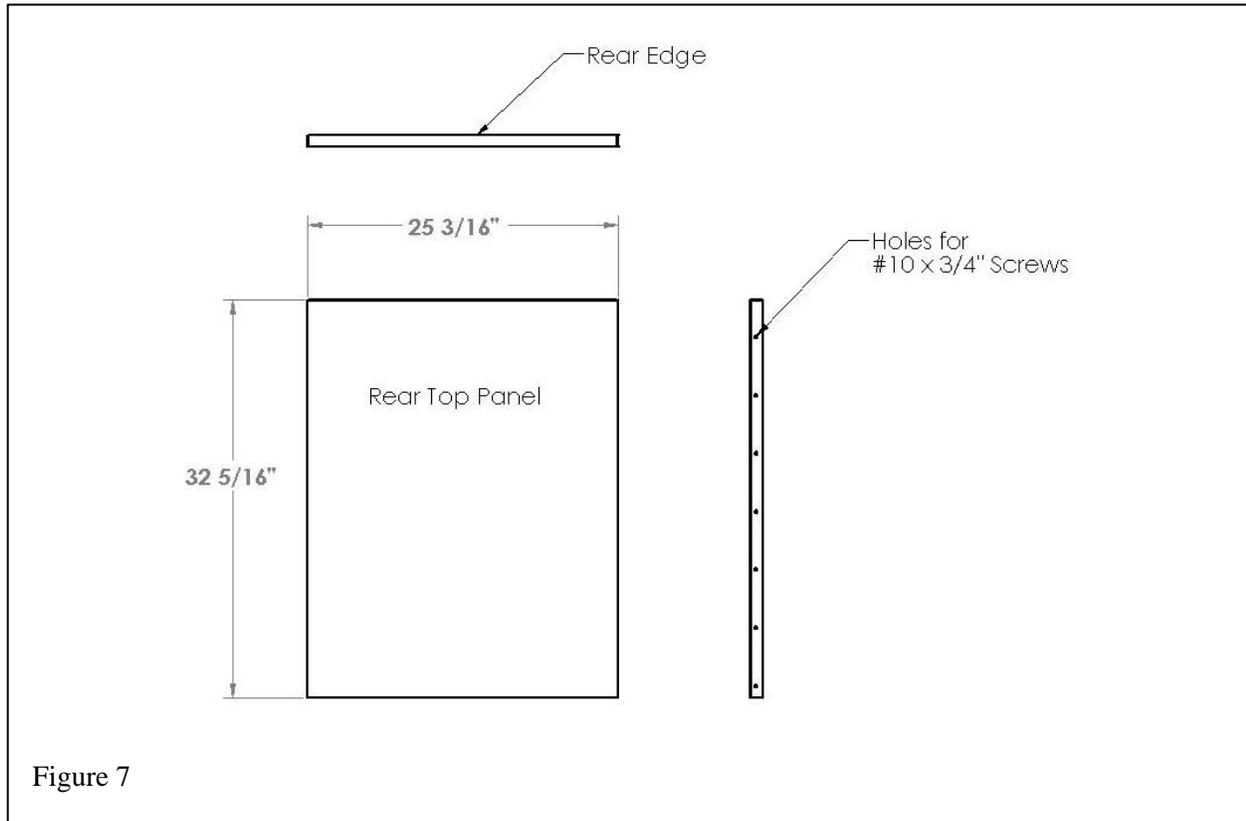
### Temperature Sensor Installation

1. Install (2) SB875-11 black anti short bushings into the upper holes in the mounting brackets along the right hand side of the boiler.
2. Install (1) SB875-11 black anti short bushing into the 7/8" hole in the right front jacket panel.
3. Run the sensor through the mounting brackets and the jacket side panel.

### Install Top Panels

Place rear top panel over the side and rear panels. Place the front top panel over the sides. Fasten the top panels using #10 x 3/4" hex washer sheet metal screws starting from the front and rear side and working into the middle. See Figure 6 and Figure 7 for top panel drawings.





### Name Plate Installation

Install nameplate provided in the upper left jacket corner. Transfer the boiler serial number which is riveted to the front leg of the boiler to the nameplate.

### Aquastat Installation and Adjustment

1. After cabinet installation is complete install the temperature control on the right side of the boiler. Attach the aquastat to the jacket side panel using sheet metal screws and the holes provided in the jacket panel. The sensor wires should be run through the bottom knockout in the aquastat. The rubber grommet provided with the sensor wires is to be securely inserted into the aquastat knockout.
2. Connect the sensor leads to the appropriate temperature control terminals.
3. Connect your line voltage and thermostat wires if applicable to the control. See electrical diagrams for proper connections.
4. Honeywell L7248 - The overall range of the High Limit is from 130<sup>0</sup>F to 220<sup>0</sup>F. Typically it would be set in the range of 180<sup>0</sup>F to 200<sup>0</sup>F.

## VENTING

**Warning:** The vent installation must be in accordance with the National Fuel Gas Code ANSI Z223.1/NFPA 54, the ASHRAE Equipment Handbook on Venting or the applicable provisions of local building codes. Failure to follow all instructions can result in flue gas spillage and carbon monoxide emissions, causing severe personal injury or death.

### Chimney

The boiler must be connected to an adequate chimney or an approved venting system in accordance with these instructions. An adequate chimney or venting system is one that is sealed and lined with the capability of producing a -.04" W.C. flue draft and having the capacity to handle the amount of flue gas that is introduced. A chimney with an internal construction of corrosion resistant tile, stainless steel, or some other material that will withstand flue gas temperatures up to 1000<sup>0</sup>F is required.

Masonry and metal chimneys shall be constructed in accordance with applicable building code requirements. Masonry chimneys shall be lined with an approved clay tile liner or a listed chimney lining system installed in accordance with manufacturers' instructions.

Prior to installation of the boiler, the chimney or venting system shall be examined by the installer and determined to be in good condition. All joints of the chimney must be tightly sealed. The inside of the chimney should be free of all obstruction, such as loose brick, broken pieces of tile, or corroded metal. If chimney flues are divided or there are multiple flues within one chimney, make sure there are no openings in the partition separating the divided or individual flues. When a new appliance is connected to an existing chimney, that chimney shall be brought up to current requirements. Chimneys which are relined shall be done so with an approved liner that will resist corrosion, softening, or cracking from the flue gasses.

All chimney clean-out doors and flue connections must fit tightly so they will seal to avoid air leakage.

The inside area of the chimney liner should equal, at a minimum, the area of the vent pipe exiting the furnace. If more than one appliance is installed, the area of both appliances shall be used in determining the required inside area of the chimney.

The flue gas exit of a chimney shall be at least 3 feet above the highest point where it passes through the roof of a building and at least 2 feet higher than any portion of a building within 10 feet of such chimney.

The chimney height will also be determined by the height of the surrounding trees, buildings and terrain. Chimney downdraft conditions cause faulty operation that creates a hazard, corrective steps must be taken.

### **Chimney Relining**

A tile lined masonry chimney serving an oil fired boiler should comply with applicable building codes such as NFPA-211. An additional listed lining may be required to reduce transient low draft during startup and acid water condensation during cyclical operation. This is particularly true for high mass masonry chimneys serving oil fired furnaces of higher efficiency. For masonry chimneys, local experience can indicate how well the construction has withstood the lower temperatures produced by higher efficiency furnaces.

Evidence of potential or existing chimney damage should be determined by visual inspection of the chimney and liner. Exterior indicators such as missing or loose mortar/bricks, white deposits on the brick or water stains on the interior building walls should be investigated further. The operational flue temperatures for boilers range from 350°F to 450°F at the outlet of the boiler. These temperatures are further reduced before reaching the chimney due to heat loss through the vent connector and dilution from the draft regulator. The resulting flue gas temperatures may become low enough to form condensation on the chimney liner walls.

To prevent condensation, it is necessary that the internal chimney wall temperature always be kept above the dew point of the flue gasses. If the chimney is a masonry type, it may have to be lined with a flue liner, if the temperature loss is too great for the boiler. A liner will act as an insulator and reduce the flue gas temperature loss. Insulation may be added around the liner for further temperature stability. Refer to NFPA-31 for recommended liner sizing tables as developed by the Oil Heat Vent Analysis Program.

### **Chimney Connector**

The chimney connector pipe between the boiler and chimney shall be equal in diameter to the flue outlet of the boiler. Refer to boiler specifications in this manual for proper size flue pipe for your model boiler. Any reduction in size required for the chimney must be made at the chimney connector. The vent connector pipe must be made of 24 gauge (or thicker) corrosion-resistant steel. The vent connector pipe should be as short as possible and installed so that it has a continuous rise from the boiler to the chimney. Long horizontal vent runs can result in the possibility of condensation in the flue pipe or the chimney. All horizontal runs of vent connector pipe should be pitched upward a minimum of 1/4 inch per foot of run. The horizontal length of the vent pipe connector shall not exceed 10 feet. The chimney connector shall be installed so as to minimize the number of elbows and to avoid sharp turns or other construction features that would create excessive resistance to the flow of flue gasses. Tees may be used in a straight section in conjunction with a barometric draft regulator; however, they must not be used for a 90° turn. No device that will obstruct the free flow of flue gasses shall be installed in the chimney connector. This does not exclude the use of devices specifically designed for the use in chimney connectors such as automatic dampers. The vent pipe should be joined

with metal screws and supported by straps. A thimble should be used to connect the vent connector pipe to the chimney so the pipe may be readily removed in case of inspection or replacement.

No chimney connector shall pass through any floor or ceiling. The vent connector pipe must not pass through a combustible wall or partition unless they are guarded at the point of passage by a ventilated metal thimble not less than 12 inches larger in diameter than the connector, on metal or fireclay thimbles adequate protection is provided at the passageway. An acceptable passageway could be either an approved, ventilated metal thimble which is at least 12 inches larger in diameter than the vent connector pipe, or brick work which is at least 8 inches thick constructed into the wall and surrounding the vent connector

Clearances from combustible materials shall be in accordance with the clearances given. The vent connector pipe should extend only to (and not beyond) the inside wall of the chimney. A thimble should be used to connect the vent connector pipe to the chimney so that the vent connector pipe may be readily removed in case of inspection or replacement.

Connection to the chimney must be made above the bottom of the chimney to avoid blockage. Vent piping should extend just into the chimney far enough to expel flue gasses. Inserting the vent piping too far into the chimney will cause undue obstruction. Use a thimble or a slip joint where the vent pipe enters the chimney to allow easy removal for cleaning.

If a draft regulator is required in the vent piping, it should be located at least 24 inches from the boiler if possible in either a horizontal or vertical section of the vent pipe. The draft regulator must be installed in the same room as the boiler and in such a manner that there is no difference in pressure between the air in the vicinity to the regulator and the combustion air supply. Ensure that the barometric damper is accessible for adjustment.

With the burner operating, use a draft gauge to adjust the regulator to the proper setting (see instructions enclosed with draft gauge to adjust the regulator to the proper setting). When the burner air supply and draft are properly adjusted, the draft in the flue should be a negative .02" W.C. to negative .04" W.C.

Two or more oil burning appliances each equipped with a safety control may be permitted to be connected to one common chimney if sufficient draft is available for the safe simultaneous removal of all products of combustion.

If two or more openings are provided into one chimney, they shall be at different levels on the same story of the building, with the smaller appliance entering at the highest possible level consistent with clearances to combustible materials.

Two or more connectors shall not be joined together unless the common connector, manifold and chimney are properly sized. Adequate draft must be available to safely remove all products of combustion simultaneously without leakage, or back flow.

## **Burner Installation**

**Warning:** The burner must be installed in accordance with the burner manufacturer's instructions.

Follow the burner manufacturer's installation instructions for proper installation, fuel piping, wiring, burner adjustment and servicing.

The burner is mounted to the door with (4) 8mm studs, nuts and washers (located in the burner trim bag). Thread the (4) studs in to the (4) M8 holes threaded to permit connection to the burner. Thread the shorter length of stud into cast door.

Check that there is a complete seal between the door and the burner flange after installing ceramic fiber seal furnished with the burner.

**Note: A high temperature stainless floor liner is provided with oil burners. This should be installed on the floor of the combustion chamber tight to the front section.**

## **Burner Swing Door**

### **Opening the Door**

1. Turn off power to boiler. More than one disconnect may be required.
2. Allow boiler to cool down.
3. Unplug the burner power cable at factory-supplied burner Molex plug electrical disconnect.
4. Lift the front jacket panel up and off the boiler. Disconnect fuel lines as required.
5. Remove the two brass nuts on the right hand side of the door using a 15/16" wrench.
6. Swing open burner door to the left.

### **Closing the Door**

1. Swing burner door as far as possible to the right.
2. Install the brass nuts onto studs making sure the shoulders on the nuts are facing inward.
3. Attach nuts to the studs and hand tightening only until the shoulders are completely through the slots.
4. Eliminate any combustion gas leaks by inspecting and replacing door seals and gaskets as required.
5. Tighten the nuts evenly until a complete seal is made. Check to ensure a proper seal between the door and the boiler has been made.
6. Reattach fuel lines as required.

## **Fuel Piping**

**Warning:** Do not use compression or soldered fittings on oil piping. No safe repair can be made. Failure to comply with this warning can cause severe personal injury, death or substantial property damage can occur.

**Warning:** Never use an open flame to test for gas leaks. Always use an approved leak detection method. Failure to comply with this warning can cause severe personal injury, death or substantial property damage.

Install all piping in compliance with local, state or national codes and the separate burner manual provided with the burner.

Use only a pipe joint compound which is suitable for the fuel type being used.

Whenever the gas supply piping is pressure tested the burner gas controls must be protected. See burner manual for proper test procedure.

Whenever oil piping is run be sure to use flare fittings only. Do not use compression fittings.

## **Electrical Wiring**

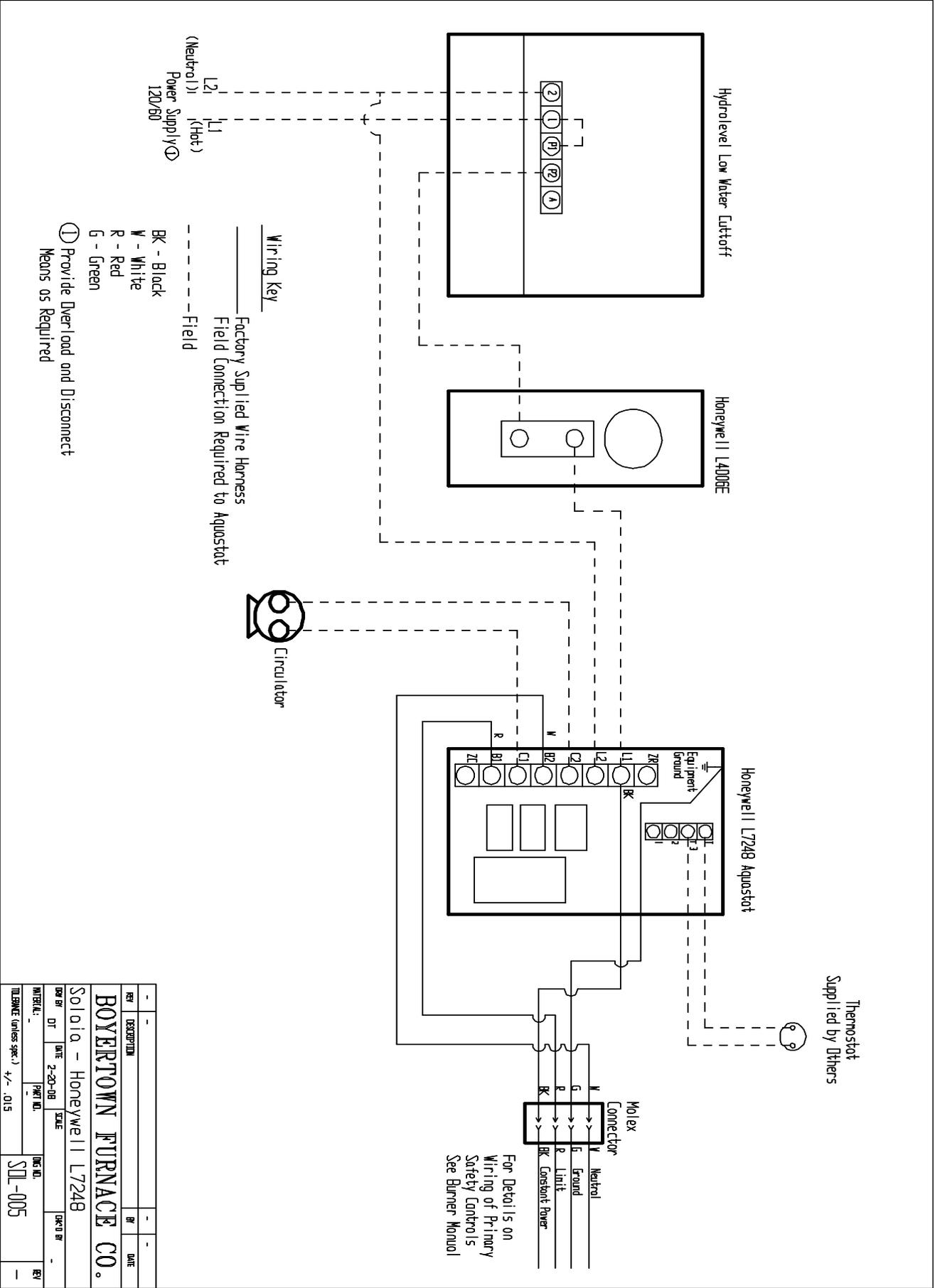
**Caution:** Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation of all safety devices after servicing.

The electrical connections to this boiler must be made in accordance with all applicable local codes and the latest revision of the National Electrical Code ANSI/NFPA – 70. Install a separate circuit properly rated for the boiler. A shut off switch should be located at the boiler.

The boiler must be grounded in accordance with the authority having jurisdiction, or if none, the latest revision of the National Electrical Code ANSI/NFPA – 70. Improper grounding can result in improper burner control function.

Use properly sized copper conductors only.

Refer to wiring diagrams in rear of manual for electrical connections. The boiler should be connected by a separate, permanently live electrical supply line.. Use copper wires rated for at least 90° C. Install a separate fused disconnect switch near the boiler so power can be shut off for servicing.



For Details on  
Wiring of Primary  
Safety Controls  
See Burner Manual

Thermostat  
Supplied by Others

## **Operation**

**Warning:** Before proceeding read and fully understand the instructions contained in this manual. Do not attempt to operate this boiler if it has not been installed in accordance with the guidelines as set forth in this manual.

Never attempt to start the boiler if the combustion chamber contains excess oil, gas, or when the boiler is full of vapors.

Failure to comply can result in an explosion causing extensive property damage, severe personal injury or death.

### **Start-Up Equipment**

THE FOLLOWING PROPER COMBUSTION INSTRUMENTS ARE REQUIRED TO DETERMINE PROPER AIR ADJUSTMENTS AND DRAFT WHEN SETTING UP OR SERVICING THE OIL BURNER.

1. CO<sub>2</sub> Analyzer
2. CO Analyzer
3. Draft gauge
4. Fuel pressure gauges
5. Vacuum gauge
6. Stack thermometer
7. Smoke tester

Do not attempt to make any adjustments or start the boiler without the proper equipment.

### **Start-Up Procedure**

1. Fill the boiler and all of the radiation with water to the required system pressure. Please consult the factory for proper trim if the system pressure exceeds 30 PSI. The Solaia boiler has a maximum working pressure of 58PSI
2. Check that all safety devices are in place and operational.
3. Check that the inside of the boiler is free of any fuel residue or foreign materials and that the ceramic fiber insulation on the burner door has not been damaged.
4. Check oil burner nozzle or gas burner orifice to ensure that the right size and type is properly installed. See preliminary settings for proper nozzle size and type.
5. Check electrode/flame rod settings, as they may have been jarred out of position during transportation. See burner instructions electrode/flame rod settings.
7. Check that the Burner mounting bolts are tight.
8. Set aquastat high limit between 180°F and 200°F and the auxiliary manual reset high limit aquastat to between 220°F and 240°F.
9. Read and understand all burner start up information included with the burner manual.
10. Turn service switch on.

## Burner Adjustments

**Warning:** Before proceeding read and fully understand the instructions contained in the burner manual.

Failure to comply can result in an explosion causing extensive property damage, severe personal injury, or death.

### Preliminary Oil Burner Settings

Boiler	Burner	Nozzle	Pump Press	CO <sub>2</sub>	Smoke
CSL6230	Riello F10	2.00 x 60B	150 PSI	11.0%	#0
CSL7290	Riello F15	2.25 x 60B	175 PSI	11.0%	#0
CSL8350	Riello F15	2.50 x 60B	175 PSI	11.0%	#0
CSL9410	Riello F15	3.00 x 60B	175 PSI	11.0%	#0
CSL10470	Riello F15	3.50 x 60B	175 PSI	11.0%	#0
CSL11530	Riello F20	4.00 x 60B	175 PSI	11.0%	#0
CSL12590	Riello F20	4.50 x 60B	175 PSI	11.0%	#0

### Preliminary Gas Burner Settings

Boiler	Burner	Gas Type	Input Btu/Hr	Gas Inlet Size	Manifold Pressure	Head	Air Setting	CO <sub>2</sub>
CSL6230	HeatWise SU-3	Nat	322,000	1"	2.40"	3	7.75	9.0%
		LP	322,000	1"	1.90"	3	8.25	11.0%
CSL7290	HeatWise SU-4	Nat	406,000	1"	3.10"	7	14.25	9.0%
		LP	406,000	1"	2.50"	7	14.5	11.0%
CSL8350	HeatWise SU-4	Nat	490,000	1"	3.40"	20	20	9.0%
		LP	490,000	1"	2.30"	20	18.5	11.0%
CSL9410	HeatWise SU-5	Nat	574,000	1"	2.10"	2"	7.5	9.0%
		LP	574,000	1"	1.55"	2"	7.5	11.0%
CSL10470	HeatWise SU-5	Nat	658,000	1"	2.70"	2"	8.7	9.0%
		LP	658,000	1"	2.05"	2"	8.7	11.0%
CSL11530	HeatWise SU-6	Nat	742,000	1-1/4"	1.13"	2-5/8"	4.25	9.0%
		LP	742,000	1-1/4"	0.76"	2-5/8"	4.75	11.0%
CSL12590	HeatWise SU-6	Nat	826,000	1-1/4"	1.40"	2-5/8"	4.75	9.0%
		LP	826,000	1-1/4"	0.95"	2-5/8"	5.1	11.0%

### Control Circuit Safety Checks

Check the safety controls on the boiler after completing the oil burner adjustments. A safety control check for satisfactory performance must be performed.

1. High limit control - Remove the temperature control cover as needed and note temperature setting. With the burner running, reduce the high limit setting until the burner shuts off. Return the high limit to its original setting.
2. Auxiliary high limit control - Remove the temperature control cover as needed and note temperature setting. With the burner running, reduce the high limit setting until the burner shuts off. Return the high limit to its original setting.
3. Primary control and flame sensors – Refer to the oil or gas burner manual supplied with the burner.
4. Low Water cutoff - Follow manufacturers recommendations for testing of the low water cut off.

## **Maintenance**

**Warning:** Servicing, inspection and adjustment of the boiler and venting system must be done in accordance with all applicable local and national codes. Improper servicing can result in property damage, severe personal injury, or death.

### **Boiler Cleaning**

At the beginning of each heating season, the boiler flue passages and the oil burner should be checked for cleanliness and, if necessary, they should be cleaned. The following procedure is required for inspection and cleaning the boiler flue passages:

1. Turn off all electrical power to the boiler before inspecting and cleaning.
2. Remove the boiler front jacket panel by lifting vertically.
3. Disconnect the Molex plug at burner.
4. Remove the front upper cleanout cover plate. Inspect door gasket materials. Repair or replace as needed.
5. Remove combustion baffles in the final pass by sliding out the front.
6. Open the swing door following previously described procedure.
7. Remove any scale or soot deposits with a flexible flue brush. Vacuum all deposits from flue passages and chamber area. Be careful not to damage the door insulation.
8. Reinstall combustion baffles.
9. Install the front upper cleanout cover plate.
10. Close swing door following previously described procedure. Check to ensure a proper seal between the door and the boiler has been made.
11. Install jacket front panel.
12. Connect Molex plug for burner power.

### **Burner**

Consult oil burner manufacturer's instructions for additional maintenance requirements.

### **Vent System**

Chimney Vent- Inspect the chimney to ensure its cleanliness, proper sizing, and condition. Remove any accumulation that may have occurred at the clean out door. Inspect and clean all vent piping, replacing as necessary.

### **Safety Valve**

Consult safety valve manufacturer's instructions for additional maintenance requirements. Never try to clean or repair the safety relief valve

### **Hydronic Controls**

Consult aquastat and low water cut off manufacturer's instructions for maintenance and testing requirements.

## **Solaia Commercial Cast Iron Boiler Limited Warranty      Effective July 1, 2008**

Boyertown Furnace Company warrants that the cast iron heat exchanger of its commercial water boiler is free from defects in material and workmanship under normal usage for ten years from the date of original installation to the original commercial owner at the original place of installation. If any sections are found to have a manufacturing defect in materials or workmanship Boyertown Furnace will repair or, at its option replace them.

### Exceptions and Exclusions

1. The ten year warranty covers only the cast iron heat exchanger assembly. The burner, jacket, controls and other equipment furnished by Boyertown Furnace Company but purchased from other manufacturers shall be limited to their warranties, if any.
2. This warranty does not cover expenses for removal or reinstallation. The original commercial owner will be responsible for the cost of removing and reinstalling the defective part or its replacement and all labor and material connected therewith. Replacement material will be invoiced to the distributor in the usual manner and will be subject to adjustment upon proof of defect.
3. This warranty in no way can be considered as a guarantee of workmanship of an installer connected with the installation of the Solaia commercial cast iron boiler or as imposing on Boyertown Furnace Company liability of any nature in the installation which liability is expressly disclaimed.
4. This warranty will not be applicable if the boiler is used or operated over its rated capacity or is not maintained or installed in accordance with Boyertown Furnace Company's recommended or accepted good practice as determined by industry standards.
5. This warranty will not be applicable if the boiler has been damaged as a result of being improperly serviced or operated, including, but not limited to the following: operated with insufficient water, allowed to freeze, subjected to flood conditions, or operated with water conditions and or fuels or additions which cause condensation, unusual deposits, or corrosion in or on the cast iron sections.
6. This warranty applies only to boilers installed in the United States.
7. In order for this warranty to be effective (a) The boiler must have been assembled in strict compliance with the installation instructions furnished with the boiler by a heating contractor whose principle occupation is the sale and installation of heating equipment. (b) Boiler sections must not have been damaged in handling during shipment or installation.
8. The remedy for breach of this warranty is expressly limited to the repair or replacement of any part found to be defective under conditions of normal use; and the remedy for incidental, special or consequential damages or loss such as loss of the use of the materials, inconvenience or limitation of incidental or consequential damages so the above limitations or exclusions may not apply to you.
9. The warranty is lieu of all others, and any and all express or implied warranties (including, without limitation any implied warranties of merchantability or fitness for a particular purpose), are expressly limited in duration to the period of the warranty as previously stated herein. Some states do not allow limitations on how long an implied warranty lasts so the above limitation may not apply to you.

**This warranty does not extend to anyone except the first purchaser at retail and only when the boiler is in the original commercial installation location.**

Implied warranties of fitness for a particular purpose and merchantability shall be limited to the duration of the express warranty. Boyertown Furnace Company expressly disclaims and excludes any liability for consequential or incidental damages for breach of any express or implied warranty.

For prompt warranty service, notify the installer who in turn will notify the Boyertown Furnace distributor from where the boiler was purchased. If this action does not result in warranty service, contact the Boyertown Furnace Customer Service Department, P.O. Box 100, Boyertown, Pa. 19512, with details in support of the warranty claim. Alleged defective part or parts must be returned through trade channels in accordance with the Boyertown Furnace Company's procedure currently in force for handling returned goods for the purpose of inspection to determine cause of failure. Boyertown Furnace will furnish the new parts to an authorized Boyertown Furnace distributor who in turn will furnish the parts to the heating contractor who installed the boiler. If you have any questions about the coverage of this warranty, contact Boyertown Furnace Company at the above address.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

## Installation and Service Check List

Boiler Model: \_\_\_\_\_

Serial No.: \_\_\_\_\_

Installation Date: \_\_\_\_\_

Installer Name: \_\_\_\_\_

Phone No.: \_\_\_\_\_

### Boiler Installation

- Boiler level and in solid contact with floor?
- Boiler and burner wired per wiring diagram and National Electric Code? 120VAC wiring  
Type \_\_\_\_\_ Size \_\_\_\_\_ AWG
- Burner sealed to boiler? Mounting nuts tight?
- Space is large enough to provide required clearances?
- Installation complies to ANSI Z2231.1/NFPA 54?
- Local, state and national codes, laws, regulations and ordinances followed?

### Vent System

- Existing chimney and vent system inspected to NFPA 211 and in good condition?
- New vent pipe installed and properly sealed?
- Vent size checked against furnace manual and codes?

### Burner Operation

- Oil Burner Model: \_\_\_\_\_ Nozzle: \_\_\_\_\_ GPH \_\_\_\_\_ Deg. \_\_\_\_\_ Type \_\_\_\_\_
- Burner Pump Pressure: \_\_\_\_\_
- Gas Burner Model: \_\_\_\_\_
- Fuel filter and fuel lines installed and inspected as per burner manual?
- Air bled from oil piping? Piping checked for leaks?
- Burner started, adjusted and tested per burner manual?

### Boiler Operation

- Limit control tested for proper operation?
- Auxiliary high limit tested for proper operation?
- Low water cutoff tested for proper operation?
- Boiler observed going through several operational cycles for proper operation?

### Post Installation

- Reviewed owners' information in this manual with owner or maintenance personnel and instructed to keep for future reference?
- Properly filled in and returned warranty registration card to Boyertown Furnace Co.
- Inserted burner manual and control instructions with boiler manual for future use.







 -----Cut and Return This Form or register online at [www.boyertownfurnace.com](http://www.boyertownfurnace.com)-----

**Warranty Registration**

Boyertown Furnace Co.

P.O. Box 100

Boyertown, PA 19512

Date Installed: \_\_\_\_\_

Boiler Model No. \_\_\_\_\_

Serial Number: \_\_\_\_\_

Name of Purchaser: \_\_\_\_\_

Purchaser's Address: \_\_\_\_\_

\_\_\_\_\_

Dealer's Name: \_\_\_\_\_

Dealer's Address: \_\_\_\_\_

\_\_\_\_\_