

Series CC

Oil, Gas & Gas/Oil Boilers



Installation, Operation & Maintenance Manual



PeerlessBoilers.com

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USING THIS MANUAL

A. MANUAL ORGANIZATION

The Series CC Installation, Operation & Maintenance Manual is divided into five basic sections:

1. Preinstallation (Sections A through I)
2. Boiler Assembly (Sections A through I)
3. Installation (Sections A through J)
4. Operation (Sections A & B)
5. Maintenance
6. Burner Set-Up
7. Repair Parts
8. Boiler Ratings & Dimensions

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 the PB Heat, LLC:



DANGER

Indicates a condition or hazard which will cause severe personal injury, death or major property damage.



WARNING

Indicates a condition or hazard which may potentially cause severe personal injury, death or major property damage.



CAUTION

Indicates a condition or hazard which will or can cause moderate personal injury or property damage.



NOTICE

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

1. PREINSTALLATION

A. GENERAL

Series CC boilers are supplied completely knocked down for field assembly, completely assembled as packaged boilers or as assembled blocks of cast iron sections. All items should be inspected for damage upon receipt and any damage reported to wholesaler and trucking company. All components should be stored in a clean, dry area.

Carefully read these instructions, burner instructions, and control instructions before beginning work. This boiler must be installed by a qualified contractor. The boiler warranty may be voided if the boiler is not installed correctly.

B. CODES & REGULATIONS

1. All work is to be performed in strict accordance with the requirements of state and local regulating agencies and codes dealing with boiler installations.
2. In the absence of such local requirements, the following codes should be followed:
 - a. ASME B & PV Code, Section IV – “Heating Boilers”
 - b. ASME B & PV Code, Section VI – “Care and Operation of Heating Boilers”
 - c. ANSI/NFPA 31 – “Installation of Oil Burning Equipment”
 - d. ANSI Z223.1 – “National Fuel Gas Code”
 - e. ANSI/NFPA 70 – “National Electric Code”
 - f. ASME CSD-1 – “Controls & Safety Devices for Automatically Fired Boilers”
 - g. ANSI/NFPA 211 – “Chimneys, Fireplaces, Vents and Solid Fuel Burning Appliances”

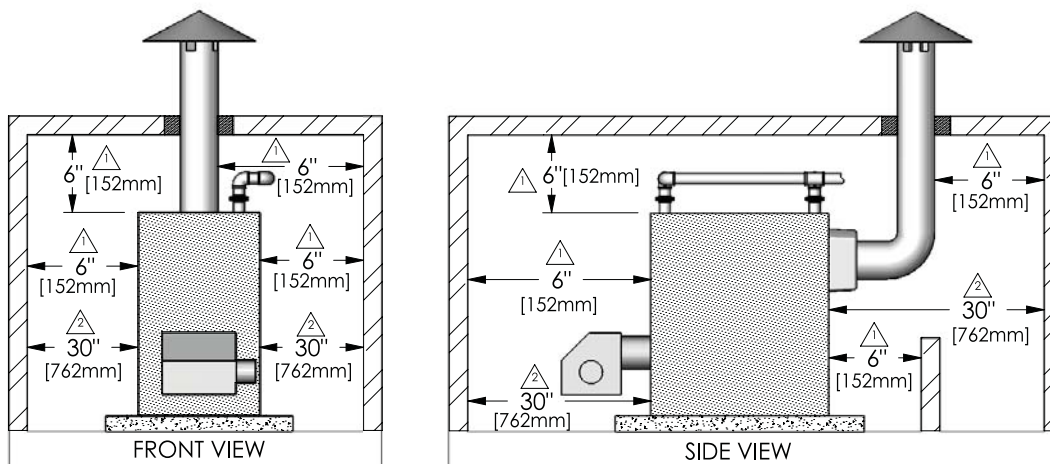
3. In Canada, the following codes should be used in addition to those in Section 1.B.2.
 - a. CAN1.3.1-77 (R1996) – “Industrial and Commercial Gas Fired Package Boilers”
 - b. CSA B140.0-M87 – “General Requirements for Oil Burning Equipment”
 - c. CSA B140.7.2-1967 – “Oil-Fired Steam and Hot Water Boilers for Commercial and Industrial Use”
 - d. CAN/CSA C22.2 No.0-M91 – “General Requirements – Canadian Electrical Code Part II”
 - e. CSA C22/2 No.3-M1988 – “Electrical Features of Fuel Burning Equipment”

C. BOILER LOCATION

1. Locate the boiler close to the chimney to minimize the breeching length, but allow adequate clearance for piping, service, maintenance, and tankless coil replacement. See Figure 1.1 for service requirements.

WARNING

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



-  MINIMUM CLEARANCE TO COMBUSTIBLE CONSTRUCTION
-  ACCESSIBILITY CLEARANCE

Figure 1.1: Clearance Requirements

- The minimum clearances to combustible materials are as follows. See Figure 1.1.
 - Right Side: 6 inches (152 mm)
 - Left Side: 6 inches (152 mm)
 - Rear of Jacket: 6 inches (152 mm)
 - Front of Boiler: 6 inches (152 mm)
 - Top of Jacket: 6 inches (152 mm)
 - Vent/Chimney/Flue Collector: 6 inches (152 mm)

⚠ WARNING

If this boiler is to be installed on combustible flooring, consult local building authorities for proper installation, or in the absence of regulations consult ANSI/NFPA 31 – "Installation of Oil Burning Equipment." Failure to comply with this warning may result in a fire, severe personal injury or death.

D. COMBUSTION & VENTILATION AIR

⚠ WARNING

This boiler must be supplied with combustion and ventilation air in accordance with the latest revision of Section 5.3, Air for Combustion & Ventilation, of the National Fuel Gas Code, ANSI Z223.1/NFPA 54 for gas boilers or ANSI/NFPA 31 Installation of Oil Burning Equipment for oil boilers. Canadian installations must comply with CAN/CSA B149.1 Natural Gas and Propane Installation Code for gas boilers or CSA B140.7 Oil Burning Equipment for oil boilers. All applicable local building codes must be adhered to. Failure to provide adequate combustion air for this boiler can result in excessive levels of carbon monoxide which can result in severe personal injury or death!

- To operate properly and safely this boiler requires a continuous supply of air for combustion. An adequate supply of air must be available to replace the air used by the combustion process. NEVER store objects on or around the boiler.

⚠ CAUTION

Never use an exhaust fan in the boiler room. The boiler room must never be under a negative pressure or improper burner operation will occur!

⚠ NOTICE

Forced make-up air supplied to the boiler room must be approved by the local authorities. A minimum of 30 ft³/GAL (0.22 m³/L) for oil or 25 ft³/100 MBH (Therm) (0.024 m³/kW) for gas must be provided.

- All Air From Inside The Building:**
If the boiler is to be located in a confined space minimum clearances of 30" (762 mm) must be maintained between the boiler and any adjacent construction. When installed in a confined space, two permanent openings communicating with an additional room(s) are required. The combined volume of these spaces must have sufficient volume to meet the criteria for an unconfined space. The total air requirements of all fuel burning equipment or any type of exhaust fan must be considered when making this determination.

Each opening must have a minimum free area of 1 in²/1000 Btu/hr, 140 in²/GPH (2200 mm²/kW) based on the total input rating of ALL fuel burning equipment in the confined area. Each opening must be no less than 100 in² (64,516 mm²) in size. The upper opening must be within 12" (305 mm) of, but not less than 3" (76 mm) from, the top of the enclosure. The bottom opening must be within 12", (305 mm) of, but not less than 3" (76 mm) from the bottom of the enclosure.

- All Air From Outside The Building:**
When installed in a confined space two permanent openings communicating directly with, or by ducts to, the outdoors or spaces that freely communicate with the outdoors must be present. The upper opening must be within 12" (305 mm) of, but not less than 3" (76 mm) from, the top of the enclosure. The bottom opening must be within 12" (305 mm) of, but not less than 3" (76 mm) from, the bottom of the enclosure.

Where directly communicating with the outdoors or communicating with the outdoors through vertical ducts, each opening shall have a minimum free area of 1 in²/4000 Btu/hr, 35 in²/GPH (550 mm²/kW) of the total input rating of all of the equipment in the enclosure.

Where communicating with the outdoors through horizontal ducts, each opening shall have a minimum free area of 1 in²/2000 Btu/hr, 70 in²/GPH (1100 mm²/kW) of the total input rating of all of the equipment in the enclosure. When ducts are used, they must have the same cross-sectional area as the free area of the opening to which they connect. When calculating the free area necessary to meet the make-up air requirements of the enclosure, consideration must be given to the blockage effects of louvers, grills and screens. Screens must have a minimum mesh size of 1/4 in (6.4mm). If the free area through a louver or grill is not known the louver or grille should be sized per Table 1.1.

- If motorized dampers are used on the combustion and ventilation air openings they must include an interlock device that prevents the boiler from operating if they do not open. See Figure 1.2 for this configuration.

Table 1.1: Make-up Air Louver Sizing

Input (MBH)	Required Cross Sectional Louver Area (in ²)					
	1/4" (6.4 mm) Wire Screen		Metal Louvers 75% Free Area		Wooden Louvers 25% Free Area	
	in ²	cm ²	in ²	cm ²	in ²	cm ²
1000	250	1613	333	2148	1000	6452
1200	300	1936	400	2578	1200	7742
1400	350	2258	467	3007	1400	9033
1600	400	2581	533	3437	1600	10,323
1800	450	2903	600	3866	1800	11,614
2000	500	3226	666	4296	2000	12,904
2200	550	3549	733	4726	2200	14,194
2400	600	3871	800	5155	2400	15,485
2600	650	4194	867	5585	2600	16,775
2800	700	4516	934	6014	2800	18,066
3000	750	4838	1000	6452	3000	19,354
3200	800	5162	1066	6874	3200	20,646
3400	850	5484	1134	7303	3400	21,937
3600	900	5807	1200	7733	3600	23,227
3800	950	6129	1267	8162	3800	24,518
4000	1000	6452	1334	8592	4000	25,808
4200	1050	6775	1400	9022	4200	27,098
4400	1100	7097	1467	9451	4400	28,389
4600	1150	7420	1533	9881	4600	29,679
4800	1200	7742	1600	10,310	4800	30,970

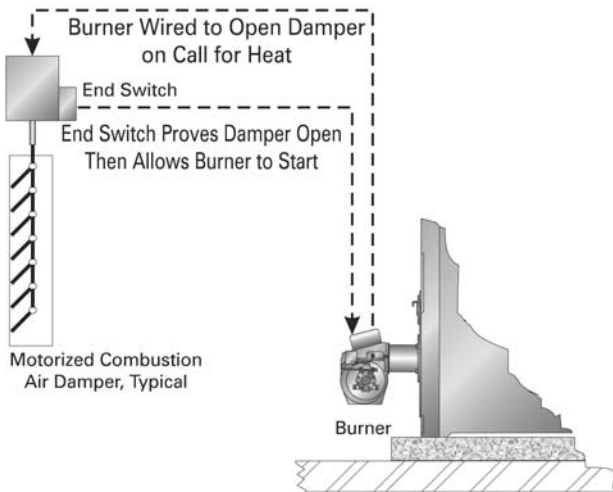


Figure 1.2: Motorized Vent Damper Interlock

E. CHIMNEY & BREECHING

1. Vent System Inspection:
 - a. Inspect the existing chimney or vent system. Look for damage due to corrosion or other causes. Make sure the vent system is in good condition and all vent connectors and chimneys are properly supported.
 - b. Inspect the chimney liner and repair or replace as necessary.
2. Vent System Sizing:
 - a. 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 correctly. This may cause poor combustion or sooting.

- b. The breeching connection between the boiler and chimney should be as short as possible with a minimum number of elbows.
 - c. Breeching Diameter:

The breeching must be the same diameter as the boiler outlet for Models CC-03 through CC-10. Models CC-11 and CC-12 use an adapter collar to 12" (305 mm).

The vent sizes for all Series CC Boilers are listed in the "Ratings and Dimensions" section of this manual.
 - d. If extreme length, excessive elbows, or a reduction in diameter is necessary, consult your PB Heat representative for recommendations.
3. Vent System Installation:
 - a. 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 local building codes.

⚠ WARNING

Configuration of the breeching and chimneys on some installations may result in a positive breeching pressure. In these cases, the breeching must be constructed of pressure tight materials. Consult local building authorities for proper installation. Failure to comply with this warning may result in carbon monoxide poisoning or fire, resulting in severe personal injury or death.

- b. Vent Terminations:
 - i. Vent terminations must be extended to three feet above expected snow accumulation. See Figure 1.3.
 - ii. If the vent system terminates in any area where wind-generated down drafts are likely, install a suitable vent cap to help control wind effects.
- c. Vent Connection Support:
 - i. Support the vent system independently of the boiler flue connection.
 - ii. Provide support of the vent connector (breeching) at maximum 12 foot (3.66 meter) intervals to prevent sagging.
- d. Horizontal runs of vent are to be sloped back toward the boiler at approximately 1/4" per foot (2 cm per meter).
- e. Breeching used with forced draft boilers must be sealed, of heavy gauge construction and must comply with all applicable codes of construction.
- f. Exterior Vents: Insulate vent pipes that pass through unheated spaces sufficiently to prevent excessive condensation and ensure adequate draft.

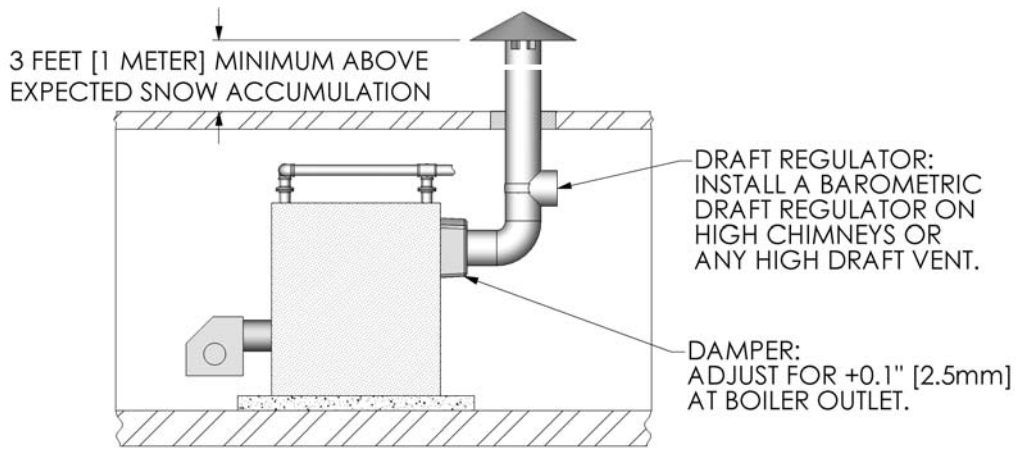


Figure 1.3: Typical Vent Termination

- g. Multiple Appliances: Do not vent multiple appliances with venting that operates under positive pressure into a common chimney or vent connector. This may cause products of combustion to circulate into the boiler room when one of the appliances is not operating.
- h. Draft Regulator: Install a barometric draft regulator when using a high chimney or any high draft vent.
 - i. This is necessary to prevent negative draft conditions in the boiler.
 - ii. Excessive draft will cause flame lifting, poor combustion, or impingement.
- 4. Vent System Operation:
 - a. This boiler is designed to fire only with a pressurized combustion chamber. The breeching and vent may be sized for negative, neutral, or positive pressure as desired.
 - b. Maintain maximum of +0.1 inches (2.5 mm) of water at the boiler outlet.
- c. Avoid excessive negative pressure in the combustion chamber. This may cause the flame to lift off of the burner causing unstable combustion. In addition, this may cause impingement of the burner flame onto the crown sheet, which may lead to overheating.

F. BOILER FOUNDATION

1. If the boiler room floor is not level or if additional structural support is required, provide a level concrete foundation pad for the boiler. The flooring and structural support system must be suitable for the operating weight of the boiler and any connected piping.
 - a. Figure 1.4 shows the Foundation Layout for Knocked-Down Boilers and Packaged Boilers.
 - b. Dimensions for the foundation are given in Table 1.2.

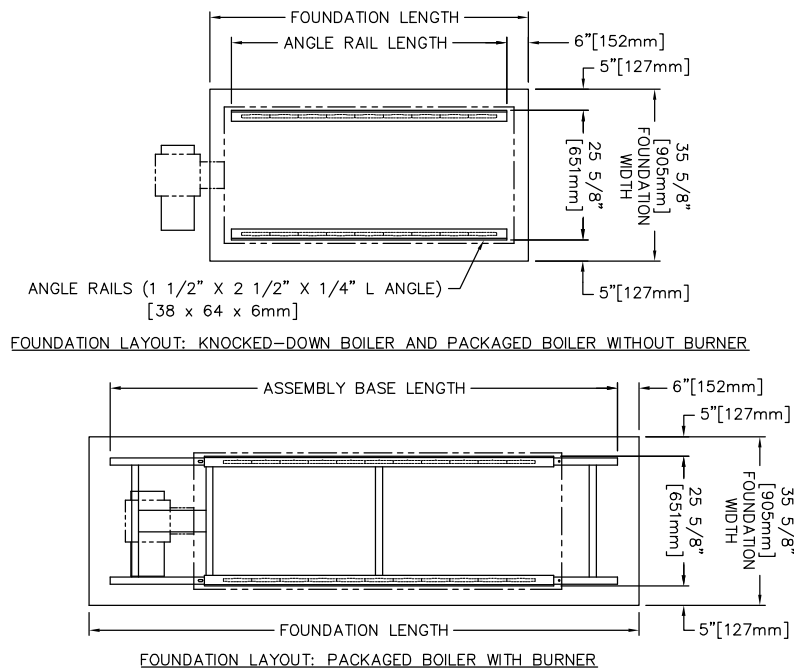


Figure 1.4: Foundation Layout

Table 1.2: Foundation Dimensions

Boiler Model	Knock-Down Boilers				Packaged Boilers With Burners			
	Rail Length (inches)	Rail Length (mm)	Foundation		Base Length (inches)	Base Length (mm)	Foundation	
			Length (inches)	Length (mm)			Length (inches)	Length (mm)
CC-03	18	457	30	762	59	1499	59	1499
CC-04	24	610	36	914	74	1880	74	1880
CC-05	30	762	42	1067	80	2032	80	2032
CC-06	36	914	48	1219	86	2184	86	2184
CC-07	42	1067	54	1372	92	2337	92	2337
CC-08	48	1219	60	1524	98	2489	98	2489
CC-09	54	1372	66	1676	104	2642	104	2642
CC-10	60	1524	72	1829	110	2794	110	2794
CC-11	66	1676	78	1981	116	2946	116	2946
CC-12	72	1829	84	2134	122	3099	122	3099

- Do not operate the boiler until the foundation, if newly poured concrete, has thoroughly cured. Rapid heating may damage the concrete due to expanding moisture.

G. INSTALLATION SURVEY

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

You can also use this survey to locate system problems that will have to be corrected. To obtain copies of the Steam or Water 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 interference with new or existing equipment, piping, venting, and wiring.

I. VERIFY COMPONENTS

- Packaged Boilers: All standard components are located in the boiler package with the following exceptions:
 - Relief Valves are assembled with piping and included in a separate carton to prevent damage in shipment.
 - In some cases, the Burner and/or Gas Train may be shipped separately.
 - The Optional Barometric Draft Damper is shipped in a separate carton.
- Knocked-down Boilers: All components are shipped for field assembly. See Table 1.3 for standard components. See Tables 1.4 for Burner Mounting Plate use.
- Assembled Block Boilers: These are similar to knocked-down boilers except the angle rails, sections and section assembly kit cartons are pre-assembled into a single shipping level component.

Table 1.3: Series CC Shipping Level Items for Water or Steam Boilers

Boiler Model	Angle Rails			Sections			Flue Outlet		Control Carton Water	Control Carton Steam	Trim Carton Water	Trim Carton Steam	Section Assembly Carton	Clean Out Cover Plate Carton	Burner Door Insulation Carton (Becket Burner)	Burner Door Insulation Carton	Target Wall Carton	Jacket Panels			
	Qty.	Front	Intermediate	Back	Flue Box	Outlet Adapter	Qty.	Qty.	Qty.	Qty.	Qty.	Qty.	Qty.	Qty.	Qty.	Qty.	Qty.	Jacket Front/Back Carton	Jacket Top/Sides/Channel Carton	Jacket Channel Carton	Jacket Top/Sides Carton
CC-03	2	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1		
	69603	69101	69103	69109	69303		69901	69911	69906	69916	69906	69916	69003	69320	69330	69331	69340	69701	69703		
CC-04	2	1	2	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	69604	69101	69103	69109	69303		69901	69911	69906	69916	69906	69916	69004	69321	69330	69331	69340	69701		69704	69713
CC-05	2	1	3	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	69605	69101	69103	69109	69305		69901	69911	69906	69916	69906	69916	69005	69322	69330	69331	69340	69701		69705	69715
CC-06	2	1	4	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	69606	69101	69103	69109	69305		69901	69911	69906	69917	69906	69917	69006	69320	69330	69331	69340	69701		69706	69716
CC-07	2	1	5	1	1		1	1	1	1	1	1	1	2	1	1	1	1	1	1	1
	69607	69101	69103	69109	69307		69901	69911	69906	69917	69906	69917	69007	69321		69331	69340	69701		69707	69717
CC-08	2	1	6	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	69608	69101	69103	69109	69308		69901	69911	69906	69917	69906	69917	69008	69321		69331	69340	69701		69708	69718
CC-09	2	1	7	1	1		1	1	1	1	1	1	1	2	1	1	1	1	1	1	1
	69609	69101	69103	69109	69308		69901	69911	69907	69918	69907	69918	69009	69322		69331	69340	69701		69709	69719
CC-10	2	1	8	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	69610	69101	69103	69109	69308		69901	69911	69907	69918	69907	69918	69010	69320		69331	69340	69701		69710	69720
CC-11	2	1	9	1	1		1	1	1	1	1	1	1	2	1	1	1	1	1	1	1
	69611	69101	69103	69109	69308	69311	69901	69911	69907	69918	69907	69918	69011	69321		69331	69340	69701		69711	69721
CC-12	2	1	10	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	69612	69101	69103	69109	69308	69311	69901	69911	69908	69918	69908	69918	69012	69321		69331	69340	69701		69712	69722

PREINSTALLATION

Table 1.4: Burner Mounting Plates

Boiler Model	Beckett Oil			Beckett (Gas)			Carlin			
	Mounting Plate Stock Code	Mounting Plate Insulation Stock Code	Burner Model	Mounting Plate Stock Code	Mounting Plate Insulation Stock Code	Burner Model	Mounting Plate Stock Code	Mounting Plate Insulation Stock Code	Burner Model	
CC-03	69351	69330	CF-500	69351	69331	CG10	69351	69331	201CRD	
CC-04			CF-800			CG10B			301CRD	
CC-05			CF-1400			CG15			702CRD	
CC-06			N/A			N/A				N/A
CC-07										
CC-08	69352	69331	CF-2300	69353	CG25	69351	69331	801CRD		
CC-09			CF2500A							
CC-10										
CC-11										
CC-12										

Boiler Model	Power Flame (Oil)			Power Flame (Gas)			Power Flame (Gas/Oil)		
	Mounting Plate Stock Code	Mounting Plate Insulation Stock Code	Burner Model	Mounting Plate Stock Code	Mounting Plate Insulation Stock Code	Burner Model	Mounting Plate Stock Code	Mounting Plate Insulation Stock Code	Burner Model
CC-03	N/A	69331	N/A	69352	69331	JR15A-10	N/A	69331	N/A
CC-04	69352		CR1-OA			JR30A-10	69352		CR1-GO-10
CC-05			CR2-OA			JR50A-15	69353		CR1-GO-12
CC-06			CR2-G-20A			CR2-GO-15			
CC-07	69353		CR2-OB			CR2-GO-20A			
CC-08									
CC-09									
CC-10									
CC-11									
CC-12									

Boiler Model	Riello (Oil)			Riello (Gas)			Riello (Gas/Oil)								
	Mounting Plate Stock Code	Mounting Plate Insulation Stock Code	Burner Model	Mounting Plate Stock Code	Mounting Plate Insulation Stock Code	Burner Model	Mounting Plate Stock Code	Mounting Plate Insulation Stock Code	Burner Model						
CC-03	69352	69331	F10	69352	69331	GAS400	69352	69331	N/A						
CC-04			F15			GAS750				N/A					
CC-05			F20			RS28/M				RLS28					
CC-06			RL28/2			RS38/M				RLS38					
CC-07			RL38/M			RS50/M				RLS50					
CC-08			RL50/M			69352				69331	69352	69331	69352	69331	N/A
CC-09															
CC-10															
CC-11															
CC-12															

2. ASSEMBLY

A. PACKAGED BOILERS

1. All assemblies should be carefully inspected for shipping damage on arrival. Any damage should be reported immediately to the shipping company and PB Heat.
2. Remove shrink-wrap and inspect the jacket, cast iron sections, and burner (if supplied) for damage. Remove the left side panels and inspect the clean out covers for damaged or missing silicone seals.
3. Continue to Section 3, Installation.

B. ASSEMBLED BLOCKS

1. All assemblies should be carefully inspected for shipping damage on arrival. Any damage should be reported immediately to the shipping company and PB Heat.
2. Check the component list in Table 1.3 and packing slip to assure that all shipping level items are received. Inspect all packages for shipping damage.
3. Continue to Section 2.G, Burner Mounting Plate Installation.

C. KNOCKDOWN BOILERS

1. Check the component list in Table 1.3 and packing slip to assure that all shipping level items are received. Inspect all packages for shipping damage.
2. Report any damage to the shipping company and PB Heat immediately.
3. Lay the angle rails provided at the point of final installation. Set the angles in parallel position with the 2" side of angle on the floor and measuring 25 11/16" (652 mm) outside-to-outside of angles. Shim the angles to level them and grout under angles after the sections are assembled.
4. Place the Front Section in position on the angles as shown in Figure 2.1. The end of the floor angle must either be flush with the boss for the wash out connection or extend beyond it by as much as 3/8" (10 mm).

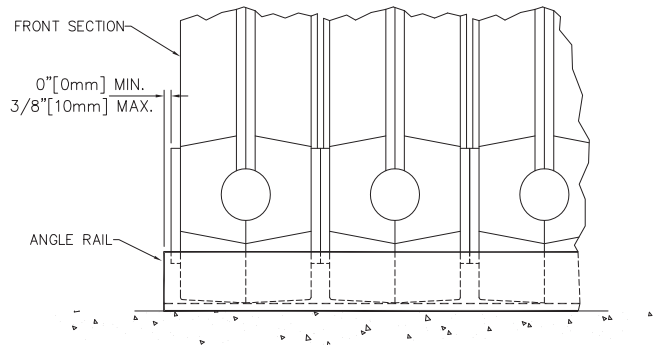


Figure 2.1: Front Section Placement

5. The Front Section should be supported vertically as shown in Figure 2.2. Install a 3" NPT x 30" (762 mm) long pipe in the wash out connection at the front of the section and block with wood.

WARNING

The cast iron sections are top heavy. Handle with care to avoid tipping or falling.

6. Inspect the port connector recesses and rope groove on the cast iron rear section for dirt and obstructions.
7. Clean the port connector recesses with a stiff wire brush.
8. Apply the spray-on adhesive supplied with the boiler to the rope groove. This will hold the rope gasket in place during assembly.

NOTICE

Do not use any section that has been damaged in the port seal area.

CAUTION

Do not spray adhesive into the port seal area.

NOTE: Some sections may need shims under support feet to align with other sections.

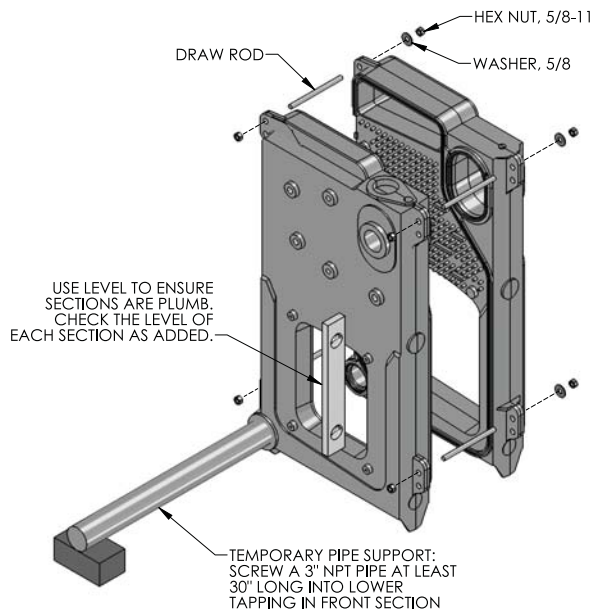


Figure 2.2: Front Section Support

9. Apply a length of rope gasket (supplied in the section assembly cartons), avoiding bends and twists in the rope. Ensure that the ends of the rope gasket extend past the clean-out cover opening as shown in Figure 2.3.

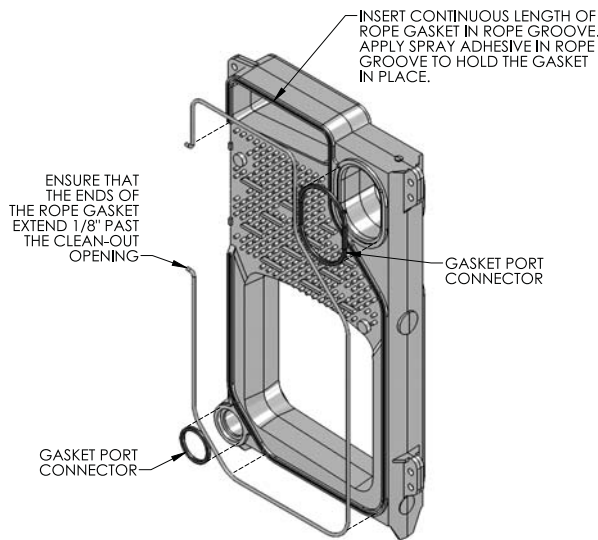


Figure 2.3: Rope Gasket and Port Connector Installation

10. Install the upper and lower hydronic seals into the upper and lower port areas in the section.

NOTICE

The upper and lower ports should be drawn up metal to metal around the seals. Metal to metal conditions will not occur at every location. Avoid excessive torque on upper left and lower right draw rods, which may cause warping of sections.

11. Select the correct intermediate section (refer to Table 2.2), and slide it into place against the front section. Ensure that the sections are plumb and the port connectors are properly seated in the port recesses as indicated in Figure 2.4.

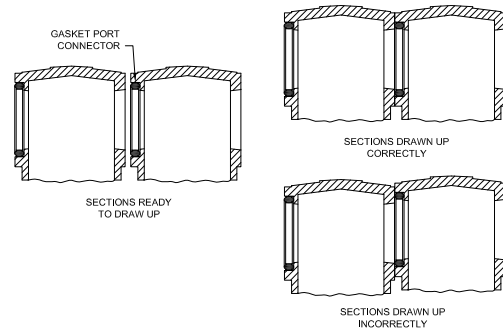


Figure 2.4: Drawing Up Sections

12. Install the draw rods as shown in Figure 2.2 and tighten them lightly. Use only one washer per draw rod. Tighten nut on washer side only.
13. Inspect the rope gasket to ensure that it remains in the rope groove.
14. Check the section alignment and port connector position by looking through the ports. If necessary, reposition the port connector by loosening the draw rods and then retightening them.
15. Check the floor angles and sections for alignment.
16. Gently tighten the draw rods to the torque specification and sequence as described in Table 2.1. Make sure the port connectors stay inside the boiler ports. Do not completely tighten any draw rod out of sequence. Gradually work each side until the correct torque is reached.
17. Select the next appropriate section in accordance with Table 2.2.

Table 2.1: Torque Specifications for Series CC Boiler

Seq. No.	Draw Rod Position	Torque (ft. lbs.)	Torque (Nm)
1	Upper Right	5	7
2	Lower Left	5	7
3	Upper Left	5	7
4	Lower Right	5	7
5	Upper Right	25	34
6	Lower Left	25	34
7	Upper Right	50	68
8	Lower Left	50	68
9	Upper Left	10	14
10	Lower Right	10	14

Table 2.2: Section Arrangement

3 SECT	F	H	B																	
4 SECT	F	P	H	B																
5 SECT	F	H	P	H	B															
6 SECT	F	P	H	P	H	B														
7 SECT	F	P	P	H	P	H	B													
8 SECT	F	P	P	P	H	P	H	B												
9 SECT	F	P	H	P	H	P	H	P	B											
10 SECT	F	P	P	H	P	H	P	H	P	B										
11 SECT	F	P	P	P	H	P	H	P	H	P	B									
12 SECT	F	P	P	P	P	H	P	H	P	H	P	B								

F = Front Section
 P = Plain Intermediate Section
 H = Heater Intermediate Section - Optional, must be ordered.
 B = Back Section

D. HYDROSTATIC TESTING

1. Plug all openings in the boiler waterways and fill the boiler with cold water. While filling the boiler, re-check the torque on all ports and tighten the draw rods if necessary.

NOTICE

Do not exceed the maximum torque specifications . Tighten the rods in the sequence shown in Table 2.1.

Do not continue to tighten the sections after metal-to-metal contact is made. Over-tightening the draw rods will not improve the seal and may cause damage to the castings.

2. Hydrostatically test the boiler for leaks in accordance with ASME Code, Section IV.
 - a) Steam Boilers: The assembled boiler shall be subjected to a hydrostatic test pressure of not less than 45 psig (310 kPa).
 - b) Water Boilers: The assembled boiler shall be subjected to a hydrostatic test pressure of not less than 1-1/2 times the maximum allowable working pressure.
 - c) The test pressure shall not exceed the minimum requirements shown above by more than 10 psi (69 kPa).
3. If any port connector leaks, tighten the draw rods until either the joint achieves full metal-to-metal contact or until the maximum torque is reached. Check the torque on the other draw rods that may have been affected by the draw rod that was tightened.

NOTICE

When the boiler is put into operation for the first time, the temperature should be brought up slowly (low fire on burners with this capability).

E. CC CLEANOUT COVER INSTALLATION

CAUTION

Inspect the covers to ensure that the insulation is not damaged or missing. If it is call PB Heat customer service.

1. The CC uses special cast iron cover plates with flue side fins. The insulation and rope seal are installed at the factory.
2. Trim the rope that is sticking out around the cleanout opening flush with the castings to insure an air-tight seal.
3. Install the cleanout cover bolts from the baffled side of the cleanout cover and start the nuts.
4. Rotate the bolts so the cam heads fit between the cleanout cover bosses on the castings.
5. Insert the cleanout cover and tighten the nuts to 10 ft lbs (14 Nm).
6. Apply a bead of high temperature silicone caulk around the perimeter of the cleanout cover to ensure an air tight seal.

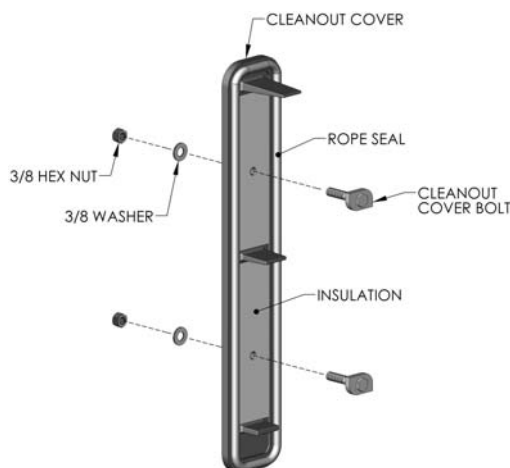


Figure 2.5: CC Cleanout Cover Installation

F. BURNER MOUNTING PLATE AND TARGET WALL INSTALLATION

1. The target wall is used on 3–6 section boilers. It is to be inserted into the combustion chamber and positioned with the large flat side against the Back section. No glue or fasteners are used to secure the target wall against the section. Refer to Figure 2.7.
NOTE: Install the round insulation plug, provided in the Target Wall carton, into the Back Section prior to installing the target wall.
2. Inspect the rope groove on the Burner Mounting Plate for dirt and obstructions. Use a wire brush if necessary to clean the groove.
3. Spray the rope groove with the spray adhesive provided and apply the 3/8" diameter rope gasket.
4. Install the 7/16" x 2-1/2" Studs provided into the four threaded holes around the perimeter of the burner opening in the Boiler Front Section as shown in Figure 2.6.

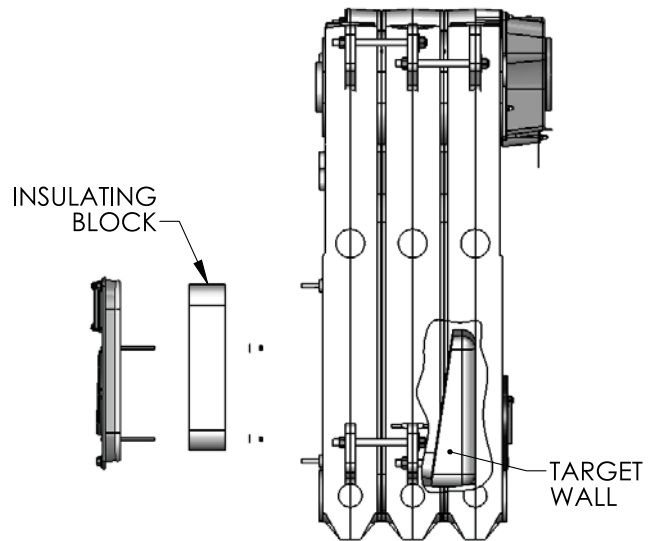


Figure 2.7: Target Wall Installation

G. REAR OBSERVATION PORT INSTALLATION

NOTE: Boiler Models CC-03 through CC-06 are equipped with a target wall and the Rear Observation Plate does not have a viewing window.

For boiler Models CC-07 through CC-12 assemble the rear Observation Plate and install as shown in Figure 2.8.

1. Assemble Rear Observation Port as shown in Figure 2.8:
 - a) Lift up the flapper door on the inside of the Observation Port and insert the Hex Head Cap Screw provided in the Section Assembly Carton.
 - b) Slide the Spring over the hex head screw and thread the Hex Nut onto the screw.
 - c) Thread the Knob onto the Hex Head Screw behind the nut and lock into position using the jam nut.

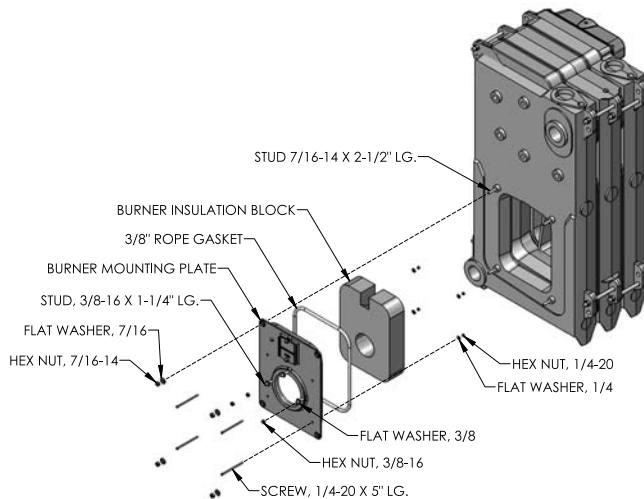


Figure 2.6: Burner Mounting Plate Installation

5. Align the insulation notch with the burner plate view port. The notch slope should face toward the combustion chamber. Attach the burner plate insulation to the burner plate with the 1/4 x 5" long screws, nuts and washers.
NOTE: For Beckett burners used on CC-03 through CC-06 models, a Burner Insulation Block, 69330, must be used.
6. Attach the burner mounting plate to the front section with the 7/16 nuts and washers.
7. Install the three 3/8-16 x 1-1/4" studs provided into the screw seats provided on the Burner Mounting Plate.
8. When the burner is installed, the hole in the Insulation Block for the Burner may need to be enlarged and shaped. This can be cut with a hacksaw blade.

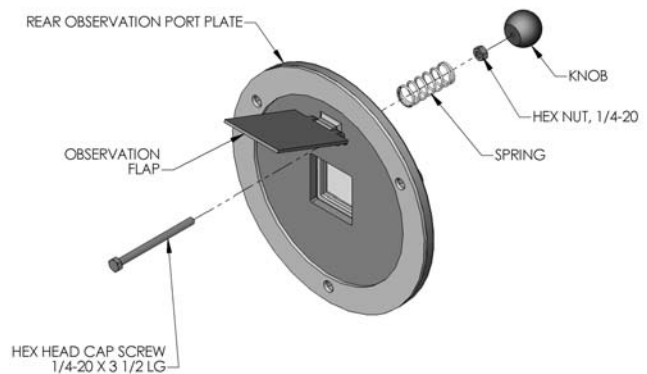


Figure 2.8: Rear Observation Port Assembly

2. Thread the 5/16" x 1-1/2" studs into the screw seats around the rear observation port opening in the Boiler Back Section.
3. Apply the 1/8" (3mm) thick x 3/4" (19mm) wide tape to the seal area around the studs.
4. Install the Rear Observation Port Assembly on the Boiler Back Section using three 5/16" hex nuts and washers.

H. FLUE COLLECTOR INSTALLATION

1. Screw the four 5/16-18 x 1 1/2" studs provided into the screw seats around the flue collector outlet on the Boiler Back Section.
2. Place the 1/8" (3 mm) thick x 3/4" (19 mm) wide Insulation Tape provided in the Section Assembly Carton over the studs.
3. Place the flue collector in position and install the 5/16" washers and nuts. Tighten the nuts uniformly.
4. Open the Slide Damper to the full open position to prepare for adjustment during Burner commissioning.
5. Apply the 1/8" (3 mm) thick x 3/4" (19 mm) wide tape to the slide damper angle. See Figure 2.9.

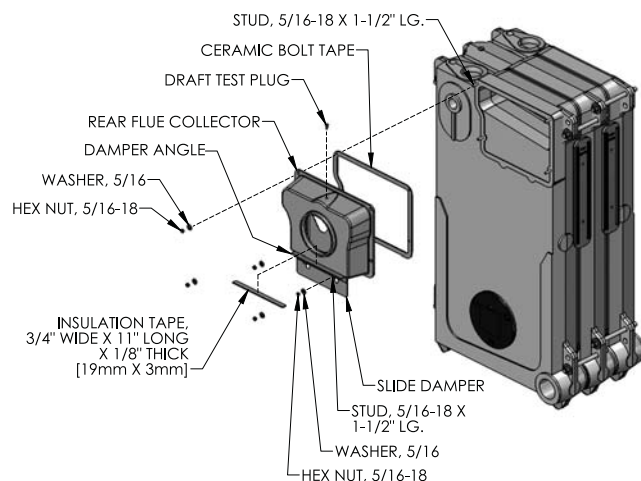


Figure 2.9: Rear Flue Collector Installation

I. BURNER MOUNTING

1. Read the Burner Instruction Manual before starting.
2. Remove the Burner from its crate. Verify that all components are included with the burner.
3. Place the high temperature gasket specified by the Burner Manufacturer on the Burner Mounting Plate and secure the Burner using 3/8" flat washers and hex nuts provided.
4. If the Burner is supplied with a pedestal support, install it per the Burner Manufacturer's Instructions. The pedestal supports the burner and prevents undue stress on the Boiler Castings.

3. INSTALLATION

A. PREPARATION

1. The boiler must be hydrostatically pressure tested as indicated in Section 2, paragraph D.
2. The jacket panels are designed so that they may be installed after the boiler is piped. Use nipples long enough to extend through the jacket.

B. STEAM BOILER PIPING

1. Refer to the PB Heat Steam Installation Survey for guidance with steam boiler piping and components.
2. Piping for steam boilers is shown in Figures 3.1 and 3.2. Table 3.1 contains a pipe size schedule for steam boilers.
3. Series CC Boilers are intended to be piped with one or two risers to the header depending on the boiler size.
 - a) Table 3.1 shows a pipe schedule for steam boiler headers.
 - b) See Figure 3.1 for a typical piping arrangement for boilers with one riser.

CAUTION

Do not reduce the size or number of risers shown in Table 3.1. If the risers are undersized or incorrectly placed, a sloped water line may occur in the boiler. This may lead to the overheating of boiler sections.

Table 3.1: Piping Schedule

Steam Boiler Piping			
Boiler Model	Number of 3" NPT Risers	Header Size (NPT)	Equalizer Size (NPT)
CC-03 to CC-05	1	3"	1-1/2"
CC-06 to CC-10	2	4"	2"
CC-11 & CC-12	2	5"	2-1/2"

- c) See Figure 3.2 for a typical piping arrangement for boilers with two risers.
4. A Hartford loop, as shown in Figures 3.1 and 3.2 is recommended in all steam boiler installations. The loop prevents the boiler from being drained completely due to a leak in a return line.

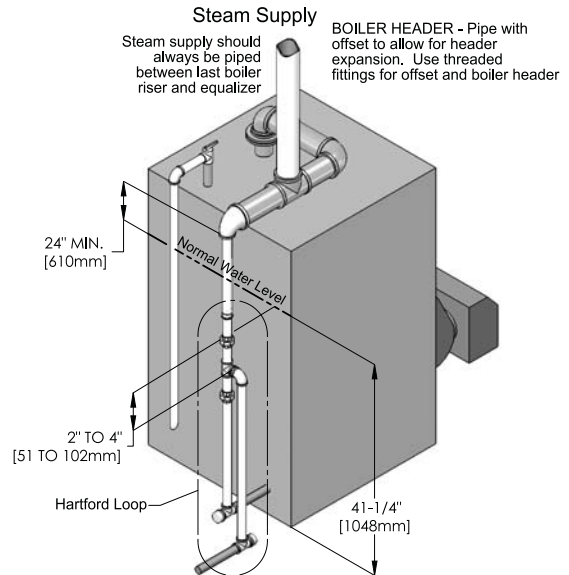


Figure 3.1: Typical piping arrangement for boilers with one riser.

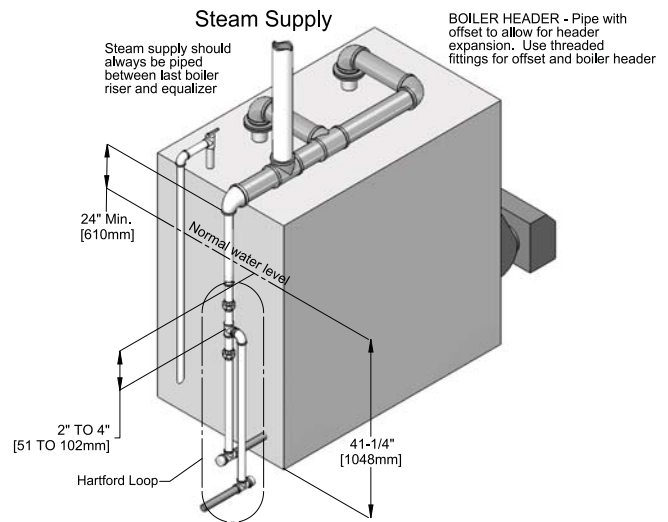


Figure 3.2: Typical piping arrangement for boilers with two risers.

5. Pumped Return Systems:
 - a) For pumped return systems, install a spring-loaded check valve on the pump discharge. This will prevent boiler water from backing up into the condensate receiver.
 - b) If the pump discharge is looped above the normal water level, install a spring-loaded check valve at the connection to the boiler return. This will ensure water under pressure in the vertical pipe preventing water hammer due to hot condensate flashing to steam.

- c) Install a flow regulating valve on the pump discharge to allow throttling of the pump flow. Excess return flow may cause water hammer and water level fluctuations.
- d) Use a Hartford Loop connection. Oversize the equalizer slightly to make sure water doesn't spray into the header and cause hammering.
- 6. Always locate the steam supply take-off between the equalizer and the last boiler riser. Failure to do this will cause water carryover into the system because the condensate will collect at the entrance to the steam main.
- 7. Pitch the steam header to allow condensate to flow toward the equalizer.
- 8. Feedwater requirements for steam boilers at full input are shown in Tables 3.2a and 3.2b. Addition of water to the boiler should be controlled by sensing the boiler water level.
- 9. 1" NPT water column tapplings are provided on the front section for mounting low water cutoffs and level controllers.
- 10. The front section has 3" NPT tapping at the base for installation of 3" NPT close nipple and 3" NPT pipe caps. Removal of caps allows flushing of sediment from the boiler.

C. MULTIPLE STEAM BOILER PIPING

- 1. Figure 3.4 shows typical piping for multiple steam boiler gravity return systems.
- 2. Figure 3.5 shows typical piping for multiple steam boiler pumped return systems.
- 3. Provide separate feed lines for multiple steam boiler pumped return systems. Use either separate feed pumps or electrically actuated valves to isolate the boiler feed. This is necessary to provide reliable level control and avoid nuisance performance problems.
- 4. Condensate return units are not recommended for multiple boiler installations. Use a boiler feed system which is actuated by a boiler control that responds to the needs of the boiler.
- 5. Install a float & thermostatic (F&T) trap at the boiler normal water level on each of the boilers in a multiple boiler system with pumped returns. This will prevent flooding of idle boilers due to condensation of steam.

Table 3.2a: Feedwater Requirements – US Customary Units

Boiler Model	Gross Output MBH	Evap. Rate ¹ GPM	Minimum Feedwater Pump Flow ² GPM	Condensate Receiver Capacity ³ Gallon
CC-03	308	0.6	1.22	12
CC-04	421	0.9	1.7	17
CC-05	587	1.2	2.38	24
CC-06	762	1.5	3.04	30
CC-07	924	1.9	3.72	37
CC-08	1087	2.2	4.38	44
CC-09	1262	2.5	5.06	51
CC-10	1424	2.9	5.72	57
CC-11	1587	3.2	6.4	64
CC-12	1750	3.5	7.06	71

- 1. Evaporation rate is based on heat of vaporization at 212°F, 970 BTU/lbm.
- 2. Minimum feedwater pump flow is based on 2 times evaporation rate.
- 3. Condensate receiver capacities are based on 20 minute steam

Table 3.2b: Feedwater Requirements – SI Metric Units

Boiler Model	Gross Output KW	Evap. Rate ¹ ltr/min	Minimum Feedwater Pump Flow ² ltr/min	Condensate Receiver Capacity ³ Liter
CC-03	90	2.3	4.6	46
CC-04	123	3.2	6.4	64
CC-05	172	4.5	9.0	90
CC-06	223	5.8	11.5	115
CC-07	271	7.0	14.1	141
CC-08	318	8.3	16.6	166
CC-09	370	9.6	19.2	192
CC-10	417	10.8	21.7	217
CC-11	465	12.1	24.2	242
CC-12	513	13.4	26.7	267

- 1. Evaporation rate is based on heat of vaporization at 100°C, 2257 kJ/kg.
- 2. Minimum feedwater pump flow is based on 2 times evaporation rate.
- 3. Condensate receiver capacities are based on 20 minute steam cycle. Chart shows actual capacity, not gross receiver volume

INSTALLATION

USE SWING JOINTS WITH THREADED FITTINGS ON ALL HEADER PIPING TO ALLOW FOR THERMAL EXPANSION

PIPE ALL HEADERS MINIMUM 24" ABOVE BOILER WATER LINE

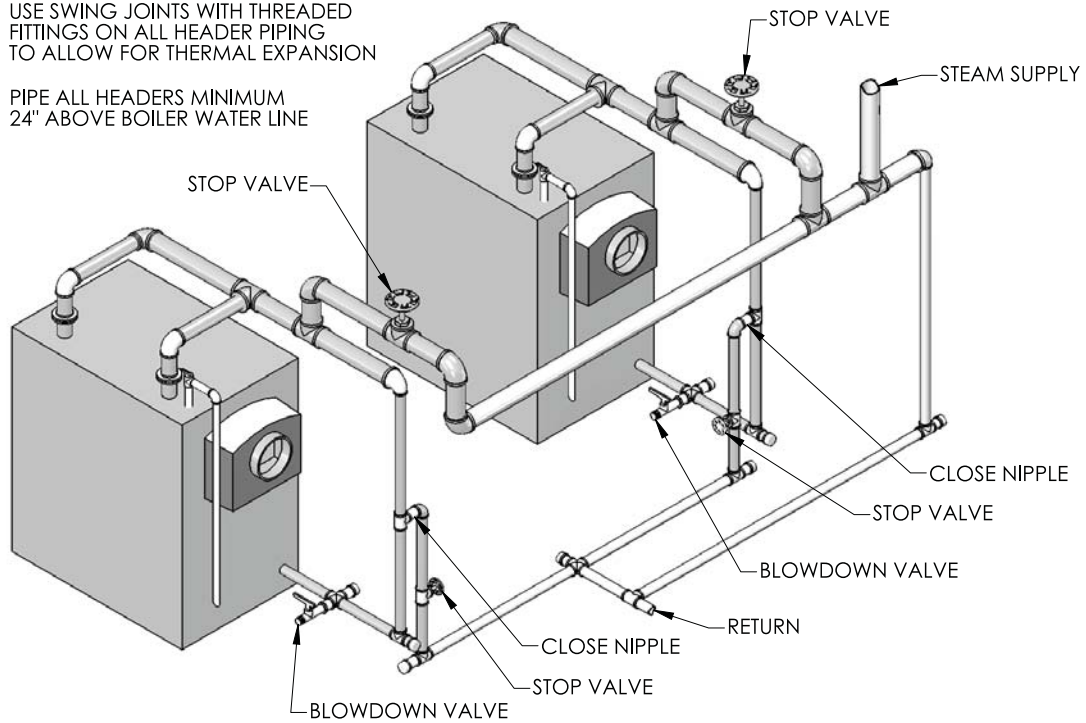


Figure 3.4: Multiple Steam Boiler Piping - Gravity Return

USE SWING JOINTS WITH THREADED FITTINGS ON ALL HEADER PIPING TO ALLOW FOR THERMAL EXPANSION

PIPE ALL HEADERS MINIMUM 24" ABOVE BOILER WATER LINE

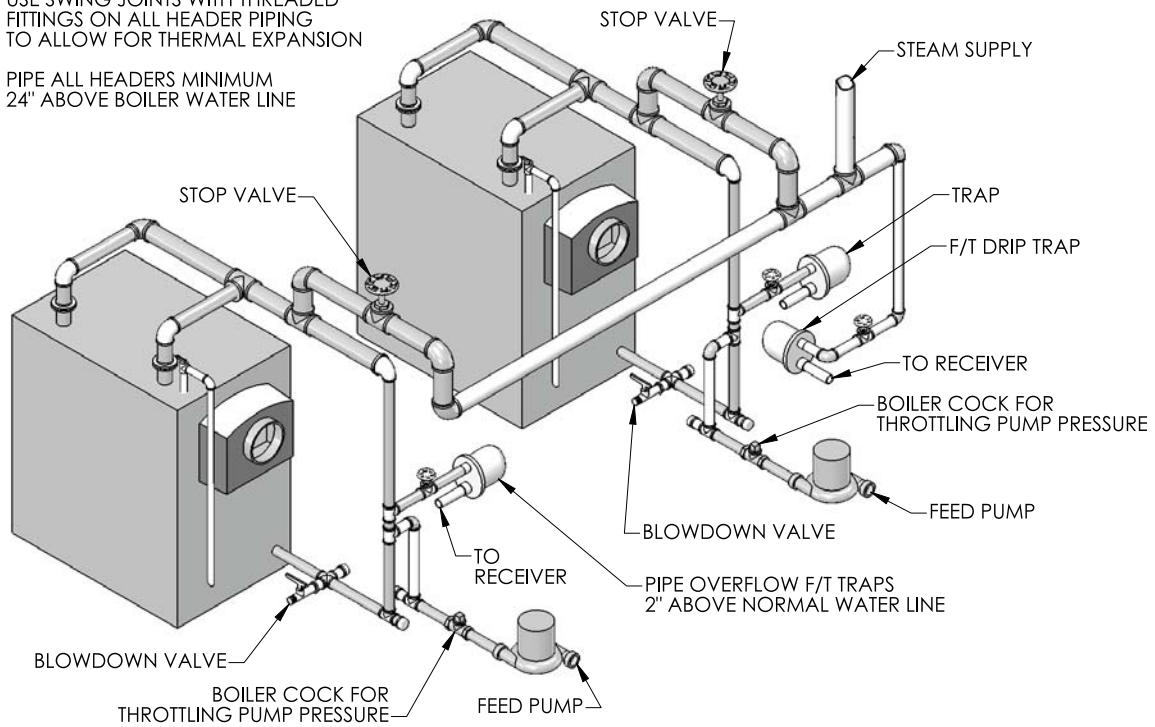


Figure 3.5: Multiple Steam Boiler Piping - Pumped Return

D. WATER BOILER PIPING

1. Refer to the Peerless® Water Installation Survey for guidance with water boiler piping and components.
2. Typical piping for a Series CC water boiler is shown in Figure 3.6.
3. The recommended supply and return pipe sizing in Tables 3.3 and 3.4 is based on a flow rate through the boiler that produces a 20°F (11°C) temperature rise [1 gpm (3.79 ltr/min)] of flow for each 10,000 Btu/hr (2.93 kW) of boiler output.
4. Using higher flow rates is not recommended because it may cause poor distribution through the boiler.
5. Lower flow rates are acceptable providing that the return temperature to the boiler is a minimum of 130°F (54°C) on gas boilers and 150°F (66°C) on oil boilers to prevent condensation of flue gases.
6. The size of supply and return connections given in Tables 3.3 and 3.4 are the minimum size for a 20°F (36°C) temperature differential. Do not reduce these sizes unless the flow is low enough to keep the velocity from developing noise and erosion problems.

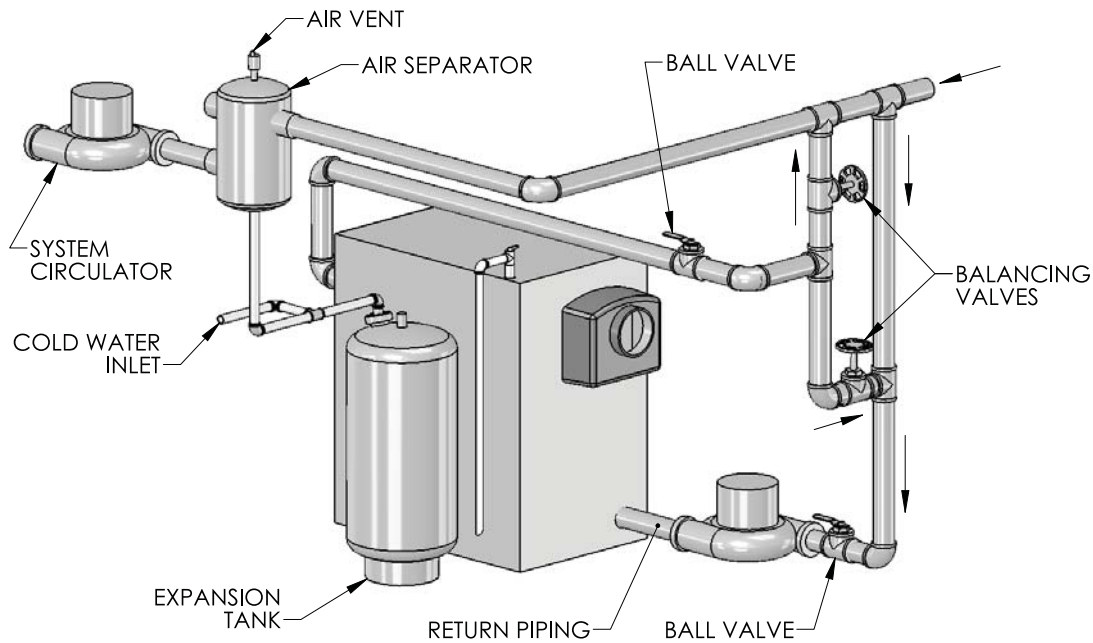


Figure 3.6: Water Boiler Piping

Table 3.3: Supply & Return Pipe Sizing – US Customary Units

Boiler Model	Gross Output (MBH)	Flow Rate @20 F Rise (GPM)	Recommended	
			Supply Size (NPT)	Return Size (NPT)
CC-03	308	31	2	2
CC-04	421	42	2	2
CC-05	587	59	2 1/2	2 1/2
CC-06	762	76	3	3
CC-07	924	92	3	3
CC-08	1087	109	3	3
CC-09	1262	126	3	3
CC-10	1424	142	3	3
CC-11	1587	159	4	3
CC-12	1750	175	4	3

Table 3.4: Supply & Return Pipe Sizing – SI Metric Units

Boiler Model	Gross Output (kW)	Flow Rate @36 C Rise (ltr/min)	Recommended	
			Supply Size (NPT)	Return Size (NPT)
CC-03	90	117	2	2
CC-04	123	159	2	2
CC-05	172	222	2 1/2	2 1/2
CC-06	223	288	3	3
CC-07	271	350	3	3
CC-08	318	411	3	3
CC-09	370	478	3	3
CC-10	417	539	3	3
CC-11	465	601	4	3
CC-12	513	662	4	3

INSTALLATION

7. When the boiler is connected to heating coils located in air handling units, the boiler piping must be equipped with flow control devices to prevent gravity circulation of the boiler water during the cooling cycle.
8. Low Temperature Return Systems:
 - a) When the system return temperature will be below 130°F (54°C) on gas or 150°F (66°C) on oil for extended periods (heat pump systems, radiant panels, snow melt, outdoor reset, etc.) provide piping and controls to protect the boiler from condensation. Excessive condensation will lead to corrosion in the boiler and breaching, which will shorten the life of the boiler.
 - b) Low return water temperatures are likely to occur whenever the boiler is allowed to cool below design temperatures (cold start). This is acceptable as long as the frequency of these shut-downs is very low.
9. Chilled Water Systems:

If the boiler will be used in conjunction with a chilled medium system, the chiller must be piped in parallel with the boiler to prevent the chilled medium from entering the boiler and causing damage. See Figure 3.7.

E. MULTIPLE WATER BOILER PIPING

1. Figure 3.8 shows a typical piping arrangement for multiple water boilers. The optional bypass valve is used when the system return water temperature is consistently below 130°F (54°C) for gas boilers or 150°F (66°C) for oil boilers.

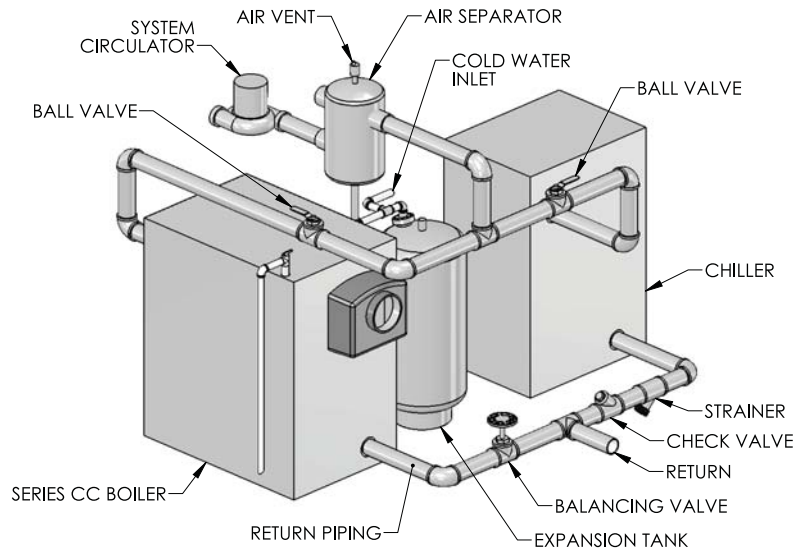


Figure 3.7: Chilled Water Systems

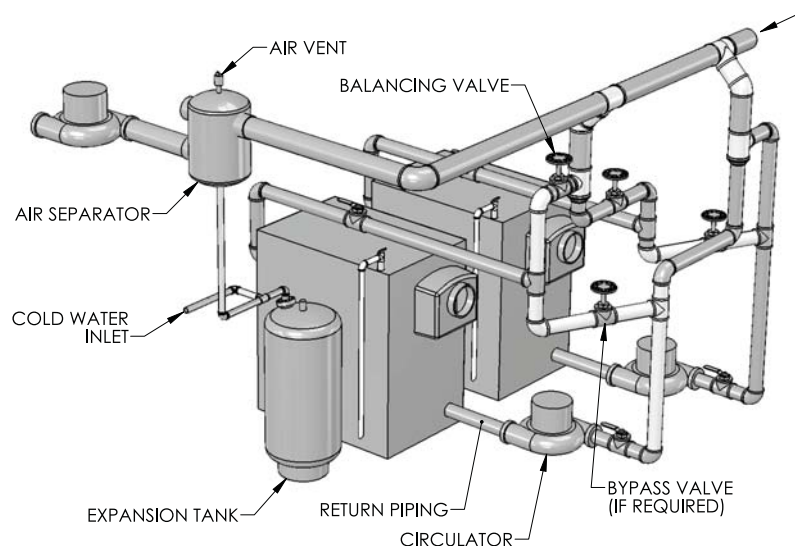


Figure 3.8: Multiple Water Boiler Piping

- For systems with variable low temperature return temperature, a three-way valve may be used (see Peerless® Water Installation Survey for details).

F. TANKLESS HEATER INSTALLATION

- Heater sections must be installed as shown in Table 2.2 in the Assembly section of this manual.
- Inspect heater section for dirt or rust on the mating surface. Clean with a wire brush if necessary.
- Install 7/16" x 1 1/2" studs in the screw seats around the heater opening as shown in Figure 3.9.

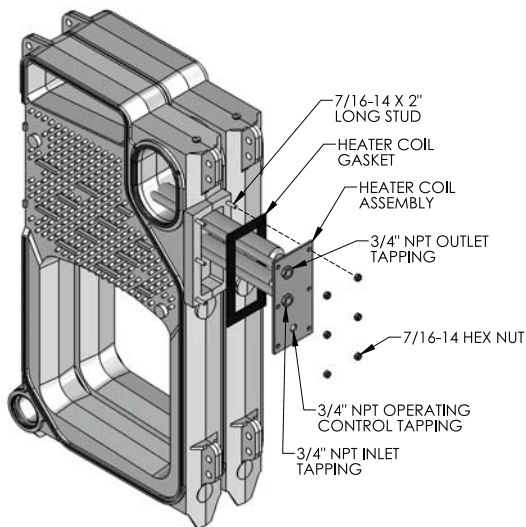


Figure 3.9: Tankless Heater Coil Installation

- Place the heater gasket over the studs. Be sure the gasket is not twisted.
- Carefully install the heater coil. Install the nuts and tighten them evenly to ensure uniform compression of the gasket.
- Install the operating control in the center tapping on the heater mounting plate. Figure 3.10 shows an acceptable piping arrangement for multiple heater coils.

WARNING

Provide anti-scald devices in the system where needed. Failure to control water temperature to showers or other usage areas where scald risk exists may result in severe personal injury.

G. JACKET PREPARATION

- Collect all jacket cartons as listed in Table 1.3 in the Pre-installation section of this manual.
- The cartons contain pre-insulated panels and screws for attaching them to the unit.

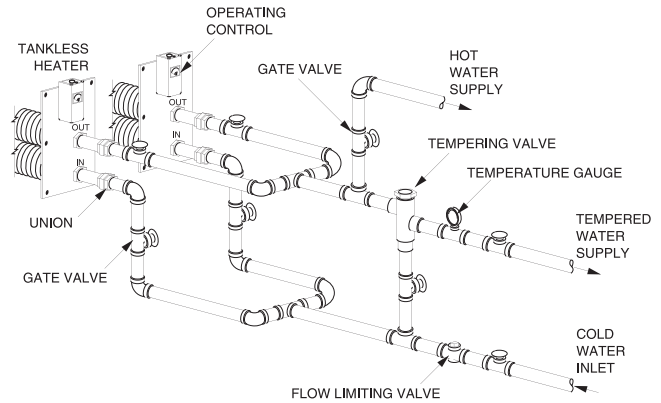


Figure 3.10: Typical Piping for Multiple Tankless Heater Coils

- Remove all required knock-outs (Heater Coils, Steam Supply, LWCO, etc.) from jacket panels before assembly.
- The boiler block must be completely assembled on the Angle Rails supplied by PB Heat before installing the jacket.
- Any limit controls, steam gauge glass, low water cutoffs or gauges to be mounted on the front of the boiler must be installed after the Front Jacket Panel.
- All other piping and burner mounting plate may be made before jacket installation.

H. CC JACKET ASSEMBLY

- Lower Channels: Place lower channels on floor along side boiler with the wider side against boiler. Lower channels are labeled (LC). Attach four adjustable feet to the studs on the lower channels. The feet are located in the front/back carton
- Front Panels: The front panel is labeled (F1) and attaches to the lower channels with four sheet metal screws. Slide assembly back against boiler front section.
- Rear Panels: (R1) is the label of the rear panel and attaches to the lower channels in the same manner as the front panel did.
- Upper Channels: Upper channels are labeled (UC) and mount to both the front and rear panels with four sheet metal screws. The widest part of the upper channel should be against the boiler side.
- Top Panels: There are six different top panels labeled (T1 thru T6). (T1) is the front top panel and has two knockouts in it which may or may not have to be

removed depending on your operation. It is attached to the front panel by three sheet metal screws. (T2) is the rear top panel and attaches to the rear panel with two sheet metal screws. There is one hole in the panel for either a relief valve and one knockout that may or may not be needed. (T3 thru T6) are center top panels which fit over both upper channels.

NOTE: There are two metal spring “C” clips that are furnished to attach the front top panel (T1) to the center top panel when the large knockout is removed. The same is true for the rear top panel (T2). Refer to Figure 3.12.

6. Side Panels:

Each side panel requires either one or two chrome knobs, depending on its size. Side panels are installed by inserting the top of the panel into the upper channel and lifting until it clears the low channel, then pushing the bottom into the lower channel. Refer to the side panel location schedule for the correct locations of the panels.

7. Front Panel Side Cover:

Place F2 slide cover in position as indicated. Fasten in position with sheet metal screws.

8. Leveling Jacket:

The entire jacket assembly can be leveled by using the four adjustable feet on the bottom of the lower channels.

Table 3.5: Side Panel Location Schedule

Section Number	Left Side	Right Side
3	S3	S1W, S2H(R)
4	S2, S2	S2W, S2H(R)
5	S2, S3	S1W, S2H(R), S2H(R)
6	S3, S3	S2W, S2H(R), S2H(R)
7	S3, S2, S2	S1W, S2H(R), S2H(R), S2H(R)
8	S4, S4	S2W, S2H(R), S2H(R), S2H(R)
9	S3, S3, S3	S1W, S2H(R), S2H(R), S2H(R), S2
10	S4, S3, S3	S2W, S2H(R), S2H(R), S2H(R), S2
11	S4, S4, S3	S3W, S2H(R), S2H(R), S2H(R), S2
12	S4, S4, S4	S2W, S2, S2H(R), S2H(R), S2H(R), S2

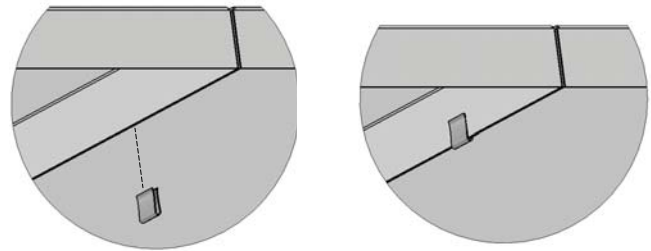


Figure 3.12: Spring “C” Clip View

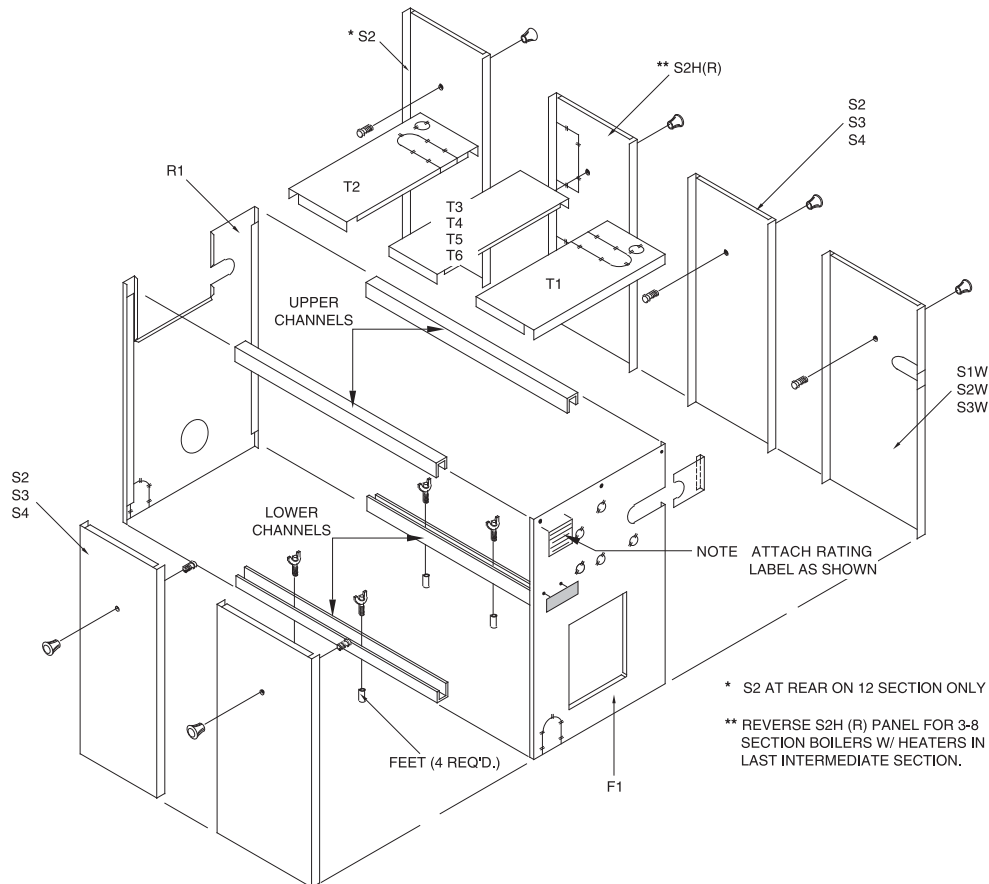


Figure 3.11: Jacket Assembly

Table 3.6: Jacket Channel Schedule

Box Number	Jacket Channel Carton																			
Box Contents	UC3	UC4	UC5	UC6	UC7	UC8	UC9	UC10	UC11	UC12	LC3	LC4	LC5	LC6	LC7	LC8	LC9	LC10	LC11	LC12
Boiler Size																				
3 Section	2										2									
4 Section		2										2								
5 Section			2										2							
6 Section				2										2						
7 Section					2										2					
8 Section						2										2				
9 Section							2										2			
10 Section								2										2		
11 Section									2										2	
12 Section										2										2

Table 3.7: Jacket Front/Back & Top/Sides Schedule

Box Number	Jacket Front/Back Carton					Jacket Top/Sides Carton																
Box Contents	F1	R1	T1	T2	Bag Hdw.	T3	T4	T5	T6	S1W	S2	S2H(R)	S2W	S3	S3W	S4	Knob					
Boiler Size																						
3 Section	The carton which consists of one (1) each of the above listed items, is the same for all sizes of boilers.									1		1		1			4					
4 Section						1					2	1	1								4	
5 Section							1				1	1	2			1					6	
6 Section								1					2	1	2							7
7 Section									1		1	1	2	3		1						8
8 Section							1	1					3	1							2	10
9 Section								2			1	1	3		3							11
10 Section								1	1			1	3	1	2					1		12
11 Section									2			1	3		1	1	2					12
12 Section								3				2	3	1						3		12

NOTE: The CC-03 model has a combined top/sides/channel carton.

I. FUEL PIPING

1. General:
 - a) Read the Burner Instruction Manual, supplied with the boiler, or if the burner was purchased separately, with the burner.
 - b) Review applicable code requirements for the burner and fuel piping installations.
 - c) Install piping to allow for removal of burner and access to combustion chamber for cleaning or service.
2. Install Fuel Oil Piping:
 - a) Place the fuel oil tank and install the piping in accordance with local codes or in the absence of such codes with the codes listed in paragraph 1.B.
 - b) Follow guidelines in the Burner Instruction Manual for sizing oil lines. Never use smaller than 1/2" (12.7 mm) OD copper tubing.
 - c) Install manual shut-off valves on the suction line at the burner and at the oil line entrance to the building.
 - d) 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.
 - e) Install a two pipe oil distribution system when possible. It will improve the reliability of the oil delivery to the burner.
 - f) Use flare fittings when using copper tubing.
 - g) If the 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.
 - h) If the burner is below the top of the tank, install an anti-siphon device to prevent oil flow in the event of an oil line break.
3. Install Gas Supply Piping:
 - a) Size gas piping as required by Local codes or in the absence of such authority, the codes listed in paragraph 1.B.
 - b) Use Table 3.8 & 3.9 for sizing of piping for natural gas with a system pressure drop of 0.3 inches of water (0.075 kPa).
 - c) Check the maximum inlet gas pressure in the Burner Instruction Manual and make sure that the system regulator will not allow the gas pressure to exceed this value.
 - d) The minimum gas supply pressure is listed on the Burner Rating Plate. Make sure the system regulator and piping are sized and adjusted properly to provide this pressure under all conditions.

Table 3.8: Capacity of Gas Supply Pipe in Cubic Feet Per Hour of Natural Gas for a Pressure Drop of 0.30 inches of water

Pipe Length (Feet)	1-1/4" Pipe	1-1/2" Pipe	2" Pipe	2-1/2" Pipe	3" Pipe	4" Pipe	6" Pipe
10	1,050	1,600	3,050	4,800	8,500	17,500	44,000
20	730	1,100	2,100	3,300	5,900	12,000	31,000
30	590	890	1,650	2,700	4,700	9,700	25,000
40	500	760	1,450	2,300	4,100	8,300	22,000
50	440	670	1,270	2,000	3,600	7,400	20,000
60	400	610	1,150	1,850	3,250	6,800	18,000
70	350	560	1,050	1,700	3,000	6,200	17,000
90	320	490	930	1,500	2,600	5,400	15,000
100	305	460	870	1,400	2,500	5,100	14,000
150	250	380	710	1,130	2,000	4,100	11,500

Table 3.9: Capacity of Gas Supply Pipe in Cubic Meters Per Hour of Natural Gas for a Pressure Drop of 0.075 kPa

Pipe Length (meter)	1-1/4" Pipe	1-1/2" Pipe	2" Pipe	2-1/2" Pipe	3" Pipe	4" Pipe	6" Pipe
3.05	30	45	86	136	241	496	1,246
6.10	21	31	59	93	167	340	878
9.14	17	25	47	76	133	275	708
12.19	14	22	41	65	116	235	623
15.24	12	19	36	57	102	210	566
18.29	11	17	33	52	92	193	510
21.34	10	16	30	48	85	176	481
27.43	9	14	26	42	74	153	425
30.48	9	13	25	40	71	144	396
45.72	7	11	20	32	57	116	326

Above ratings are based on natural gas with a specific gravity of 0.60 allowing pressure drop of 0.3 inches of water (0.075 kPa). No allowance is needed for pipe fittings. Apply the following factors to the above capacities for specific gravity other than 0.60.

Specific Gravity	0.50	0.55	0.60	0.65	0.70	0.75
Multiplier	1.10	1.04	1.00	0.96	0.93	0.90
Specific Gravity	0.80	0.85	0.90	1.00	1.10	1.20
Multiplier	0.87	0.84	0.82	0.78	0.74	0.71
Specific Gravity	1.30	1.40	1.50	1.60	1.70	1.80
Multiplier	0.68	0.66	0.63	0.61	0.59	0.58

- e) Install a Service Valve, Sediment Trap and Ground Joint Union at the supply connection to the Gas Control Train as shown in Figure 3.12. These components are to be supplied by the installing contractor and are not part of the boiler or burner. Install them in accordance with local codes or in the absence of such authority with the codes listed in paragraph 1.B.
- f) Use only pipe joint compounds rated for use with Liquefied Petroleum Gases.

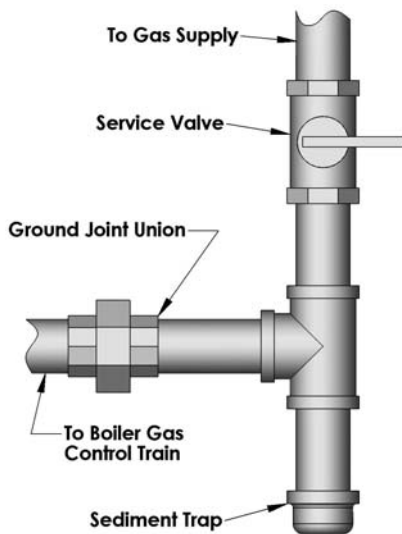


Figure 3.12: Gas Supply Connection to Boiler

4. Test Gas Supply Piping:
 - a) Isolate the Boiler Gas Control Train from the system during testing.
 - b) For test pressures 1/2 psig (3.4 kPa) or less, close the Manual Shut-Off Valve on the Boiler Gas Control Train.

⚠ WARNING

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

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

- c) For test pressures above 1/2 psig (3.4 kPa), disconnect the gas supply piping upstream of the Boiler Manual Shut-Off Valve.

J. INSTALL CONTROLS AND TRIM

1. Install Safety Relief Valve:
 - a) Install a Safety Relief Valve on the 1-1/4" NPT tapping at the top of the rear section for both steam and water boilers as shown in Figure 3.13.

⚠ 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 in the same size pipe or larger than the valve discharge size. Do not put any valves or restrictions in the Safety Relief Valve discharge piping.

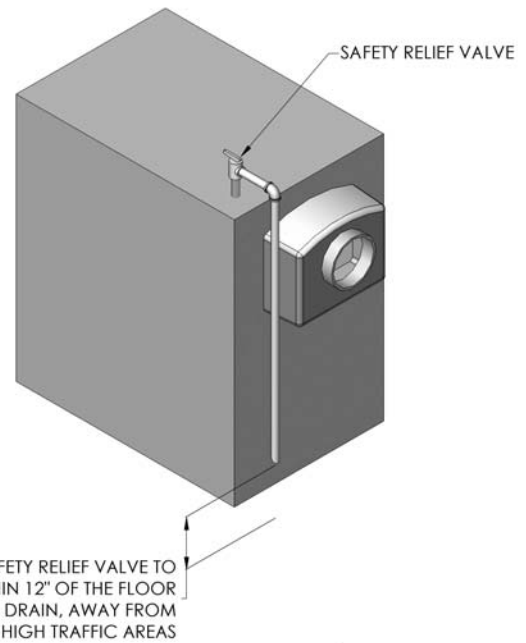


Figure 3.13: Safety Relief Valve Installation

- b) Water and Steam Trim Cartons contain safety relief valves and fittings.
 - c) Be sure that the relief valve sizing meets local code requirements.
2. Install Drain/Blowdown Valves:
 - a) Water Boilers: Install a drain valve either in the return piping or in the 3" NPT lower tapplings in the Front Section of the boiler. See Figure 3.14.
 - b) Steam Boilers: Install a 1-1/4" NPT Full Port Blowdown Valve either in the return piping or in the 3" NPT connections in the Front Section of the boiler. See Figure 3.14.

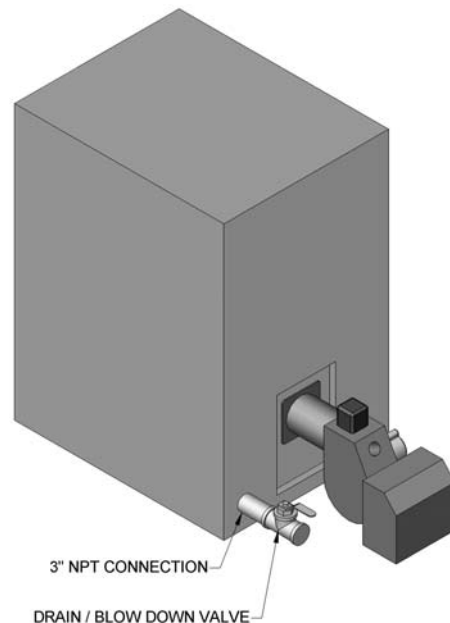


Figure 3.14: Boiler Drain/Blowdown Valve Installation

INSTALLATION

- c) Pipe the valve discharge to a floor drain if available or install a nipple and a pipe cap to close off the discharge when not in use.
3. Install Low Water Cut-off:
- Mount an optional Float-type Low Water Cutoff (LWCO) in the tappings provided in the top and side of the Front Section. See Figure 3.15 for the location of control connection tappings.
 - Figure 3.16 shows a typical control configuration for a steam boiler and Figure 3.17 shows a typical control configuration for a water boiler.

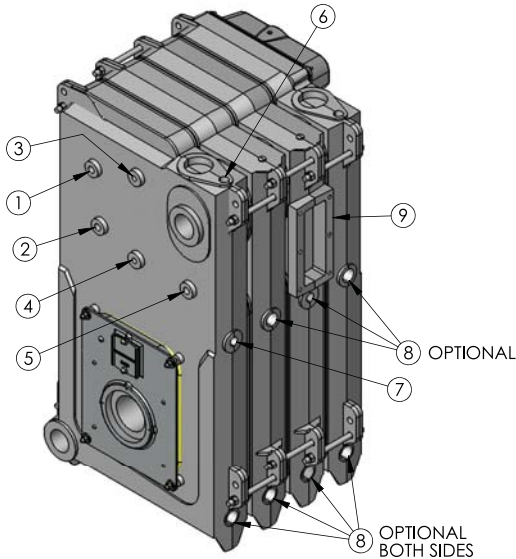


Figure 3.15: Control Connection Locations

**Table 3.8: Control Connections Sizes
(See Figure 3.15)**

Tap. No.	Tapping Size	Connection Description	
		Steam Boiler	Water Boiler
1	3/4" NPT	N/A	Manual Reset High Limit
2	3/4" NPT	Optional Probe LWCO	Optional Probe LWCO
3	1/2" NPT	Water Gage Glass	Pressure/Temp Gage
4	1/2" NPT	Water Gage Glass	N/A
5	3/4" NPT	N/A	Operating Limit
6	1" NPT	Manual Reset Limit/Operating Limit/Pressure Gage/LWCO Connection	LWCO Connection
7	1" NPT	LWCO Connection	LWCO Connection
8	1-1/4" NPT	Optional Inspection Tapping	Optional Inspection Tapping
9	-	Tankless Heater Opening	Tankless Heater Opening

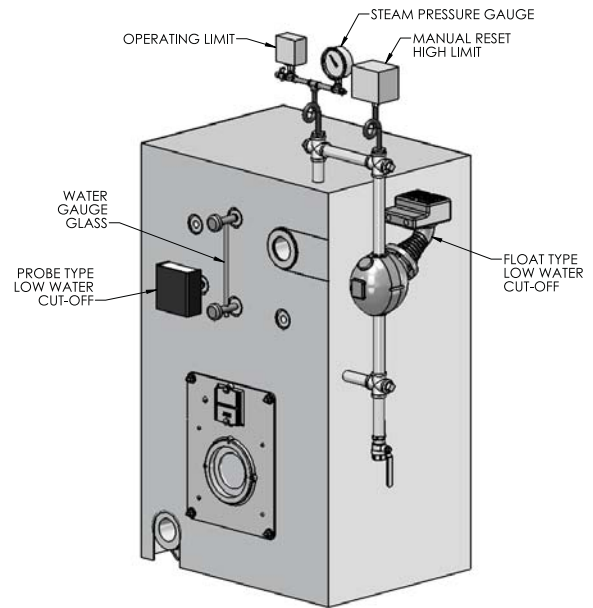


Figure 3.16: Steam Boiler Control Locations

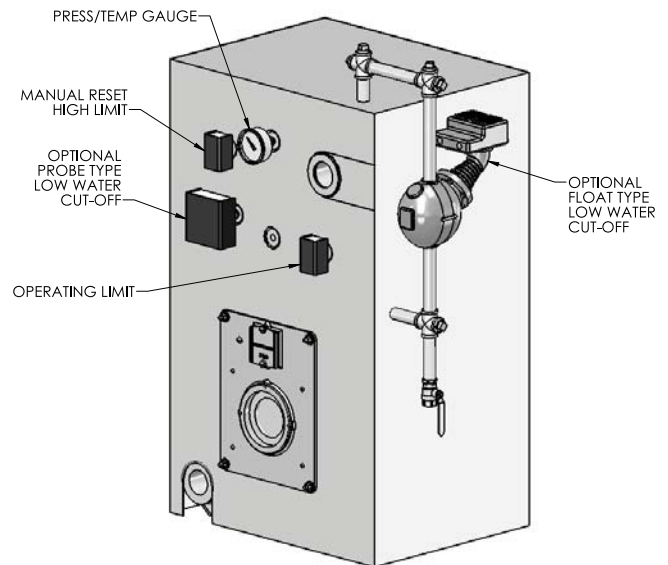


Figure 3.17: Water Boiler Control Locations

- Provide piping for the Float-type LWCO such that the vertical position of the device is as recommended by the manufacturer.
 - LWCOs that are piped too high will result in water carryover into the steam distribution system and will cause erratic operation of the boiler.
 - LWCOs that are piped too low will expose the boiler crown sheet and cause damage to the boiler.
- For correct positions of common Float-type LWCO devices see Figures 3.18 through 3.19.

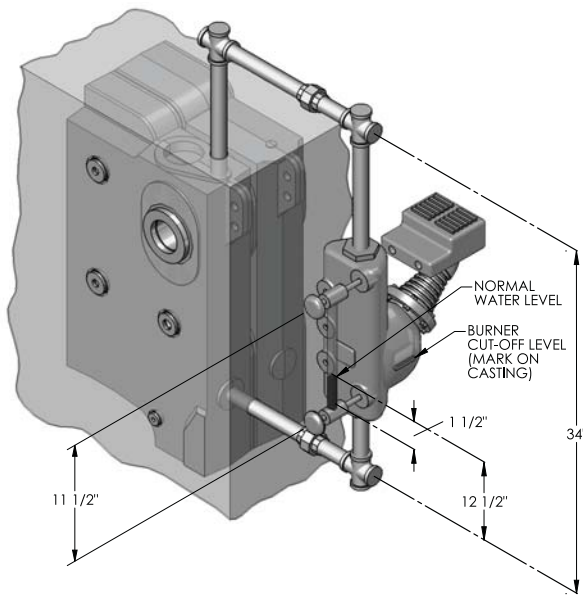


Figure 3.18: Optional Model 157 Low Water Cutoff/Pump Control

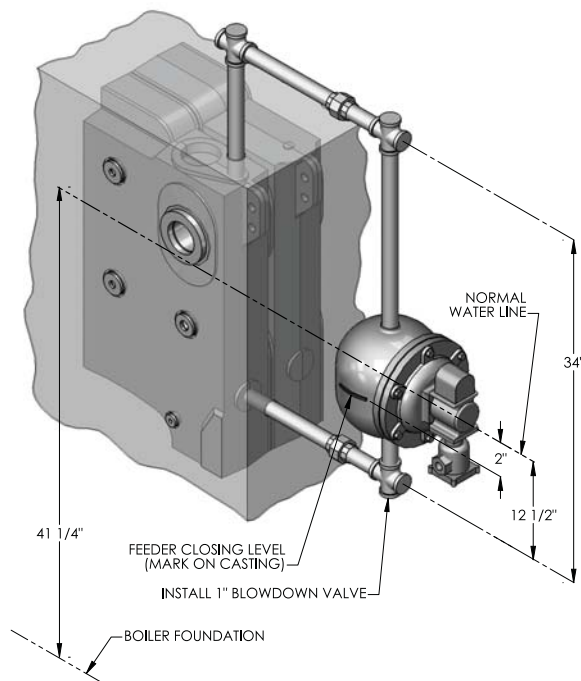


Figure 3.19: Optional Model 51-2 Low Water Cutoff/Feeder

e) Provide a blowdown valve for each Float-type LWCO. Pipe the valve discharge away from high traffic areas to a floor drain if possible. The blowdown valve is required for proper maintenance of the control.

f) Maintain a height of 41 1/4" (1048 mm) from the bottom of the Angle Rails to the Normal Water Level.

4. Install Limit Controls:

a) Steam Boilers: See Figure 3.16 for typical control locations for steam boilers. Additional limit and firing rate controls can be added to the 3/4" NPT piped header.

b) Water Boilers: See Figure 3.17 for typical control locations for water boilers. Additional limit and firing rate controls can be added to the boiler supply piping.

5. Connect Control Wiring:

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

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

c) Mount an electrical junction box on the boiler Front Panel for connection of boiler controls to the burner control panel.

⚠ NOTICE

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

d) Follow the instructions in the Burner Manual and the wiring diagram supplied with the burner.

e) Install all line voltage (120 VAC) wiring in conduit.

f) Do not install single pole switches including safety controls in the neutral leg of a motor control circuit.

4. OPERATION

A. STARTING THE BOILER

1. Check the Piping:
 - a) Water/Steam Piping:
 - i. The Boiler must have been hydrostatically tested.
 - ii. Check the attached piping for joint tightness.
 - iii. Continue monitoring as you proceed through start up.
 - b) Gas Piping:
 - i. Make sure the gas system piping and the connections to the boiler Gas Control Train(s) have been leak tested.
 - ii. After the boiler is in operation, check the tightness of all joints in the boiler gas piping with a soap suds solution.
 - iii. Purge the gas piping of all air up to the boiler Gas Control Train.
 - c) Oil Piping:
 - i. Check the oil piping visually. Make sure all joints are tight.
 - ii. When the burner is firing, check the suction line and return line pressures.
 - iii. 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.
 - iv. Excess pressure can cause pump seal failures. Excess vacuum will cause fuel flow problems with the burner oil pump.
2. Fill the Boiler:
 - a) Steam: Fill the boiler to the normal water line.
 - i. Gravity Systems and Pumped Return with Condensate Units – Fill to the normal water level mark on front jacket panel.
 - ii. 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 at the normal water level mark on front jacket panel.
3. Fill the Boiler:
 - a) Water: Fill the boiler and system.
 - i. Fill the system with fresh water only. If the water hardness is high, use water treatment to reduce the deposition of minerals in the boiler.
 - ii. If the system requires antifreeze, use only antifreeze designed for hydronic systems. These contain inhibitors to prevent corrosion of the boiler and system components. Do not use ethylene glycol or automotive antifreezes.
 - Make sure the antifreeze supplier can provide periodic inhibitor check service.
 - If automatic fill is used, the system will have to be checked periodically to make sure the antifreeze concentration has not been diluted below design level.
 - Local codes may require the use of a backflow preventer or manual fill only with separation from the city supply.
 - Consider the minimum temperature of potential exposure for the system when deciding on the antifreeze concentration. A concentration of 50% generally provides protection from freezing down to -30°F.
3. Purge the air from the system.
4. Run Burner Check-out:
 - a) Before firing the burner, slide the Slide Gate Damper on the rear flue box all the way down (full open).
 - b) 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.
 - c) After burner is set at rate, close the damper until the pressure reading at the test opening in the rear flue box is between 0.0" wc and 0.1" wc positive.
 - d) When a barometric draft regulator is installed in the venting system, adjust the boiler damper for 0.0" wc pressure reading at the damper. Adjust the draft regulator for -0.05" wc draft between the boiler damper and the draft regulator.
 - e) Adjust the burner as needed for a CO₂ reading of:
 - i. Oil burners: 12% to 12.5% or 1% less than the level at which the smoke reading goes above a trace on the Bacharach scale.
 - ii. Natural gas burners: 9% to 10% with CO less than 50 ppm.
5. Check Boiler Controls:
 - a) Limit and Operating Controls
 - i. Lower the setting of each control until the burner shuts down.

CAUTION

Check the system for leaks and make sure the automatic fill valve (if used) and the expansion tank are operating correctly. Leakage or weeping of the relief valve will cause make-up water to be added to the system. Excessive make-up water will damage the boiler and system components due to liming and oxygen corrosion.

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.

- b) Low Water Cutoffs:
 - i. Test probe type controls by using the Push-to-Test Button.
 - ii. Test float type controls. ASME CSD-1 requires the control to be piped with Test-n-Check valves in order to allow isolation for test.
- c) Follow additional instructions in the Burner Manual for proving the burner component operation.
- d) Check all controls to make sure they function correctly.
- e) After all controls have been proven, set the Operating and High Limit Controls to the set point desired.

B. CLEANING BOILER WATERWAYS

Steam Boilers

1. The boiler must be completely assembled before cleaning. The burner must be installed and made operational with the operating, limit and safety controls functional. Combustion should be adjusted to prevent sooting of the boiler flues.
2. Final burner adjustment is to be made after cleaning. Plug any unused boiler tappings and install gauge glass and safety valve.
3. Install a skim valve and fittings in the relief valve tapping. See Figure 4.1.
4. 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.

5. 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.
6. Connect a drain line off of the skim valve, run to a point of safe discharge.
7. Close all valves to the system. Provide a means of continuous fresh water to the boiler for the cleaning process.
8. Use common washing soda (such as Arm and Hammer Super Washing Soda). Mix the soda with water in a 10 quart pail and pour into the boiler through the safety valve tapping. Use a proportion of one (1) pound of washing soda for each 800 square feet EDR net boiler rating.
9. Open the skim valve. Fill the boiler until water begins to flow out of the valve.

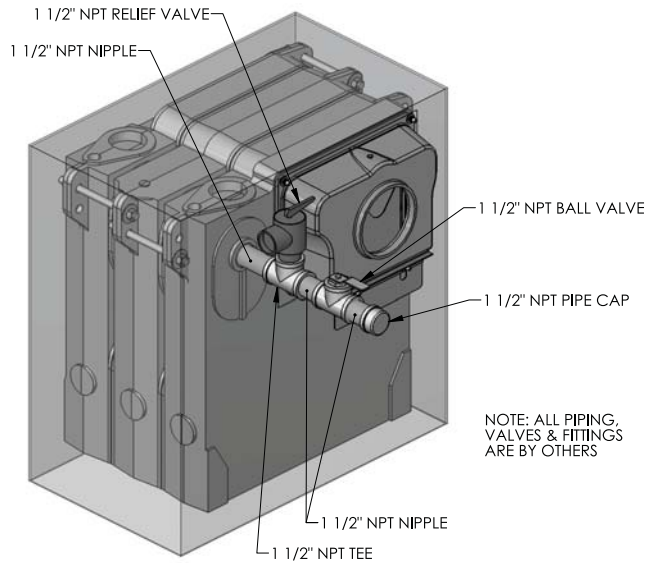


Figure 4.1: Skim Valve Piping

10. 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.
11. Open the make-up water valve to continuously feed water to the boiler. Allow water to flow out the skim tapping.
12. 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.
13. After skimming is complete, close the skim valve and turn off the boiler.
14. Close the make-up water valve and open the boiler blowdown valves.
15. Drain the boiler completely then refill and drain again one or two times to make sure all of the soda has been washed out.
16. Restore piping to normal. Pipe a nipple and cap in the skim valve.
17. 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 during the cleaning cycle.

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.

5. MAINTENANCE

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.

1. Placing Boiler in Operation:
 - a) Start up the Burner/Boiler per the Burner Manual and the instructions in this manual on starting the boiler.
 - b) Prove the correct operation of all controls on the boiler and burner as outlined below.
 - c) Check the operation of the ignition and flame proving controls as described in the Burner Manual.
 - d) Test the limit and operating controls to assure they are operating correctly.
 - e) Inspect and test all low water cutoffs.
 - f) Test the safety relief valve(s) using the procedure given by the valve manufacturer on the valve tag.
 - g) Visually inspect the burner and pilot flames (if applicable).
2. To Shut Down the Boiler:
 - a) Turn off Burner.
 - b) Open main line power disconnect switch to boiler/burner.
 - c) Close fuel shut-off valves.
 - d) To take boiler out of service if the boiler and system are not to be used when temperatures are below freezing:
 - i. Shut off make-up water supply and drain the boiler and system completely.
 - ii. 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.
 - iii. Do not use ethylene glycol antifreeze in a boiler system.

- iv. Be certain that the boiler and system are refilled before returning to service. Follow the instructions in this manual and the burner instructions to operate.

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.

3. Maintenance – Annual:

- a) **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.
- b) Inspect the Venting System:
 - i. Check the chimney or vent to make sure it is clean and free from cracks or potential leaks.
 - ii. All joints must be tight and sealed.
 - iii. The vent connector must extend into, but not beyond the inside edge of the chimney or vent.
- c) Inspect the Boiler Area:
 - i. The boiler area must be clean and free from combustible materials, gasoline or any other flammable liquids or vapors.
 - ii. The combustion air openings and the area around the boiler must be unobstructed.
- d) Inspect boiler flueways and burner for cleanliness. If cleaning is required, use the following procedure.
 - i. Turn off all electrical power to the boiler.
 - ii. Remove left jacket panels. Remove cleanout cover plates on each flueway.
 - iii. Brush the boiler flue areas through cleanout openings.
 - iv. 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.
 - v. Reinstall the burner mounting plate and all cleanout cover plates. Make sure all sealing rope and seals are in good condition. Replace sealing rope if necessary.
 - vi. Reinstall all jacket panels.

- e) 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.
 - f) When placing boiler into operation, follow burner manual, all instructions supplied with the boiler and the instructions in this chapter.
 - g) Test the operation of all limit controls, float controls and ignition components.
4. Monthly Maintenance
- a) Inspect the burner and pilot flames.
 - b) Inspect the boiler and system for any signs of leakage or excessive make-up water usage.
 - c) Inspect and check the operation of the venting system.
5. Daily Maintenance
- a) 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.
 - b) 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.

 **NOTICE**

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.

 **NOTICE**

STEAM BOILERS: Do not place cold boilers in service on a hot steam line or severe damage may occur to boiler and piping. Keep cold boilers valved off line, fire until boiler reaches line pressure and then open steam main isolation valve. Steam entering a cold boiler cools quickly causing severe steam hammer. Boilers not valved off the system should have an overflow installed to prevent idle boilers from flooding. If this is not done, cold boilers must be heated to near steaming conditions (210°F) before the water level is dropped to normal.

WATER BOILERS: Avoid thermal shock of water boilers. Establish water circulation through the boiler before starting burner. Where hot standby is required, special piping and operation procedures are required. Consult your PB Heat, LLC representative.

6. BURNER SET-UP

Settings and adjustment are for start up only. Final adjustments are to made with combustion test equipment. Refer to Section 4: Operation; Part A: Starting The Boiler, for recommended combustion settings.

Table 6.1: Beckett Oil Burners

Boiler Model	Burner Model	Nozzle Size		Pump Pressure PSI		Air Adjustment	
		Lo Fire	Hi Fire	Lo Fire	Hi Fire	Lo Fire Shutter	Hi Fire Band
CC-03	CF500	N/A	1.75 x 60ES Hago	N/A	180	4.00	0.00
CC-04	CF500	N/A	3.00 x 45B Del	N/A	140	8.00	0.00
CC-05	CF800	N/A	4.00 x 45B Del	N/A	150	10.00	4.00
CC-06	CF1400	N/A	4.00 x 45P Hago	150	250	2.75	4.00
CC-07	CF1400	N/A	4.50 x 45P Hago	150	300	3.50	6.00
CC-08	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CC-09	CF2300	N/A	6.50 x 45P Hago	175	275	2.25	2.75
CC-10	CF2300	N/A	7.00 x 45P Hago	175	275	2.50	3.25
CC-11	CF2300	5.00 x 45B Del	2.75 x 45B Del	300	300	1.50	2.50
CC-12	CF2300	5.50 x 45P Hago	3.25 x 45P Hago	300	300	1.75	3.00

Table 6.2: Carlin Oil Burners

Boiler Model	Burner Model	Nozzle Size		Pump Pressure PSI		Air Adjustment	
		Lo Fire	Hi Fire	Lo Fire	Hi Fire	Head Setting	Air Setting
CC-03	201 CRD-PA	N/A	2.00 X 70B Del	N/A	150	7/16	25%
CC-04	301 CRD-PA	N/A	2.75 x 80SS Hago	N/A	150	5/16	50%
CC-05	301 CRD-PA	N/A	4.00 x 60PLP Mon	N/A	150	13/16	100%
CC-06	702 CRD	N/A	3.75 x 60P Hago	100	300	1/16	5/16*
CC-07	702 CRD	N/A	4.50 x 60P Hago	100	300	3/16	1/2*
CC-08	702 CRD	N/A	5.00 x 60P Hago	100	300	3/8	7/16*
CC-09	702 CRD	N/A	6.00 x 60P Hago	100	300	1	5/8*
CC-10	801 CRD	5.50 x 45H Hago	4.00 x 45H Hago	150	150	5/8	1/4*
CC-11	801 CRD	5.50 x 45H Hago	5.50 x 45H Hago	150	150	5/8	3/8*
CC-12	801 CRD	6.00 x 45H Hago	6.00 x 45H Hago	150	150	7/8	7/16*

* Air setting for low fire only

Table 6.3: Power Flame Burners

Boiler Model	Burner Model			Oil Nozzle Size	Oil Pump Pressure PSI
	Lo Fire	Hi Fire	Lo Fire		
CC-03	N/A	JR15A-10	N/A	N/A	N/A
CC-04	CR1-0A	JR15A-10	CR1-GO-10	2.25 x 90 B Del	260
CC-05	CR1-0A	JR30A-10	CR1-GO-10	3.00 x 80 B Del	280
CC-06	CR1-0A	JR30A-10	CR1-GO-12	4.00 x 90 A Del	265
CC-07	CR2-0A	JR30A-12	CR2-GO-15	4.50 x 80 A Del	300
CC-08	CR2-0A	JR50A-15	CR2-GO-15	5.50 x 80 A Del	285
CC-09	CR2-0A	JR50A-15	CR2-GO-15	6.50 x 70 A Del	275
CC-10	CR2-0A	JR50A-15	CR2-GO-15	7.00 x 80 A Del	300
CC-11	CR2-0A	CR2-G-20A	CR2-GO-20A	8.00 x 80 A Del	290
CC-12	CR2-0B	CR2-G-20B	CR2-GO-20B	9.00 x 80 A Del	280

7. 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.

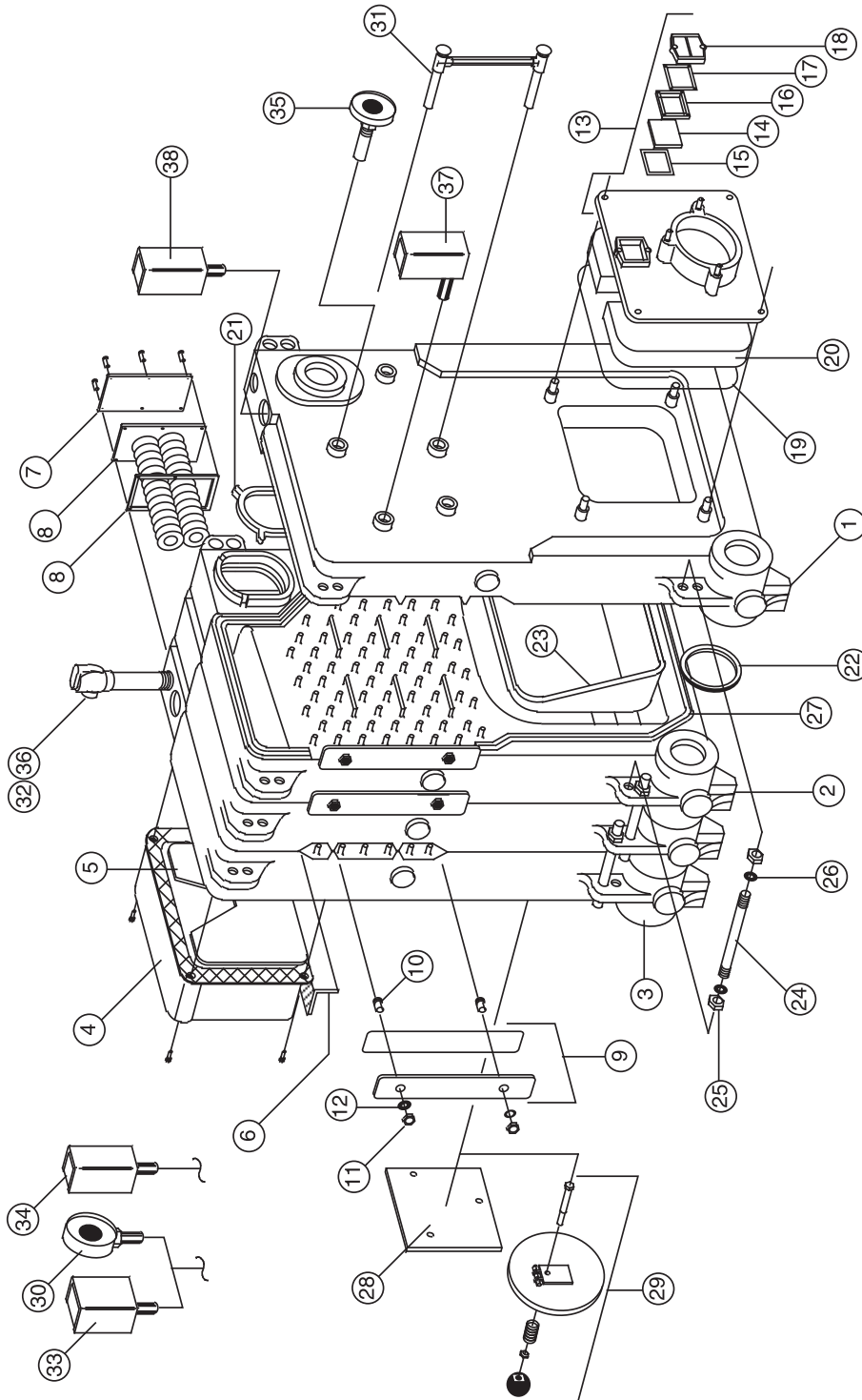


Figure 7.1: Boiler Assembly

REPAIR PARTS

Table 7.1: Series CC™ Repair Parts

Item No.	Description	Stock Code	Item No.	Description	Stock Code
1	Front Section	69101	17	Observation Glass Holder	7651
2	Intermediate Section	69103	18	Observation Cover Plate	7677
	Intermediate Heater Section	69105	19	Rope Seal 1/4" x 4.75ft.	92056
3	Back Section	69109	20	Burner Door Insulation CC-03 though 06 Beckett Burner	69330
Flue Collector Assembly includes: Smokehood, Slide Damper, Angle Bracket, and Hardware				Burner Door Insulation CC-03 though 12	69331
4	7" Flue Box Assembly CC-03/04	69303		Burner Door Insulation Hardware	92057
	8" Flue Box Assembly CC-05/06	69305	21	Upper Port Gasket (Viton) 1 per Section	92058
	9" Flue Box Assembly CC-07	69307	22	Lower Port gasket (Viton) 1 per Section	92059
	10" Flue Box Assembly CC-08-12	69308	23	Target Wall CC-03 through 06 only	69340
	Flue Outlet Adapter 10" to 12" CC-11/12	69311	24	Draw Rod 5/8" x 9"	92060
5	Slide Damper Only	92050	25	Hex Nut 5/8"	51567
6	Angle Bracket Only	92051	26	Washer 5/8"	7289
7	Tankless Cover Plate Assembly (includes hardware and gasket)	92052	27	Rope 3/8" 10' 4" per section	92061
8	Tankless Cover Plate Gasket	92053	28	Rear Observation Cover Plate CC-03 through 06	92062
	Tankless Coil (includes hardware and gasket)	69361	29	Rear Observation Cover Plate CC-07 through 12	92063
Clean Out Cover Plate assembly includes: Clean Out Plate, Insulation and rope.			Steam Trim and Controls		
9	Clean Out Cover Plate Assembly	92054	30	3-1/2" Steam Gage w/internal siphon	92064
10/11/12	Clean Out Cover Plate Hardware Kit (2 Sections)	92055	31	Gage Glass Set	92065
Burner Mounting Plate Assembly Includes: Burner Plate, with Observation Glass assembly			32	1" Safety Relief Valve 15 PSI (CC-03 through 05)	92066
13	Burner Mounting Plate Assembly 6-1/2" Opening	69351		1-1/4" Safety Relief Valve 15 PSI (CC-06 through 10)	92067
	Burner Mounting Plate Assembly 7-3/4" Opening	69352		1-1/2" Safety Relief Valve 15 PSI (CC-11/12)	92068
	Burner Mounting Plate Assembly 9-1/8" Opening	69353	33	PA 404A Operating Control	50549
	Burner Mounting Plate Hardware	7653	34	L4079B Limit Control	50681
14	Observation Glass	7648	Water Trim and Controls		
15	Observation Glass Gasket	7650	35	3-1/2" Pressure/Temperature Gage	92069
16	Observation Glass Gasket	7649	36	3/4" 40 PSI Relief Valve CC-03 through 08	92070
				1" 40 PSI Relief Valve CC-09 through 11	92071
				1-1/4" 40 PSI Relief Valve CC-12	92072
			37	L4006A Operating Control	51702
			38	L4006E Limit Control	50570

8. BOILER RATINGS & DIMENSIONS

Table 8.1: Series CC Boiler Ratings

Series CC										SERIES CC BOILER RATINGS					
Boiler Model	Oil Input		Gas Input MBH	Gross Output MBH	NET			Oil Thermal Effy	Gas Thermal Effy	Boiler H.P.	Water Content		Furnace Volume (Cu. Ft.)	Boiler Working Weight (lbs)	Heating Surface (sqft)
	GPH	MBH			Steam		Water MBH				Steam (Gallons)	Water (Gallons)			
			sqft	MBH											
CC-03	2.6	364	375	308	963	231	268	84.6	82.1	9.2	33	38	2.12	1716	23.9
CC-04	3.6	504	520	421	1316	316	366	84.1	81.5	12.5	41	49	3.50	2122	35.8
CC-05	5.0	700	722	587	1825	441	510	83.9	81.3	17.5	49	59	4.88	2528	47.7
CC-06	6.5	910	938	762	2382	572	663	83.7	81.2	22.8	56	70	6.27	2933	59.7
CC-07	7.9	1106	1140	924	2888	694	803	83.5	81.1	27.6	64	80	7.65	3339	71.6
CC-08	9.3	1302	1342	1087	3398	815	945	83.5	81.0	32.5	72	91	9.04	3745	83.5
CC-09	10.8	1512	1559	1262	3947	947	1097	83.5	83.5	37.7	80	102	10.42	4150	95.4
CC-10	12.2	1708	1761	1424	4506	1081	1238	83.4	83.4	42.5	88	112	11.81	4555	107.4
CC-11	13.6	1904	1963	1587	5071	1217	1380	83.4	83.4	47.4	96	123	13.20	4960	119.3
CC-12	15.0	2100	2165	1750	5635	1352	1522	83.4	83.4	52.3	104	133	14.58	5366	131.2

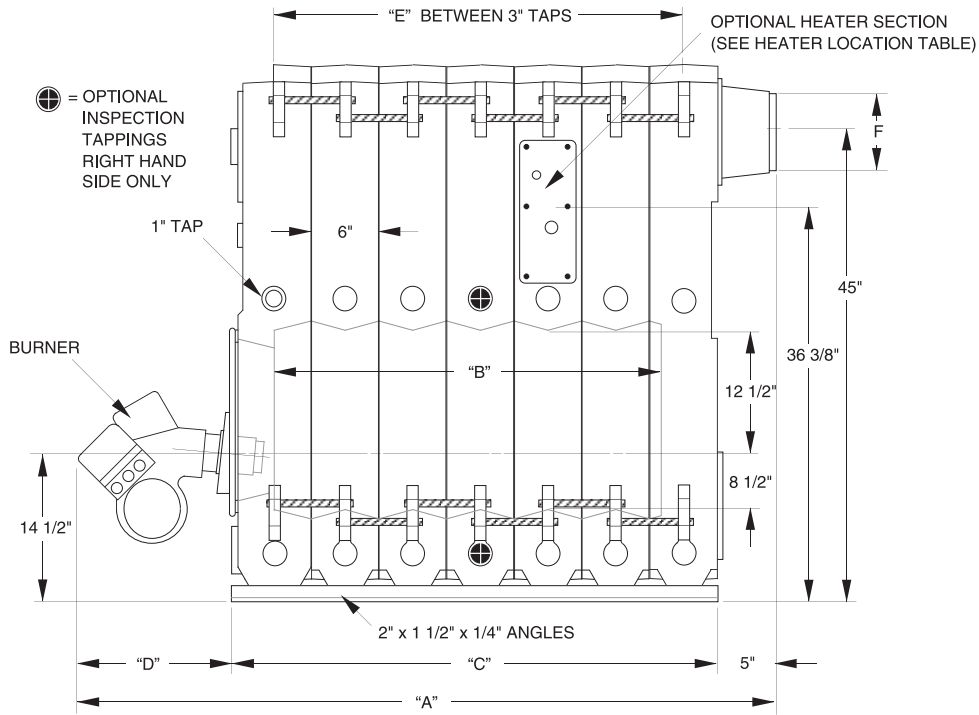
- Notes: 1. Net Ratings are based on an allowance of 1.15 for Water Boilers. Net Ratings for steam boilers are based on a pick-up factor of 1.333.
 2. Burner oil input based on Commercial Standard #2 fuel oil with a heating value of 140,000 BTU/Gal.
 3. Burner natural gas input based on natural gas with a heating value of 1,000 BTU/Cu. Ft. and a specific gravity of 0.60.

Table 8.1a: Series CC Boiler Ratings (SI Metric Units)

Series CC										SERIES CC BOILER RATINGS (SI METRIC UNITS)					
Boiler Model	Oil Input		Gas Input kW	Gross Output kW	NET			Oil Thermal Effy	Gas Thermal Effy	Boiler H.P.	Water Content		Furnace Volume (m³)	Boiler Working Weight (kg)	Heating Surface (m²)
	l/hr	kW			Steam		Water kW				Steam (Liters)	Water (Liters)			
			m²	kW											
CC-03	9.841	106.7	109.9	90.2	89.5	67.7	78.5	84.6	82.1	9.2	124.9	143.8	0.20	778	2.22
CC-04	13.63	147.7	152.4	123.4	122.3	92.6	107.2	84.1	81.5	12.5	155.2	185.5	0.33	962	3.33
CC-05	18.93	205.1	211.5	172.0	169.5	129.2	149.4	83.9	81.3	17.5	185.5	223.3	0.45	1146	4.43
CC-06	24.6	266.6	274.8	223.3	221.3	167.6	194.3	83.7	81.2	22.8	212.0	265.0	0.58	1330	5.55
CC-07	29.9	324.1	334.0	270.7	268.3	203.3	235.3	83.5	81.1	27.6	242.2	302.8	0.71	1514	6.65
CC-08	35.2	381.5	393.2	318.5	315.7	238.8	276.9	83.5	81.0	32.5	272.5	344.4	0.84	1698	7.76
CC-09	40.88	443.0	456.8	369.8	366.7	277.5	321.4	83.5	83.5	37.7	302.8	386.1	0.97	1882	8.86
CC-10	46.18	500.4	516.0	417.2	418.6	316.7	362.7	83.4	83.4	42.5	333.1	423.9	1.10	2066	9.98
CC-11	51.48	557.9	575.2	465.0	471.1	356.6	404.3	83.4	83.4	47.4	363.4	465.6	1.23	2249	11.08
CC-12	56.78	615.3	634.3	512.8	523.5	396.1	445.9	83.4	83.4	52.3	393.6	503.4	1.35	2433	12.19

- Notes: 1. Net Ratings are based on an allowance of 1.15 for Water Boilers. Net Ratings for steam boilers are based on a pick-up factor of 1.333.
 2. Burner oil input based on Commercial Standard #2 fuel oil with a heating value of 39,000 kJ/liter.
 3. Burner natural gas input based on natural gas with a heating value of 37,234 KJ/m³ and a specific gravity of 0.60.

BOILER RATINGS & DIMENSIONS



Side View

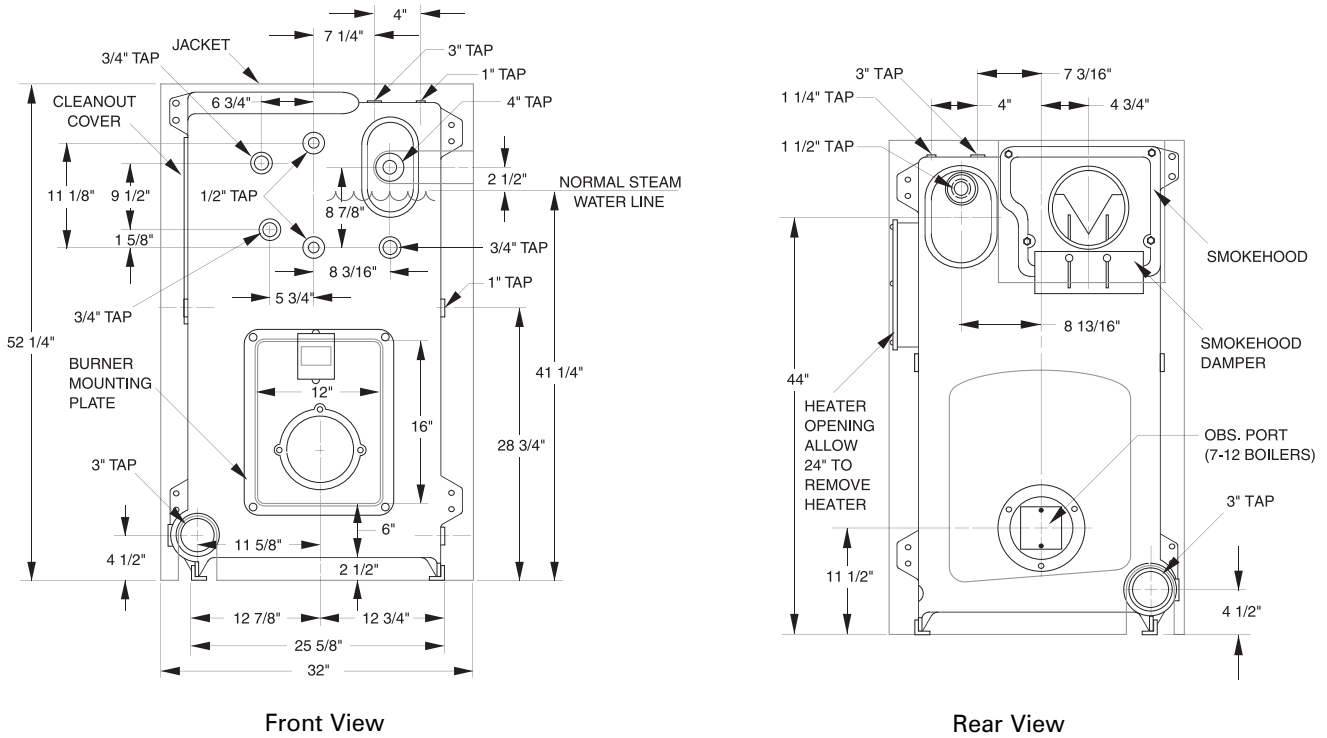


Figure 7.1: Boiler Dimensions

Table 7.2a: Series CC Boiler Dimensions (U.S. Customary Units)

SERIES CC BOILER DIMENSIONS (U.S. CUSTOMARY UNITS)												
Boiler Model	Overall Length - "A" (inch)				Firebox Length "B" (inch)	Boiler Length "C" (inch)	Burner Length "D" (inch)				Riser Tapping Location "E" (inch)¹	Diameter of Vent Connector "F" (inch)
	Carlin	Power Flame/J	Power Flame/C	Beckett Oil			Carlin	Power Flame/J	Power Flame/C	Beckett Oil		
CC-03	39	44	N/A	31	9	18	16	21	N/A	13	12	7
CC-04	45	50	59	37	15	24	16	21	30	13	18	7
CC-05	51	56	65	43	21	30	16	21	30	13	24	8
CC-06	61	62	71	49	27	36	20	21	30	13	30	8
CC-07	67	68	82	64	33	42	20	21	35	22	36	9
CC-08	73	74	88	N/A	39	48	20	21	35	23	42	10
CC-09	79	80	94	77	45	54	20	21	35	23	48	10
CC-10	87	86	100	83	51	60	22	21	35	23	54	10
CC-11	93	N/A	106	89	57	66	22	N/A	35	23	60	12 ²
CC-12	99	N/A	112	99	63	72	22	N/A	35	27	66	12 ²

Table 7.2b: Series CC Boiler Dimensions (SI Metric Units)

SERIES CC BOILER DIMENSIONS (SI METRIC UNITS)												
Boiler Model	Overall Length - "A" (mm)				Firebox Length "B" (mm)	Boiler Length "C" (mm)	Burner Length "D" (mm)				Riser Tapping Location "E" (mm)¹	Diameter of Vent Connector "F" (mm)
	Carlin	Power Flame/J	Power Flame/C	Beckett Oil			Carlin	Power Flame/J	Power Flame/C	Beckett Oil		
CC-03	991	1118	N/A	787	229	457	406	533	N/A	330	305	178
CC-04	1143	1270	1499	940	381	610	406	533	762	330	457	178
CC-05	1295	1422	1651	1092	533	762	406	533	762	330	610	203
CC-06	1549	1575	1803	1245	686	914	508	533	762	330	762	203
CC-07	1702	1727	2083	1626	838	1067	508	533	889	559	914	229
CC-08	1854	1880	2235	N/A	991	1219	508	533	889	584	1067	254
CC-09	2007	2032	2388	1956	1143	1372	508	533	889	584	1219	254
CC-10	2210	2184	2540	2108	1295	1524	559	533	889	584	1372	254
CC-11	2362	N/A	2692	2261	1448	1676	559	N/A	889	584	1524	305 ²
CC-12	2515	N/A	2845	2515	1600	1829	559	N/A	889	686	1676	305 ²

Notes: 1. Dimensions between risers are approximate.
 2. Models CC-11 and CC-12 use a 10"(254mm) to 12" (305mm) flue adapter.

Series CC

Oil, Gas & Gas/Oil Boilers

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

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