Series LC™

Oil, Gas & Gas/Oil Boilers – Steam

Installation, Operation & Maintenance Manual

PeerlessBoilers.com

TABLE OF CONTENTS

USING THIS MANUAL

A. INSTRUCTION MANUALS

The Series LC™ Installation, Operation & Maintenance Manual is divided into four basic sections:

1. Preinstallation (Section 1)
2. Installation (Sections 2 through 8)
3. Start-Up (Section 9)
4. Maintenance (Section 10)

B. SPECIAL ATTENTION BOXES

Throughout this manual you will see special attention boxes intended to supplement the instructions and make special notice of potential hazards. These categories mean, in the judgment of PB Heat, LLC:

⚠ DANGER

Indicates a hazardous situation, which, if not avoided, will result in death or serious injury and major property damage.

⚠ WARNING

Indicates a hazardous situation, which, if not avoided, could result in death or serious injury and major property damage.

⚠ CAUTION

Indicates a hazardous situation, which, if not avoided, could result in minor or moderate injury, and minor property damage.

NOTICE

Indicates special attention is needed, not related to personal injury or property damage.

1. PREINSTALLATION

Carefully read these instructions before beginning work. Understand all aspects of the installation. Contact your PB Heat, LLC sales representative or customer service for help in answering questions.

⚠ WARNING

This manual is intended for use by Qualified Heating Professionals only. Installation, service, or adjustment of this heating appliance by anyone other than a Qualified Heating Professional may cause severe personal injury, death, or major property damage.

This boiler must be installed by a qualified contractor. The boiler warranty can be voided if the boiler is not installed, maintained and serviced correctly.

NOTICE

The installer must verify that at least one carbon monoxide alarm has been installed within a residential living space or home following the alarm manufacturer's instructions and applicable local codes before putting the appliance into operation.

L'installateur est tenu de vérifier qu'au moins une alarme de détection de monoxyde de carbone soit installée dans une espace résidentiel ou dans un domicile conformément aux directives du fabricant de l'alarme et aux codes locaux applicables avant de mettre l'appareil en service.

NOTICE

The equipment must be installed in accordance with installation requirements of the authority having jurisdiction or, in the absence of such requirements, to the current edition of the *National Fuel Gas Code*, ANSI Z223.1/NFPA 54.

Where required by the authority having jurisdiction, the installation must conform to *American Society of Mechanical Engineers Safety Code for Controls and Safety Devices for Automatically Fired Boilers,* ASME CSD-1.

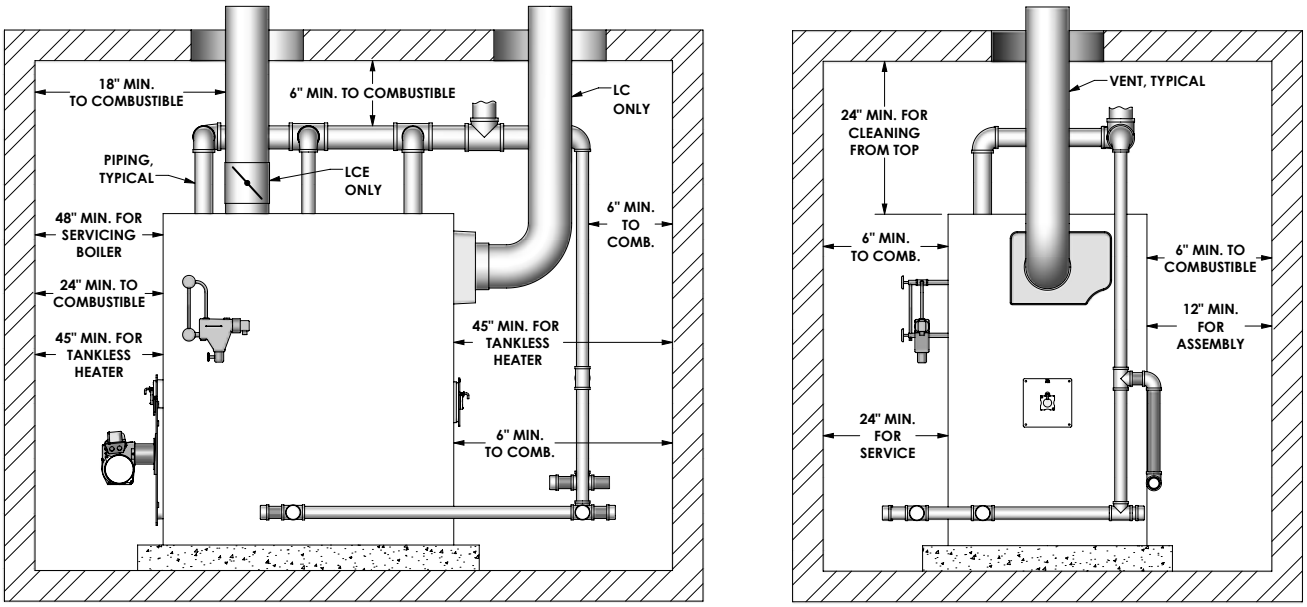

Figure 1.1: Clearance Requirements

A. ACCESSIBILITY CLEARANCES

1. Clearances for service and from combustible surfaces are the same for the LCE as for the LC. The following recommendations allow for *reasonable access to the boiler*. Follow local codes and requirements when setting actual layout. See Figure 1.1.
   a) For installing, removing and servicing the burner: provide 48" between the front of the boiler and any adjacent wall or other appliance.
   b) For access to the top of the boiler for cleaning flueways: provide 24" above top of jacket.
   c) For accessing and servicing of level controls and inspection tappings (if used): provide 24" minimum from the right side of the boiler to any wall or obstruction.
   d) For installation of jacket: provide at least 12" from the left side of the boiler to any wall or obstruction. More clearance may be needed for longer boilers unless the jacket is pre-assembled before placing the boiler.
   e) For installation and removal of tankless heaters: provide 45" between the end of the boiler and any adjacent wall of obstruction. [This provides for all available tankless coils. The spacing can be closer for Heater Number X-1020 (allow 30")].

B. CLEARANCE FROM COMBUSTIBLE CONSTRUCTION

Provide the following *minimum clearances to combustible construction*. See Figure 1.1.

1. Sides: 6"
2. Rear of Jacket: 6"
3. Front of Jacket: 24"
4. Top of Jacket: 24"
5. Steam and Hot Water Pipes: 6"
6. Vent or Chimney Connector: 18"

C. COMBUSTION & VENTILATION AIR

1. The installation must provide adequate air for combustion and ventilation.
2. Unless the boiler room construction and natural air infiltration are sure to provide all the air needed, provide an opening or duct to the outside with a free cross sectional area of at least 1 square inch per 4000 Btuh input for all installed appliances. At high altitude, increase this requirement 4% for each 1000 feet above sea level.
3. The boiler room must never be under negative pressure. If exhaust fans or other equipment can cause a negative pressure in the boiler room, the air openings and equipment design must be engineered to assure a neutral or slightly positive pressure in the boiler room at all times of operation. If the equipment design and air openings cannot assure this, then the boiler must be located in an isolated room.
4. Using combustion air dampers:
   If motorized dampers are used on the combustion and ventilation air openings, wire them such that they must open when the boiler tries to operate. They must include a switch which prevents the boiler from operating if they do not open. See Figure 1.2.

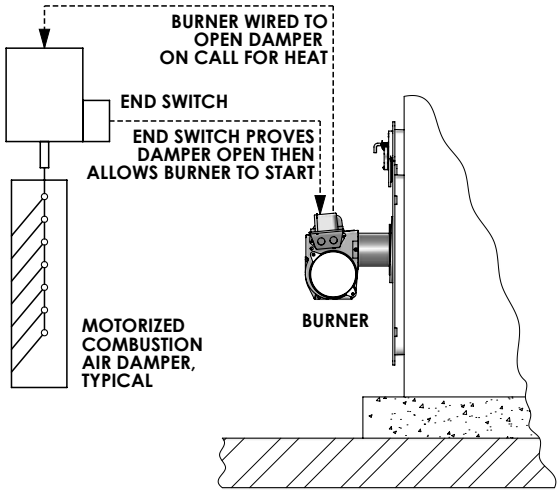

Figure 1.2: Motorized Vent Damper Interlock

D. CHIMNEY OR VENT

1. Inspect the existing chimney or vent system. Make sure it is in good condition. Inspect chimney liner and repair or replace if necessary.
2. The vent system and installation must be in accordance with the current edition of the American National Standard ANSI/NFPA 211, "Chimneys, Fireplaces, Vents, and Solid Fuel Burning Appliances", or applicable provisions of the local building codes. The venting requirements for the LCE are the same as for the LC. Figure 1.3 shows the top flue outlet required on LCE boilers.
3. Chimney/Vent Operation: The vent system must be sized and installed to remove all combustion products. If the vent system is not sized properly, the burner may not operate properly. This can cause poor combustion or sooting to occur.
4. If the vent terminates in an area where wind-generated downdrafts are likely, install a suitable vent cap which can control wind effects.
5. This boiler is designed to fire only with a pressurized fire box. The breeching and vent may be sized for negative, neutral or positive pressure (no more than 0.l inches water column at the boiler outlet) as desired. But negative pressure overfire can cause lifting of the flame and poor combustion or overheating of the boiler crown sheet.
6. Forced draft breechings and vents must be sealed and of heavy gauge steel construction and must comply with all applicable codes of construction.
7. The vent diameter and minimum height for stub vents are listed in the Ratings and Dimensions Section of this manual. Always extend vent terminations at least 3 feet above the roof line. See Figure 1.3.

⚠ WARNING

Failure to provide adequate venting can result in severe property damage, personal injury or death.

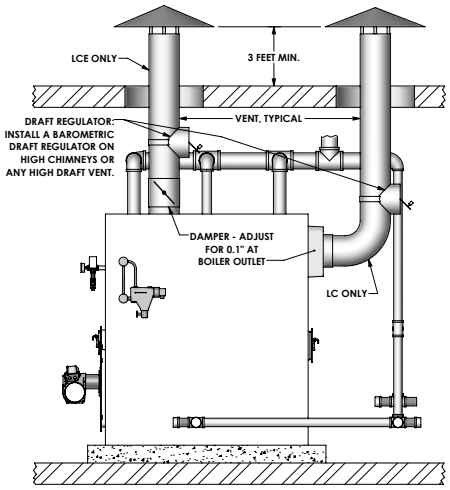

Figure 1.3: Vent Termination, Typical

8. Exterior Vents:
   a) Insulate sufficiently to ensure adequate draft and to prevent vent damage due to condensation.
9. Vent Connection to Boiler:
   a) Support the weight of the vent system independently of the boiler flue connection.
   b) Provide support of the vent connector (breeching) at maximum 12 foot intervals to prevent sagging and to provide a minimum upward slope of 1/4" per foot.
10. Do not vent natural draft appliances in a combined vent which operates under positive pressure.
11. Draft Regulator: Install a barometric draft regulator where using high chimney or any high draft vent. This is needed to prevent causing negative draft in the boiler. Excess draft will cause flame lifting and possible impingement.
12. The Draft Damper for the LCE boiler is a separate piece, shipped in the Top Flue Outlet Carton.
    a) Install the Draft Damper as close as possible to the boiler flue outlet. It can be installed vertically or horizontally provided that the connecting vent piping and fittings are designed and installed for pressurized service.
    b) Secure the damper to the vent with screws and seal the joints with a bead of high temperature silicone sealant (found in Section Assembly Kits).
    c) The vent must be installed so it can be disconnected and the Top Flue Outlet removed for proper cleaning of the flueways.

E. BOILER WATER QUALITY & TREATMENT

1. Excessive Make-up Water
   Leaks in the system must be repaired. Leaks increase the volume of make-up water, which significantly shortens the life of the boiler. Oxygen and chlorides in make-up water greatly accelerate corrosion of the cast iron sections. Minerals in make-up water precipitate when heated and adhere to the cast iron, which eventually overheats the iron and cause the iron to crack. Minerals in make-up water also create foam, which can interfere with proper operation of probe low water cutoffs.

   If an automatic water feeder is installed, provide a means of detecting and alerting the user to excessive make-up water, such as a water feed counter.
2. Boiler Water Quality
   a. Boiler water pH should be in the 7.5 to 11 range.
   b. Boiler water chloride concentration should be less than 30 ppm.
   c. The water hardness should be less than 7 grains per gallon to prevent scale build-up and foaming.

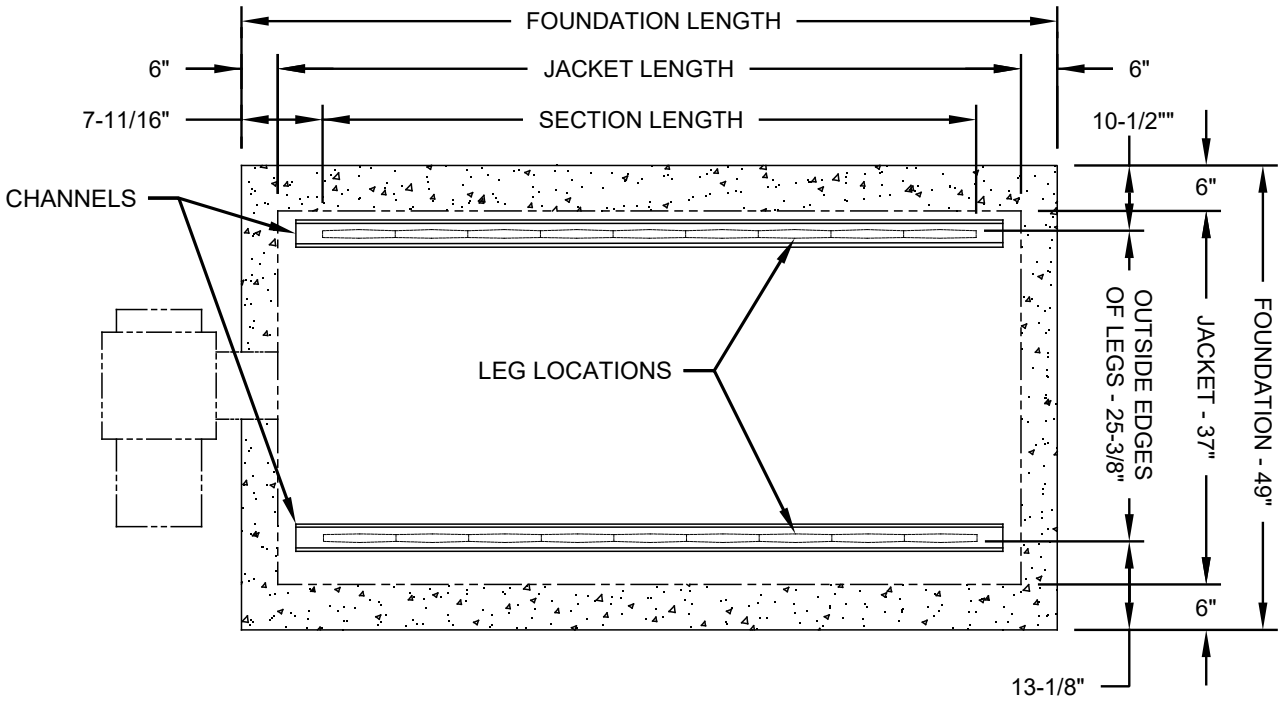

Figure 1.4: Foundation Layout

Consult a local qualified water treatment specialist for recommendations regarding the appropriate chemical compounds and concentrations which are compatible with local environmental regulations.

Boiler failure caused by excessive make-up water and poor water quality are not covered as manufacturing defects.

F. BOILER SETTING

1. If the boiler room floor is not level or if additional structural support is needed, provide a good, level foundation for the boiler with the minimum dimensions given in Table 1.1. The flooring and structural support system must be suitable for the operating weight of the boiler and any connected piping. Place the Steel Channels on the foundation as shown in Figure 1.4.

2. Do not operate the boiler until the foundation, if new concrete, has thoroughly cured. The concrete might be damaged if heated too quickly due to the entrained moisture remaining.

⚠ WARNING

Do not install this boiler on carpeting or any combustible flooring. A significant fire hazard could result, with potential for property damage, personal injury or death.

3. If the boiler is installed in a penthouse or if wiring of any sort is run underneath the boiler foundation, construct the foundation with provision for air flow underneath between the main floor and the top of the boiler foundation.

Table 1.1: Foundation Lengths

Model	Foundation Length, Inches
LC-04	37-15/16
LC-05	43
LC-05	48-1/16
LC-06	53-1/8
LC-07	58-5/16
LC-08	63-3/8
LC-09	68-7/16
LC-10	73-1/2
LC-11	78-9/16
LC-12	
LCE-13	83-3/4
LCE-14	88-13/16
LCE-15	93-7/8
LCE-16	98-15/16
LCE-17	104-1/8
LCE-18	109-3/16
LCE-19	114-1/4
LCE-20	119-7/16
LCE-21	124-1/2
LCE-22	129-9/16
LCE-23	134-5/8
LCE-24	139-11/16

G. INSTALLATION SURVEY

For new and existing installations, a Steam Installation Survey is available from PB Heat, LLC. The survey will provide information on how a steam boiler works with your specific system and will provide an overview of steam system operation in general.

You can also use this survey to locate system problems which will have to be corrected. To obtain copies of the Steam Installation Survey, contact your PB Heat, LLC representative or download it from PeerlessBoilers.com.

H. PLANNING THE LAYOUT

Prepare sketches and notes of the layout to minimize the possibility of interferences with new or existing equipment, piping, venting and wiring.

I. VERIFY COMPONENTS

1. Packaged: All components should be inside crate. In some cases the burner may be shipped separately. Optional equipment, such as barometric draft dampers, may also be shipped separately.

2. Knockdown: All components shipped for field assembly. See Table 1.2 for standard components. See Tables 1.3 through 1.7 for optional components.
   a) Channel Rails
   b) Sections
   c) Assembly Kit Carton(s): Includes flow port gaskets, tie rods with hardware, high temperature rope, and cleanout cover plates.
   d) Flue Box Carton: Includes flue box, rear flue cover plate (LCE only), rear observation assembly and port cover plates.
   e) Baffle Carton
      i) LC: Includes baffles, combustion chamber liner, rating label
      ii) LCE-21 through LCE-24: Baffles
   f) Jacket Cartons: Includes ASME plate
   g) Draft Damper (LCE only)
   h) Label Carton (LCE only)
   i) Burner Mounting Plate
   j) Trim Carton: Includes safety relief valve and temperature-pressure gage
   k) Control Carton: Limit controls
   l) Tankless Heater(s)
   m) Additional controls and fittings

3. Assembled Block: Same as knockdown except channel rails, sections and assembly kit cartons are assembled into a block as a single shipping level component.

Table 1.2A: LC Shipping List

Boiler Model Number		Channel Rail Bundle	Standard Sections (See Table 1.3 for Options)					Baffle Carton	Assembly Kit Ctns.		Flue Ctn.	Jacket Cartons (Tbl 1.4, 1.5 Options)		
			Front	Back	Plain Interm.	1" LWCO Interm.	3" Tap. Interm.		Contents See Below Item 1		Contents See Below Item 2	Front/Rear Panels Hardware	Top/Side Panels Hardware Chamber Liner	
LC-04	Quantity	1	1	1	1	1		1	1		1	1	1	
	Part No.		LC-1013	LC-1016	LC-1000	LC-1000-1		LC-1023	LC-1022		LC-5004	LC-6016	LC-6017	
	Label							LC-04	A		A		A	
	Stock Code	90160	86010	86018	86004	86005		85004	86050		86040	86030	86031	
LC-05R	Quantity	1	1	1	2	1		1	1		1	1	1	
	Part No.		LC-1013	LC-1016	LC-1000	LC-1000-1		LC-1023	LC-1022-1		LC-5004	LC-6016	LC-6017-1	
	Label							LC-05	B		A		B	
	Stock Code	90161	86010	86018	86004	86005		85105	86051		86040	86030	86032	
LC-05	Quantity	1	1	1	2	1		1	1		1	1	1	
	Part No.		LC-1013	LC-1016	LC-1000	LC-1000-1		LC-1023-1	LC-1022-1		LC-5004	LC-6016	LC-6017-1	
	Label							LC-05	B		A		B	
	Stock Code	90161	86010	86018	86004	86005		85005	86051		86040	86030	86032	
LC-06	Quantity	1	1	1	3	1		1	1		1	1	1	
	Part No.		LC-1013	LC-1016	LC-1000	LC-1000-1		LC-1023-2	LC-1022-2		LC-5004-1	LC-6016	LC-6017-2	
	Label							LC-06	C		B		C	
	Stock Code	90162	86010	86018	86004	86005		85006	86052		86041	86030	86033	
LC-07	Quantity	1	1	1	4	1		1	1		1	1	1	
	Part No.		LC-1013	LC-1016	LC-1000	LC-1000-1		LC-1023-3	LC-1022-3		LC-5004-1	LC-6016	LC-6017-3	
	Label							LC-07	D		B		D	
	Stock Code	90163	86010	86018	86004	86005		85007	86053		86041	86030	86034	
LC-08	Quantity	1	1	1	4	1		1	1	1	1	1	1	1
	Part No.		LC-1013	LC-1016	LC-1000	LC-1000-1		LC-1023-4	LC-1022	LC-1022-1	LC-5004-1	LC-6016	LC-6017	LC-6017-1
	Label							LC-08	A	B	B		A	B
	Stock Code	90164	86010	86018	86004	86005		85008	86050	86051	86041	86030	86031	86032
LC-09	Quantity	1	1	1	5	1		1	2		1	1	2	
	Part No.		LC-1013	LC-1016	LC-1000	LC-1000-1		LC-1023-5	LC-1022-1		LC-5004-2	LC-6016	LC-6017-1	
	Label							LC-09	B		C		B	
	Stock Code	90165	86010	86018	86004	86005		85009	86051		86042	86030	86032	
LC-10	Quantity	1	1	1	6	1		1	1	1	1	1	1	1
	Part No.		LC-1013	LC-1016	LC-1000	LC-1000-1		LC-1023-6	LC-1022-1	LC-1022-2	LC-5004-2	LC-6016	LC-6017-1	LC-6017-2
	Label							LC-10	B	C	C		B	C
	Stock Code	90166	86010	86018	86004	86005		85010	86051	86052	86042	86030	86032	86033
LC-11	Quantity	1	1	1	7	1	1	1	2		1	1	2	
	Part No.		LC-1013	LC-1016	LC-1000	LC-1000-1	LC-1015	LC-1023-7	LC-1022-2		LC-5004-2	LC-6016	LC-6017-2	
	Label							LC-11	C		C		C	
	Stock Code	90167	86010	86018	86004	86005	86016	85011	86052		86042	86030	86033	
LC-12	Quantity	1	1	1	8	1	1	1	1	1	1	1	1	1
	Part No.		LC-1013	LC-1016	LC-1000	LC-1000-1	LC-1015	LC-1023-8	LC-1022-2	LC-1022-3	LC-5004-2	LC-6016	LC-6017-2	LC-6017-3
	Label							LC-12	C	D	C		C	D
	Stock Code	90168	86010	86018	86004	86005	86016	85012	86052	86053	86042	86030	86033	86034

1 Assembly Kit Cartons Contents: Flow Port Gaskets, Silicone Sealant, Tie Rods, Washers, Tie Rod Nuts, Section Seal Rope, Spray Adhesive, Cleanout Plates, Mounting Hardware

2 Flue Box Carton Contents: Flue Box, Seal Rope, Observation Assembly, Coil Cover Plates, Cover Plate Gaskets, Mounting Hardware

Table 1.2B: LCE Shipping List

Boiler Model Number		Channel Rail Bundle	Standard Sections (See Table 1.3 for Options)						Baffle Carton	Assembly Kit Cartons				Flue Ctn.	Jacket Cartons (See Table 1.4 for Options)				Draft Damper	Lbl. Ctn.
			Front	Top Flue Interm.	1" LWCO Interm.	3" Tap. Interm.	Plain Interm.	Back		Flow Port Gaskets, Silicone Sealant, Tie Rods, Washers, Tie Rod Nuts, Section Seal Rope, Rope Adhesive or Spray Adhesive, Cleanout Plates, Mounting Hardware				Contents See Below Item 1	Front/Rear Panels Hardware	Top/Side Panels Hardware Chamber Liner				Rating Label
LCE-13	Quantity	2	1	3	1	1	6	1		1	1			1	1	1	1	1	1	1
	Part No.		LC-1013	LCE-1056	LC-1000-1	LC-1015	LC-1000	LC-1016						LC-5011	LCE-6016	LC-6017	LC-6017-1	LCE-6023	S-5007-3	LCE-8028
	Label									C	E			D		A	B	E	A	
	Stock Code	90169	86010	86100	86005	86016	86004	86018		86052	86054			86043	86030	86031	86032	86094	90523	85013
LCE-14	Quantity	2	1	3	1	2	6	1		1	1			1	1	2		1	1	1
	Part No.		LC-1013	LCE-1056	LC-1000-1	LC-1015	LC-1000	LC-1016						LC-5011	LCE-6016	LC-6017-1		LCE-6023	S-5007-3	LCE-8028-1
	Label									D	E			D		B		E	A	
	Stock Code	90162	86010	86100	86005	86016	86004	86018		86053	86054			86043	86030	86032		86094	90523	85014
LCE-15	Quantity	2	1	3	1	2	7	1		1	1	1		1	1	1	1	1	1	1
	Part No.		LC-1013	LCE-1056	LC-1000-1	LC-1015	LC-1000	LC-1016						LC-5011	LCE-6016	LC-6017-1	LC-6017-2	LCE-6023	S-5007-3	LCE-8028-2
	Label									A	B	E		D		B	C	E	A	
	Stock Code	90163	86010	86100	86005	86016	86004	86018		86050	86051	86054		86043	86030	86032	86033	86094	90523	85015
LCE-16	Quantity	2	1	3	1	2	8	1		2	1			1	1	2		1	1	1
	Part No.		LC-1013	LCE-1056	LC-1000-1	LC-1015	LC-1000	LC-1016						LC-5011	LCE-6016	LC-6017-2		LCE-6023	S-5007-3	LCE-8028-3
	Label									B	E			D		C		E	A	
	Stock Code	90163	86010	86100	86005	86016	86004	86018		86051	86054			86043	86030	86033		86094	90523	85016
LCE-17	Quantity	2	1	3	1	3	8	1		1	1	1		1	1	1	2	1	1	1
	Part No.		LC-1013	LCE-1056	LC-1000-1	LC-1015	LC-1000	LC-1016						LC-5011	LCE-6016	LC-6017	LC-6017-1	LCE-6023	S-5007-3	LCE-8028-4
	Label									B	C	E		D		A	B	E	A	
	Stock Code	90164	86010	86100	86005	86016	86004	86018		86051	86052	86054		86043	86030	86031	86032	86094	90523	85017
LCE-18	Quantity	2	1	3	1	3	9	1		2	1			1	1	3		1	1	1
	Part No.		LC-1013	LCE-1056	LC-1000-1	LC-1015	LC-1000	LC-1016						LC-5012	LCE-6016	LC-6017-1		LCE-6023	S-5007-4	LCE-8028-5
	Label									C	E			E		B		E	B	
	Stock Code	90164	86010	86100	86005	86016	86004	86018		86052	86054			86044	86030	86032		86094	90524	85018
LCE-19	Quantity	2	1	3	1	3	10	1		1	1	1		1	1	2	1	1	1	1
	Part No.		LC-1013	LCE-1056	LC-1000-1	LC-1015	LC-1000	LC-1016						LC-5012	LCE-6016	LC-6017-1	LC-6017-2	LCE-6023	S-5007-4	LCE-8028-6
	Label									C	D	E		E		B	C	E	B	
	Stock Code	90165	86010	86100	86005	86016	86004	86018		86052	86053	86054		86044	86030	86032	86033	86094	90524	85019
LCE-20	Quantity	2	1	3	1	4	10	1		2	1			1	1	2	2	1	1	1
	Part No.		LC-1013	LCE-1056	LC-1000-1	LC-1015	LC-1000	LC-1016						LC-5012	LCE-6016	LC-6017	LC-6017-1	LCE-6023	S-5007-4	LCE-8028-7
	Label									D	E			E		A	B	E	B	
	Stock Code	90165	86010	86100	86005	86016	86004	86018		86053	86054			86044	86030	86031	86032	86094	90524	85020
LCE-21	Quantity	2	1	3	1	4	11	1	1	1	1	1	1	1	1	1	3	1	1	1
	Part No.		LC-1013	LCE-1056	LC-1000-1	LC-1015	LC-1000	LC-1016	LCE-1074					LC-5012	LCE-6016	LC-6017	LC-6017-1	LCE-6023	S-5007-4	LCE-8028-8
	Label									A	B	D	E	E		A	B	E	B	
	Stock Code	90166	86010	86100	86005	86016	86004	86018	86113	86050	86051	86053	86054	86044	86030	86031	86032	86094	90524	85021
LCE-22	Quantity	2	1	3	1	4	12	1	1	2	1	1		1	1	4		1	1	1
	Part No.		LC-1013	LCE-1056	LC-1000-1	LC-1015	LC-1000	LC-1016	LCE-1074					LC-5012	LCE-6016	LC-6017-1		LCE-6023	S-5007-4	LCE-8028-9
	Label									B	D	E		E		B		E	B	
	Stock Code	90166	86010	86100	86005	86016	86004	86018	86113	86051	86053	86054		86044	86030	86032		86094	90524	85022
LCE-23	Quantity	2	1	3	1	4	13	1	1	1	1	1	1	1	1	3	1	1	1	1
	Part No.		LC-1013	LCE-1056	LC-1000-1	LC-1015	LC-1000	LC-1016	LCE-1074					LC-5012	LCE-6016	LC-6017-1	LC-6017-2	LCE-6023	S-5007-4	LCE-8028-10
	Label									B	C	D	E	E		B	C	E	B	
	Stock Code	90167	86010	86100	86005	86016	86004	86018	86113	86051	86052	86053	86054	86044	86030	86032	86033	86094	90524	85023
LCE-24	Quantity	2	1	3	1	4	14	1	1	2	1	1		1	1	2	2	1	1	1
	Part No.		LC-1013	LCE-1056	LC-1000-1	LC-1015	LC-1000	LC-1016	LCE-1074					LC-5012	LCE-6016	LC-6017-1	LC-6017-2	LCE-6023	S-5007-4	LCE-8028-11
	Label									C	D	E		E		B	C	E	B	
	Stock Code	90167	86010	86100	86005	86016	86004	86018	86113	86052	86053	86054		86044	86030	86032	86033	86094	90524	85024

1 Flue Box Carton Contents: Top Flue Plate, Rear Flue Cover, Seal Rope, Observation Assembly, Coil Cover Plates, Cover Plate, Gaskets, Mounting Hardware

Table 1.3: Standard and Optional Sections for Knockdown Boilers

Sections	15 psig Steam MAWP			
	Standard		w/Inspection Tappings	
	Part #	Stock Code	Part #	ITP Stock Code
Front	LC-1001	86000	LC-1013	86010
Intermediate	LC-1000	86004	LC-1014	86014
LWCO Intermediate	LC-1000-1	86005	LC-1014-2	86092
Top Flue Intermediate	LCE-1056	86100	LCE-1064	86110
3" Tapped Intermediate	LC-1003	86008	LC-1015	86016
Closed Back	LC-1007	86022	LC-1016	86018
Coil Back	LC-1002	86036	LC-1017	86026

Table 1.4: Standard and Optional Jacket Cartons, Top/Side Panels

Jacket Label	Standard (No Inspection Tappings)	With Inspection Tappings
A	86031	86101
B	86032	86102
C	86033	86103
D	86034	86104
E	86094	86097

Note: Boilers with inspection tappings in front and back sections only use standard cartons.

Table 1.5A: Burner Mounting Plates

Model		Boiler Model									
		LC-04	LC-05R	LC-05	LC-06	LC-07	LC-08	LC-09	LC-10	LC-11	LC-12
Beckett	CF-800	86070*	86070*								
	CF-1400			86069*	86069*	86069*					
	CF-2300						86074*	86074*	86074*	86074*	86074*
	CG-10	86085									
	CG-15		86074	86074	86074	86074					
	CG-25						86074	86074	86074	86074	86074
Carlin	301CRD	86070*	86070*								
	702CRD			86069*	86069*	86069*	86069*				
	801CRD							86073	86073	86073	86073
Power Flame	C1	86071	86071	86071	86071	86071					
	C2						86076	86076	86076	86076	86076
	J15A	86072	86072								
	J30A			86072	86072	86072					
	J50A						86077	86077	86077	86077	
Webster	JB1	86071	86071	86071	86071	86071	86075	86075	86075	86075	86075

* Standard Burner Mounting Plate

Table 1.5B: Burner Mounting Plates

Model		Boiler Model											
		LCE-13	LCE-14	LCE-15	LCE-16	LCE-17	LCE-18	LCE-19	LCE-20	LCE-21	LCE-22	LCE-23	LCE-24
Beckett	CF2300AKG	80674*										Not Available	
	CF2300AKB		86083*	86083*									
	CF2500				86074*	86074*							
	CF3500AKM						86083*	86083*	86083*				
	CF3500AKL									86080*	86080*		
	CG-50	86083	86083	86083	86083	86083	86083	86083	86083	86083	86083	86083	N/A
Carlin	801CRD	86073	86073										N/A
	1050FFD			86086	86086								
	1150FFD					86087	86087	86087	86087	86087	86087	86087	
Power Flame	C2	86076	86076	86076									
	C3				86080	86080	86080	86080	86080	86080	86080	86080	86080
Webster	JB2	86081	86081	86081	86081	86081	86081	86081	86081	86081	86081	86081	86081

* Standard Burner Mounting Plate

Table 1.6: Trim Cartons

Model	Stock Code	Label
LC-04	87000	A
LC-05R	87000	A
LC-05	87000	A
LC-06	87000	A
LC-07	87000	A
LC-08	87000	A
LC-09	87001	B
LC-10	87001	B
LC-11	87001	B
LC-12	87001	B
LCE-13	87002	C
LCE-14	87002	C
LCE-15	87002	C
LCE-16	87002	C
LCE-17	87003	D
LCE-18	87003	D
LCE-19	87003	D
LCE-20	87003	D
LCE-21	87003	D
LCE-22	87003	D
LCE-23	87004	E
LCE-24	87004	E

1 Safety Relief Valve selection based on capacity determined by boiler output (Gross I=B=R Output). Applies to most locations in United States and Canada.

Table 1.7: Control Cartons

Model	Stock Code	Label
LC-04 Through LCE-24	88511	Steam

2. PLACE THE BOILER

A. PACKAGED BOILER

1. Remove crate top and sides. Remove any loose cartons. Remove burner support pedestal and nipple, if supplied
2. Lift boiler off crate pallet. Move to location determined in Chapter 1: Preinstallation.
3. Remove lifting frame and hardware.
4. Re-install burner support pedestal and nipple if necessary.
5. Proceed to Chapter 3: Piping the Boiler.

B. ASSEMBLED BLOCK BOILER

1. Move block to location determined in Chapter 1: Preinstallation.
2. Remove lifting frame and hardware.
3. Proceed to Section D: Install Coils or Plates

C. KNOCKDOWN BOILER

1. Place channel rails as shown in Figure 1.4.
2. Open the Section Assembly Kit cartons. These cartons contain the parts needed for assembly of the sections.
3. Place the Back Section on the floor as shown in Figure 2.1.
4. The Back Section combustion chamber area is lined with a ceramic fiber blanket liner. Make sure the liner is in good condition. Minor tears are not a problem, but there should be no holes in the insulation.

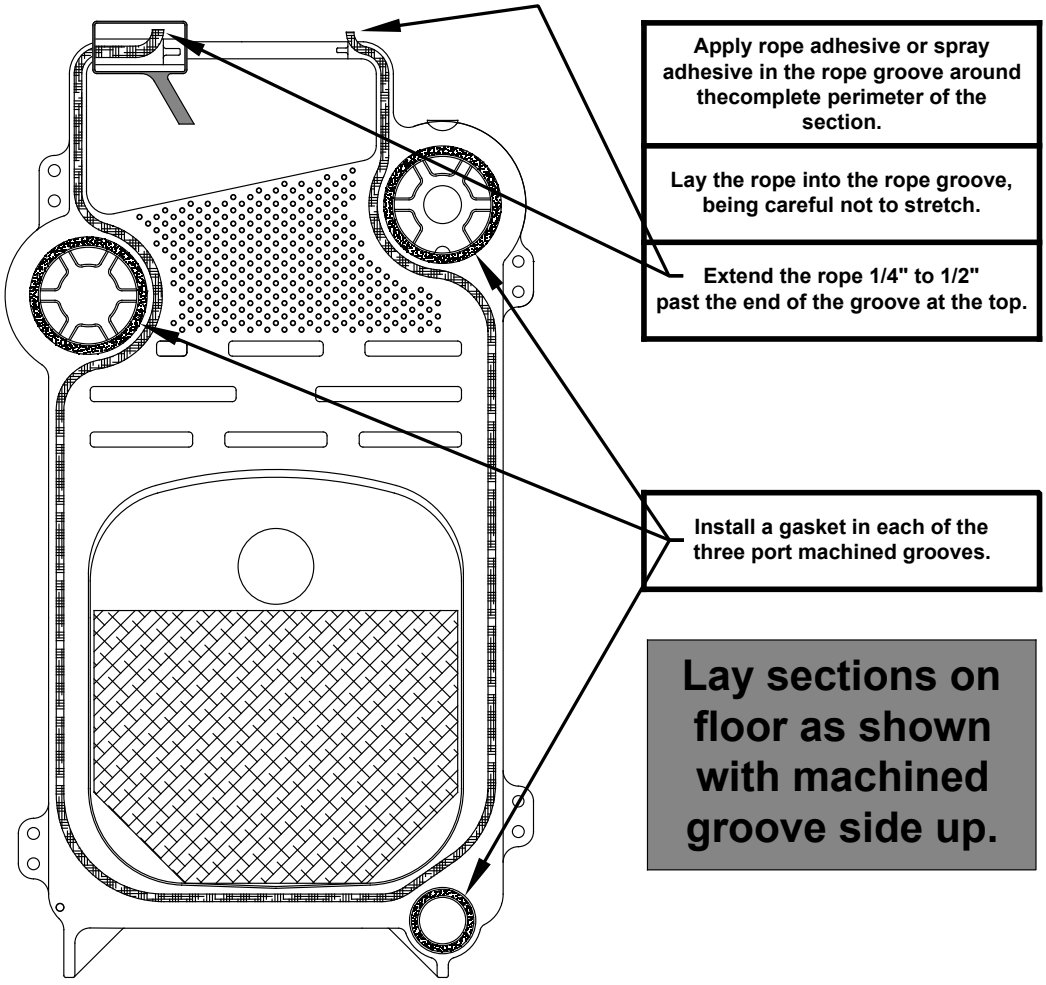

Figure 2.1: Lay Sections on Floor and Apply Rope Seal and Gaskets

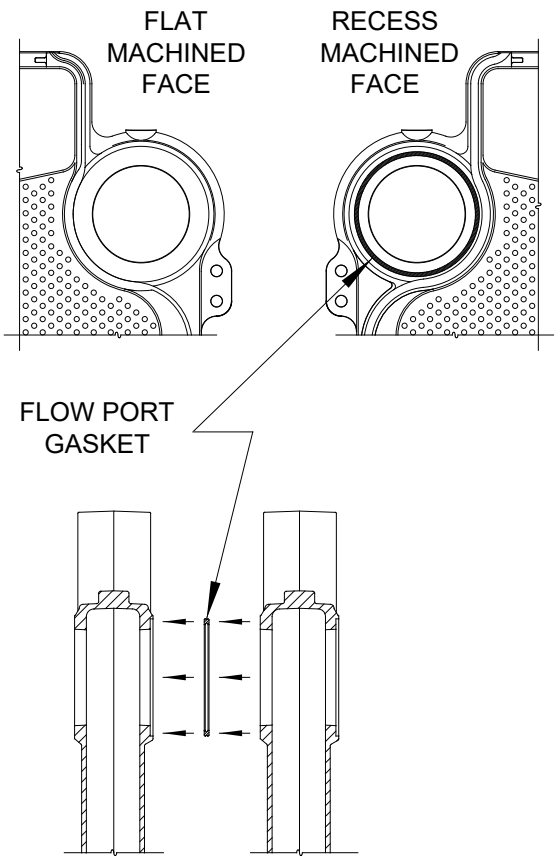

Figure 2.2: Flow Port Machining & Gasket

⚠ CAUTION

Gaskets will be damaged by petroleum or its derivatives. Completely remove all solvent residue before placing gaskets.

Do not use petroleum based compounds in the boiler.

5. Clean the area around the flow ports and in the seal recess. Use solvent and a clean cloth to thoroughly clean all of the sealing surfaces. Remove all foreign matter to assure a water tight seal when the sections are drawn together.
6. Place a Flow Port Gasket in each of the three flow port recesses as shown in Figures 2.1 and 2.2.
7. Apply rope adhesive or spray adhesive in the rope groove around the perimeter of the section. Variation in cast iron sections can cause areas of the rope seal to be under more or less compression. In areas where the rope is less compressed, use silicon sealant (provided) to seal those areas. Silicon sealant should be applied to the rope groove of the rear section in the area above the top nipple ports to aid in sealing the flue box as shown in Figure 2.3.
8. Place the sealing rope completely around the rope groove, being careful not to stretch the rope. Extend the rope from 1/4" to 1/2" past the end of the groove on both sides of the cleanout opening on the top of the section. This will assure a gas tight seal when the cleanout cover plate is applied.

⚠ WARNING

The sections are heavy and must be supported securely.

9. Apply a bead of silicone sealant around each flow port as shown in Figure 2.3. Do not get sealant on the flow port gaskets.
10. Lift up the Rear Section and move into position on the steel channels on the boiler foundation.
11. Screw a 3" pipe at least 30 inches long into the lower 3" tapping on the back of the Rear Section as shown in Figure 2.4. Place a block under the pipe as shown in the figure and use as a brace during assembly.
12. Place a Plain Intermediate Section on the floor and prepare as above.

13a. Silicon sealant should be applied to the rope groove of the rear section in the area above the top nipple ports to aid in sealing the flue box as shown in Figure 2.3.

13b. Carefully place the Intermediate Section against the Rear Section and visually line up the flow ports as close as possible.

14. Insert a tie rod with one nut and washer applied into each of the four tie rod lugs. See Figures 2.5 and 2.6.
15. Place the nut and washer on the other end of the tie rod and draw finger tight.

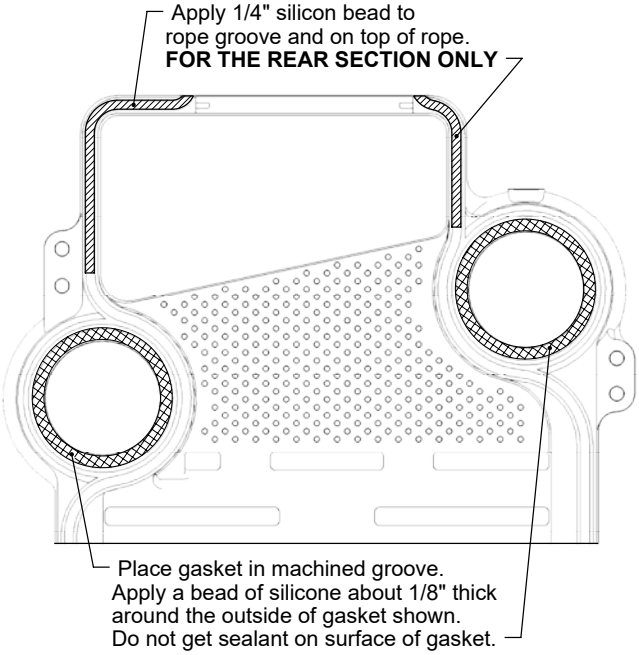

Figure 2.3: Apply Silcone Sealant

⚠ WARNING

SECTIONS ARE TOP HEAVY. HANDLE WITH CARE TO AVOID TIPPING OR FALLING.

LEVEL EACH SECTION:
PLACE THE FIRST INTERMEDIATE SECTION NEXT TO THE REAR SECTION AS SHOWN. USE A SPIRIT LEVEL TO MAKE SURE THE SECTIONS ARE PLUMB. CHECK THE LEVEL AS EACH ADDITIONAL INTERMEDIATE SECTION IS ADDED.

TEMPORARY PIPE SUPPORT:
SCREW A 3" NPT PIPE AT LEAST 30" LONG INTO LOWER RETURN TAPPING IN THE REAR SECTION.

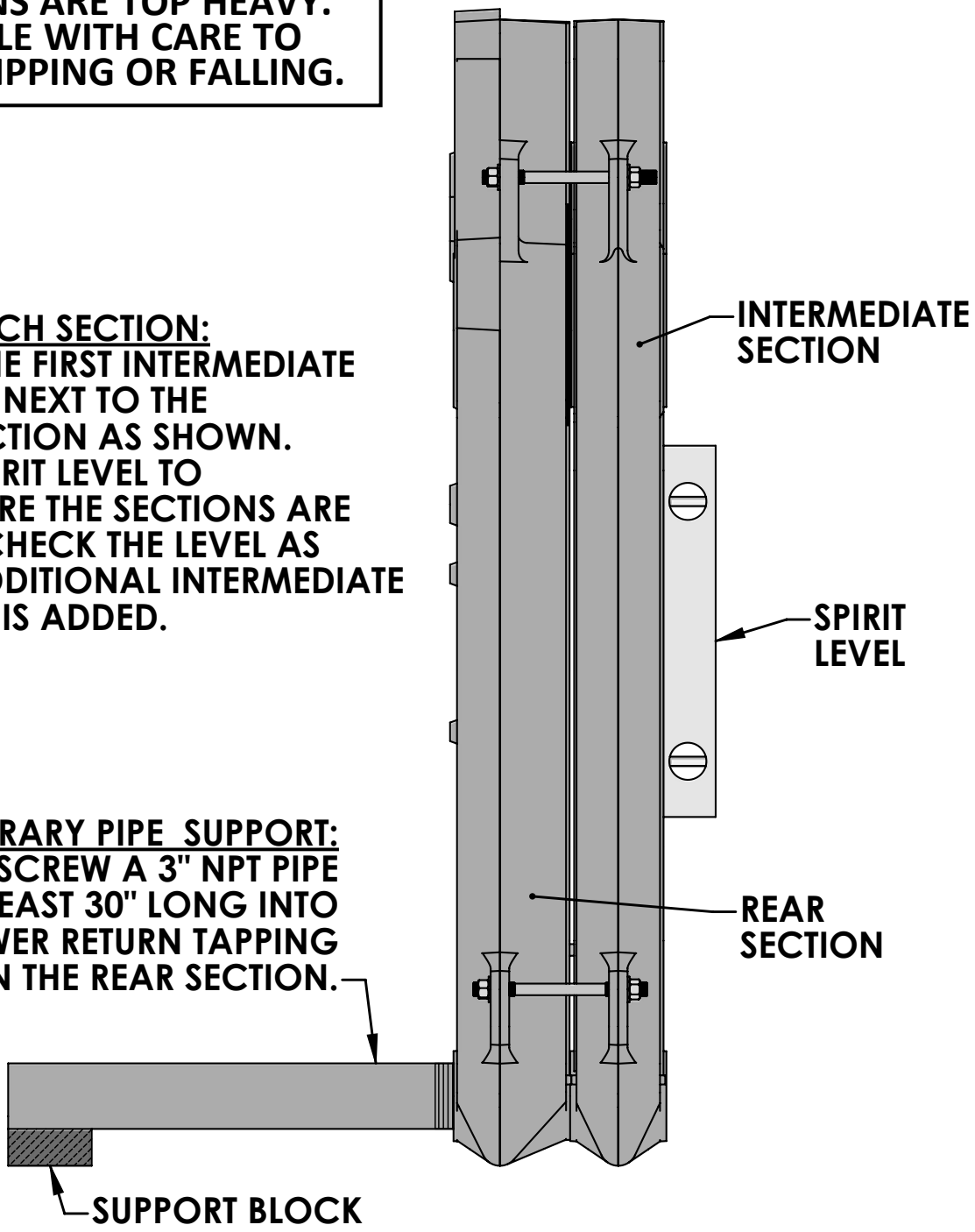

Figure 2.4: Install Additional Sections. Use level on each section as tie rod bolts are drawn up.

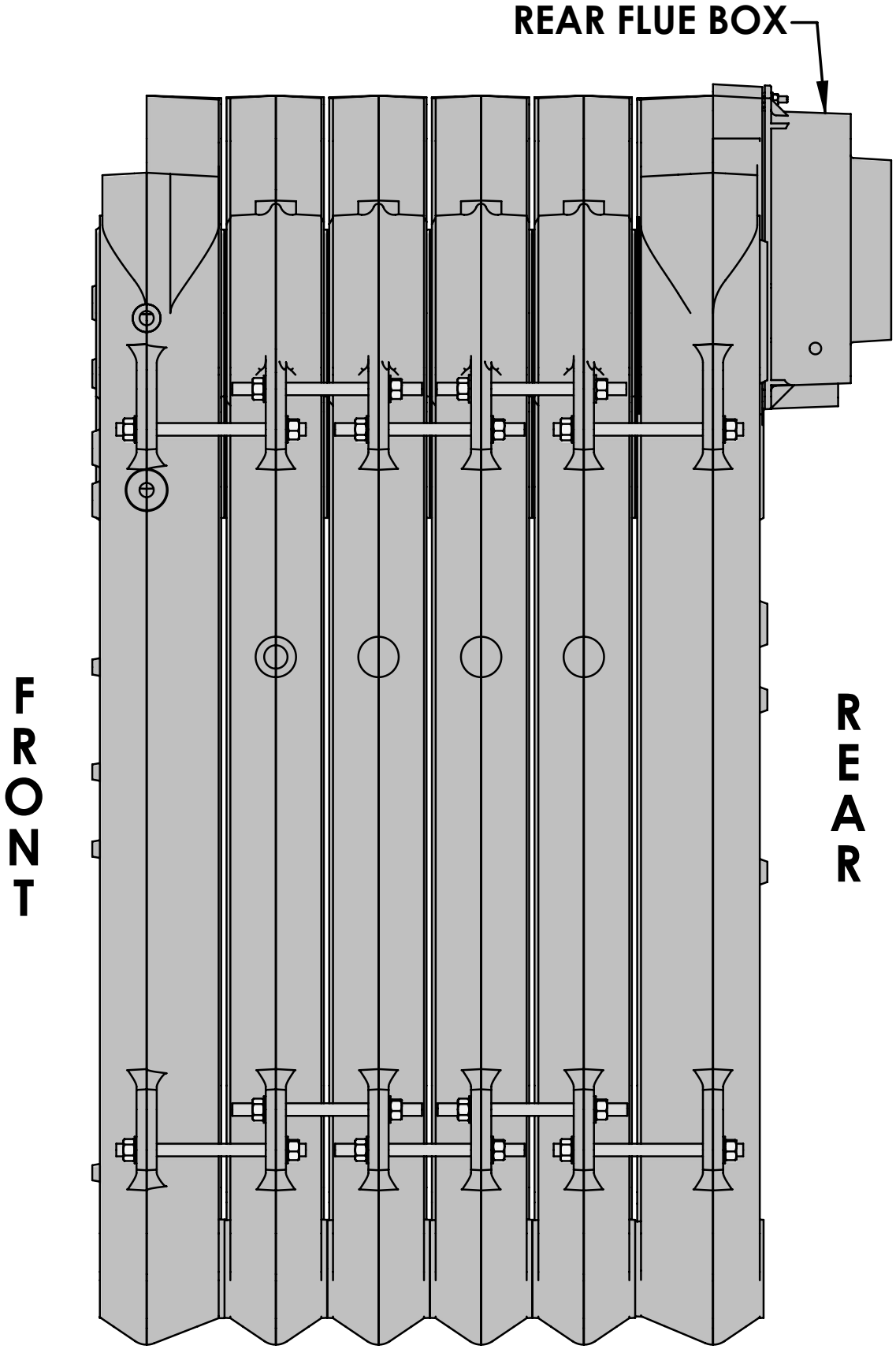

Figure 2.5: Series LC™ Boiler Assembly – Right Side View

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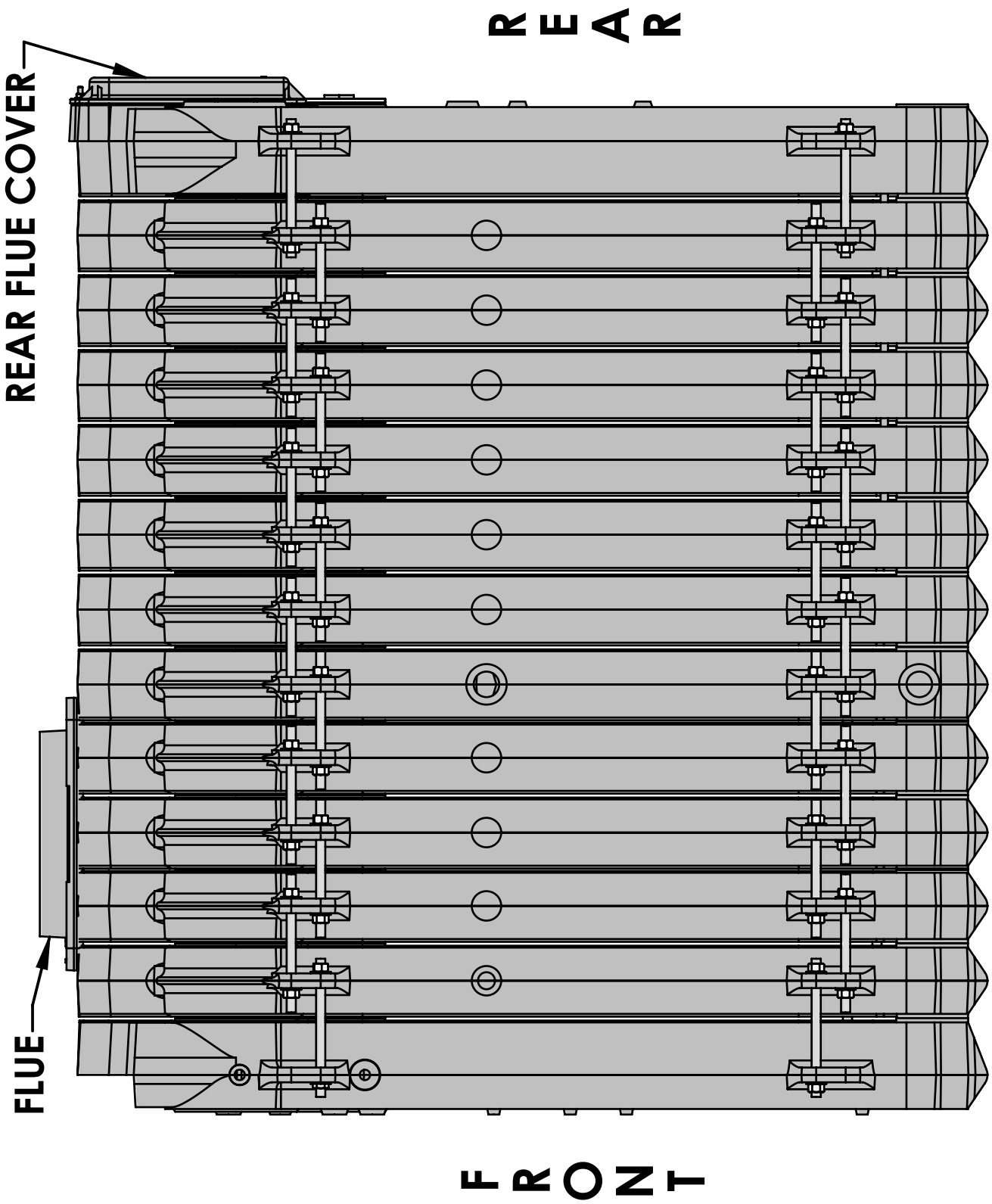


Figure 2.6: LCE Boiler Assembly – Right Side View

16. To properly assemble LC/LCE sections in the field, the following steps *must* be followed to ensure that no damage occurs to the tie rod lugs. A 0-100 ft-lbs torque wrench is required.
    a. Use a spirit level as shown in Figure 2.4 to check the alignment of the sections as the nuts are drawn up. Keep the sections plumb.
    b. Draw the sections together evenly, in three rotations. Torque each port to 20 ft-lbs for the first rotation, then to 40 ft-lbs for the second rotation, then to 60 ft-lbs for the third rotation. Use the following sequence until all three ports touch metal-to-metal at 60 ft-lbs. See Figure 2.7 for port reference.
        i) First: Lower Top Port
        ii) Second: Bottom Port
        iii) Third: Upper Top Port
    c. Tighten these (3) three locations only to a torque value of 60 ft-lbs. DO NOT EXCEED.
    d. After the three ports have been tightened to 60 ft-lbs, tighten the draw rod at the bumping pads until metal-to-metal contact is reached. This will assure a proper gas tight seal and prevent the products of combustion from migrating into the boiler room.

⚠ WARNING

Do not exceed the manufacturer's torque recommendations.

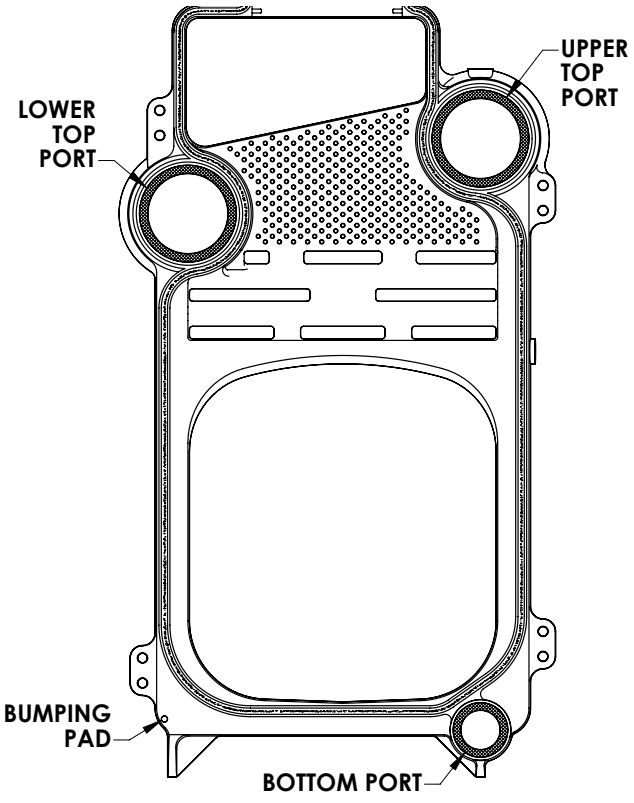


Figure 2.7: Torque Specification/Procedure

17. Repeat with the remaining sections.
    a. Save the LWCO Intermediate with two 1" tappings (for level control) for use as the section closest to the front section.
    b. Place the Intermediate Section with 3" top tapping (Tapped Intermediate) in the position given in Figure 2.9.
    c. LCE ONLY. Save the (3) Top Flue Outlet Intermediates (with wide opening in top of the flue collector) for use as the sections closest to the LWCO Intermediate Section. See Figure 2.9.
        i) The sequence from Front to Rear is:
            • Front Section
            • 1" Low Water Cut-off Intermediate
            • Three (3) Top Flue Outlet Intermediates
        ii) The remaining intermediate sections are 3" Tapped Intermediates or Plain Intermediates as shown in Figure 2.8 and Figure 2.9.

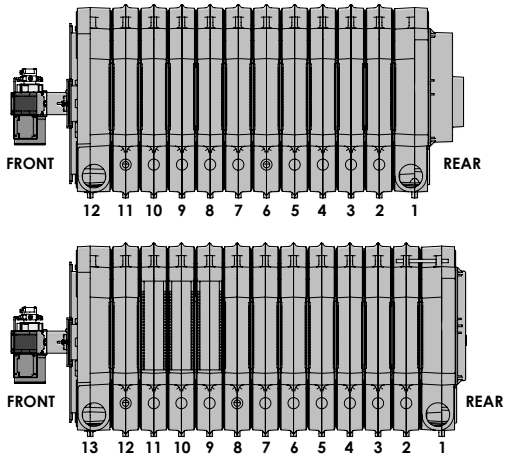


Figure 2.8: Section Positioning Numbering

Table 2.1: Section Numbering Sequence

Model	Place a Tapped Intermediate Section at Position (Numbered Rear to Front)
LC-04	NA
LC-05	NA
LC-06	NA
LC-07	NA
LC-08	NA
LC-09	NA
LC-10	NA
LC-11	6
LC-12	6
LCE-13	8
LCE-14	5, 9
LCE-15	6, 10
LCE-16	6, 11
LCE-17	5, 9, 12
LCE-18	5, 9, 13
LCE-19	5, 9, 14
LCE-20	5, 9, 12, 15
LCE-21	5, 9, 13, 16
LCE-22	5, 9, 13, 17
LCE-23	6, 10, 14, 18
LCE-24	6, 10, 14, 19

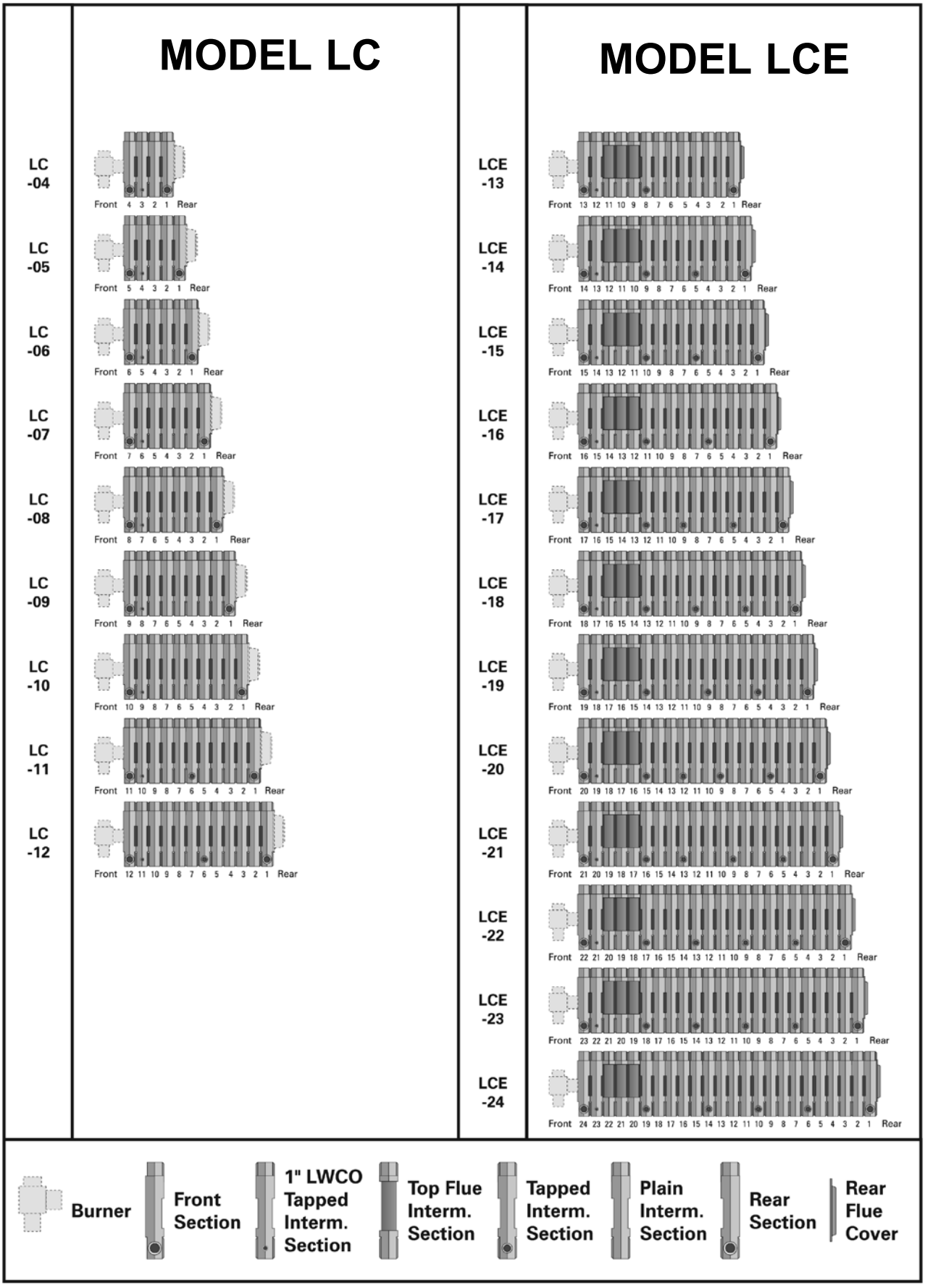


Figure 2.9: LC/LCE Boiler Section Assembly Sequence

D. INSTALL COILS OR PLATES

1. Remove the coil cover plates, gaskets and mounting hardware, located in the Flue Box Carton.
2. Place the cover plates and gaskets over any unused heater openings. Place the cover plate with two 3/4" NPT tappings on the upper flow port opening (Position #2) of the Front Section.
3. Install tankless heaters, if used, in openings #1 and #3. (Optional on Rear Section)
4. See Figure 2.10.
5. Steam boilers may have up to two coils installed when supplied with special tankless coil rear seciton.
6. Standard Rear Sections do not have a tankless opening (position #3). This is available only as optional construction. This special rear section is needed to install two coils on a steam boiler.

E. HYDROSTATIC TEST THE BOILER

1. Install a drain valve in the Rear Section, Tapping 13. See Figure 8.2.
2. Provide a water supply line to the boiler.
3. Plug all open tappings in the boiler.
4. Provide a means to vent air as the boiler fills.
5. Fill the boiler with water, venting air as water level rises.
6. Pressurize boiler to:
   - 45 psig
   - **DO NOT EXCEED THESE PRESSURES.**

   a) Maintain pressure while checking all joints and fittings for leaks.
7. After inspection is complete, drain the boiler and remove plugs from tappings that are to be used.

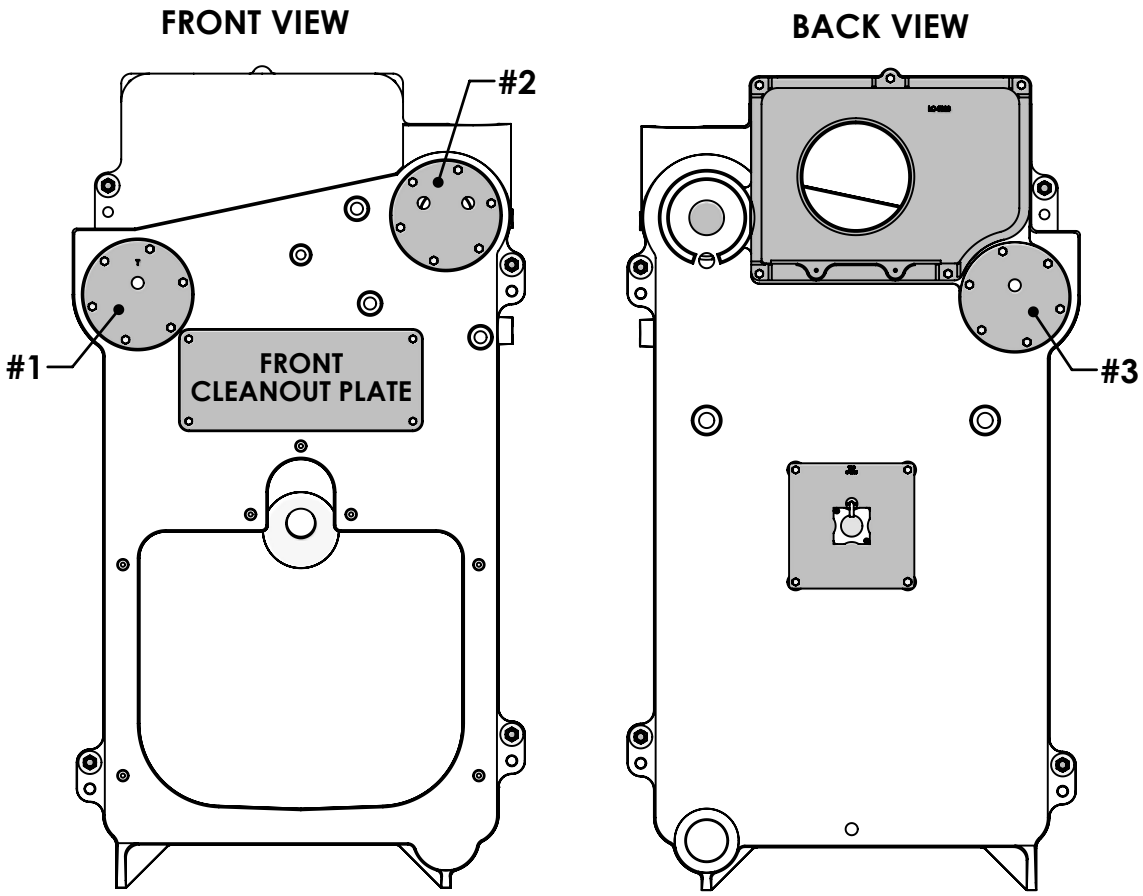


Figure 2.10: Tankless Coil Openings

Table 2.2: Tankless Coil Ratings

Model	Heater No. X-1020			Heater No. X-1022			Two Heaters No. X-1020			Two Heaters No. X-1022		
	GPM	Press. Drop PSI	Location	GPM	Press. Drop PSI	Location	GPM	Press. Drop PSI	Location	GPM	Press. Drop PSI	Location
LC-04	5.5	11	1	–	–	–	–	–	–	–	–	–
LC-05R	5.62	11	1	–	–	–	–	–	–	–	–	–
LC-05	5.75	12	1	–	–	–	–	–	–	–	–	–
LC-06	6.25	14	1	–	–	–	–	–	–	–	–	–
LC-07	6.5	15	1	13.0	27	1	–	–	–	–	–	–
LC-08	7.0	16	1	13.75	30	1	–	–	–	–	–	–
LC-09	7.25	17	1	14.5	33	1	14.5	17	1 & 3	–	–	–
LC-10	7.5	18	1	15.5	38	1	15.0	18	1 & 3	–	–	–
LC-11	8.0	20	1	16.5	43	1	16.0	20	1 & 3	–	–	–
LC-12	–	–	–	17.5	48	1	–	–	–	–	–	–
LCE-13	–	–	–	18.0	51	1	–	–	–	–	–	–
LCE-14	–	–	–	18.75	55	1	–	–	–	–	–	–
LCE-15	–	–	–	19.5	58	1	–	–	–	33.5	44	1 & 3
LCE-16	–	–	–	20	61	1	–	–	–	35.5	49	1 & 3
LCE-17	–	–	–	20	61	1	–	–	–	37.5	53	1 & 3
LCE-18	–	–	–	20	61	1	–	–	–	39.5	60	1 & 3
LCE-19	–	–	–	20	61	1	–	–	–	40	61	1 & 3
LCE-20	–	–	–	20	61	1	–	–	–	40	61	1 & 3
LCE-21	–	–	–	20	61	1	–	–	–	40	61	1 & 3
LCE-22	–	–	–	20	61	1	–	–	–	40	61	1 & 3
LCE-23	–	–	–	20	61	1	–	–	–	40	61	1 & 3
LCE-24	–	–	–	20	61	1	–	–	–	40	61	1 & 3

Above heater ratings are based on intermittent demand for water from 40˚F to 140˚F with 200˚F boiler water.

Steam boilers require a special rear section with coil opening in order to use two tankless heaters.

DANGER: Install mixing valve in hot water supply piping. Water temperature over 125°F can cause severe burns instantly or death from scalds.

F. APPLY CLEANOUT COVER PLATES

1. Apply the Cleanout Cover Plates on the tops of the section joints as shown in Figure 2.11.
2. Pre-assemble a steel flat washer and steel nut on the carriage bolts. Place a carriage bolt into each side of the cleanout opening as shown in the figure.
3. Tighten the lower nut securely.
4. Press the Cleanout Plate with insulation over the protruding carriage bolts until the insulation lays flush against the cast iron.
5. Apply a flat washer and brass nut to the carriage bolt. Draw the brass nuts down until the insulation presses firmly against the iron.

G. INSTALL FLUE COLLAR

1. (LC) Remove the Flue Collar and Rear Observation Door Assembly from the LC Rear Flue Box Carton. (LCE) Remove the Top Flue Outlet Plate, the Rear Flue Cover Plate and the Rear Observation Door Assembly from the LCE Top Flue Outlet Carton.
2. (LC) Attach the Flue Collar to the Back Section with 5/16" x 1½" studs, flat washers and hex nuts supplied. See Figure 2.12.
   (LCE) Attach the Rear Flue Cover Plate to the Rear Section with 5/16" x 1½" studs, flat washers and nuts supplied.
3. (LCE) Apply high tack adhesive or spray adhesive (supplied in Section Assembly Kits) to the rope groove on the bottom of the Top Flue Outlet Plate. Place the high temperature rope seal in the groove, overlapping at the ends for a good seal.
   a) Place the plate over the opening provided by the three top flue intermediate sections at the front of the boiler. NOTE: Top flue outlet plate is marked "FRONTt" for proper orientation.
   b) Secure the plate and compress using the 3/8" tie down assembly, nuts and washers provided. See Figure 2.13.
   c) Inspect the finished seal, particularly where the plate crosses the section joints.

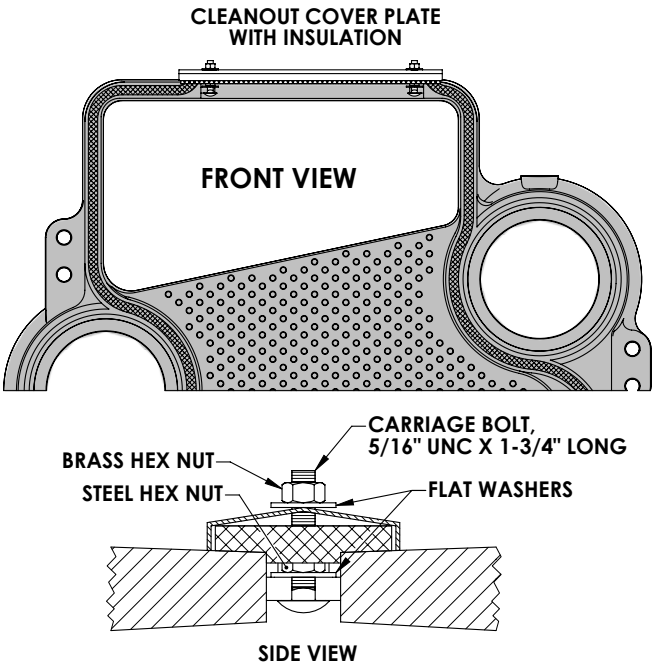


Figure 2.11: Install Cleanout Cover Plates

   d) The correct Top Flue Outlet Plate for the LCE boiler is:
      - LCE-13 thru LCE-17 use the 14" flue opening, part number LCE-5007, Carton D
      - LCE-18 thru LCE-24 use the 16" flue opening, part number LCE-5007-1, Carton E
4. Attach the Rear Observation Door to the Rear Section with four (4) 5/16"-18 x 3/4" hex head bolts provided.

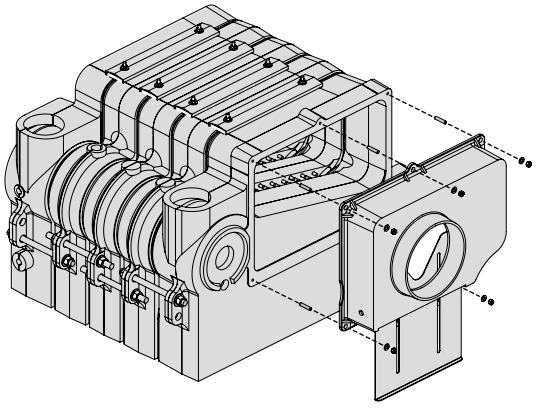


Figure 2.12: Rear Flue Collar Attachment

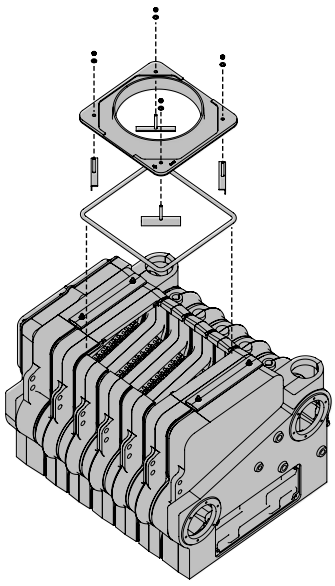


Figure 2.13: Top Flue Collar Attachment

H. INSTALL FLUE BAFFLES

1. Remove the Front Cleanout Plate from Front Section.
2. Open Baffles carton. Remove Baffles. For LC Only – Save Ceramic Fiber Liner for Section I. Save Rating Label for Chapter 4. Models LCE-13 through LCE-20 do not require baffles.
3. Place baffles as shown in Figure 2.14. Three of these are special stainless steel baffles, identified with a 1/4" hole punched in each end. These baffles must be placed in the lowest row of tubes.
4. Install the Front Cleanout Plate.

I. INSTALL CHAMBER LINER

1. (LCE) Remove Ceramic Fiber Liner from Jacket Carton E. Place the liner on the floor of the combustion chamber. Place the front end of the liner flush with the inside of the Front Section. The liner is 24 inches wide. It will not extend all the way to the rear of the boiler on all boiler sizes. No adhesive is required, just press the liner down firmly.

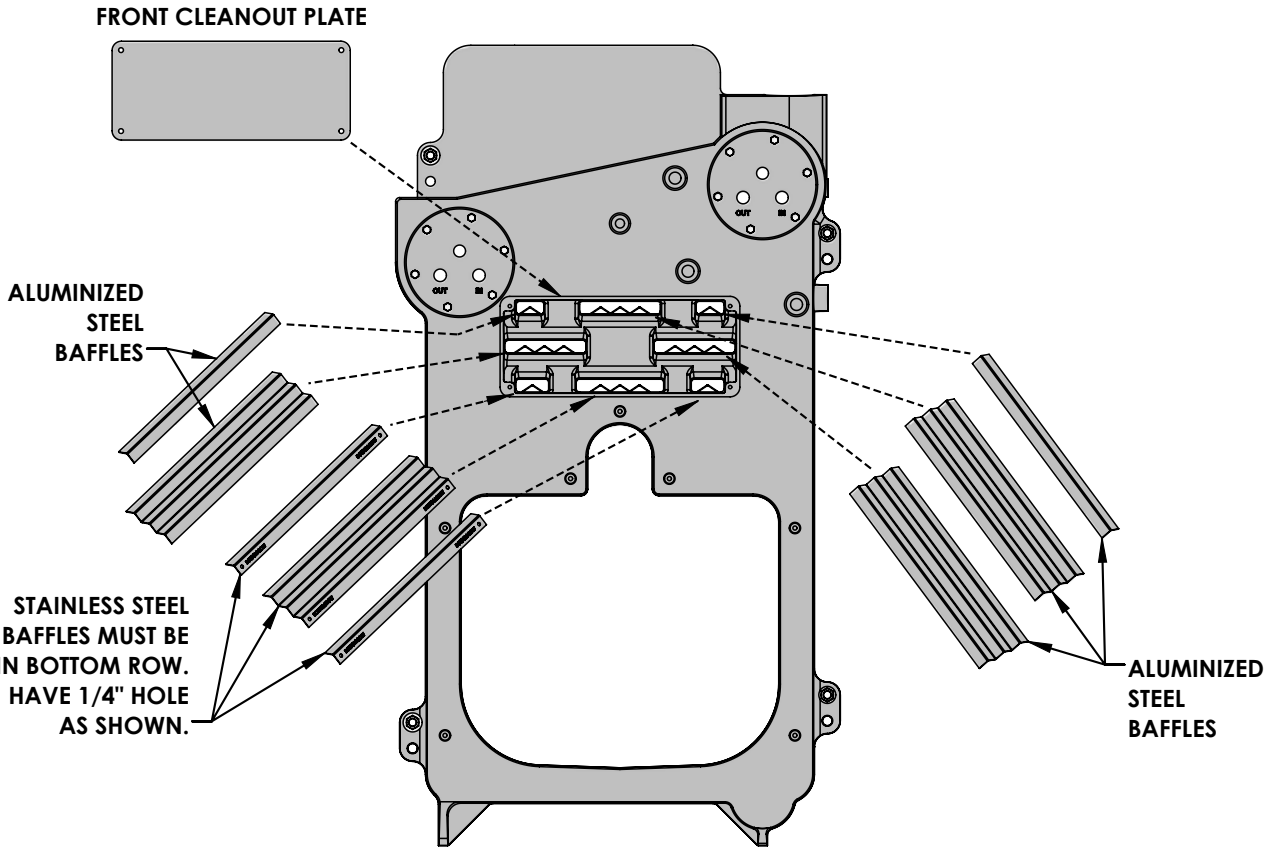


Figure 2.14: Flue Baffle Locations

3. PIPE THE BOILER

A. PREPARATION

1. The boiler must be pressure tested as outlined in the chapter “Place the Boiler Sections” of this manual.
2. The Supply and Return piping can be installed before installing the jacket. Use nipples long enough to extend through the jacket.

B. SUPPLY PIPING

1. See Figure 3.3 for piping illustration.
2. Install Top connections sized per Table 3.1.
   a) Model LC-04 requires one riser off the Rear Section. Plug the 4” tapping in the top of the Front Section.
   b) Models LC-05 through LC-10 require two risers, one off the Front and one off the Rear Section.
   c) Models LC-11 and LC-12 require three risers, one each off the Front and Rear Sections plus one off the Tapped Intermediate Section.
   d) LCE models require three or more risers.
3. Size the Header per Table 3.1. Pipe the header at least 24 inches above the normal boiler water line. See Figure 3.1. This is required to prevent water from carrying over into the header and then to the system.
4. Figure 3.3 shows the Supply and Return piping for Parallel Flow Gravity systems and all Pumped Return Systems.
5. Counterflow Gravity systems require the boiler steam line to **enter the top of the steam main**. See Figure 3.2 for this special case.
6. **Do not reduce the size or number of risers shown.** These are required for reliable operation of the boiler. If the risers are undersized or incorrectly placed, a sloped water line can occur in the boiler, causing possible overheating of some sections.
7. **Pipe the Header with an offset** as shown in the drawings. This offset prevents the expansion and contraction of the Header from damaging the boiler sections.
8. **Always locate the Steam Supply take-off between the Equalizer and the last Boiler Riser.** (See PB Heat, LLC’s “Steam Installation Survey” for discussion). Locating the steam supply between the risers will cause water carryover to the system.
9. Do not use a bull head tee to provide steam supply and equalizer connections. This will cause water level bounce and carryover.

C. RETURN PIPING

1. The use of a Hartford loop is recommended in all parallel flow installations. See Figure 3.1. The loop provides additional reliability for the system.
2. A check valve must still be installed on the pump discharge of all pumped return systems.

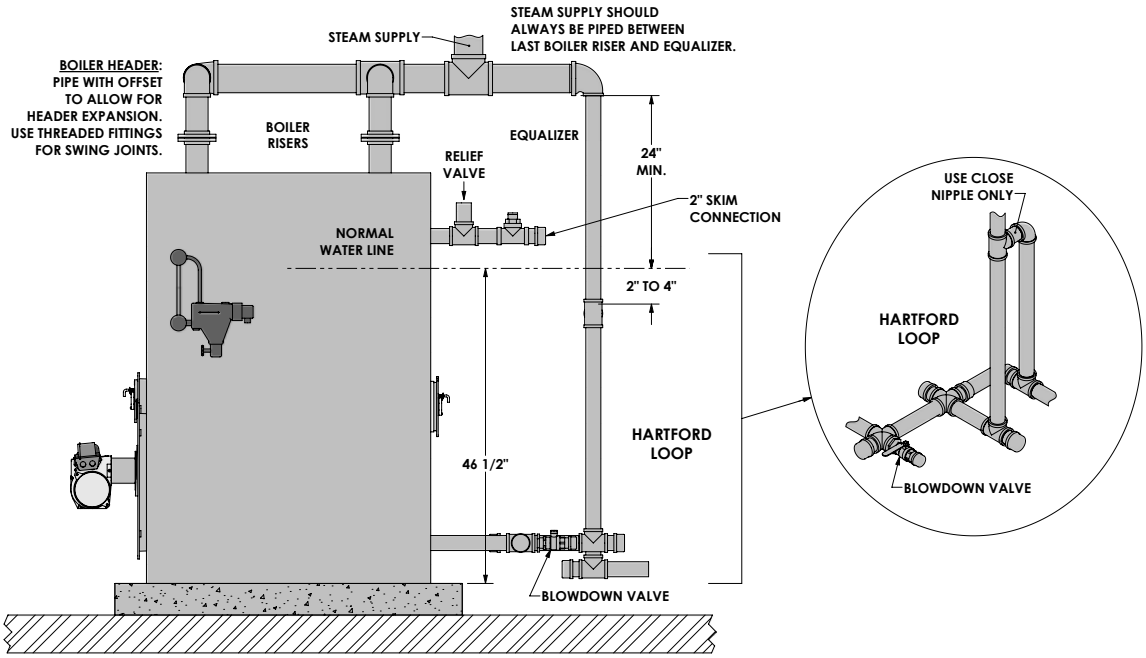


Figure 3.1: Supply and Return Connections, Skim Piping, Hartford Loop

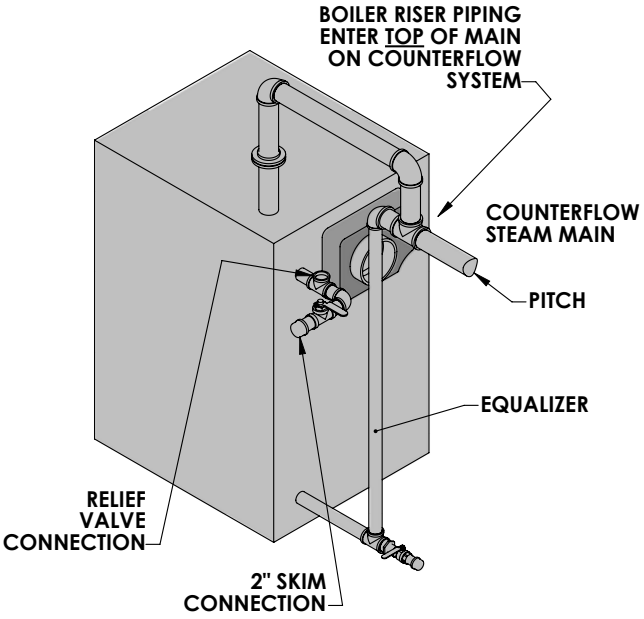


Figure 3.2: Supply and Return Piping – Counterflow Gravity Systems

3. On pumped return systems, install a boiler cock after the pump to allow throttling of the pump discharge. The pressure after the boiler cock should be no more than 5 psig above the boiler operating pressure. Pumping the water into the boiler too fast will cause collapse of the water level and level control problems.
4. Size the equalizer per Table 3.1. Models LC-11, LC-12 and LCE-13 through LCE 24 require two return connections to the boiler off of the equalizer line.
5. Pipe the Hartford loop tee so the inside top of the close nipple is 2 to 4 inches below the normal boiler water line. See Figure 3.1.
6. If the pump discharge is looped overhead, above the boiler water line, install spring-loaded check valves at both the pump discharge and the connection to the boiler return.

D. MULTIPLE BOILER INSTALLATIONS

1. Figure 3.4 shows typical piping for multiple boiler Gravity Return systems. Figure 3.5 show typical piping for multiple boiler Pumped Return Systems.
2. Provide separate feed lines for multiple boiler pumped return systems. Use either separate feed pumps or solenoid or motorized valves to isolate feeding of the boilers. This is needed to provide reliable level control and avoid nuisance performance problems.
3. Condensate return units are not effective for multiple boiler installations since they do not respond to the needs of the boilers. always use Boiler Feed Units.
4. Install a Float and Thermostatic trap at the boiler water level on each of the mulitple boilers on a pumped return system. This prevents flooding of idle boilers due to condensation of steam.

Table 3.1: Header, Risers & Equalizer Sizing

Model	Gross Output MBH	End Section Risers		Intermediate Section Risers		Equalizer (Inches)	Header Size (inches)
		Number	Size (inches)	Number	Size (inches)		
LC-04	547	1	4	–	–	2	4
LC-05R	649	2	3	–	–	2	5
LC-05	707	2	3	–	–	2	5
LC-06	868	2	4	–	–	2	5
LC-07	1029	2	4	–	–	2½	5
LC-08	1189	2	4	–	–	2½	6
LC-09	1350	2	4	–	–	2½	6
LC-10	1511	2	4	–	–	2½	6
LC-11	1672	2	4	1	3	3	6
LC-12	1832	2	4	1	3	3	6
LCE-13	1966	2	4	1	3	3	6
LCE-14	2125	2	4	2	3	3	8
LCE-15	2284	2	4	2	3	3	8
LCE-16	2444	2	4	2	3	3	8
LCE-17	2603	2	4	3	3	4	8
LCE-18	2763	2	4	3	3	4	8
LCE-19	2922	2	4	3	3	4	8
LCE-20	3082	2	4	4	3	4	8
LCE-21	3256	2	4	4	3	4	8
LCE-22	3430	2	4	4	3	4	8
LCE-23	3604	2	4	4	3	4	8
LCE-24	3777	2	4	4	3	4	8

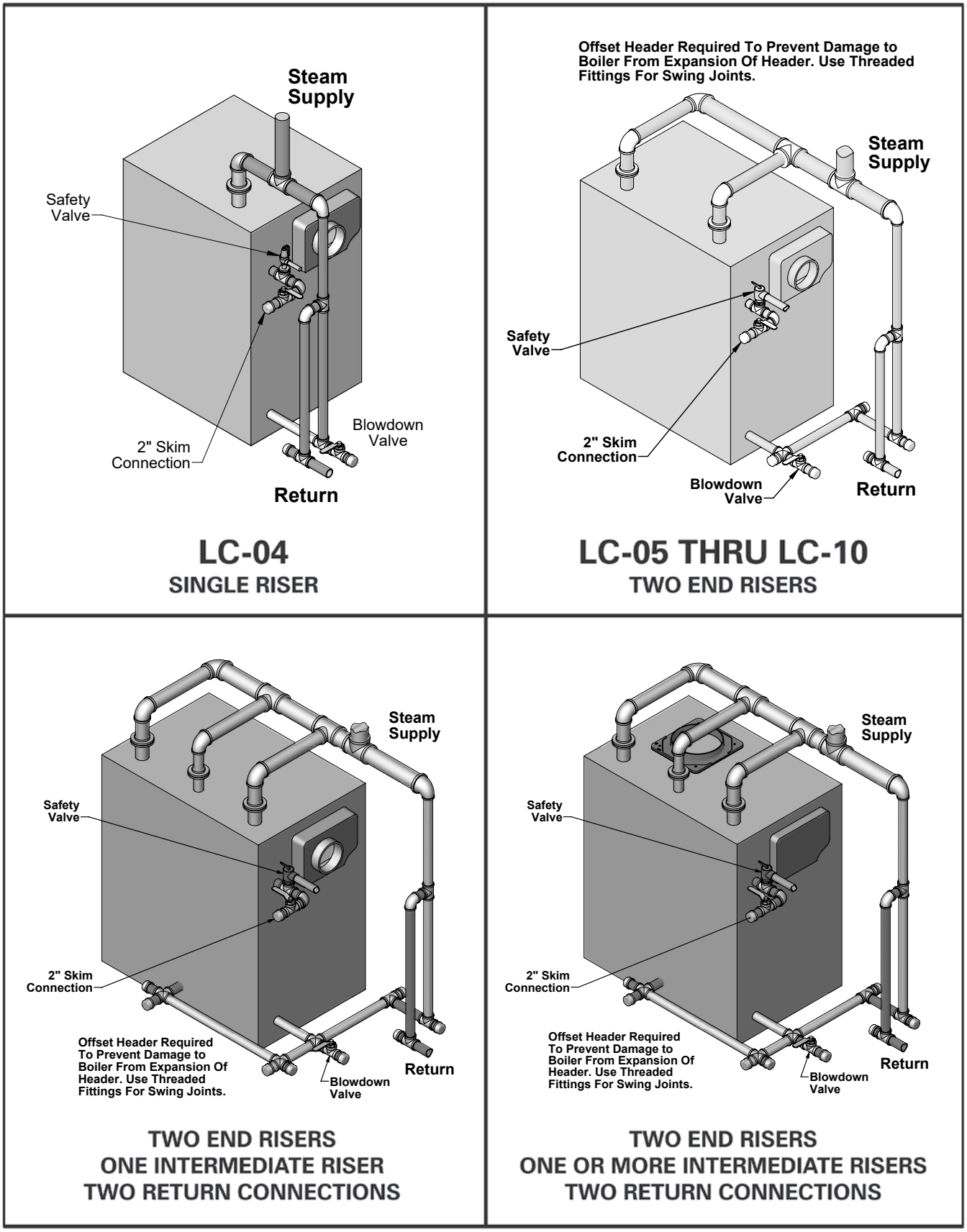


Figure 3.3: Supply and Return Piping – Pumped Return and Parallel Flow Gravity Systems

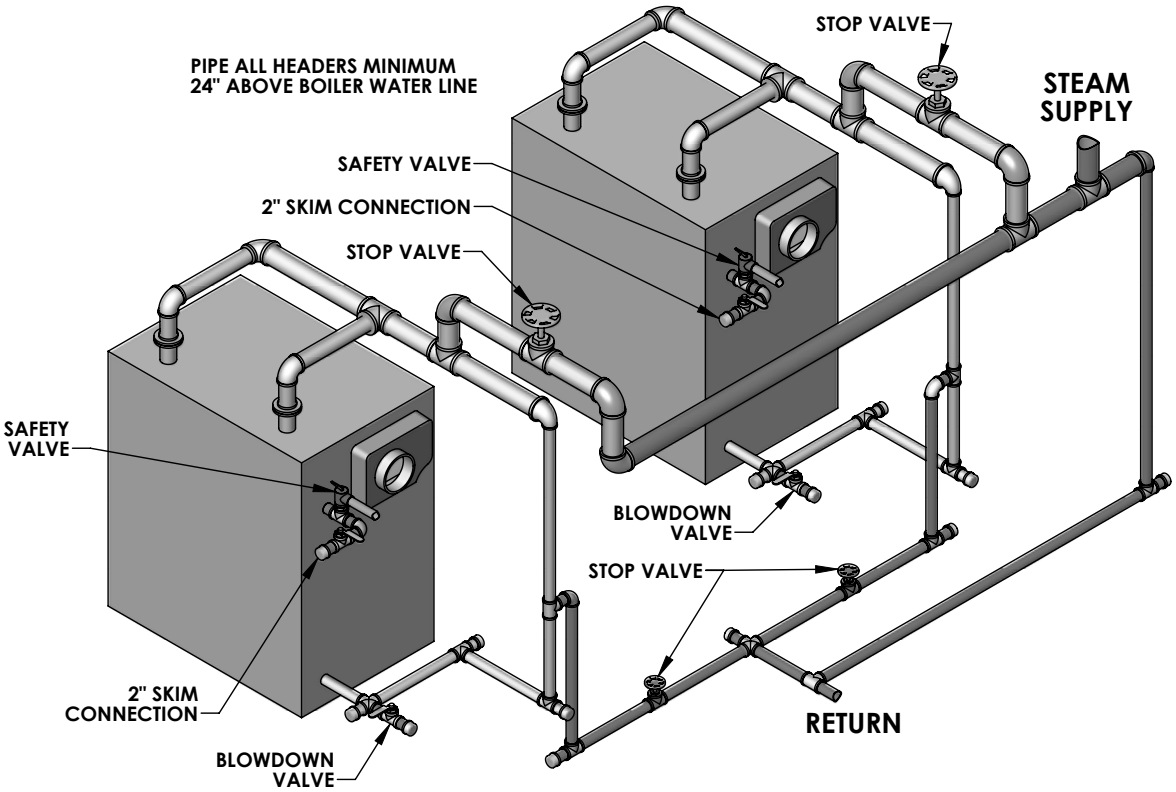


Figure 3.4: Piping Multiple Boilers, Typical, Gravity Return Systems

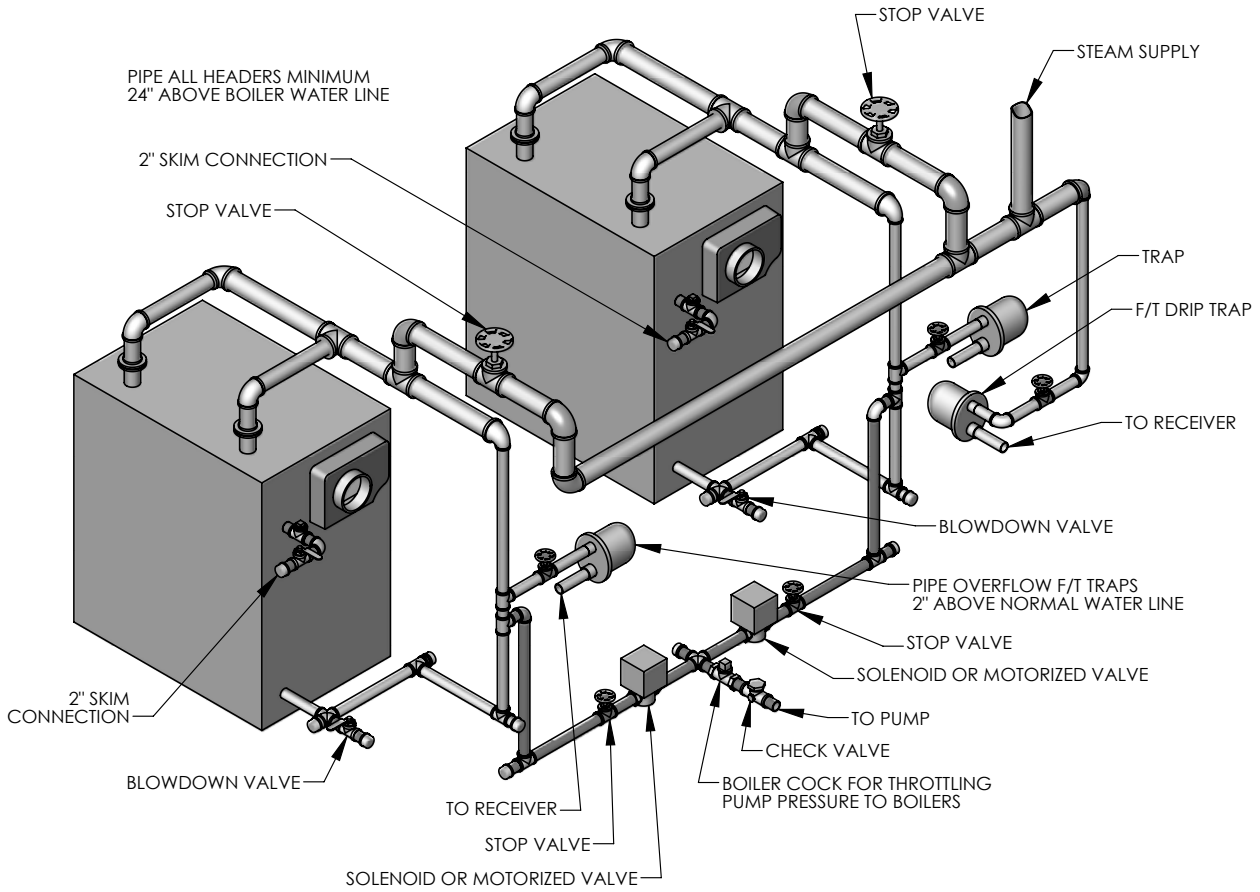


Figure 3.5: Piping Multiple Boilers, Typical, Pumped Return Systems

4. ASSEMBLE THE JACKET

A. PREPARE THE PARTS

1. Collect all the jacket cartons: **Jacket Front & Back Carton plus Jacket Side & Top Cartons**. See the Shipping List in the front of this manual for the jacket cartons required. The cartons contain the jacket parts and screws. The jacket panels are pre-insulated.
2. Remove all needed knockouts from the jacket parts before beginning assembly.

B. APPLY JACKET SIDES & CORNERS

1. See Figure 4.2 for details.
2. The Side Panels can be used on either side of the boiler.
3. Place the Jacket Side Panels on each side leaned against the Boiler Sections.
4. On Models LC-08 through LC-12, each side uses two panels. Place the panels so the seam is centered on the Tapped Intermediate Section. On LCE models, place panels in the sequence shown in Table 4.1.
5. On boilers with two or more Jacket Side Panels per side, join the panels together with #10 x 1/2" sheet metal screws. Also attach the Jacket Side Panel Reinforcing Angle inside the jacket at the bottom of the seam.
6. Attach the Left Front Corner Panel to the Left Side Panel with #10 x 1/2" sheet metal screws.
7. Attach the Right Front Corner Panel to the Right Side Panel with #10 x 1/2" sheet metal screws.

C. APPLY JACKET FRONT PANELS

1. Attach the Upper Front Panel to the Right and Left Front Corner Panels with #10 x 1/2" sheet metal screws.
2. Attach the Middle Front Panel and Lower Front Rail in the same manner.
3. Position the Jacket Assembly with the front panels pushed up against the front section. You will need the jacket in this position to install the Burner Mounting Plate.

Table 4.1: Jacket Top & Side Panel Placement

Model	Locate Jacket Top and Side Panels in the Position Below (Numbers are from Rear to Front)				
	5 (Front)	4	3	2	1 (Rear)
LCE-13	–	–	E	B	A
LCE-14	–	–	E	B	B
LCE-15	–	–	E	B	C
LCE-16	–	–	E	C	C
LCE-17	–	E	A	B	B
LCE-18	–	E	B	B	B
LCE-19	–	E	C	B	B
LCE-20	E	A	A	B	B
LCE-21	E	A	B	B	B
LCE-22	E	B	B	B	B
LCE-23	E	B	B	B	C
LCE-24	E	C	B	B	C

D. APPLY JACKET REAR PANEL

1. Attach the Rear Jacket Panel to the Jacket Side Panels with #10 x 1/2" sheet metal screws.

E. APPLY JACKET TOP PANELS

1. Attach the Top Front Panel to the Sides and Upper Front Panel with #10 x 1/2" sheet metal screws.
2. Models LC-08 through LC-12 use two Jacket Top Panels. Place them on top with the seam at the same point as the side panels. Join them at their seam with #10 x 1/2" sheet metal screws. On LCE models, place panels in the sequence shown in Table 4.1.
3. Attach the Jacket Top Panel to the Jacket Top Front Panel with #10 x 1/2" sheet metal screws.
4. Attach the Top Rear Panel to the Jacket Top Panel with #10 x 1/2" sheet metal screws.
5. Finish by placing #10 x 1/2" sheet metal screws in the remaining holes along the Jacket Top Panel flanges, into the Jacket Side Panels.

F. APPLY LABELS

1. Attach labels to the Upper Jacket Front Panel as shown in Figure 4.1.

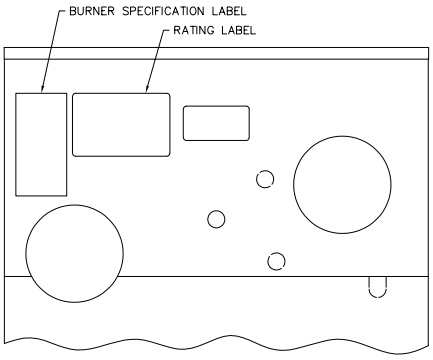


Figure 4.1: Attach Labels to Jacket Front Top Panel

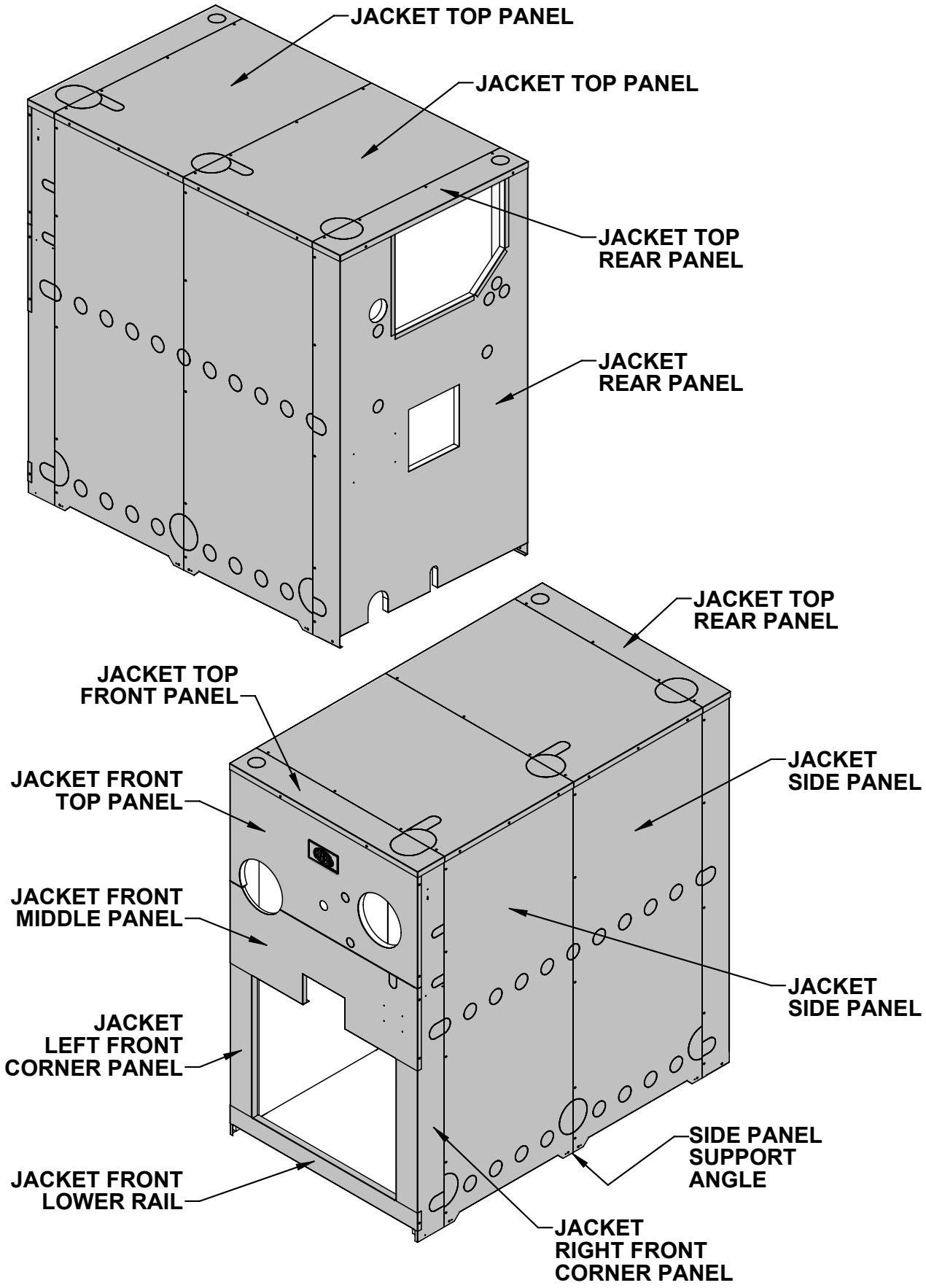


Figure 4.2: Jacket Assembly

5. VENTING

Refer to Chapter 1, Preinstallation, Section D. Chimney or Vent for installation requirements. Refer to Chapter 9, Starting the Boiler, Section C. Run Burner Check Out for damper settings and draft requirements.

6. INSTALL THE BURNER

A. BURNER APPLICATION

1. Refer to Burner Spec and Data Sheets for the Oil and Gas/Oil Burners pre-tested with Series LC™ boilers.
2. Make sure the nozzle sizing and spray pattern match those given in the spec and data sheets.
3. See Figure 6.1 and Table 6.1 for combustion chamber dimensions.

B. INSTALL BURNER MOUNTING PLATE

1. The Burner Mounting Plate is made to fit the burner being used. Burners vary in bolt pattern for the flange, burner tube diameter, insertion length and near-tube configuration. Make sure the front plate is correct for your burner if purchased separately from the boiler.
2. Remove the Burner Mounting Plate and Hardware Bag from the crate.
3. Screw (7) 3/8”-16 x 2 1/4” studs into the holes in the front section around the chamber opening.
4. Secure the Burner Mounting Plate to the front section with the flat washers and hex nuts.

C. MOUNT THE BURNER

1. Remove the Burner from its crate. Read the burner instructions.
2. Insert (4) 3/8”-16 x 1 1/4” studs supplied with Burner Mounting Plate into the front plate holes.
3. Place the high temperature gasket on the burner front plate and secure the burner to the front plate with 3/8” flat washers and hex nuts.
4. If the burner is supplied with a pedestal, install it to the burner per the Burner Manufacturer’s Instructions. The pedestal provides additional support and prevents the burner from sagging.

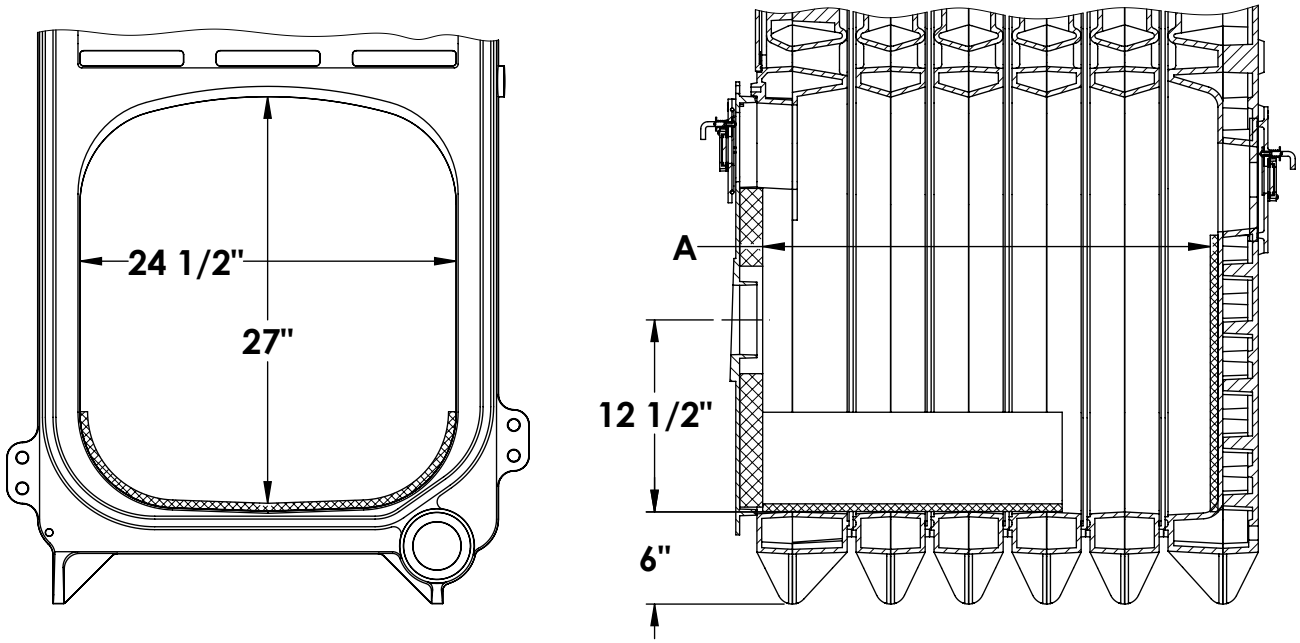


Figure 6.1: Combustion Chamber Layout – See Table 6.1 for Dimensions

Table 6.1: Combustion Chamber Dimensions

Model	Chamber Length "A" (Inches)	Burner Front Plate Extension Past Jacket (Inches)				
		Beckett Gas	Beckett Oil	Carlin	Power Flame	Webster
LC-04	18 7/8	1 1/8	6 1/8	6 1/8	6 1/8	6 1/8
LC-05R	23 15/16	1 1/8	6 1/8	6 1/8	6 1/8	6 1/8
LC-05	23 15/16	1 1/8	6 1/8	6 1/8	6 1/8	6 1/8
LC-06	29	1 1/8	6 1/8	6 1/8	6 1/8	6 1/8
LC-07	34 1/16	1 1/8	6 1/8	6 1/8	6 1/8	6 1/8
LC-08	39 1/8	1 1/8	1 1/8	6 1/8	1 1/8	1 1/8
LC-09	44 3/16	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8
LC-10	49 1/4	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8
LC-11	54 5/16	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8
LC-12	59 3/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8
LCE-13	64 7/16	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8
LCE-14	69 1/2	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8
LCE-15	74 9/16	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8
LCE-16	79 5/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8
LCE-17	84 11/16	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8
LCE-18	89 3/4	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8
LCE-19	94 13/16	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8
LCE-20	99 7/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8
LCE-21	104 15/16	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8
LCE-22	110	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8
LCE-23	115 1/16	1 1/8	N/A	1 1/8	1 1/8	1 1/8
LCE-24	120 1/8	N/A	N/A	N/A	1 1/8	1 1/8

7. CONNECT FUEL PIPING

A. GENERAL

1. Read the Burner Instruction Manual, supplied with the boiler or with the burner if purchased separately. Review applicable code requirements for burner and fuel piping installations.

2. Install piping to allow removal of burner and access to combustion chamber for cleaning or service.

B. INSTALL FUEL OIL PIPING

1. Place the fuel oil tank and install the piping in accordance with NFPA-31 and all other applicable codes.

2. General Guidelines for Oil Piping
   a) Follow the guidelines in the Burner Manual for sizing oil lines. Never use smaller than 1/2" OD copper tubing.
   b) Install manual shut-off valves on the suction line at the burner and at the oil line entrance to the building. If installing a shut-off valve on the return line, you must provide an oil pressure relief valve piped ahead of the shut-off valve and discharged to the tank to prevent over-pressure conditions.
   c) Install a two-pipe oil distribution system when possible. It will improve the reliability of the oil delivery to the burner.
   d) Use flare fittings when using copper tubing.
   e) Provide an oil line filter in the suction line. Size the filter for the suction gear capacity of the burner oil pump if running a two-pipe system.
   f) If burner is above the top of the fuel oil tank, install a check valve on the oil suction line at the burner to prevent oil from evacuating the line. If burner is below the top of the tank, install an anti-siphon device to prevent oil flow should the oil line break.

C. INSTALL GAS SUPPLY PIPING

1. Size the piping as required by the National Fuel Gas Code, ANSI Z223.1 or as required by local codes.
   a) Use Table 7.1 for sizing of natural gas for a system pressure drop of 0.3 inch water column.

2. The standard gas train is designed for a maximum pressure of 1/2 psig (14 inches water column). Make sure the system regulator will not allow a higher pressure to the Gas Control Train under any conditions.

3. The minimum gas supply pressure is listed on the Burner Rating Plate. Make sure the system regulator and the piping are sized and adjusted properly to provide this pressure under all conditions.

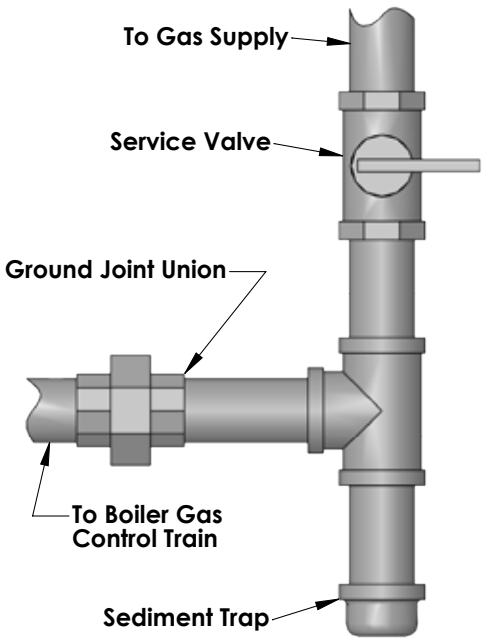


Figure 7.1: Gas Supply Connection to Boiler

4. Install a Service Valve, Sediment Trap and Ground Joint Union at the supply connection to the Gas Control Train as shown in Figure 7.1. These are not supplied with the boiler. Install them in accordance with local codes.

5. Use only pipe joint compounds rated for use with Liquefied Petroleum Gases.

D. TEST GAS SUPPLY PIPING

1. ISOLATE THE BOILER GAS CONTROL TRAIN FROM THE SYSTEM DURING TEST:
   a) Test pressure 1/2 psig or less – Close the Manual Shut-Off Valve on the Boiler Gas Control Train.
   b) Test pressure over 1/2 psig – Disconnect the gas supply piping upstream of the Boiler Manual Shut-Off Valve.

⚠ WARNING

Do not expose the Gas Control Train to excessive pressure. The gas valves can be damaged. This could result in explosion hazard and severe personal injury or death.

Do not test gas supply piping with open flame. Use a soap suds mixture brushed onto the pipe joints to test for leaks.

Table 7.1: Capacity of Gas Supply Pipe in Cubic Feet Per Hour of Natural Gas for Pressure Drop of 0.3 inch Water Column.

Pipe Length (Feet)	1-1/4" Pipe	1-1/2" Pipe	2" Pipe	2-1/2" Pipe	3" Pipe	4" Pipe	6" Pipe
10	1050	1600	3050	4800	8500	17500	44000
20	730	1100	2100	3300	5900	12000	31000
30	590	890	1650	2700	4700	9700	25000
40	500	760	1450	2300	4100	8300	22000
50	440	670	1270	2000	3600	7400	20000
60	400	610	1150	1850	3250	6800	18000
70	350	560	1050	1700	3000	6200	17000
90	320	490	930	1500	2600	5400	15000
100	305	460	870	1400	2500	5100	14000
150	250	380	710	1130	2000	4100	11500

Above ratings based on natural gas with specific gravity of 0.60 allowing pressure drop of 0.3 inches water column. No allowance is needed for pipe fittings. Use the following multipliers on above capacities for specific gravity other than 0.60:

Specific Gravity	0.50	0.55	0.60	0.65	0.70
Multiply Capacity by:	1.10	1.04	1.00	0.962	0.926

8. INSTALL CONTROLS, TRIM & WIRING

A. INSTALL SAFETY VALVES

1. Pipe the Pop Safety Valve on a tee mounted in the 2½" tapping located on the upper left side of the Rear Section. Make sure the relief valve sizing meets local code requirements.

⚠ CAUTION

Pipe the discharge of the Safety Relief Valve away from any traffic area, preferably to a floor drain. This is necessary to prevent injury should the valve discharge.

Pipe the discharge full size of valve outlet.

2. Install a 2" ball valve for skimming off the end of the tee as shown in the piping drawings in this manual.

B. INSTALL BLOWDOWN VALVES

1. Install a 1½" full port ball valve off of the return connection as shown in the "Pipe the Boiler" section of this manual. See Figure 8.1.

2. Pipe the valve discharge to a floor drain if available or apply a nipple and cap to close off when not in use.

C. INSTALL LOW WATER CUTOFF(S)

1. Mount a float type Low Water Cutoff and Gauge Glass in the tappings provided in the side of the front section or the side and top of the first intermediate section.

2. Do not apply piping which would raise or lower the location of the cutoff relative to the tappings in the boiler. Raising the water level over the design height will cause water carryover to the system.

3. For correct location of typical low water cutoff/feeder or low water cutoff/pump control, see Figures 8.4 through 8.7.

4. See Figure 8.2 for the location of control connection tappings.

5. Provide each float low water cutoff with a blowdown valve. Pipe the blowdown away from traffic to a floor drain if available. The blowdown valve is required for proper maintenance of the control.

6. Maintain a height of 46½" from boiler foundation to the normal water level.

7. When using Multiple Float Type Controls: Always pipe the controls off of the same tappings to the boiler. Do not mount on different ends of the boiler or in different tappings. This can cause erratic operation and nuisance problems with the controls.

D. INSTALL PRESSURE CONTROLS

1. Pipe the Steam Pressure Gauge and Boiler Limit and Operating Pressure Controls as shown in Figure 8.3. Connect the control assembly to the 1/2" tapping in the front section.

⚠ CAUTION

Make sure that the ignition system components, electrical controls, junction boxes and electrical panels are protected from water (dripping, spraying, rain, etc.) during boiler operation and service (trap servicing, control replacements or other).

E. PIPE TANKLESS HEATER(S)

1. Connect piping to any installed tankless heaters. See Figure 8.8 for suggested piping for single coils and Figure 8.9 for suggested piping for dual coils.

F. CONNECT SUPPLY WIRING

1. Install all wiring in accordance with local codes, the National Electrical Code and other controlling agencies or governing bodies.

NOTICE

The boiler/burner must be electrically grounded in accordance with the requirements of the authority having jurisdiction, or in the absence of such requirements, with the current edition of the National Electrical Code, ANSI/NFPA Number 70.

2. Use #14 gauge or heavier wire for supply wiring. Protect the circuit with a fused disconnect switch (by others) and a grounded neutral.

3. Mount an electrical junction box on the boiler Front Panel for connection of supply wiring and distribution to the boiler controls.

4. Follow the instructions in the Burner Manual and the Wiring Diagrams supplied with the burner and the boiler.

G. INSTALL CONTROL WIRING

1. Wire the boiler according to the wiring diagrams supplied with the burner and the boiler (in the Boiler Envelope).
2. Low Energy Safety Control wiring, if used, must follow the contour of the boiler. Some local codes may require that all wiring, even low voltage, be routed in conduit.
3. Install line voltage wiring in conduit.
4. Do not install single pole switches, including safety controls, in a grounded line.

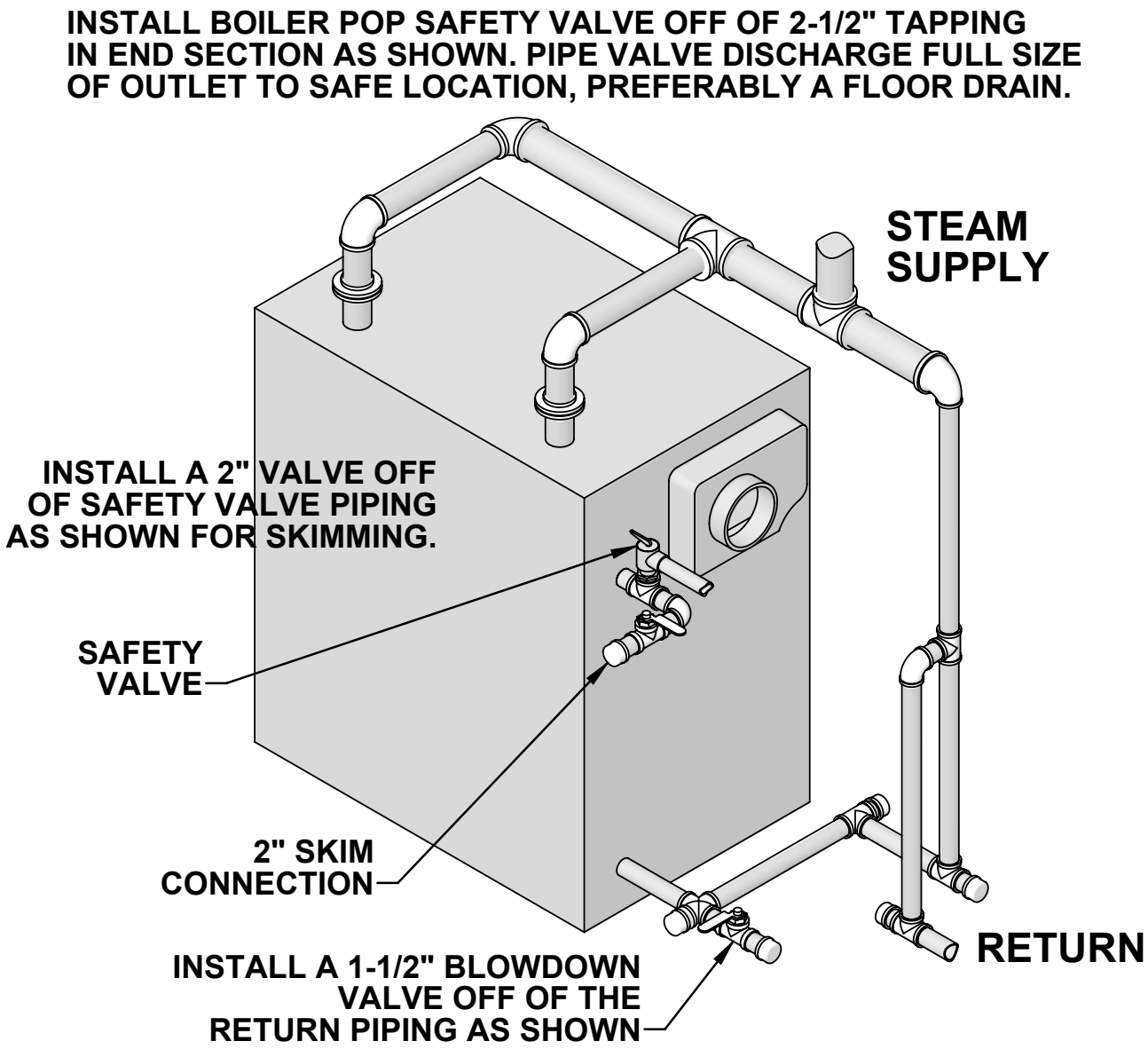
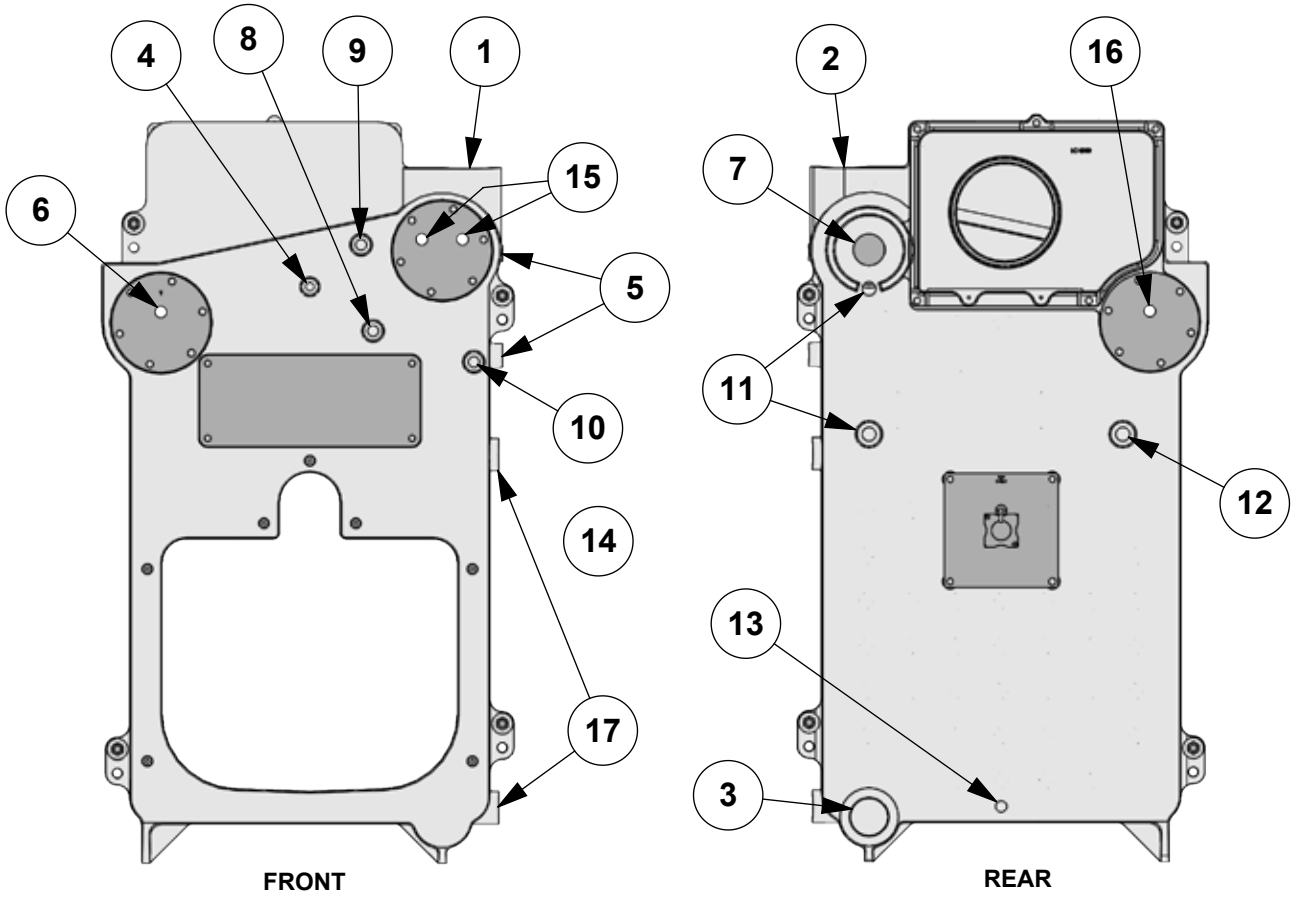
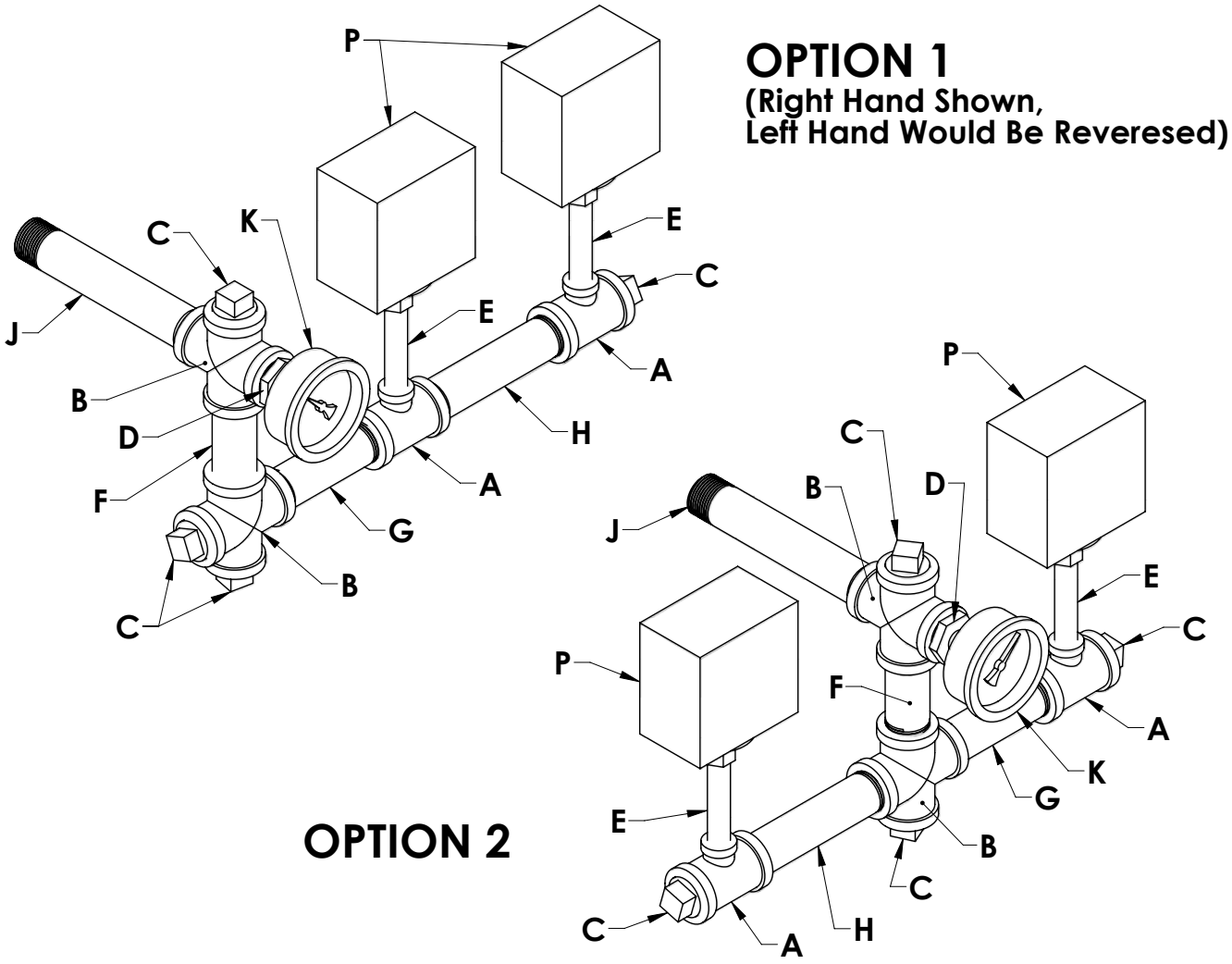


Figure 8.1: Blowdown Valve, Safety Valve and Skim Valve Piping



1	4” NPT Supply Tapping, Front Section	9	Pressure Control/Gauge Assembly Tapping, 3/4” NPT
2	4” NPT Supply Tapping, Rear Section	10	Secondary Probe LWCO Tapping, 3/4” NPT
3	3” NPT Return Tapping, Rear Section	11 12	Not Used On Steam, 1” NPT Tapping - Plug
4	Not Used On Steam, 1/2” NPT Tapping - Plug	13	Drain Tapping, 3/4” NPT
5	(2) 1/2” NPT Gauge Glass or LWCO Tapping	14	Not Shown - 1” NPT Tapping in Side and Top of First Intermediate - for Float LWCO
6	Tankless Coil Temp Control Tapping, 3/4” NPT, Only with Tankless Coil	15	Not Used On Steam, (2) 3/4” NPT Tapping - Plug
7	Relief Valve and Skim Tapping, 2-1/2” NPT	16	Tankless Coil Temp Control Tapping, 3/4” NPT, Only with Optional Tankless Coil Rear Section
8	Not Used On Steam, 3/4” NPT - Plug	17	Inspection Tappings, Optional

Figure 8.2: Control and Pipe Tapping Locations



A	3/4" X 3/4" X 1/4" Reducing Tee, Malleable	G	3/4" x 4" Nipple, Black Iron
B	3/4" Cross, Malleable	H	3/4" x 5" Nipple, Black Iron
C	3/4" Plug, Malleable	J	3/4" x 6" Nipple, Black Iron
D	3/4" x 1/4" Hex Bushing, Malleable	K	Steam Gauge
E	1/4" x 3" Nipple, Brass	P	Steam Pressure Control
F	3/4" x 3" Nipple, Black Iron		

(NOTE: Some local codes may require larger piping)

Figure 8.3: Control and Pipe Tapping Locations

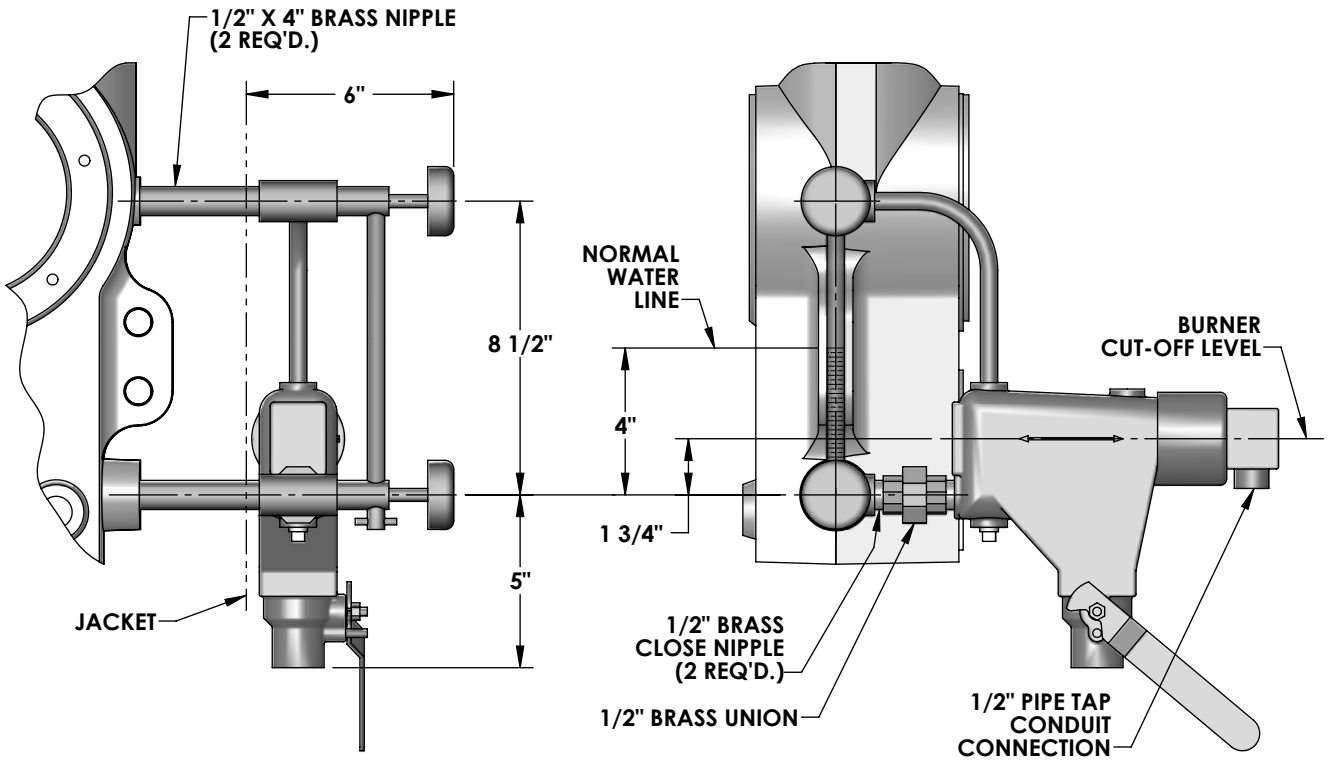


Figure 8.4: Optional Model 67PE2 Float Low Water Cutoff

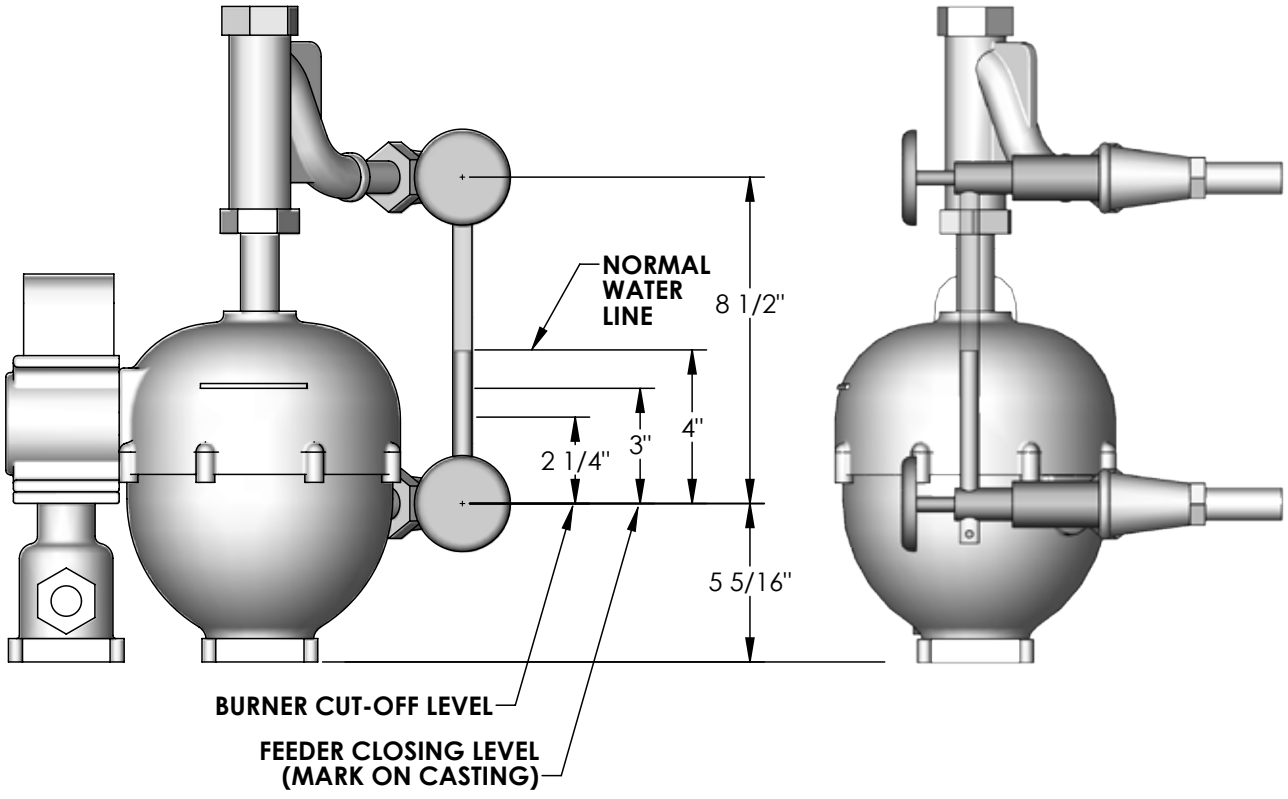
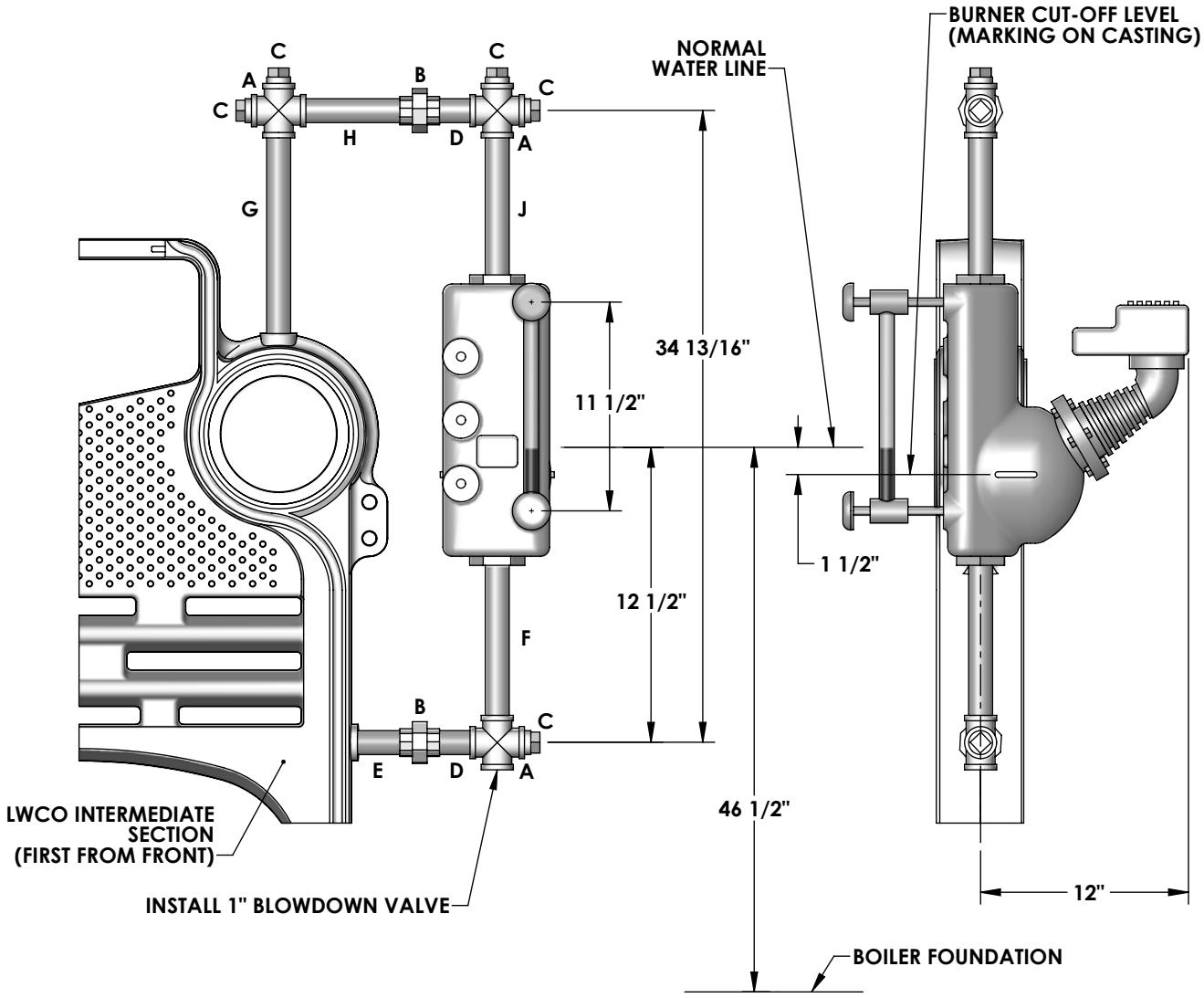


Figure 8.5: Optional Model 47-2 Low Water Cutoff/Feeder – Use only up to Model LC-07

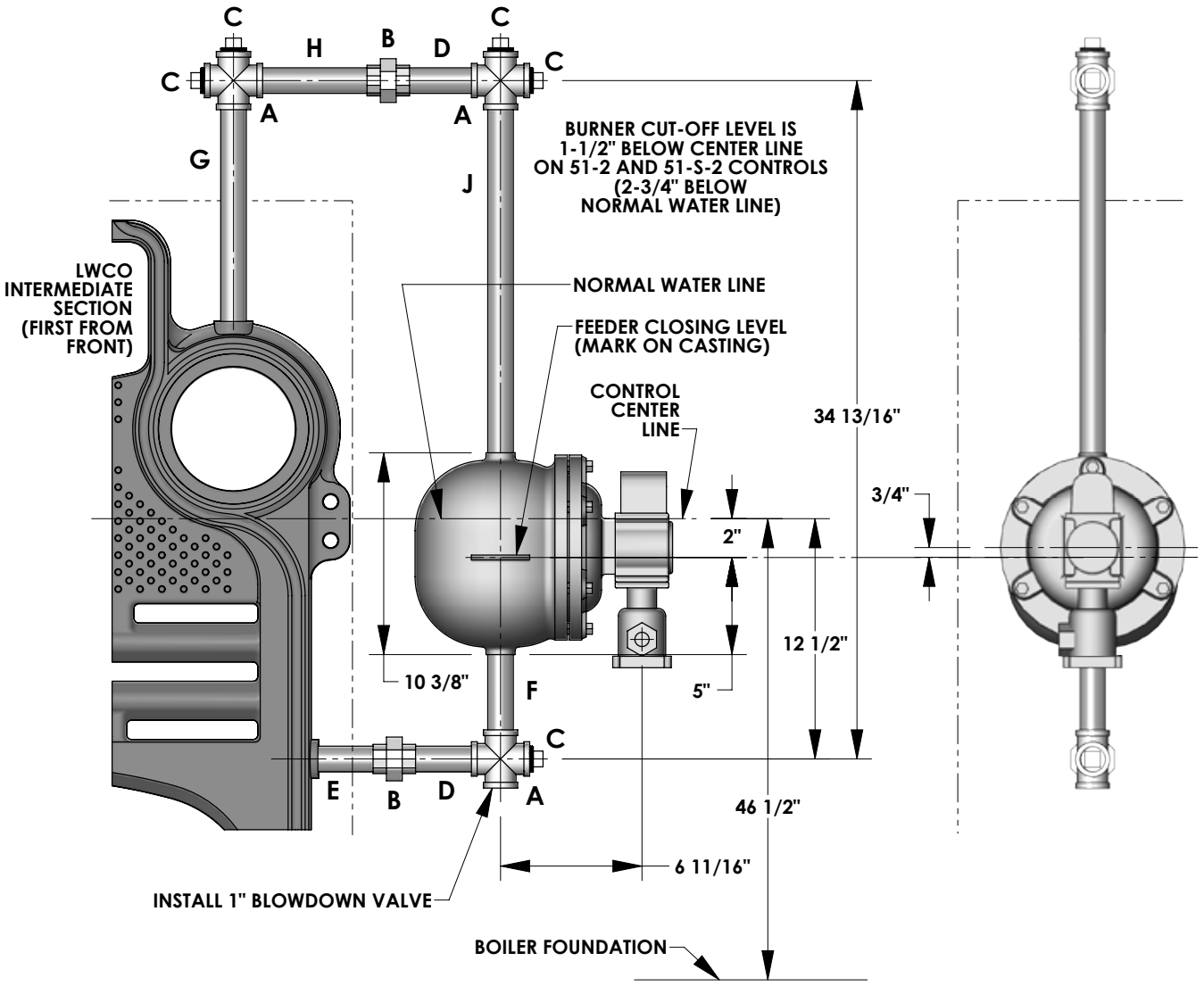


SUGGESTED FITTINGS LIST

A	*1" Cross*	*D*	*1" x 3" Nipple*	*G*	*1" x 12" Nipple*
B	*1" Ground Joint Union*	*E*	*1" x 4" Nipple*	*H*	*1" x 6½" Nipple*
C	*1" Plug*	*F*	*1" x 6" Nipple*	*J*	*1" x 12¼" Nipple*

The connected fittings shown on this drawing are to be supplied by the installer.

Figure 8.6: Optional Float Type Pump Control/Low Water Cutoff, Model 157



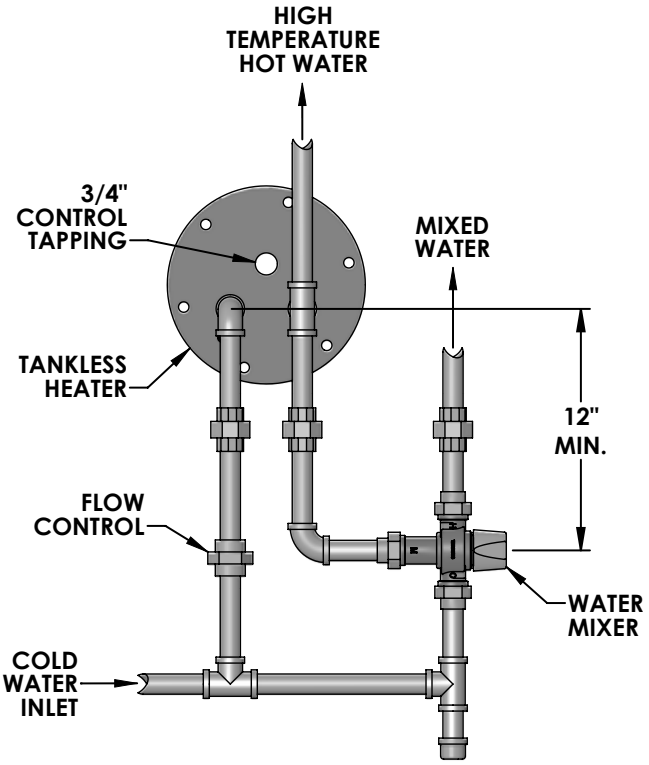
SUGGESTED FITTINGS LIST

A	*1" Cross*	***D***	*1" x 4" Nipple*	***G***	*1" x 12" Nipple*
B	*1" Ground Joint Union*	***E***	*1" x 4" Nipple*	***H***	*1" x 6½" Nipple*
C	*1" Plug*	***F***	*1" x 5" Nipple*	***J***	*1" x 19" Nipple*

Consult Factory for proper application of feeders. Always use a pump control and boiler feed system instead when possible.

The connected fittings shown on this drawing are to be supplied by the installer.

Figure 8.7: Optional Feeder/Low Water Cutoff, Type 51-2



⚠ DANGER

Provide anti-scald devices in the system where needed.

Failure to control water temperature to showers or other usage areas where a scald risk exists can result in severe personal injury.

Figure 8.8: Suggested Piping – Single Tankless Coil Installation

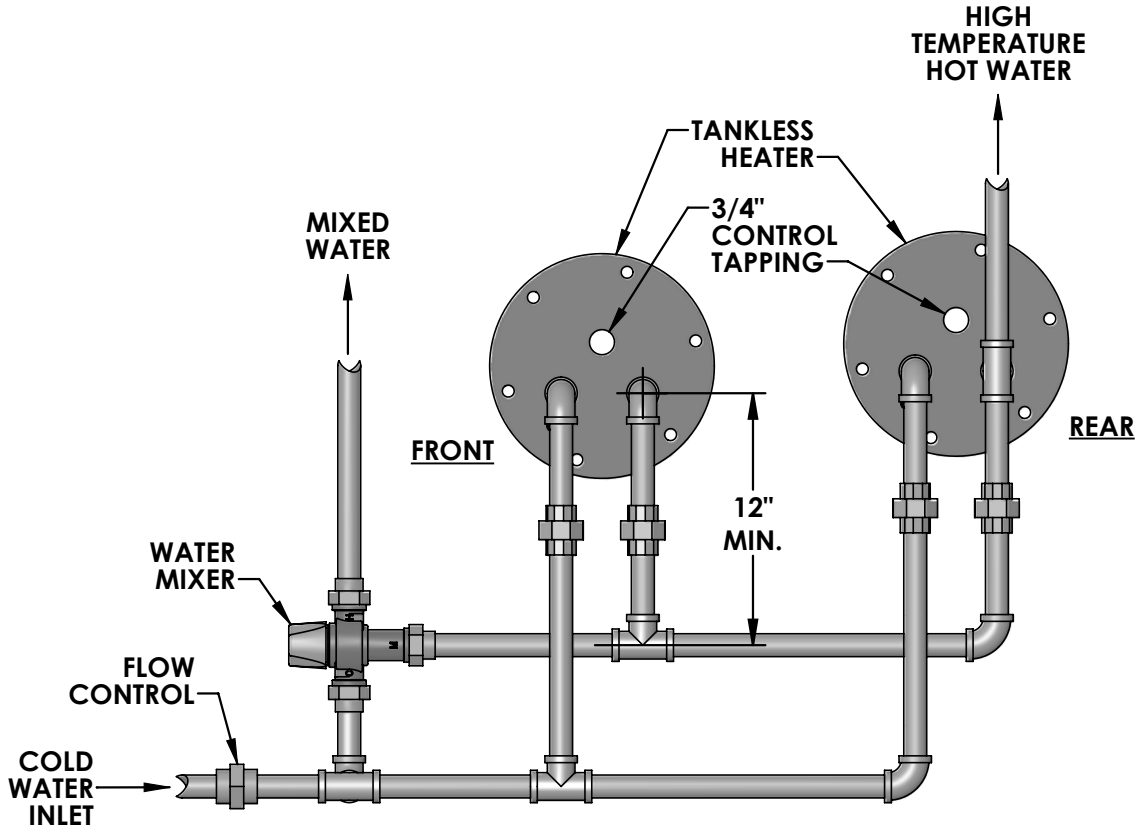


Figure 8.9: Suggested Piping – Dual Tankless Coil Installation

9. STARTING THE BOILER

A. CHECK THE PIPING

1. Steam Piping
   a) The Boiler must have been hydrostatically tested.
   b) Check the attached piping for joint tightness.
   c) Continue monitoring as you proceed through start up.
2. Gas Piping
   a) Make sure the gas system piping and the connections to the boiler Gas Control Train(s) have been leak tested.
   b) After the boiler is in operation, check the tightness of all joints in the boiler gas piping with a soap suds solution.
   c) Purge the gas piping of all air up to the boiler Gas Control Train.
3. Oil Piping
   a) Check the oil piping visually. Make sure all joints are tight.
   b) When the burner is firing, check the suction line and return line pressures.
   c) If the pressure exceeds the allowable pressure in the Burner Manual or if the suction line vacuum is higher than allowable, correct the piping as needed to bring the suction line and return line pressures within acceptable range.
   d) Excess pressure can cause pump seal failures. Excess vacuum will cause fuel flow problems with the burner oil pump.

B. FILL THE BOILER

1. Fill the boiler to the normal water line.
   a) Gravity Systems and Pumped Return with Condensate Units – Fill to 46½" above the boiler foundation (center of gauge glass).
   b) Pumped Return with Boiler Feed Unit - Fill the boiler using the boiler feed unit. Fill level will depend on the control being used, but should be 46½" above the boiler foundation (just below center of gauge glass) when the pump stops.
2. See Section 1-Preinstallation, for boiler water treatment requirements.

C. RUN BURNER CHECK-OUT

1. Before firing the burner, slide the Slide Gate Damper on the rear flue box all the way down (full open) on LC's or open the LCE Draft Damper until the handle is parallel to the vent pipe (full open).
2. Follow the instructions in the Burner Manual for starting the burner, adjusting air openings and fuel rates. Perform ignition system and flame supervisory control test and checkout as described in the manual.
3. After burner is set at rate, close the damper until the pressure reading at the test opening in the rear flue box or draft damper is between 0" wc and 0.1" wc positive. See Table 9.1 for typical overfire pressure (measured at the burner front plate) and boiler draft loss.

   When a barometric draft regulator is installed in the venting system, adjust the boiler damper for 0" wc pressure reading at the damper. Adjust the draft regulator for -0.05" wc draft between the boiler damper and the draft regulator.
4. Adjust the burner as needed for a CO_2 reading of:
   a) Oil burners: CO_2 approximately 12.5% or 1% less than the level at which the smoke reading goes above a trace on the Bacharach scale.
   b) Gas burners: 9% to 10% with CO less than 50 ppm.
5. Inspect all flue gas joints (sections, attachments, breeching and vent) for gas tightness. Remove the jacket panels in order to thoroughly inspect all rope seal joints between the sections.

⚠ CAUTION

On installations with high draft, do not leave the boiler with a negative draft reading at the rear flue box or draft damper. High negative draft can pull the flame up into the boiler crown sheet and overheat the iron. This can result in cracked sections or shortened boiler life.

D. CHECK BOILER CONTROLS

1. Limit and Operating Temperature Controls
   a) Lower the setting of each control until the burner shuts down.
2. Low Water Cutoffs
   a) Test probe type controls by using the Push-to-Test Button.
   b) Test float type controls.
3. Follow additional instructions in the Burner Manual for proving the burner component operation.
4. Check all controls to make sure they function correctly.
5. After all controls have been proven, set the Operating and High Limit Temperature Controls to the temperatures desired.

E. CLEAN THE BOILER

1. Clean the boiler as described below no later than one week after the initial start-up. Cleaning will be more effective if the boiler operates a day or two to loosen sediment and impurities in the system.

⚠ WARNING

Cleaning the boiler requires the use of very hot water and corrosive chemicals. Use care when handling to prevent injury.

2. The boiler must be cleaned to remove any accumulation of oil, grease, sludge, etc. that may be in the system. These substances can cause foaming and surging of the boiler water, producing unstable water line and water carryover to the system.
3. The piping for a 2" Skim Valve must be done as shown in this manual, with the skim valve mounted off the Pop Safety Valve tee on the rear of the boiler.
4. Use common washing soda (such as Arm and Hammer Super Washing Soda). Mix the soda with water in a 10 quart pail. Use a proportion of one pound of washing soda for each 800 square feet EDR net boiler rating. Remove the Pop Safety Valve and pour the washing soda solution into the boiler through the Pop Safety Valve tee. Replace Pop Safety Valve.
5. Connect a 2 inch drain line off of the Skim Valve, run to a point of safe discharge.
6. Close all valves to the system. Provide a means of continuous fresh water to the boiler for the cleaning process.
7. Open the Skim Valve. Fill the boiler until water begins to flow out of the valve.
8. Turn burner on and allow the boiler water to heat up to just below steaming (180° to 200° F). Cycle the burner to maintain temperature during skimming. Do not allow the boiler to steam. Steaming mixes up the contaminants in the water instead of floating them at the surface.
9. Open the make-up water valve to continuously feed water to the boiler. Allow water to flow out the skim tapping.
10. Continue skimming the boiler until the water flowing from the skim tapping flows clear. This will take some time, possibly several hours for a dirty system.
11. After skimming is complete, close the skim valve and turn off the boiler.
12. Close the make-up water valve and open the boiler blowdown valves.
13. Drain the boiler completely, then refill and drain again one or two times to make sure all of the soda has been washed out.
14. Restore piping to normal. Pipe a nipple and cap in the skim valve.
15. Note: If the gauge glass becomes dirty again, this indicates more contaminants have worked loose in the system. Repeat the cleaning and skimming process as needed to clean the system.

⚠ CAUTION

Do not leave the boiler unattended while firing.

Take great care not to allow the water level to drop below the bottom of the gauge glass or to allow fresh water make-up to flow in too fast. This will avoid the possibility of causing the boiler sections to fracture.

Table 9.1: Typical Combustion Chamber Pressure and Boiler Draft Loss

Model	Combustion Chamber Pressure with 0.1" w.c. at Rear Flue Box Test Port (Inches w.c.)	Boiler Draft Loss (Inches w.c.)
LC-04	+ 0.22	0.12
LC-05R	+ 0.22	0.12
LC-05	+ 0.24	0.14
LC-06	+ 0.26	0.16
LC-07	+ 0.27	0.17
LC-08	+ 0.28	0.18
LC-09	+ 0.29	0.19
LC-10	+ 0.30	0.20
LC-11	+ 0.31	0.21
LC-12	+ 0.32	0.22
LCE-13	+ 0.24	0.14
LCE-14	+ 0.25	0.15
LCE-15	+ 0.26	0.16
LCE-16	+ 0.27	0.17
LCE-17	+ 0.28	0.18
LCE-18	+ 0.29	0.19
LCE-19	+ 0.30	0.20
LCE-20	+ 0.31	0.21
LCE-21	+ 0.31	0.21
LCE-22	+ 0.31	0.21
LCE-23	+ 0.32	0.22
LCE-24	+ 0.32	0.22

NOTE: Actual chamber pressure and draft loss readings may vary with each boiler and installation due to variation in the heat exchanger, deposits in the flueways, actual burner firing rate and excess air conditions. Use the above numbers as a general guide only. If the measured draft loss is considerably higher than the above, check the flueways for deposits and confirm the burner firing rate.

10. MAINTENANCE

⚠ WARNING

Product Safety Information
Refractory Ceramic Fiber Product

This appliance contains materials made from refractory ceramic fibers (RCF). Airborne RCF, when inhaled, have been classified by the International Agency for Research on Cancer (IARC), as a possible carcinogen to humans. After the RCF materials have been exposed to temperatures above 1800°F (982°C), they can change into crystalline silica, which has been classified by the IARC as carcinogenic to humans. If particles become airborne during service or repair, inhalation of these particles may be hazardous to your health.

Avoid Breathing Fiber Particulates and Dust

Suppliers of RCF recommend the following precautions be taken when handling these materials:

<u>Precautionary Measures:</u>
Provide adequate ventilation.
Wear a NIOSH/MSHA approved respirator.
Wear long sleeved, loose fitting clothing and gloves to prevent skin contact.
Wear eye goggles.
Minimize airborne dust prior to handling and removal by water misting the material and avoiding unnecessary disturbance of materials.
Wash work clothes separately from others. Rinse washer thoroughly after use.
Discard RCF materials by sealing in an airtight plastic bag.

<u>First Aid Procedures:</u>
Inhalation: If breathing difficulty or irritation occurs, move to a location with fresh clean air. Seek immediate medical attention if symptoms persist.
Skin Contact: Wash affected area gently with a mild soap and warm water. Seek immediate medical attention if irritation persists.
Eye Contact: Flush eyes with water for 15 minutes while holding eyelids apart. Do not rub eyes. Seek immediate medical attention if irritation persists.
Ingestion: Drink 1 to 2 glasses of water. Do not induce vomiting. Seek immediate medical attention.

⚠ WARNING

Do not store or allow combustible or flammable materials near the boiler. Substantial fire or explosion hazard could result, causing risk of personal injury, death or property damage.

Do not use this boiler if any part of it has been under water. Immediately call a qualified service technician to inspect the boiler. Any part of the control system, any gas control or any burner or gas component which has been under water must be replaced.

Should overheating occur or the fuel supply fail to shut off: Shut off the fuel supply at a location external to the boiler. Do not turn off or disconnect the electrical supply to the pump. Immediately call a qualified service technician to inspect the boiler for damage and defective components.

A. PLACING BOILER IN OPERATION

1. Start up the Burner/Boiler per the Burner Manual and the instructions in this manual on starting the boiler.
2. Prove the correct operation of all controls on the boiler and burner as outlined below.
3. Check the operation of the ignition and flame proving controls as described in the Burner Manual.
4. Test the limit and operating controls to assure they are operating correctly.
5. Inspect and test all low water cutoffs.
6. Test the safety relief valve(s) using the procedure given by the valve manufacturer on the valve tag.
7. Visually inspect the burner and pilot flames (if applicable).

B. TO SHUT DOWN THE BOILER

1. Turn off Burner.
2. Open main line power disconnect switch to boiler/ burner.
3. Close fuel shut-off valves.
4. To take boiler out of service if the boiler and system are not to be used when temperatures are below freezing:
   a) Drain the boiler and system completely and shut off make-up water supply.
   b) Open main line power disconnect switch to boiler/ burner. Remove the fuses or secure the switch so that the power cannot be turned on accidentally.
   c) Be certain that the boiler and system are refilled before returning to service. Follow the Instructions in this manual and the Lighting Instructions to operate.
   d) The system may be filled with a 50% inhibited propylene glycol solution for protection down to -35°F. Use only antifreeze solutions specifically designed for hydronic use.

⚠ CAUTION

Before servicing the boiler:

- **Turn off all electrical power to the boiler.**
- **Close the Gas Service Valve and Oil Shut-Off Valve.**
- **Allow the boiler to cool if it has been operating.**
- **Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.**

C. GENERAL

If there is considerable foreign matter in the boiler water, the boiler should be shut down and allowed to cool, then drained and thoroughly flushed out. Drain the boiler at the drain cock. Pipe the drain cock to a suitable drain. Flush the system to remove remaining matter. See Section 1 - Preinstallation, for boiler water treatment requirements. If there is evidence that hard scale has formed on the internal surfaces, the boiler should be cleaned by chemical means as prescribed by a qualified water treatment specialist.

D. MAINTENANCE – ANNUAL

1. **Before the start of each heating season**, inspect and make all necessary adjustments to insure proper boiler and burner operation. Use the maintenance and inspection procedures following.
2. Inspect the Venting System
   a) Check the chimney or vent to make sure it is clean and free from cracks or potential leaks.
   b) All joints must be tight and sealed.
   c) The vent connector must extend into, but not beyond the inside edge of the chimney or vent.
3. Inspect the Boiler Area
   a) The boiler area must be clean and free from combustible materials, gasoline or any other flammable liquids or vapors.
   b) The combustion air openings and the area around the boiler must be unobstructed.
4. Inspect boiler flueways and burner for cleanliness. If cleaning is required, use the following procedure.
   a) Turn off all electrical power to the boiler.
   b) Remove Jacket Middle Front Panel and Jacket Top Panels. Remove Front Cleanout Plate and Cleanout Cover Plates on each flueway. On LCE boilers, remove the top flue outlet plate and vent piping as necessary to access the top of the sections.
   c) Brush the boiler tube spaces both horizontally (through cleanout openings on ends) and vertically (from top of boiler through cleanout openings at flueways).

d) Remove the Burner and Burner Mounting Plate. Remove any scale or soot from the combustion chamber by means of vacuum cleaning or other available means. Take care not to damage the chamber floor liner or target wall liner.

e) Replace the Front Cleanout Plate, Burner Mounting Plate, Burner and all Cleanout Cover Plates on top of the sections. Make sure all sealing rope and seals are in good condition. Replace sealing rope if necessary.

f) Replace all Jacket Panels.

5. Inspect the boiler and piping for signs of leaks. Check to see if there are signs of heavy make-up water addition to the system.

6. When placing boiler into operation, follow Burner Manual, all instructions supplied with the boiler and the instructions in this chapter.

7. Test the operation of all limit controls, float controls and ignition components as described in Part A, "Placing Boiler in Operation", of this chapter.

8. Inspect low water cut-off(s) per manufacturer's instructions.

E. MONTHLY MAINTENANCE

1. Check function and maintain safety relief valve as specified by manufacturer, typically every other month or every month, per the instructions on the tag on the safety relief valve.

2. Inspect the burner and pilot flames as for the annual inspection.

3. Inspect the boiler and system for any signs of leakage or excessive make-up water usage. If the steam boiler water level is erratic and dirt and deposits appear in the water gauge glass, skim the boiler as described in Section 9.

4. Inspect and check the operation of the venting system.

F. WEEKLY MAINTENANCE (WITH BOILER OPERATING)

Flush float-type low water cut-off (if used) to remove sediment from the float bowl as stated in the manufacturer's instructions.

G. DAILY MAINTENANCE

1. Inspect the boiler area to make sure the area is free from combustible or flammable materials and that there are not obstructions to the flow of air to the boiler or combustion air openings to the room.

2. Make sure there are no signs of abnormal operation, such as overfilling or leakage.

⚠ CAUTION

Be very careful when adding water to a hot boiler. Add very slowly or, if possible, allow the boiler to cool naturally before adding water.

If an excessive loss of water occurs, check for a leak in the piping and correct the problem. Excessive make-up water will cause corrosion and damage to the boiler.

11. BOILER RATINGS & DIMENSIONS

Table 11.1: Boiler Ratings

Series LC™										Boiler H.P.
Boiler Model	Oil Input[1]		Gas Input, MBH	Gross Output, MBH	Net Ratings[3]		Oil		Gas		
	GPH	MBH			Steam, sqft	Steam[2], MBH	Combustion Efficiency[4], %	Thermal Efficiency[4], %	Combustion Efficiency[4], %	Thermal Efficiency[4], %	
LC-04	4.75	665	686	547	1,708	410	83.7	82.2	81.2	79.8	16.3
LC-05R	5.60	784	808	649	2,029	487	83.7	82.8	81.2	80.3	19.4
LC-05	6.10	854	881	707	2,208	530	83.7	82.8	81.2	80.3	21.1
LC-06	7.50	1,050	1,077	868	2,713	651	83.7	83.1	81.1	80.6	25.9
LC-07	8.80	1,232	1,273	1,029	3,217	772	83.6	83.3	81.1	80.8	30.7
LC-08	10.20	1,428	1,469	1,189	3,717	892	83.6	83.5	81.1	81.0	35.5
LC-09	11.60	1,624	1,664	1,350	4,250	1,020	83.6	83.6	81.1	81.1	40.3
LC-10	12.80	1,792	1,860	1,511	4,804	1,153	83.6	83.7	81.1	81.2	45.1
LC-11	14.20	1,988	2,056	1,672	5,367	1,288	83.6	83.8	81.1	81.3	50.0
LC-12	15.60	2,184	2,252	1,832	5,917	1,420	83.6	83.9	81.1	81.4	54.7
LCE-13	17.00	2,380	2,464	1,966	6,358	1,526	83.5	82.2	81.0	79.8	58.7
LCE-14	18.40	2,576	2,657	2,125	6,875	1,650	83.5	82.5	81.0	80.0	63.5
LCE-15	19.80	2,772	2,850	2,284	7,388	1,773	83.5	82.6	81.0	80.2	68.2
LCE-16	21.00	2,940	3,043	2,444	7,908	1,898	83.5	82.8	81.0	80.3	73.0
LCE-17	22.50	3,150	3,236	2,603	8,421	2,021	83.5	82.9	81.0	80.4	77.7
LCE-18	24.00	3,360	3,429	2,763	8,938	2,145	83.5	83.1	81.0	80.6	82.5
LCE-19	25.00	3,500	3,622	2,922	9,454	2,269	83.5	83.2	81.0	80.7	87.3
LCE-20	26.50	3,710	3,815	3,082	9,971	2,393	83.5	83.3	81.0	80.8	92.1
LCE-21	28.00	3,920	4,027	3,256	10,533	2,528	83.6	83.3	81.1	80.8	97.3
LCE-22	29.50	4,130	4,239	3,430	11,096	2,663	83.6	83.4	81.1	80.9	102.5
LCE-23	31.00	4,340	4,451	3,604	11,658	2,798	83.7	83.5	81.2	81.0	107.7
LCE-24	32.50	4,550	4,663	3,777	12,217	2,932	83.7	83.5	81.2	81.0	112.8

1 Burner input based on No. 2 fuel oil with a heating value of 140,000 Btu per gallon.
2 Net steam ratings based on an allowance for LC-04 to LC-08=1.333, LC-09=1.323, LC-10=1.310, LC-11=1.298, LC-12=1.290,LCE-13 to LCE-24=1.288.
3 Consult factory before selecting a boiler for installations having unusual piping and pickup requirements, such as intermittent system operation, extensive piping systems, etc.
4 Combustion and thermal efficiencies are determined in accordance with ANSI/AHRI Standard 1500.

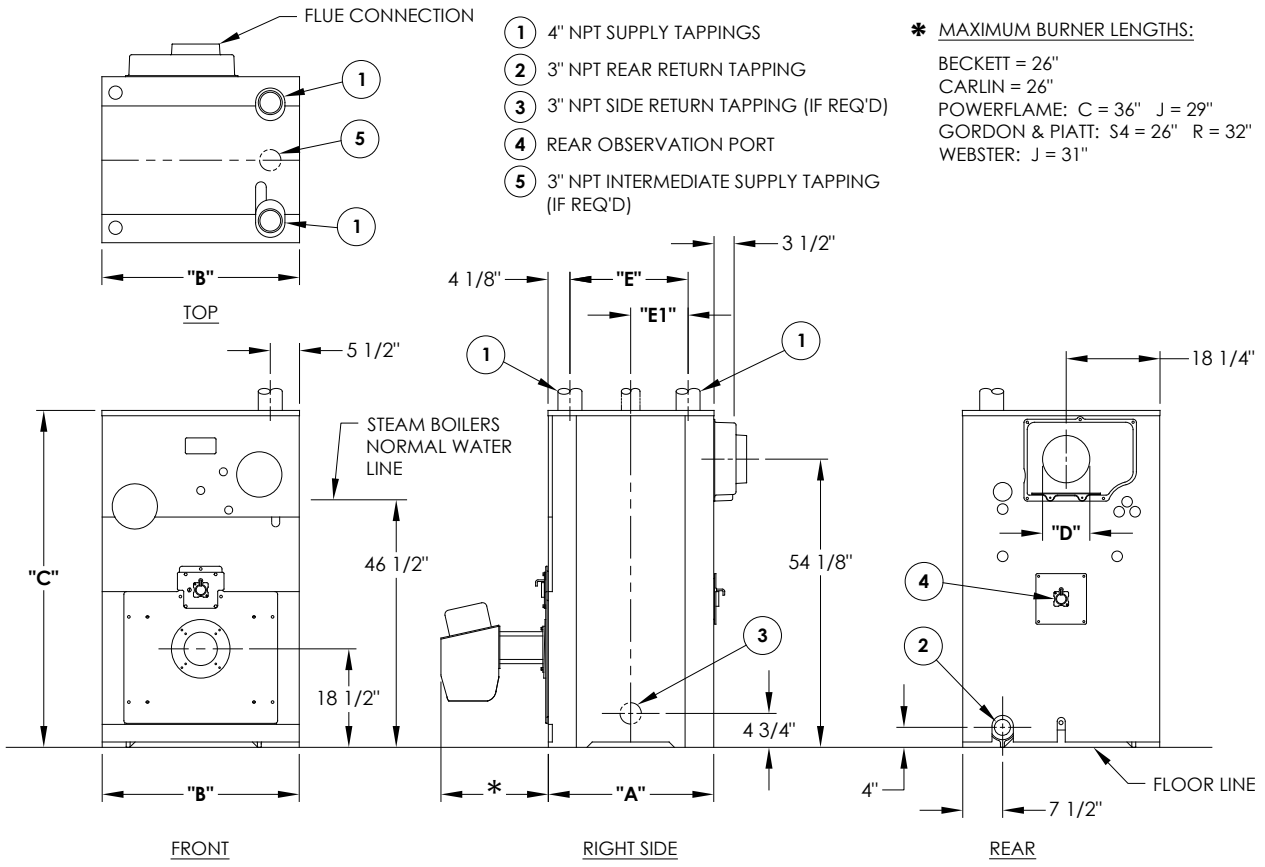


Figure 11.1: LC Dimensional Diagram

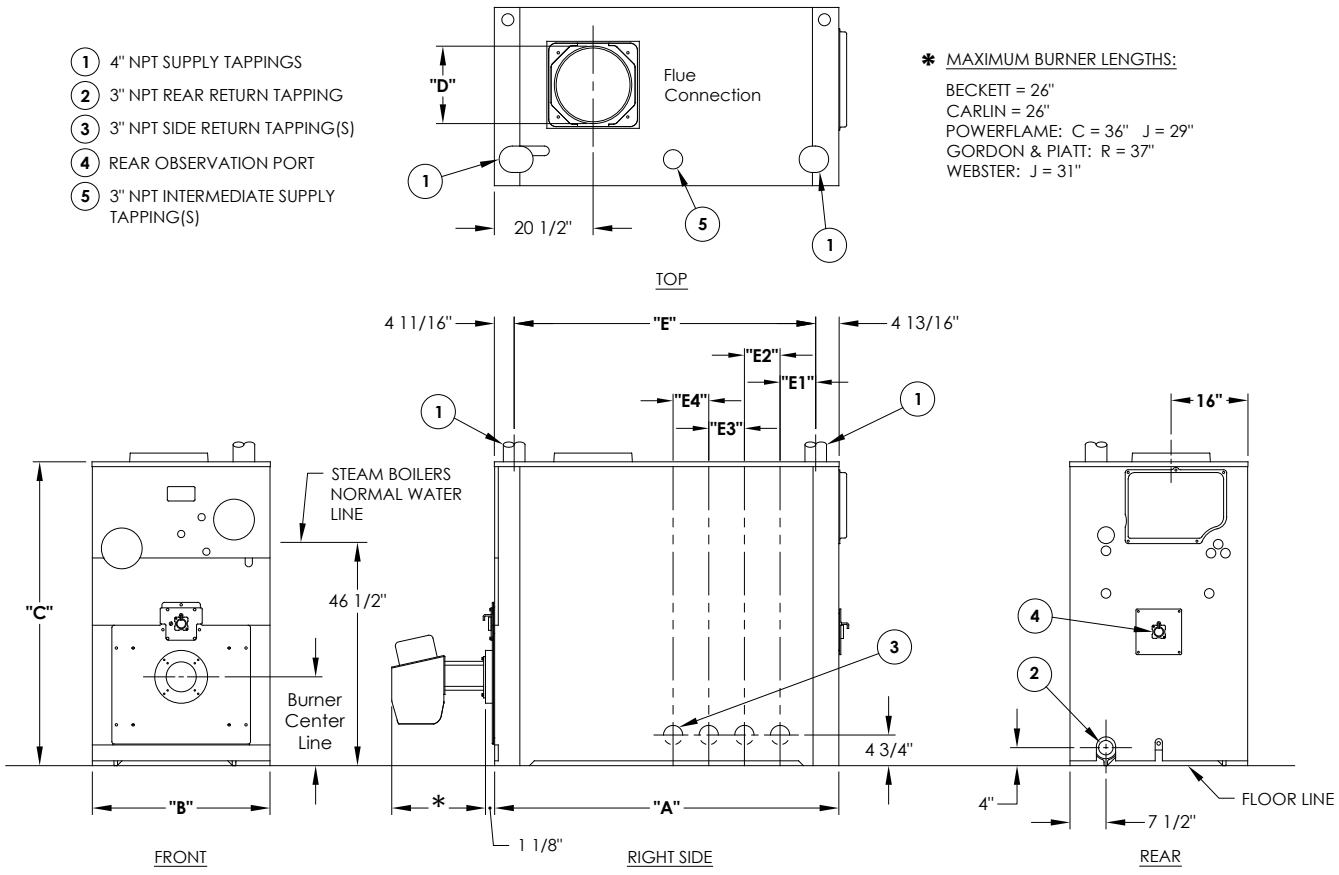


Figure 11.2: LCE Dimensional Diagram

Table 11.2: Series LC™ Boiler Dimensions

SERIES LC™ BOILER DIMENSIONS														
Boiler Model Number	Jacket	Supply Piping			Return Piping	Riser Tapping Locations *					Vent Location		Vent	
	Length "A"	Risers	Size	Recom. Header	Equalizer	End Sect. Tappings "E"	Intermediate Section Tapping "E1"	"E2"	"E3"	"E4"	"B"	"C"	Diameter "D"	Minimum Height
LC-04	25-15/16"	1	4"	4"	2"	16-1/2"	—	—	—	—	18-1/4"	54-1/8"	9"	3'
LC-05R	31"	2	3"	5"	2"	21-9/16"	—	—	—	—	18-1/4"	54-1/8"	9"	3'
LC-05	31"	2	3"	5"	2"	21-9/16"	—	—	—	—	18-1/4"	54-1/8"	9"	3'
LC-06	36-1/16"	2	4"	5"	2"	26-5/8"	—	—	—	—	18-1/4"	54-1/8"	9"	3'
LC-07	41-1/8"	2	4"	5"	2-1/2"	31-11/16"	—	—	—	—	18-1/4"	54-1/8"	10"	3'
LC-08	46-5/16"	2	4"	6"	2-1/2"	36-13/16"	—	—	—	—	18-1/4"	54-1/8"	10"	3'
LC-09	51-3/8"	2	4"	6"	2-1/2"	41-7/8"	—	—	—	—	18-1/4"	54-1/8"	10"	3'
LC-10	56-7/16"	2	4"	6"	2-1/2"	46-15/16"	—	—	—	—	18-1/4"	54-1/8"	12"	3'
LC-11	61-1/2"	2, 1	4", 3"	6"	3" (2 Ret.)	52"	26"	—	—	—	18-1/4"	54-1/8"	12"	3'
LC-12	66-9/16"	2, 1	4", 3"	6"	3" (2 Ret.)	57-1/8"	26"	—	—	—	18-1/4"	54-1/8"	12"	3'
LCE-13	71-3/4"	2, 1	4", 3"	6"	3"	62-3/16"	36-3/16"	—	—	—	16"	20-1/2"	14"	3'
LCE-14	76-13/16"	2, 2	4", 3"	8"	3"	67-1/4"	20-15/16"	20-5/16"	—	—	16"	20-1/2"	14"	3'
LCE-15	81-7/8"	2, 2	4", 3"	8"	3"	72-5/16"	26"	20-5/16"	—	—	16"	20-1/2"	14"	3'
LCE-16	86-15/16"	2, 2	4", 3"	8"	3"	77-7/16"	26"	20-7/16"	—	—	16"	20-1/2"	14"	3'
LCE-17	92-1/8"	2, 3	4", 3"	8"	4"	82-1/2"	20-15/16"	20-5/16"	15-1/4"	—	16"	20-1/2"	14"	3'
LCE-18	97-3/16"	2, 3	4", 3"	8"	4"	87-9/16"	20-15/16"	20-5/16"	20-5/16"	—	16"	20-1/2"	16"	3'
LCE-19	102-1/4"	2, 3	4", 3"	8"	4"	92-5/8"	20-15/16"	20-5/16"	20-5/16"	—	16"	20-1/2"	16"	3'
LCE-20	107-7/16"	2, 4	4", 3"	8"	4"	97-3/4"	20-15/16"	20-5/16"	15-1/4"	15-1/4"	16"	20-1/2"	16"	3'
LCE-21	112-1/2"	2, 4	4", 3"	8"	4"	102-3/16"	20-15/16"	20-5/16"	20-5/16"	15-1/4"	16"	20-1/2"	16"	3'
LCE-22	117-9/16"	2, 4	4", 3"	8"	4"	107-7/8"	20-15/16"	20-5/16"	20-5/16"	20-5/16"	16"	20-1/2"	16"	3'
LCE-23	122-5/8"	2, 4	4", 3"	8"	4"	112-15/16"	26"	20-5/16"	20-5/16"	20-5/16"	16"	20-1/2"	16"	3'
LCE-24	127-11/16"	2, 4	4", 3"	8"	4"	118-1/16"	26"	20-5/16"	20-5/16"	26"	16"	20-1/2"	16"	3'

* These dimensions are approximate.

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12. REPAIR PARTS

Repair parts are available from your local PB Heat, LLC distributor or from Parts To Your Door at 1 (610) 916-5380 (www.partstoyourdoor.com).

Note: Remember to include the boiler model number and serial number when ordering parts.

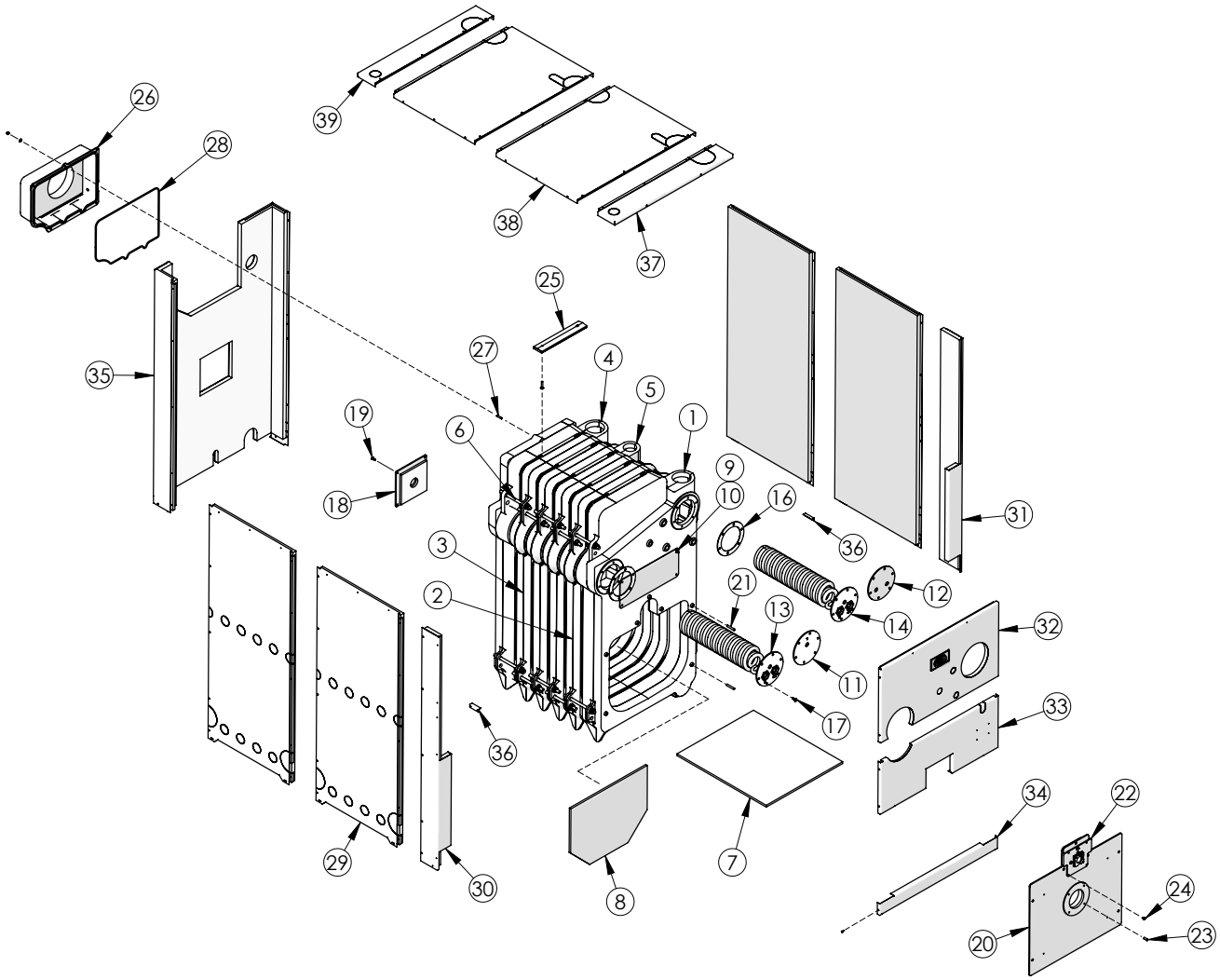

Figure 12.1: LC Boiler Assembly

Table 12.1A: LC Repair Parts

	Description	Part Selection Information	Stock Code
1	Front Section	See Table 1.3 for Stock Code	
2	Intermediate Section w/ 1" Tapping	See Table 1.3 for Stock Code	
3	Intermediate Section	See Table 1.3 for Stock Code	
4	Back Section	See Table 1.3 for Stock Code	
5	Tapped Intermediate Section	See Table 1.3 for Stock Code	
–	Upper Flow Port Gasket	2 Reqd. per Flueway	51671
–	Lower Flow Port Gasket	1 Reqd. per Flueway	51672
–	Silicone Sealer, 3 Oz.		7605
6	Tie Rod	4 Reqd. per Flueway	51721
–	5/8" Diameter High Temp Rope	13 Feet Reqd. per Flueway	55723
7	Ceramic Fiber Base Liner	Models LC-04 through LC-12	50862
8	Ceramic Fiber Target Wall		50854
9	Front Cleanout Plate (C.I.)		51162
10	5/16"-18 x 1-1/4" Studs w/ Brass Nuts	4 Required	
11	Steel Cover Plate		51776
12	Steel Cover Plate		51777
13	Tankless Heater Location 1	Specify Heater Model Number	
14	Tankless Heater Location 2	Not Used On Steam	
15	Tankless Heater Location 3 (Rear; not shown)	Specify Heater Model Number	
16	Rubber Gasket	Specify Quantity	51800
17	3/8"-16 x 3/4" SS Hex Head Cap Screw	Specify Quantity	
18	Rear Observation Assembly		90923
19	5/16"-18 x 3/4" Hex Head Cap Screw	Specify Quantity	
–	Observation Glass, Front or Rear		51681
–	Observation Glass Gasket Kit, Front or Rear		90091
20	Burner Mounting Plate	Specify Burner Model	
21	3/8"-16 x 2-1/4" Studs with Nuts	7 Required	
–	Insulation, Burner Plate (Flat plate/insul.)		50798
–	Insulation, Burner Plate (built-out plate/insul.)		50793
22	Flame Observation Assembly		90922
23	3/8"-16 x 1" Studs for Burner Mounting	4 Required	
24	1/4"-20 x 1/2" Hex Head Machine Screw	4 Required	
25	Cleanout Cover Plate (Steel)	1 Reqd. per Flueway	51772
–	Cleanout Cover Plate Insulation	1 Reqd. per Flueway	50800
26	Rear Flue Box w/ 9" Flue Outlet	Models LC-04 and LC-05	86040
	Rear Flue Box w/ 10" Flue Outlet	Models LC-06, LC-07 and LC-08	86041
	Rear Flue Box w/ 12" Flue Outlet	Models LC-09, LC-10, LC-11 and LC-12	86042
27	Rear Flue Box Stud 5/16"-18 x 1-1/2"	7 Required	
28	Rear Flue Box Hi Temp Rope, 1/4" Diameter x 65" Long		51209
29	Side Jacket Panel LC-6000 (top/side carton*)	For Models LC-04 and LC-08	
	Side Jacket Panel LC-6001 (top/side carton*)	For Models LC-05, LC-08, LC-09, LC-10	
	Side Jacket Panel LC-6002 (top/side carton*)	For Models LC-06, LC-10, LC-11, LC-12	
	Side Jacket Panel LC-6003 (top/side carton*)	For Models LC-07 and LC-12	
30	Left Front Jacket Corner Panel LC-6011	(front/back carton*)	
31	Right Front Jacket Corner Panel LC-6010	(front/back carton*)	
32	Upper Front Jacket Panel LC-6007	(front/back carton*)	
33	Middle Front Jacket Panel LC-6008	(front/back carton*)	
34	Lower Front Jacket Rail LC-6009	(front/back carton*)	
35	Back Jacket Panel LC-6012	(front/back carton*)	
36	Side Jacket Panel Support Angle LC-6014	(top/side carton*)	
37	Front Top Jacket Panel LC-6005	(front/back carton*)	
38	Top Jacket Panel LC-6004 (top/side carton*)	For Models LC-04 and LC-08	
	Top Jacket Panel LC6004-1 (top/side carton*)	For Models LC-05, LC-08, LC-09, LC-10	
	Top Jacket Panel LC-6004-2 (top/side carton*)	For Models LC-06, LC-10, LC-11, LC-12	
	Top Jacket Panel LC-6004-3 (top/side carton*)	For Models LC-07 and LC-12	
39	Rear Top Jacket Panel LC-6006	(front/back carton*)	
	Rear Top Jacket Panel LC-6006	(front/back carton*)	
	Rear Top Jacket Panel LC-6006	(front/back carton*)	
–	Flue Baffle Sets. Each set consists of (3) aluminized triple rib baffles, (2) aluminized single rib baffle, (2) stainless single rib baffles, and (1) stainless triple rib baffle.	"Specify Boiler Model Number."	

* Jacket assembly components available only as cartoned assemblies as shown in Table 1.2A.

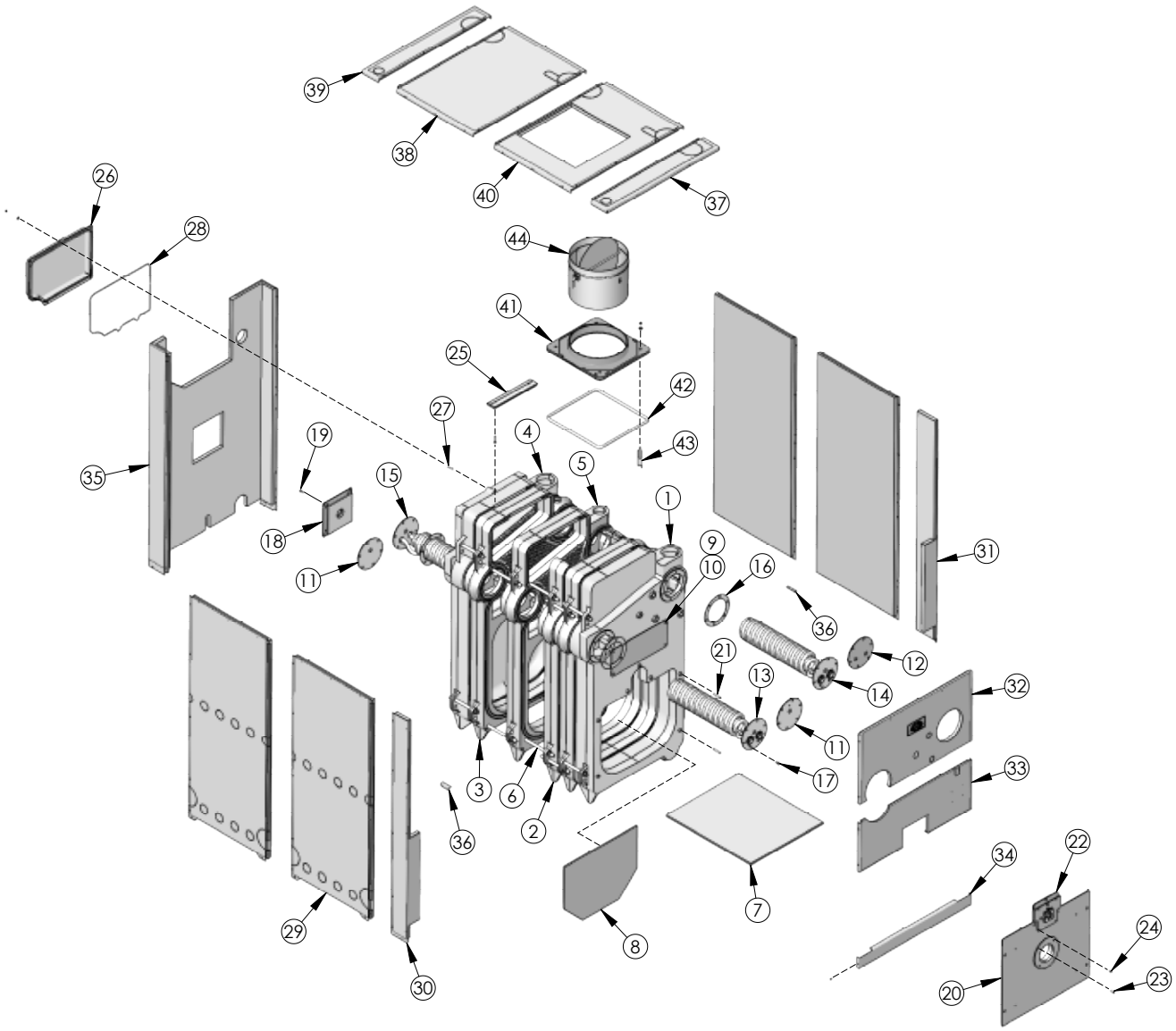

Figure 12.2: LCE Boiler Assembly

Table 12.1B: LCE Repair Parts

	Description	Part Selection Information	Stock Code
1	Front Section	See Table 1.3 for Stock Code	
2	Top Flue Outlet Intermediate Section	See Table 1.3 for S tock Code	
–	Intermediate Section w/ 1” Tapping	See Table 1.3 for Stock Code	
3	Intermediate Section	See Table 1.3 for Stock Code	
4	Back Section (Closed Back)	See Table 1.3 for Stock Code	
_	Back Section w/ Tankless Coil Opening	See Table 1.3 for Stock Code	
5	Tapped Intermediate Section	See Table 1.3 for Stock Code	
–	Upper Flow Port Gasket	2 Reqd. per Flueway	51671
–	Lower Flow Port Gasket	1 Reqd. per Flueway	51672
–	Silicone Sealer, 3 Oz.		7605
6	Tie Rod	4 Required per Flueway	51721
–	5/8” Diameter High Temp Rope	13 Feet Reqd. per Flueway	55723
7	Ceramic Fiber Base Liner	For All LCE Boilers	50862
8	Ceramic Fiber Target Wall		50854
9	Front Cleanout Plate (C.I.)		51162
10	5/16”-18 x 1-1/4” Studs w/ Brass Nuts	4 Required	
11	Steel Cover Plate		51776
12	Steel Cover Plate		51777
13	Tankless Heater Location 1	Specify Heater Model Number	
14	Tankless Heater Location 2	Not Used On Steam	
15	Tankless Heater Location 3	Specify Heater Model Number	
16	Rubber Gasket	Specify Quantity	51800
17	3/8”-16 x 3/4” SS Hex Head Cap Screw	Specify Quantity	
18	Rear Observation Assembly		90923
19	5/16”-18 x 3/4” Hex Head Cap Screw	Specify Quantity	
–	Observation Glass, Front or Rear		51681
_	Observation Glass Gasket Kit, Front or Rear		90091
20	Burner Mounting Plate	Specify Burner Model	
21	3/8”-16 x 2-1/4” Studs with Nuts	7 Required	
_	Insulation, Burner Plate (Flat plate/insul.)		50798
_	Insulation, Burner Plate (built-out plate/insul.)		50793
22	Front Observation Assembly		90922
23	3/8”-16 x 1” Studs for Burner Mounting	4 Required	
24	1/4”-20 x 1/2” Hex Head Machine Screw	4 Required	
25	Cleanout Cover Plate (Steel)	1 Reqd. per Flueway	51772
–	Cleanout Cover Plate Insulation	1 Reqd. per Flueway	50800
26	Rear Flue Cover Plate	For All LCE Boilers	51131
27	Rear Flue Cover Stud 5/16”-18 x 1-1/2”	5 Required	
28	Rear Flue Cover Hi Temp Rope, 1/4” Dia. x 65” Long		51209

	Description	Part Selection Information	Stock Code
29	Side Jacket Panel LC-6000 (top/side carton*)	For Models LCE-13, -17, -20, -21	
	Side Jacket Panel LC-6001 (top/side carton*)	For Models LCE-13 to -15, LCE-17 TO -24	
	Side Jacket Panel LC-6002 (top/side carton*)	For all LCE Models	
30	Left Front Jacket Corner Panel LC-6011	(front/back carton*)	
31	Right Front Jacket Corner Panel LC-6010	(front/back carton*)	
32	Upper Front Jacket Panel LC-6007	(front/back carton*)	
33	Middle Front Jacket Panel LC-6008	(front/back carton*)	
34	Lower Front Jacket Rail LC-6009	(front/back carton*)	
35	Back Jacket Panel LC-6012	(front/back carton*)	
36	Side Jacket Panel Support Angle LC-6014	(top/side carton*)	
37	Front Top Jacket Panel LC-6005	(front/back carton*)	
38	Top Jacket Panel LC-6004 (top/side carton*)	For Models LCE-13, -17, -20, -21	
	Top Jacket Panel LC6004-1 (top/side carton*)	For Models LCE-13 to -15, LCE-17 TO -24	
	Top Jacket Panel LC-6004-2 (top/side carton*)	For all LCE Boilers	
39	Rear Top Jacket Panel LC-6006	(front/back carton*)	
40	Top Jacket Panel with Flue Opening LC-6022 (top/side carton*)	For All LCE Boilers	
41	Top Flue Outlet Plate (14” Flue)	For Models LCE-13 through LCE-17	51132
	Top Flue Outlet Plate (16” Flue)	For Models LCE-18 and Larger	51133
42	5/8” Diameter High Temperature Rope	For Top Flue Outlet Plate, 6 Feet	55723
43	3/8” Diameter Tie Down Assembly	For Top Flue Outlet Plate, 4 Required	51604
44	Draft Damper, 14”	For Models LCE-13 through LCE-17	90523
	Draft Damper, 16”	For Models LCE-18 and Larger	90524
–	Flue Baffle Sets. Each set consists of (3) aluminized triple rib baffles, (2) aluminized single rib baffle, (2) stainless single rib baffles, and (1) stainless triple rib baffle.	Models LCE-21 through LCE-24 Only	86113

* Jacket assembly components available only as cartoned assemblies as shown in Table 1.2B.

13. STARTUP & SERVICE REPORT

Job _____

Date _____ Serial No. _____

Boiler Model No. _____ Burner Operation _____

Burner Type _____ Mfr. _____ No. _____

Combustion Test Results:

Gas Type _____	Input (cfh)	Gas Pressure		CO_2 %	CO %	Stack Press . " w.c.	Temp. °F		Flame Signal		Air Settings	
		Orifice " w.c.	Supply " w.c.				Stack (Gross)	Room	Pilot	Main	Total (In.)	Primary %
High Fire												
Low Fire												

Oil	Input (gph)	Oil Pressure		CO_2 %	Smoke No.	Stack Press . " w.c.	Temp. °F		Flame Signal		Air Settings	
		Supply psig	Bypass psig				Stack (Gross)	Room	Pilot	Main	Total (In.)	Primary %
High Fire												
Low Fire												

Check of Safety Controls

Low Water Cutoff _____ High Gas Press . _____ Setting _____ " w.c. _____

Pilot Failure _____ Low Gas Press . _____ Setting _____ " w.c. _____

Main Flame Failure _____

Limit Control Settings

High Limit _____ Operating Cont. _____ Mod. Cont. _____ Hi-Lo Cont _____

Oil Nozzle — _____ gph _____ Angle Spray _____ Type _____ Make

Remarks: _____

_____

_____

_____

Startup By: _____ Accepted By: _____

_____ _____

_____ _____

Copies of Report to: _____

Series LC™

Oil, Gas & Gas/Oil Boilers Steam

Installation, Operation & Maintenance Manual

TO THE INSTALLER:

This manual is the property of the owner and must be affixed near the boiler for future reference.

TO THE OWNER:

This boiler should be inspected annually by a Qualified Service Agency.

PeerlessBoilers.com

PB HEAT, LLC
131 S. CHURCH STREET• BALLY, PA 19503

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