

COMMERCIAL GAS WATER HEATERS

GAS MODELS POWER VENT BTF-80
WITH HOT SURFACE IGNITION



500 Tennessee Waltz Parkway
Ashland City, TN 37015
www.hotwater.com



GAS-FIRED



Low Lead Content



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.



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.

• For Your Safety •

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

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





KEEP THIS MANUAL IN THE POCKET ON HEATER FOR FUTURE REFERENCE
WHENEVER MAINTENANCE ADJUSTMENT OR SERVICE IS REQUIRED.

SAFE INSTALLATION, USE AND SERVICE

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.

	<p>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.</p>
---	---

	<p>DANGER indicates an imminently hazardous situation which, if not avoided, will result in injury or death.</p>
	<p>WARNING indicates a potentially hazardous situation which, if not avoided, could result in injury or death.</p>
	<p>CAUTION indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.</p>
	<p>CAUTION used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, could result in property damage.</p>

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.

This product contains a chemical known to the State of California to cause cancer, birth defects, or other reproductive harm. This water heater can cause low level exposure to some of the substances listed in the Act.

APPROVALS

GAS-FIRED



LISTED



Low Lead Content



GENERAL SAFETY



⚠ 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.

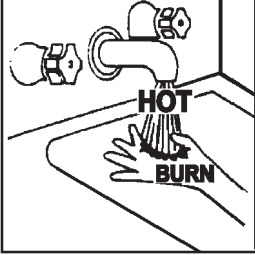


⚠ WARNING

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.



⚠ DANGER

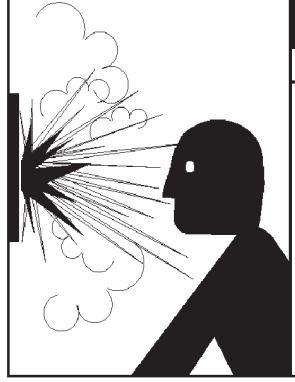
Water temperature over 125°F (52°C) can cause severe burns instantly resulting in severe injury or death.

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.



⚠ WARNING

Explosion Hazard



- 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

- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.
- Avoid all ignition sources if you smell LP gas.
- Do not expose water heater control to excessive gas pressure.
- Use only gas shown on rating plate.
- Maintain required clearances to combustibles.
- Keep ignition sources away from faucets after extended period of non-use.

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



GENERAL SAFETY

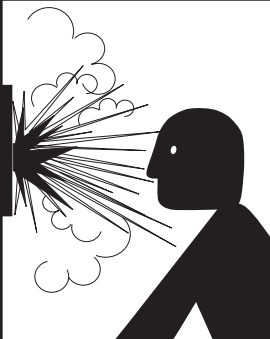
PRECAUTIONS

Do not use this water heater if any part has been under water. Immediately call a qualified service agency to inspect the water heater and to make a determination on what steps should be taken next.

If the unit is exposed to the following, do not operate heater until all corrective steps have been made by a qualified service agency.

1. External fire.
2. Damage.
3. Firing without water.

HYDROGEN GAS FLAMMABLE



! WARNING

Explosion Hazard

- Flammable hydrogen gases may be present.
- Keep all ignition sources away from faucet when turning on hot water.


Hydrogen gas can be produced in a hot water system served by this water heater that has not been used for a long period of time (generally two weeks or more). Hydrogen gas is extremely flammable. To reduce the risk of injury under these conditions, it is recommended that a hot water faucet served by this water heater be opened for several minutes before using any electrical appliance connected to the hot water system. If hydrogen is present there will probably be an unusual sound such as air escaping through the pipe as the water begins to flow. THERE SHOULD BE NO SMOKING OR OPEN FLAME NEAR THE FAUCET AT THE TIME IT IS OPEN.

CAUTION

Improper installation and use may result in property damage.

- 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.

Refer to instruction manual for installation and service.




! WARNING

- Before servicing the water heater, make sure the blower assembly is unplugged or the electrical supply to the water heater is turned "OFF".
- Label all wires prior to disconnection when servicing controls. Wiring error can cause improper and dangerous operation. Verify proper operation after servicing.
- Failure to do this could result in death, serious bodily injury, or property damage.

! WARNING


Breathing Hazard - Carbon Monoxide Gas



- Install vent system in accordance with codes.
- Do not operate water heater if flood damaged.
- High altitude orifice must be installed for operation above 7,700 feet (2,347m).
- Do not operate if soot buildup is present.
- Do not obstruct water heater air intake with insulating jacket.
- Do not place chemical vapor emitting products near water heater.
- Gas and carbon monoxide detectors are available.
- No vent damper installation is compatible with this power vented water heater.
- Form an approximately 8" diameter loop in the condensate hoses on top of the water heater to trap water and prevent the escape of combustion by-products.
- Do not elevate the condensate hose on the bottom of the water heater above the bracket attached to the side of the unit. This must be true for the entire length of the hose including the exit into an appropriate drain.
- Condensate lines must be free and clear of debris and must not allow back flow through the hose. The condensate lines must be able to flow freely to an appropriate drain.
- Do not allow condensate lines to become crimped closed.
- Analyze the entire vent system to make sure that condensate will not become trapped in a section of vent pipe and therefore reduce the open cross sectional area of the vent.

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

! DANGER



! Vapors from flammable liquids may explode and catch fire causing death or severe burns.

Do not use or store flammable products such as gasoline, solvents or adhesives in the same room or area near the water heater.

Keep flammable products:

1. far away from heater,
2. in approved containers,
3. tightly closed and
4. out of children's reach.

Water heater has a main burner and hot surface igniter. The hot surface igniter:

1. can come on at any time and
2. will ignite flammable vapors.

Vapors:

1. cannot be seen,
2. are heavier than air,
3. go a long way on the floor and
4. can be carried from other rooms to the hot surface igniter by air currents.

Installation:
Do not install the water heater at least 18" above the floor. This will reduce, but not eliminate, the risk of vapors being ignited by the main burner or hot surface igniter.

TABLE OF CONTENTS

SAFE INSTALLATION, USE AND SERVICE.....	2	Contaminated Air	18
APPROVALS	2	Venting	18
GENERAL SAFETY.....	3	U.S. Horizontal Vent Clearances	19
Precautions.....	4	Vent Pipe Termination.....	20
Hydrogen Gas Flammable.....	4	Planning the Vent System.....	20
INTRODUCTION.....	5	Blower Assembly Installation	21
Preparing for the Installation.....	5	Installation of Vent System.....	21
INSTALLATION REQUIREMENTS FOR THE COMMONWEALTH OF MASSACHUSETTS.....	6	Vent Terminal Installation, Sidewall.....	21
FEATURES AND COMPONENTS	7	Installation of Vent System, Sidewall	22
Replacement Parts and Delimiting Products.....	7	Installation of Vertical Vent System.....	22
INSTALLATION CONSIDERATIONS	8	TEMPERATURE REGULATION	24
Rough-In-Dimensions	8	FOR YOUR INFORMATION.....	25
Circulation Pumps.....	8	Start Up Conditions.....	25
Facts to Consider About the Location.....	9	Operational Conditions	25
Insulation Blankets.....	10	PERIODIC MAINTENANCE	26
INSTALLATION REQUIREMENTS	11	Venting System Inspection.....	26
Mixing Valves.....	11	Burner Operation and Inspection.....	26
Water Piping	11	Burner Cleaning.....	26
Closed Water Systems	11	Housekeeping	26
Thermal Expansion.....	11	Anode Rod Inspection.....	27
Temperature-Pressure Relief Valve.....	12	Temperature-Pressure Relief Valve Operation	27
Gas Supply Systems.....	13	Draining and Flushing.....	28
Supply Gas Regulator.....	13	Service.....	28
Gas Piping	13	LEAKAGE CHECKPOINTS.....	29
Sediment Trap.....	15	TROUBLESHOOTING GUIDELINES.....	30
Gas Line Leak Testing	15	Troubleshooting	30
Purging.....	15	WIRING DIAGRAMS.....	32
Filling the Water Heater	15	Circulation Pump Wiring Diagrams.....	33
Air Requirements.....	16	PIPING DIAGRAMS	34
Combustible Material Storage.....	18	NOTES:.....	40
		MODEL BTF LIMITED WARRANTY	43

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:

- ANSI - American National Standards Institute
- NFPA - National Fire Protection Association
- ASME - American Society of Mechanical Engineers
- AHRI - Air-Conditioning, Heating and Refrigeration Institute
- UL - Underwriters Laboratories Inc.
- CSA - Canadian Standards Association

This gas-fired water heater is design certified by Underwriters Laboratories Inc. under American National Standard for Gas Water Heaters ANSI Z21.10.3 - CSA 4.3 (current edition).

Qualified Installer or Service Agency Installation and service of this water heater requires ability equivalent to that of a Qualified Agency (as defined by ANSI below) in the field involved. Installation skills such as plumbing, air supply, venting, gas supply and electrical supply are required in addition to electrical testing skills when performing service.

ANSI Z223.1 2006 Sec. 3.3.83: "Qualified Agency" - "Any individual, firm, corporation or company that either in person or through a representative is engaged in and is responsible for (a) the installation, testing or replacement of gas piping or (b) the connection, installation, testing, repair or servicing of appliances and equipment; that is experienced in such work; that is familiar with all precautions required; and that has complied with all the requirements of the authority having jurisdiction." If you are not qualified (as defined by ANSI above) and licensed or certified as required by the authority having jurisdiction to perform a given task do not attempt to perform any of the procedures described in this manual. If you do not understand the instructions given in this manual do not attempt to perform any procedures outlined in this manual.

PREPARING FOR THE INSTALLATION

1. Read the "General Safety" section, page 3 and 4 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. The installation must conform with these instructions and the local code authority having jurisdiction. In the absence of local codes, the installation must comply with the current editions of the National Fuel Gas Code, ANSI Z223.1/NFPA 54 and the National Electrical Code, NFPA 70 or CAN/CSA-B149.1 the Natural Gas and Propane Installation Code and CSA C22.1. All documents are available from the Canadian Standards Association, 8501 East Pleasant Valley Road, Cleveland, OH 44131. NFPA documents are also available from the National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02269.
3. The water heater when installed must be grounded in accordance with the local codes, or in the absence of local codes: the National Electrical Code (NFPA 70) or the Canadian Electrical Code, CSA C22.1.
4. 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.
5. 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 Figure 1. and Figure 2.

Examine the location to ensure the water heater complies with the "Locating the New Water Heater" section in this manual.

6. 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 Office of the State Architect, 400 P Street, Sacramento, CA 95814.
7. 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. For more information see next page.

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.

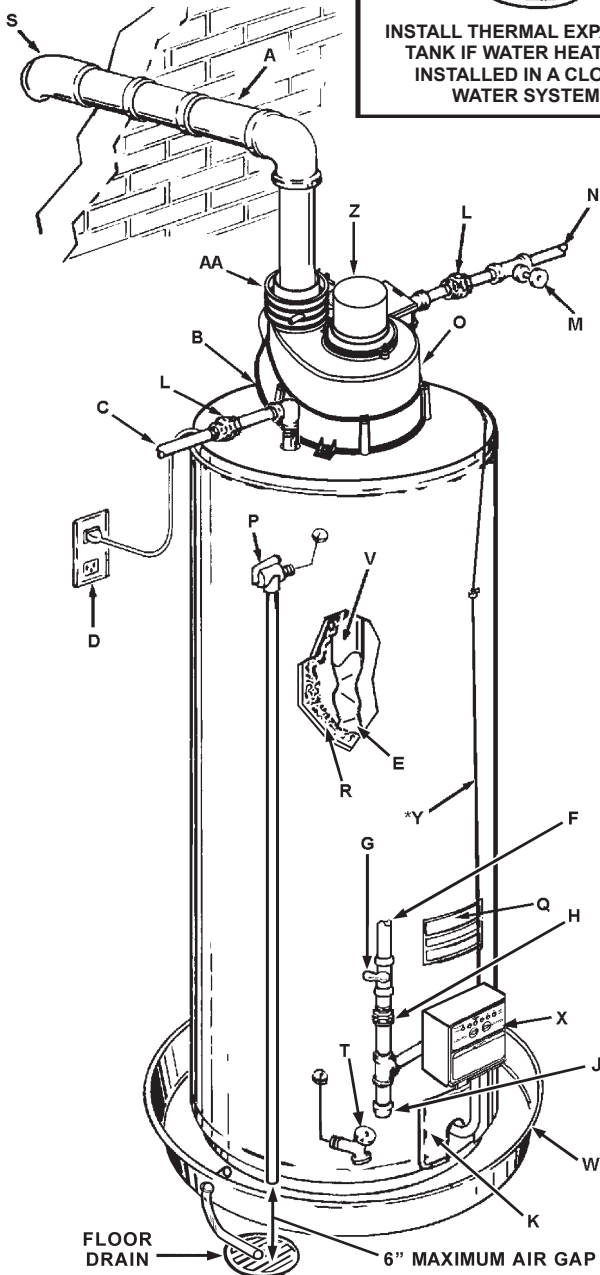
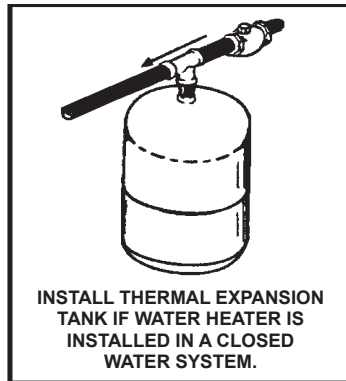
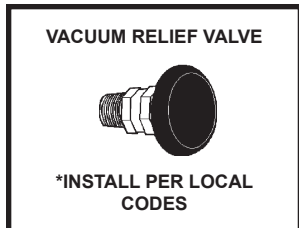
A copy of all installation instructions for all Product Approved side wall horizontally vented gas fueled equipment, all venting instructions, all parts lists for venting instructions, and/or all venting design instructions shall remain with the appliance or equipment at the completion of the installation.

FEATURES AND COMPONENTS

REPLACEMENT PARTS AND DELIMING PRODUCTS

Replacement parts and recommended delimer may be ordered through authorized servicers or distributors. Refer to the Yellow Pages for where to call or contact the water heater manufacturer at, 500 Tennessee Waltz Parkway, Ashland City, TN 37015. When ordering parts, please call 1-800-433-2545 and provide complete model and serial numbers (see rating plate), quantity and name of part desired, see Figure 1. Standard hardware items may be purchased locally.

- | | |
|------------------------------------|---|
| (A) VENT PIPE | (O) INLET DIP TUBE |
| (B) ANODE | (P) TEMPERATURE AND PRESSURE RELIEF VALVE |
| (C) HOT WATER OUTLET | (Q) RATING PLATE |
| (D) OUTLET (120 VAC) | (R) INSULATION |
| (E) FLUE BAFFLE | (S) VENT TERMINAL |
| (F) GAS SUPPLY | (T) DRAIN VALVE |
| (G) MAIN MANUAL GAS SHUT OFF VALVE | (U) IGNITER AND MAIN BURNER |
| (H) GROUND JOINT UNION | (V) FLUE |
| (J) SEDIMENT TRAP | (W) METAL DRAIN PAN |
| (K) OUTER DOOR | (X) GAS CONTROL/THERMOSTAT |
| (L) UNION | (Y) CONTROL HARNESS* |
| (M) INLET WATER SHUT OFF VALVE | (Z) MOTOR & BLOWER |
| (N) COLD WATER INLET | (AA) CONDENSATE FITTING |



CAUTION

Harness has 115 VAC in operation.

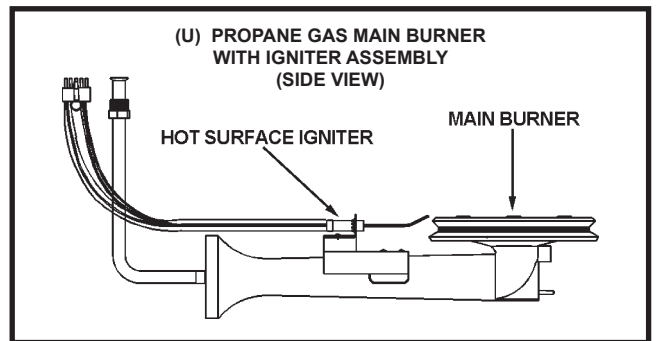
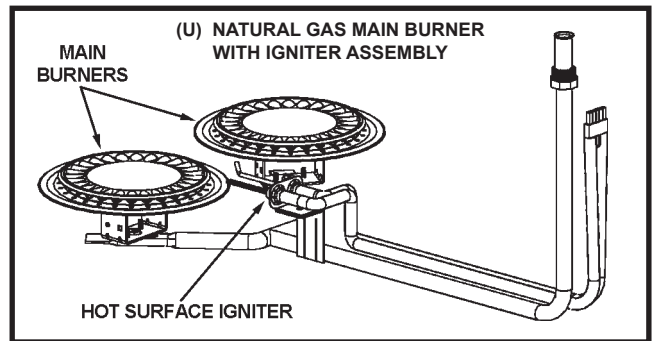
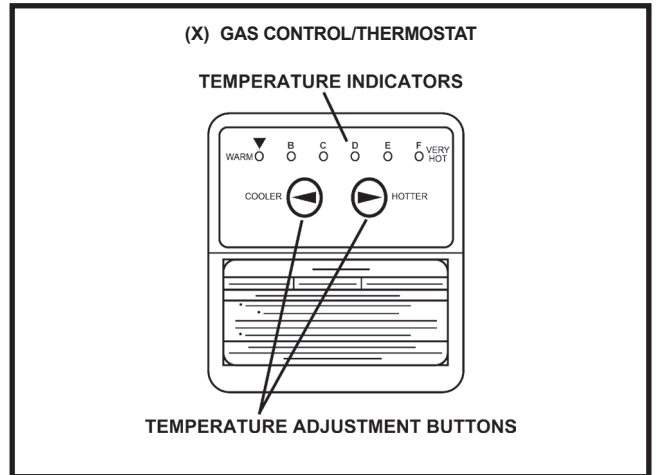


FIGURE 1.

INSTALLATION CONSIDERATIONS

ROUGH-IN-DIMENSIONS

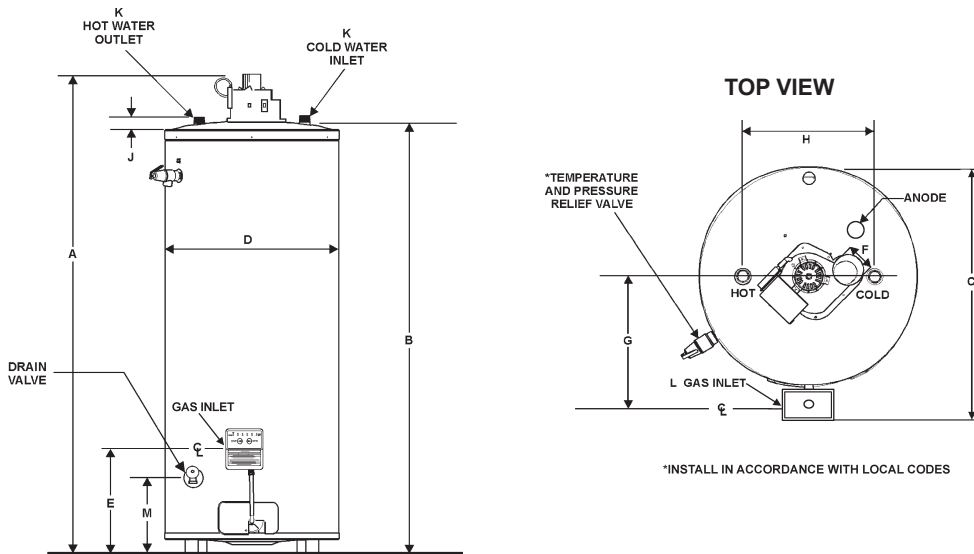


FIGURE 2.

TABLE 1.

Model	Units	A	B	C	D	E	F	G	H	J	K	L	M
BTF-80	inches	68.0	57 1/4	29 5/8	25 3/8	15	4	15 5/8	16	2	1	1/2	11 15/16
	cm	172.7	145.4	75.2	64.5	38.1	10.2	39.7	40.6	5.1	NPT	NPT	30.3

TABLE 2. - Recovery Capacities

Model	Input		Approx. Gal. Cap.	Approx. Liter Cap.	Temp. °C	17	22	28	33	39	44	50	56	61	67	72	78
	Rating Btu/Hr	Rating KW/Hr				Rise °F	30	40	50	60	70	80	90	100	110	120	130
BTF-80	80,000	23.4	74	284	LPH	979	734	587	489	419	367	326	294	267	245	226	210
					GPH	259	194	155	129	111	97	86	78	71	65	60	55

Recovery capacity based on 80% thermal efficiency.

CIRCULATION PUMPS

A circulating pump is used when a system requires a circulating loop or there is a storage tank used in conjunction with the water heater. See Water Piping Diagrams in this manual for installation location of circulating pumps.

See the Circulation Pump Wiring Diagrams in this manual for electrical hookup information. Install in accordance with the current edition of the National Electrical Code, NFPA 70 or the Canadian Electrical Code, CSA C22.1.

All bronze or stainless steel circulating pumps are recommended for used with commercial water heaters.

Some circulating pumps are manufactured with sealed bearings and do not require further lubrication. Some circulating pumps must be periodically oiled. Refer to the pump manufacturer's instructions for lubrication requirements.

This water heater has been design certified as complying with ANSI Z21.10.3-CSA 4.3 for water heaters and is considered suitable for:

Water (Potable) Heating and Space Heating: All models are considered suitable for water (potable) heating and space heating.

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, 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 22.

INSTALLATION CONSIDERATIONS

FACTS TO CONSIDER ABOUT THE LOCATION

Carefully choose an indoor location for the new water heater, because the placement is a very important consideration for the safety of the occupants in the building and for the most economical use of the water heater. **This water heater is not for use in manufactured (mobile) homes or outdoor installation.**

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

1. Select a location indoors as close as practical to the vent terminal or location to which the water heater vent piping is going to be connected, and as centralized with the water piping system as possible.
2. Selected location must provide adequate clearances for servicing and proper operation of the water heater.

CAUTION

Property Damage Hazard

- 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. Drain pans are available at your local hardware store. Such a drain pan must have a clearance of at least 1.0" (2.5cm) greater than any point on the water heater's outer jacket and must be piped to an adequate drain. The pan must not restrict combustion air flow. For example, if a circular pan is used, it must be a minimum of 27" (69cm) in diameter, see Figure 1.

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 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.

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 hot surface igniter or main burner. The resulting flashback and fire can cause death or

serious burns to anyone in the area.

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

⚠ WARNING

Fire or Explosion Hazard

- Avoid all ignition sources if you smell LP gas.
- Do not expose water heater control to excessive gas pressure.
- Use only gas shown on rating plate.
- Maintain required clearances to combustibles.
- Keep ignition sources away from faucets after extended period of non-use.



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



⚠ 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.



⚠ 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 water heater extending beyond the full width and depth of the water heater by at least 3" (7.6 cm) in any direction, or if the water heater 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.

⚠ 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.



Minimum clearances between the water heater and combustible construction are 0 inch at the sides and rear, 5.5" (14.0 cm) from the front and 12" (30.5 cm) from the top (standard clearance). If clearances stated on the heater differ from standard clearances, install water heater according to clearances stated on the heater.

Adequate clearance 24" (61.0 cm) for servicing this water heater should be considered before installation, such as changing the anodes, etc.

A minimum clearance of 5.5" (14.0 cm) must be allowed for access to replaceable parts such as the thermostats, drain valve and relief valve.

When installing the heater, consideration must be given to proper location. Location selected should be as close to the wall as practicable and as centralized with the water piping system as possible.

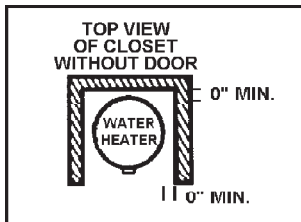


FIGURE 3.

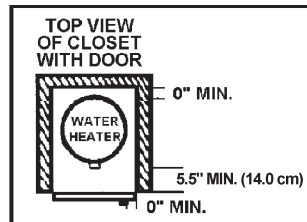



FIGURE 4.

A gas water heater cannot operate properly without the correct amount of air for combustion. Do not install in a confined area such as a closet, unless you provide air as shown in the "Locating The New Water Heater" section. 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 NFPA54.
- To avoid injury, combustion and ventilation air must be taken from outdoors.
- Do not place chemical vapor emitting products near water heater.

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

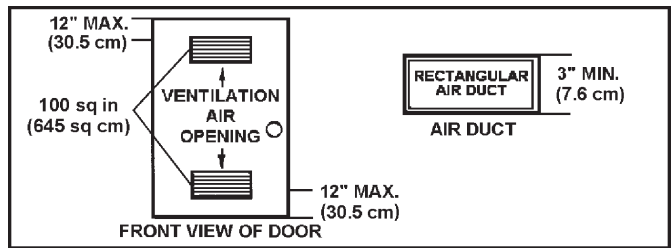


FIGURE 5.

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 react to form corrosive hydrochloric acid when exposed to the combustion products of the water heater. The results can be hazardous, and can also cause product failure.

INSULATION BLANKETS

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 Energy Policy 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.

⚠ WARNING
Breathing Hazard - Carbon Monoxide Gas



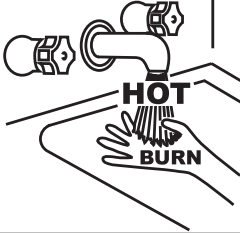
- Do not obstruct water heater air intake with insulating blanket.
- Gas and carbon monoxide detectors are available.
- Install water heater in accordance with the instruction manual.

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

- Do not apply insulation to the top of the water heater, as this will interfere with safe operation of the blower assembly.
- Do not cover the outer door, thermostat or temperature & pressure relief valve.
- Do not allow insulation to come within 2" (5.1 cm) 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.

INSTALLATION REQUIREMENTS

MIXING VALVES



⚠ 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 devices such as mixing valves must be installed when required by codes and to ensure safe temperatures at fixtures.

Water heated to a temperature which will satisfy clothes washing, dish washing, and other sanitizing needs can scald and cause permanent injury upon contact. Short repeated heating cycles caused by small hot water uses can cause temperatures at the point of use to exceed the water heater's temperature setting by up to 20°F (11°C).

Some people are more likely to be permanently injured by hot water than others. These include the elderly, children, the infirm and the physically/mentally disabled. Table 3. shows the approximate time-to-burn relationship for normal adult skin. If anyone using hot water provided by the water heater being installed fits into one of these groups or if there is a local code or state law requiring a certain water temperature at the point of use, then special precautions must be taken.

In addition to using the lowest possible temperature setting that satisfies the demand of the application a Mixing Valve should be installed at the water heater (see Figure 1.) or at the hot water taps to further reduce system water temperature.

Mixing valves are available at plumbing supply stores. Consult a Qualified Installer or Service Agency. Follow mixing valve manufacturer's instructions for installation of the valves.

TABLE 3.

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)

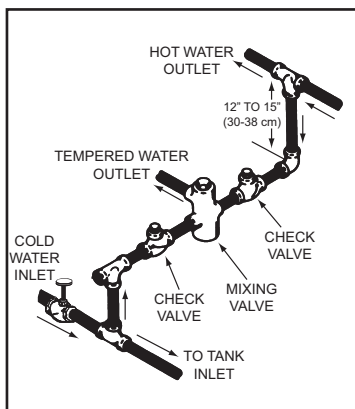
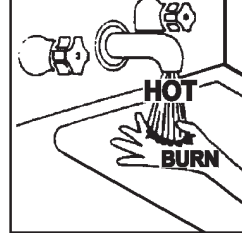


FIGURE 6.

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.

⚠ WARNING

Toxic Chemical Hazard

- Do not connect to non-potable water system.

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

All piping components connected to this unit for space heating applications should be suitable for use with potable water.

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

When the system requires water for space heating at temperatures higher than required for domestic water purposes, a mixing valve must be installed. Please refer to Figure 2. for suggested piping arrangement.

These water heaters cannot be used in space heating applications only

CLOSED WATER SYSTEMS

Water supply systems may, because of code requirements or such conditions as high line pressure, among others, have installed devices such as pressure reducing valves, check valves, and back flow preventers. Devices such as these cause the water system to be a closed system.

THERMAL EXPANSION

As water is heated, it expands (thermal expansion). In a closed system the volume of water will grow when it is heated. 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. This condition is not covered under the limited warranty. The Temperature-Pressure Relief Valve is not intended for the constant relief of thermal expansion.

A properly sized thermal expansion tank must be installed on all closed systems to control the harmful effects of thermal expansion. Contact a local plumbing service agency to have a thermal expansion tank installed.

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

All gas piping must comply with local codes and ordinances or with the National Fuel Gas Code (ANSI Z223.1/ NFPA-54). Copper and brass tubing and fittings (except tin lined copper tubing) should not be used.

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.

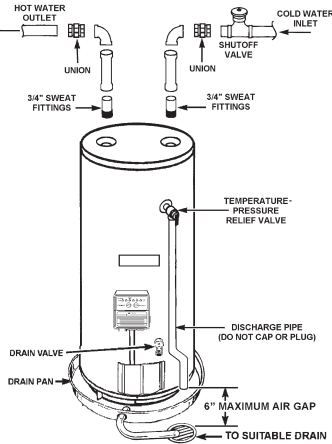


FIGURE 7.

Figure 7. shows typical attachment of water piping to water heater. The water heater is equipped with 3/4 inch NPT water connections.

NOTE: If using copper tubing, solder tubing to an adapter before attaching the adapter to the water heater connections. Do not solder the water lines directly to the water heater connections. It will harm the dip tube and damage the tank.

T & P Valve and Pipe Insulation (if supplied)

Remove insulation for T & P valve and pipe connections from carton.

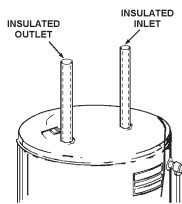
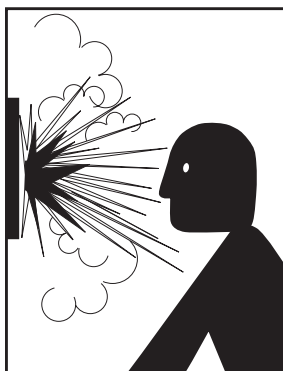


FIGURE 8.

Fit pipe insulation over the incoming cold water line and the hot water line. Make sure that the insulation is against the top cover of the heater. Fit T & P valve insulation over valve. Make sure that the insulation does not interfere with the lever of the T & P valve.

Secure all insulation using tape.

TEMPERATURE-PRESSURE RELIEF VALVE



WARNING

Explosion Hazard

- 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.
- Can result in overheating and excessive tank pressure.
- Can cause serious injury or death.

This water heater is provided with a properly rated/sized and certified combination Temperature-Pressure Relief Valve (T&P 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 for Hot Water Supply Systems, ANSI Z21.22 • CSA 4.4, and the code requirements of ASME.

If replaced, the new T&P valve must meet the requirements of local codes, but not less than a combination Temperature-Pressure Relief Valve rated/sized and certified as indicated in the above paragraph. The new 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 Btu/hr or kW input rate as shown on the water heater's model rating label.

NOTE: In addition to the factory installed Temperature-Pressure Relief Valve on the water heater, each remote storage tank that may be installed and piped to a water heater must also have its own properly sized, rated and approved Temperature-Pressure Relief Valve installed. Call the toll free technical support phone number listed on the back cover of this manual for technical assistance in sizing a Temperature-Pressure Relief Valve for remote storage tanks.

For safe operation of the water heater, the Temperature-Pressure 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. Install discharge piping so that any discharge will exit the pipe within 6 inches (15.2 cm) above an adequate floor drain, or external to the building. In cold climates it is recommended that it be terminated at an adequate drain inside the building. 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.

No valve or other obstruction is to be placed between the Temperature-Pressure Relief Valve and the tank. Do not connect discharge piping directly to the drain unless a 6" (15.2 cm) air gap is provided. To prevent bodily injury, hazard to life, or property damage, the relief valve must be allowed to discharge water in adequate 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

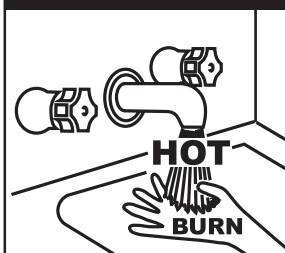
Water Damage Hazard

- Temperature-Pressure Relief Valve discharge pipe must terminate at adequate drain.

T&P Valve Discharge Pipe Requirements:

- 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 not be exposed to freezing temperatures.
- 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.
- Must terminate a maximum of six inches above a floor drain or 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 or other obstruction between the relief valve and the drain.

DANGER



- Burn hazard.
- Hot water discharge.
- Keep clear of Temperature-Pressure Relief Valve discharge outlet.

The Temperature-Pressure Relief Valve must be manually operated at least twice 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 in this manual, and replace the Temperature-Pressure Relief Valve with a properly rated/sized new one.

NOTE: The purpose of a Temperature-Pressure Relief Valve is to prevent excessive temperatures and pressures in the storage tank. The T&P valve is not intended for the constant relief of thermal expansion. A properly sized thermal expansion tank must be installed on all closed systems to control thermal expansion, see Closed Water Systems and Thermal Expansion on page 12.

If you do not understand these instructions or have any questions regarding the Temperature-Pressure Relief Valve call the toll free number listed on the back cover of this manual for technical assistance.

GAS SUPPLY SYSTEMS

Low pressure building gas supply systems are defined as those systems that cannot under any circumstances exceed 14" W.C. (1/2 PSI Gauge). These systems do not require pressure regulation. Measurements should be taken to insure that gas pressures are stable and fall within the requirements stated on the water heater rating plate. Readings should be taken with all gas burning equipment off (static pressure) and with all gas burning equipment running at maximum rate (dynamic pressure). The gas supply pressure must be stable within 1.5" W.C. from static to dynamic pressure to provide good performance. Pressure drops that exceed 1.5" W.C. may cause rough starting, noisy combustion or nuisance outages. Increases or spikes in static pressure during off cycles may cause failure to ignite or in severe cases damage to appliance gas valves. If your low pressure system does NOT meet these requirements, the installer is responsible for the corrections.

High Pressure building supply systems use pressures that exceed 14" W.C. (1/2 PSI Gauge). These systems must use field supplied regulators to lower the gas pressure to less than 14" W.C. (1/2 PSI Gauge). Water heaters require gas regulators that are properly sized for the water heater input and deliver the rating plate specified pressures. Gas supply systems where pressure exceeds 5 PSI often require multiple regulators to achieve desired pressures. Systems in excess of 5 PSI building pressure should be designed by gas delivery professionals for best performance. Water heaters connected to gas supply systems that exceed 14" W.C. (1/2 PSI Gauge) at any time must be equipped with a gas supply regulator.

All models require a minimum gas supply pressure of 5.0" W.C. for natural gas and 11.0" W.C. for propane gas. The minimum supply pressure is measured while gas is flowing (dynamic pressure). The supply pressure should never fall below 5.0" W.C. for natural gas and 11.0" W.C. for propane gas. The supply pressure should be measured with all gas fired appliances connected to the common main firing at full capacity. If the supply pressure drops more than 1.5" W.C. as gas begins to flow to the water heater then the supply gas system including the gas line and/or the gas regulator may be restricted or undersized. See Supply Gas Regulator section and Gas Piping section of this manual. The gas valve on all models has a maximum gas supply pressure limit of 14" W.C. The maximum supply pressure is measured while gas is not flowing (static pressure).

SUPPLY GAS REGULATOR

The maximum allowable gas supply pressure for this water heater is 14.0" W. C. (2.49 kPa) for natural gas and propane gas. Install a positive lock-up gas pressure regulator in the gas supply line if inlet gas pressure can exceed these pressures at any time.

If a positive lock-up regulator is required follow these instructions:

1. Positive lock-up gas pressure regulators must be rated at or above the input Btu/hr rating of the water heater they supply.
2. Supply gas regulators shall have inlet and outlet connections not less than the minimum supply gas line size for the water heater they supply. See Table 4. on page 14.

3. Positive lock-up gas pressure regulator(s) should be installed no closer than 3 feet (1 meter) and no farther than 8 feet (2.4 meters) from the water heater's inlet gas connection.
4. After installing the positive lock-up gas pressure regulator(s) an initial nominal supply pressure setting of 7.0" W.C. while the water heater is operating is recommended and will generally provide good water heater operation. Some addition adjustment maybe required later to maintain a steady gas supply pressure.
5. When installing multiple water heaters in the same gas supply system it is recommended that individual positive lock-up gas pressure regulators be installed at each unit.

GAS PIPING

Contact your local gas utility company to ensure that adequate gas service is available and to review applicable installation codes for your area.

Be sure that the gas meter has sufficient capacity to supply the rated gas input of the water heater as well as the requirements of all other gas fired equipment supplied by the meter. If the gas meter is undersized, the gas company will have to install a properly sized gas meter.



Make sure the gas supplied is the same type listed on the model rating plate. The inlet gas pressure must not exceed 14.0" W.C. (2.49 kPa) water column (3.5 kPa) for natural and propane gas (L.P.). The minimum inlet gas pressure shown on the rating plate is that which will permit firing at rated input.

The water heaters covered in this manual require supply gas regulators to maintain required supply gas pressure. Exposure to higher gas supply pressure may cause damage to the gas controls which could result in fire or explosion. If overpressure has occurred such as through improper testing of gas lines or malfunction of the supply system the water heater's gas valve must be checked for safe operation by a Qualified Service Agency. Ensure supply regulator vent lines and the safety vent valves are protected against blockage. These are components of the gas supply system, not the water heater. Vent blockage may occur during ice storms.

It is important to guard against gas valve fouling from contaminants in the gas ways. Such fouling may cause improper operation, fire or explosion. If copper supply lines are used they must be internally tinned and certified for gas service.

GAS LINE SIZING

Depending on the developed equivalent length and/or the number of appliances connected to a common main, the size of supply gas lines may have to be increased.

Size the supply/main gas line(s) in accordance with Table 4. or Table 5. The values given in Table 4. and Table 5. are for straight lengths of iron pipe at 0.5" W. C. (125 Pa) pressure drop, which is considered normal for low pressure systems. Note that fittings such as elbows and tees will add to the pipe pressure drop.

Schedule 40 Steel or Wrought Iron Pipe is the preferred material for the gas line of this water heater. It is imperative to follow the sizing recommendations in the latest version of the National Fuel Gas Code if Corrugated Stainless Steel Tubing (CSST) is used as the gas line for this water heater.

SUPPLY GAS LINE SIZING U. S. UNITS

TABLE 4.

LENGTH IN FEET	NORMAL IRON PIPE SIZES (INCHES) INPUT IN THOUSANDS BTU/HR					
	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"
10	175	360	680	1400	2100	3960
20	120	250	485	950	1460	2750
30	97	200	375	770	1180	2200
40	82	170	320	660	990	1900
50	73	151	285	580	900	1680
60	66	138	260	530	810	1520
70	61	125	240	490	750	1400
80	57	118	220	460	690	1300
90	53	110	205	430	650	1220
100	50	103	195	400	620	1150
125	44	93	175	360	550	1020
150	40	84	160	325	500	950
175	37	77	145	300	460	850
200	35	72	135	280	430	800

SUPPLY GAS LINE SIZING METRIC UNITS

TABLE 5.

LENGTH IN METERS	NORMAL IRON PIPE SIZES (INCHES) INPUT IN KW					
	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"
3.0	51	105	199	410	615	1160
6.1	35	73	142	278	428	805
9.1	28	59	110	225	346	644
12.2	24	50	94	193	290	556
15.2	21	44	83	170	264	492
18.3	19	40	76	155	237	445
21.3	18	37	70	143	220	410
24.4	17	35	64	135	202	381
27.4	16	32	60	126	190	357
30.5	15	30	57	117	182	337
38.1	13	27	51	105	161	299
45.7	12	25	47	95	146	278
53.3	11	23	42	88	135	249
61.0	10	21	40	82	126	234

Failure to replace the standard orifice with a high altitude orifice when installed could result in improper and inefficient operation of the water heater, producing carbon monoxide gas in excess of safe limits, which could result in serious injury or death. Contact your gas supplier for any specific changes which may be required in your area.

⚠ WARNING

Fire and Explosion Hazard

- Use joint compound or tape compatible with propane.
- Leak test before operating heater.
- Disconnect gas piping and shut-off valve before pressure testing system.

Use pipe joint compound or teflon tape marked as being resistant to the action of petroleum [Propane (L.P.)] gases.

The water heater and its gas connection must be leak tested before placing the water heater in operation.

The water heater and its individual shut-off valve should be disconnected from the gas supply piping system during any pressure testing of that system at test pressures in excess of 1/2 pound per square inch (3.5 kPa). It should be isolated from the gas supply piping system by closing its individual manual shut-off valve during any pressure testing of the gas supply piping system at test pressures equal to or less than 1/2 pound per square inch (3.5 kPa).

Connecting the gas piping to the gas control valve of the water heater can be accomplished by either of two methods shown in Figure 9. and Figure 10.

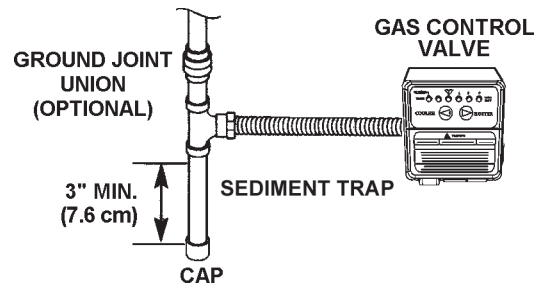


FIGURE 9.

GAS PIPING WITH FLEXIBLE CONNECTOR.

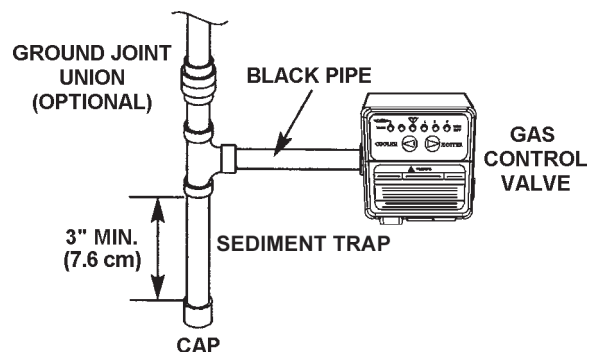


FIGURE 10.

GAS PIPING WITH ALL BLACK IRON PIPE TO GAS CONTROL.

⚠ WARNING


Breathing Hazard - Carbon Monoxide Gas

- High altitude orifice must be installed for operation above 7,700 feet (2,347m).
- Contact a qualified installer or service agency.

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

When installed at elevations above 7,700 feet (2,347 meters), input rating should be reduced at the rate of 4 percent for each 1,000 feet (305 meters) above sea level which requires replacement of the burner orifice in accordance with National Fuel Gas Code (ANSI Z223.1/ NFPA 54). Contact your local gas supplier for further information.


SEDIMENT TRAP

	<h3>⚠ WARNING</h3>
	<h4>Fire and Explosion Hazard</h4> <ul style="list-style-type: none"> Contaminants in gas lines can cause fire or explosion. Clean all gas piping before installation. Install sediment trap in accordance with NFPA54.

A sediment trap should be installed as close to the inlet of the water heater as practical at the time of water heater installation. The sediment trap should 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 should be installed in conformance with one of the methods of installation shown in Figure 9. and Figure 10.

Contaminants in the gas lines may cause improper operation of the gas control valve 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 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).

GAS LINE LEAK TESTING

	<h3>⚠ WARNING</h3>
	<h4>Fire and Explosion Hazard</h4> <ul style="list-style-type: none"> Use joint compound or Teflon tape compatible with propane gas. Leak test before placing the water heater in operation. Disconnect gas piping and main gas shutoff valve before leak testing. Install sediment trap in accordance with NFPA 54.

Any time work is done on the gas supply system perform a leak test to avoid the possibility of fire or explosion.

- For test pressures exceeding 1/2 psi (3.45 kPa) disconnect the water heater and its Main Gas Shutoff Valve from the gas supply piping system during testing, see Figure 11. The gas supply line must be capped when disconnected from the water heater.
- For test pressures of 1/2 psi (3.45 kPa) or less, the water heater need not be disconnected, but must be isolated from the supply gas line by closing the Main Gas Shutoff Valve during testing.
- Paint all supply gas line joints and connections upstream of the water heater with a rich soap and water solution to test for leaks. Bubbles indicate a gas leak. Do not use matches, candles, flame or other sources of ignition for this purpose.
- Repair any leaks before placing the water heater in operation.

PURGING

Gas line purging is required with new piping or systems in which air has entered.

Purging should be performed per the current edition of NFPA 54 the National Fuel Gas Code.

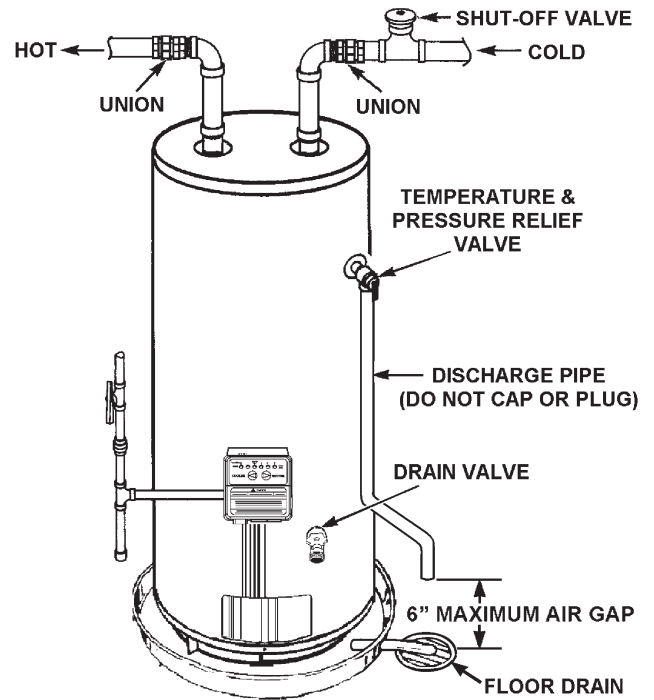


FIGURE 11.

FILLING THE WATER HEATER



<h2>CAUTION</h2>
<h3>Property Damage Hazard</h3>
<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:

- 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.
- 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.**
- To insure 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.
- Check all water piping and connections for leaks. Repair as needed.

AIR REQUIREMENTS

 WARNING	
Breathing Hazard - Carbon Monoxide Gas	
	<ul style="list-style-type: none">• Install water heater in accordance with the Instruction Manual and NFPA 54 or CAN/CSA-B149.1.• 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.	

For safe operation an adequate supply of fresh uncontaminated air for combustion and ventilation must be provided.

An insufficient supply of air can cause recirculation of combustion products resulting in contamination that may be hazardous to life. Such a condition often will result in a yellow, luminous burner flame, causing sooting of the combustion chamber, burners and flue tubes and creates a risk of asphyxiation.

Do not install the water heater in a confined space unless an adequate supply of air for combustion and ventilation is brought in to that space using the methods described in the Confined Space section that follows.

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 property damage, serious bodily injury or death.

UNCONFINED SPACE

An Unconfined Space is one whose volume IS NOT LESS THAN 50 cubic feet per 1,000 Btu/hr (4.8 cubic meters per kW) of the total input rating of all appliances installed in the space. Rooms communicating directly with the space, in which the appliances are installed, through openings not furnished with doors, are considered a part of the unconfined space.

Makeup air requirements for the operation of exhaust fans, kitchen ventilation systems, clothes dryers and fireplaces shall also be considered in determining the adequacy of a space to provide combustion, ventilation and dilution air.

UNUSUALLY TIGHT CONSTRUCTION

In unconfined spaces in buildings, infiltration may be adequate to provide air for combustion, ventilation and dilution of flue gases. However, in buildings of unusually tight construction (for example, weather stripping, heavily insulated, caulked, vapor barrier, etc.) additional air must be provided using the methods described in the Confined Space section that follows.

CONFINED SPACE

A Confined Space is one whose volume IS LESS THAN 50 cubic feet per 1,000 Btu/hr (4.8 cubic meters per kW) of the total input rating of all appliances installed in the space.

Openings must be installed to provide fresh air for combustion, ventilation and dilution in confined spaces. The required size for the openings is dependent on the method used to provide fresh air to the confined space AND the total Btu/hr input rating of all appliances installed in the space.

DIRECT VENT APPLIANCES

Appliances installed in a Direct Vent configuration that derive all air for combustion from the outdoor atmosphere through sealed intake air piping are not factored in the total appliance input Btu/hr calculations used to determine the size of openings providing fresh air into confined spaces.

EXHAUST FANS

Where exhaust fans are installed, additional air shall be provided to replace the exhausted air. When an exhaust fan is installed in the same space with a water heater, sufficient openings to provide fresh air must be provided that accommodate the requirements for all appliances in the room and the exhaust fan. Undersized openings will cause air to be drawn into the room through the water heater's vent system causing poor combustion. Sooting, serious damage to the water heater and the risk of fire or explosion may result. It can also create a risk of asphyxiation.

LOUVERS AND GRILLES

The free areas of the fresh air openings in the instructions that follow do not take in to account the presence of louvers, grilles or screens in the openings.

The required size of openings for combustion, ventilation and dilution air shall be based on the "net free area" of each opening. Where the free area through a design of louver or grille or screen is known, it shall be used in calculating the size of opening required to provide the free area specified. Where the louver and grille design and free area are not known, it shall be assumed that wood louvers will have 25% free area and metal louvers and grilles will have 75% free area. Non motorized louvers and grilles shall be fixed in the open position.

FRESH AIR OPENINGS FOR CONFINED SPACES

The following instructions shall be used to calculate the size, number and placement of openings providing fresh air for combustion, ventilation and dilution in confined spaces. The illustrations shown in this section of the manual are a reference for the openings that provide fresh air into confined spaces only. **DO NOT** refer to these illustrations for the purpose of vent installation. See Venting Installation on page 18 for complete venting installation instructions.

OUTDOOR AIR THROUGH TWO OPENINGS

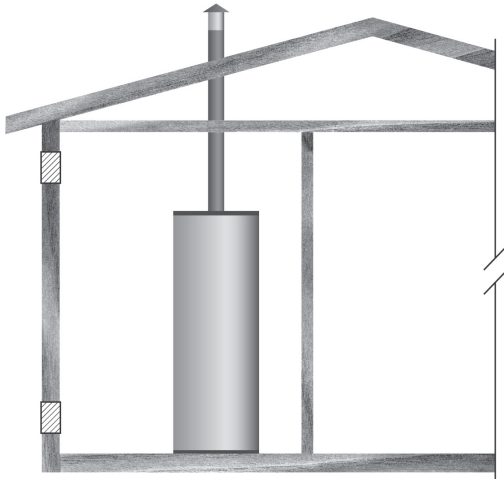


FIGURE 12.

The confined space shall be provided with two permanent openings, one commencing within 12 inches (300 mm) of the top and one commencing within 12 inches (300 mm) of the bottom of the enclosure. The openings shall communicate directly with the outdoors. See Figure 12.

Each opening shall have a minimum free area of 1 square inch per 4,000 Btu/hr (550 mm² per kW) of the aggregate input rating of all appliances installed in the enclosure. Each opening shall not be less than 100 square inches (645 cm²).

OUTDOOR AIR THROUGH ONE OPENING

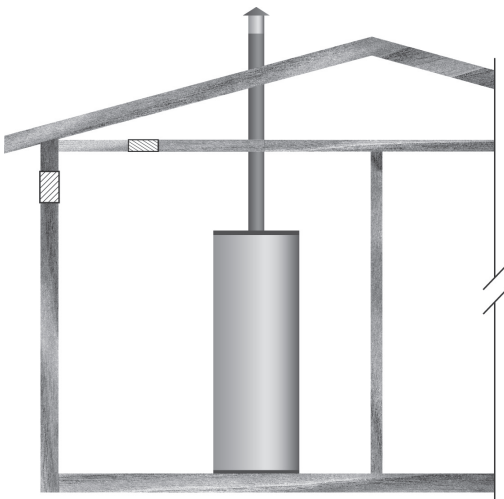


FIGURE 13.

Alternatively a single permanent opening, commencing within 12 inches (300 mm) of the top of the enclosure, shall be provided. See Figure 13. The water heater shall have clearances of at least 1 inch (25 mm) from the sides and back and 6 inches (150 mm) from the front of the appliance. The opening shall directly communicate with the outdoors or shall communicate through a vertical or horizontal duct to the outdoors or spaces that freely communicate with the outdoors and shall have a minimum free area of the following:

1. 1 square inch per 3000 Btu/hr (733 mm² per kW) of the total input rating of all appliances located in the enclosure, and

2. Not less than the sum of the areas of all vent connectors in the space.

OUTDOOR AIR THROUGH TWO HORIZONTAL DUCTS

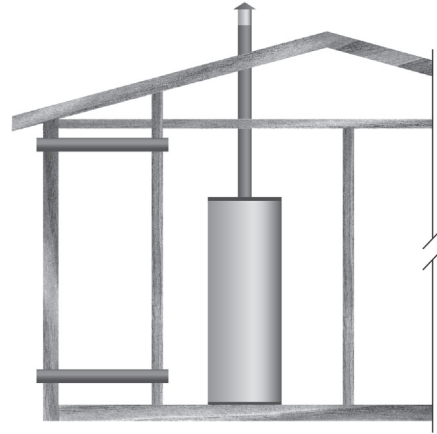


FIGURE 14.

The confined space shall be provided with two permanent horizontal ducts, one commencing within 12 inches (300 mm) of the top and one commencing within 12 inches (300 mm) of the bottom of the enclosure. The horizontal ducts shall communicate directly with the outdoors. See Figure 14.

Each duct opening shall have a minimum free area of 1 square inch per 2,000 Btu/hr (1100 mm² per kW) of the aggregate input rating of all appliances installed in the enclosure.

When ducts are used, they shall be of the same cross sectional area as the free area of the openings to which they connect. The minimum dimension of rectangular air ducts shall be not less than 3 inches.

OUTDOOR AIR THROUGH TWO VERTICAL DUCTS

The illustrations shown in this section of the manual are a reference for the openings that provide fresh air into confined spaces only.

DO NOT refer to these illustrations for the purpose of vent installation. See Venting Installation on page 18 for complete venting installation instructions.

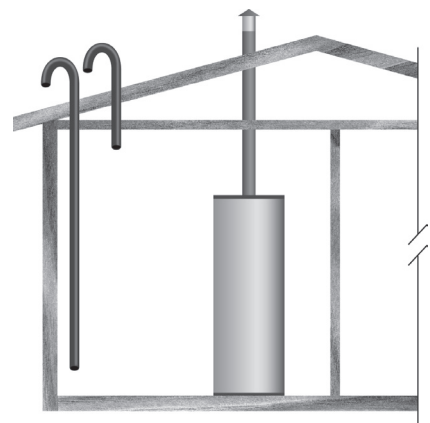


FIGURE 15.

The confined space shall be provided with two permanent vertical ducts, one commencing within 12 inches (300 mm) of the top and one commencing within 12 inches (300 mm) of the bottom of the enclosure. The vertical ducts shall communicate directly with the outdoors. See Figure 15.

Each duct opening shall have a minimum free area of 1 square inch per 4,000 Btu/hr (550 mm² per kW) of the aggregate input rating of all appliances installed in the enclosure.

When ducts are used, they shall be of the same cross sectional area as the free area of the openings to which they connect. The minimum dimension of rectangular air ducts shall be not less than 3 inches.

AIR FROM OTHER INDOOR SPACES

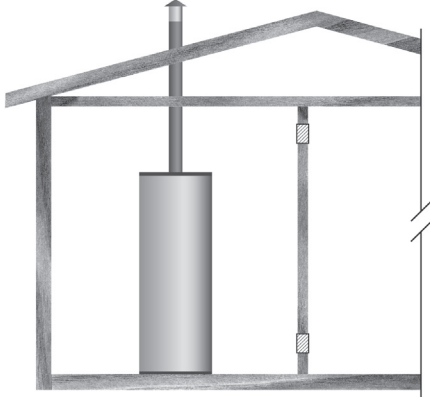




FIGURE 16.

The confined space shall be provided with two permanent openings, one commencing within 12 inches (300 mm) of the top and one commencing within 12 inches (300 mm) of the bottom of the enclosure. See Figure 16.

Each opening shall communicate directly with an additional room(s) of sufficient volume so that the combined volume of all spaces meets the criteria for an Unconfined Space.


Each opening shall have a minimum free area of 1 square inch per 1,000 Btu/hr (2200 mm² per kW) of the aggregate input rating of all appliances installed in the enclosure. Each opening shall not be less than 100 square inches (645 cm²).

COMBUSTIBLE MATERIAL STORAGE

⚠ 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. • Avoid all ignition sources if you smell gas. • Do not expose water heater controls to excessive gas pressure. • Use only the gas shown on the water heater rating label. • Maintain required clearances to combustibles. • Keep ignition sources away from faucets after extended periods of non-use. 	
	<p>Read instruction manual before installing, using or servicing water heater.</p> 

Keep water heater area clear and free of combustible materials, gasoline and other flammable vapors and liquids.

CONTAMINATED AIR

⚠ WARNING	
Breathing Hazard - Carbon Monoxide Gas	
	<ul style="list-style-type: none"> • Install water heater in accordance with the Instruction Manual and NFPA 54 or CAN/CSA-B149.1. • To avoid injury, combustion and ventilation air must be taken from outdoors. • Do not place chemical vapor emitting products near water heater.
<p>Breathing carbon monoxide can cause brain damage or death. Always read and understand instruction manual.</p>	


Corrosion of the flue ways and vent system may occur if air for combustion contains certain chemical vapors. Such corrosion may result in failure and risk of asphyxiation.

Combustion air that is contaminated can greatly diminish the life span of the water heater and water heater components such as hot surface igniters and burners. Propellants of aerosol sprays, beauty shop supplies, water softener chemicals and chemicals used in dry cleaning processes that are present in the combustion, ventilation or ambient air can cause such damage.

Do not store products of this sort near the water heater. Air which is brought in contact with the water heater should not contain any of these chemicals. If necessary, uncontaminated air should be obtained from remote or outdoor sources. The limited warranty is voided when failure of water heater is due to a corrosive atmosphere. (See limited warranty for complete terms and conditions).

If the 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(s) be installed in a Direct Vent configuration so that all air for combustion is derived directly from the outdoor atmosphere through a sealed intake air pipe. See Venting Installation on page 18.

VENTING

⚠ 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 7,700 feet (2,347m). • Do not operate if soot buildup. • Do not obstruct water heater air intake with insulating jacket. • Do not place chemical vapor emitting products near water heater. • Gas and carbon monoxide detectors are available. • Never operate the heater unless it is vented to the outdoors and has adequate air supply to avoid risks of improper operation, fire, explosion or asphyxiation. • Analyze the entire vent system to make sure that condensate will not become trapped in a section of vent pipe and therefore reduce the open cross sectional area of the vent.
<p>Breathing carbon monoxide can cause brain damage or death. Always read and understand instruction manual.</p>	

U.S. HORIZONTAL VENT CLEARANCES

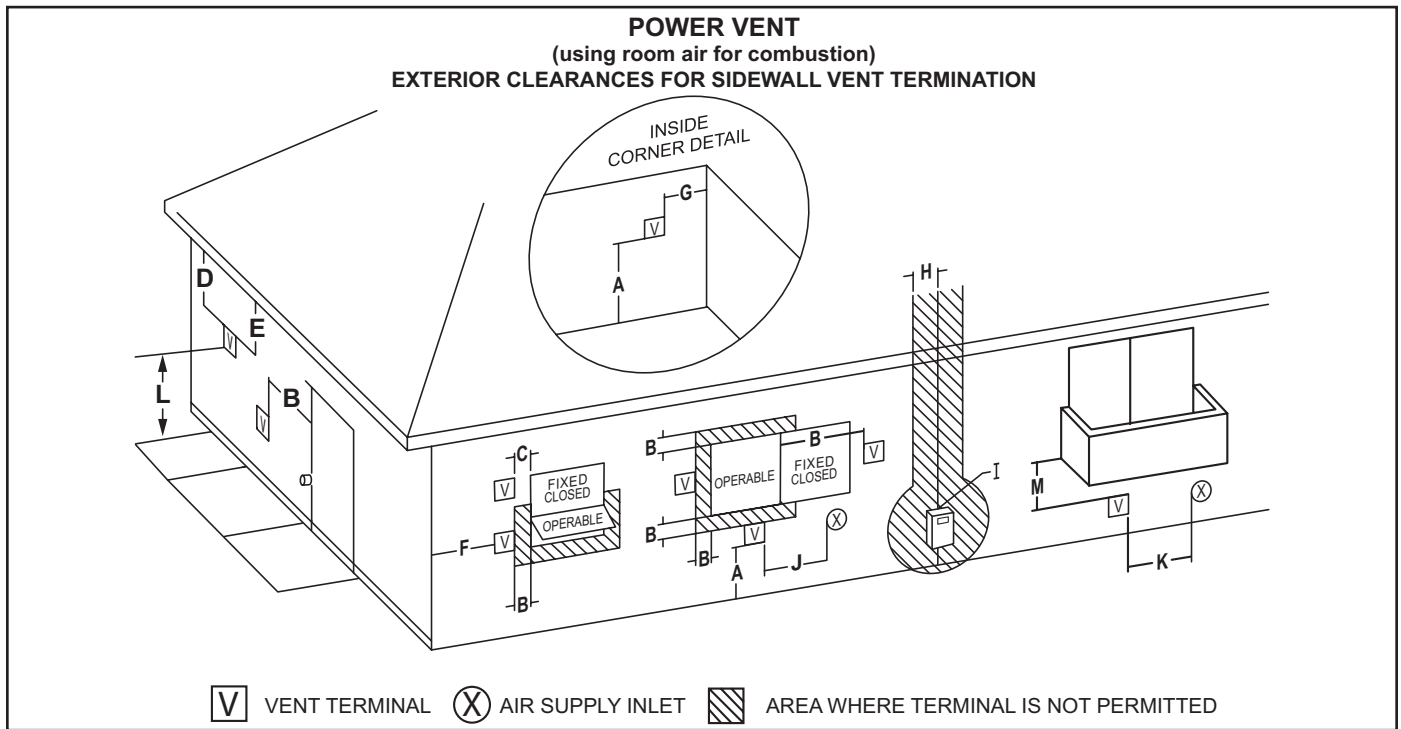


FIGURE 17.

Vent terminal clearances for “Power Vent” installations. Power Vent configurations use room air for combustion.

	CANADIAN INSTALLATIONS ¹		US INSTALLATIONS ²		CANADIAN INSTALLATIONS ¹		US INSTALLATIONS ²	
A	Clearance above grade, veranda, porch, deck or balcony	12 inches (30 cm)	12 inches (30 cm)	H	Clearance to each side of center line extended above meter/regulator assembly	3 feet (91 cm) within a height 15 feet (4.5 m) above the meter/regulator assembly	3 feet (91 cm) within a height 15 feet (4.5 m) above the meter/regulator assembly*	
B	Clearance to window or door that may be opened	6 inches (15 cm) for appliances up to 10,000 Btu/hr (3 kW), 12 inches (30 cm) for appliances between 10,000 Btu/hr (3 kW) and 100,000 Btu/hr (30 kW), 36 inches (91 cm) for appliances above 100,000 Btu/hr (30 kW)	4 feet (1.2 m) below or to side of opening; 1 foot (30 cm) above opening	I	Clearance to service regulator vent outlet	3 feet (91 cm)	3 feet (91 cm)*	
C	Clearance to permanently closed window	12 inches (30 cm)*	12 inches (30 cm)*	J	Clearance to a non mechanical air supply inlet into building or combustion air inlet to any other appliance	6 inches (15 cm) for appliances up to 10,000 Btu/hr (3 kW), 12 inches (30 cm) for appliances between 10,000 Btu/hr (3 kW) and 100,000 Btu/hr (30kW), 36 inches (91 cm) for appliances above 100,000 Btu/hr (30 kW)	4 feet (1.2 m) below or to side of opening; 1 foot (30 cm) above opening.	
D	Vertical clearance to ventilated soffit located above the terminal within a horizontal distance of 2 feet (61 cm) from the center line of the terminal	12 inches (30 cm)*	12 inches (30 cm)*	K	Clearance to a mechanical air supply inlet	6 feet (1.83 m)	3 feet (91 cm) above if within 10 feet (3 m) horizontally	
E	Clearance to unventilated soffit	12 inches (30 cm)*	12 inches (30 cm)*	L	Clearance above paved sidewalk or paved driveway located on public property	7 feet (2.13 m)†	7 feet (2.13 m)	
F	Clearance to outside corner	2 feet (60 cm)*	2 feet (60 cm)*	M	Clearance under veranda, porch, deck, or balcony	12 inches (30 cm) ‡	12 inches (30 cm) ‡	
G	Clearance to inside corner	18 inches (45 cm)*	18 inches (45 cm)*					

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

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

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

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

* Clearance in accordance with local installation codes and the requirements of the gas supplier and the manufacturer’s installation instructions.

VENT PIPE TERMINATION

The first step is to determine where the vent pipe will terminate. The vent may terminate through the roof as shown in Figure 21. or through a sidewall as shown in Figure 20.

IMPORTANT

The vent system must terminate so that proper clearances are maintained as cited in local codes or the current edition of the National Fuel Gas Code, ANSI Z223.1 or the Natural Gas and Propane Installation Code CAN/CSA-B149.1, see Figure 17.

For your convenience instructions on proper installation through a sidewall are provided in Figure 19.

PLANNING THE VENT SYSTEM

Plan the route of the vent system from the discharge of the blower to the planned location of the vent terminal.

1. Layout the total vent system to use a minimum of vent pipe and elbows. Take into consideration that an elbow will be necessary to make the first vent pipe connection to the power venter outlet, see Figure 18.
2. This water heater is capable of venting the flue gases the equivalent of thirty (30) feet of 3 inch pipe or one-hundred (100) feet of 4 inch pipe as listed in Table 6.

TABLE 6.

Number of 90° Elbows	3" Maximum Pipe (Feet)	4" Maximum Pipe Feet
ONE (1)	25	92
TWO (2)	20	84
THREE(3)	15	76
FOUR (4)	10	68
FIVE (5)	- - -	60

Minimum of one (1) elbow and 2 feet of straight pipe must be installed for 3" and 4" pipe.

NOTE: The equivalent feet of pipe listed above are exclusive of the "45° Elbow" termination. That is, the termination "45° Elbow", with installed screen, is assumed to be in the system and the remainder of the system must not exceed the thirty (30) equivalent feet of 3 inch pipe or one-hundred (100) equivalent feet of 4 inch pipe.

3. The blower discharge adapter is made to accept only straight sections of 3" pipe. To start a minimum of 2 inches of 3" pipe must be attached to the blower discharge, see Figure 17.

If using 3 inch vent pipe:

A minimum of 2 inches, maximum of 4 feet of 3" pipe must be attached to the blower before the first 3-inch elbow. After the first elbow add the additional venting required for the installation. The total system cannot exceed 30 equivalent feet of venting, where each elbow is equal to 5 feet of straight pipe.

If using 4 inch vent pipe:

Two inches of 3" pipe must be attached to the blower discharge. A 4" x 3" reducer is added and then up to maximum 4 feet of 4 inch pipe added before the first elbow. An additional 4" x 3" reducer and (1) foot of 3" pipe must be added to the end of the vent system before terminating into the 3" 45° elbow. The total system cannot exceed 100 equivalent feet of 4" venting, where each elbow is equal to 8 feet of straight pipe.

APPROVED VENT MATERIAL

Approved vent and intake air pipe materials that may be used in the United States:

- PVC Schedule 40 (ASTm D 2241 / CSA B181.2, ASTm D1785 / CSA B137.3
- CPVC Schedule 40 (ASTm F-411 / CSA B137.6)
- ABS (ASTm D-2661)

Approved vent and intake air pipe materials that must be used in Canada:

- ULC S636 PVC / CPVC

field supplied fittings

Field supplied fittings should be equivalent to the piping material being installed. Field installed/supplied fittings will add equivalent feet to the vent or intake air piping as indicated below. All field supplied/installed fittings and piping must be factored into the equivalent feet calculations.

- 90° elbows (short or long radius) are equivalent to 5 linear feet (152 cm) of pipe.
- 45° elbows (short or long radius) are equivalent to 2.5 linear feet (76 cm) of pipe.

primer and cement

Tetrahydrofuran (THF) primer should be used to prepare the surfaces of pipe and fittings for solvent welding. if CPVC or ABS pipe and fittings are used, then the proper cement must be used for all joints, including joining the pipe to the factory provided terminations (PVC material). PVC materials should use ASTm D-2564 Grade Cement; CPVC materials should use ASTm F-493 Grade Cement and ABS materials should use ASTm D-2235 Grade Cement.

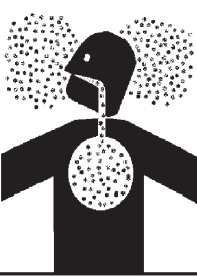
NOTE: A. For water heaters in locations with high ambient temperatures (above 100°F) it is recommended that CPVC or ABS pipe and fittings be used. B. A 22.5 degree elbow (2" vent pipe) or a 45 degree elbow (3" and 4" vent pipe) with an installed screen VENT TERMINAL must be used in all cases.

CONDENSATE

Condensate formation does not occur in all installations of power vented water heaters, but should be protected against on installations where it can form in the venting system. Condensation in the venting system of power vented water heaters is dependent upon installation conditions including, but not limited to ambient temperature and humidity of installation location, ambient temperature and humidity of venting space, vent discharge and slope, and product usage. In certain conditions, installations in unconditioned space or having long horizontal or vertical vent runs may accumulate condensate. In these conditions, the vent pipe should be sloped downward away from the blower assembly (not less than 1/8" (3.2 mm) nor greater than 1/2" (12.7 mm) per foot maximum). If the vent piping is vented level or sloped upwards away from the blower assembly, then adequate means for draining and disposing of the condensate needs to be made by the installer (if condensate is detected). If you have condensate, then a 3/8" drain hose can be connected to the built-in drain port of the rubber boot on the blower assembly. For your convenience, the rubber boot is supplied with a removable cap on the built-in drain port. Prior to operating the water heater, make sure the removable cap is installed on the drain port (if a drain hose is not needed).

⚠ WARNING


Breathing Hazard - Carbon Monoxide Gas



- Form an approximately 8" diameter loop in the condensate hoses on top of the water heater to trap water and prevent the escape of combustion by-products.
- Do not elevate the condensate hose on the bottom of the water heater above the bracket attached to the side of the unit. This must be true for the entire length of the hose including the exit into an appropriate drain.
- Condensate lines must be free and clear of debris and must not allow back flow through the hose. The condensate lines must be able to flow freely to an appropriate drain.
- Do not allow condensate lines to become crimped closed.
- Analyze the entire vent system to make sure that condensate will not become trapped in a section of vent pipe and therefore reduce the open cross sectional area of the vent.

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

BLOWER ASSEMBLY INSTALLATION



⚠ WARNING

- Before servicing the water heater, make sure the blower assembly is unplugged or the electrical supply to the water heater is turned "OFF".
- Label all wires prior to disconnection when servicing controls. Wiring error can cause improper and dangerous operation. Verify proper operation after servicing.
- Failure to do this could result in death, serious bodily injury, or property damage.

1. Check to make sure that the wire harness is attached to the gas valve and blower control box.
2. Make sure no material is still attached to the outside or inside of blower assembly.

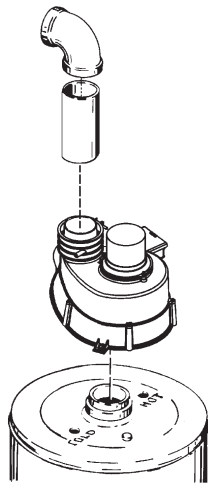


FIGURE 18.
BLOWER ASSEMBLY

3. Make sure that plastic tubing is still attached to the pressure switch and fan housing. Also make sure that wiring connector from motor to control box is securely attached.
4. Do not plug in power cord until vent system is completely installed. The Power Vent operates on 120 Vac, therefore a grounded outlet must be within reach of the 6 foot flexible power cord supplied with the vent. The power cord supplied may be used on unit only where local codes permit. If local codes do not permit use of flexible power supply cord:
 - A. Remove screws that hold cover plate on control box and remove plate.
 - B. Cut flexible power cord on inside of control box, as close to inside wall as possible.
 - C. If flexible cord and strain relief are removed, then opening in box must be covered by a plastic cap on the front side of the control box.
 - D. Remove plastic cap on the right side of control box and install suitable conduit fitting in enclosure.
 - E. Splice field wiring into existing wiring using code authorized method (wire nuts, etc.).
 - F. Be certain that neutral and line connections are not reversed when making these connections.
 - G. Ground heater properly. This water heater must be grounded in accordance with the National Electrical Code ANSI/NFPA70, CSA C22.1, the Canadian Electrical Code, and/or local codes. These must be followed in all cases.

The water heater must be connected to a grounded metal, permanent wiring system; or an equipment grounding conductor must be run with the circuit conductors and connected to the equipment grounding terminal or lead on the water heater, see Figure 26.

H. Replace cover plate and secure with two screws.

5. The blower discharge boot is made to accept only straight sections of 3" pipe. To start off with an elbow, a short section of the furnished pipe, a minimum of 2 inches, must be cut and glued into the end of the elbow that will mount on the discharge boot, see Figure 18.

INSTALLATION OF VENT SYSTEM

Before beginning installation of piping system thoroughly read the section of this manual VENT PIPE PREPARATION.

If you are installing your system so that it vents through the roof, please refer to section titled INSTALLATION OF VERTICAL VENT SYSTEM.

VENT TERMINAL INSTALLATION, SIDEWALL

1. Install the vent terminal by using the cover plate as a template to mark the hole for the vent pipe to pass through the wall. BEWARE OF CONCEALED WIRING AND PIPING INSIDE THE WALL.
2. If the Vent Terminal is being installed on the outside of a finished wall, it may be easier to mark both the inside and outside wall. Align the holes by drilling a hole through the center of the template from the inside through to the outside. The template can now be positioned on the outside wall using the drilled hole as a centering point for the template.
3. A) MASONRY SIDE WALLS
Chisel an opening approximately one half inch (1.3 cm) larger than the marked circle.
- B) WOODEN SIDE WALLS
Drill a pilot hole approximately one quarter inch (0.64 cm) outside of the marked circle. This pilot hole is used as a starting point for a saws-all or sabre saw blade. Cut around the marked circle staying approximately one quarter inch (0.64 cm) outside of the line. (This will allow the vent to easily slide through the opening. The resulting gap will be covered up by the Vent Terminal cover plate.) Repeat this step on inside wall if necessary.

SEQUENCE OF INSTALLATIONS

Cut a length of PVC pipe about 3.5 inches (8.9 cm) longer than the wall thickness at the opening. Glue the vent terminal to this section of pipe. Slide the wall plate over the pipe to stop against the vent terminal. Place a bead of caulking (not supplied) around the gap between the pipe and cover plate. Apply enough to fill some of the gap between the pipe and wall. Place some of the caulking on the back of the plate to hold it against the wall after installation. If the vent pipe is installed up to the wall, with a coupling on the end against the wall opening, the pipe with the vent terminal can be prepared for gluing before inserting through the wall. Slide the pipe through the wall and insert into the coupling on the other side of the wall, making sure that the vent terminal ends up pointed in the correct position, see Figure 19.

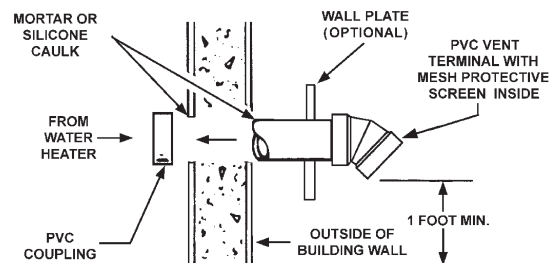


FIGURE 19.
VENT TERMINATION

INSTALLATION OF VENT SYSTEM, SIDEWALL

With the route of the venting system and selection of materials completed, as discussed in the section of this manual titled PLANNING THE VENT SYSTEM, the through the wall vent terminal in place and the first section of piping, up to first elbow, installed at the blower it is time to complete the installation of the venting system for the sidewall installation.

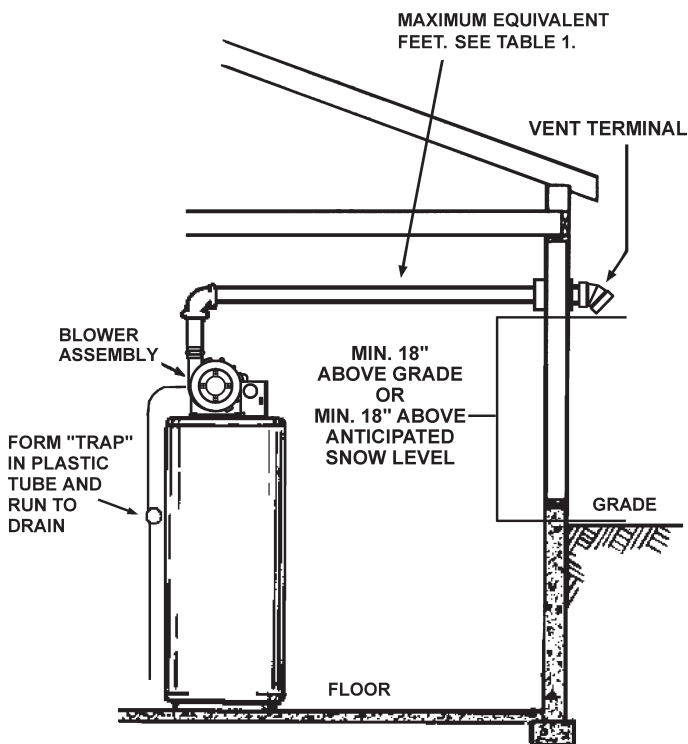


FIGURE 20.

Before completing the installation of the venting system be sure to read the sections of this manual discussing the proper method of cutting and cementing PVC pipe and fittings: VENT PIPE PREPARATION.

It is recommended that the completion of the venting system start at the blower assembly and run to the coupling on the inside wall of the vent terminal, see Figure 20.

The vent system piping should be supported every 5 feet (1.5 m) of vertical run and every 3 feet (91 cm) of horizontal run. All piping and fittings must be joined by the proper procedures as described under: VENT PIPE PREPARATION.

INSTALLATION OF VERTICAL VENT SYSTEM

A proper flashing or "BOOT" should be used to seal the pipe where it exits the roof. The total vent system should not exceed the equivalent feet of pipe as listed in Table 4.

Provide support for all pipe protruding through the roof. All piping should be properly secured. The vent system piping should be supported every 5 feet (1.5 m) of vertical run and every 3 feet (91 cm) of horizontal run. All piping and fittings must be joined by the proper procedures as described under: VENT PIPE PREPARATION.

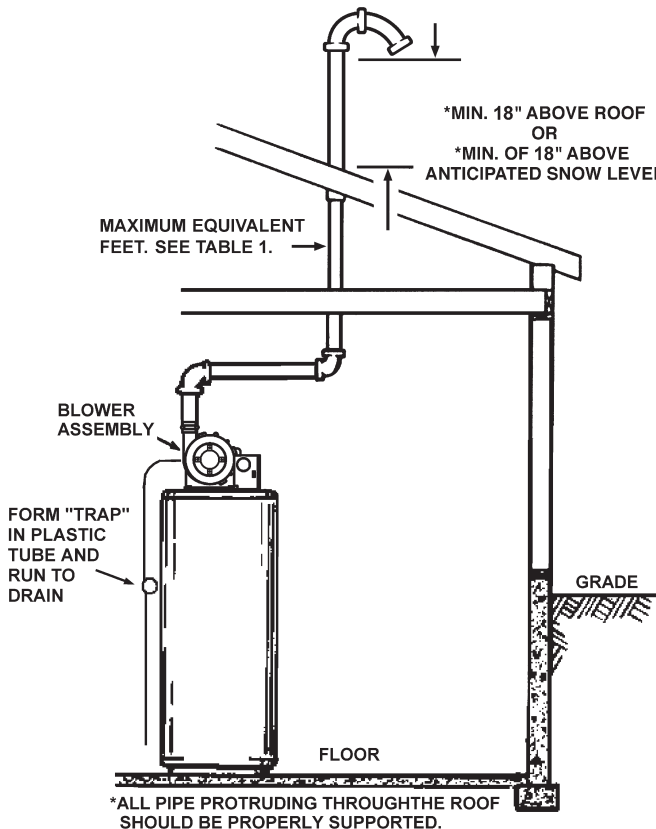


FIGURE 21.

IMPORTANT

The vent system must terminate so that proper clearances are maintained as cited in local codes or the current edition of the National Fuel Gas Code (ANSI Z223.1) or CAN/CSA-B149.1, the Natural Gas and Propane Installation Code as shown in Figure 17.

FOR YOUR SAFETY READ BEFORE LIGHTING



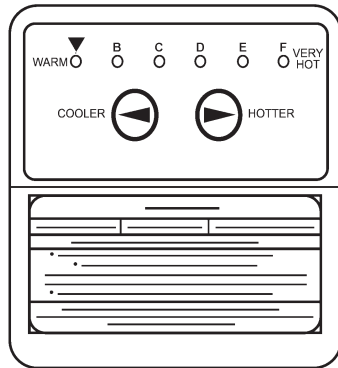
WARNING: If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.



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

- A. This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do **NOT** try to light the burner by hand.
- B. BEFORE OPERATING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.
- WHAT TO DO IF YOU SMELL GAS:
- Do not try to light any appliance.
 - Do not touch any electric switch; do not use any phone in your building.
 - Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.
- C. Use only your hand to push in the gas control buttons. Never use tools. If the control buttons will not push in, don't try to repair them, call a qualified service technician. Force or attempted repair may result in a fire or explosion.
- D. Do not use this appliance if any part has been under water. Immediately contact a qualified installer or service agency to replace a flooded water heater. Do not attempt to repair the unit. It must be replaced!

OPERATING INSTRUCTIONS



1. STOP! Read the safety information above on this label.
 2. Set the ON/OFF switch on the control box to the "ON" position.
 3. Set the thermostat to the lowest setting by first pressing the COOLER and HOTTER buttons together and holding for 1 second. Then press the COOLER button until the warm indicator light appears.
 4. Set the ON/OFF switch on the control box to the "OFF" position.
 5. This appliance is equipped with a device which automatically lights the burner.
DO NOT TRY TO LIGHT THE BURNER BY HAND.
 6. Wait five (5) minutes to clear out any gas. If you then smell gas, STOP! Follow "B" in the safety information above on this label. If you don't smell gas, go to the next step.
 7. Turn on all electrical power to the appliance.
 8. Set the ON/OFF switch on the control box to the "ON" position.
 9. Set the thermostat to the desired setting by first pressing the COOLER and HOTTER buttons together and holding for 1 second. Then press the HOTTER button.
 10. WATER TEMPERATURE ADJUSTMENT ▼ is approximately 120°F.
- CAUTION: Hotter water increases the risk of scald injury. Consult the instruction manual before changing temperature.**
11. If the appliance will not operate, follow the instructions "TO TURN OFF GAS TO THE APPLIANCE" and call your technician or gas supplier.
- WARNING: TURN OFF ALL ELECTRIC POWER BEFORE SERVICING.**

TO TURN OFF GAS TO APPLIANCE

1. Set the thermostat to the lowest setting by first pressing the COOLER and HOTTER buttons together and holding for 1 second. Then press the COOLER button until the warm indicator light appears.
2. Set the ON/OFF switch on the control box to the "OFF" position.
3. Turn off all electrical power to the appliance if service is to be performed.

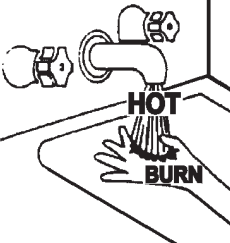
TEMPERATURE REGULATION

Any water heater's intended purpose is to heat water. Hot water is needed for cleansing, cleaning, and sanitizing (bodies, dishes, clothing). Untempered hot water can present a scald hazard. Depending on the time element, and the people involved (adults, children, elderly, infirm, etc.) scalding may occur at different temperatures.

It is recommended that lower water temperatures be used to avoid the risk of scalding. It is further recommended, in all cases, that the water temperature be set for the lowest temperature which satisfies your hot water needs. This will also provide the most energy efficient operation of the water heater.

Figure 22. shows the approximate water temperatures produced at various thermostat settings. Short repeated heating cycles caused by small hot water uses can cause temperatures at the point of use to exceed the thermostat setting by up to 30°F (17°C). If you experience this type of use you should consider using lower temperature settings to reduce scald hazards.

Valves for reducing the point-of-use temperature by mixing cold and hot water are available, see Figure 2. Also available are inexpensive devices that attach to faucets to limit hot water temperatures. Contact a licensed plumber or the local plumbing authority.



⚠ 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.

HOT 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, 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, read the "Temperature Regulation" section in this manual, see Figure 22.

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.

The water heater should be located in an area where the general public does not have access. If a suitable area is not available, a cover should be installed over the thermostat to prevent tampering.

The water temperature setting was factory set at the lowest temperature; Pressing the "COOLER" button decreases temperature and pressing the "HOTTER" button increases the temperature.

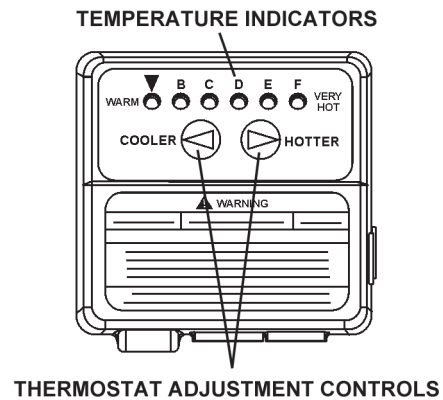
Setting the water heater temperature at 120°F (49°C) (Approx. "▼" mark on temperature setting of gas valve) will reduce the risks of scalds. Some states require settings at specific lower temperatures.

To avoid any unintentional changes in water temperature settings, the control has a tamper resistant feature for changing the temperature setting. To change the temperature setting follow these instructions:

1. "Wake Up" the temperature indicators by holding down both "COOLER" and "HOTTER" temperature adjustment buttons at the same time for one second, see Figure 22. One or two of the temperature indicators will light up. These indicators will only remain on for 30 seconds if no further buttons are pressed. After 30 seconds the control will go back to "Sleep" mode.
2. Release both of the temperature adjustment buttons.
 - a. To decrease the temperature press and release the "COOLER" button until the desired setting is reached.
 - b. To increase the temperature press and release the "HOTTER" button until the desired setting is reached.

NOTE: Holding down the button will not continue to lower or raise the temperature setting. The button must be pressed and released for each temperature change desired.

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



Temperature Setting	Display ▼ B C D E F	Time to Produce 2nd & 3rd Degree Burns on Adult Skin
F = approx. 180°F (82°C)	○○○○●	Nearly Instantaneous
E = approx. 170°F (77°C)	○○○○●○	Nearly Instantaneous
D = approx. 160°F (71°C)	○○○●○○	About 1/2 Second
C = approx. 150°F (65°C)	○○●○○○	About 1 1/2 Seconds
B = approx. 140°F (60°C)	○●○○○○	Less than 5 Seconds
▼ B = approx. 130°F (54°C)	●●○○○○	More than 30 Seconds
▼ = approx. 120°F (49°C)	●○○○○○	More than 5 Minutes

FIGURE 22.

FOR YOUR INFORMATION

START UP CONDITIONS

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.

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. The smell is a result of four factors which must all be present for the odor to develop:

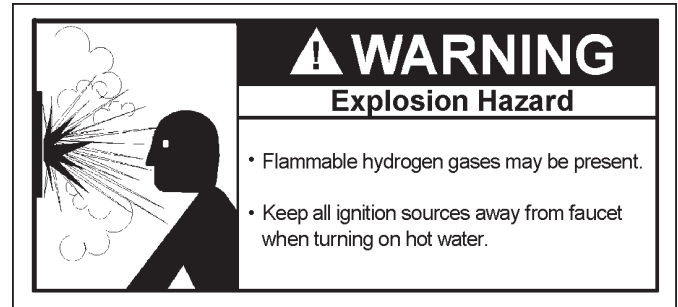
- A concentration of sulfate in the supply water.
- Little or no dissolved oxygen in the water.
- A sulfate reducing bacteria which has accumulated within the water heater (this harmless bacteria is nontoxic to humans).
- An excess of active hydrogen in the tank. This is caused by the corrosion protective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




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.

HIGH WATER TEMPERATURE SHUT OFF SYSTEM

This water heater is equipped with an automatic gas shut-off system. This system works when high water temperatures are present. Turn "OFF" the entire gas supply to the water heater. The high temperature shut-off is built into the gas control valve. It is non-resettable. If the high temperature shut-off activates, the gas control valve must be replaced. Contact your gas supplier or service agency.

PERIODIC MAINTENANCE

VENTING SYSTEM INSPECTION

⚠ WARNING	
Breathing Hazard - Carbon Monoxide Gas	
	<ul style="list-style-type: none">• Flue gases may escape if vent pipe is not connected.• Be alert for obstructed, sooted or deteriorated vent system to avoid serious injury or death.• Do not store corrosive chemicals in vicinity of water heater.• Chemical corrosion of flue and vent system can cause serious injury or death.• Analyze the entire vent system to make sure that condensate will not become trapped in a section of vent pipe and therefore reduce the open cross sectional area of the vent.
Breathing carbon monoxide can cause brain damage or death. Always read and understand instruction manual.	

At least once a year a visual inspection should be made of the venting system. You should look for:

1. Obstructions which could cause improper venting. The combustion and ventilation air flow must not be obstructed.
2. Damage or deterioration which could cause improper venting or leakage of combustion products.

Be sure the vent piping is properly connected to prevent escape of dangerous flue gasses which could cause deadly asphyxiation.

Obstructions and deteriorated vent systems may present serious health risk or asphyxiation.

Chemical vapor corrosion of the flue and vent system may occur if air for combustion contains certain chemical vapors. Spray can propellants, cleaning solvents, refrigerator and air conditioner refrigerants, swimming pool chemicals, calcium and sodium chloride, waxes, bleach and process chemicals are typical compounds which are potentially corrosive.

If after inspection of the vent system you found sooting or deterioration, something is wrong. Call the local gas utility to correct the problem and clean or replace the flue and venting before resuming operation of the water heater.

BURNER OPERATION AND INSPECTION

Flood damage to a water heater may not be readily visible or immediately detectable. However, over a period of time a flooded water heater will create dangerous conditions which can cause **DEATH, SERIOUS BODILY INJURY, OR PROPERTY DAMAGE.** Contact a qualified installer or service agency to replace a flooded water heater. Do not attempt to repair the unit! It must be replaced!

At least once a year a visual inspection should be made of the main burner and the hot surface igniter assembly for proper flame characteristics and ignition sequences. This can be done by removing the Outer Door and viewing the main burner operation through the Viewport on the Inner Door, see Figure 1. The main burner should provide complete combustion of gas, ignite rapidly, give reasonably quiet operation, and cause no excessive flame lifting from the burner ports. If the proper flame characteristics are not evident, see Figure 23., make sure that the flow of combustion and ventilation air is not blocked.

You should also check for sooting. Soot is not normal and will impair proper combustion. A visual inspection of the main burner and HSI igniter assembly should also be done at least once a year, see Figure 23.

Soot build-up indicates a problem that requires correction before further use. Turn "OFF" gas to water heater and leave off until repairs are made, because failure to correct the cause of the sooting can result in a fire causing death, serious injury, or property damage.

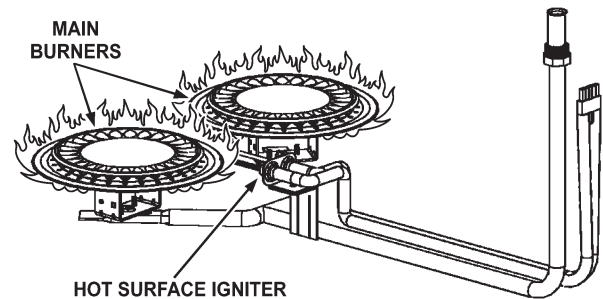



FIGURE 23.

BURNER CLEANING

In the event your burner or burner air openings require cleaning, turn the blower switch to the "OFF" position and allow the burner to cool. Call a service agency to remove and clean the burner and correct the problem that required the burner to be cleaned.

HOUSEKEEPING

Vacuum around base of water heater for dust, dirt, and lint on a regular basis.

	⚠ DANGER
	Fire and Explosion Hazard
	<ul style="list-style-type: none">• Do not obstruct combustion air openings at the bottom of the water heater.• Do not use or store flammable vapor products such as gasoline, solvents or adhesives in the same room or area near water heater or other appliance.• Can cause serious injury or death.

INSTALLED IN SUITABLE AREA: To insure sufficient ventilation and combustion air supply, proper clearances from the water heater must be maintained. See "Locating the New Water Heater" section. Combustible materials such as clothing, cleaning materials, or flammable liquids, etc. must not be placed against or adjacent to the water heater which can cause a fire.

ANODE ROD INSPECTION

CAUTION

Property Damage Hazard

- Avoid water heater damage.
- Inspection and replacement of anode rod required.

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.

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. The parts list includes a special anode rod that can be ordered 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".
- * 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 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 nearby hot water faucet to purge air from water system. Check for any leaks and immediately correct any if found.

Restart the water heater as directed under "Operating Your Water Heater." See the Repair Parts Illustration for anode rod location.

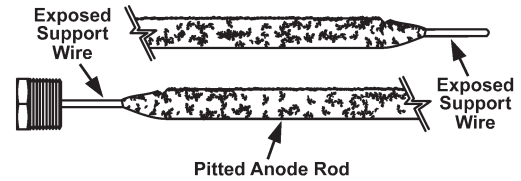
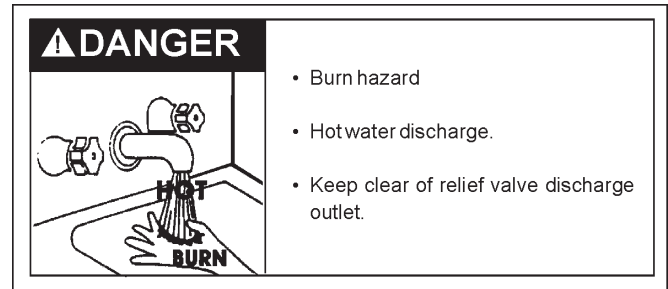


FIGURE 24.
ANODE ROD DEPLETION DETAIL.

TEMPERATURE-PRESSURE RELIEF VALVE OPERATION



The temperature-pressure relief valve must be manually operated at least once a year.

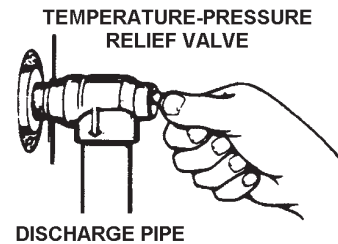


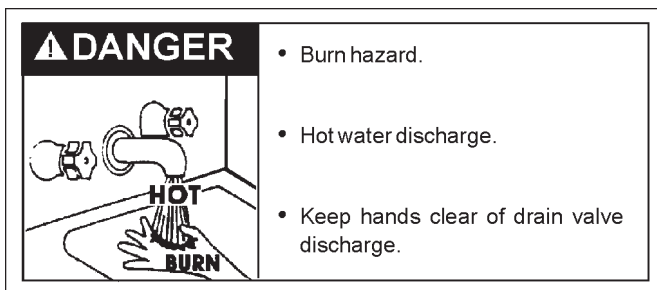
FIGURE 25.

When checking the temperature-pressure relief valve operation, make sure that (1) no one is in front of or around the outlet of the temperature-pressure relief valve discharge line, and (2) that the water discharge will not cause any property damage, as the water may be extremely hot, see Figure 25.

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.

If the temperature-pressure relief valve on the water heater weeps or discharges periodically, this may be due to thermal expansion. You may have a check valve installed in the water line or a water meter with a check valve. Consult your local water supplier or service agency for further information. Do not plug the temperature-pressure relief valve.

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.

SERVICE

Before calling for repair service, read the "Start Up Conditions" and "Operational Conditions" found in the "For Your Information" section of this manual.

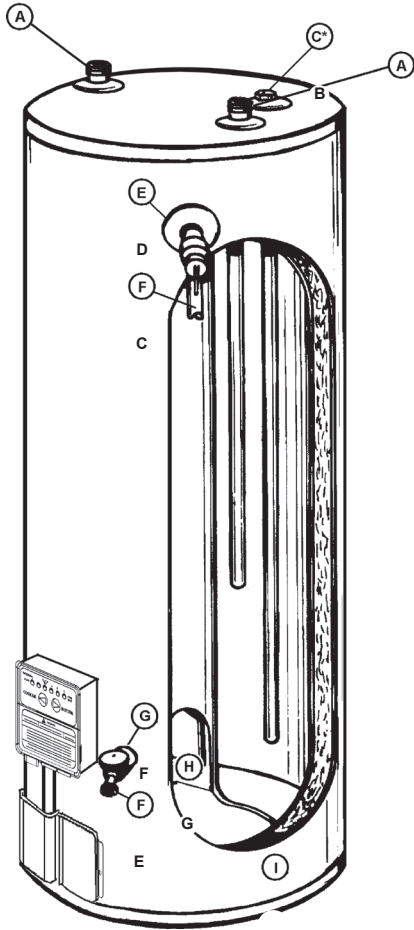
If a condition persists or you are uncertain about the operation of the water heater contact a service agency. If you are not thoroughly familiar with gas codes, your water heater, and safety practices, contact your gas supplier or qualified installer to check the water heater.

Use the "Leakage Checkpoints" 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.

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.

Never use this water heater unless it is completely filled with 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.

LEAKAGE CHECKPOINTS




Never use this water heater unless it is completely filled with 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.

- A *Condensation may be seen on pipes in humid weather or pipe connections may be leaking.
- B. *The anode rod fitting may be leaking.
- 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" instructions in the "Periodic Maintenance" section 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.



⚠ 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

TROUBLESHOOTING

Please check guidelines below. For your safety, water heater service should be performed only by a qualified service technician.

Read the GENERAL SAFETY INFORMATION section first.

LED STATUS		
	An open earth ground circuit to the ignition system.	<ol style="list-style-type: none"> 1. Check that the earth ground connection is properly connected. 2. Check that the ground conductor on the water heater is properly connected.
	Wiring error or a high resistance to earth ground.	<ol style="list-style-type: none"> 1. Check for proper connection of line neutral and hot wires. 2. Check that the water heater is securely connected to earth ground.
	Pressure switch remained closed longer than 5 seconds after the call for heat began.	<ol style="list-style-type: none"> 1. Pressure switch wiring is incorrect. 2. Replace pressure switch.
	Pressure switch remained open longer than 5 seconds after the combustion blower was energized.	<ol style="list-style-type: none"> 1. Pressure switch wiring is incorrect. 2. Pressure switch tubing not connected correctly. 3. Air intake or exhaust obstructed.
	Error in the hot surface ignitor circuit.	<ol style="list-style-type: none"> 1. Check that all wiring is correct and secure. 2. Replace hot surface ignitor.
	System in lockout.	<ol style="list-style-type: none"> 1. Gas supply is off or too low to operate. 2. Hot surface ignitor not positioned correctly. 3. Low voltage to the water heater. 4. Electric polarity to unit is incorrect - test and correct.
	Problem in the gas valve driver circuit.	<ol style="list-style-type: none"> 1. Turn power to the water heater off for 10 seconds and then back on. 2. Replace gas control valve.
	Problem with the internal circuit.	<ol style="list-style-type: none"> 1. Turn power to the water heater off for 10 seconds and then back on. 2. Replace gas control valve.
	Problem with the internal circuit.	<ol style="list-style-type: none"> 1. Turn power to the water heater off for 10 seconds and then back on. 2. Replace gas control valve.
	Flame signal sensed out of proper sequence.	<ol style="list-style-type: none"> 1. Replace gas control valve.
	ECO activated.	<ol style="list-style-type: none"> 1. Lower water temperature to below 120°F and turn power to the water heater off for 10 seconds and then back on. 2. Replace gas control valve.
	One of the temperature adjust buttons stuck closed.	<ol style="list-style-type: none"> 1. Press and release each of the buttons once. 2. Replace gas control valve.
	Water temperature sensor is either open or short circuited.	<ol style="list-style-type: none"> 1. Check that all wiring is correct and secure. 2. Replace gas control valve.

WATER HEATER CONTROL

TROUBLESHOOTING GUIDELINES

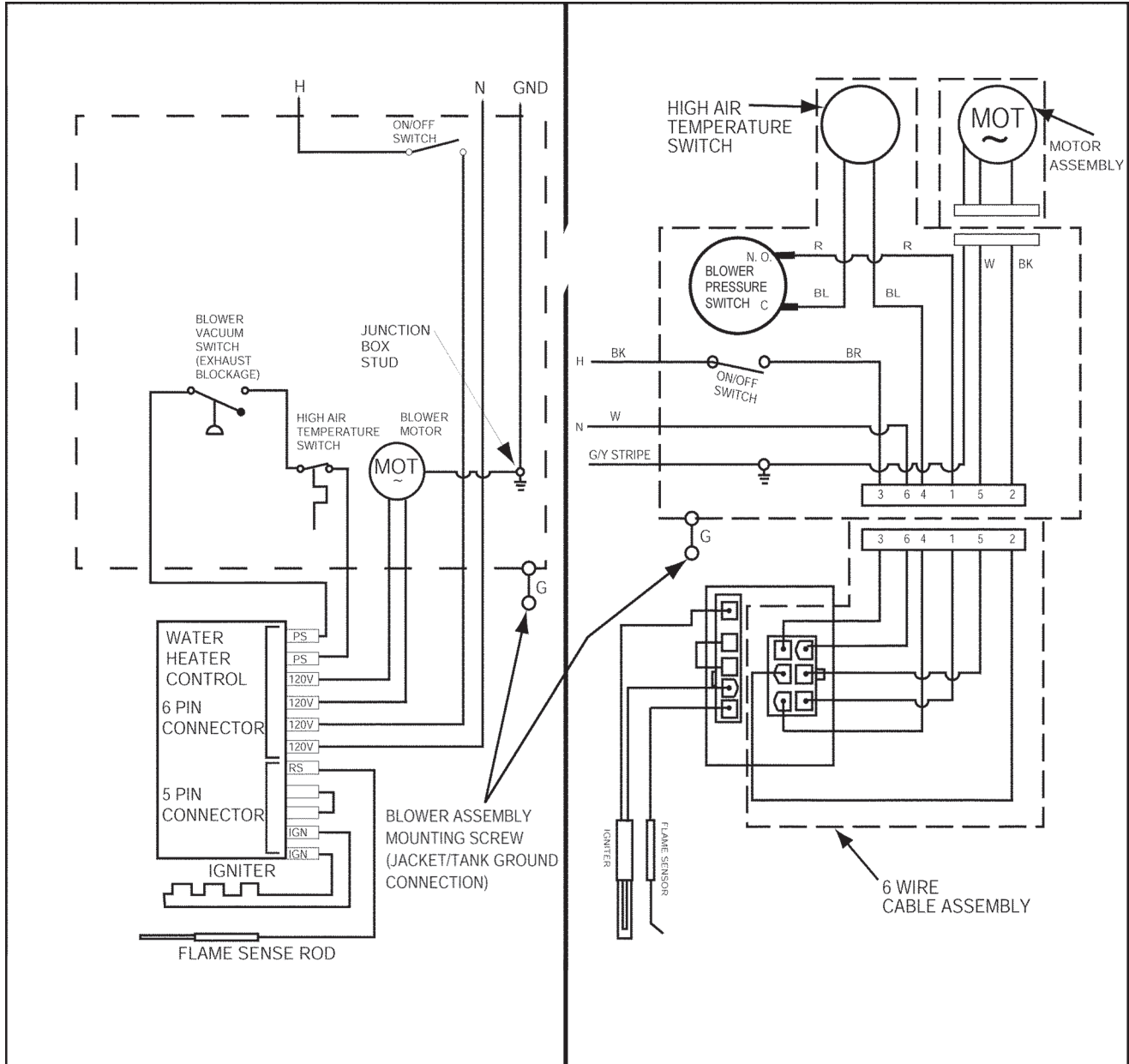
These guidelines should be utilized by a qualified service agent.

PROBLEM	POSSIBLE MALFUNCTION	SERVICE TO BE PERFORMED
NOT ENOUGH OR NO HOT WATER	1) Blower will not run	
	A) "ON/OFF" control switch turned off	Turn switch to the "ON" position.
	B) Blower unplugged	Plug blower back into 115 vac. outlet.
	C) No power at outlet	Repair service to outlet.
	D) "ON/OFF" switch defective	Replace switch.
	E) Control harness defective	Replace control harness.
	F) Blower motor defective	Replace blower and motor.
	2) Blower running, burner not on	Replace switch.
	A) Fan not running fast enough to close air switch contacts	Check for low voltage, less than 102 vac., have service checked and repaired. If voltage is above 102 vac., make sure there is not more than 30 equivalent feet (9.1 equivalent meters) of 3 inch pipe or 100 equivalent feet (30.5 equivalent meters) of 4 inch pipe installed or vent terminal blockage. If at least 102 vac., less than 30 equivalent feet (9.1 equivalent meters) of 3 inch pipe or 100 equivalent feet (30.5 equivalent meters) of 4 inch pipe and not terminal blockage, replace blower.
	B) Air pressure switch defective	Replace switch.
	C) Gas valve defective	Replace gas valve.
	D) Control harness defective	Replace harness.
	E) Igniter defective	Replace igniter.
	F) Unit has completed three trials to light and failed	Reset cycle by turning switch off and then back on. If unit does not light in three trials, call an authorized service representative.
	G) Discharge air limit tripped	Verify dilution air openings are free of obstructions. Make sure there is no more than 30 equivalent feet (9.1 equivalent meters) of 3 inch pipe or 100 equivalent feet (30.5 equivalent meters) of 4 inch pipe. Check for low voltage, less than 102 vac., have service checked and repaired. Make sure vent terminal is not blocked.
	3) Thermostat problems	
	A) Thermostat set too low	Turn temperature control higher.
	B) Thermostat or ECO defective	Replace thermostat.
	C) High limit control circuit open	Replace.
	4) Others	
	A) Heater undersized	Reduce hot water use.
	B) Low gas pressure	Contact an authorized service representative.
	C) Incoming water is unusually cold	Allow more time for heater to re-heat.
D) Leaking hot water pipes or fixtures	Have plumber check and repair leaks.	
E) Polarity reversed	Correct wiring	
F) Heater not grounded	Correct	
VENT PIPE TOO HOT (ABOVE 170° F)	A) Blower does not run when heater fired	Take unit out of service immediately, call an authorized service representative.
	B) Not enough dilution air to mix with flue gases	Proper air circulation must be provided for combustion and dilution of flue temp. Refer to "INSTALLATION" section.
	C) Air in room too hot for mixing with flue gases	Room air to be used for dilution with combustion products in flue should be less than 90°F.
	D) Wrong burner orifice	Install correct orifice.
YELLOW FLAME	A) Dirt in burner ports	Turn off heater and gas, clean burner head.
	B) Combustion air path restricted	Clear area around heater and check under heater, remove any debris under heater and in openings in bottom cover.
	C) Not enough room air for proper combustion	Refer to installation manual - Confined and Unconfined Space statements on page 4 and 5 for required openings.
CONDENSATION	A) Water on the floor under heater	See "CONDENSATION."
WATER LEAKS	Improperly sealed, hot or cold supply connections, relief valve, drain valve or thermostat threads	Turn off heater & water, repair unit.
	Leakage from other appliances or water lines	Inspect other appliances near water heater.
	Condensation of flue products	Refer to "CONDENSATION."
LEAKING T&P VALVE	Thermal expansion in closed water system Improperly seated valve	Install thermal expansion tank (DO NOT plug T&P valve). Check relief valve for proper operation (DO NOT plug T&P valve).
HOT WATER ODORS OR COLOR (Refer to CATHODIC PROTECTION)	High sulfate or mineral content in water supply or iron or sulfate reducing bacteria in water supply	Drain and flush heater thoroughly, chlorinate, refill and flush again then chlorinate water supply.
HEATER LIGHT GOES OUT IN 4-5 SECONDS	Outlet polarity is reversed	Test polarity and correct.

WIRING DIAGRAMS

⚠ CAUTION

LABEL ALL WIRES PRIOR TO DISCONNECTION WHEN SERVICING CONTROLS. WIRING ERRORS CAN CAUSE IMPROPER AND DANGEROUS OPERATION. VERIFY PROPER OPERATION AFTER SERVICING.



You must provide all wiring of the proper size outside of the water heater. You must obey local codes and electric utility requirements when you install this wiring.

This appliance must be electrically grounded in accordance with local codes, or in the absence of local codes, with the National Electrical Code ANSI/NFPA No 70(current edition).

Note: If any of the original wire as supplied with the appliance must be replaced, it must be replaced with 105°C wire or its equivalent.

FIGURE 26.
POWER VENT WIRING SCHEMATIC.

CIRCULATING PUMP WIRING DIAGRAM
STORAGE TANK OR BUILDING RECIRCULATION

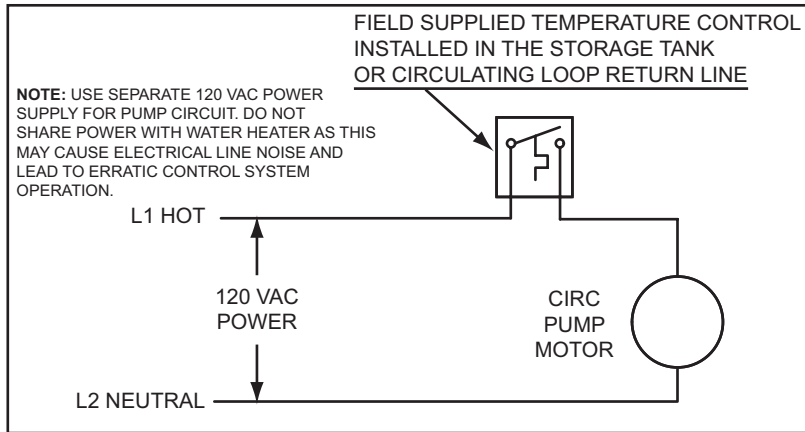


FIGURE 27.

CIRCULATING PUMP WIRING DIAGRAM
DISHWASHER LOOP WITH TOGGLE SWITCH

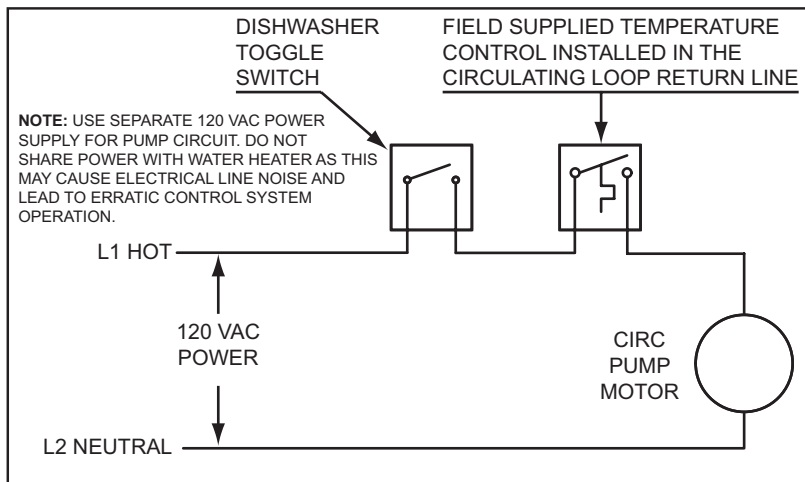











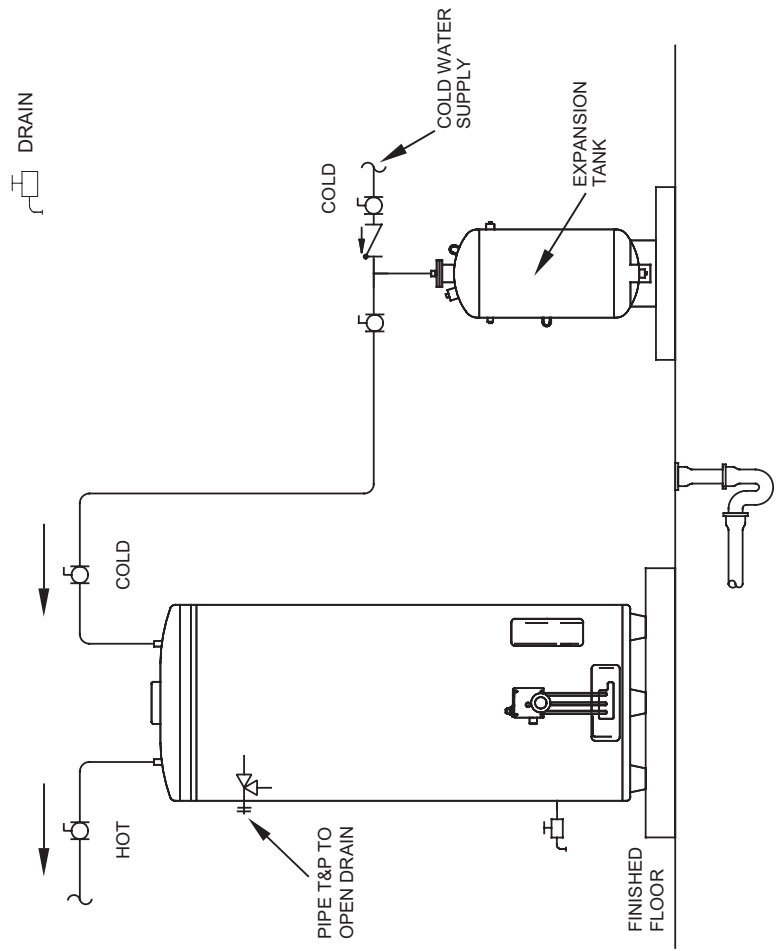
FIGURE 28.

SINGLE FLUE - (1 UNIT)

WARNING: THIS DRAWING SHOWS SUGGESTED PIPING CONFIGURATION AND OTHER DEVICES; CHECK WITH LOCAL CODES AND ORDINANCES FOR ADDITIONAL REQUIREMENTS.

LEGEND

	TEMPERATURE & PRESSURE RELIEF VALVE		FULL PORT BALL VALVE
	PRESSURE RELIEF VALVE		CHECK VALVE
	CIRCULATING PUMP		TEMPERATURE GAGE
	TANK TEMPERATURE CONTROL		WATER FLOW SWITCH
	DRAIN		












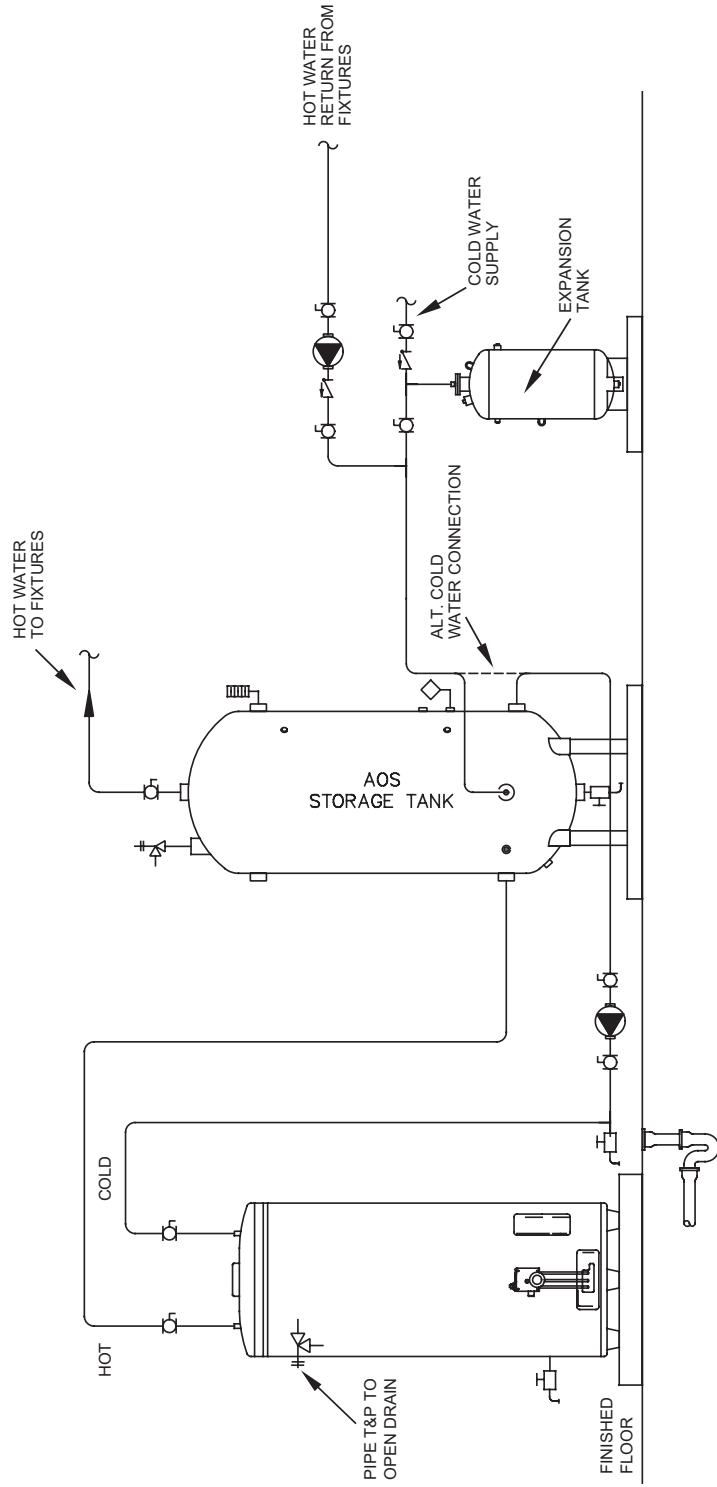
- NOTES:**
1. Preferred piping diagram.
 2. The temperature and pressure relief valve setting shall not exceed pressure rating of any component in the system.
 3. Service valves are shown for servicing unit. However, local codes shall govern their usage.

SINGLE FLUE - (1 UNIT) WITH VERTICAL STORAGE TANK

WARNING: THIS DRAWING SHOWS SUGGESTED PIPING CONFIGURATION AND OTHER DEVICES; CHECK WITH LOCAL CODES AND ORDINANCES FOR ADDITIONAL REQUIREMENTS.

LEGEND

	TEMPERATURE & PRESSURE RELIEF VALVE		FULL PORT BALL VALVE
	PRESSURE RELIEF VALVE		CHECK VALVE
	CIRCULATING PUMP		TEMPERATURE GAGE
	TANK TEMPERATURE CONTROL		WATER FLOW SWITCH
	DRAIN		



NOTES:

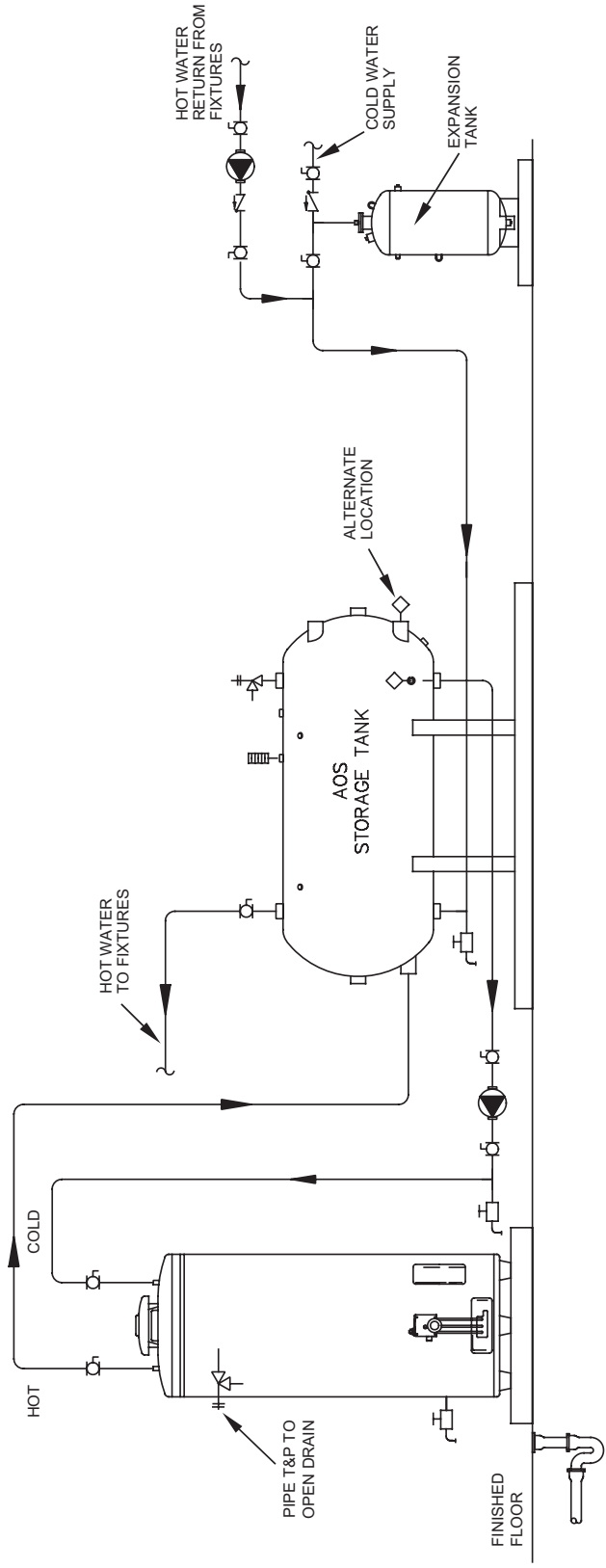
1. Preferred piping diagram.
2. The temperature and pressure relief valve setting shall not exceed pressure rating of any component in the system.
3. Service valves are shown for servicing unit. However, local codes shall govern their usage.
4. The Tank Temperature Control should be wired to and control the pump between the water heater(s) and the storage tank(s).
5. The water heater's operating thermostat should be set 5 degrees F higher than the Tank Temperature Control.

SINGLE FLUE - (1 UNIT) WITH HORIZONTAL STORAGE TANK

WARNING: THIS DRAWING SHOWS SUGGESTED PIPING CONFIGURATION AND OTHER DEVICES; CHECK WITH LOCAL CODES AND ORDINANCES FOR ADDITIONAL REQUIREMENTS.









LEGEND

- TEMPERATURE & PRESSURE RELIEF VALVE
- PRESSURE RELIEF VALVE
- CIRCULATING PUMP
- TANK TEMPERATURE CONTROL
- DRAIN
- FULL PORT BALL VALVE
- CHECK VALVE
- TEMPERATURE GAGE
- WATER FLOW SWITCH



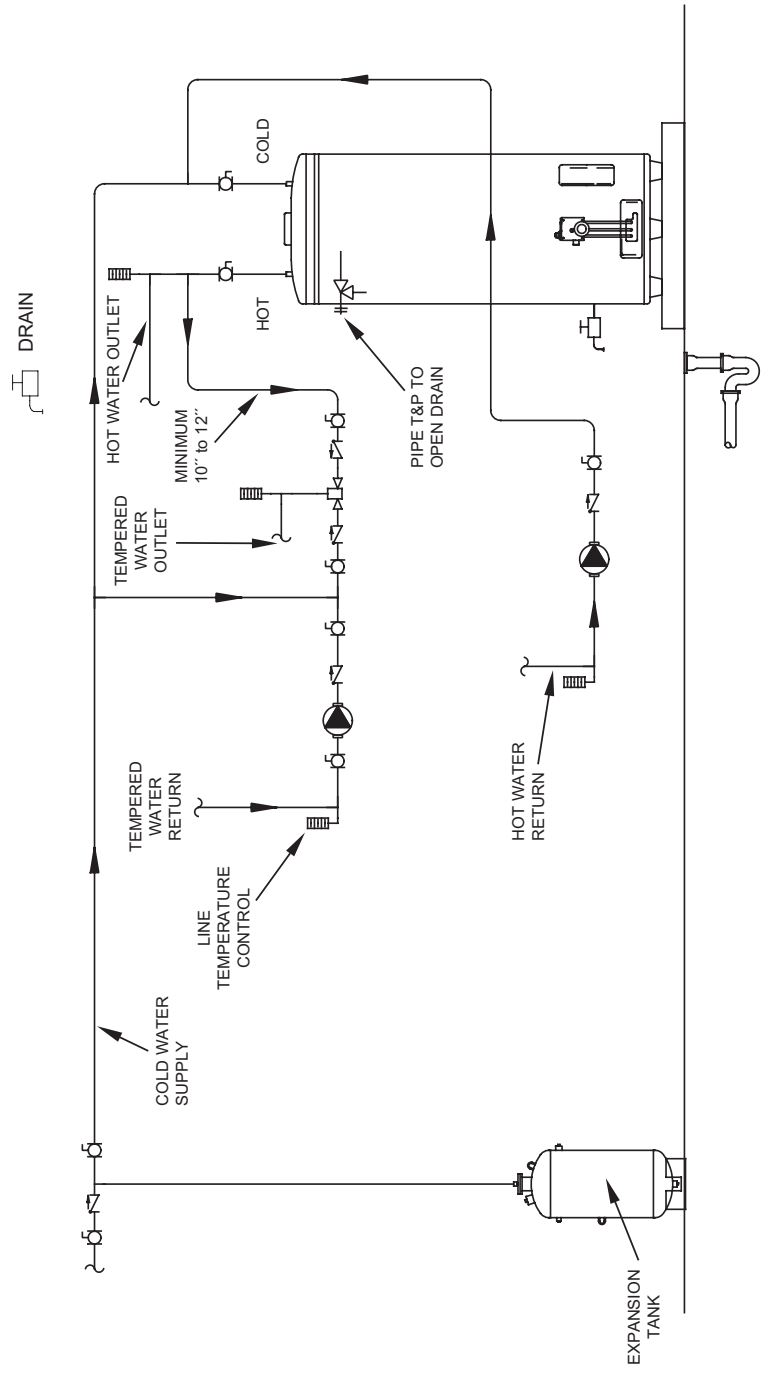
- NOTES:**
1. Preferred piping diagram.
 2. The temperature and pressure relief valve setting shall not exceed pressure rating of any component in the system.
 3. Service valves are shown for servicing unit. However, local codes shall govern their usage.
 4. The Tank Temperature Control should be wired to and control the pump between the water heater(s) and the storage tank(s).
 5. The water heater's operating thermostat should be set 5 degrees F higher than the Tank Temperature Control.

LEGEND

	TEMPERATURE & PRESSURE RELIEF VALVE		FULL PORT BALL VALVE
	PRESSURE RELIEF VALVE		CHECK VALVE
	CIRCULATING PUMP		TEMPERATURE GAGE
	TANK TEMPERATURE CONTROL		WATER FLOW SWITCH

SINGLE FLUE - (1 UNIT) WITH MIXING VALVE TWO TEMPERATURE

WARNING: THIS DRAWING SHOWS SUGGESTED PIPING CONFIGURATION AND OTHER DEVICES; CHECK WITH LOCAL CODES AND ORDINANCES FOR ADDITIONAL REQUIREMENTS.












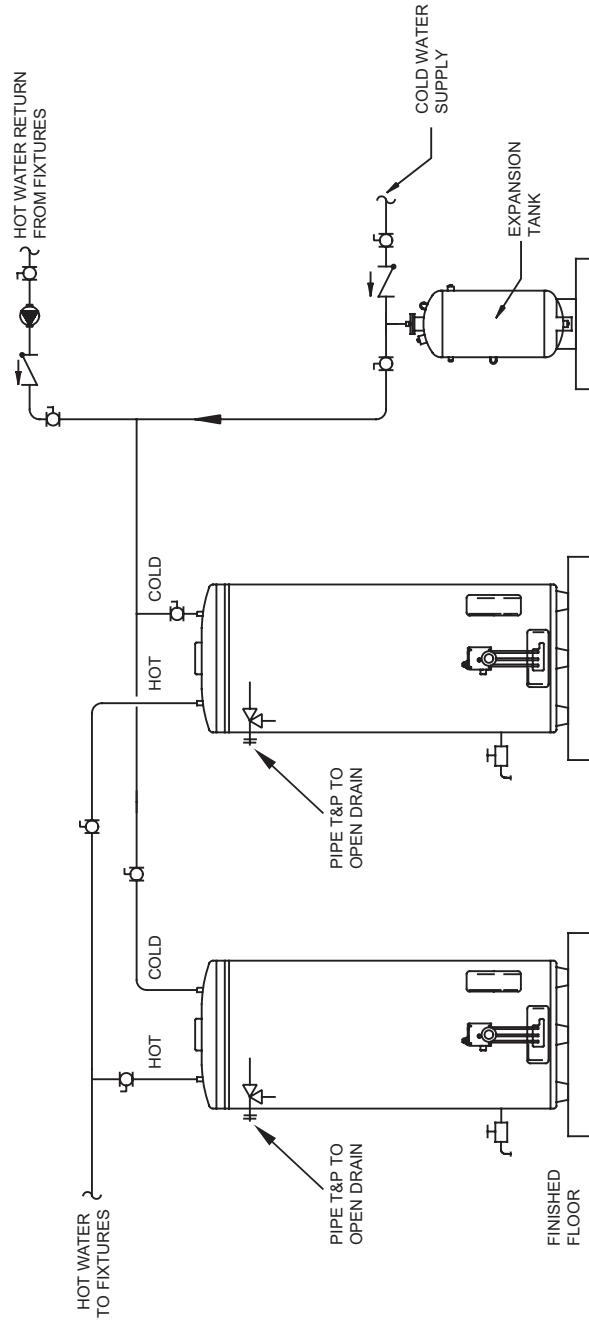
- NOTES:**
1. Preferred piping diagram.
 2. The temperature and pressure relief valve setting shall not exceed pressure rating of any component in the system.
 3. Service valves are shown for servicing unit. However, local codes shall govern their usage.

SINGLE FLUE - (2 UNITS)

WARNING: THIS DRAWING SHOWS SUGGESTED PIPING CONFIGURATION AND OTHER DEVICES; CHECK WITH LOCAL CODES AND ORDINANCES FOR ADDITIONAL REQUIREMENTS.










LEGEND

	TEMPERATURE & PRESSURE RELIEF VALVE		FULL PORT BALL VALVE
	PRESSURE RELIEF VALVE		CHECK VALVE
	CIRCULATING PUMP		TEMPERATURE GAGE
	TANK TEMPERATURE CONTROL		WATER FLOW SWITCH
	DRAIN		



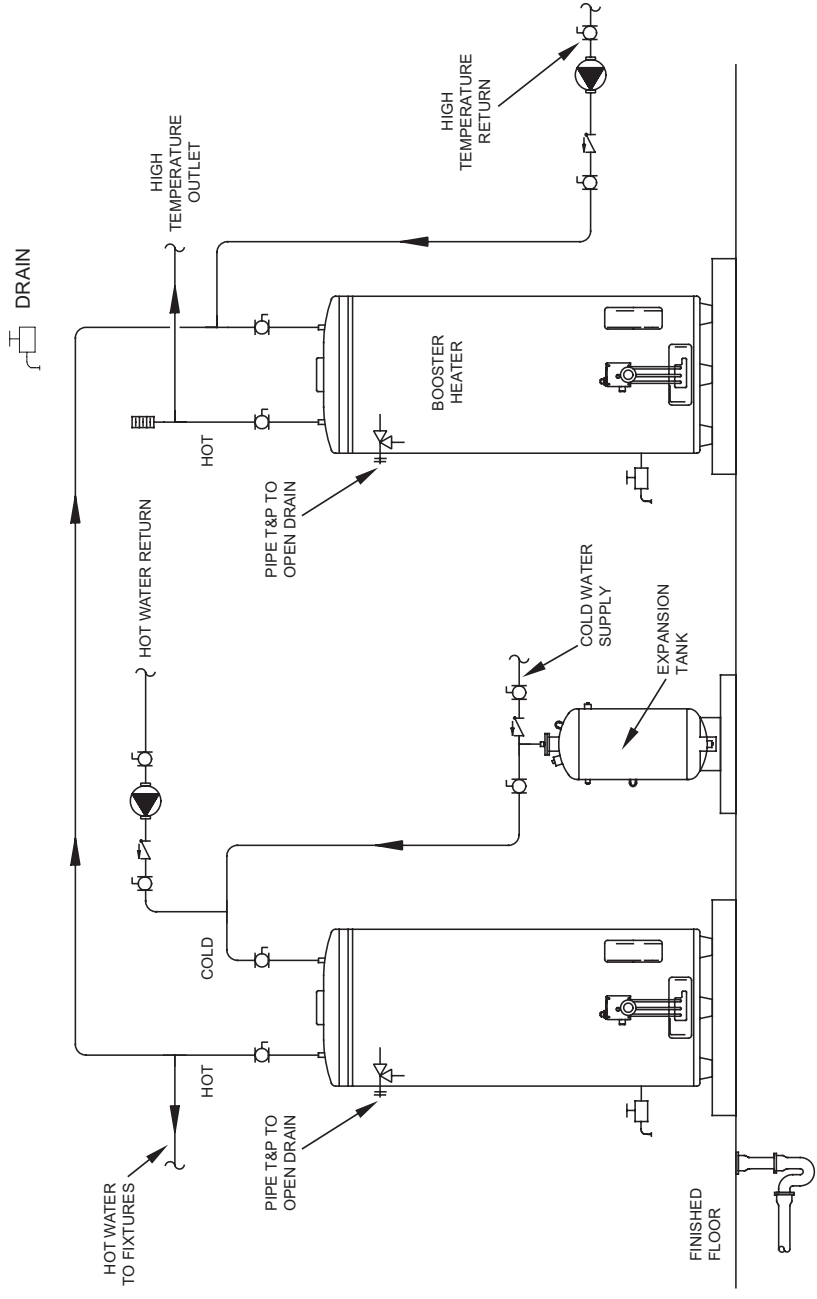
- NOTES:**
1. Preferred piping diagram.
 2. The temperature and pressure relief valve setting shall not exceed pressure rating of any component in the system.
 3. Service valves are shown for servicing unit. However, local codes shall govern their usage.

LEGEND

	TEMPERATURE & PRESSURE RELIEF VALVE		FULL PORT BALL VALVE
	PRESSURE RELIEF VALVE		CHECK VALVE
	CIRCULATING PUMP		TEMPERATURE GAGE
	TANK TEMPERATURE CONTROL		WATER FLOW SWITCH
	DRAIN		

SINGLE FLUE - (2 UNITS) TWO TEMPERATURE ONE PRE-HEATER/ONE BOOSTER HEATER

WARNING: THIS DRAWING SHOWS SUGGESTED PIPING CONFIGURATION AND OTHER DEVICES; CHECK WITH LOCAL CODES AND ORDINANCES FOR ADDITIONAL REQUIREMENTS.



NOTES:

1. Preferred piping diagram.
2. The temperature and pressure relief valve setting shall not exceed pressure rating of any component in the system.
3. Service valves are shown for servicing unit. However, local codes shall govern their usage.

NOTES:

NOTES:

NOTES:

MODEL BTF LIMITED WARRANTY

A. O. Smith Corporation, the warrantor, extends the following LIMITED WARRANTY to the owner of this water heater.

1. THE TANK

If the glass-lined tank in this water heater shall prove upon examination by the warrantor to have leaked due to natural corrosion from potable water therein, during the first THREE years after initial installation, the warrantor will supply a complete new A. O. Smith water heater of equivalent size and current model. Some government agencies are requiring energy efficient standards for water heaters. In the event regulations prohibit sale of a model of equivalent size and construction, A. O. Smith will provide a model which complies with the regulations of your area, in which case the consumer will be charged the difference in price between the like replacement and the energy efficient model required. The warranty on the replacement water heater will be limited to the unexpired term of the original warranty.

2. ALL OTHER PARTS

If within ONE year after initial installation of this water heater, any part or portion shall prove upon examination by the warrantor to be defective in material or workmanship, the warrantor will repair or replace such part or portion at its option.

3. CONDITIONS AND EXCEPTIONS

This warranty shall apply only when the water heater is installed in accordance with local plumbing and building codes, ordinances and regulations, the printed instructions provided with it and good industry practices. In addition, a temperature and pressure relief valve, certified by and officially sanctioned and recognized independent testing agency and approved by the American Society of Mechanical Engineers, must have been installed.

a. This warranty shall apply only when the heater is:

- (1) used at temperatures not exceeding the maximum calibrated setting of its thermostat;
- (2) used at water pressure not exceeding the working pressure shown on the heater;
- (3) filled with potable water, free to circulate at all times and with the tank free of damaging water sediment or scale deposits;
- (4) used in a non-corrosive and non-contaminated atmosphere;
- (5) used with factory approved anode(s) installed;
- (6) in its original installation location;
- (7) in the United States, its territories or possessions, and Canada;
- (8) sized in accordance with proper sizing techniques for commercial and/or residential water heaters;
- (9) bearing a rating plate which has not been altered, defaced or removed, except as required by the warrantor;
- (10) operated with properly installed dirt leg;
- (11) fired with the fuel for which it was factory built;
- (12) fired at the factory rated input;

b. Any accident to the water heater, any misuse, abuse (including freezing or thermal expansion damage) or alteration of, any operation in a modified form, or any attempt to repair tank leaks will void this warranty.

c. This warranty is void if a device acting as a backflow prevention device (check valves etc.) is installed in the cold water supply the heater is connected to, unless an effective method of controlling thermal expansion is also installed at the heater(s) and operational at all times. The relief valve installed on the heater is not an acceptable method.

4. SERVICE AND REPAIR EXPENSES

Under the limited warranty the warrantor will provide only a replacement water heater or part thereof. The owner is responsible for all other costs. Such costs may include but are not limited to:

- a. Labor charges for service removal, repair or reinstallation of the water heater or any component part;
- b. Shipping, delivery, handling, and administrative charges for forwarding the new heater or replacement part from the nearest distributor and returning the claimed defective heater or part to such distributor.
- c. All cost necessary or incidental for any material and/or permits required for installation of the replacement heater or part.

5. LIMITATIONS ON IMPLIED WARRANTIES

Implied warranties, including the warranty of merchantability imposed on the sale of this heater under state law are limited to one (1) year duration for the heater or any of its parts. Some states or provinces do not allow limitation on how long an implied warranty lasts, so the above limitation may not apply to you.

6. CLAIM PROCEDURE

Any claim under the warranty should be initiated with the dealer who sold the heater, or with any other dealer handling the warrantor's products. If this is not practicable, the owner should contact:

U.S. Customers

A. O. Smith
500 Tennessee Waltz Parkway
Ashland City, TN 37015
Telephone: 800-323-2636

Canadian Customers

A. O. Smith Enterprises Ltd.
P. O. Box, 310 - 768 Erie Street
Stratford, Ontario N5A 6T3
Telephone: (800) 265-8520

- a. The warrantor will only honor replacement with identical or similar water heater or parts thereof which are manufactured or distributed by the warrantor.
- b. Dealer replacements are made subject to in-warranty validation by warrantor.

7. DISCLAIMERS

NO OTHER EXPRESS WARRANTY HAS BEEN OR WILL BE MADE IN BEHALF OF THE WARRANTOR WITH RESPECT TO THE MERCHANTABILITY OF THE HEATER OR THE INSTALLATION, OPERATION, REPAIR OR REPLACEMENT OF THE HEATER. THE WARRANTOR SHALL NOT BE RESPONSIBLE FOR WATER DAMAGE, LOSS OF USE OF THE UNIT, INCONVENIENCE, LOSS OR DAMAGE TO PERSONAL PROPERTY OR OTHER CONSEQUENTIAL DAMAGE. THE WARRANTOR SHALL NOT BE LIABLE BY VIRTUE OF THIS WARRANTY OR OTHERWISE FOR DAMAGE TO ANY PERSONS OR PROPERTY, WHETHER DIRECT OR INDIRECT, AND WHETHER ARISING IN CONTRACT OR IN TORT.

- a. Some states and provinces do not allow the exclusion or limitation of the incidental or consequential damage, so the above limitations or exclusions may not apply to you.
- b. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state or province to province.

Fill in the following for your own reference. Keep it. Registration is not a condition of warranty. The model and serial number are found on the heater's rating plate.

Model No. _____ Serial No. _____ Date Installed _____

Dealer's Name _____

Dealer's Address _____ Phone No. _____

City and State/Province _____ Zip/Postal Code _____

KEEP THIS WARRANTY POSTED ADJACENT TO THE HEATER FOR FUTURE REFERENCE.



500 Tennessee Waltz Parkway
Ashland City, TN 37015
www.hotwater.com