



## Oil-Fired Water Boilers

# Boiler Manual

- Installation
- Maintenance
- Startup
- Parts



Mobile Product Library

**WARNING**

This manual must only be used by a qualified heating installer/service technician. BEFORE installing, read all instructions in this manual and all other information shipped with the boiler. Perform steps in the order given. Failure to comply could result in severe personal injury, death or substantial property damage.

Part number 550-141-826/1014



**▲WARNING** HOMEOWNER and SERVICE TECHNICIAN — read and follow completely.

## Using this manual

### Homeowner —

Read and follow all information on pages 1 through 7 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.

### When calling or writing about the boiler

Please have boiler model number and series from boiler rating label and CP number(s) from boiler jacket, burner and controls. On page 28 of this manual is space to list CP number(s).

### Packaged and non-packaged boilers

Packaged boilers, available only in sizes 2 through 6, are factory assembled, complete with block, jacket and controls. Burner is shipped separately.

Non-packaged boilers, available in all sizes, 2 through 9, are shipped with block assembled, with jacket. Controls, trim and burner shipped separately for field assembly.

## Hazard definitions

The following defined terms are used throughout this manual to bring attention to the presence of hazards of various risk levels or to important information concerning the life of the product.

**▲DANGER** Indicates presence of hazards that will cause severe personal injury, death or substantial property damage.

**▲WARNING** Indicates presence of hazards that can cause severe personal injury, death or substantial property damage.

**▲CAUTION** Indicates presence of hazards that will or can cause minor personal injury or property damage.

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



**▲WARNING** HOMEOWNER and SERVICE TECHNICIAN — read and follow completely.

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**▲WARNING** HOMEOWNER and SERVICE TECHNICIAN — read and follow completely.

## Please read before proceeding

### Homeowner —

- For homeowner or person responsible for simple start-up and routine maintenance of the system
- Instructions on page 1 through page 7 must be followed to assure proper operation of your boiler. See page 7 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 5.

### 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 29 for service record.
- Review and explain start-up and routine maintenance procedures with homeowner.

**▲DANGER** Follow instructions 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, flue cap, jacket cap, breeching and burner mounting door are secured in place.
- Never burn garbage or paper in the boiler. Never leave combustible material around boiler.
- **DO NOT TAMPER WITH UNIT OR CONTROLS.** Always follow specific instructions when starting up boiler or performing routine maintenance or service.

**▲WARNING** 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 flueways cleaned and have the following replaced:
  - all electrical and mechanical controls
  - electrical wiring
  - oil burner and controls
  - insulation and chamber lining

### 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 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.

**▲WARNING** 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 back cover of Boiler Manual.
- ❑ 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.



**▲WARNING** HOMEOWNER and SERVICE TECHNICIAN — read and follow completely.

## Routine maintenance schedule

<p><b>Beginning each heating season</b></p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Call a qualified service technician to perform annual service.</li> </ul>
<p><b>Daily during heating season</b></p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Check that boiler area is free from combustible materials, gasoline and other flammable vapors and liquids.</li> </ul>
<p><b>Weekly during heating season</b></p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Check for and remove any obstructions to flow of combustion or ventilation air to boiler.</li> <li><input type="checkbox"/> 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.</li> <li><input type="checkbox"/> Check for oil leaks in oil piping and around burner. If found, immediately call qualified service technician to correct situation.</li> <li><input type="checkbox"/> 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.</li> </ul>
<p><b>End of heating season</b></p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> If tankless heater is installed, boiler will continue to operate. Check for the following:             <ul style="list-style-type: none"> <li>• All daily and weekly instructions listed on this page must be followed.</li> <li>• 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.</li> </ul> </li> </ul>
<p><b>Boiler shutdown</b></p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Do not drain boiler unless exposure to freezing temperatures will occur.</li> <li><input type="checkbox"/> Always keep manual fuel supply shut off if burner is shut down for an extended period of time.             <ul style="list-style-type: none"> <li>• Turn off switch at boiler and any external switch to boiler.</li> <li>• Close fuel valves.</li> <li>• Turn off water feed valve.</li> <li>• Cover burner to protect from dust and dampness.</li> </ul> </li> </ul>



**WARNING** HOMEOWNER and SERVICE TECHNICIAN — read and follow completely.

# Operation

## WGO (see Figure 1)

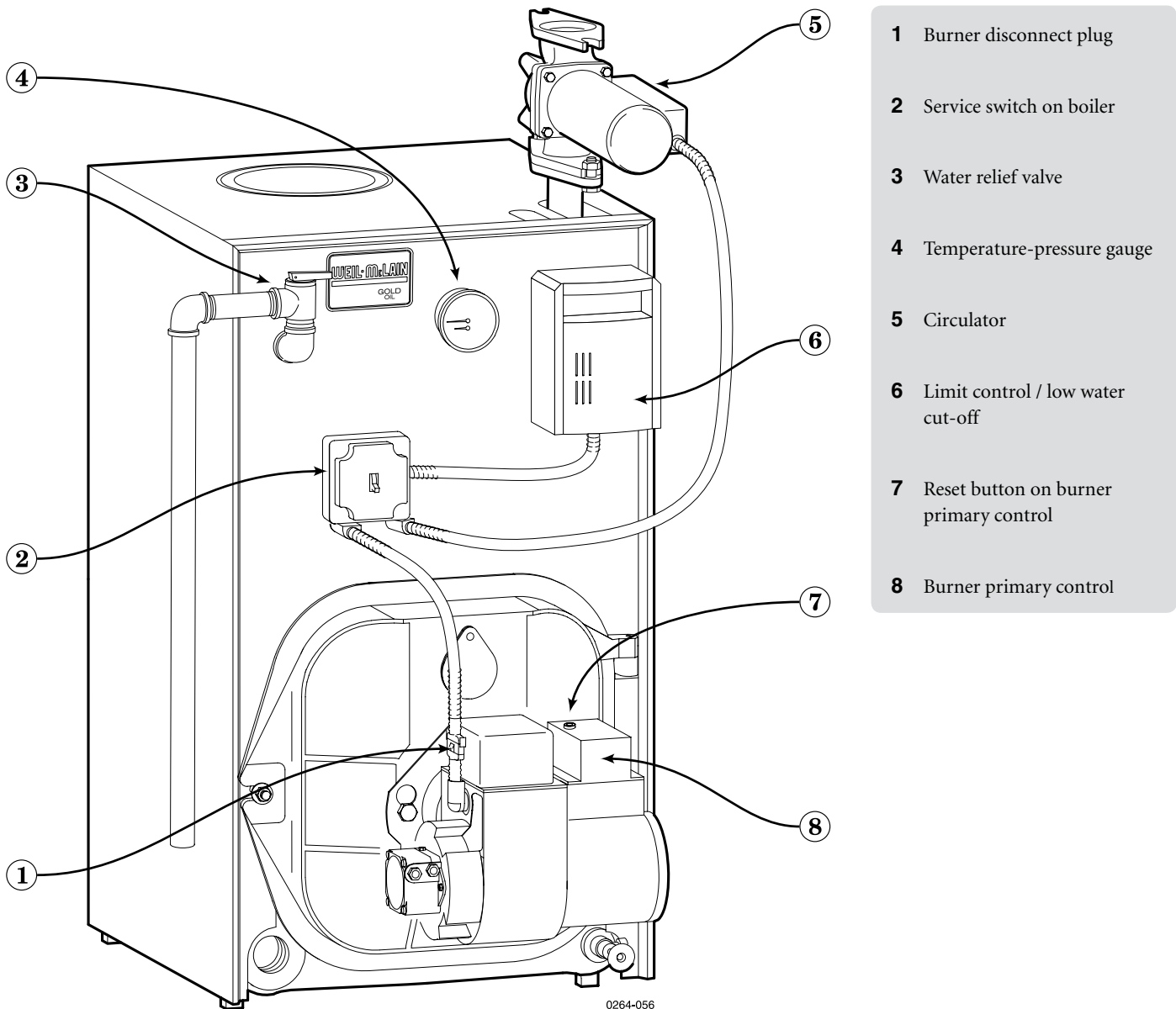
1. If burner does not fire, check for:
  - Service switch on boiler or additional switches turned off.
  - Fuses or breaker switch tripped.
  - Thermostat set below room temperature.
  - Fuel valves turned off.
  - Not enough oil in tank to supply burner.

2. Correct problems found in step #1. If burner does not fire, press reset button on burner primary control only once. Repeated presses will deposit oil in combustion chamber.

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

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

**Figure 1** WGO Boilers



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**▲WARNING** HOMEOWNER and SERVICE TECHNICIAN — read and follow completely.

# Troubleshooting

**▲WARNING** 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.	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 flueway.	Contaminated combustion air supply.	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 boiler operation.
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.



**WARNING** SERVICE TECHNICIAN ONLY — read and follow completely.

# Before installing boiler

**DANGER** Homeowner — 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 7 before proceeding.

## Installations must comply with

- United States
  - State and local plumbing, heating and electrical codes.
  - National codes where applicable.
- Canada
  - Canadian Standards Association, CSA B139, Installation Code for Oil-Burning Equipment.
  - CSA C22.1 Canadian Electrical Code Part One.
  - Applicable local or provincial codes.

## Before selecting boiler location

Check for nearby connections to:

- System water piping.
- Chimney. See page 16. Boiler can be top or back vented.
- Combustion and ventilation air supply. See page 9.
- Oil supply. See page 26 for oil line routing.
- 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.

## Provide clearances around boiler (see Figure 2)

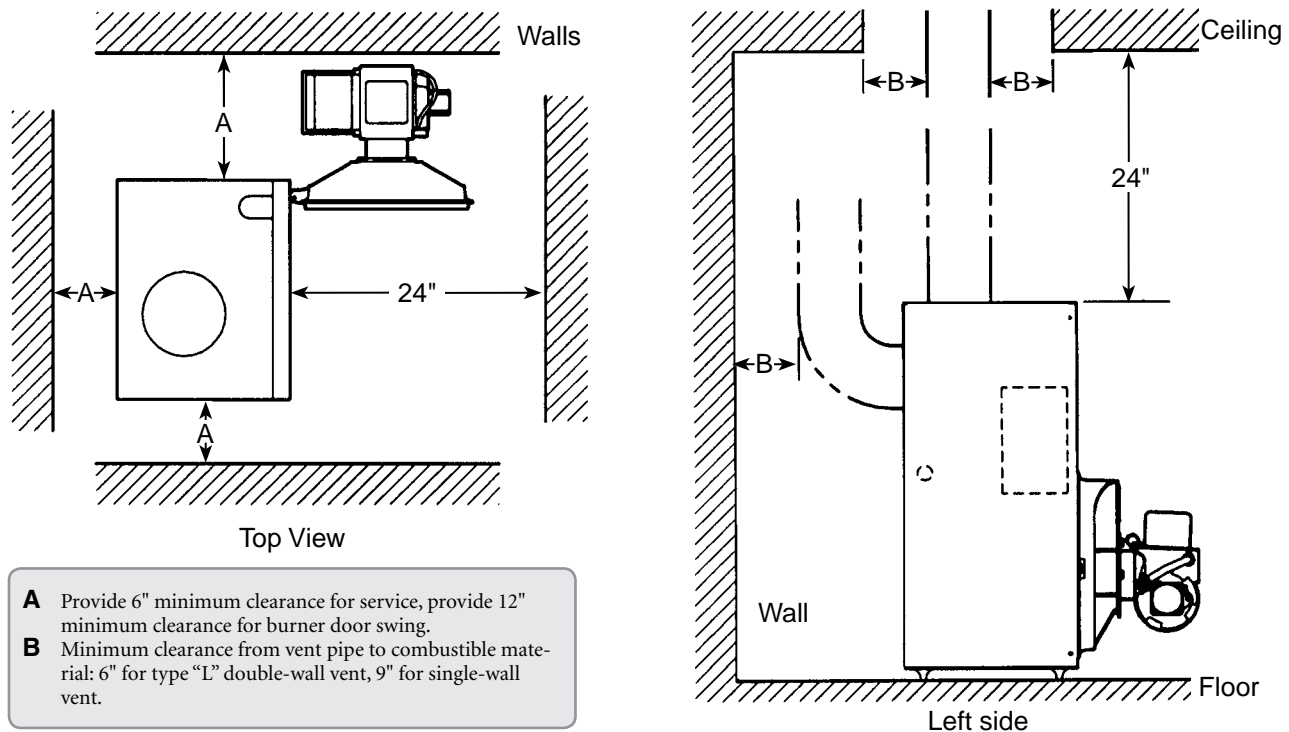
**NOTICE** Jacket cap must be in place on boiler to avoid requiring an 9" minimum clearance from back or top of boiler to combustible material.

- MINIMUM clearances from vent pipe to combustible material
  - 6 inches — Type "L" double-wall vent\*
  - 9 inches — Single-wall vent\*

**NOTICE** Flue pipe clearances must take precedence over jacket clearances.

- Recommended SERVICE clearances
  - 24 inches — Front and top
  - 6 inches — Left side, back and right side
  - 12 inches — Right side for burner door swing radius
- Special close clearances (alcove, closet, under counters, etc.) — see Appendix, page 32.

**Figure 2** Recommended service clearances







**▲WARNING** SERVICE TECHNICIAN ONLY — read and follow completely.

# Before installing boiler (continued)

## Provide air for combustion and ventilation

**▲WARNING** Do not install exhaust fan in boiler room.

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.

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 33.5 ft. x 33.5 ft. is 7200 cu. ft.).

## Permanent Openings

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.

## Inside air

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).

## Outside air

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 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.

## Foundation

Lay a foundation, if needed. Boiler may be installed on non-carpeted combustible flooring. Solid concrete blocks can be used to create a pad.

For residential garage installation, install boiler so burner is at least 18 inches above floor to avoid contact with gasoline fumes.

A level concrete or masonry foundation is required when:

- Floor could possibly become flooded.
- Non-level conditions exist.

**Table 1** Boiler foundation sizes

Boiler model	Length inches	Width inches	Min. height inches
WGO-2	14	22	2
WGO-3	17	22	2
WGO-4	17	22	2
WGO-5	20	22	2
WGO-6	23	22	2
WGO-7	26	22	2
WGO-8	29	22	2
WGO-9	32	22	2

Installation instructions:  
 Packaged boiler — Continued on page 10  
 Non-packaged boiler — Continued on page 12



**▲WARNING** SERVICE TECHNICIAN ONLY — read and follow completely.

## Install boiler — packaged boilers only

### Place boiler

1. Remove circulator 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 on floor or pallet. Damage to boiler can result.

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

3. Boiler is shipped for back flue outlet. To change to top flue outlet (see Figure 3, page 11):
  - a. Remove jacket cap on top of boiler.
  - b. Loosen two screws holding flue cap strap to collector hood. Remove strap and flue cap from opening. Re-tighten screws.
  - c. Check rope placement inside flue cap.

(Read **▲WARNING** under step #6 below).

- d. Loosen two screws on back flue outlet. Set flue cap on outlet. Install strap by engaging slots in screws. Tighten screws. Make sure cap is securely installed.
- e. Snap jacket cap in back outlet opening.

**NOTICE** Jacket cap must be in place on boiler to avoid requiring an 18" minimum clearance from back or top of boiler to combustible material.

4. Check level. Shim legs, if needed.
5. Check for secure placement of insulation on target wall, chamber floor and burner 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.

### Perform hydrostatic pressure test

1. Remove relief valve installed in boiler.
2. Install air vent in "N" tapping on top boiler.
3. Plug supply and return tappings.
4. Drain valve is already factory-installed.
5. Fill boiler. Vent all air. Pressure test boiler at 1½ 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. Check for maintained gauge pressure for more than 10 minutes. Visually check for leaks if gauge pressure drops.
7. Drain boiler. Repair leaks if found.

**▲CAUTION** Do not use petroleum-based sealing compounds to repair leaks. Damage to system components can result, causing property damage.

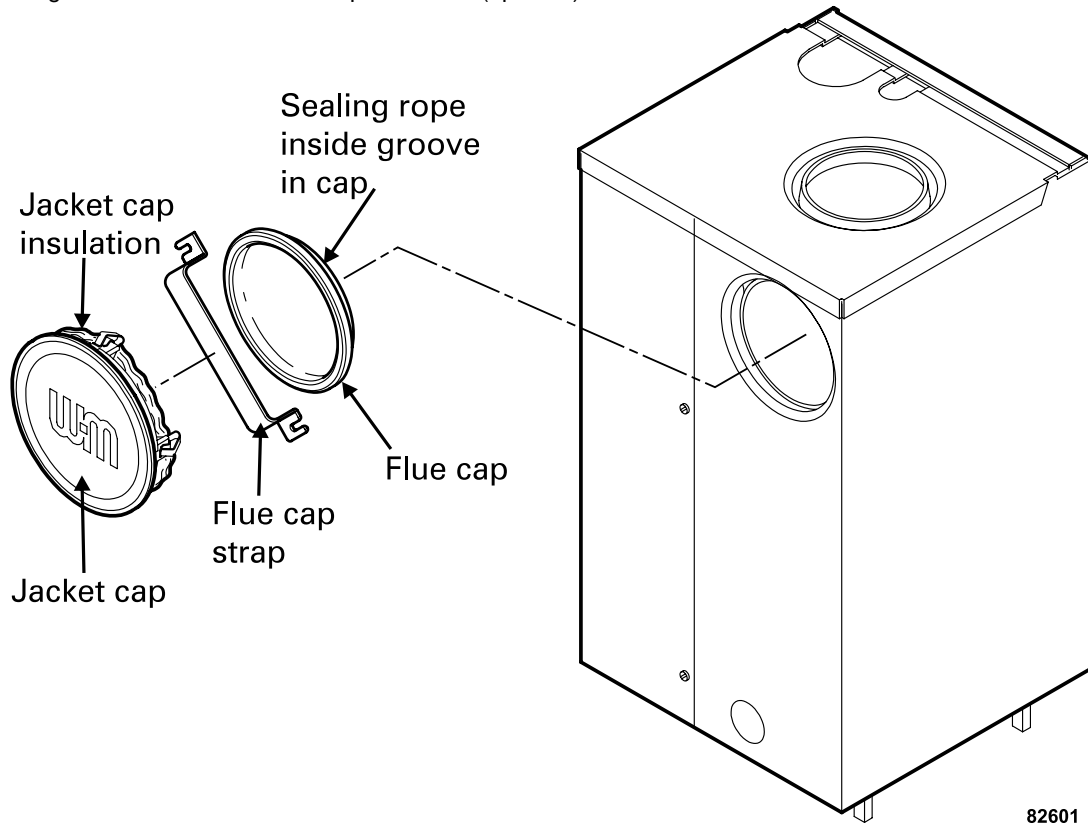
8. Retest boiler after repairing leaks.
9. Remove air vent and plugs. Reinstall relief valve.



**▲WARNING** SERVICE TECHNICIAN ONLY — read and follow completely.

# Install boiler — packaged boilers only (continued)

**Figure 3** Change from back flue outlet to top flue outlet (optional)



Instructions for packaged boilers continued on page 15.

**▲WARNING** SERVICE TECHNICIAN ONLY — read and follow completely.

## Install boiler — non-packaged boilers only

**▲WARNING** Fiberglass wool and ceramic fiber materials are possible cancer hazards. See warning on page 31.

### Place boiler

#### Non-Packaged WGO-2 through 6 — position on site

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

Boiler is shipped for back flue outlet. To change to top flue outlet (see Figure 3):

1. Loosen two screws holding flue cap strap to collector hood. Remove strap and flue cap from opening. Re-tighten screws.
2. Check rope placement inside flue cap.  
(Read **▲WARNING** under Step #3 on page 13.)
3. Loosen two screws on back flue outlet. Set flue cap on outlet. Install strap by engaging slots in screws. Tighten screws. Make sure cap is securely installed.

#### Non-Packaged WGO-7, 8 & 9 — split the assembled block for easier handling (see Figure 4, page 13)

1. Open burner mounting door and, using utility knife, slit floor insulation at joint to be separated.
2. Remove 5½" draw rod and the longest draw rod from each side. Pull block apart. Save draw rods, nuts, washers and sealing rings for reassembly.
3. Move divided block to location.
4. Clean port openings with clean rag.

**▲CAUTION** Do not use petroleum-based compounds to clean openings. Damage to system components can result, causing property damage.

5. Place rings in port openings. If ring slips out of groove, stretch ring gently for several seconds, then place in groove.
6. Position sections so aligning lugs fit into sockets of next section. Make sure sealing rope is in good condition and in position.
7. Oil threads on draw rods. Install washer and nut on end to be tightened. Use nut only on other end.
8. With wrench at washer/nut end, uniformly tighten nuts starting with 5½" rod at large port, 5½" rod at small port, bottom long rod and finally top long rod.
9. Torque on both 5½" rods and bottom long rod should be 50-60 ft. lbs; long top rod should be 20-25 ft. lbs. Do not back-off nuts.
10. Metal-to-metal contact should be made around port openings. If gap does exist, it should be less than .020". Check with feeler gauge.
11. If gap around port openings exceeds .020", check for dirt on port openings, sockets or misaligned lugs. If corrections are made and gap still exists, contact your Weil-McLain distributor or sales office before continuing installation.



**WARNING** SERVICE TECHNICIAN ONLY — read and follow completely.

# Install boiler — non-packaged boilers only (continued)

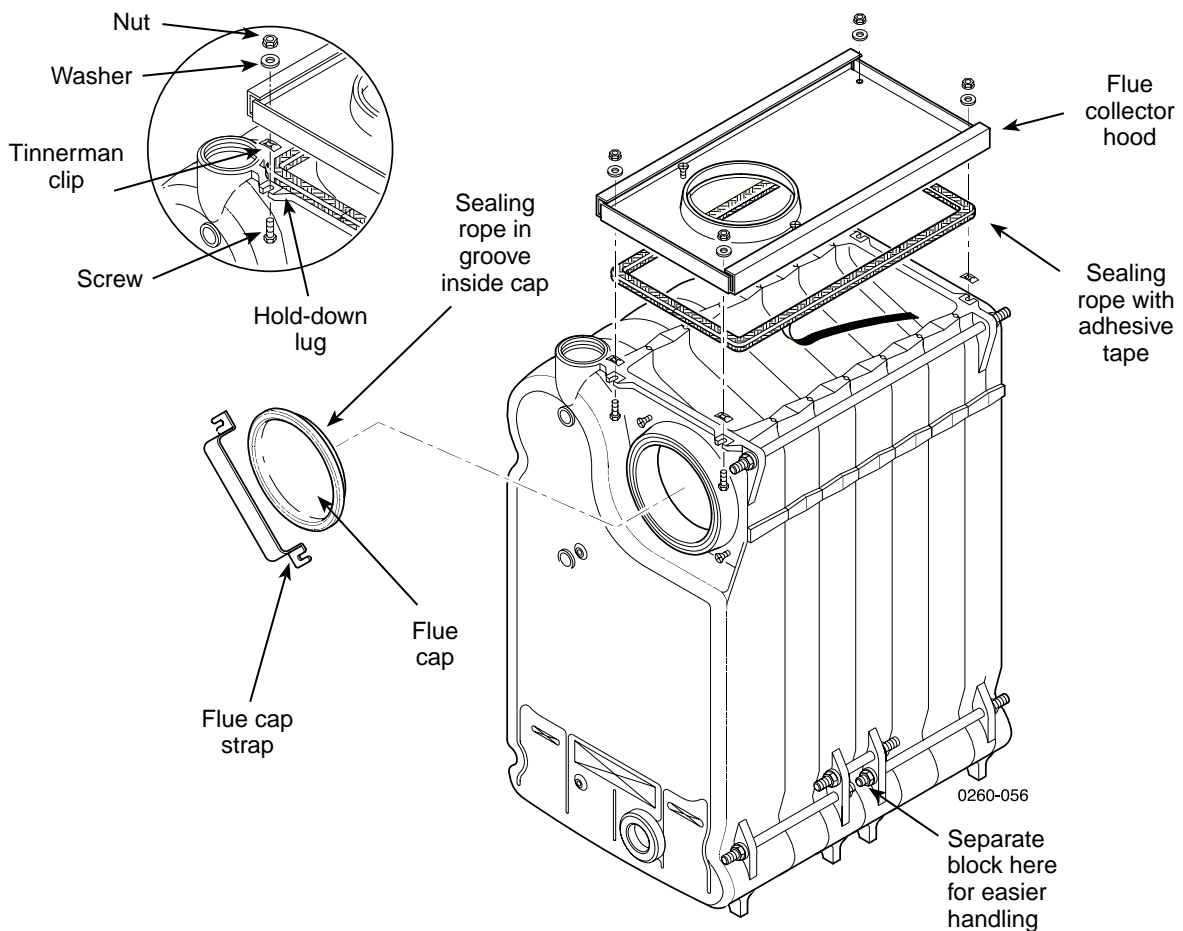
## Non-Packaged WGO-7, 8 & 9 — install flue collector hood (see Figure 4)

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

1. Thread Tinnerman clip on screw so that clip fits snugly in notch of hold-down lug. Screw must not turn.
2. Remove paper on sealing rope. Starting at back section near flue collar, position sealing rope around top of block with adhesive side to sections. Do not stretch rope. Make sure rope ends meet. Trim excess rope.
3. Position flue collector hood on top of boiler sections and over screws and clips as shown in Figure 4.

4. Install washers and nuts. Tighten nuts until collector hood makes contact with Tinnerman clip.
5. Flue Cap
  - Back flue outlet boiler — Position flue cap and strap over opening in flue collector hood. Make sure rope in cap is in place and in good condition. Tighten strap to hood with screws provided.
  - Top flue outlet boiler — Position flue cap and strap over opening in back section. Make sure rope in cap is in place and in good condition. Tighten strap to boiler with screws provided in section. Install remaining screws in holes in flue collector hood.
6. Check level. Shim legs, if needed.

**Figure 4** Change from back flue outlet to top flue outlet (optional)





**▲WARNING** SERVICE TECHNICIAN ONLY — read and follow completely.

# Install boiler — non-packaged boilers only (continued)

## Perform hydrostatic pressure test

1. See Figure 5 and Control Tapping table to install:
  - a. Boiler drain.
  - b. Water pressure gauge (test only). Be sure gauge can handle test pressure.
  - c. Air vent in upper “N” tapping.
  - d. Plugs in remaining tappings.
2. Fill boiler. Vent all air. Pressure test boiler at 1 times working pressure. For boilers split and reassembled, test between 75 and 85 psig.

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

3. Check for maintained gauge pressure for more than 10 minutes. Visually check for leaks if gauge pressure drops.
4. Drain boiler. Repair leaks if found.

**▲CAUTION** Do not use petroleum-based compounds to repair leaks. Damage to system components can result, causing property damage.

5. Re-test boiler after repairing leaks.
6. Remove pressure gauge, air vent and plugs from tappings used for controls.

7. Visually check:
  - a. Sealing rope placement.
  - b. Metal-to-metal contact around port openings.
  - c. Flue collector hood seal.
  - d. 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.

## Install jacket (sizes 7 through 9 only)

Before installing jacket, remove burner mounting door. See jacket instructions for details.

## Install boiler controls

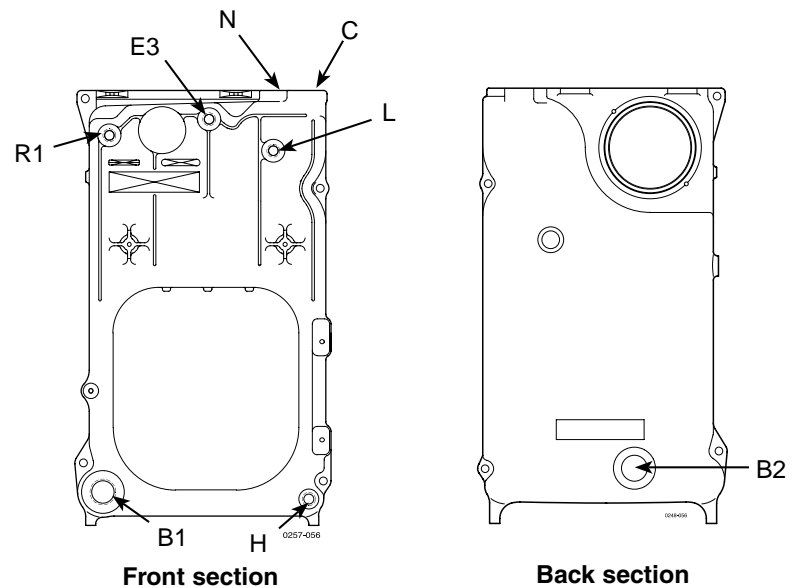
See Control Tapping Table and Figure 5 and Figure 6, page 15 to install controls.

1. Install limit control. If not furnished, use high limit with maximum 220°F setting.
2. Affix CP number label(s) on jacket front panel.

**Table 2** Control tappings

Location	Size	Function
B1	1½"	Return piping
B2	1½"	Alternate return piping for A/B WGO
C	1½"	Supply piping
E3	1¼"	Pressure-temperature gauge
H	¾"	Drain valve
L	¾"	High limit control
N	½"	Air vent or expansion tank piping
R1	¾"	Relief valve

**Figure 5** Control tapping locations



**WARNING** SERVICE TECHNICIAN ONLY — read and follow completely.

## Install burner — all boilers

### Install burner

(also refer to instructions packed with burner)

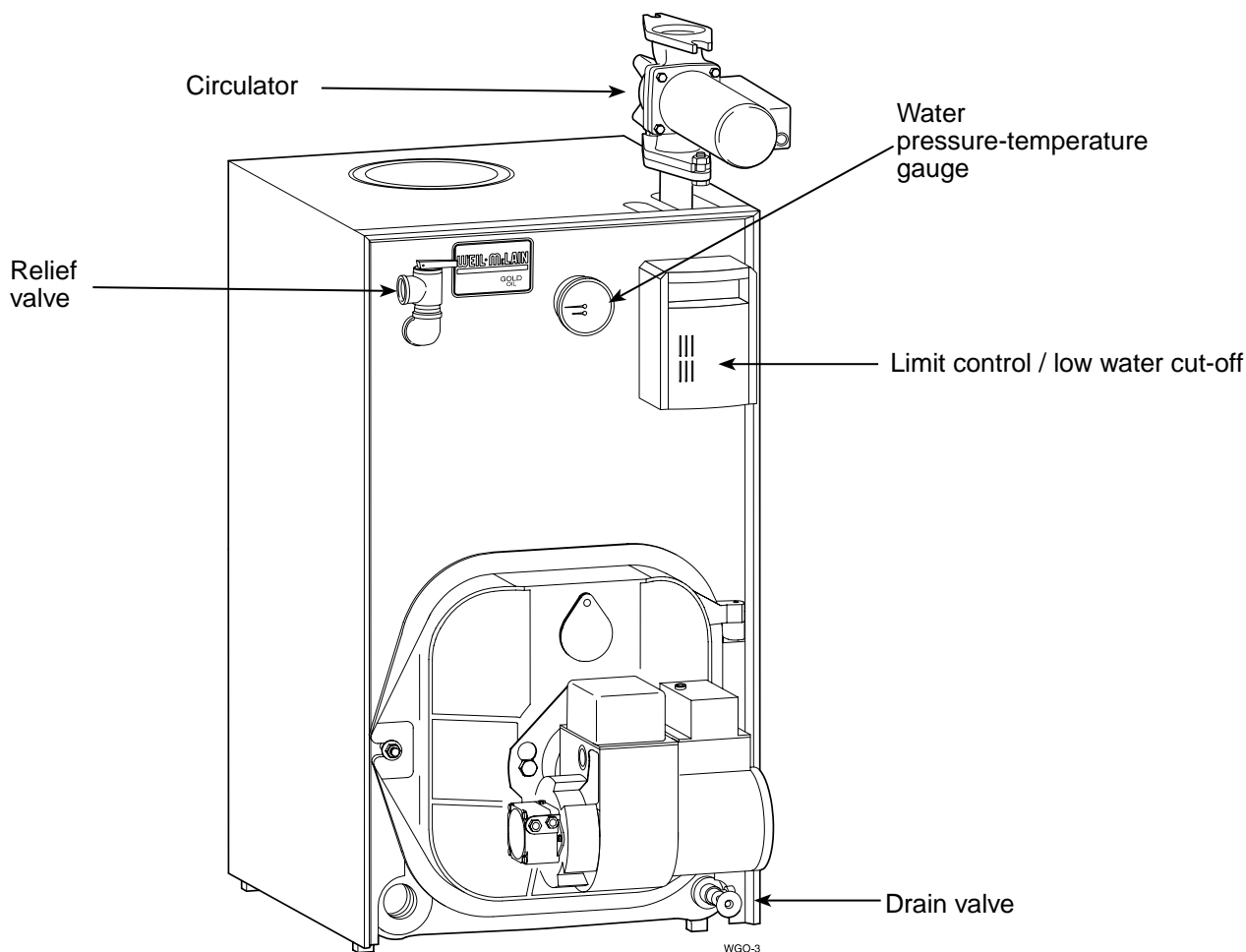
**NOTICE**

Use only burners specified for use on Weil-McLain GOLD oil boilers. DO NOT use burners specified for use on Weil-McLain Model 68 boilers. Contact individual burner manufacturers for proper burner selections.

### For P-WGO and A-WGO boiler:

1. Secure universal mounting flange and gasket to burner mounting door. Use three bolts provided.
2. Secure burner on flange with three bolts.
3. Position burner so end of air tube is level to  $1\frac{1}{2}^\circ$  tilt downward. Open door to verify burner position. End of air tube should be flush to  $\frac{1}{4}$ " recessed from inside wall of burner door refractory. Check for secure placement of insulation on target wall, chamber floor and burner mounting door. Securely close door with nut.

**Figure 6** Water boiler controls





**▲WARNING** SERVICE TECHNICIAN ONLY — read and follow completely.

# Connect breeching

## General chimney requirements

- Designed for natural draft firing. Connect boiler to vertical chimney.
- Insufficient draft can cause flue gas leakage and carbon monoxide emissions, which will lead to severe personal injury or death.
- 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.
  - In Canada, refer to CSA B139, Installation Code for Oil-Burning Equipment.
- NFPA 211 requires chimney to be lined before connected to boiler.
- Inspect existing chimney before installing new boiler. Failure to do any of the following will result in severe personal injury or death:
- Clean chimney, including removal of blockage.
- Repair or replace damaged pipe or liner.
- Repair mortar and joints.
- 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.
- Minimum clearances from vent pipe to combustible material:
  - 6 inches — Type “L” double-wall vent
  - 9 inches — Single-wall vent
- Minimum chimney sizes should be used.

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

## Connect breeching:

**▲WARNING** 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.

1. Install 2 flue pipe brackets.
2. Connect full-sized breeching when possible. See Minimum Chimney Size Table.
  - Back outlet — see Figure 7, page 17.
  - Top outlet — see Figure 8, page 17.
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.

**Table 3** Minimum chimney sizes

Boiler model number	Minimum breeching diameter (note 3)	Minimum AHRI chimney size		Minimum chimney height
		Rect.	Round	
WGO-2	5"	8" x 8" (note 1)	6"	15'
WGO-3				
WGO-4	6"	8" x 8" (note 1)	7"	15'
WGO-5	6"			
WGO-6	7"			
WGO-7				
WGO-8	7"	8" x 12" (note 2)	7"	20'
WGO-9				
Note 1	6¾" x 6¾" inside liner			
Note 2	6½" x 10½" inside liner			
Note 3	Flue collar on boiler is 7" diameter			

4. When burner and boiler are properly installed, draft overfire 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.

**▲WARNING** Seal all vent joints. Interlock burner with fan operation.

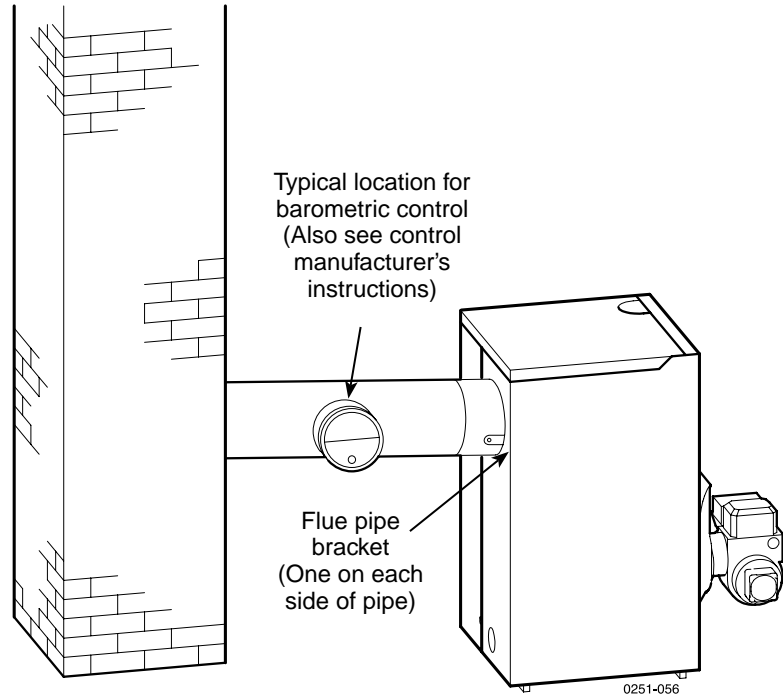




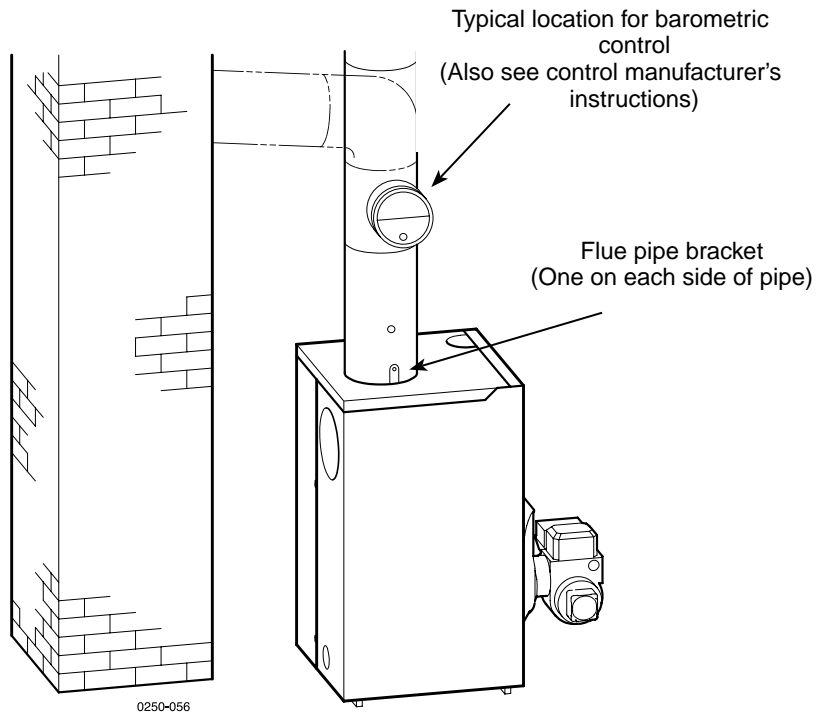
**WARNING** SERVICE TECHNICIAN ONLY — read and follow completely.

# Connect breeching (continued)

**Figure 7** Back outlet breeching connection



**Figure 8** Top outlet breeching connection





**▲WARNING** SERVICE TECHNICIAN ONLY — read and follow completely.

# Connect water piping

## General piping information

- All packaged WGO boilers are shipped with an installed combination temperature limit control/low water cut-off.
- If installation is to comply with ASME or Canadian requirements, an additional high temperature limit is needed. 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.
- Use backflow check valve in cold water supply as required by local codes.

## Install piping

- See Figure 9 or Figure 10, page 19, and Table 4, page 18 for near-boiler piping and single-zone piping. See page 20 to complete multiple-zone piping or page 21 to complete piping for systems operating below 140°F.
- For multiple-boiler piping, refer to Weil-McLain’s “Primary/Secondary Piping Guide” and “M-WGO Multiple Boiler Manual.”
- Install relief valve vertically in “R1” tapping on front of boiler. See Figure 9 or Figure 10 and also refer to tag attached to relief valve for manufacturer’s instructions.

**▲WARNING** Pipe relief valve discharge line near floor close to floor drain to eliminate potential of severe burns. Do not pipe to any area where freezing could occur. Do not plug, valve or place any obstruction in discharge line.

## DIAPHRAGM expansion tank (Figure 9, page 19)

- Make sure expansion tank size will handle boiler and system water volume and temperature. Tank must be located near boiler before inlet to circulator. See tank manufacturer’s instructions for details.
- Undersized expansion tanks cause system water to be lost from relief valve and makeup water added through fill valve. Eventual section failure can result.
- Install automatic air vent in “N” tapping as shown in Figure 9.

## CLOSED expansion tank (Figure 10, page 19)

- Ensure expansion tank size will handle boiler and system water volume and temperature.

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

- Connect tank from “N” tapping shown in Figure 9 to expansion tank. Use ½" N.P.T. piping. Pitch any horizontal piping up towards tank 1 inch per 5 feet of piping.

## To connect WGO boilers to indirect-fired water heaters

Install and wire per water heater manual provided with water heater.

**Table 4** Water piping sizes

Boiler model number	To system	From system
WGO-2	1"	1"
WGO-3	1¼"	1¼"
WGO-4	1¼"	1¼"
WGO-5	1½"	1½"
WGO-6	1½"	1½"
WGO-7	1½"	1½"
WGO-8	2"	2"
WGO-9	2"	2"

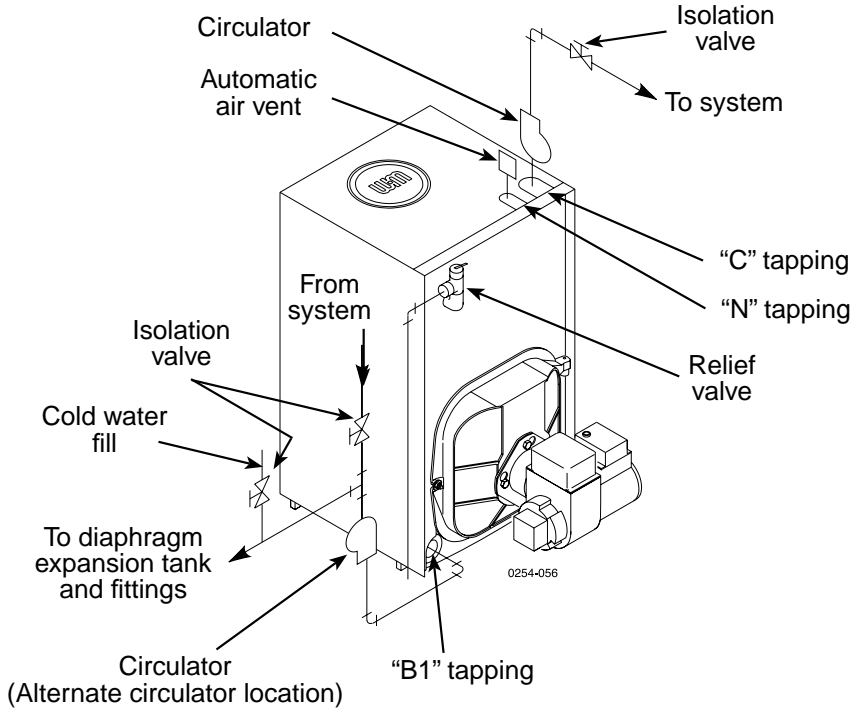
\* All piping sizes based on 20°F temperature rise through boiler.



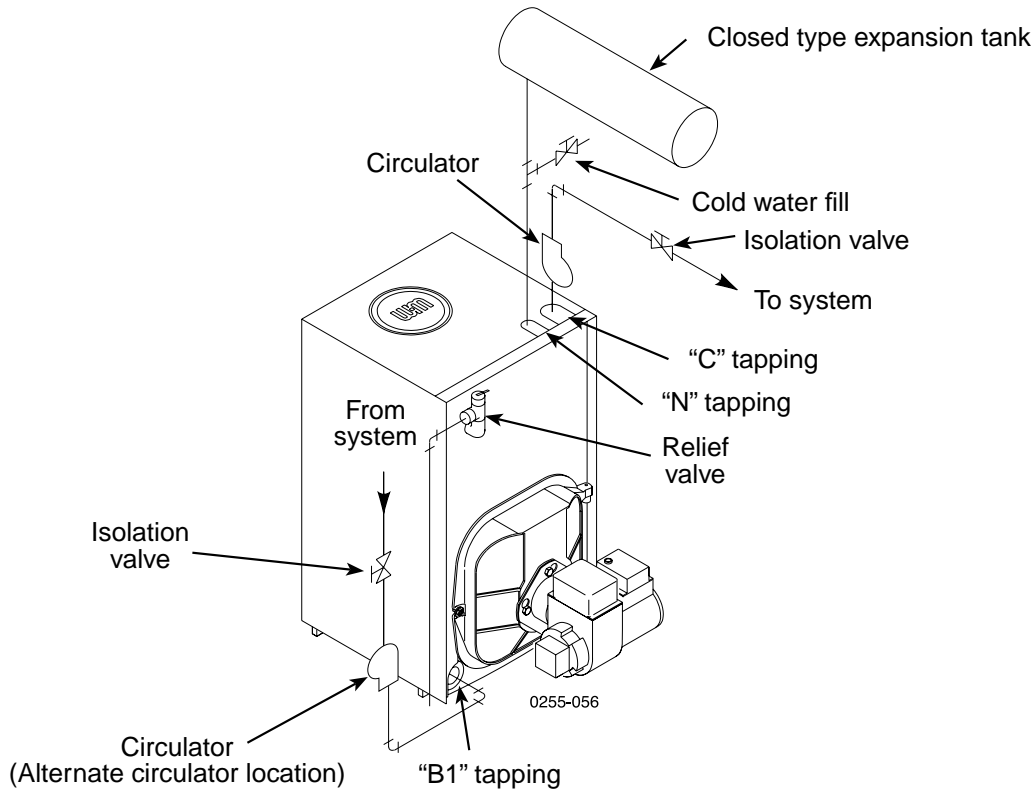
**WARNING** SERVICE TECHNICIAN ONLY — read and follow completely.

# Connect water piping (continued)

**Figure 9** Piping with DIAPHRAGM expansion tank



**Figure 10** Piping with CLOSED expansion tank





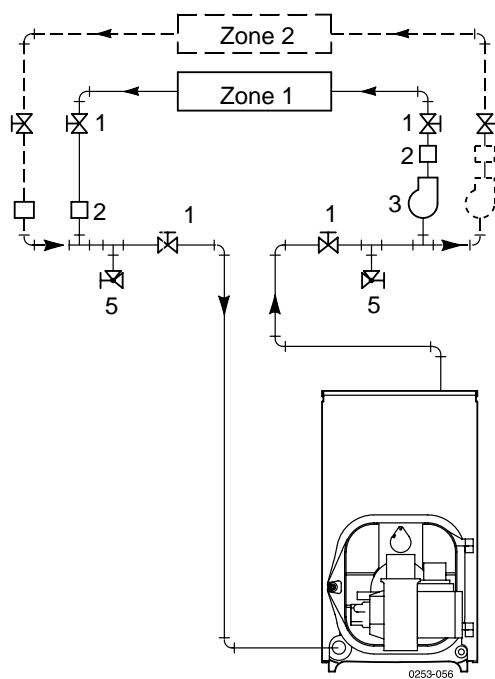
**WARNING** SERVICE TECHNICIAN ONLY — read and follow completely.

# Connect water piping (continued)

## Piping MULTIPLE ZONES

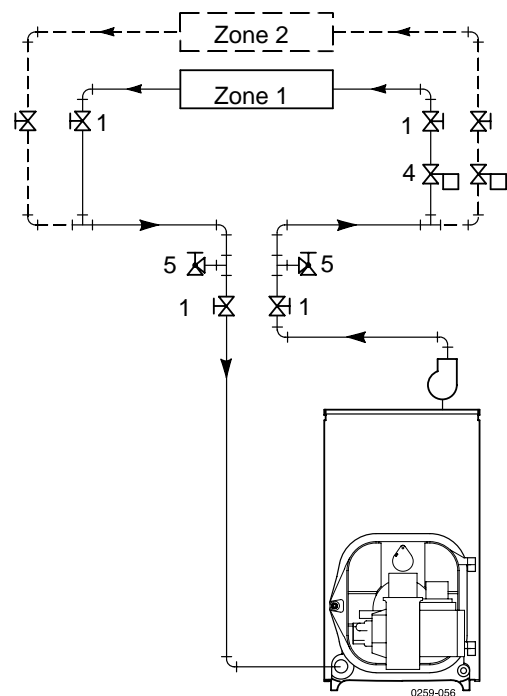
1. Follow instructions on page 18 and page 19 to install piping near boiler.
2. See Figure 11 or Figure 12 to complete installation
3. Zoning with circulators:
  - a. Size each circulator to individual circuit requirements.
  - b. Remove circulator (when furnished as standard equipment).
  - c. Install balancing valves to adjust flow to distribute heat to all zones.
  - d. Separate relay is required for each circulator.
4. Zoning with zone valves:
  - a. Install balancing valves to adjust flow to distribute heat to all zones.
  - b. Separate transformer is required to power zone valves. Refer to “Weil-McLain Zone Valve Wiring Guide” for details.

**Figure 11** Multiple zoning with CIRCULATORS



Legend	
1	Isolation valve
2	Flow control valve
3	Circulator
4	Zone valve
5	Drain valve

**Figure 12** Multiple zoning with ZONE VALVES





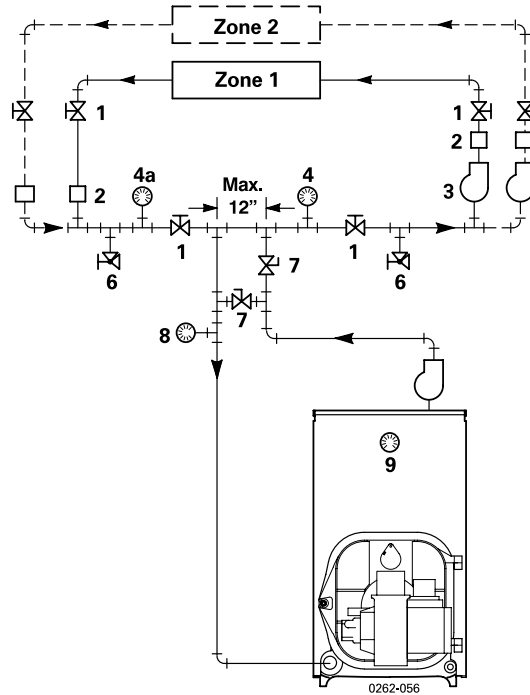
**WARNING** SERVICE TECHNICIAN ONLY — read and follow completely.

# Connect water piping (continued)

## Piping for systems requiring temperatures below 140°F

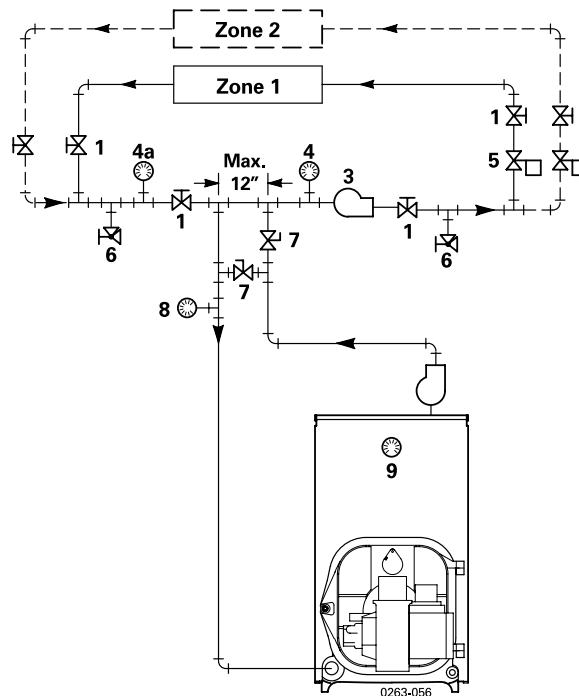
In most systems, this type of piping is not required. If system water temperature requirements are less than 140°F, such as radiant panels or converted gravity systems, use piping as shown in Figure 13 or Figure 14. If system piping is plastic without an oxygen barrier, a heat exchanger must be used.

**Figure 13** Piping with CIRCULATORS



Legend	
1	Isolation valve
2	Flow control valve
3	Circulator
4	System temperature gauge
5	Zone valve
6	Drain valve
7	System temperature valves Adjust valves so that: - the temperature at gauge 8 is at least 140°F - the temperature at gauge 9 is at least 160°F
8	Blend temperature gauge
9	Boiler temperature gauge

**Figure 14** Piping with ZONE VALVES





**▲WARNING** SERVICE TECHNICIAN ONLY — read and follow completely.

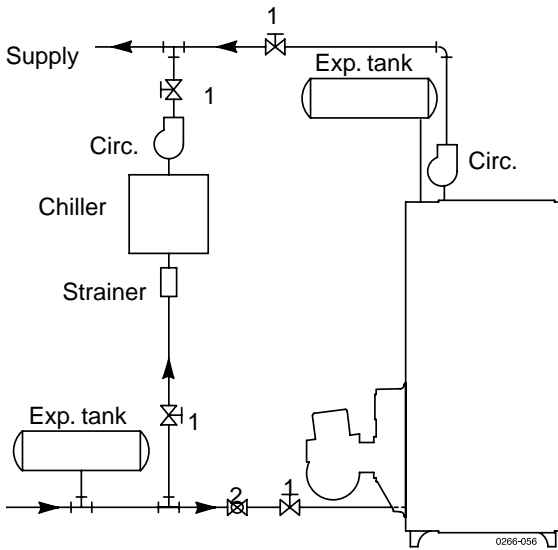
# Connect water piping

(continued)

## Use with refrigeration systems

- 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.

**Figure 15** Use with refrigeration system



**1** Isolation valve      **2** Balancing valve

# Connect wiring

## General wiring requirements

**▲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.
  - In Canada, CSA C22.1 Canadian Electrical Code Part 1 and any 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 ga. 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.

## Zone Valve Wiring

**▲CAUTION** **DO NOT connect directly from 3-wire zone valves to the T-T terminals on the boiler.** When using 3-wire zone valves, install an isolation relay. Connect the zone valve end switch wires to the isolation relay coil. Connect the isolation relay contact across the boiler T-T terminals. Failure to comply can result in damage to boiler components or cause unreliable operation, resulting in possible severe property damage.

**4- wire zone valves may be connected directly to the boiler control.**



**WARNING** SERVICE TECHNICIAN ONLY — read and follow completely.

# Connect wiring (continued)

## Junction box (furnished)

- Junction box houses electrical connections for all boiler components.
- “P” boilers have harnesses furnished.
- “A” boilers are furnished with burner and limit harnesses.
- All field-provided high voltage wiring must be sheathed in flexible metal conduit.
- Connect incoming line voltage “HOT” wire to service switch, and neutral wire to white wire. Field-install equipment ground wire to green wire with wire nut.
- Service switch (15 amp) is provided with boiler. “A” boilers — install switch as shown.
- Some local codes may require an emergency shut-off switch installed at a location away from boiler. Follow local codes.

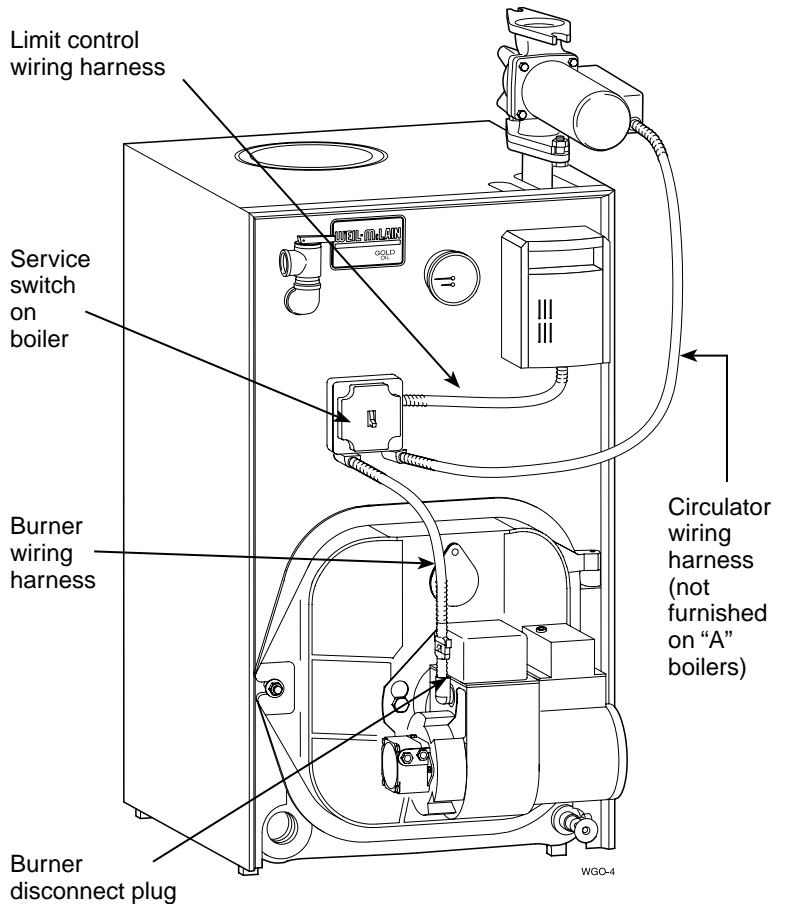
## Burner wiring

- Burner harness incorporates a disconnect plug, providing a convenient way to disconnect wiring when burner mounting door is opened.
- All “P” boilers have a power disconnect plug installed on burner.
- On “A” boilers, mount the plug (provided in water trim carton) on the burner housing as shown in Figure 16. For Carlin burners, screw burner plug into threaded conduit coupling, then mount this assembly to the burner housing using the chase nipple. Route wires through housing and make connections in burner junction box as shown in boiler wiring diagram.

## High temperature limit

- To comply with ASME, UL 726 or Canadian requirements, an additional high temperature limit is needed.
- Install the secondary control in the supply piping between boiler and isolation valve.
- Set the control to a minimum of 20°F above the set point of the combination control.
- The maximum allowable set point is 220°F.
- Wire the control as shown on page 24.

**Figure 16** Boiler wiring for forced hot water





**WARNING** SERVICE TECHNICIAN ONLY — read and follow completely.

# Connect wiring (continued)

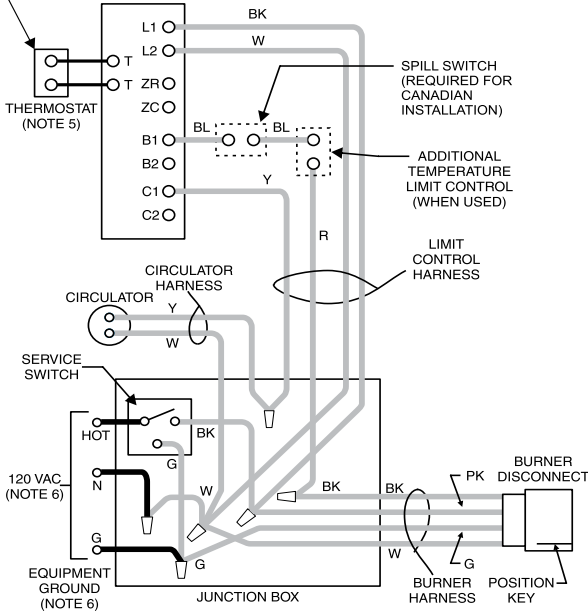
Figure 17 Wiring diagram

## Boiler Wiring

**WARNING** Electrical shock hazard — can cause severe injury or death. Disconnect power before installing or servicing.

**CAUTION** DO NOT connect directly from 3-wire zone valves to the T-T terminals on the boiler. When using 3-wire zone valves, install an isolation relay. Connect the zone valve end switch wires to the isolation relay coil. Connect the isolation relay contact across the boiler T-T terminals. Failure to comply can result in damage to boiler components or cause unreliable operation, resulting in possible severe property damage.

**Low Limit Setting:**  
WGO - Set to "OFF"  
WTGO - Set Low Limit Temperature

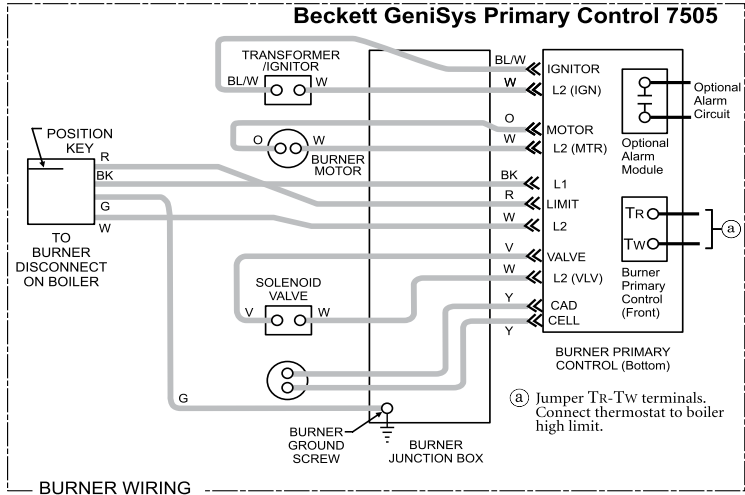
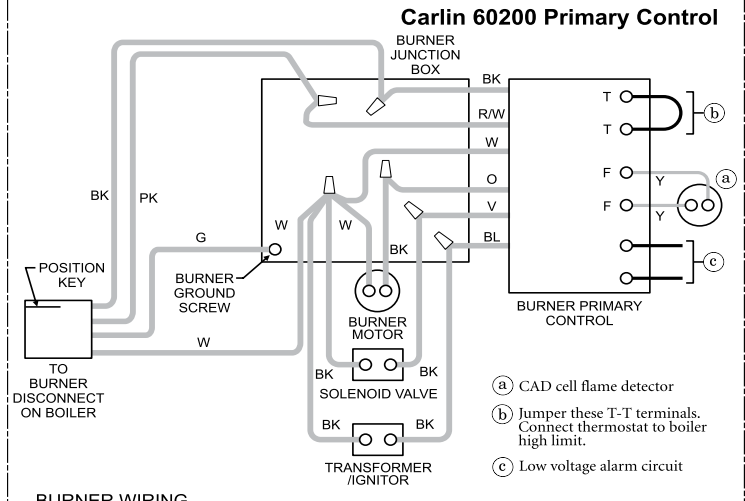
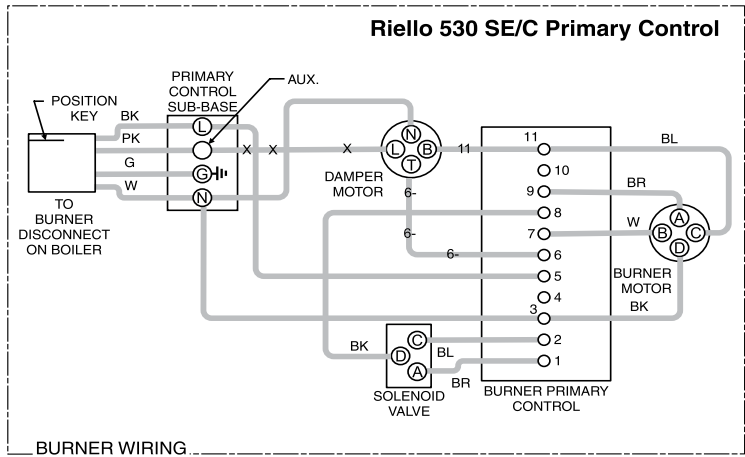


**NOTICE** Burners with Beckett Clean Cut Pump must be used with a primary control that has a valve-on delay (pre-purge). Controls shown have valve on delay (see control manufacturer's instructions for timings.)

**NOTES:**

1. All wiring must be installed in accordance with N.E.C. and any other national, state, or local code requirements. For Canadian installations, all wiring must comply with the Canadian Electrical Code.
2. All wiring must be N.E.C. Class 1.
3. Refer to control component instructions packed with the boiler for application information.
4. If any of the original wire as supplied with the appliance must be replaced, use minimum 105 °C wire or equivalent.
5. Set thermostat heat anticipator as per control manufacturer's recommendations.
6. Connect incoming line voltage "HOT" wire to service switch and neutral wire to white wire. Connect ground wire to green wire with wire nut.

- 120 VAC FIELD WIRING
- LOW VOLTAGE FIELD WIRING
- 120 VAC FACTORY WIRING
- LOW VOLTAGE FACTORY WIRING
- ◀◀ 1/4" QUICK CONNECT TERMINAL



<b>WGO</b> 2 thru 9	<b>WTGO</b> 3 thru 9	<p>WGO • Water without tankless heater</p> <p>WTGO • Water with tankless heater</p>	 Weil-McLain • 500 Blaine St. • Michigan City, IN 46360-2388 <b>PART NUMBER 550-200-018/1211</b>
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**WARNING** SERVICE TECHNICIAN ONLY — read and follow completely.

# Connect wiring — blocked vent shutoff switch option

## Blocked vent shutoff switch

**NOTICE** In Canada, blocked vent shutoff switch kit (see parts list page 34) must be installed. See Figure 18. The wiring diagram in Figure 19 shows boiler wiring only up to the burner disconnect. For additional information, refer to manufacturer’s instructions.

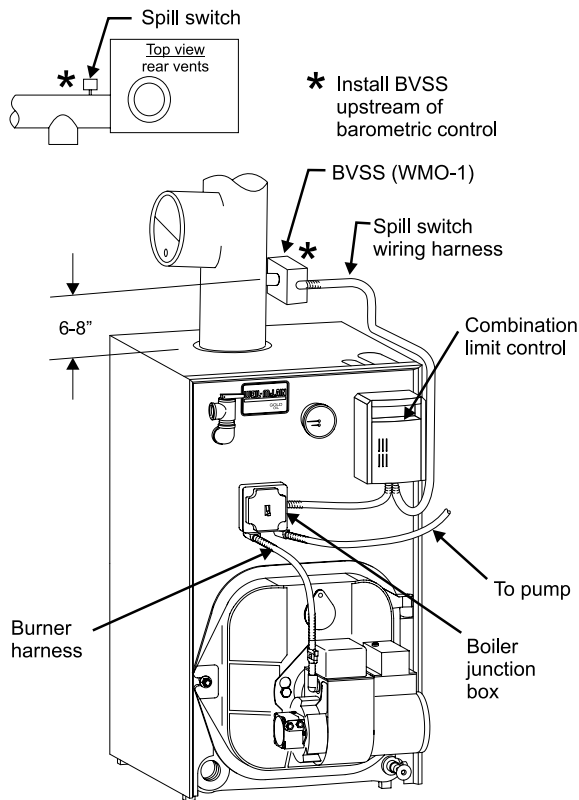
**WARNING** Electric shock hazard. Turn off electrical power supply at service entrance panel before making any electrical connections to avoid possible electric shock hazard. Failure to do so can cause severe personal injury or death.

After installing BVSS switch, proceed as follows:

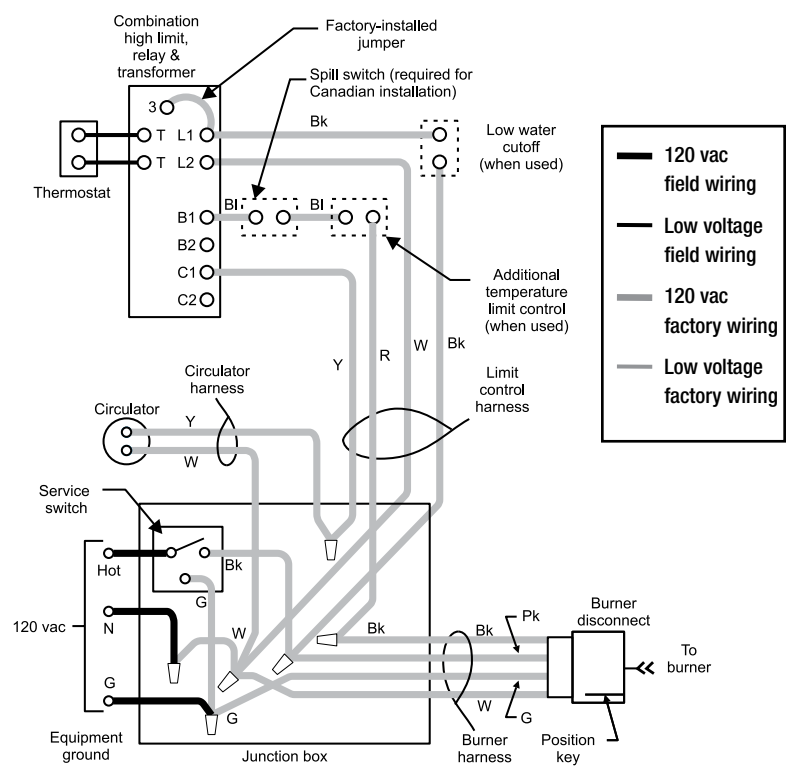
1. Disconnect power.

2. Install Spill Switch (BVSS) Wiring Harness (P/N 591-391-942) as follows:
  - a. Remove cover from BVSS Box.
  - b. Install straight fitting end of the harness on the BVSS Box. Install elbow (90°) end fitting on the Boiler Junction Box (see Figure 18).
  - c. Install both the fork ends to the screw terminals on the BVSS Switch as per the wiring diagram, (see Figure 19).
  - d. Replace BVSS box cover.
  - e. Locate Combination Control, remove cover, and disconnect red wire from “B1” terminal.
  - f. If red wire from Step “e” has uninsulated female end, replace it with insulated female end as supplied in kit.
  - g. Connect female end of Spill Switch BVSS Harness (blue wire) to “B1” terminal.
  - h. Connect male end of Spill Switch BVSS Harness to the red wire removed in Step “e”.
  - i. Replace Combination Control Cover.
3. Turn on power and verify safe operation of the appliance.
4. Restore boiler to normal operation.

**Figure 18** Blocked vent shutoff switch installation



**Figure 19** BVSS wiring diagram





**WARNING** SERVICE TECHNICIAN ONLY — read and follow completely.

## 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.
  - In Canada, CSA B139, 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, installation of an anti-siphon device is highly recommended to 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.



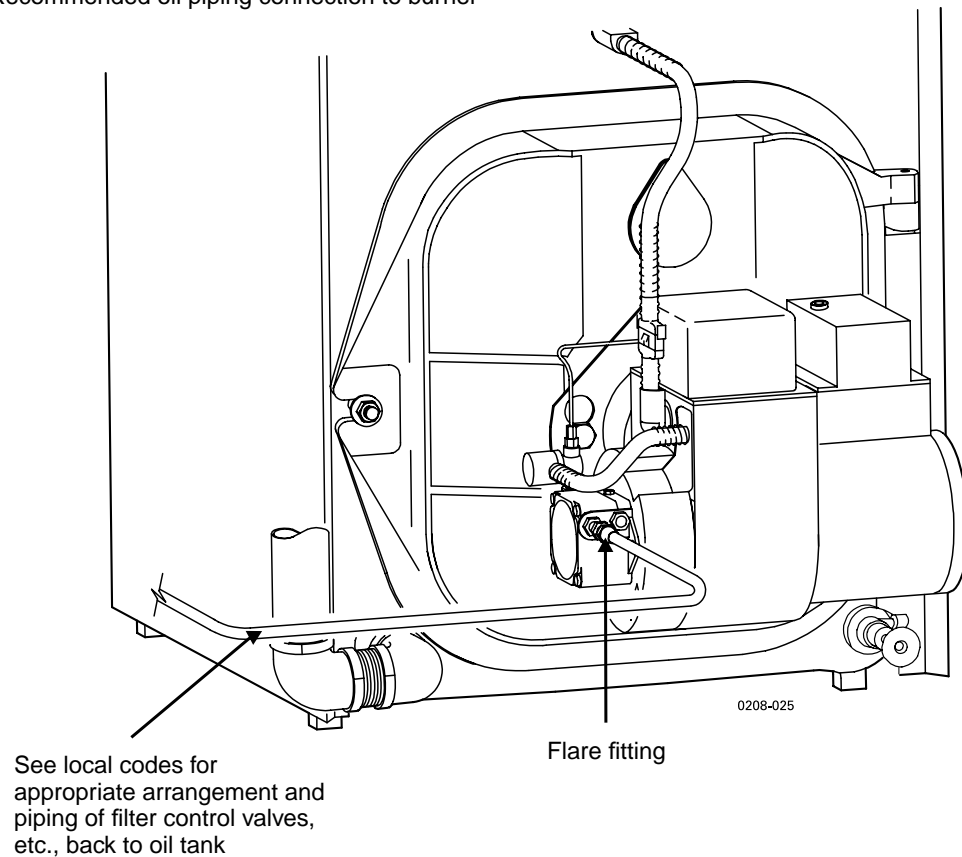
Do not use Teflon tape as an oil pipe sealant. It can cause valves to fail, creating hazards. Do not use compression fittings.

- 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 20 for recommended connection at burner, allowing burner mounting door to swing open completely for servicing.

**Figure 20** Recommended oil piping connection to burner





**▲WARNING** SERVICE TECHNICIAN ONLY — read and follow completely.

## Start-up

### 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.

### 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 back-flow 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.
- Do not add cold water to hot boiler. Thermal shock can cause sections to crack.

### To 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.
3. Verify burner mounting door is closed tightly and burner wiring harness is connected to junction box.
4. Factory burner adjustment and settings may not be suitable for specific job conditions. See Appendix, page 32.

**NOTICE** 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. 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.
6. Check boiler and system piping for leaks. See "Tips for water systems" on page 4.
7. Inspect breeching and venting for proper operation.



**▲WARNING** SERVICE TECHNICIAN ONLY — read and follow completely.

# Check-out procedure

## Check off steps as completed

- Boiler and heat distribution units filled with water?
- Automatic air vent, if used, opened one full turn?
- Air purged from system? Piping checked for leaks?
- Air purged from oil piping? Piping checked for leaks?
- Flue cap in place and tightened? Burner door closed, sealed and nut tight? Burner plugged in and service switch on?

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

- Proper draft and burner flame? Final adjustment made with combustion test equipment?
- 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 re-ignite.
- Test additional field-installed controls: If boiler has a low water cutoff, additional high limit or other controls, test

operation as outlined by the manufacturer. Burner should be operating and should go off when controls are tested. When controls are restored, burner should re-ignite.

- Limit control set to system temperature requirements (max. 220°F)?
- For multiple zones, flow adjusted to distribute heat in all zones?
- Thermostat heat anticipator setting (if available) set properly? Refer to “Connect wiring,” page 22.
- 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.
- Observed several operating cycles for proper operation?
- Set room thermostat(s) to desired room temperature?
- Completed Installation and Service Certificate below?
- Reviewed pages 1–7 with owner or maintenance person and instructed person to keep for future reference?
- Returned all instructions provided with boiler to its envelope and placed with boiler for future reference?

## Installation and service certificate

Date Installed: \_\_\_\_\_

Boiler Model Number: \_\_\_\_\_ Series: \_\_\_\_\_

CP Number(s): \_\_\_\_\_

Measured Btu or GPH Input: \_\_\_\_\_

Installer: \_\_\_\_\_

(Company)

(Address)

(Phone)

\_\_\_\_\_  
(Installer’s Signature)

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



**▲WARNING** SERVICE TECHNICIAN ONLY — read and follow completely.

# Annual service check list

Annual Service Call Checklist (follow in order listed below)		Dates								Comments
<b>1</b>	Check that boiler area is free from combustible materials, gasoline and other flammable vapors and liquids.									
<b>2</b>	Check for and remove any obstruction to combustion and ventilation air flow to boiler.									
<b>3</b>	Check breeching and chimney or vent for obstructions, damage, etc. Repair or replace as necessary.									
<b>4</b>	Clean boiler flueways. See Figure 21, page 30.									
<b>5</b>	Perform service on relief valve and circulator. See page 30.									
<b>6</b>	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 WGO torque to 20-25 ft.lbs.).									
<b>7</b>	Inspect and adjust burner. See burner manual and: <ul style="list-style-type: none"> <li>• change nozzle.</li> <li>• check ignition electrode settings.</li> <li>• clean blower housing and wheel.</li> <li>• make sure blower wheel turns freely.</li> <li>• oil burner motor if required.</li> <li>• clean air inlet.</li> <li>• clean or change fuel filter and strainer.</li> </ul>									
<b>8</b>	Make sure boiler is filled with water.									
<b>9</b>	Start unit and verify combustion settings with combustion test equipment. See page 28.									
<b>10</b>	Verify operation of all controls on boiler. See page 28.									
Any parts of the boiler furnished by Weil-McLain must be replaced by parts listed in Weil-McLain Boiler and Repair Parts Book.										

## Controls requiring annual service

### Water Relief Valve

Check operation of water relief valve. Follow instructions on label fastened to relief valve.



Scald potential. Do not check operation of relief valve unless discharge piping has been installed according to Boiler Manual. If piping is not in place, a qualified service technician must properly install piping.

### Circulator

Follow oil-lubricating instructions on circulator. Over-oiling will damage circulator. Water-lubricated circulators do not need oiling.

**▲WARNING** SERVICE TECHNICIAN ONLY — read and follow completely.

## Detailed service procedures

### Cleaning boiler flueways

**▲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. **Top flue boilers** -remove breeching and jacket top panel.  
**Rear flue boilers** - 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.
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.

**▲WARNING** 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.

### General description of control operation

#### Automatic air vent

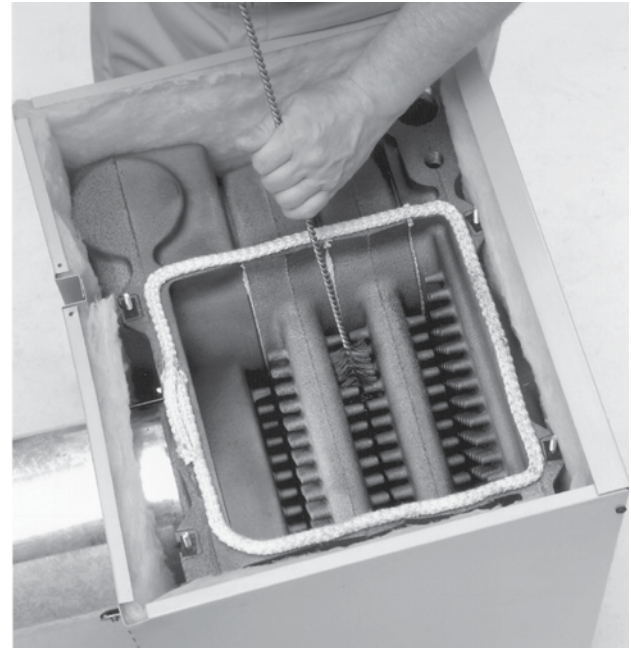
Air is released when cap is unscrewed one turn. If air vent leaks, remove small cap on top of vent, push in stem of valve and then release to clean valve seat. Screw cap completely on, then unscrew one turn.

#### Temperature limit control

If high boiler water temperature occurs, control shuts down burner, but allows circulator to run as long as there is a call for heat. Limit should be set higher than temperature needed for the system.

Maximum limit setting is 220°F.

**Figure 21** Thoroughly clean flueways between all pins at all angles. Start on top of boiler, finish from the bottom.



### Water relief valve

Provides discharge if boiler pressure exceeds 30 psig.

### Circulator

Circulator provides forced water circulation through boiler and piping system.

### Pressure-temperature gauge

Provides reading of boiler pressure and temperature. Maximum boiler pressure is 50 psig, maximum water temperature is 220°F. Temperature will vary according to system and daily heating demands. The range will be from room temperature up to limit control setting.

**▲WARNING** SERVICE TECHNICIAN ONLY — read and follow completely.

# 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).”:

### Precautionary measures

- ❑ Avoid breathing fiberglass dust and contact with skin or 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.
- ❑ 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 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.

### Precautionary measures

- ❑ Avoid breathing fiberglass dust and contact with skin or 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



**▲WARNING** SERVICE TECHNICIAN ONLY — read and follow completely.

# Close clearance installation

**▲WARNING** To provide close clearances as described on pages 26 and 27:

Obtain the Close Clearance Kit, Weil-McLain Part No. 386-500-050. Install the kit 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.

## Close clearance installation

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 8 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.
- Double-wall flue pipe to combustible surface — as listed in Table 5, page 33 and Figure 24 through Figure 26, page 33.

**NOTICE** Jacket cap must be in place on boiler to avoid requiring an 9" minimum clearance from back or top of boiler to combustible material. Flue pipe clearances must take precedence over jacket clearances.

1. Install boiler using clearances described at left.
2. Install barometric control 18-20 inches from boiler in breeching.
3. Attach manual reset temperature switch near upper surface of enclosed area. See Figure 22.

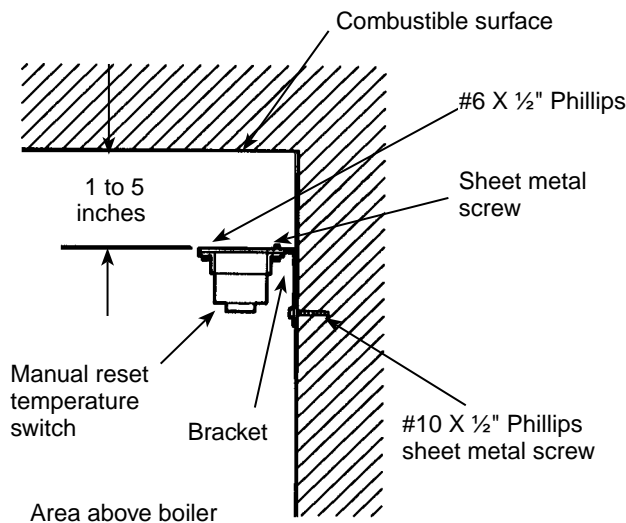
4. Wire switch in series with thermostat. See Figure 23.
5. Provide two combustion/ventilation openings when installing in confined space. Size opening 140 sq. in. (1000 Btu) per 1 GPH input. Locate openings near top and bottom of enclosed space.

## Burner adjustments for packaged and non-packaged boilers

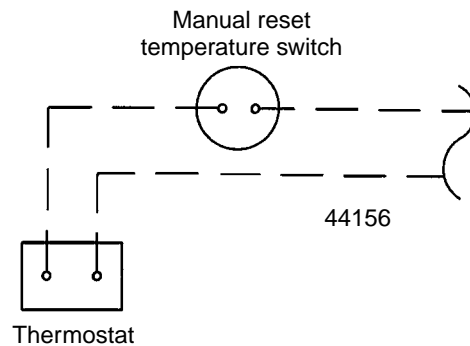
**▲WARNING** Final burner adjustments must be made using combustion test equipment to assure proper operation. Do not fire boiler without water or sections will overheat.

1. Refer to burner manual for start-up.
2. Allow boiler to heat to design condition.
3. Burner should be adjusted to 13% CO<sub>2</sub> 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 CO<sub>2</sub> 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.

**Figure 22** Manual reset temperature switch location



**Figure 23** Manual reset temperature switch wiring



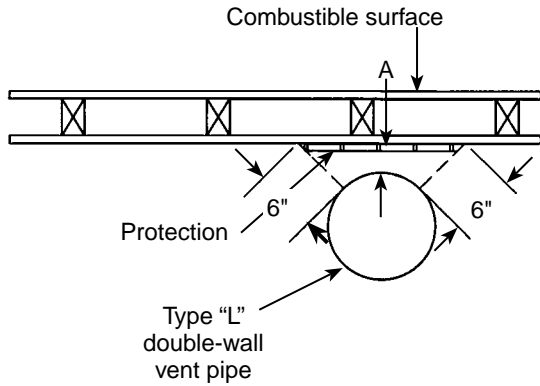




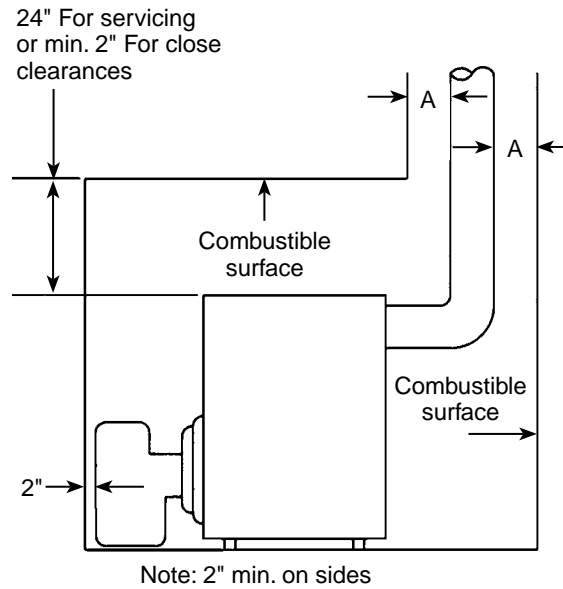
**WARNING** SERVICE TECHNICIAN ONLY — read and follow completely.

# Close clearance installation (continued)

**Figure 24** Flue pipe clearances



**Figure 25** Back vent clearances

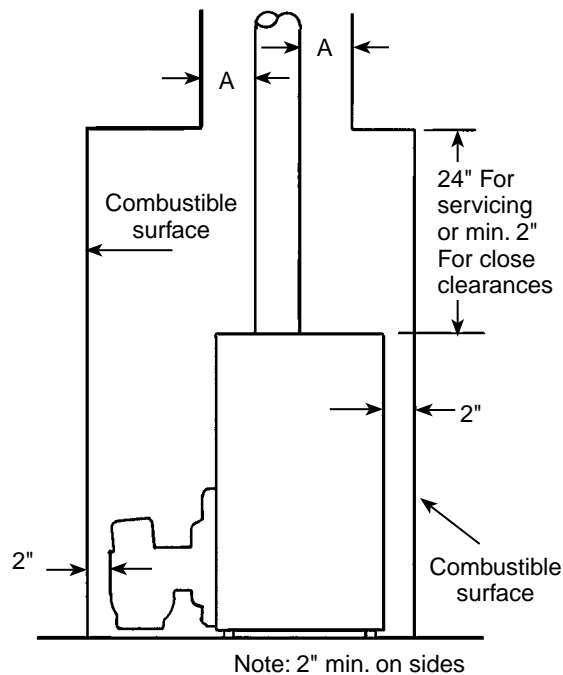


**Table 5** Protection required for clearances less than 6 inches from doublewall vent pipe\*

Dimension A When desired minimum clearance from Type "L" double-wall vent pipe to combustible surface is:	Use the following protection**:
3"	½" thick insulation board *** over one-inch glass fiber or mineral wool batts+
2"	24 gauge sheet metal with one-inch ventilated air space
3"	½" thick insulation board *** with one-inch ventilated air space

\* All clearances measured from outer surface of equipment to combustible surface, not to the protection used.  
 \*\* Apply to combustible surface unless otherwise noted. Cover all surfaces as specified in Table and Figure 24. Thicknesses are minimum.  
 \*\*\* Factory-fabricated board made of non-combustible materials, normally fibers, having thermal conductivity in range of one (Btu-inch)/(hr./sq. ft./°F) or less.  
 + Mineral wool batts (blanket or board), having min. density of 8 lb/ft<sup>3</sup> and a min. melting point of 1500°F.  
 Other dimensions available. Refer to NFPA-31.

**Figure 26** Top vent clearances





**▲WARNING** SERVICE TECHNICIAN ONLY — read and follow completely.

# Replacement parts

**Table 6** Series 3 section and flue collector parts

Item	Description	Part no.
A	Regular front section 7022	316-700-215
B	Wide intermediate section (WGO-3) 7010	316-700-075
B	Narrow intermediate section 7015	316-700-065
C	Intermediate section w/draw rod lugs 7016	316-700-070
D	Back section w/7" flue, supply & 2" return 7027	316-700-235
E	Section replacement kit (for 1 joint, includes seals, rope, adhesive and collector hood hardware) front or back section	386-700-852
	Section replacement kit (for 2 joints, includes seals, rope and adhesive) intermediate section	386-700-851
	Section assembly complete, for WGO-2	386-700-650
	Section assembly complete, for WGO-3	386-700-651
	Section assembly complete, for WGO-4	386-700-652
	Section assembly complete, for WGO-5	386-700-653
	Section assembly complete, for WGO-6	386-700-654
	Section assembly complete, for WGO-7	386-700-655
	Section assembly complete, for WGO-8	386-700-656
	Section assembly complete, for WGO-9	386-700-657
F	Collector hood kit for WGO-2*	386-700-336
F	Collector hood kit for WGO-3*	386-700-337
F	Collector hood kit for WGO-4*	386-700-337
F	Collector hood kit for WGO-5*	386-700-338
F	Collector hood kit for WGO-6*	386-700-339

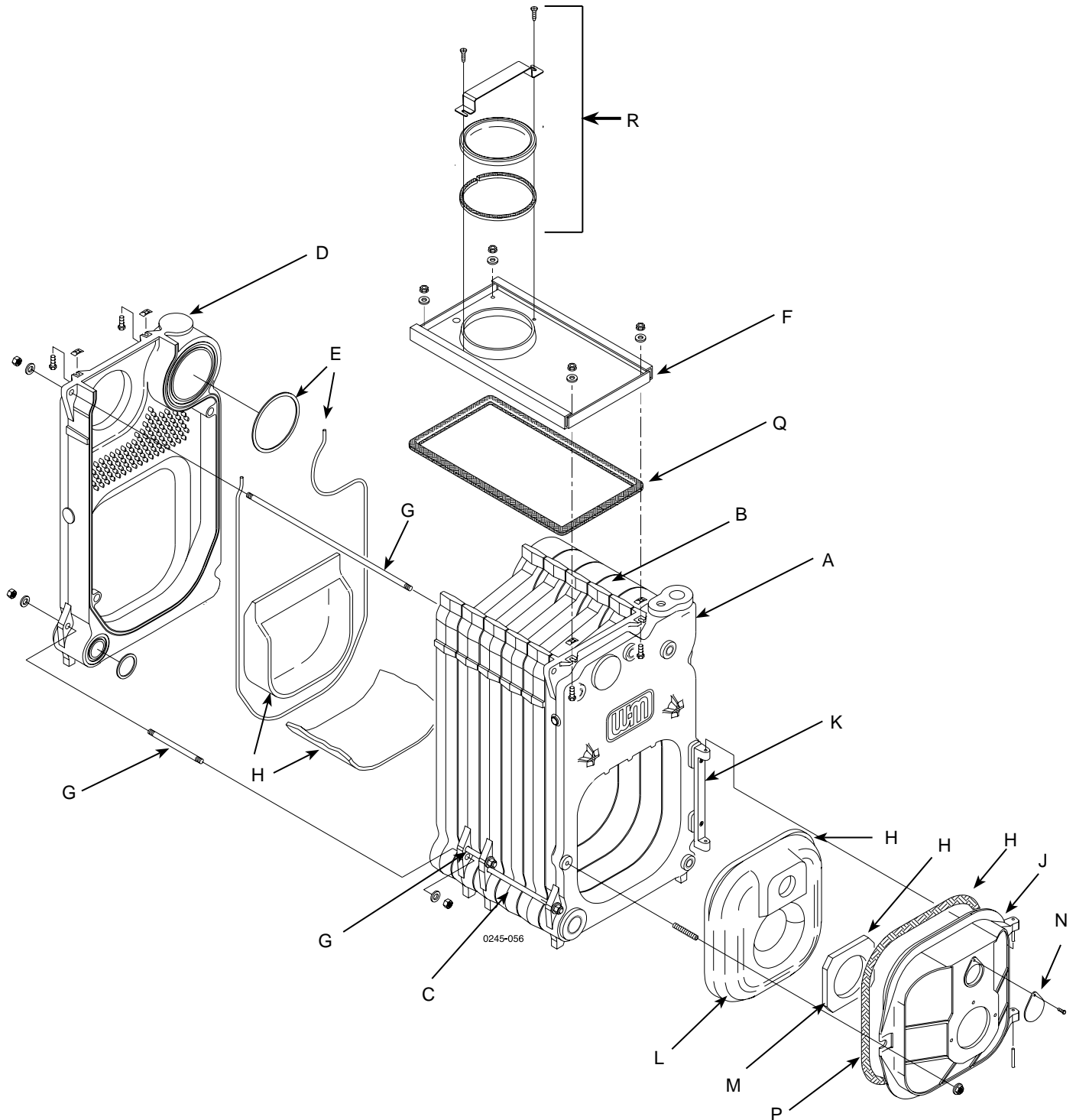
Item	Description	Part no.
F	Collector hood kit for WGO-7*	450-020-188
F	Collector hood kit for WGO-8*	450-020-189
F	Collector hood kit for WGO-9*	450-020-190
G	Tie rod 1/2 x 5 1/2 (WGO-7, 8, 9)	560-234-464
G	Tie rod 1/2 x 10 3/4 (WGO-2 & 7)	560-234-491
G	Tie rod 1/2 x 12 (WGO-7)	560-234-492
G	Tie rod 1/2 x 14 (WGO-3, 4, 8, 9)	560-234-470
G	Tie rod 1/2 x 15 (WGO-9)	560-234-495
G	Tie rod 1/2 x 17 (WGO-5)	560-234-472
G	Tie rod 1/2 x 20 (WGO-6)	560-234-534
G	Tie rod 1/2 x 23 1/4 (WGO-7)	560-234-538
G	Tie rod 1/2 x 26 3/8 (WGO-8)	560-234-542
G	Tie rod 1/2 x 29 1/2 (WGO-9)	560-234-497
H	Combustion chamber kit (rear & frt. ref., door ref. blanket, rope, blanket & water glass)	386-700-355
	Burner mounting door assembly (door, obs. port, rope, ins. & pins)	386-700-358
J	Burner mounting door 7070	330-054-302
K	Door hinge 7054	330-054-300
L	Door refractory	386-700-359
M	Door refractory blanket	591-222-115
N	Observation port shutter	460-039-867
P	Door seal rope 5'	590-735-104
Q	3/8" Glass rope for collector hood (7' for largest size hood)	590-735-109
R	Flue cap assembly (cap, strap, rope & screws)	386-700-344
	Flue brush 123D	591-706-214
	Blocked vent shutoff switch (Canada only)	511-624-650
*	Includes flue cap assembly, rope and hardware for installation.	



**WARNING** SERVICE TECHNICIAN ONLY — read and follow completely.

# Replacement parts (continued)

Figure 27 Parts drawing



**NOTICE** Repair parts must be purchased through Weil-McLain for the specific boiler as indicated in the list below. Results from using modified or other manufactured parts will not be covered by warranty and may damage boiler or impair operation.



**▲WARNING** SERVICE TECHNICIAN ONLY — read and follow completely.

# Replacement parts (continued)

**Table 7** Series 3 trim parts

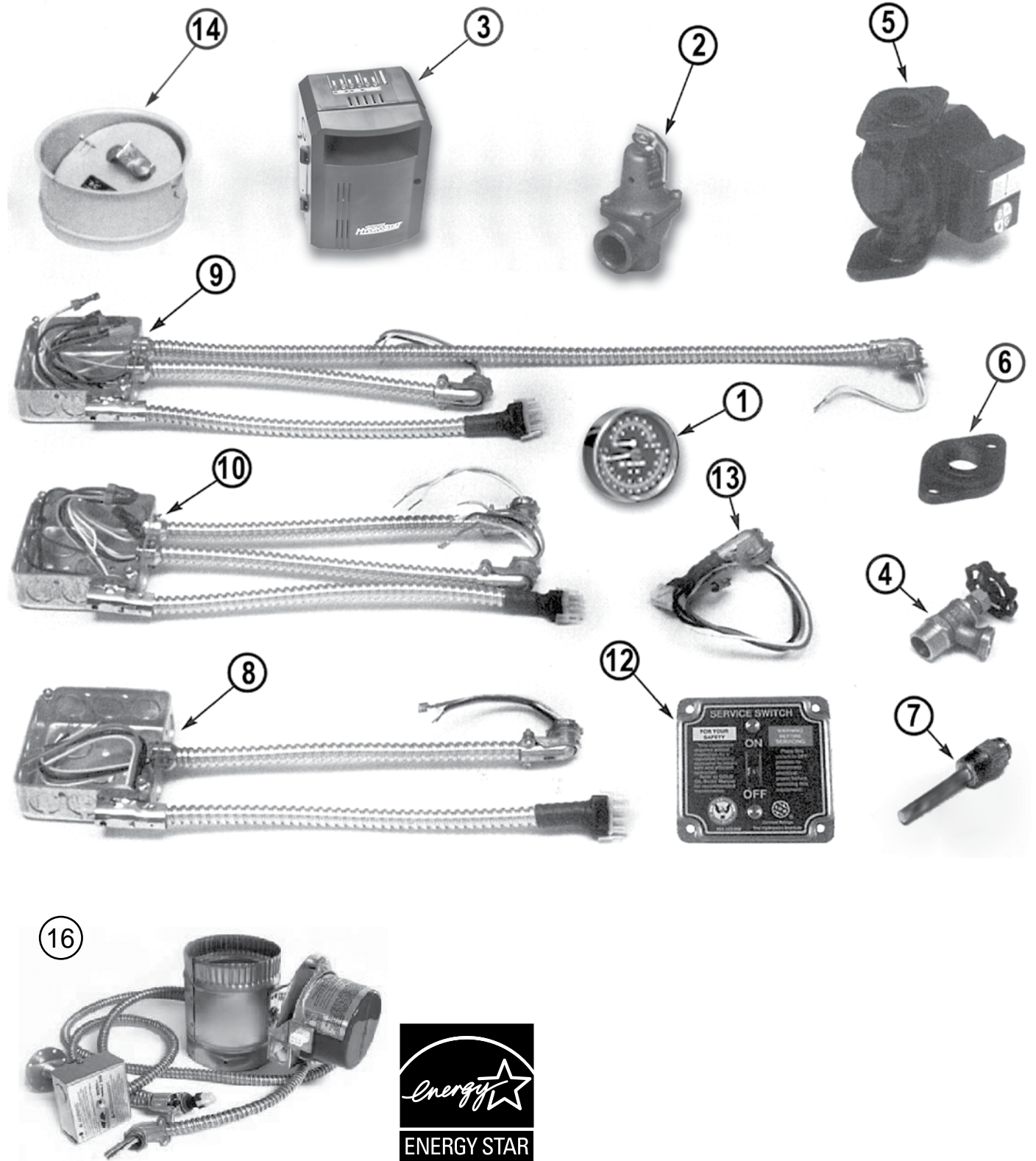
Fig. No.	Description	Mfr.	Mfr. part no.	Part no.
1	Combination pressure-temperature gauge kit, 60° – 360° F., 0 - 75 psi, 3 1/8" dia., 1/4" NPT, short shank, with 1/4" x 1/2" reducing bushing	Weil-McLain		380-000-000
2	ASME pressure relief valve, set to relieve at 30 PSIG, 3/4" male inlet, 3/4" female outlet	Conbraco	M330	511-546-920
3	Electronic aquastat, high limit or combination high/low limit, with LWCO, high limit 100°– 220°, low limit 110°- 200°, circulator amps: 5.8 FLA, anticipator: 0.2 amps	Hydrolevel	3250	381-300-000
4	Drain cock, 3/4", 1 1/2" shank	Conbraco	31-606-01	511-210-423
	Drain cock, 3/4"	Hammond	710	
	Drain cock, 3/4"	Watts	BD2C	
	Drain cock, 3/4"	Matco-Norca		
	Drain cock, 3/4"	Nibco	#74	
5	Circulator, 1/25 HP, 120/60/1 motor, 175 RPM, 0.75 amps	Taco	W007F	511-405-113
6	Circulator universal hardware kit 1 1/4" (Includes: (1) Flange, (1) Gasket, (2) Screws and (2) nuts) for sizes 2, 3 & 4 only	Weil-McLain		381-354-526
	Circulator universal hardware kit 1 1/2" (Includes: (1) Flange, (1) Gasket, (2) Screws and (2) nuts) for sizes 5 & 6 only	Weil-McLain		381-354-531
7	3/4" NPT well, 4.25" long	Hydrolevel		592-300-026
8	Junction box - wiring harness assembly (series 1 A & B only)	Weil-McLain		591-391-846
9	Junction box - wiring harness assembly (series 1 only - large pump)	Weil-McLain		591-391-856
10	Junction box - wiring harness assembly (series 2 & 3 packaged only)	Weil-McLain		591-391-836
11	(Not shown) Junction box - wiring harness assembly (series 2 & 3 A & B only)	Weil-McLain		591-391-837
12	Junction box cover assembly with service switch	Weil-McLain		591-391-854
13	Burner harness assembly	Weil-McLain		591-391-850
14	Barometric damper	Weil-McLain		510-512-267
15	Flue pipe brackets (set of 2) (Not shown)	Weil-McLain		426-700-268
16	Vent damper kits - Required for ENERGY STAR® compliance, (Version 3.0 Boilers specification of 87% AFUE), with reduced rates only	Field Controls	OVD-7	381-800-501 381-800-502 381-800-503 381-800-504 381-800-505 381-800-506
	WGO-2RD (Optional equipment)	Weil-McLain		
	WGO-3RD (Optional equipment)			
	WGO-4RD (Optional equipment)			
	WGO-5RD (Optional equipment)			
	WGO-6RD (Optional equipment)			
	WGO-7RD (Optional equipment)			



**WARNING** SERVICE TECHNICIAN ONLY — read and follow completely.

# Replacement parts (continued)

Figure 28 Series 3 trim





**▲WARNING** SERVICE TECHNICIAN ONLY — read and follow completely.

# Replacement parts (continued)

**Table 8** Weil-McLain part numbers

Model	1		2		3		
	Jacket panel with insulation — front		Left side and rear			Right side and rear	Top panel with cap
	UL	Non-UL	UL	Non-UL			
WGO-2	381-355-494	381-355-593	381-355-495	381-355-496	426-700-250	381-355-497	
WGO-3	381-355-494	381-355-593	381-355-498	381-355-499	426-700-252	381-355-500	
WGO-4	381-355-494	381-355-593	381-355-501	381-355-502	426-700-252	381-355-771	
WGO-5	381-355-494	381-355-593	381-355-503	381-355-504	426-700-254	381-355-505	
WGO-6	381-355-494	381-355-593	381-355-506	381-355-507	426-700-256	381-355-508	

Complete Jacket cartons		
	UL	Non-UL
7 section	416-700-170	416-700-171
8 section	416-700-172	416-700-173
9 section	416-700-174	416-700-175

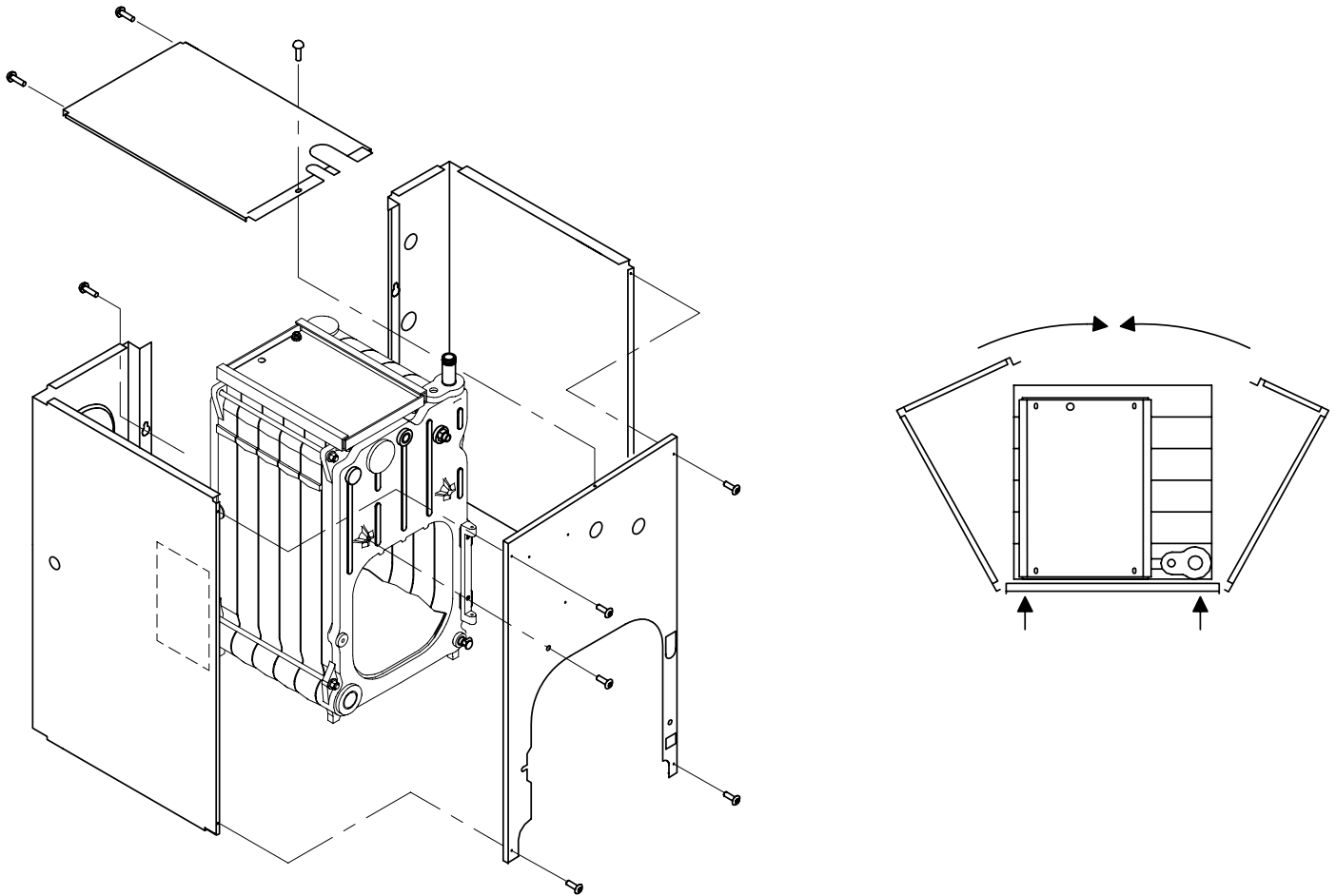
Common jacket parts for all boilers	
Plastic flue cap cover w/insulation	560-907-687
Jacket hardware kit	386-700-853
Touch up paint, gold spray can	592-000-000



**▲WARNING** SERVICE TECHNICIAN ONLY — read and follow completely.

# Replacement parts (continued)

**Figure 29** Boiler jacket

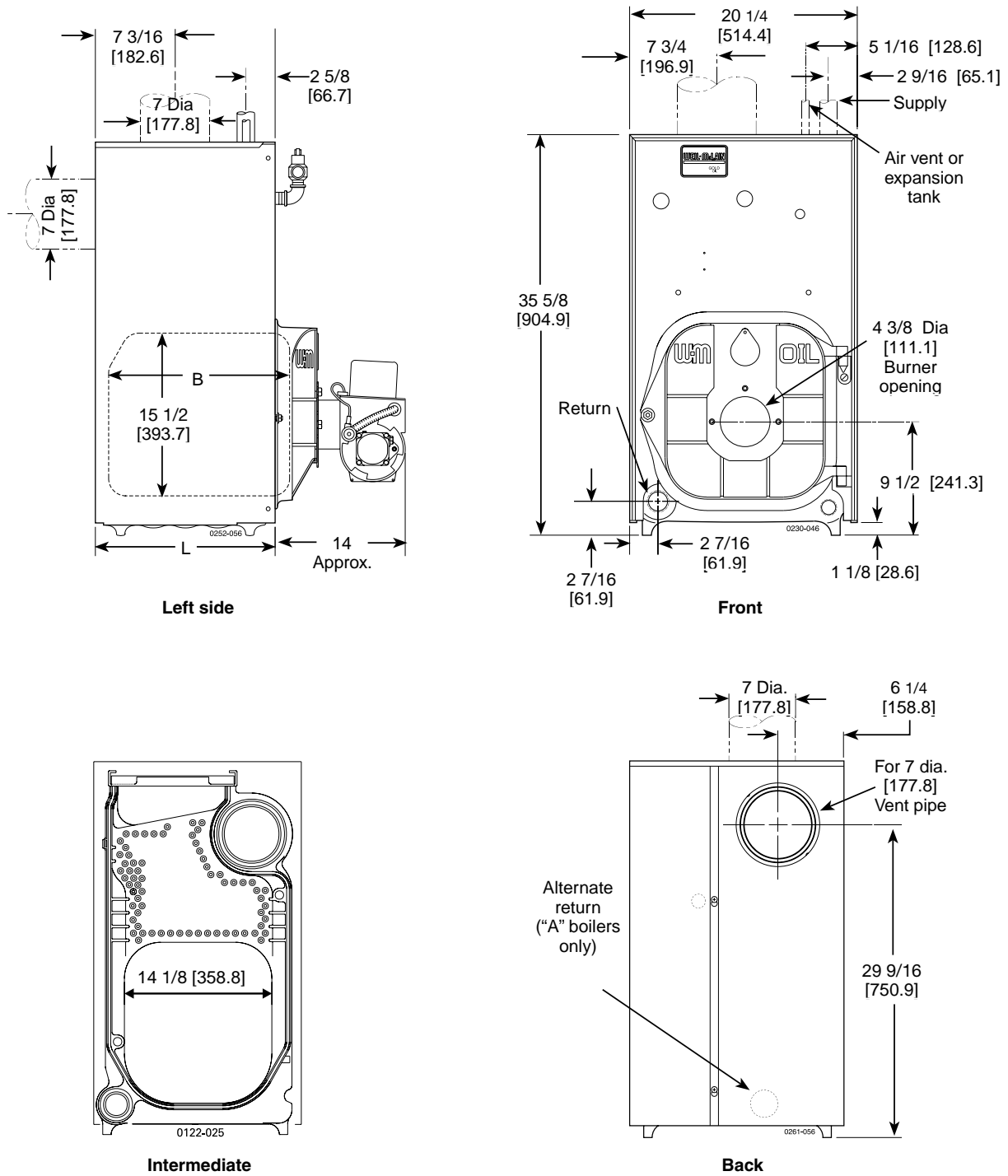




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# Dimensions

**Figure 30** WGO dimensions — inches (mm) — see Table 9, page 41







**⚠ WARNING** SERVICE TECHNICIAN ONLY — read and follow completely.

# Dimensions (continued)

**Table 9** Dimensions

BOILER MODEL NUMBER	B		L	
	Inches	mm.	Inches	mm.
WGO-2	10 1/2	266.7	13 3/4	349.2
WGO-3	13 1/2	342.9	16 7/8	428.7
WGO-4	13 5/8	345.9	16 7/8	428.7
WGO-5	16 7/8	428.7	20	508.0
WGO-6	20	508	23 1/8	587.2
WGO-7	23 1/8	587.2	26 1/4	666.7
WGO-8	26 1/4	666.7	29 31/32	746.2
WGO-9	29 3/8	746.2	32 1/2	825.5



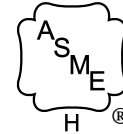
**▲WARNING** SERVICE TECHNICIAN ONLY — read and follow completely.

# Ratings

**Table 10 GOLD WGO oil-fired water boiler ratings**



**DOE**



**AHRI Certified Ratings**

Boiler Model (9)	Burner Input		Heating Capacity	Seasonal Efficiency	Net Rating (water)	Boiler Water Content	Flue Outlet Diameter	Minimum Chimney			Draft Loss Thru boiler
	GPH (3)	MBH (3)	MBH (2) (4)	AFUE %	MBH (2) (5)	Gallons	Inches (7)	Rect In	Round In	Height Ft	In W.C. (8)
*WGO-2	0.70	98	86	86.4	75	11.0	7	8 x 8	6	15	0.010
*WGO-3R	0.80	112	98	86.2	85	14.9	7	8 x 8	6	15	0.020
*WGO-3	0.95	133	115	85.3	100						0.020
*WGO-4R	1.00	140	122	86.2	106	13.4	7	8 x 8	6	15	0.010
*WGO-4	1.20	168	145	85.0	126						0.010
*WGO-5R	1.20	168	147	86.1	128	15.9	7	8 x 8	7	15	0.015
*WGO-5	1.45	203	175	85.0	152						0.015
*WGO-6R	1.40	196	171	86.1	149	18.4	7	8 x 8	7	15	0.015
*WGO-6	1.75	245	212	85.0	184						0.015
*WGO-7R	1.60	224	196	86.0	170	20.8	7	8 x 8	8	15	0.015
*WGO-7	2.00	280	242	85.0	210						0.015
**WGO-8	2.30	322	266 (6)	-	231	23.3	7	8 x 12	8	20	0.025
**WGO-9	2.55	357	295 (6)	-	257	25.8					0.030

\* Substitute "P" for completely assembled packaged boiler without burner (WGO-3 through WGO-6 only).  
 Substitute "A" for boiler only for use with approved burners as listed with AHRI.

\*\* Available only as an "A" unit.

- (1) WGO boiler designed with convertible vertical and horizontal flue outlet.
- (2) MBH refers to thousands of Btu per hour.
- (3) Based on 140,000 Btu/gal.
- (4) Based on standard test procedures prescribed by the United States Department of Energy at combustion condition of 13.5% CO<sub>2</sub> and -0.02" W.C. draft overfire.
- (5) Net AHRI 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 pick-up. Water ratings are based on a piping and pick-up allowance of 1.15. An additional allowance should be made for unusual piping and pick-up loads.
- (6) AHRI gross output.
- (7) See page 12 for minimum breeching diameter.
- (8) Listed draft losses are for factory-shipped settings.
- (9) Boiler model suffixes: "R" designates a reduced input version. NOTE: A burner nozzle change is required — refer to the burner instructions or boiler's rating label for correct selection.



