

# SAUNATEC AI-SERIES COMMERCIAL BOILER ROUTINE MAINTENANCE GUIDE

**WARNING:** All Maintenance Procedures must be performed by qualified personal, familiar with boilers and boiler accessories.

**WARNING:** The boiler shall not be left unattended while tests are being performed and the Boiler Steam Room should not be occupied.

**WARNING:** Failure to properly maintain the Boiler can cause equipment failure and may void the warranty.

**CAUTION:** Turn Main Power and Control Circuit power off before servicing equipment!

**CAUTION:** Exposed plumbing may be over 200°F during normal operation and can present a severe burn hazard. Be sure to protect people from accidental contact!

**CAUTION:** Draining a hot boiler may release dangerously hot water or steam, risking personal injury and damage to plumbing! Your local code may require that boiler pressure be limited to under 5 psi and require a special drain system to drain a hot boiler while under pressure!

**CAUTION:** Loose wire connections can cause heat damage to wires, terminal blocks and other components and may void the warranty.

**Note:** If the water drains slowly or sporadically, it may be necessary to remove the element assembly and clean the tank by hand. If this condition is seen, stop using the generator and call: Saunatec Steam Service for assistance between 7:00am and 5:00pm Pacific Time at 1-800-363-0251.

## Water Quality Requirements:

The nature of a steambath generator requires testing of the feedwater to avoid potential high concentrations of impurities which can cause a deposit or scale to form on the internal surfaces. This deposit or scale can interfere with the equipments proper operation and even cause premature generator failure. Concentration of impurities is generally controlled by treating the feedwater and/or “blowing down” the generator when it is not heating. The “blow down” process involves removing a portion of the tank water with high solid concentration and replacing it with makeup water.

To reduce corrosion and element damage risks, always flush feedwater lines thoroughly to eliminate flux residue and avoid sodium based water softeners. The ASX-200 filter system available from Saunatec provides very good protection in most installations and should be connected to a cold water supply. *Feedwater temperature must be no hotter than 100°F if the ASX-200 is installed!*

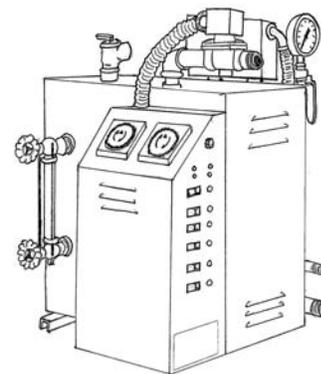
To insure proper operation, the water supply should be tested prior to operating the equipment. There are several treatment processes which can be used if you have hard water. A local reliable water treatment company can recommend the appropriate treatment if required. The recommended feedwater quality is listed below.

## Feedwater Quality

Hardness, ppm	10 – 30 (.5 – 1.75 gpg)
T-Alkalinity, ppm	150 – 700 (8.75 – 40.8 gpg)
Silica, ppm	15 – 25 (.875 – 1.45 gpg)
PH (strength of alkalinity)	10.5 – 11.5

**Some water filtration equipment is available through Saunatec. Contact us for further information.**

For service or assistance contact Saunatec Steam Service between 7:00am and 5:00pm Pacific Time at **1-800-363-0251**.



## 1. Routine Maintenance (Daily)

**BLOWDOWN** Daily blowdown/draining of the boiler is recommended, particularly in commercial installations and areas with hard water. Failure to properly maintain the boiler in this manner may cause equipment failure and void the warranty! When possible, allow the boiler to cool before opening the drain. Refer to local codes for drain plumbing requirements. **CAUTION: draining a hot boiler may release dangerously hot water or steam, risking personal injury and damage to plumbing! Your local code may require that boiler pressure be limited to under 5 psi and require a special drain system to drain a hot boiler under pressure!**

**Manual Drain:** After allowing the boiler to cool, open the manual ball valve (or open the Autodrain using the **ELECTRONIC DRAIN** switch) to drain the tank. Open the steam or safety valve to relieve the vacuum and let the drain flow fully. When the tank is fully drained, close the drain again and the boiler is ready for normal operation.

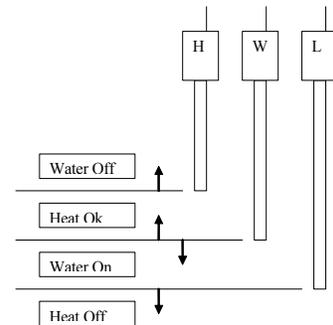
**Autodrain:** Set the **DRAIN CLOCK** to open the drain valve daily at a convenient time. The best time for this is shortly before the boiler will be turned on for the day so the restart will use fresh, clean water. The **Cool Drain** option adds fresh water and drains part way multiple times to drain only cool water and to rinse the tank.

## 2. (Weekly)

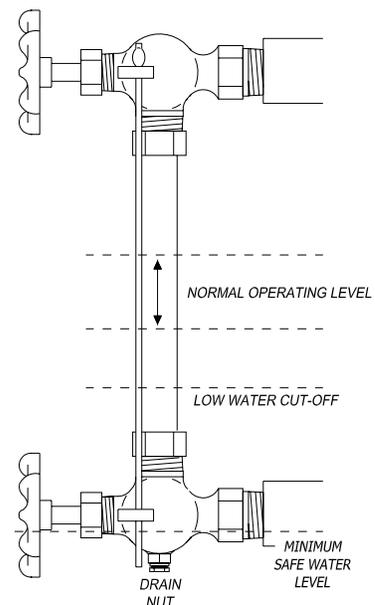
- a. Check Water Level Circuit for proper operation. (See Water Level Probes and Site Glass picture below).

**To check the water level control** circuit, first start the generator using the **BOILER OPERATION** switch.

- Set the **HEAT** switch OFF. Turn on the steam bath and verify the room's steam valve is open (this will help the generator drain more quickly in the following steps). Adjust the thermostat as needed to open the steam valve.
- Check the water level showing in the gauge glass: when the level rises above the middle of the glass, the water valve should close and stop filling the generator.
- Open the generators drain and reset the **HEAT** switch to its NORMAL position: the **BOILER HEATING** light will turn on and the heating contactors will close.
- Watch the water level in the gauge glass: as the level reaches a depth of about 1/3 of the glass, the water valve will turn on again.
- Set the **FEEDWATER** switch to STOP FILL and the water valve will close.
- Allow the water to continue to drain and watch the level in the glass. When the water level drops to about 1/2" depth in the glass, the **BOILER HEATING** light will turn off and the heat contactor will open. *This is the low water cut-off level.*
- Set the **BOILER OPERATION** switch to off, close the drain and reset all switches to their NORMAL position. Reset the thermostat to its original position. The generator is now ready for normal operation again.



- b. Check for steady flow of water when tank is filling.
- c. During Manual or Auto drain cycle check for smooth rapid flow of water out of drain line. Clean drain valve and drain piping if necessary. There is a Cross Fitting in the drain piping for inspection and clean out purposes.
- d. Check Site Glass for adequate water level & discoloration (see picture below).
- e. Check all Valves, Site Glass, Pressure Gauges and plumbing fittings for water or steam leaks, repair if necessary.
- f. Check Site Glass for proper water level during steam cycle. Water level in glass should be 1/3 to 2/3 full (see picture directly to the right).
- g. Check Pressure Gauge for proper operating pressure. When the Steam Valve(s) are closed the registered pressure should be approximately 5 to 9psi. When the Steam Valve is open the registered pressure should be 0psi.



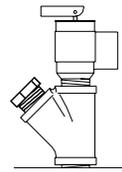
- h.** Check for noisy or worn Contactors, replace if necessary.
- i.** Check IT-1 Thermostat and optional I60 On/Off or Refresh Switches for proper operation (see Commercial Steam Generator Installation Instructions).

### **3. (Monthly)**

- a.** Check for loose or overheated wires, and for indications of corrosion.
- b.** Check Pressure Switches for proper operation.  
(See attached Pressure Control Assembly on page 4).
- c.** Remove Water level Probes, check for signs of scale and clean if necessary (probe access cover is located on top of the Boiler near the Pressure Relief Valve).
- d.** Check Low Water Cut Off Probe (if required to be installed) for deposits and clean or replace as necessary.

### **4. (Quarterly)**

- a.** De-Scale tank. A plugged port is provided next to the Pressure Relief Valve for adding factory recommended de-scaler to the generator tank.  
The safety valve must remain installed in the upright position as shown.
- b.** Element(s) should be removed and checked for scale. Clean element if necessary (see attached Element Installation Instructions).
- c.** Clean Tank and Baffle (located on left wall of tank) area completely.
- d.** Element wire terminals should be inspected and tightened if necessary.  
(See AI Boiler Element Wiring Diagram located on the back of the Contactor & Element Access Cover).
- e.** Element Flange bolts should be tightened to recommended torque specifications  
(See attached Element Installation Instructions).
- f.** Contactor terminals should be inspected & tightened securely.
- g.** Check Water Inlet Valve Strainer and clean if necessary.
- h.** Check all plumbing connections for tightness.



### **5. (Annually)**

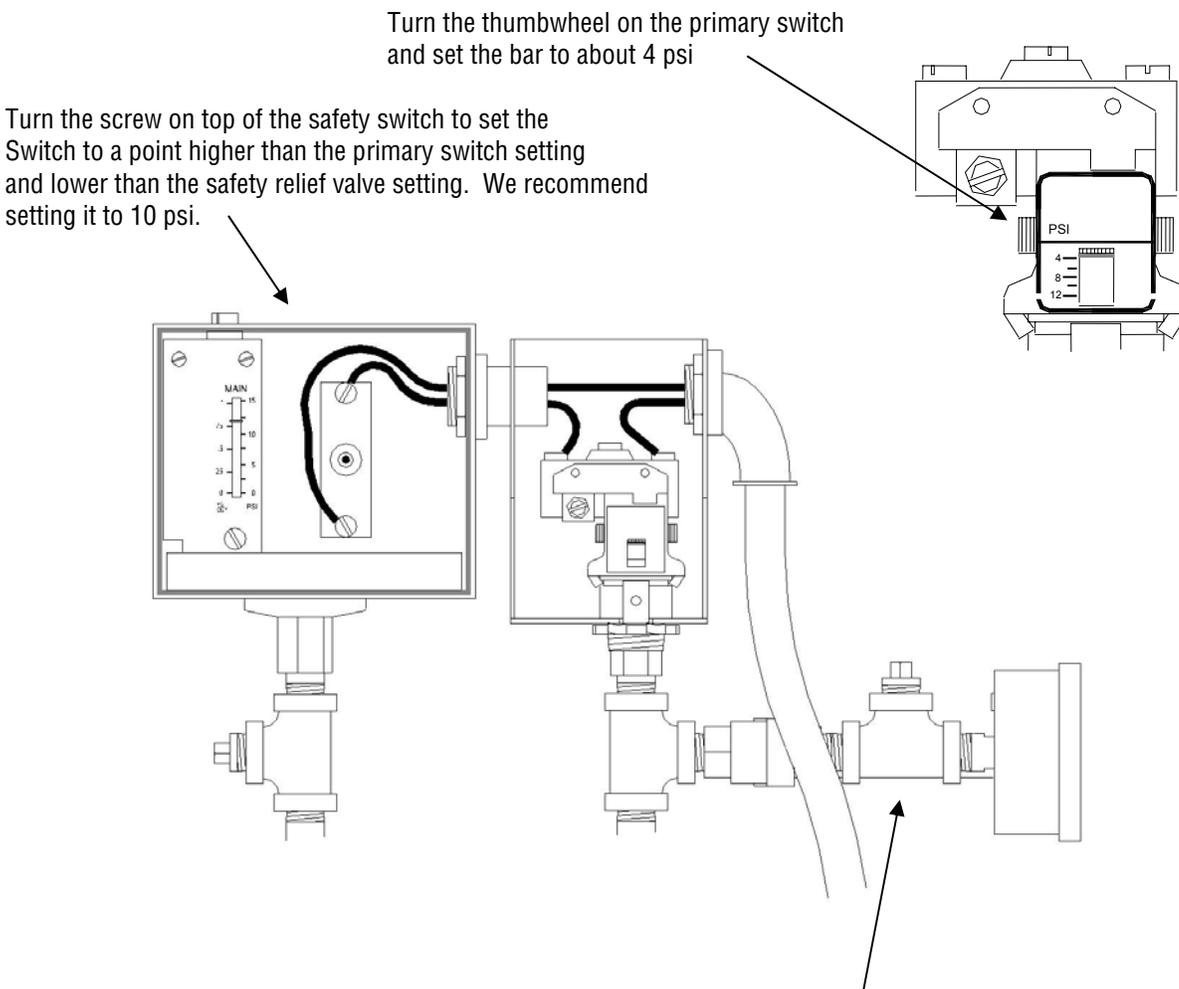
- a.** Conduct a complete inspection of the Boiler and replace all faulty or worn components.
- b.** Check all equipment relays, coils, diaphragms and replace if necessary.
- c.** Replace element gasket.
- d.** Test emergency disconnect switch (if installed). by activating and making sure all power shuts off.
- e.** Inspect Tank for signs of erosion, cracks or leakage.

## PRESSURE CONTROL ASSEMBLY

The AI boiler comes equipped with two pressure switches, wired in series, to control boiler heating. The primary switch automatically closes when the generator's internal pressure is low and opens when the pressure is high, turning the heating elements on and off as needed to create steam and maintain generator pressure. The second switch is a safety control: it remains closed during normal operation but, should the primary switch fail and the generator pressure increase too much, the safety switch will open, turning off the heating elements. The safety switch will remain open until the pressure has dropped and its reset button is manually pushed.

***If the safety switch opens, there may be a problem with the primary switch. Check the primary switch operation by creating pressure in the generator. Also verify that the pressure gauge shows a smooth and steady pressure increase. If the primary switch does not open at the correct pressure or the gauge shows rapid pressure increases, release all pressure and remove line voltage from the generator and clean or repair the pressure control assembly as needed.***

Adjust the pressure switches as shown below.



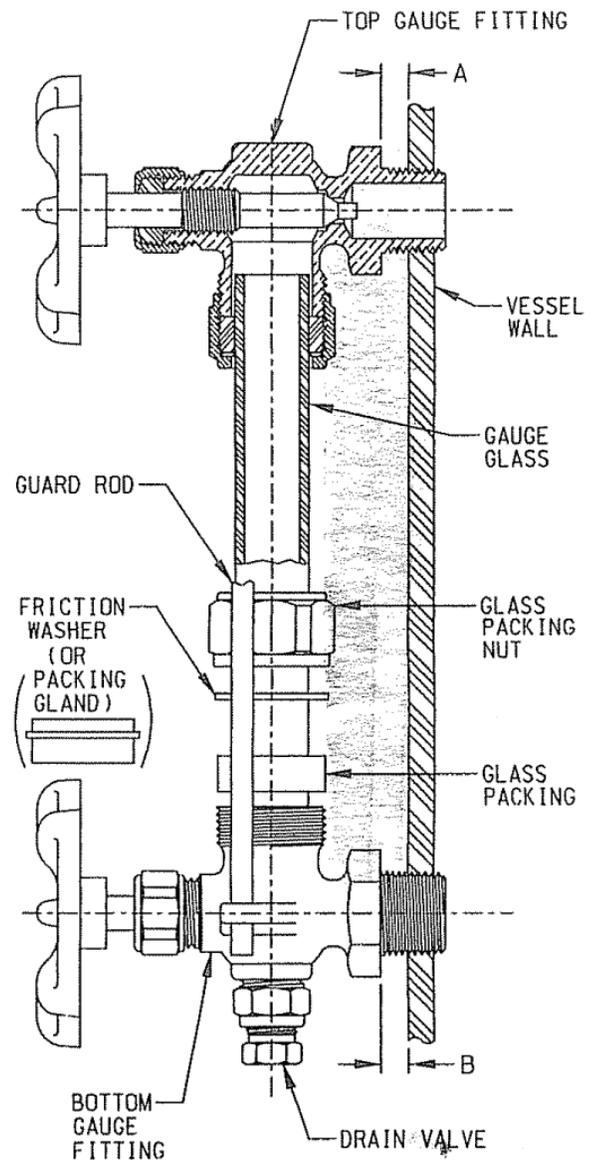
A fitting is supplied to allow connecting a second pressure gauge to easily replace the supplied gauge or to connect a second gauge for inspection. A ball valve is supplied assist with gauge changes; the valve should be left open during normal operation.

# WATER GAUGE & GAUGE GLASS INSTALLATION INSTRUCTIONS

## INSTALLATION

Only properly trained personnel should install and maintain water gauge glass and connections. Remember to wear safety gloves and glasses during installation. Before installing, make sure all parts are free of chips and debris.

1. Apply Teflon tape or pipe dope to pipe threads. Install top gauge fitting (fitting without a drain valve) into the uppermost tapping. Wrench tighten the fitting until it is snug and the glass outlet is pointing at five o'clock. (about 1/8 turn from its final downward vertical position.)
2. Install the bottom gauge fitting (the fitting with a drain valve) until it is snug and the glass outlet is pointing directly upward. Verify top and bottom fittings are threaded into the tappings the same number of turns (distance A= distance B).
3. Remove glass packing nut, friction washer (or packing gland, depending upon the model), and glass packing from the fittings and place them, in same order, onto both ends of the gauge glass. Push both packings about an inch up the gauge glass.
4. Gently insert one end of the glass into the top gauge fitting. Keeping the glass inside the top fitting, gently rotate the top gauge fitting clockwise until vertically aligned with the bottom gauge fitting, then insert glass into bottom fitting until glass bottoms out on the shoulder inside the bottom fitting.
5. Carefully raise glass about 1/16" and slide lower glass packing down until the glass packing contacts the lower gauge fitting DO NOT allow the glass to remain in contact with any metal!
6. Carefully slide upper glass packing up as far as possible.
7. Hand tighten both glass packing nuts, and then tighten 1/2 turn more by wrench. Tighten only enough to prevent leakage. DO NOT OVER TIGHTEN! If any leakage should occur, tighten slightly, a quarter turn at a time, checking for leakage after each turn.



## **WATER GAUGE GLASS**

**NOTICE: READ ALL WARNINGS AND INSTRUCTIONS BEFORE PERFORMING INSTALLATION OR MAINTENANCE.**

### **WARNING!**

**SAFETY GLASSES AND GLOVES SHOULD BE WORN AT ALL TIMES WHEN WORKING WITH OR EXAMINING WATER GAUGE GLASS AND CONNECTIONS.**

**IMPROPER INSTALLATION OR MAINTENANCE OF GAUGE GLASS AND CONNECTIONS CAN CAUSE IMMEDIATE OR DELAYED BREAKAGE RESULTING IN BODILY INJURY AND/OR PROPERTY DAMAGE,**

### **USE AND CARE**

#### **DO NOT's**

**DO NOT use the glass if it contains any scratches, chips, or any other visible signs of damage.**

**DO NOT reuse any tubular glass or glass packings.**

**DO NOT subject gauge glass to bending or torsional stresses.**

**DO NOT over tighten glass packing nuts.**

**DO NOT allow glass to touch any metal parts.**

**DO NOT exceed the recommended pressure of the gauge or gauge glass.**

**DO NOT clean the gauge or gauge glass while pressurized or in operation.**

## **WATER GAUGE GLASS**

### **DO's**

DO verify proper gauge has been supplied.

DO examine gauge glass and packings carefully for damage before installation.

Do install protective guards and utilize automatic ball checks where necessary to help prevent injury in case of glass breakage.

Do inspect the gauge glass daily, keep maintenance records, and conduct routine replacements.

DO protect glass from sudden changes in temperatures such as drafts, water spray, etc.

### **MAINTENANCE**

Examine the gauge glass regularly for any signs of clouding, scratching, erosion, or corrosion. The glass should be inspected daily until the need for replacement becomes apparent. This will help establish the routine inspection and routine replacement schedules.

### **CLEANING**

Use commercial non-abrasive glass cleaners to keep the glass clean. Use diluted acids such as hydrochloric (muriatic) acid when regular cleaners do not seem to work. Do not use wire brushes or any other abrasive materials which could scratch the glass.

### **INSPECTION**

Examine the surface of the glass for scratches, corrosion, chips, cracks, surface flaws, or nicks. To do this, shine a very bright concentrated light at an angle of about 45 degrees. A defective glass will glisten as the light strikes imperfections. Glass which appears cloudy or roughened, and will not respond to cleaning, should be replaced

### **Storing**

Keep gauge glass in original packaging until ready to install.

# AI BOILER: Element Installation Instructions

After removing the element from the boiler tank, inspect the inside surfaces of the tank for scale build up and debris. Clean as necessary. Ensure all ports are free of build-up.

**Note:** *scale and sediment build up will affect boiler operation and reliability. Excessive build-up can cause element burn out, slow water fill, slow draining, safety valve leakage and erratic operation. Ensure the tank is clean before installing the element. If there is build up on the tank walls, also remove the level probes and clean them as necessary.*

Clean the tank's element flange, removing any gasket debris and old sealant, and ensure the surface is smooth and undamaged.

Run a bead of sealant between and around the bolt holes on both sides of a new element gasket.

Bolt the element in place. Each bolt requires one lock washer and at least one flat washer. When replacing an element having a 3/8" thick flange with an element having a 1/4" thick flange, change the 1" bolts to 3/4" bolts or add a second flat washer.

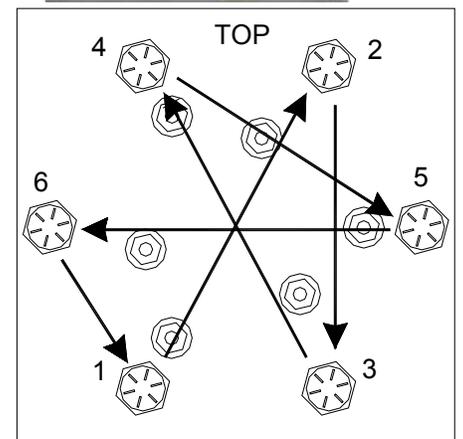
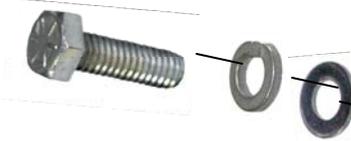
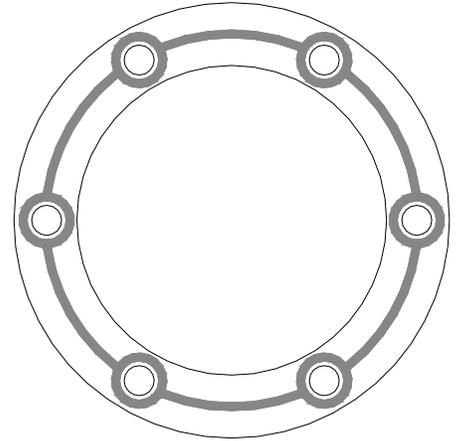
Tighten all bolts until snug: the element should be flat against the tank.

Next tighten all of the bolts in the sequence shown below until they are tight but not to full torque. Using a torque wrench, tighten the bolts in the sequence shown to 230 to 240 inch pounds.

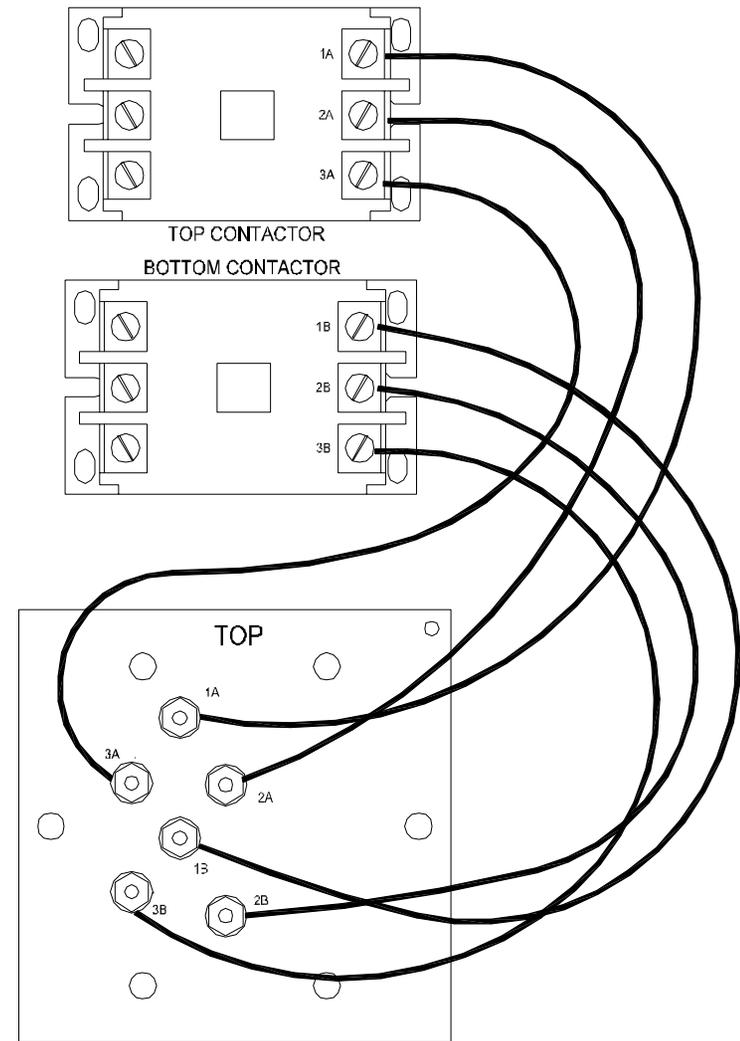
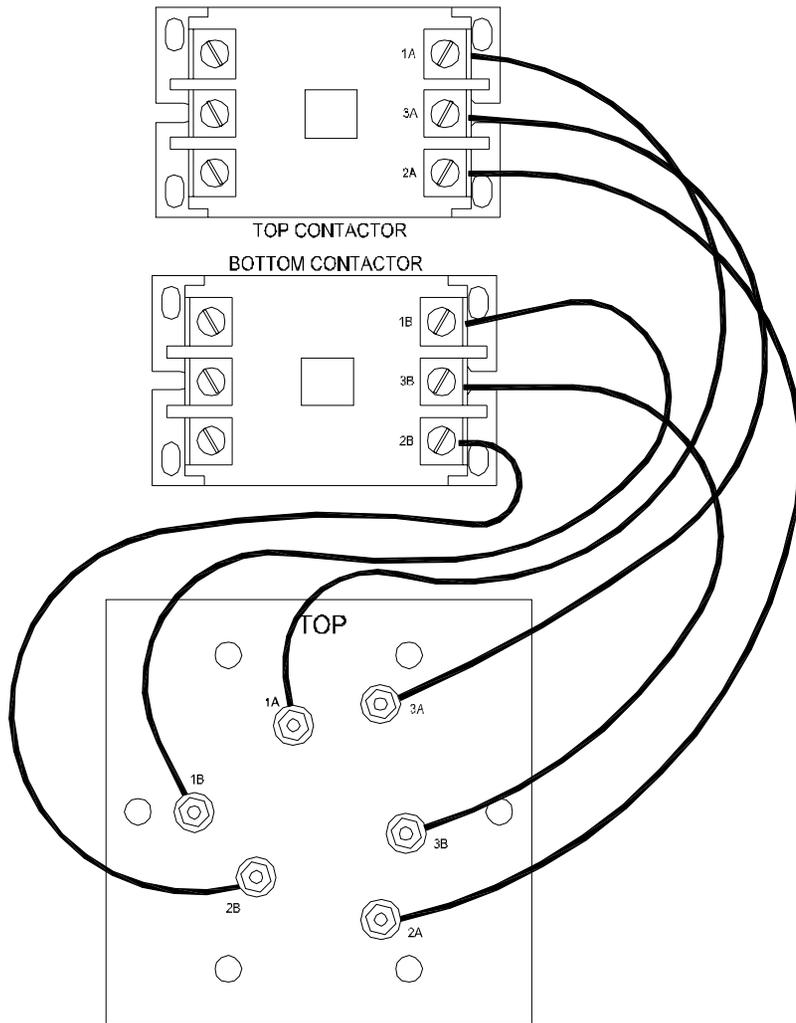
Finally, tighten all of the bolts in sequence to a final torque of 245 inch pounds.

Allow the gasket seal time to set up, then test for leaks. Set up time varies, but should generally be at least 20 minutes for low pressure applications such as the boiler. Use set up times as recommended by the manufacturer, when known.

**Note:** *If it is necessary to replace a bolt, use only grade 8 steel bolts with a rust proof finish, 5/16", 18 threads per inch. Bolts should be 1" long for 3/8" flanges or 3/4" long for 1/4" flanges.*



Your element should look similar to one of the two styles shown below.  
Connect the element's terminals to the boiler's contactors as shown for the appropriate element.  
Route the wires to ensure they do not rest against any sharp edges and so there is no stress on the connections.  
Note that the drawings show wire connections only, not wire routing.



AI BOILER ELEMENT WIRING