### Type CHPES-6A through CHPES-180A

**High Pressure Electric Steam Boiler**

Standard Trim is 250 PSI — 0-225 PSI Operating Pressure Range

<table>
<thead>
<tr>
<th>Model</th>
<th>Rating (BHP)</th>
<th>Elec Cap. (KW)</th>
<th>Vol. (Gals.)</th>
<th>Output at 212˚F (Lbs./Hr.)</th>
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</tbody>
</table>

* Single phase available up to and including 24 KW capacity.
† All boilers must have separate 120V Control Circuit or Transformer. Boilers under 40 Amps max are not fused.
**WARNING:** To avoid electrical shock hazard, boilers must be suitably grounded to earth.

1. The boiler should be mounted on a solid level foundation. **Note:** When installing boiler, allow sufficient room (21” minimum) to facilitate removal of elements if and when necessary.

2. **WARNING:** A minimum distance of 18” between boiler and any combustible material must be maintained.

3. Complete all piping to boiler. Connect water line to tagged fitting on the motor and pump assembly, if used, or to tagged fitting on water control feeder.

4. When any type of feed other than a pump feed is used — the existing water supply must be 10 pounds greater than the boiler operating pressure to assure water supply maintains proper water level in boiler. Otherwise, lack of water can cause heater failure. Keep feed water line valves open at all times except during blowdown.

5. All water feed systems are connected to water inlet check valve.

6. Connect steam line (with Globe valve) to boiler steam outlet. Valve should be placed as close as possible to boiler outlet and sized per label on boiler.

7. To insure maximum efficiency of supplied kW, all piping from outlet should be insulated.

8. Drain and relief valve piping should be in accordance with state and local codes. Floor drain to be provided directly below unit.

9. All electrical wiring should be done by licensed electrician in accordance with national and local electrical codes.

10. If pump is located less than 30 feet from boiler, a second check valve is required.

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**Typical Plumbing Installation of a Steam Boiler with Condensate Return System**
WARNING: Hazard of Shock. Disconnect all power before working on boiler. Boilers must be effectively grounded in accordance with the National Electrical Code to eliminate shock hazard.

WARNING: Use 90˚copper conductors only.

1. Select proper wire gauge and type for supply conductors in accordance with the National Electrical Code and local wiring codes following wiring diagram supplied (See recommendations for disconnect switches and fusing).

2. The unit is completely wired and pre-tested before shipment. No internal wiring is required. Check all electrical connections for tightness and retighten if necessary before energizing.

If a separate control circuit is used, the control circuit should be connected to the control terminal block, inside access door (not required with transformer).

3. Safety Switches — WARNING: Purchaser should use a safety switch employing circuit breakers or fuses between his main power source and the boiler.

4. Because of their water lines, boilers are susceptible to lightning damage. Industrial type lightning protectors should be installed per manufacturer’s recommendations at your service entrance. Check your contractor or electrical dealer for recommended type for your system.

5. Be sure all electrical connections are sufficiently tightened.

6. WARNING: Substitution of components or modification of wiring system voids the warranty and may lead to dangerous operating conditions.

7. SPECIAL INSTRUCTIONS FOR CUSTOMERS SUPPLYING THEIR OWN CONDENSATE OR PUMP SYSTEMS.

A. Check the voltage of the motor before making the wiring connection. Some Chromalox boilers are supplied with dual voltage systems. The motor should always match the voltage of the control circuit.

B. The motor circuit should be wired into the pump control as shown in wiring diagram (float type pump control). If boiler is equipped with solid state pump control, refer to wiring diagram and use terminals 5 and 2.

**TYPICAL WIRING DIAGRAMS**

Use Applicable wiring diagrams based on model number and power voltage.

<table>
<thead>
<tr>
<th>Boiler</th>
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<th>3 Phase Voltage</th>
<th>3 Phase Voltage</th>
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**Diagram 1**

- **Feed Water Electrical Connection**
- **Cabinet Exterior Left Side**
- **Panel Layout**
- **Cabinet Exterior Right Side**

**Wire Color Code**

- B = Black
- BR = Brown
- R = Red
- O = Orange
- Y = Yellow
- G = Green
- BL = Blue
- W = White

* Boilers under 40 Amps total (not fused)
Diagram 8

Feed Water Electrical Connection

Cabinet Exterior Left Side

Panel Layout

Cabinet Exterior Right Side

Diagram 9

Feed Water Electrical Connection

Cabinet Exterior Left Side

Panel Layout

Cabinet Exterior Right Side

Wire Color Code

B = Black
BR = Brown
R = Red
O = Orange
Y = Yellow
G = Green
BL = Blue
W = White

Wire Color Code

B = Black
BR = Brown
R = Red
O = Orange
Y = Yellow
G = Green
BL = Blue
W = White
After proper wiring and piping of boiler system is complete, testing of controls can start. Before testing controls, it is recommended that all contactor fusing be removed. This is to prevent possible element failure under test conditions.

A. OPERATING AND TESTING THE MCDONNELL & MILLER LOW WATER CUTOFF CONTROL.

1. Be sure all valves from incoming water supply are fully open. Turn boiler switch to “ON” position, pump or solenoid valve will energize, allowing boiler to fill with water. Proper water level is automatically reached with level control supplied. Pump or solenoid feed will shut off at proper water level. Contactor(s) will energize, supplying power voltage to elements.

2. Checking operation of pump switch. (Figure 1) With water level visible in sight glass, partially open drain valve at bottom of boiler. If automatic blowdown supplied, push manual blowdown switch until valve open light is on, hold for few seconds. Water level will fall, allowing float to trip pump switch to “ON” position. Close drain valve or release manual blowdown switch. Pump motor or solenoid valve will energize and water level will resume to normal level in sight glass.

3. Checking low water cutout switch operation, open drain valve completely. If automatic blowdown supplied, push in and hold manual blowdown switch until water level falls enough to trip cutout switch. Close drain valve or release manual blowdown switch. If low water cutout is automatic reset, pump or solenoid will return water level to normal. If low water cutout is manual reset, then manual reset button on McDonnell & Miller low water cutoff control must be pushed to complete circuit. Turn off boiler. Reinstall contactor fuses.

WARNING: Be sure all electrical connections are tight before energizing boiler. Reset all manual reset controls by pushing reset buttons on: (1) high limit control located on top of boiler and (2) McDonnell & Miller located on the side of boiler.
B. ADJUSTING OPERATING PRESSURE CONTROLS

1. Chromalox boilers are supplied with operating and high limit pressure controls. One is used for controlling the operating pressure of the boiler while the other is used as a high limit control. To determine the difference in the controls, the high limit has a manual reset lever on top of the case. Also, there is no differential scale present.

2. On all controls, the pressure adjusting screw on the top of the case sets the desired pressure. Turning the screw counterclockwise reduces the pressure setting (CUT OUT) (See Figure 2). High limit control should be set at 10 psig above the operating pressure of the boiler.

3. The differential adjusting screw on the operating control is set in the same manner as the pressure adjusting screw. The CUT OUT setting minus the differential setting, equals CUT IN pressure of the operating control.

4. HIGH LIMIT PRESSURE CONTROL OPERATION

The high limit is tested in the same manner but with the operating control set above the pressure setting of the high limit. (Figure 3)

**CAUTION: THIS IS FOR TEST PURPOSES ONLY!**

When the high limit trips, turn off boiler and reset high limit to proper setting. The manual reset level must be pushed to resume operation upon startup.

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**RECOMMENDED START-UP PROCEDURES**

1. Close globe valve on steam outlet side of boiler. (Customer Supplied)

2. Turn on boiler and allow pressure to build up to operating pressure.

3. Only open globe valve at quarter turns at first, introducing smaller amounts of steam into process. Avoid opening globe valve all at once. This will eliminate the possibility of evacuating the boiler of water caused by the suddenly increased boiling of the water in the vessel as the pressure is reduced. On boilers where constant pressure is not maintained, globe valve should be kept partially closed. This will maintain a constant head on the boiler and stabilize any fluctuation in boiler water level.

**Note:** For best boiler performance, a 1/4" less steam valve than size of safety valve should be plumbed as close as practicable to steam outlet. Where 1/2" safety valve is used on boiler, a 1/4" steam valve is recommended.

**MANUAL BLOWDOWN INSTRUCTIONS**

*Blowdown is an essential part of boiler operation. It is the best preventative maintenance you can give your boiler and will add years of life to the unit. Make sure a blowdown schedule is established and followed regularly.*

In extremely hard water areas, blowdown is necessary once a day. In soft water areas, once each week. If there is a particular problem which applies to your own local water condition other than mineral content, take this into consideration in determining which schedule is to be followed.

1. At end of the working day, while boiler is still operating, turn switch to the OFF position and close water supply valve. De-energize wall mounted safety switch.

2. If blowing-down into a receptacle, allow pressure to decrease to 15-20 psi before opening blowdown valve.

3. It is preferable to connect the blowdown valve directly into a drainage system. If this is done, the boiler can be discharged at operating pressure.

4. When discharge is complete and boiler is drained — (a) close the blowdown valve; (b) open water supply valve; (c) put boiler switch in the ON position; and, (d) close wall mounted safety switch.

5. When refilling is complete, turn off the boiler switch unless further operation is desirable.

6. If you have been supplied with a Manual Reset Low Water control as required in some states, the reset button on the control must be pushed before boiler will begin developing pressure. (Do not push reset until boiler has filled with water.)

The use of chemical boiler cleaning compounds in these boilers voids all warranties unless approved by manufacturer. Some compounds will damage copper sheathed heating elements to shorten useful life.
AUTOMATIC BLOWDOWN INSTRUCTIONS (IF FURNISHED)

The Automatic Blowdown is a device which automatically starts your boiler in the morning; shuts it down at night and blows down (partially drains) the main boiler drain and the low water cut-off column for a predetermined time interval each working day.

The heart of the unit is an electrically operated straight through type ball valve. It is specially designed to handle dirty, corrosive fluids and particles without requiring cleaning or the use of a strainer.

Both the valve and the boiler are controlled by an electric control unit which indicates with pilot lights when the drain valve is in the opened or closed position and when the boiler is ON or OFF. In addition to the automatic control function, the unit has a push button which momentarily de-energizes the boiler and opens the drain valve regardless of the time of day.

The unit may also be used to blow down boilers which run continuously, day and night.

INITIAL TESTING — Set the switch marked “Programmed duty/24 Hour duty” located on the panel box to the “ON” position.

On the large timer set the “ON” tab at about 8 AM and the “OFF” tab at about 8 PM. Set the blowdown cycle dial at “O”.

Turn the large timer by hand until the “ON” tab passes the “TIME NOW” indicator so the “TIME NOW” arrow indicates 10 AM.

Energize the main feed to the “LINE TERMINALS” of the unit. The “BOILER ON” pilot light as well as the “VALVE CLOSED” light should glow.

Hold down the “DRAIN” button for about six seconds. The “BOILER ON” light should go out immediately as well as the “VALVE CLOSED” light should glow.

Now turn the wheel on the large timer until the “OFF” tab passes the “TIME NOW” arrow. The “BOILER ON” light should remain open for a few seconds and then automatically close. The “VALVE CLOSED” light should light and the “BOILER ON” light should remain off.

OPERATION— Set the “BOILER PROGRAMMED DUTY” switch to “BOILER ON” if the boiler is to be shut down each night. Set it to “24-HOUR DUTY” if the boiler is to remain on continuously 24-hours per day (except during blowdown).

Set the tabs on the large timer for the on and off times desired for the boiler, screw in the small black day-skip tabs if it is to remain off during the weekend, etc.

If the boiler is on 24-hour duty, set the off tab for the time that is desired for blowdown. Tzhe ON tab can be ignored, but must remain on timer.

The small time delay relay controls the time that the drain valve remains open. The time is controlled by adjusting knob marked Blowdown cycle. Counterclockwise decreases, clockwise increases blowdown time. Time must be adjusted by trial.
AUXILIARY LOW WATER CUTOFF

Operation

Operation of this control is accomplished by sensing a minute AC current flowing between submerged contact probe in the boiler shell. When this minute AC current is conducted through an external circuit resistance up to 40,000 ohms or less, a signal of sufficient magnitude is present to trigger the SCR and, in turn, energize the control relay.

As the water level in the boiler drops below the level of the probe, the AC current is broken and the control relay is de-energized. The control will not energize until sufficient water is present in the boiler.

Specifications

Input Supply — 120 vac/50-60 hz
Detectable Range — 100,000 ohms
Probe Voltage — 24 Vac
Probe Current — 10 milliamps
Control Relay — Single pole double throw

WARNING: Control will not work with de-ionized or demineralized water.

Typical Wiring for Auxiliary Low Water Cutoff

Electronic Resistance Sensing Amplifier for Auxiliary Low Water Cutoff

Pressure variations cause the bellows to expand or contract. Linkage between the bellows and the potentiometer wiper causes the wiper to move across the windings on the potentiometer. This varies the resistance between R and B, and between R and W, causing an unbalance in the circuit connected to the controller.

A proportioning pressure control is used to regulate a motor driven or solid state sequencer. The controller potentiometer, the feedback potentiometer in the motor and a balancing relay in the motor form an electric bridge circuit. As long as the pressure of the controlled medium remains at the set point of the controller, the circuit is balanced; i.e., equal currents flow through both sides of the balancing relay and the relay contacts are open. When the circuit is balanced, the motor does not run.

If the pressure of the controlled medium rises, the wiper in the controller moves toward W. This unbalances the circuit so a larger current flows through one side of the balancing relay. The “close” contacts in the relay make, causing the motor to drive toward its closed position. As the motor runs, the wiper on the feedback potentiometer moves in a direction to balance the circuit. When the circuit is again in balance, the balancing relay contacts open and the motor stops.

Similarly if the pressure of the controlled medium falls, the wiper on the controller potentiometer moves toward B, and the “open” contacts in the balancing relay make. The motor drives towards its open position until circuit balance is achieved.

The slightest change in the pressure of the controlled medium will cause a change in the number of elements energized to compensate for it, thus keeping the pressure constant. This process is called modulation.

PROPORTIONAL PRESSURE CONTROL ONLY SUPPLIED WITH SEQUENCER

Main Setting — Turn the adjustment screw until the indicator is opposite the low point of the desired throttling range. That is, if the pressure is to be held at a minimum of 50 psi, set the indicator at 50 psi. The pressure will then be maintained between 50 psi and a higher pressure equal to the 50 psi plus the throttling range.

THROTTLING RANGE SETTING L91B

After setting the indicator for the minimum pressure, turn the throttling range adjustment screw until the throttling range indicator points to the desired throttling range on the scale. This scale is graduated from “min” to “F”. The value of each division varies with the scale range of the instrument.

PRESSURE VALUE EACH

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<th>PRESSURE SCALE RATING</th>
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<tr>
<td>20-300 psi</td>
<td>16.4 psi</td>
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Pressure scale rating will vary depending on pressure control supplied.

CHECKOUT

After the controller has been installed, wired, and set, it should be tested with the system in operation. First allow the system to stabilize. Then observe the operation of the controller while raising and lowering its set point. Pressure should increase when the set point is raised and decrease when the set point is lowered. Use accurate pressure testing equipment when checking out the controller. Do not rely on inexpensive gauges. The controllers are carefully calibrated at the factory.

If the motor or actuator runs the proper direction when the set point is adjusted, it can be assumed that the controller is operating properly. If it runs in the wrong direction, reverse the B and W wires. Observe the action of the motor to see if it stabilizes. If the motor is moving constantly, widen the proportioning range a little at a time, until the system is stable.
OPTIONAL EQUIPMENT FOR STEAM BOILERS

IF A CONTROLLER SEEMS TO OPERATE IMPROPERLY
If the controller is suspected of operating improperly, it may be further checked as follows:
1. Leave the controller installed where it is, but disconnect all power to the boiler.
2. Loosen the cover screw below the main scaleplate and remove the cover.
3. Disconnect the wires from the controller.
4. Connect an ohmmeter between controller terminals B and W to measure the resistance of the potentiometer in the controller. The ohmmeter should read about 135 ohms on an L91B.
5. Connect the ohmmeter between controller terminals W and R and raise the set point of the controller above the actual pressure being measured. The ohmmeter should read the full value of the potentiometer measured in step 4 (135 ohms for an L91B).
6. Slowly lower the set point of the controller while observing the ohmmeter reading. The resistance should drop to zero at some set point below the actual pressure.
7. An approximation of the proportioning range can be made by observing the change in set point required for a resistance change from zero to full value.
8. When the controller is operating properly, reconnect the wires, replace the cover, tighten the cover screw, and reset the controller to the desired value.
9. Reconnect power to the controlled motor.

BOILER SEQUENCER (5 STEP) MOTOR DRIVEN RECYCLE FEATURE
The step control is designed to drop out all contactors when control circuit is interrupted. On resumption of power, the camshaft rotates to the counterclockwise (ccw) limit, opening all the load switches. The recycle relay then energizes, pulling in the load contact, and finally the camshaft rotates clockwise (cw) to the position called for by the pressure controller energizing, in sequence, the required load stages.

TESTING OPERATION OF SEQUENCER
1. With boiler off, remove wiring from pressure control on sequencer low voltage terminal board.
2. Turn on boiler to supply the voltage to the sequencer. Short terminal R and B for counterclockwise rotation and terminal R and W for clockwise rotation.
3. If sequencer operates under this test procedure, but when rewired to pressure controller and does not function, check pressure control. Note that wiring is W-B and B-W-R-R between sequencer and pressure controller.

BOILER SEQUENCE — SOLID STATE
Solid State Progressive Sequencer
The solid state progressive sequencer provides accurate electronic control of multi-stage loads of the type used in Chromalox steam boilers. It features progressive sequencing (first on-first off) which equalizes the operating time of each load. This control gives visual indication of each energized stage by means of integral solid state light emitting diodes. In the event of power interruption, all heating elements are immediately de-energized for safety. When power resumes, the control will restage the loads one at a time.

The solid state sequencer operates on 120V AC/60 Hz and each output is relay switched with a load rating of 125 VA at 120V AC. The input to the sequencer is a 0-135 OHM potentiometer supplied on the operating pressure control. The sequencer has a sensitivity control which is adjustable from min. to max. This sensitivity control defines the amount of resistance (pressure) deviation allowed before adding or subtracting a load. Potentiometer resistance should decrease with increasing pressure. Connections are made to red and white terminals of proportional pressure control. See Wiring Diagram 337-300164-452 for Boiler With Solid State Sequencer.
OPTIONAL EQUIPMENT FOR STEAM BOILERS

HIGH PRESSURE FEED

High pressure makeup water pumps are used when water pressure does not exceed boiler pressure by more than 10 psi and when condensate water is not returned to the boiler. **Note:** Consult factory or sales office for motor/pump sizing for appropriate water feed system.

Installation

**WARNING:** Hazard of Electric Shock. Water feed system must be effectively grounded in accordance with the National Electrical Codes to eliminate shock hazard.

WATER FEED SYSTEMS

1. Locate feed on level floor or platform.
2. Connect water line to tagged fitting on feed.
3. Connect piping from discharge to water inlet check valve on boiler with minimum of 90° bends or other restrictions.
4. All electrical wiring should be done by licensed electricians in accordance with local and national electrical codes. Refer to boiler instruction for manual wiring diagram.
5. If pump is located less than 30 feet from boiler, a second check valve is required.

Automatic High Pressure Water Feed Pump/Motor Assembly

**Pump Motor Dimensions**

<table>
<thead>
<tr>
<th>Assembly Model</th>
<th>HP</th>
<th>Pressure Range (PSI)</th>
<th>Pipe Size (NPT)</th>
<th>Dimensions (In.)</th>
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<td>3/4</td>
<td>0-200</td>
<td>1/2</td>
<td>16-1/4 3 7-3/16 4-7/8 6-1/2 6-1/8</td>
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</table>
**WATER FEED SYSTEMS**

**CONDENSATE RETURN SYSTEMS**

Chromalox condensate return systems are used wherever condensed steam can be collected for reuse in the boiler. Significant energy can be saved by returning condensate to the boiler. The condensed water is free from corroding minerals and carries a substantial amount of heat which does not have to be replenished.

**IMPORTANT:** Vacuum breaker is required whenever using a condensate return system.

**Installation — Wiring**

A. Check the voltage of the motor before making the wiring connection. Some Chromalox boilers are supplied with dual voltage systems. The motor should always match the voltage of the control circuit.

B. The motor circuit should be wired into the pump control located on the boiler. See boiler instruction sheet for wiring diagram.

C. All electrical wiring should be done by licensed electrician.

D. Be sure to use the proper wire. Electrical wiring to boiler should be in accordance with National Electrical Code or local wiring code following wiring diagram supplied.

**Plumbing**

A. Connect water line to tagged fitting on the motor and pump assembly control feeder.

B. Interconnecting piping between boiler and condensate return system should be installed with a minimum of 90° bends or other restrictions.

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**MAINTENANCE**

**WARNING: Hazard of Shock. Disconnect all power before working on boiler.**

Chromalox Electric Steam Boilers are designed for years of trouble-free performance. To establish a good preventative maintenance program, we suggest the building maintenance man or engineer familiarize himself with these simple rules:

1. The use of specific boiler cleaning compounds cannot be recommended. We do recommend that a reputable firm of water treatment engineers be consulted regarding conditioning boiler water. Proper selection must be made of a compound to prevent damage to copper sheath heating elements.

2. The sight glass should be checked daily to ensure the boiler has adequate water.

3. A monthly inspection should be made of internal wiring. All electrical connections should be checked for tightness. A check for water or steam leaks should also be made and any loose fittings immediately tightened.

4. If boiler is equipped with Solid State Auxiliary Low Water Cutoff, every four months the probe should be checked for deposits and cleaned, if necessary. This is accomplished by removing inspection plate, removing the probe (with a standard sparkplug wrench) cleaning and replacing.

   **Note:** The system will not operate if the boiler is using distilled, demineralized or deionized water. At the same time, one of the bottom heating elements should be removed. If scale has begun to form, all elements should be cleaned and boiler drained and flushed.

5. **IMPORTANT:** The Manufacturers’ Data Report enclosed within the instruction sheet is very important and must be put in a safe place. You may be called upon to produce it by a state agency.

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**INSTRUCTIONS FOR ELEMENT REPLACEMENT**

**WARNING:** Before installing your new elements, be sure the McDonnell-Miller low-water cut-off is operating perfectly and the float chamber and lower equalizer column are completely clear of sludge or other foreign matter.

Failure to do this may cause the immediate burnout of the new elements. All elements are thoroughly checked before shipment. The manufacturer cannot be responsible for burnouts caused by a faulty low-water cut-off.

The lower equalizer column can best be examined by breaking the unions on either side and then visually and manually examining the piping with your fingers or probes to see if it is clear and clean.

---

**TABLE: Condensate Storage Tank**

<table>
<thead>
<tr>
<th>Condensate Model</th>
<th>For Boiler Model</th>
<th>Max. Pressure (psig)</th>
<th>Storage Tank Capacity (Gals.)</th>
<th>Pump (Hp)</th>
<th>Motor (Volts/Phase)</th>
<th>Condensate Pump Discharge Conn. (NPT)</th>
<th>Condensate Ref. Conn. (NPT)</th>
<th>Dimensions (In.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HPCS-3003</td>
<td>All CHPES</td>
<td>250</td>
<td>30</td>
<td>3</td>
<td>240 / 480 1</td>
<td>1-1/4</td>
<td>2</td>
<td>36</td>
</tr>
</tbody>
</table>
**MAINTENANCE**

**READ COMPLETELY BEFORE STARTING WORK**

1. Disconnect boiler from electric power supply at main safety switch or fuse panel. Then, turn boiler switch to “off” position.
2. On automatic feed units, close valve on incoming water line. Drain boiler completely of water.
3. Open boiler door to expose heating element.
4. Disconnect wire (electric) leads connecting element to main power system of boiler. Again note wire connections to facilitate reassembly. Proceed to remove (6) 5/16-18 bolts from flange.
5. Thoroughly clean boiler flange of all foreign material. Be certain no part of old gasket remains on boiler flange.
6. Apply “Slic-Tite” Gasket Compound or equal to both surfaces of new gasket with supplied replacement element. Proceed to install element flange assembly with gasket between boiler flange and element flange. In doing this, be careful to align flange holes so wire connection terminals on element assembly are in line with previously disconnected wire leads to facilitate easy connections.
7. When all (6) flange bolts are tight, connect all wires to terminals. Make certain wires are clean and bright to assure good electrical contact and nuts on screws are firmly secured.

**WARNING: AVOID USE OF CHEMICAL CLEANING COMPOUNDS. FOLLOW MAINTENANCE INSTRUCTIONS.**

8. Open water valve so water supply can reach boiler feed mechanism.
9. Put main safety switch to “on” position.
10. Turn boiler to “on” position.
11. As boiler automatically refills, observe the new flange assembly for possible leaks. If water is noticed, to bolts must be retightened. Before doing this, turn the boiler off at the main fuse safety switch.
12. As boiler is heated to working pressure, check flange assembly again for leaks.

**WARNING: AVOID THE USE OF CHEMICAL CLEANING COMPOUNDS. FOLLOW MAINTENANCE INSTRUCTIONS**

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**RENEWAL PARTS IDENTIFICATION**

- **Drain Blowdown Valve**
- **Water Level Sight Glass**
- **On/Off Switch and Pilot Light**
- **Steam Outlet**
- **Operating Pressure Control**
  - Range 10-300 Psi
- **Safety Valve**
- **Manual Reset High Limit Control**
- **Pressure Gauge, 0-600 Psi**
- **McDonnell & Miller #194 Low Water Cut-off/Pump**
- **Check Valve/Water Inlet**
  - (not shown)
- **Drain Blowdown Valve**
- **Pressure Gauge, 0-600 Psi**
- **Steam Outlet**
- **Safety Valve**
- **Manual Reset High Limit Control**
- **Pressure Gauge, 0-600 Psi**
- **McDonnell & Miller #194 Low Water Cut-off/Pump**
- **Check Valve/Water Inlet**
  - (not shown)
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- **Safety Valve**
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  - (not shown)
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- **Pressure Gauge, 0-600 Psi**
- **Steam Outlet**
- **Safety Valve**
- **Manual Reset High Limit Control**
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- **Check Valve/Water Inlet**
  - (not shown)
- **Drain Blowdown Valve**
### RENEWAL PARTS IDENTIFICATION

#### VALVES & GAUGES

<table>
<thead>
<tr>
<th>Part Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4&quot; Ball Valve (Pressure Gauge) through 180A</td>
<td>344-121194-007</td>
</tr>
<tr>
<td>through 180A</td>
<td>344-121194-042</td>
</tr>
<tr>
<td>Pressure Gauge 3-1/2&quot; 0-600 psi CHPES-100A through 180A</td>
<td>344-300032-006</td>
</tr>
</tbody>
</table>

#### CONTACTORS

<table>
<thead>
<tr>
<th>Part Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check Valve 3/4&quot; CHPES-24A through 180A</td>
<td>344-114590-014</td>
</tr>
<tr>
<td>Check Valve 1/2&quot; CHPES-6A through 18A</td>
<td>344-114590-013</td>
</tr>
</tbody>
</table>

#### POWER FUSES AND TERMINAL BLOCKS

<table>
<thead>
<tr>
<th>Part Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>60 amp without fuse block</td>
<td>072-047913-016</td>
</tr>
<tr>
<td>50 amp without fuse block</td>
<td>072-047913-019</td>
</tr>
</tbody>
</table>

#### MISCELLANEOUS PARTS

<table>
<thead>
<tr>
<th>Part Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Element Gasket</td>
<td>132-146012-001</td>
</tr>
<tr>
<td>Blank Flange</td>
<td>121-300199-001</td>
</tr>
<tr>
<td>Element Gasket</td>
<td>132-146012-001</td>
</tr>
<tr>
<td>Stainless Steel Bolts (6 required) for Element</td>
<td>344-072565-428</td>
</tr>
<tr>
<td>Probe 10-15/16&quot; CHPES-100A through 180A</td>
<td>242-300036-017</td>
</tr>
<tr>
<td>Probe 7-15/16&quot; CHPES 6A through 18A</td>
<td>242-300036-019</td>
</tr>
</tbody>
</table>

#### PRESSURE CONTROLS & SEQUENCES

<table>
<thead>
<tr>
<th>Part Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Pressure Control</td>
<td>429-300038-009</td>
</tr>
<tr>
<td>Hi-Limit Control (Manual Reset) 15 psi</td>
<td>429-300038-008</td>
</tr>
<tr>
<td>Proportional Pressure Control</td>
<td>429-300038-004</td>
</tr>
<tr>
<td>5-Step Motor-Driven Sequencer</td>
<td>323-121505-001</td>
</tr>
<tr>
<td>10-Step Motor-Driven Sequencer</td>
<td>323-121505-002</td>
</tr>
<tr>
<td>6-Step Solid State Sequencer</td>
<td>323-300107-015</td>
</tr>
<tr>
<td>10-Step Solid State Sequencer</td>
<td>323-300107-015</td>
</tr>
<tr>
<td>Solenoid Valve used in ES-38020 HP</td>
<td>344-121760-002</td>
</tr>
</tbody>
</table>
Limited Warranty:
Please refer to the Chromalox limited warranty applicable to this product at http://www.chromalox.com/customer-service/policies/termsofsale.aspx.