

OWB & OWT

Oil-Fired Water Boilers

Boiler Manual

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Hazard definitions

DANGER Hazards that **will cause severe** personal injury, death or substantial property damage.

WARNING Hazards that **can cause severe** personal injury, death or substantial property damage.

CAUTION Hazards that **will or can cause minor** personal injury or property damage.

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

WARNING **INSTALLER** — Read all instructions before installing. **Read page 2 first.** Follow all instructions in proper order to prevent personal injury or death.

- Consider piping and installation when determining boiler location.
- Any claims for damage or shortage in shipment must be filed immediately against the transportation company by the consignee.

WARNING **USER** — Please read the following. Failure to comply could result in severe personal injury, death or substantial property damage.

- **This manual is for use only by your qualified heating installer/service technician.**
- Please see the User's Information Manual for your reference.
- Have the boiler serviced by a qualified service technician, at least annually.

WARNING This manual must only be used by a **qualified heating installer/service technician**. Boiler and burner must be installed and serviced only by a qualified heating installer/service technician. Failure to comply could result in severe personal injury, death or substantial property damage.

NOTICE When calling or writing about the boiler— Please have: • boiler model number from the boiler rating label and • CP number from the boiler jacket. You may list the CP number in the space provided on the "Installation and service certificate" found on page 16.

Read this first!

WARNING Failure to adhere to the guidelines below can result in severe personal injury, death or substantial property damage.

When servicing boiler —

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

Boiler operation —

3. Do not block flow of combustion or ventilation air to boiler.
4. Should overheating occur, do not turn off or disconnect electrical supply to circulator. Instead, shut off the oil supply at a location external to the appliance, if possible.
5. 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 burner control that has been under water.

Boiler water —

6. DO NOT use petroleum-based cleaning or sealing compounds in boiler system. Water seal deterioration will occur, causing leakage between boiler sections, circulator flanges, diaphragm tanks or other system components. This can result in substantial property damage.
7. DO NOT use "homemade cures" or "boiler patent medicines". Serious damage to boiler, personnel and/or property may result.
8. Continual fresh makeup water will reduce boiler life. Mineral buildup in sections reduces heat transfer, overheats cast iron, and causes section failure. Addition of oxygen and other gases can cause internal corrosion. Leaks in boiler or piping must be repaired at once to prevent makeup water.
9. Do not add cold water to hot boiler. Thermal shock can cause sections to crack.

Glycol — potential fire hazard —

All glycol is flammable when exposed to high temperatures. If glycol is allowed to accumulate in or around the boiler or any other potential ignition source, a fire can develop. In order to prevent potential severe personal injury, death or substantial property damage from fire and/or structural damage:

- Never store glycol of any kind near the boiler or any potential ignition source.
- Monitor and inspect the system and boiler regularly for leakage. Repair any leaks immediately to prevent possible accumulation of glycol.
- Never use automotive antifreeze or ethylene glycol in the system. Using these glycols can lead to hazardous leakage of glycol in the boiler system.

1 Prepare boiler location

Codes & checklist

Installations must follow these codes:

- Local, state, provincial, and national codes, laws, regulations and ordinances.
- NFPA-31, Installation of Oil-Burning Equipment.
- Standard for Controls and Safety Devices for Automatically Fired Boilers, ANSI/ASME CSD-1, when required.
- National Electrical Code.

Before locating the boiler:

- Check for nearby connection to:
 - System water piping
 - Venting connections (page 6)
 - Combustion and ventilation air provisions (page 4)
 - Oil supply piping (page 14 and burner manual)
 - Electrical power
- 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.

- Boiler must be installed so that burner and control system components are protected from dripping or spraying water or rain during operation or service.
- If new boiler will replace existing boiler, check for and correct system problems, such as:
 1. System leaks causing oxygen corrosion or section cracks from hard water deposits.
 2. Incorrectly-sized expansion tank.
 3. Lack of antifreeze (when required) in boiler water causing system and boiler to freeze and leak.

1 Prepare boiler location

Clearances

Minimum clearance to combustible materials

- Minimum clearances from vent pipe to combustible material (see Figure 1, vent clearances indicated with “**”):
 - Type “L” doublewall vent — 6 inches minimum
 - Singlewall vent — 18 inches minimum

NOTICE Flue pipe clearances must take precedence over jacket clearances (listed below).

Service clearances

- Recommended **service** clearances (see Figure 1):
 - Front and top — 24 inches
 - Left side, back and right side — 6 inches
 - Right side for burner door swing radius — 12 inches
- Special close clearances (alcove, closet, under counters, etc.) — see “Appendix,” page 17.

Flooring and foundation

Flooring

The OWB and OWT boilers are approved for installation on combustible flooring, but must never be installed on carpeting.

WARNING Do not install boiler on carpeting even if foundation is used. Fire can result, causing severe personal injury, death or substantial property damage.

Foundation

- Provide a solid brick or minimum 2-inch thick concrete foundation pad if any of the following is true:
 - floor can become flooded.
 - the boiler mounting area is not level.
- See Table 1 for minimum foundation dimensions.

Figure 1 Minimum clearances

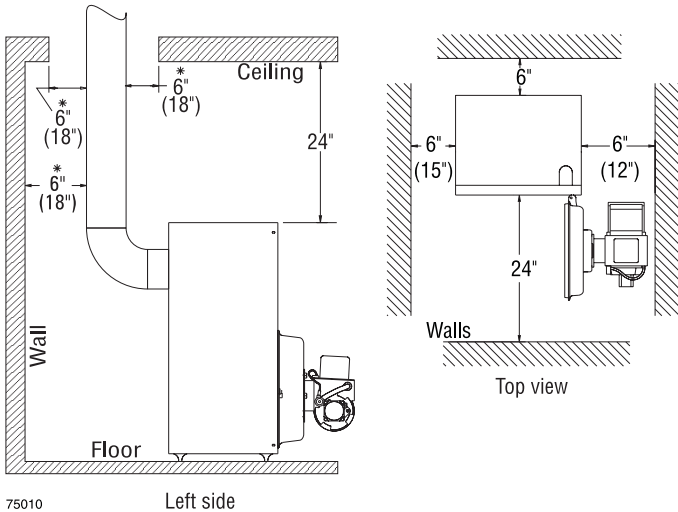


Table 1 Minimum foundation size

Boiler model number	Length inches	Width inches	Minimum height inches
OWB/OWT-3	17	22	2
OWB/OWT-4	17	22	2
OWB/OWT-5	20	22	2
OWB/OWT-6	23	22	2

Residential garage installations

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

- Mount the boiler a minimum of 18 inches above the floor of the garage 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.

1 Prepare boiler location continued

Air for combustion and ventilation

- WARNING** Adequate combustion and ventilation air:
- Assures proper combustion.
 - Reduces risk of severe personal injury or death from possible flue gas leakage and carbon monoxide emissions.
 - Do not install exhaust fan in boiler room.

Consider building construction

Older buildings with single-pane windows, minimal weather-stripping and no vapor barrier often provide enough natural infiltration and ventilation without dedicated openings.

New construction or remodeled buildings are most often built tighter. Windows and doors are weather-stripped, vapor barriers are used and openings in walls are caulked. As a result, such tight construction is unlikely to allow proper natural air infiltration and ventilation.

Follow state, provincial or local codes when sizing adequate combustion and ventilation air openings. In absence of codes, use the following guidelines when boiler is in a confined room (defined by NFPA 31 as less than 7200 cubic feet per 1 GPH input of all appliances in area. A room 8 ft. high x 30.0 ft. x 30.0 ft. is 7200 cu. ft.).

Provide two permanent openings:

One within 12 inches of ceiling, one within 12 inches of floor. Minimum height or length dimension of each rectangular opening should be at least 3 inches.

When inside air is used:

Each opening must freely connect with areas having adequate infiltration from outside. Each opening should be at least 140 sq. in. per 1 GPH input (1 sq. in. per 1000 Btu input) of all fuel-burning appliances plus requirements for any equipment that can pull air from room (including clothes dryer and fireplace).

When outside air is used:

Connect each opening directly or by ducts to the outdoors or to crawl or attic space that freely connects with outdoors. Size per below:

- Through outside wall or vertical ducts — at least 35 sq. in. per 1 GPH input (1 sq. in. per 4000 Btu input) of all fuel burning appliances plus requirements for any equipment that can pull air from room (including clothes dryer and fireplace).
- Through horizontal ducts — at least 70 sq. in. per 1 GPH boiler input (1 sq. in. per 2000 Btu input) of all fuel-burning appliances plus requirements for any equipment that can pull air from room (including clothes dryer and fireplace).
- Where ducts are used, they should have same cross-sectional area as free area of openings to which they connect. Compensate for louver, grille or screen blockage when calculating free air openings. Refer to their manufacturer’s instructions for details. If unknown, use:
 - Wood louvers, which provide 20-25% free air.
 - Metal louvers or grilles, which provide 60-75% free air.

Lock louvers in open position or interlock with equipment to prove open before boiler operation.

Air contamination

Please review the following information on potential combustion air contamination problems.

See Table 2 for products and areas which may cause contaminated combustion air.

- WARNING** To prevent potential of severe personal injury or death, check for products or areas listed below before installing boiler. If any of these contaminants are found:
- remove contaminants permanently.
- OR —
- isolate boiler and provide outside combustion air. See national, provincial or local codes for further information.

Table 2 Corrosive contaminants and likely locations

Products to avoid
Spray cans containing chloro/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 with workshops

2 Prepare boiler

Place boiler

WARNING The boiler contains ceramic fiber and fiberglass materials. Use care when handling these materials per instructions on page 21 of this manual. Failure to comply could result in severe personal injury.

1. Remove circulator carton strapped to pallet.

NOTICE Circulator will be damaged if not removed before boiler is lifted from pallet.

2. Remove boiler from pallet.

NOTICE Do not drop boiler or bump jacket or burner on floor or pallet. Damage to boiler or burner can result.

CAUTION Smaller sized boilers may be top heavy. Use caution when handling to avoid minor personal injury or property damage.

3. Check level. Shim legs if needed.
4. Open burner mounting door. Verify that chamber ceramic liner is securely in place on target wall, chamber floor and burner door. Verify door seal is intact and in place. Close and securely bolt the door.
6. Visually check:
 - a. Flue collector hood seal.
 - b. Burner mounting door seal.

WARNING Obtain gas-tight seal to prevent possible flue gas leakage and carbon monoxide emissions, which can lead to severe personal injury or death.

Hydrostatic pressure test

1. Install air vent in air vent tapping on top of boiler (see Figure 20, page 26, for location).
3. Plug supply and return tapings.
4. Drain valve is factory-installed.
5. Fill boiler. Vent all air. Pressure test boiler at 1 ½ times working pressure.

WARNING Do not leave boiler unattended. Cold water fill can expand and damage cast iron, resulting in severe personal injury, death or substantial property damage.

6. Verify that boiler maintains pressure for at least 10 minutes. Visually check for leaks if gauge pressure drops.
7. Drain boiler. Repair leaks if found.

WARNING Using petroleum-based compounds to repair leaks can damage system components, resulting in property damage.

8. Retest boiler after repairing leaks.
9. Remove air vent and plugs.

3 Connect breaching

General venting requirements

WARNING Failure to follow all instructions can result in flue gas spillage and carbon monoxide emissions, causing severe personal injury or death.

DANGER Inspect existing chimney before installing boiler. Insufficient draft can cause flue gas leakage and carbon monoxide emissions. Failure to clean or replace perforated pipe or tile lining and/or patch mortar and joints can cause severe personal injury or death.

- The OWB and OWT boilers are designed to operate with an over-fire draft of -0.01" to -0.02" w.c. Proper draft for these oil boilers may be achieved using either a conventional chimney (natural draft) or a power vent (sidewall) system that has been properly designed for use with oil-fired equipment. Power vent manufacturer's instructions must be followed.
- Use vent material approved by local codes for oil-fired burners. In their absence, refer to:
 - NFPA 31, Installation of Oil-Burning Equipment.
 - NFPA 211, Standard for Chimneys, Fireplaces, Vents and Solid Fuel Burning Appliances.
 - NFPA 211 requires chimney to be lined before connected to boiler.
- To prevent downdrafts, extend chimney at least 3 feet above highest point where it passes through roof and 2 feet higher than any portion of building within 10 feet. Increase chimney cross-sectional area and height at least 4% per 1,000 feet above sea level.
- Provide minimum clearances from vent (flue) pipe to combustible material:
 - Type "L" doublewall vent — 6 inches minimum
 - Singlewall vent — 18 inches minimum
- Minimum chimney sizes should be used. See Table 3.

NOTICE Oversized chimneys, outside masonry chimneys and/or derated inputs can result in condensation in chimney.

Connect breaching

WARNING Long horizontal breachings, excessive number of tees and elbows, or other obstructions restricting combustion gas flow can result in possibility of condensation, flue gas leakage and carbon monoxide emissions, which can lead to severe personal injury or death.

- See Figure 2.
- Connect full-sized breaching when possible. See Table 3.
- Connection must be made above bottom of chimney to avoid blockage. Breaching must not enter chimney far enough to cause obstruction. Use thimble or slip joint where breaching enters chimney to allow removal for cleaning.

Figure 2 Chimney and breaching connections

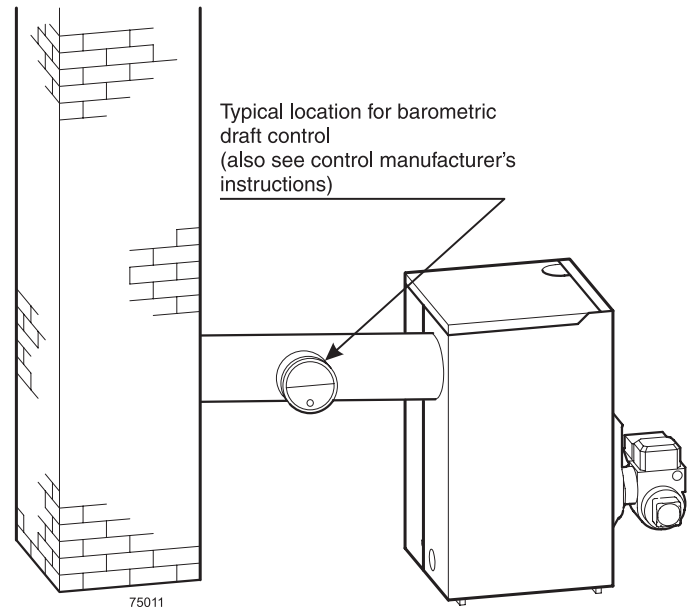


Table 3 Chimney and breaching minimum sizes

Boiler model number	Minimum breaching diameter Note 1	Minimum I=B=R chimney size		Minimum chimney height
		Rectangle Note 2	Round	
OWB/OWT-3	5"	8" x 8"	6"	15'
OWB/OWT-4	6"	8" x 8"	6"	15'
OWB/OWT-5	6"	8" x 8"	7"	15'
OWB/OWT-6	7"	8" x 8"	7"	15'

Notes:
 1. Flue collar on boiler is 7" diameter
 2. 6 3/4" x 6 3/4" inside liner

- When burner and boiler are properly installed, draft overfire will be approximately -0.01" to -0.02" W.C. Install barometric control in breaching, per control manufacturer's instructions, when excess draft needs to be relieved or to comply with applicable codes and regulations. Use draft gauge to adjust proper opening.
- An induced draft fan for the chimney may be necessary if:
 - Excessive resistance to flow of combustion gases can be expected.
 - Cross-sectional area of chimney is smaller than minimum recommended.
 - Chimney height is less than recommended.
 - Seal all vent joints. Interlock burner with fan operation.

4 Connect water piping

General

If installation is to comply with ASME an additional high temperature limit is needed. Install control in supply piping between boiler and isolation valve. Set second control to minimum 20 °F above setpoint of first control. Maximum allowable setpoint is 240 °F. See page 11 for wiring.

A low water cutoff device is required when boiler is installed above radiation level or by certain state or local codes or insurance companies. Use low water cutoff designed for water installations. Electrode probe-type is recommended. Purchase and install in tee in supply piping above boiler.

Use backflow check valve in cold water supply if required by local codes.

Near-boiler piping

See Figure 3 (diaphragm-type or bladder-type expansion tank) or Figure 4 (closed-type expansion tank) on page 8, and Table 4, for near-boiler and single-zone systems designed for return water at least 130 °F. See Figure 6 or 7, page 9 for low return temperature applications.

See this page for multiple-zone piping.

See page 8 for boilers used with refrigeration systems.

Relief valve

Install relief valve vertically in ¾" tapping on rear of boiler using ¾" nipple and elbow supplied in bag with valve. See the tag attached to the relief valve for manufacturer's instructions.

WARNING

To avoid water damage or scalding due to valve operation, discharge line must be connected to relief valve outlet and run to a safe place of disposal. Terminate the discharge line to eliminate possibility of severe burns should the 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 where any discharge will be 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 place 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.
- Failure to comply with the above guidelines could result in failure of the relief valve to operate, resulting in possibility of severe personal injury, death or substantial property damage.
- Test the operation of the valve after filling and pressurizing 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.

Near-boiler piping continued

Table 4 Water pipe size (based on 20 °F rise)

Boiler model number	To system	From system
OWB/OWT-3	1 ¼"	1 ¼"
OWB/OWT-4	1 ¼"	1 ¼"
OWB/OWT-5	1 ½"	1 ½"
OWB/OWT-6	1 ½"	1 ½"
All piping sizes based on 20 °F temperature rise through boiler.		

Circulator

The circulator is shipped loose (wiring pre-attached to boiler) to allow you to locate it either in the return or supply piping, as desired. See page 8 for a typical installation. Pipe the expansion tank to the suction side of the circulator whenever possible. Install an air separator in the supply piping. Connect the expansion tank to the air separator only if the 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. Figures 3 and 4, on page 8, show typical near-boiler piping connections.

Expansion tank

Diaphragm- or bladder-type expansion tank — Figure 3, page 8

1. Ensure expansion tank size will handle boiler and system water volume and temperature. Tank must be located in boiler return piping as close to boiler as possible, before inlet side of circulator. See tank manufacturer's instructions for details.
2. Install an automatic air vent as shown.

Closed-type expansion tank — Figure 4, page 8

1. Ensure expansion tank size will handle boiler and system water volume and temperature. See tank manufacturer's instructions for details.
2. Connect tank to ½" NPT tapping located behind supply outlet, using ½" NPT piping. Pitch any horizontal piping up towards tank 1 inch per 5 feet of piping.

CAUTION

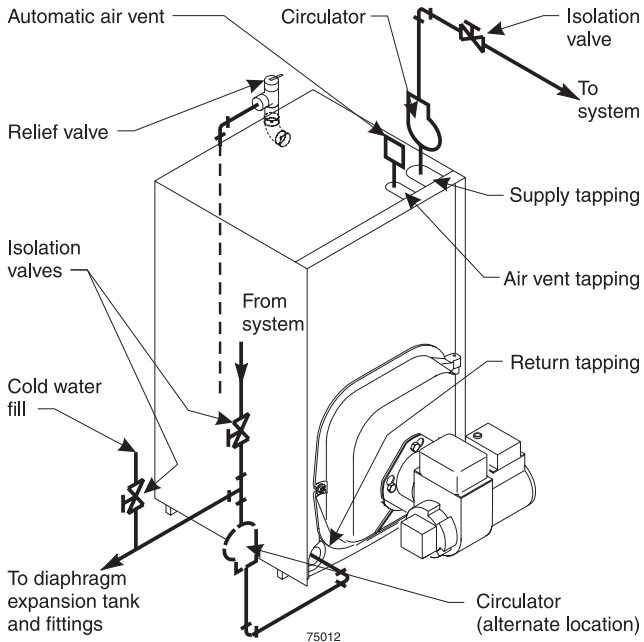
Undersized expansion tanks cause system water to be lost from relief valve and makeup water to be added through fill valve. Eventual section failure can result.

Water piping — multiple zone systems

Install system piping using either circulator zoning or zone valve zoning. Install expansion tank on suction side of system pump. Always connect fill line only at the expansion tank — never at another point in the system.

4 Connect water piping continued

Figure 3 Diaphragm- or bladder-type expansion tank: Piping to single-zone system using diaphragm-type or bladder-type expansion tank. See Table 4, page 7, for piping sizes.

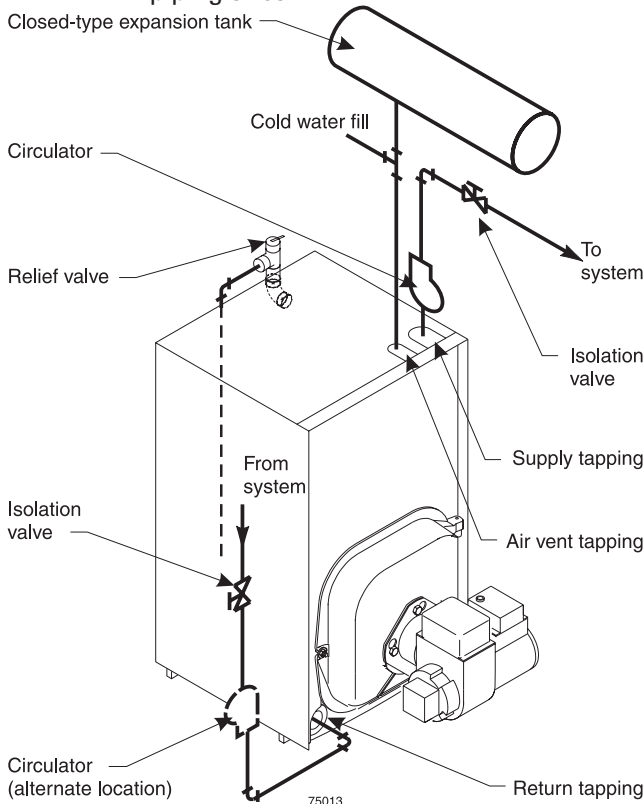


WARNING Use Figure 3 or Figure 4 only for systems designed for return water at least 130 °F. For systems with low return water temperature possible, such as converted gravity systems and radiant heating systems, install by-pass piping (see page 9) to protect boiler against condensation. Failure to prevent low return water temperature to the boiler could cause corrosion of the boiler sections or burners, resulting in severe personal injury, death or substantial property damage.

WARNING If system includes radiant heating circuits, provide piping and controls to regulate the temperature supplying the radiant circuits. Failure to comply could result in substantial property damage.

WARNING Install boiler so that chilled medium is piped in parallel with heating boiler. Use appropriate valves to prevent chilled medium from entering boiler. Consult I=B=R Installation and Piping Guides. If boiler is connected to heating coils located in air handling units where they can be exposed to refrigerated air, use flow control valves or other automatic means to prevent gravity circulation during cooling cycle. Circulation of cold water through the boiler could result in damage to the heat exchanger, causing possible severe personal injury, death or substantial property damage.

Figure 4 Closed-type expansion tank: Piping to single-zone system using closed-type expansion tank. See Table 4, page 7, for piping sizes.

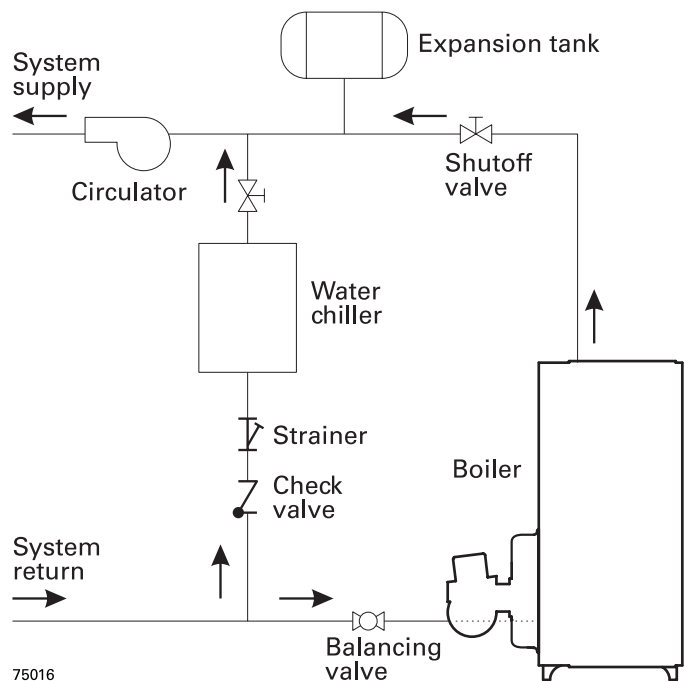


Water piping — refrigeration systems

Prevent chilled water from entering boiler

Install boiler so that chilled medium is piped in parallel with the heating boiler. Use appropriate valves to prevent chilled medium from entering boiler. See Figure 5 for typical installation of balancing valve and check valve.

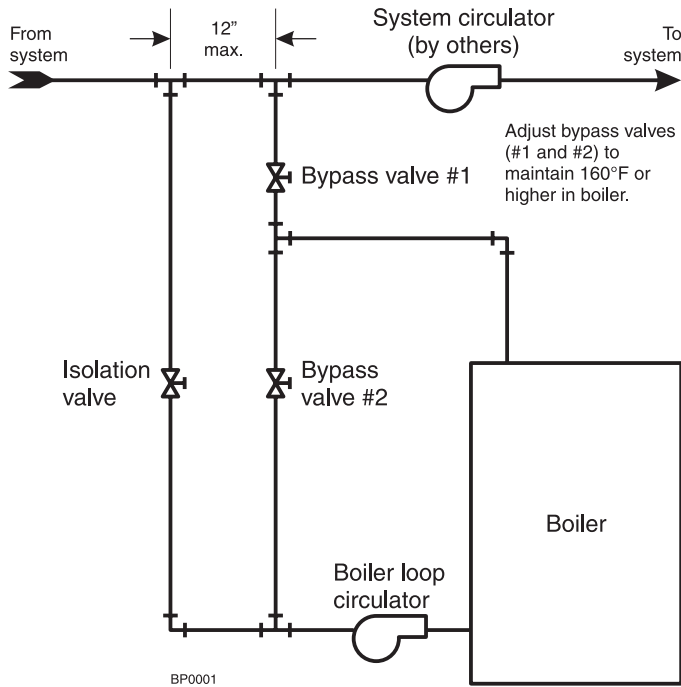
Figure 5 Piping refrigeration systems



4 Connect water piping continued

Near-boiler piping continued

Figure 6 System bypass piping in boiler loop with separate system circulator, using primary/secondary piping.



System bypass method

1. Apply bypass piping of Figure 6 to high water content systems, radiant panel systems or any system that is likely to operate with low return water temperature for extended periods.
2. The bypass arrangement shown protects the boiler from damage caused by condensate corrosion due to low return water temperature and protects low temperature systems from too high a supply temperature.
3. Adjust the bypass valves as indicated below.

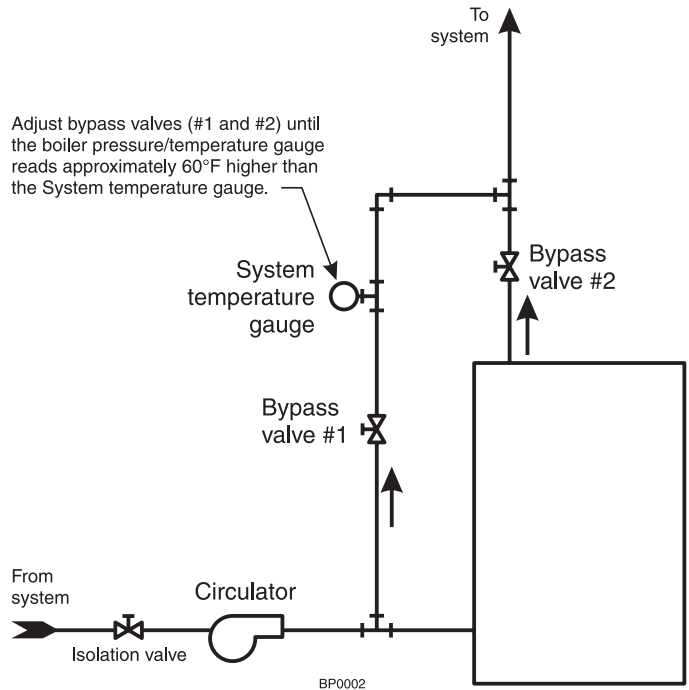
Adjust Bypass valves 1 and 2 as follows:

1. Start with valve 2 fully closed, valve 1 fully open.
2. Slowly open valve 2 while closing valve 1. Adjust the valves until the boiler pressure/temperature gauge reads 160 °F or higher. As you open the valves, pause long enough to allow temperatures to level off. It takes a while for the boiler water temperature to rise as the flow changes.
3. Bypass valve 2 allows hot boiler outlet water to blend with colder return water, raising the supply temperature to the boiler. Bypass valve 1 balances the pressure drop through valve 2.
4. The purpose of this piping is to raise the return water temperature to the boiler enough to prevent condensation of flue gases.

WARNING

Install all components specified above and adjust valves as described to prevent low temperature in the boiler. Failure to prevent low water temperature in the boiler could cause corrosion of the boiler sections or burners, resulting in severe personal injury, death or substantial property damage.

Figure 7 Boiler bypass piping — use only for high water content systems —DO NOT use for radiant panel systems.



Boiler bypass method

1. Apply bypass piping of Figure 7 to high water content systems, such as converted gravity systems.
2. The bypass arrangement shown protects the boiler from damage caused by condensate corrosion due to low return water temperature. This method does not provide protection from high temperature water being supplied to the system.
3. DO NOT apply this piping to radiant panel systems.
4. Adjust the bypass valves as indicated below.

Adjust Bypass valves 1 and 2 as follows:

1. Start with valve 1 fully closed, valve 2 fully open.
2. Slowly open valve 1 while closing valve 2. Adjust the valves until the boiler pressure/temperature gauge reads approximately 60 °F higher than the system temperature gauge. As you open the valves, pause long enough to allow temperatures to level off. It takes a while for the boiler water temperature to rise as the flow changes.
3. Bypass valve 1 controls system flow rate. Bypass valve 2 controls flow through the boiler.
4. The purpose of this piping is to cause a high enough temperature rise in the boiler that the average temperature will be warm enough to prevent condensation of flue gases.

5 Connect tankless heater piping (OWT boilers only)

DANGER Hot water can scald!

- Consumer Product Safety Commission and some states recommend domestic hot water temperature of 130 °F or less.
- When installing an automatic mixing valve, selection and installation must comply with valve manufacturer's recommendations and instructions.
- Water heated to a temperature suitable for clothes washing, dish washing and other sanitizing needs will scald and cause injury.
- Children and elderly, infirm or physically handicapped persons are more likely to be injured by hot water. Never leave them unattended in or near a bathtub, shower or sink. Never allow small children to use a hot water faucet or draw their own bath. If anyone using hot water in the building fits this description, or if state laws or local codes require certain water temperatures at hot water faucets, take special precautions:
- Install automatic mixing valve set according to those standards.
- Use lowest practical temperature setting.
- Check water temperature immediately after first heating cycle and after any adjustment.

WARNING Studies have indicated that dangerous bacteria can form in potable water distribution systems if certain minimum water temperatures are not maintained. Contact local health department for more information.

Table 5 Tankless heater ratings

Boiler model number	Heater number	Intermittent draw ratings (GPM)	Inlet and outlet tapping sizes
OWB/OWT-3	WT-11	3.00 (note 1)	3/4"
OWB/OWT-4	WT-14	3.75 (note 2)	3/4"
OWB/OWT-5	WT-14	4.00 (note 2)	3/4"
OWB/OWT-6	WT-14	4.25 (note 2)	3/4"

Note 1: Gallons of water per minute heated from 50°F to 140°F with 200°F boiler water temperature.

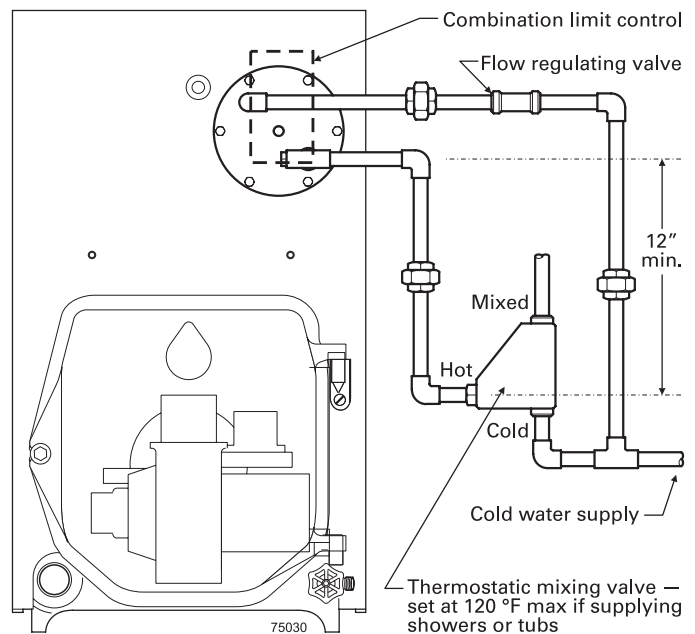
Note 2: Gallons of water per minute heated from 40°F to 140°F with 200°F boiler water temperature.

Tested in accordance with I=W=H Testing and Rating Standard for Indirect Tankless Water Heaters Tested with Boilers.

Pipe tankless heater

1. Size piping no smaller than tankless heater inlet and outlet.
2. Following controls (furnished by others) must be installed:
 - a. Automatic mixing valve. See Figure 8. (Read **DANGER** statement at left.)
 - b. Flow regulating valve (see Figure 8). Size according to intermittent draw of tankless heater. See Table 5. Follow valve manufacturer's instructions to install.
3. Additional anti-scald devices may be installed at each hot water faucet, bath and shower outlet.
4. In hard water areas, soften cold domestic supply water to heaters to prevent lime buildup.

Figure 8 Piping connections to tankless heater, typical



NOTICE These single wall heat exchangers comply with National Standard Plumbing Code provided that:

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

NOTICE Tankless heater ratings are based on 200°F boiler water temperature. To get rated output, set tankless heater control to 200°F. Control can be adjusted to meet system hot water requirements.

6 Connect wiring

WARNING Electric shock hazard. Can cause severe personal injury or death if power source, including service switch on boiler, is not disconnected before installing or servicing.

Installations must follow these codes:

- National Electrical Code, ANSI/NFPA 70, latest edition and any additional national, state or local codes.
- Wiring must be N.E.C. Class 1. If original wire as supplied with boiler must be replaced, type 105 °C wire or equivalent must be used. Supply wiring to boiler and additional control wiring must be 14 gauge or heavier.
- Provide electrical ground at boiler as required by codes.

Thermostat wiring

- Install thermostat on inside wall away from influences of drafts, hot or cold water pipes, lighting fixtures, television, sun rays or fireplaces.
- Follow instructions with thermostat. If it has a heat anticipator, set heat anticipator in thermostat to match power requirements of equipment connected to it. Boiler wiring diagrams give setting for standard equipment.

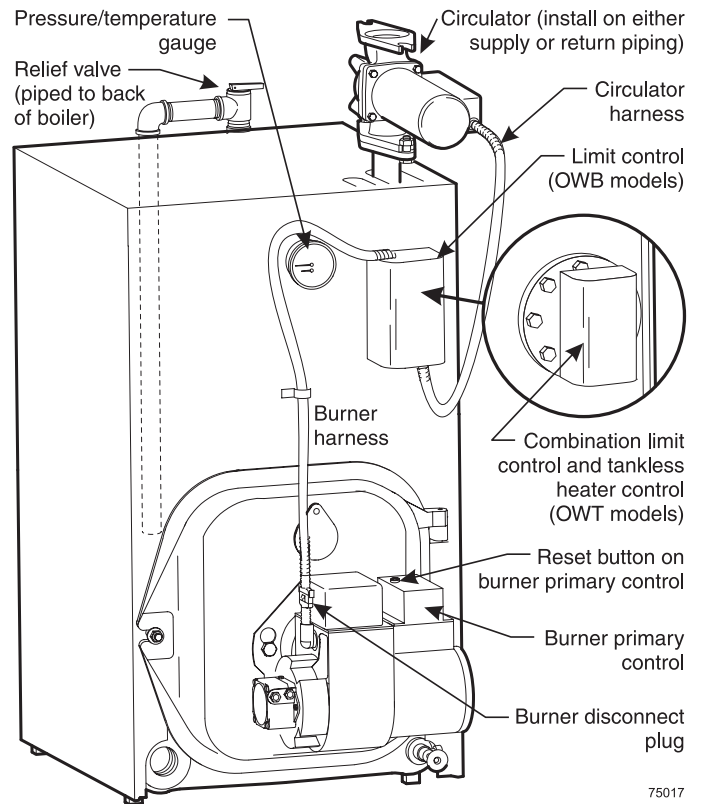
Burner wiring

- Burner harness incorporates a disconnect plug, providing a convenient way to disconnect wiring when burner mounting door is opened. See Figure 9.

Wiring entrance

- The limit control enclosure houses electrical connections for all boiler components.
- Boilers have harnesses furnished. See Figure 10, page 12, (OWB boilers) or Figure 11, page 13, (OWT boilers) for factory and field wiring information.
- All field-installed high voltage wiring must be sheathed in metal conduit.
- Connect incoming line voltage wires as shown in Figure 10 or Figure 11. Field-install equipment ground wire to green wire with wire nut.
- Some local codes may require an emergency shut-off switch installed at a location away from boiler. Follow local codes.

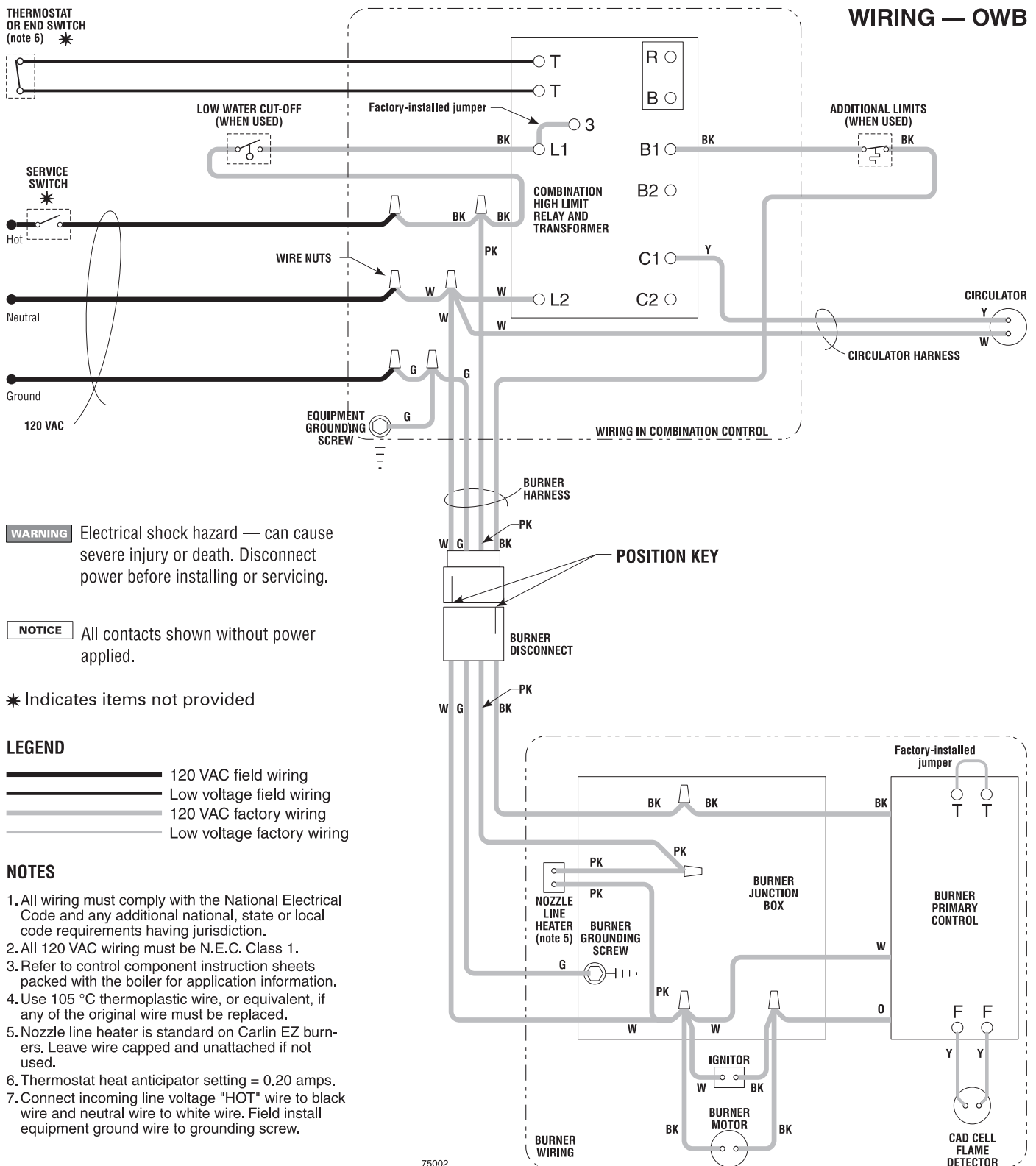
Figure 9 Electrical components and harnesses



75017

6 Connect wiring continued

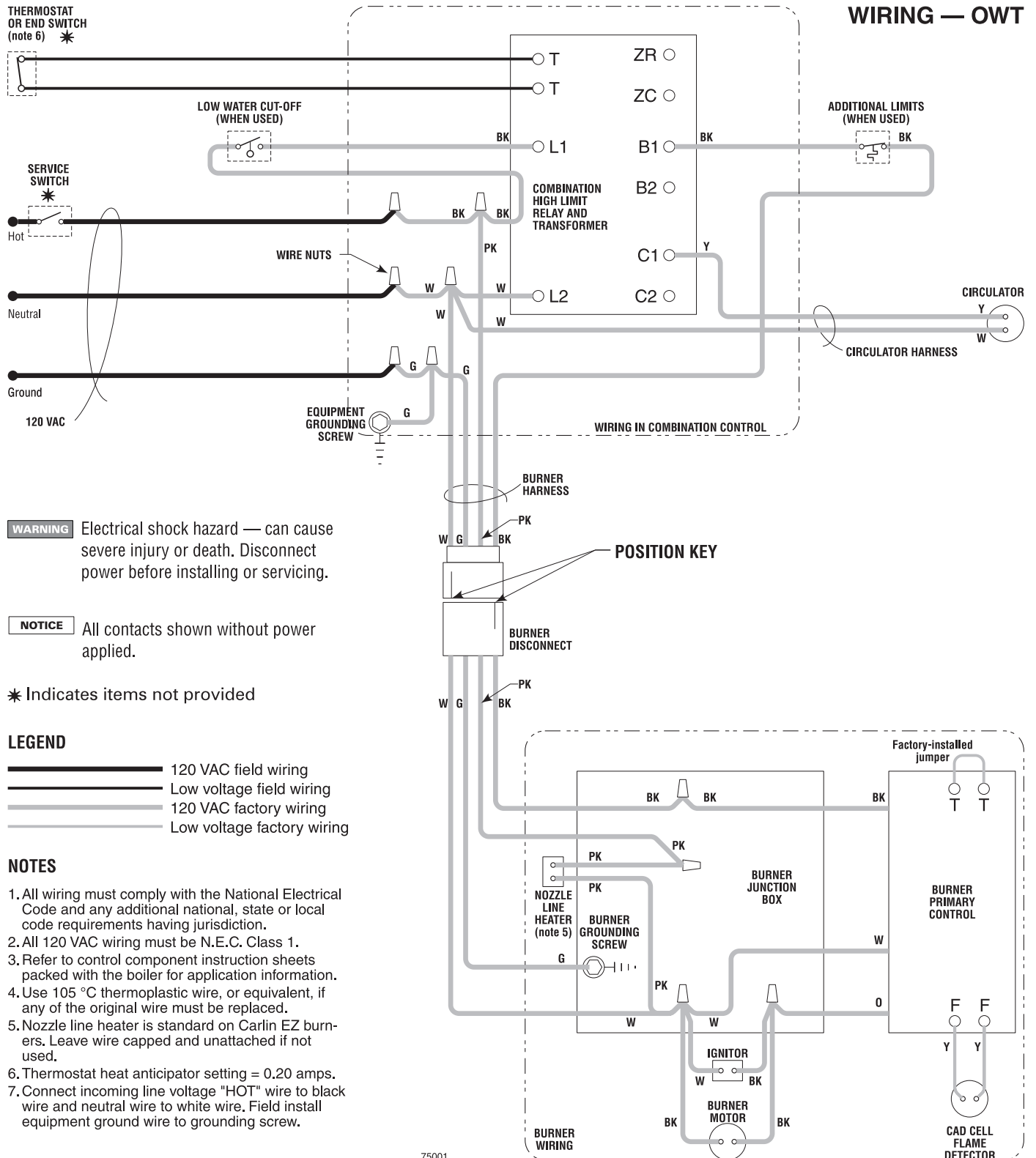
Figure 10 Wiring diagram — OWB boilers



75002

6 Connect wiring continued

Figure 11 Wiring diagram — OWT boilers



75001

7 Connect oil piping

General oil piping requirements

- Location and installation of oil tanks, oil piping and burners must follow:
 - NFPA 31, Standard for the Installation of Oil-Burning Equipment.
 - Local codes and regulations.
 - Information provided with burner and fuel pump.
- If any part of fuel oil tank is above level of burner, an anti-siphon device must be used to prevent flow of oil in case of oil line break.
- Support oil lines as required by codes.
- Make tank connections with swing joints or copper tubing to prevent breaking in case the tank settles. Make swing joints so they will tighten as tank settles. Non-hardening pipe joint compounds should be used on all threads.

WARNING

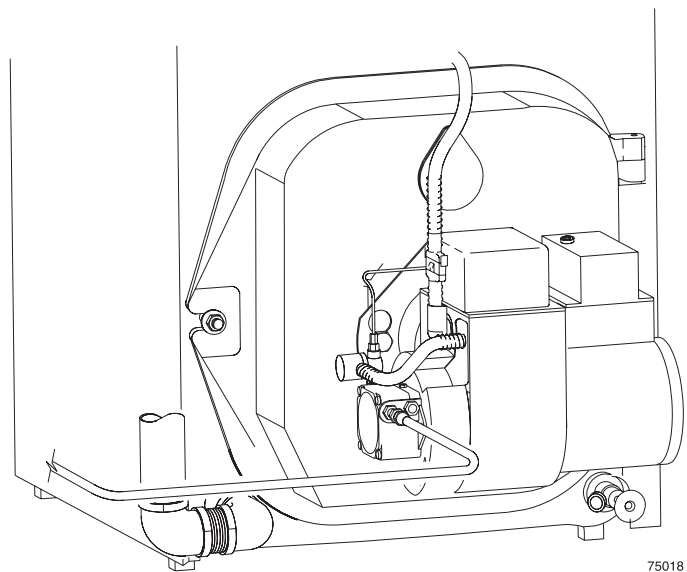
Do not use Teflon tape as an oil pipe sealant. It can cause valves to fail, creating hazards. Use only flare fittings. Do not use compression fittings. Failure to comply could result in severe personal injury, death or substantial property damage from oil leakage and/or fire hazard.

- Underground pipe must be run in a casing to prevent oil leaking into ground or under floor. Check local codes for information.

Oil piping connection at burner

- See Figure 12 for typical oil connection at burner, allowing burner mounting door to swing open completely for servicing.
- Connect oil line to burner using flare fitting (Figure 12).
- See local codes for appropriate arrangement and piping of filter, control valves, etc. connecting to oil tank.
- Refer to burner manual for oil system requirements. Verify that suction lift does not exceed stated limit. Where lift exceeds limit for a one-pipe system, use a two-pipe system as directed in burner manual.

Figure 12 Oil piping connection to burner, typical



75018

8 Start-up

DANGER Follow information below to prevent severe personal injury, death or substantial property damage:

- Do not use gasoline crankcase drainings or any oil containing gasoline. See burner manual for proper fuel oil.
- Do not attempt to start burner when excess oil has accumulated, when unit is full of vapor or when combustion chamber is very hot.
- Do not start burner unless collector hood, breeching and burner mounting door are secured in place.
- Never burn garbage or paper in the boiler.
- Never leave combustible material around it.

• When using antifreeze:

WARNING Do not use automotive, ethylene glycol, undiluted or petroleum-based antifreeze. Severe personal injury, death or substantial property damage can result.

- Use antifreeze especially made for hydronic systems. Inhibited propylene glycol is recommended.
- 50% solution provides protection to about -30 °F. Do not exceed 50% mixture.
- Local codes may require backflow preventer or actual disconnect from city water supply.
- Determine quantity according to system water content. Boiler water content is listed on back cover of manual. Percent of solution will affect sizing of heat distribution units, circulator and expansion tank.
- Follow antifreeze manufacturer's instructions.

Fill the system

1. Close manual and automatic air vents and boiler drain cock.
2. Fill to correct system pressure. Correct pressure will vary with each installation. Normal cold water fill pressure for residential systems is 12 psig. Boiler water pH 7.0 to 8.5 is recommended.

NOTICE Failure to maintain recommended pH level can cause section failure and leaks.

3. Open automatic air vent one turn.
4. Open other vents.
 - a. Starting on the lowest floor, open air vents one at a time until water squirts out. Close vent.
 - b. Repeat with remaining vents.
5. Refill to correct pressure.

Tips for water systems

- Check boiler and system piping for leaks. Continual makeup water will reduce boiler life. Minerals can build up in sections, reducing heat transfer and causing cast iron to overheat, resulting in section failure.

CAUTION Failure to maintain recommended pH and repair leaks can cause section iron corrosion, leading to section failure and leaks. Do not use petroleum-based sealing or stop-leak compounds in boiler system. Damage to system components can result.

- For pH conditions outside 7.0 to 8.5 range or unusually hard water areas (above 7 grains hardness), consult local water treatment company.

Place in operation

1. Verify boiler is filled with water.
2. Open burner mounting door and verify rear target wall, floor and burner door insulations are in proper position and condition.
3. Verify burner mounting door is closed tightly and burner wiring harness is connected securely.
4. Factory burner adjustment and settings may not be suitable for specific job conditions. Refer to burner manual for burner start-up, adjustment and checkout procedures.

5. Refer to burner manual for start-up. Allow boiler to heat to design temperature. Then adjust burner for correct combustion, using combustion test equipment. Adjust burner for:

Draft: -0.01 to -0.02 inches water column draft in boiler combustion chamber.

CO₂: between 11% and 12%, with 0 smoke.

WARNING Make final burner adjustments using combustion test equipment to assure proper operation. Do not fire boiler without water. Sections will overheat, damaging boiler and resulting in substantial property damage.

6. Vent air from system. Repeat steps 4 and 5 under "Fill the system". Air in system can interfere with water circulation and cause improper heat distribution.
7. Check boiler and system piping for leaks. See "Tips for water systems" on this page.
8. Inspect breeching and venting for proper operation.

NOTICE For additional information, refer to instructions packed with boiler or burner:

- Burner Manual
- Component literature

9 Checkout procedure

Check off steps as completed

- 1. Boiler and heat distribution units filled with water?
- 2. Automatic air vent, if used, opened one full turn?
- 3. Air purged from system? Piping checked for leaks?
- 4. Air purged from oil piping? Piping checked for leaks?
- 5. Burner door closed, sealed and nut tight? Burner harness securely plugged in?
- 6. Proper draft and burner flame? Final adjustment made with combustion test equipment?
- 7. Test limit control: While burner is operating, move indicator on limit control below actual boiler water temperature. Burner should go off while circulator continues to operate. Raise setting on limit control above water temperature and burner should reignite.
- 8. Test additional field-installed controls: If boiler has a low water cutoff, additional high limit or other controls, test for operation as outlined by manufacturer. Burner should be operating and should go off when controls are tested. When controls are restored, burner should reignite.
- 9. Limit control set to system temperature requirements (maximum 220 °F)?
- 10. For multiple zones, flow adjusted to distribute heat in all zones?
- 11. Thermostat heat anticipator setting (if available) set properly? Refer to “Connect wiring,” page 11.
- 12. Boiler cycled with thermostat? Raise to highest setting and verify boiler goes through normal start-up cycle. Lower to lowest setting and verify boiler goes off.
- 13. Observed several operating cycles for proper operation?
- 14. Set room thermostat(s) to desired room temperature?
- 15. Completed “Installation and service certificate” below?
- 16. Reviewed User’s Information Manual with owner or maintenance person and instructed person to keep for future reference?
- 17. Returned all instructions provided with boiler to its envelope and placed with boiler for future reference?

WARNING

Obtain gas-tight seal to prevent possible flue gas leakage and carbon monoxide emissions, leading to severe personal injury or death.

Installation and service certificate

Boiler model _____ Series _____

CP number _____ Date installed _____

Measured Btuh input _____

- Installation instructions have been followed.
- Checkout sequence has been performed.
- Above information is certified to be correct.
- Information received and left with owner/maintenance person.

Installer _____ (company) _____ (address) _____ (phone)

(installer’s signature)

10 Appendix

Close clearance installation

WARNING To provide close clearances as described on this page, obtain Close Clearance Kit and install as described below. Failure to use kit or install as described can result in a fire hazard, causing severe personal injury, death or substantial property damage.

Substitute these instructions for corresponding material in manual. All other procedures and practices must remain the same.

Recommended service and minimum clearances shown on page 3 should be used where possible.

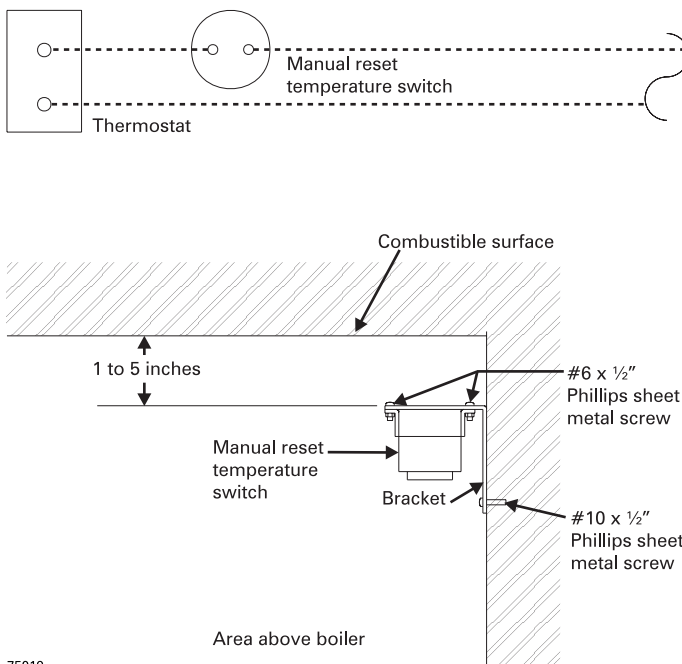
Where closer clearances are required:

- Top of boiler – If less than 24" available, provide removable surface to allow for cleaning boiler flueways.
- Right or left side – Minimum 2 inches.
- Front – Minimum 2 inches from burner.
- Type "L" doublewall flue (vent) pipe to combustible surface – as listed in Table below and Figures 13, 14 and 15.

NOTICE Flue pipe clearances must take precedence over jacket clearances.

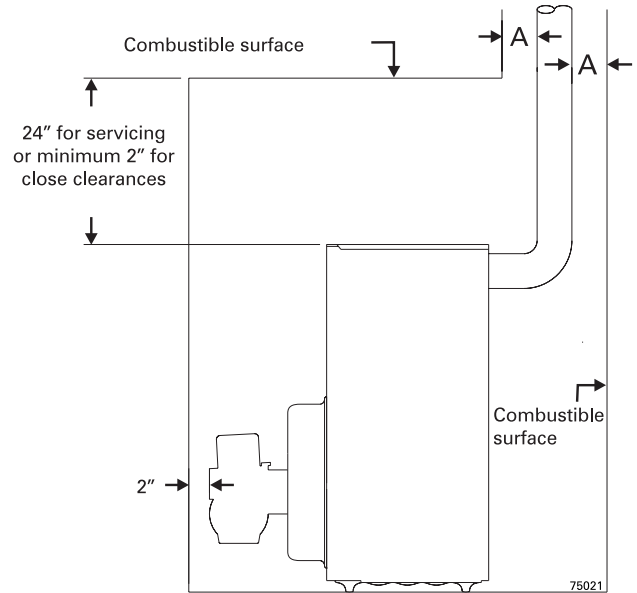
1. Install boiler using clearances described above.
2. Install barometric control 18 to 20 inches from boiler in breeching.
3. Attach manual reset temperature switch near upper surface of enclosed area. See Figure 13.
4. Wire switch in series with thermostat. See Figure 13.
5. Provide two combustion/ventilation openings when installing in confined space. Size opening 140 sq. in. (1000 Btu) per 1 GPH input. Locate openings near top and bottom of enclosed space.

Figure 13 Manual reset temperature switch wiring and location



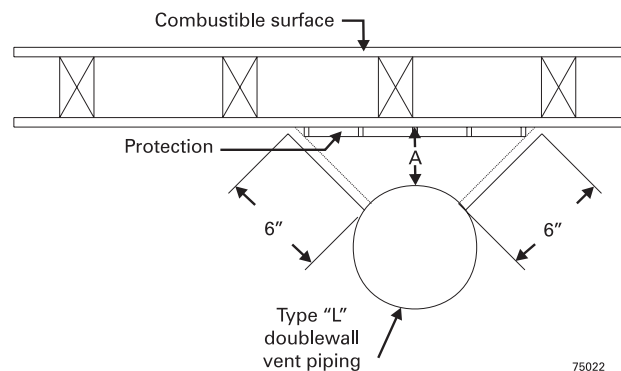
75019

Figure 14 Minimum vent clearances



75021

Figure 15 Protection required for close clearance



75022

Protection required for clearance less than 6" from doublewall vent pipe (Note 1)	
Dimension A When desired minimum clearance from Type "L" doublewall vent pipe to combustible surface is:	Use the following protection (Note 2):
3"	½" thick insulation board (Note 3) over one-inch glass fiber or mineral wool batts (Note 4)
2"	24 gauge sheet metal with one-inch ventilated air space
1"	½" thick insulation board (Note 3) with one-inch ventilated air space

Notes:
 1. All clearances measured from outer surface of equipment to combustible surface, not to the protection used.
 2. Apply to combustible surface unless otherwise noted. Cover all surfaces as specified in Table above and Figure 14. Thicknesses are minimum.
 3. Factory-fabricated board made of non-combustible materials, usually mineral wool, having thermal conductivity in range of one (Btu-inch)/(hr/sq. ft/°F) or less.
 4. Mineral wool batts (blanket or board), having minimum density of 8 lb/ft³ and a minimum melting point of 1500 °F.

11 Service and maintenance

Annual service and start-up

WARNING Follow the “Service and maintenance” procedures given throughout this manual and in component literature shipped with the boiler. Failure to perform the service and maintenance could result in damage to the boiler or system. Failure to follow the directions in this manual and component literature could result in severe personal injury, death or substantial property damage.

WARNING The boiler should be inspected and started annually, at the beginning of the heating season, only by a qualified service technician. In addition, the maintenance and care of the boiler designated in the table below, and explained on the following pages must be performed to assure maximum boiler efficiency and reliability. Failure to service and maintain the boiler and system could result in equipment failure.

Annual service call check list (follow in order listed below)		D	D	D	D	D	D	D	D	D	D	Comments
		A	A	A	A	A	A	A	A	A	A	
		T	T	T	T	T	T	T	T	T	T	
E	E	E	E	E	E	E	E	E	E	E	E	
1	Check that boiler area is free from combustible materials, gasoline and other flammable vapors and liquids.											
2	Check for and remove any obstruction to combustion and ventilation air flow to boiler.											
3	Check breeching and chimney or vent for obstructions, damage, etc. Repair or replace as necessary.											
4	Clean boiler flueways. See page 19.											
5	Perform service on relief valve and circulator. See page 20.											
6	Check boiler and piping for leaks and repair if found. Check for leaks at tankless heater plate. Tighten nuts only if leaks are found (for OWT torque to 20-25 ft.lbs.).											
7	Inspect and adjust burner. See burner manual and: - change nozzle. - check ignition electrode settings. - clean blower housing and wheel. - make sure blower wheel turns freely. - oil burner motor if required. - clean air inlet. - clean or change fuel filter and strainer.											
8	Make sure boiler is filled with water.											
9	Start unit and verify combustion settings with combustion test equipment. See page 20.											
10	Verify operation of all controls on boiler. See page 20.											

11 Service and maintenance continued

Cleaning boiler flueways

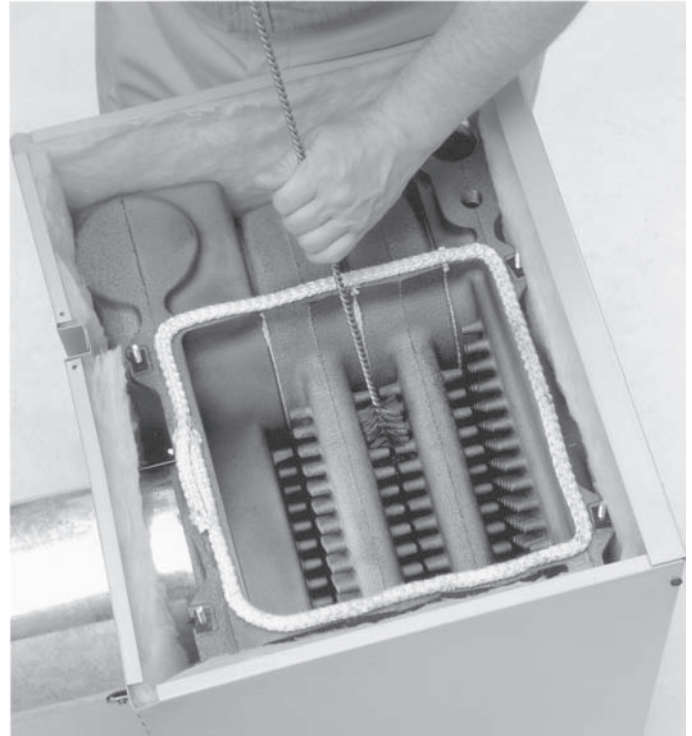
WARNING The boiler contains ceramic fiber and fiberglass materials. Use care when handling these materials per instructions on page 21 of this manual. Failure to comply could result in severe personal injury.

DANGER Make sure all electrical connections to boiler are turned off and wait until boiler is warm, not hot, before cleaning. Failure to do so will result in severe personal injury, death or substantial property damage.

1. Remove jacket top panel.
2. Remove flue collector hood, saving hardware for reassembly.
3. Shut off oil valves. Arrange drip pans under the areas of oil piping that will be disconnected. Disconnect oil line at burner so that you can swing open the door completely.
4. Line combustion chamber floor with newspaper to catch any soot that will be loosened in the cleaning process.
5. Starting at the top of the boiler, use a wire flue brush to thoroughly clean between all pins at all angles. Be careful not to damage side walls of rear refractory.
6. Move to the bottom of the flueways and clean up between the sections to reach pins left uncleaned in step #5.
7. Once the flueways are cleaned, carefully remove the paper from the floor of the combustion chamber. Fold the paper to capture the refuse, seal in a plastic bag, and dispose.
8. Verify sealing rope around flue area is intact. Visually check condition and position of insulation in combustion chamber floor, and the refractories at the rear of boiler and in the burner mounting door. Replace any parts as necessary.
9. Close burner mounting door and tighten nut securely. Place flue collector hood on top of boiler. Secure with hardware from step #2. Maintain a gas-tight seal to avoid possible flue gas leakage and carbon monoxide emissions, which can lead to severe personal injury or death.
10. Check breeching for sooting and clean if necessary. Install jacket top panel and breeching.
11. Reconnect oil line and all electrical connections.

Figure 16 Cleaning boiler flueways — Thoroughly clean flueways between all pins at all angles. Start on top of boiler, finish from the bottom.

WARNING Wear a NIOSH -certified dust respirator (N95) while cleaning the boiler, per WARNING on page 21. Failure to comply could result in severe personal injury.



11 Service and maintenance continued

Fill the system:

1. Close manual and automatic air vents and drain cock.
2. Fill to correct system pressure. Correct pressure will vary with each installation. Normal cold water fill pressure for residential systems is 12 psig. Boiler water pH 7.0 to 8.5 is recommended.

WARNING Failure to maintain recommended pH level can cause section failure and leaks, resulting in potential of severe personal injury, death or substantial property damage.

3. Open automatic air vent (if installed) one turn.
4. Starting on the lowest floor, open manual air vents one at a time until water squirts out. Close vent. Repeat with remaining vents.
5. Refill to correct pressure.

To place boiler in operation:

DANGER Follow information below to prevent severe personal injury, death or substantial property damage:

- Do not use crankcase drainings or any oil containing gasoline. See burner manual for proper fuel oil.
- Do not attempt to start burner when excess oil has accumulated in combustion chamber, when unit is full of vapor, or when combustion chamber is very hot.
- Do not start burner unless collector hood, breeching and burner mounting door are secured in place. Never burn garbage or paper in the boiler.
- Never leave combustible material around boiler.

1. Verify boiler is filled with water.
2. Open burner door and verify rear target wall, floor and burner door insulations are in proper condition and position.
3. Verify burner mounting door is closed and bolted tightly and burner plug is connected.
4. Refer to burner manual for burner start-up, adjustment and checkout procedures. Factory burner adjustment and settings may not be suitable for specific job conditions.

WARNING Make final burner adjustments using combustion test equipment to assure proper operation. Do not fire boiler without water. Sections will overheat, damaging boiler and resulting in substantial property damage.

5. Check boiler and system piping for leaks.
6. Inspect breeching and venting for proper operation.

Annual service

Boiler relief valve

1. Inspect the relief valve and lift the lever to verify flow as in the following warnings, excerpted from a relief valve manufacturer's warning label. Before operating any relief valve, ensure that it is piped with its discharge in a safe area to avoid severe scald potential. Read manual Section 4, page 7, before proceeding further.

WARNING Safety relief valves should be reinspected AT LEAST ONCE EVERY THREE YEARS, by a licensed plumbing contractor or authorized inspection agency, to ensure that the product has not been affected by corrosive water conditions and to ensure that the valve and discharge line have not been altered or tampered with illegally. Certain naturally occurring conditions may corrode the valve or its components over time, rendering the valve inoperative. Such conditions are not detectable unless the valve and its components are physically removed and inspected. This inspection must only be conducted by a plumbing contractor or authorized inspection agency — not by the owner. Failure to reinspect the boiler relief valve as directed could result in unsafe pressure buildup, which can result in severe personal injury, death or substantial property damage.

2. After following the above warning directions, if the relief valve weeps or will not seat properly, replace the relief valve. Ensure that the reason for relief valve weeping is the valve and not over-pressurization of the system due to expansion tank waterlogging or undersizing.

WARNING Following installation, the valve lever must be operated AT LEAST ONCE A YEAR to ensure that waterways are clear. Certain naturally occurring mineral deposits may adhere to the valve, rendering it inoperative. When manually operating the lever, water will discharge and precautions must be taken to avoid contact with hot water and to avoid water damage. Before operating lever, check to see that a discharge line is connected to this valve directing the flow of hot water from the valve to a proper place of disposal otherwise severe personal injury may result. If no water flows, valve is inoperative. Shut down boiler until a new relief valve has been installed.

Oiled-bearing circulators

1. The circulator shipped with the OWB and OWT boilers are water-lubricated. No oiling is required.
2. Check other circulators in the system. Oil any circulators requiring oil, following circulator manufacturer's instructions. Over-oiling will damage the circulator.

Oiled-bearing burner motors

1. The burner may need to be lubricated if motor is equipped with oiling cups. Apply a few drops only of SAE 20 detergent oil (never use household oils). Do not attempt to "fill up" the oil cup. Over-oiling can damage the motor.

Verify component operation

1. Perform the checkout sequence on page 16 to verify system and components are operating correctly.

11 Service and maintenance continued

Handling ceramic fiber and fiberglass materials

REMOVAL OF COMBUSTION CHAMBER LINING OR BASE PANELS

WARNING

The combustion chamber lining or base insulation panels in this product contain ceramic fiber materials. 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 (Group 1).":

- 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 web site at <http://www.cdc.gov/niosh/homepage.html>. NIOSH approved respirators, manufacturers, and phone numbers are also listed on this web site.
 - Wear long-sleeved, loose fitting clothing, gloves, and eye protection.
- Apply enough water to the combustion chamber lining or base insulation to prevent airborne dust.
- Remove combustion chamber lining or base insulation from the boiler and place it in a plastic bag for disposal.
- Wash potentially contaminated clothes separately from other clothing. Rinse clothes washer thoroughly.

NIOSH stated First Aid.

- Eye: Irrigate immediately
- Breathing: Fresh air.

REMOVAL OF FIBERGLASS WOOL — OR —

INSTALLATION OF FIBERGLASS WOOL, COMBUSTION CHAMBER LINING OR BASE PANELS:

WARNING

This product contains fiberglass jacket insulation and ceramic fiber materials in combustion chamber lining or base panels in gas fired products. Airborne fibers from these materials have been listed by the State of California as a possible cause of cancer through inhalation.

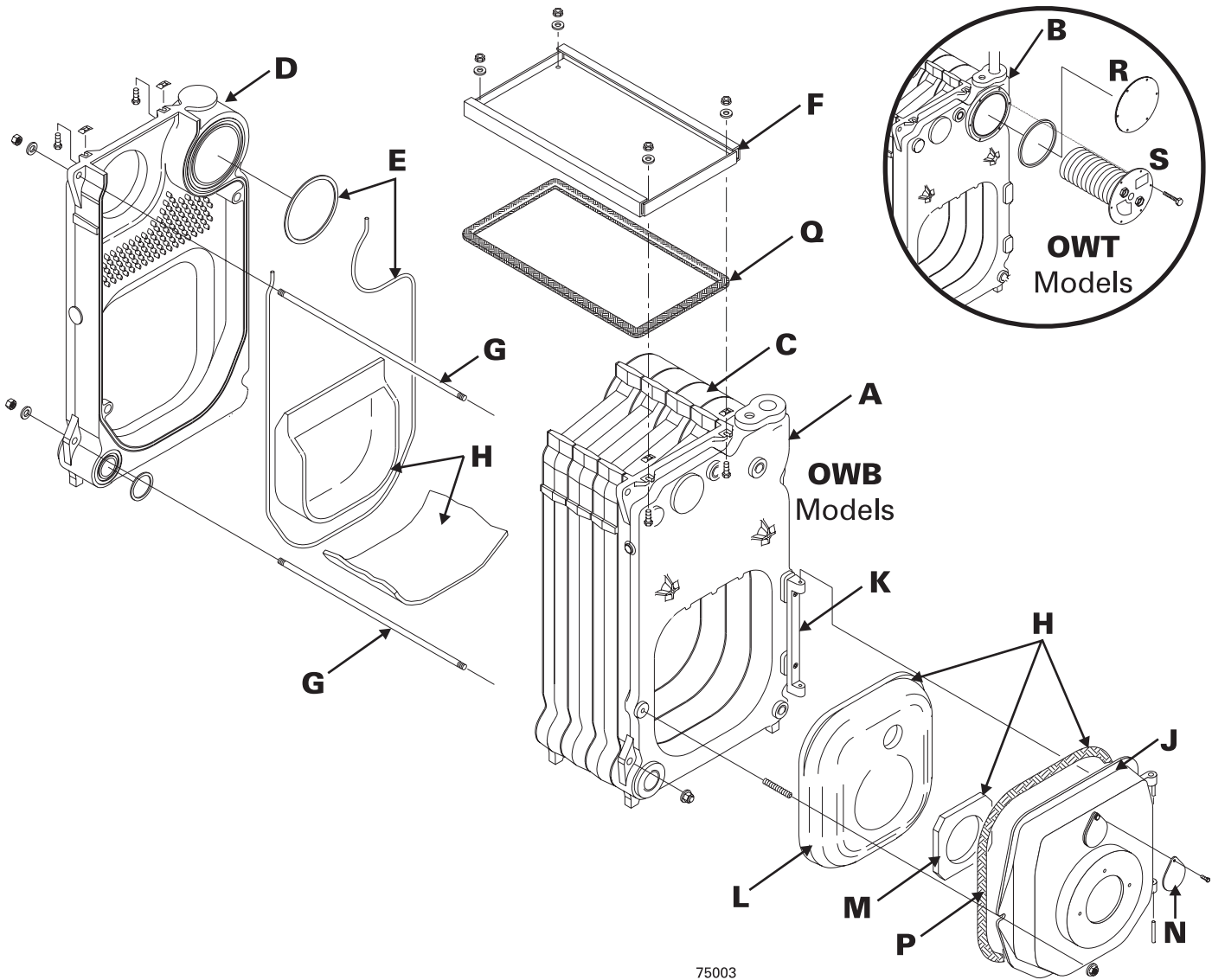
- Avoid breathing dust and contact with skin and eyes.
 - Use NIOSH certified dust respirator (N95). This type of respirator is based on the OSHA requirements for fiberglass wool at the time this document was written. Other types of respirators may be needed depending on the job site conditions. Current NIOSH recommendations can be found on the NIOSH web site at <http://www.cdc.gov/niosh/homepage.html>. NIOSH approved respirators, manufacturers, and phone numbers are also listed on this web site.
 - Wear long-sleeved, loose fitting clothing, gloves, and eye protection.
- Operations such as sawing, blowing, tear out, and spraying may generate airborne fiber concentration requiring additional protection.
- Wash potentially contaminated clothes separately from other clothing. Rinse clothes washer thoroughly.

NIOSH stated First Aid.

- Eye: Irrigate immediately
- Breathing: Fresh air.

12 Replacement parts

Figure 17 Boiler section assembly, refractories, collector hood and burner door assembly



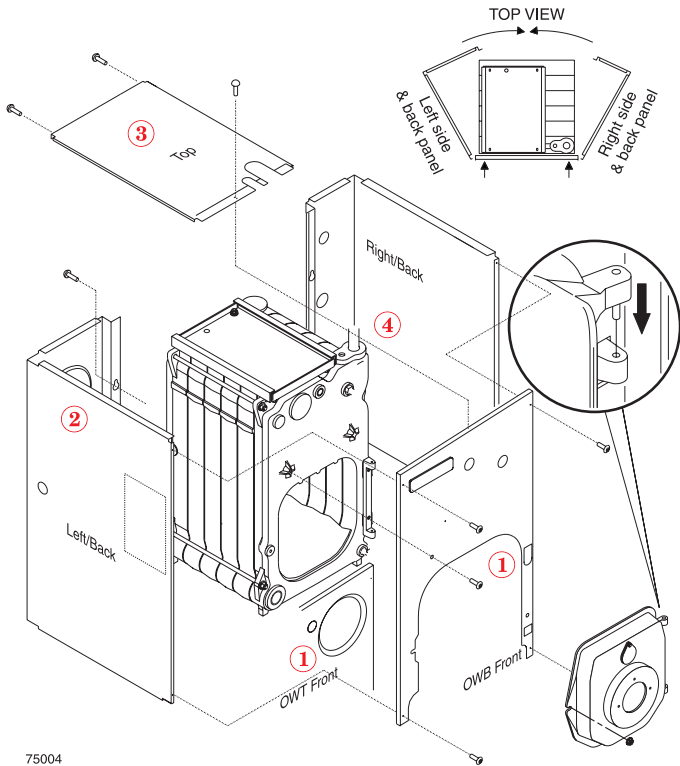
12 Replacement parts continued

Table 6 Parts list for Figure 17

Figure number	Description	Boiler model number	Part Number
A	Front section, number 7112	All	316-722-013WT
B	Front section with tankless heater opening, number 7113	All	316-722-005WT
C	Intermediate section, number 7115	All	316-722-017WT
D	Back section, number 7117	All	316-722-021WT
E	Section replacement kit, front or back section (for 1 joint, includes seals, rope, adhesive and collector hood hardware)	All	386-700-852WT
	Section replacement kit, intermediate section (for 2 joints, includes seals, rope and adhesive)	All	386-700-851WT
	Section assembly complete	OWB-3	326-700-020WT
		OWB-4	326-700-021WT
		OWB-5	326-700-022WT
		OWB-6	326-700-023WT
		OWT-3	326-700-010WT
		OWT-4	326-700-011WT
		OWT-5	326-700-012WT
		OWT-6	326-700-013WT
F	Collector hood kit (includes rope and hardware for installation)	OWB/OWT-3	386-700-841WT
		OWB/OWT-4	386-700-842WT
		OWB/OWT-5	386-700-843WT
		OWB/OWT-6	386-700-844WT
G	Tie rod ½ x 10¾"	OWB/OWT-3	560-234-491WT
	Tie rod ½ x 14"	OWB/OWT-4	560-234-470WT
	Tie rod ½ x 17"	OWB/OWT-5	560-234-472WT
	Tie rod ½ x 20"	OWB/OWT-6	560-234-534WT
H	Combustion chamber kit (rear and front refractory, door refractory blanket and water glass)	All	386-700-836WT
	Burner mounting door assembly (door, observation port, rope, insulation and pins)	All	343-500-546WT
J	Burner mounting door, number 7171	All	330-054-305WT
K	Door hinge, number 7054	All	330-054-300WT
L	Door refractory	All	592-400-028WT
M	Door refractory blanket	All	591-222-115WT
N	Observation port shutter	All	460-039-867WT
P	Door seal rope 5'	All	590-735-105WT
Q	¾" Glass rope for collector hood (7' for largest size hood)	All	590-735-109WT
R	Heater cover plate carton (cover plate, gasket, studs and nuts)	All	386-700-360WT
S	Tankless heater kit (heater, gasket, studs and nuts) OWT-3 (heater model WT-11) OWT-4 through OWT-6 (heater model WT-14)	OWT-3 OWT-4, -5 & -6	590-921-599WT 590-921-612WT
	Flue brush, 123D	All	591-706-214WT

12 Replacement parts continued

Figure 18 Jacket parts and replacement instructions



75004

Item number	Description	Boiler model number	Part number
1	Jacket panel, front without heater opening with heater opening	OWB (All) OWT (All)	426-722-001WT 426-722-003WT
2	Jacket panel, left side and back	OWB/OWT-3 OWB/OWT-4 OWB/OWT-5 OWB/OWT-6	426-722-025WT 426-722-027WT 426-722-029WT 426-722-031WT
3	Jacket panel, top	OWB/OWT-3 OWB/OWT-4 OWB/OWT-5 OWB/OWT-6	426-722-007WT 426-722-009WT 426-722-011WT 426-722-013WT
4	Jacket panel, right side and back	OWB/OWT-3 OWB/OWT-4 OWB/OWT-5 OWB/OWT-6	426-722-035WT 426-722-037WT 426-722-039WT 426-722-041WT
	Jacket hardware kit	All	386-700-845WT

WARNING The boiler contains ceramic fiber and fiberglass materials. Use care when handling these materials per instructions on page 21 of this manual. Failure to comply could result in severe personal injury.

Before installing jacket:

- Do not remove any knockouts.
- Make sure all unused tappings are plugged.
- These parts may be on boiler:
 - Supply piping
 - Return piping
 - Drain valve
 - Air vent or expansion tank piping
- These parts must be off boiler:
 - Breeching connection
 - Pressure/temperature gauge and limit control
 - Water relief valve and piping
- Remove burner mounting door by removing locking nut and lifting door off hinge. Do not remove hinge.

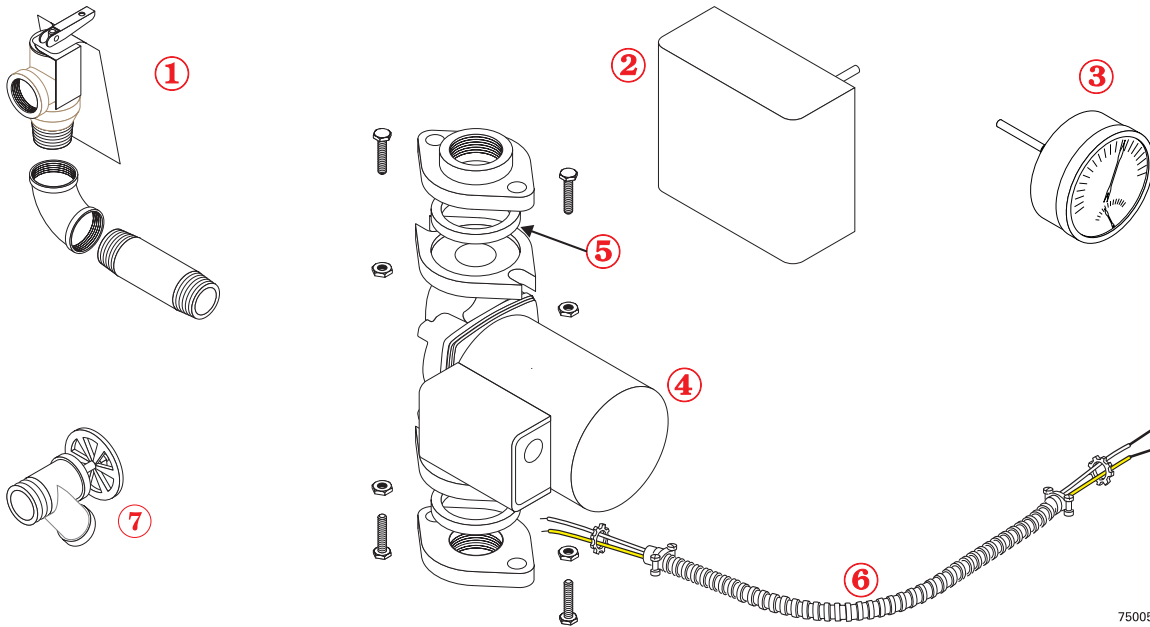
To install jacket:

- Install jacket front panel to front section, making sure burner door hinge lugs extend through holes in lower jacket leg. Secure with two 3/8" x 1/2" black machine screws.
- Right and left side pieces are shipped as straight pieces. Before installing, bend about 90° at perforation as shown, to form sides and back panels.
 - Secure side panels to front panel with four sheet metal screws.
 - To secure back panels, using two 1/4" x 1/2" self-tapping screws:
 - Start upper screw in boiler section. Do not tighten.
 - Slip keyhole opening in back panels behind screw.
 - Install lower screw and tighten both screws.
 - Install top panel and secure with two sheet metal screws.
- Reinstall burner mounting door and secure locking nut on stud, making sure door is secured gas-tight.

WARNING Gas-tight seal must be obtained to prevent possible flue gas leakage and carbon monoxide emissions, leading to severe personal injury or death.

12 Replacement parts continued

Figure 19 Trim and controls



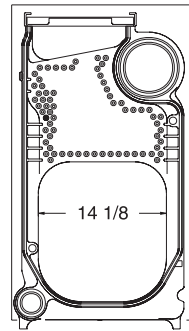
75005

Item number	Description	Manufacturer	Manufacturer's part number	Part number
1	Pressure relief valve, ASME, 30 PSIG, 3/4" male inlet	Watts	M330	511-546-920WT
2	Combination high limit/circulator relay control (OWB) Combination high limit/low limit/circulator relay control (OWT)	Honeywell Honeywell	L8148A1157 L8124A1155	510-311-030WT 510-311-040WT
3	Combination pressure-temperature gauge	ENFM	4104	510-218-099WT
4	Circulator (<i>Fittings shown are shipped loose with boiler.</i>)	Taco	007	511-405-113WT
5	Circulator gasket, universal (2 per boiler)			590-317-535WT
not shown	Circulator hardware kit, includes: 2 flanges, 4 nuts, 4 bolts, 1 nipple, 1 ell — 1 1/4" NPT — OWB/OWT-3 & OWB/OWT-4 1 1/2" NPT — OWB/OWT-5 & OWB/OWT-6			381-354-526WT 381-354-531WT
6	Circulator wiring harness			591-391-910WT
7	Drain valve, 3/4"	Conbraco Hammond Valve Matco-Norca Watts	31-606-01 710 205F04 BD-2C	511-210-423WT 511-246-392WT 511-246-392WT 511-246-392WT
not shown	Burner wiring harness			591-391-911WT
not shown	Burner plug			643-900-020WT
not shown	Balanced draft damper (barometric)	Effikal	ESOC-7	510-512-267WT

13 Dimensions

Figure 20 Dimensional drawing — ALL DIMENSIONS IN INCHES

- ① Supply piping (*note 1*)
- ② Return piping (*note 1*)
- ③ Relief valve, 3/4" NPT
- ④ 1/2" NPT to expansion tank/air vent
- ⑤ Vent connection — 7" diameter
- ⑥ Burner opening — 4 3/8" diameter
- ⑦ Oil burner
- ⑧ Drain valve
- ⑨ Tankless coil & combination limit (**OWT only**)
- ⑩ Pressure/temperature gauge

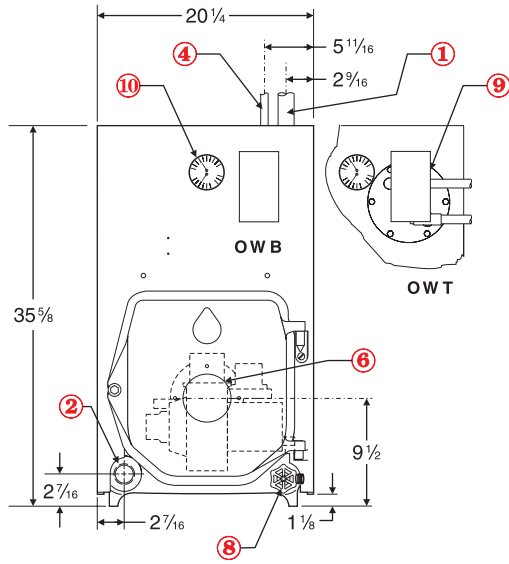


INTERMEDIATE SECTION

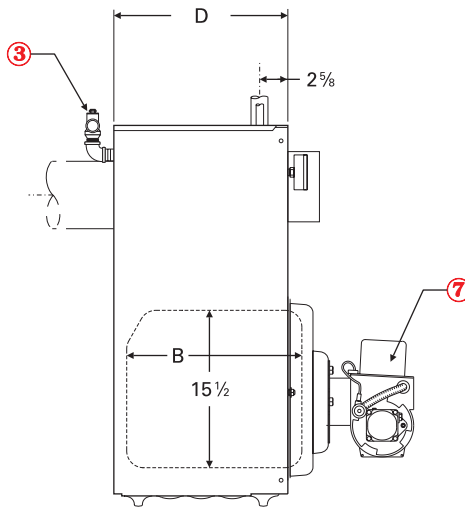
Note 1: Boiler supply and return tappings are both 1 1/2" NPT on all boiler sizes. See Table 4, page 7 for recommended system supply and return piping sizes.

Note 2: Boiler circulator (shown piped in supply piping) is shipped loose. Circulator may be mounted on either boiler supply or return piping. Circulator wiring harness is factory-connected in limit control, left loose on circulator end for field connection. Circulator flange provided with boiler is same size as recommended pipe size on page 7, Table 4.

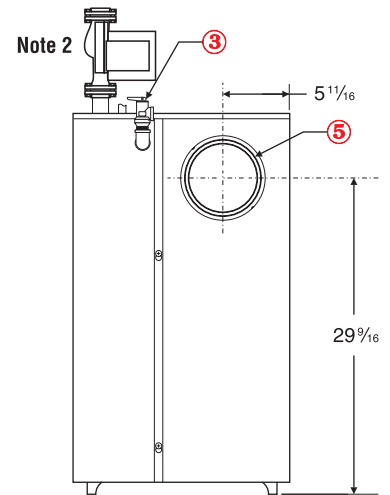
ALL DIMENSIONS IN INCHES



FRONT



LEFT SIDE



REAR

75006

Boiler model number	Supply tapping (inches NPT)	Return tapping (inches NPT)	"B" Combustion chamber depth (inches)	"D" Jacket depth (inches)
OWB/OWT-3	1 1/2	1 1/2	10 1/2	13 3/4
OWB/OWT-4	1 1/2	1 1/2	13 5/8	16 7/8
OWB/OWT-5	1 1/2	1 1/2	16 7/8	20
OWB/OWT-6	1 1/2	1 1/2	20	23 1/8

14 Ratings

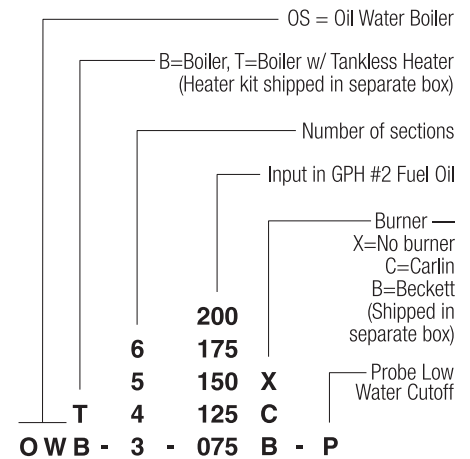


DOE

Boiler model number	I=B=R burner capacity GPH	DOE heating capacity MBH	Net I=B=R ratings MBH		DOE seasonal efficiency % AFUE	Round flue outlet size inches	Minimum I=B=R Chimney			Boiler water content gallons	Draft loss through boiler inches W.C.
			Water sq. feet				Rectangle inches	Round inches	Height feet		
Note 1	Note 3	Notes 2 & 4	Note 5			Note 6					Note 7
OWB/OWT-3-075	0.75	90	78		84.3	7	8 x 8	6	15	11.0	.000
OWB/OWT-3-100	1.00	116	101		82.2	7	8 x 8	6	15	14.9	.000
OWB/OWT-4-110	1.10	129	112		82.5	7	8 x 8	6	15	13.4	.010
OWB/OWT-4-125	1.25	145	126		81.7	7	8 x 8	6	15	13.4	.010
OWB/OWT-5-135	1.35	159	138		82.8	7	8 x 8	7	15	15.9	.010
OWB/OWT-5-150	1.50	174	151		81.3	7	8 x 8	7	15	15.9	.010
OWB/OWT-5-165	1.65	191	166		81.2	7	8 x 8	7	15	15.9	.010
OWB/OWT-6-175	1.75	203	177		80.8	7	8 x 8	7	15	18.4	.000
OWB/OWT-6-200	2.00	231	201		80.7	7	8 x 8	7	15	18.4	.005

Notes

1. See information at right for model number suffixes.
2. MBH refers to thousands of Btu per hour.
3. Base on 140,000 Btu per gallon.
4. Based on standard test procedures prescribed by the United States Department of Energy, with combustion conditions of 13% CO₂ and -0.02" W.C. draft.
5. Net I=B=R ratings are based on net installed radiation of sufficient quantity for the requirements of the building and nothing need be added for normal piping and pickup. Ratings are based on a piping and pickup allowance of 1.15. An additional allowance should be made for unusual piping and pickup loads.
6. See page 6 for minimum breeching diameter.
7. Listed draft losses are for factory-shipped settings.



NOTICE Install OWB and OWT boilers for residential radiant panel systems, converted gravity heating systems or other low water temperature applications per instructions in this manual to avoid damage due to condensation. OWB and OWT boilers are designed for installation on combustible flooring. OWB and OWT boilers are ASME rated for 50 psig working pressure.

W-T
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