



# Indirect Fired Water Heaters

## Installation and Operating Manual



**Models: SST150-40**  
**SST250-65**  
**SST300-80**  
**SST450-119**



**CAUTION:**

The heat transfer medium must be water or other nontoxic fluid having a toxicity rating or class of 1, as listed in Clinical Toxicology of Commercial Products, 5th edition.

The pressure of the heat transfer medium must be limited to a maximum of 30 PSIG by an approved safety or relief valve.



**WARNING:**

This manual must only be used by a trained heating installer / service technician. Read all instructions before installing. Perform steps in the order given. Failure to comply could result in severe personal injury, death, or substantial property damage.



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## Explanation Of Symbols

### Warnings



Warnings in this document are identified by a warning triangle printed against a grey background.

Keywords at the start of a warning indicate the type and seriousness of the ensuing risk if measures to prevent the risk are not taken.

The following keywords are defined and can be used in this document:

- ▶ **DANGER** indicates a hazardous situation which, if not avoided, will result in death or serious injury.
- ▶ **WARNING** indicates a hazardous situation which, if not avoided, could result in death or serious injury.
- ▶ **CAUTION** indicates a hazardous situation which, if not avoided, could result in minor to moderate injury.
- ▶ **NOTICE** is used to address practices not related to personal injury.

### Important information



Important information in cases where there is no risk of personal injury or material losses is identified by the symbol shown on the left. It is bordered by horizontal lines above and below the text.

## Please Read Before Proceeding



### **DANGER: Installer – Read all instructions before installing.**

Perform steps in the order given. Have this indirect water heater serviced/inspected by a qualified service technician, at least annually. Failure to comply with the above could result in severe personal injury, death or substantial property damage.

### **NOTICE:**

When calling or writing about the appliance

- Please have the indirect water heater model and serial number from the indirect water heater rating plate.
- Consider piping and installation when determining appliance location.
- Any claims for damage or shortage in shipment must be filled immediately against the transportation company by the consignee.
- Factory warranty does not apply to appliances improperly installed or improperly operated.



### **DANGER:**

If the information in this manual is not followed exactly, a fire or explosion may result causing property damage, personal injury or loss of life. This appliance **MUST NOT** be installed in any location where gasoline or flammable vapors are likely to be present.

### **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 home/building.
- Evacuate the home/building immediately.
- Immediately call your gas supplier. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.
- Installation and service must be performed by a qualified installer, service agency, or the gas supplier.



**DANGER: HOT WATER CAN SCALD!**

Water heated to temperatures for clothes washing, dish washing, and other sanitizing needs can scald and cause permanent injury.

Children, elderly, and infirm or physically handicapped persons are more likely to be permanently injured by hot water. Never leave them unattended in a bathtub or shower. Never allow small children to use a hot water tap or draw their own bath.

If anyone using hot water in the building fits the above description, or if state laws or local codes require certain water temperatures at hot water taps, you must take special precautions:

- Use lowest possible temperature setting.
- Install some type of tempering device, such as an automatic mixing valve, at hot water tap or water heater. Automatic mixing valve must be selected and installed according to valve manufacturer's recommendations and instructions.

Water passing out of drain valves may be extremely hot. To avoid injury:

- Make sure all connections are tight.
- Direct water flow away from any person

Protection Must Be Taken Against Excessive Temperature and Pressure! Installation of a Temperature & Pressure (T&P) relief valve is required.



**DANGER:**

Failure to adhere to the guidelines on this page can result in severe personal injury, death, or substantial property damage.

**When Servicing the Indirect Water Heater -**

To avoid severe burns, allow the appliance to cool before performing maintenance.

**Indirect water heater operation –**

Should overheating occur or gas supply fail to shut off, do not turn off or disconnect electrical supply to circulator. Instead, shut off the gas supply at a location external to the appliance.

Do not use this appliance if any part has been under water. The possible damage to a flooded appliance can be extensive and present numerous safety hazards. Any appliance that has been under water must be replaced.

The following chart details the relationship of water temperature and time with regard to scald injury and may be used as a guide in determining the safest water temperature for your applications.

APPROXIMATE TIME / TEMPERATURE RELATIONSHIPS IN SCALDS	
120° F	More than 5 minutes
125° F	1 ½ to 2 minutes
130° F	About 30 seconds
135° F	About 10 seconds
140° F	Less than 5 seconds
145° F	Less than 3 seconds
150° F	About 1 ½ seconds
155° F	About 1 second

## 1 General Information

The SST series indirect water heater (FIG. 1-1) is designed to generate domestic hot water in conjunction with a hot water boiler using forced boiler water circulation. This indirect water heater consists of a 316L Stainless Steel tank in which a smooth 316L stainless steel coil is located (Table 1A). Boiler water is pumped through the coil and heats the water in the tank. This tank is not intended for use in pool heating applications or for heating any fluid other than water. It is also not intended for use in gravity hot water heating systems.

### Operating Restrictions:

- Maximum domestic hot water temperature is 194°F.
- Maximum boiler water temperature is 210°F.
- Maximum working pressure for the vessel tank is 150 psig.

Component Materials		Table 1A
Component	Material	
Tank	316L Steel Stainless Steel	
Coil	316L Stainless Steel	
Insulation	Polyurethane	
Jacket	Polypropylene/ABS	

### Single-Wall Heat Exchanger

#### National Standard Plumbing Code

Single-wall heat exchangers in water heaters comply with the National Standard Plumbing Code provided that:

- boiler water (including additives) is practically non-toxic, having a toxicity rating or class of 1, as listed in Clinical Toxicology of Commercial Products, and
- boiler water pressure is limited to a maximum of 30 psig by approved relief valve.

#### Uniform Plumbing Code

Single-wall heat exchangers are permitted if they satisfy all of the following requirements:

1. The heat transfer medium is potable water or contains only substances which are recognized as safe by the U.S. Food and Drug Administration.
2. The pressure of the heat transfer medium is maintained less than the normal minimum operating pressure of the potable water system.
3. The equipment is permanently labeled to indicate that only additives recognized as safe by the FDA shall be used in the heat transfer medium.

Other heat exchanger designs may be permitted where approved by local code.

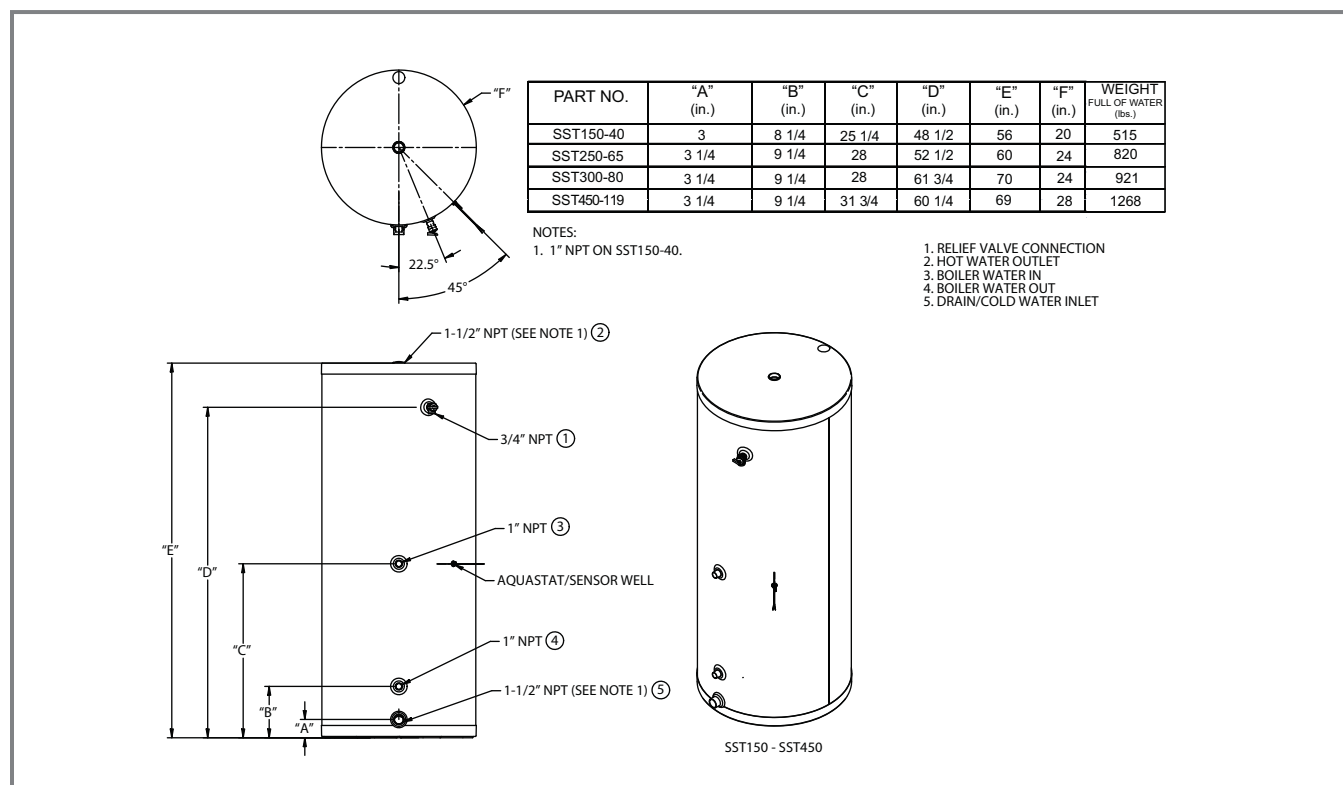


Figure 1-1

## 2 Pre-installation

1. The installation must conform to the instructions in this manual and all applicable local, state, provincial, and national codes, laws, regulations, and ordinances. Installations in Canada must conform to B149.2 Installation Code.
2. Be certain the domestic water supply to the tank has physical and chemical characteristics that fall within the limits shown in Table 2A. Where questions exist as to the composition of the water on the job, a qualified water treatment expert should be consulted.



**CAUTION:**  
Water with characteristics outside the limits shown in Table 2A may severely shorten the life of the tank due to corrosion. Damage to tanks in such cases is not covered under warranty.

3. Read and understand all installation requirements in this manual.

**Water Chemistry Requirements** Table 2A

Water used in the tank must have characteristics falling within the following limits:

Characteristic	Min.	Max.
Ph	6.0	8.0
Chloride (PPM)	--	80

## Locating the Tank

1. Choose a location for your water heater centralized to the piping system. You must also locate the SST water heater where it will not be exposed to freezing temperatures. Additionally, you will need to place the water heater so that the controls, drain, and inlet/outlets are easily accessible. This appliance must not be installed outdoors, as it is certified as an indoor appliance, and must also be kept vertical on a level surface.
2. Keep distance between boiler and water heater to a minimum to:
  - a. reduce piping heat loss
  - b. provide minimal friction loss
3. Figure 1-1 on page 6 shows the weights of all the tanks filled with water. Make sure that the location chosen for the tank is capable of supporting it.



**CAUTION:**  
This appliance must be placed where leakage from the temperature and pressure (T&P) relief valve, leakage from the related piping, or leakage from the tank or connections, will not result in damage to the surrounding areas, or to the lower floors of the building. A water heater should always be located in an area with a floor drain or installed in a drain pan suitable for water heaters. The manufacturer shall not be held liable for any such water damage. Damage caused by the failure to properly install a drain pan or in an area with a drain is not the responsibility of the manufacturer or Bosch Thermotechnology Corp. (BTC).

4. The tank may be located some distance from the boiler provided the pump is designed to provide the flow called for in Table 3B - Pressure Drop Values, through the coil. Also, the further the tank is from the boiler, the longer the response of the boiler will be to a call from the tank zone. Insulate piping between the boiler and the tank.



**WARNING:**  
Failure to properly support the tank could result in property damage or personal injury.

## Recommended Clearances

The installation location must provide adequate clearances for servicing and proper operation of the water heater. A 12 inch vertical clearance is recommended from the top of the water heater. A zero clearance is allowed for the sides of the water heater. However, boiler and servicing clearances must be figured when locating the water heater.

## 3 Boiler Side Piping

Figures 3-1 thru 3-4 show typical boiler side piping for several common situations. Regardless of which system is used it is imperative that the flow rates called for in Table 3B are developed through the coil. This requires properly sized piping and a properly sized pump. The system shown in FIG's 3-1 thru 3-4 are described below:

### DHW Prioritization

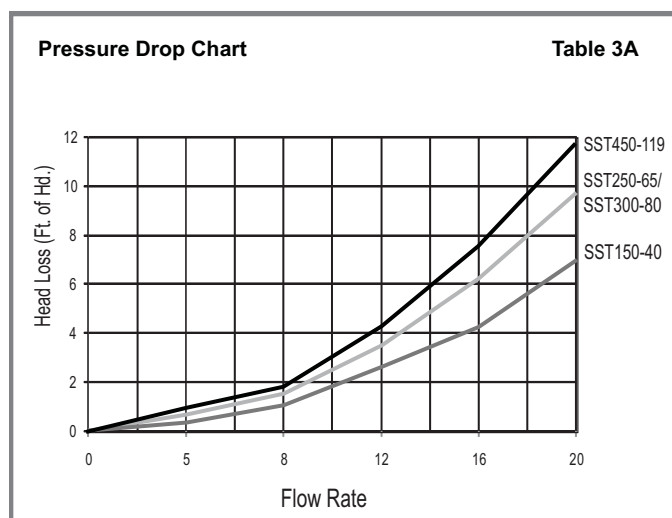
This piping system is designed to provide direct hot water priority over the other zones in the heating system. When there is a Domestic Hot Water (DHW) call for heat, the controller will shut off the boiler circulator and activate the domestic hot water circulator. Once the DHW demand is satisfied, the boiler circulator will be readjusted as demand requires. The circulator must be large enough to move the boiler water through the coils. The recommended piping for a DHW priority system is depicted in FIG. 3-1 and 3-2 using a GB142 wall hung boiler.

### Zone with Circulator to Aquastat

This system is like the circulator zone system on a straight heat job except that one of the zones goes to the tank instead of radiation. As on any circulator zone system check valves should be installed in each zone to prevent unwanted circulation through zones which are not calling for heat. Figure 3-3 illustrates typical circulator zone piping with a floor standing G115WS, G125BE, GB125BE, or G215 boiler.

### Multiple Tank Connections (Boiler Side)

Multiple tank installations must be done in the "reverse-return" manner. The reason for this is to create the same pressure drop (and therefore, the same flow) through the coil of each tank. The boiler manifold piping must be sized so that each coil has the flow rate called for in Table 3B. Because the pressure drop through tank coils varies from size to size, it is hard to predict the flow rate that will be developed through each coil when two tanks of different sizes are placed in the same manifold. For this reason it is best not to mix tanks of different sizes in the same zone if their recovery is critical. A sample system is shown in FIG. 3-4.



Pressure Drop Values						Table 3B				
Model	Water Inlet (IN)	Water Outlet (IN)	Coil Connection (IN)	Coil Length (FT)	Surface area (SQ-FT)	Pressure Drop (FT/HD)				
						5 GPM	8 GPM	12 GPM	16 GPM	20 GPM
SST150-40	1	1	1	30.8	10.0	0.41	1.04	2.34	4.16	6.49
SST250-65	1.5	1.5	1	41.5	13.5	0.61	1.57	3.53	6.27	9.80
SST300-80	1.5	1.5	1	41.5	13.5	0.61	1.57	3.53	6.27	9.80
SST450-119	1.5	1.5	1	67.3	22.0	0.73	1.87	4.22	7.50	11.71



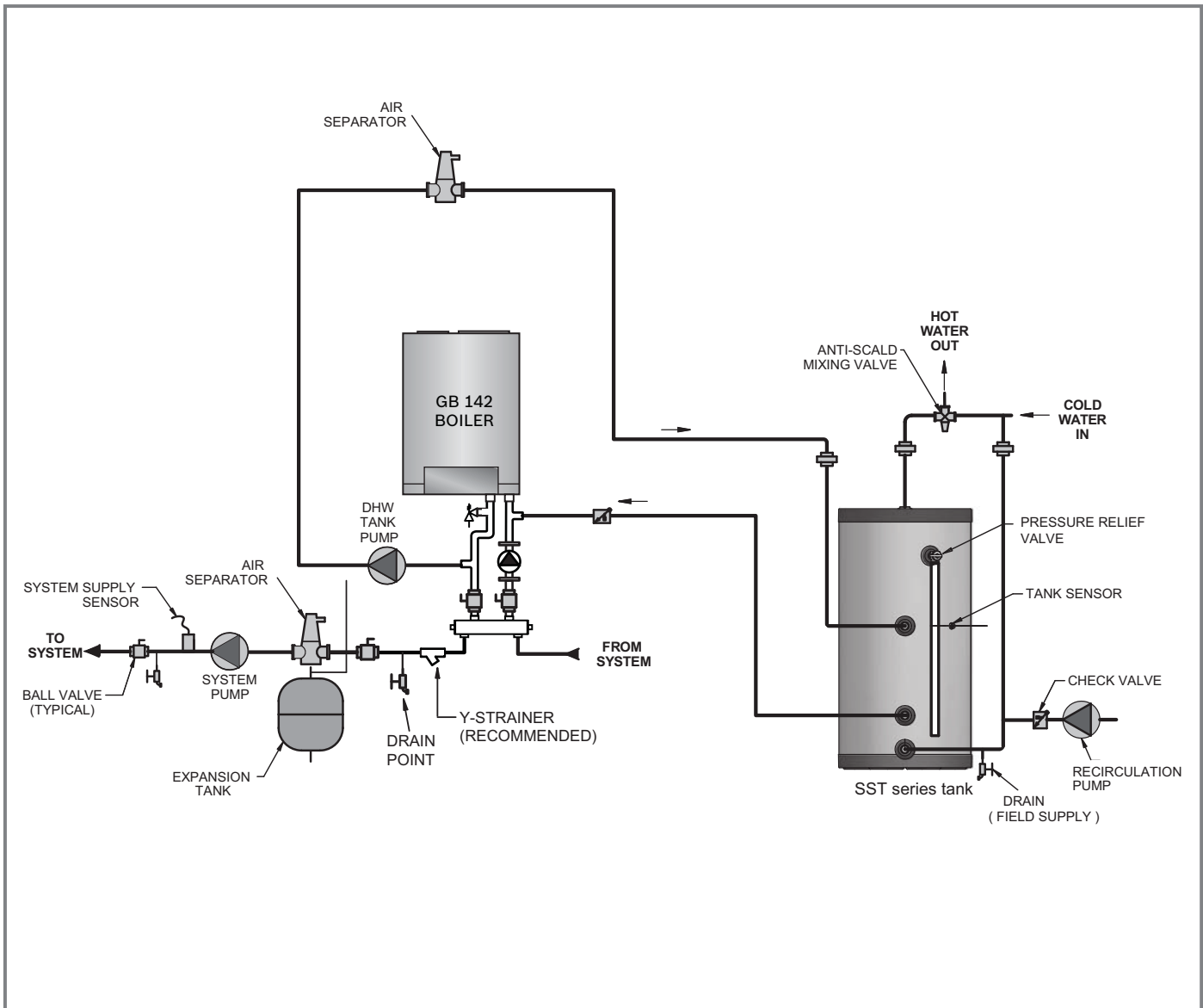


Figure 3-1 GB142 Boiler Low Loss Header piping and DHW priority

**NOTICE:**

Please note that these illustrations are meant to show system piping concept only, the installer is responsible for all equipment and detailing required by local codes.

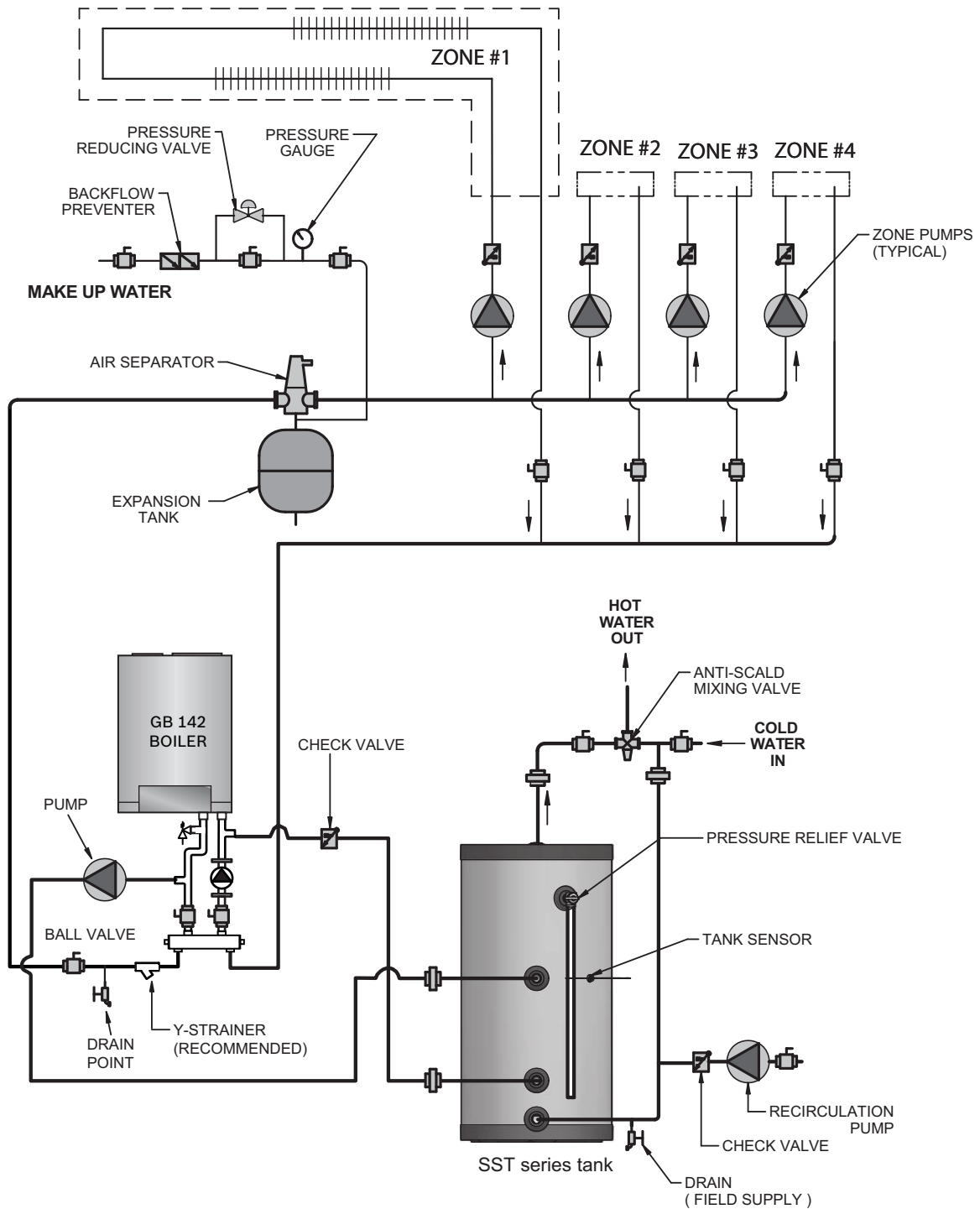


Figure 3-2 Piping diagram zoned with circulators and DHW priority

## NOTICE:

Please note that these illustrations are meant to show system piping concept only, the installer is responsible for all equipment and detailing required by local codes.

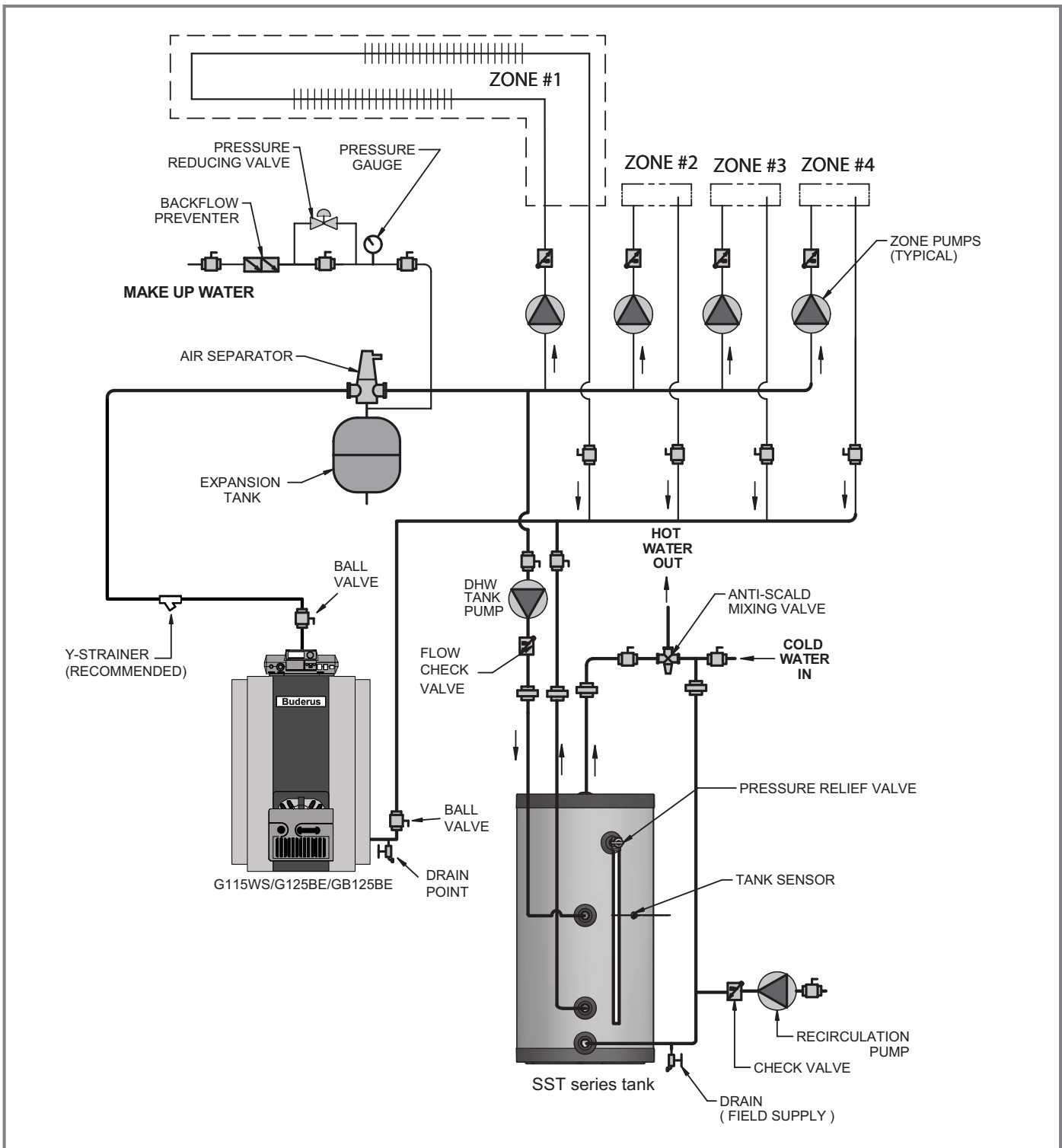


Figure 3-3 Piping diagram of floor standing boiler and DHW priority

**NOTICE:**

Please note that these illustrations are meant to show system piping concept only, the installer is responsible for all equipment and detailing required by local codes.

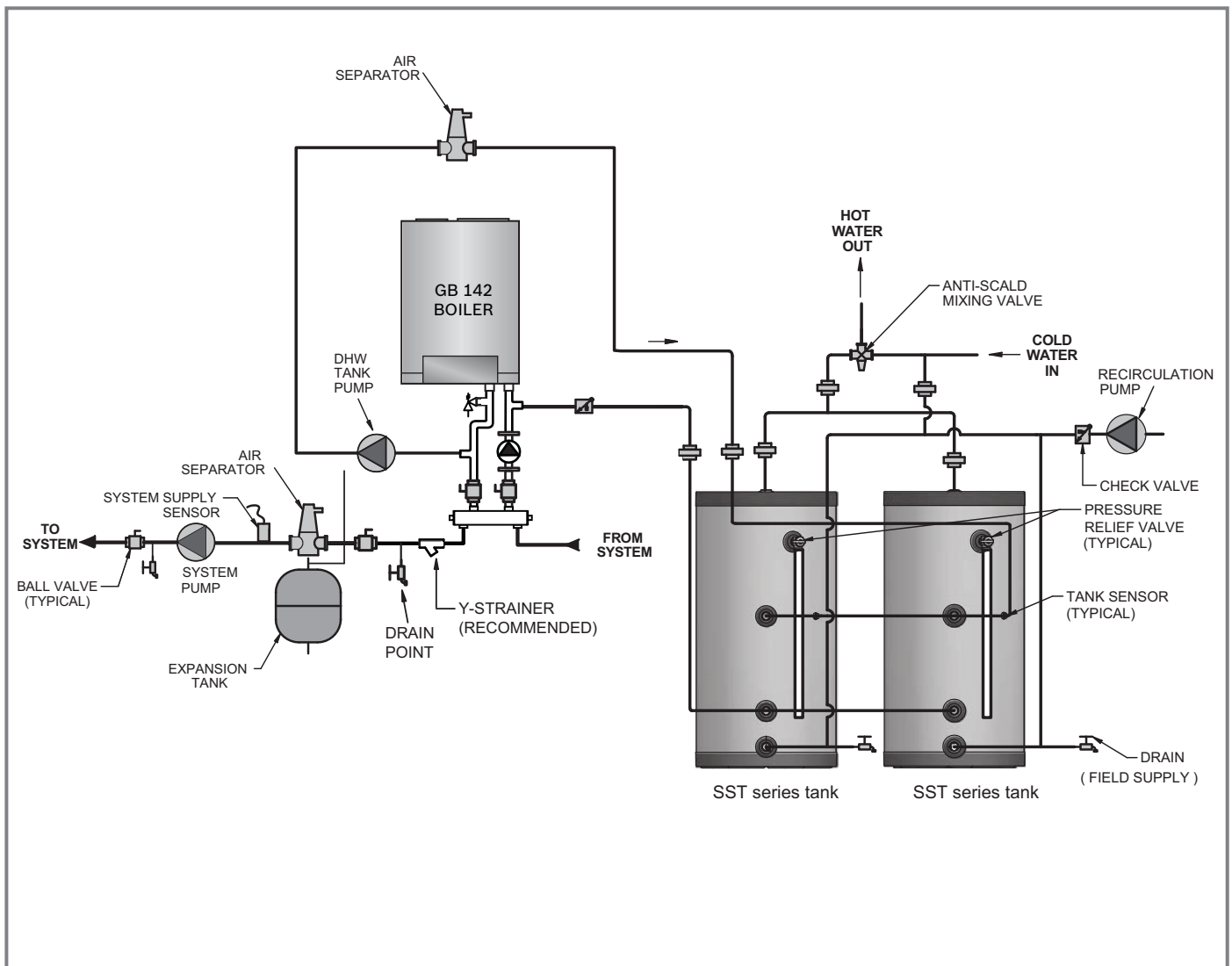


Figure 3-4 Multiple tank connections in reverse return

## NOTICE:

Please note that these illustrations are meant to show system piping concept only, the installer is responsible for all equipment and detailing required by local codes.

## 4 Domestic Side (Tank) Piping

### Basic Domestic Piping

Figure 4-2 shows typical domestic water piping for a tank. The function of the components shown are as follows:

- a. Shut-off valves (recommended) - Used to isolate the tank for servicing.
- b. Backflow Preventer (required by some codes) - Used to prevent water from backing out of the tank in the event that inlet water pressure drops.
- c. Expansion Tank (required when a backflow preventer is used) - This expansion tank absorbs the increased volume caused by heating water.

Use an expansion tank designed for use on domestic water systems. Refer to the expansion tank manufacturer's literature for the proper size expansion tank to use.

#### NOTICE:

If an expansion tank is used, do not put any valves between the expansion tank and tank inlet.

- d. Unions (optional) - Used to disconnect the tank in the unlikely event that this is necessary.
- e. Drain (required) - Used to drain the tank for inspection or servicing.

### Multiple Tank Domestic Water Piping

The two pipe reverse return piping uses more pipe than the two pipe direct return piping, but the flow is more balanced and even in the two pipe reverse return piping layout (see FIG. 3-4).

Each tank must have its own T&P valve. It is recommended that each tank be equipped with its own isolation valves, unions, and drains so that one tank may be removed from the system. If local codes require a backflow preventer, check with the appropriate authority to find out whether one backflow preventer may be used for tanks or each tank must be equipped with its own backflow preventer. If each tank must have its own backflow preventer, each tank must also have its own expansion tank. If a common backflow preventer is permitted, an expansion tank must be sized to accommodate the expansion volume of all tanks.

### Domestic Water Piping for Distant Fixtures

In some cases the furthest fixture may be quite distant from the tank. Such an installation would result in an unacceptable delay before hot water reaches these distant fixtures. Even if all the fixtures are relatively close to the tank, the building owner may want hot water at all fixtures as soon as they are opened.

A solution to this problem is that a pipe runs from the furthest fixture on each branch back to the return of the tank (reference FIG. 4-2). A small DHW recirculation pump is mounted in this line and is wired so as to run continuously. A check valve in this line permits flow towards the tank inlet only.

When no fixtures are drawing water, the DHW recirculation pump moves hot water from the tank to the end of the branch just below the last fixture, then back to the inlet of the tank via the return pipe. When a fixture is opened, hot water is already out in the branch very close to the fixture and hot water appears at it almost immediately. The check valve prevents cold water in the tank's inlet pipe from passing around the tank and heading directly to the fixture.

Because hot water is always circulating in the hot water branch the entire branch should be insulated to prevent excessive heat loss.

## Anti-scald Valves (Mixing Valves)

Anti-scald valves used with water heaters are also called tempering valves or mixing valves. An anti-scald valve mixes cold water in with the outgoing hot water to assure that hot water reaching a building fixture is at a temperature low enough to be safe.

Usually, the maximum temperature of the outlet water will stay near the setting of the tank control. In some cases, however, hot water usage patterns can cause the outlet water temperature to rise significantly above the control setting.

The temperature of water going to the fixtures may be more carefully controlled through the use of a thermostatic mixing valve. This device blends a controlled amount of cold water with the hot water leaving the tank so that water at a more constant temperature exits the mixing valve. Anti-scald mixing valve piping is illustrated in FIG.'s 3-1 thru 3-4.



### WARNING:

An anti-scald mixing valve does not eliminate the risk of scalding.

- Set the tank thermostat as low as practical.
- Feel water before bathing or showering.
- If anti-scald or anti-chill protection is required, use devices specifically designed for such service. Install these devices in accordance with their manufacturer's instructions.

## Install Drain Valve

Drain valve and fittings are supplied by others.

### Standard Installation

- Install a tee connection at the domestic cold water inlet (FIG. 4-1).

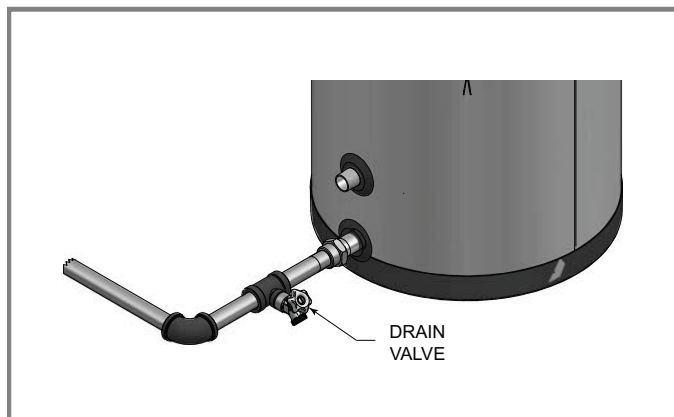


Figure 4-1 Drain valve installed

## Temperature & Pressure (T&P) Relief Valve



### WARNING:

For protection against excessive temperatures and pressure, install temperature and pressure protective equipment required by local codes, but not less than a combination temperature and pressure (T&P) relief valve certified by a nationally recognized testing laboratory that maintains periodic inspection of production of listed equipment or materials as meeting the requirements for Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems, ANSI Z21.22 and the Standard CAN1-4.4, Temperature, Pressure, Temperature and Pressure Relief Valves and Vacuum Relief Valves. The combination temperature and pressure relief valve shall be marked with a maximum set pressure not to exceed the maximum working pressure of the water heater. The combination temperature and pressure relief valve shall also have an hourly rated temperature steam BTU discharge capacity not less than shown in Table 4A.

Install the combination temperature and pressure relief valve into the opening provided and marked for this purpose on the water heater. Failure to properly install the correct temperature and pressure (T&P) relief valve can result in a discharge of hot water that can cause severe personal injury or substantial property damage.

### NOTICE:

Verify that the combination temperature and pressure (T&P) relief valve complies with local codes. If the combination temperature and pressure relief valve does not comply with local codes, replace it with one that does. Follow the installation instructions in this section.

Do not place a valve between the combination temperature and pressure relief valve and the tank.

Determine T&P relief valve size by the following specifications, unless they conflict with local codes:

- SST150-40 - 3/4" NPT with a minimum AGA Rating of 105,000 Btu/hr.
- SST250-65/300-80/450-119 - 3/4" NPT with a minimum AGA Rating of 200,000 Btu/hr.

**NOTICE:**

The SST series water heaters will absorb/store less than 200,000 Btu/hr when domestic water outlet temperature is 210°F and boiler water supply temperature is 240°F. Listed outputs are based on ASME Section VIII Interpretation VIII-1-86-136. Check with local codes for applicability.

Minimum Relief Valve (AGA Rating)		Table 4A
Model	BTU/hr	
SST150-40	105,000	
SST250-65	200,000	
SST300-80	200,000	
SST450-119	200,000	

**Standard Installation**

- Install the T&P relief valve in the connection marked "Relief Valve".

**T&P Relief Valve Discharge Piping**

T&P relief valve discharge piping **must** be:

- made of material serviceable for a temperature of 250°F or greater.
- directed so that hot water flows away from all persons.
- directed to a suitable place for disposal.
- installed so as to allow complete draining of the T&P relief valve and discharge line.
- terminated within 6" of the floor.

T&P relief valve discharge piping **must not** be:

- excessively long. Using more than two (2) elbows or 15 feet of piping can reduce discharge capacity.
- directly connected to a drain. Refer to local codes.
- subject to freezing.



**DANGER:**

Do not install any valve between the temperature and pressure (T&P) relief valve and the tank connection or on the T&P relief valve discharge piping. Improper placement and piping of T&P relief valve may result in a discharge of hot water that can cause severe personal injury, death or substantial property damage.



**WARNING:**

The temperature and pressure (T&P) relief valve is not intended for constant duty, such as relief of pressure due to repeated normal system expansion. Correct this condition by installing a properly sized expansion tank in a domestic water system. Refer to the expansion tank manufacturer's installation instructions for proper sizing. Be advised, the hot discharge water from the temperature and pressure (T&P) relief valve, can cause severe personal injury, or substantial property damage.



**WARNING:**

Failure to install and maintain a new, listed 3/4" X 3/4" temperature and pressure (T&P) relief valve will release the manufacturer from any claim which might result from excessive temperature and pressures or discharge of hot water.

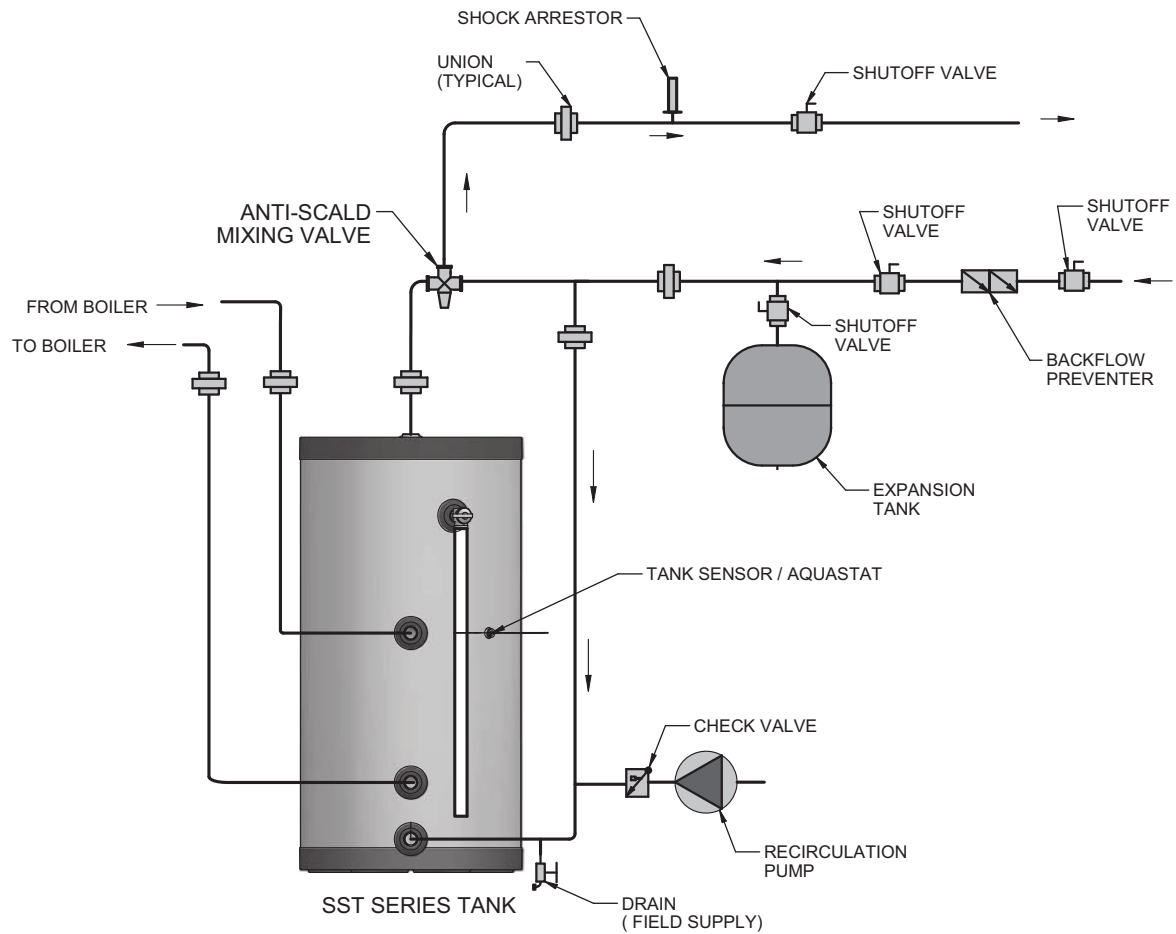


Figure 4-2 Recommended domestic water piping

## NOTICE:

Please note that these illustrations are meant to show system piping concept only, the installer is responsible for all equipment and detailing required by local codes.



## 5 Wiring

### Wiring using boiler sensor:

1. For wiring using boiler sensor, see boiler installation manual.

### Indirect Water Heater Controlled Using Aquastat and Zone Circulator / Valve:

1. Install Aquastat to tank. Aquastat control (Honeywell L4006 or equivalent) can be ordered from your local distributor.
2. Connect Aquastat to the zone controller for the Indirect Water Heater Zone.
3. Adjust Aquastat to the desired temperature.

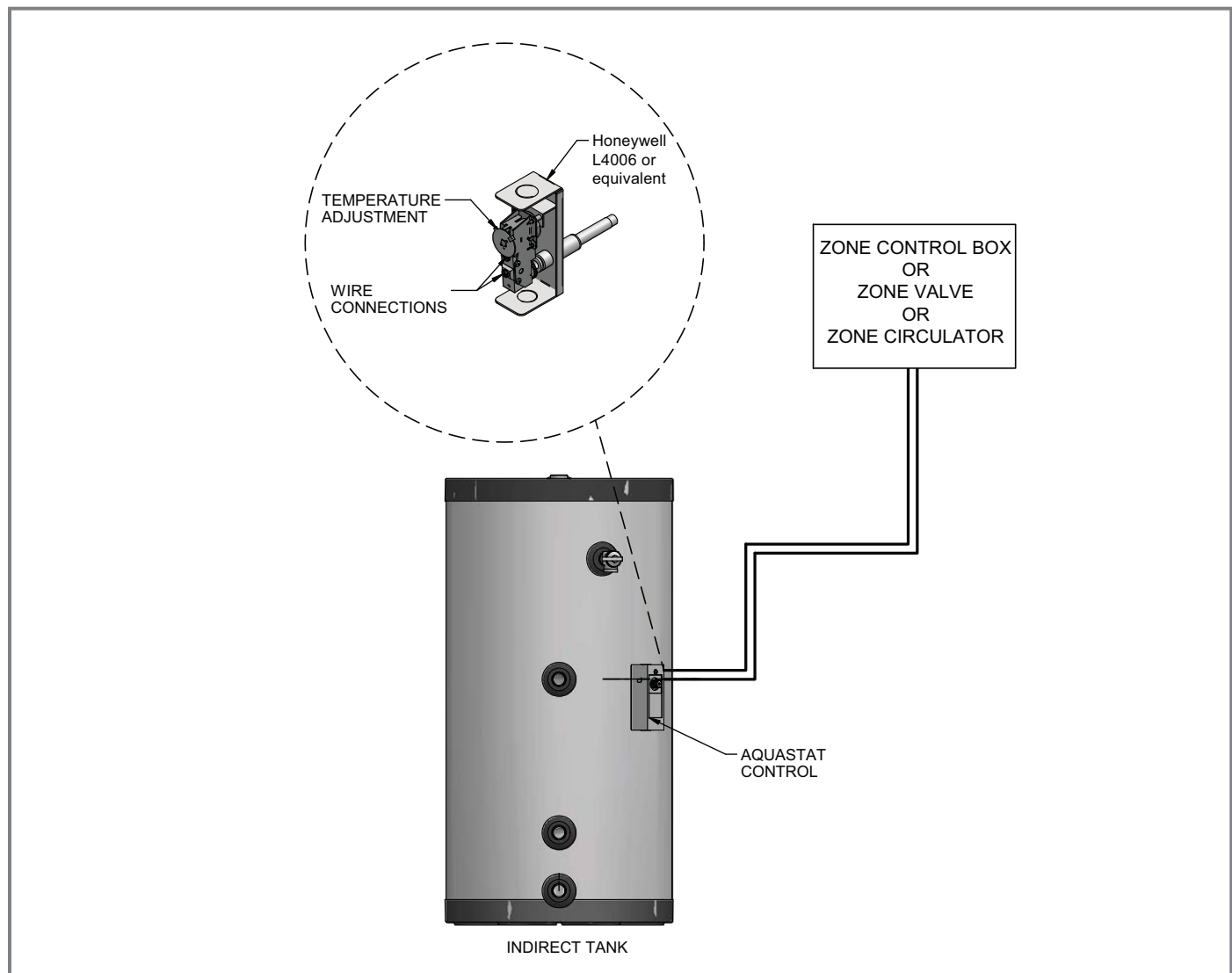


Figure 5-1 Wiring for zone control

## 6 Start-up and Check-out

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1. Make sure the system is free of leaks and that air is purged from the system.



**CAUTION:**

Fix any leaks found before proceeding further. Leakage from the boiler piping can result in severe damage to the boiler.

2. Many soldering fluxes contain Zinc Chloride which can cause severe corrosion damage to stainless steel. After completing all domestic water connections, flush the indirect water heater thoroughly before leaving the installation. This is particularly important if the indirect water heater will be unused for an extended period of time after installation. Flush the indirect water heater by drawing at least three times its volume from the tank.
3. Make sure that all electrical connections are made correctly and that no exposed high voltage wiring is present.
4. Make sure that each zone valve or circulator operates when, and only when, its thermostat calls for heat. Let each zone operate long enough to purge any remaining air from the system.
5. Set the indirect water heater to the desired temperature. Because hot water presents a scald hazard, it is best to set the thermostat at 120°F or lower and raise it only if necessary to provide adequate hot water.
6. Re-enable the burner and allow the boiler to operate. Make sure that the boiler shuts down when the indirect water heater is satisfied.

## 7 Maintenance

The SST series indirect water heater system requires annual inspection and maintenance to ensure a reliable supply of hot water:

- Make sure that the rest of the boiler and domestic water piping is free of leaks.
- The indirect water heater depends upon the boiler for a source of heat and is therefore only as reliable as the boiler.
- Make sure that the boiler is maintained in accordance with the boiler manufacturer's instructions.
- If a water treatment system is required to keep the water chemistry within the parameters shown in Table 2A (see Section 2 - Pre-Installation), make sure that this system is properly maintained.
- After installation, installer to review with homeowner their maintenance responsibilities and their frequencies, including any not listed in the following section.

### Maintenance Schedule

Annual service by a qualified service technician includes the following:

1. Any procedure required by local codes.
2. Verify system pressure. Air venting procedure may require adding water to bring boiler system up to pressure, typically 12 psig.
3. Manually operate T&P relief valve at least once a year. This will release some hot water.



#### WARNING:

Before operating a temperature and pressure (T&P) relief valve, make sure no one is in front of or around the T&P relief valve discharge piping. Hot discharge water can cause severe personal injury or substantial property damage.

4. Move operating lever to open position for a few seconds and then move it back, allowing it to snap closed. After the T&P relief valve is operated, if it continues to release water, close the cold water inlet to the water heater immediately. Follow the draining instructions, and replace the T&P relief valve. If the T&P relief valve weeps periodically, it may be due to thermal expansion. Do not plug the T&P relief valve or discharge piping.



#### DANGER:

Plugging the temperature and pressure (T&P) relief valve or discharge piping can cause excessive pressure in the water heater, resulting in severe personal injury, death, or substantial property damage.

### Homeowner monthly maintenance to include:

1. Visually check valves, pipes, and fittings for leaks. Call a qualified service technician to repair leaks.

### To Fill the Water Heater

1. Close the water heater drain valve by turning the knob clockwise.
2. Open the cold water supply shutoff valve. Open several hot water faucets to allow air to escape from the system.
3. When a steady stream of water flows from the faucets, the water heater is filled. Close the faucets and check for water leaks at the water heater drain valve, combination temperature and pressure relief valve and the hot and cold water connections.



#### DANGER:

Water from opened drain valves, unions and other connections may be extremely hot. To avoid severe personal injury, death, or substantial property damage:

- Tighten all drain hose connections.
- Direct hot water away from all persons.

### To Drain the Water Heater

Should it become necessary to completely drain the water heater, be sure to follow the steps below:

1. Disconnect the power supply to the heat source. Consult the plumbing professional or electric company in your area for service.
2. Close the cold water supply shutoff valve.
3. Open the drain valve on the water heater.
4. Open a hot water faucet to allow air to enter the system.

Drain the water heater if it will be shut off and exposed to freezing temperatures. Freezing water will expand and damage the water heater.

- If boiler water contains sufficient antifreeze, then only the domestic water needs to be drained.
- If boiler water does not contain sufficient antifreeze, the boiler water and the domestic water must be drained.

If antifreeze is used in the boiler water, check concentration. Boiler water (including additives) must be practically non-toxic, having a toxicity rating or class of 1,


as listed in the “Clinical Toxicology of Commercial Products”. A maximum 50/50 mixture of inhibited propylene glycol is recommended. Follow the antifreeze manufacturer’s instructions.



**DANGER:**

Do not use automotive, ethylene glycol or petroleum-based antifreeze. These types of antifreezes are toxic and could cause severe personal injury or death if leakage into the domestic hot water supply occurs. Do not use any undiluted antifreeze. This can cause severe personal injury, death, or substantial property damage.

## 8 Performance Data

Indirect Water Heater					Table 8A			
Model	Potable Water Volume Gal.	Heat Source Water Volume Gal.	Standby Heat Loss F/hr	Continuous Draw Rating Gal/hr	First Hour Rating Gal/hr	Minimum Heat Output Rate from Heat Source Btu/hr	Minimum Heat Source Flow Rate GPM	Tank Heat Source Friction Loss Feet W.C
SST150-40	40.0	1.6	0.9	181	208	115,000	14.0	4.5
SST250-65	67.0	1.9	0.7	263	327	154,000	14.0	5.7
SST300-80	81.5	2.1	0.6	266	347	171,000	14.0	5.7
SST450-119	113.4	3.2	0.5	322	431	199,000	14.0	6.5

- These ratings were obtained with a heat source output and heat source flow rate as listed in the chart using the parameters of the Domestic Cold Water Inlet at 58°F, Domestic Temperature Rise of 77°F, and a Boiler Temperature Output of 180°F. Other results will be obtained under different conditions.

## How to Properly Size Your Indirect Water Heater

Use the First Hour Rating (FHR) to properly size your Indirect Water Heater. The First Hour Rating is the amount of hot water in gallons the heater can supply per hour (starting with a tank full of hot water), depending on tank capacity, source of heat, and the size of the burner.

### Estimate your peak hour demand as follows:

- Determine what time of day (morning, noon, evening) you use the most hot water in your home. Keep in mind the number of people living in your home.
- Use the worksheet below to estimate your maximum usage of hot water during this one hour of the day -- this is your peak hour demand. Note: The worksheet does not estimate total daily hot water usage.

The worksheet example shows a total peak hour demand of 165 gallons; therefore, this household would need a water heater with a First Hour Rating of no less than 165 gallons.

### Fixture Count Guide

To quickly estimate the minimum gallons of hot water required based on a family size number of baths and hot water appliances the First Hour Rating of the STS tank must be equal to or exceed the total first hour requirements.

Peak Hour Demand Worksheet				
Description	Fill in the Blank		Example	
40 Gallons for the first 2 people	_____	Gals.	<u>40</u>	Gals.
10 Gallons for each additional person	_____	Gals.	<u>20</u>	Gals.
20 Gallons for each bath after the first (consecutive bath)	_____	Gals.	<u>20</u>	Gals.
10 Gallons if dishwasher is used	_____	Gals.	<u>10</u>	Gals.
20 Gallons if clothes washer is used	_____	Gals.	<u>20</u>	Gals.
<b>TOTAL</b>	_____	Gals.	<b><u>110</u></b>	Gals.
Heavy Usage Buffer Use if family members take longer than average showers, etc.	<u>x 1.5</u>		<u>x 1.5</u>	
First Hour Rating	_____	Gals.	<b>165</b>	Gals.

Proceed to pages 23 & 24 of this manual to locate your Indirect Water Heater and Boiler in the sizing charts. Using the First Hour Rating calculated in this worksheet, locate your Indirect Water Heater and Boiler along with your First Hour Rating. This will also determine the flow needed between the Indirect Water Heater and Boiler.

First Hour Rating - 180°F Boiler Loop Water (Universal Sizing - 45,000 - 295,000 Btu/hr)

Table 8B

Model		SST150-40										SST250-65									
Circulator Flow (GPM)		5		8		12		16		20		5		8		12		16		20	
Domestic Outlet		115	140	115	140	115	140	115	140	115	140	115	140	115	140	115	140	115	140	115	140
Boiler Heating Capacity	45,000	122	97	122	97							153	128	153	128						
	60,000	150	118	150	118							183	149	183	149						
	75,000	179	138	179	138							213	170	213	170						
	95,000	217	165	217	165	217	165					252	197	252	197	252	197				
	115,000	217	165	252	189	252	189	252	189			291	226	291	226	291	226	291	226		
	140,000			252	189	267	200	282	211	286	208	305	235	319	245	338	259	338	259	338	259
	165,000					267	200	282	211	286	213	305	235	319	245	356	271	386	293	388	294
	195,000													319	245	356	271	386	293	388	294
	225,000															356	271	386	293	388	294
	260,000																			388	294
	295,000																				
Max BTU Input		92,998		112,972		123,331		129,574		132,764		118,488		129,139		146,864		163,768		167,924	

First Hour Rating - 180°F Boiler Loop Water (Universal Sizing - 45,000 - 295,000 Btu/hr)

Table 8C

Model		SST300-80										SST450-119									
Circulator Flow (GPM)		5		8		12		16		20		5		8		12		16		20	
Domestic Outlet		115	140	115	140	115	140	115	140	115	140	115	140	115	140	115	140	115	140	115	140
Boiler Heating Capacity	45,000	163	138	163	138							197	172	197	172						
	60,000	193	159	193	159							226	193	226	193						
	75,000	222	180	222	180							255	213	255	213						
	95,000	261	207	261	207	261	207					294	241	294	241	294	241				
	115,000	300	235	300	235	300	235	300	235			333	268	333	268	333	268	333	268		
	140,000	304	238	347	268	347	268	347	268	347	268	384	302	382	302	382	302	382	302	382	302
	165,000	304	238	349	270	374	288	395	302	395	302	387	306	429	337	429	337	429	337	429	337
	195,000			349	270	374	288	409	312	424	323			483	375	485	376	485	376	485	376
	225,000					374	288	409	312	424	323					501	388	548	421	541	416
	260,000									424	323						573	438	596	454	
	295,000																			596	454
Max BTU Input		115,860		139,106		154,002		171,229		181,544		141,419		190,161		204,795		237,649		253,504	



**Notes:**





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