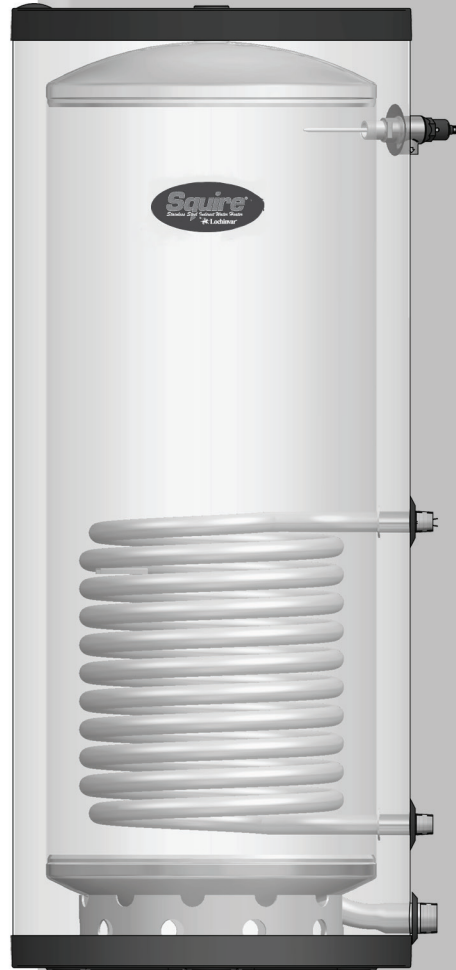


Squire®
Stainless Steel Indirect Water Heater

**Installation & Operation
Manual**

Models: SIT040DW - SIT119DW



Lochinvar®
HIGH EFFICIENCY BOILERS & WATER HEATERS

WARNING

This manual must only be used by a qualified 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.

Save this manual for future reference.

Contents

HAZARD DEFINITIONS	2	Anti-scald Valves (Mixing Valves)	12
PLEASE READ BEFORE PROCEEDING	3	Install Drain Valve	12
1. GENERAL INFORMATION		Temperature and Pressure (T&P) Relief Valve	12
Operating Restrictions	4	Table 4A - Minimum Relief Valve (AGA Rating) ...	13
Double-Wall Heat Exchanger	4	5. WIRING	
2. PRE-INSTALLATION		Indirect Water Heater Sensor Setup (Knight Boiler)	14
Locating the Tank	5	Install and Connect Tank Sensor	14
Recommended Clearances	5	Indirect Water Heater Controlled Using Aquastat and	
3. BOILER SIDE PIPING		Zone Circulator	15
Zone with Circulator to Aquastat	6	6. START-UP AND CHECK-OUT	16
Zone with Valve to Aquastat	6	7. MAINTENANCE	
DHW Prioritization	6	Maintenance Schedule	17
Multiple Tank Connections (Boiler Side)	6	To Fill the Water Heater	17
Table 3A - Pressure Drop Chart	6	To Drain the Water Heater	17
Table 3B - Pressure Drop Values	6	8. PERFORMANCE DATA	
Piping Diagrams	7-10	AHRI Chart	18
4. DOMESTIC SIDE (TANK) PIPING		How to Properly Size Your Indirect Water Heater	19
Basic Domestic Piping	11	Performance Data Charts	20-22
Multiple Tank Domestic Water Piping	11	REVISION NOTES	Back Cover
Domestic Water Piping for Distant Fixtures	11		

Hazard definitions

The following defined terms are used throughout this manual to bring attention to the presence of hazards of various risk levels or to important information concerning the life of the product.

⚠ DANGER DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

CAUTION CAUTION used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.

NOTICE NOTICE indicates special instructions on installation, operation, or maintenance that are important but not related to personal injury or property damage.

Please read before proceeding

⚠ WARNING

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 filed immediately against the transportation company by the consignee.

Factory warranty (shipped with appliance) does not apply to appliances improperly installed or improperly operated.

⚠ WARNING

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 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

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 1/2 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 1/2 seconds
155°F	About 1 second

⚠ 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.

1 General information

The Lochinvar SIT DW 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.

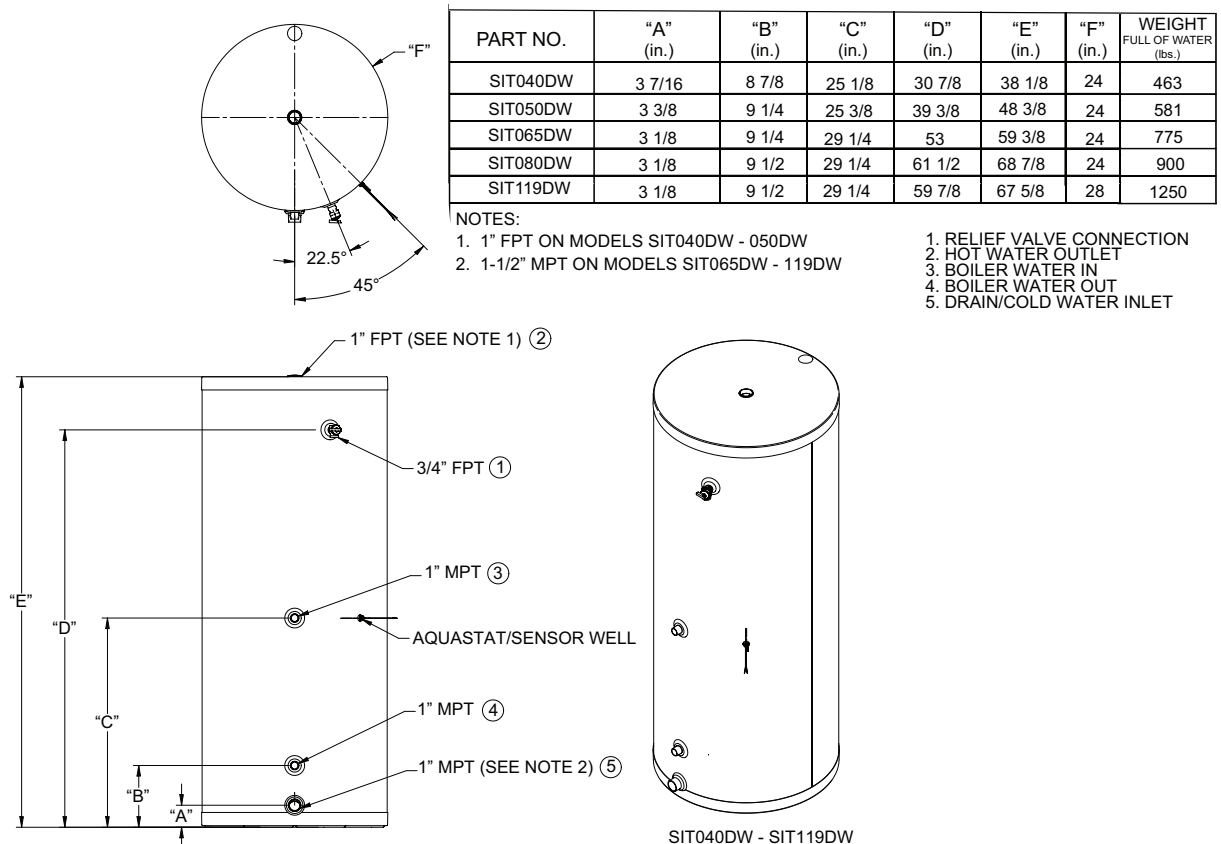
Double-wall heat exchanger

Uniform plumbing code

Heat exchangers used for heat transfer or heat recovery shall be separated from the potable water by a double-wall construction with a space open to the atmosphere between the two (2) walls.

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

Figure 1-1 Lochinvar SIT DW Series Indirect Water Heater



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.

Table 2A Water Chemistry Requirements		
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 SIT DW 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 4 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 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. Lochinvar shall not be held liable for any such water damage.

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:

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 3-1 on page 7 illustrates typical circulator zone piping.

Zone with valve to Aquastat

As with the circulator zone system, this system is just like a standard heating zone system except that one of the zones is connected to the tank coil as shown in FIG. 3-2. The system circulator must be large enough to move boiler water through the coil regardless of the flow rate required through the heating zones.

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 Knight control 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. 3-3 on page 9.

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.

Table 3A
Pressure Drop Coil Chart

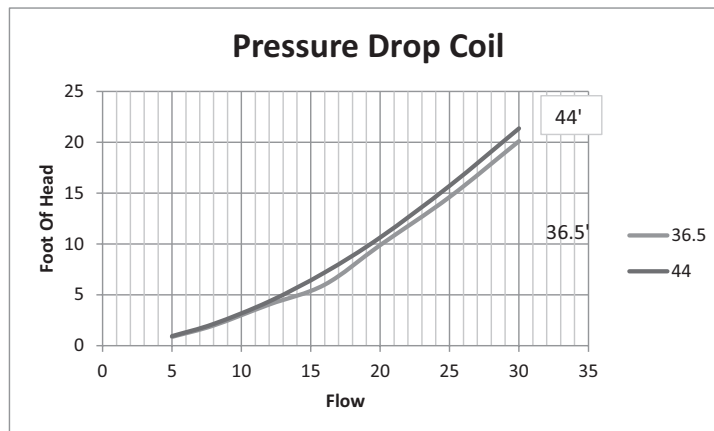
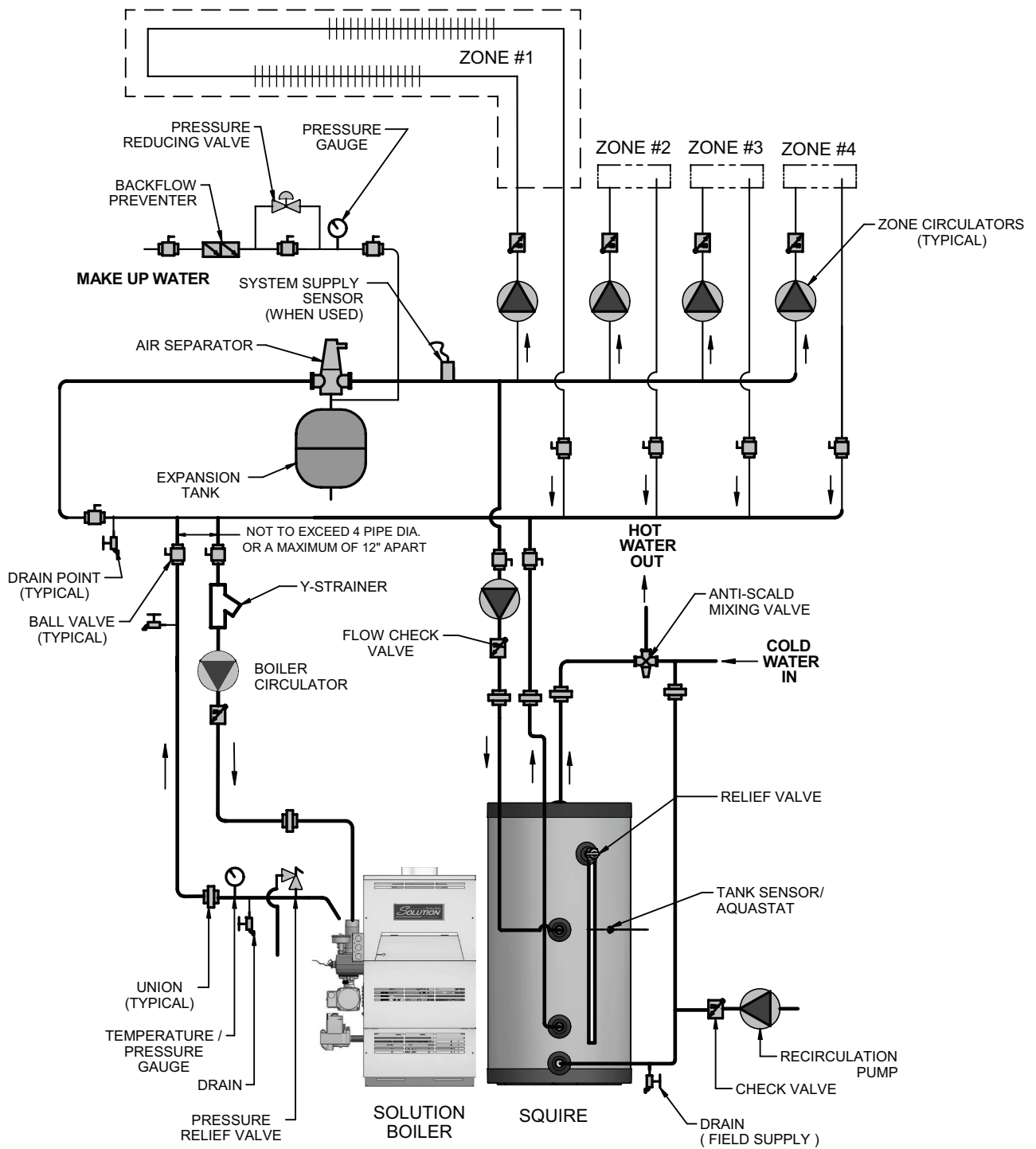


Table 3B
Pressure Drop Values

MODEL	WATER INLET (NPT)	WATER OUTLET (NPT)	COIL CONNECTION (NPT)	COIL LENGTH (FT)	SQ FT SURFACE AREA	PRESSURE DROP (FT/HD)						
						5 GPM	8 GPM	12 GPM	16 GPM	20 GPM	25 GPM	30 GPM
SIT040	1	1	1	36.5	12.05	0.87	1.99	4.05	6.00	9.89	14.62	20.11
SIT050	1	1	1	36.5	12.05	0.87	1.99	4.05	6.00	9.89	14.62	20.11
SIT065	1.5	1.5	1	44	15.03	0.94	2.14	4.35	7.20	10.64	15.72	21.63
SIT080	1.5	1.5	1	44	15.03	0.94	2.14	4.35	7.20	10.64	15.72	21.63
SIT119	1.5	1.5	1	44	15.03	0.94	2.14	4.35	7.20	10.64	15.72	21.63

3 Boiler side piping *(continued)*

Figure 3-1 Piping Diagram Zoned with Circulators



NOTICE

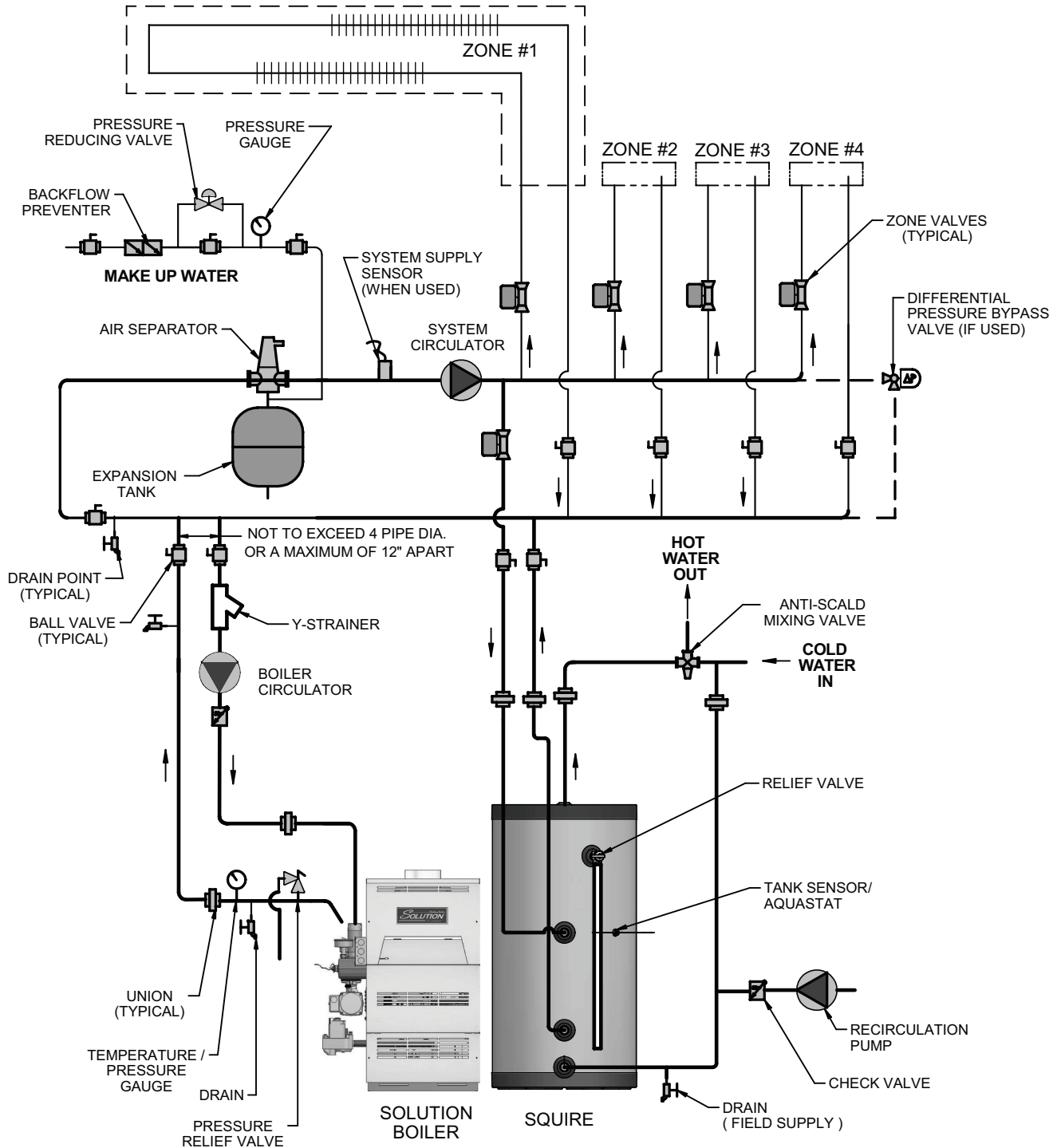
Please note that these illustrations are meant to show system piping concept only, the installer is responsible for all equipment and detailing required by local codes.

NOTICE

Please note that the installer is responsible for ensuring DHW prioritization when piped as a zone.

3 Boiler side piping

Figure 3-2 Piping Diagram Zoned with Valves



NOTICE

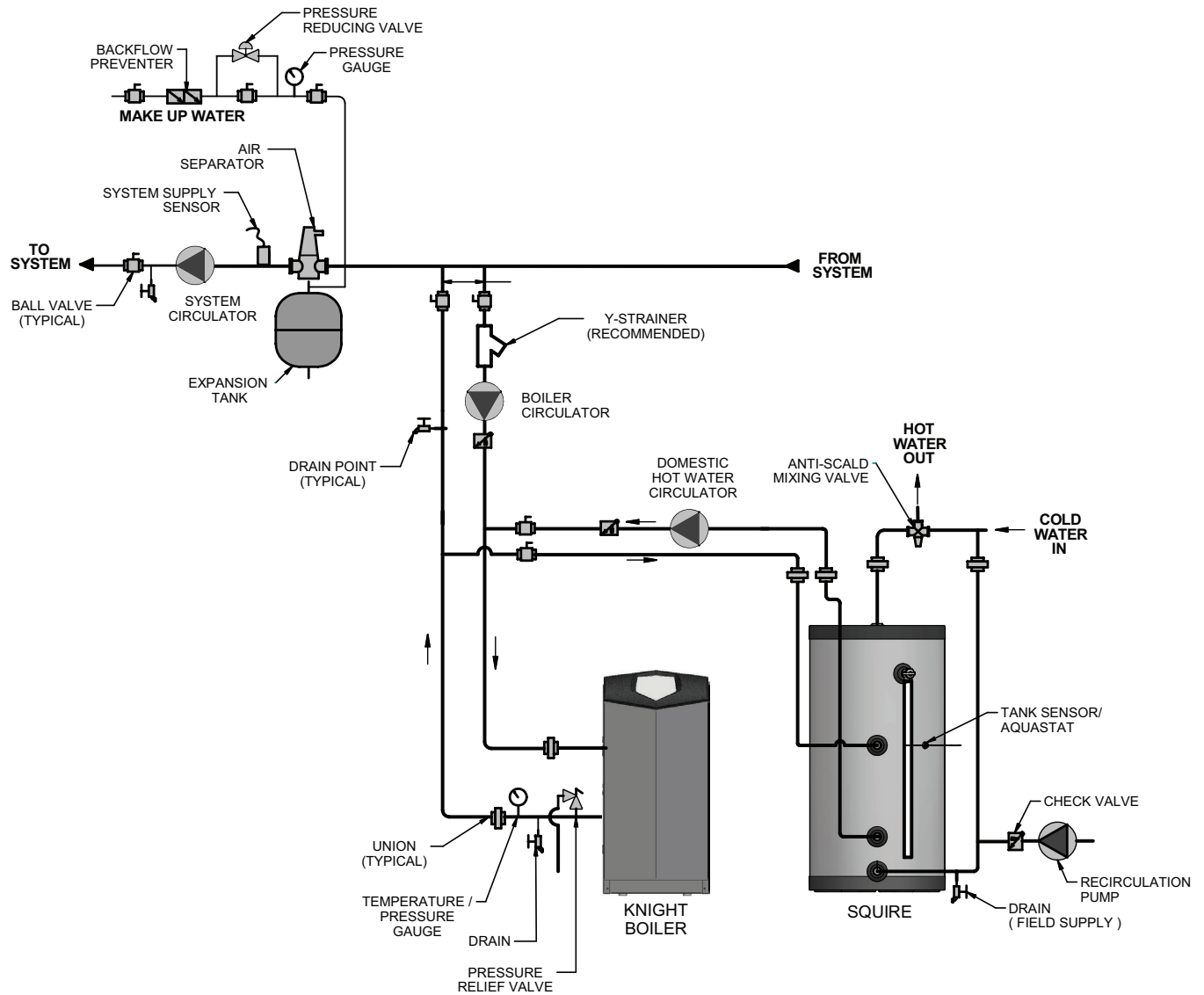
Please note that these illustrations are meant to show system piping concept only, the installer is responsible for all equipment and detailing required by local codes.

NOTICE

Please note that the installer is responsible for ensuring DHW prioritization when piped as a zone.

3 Boiler side piping *(continued)*

Figure 3-3 Knight Boiler Primary / Secondary Piping

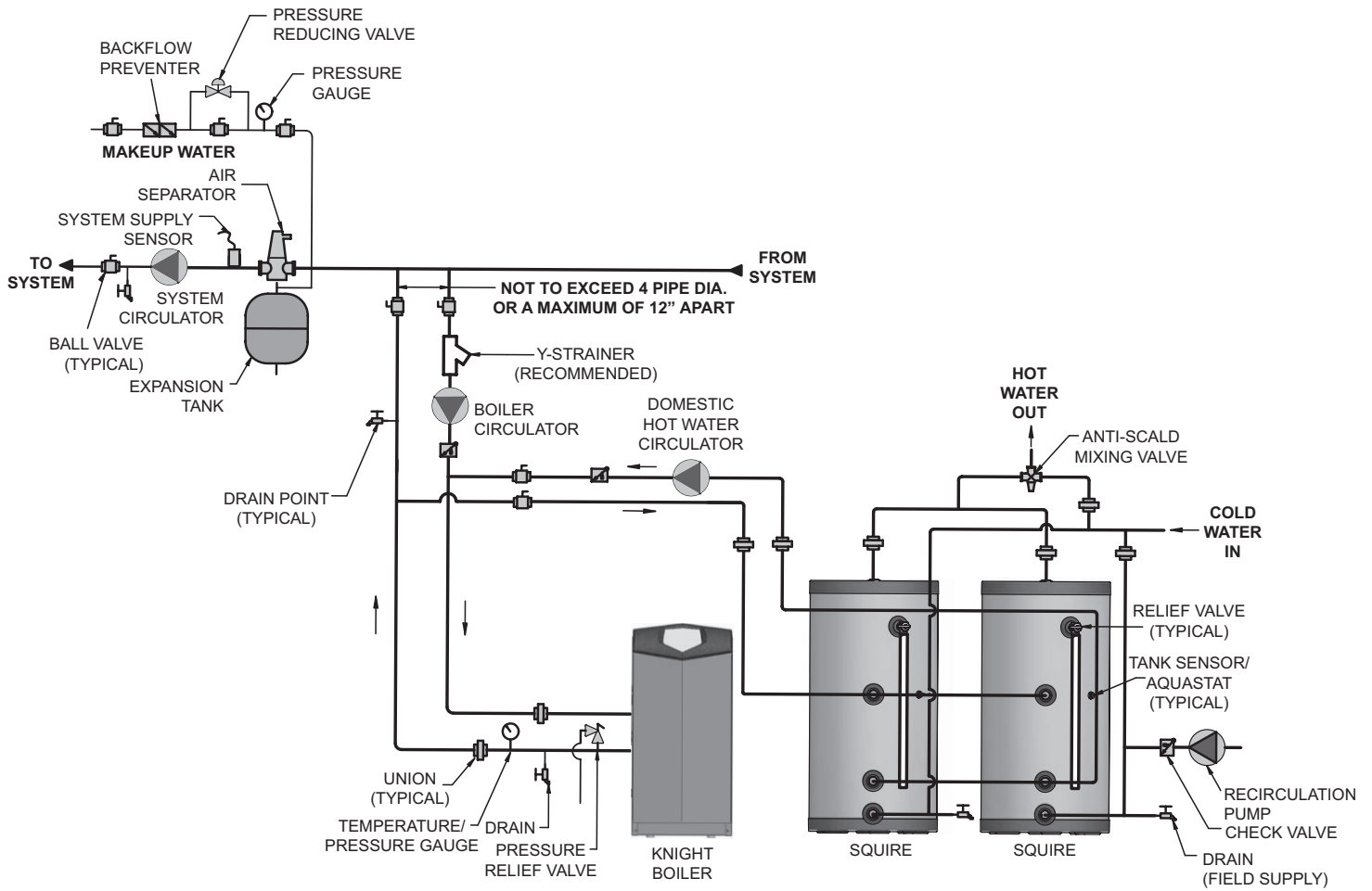


NOTICE

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.

3 Boiler side piping

Figure 3-4 Multiple Tank Connections



IMG00184

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 on page 13 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 and into the main potable water supply in the event that inlet water pressure drops.
- c. Expansion Tank (required for thermal expansion) - 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.

To prevent delays, return circulation piping with a check valve that allows flow to the inlet of the tank. This should be installed on each branch circuit at the farthest fixture or device, so that hot water is supplied upon demand.

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

NOTICE

When connecting the unit to piping made of a different material, use of a dielectric fitting or a dielectric union conforming to ASSE 1079 is recommended to prevent corrosion and potential subsequent water leaks at or near the connection. Dielectric fittings may be required by local plumbing codes.

4 Domestic side (tank) piping

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. ASSE1017 and ASSE1070 certified valves are recommended.

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.

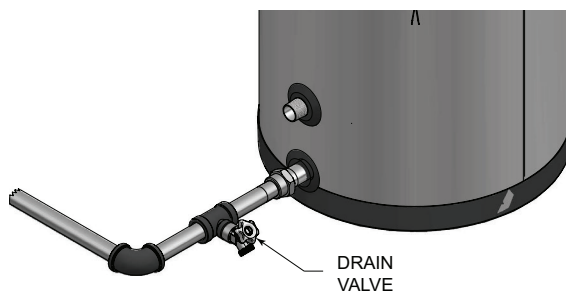
Install drain valve

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. This equipment shall not be less than a combination temperature and pressure 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.

NOTICE

Verify that the combination temperature and pressure 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 T&P relief valve and the tank.

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

- SIT040/050DW - 3/4" NPT with a minimum CSA Rating of 105,000 Btu/hr.
- SIT065/080/119DW - 3/4" NPT with a minimum CSA Rating of 200,000 Btu/hr.

NOTICE

The Lochinvar SIT DW 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.

4 Domestic side (tank) piping *(continued)*

Table 4A Minimum Relief Valve (CSA Rating)	
Model	Btu/hr
SIT040DW	105,000
SIT050DW	105,000
SIT065DW	205,000
SIT080DW	205,000
SIT119DW	205,000

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.

WARNING

Do not install any valve between the 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 can cause severe personal injury, death or substantial property damage.

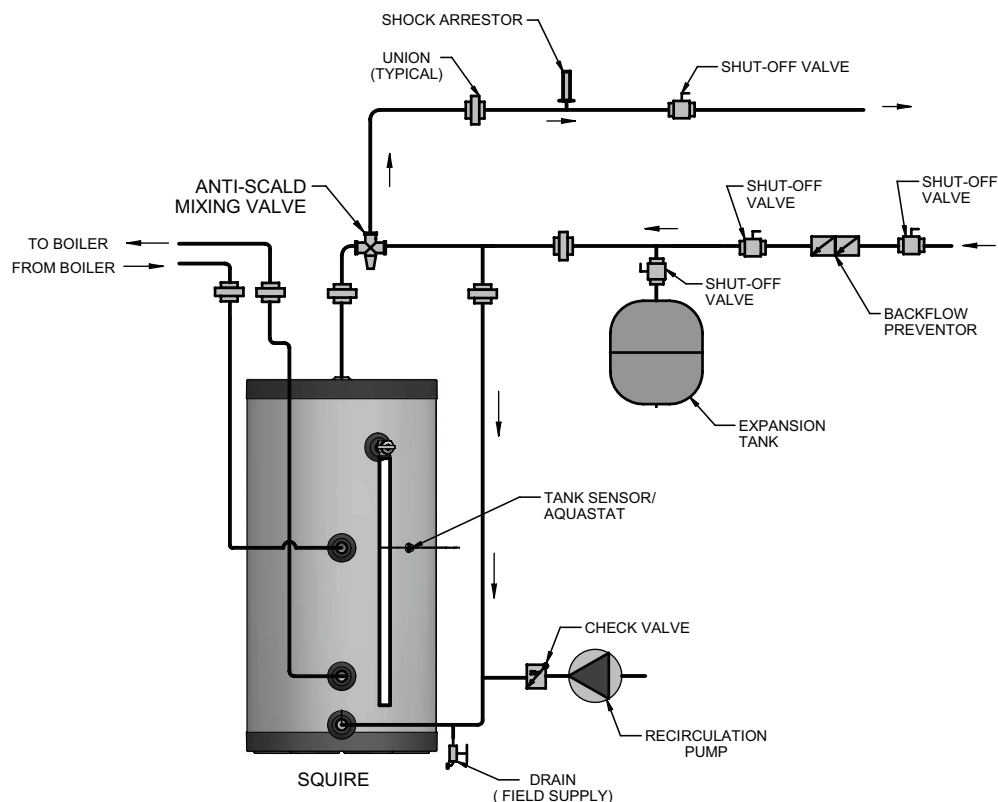
CAUTION

The 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.

WARNING

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

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

Indirect water heater sensor setup (Knight boiler)


CAUTION

Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation.

NOTICE

The sensor supplied contains an Auto Reset High Limit (194°F).

Install tank sensor

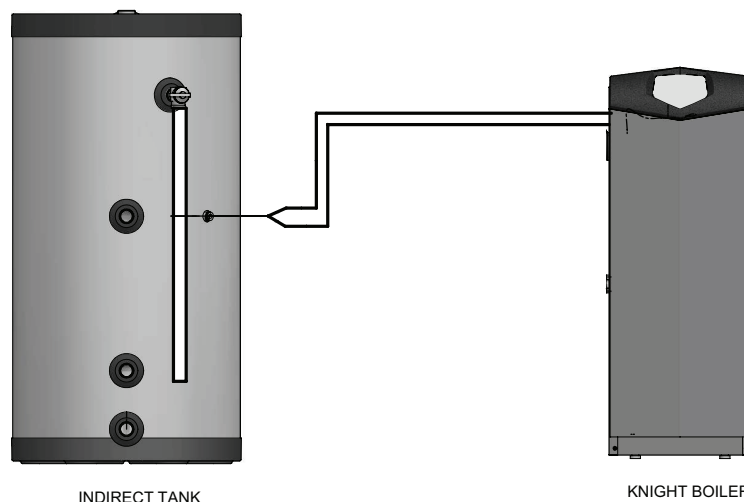
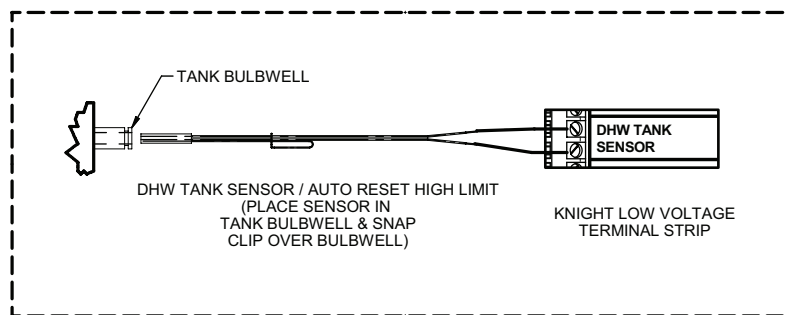
The tank sensor is a dual sensor which controls the temperature of the tank from the boiler (see FIG. 5-1). The tank sensor has a built-in high temperature limit set at 194°F.

1. Install the sensor inside the tank as depicted in FIG. 5-1.
2. Connect the wire leads to the DHW Tank Sensor (AUX) connection point on the Knight boiler connection board (see FIG. 5-1).
3. The Knight boiler will automatically read the sensor and default the tank temperature setting to 125°F.
4. Adjust the tank setpoint program. Reference the Knight Installation and Operation Manual for a detailed explanation of the tank setpoint program.

Connect tank sensor

1. Turn OFF the power to the unit. Use wire strippers to strip one inch of insulation from the ends of each wire that will be spliced.
2. Splice the two ends of bare wire by twisting them together with a pair of electrical pliers. Turn the pliers three or four times to make a sufficient connection.
3. Attach a wire nut at the point where the two wires have been twisted together. Twist the wire nut until it fits snugly, or until it cannot be twisted any more.
4. Wrap the wire nut and the two wires with electrical tape to secure the connection. Cover any exposed wiring with electrical tape.

Figure 5-1 Indirect Water Heater Controlled Using Tank Sensor

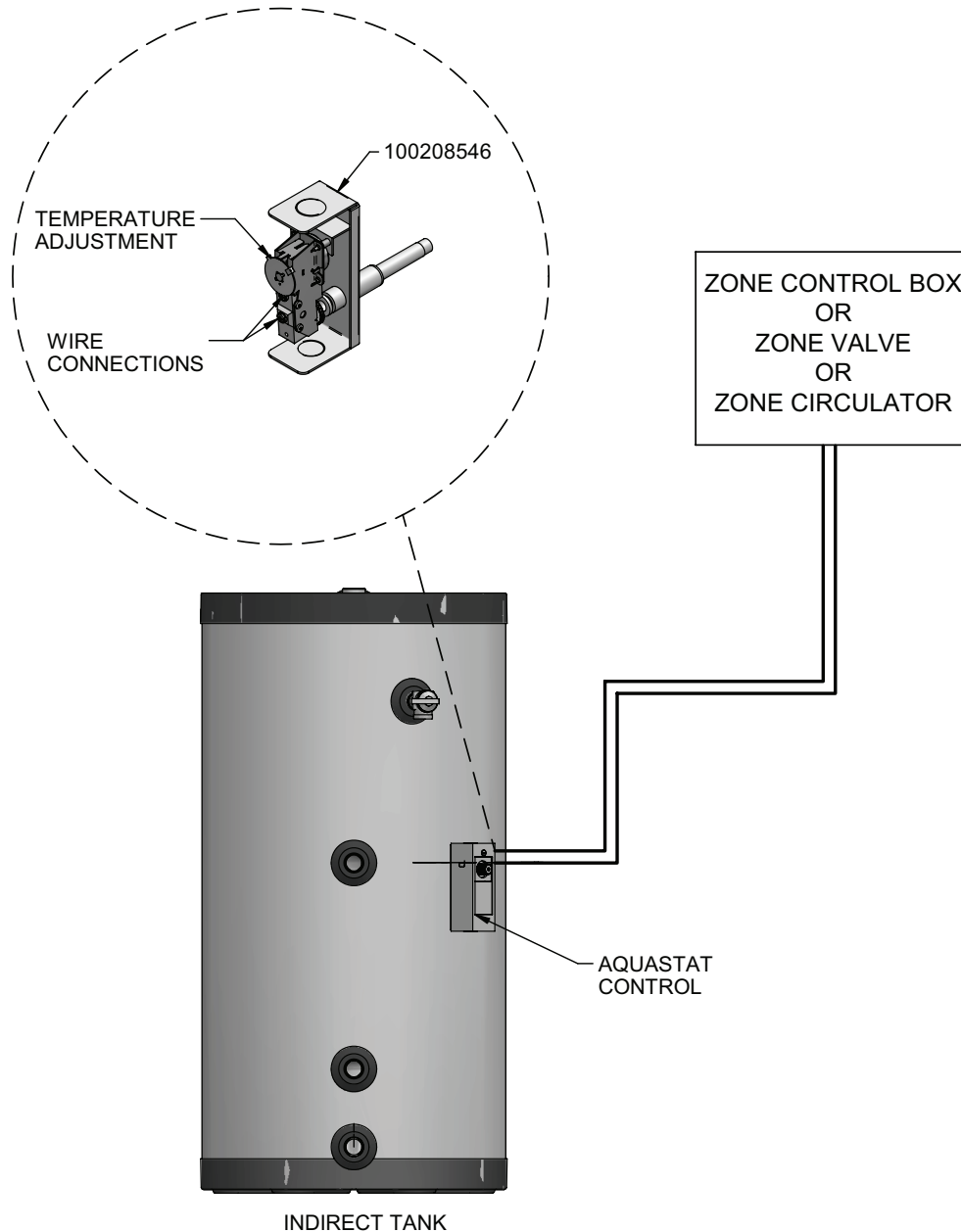


5 Wiring *(continued)*

Indirect water heater controlled using Aquastat and zone circulator / valve

1. Install Aquastat to tank. Aquastat control (100208546) can be ordered from your local Lochinvar distributor.
2. Connect Aquastat to the zone controller for the Indirect Water Heater Zone.
3. Adjust Aquastat to the desired temperature.

Figure 5-2 Wiring for Zone Control



6 Start-up and check-out

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 Lochinvar SIT DW series indirect water heater is an extremely simple device and as such requires very little maintenance. There are, however, several items which should be checked out on an annual or as needed basis to ensure a reliable supply of hot water:

- * Make sure that the rest of the boiler and domestic water piping is free of leaks.
- * If there is an oil lubricated circulator in the system, make sure it is lubricated as called for by the circulator manufacturer.
- * 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.

Maintenance Schedule

Annual service by a qualified service technician should include the following:

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

WARNING

Before operating a 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.

- ☐ 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 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.

- ☐ Follow instructions on circulator to oil, if required.
- ☐ Check mixing valve, valves, pipes, and fittings for leaks.
- ☐ Check function of the field-installed controls and valves. See component manufacturer's instructions.
- ☐ Review homeowner's maintenance responsibilities and their frequencies, including any not listed in the following section.

Homeowner monthly maintenance to include:

- ☐ 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.
3. Open several hot water faucets to allow air to escape from the system.
4. 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.

WARNING

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.

WARNING

Do not use automotive, ethylene glycol or petroleum-based antifreeze. Do not use any undiluted antifreeze. This can cause severe personal injury, death, or substantial property damage.

8 Performance data

Table 8A AHRI Chart

<div>  Squire Indirect DW Water Heater AHRI Rating </div>								
Indirect Water Heater Model Number	Potable Water Volume Gal.	Heat Source Water Volume Gal.	Standby Heat Loss F/hr	First Hour Rating Gal/hr	Continuous Draw 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.
SIT040DW	38	1.6	1.5	153	120	90,000	14.00	5.3
SIT050DW	50	1.6	0.9	165	120	90,000	14.00	5.3
SIT065DW	63	2.5	0.7	235	174	120,000	14.00	5.7
SIT080DW	80	2.5	0.6	249	174	120,000	14.00	5.7
SIT119DW	113	2.5	0.5	280	174	120,000	14.00	5.7

• 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.

8 Performance data *(continued)*

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 Squire 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.
TOTAL	_____	Gals.	<u>110</u>	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.	165	Gals.

Proceed to pages 21 – 23 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.

8 Performance data

Table 8B First Hour Rating - 180°F Boiler Loop Water (Knight Boiler)

First Hour Rating - 180°F Boiler Loop Water (Knight Boiler - Models SIT040DW - SIT050DW)																									
Model		SIT040DW												SIT050DW						SIT065DW					
Circulator Flow GPM		5	8	12	16	20	25	30	5	8	12	16	20	25	30	5	8	12	16	20	25	30			
Domestic Outlet		115	140	115	140	115	140	115	140	115	140	115	140	115	140	115	140	115	140	115	140	115	140	115	140
Boiler Output Capacity	52,500 WH/KH55	141	110	152	118					153	122	164	130				226	178							
	76,000 KB81			164	126	175	135	186	142	199	151	203	154			176	138	187	147	198	154	211	163	215	166
	80,750 WH85									214	162						226	174			305	234	317	242	
	99,750 KB106									216	163	236	178				228	175	248	190			339	258	371
	104,500 WH110																						379	287	392
	142,500 KB151																							421	317
MAX BTU INPUT		47,144	57,327	62,606	67,133	73,108	81,841	89,761	47,144	57,327	62,606	67,133	73,108	81,841	89,761	70,904	77,315	87,876	98,059	100,699	113,899	124,459			

First Hour Rating - 180°F Boiler Loop Water (Knight Boiler - Models SIT080DW - SIT119DW)																	
Model		SIT080DW										SIT119DW					
Circulator Flow GPM		5	8	12	16	20	25	30		5	8	12	16	20	25	30	
Domestic Outlet		115	140	115	140	115	140	115	140	115	140	115	140	115	140	115	140
Boiler Output Capacity	52,500 WH/KH55	243	195							271	223						
	76,000 KB81	302	237	318	248					330	265	346	276	347	277		
	80,750 WH85			322	251	334	259						362	287	362	287	
	99,750 KB106					356	275	388	298	393	301				416	326	421
	104,500 WH110								396	304	409	313				424	332
	142,500 KB151									438	334	471	357				466
MAX BTU INPUT		70,904	77,315	87,876	98,059	100,699	113,899	124,459		70,904	77,315	87,876	98,059	100,699	113,899	124,459	

NOTICE

All data was generated under lab conditions. There is no extra benefit in the shaded out areas on the tables. Results will vary under individual applications.

NOTICE

It is not recommended to have a unit that is 400,000 Btu input or greater on the SIT040DW and SIT050DW models.

8 Performance data *(continued)*

Table 8C First Hour Rating - 180°F Boiler Loop Water (Universal Sizing)

First Hour Rating - 180°F Boiler Loop Water (Universal Sizing - 45,000 - 140,000 Btu/hr)																																					
Model		SIT040DW								SIT050DW								SIT065DW																			
Circulator Flow GPM		5	8	12	16	20	25	30	5	8	12	16	20	25	30	5	8	12	16	20	25	30	5	8	12	16	20	25	30								
Domestic Outlet		115	140	115	140	115	140	115	140	115	140	115	140	115	140	115	140	115	140	115	140	115	140	115	140	115	140	115	140								
Boiler Output Capacity	45,000	138	109													148	119							207	166												
	60,000	141	110	164	126	172	132									153	122	176	138	182	143				254	199											
	75,000					175	135	186	142	199	151	203	155					187	147	198	154	211	163	213	165		285	220	302	233							
	95,000																							228	175	248	190		305	234	339	258	365	278			
	115,000																													371	281	379	287	421	317	428	322
	140,000																																	454	340		
MAX BTU INPUT		47,144	57,327	62,606	67,133	73,108	81,841	89,761	47,144	57,327	62,606	67,133	73,108	81,841	89,761	70,904	77,315	87,876	98,059	100,699	113,899	124,459															

First Hour Rating - 180°F Boiler Loop Water (Universal Sizing - 45,000 - 140,000 Btu/hr)																													
Model		SIT080DW														SIT119DW													
Circulator Flow GPM		5		8		12		16		20		25		30		5		8		12		16		20		25		30	
Domestic Outlet		115	140	115	140	115	140	115	140	115	140	115	140	115	140	115	140	115	140	115	140	115	140	115	140	115	140	115	140
Boiler Output Capacity	45,000	218	177													252	211												
	60,000	266	211													300	245	300	245										
	75,000	302	237	313	244													347	278										
	95,000			322	251	356	275	377	289									350	279	384	303	411	323						
	115,000							388	298	396	304	438	334	440	334							416	326	424	332	466	362	474	368
	140,000													471	357													499	385
MAX BTU INPUT		70,904		77,315		87,876		98,059		100,699		113,899		124,459		70,904		77,315		87,876		98,059		100,699		113,899		124,459	

8 Performance data

Table 8D First Hour Rating - 200°F Boiler Loop Water (Universal Sizing)

First Hour Rating - 200°F Boiler Loop Water (Universal Sizing - 45,000 - 225,000 Btu/hr)																																					
Model		SIT040DW												SIT050DW												SIT065DW											
Circulator Flow GPM		5		8		12		16		20		25		30		5		8		12		16		20		25		30									
Domestic Outlet		115	140	115	140	115	140	115	140	115	140	115	140	115	140	115	140	115	140	115	140	115	140	115	140	115	140	115	140								
Boiler Output Capacity	45,000	134	109											145	119											202	166										
	60,000	167	132											177	143											248	199										
	75,000	199	156											210	167											293	233										
	95,000	210	164	243	188									222	176	253	199									354	278										
	115,000			248	192	268	206	285	219	286	220				260	204	280	218	296	230					415	323											
	140,000									307	235	335	256	340	260					297	231	319	247	346	267	350	270	433	334	467	359	492	379				
	165,000													369	281										347	268	381	293			523	401	569	435			
	195,000																													576	440	589	449	659	501	659	502
	225,000																																	714	541		
MAX BTU INPUT		81,087		98,603		107,683		115,469		125,746		140,766		154,389		81,087	98,603	107,683	115,469	125,746	140,766	154,389	121,955	132,982	151,146	168,661	173,202	195,905	214,070								

First Hour Rating - 200°F Boiler Loop Water (Universal Sizing - 45,000 - 225,000 Btu/hr)																	
Model		SIT080DW								SIT119DW							
Circulator Flow GPM		5	8	12	16	20	25	30		5	8	12	16	20	25	30	
Domestic Outlet		115	140	115	140	115	140	115	140	115	140	115	140	115	140	115	140
Boiler Output Capacity	45,000	213	177							247	211						
	60,000	259	211							293	245						
	75,000	305	244							339	278						
	95,000	366	289							400	323						
	115,000	427	334							461	368						
	140,000	450	351	484	376	504	391			478	379	512	404	538			
	165,000					540	418	580	447					568	446	614	481
	195,000							593	457	606	466	671	514			621	485
MAX BTU INPUT		121,955	132,982	151,146	168,661	173,202	195,905	214,070	121,955	132,982	151,146	168,661	173,202	195,905	214,070		

Notes

Revision Notes: *Revision A (Process #3000001798_Change #500002025) initial release.*

Revision B (PCP# 3000006451 / CN# 500006731) reflects the addition of the CSA 1-91 logo to the front cover.

Revision C (PCP #3000060820 / CN# 500046810) reflects the addition of a dielectric notice on page 11.