Handling ceramic fiber and fiberglass materials

REMOVAL OF COMBUSTION CHAMBER LINING OR BASE PANELS:

WARNING

The combustion chamber lining or base insulation panels in this product contain ceramic fiber materials. Ceramic fibers can be converted to cristobalite in very high temperature applications. The International Agency for Research on Cancer (IARC) has concluded, “Crystalline silica inhaled in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (Group 1).”:

- Avoid breathing dust and contact with skin and eyes.
- Use NIOSH certified dust respirator (N95). This type of respirator is based on the OSHA requirements for fiberglass at the time this document was written. Other types of respirators may be needed depending on the job site conditions. Current NIOSH recommendations can be found on the NIOSH web site at http://www.cdc.gov/niosh/homepage.html. NIOSH approved respirators, manufacturers, and phone numbers are also listed on this web site.
- Wear long-sleeved, loose fitting clothing, gloves, and eye protection.
- Apply enough water to the combustion chamber lining or base insulation to prevent airborne dust.
- Remove combustion chamber lining or base insulation from the boiler and place it in a plastic bag for disposal.
- Wash potentially contaminated clothes separately from other clothing. Rinse clothes washer thoroughly.

NIOSH stated First Aid:

- Eye: Irrigate immediately
- Breathing: Fresh air.

REMOVAL OF FIBERGLASS WOOL — OR — INSTALLATION OF FIBERGLASS WOOL, COMBUSTION CHAMBER LINING OR BASE PANELS:

This product contains fiberglass jacket insulation and ceramic fiber materials in combustion chamber lining or base panels in gas fired products. Airborne fibers from these materials have been listed by the State of California as a possible cause of cancer through inhalation:

- Avoid breathing dust and contact with skin and eyes.
- Use NIOSH certified dust respirator (N95). This type of respirator is based on the OSHA requirements for fiberglass wool at the time this document was written. Other types of respirators may be needed depending on the job site conditions. Current NIOSH recommendations can be found on the NIOSH web site at http://www.cdc.gov/niosh/homepage.html. NIOSH approved respirators, manufacturers, and phone numbers are also listed on this web site.
- Wear long-sleeved, loose fitting clothing, gloves, and eye protection.
- Operations such as sawing, blowing, tear out, and spraying may generate airborne fiber concentration requiring additional protection.
- Wash potentially contaminated clothes separately from other clothing. Rinse clothes washer thoroughly.

NIOSH stated First Aid:

- Eye: Irrigate immediately
- Breathing: Fresh air.

Boiler Manual

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Hazard definitions

Hazards that will cause severe personal injury, death or substantial property damage.

CAUTION

Hazards that will or can cause minor personal injury or property damage.

NOTICE

Special instructions on installation, operation and maintenance that are important but not related to personal injury or property damage.

INSTALLER — Read all instructions before installing. Read page 2 first. Follow all instructions in proper order to prevent personal injury or death.
- Consider piping and installation when determining boiler location.
- Any claims for damage or shortage in shipment must be filed immediately against the transportation company by the consignee.
- GSA boilers cannot be adapted for heater use.

USER — Please read the following. Failure to comply could result in severe personal injury, death or substantial property damage.
- This manual is for use only by your qualified heating installer/service technician.
- Please see the User’s Information Manual for your reference.
- Have the boiler serviced by a qualified service technician, at least annually.

This manual must only be used by a qualified heating installer/service technician. Failure to comply could result in severe personal injury, death or substantial property damage.

When calling or writing about the boiler— Please have: • boiler model number from the boiler rating label and • CR number from the boiler jacket. You may list the CP number in the space provided on the "Installation and service certificate" found on page 16.
1 Prepare boiler location

Codes & checklist

Installations must follow these codes:

- Local, state, provincial, and national codes, laws, regulations and ordinances.
- Standard for Controls and Safety Devices for Automatically Fired Boilers, ANSI/ASME CSD-1, when required.
- National Electrical Code.
- For Canada only: B149.1 or B149.2 Installation Code, CSA C22.1 Canadian Electrical Code Part 1 and any local codes.

Certification


Before locating the boiler:

- Check for nearby connection to: Venting connections
  Gas supply piping
  Electrical power
- Check area around boiler. Remove any combustible materials, gasoline and other flammable liquids.
- Failure to keep boiler area clear and free of liquids and vapors can result in severe personal injury, death or substantial property damage.
- Boiler must be installed so that gas control system components are protected from dripping or spraying water or rain during operation or service.
- If new boiler will replace existing boiler, check for and correct system problems, such as:
  - System leaks causing oxygen corrosion or section cracks from hard water deposits.

15 Ratings

<table>
<thead>
<tr>
<th>Boiler model number</th>
<th>0–2,000 feet altitude</th>
<th>2,000–4,500 feet altitude (Canada)</th>
<th>Net I=B=R ratings</th>
<th>Boiler water content (gallons) (to waterline)</th>
<th>DOE Seasonal efficiency (% A.F.U.E.)</th>
<th>Chimney and breeching size</th>
</tr>
</thead>
<tbody>
<tr>
<td>GSA075</td>
<td>75,000</td>
<td>62,000</td>
<td>Input (Btu/h)</td>
<td>(Note 1)</td>
<td>8.4</td>
<td>81.0 51/4&quot; x 20&quot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Output (Btu/h)</td>
<td>(Note 4)</td>
<td>47,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sq. Ft. Steam</td>
<td>(Note 2)</td>
<td>258</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Steam Btu/h</td>
<td>(Note 3)</td>
<td>62,000</td>
<td></td>
</tr>
<tr>
<td>GSA100</td>
<td>100,000</td>
<td>83,000</td>
<td>Input (Btu/h)</td>
<td>(Note 1)</td>
<td>9.8</td>
<td>81.5 61/4&quot; x 20&quot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Output (Btu/h)</td>
<td>(Note 4)</td>
<td>325</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sq. Ft. Steam</td>
<td>(Note 2)</td>
<td>78,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Steam Btu/h</td>
<td>(Note 3)</td>
<td>62,000</td>
<td></td>
</tr>
<tr>
<td>GSA125</td>
<td>125,000</td>
<td>104,000</td>
<td>Input (Btu/h)</td>
<td>(Note 1)</td>
<td>112,500</td>
<td>9.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Output (Btu/h)</td>
<td>(Note 4)</td>
<td>90,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sq. Ft. Steam</td>
<td>(Note 2)</td>
<td>325</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Steam Btu/h</td>
<td>(Note 3)</td>
<td>78,000</td>
<td></td>
</tr>
<tr>
<td>GSA150</td>
<td>150,000</td>
<td>125,000</td>
<td>Input (Btu/h)</td>
<td>(Note 1)</td>
<td>135,000</td>
<td>11.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Output (Btu/h)</td>
<td>(Note 4)</td>
<td>108,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sq. Ft. Steam</td>
<td>(Note 2)</td>
<td>392</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Steam Btu/h</td>
<td>(Note 3)</td>
<td>94,000</td>
<td></td>
</tr>
<tr>
<td>GSA175</td>
<td>175,000</td>
<td>145,000</td>
<td>Input (Btu/h)</td>
<td>(Note 1)</td>
<td>157,500</td>
<td>11.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Output (Btu/h)</td>
<td>(Note 4)</td>
<td>126,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sq. Ft. Steam</td>
<td>(Note 2)</td>
<td>454</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Steam Btu/h</td>
<td>(Note 3)</td>
<td>109,000</td>
<td></td>
</tr>
<tr>
<td>GSA200</td>
<td>200,000</td>
<td>167,000</td>
<td>Input (Btu/h)</td>
<td>(Note 1)</td>
<td>180,000</td>
<td>11.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Output (Btu/h)</td>
<td>(Note 4)</td>
<td>144,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sq. Ft. Steam</td>
<td>(Note 2)</td>
<td>521</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Steam Btu/h</td>
<td>(Note 3)</td>
<td>125,000</td>
<td></td>
</tr>
<tr>
<td>GSA250</td>
<td>250,000</td>
<td>209,000</td>
<td>Input (Btu/h)</td>
<td>(Note 1)</td>
<td>225,000</td>
<td>12.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Output (Btu/h)</td>
<td>(Note 4)</td>
<td>180,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sq. Ft. Steam</td>
<td>(Note 2)</td>
<td>654</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Steam Btu/h</td>
<td>(Note 3)</td>
<td>157,000</td>
<td></td>
</tr>
</tbody>
</table>

Notes:

1. Based on standard test procedures prescribed by the United States Department of Energy.
2. Net I=B=R ratings are based on net installed radiation of sufficient quantity for the requirements of the building and nothing need be added for normal piping and pickup. Ratings are based on a piping and pickup allowance of 1.333. An additional allowance should be made for unusual piping and pickup loads.
3. See information at right for model number suffixes. Letters shown are model number suffixes. An ‘N’ after the model number designates natural gas.
4. Contact your International Comfort Products dealer regarding information and parts for high altitude applications.
# 14 Dimensions

### Figure 20

**Dimensional drawing — ALL DIMENSIONS IN INCHES**

1. Supply piping (Note 1)
2. Return piping (Note 1)
3. Gas supply piping
4. Gas supply entrance (right or left side)
5. Drain valve
6. Slip tapping
7. Manual main shut-off valve

**DANGER**

Do not cut or alter draft hood in any way. Boiler combustion will be affected, causing severe personal injury, death or substantial property damage.

**Note 1:** Boiler supply and return tapping can be found in the table below. See Table 5 on page 9 for recommended system supply and return piping sizes.

---

## 1 Prepare boiler location

### Clearances

#### Service clearances

1. Provide minimum clearances for cleaning and servicing the boiler and for access to controls and components as listed in the table below.
2. Provide at least screwdriver clearance to jacket front panel. Screws for removal of jacket front panel and for cleaning and servicing must be 6 inches from combustible material in all installations.
3. Type B double-wall metal vent pipe — see vent manufacturer’s recommendation for clearances to combustible material.

#### Minimum clearance to combustible materials

**General — all installations**

1. Hot water pipes must be at least 3" from combustible material.
2. Single-wall vent pipe must be at least 6 inches from combustible material.
3. Type B double-wall metal vent pipe — see vent manufacturer’s recommendation for clearances to combustible material.

**Small space — alcove (not closet) installation**

**NOTICE**

GSA boilers are not approved for closet installation — only for alcove installation, with minimum clearances as shown in Figure 1 and the table below, and the front side completely open — that is, a 3-walled room.

#### Clearances from combustible materials

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top</td>
<td>46&quot;</td>
</tr>
<tr>
<td>Front</td>
<td>18&quot;</td>
</tr>
<tr>
<td>Back</td>
<td>6&quot;</td>
</tr>
<tr>
<td>Left side</td>
<td>24&quot;</td>
</tr>
<tr>
<td>Right side</td>
<td>6&quot;</td>
</tr>
</tbody>
</table>

#### Large space — (see minimum room volume, below)

- If installed in a four-walled room, the room volume must be no less than the following (Ceiling height, if over 8 feet, can only be counted as 8 feet):
  - GSA075 & GSA100: 147 cubic feet
  - GSA125 & GSA150: 184 cubic feet
  - GSA175 & GSA200: 221 cubic feet
  - GSA250: 267 cubic feet

The room must provide the following minimum clearances (in all directions) to the boiler and components:

- Jacket and flue collector sides & rear: 6 inches
- Jacket front: 18 inches
- Vent pipe (other than Type B vent): 6 inches
- Vent damper: 6 inches

#### Flooring and foundation

**WARNING**

Do not install boiler on combustible flooring or carpeting even if a concrete or aerated foundation is used. Floor can result, causing severe personal injury, death or substantial property damage.

1. Provide a solid brick or minimum 2-inch thick concrete foundation pad if any of the following is true:
   - Floor can become flooded.
   - The boiler mounting area is not level.
   - Boiler combustion will be affected, causing severe personal injury, death or substantial property damage.
2. See Table 1 for minimum foundation dimensions.
3. Use a foundation with airways when:
   - Boiler combustion will be affected, causing severe personal injury, death or substantial property damage.
   - Boiler foundation pad if any of the following is true:

#### Table 1 Minimum foundation size

<table>
<thead>
<tr>
<th>Boiler model number</th>
<th>Minimum foundation length</th>
<th>Minimum foundation width</th>
</tr>
</thead>
<tbody>
<tr>
<td>GSA075 – GSA100</td>
<td>29 ¼&quot;</td>
<td>19&quot;</td>
</tr>
<tr>
<td>GSA125 – GSA150</td>
<td>29 ¼&quot;</td>
<td>23 ½&quot;</td>
</tr>
<tr>
<td>GSA175 – GSA200</td>
<td>29 ¼&quot;</td>
<td>27 ½&quot;</td>
</tr>
<tr>
<td>GSA250</td>
<td>29 ¾&quot;</td>
<td>31 ¾&quot;</td>
</tr>
</tbody>
</table>
13 Replacement parts

Figure 19 Gas controls

<table>
<thead>
<tr>
<th>Item number</th>
<th>Description</th>
<th>Manufacturer</th>
<th>Manufacturer’s part number</th>
<th>International Comfort Products part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pilot assembly kit with orifice</td>
<td>International Comfort Products</td>
<td>5108160400</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Tubing, pilot, aluminum with fittings</td>
<td>Honeywell</td>
<td>5607428600</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Tubing, thermostate</td>
<td>Honeywell</td>
<td>5137242500</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Transformer with receptacle</td>
<td>Honeywell</td>
<td>5333223660</td>
<td></td>
</tr>
</tbody>
</table>

**Boiler Manual – Gas-Fired Steam Boilers**

**1 Prepare boiler location continued**

**Vent system**

**WARNING**
Failure to follow all instructions can result in flue gas spillage and carbon monoxide emissions, causing severe personal injury or death.

**DANGER**
Inspect existing chimney before installing boiler. Failure to clean or replace perforated pipe or tile liner will cause severe personal injury or death.

Do not alter boiler draft diverter or place any obstruction or non-certified vent damper in breeching or vent system. CSA certification will become void. Flue gas spillage and carbon monoxide emissions will occur causing severe personal injury or death.

The following requirements apply when you remove an existing boiler from a vent system shared with other appliances. If the new boiler will not use the common vent, you must test (as described below) each remaining appliance — operating by itself — to verify that the vent system operates adequately.

When removing boiler from existing common vent system:

At the time of removal of an existing boiler, the following steps shall be followed with each appliance remaining connected to the common venting system placed in operation, while the other appliances remaining connected to the common venting system are not in operation.

a. Seal any unused openings in the common venting system.

b. Visually inspect the venting system for proper size and horizontal pitch and determine there is no blockage or restriction, leakage, corrosion or other deficiencies which could cause an unsafe condition.

c. Test vent system — Inspect as is practical, close all building doors and windows and all doors between the space in which the appliances remaining connected to the common venting system are located and other spaces of the building. Turn on clothes dryers and any appliance not connected to the common venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they will operate at maximum speed. Do not operate a summer exhaust fan. Close fireplace dampers.

d. Place in operation the appliance being inspected. Follow the lighting instructions. Adjust thermostat so appliance will operate continuously.

e. Test for spillage at draft diverter relief opening after 5 minutes of main burner operation. Use the flame of a match or candle.

f. After it has been determined that each appliance remaining connected to the common venting system properly vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers, and any other gas-burning appliance to their previous conditions of use.

Any improper operation of common vent system should be corrected so the installation conforms with the National Fuel Gas Code, ANSI Z223.1–latest edition. Correct by resizing to approach the minimum size as determined using the appropriate tables in Part 11 of that code. Canadian installations must comply with B149.1 or B149.2 Installation Code.

**Chimney or vent requirements**

1. Venting must be installed according to Part 7, “Venting of Equipment”, of National Fuel Gas Code, ANSI Z223.1–latest edition and applicable building codes. Canadian installations must comply with B149.1 or B149.2 Installation Codes.

2. See “Ratings” on page 31 for minimum chimney or vent sizes. Chimney or vent terminations:

   a. A chimney, or any vent other than a Type B vent with listed vent cap, must extend at least 3 feet above the highest point where it passes through a roof of a building, and at least 2 feet higher than any portion of a building within a horizontal distance of 10 feet.

   b. Type B vents with listed caps may terminate as in Figure 2 if no closer than 8 feet from a vertical wall or similar obstruction.

   c. Otherwise, Type B vents must terminate at least 2 feet above the roof penetration and at least 2 feet higher than any portion of a building within 10 feet.

3. A lined chimney is preferred and must be used when required by local, state, provincial and national codes, laws, regulations and ordinances. Vitreous tile linings with joints that prevent retention of moisture and linings made of noncorrosive materials are best. Advice for flue connections and chimney linings can be obtained from local gas utility. Type B double-wall metal vent pipe or single-wall vent pipe may be used as a liner.

4. Cold masonry chimneys, also known as outside chimneys, typically have one or more walls exposed to outside air. When any atmospheric gas-fired boiler with automatic vent damper is vented through this type of chimney, the potential exists for condensation to occur. Condensation can damage a masonry chimney. Williamson-Thermoflo recommends the following to prevent possible damage:

   a. Line chimney with corrosion-resistant metal liner such as AL29-4C stainless steel or B-vent. Size liner per National Fuel Gas Code ANSI Z223.1–latest edition.

   b. Provide drain trap to remove any condensate.

5. Where two or more gas appliances vent into a common chimney or vent, equivalent area should be at least equal to area of vent outlet plus 50 percent of vent outlet area of additional appliances.

**Figure 2 Terminations with Type B vent fitted with listed cap, provided vent is at least 8 feet from any vertical wall or similar obstruction**

**Figure 19 Gas controls**

**Part Number 670 01 1004 00**
To prevent potential of severe personal injury or death, check for products or areas listed below before installing boiler. If any of these contaminants are found:

- Remove contaminants permanently.
- OR — Isolate boiler and provide outside combustion air. See national, provincial or local codes for further information.

Please review the following information on potential combustion air contamination problems. See Table 2 for products and areas which may cause contaminated combustion air.

<table>
<thead>
<tr>
<th>Air contamination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Products to avoid</td>
</tr>
<tr>
<td>Spray cans containing chloro/fluorocarbons</td>
</tr>
<tr>
<td>Permanent wave solutions</td>
</tr>
<tr>
<td>Chlorinated waxes/cleaners</td>
</tr>
<tr>
<td>Chlorine-based swimming pool chemicals</td>
</tr>
<tr>
<td>Calcium chloride used for thawing</td>
</tr>
<tr>
<td>Sodium chloride used for water softening</td>
</tr>
<tr>
<td>Refrigerant leaks</td>
</tr>
<tr>
<td>Paint or varnish removers</td>
</tr>
<tr>
<td>Hydrochloric acid/muriatic acid</td>
</tr>
<tr>
<td>Cements and glues</td>
</tr>
<tr>
<td>Antistatic fabric softeners used in clothes dryers</td>
</tr>
<tr>
<td>Chlorine-type bleaches, detergents, and cleaning solvents found in household laundry rooms</td>
</tr>
<tr>
<td>Adhesives used to fasten building products and other similar products</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Areas likely to have contaminants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry cleaning/laundry areas and establishments</td>
</tr>
<tr>
<td>Swimming pools</td>
</tr>
<tr>
<td>Metal fabrication plants</td>
</tr>
<tr>
<td>Beauty shops</td>
</tr>
<tr>
<td>Refrigeration repair shops</td>
</tr>
<tr>
<td>Auto body shops</td>
</tr>
<tr>
<td>Furniture manufacturing plants</td>
</tr>
<tr>
<td>Factory/refrigeration food/existing and establishments</td>
</tr>
<tr>
<td>New building construction</td>
</tr>
<tr>
<td>Remodeling areas</td>
</tr>
<tr>
<td>Garages with workshops</td>
</tr>
</tbody>
</table>

Air openings

Combustion air and ventilation openings must comply with Section 5.3, “Air for Combustion and Ventilation,” of National Fuel Gas Code ANSI Z223.1—latest edition, or applicable local building codes. Canadian installations must comply with B149.1 or B149.2 Installation Codes.

See table below for minimum combustion/ventilation air opening sizes. Where openings are required, provide two (2) openings — one within 12 inches of the ceiling, the other within 12 inches of the floor, as shown in the table illustrations.

Minimum air opening sizes (for Exception A)

Required area of the air openings given in the table on this area — after the correction for buoyant dilution

Air openings

- 2 Openings: Each 1 square inch free area per 5,000 Btu input of other appliances plus GSA input

- 2 Openings: Each 1 square inch free area per 4,000 Btu input of other appliances plus GSA input

- 2 Openings: Each 1 square inch free area per 2,000 Btu input of other appliances plus GSA input

**Table 2 Corrosive contaminants and likely locations**

<table>
<thead>
<tr>
<th>Items</th>
<th>Number</th>
<th>Description</th>
<th>Manufacturer</th>
<th>Manufacturer’s part number</th>
<th>International Comfort Products part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pressure relief valve, ASME, 15 PSIG, ⅜ ” npt (Fittings shown are factory-installed on boiler. Coupling ¼ ” npt, Nipple ⅜ ” npt)</td>
<td>Conbraco Watts</td>
<td>13-501-08 315</td>
<td>511548023WT</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Low water cutoff, probe-type</td>
<td>Hydrolevel</td>
<td>400</td>
<td>511114615WT</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Limit control/gauge assembly, includes: Pressure control One piece, Siphon, ½ ” npt, 90° brass Nipple, close ⅛ ” npt Tee, 10° npt</td>
<td>Honeywell Winter’s</td>
<td>PR-404-A E1437</td>
<td>510312315WT 510218045WT obtain locally obtain locally</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Gauge glass assembly, includes: Gauge glass Gauge glass guard, 9 ⅛ ” Gauge cock set, brass</td>
<td>Conbraco United Brass Wks</td>
<td>21-205-03 W 905 and 946</td>
<td>591419185WT 63334680WT 510218145WT</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Drain valve, ⅜ ”</td>
<td>International Comfort Products</td>
<td></td>
<td>511204239WT</td>
<td></td>
</tr>
</tbody>
</table>
1 Prepare boiler location continued

Air openings continued

Exhaust fans and air movers
The appliance space must never be under a negative pressure. Always provide air openings sized not only to the dimensions required for the firing rate of all appliances, but also to handle the air movement rate of the exhaust fans or air movers using air from the building or space.

Motorized air dampers
If the air openings are fitted with motorized dampers, electrically interlock the damper to:
• Prevent the boiler from firing if the damper is not fully open.
• Shut the boiler down should the damper close during boiler operation.
To accomplish this interlock, wire an isolated contact (proving the damper open) in series with the thermostatic input to the boiler. The boiler will not start if this damper is closed, and will shut down should damper close during operation.

2 Prepare boiler

Placement and setup
Place boiler/crate near position
1. Leave boiler in crate and on pallet until installation site is ready.
2. Move entire crate and pallet next to selected location.
4. Unbolt boiler from pallet.
5. Remove boiler from pallet.

Inspect orifices and burners
1. Remove front jacket door. Remove base access panel (see Figure 16, item 14, page 26).
2. Check for correctly-sized manifold orifices. See Table 3 for sizing. (The orifice size is stamped on the orifice spud barrel.) Correctly-sized manifold orifices must be used. Failure to do so will result in severe personal injury, death or substantial property damage.
3. Level and straighten burners. Burners must be properly seated in slots in burner rest with their openings face up. Main burner orifices must inject down center of burner. Failure to properly seat burners will result in severe personal injury, death or substantial property damage.
4. Reinstall base access panel. Do not operate boiler without access panel secured in place. Failure to comply could cause momentary flame rollout on ignition of main flame, resulting in possible fire or personal injury hazard.

Table 3 Manifold orifice sizing

<table>
<thead>
<tr>
<th>Location</th>
<th>Natural gas</th>
</tr>
</thead>
<tbody>
<tr>
<td>U. S.</td>
<td></td>
</tr>
<tr>
<td>Sea level – 2,000 ft</td>
<td>over 2,000 ft</td>
</tr>
<tr>
<td>2.45 mm</td>
<td>(Note 1)</td>
</tr>
<tr>
<td>Canada</td>
<td></td>
</tr>
<tr>
<td>Sea level – 2,000 ft</td>
<td>2,000 – 4,500</td>
</tr>
<tr>
<td>2.45 mm</td>
<td>2.30 mm</td>
</tr>
</tbody>
</table>

Note 1: For U. S. elevations above 2,000 feet, contact your Williamson-Thermoflo supplier for details.

Pressure test
Perform hydrostatic pressure test
Pressure test boiler before attaching water or gas piping or electrical supply.

Prepare boiler for test
1. Plug tappings or openings.
2. Do not use gauge supplied with boiler for pressure testing. Install gauge with appropriate range.

Fill and pressure test
1. Fill boiler with water. Vent all air. Test boilers between 45-50 psi. Do not leave boiler unattended. A cold water fill could expand and cause excessive pressure resulting in severe personal injury, death or substantial property damage. Check for maintained gauge pressure for more than 10 minutes. Visually check for leaks if gauge pressure drops.

Motorized air dampers
If the air openings are fitted with motorized dampers, electrically interlock the damper to:
• Prevent the boiler from firing if the damper is not fully open.
• Shut the boiler down should the damper close during boiler operation.
To accomplish this interlock, wire an isolated contact (proving the damper open) in series with the thermostatic input to the boiler. The boiler will not start if this damper is closed, and will shut down should damper close during operation.

13 Replacement parts continued

Figure 17 Jacket assembly

<table>
<thead>
<tr>
<th>Item number</th>
<th>Description</th>
<th>International Comfort Products part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Jacket panel, left side</td>
<td>421800350WT</td>
</tr>
<tr>
<td>2</td>
<td>Jacket panel, top</td>
<td>421800152WT, 421800153WT, 421800154WT, 421800155WT</td>
</tr>
<tr>
<td>3</td>
<td>Jacket panel, right side</td>
<td>421800151WT</td>
</tr>
<tr>
<td>4</td>
<td>Jacket panel, door</td>
<td>421800167WT, 421800168WT, 421800169WT, 421800170WT</td>
</tr>
<tr>
<td>5</td>
<td>Jacket panel, interior</td>
<td>421800162WT, 421800163WT, 421800164WT, 421800165WT</td>
</tr>
<tr>
<td>6</td>
<td>Jacket panel, rear</td>
<td>421800157WT, 421800158WT, 421800159WT, 421800160WT</td>
</tr>
<tr>
<td>7</td>
<td>Bottom cross tie</td>
<td>421800172WT, 421800173WT, 421800174WT, 421800175WT</td>
</tr>
<tr>
<td>8</td>
<td>Junction box, 4 x 4 (Available at local supply house)</td>
<td></td>
</tr>
</tbody>
</table>
Part Number 670 01 1004 00

13 Replacement parts

Table 4: Control tapping locations

<table>
<thead>
<tr>
<th>Location</th>
<th>Size</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>¾&quot;</td>
<td>Probe-type low water cutoff</td>
</tr>
<tr>
<td>D</td>
<td>¾&quot;</td>
<td>Drain</td>
</tr>
<tr>
<td>E</td>
<td>¾&quot;</td>
<td>Relief valve</td>
</tr>
<tr>
<td>G</td>
<td>¾&quot;</td>
<td>Plugged</td>
</tr>
<tr>
<td>H</td>
<td>¾&quot;</td>
<td>Gauge glass and/or optional low water cutoff</td>
</tr>
<tr>
<td>L</td>
<td>¼&quot;</td>
<td>Siphon, pressure gauge, high limit control</td>
</tr>
<tr>
<td>B</td>
<td>1/2&quot;</td>
<td>Skim tapping</td>
</tr>
</tbody>
</table>

Table 4: Control tapping

<table>
<thead>
<tr>
<th>Item number</th>
<th>Description</th>
<th>International Comfort Products part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Draft diverter</td>
<td>GSA275, GSA100, GSA125, GSA175, GSA200, GSA250</td>
</tr>
<tr>
<td>2</td>
<td>Draft diverter</td>
<td>GSA275, GSA100, GSA125, GSA175, GSA200, GSA250</td>
</tr>
<tr>
<td>3</td>
<td>Draft diverter</td>
<td>GSA275, GSA100, GSA125, GSA175, GSA200, GSA250</td>
</tr>
<tr>
<td>4</td>
<td>Draft diverter</td>
<td>GSA275, GSA100, GSA125, GSA175, GSA200, GSA250</td>
</tr>
<tr>
<td>5</td>
<td>Draft diverer</td>
<td>GSA275, GSA100, GSA125, GSA175, GSA200, GSA250</td>
</tr>
<tr>
<td>6</td>
<td>Draft diverer</td>
<td>GSA275, GSA100, GSA125, GSA175, GSA200, GSA250</td>
</tr>
<tr>
<td>7</td>
<td>Draft diverer</td>
<td>GSA275, GSA100, GSA125, GSA175, GSA200, GSA250</td>
</tr>
<tr>
<td>8</td>
<td>Draft diverer</td>
<td>GSA275, GSA100, GSA125, GSA175, GSA200, GSA250</td>
</tr>
<tr>
<td>9</td>
<td>Draft diverer</td>
<td>GSA275, GSA100, GSA125, GSA175, GSA200, GSA250</td>
</tr>
<tr>
<td>10</td>
<td>Draft diverer</td>
<td>GSA275, GSA100, GSA125, GSA175, GSA200, GSA250</td>
</tr>
<tr>
<td>11</td>
<td>Draft diverer</td>
<td>GSA275, GSA100, GSA125, GSA175, GSA200, GSA250</td>
</tr>
<tr>
<td>12</td>
<td>Draft diverer</td>
<td>GSA275, GSA100, GSA125, GSA175, GSA200, GSA250</td>
</tr>
<tr>
<td>13</td>
<td>Draft diverer</td>
<td>GSA275, GSA100, GSA125, GSA175, GSA200, GSA250</td>
</tr>
<tr>
<td>14</td>
<td>Draft diverer</td>
<td>GSA275, GSA100, GSA125, GSA175, GSA200, GSA250</td>
</tr>
<tr>
<td>15</td>
<td>Draft diverer</td>
<td>GSA275, GSA100, GSA125, GSA175, GSA200, GSA250</td>
</tr>
<tr>
<td>16</td>
<td>Draft diverer</td>
<td>GSA275, GSA100, GSA125, GSA175, GSA200, GSA250</td>
</tr>
<tr>
<td>17</td>
<td>Draft diverer</td>
<td>GSA275, GSA100, GSA125, GSA175, GSA200, GSA250</td>
</tr>
<tr>
<td>18</td>
<td>Draft diverer</td>
<td>GSA275, GSA100, GSA125, GSA175, GSA200, GSA250</td>
</tr>
<tr>
<td>19</td>
<td>Draft diverer</td>
<td>GSA275, GSA100, GSA125, GSA175, GSA200, GSA250</td>
</tr>
<tr>
<td>20</td>
<td>Draft diverer</td>
<td>GSA275, GSA100, GSA125, GSA175, GSA200, GSA250</td>
</tr>
<tr>
<td>21</td>
<td>Draft diverer</td>
<td>GSA275, GSA100, GSA125, GSA175, GSA200, GSA250</td>
</tr>
<tr>
<td>22</td>
<td>Draft diverer</td>
<td>GSA275, GSA100, GSA125, GSA175, GSA200, GSA250</td>
</tr>
<tr>
<td>23</td>
<td>Draft diverer</td>
<td>GSA275, GSA100, GSA125, GSA175, GSA200, GSA250</td>
</tr>
<tr>
<td>24</td>
<td>Draft diverer</td>
<td>GSA275, GSA100, GSA125, GSA175, GSA200, GSA250</td>
</tr>
</tbody>
</table>

2 Prepare boiler

Pressure test continued

<table>
<thead>
<tr>
<th>Location</th>
<th>Size</th>
<th>Description</th>
</tr>
</thead>
<tbody>
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<td>D</td>
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<td>Drain</td>
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<td>E</td>
<td>¾&quot;</td>
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<tr>
<td>L</td>
<td>¼&quot;</td>
<td>Siphon, pressure gauge, high limit control</td>
</tr>
<tr>
<td>B</td>
<td>1/2&quot;</td>
<td>Skim tapping</td>
</tr>
</tbody>
</table>

Note: Available only on special request.

Draft diverter & spill switch

Draft diverter installation

1. Secure draft diverter to flue collector hood with sheet metal screws. See Figure 16, Items 1 and 9, on page 26. Use boiler cement to provide gas tight seal.

2. Retest boiler after repair leaks. Do not alter boiler draft diverter or place any obstruction or non-approved vent damper in breeching or vent system. CSA certification will become void. Flue gas spillage and carbon monoxide emissions will occur causing severe personal injury or death.

3. Remove plugs from any tappings that will be used for controls and accessories. Refer to Table 4 and Figure 3, below.

Spill switch installation

1. Fasten spill switch to draft diverter as shown in Figure 16, Item 20, page 26.

2. See Wiring diagram on page 17 to connect wires.

Install vent piping

1. Connect from draft diverter or vent damper outlet to chimney or vent with same size vent connector.

2. Where possible, vertical venting to the outside from the draft diverter or vent damper outlet will offer best performance.

3. Where horizontal vent connector is used, slope upward at least ¼" per lineal foot toward chimney or vent and support with hangers to prevent sagging.

4. Breeching must not be connected to any portion of a mechanical draft system that can operate under positive pressure. Long horizontal vent connector, excessive number of elbows or tees, or other obstructions that restrict the flow of combustion gases should be avoided. Severe personal injury, death or substantial property damage could result.

Float-type low water cutoff — If field installing a float-type low water cutoff, it must be piped only to the gauge glass tappings, items H, Figure 3. The tappings are spaced 9" on center. Use only float-type low water cutoffs with quick-connect hookups that will provide a low water cutoff point no higher than 2" above the center of the bottom tapping. See page 11, Figure 9, for a typical installation.

WARNING
Severe personal injury, death or substantial property damage could result.
2 Prepare boiler continued

Vent damper

**Notice**
Those systems are used on gas-fired boilers with vent dampers as shipped from factory. Boiler will not operate without vent damper installed.

DAMPER BLADE
See vent manufacturer’s instructions to install plug (shipped with damper) in damper hole. Install plug with "N" diameter hole in vent damper hole.

Minimum clearances
Provide a minimum of 6" between the vent damper and any combustible material. (See “Minimum clearance to combustible materials,” page 3, for minimum clearance from jacket top to ceiling to maintain this dimension.)

Damper installation

**DANGER**
Do not modify draft diverter or vent damper, or make another connection between draft diverter and vent damper or boiler except as noted below. This will void CSA certification and will not be covered by Williamson-Thermoflo warranty. Any changes will cause severe personal injury, death or substantial property damage.

1. Install vent damper as shown in vent damper manufacturer’s instructions. Vent damper must be installed so that it serves only one boiler and so damper blade indicator is visible to the user. See Figure 4.

2. Screws or rivets used to secure the vent damper to the draft diverter must not interfere with rotation of the damper blade.

3. Install damper harness between damper actuator and knockout in jacket top panel. Use strain relief connectors and locknuts to secure both ends of damper harness.

**CAUTION**
Keep wiring harness clear of all hot surfaces. Wire insulation could be damaged, causing risk of electrical short-circuit.

Figure 4 Vent damper assemblies

**Effikal damper**
Johnson Controls damper

Refer to vent manufacturer’s instructions to install plug shipped with damper in damper hole.

Diverter/Maple indicator

Hold-open switch (Effikal only) — Install vent damper so that switch is visible and accessible to user.

DAMPER ACTUATOR

Bypassing (jumpering) vent damper will cause flue products such as carbon monoxide to escape into the house. This will cause severe personal injury or death.

After boiler has operated once, if either end of harness is disconnected, the system safety shutdown will occur. The boiler will not operate until harness is reconnected.

**CAUTION**
Effikal damper — Damper hold open switch must be in Automatic Operation position for system to operate properly.

4. Read and apply the harness plug warning label (shown above) so that it is visible after installation

5. Plug damper harness receptacle into damper harness plug.

**DANGER**
If LWCO, spill switch or rollout thermal fuse element contacts are open, determine cause and correct condition. Failure to do so will cause severe personal injury, death or substantial property damage.

Check for open thermostat, LWCO, high limit, spill switch or rollout thermal fuse element contacts or check for loose wire connections.

Check repair or outlet stack section. Does vent damper rotate open?

- No
- Yes

Replace actuator. Retest.

**WARNING**
LINE UP KEYWAY WHEN CONNECTING PLUGS.

FORCING A MISMATCH CAN CAUSE A HAZARDOUS CONDITION.

Keyway

Key

1984

12 Troubleshooting continued

Chart 1 — Standing pilot — Boiler will not fire

Before proceeding, follow “Troubleshooting sequence” on page 24. If problem persists, then:

<table>
<thead>
<tr>
<th>Condition</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is damper harness securely plugged in at both ends?</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Secure connections.</td>
</tr>
<tr>
<td>Check for open thermostat, LWCO, high limit, spill switch or rollout thermal fuse element contacts or check for loose wire connections.</td>
<td>No</td>
</tr>
<tr>
<td>If LWCO, spill switch or rollout thermal fuse element contacts are open, determine cause and correct condition. Failure to do so will cause severe personal injury, death or substantial property damage.</td>
<td>No</td>
</tr>
<tr>
<td>Check repair or outlet stack section. Does vent damper rotate open?</td>
<td>No</td>
</tr>
<tr>
<td>Replace actuator. Retest.</td>
<td></td>
</tr>
<tr>
<td>Is 24VAC present across transformer terminals C &amp; Y?</td>
<td>No</td>
</tr>
<tr>
<td>Check for 24VAC present across transformer terminals C &amp; Y.</td>
<td>No</td>
</tr>
<tr>
<td>Is 24VAC present across transformer terminal C and yellow wire on vent damper connector?</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Replace damper wiring harness.</td>
</tr>
<tr>
<td></td>
<td>Turn gas valve cock to ON position. Retest.</td>
</tr>
<tr>
<td>Is gas valve cock turned to ON position?</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Replace gas valve.</td>
</tr>
<tr>
<td>Is main flame on now?</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Is vent damper rotated open?</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Is vent damper rotated open?</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Is 24VAC present across gas valve terminals?</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td>Check continuity of each wire in damper harness. Does continuity exist for each wire? See Table right.</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Replace damper actuator. Retest.</td>
</tr>
<tr>
<td></td>
<td>Replace damper wiring harness.</td>
</tr>
<tr>
<td></td>
<td>Replace gas valve.</td>
</tr>
<tr>
<td>Remove damper harness from damper harness plug. TEMPORARILY install jumper between terminal 2 and terminal 5 on damper plug in boiler wiring harness. See Table, right. Does boiler fire?</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
12 Troubleshooting

In event of vent damper failure:

**Effikat vent damper**

If troubleshooting chart recommends replacing actuator and actuator is not immediately available, damper blade can be fixed in an open position to allow boiler operation. Manually turning blade can cause actuator malfunction. Follow these instructions only in case of no heat or damper actuator malfunction.

1. Move damper service switch to Hold Damper Open position. Apply call for heat to boiler. Damper blade should then rotate to Open position and boiler will fire.
2. If step 1 does not open damper, manually rotate damper blade to open position using wrench or pliers on flat shaft between damper and actuator. Boiler will fire. Verify that damper service switch is in Hold Damper Open position. See Figure 15.
3. Do not leave vent damper permanently in this position. Replace actuator immediately. If vent damper is left in Open position, boiler will not operate at published efficiencies.

**Johnson Controls vent damper**

If troubleshooting chart recommends replacing actuator and actuator is not immediately available, damper blade can be fixed in an open position to allow boiler operation. Follow these instructions only in case of no heat or damper actuator malfunction. See Figure 15.

1. Turn off power to boiler.
2. See vent damper manufacturer’s instructions for procedure to fix vent damper in open position.
3. Turn on power to boiler.
4. Using wrench or pliers on flat shaft section, manually rotate damper blade until green light turns on. Boiler will fire. See Figure 15.
5. Do not leave vent damper permanently in this position. Replace actuator immediately. If vent damper is left in Open position, boiler will not operate at published efficiencies.

Troubleshooting sequence:

1. Before proceeding, check for:
   - Loose connections, blown fuse or service switch off?
   - High limit switch set below boiler water temperature?
   - Thermostat set below room temperature?
   - Gas not turned on at meter or boiler?
   - Incoming gas pressure less than:
     - 5" w.c. for natural gas?
     - 11" w.c. for propane gas?
   - If all of the above check correctly, check gas pressures:
     - A. With boiler off:
       - 13" w.c. maximum natural or propane gas pressure upstream of gas valve.
     - B. With boiler on:
       - 5" w.c. minimum natural gas pressure or 11" w.c. propane gas pressure upstream of gas valve.
       - 3.5" w.c. minimum natural gas pressure or 10" w.c. propane gas pressure downstream tapping on gas valve. Can be adjusted by regulator on gas valve.
       - If gas pressure is incorrect or gas is not available to boiler, contact gas supplier to correct before proceeding further.
   - If gas is available and you cannot obtain a pilot flame, try pumping the gas line and cleaning pilot and pilot gas tubing. Follow “Lighting Instructions” again. If you still cannot obtain a flame, replace pilot burner and gas tubing. If this does not allow you to obtain a pilot flame, replace gas valve.
   - If you obtain a pilot flame, but pilot will not remain on, replace thermocouple. If this does not correct problem, replace gas valve and pilot burner.
   - If pilot stays on, but main gas will not come on, proceed to page 25.

Before troubleshooting:

1. Have the following items:
   - Voltmeter that can check 120 VAC and 24 VAC.
   - Continuity checker.
   - U-tube manometer.
2. Check for 120 VAC (minimum 102 VAC to maximum 132 VAC) to boiler.
3. Make sure thermostat is calling for heat and contacts (including appropriate zone controls) are closed. Check for 24 VAC between thermostat wire nuts and ground.

**Connecting to counterflow piping**

Install relief valve in tapping on top of boiler. See Table 4, page 7, for control tapping locations. See the tag attached to the relief valve for manufacturer’s instructions.

Follow the steps below to avoid potential severe personal injury, death or substantial property damage.

1. Pipe before installing controls. Connect return piping after jacket is attached. Connect supply piping before or after jacket is attached. Failure to properly pipe the boiler may result in improper operation and damage to the boiler or building.
2. See Figure 5 and Table 5. Pipe exactly as shown. Satisfactory operation of a steam heating system depends on adequate condensate return to boiler to maintain a steady water level. Avoid adding raw makeup water. Where condensate return is not adequate, install low water cutoff/pump control, condensate receiver and condensate boiler feed pump. Refer to Table 7, page 10, for sizing. See page 7, Table 4, for tapping locations.

**Relief valve**

Install relief valve in tapping on top of boiler. See Table 4, page 7, for control tapping locations. See the tag attached to the relief valve for manufacturer’s instructions.

Follow the steps below to avoid potential severe personal injury, death or substantial property damage.

- When installing the relief valve, ensure that all connections, including the valve inlet, are clean and free from any foreign matter.
- Mount the relief valve only in the vertical position, directly connected to the tapping designated in the manual on top of the boiler.
- Use pipe compound sparingly, or tape, on external threads only.
- Do not use a pipe wrench! Use proper type and size wrench on wrench pads only.

**Troubleshooting**

Failure to comply with instructions packed with vent damper can cause in personal injury, death or substantial property damage.
**Relief valve continued**

**DANGER**
During operation, this valve may discharge large amounts of steam and/or hot water. Therefore, to reduce the potential for bodily injury and property damage the valve must be installed that:
- Is connected from the outlet to a safe point of discharge with no intervening valve.
- Allows complete drainage of both the valve and the discharge line.
- Is independently supported and securely anchored so as to avoid applied stress as possible.
- Terminates freely to atmosphere where any discharge will be clearly visible and is at no risk of freezing.
- Is, over its entire length, of a pipe size equal to or greater than the discharge pipe used.

Use only schedule 40 metal pipe for discharge. (Do not use schedule 80, extra strong or double strong pipe or connections.) DO NOT CAP PLUG OR OTHERWISE OBSTRUCT DISCHARGE PIPE OUTLET! If discharge is piped upward, a condensate drain must be provided in the elbow below the vertical pipe to prevent condensate from returning into the valve. Failure to comply with these instructions will cause a dangerous spray of hot water and steam that would cause severe personal injury or death.

<table>
<thead>
<tr>
<th>Table 6</th>
<th>Reservoir pipe sizing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boiler group number</td>
<td>Reservoir pipe output</td>
</tr>
<tr>
<td></td>
<td>15 minutes</td>
</tr>
<tr>
<td>MBH</td>
<td>pipe length</td>
</tr>
<tr>
<td>GSA75</td>
<td>15</td>
</tr>
<tr>
<td>GSA75</td>
<td>100</td>
</tr>
<tr>
<td>GSA125</td>
<td>175</td>
</tr>
<tr>
<td>GSA200</td>
<td>250</td>
</tr>
</tbody>
</table>

Table 7  | Boiler feed system sizing |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Boiler group number</td>
<td>Horsepower output (gross) (pounds steam per hour)</td>
</tr>
<tr>
<td></td>
<td>Time from initial steam to average condensate return (boiler steaming capacity based on 970 Btu per pound of steam):</td>
</tr>
<tr>
<td></td>
<td>15 min.</td>
</tr>
<tr>
<td>GSA75</td>
<td>120</td>
</tr>
<tr>
<td>GSA125</td>
<td>175</td>
</tr>
<tr>
<td>GSA200</td>
<td>250</td>
</tr>
</tbody>
</table>

Table 8  | Condensate return |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Modern steam boilers are designed to steam for less time than older, larger boilers. When replacing an older steam boiler the system condensate return time may be longer than the steam time. This could cause the following problems:</td>
<td></td>
</tr>
<tr>
<td>1. Boilers fitted with an automatic water feed could overfill.</td>
<td></td>
</tr>
<tr>
<td>2. Units fitted with only a low water cutoff would shut down and cycle while waiting for condensate to return.</td>
<td></td>
</tr>
<tr>
<td>Following is a simple method for determining whether or not a reservoir pipe is required to lengthen steam time for a residential installation:</td>
<td></td>
</tr>
<tr>
<td>1. Disconnect condensate return line at existing boiler.</td>
<td></td>
</tr>
<tr>
<td>2. Heat boiler and allow to steam for 10 minutes. Turn off boiler.</td>
<td></td>
</tr>
<tr>
<td>3. Measure length of time from when boiler started to steam to when condensate begins to return through condensate line.</td>
<td></td>
</tr>
<tr>
<td>4. Measure length of time from when condensate begins to return to when it stops returning. Divide this time by 2.</td>
<td></td>
</tr>
<tr>
<td>5. Add time measured in step 3 to time calculated in step 4. This sum is the average time required for condensate to return to the boiler.</td>
<td></td>
</tr>
<tr>
<td>6. If this total time is 10 minutes or less, no reservoir pipe is needed. If total time for condensate to return to boiler (step 5) is more than 10 minutes, a reservoir pipe (or boiler feed system) is recommended. See Table 6, this page, for suggested reservoir pipe sizes.</td>
<td></td>
</tr>
</tbody>
</table>

**Check/test continued**

**Boiler relief valve**
1. After following the warning directions below, if the relief valve weeps or will not seat properly, replace the relief valve.

**DANGER**
Before testing, make certain discharge pipe is properly connected to valve outlet and arranged to contain and safely dispose of boiler discharge. Wear gloves to protect your hands from hot surfaces. Verify that discharge piping is installed in accordance with this manual and the instructions on the relief valve tag. Failure to comply will expose operator and others to severe personal injury or death.

**WARNING**
Safety relief valves should be retested AT LEAST ONCE EVERY THREE YEARS, by a licensed plumbing contractor or authorized inspection agency, to ensure that the product has not been affected by corrosive water conditions and to ensure that the valve and discharge line have not been altered or tampered with illegally. Certain naturally occurring conditions may corrode the valve or its components over time, rendering the valve inoperative. Such conditions are not detectable unless the valve and its components are physically removed and inspected. This inspection must only be conducted by a plumbing contractor or authorized inspection agency — not by the owner. Failure to reinspect the boiler relief valve as directed could result in unsafe pressure buildup, which can result in severe personal injury, death or substantial property damage.

Check the setting of the boiler limit control. The control should never be set with a pressure above 10 psig. Operating at a higher pressure can cause damage to the boiler relief valve.

The boiler relief valve must be tested at least monthly during the heating season to verify the valve and discharge piping flow freely. If corrosion and/or deposits are noticed within the valve body, testing must be performed more often. A "try lever test" must also be performed at the end of any non-service period. Follow the instructions below for a "try lever test":

- With the system at operating pressure, lift and hold the test lever fully open for at least 5 seconds to flush the valve seat free of sediment and debris. Then release lever and permit the valve to snap shut.

**Review with owner**
1. Review the User's Information Manual with the owner.
2. Emphasize the need to perform the maintenance schedule specified in the User's Information Manual (and in this manual as well).
3. Remind the owner of the need to call in a licensed contractor should the boiler or system exhibit any unusual behavior.

**Cleaning boiler heating surfaces**

The boiler contains ceramic fiber and fiberglass materials. Use care when handling these materials per instructions on page 32 of this manual. Failure to comply could result in severe personal injury.

- 1. Shut down boiler — Follow "To Turn Off Gas to Appliance" instructions on boiler and "Lighting Instructions".
- 2. Disconnect breeching and remove damper and draft diverter.
- 3. Remove upper rear jacket panel. Turn back jacket insulation to expose collector hood.
- 4. Remove collector hood. Clean excess boiler cement from collector hood and cast iron sections.
- 5. Remove burners from base of boiler. Follow "Burners and base" on page 21, to thoroughly clean burners. Place newspaper in base of boiler to collect soot that will fall.
- 6. With a wire flue brush, clean between the sections.
- 7. Emphasize the need to perform the maintenance schedule specified on page 21, to thoroughly clean burners. Place newspaper in base of boiler to collect soot that will fall.

---

**Figure 7** Recommended piping for parallel-flow systems with optional reservoir pipe
4 Install controls

Controls

Failure to properly install, pipe and wire boiler controls may result in severe damage to the boiler, building and personnel.

1. Controls are mounted and wired as shown in Figure 8. For actual tapping locations see Table 4 and Figure 3 on page 7.
2. Bring supply wiring to boiler. Must be 14 gauge or heavier.
3. See wiring diagram on page 17.

Gas piping

1. Sniff near floor and around boiler area for any indication of a gas leak.
2. Test gas piping using bubble test, per page 12 of this manual, if there is any indication of a leak.

Boiler waterline

Normal waterline is halfway up gauge glass.

Limit controls

1. Inspect and test the boiler limit control. Verify operation by turning control set point below boiler pressure. Boiler should cycle off. Return dial to original setting.

Start-up

1. Perform “Start-up” procedures, Section 7, pages 14-15, including “Verify operation” of burners and vent damper on page 15.
2. Check gas piping, per pages 12 and 14, verifying no indications of leakage and all piping and connections are in good condition.
3. Read the “Lighting Instructions” (page 18 or 19, whichever applies based on boiler gas valve).
4. Start the boiler following the “Lighting Instructions”, page 18 or 19.

Check/test

Low water cutoffs

Probe-type low water cutoff (see below)

Clean probe-type low water cutoff for proper operation.
1. Turn off power to boiler and wait 5 minutes.
2. Drain water to bottom of gauge glass.
3. Turn on power.
4. Set thermostat to call for heat. Red neon lamp on lower water cutoff should light.
5. Wait 5 minutes. Boiler should not fire.
6. Refill boiler to correct waterline. Red lamp should go off.
7. Wait 5 minutes. Boiler should fire.
8. Return thermostat to normal setting.

Float-type low water cutoff (when provided by others)

Clean float-type low water cutoff (when provided by others) to clear float chamber of sediment.
1. Open blowdown valve at bottom control.
2. Drain water into a bucket.
3. Check float-type low water cutoff for proper operation:
   a. Turn operating control to call for heat.
   b. Before water gets hot, drain to bottom of gauge glass. Boiler should shut off after water level lowers a few inches.
   c. Refill boiler to correct waterline. Boiler should come back on.

Figure 8 Controls

Figure 9 Float-type low water cutoff (when provided by others)
### 5 Install gassing

#### Connecting gas supply piping to boiler

1. Remove jacket front panel and see Figure 10 to pipe gas to boiler.
   a. Install drip leg at inlet of gas connection to boiler. Where local utility requires drip leg to be extended to the floor, use appropriate length of nipple between cap and tee.
   b. Install ground joint union for servicing, when required.
   c. Install manual shutoff valve in gas supply piping outside boiler jacket when required by local codes or utility requirements.
   d. In Canada—When using manual main shutoff valve, it must be identified by the installer.
   e. Support piping with hangers, not by boiler or its accessories.
   f. Purge all air from gas supply piping.
   g. Before placing boiler in operation, check boiler and its gas connection for leaks.
      - Close manual main shutoff valve during any pressure testing at less than 13" w.c.
      - Disconnect boiler and gas valve from gas supply piping during any pressure testing greater than 13" w.c.
   h. Do not check for gas leaks with an open flame—Use bubble test. Failure to use bubble test or check for gas leaks can cause severe personal injury, death or substantial property damage.
   i. Use pipe dope compatible with propane gases. Apply sparingly only to male threads of pipe joints so that pipe dope does not block gas flow.

   Failure to apply pipe dope as described in this manual can result in severe personal injury, death or substantial property damage.

#### Natural Gas

1. See Table 8 for pipe length and diameter. Base on rated boiler input, found on page 31 (divide by 1,000 to obtain cubic feet per hour). Table 8 is only for gas with specific gravity 0.60, with a pressure drop through the gas piping of 0.30" w.c. For additional gas pipe sizing information, see ANSI Z220.1 (B149.1 or B149.2 for Canadian installations).

2. Inlet pressure required at gas valve inlet:
   - Maximum: 13" w.c.
   - Minimum: 5" w.c.
   - Manifold gas pressure: 3.5" w.c.

3. Install 100% lock-up gas pressure regulator in supply line if inlet pressure exceeds 13" w.c. Adjust for 13" w.c. maximum.

#### Propane Gas

1. Contact gas supplier to size pipes, tanks and 100% shut-off gas pressure regulator.
2. Adjust propane supply regulator provided by gas supplier for 13" w.c. maximum pressure.
3. Inlet pressure required at gas valve inlet:
   - Maximum: 13" w.c.
   - Minimum: 11" w.c.
   - Manifold gas pressure: 10" w.c.

#### Table 8: Pipe capacity for 0.60 specific gravity natural gas

<table>
<thead>
<tr>
<th>Gas pipe length (ft)</th>
<th>Capacity of pipe for pipe size of:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Capacity in standard cubic feet gas per hour)</td>
</tr>
<tr>
<td>1/8</td>
<td>1/4&quot;</td>
</tr>
<tr>
<td>1/4</td>
<td>1/2&quot;</td>
</tr>
<tr>
<td>1/2</td>
<td>1&quot;</td>
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<tr>
<td>1&quot;</td>
<td>1-1/4&quot;</td>
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<td>1-1/2&quot;</td>
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<td>75</td>
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<td>100</td>
<td>100&quot;</td>
</tr>
<tr>
<td>150</td>
<td>150&quot;</td>
</tr>
</tbody>
</table>

#### Figure 30: Gas supply piping

### 11 Service and maintenance

#### The boiler should be inspected and started annually, at the beginning of the heating season, only by a qualified service technician. In addition, the maintenance and care of the boiler designated in Table 9, page 20 and explained on the following pages must be performed to assure maximum boiler efficiency and reliability. Failure to service and maintain the boiler and system could result in equipment failure.

**Electrical shock hazard**—Turn off power to the boiler before any service operation on the boiler except as noted otherwise in this manual. Failure to turn off electrical power could result in electrical shock, causing severe personal injury or death.

The boiler contains ceramic fiber and fiberglass materials. Use care when handling these materials per instructions on page 32 of this manual. Failure to comply could result in severe personal injury.

#### Inspect

**Reported problems**

Inspect any problems reported by owner and correct before proceeding.

1. **Boiler area**
   - 1. Verify that boiler area is free of any combustible materials, gasoline and other flammable vapors and liquids.
   - 2. Verify that boiler area is free of any of the contaminants listed in Table 2 on page 5 of this manual. If any of these are present in the boiler, the air intake must be removed. If it cannot be removed, install combustion air piping to the boiler in accordance with national, provincial or local codes.

2. **Air openings**
   - 1. Verify that combustion and ventilation air openings to the boiler room and/or building are open and unobstructed. Check operation and wiring of automatic combustion air dampers, if used.
   - 2. Verify that boiler vent discharge and air intake are clean and free of obstructions.

3. **Flue gas vent system**
   - 1. Visually inspect entire flue gas venting system for blockage, vacuum the burners thoroughly, making sure all ports are free of debris. Carefully replace all burners, making sure the burner (if present) is replaced in its original position and all burners are upright (ports up).
   - 2. Verify that masonry chimneys are lined, lining is in good condition, and there are not openings into the chimney.

4. **Boiler heating surfaces**
   - 1. Disconnect the vent pipe at the boiler draft diverter and remove draft diverter after turning off power to the boiler.
   - 2. Use a bright light to inspect the boiler flue collector and heating surfaces.
   - 3. If the vent pipe or boiler interior surfaces show evidence of soot, follow "Cleaning boiler heating surfaces", page 23. Remove the flue collector and clean the boiler if necessary after closer inspection of boiler heating surfaces.
   - 4. If there is evidence of rust or scale deposits on boiler surfaces, check the water piping and control system to make sure the boiler input return water temperature is properly maintained (per this manual).
   - 5. Reconnect vent and draft diverter. Replace all boiler components before returning to service.

5. **Burners and base**
   - 1. After turning off power to the boiler, remove the jacket door and base access panel (Figure 16, item 4, page 26).
   - 2. Inspect burners and all other components in the boiler base.
   - 3. If burners must be cleaned, raise rear of each burner to release connection for leaks.
   - 4. Check inside and around boiler for evidence of any leaks from the boiler. If found, locate source of leaks and repair.

6. **Pipe dope**
   - 1. See Table 8 for pipe length and diameter. Base on rated boiler input, found on page 31 (divide by 1,000 to obtain cubic feet per hour). Table 8 is only for gas with specific gravity 0.60, with a pressure drop through the gas piping of 0.30" w.c. For additional gas pipe sizing information, see ANSI Z220.1 (B149.1 or B149.2 for Canadian installations).
   - 2. Inlet pressure required at gas valve inlet:
     - Maximum: 13" w.c.
     - Minimum: 5" w.c.
     - Manifold gas pressure: 3.5" w.c.

---

**WARNING**

Failure to apply pipe dope as described in this manual can result in severe personal injury. Do not use petroleum based cleaning or sealing compounds in boiler system. Severe damage to boiler will occur, resulting in substantial property damage.

### Troubleshooting

---

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Failure to apply pipe dope as described in this manual can result in severe personal injury. Do not use petroleum based cleaning or sealing compounds in boiler system. Severe damage to boiler will occur, resulting in substantial property damage.
11 Service and maintenance

For your safety, turn off electrical power supply at service entrance panel before making any electrical connections to avoid possible electric shock hazard. Failure to do so can cause severe personal injury or death.

Wiring must be N.E.C. Class 1.

If rollout thermal fuse element wire supplied with boiler must be replaced, type 200 °C wire or equivalent must be used. If other original wiring supplied with boiler must be replaced, use only type 105 °C wire or equivalent.

Boiler must be electrically grounded as required by National Electrical Code ANSI/NFPA 70-latest edition.

Electrical installation must comply with:
1. National Electrical Code and any other national, state, provincial or local codes or regulations.
2. In Canada, CSA C22.1 Canadian Electrical Code Part 1, and any local codes.

Thermostat

1. Connect thermostat as shown on wiring diagram on boiler.
2. Install on inside wall away from influences of drafts, hot or cold water pipes, lighting fixtures, television, sunrays or fireplaces.
3. If thermostat has a heat anticipator, set heat anticipator in thermostat to match power requirements of equipment connected to it. If connected directly to boiler, set for 0.4 amps. For other devices, see manufacturer’s specifications. Wiring diagram on boiler gives setting for control module and gas valve. Also see instructions with thermostat.

Junction box

1. Connect 120 VAC power wiring (Figure 11). A separate electrical circuit with a fused disconnect switch (15 amp, recommended) should be used for the boiler.

---

6 Field wiring

**Wiring connections**

Boiler is shipped with controls completely wired, except spill switch and vent damper. See wiring diagram on page 17 for standing pilot ignition boiler.

**Thermostat**

1. Connect thermostat as shown on wiring diagram on boiler.
2. Install on inside wall away from influences of drafts, hot or cold water pipes, lighting fixtures, television, sunrays or fireplaces.
3. If thermostat has a heat anticipator, set heat anticipator in thermostat to match power requirements of equipment connected to it. If connected directly to boiler, set for 0.4 amps. For other devices, see manufacturer’s specifications. Wiring diagram on boiler gives setting for control module and gas valve. Also see instructions with thermostat.

**Junction box**

1. Connect 120 VAC power wiring (Figure 11). A separate electrical circuit with a fused disconnect switch (15 amp, recommended) should be used for the boiler.

---

**Table 9**

<table>
<thead>
<tr>
<th>Service technician</th>
<th>Owner maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td>(see following pages for instructions)</td>
<td>(see User’s Information Manual for instructions)</td>
</tr>
</tbody>
</table>
| Daily | • Check boiler area  
| | • Check boiler pressure gauge  
| | • Check air openings |
| Monthly | • Check boiler and system piping  
| | • Check venting system  
| | • Check/operate boiler relief valve  
| | • Check pilot and main burner flames |
| Periodically | • Test low water cutoff |
| End of season | • Shut down procedure |

**ANNNUAL START-UP**

- Inspect:
  - Reported problems  
  - Boiler area  
  - Air openings  
  - Flue gas vent system  
  - Pilot and main burner flames  
  - Piping  
  - Boiler heating surfaces  
  - Burners and base  

- Service:
  - Gauge glass  

- Start-up:
  - Perform start-up per manual  

- Check/test:
  - Gas piping  
  - Boiler waterline  
  - Limit controls and cutoffs  
  - Boiler relief valve  

- Review:
  - Review with owner  

**Daily**

- Check boiler area  
- Check boiler pressure gauge  
- Check air openings

**Monthly**

- Check boiler and system piping  
- Check venting system  
- Check/operate boiler relief valve  
- Check pilot and main burner flames

**Periodically**

- Test low water cutoff

**End of season**

- Shut down procedure

**Follow the “Service and maintenance” procedures given throughout this manual and in component literature shipped with the boiler. See “Read this first!” on page 2. Failure to perform the service and maintenance could result in damage to the boiler or system. Failure to follow the directions in this manual and component literature could result in severe personal injury, death or substantial property damage.**
7 Start-up

Preparation

Check for gas leaks

**WARNING**

Before starting the boiler, and during initial operation, smell near the floor and around the boiler for gas odorant or any unusual odor. Do not proceed with start-up if there is any indication of a gas leak. Repair any leak at once.

Propane boilers only — Your propane supplier mixes an odorant with the propane to make its presence detectable. In some instances, the odorant can fade and the gas may no longer have an odor.

- Propane gas can accumulate at floor level. Smell near the floor for the gas odorant or any unusual odor. If you suspect a leak, do not attempt to light the pilot.
- Use caution when attempting to light the propane pilot. This should be done by a qualified service technician, particularly if pilot outages are common.
- Periodically check the odorant level of your gas.
- Inspect boiler and system at least yearly to make sure all gas piping is leak-tight.
- Consult your propane supplier regarding installation of a gas leak detector. There are some products on the market intended for this purpose. Your supplier may be able to suggest an appropriate device.

**Determine if water treatment is needed**

Do not use petroleum-based cleaning or sealing compounds in boiler system. Severe damage to boiler will occur, resulting in substantial property damage.

Eliminate all system leaks. Continual fresh makeup water will reduce boiler life. Minerals can build up in sections, reducing heat transfer, overheating cast iron, and causing section failure.

Consult local water treatment companies for unusually hard water areas (above 7 grains hardness) or low pH water conditions (below 7.0). Boiler water pH 7.0 to 8.5 is recommended.

Fill the system with water

1. Do not fill (except for leakage tests) until boiler is ready to be fired.
2. Fill to normal waterline, halfway up gauge glass.
3. Boiler water pH 7.0 to 8.5 is recommended.
4. Follow skimming procedure, right.

**Operate boiler**

**WARNING**

DO NOT proceed with boiler operation unless boiler and system have been filled with water and all instructions and procedures of previous manual sections have been completed. Failure to do so could result in severe personal injury, death or substantial property damage. Before starting the boiler:

- See pages 18 and 19, for “Lighting Instructions”.
- Verify the boiler and system water level is correct (no more than 1/4 of gauge glass or less than 1/2 above bottom of gauge glass).
- Verify the “Preparation” procedures, on this page, have been completed.

Skimming the boiler

**NOTICE**

Clean all newly installed steam boilers to remove oil and grease. Failure to properly clean can result in violent fluctuations of water level, water passing into steam mains or high maintenance costs on strainers, traps and vents.

Do not use petroleum-based cleaning or sealing compounds in boiler system. Severe damage to boiler will occur, resulting in substantial property damage.

1. Provide 1½” piping from skin tapping to floor drain.
2. Adjust waterline to midpoint of skin tapping. See Figure 3, page 7.
3. Follow “Lighting Instructions” found on boiler or on pages 18 and 19 of this manual, to fire boiler to maintain temperature below steaming rate.
4. Feed in water to maintain water level. Cycle burners to prevent rise in steam pressure.
5. Continue skimming until discharge is clear. May take several hours.
6. Drain boiler. While boiler is warm, but not hot, flush all interior surfaces under full pressure until drain water runs clear.
8. Close drain cock. Fill with fresh water to waterline. Start burners and steam for 15 minutes to remove dissolved gases. Stop burners.
9. Check traps and air vents for proper operation.
10. Process may need to be repeated after several weeks of operation.

**Inspect base insulation**

Check to make sure insulation is secure against all four sides of the base. If insulation is damaged or displaced, do not operate boiler.

Replace or reposition insulation.

**WARNING**

Failure to replace damaged insulation or reposition insulation can result in a fire hazard, causing severe personal injury, death or substantial property damage.

The boiler contains ceramic fiber and fiberglass materials. Use care when handling these materials to prevent property damage, personal injury or loss of life.

11. Set the thermostat to lowest setting.
12. Turn off all electrical power to the appliance.
13. T urn off all gas power to the appliance.
14. Remove front panel.
15. Depress and move selector arm left to OFF.
16. Wait five (5) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP! Follow “Safety information above”.
17. Skimming the boiler and system at least yearly to make sure all gas piping is leak-tight.
18. Set thermostat to desired setting.
19. Find pilot, place service department.

10 Lighting Instructions — GSA-30 through GSA-50 Robertshaw 7200 gas valve

**FOR YOUR SAFETY READ BEFORE LIGHTING**

If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

**WHAT TO DO IF YOU SMELL GAS**

- Do not try to light any appliance.
- Do not touch any electrical switch; do not use any phone in your building.
- Immediately call your gas supplier from a neighbor’s phone. Follow the gas supplier’s instructions.
- If you cannot reach your gas supplier, call the fire department.

**LIGHTING INSTRUCTIONS**

**WARNING**

A. This appliance has a pilot, which must be lighted by hand. When lighting the pilot, follow these instructions exactly.

B. Before LIGHTING, smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor. See below.

C. Use only your hand to push down the reset button or turn the gas control knob. Never use tools. If the knob or reset button will not operate by hand, don’t try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.

D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control, which has been under water.

1. Stop! Read the safety information above on this label.
2. Set the thermostat to lowest setting.
3. When equipped with Effikal vent damper Model RVGP, place service switch in Hold Damper Open position.
4. Turn off all electrical power to the appliance.
5. When equipped with Johnson Controls vent damper Model M35, manually rotate damper blade in direction of arrow to Open position indicated on damper assembly.
6. Depress and move selector arm left OFF to OFF.
7. When equipped with vent damper, verify damper blade is in full open position.
8. Start: Lighting boiler. When lighting the pilot, follow these instructions exactly.

**TOTURN OFF GAS TO THE APPLIANCE**

1. Set the thermostat to lowest setting.
2. Turn off all electric power to the appliance if service is to be performed.
3. Remove front panel.
4. Depress and move selector arm left OFF to OFF.
5. Replace front panel.
10 Lighting Instructions — GSA standing pilot boilers

Honeywell VR8200/VR8300 gas valve

FOR YOUR SAFETY READ BEFORE LIGHTING

A. This appliance has a pilot, which must be
lighted by hand. When lighting the pilot, follow
these instructions exactly.
B. Before LIGHTING, smell all around the
appliance area for gas. Be sure to smell next
to the floor because some gas is heavier than
air and will settle on the floor. See below.

C. Use only your hand to push down the reset button or turn the gas control
knob. Never use tools. If the knob or reset button will not operate by hand,
don’t try to repair it, call a qualified service technician. Force or attempted
repair may result in a fire or explosion.
D. Do not use this appliance if any part has been under water. Immediately call
a qualified service technician to inspect the appliance and to replace any
part of the control system and any gas control, which has been under water.

WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance.
- Do not touch any electric switch; do not use any phone in
your building.

LIGHTING INSTRUCTIONS

1. Stop! Read the safety information above on this label.
2. Set the thermostat to lowest setting.
3. When equipped with Effikal vent damper Model RVGP, place service switch in Hold Damper Open position.
4. Turn off all electrical power to the appliance.
5. When equipped with Johnson Controls vent damper Model M3S, manually rotate damper blade in direction of arrow to Open position indicated on damper assembly.
6. Turn gas control knob clockwise to OFF.
7. When equipped with vent damper, verify damper blade is in full open position.
8. Wait five (5) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP! Follow "B" in the safety information above. If you don’t smell gas, go to the next step.

TO TURN OFF GAS TO THE APPLIANCE

1. Set the thermostat to lowest setting.
2. Turn off all electric power to the appliance if service is to be performed.
3. Remove front panel.
4. Turn gas control knob clockwise to OFF.
5. Replace front panel.

7 Start-up continued

Operate boiler continued

Start the boiler
1. Check boiler water level — Should be approximately ⅛ way up gauge glass.
2. Remove boiler jacket door and note the gas valve manufacturer and model number.
3. Follow the "Lighting Instructions" on page 18 or 19, depending on gas valve installed in boiler. Use only the "Lighting Instruction" which applies to this gas valve. (The "Lighting Instruction" label on the boiler provides the same information.)
4. If boiler fails to start, see “If boiler doesn’t start . . . Check for:”

Check system and boiler

Eliminate all system leaks. Continual fresh makeup water will reduce boiler life. Minerals can build up in sections, reducing heat transfer, overheating cast iron, and causing section failure.

If you discover evidence of any gas leak, shut down the boiler at once. Find the leak source with bubble test and repair immediately. Do not start boiler again until corrected. Failure to comply could result in severe personal injury, death or substantial property damage.

Do not use petroleum-based cleaning or sealing compounds in boiler system. Severe damage to boiler will occur, resulting in substantial property damage.

Check system piping for leaks. If found, shut down boiler and repair immediately.

Inspect vent system thoroughly for signs of deterioration from corrosion, physical damage or sagging. Verify that masonry chimney liners are in good condition, with no obstructions, and there are no openings into the chimney.

Check system and boiler again for gas odor following the procedure of “Check for gas leaks”, page 14.

Verify operation

Check burner flame — Pilot burner

Proper pilot flame (see Figure 12):
1. Blue flame.
2. Inner cone engulfing thermocouple.
3. Thermocouple glowing cherry red.

Improper pilot flame:
1. Overfired — Large flame lifting or blooming past thermocouple.
3. Lack of primary air — Yellow flame tip.
4. Incorrectly heated thermocouple.

Check vent damper operation

1. Raise room thermostat to call for heat — Vent damper actuator will slowly open vent damper.
2. When vent damper is fully open — Main valve gas will open and main burners will ignite.

Check venting system operation

1. With boiler firing, hold a candle or match below lower edge of draft diverter “skirt.” If flame does not blow out, but burns undisturbed, the vent system is working properly. If flame blows out or flickers severely, the vent system must be checked for obstructions or other causes of improper venting.
8 Sequence of operation

- Test ignition system safety device — Turn gas cock knob to PILOT position and extinguish pilot flame. Pilot gas flow should stop in less than 3 minutes. Put system back into operation (see Section 7, pages 14-15).
- Set limit controls to system pressure requirements. Adjust balancing valves and controls to provide design pressure to system.
- Cycle boiler with thermostat — Raise to highest setting and verify boiler goes through normal start-up cycle. Lower to lowest setting and verify boiler goes off.
- Measure natural gas input:
  a. Operate boiler 10 minutes.
  b. Turn off other appliances.
  c. At natural gas meter, measure time (in seconds) required to use one cubic foot of gas.
  d. Calculate gas input:

\[
\text{Btuh} = \frac{3600 \times 1000}{\text{number of seconds from step c}}
\]

- Check manifold gas pressure by connecting manometer to downstream test tapping on main gas valve. Manifold pressure for natural gas should be 3.5” w.c. and for propane gas should be 10” w.c.
- Correctly sized manifold orifices must be used. Failure to do so will cause severe personal injury, death or substantial property damage.
- Test additional field-installed controls — If boiler has an additional high limit, low water cutoff or other controls, test for operation as outlined by manufacturer. Burners should be operating and should go off when controls are tested. When controls are restored, burners should reignite.
- Test boiler filled with water?
- Boilers properly skimmed?
- Air purged from gas piping? Piping checked for leaks?
- Correctly sized manifold orifices installed? See Table 3, page 6, to check size and fuel type.
- Button on spill switch pushed in?
- Followed “Lighting Instructions” on boiler or in Manual Section 10, pages 18 and 19, for proper start-up?
- Proper burner flame observed? See “Verify operation”, page 15.
- Test limit control — While burners are operating, move indicator on limit control below actual boiler pressure. Burners should go off. Raise setting on limit control above boiler pressure and burners should reignite.
- Test low water cutoff — Check probe-type low water cutoff for proper operation.
  a. Turn off power to boiler and wait 5 minutes.
  b. Drain water to bottom of gauge glass.
  c. Turn on power.
  d. Set thermostat to call for heat. Red neon lamp on lower water cutoff should light.
  e. Wait 5 minutes. Boiler should not fire.
  f. Refill boiler to correct water line. Red lamp should go off.
  g. Wait 5 minutes. Boiler should fire.
  h. Return thermostat to normal setting.
- Test additional field-installed controls — If boiler has an additional high limit, low water cutoff or other controls, test for operation as outlined by manufacturer. Burners should be operating and should go off when controls are tested. When controls are restored, burners should reignite.

9 Installation and service certificate

Boiler model: __________ Series: __________

CP number: __________ Date installed: __________

- Installation instructions have been followed.
- Checkout sequence has been performed.
- Above information is correct.
- Information received and left with owner/maintenance person.

Installer (company): __________ (address): __________ (phone): __________

(installer’s signature)

Figure 14. Schematic Wiring Diagram

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GSA Gas-Fired Steam Boilers - Boiler Manual

8 Sequence of operation

1. Standby: After this point is manually engaged, the gas valve provides pilot gas and the limit circuit is energized. When there is a call for heat, the main gas valve is energized and the fan motor begins to rotate. After 60 seconds, the ignitor energizes the main gas valve. This provides gas to the main burner. Burner is reignited when ignition system safety device - turn gas cock knob to PILOT position and extinguish pilot flame. Pilot gas flow should stop in less than 3 minutes. Put system back into operation (see section 7, pages 14-15).

2. Call for heat: When thermostat circuit closes, the boiler vent damper is energized. When thermostat circuit or limit circuit closes again, the main gas valve is energized if there is still a call for heat. When a limit control opens, the main gas valve is deenergized. When thermostat circuit or limit circuit opens, the main gas valve is deenergized.


4. Limit operation: When a limit control opens, the main gas valve is deenergized. When thermostat circuit or limit circuit closes again, the main gas valve is energized.


7. Correctly sized manifold orifices must be used. Failure to do so will cause severe personal injury, death or substantial property damage.

8. Button on spill switch pushed in?

9. Air purged from gas piping? Piping checked for leaks?


11. Test limit control - While burners are operating, move indicator on limit control below actual boiler pressure. Burners should go off. Raise setting on limit control above boiler pressure and burners should reignite.

12. Low water cutoff - Check probe type low water cutoff for proper operation.
   a. Turn off power to boiler and wait 5 minutes.
   b. Drain water to bottom of gauge glass.
   c. Turn on power.
   d. Set thermostat to call for heat. Red neon lamp on lower water cutoff should light.
   e. Wait 5 minutes. Boiler should not fire.
   f. Refill boiler to correct water line. Red lamp should go off.
   g. Wait 5 minutes. Boiler should fire.
   h. Return thermostat to normal setting.

13. Test additional field-installed controls - If boiler has an additional high limit, low water cutoff or other controls, test for operation as outlined by manufacturer. Burners should be operating and should go off when controls are tested. When controls are restored, burners should reignite.

9 Installation and service certificate

Boiler model

Series

CP number

Date installed

Installation instructions have been followed.

Checklist sequence has been performed.

Above information is certified to be correct.

Information received and left with owner/maintenance person.

Installer

(company)

(address)

(phone)

(installer’s signature)
10 Lighting Instructions — GSA standing pilot boilers

Honeywell VR8200/VR8300 gas valve

FOR YOUR SAFETY READ BEFORE LIGHTING

If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

A. This appliance has a pilot, which must be lighted by hand. When lighting the pilot, follow these instructions exactly.
B. Before LIGHTING, smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor. See below.

WHAT TO DO IF YOU SMELL GAS

• Do not try to light any appliance.
• Do not touch any electric switch; do not use any phone in your building.

LIGHTING INSTRUCTIONS

1. Stop! Read the safety information above on this label.
2. Set the thermostat to lowest setting.
3. When equipped with Effikal vent damper Model RVGP, place service switch in Hold Damper Open position.
4. Turn off all electrical power to the appliance.
5. When equipped with Johnson Controls vent damper Model M35, manually rotate damper blocking direction of arrow to Open position indicated on damper assembly.
6. Turn gas control knob clockwise to OFF.
7. When equipped with vent damper, verify damper blade is in full open position.

Position indicator (shown in ON position)

Red reset button

7/1989

8. Wait five (5) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP! Follow "B" in the safety information above. If you don’t smell gas, go to the next step.

TO TURN OFF GAS TO THE APPLIANCE

1. Set the thermostat to lowest setting.
2. Turn off all electric power to the appliance if service is to be performed.
3. Remove front panel.
4. Turn gas control knob clockwise to OFF.
5. Replace front panel.

WARNING

TOUCHING THE THERMOCOUPLE OR ANY PORTION OF THE GAS VALVE DURING LIGHTING OR MAKING ADJUSTMENTS MAY RESULT IN SEVERE BURNS OR SCALDS.

7 Start-up continued

Operate boiler continued

Start the boiler

1. Check boiler water level — Should be approximately 1/3 way up gauge glass.
2. Remove boiler jacket door and note the gas valve manufacturer and model number.
3. Follow the “Lighting Instructions” on page 18 or 19, depending on gas valve installed in boiler. Use only the “Lighting Instruction” which applies to this gas valve. (The “Lighting Instruction” label on the boiler provides the same information.)

If boiler fails to start, see “If boiler doesn’t start.”

Check system and boiler

Eliminate all system leaks. Continued fresh makeup water will reduce boiler life. Minerals can build up in sections, reducing heat transfer, overheating cast iron, and causing section failure.

If you discover evidence of any gas leak, shut down the boiler at once. Find the leak source with bubble test and repair immediately. Do not start boiler again until corrected. Failure to comply could result in severe personal injury, death or substantial property damage.

Check operation using procedures below. Perform “Checkout procedure”, page 16, and fill in the “Installation and Service Certification”.

If boiler doesn’t start...

Check for:

1. Loose connections, blown fuse or service switch off?
2. High limit switch set below boiler pressure?
3. Thermostat set below room temperature?
4. Gas not turned on at meter or boiler?
5. Flowing gas pressure less than:
   a. 5” w.c. for natural gas?
   b. 11” w.c. for propane gas?

If none of the above corrects the problem, see “Troubleshooting” page 24.

Verify operation

Check burner flame — Pilot burner

Proper pilot flame (see Figure 12):

1. Blue flame.
2. Inner cone engulfing thermocouple.
3. Thermocouple glowing cherry red.

Improper pilot flame:

1. Overfired — Large flame lifting or blowing past thermocouple.

Improve main burner flame:

1. Overfired — Large flames.
2. Underfired — Small flames.
3. Lack of primary air — Yellow tipping on flames (sooting will occur).

Check vent damper operation

1. Raise room thermostat to call for heat — Vent damper actuator will slowly open vent damper.
2. When vent damper is fully open — Main gas valve will open and main burners will ignite.

Vent damper must be fully open before main burners light. If vent damper does not fully open, flue products such as carbon monoxide will escape into house, causing severe personal injury or death.

3. Lower thermostat setting — Main burner flames will go out, then vent damper will close.
4. Repeat Steps 2 through 4 several times to verify operation.
5. Return thermostat to normal setting.
6. Set thermostat heat anticipator setting indicated on wiring diagram.

Check venting system operation

1. With boiler firing, hold a candle or match below lower edge of draft divertor “skirt.” If flame does not blow out, but burns undisturbed, the vent system is working properly. If flame blows out or flickers severely, the vent system must be checked for obstructions or other causes of improper venting.
7 Start-up

Preparation

Check for gas leaks

Before starting the boiler, and during initial operation, smell near the floor and around the boiler for gas odorant or any unusual odor. Do not proceed with start-up if there is any indication of a gas leak. Repair any leak at once.

Propane boilers only — Your propane supplier mixes an odorant with the propane to make its presence detectable. In some instances, the odorant can fade and the gas may no longer have an odor.

- Propane gas can accumulate at floor level. Smell near the floor for the gas odorant or any unusual odor. If you suspect a leak, do not attempt to light the pilot.
- Use caution when attempting to light the propane pilot. This should be done by a qualified service technician, particularly if pilot outages are common.
- Periodically check the odorant level of your gas.
- Inspect boiler and system at least yearly to make sure all gas piping is leak-tight.
- Consult your propane supplier regarding installation of a gas leak detector. There are some products on the market intended for this purpose. Your supplier may be able to suggest an appropriate device.

Determine if water treatment is needed

Do not use petroleum-based cleaning or sealing compounds in boiler system. Severe damage to boiler will occur, resulting in substantial property damage.

Eliminate all system leaks. Continual fresh makeup water will reduce boiler life. Mines can build up in sections, reducing heat transfer, overheating cast iron, and causing section failure.

Consult local water treatment companies for unusually hard water areas (above 7 grains hardness) or low pH water conditions (below 7.0). Boiler water pH of 7.0 to 8.5 is recommended.

Fill the system with water

1. Do not fill (except for leakage tests) until boiler is ready to be fired.
2. Fill to normal waterline, halfway up gauge glass.
3. Boiler water pH 7.0 to 8.5 is recommended.
4. Follow skimming procedure, right.

Operate boiler

DO NOT proceed with boiler operation unless boiler and system have been filled with water and all instructions and procedures of previous manual sections have been completed. Failure to do so could result in severe personal injury, death or substantial property damage. Before starting the boiler:

- See pages 18 and 19, for “Lighting Instructions”.
- Verify the boiler and system water level is correct (no more than ⅛ of gauge glass or less than ⅛ above bottom of gauge glass).
- Verify the “Preparation” procedures, on this page, have been completed.

Skimming the boiler

**Notice**

Clean all newly installed steam boilers to remove oil and grease. Failure to properly clean can result in violent fluctuations of water level, water passing into steam mains or high maintenance costs on strainers, traps and vents.

**Danger**

Do not use petroleum-based cleaning or sealing compounds in boiler system. Severe damage to boiler will occur, resulting in substantial property damage.

1. Provide ⅛” piping from skim tapping to floor drain.
2. Adjust waterline to midpoint of skim tapping. See Figure 3, page 7.
3. Follow “Lighting Instructions” found on boiler or on pages 18 and 19 of this manual, to fire boiler to maintain temperature below steam rate.
4. Feed in water to maintain water level. Cycle burners to prevent rise in steam pressure.
5. Continue skimming until discharge is clear. May take several hours.
6. Drain boiler. While boiler is warm, but not hot, flush all interior surfaces under full pressure until drain water runs clear.
8. Close drain cock. Fill with fresh water to waterline. Start burners and steam for 15 minutes to remove dissolved gases. Stop burners.
9. Check traps and air vents for proper operation.
10. Process may need to be repeated after several weeks of operation.

Inspect base insulation

Check to make sure insulation is secure against all four sides of the base. If insulation is damaged or displaced, do not operate boiler.

Replace or reposition insulation.

**Danger**

Failure to replace damaged insulation or reposition insulation can result in a fire hazard, causing severe personal injury, death or substantial property damage.

The boiler contains ceramic fiber and fiberglass materials. Use care when handling these materials and grease. Failure to properly clean can result in violent fluctuations of water level, water passing into steam mains, or high maintenance costs on strainers, traps and vents.

8. Wait five (5) minutes to clear out any gas. Then smell for gas, including near the floor if you smell gas. STOP! Follow “B” in the safety information above. If you don’t smell gas, go to the next step.

11. Move selector arm on gas control right — to SET position.


13. Release selector arm. If pilot does not light, wait one hour before starting boiler to fire boiler to maintain temperature below steam rate.

14. Replace access panel.

15. Turn selector arm left — to OFF.

16. Turn on all electric power to the appliance.

17. When equipped with Effika vent damper, place service switch in Automatic Operation position.

18. Set thermostat to lowest setting.

19. Replace front panel.

10 Lighting Instructions — GSA-30 through GSA-50

Robertshaw 7200 gas valve

FOR YOUR SAFETY READ BEFORE LIGHTING

**Warning**

If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

A. This appliance has a pilot, which must be lighted by hand. When lighting the pilot, follow these instructions exactly.

B. Before LIGHTING, smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor. See below.

C. Use only your hand to push down the reset button or turn the gas control knob. Never use tools. If the knob or reset button will not operate by hand, don’t try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.

D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control, which has been under water.

WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance.
- Do not touch any electric switch; do not use any phone in your building.
- Immediately call your gas supplier from a neighbor’s phone. Follow the gas supplier’s instructions.
- If you cannot reach your gas supplier, call the fire department.

LIGHTING INSTRUCTIONS

1. Stop! Read the safety information above on this label.
2. Set the thermostat to lowest setting.
3. When equipped with Effika vent damper Model RVGP, place service switch in Hold Damper Open position.
4. Turn off all electrical power to the appliance.
5. When equipped with Johnson Controls vent damper Model M35, manually rotate damper blade in direction of arrow to Open position indicated on damper assembly.
6. Depress and move selector arm left — to OFF.
7. When equipped with vent damper, verify damper blade is in full open position.
8. Wait five (5) minutes to clear out any gas. Then smell for gas, including near the floor if you smell gas. STOP! Follow “B” in the safety information above. If you don’t smell gas, go to the next step.
9. Remove access panel located above burners.
10. Find pilot — follow metal tube from gas control. The pilot is between two burners behind the access panel.
11. Move selector arm on gas control right — to SET position.
12. Hold selector arm in SET position and immediately light the pilot with a match. Continue to hold selector arm to SET to about one-half (⅛”) minute after the pilot is lit.
13. Release selector arm. If pilot does not remain lit, repeat steps 6 through 13.
14. If the pilot will not stay lit after several tries, move selector arm left — to OFF and call your service technician or gas supplier.
15. Replace access panel.
16. Turn on all electric power to the appliance.
17. When equipped with Effika vent damper, place service switch in Automatic Operation position.
18. Set thermostat to desired setting.
19. Replace front panel.

TOTURN OFF GAS TO THE APPLIANCE

1. Set the thermostat to lowest setting.
2. Turn off all electric power to the appliance if service is to be performed.
3. Remove front panel.
4. Depress and move selector arm left — to OFF.
5. Replace front panel.
11 Service and maintenance

Table 9  Service and maintenance schedules (service technician and owner)

<table>
<thead>
<tr>
<th>Service technician (see following pages for instructions)</th>
<th>Owner maintenance (see User’s Information Manual for instructions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Inspect:</td>
<td>• Daily</td>
</tr>
<tr>
<td>• Reported problems</td>
<td>• Check boiler area</td>
</tr>
<tr>
<td>• Boiler area</td>
<td>• Check boiler pressure gauge</td>
</tr>
<tr>
<td>• Air openings</td>
<td>• Check air openings</td>
</tr>
<tr>
<td>• Flue gas vent system</td>
<td>• Monthly</td>
</tr>
<tr>
<td>• Pilot and main burner flames</td>
<td>• Check boiler and system piping</td>
</tr>
<tr>
<td>• Piping</td>
<td>• Check venting system</td>
</tr>
<tr>
<td>• Boiler heating surfaces</td>
<td>• Check/operate boiler relief valve</td>
</tr>
<tr>
<td>• Burners and base</td>
<td>• Check pilot and main burner flames</td>
</tr>
<tr>
<td>• Service:</td>
<td>• Periodically</td>
</tr>
<tr>
<td>• Gauge glass</td>
<td>• Test low water cutoff</td>
</tr>
<tr>
<td>• Start-up:</td>
<td>• End of season</td>
</tr>
<tr>
<td>• Perform start-up per manual</td>
<td>• Shut down procedure</td>
</tr>
</tbody>
</table>

ANNUAL START-UP

Follow the “Service and maintenance” procedures given throughout this manual and in component literature shipped with the boiler. See “Read this first!” on page 2. Failure to perform the service and maintenance could result in damage to the boiler or system. Failure to follow the directions in this manual and component literature could result in severe personal injury, death or substantial property damage.

6 Field wiring

Wiring connections

Boiler is shipped with controls completely wired, except spill switch and vent damper. See wiring diagram on page 17 for standing pilot ignition boiler.

Thermostat

1. Connect thermostat as shown on wiring diagram on boiler.
2. Install on inside wall away from influences of drafts, hot or cold water pipes, lighting fixtures, television, sunrays or fireplaces.
3. If thermostat has a heat anticipator, set heat anticipator in thermostat to match power requirements of equipment connected to it. If connected directly to boiler, set for 0.4 amps. For other devices, see manufacturer’s specifications. Wiring diagram on boiler gives setting for control module and gas valve. Also see instructions with thermostat.

Junction box

1. Connect 120 VAC power wiring (Figure 11). A separate electrical circuit with a fused disconnect switch (15 amp, recommended) should be used for the boiler.

Figure 11  Field wiring connections — service switch and thermostat (or end switch) provided by installer
5 Install gas piping

Connecting gas supply piping to boiler

1. Remove jacket front panel and see Figure 10 to pipe gas to boiler.
   a. Install drip leg at inlet of gas connection to boiler. Where local utility requires drip leg to be extended to the floor, use appropriate length of nipple between cap and tee.
   b. Install ground joint union for servicing, when required.
   c. Install manual shutoff valve in gas supply piping outside boiler jacket when required by local codes or utility requirements.
   d. In Canada — When using manual main shutoff valve, it must be identified by the installer.
   e. Support piping with hangers, not by boiler or its accessories.
   f. Purge all air from gas supply piping.
   g. Before placing boiler in operation, check boiler and its gas connection for leaks.
      - Close manual main shutoff valve during any pressure testing at less than 13" w.c.
      - Disconnect boiler and gas valve from gas supply piping during any pressure testing greater than 13" w.c.
   h. Do not check for gas leaks with an open flame — Use bubble test. Failure to use bubble test or check for gas leaks can cause severe personal injury, death or substantial property damage.
   i. Use pipe dope compatible with propane gases. Apply sparingly only to male threads of pipe joints so that pipe dope does not block gas flow.

Failure to apply pipe dope as described in this manual can result in severe personal injury, death or substantial property damage.

Propane Gas:

1. Contact gas supplier to size pipes, tanks and 100% lockup gas pressure regulator.
2. Adjust propane supply regulator provided by gas supplier for 13" w.c. maximum pressure.
3. Inlet pressure required at gas valve inlet:
   - Maximum: 13" w.c.
   - Minimum: 11" w.c.
   - Manifold gas pressure: 10" w.c.

NOTE: Use bubble test. Failure to use bubble test or check for leaks can cause severe personal injury, death or substantial property damage.

Table 8. Pipe capacity for 0.60 specific gravity natural gas

<table>
<thead>
<tr>
<th>Gas pipe length (feet)</th>
<th>Capacity of pipe for pipe size of:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/8&quot;</td>
<td>150</td>
</tr>
<tr>
<td>1/4&quot;</td>
<td>300</td>
</tr>
<tr>
<td>1/2&quot;</td>
<td>500</td>
</tr>
<tr>
<td>3/4&quot;</td>
<td>750</td>
</tr>
<tr>
<td>1&quot;</td>
<td>1000</td>
</tr>
<tr>
<td>1-1/4&quot;</td>
<td>1500</td>
</tr>
<tr>
<td>1-1/2&quot;</td>
<td>2000</td>
</tr>
<tr>
<td>2&quot;</td>
<td>3000</td>
</tr>
</tbody>
</table>

Example: Use a 1-1/2" pipe because 1500 is greater than the flow at 1500 ft.

The boiler shall be inspected and started annually, at the beginning of the heating season, only by a qualified service technician. In addition, the maintenance and care of the boiler designated in Table 9, page 20 and explained on the following pages must be performed to assure maximum boiler efficiency and reliability. Flammable to service and maintain the boiler and system could result in equipment failure.

Electrical shock hazard — Turn off power to the boiler before any service operation on the boiler except as noted otherwise in this manual. Failure to turn off electrical power could result in electrical shock, causing severe personal injury or death.

The boiler contains ceramic fiber and fiberglass materials. Use care when handling these materials per instructions on page 32 of this manual. Failure to comply could result in severe personal injury.

Inspect . . . . . .

Reported problems

Inspect any problems reported by owner and correct before proceeding.

Boiler area

1. Verify that boiler area is free of any combustible materials, gasoline and other flammable vapors and liquids.
2. Verify that boiler area is free of any of the contaminants listed in Table 2 on page 5 of this manual. If any of these are present in the boiler intake air vicinity, they must be removed. If they cannot be removed, install combustion air piping to the boiler in accordance with national, provincial or local codes.

Air openings

1. Verify that combustion and ventilation air openings to the boiler room and/or building are open and unobstructed. Check operation and wiring of automatic combustion air dampers, if used.
2. Verify that boiler vent discharge and air intake are clean and free of obstructions.

Flue gas vent system

1. Visually inspect entire flue gas venting system for blockage, deterioration or leakage. Repair any joints that show signs of leakage in accordance with vent manufacturer’s instructions.
2. Verify that masonry chimneys are lined, lining is in good condition, and there are not openings into the chimney.

Boiler heating surfaces

1. Disconnect the vent pipe at the boiler draft diverter and remove draft diverter after turning off power to the boiler.
2. Use a bright light to inspect the boiler flue collector and heating surfaces.
3. If the vent pipe or boiler interior surfaces show evidence of soot, follow “Cleaning boiler heating surfaces”, page 23. Remove the flue collector and clean the boiler if necessary after closer inspection of boiler heating surfaces.
4. If there is evidence of rust, scale deposits on boiler surfaces, check the water piping and control system to make sure the boiler return water temperature is properly maintained (per this manual).
5. Reconnect vent and draft diverter. Replace all boiler components before returning to service.
6. Check inside and around boiler for evidence of any leaks from the boiler. If found, locate source of leaks and repair.

Burners and base

1. After turning off power to the boiler, remove the jacket door and base access panel (Figure 10, page 20).
2. Inspect burners and all other components in the boiler base.
3. If burners must be cleaned, raise rear of each burner to release is. Carefully repel all burners and make sure burner with pilot bracket is replaced in its original position and all burners are upright (ports up).
4. Inspect the base insulation.

Boiler manual

1. Visually inspect pilot burner and main burner flames as directed under Section 7, page 15 of this manual.
2. Inspect pilot and main burner flames.
3. If insulation is damaged or displaced, do not operate the boiler. Replace or reposition insulation as necessary. Failure to replace damaged insulation can result in a fire hazard, causing severe personal injury, death or substantial property damage.
11 Service and maintenance

Service

Gauge glass
Normal waterline is halfway up gauge glass. Clean when needed.
1. Close lower gauge cock.
2. Open pet cock.
3. Open lower gauge cock and allow a small amount of water to flush out through open pet cock.
5. Open lower gauge cock.

Boiler pressure must be low to eliminate potential of severe burns.

If gauge glass breaks, close bottom gauge cock. Replace gauge glass. Do not replace with thin glass tubing. Failure to comply could cause severe personal injury, death or substantial property damage.

Start-up

1. Perform “Start-up” procedures, Section 7, pages 14-15, including “Verify operation” of burners and vent damper on page 15.
2. Check gas piping, per pages 12 and 14, verifying no indications of leakage and all piping and connections are in good condition.
3. Read the “Lighting Instructions” (page 18 or 19, whichever applies based on boiler gas valve).
4. Start the boiler following the “Lighting Instructions”, page 18 or 19.

Check/test

Low water cutoffs
Probe-type low water cutoff (see below)
Clean probe-type low water cutoff for proper operation.
1. Turn off power to boiler and wait 5 minutes.
2. Drain water to bottom of gauge glass.
3. Turn on power.
4. Set thermostat to call for heat. Red neon lamp on lower water cutoff should light.
5. Wait 5 minutes. Boiler should not fire.
6. Refill boiler to correct waterline. Red lamp should go off.
7. Wait 5 minutes. Boiler should fire.
8. Return thermostat to normal setting.

Float-type low water cutoff (when provided by others – see below)
Clean float-type low water cutoff (when provided by others) to clear float chamber of sediment.
1. Open blowdown valve at bottom control.
2. Drain water into a bucket.
3. Check float-type low water cutoff for proper operation:
   a. Turn operating control to call for heat.
   b. Before water gets hot, drain to bottom of gauge glass. Boiler should shut off after water level lowers a few inches.
   c. Refill boiler to correct waterline. Boiler should come back on.

Controls

Failure to properly install, pipe and wire boiler controls may result in severe damage to the boiler, building and personnel.

1. Controls are mounted and wired as shown in Figure 8. For actual tapping locations see Table 4 and Figure 3 on page 7.
2. Bring supply wiring to boiler. Must be 14 gauge or heavier.

3. Water feeders are not recommended for primary control. A low water cutoff with pump controller is recommended with a condensate receiver and feed pump.

Start-up

1. Perform “Start-up” procedures, Section 7, pages 14-15, including “Verify operation” of burners and vent damper on page 15.
2. Check gas piping, per pages 12 and 14, verifying no indications of leakage and all piping and connections are in good condition.
3. Read the “Lighting Instructions” (page 18 or 19, whichever applies based on boiler gas valve).
4. Start the boiler following the “Lighting Instructions”, page 18 or 19.

Check/test

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3. Turn on power.
4. Set thermostat to call for heat. Red neon lamp on lower water cutoff should light.
5. Wait 5 minutes. Boiler should not fire.
6. Refill boiler to correct waterline. Red lamp should go off.
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8. Return thermostat to normal setting.

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1. Open blowdown valve at bottom control.
2. Drain water into a bucket.
3. Check float-type low water cutoff for proper operation:
   a. Turn operating control to call for heat.
   b. Before water gets hot, drain to bottom of gauge glass. Boiler should shut off after water level lowers a few inches.
   c. Refill boiler to correct waterline. Boiler should come back on.
3 Install piping

Relief valve

DANGER

During operation, this valve may discharge large amounts of steam and/or hot water. Therefore, to reduce the potential for bodily injury and property damage, the valve outlet should be installed that:

• Is connected from the outlet to a safe point of discharge with no intervening valve.
• Allows complete drainage of both the valve and the discharge line.
• Is independently supported and securely anchored so as to avoid applied stress as possible.
• Terminates freely to atmosphere where any discharge will be clearly visible and is at no risk of freezing.
• Is, over its entire length, of a pipe size equal to or greater than the discharge pipe size. (Use only schedule 40 metal pipe for discharge. Do not use schedule 80, extra strong or double strong pipe or connections.) DO NOT CAP PLUG OR OTHERWISE OBSTRUCT DISCHARGE PIPE OUTLET! If discharge is piped upward, a condensate drain must be provided in the elbow below the vertical pipe to prevent condensate from returning into the valve. Failure to comply with these instructions will cause a dangerous spray of hot water and steam that could cause severe personal injury or death.

Table 6  Reservoir pipe sizing

<table>
<thead>
<tr>
<th>Boiler model number</th>
<th>Boiler gravity output</th>
<th>Time from initial steaming to average condensate return</th>
<th>(boiler steaming capacity based on 970 Btu per pound of steam)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>15 min.</td>
<td>20 min.</td>
<td>30 min.</td>
</tr>
<tr>
<td>MBH</td>
<td>pipe length (feet)</td>
<td>pipe length (feet)</td>
<td>pipe length (feet)</td>
</tr>
<tr>
<td>GSA075</td>
<td>150</td>
<td>1 ½</td>
<td>2 ½</td>
</tr>
<tr>
<td>GSA125</td>
<td>175</td>
<td>1 ½</td>
<td>2 ½</td>
</tr>
<tr>
<td>GSA150</td>
<td>200</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>GSA200</td>
<td>250</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

Use boiler feed system

Use boiler feed system

Designated full capacity steaming time of modern boilers is 10 minutes.

Condensate return

Modern steam boilers are designed to steam for less time than older, larger boilers. When replacing an older steam boiler the system condensate return time may be longer than the steaming time. This could cause the following problems:

1. Boilers fitted with an automatic water feed could overfill.
2. Units fitted with only a low water cutoff would shut down and cycle while waiting for condensate to return.

Following is a simple method for determining whether or not a reservoir pipe is required to lengthen steaming time for a residential installation:

1. Disconnect condensate return line at existing boiler.
2. Heat boiler and allow for steam for 10 minutes. Turn off boiler.
3. Measure length of time from when boiler started to steam to when condensate begins to return through condensate line.
4. Measure length of time from when condensate begins to return to when it stops returning. Divide this time by 2.
5. Add time measured in step 3 to time calculated in step 4. This sum is the average time required for condensate to return to the boiler.
6. If this total time is 10 minutes or less, no reservoir pipe is needed. If total time for condensate return to boiler (from step 5) is more than 10 minutes, a reservoir pipe (or boiler feed system) is recommended. See Table 6, this page, for suggested reservoir pipe size. Install as shown in Figure 7, below.

For larger systems (as noted in Table 6), use a boiler feed system with a condensate tank and feed pump. You will have to install a low water cut-off/pump control on the boiler to operate the pump. Use Table 7 to size boiler feed systems. See page 47, Table 4, for tapping locations. (The use of a combination condensate tank and float-controlled condensate return pump is not recommended.) For most residential installations a reservoir pipe may be all that is necessary to ensure proper operation.

Table 7  Boiler feed system sizing

<table>
<thead>
<tr>
<th>Boiler model number</th>
<th>Boiler gross output</th>
<th>(pounds steam per hour)</th>
<th>Feed pump capacity (gallons per minute)</th>
<th>( Emergency minimum condensate receiver capacity (gpm) at 15 PSI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>15 min.</td>
<td>30 min.</td>
<td>45 min.</td>
<td>60 min.</td>
</tr>
<tr>
<td>GSA075</td>
<td>63</td>
<td>1 ½</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>GSA125</td>
<td>81</td>
<td>1 ½</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>GSA150</td>
<td>102</td>
<td>1 ½</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>GSA175</td>
<td>125</td>
<td>1 ½</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>GSA200</td>
<td>142</td>
<td>1 ½</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>GSA250</td>
<td>163</td>
<td>1 ½</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>GSA300</td>
<td>200</td>
<td>1 ½</td>
<td>3</td>
<td>6</td>
</tr>
</tbody>
</table>

Notes:
1. Maximum time to when condensate returns to boiler.
2. If pump capacity exceeds capacity shown, pump can be throttled with globe or ball valve.

Check/test ........

Boiler relief valve

1. After following the warning directions below, if the relief valve weeps or will not seat properly, replace the relief valve.

Before testing, make certain discharge pipe is properly connected to valve outlet and arranged to contain and safely dispose of boiler discharge. Wear gloves to protect your hands from hot surfaces. Verify that discharge piping is installed in accordance with this manual and the instructions on the relief valve tag. Failure to comply will expose operator and others to severe personal injury or death.

Safety relief valves should be reinspected AT LEAST ONCE EVERY THREE YEARS, by a licensed plumbing contractor or authorized inspection agency, to ensure that the product has not been affected by corrosive water conditions and to ensure that the valve and discharge line have not been altered or tampered with illegally. Certain naturally occurring conditions may corrode the valve or its components over time, rendering the valve inoperative. Such conditions are not detectable unless the valve and its components are physically removed and inspected. This inspection must only be conducted by a plumbing contractor or authorized inspection agency—not by the owner. Failure to reinspect the boiler relief valve as directed could result in unsafe pressure buildup, which can result in severe personal injury, death or substantial property damage.

Check the setting of the boiler limit control. The control should never be set with a pressure above 10 psi. Operating at a higher pressure can cause damage to the boiler relief valve.

The boiler relief valve must be tested at least monthly during the heating season to verify the valve and discharge piping flow freely. If corrosion and/or deposits are noticed within the valve body, testing must be performed more often. A “try lever test” must also be performed at the end of any non-service period. Follow the instructions below for a “try lever test”:

• With the system at operating pressure, lift and hold the test lever fully open for at least 5 seconds to flush the valve seat free of sediment and debris. Then release lever and permit the valve to snap shut.

11 Service and maintenance

Review with owner

1. Review the User’s Information Manual with the owner.

2. Emphasize the need to perform the maintenance schedule specified in the User’s Information Manual (and in this manual as well).

3. Remind the owner of the need to call in a licensed contractor should the boiler or system exhibit any unusual behavior.

4. Remind the owner to follow the proper shutdown procedure and to schedule an annual start-up at the beginning of the next heating season.

Cleaning boiler heating surfaces

The boiler contains ceramic fiber and fiberglass materials. Use care when handling these materials in accordance with the instructions on page 32 of this manual. Failure to comply could result in severe personal injury.

1. Shut down boiler—Follow “To Turn Off Gas to Appliance” instructions on boiler and “Lighting Instructions”.

2. Disconnect breeching and remove damper and draft diverter.

3. Remove upper rear jacket panel. Turn back jacket insulation to expose collector hood.

4. Remove collector hood. Clean excess boiler cement from collector hood and cast iron sections.

5. Remove burners from base of boiler. Follow “Burners and base” on page 21, to thoroughly clean burners. Place newspaper in base of boiler to collect soot that will fall.

6. With a wire brush, clean, between the sections.

7. Remove paper and soot. Vacuum or brush base and surrounding area.

8. Replace collector hood. Seal with boiler cement.

Figure 7  Recommended piping for parallel-flow systems with optional reservoir pipe
12 Troubleshooting

Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation.

Never jumper (bypass) rollout thermal fuse element or gas device except for momentary testing as outlined in “Chart 1”, page 25. Severe personal injury, death or substantial property damage can result.

Burner base access panel must be in position during boiler operation to prevent momentary flame rollout on ignition of main flame. Severe personal injury or substantial property damage will result.

Troubleshooting sequence:

1. Before proceeding, check for:
   - Loose connections, blown fuse or service switch off?
   - High limit switch set below boiler temperature?
   - Thermostat set below room temperature?
   - Gas not turned on at meter or boiler?
   - Incoming gas pressure less than:
     - 5" w.c. for natural gas?
     - 11" w.c. for propane gas?
   - If all of the above check correctly, check gas pressures:
     a. With boiler off:
        - 13" w.c. maximum natural or propane gas pressure upstream of gas valve.
     b. With boiler on:
        - 5" w.c. minimum natural gas pressure or 11" w.c. propane gas pressure upstream of gas valve.
        - 3.5" w.c. minimum natural gas pressure or 10" w.c. propane gas pressure downstream tapping on gas valve — Can be adjusted by regulator on gas valve.
        - If gas pressure is incorrect or gas is not available to boiler, contact gas supplier to correct before proceeding further.

   - If gas is available and you cannot obtain a pilot flame, try purging the gas line and cleaning pilot and pilot gas tubing. Follow “Lighting Instructions” again. If you still cannot obtain a flame, replace pilot burner and gas tubing. If this does not allow you to obtain a pilot flame, replace gas valve.
   - If you obtain a pilot flame, but pilot will not remain on, replace thermocouple. If this does not correct problem, replace gas valve and pilot burner.
   - If pilot stays on, but main gas will not come on, proceed to page 25.

In event of vent damper failure:

**Effikat vent damper**

If troubleshooting chart recommends replacing actuator and actuator or damper blade is not released, damper blade can be fixed in an open position to allow boiler operation. Manually turn blade can cause actuator failure. Follow these instructions only in case of no heat or damper actuator malfunction:

1. Move damper service switch to Hold Damper Open position. Apply call for heat to boiler. Damper blade should then rotate to Open position and boiler will fire.
2. If step 1 does not open damper, manually rotate damper blade to open position using wrench or pliers on shaft between damper and actuator. Boiler will fire. Verify that damper service switch is in Hold Damper Open position. See Figure 15.
3. Do not leave vent damper permanently in this position. Replace actuator immediately. If vent damper is left in Open position, boiler will not operate at published efficiencies.

**Johnson Controls vent damper**

If troubleshooting chart recommends replacing actuator and actuator or damper blade is not released, damper blade can be fixed in an open position to allow boiler operation. Follow these instructions only in case of no heat or damper actuator malfunction. See Figure 15.

1. Turn off power to boiler.
2. Vent damper manufacturer’s instructions for procedure to fix vent damper in open position.
3. Turn on power to boiler.
4. If using wrench or pliers on flat shaft between damper and actuator, manually rotate damper blade until green light turns on. Boiler will fire. See Figure 15.
5. Do not leave vent damper permanently in this position. Replace actuator immediately. If vent damper is left in Open position, boiler will not operate at published efficiencies.

Troubleshooting:

Before troubleshooting:

1. Have the following items:
   - Voltmeter that can check 120 VAC and 24 VAC.
   - Continuity checker.
   - U-tube manometer.
2. Check for 120 VAC (minimum 102 VAC to maximum 132 VAC) to boiler.
3. Make sure thermostat is calling for heat and contacts (including appropriate zone controls) are closed. Check for 24 VAC between thermostat wires and ground.

Connecting to counterflow piping

Install relief valve in tapping on top of boiler. See Table 4, page 7, for control tapping locations. See the tag attached to the relief valve for manufacturer’s instructions.

Follow the steps below to avoid potential severe personal injury, death or substantial property damage.

- When installing the relief valve, ensure that all connections, including the valve inlet, are clean and free from any foreign matter.
- Mount the relief valve only in the vertical position, directly connected to the tapping designated in the manual on top of the boiler.
- Use pipe compound sparingly, or tape, on external threads only.
- Do not use a pipe wrench! Use proper type and size wrench on wrench pads only.

3 Install piping

**General**

1. Pipe before installing controls. Connect return piping after jacket is attached. Connect supply piping before or after jacket is attached.

**CAUTION**

Failure to properly pipe the boiler may result in improper operation and damage to the boiler or building.

2. See Figure 5 and Table 5. Pipe exactly as shown. Satisfactory operation of a steam heating system depends on adequate condensate return to boiler to maintain a steady water level. Avoid adding raw makeup water. Where condensate return is not adequate, install low water cutoff/pump control, condensate receiver and condensate boiler feed pump. Refer to Table 7, page 10, for sizing. See page 7, Table 4, for tapping locations.

**Connecting to counterflow piping**

Apply the recommended piping in Figures 4 through 7 only when connecting to a parallel flow system. When connecting to a counterflow system, the boiler steam supply must connect into the top of the counterflow system header, as shown in Figure 6.

**Figure 5** Recommended piping, piping for parallel flow systems only.

**Table 5** Recommended pipe sizing

<table>
<thead>
<tr>
<th>Boiler model number</th>
<th>Riser (A)</th>
<th>Header (H)</th>
<th>Equalizer (J)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GSA075 and GSA100</td>
<td>2”</td>
<td>2”</td>
<td>1½”</td>
</tr>
<tr>
<td>GSA125 through GSA175</td>
<td>2½”</td>
<td>2½”</td>
<td>1½”</td>
</tr>
<tr>
<td>GSA200 and GSA250</td>
<td>3”</td>
<td>3”</td>
<td>1½”</td>
</tr>
</tbody>
</table>

Note: 24” minimum from waterline to header.
2 Prepare boiler continued

Vent damper

**NOTICE** Those systems are used on gas-fired boilers with vent dampers as shipped from factory. Boiler will not operate without vent damper installed.

**DAMPER BLADE**
See vent manufacturer’s instructions to install plug (shipped with damper) in damper hole. Install plug with 3/8” diameter hole in vent damper hole.

**MINIMUM CLEARANCES**
Provide a minimum of 6” between the vent damper and any combustible material. (See “Minimum clearance to combustible materials,” page 3, for minimum clearance from jacket top to ceiling to maintain this dimension.)

**DAMPER INSTALLATION**
Do not modify draft diverter or vent damper, or make any other connection between draft diverter and vent damper or boiler except as noted below. This will void CSA certification and will not be covered by Williamson-Thermoflo warranty. Any changes will cause severe personal injury, death or substantial property damage.

1. Install vent damper as shown in vent damper manufacturer’s instructions. Vent damper must be installed so that it serves only one boiler and damper blade indicator is visible to the user. See Figure 4.
2. Screws or rivets used to secure the vent damper to the draft diverter must not interfere with rotation of the damper blade.
3. Install damper harness between damper actuator and knockout in jacket top panel. Use strain relief connectors and locknuts to secure both ends of damper harness.

**CAUTION**
Keep wiring harness clear of all hot surfaces. Wire insulation could be damaged, causing risk of electrical short-circuit.

**Figure 4 Vent damper assemblies**

Effikal damper — Damper hold open switch must be in Automatic Operation position for system to operate properly.

4. Read and apply the harness plug warning label (shown above) so that it is visible after installation.

**FORCING A MISMATCH CAN CAUSE A HAZARDOUS CONDITION.**

5. Plug damper harness receptacle into damper harness plug.

**DANGER**
Bypassing (jumpering) vent damper will cause flue products such as carbon monoxide to escape into the house. This will cause severe personal injury or death.

**CAUTION**
After boiler has operated once, if either end of harness is disconnected, the system safety shutdown will occur. The boiler will not operate until harness is reconnected.

**DANGER**
Effikal damper — Damper hold open switch must be in Automatic Operation position for system to operate properly.

**Figure 4 Vent damper assemblies**

**WARNING**
LINE UP KEYWAY WHEN CONNECTING PLUGS.

Secure connections.

Check for loose wire connections or bad relay on transformer.

Check for open thermostat, LWCO, high limit, spill switch or rollout thermal fuse element contacts or check for loose wire connections.

DANGER
If LWCO, spill switch or rollout thermal fuse element contacts are open, determine cause and correct condition. Failure to do so will cause severe personal injury, death or substantial property damage.

**CAUTION**
Effikal damper — Damper hold open switch must be in Automatic Operation position for system to operate properly.

**DANGER**
Bypassing (jumpering) vent damper will cause flue products such as carbon monoxide to escape into the house. This will cause severe personal injury or death.

**CAUTION**
After boiler has operated once, if either end of harness is disconnected, the system safety shutdown will occur. The boiler will not operate until harness is reconnected.

**Figure 4 Vent damper assemblies**

**Effikal damper**

Refer to vent manufacturer’s instructions to install plug shipped with damper in damper hole.

**Johnson Controls damper**

Install vent damper so that switch is visible and accessible to user.

**Table 1 — Standing pilot — Boiler will not fire**

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Check continuity of each wire in damper harness. Does continuity exist for each wire? See Table right.</td>
</tr>
<tr>
<td>2.</td>
<td>Replace damper wiring harness. Retest.</td>
</tr>
<tr>
<td>3.</td>
<td>Remove damper harness from damper harness plug. TEMPORARILY install jumper between terminal 2 and terminal 5 on damper plug in boiler wiring harness. See Table, right. Does boiler fire?</td>
</tr>
<tr>
<td>5.</td>
<td>Replace damper actuator. Retest.</td>
</tr>
</tbody>
</table>

**Chart 1 — Standing pilot — Boiler will not fire**

Before proceeding, follow “Troubleshooting sequence” on page 24. If problem persists, then:

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Is damper harness securely plugged in at both ends?</td>
</tr>
<tr>
<td>2.</td>
<td>Is 24VAC present across transformer terminals C &amp; Y?</td>
</tr>
<tr>
<td>3.</td>
<td>Check for open thermostat, LWCO, high limit, spill switch or rollout thermal fuse element contacts or check for loose wire connections.</td>
</tr>
<tr>
<td>4.</td>
<td>If LWCO, spill switch or rollout thermal fuse element contacts are open, determine cause and correct condition. Failure to do so will cause severe personal injury, death or substantial property damage.</td>
</tr>
<tr>
<td>5.</td>
<td>Check repair of their stack section. Does vent damper rotate open?</td>
</tr>
<tr>
<td>7.</td>
<td>Open thermostat contacts for 30 seconds. Vent damper will rotate to closed position. Close thermostat contacts. Vent damper will rotate to open position. Is 24VAC present across gas valve terminals?</td>
</tr>
<tr>
<td>8.</td>
<td>Is gas valve cock turned to ON position?</td>
</tr>
</tbody>
</table>

**Table 2 — Damper harness continuity test**

<table>
<thead>
<tr>
<th>Pin Number</th>
<th>Pin Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>N/C</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>N/C</td>
</tr>
</tbody>
</table>

**Chart 1 — Standing pilot — Boiler will not fire**

Before proceeding, follow “Troubleshooting sequence” on page 24. If problem persists, then:

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Is damper harness securely plugged in at both ends?</td>
</tr>
<tr>
<td>2.</td>
<td>Is 24VAC present across transformer terminals C &amp; Y?</td>
</tr>
<tr>
<td>3.</td>
<td>Check for open thermostat, LWCO, high limit, spill switch or rollout thermal fuse element contacts or check for loose wire connections.</td>
</tr>
<tr>
<td>4.</td>
<td>If LWCO, spill switch or rollout thermal fuse element contacts are open, determine cause and correct condition. Failure to do so will cause severe personal injury, death or substantial property damage.</td>
</tr>
<tr>
<td>5.</td>
<td>Check repair of their stack section. Does vent damper rotate open?</td>
</tr>
<tr>
<td>7.</td>
<td>Open thermostat contacts for 30 seconds. Vent damper will rotate to closed position. Close thermostat contacts. Vent damper will rotate to open position. Is 24VAC present across gas valve terminals?</td>
</tr>
<tr>
<td>8.</td>
<td>Is gas valve cock turned to ON position?</td>
</tr>
</tbody>
</table>

**Table 2 — Damper harness continuity test**

<table>
<thead>
<tr>
<th>Pin Number</th>
<th>Pin Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>N/C</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>N/C</td>
</tr>
</tbody>
</table>
1. Connect from draft diverter or vent damper outlet to chimney or vent with same size vent connector.

2. Where possible, vertical venting to the outside from the draft diverter or vent damper outlet will offer best performance.

3. Where horizontal vent connector is used, slope upward at least \( \frac{1}{4} \) in. per foot to prevent condensation and to divert rainwater away from vent pipes. The minimum slope is \( \frac{1}{24} \) in. per foot. Slope upward at least \( \frac{1}{4} \) in. to avoid condensation and to divert rainwater away from vent pipes. The minimum slope is \( \frac{1}{24} \) in. per foot. Slope upward at least \( \frac{1}{4} \) in. per foot.

4. Breeching must not be connected to any portion of a mechanical breeching or vent system. CSA certification will become void. Flue gas spillage and carbon monoxide emissions will occur causing severe personal injury or death.

5. Do not alter boiler draft diverter or place any obstruction or non-approved vent damper in breeching or vent system. CSA certification will become void.

6. Float-type low water cutoff—If field installing a float-type low water cutoff, it must be piped only to the gauge glass tapping, items H, Figure 3. The tapping is spaced 9" on center. Use only float-type low water cutoffs with quick-connect hookups that will provide a low water cutoff point no higher than 2" above the center of the bottom tapping. See page 11, Figure 9, for a typical installation.

7. Do not use petroleum-based cleaning or sealing compounds in boiler system. Severe damage to boiler, resulting in substantial property damage could result.
1 Prepare boiler location

Air openings

Exhaust fans and air movers
The appliance space must never be under a negative pressure. Always provide air openings sized not only to the dimensions required for the firing rate of all appliances, but also to handle the air movement rate of the exhaust fans or air movers using air from the building or space.

Motorized air dampers
If the air openings are fitted with motorized dampers, electrically interlock the damper to:
- Prevent the boiler from firing if the damper is not fully open.
- Shut the boiler down should the damper close during boiler operation.
To accomplish this interlock, wire an isolated contact (proving the damper open) in series with the thermostat input to the boiler. The boiler will not start if this damper is closed, and will shut down should damper close during operation.

2 Prepare boiler

Placement and setup

Place boiler/crate near position
1. Leave boiler in crate and on pallet until installation site is ready.
2. Move entire crate and pallet next to selected location.
4. Unbolt boiler from pallet.
5. Remove boiler from pallet.

Inspect orifices and burners
1. Remove front jacket door. Remove base access panel (see Figure 16, item 14, page 26).
2. Check for correctly-sized manifold orifices. See Table 3 for sizing. (The orifice size is stamped on the orifice spud barrel.)
3. Correctly-sized manifold orifices must be used. Failure to do so will result in severe personal injury, death or substantial property damage.
4. Level and straighten burners. Burners must be properly seated in slots in burner rest with their openings face up. Main burner orifices must inject down center of burner. Failure to properly seat burners will result in severe personal injury, death or substantial property damage.
5. Reinstall base access panel. Do not operate boiler without access panel secured in place. Failure to comply could cause momentary flame rollout on ignition of main flame, resulting in possible fire or personal injury hazard.

Exhaust fans and air movers
The appliance space must never be under a negative pressure. Always provide air openings sized not only to the dimensions required for the firing rate of all appliances, but also to handle the air movement rate of the exhaust fans or air movers using air from the building or space.

Motorized air dampers
If the air openings are fitted with motorized dampers, electrically interlock the damper to:
- Prevent the boiler from firing if the damper is not fully open.
- Shut the boiler down should the damper close during boiler operation.
To accomplish this interlock, wire an isolated contact (proving the damper open) in series with the thermostat input to the boiler. The boiler will not start if this damper is closed, and will shut down should damper close during operation.

Table 3

<table>
<thead>
<tr>
<th>Location</th>
<th>Natural gas</th>
</tr>
</thead>
<tbody>
<tr>
<td>U. S. Sea level – 2,000 ft 2.45 mm over 2,000 ft (Note 1) 2,000 – 4,500 2.00 mm 2.30 mm Canada</td>
<td></td>
</tr>
</tbody>
</table>

Note 1: For U. S. elevations above 2,000 feet, contact your Williamson-Thermostall supplier for details.

Pressure test

Perform hydrostatic pressure test
Pressure test boiler before attaching water or gas piping or electrical supply.

Prepare boiler for test
1. Plug tappings or openings.
2. Do not use gauge supplied with boiler for pressure testing. Install gauge with appropriate range.

Fill and pressure test
1. Fill boiler with water. Vent all air. Test boilers between 45-50 psi.
2. Do not leave boiler unattended. A cold water fill could expand and cause excessive pressure resulting in severe personal injury, death or substantial property damage.
3. Check for maintained gauge pressure for more than 10 minutes. Visually check for leaks if gauge pressure drops.

13 Replacement parts

Figure 17 Jacket assembly

Table 3

<table>
<thead>
<tr>
<th>Item number</th>
<th>Description</th>
<th>International Comfort Products part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Jacket panel, left side</td>
<td>4218000150WT</td>
</tr>
<tr>
<td>2</td>
<td>Jacket panel, top</td>
<td>GSA075 &amp; GSA100 421800152WT  GSA125 &amp; GSA150 421800153WT  GSA175 &amp; GSA200 421800154WT  GSA250 421800155WT</td>
</tr>
<tr>
<td>3</td>
<td>Jacket panel, right side</td>
<td>4218000151WT</td>
</tr>
<tr>
<td>4</td>
<td>Jacket panel, door</td>
<td>GSA075 &amp; GSA100 421800156WT  GSA125 &amp; GSA150 421800157WT  GSA175 &amp; GSA200 421800158WT  GSA250 421800159WT</td>
</tr>
<tr>
<td>5</td>
<td>Jacket panel, interior</td>
<td>GSA075 &amp; GSA100 421800160WT  GSA125 &amp; GSA150 421800161WT  GSA175 &amp; GSA200 421800162WT  GSA250 421800163WT</td>
</tr>
<tr>
<td>6</td>
<td>Jacket panel, rear</td>
<td>GSA075 &amp; GSA100 421800164WT  GSA125 &amp; GSA150 421800165WT  GSA175 &amp; GSA200 421800166WT  GSA250 421800167WT</td>
</tr>
<tr>
<td>7</td>
<td>Bottom cross tie</td>
<td>GSA075 &amp; GSA100 421800168WT  GSA125 &amp; GSA150 421800169WT  GSA175 &amp; GSA200 421800170WT  GSA250 421800171WT</td>
</tr>
<tr>
<td>8</td>
<td>Junction box, 4 x 4 (Available at local supply house)</td>
<td>421800172WT 421800173WT 421800174WT 421800175WT</td>
</tr>
</tbody>
</table>
### 13 Replacement parts continued

**Figure 18** Controls and trim

#### Table 2 Corrosive contaminants and likely locations

<table>
<thead>
<tr>
<th>Product to avoid</th>
<th>Areas likely to have contaminants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spray cans containing chloro/fluorocarbons</td>
<td>Dry cleaning/laundry areas and establishments</td>
</tr>
<tr>
<td>Permanent wave solutions</td>
<td>Swimming pools</td>
</tr>
<tr>
<td>Chlorinated waxes/cleaners</td>
<td>Metal fabrication plants</td>
</tr>
<tr>
<td>Chlorine-based swimming pool chemicals</td>
<td>Beauty shops</td>
</tr>
<tr>
<td>Calcium chloride used for thawing</td>
<td>Refrigeration repair shops</td>
</tr>
<tr>
<td>Sodium chloride used for water softening</td>
<td>Photo processing plants</td>
</tr>
<tr>
<td>Reagents used in clothes dryers</td>
<td>Furniture refinishing areas and establishments</td>
</tr>
<tr>
<td>Chlorine-type bleaches, detergents and cleaning solvents found in household laundry rooms</td>
<td>New building construction</td>
</tr>
<tr>
<td>Adhesives used to fasten building products and other similar products</td>
<td>Remodeling areas</td>
</tr>
<tr>
<td></td>
<td>Garages with workshops</td>
</tr>
</tbody>
</table>

### Air contamination

Please review the following information on potential combustion air contamination problems. See Table 2 for products and areas which may cause contaminated combustion air.

To prevent potential of severe personal injury or death, check for products or areas listed below before installing boiler. If any of these contaminants are found:

- Remove contaminants permanently.
- OR — Isolate boiler and provide outside combustion air. See national, provincial or local codes for further information.

### Minimum air opening sizes

Required area of the air openings given in the table are free area — after the correction for buoyant suction.

### Air openings

Combustion air and ventilation openings must comply with Section 5.3, “Air for Combustion and Ventilation”, of National Fuel Gas Code ANSI Z223.1—latest edition, or applicable local building codes. Canadian installations must comply with B149.1 or B149.2 Installation Codes.

See table below for minimum combustion/ventilation air opening sizes. Where openings are required, provide two (2) openings — one within 12 inches of the ceiling, the other within 12 inches of the floor, as shown in the table illustrations.

### Areas likely to have contaminants

- Swimming pools
- Metal fabrication plants
- Beauty shops
- Refrigeration repair shops
- Photo processing plants
- Furniture refinishing areas and establishments
- New building construction
- Remodeling areas
- Garages with workshops

### Preparation of boiler location

COMBUSTION AIR AND VENTILATION OPENINGS MUST COMPLY WITH SECTION 5.3, ‘‘AIR FOR COMBUSTION AND VENTILATION,’’ OF NATIONAL FUEL GAS CODE ANSI Z223.1—LATEST EDITION, OR APPLICABLE LOCAL BUILDING CODES. CANADIAN INSTALLATIONS MUST COMPLY WITH B149.1 OR B149.2 INSTALLATION CODES.

**Table 2** Minimum air opening sizes (in square inch per 5,000 Btu/h input)

**Air supply_INTAKE**

- **Air supply_INTAKE**
- **Air supply_INTAKE**
- **Air supply_INTAKE**
- **Air supply_INTAKE**
- **Air supply_INTAKE**

**Air return_OUTLET**

- **Air return_OUTLET**
- **Air return_OUTLET**
- **Air return_OUTLET**
- **Air return_OUTLET**
- **Air return_OUTLET**

**Heat losses**

- **Heat losses**
- **Heat losses**
- **Heat losses**
- **Heat losses**
- **Heat losses**

**Air handling**

- **Air handling**
- **Air handling**
- **Air handling**
- **Air handling**
- **Air handling**

**Air supply_INTAKE**

- **Air supply_INTAKE**
- **Air supply_INTAKE**
- **Air supply_INTAKE**
- **Air supply_INTAKE**
- **Air supply_INTAKE**

**Air return_OUTLET**

- **Air return_OUTLET**
- **Air return_OUTLET**
- **Air return_OUTLET**
- **Air return_OUTLET**
- **Air return_OUTLET**

**Heat losses**

- **Heat losses**
- **Heat losses**
- **Heat losses**
- **Heat losses**
- **Heat losses**

**Air handling**

- **Air handling**
- **Air handling**
- **Air handling**
- **Air handling**
- **Air handling**

**Air supply_INTAKE**

- **Air supply_INTAKE**
- **Air supply_INTAKE**
- **Air supply_INTAKE**
- **Air supply_INTAKE**
- **Air supply_INTAKE**

**Air return_OUTLET**

- **Air return_OUTLET**
- **Air return_OUTLET**
- **Air return_OUTLET**
- **Air return_OUTLET**
- **Air return_OUTLET**

**Heat losses**

- **Heat losses**
- **Heat losses**
- **Heat losses**
- **Heat losses**
- **Heat losses**

**Air handling**

- **Air handling**
- **Air handling**
- **Air handling**
- **Air handling**
- **Air handling**

### Figure 18

**Controls and trim**

*Item number Description Manufacturer Manufacturer’s part number International Comfort Products part number*

<table>
<thead>
<tr>
<th>Item number</th>
<th>Description</th>
<th>Manufacturer</th>
<th>Manufacturer’s part number</th>
<th>International Comfort Products part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pressure relief valve, ASME, 15 PSIG, 3/4” npt (Fittings shown are factory-installed on boiler. Coupling 1/2” npt, Nipple 3/4” npt)</td>
<td>Conbraco Watts</td>
<td>13-501-08 315</td>
<td>511540020WT</td>
</tr>
<tr>
<td>2</td>
<td>Low water cutoff, probe-type</td>
<td>Hydrolevel</td>
<td>400</td>
<td>511114610WT</td>
</tr>
<tr>
<td>3</td>
<td>Limit control/gauge assembly, includes: Pressure control</td>
<td>Honeywell Winter’s</td>
<td>PR-404-A E1437</td>
<td>510312135WT 510218045WT obtain locally on locally</td>
</tr>
<tr>
<td>4</td>
<td>Gauge glass assembly, includes: Gauge glass, Gauge glass guard, 9” h, Gauge cock set, brass</td>
<td>Conbraco United Brass Wks</td>
<td>21-205-03 W 905 and 946</td>
<td>914191980WT 66334680WT 510218145WT</td>
</tr>
<tr>
<td>5</td>
<td>Drain valve, 3/4”</td>
<td>International Comfort Products</td>
<td>511210420WT</td>
<td>511210420WT</td>
</tr>
</tbody>
</table>
1 Prepare boiler location continued

**Vent system**

**WARNING** Failure to follow all instructions can result in flue gas spillage and carbon monoxide emissions, causing severe personal injury or death.

**DANGER** Inspect existing chimney before installing boiler. Failure to clean or replace perforated pipe or tile lining will cause severe personal injury or death.

Do not alter boiler draft diverter or place any obstruction or non-certified vent damper in breeching or vent system. CSA certification will become void. Flue gas spillage and carbon monoxide emissions will occur causing severe personal injury or death.

The following requirements apply when you remove an existing boiler from a vent system shared with other appliances. If the new boiler will not use the common vent, you must test (as described below) each remaining appliance — operating by itself — to verify that the vent system operates adequately.

When removing boiler from existing common vent system:

1. At the time of removal of an existing boiler, the following steps shall be followed with each appliance remaining connected to the common venting system placed in operation, while the other appliances remaining connected to the common venting system are not in operation.
2. a. Seal any unused openings in the common venting system.
3. a. Visually inspect the venting system for proper size and horizontal pitch and determine there is no blockage or restriction, leakage, corrosion or other deficiencies which could cause an unsafe condition.
4. b. Visually inspect the venting system for proper size and horizontal pitch, and determine there is no blockage or restriction, leakage, corrosion or other deficiencies which could cause an unsafe condition.
5. c. Test vent system — Inspect as is practical, close all building doors and windows and all doors between the space in which the appliances remaining connected to the common venting system are located and other spaces of the building. Turn on clothes dryers and any appliance not connected to the common venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they will operate at maximum speed. Do not operate a summer exhaust fan. Close fireplace dampers.
6. d. Place in operation the appliance being inspected. Follow the lighting instructions. Adjust thermostat so appliance will operate continuously.
7. a. Test for spillage at draft diverter relief opening after 5 minutes of main burner operation. Use the flame of a match or candle.
8. b. After it has been determined that each appliance remaining connected to the common venting system is operating by itself — to verify that the vent system operates adequately.
9. c. Test vent system — Inspect as is practical, close all building doors and windows and all doors between the space in which the appliances remaining connected to the common venting system are located and other spaces of the building. Turn on clothes dryers and any appliance not connected to the common venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they will operate at maximum speed.
10. d. Place in operation the appliance being inspected. Follow the lighting instructions. Adjust thermostat so appliance will operate continuously.
11. a. Test for spillage at draft diverter relief opening after 5 minutes of main burner operation. Use the flame of a match or candle.
12. b. After it has been determined that each appliance remaining connected to the common venting system is operating by itself — to verify that the vent system operates adequately.

Chimney or vent requirements:

1. Venting must be installed according to Part 7, "Venting of Equipment", of National Fuel Gas Code, ANSI Z223.1—latest edition and applicable building codes. Canadian installations must comply with B149.1 or B149.2 Installation Codes.
2. 2. See “Ratings” on page 31 for minimum chimney or vent sizes.
3. Chimney or vent termination:
   - A chimney, or any vent other than a Type B vent with listed vent cap, must extend at least 3 feet above the highest point where it passes through a roof of a building, and at least 2 feet higher than any portion of a building within a horizontal distance of 10 feet.
   - Type B vents with listed caps may terminate as in Figure 2 if no closer than 8 feet from a vertical wall or similar obstruction.
   - Otherwise, Type B vents must terminate at least 2 feet above the roof penetration and least 2 feet higher than any portion of a building within 10 feet.
4. A lined chimney is preferred and must be used when required by local, state, provincial and national codes, laws, regulations and ordinances. Vitreous tile linings with joints that prevent retention of moisture and linings made of noncorrosive materials are best. Advice for flue connections and chimney linings can be obtained from local gas utility. Type B double-wall metal vent pipe or single-wall vent pipe may be used as a liner.
5. Cold masonry chimneys, also known as outside chimneys, typically have one or more walls exposed to outside air. When any atmospheric gas-fired boiler with automatic vent damper is vented through this type of chimney, the potential exists for condensation to occur. Condensation can damage a masonry chimney. Williamson-Thermoflo recommends the following to prevent possible damage:
   - Line chimney with corrosion-resistant metal liner such as AL29-4C.
   - Provide drain trap to remove any condensate.
6. Where two or more gas appliances vent into a common chimney or vent, equivalent area should be at least equal to area of vent outlet plus 50 percent of vent outlet area of additional appliances.

### Figure 2

Terminations with Type B vent fitted with listed cap, provided vent is at least 8 feet from any vertical wall or similar obstruction

<table>
<thead>
<tr>
<th>Pitch</th>
<th>M (max) (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/12</td>
<td>1.0</td>
</tr>
<tr>
<td>2/12</td>
<td>1.25</td>
</tr>
<tr>
<td>3/12</td>
<td>1.5</td>
</tr>
<tr>
<td>4/12</td>
<td>1.75</td>
</tr>
<tr>
<td>5/12</td>
<td>2.0</td>
</tr>
<tr>
<td>6/12</td>
<td>2.25</td>
</tr>
<tr>
<td>7/12</td>
<td>2.5</td>
</tr>
<tr>
<td>8/12</td>
<td>2.75</td>
</tr>
<tr>
<td>9/12</td>
<td>3.0</td>
</tr>
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<td>10/12</td>
<td>3.25</td>
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<td>11/12</td>
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<tr>
<td>12/12</td>
<td>3.75</td>
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<td>13/12</td>
<td>4.0</td>
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<td>14/12</td>
<td>4.25</td>
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<tr>
<td>18/12</td>
<td>5.25</td>
</tr>
<tr>
<td>19/12</td>
<td>5.5</td>
</tr>
<tr>
<td>20/12</td>
<td>5.75</td>
</tr>
<tr>
<td>21/12</td>
<td>6.0</td>
</tr>
</tbody>
</table>

### Figure 19

Gas controls

---

13 Replacement parts continued
14 Dimensions

Figure 20  Dimensional drawing — ALL DIMENSIONS IN INCHES

- Supply piping (Note 1)
- Return piping (Note 1)
- Gas supply piping
- Gas supply entrance (right or left side)
- Drain valve
- Skim tapping
- Manual main shut-off valve

**DANGER**

Do not cut or alter draft hood in any way. Boiler combustion will be affected, causing severe personal injury, death or substantial property damage.

**Note 1:** Boiler supply and return tapping can be found in the table below. See Table 5 on page 9 for recommended system supply and return piping sizes.

<table>
<thead>
<tr>
<th>Boiler model number</th>
<th>Supply tapping (inches NPT)</th>
<th>Return tapping (inches NPT)</th>
<th>Gas connection &amp; manifold size (Note 2) (inches NPT)</th>
<th>&quot;V&quot; Damper height (inches)</th>
<th>&quot;O&quot; Vent diameter (inches)</th>
<th>&quot;W&quot; Jacket width (inches)</th>
<th>Approximate shipping weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>GSA075</td>
<td>3</td>
<td>2½</td>
<td>½</td>
<td>6</td>
<td>5</td>
<td>17</td>
<td>430</td>
</tr>
<tr>
<td>GSA100</td>
<td>3</td>
<td>2½</td>
<td>½</td>
<td>6</td>
<td>5</td>
<td>17</td>
<td>430</td>
</tr>
<tr>
<td>GSA125</td>
<td>3</td>
<td>2½</td>
<td>½</td>
<td>6</td>
<td>5</td>
<td>17</td>
<td>505</td>
</tr>
<tr>
<td>GSA150</td>
<td>3</td>
<td>2½</td>
<td>½</td>
<td>6</td>
<td>5</td>
<td>17</td>
<td>505</td>
</tr>
<tr>
<td>GSA175</td>
<td>3</td>
<td>2½</td>
<td>½</td>
<td>9</td>
<td>7</td>
<td>25½</td>
<td>585</td>
</tr>
<tr>
<td>GSA200</td>
<td>3</td>
<td>2½</td>
<td>½</td>
<td>9</td>
<td>7</td>
<td>25½</td>
<td>585</td>
</tr>
<tr>
<td>GSA250</td>
<td>3</td>
<td>2½</td>
<td>½</td>
<td>9</td>
<td>8</td>
<td>29½</td>
<td>660</td>
</tr>
</tbody>
</table>

Note 2: Size gas piping from meter to boiler per local utility requirements.

Clearances

1. Provide minimum clearances for cleaning and servicing the boiler and for access to controls and components as listed in the table below.
2. Provide at least screwdriver clearance to jacket front panels and for王国enance of front panel for inspection and minor service. If unable to provide at least screwdriver clearance, install unions and shut-off valves in system so boiler can be moved for servicing.
3. Type B double-wall metal vent pipe — See vent manufacturer’s recommendation for clearances to combustible material.

Minimum clearances to combustible materials

**General — all installations**

1. Hot water pipes must be at least ½" from combustible material.
2. Single-wall vent pipe must be at least 6 inches from combustible material.
3. Type B double-wall metal vent pipe — See vent manufacturer’s recommendation for clearances to combustible material.

**Small space — alcove (not closet) installation**

- GSA boilers are not approved for closet installation — only for alcove installation, with minimum clearances as shown in Figure 1 and the table below, and the front side completely open — that is, a 3-walled room.

<table>
<thead>
<tr>
<th>Clearances from combustible materials:</th>
<th>Minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top (for cleaning flueways)</td>
<td>46&quot;</td>
</tr>
<tr>
<td>Front (for access to controls and components)</td>
<td>18&quot;</td>
</tr>
<tr>
<td>Back</td>
<td>6&quot;</td>
</tr>
<tr>
<td>Left side (for cleaning and servicing)</td>
<td>24&quot;</td>
</tr>
<tr>
<td>Right side</td>
<td>6&quot;</td>
</tr>
</tbody>
</table>

**Large space — (see minimum room volume, below)**

If installed in a four-walled room, the room volume must be no less than the following (Ceiling height, if over 8 feet, can only be counted as 8 feet):

- GSA075 & GSA100: 147 cubic feet
- GSA125 & GSA150: 184 cubic feet
- GSA175 & GSA200: 221 cubic feet
- GSA250: 267 cubic feet

The room must provide the following minimum clearances (in all directions) to the boiler and components:

- Jacket and flue collector sides & rear: 6 inches
- Jacket front: 18 inches
- Vent pipe (other than Type B vent): 6 inches
- Vent damper: 6 inches

Residential garage installation

- Take the following special precautions when installing the boiler in a residential garage. If the boiler is located in a residential garage, per ANSI Z223.1, paragraph 5.1.9:
  - Mount the boiler a minimum of 18 inches above the floor of the garage to assure the burner and ignition devices will be no less than 18 inches above the floor.
  - Locate or protect the boiler so it cannot be damaged by a moving vehicle.

Flooring and foundation

- Do not install boiler on combustible flooring or carpeting even if a concrete or aerated foundation is used. Fire can result, causing severe personal injury, death or substantial property damage.
- Provide a solid brick or minimum 2-inch thick concrete foundation pad if any of the following is true:
  - floor can become flooded.
  - the floor is carpeted even if a concrete or aerated foundation is used.
- Fire can result, causing severe personal injury, death or substantial property damage.
- Do not install boiler on combustible flooring or carpeting even if a concrete or aerated foundation is used. Fire can result, causing severe personal injury, death or substantial property damage.
- 2. See Table 1 for minimum foundation dimensions.
- 3. Use a foundation with airways when:
  - Electrical wiring or telephone cables buried in the concrete

| Table 1  Minimum foundation size |
|---------|---------|---------|
| Boiler model | Minimum foundation length | Minimum foundation width |
| GSA075 – GSA100 | 29 ½" | 19" |
| GSA125 – GSA150 | 29 ½" | 23 ½" |
| GSA175 – GSA200 | 29 ½" | 27 ½" |
| GSA250 | 29 ½" | 31 ½" |
1 Prepare boiler location

Codes & checklist

Installations must follow these codes:

- Local, state, provincial, and national codes, laws, regulations and ordinances.
- Standard for Controls and Safety Devices for Automatically Fired Boilers, ANSI/AIIME CSD-1, when required.
- National Electrical Code.
- For Canada only: B149.1 or B149.2 Installation Code, CSA CG2.1 Canadian Electrical Code Part 1 and any local codes.

Certification


Before locating the boiler:

- Check for nearby connection to: Venting connections. Gas supply piping. Electrical power.
- Check area around boiler. Remove any combustible materials, gasoline and other flammable liquids.

Boiler water

- Do not use petroleum-based cleaning or sealing compounds in boiler system. Water seal deterioration will occur, causing leakage between boiler sections, circulator flanges, diaphragm tanks or other system components. This can result in substantial property damage.
- DO NOT use “homemade cures” or “boiler patent medicines”. Serious damage to boiler, personnel and/or property may result.
- Do not add cold water to hot boiler. Thermal shock can cause sections to crack.

Before locating the boiler:

- To avoid severe burns, allow boiler to cool before performing maintenance.
- To avoid electric shock, disconnect electrical supply before performing maintenance.
- Do not block flow of combustion or ventilation air to boiler. Should overheating occur, turn off or disconnect electrical supply to boiler and shut off the gas supply at a location external to the appliance, if possible.
- Do not use this boiler if any part has been under water. Immediately call a qualified service technician to inspect the boiler and to replace any part of the control system and any gas control that has been under water.

Boiler operation

- DO NOT use petroleum-based cleaning or sealing compounds in boiler system. Water seal deterioration will occur, causing leakage between boiler sections, circulator flanges, diaphragm tanks or other system components. This can result in substantial property damage.
- DO NOT use “homemade cures” or “boiler patent medicines”. Serious damage to boiler, personnel and/or property may result.
- Continual fresh makeup water will reduce boiler life. Mineral buildup in sections reduces heat transfer, overheats cast iron, and causes section failure. Addition of oxygen and other gases can cause internal corrosion. Leaks in boiler or piping must be repaired at once to prevent makeup water.
- Do not add cold water to hot boiler. Thermal shock can cause sections to crack.

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Handling ceramic fiber and fiberglass materials

REMOVAL OF COMBUSTION CHAMBER LINING OR BASE PANELS:

The combustion chamber lining or base insulation panels in this product contain ceramic fiber materials. Ceramic fibers can be converted to cristobalite in very high temperature applications. The International Agency for Research on Cancer (IARC) has concluded, "Crystalline silica inhaled in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (Group 1)."

- Avoid breathing dust and contact with skin and eyes.
  * Use NIOSH certified dust respirator (N95). This type of respirator is based on the OSHA requirements for fiberglass wool at the time this document was written. Other types of respirators may be needed depending on the job site conditions. Current NIOSH recommendations can be found on the NIOSH web site at http://www.cdc.gov/niosh/homepage.html.
  * Wear long-sleeved, loose fitting clothing, gloves, and eye protection.
  * Apply enough water to the combustion chamber lining or base insulation to prevent airborne dust.
  * Remove combustion chamber lining or base insulation from the boiler and place it in a plastic bag for disposal.
  * Wash potentially contaminated clothes separately from other clothing. Rinse clothes washer thoroughly.

NIOSH stated First Aid.
- Eye: Irrigate immediately
- Breathing: Fresh air.

REMOVAL OF FIBERGLASS WOOL — OR — INSTALLATION OF FIBERGLASS WOOL, COMBUSTION CHAMBER LINING OR BASE PANELS:

This product contains fiberglass jacket insulation and ceramic fiber materials in combustion chamber lining or base panels in gas fired products. Airborne fibers from these materials have been listed by the State of California as a possible cause of cancer through inhalation.

- Avoid breathing dust and contact with skin and eyes.
  * Use NIOSH certified dust respirator (N95). This type of respirator is based on the OSHA requirements for fiberglass wool at the time this document was written. Other types of respirators may be needed depending on the job site conditions. Current NIOSH recommendations can be found on the NIOSH web site at http://www.cdc.gov/niosh/homepage.html.
  * Wear long-sleeved, loose fitting clothing, gloves, and eye protection.
  * Operations such as sawing, blowing, tear out, and spraying may generate airborne fiber concentration requiring additional protection.
  * Wash potentially contaminated clothes separately from other clothing. Rinse clothes washer thoroughly.

NIOSH stated First Aid.
- Eye: Irrigate immediately
- Breathing: Fresh air.

Hazard definitions

DANGER — Hazards that will cause severe personal injury, death or substantial property damage.

CAUTION — Hazards that will or can cause minor personal injury or property damage.

NOTICE — Special instructions on installation, operation or maintenance that are important but not related to personal injury or property damage.

INSTALLER — Read all instructions before installing. Read page 2 first. Follow all instructions in proper order to prevent personal injury or death.

- Consider piping and installation when determining boiler location.
- Any claims for damage or shortage in shipment must be filed immediately against the transportation company by the consignee.
- GSA boilers cannot be adapted for heater use.

USER — Please read the following. Failure to comply could result in severe personal injury, death or substantial property damage.

- This manual is for use only by your qualified heating installer/service technician.
- Please see the User’s Information Manual for your reference.
- Have the boiler serviced by a qualified service technician, at least annually.