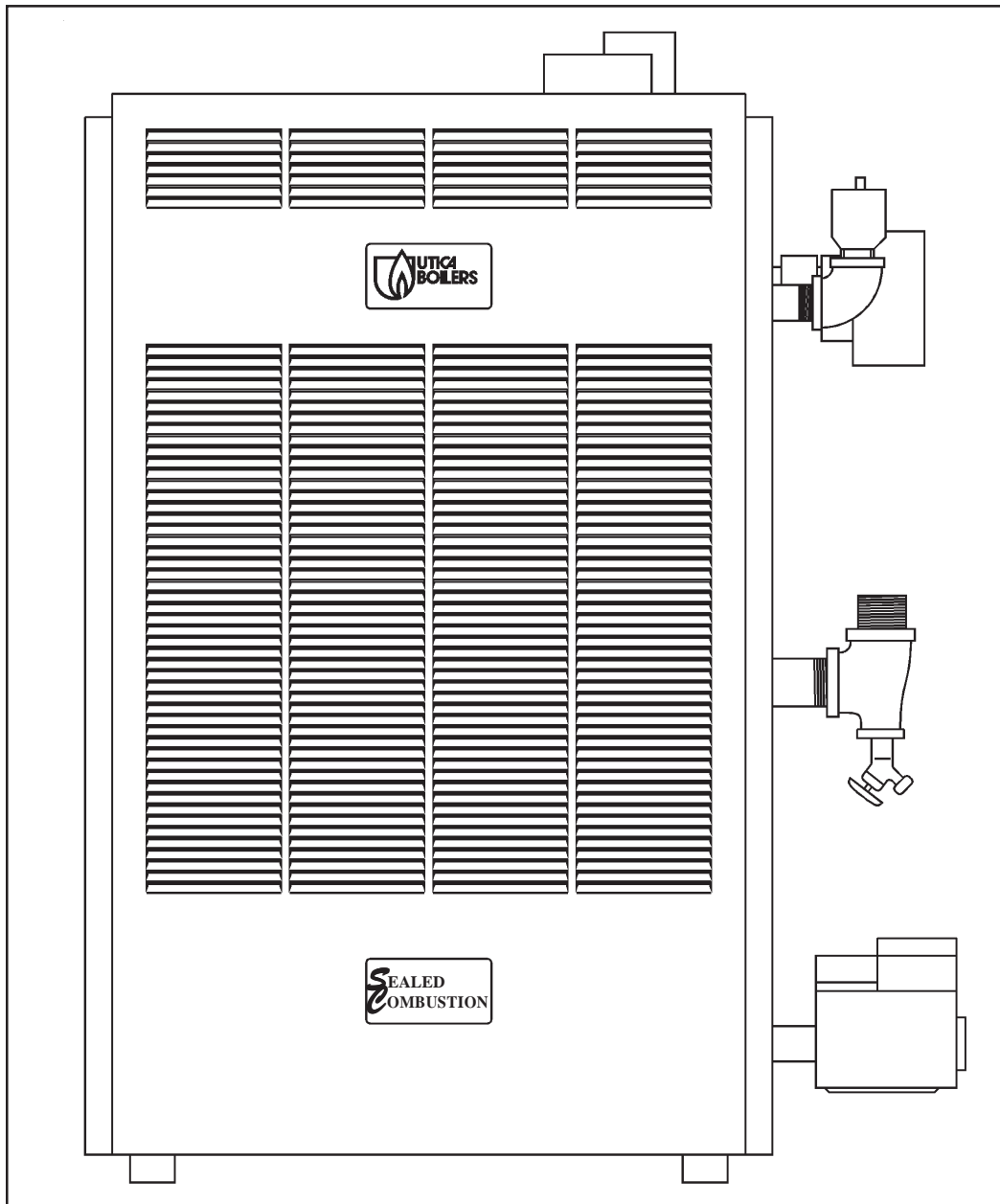


USC

DIRECT VENT GAS FIRED BOILERS
FOR FORCED HOT WATER



Utica Boilers, Inc. • P.O. Box 4729 • Utica, NY 13504

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KEEP THIS MANUAL NEAR BOILER
RETAIN FOR FUTURE REFERENCE

SERIES USC
CAST IRON
GAS FIRED BOILERS

INSTALLATION MANUAL AND
OPERATING INSTRUCTIONS

Published September 2004
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Made in USA

Safety Symbols

The following defined symbols are used throughout this manual to notify the reader of potential hazards of varying risk levels.

DANGER

DANGER - Indicates an imminently hazardous situation which, if not avoided, **WILL** result in death or serious injury.

WARNING

WARNING - Indicates a potentially hazardous situation which, if not avoided, **COULD** result in death or serious injury


CAUTION

CAUTION - Indicates a potentially hazardous situation which, if not avoided, **MAY** result in minor or moderate injury. It may also be used to alert against unsafe practices.

IMPORTANT! READ ALL INSTRUCTIONS BEFORE INSTALLING.

WARNING:

1. Keep boiler area clear and free from combustible materials, gasoline and other flammable vapors and liquids.
2. **DO NOT** obstruct air openings to the boiler room.
3. Modification, substitution or elimination of factory equipped, supplied or specified components may result in property damage, personal injury or the loss of life.
4. To the owner: Installation and service of this boiler must be performed by a qualified installer.
5. To the installer: Leave all instructions with the boiler for future reference.
6. When this product is installed in the Commonwealth of Massachusetts, the installation must be performed by a licensed Plumber or Licensed Gas Fitter.

 **WARNING:** ALL INSTALLATIONS OF BOILERS AND VENTING SHOULD BE DONE ONLY BY A QUALIFIED EXPERT AND IN ACCORDANCE WITH THE APPROPRIATE UTICA BOILERS, INC. MANUAL. INSTALLING OR VENTING A BOILER OR ANY OTHER GAS APPLIANCE WITH IMPROPER METHODS OR MATERIALS MAY RESULT IN SERIOUS INJURY OR DEATH DUE TO FIRE OR TO ASPHYXIATION FROM POISONOUS GASES SUCH AS CARBON MONOXIDE WHICH IS ODORLESS AND INVISIBLE.

INSTALLATION PROCEDURE



WARNING:

Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage.

1. The installation must conform to the requirements of the authority having jurisdiction or, in absence of such requirements to one of the following:

When installed in the United States: The latest revision of the National Fuel Gas Code, ANSI Z223.1. (Available from the American Gas Association, Pleasant Valley Road, Cleveland, Ohio 44134.) Reference should also be made to local gas utility regulations and other codes in effect in the area in which the installation is to be made.

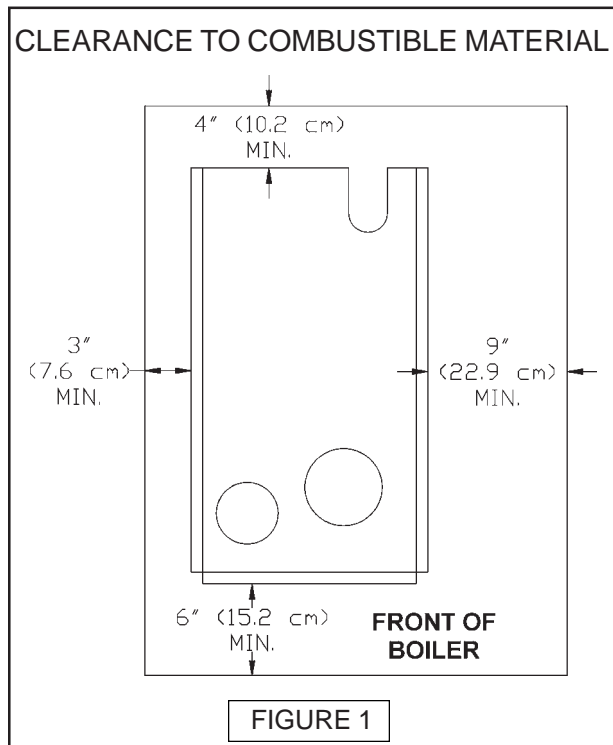
When installed in Canada: The latest revision of the CAN1-B149.1 and/or B149.2 Installation Codes for Gas-Burning Equipment and/or local codes.

2. Where required by the authority having jurisdiction, the installation must conform to American Society of Mechanical Engineers Safety Code for Controls and Safety Devices for Automatically Fired Boilers, ANSI/ASME No. CSD-1.
3. This boiler is classified as a Direct Vent and vent installation shall be in accordance with Part 7 of the latest revision of the National Fuel Gas Code, ANSI Z223.1 when installed in the United States. In Canada refer to the CAN1-B149.1 and/or B149.2 Installation Codes for Gas-Burning Equipment. Also refer to applicable provisions of the local building codes.
4. LOCATE BOILER on level, solid base as near the outside wall as possible and centrally located with respect to the heat distribution system as practicable.
5. 24 inches (61 cm) of clearance is recommended at the front and right side for servicing and cleaning.
6. When installed in utility room, the door should be wide enough to allow the largest boiler part to enter, or to permit replacement of another appliance such as a water heater.
7. The boiler shall be installed such that 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.).
8. THIS BOILER IS DESIGN CERTIFIED FOR INSTALLATION ON NON-COMBUSTIBLE FLOORS ONLY. FOR INSTALLATION ON COMBUSTIBLE FLOORING SPECIAL BASE PART NUMBER 325-2-8.00 MUST BE USED. The boiler must **NEVER** be installed on carpeting. Minimum clearances to combustible constructions are:

TOP	18 IN. (46 cm)
FLUE CONNECTOR	2 IN. (5 cm)
FRONT	6 IN. (15 cm)
REAR	4 IN. (10 cm)
RIGHT SIDE	9 IN. (23 cm)
LEFT SIDE	3 IN. (8 cm)

(SEE FIGURE 1 AT RIGHT)

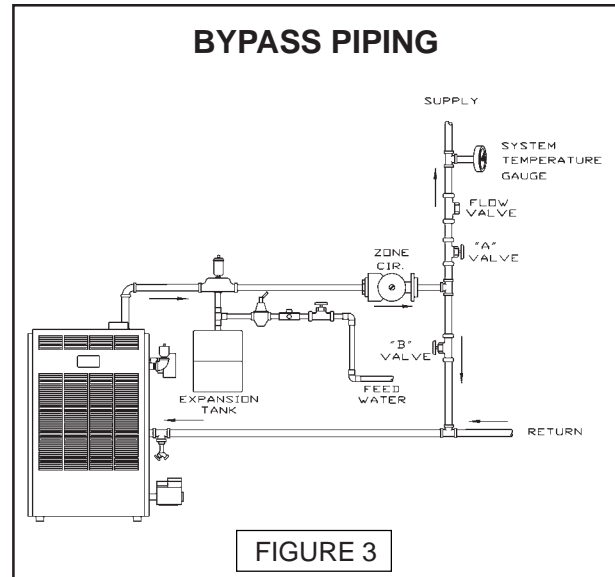
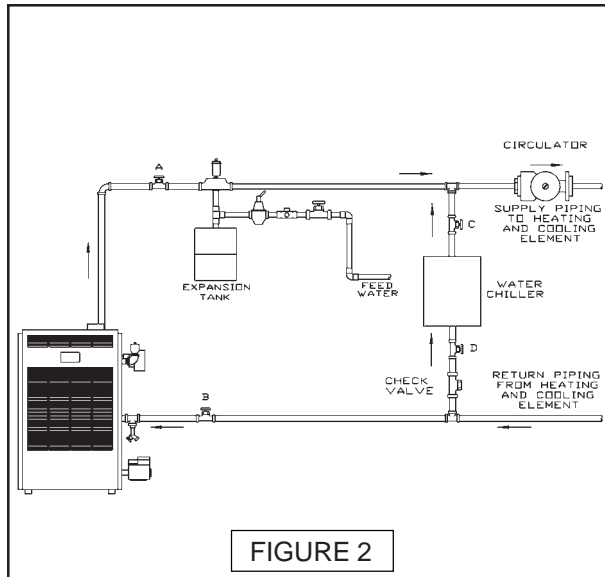
NOTE : GREATER CLEARANCES FOR ACCESS SHOULD SUPERSEDE FIRE PROTECTION CLEARANCE.



CONNECTING SUPPLY AND RETURN PIPING

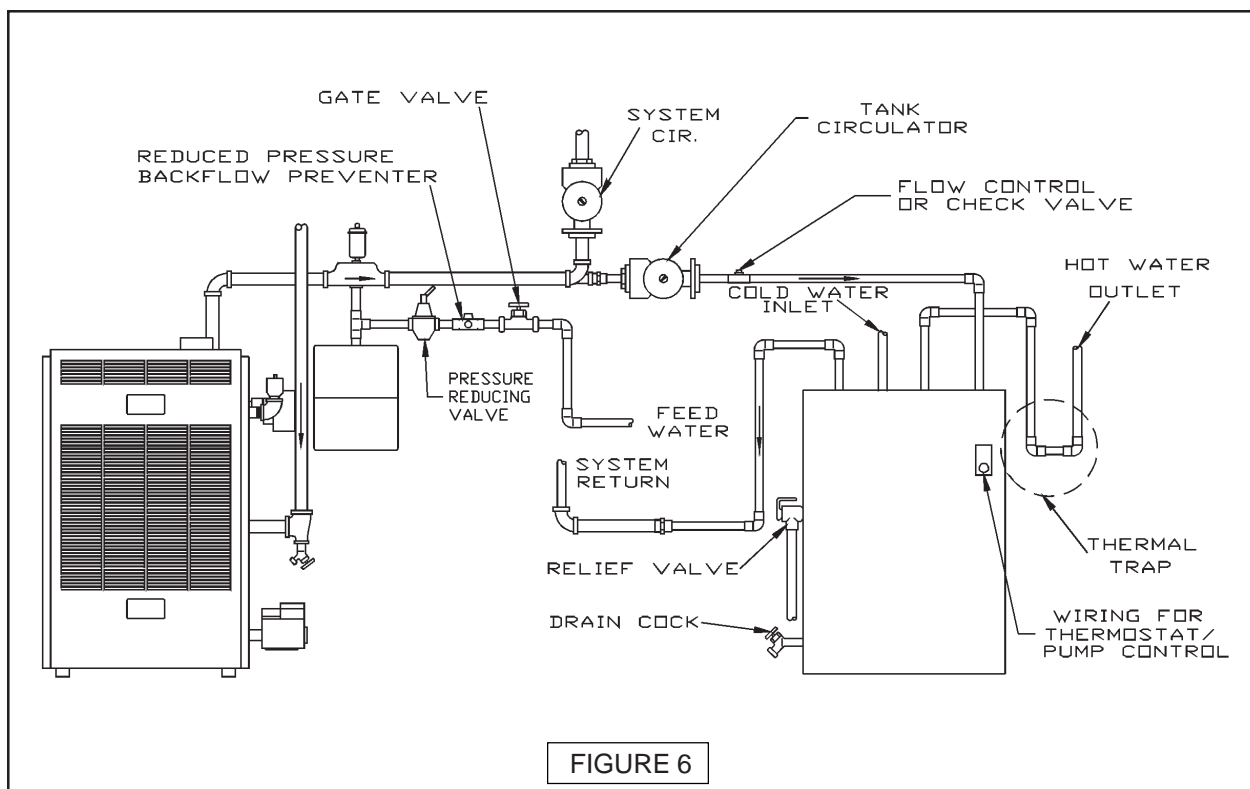
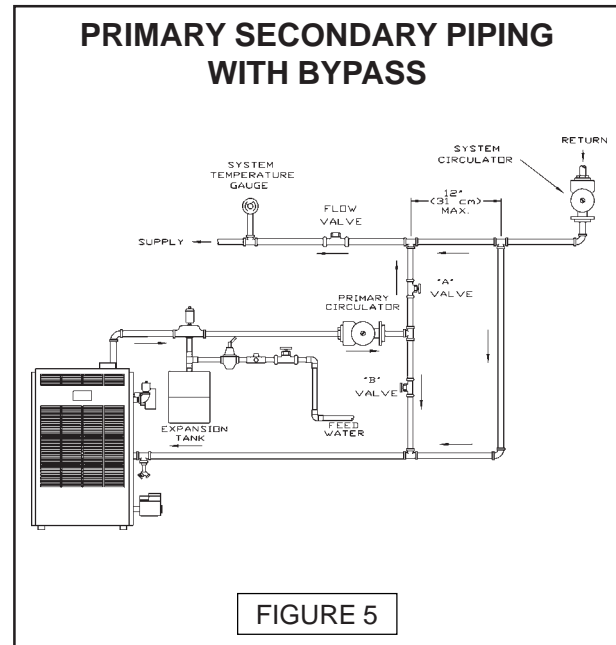
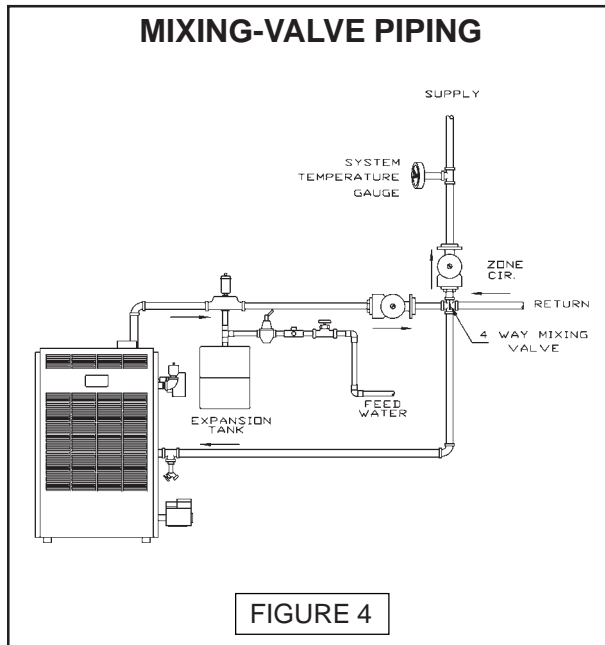
IMPORTANT: Circulators in the following illustrations are mounted on the system supply side, but mounting on the system return side is also acceptable practice.

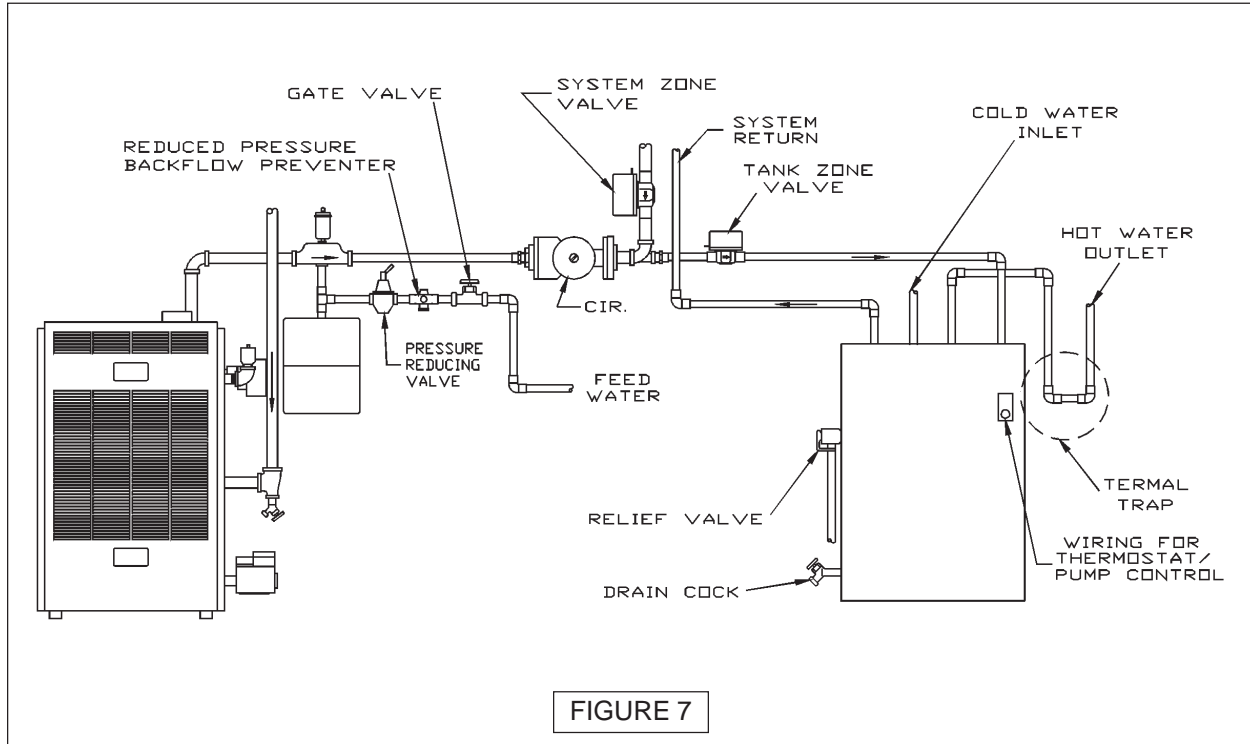
1. Connect supply and return piping as suggested in figure 2 below when the boiler is used in connection with refrigerated systems:
 - A. The chilled medium **MUST BE IN PARALLEL** with the boiler.



- B. Use appropriate valves to prevent the chilled medium from entering the heating boiler.
 1. During heating cycle open valves A and B. Close valves C and D.
 2. During cooling cycle open valves C and D, close valves A and B.
 - C. Maintain a minimum clearance of 1 inch (2.54 cm) to hot water pipes. In air handling units where they may be exposed to refrigerated air circulation, the boiler piping system **MUST** be supplied with flow control valves or other automatic means to prevent gravity circulation of the boiler water during the cooling cycle.
2. Hot water boilers installed above radiation level must be provided with a low water cut-off device at the time of boiler installation.
3. When a boiler is connected to a heating system that utilizes multiple zoned circulators, each circulator must be supplied with a flow control valve to prevent gravity circulation.
 - * Reduced pressure back flow preventer must be used under provisions required by the Environmental Protection Agency, (EPA).
4. Bypass piping is an option which gives the ability to adjust the supply boiler water temperature to fit the system or condition of the installation. This method of piping is not typically required for baseboard heating systems.
 - A. This method is used to protect boilers from condensate forming due to low temperature return water. Generally noticed in large converted gravity systems or other large water volume systems. See figure 3 above.
 - B. These methods are used to protect systems using radiant panels and the material they are encased in from high temperature supply water from the boiler and protect the boiler from condensation. See figures 4 & 5 below.
5. Note: When using bypass piping, adjust valves A and B, in figures 3 and 5, until desired system temperature is obtained.

6. Note: When using a 4-way mixing valve, set control knob until desired temperatures are met. See instruction supplied with valve.
7. Bypass loop piping must be the same size piping as the supply and the return.
8. Typical installation using circulators is shown in figure 6 on page 4.
9. Typical installation using zone valves is shown in figure 7, below.
10. For further piping information refer to the I=B=R installation and piping guide.





GENERAL INFORMATION GAS VENTS AND APPLIANCES

By Federal Codes, gas appliances are categorized by the pressure and temperature of the flue gas vented from the appliance. Category I and II appliances are natural draft (draft hood) vented, with high flue gas temperatures (Category I), or low flue gas temperatures (Category II). Category III and IV appliances are fan forced vents with high temperature (Category III) or low temperature (Category IV) flue gasses. Appliance efficiency is directly related to flue gas temperature. Higher efficiency appliances remove more heat from the gas, so they will have lower temperature flue products. When flue gas temperatures are lowered, corrosive condensates may form in the gas vent or in the appliance. Condensates may form in Category II, III, IV appliance vents, so special corrosive resistant venting systems are required for higher efficiency appliances.

! WARNING: Vents for Category I appliances may not be suitable for use with Category II, III, or IV appliances because condensate may corrode the vent.

! WARNING: Vents for Category III appliances may not be suitable for use with Category I appliances because flue gas temperatures may be too high.

Proper operation of the vent system and appliance is dependent upon the use of all parts specified by the manufacturer for use in the particular installation. Appliance and vent system performance may be affected by improper assembly.

VENT PIPE MODIFICATION

When an existing boiler is removed from a common venting system, the common venting system is likely to be too large for the proper venting of the appliances remaining connected to it. If this situation occurs, the following test procedure must be followed:

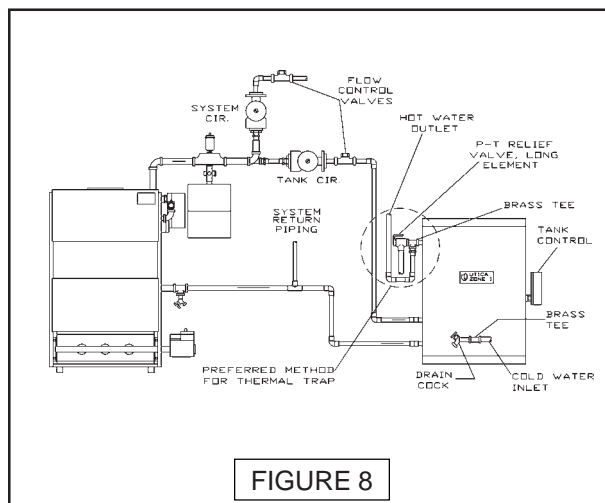
REMOVAL OF BOILER FROM VENTING SYSTEM

At the time of removal of an existing boiler, 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 the common venting system are not in operation.

1. Seal any unused openings in the common venting system.
2. Visually inspect the venting system for proper size and horizontal pitch and determine there is no blockage or restriction, leakage, corrosion and other deficiencies which could cause an unsafe condition.
3. Insofar as is practical, close all building doors and windows and all doors between the space in which the appliances remaining connected to the common venting system are located and other spaces of the building. Turn on clothes dryers and any appliance not connected to the common venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they will operate at maximum speed. Do not operate a summer exhaust fan. Close fireplace dampers.
4. Place in operation the appliance being inspected. Follow the lighting instructions. Adjust thermostat so 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, cigar or pipe.
6. After it has been determined that each appliance remaining connected to a common venting system properly vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gas burning appliance to their previous conditions of use.
7. Any improper operation of the common venting system should be corrected so the installation conforms with either the latest revision of the National Fuel Gas Code, ANSI Z223.1, (when installed in the United States) or the CAN1-B149.1 and/or B149.2 Installation Codes for Gas-Burning Equipment, (when installed in Canada). 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 latest revision of the National Fuel Gas Code, ANSI Z223.1 or the CAN1-B149.1 and/or B149.2 Installation Codes for Gas-Burning Equipment.

CONNECT GAS SERVICE

Connect gas service meter to control assembly in accordance with the latest revision of ANSI Z223.1 and local codes or utility. A ground joint union should be installed for easy removal of gas control for servicing. A drip or trap must be installed at the bottom of a vertical section of piping at the inlet to the boiler. A pipe compound resistant to the action of liquefied petroleum gases must be used on all threaded pipe connections. Check with the local utility for location of manual shutoff valve if required. (See figure 8 at right.)



1. The gas line should be of adequate size to prevent undue pressure drop and never smaller than the pipe size of the main gas control valve. See chart below.

**Maximum Capacity of Pipe in Cubic Feet of Gas Per Hour (Cubic Meters per Hour)
(Gas pressure = 0.5 psig (3.45 kPa) or less pressure drop = .5 in.w/c(1.27 cm w/c))**

Nominal Iron Pipe Size	Length of Pipe						
	10'	20'	30'	40'	60'	80'	100'
	(3.05m)	(6.10m)	(9.14m)	(12.19m)	(18.29m)	(24.38m)	(30.48m)
1/2"	175	120	97	82	66	57	50
(1.27 cm)	(4.96)	(3.40)	(2.75)	(2.32)	(1.87)	(1.61)	(1.42)
3/4"	360	250	200	170	138	118	103
(1.91 cm)	(10.20)	(7.08)	(5.66)	(4.81)	(3.91)	(3.34)	(2.92)
1"	680	465	375	320	260	220	195
(2.54 cm)	(19.26)	(13.17)	(10.62)	(9.06)	(7.36)	(6.23)	(5.52)
1.1/4"	1400	950	770	660	530	460	400
(3.18 cm)	(39.65)	(26.90)	(21.81)	(18.69)	(15.01)	(13.03)	(11.33)

For additional information refer to Part 10, table 10-2 of the National Fuel Gas Code Handbook, or in Canada, the CAN1-B149.1 and/or B149.2 Installation Codes for Gas-Burning Equipment.

2. To check for leaks in gas piping, use a soap and water solution or other approved method.



WARNING: DO NOT USE AN OPEN FLAME.

3. The boiler and its individual shutoff valve must be disconnected from the gas supply piping system during any pressure testing of that system at test pressures in excess of 1/2 psig (3.5 kPa).
4. The boiler must be isolated from the gas supply piping system by closing its individual manual shutoff valve during any pressure testing of the gas supply piping system at test pressures equal to or less than 1/2 psig (3.5 kPa).

ELECTRICAL WIRING

Electrical wiring must conform with National Electrical Code, ANSI/NFPA No. 70 when installed in the United States, the CSA C22.1 Canadian Electrical Code, Part 1, when installed in Canada, and/or the local authority having jurisdiction.

1. When an external electrical source is utilized, the boiler, when installed, **MUST BE** electrically grounded in accordance with these requirements.
2. Install a fused disconnect switch between boiler and meter at a convenient location.

3. COMPONENT CODING (SEE WIRING DIAGRAM ON PAGE 9)

TH-1	Thermostat (millivolt)	1K2	Relay Contacts
TH-2	Thermostat (24 Volt)	LS	Limit Switch
TH-3	Thermostat (Line Voltage)	MS	Manual Switch
TR-1	Transformer (120V/24V 40VA)	CIR	Circulator
TR-2	Transformer (120V/24V 50VA)	ECO	Energy Cut-Off
LGV	24 Volt Gas Valve	PSC	Pilot Safety Coil
LGV-1	24 Volt Gas Valve	—●—	Wire Connection
PS	Pressure Switch	LWCO	Low Water Cut Off
MR-PS	Manual Reset Pressure Sw.	EWf	Electric Water Feeder
—○—	Control Terminal	PG	Power Generator
1K	Relay Coil	RSW	Roll-Out Switch
1K1	Relay Contacts		

NOT ALL COMPONENTS LISTED ARE USED IN ALL CONTROL SYSTEMS.

4. Honeywell hot water control and hot surface ignition wiring for USC series boilers.
See figure 9 on page 9.

NOTES:

- Switches are shown in position during the heating cycle.
- If any of the original wiring supplied with the boiler is replaced it must be replaced with like wire size and type of insulation or equivalent.

5. WIRING CODE

—————	LINE VOLTAGE BY FACTORY
—————	LOW VOLTAGE BY FACTORY
- - - - -	LINE VOLTAGE BY INSTALLER
- - - - -	LOW VOLTAGE BY INSTALLER

HOT WATER CONTROL AND HOT SURFACE PILOT WIRING FOR USC SERIES

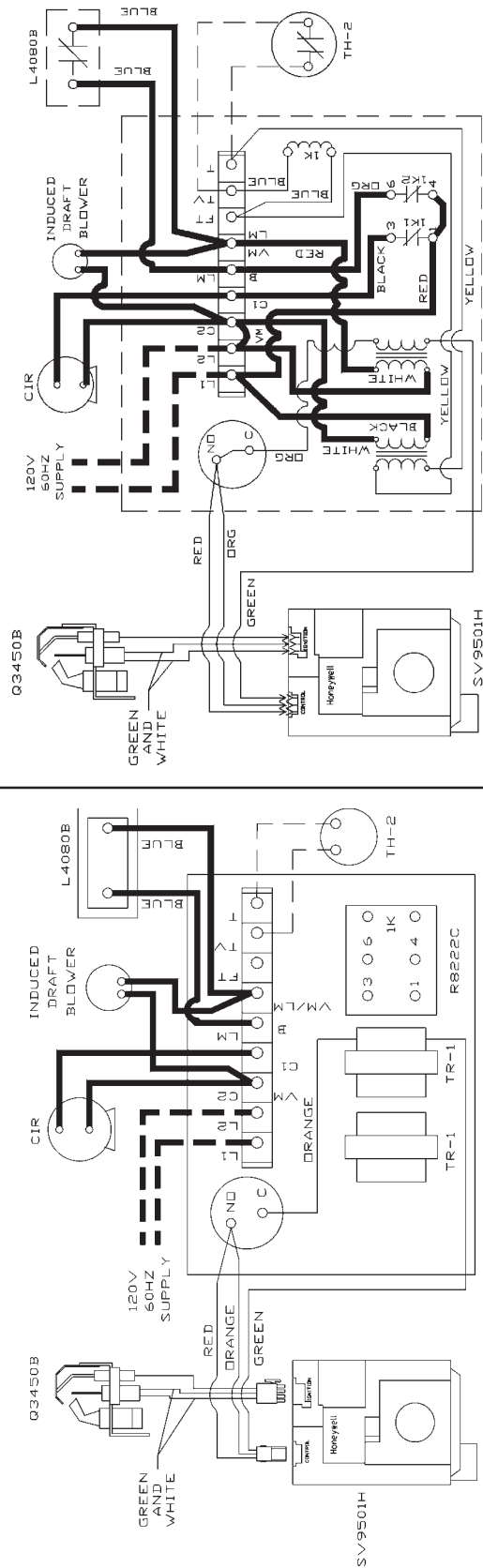


FIGURE 9

COMPONENT CODE


COMPONENTS LISTED ARE USED IN ALL CONTROL SYSTEMS	WIRING
TH-1	LINE VOLTAGE BY FACTORY
TH-2	LOW VOLTAGE BY FACTORY
TH-3	LINE VOLTAGE BY INSTALLER
TR-1	LOW VOLTAGE BY INSTALLER
TR-2	LINE VOLTAGE BY FACTORY
MGV	LOW VOLTAGE BY FACTORY
LGV	LINE VOLTAGE BY INSTALLER
LGV-1	LOW VOLTAGE BY INSTALLER


- NOTES:
- 1) SWITCHES ARE SHOWN IN POSITION TAKEN DURING THE HEATING CYCLE.
 - 2) IF ANY OF THE ORIGINAL WIRING SUPPLIED WITH THE BOILER IS REPLACED, IT MUST BE REPLACED WITH LIKE WIRE, SIZE, AND TYPE OF INSULATION OR EQUIVALENT

THERMOSTAT INSTALLATION

1. Thermostat should be installed on an inside wall about 4 ft (122 cm) above the floor.
 2. NEVER install a thermostat on an outside wall.
 3. Do not install a thermostat where it will be affected by:
 - A. Drafts
 - B. Hot or cold pipes
 - C. Sun light
 - D. Lighting fixtures
 - E. Television
 - F. Near a fireplace or chimney
 4. Check thermostat operation by raising and lowering thermostat as required to start and stop the burners.
 5. Instructions for the final adjustment of the thermostat are packaged with the thermostat (adjusting heating anticipator, calibration, etc.).
-

LIGHTING INSTRUCTIONS

 **WARNING:** IF YOU DO NOT FOLLOW THESE INSTRUCTIONS EXACTLY, A FIRE OR EXPLOSION MAY RESULT CAUSING PROPERTY DAMAGE, PERSONAL INJURY OR LOSS OF LIFE.

 **CAUTION:** Before operating, make certain the boiler and system are full of water to minimum pressure (this is usually 12 lbs. per square inch (82.7 kPa) on most systems) and system is vented of air. See the operating and lighting instructions.

LIGHTING PROCEDURE FOR BOILER WITH A HOT SURFACE PILOT SYSTEM FOR YOUR SAFETY READ BEFORE OPERATING

1. This appliance is equipped with an ignition device which automatically lights the pilot. Do not try to light the pilot by hand.
2. Before operating, smell all around the appliance for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

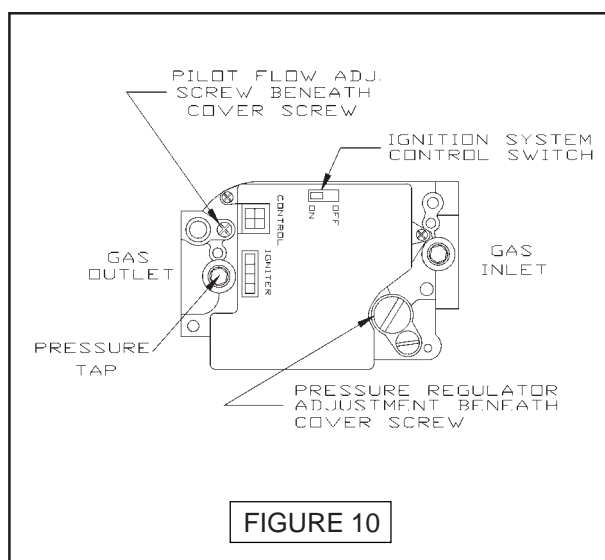
 **CAUTION:** WHAT TO DO IF YOU SMELL GAS

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

3. Use only your hand to move the ignition system control switch. Never use tools. If the switch will not move by hand, don't try to repair it, call a qualified service technician.

! WARNING: 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 gas control which has been under water.



"OPERATING INSTRUCTIONS"

1. STOP! Read the safety information in the user's information manual.
2. Set 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 pilot. DO NOT try to light the pilot by hand.
5. Move the ignition system control switch to the "OFF" position. See figure 10 above.
6. Wait five (5) minutes to clear out any gas. If you then smell gas, STOP. Follow step 2 in the lighting procedure on page 10, "What To Do If You Smell Gas." If you don't smell gas, go to the next step.
7. Move the ignition system control switch to the "ON" position. See figure 10 above.
8. Turn on all electric power to the appliance.
9. Set thermostat to desired setting.
10. If the appliance will not operate, follow the instructions **"TO TURN OFF GAS TO APPLIANCE"** (Below) and call a qualified service technician or your gas supplier.

TO TURN OFF GAS TO APPLIANCE

1. Set thermostat to lowest setting.
2. Turn off all electric power to the appliance if service is to be performed.
3. Move the ignition system control switch to the "OFF" position. **DO NOT FORCE**

SEQUENCE OF OPERATION

On a call for heat:

- 1.) The thermostat will actuate, completing the circuit between terminals T and T.
- 2.) The R8222C relay coil will energize thus pulling in the relay contacts.
- 3.) The circulator starts and power is switched to the limit. If limit circuit is closed the venter motor and TR-2 transformer are energized.
- 4.) The venter motor starts and develops static pressure.
- 5.) When the static pressure is reached the pressure switch pulls in completing the circuit between TR-2 and the SV9501H gas valve system.
- 6.) The SV9501H opens the pilot valve and ignites pilot. After pilot is proven the main burner will ignite.
- 7.) In the event the boiler water temperature exceeds the high limit setting the power will be interrupted to the venter motor, and TR-2, thus interrupting power to the ignition system. Power will remain off until the water temperature drops below the high limit setting. The circulator will continue to operate under this condition until the thermostat is satisfied.
- 8.) Should the air flow (static pressure) be interrupted (ie. blocked flue), the pressure switch will sense a drop in pressure, opening the circuit between the ignition system and TR-2. The venter motor will continue to operate until static pressure is reached or thermostat is satisfied.
- 9.) In the event the flow of combustion products through the boiler flueways becomes reduced or blocked, the Q34505 pilot will lose flame rectification and shut off the main burners. The boiler will try for ignition but will not light. If this condition occurs, turn off the main power and do not put the unit into operation.
- 10.) When the thermostat is satisfied power is interrupted to the relay coil and the relay drops out cutting power to the circulator, venter motor, and TR-2.

GENERAL INSTRUCTION FOR SEASONAL START UP AND MAINTENANCE

It is suggested that a qualified service agency be employed to make an annual inspection of the boiler and the heating system. They are experienced in making the inspection outlined below. In the event repairs or corrections are necessary they can make the proper changes for safe operation of the boiler.

CAUTION: Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after service.

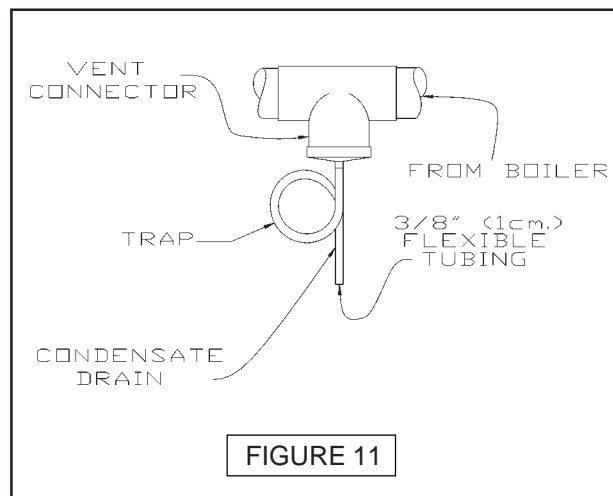
1. 1. BEGINNING OF EACH HEATING SEASON

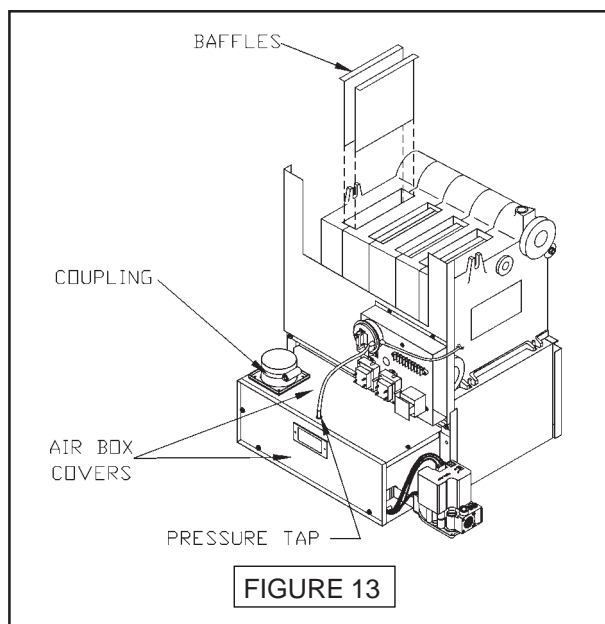
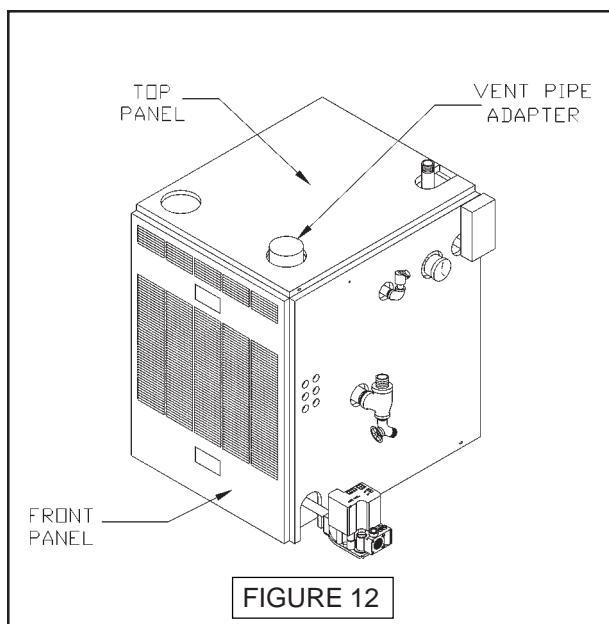
- A. Before seasonal start up it is advisable to have a competent service agency check the boiler for soot and scale in the flues, clean the burners and check the gas input rate to maintain high operating efficiency and safe operation.
- B. The service agency should make certain the system is filled with water to minimum pressure and open air vents - if used - to expel any air that may have accumulated in the system.
- C. Check automatic air vents for leakage.
- D. Inspect the venting system at the start of each heating season. Check the pipe from the boiler for signs of deterioration and sagging joints. Repair if necessary. Remove the vent pipe from the boiler and check for obstructions.
- E. Clean condensate tee & trap.

Periodically check the condensate trap for water/condensate. The trap should always have water in it. Refill the trap if it runs dry. If the trap runs dry then flue gasses can escape.

Periodic cleaning of the condensate collection system is required. When a condensate collection system is installed in a venting system, it is recommended that the cleaning become a part of the annual servicing. The procedure for cleaning this system is as follows:

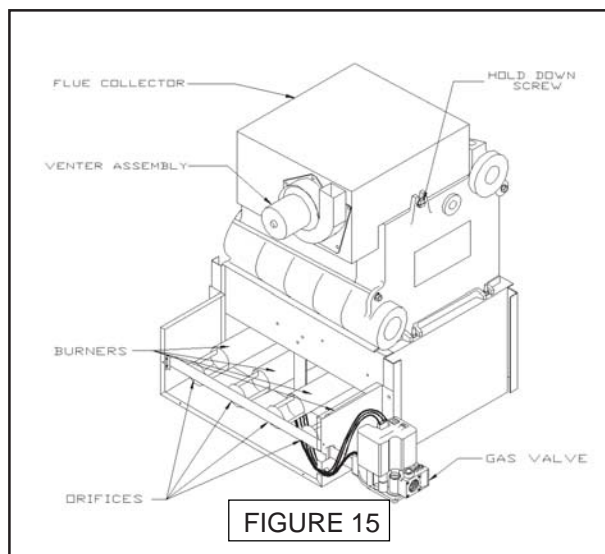
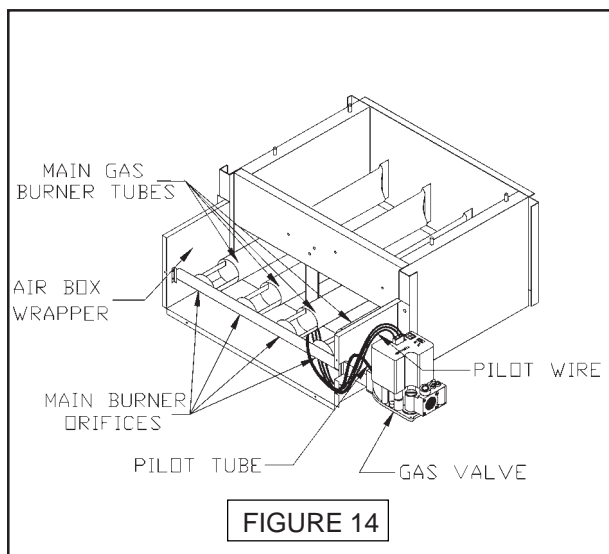
- 1. Remove tubing from condensate tee.
- 2. Empty all liquid from tubing.
- 3. Rinse tubing inside & out in a sink with water.
- 4. If the inside of the tubing cannot be cleaned, the tubing should be replaced with the same type and size of tubing.
- 5. Add water to trap before replacing.
- 6. Replace tubing as described in figure 11 above.
- 7. Visually inspect entire piping system and if any leaks appear, have them repaired as soon as possible. DO NOT use petroleum based stop leak compounds.





2. THE FOLLOWING PROCEDURE SHOULD BE FOLLOWED TO CLEAN AND CHECK THE FLUE GAS PASSAGEWAYS:

- A. Turn off gas to the boiler at the manual gas valve.
- B. Remove the jacket front panel. (See figure 12 above.)
- C. Disconnect the vent pipe from the vent pipe adapter.
- D. Disconnect the air inlet pipe from the coupling. (See figure 13 above for coupling location.)
- E. Remove the air box covers. (See figure 13 above.)
- F. Remove the burners from the combustion chamber by raising the burners up from the manifold orifices and pulling toward the front of the boiler. (See figure 14 below.)
- G. Remove the top panel. (See figure 12 above.)
- H. Remove the flue collector and venter assembly from the boiler castings by removing the hold-down screws located on each side of the flue collector. (See figure 15 below.)
- I. Remove the baffles from the heat exchanger. (See figure 13 above.)



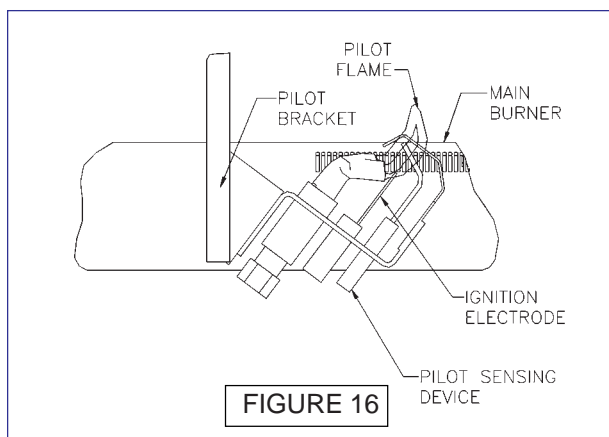


FIGURE 16

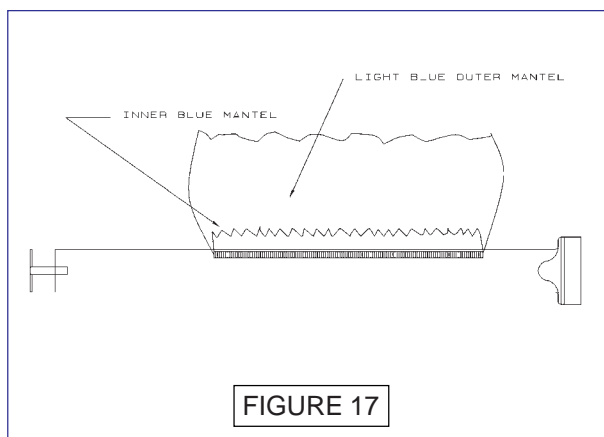




FIGURE 17

- J. Visually inspect the baffles for any unusual wear or soot build up. Clean if necessary.
- K. Visually inspect the venter assembly for any unusual wear or dirt build up. Vacuum if necessary.
- L. Place a sheet of heavy paper or similar material in the bottom of the combustion chamber and brush down the flue passageways. The soot and scale will collect on the paper and is easily removed with the paper.
- M. Replace the Flue Collector using the hold down screws and silicone in place with GE IS 808 silicone or similar. (See figure 15 on page 14.)
- N. Repeat steps A-E in reverse order to reassemble the boiler.
- O. Start boiler to insure proper operating condition.
 - 1. KEEP the area around the boiler clean and free of combustible materials such as gasoline, paints, paint thinner and other such flammable vapors and liquids.
 - 2. The free flow of combustion and ventilating air to the boiler and boiler room **must not** be restricted or blocked.
 - 3. Some circulators require periodic servicing. These circulators usually have oil cups or openings at each end of the motor and one for the shaft bearing. Put about one teaspoon of SAE 20 or 30 non-detergent motor oil in each opening twice per year. DO NOT OVER OIL. Follow the manufacturer's instructions attached to the circulator. When oil cups or holes are not provided, bearings are either permanently lubricated or water lubricated.

3. VISUALLY CHECK THE MAIN BURNERS AND PILOT FLAME AT THE START OF EACH HEATING SEASON AND AGAIN MIDWAY THROUGH THE SEASON.



- A. Check the burner throats and burner orifices for lint and dust obstructions. See figure 15 on page 14.
- B. The main burner flame should have a well defined inner blue mantle with a lighter blue outer mantle. (See figure 16 above.)
- C. The pilot flame should envelop 3/8" (.95 cm) to 1/2" (1.27 cm) of the tip of the pilot sensing device. (See figure 17 above.)

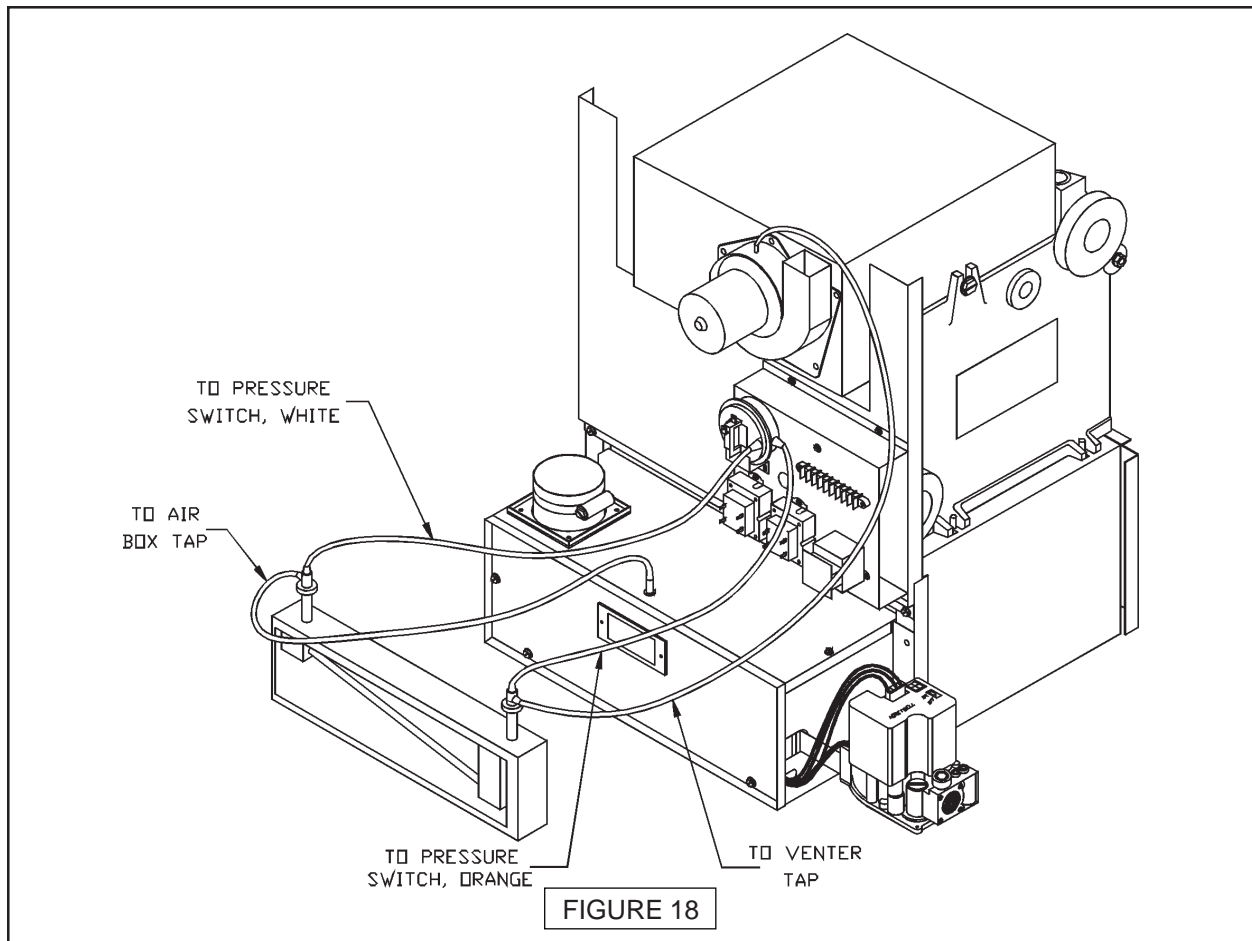
4. ADJUSTING THE PILOT FLAME:

- A. Remove the pilot adjustment cover screw.
- B. Turn inner screw (adjustment screw) clockwise  to decrease and counterclockwise  to increase the pilot flame, see figure 10 on page 11.
- C. After adjustment, be sure to replace cover screw to prevent possible gas leakage.
- D. The main burners and the pilot burner should be checked for signs of corrosion or scale build up.
- E. Clean main burners and pilot burner with a steel bristle brush.



CHECK VENTER STATIC PRESSURE AS FOLLOWS:

(Refer to figure 18 below for the following instructions.)

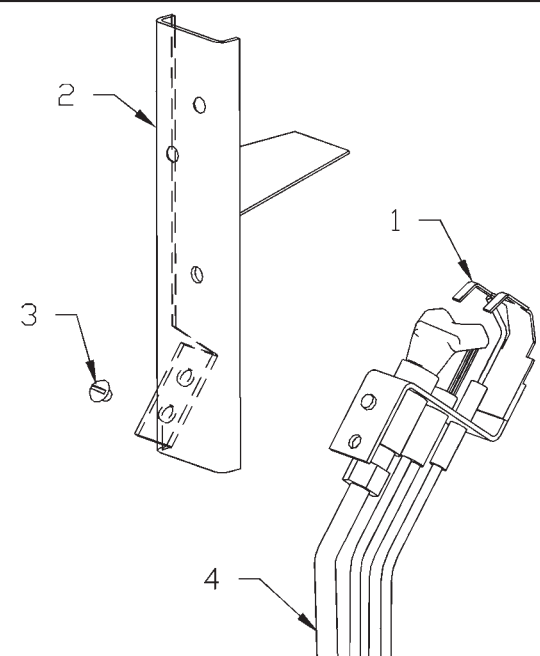
1. With the boiler off, disconnect the orange and white tubings from the pressure switch on the air box and venter motor.
2. Install a 3/16" (.48 cm) plastic barbed tee between a slope manometer and the pressure switch. ( **CAUTION:** Do not cut original tubing. Additional tubing is required.) If the tubing is cut, replace it only with O.E.M. high temperature silicone tubing.  **CAUTION:** Do not replace with vinyl or plastic tubing because it will melt.
3. The other part of the tee goes to the air box and venter pressure taps.
 - A. Orange being the high negative.
 - B. White being the low negative.
4. Turn the boiler back on and read the static pressure. The reading should be - .55±.05 inches water column or higher for the USC series boilers.
5. If the static pressures are not at the minimum allowable level, check the intake and exhaust pipes for obstructions or damage.
6. To reassemble, remove the tees and additional tubing and replace the orange tube to the venter tap, and the white tube to the air box tap.



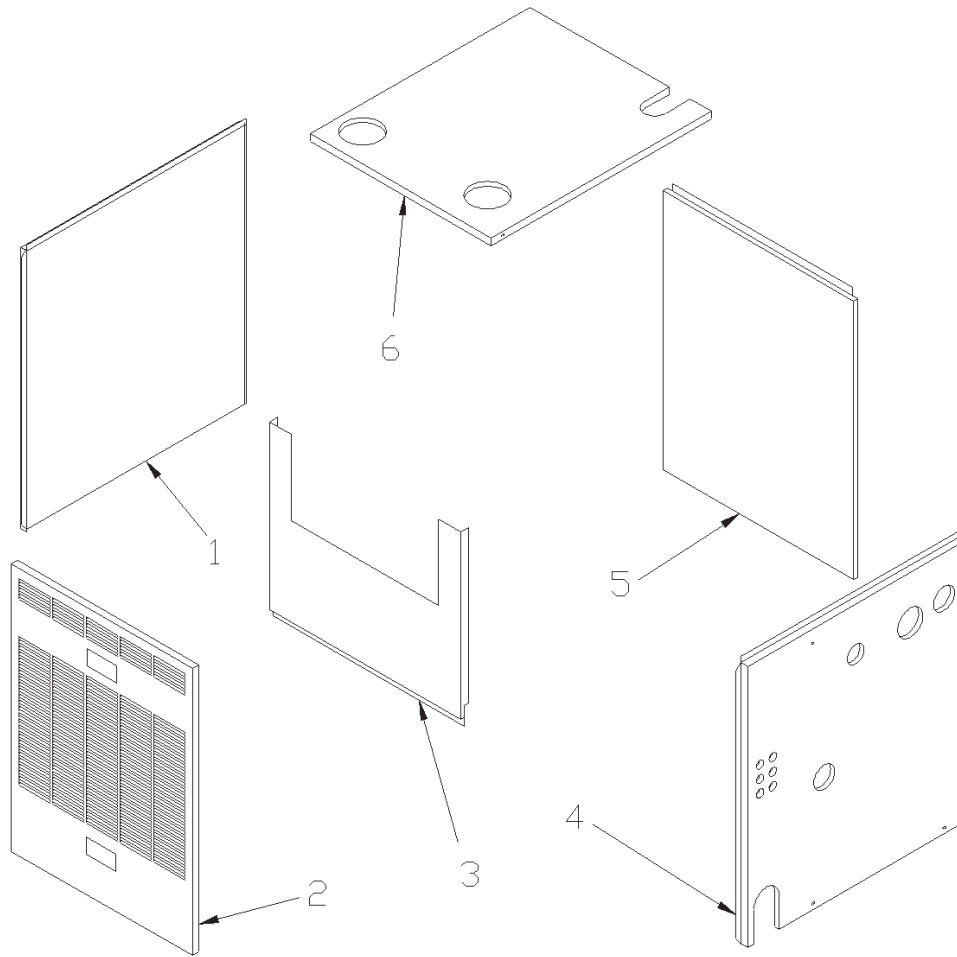
CHECK GAS INPUT RATE TO BOILER

1. Maximum permissible gas supply pressure must not be higher and minimum supply pressure must not be lower than what is specified on the rating plate.
2. To check for proper flow of natural gas to boiler using the gas meter, proceed as follows:
 - A. Turn off the gas supply to all other appliances, except the boiler.
 - B. With the boiler operating, determine the flow of gas through the meter for two minutes and multiply by 30 to get the hourly rate.
 - C. Divide the input rate shown on the rating plate by the heating value of the gas as obtained from the local gas company. This will determine the number of cubic feet of gas required per hour.
 - D. If minor adjustment is necessary, install a manometer on the outlet side of the gas valve. Adjust the pressure regulator on the combination gas control. Increase or decrease manifold pressure to obtain gas input required as described on the rating plate. To increase, turn the regulator adjusting screw clockwise  or counterclockwise  to decrease pressure, see figure 10 on page 11. After adjustment has been completed, turn the boiler off and remove the manometer and the shut-off cock.
 - E. Relight all the other appliances turned off in step A above. Be sure all pilot burners are operating.

USC SERIES REPLACEMENT PARTS - PILOT

			
ITEM NO	P/N	DESCRIPTION	QTY.
1	PBO1401	PILOT Q3450B 1039 HW NAT (FOR NATURAL GAS ONLY)	1
	PB01402	PILOT Q3450B 1112 LP USC (FOR PROPANE GAS ONLY)	
2	32711102	BASE - PILOT BRACKET	1
3	HW-024.01	SCREW #10 32X3/16	1
4	MS-003.05	PILOT TUBE 1/4"X24-1/4" ALUMINUM	1
FIGURE 19			

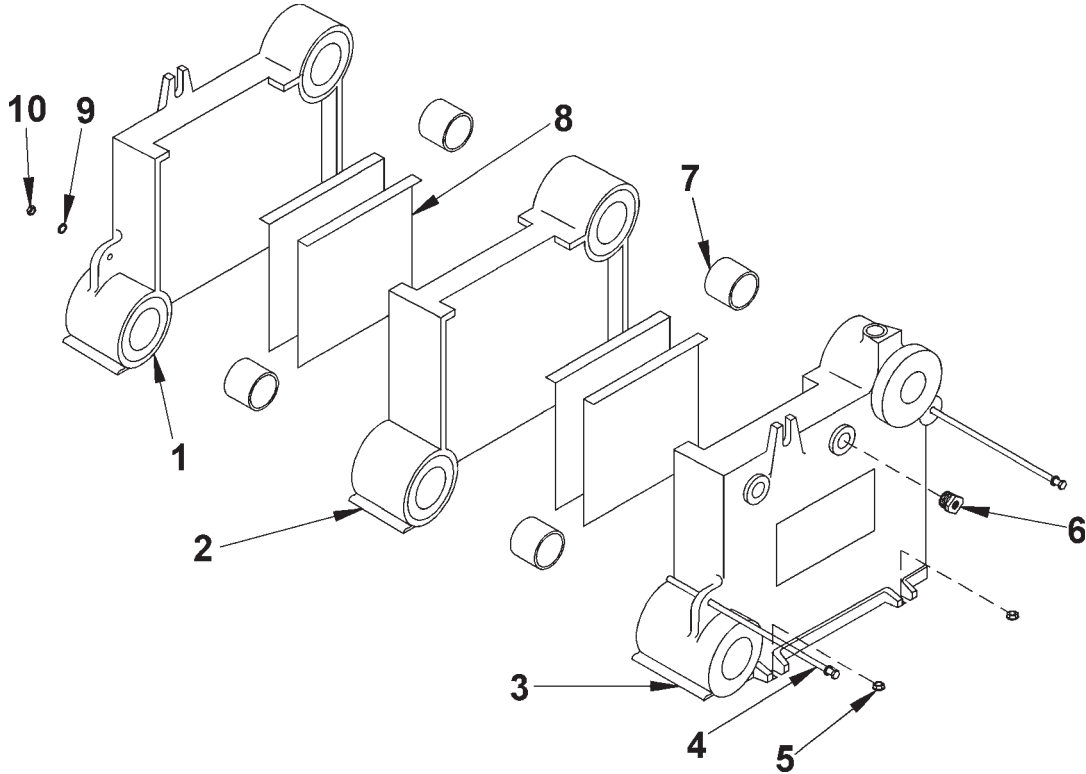
USC SERIES REPLACEMENT PARTS - JACKETS



ITEM #	PART #	DESCRIPTION	QTY.
1	31721102	PANEL - LEFT HAND SIDE	1
2	3172801	PANEL - FRONT USC3	1
	3172802	PANEL - FRONT USC4	
	3172803	PANEL - FRONT USC5	
3	3172401	PANEL - SEPARATOR PLATE USC3	1
	3172402	PANEL - SEPARATOR PLATE USC4	
	3172403	PANEL - SEPARATOR PLATE USC5	
4	31721101	PANEL - RIGHT HAND SIDE	1
5	31721401	PANEL - REAR USC3	1
	31721402	PANEL - REAR USC4	
	31721403	PANEL - REAR USC5	
6	3172201	PANEL - TOP USC3	1
	3172202	PANEL - TOP USC4	
	3172203	PANEL - TOP USC5	

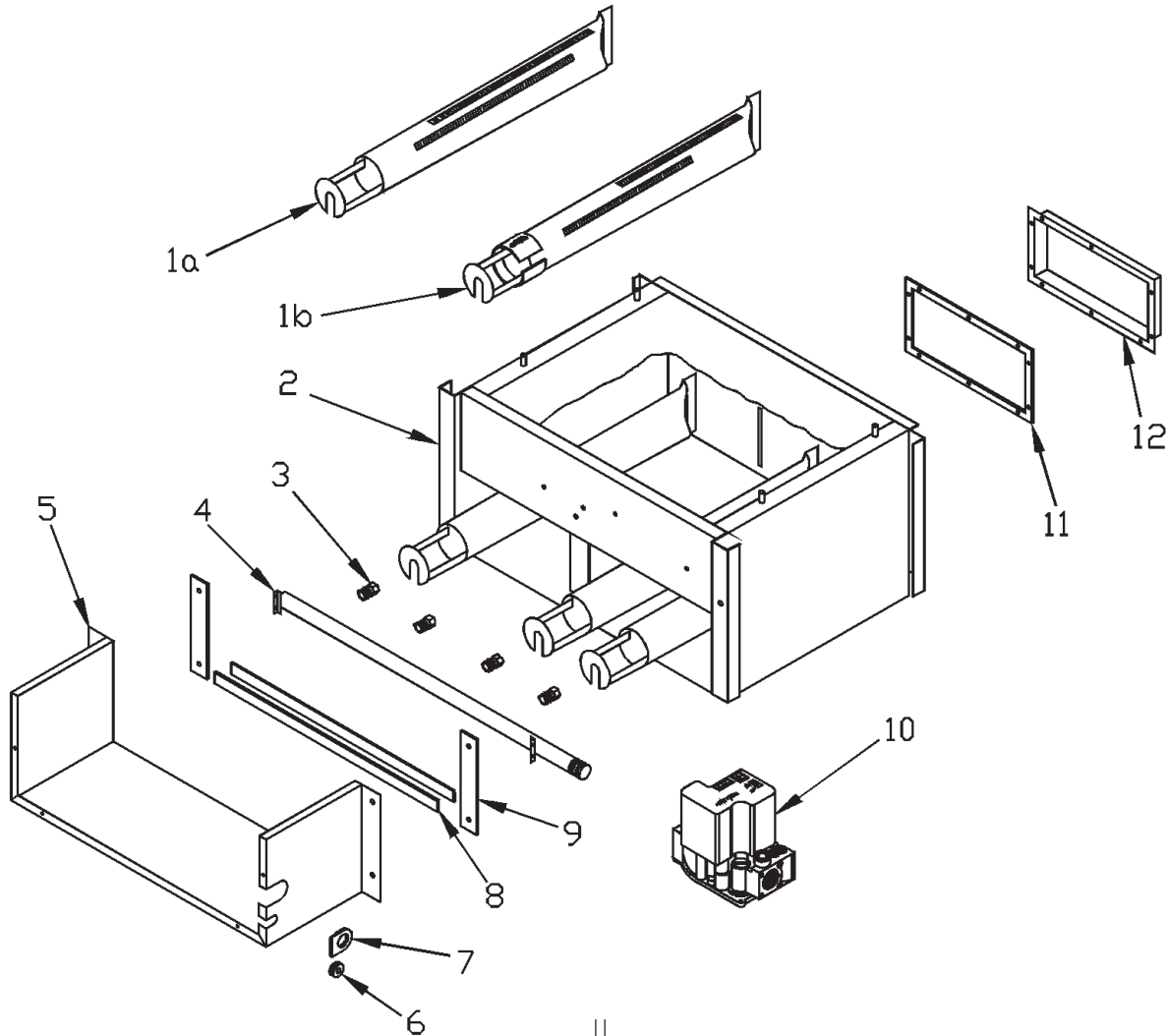
FIGURE 20

USC SERIES REPLACEMENT PARTS HEAT EXCHANGER



ITEM NO.	P/N	DESCRIPTION	QTY.
1	100-2-2.01	B-LEFT HAND SECTION	1
2	100-2-1.01	B-CENTER SECTION	
	USC3 (1)	USC4 (2) USC5(3)	
3	100-2-3.01	B-RIGHT SECTION	1
4	HW-011.01	TIE ROD 1/4X11.1/2 USC3	2
	HW-011.03	TIE ROD 1/4X15.1/2 USC4	
	HW-011.05	TIE ROD 1/4X19.1/2 USC5	
5	HW06901	NUT 5/16-18 WISLOCK	4
6	PF-004.13	PIP FIT - BUSHING 3/4" X 1/4"	1
7	43300976	NIPPLE 2" MACH.	
	USC3 (4)	USC4 (6) USC5(8)	
8	3472301	FLUE COLLECTOR BAFFLE	
	USC3 (4)	USC4 (6) USC5(8)	
9	HW-008.01	WASH-5/16 FLAT STL ZP	4
10	HW-003.02	NUT-1/4-20 HEX-STL ZP	2
FULLY ASSEMBLED HEAT EXCHANGERS			
	100-2-7.01	HEAT EXCHANGER 3 SECTION USC3	
	100-2-7.02	HEAT EXCHANGER 4 SECTION USC4	
	100-2-7.03	HEAT EXCHANGER 5 SECTION USC5	

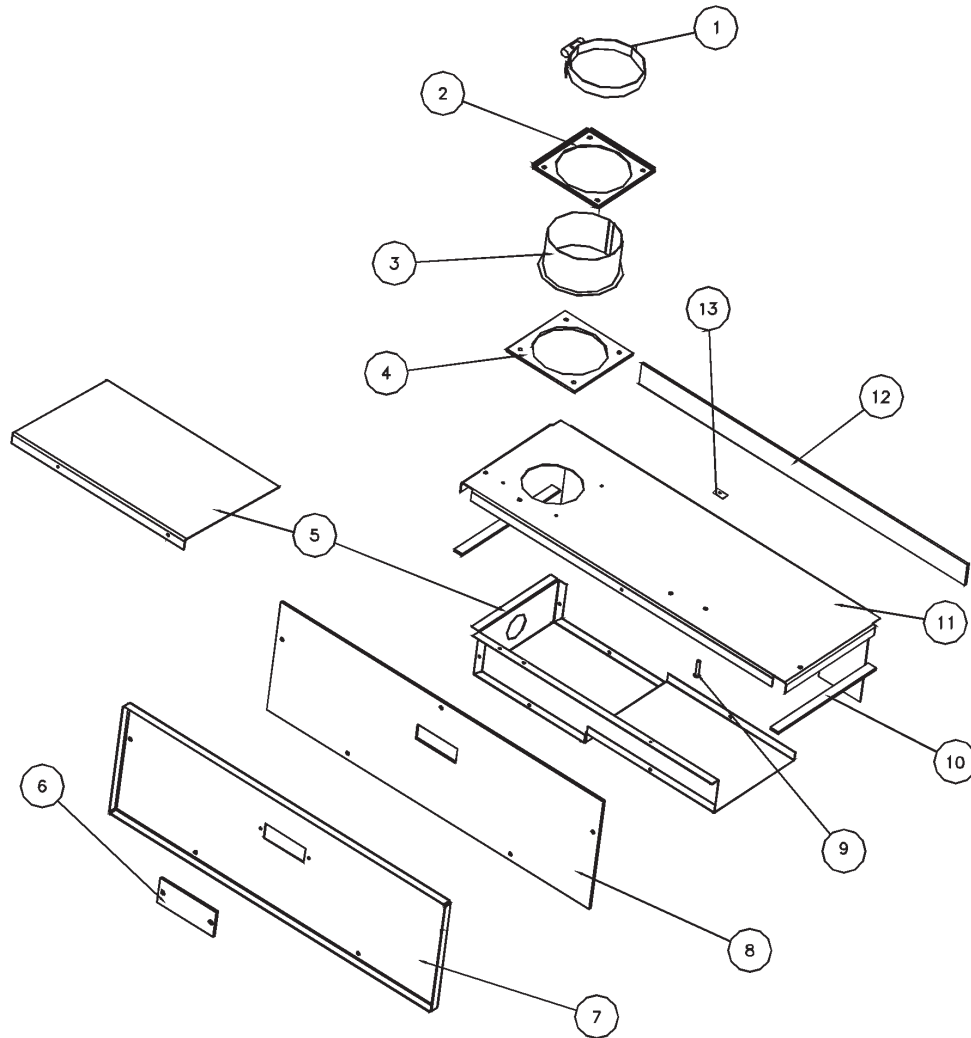
FIGURE 21



ITEM#	PART #	DESCRIPTIONS	QTY.	ITEM#	PART #	DESCRIPTION	QTY.
1a	3352401	BURNER TUBES 1.3/4" NAT (FOR NATURAL GAS ONLY)		5	3272101	AIR BOX WRAPPER USC3	1
1b	3352801	BURNER TUBES 1.3/4" LP (FOR PROPANE GAS ONLY)			3272102	AIR BOX WRAPPER USC4	
		USC3 (2) USC4 (3) USC 5 (4)			3272103	AIR BOX WRAPPER USC5	
2	5611602	KIT - BASE WITH INSUL USC3	1	6	HW10101	PILOT GROMMET	1
	5611603	KIT - BASE WITH INSUL USC4		7	HW10201	MANIFOLD GROMMET	1
	5611604	KIT - BASE WITH INSUL USC5		8	3271901	AIR BOX WRAPPER GSKT-BOT USC3	2
3	355-1-5.09	ORIFICE #36 USC5	4		3271902	AIR BOX WRAPPER GSKT-BOT USC4	
	355-1-5.10	ORIFICE #37 USC4	3		3271903	AIR BOX WRAPPER GSKT-BOT USC5	
	355-1-5.11	ORIFICE #43 USC3	2	9	3271801	AIR BOX WRAPPER GASKET	2
	355-1-5.12	ORIFICE #52 USC4LP	3	10	VG01701	GAS VALVE USC (SV9501H2417)1 (FOR NATURAL GAS ONLY)	
	355-1-5.12	ORIFICE #52 USC5LP	4		VG01702	GAS VALVE USC (SV9501H2425) (FOR PROPANE GAS ONLY)	
	355-1-5.13	ORIFICE #54 USC3LP	2	11	3271501	BRN TUBE COVER INS. USC3	1
4	3572201	MANIFOLD USC3	1		3271502	BRN TUBE COVER INS. USC4	
	3572202	MANIFOLD USC4			3271503	BRN TUBE COVER INS. USC5	
	3572203	MANIFOLD USC5		12	32721001	BRN TUBE COVER USC3	1
					32721002	BRN TUBE COVER USC4	
					32721003	BRN TUBE COVER USC5	

FIGURE 22

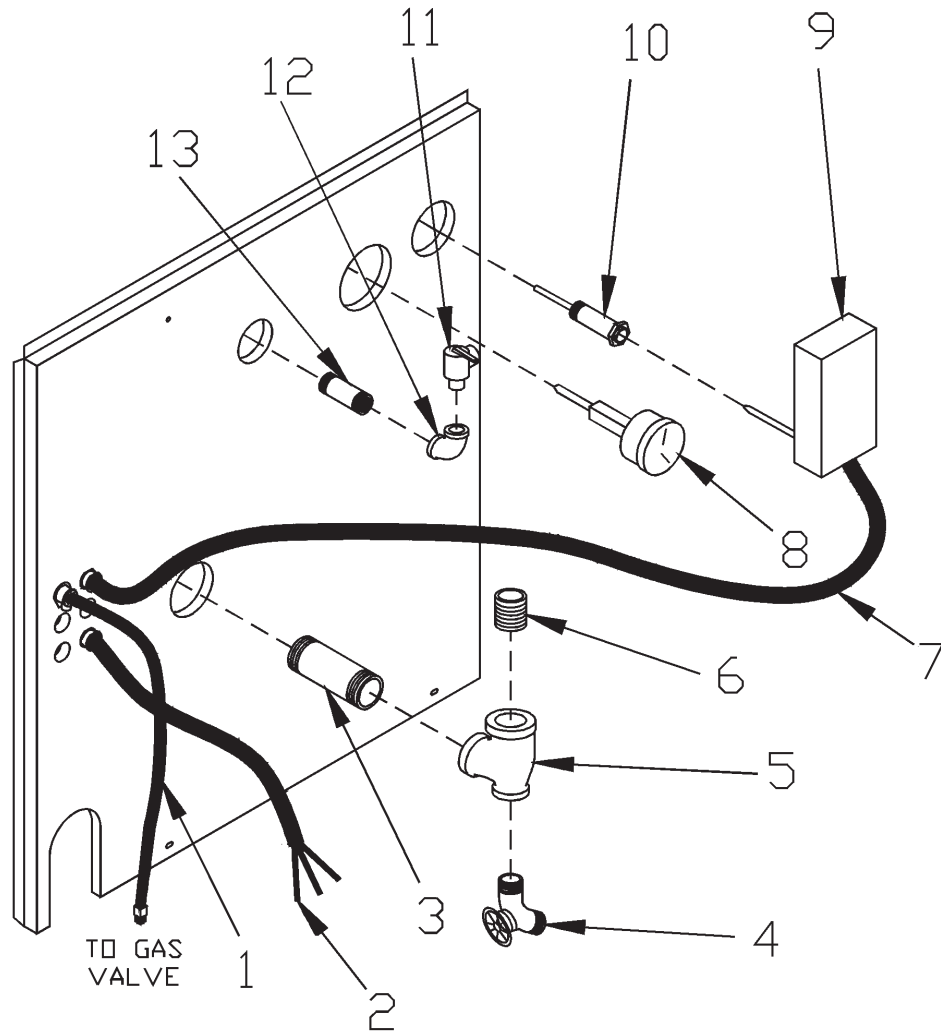
USC SERIES REPLACEMENT PARTS AIR BOX COVERS



ITEM#	PART #	DESCRIPTIONS	QTY.	ITEM#	PART #	DESCRIPTION	QTY.
1	HW10301	HOSE CLAMP SST USC	1	8	3572401	INSUL FRT COV. USC3	1
2	3271601	AIR INTAKE ADAPTER	1		3572402	INSUL FRT COV. USC4	
3	3271203	AIR INTAKE SLEEVE	1		3572403	INSUL FRT COV. USC5	
4	3271701	AIR INTAKE ADAPTER INSUL	1	9	HW10001	AIR BOX TAP 2230 RL	1
5	3271301	AIR DEFLECTOR USC3	1	10	3572304	INSUL AIR BOX COVER	2
	32721501	INTAKE BOX ASSY USC4		11	3272401	AIR BOX COVER ASSY USC3	1
	32721502	INTAKE BOX ASSY USC5			3272402	AIR BOX COVER ASSY USC4	
6	3571201	BASE OBS. WINDOW	1		3272403	AIR BOX COVER ASSY USC5	
7	3272701	AIR BOX FRT PNL ASSY USC31			(INCLUDES INSULATION #12 & # 13, AND AIR BOX TAP #6 & WASHER #7)		
	3272702	AIR BOX FRT PNL ASSY USC4		12	3572301	INSUL AIR BOX COV. USC3	1
	3272703	AIR BOX FRT PNL ASSY USC5			3572302	INSUL AIR BOX COV. USC4	
	(INCLUDES OBS. WINDOW, #9, & INSUL #11)				3572303	INSUL AIR BOX COV. USC5	
				13	HW09901	LOCK WASHER	1

FIGURE 23

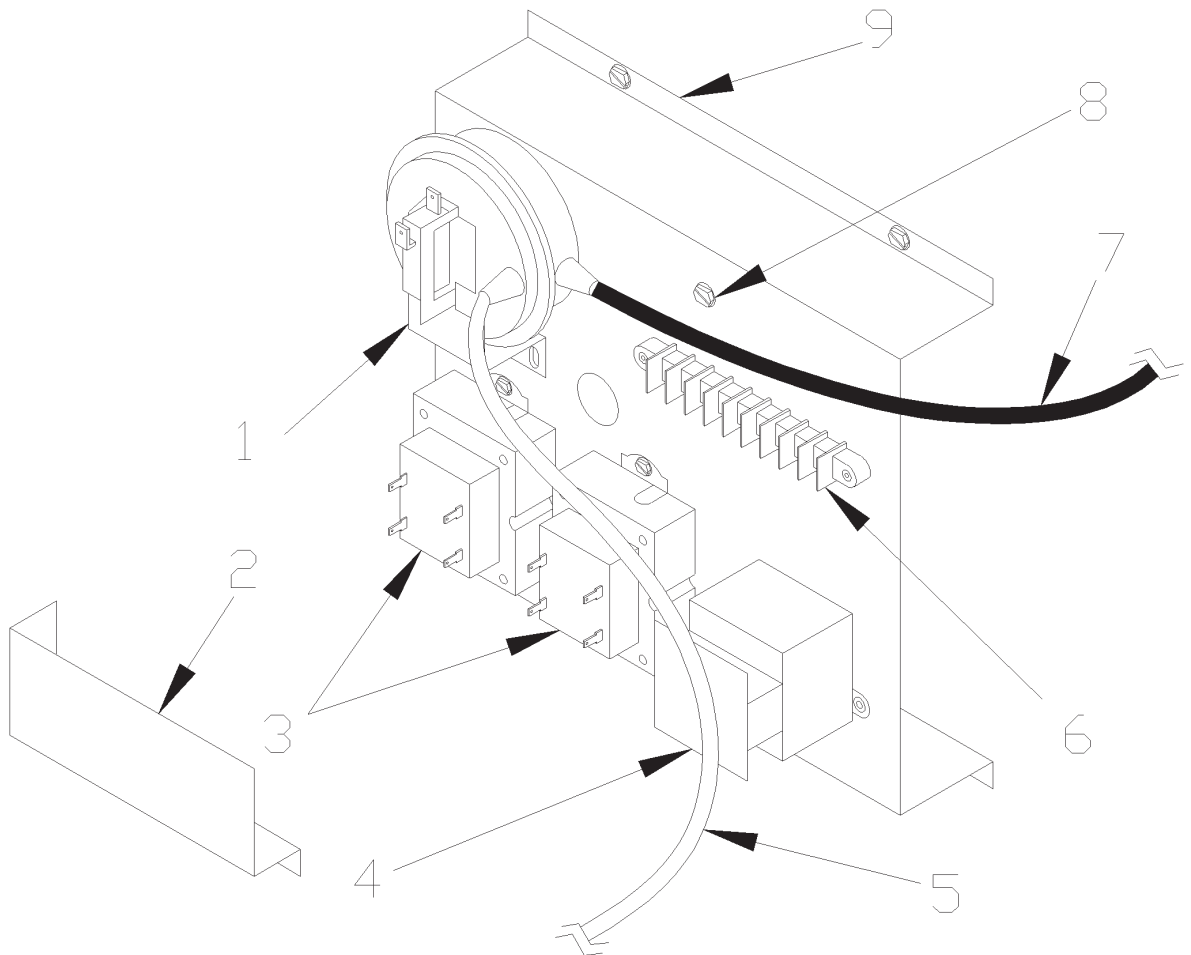
USC SERIES REPLACEMENT PARTS PIPING & CONTROLS



ITEM NO	P/N	DESCRIPTION	QTY.
1	3772301	WIRE HARNESS - GAS VALVE USC 28"	1
2	37519501	HARNESS CIRCULATOR 72"	1
3	PF-006.07	PIPE - NIPPLE 1.1/4 X 4.1/2 NPT	1
4	HW-016.03	DRAIN SHORT	1
5	PF-008.03	PIPE FIT TEE - 1.1/4X3/4X1.1/4	1
6	PF-006.01	PIPE FIT NIPPLE 1.1/4 CLOSE	1
7	37518901	HARNESS - CONTROL TO LIMIT	1
8	GA-001.00	GAUGE-THERALTIMETER	1
9	AQ02201	CONTROL - LIMIT L4080B-1212 HW	1
10	AQ-020.01	WELL 3/4 X 3 HW	1
11	VR-001.01	RELIEF VALVE 30# 3/4"	1
12	PF-002.04	PIPE FIT ELBOW 3/4 NPT 90°	1
13	PF-005.11	PIPE - NIPPLE 3/4 X 4 NPT	1

FIGURE 24

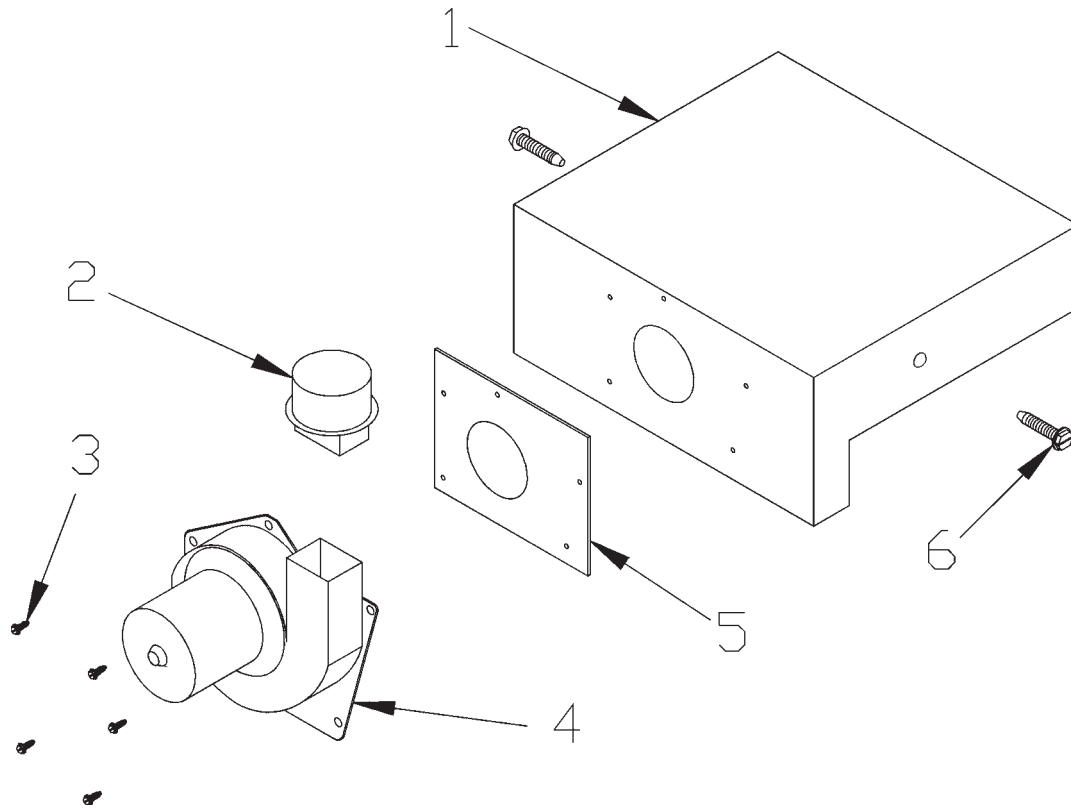
USC REPLACEMENT PARTS - ELECTRICAL



ITEM NO	P/N	DESCRIPTION	QTY.
1	SS00801	PRESSURE SWITCH (FS6205A)	1
2	3171101	TERMINAL STRIP COVER	1
3	EF03801	TRANSFORMERS - 40VA	2
4	RY-002.01	CONTROL R8222C-1008	1
5	HW09601	TUBING - SILICON - CLEAR	12"
6	EF04001	9 TERM STRIP	1
7	HW09701	TUBING - SILICON - ORANGE	17"
8	HW09001	SCREW 10-32X5/16 GREEN GROUND	1
9	3172701	PANEL CONTROL SUPPORT BRACKET	1
	3772201	COMPLETE CONTROL BRACKET ASSEMBLY (THIS INCLUDES PART # 1,2,3,5,7,8, & ALL WIRING)	1

FIGURE 25

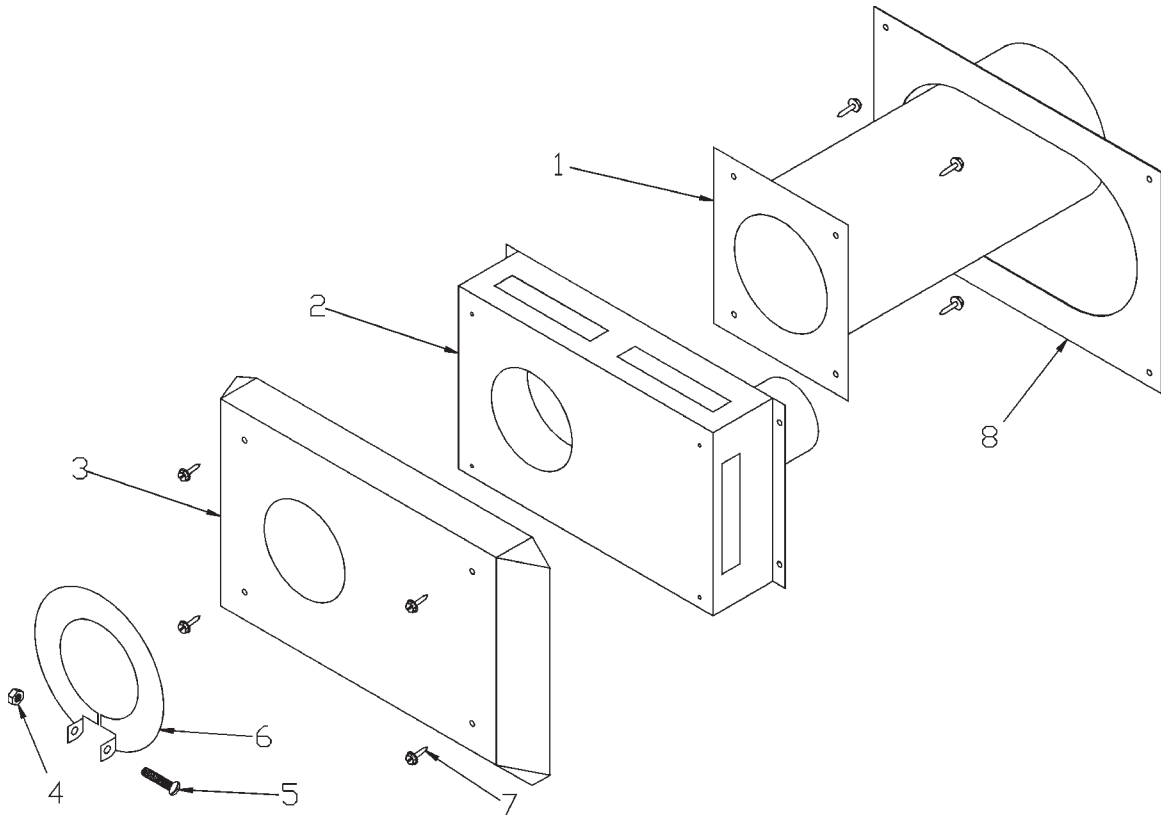
USC SERIES REPLACEMENT PARTS FLUE COLLECTOR & VENTER COMPONENTS



ITEM #	PART #	DESCRIPTIONS	QTY.
1	3472501	FLUE COLLECTOR ASSY USC3	1
	3472502	FLUE COLLECTOR ASSY USC4	
	3472503	FLUE COLLECTOR ASSY USC5	
2	345-2-7.01	VENT ADAPTER	1
3	HW-005.01	SCREW 1/4-20X1/2 SELF TAP	5
4	DC00402	VENTER USC - MAGNETEK	1
5	3571501	GASKET - VENTER USC	1
6	HW09501	BOLT 5/16"-18X1.1/2" TYPE F	2

FIGURE 26

USC SERIES REPLACEMENT PARTS TERMINATION KIT



ITEM #	PART #	DESCRIPTION	QTY.
1	34721501	VENT TERMINATION THIMBLE PLATE ASSY	1
2	34721002	TERMINATION ASSEMBLY	1
3	34721401	VENT TERMINATION DEFLECTOR	1
4	HW-003.06	NUT #10-24 HEX	1
5	30A004312	SCREW #10-24 X 1.1/2" ROUND HEAD	1
6	3471701	DRAW COLLAR - USC	1
7	HW-009.01	SCR #8-18X1/2" SLT HX WASH	8
8	3471901	VENT TEMPLATE	1
	5612601	TERMINATION KIT (INCLUDES ALL OF THE ABOVE)	

FIGURE 27

USC SERIES

Cast Iron, Direct Vent Sealed Combustion, Gas-Fired, Hot Water Boiler

RATINGS AND DIMENSION

Boiler No.	A.G.A Input Btu/Hr. (kW)	Heating Capacity Btu/Hr. (kW)	I=B=R Net Output Btu/Hr. (kW)	Natural Gas Inlet	Dimensions				Supply & Return Tappings	No. Of Burners	Water Content	AFUE Ratings
					A	B	C	D				
USC3	50,000 (14.7 kW)	44,000 (12.9 kW)	38,000 (11.1 kW)	1/2" (1.27 cm)	15.1/8" (38 cm)	3.1/2" (9 cm)	3.1/2" (9 cm)	5" (12.7 cm)	1.1/4" (3.2 cm)	2	4.0 gals 15.14 liters	87%
USC4	100,000 (29.3 kW)	87,000 (25.5 kW)	76,000 (22.3 kW)	1/2" (1.27 cm)	19" (48 cm)	3.1/2" (9 cm)	3.1/2" (9 cm)	6.1/2" (16.5 cm)	1.1/4" (3.2 cm)	3	5.6 gals 21.20 liters	87%
USC5	140,000 (41.0 kW)	122,000 (35.7 kW)	107,000 (31.3 kW)	1/2" (1.27 cm)	22.7/8" (58 cm)	4.1/4" (11 cm)	4.1/8" (11 cm)	8.3/8" (21.3 cm)	1.1/4" (3.2 cm)	4	7.2 gals 27.25 liters	87%

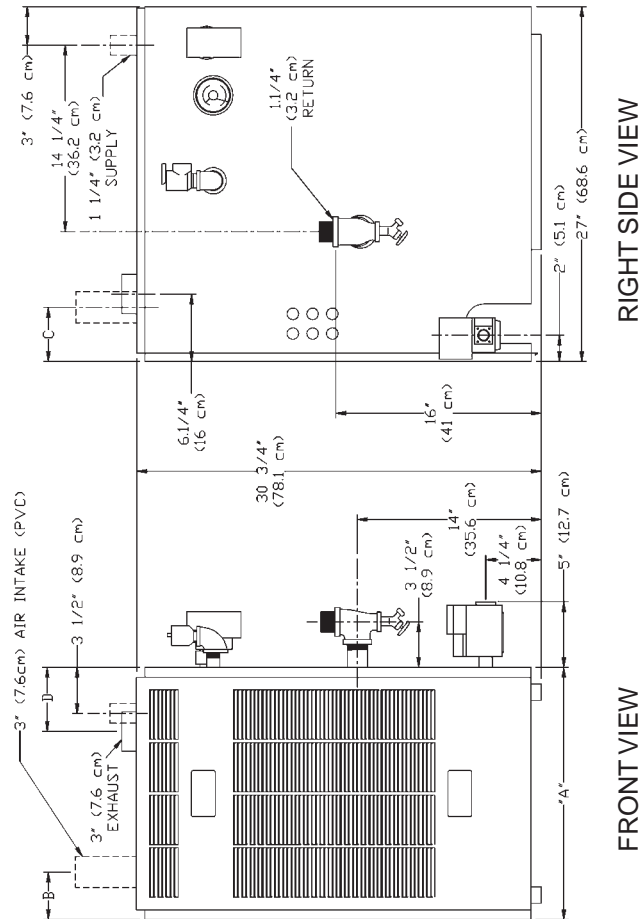
NOTE: For altitudes above 2,000 ft. ratings should be reduced at the rate of 4% for each 1,000 ft. above sea level.
 STANDARD EQUIPMENT Boiler Jacket, Cast Iron Boiler Battery, Limit Control, Removable Transformers, Plug in Relay, Theralltmer Gauge, Circulator (field mounted), Main Gas Burners, Hot Surface Pilot; A.S.M.E Relief Valve, Drain Cock, Induced Draft Fan, Safety Pressure Switch, and Combination Intake/Exhaust Termination Kit.

SEALED COMBUSTION, DIRECT VENT SERIES BOILER

All boilers are design certified for installation on non-combustible floors.
 For installation on combustible floors, use combustible floor kit.

This boiler is a Direct Vent Designed Certified appliance which requires a special horizontal through the wall venting system. Only HEAT-FAB® SAF-T-VENT™, FLEX-L® STAR-34™, ProTech™ FasNSeal®, and Z-FLEX® Z-VENT™ venting material products shall be used.

Consult venting addendum for maximum vent lengths and proper configurations.
 Electrical service to be 120 Volts, 15 Amps, 60 Hz.



Tested for 100 lbs.
(689.5 kPa) ASME
Working Pressure

C. S. A. Certified for
Natural gas or Propane