



Installation Manual

- *Installation*
- *Startup*
- *Maintenance*
- *Parts*



**Floor
mounted**



**Wall
mounted**



MH27745
US LISTED



Models

EL-80 N/LP	EL-220 N/LP
EL-110 N/LP	EL-299 N/LP
EL-150 N/LP	EL-399 N/LP

⚠ WARNING

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

NOTICE

Heat Transfer Products, Inc., reserves the right to make product changes or updates without notice and will not be held liable for typographical errors in literature.

⚠ 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.

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

WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance.
- Do not touch any electrical switch: do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department. Installation and service must be performed by a qualified installer, service agency or the gas supplier.

FOR YOUR SAFETY READ BEFORE OPERATING

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

- A. This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.
- B. BEFORE OPERATING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance
- Do not touch any electric switch; do not use any phone in your building
- Immediately call your gas supplier from a neighbor's phone. Follow the gas suppliers' instructions.

- If you cannot reach your gas supplier, call the fire department.

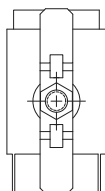
- C. Use only your hand to turn the gas control knob. Never use tools. If the handle will not turn by hand, don't try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.

- D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

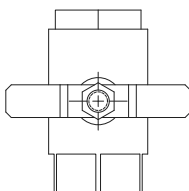
OPERATING INSTRUCTIONS

1. STOP! Read the safety information above.
2. Set the thermostat to lowest setting.
3. Turn off all electric power to the appliance.
4. This appliance is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.

GAS VALVE
ON



GAS VALVE
OFF



5. Remove front cover.
6. Turn gas shutoff valve to "off". Handle will be across the piping, do not force.
7. Wait five (5) minutes to clear out any gas. If you then smell gas, STOP! Follow "B" in the safety information above on this label. If you don't smell gas, go to next step.
8. Turn gas shutoff valve to "on". Handle will be in line with piping.
9. Install Front Cover.
10. Turn on all electric power to appliance.
11. Set thermostat to desired setting.
12. If the appliance will not operate, follow the instructions "To Turn Off Gas To Appliance" and call your service technician or gas supplier.

TO TURN OFF GAS TO APPLIANCE

1. Set the thermostat to lowest setting.
2. Turn off all electric power to the appliance if service is to be performed.
3. Remove Front Cover.
4. Turn gas shutoff valve to "off". Handle will be across the piping. Do not force.
5. Install Front Cover.

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PART 1: PRODUCT AND SAFETY INFORMATION

SPECIAL ATTENTION BOXES

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 product.

DEFINITIONS

DANGER

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

CAUTION

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

WARNING

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

CAUTION

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

This appliance must be installed by qualified and licensed personnel in accordance with local codes, or in the absence of local codes, by the national fuel gas code, ANSI Z223.1-2002. This appliance is for indoor installations only. Clearance to combustible materials: 0" top, bottom, sides and back. Front must have room for service, 24" recommended. (A combustible door or removable panel is acceptable front clearance.) This appliance has been approved for closet installation. Do not install this appliance directly on carpeting.

PART 1: PRODUCT AND SAFETY INFORMATION (CONT'D)

WARNING

Installer — Read all instructions in this manual, and Elite Heating Boilers® Venting section, before installing. Perform steps in the order given.

User — This manual is for use only by a qualified heating installer/service technician. Refer to User's Information Manual for your reference.

User — Have this boiler serviced/inspected by a qualified service technician annually.

Failure to comply with the above could result in severe personal injury, death or substantial property damage.

WARNING

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

WARNING

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 suppliers' instructions.
- If you cannot reach your gas supplier, call the fire department.

CAUTION

Due to the low water content of the boiler, improper sizing of the boiler with regard to the heating system load will result in excessive boiler cycling and accelerated component failure. Heat Transfer Products DOES NOT warrant failures caused by mis-sized boiler applications. DO NOT oversize the boiler to the system. Modular boiler installations greatly reduce the likelihood of boiler oversizing.

BEFORE INSTALLING

WHEN SERVICING BOILER

- To avoid electric shock, disconnect electrical supply before performing maintenance.
- To avoid severe burns, allow boiler to cool before performing maintenance.

BOILER OPERATION

- Do not block flow of combustion or ventilation air to boiler.
- 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 boiler if any part has been under water. Immediately call a qualified service technician to inspect the boiler and to replace any part of the control system and any gas control that has been under water.

BOILER WATER

- If you have an old system with cast iron radiators, thoroughly flush the system (without boiler connected) to remove sediment. The high-efficiency heat exchanger can be damaged by build-up or corrosion due to sediment. HTP recommends a suction strainer in this type of system.
- Do not use petroleum-based cleaning or sealing compounds in boiler system. Gaskets and seals in the system may be damaged. This can result in substantial property damage.
- Do not use "homemade cures" or "boiler patent medicines." Substantial property damage, damage to boiler, and/or serious personal injury may result.

PART 1: PRODUCT AND SAFETY INFORMATION (CONT'D)

- Continual fresh make-up water will reduce boiler life. Mineral buildup in the heat exchanger reduces heat transfer, overheats the stainless steel heat exchanger, and causes failure. Addition of oxygen in by make-up water can cause internal corrosion in system components. Leaks in the boiler or piping must be repaired at once.

FREEZE PROTECTION FLUIDS

⚠ CAUTION

NEVER use automotive or standard glycol antifreeze, ethylene glycol made for hydronic systems. Use only inhibited propylene glycol solutions, which are specifically formulated for hydronic systems. Ethylene glycol is toxic and can attack gaskets and seals used in hydronic systems.

CAUTION

Consider piping and installation when determining boiler location.

PART 2: BEFORE YOU START

A. WHAT'S IN THE BOX

Also included with the Elite Heating Boilers® are:

- Pressure and Temperature Gauge
- Indirect Sensor
- Outdoor Sensor
- Pressure Relief Valve
- Intake PVC Tee with Screens
- Exhaust PVC Coupling with Screens
- Outlet Combination Fitting
 - 1" – 7450P-134 for Models – EL-80/110/150/220
 - 1.25" – 7450P-135 for Models – EL-299
 - 1.50" – 7450P-136 for Models – EL-399
- Installation Manual
- Warranty
- CSD-1 Form
- H-3 Data Sheet

B. HOW BOILER OPERATES

Elite Heating Boiler® Condensing Technology is an intelligent system that delivers highly efficient hydronic heating, while maximizing efficiency. Outlined below are the features of the system and how they operate:

- Stainless Steel Heat Exchanger** – The highly efficient Elite Heating Boiler® Stainless Steel Heat exchanger is designed to use the cold return water from the system and extract the last bit of heat before it is exhausted.
- Modulating Combustion System** – The combustion system will modulate the output of

the burner during operation to match the system demand and achieve the control set point while in operation. The set point can change by internal or external signals which enhance the overall performance of the system.

- Control** – The integrated control system monitors the system and regulates the fan speed to control the boilers output. This allows the boiler to deliver only the amount of heat energy required and nothing more. This control can be set up to monitor outdoor temperature through an outdoor sensor to regulate the set point of the boiler. The system can be further enhanced by installing with an indirect water heater to provide domestic hot water.

The control can regulate the output of multiple boilers through its cascade system function. The cascade system is capable of connecting up to eight boilers together in such a way that they function as one boiler system. This allows for greater turn down ratios and provides systematic control of the multiple boilers in an installation to minimize downtime and maximize efficiency.

The cascade system works by establishing one boiler as the master and the other connected boilers as followers. The master boiler requires a cascade system sensor and a cascade pump in addition to its own boiler pump. Each of the follower boilers have an individual pump connected to each follower boiler.

PART 2: BEFORE YOU START (CONT'D)

4. **Text Display and Operational Led light Indicators** – The display allows the user to change the system parameters and monitor the system outputs.
5. **Gas Valve** – The gas valve senses suction from the blower allowing gas to flow only if the gas valve is powered and combustion air is flowing.
6. **All Metal Integrated Venturi** – Controls the air and gas flow into the burner.
7. **Burner** – Constructed of high grade stainless steel, the burner uses premixed air and gas fuel and provides a wide range of firing rates.
8. **Spark Ignition** – The burner is ignited by applying a high voltage through the system spark electrode. This causes the spark from the electrode to ignite the mixed gas off of the burner.
9. **Supply Water Temperature Sensor** – This sensor monitors the boiler outlet water temperature (System Supply). The control adjusts the boiler firing rate so the supply temperature will match the boiler set point.
10. **Return Water Temperature Sensor** – This sensor monitors the boiler return water temperature (System Return).
11. **Flue Sensor** – Monitors flue temperature and adjusts firing rate.
12. **Temperature and Pressure Gauge** – Allows the user to monitor the system temperature and pressure.
13. **Electrical field connections with terminal strips** – The electrical cover allows easy access to the line voltage and low voltage terminals strips which are clearly marked to facilitate wiring of the boiler.
14. **Condensation Collection System** – This boiler is a high efficiency appliance, therefore the boiler will produce condensate. The collection system has a float switch which monitors the condensation level and prevents condensation from backing up into the combustion system. Inside the collection system there is a built in trap which seals the combustion system from the connected drain. This condensate should be neutralized to avoid damage to the drainage system or piping.
15. **Outdoor Sensor** – The outdoor sensor will monitor the outdoor temperature and adjust

the unit's set point to provide greater efficiency.

16. **0-10 Volt Input** – Allows Installer to connect to a BMS (Building Management System) to control the boiler.
17. **Condensate Flue Check System** – The Check system prevents exhaust from the heat exchanger from backing up into cabinet.
18. **Pump Service Mode** – Allows manual operation of pumps to commission system and check pump operation.
19. **The Vision II system** allows the user to supply mixed temperatures in up to eight zones when connected to the Elite Boiler. The Vision II system controls the temperature to each zone by employing three way mixing valves. The Vision II also controls the output temperature of the Elite Boiler to assure accurate temperature delivery to all the connected zones.

C. OPTIONAL EQUIPMENT

Below is the list of optional equipment available for Elite Heating Boiler®.

- Wall Mount Bracket (Part # 7450P-211)
- System Sensor (Part # 7250P-324)
- Indirect Sensor (Part # 7250P-325)
- 3" Stainless Steel Outside Termination Vent Kit (V1000)
- 4" Stainless Steel Outside Termination Vent Kit (V2000)
- 6" Stainless Steel Outside Termination Vent Kit (V3000)
- 3" PVC Concentric Vent Kit (Part #KGAVT0601CVT)
- U.L. 353 Compliant Low Water Cut-Off Interface Kit with Manual Reset (Part # 7450P-225)
- Alarm System (Part # 7350P-602) (to monitor any failure)
- PC Connection Kit (Part # 7250P-320)
- Elite Heating Boiler® Condensate Neutralizer (Part # 7450P-212 for EL-80/110/150/220/299, Part # 7350P-611 for EL-399)
- Flow Switch Kit (Part # 7450P-213 for EL-80/110/150/220, EL-220, Part # 7450P-214 for EL-299, Part # 7450P-215 for EL-399)
- Vision II (Part # 7250P-322)

These additional options may be purchased through your HTP Distributor.

PART 3: PREPARE BOILER LOCATION

A. BOILER LOCATION / DIMENSIONS

Before considering the Boiler location, there are many factors that have to be addressed. These factors are covered in detail in this installation

manual. Please read the entire manual as it could save time and money. Piping, Venting, and Condensation Removal are just a few issues that need to be addressed prior to the installation of the boiler.

⚠ CAUTION

When preparing the boiler location, make sure the area where you are placing the boiler is level. In order for the condensate to properly flow out of the collection system, the boiler must be level to assure proper flow direction. The Elite Heating Boiler® comes equipped with leveling feet. Should you find the floor beneath the boiler is uneven, adjust the leveling feet with a wrench.



INCORRECT



CORRECT

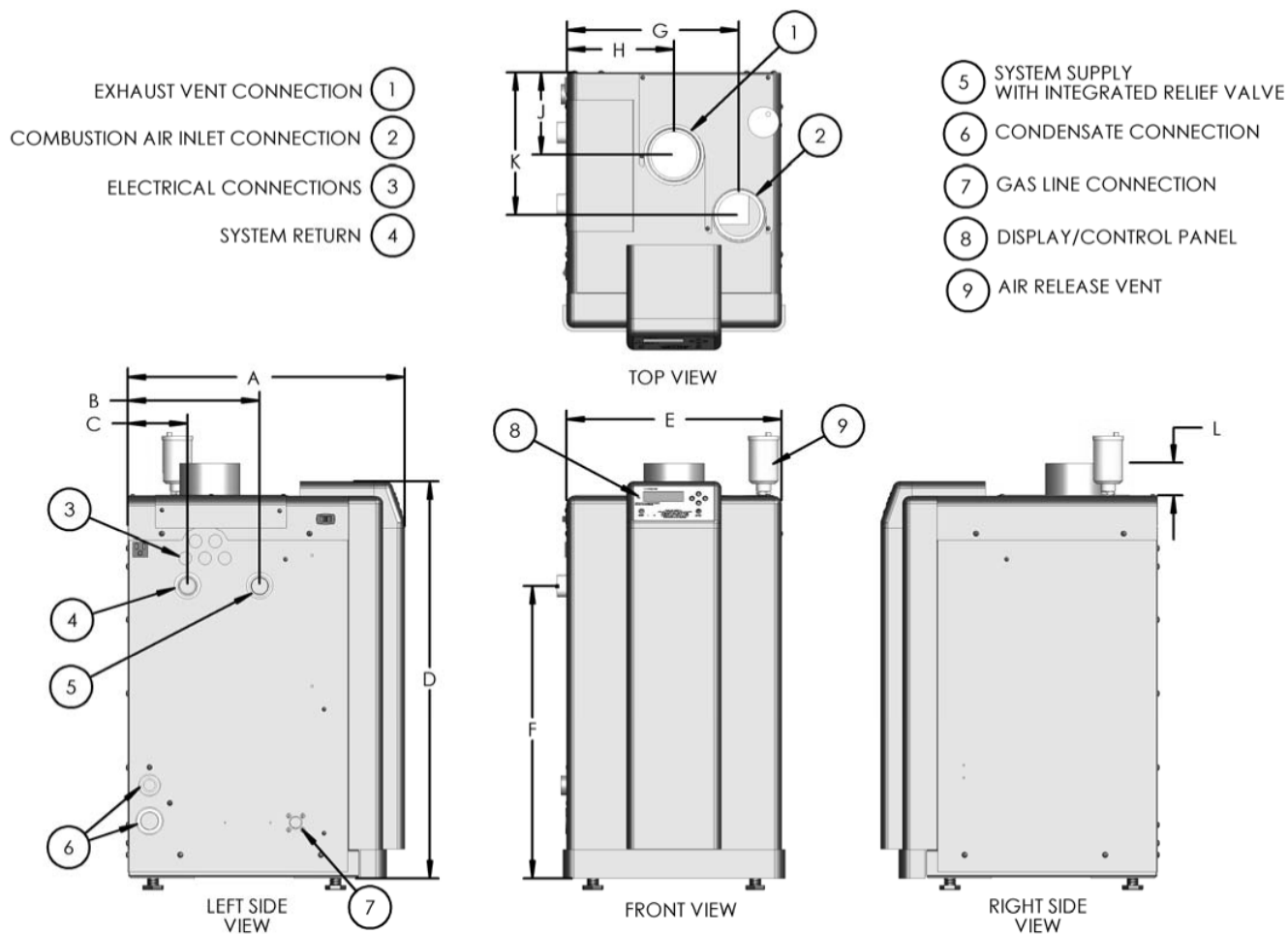


INCORRECT



CORRECT

DIMENSIONS



MODEL*	A	B	C	D	E	F	G	H	J	K	L	SHIPPING WEIGHT
EL-80	18.50	9.00	2.50	27.25	14.50	20.00	11.75	7.38	5.75	10.00	2.18	108
EL-110	18.50	9.00	2.50	27.25	14.50	20.00	11.75	7.38	5.75	10.00	2.18	113
EL-150	19.50	10.50	2.50	27.25	14.50	20.00	11.75	7.38	4.25	8.50	2.18	126
EL-220	26.50	17.50	6.00	27.25	14.50	20.00	11.75	7.38	4.25	8.50	2.18	164

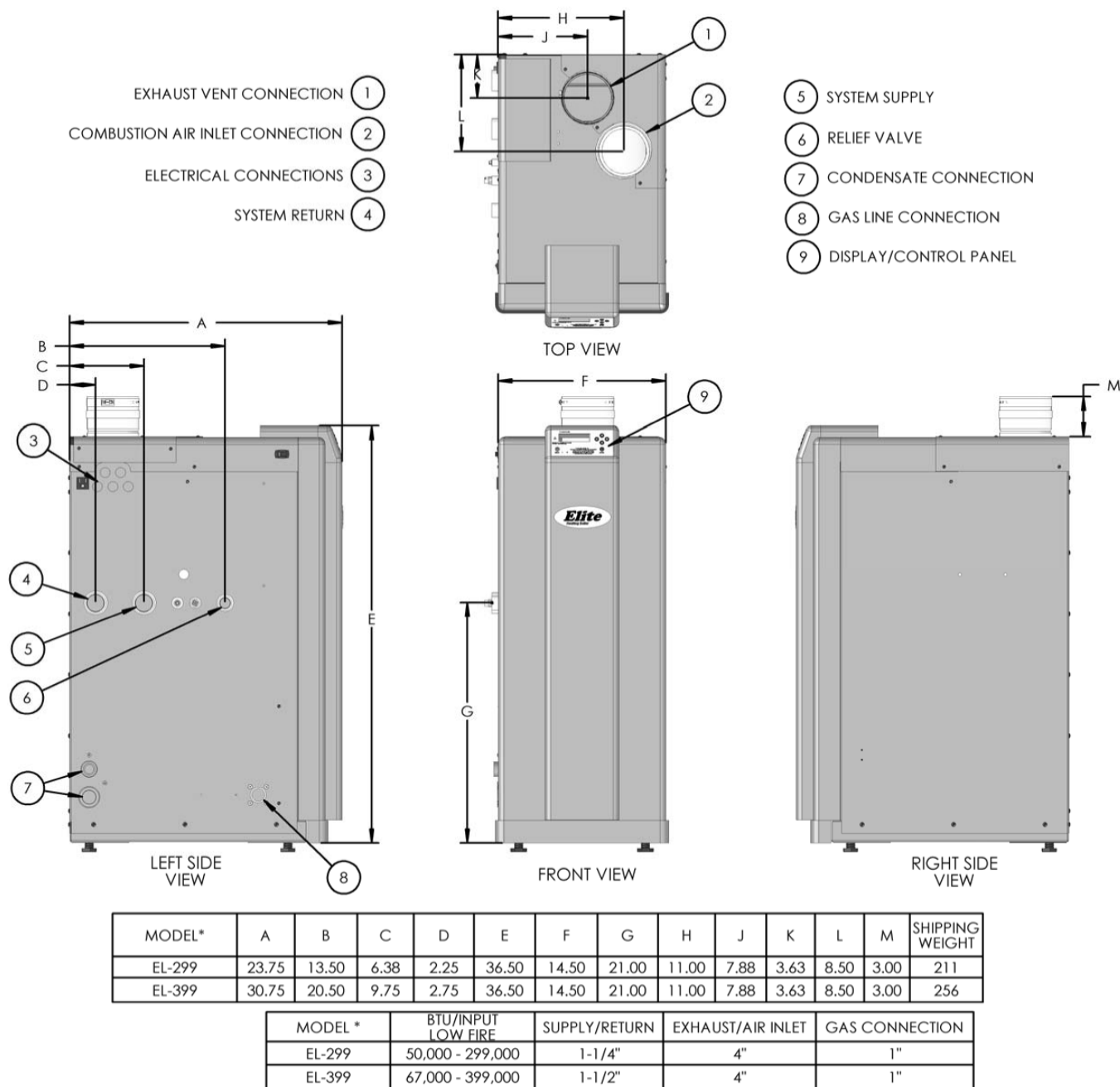
MODEL	BTU/INPUT LOW FIRE	SUPPLY/RETURN	EXHAUST/AIR INLET	GAS CONNECTION
EL-80	14,000-80,000	1"	3"	3/4"
EL-110	18,000-110,000	1"	3"	3/4"
EL-150	25,000-150,000	1"	3"	3/4"
EL-220	37,000-220,000	1"	3"	1"

*"N" DENOTES NATURAL GAS, "LP" DENOTES PROPANE
ALL DIMENSIONS ARE APPROXIMATE AND ARE SUBJECT TO CHANGE

Figure 3-1

LP-285-A Rev. 1/14/10

DIMENSIONS



*"N" DENOTES NATURAL GAS, "LP" DENOTES PROPANE
 ALL DIMENSIONS ARE APPROXIMATE AND ARE SUBJECT TO CHANGE

Figure 3-2

PART 3: PREPARE BOILER LOCATION (CONTINUED)

B. INSTALLATIONS MUST COMPLY WITH:

- Local, state, provincial, and national codes, laws, regulations and ordinances.
- National Fuel Gas Code, ANSI Z223.1 – latest edition.
- Standard for Controls and Safety Devices for Automatically Fired Boilers, ANSI/ASME CSD-1, when required.
- National Electrical Code.
- For Canada only: B149.1 or B149.2 Installation Code, CSA C22.1 Canadian Electrical Code Part 1 and any local codes.

NOTICE

The Elite Heating Boiler® gas manifold and controls met safe lighting and other performance criteria when the boiler underwent tests specified in ANSI Z21.13 — latest edition.

C. BEFORE LOCATING THE BOILER

1. Check for nearby connections to:
 - System water piping
 - Venting connections
 - Gas supply piping
 - Electrical power
 - Condensate drain
2. Check area around boiler. Remove any combustible materials, gasoline and other flammable liquids.

⚠ WARNING

Failure to keep boiler area clear and free of combustible materials, gasoline and other flammable liquids and vapors can result in severe personal injury, death or substantial property damage.

3. The Elite Heating Boiler® Gas Control System components must be protected from dripping water during operation and service.
4. If the Elite Heating Boiler® is to replace an existing boiler, check for and correct any *existing* system problems such as:
 - System leaks.

- Incorrectly-sized expansion tank.
- Lack of freeze protection in boiler water causing system and boiler to freeze and leak.
- Excessive glycol which will affect the boiler system operation.

5. Clean and flush system when re-installing a boiler.

D. CLEARANCES FOR SERVICE ACCESS

1. See Figure 3-3 for recommended service clearances. If you do not provide minimum clearances shown, it might not be possible to service the boiler without removing it from the space.

SERVICE CLEARANCES

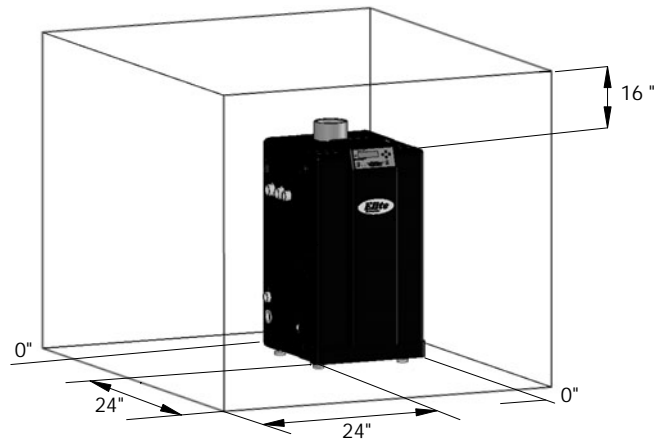


Figure 3-3

LP-293-K Rev. 9/22/09

⚠ WARNING

The space must be provided with combustion/ventilation air openings correctly sized for all other appliances located in the same space as the Elite Heating Boiler®. The boiler cover must be securely fastened to the boiler to prevent the boiler from drawing air from inside the boiler room. This is particularly important if the boiler is located in the same room as other appliances. Failure to comply with the above warnings could result in severe personal injury, death or substantial property damage.

E. RESIDENTIAL GARAGE INSTALLATION

Precautions

Take the following special precautions when installing the boiler in a residential garage. If the

PART 3: PREPARE BOILER LOCATION (CONTINUED)

boiler is located in a residential garage, per ANSI Z223.1.

- Mount the boiler with a minimum of 18 inches above the floor of the garage to the bottom of the boiler to ensure the burner and ignition devices will be no less than 18 inches above the floor.
- Locate or protect the boiler so it cannot be damaged by a moving vehicle.

F. EXHAUST VENT AND INTAKE AIR VENT

WARNING

Vents must be properly supported. The Elite Heating Boiler's® Intake and Exhaust Connections are not designed to carry heavy weight. Vent support brackets must be within 1 foot of the boiler and the balance at 4 foot intervals. The Elite Heating Boiler® venting must be readily accessible for visual inspection for the first three feet from the boiler.

The Elite Heating Boiler® requires a special vent system, designed for pressurized venting. Elite Heating Boilers® are rated ANSI Z21.13 Category IV (pressurized vent, likely to form condensate in the vent).

You must also install air intake piping from outdoors to the boiler flue adaptor. The resultant installation is categorized as direct vent (sealed combustion). **Note: To prevent combustion air contamination see Table 3-4 in this section when considering exhaust vent and intake air vent termination.**

Intake and exhaust must terminate near each other and may be vented vertically through the roof or out a side wall. The intake and exhaust venting methods are detailed in the Venting Section. Do not attempt to install the Elite Heating Boiler® using any other means. Be sure to locate the boiler such that the air intake and exhaust vent piping can be routed through the building and properly terminated. The air intake and exhaust vent piping lengths, routing and termination method must all comply with the methods and limits given in the venting section.

G. PREVENT COMBUSTION AIR CONTAMINATION

Install intake air piping for the Elite Heating

Boiler® as described in the Venting section. Do not terminate exhaust in locations that can allow contamination of intake air.

WARNING

You must pipe outside air to the boiler air intake. Ensure that the intake air will not contain any of the contaminants below. Contaminated air will damage the boiler, resulting in possible substantial property damage, severe personal injury, or death. For example, do not pipe intake air vent near a swimming pool. Also avoid areas subject to exhaust fumes from laundry facilities. These areas will always contain contaminants.

Table 3-4: Corrosive contaminants and sources


Products to avoid
Spray cans containing fluorocarbons
Permanent wave solutions
Chlorinated waxes/cleaners
Chlorine-based swimming pool chemicals
Calcium chloride used for thawing
Sodium chloride used for water softening
Refrigerant leaks
Paint or varnish removers
Hydrochloric acid/muriatic acid
Cements and glues
Antistatic fabric softeners used in clothes dryers
Chlorine-type bleaches, detergents, and cleaning solvents found in household laundry rooms
Adhesives used to fasten building products and other similar products
Areas likely to have contaminants
Dry cleaning/laundry areas and establishments
Swimming pools
Metal fabrication plants
Beauty shops
Refrigeration repair shops
Photo processing plants
Auto body shops
Plastic manufacturing plants
Furniture refinishing areas and establishments
New building construction
Remodeling areas
Garages and workshops

PART 3: PREPARE BOILER LOCATION (CONTINUED)

H. WHEN REMOVING A BOILER FROM AN EXISTING COMMON VENT SYSTEM

⚠ DANGER

Do not install the Elite Heating Boiler® into a common vent with any other appliance. This will cause flue gas spillage or appliance malfunction, resulting in possible severe personal injury, death or substantial property damage.

⚠ WARNING	
Breathing Hazard - Carbon Monoxide Gas	
	<ul style="list-style-type: none"> • Do not operate heater if flood damaged. • Install vent system in accordance with local codes and manufacturers installation instructions. • Do not obstruct heater air intake or exhaust. Support all vent piping per manufacturers installation instructions. • Do not place chemical vapor emitting products near unit. • According to NFPA 720, carbon monoxide detectors should be installed outside each sleeping area. • Never operate the heater unless it is vented to the outdoors. • Analyze the entire vent system to make sure that condensate will not become trapped in a section of vent pipe and therefore reduce the open cross sectional area of the vent.
<p>Breathing carbon monoxide can cause brain damage or death. Always read and understand instruction manual.</p>	

LP-304 4/28/09

At the time of removal of an existing boiler, follow the steps in Part 6 Section H, Heater Removal From A Common Vent System.

PART 4: PREPARE BOILER

WARNING

Uncrating Boiler – Any Claims for damage or shortage in shipment must be filed immediately against the transportation company by the consignee.

CAUTION

Cold weather handling — If boiler has been stored in a very cold location (below 0°F) before installation, handle with care until the plastic components come to room temperature.

Remove all sides of the Elite Heating Boiler® shipping crate in order to allow the boiler to be lifted into its installation location. The Elite Heating Boiler® is also equipped with leveling feet that can be used to level the boiler properly if the surface location is not level. If surface flooring is rough, care should be taken when sliding boiler into position, you could catch the leveling feet and damage the boiler if it is slid to its location.

WARNING

Never use dielectric unions for galvanized steel fittings when connecting to a stainless steel storage tank or boiler.

PART 5: BOILER PIPING

A. RELIEF VALVE

Connect the discharge piping for the relief valve to a safe disposal location, follow the guidelines in the WARNING below.

WARNING

To avoid water damage or scalding due to relief valve operation:

- Discharge line must be connected to relief valve outlet and run to a safe place of disposal. Terminate the discharge line in a manner that will prevent possibility of severe burns or property damage should the relief valve discharge.
- Discharge line must be as short as possible and be the same size as the valve discharge connection throughout its entire length.
- Discharge line must pitch downward from the valve and terminate at least 6" above the floor drain making discharge clearly visible.
- The discharge line shall terminate plain, not threaded, with a material serviceable for temperatures of 375 °F or greater.
- Do not pipe the discharge to any location where freezing could occur.
- No shutoff valve shall be installed between the relief valve and boiler or in the discharge line. Do not plug or place any obstruction in the discharge line.
- Test the operation of the relief valve after filling and pressurizing the system by lifting the lever. Make sure the valve discharges freely. If the valve fails to operate correctly, replace it with a new relief valve.
- Failure to comply with the above guidelines could result in failure of the relief valve to operate, resulting in possibility of substantial property damage, severe personal injury, or death.

PART 5: BOILER PIPING (CONTINUED)

B. GENERAL PIPING INFORMATION

NOTICE

The Elite Heating Boiler® control module uses temperature sensors to provide both high limit protection and modulating temperature control. The control module also provides low water protection by sensing the water level in the heat exchanger. Some codes/jurisdictions may require additional external controls.

C. BACKFLOW PREVENTER

Use a backflow preventer specifically designed for hydronic boiler installations. This valve should be installed on the cold water fill supply line per local codes. (See Boiler Piping Details)

CAUTION

All piping methods shown in this manual use primary/secondary connection to the boiler loop. This is to avoid the possibility of inadequate flow through the boiler. For other piping methods, consult your local Heat Transfer Products representative or refer to separate Elite Heating Boiler® piping details in this manual (Part 5).

D. SYSTEM WATER PIPING METHODS

Expansion tank and make-up water

1. Ensure that the expansion tank is sized to correctly handle boiler and system water volume and water temperature.

Elite Heating Boiler® EL-80	1.4 Gallons
Elite Heating Boiler® EL-110	1.7 Gallons
Elite Heating Boiler® EL-150	2.0 Gallons
Elite Heating Boiler® EL-220	2.6 Gallons
Elite Heating Boiler® EL-299	3.1 Gallons
Elite Heating Boiler® EL-399	3.7 Gallons

Figure 5-1 Minimum recommended expansion tank sizes

CAUTION

Undersized expansion tanks cause system water to be lost from the relief valve causing makeup water to be added. Eventual boiler failure can result due to excessive make-up water addition. This type of failure is **NOT** covered by warranty.

2. The expansion tank must be located as shown in Boiler Piping Part 5 or following recognized design methods. See expansion tank manufacturer's instructions for details.
3. Connect the expansion tank to the air separator only if the air separator is on the suction side of the circulator. Always install the system fill connection at the same point as the expansion tank connection to the system.
4. Most chilled water systems are piped using a closed type expansion tank.

Diaphragm (or bladder) expansion tank

1. Always install an automatic air vent on top of the air separator to remove residual air from the system.

E. CIRCULATORS

⚠ CAUTION

DO NOT install automatic air vents on closed-type expansion tank systems. Air must remain in the system and return to the tank to provide an air cushion. An automatic air vent would cause air to leave system, resulting in improper operation of the expansion tank.

⚠ CAUTION

DO NOT use the boiler circulator in any location other than the ones shown in this manual. The boiler circulator location is selected to ensure adequate flow through the Elite Heating Boiler®. Failure to comply with this caution could result in unreliable performance and nuisance shut downs from insufficient flow.

Sizing space heat system piping

1. See Piping Details in this manual Part 5. In all diagrams, the space heating system is

PART 5: BOILER PIPING (CONTINUED)

isolated from the boiler loop by the primary/secondary connection.

2. Size the piping and components in the space heating system using recognized design methods.

F. HYDRONIC PIPING WITH CIRCULATORS, ZONE VALVES AND MULTIPLE BOILERS

The Elite Heating Boiler® is designed to function in a closed loop Hydronic System. We have included a Temperature and Pressure Gauge that allows the user to monitor the system pressure and outlet temperature from the Elite Heating Boiler®. It is important to note that the Elite Heating Boiler® has a minimal amount of pressure drop and must be calculated when sizing the circulators. Each Elite Heating Boiler® installation must have an air elimination device that will remove air from the system.

Install the Elite Heating Boiler® so the gas ignition system components are protected from water (dripping, spraying, etc.). Allow clearance for basic service of boiler circulator, valves and other components.

Observe the minimum 1" clearance around all uninsulated hot water pipes when openings around

pipes are not protected by non-combustible materials.

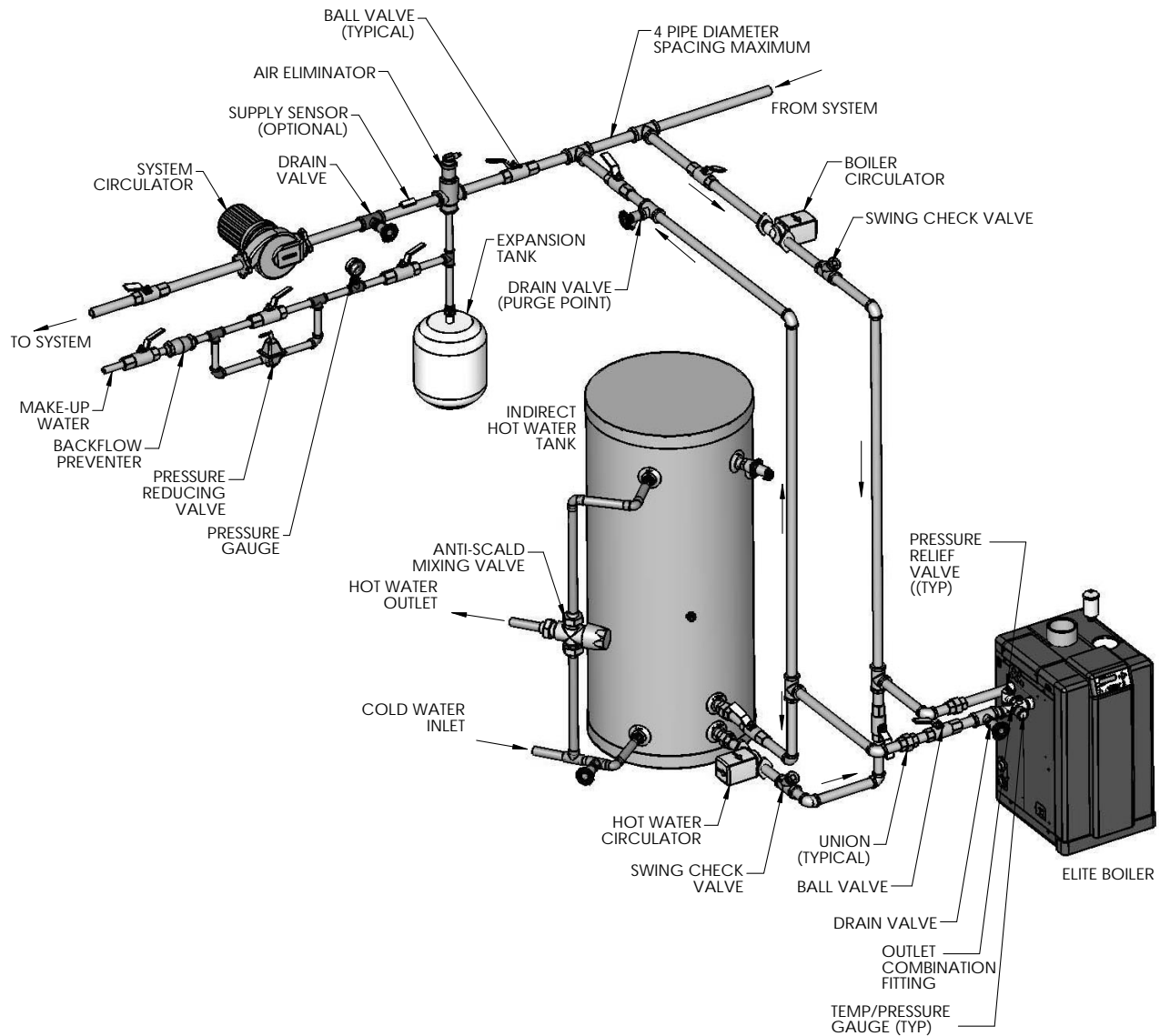
On an Elite Heating Boiler® installed above radiation level, some states and local codes require a low water cut off device which is optional on the Elite Heating Boiler® Rev. 1. Check with local codes for additional requirements. If the Elite Heating Boiler® supplies hot water to heating coils in air handler units, flow control valves or other devices must be installed to prevent gravity circulation of boiler water in the coils during the cooling cycle.

Chilled water medium must be piped in parallel with the boiler. Freeze protection for new or existing systems must use glycol that is specifically formulated for this purpose. It will include inhibitors that will prevent the glycol from attacking the metallic system components. Make certain that the system fluid is checked for the correct glycol concentration and inhibitor level. The system should be tested at least once a year and as recommended by the producer of the glycol solution. Allowance should be made for the expansion of the glycol solution in the system piping. Example: 50% by volume glycol solution expands 4.8% in volume for the temperature increase from 32 F to 180 F, while water expands 3% with the same temperature rise.

PART 5: BOILER PIPING (CONTINUED)

G. BOILER PIPING DETAILS

Single Elite Heating Boiler® Space Heating with Indirect Priority

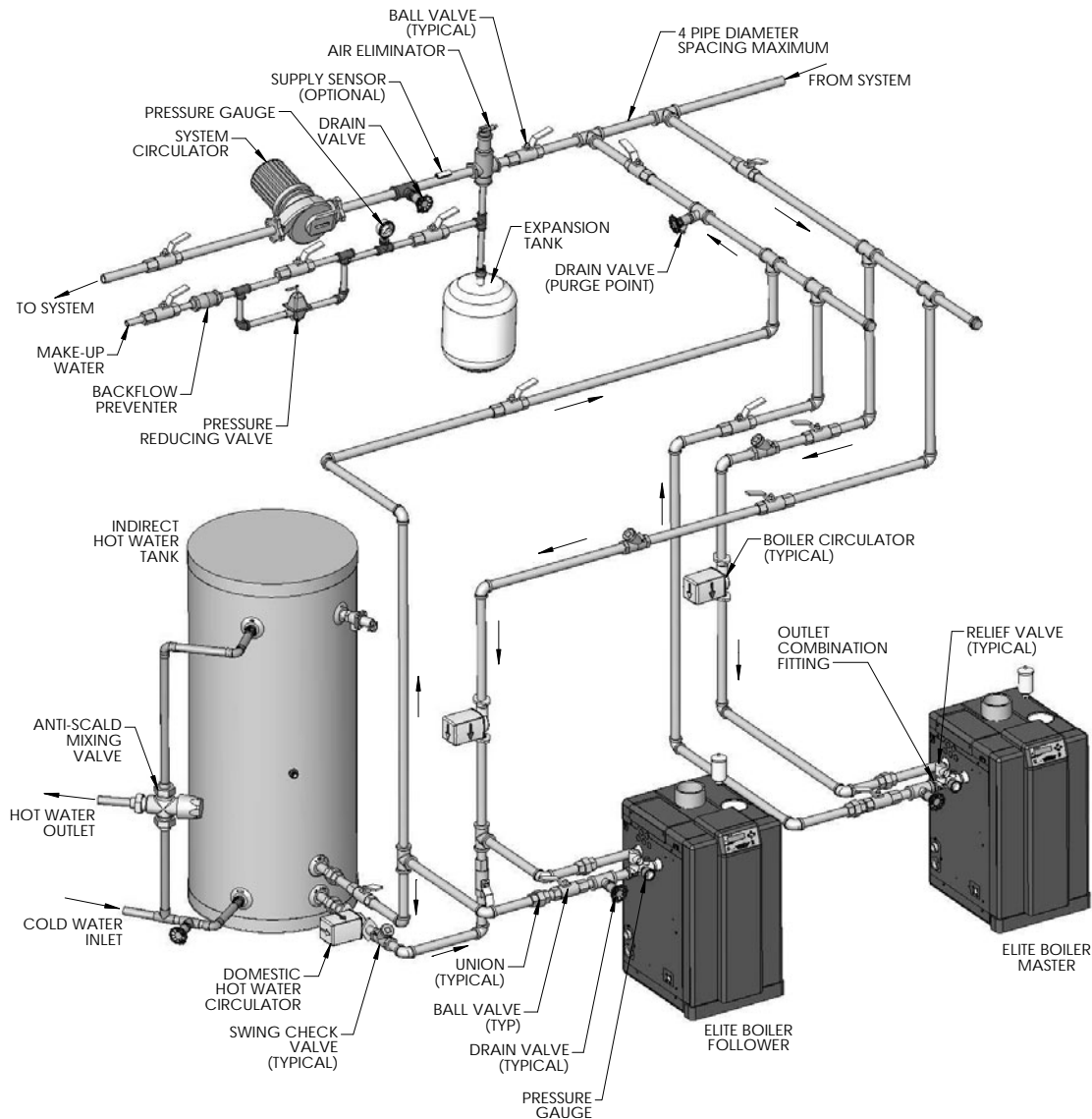


NOTES:

1. This drawing is meant to show system piping concept only.
2. An Anti-Scald mixing valve is recommended if the DHW temperature is set above the factory setting of 119°F.
3. Install a minimum of 12 diameters of straight pipe upstream of all circulators.
4. Piping shown is Primary/Secondary
5. System Flow (Secondary Loop) must be greater than the boiler's primary loop flow.
6. Installations must comply with all local codes.
7. In Massachusetts, a vacuum relief must be installed in the cold water line per 248 CMR.

PART 5: BOILER PIPING (CONTINUED)

Cascade Multiple Elite Heating Boiler® with Indirect Priority on One Boiler

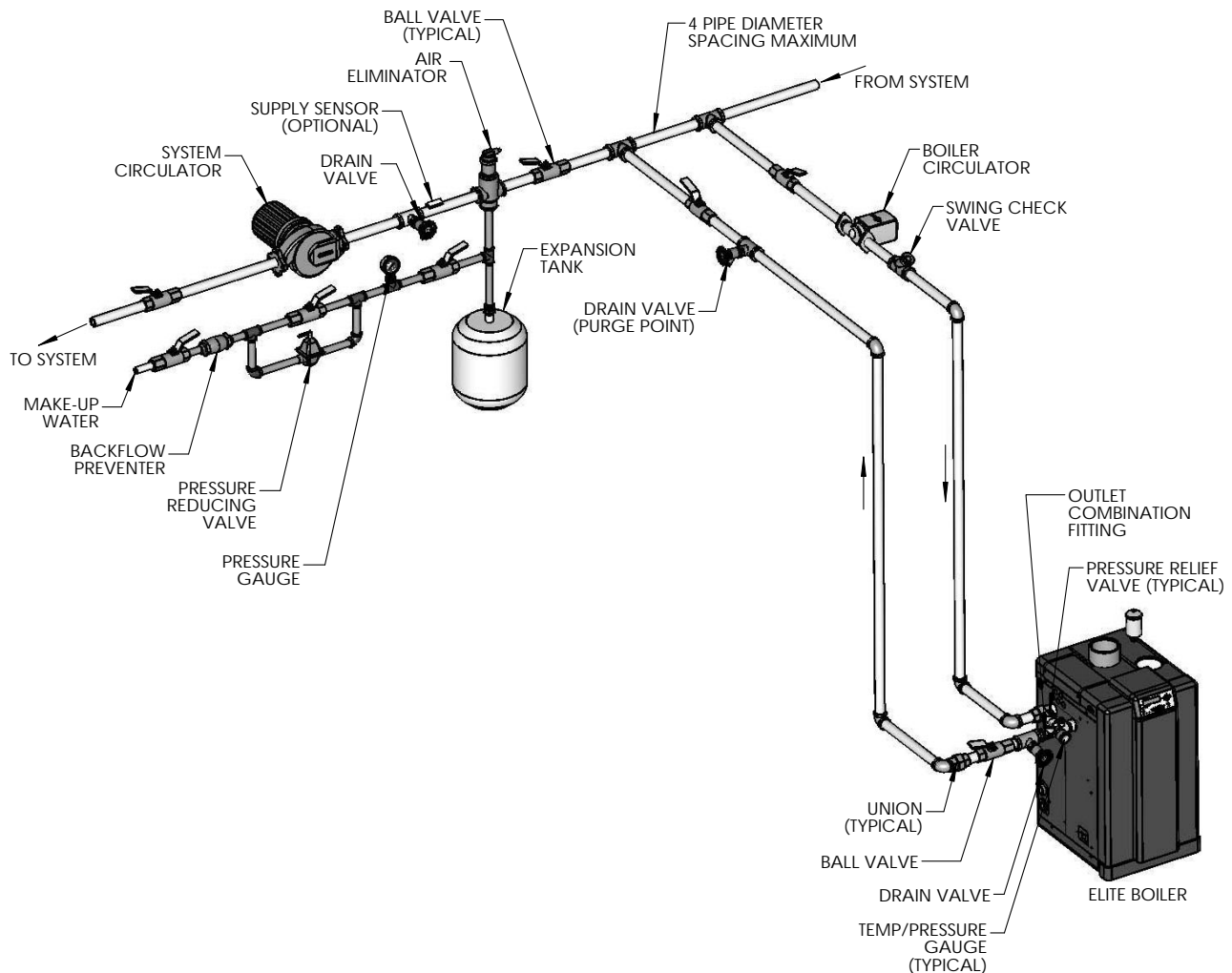


NOTES:

1. This drawing is meant to show system piping concept only.
2. An Anti-Scald mixing valve is recommended if the DHW temperature is set above the factory setting of 119°F.
3. Install a minimum of 12 diameters of straight pipe upstream of all circulators.
4. Piping shown is Primary/Secondary
5. Reference Figure 5-2 to determine manifold pipe sizing.
6. System Flow (Secondary Loop) must be greater than the boiler's primary loop flow.
7. Installations must comply with all local codes.
8. In Massachusetts, a vacuum relief must be installed in the cold water line per 248 CMR.

PART 5: BOILER PIPING (CONTINUED)

Single Elite Heating Boiler® Space Heating

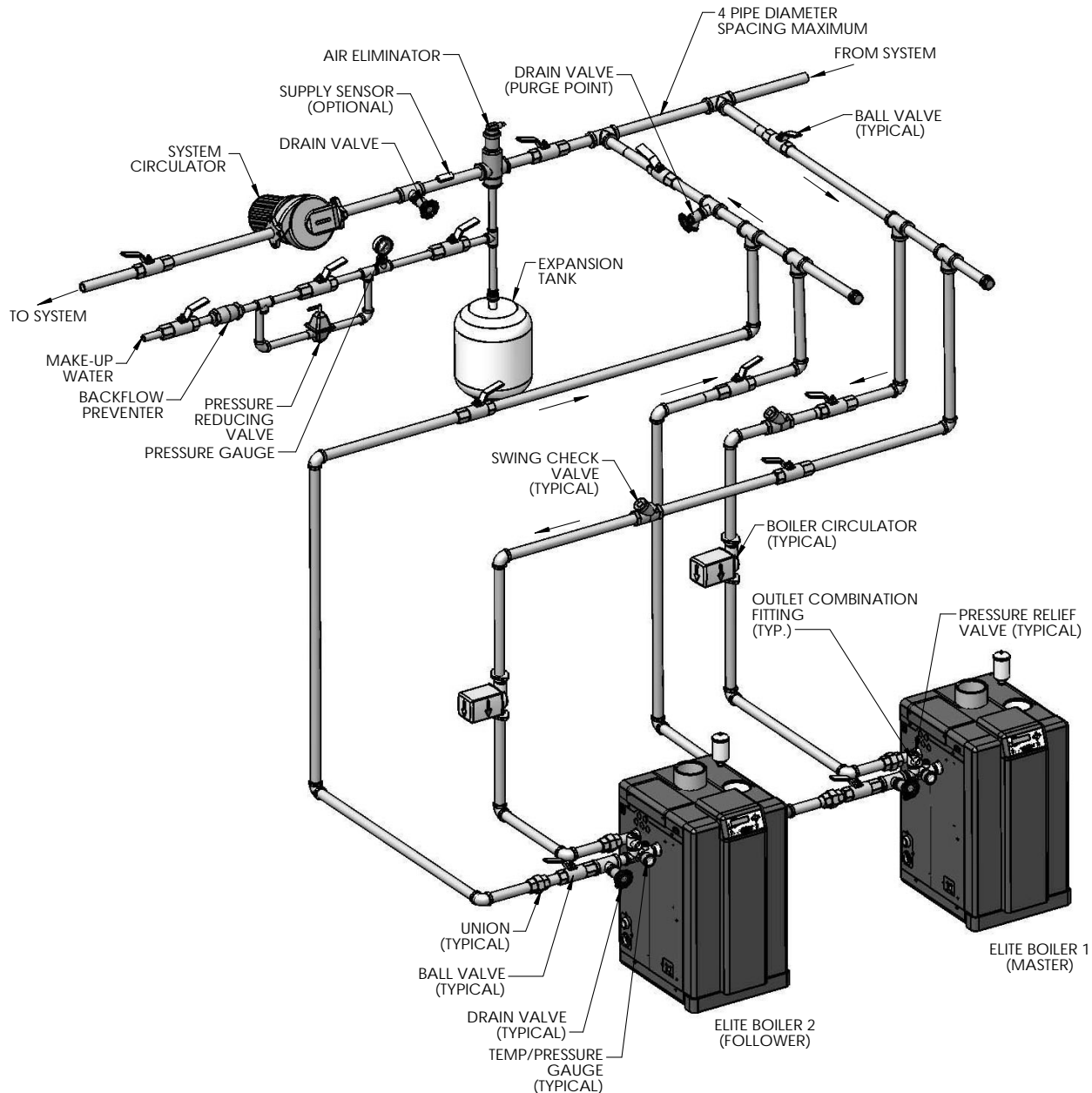


NOTES:

1. This drawing is meant to show system piping concept only.
2. Install a minimum of 12 diameters of straight pipe upstream of all circulators.
3. Piping shown is Primary/Secondary
4. Installations must comply with all local codes

PART 5: BOILER PIPING (CONTINUED)

Cascade Elite Heating Boilers® Space Heating Only



NOTES:

1. This drawing is meant to show system piping concept only.
2. An Anti-Scald mixing valve is recommended if the DHW temperature is set above the factory setting of 119°F.
3. Install a minimum of 12 diameters of straight pipe upstream of all circulators.
4. System Flow (Secondary Loop) must be greater than the boiler's primary loop flow.
5. Installations must comply with all local codes

PART 5: BOILER PIPING (CONTINUED)

CAUTION

The Elite Heating Boiler® should not be operated as a potable hot water heater. It should not be used as a direct hot water heating device.

Basic steps are listed below, with Illustration, that will guide you through the installation of the Elite Heating Boiler®.

1. Connect the system return marked "Boiler Return".
2. Connect the system supply marked "Boiler Supply".
3. Install a purge and balance valve or shut off valve and drain on the system return to purge air out of each zone.
4. Install a back flow preventer on the cold feed make-up water line.
5. Install a pressure reducing valve on the cold feed make-up water line, (15 PSI nominal on the system return). This boiler has a maximum working pressure of 160 PSI. You may order a higher pressure relief valve kit from the factory. Check temperature and pressure gauge when operating. It should read minimum pressure of 12 PSI.
6. Install a circulator as shown in piping details (this section). Make sure the circulator is properly sized for the system and friction loss.
7. Install an expansion tank on the system supply. Consult the expansion tank manufacturer's instruction (see part 5, section D for water volume) for specific information relating to expansion tank installation. Size the expansion tank for the required system volume and capacity.
8. Install an air elimination device on the system supply.
9. Install a drain valve at the lowest point of the system. Note: The Elite Heating Boiler® can not be drained completely of water without purging the unit with an air pressure 15 PSI.
10. The relief valve, temperature and pressure gauge are included in the accessory kit with the Elite Boiler Accessory Kit. A pipe discharge line should be installed 6" above the drain in the event of a pressure relief. The pipe size must be the same size as the relief valve outlet. **NEVER BLOCK THE OUTLET OF THE SAFETY RELIEF VALVE.**

H. CIRCULATOR SIZING

The Elite Heating Boiler® Heat Exchanger has a pressure drop that must be considered in your system design. Refer to the table in Fig. 5-1 for pressure drop through the Elite Heating Boiler® Heat Exchanger.

PART 5: BOILER PIPING (CONTINUED)

HEAT EXCHANGER PRESSURE DROP CHART																				
Model	Flow Rate $\Delta P'$																			
Flow Rate	2 GPM	3 GPM	4 GPM	5 GPM	6 GPM	7 GPM	8 GPM	9 GPM	10 GPM	11 GPM	12 GPM	13 GPM	14 GPM	15 GPM	16 GPM	17 GPM	18 GPM	19 GPM	20 GPM	
EL-80	2.5'	3'	4'	7'	10'	14'	17'	21'	26'	*	*	*	*	*	*	*	*	*	*	*
EL-110	*	3'	4'	7'	9'	12'	15'	17'	22'	25'	33'	*	*	*	*	*	*	*	*	*
EL-150	*	*	3'	4'	5'	6'	9'	10'	12'	15'	17'	19'	22'	27'	*	*	*	*	*	*
EL-220	*	*	*	*	*	2'	2'	3'	4'	5'	5.5'	6'	7'	8'	10'	11.5'	13'	15'	16.5'	
EL-299	*	*	*	*	*	*	3'	3.5'	4'	4.5'	5'	6'	7'	8'	8.75'	9.25'	10.25'	11'	13'	
EL-399	*	*	*	*	*	*	*	*	*	*	*	3.8'	4'	5'	6'	6.6'	7'	7.8'	8.3'	
Flow Rate	21 GPM	22 GPM	23 GPM	24 GPM	25 GPM	26 GPM	27 GPM	28 GPM	29 GPM	30 GPM	31 GPM	32 GPM	33 GPM	34 GPM	35 GPM	36 GPM	37 GPM	38 GPM	39 GPM	
EL-80	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
EL-110	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
EL-150	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
EL-220	17'	19'	21'	23'	24'	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
EL-299	14'	15'	16.5'	18'	20'	22'	24'	26'	29'	33'	36'	*	*	*	*	*	*	*	*	*
EL-399	9.2'	9.7'	10.3'	11.1'	12'	12.9'	13.6'	14'	15.7'	17'	18'	19.4'	21'	22.5'	26'	28'	31'	34'	39'	

Figure 5-1

*Do not operate boiler at these flow settings as it will damage the heat exchanger or related components caused by excessive flow rates or minimum flow rates.

The chart below represents the various system design temperature rise through the Elite Heating Boiler® along with their respective flows and friction loss which will aid in circulator selection.

SYSTEM TEMPERATURE RISE CHART										
Model	20° Δt		25° Δt		30° Δt		35° Δt		40° Δt	
	Ft / Friction	Flow Rate	Ft / Friction	Flow Rate	Ft / Friction	Flow Rate	Ft / Friction	Flow Rate	Ft / Friction	Flow Rate
EL-80	17'	8 GPM	10'	6.6 GPM	7'	5.3 GPM	7'	4.6 GPM	4'	4 GPM
EL-110	25'	11 GPM	17'	9.1 GPM	12'	7.3 GPM	9'	6.4 GPM	8.2'	5.5 GPM
EL-150	27'	15 GPM	17'	12.5 GPM	12'	10 GPM	10'	8.8 GPM	8.8'	7.5 GPM
EL-220	19'	22 GPM	13'	18.3 GPM	12'	14.6 GPM	6'	12.8 GPM	5'	11 GPM
EL-299	29'	29 GPM	18'	24.5 GPM	13'	20 GPM	9.5'	17.3 GPM	8'	14.5 GPM
EL-399	39'	39 GPM	19'	32.5 GPM	13'	26 GPM	10'	22.8 GPM	8'	19.5 GPM

Figure 5-2

PART 5: BOILER PIPING (CONTINUED)

The chart below represents the combined flow rates and pipe sizes when using multiple boilers to design the manifold system for the primary circuit. To size, simply add up the number of boilers and the required flow rates for the system design temperature.

Example: (5) EL-220 Elite Heating Boilers® with a design of 20°Δt degree temperature rise with each boiler having an individual flow rate of 22 GPM. To correctly size the manifold feeding these (5) Elite Heating Boilers you would need a pipe size of 4".

MULTIPLE BOILER MANIFOLD PIPING																									
Flow Rate (GPM)	16	22	24	30	32	33	40	44	45	48	55	60	66	75	80	88	90	110	120	132	150	160	179	200	239
Pipe Dia. (Inches)	2	2	2	2	2	2½	2½	2½	2½	2½	2½	2½	2½	3	3	3	3	4	4	4	4	4	4	4	5

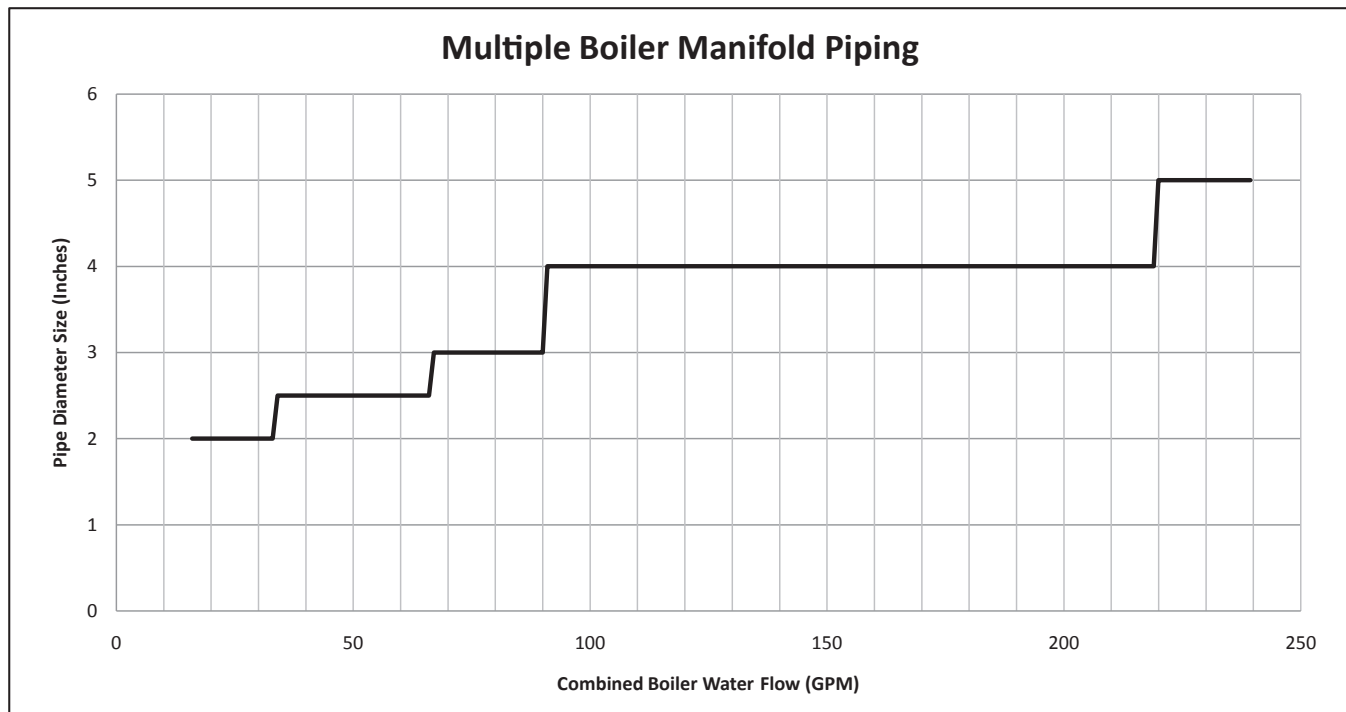


Figure 5-3

LP-293-JJ Rev. 7/31/09

MULTIPLE BOILER MANIFOLD PIPING																							
Flow rate	30	50	60	85	90	100	120	150	170	180	200	210	240	250	255	300	340	350	400	425	510	595	680
Pipe Dia.	2"	2½"	2½"	3"	3"	3"	4"	4"	4"	4"	4"	4"	5"	5"	5"	5"	5"	5"	5"	5"	6"	6"	6"

I. FILL AND PURGE HEATING SYSTEM

- Attach the hose to balance and purge hose connector or drain valve and run hose to nearest drain.
- Close the other side of the balance and purge valve or the shut off valve after the drain.
- Open the first zone balance and purge or drain valve to let water flow out the hose. If zone valves are used, open the valves one at a time manually. (Note: You should check zone valve manufacturer's instructions prior

to opening valves manually, so as not to damage the zone valve.)

- Manually operate fill valve regulator. When water runs out of the hose you will see a steady stream of water without bubbles. Close the balance and purge valve or drain to stop the water from flowing. Disconnect the hose and connect it to next zone to be purged.
- Repeat this procedure for additional zones (one at time).

PART 5: BOILER PIPING (CONTINUED)

⚠ CAUTION

For installations that incorporate standing iron radiation and systems with manual vents at the high points. Follow the previous section and starting with the nearest manual air vent, open the vent until water flows out, then close the vent. Repeat the procedure, working your way toward furthest air vent. It may be necessary to install a basket strainer in an older system where larger amounts of sediment may be present. Annual cleaning of the strainer may be necessary.

Upon completion, make sure that the fill valve and zone valves are in the automatic position. You must also assure the purge and shut off valves are in the open position.

⚠ WARNING

Use only inhibited propylene glycol solutions which are specially formulated for hydronic systems. Ethylene glycol is toxic and can attack gaskets and seals used in hydronic systems. Glycol mixtures should not exceed 50%.

1. Glycol in hydronic applications which is specially formulated for this purpose includes inhibitors that prevent the glycol from attacking metallic system components. Make certain that the system fluid is checked for the correct glycol concentration and inhibitor level.
2. The glycol solution should be tested at least once a year and as recommended by the glycol manufacturer.
3. Anti-freeze solutions expand more than water. For example a 50% by volume solution expands 4.8% in volume for a temperature increase from 32° F to 180° F, while water expands 3% with the same temperature rise. Allowances must be made for this expansion in the system design.
4. A 30% mixture of glycol will result in a BTU output loss of 15% with a 5% increase in head against the system circulator.
5. A 50% mixture of glycol will result in a BTU output loss of 30% with a 50% increase in head against the system circulator.

⚠ CAUTION

It is highly recommended that you carefully follow the glycol manufacturer's recommended concentrations, expansion requirements and maintenance recommendations (pH additive breakdown, inhibitor reduction, etc.). You must carefully calculate the additional friction loss in the system as well as the reduction in heat transfer co-efficients.

J. ZONING WITH ZONE VALVES

1. Connect the boiler to the system as shown in Piping Details (Part 5) when zoning with zone valves. The primary/secondary piping shown ensures the boiler loop will have sufficient flow. It also avoids applying the high head of the boiler circulator to the zone valves.
2. Connect DHW (domestic hot water) piping to indirect storage water heater as shown in Piping Details (Part 5).

K. ZONING WITH CIRCULATORS

1. Connect the boiler to the system when using circulator zoning as shown in the Piping Details when zoning with circulators. NOTE: The boiler circulator cannot be used for a zone. It must supply only the boiler loop.
2. Install a separate circulator for each zone.
3. Connect DHW (domestic hot water) piping to indirect storage water heater as shown in the Piping Details (Part 5).

L. MULTIPLE BOILERS

1. Connect multiple boilers as shown in the Piping Details (Part 5).
2. All piping shown is reverse return to assure balanced flow throughout the connected boilers.
3. Each connected boiler must have its own circulator pump to assure adequate flow.
4. Connect DHW (domestic hot water) piping to indirect storage water heater as shown in the Piping Details (Part 5).
5. The system flow (secondary loop) must be greater than the boiler's primary loop flow.

PART 6: VENTING, COMBUSTION AIR & CONDENSATE REMOVAL

A. INSTALLING EXHAUST VENT AND INTAKE AIR VENT

DANGER

The Elite Heating Boiler® must be vented as detailed in this section. Verify that the exhaust and intake piping comply with these instructions regarding the venting system.

Inspect finished combustion air intake and exhaust piping thoroughly to ensure all joints are secure and airtight and comply with all applicable code requirements, as well as with the instructions provided in this manual.

Failure to provide a properly installed vent system will cause severe personal injury or death.

WARNING

This vent system will operate with a positive pressure in the pipe. Do not connect vent connectors serving appliances vented by natural draft into any portion of mechanical draft systems operating under positive pressure. Follow these venting instructions carefully. Failure to do so may result in substantial property damage, severe personal injury or death.

B. GENERAL

1. Install the boiler venting system in accordance with these instructions and with the National Fuel Gas Code, ANSI Z223.1/NFPA 54, CAN/CGA B149, and/or applicable provisions of local building codes.
2. This boiler is a direct vent appliance and is listed as a Category IV appliance with Underwriters Laboratories, Inc.

C. APPROVED MATERIALS FOR EXHAUST VENT AND INTAKE AIR VENT

1. Use only Non Foam Core venting material or AL294C. See Tables 6-1 through 6-6 for all approved venting material.

WARNING

Use only the materials listed in Tables 6-1 through 6-6 for the venting systems. Failure to do so could result in severe personal injury, death or substantial property damage.

REQUIREMENTS FOR INSTALLATION IN CANADA

1. Installations must be made with a vent pipe system certified to ULC-S636. IPEX is an approved vent manufacturer in Canada supplying vent material listed to ULC-S636. Additionally you may use AL294C stainless steel venting to comply with Canadian requirements.
2. The first three (3) feet of vent pipe from the appliance flue outlet must be readily accessible for visual inspection.
3. The components of the certified vent system must not be interchanged with other vent systems or unlisted pipe / fittings.

WARNING

Do not use Cellular Foam Core Pipe in any portion of the exhaust piping from this boiler. Use of Foam Core Pipe may result in severe personal injury, death, or substantial property damage.

Cellular foam core piping may be used on air inlet piping **only**.

PART 6: VENTING, COMBUSTION AIR & CONDENSATE REMOVAL (CONTINUED)

Table 6-1

APPROVED PLASTIC EXHAUST VENTING MATERIAL		
MATERIAL	STANDARDS FOR INSTALLATION IN:	
	UNITED STATES	CANADA
PVC SCHEDULE 40 / 80	ANSI /ASTM D1785	ULC S636**
PVC -DWV	ANSI /ASTM D2665	ULC-S636**
CPVC SCHEDULE 40 / 80	ANSI /ASTM F441	ULC- S636**
*Note: Cellular Foam Core Pipe must only be used on INTAKE piping.		**Note: IPEX is an approved Manufacturer in Canada supplying vent material listed to ULC-S636

Table 6-2

APPROVED PLASTIC INTAKE VENTING MATERIAL		
MATERIAL	STANDARDS FOR INSTALLATION IN:	
	UNITED STATES	CANADA
PVC SCHEDULE 40 / 80	ANSI /ASTM D1785	ULC S636**
CPVC SCHEDULE 40 / 80	ANSI /ASTM F441	ULC- S636**
PVC DWV	ANSI /ASTM D2665	N/A
PVC-CELLULAR FOAM CORE*	U.L. LISTED	N/A
*Note: Cellular Foam Core Pipe must only be used on INTAKE piping.		**Note: IPEX is an approved Manufacturer in Canada supplying vent material listed to ULC-S636

Table 6-3

APPROVED PLASTIC CONDENSATE PIPING MATERIAL		
MATERIAL	STANDARDS FOR INSTALLATION IN:	
	UNITED STATES	CANADA
PVC SCHEDULE 40 / 80	ANSI /ASTM D1785	ULC S636**
		**Note: IPEX is an approved Manufacturer in Canada supplying vent material listed to ULC-S636

Table 6-4

APPROVED PIPE CEMENT AND PRIMER FOR PLASTIC PIPE		
MATERIAL	STANDARDS FOR INSTALLATION IN:	
	UNITED STATES	CANADA
CEMENT AND PRIMER		
CPVC	ANSI/ASTM F493	IPEX System 636
PVC	ANSI/ASTM D2564	Cements and Primers

Table 6-5

APPROVED METALLIC EXHAUST VENTING MATERIAL		
MATERIAL	STANDARDS FOR INSTALLATION IN:	
	UNITED STATES	CANADA
AL294C	U.L.LISTED	U.L.LISTED

Table 6-6

APPROVED METALLIC INTAKE VENTING MATERIAL		
MATERIAL	STANDARDS FOR INSTALLATION IN:	
	UNITED STATES	CANADA
"B" GAS VENT	U.L. LISTED	U.L. LISTED
GALVANIZED	U.L. LISTED	U.L. LISTED

PART 6: VENTING, COMBUSTION AIR & CONDENSATE REMOVAL (CONTINUED)

WARNING

You must not use "B" Vent in an exhaust application. 'B' vent is for intake applications only. Failure to do so will result in serious injury or death.

WARNING

Both exhaust and intake air vents must exit from the same side of the building to assure correct appliance operation.

D. EXHAUST VENT AND INTAKE AIR VENT PIPE LOCATION

WARNING

You must insert the provided intake and exhaust screen at your vent terminations to prevent blockage caused by birds or debris.

NOTE: SEE ADDITIONAL REQUIREMENTS FOR MASSACHUSETTS IN THE BACK OF THIS MANUAL.

1. Determine exhaust vent location:

- Total length of vent may not exceed the limits specified in Part 6 Section E.
- The vent piping for this boiler is approved for zero clearance to combustible construction.
- See Venting Details within this section of clearances for location of exit terminals of direct-vent venting systems.
- Avoid terminating exhaust vents near shrubs, air conditioners or other objects that will obstruct the exhaust stream.
- The flue products coming from the exhaust vent will create a large plume when the boiler is in operation. Avoid venting in areas that will affect neighboring buildings or be considered objectionable.
- The boiler vent system shall terminate at least 3 feet (0.9 m) above any forced air intake located within 10 ft (3 m). Note: this does not apply to the combustion air intake of a direct-vent appliance.

- Provide a minimum of 1 foot distance from any door, operable window, or gravity intake into any building.
- Provide a minimum of 1 foot clearance from the bottom of the exhaust above the expected snow accumulation level. Snow removal may be necessary to maintain clearance.
- Provide 4 feet horizontal clearance from electrical meters, gas meters, gas regulators, relief equipment, exhaust fans and inlets. In no case shall the exit terminal be above or below the aforementioned equipment unless the 4 foot horizontal distance is maintained.
- Do not locate the boiler exhaust over public walkways where condensate could drip and/or freeze and create a nuisance or hazard.
- When adjacent to a public walkway, locate exit terminals at least 7 feet above grade.
- Do not locate the exhaust directly under roof overhangs to prevent icicles from forming.
- Provide 6 feet of clearance from the inside corner of vertical walls, chimneys, etc., as well as horizontal corners created by roof overhangs.

2. Determine air intake vent locations.

- Provide 1 foot of clearance from the bottom of the intake air vent and the level of maximum snow accumulation. Snow removal may be necessary to maintain clearances.
- Do not locate the intake air vent in a parking area where machinery may damage the vent.
- Follow required minimum clearances located in Fig. 6-3, 6-4, 6-5.

3. Determine location of Condensate Piping

This boiler is a high efficiency appliance, therefore the boiler produces condensate. Condensate is a by-product of the boiler combustion process. A condensate collection system with an internal float switch

PART 6: VENTING, COMBUSTION AIR & CONDENSATE REMOVAL (CONTINUED)

monitors the condensate level to prevent it from backing up into the combustion system. There is a $\frac{3}{4}$ " sweat connection provided to connect the outlet of the collection system to a drain or condensate pump. (See Table 6-3 for approved condensate piping material)

CAUTION

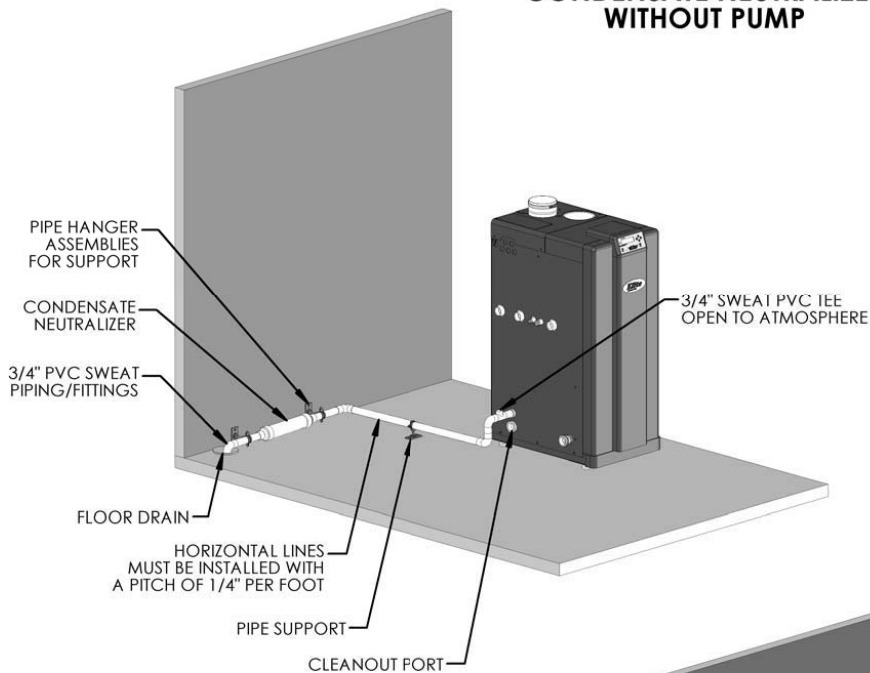
It is very important that the condensate piping be no smaller than $\frac{3}{4}$ " and you must use a tee at the condensate connection with the branch vertically up and open to the atmosphere so it will not cause a vacuum that could obstruct the flow of condensate from the boiler. The condensate piping should also be properly supported with pipe supports to prevent sagging and to maintain the pitch of the piping.

4. Condensate Neutralization

The condensate from the boiler is slightly acidic with a pH of 3.2 – 4.5 Heat Transfer Products, Inc. recommends neutralizing the condensate with a Condensate Neutralizer Kit p/n 7450P-212 (EL-80/110/150/220) p/n 7350P-611 (EL-299/399) that can be added to your system to avoid long term damage to the drainage system and to meet local code requirements. The neutralizer kit is connected to the drain system and contains marble chips that will neutralize the pH level of the water vapor. The neutralizer should be checked at least once a year and the marble chips should be replenished if necessary. When replacing the marble chips, they should be no smaller than $\frac{1}{2}$ " to avoid blockage in condensate piping. (Refer to Fig. 6-1 and 6-2 for piping of the Condensate neutralizer.)

PART 6: VENTING, COMBUSTION AIR & CONDENSATE REMOVAL (CONTINUED)

CONDENSATE NEUTRALIZER WITHOUT PUMP



NOTE: To clean out condensate collector, blow water into collector to remove any foreign matter that may block the condensate line.

⚠ WARNING

When servicing is complete, you must make sure this cap is replaced securely. Failure to do so will cause venting issues that will result in serious injury or death.

Fig. 6-1

CONDENSATE NEUTRALIZER WITH PUMP

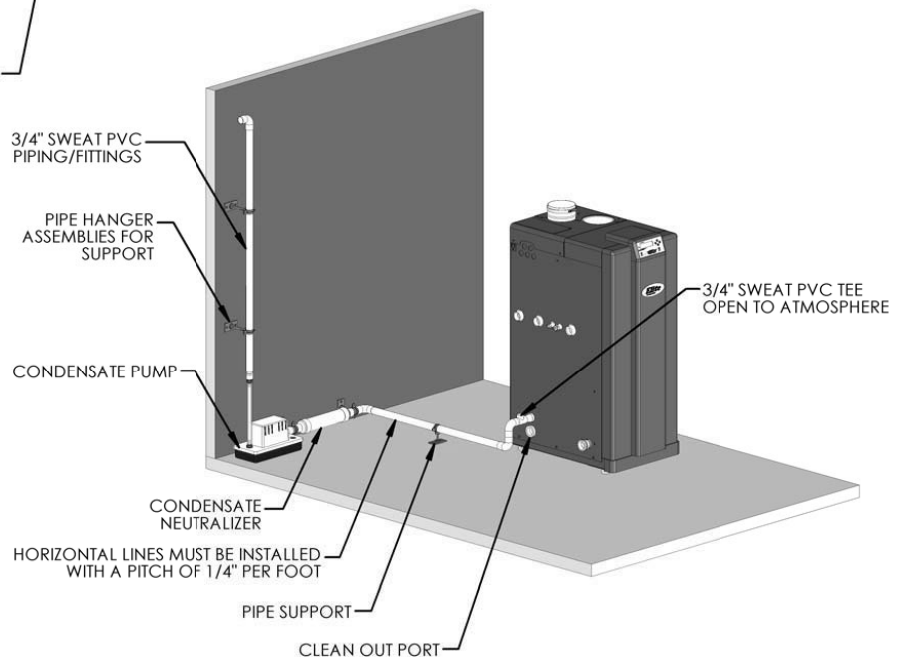


Fig. 6-2

LP-293-R Rev. 7/08/09

CAUTION

The condensate line must remain unobstructed, allowing free flow of condensate. If condensate is allowed to freeze in the line or if the line is obstructed in any other manor, condensate can exit from the boiler tee, resulting in potential water damage to property.

NOTICE

When installing a condensate pump, select one approved for use with condensing boilers and furnaces. The pump should have an overflow switch to prevent property damage from condensate spillage.

Condensate from the Elite Heating Boiler® will be slightly acidic (typically with a pH from 3.2 to 4.5). Install a neutralizing filter if required by local codes.

PART 6: VENTING, COMBUSTION AIR & CONDENSATE REMOVAL (CONTINUED)

Location of exit terminals of mechanical draft and direct-vent venting systems.

(Reference: National Fuel Gas Code ANSI Z223.1/NFPA 54 2002).

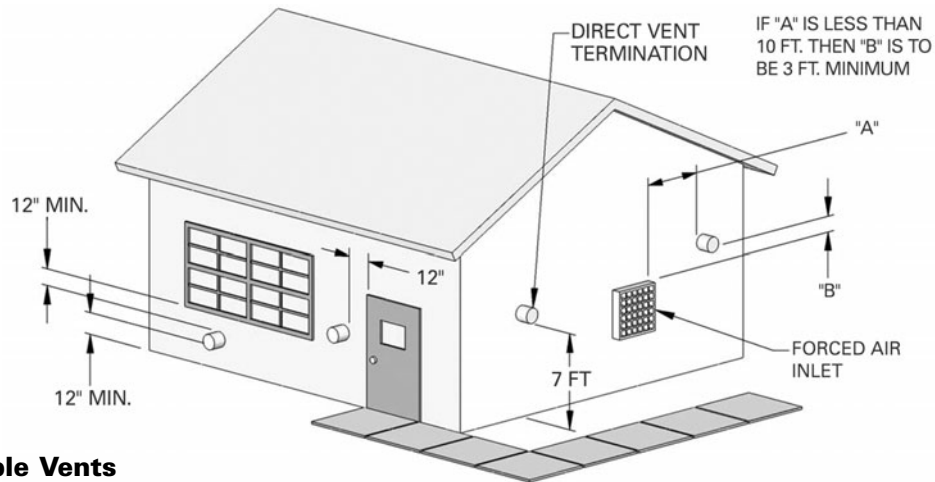


Fig. 6-3 Multiple Vents

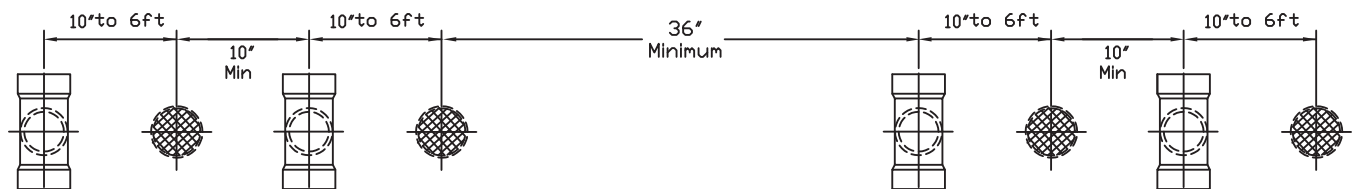


Fig. 6-4 Multiple Vent Spacing*

*Note: Exhaust must extend out 1 foot. There should be no more than 2 vents and 2 intakes then a space of 36" to the next set of vents.

*Note: There must be a minimum of 36" spacing between every 2 kit grouping.

Multiple "V" Series Vents

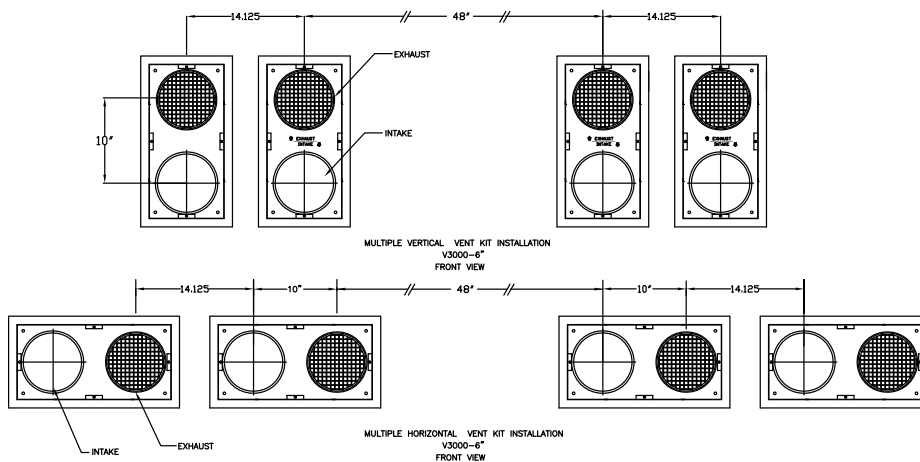


Fig. 6-5 Multiple Stainless Steel Horizontal Vent Kit Installation – Front View

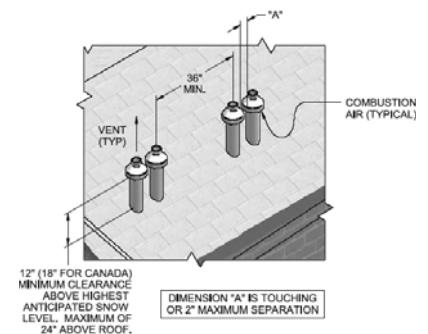


Fig. 6-6 Multiple Concentric Vent Spacing – Vertical

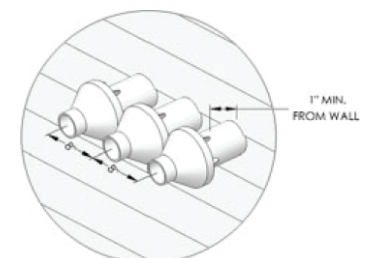


Fig. 6-7 Multiple Concentric Vent Spacing – Horizontal

PART 6: VENTING, COMBUSTION AIR & CONDENSATE REMOVAL (CONTINUED)

E. EXHAUST VENT AND INTAKE AIR VENT SIZING

1. The exhaust vent and intake air vent pipes are 3" for the Elite EL-80/110/155/220, and 4" for the EL-299/399.
2. The total combined equivalent length of exhaust vent and intake air pipe should not exceed 200 feet.
 - a. The equivalent length of elbows, tees, and other fittings are listed in the Friction Loss Table 6-8.

Table 6-8

Friction Loss Equivalent for Stainless or Plastic Piping and Fittings			
Fitting Description	3"	4"	6"
90° elbow short radius	5'	5'	3'
90° elbow long radius	4'	4'	3'
45° elbow	3'	3'	2'
Coupling	0'	0'	0'
Tee (intake only)	0'	0'	0'
V Series Vent Kit	1'	1'	1'
AL29 4C Vent Terminal	1'	1'	1'
Pipe (All materials)	1'	1'	1'

*Friction loss for long radius elbow is 1 foot less.

- b. For example: If the exhaust vent has two short 90° elbows and 10 feet of PVC pipe we will calculate:

Exhaust Vent Pipe Equivalent Length = $(2 \times 5) + 10 = 20$ feet

Further, if the intake air vent pipe has two short 90° elbows, one 45° elbow and 10 feet of PVC pipe, the following calculation applies:

Intake Air Vent Pipe Equivalent Length = $(2 \times 5) + 1 + 10 = 21$ feet

- c. The intake air vent pipe and the exhaust vent are intended to penetrate the same wall or roof of the building.
- d. You should keep an equivalent length between the intake air vent pipe and the exhaust vent. The minimum combined equivalent length is 16 to 32 maximum combined equivalent feet.
- e. The size of the venting can also be reduced in order to accommodate an existing vent sizes.

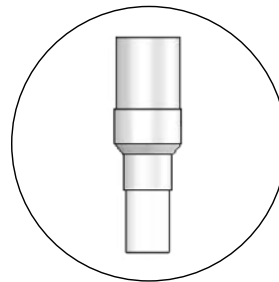
When reducing down to a 2" vent from a 3" vent or down to a 3" vent from 4", the combined length shall not exceed an equivalent of 100 feet.

F. LONGER VENT RUNS

1. The maximum combined equivalent length can be extended by increasing the diameter of both exhaust vent and intake air vent pipe equally. However, the transitions should begin a minimum of 16 to 32 maximum combined equivalent feet from the boiler on both the intake and exhaust equally.
 - a. The maximum equivalent length for the increased diameter vent pipes is 275 feet, which includes the combined 32 feet from the boiler, 16 ft. (inlet) + 16 ft. (exhaust) = 32 ft. combined with transition total of 245 ft. upsize piping for longer vent runs.

Table 6-9

Vent Transition Fitting		
Size	Reducing Coupling	Final Vent Size
3" venting	4" x 3"	4"
4" venting	6" x 4"	6"
6" venting	8" x 6"	8"



NOTE: EXTENDED VENT RUNS WHEN TRANSITIONING TO A LARGER DIAMETER MUST ALWAYS TAKE PLACE IN A VERTICAL POSITION TO PREVENT CONDENSATE BLOCKAGE.

G. EXHAUST VENT AND INTAKE AIR PIPE INSTALLATION

1. Use only solid PVC, or CPVC schedule 40 or 80 pipe and AL294C Stainless Steel. FOAM CORE PIPING IS ONLY ALLOWED FOR INTAKE PIPING.
2. Remove all burrs and debris from joints and fittings.
3. All joints must be properly cleaned, primed, and cemented. Use only cement and primer approved for use with the pipe material. Refer to the Venting Table 6-4.

PART 6: VENTING, COMBUSTION AIR & CONDENSATE REMOVAL (CONTINUED)

WARNING

All joints of positive pressure vent systems must be sealed completely to prevent leakage of flue products into the living space.

4. Horizontal lengths of exhaust vent must slope back towards the boiler not less than $\frac{1}{4}$ " per foot to allow condensate to drain from the vent pipe. If the exhaust pipe must be piped around an obstacle that results in the creation of a low point, condensate will collect in this low point and form a blockage. This condensate must be drained away using a field-installed condensate drain assembly. All vent pipes must be glued, properly supported and the exhaust must be pitched a minimum of $\frac{1}{4}$ " per foot back to the boiler to allow drainage of condensate. The condensate drain piping should be a minimum of $\frac{3}{4}$ " PVC rigid piping, pitched at a minimum of $\frac{1}{4}$ " per foot away from the boiler. (See Fig. 6-1, 6-2)
5. All piping must be fully supported. Use pipe hangers at a minimum of 4 foot intervals to prevent sagging of the pipe where condensate may form. When placing support brackets on vent piping, the first bracket must be within 1 foot of the appliance and the balance at 4 foot intervals on the vent pipe. The boiler venting must be readily accessible for visual inspection for the first three feet of the boiler.
6. Do not use the boiler to support any piping.
7. A screened straight coupling is provided with the boiler for use as an outside exhaust termination.
8. A screened inlet air tee is provided with the boiler to be used as an outside intake termination.
1. Seal any unused openings in the common venting system.
2. Visually inspect the venting system for proper size and horizontal pitch to determine if there is blockage, leakage, corrosion or other deficiencies that could cause an unsafe condition.
3. If practical, close all building doors, windows and all doors between the space in which the appliance remains connected to the common venting system located and other spaces in the building. Turn on clothes dryers and any appliances not connected to the common venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, at maximum speed. Do not operate a summer exhaust fan. Close all fireplace dampers.
4. Place in operation the appliance being inspected. Follow the lighting instructions. Adjust the thermostat so the appliance will operate continuously.
5. Test for spillage at the draft hood relief opening after 5 minutes of main burner operation. Use the flame of a match or candle or smoke from a cigarette.
6. After it has been determined that each appliance remaining connected to common venting system properly vents when tested as outlined, return doors, windows, exhaust fans, fireplace dampers and any other gas burning appliance to their previous condition of use.
7. Any improper operation of the common venting system should be corrected so the installation conforms with the National Fuel Gas Code, ANSI Z223.1. When resizing any portion of the common venting system, the common venting system should be resized to approach the minimum size as determined using the appropriate tables in Appendix G in the National Fuel Gas Code, ANSI Z 223.1

H. HEATER REMOVAL FROM A COMMON VENT SYSTEM

At the time of removal of an existing heater, the following steps shall be followed with each appliance remaining connected to the common venting system placed in operation, while the other appliances remaining connected to common venting system are not operating.

Note: For Canadian Installations, it is required that Non Metallic Vent Installations conform to ULC S636. Where plastic venting is not allowed, HTP recommends AL294C Stainless Steel Venting be used for Exhaust venting installations and "B" vent for intake air.

Please refer to 6-7 below for U.L. Approved Stainless Steel Vent Adapters.

PART 6: VENTING, COMBUSTION AIR & CONDENSATE REMOVAL (CONTINUED)

I. DIAGRAMS FOR SIDEWALL VENTING

SIDEWALL VENTING W/TEE (INTAKE) AND COUPLING (EXHAUST)

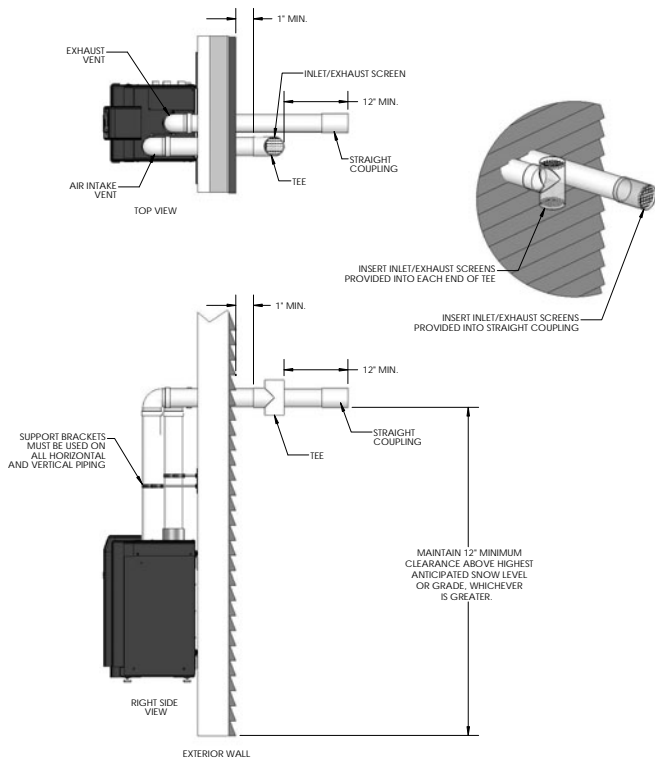


Figure 6-9

LP-293-D Rev. 9/22/08

SIDEWALL VENTING WITH KIT

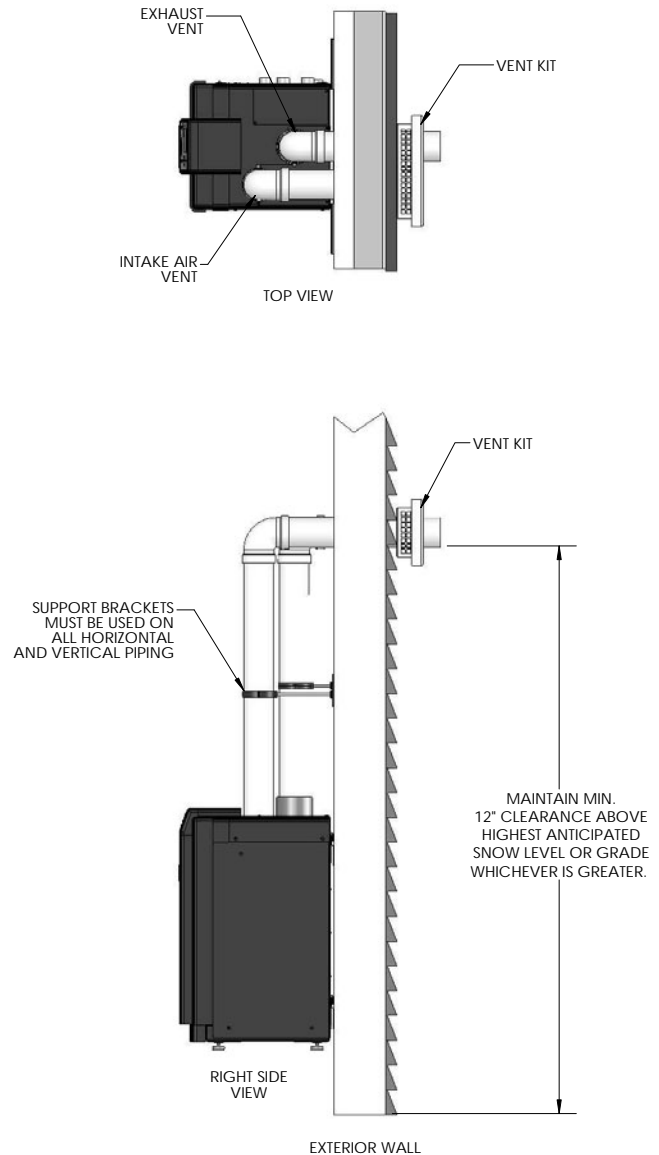


Figure 6-10

LP-293-E Rev. 9/22/09

NOTE: Vent piping should be 12" over anticipated maximum snow level.

⚠ WARNING

All vent pipes must be glued, properly supported and the exhaust must be pitched a minimum of a $\frac{1}{4}$ " per foot back to the heater (to allow drainage of condensate). When placing support brackets on vent piping, the first bracket must be within 1 foot of the appliance and the balance at 4 foot intervals on the vent pipe. The boiler venting must be readily accessible for visual inspection for the first three feet from the boiler.

PART 6: VENTING, COMBUSTION AIR & CONDENSATE REMOVAL (CONTINUED)

J. DIAGRAM FOR VERTICAL VENTING

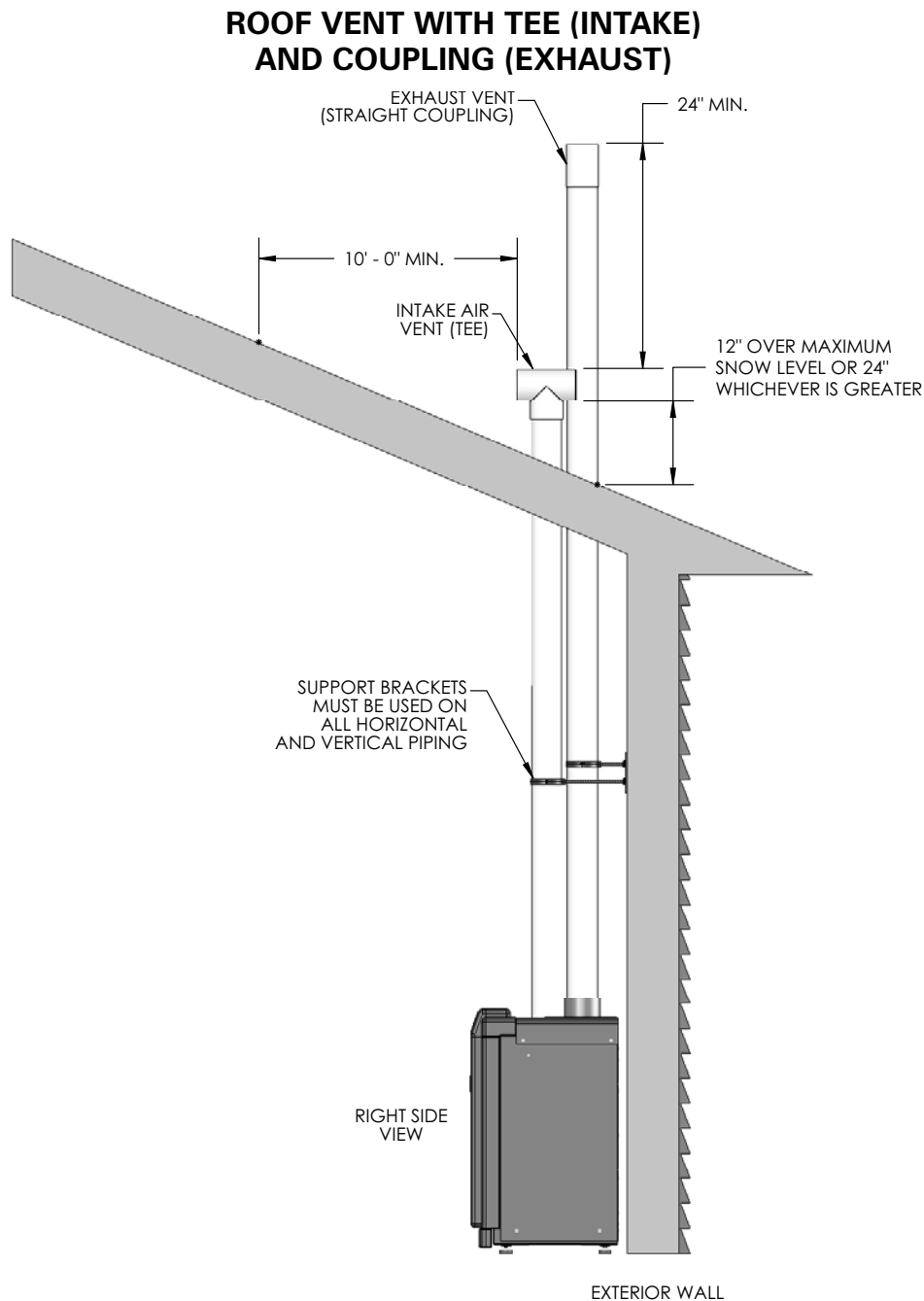


Figure 6-11

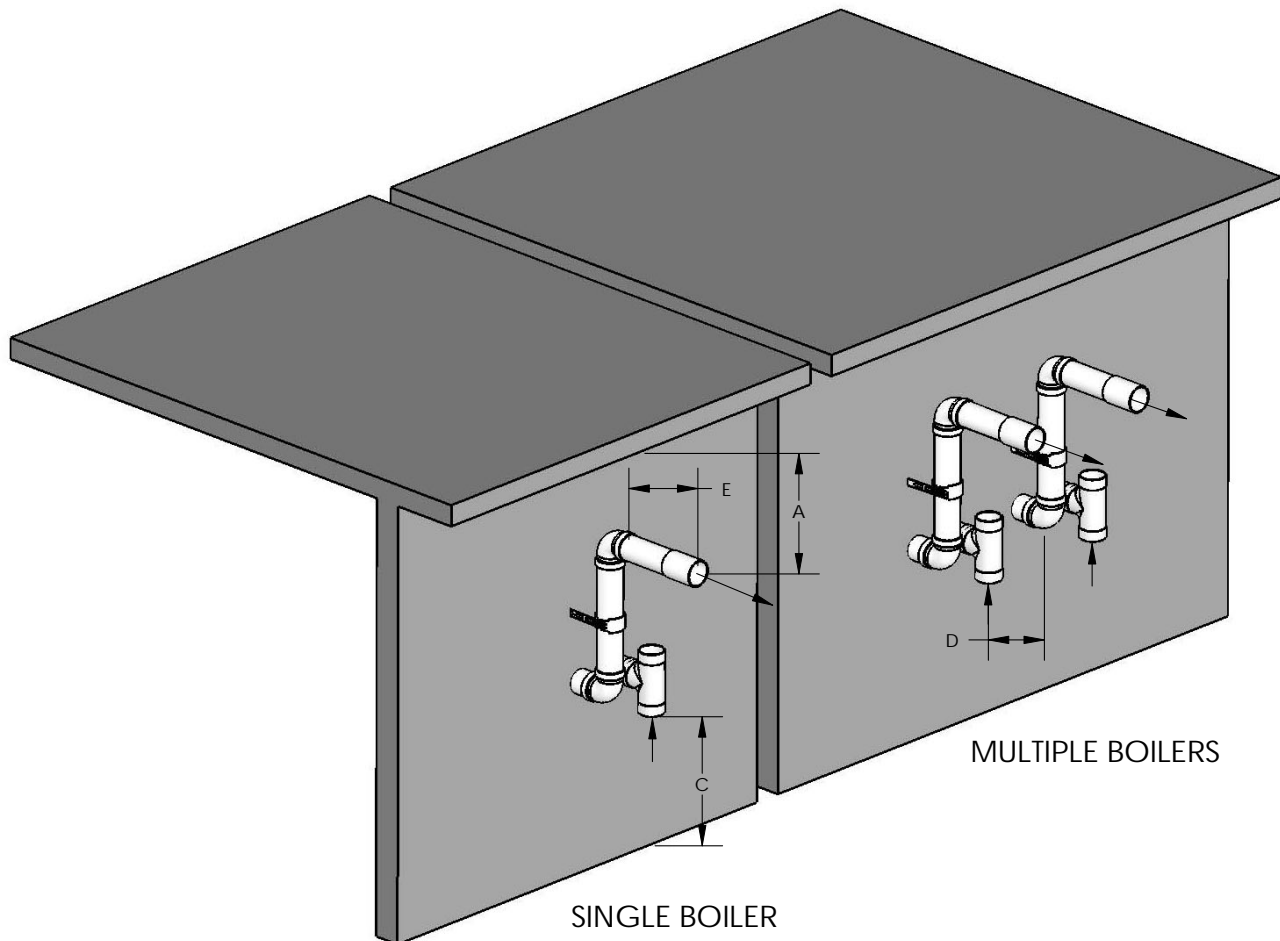
LP-293-F Rev. 2/23/09

⚠ WARNING

All vent pipes must be glued, properly supported and the exhaust must be pitched a minimum of a $\frac{1}{4}$ " per foot back to the heater (to allow drainage of condensate). When placing support brackets on vent piping, the first bracket must be within 1 foot of the appliance and the balance at 4 foot intervals on the vent pipe. The boiler venting must be readily accessible for visual inspection for the first three feet from the boiler.

PART 6: VENTING, COMBUSTION AIR & CONDENSATE REMOVAL (CONTINUED)

K. DIAGRAM FOR HORIZONTAL VENTING



- A. FOR EVERY 1" OF OVERHANG THE EXHAUST VENT MUST BE LOCATED 1" VERTICAL BELOW OVERHANG (OVERHANG MEANS TOP OF BUILDING STRUCTURE AND NOT TWO ADJACENT WALLS (CORNER OF BUILDING)).
- B. 12" SEPARATION BETWEEN BOTTOM OF EXHAUST OUTLET AND TOP OF AIR INTAKE (TYP.)
- C. MAINTAIN 12" MINIMUM CLEARANCE ABOVE HIGHEST ANTICIPATED SNOW LEVEL OR GRADE WHICHEVER IS GREATER (TYP.)
- D. MINIMUM 12" BETWEEN VENTS WHEN INSTALLING MULTIPLE VENTS
- E. 12" MIN. BEYOND INTAKE

Figure 6-12

VT-A Rev. 8/28/09

⚠ WARNING

All vent pipes must be glued, properly supported and the exhaust must be pitched a minimum of a $\frac{1}{4}$ " per foot back to the heater (to allow drainage of condensate). When placing support brackets on vent piping, the first bracket must be within 1 foot of the appliance and the balance at 4 foot intervals on the vent pipe. The boiler venting must be readily accessible for visual inspection for the first three feet from the boiler.

PART 6: VENTING, COMBUSTION AIR & CONDENSATE REMOVAL (CONTINUED)

L. DIAGRAM FOR UNBALANCED FLUE/VERTICAL VENT

⚠ WARNING

You are only allowed to install an unbalanced vent system when the exhaust vent is in the Vertical Position ONLY.

UNBALANCED FLUE / VERTICAL VENT

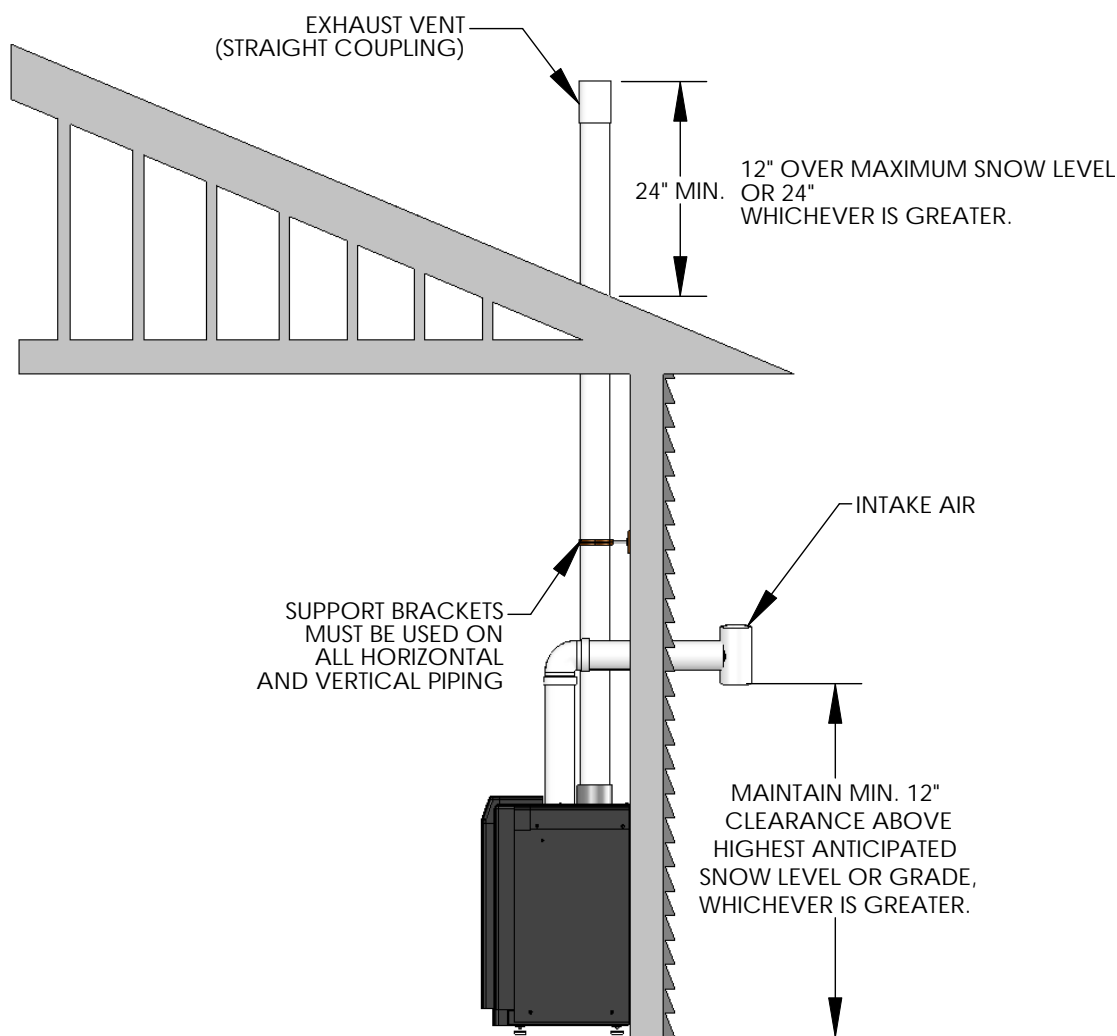


Figure 6-13

LP-293-T Rev. 9/24/09

⚠ WARNING

All vent pipes must be glued, properly supported and the exhaust must be pitched a minimum of a $\frac{1}{4}$ " per foot back to the heater (to allow drainage of condensate). When placing support brackets on vent piping, the first bracket must be within 1 foot of the appliance and the balance at 4 foot intervals on the vent pipe. The boiler venting must be readily accessible for visual inspection for the first three feet from the boiler.

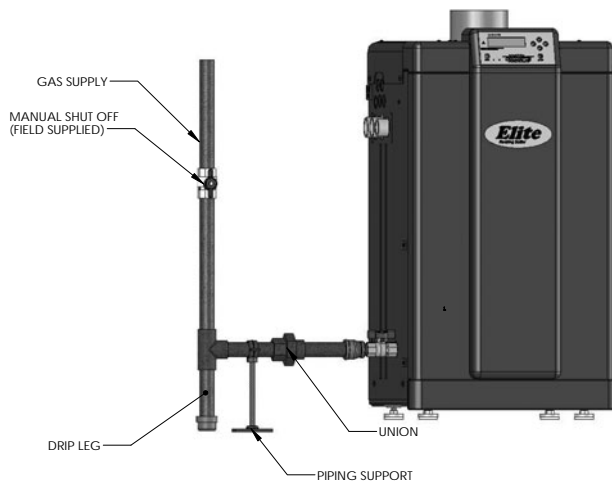
PART 7: GAS PIPING

⚠ WARNING

Failure to follow all precautions in this section could result in fire, explosion or death!

A. GAS CONNECTION

The gas supply shall have a maximum inlet pressure of less than 14" w.c. (3.5 kPa), and a minimum of 3.5" w.c. (.87 kPa). The entire piping system, gas meter and regulator must be sized properly to prevent pressure drop greater than 0.5" (.12 kPa) as stated in the National Fuel Gas Code. This information is listed on the rating label.



⚠ WARNING

It is very important that you are connected to the type of gas as noted on the rating plate. "LP" for liquefied petroleum, propane gas or, "Nat" natural or city gas. You must not do a gas conversion on this boiler without an approved gas conversion kit. All gas connections must be approved by the local gas supplier, or utility in addition to the governing authority, prior to turning the gas supply on.

The gas connection on the Elite Heating Boiler® is 3/4" for the EL-80/110/150 and 1" for the EL-220/299/399. It is mandatory that this fitting is used for connection to a field fabricated drip leg as shown in the illustration above per the National Fuel Gas Code. You must ensure that the entire gas line to the connection at the Elite Heating Boiler® is no smaller than the unit supplied connection. Once all the inspections have

been performed, the piping must be leak tested. If the leak test requirement is a higher test pressure than the maximum inlet pressure, you must isolate the Elite Heating Boiler® from the gas line. In order to do this, you must shut the gas off using factory and field-installed gas cocks. This will prevent high pressure. Failure to do so may damage the gas valve. In the event the gas valve is exposed to a pressure greater than 1/2 PSI, 14" w.c. (3.5 kPa), the gas valve must be replaced. Never use an open flame (match,

Nominal Iron Pipe Size (inches)	Internal Diameter (inches)	Length of Pipe (Feet)							
		10	20	30	40	50	60	70	
3/4	.824	278	190	152	130	115	105	96	BTU'S PER HOUR x1,000
1	1.049	520	350	285	245	215	195	180	
1 1/4	1.380	1,050	730	590	500	440	400	370	
1 1/2	1.610	1,600	1,100	890	760	670	610	560	
		80	90	100	125	150	175	200	
3/4	.824	90	84	79	72	64	59	55	BTU'S PER HOUR x1,000
1	1.049	170	160	150	130	120	110	100	
1 1/4	1.380	350	320	305	275	250	225	210	
1 1/2	1.610	530	490	460	410	380	350	320	

lighter, etc.) to check gas connections.

B. GAS PIPING

1. Run the gas supply line in accordance with all applicable codes.
2. Locate and install manual shutoff valves in accordance with state and local requirements.
3. In Canada, the Manual Shutoff must be identified by the installing contractor.
4. It is important to support gas piping as the unit is not designed to structurally support large amount of weight.
5. Purge all gas lines thoroughly to avoid start up issues with air in the lines.
6. Sealing compound must be approved for gas connections. Care must be taken when applying compound to prevent blockage or obstruction of gas flow which may effect the operation of the unit.

PART 7: GAS PIPING (CONTINUED)

⚠ WARNING

Never use an open flame (Match or Lighter) to check for Gas leaks. Use A soapy solution to test gas connection for leaks. Failure to use soapy solution test or check gas connection for leaks can cause substantial property damage, severe personal injury or death.

NOTICE

CSA or UL listed Flexible gas connections can be used when installing The Elite Heating Boiler®. Flexible gas connections have different capacities and must be sized correctly for the connected boiler firing rates. Consult with the flex line supplier to assure the line size is adequately sized for the job. Follow local codes for proper installation and service requirements.

C. CHECK INLET GAS PRESSURE

The gas valve is equipped with an inlet gas pressure tap that can be used to measure the gas pressure to the unit. To check gas pressure, perform the steps listed below:

1. Before you connect to the inlet pressure, you must shut off the gas and electrical power to unit.
2. Loosen the pressure tap with a small screwdriver. Refer to Figures 7-2 for location.
3. Each unit is equipped with a needle valve that will accept a 5/16 ID hose to connect to a digital manometer or liquid gauge to measure incoming pressure from 0-35" w.c. See Figure 7-1.
4. Turn on the Gas and Power up the unit.
5. Put the unit into manual test mode (Details on test mode are in Part 11 Section B). In service mode, monitor pressure to assure it does not drop below 1 inch from its idle reading. If Gas Pressure is out of range or pressure drop is excessive, contact the gas utility, gas supplier, qualified installer or service agency to determine correct action that is needed to provide proper gas pressure to the unit. If Gas Pressure is within normal range proceed to Step 6.
6. Exit test mode, then turn power off and shut off gas supply at the manual gas valve before

disconnecting the hose from the gas monitoring device. Tighten the screw on the pressure tap tightly and turn gas on and checks for leaks with soapy solution.

It is recommended that a soapy solution be used to detect leaks. Bubbles will appear on the pipe to indicate a leak is present. The gas piping must be sized for the proper flow and length of pipe to avoid pressure drop. The gas meter and the gas regulator must be properly sized for the total gas load. If you experience a pressure drop greater than 1" w.c. (.87 kPa), the meter, regulator or gas line may be undersized or in need of service. You can attach a manometer to the incoming gas drip leg by removing the cap and installing the manometer. The gas pressure must remain between 3.5" (.87 kPa) and 14" (3.5 kPa) during stand-by (static) mode and while in operating (dynamic) mode. **If an in-line regulator is used, it must be a minimum of 10 feet from the Elite Heating Boiler®. It is very important that the gas line is properly purged by the gas supplier or utility. Failure to properly purge the lines or improper line sizing, will result in ignition failure.** This problem is especially noticeable in NEW LP installations and also in empty tank situations. This situation can also occur when a utility company shuts off service to an area to provide maintenance to their lines. This gas valve must not be replaced with a conventional gas valve under any circumstances.

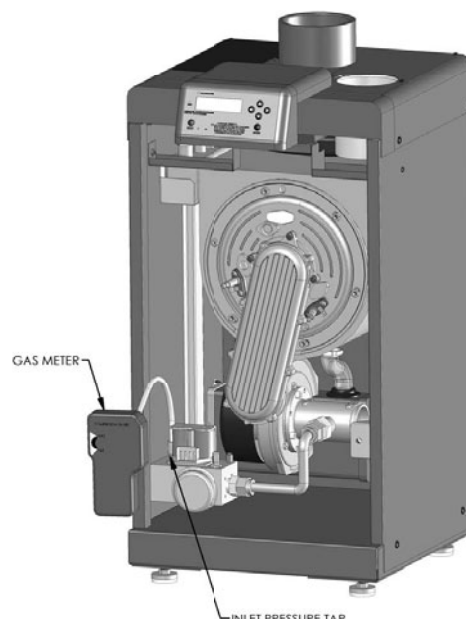


Fig. 7-1

LP-205-W Rev. 7/24/09

PART 7: GAS PIPING (CONTINUED)

D. ELITE HEATING BOILER® GAS VALVE

ELITE GAS VALVE

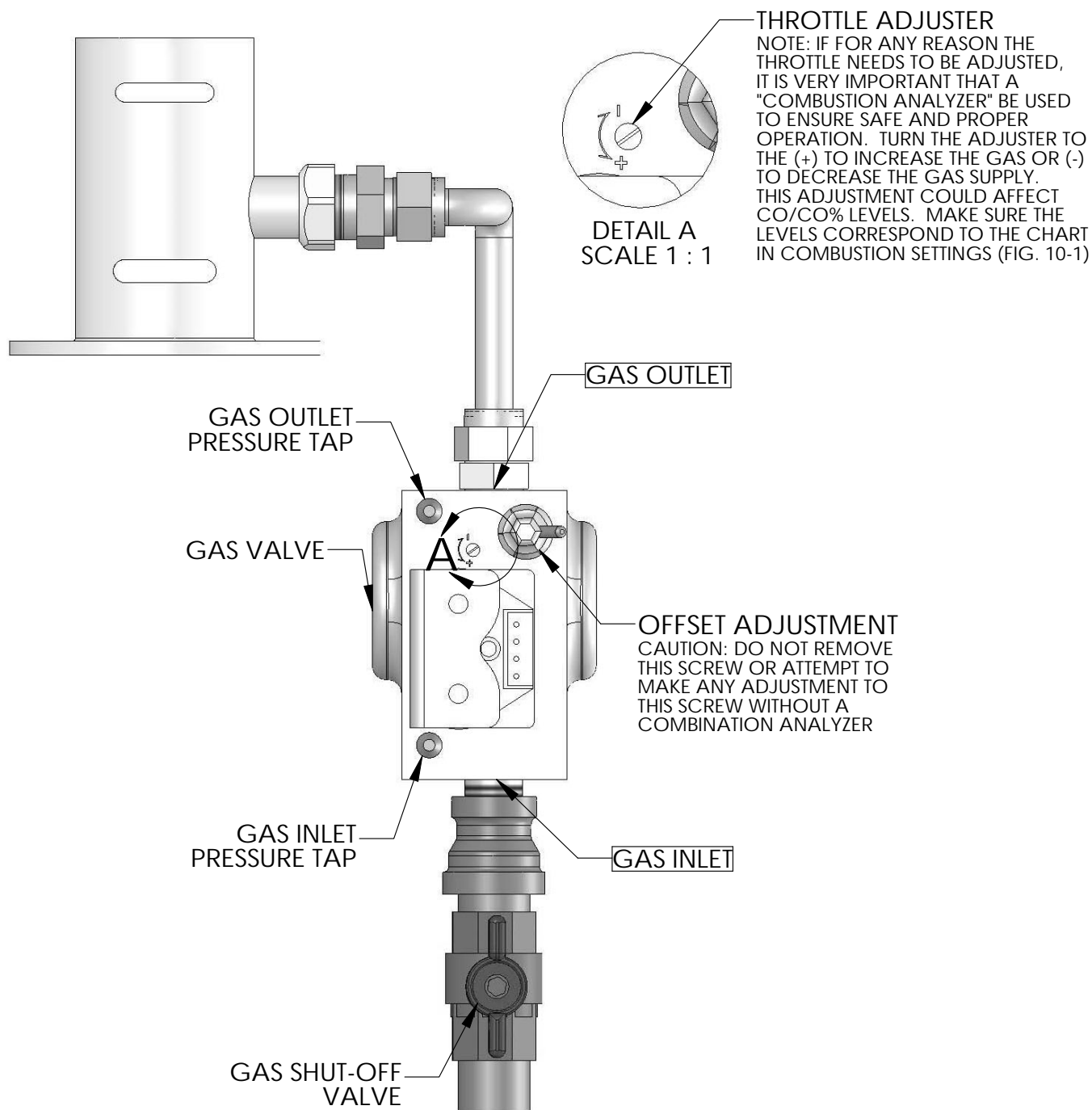


Fig. 7-2

LP-293-V Rev. 7/24/09

PART 8: FIELD WIRING

WARNING

ELECTRICAL SHOCK HAZARD — For your safety, turn off electrical power supply at service entrance panel before making any electrical connections to avoid possible electric shock hazard. Failure to do so can cause severe personal injury or death.

NOTICE

Wiring must be N.E.C. Class 1.

If original wiring as supplied with boiler must be replaced, use only TEW 105 °C wire or equivalent.

Boiler must be electrically grounded as required by National Electrical Code ANSI/NFPA 70 — latest edition.

A. INSTALLATION MUST COMPLY WITH:

1. National Electrical Code and any other national, state, provincial or local codes or regulations.
2. In Canada, CSA C22.1 Canadian Electrical Code Part 1, and any local codes.

B. FIELD WIRING

All connections made to the Elite Heating Boiler® in the field are done inside the electrical junction box located on the side of the unit. The electrical junction box is located on the left side of Elite Heating Boiler®. Multiple knockout locations are available to route field wires into and out of the electrical junction box.

The control used in the Elite Heating Boiler® series of boilers is capable of directly controlling 2 pumps when in standard mode and 3 pumps when configured as a cascade master boiler. When configured as a standard unit, each pump output can provide a maximum of 3 amps at 120 volts. If pumps used require more than this amount of power, an external contactor or motor starter is needed. If the boiler is configured as a cascade master, the system pump output is a dry contact output capable of switching 5 amps at 120 volts in addition to the boiler pump and DHW pump outputs sourcing 3 amps each.

The electrical junction box has separate, clearly marked terminal strips for line voltage and low voltage wiring. Special jacks are provided for trouble-free cascade system wiring using standard CAT3 or CAT5 patch cables.

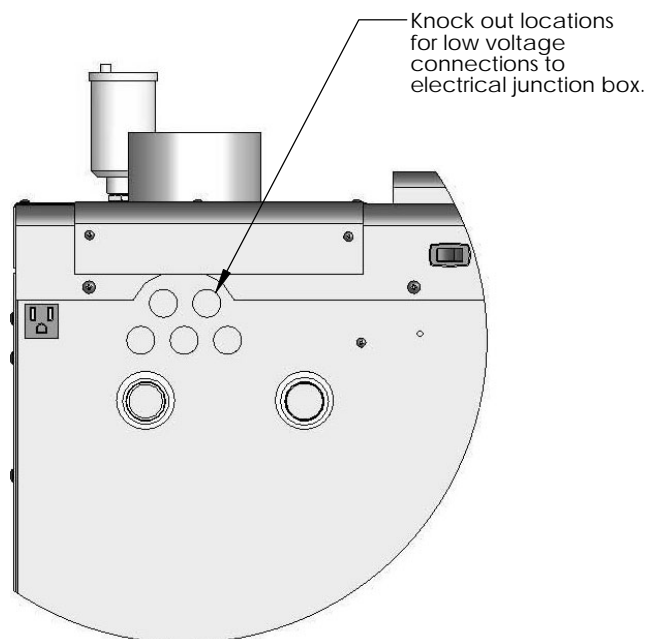
C. LINE VOLTAGE WIRING FOR STANDARD BOILER

1. Connect the incoming power wiring to the line voltage terminal strip in the electrical junction box at terminals 120V, Neutral, Ground (shown in figure 8-1.)
2. A line voltage fused disconnect switch may be required to be externally mounted and connected according to local codes that may apply.
3. Connect the central heating pump as shown in Figure 8-1 to the terminals marked BOILER HOT, BOILER NEUT, BOILER GND. The connections shown are suitable for a maximum continuous pump draw of 3 amps at 120 volts. If a the pump requires more current or voltage other than the 120 volts supplied, an external motor starter or contactor will be required.
4. If using DHW, connect the domestic hot water pump as shown in Figure 8-1 to the terminals marked DHW HOT, DHW NEUT, DHW GND. The connections shown are suitable for a maximum continuous pump draw of 3 amps at 120 volts. If a pump that requires more current or voltage other than 120 volts supplied, an external motor starter or contactor will be required.

PART 8: FIELD WIRING (CONTINUED)

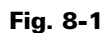
D. LOW VOLTAGE CONNECTIONS FOR STANDARD BOILER

1. All low voltage cables should enter the electrical junction box through the provided knock out holes as shown below.



2. Connect all low voltage field devices to the low voltage terminal strip located in the electrical junction box (shown in Figure 8-1).

Elite Heating Boiler® CONTROL



LP-293-NN Rev. 7/13/09

1. Connect the room thermostat to the terminals marked THERMOSTAT in the electrical junction box (shown in figure 8-1) Alternately, any dry contact closure across these terminals will cause the Elite Heating

- Boiler® unit to run. Caution should be used to ensure neither of the terminals become connected to ground.
2. Mount the thermostat on an inside wall as central as possible to the area being heated, but away from drafts or heat producing

PART 8: FIELD WIRING (CONTINUED)

devices such as television sets that could influence the ability of the thermostat to measure room temperature.

3. If the thermostat is equipped with an anticipator and it is connected directly to the Elite Heating Boiler®, the anticipator should be set at .1 amps. If the thermostat is connected to other devices, the anticipator should be set to match the power requirements of the device it is connected to. See the instruction manual of the connected devices for further information.

F. OUTDOOR SENSOR

1. There is no connection required if an outdoor sensor is not used in this installation.
3. Use a minimum 22 AWG wire for runs of 100 feet or less and minimum 18 AWG wire for runs of up to 150 feet.
4. Mount the outdoor sensor on an exterior surface of the building, preferably on the north side in an area that will not be affected by direct sunlight and will be exposed to varying weather conditions. NOTE: Follow instructions provided with the sensor for correct mounting instructions.

G. INDIRECT SENSOR

1. There is no indirect sensor connection required if an indirect water heater is not used in the installation.
2. The Elite Heating Boiler® will operate an indirect fired water heater with either a thermostat type aquastat installed in the indirect tank or an HTP 7250P-325 tank sensor. When a tank sensor is used, the Elite Heating Boiler® control will automatically detect its presence and a demand for heat from the indirect water heater will be generated when the tank temperature falls below the user set point by more than the user selectable offset. The demand will continue until the sensor measures that the indirect water heater temperature is above the set point.
3. Connect the indirect tank sensor (7250P-325) to the terminals marked DHW SENSOR (shown in figure 8-1) in the electrical junction box.

CAUTION

Caution should be used to ensure neither of these terminals become connected to ground.

H. OPTIONAL 0-10 VOLT BUILDING CONTROL SIGNAL

1. A signal from a building management system may be connected to the Elite Heating Boiler® to enable remote control. This signal should be a 0-10 volt positive-going DC signal. When this input is enabled using the installer menu, a building control system can be used to control either the set point temperature or the heat output of the Elite Heating Boiler®. The control interprets the 0-10 volt signal as follows; when the signal is between 0 and 1 volt, the Elite Heating Boiler® will be in stand-by mode, not firing. When the signal rises above 1 volt, the Elite Heating Boiler® will ignite. As the signal continues to rise towards its maximum of 10 volts, the Elite Heating Boiler® will increase either in set point temperature or firing rate depending on the setting of function 17 in the installer menu. See Part 11 for details on the setting of functions 16 and 17 for this option.
2. Connect a building management system or other auxiliary control signal to the terminals marked 0-10 VOLT + and 0-10 VOLT – in the electrical junction box (shown in figure 8-1) Caution should be used to ensure that the 0-10 VOLT + connection does not become connected to ground.

I. OPTIONAL UL353 LOW WATER CUT-OFF INTERFACE KIT

If an optional UL 353 Low Water Cut-Off (LWCO) Interface Kit is used, the control box of the kit should be mounted to the left side of the boiler cabinet near the low water cut-off probe, which is located on the outlet nipple of the boiler.

Follow the complete instructions included in the kit for proper installation.

J. WIRING OF CASCADE SYSTEM COMMUNICATION BUS

1. Use standard CAT3 or CAT5 computer network patch cables to connect the

PART 8: FIELD WIRING (CONTINUED)

communication bus between each of the boilers. These cables are readily available at any office supply, computer, electronic, department or discount home supply store in varying lengths. If you possess the skills you can also construct custom length cables.

2. It is recommended to use the shortest length cable that will reach between the boilers and create a neat installation. Do not run unprotected cables across the floor where they may become wet or damaged. Avoid running communication cables parallel and close to or against high voltage (120 volt or greater) wiring. HTP recommends that the maximum length of communication bus

cables not exceed 200 feet.

3. Route the communication cables through one of the knockouts in the cabinet.
4. Connect the boilers in a daisy chain configuration as shown below. It is best to wire the boilers using the shortest wire runs rather than trying to wire them in the order that they are addressed. The communication bus jacks on the customer connection panel are interchangeable so you can use either one or both in any order to connect the cable. If you have connected the boilers to each other properly, two of the boilers will have one open connection port on them.

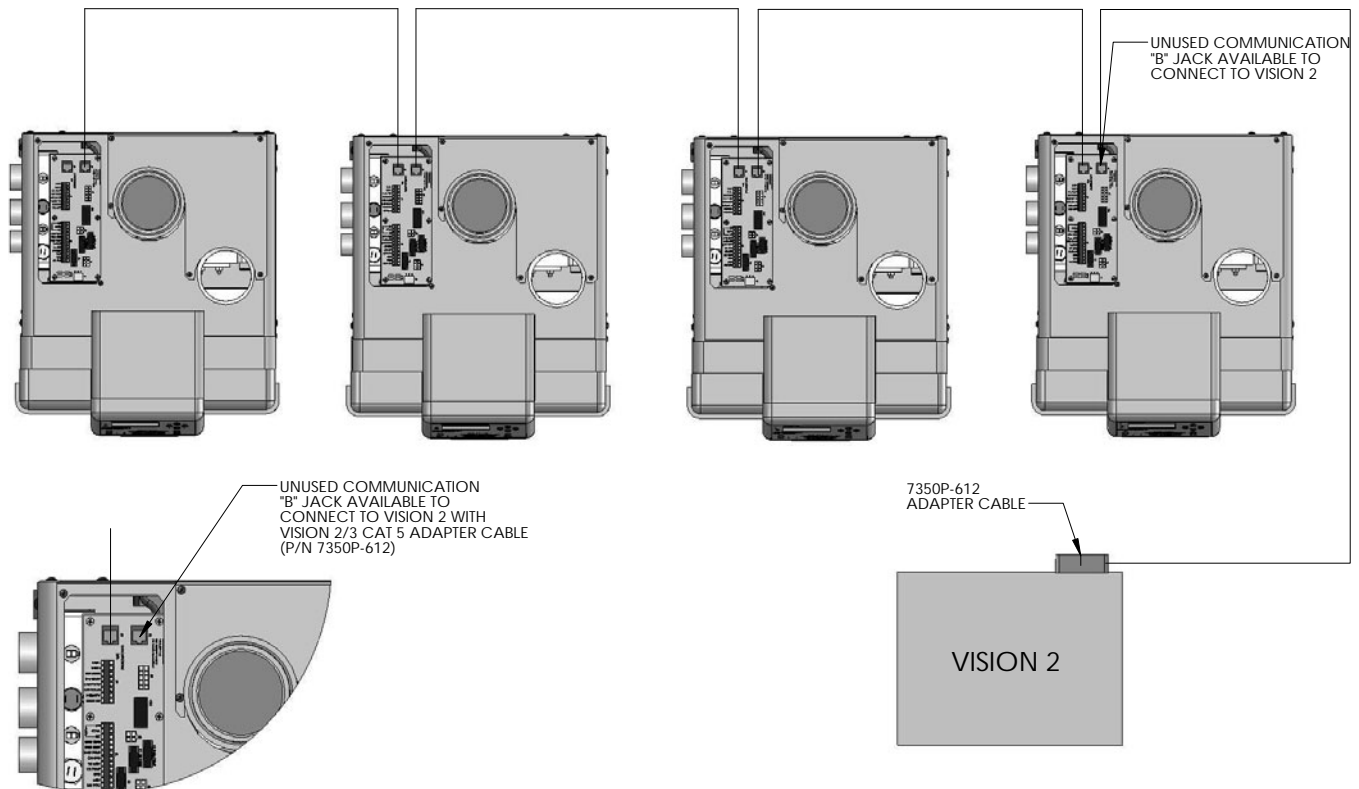


Fig. 8-2

LP-293-GG Rev. 8/11/09

PART 8: FIELD WIRING (CONTINUED)

Elite Heating Boiler® Cascade Master

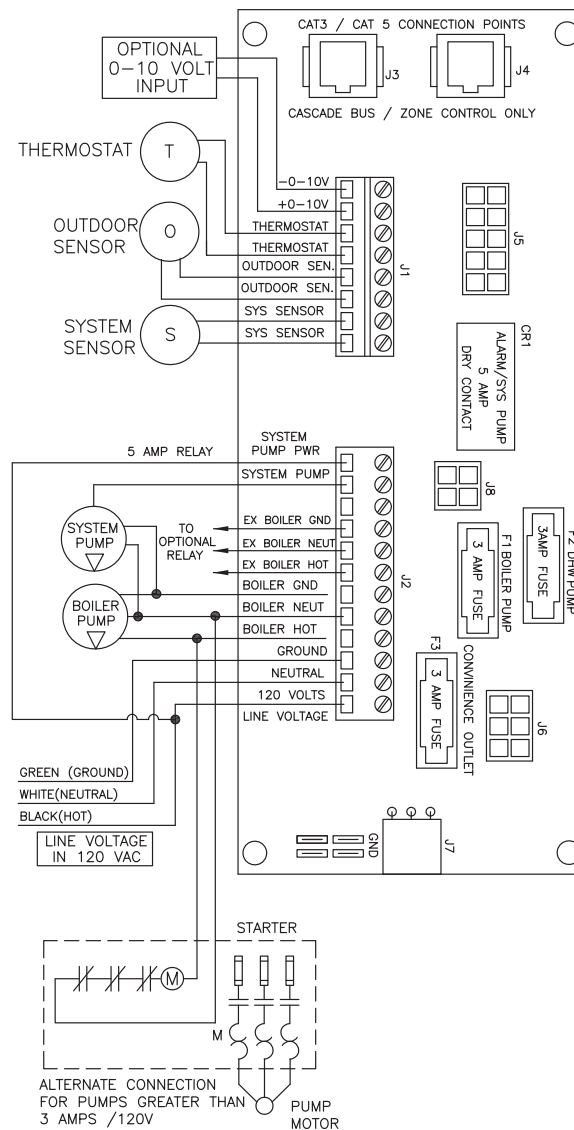


Fig. 8-3

LP-293NN Rev. 7/13/09

ELITE CASCADE MASTER PUMP AND SENSOR WIRING

1. Connect the system pump hot wire to the terminal marked **SYS PUMP**.
2. Connect the system pump neutral to the **BOILER NEUT** terminal and the pump ground wire to the **BOILER GND** terminal.
3. Connect a jumper wire from the **120 VOLT** terminal to the **SYS PUMP PWR** terminal.
4. Connect the boiler pump to the terminals marked **BOILER HOT**, **BOILER NEUT**, and

BOILER GND

5. Connect the system pipe sensor to the terminals marked **SYS SENSOR**.
6. Connect the outdoor sensor (if used) to the terminals marked **OUTDR. SEN**
7. Connect the signal to start the system to the terminals marked **THERMOSTAT**.

NOTE: This signal can come from a room thermostat or a dry contact closure. No power of any voltage should be fed into either of these terminals.

PART 8: FIELD WIRING (CONTINUED)

Elite Heating Boiler® Cascade Follower

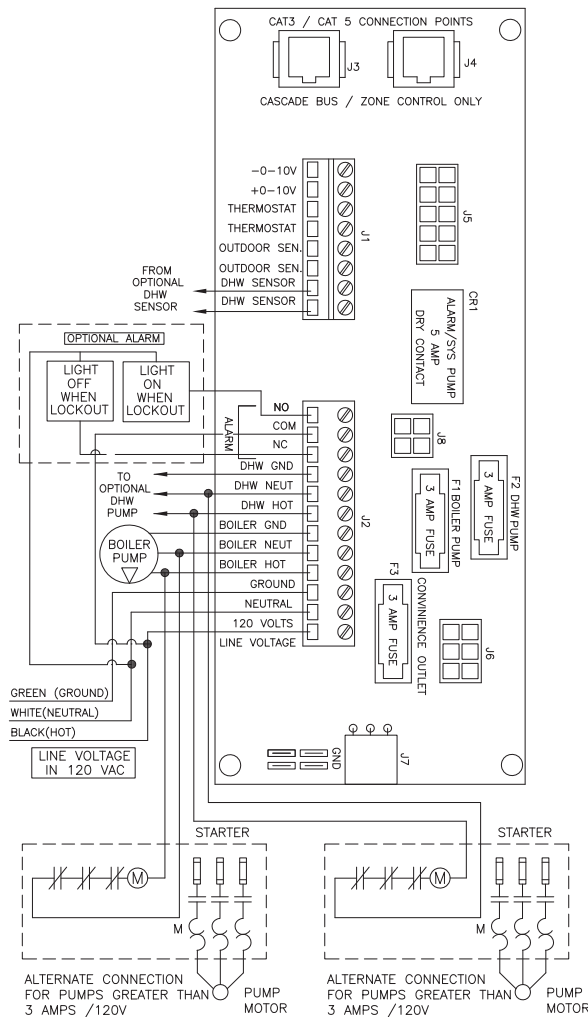


Fig. 8-4

LP-293-NN Rev. 7/13/09

ELITE CASCADE FOLLOWER PUMP AND SENSOR WIRING

1. Connect the boiler pump to the terminals labeled BOILER HOT, BOILER NEUT, BOILER GND.
2. If you are using an indirect fired water tank connected directly to the follower boiler connect the pump for it to the DHW, HOT DHW NEUT, and DHW GND terminals.

An alarm bell or light can be connected to the alarm contacts of the follower boiler. The normally closed alarm contact may be used to turn a device off if the boiler goes into lockout mode. The alarm contacts are rated 5 amps at 120 VAC.

To connect an alarm device, connect the power

for the device to the ALARM COM terminal. Connect the alarm device hot wire to the ALARM NO terminal. Connect the neutral or return of the alarm device to the neutral or return of the power for the alarm device.

To connect a device that should be powered off during a boiler lockout condition, follow the same instructions as above except use the ALARM NC terminal rather than the ALARM NO terminal.

Note that in a cascade system the alarm output of the boiler addressed as #1 will also be active if the master boiler has a lockout condition. The alarm output of boilers addressed as 2-7 will only activate an alarm if a lockout condition occurs on that specific boiler.

PART 8: FIELD WIRING (CONTINUED)

ELITE 80/ 110 / 150 BOILER INTERNAL CONNECTION DIAGRAM

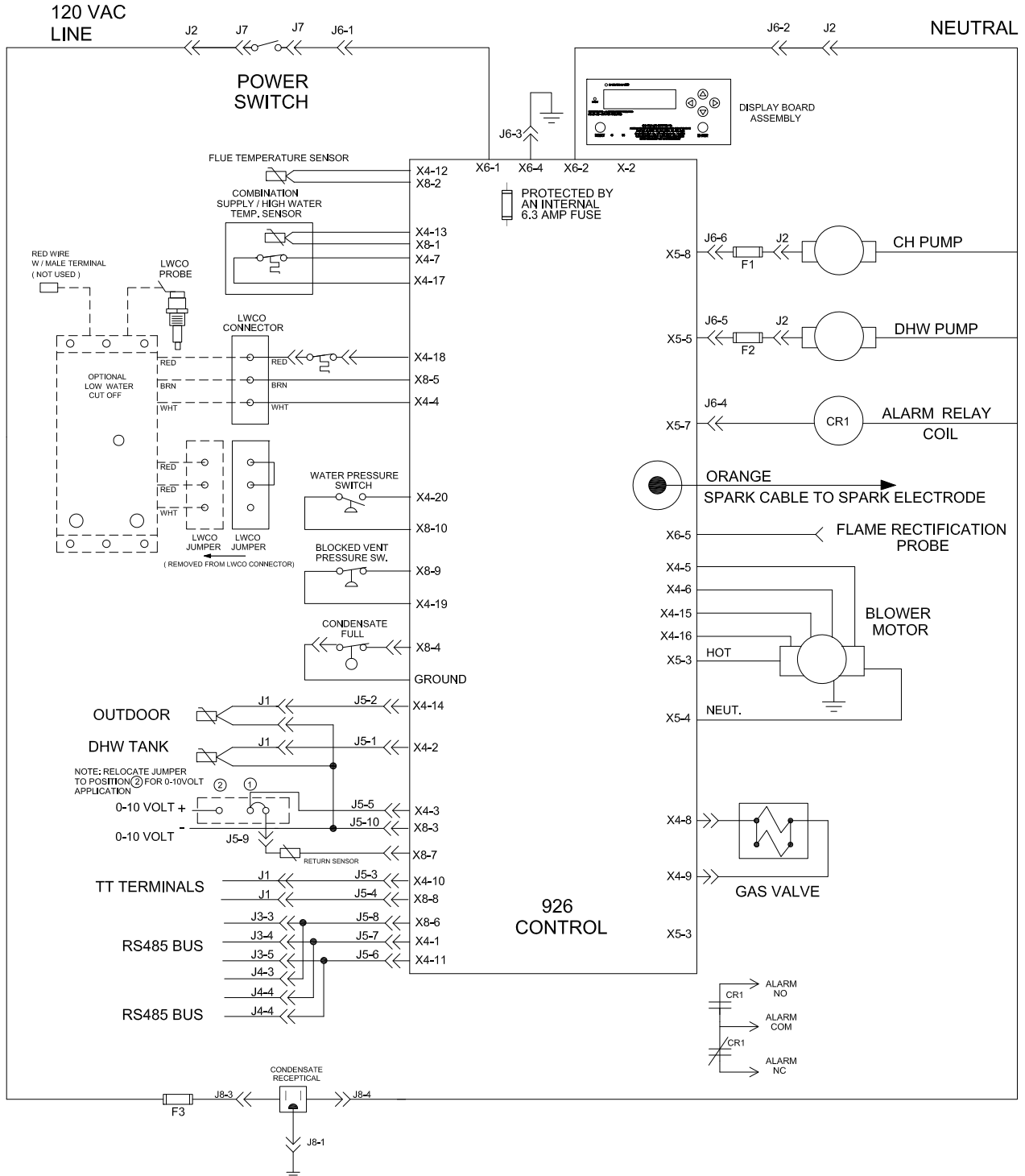
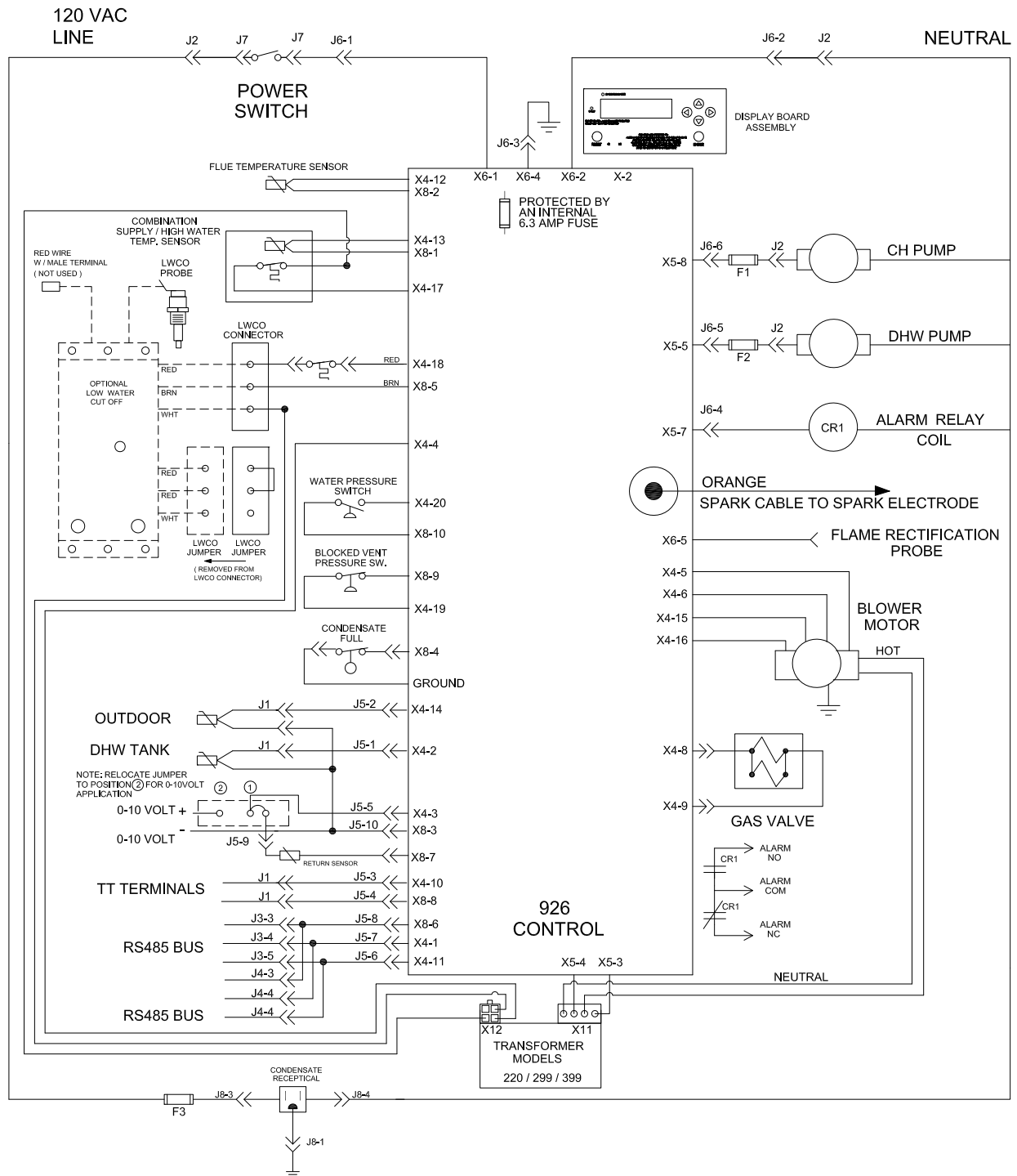


Fig. 8-5

LP-293-J Rev. 10/1/09

PART 8: FIELD WIRING (CONTINUED)

ELITE 220 / 299 / 399 BOILER INTERNAL CONNECTION DIAGRAM



* NOTE: "J" REFERENCES FIELD CONNECTION BOARD

Fig. 8-5

LP-293-J Rev. 1/14/10

PART 9. START-UP PREPARATION

To assure good extended service life, it is recommended that you test your water quality prior to installation. Listed below are some guidelines.

WARNING

Do not use petroleum-based cleaning or sealing compounds in the boiler system. Damage to elastomer seals and gaskets in the system could occur, resulting in substantial property damage.

A. CHECK/CONTROL WATER CHEMISTRY

Water pH between 6.0 and 8.0

1. Maintain boiler water pH between 6.0 and 8.0. Check with litmus paper or have it chemically analyzed by a water treatment company.
2. If the pH differs from above, consult local water treatment company for treatment needed.

Hardness less than 7 grains.

1. Consult local water treatment companies for unusually hard water areas (above 7 grains hardness).

Chlorine concentration less than 200 ppm

1. Using chlorinated fresh water should be acceptable since drinking water chlorine levels are typically less than 5 ppm.
2. Do not connect the boiler to directly heat a swimming pool or spa water.
3. Do not fill boiler or operate with water containing chlorine in excess of 200 ppm.

Clean system to remove sediment

1. You must thoroughly flush the system (without boiler connected) to remove sediment. The high-efficiency heat exchanger can be damaged by build up or corrosion due to sediment build up.
2. For zoned systems, flush each zone separately through a purge valve. (If purge valves and isolation valves are not already installed, install them to properly clean the system.)
3. Flush system until water runs clean and you are sure piping is free of sediment.

Test freeze protection fluid

1. For systems using freeze protection fluids,

follow fluid manufacturer's instructions to verify inhibitor level and that other fluid characteristics are satisfactory.

2. Freeze protection fluid must be replaced periodically due to degradation of inhibitors over time. Follow all fluid manufacturer's instructions.

B. FREEZE PROTECTION (WHEN USED)

WARNING

NEVER use automotive or standard glycol antifreeze. Do not use ethylene glycol made for hydronic systems. Use only freeze-prevention fluids certified by fluid manufacturer as suitable for use with stainless steel boilers, verified in the fluid manufacturer's literature.

Thoroughly clean and flush any system that has used glycol before installing the new boiler. Provide the boiler owner with a material safety data sheet (MSDS) on the fluid used.

1. Determine the freeze protection fluid quantity using total system water content, following fluid manufacturer's instructions. Remember to include expansion tank water content.
2. Local codes may require back flow preventer or actual disconnect from city water supply.
3. When using freeze protection fluid with automatic fill, install a water meter to monitor water makeup. Freeze protection fluid may leak before the water begins to leak, causing concentration to drop, reducing the freeze protection level.

C. FILL AND TEST WATER SYSTEM

1. Fill the system only after ensuring the water meets the requirements of this manual.
2. Close the manual and automatic air vents and boiler drain valve.
3. Fill to the correct system pressure. Correct pressure will vary with each application.
 - a. Typical cold water fill pressure for a residential system is 12 psi.
 - b. Pressure will rise when boiler is turned on and system water temperature increases. Operating pressure must never exceed the relief valve pressure setting.

PART 9. START-UP PREPARATION (CONTINUED)

4. At initial fill and during boiler startup and testing, check system thoroughly for any leaks. Repair all leaks before proceeding further.

WARNING

Eliminate all system leaks. Continual fresh make-up water will reduce boiler life. Minerals can build up in the heat exchanger, reducing heat transfer, overheating the heat exchanger, and causing heat exchanger failure.

5. The system may have residual substances that could affect water chemistry. After the system has been filled and leak tested, verify that water pH and chlorine concentrations are acceptable by sample testing.

CAUTION

It is important that you purge the system of air to avoid damage to the boiler.

D. PURGE AIR FROM WATER SYSTEM

1. Purge air from system:
 - a. Connect a hose to the purge valve and route hose to an area where water can drain and be seen.
 - b. Close the boiler or system isolation valve between the purge valve and fill connection to the system.
 - c. Close zone isolation valves.
 - d. Open quick-fill valve on cold water make-up line.
 - e. Open purge valve.
 - f. One zone at a time, open the isolation valves. Allow water to run through the zone, pushing out the air. Run water until no noticeable air flow is present. Close the zone isolation valves and proceed with the next zone. Follow this procedure until all zones are purged.
 - g. Close the quick-fill water valve and purge valve and remove the hose. Open all isolation valves. Watch the system pressure rise to correct cold-fill pressure. It is recommended that you put the pumps into manual operation to assist in purging the circuits.

- h. Disconnect the wires that are connected to the THERMOSTAT terminals of the customer connection board. Apply power to the boiler. The display will show the temperature of the water in the boiler. Press the ▼ and **ENTER** keys simultaneously and hold for 1 second. The Display will say:

```
SERVICE PUMP CH
PUMP ON          11:47A
```

and the Central Heating Pump will come on. If you then press the ▲ key the Central Heating Pump will shut off, the display will say:

```
SERVICE PUMP DH
PUMP ON          11:47A
```

and the DHW pump will come on. If the boiler is set up as the Cascade Master and you press the ▲ key again, the DHW pump will shut off, the display will say:

```
SERVICE PUMP SH
PUMP ON          11:47A
```

and the system pump will come on. Using the ▼ and ▲ keys in this manner you can toggle between running each pump in the system as required to help bleed out all entrapped air. Some good indicators that air is removed include the absence of gurgling noises in the pipes and pump operation becoming very quiet. Pressing ▼ and ▲ together at any time will return the boiler control to normal operation.

- i. After the system has operated for a while, eliminate any residual air by using the manual air vents located throughout the system.
- j. If purge valves are not installed in the system, open manual air vents in system one at a time, beginning with lowest floor. Close vent when water squirts out. Repeat with remaining vents.
- k. Refill to correct pressure.

PART 9. START-UP PREPARATION (CONTINUED)

E. CHECK FOR GAS LEAKS

WARNING

Before starting the boiler, and during initial operation, smell near the floor and around the boiler for gas odorant or any unusual odor. Remove boiler front door and smell interior of boiler enclosure. Do not proceed with startup if there is any indication of a gas leak. Repair any leak at once.

WARNING

Propane boilers only — Your propane supplier mixes an odorant with the propane to make its presence detectable. In some instances, the odorant can fade, and the gas may no longer have an odor. Before startup (and periodically thereafter), have the propane supplier verify the correct odorant level in the gas.

F. CHECK THERMOSTAT CIRCUIT(S)

1. Disconnect the two external wires connected to the boiler thermostat terminals (low voltage terminal strip).
2. Connect a voltmeter across these two incoming wires with power applied to thermostat circuits. Close each thermostat, zone valve and relay in the external circuit one at a time and check the voltmeter reading across the incoming wires.
3. There should NEVER be a voltage reading.
4. If a voltage does occur under any condition, check and correct the external wiring. (This is a common problem when using 3-wire zone valves.)
5. Once the external thermostat circuit wiring is checked and corrected if necessary, reconnect the external thermostat circuit wires to the boiler low voltage terminal strip. Allow the boiler to cycle.

G. CONDENSATE REMOVAL

1. The Elite Heating Boiler® is a high efficiency condensing boiler, therefore, the unit has a condensate drain. Condensate fluid is nothing more than water vapor, derived from

combustion products, similar to an automobile when it is initially started. The condensation is slightly acidic (typically with pH of 3 to 5) and must be piped with the correct materials. Never pipe the condensate using steel, copper, brass or other materials that will be subject to corrosion. Plastic PVC or CPVC pipe are the only approved materials. A condensate filter, if required by local authorities, can be made up of lime crystals, marble or phosphate chips that will neutralize the condensate. This may be done by the installer or you may purchase a condensate neutralizer from Heat Transfer Products, Inc. (P/N S7350-025)

2. The Elite Heating Boiler® is equipped with a $\frac{3}{4}$ female socket weld fitting connection that must be piped to a local drain. It is very important that the condensate line is sloped downward away from the Elite Heating Boiler to a suitable inside drain. If the condensate outlet on the appliance is lower than the drain, you must use a condensate removal pump, available from Heat Transfer Products (#554200). This pump is equipped with two leads that can be connected to an alarm or another type of warning device to alert the user of a condensate overflow, which, if not corrected, could cause property damage.
3. If a long horizontal run is used, it may be necessary to create a vent in the horizontal run to prevent a vacuum lock in the condensate line.
4. Do not expose the condensate to freezing temperatures.
5. It is very important you support the condensation line to assure proper drainage.

H. FINAL CHECKS BEFORE STARTING BOILER

1. Read Startup Procedures within this manual for proper steps to start boiler. (See Startup Report to record steps for future reference.)
2. Verify the boiler and system are full of water and all system components are correctly set for operation.
3. Fill condensate trap with water.
4. Verify electrical connections are correct and securely attached.

PART 9. START-UP PREPARATION (CONTINUED)

5. Inspect intake piping and exhaust piping for signs of deterioration from corrosion, physical damage or sagging. Verify intake piping and exhaust piping are intact and correctly installed per Venting Section, (Part 6) and local code.

I. CASCADE SYSTEM

1. If the boiler is used in a stand alone configuration, skip this section.
2. Programming The Master Boiler
 1. Make sure there is no demand for heat being supplied to the boiler
 2. Apply power to the boiler
 3. Enter the System Setting Program Navigation following instructions in Part 11 of this manual.
 4. Verify that Cascade Address function 15 is set to 0. This makes the master boiler address 0. **NOTE:** The Master Boiler **MUST** be addressed as 0.
 5. Change Cascade Mode function 23 to 926 Boiler. This makes it the master boiler.
 6. Exit the installer menu

NOTE: The temperature set point of the master must match the follower boiler set point in order for the system to operate properly.

3. Follower Boilers

NOTE: READ THE NOTES BELOW BEFORE PROGRAMMING FOLLOWER BOILERS:

- The boiler addressed as 1 will share its alarm output with the master boiler

- If one of the follower boilers has an indirect fired water heater connected to it, the address of this boiler must be 2 or greater.
- It is recommended but not necessary to address boilers in the order that they are wired.
- No two boilers can have the same address
- It is not required to use all consecutive address numbers. Example: In a 2 boiler system with an indirect connected to the follower, the follower address would be 2 (address 1 is not used)

1. Make sure there is no demand for heat being supplied to the master boiler
2. Apply power to the follower boiler you are working on.
3. Enter the System Settings following instructions in part 11 of this manual
4. Set Cascade Address parameter 15 to 1 for the first follower, 2 for the second follower, etc. depending on which boiler you are programming.
5. Change "CASCADE MODE" PARAMETER to "926 BOILER". This makes the boiler a follower boiler and enables all data to be transferred between boilers as needed for the system to function to full capability.
6. Exit the system menu

NOTE: The temperature set point of the follower must match the master boiler set point in order for the system to operate properly.

PART 10. START-UP PROCEDURE

FOR YOUR OWN SAFETY READ BEFORE OPERATING

1. This appliance does not have pilot. It is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.
2. **BEFORE OPERATING:** smell all around the appliance area for gas. Be sure to smell next

to the floor because some gas is heavier than air and will settle on the floor.

WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance.
- Do not touch any electric switch; do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas

PART 10. START-UP PROCEDURE (CONTINUED)

suppliers' instructions.

- If you cannot reach your gas supplier, call the fire department.
 - Turn off gas shutoff valve (located outside of the boiler) so that the handle is crosswise to the gas pipe. If the handle will not turn by hand, don't try to force or repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.
4. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control that has been damaged.
 5. The Elite Heating Boiler® shall be installed so the gas ignition system components are protected from water (dripping, spraying, rain, etc.) during appliance operation and service (circulator replacement, condensate trap, control replacement, etc.)

A. CONTROL OVERVIEW

The Control is one of the primary safety devices of the boiler. The control monitors the safety sensors of the boiler to assure safe and efficient operation. The boiler control has many features to address configurations associated with hydronic design. This section addresses the programming features of the boiler control. It is important to fully understand the capability of the boiler control. This section addresses Boiler Settings / System Settings / Maintenance Settings and System Diagnostics to help customize your boiler control. The control is programmed to run with factory defaults that may already fit your hydronic design and may not require any adjustment at all.

B. NAVIGATION OF THE DISPLAY

The Display includes a two line backlit LCD readout to provide informative messages about the operation of the Elite Boiler. Many operating parameters can be viewed and adjusted by using the six buttons on the display. The function of each button is described below.

RESET – The RESET button has two functions.

- Resets any lockout error code

- Returns the user to the default display screen.

ENTER – The ENTER key is used to enter the parameter programming mode.

To enter this mode, hold down the **ENTER** key for more than 4 seconds. The readout will change to (see below)

ENTER MENU CODE
000

One of the zero's will be blinking. Use the ▲ ▼ arrow keys to change the blinking digit to the correct value. Use the ◀ ▶ arrow keys to select the next digit to change and again use the ▲ ▼ keys to change the value. Repeat until the correct code is entered. Press the **ENTER** key to accept the code entered. If the code is correct, the readout will change to the appropriate screen. If the programming code is not accepted, the readout will continue to display as shown above.

The **ENTER** key is also used to enable a function for editing. After the user navigates to the desired function, the user would hold down the **ENTER** key for one second. When the **ENTER** key is released, the function value will begin to blink. The function can now be changed using the ▲ ▼ **ARROW** keys. After the new value is displayed, the user then presses the **ENTER** key for 1 second to lock the new value of the function in. The value will then stop blinking.

ARROW Keys – The arrow keys (right and left) ◀ ▶ are used to navigate between the default Display, Status Display, Analog and Cascade displays if they are enabled. The ◀ ▶ keys are also used in programming modes to change between the programmable functions. It is recommended you use the Menu Maps in the back of this manual and the detailed menu instructions printed in this section to help in menu navigation.

ARROW Keys – The (up and down) ▲ ▼ arrow keys are used to navigate between the various functions displayed in the menu. After the function is enabled for editing by pushing the **ENTER** key, the ▲ ▼ keys are used to adjust the function upward or downward to the desired value.

PART 10. START-UP PROCEDURE (CONTINUED)

C. OPERATING INSTRUCTIONS

Before Operating the unit, it is important to remove the cover and verify that the gas line and water lines are connected to boiler and fully purged. If you smell gas, STOP; Follow the safety instructions listed in the first part of this section. If you do not smell gas, follow the next steps.

Turn down the thermostats before applying power to the boiler. If 0–10 volt or other inputs are used, make sure that they are set so there is no call for heat while programming.

Turn on the power to the boiler or boilers if a cascade system used.

Next, check the **Boiler Settings**. Adjustment and factory defaults are outlined within this section. If a cascade system is used, it is important that all the boilers have the same boiler settings.

Next, check the **System Settings**. Adjustments and factory defaults that are outlined within this section. If a cascade system is used, it is important that the Master Boiler is programmed with the correct system settings.

Create a demand on the boiler or boilers if a cascade system is used. The user can monitor system functions when the boilers are operational.

If the boilers fails to start, refer to the troubleshooting section in the back of this manual.

D. PROGRAMMING BOILER SETTINGS

Boiler Setting Program Access

Note: Programming of the boiler control is not possible when the boiler is firing. Make sure any input such as the thermostat is turned off, so the boiler will remain idle to allow programming.

To access the **Boiler Setting Program** the user will need to press the **ENTER** Key for 4 seconds until the display shows the following:

```
ENTER MENU CODE
0000
```

Using the arrow keys on the display, log in the **Boiler Menu Access Code “600”**. To confirm the code, press the **ENTER** Key to access **Boiler Setting Program** Navigation Menu.

```
ENTER MENU CODE
600
```

Boiler Setting Program Navigation

Once the code is confirmed, the user can now start to set the **Boiler Settings**. Use the arrow keys on the display to navigate through the **Boiler Setting Program**. To change a setting, press the **ENTER** Key. Boiler settings can be increased by pressing the **UP ARROW ▲** and decreased by pressing the **DOWN ARROW ▼** on the display. When done press **RESET** key. Listed below are the boiler settings that can be programmed into the control.

```
CENTRAL HEAT
180 °F
```

Function: Allows the user to adjust the Boiler Set Point from 50°F to 190°F (Factory Default 180°F)

```
CENTRAL DIFF SET
30 °F
```

Function: Allows the user to adjust the Boiler Differential Set Point from 5°F to 30°F (Factory Default 30°F).

```
DHW SET POINT
119 °F
```

Function: Allows the User to adjust the Indirect Set Point from 70° F to 185°F (Factory Default 119°F)

```
DHW DIFF SET POINT
7 °F
```

Function: Allows the user to adjust the Indirect Differential Set Point from 1° F to 30° F (Factory Default 7°F)

```
TEMP DISPLAY C OR F
°F
```

Function: Allows the user to adjust the Temperature Measurement in Fahrenheit to

PART 10. START-UP PROCEDURE (CONTINUED)

Celsius (Factory Default is F = Fahrenheit)

Clock Settings

(Note: The clock will reset if the boiler is powered off for more than a week).

```
CLOCK MODE      (12/24)
08/28/2009  Fr  9:42A
```

Function: Changes the clock from 12 hour mode (8:45 PM) to 24 hour mode (20:45). To change to 24 hour mode when this screen is displayed, press the Enter key. The letter (A or P) after the time will blink. Press the up or down arrow key once and the letter will disappear. Press the Enter key to save the new setting.

```
CLOCK HOUR
08/28/2009  Fr 10:01A
```

Function: Allows the user to adjust the Hour Setting.

```
CLOCK MINUTE
08/28/2009  Fr 10:01A
```

Function: Allows the user to adjust the Minute Setting.

```
CLOCK DAY OF WEEK
08/28/2009  Fr 10:01A
```

Function: Allows the user to adjust the Day of Week displayed.

```
CLOCK DATE MODE
08/28/2009  Fr 10:01A
```

Function: Allows the user to switch to European date format (2009/08/28) from U.S. format (08/28/2009).

```
CLOCK YEAR
08/28/2009  Fr 10:01A
```

Function: Allows the user to adjust the Year Setting.

```
CLOCK MONTH
08/28/2009  Fr 10:01A
```

Function: Allows the user to adjust the Month setting.

```
CLOCK DATE
08/28/2009  Fr 10:01A
```

E. PROGRAMMING THE SYSTEM SETTING

System Setting Program Access

Note: Programming of the boiler control is not possible when the boiler is firing. Make sure any input such as the thermostat is turned off, so the boiler will remain idle to allow programming.

To access The **System Setting Program** the user will need to press the **ENTER** Key for 4 seconds until the display shows the following:

```
ENTER MENU CODE
000
```

Using the arrow keys on the display, log in your **System Menu Access Code "925"**. To confirm code, press the **ENTER KEY** to access System Setting Program Navigation menu.

```
ENTER MENU CODE
925
```

F. SYSTEM SETTING PROGRAM NAVIGATION

Once the **System Menu Access Code** is confirmed, the user can begin to set the System Setting Menu. Use the arrows keys on the display to navigate through the System Setting Program. To change a setting, press the **ENTER KEY**. System settings can be **increased** by pressing the **UP ARROW** and **decreased** by pressing the **DOWN ARROW** on the display. Once settings have been set, press the **RESET** button to store them. Following are the System Settings that can be changed in the control.

PART 10. START-UP PROCEDURE (CONTINUED)

Function 1 Factory Program Mode

MODE INDIRECT	1
------------------	---

This screen indicates that the control is configured correctly. Do not change this screen.

Function 3 DHW Tank Max Temp

DHW TANK MAX TEMP 180°F	3
----------------------------	---

Description: The Indirect Water Heater maximum boiler menu setting. This is the maximum temperature that can be selected for the DHW Set point in the Boiler Menu.

Factory Default is 180°F (Range: 95°F to 185°F)

Function 6 DHW Post Pump Time

DHW POST PUMP TIME 0 MINUTES	6
---------------------------------	---

Description: The Indirect Pump has the ability to post purge energy from the boiler to run the pump after the set point has been achieved. Please note that running the pump for a time greater than 5 minutes may cause tank energy to be released back to the boiler heat exchanger

Factory default of 0 Minutes (Range from 0–10 minutes)

Function 7 Warm Weather Shutoff

WARM WEATHER OFF 68 °F	7
---------------------------	---

Description: Warm weather shut down will disable the boiler if the programmed outdoor temperature is exceeded when used with an outdoor sensor. Factory Default of 68°F (Range 41°F to 122°F)

Function 8 Min Outdoor Temp

MIN OUTDOOR TEMP 5 °F	8
--------------------------	---

Description: Allows the user to set the min. outdoor design temperature for the system Factory. Default is set to 5°F (Range –49° F to 32°F)

Function 9 Max Supply Temp

MAX SUPPLY TEMP 190 °F	9
---------------------------	---

Description: Allows the user to set the maximum design supply temperature based on the minimum outdoor design temperature. Factory Default 190°F - Range (77° F to 190° F)

Function10 Max Outdoor Temp

MAX OUTDOOR TEMP 68 °F	10
---------------------------	----

Description: Allows the user to set the maximum outside design temperature for the system design. Factory default 68°F – Range (32°F to 95°F)

Function 11 Min Supply Temp

MIN SUPPLY TEMP 95 °F	11
--------------------------	----

Description: Allows the user to set the design supply water temperature based on the maximum outdoor design temperature. Factory Default 95°F – Range (32°F to 190°F)

Function 12 Min Boiler Temp

MIN BOILER TEMP 68 °F	12
--------------------------	----

Description: Allows the user to set the design minimum heat curve temperature for central heat. Factory Default 68°F – Range (32°F to 190°F)

Function 13 CH Post Pump Time

CH POST PUMP TIME 0 MINUTES	13
--------------------------------	----

Description: Allows the user to set the boiler pump post purge time once the thermostat is satisfied: Factory Default: 0 minutes – Range (0 – 10 minutes).

PART 10. START-UP PROCEDURE (CONTINUED)

Function 14

DHW Priority

```
DHW PRIORITY
30 MINUTES      14
```

Description: Allows the user to set the Maximum run time for the Indirect Fired Water Heater and the Minimum run time for Central Heating: Factory Default 30 Minutes – Range (0 – 60 Minutes)

Function 15

Cascade Address

```
CASCADE ADDRESS
0                15
```

Description: Bus addressing Boilers (Maximum boilers allowed 8 in a cascade system) Master Boiler will always be addressed = 0 and followers boilers will be addressed = 1 thru 7. Factory Default 0 – Range (0–8).

Function 16

Optional Inputs

```
OPTIONAL INPUT
RETURN SEN      16
```

Description: The control system allows the user to select from optional inputs to control or monitor the system. Factory Default = RETURN / Selection (Off / Booster 0–10 Volt / Return / DHW Sensor, Return Sen)

Function 17

0-10 Volt Function

```
0-10 VOLT FUNCTION
TEMPERATURE     17
```

Description: Allows the user to control the boiler modulation through either temperature control or controlling the fan speed: Factory Default = Temperature / Selection (Temperature control or Fan Speed)

Function 18

Step Modulation Mode

```
STEP MODULATE MODE
ON              18
```

Description: Allows the user to turn ON the step modulation which regulates the burner output in 6 steps in one minute intervals. Step modulation will start at the last modulation rate of the boiler

and work up one (1 Minute) at a time. Factory Default OFF / Selection (OFF to ON)

Function 19

Boiler DHW Temp

```
BOILER SUPPLY DHW
180 °F          19
```

Description: Allows the user to program the boiler supply water temperature to the indirect heat exchanger during a demand cycle. Factory Default 180°F / Range (119°F to 190°F)

Function 20

Water Safety Input

```
WATER SAFETY INPUT
WATER PRESSURE  20
```

Description: The user can select various water safety inputs used in the boiler system. Factory Default: Water Pressure / Selection (None / Low Water Cut off / Flow Switch / Water Pressure)

Function 21

Error Outdoor Sensor

```
ERROR OUTD SENSOR
OFF              21
```

Description: Allows the user to set the control to display and error message if an outdoor sensor is open or shorted – Note: This error does not stop the boiler from running. Factory Default OFF / Selection (ON/OFF/PHOEN ON)

Function 22 Adjust Boiler Output %

```
ADJ BOILER OUTPUT
100%            22
```

Description: Allows the user to adjust the boiler output down from 100% to 50%. Factory Default 100% / Range (100% to 50%)

Function 23

Cascade Mode

```
CASCADE MODE
926 BOILERS     23
```

Description: Allows the user to select cascade mode. Factory Default: Vision 3.

PART 10. START-UP PROCEDURE (CONTINUED)

Function 24
Cascade Rotation

CASCADE ROTATION	
48 HOURS	24

Description: This parameter sets the amount of hours before the first boiler in the cascade firing rotation will be changed. Note: if this parameter is set to 0, the firing order of the boilers will not rotate.

Default: 48 hours, selection range: 0-240 hours.

Function 25
Cascade DHW Mode

NOT USED	25
NOT USED	25

Description: Not used

Function 26
System Pump Freeze Protect

SYS FREEZE PROT	
PROTECT OFF	26

Description: Allows the user to set the freeze protection when a system pump is used. Factory Default: OFF / Selection of temperature activates Freeze (Range -47°F to 68°F)

Note: This parameter is only present if the boiler is a cascade master.

Function 27
Error System Sensor

ERROR SYSTEM SENS	
ON	27

Description: Allows the user to set the control to display an error message if the system sensor is open or shorted – Note: This error does not stop the boiler from running. Factory Default ON / Selection (ON / OFF).

Function 28
Freeze Protection

FREEZE PROTECTION	
ON	28

Description: Allows the user to set the freeze protection on the boiler. Factory Default: ON Selection (Range ON or OFF)

Function 29
DHW Modulation Mode

DHW MODULATE MODE	
NORMAL MOD	29

Description: This parameter controls how the boiler modulates for a DHW demand. In Normal Mod mode, the boiler will modulate down from high fire when there is a DHW demand. In Low Mod mode the boiler will modulate up from low fire when there is a DHW demand. This mode is useful to minimize short cycling when a large boiler and small indirect tank are used together. Factory Default: Normal Modulation / Selection Range (Normal Mod or Low Mod)

Function 30
Extra Boiler Mode

EXTRA BOILER MODE	
OFF	30

Description: Boiler is a cascade master boiler. This allows for a non HTP boiler to be controlled when the cascade output has risen above the percent of the cascade firing rate set in this parameter. Factory Default: Off / Range (50% to 100%)

Function 31
System Sensor Mode

SYSTEM SENSOR MODE	
OFF	31

Description: Suppresses the 'NO FOLLOWER' message on the display if the boiler is used as a cascade master boiler with no follower boilers connected. Factory Default: Off / Range (On / Off)

Function 32
Service Schedule

SERVICE SCHEDULE	
OFF	32

Description: Allows the user to select a service date or time based on the boiler run hours to program the boiler maintenance schedule. Factory Default OFF / Selection (Date or Run Hours) NOTE: Without setting this function, Functions 33/34/35/36 will not display.

PART 10. START-UP PROCEDURE (CONTINUED)

Note: For the following functions you must have your maintenance function turned on.

Function 33

Year

```
SERVICE SCHEDULE
YEAR 00/00/2000 33
```

Description: This parameter sets the year of the next service reminder

Hours:

```
SERVICE SCHEDULE
10000' = 000000h 33
```

Description: This parameter sets the 2 left digits of the amount of run hours for the next service reminder

Function 34

```
SERVICE SCHEDULE
MONTH 00/00/2000 34
```

Description: If you selected the date function you will need to program the month or if you selected the run hour function you will need to program 10,000 hours if required.

```
SERVICE SCHEDULE
10000' = 000000h 34
```

Description: This parameter sets the 2 middle digits of the amount of run hours for the next service reminder

Function 35

```
SERVICE SCHEDULE
DAY 00/00/2000 35
```

Description:

```
SERVICE SCHEDULE
1'S 000000h 35
```

Description: This parameter sets the 2 right digits of the amount of run hours for the next service reminder.*

Function 36

```
TELEPHONE #
000 000 0000 36
```

Description: Allows the user to input a telephone number that will be displayed when maintenance is required.

RESETTING THE MAINTENANCE SCHEDULE

When the system control flashes MAINTENANCE REQUIRED, it is advisable that you call for service. After the service is performed, reset the schedule for the next required service by using the following steps.

Press ENTER on the display for 3 seconds. The Menu code will appear as 000. This does not change. Press ENTER again. SERVICE SCHEDULE RESET will be displayed. Using the right arrow key ► scroll to the selection of Year or Hours, Select Enter to Reset the mode you are in. Use the up ▲ or down ▼ arrow key for each adjustment then select ENTER when reset is complete.

PART 11: START-UP PROCEDURES FOR THE INSTALLER

NOTICE

It is important to note that the user can adjust the heat curve down by adjusting the central heating temperature to a lower setting.

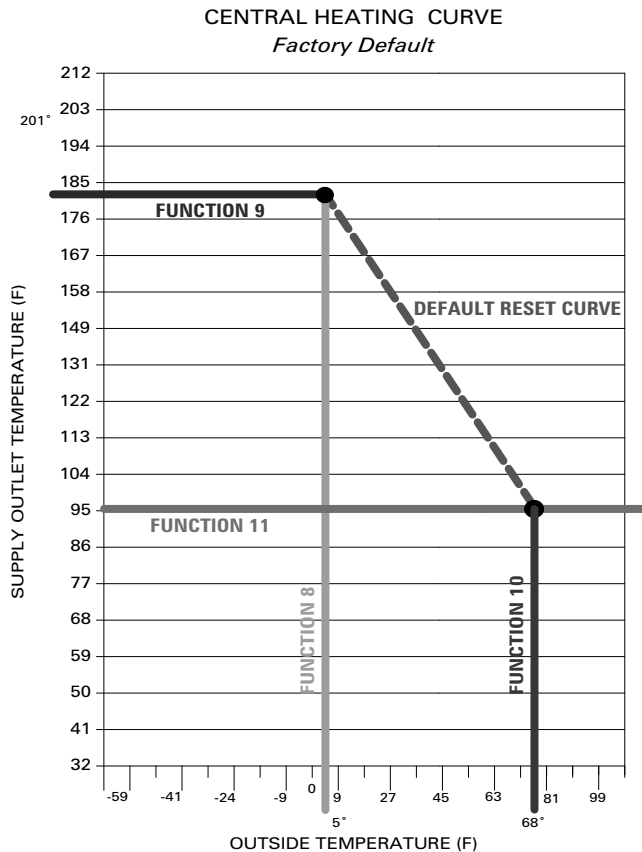


Fig. 11-1

A. ELITE HEATING BOILER® CONTROL STATUS MENU

The Elite Heating Boiler Controller also has the ability to review the status of the system. To access the status screens simply press the right arrow key ► Once the first value is displayed, then press the UP arrow key ▲ or Down arrow key ▼ to access additional information. At any point you may press the 'RESET' button to exit the status screen. Listed below are the status screens.

SUPPLY	180°F
RETURN SEN	150°F

This screen is displayed after pressing the ► key as described above. This screen displays the

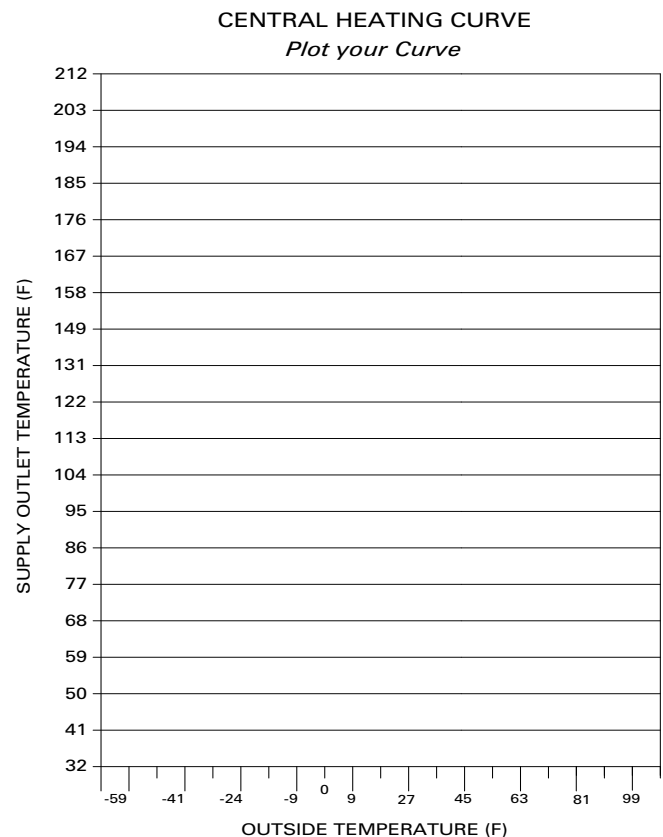


Fig. 11-2

actual temperature that the supply and return sensors are measuring. NOTE: If the boiler is configured to use a 0–10 volt input, the return sensor is disabled and the second line of the display will be blank.

Press the ▼ key once

CH SET	180°F
SUPPLY	122°F

This screen displays the current Central Heating temperature set point on the top line. NOTE: This temperature set point may vary from what was set in the Boiler Settings if an outdoor sensor is used. The actual temperature measured by the supply sensor is displayed on the bottom line.

PART 11: START-UP PROCEDURES FOR THE INSTALLER (CONTINUED)

Press the ▼ key once (This screen will appear when set in master Boiler Mode Only)

CH DEMAND	OFF
BOILER	

Description:

This screen displays the central heat demand set for the cascade system.

Press the ▼ key once (This screen will appear when set in master Boiler Mode Only)

CAS SET	190°F
SYSTEM	112°F

Description:

This screen displays the cascade set point (Maximum set point 190°). The control will cascade the boilers up to this set point depending on the demand.

Press the ▼ key once

DHW SET	119°F
DHW	117°F

This screen displays the current domestic hot water temperature set point on the top line. The actual temperature measured by the domestic hot water tank sensor (HTP 7250P-325) is displayed on the bottom line. If a mechanical aquastat is used in place of the recommended sensor, the second line will display 'OFF' in place of the temperature if the aquastat is measuring close to its set temperature or 'ON' in place of the temperature if the aquastat temperature too low.

Press the ▼ key once

OUTDOOR	11°F
FLUE	95°F

This screen displays the current outdoor temperature on the top line. If there is no outdoor sensor connected to the boiler, this line will display 'OFF' in place of the temperature. If the outdoor sensor is shorted, this line will display 'ON' in place of the temperature.

The second line displays the current flue tem-

perature of the boiler.

Press the ▼ key once

FLAME	0.00A
FAN SPEED	3497 RPM

This screen displays the boiler flame current on the top line.

The second line displays the speed of the fan in the boiler.

Press the ▼ key once

0-10 V	0.0 V
BOILER	

The top line displays the voltage on the optional input. This voltage is only relevant if an external 0-10 volt signal is being used to control the boiler.

Press the ▼ key once

BUS COMM	NO CONN
----------	---------

This display shows the status of the communication bus between multiple boilers. If the boiler is in a single boiler configuration, the display will show 'NO CONN'. If the boiler is used in a multiple boiler configuration and if it is the master boiler, and other boilers are connected to the communication bus and power is on to them, then this screen will show the address of each boiler connected to the bus.

Press the ▼ key once

POWER ON	0H
CH ON	0H

The top line of this display indicates the amount of hours the boiler has power applied to it in the life of the boiler

The second line indicates how many hours the burner has been on for a central heat demand in the life of the boiler

PART 11: START-UP PROCEDURES FOR THE INSTALLER (CONTINUED)

Press the ▼ key once

```
DHW ON          0H
GOOD IGNIT      1X
```

The top line of this display indicates the amount of hours the burner has been on for a domestic hot water demand in the life of the boiler. The second line indicates how many times the burner has successfully ignited in the life of the boiler.

The following 10 screens display the last ten lockout faults that the boiler had. The faults are displayed from most recent to oldest by depressing the ▼ key.

Press the ▼ key once (This screen will appear when set in master Boiler Mode Only)

```
SYS CH ON       0h
SYS DHW ON       0h
```

Description:

This screen displays HOW MANY HOURS RUNNING FOR THE Central Heat demand and the DHW demand.

```
FAULT HISTORY    1
07/27/2009  Mo  5:19A
```

This screen displays the last lockout fault the boiler controller had. The top line will alternate between the words 'FAULT HISTORY' and the actual fault encountered if one has occurred and the bottom line will display the date and time that the fault occurred.

Press the ▼ key once

```
FAULT HISTORY    2
08/28/2009  Fr  5:19A
```

This screen displays the second oldest lockout fault that occurred in the boiler controller. The top line will alternate between the words 'FAULT HISTORY' and the actual fault encountered if one has occurred. The bottom line will display the date and time that the fault occurred.

Press the ▼ key once

```
FAULT HISTORY    3
08/28/2009  Fr  5:19A
```

This screen displays the third oldest lockout fault that occurred in the boiler controller. The top line will alternate between the words 'FAULT HISTORY' and the actual fault encountered if one has occurred. The bottom line will display the date and time that the fault occurred.

Press the ▼ key once

```
FAULT HISTORY    4
08/28/2009       5:19A
```

This screen displays the fourth oldest lockout fault that occurred in the boiler controller. The top line will alternate between the words 'FAULT HISTORY' and the actual fault encountered if one has occurred. The bottom line will display the date and time that the fault occurred.

Press the ▼ key once

```
FAULT HISTORY    5
08/28/2009       5:19A
```

This screen displays the fifth oldest lockout fault that occurred in the boiler controller. The top line will alternate between the words 'FAULT HISTORY' and the actual fault encountered if one has occurred and the bottom line will display the date and time that the fault occurred.

Press the ▼ key once

```
FAULT HISTORY    6
08/28/2009       5:19A
```

This screen displays the sixth oldest lockout fault that occurred in the boiler controller. The top line will alternate between the words 'FAULT HISTORY' and the actual fault encountered if one has occurred and the bottom line will display the date and time that the fault occurred.

PART 11: START-UP PROCEDURES FOR THE INSTALLER (CONTINUED)

Press the ▼ key once

```

FAULT HISTORY          7
08 28 2009           5:19A
  
```

This screen displays the seventh oldest lockout fault that occurred in the boiler controller. The top line will alternate between the words 'FAULT HISTORY' and the actual fault encountered if one has occurred and the bottom line will display the date and time that the fault occurred.

Press the ▼ key once

```

FAULT HISTORY          8
08 28 2009           5:19A
  
```

This screen displays the eighth oldest lockout fault that occurred in the boiler controller. The top line will alternate between the words 'FAULT HISTORY' and the actual fault encountered if one has occurred and the bottom line will display the date and time that the fault occurred.

Press the ▼ key once

```

FAULT HISTORY          9
08 28 2009           5:19A
  
```

This screen displays the ninth oldest lockout fault that occurred in the boiler controller. The top line will alternate between the words 'FAULT HISTORY' and the actual fault encountered if one has occurred and the bottom line will display the date and time that the fault occurred.

Press the ▼ key once

```

FAULT HISTORY         10
08 28 2009          10:01A
  
```

This screen displays the tenth oldest lockout fault that occurred in the boiler controller. The top line will alternate between the words 'FAULT HISTORY' and the actual fault encountered if one has occurred and the bottom line will display the date and time that the fault occurred.

B. ELITE HEATING BOILER TEST MODE

This Function is intended to simplify the gas adjustment if needed. Listed in Figure 11-3 are the

recommended combustion settings for the gas type selected to run the Elite Heating Boilers. Automatic modulation does not take place when the controller is in Test Mode. The boilers will modulate down if the program set point is reached while running in Test Mode. It is recommended you open as many heating zones as possible to create a heat demand so the test mode operation will not be interrupted. To exit the Test Mode, Press the 'Up' and 'Down' arrow keys simultaneously. NOTE: The boiler will automatically exit the Test Mode after 20 minutes of operation.

C. CASCADE MENU

This menu is accessed by pressing the ◀ key from the default menu or the ▶ key from the status menu.

```

CASCADE MASTER READY
SYS PUMP OFF
  
```

This screen is an informative screen to tell the user that the boiler is configured as a cascade master boiler and that the cascade system is ready to accept a demand for heat. The second line indicates the status of the system pump output of the cascade system. This screen will alternate with the default screen every 5 seconds or it can be accessed by pressing the ◀ key from the default screen.

```

CASCADE NO FOLLOWER
SYS PUMP OFF
  
```

Description: This screen will be displayed when the boiler is configured as a master boiler and there are no follower boilers connected to the master or if none of the follower boilers are powered up. The second line indicates the status of the system pump output of the cascade system. This screen will alternate with the default screen every 5 seconds or it can be accessed by pressing the ◀ key from the default screen.

```

CASCADE NO SENSOR
SYS PUMP OFF
  
```

Description: This screen will be displayed when the boiler is configured as a master boiler and there is no system temperature sensor connected

PART 11: START-UP PROCEDURES FOR THE INSTALLER (CONTINUED)

or the system sensor is defective. The cascade system will still function in this situation and will function with reduced efficiency. All boilers will run simultaneously rather than in a staged fashion. The second line indicates the status of the system pump output of the cascade system. This screen will alternate with the default screen every 5 seconds or, it can be accessed by pressing the **◀** key from the default screen.

```
CASCADE TT 0123 567
SYS PUMP ON 12:47P
```

Description: This screen shows information about the cascade status. The TT in the center of the top line shows that the cascade demand is coming from the TT contact being closed. You may also see DHW if the demand is from a DHW sensor or 0-10 if the demand is from a 0-10 volt input. The following numbers show which boiler addresses are currently communicating to the master. If a boiler address is not used or not communicating, the number will not show on the display. In the example above, boiler address #4 is not communicating. When a boiler in the system is firing, its address number will alternate with a ' ' to signify it is firing. The bottom line shows the status of the system pump output contacts.

Press the **▼** key,

```
CASCADE PWR 100%
PRESENT 01234567
```

Description : This screen shows the overall cascade power output. The range of this value is the number of boilers communicating with the master x 100 so in the previous screen, the maximum cascade power is 800%. The second line shows which boiler addresses are communicating with the master boiler.

Press the **▼** key,

```
CASCADE SYST 118°F
CASCADE SET 190°F
```

Description: This screen shows the current system temperature sensor reading on the top line and the cascade system temperature setting on the bottom line.

Press the **▼** key,

```
BOILER 0 100 %
BOILER 1 56 %
```

Description: This screen shows the current cascade power output on a per connected boiler basis for boilers addressed as 0 and 1. In the above screen, boiler 0 is at 100% firing rate and boiler 1 is at 56% firing rate. If this were a 2 boiler system, the 'CASCADE PWR' screen above would now be at 156%

Press the **▼** key,

```
BOILER 2 0 %
BOILER 3 0 %
```

Description: This screen shows the current cascade power output on a per connected boiler basis. This screen is the same as the one above except that it shows the power output of boilers addressed as 2 and 3

Press the **▼** key,

```
BOILER 4 0 %
BOILER 5 0 %
```

Description: This screen shows the current cascade power output on a per connected boiler basis. This screen is the same as the one above except that it shows the power output of boilers addressed as 4 and 5

Press the **▼** key,

```
BOILER 6 0 %
BOILER 7 0 %
```

Description: This screen shows the current cascade power output on a per connected boiler basis. This screen is the same as the one above except that it shows the power output of boilers addressed as 6 and 7.

PART 11: START-UP PROCEDURES FOR THE INSTALLER (CONTINUED)

COMBUSTION SETTINGS ON ALL MODELS				
	Natural Gas		Propane LP	
	low	high	low	high
Carbon Monoxide (CO %)	0–20 ppm	70 ppm–135 ppm	0–20 ppm	80 ppm–150 ppm
Carbon Dioxide (CO ₂ %)	8½% – 9½%	8½% – 9½%	9½% – 10½%	9½% – 10½%

Fig. 11-3

D. TEST MODE ACCESS

To Activate the test mode Press the up arrow ▲

and ENTER key together for 1 second. The boiler will go through the ignition sequence then the user will adjust the Fan Speed by pressing the up arrow key ▲ to increase the fan speed or the down arrow key ▼ to decrease the fan speed.

To leave Service Mode, press the up ▲ and down ▼ arrow keys simultaneously.

```
SERVICE RUN 3400 RPM
PUMP ON           4:49P
```

PART 12: TROUBLESHOOTING

A. ELITE HEATING BOILER® ERROR CODE

If any of the sensors detect an abnormal condition or an internal component fails during the operation of the Elite Heating Boiler®, the display may show an error message and error code. This message and code may either be the result of a temporary condition in which case the display will revert to its normal readout when the condition is corrected or it may be the result of a condition that the controller has evaluated as not safe to restart the boiler. In this case, the boiler control will be locked out, the red FAULT Light will be lit steadily and the message “LOCKOUT” will be displayed on the readout on the lower line. The Elite Heating Boiler® will not start until a qualified technician has repaired the boiler and pressed the RESET button for more than 1 second. If there is an error message displayed on the readout and the message “LOCKOUT” is not displayed and the FAULT light is not lit, then the message is the result of a temporary condition and will disappear when the problem corrects itself. **IMPORTANT NOTE:** If you see error messages on your display readout, call a technician immediately since the message may be indicating that a more serious problem will occur soon.

B. BOILER ERROR

When an error condition occurs, the controller will display a description and code on the display readout. These error messages and their

recommended corrective actions are described in section D. USER INTERFACE DISPLAY.

C. BOILER FAULT

1. When a fault condition occurs, the controller will illuminate the red “FAULT” indication light and display a fault message in the screen. The alarm output will also be activated. Most fault conditions will also cause the CH pump to run in an attempt to cool the boiler.
2. Note the fault message that is displayed and refer to Part D in this section for an explanation of the fault message along with several suggestions for corrective actions.
3. Press the reset key to clear the fault and resume operation. Be sure to observe the operation of the unit for a period of time to assure correct operation and no re-occurrence of fault message.

WARNING

When servicing or replacing any components of this boiler be certain that:

- The gas is off.
- All electrical power is disconnected

PART 12: TROUBLESHOOTING (CONTINUED)

DANGER

When servicing or replacing components that are in direct contact with the boiler water, be certain that:

- There is no pressure in the boiler. (Pull the release on the relief valve. Do not depend on the pressure gauge reading).
- The boiler water is not hot
- The electrical power is off

WARNING

Do not use this appliance if any part has been under water. Improper or dangerous operation may result. Contact a qualified service technician to inspect the boiler and to repair or replace any part of the boiler that has been under water prior to placing the boiler back in operation.

CAUTION

This appliance has wire function labels on all internal wiring. Observe the position of each wire before removing it. Wiring errors may cause improper and dangerous operation. Verify proper operation after servicing.

CAUTION

If overheating occurs or the gas supply fails to shut off, do not turn off electrical power to the circulating pump. This may aggravate the problem and increase the likelihood of boiler damage. Instead, shut off the gas supply to the boiler at the gas service valve.

D. USER INTERFACE DISPLAY

Cascade Control FAULT Codes

Fault Code E03

System Sensor Failure

```
SYS SUPPLY SENSOR
PUMP OFF          E03
```

Description:

This screen shows that there is a problem with the system sensor circuit. The circuit could be either open or shorted. Possible reasons for this error to be present are:

- There is no system sensor connected to the master boiler
- The system sensor is faulty
- There is a short circuit in the system sensor wiring; possibly from a staple placed through the wire or damage to the wire

causing both conductors to touch.

- The system sensor wiring is open due to defect or damage.

Remedy:

Disconnect the system sensor from the wiring and measure the resistance of it. Compare the measured resistance to the table in this manual to see if it corresponds to the temperature of the sensor. If the resistance does not agree with the temperature of the sensor, replace the sensor. If the sensor is OK, disconnect the sensor wiring from both the boiler and the sensor and check continuity using an ohmmeter. Repair or replace as necessary.

If this error is present, all boilers in the cascaded group will run and ignite simultaneously when there is a heat demand. Each boiler will modulate to maintain set point temperature on its own supply sensor. The code will reset automatically when repair is complete. This code will not display if System Setting Function ERROR SYSTEM SENS is set to OFF.

Fault Code TT

Temperature Blocking TT demand

```
TEMPER BLOCKING
PUMP ON          TT
```

Description:

This screen shows that there is a demand on the boiler from the TT circuit and that the pump is powered on and the temperature of the water at the supply sensor is too high for the boiler to ignite. This occurs because the water temperature measured by the supply sensor is higher than the central heat setting – Central Diff Setting, when a demand from the TT circuit is placed on the boiler. This message will stay present until the water temperature measured by the supply sensor is less than the Central Heat Setting – Central Diff Setting.

Fault Code DHW

Temperature blocking DHW demand

```
TEMPER BLOCKING
PUMP ON          DHW
```

Description:

This screen shows that there is a demand on the boiler from the DHW circuit and the pump is

PART 12: TROUBLESHOOTING (CONTINUED)

powered on and the temperature of the water at the supply sensor is too high for the boiler to ignite. This occurs because the water temperature measured by the supply sensor is higher than the DHW SETPOINT – DHW DIFF SETPOINT, when a demand from the DHW circuit is placed on the boiler. When there is a demand from the DHW circuit, this message will stay present until the water temperature measured by the supply sensor is less than the DHW SETPOINT – DHW DIFF SETPOINT.

Fault Code FOU

OUTDOOR SENSOR PUMP ON	FOU
---------------------------	-----

Description:

This display indicates that the outdoor sensor is defective (either shorted or open) or the outdoor temperature is below –40 degrees Fahrenheit. NOTE: The installer must choose YES for parameter 21 to enable this feature. The boiler will continue to operate when this error is displayed and the control will ignore the outdoor reset feature and run at the programmed boiler temperature. The bottom line of the display will indicate the status of the pump.

Remedy:

Inspect the wiring from the outside sensor for damage or shorted connections and repair as necessary. Measure the resistance of the outdoor sensor and compare it to resistance chart. If not within the range on the chart, replace the sensor.

Fault Code E07

FLUE TEMP HIGH PUMP OFF	E07
----------------------------	-----

Description:

This display indicates that the flue sensor temperature is excessive and above 210 deg. F. When this code is displayed, the boiler will not respond to a demand for heat. When the flue temperature decreases below 194 Deg. F, the display will return to normal and allow the boiler to respond for a demand to heat. The bottom line of the display indicates the status of the pump. The pump will remain off when this error is displayed.

Remedy:

Check the flue for obstructions or any sign of damage, especially signs of excessive heat. Repair as necessary. Run the boiler and check the flue temperature with an external thermometer. If the flue temperature on the thermometer does not agree with the flue temperature displayed in the status menu, inspect the wiring to the flue temperature sensor in the boiler and repair as necessary. If the wiring is intact, replace the flue sensor. If the flue temperature is excessive on the status menu and the test thermometer reads the same, check and adjust combustion controls on the boiler. If the problem persists, inspect the target wall in the combustion chamber and replace it if cracked or damaged.

Fault Code E19

LINE VOLTAGE PUMP OFF	E19
--------------------------	-----

Description:

This display indicates that the line voltage frequency is out of range. This could happen if the boiler is being powered from a small gasoline powered generator that is not functioning correctly or overloaded.

Remedy:

Inspect power wiring to boiler and repair as necessary. If connected to line voltage, notify the power company. If connected to an alternate power source such as generator or inverter, make sure the line voltage frequency supplied by the device is 60 Hz.

Fault Code FLU

HIGH FLUE PRESS PUMP ON	FLU
----------------------------	-----

Description:

This display indicates that there is excessive flue pressure. This code will reset automatically after the high pressure condition is resolved. The second line indicates the status of the pump.

Remedy:

1. Assure that the flue is not blocked
2. Check the switch wiring by applying a jumper in place of the switch. If the code clears with the jumper in place, REPLACE the

PART 12: TROUBLESHOOTING (CONTINUED)

flue switch and connect the wires to the new switch BEFORE running unit.

WARNING: Do not use jumper to remedy this error. Faulty switch **MUST** be replaced. Failure to do so could result in serious injury or death.

Fault Code PRO

```

LOW WATER PRESS
PUMP OFF          PRO
  
```

Description:

This display indicates that there is low water pressure in the boiler. This code will reset automatically after the water pressure is high enough for the boiler to run safely. The second line indicates the status of the pump. Note that while the water pressure is low, the pump will be off.

Remedy:

1. Assure that the system pressure is above 10 psig.
2. Check for leaks in the system piping.

Fault Code LOU

```

24 VOLT LOW
PUMP ON          LOU
  
```

Description:

This display indicates that the 24 volt power supply on the control is damaged or overloaded. This code will reset automatically if it is the result of an overload and that overload condition is removed. The second line indicates the status of the pump. Note that while 24 volt power is low, the pump output will be on.

Remedy:

1. Check line voltage. It must be between 100-128 volts.
2. If available, connect PC and using HTP service software check the 24v supply display in the lower left corner of the screen. The number displayed here must be greater than 128 and should be no greater than 250. Use this as a troubleshooting guide as you follow the steps below.
3. Remove the 10 pin Molex Connector from customer connection board. If the message clears, then the problem is with the external

sensor wiring. Examine the external sensor wiring for shorts to the ground, repairing as necessary. If the message is still present and the boiler is so equipped, disconnect the UL 353 low water cut-off to see if the message clears. Replace the faulty part. Check the low voltage wire harness in boiler for shorts to ground.

4. If a message only occurs when the burner tries to light, check the gas valve for excessive current draw.
5. If a message is present with the low voltage harness disconnected from the 926 control board, replace the 926 control board.

Fault Code FL

```

LOW WATER FLOW    FL
PUMP OFF
  
```

Description:

This display indicates that there is low water flow in the boiler. This code should never be displayed on the Elite Heating Boiler® since there is no flow switch in this product. This code will display on VWH products only. This code will reset automatically when the water flow is high enough for the boiler to run safely. The second line indicates the status of the pump. The pump should always be on when this code is displayed. When there is a demand, the control will start the pump, wait for the flow switch to indicate flow then try to ignite the boiler. This display occurs after the pump is energized for several seconds and the flow is still too low.

Remedy:

1. Check to see if boiler pump is functioning. Repair as necessary.
2. Be sure water is flowing in the system. Check for valves that should be open, plugged filter screens, etc.
3. Check the flow switch and wiring. Repair as necessary.

PART 12: TROUBLESHOOTING (CONTINUED)

Fault Code F00

WATER HIGH TEMP F00
PUMP ON

Description:

This display indicates if the water in the boiler has overheated. This code indicates a serious safety issue and the boiler will not restart until it cools down sufficiently and a technician repairs the cause of the overheating and pushes the RESET button on the display. This is a serious situation and is indicated by the red light on the display illuminating and the word LOCKOUT flashing on the display. During this lockout fault, the pump will be on as indicated on the second line of the display in an effort to cool the boiler down.

Remedy:

1. Check circulator pump operation
2. If the circulator pump is running, be sure that there is water in the system and that the water is moving through the system as intended. Be sure that all correct ball valves and or zone valves are open or closed as intended.
3. Observe the temperature/pressure gauge. If the water is not too hot and this message is displayed, check the wiring to the water ECO sensor and repair if necessary. If the wiring is ok and this code is still present and the water is not excessively hot, replace the ECO sensor.

Fault Code F01

FLUE TEMP/WAT LV F01
PUMP ON

Description:

This display indicates that the flue temperature limit switch of the boiler has tripped or that the water level in the boiler is low (The will only occur if the optional UL353 LWCO is installed). This code indicates a serious safety issue. The boiler will not restart until the flue cools down sufficiently or the water level is restored. A technician must repair the cause of the problem and push the RESET button on both the low water cut-off control box and the display. This situation is indicated by the red light on the display and the word LOCKOUT flashing on the display. During this lockout fault, the pump will be on as indicated on the second line of the display.

Remedy:

1. If the boiler has a UL353 LWCO, check to see if the red LED on the LWCO control box is illuminated. If so, correct the low water condition and press the reset button on the LWCO control box to reset the LWCO. The LED should change to green. Press the reset button on the front panel of the boiler to reset the boiler control.
2. Check the flue for obstructions or any sign of damage especially signs of excessive heat. Repair as necessary. Push the red reset button on flue temperature switch located on the flue inside the rear access door of the boiler. NOTE: The switch temperature must be less than 90°F to reset. Press the reset button on the display. Run the boiler and check the flue temperature by using both an external thermometer in the flue pipe and the flue temperature display in the status screens. If the flue temperature is within specs and the switch trips, replace the switch. If the flue temperature is excessive, check and adjust combustion controls on the boiler. If the problem persists, inspect the target wall in the combustion chamber and replace it if cracked or damaged.

Fault Code F02

SUPPLY SENSOR F02
PUMP ON

Description:

This display indicates that the supply temperature sensor of the boiler has failed. This code indicates a serious safety issue and the boiler will not restart until the sensor is replaced by a technician and he pushes the RESET button on the display. This situation is indicated by the red light on the display and the word LOCKOUT flashing on the display. During this lockout fault, the pump will be on as indicated on the second line of the display.

Remedy:

1. Check the electrical connection to the thermistor on the outlet manifold. Verify 5 VDC by checking in Molex Connector. If there is no 5 VDC, check the harness. If harness is OK, replace control. NOTE: The boiler will reset automatically. Verify thermistor values by referencing chart in this manual.
2. Replace thermistor if necessary.

PART 12: TROUBLESHOOTING (CONTINUED)

Fault Code F03

RETURN SENSOR PUMP ON	F03
--------------------------	-----

Description:

This display indicates that the return temperature sensor of the boiler has failed. This code indicates a serious safety issue and the boiler will not restart until the sensor is replaced by a technician and he pushes the RESET button on the display. This situation is indicated by the red light on the display and the word LOCKOUT flashing on the display. During this lockout fault, the pump will be on as indicated on the second line of the display.

Remedy:

1. Check circulator pump operation.
2. Assure that there is adequate flow through the boiler by accessing the status menu and assuring that there is less than a 50°F rise from the return thermistor to the supply thermistor.
3. Troubleshoot thermistor by following steps in **F02**

Fault Code F04

FLUE SENSOR PUMP ON	F04
------------------------	-----

Description:

This display indicates that the flue temperature sensor of the boiler has failed. This code indicates a serious safety issue and the boiler will not restart until the sensor is replaced by a technician and he pushes the RESET button on the display. This situation is indicated by the red light on the display and the word LOCKOUT flashing on the display. During this lockout fault, the pump will be on as indicated on the second line of the display.

Remedy:

Inspect the flue sensor for physical damage or corrosion and replace it if necessary. Check the electrical connection to the flue sensor and repair as necessary. Measure the resistance of the sensor and refer to the chart in fig 12-2 of this manual. The temperature on the chart should be close to the same as the temperature in the flue. If it is not, replace the flue sensor.

Fault Code F05

SUPPLY TEMP HIGH PUMP ON	F05
-----------------------------	-----

Description:

This display indicates that the supply temperature of the boiler is excessive. If this code is accompanied by the red 'FAULT' light and 'LOCKOUT' flashing on the display then this code indicates that the temperature on the supply sensor has exceeded 230 deg. F and a serious safety issue exists. The boiler will not restart until the cause of the excessive temperature is repaired by a technician and he pushes the RESET button on the display.

If the red 'FAULT' light is not illuminated, and this message is displayed, then the supply temperature of the boiler is at or above 210 Deg. F. The message will clear automatically when the temperature drops below 194 Deg. F. During the time that this message or lockout fault is displayed, the pump will be on as indicated on the second line of the display.

Remedy:

1. Check circulator pump operation.
2. Assure that there is adequate flow through the boiler by accessing the status menu and assuring that there is less than a 50°F rise from the return thermistor to the supply thermistor.
3. Check the direction of flow off the boiler circulator. (See Piping Details in this manual.)
4. Troubleshoot the thermistor by following steps in **F02**

Fault Code F06

RETURN TEMP HIGH PUMP ON	F06
-----------------------------	-----

Description:

This display indicates that the return temperature of the boiler is excessive. If this code is accompanied by the red 'FAULT' light and 'LOCKOUT' flashing on the display then this code indicates that the temperature on the return sensor has exceeded 230 deg. F and a serious safety issue exists. The boiler will not restart until the cause of the excessive tempera-

PART 12: TROUBLESHOOTING (CONTINUED)

ture is repaired by a technician and he pushes the RESET button on the display.

If the red 'FAULT' light is not illuminated, and this message is displayed, then the return temperature of the boiler is at or above 210 Deg. F. The message will clear automatically when the temperature drops below 194 Deg. F. During the time that this message or lockout fault is displayed, the pump will be on as indicated on the second line of the display.

Remedy:

1. Check circulator pump operation.
2. Assure that there is adequate flow through the boiler by accessing the status menu and assuring that there is less than a 50°F rise from the return thermistor to the supply thermistor.
3. Check the direction of flow on boiler circulator. (See Piping Details in Section 5 of this manual.)
4. Troubleshoot thermistor by following steps in

F02

Fault Code F09

NO FLAME ON IGN PUMP ON	F09
----------------------------	-----

Description:

The boiler tried to ignite four times during one heat call and failed ignition all four times. The red light will display and the word LOCKOUT will flash on the display. This code indicates a serious safety issue and the boiler will not restart until the cause of no ignition is repaired by a technician and he pushes the RESET button on the display. During this lockout fault, the pump will remain on as indicated on the second line of the display

Remedy:

1. Watch the igniter through the observation window provided.
2. If there is no spark, check the spark electrode for the proper .196" (5.0 mm ± 1mm) gap.
3. Remove any corrosion from the spark electrode and flame rectifier probe.
4. If there is a spark but no flame, check the gas supply to the boiler.
5. If there is a flame, check the flame sensor.
6. Check any flue blockage or condensate blocks.

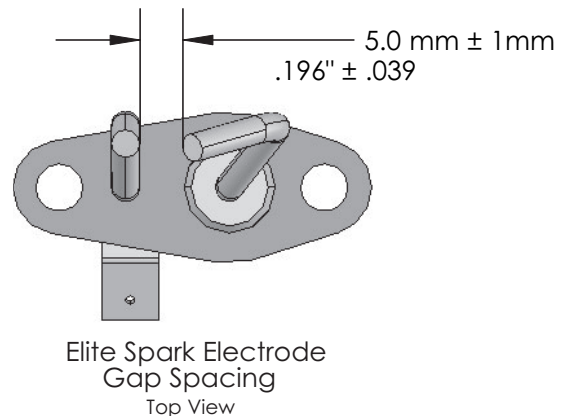


Fig. 12-1 NOTE: If receiving an F09 fault code, check the gap spacing between points on the electrode.

Fault Code F10

FLAME LOSS	F10
------------	-----

Description:

The flame was lost while the boiler was firing 3 times during 1 demand call. The red light will display and the word LOCKOUT will flash on the display. This code indicates a serious safety issue and the boiler will not restart until the cause of the flame loss is determined by a technician and he pushes the RESET button on the display. During this lockout fault, the pump will be on as indicated on the second line of the display.

Remedy:

1. Monitor the gas pressure to the unit while in operation.
2. Assure that the flame is stable when lit.
3. Check to see if the display readout changes from "GAS VALVE ON" to "RUN" within a few seconds after the boiler ignites
4. Check the FLAME signal on the status display. It should be above 1.0 when the boiler is firing.
5. If the signal reads less than 1 microampere, clean the flame rectifier and spark probe.
6. If the problem persists and the 'FLAME' signal is still less than 1.0, replace the flame probe and spark igniter probe.
7. The flame signal should be steady after the boiler has been firing for 1 minute and is nor-

PART 12: TROUBLESHOOTING (CONTINUED)

mally at 5.0 to 9.0. If the flame signal is not steady, disassemble the burner door and check the burner and its sealing gaskets.

Fault Code F11

FALSE FLAME SIG PUMP ON	F11
----------------------------	------------

Description:

There is flame when the boiler control is not telling the boiler to run. The red light will display and the word LOCKOUT will flash on the display. This code indicates a serious safety issue and the boiler will not restart until the cause is determined by a technician and he pushes the RESET button on the display. During this lockout fault, the pump will be on as indicated on the second line of the display.

Remedy:

1. Look into window. If there is flame, turn the gas off to the unit at the service valve and replace the gas valve.
2. If the flame signal on the status menu is greater than 1.0 when the burner is not lit, replace the spark ignitor and the flame rectification probe.
3. If the flame signal is not present after turning off the gas supply, check the gas valve electrical connection.
4. Check for condensate backup. Repair condensate system as necessary. If condensate has partially filled the combustion chamber, the refractory wall may be damaged and should be replaced.
5. Turn the gas on at the service valve after corrective action is taken.
6. If the refractory wall falls against the rectifier probe, it may conduct the signal to ground, giving a false reading.

Fault Code F13

FAN SPEED ERROR PUMP ON	F13
----------------------------	------------

Description:

The fan is not running at the speed that the control has commanded it to run at. The fan speed had been more than 30% faster or slower than the commanded speed for more than 10 seconds. The red light will display and the word

LOCKOUT will flash on the display. This code indicates a serious safety issue and the boiler will not restart until the cause is determined by a technician and he pushes the RESET button on the display. During this lockout fault, the pump will be on as indicated on the second line of the display.

Remedy:

1. Check the combustion air fan wiring.
2. Measure the DC voltage from the red fan wire to ground while it is connected to the fan. It should be between 24 to 40 volts. If it is lower than 24 volts, check for excessive external loads connected to the boiler sensor terminals. Disconnect the 5 pin plug from the fan and check the voltage on the red wire again. If it is now between 24-40 volts, replace the fan. If it is still below 24 volts replace the boiler control board.

Fault Code F20

CONDENSATE FULL PUMP ON	F20
----------------------------	------------

Description:

The condensate trap is full of condensate. The red light will display and the word LOCKOUT will flash on the display. This code indicates a serious safety issue and the boiler will not restart until the cause is determined by a technician and he pushes the RESET button on the display. During this lockout fault, the pump will be off as indicated on the second line of the display.

Remedy:

1. Check condensate lines for obstructions
2. Check float switch in condensate reservoir.
3. Check wiring from condensate reservoir to 926 control and repair as necessary

Fault Code F31

PROGRAM ERROR	F31
---------------	------------

Description:

There was an error while programming the control and the control's memory is corrupt. The boiler control will not function in this state and the pump will be off as indicated on the bottom line of the display. The only way for this error to occur is if a technician is programming the con-

PART 12: TROUBLESHOOTING (CONTINUED)

trol and the programming function fails. The only way to recover from this error is to program the control again. If this error occurs at any time other than when a technician is servicing the boiler, the control has failed and must be replaced by a qualified technician.

Remedy:

The control must be re-programmed. If programming does not solve problem, the control must be replaced.

Fault Code PP

CONTROL PROGRAMED
PP

Description:

The control has been programmed by a technician or the factory. After programming, the control is left in a locked out mode. Press the 'RESET' key to begin use of the control.

Remedy:

Press S4 reset for at least 1 second.

Resistance Tables

Outdoor Sensor (7250P-319)	
Outside Temperature (°F)	Resistance (ohms)
-22	171800
-13	129800
-4	98930
5	76020
14	58880
23	45950
32	36130
41	28600
50	22800
59	18300
68	14770
77	12000
86	9804
95	8054
104	6652
113	5522

Supply Temperature Sensor 7250P-324	
Boiler Sensor (7250P-667)	Indirect Sensor (7250P-325)
Water Temperature (°F)	Resistance (ohms)
32	32550
41	25340
50	19870
59	15700
68	12490
77	10000
86	8059
95	6535
104	5330
113	4372
122	3605
131	2989
140	2490
149	2084
158	1753
167	1481
176	1256
185	1070
194	915
203	786
212	667

Fig. 12-2

PART 13: MAINTENANCE

A. MAINTENANCE PROCEDURES

Periodic maintenance should be performed once a year by a qualified service technician to assure that all the equipment is operating safely and efficiently. The owner should make necessary arrangements with a qualified heating contractor for periodic maintenance of the heater. The installer must also inform the owner that the lack of proper care and maintenance of the heater may result in a hazardous condition.

WARNING

BEFORE EACH HEATING SEASON A trained and qualified service technician should perform the inspections as per the boiler inspection and maintenance schedule in the back of manual. Failure to do so could result in death or serious injury.

WARNING

The combustion chamber insulation in this product contains ceramic fiber material. Ceramic fibers can be converted to cristobalite in very high temperature applications. The International Agency for Research on Cancer (IARC) has concluded, "Crystalline silica inhaled in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (Group1).":

- Avoid breathing dust and contact with skin and eyes.
 - Use NIOSH certified dust respirator (N95). This type of respirator is based on the OSHA requirements for cristobalite at the time this document was written. Other types of respirators may be needed depending on the job site conditions. Current NIOSH recommendations can be found on the NIOSH website at <http://www.cdc.gov/niosh/homepage.html>. NIOSH approved respirators, manufacturers, and phone numbers are also listed on this website.
 - Wear long-sleeved, loose fitting clothing, gloves, and eye protection.
- Apply enough water to the combustion chamber lining to prevent dust
- Wash potentially contaminated clothes separately from other clothing. Rinse clothes washer thoroughly.

NIOSH stated First Aid.

- Eye: Irrigate immediately
- Breathing: Fresh air.

B. COMBUSTION CHAMBER COIL CLEANING INSTRUCTIONS FOR ELITE HEATING BOILER®

*Before beginning this procedure, you must have on hand the following items:

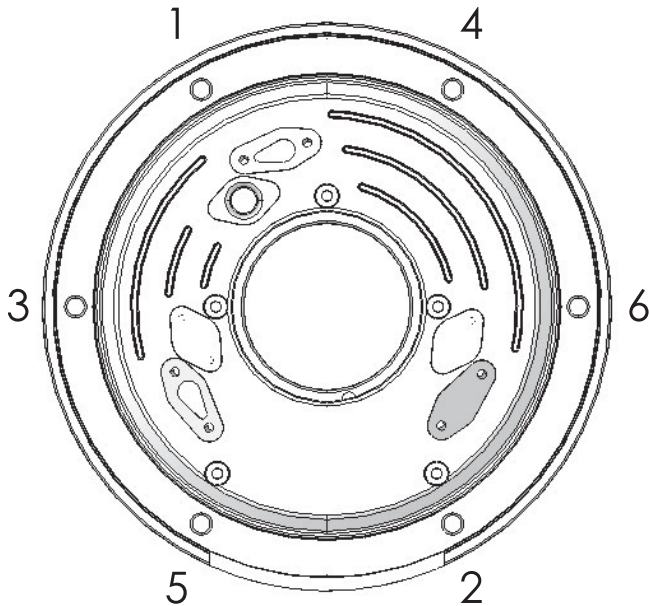
- a nylon, stainless steel or brass brush (not steel)
- "Rydlyme" (recommended for best results) (available on line www.rydlyme.com) or "CLR" (available at most hardware stores)
- Gloves, eye protection

1. Shut down the Elite Heating Boiler® by using the following steps:
 - a. Close the gas valve, shut down the unit and wait for the unit to be cool to the touch
 - b. Disconnect the condensate piping from the **outside** connection, (**not from the Elite Heating Boiler® side**), so the flow from condensate reservoir can be observed.
 - c. Disconnect electrical connections from the gas valve, spark electrode and flame rectification probe and combustion blower.
 - d. Remove the (4) screws on the aluminum $\frac{3}{4}$ " NPT connector on the right side of the gas valve.
 - e. Disconnect the wiring connected to the combustion blower motor.
 - f. Remove the (6) 10MM nuts from the burner plate assembly.
 - g. Pull the entire burner plate assembly with blower still attached towards you, while removing or pushing aside any wiring to allow the removal of the assembly.
2. Using a spray bottle filled with the recommended product "RYDLYME" or "CLR", spray liberally on the coils, making sure the solution penetrates and funnels down through the condensate system. If the condensate system is blocked, let the chemical penetrate for at least 15 minutes or until it drains.
3. Use the nylon, stainless steel or brass brush (do not use steel) and scrub coils to remove any buildup, then vacuum the debris from the coils.
4. Spray the coils with clear water, making sure to confine the spray to the area being cleaned (Try to avoid getting the back ceramic wall of the unit wet). Flush the combustion chamber with fresh

PART 13: MAINTENANCE (CONTINUED)

water until clear water runs from the condensate. At this point, the boiler should be ready to be re-assembled.

- a. Inspect gaskets.
- b. Re-install the burner assembly
- c. Replace and tighten the (6) 10MM nuts to the burner plate using staggered tightening sequence. (See detail)
- d. Re-connect all wiring connections



- e. Inspect the gas valve to assure the O-ring is in place. Replace the (4) screws on the aluminum connector on the gas valve. Turn the gas back on. **(IMPORTANT: CHECK FOR GAS LEAKS)**
- g. Turn the Elite Heating Boiler® power back on and create a demand on the boiler. When boiler is lit, observe condensate flow from the boiler. Be sure the boiler is operating properly.
- h. Re-connect the condensate piping to the outside condensate connection.

PART 13: MAINTENANCE (CONTINUED)

ITEM #	EL-80	EL-110	EL-150	EL-220	Description
1	7450P-001	7450P-002	7450P-003	7450P-004	BOILER MODULE
2	7250P-160	7250P-160	7250P-160	7250P-160	CERAMIC TARGET WALL
3	7500P-109	7500P-109	7500P-109	7500P-109	M4 FLAT WASHER
4	7250P-704	7250P-704	7250P-704	7250P-704	M4 X 8 FLAT HEAD SCREW
5	7450P-006	7450P-006	7450P-006	7450P-006	BURNER DOOR
6	7450P-005	7450P-005	7450P-005	7450P-005	BURNER DOOR INSULATION
7	7450P-009	7450P-010	7450P-011	7450P-012	BURNER
8	7500P-074	7500P-074	7500P-074	7500P-074	GASKET - BURNER
9	7450P-008	7450P-008	7450P-007	7450P-007	AIR CHANNEL
10	7250P-206	7250P-206	7250P-206	7250P-206	M5 X 14MM TORX SCREWS - AIR CHANNEL
11	7500P-075	7500P-075	7500P-075	7500P-075	GASKET - AIR CHANNEL/BLOWER
12	7500P-031	7500P-031	7500P-031	7350P-159	COMBUSTION BLOWER
13	7250P-478	7250P-478	7250P-478	7250P-478	M5 X 12MM SOCKET CAP SCREW
14	7450P-022	7450P-023	7450P-024	7450P-024	AIR/GAS MIXER
15	7450P-141	7450P-141	7450P-141	7450P-225	SCREWS - AIR/GAS MIXER
16	7450P-115	7450P-115	7450P-115	7450P-115	WASHER - AIR/GAS MIXER
17	7450P-139	7450P-139	7450P-139	7450P-138	FLARE X BSP FITTING
18	7100P-140	7100P-140	7100P-140	7450P-140	FLEXIBLE GAS LINE
19	7450P-025	7450P-025	7450P-025	7350P-033	GAS VALVE
20	7450P-154	7450P-154	7450P-154	7450P-143	FLARE X NPT FITTING
21	7500P-067	7500P-067	7500P-067	7500P-067	M6 NUT - BURNER DOOR
22	7250P-005	7250P-005	7250P-005	7250P-005	GASKET - PROBE/ELECTRODE
23	7350P-020	7350P-020	7350P-020	7350P-020	SPARK ELECTRODE (W/GASKET)
24	7250P-069	7250P-069	7250P-069	7250P-069	SCREW M4 X 8MM - PROBE/ELECTRODE
25	7350P-022	7350P-022	7350P-022	7350P-022	FLAME RECTIFICATION PROBE (W/GASKET)
26	7250P-667	7250P-667	7250P-667	7250P-667	THERMISTOR
27	7250P-096	7250P-096	7250P-096	7250P-096	WATER PRESSURE SWITCH - NPT THREAD
28	7450P-192	7450P-192	7450P-192	7450P-192	THERMISTOR/WATER TEMP SWITCH
29	7450P-185	7450P-185	7500P-057	7500P-057	CONDENSATE HOSE
30	7450P-200	7450P-200	7450P-200	7450P-200	CONDENSATE COLLECTOR ASSY
31	7250P-210	7250P-210	7250P-210	7250P-210	HOSE CLAMP
32	7450P-144	7450P-144	7450P-144	7450P-147	PAN HEAD SCREW
33	7350P-063	7350P-063	7350P-063	7350P-063	#10 X 1/2" SELF TAPPING SCREW - CONDENSATE
34	7450P-199	7450P-199	7450P-199	7450P-199	1/4" NPT NIPPLE
35	7450P-220	7450P-220	7450P-220	7450P-220	AIR/GAS MIXER INLET ASSY
36	7450P-197	7450P-197	7450P-197	7450P-197	AIR RELEASE VENT
37	7350P-167	7350P-167	7350P-167	7350P-167	CONDENSATE OVERFLOW SWITCH
38	7450P-165	7450P-165	7450P-165	7450P-165	SET SCREW - 10-32 X 3/8

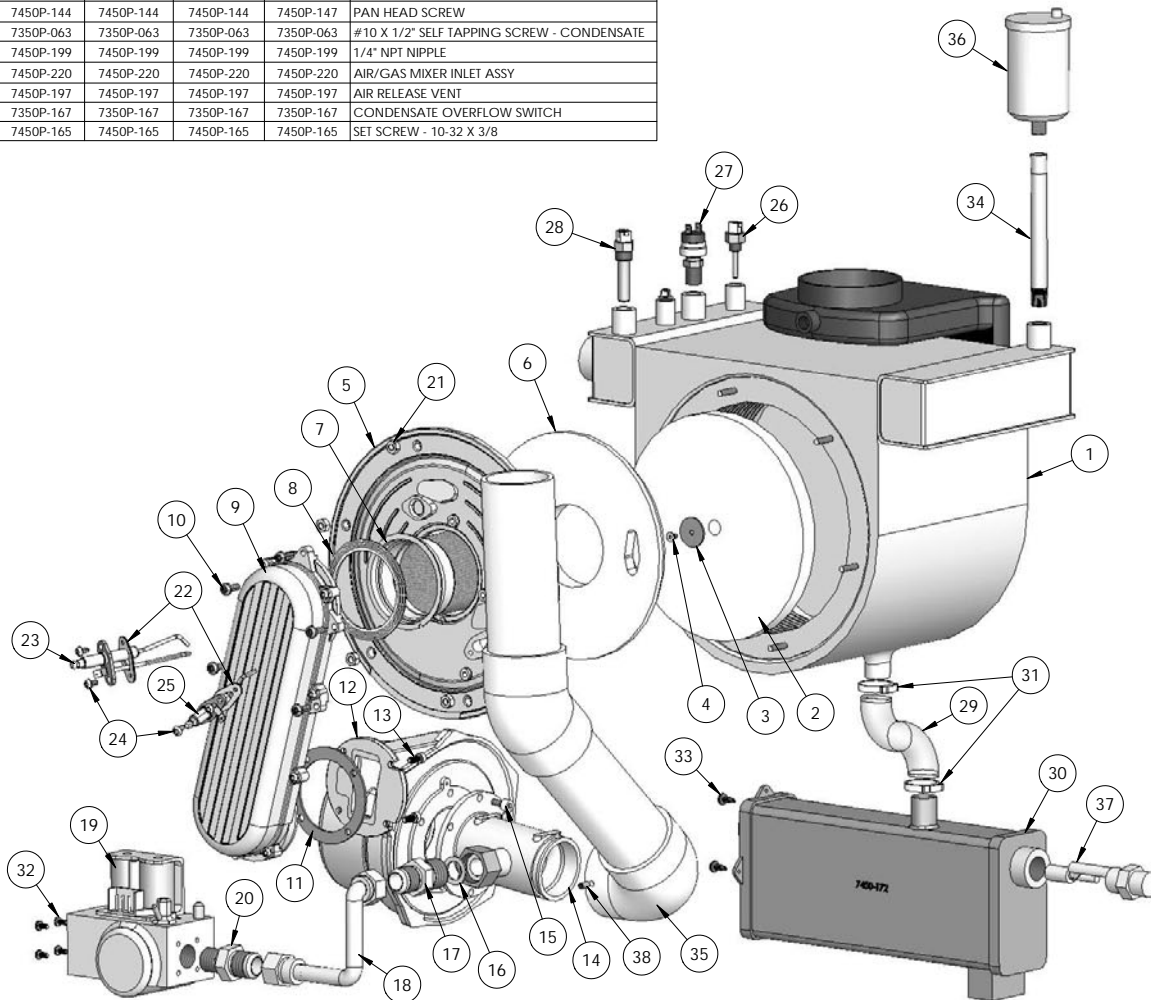
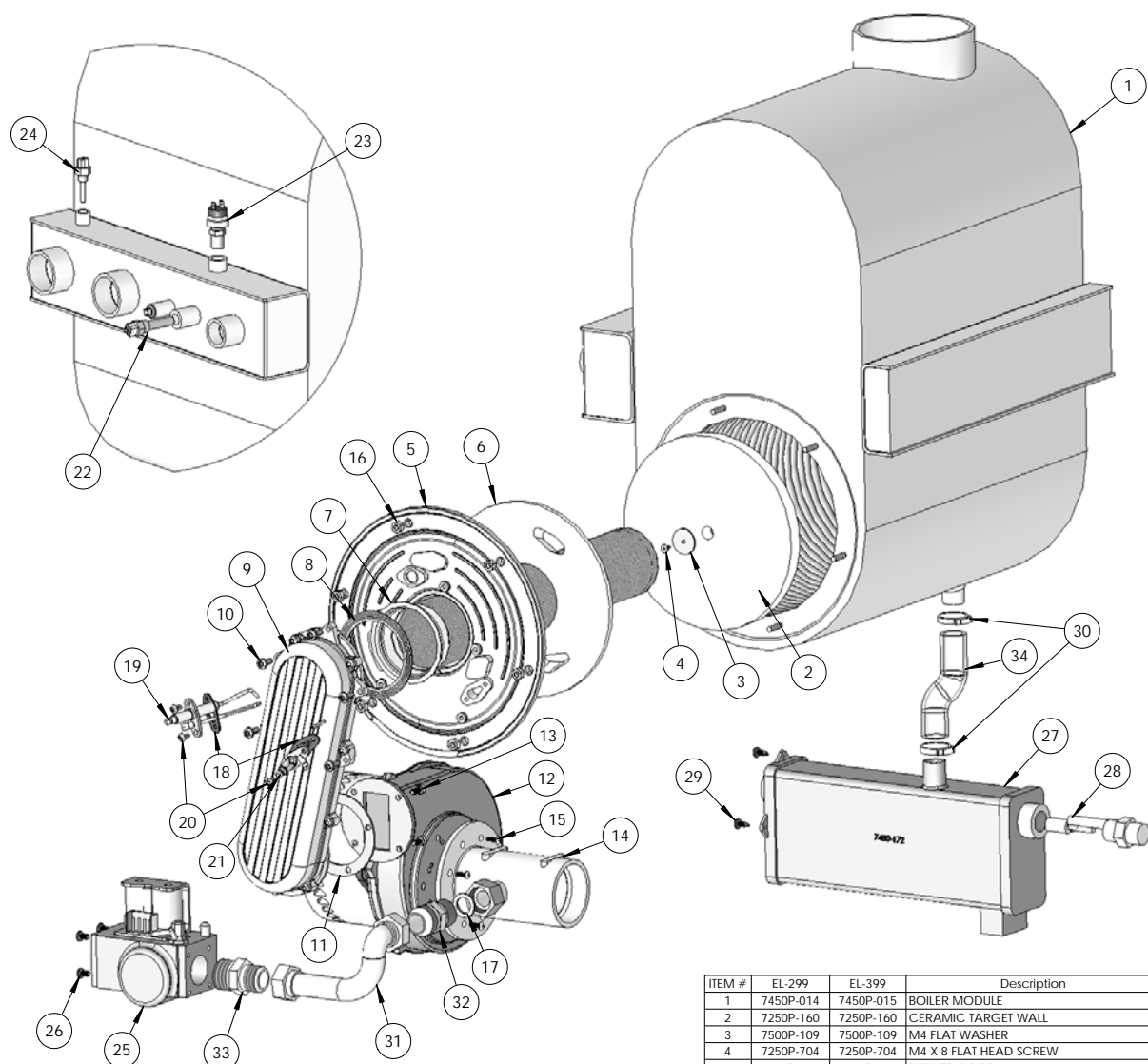


Fig. 13-1

LP-293-C
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PART 13: MAINTENANCE (CONTINUED)

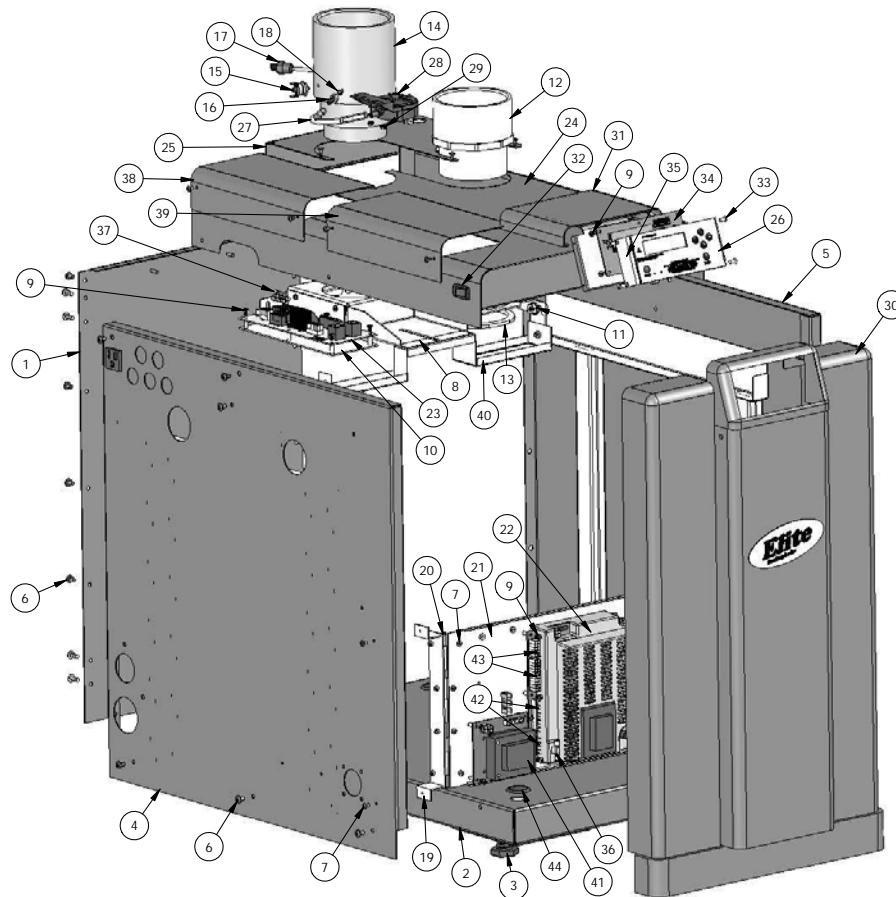


ITEM #	EL-299	EL-399	Description
1	7450P-014	7450P-015	BOILER MODULE
2	7250P-160	7250P-160	CERAMIC TARGET WALL
3	7500P-109	7500P-109	M4 FLAT WASHER
4	7250P-704	7250P-704	M4 X 8 FLAT HEAD SCREW
5	7450P-006	7450P-006	BURNER DOOR
6	7450P-005	7450P-005	BURNER DOOR INSULATION
7	7350P-031	7350P-031	BURNER
8	7500P-074	7500P-074	GASKET - BURNER
9	7450P-007	7450P-007	AIR CHANNEL
10	7250P-206	7250P-206	M5 X 14MM TORX SCREWS - AIR CHANNEL
11	7500P-075	7500P-075	GASKET - AIR CHANNEL/BLOWER
12	7350P-159	7350P-159	COMBUSTION BLOWER
13	7250P-478	7250P-478	M5 X 12MM SOCKET CAP SCREW
14	7450P-029	7450P-029	AIR/GAS MIXER
15	7450P-225	7450P-225	M4 X 12MM SOCKET BUTTON HEAD SCREW
16	7500P-067	7500P-067	M6 NUT - BURNER DOOR
17	7450P-115	7450P-115	WASHER - AIR/GAS MIXER
18	7250P-005	7250P-005	GASKET - PROBE/ELECTRODE
19	7350P-020	7350P-020	SPARK ELECTRODE (w/GASKET)
20	7250P-069	7250P-069	SCREW M4 X 8MM - PROBE/ELECTRODE
21	7350P-022	7350P-022	FLAME RECTIFICATION PROBE (w/GASKET)
22	7450P-192	7450P-192	THERMISTOR/WATER TEMP SWITCH
23	7250P-096	7250P-096	WATER PRESSURE SWITCH - NPT THREAD
24	7250P-667	7250P-667	THERMISTOR
25	7350P-033	7350P-033	GAS VALVE
26	7450P-147	7450P-147	M5 X 8MM PAN HEAD SCREW
27	7450P-200	7450P-200	CONDENSATE COLLECTOR ASSY
28	7350P-167	7350P-167	CONDENSATE OVERFLOW SWITCH
29	7350P-063	7350P-063	#10 x 1/2" SELF TAPPING SCREW
30	7250P-210	7250P-210	HOSE CLAMP
31	7450P-140	7450P-140	FLEXIBLE GAS LINE
32	7450P-138	7450P-138	FLARE X BSP FITTING
33	7450P-143	7450P-143	FLARE X NPT FITTING
34	7500P-057	7500P-057	CONDENSATE HOSE

Fig. 13-2

LP-293-N
REV. 1/18/10

PART 13: MAINTENANCE (CONTINUED)



ITEM #	EL-80	EL-110	EL-150	EL-220	EL-299	EL-399	DESCRIPTION
1	7450P-039	7450P-039	7450P-039	7450P-039	7450P-065	7450P-065	JACKET - REAR
2	7450P-055	7450P-055	7450P-056	7450P-038	7450P-064	7450P-068	JACKET - BOTTOM
3	7450P-121	7450P-121	7450P-121	7450P-121	7450P-121	7450P-121	LEVELING FEET
4	7450P-057	7450P-059	7450P-060	7450P-036	7450P-061	7450P-066	JACKET - LEFT SIDE
5	7450P-058	7450P-123	7450P-062	7450P-037	7450P-063	7450P-067	JACKET - RIGHT SIDE
6	7450P-080	7450P-080	7450P-080	7450P-080	7450P-080	7450P-080	10-32 X 5/16 PAN HEAD SCREW - JACKET
7	7450P-081	7450P-081	7450P-081	7450P-081	7450P-081	7450P-081	6-32 X 1/4 PAN HEAD SCREW - ACCESSORIES
8	7450P-074	7450P-074	7450P-074	7450P-074	7450P-075	7450P-075	AIR/EXHAUST SUPPORT PLATE
9	7500P-115	7500P-115	7500P-115	7500P-115	7500P-115	7500P-115	6-32 X 1/4 PAN HEAD SCREW - ELECTRONIC BOARDS
10	7450P-178	7450P-178	7450P-178	7450P-178	N/A	N/A	FIELD CONNECTION BOARD PLATE
11	7450P-088	7450P-088	7450P-088	7450P-088	7450P-088	7450P-088	8-32 FLANGED NUT - AIR EXHAUST PLATE
12	7450P-030	7450P-030	7450P-030	7450P-030	7450P-031	7450P-031	AIR INLET ADAPTER
13	7450P-032	7450P-032	7450P-032	7450P-032	7450P-033	7450P-033	AIR INLET CONNECTOR NUT
14	7450P-201	7450P-201	7450P-201	7450P-201	7450P-202	7450P-202	EXHAUST ADAPTER
15	7250P-739	7250P-739	7250P-739	7250P-739	7250P-739	7250P-739	ECO FLUE SWITCH - 160 DEGREES
16	7250P-154	7250P-154	7250P-154	7250P-154	7250P-154	7250P-154	S.S. BARBED FITTING - 1/4 HOSE X 10-32
17	7450P-026	7450P-026	7450P-026	7450P-026	7450P-026	7450P-026	FLUE THERMISTOR
18	7250P-152	7250P-152	7250P-152	7250P-152	7250P-152	7250P-152	SILICONE O-RING 2-007 - BARBED FITTING
19	7450P-079	7450P-079	7450P-079	7450P-079	7450P-079	7450P-079	HINGE BRACKET
20	7450P-091	7450P-091	7450P-091	7450P-091	7450P-091	7450P-091	HINGE
21	7450P-132	7450P-132	7450P-132	7450P-132	7450P-132	7450P-132	CONTROL BOARD DOOR W/HINGE
22	7450P-122	7450P-122	7450P-122	7450P-122	7450P-122	7450P-122	926 CONTROL BOARD
23	7350P-070	7350P-070	7350P-070	7350P-070	7350P-070	7350P-070	FIELD CONNECTION BOARD
24	7450P-040	7450P-040	7450P-041	7450P-042	7450P-043	7450P-044	JACKET - TOP COVER FRONT
25	7450P-072	7450P-072	7450P-099	7450P-099	7450P-073	7450P-073	JACKET - TOP COVER BACK
26	7450P-021	7450P-021	7450P-021	7450P-021	7450P-021	7450P-021	MEMBRANE TOUCHPAD
27	7000P-805	7000P-805	7000P-805	7000P-805	7000P-805	7000P-805	PLASTIC TUBING - 3/16 OD - BLOCKED VENT PRESSURE SWITCH
28	7250P-150	7250P-150	7250P-150	7250P-150	7250P-150	7250P-150	BLOCKED VENT PRESSURE SWITCH
29	7450P-142	7450P-142	7450P-142	7450P-142	7450P-142	7450P-142	6-32 FLANGED NUT - BLOCKED VENT PRESSURE SWITCH
30	7450P-046	7450P-046	7450P-046	7450P-046	7450P-051	7450P-051	JACKET - FRONT COVER ASSY
31	7450P-045	7450P-045	7450P-045	7450P-045	7450P-045	7450P-045	JACKET - TOP COVER INSERT
32	7500P-087	7500P-087	7500P-087	7500P-087	7500P-087	7500P-087	POWER SWITCH
33	7450P-092	7450P-092	7450P-092	7450P-092	7450P-092	7450P-092	6-32 FLAT HEAD SCREW - ACCESSORIES
34	7450P-028	7450P-028	7450P-028	7450P-028	7450P-028	7450P-028	DISPLAY BOARD
35	7450P-018	7450P-018	7450P-018	7450P-018	7450P-018	7450P-018	MEMBRANE SWITCH BRACKET
36	7250P-378	7250P-378	7250P-378	7250P-378	7250P-378	7250P-378	FUSE - CONTROL BOARD - 6.3 AMPS
37	7350P-129	7350P-129	7350P-129	7350P-129	7350P-129	7350P-129	FUSE - CONNECTION BOARD - 3.15 AMPS
38	7450P-160	7450P-160	7450P-160	7450P-160	7450P-160	7450P-160	FIELD CONNECTION BOARD COVER
39	N/A	N/A	N/A	7450P-061	N/A	N/A	BOILER ACCESS COVER
40	7450P-076	7450P-076	7450P-076	7450P-076	7450P-077	7450P-077 (2)	MODULE HOLD-DOWN STRAP
41	N/A	N/A	N/A	7450P-221	7450P-221	7450P-221	TRANSFORMER ASSEMBLY
42	7450P-204	7450P-204	7450P-204	7450P-208	7450P-209	7450P-210	120V WIRING HARNESS (NOT SHOWN)
43	7450P-203	7450P-203	7450P-203	7450P-205	7450P-206	7450P-207	LOW VOLTAGE WIRING HARNESS (NOT SHOWN)
44	7450P-226	7450P-226	7450P-226	7450P-226	7450P-226	7450P-226	7/8 HOLE PLUG

Fig. 13-3

BOILER START UP REPORT

Light Off Activities		Date completed _____			
1) Fill the heating system	Check all piping and gas connections, verify they are all tight				
	Pressurize System (12-15 PSI)	_____ PSI			
	Add Water to prime condensate system				
	What percentage of propylene glycol is installed in the system (0-50%)	_____ %			
	Verify near heater piping and flue are properly supported				
2) Check Gas Pipe	Leak test using locally approved methods (consult jurisdictional code book)				
	Check incoming gas pressure (3.5" to 14" W.C.)	_____ in w.c.	Static		
	What is the 'drop' on light off (No more than 1" W.C.)	_____ in w.c.	Dynamic		
3) Record Ionization Current	Check μ A reading on the Elite Control status menu (see start-up section)	_____ μ A	High Fire	_____ μ A	Low Fire
4) Verify System Operation	Turn up thermostat to verify wiring connections				
5) Check Combustion	Check and adjust (if necessary) carbon dioxide content	_____ % CO2	High Fire	_____ %CO2	Low Fire
	Check and adjust (if necessary) carbon monoxide content	_____ ppm CO	High Fire	_____ ppm CO	Low Fire
6) Record System Settings	Record heating curve, record steps	_____ *8	_____ *9	_____ *10	_____ *11
7) Indirect water heater	Verify safety and operation of the Super-Stor Indirect water heater, record settings	_____ de	_____ dh		
	Notes:				

BOILER INSPECTION AND MAINTENANCE SCHEDULE

Inspection Activities		Date last completed			
		1st Year	2nd Year	3rd Year	4th Year*
Piping					
Near Heater Piping	Check heater and system piping for any sign of leakage, verify proper support				
Vent	Check condition of all vent pipe and joints and supports. Note any deterioration and replace.				
Gas	Check gas piping, test for gas leaks and signs of aging, make sure all pipes are supported properly.				
System					
Visual	Do a full visual inspection of all system components. Pay close attention to clearances of venting. Make sure intake and exhaust screens are clean and clear of obstructions.				
Functional	Test all functions of the system (Heat, DHW, Safeties)				
Temperatures	Verify safe settings on Super-Stor indirect fired water heater or Anti-Scald Valve (see part 12 for related safety warnings)				
Temperatures	Verify temperature settings programmed into the heating curve (See Part 11)				
Electrical					
Connections	Check wire connections, make sure they are tight				
Circuit breakers	Check to see that the circuit breaker is clearly labeled, exercise circuit breaker				
Switch and Plug	Verify ON/OFF switch and convenience plug are both functional				
Smoke and CO detector	Verify devices are installed and working properly, change batteries if necessary				
Chamber and Burner					
Combustion Chamber	Vacuum Debris from Combustion Chamber if Necessary				
Combustion Chamber	Check burner tube, and combustion chamber coils, clean according to maintenance section of manual				
Spark Electrode	Clean with Scotch Brite pad, Set gap at 1/4" (see Fig 12-1 Part 12 in Troubleshooting section)				
Flame Probe	Clean with Scotch Brite pad, Check flame current (status menu in Start-up Procedures) record high fire (7-9 typical) and low fire (6-8 typical)				

* NOTE : CONTINUE MAINTENANCE BEYOND THE 4TH YEAR IS REQUIRED ON A YEARLY BASIS.

BOILER INSPECTION AND MAINTENANCE SCHEDULE (CONTINUED)

Inspection Activities		Date last completed			
		1st Year	2 Year	3 Year	4 Year*
Condensate					
Condensate Neutralizer	Check condensate neutralizer, making sure there is a sufficient quantity of chips. Replenish if necessary.				
Condensate System	1. Check entire condensate system making sure there are no obstructions in the flow 2. Make sure the condensate pump is working properly, verify all connections. 3. Clean out condensate neutralizer, use Wet / Dry Vacuum. Check for all potential obstruction issues. Replenish marble chips or lime crystals if needed (no smaller than 3/4") Refill system with water WARNING: You must verify flow of condensate and make sure the cap is connected properly before leaving boiler unattended.				
Gas					
Pressure	Measure incoming gas pressure (from 3.5" to 14" W.C.)				
Pressure Drop	Measure drop in pressure on light off (no more than 1" W.C.)				
Check gas pipe for leaks	Check piping for leaks, and verify they are all properly supported				
Combustion					
Check CO/CO2 Levels	Check levels of CO and CO2 in Exhaust (See start up section 11 fig 11-3 for ranges) record at high and low fire				
Safeties					
ECO (Energy Cut Out)	Check continuity on Flue and Water ECO, replace if corroded				
Thermistors	Check wiring, verify through ohms reading (see chart part 12 Fig. 12-2)				
Final Inspection					
Check List	Verify that you have completed the entire check list WARNING: FAILURE TO DO SO COULD RESULT IN DEATH OR SERIOUS INJURY.				
Homeowner	Review, with the homeowner what you have done				
		INIT	INIT	INIT	INIT
Tech Sign Off		DATE	DATE	DATE	DATE

* NOTE : CONTINUE MAINTENANCE BEYOND THE 4TH YEAR IS REQUIRED ON A YEARLY BASIS.

ADDITIONAL INSTALLATION REQUIREMENTS FOR THE COMMONWEALTH OF MASSACHUSETTS

In the Commonwealth of Massachusetts, the installer or service agent shall be a plumber or gas fitter licensed by the Commonwealth.

When installed in the Commonwealth of Massachusetts or where applicable state codes may apply; the unit shall be installed with a CO detector per the requirements listed below.

5.08: Modifications to NFPA-54, Chapter 10

(1) Revise NFPA-54 section 10.5.4.2 by adding a second exception as follows:

Existing chimneys shall be permitted to have their use continued when a gas conversion burner is installed, and shall be equipped with a manually reset device that will automatically shut off the gas to the burner in the event of a sustained back-draft.

(2) Revise 10.8.3 by adding the following additional requirements:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

MAINTENANCE NOTES

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MAINTENANCE NOTES

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MAINTENANCE NOTES

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