

To the Installer:

Please attach these instructions next to the water heater.

To the Consumer:

Please read these and all component instructions and keep for future reference.



Installation and Operation Instructions Manual

Solar Indirect Water Heater with Power Direct Vent Gas Backup

Models: 75-76SKG, 100-76SKG



Warranty, Registration Card and Parts List are included.
Homeowner: Please remember to return the Registration Card!

⚠ WARNING

Improper installation, adjustment, alteration, service or maintenance can cause serious injury or property damage. Refer to this manual. For assistance or additional information, consult a qualified installer or service agency.

⚠ WARNING

If the information in these instructions is not followed exactly, a fire or explosion may result causing property damage, personal injury or death.

⚠ WARNING

Install in accordance with all local codes. In the absence of local codes, refer to ANSI 223.1/NFPA 54 and/or CSA B149.1.

⚠ CAUTION

The recommended temperature for normal residential use is 120°F. The dial on the aquastat does not always reflect the out-coming water temperature and it could occasionally exceed 120°F. Variation in out-coming temperature could be based on factors including but not limited to usage patterns and type of installation. Test water at the tap nearest to the water heater. See page 32 for measuring the out-coming water temperature.

⚠ WARNING

Hotter water increases the risk of scald injury. Before adjusting the water temperature setting, read this instruction manual. Temperatures at which injury occurs vary with the person's age and the length of exposure. The slower reaction time of children, elderly or physically or mentally challenged persons increases the scalding hazard to them. It is recommended that lower water temperatures be used where these exposure hazards exist. Households with small children or invalids may require a temperature setting less than 120°F to prevent accidental contact with hot water. **To produce less than 120°F, use point-of-use temperature limiting devices.**

If higher water temperature is needed in part

of the water system, automatic temperature limiting devices must be used on all lines to water taps.

⚠ WARNING

Flammable vapors may be drawn to this water heater from other areas of the structure by air currents. Do not store or use any flammable liquids in the vicinity of this heater.

⚠ WARNING

Water heater blankets may restrict air flow to the water heater and cause fire, asphyxiation, personal injury or death.

**THIS MANUAL HAS BEEN PREPARED TO
ACQUAINT YOU WITH THE INSTALLATION,
OPERATION, AND MAINTENANCE OF
YOUR WATER HEATER AND TO PROVIDE
IMPORTANT SAFETY INFORMATION.**

Read all instructions thoroughly before attempting installation or operation of your water heater. Keep these instructions for future reference.

Local plumbing and electrical codes must be followed in the installation of this water heater. In the absence of a local code use the UNIFORM PLUMBING CODE and the NFPA Code. Local codes may supersede instructions in this installation manual.

These instructions are a guide for the correct installation of the water heater. The manufacturer will not be liable for damages caused by failure to comply with the installation and operating instructions outlined on the following pages.

Installation, testing, and replacement of gas piping, appliances, or accessories, and repair and servicing of equipment, shall be performed only by a qualified agency.

**FAILURE TO FOLLOW THESE INSTRUCTIONS
OR ALL APPLICABLE BUILDING CODES
AND REGULATIONS VOIDS THE WARRANTY
ON THIS WATER HEATER.**

IMPORTANT SAFETY INSTRUCTIONS

⚠ WARNING

If the information in these instructions is not followed exactly, a fire or explosion may result causing property damage, personal injury or death.

FOR YOUR SAFETY!

- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.
- WHAT TO DO IF YOU SMELL GAS
 - Do not try to light any appliance.
 - Do not touch any electrical switch; do not use any phone in your building.
 - Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
 - If you cannot reach your gas supplier, call the fire department.
- Installation and service must be performed by a qualified installer, service agency or the gas supplier.

⚠ DANGER

Water heaters utilizing Liquefied Petroleum gas (LP) are different from natural gas models. A natural gas heater will not function safely on LP gas and vice versa. To avoid possible equipment damage, personal injury or fire: **DO NOT** connect this water heater to a fuel type not in accordance with the rating label. These units are only certified for a single fuel type.

⚠ DANGER

Failure to properly install the vent and combustion air intake system as outlined in this manual can result in unsafe operation of the water heater. To avoid the risk of fire, explosion, or asphyxiation from carbon monoxide, never operate this water heater unless it is properly vented and has adequate air supply for combustion and dilution of flue gas. Be sure to inspect the system for proper installation at initial start-up; and at least annually thereafter. See the Maintenance section for more information.

SAVE THESE INSTRUCTIONS

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SECTION I: SPECIFICATIONS

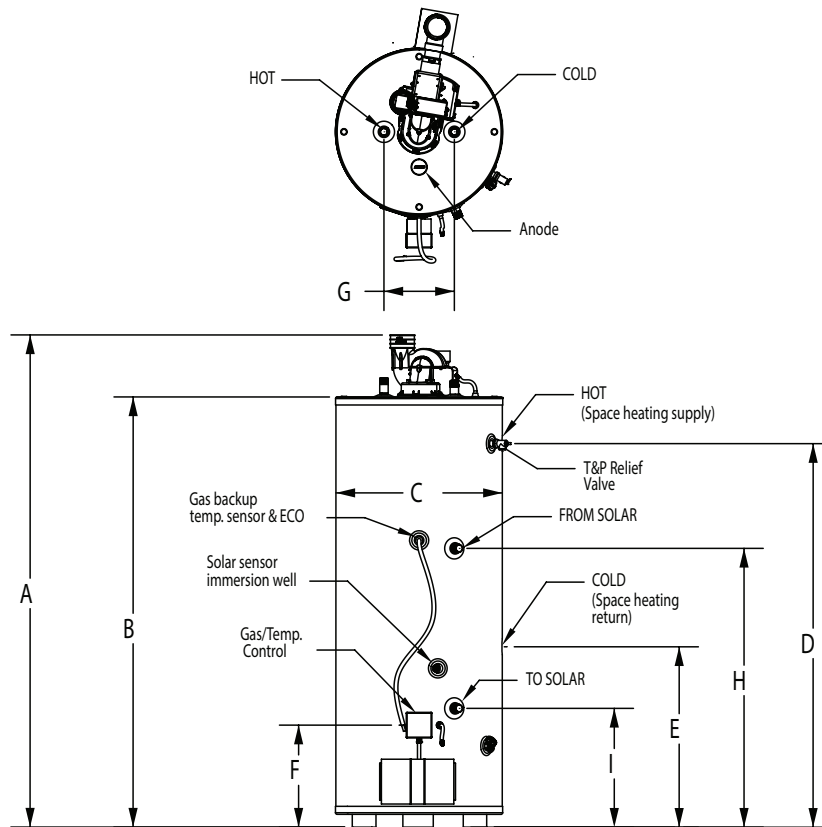


Figure 1: All Models

Table 1: Dimensions

GAS-FIRED ONLY																	
Model	Storage GAL (L)	Rated Input BTU/HR (kW)	Recovery @ 77°F rise GAL/HR (L/HR)	1st Hr. Delivery @ 77°F rise GAL (L)	DIMENSIONS				INCHES (cm)								
	A	B	C	D	E	F	G	H	I	Inlet Conn. Dia. (NPT)	Outlet Conn. Dia. (NPT)	Aux. Conn. Dia. (NPT)	Gas Conn. Dia. (NPT)	Shipping Weight LBS (kg)			
75-76SKGN	73 (276)	76000 (22.3)	96 (363)	136 (515)	76.88 (195)	67.25 (171)	26.00 (68)	60.00 (152)	28.19 (72)	16.00 (41)	11.00 (28)	43.50 (110)	18.50 (47)	1.00	1.00	1.00	469 (213)
100-76SKGN	98 (371)	76000 (22.3)	96 (363)	154 (583)	76.88 (195)	67.25 (171)	28.00 (71)	60.00 (152)	28.19 (72)	16.00 (41)	11.00 (28)	43.50 (110)	18.50 (47)	1.00	1.00	1.00	572 (259)

SOLAR ONLY					
Model	Coil Volume GAL (L)	Coil Surface Area FT² (m²)	Coil Friction Loss @ 5 GPM (feet w.c.)	Recovery*** @ 77°F rise GAL/HR (L/HR)	1st Hr. Delivery*** @ 77°F rise GAL (L)
75-76SKGN	2.76 (10.45)	14.14 (1.31)	0.6	32 (121)	98 (371)
100-76SKGN	2.76 (10.45)	14.14 (1.31)	0.6	32 (121)	121 (458)

***Input to coil: 140°F, 2 GPM

For LP models change suffix "N" to "LP"

Working Pressure: 150 PSI (1034 kPa)

Test Pressure: 300 PSI (2068 kPa)

For natural gas: Manifold pressure = 4" W.C. (1.00 kPa); Inlet pressure range 5-14" W.C. (1.25 - 3.49 kPa)

For propane gas: Manifold pressure = 10" W.C. (1.00 kPa); Inlet pressure range 11-14" W.C. (2.74 - 3.49 kPa)

T&P valve installed

All Bock products meet or exceed current ASHRAE standards.

These products are design certified by UL (Underwriters Laboratories) and meet ANSI Z21.10.3 / CSA 4.3 requirements for operation up to 180°F (82°C).

Approved for use as a direct vent automatic storage water heater.

WARNING: Installation shall be in accordance with all national and/or local codes. In the absence of local codes, refer to NFPA 54 and/or CSA B149.1.

CAUTION: The recommended maximum hot water temperature setting for normal residential use is 120°F (49°C). Bock recommends a tempering valve or anti-scald valve be installed and used according to the manufacturer's directions to prevent scalding.

SECTION II: GENERAL INFORMATION

WHEN YOU RECEIVE YOUR NEW WATER HEATER

Check the new equipment to see if all components are in good condition. If damage is observed or parts appear to be missing, contact your wholesaler.

WATER TREATMENT/FILTRATION

In areas where poor water conditions are suspected (i.e. lime, iron, and other minerals), it is essential that the water be tested and appropriate action taken to prevent damage to the water heater and ensure the quality of the water.

SOLAR WATER HEATER FUNCTION

The solar water heater is designed with an internal coil and gas burner for backup heating. A heating medium is passed through the solar panels and internal coil as long as there is an adequate temperature difference between the heating medium and stored water in the tank. The internal coil is located as close to the bottom as possible to facilitate the transfer of heat even at lower solar panel temperatures.

During periods of water flow through the water heater, hot water is drawn from the top of the heater and cold water is delivered to the bottom of the tank (by a diptube). If the hot water demand should exceed the solar heat output or there is an insufficient temperature difference between the heating medium and stored water, the gas-fired backup thermostat will activate the burner for backup heat.

Solar heat output from the internal coil will vary depending on outside conditions and the temperature of the stored water. The temperature sensor for the gas backup is higher in the tank to delay burner operation. To further limit the operation of backup heating, connect the water heater to a programmable timer. Limiting the gas backup operation to off-peak solar time can increase solar gain in the stored water.

TEMPERATURE CONTROL

The water heater is equipped with a combination gas valve, ignition control, and thermostat to operate the gas backup system. For domestic hot water, the proper temperature setting is 120°F (i.e. "WARM" setting on control). For commercial applications, the maximum approved temperature setting is 180°F (i.e. "F" setting on control).

A built-in, automatic reset Energy Cut-Off (ECO) is standard on all models. In the event that the water temperature becomes excessive (195°F), the ECO will shut off all gas to the water heater. If the ECO switch opens, it will automatically reset (or close) when the water temperature drops to 120°F or below. The water heater thermostat will automatically reset following a three minute standby period once the ECO switch closes.

The thermostat is factory set at 120°F. See Figure 21 for temperature and display settings. If hotter water is required a tempering device or anti-scald device must be installed at the domestic hot water outlet of the heater or at the point of use. Table 3 details the approximate relationship of water temperature and time with regard to scald injury. It is important for the user to understand the necessity of tempering or anti-scald devices when using hotter water in domestic water heating systems.

⚠ CAUTION: Hot water in excess of 120°F can cause scalding!

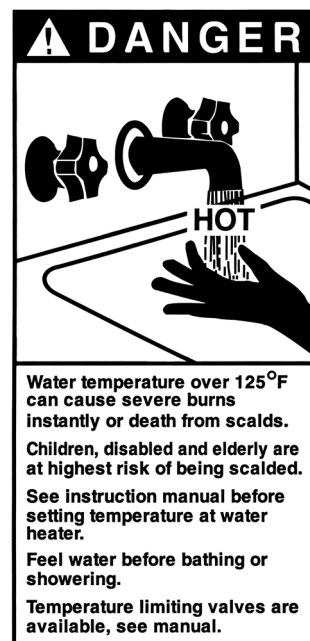
Bock recommends a tempering valve or anti-scald valve be installed and used according to the manufacturer's directions to prevent scalding. Many state and local codes now require installation of these devices. Point of use temperature may be hotter than the setting on the water heater thermostat. The tempering valve or anti-scald valve will ensure potable water temperatures at the desired set point with a higher degree of accuracy.

SECTION II: GENERAL INFORMATION (cont.)

TEMPERATURE CONTROL (cont.)

Table 2: Scald Temperature/Time Relationships

APPROXIMATE TEMPERATURE/TIME RELATIONSHIPS TO SCALDING	
120°F (49°C)	More than 5 minutes
125°F (52°C)	1 ½ to 2 minutes
130°F (54°C)	About 30 seconds
135°F (57°C)	About 10 seconds
140°F (60°C)	Less than 5 seconds
145°F (63°C)	Less than 3 seconds
150°F (66°C)	About 1 ½ seconds
155°F (68°C)	About 1 second



ANODE RODS

The anode rod is used as a sacrificial element within the volume of the storage tank. The purpose of the magnesium anode rod is to protect the inside of the tank against corrosion. Anode rods should be inspected twice in the first year and at least yearly once a time interval for inspection has been developed. Water conditions can influence the consumption rate of the anode rods. Please see the Maintenance section of this manual for instructions on how to change the anode rods.

⚠ CAUTION

Hydrogen gas is produced in a hot water system served by the heater that has not been used for a long period of time (2 weeks or more). Hydrogen gas is extremely flammable. To reduce the risk of injury under these conditions, it is recommended that the hot water faucet be opened for several minutes at the kitchen sink before using any electrical appliance connected to the hot water system. When hydrogen is present, there will probably be an unusual sound such as air escaping through the pipe as the water begins to flow. There should be no smoking or open flame near the faucet at the time it is open.

TEMPERATURE AND PRESSURE RELIEF VALVE (T&P)

⚠ CAUTION

To reduce the risk of excessive pressures and temperatures in this water heater, install temperature and pressure protective equipment required by local codes and no less than a combination temperature and pressure relief valve certified by a nationally recognized testing laboratory that maintains periodic inspection of production of listed equipment or materials, as meeting the requirements for Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems, ANSI Z21.22. This valve must be marked with a maximum set pressure not to exceed the marked maximum working pressure of the water heater. Install the valve in an opening provided and marked for this purpose in the water heater, and orient it or provide tubing so that any discharge from the valve exits only within 6 inches above, or at any distance below, the structural floor, and does not contact any live electrical part. The discharge opening must not be blocked or reduced in size under any circumstances.

SECTION II: GENERAL INFORMATION (cont.)

TEMPERATURE AND PRESSURE RELIEF VALVE (T&P) (cont.)

CAUTION

Scalding injury and/or water damage can occur from either the manual lifting of the lever or the normal operation of the T&P valve. If it is not piped to a proper drain. If the valve fails to flow water or reseal, call your plumber.

The T&P valve is factory installed. A discharge drain tube must be installed (responsibility of the installer) and shall terminate plain, not threaded, 6 inches above the floor drain. The drain tube material must be approved for temperatures of 120°F or greater and a pressure of 150 PSI or greater.

BACKFLOW PREVENTER (CLOSED SYSTEM)

Some local municipal codes and ordinances require the use of these devices on potable (domestic) water lines. Where backflow preventers, check valves, or pressure regulating valves are required, it will be necessary to install a **thermal expansion tank** (designed for use with potable water) in order to prevent pressure build up in the water heater and associated piping, which could cause the T&P valve to discharge. Follow the expansion tank manufacturer's recommendations when selecting a tank for your hot water system. The expansion tank pressure shall equal the water heater system pressure prior to initial warm up.

Note: Working pressure of the water heater is 150 PSI. Do not exceed 150 PSI.

CONDENSATION

In some installations condensation will occur in the venting (exhaust) system. It is important to not allow condensate to collect around mechanical components and bare metal parts on the water heater. Therefore, if condensation occurs in the venting system it must be routed to a proper area for drainage. Horizontal sections of the vent system shall slope downward away from the water heater a minimum of 1/8" per foot. When downward sloping of the vent system is not possible or a vertical vent arrangement is used, the condensate drain kit must be installed. See Section IV: Installation / Vent and Combustion Air Intake / Condensate Drain Kit for installation details.

HIGH ALTITUDE

Refer to Section IV: Installation / Vent & Combustion Air Intake, Tables 4b and 5b for special venting requirements for installations at altitudes greater than 2,000 feet. Expect a 2% input rate reduction per 1,000 feet altitude. Installations at altitudes greater than 7,700 feet are not permitted.

SECTION III: PRE-INSTALLATION

LOCATION

CAUTION

This water heater must be located in an area where leakage of the tank, water line connections, or the temperature and pressure relief valve will not result in damage to the area adjacent to the water heater or to lower floors of the structure. When such location cannot be avoided, a suitable drain pan must be installed under the water heater. The drain pan depth must be suitable for draining and collecting water. The drain pan can be purchased from your plumbing professional. The drain pan must be piped to an adequate drain and all drain piping must be at least 0.75" in diameter and pitched for proper drainage.

SECTION III: PRE-INSTALLATION (cont.)

CAUTION

DO NOT store or use gasoline or other flammable, combustible, or corrosive vapors and/or liquids in the vicinity of the water heater or any other appliance.

IF YOU SMELL GAS:

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

DO NOT OPERATE THE APPLIANCE UNTIL THE LEAKAGE IS CORRECTED!

CAUTION

Do not drop water heater or lay heater down on its side. Move the water heater into position by sliding or using an appropriately sized hand truck.

CAUTION

If the water heater is installed directly on carpeting, the water heater shall be installed on a metal or wood panel extending beyond the full width and depth of the water heater by at least 3 inches (76.2 mm) in any direction or, if the water heater is installed in an alcove or closet, the entire floor shall be covered by the panel. The panel must be strong enough to carry the weight of the heater when full of water.

NOTE: Locate the heater so it is not subject to physical damage from moving vehicles or flooding. Do not locate the water heater in a room where swimming pool chemicals or large quantities of water softener salt are kept. Installing a water heater in this environment will result in premature failure of tank and burner components due to corrosion caused by these elements diffusing into the air.

The water heater can be installed on combustible or non-combustible flooring. Maintain clearances specified in this manual and in accordance with the National Fuel Gas Code (NFPA 54, ANSI Z223.1) unless otherwise directed by state and local code requirements. Locate the water heater such that plastic vent pipe lengths and the number of connection fittings are minimized.

Minimum clearances from combustible construction are:

Table 3: Clearances

SIDES	BACK ¹	FRONT ²	TOP ³
0 in. (0 cm)	6 in. (15 cm)	24 in. (61 cm)	26 in. (66 cm)

1) Measured from water heater jacket to wall. This clearance accommodates the air intake boot.

2) Measured from jacket to closet door.

3) Measured from water heater top to ceiling.

This water heater is approved for installation in a closet or alcove with the clearances above.

SECTION III: PRE-INSTALLATION (cont.)

COMBUSTION AND VENTILATION AIR

The water heater can be installed to utilize combustion air from either inside or outside the building. Refer to “Section IV: Installation” for detailed venting specifications. If indoor air is used for combustion air it is imperative that the room has an adequate air supply. Inadequate air supplies may lead to unsafe levels of carbon monoxide (CO), condensation of flue gases, and excessive levels of soot. See NFPA 54 or the discussions of “Unconfined Space” and “Confined Space” below. In addition, poor ventilation will also result in hot spots around the heater. Temperatures over 90°F near the water heater generally indicate a lack of ventilation.

UNCONFINED SPACE

Unconfined space is defined by NFPA 54 as a space with a volume greater than 50 cubic feet (during typical use) per 1000 BTUH of the total combined input of all fuel burning appliances in the space. Rooms leading directly to the installation space through doors that cannot be closed can be considered part of the space. **Exception:** *Buildings with full vapor barriers, tight doors and windows or air infiltration rates of less than 0.35 air changes per hour will be considered a confined space and require additional air supplies.*

CONFINED SPACE

Confined space is defined by NFPA 54 as a space with a volume less than 50 cubic feet (during typical use) per 1000 BTUH of the total combined input of all fuel burning appliances in the space. Buildings or rooms of unusually tight construction are also considered a confined space. See “**Unconfined Space: Exception**”.

When installing fuel burning appliances in a confined space, air must be supplied to that space from either inside or outside of the building as conditions allow.

A. Inside Air Supply: A confined space shall be provided with two permanent openings; one within 12 inches of the top and one within 12 inches of the bottom of the enclosure. These openings shall lead directly to room(s) of sufficient volume so that the combined volume of all the space meets the criteria for unconfined space. Each opening shall have a minimum free area of 1 square inch per 1000 Btu/hr of the combined total input of all fuel burning appliances in the space. Each opening shall have an area of not less than 100 square inches or a minimum dimension of not less than 3 inches.

B. Outside Air Supply: Confined spaces shall be provided with two permanent openings; one within 12 inches of the top and one within 12 inches of the bottom of the enclosure. These openings shall communicate directly, or by ducts, with the outdoors or spaces that communicate with the outdoors.

1.) Leading directly to the outside or through vertical ducts: Each opening shall have a minimum free area of one square inch per 4000 Btu/hr of total input rating of all equipment in the enclosure.

2.) Leading to outside through horizontal ducts: Each opening shall have a minimum free area of one square inch per 2000 Btu/hr of total input rating of all equipment in the enclosure.

Note: All ducts shall have the same cross sectional area as the free area of each opening to which they connect. The minimum dimensions of all ducts shall not be less than three inches. Powered combustion air supplies are also commercially available and may be used.

LOUVERS & GRILLES

In calculating the free area of an opening, consideration must be given to the blocking effects of louvers or grilles protecting the opening. Any screens used must be no finer than ¼ inch mesh. If the free area of a louver or grille is known, this should be used in calculating the size of opening required. If free area is unknown, it may be assumed that wood louvers will have 20 to 25% free area and metal louvers and grilles will have 60 to 75% free area. Louvers and grilles should be fixed in the open position or interlocked with the equipment so that they open automatically during equipment operation.

SECTION IV: INSTALLATION

VENT & COMBUSTION AIR INTAKE

DANGER

Failure to properly install the vent and combustion air intake system as outlined in this manual can result in unsafe operation of the water heater. To avoid the risk of fire, explosion, or asphyxiation from carbon monoxide, never operate this water heater unless it is properly vented and has adequate air supply for combustion and dilution of flue gas. Be sure to inspect the system for proper installation at initial start-up; and at least annually thereafter. See the Maintenance section for more information.

The water heater venting and combustion air intake shall be installed in accordance with these instructions and can be installed as a power direct vent system (combustion air from outside the building, i.e. “two-pipe”) or power vent system (combustion air from inside the building, i.e. “one-pipe”). If applicable, installation must also comply with the venting system manufacturer’s instructions. Vertical or horizontal (side-wall) configurations may be used with a one-pipe, two-pipe, or concentric vent termination.

Note: If air from inside the building will be used for combustion air, the requirements in Section III, “Unconfined Space” must be met.

The water heater is supplied with a rubber coupling (with clamps) that connects to the blower assembly outlet. The air intake piping is preassembled to route dilution air to the blower assembly and combustion air to the burner chamber. All vent length measurements specified in this manual are in addition to the preassembled piping supplied with the water heater. Equivalent pipe run lengths shall not be greater than the maximum lengths (or less than minimums) given in Tables 4 and 5.

Note: DO NOT connect the water heater to an existing vent or chimney. It must be vented separately from all other appliances.

The following materials are approved for use as the vent and combustion air intake piping:

- PVC (DWV, ASTM-D2665 or CSA B181.2)
- PVC (Schedule 40, ASTM-D1785 or CSA B137.3)
- PVC (SDR Series, ASTM-D2241 or CSA B137.3)
- CPVC (Schedule 40, ASTM-F441 or CSA B137.3)
- CPVC (SDR Series, ASTM-F442)
- ABS (Schedule 40, DWV, ASTM-D2661 or CSA B181.1)
- AL29-4C Stainless Steel
- PVC IPEX 1738 (UL 1738, ASTM D2665)

In Canada, check local codes to ensure that SDR series is approved for use. SDR is not approved for all installations in Canada.

The following materials are approved for use for the fittings in the vent and combustion air intake systems:

- PVC (Schedule 40 DWV, ASTM D2665)
- CPVC (Schedule 40, ASTM F438)
- ABS (Schedule 40 DWV, ASTM D2661)
- AL29-4C Stainless Steel
- PVC IPEX 1738 (UL 1738, ASTM D2665)

The use of cellular core PVC (ASTM F891), cellular core CPVC, or Radel® (polyphenylsulfone) in non-metallic vent pipe and systems is prohibited. Covering non-metallic vent pipe and fittings with thermal insulation is prohibited.

SECTION IV: INSTALLATION (cont.)

VENT & COMBUSTION AIR INTAKE (cont.)

NOTICE

Installations in Canada must conform to the requirements of CSA B149 code. Plastic vent systems must be assembled with pipe, fittings, cements, and primers listed to ULC S636. Components of this listed system shall not be interchanged with other vent systems or unlisted pipe/fittings. In Canada, the primer and cement must be of the same manufacturer as the vent system; do not mix primers and cements from one manufacturer with a vent system from a different manufacturer. The supplied plastic pipe/fittings are certified as part of the water heater.

Minimum and Maximum System Lengths

The water heater should be located such that plastic vent pipe lengths and the number of connection fittings are minimized. Minimum and maximum equivalent pipe lengths for the vent and combustion air intake systems are given in Tables 4(a, b) and 5(a, b). Either 3 in. or 4 in. plastic piping may be used, where applicable. The water heater is provided with fittings that readily adapt to 3 in. plastic pipe. DO NOT use less than 3 in. diameter plastic pipe and DO NOT use unequal sizes except as shown to increase from 3 in. to 4 in. diameter at the point of connection to the water heater.

NOTE: The equivalent straight pipe length of a 90°, 1/4 inch standard bend elbow and a 45°, 1/8 inch standard bend elbow is 5 feet and 2.5 feet, respectively. The concentric vent termination is equivalent to 10 feet of straight pipe. DO NOT use short bend elbows.

NOTE: Elbows used as termination fittings must be included when determining the total number of elbows.

Table 4a: Min and Max Vent and Air Intake Pipe Lengths (*Two-Pipe Terminations*) - 0-2,000 FT Elevation

Model(s)	Pipe Ø (in)	Minimum Equivalent Pipe Length (per pipe run)		Maximum Equivalent Pipe Length (per pipe run)	
		Air Intake Ft (m)	Vent Ft (m)	Air Intake Ft (m)	Vent Ft (m)
75-76SKG, 100-76SKG	3	5 (1.52)	12 (3.66)	55 (16.76)	55 (16.76)
	4	5 (1.52)	12 (3.66)	85 (25.91)	85 (25.91)

Table 4b: Min and Max Vent and Air Intake Pipe Lengths (*Two-Pipe Terminations*) - 2,000 - 7,700 FT Elevation

Model(s)	Pipe Ø (in)	Minimum Equivalent Pipe Length (per pipe run)		Maximum Equivalent Pipe Length (per pipe run)	
		Air Intake Ft (m)	Vent Ft (m)	Air Intake Ft (m)	Vent Ft (m)
75-76SKG, 100-76SKG	4	5 (1.52)	12 (3.66)	55 (16.76)	55 (16.76)

Table 5a: Min and Max Vent and Air Intake Pipe Lengths (*Concentric Termination*) - 0-2,000 FT Elevation

Model(s)	Pipe Ø (in)	Minimum Equivalent Pipe Length (per pipe run)		Maximum Equivalent Pipe Length (per pipe run)	
		Air Intake Ft (m)	Vent Ft (m)	Air Intake Ft (m)	Vent Ft (m)
75-76SKG, 100-76SKG	3	5 (1.52)	12 (3.66)	45 (13.72)	45 (13.72)
	4	5 (1.52)	12 (3.66)	75 (22.86)	75 (22.86)

Table 5b: Min and Max Vent and Air Intake Pipe Lengths (*Concentric Termination*) - 2,000 - 7,700 FT Elevation

Model(s)	Pipe Ø (in)	Minimum Equivalent Pipe Length (per pipe run)		Maximum Equivalent Pipe Length (per pipe run)	
		Air Intake Ft (m)	Vent Ft (m)	Air Intake Ft (m)	Vent Ft (m)
75-76SKG, 100-76SKG	4	5 (1.52)	12 (3.66)	45 (13.72)	45 (13.72)

SECTION IV: INSTALLATION (cont.)

VENT & COMBUSTION AIR INTAKE (cont.)

For quick reference, Tables 6 and 7 give the maximum allowable length of straight pipe based on the total number of elbows per pipe run.

Table 6: Maximum Pipe Lengths Quick Reference (Two-Pipe Terminations)

Model(s)	Pipe Ø (in)	# of 90° Elbows per pipe run (including termination fittings)	Maximum Equivalent Pipe Length (per pipe run)	
			Air Intake Ft (m)	Vent Ft (m)
75-76SKG, 100-76SKG	3	0	55 (16.76)	55 (16.76)
	3	1	50 (15.24)	50 (15.24)
	3	2	45 (13.72)	45 (13.72)
	3	3	40 (12.19)	40 (12.19)
	3	4	35 (10.67)	35 (10.67)
	3	5	30 (9.14)	30 (9.14)
	3	6	25 (7.62)	25 (7.62)
	4	0	85 (25.91)	85 (25.91)
	4	1	80 (24.38)	80 (24.38)
	4	2	75 (22.86)	75 (22.86)
	4	3	70 (21.34)	70 (21.34)
	4	4	65 (19.81)	65 (19.81)
	4	5	60 (18.29)	60 (18.29)
	4	6	55 (16.76)	55 (16.76)

Table 7: Maximum Pipe Lengths Quick Reference (Concentric Termination)

Model(s)	Pipe Ø (in)	# of 90° Elbows per pipe run (including termination fittings)	Maximum Equivalent Pipe Length (per pipe run)	
			Air Intake Ft (m)	Vent Ft (m)
75-76SKG, 100-76SKG	3	0	45 (13.72)	45 (13.72)
	3	1	40 (12.19)	40 (12.19)
	3	2	35 (10.67)	35 (10.67)
	3	3	30 (9.14)	30 (9.14)
	3	4	25 (7.62)	25 (7.62)
	3	5	20 (6.10)	20 (6.10)
	3	6	15 (4.57)	15 (4.57)
	4	0	75 (22.86)	75 (22.86)
	4	1	70 (21.34)	70 (21.34)
	4	2	65 (19.81)	65 (19.81)
	4	3	60 (18.29)	60 (18.29)
	4	4	55 (16.76)	55 (16.76)
	4	5	50 (15.24)	50 (15.24)
	4	6	45 (13.72)	45 (13.72)

SECTION IV: INSTALLATION (cont.)

VENT & COMBUSTION AIR INTAKE (cont.)

The vent and combustion air intake systems must be sufficiently supported along vertical and horizontal sections. At minimum, it is recommended that a support is placed along the vent or air intake piping every 4 feet. For horizontal systems, the first support shall be located immediately adjacent to the first 90-deg. elbow following the vertical section connected to the water heater. The support method should act to isolate the vent and combustion air intake piping from floor joists or other structural members to reduce transmission of noise and vibration.

NOTE: Do not support, pin, or secure the vent and combustion air intake pipe in a way that restricts the normal thermal expansion and contraction of the venting material.

For replacement installations, thoroughly inspect the existing vent and combustion air intake systems prior to installing the new water heater. The following steps shall be taken to properly inspect the existing vent system:

- Verify that the materials as specified in this manual have been used.
- Verify the maximum and minimum vent and combustion air intake equivalent lengths and terminal clearances meet the specifications in this manual.
- Inspect the vent and combustion air intake systems for cracking. Pay close attention to joints between elbows and straight pipe.
- Inspect the system for misalignment of components. This may lead to sagging and unwanted stresses in the joints.

If any corrections are required they must be computed before installing the replacement water heater.

Horizontal Venting, Direct Vent 2-pipe termination

This water heater may be vented horizontally (through a sidewall) with a two-pipe termination. Two holes through an exterior wall are required for the vent and combustion air intake pipes. Minimum clearances between the terminals must be met as specified in Figure 3. All clearances must comply with local codes or the latest edition of NFPA 54/ANSI Z223.1 or CSA B149. See Figure 2 and Table 8 for terminal clearances.

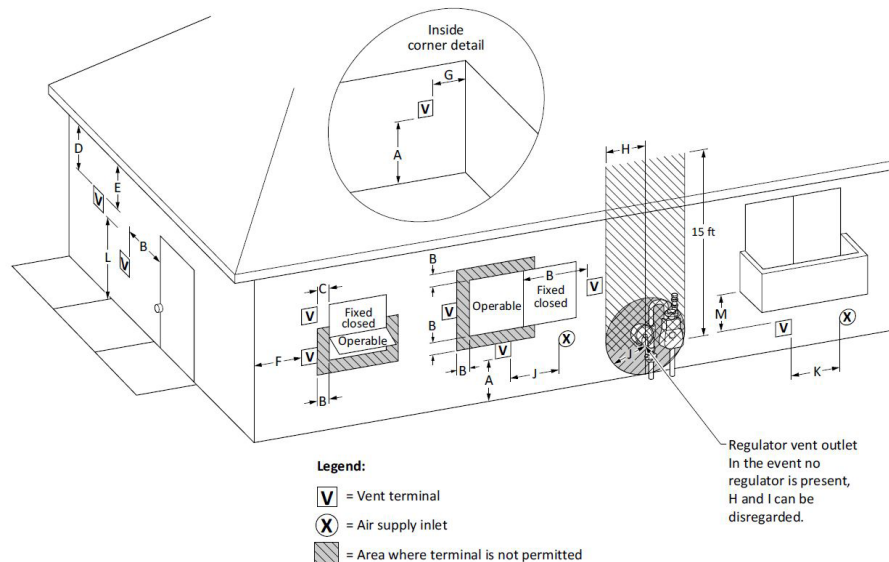


Figure 2: Terminal Clearances

SECTION IV: INSTALLATION (cont.)

VENT & COMBUSTION AIR INTAKE (cont.)

Table 8: Direct Vent Terminal Clearances

	Canadian Installations ¹	US Installations ²
A = Clearance above grade, veranda, porch, deck, or balcony	12 inches (30 cm)	12 inches (30 cm)
B = Clearance to window or door that may be opened	6 in (15 cm) for appliances ≤ 10,000 Btuh (3 kW), 12 in (30 cm) for appliances > 10,000 Btuh (3 kW) and ≤ 100,000 Btuh (30 kW), 36 in (91 cm) for appliances > 100,000 Btuh (30 kW)	6 in (15 cm) for appliances ≤ 10,000 Btuh (3 kW), 9 in (23 cm) for appliances > 10,000 Btuh (3 kW) and ≤ 50,000 Btuh (15 kW), 12 in (30 cm) for appliances > 50,000 Btuh (15 kW)
C = Clearance to permanently closed window	12 inches (30 cm)*	12 inches (30 cm)*
D = Vertical clearance to ventilated soffit located above the terminal within a horizontal distance of 2 feet (61 cm) from the centerline of the terminal	12 inches (30 cm)*	12 inches (30 cm)*
E = Clearance to unventilated soffit	12 inches (30 cm)*	12 inches (30 cm)*
F = Clearance to outside corner	2 ft (60 cm)*	2 ft (60 cm)*
G = Clearance to inside corner	18 in (45 cm)*	18 in (45 cm)*
H = Clearance to each side of centerline extended above meter/regulator assembly	3 ft (91 cm) within a height of 15 ft (4.6 m)*	Clearance in accordance with local installation codes and the requirements of the gas supplier.
I = Clearance to service regulator vent outlet	3 ft (91 cm)	Clearance in accordance with local installation codes and the requirements of the gas supplier.
J = Clearance to non-mechanical air supply inlet to building or the combustion air inlet to any other appliance	6 in (15 cm) for appliances ≤ 10,000 Btuh (3 kW), 12 in (30 cm) for appliances > 10,000 Btuh (3 kW) and ≤ 100,000 Btuh (30 kW), 36 in (91 cm) for appliances > 100,000 Btuh (30 kW)	6 in (15 cm) for appliances ≤ 10,000 Btuh (3 kW), 9 in (23 cm) for appliances > 10,000 Btuh (3 kW) and ≤ 50,000 Btuh (15 kW), 12 in (30 cm) for appliances > 50,000 Btuh (15 kW)
K = Clearance to a mechanical air supply inlet	6 feet (1.83 m)	3 feet (91 cm) above if within 10 feet (3 m) horizontally
L = Clearance above paved sidewalk or paved driveway located on public property	7 feet (2.13 m)†	Cannot be located above public walkways or other areas where condensate or vapor can cause nuisance or hazard.
M = Clearance under veranda, porch, deck, or balcony	12 inches (30 cm) ‡	12 inches (30 cm) ‡

1) In accordance with the current CSA B149.1 Natural Gas and Propane Installation Code.

2) In accordance with the current ANSI Z223.1 / NFPA 54 National Fuel Gas Code.

3) If locally adopted installation codes specify clearances different than those illustrated, then the most stringent clearance shall prevail.

† A vent shall not terminate directly above a sidewalk or paved driveway that is located between two single family dwellings and serves both dwellings.

‡ Permitted only if veranda, porch, deck, or balcony is fully open on a minimum of two sides beneath the floor.

* Manufacturer's recommendation. Must be in accordance with local installation codes and requirements of the gas supplier.

In addition to the clearances specified, the following items shall be accounted for during installation:

- Do not terminate near soffit vents or crawl space or other area where condensate or vapor could create a nuisance hazard or cause property damage.
- Do not locate the exhaust vent terminal where condensate or vapor could cause damage or could be detrimental to the operation of regulators, relief valves, or other equipment.
- Do not locate the exhaust vent terminal over public area or walkways where condensate or vapor can cause nuisance or hazard.
- Do not locate the vent terminal in proximity to plants/shrubs.
- The vent and air intake shall terminate a minimum of 12" (30.5 cm) above expected snowfall level to prevent blockage.

CAUTION

Never install air intake terminal above vent (exhaust) terminal.

SECTION IV: INSTALLATION (cont.)

VENT & COMBUSTION AIR INTAKE (cont.)

Install piping through the wall as shown in Figure 3. Adequate length of pipe must protrude beyond the exterior wall for attachment of the termination fitting. The recommended distance between the terminal fitting and the exterior wall is 1 in. (2.5 cm). Directions for cementing joints (such as the terminal fittings to the straight pipe) can be found on page 24. Two 45° elbows are provided with the water heater for termination fittings. If other fittings are required (i.e. 90° elbows) they must be purchased separately. Install a screen inside the air intake termination fitting to prevent items from entering the system. Complete the installation of the remainder of the vent and air intake system and attach to the water heater as shown in Figure 4. It is recommended that horizontal sections of piping slope downward away from the water heater a minimum of 1/8 inch per foot (10mm per meter) to prevent condensate from flowing back towards the water heater.

⚠ CAUTION

Annular spaces around vent pipe wall penetrations shall be permanently sealed using approved materials to prevent entry of combustion products into the building.

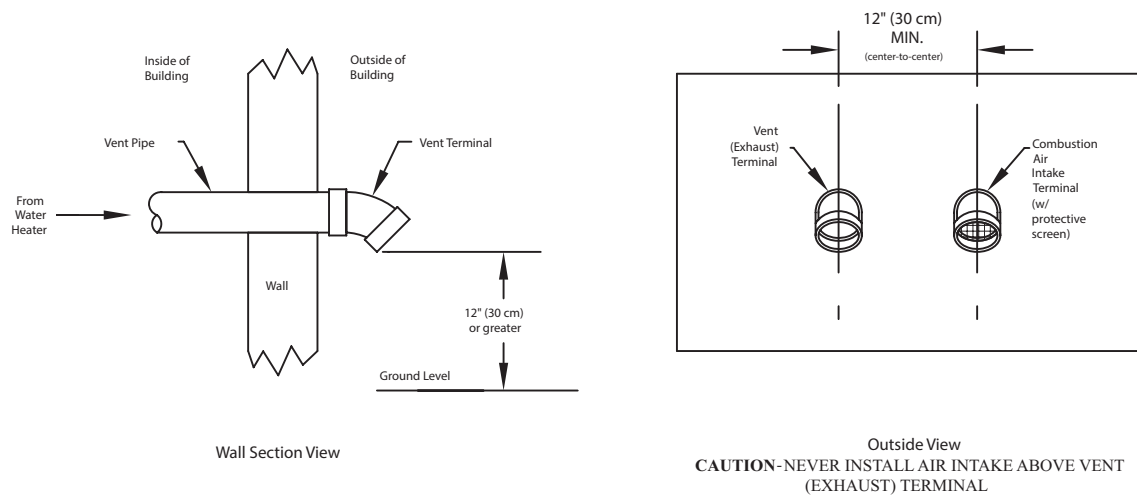


Figure 3: Horizontal Venting, 2-pipe termination

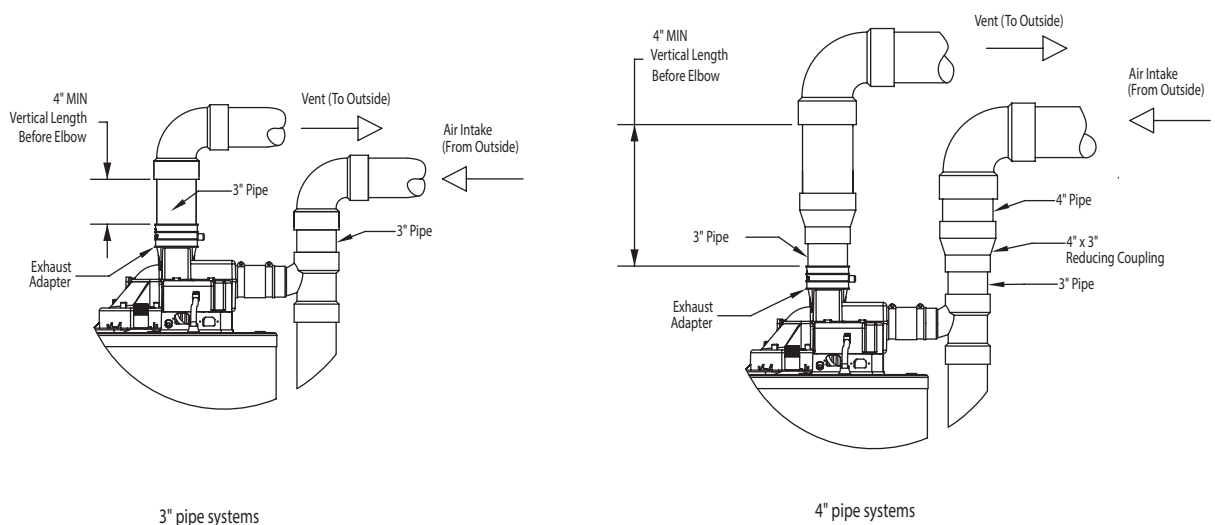


Figure 4: Horizontal Direct Vent Connections to Water Heater

SECTION IV: INSTALLATION (cont.)

VENT & COMBUSTION AIR INTAKE (cont.)

Horizontal Venting, Power Vent 1-pipe termination

This water heater may be vented horizontally (through a sidewall) with a one-pipe termination. In this case, the water heater will be utilizing air from inside the building for combustion air. A single hole through the exterior of the building is required for the vent pipe.

Note: If air from inside the building will be used for combustion air, the requirements in Section III, “Unconfined Space” must be met.

All clearances must comply with local codes or the latest edition of NFPA 54/ANSI Z223.1 or CSA B149. See Figure 5 and Table 9 for vent terminal clearances.

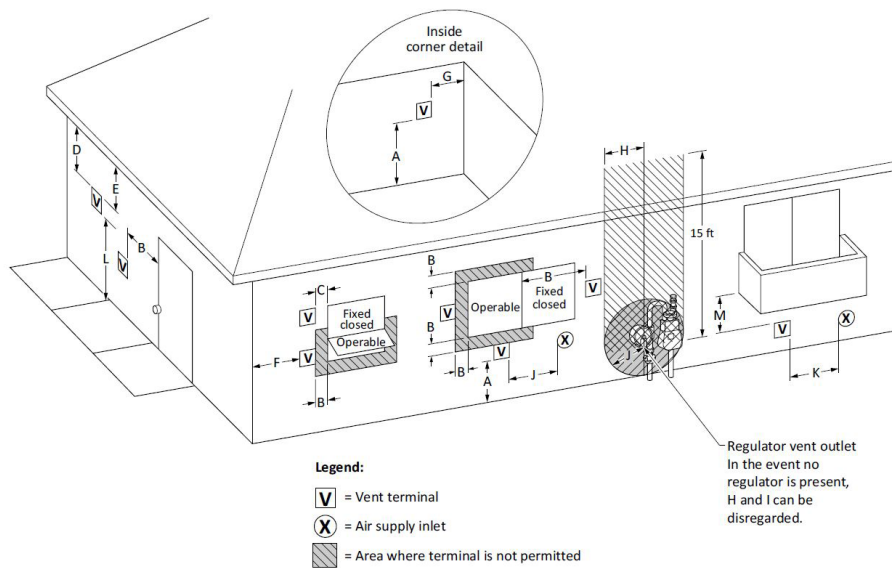


Figure 5: Terminal Clearances

SECTION IV: INSTALLATION (cont.)

VENT & COMBUSTION AIR INTAKE (cont.)

Table 9: Power Vent Terminal Clearances

	Canadian Installations ¹	US Installations ²
A = Clearance above grade, veranda, porch, deck, or balcony	12 inches (30 cm)	12 inches (30 cm)
B = Clearance to window or door that may be opened	6 in (15 cm) for appliances ≤ 10,000 Btuh (3 kW), 12 in (30 cm) for appliances > 10,000 Btuh (3 kW) and ≤ 100,000 Btuh (30 kW), 36 in (91 cm) for appliances > 100,000 Btuh (30 kW)	4 feet (1.2 m) below or to side of opening; 1 foot (300 mm) above opening
C = Clearance to permanently closed window	12 inches (30 cm)*	12 inches (30 cm)*
D = Vertical clearance to ventilated soffit located above the terminal within a horizontal distance of 2 feet (61 cm) from the centerline of the terminal	12 inches (30 cm)*	12 inches (30 cm)*
E = Clearance to unventilated soffit	12 inches (30 cm)*	12 inches (30 cm)*
F = Clearance to outside corner	2 ft (60 cm)*	2 ft (60 cm)*
G = Clearance to inside corner	18 in (45 cm)*	18 in (45 cm)*
H = Clearance to each side of centerline extended above meter/regulator assembly	3 ft (91 cm) within a height of 15 ft (4.6 m)*	Clearance in accordance with local installation codes and the requirements of the gas supplier.
I = Clearance to service regulator vent outlet	3 ft (91 cm)	Clearance in accordance with local installation codes and the requirements of the gas supplier.
J = Clearance to non-mechanical air supply inlet to building or the combustion air inlet to any other appliance	6 in (15 cm) for appliances ≤ 10,000 Btuh (3 kW), 12 in (30 cm) for appliances > 10,000 Btuh (3 kW) and ≤ 100,000 Btuh (30 kW), 36 in (91 cm) for appliances > 100,000 Btuh (30 kW)	4 feet (1.2 m) below or to side of opening; 1 foot (300 mm) above opening
K = Clearance to a mechanical air supply inlet	6 feet (1.83 m)	3 feet (91 cm) above if within 10 feet (3 m) horizontally
L = Clearance above paved sidewalk or paved driveway located on public property	7 feet (2.13 m)†	Cannot be located above public walkways or other areas where condensate or vapor can cause nuisance or hazard.
M = Clearance under veranda, porch, deck, or balcony	12 inches (30 cm) ‡	12 inches (30 cm) ‡

1) In accordance with the current CSA B149.1 Natural Gas and Propane Installation Code.

2) In accordance with the current ANSI Z223.1 / NFPA 54 National Fuel Gas Code.

3) If locally adopted installation codes specify clearances different than those illustrated, then the most stringent clearance shall prevail.

† A vent shall not terminate directly above a sidewalk or paved driveway that is located between two single family dwellings and serves both dwellings.

‡ Permitted only if veranda, porch, deck, or balcony is fully open on a minimum of two sides beneath the floor.

* Manufacturer's recommendation. Must be in accordance with local installation codes and requirements of the gas supplier.

In addition to the clearances specified, the following items shall be accounted for during installation:

- Do not terminate near soffit vents or crawl space or other area where condensate or vapor could create a nuisance hazard or cause property damage.
- Do not locate the exhaust vent terminal where condensate or vapor could cause damage or could be detrimental to the operation of regulators, relief valves, or other equipment.
- Do not locate the exhaust vent terminal over public area or walkways where condensate or vapor can cause nuisance or hazard.
- Do not locate the vent terminal in proximity to plants/shrubs.
- The vent and air intake shall terminate a minimum of 12" (25.4 cm) above expected snowfall level to prevent blockage.

CAUTION

Never install air intake terminal above vent (exhaust) terminal.

SECTION IV: INSTALLATION (cont.)

VENT & COMBUSTION AIR INTAKE (cont.)

Install piping through the wall as shown in Figure 6. Adequate length of pipe must protrude beyond the exterior wall for attachment of the termination fitting. The recommended distance between the terminal fitting and the exterior wall is 1 in. (2.5 cm). Directions for cementing joints (such as the terminal fittings to the straight pipe) can be found on page 24. Two 45° elbows are provided with the water heater for termination fittings. If other fittings are required (i.e. 90° elbows) they must be purchased separately. Install a screen inside the air intake termination fitting to prevent items from entering the system. Complete the installation of the remainder of the vent and air intake system and attach to the water heater as shown in Figure 7. It is recommended that horizontal sections of piping slope downward away from the water heater a minimum of 1/8 inch per foot (10 mm per meter) to prevent condensate from flowing back towards the water heater.

⚠ CAUTION

Annular spaces around vent pipe wall penetrations shall be permanently sealed using approved materials to prevent entry of combustion products into the building.

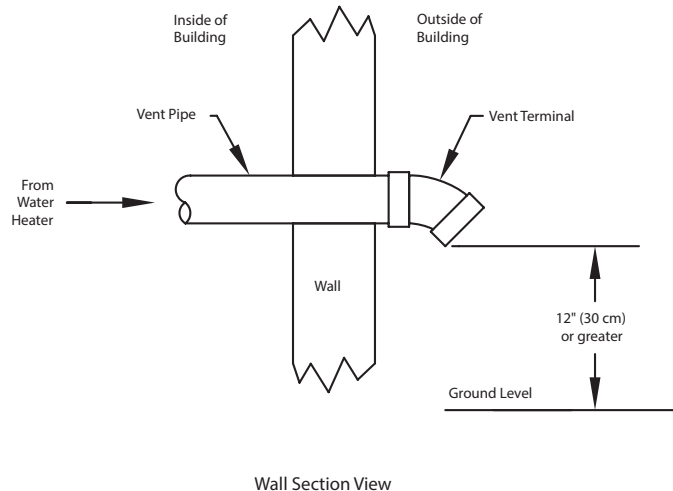


Figure 6: Horizontal Venting, 1-pipe termination

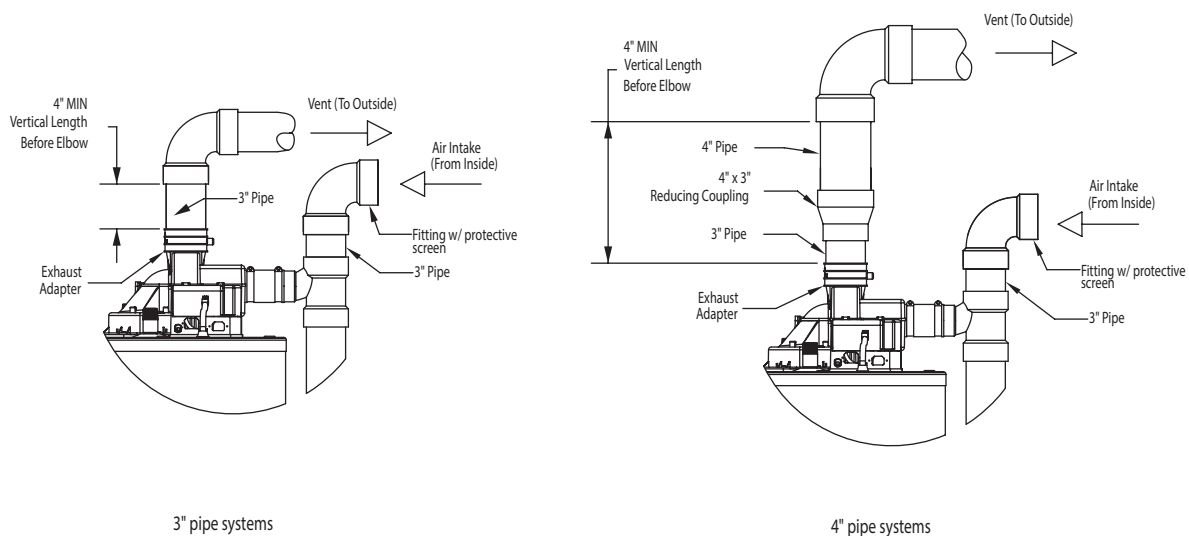


Figure 7: Horizontal Power Vent Connections to Water Heater

SECTION IV: INSTALLATION (cont.)

VENT & COMBUSTION AIR INTAKE (cont.)

Horizontal Venting, Direct Vent Concentric termination

This water heater may be vented horizontally (through a sidewall) with a concentric vent termination kit. One hole through an exterior wall is required for the concentric vent. Both combustion air intake and vent pipes must be attached to the concentric vent termination.

All clearances must comply with local codes or the latest edition of NFPA 54/ANSI Z223.1 or CSA B149. See Figure 2 and Table 8 for terminal clearances. See Figure 8 for additional information.

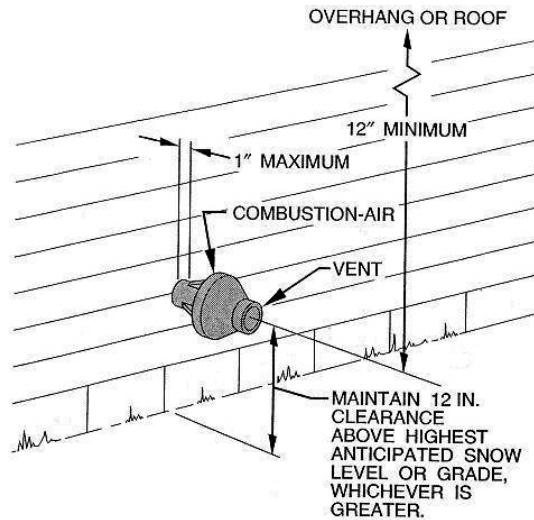


Figure 8: Concentric Vent Wall Clearances

Cut a 5 in. diameter hole through an exterior wall. Make sure the wye concentric fitting is cemented to the large diameter pipe and that the rain cap is cemented to the small diameter pipe. Install the wye concentric fitting and large pipe assembly through the 5 in. diameter hole in the wall. See Figure 9 for wall attachment details.

⚠ CAUTION

Annular spaces around vent pipe wall penetrations shall be permanently sealed using approved materials to prevent entry of combustion products into the building.

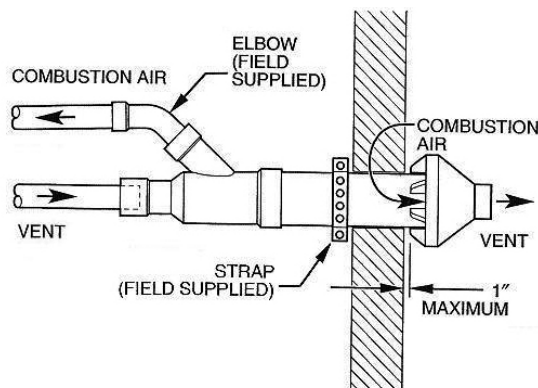


Figure 9: Concentric Vent Wall Installation

Note: Do not allow insulation or other materials to accumulate inside pipe assembly when installing through the wall.

SECTION IV: INSTALLATION (cont.)

VENT & COMBUSTION AIR INTAKE (cont.)

Install the rain cap and small pipe assembly into the wye concentric fitting and large pipe assembly. Ensure small diameter pipe is bottomed and cemented in wye concentric fitting. Complete indoor piping runs and connect piping to the water heater. See Figure 4, 3" pipe systems, for connection details. It is recommended that horizontal sections of piping slope downward away from the water heater a minimum of 1/8 inch per foot (10 mm per meter) to prevent condensate from flowing back towards the water heater. Piping must be sufficiently supported. At minimum, it is recommended that a support is placed along the vent or air intake piping every 4 feet. For additional information, see installation instructions supplied with concentric vent kit.

Vertical Venting, Direct Vent 2-pipe termination

This water heater may be vented vertically (through a roof) with a two-pipe termination. Two holes through the roof are required for the vent and combustion air intake pipes. All clearances must comply with local codes or the latest edition of NFPA 54/ANSI Z223.1 or CSA B149. As a basic guide, the following minimum clearances shall be used:

- Minimum 12 inches (30 cm) above roof.
- Minimum 12 inches (30 cm) above anticipated snow level.
- Maximum 24 inches (61 cm) above roof level without additional support for vent.
- 4 feet (1.2 m) from any gable, dormer or other roof structure with building interior access (e.g. vent or window).
- 10 feet (3 m) from any forced air inlet to the building. Any fresh or make-up air inlet such as a dryer or furnace area is considered to be a forced air inlet.
- Minimum 12 inches (30 cm) between the vent and combustion air intake terminal centerlines.

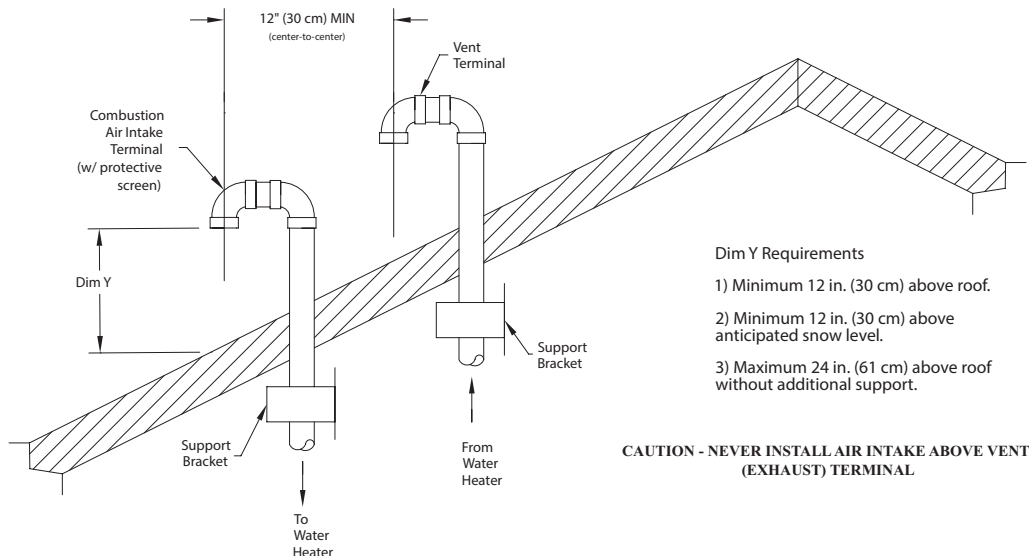


Figure 10: Vertical Venting, 2-pipe termination

⚠ CAUTION

Never install air intake terminal above vent (exhaust) terminal.

SECTION IV: INSTALLATION (cont.)

VENT & COMBUSTION AIR INTAKE (cont.)

Install piping through the roof as shown in Figure 10. Adequate length of pipe must protrude beyond the exterior of the roof (see dimension Y). Directions for cementing joints (such as the terminal fittings to the straight pipe) can be found on page 24. Two 90° elbows are recommended for the intake and exhaust terminations to reduce the risk of rain, snow, or foreign objects entering the system. Install a screen inside the air intake termination fitting as well. Complete the installation of the remainder of the vent and air intake system and attach to the water heater. Piping must be sufficiently supported. At minimum, it is recommended that a support is placed along the vent or air intake piping every 4 feet. For vertical venting, the condensate drain kit must be installed to the exhaust adapter.

⚠ CAUTION

Annular spaces around vent pipe wall penetrations shall be permanently sealed using approved materials to prevent entry of combustion products into the building.

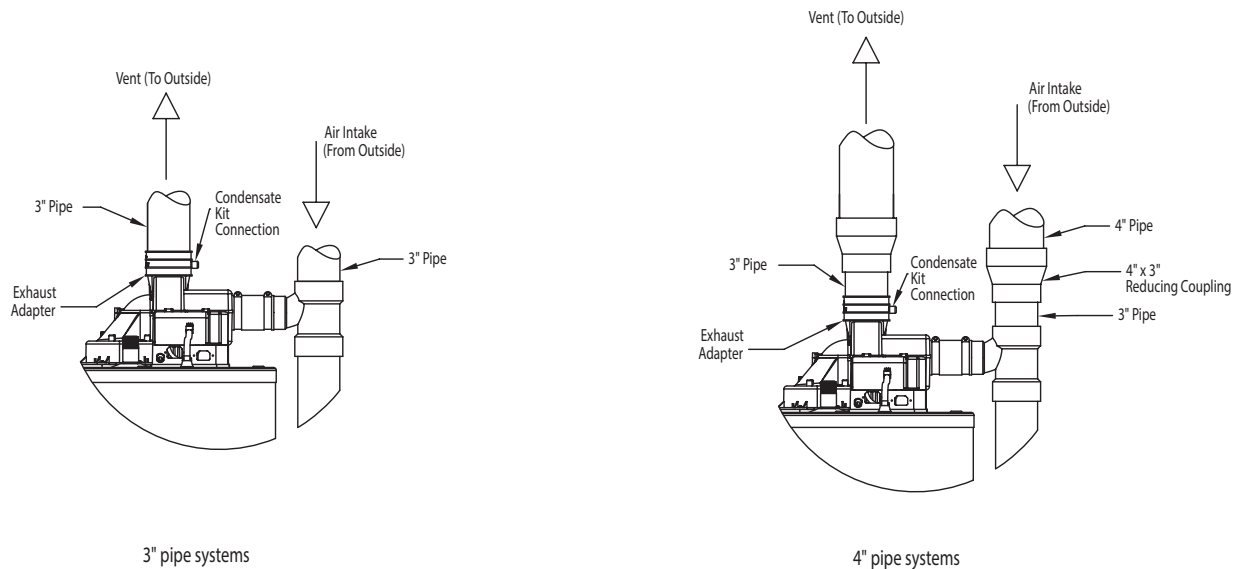


Figure 11: Vertical Direct Vent Connections to Water Heater

Vertical Venting, Power Vent 1-pipe termination

This water heater may be vented vertically (through a roof) with a one-pipe termination. In this case, the water heater will be utilizing air from inside the building for combustion air. A single hole through the roof of the building is required for the vent pipe.

Note: If air from inside the building will be used for combustion air, the requirements in Section III, “Unconfined Space” must be met.

All clearances must comply with local codes or the latest edition of NFPA 54/ANSI Z223.1 or CSA B149. As a basic guide, the following minimum clearances shall be used:

- Minimum 12 inches (30 cm) above roof.
- Minimum 12 inches (30 cm) above anticipated snow level.
- Maximum 24 inches (61 cm) above roof level without additional support for vent.
- 4 feet (1.2 m) from any gable, dormer or other roof structure with building interior access (e.g. vent or window).
- 10 feet (3 m) from any forced air inlet to the building. Any fresh or make-up air inlet such as a dryer or furnace area is considered to be a forced air inlet.

SECTION IV: INSTALLATION (cont.)

VENT & COMBUSTION AIR INTAKE (cont.)

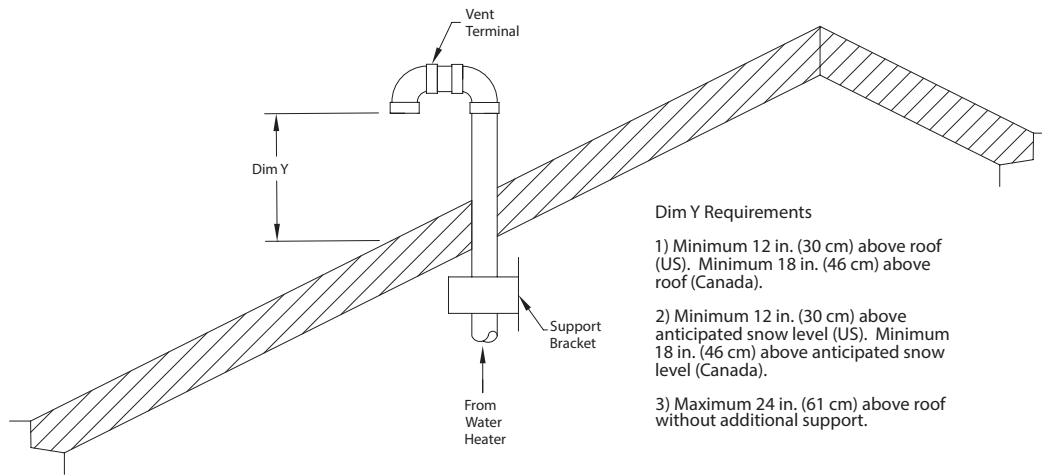


Figure 12: Vertical Venting, 1-pipe termination

Install piping through the roof as shown in Figure 12. Adequate length of pipe must protrude beyond the exterior of the roof (see dimension Y). Directions for cementing joints (such as the terminal fittings to the straight pipe) can be found on page 24. Two 90° elbows are recommended for the exhaust termination to reduce the risk of rain, snow, or foreign objects entering the system. Install a screen inside the air intake termination fitting as well. Complete the installation of the remainder of the vent system and attach to the water heater. Piping must be sufficiently supported. At minimum, it is recommended that a support is placed along the vent piping every 4 feet. For vertical venting, the condensate drain kit must be installed to the exhaust adapter.

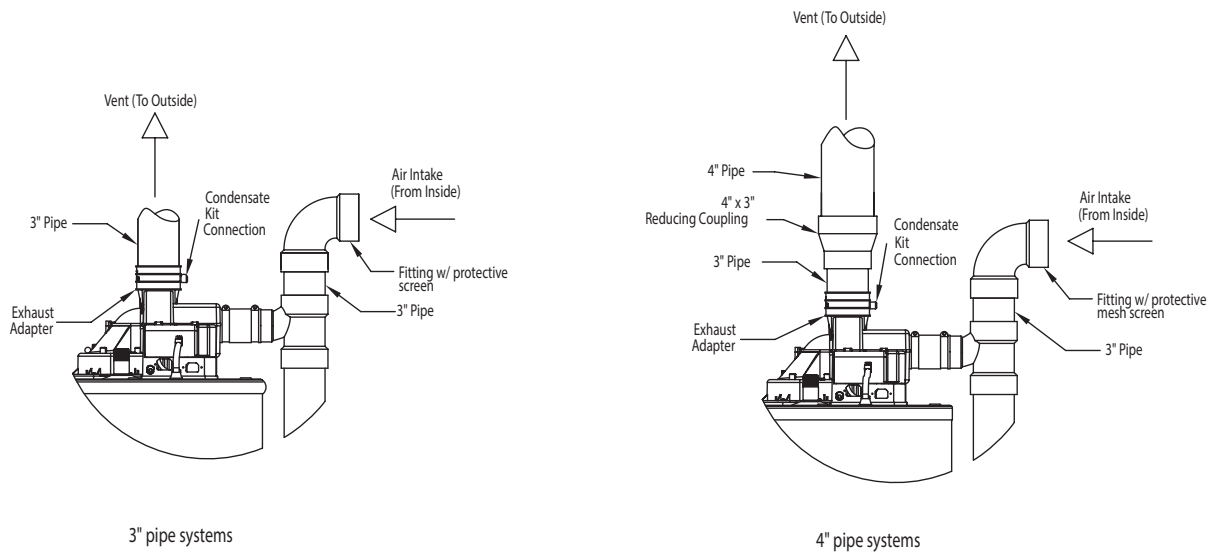


Figure 13: Vertical Power Vent Connections to Water Heater

SECTION IV: INSTALLATION (cont.)

VENT & COMBUSTION AIR INTAKE (cont.)

Vertical Venting, Direct Vent Concentric termination

This water heater may be vented vertically (through a roof) with a concentric vent termination kit. One hole through the roof is required for the concentric vent. Both combustion air intake and vent pipes must be attached to the concentric vent termination.

All clearances must comply with local codes or the latest edition of NFPA 54/ANSI Z223.1 or CSA B149. As a basic guide, the following minimum clearances shall be used (see Figure 14 for additional information):

- Minimum 12 inches (30 cm) above roof.
- Minimum 12 inches (30 cm) above anticipated snow level.
- Maximum 24 inches (61 cm) above roof level without additional support for vent.
- 4 feet (1.2 m) from any gable, dormer or other roof structure with building interior access (e.g. vent or window).
- 10 feet (3 m) from any forced air inlet to the building. Any fresh or make-up air inlet such as a dryer or furnace area is considered to be a forced air inlet.

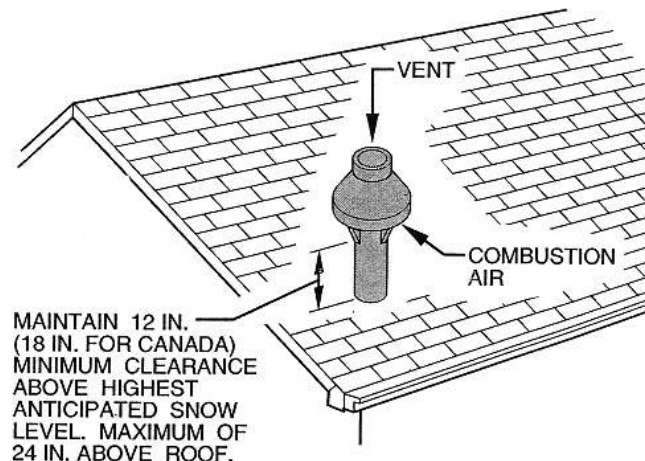
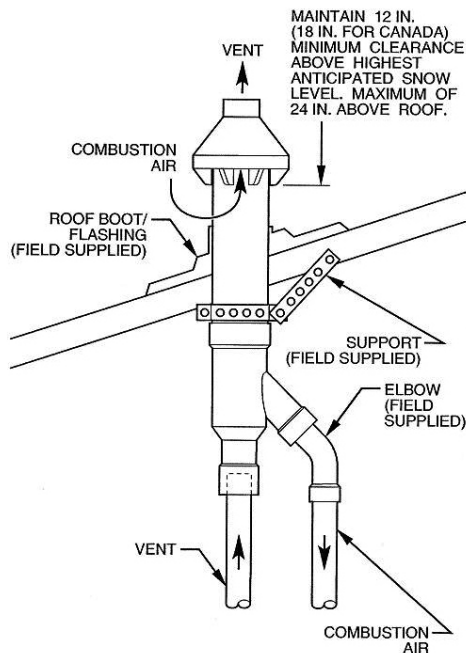


Figure 14: Concentric Vent Roof Clearances

Cut a 5 in. diameter hole through the roof. Make sure the wye concentric fitting is cemented to the large diameter pipe and that the rain cap is cemented to the small diameter pipe. Install the wye concentric fitting and large pipe assembly through the 5 in. diameter hole in the roof and field supplied roof boot/flashing. See Figure 15 for installation details.

SECTION IV: INSTALLATION (cont.)

VENT & COMBUSTION AIR INTAKE (cont.)



Note: Do not allow insulation or other materials to accumulate inside pipe assembly when installing through the roof.

Install the rain cap and small pipe assembly into the wye concentric fitting and large pipe assembly. Ensure small diameter pipe is bottomed and cemented in wye concentric fitting. Complete indoor piping runs and connect piping to the water heater. See Figure 11, 3" pipe systems, for connection details. Piping must be sufficiently supported. At minimum, it is recommended that a support is placed along the vent or air intake piping every 4 feet. For additional information, see installation instructions supplied with concentric vent kit. For vertical venting, the condensate drain kit must be installed to the exhaust adapter.

Figure 15: Concentric Vent Roof Installation

Assembling Vent and Air Intake Joints

⚠ WARNING

Cements and primers are highly flammable. Assemble joints in an adequately ventilated area away from heat sources or open flames. Do not smoke. Read cautions and warnings on material containers.

⚠ CAUTION

DO NOT use cement that is lumpy or thick. **DO NOT** thin cement.

Connections (i.e. joints) between plastic pipe and fittings must be properly sealed. This requires that an appropriate primer (cleaner) and cement (solvent) are used for the type of material (PVC, CPVC, ABS) that is used in the venting system. For PVC use ASTM D2564 grade cement, for CPVC use ASTM F493 grade cement, and for ABS use ASTM D2235 grade cement. The following steps should be taken when connecting plastic pipe and fittings:

- Cut pipe square with hand saw and remove burrs from inside and outside edges.
- Clean fitting socket and pipe joint area of all dirt, grease, or moisture.
- Check dry fit. Pipe should easily go 1/3 of the way into the fitting socket.
- Liberally apply primer to inside of fitting socket and pipe joint area.

SECTION IV: INSTALLATION (cont.)

VENT & COMBUSTION AIR INTAKE (cont.)

- Over the wet primer, apply a medium coat of cement to the fitting socket and pipe joint area.
- Insert pipe into fitting with a slight twisting motion. Ensure that the pipe is bottomed into the fitting.
- Hold pipe and fitting for 30 seconds to prevent push off.
- Wipe off excess cement. Cure time may be up to 2 hours for Ø3" pipe at 60°F. Longer cure time is required for larger diameter pipe and/or lower temperatures.

Note: The vent and combustion air intake pipe/fittings must overlap a minimum of 1/2 inch (1.3 cm) at each joint. DO NOT drill or punch holes in the plastic pipe or fittings.

Condensate Drain Kit

When downward sloping of the vent system is not possible or a vertical vent arrangement is used, the condensate drain kit must be installed. Follow these steps to properly install the kit:

- Turn off all electrical power to the water heater.
- Remove the yellow cap from the exhaust adapter.
- Insert one end of the 3/8" OD plastic tube into the fitting on the exhaust adapter. There should be a tight fit between the tube and the fitting. If the connection is not tight, apply adhesive aluminum tape around the connection to secure.
- Form a trap by looping a portion of the plastic tube into approximately a 6" diameter circle. With respect to the water heater, form the loop such that it can be mounted on the upper 1/3 of the heater.
- Use the supplied loop clamps and screws to secure the tubing to the side of the water heater and hold the loop trap in place.
- The condensate drain tube must terminate at a proper floor drain or run to a condensate neutralizer (prior to the floor drain).
- Prime the loop trap with water prior to resuming operation of the water heater. Disconnect the end of the tube that was connected to the exhaust adapter. With the free end above the loop trap, pour water into the tube until the loop is filled halfway.
- Reconnect the free end to the exhaust adapter fitting and turn on electrical power to the water heater.

DANGER

Failure to prime the condensate drain loop with water will result in combustion gas (which may contain carbon monoxide) entering the room. To avoid the risk of asphyxiation from carbon monoxide, never operate the water heater unless the condensate drain loop is sealed with water.

An example of this installation is shown in Figure 17.

SECTION IV: INSTALLATION (cont.)

WATER CONNECTIONS

CAUTION

This water heater incorporates fittings that contain a nonmetallic lining. **DO NOT** apply heat to these fittings when making sweat connections to the heater. Sweat tubing to an adapter before securing adapter to any fittings on water heaters.

ALL PIPING SHOULD CONFORM TO LOCAL CODES AND ORDINANCES. It is highly recommended that unions and shut-off valves are installed at the potable water connections to allow for isolation and/or movement during service. All piping should be adequately insulated with an approved material to minimize heat loss.

POTABLE WATER CONNECTIONS

THE WATER HEATER MUST BE FILLED WITH WATER BEFORE LIGHTING THE BURNER.

- 1) Close the main water supply valve before continuing with the installation. After the main water supply is shut-off, relieve the water line pressure by opening a faucet. Once the pressure has been relieved, close the faucet. The “Cold” and “Hot” potable water connections are labeled on the water heater. Install a union and shut-off valve at both potable water connections. All piping should be 3/4” diameter new copper or larger. A tempering valve or anti-scald valve should be installed at the potable water outlet and used according to the manufacturer’s specifications to prevent scalding.
- 2) If a backflow preventer, check valve, or pressure regulating valve is required in the cold water supply, a properly sized expansion tank must be installed to control thermal expansion. Do not operate the water heater in a closed system without installing a thermal expansion tank. Follow the expansion tank manufacturer’s recommendations when selecting a tank for your system.
- 3) Following installation of the water lines, open the main water supply valve and fill the water heater. Open several hot water faucets to relieve air from the system. After water is flowing through the faucets and the system is void of air, close the faucets and check for water leaks in the system.

Note: Do not try to heat hard water as this will drastically reduce heater life. Install a water softener or other scale reducing water treatment system if the water heater is being installed in a hard water area (water hardness higher than seven grains).

SOLAR CONNECTIONS

CAUTION

Temperature of the primary heat source medium (from solar collector) shall not exceed 200°F.

The outlet of the solar collector should be connected to the water heater at the “FROM SOLAR” fitting. The fitting labeled “TO SOLAR” should be connected to the solar return piping. It is recommended to install a union and shut-off valve at each solar connection. All pipe and fittings between the solar system and water heater should be 3/4” diameter or larger. Reference the solar collector installation instructions or contact the manufacturer for proper components and solar loop system design.

SECTION IV: INSTALLATION (cont.)

GAS CONNECTIONS

CAUTION

Do not use this water heater with any gas other than the type listed on the rating label. Check the rating label on the front of the water heater and make sure the gas to be used matches the gas stated on the rating label. Consult your local gas company or Bock Water Heaters with any questions.

A manual valve, union, and a sediment trap shall be provided in front of the gas valve. All gas piping must conform to local codes and/or the National Fuel Gas Code ANSI 223.1/NFPA 54 or CSA B149.1.

Note: When sizing the gas piping to the heater, make sure that the pressure at the valve is sufficient when all other appliances are operating. Undersized gas piping will reduce water heater performance and life as well as result in nuisance lockouts. Also verify that the gas service and meter are sized properly for the load.

Gas piping should be carried oversize, i.e.: $\frac{3}{4}$ inch or 1 inch or larger for $\frac{1}{2}$ inch valve to within 2 feet of the valve itself. This sustains pressure at the valve during start-up to prevent flashbacks caused by momentary pressure loss. For natural gas, 5" W.C. pressure must be maintained upstream of the gas valve during operation. For LP gas, a minimum of 11" W.C. must be maintained upstream of the gas valve. A $\frac{1}{8}$ inch NPT pipe connection should be installed upstream of the manual shut-off valve to check incoming gas pressure.

During pressure testing of the gas supply piping, close the manual gas shut-off valve to the water heater. Test pressure shall not **exceed** $\frac{1}{2}$ PSIG (14" W.C.). The gas valve is only rated for $\frac{1}{2}$ PSIG. To test at pressure greater than $\frac{1}{2}$ PSIG, close the manual shut-off valve and disconnect the gas operating valve.

Turn on gas and inspect piping for leaks by "painting" each joint with a soapy water solution and check for bubbles. Make sure that excess solution does not enter the control's plastic housing and all wiring remains dry.

WARNING

DO NOT use an open flame to check for leaks. Serious injury or death could result from fire or explosion.

The pipe thread compound that is used on gas piping must be of the type resistant to propane gas. Do not use teflon tape on gas piping.

The recommended gas piping to the water heater control is shown in Figure 16. Figure 17 gives an overview of all field piping connections.

SECTION IV: INSTALLATION (cont.)

GAS CONNECTIONS (cont.)

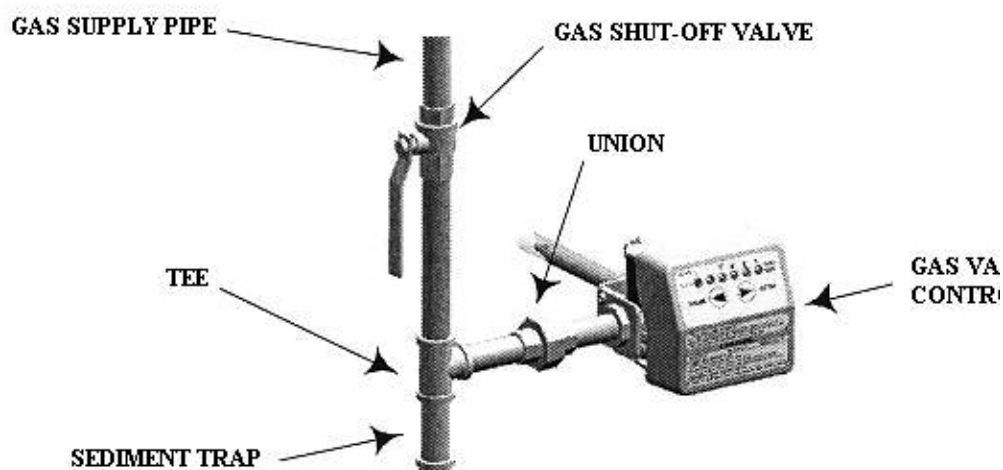


Figure 16: Gas Piping to Valve/Control

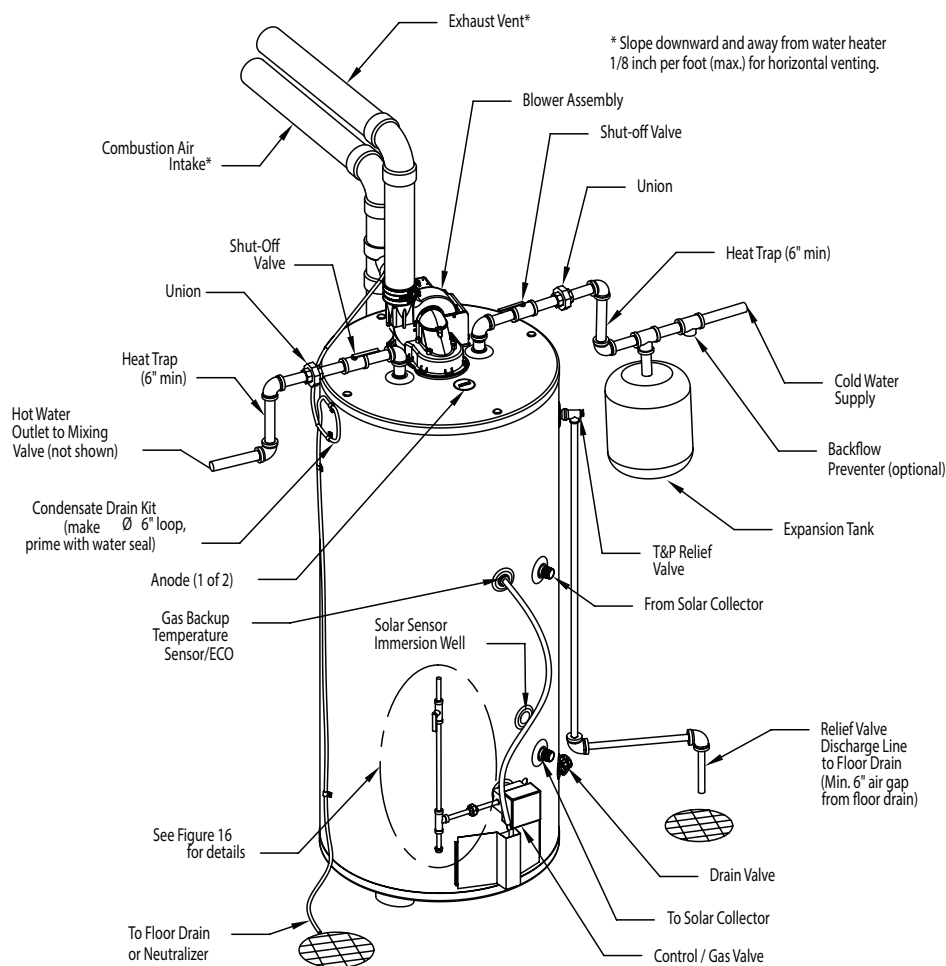


Figure 17: Recommended Water, Gas, Vent Connections

SECTION IV: INSTALLATION (cont.)

WIRING

All electrical wiring and connections must be in accordance with local codes. In the absence of local codes, wiring must conform to the National Electric Code ANSI/NFPA No. 70 or the Canadian Electrical Code C22.1. This water heater must be electrically grounded. Electrical power should be supplied through a fused disconnect switch located near the water heater. Where local codes permit, use the supplied power cord for field connection. A grounding receptacle is required. If local codes do not permit the use of the supplied cord, remove the power cord from the blower assembly and replace with suitable power supply (120V, 60 Hz) wiring and connections. The water heater draws less than 5 amps (maximum). Check for proper polarity at the main power connection prior to operating the water heater.

The factory installed immersion well is designed to accommodate insertion of a thermistor. **The solar system controller and thermistor is not supplied with this water heater.**

⚠ CAUTION

Turn off or disconnect the electrical power supply to the water heater before servicing. Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.

A component and schematic wiring diagram is shown in Figure 18.

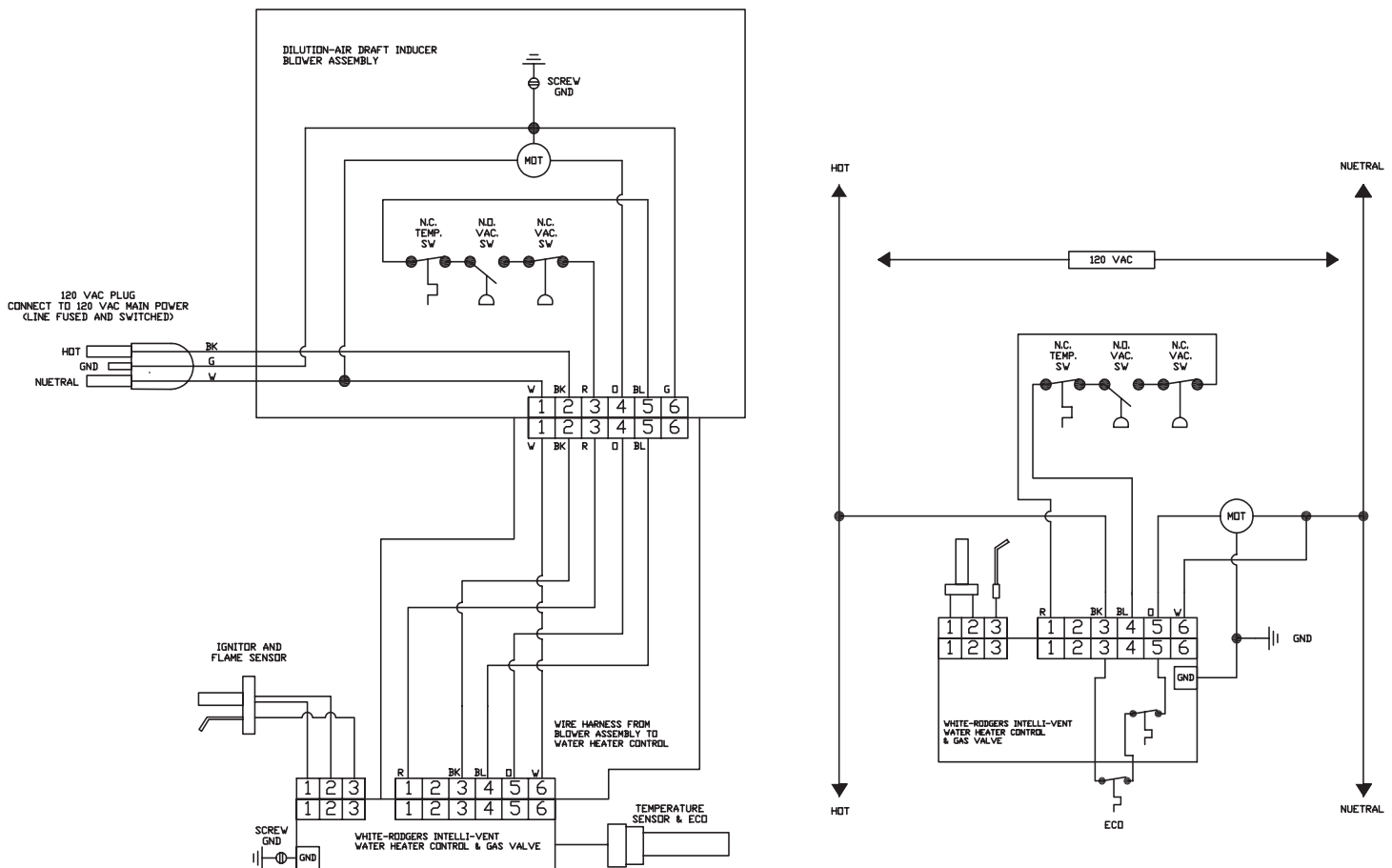


Figure 18: Component and Schematic Wiring Diagrams

SECTION V: OPERATION

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.

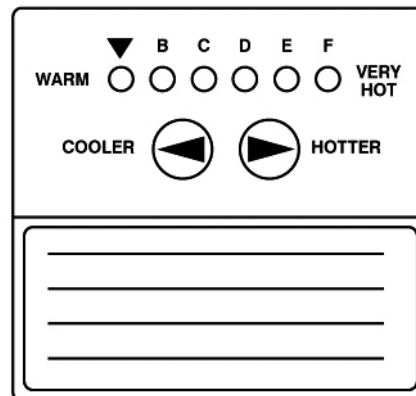
- A. This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.
- B. **BEFORE OPERATING** smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.
- 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.
- C. If you cannot reach your gas supplier, call the fire department.
- D. Use only your hand to push in or turn the gas control buttons. Never use tools. If the control buttons will not push in or turn by hand, don't try to repair them, 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 installer or service agency to replace a flooded water heater. Do not attempt to repair the unit! It must be replaced!

OPERATING INSTRUCTIONS

1. **STOP!** Read the safety information above on this label.
2. Turn on all electrical power to the appliance.
3. Set the thermostat to the lowest setting by pressing the COOLER ◀ and HOTTER ▶ buttons at the same time and holding them for one second. Then, press the COOLER ◀ button until only the WARM (or ▼) indicator light is lit.
4. Turn off all electrical power to the appliance.
5. This appliance is equipped with a device which automatically lights the burner. **DO NOT TRY TO LIGHT THE BURNER BY HAND.**
6. Wait five (5) minutes to clear out any gas. If you smell gas **STOP!** Follow "B" in the safety information above on this label. If you don't smell gas, go to the next step.
7. Turn on all electrical power to the appliance.
8. Set the thermostat to the desired temperature setting by pressing the COOLER ◀ and HOTTER ▶ buttons at the same time and holding them for one second. Then, press the HOTTER ▶ button until the desired temperature display setting is lit.

The recommended temperature setting is WARM (indicated by ▼ on the thermostat). The WARM setting is approximately 120°F. **CAUTION: Hotter water increases the risk of scald injury.**

9. If the appliance will not operate, follow the instructions "TO TURN OFF GAS TO APPLIANCE" and call your service technician or gas supplier.



TO TURN OFF GAS TO APPLIANCE

1. Set the thermostat to the lowest setting by first pressing the COOLER ◀ and HOTTER ▶ buttons at the same time and holding them for one second. Then, press the COOLER ◀ button until only the WARM indicator light is lit.
2. Turn off all electrical power to the appliance.

23085

Figure 19: Instructions To Put The Water Heater In Operation

SECTION V: OPERATION (cont.)

SEQUENCE OF OPERATION

Figure 20 gives a step-by-step description of the sequence of operations for the gas-fired water heater. See Troubleshooting section of this manual for solutions to error codes.

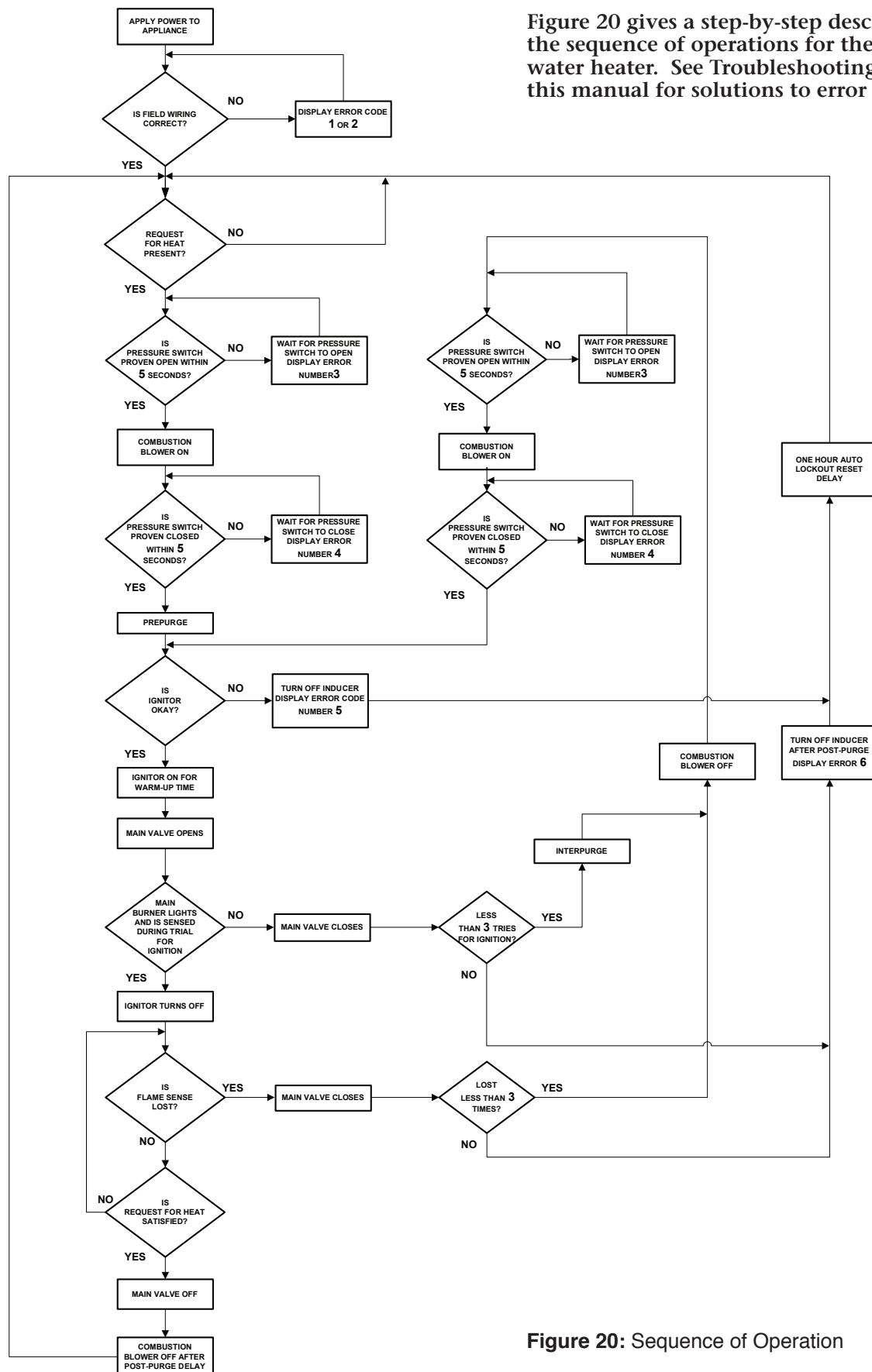


Figure 20: Sequence of Operation

SECTION V: OPERATION (cont.)

HEATING OPERATIONS

Condition 1: The minimum temperature difference (for heat transfer) between the potable water at the bottom of the tank and the solar collector is sensed by the solar controller. In addition, the tank temperature is below the maximum tank temperature setpoint (on solar control).

Action 1: The solar controller energizes a pump to flow fluid through the solar collector and heat exchanger. Heat is transferred to the potable water until the temperature difference is reduced to a desired value or the maximum tank temperature has been reached.

Condition 2: The gas backup thermostat senses that the potable water temperature in the upper area of the tank drops below the thermostat set-point.

Action 2: The gas burner is on and heats the potable water to the set-point temperature, at which point the gas valve closes.

INSPECT THE INSTALLATION AND ADJUST THE CONTROLS

For natural gas, the manifold pressure is preset at 4.0" w.c. and the acceptable inlet pressure is in the range of 5-14" w.c. For propane gas, the manifold pressure is preset at 10.0" w.c. and the acceptable inlet pressure is in the range of 11-14" w.c. See the "Pre-Installation" section of this manual for information on clearances, air supply, and venting.

The thermostat has been adjusted to 120°F at the factory. Wait until thermostat has shut off gas to the main burner. Wait 30 seconds following shut-off of gas, then set thermostat to the highest temperature. The main burner should relight. Set thermostat to the lowest temperature; the main burner should go out. The thermostat should be adjusted to the minimum setting that will meet the hot water needs of the homeowner or commercial application.

CAUTION

There is a scald potential if the thermostat is set too high. The recommended temperature setting for normal residential use is 120°F. If higher temperature settings are needed for combined appliance applications or commercial use, an automatic tempering valve must be installed on all domestic hot water lines.

MEASURING THE OUTCOMING WATER TEMPERATURE

The thermostat is factory set at 120°F for domestic use. It is the responsibility of the building owner to verify that the installer follows the recommended quantitative testing for measuring the outlet water temperature. To make sure that the system works properly after installation and in the future, it is recommended that the heater's performance be measured and monitored. Run water out of the tap nearest the heater until it comes out warm. Using a calibrated thermometer, take a measurement. If the water is not at a suitable temperature for the installation, adjust the setting on the control. Press the COOLER and HOTTER buttons at the same time and hold them for one second. Then, press either the COOLER or HOTTER buttons until the desired temperature display setting is lit.

▼	DISPLAY					APPROXIMATE TEMPERATURE °F (°C)
	B	C	D	E	F	
						120 (49)
						130 (54)
						140 (60)
						145 (63)
						150 (66)
						155 (68)
						160 (71)
						165 (74)
						170 (77)
						175 (79)
						180 (82)

Figure 21: Temperature and Display Settings

SECTION V: OPERATION (cont.)

MEASURING THE OUTCOMING WATER TEMPERATURE (cont.)

This log (or a similar one) should be filled out as follows:

Date	Time	Person running test	Set temp °F	Outlet temp °F

SECTION VI: MAINTENANCE

NOTICE TO THE OWNER: If you are having a mechanical problem with your water heater, contact your service company or installer.

WATER PIPING

On an annual basis, all piping should be checked for leakage at joints, shut-off valves, and unions.

T&P RELIEF VALVE

On an annual basis, the temperature and pressure relief valve should be checked for proper operation. First, attach a drain line to the valve to direct the water discharge to an open drain. This is very important because the temperature of the discharge could be very hot. Second, lift the lever at the end of the valve several times. The valve should operate freely and return to its original position properly. If water does not flow out of the valve, remove and inspect for corrosion or obstructions. Replace with a new valve if necessary. Do not repair the faulty valve as this may cause improper operation.

ANODE RODS

Anode rods should be inspected twice in the first year and at least yearly once a time interval for inspection has been developed. It is recommended to check the rod(s) six months after the heater is installed. If the anode rod had reduced in size by two-thirds of its original diameter of 3/4" or shows signs of pitting, it is time for replacement. Take the following steps when changing the anode rod(s):

1. Shut off water supply.
2. Open any faucet to relieve tank pressure.
3. Remove caps on water heater top; push insulation aside.
4. Use a 1 1/16" six-sided socket wrench and a breaker bar. Snap hard to break the anode rod seal.
5. Remove rod(s) and replace with new rod(s).
6. Turn water supply back on and leave faucet open until air is out of line.
7. Turn faucet off and check that new rod(s) doesn't leak.
8. Snap caps back into place.

FLUSH THE TANK

Elements in the water such as lime and iron may accumulate in the heater. Accumulation of these elements can keep your water heater from operating at peak efficiency and may lead to premature tank failure. It is recommended that the tank is drained and flushed thoroughly once a year to prevent buildup.

SECTION VI: MAINTENANCE (cont.)

SOLAR CONTROLLER AND COLLECTOR PANELS

The solar controller and collector panel manufacturer may have a recommended maintenance procedure. Refer to the instruction manual that was received with the solar equipment.

INSPECT THE VENTING SYSTEM, FLUE, AND BURNER

The vent and combustion air intake system should be checked at least once a year for damage and blockage. Make sure all joints are secure and that the system is properly supported. Inspect the outdoor terminals and screens to make sure they are free of obstructions.

CAUTION

For your safety, removal of the blower assembly, cleaning of the flue, and removal of the burner must be performed by a qualified service technician. If the burner is removed it must be leak tested following reinstallation before normal water heater operation is resumed. All parts must be replaced to their original position prior to operating the water heater.

The water heater flue should be inspected periodically to be sure it is clean. In order to inspect the flue, the blower assembly and flue baffle must be removed. **Before removing the blower assembly make sure the water heater is disconnected from the main power supply and the gas supply to the water heater is shut off.** Wait at least 5 minutes to allow the flue to cool. Remove the flue baffle and clean the flue with a flexible wire brush. Slide the brush down the flue at the free end of each row of fins. This should knock any rust flakes into the combustion chamber for removal.

WARNING

If the flue is blocked with soot this indicates serious combustion problems related to the building and/or installation. These must be addressed before placing the water heater back in operation.

Vacuum any rust flakes or sediment collected in the combustion chamber before restarting the heater. Remove the outer and inner access doors. The inner access door is mounted to the tank skirt with screws. Disconnect the burner tube and wire harness from the gas valve and remove the burner with the inner access door attached. Remove all debris from the combustion chamber. Inspect the ignitor and flame sensor. Carefully reinstall the burner. The end of the burner tube should be positioned under the burner bracket on the inner shield. Tighten the burner tube into the gas valve and reconnect the wire harness. Remount the inner door to the tank skirt, using every screw that was originally removed. The inner door must be securely mounted. Place the flue baffle back into the flue and screw the blower assembly back into place on the top pan (use every screw!).

Leak test the burner connection to the gas valve prior to resuming operation.

SECTION VII: TROUBLESHOOTING

CAUTION

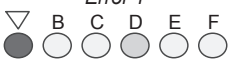
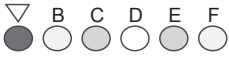

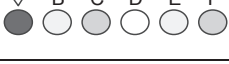



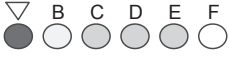
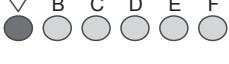
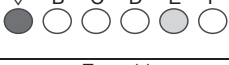

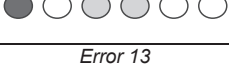

For your safety, the repair and servicing of this equipment shall only be performed by a qualified agency.

Table 10: Troubleshooting

Problem	Possible causes	Recommended Action
Unable to light the main burner	1) Air in the gas line.	1) Contact qualified agency to purge the air from the gas line.
	2) Vent or air intake system is blocked.	2) Contact qualified agency to inspect the system for blockage.
	3) Pressure switch stuck in open or closed position.	3) Make sure pressure switch hoses are not kinked. Contact qualified service agency for replacement.
	4) Loose wire connection.	4) Contact qualified agency to inspect wiring.
	5) Energy Cut-Off (ECO) or Temperature Switch in blower assembly tripped.	5) Contact qualified agency to inspect safety devices.
	6) Hot surface ignitor is bad.	6) Contact qualified agency to inspect and/or replace ignitor.
	7) Check control error codes.	7) See Table 10.
Main burner does not stay lit	1) Energy Cut-Off (ECO) or Temperature Switch in blower assembly tripped.	1) Contact qualified agency to inspect safety devices.
	2) Flame sensor is bad.	2) Contact qualified agency to inspect and/or replace sensor.
Condensation in heat exchanger	1) Heating water for the first time (i.e. following installation).	1) This is normal and will stop after water temperature reaches setpoint.
	2) Horizontal venting not sloped downward and away from water heater.	2) Contact qualified agency to inspect vent system.
	3) Condensate kit not installed (vertical or horizontal vent systems).	3) Contact qualified agency to install condensate kt. Refer to this manual.
	4) Vent & air intake system exceeds maximum.	4) Contact qualified agency to inspect vent & air intake system.
Poor combustion (sooting, yellow flame)	1) Accumulation of scale on burner.	1) Contact qualified agency to clean burner.
	2) Vent or air intake system is blocked.	2) Contact qualified agency to inspect the system for blockage.
Rumbling noise during burner operation	1) Scale or sediment build-up in tank.	1) Drain the water heater to remove scale and sediment.
Insufficient hot water	1) Heater undersized for load.	1) Reduce hot water usage rate.
	2) Low gas pressure.	2) Check gas supply and manifold pressure
	3) Check control error codes.	3) See Table 10.
	4) Temperature setting of control is too low.	4) See Figure 21 for settings.
	5) Circulator does not operate.	5) Check solar controller and power supply. Call qualified agency to replace.
	6) Undersized solar collectors.	6) Determine peak usage, compare to tank capacity, add storage if necessary.
Water too hot or not hot enough	1) Control temperature setting is too high or low.	1) Adjust setting as required, see Figure 21.
	2) Control is defective.	2) Contact qualified agency to replace the control.
T&P relief valve is dripping water	1) Excessive pressure condition in tank (greater than 150 psi).	1) Contact qualified agency to inspect water piping system. Expansion tanks are required in closed systems.
T&P relief valve is gushing hot water	1) Excessive temperature condition in tank (greater than 210°F).	1) Lower the temperature setting on the control. See "Section V: Operation" for instructions to adj

SECTION VII: TROUBLESHOOTING (cont.)

Table 11: Control LED Codes

LED Error Code	Problem	Solution
Error 1 	Open earth ground circuit to the ignition system.	1) Check that the earth ground conductor is properly connected at the fuse box or breaker panel and the water heater. 2) Check that the grounding conductors on the water heater are properly connected and secure.
Error 2 	The self diagnostic test detected a wiring error or a high resistance to earth ground.	1) Check for proper connection of the line neutral and line hot wires. 2) Check that the water heater is securely connected to earth ground.
Error 3 	The pressure switch remained closed longer than 5 seconds after the call for heat began.	1) The pressure switch wiring is incorrect. 2) The pressure switch is defective and must be replaced.
Error 4 	The pressure switch(es) remained open longer than 5 seconds after the combustion blower was energized.	1) Check wiring to the pressure switch(es). 2) Verify that pressure switch tubing is connected correctly. 3) Check the vent and combustion air intake systems for blockage.
Error 5 	Error in the hot surface ignitor circuit.	1) Check that all wiring is correct and secure. 2) Disconnect the ignitor connector and measure the ignitor resistance with an accurate ohmmeter between pins 1 and 2. Resistance should be between 11.5 and 18.8 ohms. If the reading is incorrect, replace the hot surface ignitor.
Error 6 	The maximum number of ignition retries or recycles has been reached and the system is in lockout.	1) Gas supply is off or inlet gas pressure is too low to operate. Turn on gas supply and/or increase inlet gas pressure within specified range. 2) Hot surface ignitor and flame rod assembly not positioned correctly. 3) Electric polarity to unit is incorrect - test and correct. 4) Low voltage to the water heater. Supply voltage must equal rated voltage. 5) Check the vent and combustion air intake systems for blockage.
Error 7 	Problem with the gas valve driver circuit.	1) Turn off power to the water heater for 10 seconds, then turn power on. 2) Replace the combination control / gas valve.
Error 8 	Problem with the internal microcomputer.	1) Turn off power to the water heater for 10 seconds, then turn power on. 2) Replace the combination control / gas valve.
Error 9 	Problem with the internal circuit.	1) Turn off power to the water heater for 10 seconds, then turn power on. 2) Replace the combination control / gas valve.
Error 10 	Flame signal sensed out of proper sequence.	1) Replace the combination control / gas valve.
Error 11 	The high temperature thermal cutoff (ECO) is open.	1) ECO will automatically reset (or close) when the water temperature drops to 120°F or below. The water heater thermostat will automatically reset following a three minute standby period once the ECO switch closes.
Error 12 	One of the temperature adjust buttons is stuck closed.	1) Make sure that there are no objects leaning against the front of the control. 2) Lightly press and release each of the buttons once. 3) Replace the combination control / gas valve.
Error 13 	Water temperature sensor is either open or short circuited.	1) Check that all wiring is correct and secure. 2) Replace the combination control / gas valve.

SECTION VIII: PARTS LIST

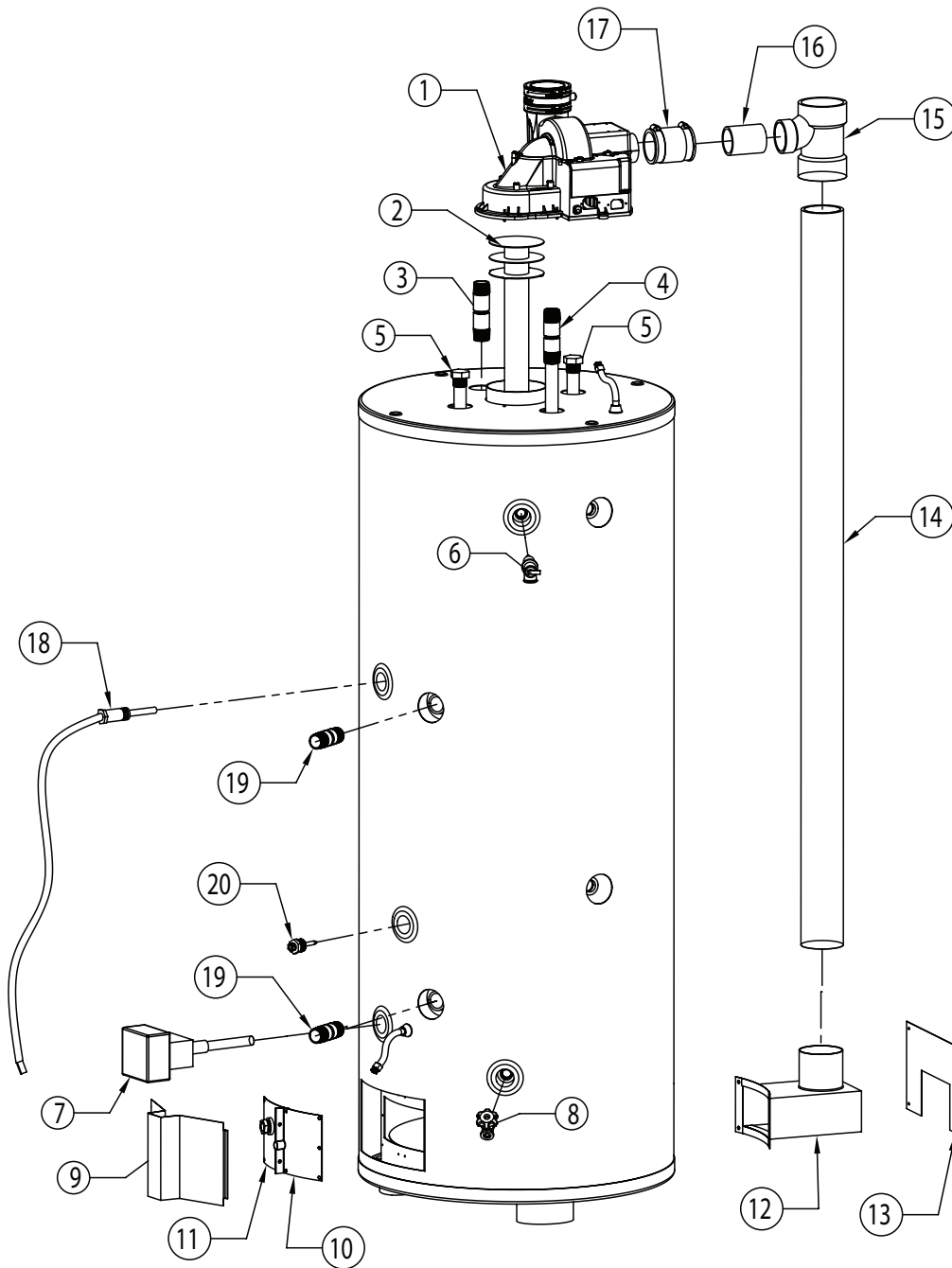


Figure 22: SKG Parts

Table 12: SKG Parts

Part Description			
1	Blower Assembly	11	Inner Door, Left Side
2	Flue Baffle	12	Air Intake Boot
3	Hot Outlet Nipple, 1" x 4.5"	13	Trim Plate
4	Dip Tube	14	PVC Pipe, Ø3" x 62.5"
5	Anode Rods	15	PVC Tee, 3" x 3" x 2"
6	T&P Relief Valve	16	PVC Pipe, Ø2" x 3"
7	Control / Gas Valve	17	Flex Coupling, Ø2" x 3.5"
8	Drain Valve	18	Sensor/ECO Harness
9	Outer Door	19	Coil Nipple, 1" x 3"
10	Inner Door, Right Side	20	Sensor Immersion Well (solar)

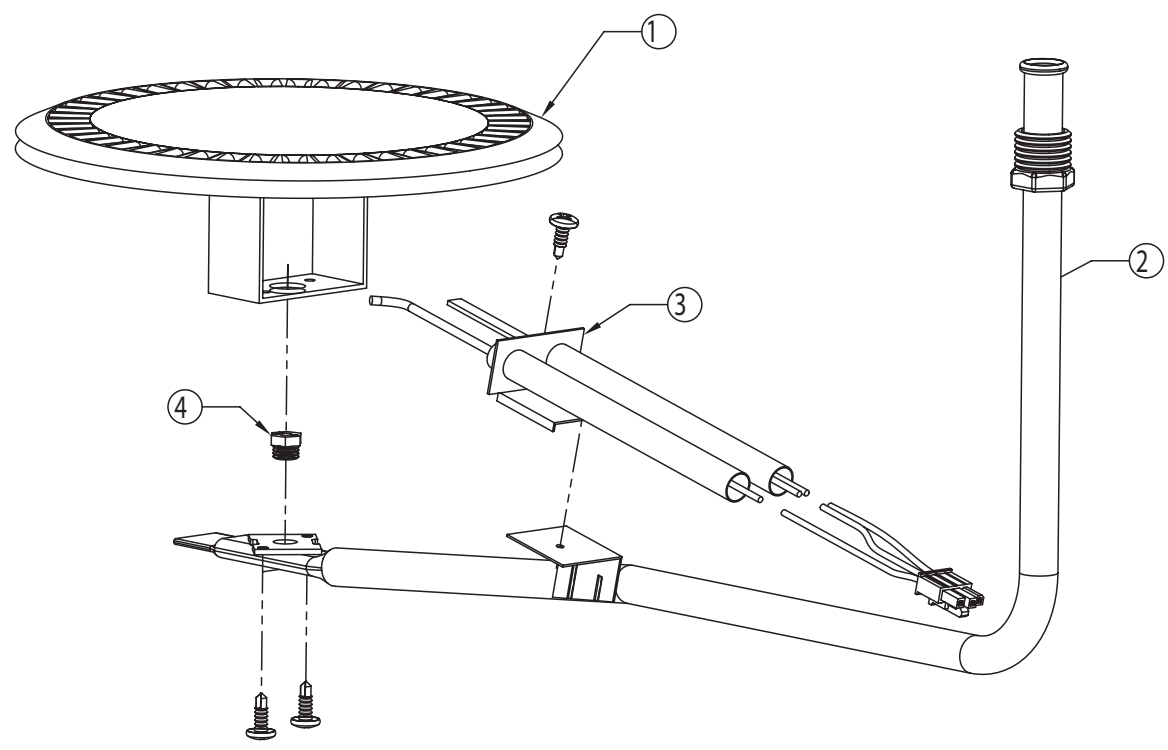


Figure 23: SKG Burner Parts

Table 13: SKG Burner Parts

Part Description	
1	Burner
2	Main Burner Tube (NAT or LP)
3	Ignitor and Flame Sensor Assembly
4	Orifice (NAT or LP)

SECTION IX: WARRANTY

LIMITED WARRANTY FOR SOLAR WATER HEATER

Bock Water Heaters, Inc.

110 S. Dickinson Street

Madison, WI 53703

Phone: 608-257-2225

WHAT DOES THIS LIMITED WARRANTY COVER?

This limited warranty applies only to the original consumer purchaser.

General Defects and Malfunctions: This warranty covers defections and malfunctions in your new water heater for a period of one year from the original installation date. We will repair or replace, at our option, any defective or malfunctioning component of the water heater. This limited warranty will terminate if you sell or otherwise transfer the water heater, or the water heater is installed at a location different from its original installation location.

For water heaters installed in single family dwellings for residential use:

Tank and Heat Exchanger: We also warrant that the tank and heat exchanger will not leak due to defective materials or workmanship for six years from the date of original installation or from date of manufacture in the event the Limited Warranty Registration Card was not completed and returned to manufacturer. If the tank and heat exchanger is leaking and we have verified that the leak is due to a defect in materials and workmanship, we will replace the tank with a tank that is the nearest Bock model available at the time of replacement. If a replacement tank is provided, it will remain warranted under this section as if it were the original tank. For example, if we send you a replacement tank under this limited warranty two years after the original installation date, then the replacement tank will remain warranted for the remaining four years after the original installation date.

For all water heaters NOT installed in single family dwellings and used exclusively for commercial uses:

Tank and Heat Exchanger: We also warrant that the tank and heat exchanger will not leak due to defective materials or workmanship for five years from the date of original installation or from date of manufacture in the event the Limited Warranty Registration Card was not completed and returned to manufacturer. If the tank and heat exchanger is leaking and we have verified that the leak is due to a defect in materials and workmanship, we will replace the tank with a tank that is the nearest Bock model available at the time of replacement. If a replacement tank is provided, it will remain warranted under this section as if it were the original tank. For example, if we send you a replacement tank under this limited warranty two years after the original installation date, then the replacement tank will remain warranted for the remaining three years after the original installation date.

HOW DO YOU GET SERVICE UNDER THE LIMITED WARRANTY?

In order for the warranty period to begin on the date of installation, you must return the warranty registration card attached below within 30 days of purchasing the water heater. You may also register your water heater online at www.bockwaterheaters.com. You must have a copy of the original sales receipt at the time you request service. Failure to return the warranty registration card and provide a copy of the sales receipt.

To get service under this limited warranty you should contact either the dealer or installer. If dealer or installer is unknown you can contact us via e-mail at warranty@bockwaterheaters.com or call us Monday through Friday between the hours of 8 o'clock a.m. to 5 o'clock p.m. Central Time at the following number: 1-608-257-2225.

You can also write us at the following address:

Bock Water Heaters, Inc.
Warranty Support Group
110 S. Dickinson Street
Madison, WI 53703

We will respond not later than ten days after we have received your request for service.

SECTION IX: WARRANTY (cont.)

WHAT DOES THIS LIMITED WARRANTY NOT COVER?

This limited warranty does not cover water heaters that are or were:

- Incorrectly installed, especially where the installation violates state or local plumbing, housing or building codes.
- Operated at inappropriate settings, excessive pressures or temperatures.
- Exposed to adverse local conditions and specifically sediment or lime precipitation in the tank or corrosive elements in the atmosphere or unacceptable water quality
- Installed outside the United States or Canada.
- Accidentally damaged.

Also, we will not cover the following charges, costs and losses:

- Any freight or delivery charges.
- Any removal or installation charges.
- Charges to return the water heater or part to the manufacturer.
- Water damage, loss or damage to property, inconvenience or loss of use.

WHAT WILL VOID THE LIMITED WARRANTY?

If you do any of the following, you will void this limited warranty:

- Fail to retain an original copy of your sales receipt.
- Fail to retain the actual rating plate from the water heater.
- Alter or remove the serial number.
- Transfer or sell the water heater.
- Remove the water heater from its original location and install it somewhere else.
- Fail to follow the care and maintenance instructions provided with the water heater.
- Remove the anode rods.
- Fail to inspect and replace the anode rods (you must retain and present your paid receipts as proof of anode rod replacement).

HOW DOES STATE LAW RELATE TO THIS LIMITED WARRANTY?

This is a limited warranty. WE MAKE NO OTHER EXPRESS WARRANTIES WITH RESPECT TO THIS WATER HEATER. We will not assume, nor authorize any person to assume for us any other liability in connection with the sale or operation of this water heater. ANY IMPLIED WARRANTIES, INCLUDING MECHANICALITY OR FITNESS FOR A PARTICULAR APPLICATION, IMPOSED ON THIS SALE UNDER THE LAWS OF THE STATE OF SALE ARE LIMITED TO ONE YEAR. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state. Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

WE WILL NOT BE RESPONSIBLE FOR WATER DAMAGE, LOSS OF USE OF THE UNIT, INCONVENIENCE, LOSS OR DAMAGE TO PERSONAL PROPERTY, WHETHER DIRECT OR INDIRECT, AND WHETHER ARISING IN CONTRACT OR TORT. Some states do not allow the exclusion of incidental or consequential damages, so the above exclusion may not apply to you.

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