

American Standard®

WATER HEATERS



Operating, installation and service manual

Standard Residential power vent
Gas Water Heater with vaporshield Technology.

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

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

1. Do not try to light any appliance.
2. Do not touch any electrical switch; do not use any phone in your building.
3. Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
4. If you can not reach your gas supplier, call the fire department.

Installation and service must be performed by a qualified installer, service agency or the gas supplier.

THIS WATER HEATER SHALL NOT BE INSTALLED IN BATHROOMS, BEDROOMS, OR ANY OCCUPIED ROOM NORMALLY KEPT CLOSED. VAPORSHIELD® Technology Gas Water Heaters meet the new ANSI Z21.10.1 standard that deals with the accidental or unintended ignition of flammable vapors, such as those emitted by gasoline.

⚠ WARNING: This water heater is equipped for one type of gas only. Check the data plate near the gas control valve for the correct gas. **DO NOT USE THIS WATER HEATER WITH ANY GAS OTHER THAN THE ONE LISTED ON THE DATA PLATE.** Failure to use the correct gas can cause problems which can result in **DEATH, SERIOUS BODILY INJURY OR PROPERTY DAMAGE.** If you have any questions or doubts consult your gas supplier or gas company. Water heaters for bottled, propane or liquefied petroleum gas (LPG) are different from natural gas models. A natural gas heater will not function safely on bottled, propane or liquefied petroleum gas (LPG) and no attempt should be made to convert a heater from natural gas to any other gas.

INSTALLER:


1. Affix these instructions or adjacent to water heater.
2. Before leaving premises: **REVIEW** this operation, installation and service manual to be sure heater has been installed correctly. Make sure unit is started and operated for one complete cycle and water temperature is acceptable to the customer at the fixtures.

OWNER:

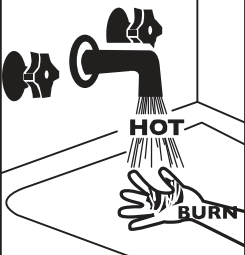
1. Retain these instructions and warranty for future reference.

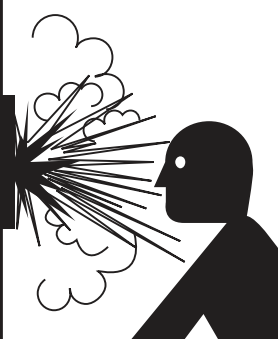
All technical and warranty questions should be directed to the local dealer from whom the water heater was purchased. If you are unsuccessful please write to the company listed on the warranty or data plate which came with your water heater.



GENERAL SAFETY

	<p>⚠ WARNING</p> <p>Read and understand instruction manual and safety message before installing, operating or servicing this water heater.</p> <p>Failure to follow instructions and safety messages could result in death or serious injury.</p> <p>Instruction manual must remain with water heater.</p>
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	<p>⚠ WARNING</p> <p>Fire Hazard</p>
	<p>For continued protection against risk or fire:</p> <ul style="list-style-type: none"> • Do not install water heater on carpeted floor. • Do not operate water heater if flood damage.

	<p>⚠ DANGER</p> <p>Water temperature over 125°F (52°C) can cause severe burns instantly resulting in severe injury or death.</p> <p>Children, the elderly, and the physically or mentally disabled are at highest risk for scald injury.</p> <p>Feel water before bathing or showering .</p> <p>Temperature limiting, valves are available.</p> <p>Read instruction manual for safe temperature setting.</p>
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	<p>⚠ WARNING</p> <p>Explosion Hazard</p>
	<ul style="list-style-type: none"> •Overheated water can cause water tank explosion. • Properly sized temperature and pressure relief valve must be installed in opening provided.

<p>⚠ WARNING</p> <p>Fire or Explosion Hazard</p>	
<ul style="list-style-type: none"> •Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance. •Avoid all ignition source if you smell gas. •Do not expose water heater control to excessive gas pressure. •Use only gas shown on rating plate. •Maintain required clearances to combustibles. •Keep ignition sources away from faucets after extended period of non-use. 	
	<p>Read instruction manual before installing, using or servicing water heater.</p>
	

<p>CAUTION</p>	
<ul style="list-style-type: none"> • Do not operate water heater if flood damaged. • Inspect and replace anode. • Install in location with drainage. • Fill tank with water before operation. •Be alert for thermal expansion. <p>Refer to instruction manual for installation and service.</p>	

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WARNING
 IMPROPER INSTALLATION,
 ADJUSTMENT, ALTERATION,
 SERVICE OR MAINTENANCE
 CAN CAUSE INJURY, DEATH OR
 PROPERTY DAMAGE READ AND
 REFER TO THIS MANUAL.

Please complete the following information at the time of installation. This should be retained and presented along with the warranty in the event a claim is necessary.

MODEL NUMBER: _____ TYPE OF GAS: _____

SERIAL NUMBER: _____

INSTALLATION ADDRESS: _____

DATE OF INSTALLATION: _____

THIS WATER HEATER HAS BEEN INSTALLED IN ACCORDANCE WITH THESE INSTALLATION INSTRUCTIONS AND LOCAL CODE REQUIREMENTS ON _____

INSTALLER: _____



CONSUMER RESPONSIBILITIES

THIS MANUAL HAS BEEN PREPARED TO ACQUAINT YOU WITH THE INSTALLATION, OPERATION AND MAINTENANCE OF YOUR GAS WATER HEATER AND TO PROVIDE IMPORTANT SAFETY INFORMATION. WE URGE YOU TO READ ALL INSTRUCTIONS THOROUGHLY before attempting installation or operation of your water heater. Keep these instructions for future reference.

The manufacturer of this water heater will not be liable for any damages caused by failure to comply with the installation and operating instructions outlined on the following pages. These instructions are a guide for the correct installation of your water heater. If you lack the necessary skills required or have difficulty following the directions, you should not proceed but get help from a qualified person for that part of the installation you do not understand. Failure to follow this warning can result in an incorrect installation that can result in **DEATH, INJURY OR PROPERTY DAMAGE**.

This water heater is design-certified by CSA International as a power vent water heater, which takes its combustion air, either from the installation area or from air ducted to the unit from outside.

This water heater must be installed according to all local and state codes, or in the absence of local and state codes, the "National Fuel Gas Code", ANSI Z223.1 (NFPA 54)-Latest Edition. This code is available from the following:

American Gas Association
400 North Capitol, St; NVV
Washington D.C. 20001-0000
E mail AGA.org

National Fire Protection Agency
1 Batterymarch Park
Quincy, MA 02269
Check your local phone listings for the local authorities having jurisdiction over your installation.

⚠ Important WARNINGS: Do not use this appliance if any part has been under water. Immediately call a qualified service technician.. Water heaters subjected to flood conditions, or anytime the gas controls, main burner or pilot have been submerged in water, require replacement of the entire water heater.

UNPACKING THE Water Heater

⚠ WARNING

Use two or more people to move and install water heater, unless proper handling equipment is utilized. Failure to do so can result in back or other injury.

Important: Do not remove any permanent instructions, labels, or the data label from outside of the water heater or on the inside of panels.

- Remove exterior packaging and place installation components aside.
- Inspect all parts for damage prior to installation and startup.
- Completely read all instructions before attempting to assemble and install this product.

When referring to your water heater always have the information listed on the rating plate readily available.

⚠ WARNING

- This water heater may not be installed in a mobile home.
- Location selection should be as close to the stack or chimney as practical and as centralized with the piping system as possible.
- Water heater should be located in an area not subject to freezing temperatures.
- The water heater should be located so that the controls and drain are easily accessible (at least 24 inches of open space of the water heater).
- A suitable drain pan must be installed under the heater.

Such pans must have a minimum length and width of at least two inches greater than the diameter of the heater, and must be piped to an adequate drain. The pan must not restrict combustion air flow. (Figure 1)

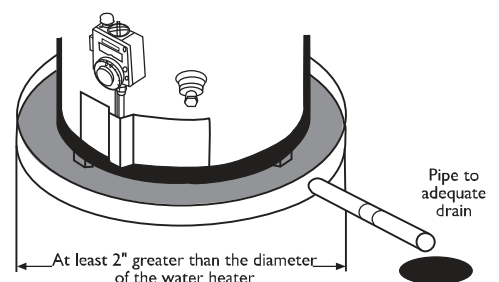


Figure 1

LOCATION

⚠ WARNING

When this heater is installed directly on caepeating, carpeting must be protected by a metal or wood panel beneath the appliance extending beyond the full width, and depth if the appliance is installed in an alcove or closet, the entire floor must be covered by the panel.

FAILURE TO HEED THIS WARNING MAY RESULT IN FIRE HAZARD.

⚠ WARNING

Minimum clearances between the water heater and combustible construction are 0" at the sides and rear, 6" at the front, and 6" from the vent pipe. Clearance from the top of the jacket is 12" on most models, refer to the label attached adjacent to the gas control valve on the water heater. When 12" top clearance is used, a minimum of 6" must be provided between the pipe and the ceiling if an elbow is used on the draft hood.

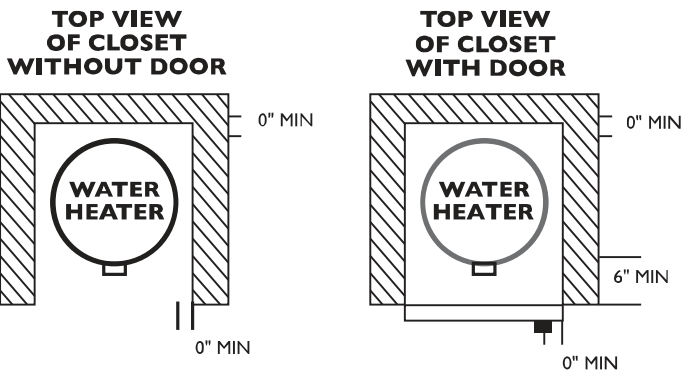


Figure 2: This may be used as reference guide to locate the specific clearance locations. A minimum of 24 inches front clearance should provide for inspection and serving.

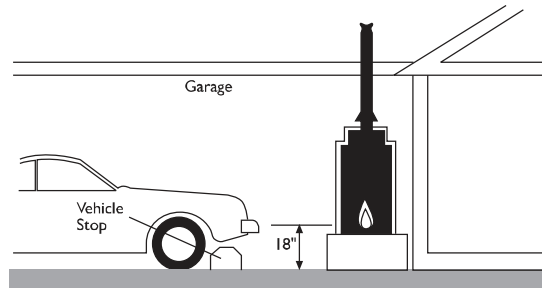
RESIDENTIAL AREA WHICH MAY NOT BE SUITABLE FOR HEATER INSTALLATION would include those areas where flammable liquids (such as gasoline, solvents, liquified propane or butane, etc.) Or other substances (such as adhesive, etc.) all of which emit flammable vapors, may be improperly are stored or used. Because of natural air movement in a room or other enclosed space, flammable vapors can be carried some distance from where their liquids are being used or stored.

The gas water heater hot surface pilot or main burner flame can ignite such vapors. The resulting flash-back and fire can cause death or serious burns to anyone in the area as well as property damage. Even though this water is flammable vectors ignition resistant water heater and is designed to reduce the chances of flammable vapors being ignited, gasoline and other flammable sustances should never be stored or used in the same vicinity or area containing or gas water heater or other flammable or spark producing appliance.

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

FIGURE 3:

Typical installation in residential garages. (Drawing copyright by the American Gas Association. Used by permission of the copyright holder).



Do not locate the water heater, near an air moving device. The operation of air moving devices such as exhaust fans, ventilation system, clothes dryers, fireplaces, etc., can affect the proper operation of the water heater. Special attention must be given to condition these devices may create. Low reversal of flue gases may cause an increase of carbon monoxide inside of the dwelling.

This water heater, like all gas appliances will perform better if dirt and debris are prevented from accumulating on the floor in front of the water heater where dust and lint can be drawn into the burner.

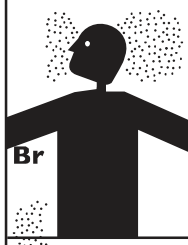
A water heater cannot operate properly without the correct amount of air for combustion. Do not install in a confined area such as closet, unless you provide air as shown in Figure 6. Never obstruct the flow of ventilation air. If you have any doubts oe question at all, call your gas supplier. Failure to provide the proper amount of combustion air can result in a fire or explotion and cause death, serious bodily injury, or property damage.

Follow all the local and state codes. Or, in the absence of local and state codes, the "National Fuel Gas Code", ANSI Z223. 1 (NFPA 54)- latest edition to properly install the system.

Failure to do so can result in death, solution, or carbon monoxide poisoning.

⚠ WARNING

Leathing Hazard - Carbon Monoxide Gas



- Install water heater in accordance with the instruction manual and NFPA54.
- To avoid injury, combustion and ventilation air must be taken from outdoors.
- Do not place chemical vapor emitting products near water heater.

Breathing carbon monoxide can cause brain damage or death. Always read and understand instruction manual.

TYPICAL INSTALLATION

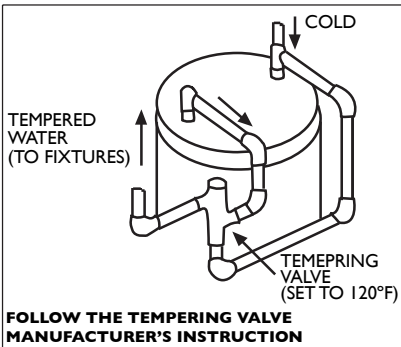
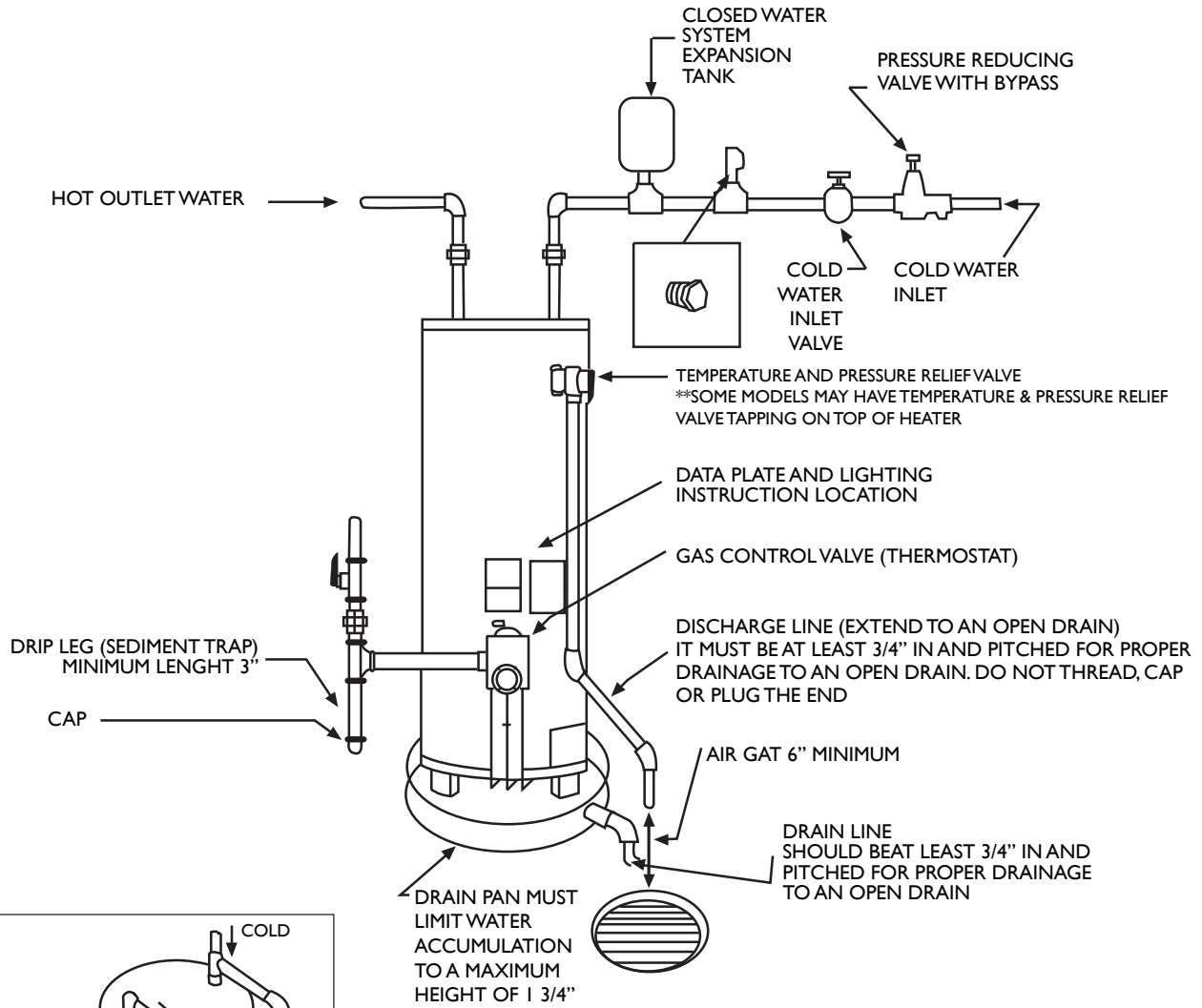


FIGURE 4

State of California Note:
 The water heater must be braced, anchored, or strapped to avoid moving during an earthquake.
 Contact local utilities for code requirement in your area or call 1-888-883-0788 and request instructions.

PIPING MUST MEET ALL LOCAL CODE REQUIREMENTS.
 NOTE: Water heater must be installed level.



AIR SUPPLY

Important air for combustion and ventilation must not come from a corrosive atmosphere. Any failure due to corrosive elements in the atmosphere is exclude from warranty coverage.

The following types of installation (not limited to the following) will require outdoor air for combustion due to chemical exposure and may reduce but not eliminate the presence of corrosive chemicals in the air.

- Beauty shops.
- Photo processing labs.
- Buildings with indoor pools.
- Water heaters installed in laundry, lobby, or craft rooms.
- Water heaters installed in chemical storage areas.

Combustion air must be free of acid-forming chemicals such as sulfur, fluorinem chlorine. These elements are found in aerosol sprays, detergents, bleaches, cleaning solvents, air fresheners, paint and varnish removers, refrigerants, and many other commercial or household products. When burned, vapors from these products form highly corrosive acid compounds. These products should not be stored or used near water heater or air inlet.

Combustion and ventilation air requirements are determined by the location of the water heater. The water heater may be located in either an open (unconfined) area or in a confined area or small enclosure, such as a closet or small room. Confined spaces are areas with less than 50 sq. ft.

ALL AIR FROM INSIDE THE BUILDING

The confined space shall be provided with two permanent openings communicating directly with an additional room(s) of sufficient volume so that the combined volume of all spaces meets the criteria for an unconfined space shall be considered in making this determination. Each opening shall have a minimum free area of 1 square inch per 1,000 BTU per hour of the total input rating of all gas utilization equipment in the confined space, but not less than 100 square inches.

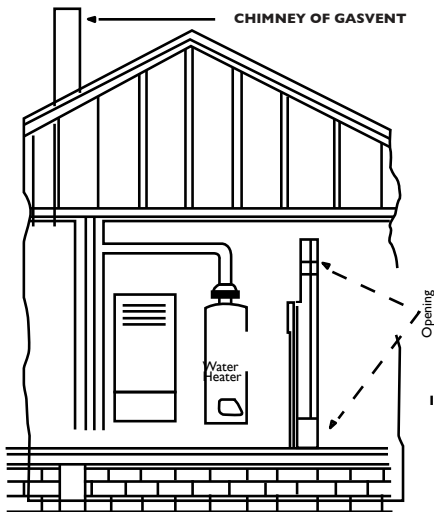
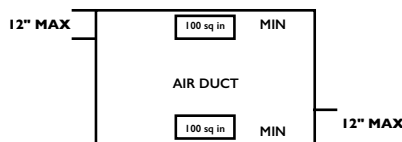


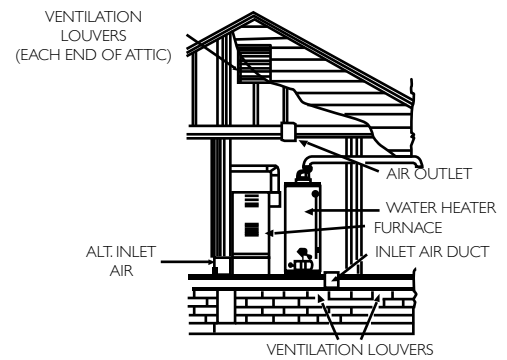
Fig. 5
 ONE OPENING SHALL BE WITHIN 12 INCHES OF THE TOP AND ONE WITHING 12 INCHES OF THE BOTTOM OF THE ENCLOSURE.



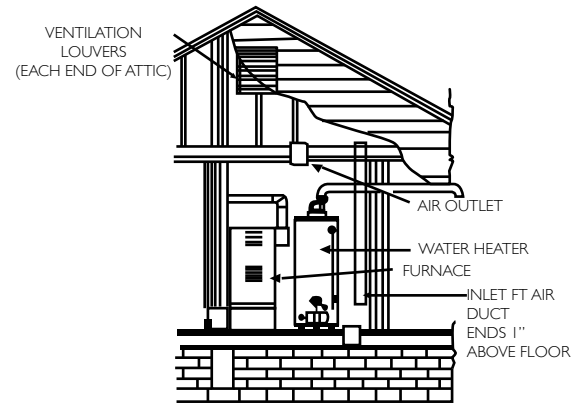
ALL AIR FROM OUTDOORS

The confined space shall be provided with two permanent openings, one commencing within 12 inches of the top and one commencing within 12 inches of the bottom of the enclosure. The openings shall communicate directly, or by ducts, with the outdoors or space (crawl or attic) that freely communicate with the outdoors.

When directly communicating with the outdoors, each opening shall have a minimum free area of 1 square inch per 4,000 BTU per hour of total input rating of all equipment in the enclosure. (Figure 6)



When communicating with the outdoors through vertical ducts, each openings shall have a minimum free area of 1 square per inch per 4,000 BTU per hour of total input rating of all equipment in the enclosure. (Figure 7)



1. When communicating with the outdoors through horizontal ducts, each duct opening shall have a minimum free area of 1 square inch per 2,000 BTU per hour of total input rating of all equipment in the enclosure. (Figure 8)

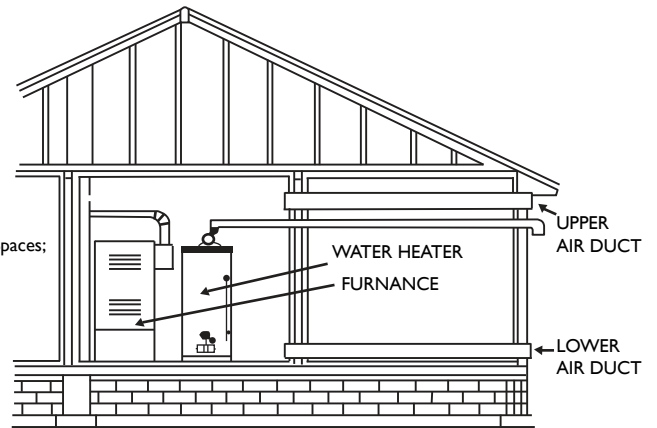
When ducts are used, the shall be of the same cross-sectional area as the free area of the openings to which they connect. The minimum dimension of rectangular air ducts shall not be less than 3 inches. For other combustion and ventilation air openings, refer to the National Fuel Gas Code ANSI Z223.1.*

NOTE: If the equipment room is located against an outside wall and the air openings communicate directly with the outdoors, each opening shall have a free area of not less than one square inch per 4,000 BTU per hour of the total input rating of all equipment in the enclosure.

Illustrations for Figures 5-8 copyright by the American Gas Association. Used by permission of the copyright holder.

FIGURE 8

Equipment Located in Confined Spaces;
All Air From Outdoors.



DISCHARGE OF PURGED GASES



When removing purged gases from a piping system, care should be taken to not create hazardous condition, such as discharging the gases into a confined area or in an area which contains an ignition source.

WARNING

VENTING

This water heater uses a non-direct, single-pipe vent system to remove exhausts gases created by the burning of fossil fuels. Air for combustion is taken from the immediate water heater location or is ducted in from the outside (see "Combustion Air Supply And Ventilation").

This water heater must be properly vented for the removal of exhaust gases to the outside atmosphere. Correct installation of the vent pipes system is mandatory for the proper and efficient operation of this water heater and is an important factor in the life of the unit.

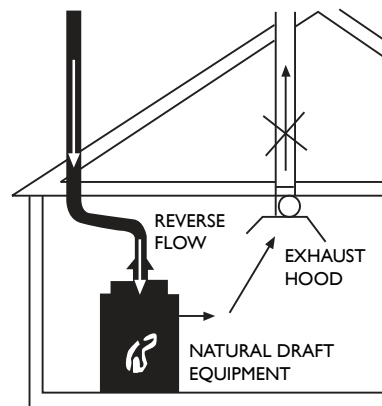
The vent pipe must be installed according to all local and state codes or, in the absence of local and state codes, the "National Fuel Gas Code", ANZI Z223.1 (NFPA 54)-latest edition. The vent pipe installation must not be obstructed so as to prevent the removal of exhaust gases to the outside atmosphere.

U.L. approved fuel gas and carbon monoxide (CO) detectors are recommended in all applications and should be installed using the manufacturer's intructions and local codes, rules, or regulations.

Important: If you lack the necessary skills required to properly install this venting system, you should not proceed, but get help from a qualified service technician.

MECHANICAL EXHAUSTING AND FIREPLACES

The operation of air-moving devices such as exhaust fans, ventilation system, clothes dryers, fireplaces, etc., can affect the proper operation of gas utilization equipment. Consequently, special attention must be given to conditions these devices may create to avoid unsatisfactory operation of the equipment.



POTENTIAL HAZARDOUS DOWNDRAFT OPERATION

- EXHAUST FANS
- VENTILATION SYSTEM
- CLOTHES DRYERS
- FIREPLACES
- OTHERS

VENT PIPE SIZE

It is important that you follow the guidelines in these instructions for sizing a vent pipe system. If a transition to a larger vent size is required, the vent transition connection must be made at the blower outlet.

VERTICAL EXHAUST GAS VENT

Vertical exhaust gas vents must be installed with U.L. listed type B vent pipe according to the vent manufacturer's instructions and the terms of its listing.

It must be connected to the water heater's blower by a certified vent connector or by directly originating at the blower outlet.

WATER PIPING

Piping and fittings should be installed in compliance with the installation drawing. Check for dip tube in cold water fitting before connection of hot and cold water lines. If the indoor installation area is subject to freezing temperatures, water piping must be protected. The water heater should be drained if being shut down during freezing temperatures.

If solder connections are used, sweat tubing to the adaptor before fitting adaptor to the cold and hot water fitting. It is imperative that no heat be applied to the water heater fitting as they may contain nonmetallic parts.

⚠ CAUTION OPERATING AN EMPTY OR PARTIALLY FILLED WATER HEATER WILL RESULT IN DAMAGE TO THE TANK

Install the water piping and fitting as shown in Figure 4.

1. Connect the cold water supply (3/4" NPT) to the fitting marked "C".
Connect the hot water supply (3/4" NPT) to the fitting marked "H".
Important: Some models may contain energy saving heat traps to prevent the circulation of hot water within the pipes. Do not remove the inserts within the heat traps.
2. The installation of unions in both the hot and cold water supply lines is recommended for ease of removing the water heater for service or replacement.
3. The manufacturer of this water heater recommends installing a thermostatic mixing valve or an anti-scald device in the domestic hot water line. These valves reduce the point-of-use temperature of the water by mixing cold and hot water and are readily available for use.
4. Install a shut-off valve in the cold water inlet line. It should be located close to the water heater and be easily accessible. Know the location of this valve and how to shut off the water to the heater.
5. A temperature and pressure relief valve must be installed in the opening marked "Temperature and Pressure (T & P) Relief Valve" on the water heater.
6. Add a discharge line to the opening of the T & P relief valve. Follow the instructions under "Temperature and Pressure Relief Valve".
7. After piping has been properly connected to the water heater, remove the aerator at the nearest hot water faucet. Open the hot water faucet and allow the tank to completely fill with water. To purge the lines of any excess air, keep the hot water faucet open for 3 minutes after a constant flow of water is obtained. Close the faucet. Check all connections for leaks. Replace the aerator.

PRESSURE BUILD-UP IN CLOSED WATER SYSTEMS

The water utility supply meter may contain a check valve, back-flow preventer, or water pressure reducing valve. This will create a closed water system. During the heating cycle of the water heater, water expands creating a pressure build-up in the water system. A temperature and pressure relief valve must be installed on the water heater (150 PSI maximum pressure setting. See Temperature and Pressure Relief Valve Page 8).

To prevent the temperature and pressure relief valve from discharging hot water, loss of energy, and reduce the possible build up of lime on the water temperature and pressure relief valve seat. An expansion tank must be installed on the cold water supply line. For every 50 US gallons of stored water, the expansion tank must have a minimum capacity of 1.5 US gallons See Figure 4.

TEMPERATURE & PRESSURE RELIEF VALVE

For protection against excessive pressures and/or temperatures, a temperature and pressure relief valve must be installed in the opening marked, "temperature and pressure relief valve". A design 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 Shut-Off Devices for Hot Water Supply Systems, Z21.22 is furnished with this water heater. Do not thread, cap, or plug the end of this discharge line. Do not connect discharge line directly to drain.

(Figure 4)

To prevent bodily injury, hazard to life or damage to property, the relief valve must be allowed to discharge water in the event of excessive temperature or pressure developing in the water heater.

The function of the temperature and pressure relief valve is to discharge water in large quantities should circumstances demand. If the discharge pipe is not directed to the drain, as shown in Figure 4, or other suitable means, the water flow may cause property damage.

THE DISCHARGE LINE

- (1) Must not be smaller than the pipe size of the relief valve.
- (2) Must not be plugged or blocked.
- (3) Must be of material capable of withstanding 210°F without distortion.
- (4) Must be installed so as to allow complete drainage of both the temperature and pressure relief valve and discharge line.
- (5) Must terminate at an adequate drain.
- (6) Must not have any valve between the relief valve and the heater.

Failure to maintain the properly listed temperature and pressure relief valve will release the manufacturer from any claims which might result from excessive temperature or water pressure.

T&P RELIEF VALVE INSULATION

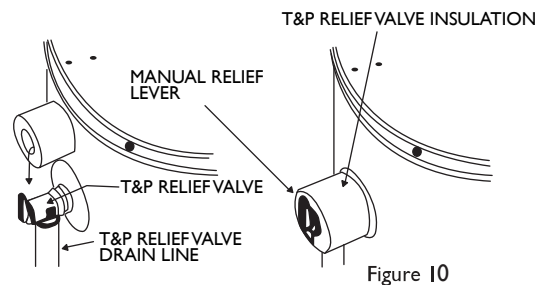


Figure 10

WARNING: Do not attempt to operate this water heater with cold water inlet valve closed.

Manually operate the temperature and pressure relief valve at least once a year (Figure 10). To prevent water damage, discharge line must terminate at an adequate drain. (Figure 4).

Standing clear of the outlet (discharge water may be hot), lift and release the handle on the temperature and pressure relief valve to make the valve operate freely. If the heater is installed in a closed system, the temperature and pressure relief valve may drip at times. If the temperature and pressure relief valve discharges a full stream of water, have the system checked. See "Pressure Build-Up in Water System".

If the temperature and pressure relief valve on the appliance discharges periodically, this may be due to thermal expansion in a closed water supply system (see "Pressure Build-Up in Water System"). Contact the water supplier or local plumbing inspector on how to correct this situation. Do not plug the temperature and pressure relief valve.

T&P Relief Valve and Pipe Insulation. (Only Models with insulation material included in the package)

1. Locate the T&P Relief Valve on the Water Heater.
2. Locate the slit running the length of the insulation.
3. Spread this slit open and slip it over the T&P Relief Valve (See Figure 10). Apply gentle pressure to the insulation to ensure it is fully seated on the T&P Relief Valve. Once sealed secure the insulation with a section of tape. **IMPORTANT:** The insulation or tape should not block or cover the T&P Relief Valve drain opening. Also the insulation or tape should not block or cover the T&P Relief Valve opening. Also the insulation or tape should not block or hinder access to the T&P Relief Valve relief lever.
4. Next locate the hot water (outlet) & cold water (inlet) pipes to the water heater.
5. Spread the slit open at the base of the insulation and slip it over the cold water (inlet) pipe. Apply gentle pressure along the length of the insulation to ensure it is fully seated around the cold water pipe. Also ensure that the base of insulation is flush with the water heater. Once seated, secure the insulation with a section of tape.

SPACE HEATING/POTABLE WATER SYSTEM

Some water heater models are equipped with inlet/outlet tapping for use with space heating applications. If this water heater is to be used to supply both space heating and domestic potable (drinking) water, the instructions listed below must be followed.

- Be sure to follow the manual(s) shipped with the air handler system.
- A properly installed flow control valve is required to prevent thermo-siphoning. Thermo-siphoning is the result of a continuous flow of water through the air handler circuit during the off cycle.
- Weeping (blow off) of the temperature and pressure relief valve (T & P) or higher than normal water temperatures are the first signs of thermo-siphoning.
- The domestic hot water line from the water heater should be vertical past any tempering valve or supply line to the air handle to remove air bubbles from the system. Otherwise, these bubbles will be trapped in the air handler heat exchanger coil, reducing efficiency.

DO NOT use this water heater as a replacement for an existing boiler installation.

DO NOT use with piping that has been treated with chromates, boiler seal or other chemicals.

DO NOT add boiler treatment or any chemicals to any heat piping, since the piping contains potable water.

DO NOT use with ferrous piping. The system should be installed only with new piping that is suitable for potable water, such as copper or polybutylene.

DO NOT use with PVC piping.

DO NOT use any pumps, valves, or fittings that are not completely compatible with potable water piping.

DO NOT use valves that may cause excessive restriction to water flow.

USE FULL BLOW BALL OR GATES VALVES ONLY.

DO NOT tamper with the thermostat, gas valve, igniter control or temperature and pressure relief valve. Tampering with any of these components is **DANGEROUS** and can result in property damage or severe injury. Tampering voids all warranties. Only qualified personnel should service these components.

DO NOT use 50/50 solder in potable water lines.

IF THE SPACE HEATING system requires water temperature in excess of 120°F, a mixing valve or other means should be installed in the domestic (potable) hot water supply to limit the **RISK OF SCALD DAMAGE** (See PAGE A).

Some jurisdictions may require a backflow preventer in the incoming cold water line. This may cause the temperature and pressure relief valve on the water heater to discharge or weep due to expansion of the heated water. A diaphragm-type expansion tank suitable for potable water will normally eliminate this weeping condition. Please read and follow the manufacturer's instructions for the installation of such tanks.

TERMINATION CLEARANCES SIDE WALL POWER VENT

Note: The following picture and table are intended to illustrate clearance requirements, and do not serve as a substitute for locally adopted installation codes.

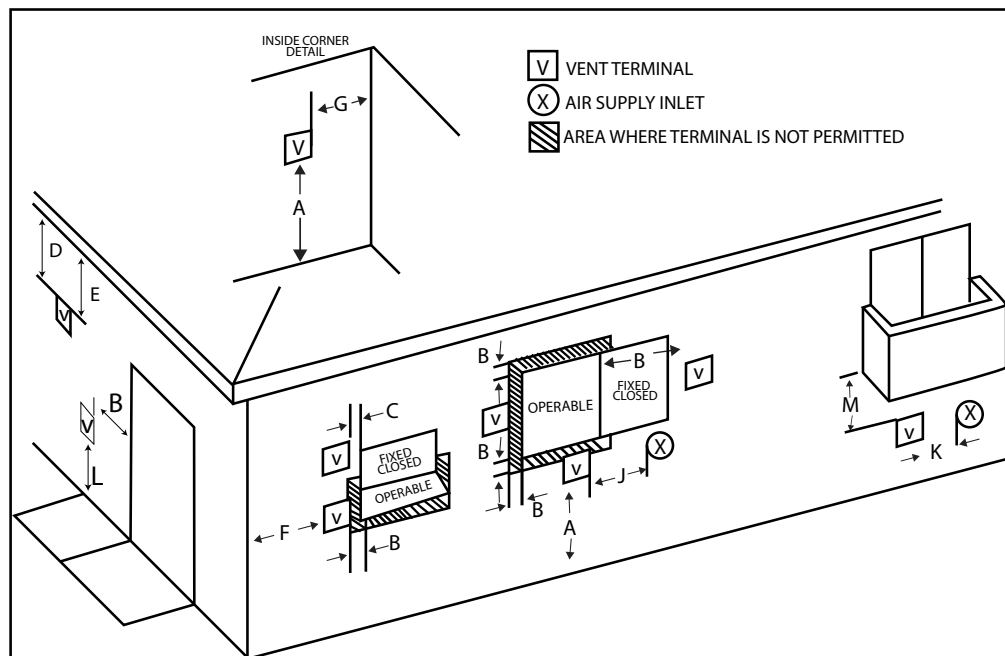


Fig. 11

Power Vent Terminal Clearances (uses room air for combustion)					
A	above grade, veranda, porch, deck or balcony	12 in.	G	To inside corner	18 in.
B	to window or door that may be opened	4 ft. below or to side of opening; 1 ft. above opening	J	to a non-mechanical air supply inlet into building or combustion air inlet to any other appliance	4 ft. below or to side of opening, 1 ft. above opening
C	to permanently closed window	0 in.	K	to a mechanical air supply inlet	3 ft. above if within 10ft. horizontally
D	Vertical clearance to ventilated soffit located above the terminal within a horizontal distance of 2 ft. from the center line of the terminal	12 in.†	L	above paved sidewalk or paved driveway located on public property	7 ft.†
E	to unventilated soffit	12 in.	M	under veranda, porch, deck, or balcony	12 in.‡
F	to outside	24 in.			

In accordance with the current ANSI Z223.1/NFPA 54, National Fuel Gas Code:
 † 1. Where local experience indicates condensate is a problem with Category IV appliances, the vent shall not terminate:
 • over public walkways; or
 • near soffit vents or crawl space vents or other areas where condensate or vapor could create a nuisance or hazard or cause property damage; or
 • where condensate vapor could cause damage or could be detrimental to the operation of regulators, relief valves or other equipment.
 ‡ Permitted only if veranda, porch, deck, or balcony is fully open on a minimum of two sides beneath the floor.

BLOWER ASSEMBLY INSTALLATION

1. This power vented water heater comes with blower assembly installed (see Figure 12).
2. After unit is set in place, make sure blower assembly is still mounted securely. Make sure there is no damage to blower.

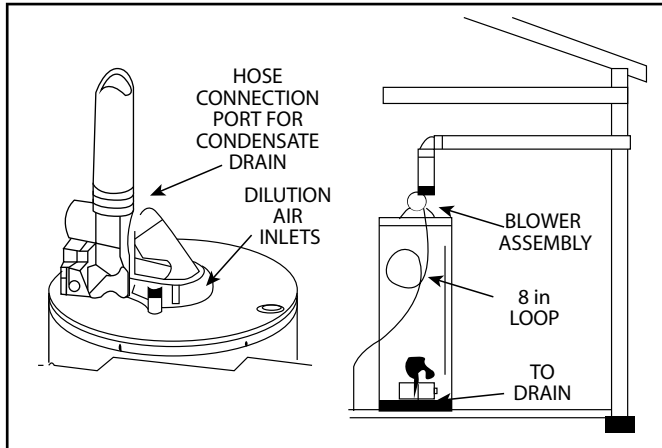


Fig. 12

3. Make sure there is no packing material in the inlet or discharge of the blower.
4. This water heater is a polarity sensitive appliance and will not operate properly if the power supply polarity is reversed. Power to this water heater must be wired properly (correct polarity).
5. Do not plug in power cord until vent system is completely installed. The Power Vent operates on 110 - 120 VAC, therefore a grounded outlet must be within reach of the 5.5-foot flexible power cord supplied with the heater. The power cord supplied may be used on a unit only where local codes permit. If local codes do not permit use of flexible power supply cord:
 - a. Make sure the unit is unplugged from the wall outlet. Remove the screw and open panel on the front of the junction box on the blower.
 - b. Cut the flexible power cord, leaving enough to be able to make connections. Remove the strain relief fitting from the box.
 - c. Install a suitable conduit fitting inside the enclosure.
 - d. Splice field wiring into existing wiring using code authorized method (wire nuts, etc.).
 - e. Be certain that the neutral and line connections are not reversed when making these connections.
 - f. Ground heater properly. This water heater must be grounded in accordance with the "National Electrical Code", NFPA 70 and/or local codes. These must be followed in all cases. The water heater must be connected to a grounded metal, permanent wiring system or an equipment grounding conductor must be run with the circuit conductors and connected to the equipment grounding terminal or lead on the water heater (see Figure 13; the wiring diagram).

WIRING DIAGRAM

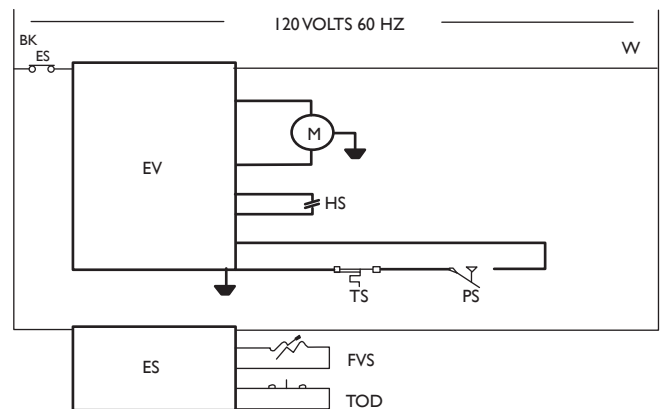
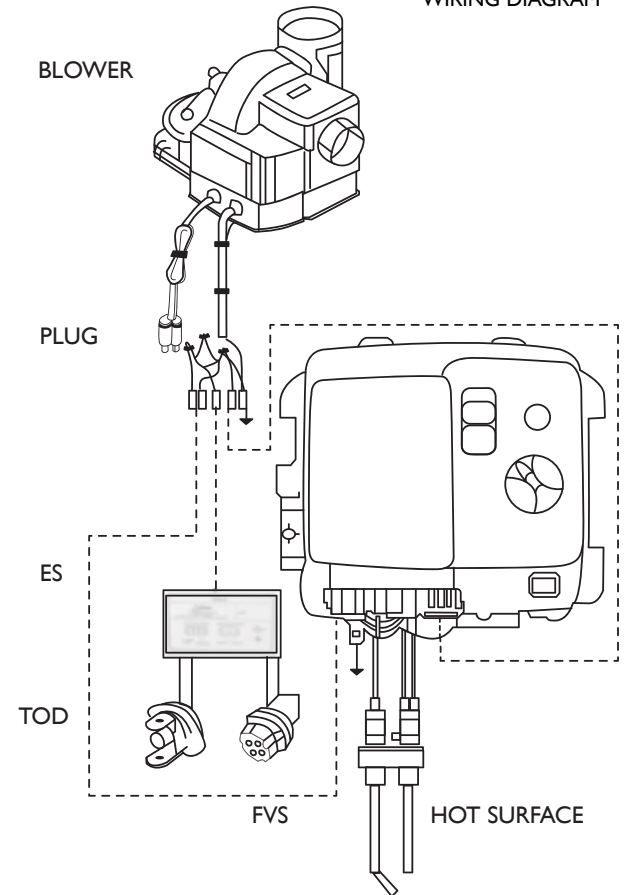


Fig. 13

g. Close the panel on the junction box. Make sure the access panel is properly secured.

6. The blower discharge coupling boot is made to accept only straight sections of 2" pipe. To start off with an elbow, a short section of the straight pipe must be cut and glued into the end of the elbow that will mount on the discharge boot.
7. A rubber coupling is an integral part of the vent system and must be used in every installation. Failure to do so may result in overheating, poor performance, nuisance lock-outs, personal injury or death.

INSTALLATION OF VENT SYSTEM

Before beginning installation of piping system, thoroughly read the "Vent Pipe Preparation" section of this manual.

PLANNING THE VENT SYSTEM

Plan the layout of the vent system from the vent termination to the water heater considering all of the 90 degree and 45 degree elbows plus the number of feet of pipe that would be needed to install the total vent system. The water heater must be vented to the outdoors as described in these instructions. This water heater must be vented separately from all other appliances. The unit may be vented horizontally through a wall or vertically through the roof. Pipe runs must be adequately supported along both vertical and horizontal runs.

Note: Do not use an elbow as a support point. Elbows are not designed to carry the load or stresses of the venting system if they are rigidly held.

It is imperative that the first hanger (or support) be located on the horizontal run immediately adjacent to the first 90° elbow from the vertical rise. Support method used should isolate the vent pipe from the floor joists or other structural members to prevent the transmission of noise and vibration. Do not support, pin, or otherwise secure the venting system in a way that restricts the normal thermal expansion and contraction of the chosen venting material.

If the water heater is being installed as a replacement for an existing power vented heater in pre-existing venting, a thorough inspection of existing venting system must be performed prior to any installation work. Verify that correct material, as detailed in below, has been used, and that the minimum or maximum vent lengths and terminal location as detailed in this manual have been met.

POLYPROPYLENE VENT SYSTEMS

Polypropylene vent systems do not use cement to connect the pipe and elbow sections but use a push together gasket seal method. Do not attempt to connect polypropylene with sealant cement. Polypropylene vent systems are designed to use specific adaptors to connect into the rubber coupling on the top of the blower. These are available through your venting supplier.

The PVC vent termination elbow supplied with this heater has been certified to be used with polypropylene vent systems. A polypropylene to PVC end connection is required and is available through your supplier.

Optional wall plates that fit the polypropylene venting are also available through your supplier.

Carefully inspect the entire venting system for any signs of cracks or fractures, particularly at joints between elbows and other fittings and straight runs of vent pipe. Check system for signs of sagging or other stresses in joints as a result of misalignment of any components in the system. If any of these conditions are found, they must be corrected in accordance with the venting instructions in this manual before completing installation and putting the water heater into service.

The vent piping must be connected to the blower with the rubber coupling and secured with gear clamps. The coupling and clamps are provided with the heater.

Even though the flue gas leaving the blower is hot, some installations will have water condense in the vent piping. If this occurs, then adequate means of draining and disposing of the condensate shall be made by the installer.

CONDENSATE

Condensate formation does not occur in all installations of power vented water heaters, but should be drained on installations where it can form in the venting system. Condensation in the venting system of power vented water heaters is dependent upon installation conditions including, but not limited to, ambient temperature and humidity of installation location, ambient temperature and humidity of venting space, vent discharge and slope, and product usage. In certain conditions, installations in unconditioned space or having long horizontal or vertical vent runs can accumulate condensate. Long lengths of venting that pass through cool/cold areas will experience condensation. The vent pipe should be sloped upwards away from the blower assembly, then adequate means for draining and disposing of the condensate needs to be made by the installer. If installation conditions cause condensation, install a condensate trap loop approximately 8 in. in diameter using 3/8 in. plastic hose. Connect the hose to the built-in drain port of the rubber coupling of the blower assembly (see Figure 12). Loop the hose in a vertical position as shown. The tube loop must be filled with water at least half way prior to operating the heater. Ensure the end of the tube has access to a drain as condensate will flow from the end. Secure the tubing to the side of the heater. Prior to operating the water heater, make sure the removable cap is installed on the drain port (if a drain hose is not needed).

Note: This cap must remain in place if a drain hose is not installed.

EXHAUST VENTING

This heater is designed to exhaust the products of combustion (flue gases) to the outdoors using a sealed piping system. Table 1 lists the allowable vent materials and sizing information. Figure 16 through Figure 18 show various end termination details and clearances. Connection of the venting piping to the blower is shown in Figure 19 through Figure 22.

Correct installation of the venting system is essential to the safe and efficient operation of this water heater. Vent piping must be installed in accordance with all applicable codes. All installations shall meet the requirements as stated in the current edition of the **“National Fuel Gas Code, ANSI Z223.1/NFPA 54”**.

Note: The information provided in Figure 14 is intended as a guideline for good vent installation practices only and is not intended to restrict venting options beyond those restrictions established by the current edition of the **“National Fuel Gas Code, ANSI Z223.1/NFPA 54”** or any applicable local and state codes.

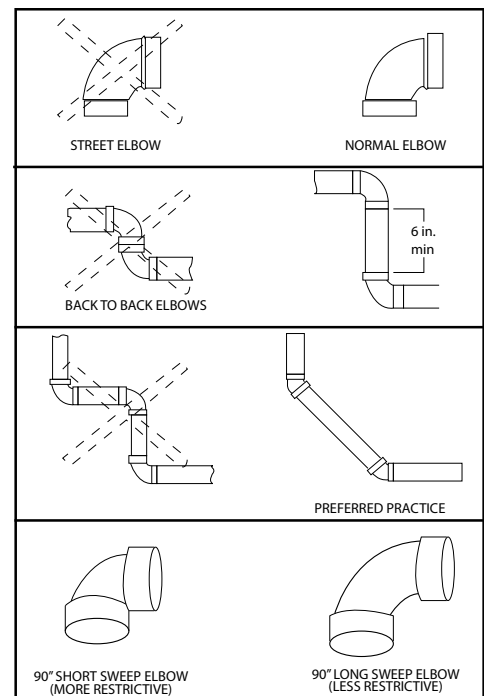


Fig. 14

IMPORTANT NOTES AND WARNINGS

- This heater is certified to be installed using PVC, CPVC, ABS or polypropylene plastic vent material. Check with your local authorities to determine which materials are allowed in your area. All venting material and components must be joined with the approved primer/ cleaner and solvent cement or mechanical seals (see “Polypropylene Vent Systems”).
- Do not common vent this heater with any other appliance.
- Do not allow insulation to cover the vent piping.
- During operation the plastic piping will expand as it heats up and contract as it cools down. This is normal for this type of venting. Rigidly fastening the vent piping can cause undue stress that may result in the cracking or fracturing the vent piping material. A fracture of the venting pipe may pose a serious safety hazard. To prevent stressing of the vent system, all hangers and supports must allow the vent piping freedom to move.
- Use long sweep elbows wherever possible. Closely coupled elbows and short radius elbows can reduce the venting capacity.
- All power vented water heaters generate a certain amount of operational noise. In order to minimize noise transmission to the support structure, use isolation pads between the pipe hangers and the vent pipe.
- Most power vent installations develop some condensation in the vent piping. When using long runs of venting or when the venting passes through cold or unheated areas, considerable amounts of condensate from the flue gases can develop. Provision must be made for the condensate to drain freely from the system or to be collected in a condensate trap(s) that can be drained. Damage or fracture of the vent piping may occur if the condensate is allowed to collect and freeze. Pooling of condensate can restrict airflow and can cause nuisance failures of the system.
- In regions that experience freezing conditions, slope the venting back towards the heater so that the condensate will drain back to the blower and be collected in the condensate trap. Draining condensate out through the termination can result in vent freeze up resulting in a nuisance shut down situation. Ice formed from frozen condensate can cause a safety hazard. See also notes in the “Venting” section.

Venting terminations and sizing

- Heaters are supplied with a 3”x 2” rubber coupling to attach the venting to the blower and a 2”, 45° vent termination elbow.
- Supplied with this heater is a vent termination screen (see Figure 15).

Installed in the vent termination elbow, the vent screen is required to keep foreign objects, rodents and small birds from entering the venting system. This screen has been sized to ensure maximum energy efficiency of the vent system based on the “equivalent length” of the vent piping. (see Figure 15).

How to determine the “equivalent length” is shown in Figure in Table I.

Vent screen installation

- Install the vent screen into the vent termination elbow.
- Gently push the screen into the termination elbow until it sits against the inside shoulder.
- The metal wire screens are self-securing.

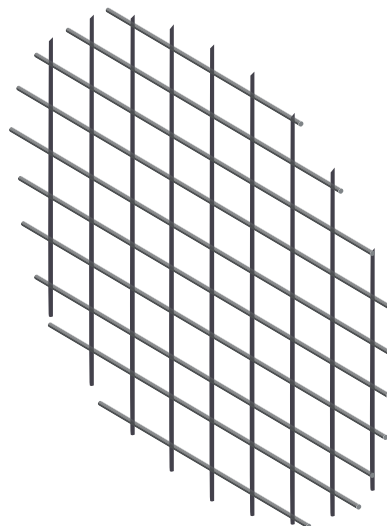


Fig. 15



Calculating Equivalent Feet

Important:

Use of cellular core PVC (ASTM F891), cellular core CPVC, or Radel® (polyphenylsulfone) in non-metallic venting systems is prohibited

WATER HEATER MODEL	HEATER INPUT (Btu/hr.)	VENT SIZE (Inside Diam.)	PRESSURE SWITCH SETTING	MAXIMUM EQUIVALENT VENT LENGTH	MINIMUM EQUIVALENT VENT LENGTH
40 & 50 gal.	40,000	2"	- 0.60 in w.c.	50 ft. + termination elbow,	7 ft. + termination elbow,
40 & 50 gal.	40,000	3"	- 0.60 in w.c.	120 ft. + termination elbow,	15 ft. + termination elbow,

Equivalent lengths of straight pipe for various elbows using Schedule 40 PVC, CPVC and polypropylene				
Vent Pipe Size	Elbow Type	Short Sweep/ Short Radius	Long Sweep/ Long Radius	Notes:
2" 3" 4"	90°	8 ft.	5 ft.	Notes: 1. Use long radius elbows where possible. Minimum distance between 90° elbows should be 6" wherever possible. 2. Venting systems may use a maximum of five (5) 90° elbows. 3. Use proper screen termination (see Figure 32 & Figure 33).
2" 3" 4"	45°	4 ft.	2.5 ft.	

Table I

Important:

The exhaust vent piping must be connected to the blower using the rubber coupling supplied with this heater.

This coupling contains the condensate trap and is sized for the efficient flow of the exhaust gases. Failure to use the coupling can result in an unsafe operating condition and poor heater performance.



Venting instructions

1. Plan the venting layout starting at the vent termination and work back toward the heater. Take into consideration the style and position of the vent termination, the vent pipe routing, elbows and connectors required and the necessary support hangers.
2. Venting should be as direct as possible with the fewest number of fittings. Use long radius 45 degree and long radius 90 degree elbows wherever possible.
3. Avoid using 90 degree elbows "back to back" and do not use street elbows. Maintain a minimum 6 in. straight section between elbows. Closely coupled and short radius elbows reduce the venting capacity. Figure 14 shows examples of vent pipe connections.
4. **DO NOT USE AN ELBOW AS A SUPPORT POINT.** Elbows are not designed to carry the weight of the venting system.
5. Calculate "Equivalent Vent Length" before starting. Do not exceed the values shown in Table 1.
6. Measure the vent piping and cut to required lengths. Pipes must be cut at right angles and deburred to ensure a good smooth fit with sufficient overlap for the glue joints. Correct any interference conditions.
7. Provide support hangers for horizontal vent piping every 4 ft. to prevent sagging and stress. Provide a minimum of 1/8 in. rise per 4 ft. of vent piping to ensure adequate drainage (polypropylene vent systems require a 1/4 in. rise per 1 ft. of vent pipe). Horizontal vent piping must not sag to form valleys where condensate can collect. Vertical venting shall be supported every 5 ft. Use appropriate support straps and vibration isolators (foam pads) on straight sections only. Allow sufficient clearance for expansion and contraction of the venting system.
8. At the point where the venting exits the building, cut a 3-1/2" hole for 3" venting or a 4-1/2" hole for 4" venting. For sidewall applications.

BEWARE OF CONCEALED WIRING AND PIPING INSIDE THE WALL.

9. Insert the vent piping through this hole and secure into position. Connect the vent pipe to the end termination elbow as shown in Figure 16 through Figure 18.
10. Dry fit all vent pipes, elbows, connectors and fittings before joining any parts with solvent cement. **PARTS MUST FIT WITH OUT STRESS OR BENDING OF ANY SECTION** and each connection must overlap a minimum of 1/2 in. Do not force fit any of the connections. Use only the appropriate solvent cement.

Caution: Solvent cements may produce flammable vapors. Use only in well-ventilated areas and keep away from all sources of ignition.
 Note: **DO NOT** use solvent cement on polypropylene vent systems.

11. Do not seal the vent piping to the wall until the venting is properly connected to the blower assembly.
12. Complete the venting installation by sealing around the termination assembly where it passes through the outside wall, inside and out, with silicone or other suitable sealant.

CAUTION

Use of Solvent Cement and Primer

- Use only in well-ventilated areas.
- Do not use near flame or open fire.
- Use only the Solvent Cement and Primer appropriate for the venting material being used.
- Solvent cements for plastic pipe are flammable liquids and must be kept away from all sources of ignition.

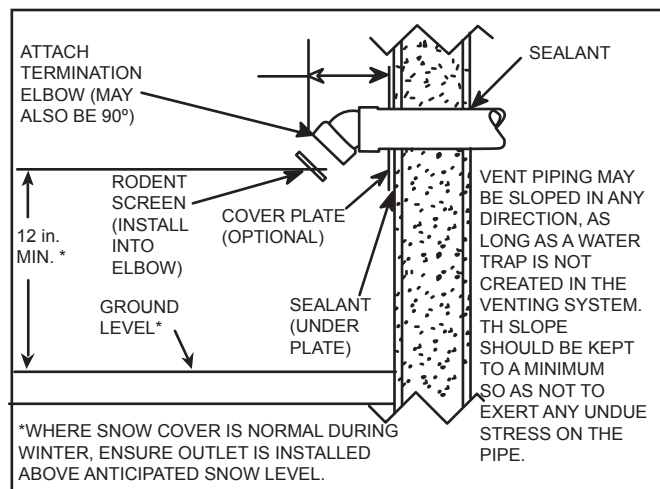


Fig. 16

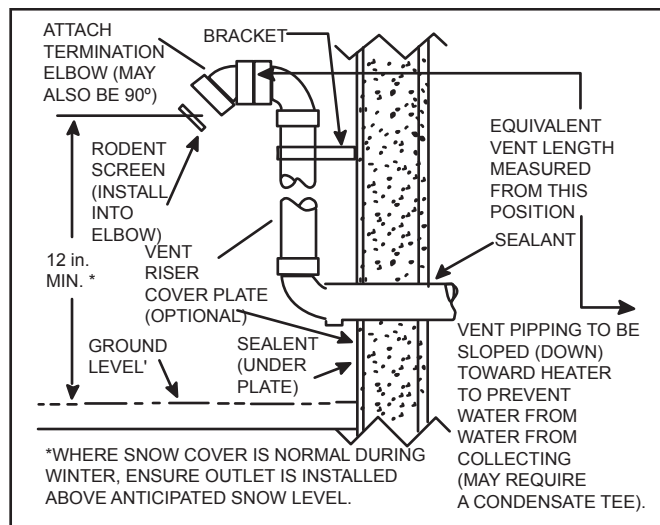


Fig. 17

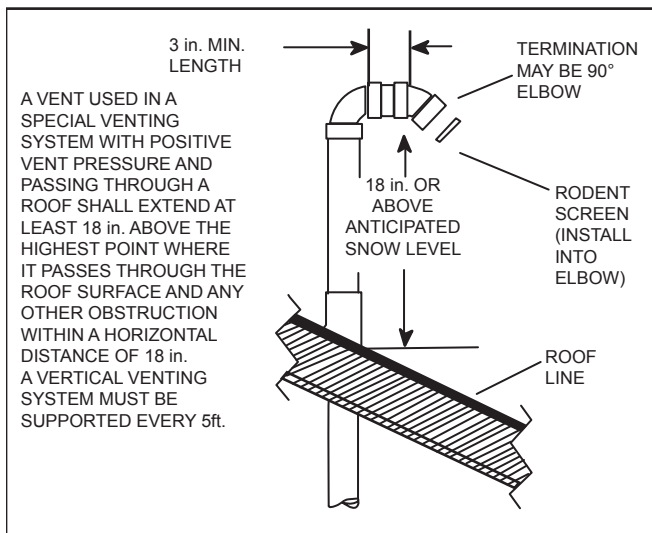


Fig. 18

Vent pipe connection to blower

1. The vent piping connects into the rubber coupling located on the top of the blower assembly. This coupling includes gear clamps to connect the venting to the blower. These connections must be properly seated and tightened to prevent the leakage of flue gases into the area. See Figure 19 through Figure 22.
2. The water heater is supplied with a 3" x 2" rubber coupling to accept the vent pipe and is required in all installations. Do not attempt to connect the vent piping directly to the blower without using the rubber coupling.

Note: Polypropylene vent systems require separate adaptor.

3. Before installing clean and lightly sand the end of the plastic vent piping that will connect into the rubber coupling. For polypropylene vent systems follow manufacturer's instructions.
4. Loosen the upper clamp on the rubber coupling and insert the sanded end of the vent piping a full 1-1/4 in. Do not use glue or sealant in the rubber coupling. Check that there is no stress on the connection or the vent piping that may be caused by twisting or bending.
5. Tighten the upper clamp so that the vent piping is firmly secured in the coupling and is gas tight. Do not over tighten or cause distortion of any of the parts. Ensure the bottom of the rubber coupling is firmly seated on the blower outlet and that the lower gear clamp is also secure. Check to ensure there is no distortion or movement of the clamped assembly once it is completed.
6. If the outlet vent pipe is to be turned horizontally directly off the blower, a 3 in. long section vent pipe shall be used to connect the elbow to the rubber coupling (see Figure 22).

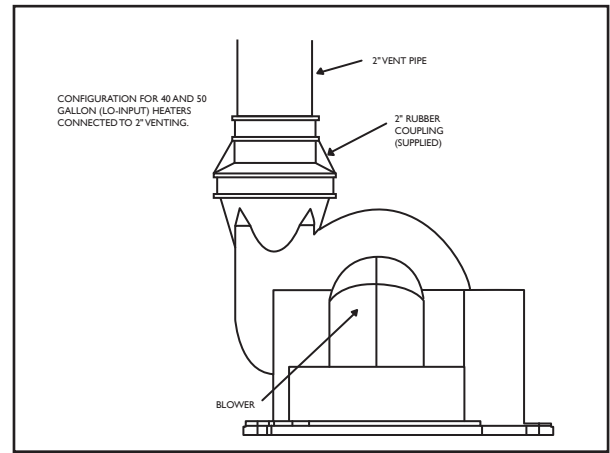


Fig. 19

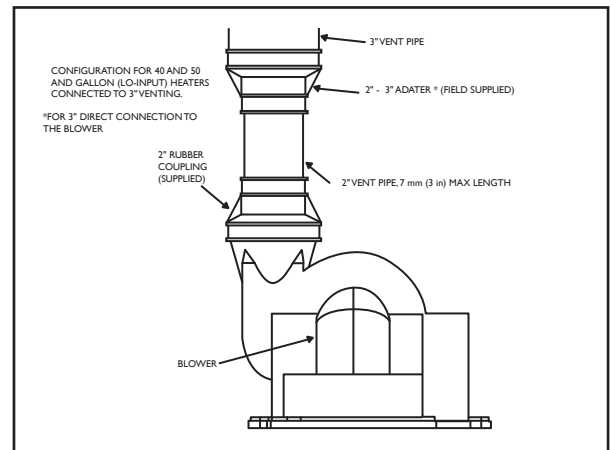


Fig. 20

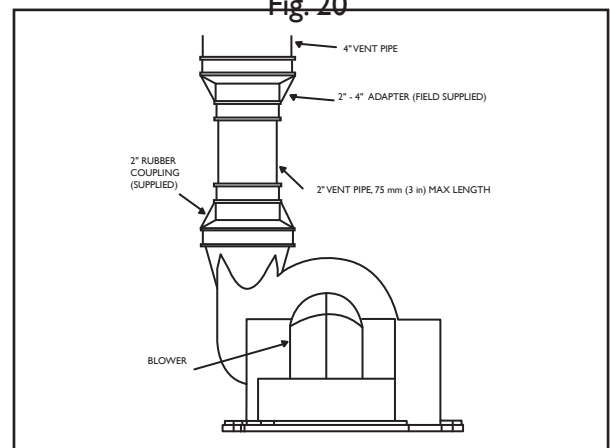


Fig. 21

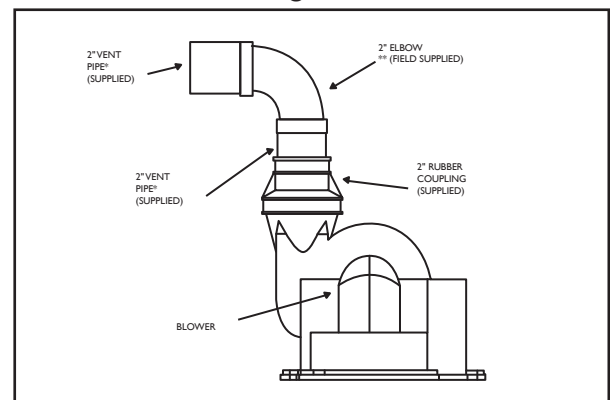


Fig. 22

VENT PIPE PREPARATION

1. INITIAL PREPARATION


- Make sure the solvent cement you are planning to use is designed for the specific application you are attempting.
- Know the physical and chemical characteristics and limitations of the PVC and CPVC piping materials that you are about to use.
- Know the reputation of your manufacturer and their products.
- Know your own qualifications or those of your contractor. The solvent welding technique of joining PVC and CPVC pipe is a specialized skill just as any other pipe fitting technique.
- Closely supervise the installation and inspect the finished job before start-up.
- Contact the manufacturer, supplier, or competent consulting agency if you have any questions about the application or installation of PVC and CPVC pipe.
- Take the time and effort to do a professional job. Shortcuts will only cause you problems and delays in start-up. By far, the majority of failures in PVC and CPVC systems are the result of shortcuts and/ or improper joining techniques.

2. SELECTION OF MATERIALS (PCV and CPVC VENTING)

- Cutting Device - Saw or Pipe Cutter
- Deburring Tool, Knife, File, or Beveling Machine (2" and above)
- Brush - Pure Bristle
- Rag - Cotton (Not Synthetic)
- Primer and Cleaner
- Solvent Cement - PVC for PVC Components and CPVC for CPVC Components only
- Containers - Metal or Glass to hold Primer and Cement. Select the type of PVC or CPVC materials to be used on the basis of their application with respect to chemical resistance, pressure rating, temperature characteristics, etc.
- Insertion Tool - Helpful for larger diameter pipe and fittings 6" and above.

Primer:

It is recommended that Tetrahydrofuran (THF) be used to prepare the surfaces of pipe and fittings for solvent welding. Do not use water, rags, gasoline or any other substitutes for cleaning PVC or CPVC surfaces. A chemical cleaner such as MEK may be used.

	! WARNING
	<p style="text-align: center;">Fire Hazard</p> <ul style="list-style-type: none"> •Primers and cements are extremely flammable, and must not be stored or used near heat or open flame. •Also, use only in a well ventilated area.

Cement:

The cement should be a bodied cement of approximately 500 to 1600 centipoise viscosity containing 10-20% (by weight) virgin PVC material solvated with Tetrahydrofuran (THF). Small quantities of Dimethyl Form amide (DMF) may be included to act as a retarding agent to extend curing time. Select the proper cement; Schedule 40 cement should be used for Schedule 40 pipe. Never use all-purpose cements, commercial glues and adhesives or ABS cement to join PVC or CPVC pipe and fittings. To join PVC and CPVC materials, use ATSM F-493 compliant cement.



Applicators:

Select a suitable pure bristle type paint brush. Use a proper width brush or roller to apply the primer and cement (see chart below). Speedy application of cement is important due to its fast drying characteristics.

IMPORTANT NOTE:

A dauber type applicator should only be used on pipe sizes 2" and below. For larger diameter pipe, a brush or roller must be used.

RECOMMENDED BRUSH* SIZE FOR PRIMER AND CEMENT APPLICATIONS	
Nominal Pipe (IPS)	Brush Size
3	1.5" - 2.5"
*USE ONLY NATURAL BRISTLE	

Table 2

3. MAKING THE JOINT

A. Cutting

Pipe must be squarely cut to allow for the proper interfacing of the pipe end and the fitting socket bottom. This can be accomplished with a miter box saw or wheel type cutter. Wheel type cutters are not generally recommended for larger diameters since they tend to flare the corner of the pipe end. If this type of cutter is used, the flare on the end must be completely removed.

Note: Power saws, if used, should be specifically designed to cut plastic pipe

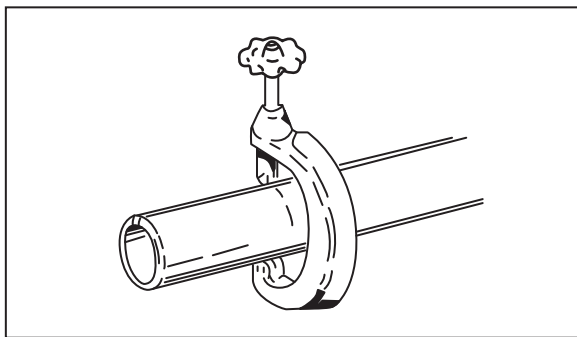


Fig. 23

B. Deburring

Use a knife, plastic pipe deburring tool, or file to remove burrs from the end of small diameter pipe.

Be sure to remove all burrs from around the inside as well as the outside of the pipe. A slight chamfer (bevel) of about 10°-15° should be added to the end to permit easier insertion of the pipe into the

end of the fitting. Failure to chamfer the edge of the pipe may remove cement from the fitting socket, causing the joint to leak.

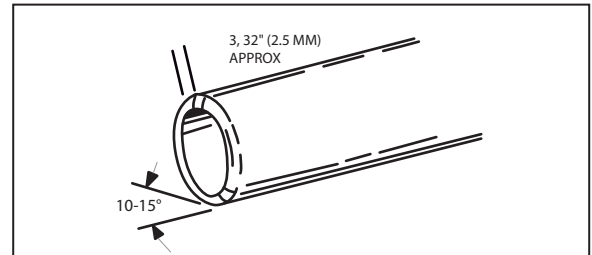


Fig. 24

C. Test dry fit of the joint

Tapered fitting sockets are designed so that an interfaced fit should occur when the pipe is inserted about 1/3 to 2/3 of the way into the socket.

Occasionally, when pipe fitting dimensions are at the tolerance extremes, it will be possible to fully insert dry pipe to the bottom of the fitting socket.

When this happens, a sufficient quantity of cement must be applied to the joint to fill the gap between the pipe and fitting. The gap must be filled to obtain a strong, leak-free joint.

D. Inspection, cleaning, priming

Visually inspect the inside of the pipe and fitting sockets and remove all dirt, grease or moisture with a clean dry rag. If wiping fails to clean the surfaces, a chemical cleaner must be used. Check for possible damage such as splits or cracks and replace if necessary.


Depth-of-entry

Marking the depth of entry is a way to check if the pipe has reached the bottom of the fitting socket in Step F. Measure the fitting depth and mark this distance on the pipe O.D. You may want to add several inches to the distance and make a second mark as the primer and cement will most likely destroy your first one.

Apply primer to the surface of the pipe and fitting socket with a natural bristle brush. This process softens and prepares the PVC or CPVC for the solvent cementing step. Move quickly and without hesitation to the cementing procedure while the surfaces are still wet with primer.

E. Application of solvent cement

- Apply solvent cement evenly and quickly around outside of pipe at a width a little greater than the depth of the fitting socket.
- Apply a light coat of cement evenly around the inside of the fitting socket. Avoid puddling.
- Apply a second coat of cement to the pipe End.

	! WARNING
	<p>Fire Hazard</p> <ul style="list-style-type: none"> •Primers and cements are extremely flammable, and must not be stored or used near heat or open flame. •Also, use only in a well ventilated area.

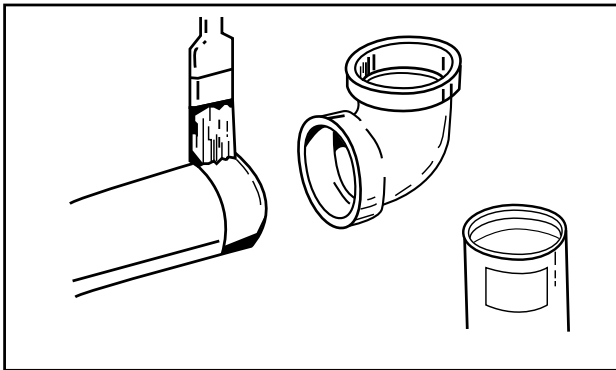


Fig. 25

F. Joint assembly

Working quickly, insert the pipe into the fitting socket bottom and give the pipe or fitting a 1/4 turn to evenly distribute the cement. Do not continue to rotate the pipe after it has hit the bottom of the fitting socket. A good joint will have sufficient cement to make a bead all the way around the outside of the fitting hub. The fitting will have a tendency to slide back while the cement is still wet so hold the joint together for about 15 seconds.

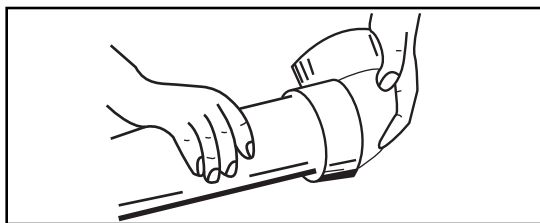


Fig. 26

G. Cleanup and joint movement

Remove all excess cement from around the pipe and fitting with a dry cotton rag. This must be done while the cement is still soft. The joint should not be disturbed immediately after the cementing procedure, and sufficient time should be allowed for proper curing of the joint.

Exact drying time is difficult to predict because it depends on variables such as temperature, humidity and cement integrity. For more specific information, you should contact your solvent cement manufacturer.

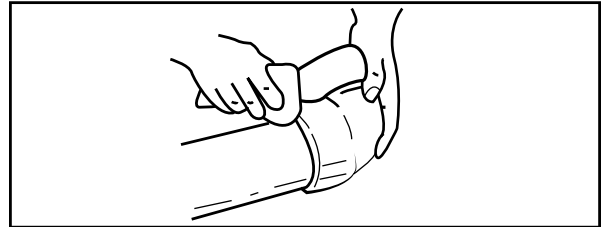


Fig. 26



INSTALLATION CHECKLIST

Note: Use and complete this checklist before lighting the heater. Correct any conditions that do not meet these instructions.

Water Heater Location

- Centrally located with the water piping system. Located as close to gas piping and vent pipe system as possible.
- Located indoors and in a vertical position. Protected from freezing temperatures.
- Proper clearances from combustibles surfaces maintained and not installed directly on a carpeted floor.
- Provisions made to protect the area from water damage. Metal drain pan installed and piped to an adequate drain.
- Installation area free of corrosive elements and flammable material.
- Sufficient room to service the water heater.

Gas Supply and Piping

- Gas supply is the same type as listed on the water heater data plate.
- Gas line equipped with shut-off valve, union and dirt leg
- Approved pipe joint compound used.
- Adequate pipe size and of approved material.
- Chloride-free soap and water solution or other approved means used to check all connections and fittings for possible gas leaks.

Vent Pipe System

- Vent pipe and fittings of approved material.
- Acceptable size, length and number of elbows on exhaust vent system.
- Installed in accordance with prevailing provisions of local codes, or in the absence of such, the latest edition of "National Fuel Gas Code", ANSI Z223.1/ NFPA 54.
- Horizontal piping slopes at an upward pitch of 1/8 in. rise per 4 ft. away from the water heater.
- Not obstructed in any way.
- Venting properly supported and able to move freely for expansion and contraction.
- Condensate drain connected as required.

Vent Termination Horizontal

- 12" min. above grade/snow level.
- Away from corners, other vents, windows etc.
- Correct termination screen installed and secured.

Vertical

- Exhaust vent termination 18" min. above roof/snow level.
- Correct termination screen installed and secured.

Water System Piping

- Temperature and Pressure relief valve properly installed with a discharge line run to an open drain and protected from freezing.
- All piping properly installed and free of leaks.
- Heater completely filled with water.
- Closed system pressure build-up precautions installed.
- All components used in combo heating systems or recirculation loop systems suitable for potable water.
- Check valves installed in combo heating and recirculation loop systems.

Electrical Connections

- Unit connected to a (preferably dedicated) 120V electrical supply.
- Proper polarity.
- Water heater properly grounded.
- Electrical outlet is NOT a GFI outlet.
- Installed in accordance with prevailing provisions of local codes, or in the absence of such, the latest edition of "National Electrical Code" (NFPA 70)".

After all actions on checklist are checked/ completed, read the Lighting Instructions and proceed with lighting the heater.

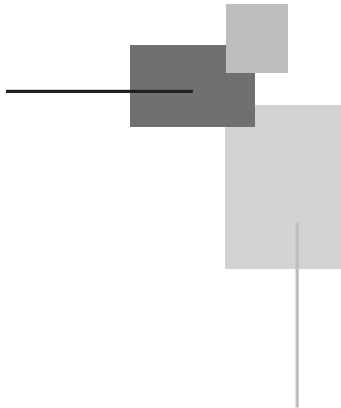
SOLAR INSTALLATION

When this appliance is used AS A SOLAR STORAGE HEATER OR AS A BACK UP FOR THE SOLAR SYSTEM, the following warning applies.



WARNINGS

Water supply to this heater must not exceed 180°F. Water temperature in excess of 180°F will cause the high limit control to function or open and shut off gas supply. The high limit control is a single use type that will require the replacement of the thermostat before the burner can operate. If the water supply from the solar system is above 120°F, a tempering valve or temperature limiting valves must be installed in the water supply line to limit the supply temperature to 120°F.



CAUTION INSULATION BLANKET

Insulation blanket kits which are available for external applications to water heaters are not recommended. However, some governing bodies require their use in new construction of additions, regardless of how efficient the water heater may be.

If an insulation blanket is applied to this heater CAUTION must be exercised not to restrict the proper function of the heater. The manufacturer of this heater will not be liable for incidents arising or resulting, from the use of external insulation blankets. The manufacturer will not be liable for corrosion of the parts which may have resulted from the use of such insulation blankets.

The space between the base and the floor on a gas water heater is necessary for proper air flow. This space must be maintained unobstructed. As time passes, the blanket may sag causing an obstruction of this air passage, resulting in an unsafe operating condition.

Do not apply insulation to the top of a gas water heater; This will affect the operation of the draft hood, resulting in an unsafe operating condition.

Do not cover any access panels leading to burner compartments, thermostat(s) control, doors, or temperature & pressure relief valve on the water heater.

Do not cover any labels or instruction material applied to this water heater. These safety labels and instruction materials must remain on the water heater and be visible for reference by the user. Do not attempt to remove these labels as they are a permanent part of this water heater as required by Certification Agencies and/or the Federal Government.

FOR YOUR SAFETY READ BEFORE OPERATING



⚠ 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.

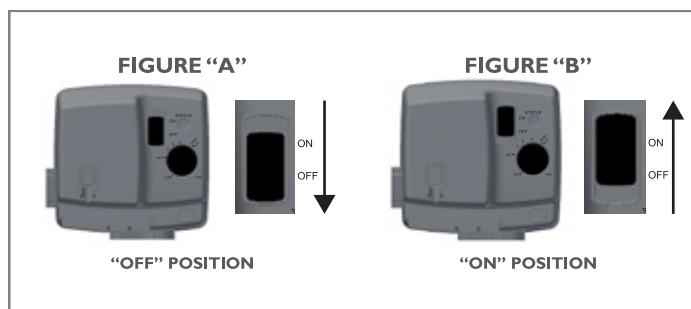
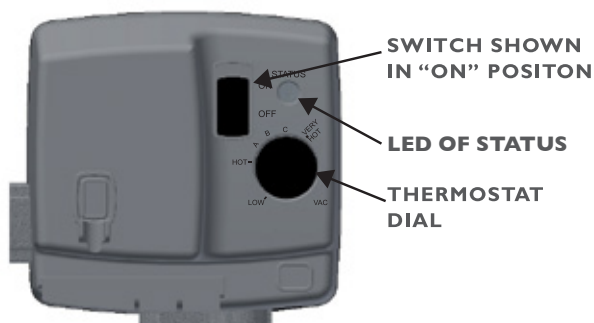
- Do not try to light any appliance.
- Do not touch any electric switch; do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.

- If you cannot reach your gas supplier, call the fire department.

C. Use only your hand to slide the gas control switch. Never use tools. If the switch cannot be moved by hand, do not try to repair it, call a service technician. Force or attempted repair may result in a fire or explosion.

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

OPERATING INSTRUCTIONS



1. **STOP!** Read the safety information above on this label.
2. Turn off all electric power to the appliance.
3. Set the thermostat to lowest setting.
4. This appliance is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.
5. Slide the switch on the right side of the gas valve down to the "OFF" position.
6. Wait five (5) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP! Follow "B" in the safety information at left on label. If you don't smell gas, go to the next step.
7. Turn on all electric power to the appliance.
8. Slide the switch on the right side of the gas valve up to the "ON" position.
9. Turn thermostat knob to desired setting.
10. 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. Turn off all electric power to the appliance if service is to be performed.
2. Set the thermostat to the lowest setting,
3. Slide the switch on the right side of the gas valve down to the "OFF" position.



Explosion Hazard

**Install a shut off valve.
Do not connect a natural gas water heater to a L.P. gas supply.
Do not connect a L.P. gas water heater to a natural gas supply.
Failure to follow these instructions can result in death, explosion, or carbon monoxide poisoning.**

GAS REQUIREMENTS

Read the data plate to be sure the water heater is made for the type of gas you will be using in your home. This information will be found on the data plate located near the gas control valve. If the information does not agree with the type of gas available, do not install or light. Call your dealer.

Note: An odorant is added by the gas supplier to the gas used by this water heater. This odorants may be fade over an extended period of time. Do not depend upon this odorant as an indication of leaking gas.

GAS PIPING INSTALLATION

All piping must comply with local and state ordinances or with the National Fuel Gas Code ANSI Z223.1 (NFPA 54), whichever applies.

Use black iron pipe or equivalent material approved by local codes and ordinances for gas piping. Install a ground-joint-union in the supply line as close to the water heater as possible. A manual gas shut-off valve should be at least 5 feet above floor level and readily accessible. A drip leg (consisting of a pipe tee, 4 inch nipple, and a cap) should be installed as shown in Figure 13.

Make sure the gas supplied to the heater is the same type as listed on the rating plate. **DON NOT ATTEMPT TO USE THIS WATER HEATER WITH ANY GAS OTHER THAN TYPE LISTED ON THE RATING PLATE.**

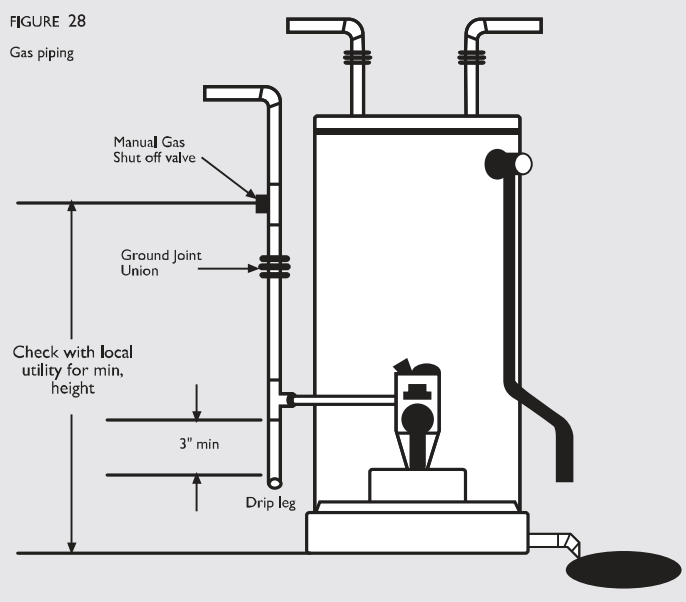
Compound set for the connection of all gas piping should be resistant to the action of liquefied petroleum (L.P.) gases. Apply pipe dope sparingly to the male threads only. **DO NOT** apply pipe dope to the gas valve.

The water heater and its individual gas shut off valve must be disconnected from the gas supply piping system during any pressure testing of the system at test pressure in excess of 1/2 psi. (14 W.C.) or 3.5 kPa.

If the gas valve is subjected to pressure excedomg 1/2 psi. the damage to the gas valve could result in an extremely hazardous condition. If this has ocurred, the gas valve must be replaced. Contact your dealer for service.

It is recommended that all service work be done by a qualified service agency.

FIGURE 28
Gas piping



NOTE:
Control valves for LP gas have left hand threads.

LP GAS



Explosion Hazard

**Have a qualified service technician make sure L.P. gas pressure does not exceed 13" water column.
Failure to do so can result in death, explosion, or fire.**

INSTALLATION SAFETY WARNING

L.P. UNITS: Liquefied petroleum (LP) gas is heavier than air and will remain at floor level if these is a leak.

Basements, crawl spaces, closet and areas below ground level will serve as pockets for accumulation of leajing gas.

Before lighting, sniff et floor level. **IF YOU SMELL GAS**, follow applicable instructions on the front cover, page 10.

GAS PRESSURE

Important: The gas supply pressure must not exceed the maximum supply pressure as stated on the water heater's data plate. The minumim supply pressure is for the purpose of input adjustment.

Note: Air may be present in the gas lines and could prevent the water heater from lighting on initial start-up. The gas lines should be purged of air by a qualified service technician after installation of the gas piping system.

WARNING DO NOT OPERATE APPLIANCE UNTILL ALL LEAKAGE IS CORRECTED. DO NOT USE OPEN FLAME OR ANY KIND OF SPARK TO CHECK FOR LEAKS.

REMOVING AND REPLACING THE GAS CONTROL VALVE/THERMOSTAT

Important: The gas control is an electronic valve:

1. On the electronic valve turn the temperature dial clockwise to low setting position. Turn the switch to the off position.
2. Turn off the gas at the manual shut-off valve on the gas supply pipe ().
3. Disconnect the electrical power supply.
4. Disconnect the blower and the hot surface harness.
5. Drain the water heater. Refer to the section of "Draining and Flusing" on page 14 and follow the procedure.
6. Disconnect the burner tube (manifold) from the electronic gas valve.

Note: L.P. gas system use a reverse (left-hand) threads on the manifold tube.

7. Refer to "Gas Piping" (Figure 4 - Page 4) and disconnect the ground joint union on the gas piping. Disconnect the remaining pipe from the electronic gas valve/thermostat. Important: When removing the electronic gas valve/thermostat do not use pipe wrench or vise the grip body. Do not insert any pipe or blunt instrument into the inlet or outlet connections. Use these type tools may result in damage to the electronic gas valve/thermostat.
8. Turn the electronic gas valve/thermostat counter-clock-wise-

Remove the electronic gas valve/thermostat.

To replace the electronic gas valve, reassemble in reverse order:

- Be sure to yse approved Teflon tape or pipe joint compound on the gas piping connections and fitting on the back of the electronic gas valve that screws into tank.
- Turn gas supply on and check for leaks. Use a chloride-free soap and water solution (bubbles formig indicate a leak) or other approved method.
- Be sure tank is completely filled with water before lighting and activating the water heater. Follow the "Lighting Instructions" on page 10.
- Follow the "Lighting Instructions" on page 10.
- If additional information is required, contact the Service Department on the phone number shown on the front of this manual.

REPLACING THE HIGH TEMPERATURE CUT OFF SWITCH ASSEMBLY

Your American Standard VAPOR SHIELD water heater is equipped with a high temperature cut off switch that is provided to shut down the water heater when the incoming air is insufficient for proper combustion. If the flame guard air intake becomes blocked, the high temperature cut off switch and the electrical switch will turn off the water heater. This is highly unlikely since this high temperature cut intake becomes blocked. If such an accident occurs however the flame guard on the bottom of combustion chamber should be checked for blockage and the high temperature cut off switch should be checked to determine if it has shut off.

If switch has shut off, merely clean the flame guard per the previous instructions and press the red reset button on the end of the switch. You should then be able to restart the heater according to the start up instructions. If the water heater will not start in this manner, proceed according to the following:

1. Run a jumper wire across the two spade connectors on the switch to determine if the switch is still in the open position. A continuity tester can also be used for this purpose.
2. If this test shows that the switch is defective, the switch should be replaced but the FVIR feature of the heater will still function with the jumper wire until a new switch can be obtained. If a gasoline spill occurs prior to the installation of a new switch, the gasoline vapors will be detected for the flammable vapors sensor and the electrical switch will turn off the electrical supply and the electronic valve will shut off the water heater.
3. To replace the high temperature cut off switch proceed per the following.

Instructions.-

1. Remove the exterior door with top seal and disconnect the harness of the flammable vapors sensor.
2. Disconnect the manifold and the hot surface harness from the electronic valve. Also disconnect high temperature cut off switch wires from the wire terminals on the switch.
3. Remove the 6 screws holding the burner mounting plate in the combustion chamber.
4. Slide the burner carefully out of the combustion chamber taking care of not damaging the burner mounting gasket.
5. Once the burner is removed outside combustion chamber, remove the high temperature cut off switch slipping out from the only used for this replacement.
6. Re-install the burner with the six screw, taking care not to damage the burner plate-mounting gasket and the hot surface assembly.
7. Re-connect the manifold, hand tight, and then with a wrench 1/4 turn will assure connection. Re-connect the VFS and the hot surface igniter harness.
8. Re-install the exterior door with the top seal.
9. Turn the gas valve on and make sure all connections are tight and no gas smell is present. Then light-on the heater according to the operating instructions. Once the burner is operating, check for gas leaks at the manifold nut connections with a soapy water solution.

HOT SURFACE, GLOW FLY AND FLAME SENSOR REPLACEMENT

In the unlikely event that it would be necessary to replace either the hot surface igniter, the glow fly or the flame sensor, these parts cannot be replaced individually therefore the entire igniter assembly should be replaced. To replace this assembly, follow the provided instructions for removing the burner, and for the TOD replacement.

After removing the burner assembly, unscrew the hot surface igniter from the bracket and remove the rubber grommet from the burner mounting plate. Then push the rubber grommet into position inside the hole in the burner mounting plate.

Re-connect the manifold, finger tight plus 1/4 turn with a wrench is sufficient. Re-connect the FVS and the hot surface harness.

Re-install the exterior door with the top seal.

Turn on the gas and make sure all connections are tight and you cannot smell gas. Then light the heater according to the lighting instructions. When the burner comes on, check for leaks at the manifold but connection with a soapy water solution.

REMOVAL OF THE BURNER ASSEMBLY

BURNER ADJUSTMENT

There are no adjustments to this water heater (other than water temperature selection). The electronic valve (gas control valve) is equipped for total regulation of the main burner.

BURNER MAINTENANCE

At least once a year a visual inspection should be made of the main burner and hot surface ignitor. You should check for sooting, soot is not normal and will impair proper combustion.

WARNING: DO NOT ATTEMPT TO REMOVE THE BURNER FROM THE COMBUSTION CHAMBER UNLESS YOU ARE QUALIFIED TO DO SO.

In the event that cleaning becomes necessary, it can be accomplished by removing the burner from the combustion chamber. To remove the burner, follow the instructions previous procedure to change the TOD.

Care must be exercised in doing this to ensure that the gaskets and the hot surface assembly are not torn or damaged. If they are damaged they must be replaced. Once the burner assembly is removed it can be cleaned with a vacuum cleaner by vacuuming both the top and bottom surfaces.

When reinstalling the burner assembly, make sure all gasket material is positioned properly. If any of the gasket are damaged the heater cannot be put back in operation until the damaged gaskets are replaced.

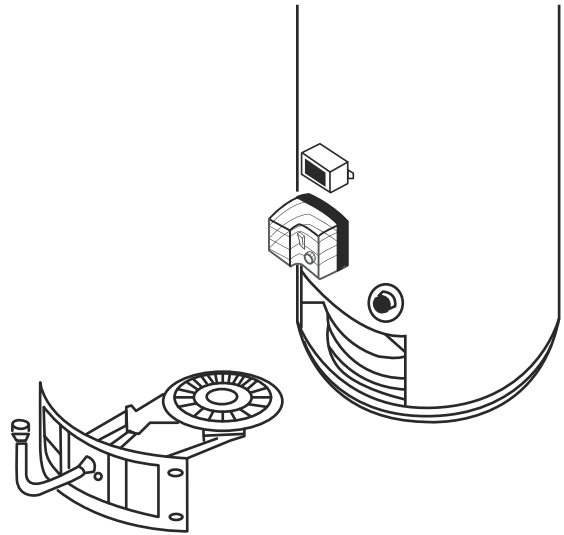


Fig. 29

⚠ WARNING: IF YOU LACK THE NECESSARY SKILLS TO REMOVE AND REPLACE THIS BURNER, DO NOT ATTEMPT TO DO SO. CALL A QUALIFIED TECHNICIAN.

DRAINING AND FLUSHING INTERIOR OF TANK

The water heater should be drained if being shut down during freezing temperatures. Also periodic draining and cleaning of sediment from the tank may be necessary.

1. "TURN OFF GAS TO APPLIANCE" (Figure 4).
2. Close the cold water inlet valve to the heater (Figure 4).
3. Open a nearby hot water faucet.
4. Open the heater drain valve. (Figure 4).


WARNING

THIS WATER CAN BE HOT

5. If the heater is going to be shut down and drained to an extended period, the drain valve should be left open. Refer to "Hydrogen Gas" warning. (Page 17).
6. To start heater again, read paragraph "Operation" and "LIGHTING INSTRUCTIONS" (Page 10).

At least every 3 months a visual inspection should be made of the venting system. You should look for:

- Obstructions which cause improper venting.
- Damage or deterioration which could cause improper venting or leakage of combustion products.

 **NOTE:** This water heater when set at the lower temperature setting is not capable of producing hot water of sufficient temperatures for sanitizing purposes. During winter season or any cold period, you may desire higher temperature setting to adjust for the colder incoming form on the cooler tank surface. This does not mean the tank is leaking. Refer to Page 16 for explanation of this condition. During the summer months, the warmer incoming water temperatures will benefit the performance of your water heater and reduce the amount of condensation developed.

Condensation does not mean that your tank is leaking. Over 40% of reported tank leaks on installation are proven to be condensation. To avoid unnecessary inconvenience and expense, make sure the tank is leaking before calling a service person.

CAUTION: Setting the temperature sector dial higher provides hotter water, which increases the risk of scald injury.

The water heater electronic valve is constructed with a built-in shut-off designed to shut off the gas supply to the main Burner. The electronic valve is also equipped with a high temperature limit switch ECO (Energy Cut Off). The Energy Cut Off will shut off all gas supplied to the Burner switch is a single use switch if the electronic valve's LED blinks four times, owner should call the service number founded in the front page of this manual.

WARNING


TAMPERING

Tampering with the electronic valve, hot surface, burner or temperature and pressure relief valve is **DANGEROUS** and voids all warranties. Only qualified personnel should service these components.

TEMPERATURE ADJUSTMENT

The temperature sector dial has been adjusted to its lowest setting when shipped from the factory.

For energy-efficient operation of your water heater, the recommended temperature setting is approximately 125°F. Households with small children or invalids may require a 120°F or lower temperature setting to reduce the risk of scald injury. Some states require a lower temperature setting. Check with your gas supplier for local requirements governing the temperature setting.

 **NOTE:** The lower the temperature setting, greater the energy efficiency, both to heat water and to maintain its temperature during standby periods. Lower water temperatures also extend the tank life.

Remember, no water heating system will provide exact temperatures at all times. Allow a few days of operation at this setting, to determine the correct temperature setting consistent with your needs.

VACATION/FREEZING TEMPERATURES- If the water heater is to remain idle for 30 days or more, or is subject to freezing temperatures while shut off, the water heater and piping should be drained, and the drain valve should be left open.

GAS PRESSURE - With the water heater in operation (main burner on), the maximum supply pressure must not exceed the specified value below, and the minimum supply and normal manifold gas pressure are as follows:

	Supply Pressure		Manifold Pressure
	MAX	MIN	NORMAL
Natural Gas	11" W.C.	4.5" W.C.	3.5" W.C.
L.P. Gas	13.0" W.C.	11" W.C.	10" W.C.

Some models have values higher or lower than those noted above. Refer to pressure noted on the label affixed to the front of the water heater. Consult your local company or gas supplier if correction is necessary.

EMERGENCY SHUT DOWN

Should overheating occur or the gas supply fail to shut off, turn off the manual gas control valve to the appliance and call a qualified service person to check for the cause.

WARNING Stacking

Stacking occurs when a series of shorts draws of hot water (3 gallons or less) are taken from the water heater tank. This causes increased cycling of the burner and can result in increased water temperatures at the hot water outlet. An antiscald device is recommended in the hot water supply line to avoid this problem.

OPERATION SAFETY PRECAUTIONS:

DO turn off heater if it has been subjected to physical damage, flooding or fire.

DO NOT turn on heater unless is filled with water.

DO NOT turn on heater if cold water supply inlet valve is closed.

DO NOT attempt to light heater until all lighting instructions are understood and followed. See label on heater near the electronic valve.

DO NOT allow flammable liquids, such as gasoline or paint thinner, to be stored or used near heater.

DO NOT allow combustible materials such as newspaper, rags or mops to accumulate near heater.

CONDENSATION

Whenever the heater is filled with cold water or hot water is drawn from a faucet there will be a certain amount of condensation formed while the burner is "ON". Moisture from the products of combustion condenses on the cooler tank surfaces and forms drops of water which may fall onto the burner or other hot surfaces to produce "sizzling" or "frying" noise. Condensation is normal and should not be confused with a leaking tank.

The water from condensation will be noted at different times of the year in varying quantities. This condensation may spill out of the bottom pan onto the floor. Do not confuse this with a leak. Once the water inside of the heater reaches a temperature of 120°F, the condensation will stop.

Operating the water heater at the lowest electronic valve temperature setting can keep the water heater in the condensation mode. Adjusting the electronic valve setting slightly higher will overcome this problem. There is hot water scald potential however if the electronic valve is set too high.

SMOKE/ODOR

The water heater may give off a small amount of smoke and odor during the initial start-up of the unit. This is due to the burning off of oil from metal parts of a new unit and will disappear after a few minutes of operation.

NATURAL GAS MODELS IF YOU SMELL GAS:

1. Open windows.
2. Get all people out of building
3. DO NOT light matches. Do not smoke.
4. DO NOT touch electrical switches (on or off).
5. Extinguish any open flames.
6. Shut off gas at manual shut-off valve.
7. Use an outside telephone call the gas company and the fire department. Ask for instructions. Before hanging up, give your name and address.
8. DO NOT go back into the building. If help is coming, wait for it outside of the building.

L.P.G. (PROPANE, BOTTLED) GAS MODELS

L.P.G. IS HEAVIER THAN AIR

Should there be a leak in the system, the gas will settle at FLOOR LEVEL. Basements, crawl spaces, skirted areas under mobile homes (even when ventilated), closets and areas below ground level will serve as pockets for the accumulation of gas.

BEFORE LIGHTING SNIFF AT FLOOR LEVEL IF YOU SMELL GAS, FOLLOW THESE RULES:

1. Open windows.
2. Get all people out of building
3. DO NOT light matches. Do not smoke.
4. DO NOT touch electrical switches (on or off).
5. Extinguish any open flames.
6. Shut off gas at L.P. tank outside the building.
7. Use an outside telephone and immediately call the L.P. Gas supplier and the fire department. Ask for instructions. Before hanging up, give your name and address.
8. DO NOT go back into the building. If help is coming, wait for it outside of the building.

OUT OF FUEL

When your L.P. tank runs out of fuel, turn off gas at all gas appliances - including gas pilots. After L.P. tank is refilled, all appliances must be re-lit according to the manufacturer's instructions.

WARNING

HYDROGEN GAS

Hydrogen gas can be produced in water system that has not been used for a long period of time (generally two weeks or more). **HYDROGEN GAS IS EXTREMELY FLAMMABLE.** To prevent the possibility of injury under these conditions, we recommend the hot water faucet be open for several minutes at the kitchen sink before you use any electrical appliance which is connected to the hot water system.

Do not light a cigarette, cigar or pipe. Do not smoke. If hydrogen is present, there will probably be an unusual sound such as air escaping through the faucet, as the water begins to flow. Remember, no smoke or open flame near the faucet at the time it is opened.

EXPOSURE TO WATER

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

ANODE

In each water heater there is installed at least one anode rod (see Parts section) for protection of the tank. Certain water conditions will cause a reaction between this rod and the water. This is defined as smelly water and removal of the rod will void any warranties stated or implied. However, this rod is only good to a certain point, after which, we can only suggest that a water conditioning company be contacted to supply filtration equipment.

WATER HEATER SOUNDS

1. Possible noises due to expansion and contraction of some metal parts during periods of heat-up and cool-down not represent harmful or dangerous conditions.
2. Sediment build-up in the tank bottom will create varying amount of noise, and may cause premature tank failure. Tank bottom may need cleaning (See "DRAINING AND FLUSHING INTERIOR OF TANK" Page 14).

Condensation causes sizzling and popping within the burner area during heating and cooling periods and should be considered normal. See "CONDENSATION" Page 16.

TAMPERING

Tampering with the electronic valve, hot surface, burner, or temperature and pressure relief valve is **DANGEROUS** and voids all warranties. Only qualified personnel should service these components.

**SERVICE MUST BE PERFORMED BY A QUALIFIED INSTALER,
SERVICE AGENCY OR GAS SUPPLIER**

THE FOLLOWING IS A LIST OF THE MOST COMMON COMPLAINTS RELATED TO THE USE OF WATER HEATERS. MANY COMPLAINTS ARE DUE TO ITEMS NOT DIRECTLY RELATED TO THE WATER HEATER. DO NOT ATTEMPT TO SERVICE THE WATER HEATER OR PERFORM OTHER RECOMMENDATIONS ON THIS LIST UNLESS YOU ARE TRAINED AND QUALIFIED TO DO SO.

VAPORSHIELD System Operational Checklist

1. Manifold gasket properly sealed.
2. Viewport not damage or cracked.
3. No leaks at manifold connection.
4. Manifold door screws securely tightened.

PROBLEM	POSSIBLE CAUSE(S)	CORRELATIVE ACTION
GAS CONTROL VALVE AND BLOWER WITH OUT POWDER	<ol style="list-style-type: none"> 1. LED of flammable vapors sensor FVS on the Electrical Switch remain lit 2. LED of high temperature cut off switch TOD on the Electrical Switch remain lit 	<ol style="list-style-type: none"> 1. Call service number on front of this manual. 2. Call service number on front of this manual.
BURNER FLAME TOO HIGH	<ol style="list-style-type: none"> 1. Air inlets blocked 2. Insufficient secondary air 3. Orifice too large 	<ol style="list-style-type: none"> 1. Unblock inlet air openings 2. Provide ventilation to water heater 3. Replace with correct orifice
BURNER WILL NOT STAY LIT	<ol style="list-style-type: none"> 1. Insufficient air 2. Flame arrestor openings blocked 3. Defective flame sensor 4. Defective gas control valve 5. High ambient room temperature 	<ol style="list-style-type: none"> 1. Provide ventilation to water heater 2. Call service number on front of this manual 3. Replace the hot surface assembly 4. Replace the control valve 5. Call service number on front of this manual
FLAME BURNS AT ORIFICE	<ol style="list-style-type: none"> 1. Low gas pressure 2. Defective gas control valve 	<ol style="list-style-type: none"> 1. Check with gas utility company 2. Replace gas control valve
INSUFFICIENT HOT WATER	<ol style="list-style-type: none"> 1. Low gas pressure 2. Orifice too small 3. Thermostat set too low 4. Gas control error codes 5. Sediment or lime in tank 6. Water heater too small 7. Wrong piping connections 8. Leaking faucets 9. Wasted hot water 10. Long runs of exposed piping 11. Hot-water piping in outside wall 	<ol style="list-style-type: none"> 1. Check with gas utility company 2. Replace with correct orifice (see rating plate) 3. Turn temperature knob to higher setting 4. Refer to gas control error codes 5. Drain/flush-provide water treatment if needed 6. Install adequate heater 7. Correct piping: dip tube must be in cold inlet 8. Repair faucets 9. Advice costumer 10. Insulate piping 11. Insulate piping
WATER IS TOO HOT	<ol style="list-style-type: none"> 1. Thermostat is too high 2. Incorrect or missing vent screen in vent termination 3. Defective gas control valve 	<ol style="list-style-type: none"> 1. Turn temperature knob to lower setting 2. Check venting for correct screen 3. Replace gas control valve
SLOW HOT WATER RECOVERY	<ol style="list-style-type: none"> 1. Insufficient air/flue blockage 2. Low gas pressure 3. Orifice too small 4. Gas control valve set too low 5. Heater too small 6. Wrong piping connection 7. Wasted hot water 8. Flue clogged 9. Air inlets blocked 	<ol style="list-style-type: none"> 1. Provide ventilation to water heater. Check flue way, flue baffle and burner 2. Check with gas utility company 3. Replace with correct orifice (see rating plate) 4. Turn temperature knob to higher setting 5. Install adequate heater 6. Correct piping-dip tube must be in cold inlet 7. Advice costumer 8. Clean flue, locate source and correct 9. Unblock inlet air openings
DRIP FROM RELIEF VALVE	<ol style="list-style-type: none"> 1. Pressure build-up 2. Hater stacking 3. Closed water system 4. Improperly seated valve 5. Water overheated 	<ol style="list-style-type: none"> 1. Use a pressure-reducing valve and relief valve 2. Lower the gas control valve setting 3. See "Thermal Expansion" section 4. Check Relief valve for proper operation (Do Not plug T&P valve) 5. Check venting for proper vent termination screen. Check valves in loop system stuck or missing. 6.

TROUBLESHOOTING CHECK LIST

GAS CONTROL VALVE FAILS TO SHUT OFF	<ol style="list-style-type: none"> 1. Defective gas control valve 2. Improper calibration 	<ol style="list-style-type: none"> 1. Replace gas control valve. 2. Replace gas control valve.
SMELLY WATER	<ol style="list-style-type: none"> 1. Sulfides in water supply 2. Bacteria in water supply 3. Incompatible anode 	<ol style="list-style-type: none"> 1. Chlorination procedure. 2. Chlorination procedure. 3. Replace with anode appropriate for water conditions.
CONDENSATION	<ol style="list-style-type: none"> 1. Filling the new water heater for the first time 2. Moisture from the products of combustion 3. Water dripping from blower assembly 4. Undersized water heater 	<ol style="list-style-type: none"> 1. Normal operation: the condensation should disappear after heater warms up 2. Normal operation: the condensation should disappear in time. 3. Install condensate hose to drain port on the rubber coupling . 4. Install adequately sized heater.
COMBUSTION ODORS	<ol style="list-style-type: none"> 1. Air inlets blocked 2. Insufficient air 3. Flue clogged 4. Heater installed in a confined area 5. House too tight 	<ol style="list-style-type: none"> 1. Unblock inlet air openings. 2. Provide fresh air ventilation to the water heater: Check flue way, flue baffle and burner. 3. Clean, locate source and correct 4. Provide fresh air ventilation to the water heater. 5. Provide fresh air ventilation to the water heater.
SMOKING AND CARBON FORMATION	<ol style="list-style-type: none"> 1. Air inlets blocked 2. Insufficient air 3. Low gas pressure 4. Orifice too large 5. Flue clogged 6. Defective gas control valve 7. Heater installed in a confined are 8. Burner flame yellow-lazy 	<ol style="list-style-type: none"> 1. Unlock inlet air openings. 2. Provide ventilation to water heater. Check flue way, flue baffle and burner. 3. Check with gas utility company. 4. Replace with correct orifice (see rating plate). 5. Clean, locate source and correct. 6. Replace gas control valve. 7. Provide fresh air ventilation. 8. Clean the burner.
UNABLE TO LIGHT THE BURNER	<ol style="list-style-type: none"> 1. Air in gas line 2. Pressure switch 3. Blocked exhaust 4. Wire connection 5. Defective gas control valve 6. Gas valve set too low 7. No gas 8. Dirt in the gas lines 9. Main burner line clogged 10. Heater installed in a confined area 	<ol style="list-style-type: none"> 1. Turn temperature knob to lower setting 2. Check venting for correct screen 3. Replace gas control valve
SIZZING, RUMBLING NOISE	<ol style="list-style-type: none"> 1. Scale and sediment 2. Condensation dripping on burner 	<ol style="list-style-type: none"> 1. Drain/flush-provide water treatment if needed. 2. Refer to “Condensate” section.
WATER LEAKAGE	<ol style="list-style-type: none"> 1. Condensation 2. Dripping Temperature & Pressyre Relief Valve 3. Drain valve dripping/leaking 4. Tank Leak 	<ol style="list-style-type: none"> 1. Refer to “Condensate” section. 2. Refer to “Temperature-Pressure Relief Valve” section. 3. Back flush to clean-out sediment, replace if necessary. 4. Check “Leakage Checkpoints”.

TROUBLESHOOTING CHECK LIST

<p>BLOWER WILL NOT START</p>	<ol style="list-style-type: none"> 1. No power to unit 2. Gas control valve set too low 3. Defective air pressure switch 4. Defective blower 5. Disconnected or loose wire 6. Control locked out 7. High limit switch open due to excessive vent temperature or defective switch 8. Disconnected, torn or blocked pressure switch hose from air pressure switch to blower housing 	<ol style="list-style-type: none"> 1. Plug in power cord, check fuses and/or supply voltage. 2. Turn temperature knob to higher setting. 3. Replace air pressure switch. 4. Replace blower. 5. Repair and reconnect wires. 6. Refer to "Resetting The Heater Control" - determine cause of lockout. 7. Determine cause of overheating check for: over-firing, insufficient air supply, high ambient air temperature. 8. Reconnect or replace pressure switch hose.
<p>BLOWER RUNS CONTINUOUSLY</p>	<ol style="list-style-type: none"> 1. Air pressure switch not closing due to insufficient draft - check for: <ol style="list-style-type: none"> a. Vent pipping blocked b. Piping length too long c. Clogged/dirty blower 2. Pressure switch continuously closed 3. Defective pressure switch 4. High limit switch continuously closed 	<ol style="list-style-type: none"> 1. Determine cause of insufficient draft. Check draft with manometer at pressure switch. <ol style="list-style-type: none"> a. Remove blockage b. Reduce vent length/increase vent size c. Clean blower wheel 2. Replace the pressure switch. 3. Replace defective pressure switch. 4. Replace High limit switch
<p>HOT SURFACE IGNITER NOT GLOWING FOLLOWING WARM-UP PERIOD</p>	<ol style="list-style-type: none"> 1. 120VAC polarity reversed at 120VAC outlet receptable 2. Defective hot surface igniter 3. Defective gas control valve 4. Gas control valve ECO open 5. High temperature cut off switch open 	<ol style="list-style-type: none"> 1. Reverse polarity at 120VAC outlet receptacle. 2. Replace igniter. 3. Replace gas control valve 4. Replace the ECO 5. Call service number on front of this manual.
<p>VENT PIPE TOO HOT</p>	<ol style="list-style-type: none"> 1. Blower high limit switch fails to open- switch defective 2. Not enough dilution air to mix with flue gases 3. Air in room too hot for mixing with flue gases 4. Wrong burner orifice 5. Wrong or missing vent termination Screen 	<ol style="list-style-type: none"> 1. Replace blower high limit switch. 2. Proper air circulation must be provided for combustion and dilution of flue temp. 3. Increase ventilation to lower room temperature. 4. Install correct orifice. 5. Install and secure proper vent termination screen.
<p>HIGH OPERATION COSTS</p>	<ol style="list-style-type: none"> 1. Gas control valve set too high 2. Sediment or lime in tank 3. Water heater undersized 4. Wrong pipe connections 5. Leaking faucets 6. Gas leaks 7. Wasted hot water 8. Long run or exposed piping 9. Hot water piping in exposed wall 	<ol style="list-style-type: none"> 1. Set temperature dial to lower setting. 2. Drain/flush provide water treatment if need. 3. Install adequate heater. 4. Correct piping dip tube must be in cold inlet. 5. Replace faucets. 6. Check with utility repair once. 7. Advise customer. 8. Insulate piping. 9. Insulate piping.

RESETTING THE HEATER CONTROL

- Soft lockouts as diagnosed by the system error codes require the gas control to be reset.
- To reset the control, slide the “ON/OFF” switch to the “OFF” position. Wait for 10 seconds and move the switch back to the “ON” position.
- If the problem that caused the control to lock out has not been corrected, the control will remain or again go back into lockout.

LOCKOUTS

Soft Lockout

- Occurs when a system safety device trips to break the sequence of operation. The control will retry the system in a timed basis but will not reinstate operation until the failure is corrected.

Hard Lockout

- Occurs when the main controller fails and must be replaced.

The gas control valve includes a temperature limiting ECO (Energy Cut Off) system that will shut off the water heater if the water temperature is too high.

Should the water temperature get too high, the diagnostic status light will indicate a code (4 flashes), indicating an over-temperature condition and the main burner will be shut off. If a high temperature condition occurs, turn the main gas supply OFF and have the water heater repaired by a qualified service technician. Contact your local dealer for service information.

Note: Should an over-temperature condition occur, restart the water heater and verify the LED flash sequence. If the 4 flash sequence is observed, slide the “ON/OFF” switch to the “OFF” position. Turn Main Gas Supply “OFF”. Replace the gas control valve.

IGNITION STATE AND TIMING

IGNITION STATE	TIMING
Pre-purge	5 seconds (NG models) 15 seconds (LP models)
Hot Surface Igniter (HSI) Warmup	10 seconds
Ignition Activation Period (IAP)	3.5 seconds maximum
Flame Recognition Period (FRP)	0.5 second
Trial For Ignition	IAP+FRP
Flame Stabilization Period	Not Applicable
Inter-purge	30 seconds
Flame Failure Response Time	2 seconds max (@ 1 uA flame current)
Post-purge	30 seconds
Pressure Switch (PS) Prove Period	2 minutes
Pressure Switch (PS) Fault Delay (failed open/closed)	2 minutes
Soft Lockout	20 minutes
Energy Cut Off (ECO) Limit Lockout	Indefinite

SYSTEM STATUS AND ERROR CODES

The micro-controller inside the gas control monitors the ignition sequence, temperature settings and overall operation of the heater. If any of these parameters does not operate properly the controller will shut down the water heater, diagnose the failure and flash an error code. The table below lists the System Status Codes for the Honeywell control. Refer to it and to the “Troubleshooting Guidelines” to diagnose the problem before attempting corrective action.

LED FLASH SEQUENCE	CONTROL STATUS
Short flash once every four seconds	IDLE (no call for heat, no fault conditions)
“Heartbeat”, alternates bright/dim	Call for Heat (no fault conditions)
One Flash, three second pause	Low Flame Signal (control continues to operate)
Two Flash, three second pause	Pressure Switch Failed Closed
Three Flash, three second pause	Pressure Switch Failed Open
Four Flash, three second pause	ECO (Energy Cut Off) Limit Lockout thermostat temperature limit was exceeded.
Five Flash, three second pause	Flame Out Of Sequence
Six-One Flash, three second pause	Soft Lockout - Retry Limit - Failed Trial For Ignition
Six-Two Flash, three second pause	Soft Lockout - Recycle Limit - Pressure Switch/High Limit Opened
Six-Three Flash, three second pause	Soft Lockout - Recycle Limit - Flame Lost
Six-Four Flash, three second pause	Soft Lockout - Sensed flame out of Sequence
Eight-Two Flash, three second pause	Temperature Sensor Fault Detected
Eight-Three Flash, three second pause	Electronics Fault Detected
Eight-Four Flash, three second pause	Valve Fault Detected
Hardware Fault Lockout	Indefinite

READING THE LED FLASH SEQUENCE

The LED indicator light is active when the gas valve is in operation. The light will normally show a flash sequence of a short flash once every four seconds or a “Heartbeat” of alternating bright/dim. Multiple flash codes indicate an error and can be read as follows:

Example: Corrective Action Number 9, Six-Two Flash, three second pause. For this code, the LED indicator light will make six bright flashes, pause for one second and then make two more bright flashes. The LED will pause for three seconds and repeat the six-two cycle of flashes.

CORRECTIVE ACTION NUMBER	CORRECTIVE ACTION
1	1. Normal operation, no action necessary.
2	1. Normal operation, no action necessary.
3	1. Flame rod not properly seated in flame, reposition rod. 2. Clean flame sensor rod with fine steel wood to avoid lock-out.
4	1. Check that blower operates and does not have any blockages. 2. Check that all wiring is correct. 3. Ensure the air pressure sensing tubes are properly connected and not kinked or damaged. 4. Ensure the air pressure switch is correct and the air pressure switch (N.O.) is not bypassed (jumped). 5. Turn power to the unit “OFF” – check for continuity of the air pressure switch (N.O.) with wires disconnected; a. If the pressure switch contacts show continuity (closed circuit), replace the pressure switch, b. If the pressure switch contacts are open and all wiring is correct, replace the Gas Control.
5	1. Ensure the blower is running - check for 120VAC to the blower when the heating cycle begins. a. If the Gas Control does not energize the blower - replace the Gas Control. b. If the blower fails to start when energized: i. Turn power to the heater “OFF” – check if the capacitor is connected; ii. Turn power to the heater “OFF” – check the capacitor rating (3uF +/-5%); iii. Turn power to the heater “OFF” - replace the blower assembly. 2. Ensure the air pressure sensing tubes are properly connected and not kinked or damaged; 3. Check continuity of the vent temperature limit switch – replace switch if contact remain open. 4. Check continuity of the air pressure switch (N.C.) – replace switch if contact remain open. 5. Ensure the correct size of exhaust and air intake pipes were used per the instruction manual for vent length. Ensure maximum number of elbows or equivalent feet of both pipes was not 6. exceeded. 7. Ensure there are no obstructions in the exhaust and air intake pipes. 8. If there are excessive restrictions in the air intake pipe the air pressure switch (N.C.) will open. 9. Check air pressure switch performance - Check blower vacuum with a manometer - Compare with air pressure switch (N.O.) setting. If the air pressure switch proves defective – replace the air pressure switch (N.O.). 10. If the air pressure switch (N.O.) performance test results prove the air pressure switch is working properly, and all other steps are followed, and fault code persist – replace the control.
6	1. Resetting the ECO (Energy Cut-Out) requires manual intervention. It cannot be reset by cycling power to the control. 2. Reset Procedure 3. Manual reset is performed by turning the set point knob to lowest set point position for a minimum of 10 seconds and then return it to the desired set point. 4. The manual reset of the ECO can only be performed 2 times, after the ECO trips a third time, the gas valve will enter a hard lock out where the gas control will need to be replaced.
7	5. Turn the power “OFF” for 10-20 seconds then “ON” again to clear the fault code. 6. Flame rod not properly seated in flame, reposition rod. 7. Clean flame sensor rod with fine steel wood to avoid lock-out. 8. Replace the control if the fault code persists

CORRECTIVE ACTION NUMBER	CORRECTIVE ACTION
8	<ol style="list-style-type: none"> 1. Gas supply is turned off or gas pressure is too low. Ensure supply pressure and manifold gas pressures are within requirements. Manifold pressure is nonadjustable, if gas supply pressure proves correct and manifold pressure is off by more than 0.3" WC replace the control. 2. Low supply voltage - should be 115 - 125 VAC 3. Ensure flame sensor is making good contact with the burner flame and flame is steady. 4. Ensure flame sensor is clean, use ultra- fine steel wool to clean flame sensor. 5. Ensure the Hot Surface Igniter is positioned properly to provide consistent ignition. 6. Check for any cracks in igniter assembly ceramic insulators - replace igniter assembly if damaged. 7. Check resistance of igniter at room temperature (at the plug). Replace the igniter if resistance is not within 9-17 ohms at room temperature. 8. Ensure correct size of exhaust and air intake pipes were used per the instruction manual for vent length. 9. Ensure maximum number of elbows or equivalent feet of both pipes was not exceeded.
9	<ol style="list-style-type: none"> 1. Ensure the blower is running - check for 120 VAC to the blower when the heating cycle begins. <ol style="list-style-type: none"> a. If the Gas Control does not energize the blower - replace the Gas Control. b. If the blower fails to start when energized: <ol style="list-style-type: none"> i. Turn power to the unit "OFF" – check if the capacitor is connected; ii. Turn power to the unit "OFF" – check the capacitor rating (3uF +/-5%); iii. Turn power to the unit "OFF" - replace the blower assembly. 2. Ensure the air pressure sensing tubes are properly connected and not kinked or damaged; 3. Check continuity of the vent temperature limit switch – replace switch if contacts remain open. 4. Check continuity of the air pressure switch (N.C.) – replace switch if contacts remain open. 5. Ensure correct size of exhaust and air intake pipes were used per the instruction manual for vent length. Ensure maximum number of elbows or equivalent feet of both pipes was not exceeded. 6. Ensure there are no obstructions in the exhaust and air intake pipes. 7. If there are excessive restrictions in the air intake pipe the air pressure switch (N.C.) will open. 8. Check air pressure switch performance - Check blower vacuum with a manometer - Compare with air pressure switch (N.O.) setting. If the air pressure switch proves defective – replace the air pressure switch (N.O.). 9. If the air pressure switch (N.O.) performance test results prove the air pressure switch is working properly, and all other steps are followed, and fault code persist – replace the control.
10	<ol style="list-style-type: none"> 1. Gas supply is turned "OFF" or gas pressure is too low. Ensure supply pressure and manifold gas pressures are within requirements. Manifold pressure is nonadjustable. If supply pressure proves correct and manifold, pressure is off by more than 0.3" WC replace the control. 2. Low supply voltage - should be 115 - 125 VAC 3. Ensure flame sensor is making good contact with the burner flame and flame is steady. 4. Ensure the flame sensor is clean, use ultra-fine steel wool to clean flame sensor. 5. Ensure the Hot Surface Igniter is positioned properly to provide consistent ignition. 6. Check for any cracks in igniter assembly ceramic insulators - replace igniter assembly if damaged. 7. Check resistance of igniter at room temperature (at the plug). Replace the igniter if resistance is not within 9-17 ohms at room temperature. 8. Ensure correct size of exhaust and air intake pipes were used per the instruction manual for vent length. Ensure maximum number of elbows or equivalent feet of both pipes was not exceeded.
11	<ol style="list-style-type: none"> 1. Turn the power "OFF" for 10-20 seconds then "ON" again to clear the fault code. 2. Replace the control if fault code persists.
12	<ol style="list-style-type: none"> 1. Turn the power "OFF" for 10-20 seconds then "ON" again to clear the fault code. 2. Replace the control if the fault code persist.
13	<ol style="list-style-type: none"> 1. Turn the power "OFF" for 10-20 seconds then "ON" again to clear the fault code. 2. Replace the control if the fault code persist.
14	<ol style="list-style-type: none"> 1. Turn the power "OFF" for 10-20 seconds then "ON" again to clear the fault code. 2. Replace the control if the fault code persist.
15	<ol style="list-style-type: none"> 1. Control has failed. If resetting the control does not clear the fault code, replace the control.

REPAIR PARTS ILLUSTRATION

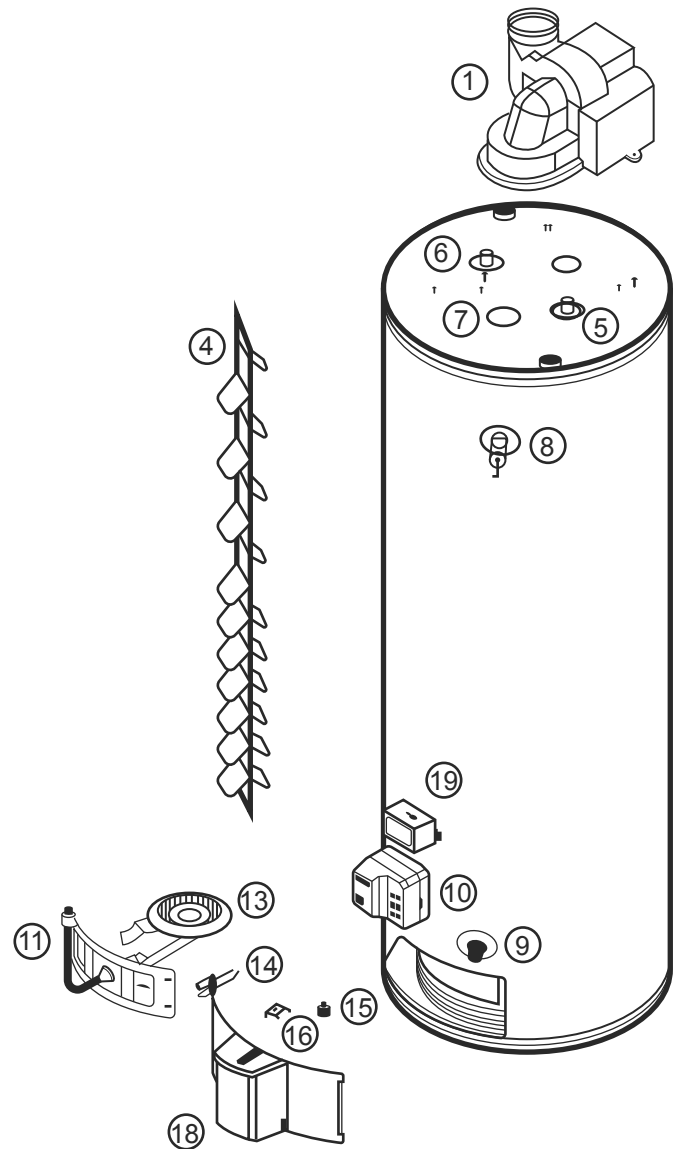
ITEM PARTS DESCRIPTION

1. BLOWER
2. TEMPERATURE SWITCH (NOT SHOWN)
3. PRESSURE SWITCH (NOT SHOWN)
4. BAFFLE
5. COLD WATER DIPTUBE
6. HEAT TRAMP (SOME MODELS)
7. ANODE ROD (NOT SHOWN)
8. TEMPERATURE & PRESSURE RELIEF VALVE
9. DRAIN VALVE
10. ELECTRONIC VALVE (PROPANE GAS VALVE WILL BE MARKED FOR LP GAS ONLY)
11. MANIFOLD
12. ORIFICE (NOT SHOWN)
13. MAIN BURNER
14. HOT SURFACE
15. FV SENSOR
16. VAPOR SENSOR BRACKET
17. HARNESS SENSOR FVR AND TOD (NOT SHOWN)
18. EXTERIOR DOOR
19. ELECTRICAL SWITCH

LEGEND A

Special anode rod (see page 30)

- Temperature & Pressure Relief Valve is required but may not be factory installed.
- It is imperative the replacement main burner, main burner orifice, manifold, hot surface and the electronic valve be ordered for the proper gas type. Natural gas electronic valve will be marked with a 3.5" pressure setting. Propane gas electronic valve will be marked "For L.P. Gas Only".



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————— WATER HEATERS

WHEN ORDERING REPAIR PARTS ALWAYS GIVE THE FOLLOWING INFORMATION: (1) MODEL AND SERIAL NUMBER, (2) TYPE OF GAS, (3) ITEM NUMBER, (4) PARTS DESCRIPTION.

THE PARTS MAY BE ORDERED THROUGH YOUR PLUMBER, A LOCAL SUPPLY COMPANY, OR DIRECT FROM THE FACTORY. PARTS WILL BE SHIPPED AND BILLED AT PREVAILING PRICES AT THE TIME OF SHIPMENT. REFER TO YOUR WARRANTY FOR FACTORY ADDRESS.

American Standard[®]

WATER HEATERS



IF YOU NEED SERVICE

1. Should you have any questions about your new water heater, or if it requires adjustment, repair, or routine maintenance, it is suggested that you first contact your installer, plumbing contractor or previously agreed upon service agency. In the event the firm has moved, or is unavailable, refer to the telephone directory, commercial listings or local utility for qualified service assistance.
2. Should your problem not be solved to your complete satisfaction, you should then contact the Manufacturer's Service Department at the following address:

American Standard Water Heaters
561 New York drive
Pomona, CA, 91768
USA
1-888-883-0788

When contacting the manufacturer, the following information will be requested:

- a. Model and serial number of the water heater as shown on the rating plate attached to the jacket of the heater.
- b. Address where the water heater is located and physical location.
- c. Name and address of installer or any service agency who performed service on the water heater.
- d. Date of original installation and dates any service work was performed.
- e. Details of the problems as you can best describe them.
- f. List of people, with dates, who have been contacted regarding your problem.

