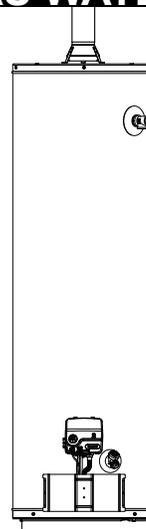


Installation Instructions and Use & Care Guide

RESIDENTIAL DIRECT VENT GAS WATER HEATERS

- SHIPPED SET FOR NATURAL GAS AND CONVERTIBLE TO L.P. (PROPANE) GAS. ALL PARTS INCLUDED.
- FOR POTABLE WATER HEATING ONLY. NOT SUITABLE FOR SPACE HEATING.
- FOR DIRECT VENT INSTALLATION IN A MANUFACTURED HOME (MOBILE HOME) ONLY.
- FOR USE ONLY WITH VENTING SYSTEMS SUPPLIED WITH THE WATER HEATER, WHETHER A NEW INSTALLATION OR A REPLACEMENT INSTALLATION.



For Your Safety

AN ODORANT IS ADDED TO THE GAS USED BY THIS WATER HEATER.



⚠ WARNING

Read and understand instruction manual and safety messages before installing, operating or servicing this water heater.

Failure to follow instructions and safety messages could result in death or serious injury.

Instruction manual must remain with water heater.

- | | |
|--|---|
| <ul style="list-style-type: none"> • Safety Instructions • Installation • Operation | <ul style="list-style-type: none"> • Care and Maintenance • Troubleshooting • Parts List |
|--|---|

INSTALLER:

- AFFIX THESE INSTRUCTIONS TO OR ADJACENT TO THE WATER HEATER.

OWNER:

- RETAIN THESE INSTRUCTIONS AND WARRANTY FOR FUTURE REFERENCE. RETAIN THE ORIGINAL RECEIPT AS PROOF OF PURCHASE.

WARNING: Gas leaks can not always be detected by smell.

Gas suppliers recommend that you use a gas detector approved by UL or CSA.

For more information, contact your gas supplier.

If a gas leak is detected, follow the "WHAT TO DO IF YOU SMELL GAS" instructions.



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

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

ALL TECHNICAL AND WARRANTY QUESTIONS: SHOULD BE DIRECTED TO THE LOCAL DEALER FROM WHOM THE WATER HEATER WAS PURCHASED. IF YOU ARE UNSUCCESSFUL, CONTACT THE COMPANY LISTED ON THE RATING PLATE ON THE WATER HEATER.

SAFE INSTALLATION, USE AND SERVICE

	This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.
	DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or injury.
	WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or injury.
	CAUTION indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.
	CAUTION used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, could result in property damage.

Your safety and the safety of others is extremely important in the installation, use and servicing of this water heater.

Many safety-related messages and instructions have been provided in this manual and on your own water heater to warn you and others of a potential injury hazard. Read and obey all safety messages and instructions throughout this manual. It is very important that the meaning of each safety message is understood by you and others who install, use or service this water heater.

All safety messages will generally tell you about the type of hazard, what can happen if you do not follow the safety message and how to avoid the risk of injury.

The California Safe Drinking Water and Toxic Enforcement Act requires the Governor of California to publish a list of substances known to the State of California to cause cancer, birth defects, or other reproductive harm, and requires businesses to warn of potential exposure to such substances.

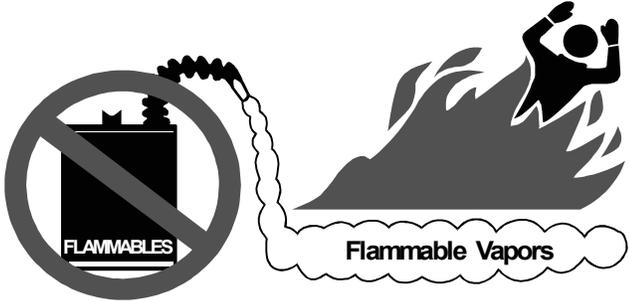
- **WARNING:** This product contains a chemical known to the State of California to cause cancer, birth defects, or other reproductive harm.
- This appliance can cause low-level exposure to some of the substances listed in the act.

This product is certified to comply with a maximum weighted average of 0.25% lead content as required in some areas.

IMPORTANT DEFINITIONS

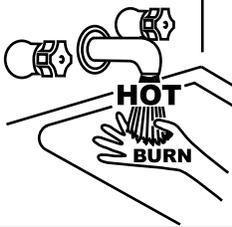
- **Qualified Technician:** A qualified technician must have ability equivalent to a licensed tradesman in the fields of plumbing, air supply, venting, and gas supply, including a thorough understanding of the requirements of the National Fuel Gas Code as it relates to the installation of gas fired water heaters. The qualified technician must also be familiar with the design features and use of flammable vapor ignition resistant water heaters, and have a thorough understanding of this instruction manual.
- **Service Agency:** A service agency also must have ability equivalent to a licensed tradesman in the fields of plumbing, air supply, venting and gas supply, including a thorough understanding of the requirements of the National Fuel Gas Code as it relates to the installation of gas fired water heaters. The service agency must also have a thorough understanding of this instruction manual, and be able to perform repairs strictly in accordance with the service guidelines provided by the manufacturer.
- **Gas Supplier:** The natural gas or propane utility or service who supplies gas for utilization by the gas burning appliances within this application. The gas supplier typically has responsibility for the inspection and code approval of gas piping up to and including the natural gas meter or propane storage tank of a building. Many gas suppliers also offer service and inspection of appliances within the building.

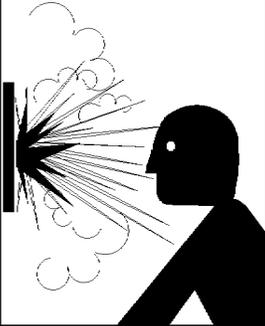
GENERAL SAFETY

 <p style="text-align: center;">Flammable Vapors</p>	<p style="text-align: center;">! WARNING</p> <p style="text-align: center;">FIRE AND EXPLOSION HAZARD Can result in serious injury or death</p> <p>! Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance. Storage of or use of gasoline or other flammable vapors or liquids in the vicinity of this or any other appliance can result in serious injury or death.</p>
<p>Read and follow water heater warnings and instructions.</p>	

	⚠ WARNING
	<p>Read and understand instruction manual and safety messages 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>

	⚠ WARNING
	<p>Fire Hazard</p> <p>For continued protection against risk of fire:</p> <ul style="list-style-type: none"> • Do not install water heater on carpeted floor. • Do not operate water heater if flood damaged.

	⚠ DANGER
	<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>

	⚠ WARNING
	<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.

⚠ WARNING	
Fire or Explosion Hazard	
<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. • Do not store or use gasoline or other flammable vapors and liquids in the vicinity of the water heater air intake. • Avoid all ignition sources if you smell Natural or LP gas. • Do not expose water heater control to excessive gas pressure. • Use only gas shown on rating plate unless the water heater has been properly converted. • Follow conversion instructions listed in manual when converting to opposite gas. • 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>
	

⚠ WARNING	
Breathing Hazard - Carbon Monoxide Gas	
	<ul style="list-style-type: none"> • Install vent system in accordance with codes. • Do not operate water heater if flood damaged. • High altitude orifice must be installed for operation above 5,400 feet (1,645.9 m) • Do not operate if soot is present. • Do not obstruct water heater air intake. • Do not place chemical vapor emitting products near water heater. • Gas and carbon monoxide detectors are available.
	<p>Breathing carbon monoxide can cause brain damage or death. Always read and understand instruction manual.</p>

CAUTION	
Improper installation and use may result in property damage.	
<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>	

⚠ DANGER	
<p>Do not use this water heater with any gas other than the one listed on the rating plate unless the water heater has been properly converted.</p> <p>Refer to the "Gas Conversion" section of this manual to convert from one gas to another. 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 utility company. Water heaters using bottled propane or liquefied petroleum gas (LPG) are different from natural gas models. A natural gas water heater will not function safely on bottled propane or liquefied petroleum gas (LPG) and a propane gas water heater will not function safely on natural gas.</p>	

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INTRODUCTION

Thank You for purchasing this water heater. Properly installed and maintained, it should give you years of trouble free service.

Abbreviations Found In This Instruction Manual:

- CSA - Canadian Standards Association
- ANSI - American National Standards Institute
- NFPA - National Fire Protection Association
- ASME - American Society of Mechanical Engineers

This gas-fired water heater is design certified by CSA INTERNATIONAL under American National Standard/CSA Standard for Gas Water Heaters (ANSI Z21.10.1 • CSA 4.1 - current edition). **IMPORTANT:** This water heater is shipped from the factory as a natural gas unit. However, it may be converted to use LP gas. See the Gas Conversion section for more information.

PREPARING FOR THE INSTALLATION

1. Read the *General Safety* section (pages 2 & 3) of this manual first and then the entire manual carefully. If you don't follow the safety rules, the water heater will not operate properly. It could cause DEATH, SERIOUS BODILY INJURY AND/OR PROPERTY DAMAGE.
This manual contains instructions for the installation, operation, and maintenance of the gas-fired water heater. It also contains warnings throughout the manual that you must read and be aware of. All warnings and all instructions are essential to the proper operation of the water heater and your safety. Since we cannot put everything on the first few pages, **READ THE ENTIRE MANUAL BEFORE ATTEMPTING TO INSTALL OR OPERATE THE WATER HEATER.**
2. Instructions to Manufactured Home Manufacturers:
The installation must conform with the Manufactured Home Construction and Safety Standards Title 24 CFR, Part 3280.

Instruction for replacement installation:

The installation must conform with these instructions and the local code authority having jurisdiction. In the absence of local codes, installations shall comply with the National Fuel Gas Code ANSI Z223.1/NFPA 54. This publication is available from the Canadian Standards Association, 8501 East Pleasant Valley Rd., Cleveland Ohio 44131, or The National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02269.

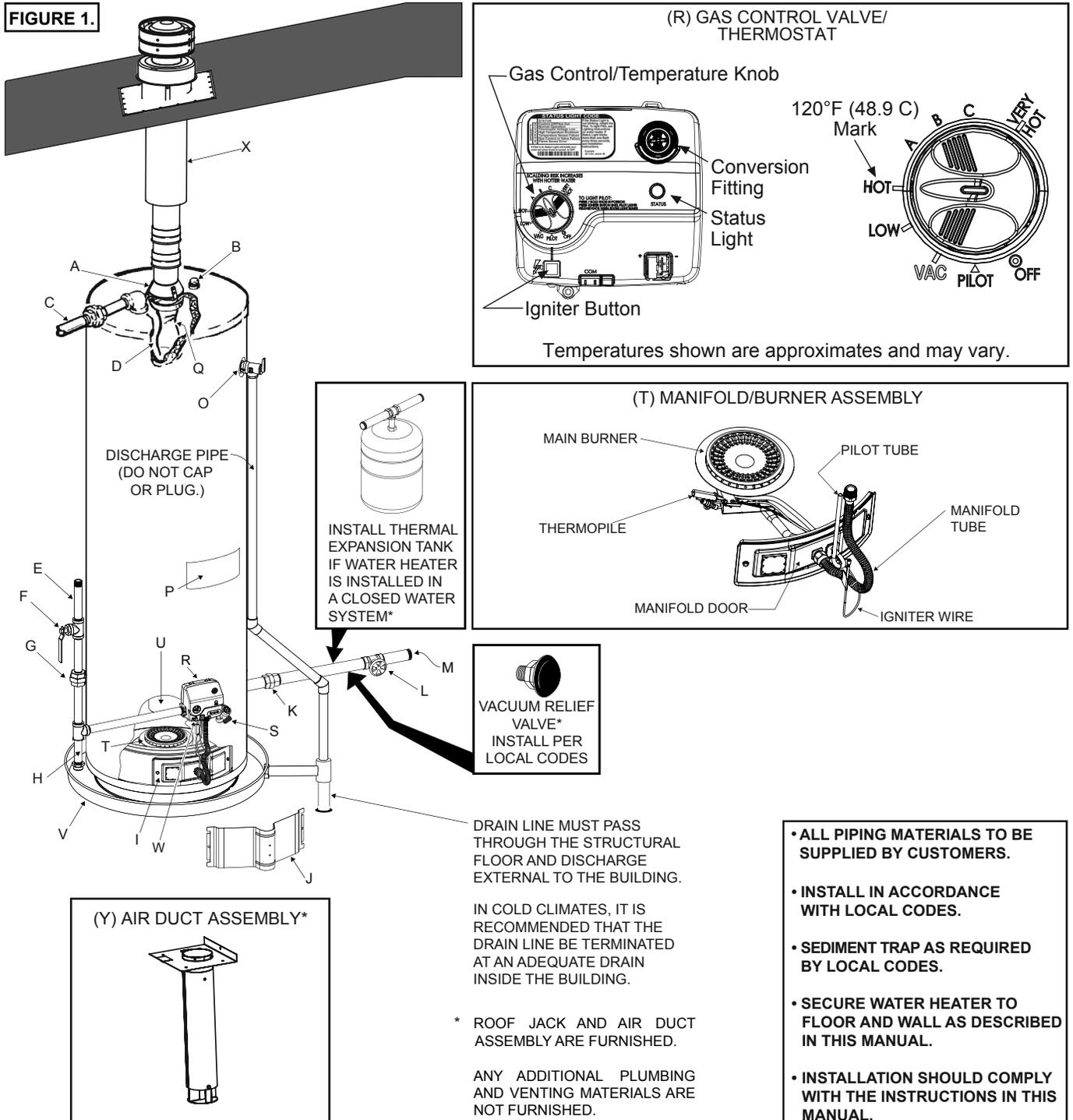
3. If after reading this manual you have any questions or do not understand any portion of the instructions, call the local gas utility or the manufacturer whose name appears on the rating plate.
4. Carefully plan the place where you are going to put the water heater. Correct combustion, vent action, and vent pipe installation are very important in preventing death from possible carbon monoxide poisoning and fires. See Figures 1 and 2.
Examine the location to ensure the water heater complies with the “Locating the New Water Heater” section in this manual.
5. For California installation this water heater must be braced, anchored, or strapped to avoid falling or moving during an earthquake. See instructions for correct installation procedures. Instructions may be obtained from California's Office of the State Architect, 1102 Q Street, Suite 5100, Sacramento, CA 95811. Instructions can also be downloaded to your computer at www.dsa.dgs.ca.gov/Pubs.
6. Massachusetts Code requires this water heater to be installed in accordance with Massachusetts 248-CMR 2.00: State Plumbing Code and 248-CMR 5.00.
7. Complies with SCAQMD rule #1121 and Districts having equivalent NOx requirements.
8. Service to the water heater should only be performed by a qualified technician. Examples of a qualified technician include: licensed plumbers, authorized gas company personnel, and authorized service personnel.

TYPICAL INSTALLATION

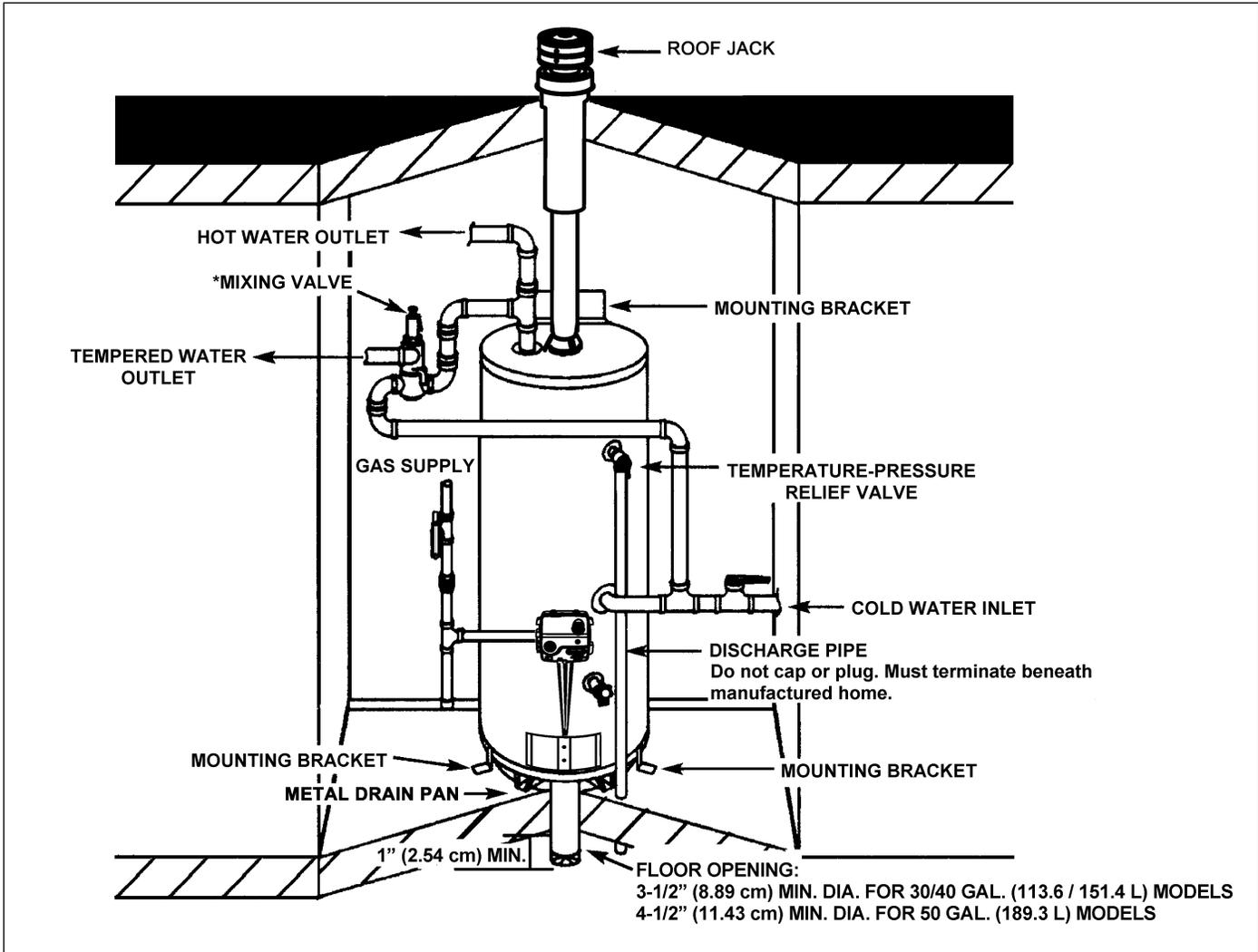
GET TO KNOW YOUR WATER HEATER - GAS MODELS

- | | | |
|-----------------------------|-------------------------------------|--|
| A Flue Reducer | J Outer Door | S Drain Valve |
| B Anode | K Union | T Manifold/Burner Assembly |
| C Hot Water Outlet | L Inlet Water Shut-off Valve | U Flue |
| D Insulation | M Cold Water Inlet | V Metal Drain Pan |
| E Gas Supply Piping | N Inlet Dip Tube (Not Shown) | W Piezo Igniter (bottom, Left-hand Side of Gas Control Valve/Thermostat) |
| F Manual Gas Shut-off Valve | O Temperature-Pressure Relief Valve | X Roof Jack * |
| G Ground Joint Union | P Rating Plate | Y Air Duct Assembly * |
| H Sediment Trap | Q Flue Baffle | |
| I Inner Door | R Gas Control Valve/Thermostat | |

FIGURE 1.



TYPICAL INSTALLATION



*** MIXING VALVE USAGE**

FIGURE 2.

This appliance has been design certified as complying with American National Standard/CSA Standard ANSI Z21.10.1 • CSA 4. 1 for water heaters and is considered suitable for:

Water (Potable) Heating: All models are considered suitable for water (potable) heating, but not suitable for space heating applications.

	<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>
--	---

HOTTER WATER CAN SCALD:

Water heaters are intended to produce hot water. Water heated to a temperature which will satisfy clothes washing, dish washing, and other sanitizing needs can scald and permanently injure you upon contact. Some people are more likely to be permanently injured by hot water than others. These include the elderly, children, the infirm, or physically/mentally handicapped. If anyone using hot water in your home fits into one of these groups or if there is a local code or state law requiring a certain temperature water at the hot water tap, then you must take special precautions. In addition to using the lowest possible temperature setting that satisfies your hot water needs, a means such as a *mixing valve should be used at the hot water taps used by these people or at the water heater. Mixing valves are available at plumbing supply or hardware stores. Consult a Qualified Installer or Service Agency. Follow mixing valve manufacturer's instructions for installation of the valves. Before changing the factory setting on the thermostat, read the "Temperature Regulation" section in this manual. See Figure 34.

LOCATING THE NEW WATER HEATER

FACTS TO CONSIDER ABOUT THE LOCATION

Whether replacing an old water heater or putting the water heater in a new location, the following critical points must be observed.

This manufactured home gas-fired water heater is for use in a manufactured home. You should carefully choose an indoor location for the new water heater, because the placement is a very important consideration for the safety of your occupants in the building and for the most economical use of the appliance. **This water heater is for use only in a manufactured home and not intended for outdoor installation.**

This water heater has been designed and certified as a direct vent (sealed combustion) unit and no draft diverter is to be used.

Minimum clearances between the water heater and combustible surfaces are stated on the label adjacent to the gas control valve/thermostat. The water heater is certified for installation on a combustible floor. Minimum vent clearances: 6" (15.2 cm). Provide 24" (61 cm) front clearance for servicing and adequate clearance between the jacket top and ceiling for servicing the flue area.

The combustion and ventilation air flow must not be obstructed.

Combustion air shall not be supplied from occupied spaces. Instead, combustion air must be supplied from outside the manufactured home by way of the furnished air intake duct assembly. The air intake duct assembly is 3" (7.62 cm) in diameter for 30 and 40 Gallon models or 4" (10.2 cm) in diameter for 50 Gallon models.

A 3-1/2" (8.89 cm) diameter floor opening beneath the water heater is required to accommodate the air intake duct assembly for 30 and 40 Gallon models. A 4-1/2" (11.43 cm) diameter floor opening is required beneath the water heater for 50 Gallon models. The weight of the water heater itself seals the water heater to the air intake duct assembly.

When a manufactured home is skirted, an air intake opening with a minimum free area of 32 square inches (206.45 cm²) must be provided in the skirt. If the opening is covered by louvers or screen, the total free area must be 32 square inches (206.45 cm²). Other gas fired appliance in the home will require additional free air openings; consult these manufacturers for correct sizing. See Figure 3.

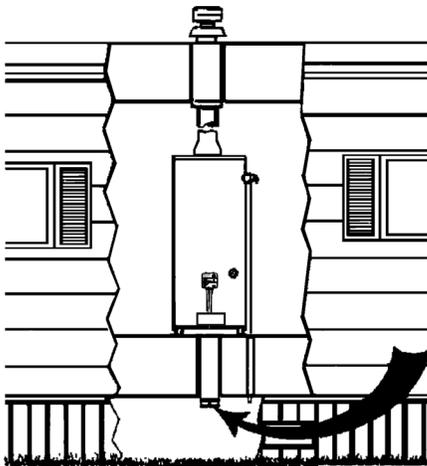


FIGURE 3.

If the manufactured home is installed over a basement or crawlspace, combustion air must be supplied from outside the manufactured home. The combustion air intake piping can be 3" (76 mm) PVC for

30 and 40 gallon models and 4" (102 mm) PVC for 50 Gallon models. The air intake piping cannot exceed the lengths shown in Table 1 (page 12), including vertical and horizontal runs, or have more than 3 elbows. All horizontal runs require adequate support at 3-1/2 foot (106.68 cm) intervals. See Figure 4.

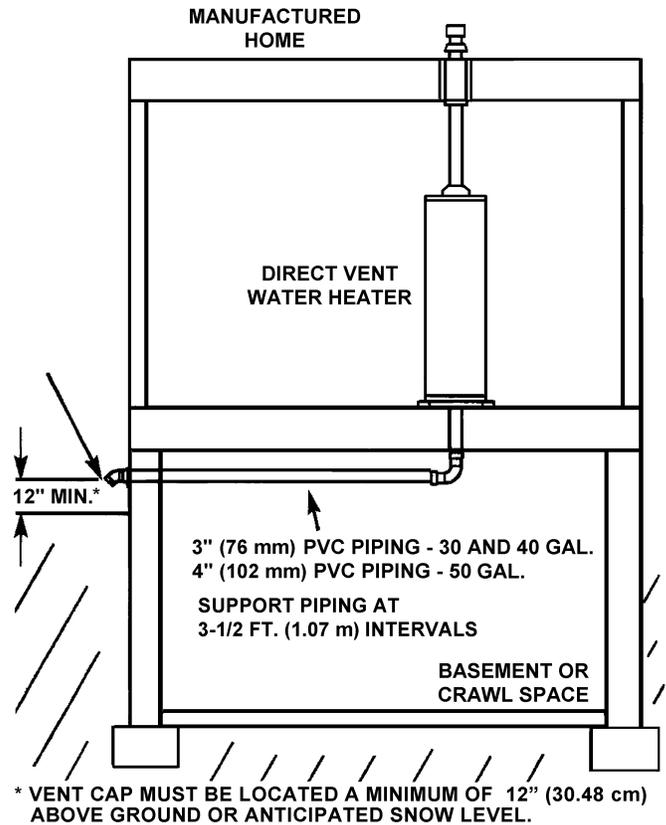


FIGURE 4.

The water heater should be secured to the floor and to the wall of the enclosure with the mounting brackets provided. For bracket location, refer to *Securing Water Heater to Floor and Wall*.

CAUTION
Property Damage Hazard
<ul style="list-style-type: none"> • All water heaters eventually leak • Do not install without adequate drainage.

Installation of the water heater must be accomplished in such a manner that if the tank or any connections should leak, the flow will not cause damage to the structure. For this reason, it is not advisable to install the water heater in an attic or upper floor. When such locations cannot be avoided, a suitable metal drain pan should be installed under the water heater. Metal drain pans are available at your local hardware store. Such a drain pan must have a minimum length and width of at least 2 inches (51 mm) greater than the water heater dimensions and must be piped to an adequate drain. The pan must not restrict combustion air flow. When a drain pan is required, see installation instructions on page 9.

Water heater life depends upon water quality, water pressure and

the environment in which the water heater is installed. Water heaters are sometimes installed in locations where leakage may result in property damage, even with the use of a metal drain pan piped to a drain. However, unanticipated damage can be reduced or prevented by a leak detector or water shut-off device used in conjunction with a piped drain pan. These devices are available from some plumbing supply wholesalers and retailers, and detect and react to leakage in various ways:

- Sensors mounted in the drain pan that trigger an alarm or turn off the incoming water to the water heater when leakage is detected.
- Sensors mounted in the drain pan that turn off the water supply to the entire home when water is detected in the drain pan.
- Water supply shut-off devices that activate based on the water pressure differential between the cold water and hot water pipes connected to the water heater.
- Devices that will turn off the gas supply to a gas water heater while at the same time shutting off its water supply.

⚠ DANGER

Fire or Explosion Hazard

- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.



Flammable Vapors

INSTALLATIONS IN AREAS WHERE FLAMMABLE LIQUIDS (VAPORS) ARE LIKELY TO BE PRESENT OR STORED (GARAGES, STORAGE AND UTILITY AREAS, ETC.): Flammable liquids (such as gasoline, solvents, propane [LP or butane, etc.] and other substances such as adhesives, etc.) emit flammable vapors which can be ignited by a gas water heater's pilot light or main burner. The resulting flashback and fire can cause death or serious burns to anyone in the area, as well as property damage. Gasoline and other flammable substances should never be stored or used in the same room or area containing a gas water heater or other open flame or spark producing appliance. Additionally, do not store or use gasoline or other flammable vapors and liquids in the vicinity of the water heater air intake. NOTE: Flammable vapors may be drawn by air currents from other areas of the structure to the appliance.

Also, the water heater must be located and/or protected so it is not subject to physical damage by a moving vehicle.

⚠ WARNING

Fire Hazard



For continued protection against risk of fire:

- Do not install water heater on carpeted floor.
- Do not operate water heater if flood damaged.

This water heater must not be installed directly on carpeting. Carpeting must be protected by metal or wood panel beneath the appliance extending beyond the full width and depth of the appliance

by at least 3 inches (76.2 mm) in any direction, or 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 a fire hazard.

IMPORTANT: Keep combustibles such as boxes, magazines, clothes, etc., away from the water heater area.

⚠ WARNING

Fire or Explosion Hazard

Read instruction manual before installing, using or servicing water heater.



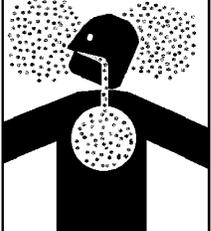
- Improper use may result in fire or explosion.
- Maintain required clearances to combustibles.



A gas water heater cannot operate properly without the correct amount of air for combustion. Provide ventilation and combustion air by means of an air intake duct assembly as stated in "Water Heater Installation". Never obstruct the flow of ventilation air. If you have any doubts or questions at all, call your gas supplier. Failure to provide the proper amount of combustion air can result in a fire or explosion and cause death, serious bodily injury, or property damage.

⚠ WARNING

Breathing Hazard - Carbon Monoxide Gas



- Install water heater in accordance with the instruction manual and NFPA 54.
- 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.

If this water heater will be used in beauty shops, barber shops, cleaning establishments, or self-service laundries with dry cleaning equipment, it is imperative that the water heater or water heaters be installed so that combustion and ventilation air be taken from outside these areas.

Propellants of aerosol sprays and volatile compounds, (cleaners, chlorine based chemicals, refrigerants, etc.) in addition to being highly flammable in many cases, will also change to corrosive hydrochloric acid when exposed to the combustion products of the water heater. The results can be hazardous and also cause product failure.

INSULATION BLANKETS

⚠ WARNING

Breathing Hazard - Carbon Monoxide Gas



- Do not obstruct water heater air intake with insulating blanket.
- Gas and carbon monoxide detectors are available.
- Install water heater in accordance with the instruction manual.

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

Insulation blankets are available to the general public for external use on gas water heaters but are not necessary with these products. The purpose of an insulation blanket is to reduce the standby heat loss encountered with storage tank heaters. Your water heater meets or exceeds the National Appliance Energy Conservation Act standards with respect to insulation and standby loss requirements, making an insulation blanket unnecessary.

Should you choose to apply an insulation blanket to this heater, you should follow these instructions (For identification of components mentioned below, see Figure 1). Failure to follow these instructions can restrict the air flow required for proper combustion, potentially resulting in fire, asphyxiation, serious personal injury or death.

- Do not apply insulation to the top of the water heater, as this will interfere with safe operation of the draft hood.
- Do not cover the outer door, the gas control valve/thermostat or the temperature & pressure relief valve.
- Do not allow insulation to come within 2" (50.8 mm) of the floor to prevent blockage of combustion air flow to the burner.
- Do not cover the instruction manual. Keep it on the side of the water heater or nearby for future reference.
- Do obtain new warning and instruction labels from the manufacturer for placement on the blanket directly over the existing labels.
- Do inspect the insulation blanket frequently to make certain it does not sag, thereby obstructing combustion air flow.

INSTALLING THE NEW WATER HEATER

WATER HEATER INSTALLATION

- To locate the position of the 3-1/2" (8.9 cm) or 4-1/2" (11.4 cm) hole to be cut in the floor, see Figures 5 and 6.

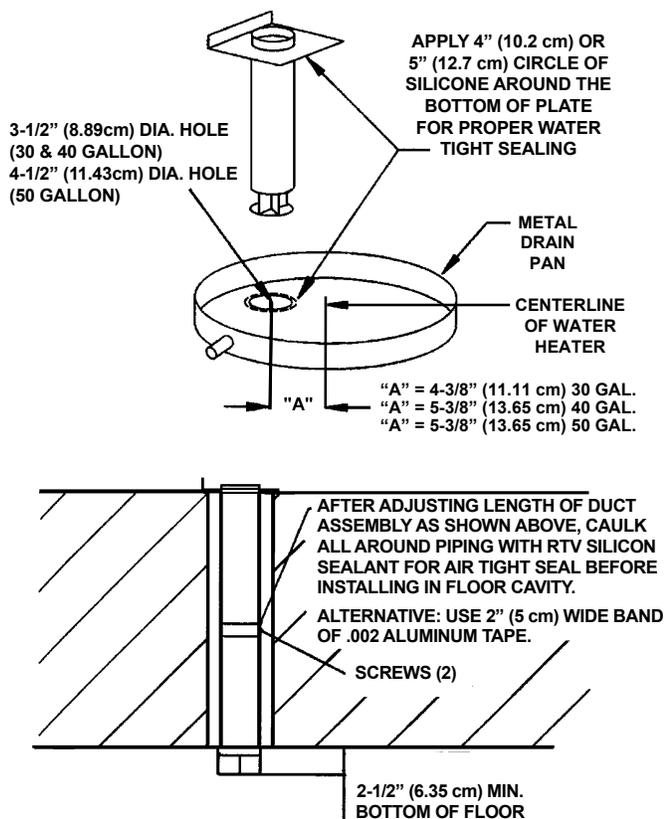


FIGURE 5.

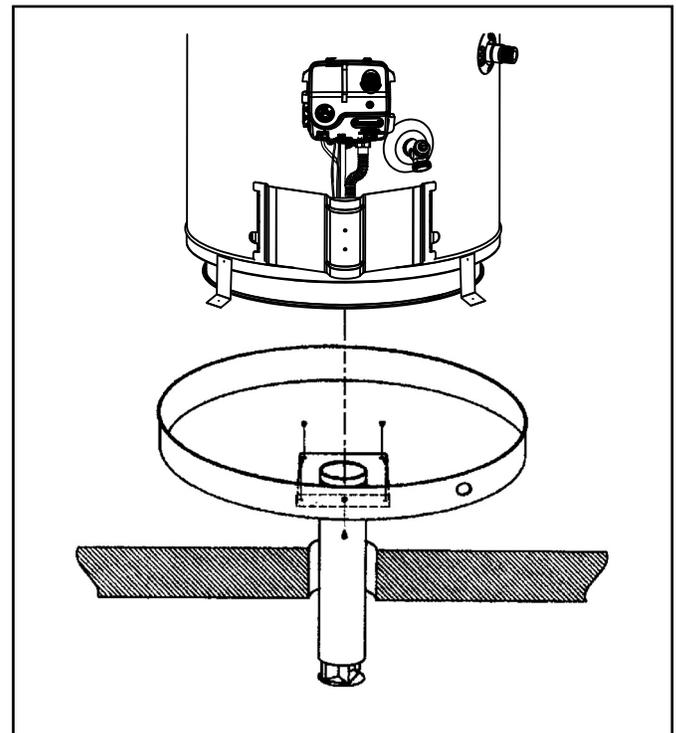


FIGURE 6.

- If you have found that the water heater is being installed in an area which, if the water heater was to leak, would cause damage and have elected to install a metal drain pan, refer to Figures 7, 8 and 9 on page 10. If you are not installing a drain pan, go directly to the next step.

NOTE: Clearances from combustible or non combustible surface to jacket will change template dimensions.

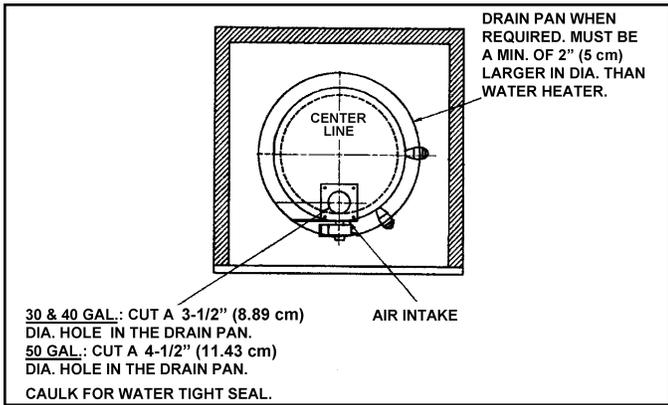
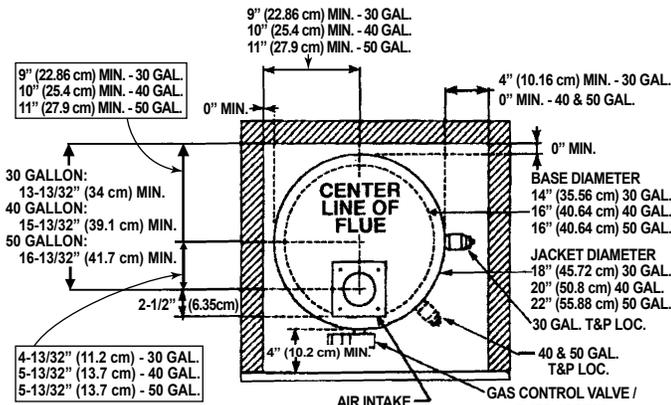
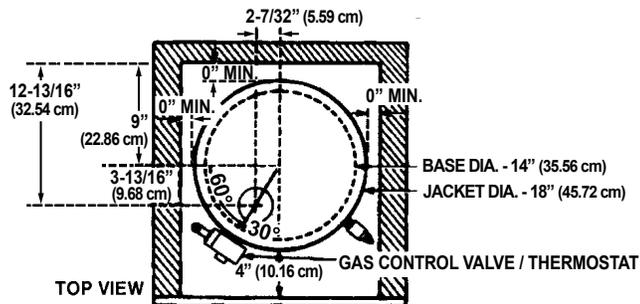


FIGURE 7.



DIRECTION IN WHICH WATER HEATER CAN BE PLACED WHEN INCREASED SIDE CLEARANCE IS AVAILABLE

FIGURE 8.



DIRECTION IN WHICH WATER HEATER MUST BE PLACED WHEN MINIMUM CLEARANCES ARE USED (30 GALLON ONLY)

FIGURE 9.

3. Insert the duct assembly as shown in Figure 10 with lip facing forward, and using only nails, secure the duct assembly to the floor.

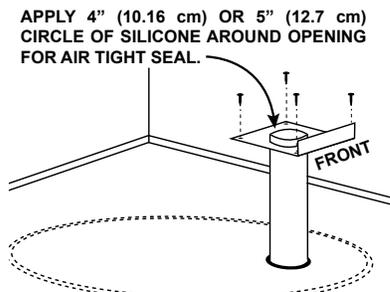


FIGURE 10.

4. Set the water heater in place against the lip of the duct assembly as shown in Figure 11.

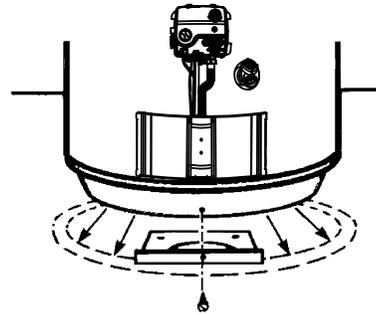


FIGURE 11.

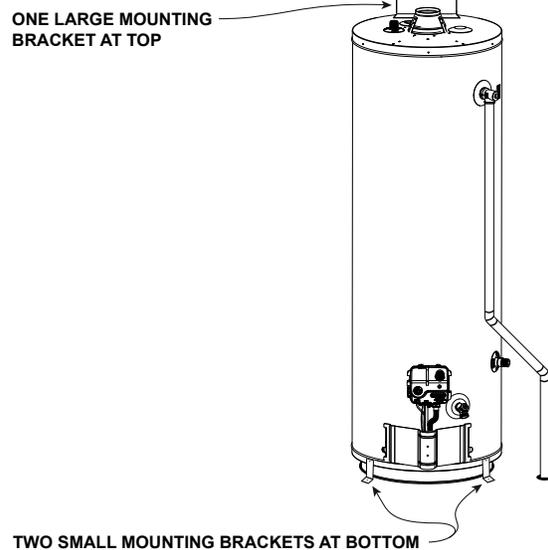
5. Secure the water heater to the duct assembly using the screw provided.

NOTE: See pages 12 and 13 for installing an air intake through an outside wall when the manufactured home is located over a basement or crawl space.

SECURING WATER HEATER TO FLOOR AND WALL

The water heater must be secured to the floor and to the wall of the enclosure with the three mounting brackets and screws packaged in the carton with the water heater. The two small brackets stamped #0110064 are used to attach the water heater to the floor and the one large bracket #0110063 is used to secure the top of the water heater to the wall.

Because of installation variances, these brackets can be located at any points around the circumference of the jacket. When the bracket locations are determined, use a 1/8 inch SAE drill bit to set a pattern. Drill only through the outer jacket of the water heater. Then using the screws provided, secure the bracket to the water heater, floor and wall. See Figure 12.



SECURE WATER HEATER TO FLOOR AND WALL. BRACKETS AND SCREWS ARE PROVIDED.

FIGURE 12.

ROOF JACK INSTALLATION

ROOF JACK KIT MODELS VENT KIT- 12 INCH (9002964005), VENT KIT - 32 INCH (9002965005), VENT KIT - 60 INCH (9002966005) AND VENT KIT - 95 INCH (9002967005)

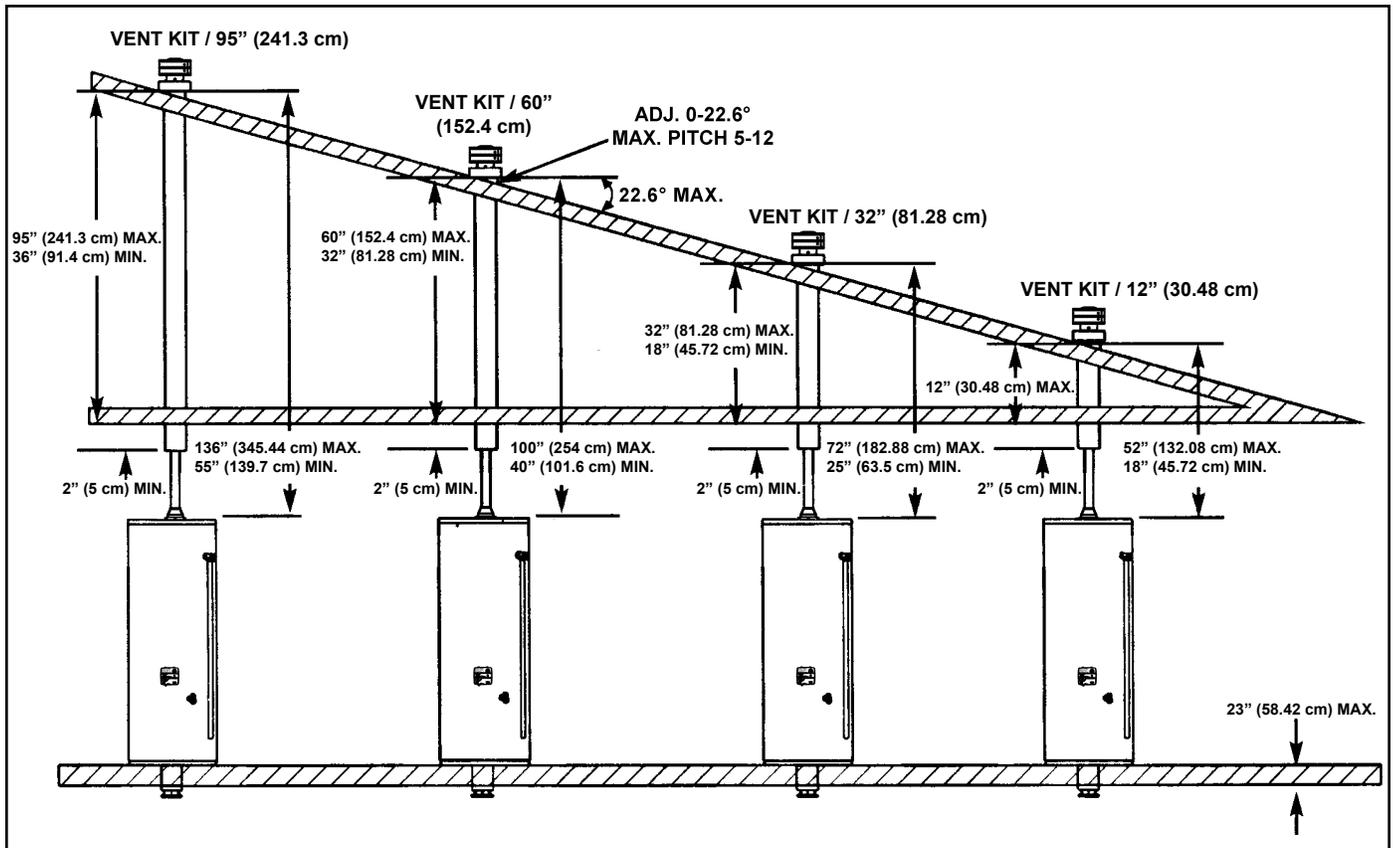


FIGURE 13.

1. Cut a 5-1/2" (14 cm) diameter hole through the roof and ceiling directly in line with the flue connection on top of the water heater. For a sloped roof, the roof hole may have to be enlarged to allow the roof jack to be installed vertically.
2. Telescope down the flue pipe in the roof jack assembly to a length that will project at least 6" (15.24 cm) below the finished ceiling before installing the roof jack assembly.
4. Ease the roof jack assembly through the roof and ceiling openings. The roof jack flashing tilts up to 22.6° degrees for use on a sloping roof.
5. Use sealant or caulk on the roof to seal under flashing of the roof jack assembly. Use roof nails or screws on wood construction or sheet metal screws on metal roofs (nails and screws not provided). See Figure 15.

NOTE: Flue pipe joints have silicone seals that must remain in place. A soapy water solution sprayed around the seal area will enable the flue pipe and outer pipe below to telescope more freely.

3. Telescope down the outer pipe of the roof jack assembly to a length that will project at least 2" (5 cm) below the finished ceiling before installing the roof jack assembly. See Figure 14.

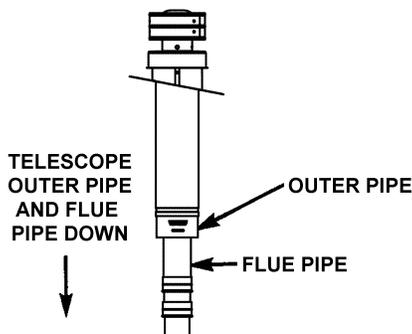


FIGURE 14.

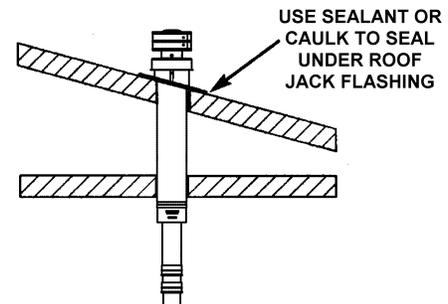


FIGURE 15.

NOTE: An optional Roof jack Extension Pipe (9002588005) is required when the roof pitch is 5-1/2" (14 cm) or greater, or where local codes require the roof jack cap (outlet) to terminate above the peak of the roof.

IMPORTANT: DO NOT common vent this water heater with any other appliance.

Continued on the next page.

- Extend the flue pipe downward until it is close to the flue reducer. See Figure 16.

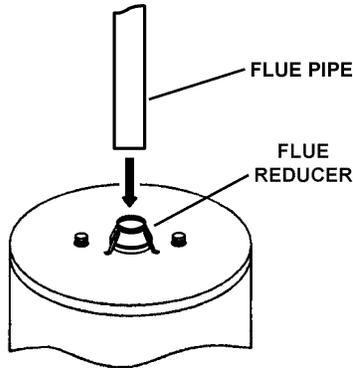


FIGURE 16.

- Fit the bottom opening of the pipe over the top opening of the flue reducer. See Figure 17. Ensure that there is no gap and that the seal is complete.
- Secure the flue pipe to the reducer with three (3) evenly-spaced sheet metal screws (Figure 17). **Do not leave any open holes in the flue reducer or flue pipe.**

NOTE: All joints for vent piping between roof jack and water heater are sealed from the manufacturer. No additional sealing of vent pipe is necessary.

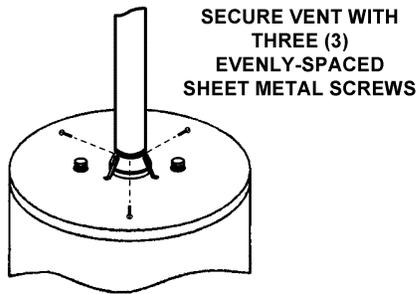


FIGURE 17.

MANUFACTURED HOME INSTALLED OVER BASEMENT OR CRAWL SPACE - AIR INTAKE THROUGH AN OUTSIDE WALL

ALL 30 AND 40 GALLON MODELS

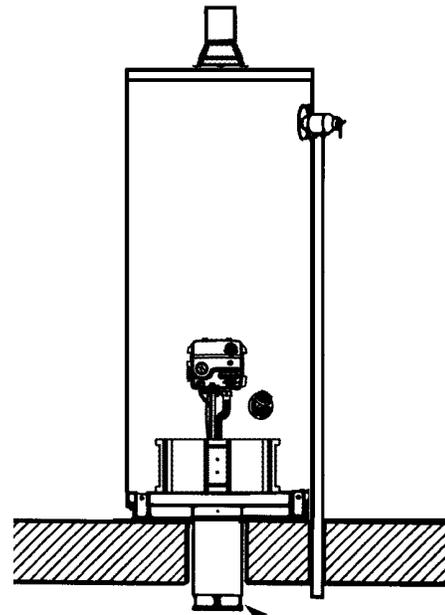
3" (76 mm) PVC Schedule 40 intake air vent piping:
Optional Kit No. 9002986005 contains a 3" (76 mm) PVC Schedule 40-45° vent cap with screen and two 3" (76 mm) wall collars.

ALL 50 GALLON MODELS

4" (102 mm) PVC Schedule 40 intake air vent piping:
Optional Kit no. 9002987005 contains a 4" (102 mm) PVC Schedule 40-45° vent cap with screen and two 4" (102 mm) wall collars.

ALL MODELS

- PVC, ABS or CPVC Schedule 40 piping and fittings are acceptable materials for the air intake vent system.
- The intake air vent system must terminate horizontally to the outdoors.
- Remove the screws which attach the wind baffle to the existing metal air intake vent pipe underneath the home. Discard the wind baffle and screws. See Figure 18.



IF ATTACHING INLET PIPING, REMOVE AND DISCARD SCREWS AND WIND BAFFLE

FIGURE 18.

- Attach a 3" (76 mm) or 4" (102 mm) PVC street elbow to the metal air intake vent using 3 sheet metal screws. Continue PVC piping to outside wall and terminate with vent cap and screen. See Figure 19 and Table 1.

3" (76 mm) size - 30 and 40 gallon models.
4" (102 mm) size - 50 gallon models.
See pages 13 and 14 for cementing instructions

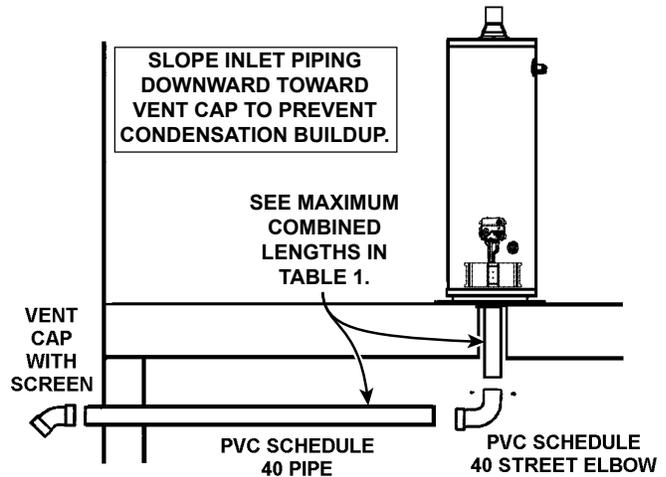


FIGURE 19.

NOTE: Vent cap must be located a minimum of 12" (30.48 cm) above the ground or anticipated snow level.

TABLE 1: AIR INTAKE VENT PIPING REQUIREMENTS

Water Heater	Gas	Vent Dia.	Do Not Exceed:
30 Gallon	NAT	3" (76mm)	17 ft. (5.18 m) length; 3 elbows
30 Gallon	LP	3" (76mm)	12 ft. (3.66 m) length; 3 elbows
40 Gallon	NAT	3" (76mm)	30 ft. (9.1 m) length; 3 elbows
40 Gallon	LP	3" (76mm)	20 ft. (6.1 m) length; 3 elbows
50 Gallon	NAT	4" (102mm)	30 ft. (9.1 m) length; 3 elbows
50 Gallon	LP	4" (102mm)	30 ft. (9.1 m) length; 3 elbows

5. Vertical and horizontal runs must be securely supported at 3-1/2 foot (1.06 m) intervals. See Figure 20.

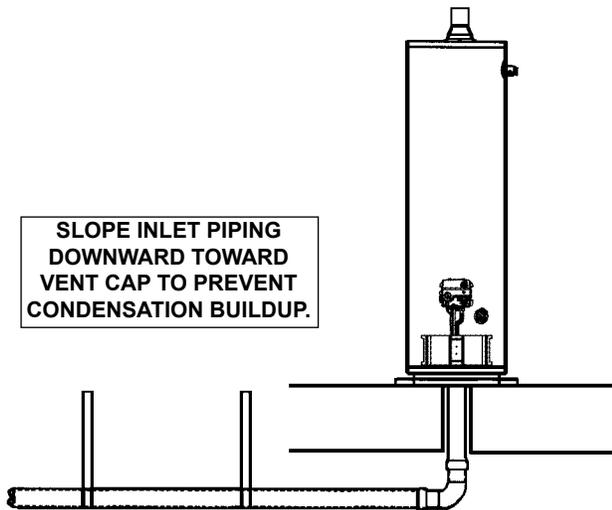


FIGURE 20.

6. The intake air vent piping can be installed with no more than 3 elbows. See Figure 21.

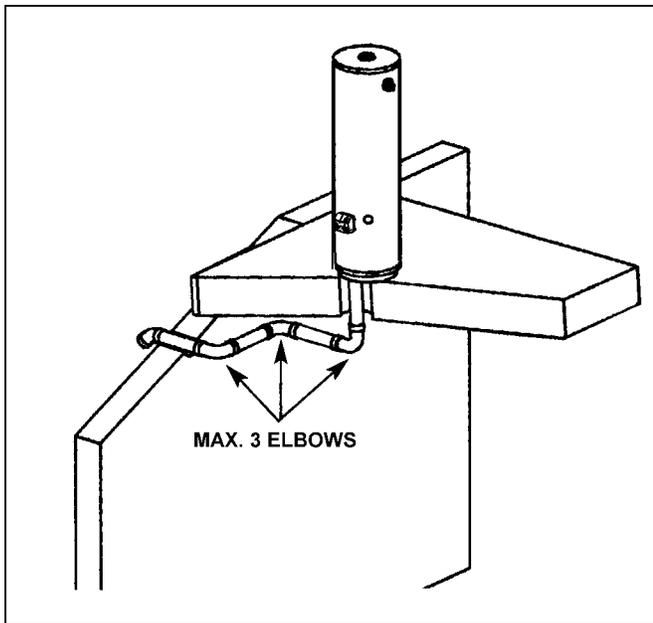


FIGURE 21.

CUTTING OPENING THROUGH AN OUTSIDE WALL AND COLLAR INSTALLATION

Determine the location for the opening in the wall. For a 30 or 40 gallon model, cut a 3-3/4" (9.5 cm) hole through the outside wall. For a 50 Gallon model, cut a 4-3/4" (12 cm) hole through the outside wall.

The 3" (76 mm) or 4" (102 mm) PVC, ABS or CPVC Schedule 40 vent pipe can be run from the water heater through the wall or from the wall to the water heater, whichever is most convenient. The vent pipe must extend a minimum of 1-1/2" (3.81 cm) through the exterior wall. Note that the inside collar must be slipped over the vent piping before locating the pipe through the wall. Before securing the inside and outside collars to the wall, use a silicone sealer between pipe and opening to ensure a water and air tight seal. See Figure 22.

INSTALLATION SHOWING USE OF PVC, ABS OR CPVC PIPE

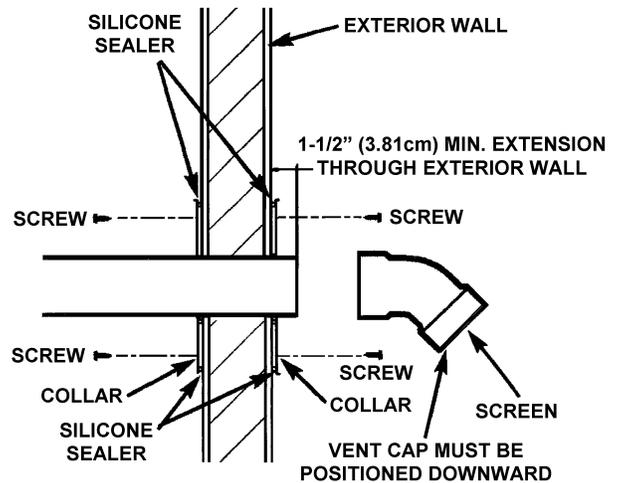


FIGURE 22.

NOTE: Wall collars are for aesthetic purposes and are not required for the heater to operate.

CEMENTING PVC, ABS OR CPVC PIPE AND FITTINGS

Read and observe all safety information printed on primer, cleaner, and cement containers.

Primer, cleaner, and cements are extremely flammable. They are harmful or fatal if swallowed. The vapors are harmful. They may irritate eyes and skin and can be absorbed through the skin.

Always store primer, cleaner, and cements in cool, dry, well ventilated places. Keep containers closed. Use them in well ventilated areas. Wear impervious clothing while handling. Do not smoke, eat, or drink while handling. Wash thoroughly after handling and before eating. Wear eye protection when handling. If swallowed, drink water, do not induce vomiting, and call a physician or poison control center immediately. If inhaled, get fresh air and seek medical attention if ill feelings persist. In case of eye and skin contact, immediately flush with plenty of water for 15 minutes and seek medical attention if irritation persists. **KEEP OUT OF REACH OF CHILDREN.**

All primers, cleaners, and cements must meet all local codes and applicable standards of the American Society For Testing Materials Standards.

Before using primers, cleaners and cements, stir or shake, making sure contents are liquid. Do not use if found to be lumpy or jelly-like.

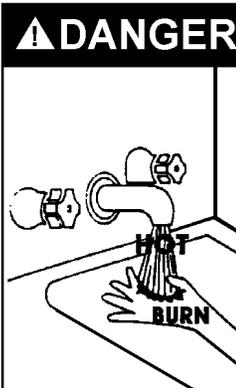
1. Cut pipe ends squarely removing all burrs and dirt.
2. Dry fit pipe and fittings to be connected for proper fit.
3. Clean pipe and fitting with primer/cleaner.
4. Apply a thin coat of cement to fitting, avoiding puddling inside.
5. Apply a liberal coat of cement to pipe, leaving no voids.
6. **QUICKLY** assemble parts while cement is fluid! If you wait too long, recoat pipes.
7. Push pipe completely into socket of fitting, turning as it goes until it bottoms.
8. Hold pipe and fitting together for 30 seconds. Then carefully clean off excess with a cloth. Allow connections a sufficient time to cure before disturbing.
9. Remember that vent pipes must be adequately and securely supported.

TABLE 2: APPROX. SETTING TIME FOR 2-1/2" (63.5mm) TO 4" (102mm) PIPE JOINTS

	MOVEMENT OF JOINT	COMPLETE SET
90°F (32.2°C) TO 150°F (65.6°C)	3/4HR.	8 HRS.
50°F (10°C) TO 90°F (32.2°C)	1 HR.	15 HRS.
0°F (-17.77°C) TO 50°F (10°C)	1-1/3 HR.	18 HRS.

WATER PIPING

⚠
DANGER



Water temperature over 125°F (52°C) can cause severe burns instantly resulting in severe injury or death.

Children, the elderly, and the physically or mentally disabled are at highest risk for scald injury.

Feel water before bathing or showering.

Temperature limiting valves are available.

Read instruction manual for safe temperature setting.

HOTTER WATER CAN SCALD:

Water heaters are intended to produce hot water. Water heated to a temperature which will satisfy space heating, clothes washing, dish washing, cleaning and other sanitizing needs can scald and permanently injure you upon contact. Some people are more likely to be permanently injured by hot water than others. These include the elderly, children, the infirm, or physically/mentally handicapped. If anyone using hot water in your home fits into one of these groups or if there is a local code or state law requiring a certain temperature water at the hot water tap, then you must take special precautions. In addition to using the lowest possible temperature setting that satisfies your hot water needs, a means such as a mixing valve should be used at the hot water taps used by these people or at the water heater. See Figure 2. Valves for reducing point of use temperature by mixing cold and hot water are also available. Consult a Qualified Installer or Service Agency. Follow manufacturer's instructions for installation of the valves. Before changing the factory setting on the thermostat, read the "Temperature Regulation" section in this manual.

⚠
WARNING

Toxic Chemical Hazard

- Do not connect to non-potable water system.

This water heater shall not be connected to any heating systems or component(s) used with a non-potable water heating appliance.

Toxic chemicals, such as those used for boiler treatment shall not be introduced into this system.

As water is heated, it expands (thermal expansion). In a closed system, the volume of water will grow. As the volume of water grows, there will be a corresponding increase in water pressure due to thermal expansion. Thermal expansion can cause premature tank failure (leakage). This type of failure is not covered under the limited warranty. Thermal expansion can also cause intermittent temperature-pressure relief valve operation: water discharged from the valve due

to excessive pressure build up. The temperature-pressure relief valve is not intended for the constant relief of thermal expansion. This condition is not covered under the limited warranty.

A properly-sized thermal expansion tank should be installed on all closed systems to control the harmful effects of thermal expansion. Contact a plumbing service agency or your retail supplier regarding the installation of a thermal expansion tank.

Also, the water supply pressure should not exceed 80 PSI (551.58 kPa). If this occurs, a pressure reducing valve with a bypass should be installed in the cold water inlet line. This should be placed on the supply to the entire house in order to maintain equal hot and cold water pressures.

NOTE: To protect against untimely corrosion of hot and cold water fittings, it is strongly recommended that dielectric unions or couplings be installed on this water heater when connected to copper pipe.

CAUTION

Property Damage Hazard

- Avoid water heater damage.
- Install thermal expansion tank if necessary.
- Do not apply heat to cold water inlet.
- Contact qualified installer or service agency.

Figure 23 shows the typical attachment of the water piping to the water heater. The water heater is equipped with 3/4 inch NPT water connections.

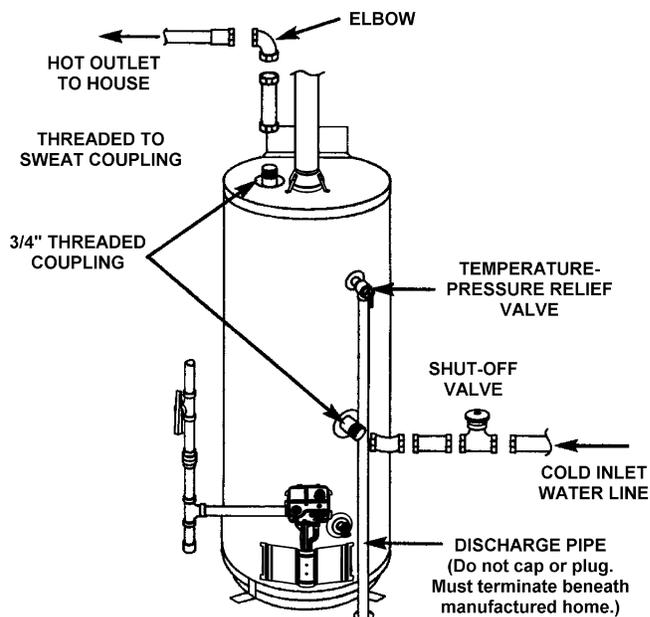


FIGURE 23.

T & P VALVE AND PIPE INSULATION

1. Locate the temperature and pressure relief valve on the water heater (also known as a T&P relief valve). See Figure 24.
2. Locate the slit running the length of the T&P relief valve insulation.
3. Spread the slit open and fit the insulation over the T&P relief valve. See Figure 24. Apply gentle pressure to the insulation to ensure that it is fully seated on the T&P Relief Valve. Once

seated, secure the insulation with duct tape, electrical tape, or equivalent. **IMPORTANT:** The insulation and tape must not block the discharge opening or hinder access to the manual relief lever (Figure 24). Ensure a discharge pipe is installed into the T&P valve discharge opening per the instructions in this manual.

4. Locate the hot water (outlet) & cold water (inlet) pipes to the water heater.
5. Locate the slit running the length of a section of pipe insulation.
6. Spread the slit open and slip the insulation over the cold water (inlet) pipe. Apply gentle pressure along the length of the insulation to ensure that it is fully seated around the pipe. Also, ensure that the base of the insulation is flush with the water heater. Once seated, secure the insulation with duct tape, electrical tape, or equivalent.
7. Repeat steps 5 and 6 for the hot water (outlet) pipe.
8. Add additional sections of pipe insulation as needed.

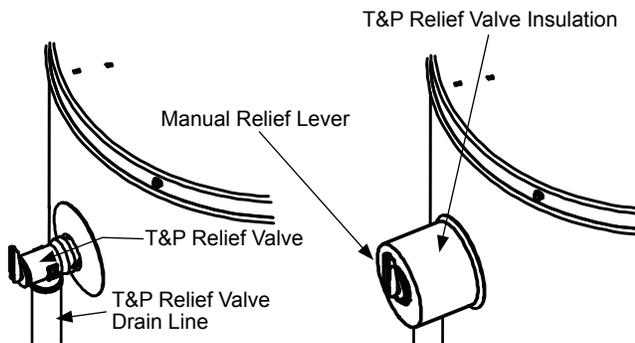


FIGURE 24.

WATER PIPING PRESSURE TEST

<p>⚠ WARNING</p> <p>Air Pressure Hazard</p>
<ul style="list-style-type: none"> • If water piping system is to be air pressure tested, the water heater must be disconnected from the water piping system. • Failure to disconnect the water heater during air pressure testing of the water system could result in DEATH, SERIOUS BODILY INJURY, OR PROPERTY DAMAGE.

This section is only for the manufacturer installing the water heater when the installation is to comply with H.U.D. standards.

When testing the waterways, H.U.D. standards state:

“Water Distribution System: All water piping in the water distribution system shall be subjected to a pressure test. The test shall be made by subjecting the system to air or water at 100 psi (689.48 kPa) for 15 minutes without loss of pressure. **When air pressure is used, the water heater shall not be connected during the test.**”

NOTE: If water piping system is to be air pressure tested, the water heater must be disconnected from the water piping system. Failure to disconnect the water heater during air pressure testing of water piping system could result in **IN DEATH, SERIOUS BODILY INJURY, OR PROPERTY DAMAGE.**

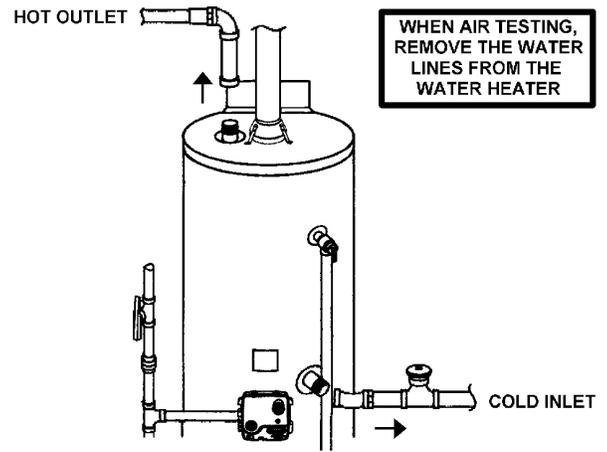


FIGURE 25.

TEMPERATURE-PRESSURE RELIEF VALVE

	<p>⚠ WARNING</p> <p>Explosion Hazard</p>
	<ul style="list-style-type: none"> • Temperature-pressure relief valve must comply with ANSI Z21.22-CSA 4.4 and ASME code. • Properly sized temperature-pressure relief valve must be installed in opening provided. • Do not plug, block, or cap the discharge line. • Failure to follow this warning can result in excessive tank pressure, serious injury or death.

This heater is provided with a properly certified combination temperature - pressure relief valve by the manufacturer.

The valve is certified by a nationally recognized testing laboratory that maintains periodic inspection of production of listed equipment of materials as meeting the requirements for Relief Valves and Automatic Gas Shut-off Devices for Hot Water Supply Systems, ANSI Z21.22 • CSA 4.4, and the code requirements of ASME.

If replaced, the valve must meet the requirements of local codes, but not less than a combination temperature and pressure relief valve certified as indicated in the above paragraph.

The valve must be marked with a maximum set pressure not to exceed the marked hydrostatic working pressure of the water heater (150 psi = 1,035 kPa) and a discharge capacity not less than the water heater input rate as shown on the model rating plate.

For safe operation of the water heater, the relief valve must not be removed from its designated opening nor plugged.

The temperature-pressure relief valve must be installed directly into the fitting of the water heater designed for the relief valve. Position the valve downward and provide tubing so that any discharge will exit only at any distance below the structural floor. Be certain that no contact is made with any live electrical part. The discharge opening must not be blocked or reduced in size under any circumstances. Excessive length, over 30 feet (9.14 m), or use of more than four elbows can cause restriction and reduce the discharge capacity of the valve. See Figure 26.

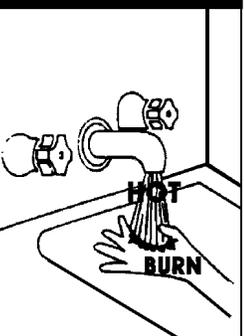
No valve or other obstruction is to be placed between the relief valve and the tank. To prevent bodily injury, hazard to life, or property

damage, the relief valve must be allowed to discharge water in quantities should circumstances demand. If the discharge pipe is not connected to a drain or other suitable means, the water flow may cause property damage.

CAUTION
Water Damage Hazard
<ul style="list-style-type: none"> • Temperature-pressure relief valve discharge pipe must terminate at adequate drain.

The Discharge Pipe:

- Shall not be smaller in size than the outlet pipe size of the valve, or have any reducing couplings or other restrictions.
- Shall not be plugged or blocked.
- Shall be of material listed for hot water distribution.
- Shall be installed so as to allow complete drainage of both the temperature-pressure relief valve, and the discharge pipe.
- Shall pass through the structural floor and terminate external to the building. In cold climates, it is recommended that the discharge pipe be terminated at an adequate drain inside the building.
- Shall not have any valve between the relief valve and tank.

⚠ DANGER	<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>
	

The temperature-pressure relief valve must be manually operated at least once a year. Caution should be taken to ensure that (1) no one is in front of or around the outlet of the temperature-pressure relief valve discharge line, and (2) the water manually discharged will not cause any bodily injury or property damage because the water may be extremely hot.

If after manually operating the valve, it fails to completely reset and continues to release water, immediately close the cold water inlet to the water heater, follow the draining instructions, and replace the temperature-pressure relief valve with a new one.

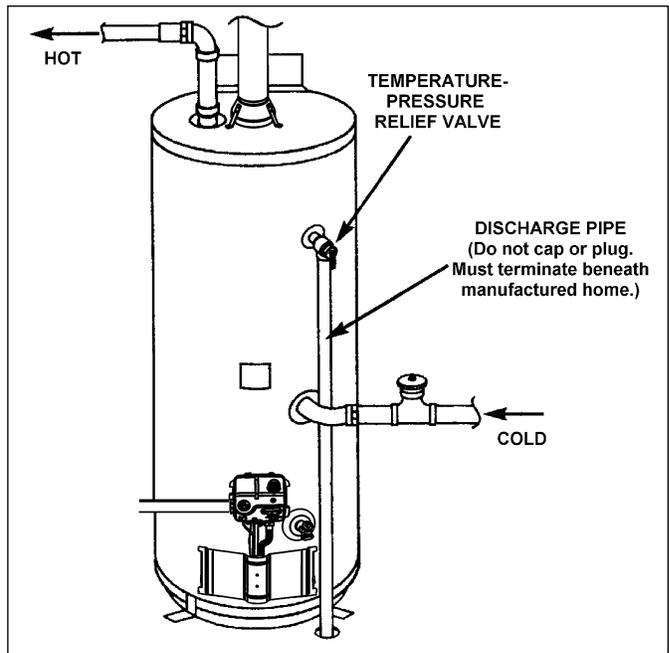


FIGURE 26.

FILLING THE WATER HEATER

CAUTION
Property Damage Hazard
<ul style="list-style-type: none"> • Avoid water heater damage. • Fill tank with water before operating.

Never use this water heater unless it is completely full of water. To prevent damage to the tank, the tank must be filled with water. Water must flow from the hot water faucet before turning "ON" gas to the water heater.

To fill the water heater with water:

1. Close the water heater drain valve by turning the handle to the right (clockwise). The drain valve is on the lower front of the water heater.
2. Open the cold water supply valve to the water heater. **NOTE: The cold water supply valve must be left open when the water heater is in use.**
3. To ensure complete filling of the tank, allow air to exit by opening the nearest hot water faucet. Allow water to run until a constant flow is obtained. This will let air out of the water heater and the piping.
4. Check all water piping and connections for leaks. Repair as needed.

⚠ WARNING



Explosion Hazard

- Use a new CSA approved gas supply line.
- Install a shut-off valve.
- Do not connect a natural gas water heater to an L.P. gas supply.
- Do not connect an 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

IMPORTANT: Read the rating 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 rating plate located near the gas control valve/thermostat. 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 odorant may fade over an extended period of time. Do not depend upon this odorant as an indication of leaking gas.

GAS PIPING

The gas piping 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)-current edition. Manufactured home manufacturers must conform with "The Manufactured Home Construction and Safety Standard, Title 24 CFR, Part 3280".

Tables 3 and 4 on page 19 provide a sizing reference for commonly used gas pipe materials. Consult the "National Fuel Gas Code" for the recommended gas pipe size of other materials.

NOTE: Use pipe joint compound or Teflon® tape marked as being resistant to the action of petroleum [Propane (L.P.)] gases. Refer to Figure 27 as you review the following items:

1. Install a readily accessible manual shut-off valve in the gas supply line as recommended by the local utility. Know the location of this valve and how to turn off the gas to this unit.
2. Install a sediment trap (if not already incorporated as part of the water heater) as shown. The sediment trap must be no less than three inches long for the accumulation of dirt, foreign material, and water droplets. See also *Sediment Traps*.
3. Install a ground joint union between the gas control valve/thermostat and the manual shut-off valve. This is to allow easy removal of the gas control valve/thermostat.
4. Turn the gas supply on and check for leaks. Test all connections by brushing on an approved noncorrosive leak-detection solution. Bubbles will show a leak. Correct any leak found.

Teflon® is a registered trademark of E. I. du Pont de Nemours and Company.

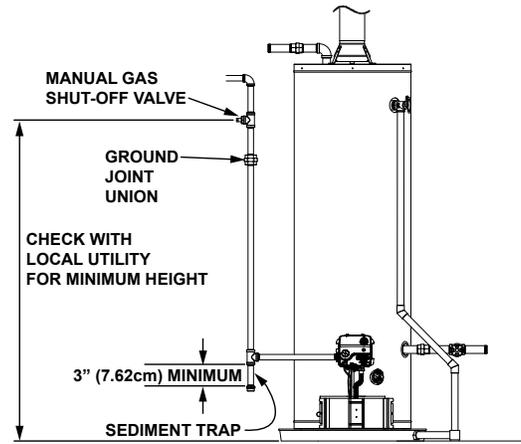


FIGURE 27.

GAS PRESSURE

⚠ WARNING



Explosion Hazard

- Gas leaks can not always be detected by smell.
- Gas suppliers recommend that you use a gas detector approved by UL or CSA.
- For more information, contact your gas supplier.
- If a gas leak is detected, follow the "What to do if you smell gas" instructions on the cover of this manual.

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

GAS PRESSURE TESTING

IMPORTANT: This water heater and its gas connection must be leak tested before placing the appliance in operation.

- If the code requires the gas lines to be tested at a pressure exceeding 14" W.C. (3.5 kPa), the water heater and its manual shut-off valve must be disconnected from the gas supply piping system and the line capped.
- If the gas lines are to be tested at a pressure less than 14" W.C. (3.5 kPa), the water heater must be isolated from the gas supply piping system by closing its manual shut-off valve.

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

NOTE: Air may be present in the gas lines and could prevent the pilot from lighting on initial start-up. The gas lines should be purged of air by a qualified technician after installation of the gas piping system. While purging the gas piping system of air, ensure that the fuel is not spilled in the area of the water heater installation, or any source of ignition. If the fuel is spilled while purging the piping system of air follow the "WHAT TO DO IF YOU SMELL GAS" instructions on the cover of this manual.

LP GAS ONLY

Liquefied petroleum gas is over 50% heavier than air and in the occurrence of 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 an L.P. gas water heater, smell all around the appliance at floor level. If you smell gas, follow the instructions as given in the warning on the front page.

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

⚠ WARNING

Explosion Hazard
<p>Have a qualified technician make sure that the L.P. gas operating pressure does not exceed 13" water column (3.237 kilopascals).</p> <p>Failure to do so can result in death, explosion, or fire.</p>

Sediment Traps

	⚠ WARNING
	Fire and Explosion Hazard
	<ul style="list-style-type: none"> • Contaminants in gas lines can cause fire or explosion. • Clean all gas piping before installation. • Install drip leg (sediment trap) in accordance with NFPA 54.

A sediment trap shall be installed as close to the inlet of the water heater as practical at the time of water heater installation. The sediment trap shall be either a tee fitting with a capped nipple in the bottom outlet or other device recognized as an effective sediment trap. If a tee fitting is used, it shall be installed in conformance with one of the methods of installation shown in Figures 28, 29, and 30.

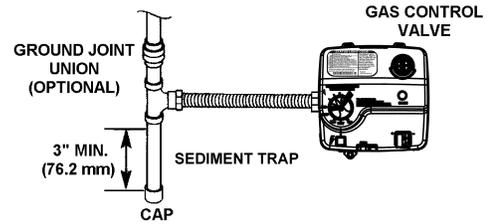


FIGURE 28. GAS PIPING WITH FLEXIBLE CONNECTOR

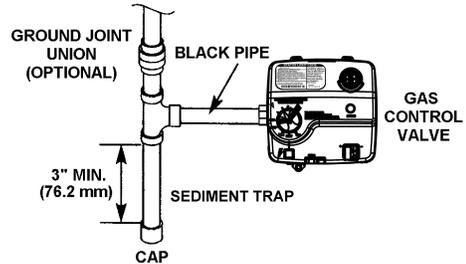


FIGURE 29. GAS PIPING WITH ALL BLACK IRON PIPE TO GAS CONTROL VALVE/THERMOSTAT

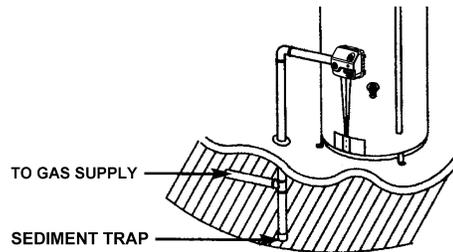


FIGURE 30. ALTERNATIVE SEDIMENT TRAP LOCATION

Contaminants in the gas lines may cause improper operation of the gas control valve/thermostat that may result in fire or explosion. Before attaching the gas line be sure that all gas pipe is clean on the inside. To trap any dirt or foreign material in the gas supply line, a sediment trap (sometimes called a drip leg) must be incorporated in the piping. The sediment trap must be readily accessible. Install in accordance with the "Gas Piping" section. Refer to the current edition of the National Fuel Gas Code, ANSI Z223.1/NFPA 54.

Table 3
Natural Gas Pipe Capacity Table (Cu. Ft./Hr.)
 Capacity of gas pipe of different diameters and lengths in cu. ft. per hr. with pressure drop of 0.3 in. and specific gravity of 0.60 (natural gas).

Nominal Iron Pipe Size, in.	Length of Pipe, Feet													
	10	20	30	40	50	60	70	80	90	100	125	150	175	200
1/2	132	92	73	63	56	50	46	43	40	38	34	31	28	26
3/4	278	190	152	130	115	105	96	90	84	79	72	64	59	55
1	520	350	285	245	215	195	180	170	160	150	130	120	110	100
1-1/4	1050	730	590	500	440	400	370	350	320	305	275	250	225	210
1-1/2	1600	1100	890	760	670	610	560	530	490	460	410	380	350	320

After the length of pipe has been determined, select the pipe size which will provide the minimum cubic feet per hour required for the gas input rating of the water heater. By formula:

$$\text{Cu. Ft. Per Hr. Required} = \frac{\text{Gas Input of Water Heater (BTU/HR)}}{\text{Heating Value of Gas (BTU/FT}^3\text{)}}$$

The gas input of the water heater is marked on the water heater data plate. The heating value of the gas (BTU/FT³) may be determined by consulting the local natural gas utility.

Table 4
LP Gas Capacity Table
 Maximum capacity of pipe in thousands of BTU per hour of undiluted liquefied petroleum gases (at 11 inches water column pressure). Based on a pressure drop of 0.5 inch water column.

Nominal Iron Pipe Size, in.	Length of Pipe, Feet												
	10	20	30	40	50	60	70	80	90	100	125	150	
1/2	275	189	152	129	114	103	96	89	83	78	69	63	
3/4	576	393	315	267	237	217	196	185	173	162	146	132	
1	1071	732	590	504	448	409	378	346	322	307	275	252	
1-1/4	2205	1496	1212	1039	913	834	771	724	677	630	567	511	

Example: Input BTU requirement of the water heater 100,000 BTUH.
 Total pipe length, 80 feet = 3/4" IPS required.

Additional tables are available in the latest edition of the "National Fuel Gas Code", ANSI Z223.1.

INSTALLATION REQUIREMENTS FOR THE COMMONWEALTH OF MASSACHUSETTS

For all side wall terminated, horizontally vented power vent, direct vent, and power direct vent gas fueled water heaters installed in every dwelling, building or structure used in whole or in part for residential purposes, including those owned or operated by the Commonwealth and where the side wall exhaust vent termination is less than seven (7) feet above finished grade in the area of the venting, including but not limited to decks and porches, the following requirements shall be satisfied:

INSTALLATION OF CARBON MONOXIDE DETECTORS At the time of installation of the side wall horizontal vented gas fueled equipment, the installing plumber or gasfitter shall observe that a hard wired carbon monoxide detector with an alarm and battery back-up is installed on the floor level where the gas equipment is to be installed. In addition, the installing plumber or gasfitter shall observe that a battery operated or hard wired carbon monoxide detector with an alarm is installed on each additional level of the dwelling, building or structure served by the sidewall horizontal vented gas fueled equipment. It shall be the responsibility of the property owner to secure the services of qualified licensed professionals for the installation of hard wired carbon monoxide detectors.

In the event that the side wall horizontally vented gas fueled equipment is installed in a crawl space or an attic, the hard wired carbon monoxide detector with alarm and battery back-up may be installed on the next adjacent floor level.

In the event that the requirements of this subdivision can not be met at the time of completion of installation, the owner shall have a period of thirty (30) days to comply with the above requirements provided that during said thirty (30) day period, a battery operated carbon monoxide detector with an alarm shall be installed.

APPROVED CARBON MONOXIDE DETECTORS Each carbon monoxide detector as required in accordance with the above provisions shall comply with NFPA 720 and be ANSI/UL 2034 listed and CSA certified.

SIGNAGE A metal or plastic identification plate shall be permanently mounted to the exterior of the building at a minimum height of eight (8) feet above grade directly in line with the exhaust vent terminal for the horizontally vented gas fueled heating appliance or equipment. The sign shall read, in print size no less than one-half (1/2) inch in size, **“GAS VENT DIRECTLY BELOW. KEEP CLEAR OF ALL OBSTRUCTIONS.”**

INSPECTION The state or local gas inspector of the side wall horizontally vented gas fueled equipment shall not approve the installation unless, upon inspection, the inspector observes carbon monoxide detectors and signage installed in accordance with the provisions of 248 CMR 5.08(2)(a) 1 through 4.

EXEMPTIONS: The following equipment is exempt from 248 CMR 5.08(2)(a)1 through 4:

1. The equipment listed in Chapter 10 entitled “Equipment Not Required To Be Vented” in the most current edition of NFPA 54 as adopted by the Board; and
2. Product Approved side wall horizontally vented gas fueled equipment installed in a room or structure separate from the dwelling, building, or structure used in whole or in part for residential purposes.

MANUFACTURER REQUIREMENTS - GAS EQUIPMENT VENTING SYSTEM PROVIDED When the manufacturer of Product Approved side wall horizontally vented gas equipment provides a venting system design or venting system components with the equipment, the instructions provided by the manufacturer for installation of the equipment and the venting system shall include:

1. Detailed instructions for the installation of the venting system design or the venting system components; and
2. A complete parts list for the venting system design or venting system.

MANUFACTURER REQUIREMENTS - GAS EQUIPMENT VENTING SYSTEM NOT PROVIDED When the manufacturer of a Product Approved side wall horizontally vented gas fueled equipment does not provide the parts for venting the flue gases, but identifies “special venting systems,” the following requirements shall be satisfied by the manufacturer:

1. The referenced “special venting system” instructions shall be included with the appliance or equipment installation instructions; and
2. The “special venting systems” shall be Product Approved by the Board, and the instructions for that system shall include a parts list and detailed installation instructions.

A copy of all installation instructions for all Product Approved side wall horizontally vented gas fueled equipment, all venting instructions, all parts lists for venting instructions, and/or all venting design instructions shall remain with the appliance or equipment at the completion of the installation.

INSTALLATION CHECKLIST

This gas water heater was manufactured to voluntary safety standards to reduce the likelihood of a flammable vapor ignition incident. The new technology used in meeting these standards makes this product more sensitive to installation errors. Please review the following checklist and make any required installation upgrades or changes.

Questions? Contact Residential Technical Assistance.

WATER HEATER LOCATION

Water heater location is important and can affect system performance. Please check the following:

- Installation area free of corrosive elements and flammable materials.
- Centrally located with the water piping system (For new installations). Located as close to the gas piping and vent pipe system as possible.
- Located indoors and in a vertical position. Protected from freezing temperatures.
- Proper clearances from combustible 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 or external to the building.
- Sufficient room to service the water heater. See the "Facts to Consider About the Location" section of this manual.
- Water heater not located near an air moving device.
- Water heater securely anchored.

GAS SUPPLY AND PIPING

- Gas supply is the same type as listed on the water heater rating plate.
- Gas line equipped with shut-off valve, union, and sediment trap.

- 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.

COMBUSTION AIR SUPPLY / VENT PIPE SYSTEM

- Sufficient fresh air supply provided from outdoors as described in this manual, free of corrosive elements and flammable vapors.
- All venting installed according to applicable codes and manufacturers' instructions.
- Vent pipe and fittings of approved material; approved roof jack.
- 12" (30.48 cm) Min. above grade/snow level.

WATER SYSTEM PIPING

- Temperature and pressure relief valve properly installed with a discharge line. (Discharge line must be run to an adequate drain or external to the building and protected from freezing.)
- All piping properly installed and free of leaks.
- Heater completely filled with water.
- Closed system pressure build-up precautions installed (i.e., thermal expansion tank).
- Mixing valve installed per manufacturer's instructions.

GAS CONVERSION

This water heater is originally shipped for use with **natural gas** but can be converted to use LP (Propane) gas by following the instructions outlined below. To convert this water heater, you must change both the conversion fitting in the gas control valve/thermostat **and** the manifold/burner assembly (supplied). Both the gas valve and the manifold/burner assembly must be correct for the type of gas used. **IMPORTANT:** For your safety, the following procedures should be performed by a qualified technician because they involve disconnection of gas piping and leak testing.

1. Contact your gas company to determine the type of gas supplied to your home.
2. Check the setting of the conversion fitting in the gas control valve/thermostat. See Figure 32.
3. Check the label on the manifold/burner assembly door.
4. Make sure both the conversion fitting (Figure 32) and the manifold burner assembly (see door label) are for the type of gas supplied to your home.
5. If you are converting this water heater from Natural to LP or from LP to Natural, follow these steps:
 - A. Remove manifold/burner assembly. (See instructions on page 22.)
 - B. Install the correct conversion manifold/burner assembly. (See instructions on page 22.)
 - C. Convert the gas control valve/thermostat to the same type of gas. (See instructions on page 22.)
 - D. Place conversion sticker next to rating plate. (This sticker shows the type of gas that your water heater has been converted to use.)

⚠ WARNING

- For your safety, the following procedures should be performed by a qualified technician as it involves disconnection of gas piping and leak testing.
- Do not connect a natural gas water heater to an L.P. gas supply.
- Do not connect an L.P. gas water heater to a natural gas supply.

A. Remove the Manifold/Burner Assembly

1. Turn off the gas supply to the water heater at the manual gas shut-off valve. This valve is typically located beside the water heater. Note the position of the shut-off valve in the open/on position, then proceed to turn it off.
2. On the lower front of the water heater, locate the gas control valve/thermostat.
3. Turn the gas control/temperature knob to the "OFF" position. With the unit shut-off, allow sufficient time for the water heater to cool before performing any maintenance.
4. Remove the outer door.
5. Remove the two screws securing the installed manifold door assembly to the combustion chamber (Figure 31).
6. Disconnect the following from the gas control valve/thermostat: pilot tube, igniter wire, and manifold tube. See Figure 31.
7. Using needle nose pliers to grip the connectors, disconnect the white and red thermopile wires from the gas control valve/thermostat (Figure 31).
8. Grasp the manifold tube and push down slightly to free the manifold tube and pilot tube.
9. Carefully remove the manifold/burner assembly from the burner compartment. NOTE: Be sure not to damage internal parts.

B. Convert the Gas Control Valve/Thermostat

1. Remove the cap (shown in Figure 32).
2. Remove the conversion fitting by turning it counter-clockwise with a flathead screwdriver.
3. Thread the opposite end of the conversion fitting into the opening by turning it clockwise, then tighten it with a flathead screwdriver.

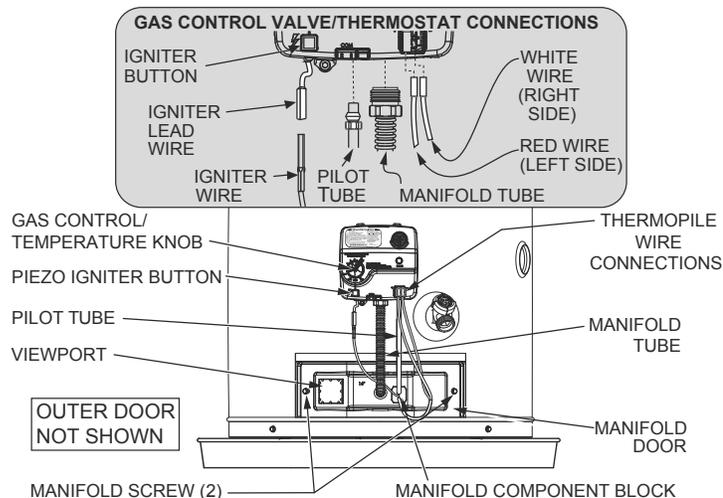


FIGURE 31.

- a. LP GAS: If you are converting the unit to use LP gas (propane), verify that "LP" is marked on the exposed end of the fitting. "LP" must face outward (toward you.) See Figure 32. If "NAT" faces outward, repeat step 2.
 - b. NATURAL GAS: If you are converting the unit to use natural gas, verify that "NAT" is marked on the exposed end of the fitting. "NAT" must face outward (toward you.) See Figure 32. If "LP" faces outward, repeat step 2.
4. Replace the cap.

C. Install the Conversion Manifold/Burner Assembly

1. Check the door gasket for damage or imbedded debris prior to installation.
2. Inspect the view port for damage and replace as required.
3. Insert the conversion manifold/burner assembly into the burner compartment, making sure that the tip of the manifold tube engages in the slot of the bracket inside the combustion chamber.
4. Inspect the door gasket and make sure there is no fiberglass insulation between the gasket and the combustion chamber.
5. Replace the two screws that secure the manifold/burner assembly door to the combustion chamber, then tighten them securely. There should be no space between the gasket part of the manifold door and the combustion chamber. IMPORTANT: Do not operate the water heater if the door gasket does not create a seal between the manifold door and the combustion chamber.
6. Reconnect the manifold tube and pilot tube to the gas control valve/thermostat (Figure 31). Do not cross-thread or apply any thread sealant to the fittings. IMPORTANT: If you were supplied with a new ferrule nut in a parts kit, follow these steps to connect the pilot tube:
 - A.) Install the ferrule nut into the gas valve at the pilot tube location, hand tight only.
 - B.) Insert the pilot tube into the ferrule nut until the tube bottoms out, then tighten the nut with a 7/16" SAE wrench until the crimp connection seals to the pilot tube.
 - C.) Continue to tighten until the nut is tight in the gas valve.
7. Connect the white and red thermopile wire connectors to the gas control valve/thermostat. See Figure 31.
8. Reconnect the igniter wire.
9. Turn the gas supply on and follow the Lighting Instructions.
10. With the main burner lit, check for leaks at the manifold and pilot connections by brushing on an approved non-corrosive leak detection solution. If such a solution is not available, use a mixture of hand dish washing soap and water (one part soap to 15 parts water). Bubbles forming indicate a leak. Correct any leak found.
11. Verify proper operation; replace outer door.
12. Place label stating gas type next to rating plate (showing the type of gas that your water heater has been converted to use).

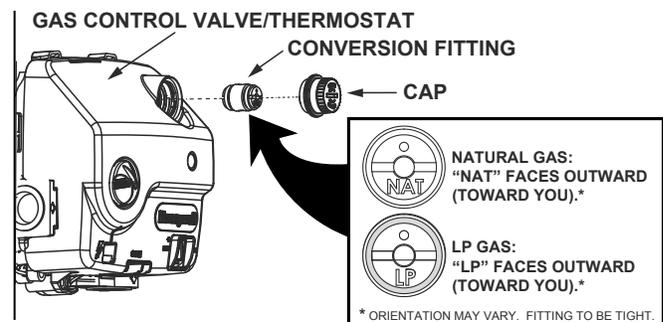
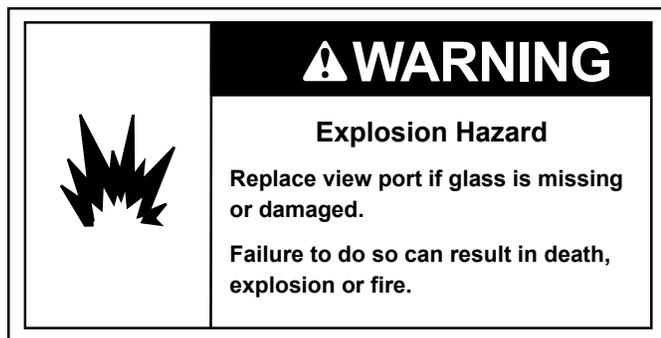


FIGURE 32.

LIGHTING INSTRUCTIONS

Read and understand these directions thoroughly before attempting to light or re-light the pilot. Make sure that the view port (sight glass) is not missing or damaged. (See Figure 40.) Make sure the tank is completely filled with water before lighting the pilot. Check the rating plate near the gas control valve/thermostat for the correct gas. Do not use this water heater with any gas other than the one listed on the rating plate unless the water heater has been properly converted. Refer to the "Gas Conversion" section of this manual. If you have any questions or doubts, consult your gas supplier or gas utility company.



LIGHTING THE PILOT:

1. Read and follow the lighting instructions on the water heater's label.
2. Turn the Control Knob to Pilot. Press the Knob in fully and hold it in. (The knob will travel in about 1/4-inch (0.635 cm) if it is set to Pilot correctly.)
3. Click the Igniter button continuously for up to 90 seconds or until the Status Light begins to blink.
If the Status Light does not begin to blink after 90 seconds, STOP. Wait 10 minutes before attempting to relight the Pilot. Repeat these steps 2-3 times, if necessary.
The circuitry in this gas valve requires that you wait 10 minutes between lighting attempts.
If the Status Light blinks, release the Control Knob and turn it to the desired setting. ("Hot" is approximately 120°F [48.9°C].)

IF THE STATUS LIGHT DOES NOT BLINK:

1. Wait 10 minutes before another lighting attempt.
2. If the Status Light did not blink, repeat the lighting procedure by following the lighting instructions on the water heater's label. Remove the outer door. The Control Knob must be set to Pilot and held in continuously while clicking the igniter button (about once per second for up to 90 seconds). To observe the Pilot, remove the outer door and look through the view port (sight glass). See Figure 40.
3. Continue clicking the Igniter button (for up to 90 seconds) until Pilot lights.
4. Once the Pilot is lit, continue to hold the Control Knob in until the Status Light begins to blink.
5. Release Control Knob and set Knob to desired temperature setting. ("Hot" is approximately 120°F [48.9°C].)
6. Replace the outer door.

IF THE PILOT DOES NOT LIGHT:

1. Wait 10 minutes before another lighting attempt.
If the pilot does not light, the Igniter may not be sparking or the unit may not be getting gas (or for a new installation, there may still be air in the gas line).
Each time you click the igniter button, you should be able to see the spark by looking through the view port. See Figure 40. (You may have to darken the room lights to see the spark.) You do not have to push the Control Knob in to check the Igniter button. Simply look through the sight glass while clicking the Igniter button and look for a spark. If you can't see a spark when the Igniter button is clicked, check the wiring connections from the Igniter button and make sure that they are tight.
2. If you see the Igniter spark, try relighting the pilot by following the instructions on the water heater's label. Ensure that the gas supply is turned on. There may be air in the gas line, and several lighting attempts may be needed to completely fill the line with gas and successfully light the pilot.

IF THE PILOT LIGHTS BUT THE STATUS LIGHT DOES NOT BLINK:

If the pilot lights, continue to hold the Control Knob in until the Status Light blinks. If the pilot is lit and remains lit for 90 seconds and the Status Light still does not blink, the thermopile connections may be loose or the thermopile may be defective.

1. Check the wiring connections from the thermopile to the gas control valve/thermostat. Ensure that all wiring connections are tight. See Figure 40.
2. Wait 10 minutes and try to light the Pilot according to the instructions on the water heater's label.
3. While clicking the Igniter button continuously, the Control Knob must be set to Pilot and held in until the Status Light blinks. Once the Status Light blinks, release the Control Knob and set the Knob to the desired temperature setting. ("Hot" is approximately 120°F [48.9°C].)

FOR YOUR SAFETY READ BEFORE LIGHTING



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



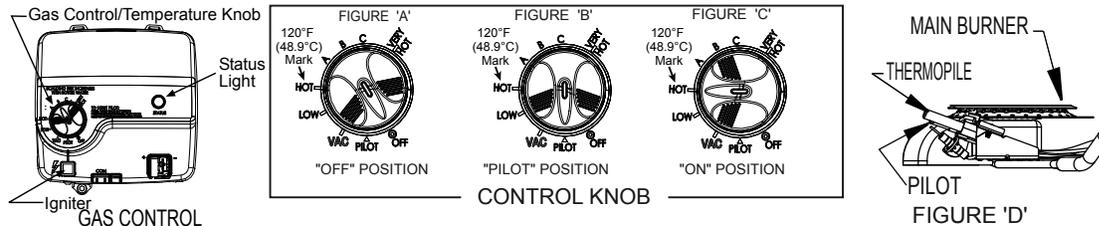
BEFORE LIGHTING: ENTIRE SYSTEM MUST BE FILLED WITH WATER AND AIR PURGED FROM ALL LINES

- A. This appliance has a pilot which is lit by a piezo-electric spark gas ignition system. Do **not** open the inner door of the appliance and try to light the pilot by hand.
- B. BEFORE LIGHTING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.
- C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, don't try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.
- D. Do not use this appliance if any part has been under water. Immediately contact a qualified installer or service agency to replace a flooded water heater. Do not attempt to repair the unit! It must be replaced!

WHAT TO DO IF YOU SMELL GAS

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

LIGHTING INSTRUCTIONS



1. STOP! It is imperative that you read all safety warnings before lighting the pilot.
2. Turn the gas control/temperature knob counterclockwise ↶ to the "OFF" setting.
3. Wait ten (10) minutes to clear out any gas. If you then smell gas, STOP! Follow "B" in the safety information above on this label. If you do not smell gas, go to the next step.
4. Turn the gas control/temperature knob clockwise ↷ to "PILOT". See Figure 'B'.
5. Press the gas control/temperature knob all the way in and hold it in. The knob should travel in about 1/4 inch (6.35 mm) if it is set to "PILOT" correctly. While holding the gas control/temperature knob in, click the igniter button continuously (about once a second) for up to 90 seconds or until Status Light begins to blink.
6. When the status light starts blinking, release the gas control/temperature knob. Set the gas control/

temperature knob to the desired setting. See Figure 'C'.

If the status light does not start blinking within 90 seconds, repeat steps 2 through 5 up to THREE (3) times, waiting 10 minutes between lighting attempts. The circuitry in this advanced gas valve requires that you wait 10 minutes between lighting attempts.

If the status light turns a solid color, release the gas control/temperature knob and repeat steps 2 through 5 (waiting 10 minutes before attempting to relight the pilot).

If the status light does not start blinking after three lighting attempts, turn the gas control/temperature knob to "OFF" and call a qualified service technician or your gas supplier.



DANGER: Hotter water increases the risk of scald injury. Consult the instruction manual before changing temperature.

Refer to the Lighting Instructions in the Installation Manual for more detailed troubleshooting information.

TO TURN OFF GAS TO APPLIANCE

1. Turn the gas control/temperature knob counterclockwise ↶ to the "OFF" setting. The status light will stop blinking and stay on for a short time after the water heater is turned off. See Figure 'A'.

FIGURE 33.

TEMPERATURE REGULATION



⚠ DANGER Water temperature over 125°F (52°C) can cause severe burns instantly resulting in severe injury or death.

Children, the elderly, and the physically or mentally disabled are at highest risk for scald injury.

Feel water before bathing or showering.

Temperature limiting valves are available.

Read instruction manual for safe temperature setting.

Due to the nature of the typical gas water heater, the water temperature in certain situations may vary up to 30°F (16.7 °C) higher or lower at the point of use such as, bathtubs, showers, sink, etc.

HOTTER WATER CAN SCALD: Water heaters are intended to produce hot water. Water heated to a temperature which will satisfy clothes washing, dish washing, and other sanitizing needs can scald and permanently injure you upon contact. Some people are more likely to be permanently injured by hot water than others. These include the elderly, children, the infirm, or physically/mentally handicapped. If anyone using hot water in your home fits into one of these groups or if there is a local code or state law requiring a certain temperature water at the hot water tap, then you must take special precautions. In addition to using the lowest possible temperature setting that satisfies your hot water needs, a means such as a mixing valve should be used at the hot water taps used by these people or at the water heater. Mixing valves are available at plumbing supply or hardware stores. See Figure 2. Follow manufacturer's instructions for installation of the valves. Before changing the factory setting on the thermostat, see Figure 34. Using the lowest hot water temperature that meets your needs will also provide the most energy efficient operation of the water heater.

Never allow small children to use a hot water tap, or to draw their own bath water. Never leave a child or handicapped person unattended in a bathtub or shower.

NOTE: A water temperature range of 120°F-140°F (49°C-60°C) is recommended by most dishwasher manufacturers.

The thermostat is adjusted to the pilot position when it is shipped from the factory. Water temperature can be regulated by moving the temperature dial to the preferred setting. The preferred starting point is 120°F at the "HOT" setting. Align the knob with the desired water temperature as shown in Figure 34. There is a hot water scald potential if the thermostat is set too high.

NOTE:

- If the knob is set to a higher temperature setting than 120°F (48.9°C), a mixing valve should be installed to limit the temperature of the water to 120°F (48.9°C) at the fixtures.
- Temperatures shown on the gas control valve/thermostat are approximates. The actual temperature of the heated water may vary.

IMPORTANT: Adjusting the thermostat past the 120°F (48.9°C) mark on the temperature dial will increase the risk of scald injury. Hot water can produce first degree burns within:

Water Temperature °F (°C)	Time for 1st Degree Burn (Less Severe Burns)	Time for Permanent Burns 2nd & 3rd Degree (Most Severe Burns)
110 (43)	(normal shower temp.)	
116 (47)	(pain threshold)	
116 (47)	35 minutes	45 minutes
122 (50)	1 minute	5 minutes
131 (55)	5 seconds	25 seconds
140 (60)	2 seconds	5 seconds
149 (65)	1 second	2 seconds
154 (68)	Instantaneous	1 second

(U.S. Government Memorandum, C.P.S.C., Peter L. Armstrong, Sept. 15, 1978)

GAS CONTROL VALVE/THERMOSTAT SETTINGS

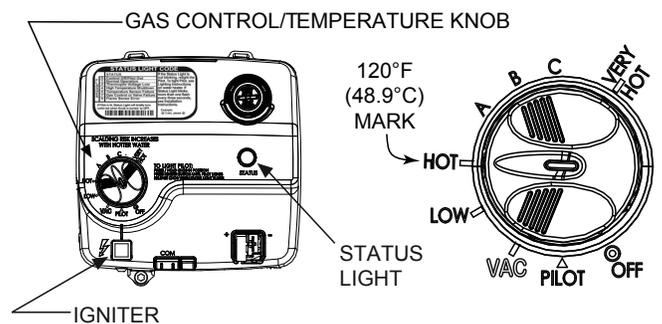


FIGURE 34.

Should overheating occur or the gas supply fail to shut off, turn off the manual gas control valve to the appliance.

NOTE: During low demand periods when hot water is not being used, a lower thermostat setting will reduce energy losses and may satisfy your normal hot water needs. If hot water use is expected to be more than normal, a higher thermostat setting may be required to meet the increased demand. When leaving your home for extended periods (vacations, etc.) turn the temperature dial to its lowest setting. This will maintain the water at low temperatures with minimum energy losses and prevent the tank from freezing during cold weather.

OPERATING THE TEMPERATURE CONTROL SYSTEM

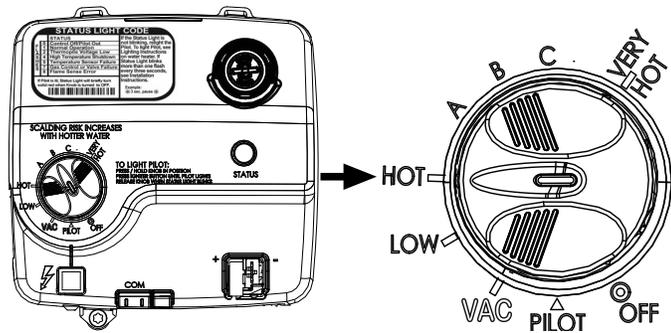


FIGURE 35.

WATER TEMPERATURE ADJUSTMENT

The water temperature setting can be adjusted from 55°F to 155°F (12.77°C to 68.33°C). Turn the Gas Control/Temperature Knob to the desired setting/temperature.

NOTE: The temperatures indicated are approximates. The actual temperature of the heated water may vary.

OPERATING MODES AND SETTINGS

- Standard Mode - The controller adjusts the water heater to maintain the temperature set by the user.
- Vacation Setting - The Vacation setting (VAC) sets the controller at approximately 55°F (12.77°C). This setting is recommended when the water heater is not in use for a long period of time. This effectively turns the controller temperature setting down to a temperature that prevents the water in the water heater from freezing while still conserving energy.

FOR YOUR INFORMATION

START UP CONDITIONS

CONDENSATE

Whenever the water heater is filled with cold water, some condensate will form while the burner is on. A water heater may appear to be leaking when in fact the water is condensation. This usually happens when:

- A new water heater is filled with cold water for the first time.
- Burning gas produces water vapor in water heaters, particularly high efficiency models where flue temperatures are lower.
- Large amounts of hot water are used in a short time and the refill water in the tank is very cold.

Moisture from the products of combustion condense on the cooler tank surfaces and form drops of water which may fall onto the burner or other hot surfaces to produce a “sizzling” or “frying” noise.

Excessive condensation can cause pilot outage due to water running down the flue tube onto the main burner and putting out the pilot.

STATUS LIGHT CODES

Normal Flashes:

- 0 Flashes Indicates Control Off/Pilot Out.
- 1 Flash Indicates Normal Operation.
- A solid light indicates that the gas control valve/thermostat is shutting down.

Diagnostic Flashes:

If the water heater is not working, look for the following diagnostic flashes after lighting the pilot. For more details, see “Status Light and Diagnostic Code Troubleshooting Chart.”

- 2 Flashes Indicates Thermopile Voltage Low
- 4 Flashes Indicates Overheat Failure
- 5 Flashes Indicates Sensor Failure
- 7 Flashes Indicates Electronic Control Failure
- 8 Flashes See “Status Light and Diagnostic Code Troubleshooting Chart.”

SMOKE / ODOR

It is not uncommon to experience a small amount of smoke and odor during the initial start-up. This is due to burning off of oil from metal parts, and will disappear in a short while.

THERMAL EXPANSION

CAUTION
Property Damage Hazard
<ul style="list-style-type: none">• Avoid water heater damage.• Install thermal expansion tank or device if necessary.• Contact qualified installer or service agency.

As water is heated, it expands (thermal expansion). In a closed system, the volume of water will grow. As the volume of water grows, there will be a corresponding increase in water pressure due to thermal expansion. Thermal expansion can cause premature tank failure (leakage). This type of failure is not covered under the limited warranty. Thermal expansion can also cause intermittent temperature-pressure relief valve operation: water discharged from the valve due to excessive pressure build up. The temperature-pressure relief valve is not intended for the constant relief of thermal expansion. This condition is not covered under the limited warranty.

A properly-sized thermal expansion tank should be installed on all closed systems to control the harmful effects of thermal expansion. Contact a plumbing service agency or your retail supplier regarding the installation of a thermal expansion tank.

STRANGE SOUNDS

Possible noises due to expansion and contraction of some metal parts during periods of heat-up and cool-down do not necessarily represent harmful or dangerous conditions.

Condensation causes sizzling and popping within the burner area during heating and cooling periods and should be considered normal. See "Condensate" in this section.

OPERATIONAL CONDITIONS

SMELLY WATER

In each water heater there is installed at least one anode rod (see parts section) for corrosion protection of the tank. Certain water conditions will cause a reaction between this rod and the water. The most common complaint associated with the anode rod is one of a "rotten egg smell" in the hot water. This odor is derived from hydrogen sulfide gas dissolved in the water. The smell is the result of four factors which must all be present for the odor to develop:

- a. A concentration of sulfate in the supply water.
- b. Little or no dissolved oxygen in the water.
- c. A sulfate reducing bacteria which has accumulated within the water heater (this harmless bacteria is nontoxic to humans).
- d. An excess of active hydrogen in the tank. This is caused by the corrosion protective action of the anode.

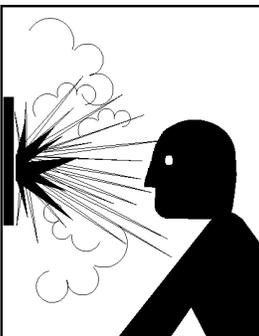
Smelly water may be eliminated or reduced in some water heater models by replacing the anode(s) with one of less active material, and then chlorinating the water heater tank and all hot water lines. Contact the local water heater supplier or service agency for further information concerning an Anode Replacement Kit and this chlorination treatment.

If the smelly water persists after the anode replacement and chlorination treatment, we can only suggest that chlorination or aeration of the water supply be considered to eliminate the water problem.

Do not remove the anode leaving the tank unprotected. By doing so, all warranty on the water heater tank is voided.

"AIR" IN HOT WATER FAUCETS

WARNING
Explosion Hazard
<ul style="list-style-type: none">• Flammable hydrogen gases may be present.• Keep all ignition sources away from faucet when turning on hot water.



HYDROGEN GAS: Hydrogen gas can be produced in a hot water system that has not been used for a long period of time (generally two weeks or more). Hydrogen gas is extremely flammable and explosive. To prevent the possibility of injury under these conditions, we recommend the hot water faucet, located farthest away, be opened for several minutes before any electrical appliances which are connected to the hot water system are used (such as a dishwasher or washing machine). If hydrogen gas is present, there will probably be an unusual sound similar to air escaping through the pipe as the hot water faucet is opened. There must be no smoking or open flame near the faucet at the time it is open.

SAFETY SHUT OFF SYSTEM

This water heater is designed to automatically shut off in the event of the following:

1. When the pilot flame is extinguished for any reason.
A thermopile is used to determine if a pilot flame is present and will shut off the gas supply to the main burner and pilot if the flame is absent.
2. When the water temperature in the tank exceeds 189°F (87°C).
The gas control valve/thermostat includes a temperature limiting ECO (Energy Cut Off) system that activates when excessive water temperatures are present. If this occurs, the system cannot be reset. The gas control valve/thermostat must be replaced.

MAINTENANCE OF YOUR WATER HEATER

IMPORTANT: If you do not have the skills and training to perform a maintenance procedure, do not attempt it. Get help from a qualified technician.

BURNER FLAME INSPECTION

Inspect the burner flames through the viewport and compare them to the drawing in Figure 36. A properly operating burner should produce a soft blue flame. Blue tips with yellow inner cones are satisfactory. The tips of the flame may have a slight yellow tint. The flame should not be all yellow or have a sharp blue-orange color. Contaminated air may cause an orange colored flame. Contact a qualified technician if the flame is not satisfactory.

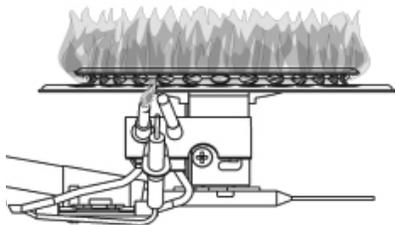


FIGURE 36.

ROUTINE PREVENTIVE MAINTENANCE

At least annually, a visual inspection should be made of the venting and air supply system, piping systems, main burner, and pilot burner. Check the water heater for the following:

- Obstructions, damage, or deterioration in the venting system. Make sure the ventilation and combustion air supplies are not obstructed.
- Soot and/or carbon on the main burner and pilot burner. Contact a qualified technician.
- Leaking or damaged water and gas piping.
- Presence of flammable or corrosive materials in the installation area.
- Presence of combustible materials near the water heater.
- After servicing this water heater, check to make sure that it is working properly.

IMPORTANT: If you lack the necessary skills required to properly perform this visual inspection, you should not proceed, but get help from a qualified technician.

ANODE ROD INSPECTION

Each water heater contains at least one anode rod, which will slowly deplete (due to electrolysis) prolonging the life of the water heater by protecting the glass-lined tank from corrosion. Adverse water quality, hotter water temperatures, high hot water usage, and water softening methods can increase the rate of anode rod depletion. Once the anode rod is depleted, the tank will start to corrode, eventually developing a leak.

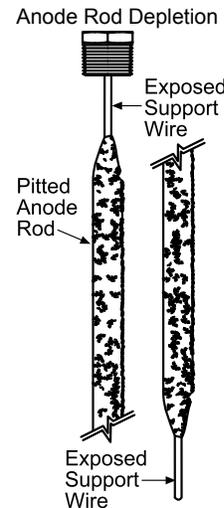


FIGURE 37.

Certain water conditions will cause a reaction between the anode rod and the water. The most common complaint associated with the anode rod is a “rotten egg smell” produced from the presence of hydrogen sulfide gas dissolved in the water. **IMPORTANT:** Do not remove this rod permanently as it will void any warranties. A special anode rod may be available if water odor or discoloration occurs. **NOTE:** This rod may reduce but not eliminate water odor problems. The water supply system may require special filtration equipment from a water conditioning company to successfully eliminate all water odor problems.

Artificially softened water is exceedingly corrosive because the process substitutes sodium ions for magnesium and calcium ions. The use of a water softener may decrease the life of the water heater tank.

The anode rod should be inspected after a maximum of three years and annually thereafter until the condition of the anode rod dictates its replacement. **NOTE:** Artificially softened water requires the anode rod to be inspected annually. The following are typical (but not all) signs of a depleted anode rod:

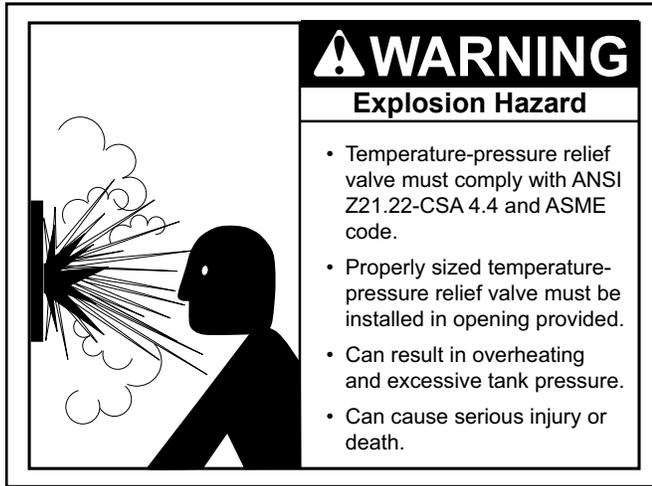
- The majority of the rods diameter is less than 3/8" (9.5 mm).
- Significant sections of the support wire (approx. 1/3 or more of the anode rod's length) are visible.

If the anode rod show signs of either or both it should be replaced. **NOTE:** Whether re-installing or replacing the anode rod, check for any leaks and immediately correct if found. In replacing the anode:

1. Turn off gas supply to the water heater.
2. Shut off the water supply and open a nearby hot water faucet to depressurize the water tank.
3. Drain approximately 5 gallons (18.9 liters) of water from tank. (Refer to “Draining and Flushing” for proper procedures.) Close drain valve.
4. Remove old anode rod.
5. Use Teflon® tape or approved pipe sealant on threads and install new anode rod.
6. Turn on water supply and open a nearby hot water faucet to purge air from water system. Check for any leaks and immediately correct any if found.
7. Restart the water heater as directed in this manual. See the Repair Parts illustration for anode rod location.

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TEMPERATURE-PRESSURE RELIEF VALVE OPERATION



Manually operate the temperature and pressure relief valve at least once a year to make sure it is working properly. To prevent water damage, the valve must be properly connected to a discharge line that passes through the structural floor and terminates external to the building. In cold climates, it is recommended that the discharge line be terminated at an adequate drain inside the building. See Figure 1. Standing clear of the outlet (discharged water may be hot), slowly lift and release the lever handle on the temperature and pressure relief valve to allow the valve to operate freely and return to its closed position. See Figure 38. If the valve fails to completely reset and continues to release water, immediately close the manual gas shut-off valve and the cold water inlet valve and call a qualified technician. Do not plug the temperature-pressure relief valve or discharge line.

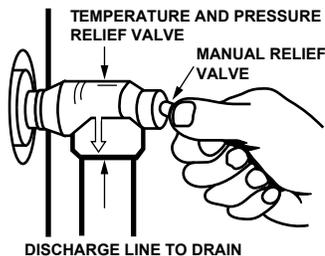
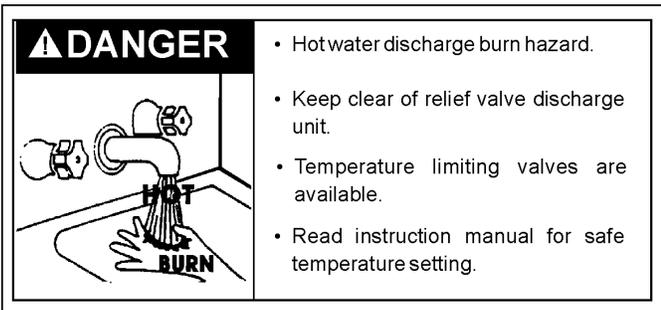


FIGURE 38.

Draining and Flushing



It is recommended that the tank be drained and flushed every 6 months to remove sediment which may build up during operation. The water heater should be drained if being shut down

during freezing temperatures. To drain the tank, perform the following steps:

1. Turn off the gas to the water heater at the manual gas shut-off valve.
2. Open a nearby hot water faucet until the water is no longer hot.
3. Close the cold water inlet valve.
4. Connect a hose to the drain valve and terminate it to an adequate drain or external to the building.
5. Open the water heater drain valve and allow all of the water to drain from the tank. Flush the tank with water as needed to remove sediment.
6. Close the drain valve, refill the tank, and restart the heater as directed in this manual. If the water heater is going to be shut down for an extended period, the drain valve should be left open.

IMPORTANT: Condensation may occur when refilling the tank and should not be confused with a tank leak.

REMOVING THE MANIFOLD/BURNER ASSEMBLY

1. Turn the gas control/temperature knob to the "OFF" position (Figure 35).
2. Before performing any maintenance, it is important to turn off the gas supply to the water heater at the manual gas shut-off valve. This valve is typically located beside the water heater. Note the position of the shut-off valve in the open/on position, then proceed to turn it off (Figure 27).
3. With the unit shut-off, allow sufficient time for the water heater to cool before performing any maintenance.

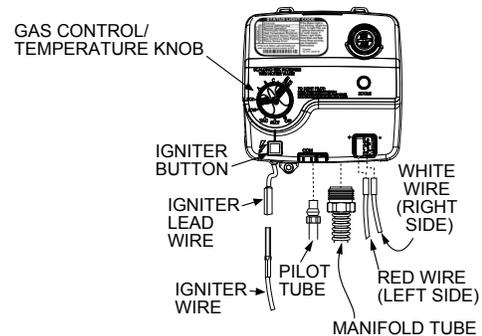


FIGURE 39.

4. Remove the outer door.
5. Disconnect the following from the gas control valve/thermostat: pilot tube (7/16" SAE wrench), igniter wire (from the igniter lead wire), and manifold tube (3/4" SAE wrench). See Figure 39.
6. Disconnect the white and red wires from the gas control valve/thermostat (Figure 39). Use needle nose pliers to grip the connector(s). **IMPORTANT:** Grip the connector carefully to prevent damage. Do not grip or pull the wires themselves.
7. Grasp the manifold tube and push down slightly to free the manifold tube and pilot tube.
8. Remove the screws (1/4" SAE nut driver) securing the manifold/burner assembly to the combustion chamber. See Figure 40.
9. Carefully remove the manifold/burner assembly from the combustion chamber. **BE SURE NOT TO DAMAGE ANY INTERNAL PARTS.**

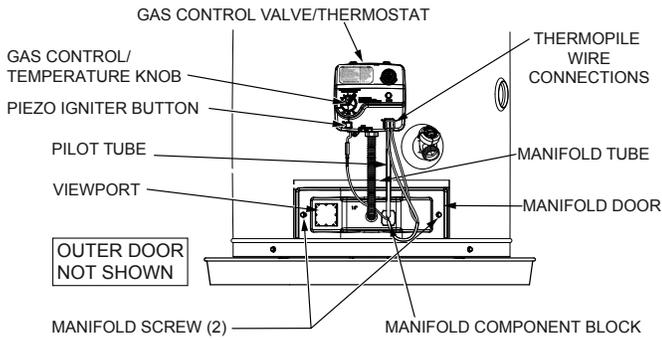


FIGURE 40.

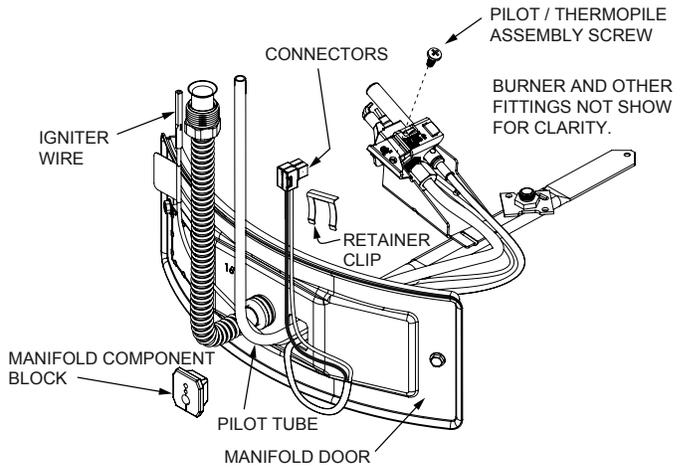


FIGURE 42.

REMOVING THE BURNER FROM THE MANIFOLD/BURNER ASSEMBLY

1. Take off the burner by removing the two (2) screws located underneath the burner.
2. Check the burner to see if it is dirty or clogged. The burner may be cleaned with soap and hot water (Figure 41).

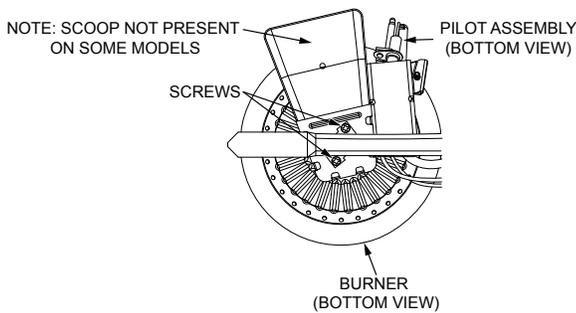


FIGURE 41.

6. Read this step carefully before proceeding. Using the old pilot/pilot tube assembly as a guide, bend the new pilot tube to match the old one. Make only the bends closest to the pilot before going to the next step.

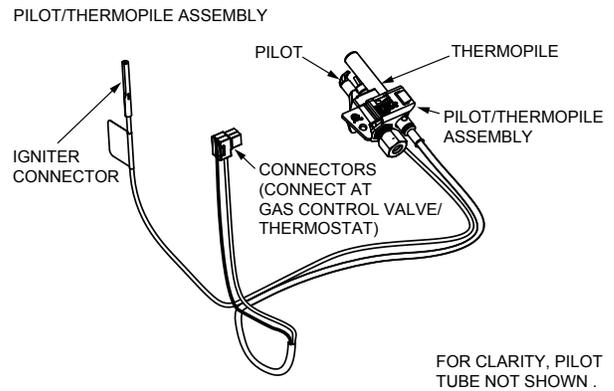


FIGURE 43.

REPLACING THE PILOT/ THERMOPILE ASSEMBLY

1. Remove the manifold door assembly as described in "Removing the Manifold/Burner Assembly" section.
2. Remove the burner to access the pilot/thermopile assembly. Remove and keep the screws securing the burner to the manifold (Figure 41). **IMPORTANT:** DO NOT remove the orifice.
3. Remove the screw securing the pilot/thermopile assembly to the pilot bracket and keep for reuse later (Figure 42).
4. Lift the retainer clip straight up from the back of the manifold component block (using a flat-blade screwdriver), then remove the manifold component block from the manifold door (Figure 42). **IMPORTANT:** Be careful not to bend or alter the position of the pilot tube. It will be used as a bending template for the new pilot assembly. Note the placement/order of the wires in the manifold component block.
5. Lift the pilot/thermopile assembly (including the igniter wire) from the manifold assembly.

7. Route the new pilot tube and wires through the opening in the manifold door. See Figure 42.
8. Using the pilot screw removed earlier, attach the new pilot/thermopile assembly. Reattach the burner to the manifold using the screws removed earlier. **NOTE:** If the burner has a scoop, make sure that the scoop is oriented to the pilot side of the manifold tube (Figure 41).
9. Reinstall the manifold component block in the manifold door. Ensure that the pilot tube and wires are positioned as shown in Figure 44.
10. Carefully bend the new pilot tube to match the bend of the manifold tube. **NOTE:** When bending, DO NOT crimp or crease the pilot tube.
11. Before you proceed to the next step, install the new brass ferrule nut in the gas control valve/thermostat's pilot tube opening, **HAND TIGHT ONLY.**
12. Install the manifold/burner assembly. Refer to the "Replacing the Manifold/Burner Assembly" section for instructions.

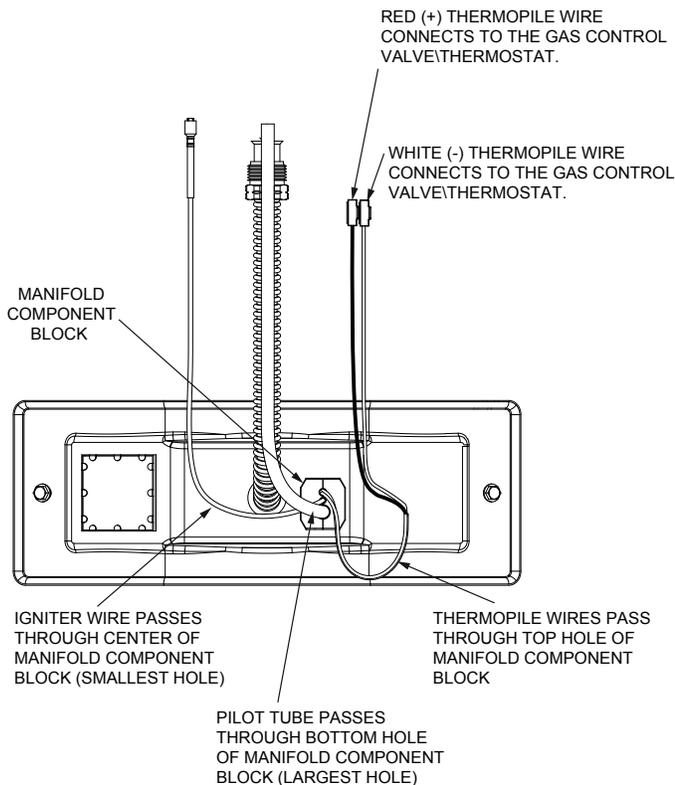
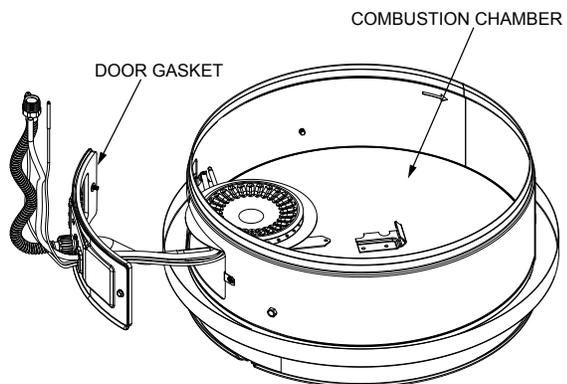


FIGURE 44.

CLEANING THE COMBUSTION CHAMBER

1. Follow procedure outlined in "Removing the Manifold/Burner Assembly".
2. Use a vacuum cleaner/shop vac to remove all loose debris in the combustion chamber (Figure 45).
3. Reassemble following the procedure under "Replacing the Manifold/Burner Assembly."



FOR CLARITY, THE INLET AIR OPENING IS NOT SHOWN.

FIGURE 45.

REPLACING THE MANIFOLD/BURNER ASSEMBLY

⚠ WARNING



Explosion Hazard

- Tighten both manifold door screws securely.
- Remove any fiberglass between gasket and combustion chamber.
- Replace viewport if glass is missing or damaged.
- Replace manifold component block if missing or removed.
- Replace door gasket if damaged.
- Failure to follow these instructions can result in death, explosion, or fire.

1. Check the door gasket for damage or imbedded debris prior to installation (Figure 45).
2. Inspect the viewport for damage and replace as required (Figure 40).
3. Insert the new manifold/burner assembly into the burner compartment, making sure that the tab of the manifold tube engages the slot of the bracket inside the combustion chamber (Figure 46).
4. Inspect the door gasket and make sure there is no fiberglass insulation between the gasket and the combustion chamber (Figure 45).
5. Tighten the two screws that secure the manifold/burner assembly to the combustion chamber. (Use a 1/4" SAE nut driver.) There should be no space between the gasket part of the manifold door and combustion chamber.

IMPORTANT: Do not operate the water heater if the door gasket does not create a seal between the manifold door and the combustion chamber.

6. Reconnect the manifold tube (3/4" SAE wrench) and pilot tube (7/16" SAE wrench) to the gas control valve/thermostat (Figure 39). Do not cross-thread or apply any thread sealant to the fittings.

IMPORTANT: If you were supplied with a new ferrule nut in a parts kit, follow these steps to connect the pilot tube:

- 1.) Install the ferrule nut into the gas valve at the pilot tube location, hand tight only. 2.) Insert the pilot tube into the ferrule nut until the tube bottoms out, then tighten the nut with a 7/16" SAE wrench until the crimp connection seals to the pilot tube. 3.) Continue to tighten until the nut is tight in the gas valve.
7. Connect the white and red wires to the gas control valve/thermostat as shown in Figure 39.
8. Reconnect the igniter wire (Figure 39).
9. Turn on the gas supply to the water heater at the manual gas shut-off valve (Figure 27).

- Follow the lighting instructions on the front of the water heater. With the main burner lit, check for leaks at the manifold and pilot connections by brushing on an approved noncorrosive leak detection solution. If such a solution is not available, use a mixture of hand dish washing soap and water (one part soap to 15 parts water) or children's soap bubble solution. Bubbles forming indicate a leak. Correct any leak found.
- Verify proper operation, then replace the outer door.

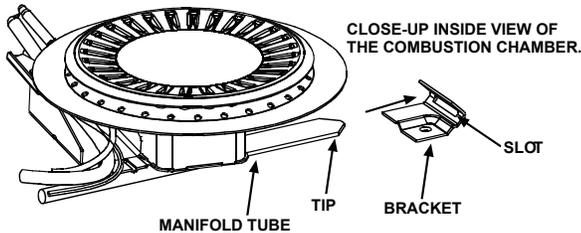


FIGURE 46.

PIEZOELECTRIC IGNITER SYSTEM

The piezoelectric igniter system consists of the igniter button, electrode, and wire. The pilot is ignited by an electric spark generated when the igniter button is pressed. See Figure 47.

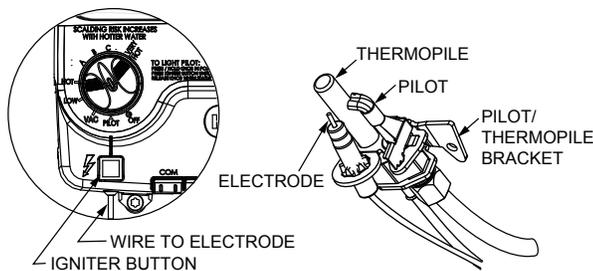


FIGURE 47.

TESTING THE IGNITER SYSTEM

Turn off the gas to the water heater at the manual gas shut-off valve. Watch the electrode tip while activating the igniter. A visible spark should jump from the electrode. To avoid shock, do not touch the burner or any metal part on the pilot or pilot assembly. If no spark is visible, check the wire connections and make sure the electrode is not broken. Replace the igniter if defective. Dirt and rust on the pilot or electrode tip can prevent the igniter spark. Wipe clean with a damp cloth and dry completely. Rust can be removed from the electrode tip and metal surfaces by lightly sanding with an emery cloth or fine grit sandpaper.

REMOVING AND REPLACING THE GAS CONTROL VALVE/THERMOSTAT

IMPORTANT: This gas control valve/thermostat is shipped from the factory as a natural gas unit. However, it may be converted to use LP gas. Before installing this gas control valve/ thermostat, make sure that it is configured for the type of gas that you are using. Refer to the "Gas Conversion" section.

Removing the Gas Control Valve/Thermostat:

- Turn the gas control/temperature knob to the "OFF" position (Figure 34).
- Turn off the gas at the manual shut-off valve on the gas supply pipe (Figure 27).

- Drain the water heater. Refer to the section of "Draining and Flushing" and follow the procedure.
- Disconnect the igniter wire from the igniter lead wire. Use needle nose pliers to disconnect the red (+) and white (-) thermopile wires. Disconnect the pilot tube (7/16" SAE wrench) and manifold tube (3/4" SAE wrench) at the gas control valve/thermostat. See Figure 39.
- Refer to "Gas Piping" (Figure 27) and disconnect the ground joint union in the gas piping. Disconnect the remaining pipe from the gas control valve/thermostat.
- To remove the gas control valve/thermostat, thread a 4" (10.16 cm) section of gas pipe into the inlet and use it to turn the gas control valve/thermostat (counterclockwise.) Do not use a pipe wrench or equivalent to grip body. Damage may result, causing leaks. Do not insert any sharp objects into the inlet or outlet connections. Damage to the gas control valve/thermostat may result.

Replacing the Gas Control Valve/Thermostat:

To replace the gas control valve/thermostat, reassemble in reverse order. When replacing the gas control valve/thermostat, thread a 4" (10.16 cm) section of gas pipe into the inlet and use it to turn the gas control valve/thermostat (clockwise.) **DO NOT OVER TIGHTEN;** damage may result.

- Be sure to use approved Teflon[®] tape or pipe joint compound on the gas piping connections and fitting on the back of the gas control valve that screws into the tank.
- Be sure to remove the pilot ferrule nut from the new gas control valve/thermostat.
- Turn the main gas supply on and check the gas supply connections for leaks. Correct any leak found. Next, light the pilot and main burner, then check the manifold tube and pilot tube connections for leaks. Correct any leak found. Use an approved noncorrosive leak detection solution. If such a solution is not available, use a mixture of hand dish washing soap and water (one part soap to 15 parts water) or children's soap bubble solution. Bubbles forming indicate a leak.
- Be sure tank is completely filled with water before lighting and activating the water heater. Follow the "Lighting Instructions" on the front of the water heater.
- If additional information is required, contact Residential Technical Assistance.

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SERVICE CHECKLIST

- Manifold gasket properly sealed.
- Viewpoint not damaged or cracked.
- Manifold component block properly installed.
- No leaks at pilot and manifold connection.
- Manifold door screws securely tightened.

LEAKAGE CHECKPOINTS

Use this guide to check a “Leaking” water heater. Many suspected “Leakers” are not leaking tanks. Often the source of the water can be found and corrected.

If you are not thoroughly familiar with gas codes, your water heater, and safety practices, contact your gas supplier or qualified installer to check the water heater.

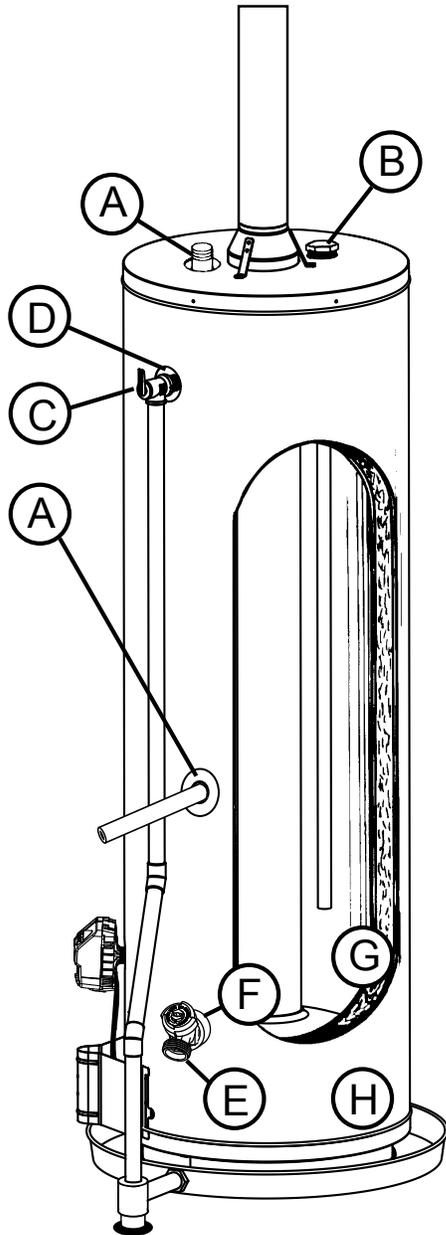


FIGURE 48.

Read this manual first. Then before checking the water heater make sure the gas supply has been turned “OFF”, and never turn the gas “ON” before the tank is completely full of water.

- A. *Condensation may be seen on pipes in humid weather or pipe connections may be leaking. NOTE: The location of the hot water outlet has been modified for clarity.
- B. *The anode rod fitting may be leaking. NOTE: The location of the anode has been modified for clarity.
- C. Small amounts of water from temperature-pressure relief valve may be due to thermal expansion or high water pressure in your area.
- D. *The temperature-pressure relief valve may be leaking at the tank fitting.
- E. Water from a drain valve may be due to the valve being slightly opened.
- F. *The drain valve may be leaking at the tank fitting.
- G. Combustion products contain water vapor which can condense on the cooler surfaces of the tank. Droplets form and drip onto the burner or run on the floor. This is common at the time of start-up after installation and when incoming water is cold.
- H. Water in the water heater bottom or on the floor may be from condensation, loose connections, or the relief valve. DO NOT replace the water heater until a full inspection of all possible water sources is made and necessary corrective steps taken.

Leakage from other appliances, water lines, or ground seepage should also be checked.

- * To check where threaded portion enters tank, insert cotton swab between jacket opening and fitting. If cotton is wet, follow “Draining and Flushing” instructions in this manual and then remove fitting. Put pipe dope or Teflon® tape on the threads and replace. Then follow “Filling the Water Heater” instructions in the “Installing the New Water Heater” section.

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	⚠ WARNING
	Read and understand instruction manual and safety messages before installing, operating or servicing this water heater.
	Failure to follow instructions and safety messages could result in death or serious injury.
Instruction Manual must remain with water heater.	

TROUBLESHOOTING GUIDELINES

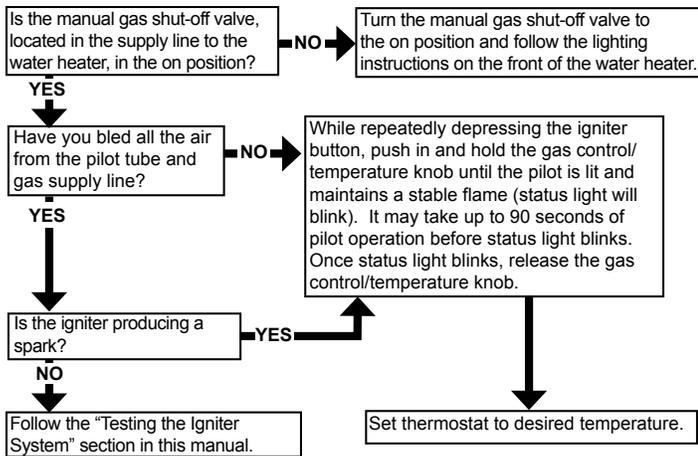
These guidelines should be utilized by a qualified technician.

PROBLEM	POSSIBLE CAUSE(S)	CORRECTIVE ACTION
BURNER WILL NOT IGNITE	<ol style="list-style-type: none"> 1. Pilot not lit 2. Thermostat set too low 3. Main burner line clogged 4. Non-functioning thermostat 5. Insufficient combustion air 	<ol style="list-style-type: none"> 1. Light pilot 2. Turn temp. dial to desired temperature 3. Clean, locate source and correct 4. Test Gas Control Valve/Thermostat 5. Check air inlet/venting
SMELLY WATER	<ol style="list-style-type: none"> 1. Sulfides in the water 	<ol style="list-style-type: none"> 1. Replace the anode with a special anode
BURNER FLAME YELLOW-LAZY	<ol style="list-style-type: none"> 1. Insufficient combustion air 2. Low gas pressure 3. Water heater flue or vent system blocked 4. Main burner line clogged 5. Insufficient combustion air 6. Obstruction in main burner orifice 7. Incorrect gas conversion (if unit was converted to use a different type of gas) 	<ol style="list-style-type: none"> 1. Check air inlet/venting 2. Check with gas utility company 3. Clean, locate source and correct 4. Clean, locate source and correct 5. Check air inlet/venting 6. Clean or replace orifice 7. Contact a qualified technician
PILOT WILL NOT LIGHT OR REMAIN LIT	<ol style="list-style-type: none"> 1. Non-functioning igniter 2. Thermopile connection loose 3. Air in gas line 4. Low gas pressure 5. No gas 6. Dirt in gas lines 7. Cold drafts 8. Thermostat temperature limit was exceeded. Status light will blink 4 flashes. 9. Pilot line or orifice clogged 10. Non-functioning thermopile 11. Air for combustion obstructed 12. Flammable vapors incident, FVIR function actuated 	<ol style="list-style-type: none"> 1. Replace igniter pilot assembly 2. Seat connector firmly in socket 3. Bleed the air from the gas line 4. Check with gas utility company 5. Check with gas utility company 6. Notify utility-install dirt trap in gas line 7. Locate source and correct 8. Replace thermostat 9. Clean, locate source and correct 10. Replace thermopile 11. Check air inlet/venting 12. Replace water heater, eliminate flammable vapors source. Contact Technical Assistance.
HIGH OPERATION COSTS	<ol style="list-style-type: none"> 1. Thermostat set too high 2. Sediment or lime in tank 3. Water heater too small for job 4. Wrong piping connections 5. Leaking faucets 6. Gas leaks 7. Wasted hot water 8. Long runs of 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 needed 3. Install adequately-sized water heater 4. Correct piping-inlet tube must be in cold inlet 5. Repair faucets 6. Check with utility-repair at once 7. Advise customer 8. Insulate piping 9. Insulate piping
INSUFFICIENT HOT WATER	<ol style="list-style-type: none"> 1. Thermostat set too low 2. Sediment or lime in tank 3. Water heater too small 4. Wrong piping connections 5. Leaking faucets 6. Wasted hot water 7. Long runs of exposed piping 8. Hot water piping in outside wall 9. Low gas pressure 10. Incorrect gas conversion (if unit was converted to use a different type of gas) 	<ol style="list-style-type: none"> 1. Turn temperature dial to desired setting 2. Drain/flush-provide water treatment if needed 3. Install adequately-sized water heater 4. Correct piping-inlet tube must be in cold inlet 5. Repair faucets 6. Advise customer 7. Insulate piping 8. Insulate piping 9. Check with gas utility company 10. Contact a qualified technician

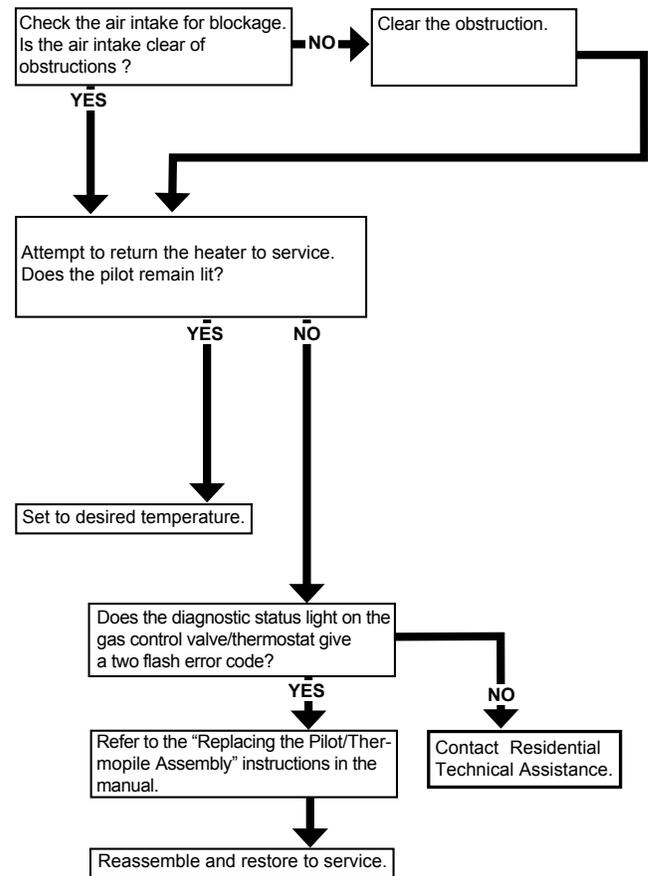
PROBLEM	POSSIBLE CAUSE(S)	CORRECTIVE ACTION
SLOW HOT WATER RECOVERY	<ol style="list-style-type: none"> 1. Insufficient combustion air 2. Water heater flue or vent system blocked 3. Low gas pressure 4. Improper calibration 5. Incorrect gas conversion (if unit was converted to use a different type of gas) 	<ol style="list-style-type: none"> 1. Provide ventilation to water heater. Check flue way, flue baffle, and burner 2. Clean flue, locate source and correct 3. Check with gas utility company 4. Replace gas control valve/thermostat 5. Contact a qualified technician
DRIP FROM RELIEF VALVE	<ol style="list-style-type: none"> 1. Excessive water pressure 2. Heater stacking 3. Closed water system 	<ol style="list-style-type: none"> 1. Use a pressure reducing valve and relief valve 2. Lower the thermostat setting 3. See "Closed System/Thermal Expansion"
GAS CONTROL VALVE/THERMOSTAT FAILS TO SHUT-OFF	<ol style="list-style-type: none"> 1. Thermostat not functioning properly 2. Improper calibration 	<ol style="list-style-type: none"> 1. Replace gas control valve/thermostat 2. Replace gas control valve/thermostat
COMBUSTION ODORS	<ol style="list-style-type: none"> 1. Insufficient combustion air 2. Water heater flue or vent system blocked 	<ol style="list-style-type: none"> 1. Provide ventilation to water heater. Check flue way, flue baffle, and burner 2. Clean, locate source and correct
SMOKING AND CARBON FORMATION (SOOTING)	<ol style="list-style-type: none"> 1. Insufficient combustion air 2. Low gas pressure 3. Water heater flue or vent system blocked 4. Gas control valve/thermostat not functioning properly 5. Burner flame yellow-lazy 6. Incorrect gas conversion (if unit was converted to use a different type of gas) 	<ol style="list-style-type: none"> 1. Provide ventilation to water heater. Check flue way, flue baffle, burner 2. Check with gas utility company 3. Clean, locate source and correct 4. Replace gas control valve/thermostat 5. See "Burner Flame Yellow-Lazy" 6. Contact a qualified technician
CONDENSATION	<ol style="list-style-type: none"> 1. Temperature setting too low 	<ol style="list-style-type: none"> 1. Increase the temperature setting.
BURNER FLAME FLOATS AND LIFTS OFF PORTS	<ol style="list-style-type: none"> 1. Orifice too large 2. High gas pressure 3. Water heater flue or vent system blocked 4. Cold drafts 5. Incorrect gas conversion (if unit was converted to use a different type of gas) 	<ol style="list-style-type: none"> 1. Replace with correct orifice 2. Check with gas utility company 3. Clean flue and burner-locate source and correct 4. Locate source and correct 5. Contact a qualified technician
BURNER FLAME TOO HIGH	<ol style="list-style-type: none"> 1. Orifice too large 2. Incorrect gas conversion (if unit was converted to use a different type of gas) 	<ol style="list-style-type: none"> 1. Replace with correct orifice 2. Contact a qualified technician
FLAME BURNS AT ORIFICE	<ol style="list-style-type: none"> 1. Gas control valve/thermostat not functioning properly 2. Low gas pressure 3. Incorrect gas conversion (if unit was converted to use a different type of gas) 	<ol style="list-style-type: none"> 1. Replace gas control valve/thermostat 2. Check with gas utility company 3. Contact a qualified technician
PILOT FLAME TOO SMALL	<ol style="list-style-type: none"> 1. Pilot line or orifice clogged 2. Low gas pressure 	<ol style="list-style-type: none"> 1. Clean, locate source and correct 2. Check with gas utility company

PILOT LIGHT TROUBLESHOOTING CHART

Section A: Pilot light will not light (new installation).



Section B: Pilot light repeatedly goes out.



NOTE: If you are still experiencing difficulties after following the steps in sections A and B, please contact Residential Technical Assistance.

STATUS LIGHT AND DIAGNOSTIC CODE TROUBLESHOOTING CHART

LED STATUS	PROBLEM	CORRECTIVE ACTION
0 FLASHES (LED NOT LIT)	Pilot light is not lit or Thermopile has not yet reached normal operating temperature.	<p>Turn Gas Control Valve/Thermostat knob to OFF. Wait 10 minutes, then attempt to relight Pilot by following the lighting instructions on the water heater's label. Until the Thermopile reaches its normal operating temperature, the Status Light will not blink, even if the Pilot is lit. It may take up to 90 seconds of continuous Pilot operation before the Thermopile reaches normal operating temperature and the Status Light starts to blink.</p> <p>If the Status Light does not blink after three lighting attempts, check to make sure unit is getting gas. Remove the outer door. Press reset button. Replace outer door. Turn Gas Control Valve/Thermostat knob to OFF. Wait 10 minutes, then attempt to light Pilot by following the lighting instructions on the water heater's label. Look through the view port for the Pilot flame. If Pilot is not visible, the spark igniter or gas supply to the Pilot should be checked.</p> <p>If the Pilot is visible and the Status Light does not blink after 90 seconds of continuous Pilot operation, the Pilot flame may not be heating the Thermopile sufficiently (weak Pilot), the Thermopile may be defective, or wiring connectors may be loose.</p>
LIGHT ON (SOLID)	Pilot light was recently extinguished and the Thermopile is cooling down.	<p>Turn Gas Control Valve/Thermostat knob to OFF. Wait 10 minutes for the Thermopile to cool, then attempt to relight Pilot by following the lighting instructions on the water heater's label. NOTE: This gas control valve/thermostat has built-in circuitry that requires waiting 10 minutes between lighting attempts.</p> <p>Until the Thermopile reaches its normal operating temperature, the Status Light will not blink, even if the Pilot is lit. It may take up to 90 seconds of continuous Pilot operation before the Thermopile reaches normal operating temperature and the Status Light starts to blink.</p>
1 FLASH (EVERY 3 SECONDS)	Normal operation.	No corrective action necessary.
2 FLASHES	Pilot is lit but the Thermopile is not producing the required output voltage.	Turn Gas Control Valve/Thermostat knob to OFF. The Thermopile is probably defective, but loose wiring connections or a weak Pilot flame can also cause this symptom.
4 FLASHES	The Gas Control Valve's temperature sensor has detected that the water temperature was too high. Once this condition occurs, the Main Burner and the Pilot Light will be shut off. Since the Pilot light will be off, should this condition occur, this Flash Code will only be displayed immediately after the Pilot has been relit. Turn Gas Control Valve/Thermostat knob to OFF.	Relight pilot and verify 4 flashes. If 4 flashes are observed, turn Gas Control Valve/Thermostat knob to OFF. Turn Main Gas Supply OFF. Replace the Gas Control Valve/Thermostat. See "Removing and Replacing the Gas Control Valve/Thermostat."

Continued on the next page.

STATUS LIGHT AND DIAGNOSTIC CODE TROUBLESHOOTING CHART (Continued)

LED STATUS	PROBLEM	CORRECTIVE ACTION
5 FLASHES	The temperature sensor (thermistor) is defective.	Turn Gas Control Valve/Thermostat knob to OFF. Replace the Gas Control Valve/Thermostat. See "Removing and Replacing the Gas Control Valve/Thermostat."
7 FLASHES	Gas Control Valve failure.	Turn Gas Control Valve/Thermostat knob to OFF. Turn Main Gas Supply OFF. Replace the Gas Control Valve/Thermostat. See "Removing and Replacing the Gas Control Valve/Thermostat."
8 FLASHES	This condition only appears if the gas control/temperature knob has been turned off and the thermopile continued to produce electric power. This condition can occur if the thermopile does not cool down as quickly as expected when the unit is shut off. This condition can also occur if the gas control/temperature knob has been turned off and the pilot continues to operate because the pilot valve is stuck in the open position.	<p>Make sure that the gas control valve/thermostat knob is set to OFF. Wait one minute. Remove the outer door. Look through the sight glass for a pilot flame. If a pilot flame is observed with the gas control valve/thermostat knob set to the OFF position, the pilot valve is stuck open. Turn the main gas supply OFF. Replace the gas control valve/thermostat. For instructions, see "Removing and Replacing the Gas Control Valve/Thermostat."</p> <p>If the pilot flame is not observed when the gas control valve/thermostat knob is set to the OFF position, wait 10 minutes for the thermopile to cool, then attempt to relight the pilot by following the lighting instructions on the water heater's label. If this condition returns, replace the gas control valve/thermostat. See "Removing and Replacing the Gas Control Valve/Thermostat" for instructions.</p>

REPAIR PARTS LIST

Key No.	Part Description
1	10" Extension Pipe (Optional)
2	Air Duct Assembly (14.5" to 24" [36.8cm to 61cm] Long)
3	Angle Bracket
4	Angle Bracket (2 Required)
5	Anode Rod
6	Burner
7	Burner Orifice (Natural Gas)
7	Burner Orifice (Propane [L.P.] Gas)
8	Drain Valve
9	Gas Control Valve / Thermostat
10	Inlet Tube
11	Inner Door Gasket
12	Manifold Component Block w/ Clip
13	Manifold/Burner Assembly (Natural Gas)
13	Manifold/Burner Assembly (Propane [L.P.] Gas)
14	Metal Drain Pan
15	Nipple w/Heat Traps
#16	Optional 3" (76mm) Outside Wall Intake Air Vent Kit 9002986
#16	Optional 4" (102mm) Outside Wall Intake Air Vent Kit 9002987
17	Outer Door
18	Pilot Assembly with Tubing and Fittings
*19	Pipe Insulation
20	Roof Jack 12" / 30.48 cm (9002964005)
20	Roof Jack 32" / 81.28 cm (9002965005)
20	Roof Jack 60" / 152.4 cm (9002966005)
20	Roof Jack 95" / 241.3 cm (9002967005)
21	Flue Reducer
*22	T & P Insulation
23	Temperature-Pressure Relief Valve (T & P Valve)

* These parts available at most hardware stores.

Not Shown.

Now that you have purchased this water heater, should a need ever exist for repair parts or service, simply contact the company it was purchased from or direct from the manufacturer listed on the rating plate on the water heater.

Be sure to provide all pertinent facts when you call or visit.

Selling prices will be furnished on request or parts will be shipped at prevailing prices and you will be billed accordingly.

The model number of your Gas Water Heater will be found on the rating plate located above the gas control valve/thermostat.

WHEN ORDERING REPAIR PARTS, ALWAYS GIVE THE FOLLOWING INFORMATION:

- MODEL NUMBER
- TYPE GAS (NATURAL OR PROPANE (L.P.))
- SERIAL NUMBER
- PART DESCRIPTION

THIS IS A REPAIR PARTS LIST, NOT A PACKING LIST.

