Series 211A™ REV2

Gas Boilers – Steam

Installation,
Operation &
Maintenance
Manual

PeerlessBoilers.com

TABLE OF CONTENTS

USING THIS MANUAL

A. FOLLOW THE PIPING GUIDELINES

1. We have provided suggested piping diagrams which will cover most applications of this boiler.
2. Follow these guidelines to make sure the boiler will operate correctly.

B. CONTROLS

1. This manual provides wiring diagrams and lighting instructions for standard systems only.
2. Use the Lighting Instructions and Wiring Diagrams provided with the boiler to make sure they represent the controls provided.

C. SPECIAL ATTENTION BOXES

1. 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

Read carefully, study these instructions before beginning work. It will save time. Study the included drawings. Save these instructions for reference.

⚠ 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.

The boiler warranty can be voided if the boiler is not installed, maintained and serviced correctly.

NOTICE

The equipment shall be installed with those 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 and/or CAN/CGA B149 Installation Codes.

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.

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 un 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.

A shipping list is enclosed with each boiler, listing the items packed at the factory. Check the list as you unpack parts. If any parts are missing or damaged, report the problem to the delivering carrier immediately.

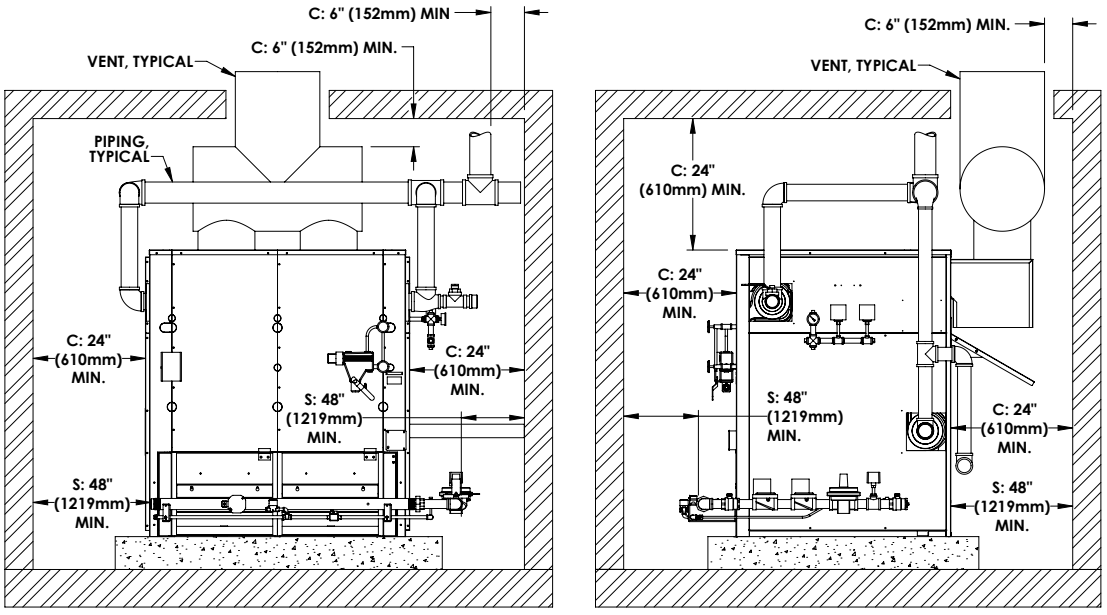


Figure 1.1: Clearance Requirements

A. ACCESSIBILITY CLEARANCES

1. The following recommendations allow for *reasonable access to the boiler*. Local codes or special conditions may require greater clearances.
   a. For servicing the boiler: provide 48" (1219 mm) between the control manifold and adjacent wall or other appliance.
   b. For access to draft hood or passage to access the boiler control manifold(s): provide 48" (1219 mm) between the side of the boiler and adjacent wall or other appliance.
   c. See Figure 1.1. Clearances with an **"S"** are minimum clearances for service accessibility.

B. COMBUSTIBLE CONSTRUCTION CLEARANCES

1. This boiler is design certified for the following *clearances to combustible construction*.
   - 24" (610 mm) between the front, top, sides and rear of the jacket.
   - 6" (152 mm) from steam and hot water pipes
   - 6" (152 mm) from vent connector
   - See Figure 1.1. Clearances with a **"C"** indicate minimum clearances from combustible construction.

C. AIR FOR COMBUSTION & VENTILATION

1. Adequate combustion air and ventilation air must be provided for this appliance in accordance with the section of the *National Fuel Gas Code* entitled, "Air for Combustion and Ventilation" or applicable provisions of the local building code. Subsections 2 through 8 as follows are based on the *National Fuel Gas Code* requirements.

2. Required Combustion Air Volume: The total required volume of indoor air is to be the sum of the required volumes for all appliances located within the space. Rooms communicating directly with the space in which the appliances are installed and through combustion air openings sized as indicated in Subsection 3 are considered part of the required volume. The required volume of indoor air is to be determined by one of two methods.
   a. ***Standard Method:*** The minimum required volume of indoor air (room volume) shall be 50 cubic feet per 1000 BTU/Hr (4.8 m^3/kW). This method is to be used if the air infiltration rate is unknown or if the rate of air infiltration is known to be greater than 0.6 air changes per hour. As an option, this method may be used if the air infiltration rate is known to be between 0.6 and 0.4 air changes per hour. If the air infiltration rate is known to be below 0.4 then the *Known Air Infiltration Rate Method* must be used. If the building in which this appliance is to be installed is unusually tight, PB Heat, LLC recommends that the air infiltration rate be determined.
   b. ***Known Air Infiltration Rate Method:*** Where the air infiltration rate of a structure is known, the minimum required volume of indoor air for appliances other than fan assisted and for the Series 211A™ Boiler shall be determined as follows:

$$\text{Required Volume}_{other} = \frac{21\ \text{ft}^3}{\text{ACH}} \left(\frac{I_{other}}{1000^{\text{Btu}}/_{\text{hr}}} \right)$$

where:
I_{other} = Input of appliances other than fan assisted in Btu/hr
ACH = air change per hour (percent of the volume of the space exchanged per hour, expressed as a decimal)

For fan assisted appliances, calculate the required volume of air using the following equation:

$$\text{Required Volume}_{fan} = \frac{15\ \text{ft}^3}{\text{ACH}} \left(\frac{I_{fan}}{1000^{\text{Btu}}/_{\text{hr}}} \right)$$

I_{fan} = Input of the fan assisted appliances in Btu/hr

Note:
These calculations are not to be used for infiltration rates greater than 0.60 ACH.

3. Indoor Air Opening Size and Location: Openings connecting indoor spaces shall be sized and located as follows:
   a. **Combining spaces on the same floor:** Provide two permanent openings communicating with additional spaces that have a minimum free area of 1 in^2 per 1000 Btu/hr (22 cm^2 per 1000 W) of the total input rating of all gas fired equipment but not less than 100 in^2 (645 cm^2). One opening is to begin within 12 inches (305 mm) from the top of the space and the other is to begin within 12 inches (305 mm) from the floor. The minimum dimension of either of these openings shall be 3 inches (76 mm). See Figure 1.2 for an illustration of this arrangement.

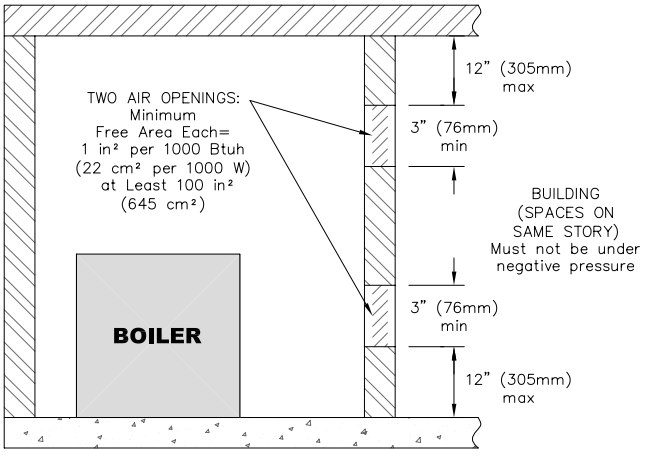


Figure 1.2: Air Openings – All Air from Indoors on the Same Floor

b. **Combining spaces on different floors:** Provide one or more permanent openings communicating with additional spaces that have a total minimum free area of 2 in² per 1000 Btu/hr (44 cm² per 1000 W) of total input rating of all equipment. See Figure 1.3 for an illustration of this arrangement.

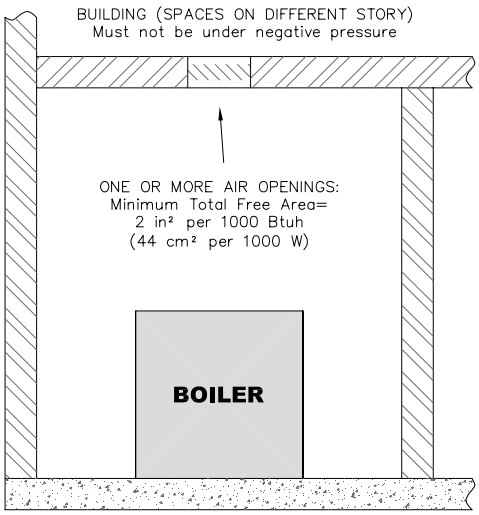


Figure 1.3: Air Openings – All Air from Indoors on Different Floors

4. Outdoor Combustion Air: Outdoor combustion air is to be provided through one or two permanent openings. The minimum dimension of these air openings is 3 inches (76 mm).

   a. **Two Permanent Opening Method:** Provide two permanent openings. One opening is to begin within 12 inches (305 mm) of the top of the space and the other is to begin within 12 inches (305 mm) of the floor. The openings are to communicate directly or by ducts with the outdoors or with spaces that freely communicate with the outdoors. The size of the openings shall be determined as follows:

      i. Where communicating directly or through vertical ducts with the outdoors each opening shall have a minimum free area of 1 in² per 4000 Btu/hr (22 cm² per 4000 W) of total input rating for all equipment in the space. See Figure 1.4 for openings directly communicating with the outdoors or Figure 1.5 for openings connected by ducts to the outdoors.

      ii. Where communicating with the outdoors through horizontal ducts, each opening shall have a minimum free area of 1 in² per 2000 Btu/hr (22 cm² per 2000 W) of total rated input for all appliances in the space. See Figure 1.6.

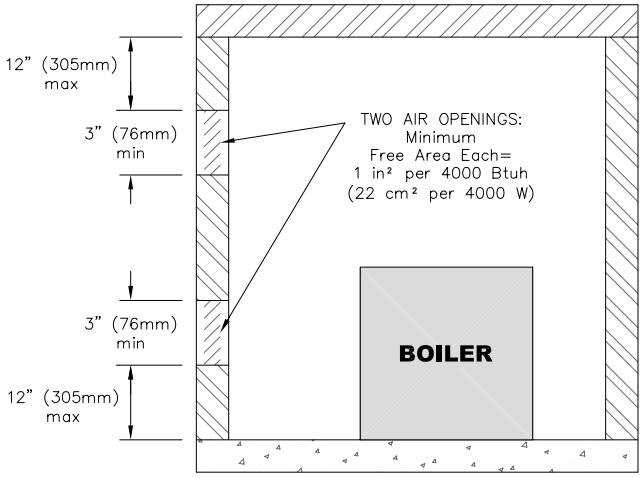


Figure 1.4: Air Openings – All Air Directly from Outdoors

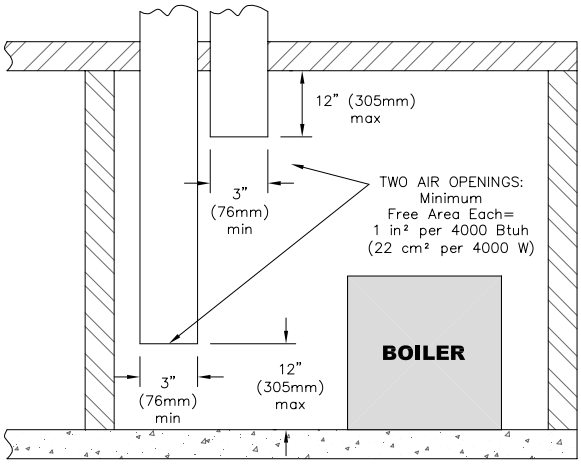


Figure 1.5: Air Openings – All Air from Outdoors through Vertical Ducts

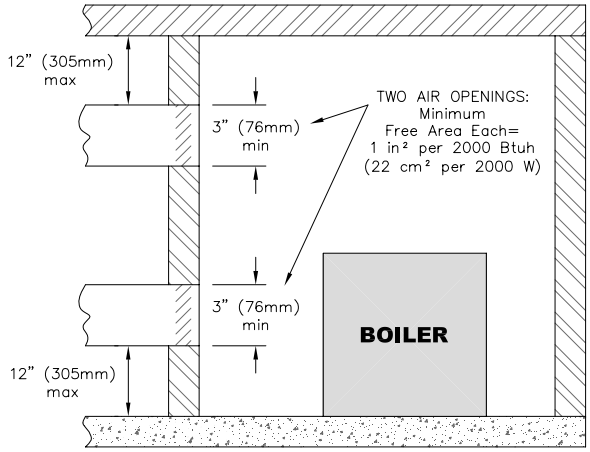


Figure 1.6: Air Openings – All Air from Outdoors through Horizontal Ducts

b. **One Permanent Opening Method:** Provide one permanent opening beginning within 12 inches (305 mm) of the top of the space. The opening shall communicate directly with the outdoors, communicate through a vertical or horizontal duct, or communicate with a space that freely communicates with the outdoors.

The opening shall have a minimum free area of 1 in² per 3000 Btu/hr of total rated input for all appliances in the space and not less than the sum of the cross-sectional areas of all vent connectors in the space. The gas-fired equipment shall have clearances of at least 1 inch (25 mm) from the sides and back and 6 inches (150 mm) from the front of the appliance. See Figure 1.7 for this arrangement.

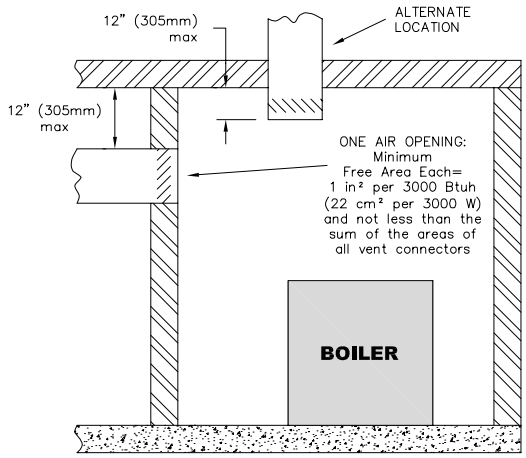


Figure 1.7: Air Openings – All Air from Outdoors through One Opening

5. Combination Indoor and Outdoor Combustion Air: If the required volume of indoor air exceeds the available indoor air volume, outdoor air openings or ducts may be used to supplement the available indoor air provided:
   a. The size and location of the indoor openings comply with Subsection 3.
   b. The outdoor openings are to be located in accordance with Subsection 4.
   c. The size of the outdoor openings are to be sized as follows:

      where:

$$A_{req} = A_{full} \left(1 - \frac{V_{avail}}{V_{req}} \right)$$

      A_{req} = minimum area of outdoor openings.
      A_{full} = full size of outdoor openings calculated in accordance with Subsection 4.
      V_{avail} = available indoor air volume
      V_{req} = required indoor air volume

6. Engineered Installations: Engineered combustion air installations shall provide an adequate supply of combustion, ventilation, and dilution air and shall be approved by the authority having jurisdiction.

7. Mechanical Combustion Air Supply:
   a. In installations where all combustion air is provided by a mechanical air supply system, the combustion air shall be supplied from the outdoors at the minimum rate of 0.35 ft³/min per 1000 Btu/hr (0.034 m³/min per 1000 W) of the total rated input of all appliances in the space.
   b. In installations where exhaust fans are installed, additional air shall be provided to replace the exhaust air.
   c. Each of the appliances served shall be interlocked to the mechanical air supply to prevent main burner operation when the mechanical air supply system is not in operation.
   d. In buildings where the combustion air is provided by the mechanical ventilation system, the system shall provide the specified combustion air rate in addition to the required ventilation air.

8. Louvers & Grills:
   a. The required size of openings for combustion, ventilation, and dilution air shall be based on the net free area of each opening.
      i. Where the free area through a louver or grille is known, it shall be used in calculating the opening size required to provide the free area specified.
      ii. Where the free area through a louver or grille is not known, it shall be assumed that wooden louvers will have 25% free area and metal louvers and grilles will have 75% free area.
      iii. Nonmotorized dampers shall be fixed in the open position.
   b. Motorized dampers shall be interlocked with the equipment so that they are proven in the full open position prior to ignition and during operation of the main burner.
      i. The interlock shall prevent the main burner from igniting if the damper fails to open during burner startup.
      ii. The interlock shall shut down the burner if the damper closes during burner operation.

9. Combustion Air Ducts
   a. Ducts shall be constructed of galvanized steel or an equivalent corrosion-resistant material.
   b. Ducts shall terminate in an unobstructed space, allowing free movement of combustion air to the appliances.
   c. Ducts shall serve a single space.
   d. Ducts shall not serve both upper and lower combustion air openings where both such openings are used. The separation between ducts serving upper and lower combustion air openings shall be maintained to the source of combustion air.
   e. Ducts shall not be screened where terminating in an attic space.
   f. Horizontal upper combustion air ducts shall not slope downward toward the source of the combustion air.

g. The remaining space surrounding a chimney liner, gas vent, special gas vent, or plastic piping installed within a masonry, metal, or factory built chimney shall not be used to supply combustion air.

h. Combustion air intake openings located on the exterior of buildings shall have the lowest side of the combustion air intake opening at least 12 inches (305 mm) above grade.

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 *National Fuel Gas Code*, ANSI Z223.1/NFPA 54, under "Venting of Equipment", or CAN/CGA B149, Installation codes, under "Venting Systems and Air Supply for Appliances", or applicable provisions of the local building codes.

3. Chimney/Vent Operation: The vent system must be sized and installed to provide the draft needed to remove all combustion products. If the vent system does not provide enough draft, combustion products will spill into the building from the draft hood relief opening. If spillage of combustion products occurs, check the vent system, the combustion and ventilation openings and make sure the boiler room is never under negative pressure.

⚠ WARNING

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

4. Exterior Vents
   a. If the vent is outside, make sure it is insulated sufficiently to ensure adequate draft.

5. Vent Sizing:
   a. Individual vents: Use vent piping the same diameter as the boiler vent connection. The minimum height is 10 feet (305 cm) above the bottom of the draft hood (relief opening). The vent must also extend above the roof or any obstructions as outlined in the current edition of the *National Fuel Gas Code*, ANSI Z223.1/NFPA 54 and/or CAN/CGA B149, Installation Codes or as required by local codes.

   b. Combined vent breeching:
      - The recommended sizing in Section 14, Boiler Ratings & Dimensions, in this Manual is based on a minimum chimney or vent height of 20 feet (610 cm) and a maximum horizontal run of 6 feet (183 cm) to the chimney with no more than one 90-degree standard elbow.

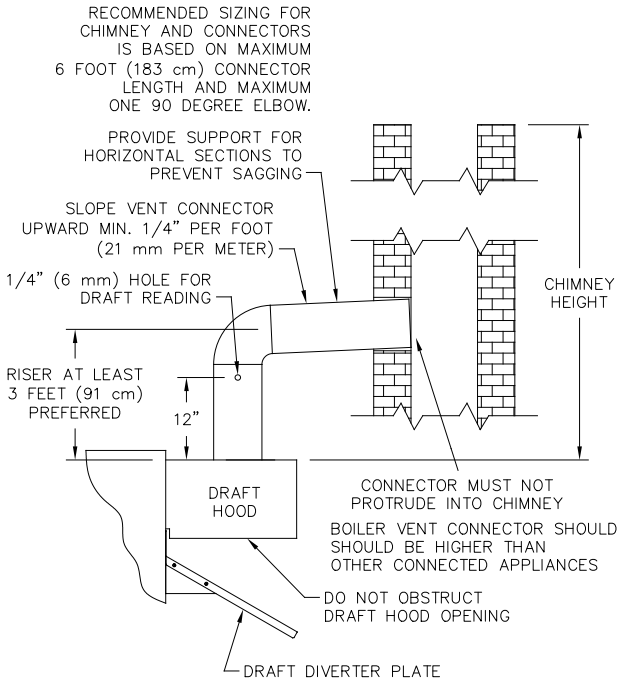


Figure 1.8: Vent Connection

- The minimum area of the chimney serving two or more appliances must be at least the area of the largest chimney connector plus 50% of the total area of all other appliance connectors.
- The vent connector must be single wall steel or Type B double wall vent pipe. The vent connector must be Type B double wall if it is located in or passes through cold areas. The vent connector must extend into, but not beyond, the inside wall of the chimney.

6. Vent Connection to Boiler (Figure 1.8):
   a. The vent system must provide a draft of at least - 0.02" w.c. (5 Pa) measured within 12 inches of the draft hood outlet. A 3 foot (91 cm) rise from the draft hood outlet on the boiler to the centerline of the chimney breach is recommended.
   b. Support the weight of the vent system independently of the boiler draft hood. The draft hood is not designed to carry structural loading.
   c. Provide support of the vent connector (breeching) at maximum 12 foot (366 cm) intervals to prevent sagging and to provide a minimum upward slope of 1/4" per foot (21 mm per meter).
   d. Do not connect the vent for this boiler into any vent system which operates with positive pressure.
   e. Use Type B double-wall pipe for vents which run through unheated spaces.

7. Removing an existing boiler from a common vent: At the time for removal of an existing boiler, the following steps shall be followed with each appliance connected to the common venting system placed in operation, while the other appliances remaining connected to the common venting system are not in operation.

a. Seal any unused openings in the common venting system.

   Sceller toute ouverture du système d'évacuation commun non utilisée.

b. Visually inspect the venting system for proper size and horizontal pitch and determine there is no blockage or restriction, leakage, corrosion and other deficiencies which could cause an unsafe condition.

   Effectuer un contrôle visuel du système d'évacuation pour vérifier la taille et la pente horizontale et s'assurer qu'il n'existe aucun blocage ou obstruction, fuite, corrosion ni tout autre problème pouvant menacer la sécurité.

c. Insofar as is practical, close all building doors and windows and all doors between the space in which the appliances remaining connected to the common venting system are located and other spaces of the building. Turn on any clothes dryers and any appliance not connected to common venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they will operate at maximum speed. Do not operate a summer exhaust fan. Close fireplace dampers.

   Dans la mesure du possible, fermer toutes les portes et fenêtres de l'immeuble ainsi que toutes les portes entre l'espace dans lequel les appareils qui demeurent raccordés au système d'évacuation commun se trouvent et le reste de l'immeuble. Mettre en marche les sécheuses et tout autre appareil non raccordé au système d'évacuation commun. Mettre en marche tous les ventilateurs aspirant, tels que les hottes de cuisinière et les ventilateurs de salle de bain, en les faisant fonctionner à vitesse maximum. Ne pas faire fonctionner les ventilateurs aspirant d'été. Fermer les registres de foyers.

d. Place in operation the appliance being inspected. Follow the lighting instructions. Adjust thermostat so appliance will operate continuously.

   Mettre en service l'appareil à inspecter. Suivre les instructions concernant l'allumage. Régler le thermostat afin que l'appareil fonctionne sans arrêt.

e. Test for spillage at the draft hood relief opening after 5 minutes of main burner operation. Use the flame of a match or candle, or smoke from a cigarette, cigar, or pipe.

   Vérifier toute fuite à l'orifice de décharge du coupe-tirage après que le brûleur ait fonctionné pendant 5 minutes. Utiliser la flamme d'une allumette ou d'une chandelle ou encore la fumée d'une cigarette, d'un cigare ou d'une pipe.

f. After it has been determined that each appliance remaining connected to the common venting system properly vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gas-burning appliance to their previous conditions of use.

   Après avoir établi que les résidus de combustion de chaque appareil qui demeure raccordé au système commun sont adéquatement évacués lorsque soumis au test décrit ci-dessus, remettre en place les portes, fenêtres, portes intérieures, ventilateurs aspirants, registres de foyer et appareils fonctionnant au gaz.

g. Any improper operation of the common venting system should be corrected so that the installation conforms with the current edition of the *National Fuel Gas Code*, ANSI Z223.1/NFPA 54 and/or CAN/CSA B149.1, *Natural Gas and Propane Installation Code*. When resizing any portion of the common venting system, the common venting system should be resized to approach the minimum size as determined using the appropriate tables in the *National Fuel Gas Code*, ANSI Z223.1/NFPA 54 and/or CAN/CSA B149.1, *Natural Gas and Propane Installation Code*.

   Tout fonctionnement inadéquat du système d'évacuation commun doit être corrigé de manière à respecter les normes du **National Fuel Gas Code,** ANSI Z223.1/NFPA 54 et/ou des Codes d'installation CAN/ACG B149**.** Lorsqu'il est nécessaire de modifier les dimensions de toute portion du système d'évacuation commun, ces dernières doivent être modifiées de manière à respecter les dimensions minimums indiquées dans les tableaux du chapitre « Sizing of Category I Venting Systems » du **National Fuel Gas Code,** ANSI Z223.1/NFPA 54 ou des Codes d'installation CAN/ACG B149.

E. BOILER SETTING

1. Provide a good, level foundation for the boiler with the minimum dimensions given in Figure 1.9 and Table 1.1. The flooring and structural support system must be suitable for the operating weight of the boiler and any connected piping.

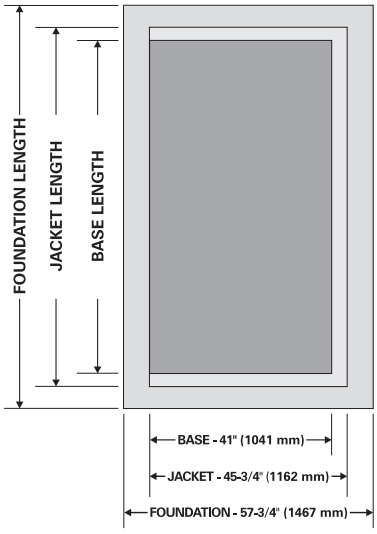


Figure 1.9: Foundation Layout

2. Do not operate the boiler until the foundation, if new concrete, has thoroughly cured. The high temperature under the burners could cause major damage to the concrete if it still contains moisture.

⚠ 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 airflow underneath between the main floor and the top of the boiler foundation.
   a. Concrete block aligned with the openings connected continuously would serve this purpose, for example.
   b. If the foundation must be a concrete slab, use an air cell high temperature insulating board, at least 1/2 inch (13 mm) thick, with aluminum backing, aluminum side up. 1/2 inch (13 mm) Hi Temp millboard with aluminum backing would be acceptable as well. Place the insulating board on the slab inside the base.

F. WATER QUALITY & MAKE-UP

1. Check the system to make sure there are no leaks or overfilling problems which might cause excessive make-up water to be added. Make-up water causes liming in the boiler and brings in oxygen. Oxygen can cause severe damage to the boiler through oxygen corrosion pitting.

2. Clean the boiler as described in this manual. Poor water quality will cause foaming, priming and overfilling of the system. Too much sediment in the water will cause build-up in the boiler and could result in cracked sections due to overheating.

3. If the condensate return time lag is too long, this boiler may not work correctly with gravity return or with a condensate return unit. Long time lags will cause make-up water to be added to the boiler, resulting in flooding of the boiler, carryover to the system and excessive make-up water addition. You will need to install a boiler feed system to prevent problems in such cases.

4. **Do not use chemicals or substances in the boiler or system which contain petroleum or its derivatives. This will damage the boiler seals.**

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 Peerless® representative or download from PeerlessBoilers.com.

Table 1.1: Boiler Foundation Layout

Boiler Model	Boiler Base Length		Jacket Length		Foundation Length	
	inches	mm	inches	mm	inches	mm
211A-05	28-1/8	714	33-3/4	857	45-3/4	1,162
211A-06	33-3/4	857	39-3/8	1,000	51-3/8	1,305
211A-07	39-3/8	1,000	45	1,143	57	1,448
211A-08	45	1,143	50-5/8	1,286	62-5/8	1,591
211A-09	50-5/8	1,286	56-1/4	1,429	68-1/4	1,734
211A-10	56-1/4	1,429	61-7/8	1,572	73-7/8	1,876
211A-11	61-7/8	1,572	67-1/2	1,714	79-1/2	2,019
211A-12	67-1/2	1,714	73-1/8	1,857	85-1/8	2,162

2. ASSEMBLE THE BASE

A. BASE ASSEMBLY

1. Collect the crates containing the Base Assembly parts. Table 2.2 (on page 12) shows the quantity of each crate required. The crates contain the following parts:

Table 2.1: Base Crate Contents

Crate	Items	"Sub Assy #"	Part #	"Stock Code #"
2	Right End Panel Sub-Assembly Left End Panel Sub-Assembly Burner Support Channel Clips (2)	90338	90737 90738 90590	90737 90738 90590
2BB	Front Panel Sub-Assembly Back Panel Sub-Assembly Burner Support Channel Angle Tie Brace Front Panel Support Bracket Section Assembly Kit	90341	GG-2080-1 GG-2081-1 90586 90326 N/A GG-1030	GG2080-1 GG2081-1 90586 90326 51781 GG1030
2CC	Front Panel Sub-Assembly Back Panel Sub-Assembly Burner Support Channel Angle Tie Brace Front Panel Support Bracket Section Assembly Kit	90342	GG-2080-2 GG-2081-2 90587 90326 N/A GG-1030-1	GG2080-2 GG2081-2 90587 90326 51781 GG1030-1
2DD	Front Panel Sub-Assembly Back Panel Sub-Assembly Burner Support Channel Angle Tie Brace Front Panel Support Bracket Section Assembly Kit	90343	GG-2080-3 GG-2081-3 90588 90326 N/A GG-1030-2	GG2080-3 GG2081-3 90588 90326 51781 GG1030-2
2EE	Front Panel Sub-Assembly Back Panel Sub-Assembly Burner Support Channel Angle Tie Brace Front Panel Support Bracket Section Assembly Kit	90344	GG-2080-4 GG-2081-4 90589 90326 N/A GG-1030-3	GG2080-4 GG2081-4 90589 90326 51781 GG1030-3

2. Open crate number 2. Remove the End Panels and mount a Support Channel Clip toward the rear on each panel as shown in Figure 2.2 using 1/4”-20 x 1/2” (13 mm) long round head machine screws and 1/4” lock washers provided.

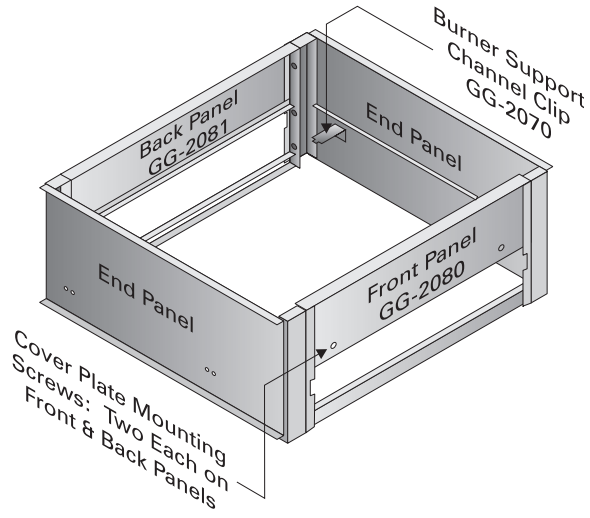


Figure 2.2: Steel Base Assembly

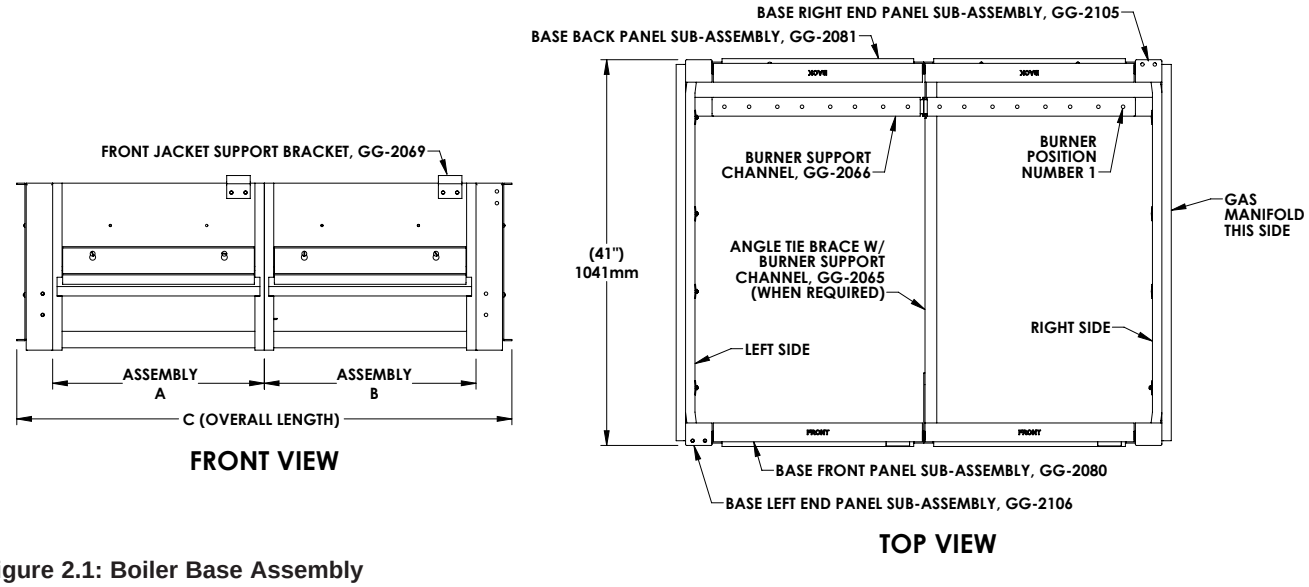


Figure 2.1: Boiler Base Assembly

3. Attach the Front Panel and Back Panel (Figure 2.2) to the Left Hand End Panel using 5/16”-18 x 1” (25 mm) long cap screws and hex head nuts provided.

4. **For 211A-05 through 211A-08 Only:**
   a. Complete the base assembly by attaching the Right End Panel and setting the Burner Support Channel on the clips.

5. **For 211A-09 through 211A-12 Only:**
   a. Attach a Front Panel Support Bracket to each Front Panel as shown in Figure 2.3.

6. Attach an Angle Tie Brace at each panel joint to secure the front and back panels as shown in Figure 2.4 using 5/16”-18 x 1” (25 mm) long cap screws and hex head nuts.

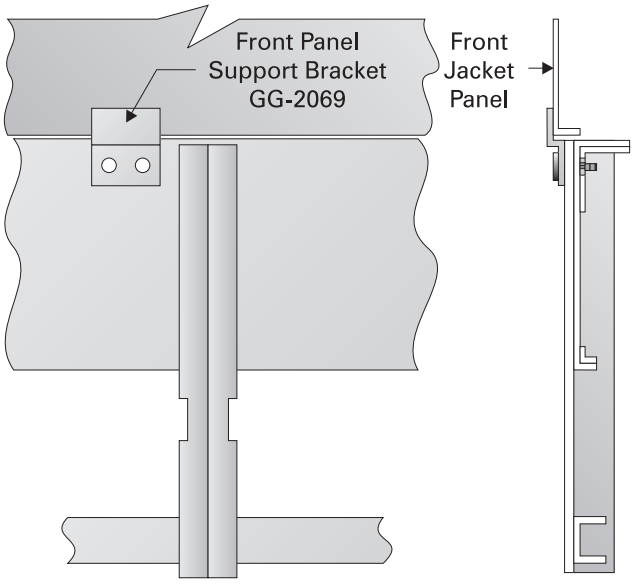


Figure 2.3: Support Bracket Installation

7. Bolt remaining Front and Back Panels together using 5/16”-18 x 1” (25 mm) long cap screws and hex head nuts. See Table 2.2 for panels required. Place the panels in the positions shown in the Table 2.2 and Figure 2.1.

8. Complete the base assembly by attaching the Right Hand End Panel using 5/16”-18 x 1” (25 mm) long cap screws and hex head nuts.

9. Set the Burner Support Channels in place as shown in Figure 2.1.

B. INSTALL THE PILOT BURNERS

1. Check the location of the Burner Support Channels in the Base Assembly. The dimensions should be:
   a. Height above boiler foundation: 6-3/4” (171 mm)
   b. Distance from back of Base: 3-3/4” (95 mm)

2. Remove the Gas Manifold and Pilot Line Assembly from Box Number 7.

3. Place Manifold on front of Base. Bolt the hangers using 5/16”-18 x 1” (25 mm) long long cap screws with 5/16” flat washers. See Figure 2.5.

4. Place only the Burners **with pilots mounted** in the locations given in Table 2.3.
   Install the Burners by slipping the opening on the front of the burner over the orifice adapter and slipping the pin on the end of the burner into the hole in the Burner Support Channel directly opposite the orifice.

5. Cut and fit the 1/4” aluminum tubing provided from the pilot gas shut-off device(s) to the pilot burners.

6. Do not install the remaining burners until the Boiler Sections are installed.

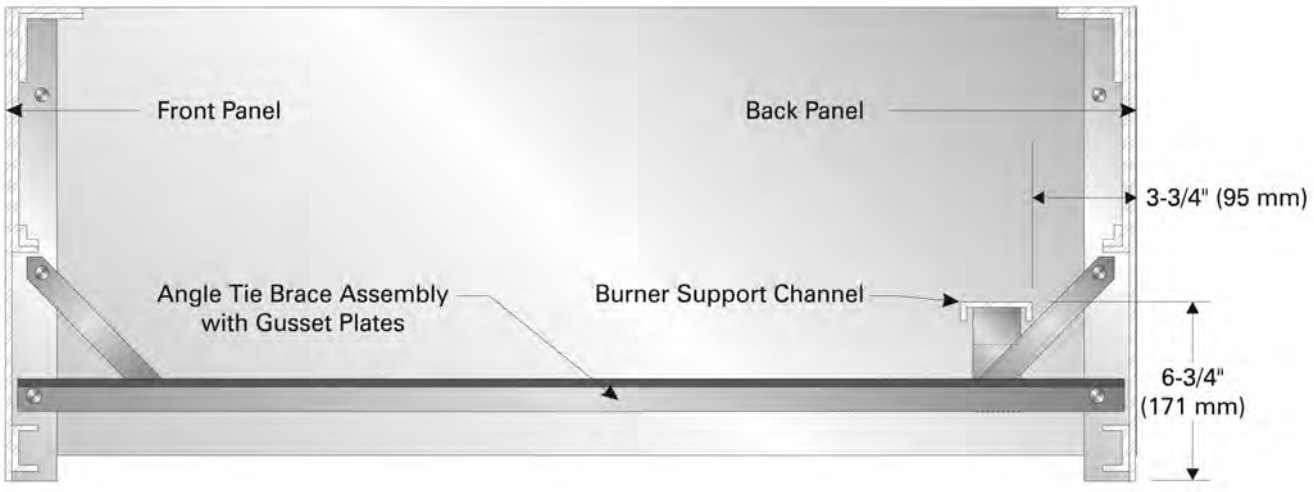
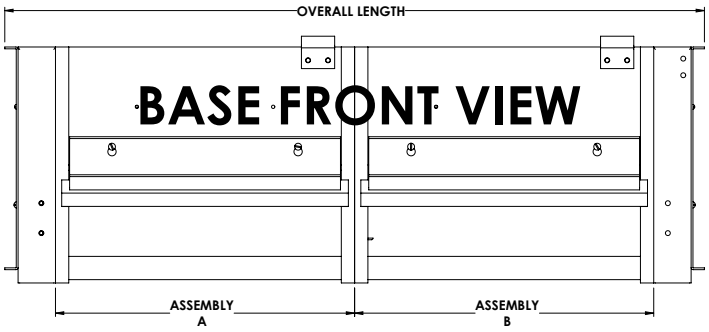


Figure 2.4: Angle Tie Brace Installation

Table 2.2: Base Front and Back Panel Crates



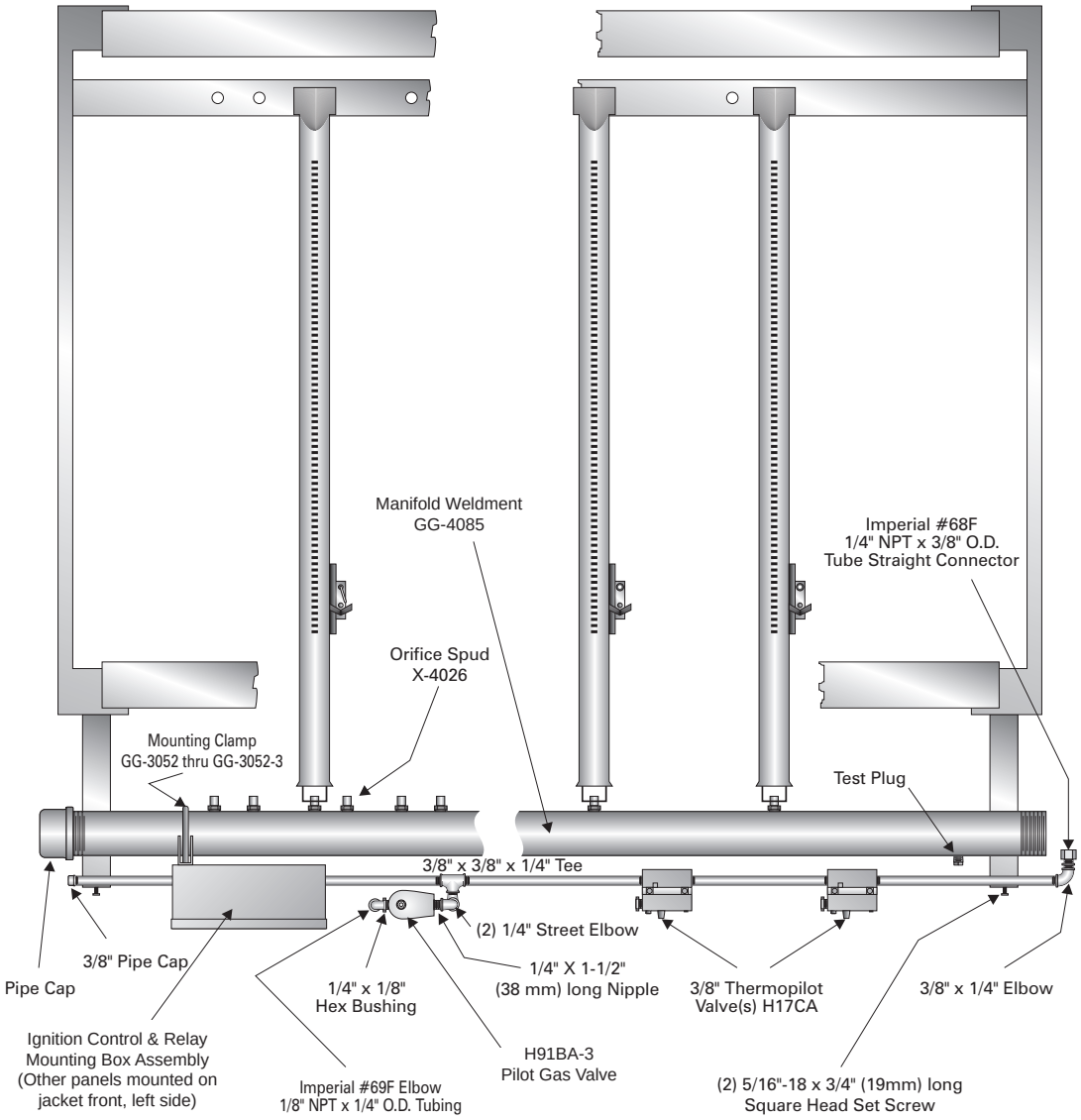
Model Number	A	B	Overall Length	
			feet/inches	mm
211A-05	2BB	—	30-3/8"	771
211A-06	2CC	—	36"	914
211A-07	2DD	—	41-5/8"	1,057
211A-08	2EE	—	47-1/4"	1,200
211A-09	2BB	2BB	52-7/8"	1,343
211A-10	2CC	2BB	58-1/2"	1,486
211A-11	2CC	2CC	64-1/8"	1,629
211A-12	2DD	2CC	69-3/4"	1,772

Table 2.3: Burner Cartons and Pilot Burner Locations (See Figure 2.1)

Boiler Model Number	Burner Cartons						Number of Pilots	Total Number of Burners	E1E Ignition System Pilot Burner Locaitons (Positions Numbered Right to Left)	
	15A	15B	15C	15D	15E	15F			Electronic Pilots (Spark Ignited)	Standing Pilots (Thermocouple)
211A-05	—	1	—	—	—	—	1	8	5	—
211A-06	—	—	1	—	—	—	1	10	5	—
211A-07	—	—	—	1	—	—	1	12	5	—
211A-08	—	—	—	—	1	—	1	14	5	—
211A-09	—	—	—	—	—	1	1	16	5	—
211A-10	1	—	—	1*	—	—	1	18	7	—
211A-11	1	—	—	—	1	—	2	20	15	5
211A-12	1	—	—	—	—	1	2	22	15	5

* 211A-10 Gas Burner Carton includes two burners with pilot bracket but only one pilot bracket is used.

Figure 2.5: Typical Gas Manifold and Pilot Line Assembly



Boiler Model	Manifold Stock Code #	Pipe Size (in)	Burner Qty.	Manifold Length
211A-05	50940	1-1/2	8	32.94
211A-06	50946	1-1/2	10	38.56
211A-07	50951	1-1/2	12	44.19
211A-08	GG4085-4	1-1/2	14	49.81
211A-09	GG4085-5	1-1/2	16	55.44
211A-05	GG4085-7	2	8	32.94
211A-06	GG4085-8	2	10	38.56
211A-07	GG4085-9	2	12	44.19
211A-08	50941	2	14	49.81
211A-09	50942	2	16	55.44
211A-10	50943	2	18	61.06
211A-11	GG4085-13	2	20	66.69
211A-12	GG4085-14	2	22	72.31
211A-10	GG4085-22	2-1/2	18	61.06
211A-11	GG4085-23	2-1/2	20	66.69
211A-12	GG4085-24	2-1/2	22	72.31

Table 2.4: Burner Manifold

3. PLACE THE BOILER SECTIONS

A. PREPARATION

1. Check the level of the Boiler Base using a spirit level. Make sure the base is level and that the base panels are aligned within plus or minus 1/16" (2 mm).

2. Check the area around the Flow Ports (Figure 3.1). Use solvent and a clean cloth to thoroughly clean the flat surfaces and recesses. All foreign matter must be removed to assure a proper seal when the sections are drawn together.

⚠ 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.

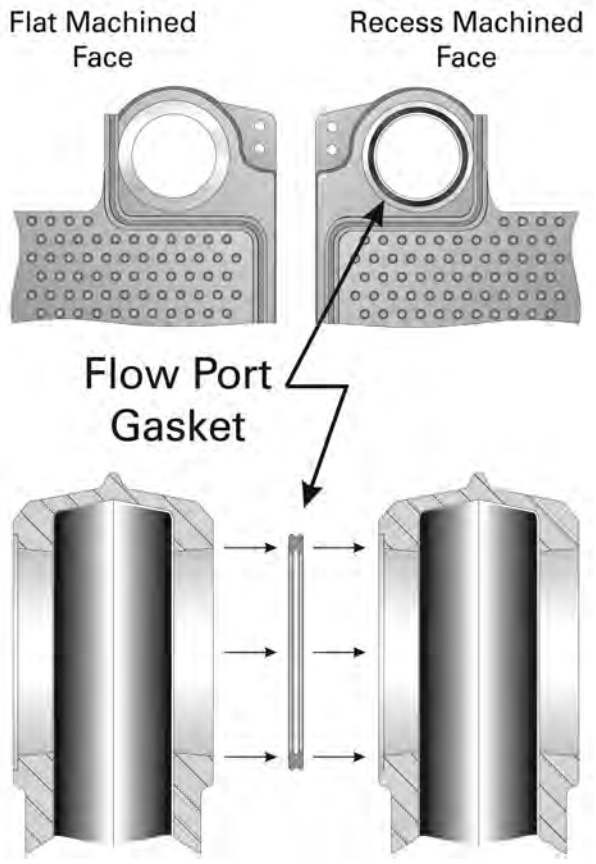


Figure 3.1: Flow Port Machining & Gasket

B. PLACING THE SECTIONS

1. Begin by placing the Left Hand End Section on the left end of the base. The upper flow port goes toward the front of the boiler as shown in Figure 3.2.

Figure 3.2: Placing the First Section on Base

2. Slide the section to the back of the base until the cast lug on the bottom of the section under the lower flow port is against the base back panel. Keep the section upright by a supporting prop or other means.

⚠ WARNING

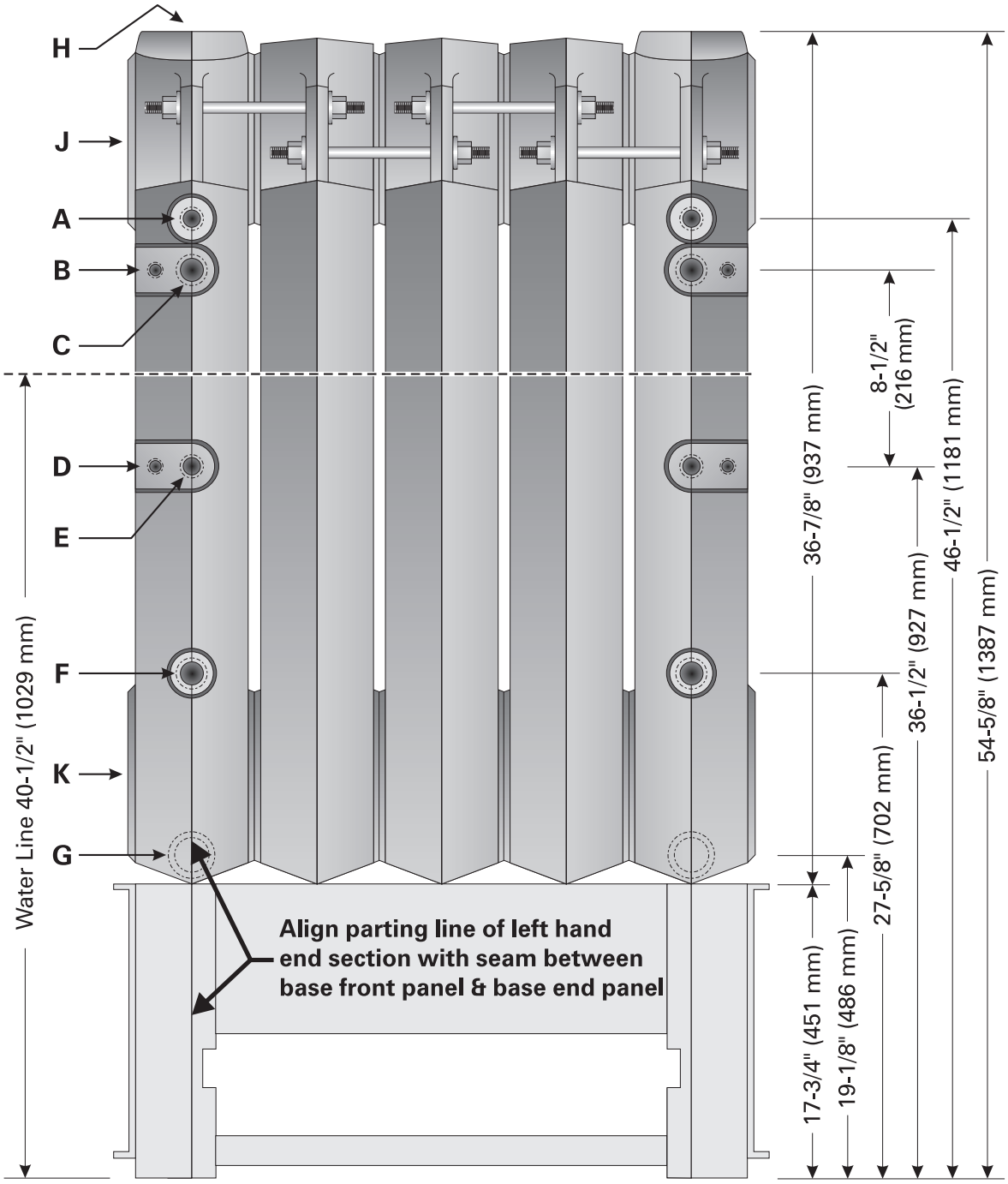
The sections are heavy and must be supported securely.

3. Align the parting line of the section with the seam between the Base End panel and the Base Front Panel as shown in Figure 3.3.

4. Apply Hi-Temp rope seal by spreading a thin coat of spray adhesive in the grooves on each end of the section. Place the rope in the grooves. Do not stretch the rope. The longer rope goes in the front groove. NOTE: The ends of each rope must extend 1/2" (13 mm) beyond the top and bottom.

5. Place the Flow Port Gaskets in the recesses provided (see Figure 3.1). **Do not use adhesive**.

6. The following steps must be followed to insure that no damage is done to the tie rod lugs. A 0-100 ft.-lbs. (0-136 N·m) torque wrench is required.
   a. Place an Intermediate Section on the base and slide it carefully against the Left Hand End Section.
   b. Align the flow ports from front to back, as close as possible.
   c. Insert a tie rod into each of the lugs on each section and apply a nut and washer to each end of the tie rod.
   d. Before tightening, check the vertical alignment of the sections using a spirit level (see Figure 3.4). Make sure they are square with the Base.



TAPPINGS, EACH END SECTION

A 3/4" NPT Tapping
B 1/2" NPT Tapping, Upper
C 1" NPT Tapping, Upper
D 1/2" NPT Tapping, Lower
E 3/4" NPT Tapping, Probe LWCO
F 1" NPT Tapping, Lower
G 1-1/2" NPT Tapping, Back, Blowdown
H 3" NPT Tapping, Pop Safety Valve(s) and Upper Equalizer for Special Float Controls (157, etc)
J 6" NPT Tapping, Steam Riser
K 6" NPT Tapping, Return

Figure 3.3: Assembling Sections on Base

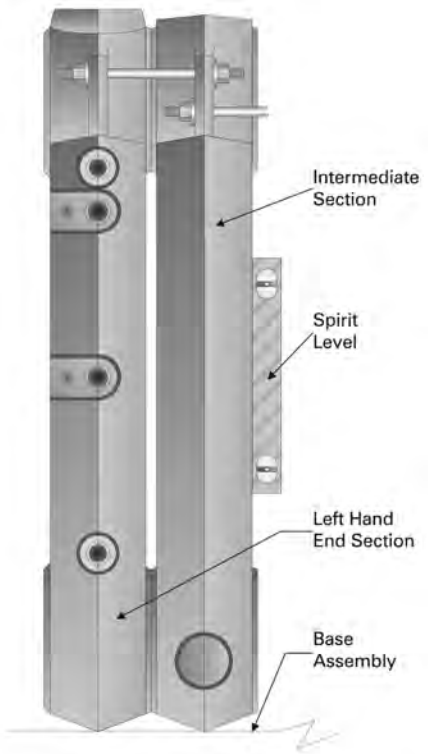


Figure 3.4: Align Sections Vertically

e. Draw sections together evenly, alternating between top lug and bottom lug in increments of 20 ft.-lbs. (27 N·m). Continue until both top and bottom lugs are tightened to 60 ft.-lbs. (81 N·m). DO NOT EXCEED 60 FT.-LBS (81 N·m).

f. Check the level while tightening to make sure alignment stays true. Also make sure sections remain square with the Base from front to back as the tie rods are tightened and as additional sections are installed.

g. If the sections tend to run out of plumb, this will usually be at the bottom front. Loosen the upper nuts slightly and tighten the lower ones to adjust.

7. Assemble the remaining sections in the same way for a finished assembly as shown in Figure 3.3.

C. HYDROSTATIC TEST THE BOILER

1. The supply and return piping can be permanently erected before applying the Boiler Jacket if the pipe nipples applied to the boiler tappings are long enough to clear the jacket.

2. Install a drain cock in the tapping provided at the bottom rear of each end section.

3. Provide a water supply line to the boiler.

4. Plug all open tappings in the boiler.

5. Provide a means to vent air as the boiler fills.

6. Fill the boiler with water, venting air as water level rises.

7. Pressurize boiler to 45 psig (310 kPa). **Do not exceed this pressure**.
   a. Maintain pressure while checking all joints and fittings for leaks.
   b. After inspection is complete, drain the boiler and remove plugs from tappings that are to be used.

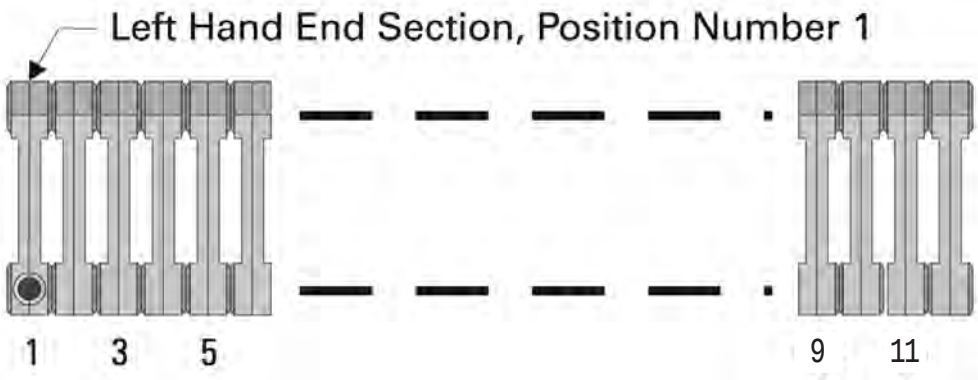


Figure 3.5: Section Positioning Numbering

4. INSTALL THE FLUE COLLECTOR

1. Collect the Flue Collector cartons. The Flue Collector sections are labeled on the part and on the carton. See Table 4.1 for the items needed.

2. Install Hi Temp Rope for **each** collector section as shown in Figure 4.1. The rope provides the seal to prevent flue gases from leaking from the collector. Make certain that the rope is well under the bottom edges of each flue collector section in order to obtain a tight seal.

3. Place the Flue Collector sections in the positions given in Table 4.1. These positions are **numbered from left to right when facing the front of the boiler**.

4. Fasten an angle bracket, part number GG-5005 (Stock Code: GG5005), to the top of each Collector section with two #10 x 1/2" (13 mm) long sheet metal screws. See Figure 4.2.

5. Insert a Long Hook Bolt, part number GG-5003 (Stock Code: GG5003), through the angle bracket. Slip the hook end over the tie rod. Apply a 1/4"-20 hex nut on the end of the rod and snug against the bracket. See Figure 4.2. **Do not tighten yet.**

6. Insert a Short Hook Bolt, part number GG-5004 (Stock Code: GG5004), through the flange in the rear of the flue collector. Catch the hook around the spacer pads at the top of the boiler sections. Apply a 1/4"-20 hex nut on the Bolt and snug against the flange. See Figure 4.2. **Do not tighten yet.**

7. Draw the Flue Collector sections tight against the sealing rope by tightening the nuts on the Hook Bolts. Draw the nuts evenly, alternating tightening.

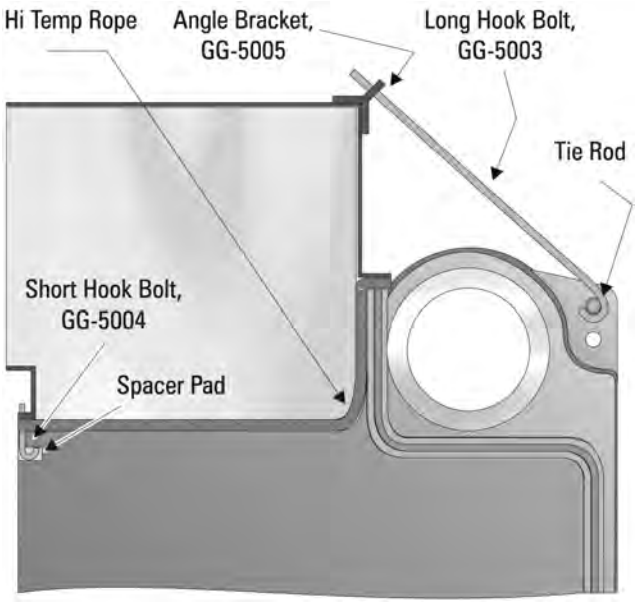


Figure 4.2: Installing Flue Collector Sections

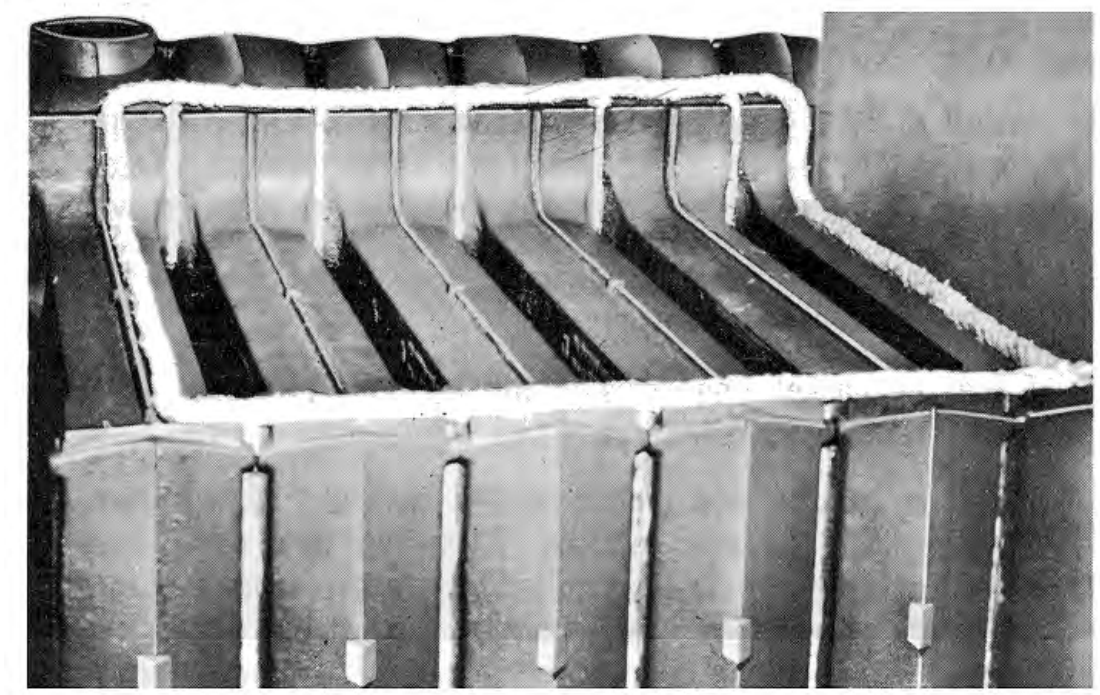


Figure 4.1: Applying Flue Collector Hi Temp Rope Gasket

Table 4.1: Flue Collector Section Location (From Left to Right Facing Front of Boiler) – Crates
Crates 14 = Part number GG-5000 (Stock Code: 90557)
Crate 14A = Part number GG-5000-1 (Stock Code: 90558)
Crate 14B = Part number GG-5000-2 (Stock Code: 90559)

Boiler Model Number	Position 1	Position 2	Position 3
211A-05	14A	—	—
211A-06	14B	—	—
211A-07	14	14	—
211A-08	14A	14	—
211A-09	14A	14A	—
211A-10	14B	14A	—
211A-11	14B	14B	—
211A-12	14A	14A	14

5. PIPE THE BOILER

A. PREPARATION

1. The boiler must be pressure tested as outlined in **Chapter 3**, "Place the Boiler Sections," of this manual.
2. The Supply and Return piping can be installed before the jacket is applied. Use nipples long enough to be sure they will extend through the jacket.

B. SUPPLY PIPING

1. Install End Riser connections sized per Table 5.1. The 3" tappings in the tops of the end sections are not used for steam boilers.
   a. Install a reducing tee on one end riser. Install a 2" valve, nipple and cap for skimming the boiler in the tee as shown in the piping drawings.
2. **Models 211A-05 through 211A-07** can be both single or dual riser.
3. **Models 211A-08 and larger** require risers in both end sections.
4. Pipe the header at least 24 inches (610 mm) above the normal boiler water line. This is required to prevent water from carrying over into the header and then to the system.
5. Figure 5.2 shows the Supply and Return piping for Parallel Flow Gravity systems and all Pumped Return Systems.
6. Counterflow Gravity systems require the boiler steam line to enter the top of the steam main. See Figure 5.3 for this special case.
7. The piping in these drawings is shown off the right hand side of the boiler. The boiler may also be piped toward the left side as shown in Figure 5.4, typical.
8. **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.
9. **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. Use threaded fittings for swing joints.
10. **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.
11. 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 in all installations is recommended. The loop provides additional reliability for the system. A check valve must still be installed on the pump discharge of all pumped return systems.
2. 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 (35 kPa) above the boiler operating pressure. Pumping the water into the boiler too fast will cause collapse of the water level and level control problems.

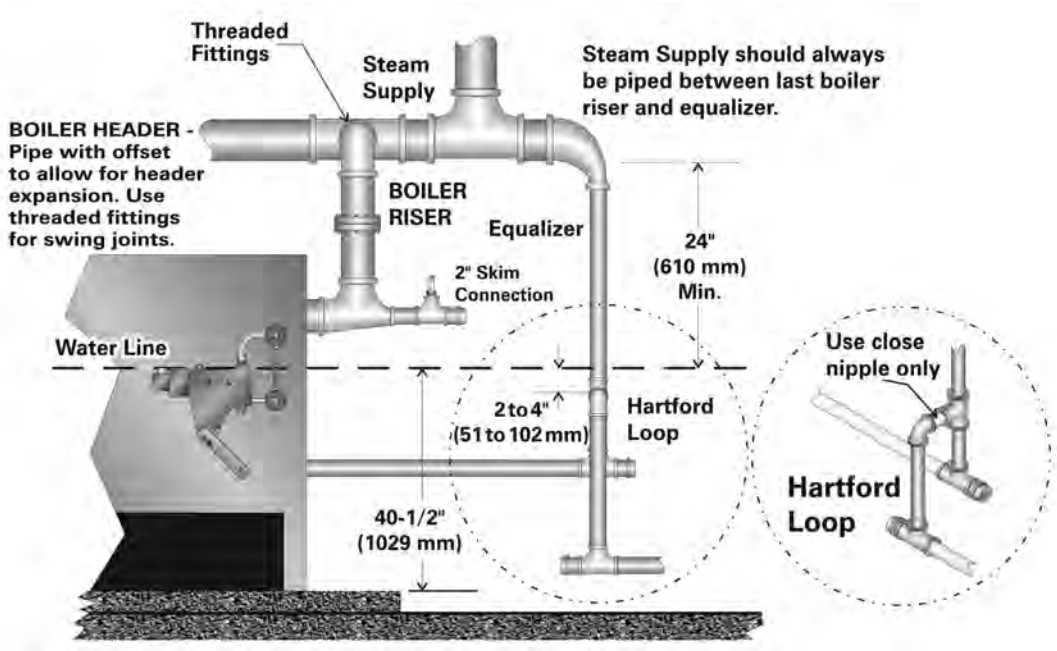
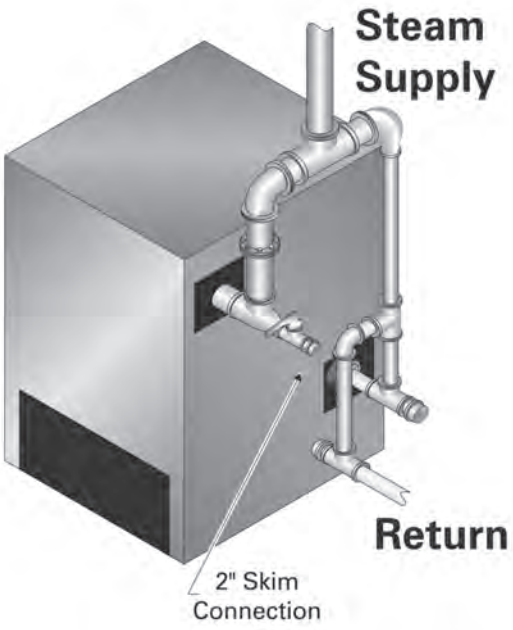
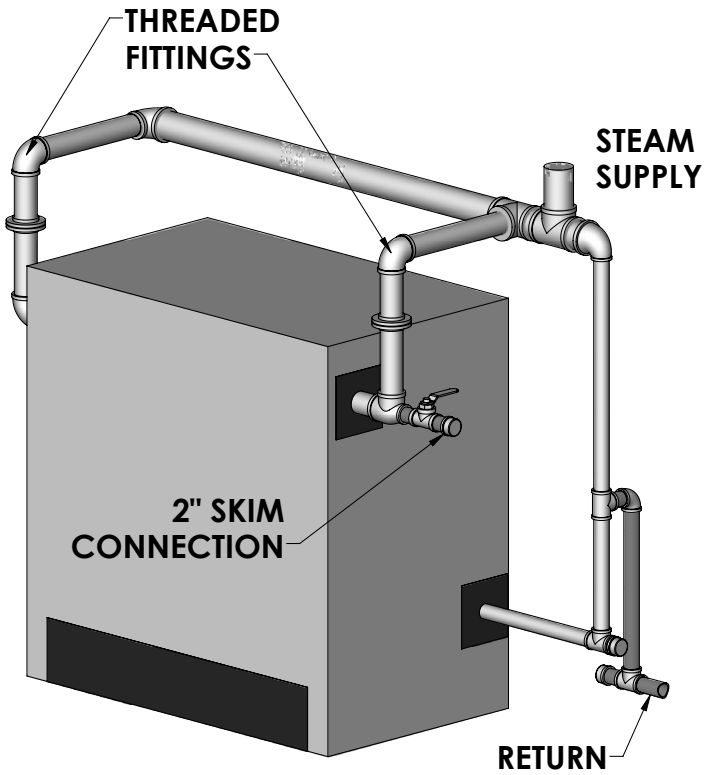


Figure 5.1: Supply and Return Positions, Skim Piping, Hartford Loop



211A-05 TO 211A-07
SINGLE END RISER

Offset Header required to prevent damage to boiler from expansion of header. Use threaded fittings for swing joint.



211A-08 TO 211A-12
TWO END RISER

Figure 5.2: Supply and Return Piping – Pumped Return and Parallel Flow Gravity Systems

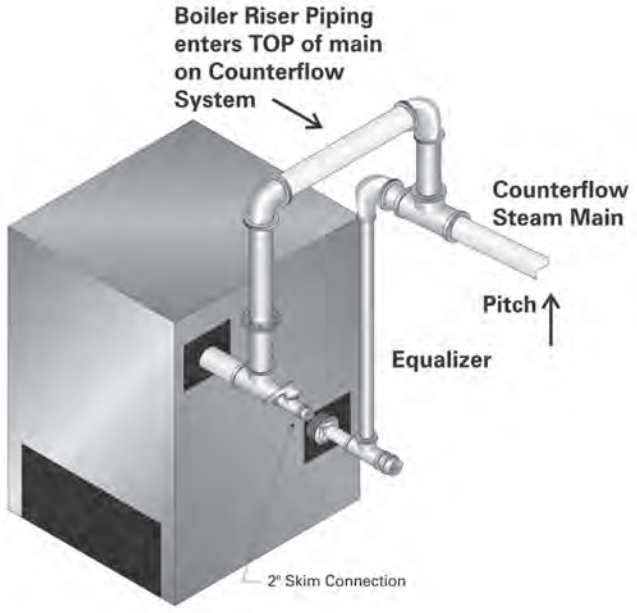


Figure 5.3: Supply and Return Piping – Counterflow Gravity Systems

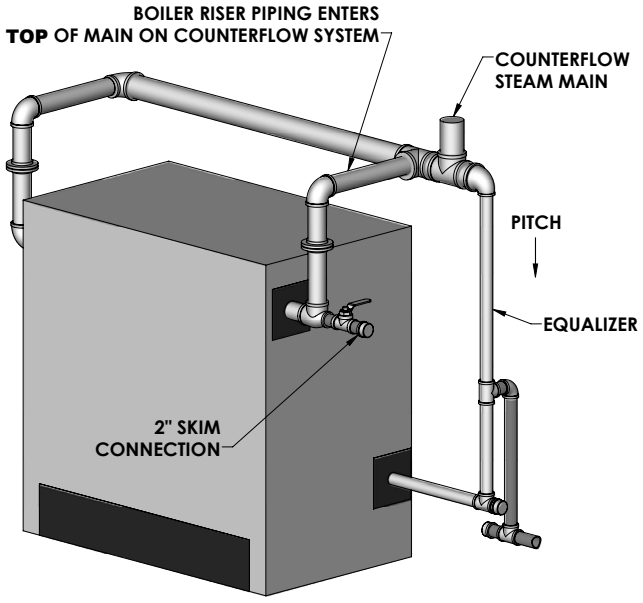


Figure 5.4: Left Hand Piping Arrangement – Typical

3. Size the equalizer per Table 5.1.

4. Pipe the Hartford loop tee so the inside top of the close nipple is 2 to 4 inches (51 to 102 mm) below the boiler water line.

5. 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 5.5 shows typical piping for multiple boiler Gravity Return systems. Figure 5.6 shows 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 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.
   a. Install a Float and Thermostatic trap at the boiler water level on each of the multiple boilers on a pumped return system. This prevents flooding of idle boilers due to condensation of steam.

Table 5.1: Header, Risers & Equalizer Sizing

Boiler Model	Header Size	Option 1				Option 2			
		End Risers		Equalizers		End Risers		Equalizers	
		No.	Size	No.	Size	No.	Size	No.	Size
211A-05	5"	1	5"	1	2-1/2"	2	4"	1	2-1/2"
211A-06	5"	1	5"	1	2-1/2"	2	4"	1	2-1/2"
211A-07	5"	1	5"	1	2-1/2"	2	4"	1	2-1/2"
211A-08	6"	2	5"	1	2-1/2"	—	—	—	—
211A-09	6"	2	5"	1	2-1/2"	—	—	—	—
211A-10	6"	2	5"	1	3"	—	—	—	—
211A-11	6"	2	5"	1	3"	—	—	—	—
211A-12	8"	2	5"	1	3"	—	—	—	—

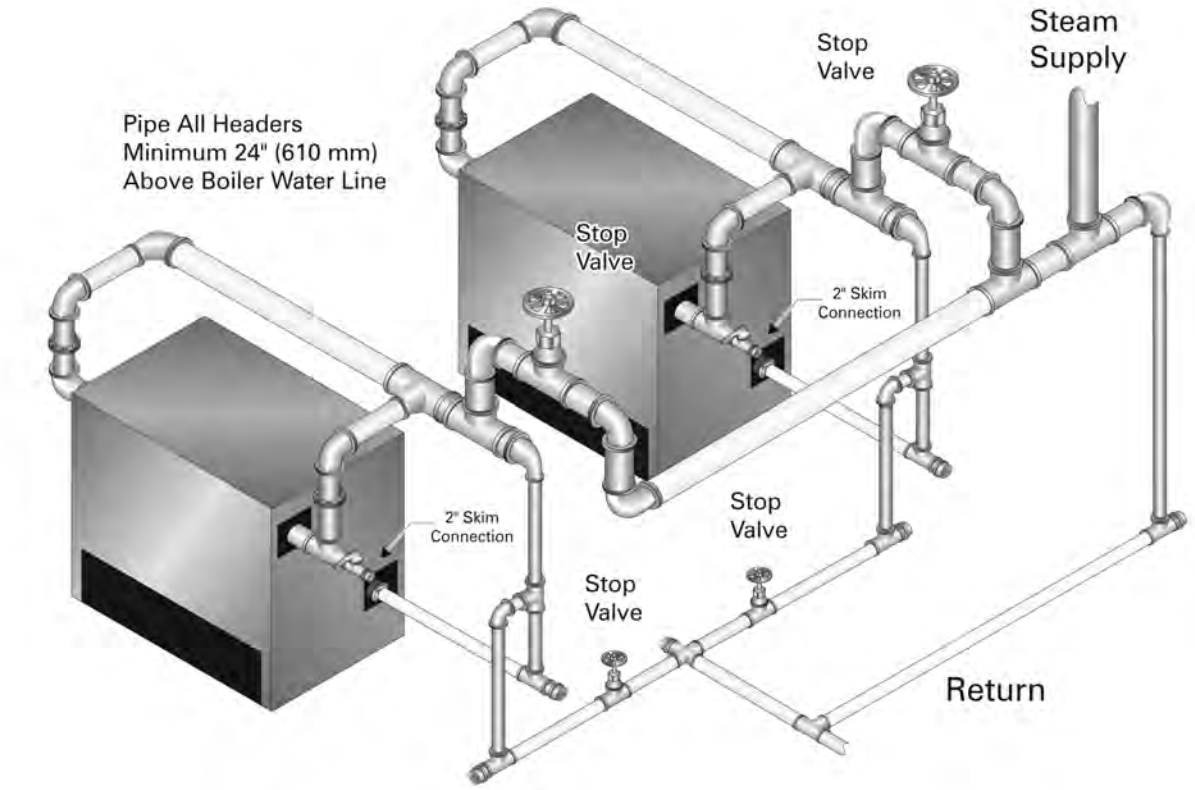


Figure 5.5: Piping Multiple Boilers, Typical, Gravity Return Systems

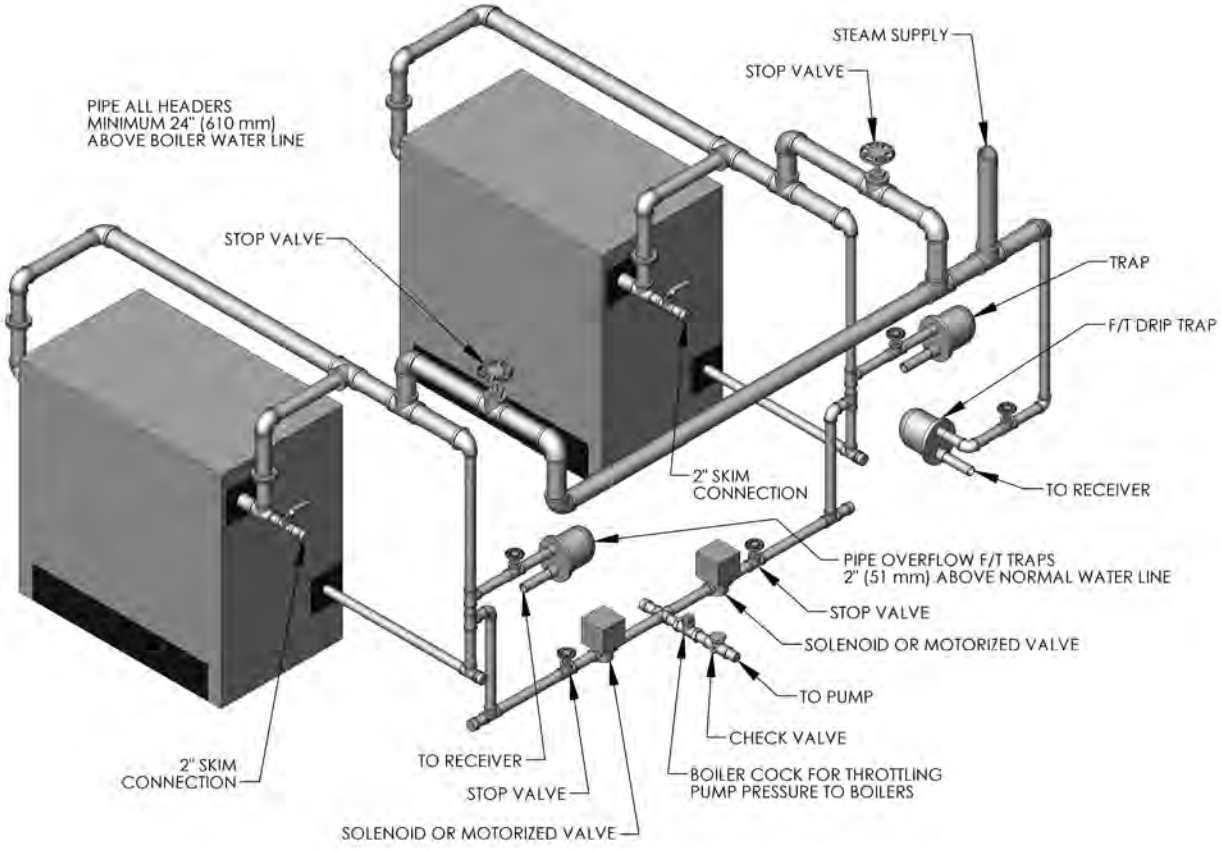


Figure 5.6: Piping Multiple Boilers, Typical, Pumped Return Systems

6. INSTALL THE JACKET & DRAFT HOOD

A. PREPARE THE PARTS

1. Collect the Jacket cartons and Draft Hood cartons (numbers 12 and 13).
2. See Figure 6.2 for the Jacket Assembly. Use these drawings for part identification and location.
3. See Figure 6.3 for the quantity of each carton required and placement of the jacket sections on the boiler.
4. See Table 6.1 for the contents of each Jacket Carton and Draft Hood carton.
5. See Table 6.2 for the Draft Hood cartons required.
6. See Table 6.3 for the Down Draft Diverter Plate.

B. APPLY CLEANOUT COVER PLATES

1. Remove Cleanout Cover Plates from carton 12.
2. Install one cover plate on each End Section. Use four 5/16”-18 x 2” (51 mm) long studs, 5/16-18” hex nuts and 5/16” flat washers.
3. Seal around the cleanout plates using the furnace cement provided and apply between base and bottom of sections.

C. APPLY JACKET END ASSEMBLIES

1. Remove necessary knockouts from the Jacket End Panel pieces in carton 12.
2. Attach a Corner Panel Support Bracket (GG-6029) to each Corner Panel using two #10 x 1/2” (13 mm) long sheet metal screws.
3. Attach the four Corner Panels to the Base Ends using 1/4”-20 x 1/2” (13 mm) long machine screws and 1/4” flat washers. The locations are:
   - Right Front – GG-6015
   - Left Front – GG-6016
   - Right Rear – GG-6017
   - Left Rear – GG-6018
4. Attach an End Panel Cover Plate (GG-6030) to the opening on the Upper Left End Panel (GG-6032) if the 6 inch tapping on that end is not used.
5. Attach Upper Left End Panel (GG-6032) to the left end corner panels with five #10 x 1/2” (13 mm) long sheet metal screws.
6. Place Top Left End Panel (GG-6020) over the Corner Panels and Upper Panel with flange pointing downward. Use four #10 x 1/2” (13 mm) long sheet metal screws.
7. Repeat for the Right End.

⚠ CAUTION

Installation is not complete until Down Draft Diverter Plate(s) (GG-5017) have been installed.

D. APPLY JACKET FRONT-REAR-TOP PANEL, DRAFT HOOD, DOWN DRAFT DIV. PLATE: 211A-05 THROUGH 211A-08 ONLY

1. Apply Front and Rear Panels as follows.
2. Collect the jacket carton listed in Table 6.3. Refer to Table 6.1 for carton contents. Open the carton and remove necessary knockouts from panels.
3. Install the Jacket Front Panel:
   - Make sure to slip the Front Panel into the Front Panel Support Brackets (mounted on the base). See Figure 6.2.
   - Slip the offset flandge of the Front Panel (GG-6023) under the edge of the Right Corner Panel (GG-6015). Place the left edge of the Front Panel over the offset flange of the Left Front Corner Panel (GG-6016). Line up the holes and secure with #10 x 1/2” (13 mm) long sheet metal screws.
4. Install the Jacket Rear Panel:
   - Slip the offset flange of the Upper Rear Panel (GG-6025) under the edge of the Left Rear Corner Panel (GG-6018). Place the left edge of the Upper Rear Panel over the offsett of the Right Rear Corner Panel (GG-6017). Line up the holes and secure with #10 x 1/2” (13 mm) long sheet metal screws.
   - Install the Lower Rear Panel (GG-6026) using the same procedure. Line up the holes and secure with #10 x 1/2” (13 mm) long sheet metal screws.
   - Attach a Rear Panel Support Leg (GG-6028) on the inside of the Left Rear Corner Panel (GG-6018). The flanges point toward the boiler. Line up the holes and secure with three #10 x 1/2” (13 mm) long sheet metal screws.
   - Install the Lower Rear Panel Guide (GG-6031) to the Rear Panel (GG-6026) and Base as shown in Figure 6.2.
5. Install the Draft Hood Sections:
   - Start from the left of the boiler (facing the front). Apply the Draft Hood section(s) (GG-5001) from left to right in the order given in Table 6.2.
   - Fasten each Draft Hood and Flue Collector section together using two #10 x 1/2” (13 mm) long sheet metal screws.
6. Install the Down Draft Diverter Plate(s):
   - Start from the left of the boiler (facing the back). Apply the Down Draft Diverter Plate(s) (GG-5017) from left to right, in the order given in Table 6.3.
   - Use (9) #10 x 1/2” (13 mm) long sheet metal screws for each Down Draft Diverter Plate.
7. Install the Top Panel:
   - Slip the offset flange of the Top Panel (GG-6024) under the edge of the Top Left End Panel (GG-6020). Place the left edge of the Top Panel over the offset of the Top Right End Panel (GG-6019). Line up the holes and secure with #10 x 1/2” (13 mm) long sheet metal screws.

E. APPLY JACKET FRONT-REAR-TOP PANEL, DRAFT HOOD, DOWN DRAFT DIV. PLATE: 211A-09 & LARGER ONLY

1. These boilers have multiple intermediate jacket panels.
2. Collect the jacket cartons listed in Table 6.3. Refer to Table 6.1 for carton contents. When installing the jacket panels, place them on boiler in the order shown in Figure 6.3.
3. Open the cartons in the order listed in Figure 6.3.
4. Install the Jacket Front Panels:
   - Make sure to slip the Front Panels into the Front Panel Support Brackets (mounted on the base). See Figure 6.2.
   - Install the first Front Panel (GG-6023) with the left edge over the Left Front Corner Panel (GG-6016). Line up the holes and secure with #10 x 1/2" (13 mm) long sheet metal screws.
   - Continue applying Front Panels this way.
   - Slip the right edge of the last Front Panel under the Right Front Corner Panel (GG-6015). Line up the holes and secure with #10 x 1/2" (13 mm) long sheet metal screws.
5. Install the Jacket Rear Panels:
   - Slip the offset flange of the first Upper Rear Panel (GG-6025) under the edge of the Left Rear Corner Panel (GG-6018). Secure with #10 x 1/2" (13 mm) long sheet metal screws.
   - Attach the first Lower Rear Panel (GG-6026) in the same way.
   - Attach a Rear Panel Support Leg (GG-6028) on the inside of the Upper Rear Panel (GG6025). The flanges point toward the boiler. Attach with #10 x 1/2" (13 mm) long sheet metal screws.
   - Install a Panel Support Angle (GG-6027) on the inside top of the Upper Rear Panel (GG6025) (See Figure 6.2). Use #10 x 1/2" (13 mm) long sheet metal screws.
   - Install the remaining Upper Rear (GG6025) and Lower Rear (GG6026) Panels in the same way.
   - Place the edge of the last rear panel over the Right Rear Corner Panel (GG-6017).
6. Install the Draft Hood Sections:
   - Start from the left of the boiler (facing the front). Apply the Draft Hood sections (GG-5001) from left to right in the order given in Table 6.2.
   - Fasten each Draft Hood and Flue Collector section together using two #10 x 1/2" (13 mm) long sheet metal screws.
7. Install the Down Draft Diverter Plate(s):
   - Start from the left of the boiler (facing the back). Apply the Down Draft Diverter Plate(s) (GG-5017) from left to right, in the order given in Table 6.3.
   - Use (9) #10 x 1/2" (13 mm) long sheet metal screws for each Down Draft Diverter Plate.
8. Install the Top Panels:
   - Apply the jacket top panels working from left to right (facing front of boiler). Place the panels from the cartons in the sequence given in Figure 6.3.
   - Mount a Panel Support Angle (GG-6027) on the back bottom edge of each Top Panel (GG-6024) with the long flange pointed down. Peel the insulation slightly away from the back edge of the panel for better contact. Secure with one #10 x 1/2" (13 mm) long sheet metal screw.
   - Slide the left hand offset flange of the first Top Panel under the Top Left End Panel (GG-6020). Place the front flange of the Top Panel over the Front Panel. Line up the holes and secure with #10 x 1/2" (13 mm) long sheet metal screws.
   - Slide the left hand edge of each additional panel under the panel to its left. Secure with #10 x 1/2" (13 mm) long sheet metal screws.
   - Apply the last Top Panel in the same way. Place its right hand edge over the Top Right End Panel (GG-6019). Secure with #10 x 1/2" (13 mm) long sheet metal screws.
   - Check for loose or missing screws as you complete the jacket assembly.

F. APPLY LOWER END PANEL(S)

1. THIS APPLIES TO ALL BOILER SIZES.
2. The parts are packed in carton #12.
3. Attach an End Panel Cover Plate (GG-6030) to the opening in the Lower End Panel (GG-6022) if the tapping in the boiler is not being used. Secure with two #10 x 1/2" (13 mm) long metal screws.
4. Apply a Lower End Panel (GG-6022) to each end of the boiler, securing to the Corner Panels with eight #10 x 1/2" (13 mm) long sheet metal screws. Attach to the Upper End Panels (GG-6032 & GG-6021) with two #10 x 1/2" (13 mm) long sheet metal screws for each panel.

G. APPLY PLATES & LABELS

1. Mount Boiler Rating Label, Agency Plates and Caution Labels in the Upper Right End Jacket Panel (GG-6021).
2. Plates to be field applied are packed in Box Number 7.
3. Place these plates as shown in Figure 6.1.
4. Secure metal plates with #6 x 6 mm (1/4") sheet metal screws. Apply all adhesive-backed labels.

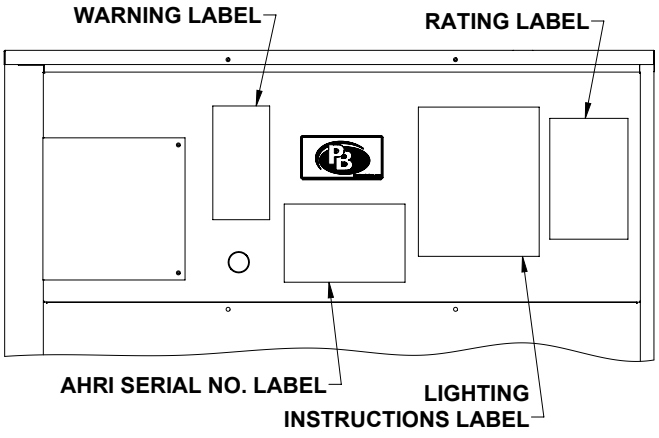


Figure 6.1: Location of Rating, Agency and Instruction Plates on Upper Right End Panel

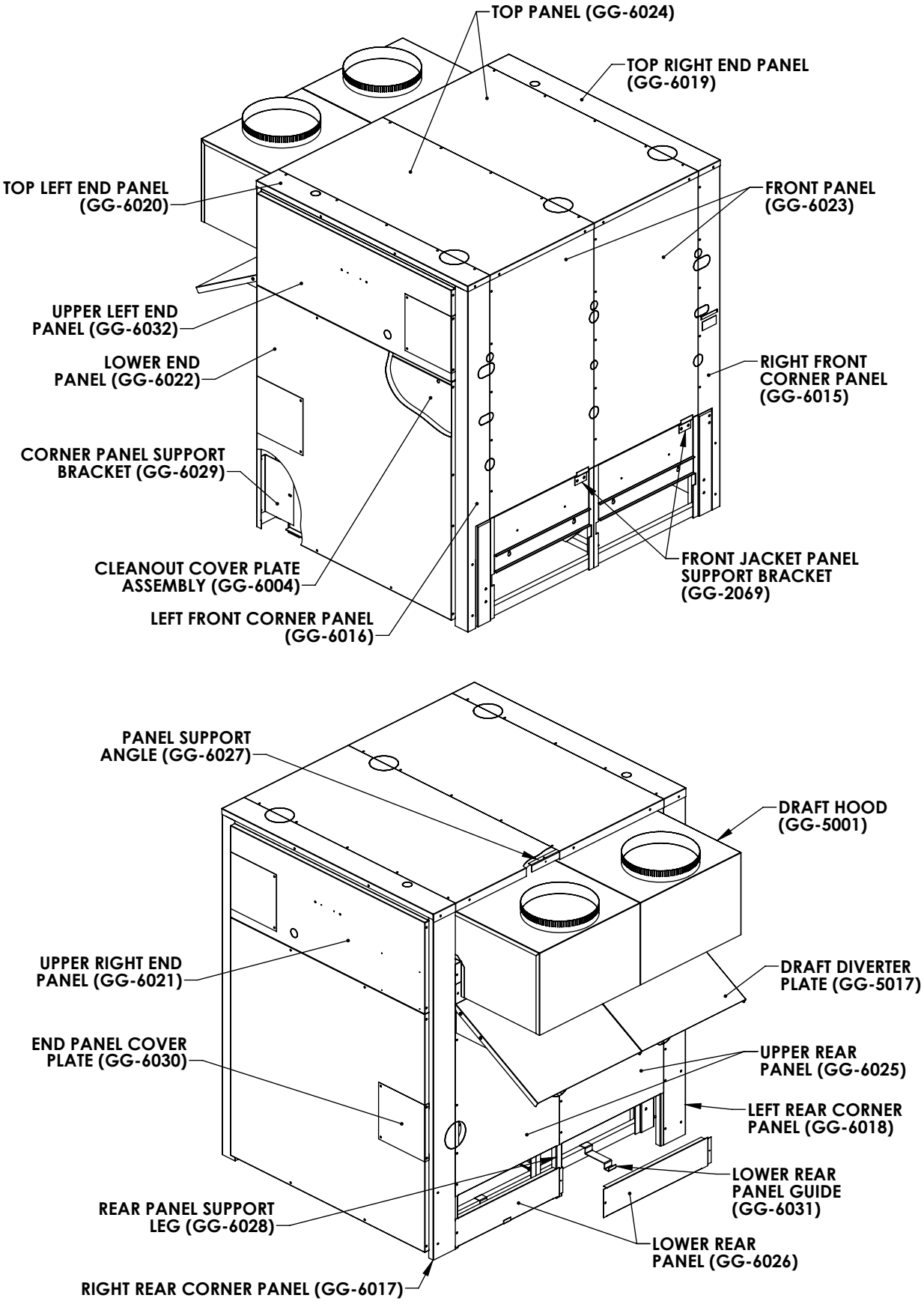
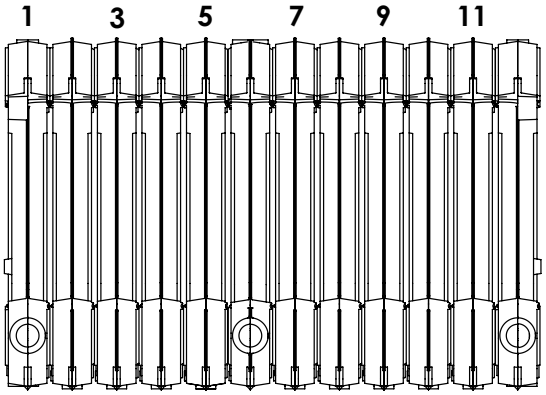


Figure 6.2: Jacket Assembly

Figure 6.3: Jacket Assembly Sequence - Carton Numbers and Locations



Boiler Model Number	Number of Cartons				Block Section Numbers											
	12B	12C	12D	12E	1	2	3	4	5	6	7	8	9	10	11	12
211A-05	1	—	—	—	B											
211A-06	—	1	—	—	C											
211A-07	—	—	1	—	D											
211A-08	—	—	—	1	E											
211A-09	2	—	—	—	B				B							
211A-10	1	1	—	—	B				C							
211A-11	—	2	—	—	C					C						
211A-12	—	1	1	—	C					D						

Table 6.1: Jacket and Draft Hood Carton Contents (continued on P. 27)
See Figure 6.2 for Placement of Jacket Sections

Carton	Contents	Sub-Assembly	Part Number	Qty.
12	Cleanout Cover Plates	GG-6033 (Stock Code: 90528)	GG-6004	2
	Jacket Corner Panel, Right Front		GG-6015	1
	Jacket Corner Panel, Left Front		GG-6016	1
	Jacket Corner Panel, Right Rear		GG-6017	1
	Jacket Corner Panel, Left Rear		GG-6018	1
	Corner Panel Support Brackets		GG-6029	4
	Jacket Upper End Panel, Left		GG-6032	1
	Jacket Upper End Panel, Right		GG-6021	1
	End Panel Cover Plates		GG-6030	4
	Jacket Lower End Panels		GG-6022	2
	Top Right End Panel		GG-6019	1
	Top Left End Panel		GG-6020	1
	Sheet Metal Screws		—	80
	Machine Screws, Washers, & Nuts		—	4

Table 6.1: Jacket and Draft Hood Carton Contents (continued on P. 28)
See Figure 6.2 for Placement of Jacket Sections

Carton	Contents	Sub-Assembly	Part Number	Qty.
12B	Jacket Intermediate Panel - Front	GG-6034-1 (Stock Code: 90284)	GG-6023-1	1
	Jacket Intermediate Panel - Top		GG-6024-1	1
	Jacket Intermediate Panel - Upper Rear		GG-6025-1	1
	Jacket Intermediate Panel - Lower Rear		GG-6026-1	1
	Panel Support Angle		GG-6027	2
	Rear Panel Support Leg		GG-6028	1
	Lower Rear Panel Guide		GG-6031	1
	Sheet Metal Screws		—	25
12C	Jacket Intermediate Panel - Front	GG-6034-2 (Stock Code: 90285)	GG-6023-2	1
	Jacket Intermediate Panel - Top		GG-6024-2	1
	Jacket Intermediate Panel - Upper Rear		GG-6025-2	1
	Jacket Intermediate Panel - Lower Rear		GG-6026-2	1
	Panel Support Angle		GG-6027	2
	Rear Panel Support Leg		GG-6028	1
	Lower Rear Panel Guide		GG-6031	1
	Sheet Metal Screws		—	25
12D	Jacket Intermediate Panel - Front	GG-6034-3 (Stock Code: 90286)	GG-6023-3	1
	Jacket Intermediate Panel - Top		GG-6024-3	1
	Jacket Intermediate Panel - Upper Rear		GG-6025-3	1
	Jacket Intermediate Panel - Lower Rear		GG-6026-3	1
	Panel Support Angle		GG-6027	2
	Rear Panel Support Leg		GG-6028	1
	Lower Rear Panel Guide		GG-6031	1
	Sheet Metal Screws		—	25
12E	Jacket Intermediate Panel - Front	GG-6034-4 (Stock Code: 90287)	GG-6023-4	1
	Jacket Intermediate Panel - Top		GG-6024-4	1
	Jacket Intermediate Panel - Upper Rear		GG-6025-4	1
	Jacket Intermediate Panel - Lower Rear		GG-6026-4	1
	Panel Support Angle		GG-6027	2
	Rear Panel Support Leg		GG-6028	1
	Lower Rear Panel Guide		GG-6031	1
	Sheet Metal Screws		—	25
13	Draft Hood Section	GG-5001 (Stock Code: 90399)	GG-5001	1
	Sheet Metal Screws		—	4
13A	Draft Hood Section	GG-5001-1 (Stock Code: 90400)	GG-5001-1	1
	Sheet Metal Screws		—	4
13B	Draft Hood Section	GG-5001-2 (Stock Code: 90401)	GG-5001-2	1
	Sheet Metal Screws		—	4
13C	Draft Hood Section	GG-5001-3 (Stock Code: 90402)	GG-5001-3	1
	Sheet Metal Screws		—	4

Table 6.1: Jacket and Draft Hood Carton Contents – See Figure 6.2 for Placement of Jacket Sections

Carton	Contents	Sub-Assembly	Part Number	Qty.
18	Draft Diverter Plate	GG-5017 (Stock Code: 90579)	GG5017	1
	Sheet Metal Screws		—	9
18A	Draft Diverter Plate	GG-5017-1 (Stock Code: 90580)	GG5017-1	1
	Sheet Metal Screws		—	9
18B	Draft Diverter Plate	GG-5017-2 (Stock Code: 90581)	GG5017-2	1
	Sheet Metal Screws		—	9

Table 6.2: Draft Hood Section Placement (from Left to Right Facing Front of Boiler)

Boiler Model Number	Position 1	Position 2	Position 3
211A-05	13A	—	—
211A-06	13C	—	—
211A-07	13	13	—
211A-08	13A	13	—
211A-09	13A	13A	—
211A-10	13C	13B	—
211A-11	13C	13C	—
211A-12	13A	13A	13

Table 6.3: Draft Diverter Plate Locations

Boiler Model Number	Position 1	Position 2	Position 3
211A-05	18A	—	—
211A-06	18B	—	—
211A-07	18	18	—
211A-08	18A	18	—
211A-09	18A	18A	—
211A-10	18B	18A	—
211A-11	18B	18B	—
211A-12	18A	18A	18

7. CONNECT GAS PIPING

A. INSTALL GAS TRAIN

1. The Gas Control Train supplied with this boiler:
   - Has been factory assembled and tested for tightness of joints.
   - Must be re-tested after installation with a soap suds test to assure it is still leak-tight after assembly.
   - Must be isolated from the gas supply piping during testing of the supply piping.
2. Assemble the Gas Control Train to the Manifold with the ground joint union provided. See Figure 7.1.
3. Support the Gas Control Train with a permanent brace.

B. CONNECT PILOT GAS TUBING

1. Use 3/8” aluminum tubing or as required by local codes.
2. Connect the Pilot Line to the Pilot Cock Assembly supplied with the Gas Control Train.
3. Connect tubing to each pilot.
   a. Connect electronic pilot to the Pilot Gas Valve.
   b. Connect standing pilot (when supplied – see Table 2.3) to the thermopilot valve.
   c. Install thermocouple in the standing pilot and connect to the thermopilot valve.
   d. Plumb bleed tubing to standing pilot.

C. INSTALL VENT & BLEED PIPING

1. Gas Pressure Regulator
   a. Connect regulator vent outlet to outside atmosphere using 1/4” tubing or as required by local codes.
   b. Terminate the tubing downward to prevent water from entering the tubing and protect from any obstruction.
   c. Terminate the tubing above and well away from normal breathing level or building air intakes.
2. Diaphragm Gas Valve
   a. Pipe diaphragm gas valve bleed lines to outside atmosphere.
   b. Use 1/4” tubing or as required by local codes. Always pipe the bleed line separate from the regulator vent line.

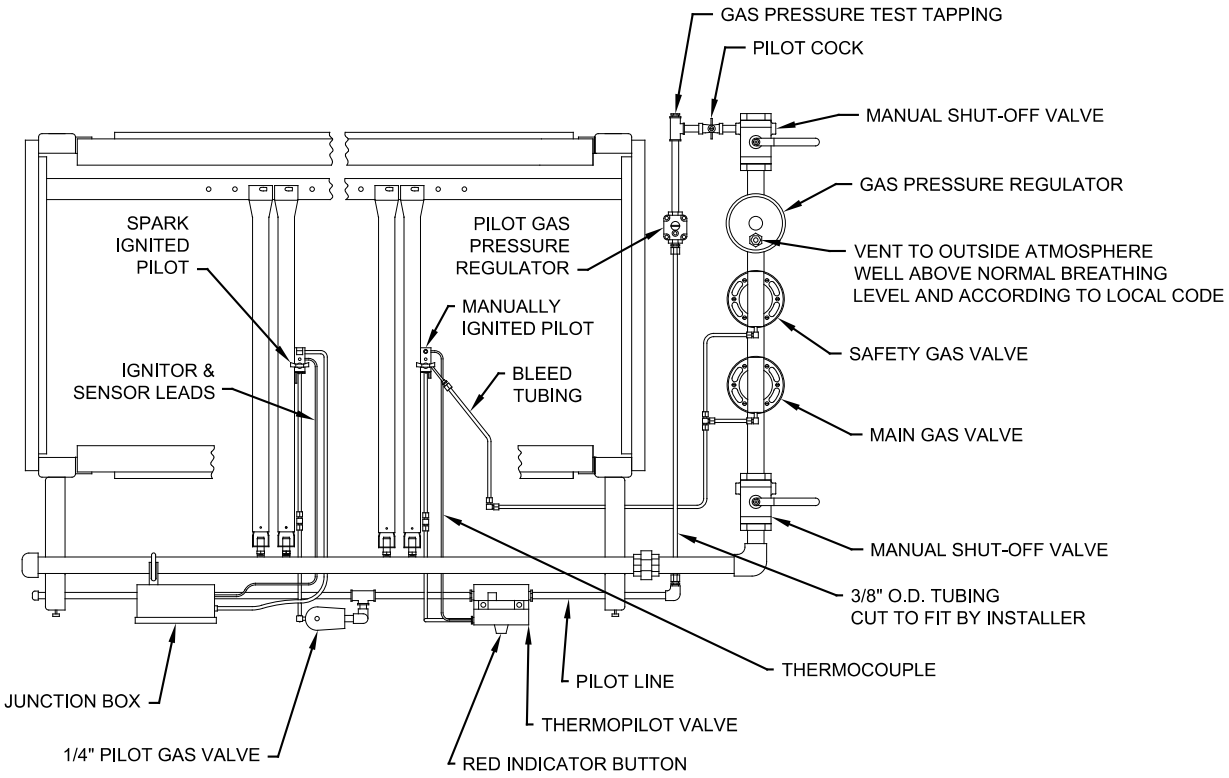


Figure 7.1: Gas Control Train and Burner Assembly

c. If the unit is equipped only with a spark ignition pilot (211A-05 thru 211A-10), the bleed line **MUST** be piped to the outside.

d. When piping bleed lines to outside, terminate the tubing downward to prevent water from entering the tubing, and protect the tubing termination from any obstruction. Terminate the tubing above and well away from normal breathing level or building air intakes.

D. INSTALL GAS SUPPLY PIPING

1. Size the piping as required by the National Fuel Gas Code, ANSI Z223.1/NFPA 54 and/or CAN/CGA B149 Installation Codes 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 (75 Pa).

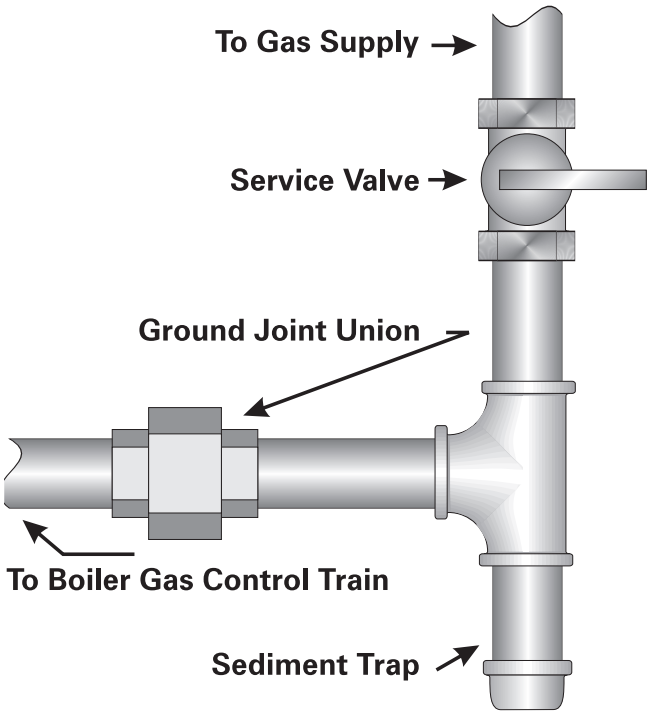


Figure 7.2: Gas Supply Connection to Boiler

2. The standard gas train is designed for a maximum pressure of 1/2 psig (14 inches water column/3.5 kPa). 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 Boiler Rating Label. Make sure the system regulator and the piping are sized and adjusted properly to provide this pressure under all conditions.

4. Install a Service Valve, Sediment Trap and Ground Joint Union at the supply connection to the Gas Control Train as shown in Figure 7.2. 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. This is necessary because most natural gas contains propane as well as methane.

E. TEST GAS SUPPLY PIPING

1. ISOLATE THE BOILER GAS CONTROL TRAIN FROM THE SYSTEM DURING TEST:
   a. Test pressure 1/2 psig (3.5 kPa) or less – Close the Manual Shut-Off Valve on the Boiler Gas Control Train
   b. Test pressure over 1/2 psig (3.5 kPa) – 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 (Cubic Meters) Per Hour of Natural Gas for 0.3 inch (75 Pa) Drop.

Pipe Length		1-1/4" Pipe		1-1/2" Pipe		2" Pipe		2-1/2" Pipe		3" Pipe		4" Pipe		6" Pipe	
Feet	Meters	Foot^3	Meter^3	Foot^3	Meter^3	Foot^3	Meter^3	Foot^3	Meter^3	Foot^3	Meter^3	Foot^3	Meter^3	Foot^3	Meter^3
10	3.0	1050	30	1,600	45	3,050	86	4,800	136	8,500	241	17,500	496	44,000	1246
20	6.1	730	21	1,100	31	2,100	59	3,300	93	5,900	167	12,000	340	31,000	878
30	9.1	590	17	890	25	1,650	47	2,700	76	4,700	133	9,700	275	25,000	708
40	12.2	500	14	760	22	1,450	41	2,300	65	4,100	116	8,300	235	22,000	623
50	15.2	440	12	670	19	1,270	36	2,000	57	3,600	102	7,400	210	20,000	566
60	18.3	400	11	610	17	1,150	33	1,850	52	3,250	92	6,800	193	18,000	510
70	21.3	350	10	560	16	1,050	30	1,700	48	3,000	85	6,200	176	17,000	481
90	27.4	320	9	490	14	930	26	1,500	42	2,600	74	5,400	153	15,000	425
100	30.5	305	9	460	13	870	25	1,400	40	2,500	71	5,100	144	14,000	396
150	45.7	250	7	380	11	710	20	1,130	32	2,000	57	4,100	116	11,500	326

Above ratings based on natural gas with specific gravity of 0.60 allowing pressure drop of 0.3 inches (75 Pa). 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	.962	.926

8. INSTALL CONTROLS & TRIM

A. INSTALL SAFETY VALVE(S)

1. Pipe the pop safety valve(s) in the 3” tappings located on the right or left end sections. Make sure the relief valve sizing meets local code requirements.

⚠ CAUTION

Pipe the discharge of the Safety Relief Valve(s) 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.

B. INSTALL BLOWDOWN VALVES

1. Install a 1-1/2” full port ball valve in each of the tappings provided at the lower back of the end sections. 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.

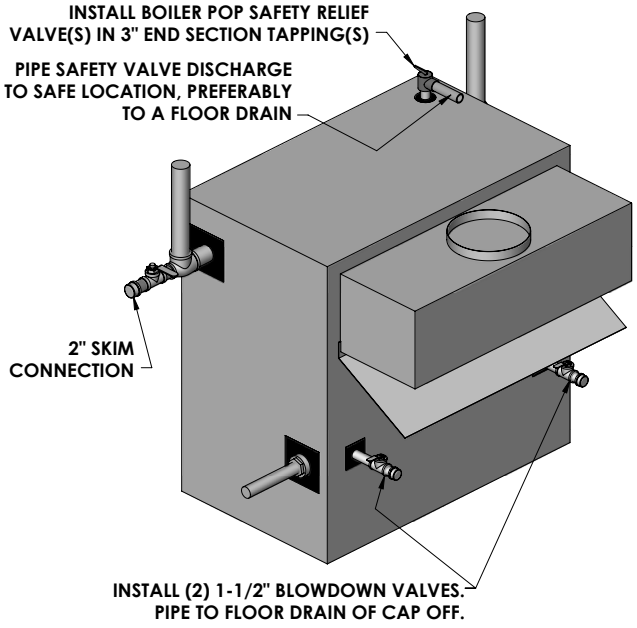


Figure 8.1: Blowdown Valve Piping

C. INSTALL LOW WATER CUT-OFF(S)

1. Hard pipe the float type low water cut-off and gauge glass in the tappings provided in the front of either end section.

2. Do not apply piping which would raise or lower the location of the cut-off 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 cut-off/feeder or low water cut-off/pump control, see Figures 8.3 through 8.6.

4. Mount the probe type low water cut-off supplied with the boiler. The end sections have 3/4” tappings in the front for mounting the probe low water cut-off auxiliary control. See Figure 3.3.
   a. The standard probe control is Hydrolevel Model 550P. This control is automatic reset type.

5. Provide each float low water cut-off 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 40-1/2” (1029 mm) from boiler foundation to the normal water level.

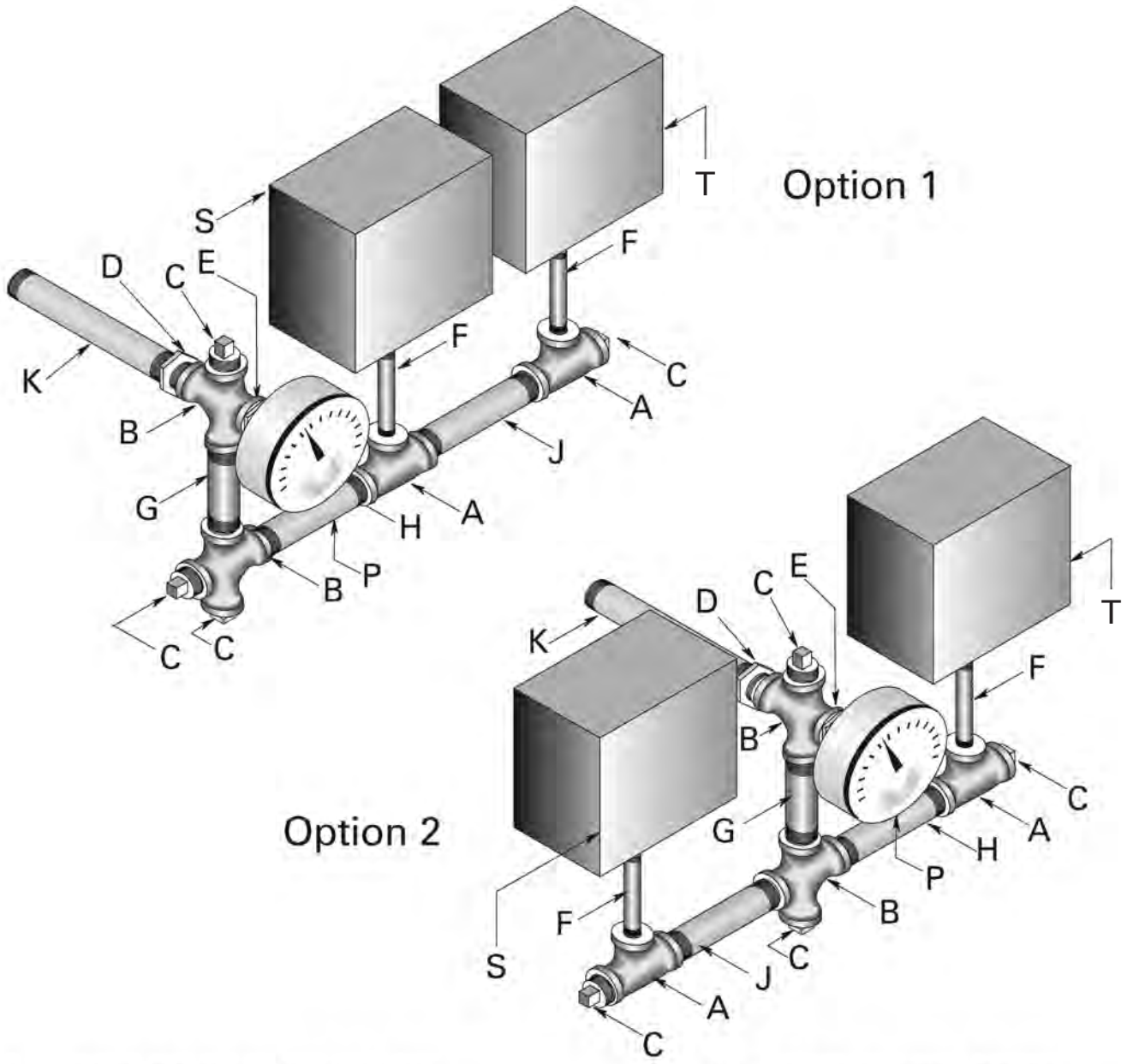
7. When using multiple float type Controls: Always pipe the controls off of the same tappings to the boiler. Do not mount on different ends of the boiler or in different tappings. This can cause erratic operation and nuisance problems with the controls.

D. INSTALL PRESSURE CONTROLS

1. Pipe the Steam Pressure Gauge and Boiler Limit and Operating Pressure Controls as shown in Figure 8.2. Connect the control assembly to the 1/2” tapping on the right end of the boiler.

⚠ CAUTION

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



A	3/4” X 3/4” X 1/4” Reducing Tee	G	3/4” X 3” (76 mm) long Nipple
B	3/4” Cross	H	3/4” X 4” (102 mm) long Nipple
C	3/4” Plug	J	3/4” X 5” (127 mm) long Nipple
D	3/4” X 1/2” Hex Bushing	K	3/4” X 6” (152 mm) long Brass Nipple
E	3/4” X 1/4” Hex Bushing	P	Steam Gauge
F	1/4” X 3” (76 mm) long Brass Nipple	S	Pressuretrol
		T	Limit Control

(Right Hand Shown, Left Hand Opposite)
(NOTE: Some local codes may require larger piping)

Figure 8.2: Pressure Control Piping (Fittings Included with Boiler)

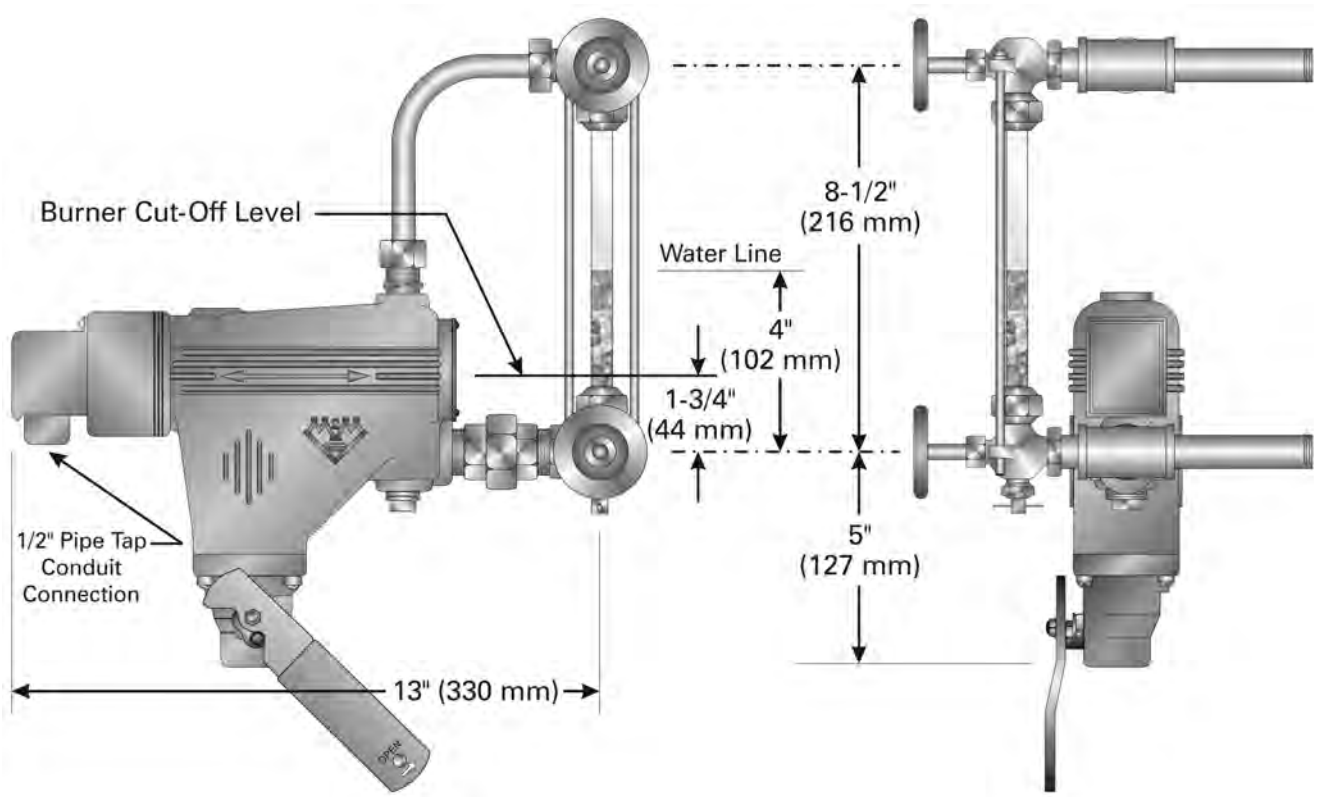


Figure 8.3: Standard Float Type Control, Model 67

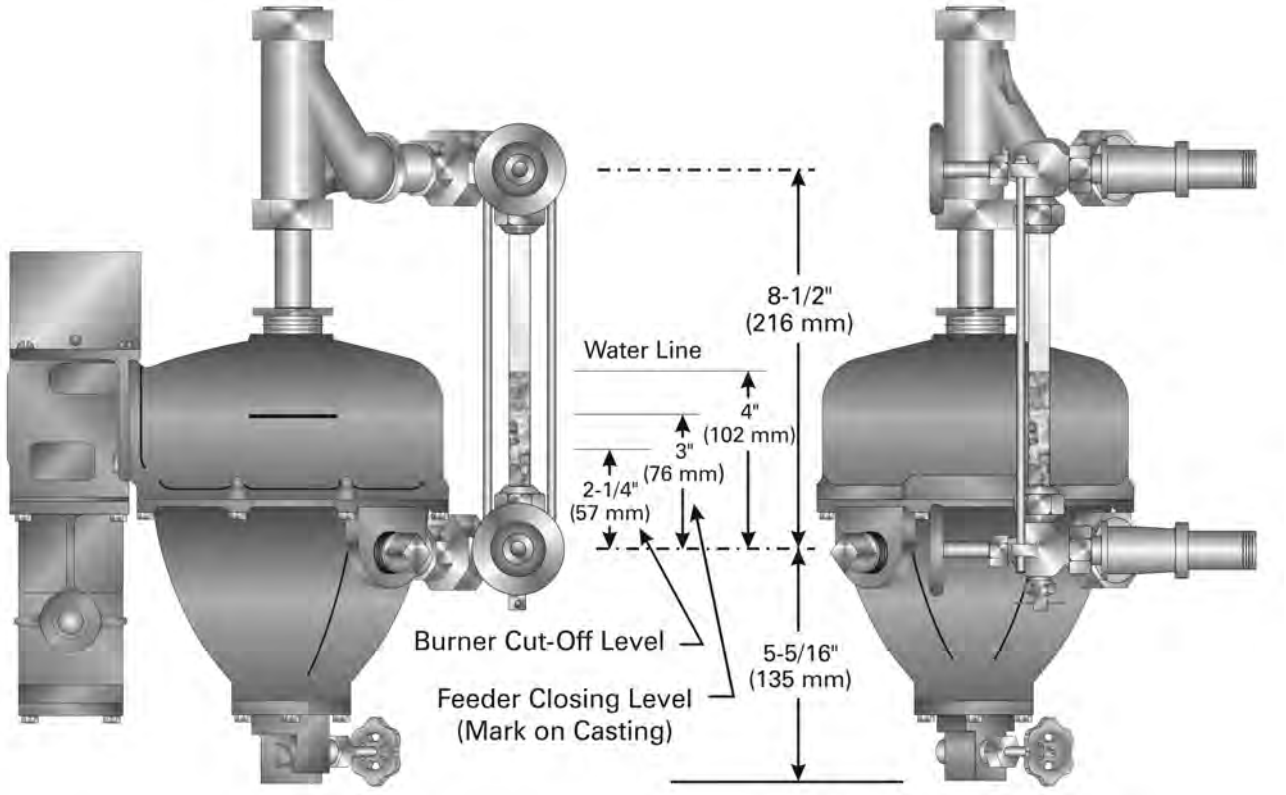
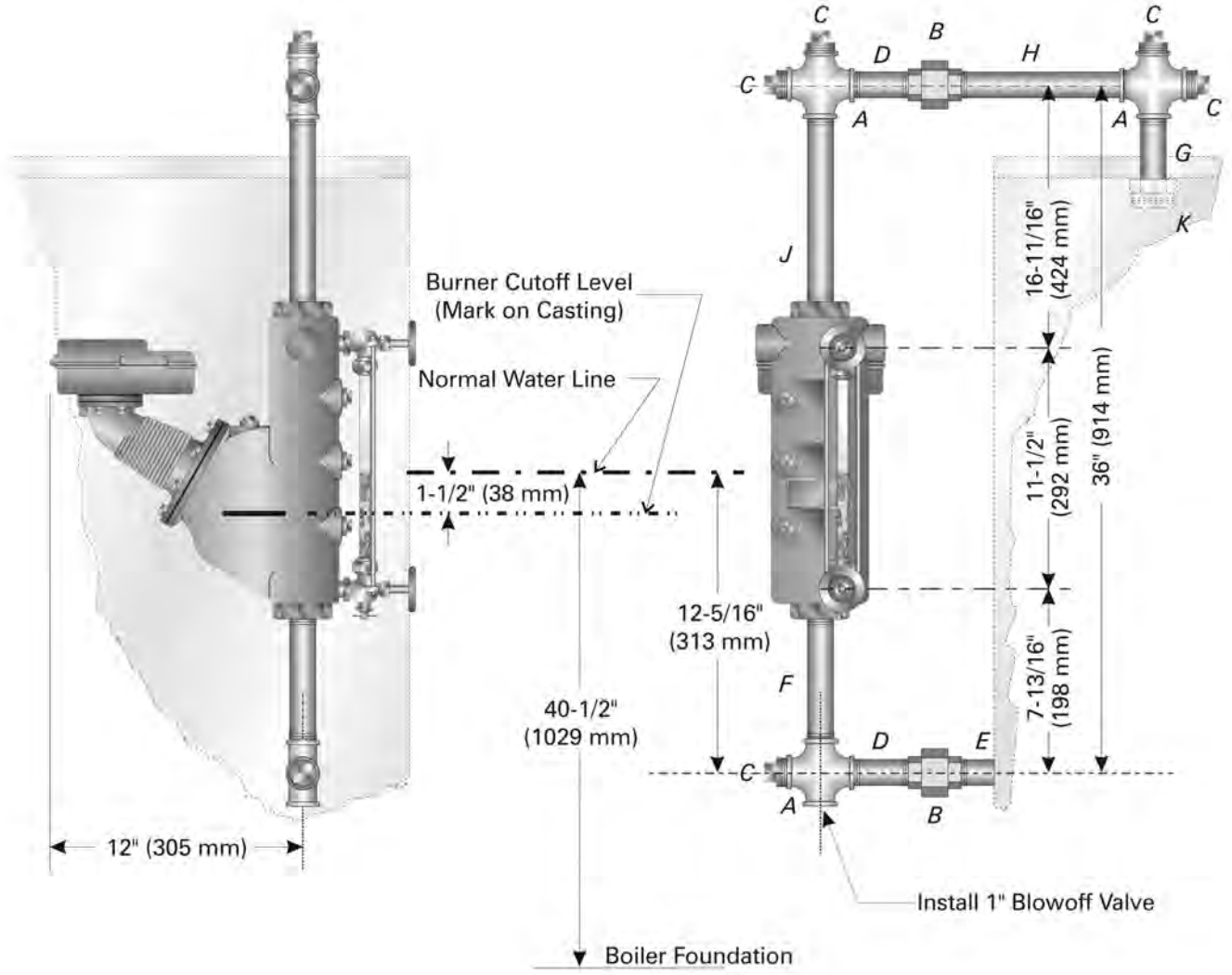


Figure 8.4: Optional Feeder/Low Water Cut-Off, Model 47-2
Used Only on Models 211A-05 through 211A-08 – Capacity Not Adequate for Larger Boilers

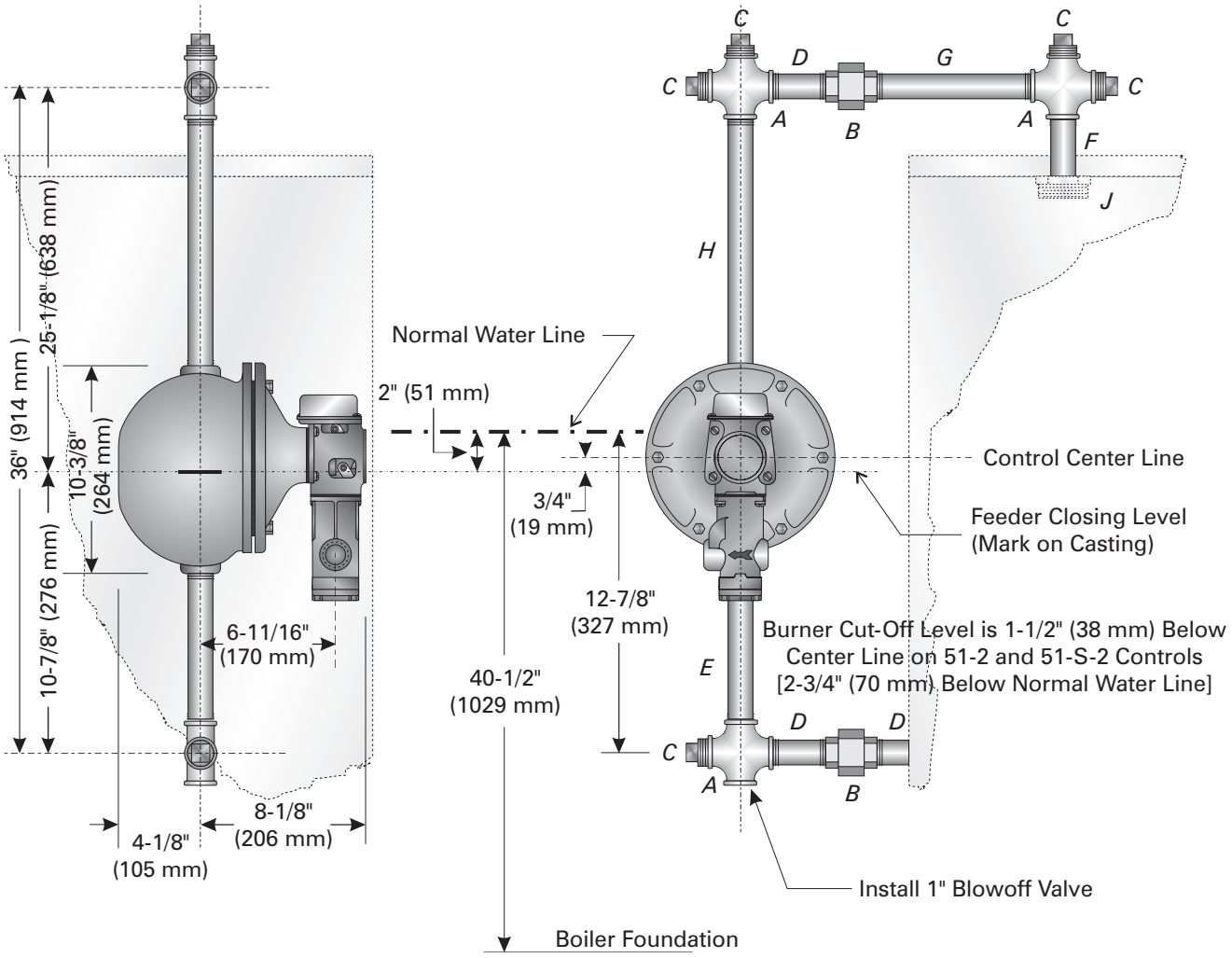


SUGGESTED FITTINGS LIST

A	1" Cross	*F*	1" x 6" (152 mm) long Nipple
B	1" Ground Joint Union	*G*	1" x 8" (203 mm) long Nipple
C	1" Plug	*H*	1" x 8-1/4" (210 mm) long Nipple
D	1" x 2" (51 mm) long Nipple	*J*	1" x 14" (356 mm) long Nipple
E	1" x 3" (76 mm) long Nipple	K	3" x 1" Bushing

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

Figure 8.5: Optional Float Type Pump Control/Low Water Cut-Off, Model 157



APPLICATION OF 51 FEEDERS

Models 211A-05 through 211A-12
One 51-2 Feeder/Cutoff

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

SUGGESTED FITTINGS LIST

A	1" Cross
B	1" Ground Joint Union
C	1" Plug
D	1" x 3" (76 mm) long Nipple
E	1" x 5-1/2" (140 mm) long Nipple
F	1" x 8" (203 mm) long Nipple
G	1" x 8-1/4" (210 mm) long Nipple
H	1" x 19-1/2" (495 mm) long Nipple
J	3" x 1" Bushing

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

Figure 8.6: Optional Feeder/Low Water Cut-Off, Type 51-2

9. WIRE THE BOILER

A. CONNECT SUPPLY WIRING

1. All wiring must be done in accordance with local codes, the National Electrical Code ANSI/NFPA70 and/or the Canadian Electrical Code Part I, CSA C22.1, Electrical Code and other controlling agencies or governing bodies.

⚠ CAUTION

Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.

⚠ AVERTISSEMENT

Identifier tous les câbles avant de les débrancher au moment d'effectuer l'entretien des commandes. Des erreurs dans le raccordement des câbles d'alimentation peuvent causer un fonctionnement inadéquat et dangereux. Vérifier le bon fonctionnement après les travaux d'entretien.

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 and/or the Canadian Electrical Code Part I, CSA C22.1, Electrical Code.

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.
   See Figure 9.1.

B. PREPARE REMAINING CONTROLS

1. Mount a junction box near each Gas Control Train for connection of conduit and wiring distribution to the gas train components.

C. INSTALL CONTROL WIRING

1. Wire the boiler according to the wiring diagram supplied with the boiler (in the Control Envelope). Figure 9.1 is a typical layout of the components on the boiler. Figure 9.2 is an example of a standard wiring system. Use this drawing for general reference only.

2. Low Energy Safety Control wiring must follow the contour of the boiler. Some local codes may require that all wiring, even low voltage, be routed in conduit.

3. Install all line voltage wiring in conduit.

4. Do not install single pole switches, including safety controls, in a grounded line.

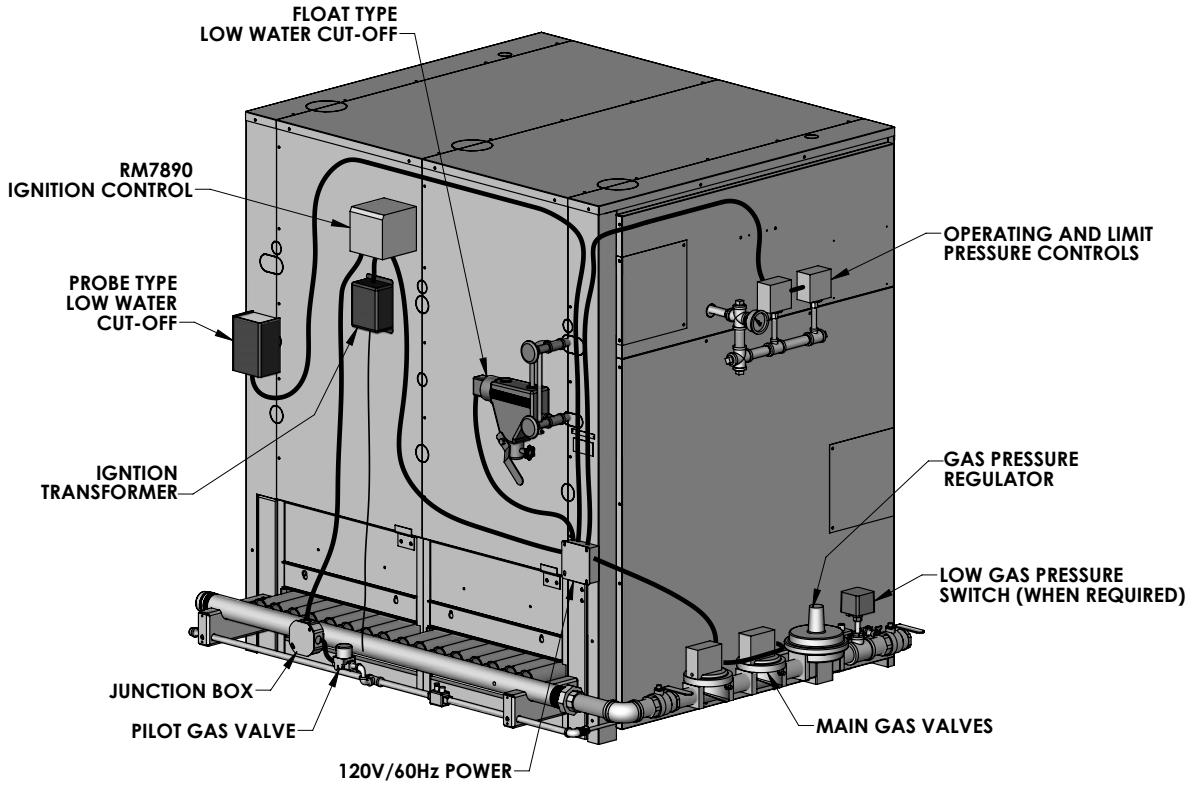


Figure 9.1: Typical Control Layout and Wiring - E*-E Ignition

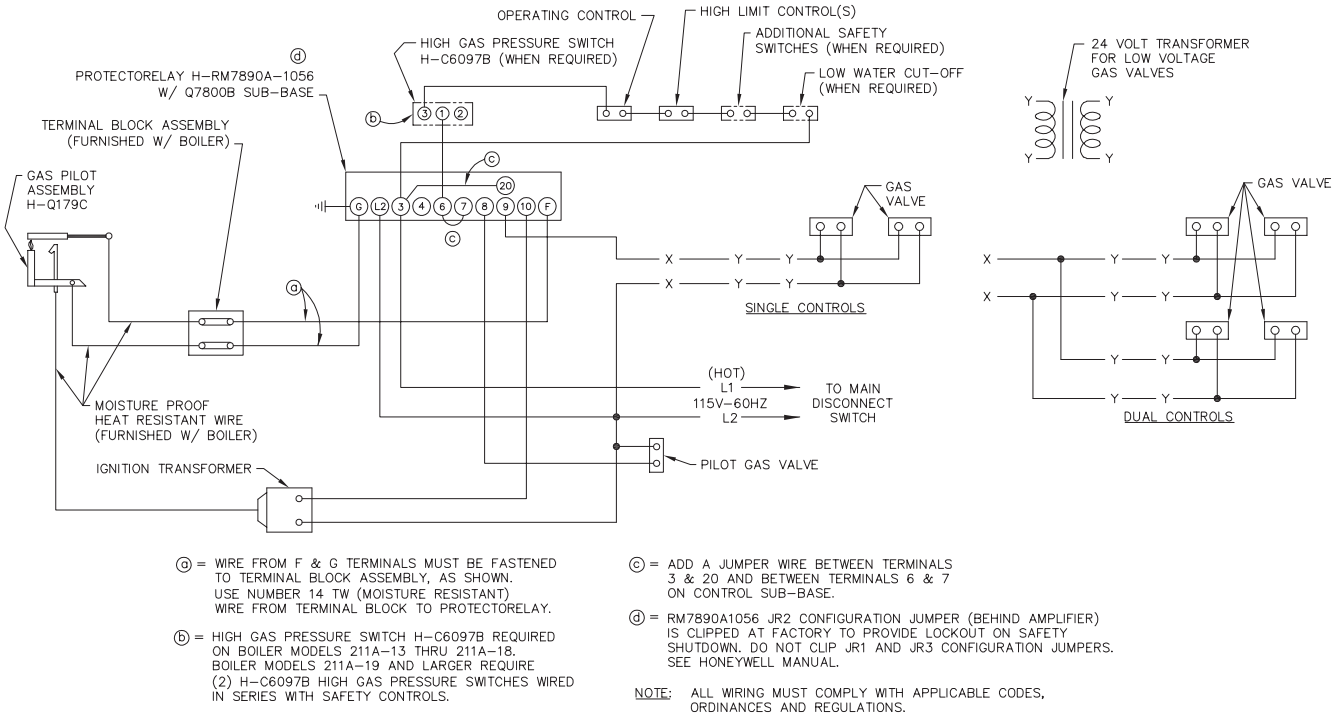


Figure 9.2: Typical Wiring – E1-E Ignition System

10. STARTING THE BOILER

A. CHECK THE PIPING

1. Water and 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.

B. FILL THE BOILER

1. Fill the boiler to the normal water line.
   a. Gravity Systems and Pumped Return with Condensate Units-Fill to 40-1/2" (103 cm) 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 40-1/2" (103 cm) above the boiler foundation (just below center of gauge glass) when the pump stops.

C. DRAFT DIVERTER PLATE INSTALLATION

⚠ CAUTION

Installation is not complete until Draft Diverter Plate(s) (GG-5017) have been installed.

D. STUDY LIGHTING INSTRUCTIONS

1. Before starting the boiler, study the Lighting Instructions supplied with the boiler.

E. RUN PILOT CHECK-OUT

1. Shut off all electrical power to the boiler.
2. Close Main and Pilot gas shut-off valves. Wait for five (5) minutes.
3. Set the Operating and Limit Pressure Controls to minimum setting so they will not call for heat.
4. Perform Pilot Spark Check:
   a. Turn main electric disconnect switch to the ON position.
   b. Turn up the settings on the Operating and Limit Pressure Controls so they will call for heat.
   c. E*-E Systems (RM7890) - The control will spark for 10 seconds, then lock out. Control will need to be reset.
   d. Turn down the Operating Pressure Control to stop the call for heat.
   e. Wait 60 seconds to allow the control to reset before proceeding with the next step.
5. Light Manual Pilots (where equipped)
   a. Follow the procedure in the Lighting Instructions to manually light any standing pilots.
6. Electronic Spark-Ignited Pilot Ignition Check
   a. Open pilot gas shut-off valves.
   b. Turn up the Operating Pressure Control for a call for heat.
   c. The electronic spark-ignited pilot(s) should ignite.
   d. Turn down the Operating Pressure Control to stop the call for heat.
   e. The spark-ignited pilot(s) should shut off.
7. Check Main Burner Ignition
   a. With the Operating Pressure Control turned down, open the main gas shut-off valve(s).
   b. Turn up the Operating Pressure Control for a call for heat.
   c. The electronic spark-ignited pilot(s) should ignite.
   d. The main gas valves will then open and the main burners should ignite.
   e. Turn down the Operating Pressure Control to stop the call for heat.
   f. The electronic spark-ignited pilot(s) and main burners should shut off.

F. CHECK MAIN BURNER SYSTEM

1. Remove the pressure test plug at the Main gas shut-off valve. Attach a U-tube manometer.
2. Restart the boiler by turning up the Operating Pressure Control for a call for heat.
3. Leak test all gas train joints with a soap suds solution.
4. Check the gas pressure at the entrance to the Gas Control train.
   a. The pressure reading under flow should be between 5 and 14 inches water column (1.7 and 3.5 kPa).
   b. If the pressure to the Gas Control Train exceeds 14 inches (3.5 kPa) under any conditions, the system must be provided with a lockup type gas pressure regulator to provide 14 inches (3.5 kPa) maximum.
5. Check the Manifold gas pressure.
   a. Remove the 1/8" pipe plug from the manifold gas pressure tapping.
   b. Attach a U-tube manometer.
   c. Adjust the Main Gas Pressure Regulator to obtain 3.5 inches water column (.9 kPa) on Natural Gas or 10 inches water column (2.5 kPa) on Propane (LP) Gas.
   d. NOTE: If the pressure is adjusted to set the nameplate input to the boiler, do not set it more than 0.3 inches (75 Pa) plus or minus from the specified settings. If more adjustment to the rate is needed, it must be done by changing the burner gas orifices.

e. The Minimum input rate listed on the nameplate applies to boilers with staged firing rate. This minimum rate is not adjustable. It is controlled by an orifice in the gas train.

6. Check the burner input by reading the gas meter.
   a. Each of the burners is rated at 105,000 Btu/hr (30.8 kW) for Natural Gas with a 0.60 specific gravity.
   b. Each of the burners is rated at 102,500 Btu/hr (30 kW) for Propane (LP) Gas with a 1.56 specific gravity.
   c. (U.S.) Determine the input by multiplying "F" – Meter Reading (Cubic Feet of Gas) times "H" – Heating Value of Gas (Btu per Cubic Foot) times 3600. Divide by "T" – the time in seconds at the meter reading.

$$\text{Rate, Btu/Hr} = \frac{F \times H \times 3600}{T}$$

   (Metric) Determine the input by multiplying "F"– Meter Reading (Cubic Meters of Gas) times "H" – Heating Value of Gas (Joules per Cubic Meter). Divide by "T" – the time in seconds of the meter reading.

$$\text{Rate, Watts} = \frac{F \times H}{T}$$

   d. Note: If the meter is not automatically corrected for temperature and pressure, the meter reading must be corrected to actual conditions during the rate test.

7. Adjustment of Primary Air
   a. A bag of air adjustment screws is provided with the boiler, attached to one of the burners with pilot bracket.
   b. Primary air adjustment is not normally required.
   c. If primary air adjustment is needed, insert the self-tapping screws into the holes located on the top front of the burners.
   d. Turn the screws in all the way until yellow flame tips appear. Turn the screws back out until the yellow tips disappear.

G. CHECK BOILER CONTROLS

1. Limit and Operating Pressure Controls
   a. Lower the setting of each control until the burners shut down.
2. Low Water Cut-offs
   a. Lower the water level in the boiler to below the control cut-off level. The burners should shut down.
3. Main Burner Shut-Off Valve(s)
   a. Close Main Burner Shut-Off Valve(s).
   b. The burners should shut down.
4. Check all controls to make sure they function correctly.
5. After all controls have been proven, set the Operating and Limit Pressure Controls to the pressures desired.

H. 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.
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 an unstable water line and water carryover to the system.

⚠ WARNING

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

3. The piping for a skim valve must be done as shown in Section 5, "Pipe the Boiler," of this manual, with the skim valve mounted off of one of the end riser connections.
4. Connect a 2 inch drain line off of the skim valve, run to a point of safe discharge.
5. Close all valves to the system. Provide a means of continuous fresh water to the boiler for the cleaning process.
6. Use common washing soda (such as Arm and Hammer Super Washing Soda). Mix the soda with water in a 10 quart (9.5 liter) pail and pour into the boiler through the safety valve tapping. Use a proportion of one (1) pound (.5 kg) of washing soda for each 800 square feet (74 m^2) EDR net boiler rating.
7. Open the skim valve. Fill the boiler until water begins to flow out the valve.

⚠ 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.

8. Turn burners on and allow the boiler water to heat up to just below steaming [180 to 200ºF (82 to 93ºC)]. Cycle the burners 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 of 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.

11. OPERATING INSTRUCTIONS – TYPICAL

FOR YOUR SAFETY READ BEFORE LIGHTING

WARNING: If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury, or loss of life.

A. This appliance is equipped with an ignition device which automatically lights the main pilots. Do not try to light the pilots by hand.

B. BEFORE OPERATING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

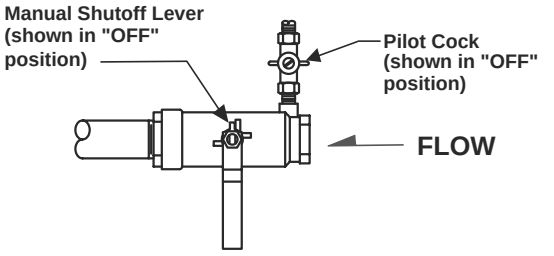
WHAT TO DO IF YOU SMELL GAS
- Do not try to light any appliance
- Do not touch any electric switch; do not use any phone in your building
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, don't try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.

D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

OPERATING INSTRUCTIONS

1. STOP! Read the safety information above on this label.
2. Set the thermostat or operating control to lowest setting.
3. Turn off all electric power to the appliance.
4. This appliance is equipped with an ignition device which automatically lights the pilot. Do not try to light the pilots by hand.
5. If the gas control assembly is not visible, remove control access panel.
6. If the manual shutoff lever(s) and pilot cock are not in the "OFF" position, turn both clockwise ↷ to "OFF".



7. Wait five (5) minutes to clear out any gas, then smell for gas, including near the floor. If you smell gas STOP! Follow "B" in the safety information above on this label. If you don't smell gas, go to the next step.
8. Turn the pilot cock and the manual shutoff lever counterclockwise ↶ to "ON".
9. Replace pilot access panel, if applicable.
10. Replace control access panel, if applicable.
11. Turn on all electric power to the appliance. Manually reset open limits and burner primary control. For boilers equipped with a Peerless Control Panel, place panel switches to "ON". Alarm may activate (if used). If so, switch alarm silencing switch.
12. Set thermostat or operating control to desired setting.
13. If the appliance will not operate, follow the instructions "To Turn Off Gas To Appliance" and call your service technician, or gas supplier.

TO TURN OFF GAS TO APPLIANCE

1. Set the thermostat or operating control to lowest setting.
2. Turn off all electric power to the appliance if service is to be performed.
3. If the gas control assembly is not visible, remove the control access panel.
4. Turn the pilot cock and the manual shutoff lever clockwise ↷ to "OFF".
5. Replace control access panel, if applicable.

V88A SPARK ONLY 9183R REV.2

Figure 11.1: Typical Operating Instructions - Spark Ignition Only (no Standing Pilots)

FOR YOUR SAFETY READ BEFORE LIGHTING

WARNING: If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury, or loss of life.

A. This appliance is equipped with standing pilot(s) which must be lighted by hand, and may also be equipped with an ignition device which automatically lights intermittent pilot(s). Light only the standing pilot(s) by hand following these instructions exactly.

B. BEFORE OPERATING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

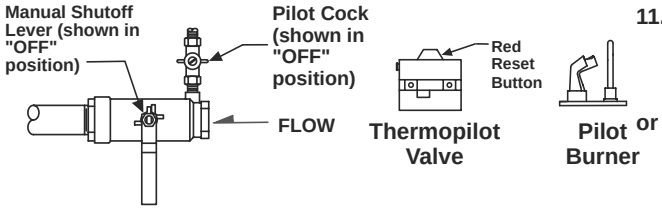
WHAT TO DO IF YOU SMELL GAS
- Do not try to light any appliance
- Do not touch any electric switch; do not use any phone in your building
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, don't try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.

D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

LIGHTING INSTRUCTIONS

1. STOP! Read the safety information above on this label.
2. Set thermostat or operating control to lowest setting.
3. Turn off all electric power to the appliance.
4. If the gas control assembly is not visible, remove control access panel.
5. If the manual shutoff lever(s) and pilot cock are not in the "OFF" position, turn both clockwise ↷ to "OFF".



6. Wait five (5) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas STOP! Follow "B" in the safety information above on this label. If you don't smell gas, go to the next step.
7. Remove the pilot access panel, if supplied, located below and behind the gas valve directly above burner tubes.
8. Find standing pilot(s) by following thermocouple from each thermopilot valve.
   Note - Boiler may also be equipped with intermittent pilot(s) that are not to be lighted by hand.
9. Turn the pilot cock handle counterclockwise ↶ to "ON".
10. Push in red reset button on right hand pilot all the way and hold in. Immediately light the right hand pilot with a match. Continue to hold the reset button in for about one (1) minute after the pilot is lit. Release button and it will pop back up. Pilot should remain lit. If it goes out, repeat steps 5 through 10.
11. Repeat above lighting procedure for additional standing pilot(s).
    - If any button does not pop up when released, stop and immediately call your service technician or gas supplier.
    - If the pilots will not stay lit after several tries, turn the pilot cock handle to "OFF" and call your service technician or gas supplier.
12. Replace pilot access panel, if applicable.
13. Turn manual shutoff lever counterclockwise ↶ to "ON".
14. Replace control access panel, if applicable.
15. Turn on all electric power to the appliance. Manually reset open limits and burner primary control. For boilers equipped with a Peerless Control Panel, place all panel switches to "ON". Alarm may activate (if used). If so, switch alarm silencing switch.

TO TURN OFF GAS TO APPLIANCE

1. Set the thermostat or operating control to lowest setting.
2. Turn off all electric power to the appliance if service is to be performed.
3. If the gas control assembly is not visible, remove the control access panel.
4. Turn the gas pilot cock and manual shutoff lever clockwise ↷ to "OFF".
5. Replace control access panel, if applicable.

9345 REV1

Figure 11.2: Typical Lighting and Operating Instructions - Models with Both Spark Ignited and Standing Pilots

12. OPERATION & 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:

Precautionary Measures:
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.

First Aid Procedures:
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 boiler per the Operating/Lighting Instructions shipped with the boiler.
2. Prove the correct operation of all controls on the boiler as outlined below.
3. Check the operation of the ignition and flame proving controls:)
   - With the boiler operating, close the Pilot manual shutoff valve.
   - The ignition control should close the main gas valves within 1 second.
   - For E*-E ignition systems, the RM7890 will need to be reset. Follow instructions provided with the control.
   - Open the Pilot manual shut-off valve and re-start the boiler per the Lighting Instructions. (Standing pilots will have to be manually re-lit per the Lighting Instructions.)
4. Check the manifold gas pressure and use a soap suds mixture to check the gas tightness of all gas joints.
5. Test the limit and operating controls to assure they are operating correctly.
6. Inspect and test all low water cut-offs. (Float type controls must be flushed (blown down) weekly to remove any sediment from the float chamber.)
7. Test the pop safety relief valve(s) using the procedure given by the valve manufacturer on the valve tag.
8. Visually inspect the burner and pilot flames.
   a. See Figure 12.1.
   b. The flame inner cone should be about 1-1/2" (4 cm) high and should have a very sharp, blue color characteristic.
   c. Poor flame conditions can be caused by dirty burners, obstructed orifices, or incorrect gas pressure.

B. TO SHUT DOWN THE BOILER

1. Open main line power disconnect switch to boiler.
2. Close Main and Pilot gas shut-off valves.
3. 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. Remove the fuses or secure the switch so that the power cannot be turned on accidentally.
   c. Do not use ethylene glycol antifreeze in a steam boiler or system.
   d. 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.

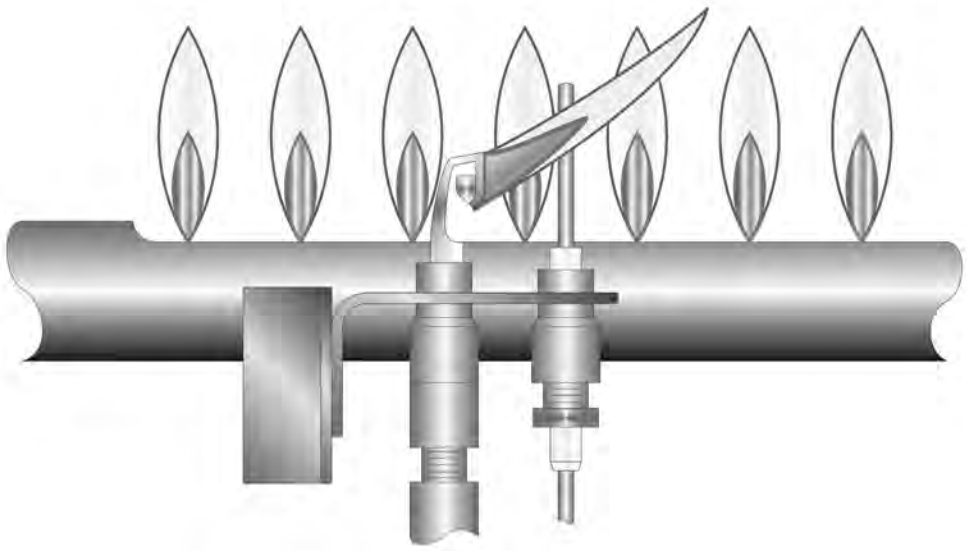


Figure 12.1: Pilot and Burner Flames

C. ANNUAL MAINTENANCE

1. **Before the start of each heating season**, inspect and make all necessary adjustments to insure proper boiler operation. Use the maintenance and inspection procedures following.

⚠ CAUTION

Before servicing the boiler:

- **Turn off all electrical power to the boiler.**
- **Close the Gas Service 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.**

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 burners for cleanliness. If cleaning is required, use the following procedure.
   a. Turn off all electrical power to the boiler.
   b. Remove top jacket panels, draft hood, flue collector and draft diverter plate(s).
   c. Remove side cleanout panels.
   d. Brush the boiler tube spaces both horizontally (through cleanout openings on ends) and vertically (from top of boiler).
   e. Replace the flue collector, draft hood, jacket, draft diverter plate(s) and cleanout panels using the procedures given in this manual.
   f. Remove the burners and brush the gas ports lightly with a soft bristle brush.

5. Inspect the boiler base and insulation.

6. 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.

7. When placing boiler into operation, follow Lighting Instructions shipped with the boiler and the instructions in this Chapter.

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

D. MONTHLY MAINTENANCE

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

2. Inspect the boiler and system for any signs of leakage or excessive make-up water usage.

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

E. WEEKLY MAINTENANCE

1. Blow down the float type low water cut-offs and test for correct operation.

F. DAILY MAINTENANCE

1. Inspect the boiler area to make sure the area is free from combustible or flammable materials and that there are no 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.

G. AUTOMATIC SAFETY SHUTOFF VALVE LEAKAGE TESTS

1. Installations subject to ASME CSD-1, Controls and Safety Devices for Automatically Fired Boilers, are required to perform leakage tests periodically on the automatic safety shutoff valves. CSD-1 recommends performing leakage tests annually.
2. Shut off electricity to boiler.
3. See Figure 12.2 for component locations referenced during these tests.
4. Disconnect wires at downstream automatic saftey shutoff valve (A2). Isolate wires to prevent possible shock hazard.
5. Close both manual shutoff valves (M1, M2).
6. Test upstream automatic safety shutoff valve (A1).
   a. Connect manometer or pressure gauge to inlet pilot tapping (P2) on downstream automatic safety shutoff valve.
   b. Open upstream manual shutoff valve (M1).
   c. If pressure rises with boiler de-energized, perform more detailed leakage test shown in Honeywell gas valve installation manual.
7. Test downstream automatic safety shutoff valve (A2).
   a. Close both manual shutoff valves (M1, M2).
   b. Connect manometer or pressure gauge to pilot tapping (P3) on downstream manual valve. If gas train includes pressure switches, plug will be in piping between manual valve (M2) and pressure switch.
   c. Energize boiler, with power to downstream automatic shutoff valve (A2) still disconnected.
   d. Verify that pilot(s) ignite and remain lit. Upstream shutoff valve (A1) must be energized during this test.
   e. If pressure rises during this test, perform more detailed leakage test shown in Honeywell gas valve installation manual.

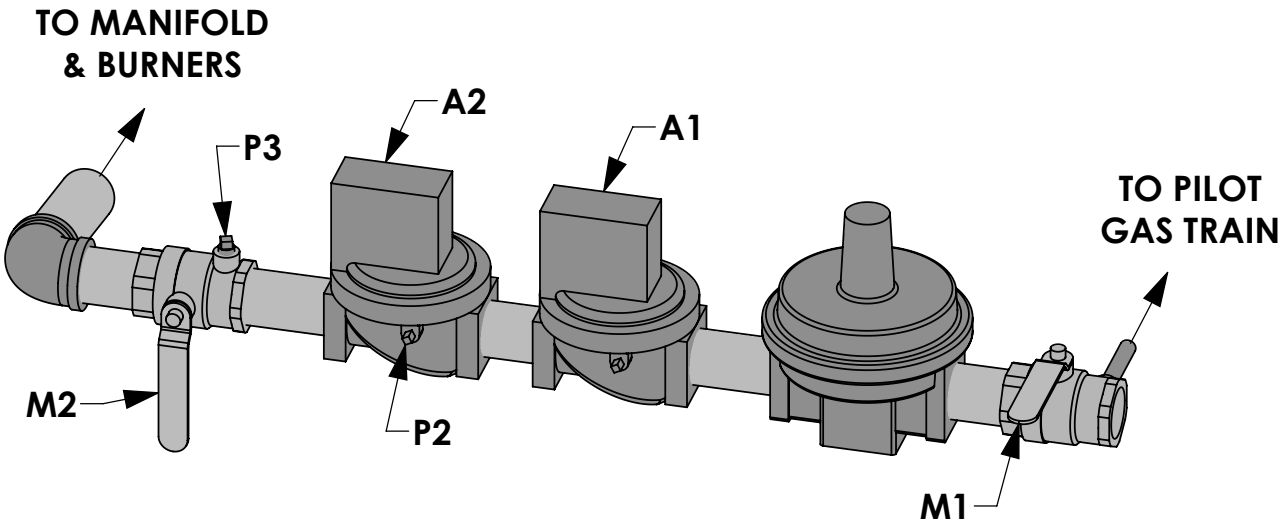


Figure 12.2: Automatic Safety Shutoff Valve Leakage Test

13. TROUBLESHOOTING – SERVICE TIPS

Problem	Possible Cause	Suggested Remedy
Pilot Outage (Units with Standing Pilots)	Defective Thermocouple	Replace
	Heavy Draft Blowing across Pilot	Redirect Air Movement or Eliminate
	Plugged Pilot Orifice	Replace Orifice
	No Gas	Check Manual Pilot Valve Check Main Gas Shut-Off Valve Check Manual Meter Valve Consult Gas Company
	Defective Thermopilot Valve	Replace
	Defective Ignition Control	Replace
Main Gas Valve Will Not Open	No Power	Check Power Source with Meter Check Fuses
	Defective Gas Valve	Replace
	RM7890A Locked Out on Safety (E*-E only)	Check for Pilot Outage
	Pilot Out (Units w/ Standing Pilots)	Relight Pilot (May have defective valve, relay or plugged orifice)
	Defective Thermocouple (Units w/ Standing Pilots)	Replace
	Low Water Level in Boiler or System Causing Low Water Cut-off to Function	Check for Leaks Check Feeder (if Supplied)
	Defective Thermopilot Valve (Units w/ Standing Pilots)	Replace
	Defective Ignition Control	Replace
	High Gas Pressure Switch Open (if Provided)	Check Switch Setting Check Manifold Gas Pressure
	Low Gas Pressure Switch Open (if Provided)	Check Switch Setting Check Manifold Gas Pressure
Burner(s) Burning with Yellow Flame	Air Adjustment Screws Turned in Too Far	Adjust Screws Out
	Low Gas Pressure in Manifold (Insufficient Air Injection)	Adjust Main Gas Pressure Regulator or Check Line Pressure
	Burner Ports Partially Closed (Rust, Dirt, Lint, etc.)	Replace Burners or Clean Ports
	Insufficient Air for Combustion	Check Size of Combustion Air Openings to Room, if Undersized, Correct as Required Check for Negative Pressure in Boiler Room
	Oversized Burner Orifice	Install Correct Orifice
	High Gas Pressure in Manifold	Adjust Main Gas Pressure Regulator
Gas Spillage from Draft Hood Relief Opening	Insufficient Draft – Chimney Too Low	Increase Height or Add Induced Draft Fan
	Insufficient Draft – Chimney Too Small	Replace Chimney or Add Induced Draft Fan
	Insufficient Draft – Blockage in Chimney or Vent	Repair Chimney or Vent
	Insufficient Draft – Downdraft Caused by Chimney Location with Respect to Other Buildings, Roofs, etc.	Install Chimney Cap
	Negative Pressure in Boiler Room (Due to Exhaust Fan or Duct System)	Remove Exhaust Fan or Isolate Fan From Boiler Room
	Insufficient Combustion Air Openings	Provide Correctly Sized Combustion and Ventilation Air Openings

Problem	Possible Cause	Suggested Remedy
Main Gas Valve Opens But No Gas Flows	Manual Valve Closed at Gas Train	Open Valve
	Manual Valve Closed at Meter	Open Valve
	Test Firing Valve Closed (if Provided)	Open Valve
Water Hammer On Start-Up	Sags in Steam Piping or not enough Pitch	Correct Piping Condition
	Concentric reducers causing condensate pooling	Correct Piping
	Drip trap failed closed	Replace Trap or Trap Element
	Dry returns wetted due to new boiler water line higher than old boiler	Correct Piping or Install Feed System and Traps
	No drip line on the back side of a back-pitched motorized valve	Install Drip Line and Trap
Water Hammer During Mid-Cycle	Clogged returns on gravity system	Clean or Re-Pipe Return Line(s)
	Incorrect near-boiler piping causing wet steam to system	Correct Piping per Manual
	Trap failed open, allowing steam to enter returns	Replace Trap or Trap Element
	{Radiator Hammer} Large radiator may be vented too quickly	Use smaller Air Vent or Use Two Small Vents in Place of One Large Vent, One Mounted Higher than the Other
	Long nipple at Hartford Loop	Replace with Close Nipple
	Water leg or back slope in return line to receiver tank, causing water pocketing	Correct Piping
	Trap installed at receiver tank, causing water trapping in return	Remove Trap at Tank, Installing Drip Traps and Radiator Traps where Required
	Boiler feed pump or condensate pump feed rate too fast, causing spraying into equalizer	Throttle Flow Rate
	No drip on the inlet side of a forward pitched motorized valve	Add Drip Line and Trap
	Uninsulated steam piping, causing excessive condensate loads	Insulate Steam Pipes
Water Hammer on Shut-Down	Close nipple on Hartford too high	Repipe 2” to 4” (5cm to 10cm) Below Water Line
	Uninsulated steam piping in boiler room, but system piping insulated, causing vacuum condition on shut-down	Insulate Steam Pipes
Hammering in the Boiler	Poor circulation in the boiler due to sludge accumulation	Clean and Blowdown the Boiler
No Heat or Poor Heat Distribution in the Building	Main vents not working	Replace Main Vents, Repiping away from End of Lines if Needed
	Drip Traps failed closed	Replace Traps or Trap Elements
	Radiator traps failed open, allowing pressurization of the returns	Replace Traps or Trap Elements
	Water legs or back slope in return lines to receiver tank, preventing air from venting out receiver vent	Correct Piping
	Boiler pressure too high, causing air vents to lock up or blowing water loop seals	Reduce Operating Pressure
System or Boiler Overfilling or Flooding	New boiler water content smaller than old boiler	Install Boiler Feed System with Receiver Tank Large enough for Condensate
	Boiler water feed rate or pump rate too fast causing water level to collapse (due to collapse of steam bubbles in boiler water)	Reduce Feed Rate
	Foaming, priming or surging due to poor water quality	Clean the Boiler
Excessive Water Level Bounce	Poor water quality, causing foaming and surging	Clean the Boiler
	Incorrect near-boiler piping, such as undersized or incorrectly placed risers	Pipe per Manual
	Boiler water feed rate or pump rate too fast	Reduce Feed Rate
Rapid Cycling	Air vents or traps not venting air, preventing steam from getting to radiation and pressurizing the air pocket	Replace Vents or Traps
	Pressure differential on pressure control too close	Adjust Control Differential
	Nuisance outages of water level control due to boiler water level bounce	See Excessive Water Level Bounce Above

14. BOILER RATINGS & DIMENSIONS

Table 14.1a: Boiler Rating Information - Natural Gas

Series 211A™												
Boiler Model Number	Natural Gas Ratings										Efficiency	
	Input		Output		AHRI Net Ratings				Steam Piping Factor	Boiler H.P.	Thermal	CMB
					Steam EDR		Steam					
	MBH	kW	MBH	kW	Sq. Ft.	m²	MBH	kW			%	%
211A-05	840	246	664	195	2,075	193	498	146	1.333	19.9	79.0	80.0
211A-06	1,050	308	830	243	2,596	241	623	183	1.332	24.9	79.0	80.0
211A-07	1,260	369	995	292	3,108	289	746	219	1.334	29.8	79.0	80.0
211A-08	1,470	431	1,161	340	3,629	337	871	255	1.333	34.7	79.0	80.0
211A-09	1,680	492	1,327	389	4,146	385	995	292	1.334	39.7	79.0	80.0
211A-10	1,890	554	1,493	438	4,667	434	1,120	328	1.333	44.6	79.0	80.0
211A-11	2,100	615	1,659	486	5,183	482	1,244	365	1.334	49.6	79.0	80.0
211A-12	2,310	677	1,825	535	5,704	530	1,369	401	1.333	54.5	79.0	80.0

Table 14.1b: Boiler Rating Information - LP Gas

Series 211A™												
Boiler Model Number	LP Gas Ratings (2500 Btu/cu. Ft.; 93,000 kj/m³)										Efficiency	
	Input		Output		AHRI Net Ratings				Steam Piping Factor	Boiler H.P.	Thermal	CMB
					Steam EDR		Steam					
	MBH	kW	MBH	kW	Sq. Ft.	m²	MBH	kW			%	%
211A-05	820	240	648	190	2,025	188	486	142	1.333	19.3	79.0	80.0
211A-06	1,025	300	810	237	2,533	235	608	178	1.332	24.2	79.0	80.0
211A-07	1,230	360	972	285	3,038	282	729	214	1.333	29.1	79.0	80.0
211A-08	1,435	421	1,134	332	3,546	329	851	249	1.333	35.2	79.0	80.0
211A-09	1,640	481	1,296	380	4,050	376	972	285	1.333	38.7	79.0	80.0
211A-10	1,845	541	1,458	427	4,558	423	1,094	321	1.333	43.6	79.0	80.0
211A-11	2,050	601	1,620	475	5,063	470	1,215	356	1.333	48.9	79.0	80.0
211A-12	2,255	661	1,781	522	5,567	517	1,336	392	1.333	53.3	79.0	80.0

TAPPING SCHEDULE	
T1	6" NPT END SUPPLY RISER TAPS, ONE EACH END SECTION
T2	6" NPT END RETURN TAPS, ONE EACH END SECTION
T3	3" NPT TAP, TOP, ONE EACH END SECTION
T4	3/4" NPT TAP, ONE EACH END SECTION
T5	1/2" NPT TAP, TWO EACH END SECTION
T6	1" NPT TAP, ONE EACH END SECTION
T7	1" NPT TAP, ONE EACH END SECTION
T8	3/4" NPT TAP, ONE EACH END SECTION, FOR PROBE LWCO
T9	1-1/2" NPT TAP, ONE AT LOWER REAR OF BOILER, EACH END SECTION, BLOWDOWN

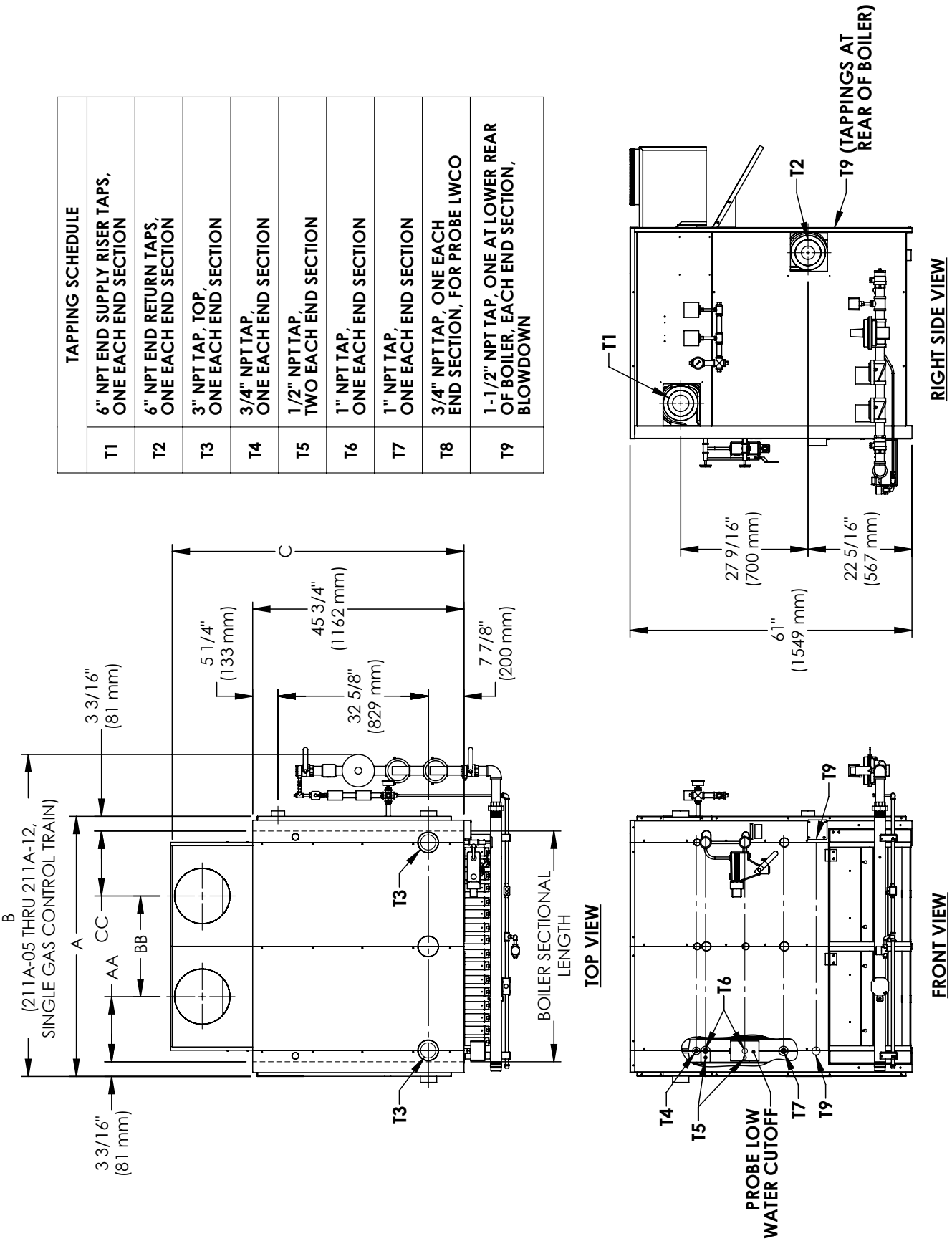


Figure 14.1: Boiler Dimensions

Table 14.2: Boiler Dimensions

Series 211A™ Steam Boiler Dimensions								
Boiler Model Number	Length & Width Dimensions						Boiler Section Length	
	A		B		C			
	inch	mm	inch	mm	inch	mm	inch	mm
211A-05	33-3/4	857	44	1,118	63	160	27-3/8	695
211A-06	39-3/8	1,000	50-1/4	1,276	65	165	33	838
211A-07	45	1,143	55-7/8	1,419	63	160	38-5/8	981
211A-08	50-5/8	1,286	61-3/4	1,568	63	160	44-1/4	1,124
211A-09	56-1/4	1,429	67-5/8	1,718	63	160	49-7/8	1,267
211A-10	61-7/8	1,572	73-1/4	1,861	65	165	55-1/2	1,410
211A-11	67-1/2	1,715	80-3/4	2,051	65	165	61-1/8	1,553
211A-12	73-1/8	1,857	86-3/8	2,194	63	160	66-3/4	1,695

Table 14.3: Flue Collector Center Lines

Series 211A™ Steam Boiler Dimensions													
Boiler Model Number	Flue Connection Centerline Dimensions						Flue Connections			Vent Connector Diameter		Chimney Diameter x 20ft (6m) high	
	AA		BB		CC		No.	Size					
	inch	mm	inch	mm	inch	mm		inch	mm	inch	mm	inch	mm
211A-05	13-3/4	349	—	—	—	—	1	12	305	12	305	12	305
211A-06	16-1/2	419	—	—	—	—	1	14	356	14	356	14	356
211A-07	10-7/8	276	16-7/8	429	—	—	2	12	305	14	356	14	356
211A-08	13-3/4	349	19-5/8	498	—	—	2	12	305	15	381	15	381
211A-09	13-3/4	349	22-1/2	572	—	—	2	12	305	16	406	16	406
211A-10	13-1/2	419	25-3/8	645	—	—	2	14	356	17	432	17	432
211A-11	16-1/2	419	28-1/8	714	—	—	2	14	356	18	457	18	457
211A-12	13-3/4	349	22-1/2	572	19-5/8	498	3	12	305	18	457	18	457

15. REPAIR PARTS – SERIES 211A™

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.

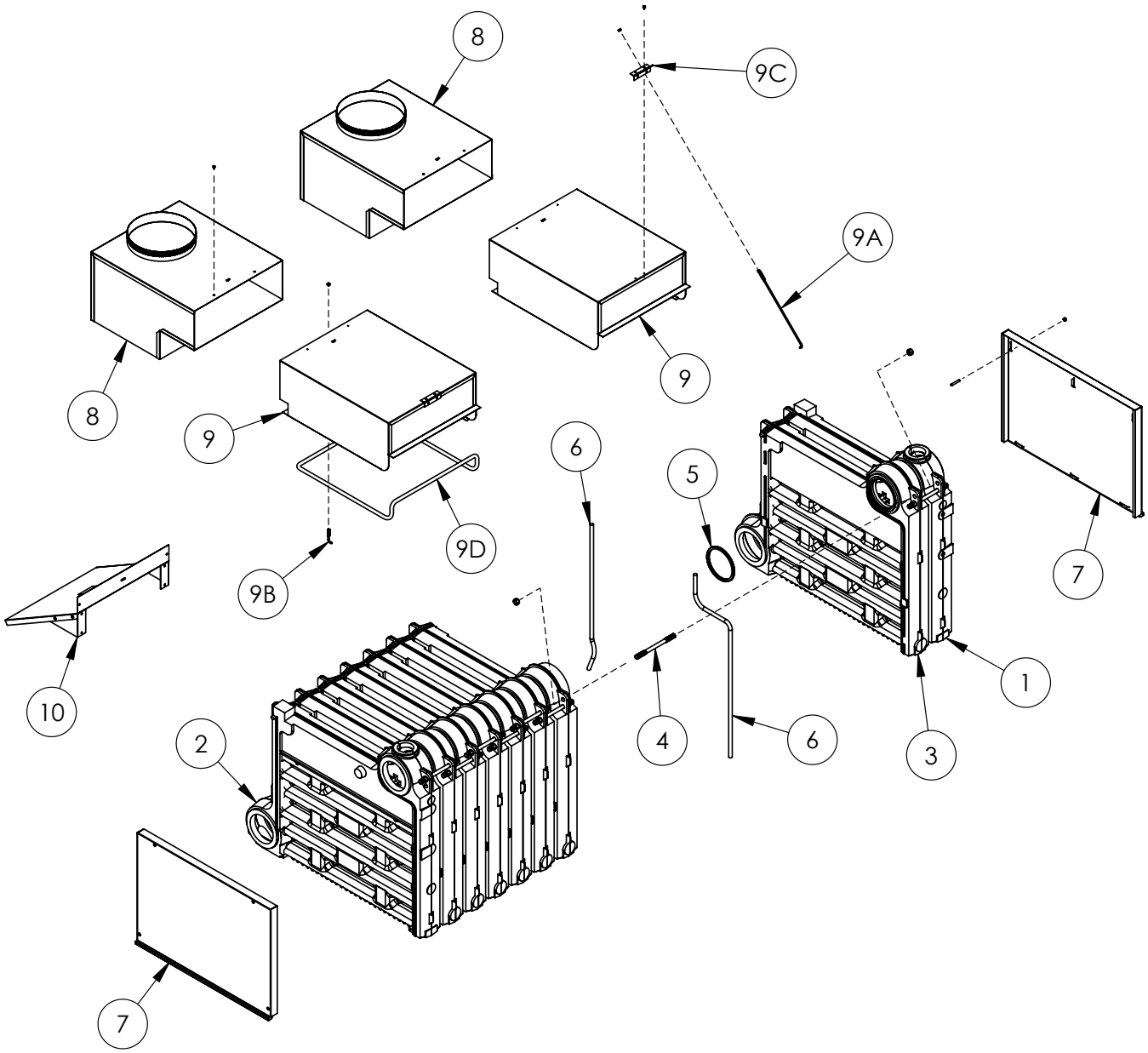


Figure 15.1: Block/Flue Collector/Draft Hood Repair Parts

Table 15.1: Block/Flue Collector/Draft Hood Repair Parts

	Description	Quantity Required	Stock Code
1	Right Hand End Section (50 psi)	—	GG1060
2	Left Hand End Section (50 psi)	—	GG1059
3	Plain Intermediate Section (50 psi)	—	GG1057
4	Tie Rod	2 per Flueway	90090
5	Flow Port Gasket	2 per Flueway	51670
6	High Temperature Rope, Diameter 5/8” (16 mm) – 6-1/2’ Length per Flueway	—	55723
7	Cleanout Cover Plate with Insulation (set of 2)	1	90489
8	Draft Hood – Box 13 with 12” Dia. Outlet (For Flue Collector 5000)[1]	—	90399
	Draft Hood – Box 13A with 12” Dia. Outlet (For Flue Collector 5000-1)[1]	—	90400
	Draft Hood – Box 13B with 14” Dia. Outlet (For Flue Collector 5000-1)[1]	—	90401
	Draft Hood – Box 13A with 14” Dia. Outlet (For Flue Collector 5000-2)[1]	—	90402
9	Flue Collector – Box 14 – GG-5000 (Includes Items 10A, 10B, 10C, 10D)[2]	—	90557
	Flue Collector – Box 14A – GG-5000-1 (Includes Items 10A, 10B, 10C, 10D)[2]	—	90558
	Flue Collector – Box 14B – GG-5000-2 (Includes Items 10A, 10B, 10C, 10D)[2]	—	90559
9A	Front Flue Collector Hook Bolt (1 per Flue Collector)	1	GG5003
9B	Rear Flue Collector Hook Bolt (1 per Flue Collector)	1	GG5004
9C	Flue Collector Mounting Bracket (1 per Flue Collector)	1	GG5005
9D	High Temperature Rope, Diameter 5/8” (16 mm)- 10’ Length per Flue Collector	—	55723
10	Down Draft Diverter Plate - Box 18 - GG-5017 (Includes Item 11A)[3]	1	90579
	Down Draft Diverter Plate - Box 18A - GG-5017-1 (Includes Item 11A)[3]	1	90580
	Down Draft Diverter Plate - Box 18B - GG-5017-2 (Includes Item 11A)[3]	1	90581
10A	#10 x 1/2" (13 mm) Long Sheet Metal Screws (local hardware supply)	9	—

1 See IOM Instructions Table 6.2 for Draft Hood Location Layout.
2 See IOM Instructions Table 4.1 for Flue Collector Location Layout.
3 See IOM Instructions Table 6.3 for Down Draft Diverter Plate Location Layout

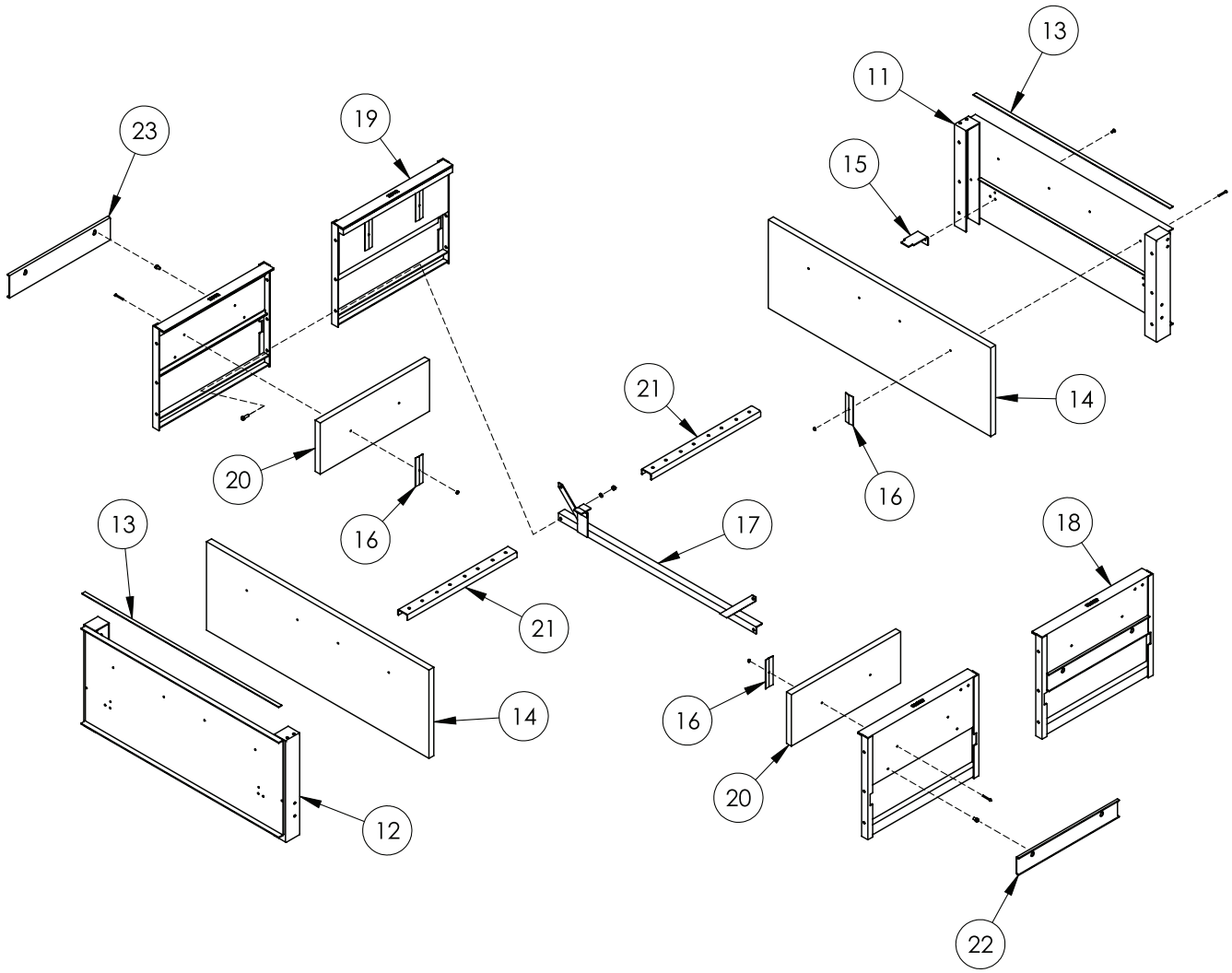


Figure 15.2: Base Assembly Repair Parts

Table 15.2: Base Assembly Repair Parts

	Description	Quantity Required	Stock Code
11	Base Right End Panel w/ Insulation (Includes Item #13, #14, #15 & #16)	—	90737
12	Base Left End Panel w/ Insulation (Includes Item #13, #14, #15 & #16)	—	90738
13	Ceramic Knitted Tape- 1/16 x 1" x 40"	—	99
14	Base End Panel Insulation Kit (Includes 2 Insulation Pieces, #14, #16 & Hardware)	—	90333
15	Burner Support Clip	—	90590
16	Insulation Fastener	—	GG2104
17	Angle Tie Brace Assembly	—	90326
18	Base Front Panel Assembly (includes #16, #20 & #22) – 22-1/2" Wide : 211A-05, -09, -10[4]	—	91800
	Base Front Panel Assembly (includes #16, #20 & #22) – 28-1/8" Wide: 211A-06, -10, -11, -12[4]	—	91801
	Base Front Panel Assembly (includes #16, #20 & #22) – 33-3/4" Wide: 211A-07, -12[4]	—	91802
	Base Front Panel Assembly includes #16, #20 & #22) – 39-3/8" Wide: 211A-08[4]	—	91803
19	Base Back Panel Assembly (includes #16, #20 & #23) – 22-1/2" Wide: 211A-05, -09, -10[4]	—	91804
	Base Back Panel Assembly (includes #16, #20 & #23) – 28-1/8" Wide: 211A-06, -10, -11, -12[4]	—	91805
	Base Back Panel Assembly (includes #16, #20 & #23) – 33-3/4" Wide: 211A-07, -12[4]	—	91806
	Base Back Panel Assembly (includes #16, #20 & #23) – 39-3/8" Wide: 211A-08[4]	—	91807
20	Base Panel Insulation (includes Front & Back) – for 22-1/2" Wide: 211A-05, -09, -10[4]	—	90329
	Base Panel Insulation (includes Front & Back) – for 28-1/8" Wide: 211A-06, -10, -11, -12[4]	—	90330
	Base Panel Insulation (includes Front & Back) – for 33-3/4" Wide: 211A-07, -12[4]	—	90331
	Base Panel Insulation (includes Front & Back) – for 39-3/8" Wide: 211A-08[4]	—	90332
21	Burner Support Channel – for 22-1/2" Wide: 211A-05, -09, -10[4]	—	90586
	Burner Support Channel – for 28-1/8" Wide: 211A-06, -10, -11, -12[4]	—	90587
	Burner Support Channel – for 33-3/4" Wide: 211A-07, -12[4]	—	90588
	Burner Support Channel – for 39-3/8" Wide: 211A-08[4]	—	90589
22	Base Front Panel Cover Plate – for 22-1/2" Wide: 211A-05, -09, -10[4]	—	90318
	Base Front Panel Cover Plate – for 28-1/8" Wide: 211A-06, -10, -11, -12[4]	—	90320
	Base Front Panel Cover Plate – for 33-3/4" Wide: 211A-07, -12[4]	—	90322
	Base Front Panel Cover Plate – for 39-3/8" Wide: 211A-08[4]	—	90324
23	Base Back Panel Cover Plate – for 22-1/2" Wide: 211A-05, -09, -10[4]	—	90319
	Base Back Panel Cover Plate – for 28-1/8" Wide: 211A-06, -10, -11, -12[4]	—	90321
	Base Back Panel Cover Plate – for 33-3/4" Wide: 211A-07, -12[4]	—	90323
	Base Back Panel Cover Plate – for 39-3/8" Wide: 211A-08[4]	—	90325

4 - See IOM Figure 2.1 and Table 2.2 for Base Assembly

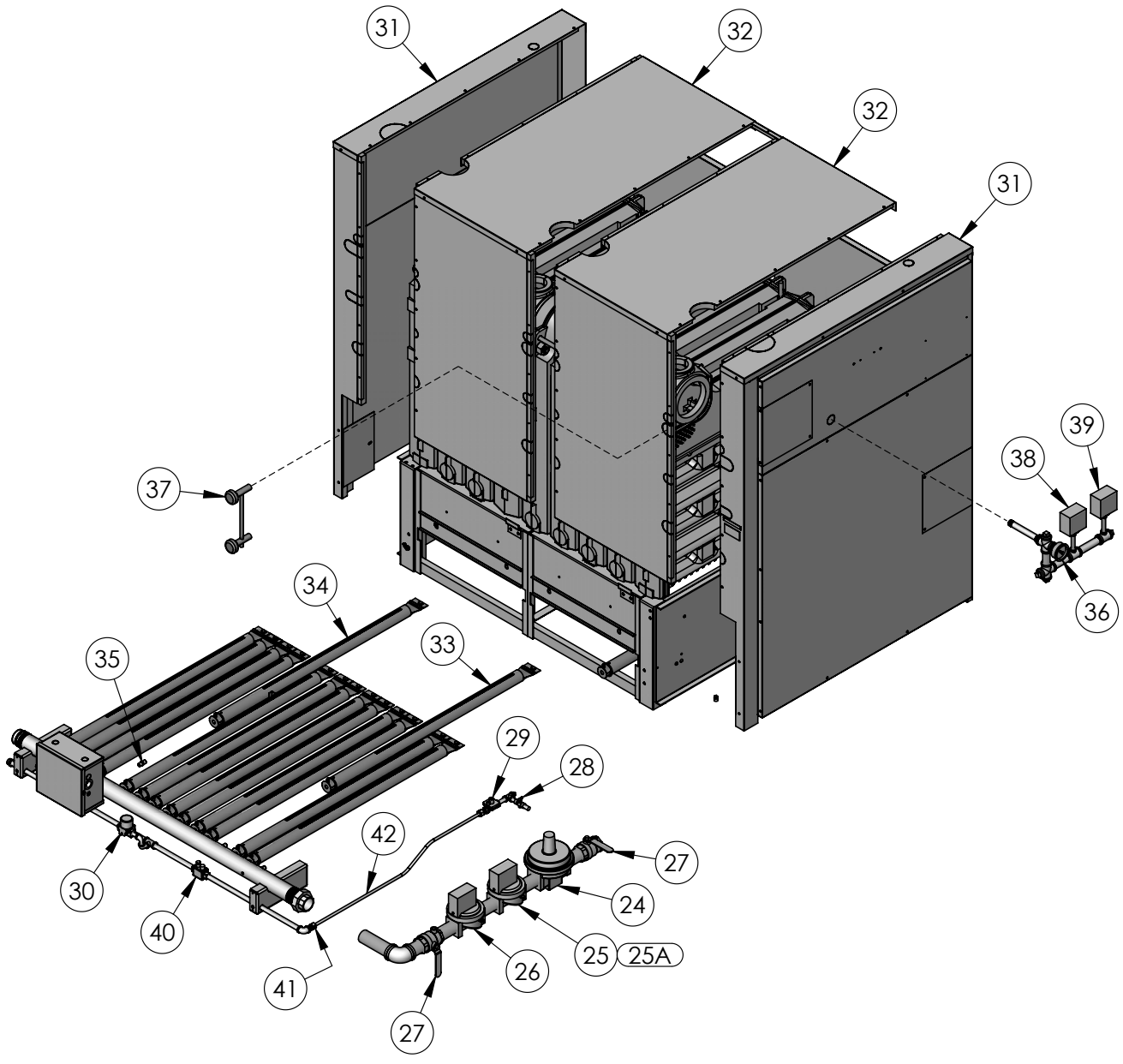


Figure 15.3: Jacket/Burner/Gas Manifold Repair Parts

Table 15.3: Typical Jacket/Burner/Gas Manifold Repair Parts

	Description	Quantity Required	Stock Code
24	Gas Pressure Regulator – 1” RV61 (Cad. Spring 3-6” w.c. Nat. Gas)	—	50645
	Gas Pressure Regulator – 1-1/4” RV81 (Cad. Spring 3-6” w.c. Nat. Gas)	—	50647
	Gas Pressure Regulator – 1-1/2” RV81 (Cad. Spring 3-6” w.c. Nat. Gas)	—	50646
	Gas Pressure Regulator – 2” RV91 (Cad. Spring 3-6” w.c. Nat. Gas)	—	50648
	Gas Pressure Regulator – 2-1/2” RV111 (Cad. Spring 3-6” w.c. Nat. Gas)	—	50642
25-26	Gas Safety Valve – 1” V48A2169 – Diaphragm-Type 120 VAC	—	50598
	Gas Safety Valve – 1-1/4” V48A2177 – Diaphragm-Type 120 VAC	—	50599
	Gas Safety Valve – 1-1/2” V48A2185 – Diaphragm-Type 120 VAC	—	50600
	Gas Safety Valve – 2” V48A2243 – Diaphragm-Type 120 VAC	—	50601
	Gas Safety Valve – 2-1/2” V48A2250 – Diaphragm-Type 120 VAC	—	50602
	Gas Safety Valve – 2-1/2” S261SH02N3KK4 – Solenoid-Type 120 VAC (When Used)	—	51025
25A	Bleed Restrictor for V48A Diaphragm Gas Valve – 126590	—	50631
27	Manual Gas Valve – 1” 50-GB5-A1	—	51703
	Manual Gas Valve – 1-1/4” 50-GB6-A1	—	51704
	Manual Gas Valve – 1-1/2” 50-GB7-A1	—	51705
	Manual Gas Valve – 2” 50-GB8-A1	—	51706
28	Manual Gas Valve – Pilot – 1/4” NPT 94MBV03	—	50559
29	Pilot Gas Regulator – 1/4” NPT RV20L (2-5” w.c. Nat. Gas)	—	50643
30	Pilot Gas Valve – 1/4” NPT H91BA-3 120 VAC - E*-E Ignition	—	50753
31	Common End Panel and Cleanout Cover Plate Assembly – Carton No. 12	—	90528
32	Intermediate Panel Jacket Assembly – Carton 12B – 211A-05, -09, -10[5]	—	90284
	Intermediate Panel Jacket Assembly – Carton 12C – 211A-06, -10, -11, -12[5]	—	90285
	Intermediate Panel Jacket Assembly – Carton 12D – 211A-07, -12[5]	—	90286
	Intermediate Panel Jacket Assembly – Carton 12E – 211A-08[5]	—	90287
33	Steel Burner	—	51045
34	Steel Burner w/ Pilot Mounting Clip	—	51046
35	Gas Orifice Spud – Natural Gas/0-2000 Feet Above MSL Altitude	—	51730
	Gas Orifice Spud – LP Gas/0-3000 Feet Above MSL Altitude	—	X4003-33LP
	Gas Orifice Spud – High Altitude (Specify Altitude & Fuel)	—	Call Factory
36	Steam Gauge – 30 psig	—	51769
37	Gauge Glass Set	—	50513
38	Operating Control – PA404A1009 Auto Reset (Standard)	—	50549
	Operating Control – L404F1060 Auto Reset (Optional)	—	50680
39	High Limit – L4079B1033 – Manual Reset	—	50681
40	Thermo Pilot Valve – 3/8” NPT H17CA-1 (where used)	—	50752
41	3/8” O.D. x 1/4” NPT Adapter	—	53
42	3/8” O.D. Aluminum Tubing	—	719

5 - See IOM Table 6.1 for Jacket Carton Contents

Table 15.4: Typical Ignition System Repair Parts

	Description	Stock Code
E*-E Ignition System		
–	Ignition Control - Honeywell RM7890A2056	50175
–	Ignition Control Sub-base - Honeywell Q7800B2003	50166
–	Ignition Control Amplifier - Honeywell R7847A1033	90807
–	Ignition Transformer - Allanson 1092F	51299
–	Pilot - Baso J992LYW-PB1C - Natural Gas (use with 51037 on LP)	51032
–	Pilot Orifice - Honeywell 388146KD - LP Gas	51051
–	Standing Pilot - Honeywell Q327A1626 - Natural Gas (where used)	50677
–	Standing Pilot - Honeywell Q327A1147 - LP Gas (where used)	50557
–	Transformer - Johnson 100VA	51716
–	Transformer - RIB 40VA	50791

Series 211A™ REV2

Gas 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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