Instruction Manual

ULTRA LOW NOX COMMERCIAL GAS WATER HEATERS

MODELS BL-80/BL-100
Series 100

INSTALLATION - OPERATION - SERVICE - MAINTENANCE - LIMITED WARRANTY

• For Your Safety •

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

PLACE THESE INSTRUCTIONS ADJACENT TO HEATER AND NOTIFY OWNER TO KEEP FOR FUTURE REFERENCE.

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

PRINTED 1215

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TABLE OF CONTENTS

SAFE INSTALLATION, USE AND SERVICE

The proper installation, use and servicing of this water heater is extremely important to your safety and the safety of others.

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.

	This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

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

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.

APPROVALS

Low Lead Content

GENERAL SAFETY INFORMATION

⚠ 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.

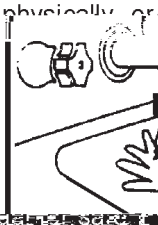
⚠ DANGER

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 high risk for scald injury.

Feel water before bathing or showering.

Temperature limiting valves are available.



⚠ WARNING

Fire or Explosion Hazard

- Avoid all ignition sources if you smell gas.
- Do not expose water heater control to excessive gas pressure.
- Use only gas shown on rating plate.
- Maintain required clearances to combustibles.
- Keep ignition sources away from fabrics 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 any part has been exposed to flooding or water damage.

⚠ WARNING

Explosion Hazard

and pressure relief valve must be installed in opening

⚠ WARNING

Breathing Hazard - Carbon Monoxide Gas

- Install vent system in accordance with
- Do not operate water heater if any part has been exposed to flooding or water damage.
- High altitude orifice must be installed

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

CAUTION

Improper installation and use may result in property damage.

- Do not operate water heater if any part has been exposed to flooding or water damage.
- Inspect and replace anode rod as needed.
- Install in location with drainage.
- Fill tank with water before operation.
- Be alert for thermal expansion.

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

ABBREVIATIONS USED

Abbreviations Found In This Instruction Manual:

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

This gas-fired water heater is design certified by Underwriters Laboratories Inc. under American National Standard/CSA 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 Qualifed Agency (as defned by ANSI below) in the feld 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: “Qualifed Agency” - “Any individual, frm, 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 qualifed (as defned by ANSI above) and licensed or certifed 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 Information section, page 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 or CAN/CSA-B149.1 the Natural Gas and Propane Installation Code. 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. If after reading this manual you have any questions or do not understand any portion of the instructions, call the local gas utility or the manufacturer whose name appears on the rating plate.

4. Carefully plan the place where you are going to put the water heater. Correct combustion, vent action, and vent pipe installation are very important in preventing death from possible carbon monoxide poisoning and fires, see Figures 3 and 7.

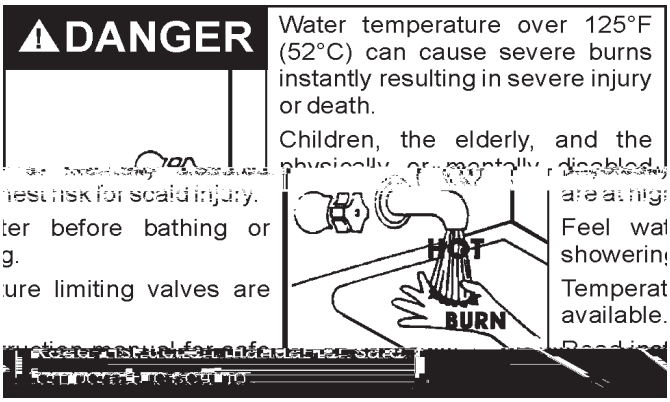
   Examine the location to ensure the water heater complies with the Fact to Consider About The Location section in this manual.

5. For

THERMOMETERS (Not Supplied)

Thermometers should be obtained and field installed.

Thermometers are installed in the system as a means of detecting the temperature of the outlet water supply.



This Water Heater has been design certified as complying with ANSI Z21.10.3-CSA 4.3 current edition 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.

HOTTER WATER CAN SCALD:

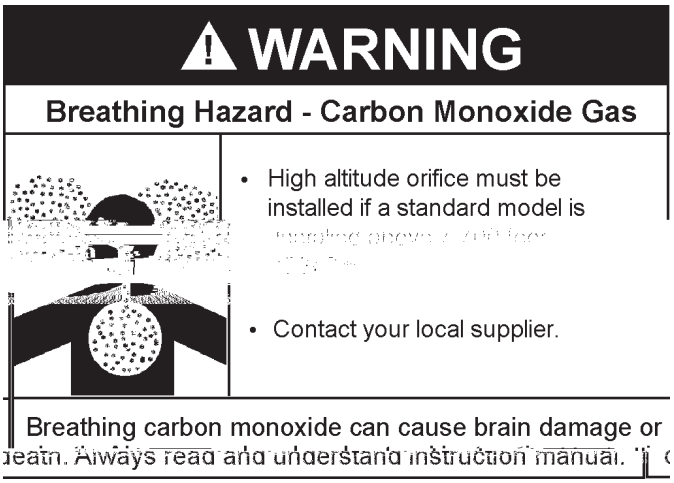
Water heaters are intended to produce hot water. Water heated to a temperature which will satisfy space heating, clothes washing, dish washing, and other sanitizing needs can scald and permanently injure you upon contact. Some people are more likely to be permanently injured by hot water than others. These include the elderly, children, the infrm, or physically/mentally handicapped. If anyone

used in the same room or area containing a gas water heater or other open fame or spark producing appliance. NOTE: Flammable vapors may be drawn by air currents from other areas of the structure to the appliance.

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

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" (76.2 mm) in any direction, or if the water heater is installed in an alcove or closet, the entire foor must be covered by the panel. Failure to heed this warning may result in a fre hazard.

HIGH ALTITUDE



Water heaters covered in this manual have been tested and approved for installation at elevations up to 7,700 feet (2,347 m) above sea level. For installation above 7,700 feet (2,347 m), the water heater's Btu input should be reduced at the rate of 4 percent for each 1,000 feet (305 m) above sea level which requires replacement of the burner orifce in accordance with the National Fuel Gas Code ANSI Z223.1/ NFPA 54 or the Natural Gas and Propane Installation Code CAN/ CSA B149.1. Contact your local gas supplier for further information.

Failure to replace the standard orifce with the proper high altitude orifce when installed

INSULATION BLANKETS

INSTALLATION REQUIREMENTS

GAS SUPPLY SYSTEMS

Low pressure building gas supply systems are defned 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 feld supplied regulators to lower the gas pressure to less than 14" W.C. (1/2 PSI Gauge). Appliances require gas regulators that are properly sized for the water heater input and deliver the rating plate specifed 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.

GAS PRESSURE REQUIREMENTS

BL-100 natural gas model requires a minimum gas supply pressure of 5" w.c. (1.25 kPa); BL-80 natural gas model requires a minimum gas supply pressure of 6" w.c. (1.49 kPa). The minimum supply pressure is measured while gas is fowing (dynamic pressure). The supply pressure (dynamic) should never fall below the specifed minimum supply pressure. The supply pressure should be measured with all gas fred appliances connected to the common main fring at full capacity. If the supply pressure drops more than 1.5" W.C. (0.37 kPa) as gas begins to fow 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.

WATER PIPING

WATER (POTABLE) HEATING AND SPACE HEATING

⚠ WARNING

Toxic Chemical Hazard

• Do not connect to non-potable water system.

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

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

Toxic chemicals, such as those used for boiler treatment shall 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 6 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 technician to have a thermal expansion tank installed.

CAUTION

Property Damage Hazard

r damage.	• Avoid water heate
ansion tank if necessary.	• Install thermal exp
to cold water inlet.	• Do not apply heat
nstaller or service agency.	• Contact qualified i

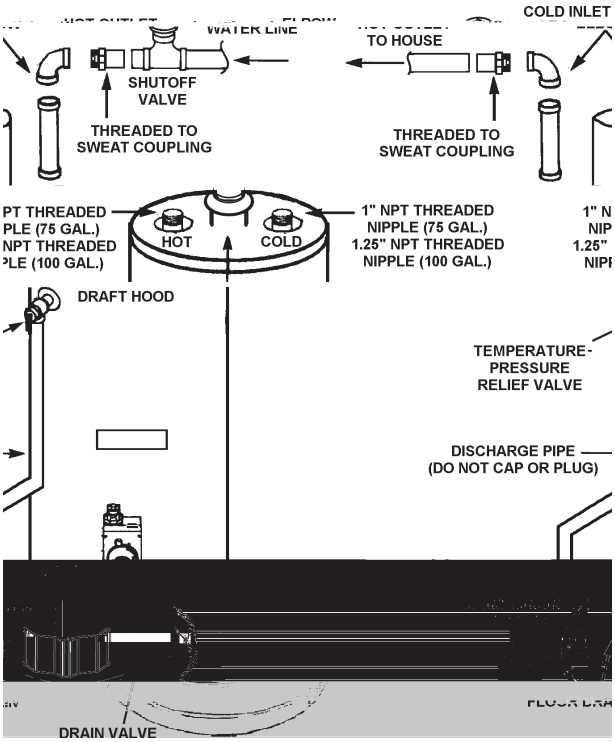


FIGURE 7.

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

Figure 7 shows the typical attachment of the water piping to the water heater.

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 heating appliance 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.

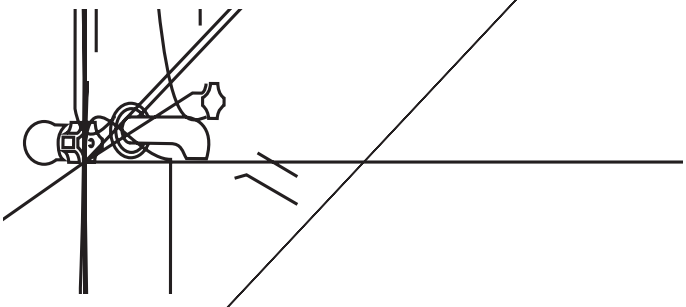
CAUTION

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 building. In cold climates, it is recommended that discharge pipe be terminated at an adequate drain inside building.
- Shall not have any valve or other obstruction between the relief valve and the drain.



amount of combustion air can result in a fre 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 Confned 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 confned spaces. The required size for the openings is dependent on the method used to provide fresh air to the confned space and the total Btu/hr input rating of all appliances installed in the space.

DIRECT VENT APPLIANCES

Appliances installed in a Direct Vent confguration 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 confned 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 specifed. 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 fxed 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 14 for complete venting installation instructions.

OUTDOOR AIR THROUGH TWO OPENINGS9alGSFIGURE 8HY

OUTDOOR AIR THROUGH TWO HORIZONTAL DUCTS

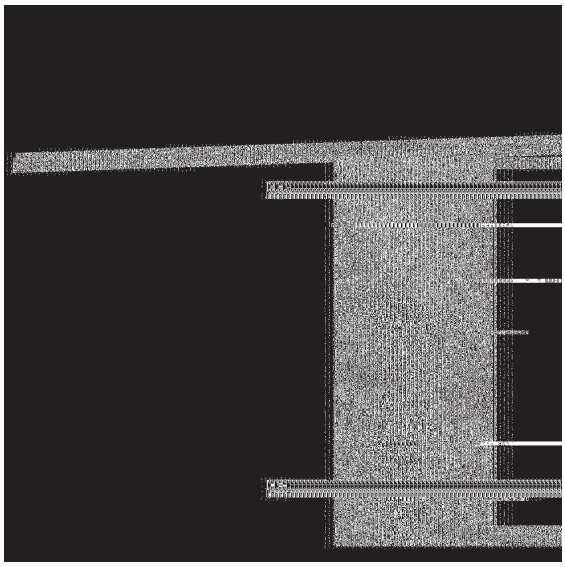


FIGURE 10.

The confned 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 10.

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 confned spaces only.

DO NOT refer to these illustrations for the purpose of vent installation. See Venting Installation on page 14 for complete venting installation instructions.

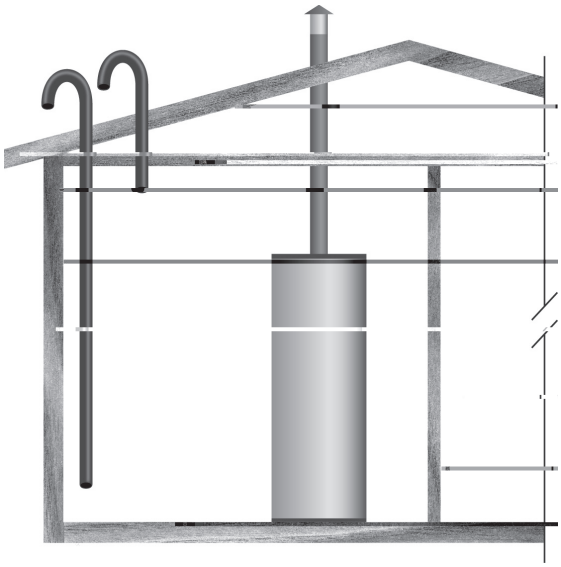


FIGURE 11.

The confned 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 11.

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

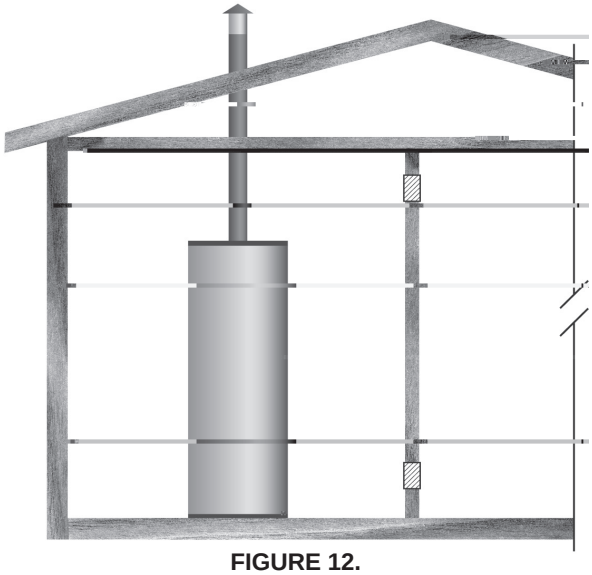


FIGURE 12.

The confned 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 12.

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

VENTING

⚠ WARNING

Breathing Hazard - Carbon Monoxide Gas

If the water heater is being installed as a replacement for an existing heater in pre-existing venting, a thorough inspection of existing venting system must be performed prior to any installation work.

VENT DAMPERS - Any vent damper, whether it is operated thermally or otherwise must be removed if its use inhibits proper drafting of the water heater.

Thermally Operated Vent Dampers: this gas-fired water heater has a thermal efficiency at or above 80% which may produce a relatively low flue gas temperature. Such temperatures may not be high enough to properly open thermally operated vent dampers. This would cause spillage of the flue gases and may cause carbon monoxide poisoning. Vent dampers must bear evidence of certification as complying with the current edition of the American National Standard ANSI Z21.66 CGA 6.14 (covering electrically and mechanically actuated vent dampers). Before installation of any vent damper, consult the local gas utility for further information.

To insure proper venting of this gas-fired water heater, the correct vent pipe diameter must be utilized. Any additions or deletions of other gas appliances on a common vent with this water heater may adversely affect the operation of the water heater. Consult your gas supplier if any such changes are planned.

For proper venting in certain installations, a larger diameter vent pipe may be necessary. Consult your gas supplier to aid you in determining the proper venting for your water heater from the vent tables in the current edition of the National Fuel [illegible]

GAS PIPING

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

Size the main gas line in accordance with Table 3. The figures shown are for straight lengths of pipe at 0.5 in. W.C. pressure drop, which is considered normal for low pressure systems. Note: Fittings such as elbows, tees and line regulators will add to the pipe pressure drop. Also refer to the current editions of the National Fuel Gas Code (NFPA 54) or Natural Gas and Propane Installation Code (CAN/CSA B149.1).

Make sure gas supplied is same type listed on model rating plate. The inlet gas pressure must not exceed 14 inch water column (2.6 kPa) for natural and propane (L.P.) gas. The minimum inlet gas pressure shown on rating plate is that which will permit firing at rated input.

If the gas control valve is subjected to pressures exceeding 1/2 pound per square inch (3.5 kPa), the damage to the gas control valve could result in a fire or explosion from leaking gas.

If the main gas line shut-off serving all gas appliances is used, also turn “off” the gas at each appliance. Leave all gas appliances shut “off” until the water heater installation is complete.

A gas line of sufficient size must be run to the water heater. Consult the current edition of National Fuel Gas Code ANSI Z223.1/NFPA 54 or the Natural Gas and Propane Installation Code CAN/CSA B149.1 and your gas supplier concerning pipe size.

There must be:

- A readily accessible manual shut off valve in the gas supply line serving the water heater, and
- A sediment trap ahead of the gas control valve to help prevent dirt and foreign materials from entering the gas control valve.
- A flexible gas connector or a ground joint union between the shut off valve and control valve to permit servicing of the unit.

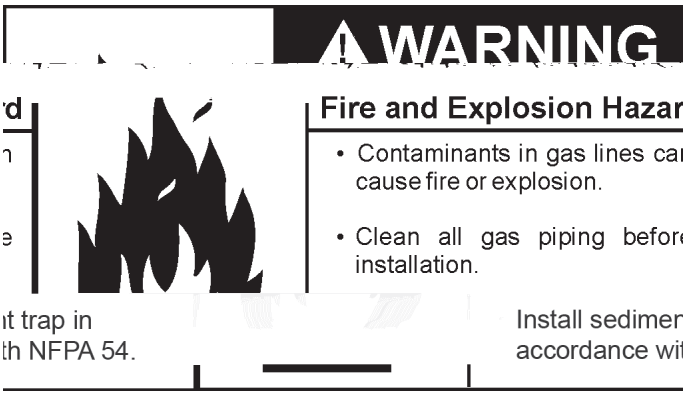
Be sure to check all the gas piping for leaks before lighting the water heater. Use a soapy water solution, not a match or open flame. Rinse off soapy solution and wipe dry.

The minimum inlet gas pressure shown on the rating plate is that which will permit firing at the rated input.

TABLE 3. GAS SUPPLY LINE SIZES (IN INCHES)*
MAXIMUM CAPACITY OF PIPE IN CUBIC FEET PER HOUR

SEDIMENT TRAPS

A sediment trap shall be installed as close to the inlet of the water heater as practical at the time of water heater installation. The sediment trap shall be either a tee fitting with a capped nipple in the bottom outlet or other device recognized as an effective sediment trap. If a tee fitting is used, it shall be installed in conformance with one of the methods of installation shown in the Figures 15 and 16.



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 or the Natural Gas and Propane Installation Code CAN/CSA B149.1.

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

FLAMMABLE

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

A.

WHAT TO DO IF YOU SMELL GAS

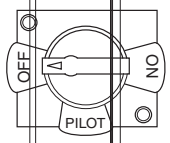
- Do not try to light any appliance.
- Do not touch any electric switch; do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

C.

D.

LIGHTING INSTRUCTIONS

FIGURE 'A'



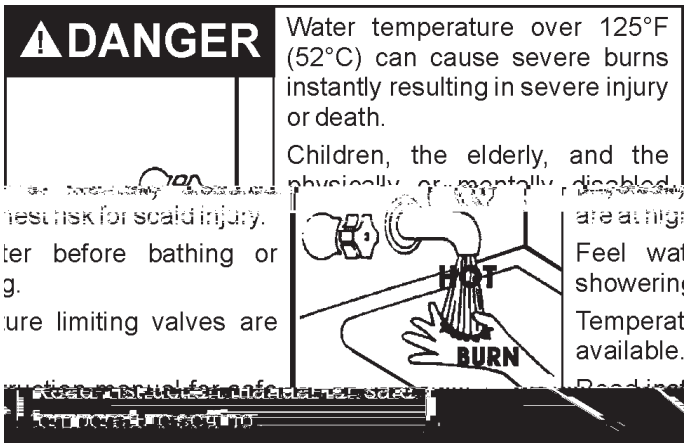
"OFF" POSITION

TOP KNOB

TEMPERATURE REGULATION

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 (16.7°C). If you experience this type of use you should consider using lower temperature settings to reduce scald hazards.

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, infrm, etc.) scalding may occur at different temperatures.



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 infrm, or physically/mentally handicapped. If anyone using hot water in your home fts 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 satisfes 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 6. 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 Figures 17 and 18.

Never allow small children to use a hot water tap, or to draw the

FOR YOUR INFORMATION

START UP CONDITIONS

DRAFT HOOD OPERATION

Check draft hood operation by performing a worst case depressurization of the building. With all doors and windows closed, and with all air handling equipment and exhaust fans operating such as furnaces, clothes dryers, range hoods and bathroom fans, a match fame should still be drawn into the draft hood of the water heater with its burner fring. If the fame is not drawn toward the draft hood, shut off water heater and make necessary air supply changes to correct.

CONDENSATION

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

a. A new water heater is fled with cold water for the frst time.

b. Burning gas produces water vapor in water heaters, particularly high effciency models where fue temperatures are lower.

c. Large amounts of hot water are used in a short time and the refll water in the tank is very cold.

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

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

CHECKING GAS INPUT

With this heater in operation, determine whether it is receiving the full rated input of gas. This may be done by timing the gas meter and measuring gas pressure with a gauge or manometer. When the heater is operating at full capacity (full gas input) it should consume approximately 1 cubic foot of gas in the time shown in Table 5.

TABLE 5. INPUT CHECK TIME REQUIRED TO CONSUME 1 CU. FT. OF GAS

Model	Type of Gas	BTU Per Cu. Ft.	Approx. Time Required To Consume 1 Cu. Ft. of Gas
BL-80 BL-100	Natural	1050	50.3 sec.

Use this formula to “clock” the meter. Be sure that other gas consuming appliances are not operating during this interval.

$$\frac{3{,}600}{T} \times H = \text{Btu/Hr}$$

T = Time in seconds needed to burn one cubic foot of gas.

H = Heating value of gas in Btu’s per cubic foot of gas.

Btu/Hr = Actual heater input rate.

Example:

T = 50.3 seconds/ft^3

H = 1,050 Btu/ft^3 (natural gas)

Btu/Hr = ?

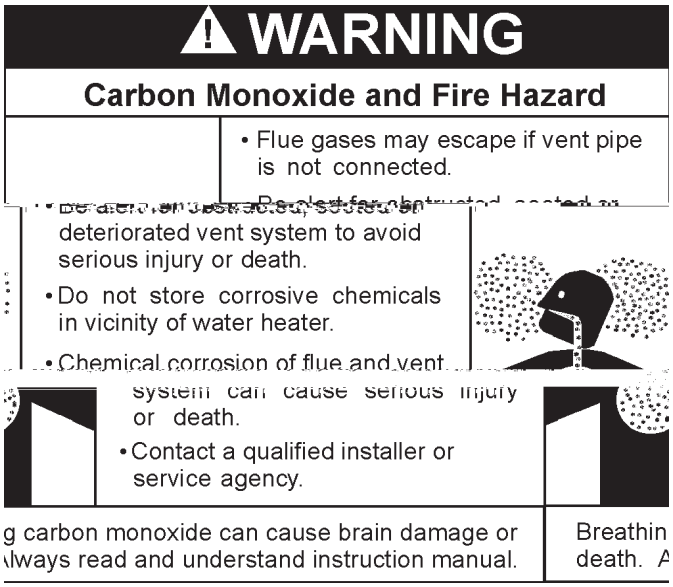
$$\frac{3{,}600}{50.3} \times 1{,}050 = 75{,}100 \text{ Btu/Hr (22.0 kW)}$$

Compare the actual input rate to that given on the heater’s rating plate. In the example, the BL-100’s full input rate should be 75,100 Btu/Hr for natural gas.

Because of the suddenness and amount of water, condensation water may be diagnosed as a “tank leak”. After the water in the tank warms up (as in the example, "should the water as the water as water the water in the tank warms

PERIODIC MAINTENANCE

VENTING SYSTEM INSPECTION



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 fow must not be obstructed.
2. Damage or deterioration which could cause improper venting or leakage of combustion products.
3. Rusted fakes around top of water heater.

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

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

Chemical vapor corrosion of the fue 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 vent system you found sooting or deterioration, something is wrong. Call the local gas utility to correct problem and clean or replace the fue and venting before resuming operation of water heater.

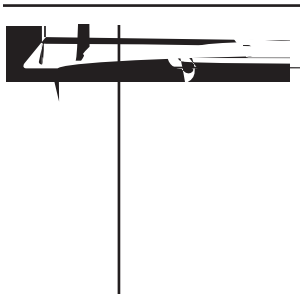
BURNER INSPECTION

Flood damage to a water heater may not be readily visible or immediately detectable. However, over a period of time a fooded water heater will create dangerous conditions which can cause DEATH, SERIOUS BODILY INJURY, OR PROPERTY DAMAGE. Contact a quali fed installer or service technician to replace a fooded 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 pilot burner, see Figure 19. Inspect burner f ames through viewport. Flames should be very small with a blue haze and small amounts of yellow or orange at the edges. After several minutes of operation the burner screen may glow red.

You should] hn fte l ith hn scqwrne n amo er sc (

INSTALLED IN SUITABLE AREA: To insure sufficient ventilation and combustion air supply, proper clearances from the water heater must be maintained. See Facts to Consider About The Location section. Combustible materials such as clothing, cleaning materials, or flammable liquids, etc. must



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. Use care when operating valve as the valve may be hot.

To check the relief valve, lift the lever at the end of valve several times, see Figure 21. The valve should seat properly and operate freely.

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 and drain the water heater, see Draining And Flushing on page 24. Replace the Temperature-Pressure Relief Valve with a properly rated/sized new one, see Temperature-Pressure Relief Valve on page 11 for instructions on replacement.

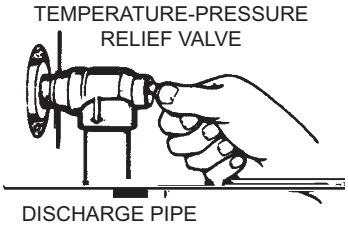


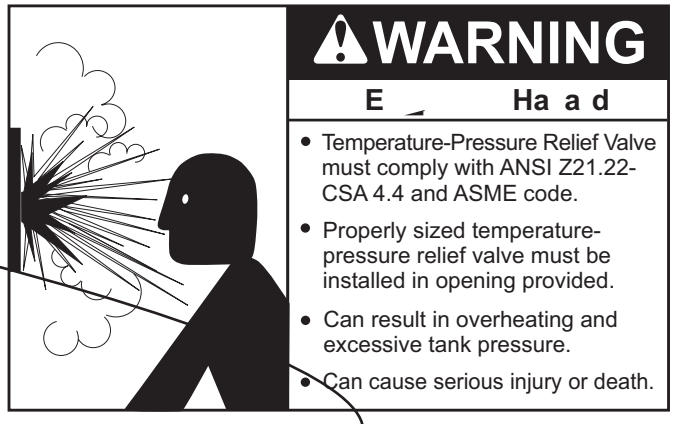
FIGURE 21.

If the Temperature-Pressure Relief Valve on the water heater weeps or discharges periodically, this may be due to thermal expansion.

NOTE: Excessive water pressure is the most common cause of Temperature-Pressure Relief Valve leakage. Excessive water system pressure is most often caused by “thermal expansion” in a “closed system.” See Closed Water Systems and Thermal Expansion on page 11. The Temperature-Pressure Relief Valve is not intended for the constant relief of thermal expansion.

Temperature-Pressure Relief Valve leakage due to pressure build up in a closed system that does not have a thermal expansion tank installed is not covered under the limited warranty. Thermal expansion tanks must be installed on all closed water systems.

DO NOT PLUG THE TEMPERATURE-PRESSURE RELIEF VALVE OPENING. THIS CAN CAUSE PROPERTY DAMAGE, SERIOUS INJURY OR DEATH.



RECOMMENDED PROCEDURE FOR PERIODIC REMOVAL OF LIME DEPOSITS FROM TANK TYPE COMMERCIAL WATER HEATERS

The amount of calcium carbonate (lime) released from water is in direct proportion to water temperature and usage, see chart. The higher the water temperature or water usage, the more lime deposits are dropped out of the water. This is the lime scale which forms in pipes, heaters and on cooking utensils.

Lime accumulation not only reduces the life of the equipment but also reduces efficiency of the heater and increases fuel consumption.

The usage of water softening equipment greatly reduces the hardness of the water. However, this equipment does not always remove all of the hardness (lime). For this reason it is recommended that a regular schedule for deliming be maintained.

The time between cleaning will vary from weeks to months depending upon water conditions and usage.

The depth of lime buildup should be measured periodically. Heaters equipped with cleanouts will have about 2" of lime buildup when the level of lime has reached the bottom of the cleanout opening. A schedule for deliming should then be set up,based on the amount of time it would take for a 1" buildup of lime. It is recommended that the water heater initially be inspected after 6 months.

Example 1:
Initial inspection after 6 months shows 1/2" of lime accumulation. Therefore, the heater should be delimed once a year.

Example 2:
Initial inspection after 6 months shows 2" of lime accumulation. Therefore, the heater should be delimed every 3 months.

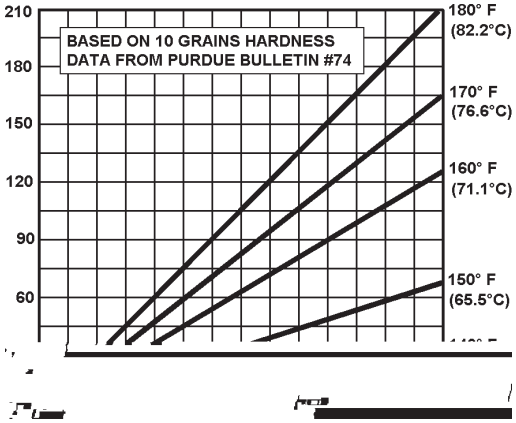


FIGURE 22.

DELIMING SOLVENTS

UN•LIME is recommended for deliming. UN•LIME is a patented food grade acid which is safe to handle and does not create the harmful fumes which are associated with other products.

UN•LIME may be obtained from your dealer, distributor or water heater manufacturer. Order Part Number 9005416105, 1 gallon, packed 4 gallons per case or Part Number 9005417105, 5 gallon container.

NOTE: Un•Lime is not available for use in Canada.

Hydrochloric base acids are not recommended for use on glass lined tanks.

Observe handling instructions on label of product being used.

TANK CLEANOUT PROCEDURE

The following practices will ensure longer life and enable the unit to operate at its designed efficiency:

1. Once a month the heater should be flushed. Open the drain valve and allow two gallons of water to drain from the heater. Inlet water valve should remain open to maintain pressure in tank.
2. A cleanout opening is provided for periodic cleaning of the tank. Gas must be shut off and heater drained before opening cleanout.

To clean heater through cleanout opening, proceed as follows:

1. Drain heater.

4. Put cap with male adapter back on the container and slide 3/4" hose over end of male adapter and fasten in place using hose clamp provided.

DELIME USING FLO-JUG METHOD

5. Slide the hose clamp over end of hose and slide hose over the male adapter in the water heater drain opening and secure in place using hose clamp.

6. Lift container to the "Pour" Position being careful to keep the vent in the handle above the liquid level and pour the UN•LIME into the heater.

7. Lower container, you may have to place the container on its empty carton to prevent the UN•LIME from fowing back into the container.

LIME remain in the heater for 5 minutes and then lower er to the "Drain" Position.

indicated by foaming on the surface of the eliming activity, repeat steps 6 thru 8.

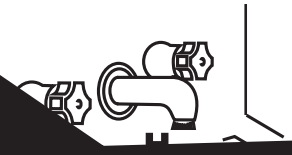
mpleted within one hour. Severe bu an hour to complete descaling.

Note: To c ce some scale or white chalk in a gla E. If the material is vigorously dissol sed; if not, the UN•LIME should be r

If the temperature-pressure or discharges periodically, this may may have a check valve installed in with a check valve. Consult your local technician for further information. Do not pressure relief valve.

DRAINING AND FLUSHING

It is recommended that the water heater storage tank drained and fushed every 6 months to reduce sediment buildup. The water heater should be drained if being shut down during freezing temperatures. See Installation Considerations in this manual for the location of the water heater components described below.



TROUBLESHOOTING GUIDELINES

These guidelines should be utilized by a qualifed service agent.

Problem	Cause	Solution

WATER PIPING DIAGRAMS

- (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


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.

- (1 UNIT) WITH VERTICAL STORAGE TANK

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.

- (1 UNIT) WITH HORIZONTAL STORAGE TANK

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.

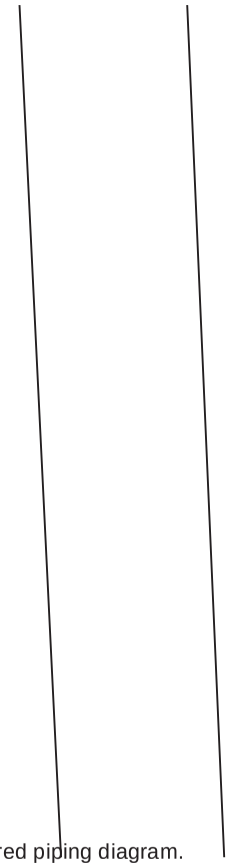
SINGLE FLUE - (1 UNIT) WITH MIXING VALVE TWO TEMPERATURE

NOTES:

1. P
2. Th
3. S

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

NOTES:

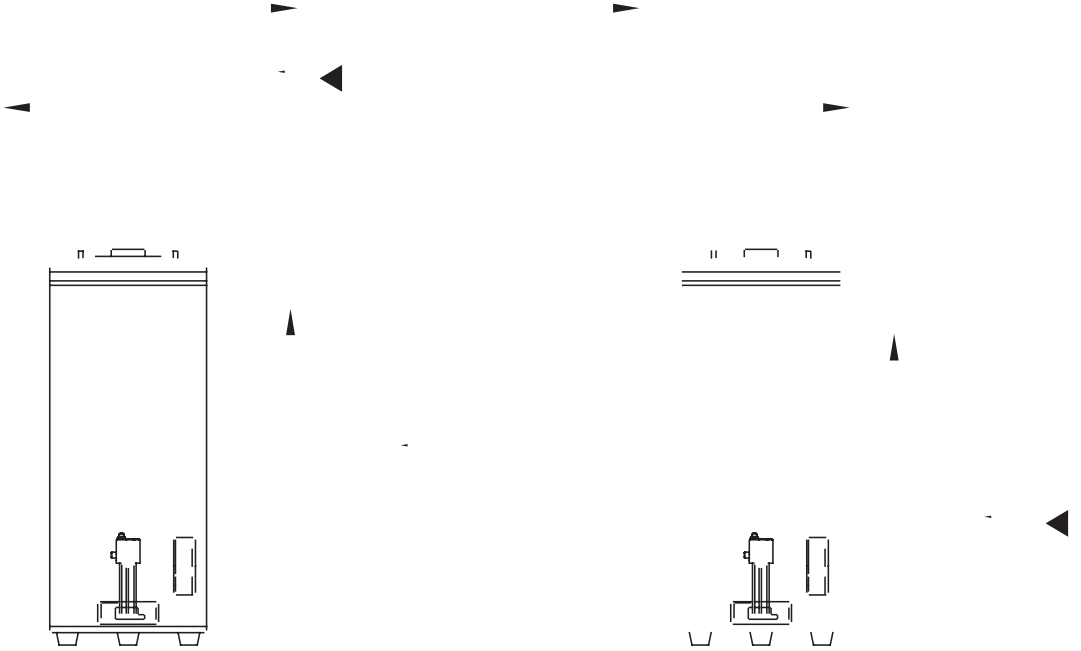
1. Preferred piping diagram.
2. The temperature and pressure relief valve setting shall not exceed pressure rating of any component in the system.
3. Service valves are shown for servicing unit. However, local codes shall govern their usage.

- (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.PIPE T&P TO

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.
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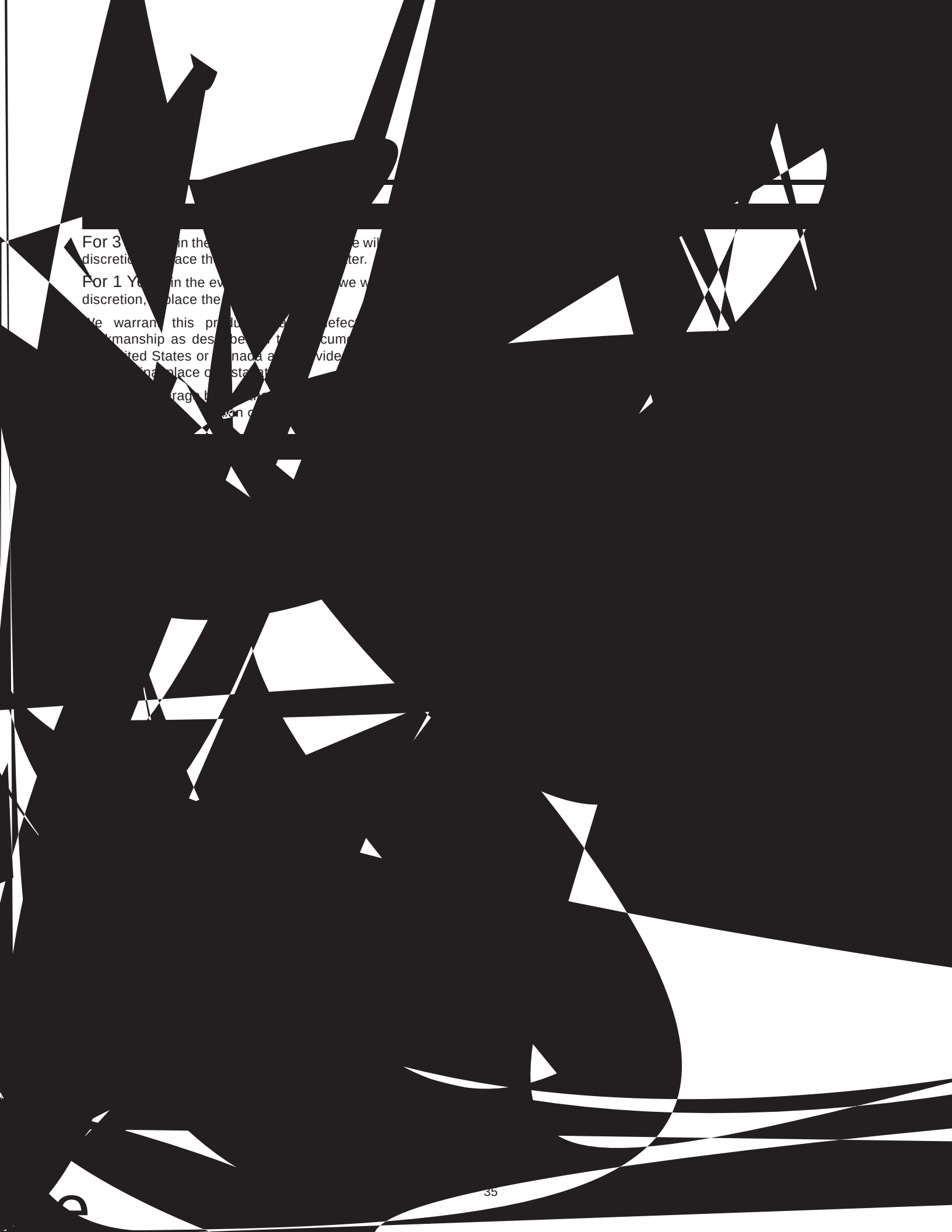
NOTES

NOTES



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