



OWB & OWT

Series 3

Oil-Fired Water Boilers

Boiler Manual

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Homeowner —

Read and follow all information on pages 1 through 6 ONLY.

Service technician —

Read and follow ALL information in the entire manual.

- ▲WARNING** Failure to follow all instructions in proper order can cause severe personal injury, death or substantial property damage.
- ▲WARNING** At the beginning of each heating season, contact your qualified service technician to inspect, clean and start-up the boiler per the Boiler Manual. Failure to comply could result in boiler failure, leading to potential severe personal injury, death or substantial property damage.

Hazard definitions

- ▲DANGER** Hazards that will cause severe personal injury, death or substantial property damage.
- ▲CAUTION** Hazards that will or can cause minor personal injury or property damage.
- ▲WARNING** Hazards that can cause severe personal injury, death or substantial 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.
 - Have the boiler serviced by a qualified service technician.

- ▲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
 - Consumer Protection (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 19.

Read this first!



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

Homeowner —

- For homeowner or person responsible for simple start-up and routine maintenance of the system.

Instructions on 1 through page 5 must be followed to assure proper operation of your boiler. See page 5 for lists common problems and possible corrections. In addition, it is your responsibility to:

- Have boiler and burner installed by a qualified installer.
- Have boiler and burner serviced annually by a qualified service technician.
- Review and understand start-up and routine maintenance procedures with qualified service technician.

Perform routine maintenance as described on page 3.

Service technician —

- For a qualified service technician who has the necessary equipment to check the boiler and system performance, and is responsible for start-up and service of boiler and system.
- All instructions in this manual must be followed to assure proper operation of this boiler.
- Annually service boiler and burner to assure proper operation. See page 21 for service record.
- Review and explain start-up and routine maintenance procedures with homeowner.



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

- To avoid electric shock, disconnect electrical supply to burner service switch and additional external switches before performing service.
- To avoid severe burns, allow boiler to cool before performing service.
- Do not block flow of combustion or ventilation air to boiler.
- Boiler must be connected to a flue with sufficient draft at all times to assure proper operation.

Do not use this boiler if any part has been under water. Electrical and mechanical failures may cause electric shock and fire risks. Immediately call a qualified service technician to inspect chimney or vent, boiler and burner. Have the boiler flue ways cleaned and have the following replaced:

- all electrical and mechanical controls
- electrical wiring
- oil burner and controls
- insulation and chamber lining

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 —

1. Do not block flow of combustion or ventilation air to boiler.
2. Should overheating occur, turn off or disconnect electrical supply to boiler and shut off the oil supply at a location external to the appliance, if possible.

Boiler water —

- ❑ 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.



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 systems. Damage to system components can result, causing property damage.

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

When using antifreeze:

- ❑ Use antifreeze especially made for hydronic systems. Inhibited propylene glycol is recommended.



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

- ❑ 50% solution provides protection to about -30°F.
- ❑ Local codes may require back-flow preventer or actual disconnect from city water supply.
- ❑ Determine quantity according to system water content. Boiler water content is listed on Rating page.
- ❑ Percent of solution will affect sizing of heat distribution units, circulator and expansion tank.
- ❑ Follow antifreeze manufacturer's instructions.
- ❑ Do not add cold water to hot boiler. Thermal shock can cause sections to crack.



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.

- ❑ DO NOT use "homemade cures" or "boiler patent medicines". Serious damage to boiler, personnel and/or property may result.
- ❑ Do not add cold water to hot boiler. Thermal shock can cause sections to crack.

Saltwater Damage — The exposure of boiler components to saltwater can have both immediate and long-term effects. While the immediate effects of saltwater damage are similar to those of freshwater (shorting out of electrical components, washing out of critical lubricants, etc.), the salt and other contaminants left behind can lead to longer term issues after the water is gone due to the conductive and corrosive nature of the salt residue. Therefore, Williamson -Thermoflo boiler equipment contaminated with saltwater or polluted water will no longer be covered under warranty and should be replaced.

Electrical Damage — If any electrical component or wiring came into contact with water, or was suspected to have come into contact with water, replace the boiler with a new Williamson -Thermoflo boiler.



Frozen Water Damage Hazard

Residences or buildings that are unattended in severely cold weather, boiler system components failures, power outages, or other electrical system failures could result in frozen plumbing and water damage in a matter of hours. For your protection, take preventative actions such as having a security system installed that operates during power outages, senses low temperature, and initiates an effective action. Consult with your boiler contractor or a home security agency.



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 Routine maintenance schedule

Beginning each heating season	☐ Call a qualified service technician to perform annual service.
Daily during heating season	☐ Check that boiler area is free from combustible materials, gasoline and other flammable vapors and liquids.
Weekly during heating season	☐ Check for and remove any obstructions to flow of combustion or ventilation air to boiler. ☐ Check that breeching is attached between boiler and chimney. If breeching is loose or damaged, immediately turn off switch on boiler and call service technician to repair. ☐ Check for oil leaks in oil piping and around burner. If found, immediately call qualified service technician to correct situation. ☐ Check for water leaks in boiler and piping; also check for leaks around tankless heater plate, if installed. If found, immediately call service technician to repair.
Periodically during heating season	☐ Test probe-type low water cutoff, if/when used: refer to control manufacturer's instructions.
End of heating season	☐ If tankless heater is installed, boiler will continue to operate. Check for the following: • All daily and weekly instructions listed on this page must be followed. • Burner motor may have to be oiled. Some motors are permanently lubricated and do not need additional oil. Check for oiling instructions on burner or motor.
Boiler shutdown	☐ Do not drain boiler unless exposure to freezing temperatures will occur. ☐ Do not use antifreeze in steam systems. ☐ Always keep manual fuel supply shut off if burner is shut down for an extended period of time. • Turn off switch at boiler and any external switch to boiler. • Close fuel valves. • Turn off water feed valve. • Cover burner to protect from dust and dampness.

2 Please read this before proceeding

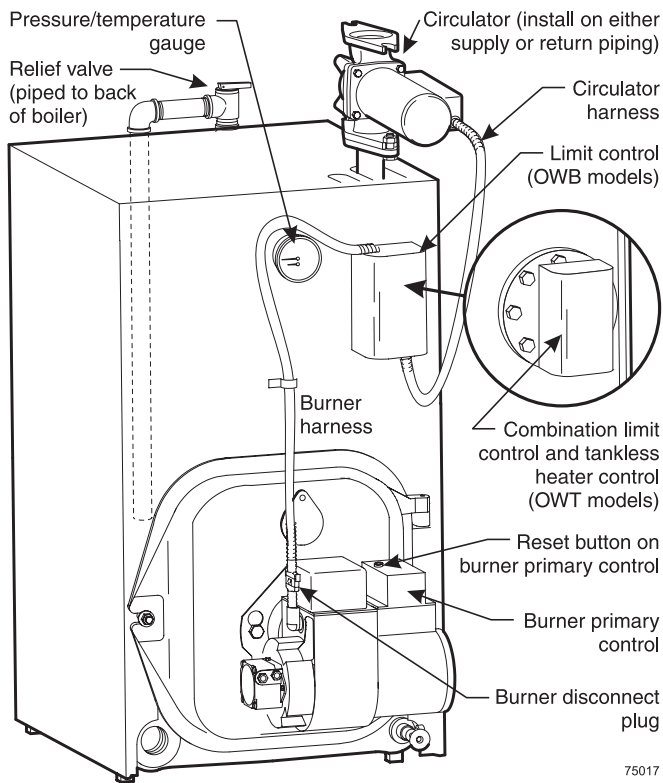
Start-up

1. If burner does not fire, check for:
 - Boiler switch turned off?
 - Fuses blown or breaker tripped?
 - Thermostat set below room temperature?
 - Fuel valves turned off?
 - Not enough oil in tank to supply burner?
2. Correct problems found in step #1. If burner does not fire, press the reset button on burner primary control only once. Repeated presses will deposit oil in chamber, creating a fire hazard.

⚠ DANGER Burner must never be fired when oil is in combustion chamber. Immediately call a qualified service technician.

3. If burner still does not fire, call a qualified service technician.

Figure 1 Boiler and components



Air openings

- Verify that combustion and ventilation air openings to the boiler room and/or building are open and unobstructed.

☐ Check monthly

- Venting system, see page 23.
- Boiler and system piping, see page 23.
- Boiler relief valve, see page 23.
- Automatic air vents (if used), see page 23.

☐ Periodically

Oil motors equipped with oil cups

Burner motors may require oiling. Such motors are fitted with oiling cups. Use a few drops only of SAE 20 detergent oil. Do not use household oils. Excessive oiling can damage motors. Do not attempt to “fill up” the oiling cup.

☐ Every 6 months

Operate boiler relief valve every 6 months



To avoid water damage or scalding due to valve operation, a metal discharge line must be connected to relief valve outlet and run to a safe place of disposal. This discharge line must be installed by a qualified heating installer or service technician in accordance with the instructions in this Boiler Manual. The discharge line must be terminated so as to eliminate possibility of severe burns should the valve discharge.

1. Before proceeding, verify that the relief valve outlet has been piped to a safe place of discharge, avoiding any possibility of scalding from hot water.
2. Read the boiler pressure/temperature gauge to make sure the system is pressurized.
3. Lift the relief valve top lever slightly, allowing water to relieve through the valve and discharge piping.
4. If water flows freely, release the lever and allow the valve to seat. Watch the end of the relief valve discharge pipe to ensure that the valve does not weep after the line has had time to drain. If the valve weeps, lift the seat again to attempt to clean the valve seat. If the valve continues to weep afterwards, contact your qualified service technician to inspect the valve and system.
5. If water does not flow from the valve when you lift the lever completely, the valve or discharge line may be blocked. Immediately turn off switch to the boiler and close fuel valves. Call your qualified service technician to inspect the boiler and system.

☐ Check daily

Boiler area

- Check that boiler area is free from combustible materials, gasoline and other flammable vapors and liquids. Ensure that no air-contaminating materials (see page 7) are present in the area.

Pressure/temperature gauge

- Pressure gauge must not show more than 24 psig. Higher pressure may indicate a system problem. Contact a qualified service technician if high pressure occurs.

☐ End of season shutdown

- Do not drain boiler unless exposure to freezing temperatures will occur.
- Always keep manual fuel supply shut off if burner is shut down for an extended period.
 - a. Turn off switch to boiler.
 - b. Close fuel valves.
 - c. Turn off water feed valve.
 - d. Cover burner to protect from dust and dampness.



3 Troubleshooting



Homeowners — The problems and corrections below represent common situations that can occur. There may be others not listed below. It is important always to contact a qualified service technician if you have any questions about the operation of your boiler or system.

Common Problems	Common Causes	Possible Corrections
Rapid cycling — burner turns on and off frequently.	Thermostat installed where drafts or heat affect reading.	Locate thermostat on inner wall away from heat sources or cool drafts.
	Heat anticipator in thermostat adjusted incorrectly.	Adjust heat anticipator to match current draw. Refer to boiler wiring diagram.
	Incorrect limit setting.	Have qualified service technician increase limit setting to decrease cycling. Maximum setting 220° F.
Need to frequently add makeup water.	Leaks in boiler or piping.	Have qualified service technician repair leaks at once to avoid constant use of makeup water.
Popping or percolating noise heard in boiler.	Mineral deposits in sections due to constant use of makeup water, or incorrect pH.	Have qualified service technician de-lime boiler, repair leaks at once to avoid constant use of makeup water and check pH (between 7.0 and 8.5).
Black water condition.	Oxygen corrosion due to leaks in piping. Improper pH.	Have qualified service technician repair leaks at once to avoid constant use of makeup water and check pH (between 7.0 and 8.5).
Frequent release of water through relief valve.	Expansion tank sized too small or water-logged.	Have qualified service technician check expansion tank operation.
Metal flakes found in flue way.	Contaminated combustion air supply in flue ways.	Remove sources of hydrocarbons in or near boiler area. (Bleaches, cleaners, chemicals, sprays, fabric softeners, paint remover, etc.)
	Condensation of combustion gases.	Have qualified service technician check burner nozzle and oil pump pressure for proper firing rate and check/adjust combustion settings with an analyzer.
Some radiators or baseboard units do not heat or are noisy.	Air in system.	Bleed air from system through air vents in radiators or baseboard units.
	Low system pressure.	Have qualified service technician check for leaks in boiler or piping at once.
	High limit set too low.	Have qualified service technician adjust limit to higher setting.
Domestic water from tankless heater is hot then suddenly turns cold. OR Domestic water from tankless heater is always lukewarm.	Mineral deposits insulate internal waterways of heater.	Have qualified service technician delime or replace coil.
	Boiler stop-leak compound has been added to boiler water and is insulating outside of coil.	Have qualified service technician remove and clean coil and drain, and flush boiler to remove stop-leak.
	Incorrect mixing valve setting for tankless heater.	Have qualified service technician adjust mixing valve setting.
	Domestic flow rate too high.	Have qualified service technician install flow check valve set to rating of tankless heater.
	Incorrect setting on tankless heater control.	Have qualified service technician raise tankless control setting. Adjust differential on tankless control to lower setting.



4 Prepare boiler location



Home Owner — STOP! The procedures and information on this and following pages are intended only for a qualified service technician who has the necessary equipment to inspect and adjust boiler and burner. A homeowner should never attempt these procedures. The service technician must also read pages 1 through 6 before proceeding.

Codes & checklist

Installations must follow these codes:

- Local, state, provincial, and national codes, laws, regulations and ordinances.
- NFPA-31 – latest edition, Installation of Oil-Burning Equipment.
- Standard for Controls and Safety Devices for Automatically Fired Boilers, ANSI/ASME CSD-1, – latest edition, when required.
- National Electrical Code, ANSI/NFPA 70, – latest edition and any additional national, state or local codes.

Before locating the boiler:

- ☐ Check for nearby connection to:
 - System water piping
 - Combustion and ventilation air provisions (page 7)
 - Breeching (Venting) connections (page 8)
 - Oil supply piping (page 17 and burner manual)
 - Electrical power
- ☐ Check area around boiler. Remove any combustible materials, gasoline and other flammable liquids.



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.

Clearances

Minimum clearance to combustible materials

1. Minimum clearances from vent pipe to combustible material (see Figure 2, vent clearances indicated with “*”):
 - Type “L” doublewall vent — 6 inches minimum
 - Singlewall vent — 9 inches minimum

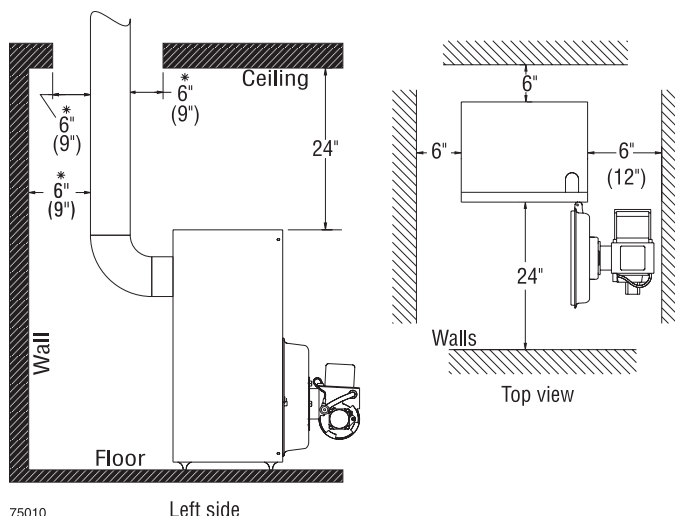


Flue pipe clearances must take precedence over jacket clearances (listed below).

Service clearances

1. Recommended **service** clearances (see Figure 2):
 - Front and top — 24 inches
 - Left side, back and right side — 6 inches
 - Right side for burner door swing radius — 12 inches
2. Special close clearances (alcove, closet, under counters, etc.) – see “Close Clearance,” page 17.

Figure 2 Minimum clearances



Flooring

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



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

Foundation

1. 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.
2. See Table 1 for minimum foundation dimensions.

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.



4 Prepare boiler location

continued

Air for combustion and ventilation



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, latest edition- 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.



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:

- H 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



5 Prepare boiler

Place boiler



The boiler contains ceramic fiber and fiberglass materials. Use care when handling these materials per instructions on page 25 of this manual. Failure to comply could result in severe personal injury.

1. Remove circulator carton strapped to pallet.



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

2. Remove boiler from pallet.



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



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.



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 25, page 30, for location).
3. Plug supply and return tappings.
4. Drain valve is factory-installed.
5. Fill boiler. Vent all air. Pressure test boiler at 1 ½ times working pressure.



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.



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.

6 Connect breeching

General venting requirements



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



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, latest edition - Installation of Oil-Burning Equipment.
 - NFPA 211, latest edition - Standard for Chimneys, Fireplaces, Vents and Solid Fuel Burning Appliances.
 - NFPA 211, latest edition - requires chimney to be lined before connecting 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 — 9 inches minimum
- Minimum chimney sizes should be used. See Table 3, below.



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

Table 3 Chimney and breeching minimum sizes

Boiler model number	Minimum breeching diameter Note 1	Minimum 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 7.00" diameter.
2. 6-3/4" x 6-3/4" inside liner

Connect breeching



Long horizontal breechings, 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 3, page 9. Back outlet (Standard).



6 Connect breeching continued

1. For Top outlet (available only with optional “Top Vent Service Kit”, See Section 12 “Replacement Parts”) See Figure 4.
2. Connect full-sized breeching when possible. See Table 3, page 8.
3. Connection must be made above bottom of chimney to avoid blockage. Breeching must not enter chimney far enough to cause obstruction. Use thimble or slip joint where breeching enters chimney to allow removal for cleaning.
4. When burner and boiler are properly installed, draft over fire will be approximately -0.01 ” to -0.02 ” W.C. Install barometric control in breeching, 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.

5. 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.

Figure 3 Standard back outlet chimney and breeching connections.

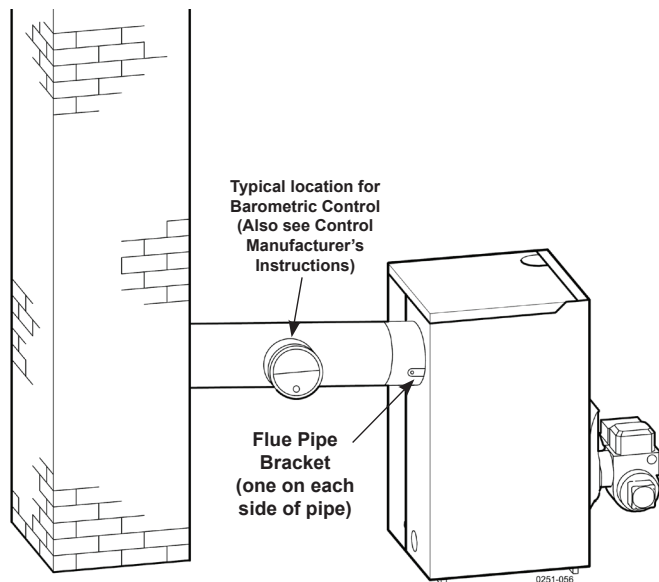


Figure 5 Standard back outlet chimney and breeching connections for models which require vent damper.

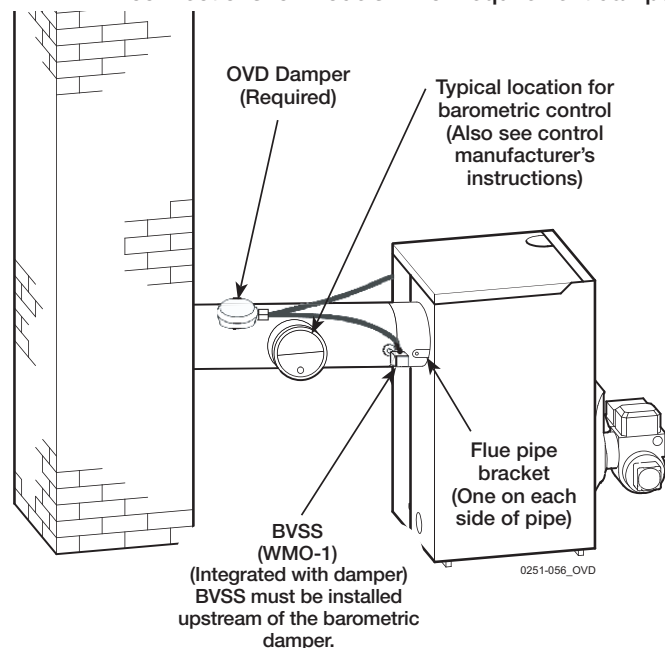


Figure 4 Top outlet breeching connections (only with optional “Top Vent Service Kit”).

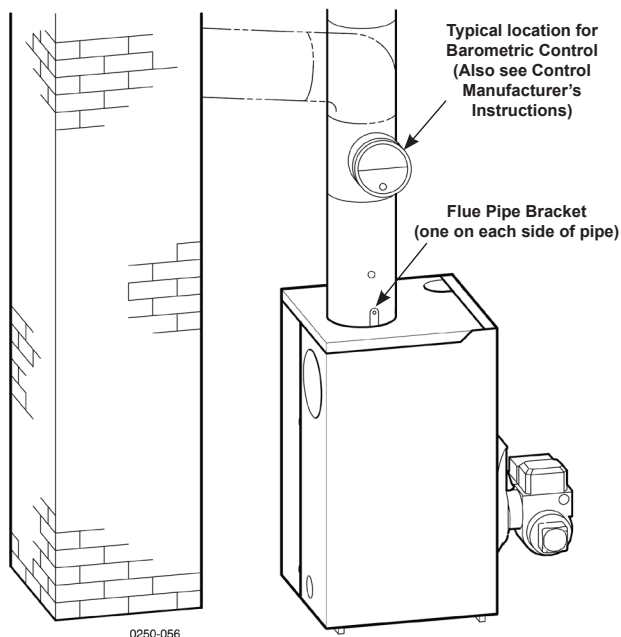
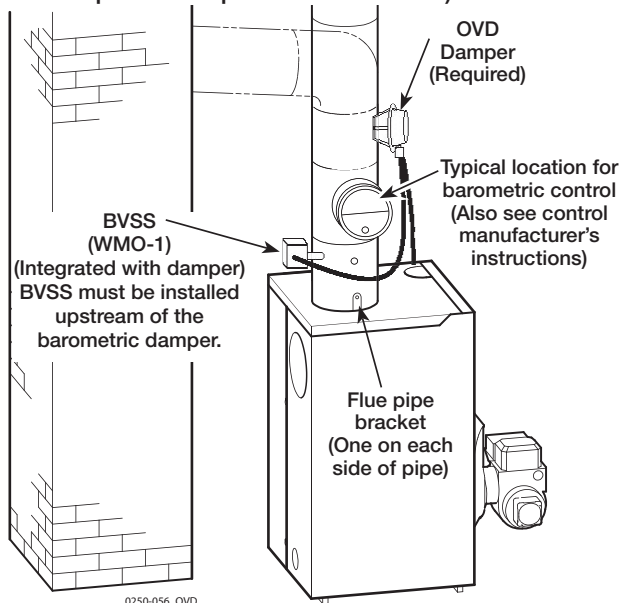


Figure 6 Standard Top outlet breeching connections for models which require a vent damper. (only with optional “Top Vent Service Kit”).



7 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 set point of first control. Maximum allowable set point is 240 °F. See page 14 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 7, page 11 (diaphragm-type or bladder-type expansion tank) or Figure 8 (closed-type expansion tank) on page 11, and Table 4, for near-boiler and single-zone systems designed for return water at least 130 °F. See Figures 10 or 11, page 12 for low return temperature applications.

See this below for multiple-zone piping.

See page 11 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	1-1/4"	1-1/4"
OWB/OWT-4	1-1/4"	1-1/4"
OWB/OWT-5	1-1/2"	1-1/2"
OWB/OWT-6	1-1/2"	1-1/2"
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 7, page 11

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 8, page 11

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.

7 Connect water piping

Figure 7 Diaphragm- or bladder-type expansion tank: Piping to single-zone system using diaphragm-type or bladder-type expansion tank. See Table 4, page 10, for piping sizes.

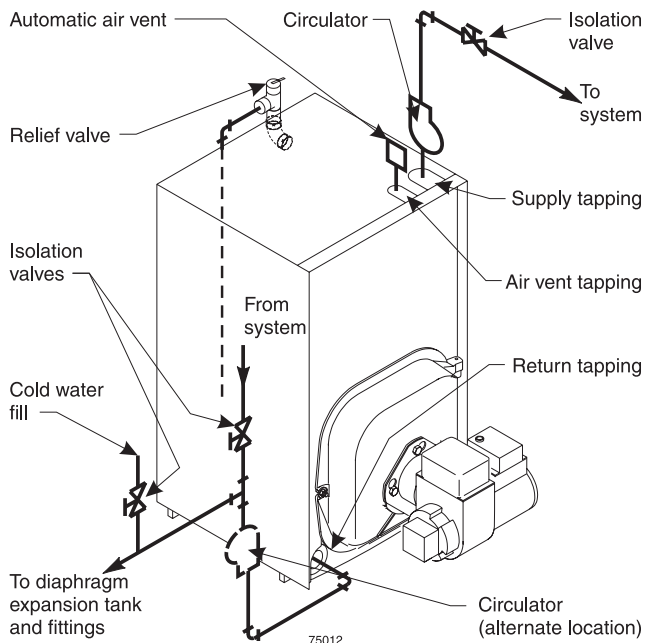
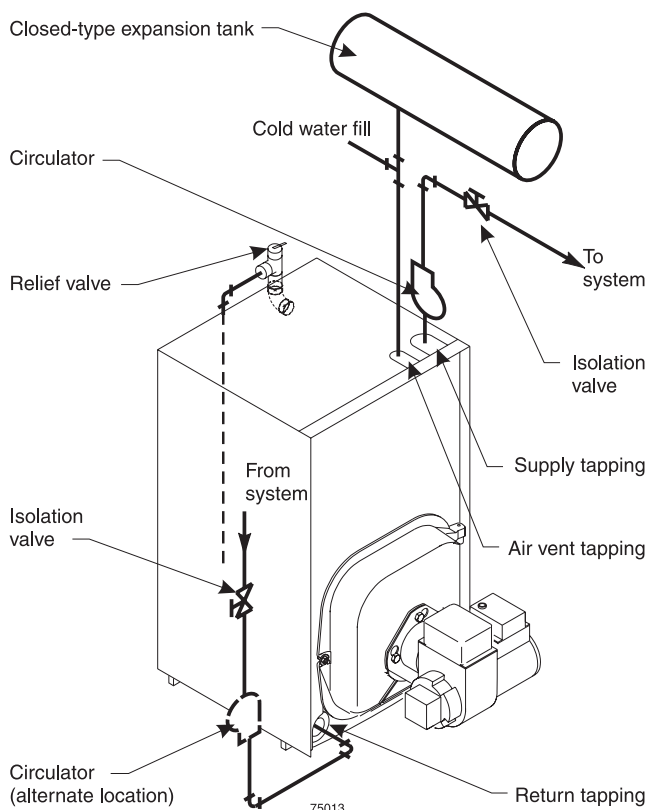


Figure 8 Closed-type expansion tank: Piping to single-zone system using closed-type expansion tank. See Table 4, page 10, for piping sizes.



Part Number 550-142-335/1220

continued

WARNING

Use Figure 7 or Figure 8 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 AHRI Installation and Piping Guides.

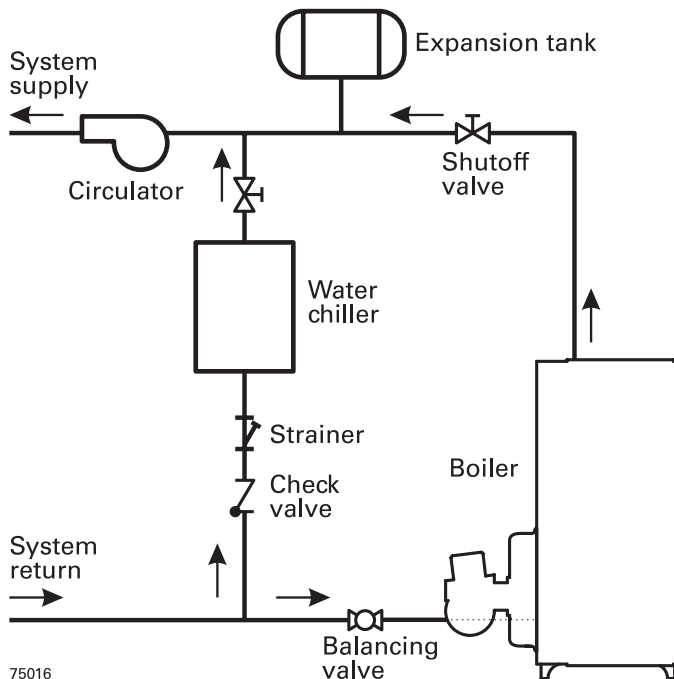
If boiler is connected to heating coils located in air handling units where they can be exposed to refrigerated air, use flow control valves or other automatic means to prevent gravity circulation during cooling cycle. Circulation of cold water through the boiler could result in damage to the heat exchanger, causing possible severe personal injury, death or substantial property damage.

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 9 for typical installation of balancing valve and check valve.

Figure 9 Piping refrigeration systems



7 Connect water piping

continued

Near-boiler piping continued

Figure 10 System bypass piping in boiler loop with separate system circulator, using primary/secondary piping.

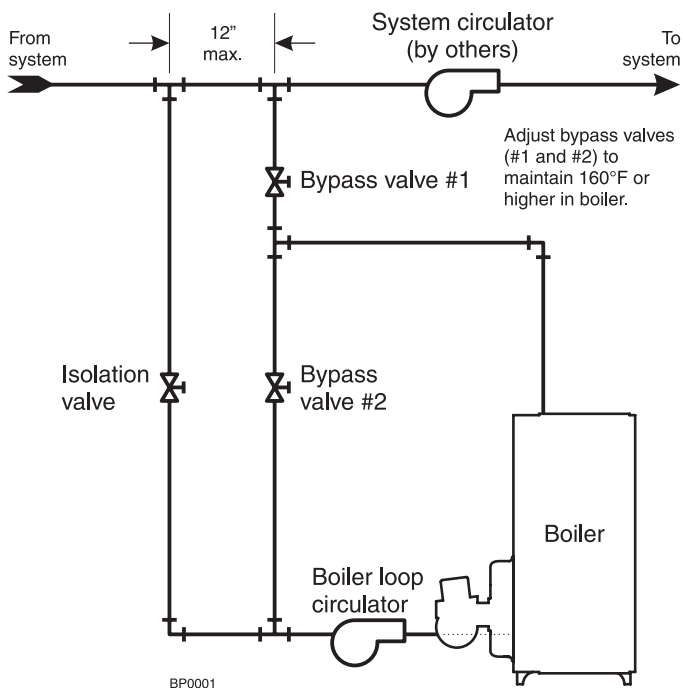
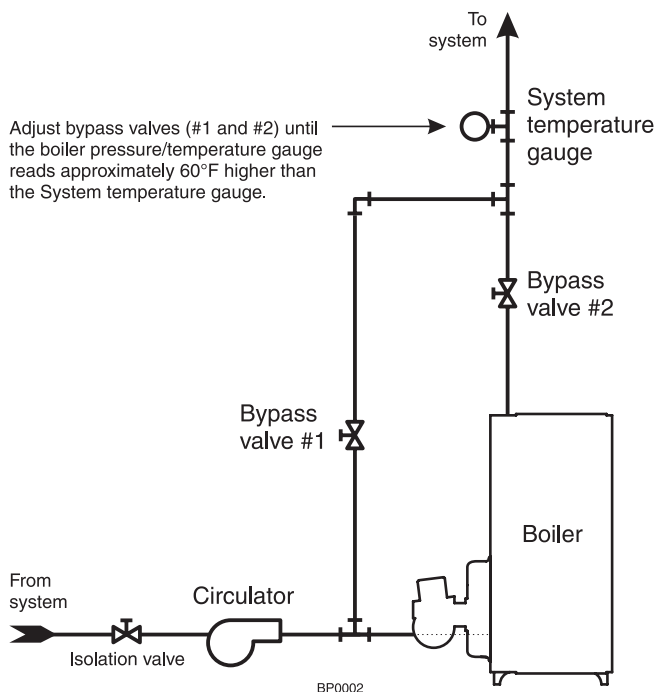


Figure 11 Boiler bypass piping — use only for high water content systems — DO NOT use for radiant panel systems.



System bypass method

1. Apply bypass piping of Figure 10 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.

Boiler bypass method

1. Apply bypass piping of Figure 11 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.



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.

8 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**, selection and installation must comply with 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.



Tankless water heaters for OWT boilers have been tested and certified by CSA Group (certificate # 2552127).

Table 5 Tankless heater ratings

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

Note:

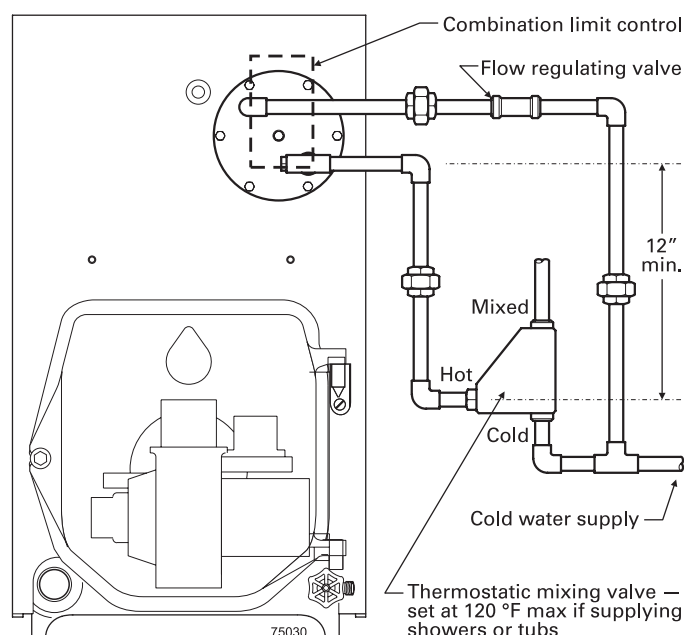
- 1: Gallons of water per minute heated from 50°F to 140°F with 200°F boiler water temperature.
- 2: Gallons of water per minute heated from 40°F to 140°F with 200°F boiler water temperature.

Tested in accordance with AHRI 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**, selection and installation must comply with. See Figure 12 (Read **DANGER** statement at left.)
 - b. Flow regulating valve (see Figure 12). 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 12 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.

9 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 NEC 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 shown in this manual, give settings for standard equipment.

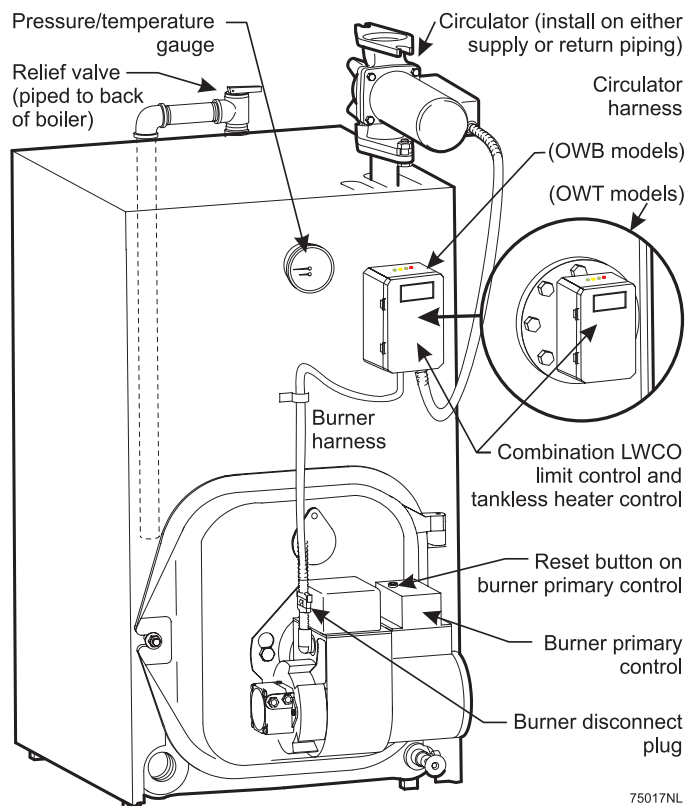
Burner wiring

- Burner harness incorporates a disconnect plug, providing a convenient way to disconnect wiring when burner mounting door is opened. See Figure 13.

Wiring entrance

- The limit control enclosure houses electrical connections for all boiler components.
- Boilers have harnesses furnished. See Figure 15, page 16, for OWB boilers and 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 15, page 16. 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 13 Electrical components and harnesses



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High Temperature Limit

Installation requirements.

⚠ CAUTION

Do not tamper with the unit or controls.

- If installation is to comply with ASME, UL 726 or Canadian requirements, an additional high temperature limit is needed. Consult local inspector. Install control in supply piping between boiler and isolation valve. Set control to a minimum of 20°F above set point of combination control. Maximum allowable set point is 220°F. Wire control as shown on wiring diagram.

THE LIMIT CONTROL SUPPLIED WITH THE BOILER MUST BE SET-UP WITH THERMAL PREPURGE OR THERMAL TARGETING ACTIVE UNLESS EXEMPTED BELOW:

IMPORTANT

In accordance with **Section 303 of the 2007 Energy Act**, this boiler is equipped with a feature that saves energy by reducing the boiler water temperature as the heating load decreases. This feature is equipped with an override which is provided primarily to permit the use of an external energy management system that serves the same function.

THIS OVERRIDE MUST NOT BE USED UNLESS AT LEAST ONE OF THE FOLLOWING CONDITIONS IS TRUE:

- An external energy management system is installed that reduces the boiler water temperature as the heating load decreases.
- This boiler is not used for any space heating.
- This boiler is part of a modular or multiple boiler system having a total input of 300,000 BTU/hr or greater.
- This boiler is equipped with a tankless coil (not applicable to OWB boilers).

9 Connect wiring continued

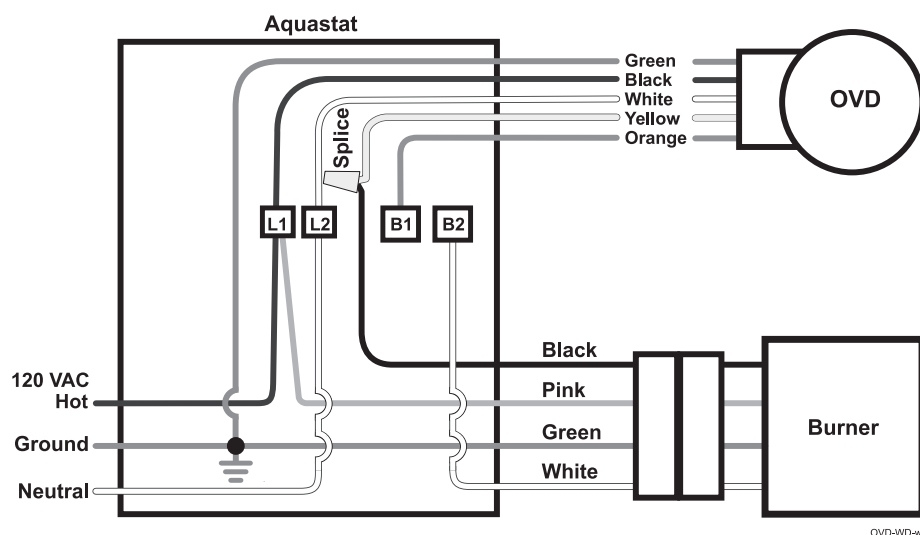
Vent Damper Wiring

1. OWB/OWT boilers require the installation of the Field Controls OVD damper for High Input nozzle applications and Energy Star applications. The OVD Damper kit part number is shown in Table 6, below.
2. When installing the boiler, wire all controls from vent damper and Blocked Vent Shutoff Switch (BVSS) in accordance with the OVD damper manual and the following wire diagram.
3. Connect damper wires to the boiler as follows:
 - a. Remove black wire (burner disconnect harness) from the B1 terminal, and connect that wire to the yellow wire from damper, using a wire nut.
 - b. Connect the orange wire from the damper to the B1 screw terminal.
 - c. Connect the black wire from the damper to the L1 screw terminal.
 - d. Connect the white wire from the damper to the L2 screw terminal.
 - e. Connect the green wire from the damper to ground.

Table 6 OVD Vent damper required kit part numbers

Boiler Configuration	OVD Damper Kit Required
OWB/OWT3-T-S3 @ 0.95 GPH	381-800-515WT
OWB/OWT4-T-S3 @ 1.20 GPH	
OWB/OWT5-T-S3 @ 1.45 GPH	
OWB/OWT6-T-S3 @ 1.75 GPH	
OWB/OWT3-T-S3-D (Energy Star)	381-800-502WT
OWB/OWT4-T-S3-D (Energy Star)	381-800-503WT
OWB/OWT5-T-S3-D (Energy Star)	381-800-504WT
OWB/OWT6-T-S3-D (Energy Star)	381-800-505WT

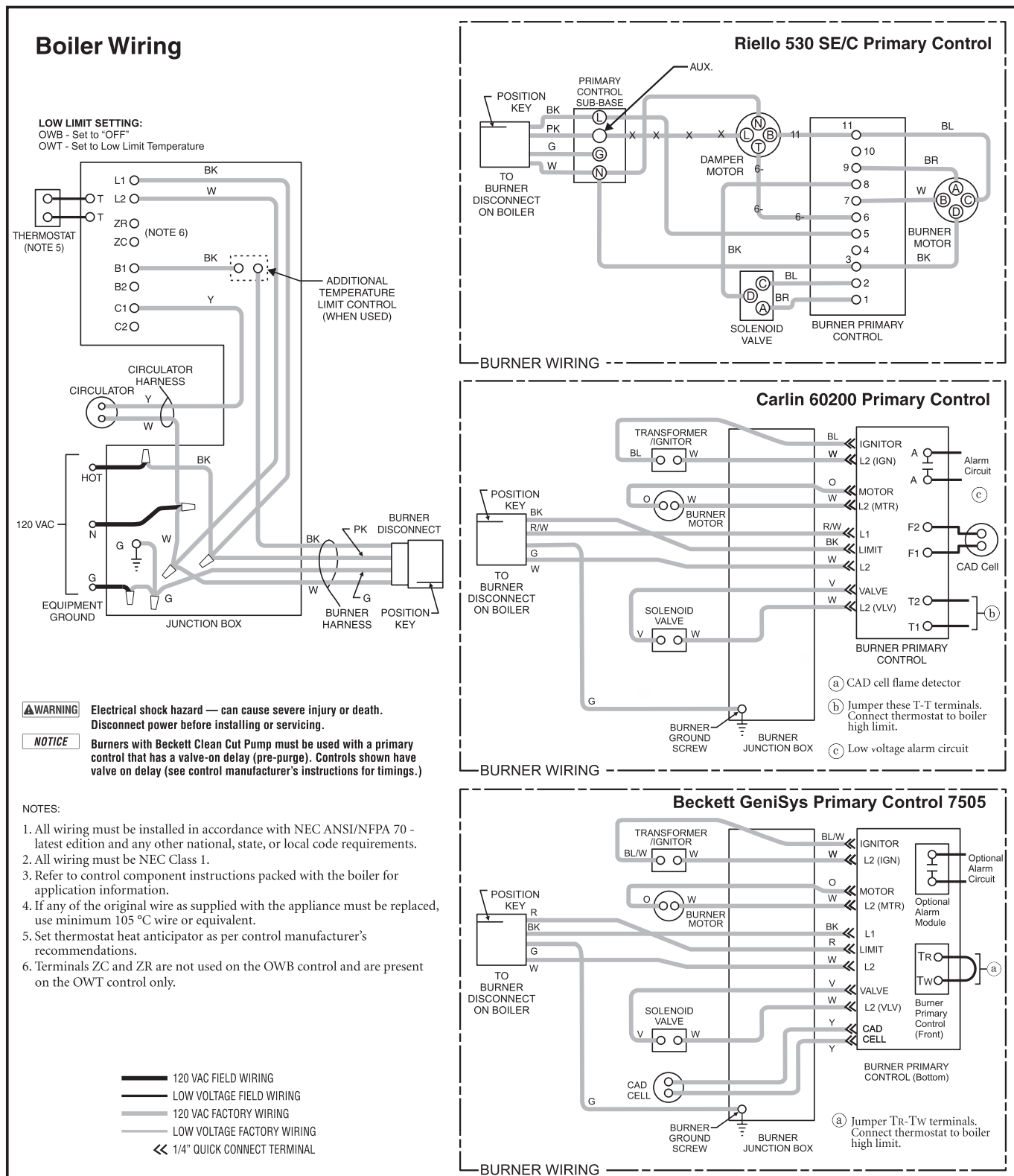
Figure 14 OVD Vent damper wiring diagram





9 Connect wiring continued

Figure 15 Wiring diagram — OWB and OWT boilers



OWB | **OWT**
 3 thru 6 | 3 thru 6

OWB
 • Water without tankless heater
OWT
 • Water with tankless heater

W-T N93 W14635 Whittaker Way Menomonee Falls, WI 53051

PART NUMBER



550-200-047/1220

10 Connect oil piping

General oil piping requirements

- Location and installation of oil tanks, oil piping and burners must follow:
 - NFPA 31, latest edition - 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 installation is highly recommended 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

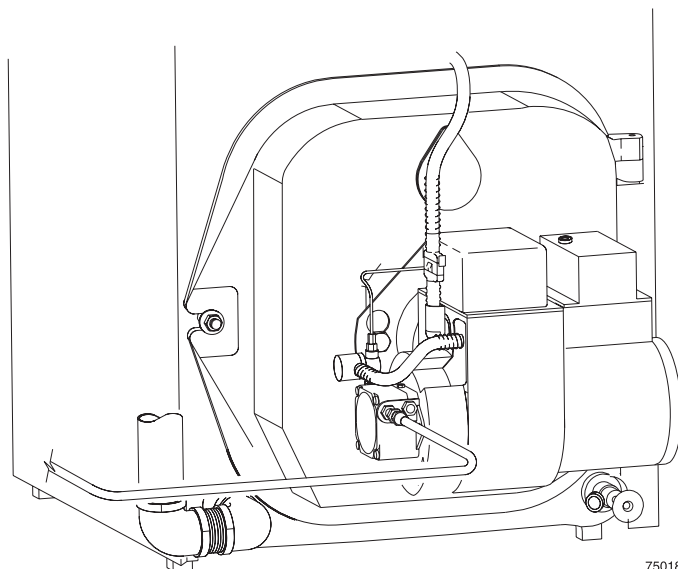
Do not use Teflon tape as an oil pipe sealant. It can cause valves to fail, creating hazards. Use only flare fittings. Do not use compression fittings. Failure to comply could result in severe personal injury, death or substantial property damage from oil leakage and/or fire hazard.

- 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 16 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 16).
- 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 16 Oil piping connection to burner, typical



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11 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.



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.
- When using antifreeze:

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. Burner should be adjusted to 13% CO₂ or less with a smoke level of zero and over-fire of -0.01" to -0.02". Re-adjust burner combustion to account for environmental conditions. Actual CO₂ value will vary and should be adjusted for clean and safe combustion operation. Seasonal variations as well as sufficient combustion air supply can affect proper combustion and boiler performance. The burner should only be adjusted by a service professional with appropriate instrumentation.

NOTICE

A burner nozzle change may be required - refer to the burner instructions or boiler's rating label for correct selection.



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



12 Checkout procedure

Check off steps as completed

- | | |
|--|--|
| <p>☐ 1. Boiler and heat distribution units filled with water?</p> <p>☐ 2. Automatic air vent, if used, opened one full turn?</p> <p>☐ 3. Air purged from system? Piping checked for leaks?</p> <p>☐ 4. Air purged from oil piping? Piping checked for leaks?</p> <p>☐ 5. Burner door closed, sealed and nut tight? Burner harness securely plugged in?</p> <p>⚠ WARNING Obtain gas-tight seal to prevent possible flue gas leakage and carbon monoxide emissions, leading to severe personal injury or death.</p> <p>☐ 6. Proper draft and burner flame? Final adjustment made with combustion test equipment?</p> <p>☐ 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.</p> <p>☐ 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.</p> | <p>☐ 9. Limit control set to system temperature requirements (maximum 220 °F)?</p> <p>☐ 10. For multiple zones, flow adjusted to distribute heat in all zones?</p> <p>☐ 11. Thermostat heat anticipator setting (if available) set properly? Refer to “Connect wiring,” page 14.</p> <p>☐ 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.</p> <p>☐ 13. Observed several operating cycles for proper operation?</p> <p>☐ 14. Set room thermostat(s) to desired room temperature?</p> <p>☐ 15. Completed “Installation and service certificate” below?</p> <p>☐ 16. Reviewed Homeowner’s Information pages 2 through 5 with owner or maintenance person and instructed person to keep for future reference?</p> <p>☐ 17. Returned all instructions provided with boiler to its envelope and placed with boiler for future reference?</p> |
|--|--|

Installation and service certificate

Boiler model _____ Series _____

Consumer Protection (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)

13 Close clearance installation

Close clearance installation

⚠ WARNING To provide close clearances as described on this page, obtain Close Clearance Kit Part Number 386-500-050WT 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.

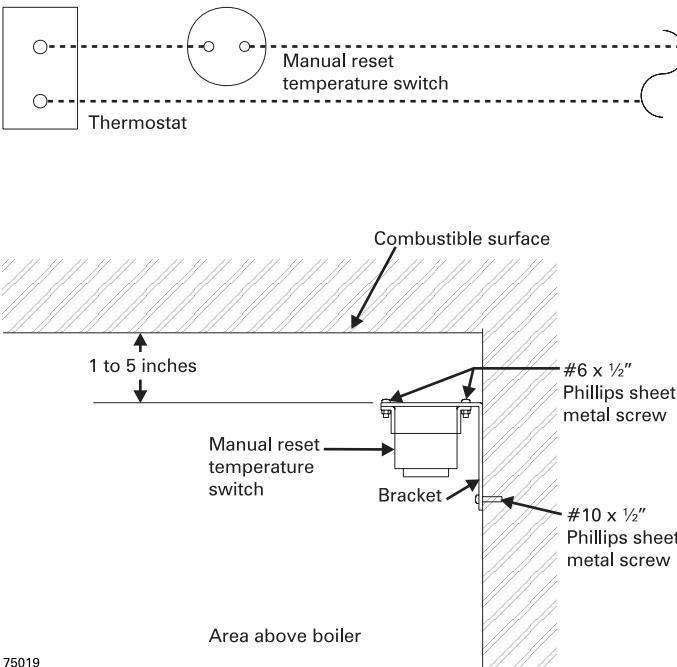
Where closer clearances are required:

- Top of boiler – If less than 24" available, provide removable surface to allow for cleaning boiler flue ways.
- 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 18 and 19.

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 17.
4. Wire switch in series with thermostat. See Figure 17.
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 17 Manual reset temperature switch wiring and location



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Figure 18 Minimum vent clearances

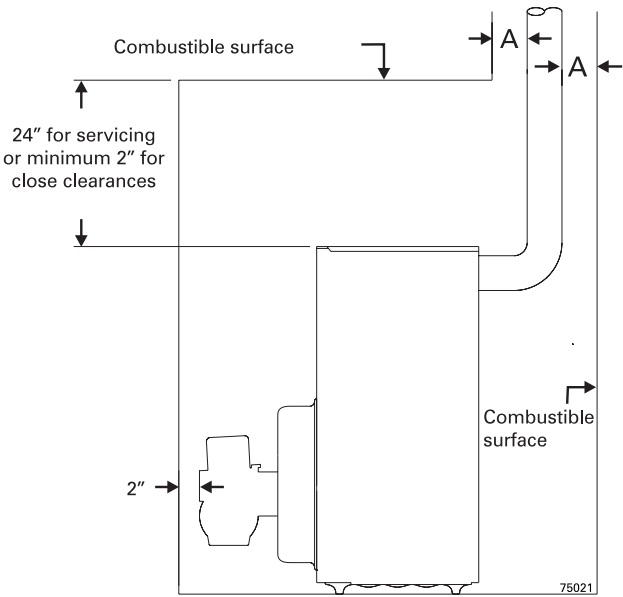
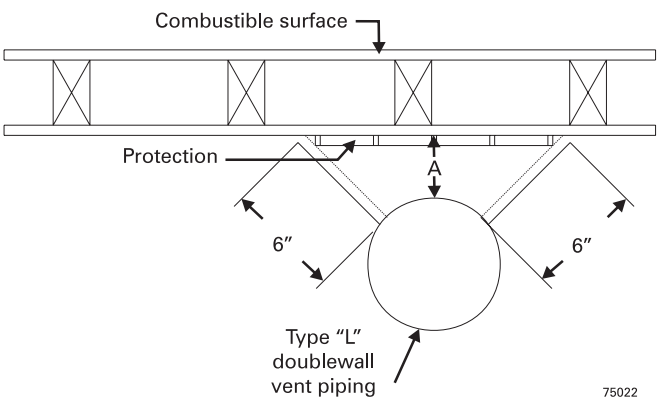


Figure 19 Protection required for close clearance



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
3"	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 18. 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.	



14 Service and maintenance

Annual service and start-up



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.



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 A T E	D A T E	D A T E	D A T E	D A T E	D A T E	D A T E	D A T E	D A T E	Comments
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 flue ways. See page 22.										
5	Perform service on relief valve and circulator. See pages 23 and 24.										
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 23.										
10	Verify operation of all controls on boiler. See pages 18 and 19.										

14 Service and maintenance continued

Cleaning boiler flue ways

▲WARNING

The boiler contains ceramic fiber and fiberglass materials. Use care when handling these materials per instructions on page 25 of this manual. Failure to comply could result in severe personal injury.

▲ DANGER

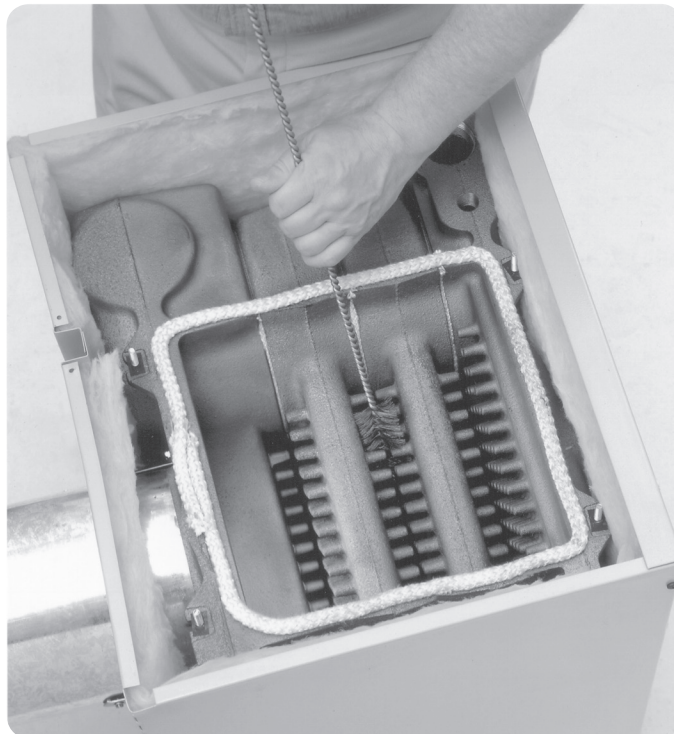
Make sure all electrical connections to boiler are turned off and wait until boiler is warm, not hot, before cleaning. Failure to do so will result in severe personal injury, death or substantial property damage.

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 flue ways and clean up between the sections to reach pins left uncleared in step #5.
7. Once the flue ways 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. Re-install jacket top panel and breeching.
11. Reconnect oil line and all electrical connections.

▲WARNING

Wear a NIOSH -certified dust respirator (N95) while cleaning the boiler, per WARNING on page 25. Failure to comply could result in severe personal injury.

Figure 20 Cleaning boiler flue ways — Thoroughly clean flue ways between all pins at all angles. Start on top of boiler, finish from the bottom.



☐ Inspect

Reported problems

Inspect any problems reported by owner and correct before proceeding.

Boiler area

1. Verify that boiler area is free of any combustible materials, gasoline and other flammable vapors and liquids.
2. Verify that boiler area is free of any of the contaminants listed in Table 2 on page 7 of this manual. If any of these are present in the boiler intake air vicinity, they must be removed. If they cannot be removed, install combustion air piping to the boiler in accordance with national, provincial or local codes.

Piping

1. Check the boiler interior piping and all system piping for signs of leaks.
2. Repair any leaks before proceeding.

▲ DANGER

Do not use petroleum-based cleaning or sealing compounds in boiler system. Severe damage to boiler will occur, resulting in substantial property damage.

▲WARNING

Eliminate all system or boiler leaks. Continual fresh makeup water will reduce boiler life. Minerals can build up in sections, reducing heat transfer, overheating cast iron, and causing section failure. Leaking water may also cause severe property damage.

14 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.

Review with owner

1. Review the Home Owner's Information, pages 2 through 5 with the owner.
2. Emphasize the need to perform the maintenance schedule specified on page 3.
3. Remind the homeowner of the need to call in a licensed contractor should the boiler or system exhibit any unusual behavior.
4. Remind the homeowner to follow the proper shutdown procedure and to schedule an annual start-up at the beginning of the next heating season.

☐ Check monthly

Boiler and system piping

Visually inspect for leaks around piping, circulators, relief valve and other fittings. Check oil lines and boiler air for signs of oil leakage. Immediately call a qualified service technician to repair any leaks.

WARNING Have leaks fixed at once by a qualified service technician. Continual fresh makeup water will reduce boiler life. Minerals can build up in sections, reducing heat transfer, overheating cast iron, and causing section failure.

WARNING Do not use petroleum-based cleaning or sealing compounds in boiler system. Severe damage to boiler and system components can occur, resulting in possible severe personal injury, death or substantial property damage.

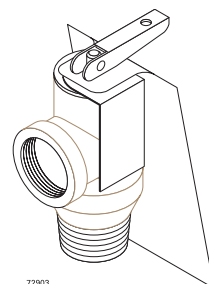
Venting system

Visually inspect all parts of the flue gas venting system for any signs of blockage, leakage or joints or deterioration of the piping. Notify your qualified service technician at once if you find any problem.

WARNING Failure to inspect the vent system as noted above and have it repaired by a qualified service technician can result in vent system failure, causing severe personal injury or death.

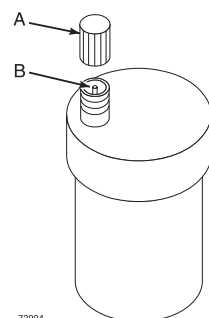
Boiler relief valve

1. Inspect the boiler relief valve and the relief valve discharge pipe for signs of weeping or leakage.
2. If the relief valve often weeps, the expansion tank may not be working properly.
 - Immediately contact your qualified service technician to inspect the boiler and system.



Automatic air vents (if used)

1. Remove the cap from any automatic air vent in the system and check operation by depressing valve **B** slightly with the tip of a screwdriver.
2. If the air vent valve appears to be working freely and not leaking, replace cap **A**, twisting all the way on. Loosen cap **A** one turn to allow vent to operate.
3. Have vent replaced if it does not operate correctly.





14 Service and maintenance continued

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 7, page 10, before proceeding further.



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.



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.

The boiler relief valve must be tested at **least monthly** during the heating season to verify the valve and discharge piping flow freely.

Inspect the boiler relief valve and the relief valve discharge pipe for signs of weeping or leakage.

If the relief valve often weeps, the expansion tank may not be working properly.

- Immediately contact your qualified service technician to inspect the boiler and system.

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

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

Perform the checkout sequence on page 19 to verify system and components are operating correctly.



Handling ceramic fiber and fiberglass materials

REMOVAL OF COMBUSTION CHAMBER LINING OR BASE PANELS



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:



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.

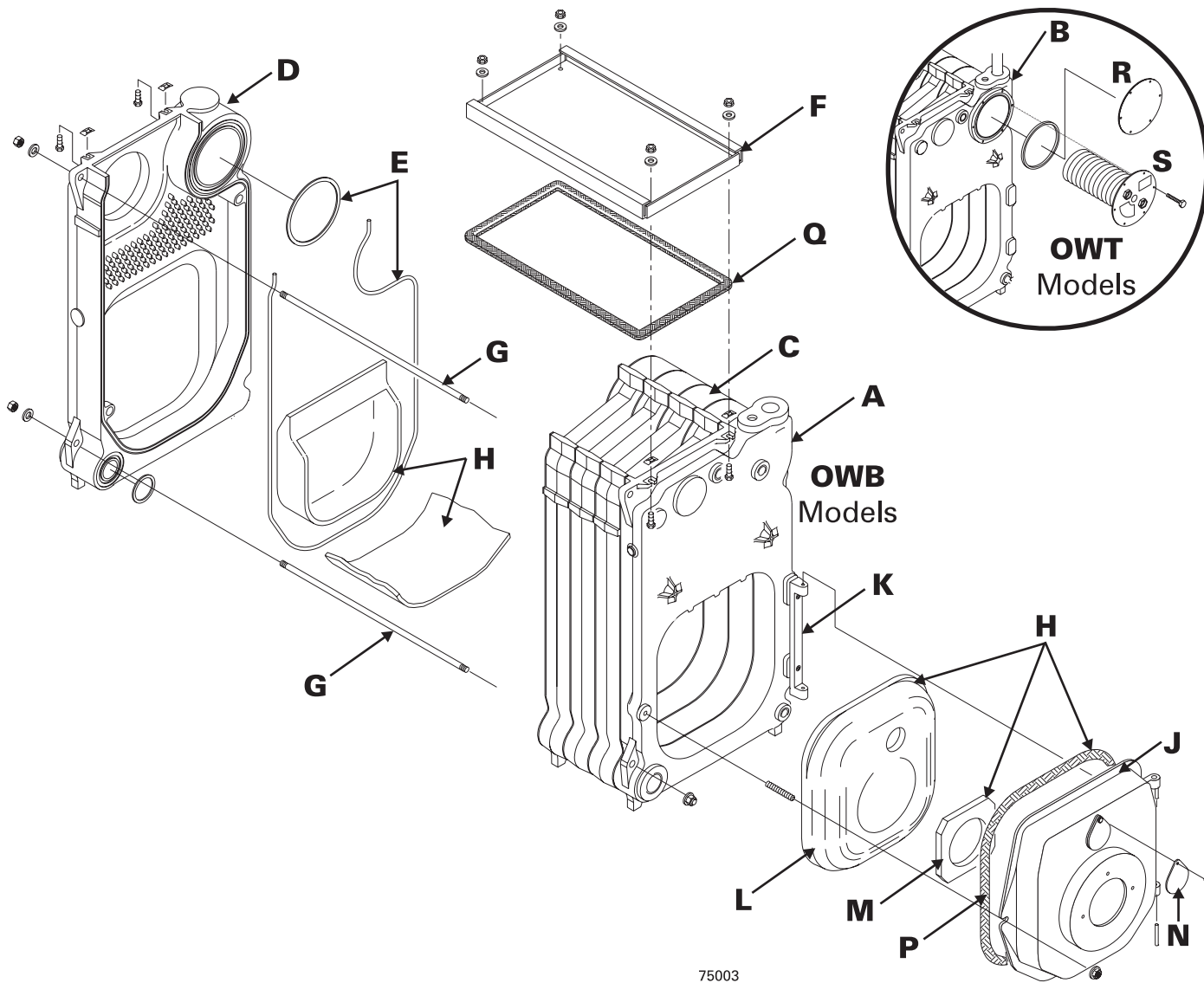
- Avoid breathing dust and contact with skin and eyes.
 - Use NIOSH certified dust respirator (N95). This type of respirator is based on the OSHA requirements for fiberglass wool at the time this document was written. Other types of respirators may be needed depending on the job site conditions. Current 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.

15 Replacement parts

Figure 21 Boiler section assembly, refractories, collector hood and burner door assembly



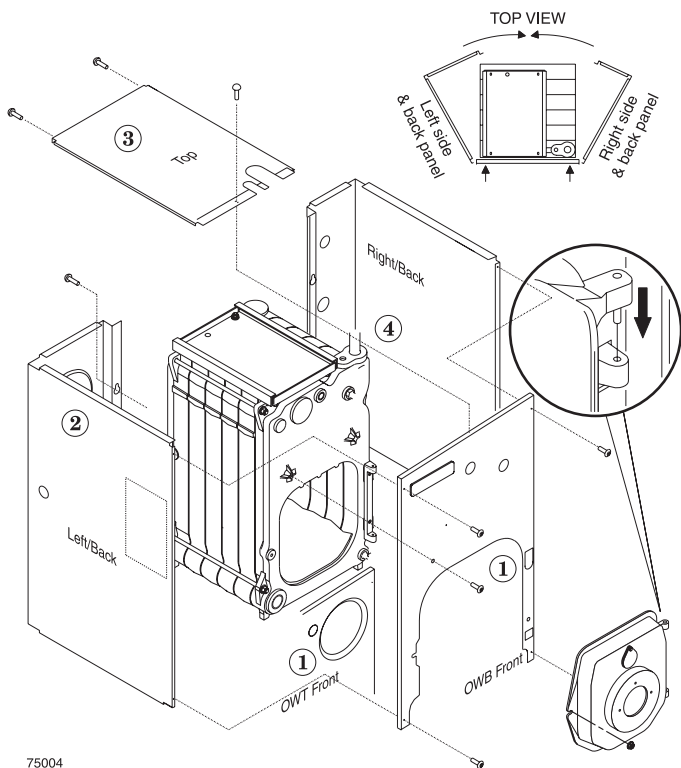
15 Replacement parts continued

Figure 22 Parts list for Figure 21

Item number	Description	Boiler model number	Part number
A	Front section, number 7122	All OWB	316-700-323WT
B	Front section with tankless heater opening, number 7123	All OWT	316-700-320WT
C	Intermediate regular section, number 7015	All	316-700-065WT
D	Back section, number 7027	All	316-700-309WT
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	326-700-400WT
		OWB-4	326-700-401WT
		OWB-5	326-700-402WT
		OWB-6	326-700-403WT
		OWT-3	326-700-404WT
		OWT-4	326-700-405WT
		OWT-5	326-700-406WT
		OWT-6	326-700-407WT
F	Standard Collector hood kit for back outlet (includes rope and hardware for installation)	OWB/OWT-3	386-700-241WT
		OWB/OWT-4	386-700-242WT
		OWB/OWT-5	386-700-243WT
		OWB/OWT-6	386-700-244WT
G	Tie rod ½ x 10-¾"	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	381-355-797WT
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 feet	All	590-735-105WT
Q	Glass rope 3/8" for collector hood (7 feet 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

15 Replacement parts continued

Figure 23 Jacket parts, top vent kits and replacement instructions



75004

⚠ WARNING

The boiler contains ceramic fiber and fiberglass materials. Use care when handling these materials per instructions on page 25 of this manual. Failure to comply could result in severe personal injury.

Before installing jacket:

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

To install jacket:

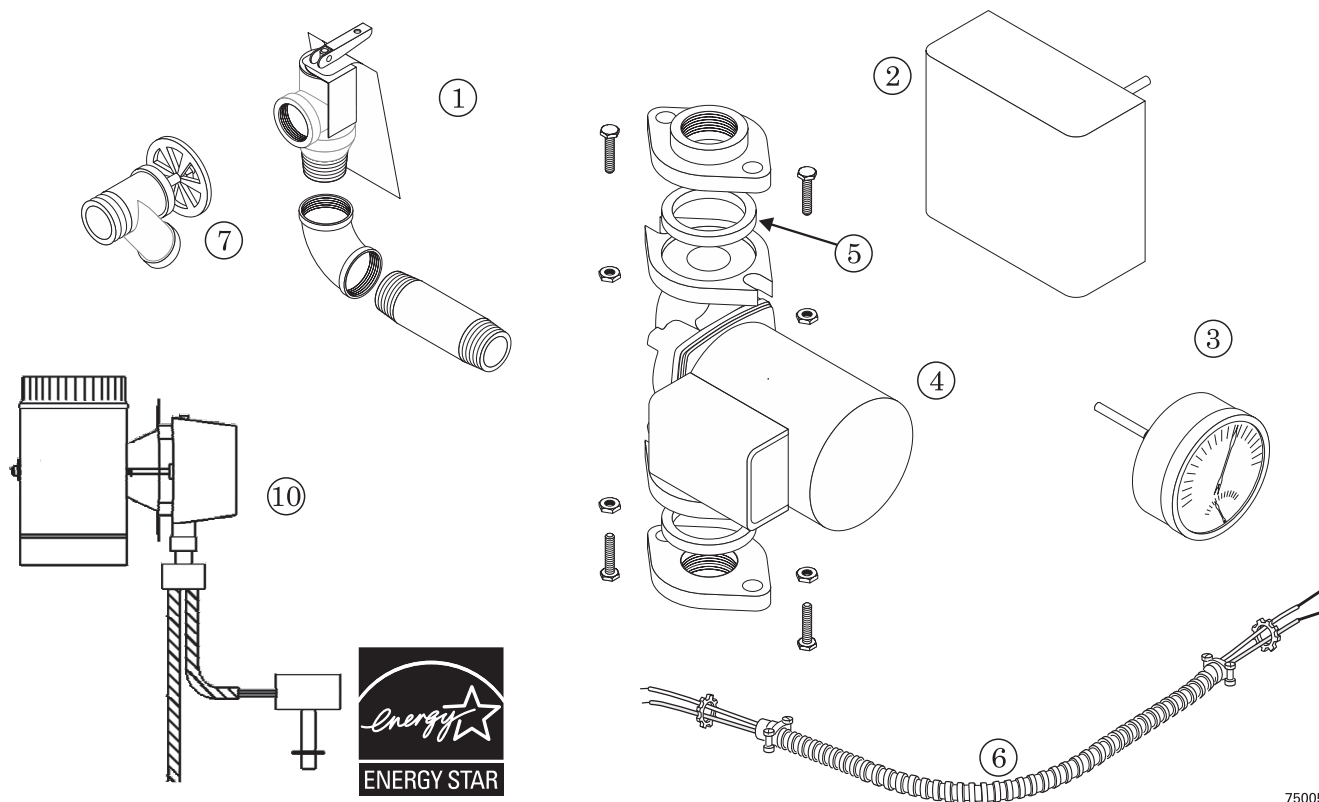
1. Install jacket front panel to front section, making sure burner door hinge lugs extend through holes in lower jacket leg. Secure with two (2) 3/8" x 1/2" black machine screws.
2. Right and left side pieces are shipped as straight pieces. Before installing, bend about 90° at perforation as shown, to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

Item number	Description	Boiler model number	Part number
1	Jacket panel, front without heater opening with heater opening	OWB (All) OWT (All)	426-722-002WT 426-722-004WT
2	Jacket panel, left side and back	OWB/OWT-3 OWB/OWT-4 OWB/OWT-5 OWB/OWT-6	426-722-225WT 426-722-227WT 426-722-229WT 426-722-231WT
3	Standard Jacket panel top for back outlet	OWB/OWT-3 OWB/OWT-4 OWB/OWT-5 OWB/OWT-6	426-722-207WT 426-722-209WT 426-722-211WT 426-722-213WT
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 (screws for assembly)	All	386-700-845WT
	Optional Top Vent Service Kit (includes jacket top jacket cover, collector hood, vent cover and vent cover strap)	OWB/OWT-3 OWB/OWT-4 OWB/OWT-5 OWB/OWT-6	386-700-846WT 386-700-847WT 386-700-848WT 386-700-849WT

15 Replacement parts continued

Figure 24 Trim and controls


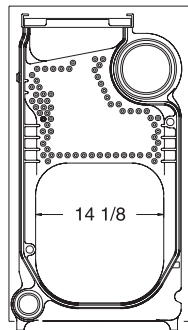
75005

Item number	Description	Part number
1	Pressure relief valve, ASME, 30 PSIG, ¼" male inlet	511-546-920WT
2	Combination high limit/low limit/circulator relay control *	381-356-530WT
	* - LWCO with Electro-Well™ installed. Electro-Well OWB Only Electro-Well OWT Only	592-300-026WT 592-300-027WT
3	Combination pressure-temperature gauge	510-218-099WT
4	Circulator (Fittings shown are shipped loose with boiler.)	511-405-113WT
5	Circulator gasket, universal (2 per boiler)	590-317-535WT
	Circulator hardware kit, includes: 2 flanges, 4 nuts, 4 bolts, 1 nipple, 1 ell — 1¼" NPT — OWB/OWT-3 & OWB/OWT-4 1½" NPT — OWB/OWT-5 & OWB/OWT-6	381-354-526WT 381-354-531WT
6	Circulator wiring harness	591-391-911WT
7	Drain valve, ¼" NPT, 1-½ Shank Drain valve, ¼" NPT, Standard	511-210-423WT 511-246-392WT
8	Burner wiring harness	591-391-910WT
9	Balanced draft damper (barometric) (Not shown)	510-512-267WT
10	Vent damper kits - Required for ENERGY STAR® compliance, (Version 3.0 Boilers specification of 87% AFUE), with reduced rates only Damper Kit OWB/OWT-3D (Optional equipment) Damper Kit OWB/OWT-4D (Optional equipment) Damper Kit OWB/OWT-5D (Optional equipment) Damper Kit OWB/OWT-6D (Optional equipment)	381-800-502WT 381-800-503WT 381-800-504WT 381-800-505WT
11	High Input Damper OWB/OWT 3 - 6 S3 - Required for high input rate configuration	381-800-515WT

16 Dimensions

Figure 25 Dimensional drawing — ALL DIMENSIONS IN INCHES

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

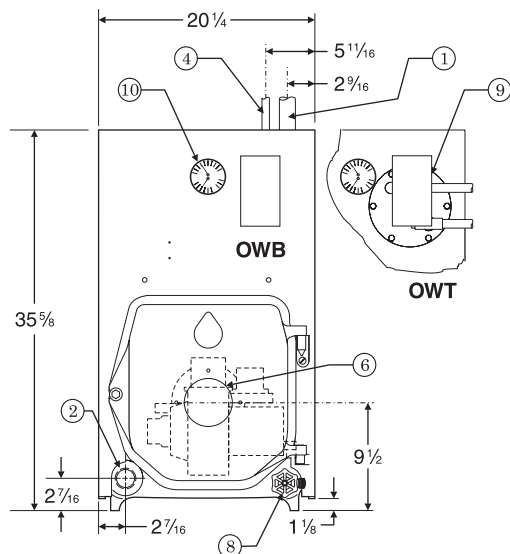


INTERMEDIATE SECTION

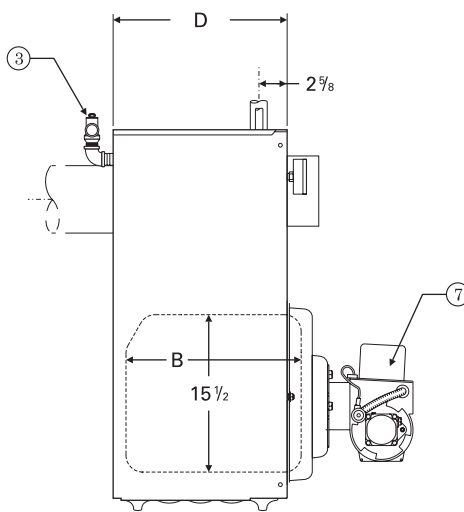
Note 1: Boiler supply and return tappings are both $\frac{1}{2}$ " NPT on all boiler sizes. See Table 4, page 10 for recommended system supply and return piping sizes.

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 10, Table 4.

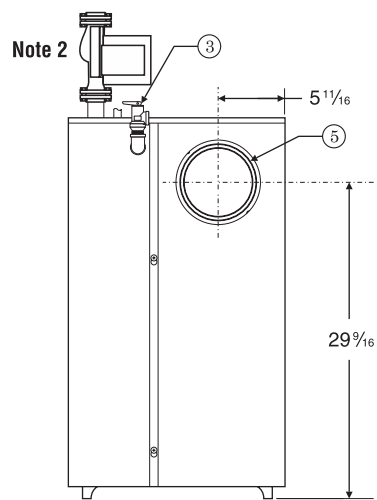
ALL DIMENSIONS IN INCHES



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



17 Ratings


DOE


AHRI Certified Ratings												
Boiler Model	Burner Input		Heating Capacity	Seasonal Efficiency	Net Rating (water)	Boiler Water Content	Flue Outlet Diameter	Minimum Chimney			Draft Loss Thru boiler	OVD Damper Required
(8)	GPH	MBH	MBH (1) (2)	AFUE %	MBH (4)	Gallons	Inches (5)	Rect In.	Round In.	Height Ft.	In W.C. (6)	Yes/No
OWB/OWT3-T-S3	0.70	98	86 (3)	86.4	75	11.0	7	8 x 8	6	15	0.010	No
OWB/OWT3-T-S3	0.95	133	115 (3)	86.0	100	11.0	7	8 x 8	6	15	0.020	Yes
OWB/OWT4-T-S3	1.00	140	122 (3)	86.2	106	13.4	7	8 x 8	6	15	0.010	No
OWB/OWT4-T-S3	1.20	168	146 (3)	86.0	127	13.4	7	8 x 8	6	15	0.010	Yes
OWB/OWT5-T-S3	1.20	168	147 (3)	86.1	128	15.9	7	8 x 8	7	15	0.010	No
OWB/OWT5-T-S3	1.45	203	176 (9)	86.0	153	15.9	7	8 x 8	7	15	0.015	Yes
OWB/OWT6-T-S3	1.40	196	171 (3)	86.1	149	18.4	7	8 x 8	7	15	0.010	No
OWB/OWT6-T-S3	1.75	245	213 (9)	86.0	185	18.4	7	8 x 8	7	15	0.015	Yes
OWB/OWT3-T-S3-D	0.70	98	75 (3)	87.0	75	11.0	7	8 x 8	6	15	0.010	Yes
OWB/OWT4-T-S3-D	1.00	140	123 (3)	87.0	107	13.4	7	8 x 8	6	15	0.010	Yes
OWB/OWT5-T-S3-D	1.20	168	148 (3)	87.0	129	15.9	7	8 x 8	7	15	0.010	Yes
OWB/OWT6-T-S3-D	1.40	196	173 (3)	87.0	150	18.4	7	8 x 8	7	15	0.010	Yes

NOTES:

1. MBH refers to thousands of Btu per hour.
2. Base on 140,000 Btu per gallon.
3. Based on standard test procedures prescribed by the United States Department of Energy, with combustion conditions of 13.0 % CO₂.
4. Net ratings are based on net installed radiation of sufficient quantity for the requirements of the building and nothing needs to 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.
5. See page 6 for minimum breeching diameter.
6. Listed draft losses are for factory-shipped settings.
7. OWB and OWT boilers are ASME rated for 50 psig working pressure.
8. The size-specific higher input rates are compliant when installed with the required/separate High Input Damper kit, P/N 381-800-515WT. The boilers are compliant with ENERGY STAR Program 3.0 when installed at the lower input rate and with the specific/separate OVD kit (P/N 381-800-502WT through 381-800-505WT).
9. Based on standard test procedures prescribed by the United States Department of Energy at combustion of 13.0% CO₂ and -0.02" W.C. draft over fire.

NOTE: A burner nozzle change may be required - refer to the burner instructions or boiler's rating label for correct selection.

