



Gas-Fired Steam Boilers



# Boiler Manual

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## 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.

**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.

**WARNING** 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.

**WARNING** 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.

**WARNING** 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.

**NOTICE** When calling or writing about the boiler— Please have: • boiler model number from the boiler rating label and • 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 16.

## Read this first!

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

### 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.

## 1 Prepare boiler location

### Codes & checklist

#### Installations must follow these codes:

- Local, state, provincial, and national codes, laws, regulations and ordinances.
- National Fuel Gas Code, ANSI Z223.1–latest edition.
- 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

**NOTICE** The GSA boiler gas manifold and controls met safe lighting and other performance criteria when boiler underwent tests specified in ANSI Z21.13–latest edition.

### 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:
  1. System leaks causing oxygen corrosion or section cracks from hard water deposits.

# 1 Prepare boiler location continued

## 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 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.

Service clearances:	Minimum
Top (for cleaning flueways)	46"
Front (for access to controls and components)	18"
Back	6"
Left side (for cleaning and servicing)	24"
Right side	6"

### Minimum clearance 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

**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:	Minimum
Top	46"
Front (provide means of access)	3"
Back	6"
Left side (provide means of access)	4"
Right side	4"

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

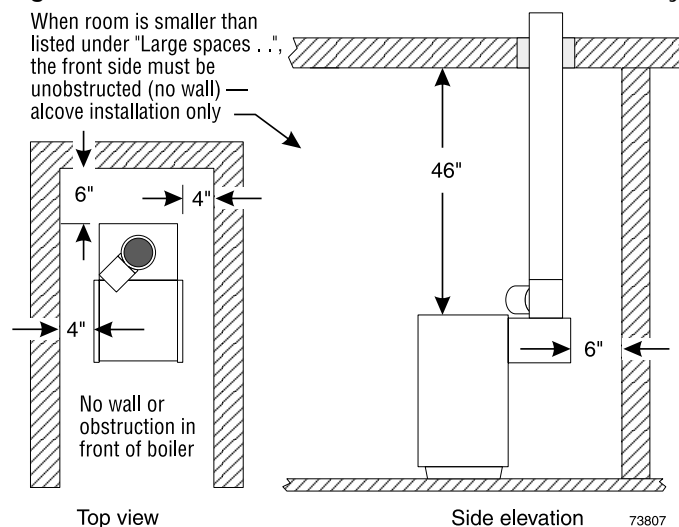
If installed in a four-walled room, the room volume must be no less than the following (Ceiling height, if over 8 feet, can only be counted as 8 feet.):

GSA075 & GSA100	147 cubic feet
GSA125 & GSA150	184 cubic feet
GSA175 & GSA200	221 cubic feet
GSA250	257 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

**Figure 1** Minimum clearances - alcove installation only



## 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

**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 1** Minimum foundation size

Boiler model	Minimum foundation length	Minimum foundation width
GSA075 – GSA100	29 5/8"	19"
GSA125 – GSA150	29 5/8"	23 1/4"
GSA175 – GSA200	29 5/8"	27 1/2"
GSA250	29 5/8"	31 3/4"

# 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.
- DANGER** 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.
- 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 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 venting 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.

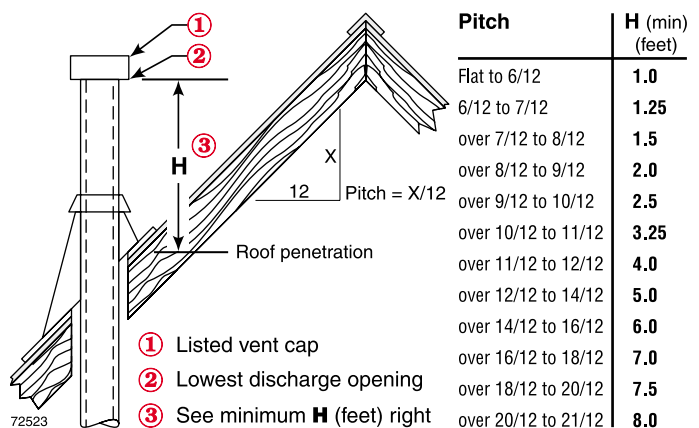
### Chimney or vent requirements

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 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. Williamson-Thermoflo recommends the following 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.

**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*



# 1 Prepare boiler location continued

## 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.

**WARNING** 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.

**Table 2** Corrosive contaminants and likely locations

Products to avoid
Spray cans containing chloro/fluorocarbons
Permanent wave solutions
Chlorinated waxes/cleaners
Chlorine-based swimming pool chemicals
Calcium chloride used for thawing
Sodium chloride used for water softening
Refrigerant leaks
Paint or varnish removers
Hydrochloric acid/muriatic acid
Cements and glues
Antistatic fabric softeners used in clothes dryers
Chlorine-type bleaches, detergents, and cleaning solvents found in household laundry rooms
Adhesives used to fasten building products and other similar products
Areas likely to have contaminants
Dry cleaning/laundry areas and establishments
Swimming pools
Metal fabrication plants
Beauty shops
Refrigeration repair shops
Photo processing plants
Auto body shops
Plastic manufacturing plants
Furniture refinishing areas and establishments
New building construction
Remodeling areas
Garages with workshops

## Air openings

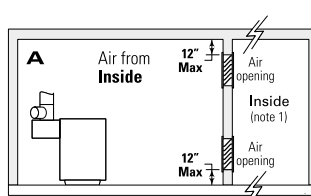
Combustion air and ventilation openings must comply with Section 5.3, “Air for Combustion and Ventilation”, of National Fuel Gas Code ANSI Z223.1–latest edition, or applicable local building codes. Canadian installations must comply with B149.1 or B149.2 Installation Codes.

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.

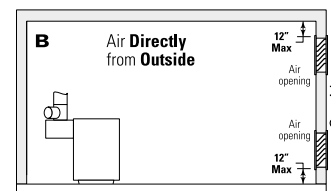
**WARNING** Provide adequate combustion and ventilation air to assure proper combustion and reduce the risk of severe personal injury, death or substantial property damage caused by flue gas spillage and carbon monoxide emissions.

### Minimum air opening sizes (See EXCEPTION below)

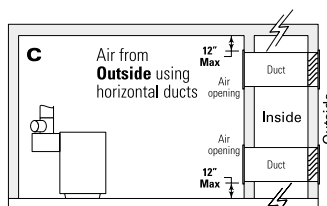
Required area of the air openings given in this table are **free area** — after the correction for louver obstruction.



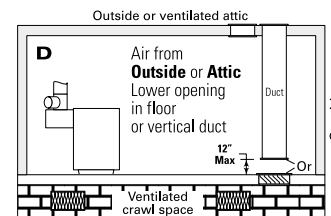
**2** Openings: Each **1** square inch free area per **1,000** Btuh input of other appliances **plus** GSA input



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



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



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

**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 below).

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

**Tight construction** means (per ANSI Z223.1):

- Walls and ceilings exposed to the outside atmosphere have a continuous water vapor retarder with a rating of 1 perm or less with openings gasketed.
- AND**
- Weather-stripping has been added on openable windows and doors.
- AND**
- Caulking or sealants are applied to areas such as joints around windows and door frames, between sole plates and floors, between wall-ceiling joints, between wall panels, at penetrations for plumbing, electrical, and gas lines, and in other openings.

Note 1: If building is of tight construction and air is taken from inside, as in A, 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.

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# 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 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.
3. Remove crate. **Leave boiler on pallet.**
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.)

**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.

Table 3 Manifold orifice sizing

Location	Natural gas	
	U. S.	Sea level – 2,000 ft 2.45 mm
Canada	Sea level – 2,000 ft 2.45 mm	2,000 – 4,500 2.30 mm

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.
 

**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 maintained gauge pressure for more than 10 minutes. Visually check for leaks if gauge pressure drops.

## 2 Prepare boiler continued

### Pressure test continued

#### 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.

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

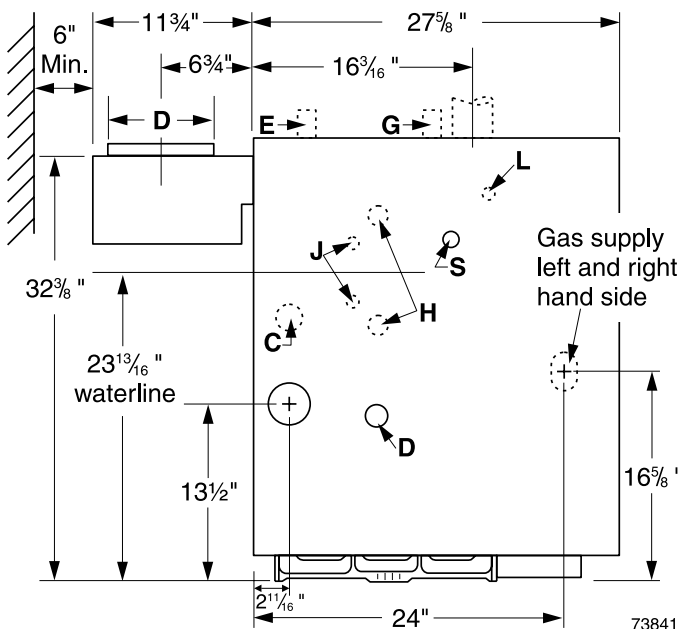
2. Retest boiler after repairing leaks.
3. Remove plugs from any tappings that will be used for controls and accessories. Refer to Table 4 and Figure 3, below.

Table 4 Control tapping

Location	Size	Description
C	3/4"	Probe-type low water cutoff
D	3/4"	Drain
E	3/4"	Relief valve
G	3/4"	Plugged
H	1/2"	Gauge glass and/or optional low water cutoff
J (See Note)	3/8"	Try cock tappings
L	1/4"	Siphon, pressure gauge, high limit control
S	1 1/2"	Skim tapping

Note: Available only on special request.

Figure 3 Control tapping locations



### 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.

**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 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.

#### 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 1/4" 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.

**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 11, Figure 9, for a typical installation.

## 2 Prepare boiler continued

### 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  $\frac{3}{8}$ " diameter hole in vent damper hole.

#### Minimum clearances

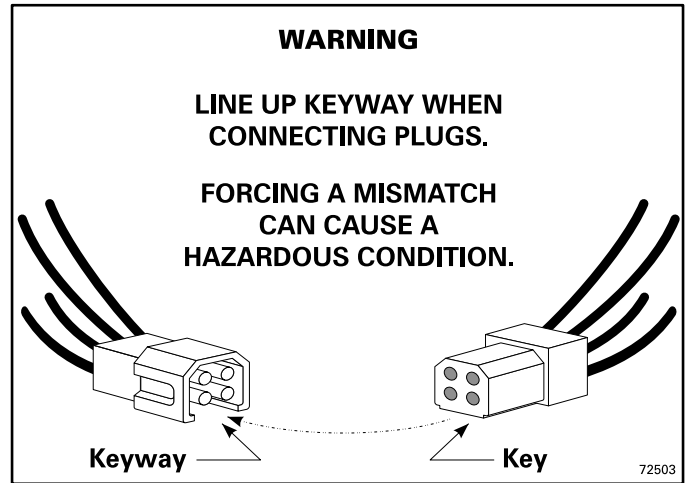
Provide a minimum of 6" between the vent damper and any combustible material. (See "Minimum clearance to combustible materials," page 3, for minimum clearance from jacket top to ceiling to maintain this dimension.)

#### Damper installation

**DANGER** Do not modify draft 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.



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** 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.

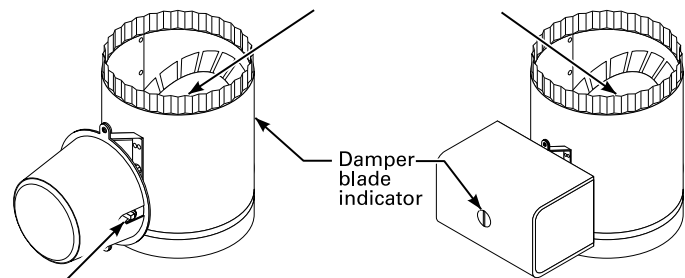
**CAUTION** After boiler has operated once, if either end of harness is disconnected, the system safety shutdown will occur. The boiler will not operate until harness is reconnected.

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

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.



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



### 3 Install piping

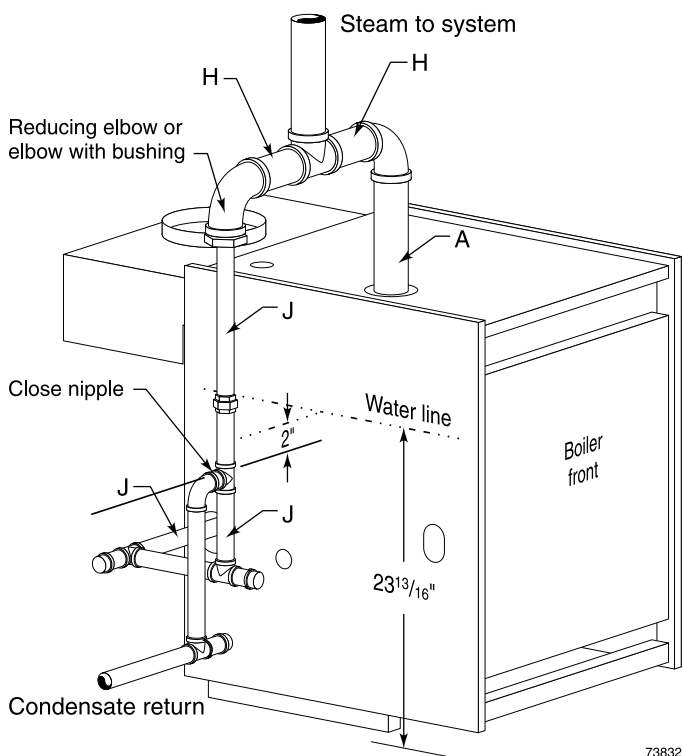
#### General

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 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.

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



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**Table 5** Recommended pipe sizing

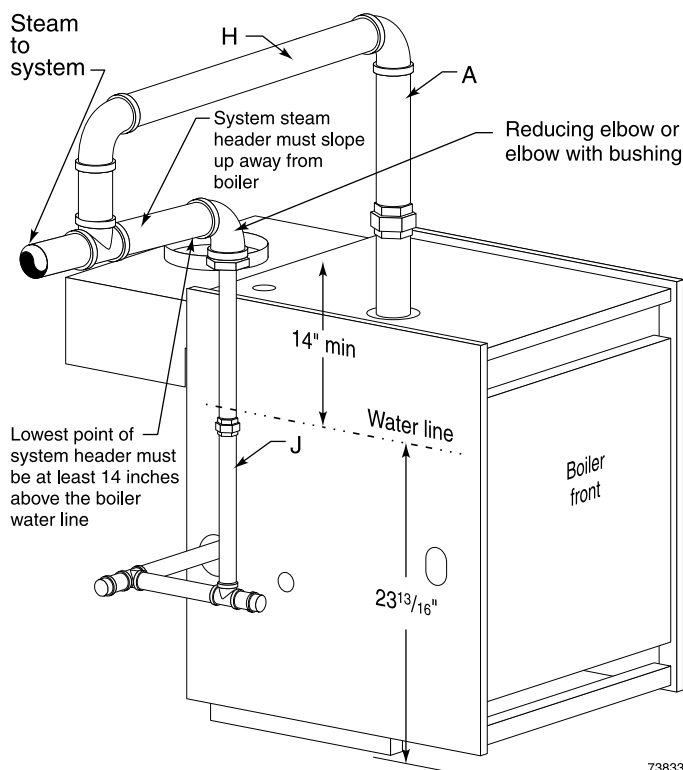
Boiler model number	Riser (A)	Header (H) see Note	Equalizer (J)
GSA075 and GSA100	2"	2"	1½"
GSA125 through GSA175	2½"	2 ½"	1½"
GSA200 and GSA250	3"	3"	1½"

Note: 24" minimum from waterline to header.

#### 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 6** Connection to counterflow steam piping



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#### 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.

### 3 Install piping continued

#### 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, 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 6** Reservoir pipe sizing

Boiler model number	Boiler gross output MBH	Time from initial steaming to average condensate return (boiler steaming capacity based on 970 Btu per pound of steam)					
		15 minutes		20 minutes		30 minutes	
		gallons	pipe length (feet)	gallons	pipe length (feet)	gallons	pipe length (feet)
GSA075	75	1	1	1½	1½	Use boiler feed system	
GSA100	100	1	1	2	2		
GSA125	125	1¼	1¼	2½	2½		
GSA150	150	1½	1½	3	2½	Use boiler feed system	
GSA175	175	1¾	1¾				
GSA200	200	2	2				
GSA250	250	2½	2½				

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

**Table 7** Boiler feed system sizing

Boiler model number	I=B=R gross output (pounds steam per hour)	Condensate (gallons per hour)	Minimum condensate receiver capacity gallons for boiler steaming times (minutes) of:				Suggested feed pump capacity (GPM @ 15 PSI) (note 2)
			15 min.	30 min.	45 min.	60 min.	
GSA075	63	8	2	4	6	8	0.2
GSA100	81	10	3	6	9	12	0.3
GSA125	102	12	4	7	11	14	0.4
GSA150	122	15	5	9	14	18	0.5
GSA175	142	17	5	10	15	20	0.6
GSA200	163	20	6	12	18	24	0.7
GSA250	203	24	7	14	22	29	0.8

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.

#### 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 overflow.
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:

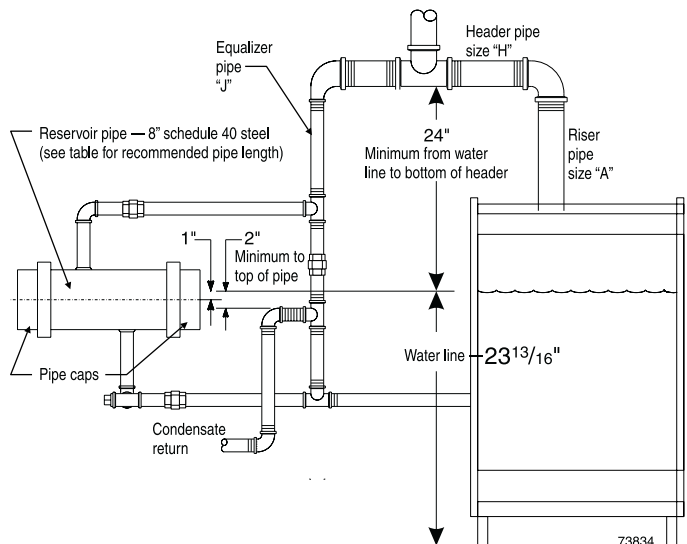
1. Disconnect condensate return line at existing boiler.
2. Heat boiler and allow to steam for 10 minutes. Turn off boiler.
3. Measure length of time from when boiler started to steam to when condensate begins to return through condensate line.
4. Measure length of time from when condensate begins to 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 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 cutoff/pump control on the boiler to operate the pump. Use Table 7 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.

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



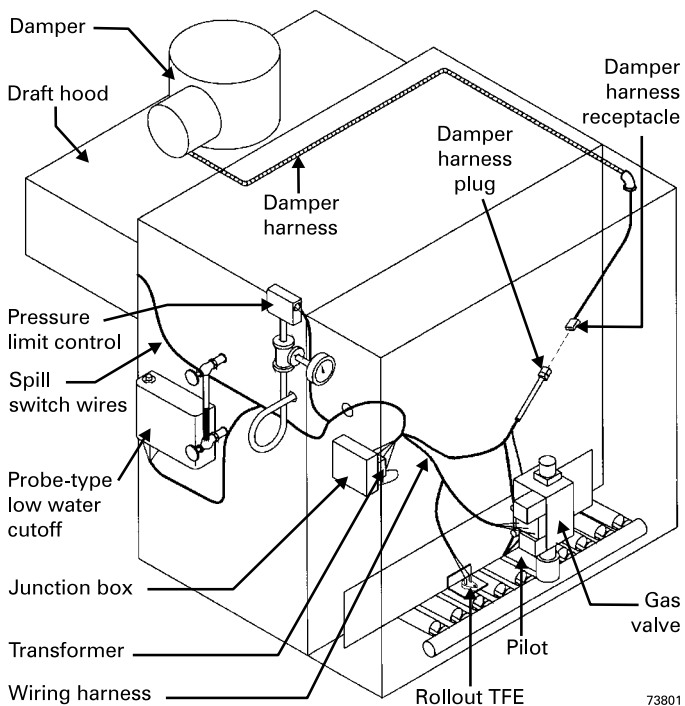
## 4 Install controls

### 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 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.

Figure 8 Controls



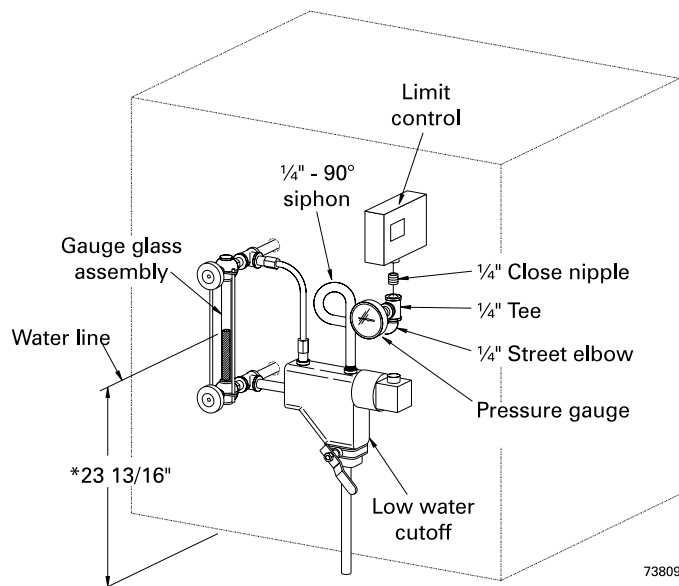
### Float-type low water cutoff (when provided by others)

1. Install low water cutoff as shown in Figure 9, 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 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.

Figure 9 Float-type low water cutoff (when provided by others)



\* 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 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.
2. Support piping with hangers, not by boiler or its accessories.
3. Purge all air from gas supply piping.
4. Before placing boiler in operation, check boiler and its gas connection for leaks.
  - 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 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 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.

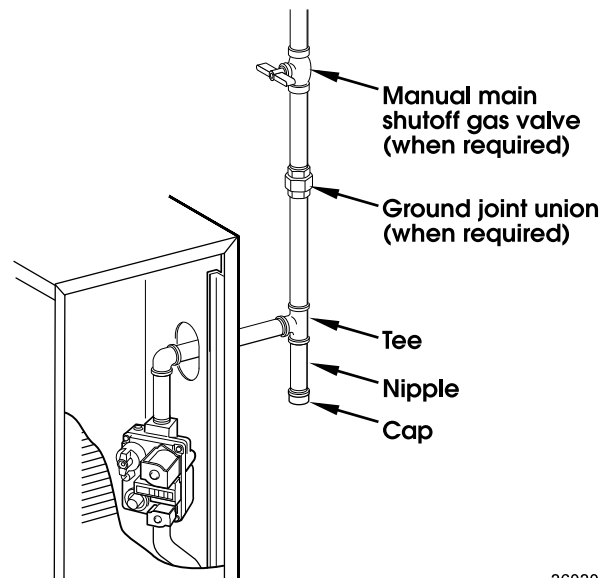
#### Propane Gas:

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 8** Pipe capacity for 0.60 specific gravity natural gas

Gas pipe length (feet)	Capacity of pipe for pipe size of: (Capacity in standard cubic feet gas per hour)					
	½"	¾"	1"	1¼"	1½"	2"
10	132	278	520	1050	1600	3050
20	92	190	350	730	1100	2100
30	73	152	285	590	860	1650
40	63	130	245	500	760	1450
50	56	115	215	440	670	1270
75	45	93	175	360	545	1020
100	38	79	150	305	460	870
150	31	64	120	250	380	710

**Figure 10** Gas supply piping



26020

## 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 Part 1, and any local codes.

### 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.

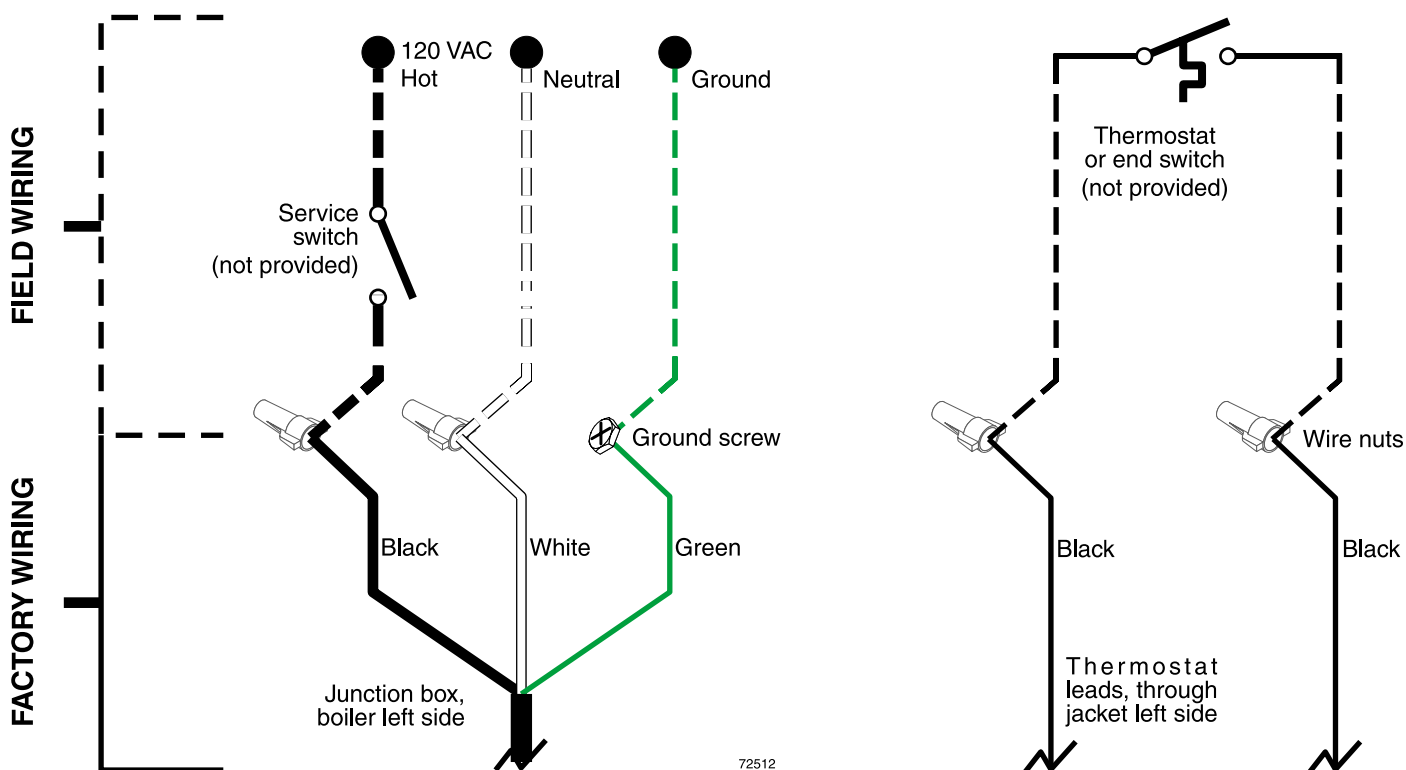
### Thermostat

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



## 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 "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.
7. Remove skim piping. Plug tapping.
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.

**WARNING** 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.

### 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 ½ of gauge glass or less than ¼" above bottom of gauge glass).
- Verify the "Preparation" procedures, on this page, have been completed.



## 7 Start-up continued

### Operate boiler continued

#### 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 “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:” 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 14.
4. Verify operation using procedures below. Perform “Checkout procedure”, page 16, and fill in the “Installation and service certificate”.

#### 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”, 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.

2. Underfired — Small flame. Inner cone not engulfing thermocouple.
3. Lack of primary air — Yellow flame tip.
4. Incorrectly heated thermocouple.

#### Check burner flames — Main burner

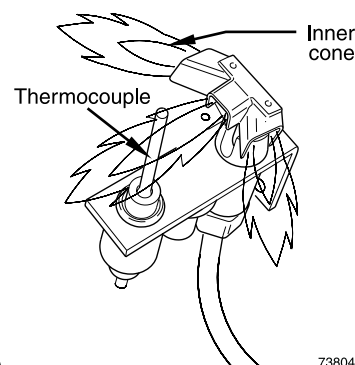
##### Proper main burner flame (see Figure 13):

1. Yellow-orange streaks may appear (caused by dust).

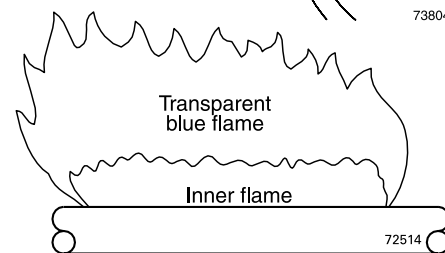
##### Improper main burner flame:

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

**Figure 12**  
Typical pilot burner flame



**Figure 13**  
Typical main burner flame



#### 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 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 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 Checkout procedure

- 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.

**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?
- 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.
- 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 control(s) to system pressure requirements. Adjust balancing valves and controls to provide design pressure to system.
- Verify thermostat heat anticipator (if available) set properly? See "Thermostat", page 13.
- 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:
 
$$\frac{3600 \times 1000}{\text{number of seconds from step c}} = \text{Btuh}$$
  - 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.
- Checkout 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 Sequence of operation

**NOTICE**

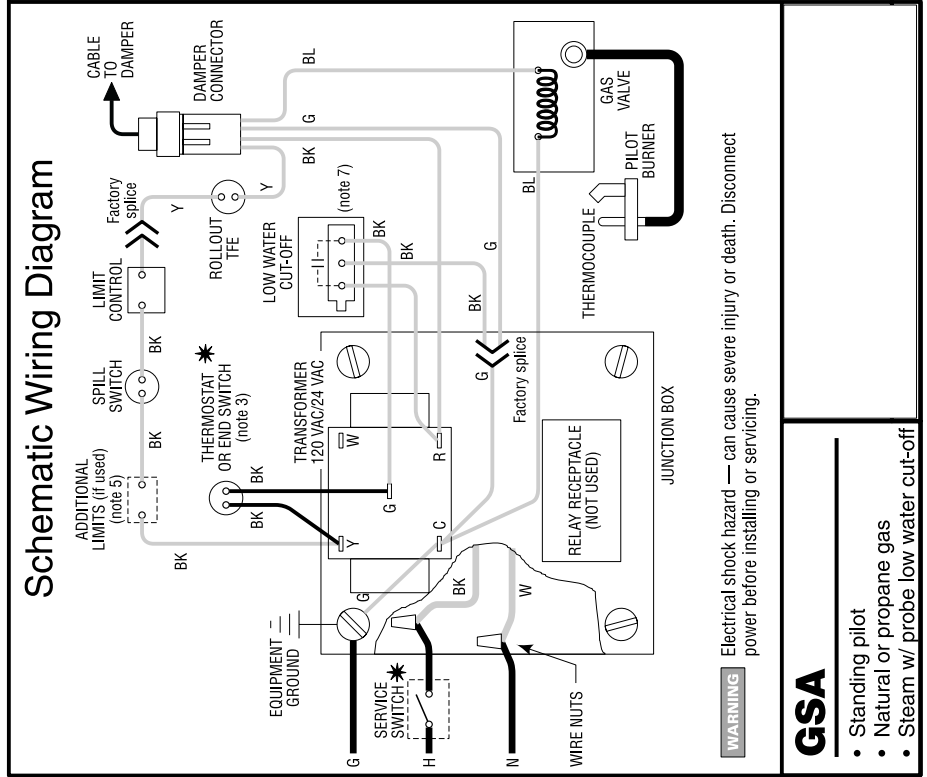
Follow all procedures given in this manual and “Lighting Instructions” when operating the boiler. Failure to do so could result in severe personal injury, death or substantial property damage.

- Standby mode:** After pilot is manually lighted, the gas valve provides pilot gas and maintains pilot as long as the thermocouple is satisfied. If thermocouple signal drops for any reason, pilot must be manually lighted, following the “Lighting Instructions” in this manual and on boiler. Vent damper will remain closed until a call for heat.
- Call for heat:** When thermostat circuit closes, the boiler vent damper is energized. The vent damper drives open. When the vent damper is fully open, its end switch

energizes the main gas valve. This provides gas to the main burners. Burners remain ignited until thermostat circuit or limit circuit opens. Burners are deenergized when call for heat stops.

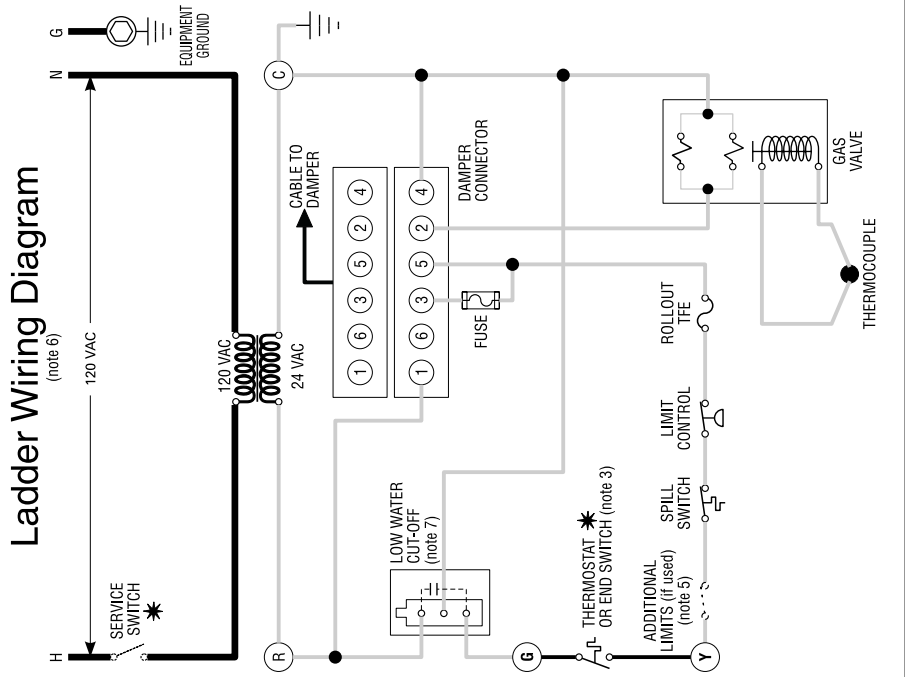
- Limit operation:** When a limit control opens, the main gas valve is deenergized. When the limit circuit closes again, the main gas valve is energized if there is still a call for heat.
- Thermostat heat anticipator:** Set heat anticipator as shown on wiring diagram, Figure 14.

Figure 14 Wiring diagram — Standing pilot system



## Schematic Wiring Diagram

## Ladder Wiring Diagram



**Notes:**

- All wiring must be installed in accordance with:
  - A. U.S.A. — N.E.C. And any other national, state, or local code requirements.
  - B. Canada — C.S.A. C22.1 C.E.C. Part 1 and any other national, provincial, or local code requirements.
- If any of the original wire as supplied with the appliance must be replaced, use minimum 105 °C wire or equivalent. Exception — wires to a rollout TFE must be 200 °C or equivalent.
- Thermostat anticipator setting (single zone) — See Table G, below. For multiple-zone applications using zone valves, refer to component manufacturer's literature for component current.
- Refer to control component instructions packed with the boiler for application information.
- Wire any additional limit controls (low water cut-off, additional high limit, etc.) in series with boiler limit control as shown.
- All contacts shown without power applied.
- Use only low water cutoffs listed in Boiler Manual. These low water cutoffs contain a plug-in wiring connector.

\* Items not provided

Gas valve	Anticipator setting (amps)	
	With Ethical vent damper	With Johnson vent damper
Honeywell VR8200	0.6	0.7
Honeywell VR8300	0.8	0.9
Robertshaw 720DER	0.5	0.6

**Legend**

- 120 VAC FIELD WIRING
- LOW VOLTAGE FIELD WIRING
- 120 VAC FACTORY WIRING
- LOW VOLTAGE FACTORY WIRING
- THERMOCOUPLE

# 10 Lighting Instructions — GSA standing pilot boilers

## Honeywell VR8200/VR8300 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.

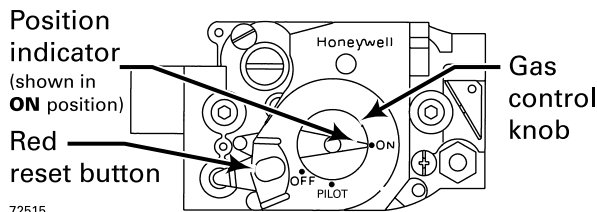
- A. This appliance has a pilot, which must be lighted by hand. When lighting the pilot, follow these instructions exactly.
- B. Before **LIGHTING**, smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor. See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

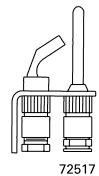
### LIGHTING INSTRUCTIONS

1. **Stop!** Read the safety information above on this label.
2. Set the thermostat to lowest setting.
3. When equipped with **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. 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.

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. Turn gas control knob counterclockwise ↺ to **PILOT**.
12. Push in red reset button and hold. Immediately light the pilot with a match. Continue to hold reset button in for about one (1) minute after the pilot is lit.
13. Release reset button. Pilot should remain lit. If pilot goes out, repeat steps 6 through 13.
  - If reset button stays depressed after release, stop and immediately call your service technician or gas supplier.
  - If the pilot will not stay lit after several tries, turn the gas control knob clockwise ↻ to **OFF** and call your service technician or gas supplier.
14. Replace access panel.
15. Turn gas control knob counterclockwise ↺ to **ON**.
16. Turn on all electric power to the appliance.
17. When equipped with **Effikal** vent damper, place service switch in **Automatic Operation** position.
18. Set thermostat to desired setting.
19. Replace front panel.



### 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.

# 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.

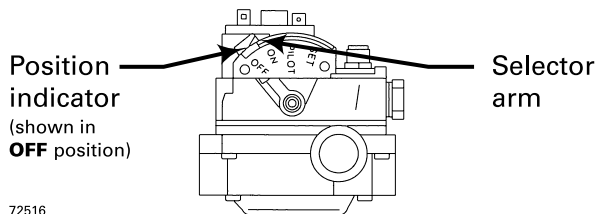
- A. This appliance has a pilot, which must be lighted by hand. When lighting the pilot, follow these instructions exactly.
- B. Before **LIGHTING**, smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor. See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

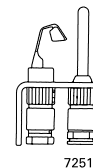
- Do not try to light any appliance.
- Do not touch any electric switch; do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

### LIGHTING INSTRUCTIONS

1. **Stop!** Read the safety information above on this label.
2. Set the thermostat to lowest setting.
3. When equipped with **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 ↶ to **OFF**.
7. When equipped with vent damper, verify damper blade is in full open position.



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** for about one-half (1/2) minute after the pilot is lit.
13. Release selector arm. If pilot does not remain lit, repeat steps 6 through 13.
- If the pilot will not stay lit after several tries, move selector arm left ↶ to **OFF** and call your service technician or gas supplier.
14. Replace access panel.
15. Turn selector arm left ↶ to **ON**.
16. Turn on all electric power to the appliance.
17. When equipped with **Effikal** vent damper, place service switch in **Automatic Operation** position.
18. Set thermostat to desired setting.
19. Replace front panel.



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. 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)

Service technician (see following pages for instructions)		Owner maintenance (see User’s Information Manual for instructions)	
ANNUAL START-UP	<input type="checkbox"/> <b>Inspect:</b> <ul style="list-style-type: none"> <li>• Reported problems</li> <li>• Boiler area</li> <li>• Air openings</li> <li>• Flue gas vent system</li> <li>• Pilot and main burner flames</li> <li>• Piping</li> <li>• Boiler heating surfaces</li> <li>• Burners and base</li> </ul>	<input type="checkbox"/> <b>Daily</b> <ul style="list-style-type: none"> <li>• Check boiler area</li> <li>• Check boiler pressure gauge</li> <li>• Check air openings</li> </ul>	
	<input type="checkbox"/> <b>Service:</b> <ul style="list-style-type: none"> <li>• Gauge glass</li> </ul>	<input type="checkbox"/> <b>Monthly</b> <ul style="list-style-type: none"> <li>• Check boiler and system piping</li> <li>• Check venting system</li> <li>• Check/operate boiler relief valve</li> <li>• Check pilot and main burner flames</li> </ul>	
	<input type="checkbox"/> <b>Start-up:</b> <ul style="list-style-type: none"> <li>• Perform start-up per manual</li> </ul>	<input type="checkbox"/> <b>Periodically</b> <ul style="list-style-type: none"> <li>• Test low water cutoff</li> </ul>	
	<input type="checkbox"/> <b>Check/test:</b> <ul style="list-style-type: none"> <li>• Gas piping</li> <li>• Boiler waterline</li> <li>• Limit controls and cutoffs</li> <li>• Boiler relief valve</li> </ul>	<input type="checkbox"/> <b>End of season</b> <ul style="list-style-type: none"> <li>• Shut down procedure</li> </ul>	
<input type="checkbox"/> <b>Review:</b> <ul style="list-style-type: none"> <li>• Review with owner</li> </ul>			

**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.



# 11 Service and maintenance continued

**WARNING** 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.

**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 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.

**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

1. Visually inspect pilot burner and main burner flames as directed under Section 7, page 15 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.

**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 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

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 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 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 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 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.

**WARNING** 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.

- 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.

# 11 Service and maintenance continued

## □ 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.
4. Close 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 bot 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 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. . . . .

### 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.

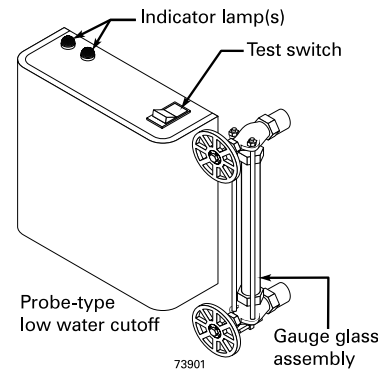
## □ Check/test. . . . .

### Low water cutoffs

Probe-type low water cutoff (see below)

Clean probe-type low water cutoff for proper operation.

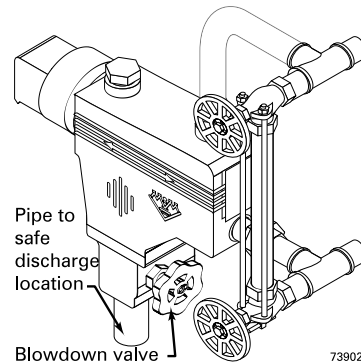
1. Turn off power to boiler and wait 5 minutes.
2. Drain water to bottom of gauge glass.
3. Turn on power.
4. Set thermostat to call for heat. Red neon lamp on lower water cutoff should light.
5. Wait 5 minutes. Boiler should not fire.
6. Refill boiler to correct waterline. Red lamp should go off.
7. 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.



# 11 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 as directed could result in unsafe pressure buildup, which can 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 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. Remove paper and soot. Vacuum or brush base and surrounding area.
8. Replace collector hood. Seal with boiler cement.

# 12 Troubleshooting

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

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

**WARNING** 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.

### Before troubleshooting:

1. Have the following items:
  - a. Voltmeter that can check 120 VAC and 24 VAC.
  - b. Continuity checker.
  - c. 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.

### 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?
2. 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.
  - c. If gas pressure is incorrect or gas is not available to boiler, contact gas supplier to correct before proceeding further.
3. Check pilot operation — Follow “Lighting Instructions”, pages 18 and 19.
  - 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:

#### Effikal 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 damage. 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

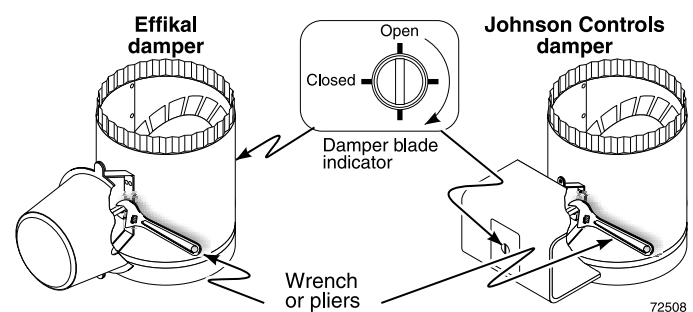
If troubleshooting chart recommends replacing actuator and actuator is not immediately available, damper blade can be fixed in an open position to allow boiler operation. Follow these instructions only in case of no heat or damper actuator malfunction. See Figure 15.

1. Turn off power to boiler.

**WARNING** Failure to turn off power to boiler can result in severe personal injury, death or substantial property damage.

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.

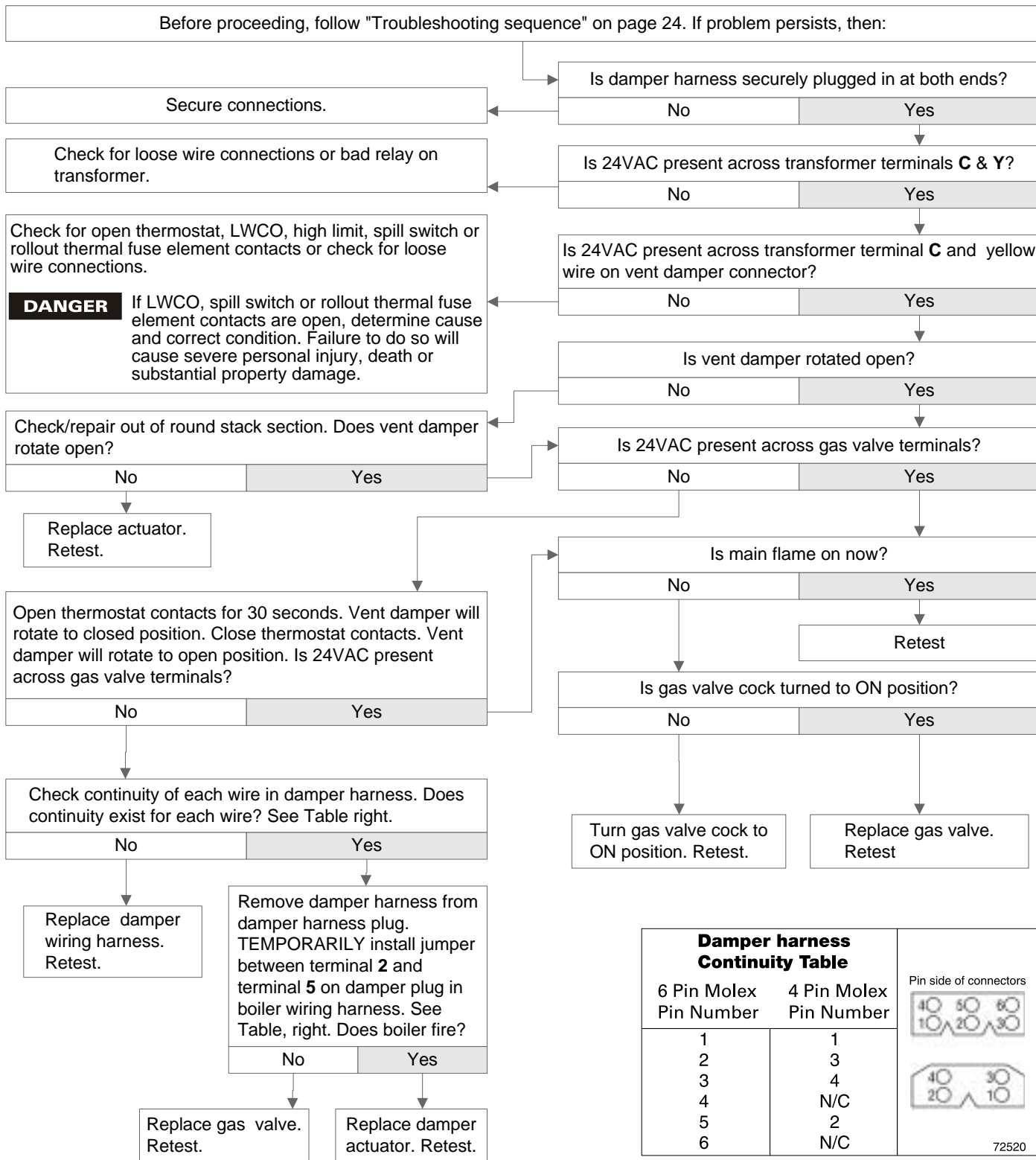
**Figure 15** Manually opening vent damper



**WARNING** Verify proper operation after servicing. • See vent damper manufacturer’s instructions packed with vent damper for additional information. Failure to comply could result in severe personal injury, death or substantial property damage.

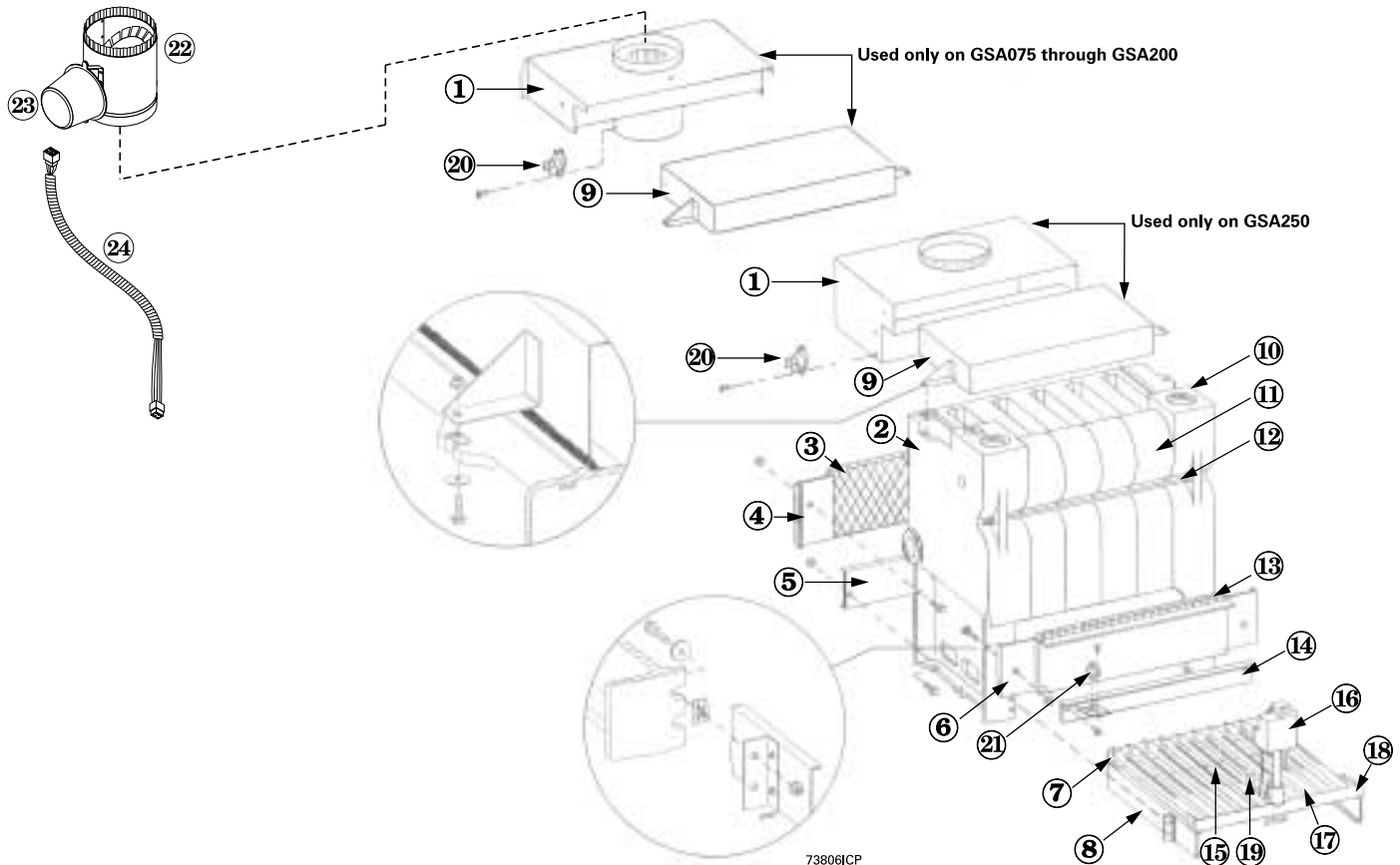
# 12 Troubleshooting continued

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



# 13 Replacement parts

Figure 16 Section assembly, flue collector, draft diverter, vent damper and base assembly



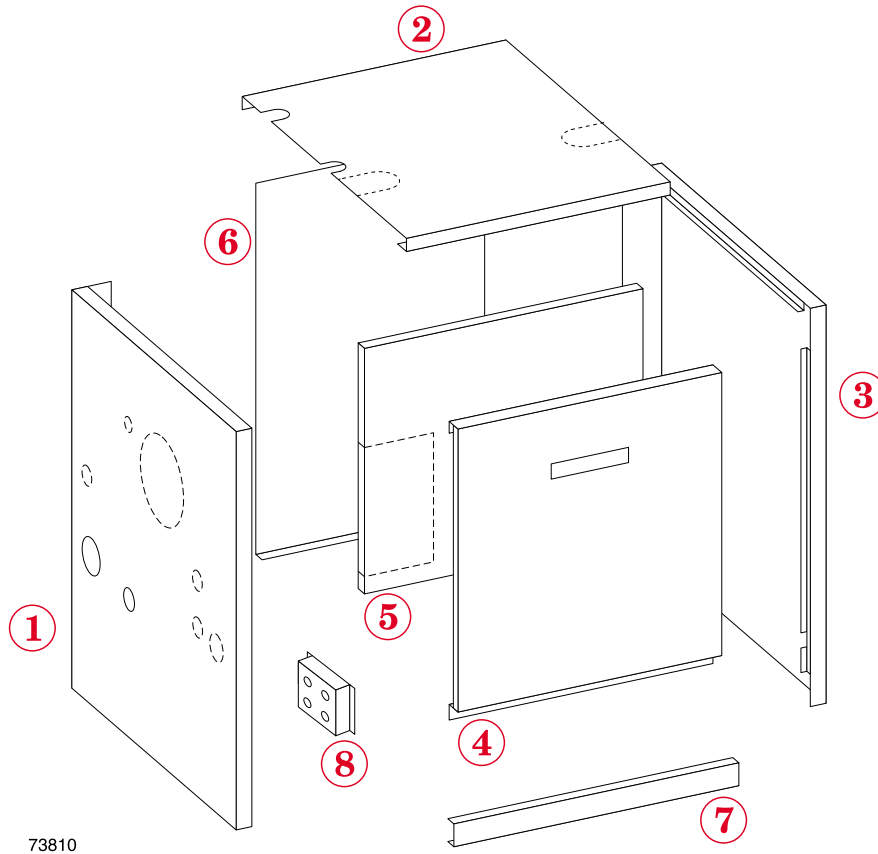
Item number	Description	International Comfort Products part number
1	Draft diverter GSA075 GSA100 GSA125 GSA150 GSA175 GSA200 GSA250	450021285WT 450021286WT 450021287WT 450021288WT 450021289WT 450021290WT 450021291WT
	Base insulation kit: Consists of items 3 and 13.	510811660WT
2	End section, left hand, 1813	311800007WT
3	Back base panel insulation (in Base insulation kit)	
4	Back base panel GSA075 & GSA100 GSA125 & GSA150 GSA175 & GSA200 GSA250	451800010WT 451800011WT 451800012WT 451800013WT
5	Back base channel GSA075 & GSA100 GSA125 & GSA150 GSA175 & GSA200 GSA250	451800020WT 451800021WT 451800022WT 451800023WT
6	Front base panel GSA075 & GSA100 GSA125 & GSA150 GSA175 & GSA200 GSA250	451800000WT 451800001WT 451800002WT 451800003WT
7	Back burner support GSA075 GSA100 GSA125 GSA150 GSA175 GSA200 GSA250	451800085WT 451800086WT 451800087WT 451800088WT 451800089WT 451800090WT 451800092WT
8	Burner pan side rail	451800070WT
9	Collector hood GSA075 & GSA100 GSA125 & GSA150 GSA175 & GSA200 GSA250	450014733WT 450014734WT 450014735WT 450014736WT
	Section replacement kit (Consists of: cope seal and 1 each 3" and 6" square cut seals)	381800100WT

Item number	Description	International Comfort Products part number
10	End section, right hand, 18118	311800029WT
11	Intermediate section, 1815	311800010WT
12	Tie rod, 1/2"	GSA075 & GSA100 GSA125 & GSA150 GSA175 & GSA200 GSA250
		560234470WT 560234475WT 560234480WT 560234485WT
13	Front base panel insulation (in Base insulation kit)	
14	Base access panel GSA075 & GSA100 GSA125 & GSA150 GSA175 GSA200 GSA250	451800040WT 451800041WT 451800039WT 451800042WT 451800043WT
15	Burner with pilot bracket	512200021WT
16	Gas valve — see "Gas controls" table on page 29	
17	Main burner orifice	560528987WT
18	Burner manifold GSA075 GSA100 GSA125 GSA150 GSA175 GSA200 GSA250	591125533WT 591125538WT 591125534WT 591125539WT 591125535WT 591125540WT 591125541WT
19	Pilot burner assembly — see "Gas controls" table on page 29	
20	Spill switch	510350100WT
21	Rollout thermal fuse element	512050230WT
22	Vent damper	5" 6" 7" 8"
		381800466WT 381800467WT 381800468WT 381800469WT
23	Vent damper actuator	only with vent damper above
24	Vent damper harness	591391795WT



# 13 Replacement parts continued

Figure 17 Jacket assembly

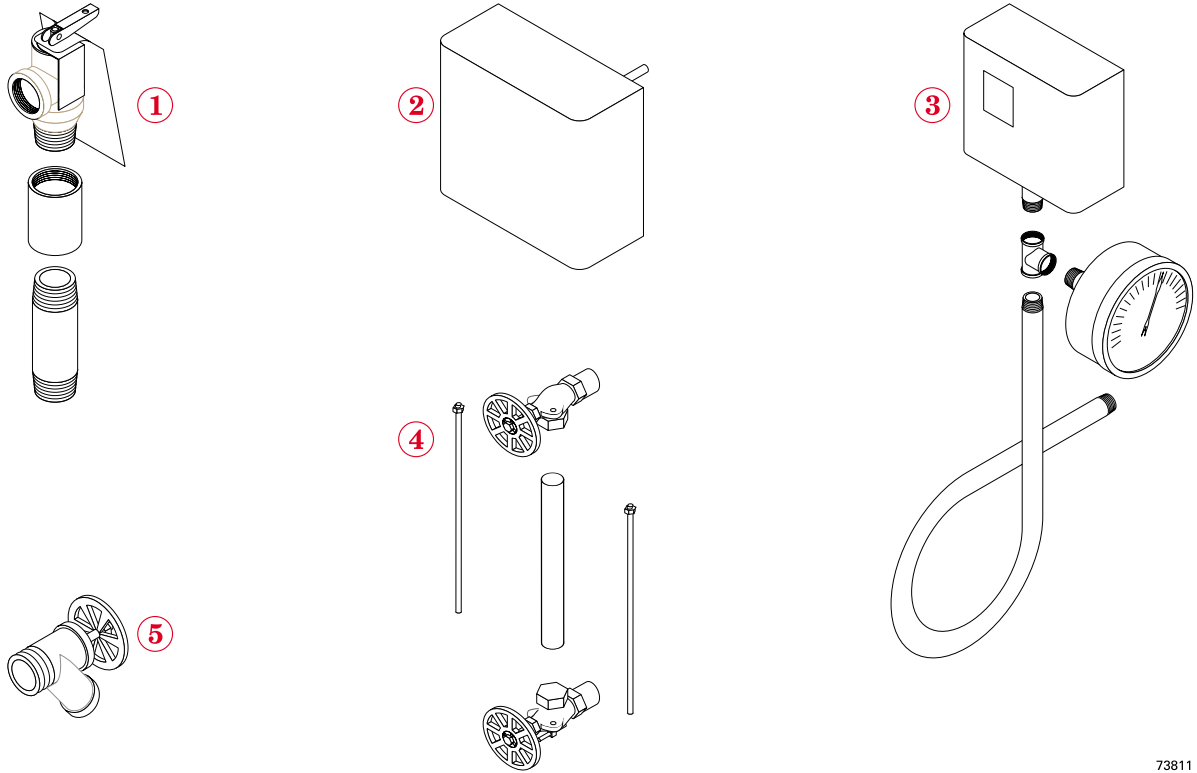


73810

Item number	Description	International Comfort Products part number
1	Jacket panel, left side	421800150WT
2	Jacket panel, top	GSA075 & GSA100 421800152WT GSA125 & GSA150 421800153WT GSA175 & GSA200 421800154WT GSA250 421800155WT
3	Jacket panel, right side	421800151WT
4	Jacket panel, door	GSA075 & GSA100 421800167WT GSA125 & GSA150 421800168WT GSA175 & GSA200 421800169WT GSA250 421800170WT
5	Jacket panel, interior	GSA075 & GSA100 421800162WT GSA125 & GSA150 421800163WT GSA175 & GSA200 421800164WT GSA250 421800165WT
6	Jacket panel, rear	GSA075 & GSA100 421800157WT GSA125 & GSA150 421800158WT GSA175 & GSA200 421800159WT GSA250 421800160WT
7	Bottom cross tie	GSA075 & GSA100 421800172WT GSA125 & GSA150 421800173WT GSA175 & GSA200 421800174WT GSA250 421800175WT
8	Junction box, 4 x 4 (Available at local supply house)	

# 13 Replacement parts continued

Figure 18 Controls and trim

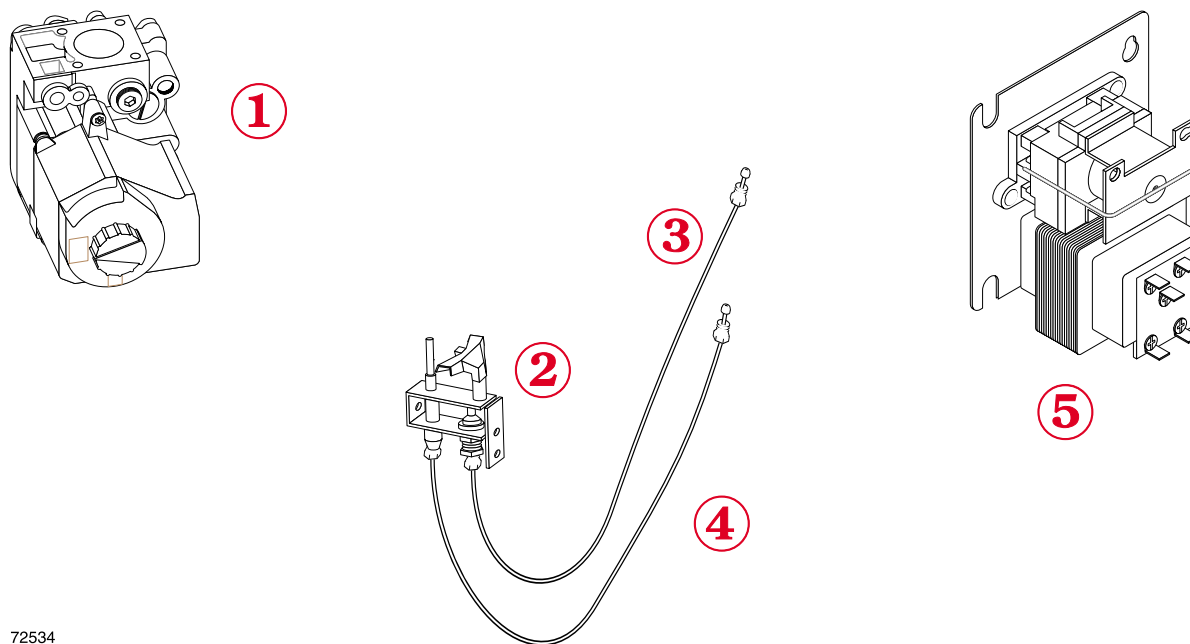


73811

Item number	Description	Manufacturer	Manufacturer's part number	International Comfort Products part number
1	Pressure relief valve, ASME, 15 PSIG, 3/4" npt (Fittings shown are factory-installed on boiler. Coupling 3/4" npt, Nipple 3/4" npt)	Conbraco Watts	13-501-08 315	511548023WT
2	Low water cutoff, probe-type	Hydrolevel	400	511114515WT
3	Limit control/gauge assembly, includes: Pressure control Gauge, steam Siphon, 1/4" npt, 90° brass Nipple, close 1/4" npt Tee, 1/4" npt	Honeywell Winter's	PA-404-A E1437	510312135WT 510218045WT obtain locally obtain locally obtain locally
4	Gauge glass assembly, includes: Gauge glass Gauge glass guard, 9 3/8" Gauge cock set, brass	Conbraco United Brass Wks	21-205-03-W 905 and 946	591419185WT 563334580WT 510218145WT
5	Drain valve, 3/4"	International Comfort Products		511210423WT

# 13 Replacement parts continued

Figure 19 Gas controls



72534

Item number	Description	Manufacturer	Manufacturer's part number	International Comfort Products part number
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Standing pilot — Natural gas components

1	Gas valve, 1/2" x 1/2", GSA075 through GSA175 Gas valve, 3/4" x 3/4", GSA200 and GSA250	Honeywell Robertshaw Honeywell	VR8200A2116 7200ER VR8300C4050	511044360WT 511044256WT
2	Pilot assembly kit with orifice	International Comfort Products		510811640WT
3	Tubing, pilot, aluminum with fittings			560742860WT
4	Tubing, thermocouple			511724254WT
5	Transformer with receptacle	Honeywell White-Rodgers	R8285K1004 S84A-85	510312166WT
not shown	Wiring harness			591391867WT

# 14 Dimensions

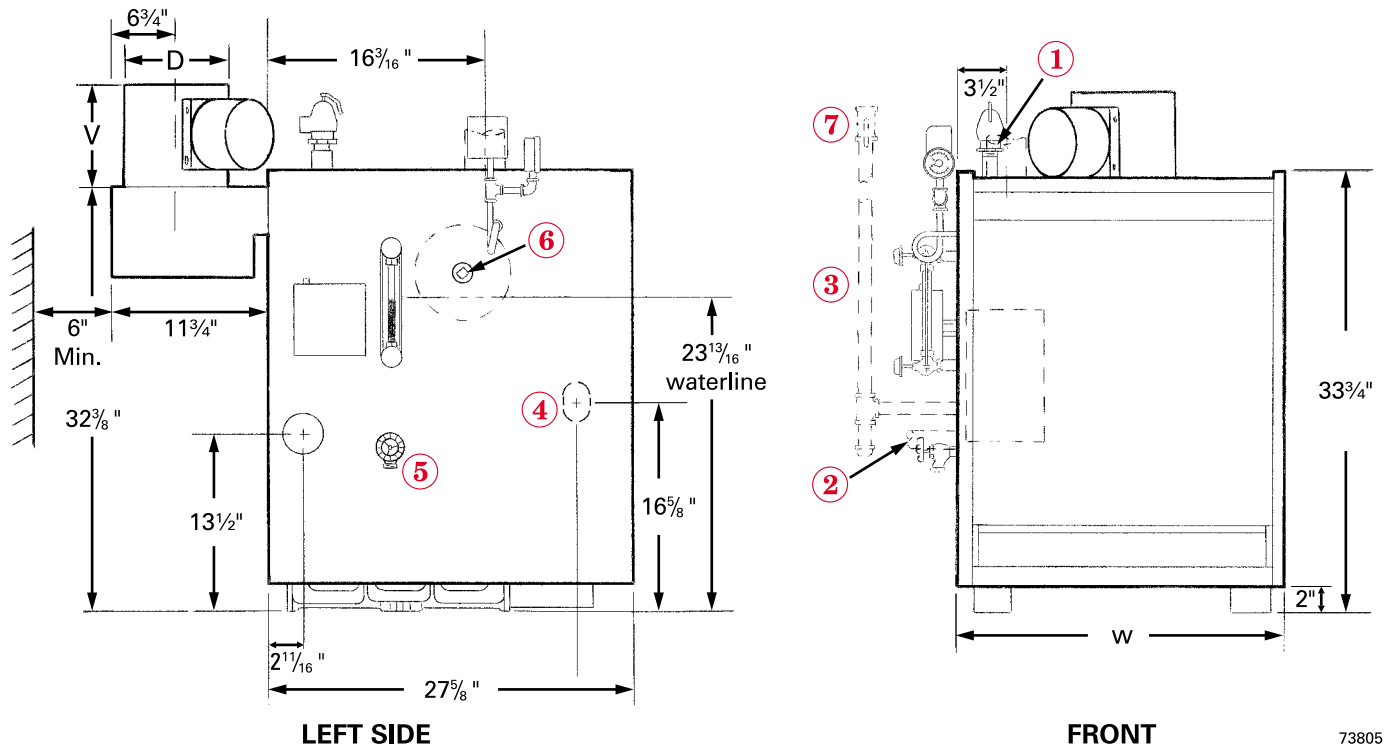
Figure 20 Dimensional drawing — ALL DIMENSIONS IN INCHES

- 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 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 Table 5 on page 9 for recommended system supply and return piping sizes.



73805

Boiler model number	Supply tapping (inches NPT)	Return tapping (inches NPT)	Gas connection & manifold size (Note 2) (inches NPT)	"V" Damper height (inches)	"D" Vent diameter (inches)	"W" Jacket width (inches)	Approximate shipping weight
GSA075	3	2 1/2	1/2	6	5	17	430
GSA100	3	2 1/2	1/2	6	5	17	430
GSA125	3	2 1/2	1/2	6 1/2	6	21 1/4	505
GSA150	3	2 1/2	1/2	6 1/2	6	21 1/4	505
GSA175	3	2 1/2	1/2	9	7	25 1/2	585
GSA200	3	2 1/2	1/2	9	7	25 1/2	585
GSA250	3	2 1/2	3/4	9 1/2	8	29 1/4	660

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

# 15 Ratings

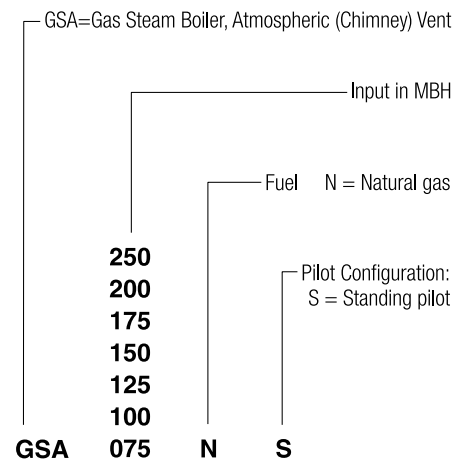


DOE

Boiler model number	0–2,000 feet altitude		2,000–4,500 feet altitude (Canada)		Net I=B=R ratings		Boiler water content (gallons) (to waterline)	DOE Seasonal efficiency (% A.F.U.E)	Chimney and breeching size
	Input (Btuh)	DOE Heating Capacity (Output) (Btuh)	Input (Btuh)	Output (Btuh)	Sq. Ft. Steam	Steam Btuh			
(Note 3)		(Note 1)	(Note 4)		(Note 2)			(Note 3)	
GSA075	75,000	62,000	67,500	54,000	196	47,000	8.4	81.0	5" I.D. x 20'
GSA100	100,000	83,000	90,000	72,000	258	62,000	8.4	81.3	5" I.D. x 20'
GSA125	125,000	104,000	112,500	90,000	325	78,000	9.8	81.5	6" I.D. x 20'
GSA150	150,000	125,000	135,000	108,000	392	94,000	9.8	81.6	6" I.D. x 20'
GSA175	175,000	145,000	157,500	126,000	454	109,000	11.2	81.9	7" I.D. x 20'
GSA200	200,000	167,000	180,000	144,000	521	125,000	11.2	81.9	7" I.D. x 20'
GSA250	250,000	209,000	225,000	180,000	654	157,000	12.6	82.0	8" I.D. x 20'

## 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.



# 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 cristobalite 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:

**WARNING**

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.

