

INSTALLATION, OPERATING AND SERVICE INSTRUCTIONS FOR

TES[®] SERIES GAS/OIL - FIRED BOILER



For service or repairs to boiler, call your heating contractor. When seeking information on boiler, provide Boiler Model Number and Serial Number as shown on Rating Label.

Boiler Model Number	Boiler Serial Number	Installation Date
Heating Contractor		Phone Number
Address		



IMPORTANT INFORMATION - PLEASE READ THIS PAGE CAREFULLY

1. THIS BOILER HAS LIMITED WARRANTIES, COPIES OF WHICH ARE PRINTED ON THE BACK COVER OF THIS MANUAL.
2. THIS BOILER IS SUITABLE FOR INSTALLATION ON COMBUSTIBLE FLOORING. BOILER CAN NOT BE INSTALLED ON CARPETING.
3. ALL BOILERS MUST BE INSTALLED IN ACCORDANCE WITH NATIONAL, STATE AND LOCAL PLUMBING, HEATING AND ELECTRICAL CODES AND THE REGULATIONS OF THE SERVING UTILITIES WHICH MAY DIFFER FROM THIS MANUAL. AUTHORITIES HAVING JURISDICTION SHOULD BE CONSULTED BEFORE INSTALLATIONS ARE MADE. IN ALL CASES, REFERENCE SHOULD BE MADE TO THE FOLLOWING STANDARDS:

USA BOILERS

- A. Current Edition of American National Standard ANSI/NFPA 31, "Installation of Oil Burning Equipment", for clearances between boiler, vent connector and combustible material.
- B. Current Edition of American National Standard ANSI/NFPA 211, "Chimneys, Fireplaces, Vents, and Solid Fuel Burning Appliances", For Chimney requirements, type of venting material and clearances between vent connector pipe and combustible materials.
- C. Current Edition of American Society of Mechanical Engineers ASME CSD-1, "Controls and Safety Devices for Automatically Fired Boilers", for assembly and operations of controls and safety devices.

CANADA BOILERS

- A. Current Edition of Canadian Standards Association CSA B139, "Installation Code for Oil Burning Equipment", for recommended Installation Practices.
4. ALL HEATING SYSTEMS SHOULD BE DESIGNED BY COMPETENT CONTRACTORS AND ONLY PERSONS KNOWLEDGEABLE IN THE LAYOUT AND INSTALLATION OF HYDRONIC HEATING SYSTEMS SHOULD ATTEMPT INSTALLATION OF ANY BOILER.
5. THE BOILER MUST BE CONNECTED TO AN APPROVED CHIMNEY IN GOOD CONDITION. SERIOUS PROPERTY DAMAGE COULD RESULT IF THE BOILER IS CONNECTED TO A DIRTY OR INADEQUATE CHIMNEY. THE INTERIOR OF THE CHIMNEY FLUE MUST BE INSPECTED AND CLEANED BEFORE THE START OF THE HEATING SEASON AND SHOULD BE INSPECTED PERIODICALLY THROUGHOUT THE HEATING SEASON FOR ANY OBSTRUCTIONS. A CLEAN AND UNOBSTRUCTED CHIMNEY FLUE IS NECESSARY TO ALLOW NOXIOUS FUMES THAT COULD CAUSE INJURY OR LOSS OF LIFE TO VENT SAFELY AND WILL CONTRIBUTE TOWARD MAINTAINING THE BOILER'S EFFICIENCY.
6. READ THE LITERATURE ENCLOSED BY THE MANUFACTURER WITH THE VARIOUS ACCESSORY DEVICES. THESE ACCESSORY DEVICES MUST BE INSTALLED AND USED ACCORDING TO THE RECOMMENDATIONS OF THE MANUFACTURER.
7. IT IS THE RESPONSIBILITY OF THE INSTALLING CONTRACTOR TO SEE THAT ALL CONTROLS ARE CORRECTLY INSTALLED AND ARE OPERATING PROPERLY WHEN THE INSTALLATION IS COMPLETED.
8. FOR OPTIMUM PERFORMANCE AND SERVICEABILITY FROM THIS UNIT ADHERE TO THE FOLLOWING RECOMMENDATIONS:
 - A. DO NOT TAMPER WITH THE UNIT OR CONTROLS. Retain your contractor or a competent serviceman to assure that the unit is properly adjusted and maintained.
 - B. Clean Firetubes at least once a year - preferably at the end of the heating season to remove soot and scale. Inside of Combustion Chamber should also be cleaned at the same time.
 - C. Have Oil Burner and Controls checked at least once a year or as may be necessitated.

WARNING

THIS BOILER IS DESIGNED TO BURN NO. 2 FUEL OIL ONLY. DO NOT USE GASOLINE, CRANKCASE DRAININGS, OR ANY OIL CONTAINING GASOLINE. NEVER BURN GARBAGE OR PAPER IN THIS BOILER. DO NOT CONVERT TO ANY SOLID FUEL (I.E. WOOD, COAL) OR GASEOUS FUEL (I.E. NATURAL GAS, LP/PROPANE). ALL FLAMMABLE DEBRIS, RAGS, PAPER, WOOD SCRAPS, ETC., SHOULD BE KEPT CLEAR OF THE BOILER AT ALL TIMES. KEEP THE BOILER AREA CLEAN AND FREE OF FIRE HAZARDS.

All boilers equipped with burner swing door have a potential hazard which can cause severe property damage, personal injury or loss of life if ignored. Before opening swing door, turn off service switch to boiler and disconnect two halves of Burner Swing Door Interlock wiring harness to prevent accidental firing of burner outside the combustion chamber. Be sure to tighten swing door fastener completely and reconnect two halves of Burner Swing Door Interlock when service is completed

CAUTION

This boiler contains controls which may cause the boiler to shut down and not restart without service. If damage due to frozen pipes is a possibility, the heating system should not be left unattended in cold weather; or appropriate safeguards and alarms should be installed on the heating system to prevent damage if the boiler is inoperative.

IMPORTANT

Before starting to install this oil boiler, read these instructions carefully. Keep instructions in legible condition and posted near oil boiler for reference by owner and service technician.

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I. General Information

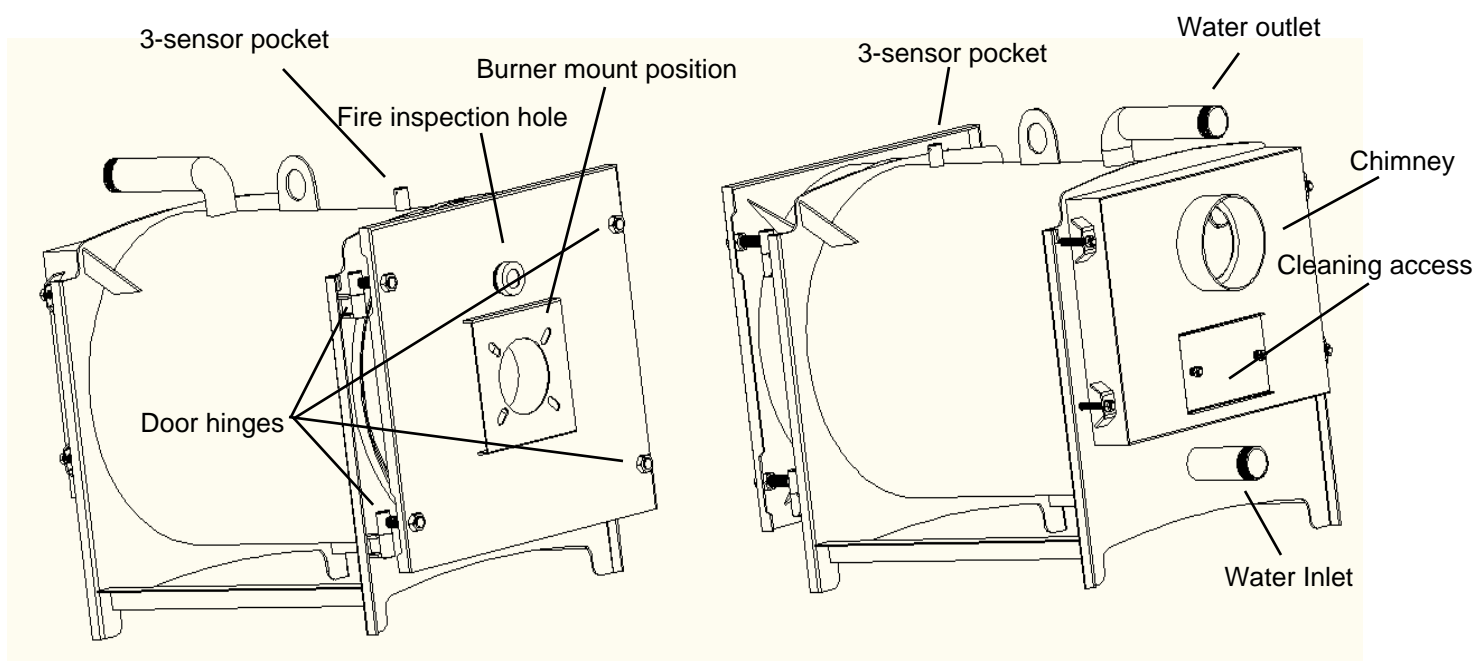


Figure 1: TES® Packaged Boiler

1. INSPECT SHIPMENT carefully for any signs of damage.
 - A. ALL EQUIPMENT is carefully manufactured, inspected and packed. Our responsibility ceases upon delivery of crated Boiler to the carrier in good condition.
 - B. ANY CLAIMS for damage or shortage in shipment must be filed immediately against the carrier by the consignee. No claims for variances from, or shortage in orders, will be allowed by the manufacturer unless presented within sixty (60) days after receipt of goods.
2. LOCATE BOILER in front of final position before removing crate. See Figure 1.
 - A. LOCATE so that smoke pipe connection to chimney will be short and direct. BOILER IS SUITABLE FOR INSTALLATION ON COMBUSTIBLE FLOOR. Boiler can not be installed on carpeting.
 - B. FOR BASEMENT INSTALLATION, provide a solid base, such as concrete, if floor is not level or if water may be encountered on floor around Boiler.
 - C. PROVIDE SERVICE CLEARANCE of at least 24" clearance in front for servicing.
 - D. For minimum clearances to combustible materials See Figure 2.

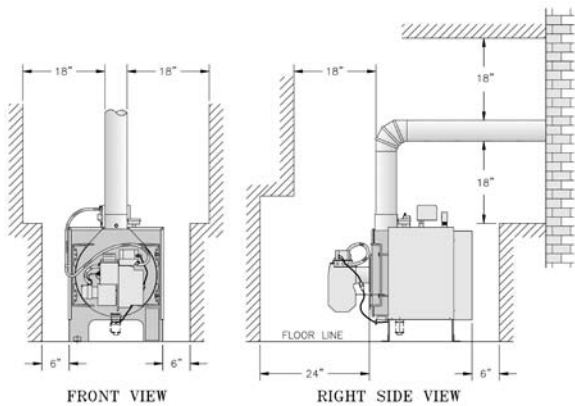


Figure 2: Minimum Installation Clearances To Combustible Materials

NOTE 1: Listed clearances comply with American National Standard ANSI/NFPA 31, Installation of oil burning equipment.

NOTE 2: TES Series boilers can be installed in rooms with clearances from combustible material as listed above. Listed clearances can not be reduced for alcove or closet installations.

NOTE 3: For reduced clearances to combustible material, protection must be provided as described in the above ANSI/NFPA 31 standard.

3. PROVIDE COMBUSTION AND VENTILATION AIR. Local code provisions may apply and should be referenced.

WARNING

Adequate combustion and ventilation air must be provided to assure proper combustion.

- A. Determine volume of space (boiler room). Rooms communicating directly with the space in which the appliances are installed, through openings not furnished with doors, are considered a part of the space.

$$\text{Volume}(\text{ft}^3) = \text{Length}(\text{ft}) \times \text{Width}(\text{ft}) \times \text{Height}(\text{ft})$$
- B. Determine total input of all appliances in the space. Add inputs of all appliances in the space and round the result to the nearest 1000 BTU per hour.
- C. Determine type of space. Divide Volume by total input of all appliances in space. If the result is greater than or equal to $50 \text{ ft}^3/1000 \text{ BTU}$ per hour, then it is considered an unconfined space. If the result is less than $50 \text{ ft}^3/1000 \text{ BTU}$ per hour then the space is considered a confined space.
- D. For boiler located in an unconfined space of a conventionally constructed building, the fresh air

infiltration through cracks around windows and doors normally provides adequate air for combustion and ventilation.

E. For boiler located in a confined space or an unconfined space in a building of unusually tight construction, provide outdoor air with the use of two permanent openings which communicate directly or by duct with the outdoors or spaces (crawl or attic) freely communicating with the outdoors. Locate one opening within 12 inches of top of space. Locate remaining opening within 12 inches of bottom of space. Minimum dimension of air opening is 3 inches. Size each opening per following:

- (1) **Direct communication with outdoors.**
 Minimum free area of 1 square inch per 4,000 BTU per hour input of all equipment in space.
- (2) **Vertical ducts.** Minimum free area of 1 square inch per 4,000 BTU per hour input of all equipment in space. Duct cross-sectional area shall be same as opening free area.
- (3) **Horizontal ducts.** Minimum free area of 1 square inch per 2,000 BTU per hour input of all equipment in space. Duct cross-sectional area shall be same as opening free area.

Alternate method for boiler located within confined space. Use indoor air if two permanent openings communicate directly with additional space(s) of sufficient volume such that combined volume of all spaces meet criteria for unconfined space. Size each opening for minimum free area of 1 square inch per 1,000 BTU per hour input of all equipment in spaces, but not less than 100 square inches.

F. Louvers and Grilles of Ventilation Ducts

- (1) All outside openings should be screened and louvered. Screens used should not be smaller than 1/4 inch mesh. Louvers will prevent the entrance of rain and snow.
- (2) Free area requirements need to consider the blocking effect of louvers, grilles, or screens protecting the openings. If the free area of the louver or grille is not known, assume wood louvers have 20-25 percent free area and metal louvers and grilles have 60-75 percent free area.
- (3) Louvers and grilles must be fixed in the open position, or interlocked with the equipment to open automatically during equipment operation.

II. Installation Instructions

1. REMOVE CRATE
 - A. Remove all fasteners at crate skid.
 - B. Lift outside container and remove all other inside fittings.
2. REMOVAL OF BOILER FROM SKID
 - A. Tilt boiler, "walk" boiler backward, and set rear legs down on floor. Tilt boiler backward, pull skid forward and set front legs down on edge of skid. Install close coupling, tee, and plug in return coupling, see Step 7 and Figure 1. Point tee toward permanent return location.
 - B. Tilt boiler backward and remove skid. Be careful not to damage Burner and Jacket.
3. CHANGE HINGE POSITION if necessary.

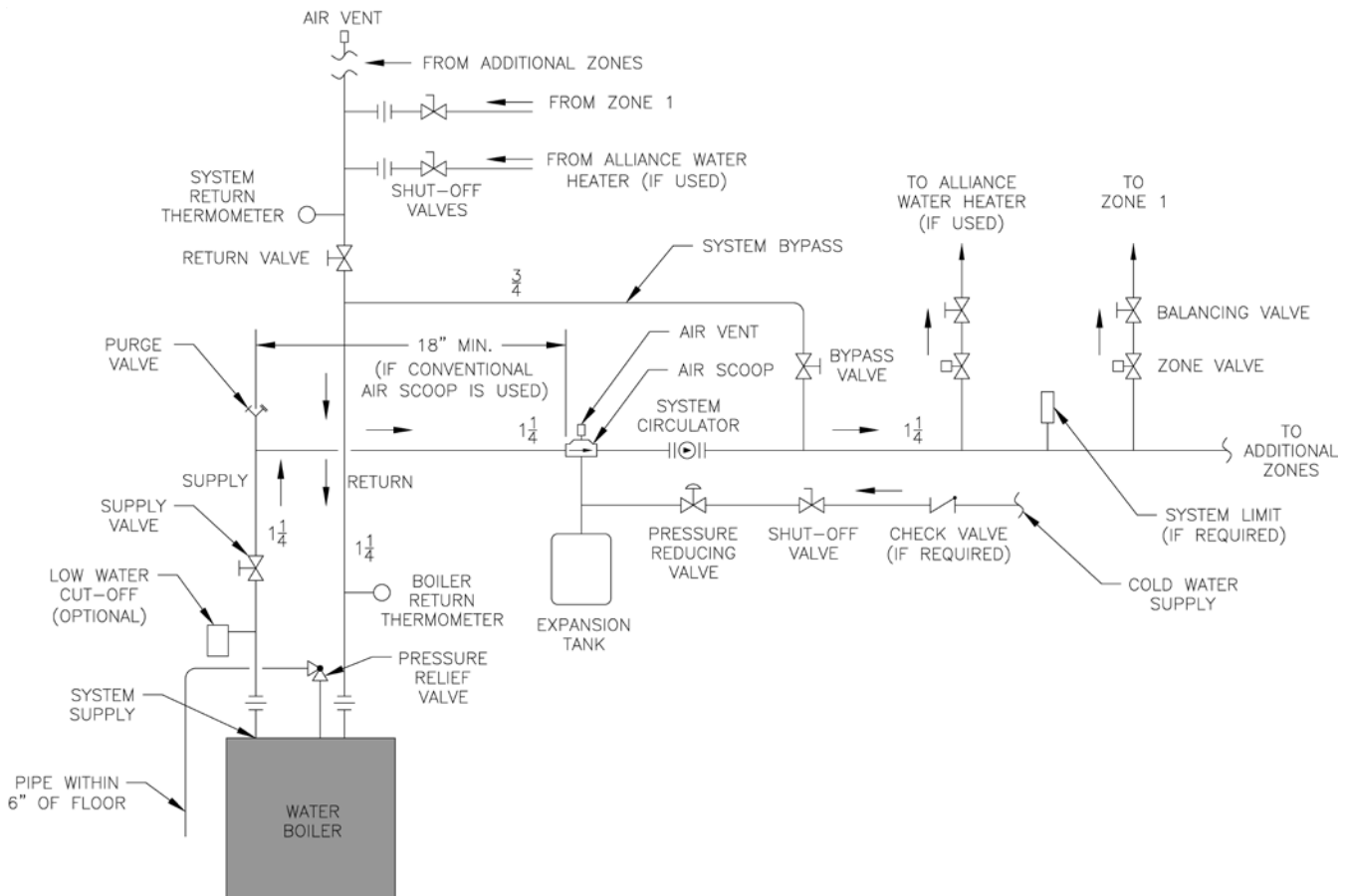


Figure 4: Recommended Water Piping for Zone Valve Zoned Heating Systems

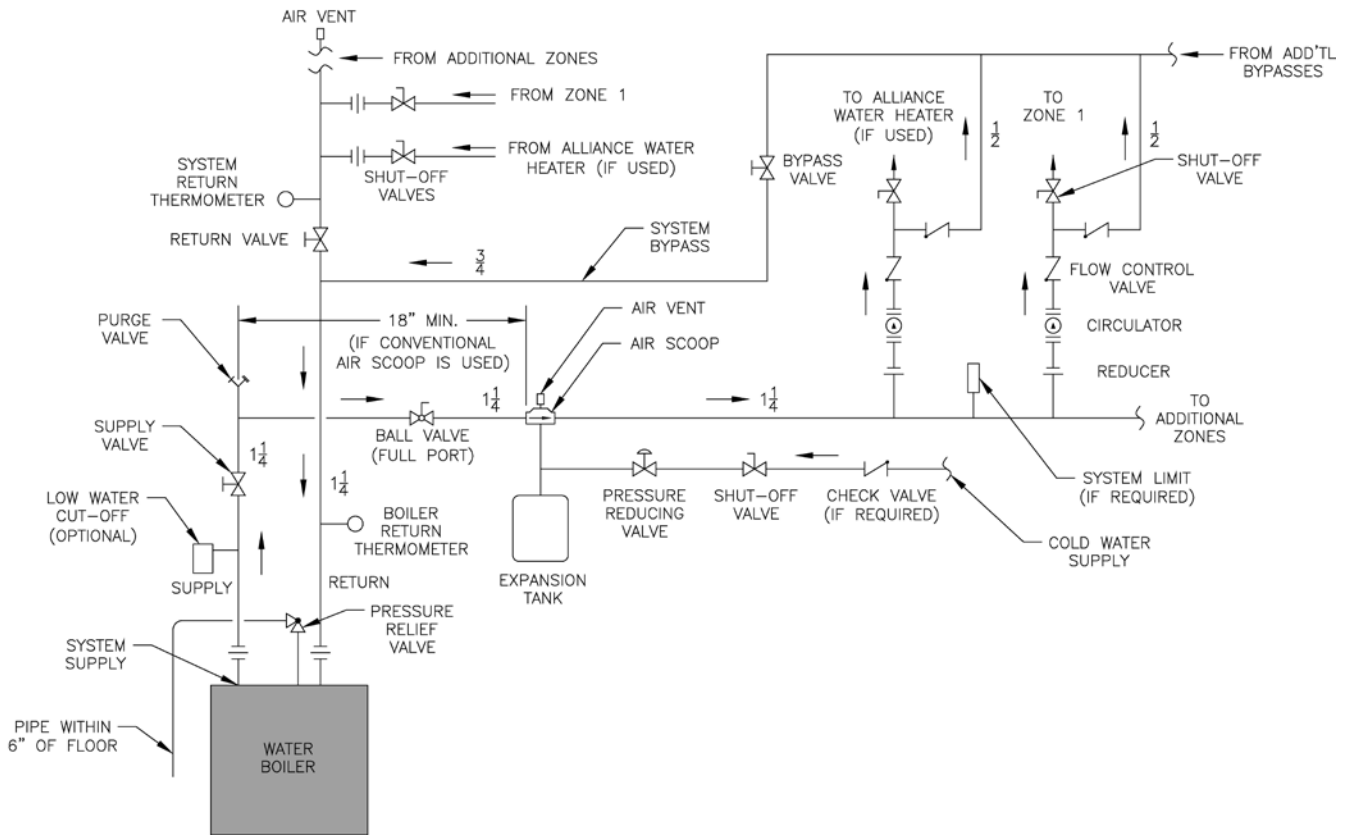


Figure 5: Recommended Water Piping for Circulator Zoned Heating Systems

4. INSTALL BOILER CONTROL.
 - A. Pull bulb and capillary tube out of hole in back of control. Insert bulb in immersion well on top of boiler and secure control with set screw in control.
 - B. Secure flexible conduit to Jacket Wrapper side with conduit clamp and sheet metal screw. Conduit must be on same side of boiler as Swing Door hinges.
5. MOVE BOILER TO PERMANENT POSITION by sliding or walking.
6. INSPECT FRONT AND REAR DOOR INSULATION PIECES AND COMBUSTION CHAMBER LINER
 - A. OPEN SWING DOOR on front of boiler. Use flashlight to inspect insulation pieces secured to front and rear doors. Inspect Ceramic Fiber Blanket secured to bottom of combustion chamber with water glass adhesive. Replace any damaged pieces.
7. CONNECT SUPPLY AND RETURN PIPING TO HEATING SYSTEM
 - A. Hot water pipes shall have clearances of at least 1/2" from all combustible construction.
 - B. Use a system by-pass if the boiler is to be operated in a system which has a large volume or excessive radiation where low boiler water temperatures may be encountered (i.e. converted gravity circulation system, etc.).

Valves should be located in the by-pass and return line as illustrated in Figures 4 and 5 in order to regulate water flow for maintenance of higher boiler water temperature.

Set the by-pass and return valves to a half throttle position to start. Operate boiler until the system water temperature reaches its normal operating range.

Adjust the valves to maintain 75°C to 85°C boiler water temperature and greater than 45°C return temperature. Adjust both valves simultaneously. Closing the boiler return valve while opening the by-pass valve will raise the boiler return temperature. Opening the boiler return valve while closing the by-pass valve will lower the boiler return temperature.
 - C. If this boiler is used in connection with refrigeration systems, the boiler must be installed so that the chilled medium is piped in parallel with the heating boiler using appropriate valves to prevent the chilled medium from entering the boiler, see Figure 6. Also consult I=B=R Installation and Piping Guides.
 - D. If this boiler is connected to heating coils located in air handling units where they may be exposed to refrigerated air the boiler piping must be equipped with flow control valves to prevent gravity circulation of boiler water during the operation of the cooling system.

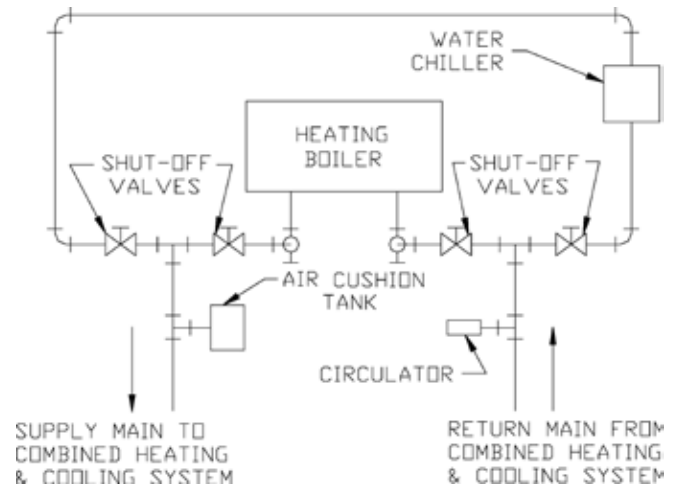


Figure 6: Recommended Piping for Combination Heating & Cooling (Refrigeration) Systems

- E. A hot water boiler installed above radiation level must be provided with a low water cutoff device as part of the installation.

If a low water cut-off is required, it must be mounted in the system piping above the boiler.

The minimum safe water level of a hot water boiler is just above the highest water containing cavity of the boiler; that is, a hot water boiler must be full of water to operate safely.
- F. There are many possible causes of oxygen contamination such as:
 - (1) Addition of excessive make-up water as a result of system leaks.
 - (2) Absorption through open tanks and fittings.
 - (3) Oxygen permeable materials in the distribution system.

In order to insure long product life, oxygen sources should be eliminated. This can be accomplished by taking the following measures:

 - (1) Repairing system leaks to eliminate the need for addition of make-up water.
 - (2) Eliminating open tanks from the system.
 - (3) Eliminating and/or repairing fittings which allow oxygen absorption.
 - (4) Use of non-permeable materials in the distribution system.
 - (5) Isolating the boiler from the system water by installing a heat exchanger.

CAUTION

Oxygen contamination of boiler water will cause corrosion of iron and steel boiler components, and can lead to boiler failure. TES Standard Warranty does not cover problems caused by oxygen contamination of boiler water.

- 8. INSTALL SMOKEPIPE** — The TES boiler should be vented into a fireclay tile-lined masonry chimney or a chimney constructed from Type L Vent or a factory built chimney that complies with the Type HT requirement, of UL103. The chimney and vent pipe shall have a sufficient draft at all times, to assure safe proper operation of the boiler. See Figure 7 for recommended installation.

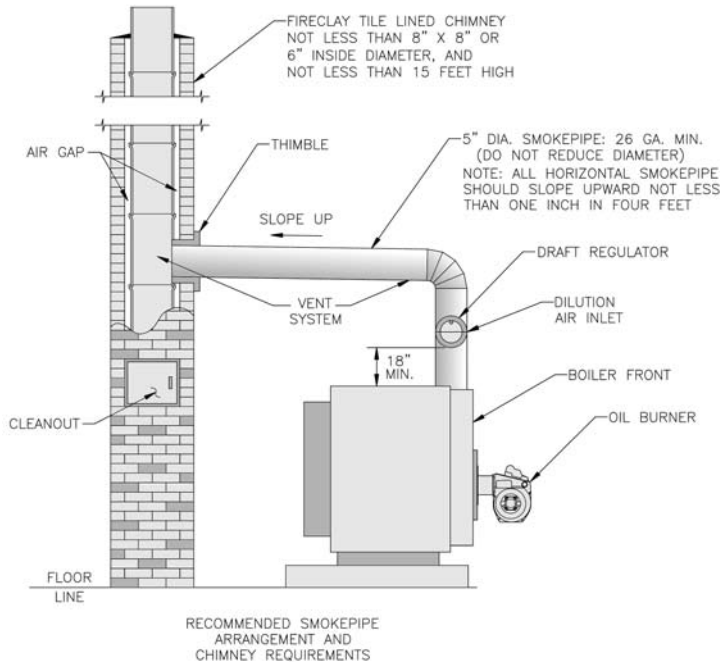


Figure 7

- A. Install the draft regulator following the instructions furnished with the regulator. See Figure 8 for alternate draft regulator locations.

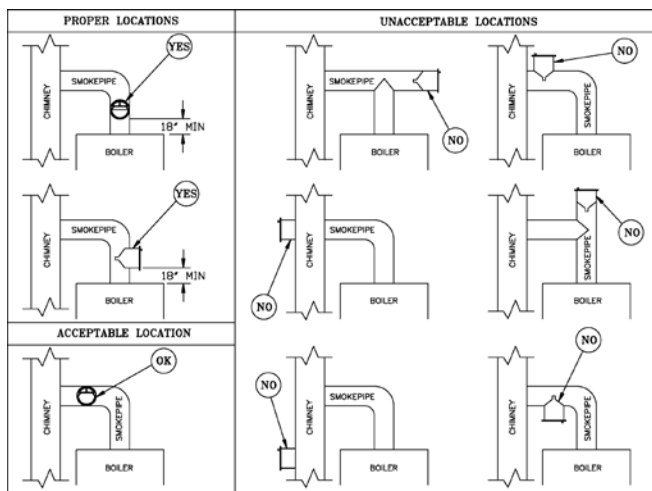


Figure 8

- B. Consider the chimney overall. Chimneys that have a high heat loss may become less suitable as the heat loss of the home goes down and the efficiency of the boiler installed goes up. Most homes have a chimney appropriate for the fuel and the era in which the home was built. That may have been a coal fired or an inefficient oil fired boiler built into

a home without insulation or storm windows. With increasing fuel prices that home probably has been insulated and fitted with storm windows so that the heat loss of the home has been reduced. This requires less fuel to be burned and sends less heat up the chimney.

A new boiler probably has a higher efficiency than the boiler being replaced. That probably means that the stack temperature from the new boiler will be lower than that from the old boiler and with less room air being drawn up the chimney to dilute the stack gases. The combination of a large uninsulated chimney, reduced firing rate, reduced firing time, lower stack temperature and less dilution air can, in some cases, contribute to the condensing of small amounts of water vapor in the chimney. Such condensation, when it occurs, can cause chimney deterioration. In extreme cases, condensed water may be visible on the outside of the breeching or chimney. In those extreme cases, the chimney may have to be lined to insulate the chimney and thus prevent the condensation. The addition of dilution air into the chimney may assist in drying the chimney interior surfaces.

- C. Heat extractors mounted into the breeching are not recommended.

9. INSTALL ELECTRIC WIRING

- A. Follow the National Electrical Code and local regulations. A separate electrical circuit must be run from the main electrical service with an over-current device/disconnect in the circuit. A service switch is recommended and may be required by some local jurisdictions. Wiring should conform to Figures 11A, 11B and 11C.
- B. CANADA — Refer to CSA standard C22.2 Part 1, 1990, Electrical Features of Fuel Burning Equipment (Gas and Oil).
- C. If boiler is installed in Canada, a blocked vent safety switch must be installed. Refer to Blocked Vent Safety Switch Instruction Supplement provided with boiler (Canada only).

10. FUEL UNITS AND OIL LINES

Use flexible oil line(s) so that Swing Door can be opened without disconnecting oil supply. A supply line fuel oil filter is recommended as a minimum for all firing rates but a pleated paper fuel oil filter is recommended for the lowest (.6 GPH) firing rate application to prevent nozzle fouling.

SINGLE-PIPE OIL LINES — Standard burners are provided with single-stage 3450 rpm fuel units with the by-pass plug removed for single-pipe installations. The single-stage fuel unit may be installed single-pipe with gravity feed or lift. Maximum allowable lift is 8 feet. See Figure 9.

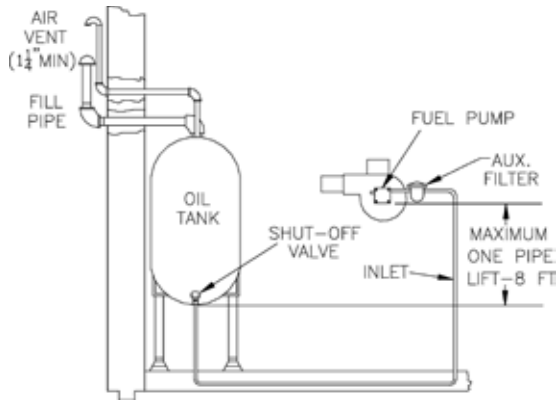


Figure 9

IMPORTANT

Single-pipe installations must be absolutely airtight or leaks or loss of prime may result. Bleed line and fuel unit completely.

TWO-PIPE OIL LINES - For two-pipe systems where more lift is required, the two-stage fuel unit is recommended. Tables 2 (single-stage) and 3 (two-stage) show allowable lift and lengths of 3/8-inch and 1/2-inch OD tubing for both suction and return lines. Refer to Figure 10.

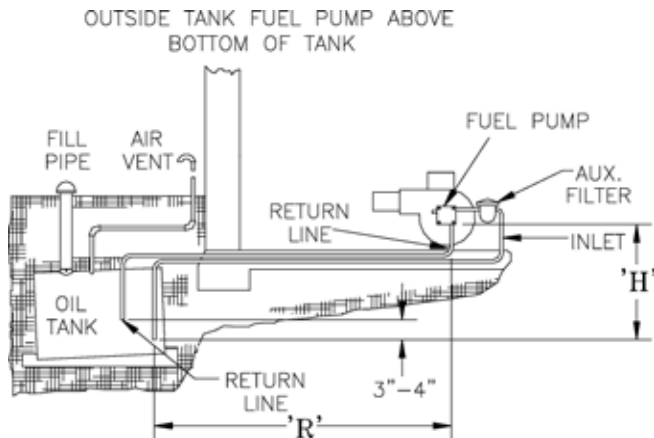


Figure 10

Be sure that all oil line connections are absolutely airtight.

Check all connections and joints. Flared fittings are recommended. Do not use compression fittings.

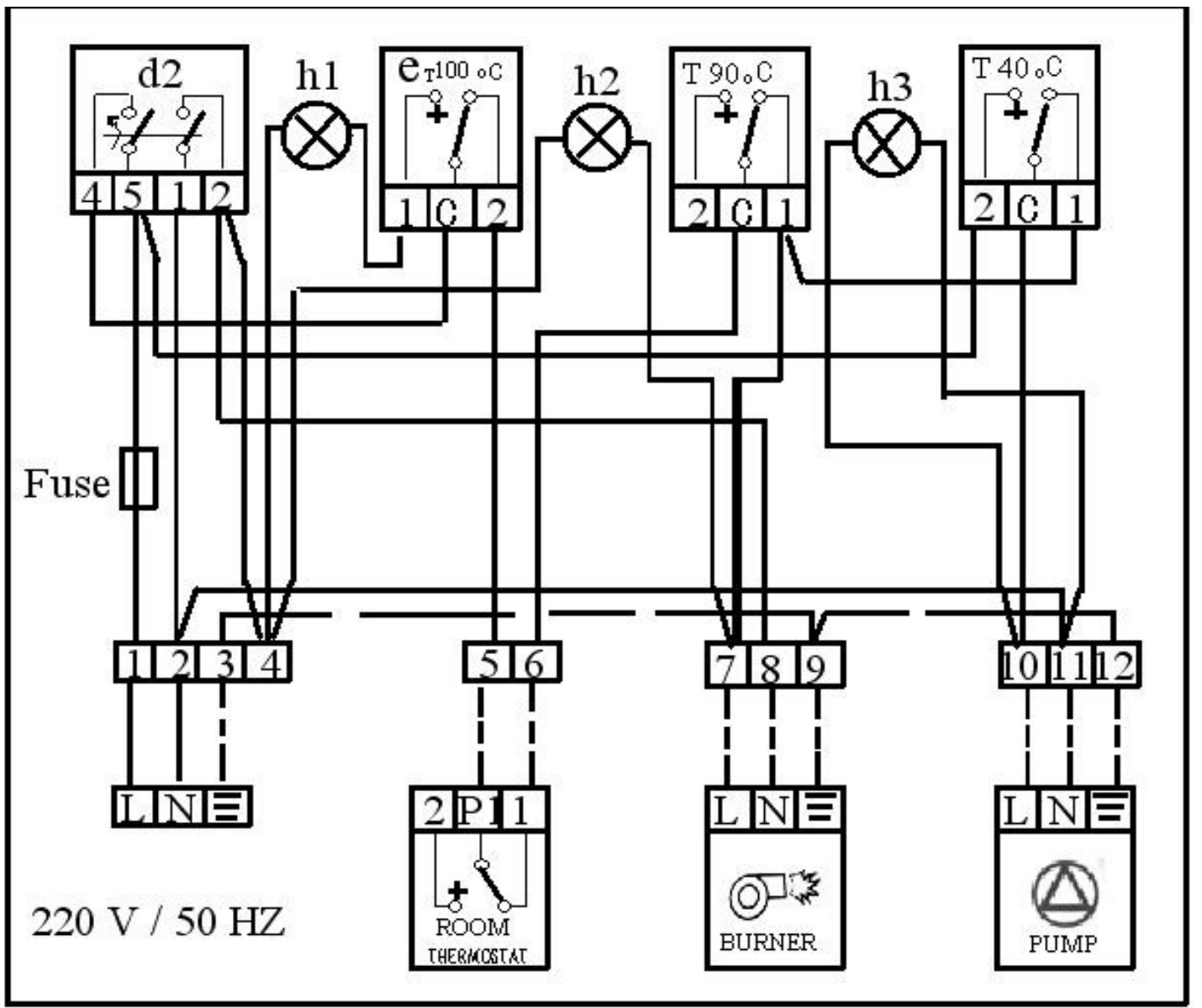
Open the air-bleed valve and start the burner. For clean bleed, slip a 3/16" ID hose over the end of the bleed valve and bleed into a container. Continue to bleed for 15 seconds after oil is free of air bubbles. Stop burner and close valve.

**TABLE 2: SINGLE-STAGE UNITS (3450 RPM)
TWO-PIPE SYSTEMS**

Lift "H"	Maximum Length of Tubing "H" + "R"	
	3/8" OD Tubing (3 GPH)	1/2" OD Tubing (3 GPH)
0'	84'	100'
1'	78'	100'
2'	73'	100'
3'	68'	100'
4'	63'	100'
5'	57'	100'
6'	52'	100'
7'	47'	100'
8'	42'	100'
9'	36'	100'
10'	31'	100'
11'	26'	100'
12'	21'	83'
13'	---	62'
14'	---	41'

**TABLE 3: TWO-STAGE UNITS (3450 RPM)
TWO-PIPE SYSTEMS**

Lift "H"	Maximum Length of Tubing "H" + "R"	
	3/8" OD Tubing (3 GPH)	1/2" OD Tubing (3 GPH)
0'	93'	100'
2'	85'	100'
4'	77'	100'
6'	69'	100'
8'	60'	100'
10'	52'	100'
12'	44'	100'
14'	36'	100'
16'	27'	100'
18'	---	76'



Wiring Diagram for TES Boiler Control Panel

III. Operating and Service Instructions

WARNING

All boilers equipped with burner swing door have a potential hazard which can cause severe property damage, personal injury or loss of life if ignored. Before opening swing door, turn off service switch to boiler and disconnect two halves of Burner Swing Door Interlock wiring harness to prevent accidental firing of burner outside the combustion chamber. Be sure to tighten swing door fastener completely and reconnect two halves of Burner Swing Door Interlock when service is completed.

1. ALWAYS INSPECT INSTALLATION BEFORE STARTING BURNER.
2. FILL HEATING SYSTEM WITH WATER.
NOTE: It is important to properly remove the oil and dirt from the system.
CLEAN HEATING SYSTEM If boiler water is dirty, refer to step 13 for proper cleaning instructions.
 - A. Fill entire Heating System with water and vent air from system.
3. CHECK CONTROLS, WIRING AND BURNER to be sure that all connections are tight and burner is rigid, that all electrical connections have been completed and fuses installed, and that oil tank is filled and oil lines have been tested.
4. LUBRICATION — Follow instruction on burner and circulator label to lubricate, if oil lubricated. Most motors currently used on residential type burners employ permanently lubricated bearings and thus do not require any field lubrication. Water lubricated circulators do not need field lubrication.

Do not over-lubricate. This can cause as much trouble as no lubrication at all.

5. ADJUST CONTROLS SETTINGS with burner service switch turned “ON”.

Important Product Safety Information **Refractory Ceramic Fiber Product**

Warning:

The Repair Parts list designates parts that contain refractory ceramic fibers (RCF). RCF has been classified as a possible human carcinogen. When exposed to temperatures about 985°C, such as during direct flame contact, RCF changes into crystalline silica, a known carcinogen. When disturbed as a result of servicing or repair, these substances become airborne and, if inhaled, may be hazardous to your health.

AVOID Breathing Fiber Particulates and Dust

Precautionary Measures:

Do not remove or replace RCF parts or attempt any service or repair work involving RCF without wearing the following protective gear:

1. A National Institute for Occupational Safety and Health (NIOSH) approved respirator
 2. Long sleeved, loose fitting clothing
 3. Gloves
 4. Eye Protection
- Take steps to assure adequate ventilation.
 - Wash all exposed body areas gently with soap and water after contact.
 - Wash work clothes separately from other laundry and rinse washing machine after use to avoid contaminating other clothes.
 - Discard used RCF components by sealing in an airtight plastic bag. RCF and crystalline silica are not classified as hazardous wastes in the United States and Canada.

First Aid Procedures:

- If contact with eyes: Flush with water for at least 15 minutes. Seek immediate medical attention if irritation persists.
- If contact with skin: Wash affected area gently with soap and water. Seek immediate medical attention if irritation persists.
- If breathing difficulty develops: Leave the area and move to a location with clean fresh air. Seek immediate medical attention if breathing difficulties persist.
- Ingestion: Do not induce vomiting. Drink plenty of water. Seek immediate medical attention.

There are various test kits available to trace air leaks, such as electronic sight glasses. Follow the manufacturers' instructions to find air leaks.

The following actions can eliminate air leaks:

- (1) Bleed pump as detailed previously.
- (2) Replace flare fittings.
- (3) Replace oil supply line.
- (4) Repair oil filter leaks.
- (5) Replace or repair tank fittings.

NOTICE

CHECK TEST PROCEDURE. A very good test for isolating fuel side problems is to disconnect the fuel system and with a 2' length of tubing, fire out of an auxiliary five gallon pail of clean, fresh, warm #2 oil from another source. If the burner runs successfully when drawing out of the auxiliary pail then the problem is isolated to the fuel or fuel lines being used on the jobsite.

- E. GASKET LEAKS — If 11.5 to 12.5% CO₂ with a #1 smoke or less cannot be obtained in the breeching, look for air leaks around the flue collar. Such air leaks will cause a lower CO₂ reading in the breeching. The smaller the firing rate the greater effect an air leak can have on CO₂ readings.
- F. DIRT — A fuel filter is a good investment. Accidental accumulation of dirt in the fuel system can clog the nozzle or nozzle strainer and produce a poor spray pattern from the nozzle. The smaller the firing rate, the smaller the slots become in the nozzle and the more prone to plugging it becomes with the same amount of dirt.
- G. WATER — Water in the fuel in large amounts will stall the fuel pump. Water in the fuel in smaller amounts will cause excessive wear on the pump, but more importantly water doesn't burn. It chills the flame and causes smoke and unburned fuel to pass out of the combustion chamber and clog the flueways of the boiler.

H. COLD OIL — If the oil temperature approaching the fuel pump is 5°C or lower poor combustion or delayed ignition may result. Cold oil is harder to atomize at the nozzle. Thus, the spray droplets get larger and the flame shape gets longer. An outside fuel tank that is above grade or has fuel lines in a shallow bury is a good candidate for cold oil. The best solution is to bury the tank and lines deep enough to keep the oil above 5°C.

I. HIGH ALTITUDE INSTALLATIONS

Air settings must be increased at higher altitudes. Use instruments and set for 11.5 to 12.5% CO₂.

- J. START-UP NOISE — Late ignition is the cause of start-up noises. If it occurs recheck for electrode settings, flame shape, air or water in the fuel lines.
- K. SHUT DOWN NOISE — If the flame runs out of air before it runs out of fuel, an after burn with noise may occur. That may be the result of a faulty cut-off valve in the fuel pump, or it may be air trapped in the nozzle line. It may take several firing cycles for that air to be fully vented through the nozzle. Water in the fuel or poor flame shape can also cause shut down noises.

15. ATTENTION TO BOILER WHILE NOT IN OPERATION.

- A. Spray inside surfaces with light lubricating or crankcase oil using gun with extended stem so as to reach all corners.
- B. Always keep the manual fuel supply valve shut off if the burner is shut down for an extended period of time.
- C. To recondition the heating system in the fall season after a prolonged shut down, follow the instructions outlined in Section III — Operating and Service Instructions, Items 1 through 8.

IV. Boiler Cleaning

WARNING

All boiler cleaning must be completed with burner service switch turned off. Boilers equipped with burner swing door have a potential hazard which can cause severe property damage, personal injury or loss of life if ignored. Before opening swing door, turn off service switch to boiler to prevent accidental firing of burner outside the combustion chamber. Be sure to tighten swing door fastener completely when service is completed.

1. CLEAN THE FIRETUBES

- A. For access to fireside of boiler, pull two halves of Burner Swing Door Interlock wiring harness apart, remove hex nuts holding door closed and open swing door.
- B. Prior to cleaning boiler, lay a protective cloth or plastic over combustion chamber liner.
- C. Using a 1 1/2" diameter wire brush (30" handle), clean firetubes. Measure 15" from end of brush opposite handle, and mark handle. **DO NOT** allow this mark to go past front end of firetube during cleaning, or brush will hit rear door insulation piece.

2. CLEAN THE COMBUSTION CHAMBER

Using wire or fiber bristle brush, clean inside of combustion chamber. **DO NOT** let brush hit rear door insulation piece or combustion chamber liner.

3. AFTER CLEANING

Vacuum debris inside bottom of rear door, remove protective cloth, and vacuum remaining fireside of boiler as necessary. **BE CAREFUL** not to damage liner or rear door insulation piece. Inspect front and rear door insulation pieces, front door gaskets and combustion chamber liner for damage. Replace any damaged pieces.

4. CLOSE BOILER

CAUTION: Do not start burner unless burner swing door is securely closed. Close door, install hex nuts, and tighten securely. Door should be parallel to tubesheet when viewed from top and sides. Reconnect two halves of Swing Door Interlock.

WARNING

The boiler must be connected to an approved chimney in good condition. Serious property damage could result if the boiler is connected to a dirty or inadequate chimney. The interior of the chimney flue must be inspected and cleaned before the start of the heating season and should be inspected periodically throughout the heating season for any obstructions. A clean and unobstructed chimney flue is necessary to allow noxious fumes that could cause injury or loss of life to vent safely and will contribute toward maintaining the boiler's efficiency.

