GSA
Gas-Fired Steam Boilers

Boiler Manual

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For Operating and Troubleshooting Instructions, see Spark Ignition Control Supplement

Hazard definitions

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

⚠️ WARNING ⚠️ Hazards that can cause severe personal injury, death or substantial property damage.

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

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

INSTALLER — Refer to this manual for general installation and maintenance information. Refer also to the GSA Spark Ignition Control Supplement, part number 550-141-971, for operating instructions, troubleshooting and other additional information for GSA boilers equipped with spark ignition.

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 document 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
- CP number from the boiler jacket. You may list the CP number in the space provided on the “Installation and service certificate” found on page 20.
Read this first!

**WARNING** Failure to adhere to the guidelines below can result in severe personal injury, death or substantial property damage.

**WARNING** The boiler contains ceramic fiber and fiberglass materials. Use care when handling these materials per instructions on page 25 of this manual. Failure to comply could result in severe personal injury.

When servicing boiler —
1. To avoid electric shock, disconnect electrical supply before performing maintenance.
2. To avoid severe burns, allow boiler to cool before performing maintenance.

Boiler operation —
3. Do not block flow of combustion or ventilation air to boiler.
4. 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.
5. 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 water —
6. 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.
7. DO NOT use “homemade cures” or “boiler patent medicines”. Serious damage to boiler, personnel and/or property may result.
8. 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.
9. Do not add cold water to hot boiler. Thermal shock can cause sections to crack.

This manual must only be used by a qualified heating installer/service technician. Read these instructions completely before beginning the installation. Failure to follow these instructions can cause severe personal injury, death or substantial property damage.

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury, exposure to hazardous materials, or loss of life. Refer to the User’s Information Manual provided with this boiler. Installation and service must be performed by a qualified installer, service agency or the gas supplier who must read and follow the supplied instructions before installing, servicing or removing this boiler. This boiler contains materials that have been identified as carcinogenic, or possibly carcinogenic, to humans.

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.

**WARNING** Failure to keep boiler area clear and free of combustible materials, gasoline and other flammable 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.
1 Prepare boiler location

Clearances

Recommended SERVICE clearances

1. Provide minimum clearances for cleaning and servicing the boiler and for access to controls and components as listed in the table at right.
2. Provide at least screwdriver clearance to jacket front panel screws for removal of front panel for inspection and minor service. If unable to provide at least screwdriver clearance, install unions and shutoff valves in system so boiler can be moved for servicing.

Minimum clearances to COMBUSTIBLE materials

General clearances — All installations

1. See the table at right for clearances to boiler and system components.
2. Clearances to Type B vent materials are as specified by the vent manufacturer.

Alcove (not closet) installations only

**WARNING** GSA boilers are not approved for closet installation — only for alcove installation, with minimum clearances to combustible surfaces as shown in the table at right. See Figure 1. The front side must be completely open — that is, a 3-walled room.

**Figure 1** Alcove installations

<table>
<thead>
<tr>
<th>Clearance for service</th>
<th>Minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clearance to boiler jacket</td>
<td></td>
</tr>
<tr>
<td>Top (for cleaning flueways)</td>
<td>46“</td>
</tr>
<tr>
<td>Front (for access to controls and components)</td>
<td>18“</td>
</tr>
<tr>
<td>Back</td>
<td>6“</td>
</tr>
<tr>
<td>Left side (for cleaning and servicing)</td>
<td>24“</td>
</tr>
<tr>
<td>Right side</td>
<td>6“</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Clearance to combustible materials</th>
<th>Minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clearance to boiler jacket</td>
<td></td>
</tr>
<tr>
<td>Top</td>
<td>46“</td>
</tr>
<tr>
<td>Front (provides means of access)</td>
<td>3“</td>
</tr>
<tr>
<td>Back</td>
<td>6“</td>
</tr>
<tr>
<td>Left side (provides means of access)</td>
<td>4“</td>
</tr>
<tr>
<td>Right side</td>
<td>4“</td>
</tr>
</tbody>
</table>

| Clear to piping and vent components | |
|-------------------------------------| |
| Water and steam pipes | 1/2“ |
| Vent pipe (other than Type B vent) | 6“ |
| Type B vent piping | Per B vent manufacturer |
| Vent damper | 6“ |
1 Prepare boiler location

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:

- 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

**WARNING** 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.

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.
2. See Table 1 for minimum foundation dimensions.
3. Use a foundation with airways when:
   - Electrical wiring or telephone cables buried in the concrete floor of the boiler room.
   - Concrete floor is “green”.
   - Water is channeled under the concrete.

<table>
<thead>
<tr>
<th>Boiler model</th>
<th>Minimum foundation length</th>
<th>Minimum foundation “L” width</th>
</tr>
</thead>
<tbody>
<tr>
<td>GSA-075 — GSA-100</td>
<td>29 ⅝”</td>
<td>19”</td>
</tr>
<tr>
<td>GSA-125 — GSA-150</td>
<td>29 ⅝”</td>
<td>23 ¼”</td>
</tr>
<tr>
<td>GSA-175 — GSA-200</td>
<td>29 ⅝”</td>
<td>27 ½”</td>
</tr>
<tr>
<td>GSA-250</td>
<td>29 ⅝”</td>
<td>31 ¾”</td>
</tr>
<tr>
<td>GSA-300</td>
<td>29 ⅝”</td>
<td>36”</td>
</tr>
</tbody>
</table>

Table 1 Minimum foundation size

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.

**DANGER** Do not alter boiler draft hood 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.

**NOTICE** 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 — Insofar 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 operating instructions. Adjust thermostat so appliance will operate continuously.

e. Test for spillage at draft hood 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 the common venting system should be corrected so the installation conforms with the National Fuel Gas Code, ANSI Z223.1/NFPA 54 and/or CAN/CGA B149, Installation Codes. When resizing any portion of the common venting system, the common venting system should be resized to approach the minimum size as determined using the appropriate tables in the National Fuel Gas Code, ANSI Z223.1/NFPA 54 and/or CAN/CGA B149, Installation Codes.
1 Prepare boiler location

Vent System

Chimney or vent requirements
1. Venting must be installed according to the 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 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 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. The following are recommended to prevent possible damage.
   a. Line chimney with corrosion-resistant metal liner such as AL29-4C® single-wall 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 on largest appliance plus 50 percent of vent outlet area of additional appliances.

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.

<table>
<thead>
<tr>
<th>Products to avoid</th>
</tr>
</thead>
<tbody>
<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>Photo processing plants</td>
</tr>
<tr>
<td>Auto body shops</td>
</tr>
<tr>
<td>Plastic manufacturing plants</td>
</tr>
<tr>
<td>Furniture refinishing areas and establishments</td>
</tr>
<tr>
<td>New building construction</td>
</tr>
<tr>
<td>Remodeling areas</td>
</tr>
<tr>
<td>Garages with workshops</td>
</tr>
<tr>
<td>Buildings under construction (where air is contaminated with particulates)</td>
</tr>
</tbody>
</table>

Table 2 Corrosive contaminants and likely locations

<table>
<thead>
<tr>
<th>Products to avoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spray cans containing chloro/fluorocarbons</td>
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<tr>
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<tr>
<td>Hydrochloric acid/muriatic acid</td>
</tr>
<tr>
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<tr>
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</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>

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 locations
1 Prepare boiler location

Air openings

**WARNING** Provide adequate combustion and ventilation air to assure proper combustion and reduce the risk of severe personal injury, death or substantial property damage caused by flue gas spillage and carbon monoxide emissions.

Combustion air and ventilation openings must comply with the 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.

Air opening sizes in the following are given in free area (after correction for louver obstruction).

### Option 1 — Provide (2) openings:

- **A** Air from Inside
- **B** Air Directly from Outside

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

### Option 2 — Provide (1) opening:

- **C** Air from Outside using horizontal ducts
- **D** Air from Outside or Attic lower opening in floor or vertical duct

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

---

**Tight construction requirements**

If building is of tight construction and air is taken from inside the building, provide two openings in building outside wall, one within 12 inches of ceiling, the other within 12 inches of the floor. Each opening must have a minimum free area of 1 square inch per 1,000 Btuh of all appliances in the building.

**Exception**

NO combustion air openings are needed when the boiler (and other appliances) are installed in a space with a volume NO LESS than 50 cubic feet per 1,000 Btuh of all installed appliances. Sum the total input of all appliances in MBH (1,000’s of Btuh) and multiply this number times 50. Building must not be of Tight construction (see above).

Example: For total input of 100 MBH (100,000 Btuh), minimum volume is 50 x 100 = 5,000 cubic feet. At a ceiling height of 8 feet, space must have at least 5,000 ÷ 8 = 625 square feet (25 feet x 25 feet, for instance).

**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.

---

**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.
1 Prepare boiler location

Setup - continued
Inspect orifices and burners

1. Remove front jacket door. Remove base access panel (see Figure 20, 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.)

**DANGER** 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.

**DANGER** 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.

**CAUTION** 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.

Pressure test - continued

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

2. Retest boiler after repairing leaks.
3. Remove plugs from any tappings that will be used for controls and accessories. Refer to Table 4 and Figure 3.

**NOTICE** 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 14, Figure 16, for a typical installation.

Table 3 Manifold orifice sizing

<table>
<thead>
<tr>
<th>Location</th>
<th>Natural gas</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S.</td>
<td><img src="https://example.com/table.jpg" alt="Table" /></td>
</tr>
<tr>
<td>Canada</td>
<td><img src="https://example.com/table.jpg" alt="Table" /></td>
</tr>
</tbody>
</table>

Note 1: For U.S. elevations above 2,000 feet, contact your local 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.

**WARNING** 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.

2. Check for stable gauge pressure for more than 10 minutes. Visually check for leaks if gauge pressure drops.

Drain and remove fittings

1. Drain boiler and repair leaks if found.

**WARNING** Leaks must be repaired at once. Failure to do so can damage boiler, resulting in substantial property damage.

Table 4 Control tapping

<table>
<thead>
<tr>
<th>Location</th>
<th>Size</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>¾”</td>
<td>Probe-type low water cutoff</td>
</tr>
<tr>
<td>D</td>
<td>¾”</td>
<td>Drain</td>
</tr>
<tr>
<td>E</td>
<td>¾”</td>
<td>Relief valve</td>
</tr>
<tr>
<td>G</td>
<td>¾”</td>
<td>Plugged</td>
</tr>
<tr>
<td>H</td>
<td>½”</td>
<td>Gauge glass and/or optional low water cutoff</td>
</tr>
<tr>
<td>J</td>
<td>⅜”</td>
<td>Tricock tappings</td>
</tr>
<tr>
<td>L</td>
<td>½”</td>
<td>Siphon, pressure gauge, high limit control</td>
</tr>
<tr>
<td>S</td>
<td>1 ½”</td>
<td>Skim tapping</td>
</tr>
</tbody>
</table>

Note: Available only on special request.

Figure 3 Control tapping locations
2 Prepare boiler continued

Installation of flue collector hood
(Factory installed on GSA boilers up to GSA-300)

Set flue collector hood on boiler as shown in Figure 4. Use boiler cement furnished to provide gas-tight seal.

**WARNING** Failure to maintain gas-tight seal can cause flue gas spillage and carbon monoxide emissions, resulting in severe personal injury or death.

![Flue collector hood diagram](image)

Figure 4 Flue collector hood

Installation of rear base panels
(Factory installed on GSA boilers up to GSA-300)

See Figure 5. Fasten rear base panel (7 3/4 inch high) and rear base channel to section assembly. Seal with boiler cement along top of insulation panels.

**WARNING** Failure to maintain gas-tight seal can cause flue gas spillage and carbon monoxide emissions, resulting in severe personal injury or death.

![Rear base panel and base channel diagram](image)

Figure 5 Rear base panel and base channel

Installation of drawer assembly,
front base panels –

1. See Figure 6. Fasten front base panel (6 1/2 inch high) and rear base channel to section assembly. Seal with boiler cement along top of insulation panels.
2. The burner drawer assembly consists of the burner drawer, main burners, gas manifold, pilot burner, etc.
3. Check for proper orifice sizing from Table 3, page 7 in GSA boiler manual.

**DANGER** Proper orifices must be used. Failure to do so will cause severe personal injury, death or substantial property damage.

4. Place burners in the drawer assembly as shown in Figures 7 and 8.
5. Slide the drawer assembly under the front base panel and attach to the section assembly as shown in Figure 9.
6. Level and straighten burners.

**DANGER** Burners must be properly seated in slots in back burner support with openings facing up. Gas orifices must inject down center of burner. Failure to properly seat burners will result in severe personal injury, death or substantial property damage.

7. Install rollout thermal fuse element with wire terminals facing up on front access panel as shown in Figure 10. Wire per the appropriate Control Supplement.

Inspect burners – GSA 300 boiler

1. All units except GSA-300 are factory-assembled, but the burners and base panels should be inspected to ensure they are in good condition.
2. Remove the access panel (Figure 10) and inspect the burners per step 6 above. Replace the access panel.
2 Prepare boiler  continued

Figure 6  Front base panel

Figure 7  Burner drawer assembly

Figure 8  Burner and pilot burner location

Legend:
- Burner
- Pilot burner
- Pilot

Jacket installation  (up to GSA-300)

1. Remove the proper knockout discs from panels as shown in Table 4, page 7.
2. Follow Jacket Instructions in jacket carton.

Draft hood & spill switch

Draft hood installation

1. Secure draft hood to flue collector hood with sheet metal screws. See Figure 20, items 1 and 9, on page 26. Use boiler cement to provide gas tight seal.

**WARNING** Failure to maintain gas-tight seal can cause flue gas spillage and carbon monoxide emissions, resulting in severe personal injury or death.

**DANGER** Do not alter boiler draft hood 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.

Spill switch installation

1. Fasten spill switch to draft hood as shown in Figure 20, item 20, page 26.
2. See wiring diagram in GSA Spark Ignition Control Supplement to connect wires.
2 Prepare boiler

Install vent piping

1. Connect from draft hood or vent damper outlet to chimney or vent with same size vent connector.
2. Where possible, vertical venting to the outside from the draft hood 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.

**WARNING**
Long horizontal vent connector, excessive number of elbow 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.

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.

**NOTICE**
Effikal or Field Control dampers — Damper hold open switch must be in Automatic Operation position for system to operate properly.

Vent damper

**NOTICE**
These 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

**DANGER**
Do not modify draft hood or vent damper, or make another connection between draft hood and vent damper or boiler except as noted below. This will void CSA certification and will not be covered by 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 11.
2. Screws or rivets used to secure the vent damper to the draft hood 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.

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

---

**Figure 11 Vent damper assemblies**

- **Effikal or Field Control dampers**
  - Refer to vent manufacturer’s instructions to install plug (shipped with damper) in damper hole.
  - Hold-open switch (Effikal or Field Control only) —
    - Install vent damper so that switch is visible and accessible to user.
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 12 and Table 6. Pipe exactly as shown.

3. 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, refer to recommendations on page 13.

Figure 12 Recommended piping, piping for parallel-flow systems only. *(see Table 6 for recommended sizing)*

Connecting to counterflow piping

Apply the recommended piping in Figures 12 and 14 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 13.

Figure 13 Connection to counterflow steam piping *(see Table 6 for recommended sizing)*

Table 6 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>GSA-075 and GSA-100</td>
<td>2&quot;</td>
<td>2&quot;</td>
<td>1 ½&quot;</td>
</tr>
<tr>
<td>GSA-125 through GSA-175</td>
<td>2 ½&quot;</td>
<td>2 ½&quot;</td>
<td>1 ½&quot;</td>
</tr>
<tr>
<td>GSA-200, GSA-250 &amp; GSA-300</td>
<td>3&quot;</td>
<td>3&quot;</td>
<td>1 ½&quot;</td>
</tr>
</tbody>
</table>

**Note:** 24" minimum from waterline to bottom of header.
3 Install piping continued

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.

⚠️ WARNING ⚠️
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.

⚠️ 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, a discharge line 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 that of the valve outlet.

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 7 Reservoir pipe sizing

<table>
<thead>
<tr>
<th>Boiler model number</th>
<th>Max. boiler gross output (pounds steam per hour)</th>
<th>Time from initial steaming to average condensate return (boiler steaming capacity based on 970 Btu per pound of steam)</th>
<th>Minimum condensate receiver capacity gallons for boiler steaming times (minutes) of:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>15 minutes</td>
<td>20 minutes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MBH</td>
<td>pipe length (feet)</td>
</tr>
<tr>
<td>GSA-075/100</td>
<td>75</td>
<td>¾</td>
<td>¾</td>
</tr>
<tr>
<td>GSA-125/150</td>
<td>125</td>
<td>1 ¼</td>
<td>1 ¼</td>
</tr>
<tr>
<td>GSA-175</td>
<td>150</td>
<td>1 ½</td>
<td>1 ½</td>
</tr>
<tr>
<td>GSA-200</td>
<td>175</td>
<td>1 ¾</td>
<td>1 ¾</td>
</tr>
<tr>
<td>GSA-250</td>
<td>225</td>
<td>2 ½</td>
<td>2 ½</td>
</tr>
<tr>
<td>GSA-300</td>
<td>250</td>
<td>2 ½</td>
<td>2 ¼</td>
</tr>
</tbody>
</table>

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

Table 8 Boiler feed system sizing

<table>
<thead>
<tr>
<th>Boiler model number</th>
<th>AHRI gross output (pounds steam per hour)</th>
<th>Condensate receiver capacity gallons for boiler steaming times (minutes) of:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>15 min.</td>
</tr>
<tr>
<td>GSA-075</td>
<td>63</td>
<td>8</td>
</tr>
<tr>
<td>GSA-100</td>
<td>81</td>
<td>10</td>
</tr>
<tr>
<td>GSA-125</td>
<td>102</td>
<td>12</td>
</tr>
<tr>
<td>GSA-150</td>
<td>122</td>
<td>15</td>
</tr>
<tr>
<td>GSA-175</td>
<td>142</td>
<td>17</td>
</tr>
<tr>
<td>GSA-200</td>
<td>163</td>
<td>20</td>
</tr>
<tr>
<td>GSA-250</td>
<td>203</td>
<td>24</td>
</tr>
<tr>
<td>GSA-300</td>
<td>240</td>
<td>29</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.
3 Install piping  continued

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 to 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 to return to boiler (from step 5) is more than 10 minutes, a reservoir pipe (or boiler feed system) is recommended. See Table 7, page 12, for suggested reservoir pipe size. Install as shown in Figure 14.

For larger systems (as noted in Table 7), use a boiler feed system with a condensate tank and feed pump. You will have to install a low water cutoff/pump control on the boiler to operate the pump. Use Table 8 to size boiler feed systems. See page 7, 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.
4 Install controls

Controls

**WARNING** 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 15. 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 in the GSA Spark Ignition Control Supplement.

---

**Figure 15 Controls**

---

**Figure 16 Float-type low water cutoff** (when provided by others)

1. Install low water cutoff as shown in Figure 16, below. See Table 4 and Figure 3 on page 7 for actual tapping location.
2. Install blowdown line in bottom of cutoff. See control manufacturer’s instructions for details.

**WARNING** Pipe blowdown line near floor close to floor drain to eliminate potential of severe burns. Do not plug, valve or place any obstruction in blowdown line.

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.

---

* Water line dimension measured from bottom of boiler section leg where it rests on the boiler room floor or boiler foundation.
5 Install gas piping

Connecting gas supply piping to boiler

1. Remove jacket front panel and see Figure 17 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.

2. Support piping with hangers, not by boiler or its accessories.

3. Purge all air from gas supply piping.

   a. Close manual main shutoff valve during any pressure testing at less than 13” w.c.
   b. Disconnect boiler and gas valve from gas supply piping during any pressure testing greater than 13” w.c.

   **WARNING**
   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.

5. 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.

   **WARNING** 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 9 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 9 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 Z223.1 (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% lockup 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% 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.

### Table 9 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></td>
<td>(Capacity in cubic feet gas per hour)</td>
</tr>
<tr>
<td></td>
<td>½”</td>
</tr>
<tr>
<td>10</td>
<td>132</td>
</tr>
<tr>
<td>20</td>
<td>92</td>
</tr>
<tr>
<td>30</td>
<td>73</td>
</tr>
<tr>
<td>40</td>
<td>63</td>
</tr>
<tr>
<td>50</td>
<td>56</td>
</tr>
<tr>
<td>75</td>
<td>45</td>
</tr>
<tr>
<td>100</td>
<td>38</td>
</tr>
<tr>
<td>150</td>
<td>31</td>
</tr>
</tbody>
</table>

### Figure 17 Gas supply piping

![Gas supply piping diagram](image)
6 Field wiring

**WARNING**
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.

**NOTICE**
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, and any local codes.

### Wiring connections
Boiler is shipped with controls completely wired, except spill switch and vent damper. See wiring diagram in the GSA Spark Ignition Control Supplement.

### 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. See boiler wiring diagram (on boiler, or in Spark Ignition Control Supplement) for recommended setting. 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
Connect 120 VAC power wiring (Figure 18). A separate electrical circuit with a fused disconnect switch (15 amp. recommended) should be used for the boiler.

---

**Figure 18** Field wiring connections — service switch and thermostat (or end switch) provided by installer

![Field wiring diagram](image-url)
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.

**WARNING** 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

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

**WARNING** 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 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.

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 1½” piping from skim tapping to floor drain.
2. Adjust waterline to midpoint of skim tapping. See Figure 3, page 7.
3. Follow the appropriate Operating Instructions in the Spark Ignition Control Supplement, to fire the 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

**WARNING** The boiler contains ceramic fiber and fiberglass materials. Use care when handling these materials per instructions on page 25 of this manual. Failure to comply could result in severe personal injury.

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.
7 Start-up continued

Operate the 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 Spark Ignition Control Supplement for Operating Instructions
- Verify the boiler and system water level is correct (no more than ½ of gauge glass or less than ¼" above bottom of gauge glass).
- Verify the “Preparation” procedures, on previous page, have been completed.

Start the boiler

1. Check boiler water level — Should be approximately ½ way up gauge glass.
2. Remove boiler jacket door and note the gas valve manufacturer and model number.
3. Follow the appropriate Operating Instructions found in the GSA Spark Ignition Control Supplement. (The Operating Instruction label on the boiler provides the same information.)
4. If boiler fails to start, see “If boiler doesn’t start . . . Check for:” on this page.

Check system and boiler

**WARNING** 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.

**WARNING** 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.

**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. Check system piping for leaks. If found, shut down boiler and repair immediately.
2. 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.
3. Check around the boiler for gas odor following the procedure of “Check for gas leaks”, page 17.

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. Incoming gas pressure less than:
   - 5” w.c. for natural gas?
   - 11” w.c. for propane gas?
6. If none of the above corrects the problem, see “Troubleshooting”, in the GSA Spark Ignition Control Supplement.
7 Start-up continued

Verify operation

Check burner flame — Pilot burner

Proper pilot flame (see Figure 19):
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.
3. Lack of primary air — Yellow flame tip.
4. Incorrectly heated thermocouple.

Check burner flame — Main burner

Proper main burner flame (see Figure 20):
1. Yellow-orange streaks may appear (caused by dust).

Improper 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.

| DANGER | 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 1 through 3 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

With boiler firing, hold a candle or match below lower edge of draft hood “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 Checkout procedure

- Boiler and heat distribution units filled with water?
- Boilers properly skimmed?
- Air purged from gas piping? Piping checked for leaks?
- Correctly-sized manifold orifices installed? See Table 3, page 7, to check size and fuel type.

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

- Button on spill switch pushed in?
- Follow Operating Instructions in Control Supplement for proper start-up?
- 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.
- Test ignition system safety device —

**Spark ignition** boilers: Connect manometer to outlet side of gas valve. Start boiler, allowing for normal start-up cycle to occur and main burners to ignite. With main burners on, manually shut off gas supply at manual main shutoff gas valve. Burners should go off. Open manual main shutoff gas valve. Manometer should confirm there is no gas flow. Pilot will relight, flame sensing element will sense pilot flame and main burners reignite. Put boiler back into operation.

- Set limit control(s) 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:

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

  e. Btuh calculated should approximate input rating on boiler rating label.
- 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.
- Observe several operating cycles for proper operation.
- Set room thermostat to desired room temperature.
- Fill in “Installation and service certificate” below?
- Review all instructions shipped with this boiler with owner or maintenance person. Return instructions to envelope and give to owner or place in pocket inside front panel in boiler.

---

### Installation and Service Certificate

Boiler model ________________  Series __________  CP number ________________  Date installed ________________

Measured Btuh input ________________

- Installation instructions have been followed.
- Check-out 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)

---
## 9 Service and maintenance

### Table 10 Service and maintenance schedules (service technician and owner)

<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>
<tr>
<td><strong>ANNUAL START-UP</strong></td>
<td></td>
</tr>
<tr>
<td>❑ <strong>Inspect:</strong></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>❑ <strong>Service:</strong></td>
<td>❑ Periodically</td>
</tr>
<tr>
<td>- Gauge glass</td>
<td>- Test low water cutoff</td>
</tr>
<tr>
<td>❑ <strong>Start-up:</strong></td>
<td></td>
</tr>
<tr>
<td>- Perform start-up per manual</td>
<td>❑ End of season</td>
</tr>
<tr>
<td>❑ <strong>Check/test:</strong></td>
<td>- Shut down procedure</td>
</tr>
<tr>
<td>- Gas piping</td>
<td></td>
</tr>
<tr>
<td>- Boiler waterline</td>
<td></td>
</tr>
<tr>
<td>- Limit controls and cutoffs</td>
<td></td>
</tr>
<tr>
<td>- Boiler relief valve</td>
<td></td>
</tr>
<tr>
<td>❑ <strong>Review:</strong></td>
<td></td>
</tr>
<tr>
<td>- Review with owner</td>
<td></td>
</tr>
</tbody>
</table>

**WARNING**

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.
9 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 10, page 22 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.

**WARNING**
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.

**WARNING**
The boiler contains ceramic fiber and fiberglass materials. Use care when handling these materials per instructions on page 25 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.

**WARNING**
Failure to inspect for the above conditions and have them repaired can result in severe personal injury or death.

**Pilot and main burner flames**
Visually inspect pilot burner and main burner flames as directed under Section 7, page 17 of this manual.

- **Inspect . . . . . . . . . . .**

**Piping**
1. Check the boiler interior piping and all system piping for signs of leaks.
2. Repair any leaks before proceeding.

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

**WARNING**
Eliminate all system or boiler 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. Leaking water may also cause severe property damage.

**Boiler heating surfaces**

**WARNING**
The boiler contains ceramic fiber and fiberglass materials. Use care when handling these materials per instructions on page 25 of this manual. Failure to comply could result in severe personal injury.

1. Disconnect the vent pipe at the boiler draft hood and remove draft hood 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 27. Remove the flue collector and clean the boiler if necessary after closer inspection of boiler heating surfaces.
4. If there is evidence of rusty 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 hood. 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 20, 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 from support slot, slide forward and remove. Then brush and vacuum the burners thoroughly, making sure all ports are free of debris. Carefully replace all burners, making sure burner with pilot bracket is replaced in its original position and all burners are upright (ports up).
4. Inspect the base insulation.
   a. Verify that the insulation is intact and secure against all four sides of the base.

**WARNING**
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.
9 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.

  **DANGER**

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

  **WARNING**

  If gauge glass breaks, close both gauge cocks. 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 17-18, including Verify operation of burners and vent damper on page 19.
  2. Check gas piping, per pages 15 and 17, verifying no indications of leakage and all piping and connections are in good condition.
  3. Read the Operating Instructions in the GSA Spark Ignition Control Supplement.
  4. Start the boiler following the Operating Instructions in the GSA Spark Ignition Control Supplement.

- **Check/test . . . . . . . . . .**

  **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 15 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.

- **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.

  **DANGER** Scald potential. Boiler pressure must be low to avoid the potential of severe burns from steam.
  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.
9 Service and maintenance continued

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.

**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 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 could result in severe personal injury, death or substantial property damage.

**WARNING**
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.

**WARNING**
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.
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

**WARNING**
The boiler contains ceramic fiber and fiberglass materials. Use care when handling these materials per instructions on page 25 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 Operating Instructions.
2. Disconnect breeching and remove damper and draft hood.
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 22, 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. Remove paper and soot. Vacuum or brush base and surrounding area.
8. Replace collector hood. Seal with boiler cement.
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).”

Precautionary measures

- Avoid breathing fiberglass dust and contact with skin or 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.
- 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.

Precautionary measures

- Avoid breathing fiberglass dust and contact with skin or 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.
### Figure 20 Section assembly, flue collector, draft hood, vent damper and base assembly

**WARNING**

The boiler contains ceramic fiber and fiberglass materials. Use care when handling these materials per instructions on page 25 of this manual. Failure to comply could result in severe personal injury.

<table>
<thead>
<tr>
<th>Item number</th>
<th>Description</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>End section, left hand, 1813</td>
<td>311-800-007WT</td>
</tr>
<tr>
<td>3</td>
<td>Back base panel GSA-075 &amp; GSA-100 GSA-125 &amp; GSA-150 GSA-175 &amp; GSA-200 GSA-250 &amp; GSA-300</td>
<td>451-800-010WT 451-800-011WT 451-800-012WT 451-800-013WT 451-800-014WT</td>
</tr>
<tr>
<td>4</td>
<td>Back base channel GSA-075 &amp; GSA-100 GSA-125 &amp; GSA-150 GSA-175 &amp; GSA-200 GSA-250 &amp; GSA-300</td>
<td>451-800-020WT 451-800-021WT 451-800-022WT 451-800-023WT</td>
</tr>
<tr>
<td>5</td>
<td>Front base panel GSA-075 &amp; GSA-100 GSA-125 &amp; GSA-150 GSA-175 &amp; GSA-200 GSA-250 &amp; GSA-300</td>
<td>451-800-000WT 451-800-001WT 451-800-002WT 451-800-003WT 451-800-004WT</td>
</tr>
<tr>
<td>6</td>
<td>Back burner support GSA-075 GSA-100 GSA-125 GSA-150 GSA-175 GSA-200 GSA-250 GSA-300</td>
<td>451-800-085WT 451-800-086WT 451-800-087WT 451-800-088WT 451-800-089WT 451-800-090WT 451-800-092WT 451-800-095WT</td>
</tr>
<tr>
<td>7</td>
<td>Burner pan side rail GSA-075 GSA-100 GSA-125 GSA-150 GSA-175 GSA-200 GSA-250 GSA-300</td>
<td>451-800-070WT 451-800-071WT 451-800-072WT 451-800-073WT 451-800-074WT 451-800-075WT 451-800-076WT 451-800-077WT</td>
</tr>
<tr>
<td>8</td>
<td>Collector hood GSA-075 &amp; GSA-100 GSA-125 &amp; GSA-150 GSA-175 &amp; GSA-200 GSA-250 &amp; GSA-300</td>
<td>450-014-733WT 450-014-734WT 450-014-735WT 450-014-736WT 450-014-737WT</td>
</tr>
<tr>
<td>9</td>
<td>Section replacement kit (Consists of: rope glass and 1 each 3&quot; and 6&quot; square cut seals)</td>
<td>381-800-100WT</td>
</tr>
<tr>
<td>10</td>
<td>End section, right hand, 18118</td>
<td>311-800-029WT</td>
</tr>
<tr>
<td>11</td>
<td>Intermediate section, 1815</td>
<td>311-800-010WT</td>
</tr>
</tbody>
</table>
The boiler contains ceramic fiber and fiberglass materials. Use care when handling these materials per instructions on page 25 of this manual. Failure to comply could result in severe personal injury.

<table>
<thead>
<tr>
<th>Item number</th>
<th>Description</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Jacket panel, left side</td>
<td>421-800-150WT</td>
</tr>
<tr>
<td>2</td>
<td>Jacket panel, top</td>
<td>421-800-152WT</td>
</tr>
<tr>
<td></td>
<td>GSA-075 &amp; GSA-100</td>
<td>421-800-153WT</td>
</tr>
<tr>
<td></td>
<td>GSA-125 &amp; GSA-150</td>
<td>421-800-154WT</td>
</tr>
<tr>
<td></td>
<td>GSA-175 &amp; GSA-200</td>
<td>421-800-155WT</td>
</tr>
<tr>
<td></td>
<td>GSA-250</td>
<td>421-800-156WT</td>
</tr>
<tr>
<td>3</td>
<td>Jacket panel, right side</td>
<td>421-800-151WT</td>
</tr>
<tr>
<td>4</td>
<td>Jacket panel, door</td>
<td>421-800-167WT</td>
</tr>
<tr>
<td></td>
<td>GSA-075 &amp; GSA-100</td>
<td>421-800-168WT</td>
</tr>
<tr>
<td></td>
<td>GSA-125 &amp; GSA-150</td>
<td>421-800-169WT</td>
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<td></td>
<td>GSA-175 &amp; GSA-200</td>
<td>421-800-170WT</td>
</tr>
<tr>
<td></td>
<td>GSA-250</td>
<td>421-800-171WT</td>
</tr>
<tr>
<td>5</td>
<td>Jacket panel, interior</td>
<td>421-800-162WT</td>
</tr>
<tr>
<td></td>
<td>GSA-075 &amp; GSA-100</td>
<td>421-800-163WT</td>
</tr>
<tr>
<td></td>
<td>GSA-125 &amp; GSA-150</td>
<td>421-800-164WT</td>
</tr>
<tr>
<td></td>
<td>GSA-175 &amp; GSA-200</td>
<td>421-800-165WT</td>
</tr>
<tr>
<td></td>
<td>GSA-250</td>
<td>421-800-166WT</td>
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<tr>
<td>6</td>
<td>Jacket panel, rear</td>
<td>421-800-157WT</td>
</tr>
<tr>
<td></td>
<td>GSA-075 &amp; GSA-100</td>
<td>421-800-158WT</td>
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<tr>
<td></td>
<td>GSA-125 &amp; GSA-150</td>
<td>421-800-159WT</td>
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<td>GSA-175 &amp; GSA-200</td>
<td>421-800-160WT</td>
</tr>
<tr>
<td></td>
<td>GSA-250</td>
<td>421-800-161WT</td>
</tr>
<tr>
<td>7</td>
<td>Bottom cross tie</td>
<td>421-800-172WT</td>
</tr>
<tr>
<td></td>
<td>GSA-075 &amp; GSA-100</td>
<td>421-800-173WT</td>
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<td></td>
<td>GSA-125 &amp; GSA-150</td>
<td>421-800-174WT</td>
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<tr>
<td></td>
<td>GSA-175 &amp; GSA-200</td>
<td>421-800-175WT</td>
</tr>
<tr>
<td></td>
<td>GSA-250</td>
<td>421-800-190WT</td>
</tr>
<tr>
<td>8</td>
<td>Junction box, 4 x 4 (Available at local supply house)</td>
<td></td>
</tr>
</tbody>
</table>
# 10 Replacement parts

**Figure 22 Controls and trim**

<table>
<thead>
<tr>
<th>Item number</th>
<th>Description</th>
<th>Manufacturer</th>
<th>Manufacturer’s part number</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pressure relief valve, ASME, 15 PSIG, ¾” npt (Fittings shown are factory-installed on boiler. Coupling ¾” npt, Nipple ¾” npt)</td>
<td>Conbraco</td>
<td>13-501-08 315</td>
<td>511-548-023WT</td>
</tr>
<tr>
<td>2</td>
<td>Low water cutoff, probe-type</td>
<td>Hydrolevel</td>
<td>400</td>
<td>511-114-515WT</td>
</tr>
<tr>
<td>3</td>
<td>Limit control/gauge assembly, includes: Pressure control Gauge, steam Siphon, ¾” npt, 90° brass Nipple, close ¾” npt Tee, ¾” npt</td>
<td>Honeywell Winter’s</td>
<td>PA-404-A E1437</td>
<td>510-312-135WT 510-218-045WT obtained locally obtain locally obtain locally</td>
</tr>
<tr>
<td>4</td>
<td>Gauge glass assembly, includes: Gauge glass Gauge glass guard, 9 ⅜” Gauge cock set, brass</td>
<td>Conbraco United Brass Wks</td>
<td>21-205-03-W 905 and 946</td>
<td>591-419-185WT 563-334-580WT 510-218-145WT</td>
</tr>
<tr>
<td>5</td>
<td>Drain valve, ¾”</td>
<td></td>
<td></td>
<td>511-210-423WT</td>
</tr>
</tbody>
</table>
10 Replacement parts continued

Figure 23 For Spark Ignition Gas Controls see GSA Spark Ignition Control Supplement.
11 Dimensions

Figure 24  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. Skim tapping
7. Manual main shutoff 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 tappings can be found in the table below. See Piping section for recommended system supply and return piping sizes.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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<td>GSA-075</td>
<td>3</td>
<td>2½</td>
<td>½</td>
<td>6</td>
<td>5</td>
<td>17</td>
<td>430</td>
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<tr>
<td>GSA-100</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>GSA-125</td>
<td>3</td>
<td>2½</td>
<td>½</td>
<td>6½</td>
<td>6</td>
<td>21¼</td>
<td>505</td>
</tr>
<tr>
<td>GSA-150</td>
<td>3</td>
<td>2½</td>
<td>½</td>
<td>6½</td>
<td>6</td>
<td>21¼</td>
<td>505</td>
</tr>
<tr>
<td>GSA-175</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>GSA-200</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>GSA-250</td>
<td>3</td>
<td>2½</td>
<td>¼</td>
<td>9½</td>
<td>8</td>
<td>29¼</td>
<td>660</td>
</tr>
<tr>
<td>GSA-300</td>
<td>3</td>
<td>2½</td>
<td>¼</td>
<td>Note 3</td>
<td>Note 3</td>
<td>34</td>
<td>735</td>
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</tbody>
</table>

Note 2: Size gas piping from meter to boiler per local utility requirements.
Note 3: GSA-300 the damper is additional equipment.
## 12 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 AHRI 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></td>
<td>Input (Btuh)</td>
<td>DOE Heating Capacity (Output) (Btuh)</td>
<td>Input (Btuh)</td>
<td>(Output) (Btuh)</td>
<td>Sq. Ft. Steam</td>
<td>Steam Btuh</td>
</tr>
<tr>
<td>(Note 3)</td>
<td>(Note 1)</td>
<td>(Note 4)</td>
<td>(Note 2)</td>
<td>(Note 3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GSA-075</td>
<td>75,000</td>
<td>62,000</td>
<td>67,500</td>
<td>56,000</td>
<td>196</td>
<td>47,000</td>
</tr>
<tr>
<td>GSA-100</td>
<td>100,000</td>
<td>83,000</td>
<td>90,000</td>
<td>75,000</td>
<td>258</td>
<td>62,000</td>
</tr>
<tr>
<td>GSA-125</td>
<td>125,000</td>
<td>104,000</td>
<td>112,500</td>
<td>93,000</td>
<td>325</td>
<td>78,000</td>
</tr>
<tr>
<td>GSA-150</td>
<td>150,000</td>
<td>125,000</td>
<td>135,000</td>
<td>112,000</td>
<td>392</td>
<td>94,000</td>
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<tr>
<td>GSA-175</td>
<td>175,000</td>
<td>145,000</td>
<td>157,500</td>
<td>131,000</td>
<td>454</td>
<td>109,000</td>
</tr>
<tr>
<td>GSA-200</td>
<td>200,000</td>
<td>167,000</td>
<td>180,000</td>
<td>150,000</td>
<td>521</td>
<td>125,000</td>
</tr>
<tr>
<td>GSA-250</td>
<td>250,000</td>
<td>209,000</td>
<td>225,000</td>
<td>188,000</td>
<td>654</td>
<td>157,000</td>
</tr>
<tr>
<td>GSA-300</td>
<td>299,000</td>
<td>247,000</td>
<td>270,000</td>
<td>216,000</td>
<td>770</td>
<td>185,000</td>
</tr>
</tbody>
</table>

### Notes

1. Based on standard test procedures prescribed by the United States Department of Energy.
2. Net AHRI 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 local dealer regarding information and parts for high altitude applications.